Technical Memorandum

To: Jenifer Willer, City Engineer, City of Eugene Date: September 25, 2025

From: Chris Clough, MFA and Merideth D'Andrea, RG, MFA Project No.: M0076.12.001

REGISTERED OREGON MERIDETH D'ANDREA G1979 GEOLOGIST

EXPIRES: 5/1/2026
This digital seal certifies the signatory and document content.

Re: Review of DEQ No Further Action Designations for the Riverfront Research Property (Tax Lot 1703322405300) and review of the open adjacent LUST #20-10-1128

Maul Foster & Alongi (MFA) has prepared this memorandum on behalf of the City of Eugene summarizing our review of regulatory agency records for Tax Lot 1703322405300 (the Property), including a screening of available historical data for the Property relative to current regulatory criteria for complete or potentially complete pathways and screening the currently open leaking underground storage tank (LUST) file #20-10-1128. Files provided by the Oregon Department of Environmental Quality (DEQ) for the P-A and P-B Parcels of the Property are included in Attachment A.

Background

According to the DEQ files, between 1984 and 2006 the University of Oregon completed investigation and cleanup activities at the Property under a voluntary cleanup program (VCP) agreement with DEQ (DEQ 2010). The portions of the Property that were assessed are known as P-A and P-B (see Figure). The P-A property was then subdivided into the upland portion and the riverbank portions for decision-making during the assessment and cleanup activities. In 2001, the P-B portion of the Property was issued a no further action (NFA) determination (DEQ 2001). In October 2010, the P-A (Upland) Site was issued a conditional NFA determination (DEQ 2010). This NFA indicated that the upland portion of the Property was adequately assessed and that contamination in the soil and groundwater was known and concentrations were below applicable regulatory screening levels for complete pathways, with the exception of groundwater exposure for construction and excavation workers. The 2010 conditional NFA letter stated the following:

- Historical contamination was the result of petroleum products and byproducts of the adjacent manufactured gas plant (MGP) site impacting soil and groundwater at the Property.
- Impacted shallow soils were removed from the western portion of the Property, however, some residual contamination is present below screening levels for construction and excavation worker exposure.

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- Groundwater monitoring was completed at the Property, and results indicated that contamination is limited to the western portion of Parcel P-A. Groundwater contamination could pose a potential risk to future construction and excavation workers. However, no other complete pathways had screening level exceedances.
- The contamination exposure could be controlled through implementation of a Site Management Plan, to require safe work practices for future construction and excavation work.
- The Property owner would be required to have future construction or excavation work at the Property conform to the requirements of the Site Management Plan.
- The Property would continue to be listed in DEQ's inventory of confirmed release sites as long as residual contamination is present exceeding screening levels for complete exposure pathways or as long as institutional or engineering controls are required at the Property.

In October 2010, shortly after the P-A parcel had been issued the NFA, a 6,500-gallon LUST was discovered near the P-B parcel (PBS 2011). The LUST was discovered during installation of underground utilities in the area. The LUST was reported to DEQ and was decommissioned by removal on October 28, 2010. A total of approximately 66 tons of impacted soils were also removed for off-site disposal. Samples were collected from the soils left in place after tank excavation and a subsurface investigation was conducted in February 2011. PBS screened the collected analytical data against applicable exposure pathways and concluded that a NFA should be issued for the LUST file because all soil and groundwater samples were "significantly below all of the DEQ RBCs representing the potential exposure pathway scenarios for the current and likely future uses of the site" (PBS 2011). No GPS locations of the tank were reported and subsequent DEQ files were ambiguous as to the location of the former tank pit. Figures provided in reporting were not placed on an aerial and subsequent landmarks, such as fences and structures, are no longer available for accurate locating of the former tank pit. It is uncertain if this former LUST site is located within the portion of the P-B parcel that the City of Eugene intends to acquire from the University of Oregon.

In April 2015, a partial NFA was issued for the P-A (Riverbank) Site (DEQ 2015). The NFA determination letter indicated that additional ecological receptors were included in the assessment of residual contamination. This additional review was performed to ensure that no additional actions were required for the cleanup to be considered protective of the environment. The determination indicated that the remaining contamination was not a risk to surface water or riverbank sediment ecological receptors.

The DEQ files indicate that residual contamination is present on the Property, however, at the time of the NFA determinations in 2001, 2010, and 2015, the known contaminant was below applicable screening levels for site receptors (DEQ 2024). Deed restrictions requiring the use of a Site Management Plan (PBS 2009), and the presence of residual contamination are considered controlled recognized environmental conditions (CRECs) for the Property.

MFA's review of the Site Management Plan determined that while the plan addresses general soil management considerations and references exceedances of naphthalene and benzo(a)pyrene in the groundwater monitoring wells, it lacks specific information regarding the locations of soil exceedances.

Updated Risk-Based Screening of Analytical Data

MFA reviewed the DEQ provided documents cited in the partial NFA letter for Riverfront Research Park – Parcel P/A, Riverfront Portion (DEQ 2015) and the Environmental Investigations through August 1993 report (Squier Associated 1993). The results of this review determined that there were no sample locations on this portion of the Property and therefore an updated risk screening could not be conducted for the P-A riverbank.

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Additionally, after reviewing the 2001 NFA report for the P-B portion of the Property (DEQ 2001), MFA determined that there were no sample locations on the portion of the P-B parcel that the City intends to acquire from the University of Oregon. The previous NFA was inclusive of a larger P-B property, and sampling data was limited to the eastern segment of the P-B parcel, outside of the area that the City intends to acquire. Consequently, an updated risk screening could not be conducted for the P-B portion of the Property.

The only historical data available for review that was identified as within the Property, was limited to the P-A upland portion (See Figure 3 in Attachment B). Due to the ambiguity of the location of LUST #20-10-1128, MFA also reviewed the Site Investigation for the former diesel UST (PBS 2011).

Data collected during previous investigations conducted between 1984 and 2006 described in the 2010 conditional NFA and Draft Staff Report (DEQ 2009) and the data from the 2011 LUST investigation were compared to the following applicable DEQ risk-based concentrations (RBCs) (DEQ 2023) (i.e., screening criteria for complete or potentially complete pathways):

- Ingestion, dermal contact, and inhalation (soil direct contact) for occupational, construction, and excavation workers
- Volatilization to outdoor air for occupational receptors (soil and groundwater)
- Groundwater in excavation for construction and excavation workers (groundwater)

Volatilization to indoor air was excluded from this updated risk screening as the Property is currently undeveloped, future use is unlikely to include occupied buildings, and a future PPA is believed to restrict occupied buildings without additional investigation or soil vapor mitigation.

Updated Screening Results

P-A Upland Risk

The following is a summary of changes identified in the risk-screening for sampling locations on the P-A upland portion of the Property.

- Detected concentrations of polycyclic aromatic hydrocarbons (PAHs) from historical sample UO-WP-T5-2’ exceeded the direct-contact RBC for occupational workers for benzo(a)pyrene and dibenzo(a,h)anthracene (See Figure 5, Attachment B). This sample had previously exceeded the direct-contact RBC for construction workers.
- Detected concentrations of total petroleum hydrocarbons (TPH) from historic samples UO-SS-S2-5' (TPH by SM 418.1M) and WP-EXC2-N-1' (oil-range hydrocarbons) exceeded the direct-contact RBC for construction workers (See Figure 5, Attachment B). Previously, there were no exceedances at these locations.
- Carcinogenic PAHs (cPAHs) were assessed at locations where PAHs were analyzed. The sample UO-WP-T5-2' exceeded the RBC for soil ingestion, dermal contact, and inhalation for both construction worker and occupational receptors (See Figure 5, Attachment B).
- There were no new exceedances identified in the historic groundwater samples. Additionally, benzo(a)pyrene is no longer considered a chemical of concern, as the groundwater RBC for exposure to construction and excavation workers increased, and there is no longer an exceedance of the current RBC (DEQ 2023).

LUST #20-10-1128 Risk

The following is a summary of changes identified in the risk-screening for sampling locations associated with the open LUST file #20-10-1128. The site figure from the Site Investigation Report

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(PBS 2011) has been included in Attachment B. The site location is not confirmed to be within the portion of Parcel P-B that will be acquired by the City.

- Detected concentrations of TPH diesel-range from historical samples Tank N12 and Tank N17, collected during tank decommissioning, exceeded the direct-contact RBC for construction workers. This sample had previously not exceeded the RBCs in use during the preparation of the 2011 report. The depths of these samples are listed as 12 and 17 feet below ground surface and are unlikely to be complete pathways except as part of deep utility installation projects. The exceedances noted for these samples ranged between 7,700 milligrams per kilogram (mg/kg) to 10,100 mg/kg, compared to the direct soil ingestion screening for construction workers of 4,600 mg/kg. Petroleum contamination naturally degrades over time, and concentrations, if present on the property to be acquired, are likely to be significantly lower than observed in 2010.

Recommendations

In general, it is recommended that the Site Management Plan (PBS 2009) prepared in November of 2009 be updated to provide more detail including exceedances and newly discovered information. The plan should be revised to exclude benzo(a)pyrene as a constituent of concern in groundwater. Additionally, TPH and PAHs in soil should be included in the revised plan as constituents of concern at the locations described above. While the Site Management Plan primarily focuses on the Parcel P-A, the document could be utilized for the Parcel P-B property in the event that the LUST location is identified as within the acquired property or if contamination associated with the LUST is encountered.

Attachments

References

Limitations

Figure

Attachment A – DEQ File Review Documents

Attachment B – Historical Site Figures

Cc: Katie Marwitz, City of Eugene

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References

DEQ. 2001. Letter RE: No Further Action Determination, Area P-B of Western Parcel University of Oregon Riverfront Research Park. Oregon Department of Environmental Quality: Eugene, OR. March 2001.

DEQ. 2009. *Draft Staff Report Conditional No Further Action Recommendation for the Area P-A Upland Portion of the Western Parcel – Riverfront Research Park, University of Oregon Eugene, Oregon.* Oregon Department of Environmental Quality: Western Region Office. September.

DEQ. 2010. Letter RE: Conditional No Further Action Determination, UO Riverfront Research Park. Oregon Department of Environmental Quality: Eugene, OR. October 29.

DEQ. 2015. *Letter RE: Partial No Further Action Determination for Riverfront Research Park – Parcel P/A.* Oregon Department of Environmental Quality: Eugene, OR. April 23.

DEQ. 2023. *Table: Risk-Based Concentrations for Individual Chemicals*. Oregon Department of Environmental Quality, Environmental Cleanup Program. August.

DEQ. 2025. Public Project Records – Facility Info, Riverfront Research Park. Accessed July 2025. https://ordeq-edms-public.govonlinesaas.com/app/pub-rcd/projects/review/9/899;tab=narrative

PBS. 2009. *Site Management Plan Western Parcel of the Riverfront Research Park Project*. PBS Engineering + Environmental. November.

PBS. 2011. Site Investigation Former Diesel UST - UO Riverfront Research Park – Western Parcel LUST NO. 20-10-1128. PBS Engineering + Environmental. March.

Squier Associated. 1993. *Environmental Investigations Through August 1993, Riverfront Research Park University of Oregon. Squier Associates Inc., Environmental/Geotechnical Consultants.* September.

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Limitations

The services undertaken in completing this technical memorandum were performed consistent with generally accepted professional consulting principles and practices. No other warranty, express or implied, is made. These services were performed consistent with our agreement with our client. This technical memorandum is solely for the use and information of our client unless otherwise noted. Any reliance on this report by a third party is at such party's sole risk.

Opinions and recommendations contained in this technical memorandum apply to conditions existing when services were performed and are intended only for the client, purposes, locations, time frames, and project parameters indicated. We are not responsible for the impacts of any changes in environmental standards, practices, or regulations subsequent to performance of services. We do not warrant the accuracy of information supplied by others, or the use of segregated portions of this technical memorandum.

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Figure

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Figure
Property Overview

City of Eugene
Eugene, OR

Legend

- Property Boundary
- Site P-A (Riverbank)
- Site P-A (Upland)
- Site P-B
- UST Decommissioning Area (Exact Location Unknown)

0 100
Feet

Data Sources
Aerial photograph obtained from the Oregon Geospatial Enterprise Office; site boundary obtained from the Oregon Department of Environmental Quality.

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Path: X:\Q_MFA_Projects\M0076.12\001\Pro\M0076_12_001_001.aprx\Fig 2-1 Property Overview
Print Date: 4/29/2024
Reviewed By: ccdough
Produced By: sturner
Project: M0076.12.001

Attachment A

DEQ File Review Documents

MAUL FOSTER ALONGI

ECSI 1018

Oregon

Kate Brown, Governor

Department of Environmental Quality
Western Region Eugene Office
165 E. 7th Avenue
Eugene, OR 97401
(541) 686-7838

April 23, 2015

Doug Brooke
University of Oregon – Enterprise Risk Services
5224 University of Oregon
Eugene, OR 97403

RE: **Partial No Further Action Determination**
for Riverfront Research Park – Parcel P/A, Riverfront Portion
ECSI # 1018

Dear Mr. Brooke,

The Oregon Department of Environmental Quality (DEQ) has completed a review of the available information regarding the Riverfront Research Park, Parcel P/A Site at is 855 Riverfront Parkway, Tax Lot 5300.

A Partial No Further Action Determination was made in 2009 for the uplands portion of the site. DEQ has determined that remedial action to address environmental contamination associated with river frontage, sediment, and adjacent Willamette River Sediment from the Riverfront Research Park - Parcel P/A is complete, and no further action is required. This determination is based on the DEQ regulations and the facts as we now understand them including, but not limited to the following:

- The site was a part of the former Eugene Manufactured Gas Plant (MGP).
- Wastes from MGP processes included polycyclic aromatic hydrocarbons and volatile organic compounds which are present on site.
- Site soils are contaminated with low concentrations of MGP waste.
- Investigations associated with the Ecological Risk Assessment for the adjacent MGP site have shown that there is no unacceptable risk to surface water users of ecological receptors at the Riverfront Research Park-Parcel P/A site.
- No remedial actions are required as there are no unacceptable risks to sediment or surface water.
- A public comment period is not required as no remedial action is necessary.

Based on the available information, the Riverfront portion of Research Park-Parcel P/A is currently protective of public health and the environment. The site requires no further action under the Oregon Environmental Cleanup Law, ORS 465.200 et seq. unless new or previously undisclosed information becomes available, or there are changes in site development or land and water uses, or more contamination is discovered. DEQ will update the Environmental Cleanup Site Information System (ECSI) database to reflect this decision.

If any contaminated soil or groundwater is encountered in the future, it must be handled and disposed of in accordance with local, state and federal regulations. Monitoring wells should be maintained or decommissioned in accordance with Oregon Water Resources Department regulations.

A copy of the staff memo supporting this No Further Action decision can be viewed at: http://www.deq.state.or.us/Webdocs/Forms/Output/FPController.ashx?SourceIdType=11&SourceId=1018&Screen=Load
DEQ recommends keeping a copy of all of the documentation associated with this remedial action with the permanent facility records. If you have any questions, please contact Seth Sadofsky at 541-687-7329, or via email at sadofsky.seth@deq.state.or.us.

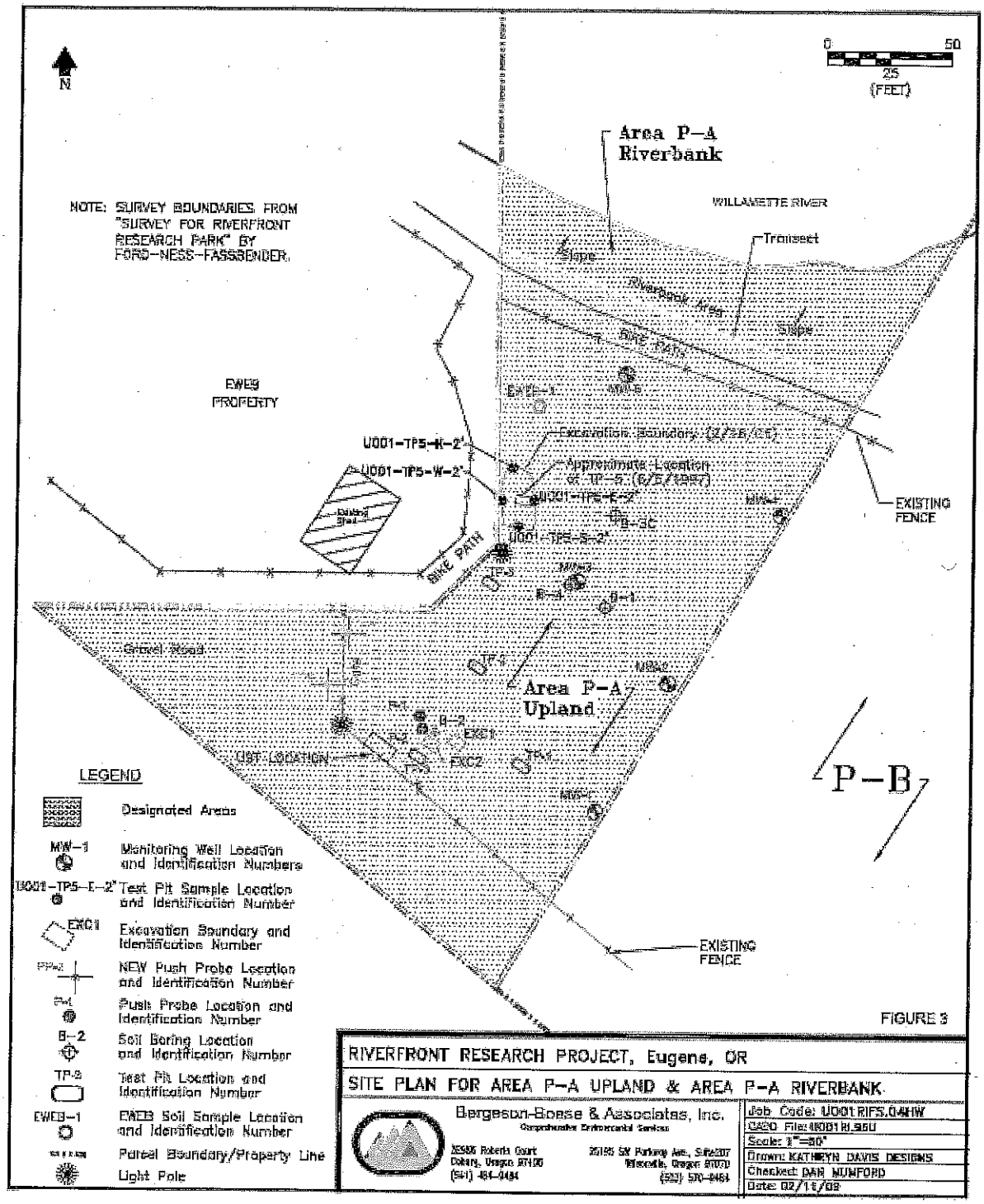
Sincerely,

Michael E. Kucinski, Manager
Western Region Cleanup Section

Attachment(s): [Site Map]

MEK/sjs

cc: Jared Rubin, EWEB, PO Box 10148, Eugene, OR 97440
ECSI File #1018 - COMM


N
0
50
25
(FEET)
Area P-A
Riverbank
WILLAMETTE RIVER
NOTE: SURVEY BOUNDARIES FROM "SURVEY FOR RIVERFRONT RESEARCH PARK" BY FORD-NESS-FASSBENDER.
Transect
Slope
River Rock Area
Slope
Bike Path
EWEB PROPERTY
EWEB-1
MW-5
U001-TP5-W-2'
U001-TP5-E-2'
Excavation Boundary (2/25/08)
Approximate Location of TP-5 (6/25/1997)
U001-TP5-E-2'
B-3E
MW-4
EXISTING FENCE
U001-TP5-S-2'
TP-5
MW-3
B-4
B-1
Bike Path
Gravel Road
Area P-A
Upland
MW-2
P-1
B-2
EXC1
P-2
TP-3
EXC2
TP-4
UST LOCATION
MW-1
P-B
EXISTING FENCE
LEGEND
Designated Areas
MW-1 Monitoring Well Location and Identification Numbers
U001-TP5-E-2' Test Pit Sample Location and Identification Number
EXC1 Excavation Boundary and Identification Number
PP-2 NEW Push Probe Location and Identification Number
P-1 Push Probe Location and Identification Number
B-2 Soil Boring Location and Identification Number
TP-3 Test Pit Location and Identification Number
EWEB-1 EWEB Soil Sample Location and Identification Number
Parcel Boundary/Property Line
Light Pole
FIGURE 3
RIVERFRONT RESEARCH PROJECT, Eugene, OR
SITE PLAN FOR AREA P-A UPLAND & AREA P-A RIVERBANK
Bergeson-Beese & Associates, Inc.
Comprehensive Environmental Services
35585 Roberts Court
Coburg, Oregon 97408
(541) 484-0484
35185 SW Parkway Ave., Suite 207
Wilsonville, Oregon 97070
(503) 570-0484
Job Code: U001 RIFS.04HW
CAD File: 48031 RI.SSD
Scale: 1"=50'
Drawn: KATHRYN DAVIS DESIGNS
Checked: DAN NUNFORD
Date: 02/15/08

State of Oregon
Department of Environmental Quality **Memorandum**

Date: 4/20/2015

To: FILE – ECSI 1018

Through: Bruce Scherzinger, Lead Worker
Michael Kucinski, Manager
Western Region Cleanup Program

From: Seth Sadofsky, PhD, RG
Western Region

Subject: Riverfront Research Park, ECSI # 1018
Staff Memorandum in support of a No Further Action determination

This document presents the basis for the Oregon Department of Environmental Quality's (DEQ's) recommended Partial No Further Action (NFA) determination for the Manufactured Gas Plant (MGP) wastes in the Shoreline area of Parcel P-A Western Portion in Eugene. As discussed in this report, contaminant concentrations in Soil, Groundwater, sediment, and surface water are below acceptable risk levels.

The proposed NFA determination meets the requirements of Oregon Administrative Rules and Chapter 340 Division 122, Sections 010 to 0140; and ORS 465.200 through 465.455.

The proposal is based on information documented in the administrative record for this Site. A copy of the administrative record index is presented at the end of this report.

1. BACKGROUND

The Portion of the University of Oregon Riverfront Research Park Project (Site; ECSI 1018) adjacent to the former Eugene Manufactured Gas Plant (MGP; ECSI 1723) has been impacted by contamination from the former Manufactured Gas Plant. In 2009, a **Partial No Further Action Determination** was issued by DEQ for the upland portions of the Site. At the time of the NFA, upland soils were known to contain low concentrations of several Polycyclic Aromatic Hydrocarbons (PAHs) associate with MGP operations. This contamination was determined not to pose a risk to Site users aside from excavation or construction activities and a Contaminated Media Management Plan was prepared for the Site. At that time it was determined that decisions related to the riverbank portion of the Site would not be addressed until the ecological risk assessment was completed for the adjacent main MGP Site owned by the Eugene Water and Electrical Board (EWEB).

Site location.
The Site's is located adjacent to the Willamette River, NE of downtown Eugene and NW of the Main campus of the University of Oregon (see Figure 1) and can be described as follows:
- Address: 855 Riverfront Parkway, Eugene, Oregon.
- Latitude 44.0484^{o} North, longitude 123.0676^{o} West
- Tax lot(s) 5300, Township 17 South, Range 03 West, Section 32.

Site setting.
The Site is approximately 67 acres in size encompassing a large proportion of the Eugene Riverfront adjacent to the University of Oregon. Tax lot 5300 is a portion of the Site and is 8.7 acres in size according to Lane County Assessor data.
This section of the Site is currently undeveloped. A soil cap with appropriate deed restrictions is in place for a portion of the Site uplands containing MGP waste constituents in excess of direct contact screening levels.
Adjacent properties are the Willamette River to the North, additional property owned by the University to the East, a railroad line to the South, and property owned by the local utility (Eugene Water and Electrical Board to the West, which includes most of the former Manufactured Gas Plant which is the main source of the contamination in question.
Zoning is commercial and likely future use is for university buildings and grounds.

Physical setting.
The portion of the Site under consideration is the hill slope and river frontage between the Willamette River and Site uplands (Figure 2). The shore of the river is approximately 20' beneath the shelf above where most human activities take place. Groundwater reaches the surface at the river's edge and is relatively shallow in the near shore area. The edge of the river is underlain by the local marine bedrock of the Eugene Formation and the mid-channel area cuts into this formation. Overlying the Eugene Formation in the 5-15' located near shore are the sediments that contain the shallow aquifer. Groundwater flows from the uplands in the southern portion of the Site to the river in the area of the Site.

2. BENEFICIAL LAND AND WATER USE DETERMINATIONS

Land use.
The Site is currently unoccupied. The uplands include unoccupied land owned by the University of Oregon and a multi-use recreational path. Future commercial development as part of the University's Riverfront Research Park is likely. The uplands have already been determined to be acceptable for occupational workers and Site visitors with Site controls. The portion of the site being considered here is the riverbank and discharge zone and is likely to be used as a park and ecological habitat.

Groundwater use.
There is no groundwater use in the LOF and no likely future groundwater use. The LOF is very small and the results of this investigation do not require a beneficial use survey.

Surface water use.
The Site is the frontage of the Willamette River. There are no nearby drinking water intakes downstream of the Site. Pathways of concern are for ecological receptors and have been outlined in the Ecological Risk Assessment prepared as part of the MGP investigation. The receptors of concern are the benthic invertebrate community, migrating adult salmonids, and small fish including rearing juvenile salmonids. Stormwater flow is unlikely to cause migration of contaminants as surface water is generally confined to gutters, ditches, and drains and contaminants are not primarily in surface soils. Concerns about the potential for deeper soils and groundwater migration to leach contaminants to the river with groundwater flow Led to the investigations described below.

3. INVESTIGATION AND CLEANUP WORK

The University of Oregon (UO) conducted Site investigation and cleanup activities between 1984 and 2006 at the Riverfront Research Park property located in Eugene, Oregon. The upland areas associated with the MGP wastes are discussed in a staff report and NFA document completed in 2009. Ecological issues and risk to surface water were investigated as part of the Ecological Risk Assessment for the adjacent MGP site. Surface water samples were collected from one location near the upstream edge of the Site and one location at the border between Parcel P-A and the EWEB property (Figure 3).

Field Code Changed

The surface water and sediment investigation in support of the Level II Screening Ecological Risk Assessment for the MGP site (Windward and Axlerod, 2009) determined the following:

- MGP-related contaminants to investigate included polycyclic aromatic hydrocarbons (PAHs), and benzene, toluene, ethylbenzene, and xylenes (BTEX).
- For surface water analyses, the upstream (background) sample and the most upstream sample associated with the focus of the investigation are adjacent to the University of Oregon Property. These samples do not contain concentrations of chemicals that would pose an ecological risk when screened against Level II SLVs (Table 1).
- Analysis of interstitial water in sediments from the most Upgradient sample for which was measured (nearest the subject parcel) found no analytes above ecological screening levels (Table 2).
- Sediment sample collection and analysis was limited to areas with presence of fine-grained sedimentary materials, this did not include the areas adjacent to the University of Oregon property.

Nature and extent of contamination.
Contaminants of potential concern for this site are PAHs and BTEX associated with MGP waste. The extent of this contamination is more fully explored in the evaluation of the upland portions of the site. Media investigated are surface water and interstitial water in the discharge zone between groundwater and surface water. Sediment was not investigated because there are no appropriate sedimentary environments on this section of the river.

Overall, it appears that contamination of surface waters from the Eugene former MGP does not exceed ecological screening levels. Furthermore, contamination associated with the stretch of river owned by the University of Oregon is significantly less than that of the stretch adjacent to property owned by EWEB.

4. RISK EVALUATION

Based on the lack of sediment present in the appropriate section of shoreline, sediment was not evaluated for ecological risk.
Surface water data was screened against DEQs Level II Ecological Screening Values and DEQ Water Quality Program Surface Water standards, no parameters exceed rick screening levels.
Interstitial pore water was screened against DEQs Level II Ecological Screening Values and no parameters exceed rick screening levels.

Human health risk.
DEQ's surface water standards include human health considerations and samples do not exceed these levels.

Ecological risk.
Surface water and interstitial water beneath the surface do not exceed ecological risk screening level values.

5. RECOMMENDATION

Based on the data presented above, contamination in the riverfront area of Riverfront Research Park, Parcel P/A does not pose any risk to human health or the environment. Therefore, a No Further Action determination is recommended for this portion of the Site. As other portions of this Site have already received a partial No Further Action determination, this determination should be expanded to the entire Site. The No Further Action determination should be recorded in DEQ's ECSI database (ECSI # 1018).

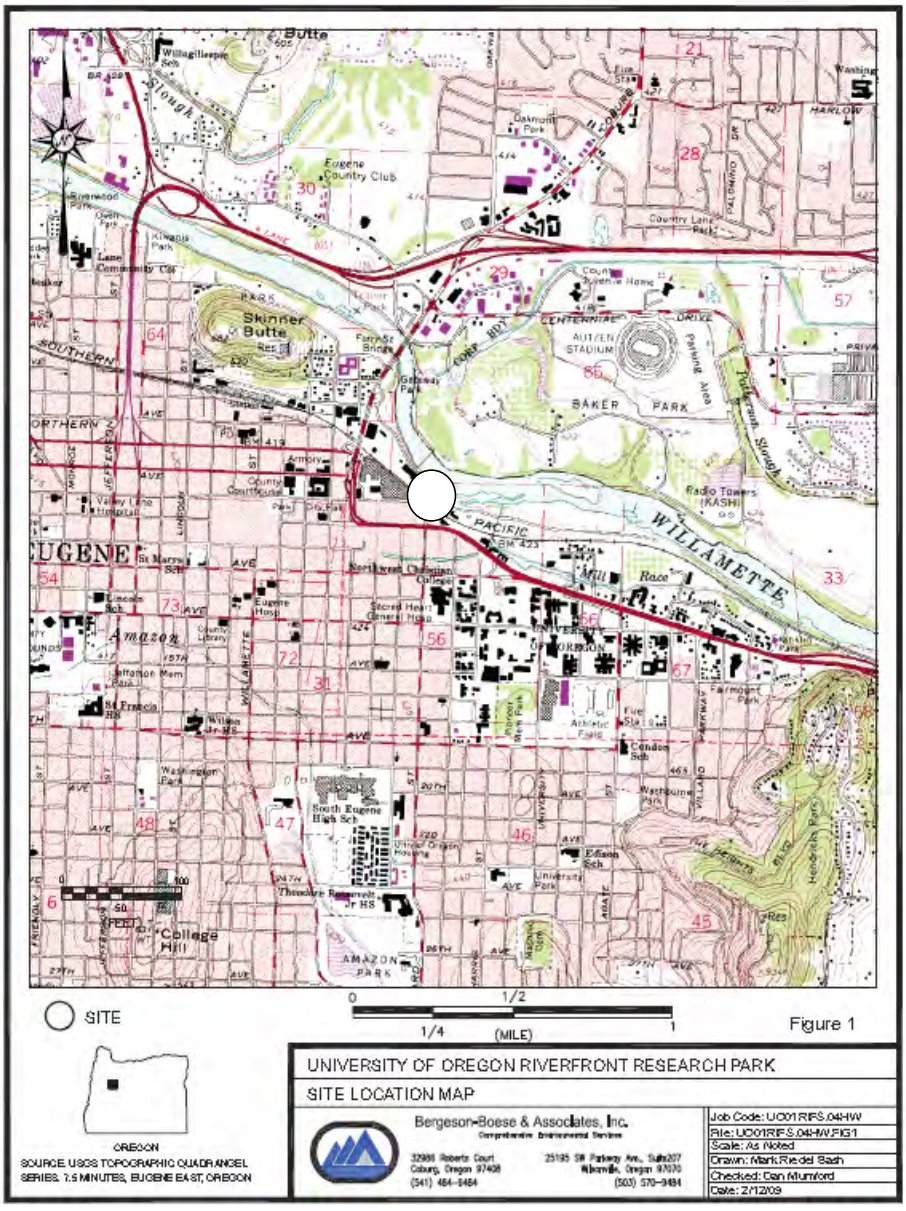
6. REFERENCES

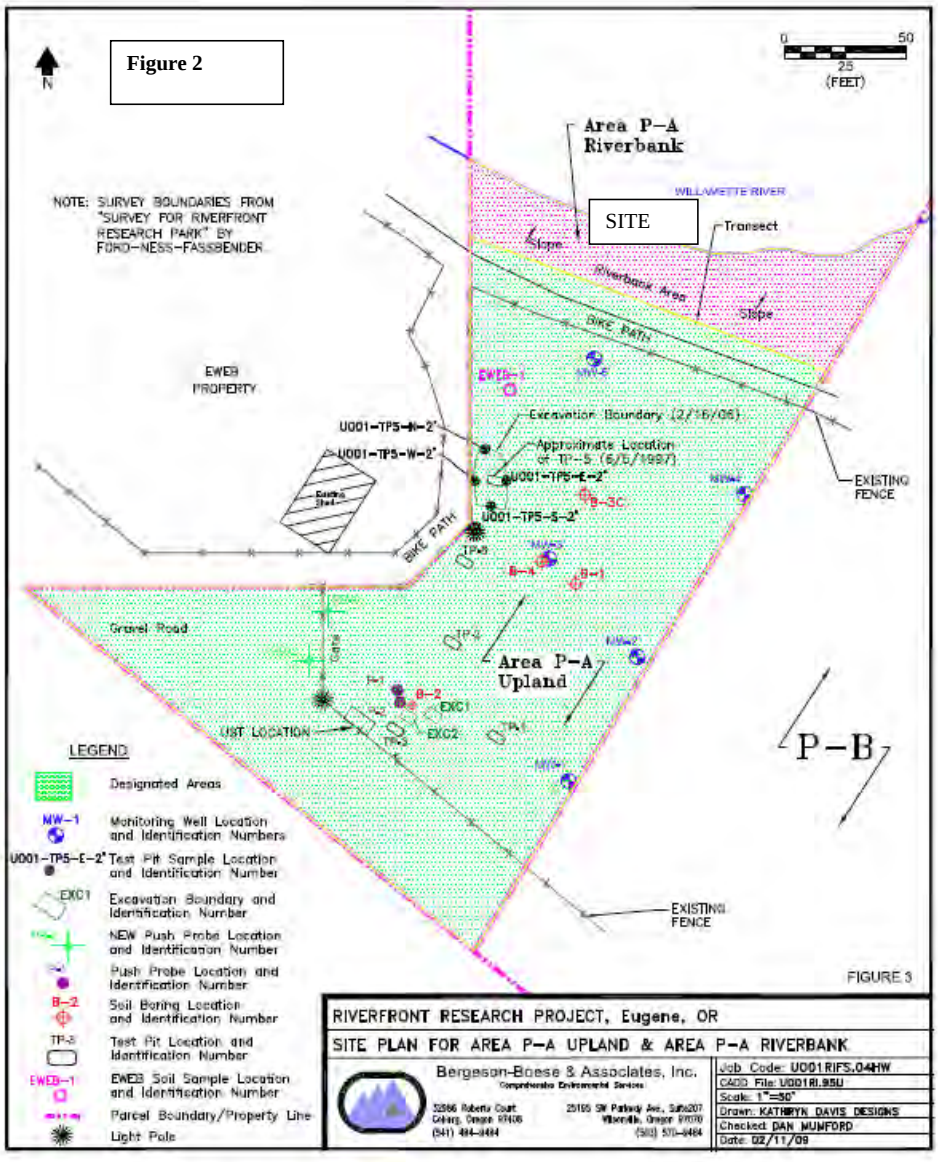
Level II (Screening) Ecological Risk Assessment—Eugene Former MGP Site. 2009. Axlerod Environmental and Windward Environmental

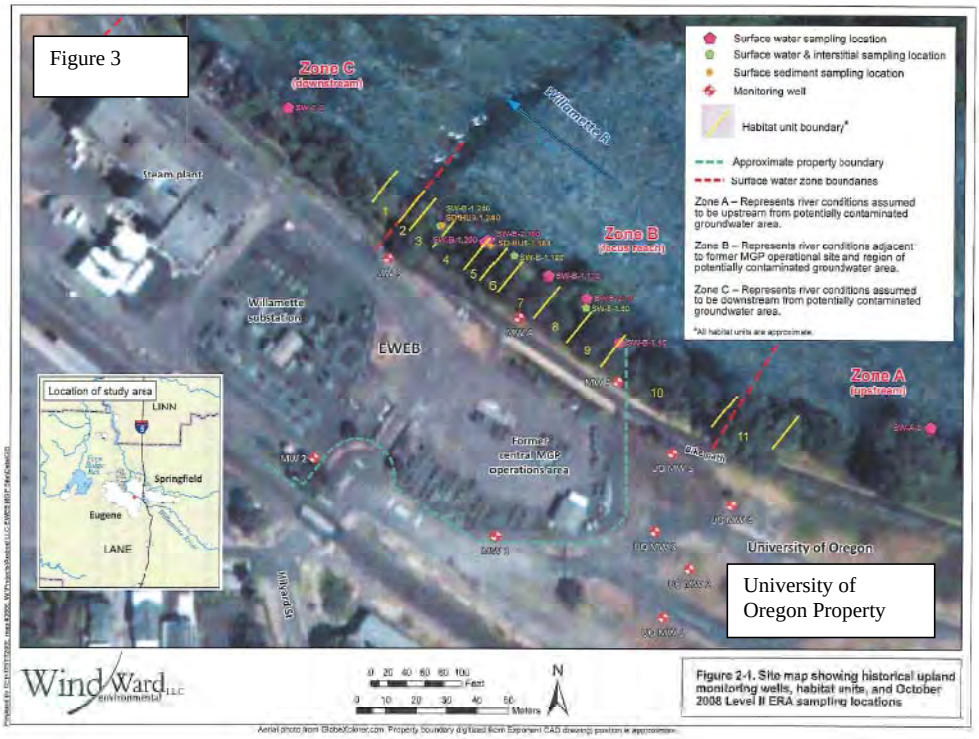
DEQ Table 40, Human Health Water Quality Criteria for Toxic Pollutants.

DEQ Screening Level Values for Ecological Risk Assessment.

Figures and Tables




Figure 2
N
0
50
25
(FEET)
Area P–A
Riverbank
WILLAMETTE RIVER
SITE
Transect
Slope
Riverbank Area
Slope
BIKE PATH
EWEB
PROPERTY
EWEB-1
MW-5
Excavation Boundary (2/16/06)
Approximate Location
of TP-5 (6/5/1997)
U001-TP5-N-2'
U001-TP5-W-2'
U001-TP5-E-2'
U001-TP5-S-2'
B-3C
EXISTING
FENCE
BIKE PATH
TP-5
MW-6
B-4
B-1
Gravel Road
TP-4
MW-7
Area P–A
Upland
P-1
B-2
EXC1
EXC2
UST LOCATION
TP-3
TP-2
P-2
MW-8
P–B
LEGEND
Designated Areas
MW-1
Monitoring Well Location
and Identification Numbers
U001-TP5-E-2'
Test Pit Sample Location
and Identification Number
EXC1
Excavation Boundary and
Identification Number
NEW Push Probe Location
and Identification Number
Push Probe Location and
Identification Number
B-2
Soil Boring Location
and Identification Number
TP-5
Test Pit Location and
Identification Number
EWEB-1
EWEB Soil Sample Location
and Identification Number
Parcel Boundary/Property Line
Light Pole
EXISTING
FENCE
FIGURE 3
RIVERFRONT RESEARCH PROJECT, Eugene, OR
SITE PLAN FOR AREA P–A UPLAND & AREA P–A RIVERBANK
Bergeson-Boese & Associates, Inc.
Comprehensive Environmental Services
32866 Roberts Court
Coburg, Oregon 97408
(541) 484-9484
25155 SW Parkway Ave., Suite207
Wilsonville, Oregon 97070
(503) 570-9484
Job Code: U001RIFS.04HW
CADD File: U001RI.95U
Scale: 1"=50'
Drawn: KATHRYN DAVIS DESIGNS
Checked: DAN MUMFORD
Date: 02/11/09


Figure 3
Zone C
(downstream)
Willamette R.
Steam plant
Zone B
(focus reach)
Willamette substation
EWEB
Zone A
(upstream)
Location of study area
LINN
Springfield
Eugene
LANE
Former central MGP operations area
University of Oregon
University of Oregon Property
Surface water sampling location
Surface water & interstitial sampling location
Surface sediment sampling location
Monitoring well
Habitat unit boundary*
Approximate property boundary
Surface water zone boundaries
Zone A – Represents river conditions assumed to be upstream from potentially contaminated groundwater area.
Zone B – Represents river conditions adjacent to former MGP operational site and region of potentially contaminated groundwater area.
Zone C – Represents river conditions assumed to be downstream from potentially contaminated groundwater area.
*All habitat units are approximate.
Wind Ward LLC environmental
Feet
Meters
N
Figure 2-1. Site map showing historical upland monitoring wells, habitat units, and October 2008 Level II ERA sampling locations

SITE:
Western Parcel of the Riverfront Research Park Project
Hilyard St. and E 8th Ave. (Approximately)
Eugene, Oregon

1.0 INTRODUCTION

1.1 Purpose

This purpose of this Site Management Plan (SMP) is to clarify the roles and responsibilities regarding environmental conditions that may be encountered when potentially contaminated soil or shallow groundwater is disturbed at the site. The property owner is responsible to characterize and manage potentially impacted media according to applicable state and federal regulations. The property owner also has the responsibility to see that there is a health and safety plan (HASP) available to communicate to site workers, contractors and subcontractors and their representatives the anticipated nature, level, and degree of potential chemical and physical hazards that could be encountered while working on the project site. The HASP identifies procedures designed to minimize the risk of chemical exposure or physical injuries by a combination of personal protective equipment (PPE), engineering controls, and safe work practices.

1.2 Property/Facility Description and Status

The site is legally described as tax lot 5300 in the southeast quarter of the northwest quarter of Section 32, T17S, R3W of the Willamette Meridian. The site is listed on the Oregon Department of Environmental Quality's (DEQ's) Environmental Cleanup Site Information (ECSI) database as Riverfront Research Park Site - ECSI Site ID Number 1018. The University of Oregon (UO) completed extensive investigative and cleanup activities between 1984 and 2006 at the Riverfront Research Park property. In order to most efficiently address specific environmental concerns and issues associated with various parts of the Riverfront Research Park, the UO divided the property into several separate parcels.

In an agreement with DEQ, under its Voluntary Cleanup Program (VCP,) the UO has completed investigations and cleanup activities that have culminated in an Oregon DEQ "no further action" (NFA) determination for all but one remaining area of the Western Parcel of the Research Park (Area P-A). The investigative work has been completed on Area P-A and the DEQ has recently issued a NFA conditioned on maintaining a HASP that details safe work practices when shallow groundwater is encountered.

1.3 Contaminants of Concern

The contaminants of potential concern (COPC) have been identified as total petroleum hydrocarbons (TPH) and related constituents associated with the adjacent manufactured gas plant (MGP) site (ECSI # 1723) located directly west of Area P-A, and former sand and gravel operations. TPH constituents naphthalene and benzo(a)pyrene have historically been detected in groundwater monitoring wells on Parcel P-A. Recent sampling (2004 and 2008) did not detect these constituents above their risk-based concentrations. However, the DEQ has determined that these constituents may be present in the shallow groundwater based on the historic levels in on-site wells in Parcel P-A adjacent to the MGP site.

1.4 Notification and Acknowledgement

The property owner is responsible for notifying all contractors of the site conditions and provide them with a copy of this document and any supplemental HASPs created for a specific work activity at the site. All contractors must read and acknowledge in writing that they have read, understood and agree to abide by the HASP document(s). When soil or groundwater is encountered, then the HASP is to be reviewed immediately by onsite workers to determine any required precautions are to be implemented. Contingency arrangements are also provided for emergency situations. Any individual who refuses to abide by the requirements of this HASP will not be allowed to work on the site.

2.0 SAFETY BRIEFINGS AND HAZARD COMMUNICATION

Before fieldwork begins, all field personnel must be briefed on the potential site hazards, individual work assignments, and the provisions of this HASP as part of a "tailgate" safety meeting. Subcontractors will also attend the tailgate safety meeting. All field personnel are required to sign the HASP at the completion of the tailgate meeting indicating that they attended the on-site safety meeting. The meeting may also include the following:

- Site-specific requirements imposed by the property owner or facility operator.
- Evacuation plan and/or designated meeting place in case of an emergency.

3.0 GENERAL JOB ACTIVITIES WITH MINIMUM PPE REQUIREMENTS

Job activities which will have the potential to encounter shallow groundwater include excavation, drilling, test pit excavation, and collecting samples from the drill hole/boring hole/test pit/excavations (note: other activities not specifically listed above may also disturb site soils). The chemical hazards identified are from direct contact (ingestion, inhalation, and dermal contact) with TPH and related constituents naphthalene and benzo(a)pyrene. Groundwater may be encountered at the site at depths greater than 15 feet below ground surface.

3.1 Drilling. To reduce the risk associated with drilling, all personnel working around the drill rig must be wearing a hard hat, steel toed boots, eye protection, and hearing protection at all times. (If drilling into the shallow groundwater see below for additional requirements).

3.2 Test Pitting/Trenching/Excavation. Site workers must wear high visibility vests, a hard hat, steel toed boots, eye protection, gloves (OSHA Level D PPE) and communicate with the equipment operator using a set of simple pre-determined hand signals. When vehicles or heavy equipment must operate near an excavation, the sides of the excavation may have to be shored or braced as necessary to withstand forces exerted by the superimposed load and the earth pressure. If shoring is required for the contractor to perform work, a shoring system must be designed and implemented by a person with the necessary training and experience to fulfill the OSHA defined role of a "competent person" on an excavation site. Secure barriers or highly visible tape must be installed at the edges of the excavations over four (4) feet in depth.

3.3 Shallow Groundwater. If shallow groundwater is anticipated to be encountered and workers need to be in close contact with the groundwater media, workers will need to wear the following PPE in addition to Level D as specified above: splash protection for eyes and face, coated tyvek coveralls, chemical resistant gloves and boots.

3.4 PPE Contingency Plan

In the event that conditions at the site change significantly, typically caused by the presence of chemicals or contamination, site personnel will cease all work immediately and exit the work area. The person in charge of field operations will communicate with the UO project manager, and they will assess the new conditions to determine how to proceed with sufficient worker protection.

4.0 CONTAINMENT OF SUSPECTED CONTAMINATED MEDIA

Because construction actions associated with development of the property could involve the excavation of potentially impacted soils and groundwater, it is appropriate that this plan for safe work practices be followed.

If suspected contaminated soil is encountered, the subcontractor will expose the soil using a backhoe or excavator. The excavated soil will be removed and stored on a visqueen-covered area with berms. All soil suspected to be contaminated will be segregated and covered with visqueen. If deemed necessary, excavated soil and the excavated area will be fenced off with construction fencing until all excavation activities are concluded.

If dewatering activities need to be performed on site, groundwater will be pumped into a storage tank until sampling and and characterization is conducted to determine the appropriate treatment and/or disposition of the water.

Procedures in the site Contaminated Media Management Plan (CMMP) will be used to guide the sampling, characterization and management of media suspected of being contaminated. The temporary storage of excavaed media will be constructed to isolate the media from potential site storm water during grading and/or excavation activities.

5.0 SITE CONTROL/WORK ZONES

Access to hazardous and potentially hazardous areas must be controlled to reduce the probability of occurrence of physical injury and chemical exposure of field personnel, visitors, and the public. A hazardous or potentially hazardous area includes any area where (1) borings are being drilled with direct drive equipment or powered augers, (2) excavating operations with heavy equipment are being performed, (3) any area that has been identified where exposure to shallow groundwater is likely.

Entry to hazardous areas shall be limited to individuals who must work in those areas. Unofficial visitors must not be permitted to enter hazardous areas while work in those areas is in progress. Official visitors should be discouraged from entering hazardous areas, but may be allowed to enter only if they agree to abide by the provisions of this document and project specific HASP and CMMP documents.

6.0 DECONTAMINATION

Field decontamination of personnel and equipment is not required except when contamination is obvious (visually or by odor). Disposable garments should be properly disposed of as solid waste. If soil or groundwater comes in contact with the skin it should be thoroughly rinsed using a mild detergent and water. Reuseable equipment should be cleaned using Alconox-type detergent and rinsed with clean water.

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Acronyms

Acronym	Definition
BTEX	benzene, toluene, ethylbenzene and xylenes
COI	contaminant of interest
CPEC	contaminant of potential ecological concern
DEQ	Oregon Department of Environmental Quality
DO	dissolved oxygen
EC	environmental concentration
EF	exceedance factor
EPA	US Environmental Protection Agency
ERA	ecological risk assessment
ESA	Endangered Species Act
EWEB	Eugene Water & Electric Board
FR	focus reach
FS	feasibility study
HPAH	high-molecular-weight polycyclic aromatic hydrocarbon
IW	interstitial water
JSCS	Joint Source Control Strategy
LPAH	low-molecular-weight polycyclic aromatic hydrocarbon
MGP	manufactured gas plant
NGVD	National Geodetic Vertical Datum
PAH	polycyclic aromatic hydrocarbons
RI	remedial investigation
SAP	sampling and analysis plan
SLV	screening level value
SW	surface water
TOC	total organic carbon
TMDP	technical management decision point
TSS	total suspended solids
90%UCL	90% upper confidence limit on the mean

Acronym	Definition
UO	University of Oregon
USACE	US Army Corps of Engineers
VOC	volatile organic compound
Windward	Windward Environmental LLC
WP	work plan

1 Introduction

This report presents the findings of a Level II (screening) ecological risk assessment (Level II ERA) conducted for the Willamette River shoreline along the Site, which is property currently owned by the Eugene Water & Electric Board (EWEB) in Eugene, Oregon where a portion of a former manufactured gas plant (MGP) facility was located (Figure 1-1). The Level II ERA report was prepared in accordance with the focused work plan and sampling and analysis plan (WP/SAP) for the Level II ERA (Axelrod and Windward 2008), previously approved by the Oregon Department of Environmental Quality (DEQ).

DEQ directed that EWEB complete a focused Level II ERA to assess the potential for juvenile salmonids and resident benthic invertebrates in the Willamette River to be adversely affected by the discharge of groundwater along the shoreline portion of the Site (DEQ 2007b). The WP/SAP and this Level II ERA report were prepared to address this objective and satisfy the requirements of a Level II ERA as presented in DEQ's *Guidance for Ecological Risk Assessment*, April 1998, Final (as amended) (DEQ 1998).

Dr. John Toll, ecological risk assessor, with Windward Environmental LLC (Windward) directed the Level II ERA analyses with key support from Matt Luxon, fisheries biologist, and Helle Andersen, benthic ecologist, also from Windward. Mr. Russell Axelrod, R.G., of Axelrod LLC assisted with all aspects of the Level II ERA, including sampling design, WP/SAP preparation and implementation, and reporting.

This report is organized according to DEQ guidance (DEQ 1998). Section 1 includes limited background information to provide context for the Level II ERA. Section 2 describes the results from the Level II survey conducted to characterize the aquatic habitats and ecological receptors of interest to the screening assessment. Section 3 describes the environmental sampling performed to support the Level II ERA, the results of the sampling, and screening and analysis of the data relative to ecological factors applicable to the Level II assessment. Conclusions and recommendations are presented in Section 4. Additional documentation in support of the Level II ERA is provided in Attachments 1 through 6.

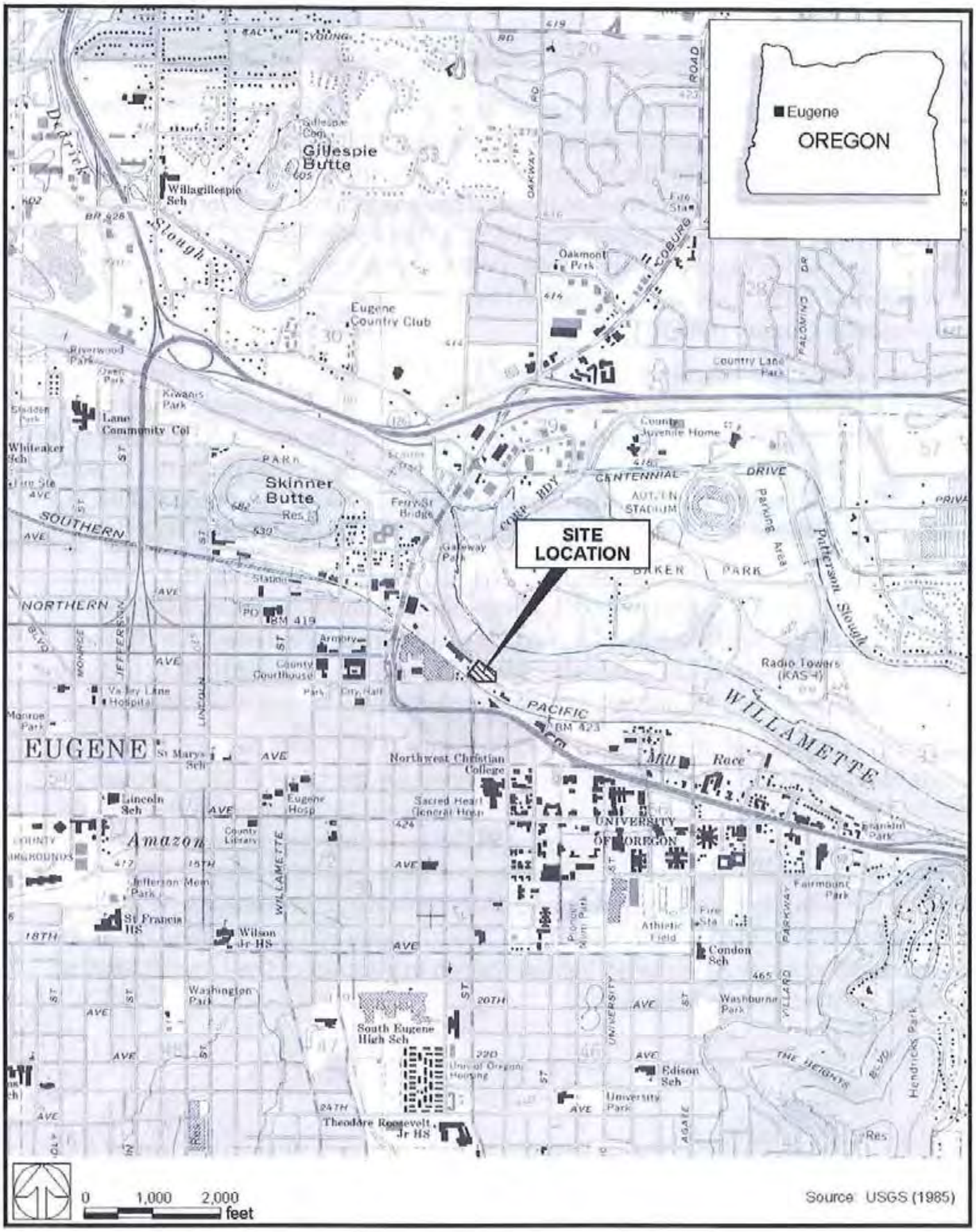


Figure 1-1. Site location

1.1 SITE HISTORY

An MGP formerly operated on the approximate 1.5-acre upland Site now owned by EWEB. The former MGP operations also occupied land to the east of the Site currently owned by the University of Oregon (UO) and land to the south of the Site currently owned by the City of Eugene. The MGP operated between 1907 and approximately 1950, when it was converted to a propane-air gas operation and then later used for the storage and distribution of propane. By approximately 1972, all MGP aboveground structures (except a main brick building shell) had been removed from the Site. EWEB purchased the Site in 1976 and has used the upland paved portion of the property largely for egress and to store equipment to support its utility and maintenance operations.

The shoreline portion of the Site has been extensively modified during its complex history, which has included filling during former MGP operations and demolition activities, and later during bike path construction at the top of the upper bank by the City of Eugene. These shoreline activities have helped stabilize the property along the reach of the Willamette River bordering the Site. In addition, a lower topographic bench is present at the base of the upper bank along the shoreline portion of the Site that is underlain by complex fill, including some wire-reinforced gabions, rip-rap and debris, and some alluvium or similar fill deposits above resistant bedrock. The Phase 1 RI Work Plan generally describes these shoreline area features (Exponent 1998).

1.2 REGULATORY STATUS

The Site has been the subject of a remedial investigation and feasibility study (RI/FS) under an intergovernmental agreement between EWEB and DEQ (Agreement No. WMCVC-WR-98-13 dated November 25, 1998). Numerous evaluations have been completed for the Site RI/FS, and these are documented in the project record on file at DEQ and EWEB.

1.3 SUMMARY OF LEVEL I ASSESSMENT RESULTS

A Level I (scoping) ecological risk assessment (Exponent 1999) identified the Willamette River adjacent to the Site as the only potentially ecologically important habitat associated with the Site. The assessment also applied to the westernmost portion of property owned by UO along the Willamette River located immediately east of EWEB's property and concluded that the habitat characteristics of that property were similar to the EWEB property. The in-stream habitat along the Site boundary was characterized as channelized fast-moving water on the outside of a meander bend with a channel bank underlain principally by riprap fill and rocky substrate. Because juvenile salmonids do not rear in fast-flowing channelized waters, the Level I ERA concluded that these

species might migrate along the Site boundary but preferred other relatively quiet-water reaches of the Willamette River and its tributaries. Adult salmonids were identified as migrants at this point in the river, with only a minimal potential for exposure. The fish community was assumed to be typical of this area of the Willamette River.

Because aquatic receptors were assumed to be only temporary inhabitants along the Site and because this portion of the Willamette River was identified as having little sediment accumulation, the Level I ERA concluded that hazardous substances via groundwater discharge do not reach aquatic receptors at concentrations that would result in adverse impact to these receptors. These findings of the Level I assessment were confirmed through a conservative dispersion (mixing zone) analysis in the Phase 1 RI report (Exponent 2000), and the Level I assessment and RI findings were subsequently approved by DEQ.

Subsequently, in October 2007, DEQ directed EWEB to perform a Level II ERA with further analysis of aquatic receptors at the shoreline area along the Site (DEQ 2007b). Based on the results of the Level I ERA and analyses leading up to preparation of the Level II ERA WP/SAP (Axelrod and Windward 2008; Axelrod 2008; Windward 2008a, b), the assessment boundary, source of contamination, primary transport pathway and contaminants of interest (COIs) were identified. These key elements are described briefly below as they relate to this Level II ERA, and are described in further detail in the WP/SAP (Axelrod and Windward 2008).

Level II Assessment Boundary

The aquatic assessment is focused on the Willamette River shoreline area along the Site that coincides with shallow groundwater contamination in the upland area. This portion of the shoreline area is referred to as the focus reach (FR) and is shown on Figure 1-2. The FR was originally estimated using an aerial photograph and later measured in the field. The Level II ERA addresses the FR on the EWEB property, as described in further detail in Section 1.2 of the WP/SAP (Axelrod and Windward 2008).

Addressing the ecological risk conditions for aquatic receptors at the shoreline area along the Site should address ecological risk concerns from groundwater discharge along the shoreline area on the UO property for the following reasons: 1) the Level I assessment results established the similarity of the shoreline area on the UO property to the shoreline area along the EWEB property; 2) the former MGP operated during the same period of time and generally in the same manner on both properties; and, 3) the groundwater contaminants of interest (COIs) are similar and have been reported at generally lower concentrations beneath the UO property as compared to the samples from the core area on the EWEB property.



Wind Ward environmental LLC

0 20 40 60 80100 Feet
0 10 20 30 40 50 Meters

N

Figure 1-2. Habitat Assessment Area and Focus Reach

Orthophoto created July 30, 2000 by th U.S. Geological Survey and obtained through http://terraserver.microsoft.com.
Property boundary traced from Exponent CAD drawing; position is approximate.

Prepared by LSM 11/27/2007, MTY 10/08/2009, map #3117, W:\Projects\Axelrod LLC EWEB MGP Site\Data\GIS

Source of Contamination

The primary source of concern for the aquatic environment is contaminated shallow groundwater discharge or seepage from the upland area of the former MGP facility that operated on the property currently owned by EWEB, the UO, and the City of Eugene. Shallow groundwater discharge occurs at the Willamette River along the top of relatively impermeable bedrock, and the discharge zone may range from approximately 1 to 3 ft thick near the shoreline area. The shallow groundwater beneath the Site derives from local precipitation and recharge along the valley floor by the Willamette River system and the groundwater likely dried up or declined significantly (e.g., seasonally) in historical times prior to the implementation of flow controls at dams upstream on the river system (Exponent 2000).

Primary Transport Pathway

The primary transport pathway is shallow groundwater discharge to Willamette River surface water.

Contaminants of Interest

Polycyclic aromatic hydrocarbons (PAHs) and benzene, toluene, ethylbenzene and xylenes (BTEX) are the groundwater COIs.

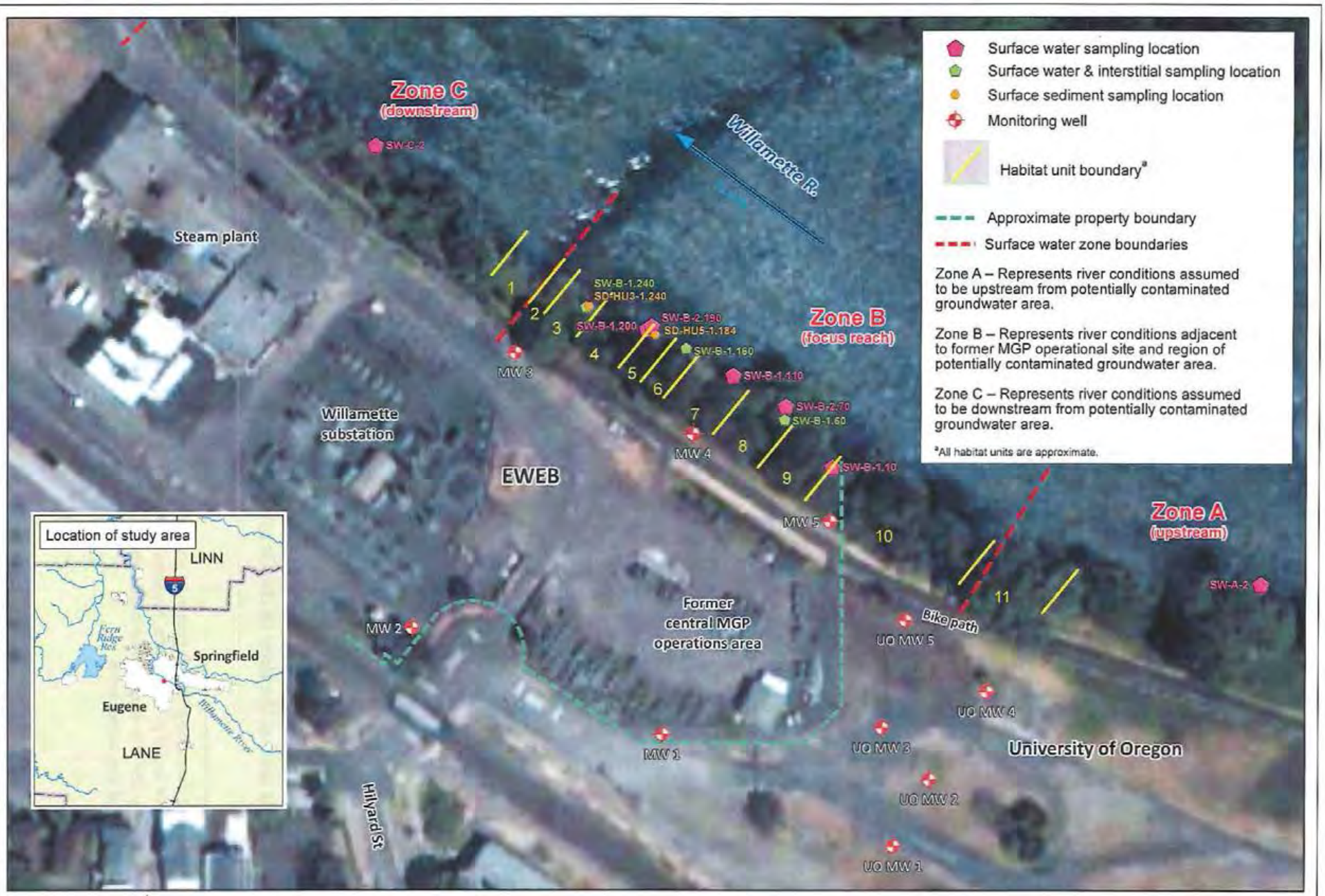
2 Site Survey

A field survey of the Willamette River aquatic habitat bordering the Site was conducted on September 19, 2007, as an element of the Level II ERA. A memorandum summarizing the field survey was submitted to the DEQ on January 17, 2008 (Windward 2008a) (Attachment 1). The survey encompassed the FR and aquatic habitats immediately upstream and downstream of the FR comprising the habitat assessment area (Figure 1-2). The aquatic and immediate shoreline environment was evaluated for the presence of fish and benthic invertebrates and for fish and benthic invertebrate habitat quality.

Eleven habitat units (HU1 through HU11) coinciding with changes in habitat characteristics that may influence fish or invertebrates were identified in the habitat assessment area (Figure 2-1). Near-shore substrate (within 10 to 15 feet of shore) was predominantly cobble mixed with boulders. Isolated areas of gravel, sand, and silt were identified immediately along the shoreline. At the time of the 2007 survey, limited areas of finer-grained sand were observed in two habitat units within the FR (HU5 and HU9) with a total estimated area of 230 ft^2, which is approximately 5% of the FR habitat along the EWEB property.[1] Also, a small embayment ("pocket" eddy) containing sand and silt deposits of approximately 32 ft^2 (HU3) was identified just downstream of the estimated downstream limit of the FR. Maximum sediment depth in these limited sand/silt areas was approximately 30 cm (12 inches).

As described in Section 3.3.1, the field conditions were slightly different during the October 2008 Level II ERA field sampling, and the field measurement of the FR resulted in a slight decrease in the measured length of the FR. There also was a reduction in the area of fine-grained sediment present along the FR. Based on measurements in the field, the FR along EWEB property is approximately 250 ft in length (measured linearly), and the FR now includes the small pocket eddy at the downstream extent of the FR. The other key difference is that the small area of sandy bar deposits identified at HU9 in 2007 was not present during the October 2008 sampling (deposits were eroded during 2007-2008 winter flows), and the underlying coarse-grained cobble substrate remains at this location as typically observed for this area. Based on these observed conditions, the total area of fine-grained sediment comprised approximately 130 ft^2 or less than 4% of the FR habitat area at the time of the October 2008 sampling. Also, as noted below in

[1] The FR habitat area along EWEB property was estimated to be approximately 300 ft in length during initial review of aerial photographs. Measurements during Level II ERA sampling indicate that the FR is approximately 250 ft in length. The habitat area extends up to approximately 15 ft into the river from the shoreline at low water level.



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Figure 2-1. Site map showing historical upland monitoring wells, habitat units, and October 2008 Level II ERA sampling locations

Aerial photo from GlobeXplorer.com. Property boundary digitized from Exponent CAD drawing; position is approximate.

Prepared by CEH 03/13/2009, map #3688, W:\Projects\Axelrod LLC EWEB MGP Site\Data\GIS

Section 3.4.3.2 and described further in Attachment 2, field observations during preparation of this report in March 2009 showed that a majority of the fine-grained deposits at HU5 were eroded during recent winter flows to expose the underlying cobble substrate typical of the shoreline area.

Habitat attributes in all habitat units were potentially suitable for juvenile salmonid rearing for the river discharge conditions observed. Habitat attributes were not potentially suitable for juvenile salmonid spawning in any of the habitat units. A school of juvenile fish and one salmonid (approximately 10 inches in length) were observed in the FR. Invertebrate taxa were also observed with distribution depending on substrate. Clinging snails and insect larvae such as stonefly larvae (an indicator of good water quality) were observed on the predominant rock and cobble substrate; and crayfish, clam (*Corbicula* sp.), freshwater mussel, oligochaetes, snails, chironomids, and two lamprey ammocoetes were observed in the limited sandy areas.

3 Sampling Results and Screening Results and Analysis

This section describes the following elements and analyses completed to support the Level II ERA:

- Summary of shoreline area features and site-specific ecological receptors and exposure factors.
- Results from the October 2008 sampling of surface water, interstitial water, and sediment; additional information on the October 2008 sampling is provided in Attachment 2.
- Calculation of environmental concentrations (ECs) for site-specific chemical contaminants and screening of the Level II ERA sampling results relative to DEQ screening level values (SLVs).
- Refined conceptual site model integrating findings from the Level II ERA analysis.

To provide context for the screening and conceptual site model, the ecology of the study area is described as it relates to potential interactions between receptors and the chemical contaminants. The organization and content of this section follows DEQ guidance for the Level II ERA report (DEQ 1998).

3.1 Site Description

The shoreline area at the Site has been characterized in previous RI/FS documentation (Exponent 1998, 1999, 2000; Swanson 2006) and more recently during Level II survey activities described in Section 2. Figure 3-1 is a scaled schematic cross section of the shoreline area around the middle of the FR on EWEB property. This figure best illustrates the key features of the immediate shoreline environment along the FR of interest to the Level II ERA. Key aspects of the shoreline conceptual site model are summarized below:

- Willamette River water levels are controlled by water storage behind upstream dams and releases from the dams by the US Army Corps of Engineers (USACE). During RI monitoring from April 1998 through February 2002, the seasonal fluctuation in river levels typically ranged from approximately 404 to 412 ft elevation (NGVD), with the lowest elevation in late summer or fall and the highest levels during winter and early spring runoff periods. Beginning in 2008, the USACE, in cooperation with the Nature Conservancy, initiated a new river management program using periodic pulse flows throughout the year to enhance river habitat diversity. While the pattern of river flow has changed under this

new program, the range of river flow is expected to occur generally within the minimum and maximum flows observed during the RI monitoring period, although the USACE can increase flow up to bankfull stage (20.3 ft as measured at Eugene staff gauge datum representing approximately 40,000 cfs) which is approximately 2-ft above the maximum levels observed during the RI monitoring. Under this new river management plan, low and high river levels may occur throughout the year somewhat independent of natural rainfall or runoff patterns.

- Shallow groundwater discharge or seepage occurs along the top of relatively impermeable bedrock, and the discharge zone may range from approximately 1 to 3 ft thick near the shoreline area; the groundwater likely dried up or declined significantly (e.g., seasonally) in historical times prior to the implementation of flow controls at dams upstream on the river system (Exponent 2000).
- The immediate bank and lower bench area along the shoreline is underlain by cobble-boulder alluvium, riprap, sand, gravel, Site debris and other fill materials including some wire-wrapped, rock-filled gabions (Exponent 2000). These components form a topographic bench above the shoreline and below a steep 20-ft embankment that rises to the City of Eugene bike path. These components and riparian vegetation (including maple, alder and poplar trees) help stabilize the shoreline and lower bench area along the Site.
- Fine-grained sediment environments are generally absent due to local geologic and hydrologic conditions of the Willamette River reach, including dominant scour processes along the outer meander bend in the river in this area. The river bed in this area consists of consolidated bedrock (Eugene Formation) overlain primarily by cobble substrate.
- There is limited accumulation of fine-grained (sand and silt) deposits at the small pocket eddy at the downstream end of the FR, and these deposits appear somewhat stable based on the shoreline configuration. Upstream along the lower bench, limited areas of fine-grained deposits may periodically form at local irregularities along the river bank and these deposits principally form by erosion of adjacent bank material. These deposits are ephemeral and are typically eroded from the river bed during periods of higher river flow (e.g., seasonal flow events) exposing the predominant cobble substrate of the reach. These observations are consistent with the dynamic character of the shoreline area described in the conceptual site model for the Site in the Phase I RI Work Plan (Exponent 1998).

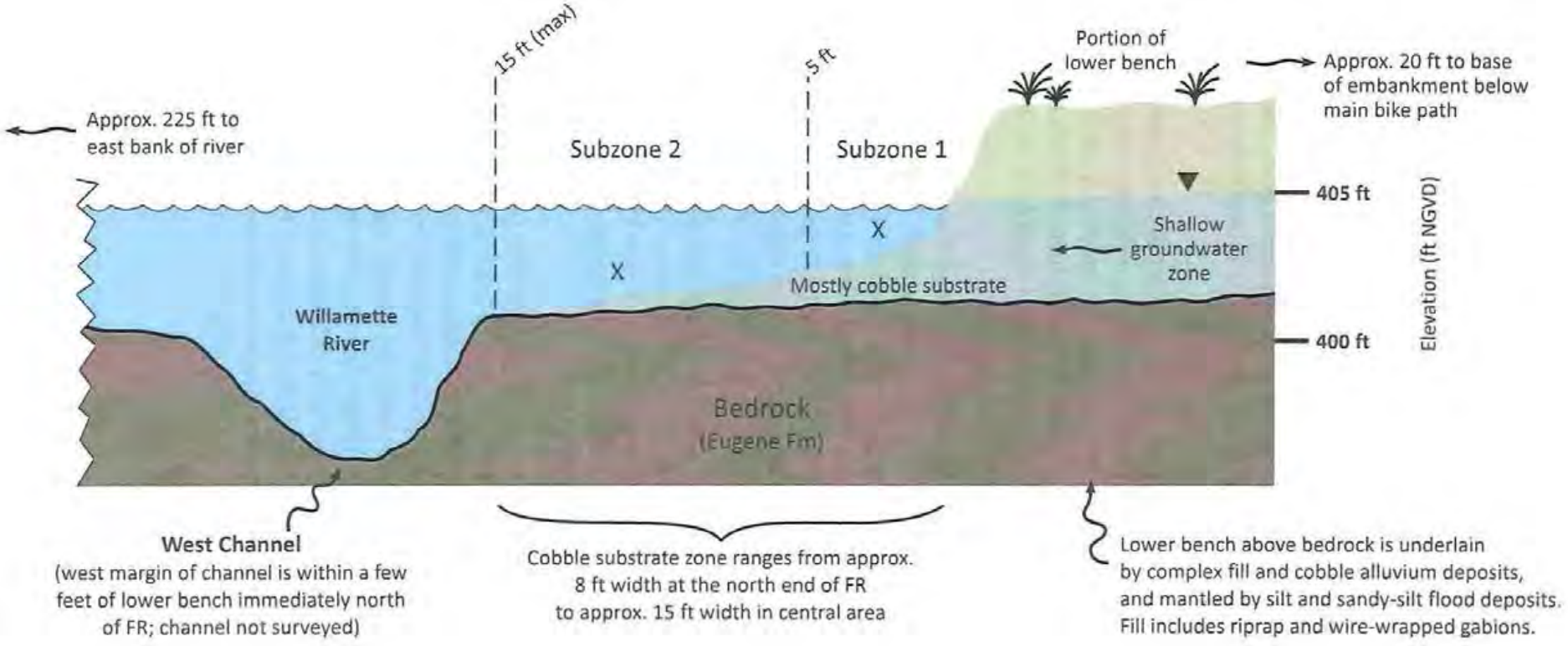


Figure 3-1. Schematic Illustration of Shoreline Conceptual Model
Eugene Former MGP Site; view looking upstream (south) along Focus Reach (FR)

3.2 SITE-SPECIFIC ECOLOGICAL RECEPTORS

The target ecological receptors for the aquatic assessment are juvenile salmonids and the benthic invertebrate community along the FR. The benthic community includes both infaunal and epibenthic invertebrates; however, the principal invertebrates of interest are the high-flow-adapted epibenthic community living on the rocky substrate of the shoreline area along the Site. The rationale for the selection of ecological receptors is presented in Table 3-1 and discussed in greater detail below.

Table 3-1. Aquatic habitats, supported species, and selected ecological receptors

HABITAT TYPE	EXTENT OF HABITAT	SPECIES SUPPORTED	SITE-SPECIFIC RECEPTOR
Low velocity (<1m/s) water column	during periods of low flow, riverbed to water surface along entire length of Site, extending 5 to 20 ft into river from shoreline	migrating adult salmon; small fish (including rearing juvenile salmonids); clinging insects on rocks such as snails and stonefly larvae	assumed juvenile Chinook salmon (representing juvenile salmon and other small fish); benthic invertebrate community
Mixed cobble substrate with some boulders	> 95% of substrate along shoreline extending up to 20 ft out to west-channel thalweg	clinging insects such as stonefly larvae and amphipods	benthic invertebrate community
Mixed sand and silt substrate	small generally fluctuating areas constituting < 4% of substrate along shoreline	*Corbicula* clam, oligochaete worms, snails, and chironomid fly larvae	benthic invertebrate community

3.2.1 Juvenile salmonids

During low flows, low-velocity water column habitat is present along the FR to support fish, including juvenile salmonids. Juvenile salmon rear in the Willamette River in the vicinity of the Site. As a conservative assumption, this assessment assumed that juvenile upper Willamette River Chinook salmon listed as threatened under the Endangered Species Act of 1973, as amended (ESA) are present at the Level II ERA study area (although juvenile Chinook salmon have not been observed there and spawning for Chinook salmon generally occurs a significant distance upstream). The maximum holding velocity for juvenile Chinook salmon is approximately 1 m per second (Healy 1991). At the time of the ecological survey, water velocity < 1 m per second extended from the shore out 5 to 15 or 20 ft, where faster currents prevailed; this distance is significantly reduced under average to higher flows. Juvenile fish species (unidentified) and salmonids (unidentified species) were observed during the 2007 survey. Low-flow conditions likely represent the high end of potential exposure because there is lower groundwater dilution and more favorable holding conditions for juvenile salmonids. No habitat suitable for salmonid spawning has been observed in this reach of the river.

3.2.2 Benthic invertebrate community

As described in Section 3.1, the riverbed adjacent to the Site is primarily cobble substrate overlaying consolidated bedrock. This substrate provides stable benthic epifaunal habitat throughout the FR. Dominant scour processes along the outer meander bend in the river generally limit fine-grained sediment deposition to small (pocket) eddies or other limited depositional areas along shoreline irregularities. At the time of the 2007 ecological survey, approximately 230 ft^2 of fine-grained sediments were identified within the FR, which constituted approximately 5% of the estimated benthic surface area (Windward 2008a). However, during the October 2008 sampling for the Level II ERA, no fine-grained sediment was present in HU9 (an area approximately 130 ft^2), which constituted more than half the total sand/silt habitat identified in the FR during the ecological survey. This sand bar present during the 2007 survey was eroded during 2007-2008 winter flows, revealing the underlying coarse-grained cobble substrate, which is typically observed during all previous times for this area. In addition, as noted in Section 3.4.3.2 and Attachment 2, a majority of the fine-grained deposits sampled at HU5 in October 2008 were eroded during recent (winter 2009) high river flows. The ephemeral nature of these sandy deposits is consistent with the conceptual site model for the general shoreline area which describes insignificant fine-grained sediment accumulation along the immediate reach of the Willamette River (Exponent 1998, 1999).

In rivers, benthic invertebrates are generally limited to a narrow band of habitat near the substrate surface. In fine-grained sediments, invertebrates are generally limited to the top 10 cm because they require surface water for ventilation (e.g., SEA 2002; Boudreau 1998). The decomposition of organic material that settles to the bottom consumes dissolved oxygen, creating an anoxic environment, and releases products that result in the formation of hydrogen sulfide and ammonia. These conditions create a toxic environment for infaunal organisms, thus preventing invertebrates from living at greater depths in the fine-grained sediments (Forbes et al. 1998; Hershey and Lamberti 1998).

In river environments with coarse substrates, such as gravel, cobble, and boulders, macroinvertebrates are adapted to higher flows and use lower-velocity microhabitats to avoid the highest flows (e.g., Merigoux and Doledec 2004). In coarse substrates, the roughness of the bottom helps entrain oxygenated overlying water into the upper portions of the substrate (Hart and Finelli 1999). However, with an increase in depth in a coarse substrate, water velocity diminishes and fines, including organic material, fill in the substrate. Reduced dissolved oxygen (DO) and increased hydrogen sulfide and ammonia from decomposition of organic materials can limit biological activity or conditions suitable to macroinvertebrates at these greater depths.

In the high-flow reaches of the river adjacent to the Site, the benthic invertebrates inhabit the lower-velocity microhabitats found behind, underneath or between boulders, cobble and gravel that typify the bottom substrates. The September 2007 site survey observed insects such as stonefly larvae and amphipods clinging to the predominant rocky substrate. In the limited areas where finer-grained silt and sand accumulated, the benthic invertebrates inhabited the substrate by building burrows or tubes within the finer-grained deposits, as well as living on the sediment surface. The September 2007 site survey observed crayfish, clam (*Corbicula* sp.), and one pearlshell mussel (*Margaritifera falcata*), oligochaetes, snails, and chironomids in these limited and ephemeral fine-grained sediment accumulation areas.

Where an organism lives affects how it might be exposed to contaminants that have been released into the aquatic environment. Benthic invertebrates living on the surface of bottom substrates (epifaunal invertebrates) are potentially exposed to contaminants in the water that flows past them. Invertebrates that live in the sediment (infaunal invertebrates) are exposed to waterborne contaminants in the porewater that they respire. Porewater generally refers to interstitial water in fine-grained sediments. Due to the limited extent of fine-grained sediment in the river adjacent to the Site, there is limited exposure of the benthic invertebrate community to porewater. In addition, the sand present in these limited areas represents a fairly porous medium so that porewater readily exchanges with the overlying water and takes on the characteristics of the overlying water (Hoffman 2005).

Infaunal invertebrates address their need for oxygen through modifications to the sediment environment or behaviors that increase the interchange with overlying water. Mechanisms and behaviors that alter an infaunal organism's exposure to porewater vary by species. Burrowing and tube-dwelling organisms may actively pump overlying water into their burrows or tubes by regular beating of various structures such as pleopods (e.g., crayfish) or cilia, or body undulations or peristaltic contractions (e.g., some softbodied worms) (Riisgard and Larsen 2005). Some infauna construct a U-shaped burrow or tube with one opening slightly higher in elevation than the other—this slight difference in height creates a passive flow-through system that minimizes the metabolic energy required to flush their tubes or burrows (Vogel 1994). The entrainment of overlying water into tubes and burrows oxygenates not only the tube or burrow, but the sediment surrounding the tube or burrow (Satoh et al. 2007).

All invertebrates (whether epifaunal or infaunal) also have potential chemical exposure through feeding. How an organism feeds affects its exposure to porewater contaminants. Filter-feeding organisms are dependent upon food being brought to them by flowing water. Organisms that feed via this mode will extend specialized appendages or structures into the water column to gather food. As an example, a filter-feeding bivalve will extend its siphon above the sediment surface and pump overlying

water via gill ciliary action across the gills, through the mantle cavity and out the siphon. This action limits exposure to porewater, while supporting both feeding and respiration (e.g., *Macoma* clams are estimated to ventilate approximately 10% porewater even when their siphons are retracted inside their burrow (Winsor et al. 1990)). Infauna that feed on organic material below the sediment surface tend to increase the porosity of the sediments by their activities, which increases the exchange of porewater with overlying water (Winsor et al. 1990; Krantzberg 1985).

In summary, the invertebrate communities using the benthic habitats along the FR adjacent to the Site are primarily epifaunal organisms living on the predominantly rocky (cobble) substrate. In these areas, benthic invertebrates occupy the microhabitats that are available on and in the interstices around the cobble substrate. Most of these organisms filter food from the water column or scrape biofilms from rock surfaces so they are exposed to near-bottom surface water and not to porewater. Infaunal organisms are present in the limited areas of finer-grained sand present in small eddies or shoreline irregularities localized along the river bank. Because the presence of sand, a fairly porous medium, allows the porewater to exchange readily with the overlying water and the behavior of infaunal organisms during respiration further ensures that this exchange takes place, examination of near-bottom water quality provides a measure of the exposure of the infaunal organisms to any contamination. Based on these site-specific features and conditions, the evaluation of near-bottom surface water quality provides a reasonable estimate of the maximum exposure to contaminants transported by groundwater due to the mixing with surface water.

3.3 Contaminants of Potential Ecological Concern

PAHs and benzene, toluene, ethylbenzene and xylenes (BTEX) are the groundwater COIs identified in the Level I ERA and are the COIs for the Level II ERA. This section describes the results of additional sampling conducted at the shoreline area for the COIs in order to identify contaminants of potential ecological concern (CPECs) and support the Level II ERA evaluations. After the description of the Level II ERA sampling activities and results, the sampling results are screened against DEQ SLVs.

3.3.1 Level II ERA sampling

Additional environmental sampling was performed on October 12 and 13, 2008, to fill data gaps and support the exposure assessment for the Level II ERA. The sampling of Willamette River surface water was the primary objective of the sampling based on potentially complete exposure pathway assumptions described in the WP/SAP and in this report. Supplemental sampling of sediment and interstitial water was performed to support the Level II ERA and provide a better understanding of the nature and extent of contamination, as requested by DEQ. Mr. Geoff Brown of DEQ visited the field site early on October 13 during interstitial water sampling. Mr. Brown was briefed on the

field activities, and he was shown the sampling stations during a Site walk across the length of the FR along the EWEB property. Detail on the field sampling methods and chemical analyses is provided in the WP/SAP (Axelrod and Windward 2008).

The type and number of samples collected and the sample analyses performed are summarized in Table 3-2. Sampling locations are presented in Figure 3-2. A more detailed description of the field sampling is provided in Attachment 2. Photographs from the October 2008 sampling event are provided in Attachment 3. Form 1 summaries from the laboratory are provided in Attachment 4. Results from data validation of the laboratory results are presented in Attachment 5. Results from output of Pro-UCL statistical calculations are provided in Attachment 6.

Table 3-2. Summary of Level II ERA sampling, October 2008

Media	River Zone	No. of Samples		Analytes
		Subzone 1 (0 to 5 ft from Shore)	Subzone 2 (5 to 15 ft from Shore)	
Surface water	A (upstream)	0	1	PAHs BTEX (Subzone 1 only) TSS conductivity conventionals[a]
	B (focus reach)	6 (+1 field duplicate)	2	
	C (downstream)	0	1	
Interstitial water	B (focus reach)	3	0	
Sediment	B (focus reach)	2 (+1 field duplicate)	0	PAHs TOC total solids grain size

[a] Temperature, pH, dissolved oxygen, and oxygen-reduction potential. All conventional parameters, except conductivity, were measured in the field using a multimeter probe. Conductivity was measured at the contract laboratory (Columbia Analytical Services, Inc.) because the conductivity probe on the field meter was not working properly.

BTEX – benzene, toluene, ethylbenzene, and xylenes

PAH – polycyclic aromatic hydrocarbon

TOC – total organic carbon

TSS – total suspended solids

3.3.2 Analytical results and comparison of the analytical results to SLVs

The results from sampling of surface water, interstitial water, and sediment data are provided in Tables 3-3, 3-5 and 3-6. These data were screened against 2001 DEQ Level II ERA SLVs in accordance with DEQ guidance (DEQ 1998). Screening against these SLVs is a required component of the Level II ERA analysis. COIs that fail the screening comparison are retained as CPECs under the conditions defined subsequently for the various media sampled. COIs which pass the screening comparison are not of ecological concern and are not retained for further evaluation.

In addition, sediment data were screened against the DEQ/US Environmental Protection Agency (EPA) Joint Source Control Strategy (JSCS) SLVs. The JSCS SLVs were developed for the Portland Harbor Superfund site to screen data from upland sites along the Willamette River. Because the JSCS SLVs are risk-based and have been accepted by DEQ for evaluating sediment entering the Willamette River, the values are relevant and included in the draft tables for the purpose of comparison. JSCS SLVs for PAHs in sediment are generally higher than the DEQ Level II ERA SLVs for sediment. With the exception of anthracene, the DEQ Level II ERA SLVs and JSCS SLVs for water are equivalent for ecological receptors so a comparison of water data to JSCS SLVs would be redundant. Note that the DEQ Level II ERA SLV for anthracene in water listed in the DEQ guidance is a typographical error. The original source of the SLV (Suter and Tsao 1996) reports a Tier II secondary chronic value of 0.73 µg/L, whereas, the DEQ Level II ERA SLV listed is 13 µg/L. Suter and Tsao (1996) report 13 µg/L as the anthracene Tier II secondary acute value.

3.3.2.1 Surface water

Surface water sampling results represent the primary medium and exposure concentrations for evaluating risk to aquatic ecological receptors at the FR. The Level II ERA surface water sampling results were compared to 2001 DEQ Level II ERA SLVs to determine if there were any location-specific exceedances (Table 3-3). None of the COIs detected in any individual surface water sample exceeded the DEQ risk-based SLVs.

Surface water data from Zone B were screened to identify CPECs by considering COI detection frequency and by comparison of ECs to SLVs to calculate exceedance factors (EFs) according to DEQ guidance (DEQ 1998). In addition, because multiple COIs were identified for surface water, CPECs were evaluated considering the potential for aggregate exposure to all COIs. COIs were eliminated as CPECs in surface water if the detection frequency was < 0.05 (5%), if the exceedance factor was less than 1.0, or if the sum of exceedance factors for all COIs was less than 1.0. Identification of CPECs using an exceedance factor of 1.0 rather than 5.0 is appropriate because juvenile Chinook salmon, the most conservative potential receptor species for surface water, is a threatened species under the ESA.

Table 3-3. COI concentrations in surface water samples compared to SLVs

Analyte	Upstream (Zone A)	Focus Reach (Zone B)									Down-stream (Zone C)	DEQ Eco Level II SLV[a]
	SW-A-2	SW-B-1.10	SW-B-1.60	SW-D-1.60 (FD)	SW-B-2.70	SW-B-1.110	SW-B-1.160	SW-B-1.200	SW-B-1.240	SW-B-2.190	SW-C-2	
PAHs												
2-Methylnaphthalene	0.0023 U	0.033	0.0090 J	0.012 J	0.0075 J	0.0080 J	0.011 J	0.0059 J	0.0084 J	0.0040 J	0.0023 U	nv
Acenaphthene	0.0044 U	0.0079 J	0.0076 J	0.0070 J	0.0044 U	0.017 J	0.012 J	0.0044 U	0.026	0.0044 U	0.0044 U	520
Acenaphthylene	0.0034 U	0.0036 U	0.0038 U	0.0046 U	0.0034 U	0.0051 J	0.0034 U	0.0034 U	0.0036 U	0.0034 U	0.0034 U	nv
Anthracene	0.0036 U	0.0038 U	0.0040 U	0.0048 U	0.0036 U	0.0038 U	0.0036 U	0.0036 U	0.0038 U	0.0036 U	0.0036 U	0.73[b]
Benzo(a)anthracene	0.0026 U	0.0027 U	0.0086 U	0.0035 U	0.0026 U	0.0047 U	0.0026 U	0.0026 U	0.0028 U	0.0026 U	0.0026 U	0.027
Benzo(a)pyrene	0.0043 U	0.0045 U	0.0077 J	0.0058 U	0.0043 U	0.0088 J	0.0043 U	0.0043 U	0.0046 U	0.0043 U	0.0043 U	0.014
Benzo(b)fluoranthene	0.0023 U	0.0024 U	0.011 J	0.0031 U	0.0023 U	0.0073 J	0.0023 U	0.0023 U	0.0025 U	0.0023 U	0.0025 U	nv
Benzo(g,h,i)perylene	0.0029 U	0.0030 U	0.0096 J	0.0039 U	0.0029 U	0.0090 J	0.0029 U	0.0029 U	0.0031 U	0.0029 U	0.0029 U	nv
Benzo(k)fluoranthene	0.0025 U	0.0026 U	0.0060 J	0.0034 U	0.0025 U	0.0027 U	0.0025 U	0.0025 U	0.0027 U	0.0025 U	0.0025 U	nv
Chrysene	0.0034 U	0.0036 U	0.0070 U	0.0046 U	0.0034 U	0.0069 U	0.0034 U	0.0034 U	0.0036 U	0.0034 U	0.0034 U	nv
Dibenzo(a,h)anthracene	0.0025 U	0.0026 U	0.0028 U	0.0034 U	0.0025 U	0.0027 U	0.0025 U	0.0025 U	0.0027 U	0.0025 U	0.0025 U	nv
Dibenzofuran	0.0046 U	0.0048 U	0.0052 U	0.0062 U	0.0046 U	0.0048 U	0.0046 U	0.0046 U	0.0049 U	0.0046 U	0.0046 U	3.7
Fluoranthene	0.0044 U	0.0046 U	0.0079 U	0.0059 U	0.0044 U	0.0046 U	0.0044 U	0.0044 U	0.0047 U	0.0044 U	0.0044 U	6.16
Fluorene	0.0038 U	0.0040 U	0.0043 U	0.0051 U	0.0038 U	0.0063 J	0.0061 J	0.0038 U	0.0085 J	0.0038 U	0.0038 U	3.9
Indeno(1,2,3-cd)pyrene	0.0026 U	0.0027 U	0.0089 J	0.0035 U	0.0026 U	0.0028 U	0.0026 U	0.0026 U	0.0028 U	0.0026 U	0.0026 U	nv
Naphthalene	0.0030 U	0.44	0.16	0.17	0.07	0.23	0.21	0.7	0.11	0.047	0.023	620
Phenanthrene	0.0050 U	0.0052 U	0.0056 U	0.0067 U	0.0050 U	0.0093 J	0.0093 J	0.0050 U	0.0053 U	0.0050 U	0.0050 U	nv
Pyrene	0.0035 U	0.0037 U	0.017 U	0.0047 U	0.0035 U	0.0071 U	0.0035 U	0.0035 U	0.0071 U	0.0035 U	0.0035 U	nv
VOCs												
Benzene	na	0.045 U	0.045 U	0.045 U	na	0.16 J	0.15 J	0.045 U	0.045 U	na	na	130
Ethylbenzene	na	0.25 J	0.080 J	0.070 J	na	0.15 J	0.17 J	0.042 U	0.042 U	na	na	7.3
m,p-Xylenes	na	0.078 U	0.078 U	0.078 U	na	0.078 U	0.078 U	0.078 U	0.078 U	na	na	1.8[c]

Analyte	Upstream (Zone A)	Focus Reach (Zone B)									Down-stream (Zone C)	DEQ Eco Level II SLV[a]
	SW-A-2	SW-B-1.10	SW-B-1.60	SW-D-1.60 (FD)	SW-B-2.70	SW-B-1.110	SW-B-1.160	SW-B-1.200	SW-B-1.240	SW-B-2.190	SW-C-2	
o-Xylene	na	0.050 J	0.037 U	0.037 U	na	0.037 U	0.040 J	0.037 U	0.037 U	na	na	1.8[c]
Toluene	na	0.048 U	0.048 U	0.048 U	na	0.10 J	0.048 U	0.048 U	0.048 U	na	na	9.8

[a] DEQ Tier II ERA SLV – Table 1, DEQ Guidance for Ecological Risk Assessment, Level II Screening Level Values for Plants, Invertebrates, and Wildlife Exposed to Soil and Surface Water (DEQ 1998).

[b] The DEQ Tier II ERA SLV incorrectly identified the Tier II acute SLV of 13 µg/L as the Tier II chronic SLV.

[c] The more conservative value for m-xylene is shown.

DEQ – Oregon Department of Environmental Quality
FD — field duplicate
J – estimated concentration
na – not analyzed
nv – no value available for this compound
SLV – screening level value
U – undetected at detection limit shown
PAH – polycyclic aromatic hydrocarbon
VOC – volatile organic compound

Bold values indicate exceedance of the respective SLV: there is none.

ECs were calculated according to DEQ guidance (DEQ 1998) for each media sampled. To ensure that risks are not underestimated, conservative estimates of the average concentration of COIs in water and sediment were determined using USEPA software (ProUCL Version 4 (USEPA 2007a)) to calculate the 90% upper confidence limit on the mean (90% UCL). The 90% UCLs were calculated with ProUCL whenever three or more detected values were reported for a COI within each Zone B sample group. If fewer than three samples had concentrations above the detection limit for a particular COI, then the maximum detected concentration over all samples was used as the EC. If all samples had concentrations below the detection limit, the EC was calculated as half the maximum detection limit. For the calculation of 90% UCLs, samples SW-B-1.60 and SW-D-1.60 (field duplicate) were averaged. If concentrations in both samples were below detection limits, the average detection limit was calculated. 90% UCLs were calculated using ProUCL 4.00.02 (USEPA 2007a), which incorporates algorithms for estimating concentrations below detection limits and incorporating them into UCL calculations.

For a given dataset, ProUCL calculates both parametric (when data conform to a distribution) and non-parametric (when no particular distribution provides a good fit for the data) UCLs and recommends the most appropriate UCL for the empirical data distribution, based on the best professional judgment of the USEPA's ProUCL developers. Although ProUCL calculates 90% UCLs using a variety of methods, it does not recommend which 90% UCL is appropriate for each dataset; instead it recommends appropriate 95% UCLs. Thus, the 90% UCL selected for each COI was calculated using the same method as that of the ProUCL-recommended 95% UCL. The Pro-UCL generated output is presented in Attachment 6. CPEC screening results for the surface water data are presented in Table 3-4.

In Table 3-4, the EC method entitled "90% Student's-t UCL" is calculated for normally distributed data sets where there are no values reported below the detection limit. The critical value for the UCL is obtained from Student's t-distribution (equation 2-32 in the ProUCL Technical Guide (USEPA 2007b)).

The EC method entitled "90% approximate gamma UCL" in Table 3-4 provides a parametric estimate of the 90% UCL on the mean. This method is chosen when the goodness of fit tests indicate that the gamma distribution was the best fit for the data and there were no values reported below the detection limit.

The EC method entitled "90% KM(t) UCL" in Table 3-4 is used when no particular distributional form provides a good fit for the data, and/or the detection frequency is around 60% or less. This method is based upon Kaplan-Meier (KM) estimates of the population mean and standard error, and uses the Student's t critical value in the UCL calculation (given by equation 4-8 in the ProUCL Technical Guide (USEPA 2007b)). The

KM estimates are non-parametric which means they use only the empirical distribution function. This method is particularly advantageous when multiple detection limits are reported. EPA found this method to provide consistent and reliable UCL estimates for data sets with non-detects at all sample sizes (USEPA 2007b).

Table 3-4. CPEC identification from comparison of surface water ECs to SLVs

Analyte	EC (µg/L)	EC Calculation Method	DEQ Eco Level II SLV (µg/L)[a]	Detection Frequency (unitless)	Exceedance Factor (unitless)
PAHs					
2-Methylnaphthalene	0.016	90% approximate gamma UCL	nv	1	ne
Acenaphthene	0.015	90% KM (t) UCL	520	0.63	0.000
Acenaphthylene	ne	ne	nv	0.13	ne
Anthracene	0.0024	one-half detection limit	0.73[b]	0.0	0.003
Benzo(a)anthracene	0.0043	one-half detection limit	0.027	0.0	0.16
Benzo(a)pyrene	0.0088	maximum detect	0.014	0.25	0.63
Benzo(b)fluoranthene	ne	ne	nv	0.25	ne
Benzo(g,h,i)perylene	ne	ne	nv	0.25	ne
Benzo(k)fluoranthene	ne	ne	nv	0.13	ne
Chrysene	ne	ne	nv	0.0	ne
Dibenzo(a,h)anthracene	ne	ne	nv	0.0	ne
Dibenzofuran	0.0031	one-half detection limit	3.7	0.0	0.001
Fluoranthene	0.0040	one-half detection limit	6.16	0.0	0.001
Fluorene	0.0069	90% KM (t) UCL	3.9	0.38	0.002
Indeno(1,2,3-cd)pyrene	ne	ne	nv	0.13	ne
Naphthalene	0.36	90% Student's-t UCL	620	1	0.001
Phenanthrene	ne	ne	nv	0.13	ne
Pyrene	ne	ne	nv	0.0	ne
VOCs					
Benzene	0.16	maximum detect	130	0.33	0.001
Ethylbenzene	0.18	90% KM (t) UCL	7.3	0.67	0.02
m,p-Xylenes	0.0039	one-half detection limit	1.8 [c]	0.0	0.002
o-Xylene	0.050	maximum detect	1.8 [c]	0.33	0.03
Toluene	0.050	one-half detection limit	9.8	0.0	0.01
Sum of Exceedance Factors					**0.86**

[a] DEQ Eco SLV – Table 1, DEQ Guidance for Ecological Risk Assessment, Level II Screening Level Values for Plants, Invertebrates, and Wildlife Exposed to Soil and Surface Water (DEQ 1998).

[b] The DEQ Tier II ERA SLV incorrectly identified the Tier II acute SLV of 13 µg/L as the Tier II chronic SLV.

[c] The more conservative value for m-xylene is shown.

DEQ – Oregon Department of Environmental Quality

EC – environmental concentration

nv – no DEQ value available for this compound

ne – not evaluated because a DEQ SLV was not available

PAH – polycyclic aromatic hydrocarbon

SVL – screening value level

UCL – upper confidence limit on the mean

VOC – volatile organic compound

Based on the screening evaluation presented in Table 3-4, no CPECs were identified for surface water. Concentrations of anthracene, benzo(a)anthracene, chrysene, dibenzo(a,h)anthracene, dibenzofuran, fluoranthene, pyrene, and m,p-xylenes were below detection limits in all samples. Because these COIs were detected in less than 5% of samples, they were screened out as CPECs. In addition, exceedance factors for all individual COIs were less than 1.0, the sum of exceedance factors over all COIs was less than 1.0, and maximum concentrations of each COI were also less than 1.0; therefore, all COIs were screened-out as CPECs for surface water, the primary medium and exposure pathway for the Level II ERA.

3.3.2.2 Sediment

Sediment samples were collected primarily to support the characterization of the nature and extent of contamination and secondarily to address uncertainty regarding exposure of infaunal invertebrates living in the limited fine-grained sediment areas along the FR. Sampling results were compared to 2001 DEQ Level II ERA sediment SLVs to identify locations with elevated concentrations. In addition, sediment data were also compared to Portland Harbor JSCS SLVs for perspective because the JSCS SLVs are risk-based and have been accepted by DEQ for evaluating sediment entering the Willamette River (Table 3-5).

CPECs in sediment were screened by dividing the maximum concentration in any sample by the DEQ Level II ERA SLV to calculate an EF. COIs with an EF of 5.0 or greater were identified as CPECs. Identification of CPECs using an exceedance factor of 5.0 is appropriate because no species in the infaunal benthic invertebrate community at the FR, the community of potential receptors identified for sediment, is federally listed under the ESA. The ecological relevance of these CPECs is discussed in Section 3.4.

Table 3-5. Sediment sampling results compared to SLVs

Analyte	Sample Data (µg/kg dw)			SLV (µg/kg dw)			EFs (unitless)		
	SD-HU5-1.184	SD-HU20-1.184 (FD)	SD-HU3-1.240	DEQ Level II ERA[a]	DEQ Bioaccum[b]	JSCS[c]	DEQ Level II ERA EF	DEQ Bioaccum[b]	JSCS[c]
Dibenzofuran	370	320	0.59 U	5,100	nv	nd	0.1	nc	nv
LPAHs									
2-Methylnaphthalene	*470*	*420*	7	nv	nv	200	nc	nc	2.2
Acenaphthene	***2,700***	***2,200***	620	290	nv	300	**8.4**	nc	**8.2**
Acenaphthylene	***250***	***350***	54	160	nv	200	1.9	nc	1.5
Anthracene	***4,200***	***3,000***	110	57	nv	845	**63**	nc	4.3
Fluorene	***2,500***	***2,000***	**390**	77	nv	536	**29**	nc	4.2
Naphthalene	***3,300***	***3,400***	19	176	nv	561	**19**	nc	**6.0**
Phenanthrene	***17,000***	***13,000***	**260**	42	nv	1,170	**357**	nc	**13**
HPAHs									
Benzo(a)anthracene	***1,900***	***2,000***	**270**	32	nv	1,050	**61**	nc	1.9
Benzo(a)pyrene	***2,100***	***2,200***	**360**	32	nv	1,450	**67**	nc	1.5
Benzo(b)fluoranthene	1,500	1,600	280	nv	nv	nv	nc	nc	nv
Benzo(g,h,i)perylene	***1,400***	***1,400***	260	300	nv	300	4.7	nc	4.7
Benzo(k)fluoranthene	**470**	**520**	**93**	27	nv	13,000	**18**	nc	0.0
Chrysene	***1,900***	***2,000***	**320**	57	nv	1,290	**34**	nc	1.5
Dibenzo(a,h)anthracene	**260**	**270**	**50**	33	nv	1,300	**8.0**	nc	0.2
Fluoranthene	***5,700***	***4,700***	**560**	111	37,000	2,230	**47**	**0.14**	2.3
Indeno(1,2,3-cd)pyrene	***1,300***	***1,300***	***250***	17	nv	100	**76**	nc	**13**
Pyrene	***7,700***	**6,700**	**790**	53	1,900	1,520	**136**	**3.8**	4.7
Total LPAHs	**30,420**	**24,370**	**1,460**	76	nv	nv	**360**	nc	nv
Total HPAHs	**24,230**	**22,690**	**3,233**	193	nv	nv	**122**	nc	nv
Total PAHs	**54,650**	**47,060**	**4,693**	1,610	nv	nv	**32**	nc	nv
Total organic carbon (%)	1.30	1.01	1.73	nv	nv	nv	nc	nc	nc

[a] DEQ Eco SLV – Table 1, DEQ Guidance for Ecological Risk Assessment, Level II Screening Level Values for Plants, Invertebrates, and Wildlife Exposed to Soil and Surface Water (DEQ 1998).

[b] *DEQ Guidance for Assessing Bioaccumulative Chemicals of Concern in Sediment,* Table A-1a, Sediment Bioaccumulation Screening Level Values (SLVs) (DEQ 2007a).

[c] JSCS SLV – Table 3-1, *Portland Harbor Joint Source Control Strategy, Screening Level Values for Soil/Storm Water Sediment, Storm Water, Groundwater and Surface Water* (DEQ and EPA 2005).

DEQ – Oregon Department of Environmental Quality

dw – dry weight

EC – environmental concentration (sample result)

EF – environmental factor (= EC/SLV)

FD –field duplicate

HPAH – high-molecular-weight polycyclic aromatic hydrocarbon

JSCS – Joint Source Control Strategy

LPAH – low-molecular-weight polycyclic aromatic hydrocarbon

nc– not calculated (no SLV available)

nv – no value available for this compound

PAH – polycyclic aromatic hydrocarbon

SLV – screening level value

U – undetected at detection limit shown

Bold text indicates value exceeds 2001 DEQ ecological screening level guidance value by a factor of 5.0.

Italics text indicates value exceeds JSCS screening level value by a factor of 5.0.

Fluoranthene and pyrene are identified as bioaccumulative chemicals in *DEQ Guidance for Assessing Bioaccumulative Chemicals of Concern in Sediment* (DEQ 2007a), and were therefore also screened against bioaccumulative SLVs. Bioaccumulative CPECs were screened by dividing the maximum concentration in any sample by the bioaccumulative SLV to calculate an EF according to DEQ guidance (DEQ 1998). COIs with an EF of 1.0 or greater were identified as bioaccumulative CPECs. In addition, if the sum of bioaccumulative EFs was greater than 1.0, those COIs with EFs greater than 0.1 were identified as bioaccumulative CPECs.

Concentrations of all PAHs in sample SD-HU5-1.184 were higher than those in sample SD-HU3-1.240, generally by approximately an order of magnitude.

Although there is only a small amount of ephemeral fine-grained deposits along the FR supporting a minority fraction of the benthic community, to address uncertainty regarding exposure to these organisms, sediment chemistry data were compared with SLVs to determine CPECs following DEQ guidance (DEQ 1998), and also to JSCS SLVs for comparison. CPEC screening was determined from the maximum concentration because the number of samples was too low to calculate 90%UCLs. Therefore, screening was conducted using the average of SD-HU5-1.184 and SD-HU20-1.184 (the field duplicate for SD-HU5-1.184) data. With the exception of acenaphthylene and benzo(g,h,i)perylene, concentrations of all PAHs measured in sample SD-HU5-1.184 exceeded the Level II ERA SLVs by a factor of 5.0 or more.

Thus, these PAHs are identified as CPECs in sediment. In contrast, when compared to the more recent JSCS SLVs, only four PAHs (acenaphthene, naphthalene, phenanthrene, and indeno(1,2,3-cd)pyrene), exceed SLVs by a factor of 5.0 or more. Pyrene also exceeded the DEQ bioaccumulation SLV for fish (by a factor of 3.8) and is identified as a bioaccumulative CPEC. In addition, although fluoranthene did not exceed the bioaccumulative SLV, it is identified as a bioaccumulative CPEC because it has an exceedance factor greater than 0.10 (EF = 0.14), and the sum of the fluoranthene and pyrene exceedance factors is greater than 1.0 (DEQ 2007a).

In sample SD-HU3-1.240, concentrations of eight individual PAHs (fluorene, phenanthrene, benzo(a)anthracene, benzo(a)pyrene, chrysene, fluoranthene, indeno(1,2,3-cd)pyrene, and pyrene) and three PAH mixtures (low-molecular-weight PAH [LPAH], high-molecular-weight PAH [HPAH], and total PAH) exceed Level II ERA SLVs by a factor of 5.0 or more. In contrast, when PAH concentrations in sample SD-HU3-1.240 were screened with the more recently derived JSCS SLVs, only indeno(1,2,3-cd)pyrene exceeded its respective SLV (by a factor of 2.5).

Based on these data, concentrations of PAHs in the limited area of sediment at location HU5-1.184 are elevated above Level II ERA, JSCS, and two bioaccumulative SLVs. In contrast, PAH concentrations from location HU3-1.240, which is approximately 50 ft

downstream, are much lower and exceed only the conservative Level II ERA SLVs for a few chemicals. As noted below in Section 3.4.3.2 and Attachment 2, the majority of the fine-grained sediment sampled at HU5 in October 2008 was eroded between October 2008 and March 2009 during high river flows.

3.3.3 Comparison of Interstitial and surface water concentrations

Interstitial water samples were collected for general comparison to the near-bottom surface water samples and to support characterization of the nature and extent of contamination. Although these data are not intended to characterize ecological exposure (Axelrod and Windward 2008), individual sample data for each COI were compared to 2001 DEQ Level II ERA surface water SLVs for perspective (Table 3-6). In addition, CPECs in interstitial water were identified as those COIs with the maximum concentration from any sample exceeding its respective SLV by a factor of 5.0 or more. Identification of CPECs using an exceedance factor of 5.0 is appropriate because no species in the benthic invertebrate community, the potential receptor most closely associated with interstitial water, is federally listed under the ESA. The ecological relevance of these CPECs is discussed in Section 3.4.

The PAH and BTEX concentrations in interstitial water from stations B-1.160 and B-1.240 were higher than those in co-located surface water. PAH concentrations from station B-1.160 were on average three orders of magnitude higher in interstitial water than in surface water, and BTEX concentrations were on average two orders of magnitude higher in interstitial water than in surface water. PAH concentrations from station B-1.240 were on average two orders of magnitude higher in interstitial water than in surface water, and BTEX concentrations were on average an order of magnitude higher in interstitial water than in surface water. PAH concentrations from station B-1.60 in interstitial and surface water were similar, whereas interstitial water BTEX concentrations were on average an order of magnitude higher than surface water BTEX concentrations.

Conductivity and total suspended solids (TSS) were also higher in all three interstitial water samples than in co-located surface water samples, confirming that the interstitial water represents groundwater. Conductivity of groundwater collected at contaminated wells upgradient on the Site varies, but typically ranges from 200 to 400 µMHOS/cm (Exponent 2000). In addition, the high TSS in samples IW-B-1.160 and IW-B-1.240 indicates the presence of particulates, likely contributing to the PAH concentrations reported in these samples. Overall, comparison of interstitial water samples taken from approximately 1 ft below the substrate surface and co-located surface water samples taken from approximately 1 inch above the substrate surface confirm the groundwater dispersion (mixing zone) model in the Phase I RI (Exponent 2000). That evaluation

Table 3-6. Interstitial water sampling results compared to co-located surface water results

Analyte	B-1.60 (7-to-9-in. depth)			B-1.160 (9-to-11-in. depth)			B-1.240 (11-to-13-in. depth)			DEQ Level II ERA SLV (µg/L)[a]
	IW (µg/L)	SW (µg/L)	IW:SW Ratio (unitless)	IW (µg/L)	SW (µg/L)	IW:SW Ratio (unitless)	IW (µg/L)	SW (µg/L)	IW:SW Ratio (unitless)	
PAHs										
2-Methylnaphthalene	0.017 J	0.011 J	1.6	26	0.011 J	2364	2.6	0.0084 J	310	nv
Acenaphthene	0.011 J	0.0073 J	1.5	68	0.012 J	5667	17	0.026	654	520
Acenaphthylene	0.0037 U	0.0042 U	0.9	1.8	0.0034 U	529	0.94	0.0036 U	261	nv
Anthracene	0.0040 U	0.0044 U	0.9	**6.6**	0.0036 U	1,833	2.3	0.0038 U	605	0.73 [b]
Benzo(a)anthracene	0.0058 U	0.0061 U	1.0	**1.2**	0.0026 U	462	**1.3**	0.0028 U	464	0.027
Benzo(a)pyrene	0.0047 U	0.0077 J	0.6	**0.83**	0.0043 U	193	1	0.0046 U	217	0.014
Benzo(b)fluoranthene	0.0025 U	0.011 J	0.2	0.66	0.0023 U	287	0.93	0.0025 U	372	nv
Benzo(g,h,i)perylene	0.0032 U	0.0096 J	0.3	0.39	0.0029 U	134	0.75	0.0031 U	242	nv
Benzo(k)fluoranthene	0.0028 U	0.006	0.5	0.23	0.0025 U	92	0.28	0.0027 U	104	nv
Chrysene	0.0065 U	0.0058 U	1.1	1.3	0.0034 U	382	1.5	0.0036 U	417	nv
Dibenzo(a,h)anthracene	0.0028 U	0.0031 U	0.9	0.091	0.0025 U	36	0.14	0.0027 U	52	nv
Dibenzofuran	0.0050 U	0.0057 U	0.9	*3.9*	0.0046 U	848	0.43	0.0049 U	88	3.7
Fluoranthene	0.016 U	0.0069 U	2.3	5.6	0.0044 U	1,273	*7.9*	0.0047 U	1,681	6.16
Fluorene	0.0055 J	0.0047 U	1.2	**24**	0.0061 J	3,934	*8.6*	0.0085 J	1,012	3.9
Indeno(1,2,3-cd)pyrene	0.0029 U	0.0089 J	0.3	0.39	0.0026 U	150	0.7	0.0028 U	250	nv
Naphthalene	0.22	0.165	1.3	85	0.21	405	0.8	0.11	7.3	620
Phenanthrene	0.015 J	0.0062 U	2.4	47	0.0093 J	5,054	7.4	0.0053 U	1,396	nv
Pyrene	0.018 U	0.011 U	1.7	8.9	0.0035 U	2,543	10	0.0071 U	1,408	nv
VOCs										
Benzene	1.2	0.045 U	26.7	*170*	0.15 J	1,133	0.36 J	0.045 U	8	130
Ethylbenzene	3	0.075 J	40.0	**260**	0.17 J	1,529	0.050 J	0.042 U	1.2	7.3
m,p-Xylenes	0.76	0.078 U	9.7	*16*	0.078 U	205	0.28 J	0.078 U	3.6	1.8 [c]

Analyte	B-1.60 (7-to-9-in. depth)			B-1.160 (9-to-11-in. depth)			B-1.240 (11-to-13-in. depth)			DEQ Level II ERA SLV (µg/L)[a]
	IW (µg/L)	SW (µg/L)	IW:SW Ratio (unitless)	IW (µg/L)	SW (µg/L)	IW:SW Ratio (unitless)	IW (µg/L)	SW (µg/L)	IW:SW Ratio (unitless)	
o-Xylene	2.1	0.037 U	56.8	*52*	0.040 J	1,300	0.13 J	0.037 U	3.5	1.8 [c]
Toluene	0.14 J	0.048 U	2.9	2.4 J	0.048 U	50	0.23 J	0.048 U	4.8	9.8
Conventionals										
Conductivity (µMHOS/cm)	75	47	na	195	46	na	246	47	na	na
TSS (mg/L)	10	5	na	22	5	na	36	5	na	na
Depth below substrate surface (inches)	7-9	na	na	9 – 11	na	na	11 – 13	na	na	na

[a] DEQ Eco SLV – Table 1, DEQ Guidance for Ecological Risk Assessment, Level II Screening Level Values for Plants, Invertebrates, and Wildlife Exposed to Soil and Surface Water (DEQ 1998).

[b] The DEQ Level II ERA SLV is erroneously reported as 13 µg/L; no samples exceed the reported DEQ Level II ERA SLV of 13 µg/L.

[c] The more conservative value for m-xylene is shown.

DEQ – Oregon Department of Environmental Quality

ERA – ecological risk assessment

IW – interstitial water

SW – surface water

na – not applicable

nv – no DEQ value available for this compound

PAH – polycyclic aromatic hydrocarbon

SVL – screening value level

TSS – total suspended solids

U – undetected at detection limit shown

VOC – volatile organic compound

Bold text indicates value exceeds SLV by a factor of 5.0 or more.

Italics text indicates value exceeds SLV by a factor of 1 to 4.9.

showed that elevated PAH and BTEX concentrations in groundwater are rapidly attenuated at the shoreline area in response to the interaction of low volumes of groundwater with relatively high volumes of river water.

For sample IW-B-1.160, concentrations of four PAHs, benzo(a)anthracene, benzo(a)pyrene, dibenzofuran, and fluorene, and four VOCs, benzene, ethylbenzene, m,p-xylenes, and o-xylene, exceeded their respective surface water SLV. For sample IW-B-1.240, concentrations of four PAHs (benzo(a)anthracene, benzo(a)pyrene, fluoranthene, and fluorene) exceeded surface water SLVs, whereas no VOCs exceeded surface water SLVs. For sample IW-B-1.60, the VOC o-xylene slightly exceeded the surface water SLV.

Although samples were collected at depths below which benthic invertebrates generally occur, interstitial water data were compared with surface water SLVs to identify CPECs following DEQ guidance (DEQ 1998) in order to establish an upper bound regarding maximum potential exposure for benthic invertebrates. Considering results from all three samples, EFs greater than 5.0 were noted for anthracene (EF=9), benzo(a)anthracene (EF=48), benzo(a)pyrene (EF=71), and fluoranthene (EF=6.2). These four COIs are identified as CPECs based on this comparison.

3.4 PRELIMINARY CONCEPTUAL SITE MODEL

This section discusses the preliminary conceptual site model integrating information on ecologically important receptors, assessment endpoints, CPECs, exposure pathways, and potential effects.

3.4.1 Known ecological effects

This section discusses chemical specific factors (from literature) that affect the toxicity and behavior of PAHs and BTEX with respect to fish and benthic invertebrates.

PAHs

Both LPAHs, such as naphthalene, fluorene, phenanthrene, and anthracene, and HPAHs, such as chrysene and benzo(a)pyrene, are acutely toxic to aquatic organisms. Many of the HPAHs are also carcinogenic, mutagenic, or teratogenic to a wide variety of organisms including fish (Moore and Ramamoorthy 1984; Eisler 1987).

In most fish, PAHs are rapidly metabolized and excreted following uptake; thus PAH tissue concentrations are generally low. The major route of elimination is through excretion into bile. Biotransformation and excretion rates can vary widely among fish species (Meador et al. 1995). Fish exposed to PAHs may be induced to produce higher levels of enzymes capable of transforming PAHs to more excretable, but occasionally more toxic, metabolites (O'Connor et al. 1988). Generally, aquatic invertebrates are less

able to metabolize PAHs than aquatic vertebrates, although rates of PAH metabolism vary widely within and between phyla (Meador et al. 1995). Thus, invertebrates tend to be more sensitive to PAHs due to acute lethality by narcosis than other organisms that actively metabolize these compounds.

PAHs tend to adhere to organic matter both in sediments and in the water column. In general, PAHs with higher octanol-water partitioning coefficients (K_{OW}) tend to have a greater tendency to adhere to particulate matter (Varanasi 1989). As a result of adherence to particulates, PAH bioaccumulation and toxicity tends to decrease in the presence of particulate organic matter (Neff 2002).

BTEX

In a review of bioaccumulation and toxicity of monocyclic aromatic hydrocarbons, Neff (2002) notes that BTEX are rapidly volatilized from water and sediment and biodegradation in these media also generally occurs rapidly. BTEX readily bioaccumulates to lipid rich tissues in organisms and are also rapidly eliminated when removed from direct exposure. The toxic mechanism of BTEX is narcosis (Freidig and Hermens 2000).

3.4.2 Candidate assessment endpoints

The candidate assessment endpoint for juvenile salmonids is maintenance of individual juvenile Chinook salmon survival and growth. An individual, rather than population-level assessment endpoint is appropriate for juvenile Chinook salmon because Chinook salmon is a threatened species under the ESA. Reproduction of salmonids is an inappropriate assessment endpoint because salmonids do not spawn in this section of the river, and spawning salmonids would only briefly be present during migration; therefore, reproductive life stages (adults and eggs) are not expected to be exposed to Site contaminants.

An appropriate assessment endpoint for benthic invertebrates is maintenance of survival, growth and/or reproduction of the benthic community, and maintenance of community structure.

3.4.3 Relevant and complete exposure pathways

This section discusses the potential for receptors in the Willamette River to have significant exposure to CPECs. The interpretations presented are based on the screening results presented in Sections 3.3.2 and 3.3.3, and the conceptual site model developed for the shoreline area and Level II screening analysis. The exposure pathway determinations for the shoreline area were made following the criteria presented in technical management decision point (TMDP) 3 '*Ecological Risk Probable?*' of the DEQ Level II screening guidance (DEQ 1998).

For CPECs to pose a potential risk to receptors, the exposure pathway must be complete. An exposure pathway is considered complete if a chemical can migrate from its source to an ecological receptor, and the receptor is exposed via one or more exposure routes at concentrations above risk-based SLVs. Complete exposure pathways can be of varying importance, so key pathways that reflect maximum exposures to ecological receptors are identified as having more importance than pathways likely to provide a very low fraction of the total exposure of receptor to CPECs. Pathways for the exposure of receptors to CPECs were designated in one of three ways: complete and significant, complete and insignificant, or incomplete. Each of these three designations is defined below, including whether it warrants further evaluation in a higher-tiered risk assessment. This section also presents a brief rationale for each designation by exposure pathway. The conceptual site model is presented in Figure 3-2.

- **Complete and significant.** This pathway is identified when there is a direct link between the receptor and chemical via the pathway, and the specific pathway is considered to be potentially important. Pathways classified as complete and significant are recommended for further risk assessment.
- **Complete and insignificant.** This pathway is identified when there is a direct link between the receptor and the chemical via the pathway; however, the significance of this pathway in terms of exposure is considered to be very low. Pathways classified as complete and insignificant are not recommended for further risk assessment.
- **Incomplete.** This pathway is identified when there is no direct pathway between the receptor and the chemical at concentrations above SLVs. Pathways classified as incomplete are not recommended for further evaluation.

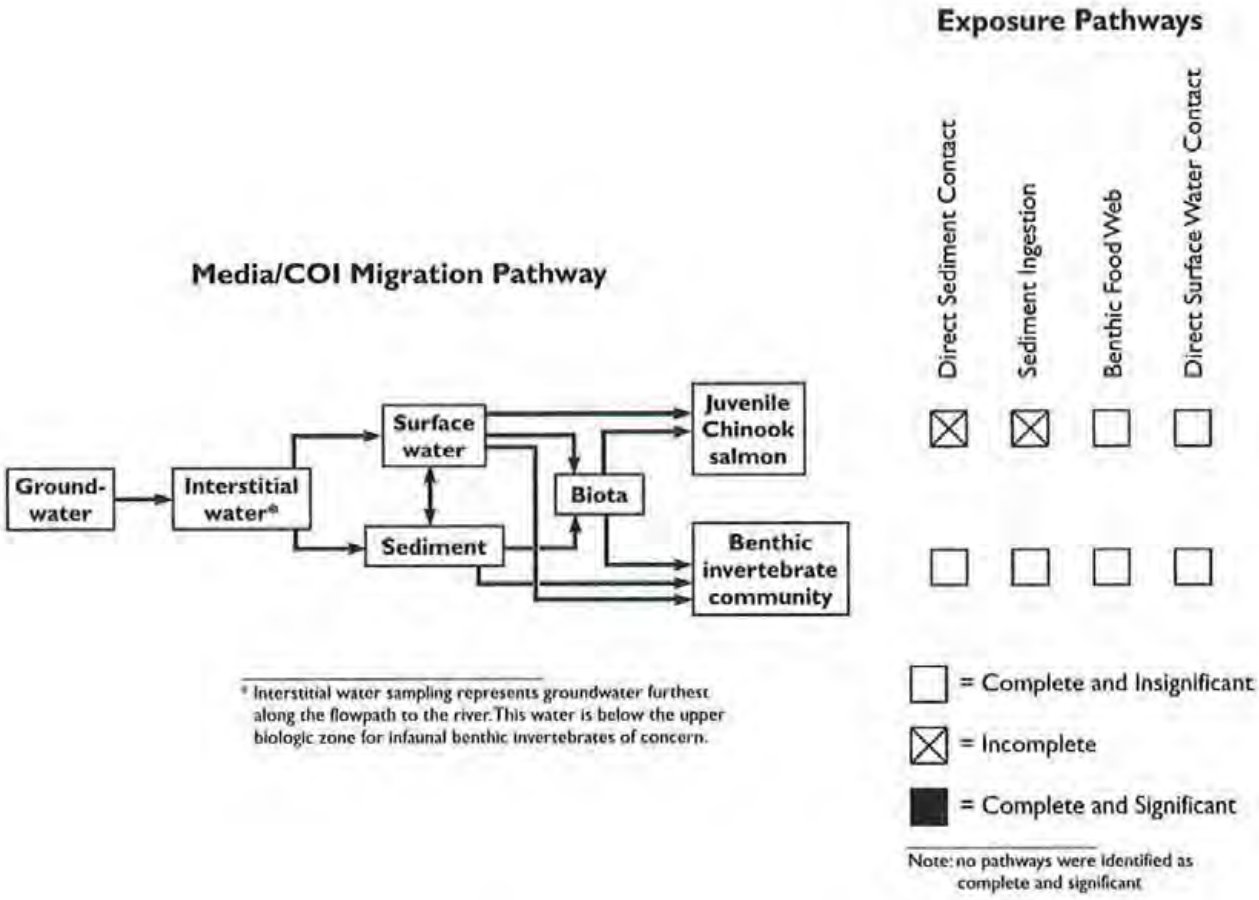


Figure 3-2. Conceptual site model

3.4.3.1 Surface water

Willamette River surface water along the FR is a complete and insignificant exposure pathway for fish, including juvenile Chinook salmon, and the benthic invertebrate community. Surface water is the primary exposure pathway potentially linking upland contamination in groundwater at the Site to fish in the river. Groundwater data collected from upland wells and interstitial water samples collected along the Willamette River indicate that upland contaminants are transported in groundwater to the shoreline zone along the river; however, chemical concentrations in surface water collected within 1 inch of the river bed were below detection limits or below biologically significant concentrations (DEQ 1998) represented by DEQ risk-based SLVs (see Section 3.3.2). Because no CPECs were identified in surface water, fish, including juvenile Chinook salmon, and the benthic invertebrate community exposure to surface water are complete and insignificant exposure pathways.

3.4.3.2 Sediment

Juvenile Chinook Salmon

Direct sediment contact, sediment ingestion, and the sediment-associated benthic invertebrate food web are incomplete exposure pathways for juvenile Chinook salmon. Juvenile Chinook salmon reside in the water column, where they forage mainly on drifting insects and to a lesser extent on benthic invertebrates (Healy 1991), and do not have appreciable amounts of sediment in their stomachs (Cordell 2001). Thus, juvenile Chinook salmon are not likely to be exposed to contaminants through sediment ingestion. Furthermore, although concentrations of fluoranthene and pyrene in sediment slightly exceeded DEQ bioaccumulative SLVs, these CPECs are not likely to pose a risk to juvenile Chinook salmon through the food web.

The surface area of sediments along the Site is very small relative to the area over which juvenile Chinook salmon forage in the river environment. Only two small areas with fine-grained sediment were identified for sampling in October 2008 (HU5 and HU3). The sediment at HU5 (approximately 100 ft^2) comprised a narrow band at the base of the bank shoreline during the 2007 survey and while this material was sampled in October 2008, a majority of the deposits has since been eroded from the area (see further discussion in Attachment 2). The sediment at HU3 (approximately 30 ft^2) is located in a shallow embayment or pocket eddy at the downstream end of the FR and appears relatively stable based on its configuration. Juvenile Chinook salmon grow rapidly during stream residence and shift their habitat use with growth (Healy 1991), so they would not reside for extended periods in these small areas of sediment along the Site. Thus, because of their diet (obtaining a majority of their food from the water column), their habitat use (pelagic), and the limited area of affected sediment at the FR, juvenile Chinook salmon are unlikely to have significant exposure to the Site CPECs in sediment either directly or through the food web.

Benthic Invertebrate Community

Direct sediment contact, sediment ingestion, and the sediment-associated benthic invertebrate food web are complete and insignificant pathways for the benthic invertebrate community. The concentrations of several PAHs in sediment from both HU3 and HU5 were greater than Level II ERA SLVs. However, PAH concentrations from HU3 were generally below the more recently derived JSCS SLVs by comparison. JSCS EFs for PAHs from HU5 also tended to be low (i.e., 13 or lower). The JSCS SLVs are used for screening at other locations in the Willamette River and are included for perspective.

The Site is located on the outside of a meander bend, where turbulent flow limits fine-grained sediment accumulation to small irregularities in the shoreline where flow velocity is significantly reduced. The total area of fine-grained sediment habitat along

the Site was less than approximately 130 ft^2 during sampling in October 2008 and the area has been reduced further due to erosion of the finer-grained deposits from the river bed at HU5 during high river flows between October 2008 and March 2009 (see discussion in Attachment 2). Therefore, although some benthic invertebrates may be exposed to CPECs in fine-grained sediments, any exposure would be limited to an insignificant fraction of the overall benthic invertebrate community along the FR.

3.4.3.3 *Interstitial water*

The exposure of benthic invertebrates to interstitial water is an incomplete exposure pathway. Anthracene, benzo(a)anthracene, benzo(a)pyrene, and fluoranthene were identified as CPECs in interstitial water because maximum concentrations were more than five times greater than surface water SLVs. Despite the SLV exceedances, benthic invertebrates are not likely to come into contact with elevated concentrations of PAHs and BTEX from the Site because the depths at which the water samples were collected (i.e., 7 to 13 inches below the river bed) is not a depth where benthic invertebrates occur generally.

The surface substrate at sampling location B-1.240 (the downstream pocket eddy at HU3) was fine-grained sand and silt; and in such fine-grained sediments, invertebrates are generally limited to the top 10 cm (e.g., SEA 2002; Boudreau 1998). The surface substrate at locations B-1.60, and B-1.160 was cobble; and at the depths sampled (9 to 13 inches), the interstices of the cobble substrate are filled with fine-grained (silt and sand) sediment. As depth increases in such coarse-grained substrates, water velocity diminishes, fines accumulate in the interstices, and the biological activity or presence of potential benthic receptors of concern is reduced or eliminated (see Section 3.2). Because these samples were collected at depth (as requested by DEQ), they are interpreted to represent concentrations in a subsurface zone where benthic invertebrate species are generally not present. As described previously in this report, the interstitial water samples represent groundwater furthest along the flow path to the river, and this water is below the biologic zone of infaunal benthic invertebrates. In addition, these data were collected principally to support nature and extent understanding and to establish an upper bound (i.e., worst-case) potential exposure for infaunal benthic organisms if they were present. Overall, comparison of interstitial water samples collected from approximately 1 ft below the substrate surface and co-located surface water samples collected from approximately 1 inch above the substrate surface show that COIs are attenuated in the shoreline zone below levels of concern, confirming the groundwater dispersion (mixing zone) model in the Phase I RI (Exponent 2000).

4 Conclusions and Recommendations

This section presents the conclusions and recommendations of the Level II ERA based on analysis of the ecology of the shoreline environment, chemical data collected, and potential for exposure of ecological receptors to COIs under the site-specific conditions. The primary findings of this Level II ERA are as follows:

- The Willamette River adjacent to the Site provides habitat for juvenile fish, including rearing habitat for juvenile Chinook salmon; Chinook salmon spawning occurs a significant distance upstream on the river system.
- The Willamette River adjacent to the Site supports a benthic invertebrate community composed primarily of epibenthic invertebrates on the primarily rocky/cobble substrate
- Because of the hydraulic and substrate characteristics of the river along the FR, there is limited fine-grained sediment present to support an infaunal benthic invertebrate community.
- Surface water represents the primary potential pathway for contaminated groundwater to expose aquatic ecological receptors to COIs. All COI concentrations in surface water collected from throughout the FR at 1 inch above the river bed were below detection limits or below biologically significant concentrations (conservative risk-based SLVs established by DEQ), and no surface water CPECs were identified; therefore, surface water was determined to be a complete and insignificant exposure pathway for fish and the benthic invertebrate community, and risk from this pathway is acceptable.
- Some sediment COI concentrations from the two fine-grained sediment locations sampled within the FR exceeded conservative risk-based SLVs. However, sediment represents an insignificant pathway for the benthic invertebrate community to be exposed to COIs in contaminated groundwater because there is a very small amount of fine-grained sediment in the FR and fine-grained sediments constitute a small fraction of the available habitat. The sediment has also been demonstrated to be ephemeral for a majority of the FR. Therefore, although some benthic invertebrates may be exposed to CPECs in sediments at the FR, any exposure would be limited to an insignificant fraction of the benthic invertebrate community in the FR.
- Interstitial water data from the Site represents COI concentrations in groundwater furthest along the flow path to the Willamette River. Water samples collected from below and above the bed of the river demonstrate that COIs are attenuated in the shoreline zone below levels of concern. These sampling results confirm the findings from earlier dispersion modeling analyses presented in the

Phase I RI report. Invertebrates are not likely exposed to interstitial water at the depths sampled, and surface water data better represent concentrations to which epibenthic invertebrates, the predominant invertebrates at the site, are exposed.

- The ecological survey determined that the aquatic habitats along the FR support a diverse benthic community, including several long-lived species (e.g., *Corbicula* and freshwater mussel), as well as species indicative of good water quality, such as stonefly larvae. Therefore, COIs in groundwater do not appear to be adversely affecting the condition of the benthic community. In addition, the FR provides good-quality instream and supporting upland habitat (vegetation shade and cover) for rearing fish, including juvenile salmonids.
- Addressing the ecological risk conditions for aquatic receptors at the shoreline area along the Site should address ecological risk concerns from groundwater discharge along the shoreline area on the UO property based on similarity of the habitat conditions and COIs for both properties, and because the former MGP operated during the same period of time and generally in the same manner on both properties.

In conclusion, the findings of this Level II ERA show that there is no unacceptable risk to the aquatic ecological receptors present in the Site shoreline area. Based on these findings, and in accordance with TMDP 3 of the DEQ Level II screening guidance (DEQ 1998), no further ecological investigation is necessary.

5 References

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March 22, 2000

Marilyn Daniel
Department of Environmental Quality
Western Region Eugene Office
1102 Lincoln Street, Suite 210
Eugene, Oregon 97401

RE: WORKPLAN FOR INTERIM SOIL CLEANUP

FOR: WESTERN PARCEL
UNIVERSITY OF OREGON
RIVERFRONT RESEARCH PARK
EUGENE, OREGON

Dear Marilyn:

This letter report presents a forwards a survey of the Western Parcel Area of the University of Oregon Riverfront Research Park that identifies the eastern portion of the study area where no further action has been recommended. The recommendation for no further action for the eastern portion of the Western Parcel study area was included in a report prepared by Bergeson-Boese & Associates, Inc. (BB&A) titled *Subsurface Investigation of Western Parcel*. In a letter dated January 7, 1999, the Department of Environmental Quality (DEQ) requested that a survey be performed to delineate the area of the Western Parcel requiring no further action from the portion of the site that will need to be addressed through the Remedial Investigation/Feasibility Study (RI/FS) process. The basis for the delineation was the three (3) clean monitoring wells at the subject property.

A survey of the Western Parcel was performed by licensed surveyors from Ford-Ness-Fassbender of Eugene, Oregon. Information regarding the location of the boundary to separate the two (2) areas of the Western Parcel was provided to the surveyors by personnel of BB&A. The boundary is a northeast trending line along monitoring wells MW-1, MW-2, and MW-4 (i.e., the clean wells). The survey has identified two (2) areas of the Western Parcel designated as P-A and P-B. These areas are shown on the Site Map (Figure 1) included as an attachment to this letter report. A copy of the survey is also included as an attachment to this

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letter report. A third area included on the survey map designated as P-C includes portions of the Riverfront Research Park that is outside of the Western Parcel study area.

Area P-A which is the western most portion of the Western Parcel is the area to be addressed by the RI/FS process. Area P-B is the portion of the Western Parcel that is recommended for no further action. Area P-B is bounded by monitoring wells MW-1, MW-2, and MW-4 on the west and the channel of the Mill Race on the east. The north boundary is the property line which extends into the Willamette River and the south boundary of area P-B is the south property boundary which is adjacent to the Union Pacific railroad tracks.

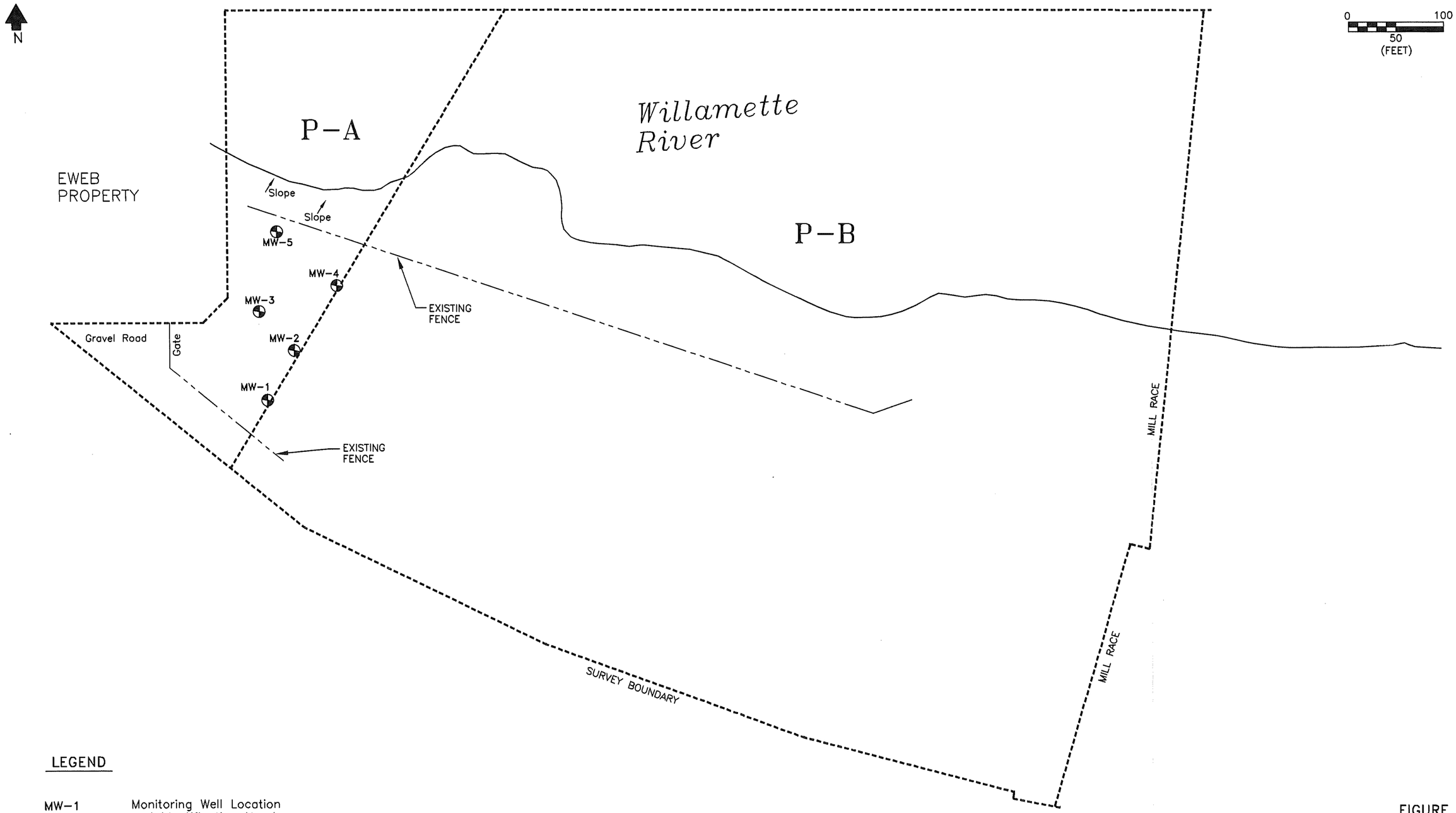
The attached survey should satisfy the DEQ's requirement of a surveyed boundary of the area of the Western Parcel requiring no further action and allow the NFA process to proceed. If you have any questions regarding the attached survey, please feel free to contact me at your convenience.

Sincerely,
Bergeson-Boese & Associates, Inc.

Stephen Lawn
Hazardous Materials Specialist

Attachments

cc: Kay Coots
University of Oregon
Office of Environmental Health and Safety
5224 University of Oregon
Eugene, Oregon 97403-5524



LEGEND

MW-1 — Monitoring Well Location and Identification Numbers

NOTE: SURVEY BOUNDARIES FROM "SURVEY FOR RIVERFRONT RESEARCH PARK" BY FORD-NESS-FASSBENDER.

FIGURE 1

UNIVERSITY OF OREGON-RIVERFRONT RESEARCH PARK

SITE PLAN-WESTERN PARCEL AREA

Bergeson-Boese & Associates, Inc.
Environmental Engineering
65 Centennial Loop
Eugene, Oregon 97401
(541) 484-9484

Job Code:	U001RI.95H
CADD File:	U001RI.DWG
Scale:	1" = 100'
Drawn:	ROBERT ROBINSON
Checked:	STEPHEN LAWN
Date:	03/22/00

ECSI 1018

UNIVERSITY OF OREGON

ENVIRONMENTAL INVESTIGATIONS THROUGH AUGUST 1993

RIVERFRONT RESEARCH PARK
UNIVERSITY OF OREGON

Prepared by:

Squier Associates, Inc., Environmental/Geotechnical Consultants

SEPTEMBER 1993

SQUIER ASSOCIATES

ENVIRONMENTAL INVESTIGATIONS THROUGH AUGUST 1993 RIVERFRONT RESEARCH PARK UNIVERSITY OF OREGON

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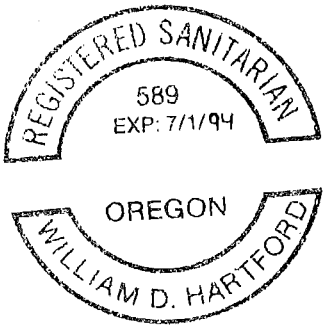
ENVIRONMENTAL INVESTIGATIONS
THROUGH AUGUST 1993
RIVERFRONT RESEARCH PARK
UNIVERSITY OF OREGON

ECSI No. 1018

September 20, 1993



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ENVIRONMENTAL INVESTIGATIONS
THROUGH AUGUST 1993
RIVERFRONT RESEARCH PARK
UNIVERSITY OF OREGON
ECSI No. 1018

1.0 INTRODUCTION

1.1 Objective

This report presents work completed by Squier Associates, Inc., of Lake Oswego, Oregon, on behalf of the University of Oregon. The purpose of the report is to compile, summarize, and present field observations, laboratory analytical data, and office studies completed as parts of environmental investigations conducted at the Riverfront Research Park in Eugene, Oregon, through August 1993. This report has been requested of the University of Oregon by the Voluntary Cleanup Section (VCS) of the Oregon Department of Environmental Quality (DEQ).

1.2 Project Background

The University of Oregon, the City of Eugene, and a private developer are developing the university-related Riverfront Research Park on about 67 acres located between Franklin Boulevard and the Willamette River in Eugene, Oregon (refer, Figure 1).

Between January and August 1990, an Environmental Site Assessment (ESA) was conducted by Squier Associates, Inc., for the entire research park. Prior to implementation of the ESA, the site was divided geographically into the following four areas: the Silva Area, the Western Parcel, the Millrace Parcel, and the Parcel North of the Railroad Tracks, to provide for more easily readable and understandable ESA reports. These four ESA reports are titled:

- Environmental Site Assessment, Silva Area, Riverfront Research Park, University of Oregon, April 1990
- Environmental Site Assessment, Western Parcel, Riverfront Research Park, University of Oregon, May 1990
- Environmental Site Assessment, Parcel North of the Railroad Tracks, Riverfront Research Park, University of Oregon, July 1990; and

- Environmental Site Assessment, Millrace Parcel, Riverfront Research Park, University of Oregon, August 1990.

Evidence of past hazardous materials handling, storage, and disposal was documented in the four ESA reports.

It is our understanding that a private citizen's environmental concern resulted in a meeting with DEQ and the U.S. Environmental Protection Agency (EPA). Subsequent to this meeting, as required by EPA, representatives of DEQ and EPA visited the site and conducted a Preliminary Assessment (PA) under the Federal and State Superfund Programs. The PA was conducted in November 1990 and the site was listed in the DEQ Environmental Cleanup database as Site Number 1018.

Under direction of the University of Oregon, and with task-specific approval as necessary from DEQ, Squier Associates conducted additional environmental investigations based on recommended actions identified in the four 1990 ESAs. A report summarizing additional activities in the Silva Area was submitted to DEQ on February 21, 1991. Subsequent to this report, DEQ issued a letter to the University of Oregon, dated September 6, 1991, stating "No Further Action" was necessary in the Silva Area.

This report summarizes earlier reports and documents additional environmental investigations performed by Squier Associates on the Western Parcel, the Millrace Parcel, and the Parcel North of the Railroad Tracks through August 1993 (refer, Figures 2, 3, and 4, respectively). The purpose of this report is to compile, summarize, and present the additional environmental investigations, and to provide conclusions and recommendations for future action.

2.0 WESTERN PARCEL

2.1 Western Parcel Background

The Western Parcel encompasses the western end of the University of Oregon's Riverfront Research Park. The parcel is located north of Franklin Boulevard and east of the intersection of Hilyard Street and 8th Avenue. The approximate 6-acre site is bounded by the Willamette River on the north, the Millrace outfall and university property on the east, the Southern Pacific Transportation Company (SPTC) railroad right-of-way and tracks on the south, and Eugene Water & Electric Board (EWEB) property on the west. From 1975 to June 1990, the Western Parcel (commonly referred to as the "poleyard") had been leased by EWEB for storage of various materials including utility poles, concrete vaults, water pipes, cable reels, electrical transformers, and other utility related supplies and equipment.

The ESA report on the Western Parcel, as documented in our report titled "Environmental Site Assessment, Western Parcel, Riverfront Research Park, University of Oregon", May 1990, is made part of this report by reference.

2.2 Underground Storage Tanks

Squier Associates had reviewed a list of personal property to be removed by Eugene Sand & Gravel, prior to transfer of the property to the University of Oregon, which identified a petroleum fuel dispensing pump. Therefore, the possible presence of two fuel tanks in the southwest corner of the parcel was investigated. The general location of the tanks and dispensing pumps were identified by the owner of Eugene Sand & Gravel during a site walk through with University of Oregon and Squier Associates staff. The Eugene Sand & Gravel representative remembered where the tanks were located, but could not recall if they were above or below the ground surface.

2.2.1 Field Explorations. On November 7 and 8, 1990, Squier Associates explored the southwest corner of the Western Parcel with a metal detector to evaluate for the presence of underground storage tanks (USTs) (refer, Figure 5). The area between two utility poles, where the tank locations were identified, was surveyed for indications of USTS with a Schonstedt MAC-B51 magnetometer, capable of detecting drums and tanks to about depth 7 to 8 feet.

A site specific Sampling Plan and Safety Plan were prepared prior to initiating the field explorations. The Sampling Plan documented sampling and exploration procedures;

quality assurance/quality control (QA/QC) practices, and work objectives. The Safety Plan was written and implemented to minimize risk during the work activity onsite.

Four areas identified by the magnetometer were excavated to identify detected metal objects; the readings were caused by metal debris. Test pit TP-1 was excavated to about depth 5.5 feet and encountered the metal head of a shovel. Test pits TP-2 and TP-3 were excavated to about depths 4.5 feet and 2 feet, respectively, and uncovered two short sections of pipe. Test pit TP-4, excavated to about depth 3 feet, encountered a 4-foot long section of 3-inch diameter pipe and a 2.5 foot section of smaller diameter pipe. No evidence of USTs or soil contamination were found. Subsequent to initial excavation, an additional scan was made with the magnetometer within each test pit, and no additional indications of metal were found.

2.2.2 Conclusions and Recommendations. The UST magnetometer search, including backhoe excavation of detected anomalies, did not discover evidence of underground storage tanks. It is probable the tanks were portable above ground tanks which could be moved to the construction site, which would have been more likely for a sand and gravel operation. Based on the results of investigations for UST's in this area, Squier Associates' current opinion is that no further action is recommended.

2.3 Discolored Soils (EWEB-2)

In the Western Parcel ESA, visually discolored soils were identified within an area of the property used by EWEB, identified as location EWEB-2 (refer, Figure 5). Knowledgeable EWEB personnel indicated that concrete vaults were manufactured in this area and that the wooden vault forms were coated with waste oil to prevent adherence of concrete. In a soil sample collected during the ESA at about depth 1 foot, a concentration of total petroleum hydrocarbons (TPH) at 5,500 parts per million (ppm) was detected; however, no polychlorinated biphenyls (PCBs) were detected.

2.3.1 Field Explorations. On October 7, 1992, Squier Associates provided additional remedial investigation in area EWEB-2. Excavation work was performed using a Komatsu PC150 track-hoe provided and operated by Staton Construction, Inc., of Eugene, Oregon. The excavation work was observed by Squier Associates staff who identified and located the EWEB-2 excavation site, documented observations, and collected representative soil samples (refer, Figure 5). A site-specific Work Plan was

written and approved by DEQ according to the agreement between DEQ and the University of Oregon. The Work Plan included objectives, scope of work, and a site specific Sampling Plan which described the sampling procedures and QA/QC practices that were to be implemented (refer, Appendix A). A Safety Plan was written and implemented to minimize risk during the work activity onsite. The following subsequent work, field explorations, chemical analysis, and conclusions and recommendations were completed in this area.

Prior to the commencement of excavation activities the track-hoe's bucket was cleaned by scraping and brushing. The track-hoe hydraulic lines and cylinders were examined and no leaking hydraulic fluid was observed. Approximately 2 cubic yards of material was excavated and placed on 6 mil plastic sheeting. The excavation, measuring approximately 3 feet by 6 feet encountered concrete rubble to about depth 1 foot below ground surface, followed by fill. The excavation was terminated in concrete which covered the entire base of the excavation at a maximum depth of about 2.8 feet. Field observations suggest that the concrete was poured out during equipment cleaning and was not related to a former structure.

Five representative soil samples, including one duplicate sample, were collected from the excavation sidewalls, and two additional samples were taken from the excavated material. In addition, an equipment rinsate sample (sample number EWEB-2EQ) was collected. Sample locations were based on gross indicators of contamination and/or the depth observed to be most likely contaminated. The base of the excavation was not sampled, due to the presence of the concrete slab. Samples were collected according to the Work Plan. In brief, a 4-ounce glass jar with a septum lid, and a 9-ounce glass jar with a Teflon lid liner were filled, using a stainless steel trowel, at each sample location from approximate depths 1.5 to 2.5 feet.

The soil samples were designated with the prefix EWEB-2 and then a unique suffix pertaining to the specific location in the excavation. Two samples collected from the western wall of the excavation, EWEB-2W1 and EWEB-2W2 (duplicate of EWEB-2W1), and a soil sample collected from the eastern wall of the excavation (EWEB-2E), were submitted for chemical analyses. The soil samples collected from the northern and southern excavation walls, EWEB-2N and EWEB-2S, respectively, were archived with the analytical laboratory. The two soil samples analyzed from the excavation stockpile, EWEB-2P1 and EWEB-2P2, were collected at an approximate depth of 0.8 feet.

The excavation was lined with 6 mil plastic and the excavated materials were then returned to the excavation. The plastic sheeting was folded and secured over the top of the excavation and lumber and concrete debris was placed on top of the plastic to prevent dislodgement of the plastic sheet by wind.

2.3.2 Chemical Analyses. The representative soil samples were labeled and immediately placed on ice in a secured insulated chest. Chain of custody records were completed to document the collected samples. Seven soil samples and one equipment rinse water sample collected from the EWEB-2 Area were delivered to the sample receiving clerk at Pacific Environmental Laboratory (PEL) in Beaverton, Oregon, under chain of custody. Six of the samples, including one duplicate sample and one equipment rinse sample, were submitted for chemical analyses while the two remaining soil samples were archived by PEL. The six samples were chemically analyzed for the following parameters:

- TPH using the Oregon Administrative Rules (OAR) Modified EPA Method 418.1;
- Volatile Organic Compounds (VOCs) using EPA Method 8240; and
- total lead, chromium and cadmium by EPA Method 7000 series.

VOCs and cadmium were not detected in soil samples collected from the EWEB-2 Area. TPH was detected in the five soil samples at concentrations ranging from 200 ppm to 520 ppm. Analysis of the equipment rinse sample detected TPH at 41 ppm. Lead concentrations ranged from 6.8 ppm to 12 ppm, and chromium concentrations ranged from 7.3 ppm to 12 ppm; cadmium was not detected.

The analytical results are summarized in Table 1. Complete copies of the analytical results and QA/QC from PEL are included for reference in Appendix B. Squier Associates has copies of the complete laboratory data sheets, which include all laboratory work sheets; these are available from Squier Associates upon request.

2.3.3 Conclusions and Recommendations. DEQ appropriate state regulations pertaining to UST cleanups are OAR 340-122-305 through 360. The current regulations, effective March 1, 1991, establish numeric soil cleanup standards for the remediation of motor fuel and heating oil releases from USTs, pursuant to Oregon Revised Statutes (ORS) 466.745. These rules are also used as guidance for other non-UST petroleum

releases, such as occurred at this location. Under these rules, to determine a specific numeric cleanup level, the site must be evaluated according to the five site-specific steps of the Soil Matrix procedure. Squier Associates conducted a Soil Matrix evaluation for the Riverfront Research Park during earlier work (refer, Figure 6). According to this evaluation, the site should be classified as a Level II site. In this regard, the numerical soil cleanup for the site is as follows: gasoline, 80 ppm; diesel, 500 ppm; and heavy oil, 500 ppm.

Chemical analyses of soil samples collected from the sides of the excavation detected a level of petroleum hydrocarbons in one sample four percent (520 ppm) above the numeric soil cleanup level of 500 ppm; which is less than the Matrix II cleanup level plus 10 percent (550 ppm). The collected sample results indicate that petroleum hydrocarbon levels are consistent with the numeric soil cleanup level. The concentration of petroleum hydrocarbons found in these soil samples collected at about depth 1.5 to 2.5 feet, were approximately an order of magnitude less than the concentrations found in the earlier sample collected at approximately 1 foot. VOCs and PCBs were not detected. In addition, lead and chromium sample levels appear consistent with other analytical results obtained in the Riverfront Research Park. The concentrations of chromium and lead detected in the collected soil samples are less than the DEQ Soil Cleanup, Appendix 1, values. Therefore, Squier Associate's current opinion is that no further action is considered necessary in this area.

2.4 Western Boundary of Property

The Western Parcel ESA report documents that on October 15, 1984, Pittsburgh Testing Laboratory (PTL) placed a soil boring near the eastern boundary of the Eugene Water & Electric Board (EWEB) property, which adjoins the University of Oregon Western Parcel on its western boundary (refer, Figure 5). The boring was placed for geotechnical purposes at the City of Eugene's request. A record of the boring reports a creosote-like contamination detected at about depth 4 feet, although no samples were collected for chemical analyses. Historically, Cascade Natural Gas Corporation operated a water gas synthesis plant on the adjacent EWEB property.

2.4.1 Field Explorations. The Work Plan developed for the Western Parcel Area included work to be completed along the Western Boundary. Excavation work in this area was also accomplished using the Staton Construction track-hoe on October 7,

1992. Again, the track-hoe bucket was cleaned by scraping and brushing. The excavation work was observed by Squier Associates staff who located the excavation sites, documented observations, and collected representative soil samples.

Eight excavations, designated test pit EX-1 through test pit EX-8, were excavated on University of Oregon property, along and near the common western boundary shared by EWEB and the University of Oregon (refer, Figures 2, 5, and 7). The test pits were excavated to depths ranging from about 1.0 to 3.5 feet.

Excavation of a 50-foot long exploratory trench in this area was originally planned, according to the written Work Plan approved by DEQ. However, upon the start of excavation, in the vicinity of EX-1, heat discolored cobble with dark gray discolored soil and a slight petroleum-like odor was observed at about depth 1.2 to 2.0 feet. Rather than continuing to further excavate the planned exploratory trench and stockpiling possible contaminated material, a field decision was made to collect representative analytical samples and replace the excavated material in the excavation. DEQ was notified of the field decision to excavate test pits rather than the proposed 50-foot long trench. A subsequent decision was made to excavate seven additional test pits farther to the south, north, and east to evaluate the lateral extent of the observed discolored soils, with the collection of selected representative soil samples. The first test pit, EX-1, was placed approximately 13 feet south of the reference utility pole, within about 5 feet of the University of Oregon property boundary (refer, Figure 7).

In test pit EX-2, placed further south along the property line, discolored cobble and sand, but no associated odor, was encountered at approximate depth 1 foot. In test pit EX-3, placed approximately 9 feet north of the utility pole along the western boundary line, discolored soil and rock was encountered at about depth 1.2 to 2.0 feet. Soil samples of carbonaceous material, which appeared to consist of charred sawdust, charred wood chips (approximately 1 centimeter by 0.5 centimeter), and discolored rock were collected from test pit EX-3. An additional sample was collected into a zip-closure polyethylene bag for further office evaluation. In test pit EX-4, placed 28 feet east and 14 feet north of the utility pole, there was no visual evidence of discolored soils or cobbles. In test pit EX-5, placed 36 feet north and 4 feet east of the utility pole, there also was no visual evidence of discolored soils or rock. In test pit EX-6, placed 33 feet north and 8 feet west of the utility pole, no visually discolored soil was observed. In test pit EX-7, placed 22 feet south and 16 feet east of the utility pole, again there was no visual

evidence of contamination. In test pit EX-8, placed 47 feet south and 7 feet east of the utility pole, oil-stained ¾-inch minus crushed rock was observed in a shallow soil sample collected at about depth 1.7 feet.

Soil samples were collected from three test pits with soils that displayed gross indicators of contamination, such as discoloration and/or odor. The soil samples were collected according to procedures documented in the Work Plan (refer, Appendix A). From test pit EX-1, soil sample EX-1,S1 was collected from dark gray soil, dispersed within discolored cobble at about depth 1.0 foot. From test pit EX-3, soil sample EX-3,S1 was collected from what appeared to be black charred sawdust and wood chips. From test pit EX-8, soil sample EX-8,S1 was collected from ¾-inch minus crushed rock, which appeared to be stained with oil. These three samples were individually compacted into 9-ounce jars, labeled, sample sheets completed, and placed at ice temperature in an insulated chest under chain of custody.

2.4.2 Chemical Analyses. The three collected soil samples were delivered under chain of custody to the PEL sample receiving clerk and subsequently chemically analyzed for petroleum hydrocarbons using the OAR Method for total petroleum hydrocarbons-hydrocarbon identification (TPH-HCID) and TPH using OAR Modified EPA Method 418.1. Two of the samples were also analyzed for diesel range petroleum hydrocarbons using OAR Method TPH-D, and one sample was analyzed for gasoline range hydrocarbons using OAR Method TPH-G. In addition, the three soil samples were also analyzed for polynuclear aromatic hydrocarbons (PAHs) using EPA Method 8270.

Analysis of sample EX-1,S1, by the DEQ TPH-HCID method, identified the presence of diesel and heavy/bunker oils. Further analysis of sample EX-1,S1 by Methods TPH-D and TPH-418.1M, identified the presence of diesel at 170 ppm; heavy/bunker oil was not detected. It was noted in the analytical laboratory report that a heavy petroleum product was observed in the diesel analysis which could not be quantified by this method. Sample EX-1,S1 was further analyzed for PAHs by Method 8270; PAHs were detected which are characteristic of coal tar (refer, Table 2). The analytical results obtained were then compared to analytical results for a typical coal tar, by calculating the ratio of sample EX-1,S1 analytical results to the coal tar results for each compound detected. The ratios obtained were then divided by the smallest ratio in the set, to normalize the set. Ratios of 1 to 3, with two exceptions, were obtained, which would

indicate that sample EX-1,S1 is characteristic of coal tar (refer, Table 3). The levels of PAHs identified are generally above DEQ action levels (refer, Table 4).

Analysis of sample EX-3,S1, by the DEQ TPH-HCID method, identified the presence of gasoline, diesel, and heavy/bunker oils. Further analysis of sample EX-3,S1 by methods TPH-G, TPH-D, and TPH-418.1M, identified the presence of diesel at 2,000 ppm, heavy oil/bunker at 960 ppm, and gasoline was not detected (refer, Table 2). It was noted in the analytical laboratory report that a light petroleum product was identified in the diesel analysis, which could not be quantified by this method. Sample EX-3,S1 was further analyzed for PAHs by Method 8270; three PAHs were detected. Test pit EX-3, as mentioned earlier, contains what appears to be charred sawdust and small charred wood chips, along with heat discolored rock. The office evaluation sample from test pit EX-3 was examined with a magnifying glass that confirmed the presence of charred sawdust and associated wood chips.

Analysis of sample EX-8,S1 by the DEQ TPH-HCID method, identified the presence of only heavy/bunker oils. Further analysis of sample EX-8,S1 by TPH-418.1M identified the presence of 1,200 ppm of heavy/bunker oils. This sample was also analyzed for PAHs by Method 8270; none were found. Sample EX-8,S1 was also extracted by Method 1311 and analyzed by Method 8270 for leachable PAHs. The other two samples, EX-1,S1 and EX-3,S1, did not have sufficient sample remaining for this additional analysis. Due to the extraction procedures, lower detection limit of 0.005 ppm, it was decided by Squier Associates and DEQ staff to analyze this sample (EX-8,S1). PAHs were not detected. The material collected from test pit EX-8, as noted earlier, appears to be ¾-inch minus crushed rock coated with oil.

Samples were not collected from the other five test pits for chemical analysis. Material in test pit EX-2 was similar to test pit EX-1 and test pits EX-4, EX-5, EX-6, and EX-7 soils did not appear to be visually discolored, nor was an odor detected of petroleum or coal tar related materials.

Complete copies of the analytical results and QA/QC reports are included for reference in Appendix B. The complete laboratory reports, which include all laboratory data sheets, are available upon request from Squier Associates.

2.4.3 Conclusions and Recommendations. Three of the test pits placed adjacent to the University of Oregon and EWEB boundary exhibit characteristics of petroleum hydrocarbon contamination and/or the presence of coal tar. In four of the test pits placed farther north and east of the boundary line, no discolored soil or visual evidence of contamination was observed. These test pits appear to have bounded on the north and east the lateral extent of the contamination. The contaminated subsurface soils appear to be in the immediate vicinity of the EWEB/University of Oregon property boundary; therefore, Squier Associates recommends the following scope of work to characterize the downward extent of the contamination in the area adjacent to the boundary. The recommended work would entail the placement of three borings (or two test pits and one boring) in the vicinity, with one boring, the farthest north, to ground water, with the installation of a monitoring well, to evaluate the vertical presence of petroleum and coal tar compounds. The borings (or test pits) should be placed near test pits EX-1, EX-2, and EX-3.

2.5 Adjacent Property - 933 Franklin Boulevard Investigations

In 1989, a geotechnical engineering boring was placed by Applied Geotechnology, Inc., on the northeast corner of the 933 Franklin Boulevard property. At about depth 4 feet, petroleum-like contaminated soils were detected, and the boring was terminated; an environmental sample was not collected.

A Level I ESA was conducted in May 1990 by Russ Fetrow Engineering, Inc. The ESA involved some soil sampling and chemical analyses. A copy of the report is included in Appendix C. The ESA reported the presence of petroleum hydrocarbon contamination that was assumed to be from the surface application of oil or possibly surface spillage.

Additional environmental investigations were conducted by Rittenhouse Zeman Associates (RZA) AGRA, Inc., of Portland, Oregon, in April 1993. The RZA AGRA investigation consisted of the drilling of three borings to about depth 20 feet, three borings to about depth 5 feet, and the collection and chemical analyses of soil and ground water samples. Ground water monitoring wells were not installed for the collection of the ground water samples. Instead, the hollow-stem auger was retracted about 2 feet and a bailer was inserted inside of the auger to collect the water samples. A geophysical survey, using ground penetrating radar, was also completed. The complete RZA AGRA report is included in Appendix C for reference.

In summary, very low levels of gasoline were detected in soils at about depth 5 feet and 3 feet in two borings. Diesel, ranging in concentrations from 29.1 ppm to 85.4 ppm, was detected in soil from three borings. Heavy oil, in concentrations greater than 250 ppm, was also detected in the three borings. Aromatic and halogenated VOCs were not detected in the ground water, but a concentration of 0.13 ppm of naphthalene, a PAH, was detected in one ground water sample. It is our understanding that the property owner will be submitting the Rittenhouse Zeman Associates AGRA environmental report conducted on this site to the Willamette Valley Regional Office of DEQ for review to determine the environmental status of the site.

3.0 MILLRACE PARCEL

The Millrace Parcel encompasses the south central part of the University of Oregon's Riverfront Research Park (refer, Figures 3 and 8). The parcel is located north of the Millrace waterway. The approximate 15-acre site is bounded to the north by the SPTC railroad right-of-way and the Parcel North of the Railroad Tracks, to the east by the University of Oregon Architecture and Allied Arts complex, and to the south and southwest the site is bounded by the Millrace waterway and Franklin Boulevard. The Millrace Parcel includes the University of Oregon Physical Plant complex, which is composed of 12 buildings used for shops, storage, offices, and a Power Plant. The hog fuel (wood bark and wood chips) storage area west of the Power Plant, the parking area south of the Physical Plant complex, a number of quonset huts and other small buildings, and three greenhouses east of the Physical Plant complex are also included as part of the Millrace Parcel.

The ESA report for the Millrace Parcel as documented in our report titled, "Environmental Site Assessment, Millrace Parcel, Riverfront Research Park, University of Oregon", August 1990, is made part of this report by reference. The Millrace Parcel ESA identified several areas that, in Squier Associates' opinion, required additional investigation.

The field explorations in the Millrace Parcel were performed on October 6 and 7, 1992, by representatives from Squier Associates, who jointly with DEQ staff, located the sampling points. Representatives from Squier Associates documented observations and collected representative soil samples. Prior to implementing field work in the Millrace Parcel, a site specific Work Plan was written and approved by DEQ (refer, Appendix D). The following subsequent work, field explorations, chemical analyses, conclusions and recommendations are made for the identified areas of concern.

3.1 Millrace Waterway

On the Millrace waterway, south-southwest of the Power Plant, a dull surface sheen had been observed along the northern shore of the waterway in February 1990 during the ESA site reconnaissance by Squier Associates staff. This was observed during a Level I ESA, therefore, a sample was not collected at this time. This dull sheen may have been leachate, consisting of tannins and lignins from the adjacent hog fuel pile, which consists of wood, bark, and chips. Squier Associates has observed similar conditions at other sites.

3.1.1 Field Explorations. On October 6, 1992, the Millrace was observed by representatives of both Squier Associates and DEQ. No evidence of a dull surface or other sheen along the north shore of the Millrace was observed.

3.1.2 Conclusions and Recommendations. Based on observations and lack of visible sheen, Squier Associates and DEQ staff concurred on October 6, 1992, that collecting a surface water sample was not required at this time.

3.2 Transformer Decommissioning Area, Building 132

Electrical transformers were decommissioned by draining and flushing in Building 132, located north of the Physical Plant shops, prior to disposal. Transformers also were stored outside an area adjoining Building 134. Squier Associates, in the ESA report, recommended these areas be investigated.

3.2.1 Field Explorations. Three concrete cores were drilled by Empire Concrete Cutting of Springfield, Oregon, in the floor of Building 132, where PCB transformers were reportedly drained and flushed (refer, Figure 3 and 9). The locations of the concrete cores were jointly agreed to by Squier Associates and DEQ staff.

Following removal of the concrete cores, fill rock below the concrete was removed. Four soil samples, including one QA/QC duplicate sample, were collected from freshly exposed soil below the concrete cores. Each sample consisted of sandy soil with some ¼-inch minus crushed rock, collected between about depth 0.1 feet and 0.5 feet below the underside of the concrete floor surface. In addition, four concrete samples, including one QA/QC duplicate sample, were collected to about 1 inch below the concrete floor surface for chemical analysis.

3.2.2 Sample Locations. The first concrete core (S132W) was removed approximately 9 feet 2 inches, west of the east wall of Building 132 and 13 feet 1 inch, south of the north wall (refer, Figure 9). Soil sample S132-W1 was collected from the soil below the concrete core and the concrete sample S132-W2 was collected from the concrete core. Sample S132-W3 was collected as a QA/QC duplicate of sample S132-W1. Soil samples were collected with a stainless steel trowel and concrete samples were collected by the use of a carbide tip chisel. Samples were collected into 9-ounce jars, labeled,

sample sheets completed, samples placed under ice conditions in an insulated chest, secured, and chain of custody established.

The second concrete core (S132N) was removed approximately 11 feet west of the east door of Building 132 and 9 feet 4 inches, south of the north wall. Soil sample S132-N1 was collected from soil below the concrete core and the concrete sample S132-N2 was collected from the concrete core.

The third concrete core (S132E) was removed approximately 13 feet 11 inches, west of the east wall and 13 feet 9 inches, south from the north wall of Building 132. Soil sample S132-E1 was collected from soil below the concrete core and concrete samples S132-E2 and S132-E3 were collected from the concrete core. Sample S132-E3 was collected as a QA/QC duplicate of sample S132-E2.

3.2.3 Sampling and Analyses. The eight discrete representative soil and concrete chip samples, including one QA/QC sample from each material, were submitted by chain of custody to the sample receiving clerk at PEL, located in Beaverton, Oregon, for chemical analysis for PCBs by EPA Method 8080 (refer, Table 5). No PCBs were detected in these samples. Samples were collected according to the approved Work Plan developed for this area, which also describes sampling procedures and QA/QC protocol (refer, Appendix D). The complete laboratory report, including QA/QC, is included in Appendix E for reference. The complete set of laboratory data sheets are available upon request from Squier Associates. Subsequent to sampling the cored areas, the core holes were plugged with concrete by University of Oregon Physical Plant staff.

3.2.4 Conclusions and Recommendations. PCBs were not detected in the soil and concrete samples collected from this area, therefore, in Squier Associates' opinion, no further action is necessary.

3.3 Transformer Storage Area (Outside Building 134)

3.3.1 Field Explorations. Asphalt cuts were made at three locations, outside Building 134 on the south, to obtain samples of underlying soil for PCB analysis (refer, Figure 9). These three locations were jointly chosen by DEQ and Squier Associates staff as representative locations. On October 6, 1992, asphalt concrete paving was cut and

removed in square sections approximately 1.0 foot by 1.0 foot in size. Following asphalt removal, fill rock below the paving was removed prior to sample collection.

3.3.2 Sample Locations. One soil sample was collected from each of the three exposed soil areas below the removed asphalt concrete. Soil sample TSA-S1 was collected at depth 0.2 feet below an asphalt cut placed 6 feet south and 11 feet east of the west end of Building 134. Soil sample TSA-S2 was collected at about depth 0.3 feet, 11 feet south and 19 feet east of the west end of Building 134. Soil sample TSA-S3 was collected at depth 0.3 feet, 14 feet south and 14 feet east of the west end of Building 134. Samples were collected, using a stainless steel trowel, into 9-ounce jars, labeled, sample sheets completed, samples placed under ice conditions in an insulated chest, secured, and chain of custody established.

3.3.3 Sampling and Analyses. The three discrete representative soil samples were submitted by chain of custody to the sample receiving clerk of PEL, located in Beaverton, Oregon, for chemical analysis for PCBs by EPA Method 8080 (refer, Table 6). No PCBs were detected in these samples. Samples were collected according to the approved Work Plan developed for this area, which also describes sampling procedures and QA/QC protocol (refer, Appendix D). The complete laboratory report, including QA/QC, is included in Appendix E for reference. The complete set of laboratory data sheets are available upon request from Squier Associates. The cut asphalt was replaced and resealed by University of Oregon Physical Plant staff.

3.3.4 Conclusions and Recommendations. PCBs were not detected in this area, therefore, in Squier Associates opinion, no further action is necessary.

3.4 Power Plant Substation - PCB Leak

A PCB containing transformer was reported to have leaked into the subsurface soils sometime between 1984 and 1985 at the University of Oregon electrical substation, located adjacent to the Power Plant. Portland General Electric (PGE) reportedly removed the contaminated soils, but confirmation samples were not collected.

3.4.1 Field Explorations. On October 6, 1992, two hand auger holes were advanced to about depth 1.5 feet (refer, Figure 10). Two discrete representative soil samples were collected, one from the base of each hole. The soil samples were collected in the area

where the earlier release occurred, as identified by University of Oregon Physical Plant staff.

Soil sample PPA-S1 was collected 6.5 feet from the south fence and 5.0 feet from the west fence near the southwest corner within the substation's fenced area. Soil sample PPA-S2 was collected 10 feet from the south fence and 7 feet from the west fence, also within the fenced area.

Samples were collected, with a stainless steel 2-inch hand auger, according to the DEQ approved Work Plan, and placed into 9-ounce jars, labeled, sample sheets completed, samples placed under ice conditions in an insulated chest, secured, and chain of custody established (refer, Appendix D).

3.4.2 Sampling and Analyses. The two soil samples were submitted by chain of custody to the sample receiving clerk at PEL, located in Beaverton, Oregon, for chemical analysis for PCBs by EPA Method 8080; no PCBs were detected (refer, Table 7). The complete laboratory report, including QA/QC, is included in Appendix E for reference. The complete set of laboratory data sheets is available upon request from Squier Associates.

3.4.3 Conclusions and Recommendations. PCBs were not detected, therefore, Squier Associates' current opinion is that no further action is necessary in this area.

3.5 Scrap/Waste Storage Area

Observations made during the ESA investigation in a waste and recycling storage area located east of Building 131 suggested that soil samples should be collected from below the asphalt concrete pavement for chemical analyses. Possible concerns identified were storage of various oil and water paint wastes; lead acid batteries; and petroleum related wastes.

3.5.1 Field Explorations. On October 6 and 7, 1992, asphalt cuts were made at four locations in the Scrap/Waste Storage Area in order to obtain samples of the underlying soil (refer, Figure 11). The sample locations were jointly located by Squier Associates and DEQ staff based on crack failures in the asphalt surface, and to assure that representative samples were collected.

Initially, the asphalt concrete paving was cut and removed. Following asphalt removal, a hand augered hole was advanced to about depth 1.5 feet, where a soil sample was collected at the base. Sample WSA-S1 was collected 24 feet east and 63 feet south of the Power Plant fence, sample WSA-S2 was collected 16 feet east and 56 feet south of the fence, sample WSA-S3 was collected 18 feet east and 52 feet south of the fence, and sample WSA-S4 was collected 15 feet east and 47 feet south of the fence.

In hand auger holes WSA-S2, WSA-S3, and WSA-S4, freshly exposed soil near the soil/fill rock interface was found to have gross indicators of contamination, such as soil staining and odor. Three additional soil samples were collected immediately below the earlier samples from these areas and identified as samples WSA-S2A, WSA-S3A, and WSA-S4A, respectively. A second soil sample was also collected from just below sample WSA-S1, and identified as WSA-S1A. These additional four samples, WSA-S1A, WSA-S2A, WSA-S3A, and WSA-S4A, were collected to assure sufficient material for analytical analysis. A total of eight soil samples, plus an equipment rinsate sample for QA/QC purposes, were collected with a stainless steel hand auger into 9-ounce jars, labeled, sample sheets completed, samples placed under ice conditions in an insulated chest, secured, and chain of custody established. Samples were collected according to the DEQ approved Work Plan, which also describes sampling procedures and QA/QC protocol. According to the Work Plan, an additional set of samples were to be collected at about depth 3 to 3.5 feet. This was not possible due to hand auger refusal from the presence of cobble. Subsequent to completion of sampling activities, the cut asphalt surface was replaced and resealed by University of Oregon staff.

3.5.2 Sampling and Analyses. The eight discrete representative soil samples and the QA/QC equipment sample collected from the Scrap/Waste Storage Area were submitted by chain of custody to the PEL sample receiving clerk for chemical analyses. Four of the eight soil samples were first analyzed for petroleum hydrocarbons using OAR Method TPH-HCID.

The TPH-HCID results identified diesel and oil range hydrocarbons in samples WSA-S2A collected from hand auger hole WSA-S2. The diesel range hydrocarbons were quantified at 1,000 ppm, using OAR Method TPH-D, and the oil range hydrocarbons were quantified at 2,300 ppm, using OAR Modified EPA Method 418.1 (refer, Table 8). Sample WSA-S2A was also analyzed for PCBs by EPA Method 8080, volatile halogenated organic compounds by Method 8010, and volatile aromatic compounds by Meth-

od 8020, due to the presence of oil and heavy hydrocarbons; no PCBs or volatile halogenated and aromatic organic compounds were detected.

Four samples, one from each hand auger hole, were analyzed for VOCs by EPA Method 8240 and five total metals, including arsenic, cadmium, chromium, lead, and mercury, by EPA Methods of the 6000 and 7000 series. No VOCs were detected (refer, Table 8). Of the five metals tested, 10 ppm, 5.0 ppm, 5.0 ppm, and 4.3 ppm of arsenic, 8.4 ppm, 9.4 ppm, 30 ppm, and 26 ppm of chromium, and 9.4 ppm, 9.0 ppm, 60 ppm, and 22 ppm of lead, were detected respectively from samples WSA-S1, WSA-S2, WSA-S3, and WSA-S4 (refer, Table 8). Cadmium and mercury were not detected. Arsenic and mercury are possible paint additives for color or as a preservative, while lead, cadmium, and chromium may occur in both paints and petroleum waste oils. In addition, chemical analyses of the equipment rinsate QA/QC sample did not detect the five metals or VOCs. A complete copy of the laboratory report, including QA/QC, is included in Appendix E. The complete set of laboratory data sheets are available upon request from Squier Associates.

The concentrations of the three detected metals are generally consistent with background concentrations as reported by Dr. Marvin Beeson of Portland State University and the U.S. Geological Survey (USGS) Professional Paper 127 titled "Elemental Concentrations in Soils and Other Surfical Material of the Conterminous United States, 1984". This data is provided for comparison purposes in Table 9. The exception is the detected presence of 60 ppm of lead in sample WSA-S3. This concentration exceeds the reported background concentration of 8 ppm to 20 ppm for lead.

After discussion between Squier Associates, and DEQ staff, additional analyses of samples WSA-S2A and WSA-S3A for leachable lead was requested on December 1, 1992. Due to insufficient sample volume, samples WSA-S2A and WSA-S3A were substituted for samples WSA-S2 and WSA-S3. Sample WSA-S2A was also analyzed for leachable cadmium and chromium due to the presence of waste oils. The two samples were initially extracted using EPA Method 1311, the Toxicity Characteristic Leaching Procedure (TCLP); the concentration of leachable lead, chromium, and cadmium, was then determined using EPA Method 6000 series. Leachable lead, chromium, or cadmium were not detected in sample WSA-S2A; analysis of sample WSA-S3A was not completed by PEL.

3.5.3 Conclusions and Recommendations. The presence of diesel at 1,000 ppm and heavy oils at 2,300 ppm are at concentrations above the numeric soil cleanup level for the site and merit soil remediation (refer, Figure 6). A total concentration of lead at 60 ppm, which is above background levels established at between 8 and 20 ppm, was detected in sample WSA-S3. Sample WSA-S3 was not analyzed by PEL, as requested by Squier Associates. However, lead analysis of sample WSA-S2A did not detect the presence of leachable lead, according to TCLP analyses. In Squier Associates current opinion, the contamination in the vicinity of sample WSA-S2 has been sufficiently bounded laterally by the concentrations detected in the three other soil samples, but information on the vertical extent will be necessary to complete remediation of this area; this would best be accomplished by confirmation sampling during remedial activity.

3.6 Bunker C Tanks

Two Bunker C heating oil tanks currently serve the Power Plant; investigation and decommissioning of these two tanks is planned by the University of Oregon. Installation of new diesel USTs will occur in early December 1993–February 1994. In addition, the three vehicle fuel tanks in the vicinity, will also be decommissioned by removal and replaced with new tanks. Once this work is completed, decommissioning of the existing two Bunker C USTs is scheduled for the spring of 1994.

3.7 New Tank Storage Area

Squier Associates and University of Oregon staff agreed that environmental soil samples should be collected North of the Power Plant, at the proposed location of the new Power Plant fuel USTs. It was concluded that this would provide additional information to characterize the soils in this area.

3.7.1 Field Explorations. On October 6 and 7, 1992, at the east end of the hog fuel area, three soil samples were collected with a hand auger for evaluation of possible petroleum contaminates in near surface soils (refer, Figure 10). Sample PPA-S3 was collected at about depth 1.5 feet in gravelly sand with bark chips, at a location in a traffic area 69 feet west of the fence and 88 feet north of the Power Plant building. Sample PPA-S4 was also collected at about depth 1.5 feet in gray clayey silt with some rock, at a location 53 feet west of the fence and 100.5 feet north of the Power Plant building. On October 7, 1992, sample PPA-S5 was collected at about depth 1.5 feet in

gray clay at a location placed at the eastern end of the hog fuel pile, located 72 feet west of the fence and 72 feet north of the Power Plant. The samples were collected into 9-ounce jars, labeled, sample sheets completed, the samples secured under ice conditions in an insulated chest, and the chain of custody established.

3.7.2 Sampling and Analyses. The three samples were transferred to PEL's sample receiving clerk under chain of custody. The three samples were chemically analyzed for OAR TPH-HCID which identifies the presence of gasoline, diesel, or oil/heavy bunker-related petroleum hydrocarbons. Diesel and waste oil were detected in one of the samples, sample PPA-S3, located in a vehicular traffic area.

Additional analyses of sample PPA-S3 by OAR Modified EPA Method 418.1M detected 790 ppm of waste oil. The TPH-HCID scan did not detect petroleum hydrocarbons in the other two samples (refer, Table 10).

3.7.3 Additional Field Explorations, Sample Collection, and Analyses. Two geotechnical foundation borings were placed on June 11, 1993, in preparation for installation of the new Power Plant fuel USTs. Squier Associates and University of Oregon staff concurred that collection of environmental soil samples in addition to geotechnical soil samples to further characterize this area, would be appropriate and could be accomplished at minimal additional cost. Two environmental soil samples were collected from each of two borings; one from the vadose zone and one from below the phreatic surface of the ground water. The location of two borings, B-1 and B-2, along with the earlier hand auger holes, are shown in relation to the Power Plant are shown on Figure 12. Logs of the borings are included as Figures 13 and 14. Environmental soil samples B-1,S1 and B-2,S3 were collected at about depths 2.5 to 4.0 feet and 8.0 to 9.5 feet, respectively, using a split-spoon sampler. A shallower sample from boring B-2 could not be collected due to the presence of larger gravel. Environmental soil samples B-1,S4, and B-2,S4 were both collected below the phreatic surface at about depth 10 to 11½ feet. The four samples were collected directly into split-spoon brass tube inserts. The ends of the brass tubes were sealed with aluminum foil, plastic caps, duct tape, labeled, and secured in insulated chests at ice temperature. The other soil samples were collected for geotechnical purposes. Sample sheets were completed and a chain of custody was maintained until transfer of the samples to the PEL sample receiving clerk.

The four soil samples, B-1,S1; B-1,S4; B-2,S3; and B-2,S4 were analyzed by the DEQ approved TPH-HCID method. Heavy oils were detected only in sample B-1,S1. No petroleum hydrocarbons were detected in the other three samples. Sample B-1,S1 was further analyzed by TPH 418.1M, with 220 ppm of heavy oils detected (refer, Table 11). Subsequently, sample B-1,S1 was analyzed for volatile halogenated and aromatic compounds by Methods 8010 and 8020; PCBs by Method 8080; TCLP cadmium, chromium, and lead by Methods 1311 and the 6000 series. No volatile organic compounds, PCBs, leachable chromium, cadmium, or lead were detected.

Copies of the complete analytical results from PEL, including QA/QC, are included for reference in Appendix E and summarized in Table 11. The complete set of laboratory data sheets are available upon request from Squier Associates.

3.7.4 Conclusions and Recommendations. Analyses of shallow soil samples PPA-S3 and B-1,S1 detected 790 ppm and 220 ppm of petroleum oils, respectively. A concern to be addressed, as part of the dewatering plan for installation of the two new fuel USTs, is the disposal of the ground water generated by the dewatering system. The analysis of soil samples taken below the phreatic surface of the ground water in the borings showed no detectable level of contamination and there is no current evidence that a ground water contamination problem exists in this area. However, care should be taken in developing the excavation and dewatering plans to minimize the risk of creating contamination of the ground water from the near surface soil. Procedures, such as identifying, excavating, and segregating all near surface contaminated soils prior to beginning dewatering or deep excavation, is recommended to minimize the risk of contaminating the ground water. The procedures selected for use by the contractor as part of his dewatering and excavation plan should be reviewed by the University of Oregon and DEQ to evaluate their probable effectiveness at minimizing the risk of creating ground water contamination.

3.8 Underground Storage Tanks

A total of five regulated USTs were identified in the ESA report on the Millrace Parcel. The approximate location of one of these five USTs was identified during the Level I ESA, as being near the west side of the Power Plant. Subsequent to the Level I ESA report dated August 1990, the fill pipe cover for this UST was located and the UST was found to contain diesel

fuel. Two of these tanks were subsequently decommissioned by removal by Omnicon Environmental Management Company, of Veneta, Oregon.

Two 1,000-gallon USTs were decommissioned by Omnicon and Staton Construction, Inc., on September 14, 1990. During the decommissioning activities, it was found that a gasoline release had occurred in the vicinity of the fill ports from the UST located north of the Physical Plant, and additional excavation was undertaken to remediate the site. Due to the proximity of the foundation of the Physical Plant warehouse building, however, a pocket of contamination was left onsite. A release of diesel from the fill ports of the other UST, located near the northwest corner of the Power Plant, also was documented; contamination levels did not merit remediation. This UST was the diesel fuel tank identified during the Level I ESA, which subsequently was located.

On October 15, 1990, a Summary Report prepared by Omnicon on the decommissioning of two USTs at the University of Oregon Physical Plant, was forwarded to DEQ, Willamette Valley Regional Office, by the University of Oregon, for review. A supplemental report, documenting the placement of three borings north of the Physical Plant in the vicinity of the UST release, subsequently was submitted by the University of Oregon (refer, Appendix F). The Willamette Valley Regional Office of DEQ issued a "No Further Action" (NFA) letter for the site on May 15, 1990. This letter is also included in Appendix F for reference.

3.9 Floor Drains

It was recommended that floor drains of Buildings 130 and 131 be evaluated to determine the discharge locations. Subsequent to the ESA report, the Physical Plant staff corrected floor drainage in Building 130 (the vehicle shop area) by installing an oil/water separator, connecting the auto shop sink and floor drain to the sanitary sewer. Historically, petroleum related oils and greases were discharged to the storm sewer, according to University of Oregon staff. The drainage from Building 131, and the adjacent vehicle wash areas, discharges into a storm sewer which runs due south into the Millrace (refer, Figure 3). Currently, no soaps or detergents are used in the vehicle wash area.

3.10 Appropriate Waste Storage

It was recommended by University of Oregon and Squier Associates staff that various waste materials that had been externally stored should be placed under cover. Subsequent to the

ESA report, University of Oregon Physical Plant staff implemented new procedures; including storing waste drums, pails, and batteries under covered roofs, and securing all contained asbestos material in a fenced and locked area until shipment for disposal.

4.0 PARCEL NORTH OF THE RAILROAD TRACKS

4.1 Parcel North of the Railroad Tracks Background

The Parcel North of the Railroad Tracks is an area that encompasses approximately 15 acres (refer, Figures 4, 15, and 16). The parcel is bounded by the Willamette River on the north and east, the SPTC railroad right-of-way and tracks on the south, and the Millrace outfall and Western Parcel of the Riverfront Research Park on the west.

The initial report on the Parcel North of the Railroad Tracks, as documented in Squier Associates report titled, "Environmental Site Assessment, Parcel North of the Railroad Tracks, Riverfront Research Park, University of Oregon", July 1990, is made part of this report by reference.

Information obtained during the ESA investigation for the Parcel North of the Railroad Tracks indicated that small quantities of chemical wastes had been disposed of in the area. In order to evaluate the subsurface conditions, Squier Associates placed eight monitoring wells at various locations on this parcel between February 5 to 7, 1990. Water samples from the monitoring wells were chemically analyzed for volatile organic compounds using EPA Method 8240, and dissolved metals using EPA Method 1310 and EPA Methods 6000, and the 7000 series. No contaminants at regulated levels were detected using these analytical methods. However, Squier Associates did recommend that further explorations should be undertaken to locate the reported disposal sites, possible contamination near the Millrace outfall to the west, and to evaluate the power plant ash disposal area for the presence of leachable metals. The direction of flow of the shallow ground water underlying the parcel was found to be generally north, toward the Willamette River.

4.2 Additional Environmental Investigation

Subsequent to the ESA, an additional environmental investigation was performed on this parcel and documented in a second report titled, "Additional Environmental Investigation, Parcel North of the Railroad Tracks, University of Oregon", July 1991. This report is also made part of this report by reference. The additional environmental investigation included follow-up interviews with current and former employees, magnetometer surveys, soil vapor surveys, ground water probe sampling, and ash sample analyses, which are summarized in Section 4.2.1 through 4.2.3 of this report.

In general, the additional environmental investigation consisted of a magnetometer survey of the Millrace outfall, Area A, Area B, and in the vicinity of sample location SVS-16, as shown on Figure 16). Based on the magnetometer survey, past explorations, and interviews of former employees, a soil vapor survey was undertaken in Areas A and B, and in the vicinity of sample location SVS-16. Also, ground water samples were collected using ground water probes in Area A and near the Millrace, where it crosses under the SPTC rail line. The results of this work are summarized below.

4.2.1 Soil Vapor Survey. A soil vapor survey, to further evaluate the possible presence of disposed chemicals, was completed in April 1991 (refer, Figures 17 and 18). Soil vapor samples were collected and analyzed by an onsite NET mobile laboratory. The mobile laboratory, by rapid analysis of samples, provided information to assist in locating subsequent soil vapor probe locations. The soil vapor samples were analyzed for the presence of aliphatic hydrocarbons: methane, ethane, propane, butane, pentane, and hexane by modified EPA Method 8015; volatile halogenated organic compounds by Method 8010; and volatile aromatic compounds by Method 8020. Two samples were also analyzed for hydrogen sulfide. Thirty-nine organic compounds were analyzed; of these chemicals, only ethane and methane were detected. Hydrogen sulfide was detected in sample SVS-20, and the duplicate samples, SVS-21, where methane was detected at 45,000 ppm and 51,000 ppm, respectively. This was in the vicinity where Eugene Water & Electric Board (EWEB) was planning to install a steam line to the University of Oregon Power Plant. It was recommended that measurements of methane and hydrogen sulfide should be provided in this area during construction of the steam line and associated steam vaults. It was further recommended that advantage be taken of the opportunity for observation of the EWEB excavations for the possible presence of earlier disposed chemicals, along with excavation of test pits in areas identified during the soil vapor probe and water probe survey. Excavation of test pits at locations SVS-2, SVS-3, SVS-5, SVS-7, and SVS-8 was recommended to further investigate the presence of priority metals and organic compounds, including methane.

4.2.2 Ground Water Probe Survey. Ground water probe samples were collected at locations SVS-17, SVS-23, and in Area A. Water probe samples in Area B, and at location SVS-16, met refusal (refer, Figures 16 and 18). In Area B, refusal was met generally at about depth 6 to 7 feet, which may indicate the location of the former roadway in this area. Water probe samples, and samples from monitoring wells MW-8 and MW-15,

were analyzed for the 13 priority total metals, and selectively TPH-HCID, TPH-D, and Method 8020.

Analysis of ground water probe samples SVS-2, SVS-7, and SVS-8, detected total chromium at 0.58, 0.43, and 0.57 ppm, respectively. Benzene, 1,2-dichlorobenzene and beryllium were also detected in ground water probe sample SVS-2 at low levels of 0.018, 0.008, and 0.01 ppm, respectively.

Diesel fuel oil was detected at 9.5 ppm in the ground water probe sample collected at location SVS-17. Traces of toluene and total xylene at 0.0006 ppm and 0.0005 ppm, respectively, were also detected in this sample. Chromium at 0.42 ppm, which is above the drinking water maximum contaminant level (MCL) of 0.1 ppm, was also identified in ground water probe sample SVS-17.

Based on the earlier July 1990 environmental site assessment report, a possible source is the former asphalt plant, located in this vicinity. Additional exploration was recommended in this area to evaluate the extent and possible source of apparent diesel fuel oil and chromium contamination of the ground water. The additional exploration was recommended to consist of borings and placement of monitoring wells to evaluate the extent of contamination and remediation options.

4.2.3 Power Plant Ash Samples. Ash samples were collected along the north side of the SPTC rail line where earlier interviews, documented in the ESA report, indicated Power Plant ash was disposed. The two ash samples collected were analyzed for the 13 priority total metals. Nine of the analyzed metals were detected in the two ash samples. Squier Associates recommended that TCLP analyses be completed to evaluate the leachability of the detected metals. Subsequent discussion with DEQ staff determined that TCLP analysis of the ash samples was not necessary. In the Silva Parcel, Power Plant ash had been analyzed for TCLP priority metals and, the metals were either not detected in the leachate or were well below regulatory standards defining hazardous waste.

4.3 Steam Vault Investigation

The installation of a new steam line and the associated steam vaults by EWEB to the University of Oregon Power Plant, created an opportunity to observe the subsurface soils within five

large excavations (EWEB1-5, refer, Figure 15). These excavations ranged from about 30 feet by 40 feet to about 40 feet by 80 feet. This allowed observation for possible contaminated soil and also for the nature of the fill placed through the North of Railroad Tracks Parcel area earlier by Eugene Sand & Gravel and the University of Oregon. Two additional steam vault excavations (EWEB-6 and EWEB-7) were also completed and observed at the western and eastern ends of the Western Parcel.

A Work Plan and Safety Plan were developed and written for this work scope and submitted to and approved by DEQ (refer, Appendix G).

As noted in the "Additional Environmental Investigation" report, dated July 1991, Squier Associates' opinion was that appropriate worker safety precautions should be undertaken during the EWEB excavations and related welding operation due to the detected presence of methane and hydrogen sulfide near the proposed steam vault EWEB-2 (refer, Figure 17). EWEB agreed to have onsite a staff member, trained in the use of an explosimeter and a hydrogen sulfide detector, to evaluate this concern.

4.3.1 Field Explorations. The EWEB steam line excavations and construction was initiated on September 17, 1991. The excavation was started near the existing steam vault, EWEB-1, and proceeded south to excavation EWEB-2, and then to excavation EWEB-3, from where the steam pipe was driven underneath the SPTC rail line to the University of Oregon Power Plant (refer, Figure 17). Steam vaults EWEB-4 and EWEB-5 also were excavated at this time, along with two vault excavations, EWEB-6 and EWEB-7, west of the Millrace, near the eastern and western borders of the Western Parcel. The subsurface materials throughout the excavations ranged from silts to sandy silts, clayey silts, cobbles, sand, and large boulders, with concrete and asphalt debris sections of metal pipe, construction rebar, and other similar materials.

Excavation EWEB-1 adjoined the existing steam vault on the south (refer, Figure 17). The purpose of the excavation was to expose and repair existing steam lines, and install expansion joints prior to installation of the new steam lines. No measurable levels of methane and hydrogen sulfide were observed by EWEB staff during and after excavation.

Excavation EWEB-2 was placed to the south of excavation EWEB-1, in the vicinity where methane and hydrogen sulfide were measured at location SVS-18 (refer, Figure 17). An

environmental sample, TP-20, was collected from the west side of excavation EWEB-2 at about depth 7 feet. This excavation was approximately 40 feet in width, similar to the other excavations. The sample was obtained in an area of discolored soil, which was about 2 feet by 3 feet in area, with a thickness of approximately 1 foot. The sample was collected and compacted into a 9-ounce jar, labeled, sample sheets completed, the sample placed in an insulated chest at ice temperature, and chain of custody established. The sample protocol was according to the Work Plan written and then approved by DEQ. No measurable levels of methane and hydrogen sulfide were observed within the excavation by EWEB staff during and after excavation.

A horizontal boring machine was used to advance the steam line at excavation EWEB-3, underneath the SPTC rail line. Observations at this location included the presence of 1 to 2 feet of ash on the west side of the excavation and 2 to 3 feet of ash on the east side of the excavation. No other visual evidence of environmental concern was noted. EWEB personnel, using an explosimeter and a hydrogen sulfide detector, reported that no measurable levels of volatile gases and hydrogen sulfide were detected in this area.

Excavations EWEB-4 and EWEB-5 were made west of excavation EWEB-1. These two excavations were made by EWEB to expose steam line expansion joints for repair and maintenance (refer, Figure 15). Observation of the excavations identified numerous pieces of what appeared to be water pipe, construction rebar and concrete debris. No methane or hydrogen sulfide was detected by EWEB staff during and after excavation of these two excavations.

Two additional excavations were completed on the Western Parcel for installation of the new steam lines. One, identified as EWEB-6, was placed just west of the Millrace outfall. The second, EWEB-7, was placed near the western EWEB/University of Oregon border, on EWEB property. Observations made in the excavation near the EWEB/University of Oregon border suggested the possible presence of coal tar remnants from the former water gas synthesis plant.

4.3.2 Chemical Analyses. Sample TP-20, collected from excavation EWEB-2, in the Parcel North of the Railroad Tracks, was delivered to PEL, with chain of custody transferred to the sample receiving clerk. The sample was analyzed by TPH-HCID and heavy oil/Bunker C was detected; no further analysis was completed (refer, Appendix H).

4.3.3 Conclusions. The visual observation, explosimeter and hydrogen sulfide measurements made along the EWEB steam line trench excavation did not indicate the presence of environmental concerns. Shallow subsurface ash was observed at location EWEB-3, and the presence of scrap metal, concrete, and asphalt debris, cable, pipe, and wire were observed generally throughout, within the excavated areas. The 2-foot by 3-foot area of discolored soil (0.2 yds.), where Bunker C was detected, was accidently excavated and stockpiled with other excavated soil, and was not relocated.

4.4 Additional Investigation - Test Pits

During observation of the EWEB steam line project, Squier Associates also took advantage of being onsite to conduct an additional investigation to follow-up on the magnetometer soil vapor and ground water probe survey work completed in April 1991. On September 18, 1991, Squier Associates excavated four test pits to further investigate areas where an earlier soil vapor, ground water probe, and magnetometer investigation indicated the possibility that contamination may be present. This soil vapor/ground water probe/magnetometer investigation is included in the "Additional Environmental Investigation", report dated July 1991, and included in this report by reference, as noted above. A representative of Squier Associates relocated the earlier soil vapor/water probe grid lines that had been referenced from the southern corner of the existing steam line vault, adjoining EWEB-1. From this re-established grid line, the earlier measured soil vapor/ground water probe locations were determined.

4.4.1 Field Explorations. Excavation activities were undertaken on September 18, 1991, by Squier Associates, using the track-hoe services of Staton Construction, Inc., of Eugene, Oregon. The track-hoe was scrapped and brushed prior to excavation of the test pits. The hydraulic system and lines were examined; no leaks were observed. The Work Plan and Safety Plan covering this additional exploration was developed, submitted, and approved by DEQ (refer, Appendix G).

A series of four test pits were placed in locations where the earlier soil vapor probes, ground water probes, and magnetometer survey suggested the possible presence of contamination. The test pits were observed by a representative of our firm who located the test pits and documented observations.

The first test pit was placed in the vicinity of former sampling point SVS-8 (refer, Figure 17). A log of the test pit, designated test pit SVS-8.1, is included as Figure 19. The

test pit extended to about depth 8.3 feet, where concrete was encountered, extending across the floor of the excavation. Five soil samples were collected within the test pit: one environmental and four geotechnical. Upon completion, the test pit was backfilled with excavation material.

A second test pit, SVS-7.1, was placed in the former vicinity of sampling point SVS-7. Four soil samples were collected in the test pit; one environmental and three geotechnical. The test pit extended to about depth 8 feet, where again continuous concrete was encountered extending across the floor of the excavation (refer, Figure 20). Upon completion, the test pit was backfilled with excavation material.

A third test pit was placed in the former vicinity of sampling points SVS-2 and SVS-3. A log of the test pit, designated test pit SVS-2.1/3.1, is included as Figure 21. The test pit extended to about depth 8.5 feet. Six soil samples were collected in the test pit, three environmental and three geotechnical. Excavated brown, green, and yellow colored soils were segregated and placed on 4-mil plastic and the test pit was backfilled with the overburden fill material. The excavated soil was then covered with 4-mil plastic and secured.

The fourth test pit, SVS-5.1, was placed in the former vicinity of sampling point SVS-5. Gray, brown, and gray-green colored soils were observed from about depth 5 feet to about depth of 6 feet. The overlying material was classified as fill material and included a broken porcelain commode, metal rod, and asphalt fragments (refer, Figure 22). Three soil samples were collected from the test pit; one environmental and two geotechnical. Upon completion, the test pit was backfilled with excavation material.

Environmental samples were collected into 9-ounce jars, labeled, sample sheets completed, samples placed under ice conditions in an insulated chest, secured, and chain of custody established. Geotechnical samples were collected into 1-pint jars.

4.4.2 Chemical Analyses. The six environmental soil samples collected from the four test pits were delivered to PEL and transferred under chain of custody to the sample receiving clerk. Four of the soil samples were submitted for chemical analysis and two samples were archived by PEL.

The environmental sample SVS-2.1,S-4, collected at about depth 8 feet in test pit SVS-2.1/3.1 (refer, Figure 21), was chemically analyzed for 23 priority metals and VOCs by EPA Method 8240. The reported metal concentrations are summarized in Table 12. Regulatory levels, including those published in the Oregon Soil Cleanup Table (OAR 340-122-045), have also been included in Table 12. Acetone was detected by EPA Method 8240 at a concentration of 0.310 ppm. Due to the volatility and infinite water solubility of acetone, along with the age of suspected releases (1960s), this value is suspect and is considered a laboratory artifact. No other VOCs were detected.

The environmental sample collected at about depth 6 feet in test pit SVS-7.1, sample SVS-7.1,S3A, was chemically analyzed for the following eight metals: arsenic, beryllium, cadmium, chromium, copper, nickel, lead, and zinc (refer, Table 12).

The environmental samples from SVS-5.1,S3A and SVS-8.1 were chemically analyzed for the following five metals: arsenic, cadmium, chromium, copper, and lead. The above analytical protocol was agreed to by Squier Associates and DEQ staff prior to sample analysis.

Additional analysis on sample SVS2.1,S-4 for leachable concentrations of chromium, cadmium, and lead was requested by DEQ staff on November 14, 1991. The analysis involved TCLP extraction process, per EPA Method 1311 and the EPA Method 6000 series. Leachable lead was detected at 0.007 ppm. Leachable chromium and leachable cadmium were not detected.

Copies of the laboratory reports and QA/QC are included in Appendix H. Complete copies of the laboratory data sheets are available from Squier Associates, upon request.

The twelve geotechnical soil samples collected from the four excavations were delivered to Squier Associates' soils lab for examination (refer, Figures 19, 20, 21, and 22).

4.4.3 Conclusions. The chemical analyses for total metals of soil samples did not detect elevated concentrations above expected background levels, and additional TCLP analyses for cadmium, chromium, and lead in the sample collected from test pit SVS-2.1 detected only lead at 0.007 ppm, below current regulatory concern.

is not likely that the location of the buried chemicals can be found, except accidently. This is supported by the high background noise observed during the magnetometer surveys in the areas where the soil gas and ground water probes were placed, and also in the area adjoining the Millrace outfall. Excavation of the five large areas by EWEB and the four test pits excavated by Squier Associates, did not identify the presence of buried chemicals. In addition, the eight monitoring wells installed in the North of the Railroad Track Parcel have not detected metal contamination above background or the presence of regulatory levels of VOCs.

Based on a review of the additional information included in this report and information previously submitted, Squier Associates currently recommends the following:

1. Three remedial investigation borings with installed monitoring wells, along the eastern edge of the Millrace outfall, to characterize the area where diesel fuel oil was detected in the vicinity of the former Eugene Sand & Gravel asphalt plant,

2. Quarterly monitoring of the eight established monitoring wells, and the additional recommended monitoring wells, for one year (five quarters) to obtain information on seasonal variations of total metals and VOCs in the ground water, and also ground water flow directions.

5.0 LIMITATIONS

Squier Associates has completed remedial investigations of shallow soils underneath portions of the Riverfront Research Park. The subsurface investigations were conducted in accordance with generally accepted environmental practices, and included such tasks as were considered necessary, in Squier Associates' professional judgment, to enable continuing evaluation of the site. The investigations were conducted, in part, to evaluate the presence and extent of possible contaminants in the subsurface soils of the site. Our conclusions and recommendations are based on the data obtained during the investigations, our observations, and laboratory analytical results. This report is based on the assumption that the subsurface conditions disclosed during the investigations are indicative of the subsurface conditions in other portions of the site. However, there remains a level of risk that latent, or unforeseen, hazardous conditions may exist that may not become apparent until later. This level of risk could be reduced, but not eliminated, only with extensive systematic subsurface exploration, sampling, and chemical analyses.

Table 1
EWEB-2 Area
Sample Results (ppm)

Analyte	Analytical Results					Sample Statistics			
	EWEB-2W1	EWEB-2W2	EWEB-2E	EWEB-2P1	EWEB-2P2	Arithmetic Mean	Ln Mean	Standard Deviation	Detection Limit
TPH-418.1	260	450	520	200	350	356	-----	132	20/1.5*
Total Cadmium	ND	ND	ND	ND	ND				2.5
Total Chromium	12	9.8	7.3	8.9	12		9.83 (2.285)**	1.235 (0.211)	2.5
Total Lead	12	12	6.8	11	11		10.35 (2.336)	1.269 (0.238)	2.5
VOC/Method 8240	ND	ND	ND	ND	ND	-----	-----	-----	0.002 - 0.050

ND = Not Detected
ppm = parts per million
* = 20/1.5 = soil/water detection limits
** = natural log

Table 2
U of O/EWEB Boundary
Sample Results (ppm)

Analyte	EX1-S1	EX3-S1	EX8-S1	Method Blank	Detection Limit
TPH-HCID	-----	gasoline	-----	ND	50
	diesel	diesel	-----	ND	20
	heavy/bunker	heavy/bunker	heavy/bunker	ND	-----
TPH-G	-----	ND	-----	ND	5.0
TPH-D	170 (i)	2,000 (j)	-----	ND	25-100
TPH-418.1M	ND	960	1200	ND	20
Method 8270					
benzo(a)anthracene	~ 1.2	ND	ND	ND	0.50-25
benzo(a)pyrene	~ 2.2	ND	ND	ND	0.50-25
benzo(b)fluoranthene	~ 4.1	~ 44	ND	ND	0.50-25
benzo(g,h,i,)perylene no std	1.5	35	ND	ND	0.50-25
benzo(k)flouranthene	~1.1	ND	ND	ND	0.50-25
chrysene	~ 1.2	ND	ND	ND	0.50-25
fluoranthene	2.8	ND	ND	ND	0.50-25
indeno(1,2,3-cd)pyrene	~1.6	~ 31	ND	ND	0.50-25
2-methylnaphthalene no std	0.95	ND	ND	ND	0.50-25
naphthalene	2.6	ND	ND	ND	0.50-25
phenanthrene no std	1.4	ND	ND	ND	0.50-25
pyrene	2.8	ND	ND	ND	0.0050
TCLP/Method 1311 and 8270	-----	-----	ND	ND	

ND = Not Detected
ppm = parts per million
TPH-HCID = Total Petroleum Hydrocarbon-Hydrocarbon Identification
(i) = This sample contains a heavy petroleum product. The product cannot be quantitated by this method.
(j) = This sample contains a light petroleum product. The product cannot be quantitated by this method.

Table 3
Comparison of Sample EX1-S1 To Coal Tar Sample

Analyte	EX1-S1	Coal tar*	Ratio**	Normalized Values***	Detection Limit
benzo(a)anthracene	1.2	51.4	0.023	1	0.50-25
benzo(a)pyrene	2.2	39.0	0.056	2.4	0.50-25
benzo(b)fluoranthene	4.1	72.4	0.072	3.1	0.50-25
benzo(k)fluoranthene	1.1				0.50-25
benzo(g,h,j)perylene	1.5	31.4	0.048	2.1	0.50-25
chrysene	1.2	46.0	0.026	1.1	0.50-25
fluoranthene	2.8	58.2	0.048	2.1	0.50-25
indeno(1,2,3-cd)pyrene	1.6	36.4	0.044	1.9	0.50-25
2 methylnaphthalene	0.95	2.9	0.33	14.3	0.50-25
naphthalene	2.6	6.1	0.42	18.3	0.50-25
phenanthrene	1.4	19.4	0.072	3.1	0.50-25
pyrene	2.8	81.8	0.034	1.5	0.50-25
acenapthene	ND	1.8			0.50-25
acenaphthylene	ND	1.0			0.50-25
anthracene	ND	12.4			0.50-25
dibenzo(a,h)anthracene	ND	14.8			0.50-25
fluorene	ND	13.0			0.50-25

ND = Not Detected
* Coal tars pose cleanup challenge, Pollution Engineering, September 15, 1992, Seyed M. Mohammadi, Ph.D., P.E.
** Ratio = sample EX1-S1/coal tar
*** Normalized = ratio/smallest ratio

Table 4
U of O/EWEB Boundary
Action Levels (ppm)

Analyte	EX1-S1	EX3-S1	EX8-S1	Soil Cleanup Level*	Leachates* Reference Conc.	Residential* Maximum Soil	Industrial (1) Maximum Soil
Method 8270							
benzo(a)anthracene	1.2	ND	ND	0.1	0.002	0.1	1
benzo(a)pyrene	2.2	ND	ND	0.1	0.002	0.1	1
benzo(b)fluoranthene	4.1	44	ND	0.1	0.002	0.1	1
benzo(g,h,i,)perylene	1.5	35	ND	-----	-----	-----	-----
benzo(k)flouranthene	1.1	ND	ND	0.1	0.002	0.1	1
chrysene	1.2	ND	ND	0.1	0.002	0.1	1
fluoranthene	2.8	ND	ND	8,000	60	10,000	80,000
indeno(1,2,3-cd)pyrene	1.6	31	ND	0.1	0.002	0.1	1
2-methylnaphthalene	0.95	ND	ND	-----	-----	-----	-----
naphthalene	2.6	ND	ND	30	1	1,000	8,000
phenanthrene	1.4	ND	ND	-----	-----	-----	-----
pyrene	2.8	ND	ND	6,000	100	8,000	60,000
TCLP/Method 8270	-----	-----	ND at 0.0050	-----	-----	-----	

ND = Not Detected
ppm = parts per million
* DEQ Soil Cleanup Table and Appendix 1

Table 5
Building 132 Transformer Drain and Flush Area
Sample Results (ppm)

Analyte	S132-W1	S132-W2	S132-W3	S132-E1	S132-E2	S132-E3	S132-N1	S132-N2	Method Blank	Detection Limit
	Soil	Concrete	Soil (duplicate)	Soil	Concrete	Concrete (duplicate)	Soil	Concrete		
PCB 1016	ND	ND	ND	ND	ND	ND	ND	ND	ND	0.1
PCB 1221	ND	ND	ND	ND	ND	ND	ND	ND	ND	0.1
PCB 1232	ND	ND	ND	ND	ND	ND	ND	ND	ND	0.1
PCB 1242	ND	ND	ND	ND	ND	ND	ND	ND	ND	0.1
PCB 1248	ND	ND	ND	ND	ND	ND	ND	ND	ND	0.1
PCB 1254	ND	ND	ND	ND	ND	ND	ND	ND	ND	0.1
PCB 1260	ND	ND	ND	ND	ND	ND	ND	ND	ND	0.1

ND = Not Detected
ppm = parts per million
PCB = Polychlorinated Biphenyl

Table 6
Transformer Storage Area
Sample Results (ppm)

Analyte	TSA-S1	TSA-S2	TSA-S3	Method Blank	Detection Limit
PCB 1016	ND	ND	ND	ND	0.1
PCB 1221	ND	ND	ND	ND	0.1
PCB 1232	ND	ND	ND	ND	0.1
PCB 1242	ND	ND	ND	ND	0.1
PCB 1248	ND	ND	ND	ND	0.1
PCB 1254	ND	ND	ND	ND	0.1
PCB 1260	ND	ND	ND	ND	0.1

ND = Not Detected
ppm = parts per million
PCB = Polychlorinated Biphenyl

Table 7
Power Plant Electrical Substation
Sample Results (ppm)

Analyte	PPA-S1	PPA-S2	Method Blank	Detection Limit
PCB 1016	ND	ND	ND	0.1
PCB 1221	ND	ND	ND	0.1
PCB 1232	ND	ND	ND	0.1
PCB 1242	ND	ND	ND	0.1
PCB 1248	ND	ND	ND	0.1
PCB 1254	ND	ND	ND	0.1
PCB 1260	ND	ND	ND	0.1

ND = Not Detected
ppm = parts per million
PCB = Polychlorinated Biphenyl

Table 8
Waste Scrap Area
Sample Results (ppm)

Analyte	WSA-S1	WSA-S1A	WSA-S2	WSA-S2A	WSA-S3	WSA-S3A	WSA-S4	WSA-S4A	WSA-ER1	Method Blank(s)	Detection Limit
Total arsenic	10	-----	5.0	-----	5.0	-----	4.3	-----	ND	ND	0.20/0.0040*
Total cadmium	ND	-----	ND	-----	ND	-----	ND	-----	ND	ND	2.5/0.050
Total chromium	8.4	-----	9.4	-----	30	-----	26	-----	ND	ND	2.5/0.050
Total lead	9.4	-----	9.0	-----	60	-----	22	-----	ND	ND	2.5/0.0050
Total mercury	ND	-----	ND	-----	ND	-----	ND	-----	ND	ND	0.50/0.00050
TCLP cadmium	-----	-----	-----	ND	-----	-----	-----	-----	-----	ND	0.050
TCLP chromium	-----	-----	-----	ND	-----	-----	-----	-----	-----	ND	0.050
TCLP lead	-----	-----	-----	ND	-----	(1)	-----	-----	-----	ND	0.10
TPH-HCID											
Gasoline	-----	-----	ND	ND	-----	ND	-----	ND	-----	ND	20
Diesel	-----	-----	ND	Detected	-----	ND	-----	ND	-----	ND	50
Heavy/bunker	-----	-----	ND	Detected	-----	ND	-----	ND	-----	ND	-----
TPH-D	-----	-----	-----	1,000**	-----	-----	-----	-----	-----	ND	25
TPH-418.1M	-----	-----	-----	2,300	-----	-----	-----	-----	-----	ND	20
Method 8020	-----	-----	-----	ND	-----	-----	-----	-----	-----	ND	0.002
Method 8010	-----	-----	-----	ND	-----	-----	-----	-----	-----	ND	0.004-0.020
Method 8240	-----	ND	ND	-----	ND	-----	ND	-----	ND	ND	0.002-0.100
Method 8080 (7 PCBs)	-----	-----	-----	ND	-----	-----	-----	-----	-----	ND	0.10

(1) = analysis not completed
ppm = parts per million
PCB = Polychlorinated Biphenyl
ND = Not Detected
* 0.20/0.0040 = detection limit soil/detection limit water
** This sample contains a heavy petroleum product. The product cannot be quantitated by this method.

Table 9
Background Levels Expected

Analyte	USGS Paper 1270	Marvin Beeson, Ph.D. Portland State University
Lead	10-15 ppm	8-20 ppm
Chromium	5-70 ppm	40-90 ppm
Cadmium	---	0.5 ppm

Table 10
Proposed Location Above Ground Storage Tanks
Sample Results (ppm)

Analyte	PPA-S3	PPA-S4	PPA-S5	Method Blank	Detection Limit
TPH-HCID					
Gasoline	ND	ND	ND	ND	20
Diesel	Detected	ND	ND	ND	50
Heavy/bunker	Detected	ND	ND	ND	---
TPH-418.1M	790.00	---	---	ND	20
Method 8010	ND	---	---	---	---
Method 8020	ND	---	---	---	---
Method 8080	ND	---	---	---	---
TCLP 1311/6000 Series	ND	---	---	---	---

ND = Not Detected
ppm = parts per million
TPH-HCID = Total Petroleum Hydrocarbon-hydrocarbon identification

Table 11
Additional Boring Samples
Proposed Location Above Ground Storage Tanks
Sample Results (ppm)

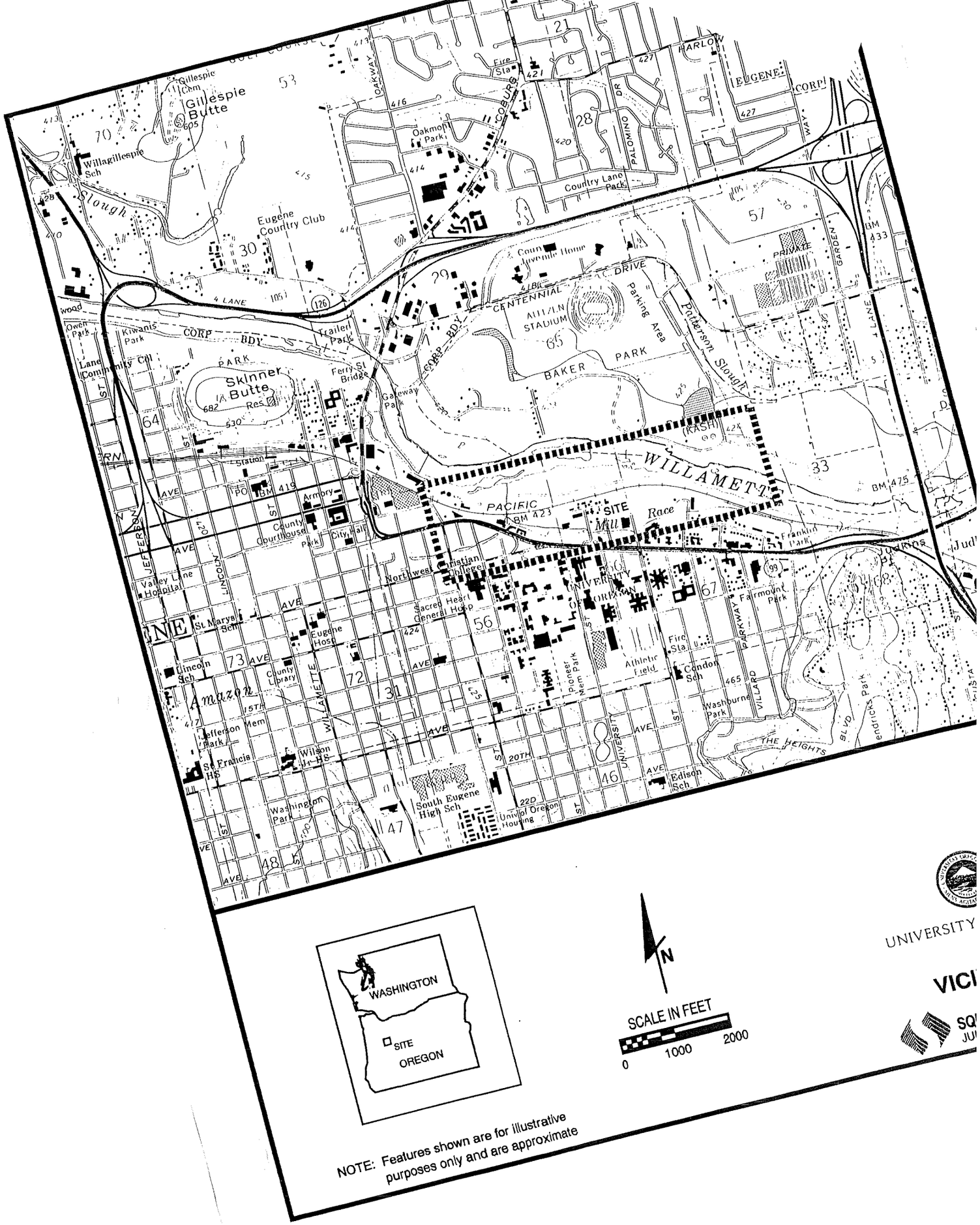
Analyte	B1-S1	B1-S4	B2-S3	B2-S4	Method Blank	Detection Limit
TPH-HCID						
Gasoline	ND	ND	ND	ND	ND	20
Diesel	ND	ND	ND	ND	ND	50
Heavy/bunker	Detected	ND	ND	ND	ND	100
TPH-418.1M	220	- - -	- - -	- - -	ND	10

ND = Not Detected
ppm = parts per million
TPH-HCID = Total Petroleum Hydrocarbon-hydrocarbon identification

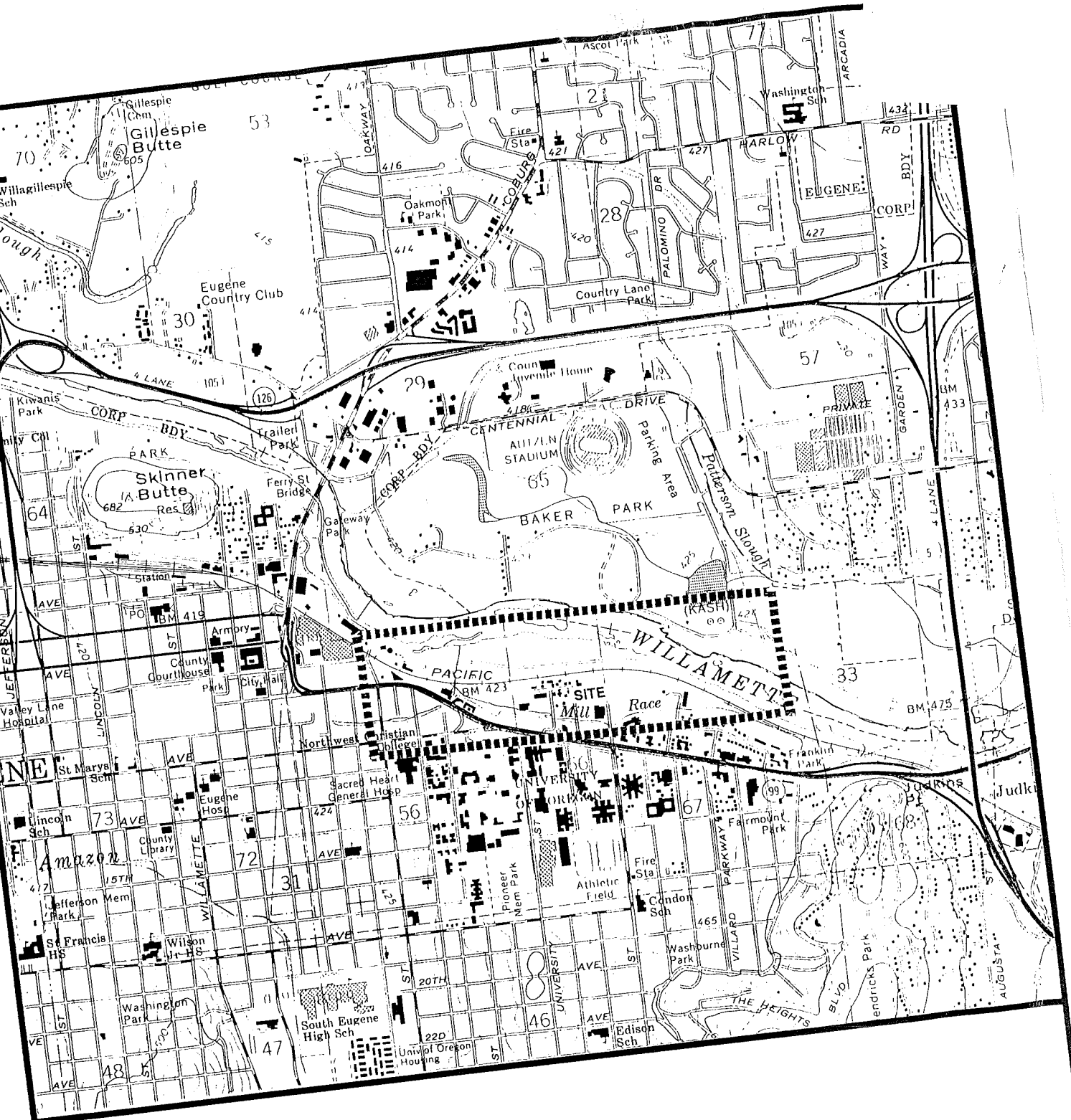
Table 12
Soil Samples For Total Metal and
Toxicity Characteristic Leachability Procedure (TCLP)
Concentrations (ppm)

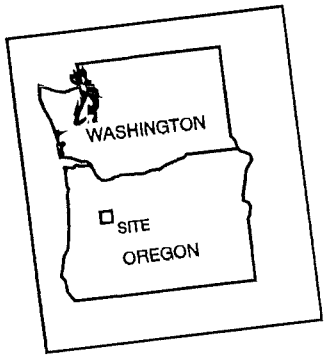
Metal	Sample Designation					Detection Limit	Risk/Regulatory Limit
	SVS-2.1,S-4	SVS-5.1,S-3A	SVS-5.1,S-3B	SVS-7.1	SVS-8.1		
Aluminum	20,000	--	--	--	--	5	
Antimony	ND	--	--	--	--	16	[1]30
Arsenic	6.8	4.5	5.1	9.6	4.1	0.2	[3]0.4
Barium	110	--	--	--	--	0.8	[3]20,000
Beryllium	ND	ND	--	--	--	0.8	[3]0.1
Cadmium	ND	ND	ND	ND	ND	0.8	[3]100
TCLP Cadmium	ND	--	--	--	--	0.003	[3]0.5
Calcium	1,900	--	--	--	--	1	NS
Chromium	27	22	21	19	16	0.8	[3]1,000
TCLP Chromium	ND	--	--	--	--	0.01	[3]10.0
Cobalt	23	--	--	--	--	4	NS
Copper	12	13	18	26	19	0.8	[3]10,000
Iron	18,000	--	--	--	--	3	[2]0.3
Lead	18	17	11	45	14	4	[3]5,000
TCLP Lead	0.007	--	--	--	--	0.003	[3]0.015
Magnesium	1,800	--	--	--	--	1	NS
Manganese	360	--	--	--	--	0.8	[2]0.05
Mercury	ND	--	--	--	--	0.4	[3]80
Nickel	6	8	--	--	--	4	[3]5,000
Potassium	430	--	--	--	--	40	NS
Selenium	0.32	--	--	--	--	0.2	[2]0.05
Silver	ND	--	--	--	--	0.8	[3]1,500
Sodium	94	--	--	--	--	8	NS
Thallium	ND	--	--	--	--	0.8	[1]0.01
Vanadium	41	--	--	--	--	4	NS
Zinc	37	50	--	--	--	0.8	[2]5

ppm = parts per million
NS = not specified
ND = not detected
[1] = Health Based Criteria for Carcinogens and Systemic Toxicants are specified in the RCRA Facility Investigation Guidance Volume I (PB89-200299), May 1989.
[2] = National Primary and Secondary Drinking Water Regulations dated January 30, 1991, 40 CFR Parts 141-143.
[3] = Oregon DEQ Cleanup Levels, 1992.



NOTE: Features shown are for illustrative purposes only and are approximate





SCALE IN FEET

0 1000 2000

UNIVERSITY OF OREGON

VICINITY MAP

SQUIER ASSOCIATES
JULY 1993 93759

FIGURE 1

NOTE: Features shown are for illustrative purposes only and are approximate

LANE COUNTY

1" = 100'

WILLAMETTE RIVER

See Map 17 03 32 21

1/16 Cor

5300

8TH AVENUE

1600

HILYARD STREET

WESTERN PARCEL

Tax Lotted on Map 17 03 32 21

1700

199

5100

FRANKLIN BOULEVARD

1800 2000 2100

1900

2300 2200

2400 2500

2900 5200

3000

13 1501

3100

NOTE: Features shown are for illustrative purposes only and are approximate

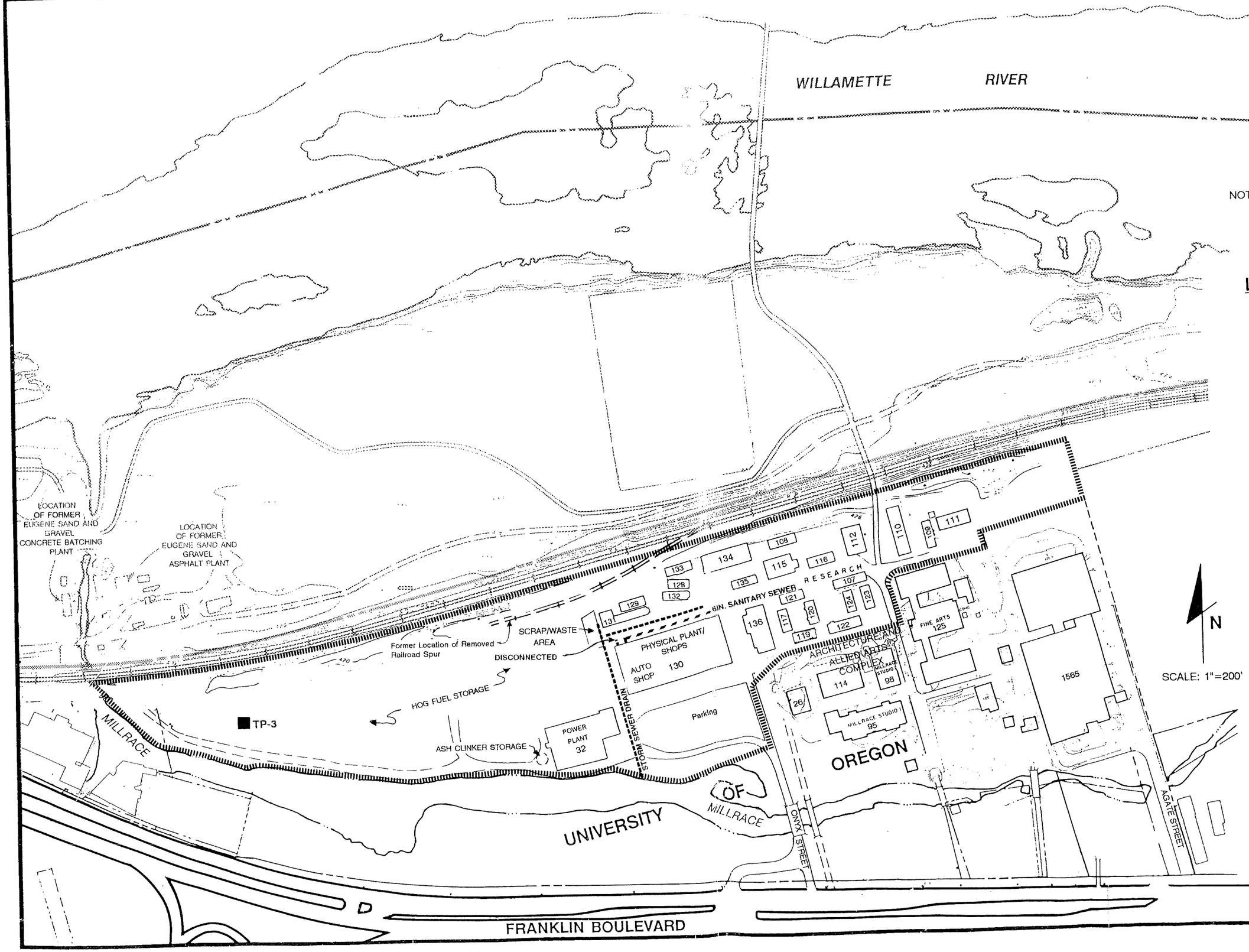
UNIVERSITY OF OREGO

WESTERN PARCEL SITE SKETCH

AUGUST 1993 8938

SQUIER ASSOCIATES, I
GEOTECHNICAL CONSULTA

FIGURE



NOTE: Features shown are for illustrative purposes only and are approximate

LEGEND

- 133 — University of Oregon Buildings with Identification Number
- Former transformer storage area
- Greenhouse pesticide/ herbicide storage building
- Former PCB electrical transformer decommission site
- Current electrical transformer locations
- Underground Storage Tanks

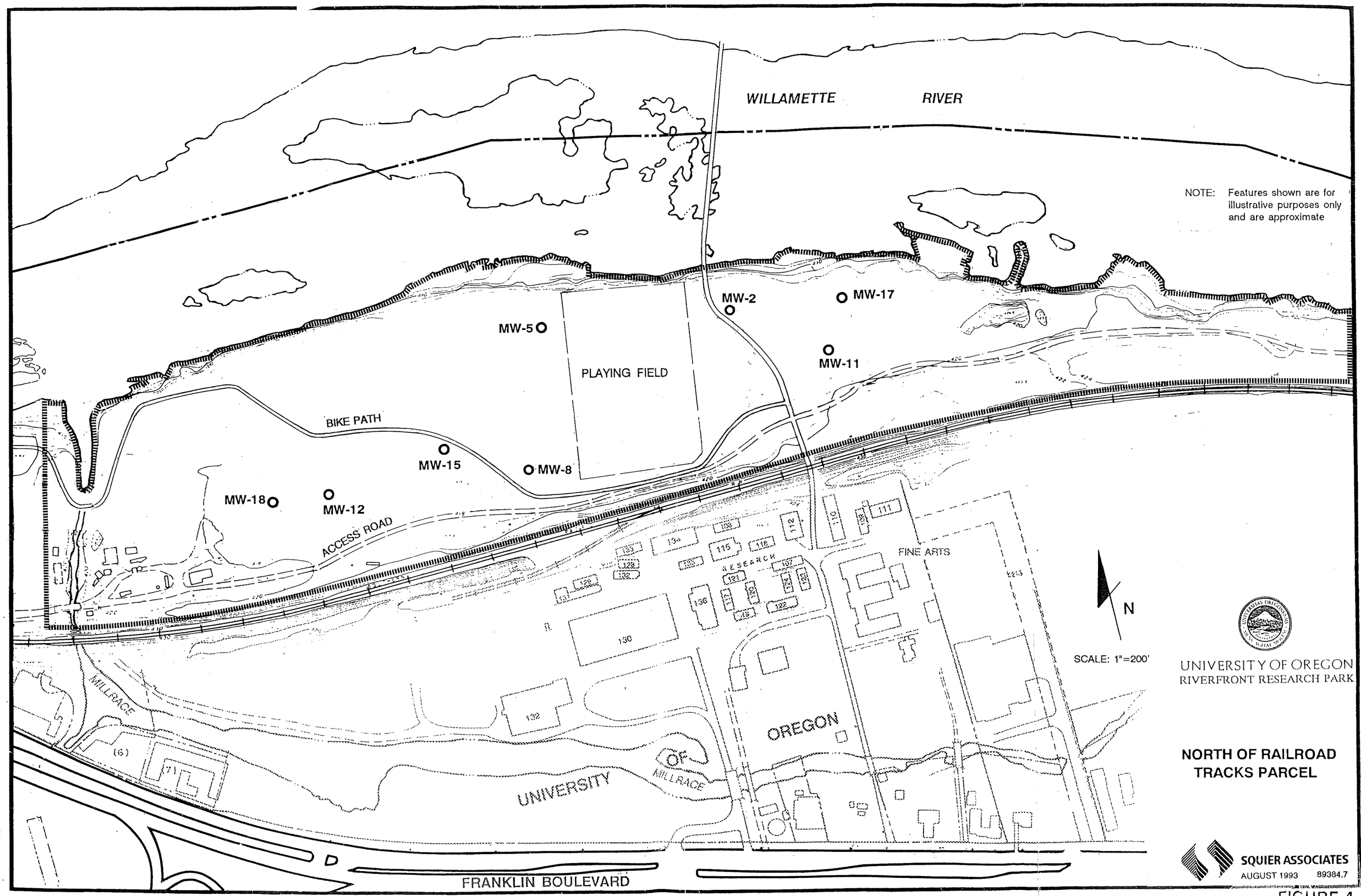
UNIVERSITY OF OREGO

MILLRACE PARCE SITE SKETCH

AUGUST 1993 8938

SQUIER ASSOCIATES, I
GEOTECHNICAL CONSULTA

FIGURE

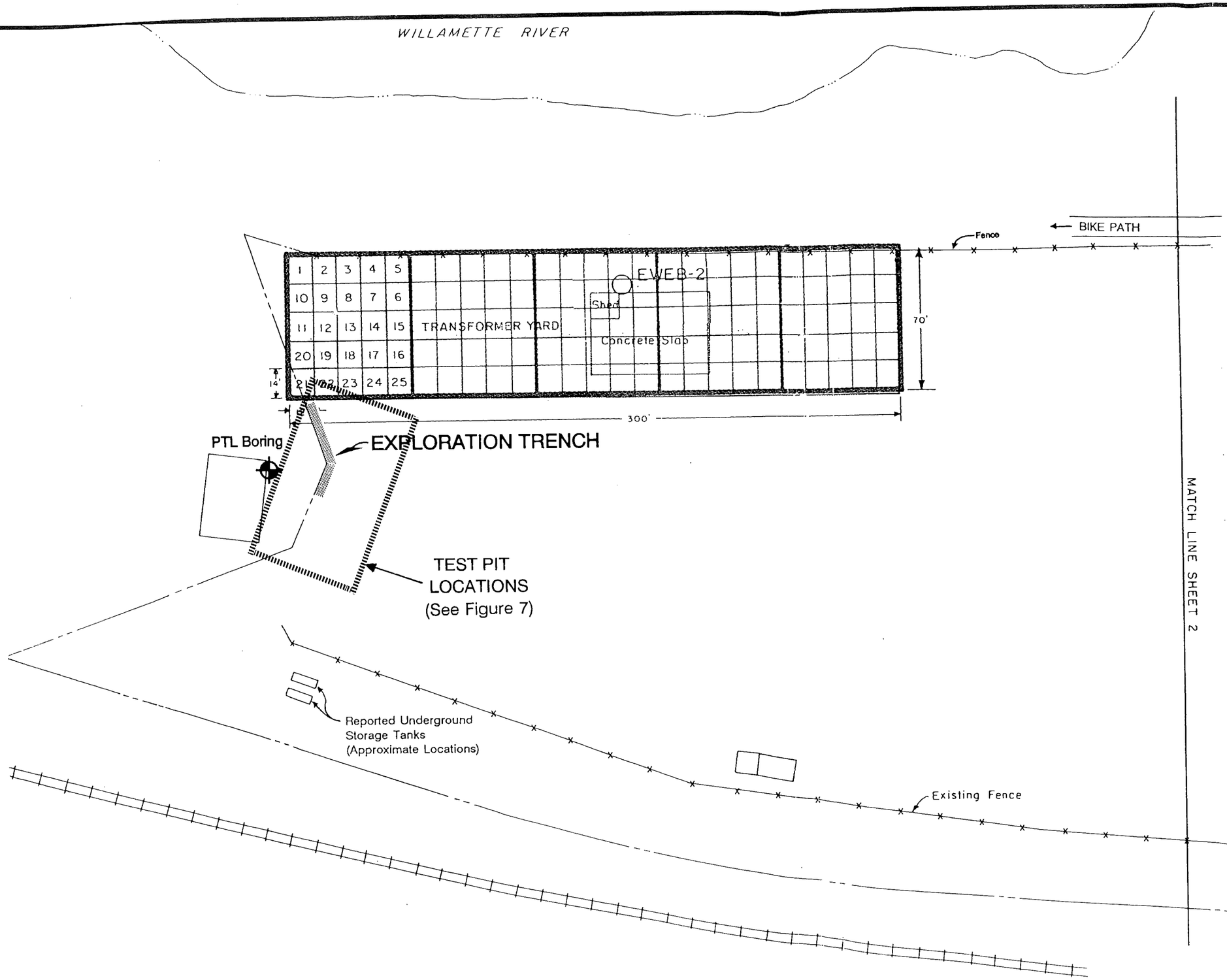


UNIVERSITY OF OREGON
RIVERFRONT RESEARCH PARK

NORTH OF RAILROAD TRACKS PARCEL

SQUIER ASSOCIATES
AUGUST 1993 89384.7

FIGURE 4



UNIVERSITY OF OREGON

WESTERN PARCEL
RIVERFRONT
RESEARCH PARK
SITE SKETCH

NOTE: Features shown are for illustrative purposes only and are approximate

SQUIER ASSOCIATES

DECEMBER 1992 89384

FIGURE

Site Name: University of Oregon

Date: August 6, 1993

Project No.: 89384.8

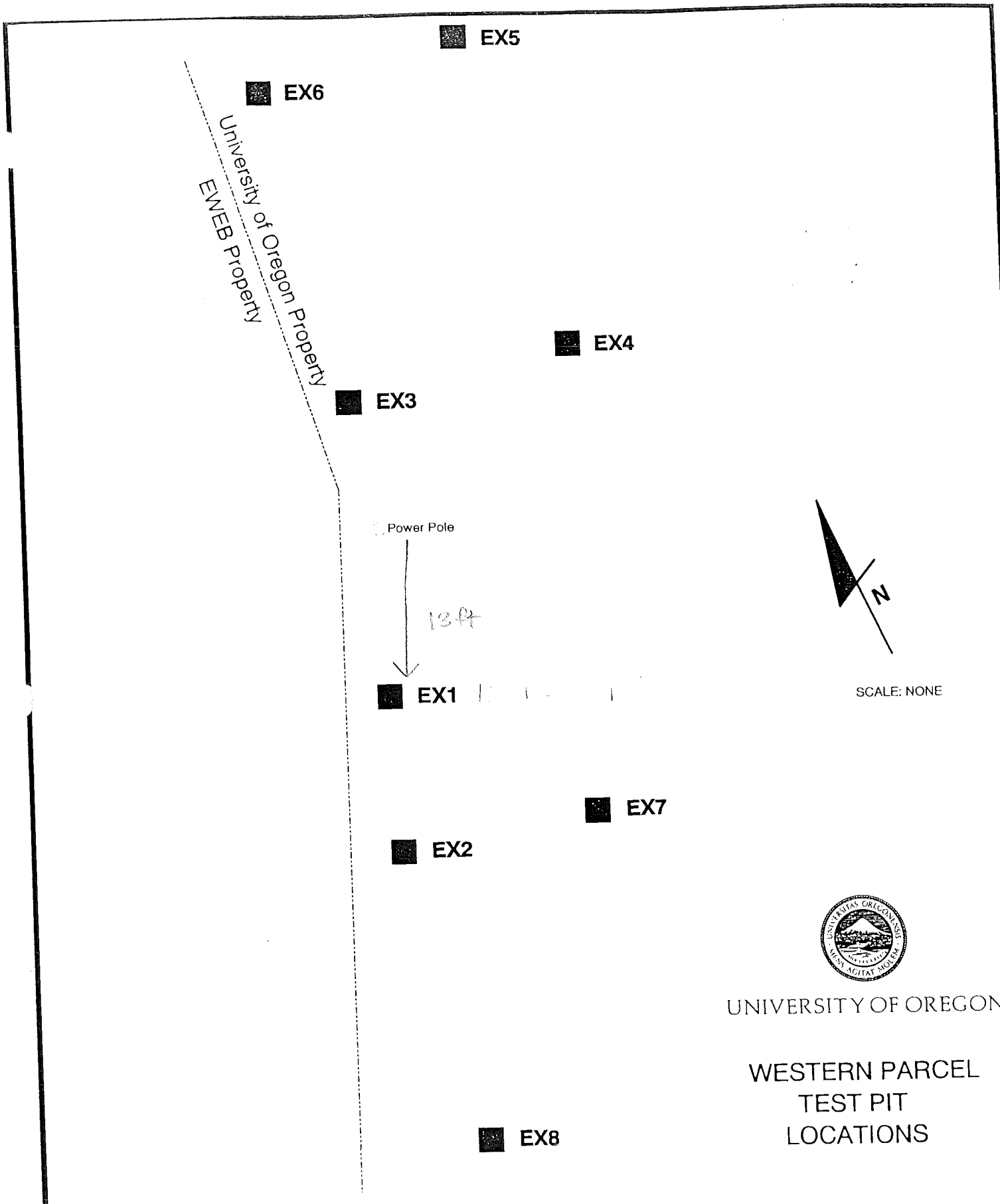
MATRIX SCORE SHEET		SCORE
1. Depth to Ground Water	Values	10
< 25 feet	10	
25 - 50 feet	7	
51 - 100 feet	4	
> 100 feet	1	
2. Mean Annual Precipitation		5
> 45 inches	10	
20 - 45 inches	5	
< 20 inches	1	
3. Native Soil Type		5
High Permeability (sands, gravels)	10	
Moderate Permeability (sandy loams, clay loams)	5	
Low Permeability (clays, silty clays)	1	
4. Sensitivity of Uppermost Aquifer		7
Sole Source Aquifer No Alternative Sources Available	10	
Potable Aquifer Currently Used	7	
Alternative Sources Available	4	
Future Potable But Not Currently Used	1	
Unuseable		
5. Potential Receptors		10
Distance Descriptions:		
Near < ½ mile		
Medium ½ - 2 miles		
Far > 2 miles		
Number of People at Risk:		
Many > 3,000 People		
Medium 100 - 3,000 People		
Few < 100 People		

	Many	Medium	Few
Near	10	10	5
Medium	10	5	1
Far	5	1	1

TOTAL SCORE	=	37

Matrix Score		Cleanup Level in ppm TPH	
		Gasoline	Diesel
Level 1:	> 40 pts.	40	100
Level 2:	25 - 40 pts.	80	**500**
Level 3:	< 25 pts.	130	1000

FIGURE 6



UNIVERSITY OF OREGON

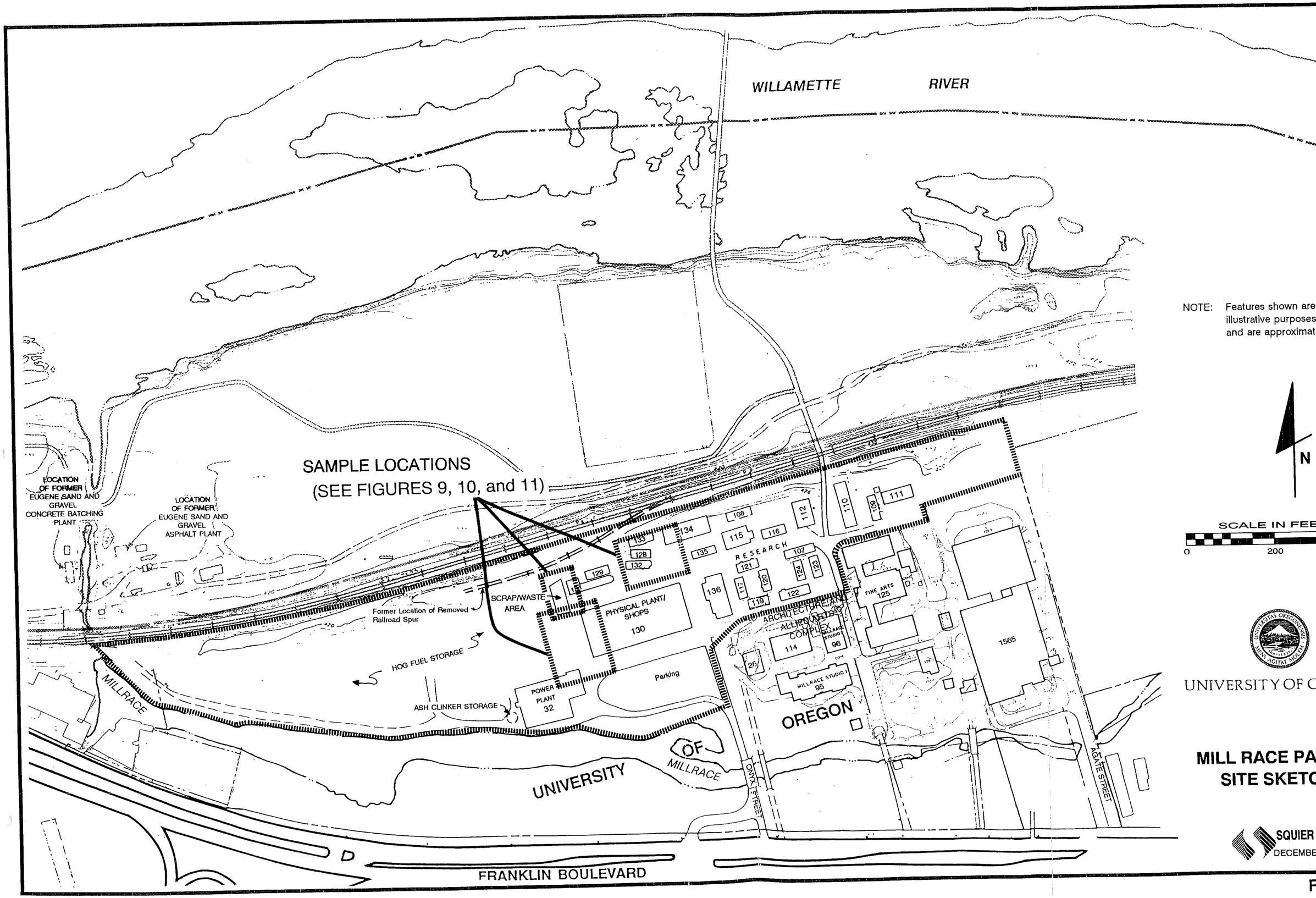
WESTERN PARCEL TEST PIT LOCATIONS

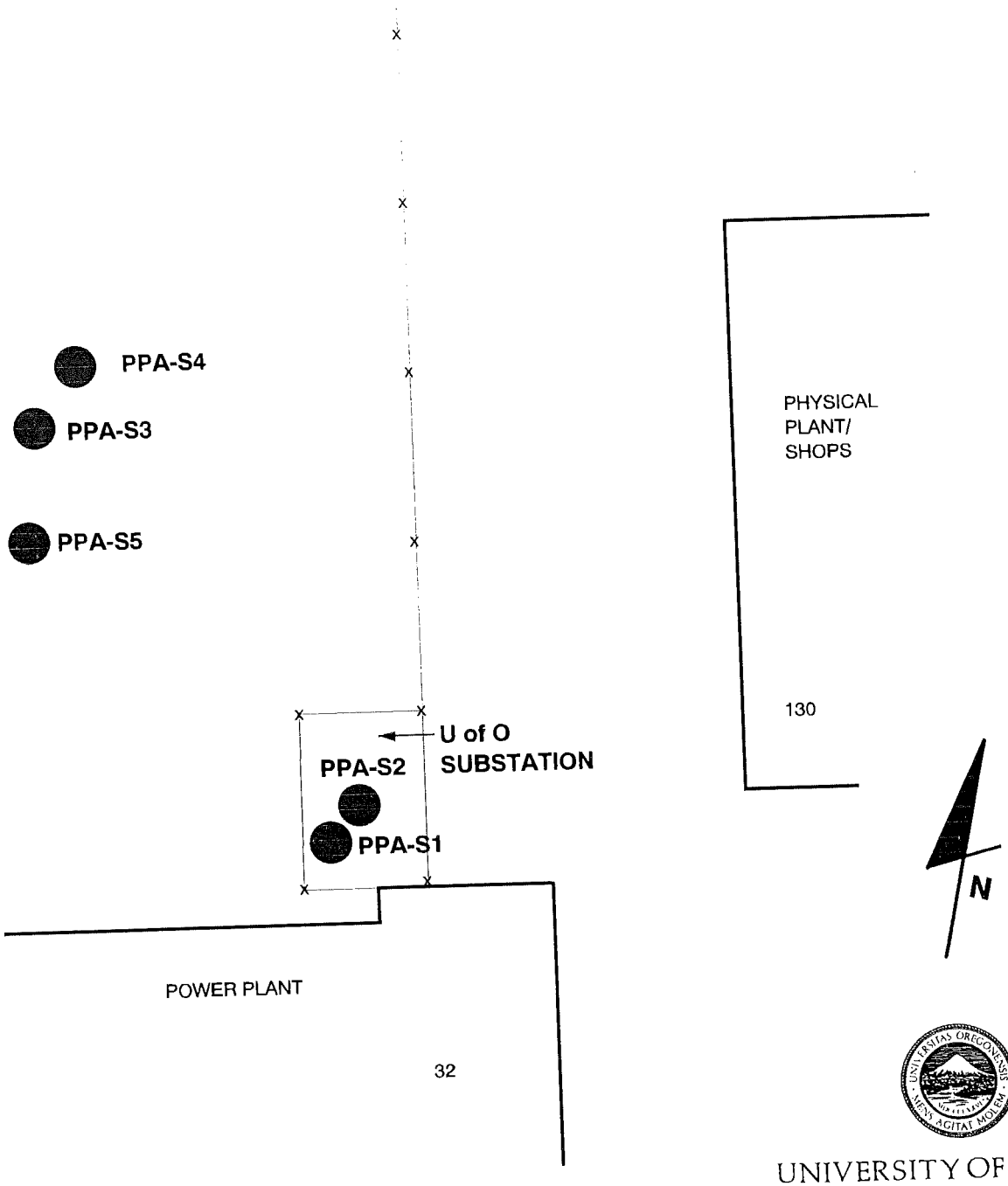
NOTE: Features shown are for illustrative purposes only and are approximate

SQUIER ASSOCIATE

DECEMBER 1992 8938

FIGURE


WILLAMETTE RIVER
SAMPLE LOCATIONS
(SEE FIGURES 9, 10, and 11)
LOCATION OF FORMER EUGENE SAND AND GRAVEL CONCRETE BATCHING PLANT
LOCATION OF FORMER EUGENE SAND AND GRAVEL ASPHALT PLANT
Former Location of Removed Railroad Spur
SCRAP/WASTE AREA
PHYSICAL PLANT/ SHOPS 130
HOG FUEL STORAGE
ASH CLINKER STORAGE
POWER PLANT 32
Parking
RESEARCH
ALLIED ARTS COMPLEX
ARCHITECTURE AND
FINE ARTS 125
1565
MILLRACE STUDIO I 95
MILLRACE
UNIVERSITY OF OREGON
MILLRACE
ONYX STREET
AGATE STREET
FRANKLIN BOULEVARD
NOTE: Features shown are for illustrative purposes only and are approximate
N
SCALE IN FEET
0
200
UNIVERSITY OF OREGON
MILL RACE PARCEL
SITE SKETCH
SQUIER ASSOCIAT
DECEMBER 1992 893
FIGURE



UNIVERSITY OF OREGON

SAMPLE LOCATIONS
MILL RACE PARCEL
SUBSTATION AREA

SCALE IN FEET

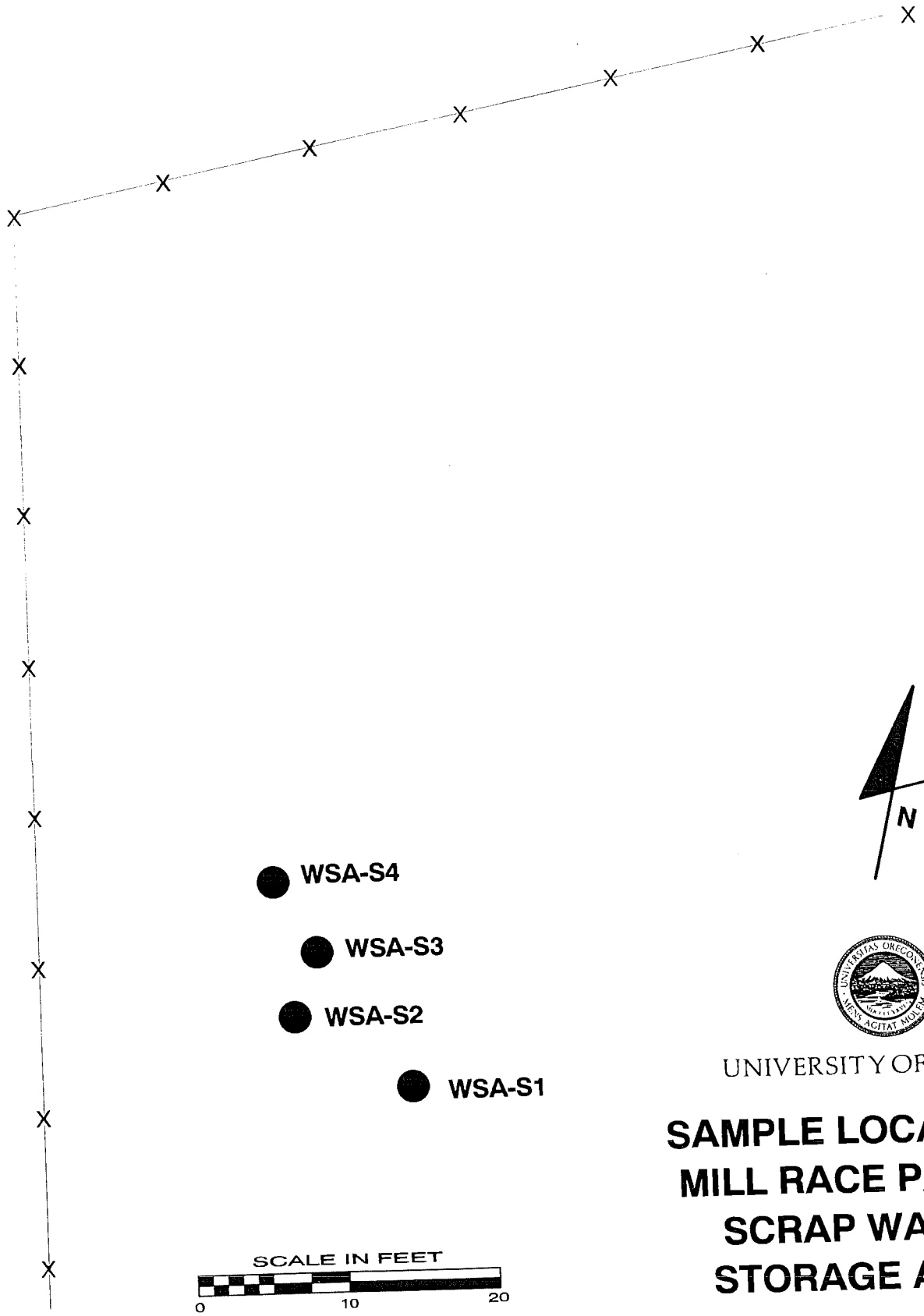
0 30 60

NOTE: Features shown are for illustrative purposes only and are approximate

SQUIER ASSOCIATES

DECEMBER 1992 89384.

FIGURE 1



UNIVERSITY OF OREGON

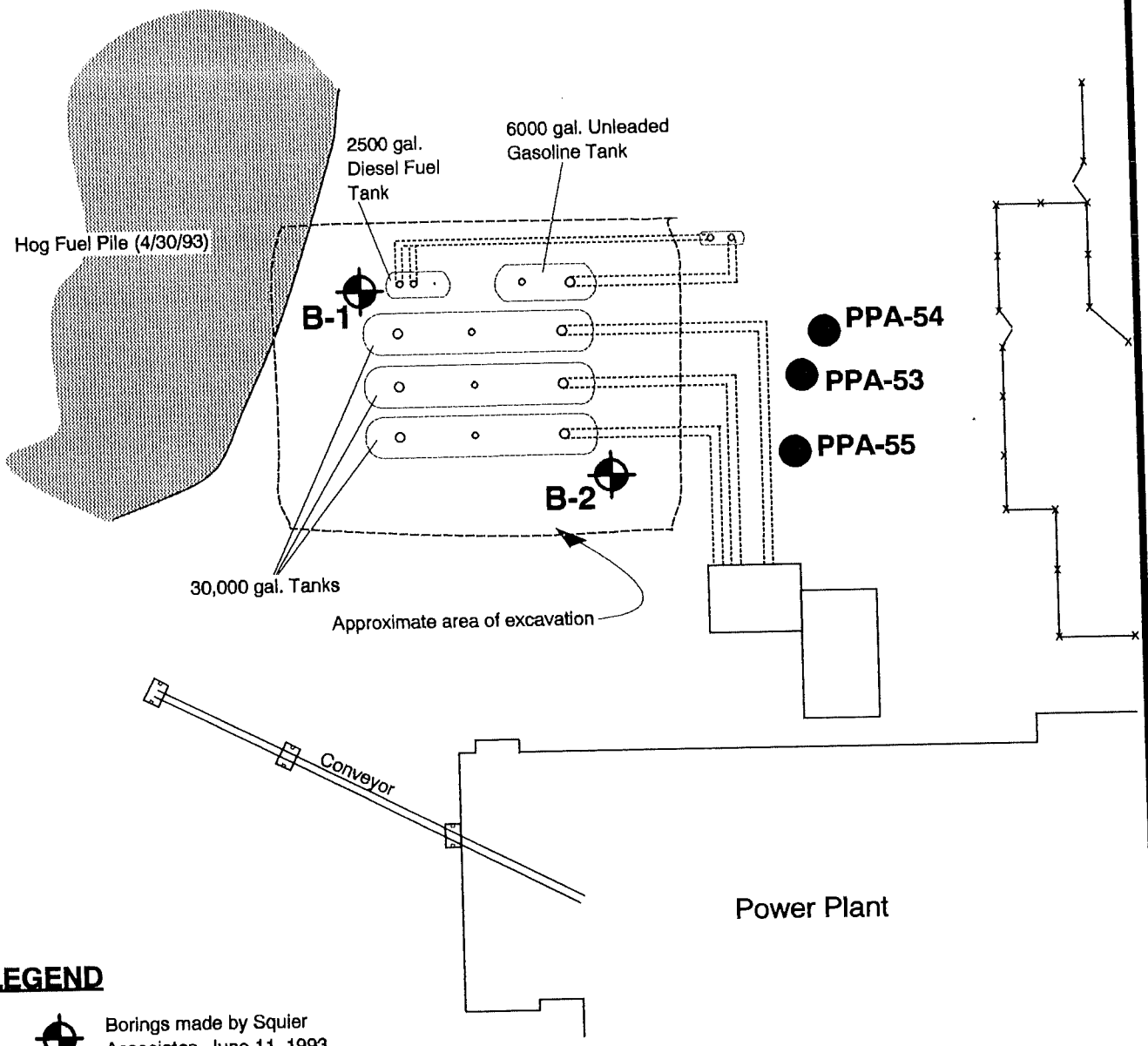
SAMPLE LOCATIONS MILL RACE PARCEL SCRAP WASTE STORAGE AREA

NOTE: Features shown are for illustrative purposes only and are approximate

SQUIER ASSOCIATES

DECEMBER 1992 89384.7

FIGURE 1



LEGEND

- Borings made by Squier Associates, June 11, 1993
- Hand Auger Holes made by Squier Associates, October 6 and 7, 1993

N

SCALE IN FEET (approx.)

0 40 80

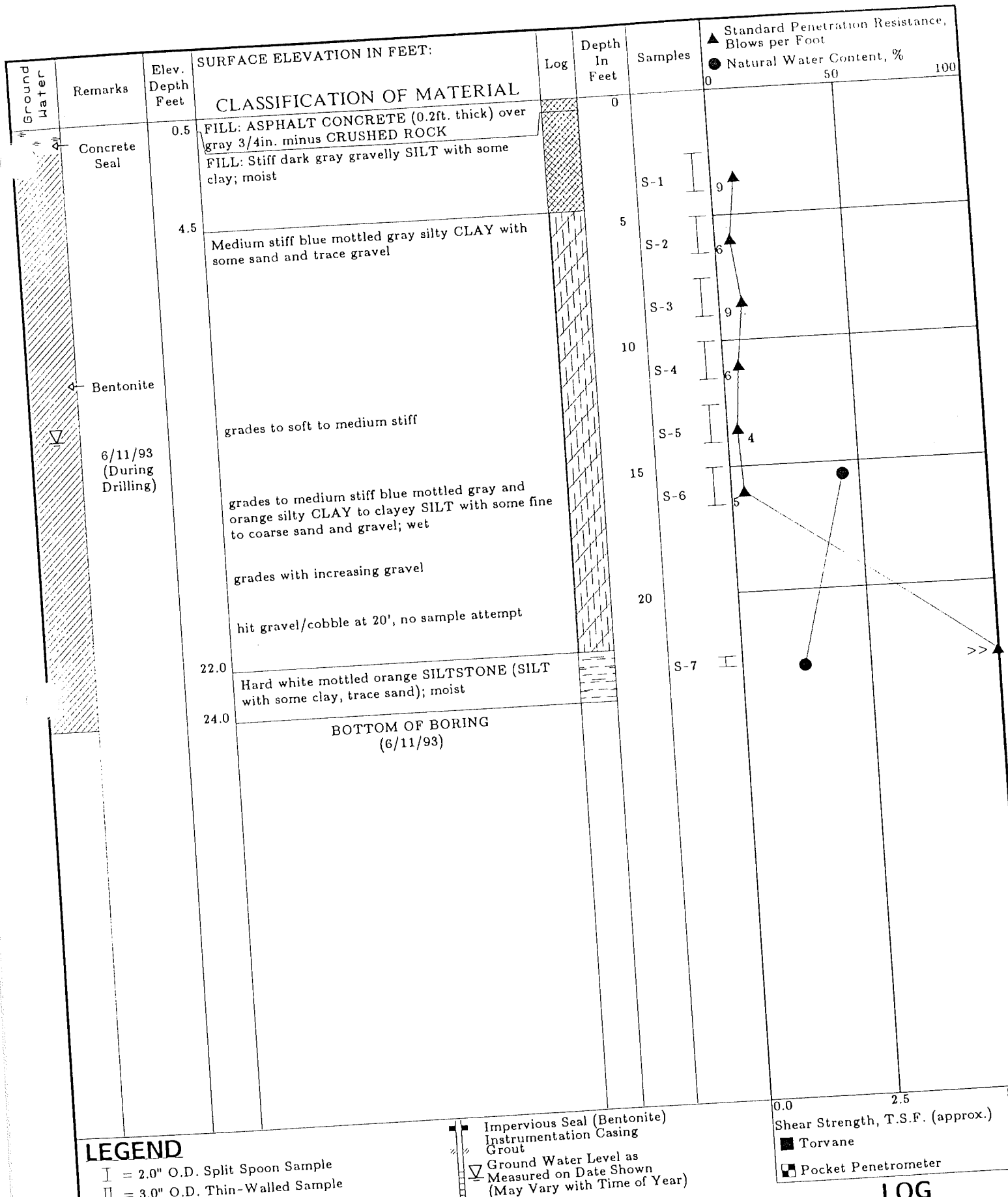
NOTE: Features shown are for illustrative purposes only and are approximate

UNIVERSITY OF OREGON

SITE SKETCH

SQUIER ASSOCIATES
DECEMBER 1993 89384.7

FIGURE 12



LEGEND

- I = 2.0" O.D. Split Spoon Sample
- II = 3.0" O.D. Thin-Walled Sample
- * = Sample Not Recovered
- ⊠ = Grab Sample: Drill Cuttings
- □ = CBR Test Sample
- ▽ = Ground Water Level

Impervious Seal (Bentonite)
Instrumentation Casing
Grout
▽ Ground Water Level as Measured on Date Shown (May Vary with Time of Year)
Pea-Gravel
Perforated Casing

ATTERBERG LIMITS
Plastic Limit — Liquid Limit
Oven Dried L.L. — Natural Water Content

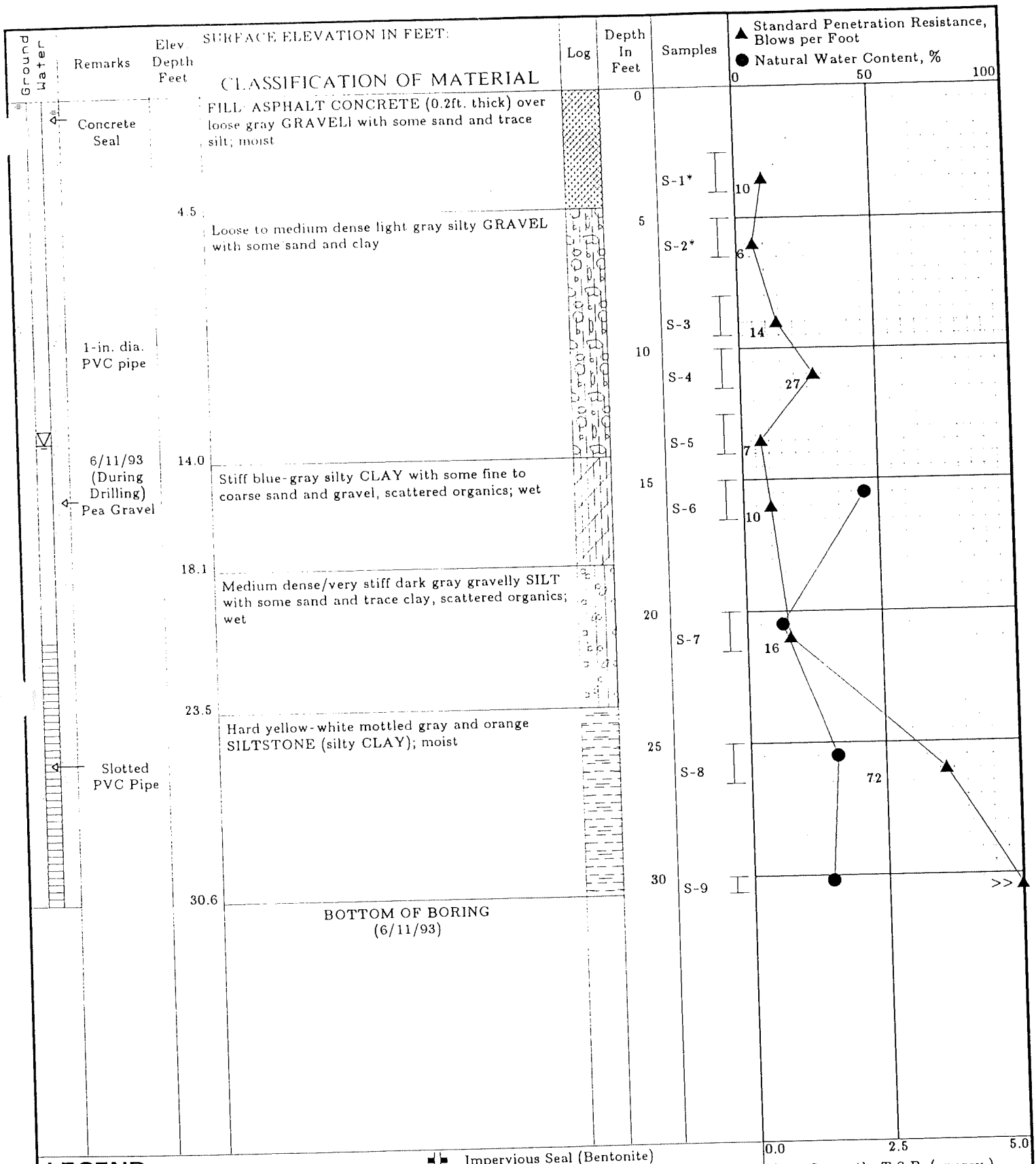
NOTE: Lines representing the interface between soil/rock units of differing description are approximate only and may indicate gradual transition

LOG BORING B-1

SQUIER ASSOCIAT
JUNE 1993
937

FIGURE

Reviewed



LEGEND

- = 2.0" O.D. Split Spoon Sample
- = 3.0" O.D. Thin-Walled Sample
- * = Sample Not Recovered
- = Grab Sample: Drill Cuttings
- = CBR Test Sample
- = Ground Water Level

Impervious Seal (Bentonite)
Instrumentation Casing
Grout
Ground Water Level as Measured on Date Shown (May Vary with Time of Year)
Pea-Gravel
Perforated Casing

ATTERBERG LIMITS
Plastic Limit — Liquid Limit
Oven Dried L.L. — Natural Water Content

NOTE: Lines representing the interface between soil/rock units of differing description are approximate only and may indicate gradual transition

LOG BORING B-2

SQUIER ASSOCIATES
JUNE 1993 93759

Reviewed

FIGURE 14

WILLAMETTE RIVER

NOTE: Features shown are for illustrative purposes only and are approximate

MW-2
MW-17
MW-5
MW-11
AREA A (See Figure 17)
AREA B (See Figure 18)
PLAYING FIELD
SVS-16
BIKE PATH
VAULT
MILLRACE AREA
MW-15
MW-8
MW-18
MW-12
ACCESS ROAD
AH-ASH-3
AH-ASH-2
SVS-17
(A-9)
AH-ASH-1
ASH DISPOSAL AREA
SVS-23
(A-6)
MILLRACE
(6)
UNIVERSITY OF OREGON
MILLRACE
FINE ARTS
RESEARCH
N
SCALE: 1"=200'

LEGEND

MW-5 = Monitoring Well

UNIVERSITY OF OREGON
RIVERFRONT RESEARCH PARK

SOIL GAS/ GROUND WATER SURVEY

SQUIER ASSOCIATES
JUNE 1991 89384.6

FIGURE

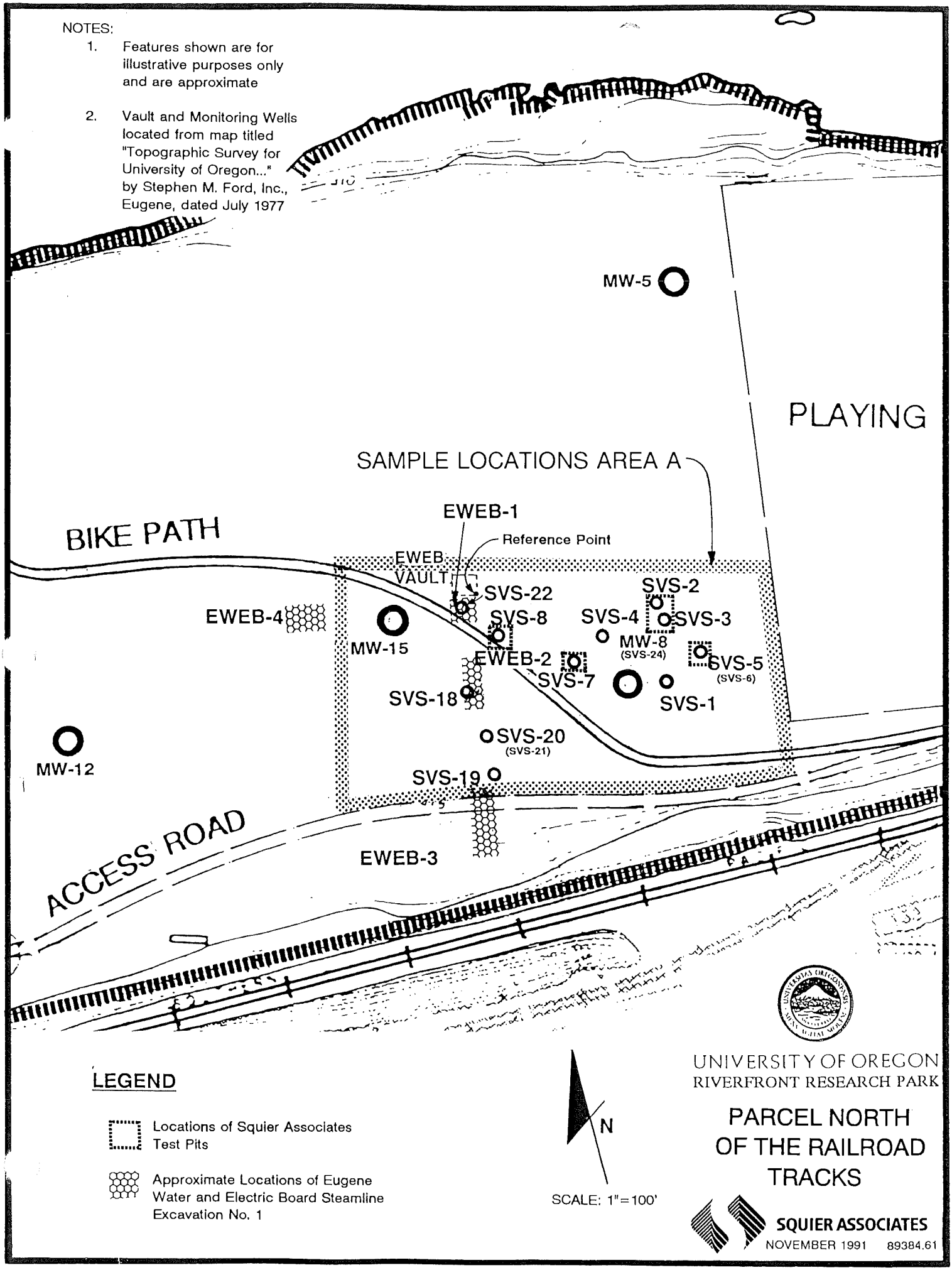

NOTES:
1. Features shown are for illustrative purposes only and are approximate
2. Vault and Monitoring Wells located from map titled "Topographic Survey for University of Oregon..." by Stephen M. Ford, Inc., Eugene, dated July 1977
MW-5
PLAYING
SAMPLE LOCATIONS AREA A
EWEB-1
Reference Point
BIKE PATH
EWEB VAULT
SVS-22
SVS-2
EWEB-4
SVS-8
SVS-4
SVS-3
MW-15
MW-8 (SVS-24)
EWEB-2
SVS-5 (SVS-6)
SVS-7
SVS-18
SVS-1
SVS-20 (SVS-21)
MW-12
SVS-19
ACCESS ROAD
EWEB-3
LEGEND
Locations of Squier Associates Test Pits
Approximate Locations of Eugene Water and Electric Board Steamline Excavation No. 1
N
SCALE: 1"=100'
UNIVERSITY OF OREGON
RIVERFRONT RESEARCH PARK
PARCEL NORTH OF THE RAILROAD TRACKS
SQUIER ASSOCIATES
NOVEMBER 1991 89384.61

FIGURE 17

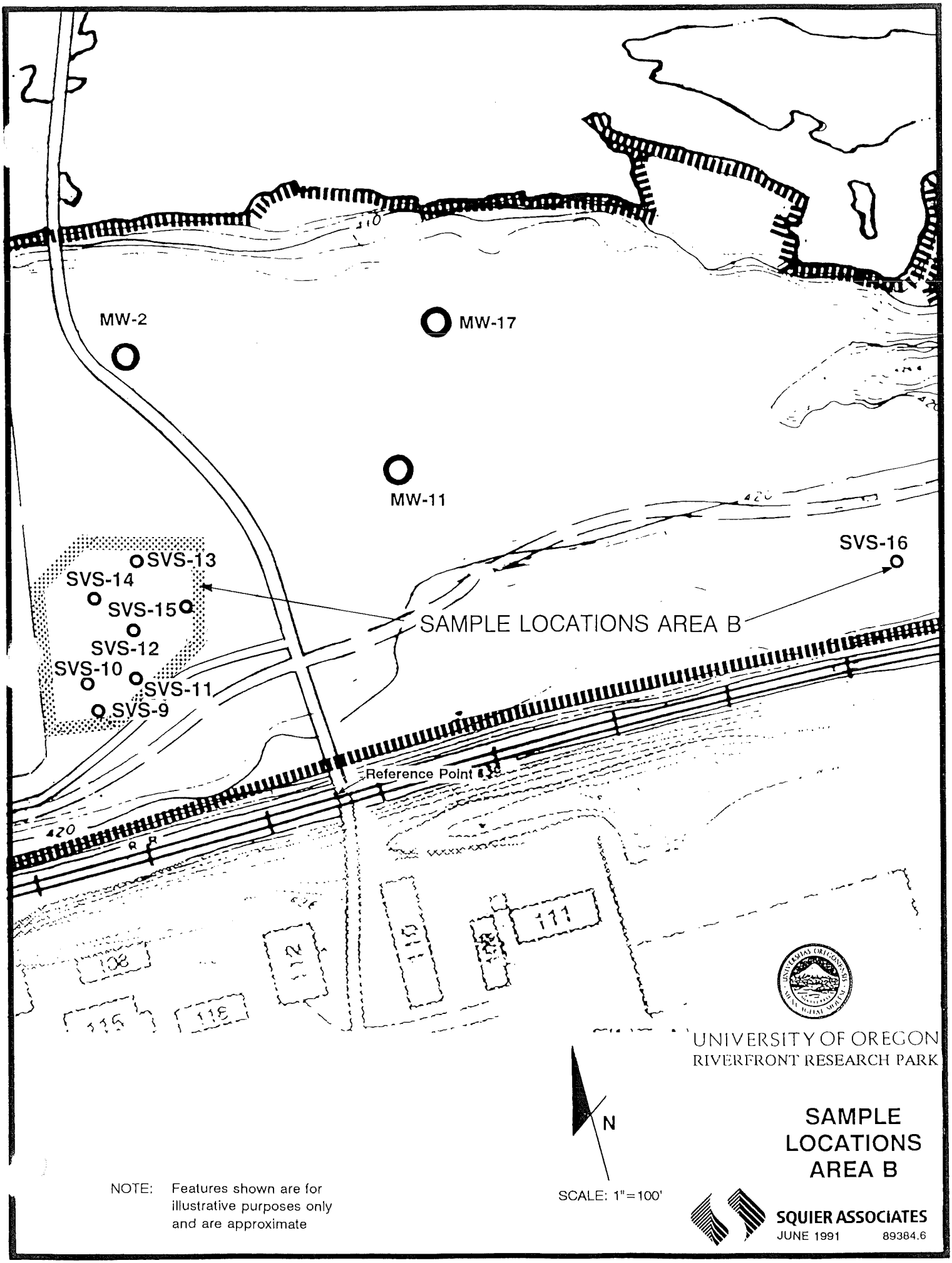

MW-2
MW-17
MW-11
SVS-16
SVS-13
SVS-14
SVS-15
SVS-12
SVS-10
SVS-11
SVS-9
SAMPLE LOCATIONS AREA B
Reference Point
420
R R
108
112
111
115
116
UNIVERSITY OF OREGON
RIVERFRONT RESEARCH PARK
N
SCALE: 1"=100'
SAMPLE
LOCATIONS
AREA B
NOTE: Features shown are for illustrative purposes only and are approximate
SQUIER ASSOCIATES
JUNE 1991 89384.6

FIGURE 18

Ground Water	Remarks	Elev. Depth Feet	SURFACE F VATION IN FEET: CLASSIFICATION OF MATERIAL	Log	Depth In Feet	amples	△ Dry Density, P.C.F. ● Natural Water Content, % 0 50 100
		0.0			0		
					2		
			FILL: Light brown SILT with some clay, bark, fine to coarse sand, and subangular to rounded gravel, trace roots; dry			S-1	
					4		
			Brown SILT with some fine sand and trace to some clay and gravel; dry			S-2	
					6		
			Brown SILT with some silt and trace subrounded gravel, sand, and roots; moist			S-3	
					8		
			Brown gravelly SILT with some fine to coarse sand; moist			S-4	
		8.3	REFUSAL ON CONCRETE				
			BOTTOM OF TEST PIT (9/19/91)				

0.0 2.5 5.0
Shear Strength, T.S.F. (approx.)
■ Torvane
▣ Pocket Penetrometer

LEGEND

I = 2.0" O.D. Split Spoon Sample
II = 3.0" O.D. Thin-Walled Sample
* = Sample Not Recovered
⊠ = Jar Sample
□ = Bag Sample
▭ = CBR Test Sample
~~ = Seepage

▽ Ground Water Level as Measured on Date Shown (May Vary with Time of Year)

ATTERBERG LIMITS
Liquid Limit
Natural Water Content
Plastic Limit

NOTE:
Lines representing the interface between soil/rock units of differing description are approximate only and may indicate gradual transition

LOG--GEOTECHNICAL TEST PIT SVS-8.1

SQUIER ASSOCIATES
NOVEMBER 1991 89384.61

FIGURE

TPGEO

Ground Water	Remarks	Elev. Depth Feet	SURFACE E' 'ATION IN FEET: CLASSIFICATION OF MATERIAL	Log	Depth In Feet	Samples
		0.0	Broken BRICKS 4in.-6in. fragments of CONCRETE		0	
					2	
					4	
			Burnt Bookbinding			
					6	
			CONCRETE Fragments to 10in. size			
			REFUSAL ON CONCRETE		8	S-3
		8.3	BOTTOM OF TEST PIT (9/19/91)			

⊗ Oxygen, O_2, %
Ⓘ Methane, %
0 50 100

0.0 50 100
O Photoionization Detector, p.p.m.

LEGEND

⊟ = Environmental Sample

* = Sample Not Recovered

☐ = Bag Sample

~~> = Seepage

▽ Ground Water Level as Measured on Date Shown (May Vary with Time of Year)

NOTE:
Lines representing the interface between soil/rock units of differing description are approximate only and may indicate gradual transition

LOG--ENVIRONMENTAL TEST PIT SVS-8.1

SQUIER ASSOCIATES
NOVEMBER 1991 89384.61

FIGURE 19

TPENV

Ground Water	Remarks	Elev. Depth Feet	SURFACE EL[illegible]VATION IN FEET: CLASSIFICATION OF MATERIAL	Log	Depth In Feet	Samples	△ Dry Density, P.C.F. ● Natural Water Content, % 0 50 100
		0.0			0		
					2		
			FILL: Brown SILT with some fine to coarse sand, rounded to angular gravel, and trace roots, concrete fragments, debris; dry			S-1 ⊠	
					4		
			Gray to brown clayey SILT with some fine to coarse sand and trace gravel, roots; moist			S-2 ⊠	
					6		
			Brown clayey SILT with some fine to coarse sand, subangular to angular gravel, and trace roots; moist			S-3 ⊠	
			REFUSAL ON CONCRETE		8		
		8.0	BOTTOM OF TEST PIT (9/19/91)				

0.0 2.5 5.0
Shear Strength, T.S.F. (approx.)
■ Torvane
◪ Pocket Penetrometer

LEGEND

I = 2.0" O.D. Split Spoon Sample
II = 3.0" O.D. Thin-Walled Sample
* = Sample Not Recovered
⊠ = Jar Sample
□ = Bag Sample
■ = CBR Test Sample
~~▸ = Seepage

▽ Ground Water Level as Measured on Date Shown (May Vary with Time of Year)

ATTERBERG LIMITS
Liquid Limit
Natural Water Content
Plastic Limit

NOTE:
Lines representing the interface between soil/rock units of differing description are approximate only and may indicate gradual transition

LOG--GEOTECHNICAL TEST PIT SVS-7.1

SQUIER ASSOCIATES
NOVEMBER 1991 89384.61

FIGURE 20

TPGEO

Ground Water	Remarks	Elev. Depth Feet	SURFACE E[illegible]VATION IN FEET: CLASSIFICATION OF MATERIAL	Log	Depth In Feet	Samples
		0.0	CONCRETE Slab Wooden 2 x 4 Scattered BRICK fragments Trace ASBESTOS--1in. x 1in. Transite TILE, CONCRETE, ASPHALT Debris to 3ft. size PLASTER-like material		0 2 4 6	
			REFUSAL ON CONCRETE		8	S-3
		8.0	BOTTOM OF TEST PIT (9/19/91)			

⊗ Oxygen, O_2, %
Ⓘ Methane, %
0 50 100

0.0 50 100
O Photoionization Detector, p.p.m.

LEGEND

⊟ = Environmental Sample

* = Sample Not Recovered

☐ = Bag Sample

∿∿ = Seepage

▽ Ground Water Level as Measured on Date Shown (May Vary with Time of Year)

NOTE:
Lines representing the interface between soil/rock units of differing description are approximate only and may indicate gradual transition

LOG--ENVIRONMENTAL TEST PIT SVS-7.1

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FIGURE 20

TPENV

Ground Water	Remarks	Elev. Depth Feet	SURFACE ELEVATION IN FEET: CLASSIFICATION OF MATERIAL	Log	Depth In Feet	Samples	△ Dry Density, P.C.F. ● Natural Water Content, % 0 50 100
		0.0			0		
					2		
			Brown SILT with some subrounded angular gravel, wood fragments, concrete fragments, and trace to some sand; dry			S-1 ☒	
			becomes moist		4	S-2 ☒	
					6		
			Brown, green, and yellow-brown clayey SILT with some subrounded to angular gravel with trace sand and organics; moist to wet		8	S-4 ☒	
		8.5	BOTTOM OF TEST PIT (9/19/91)				

0.0 2.5 5.0
Shear Strength, T.S.F. (approx.)
■ Torvane
Pocket Penetrometer

LEGEND

I = 2.0" O.D. Split Spoon Sample
II = 3.0" O.D. Thin-Walled Sample
* = Sample Not Recovered
☒ = Jar Sample
□ = Bag Sample
■ = CBR Test Sample
~~> = Seepage

▽ Ground Water Level as Measured on Date Shown (May Vary with Time of Year)

ATTERBERG LIMITS
Liquid Limit
Natural Water Content
Plastic Limit

NOTE:
Lines representing the interface between soil/rock units of differing description are approximate only and may indicate gradual transition

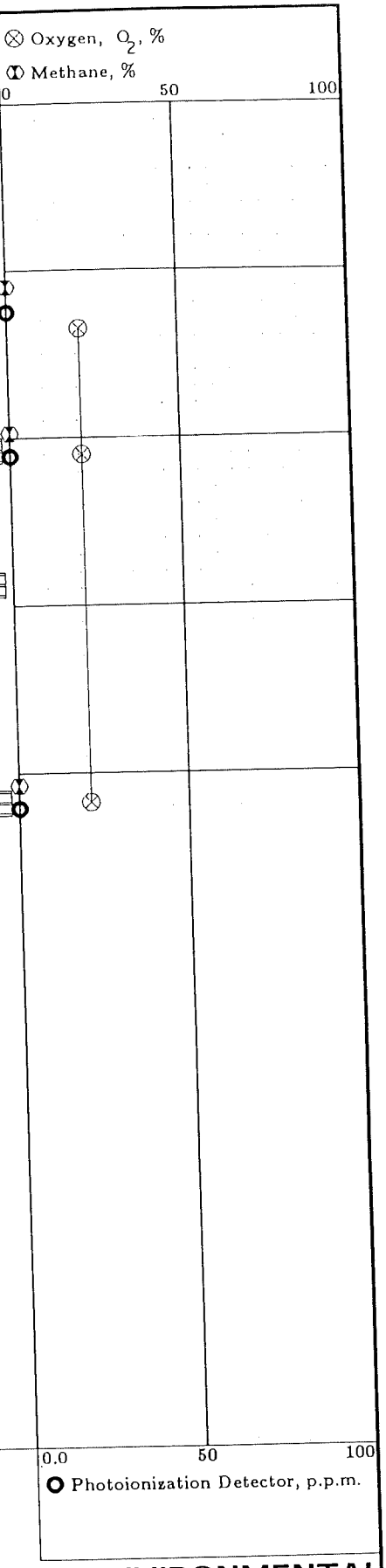
LOG--GEOTECHNICAL TEST PIT SVS-2.1/3.1

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FIGURE 21

TPGEO

Ground Water	Remarks	Elev. Depth Feet	SURFACE ELEVATION IN FEET: CLASSIFICATION OF MATERIAL	Log	Depth In Feet	Samples
		0.0	CONCRETE Fragment, 1ft. x 2ft.		0	
			BARKDUST-like material		2	
			Green-brown-gray coloration, 4ft. to 8.5ft.		4	S-2
					6	S-3
			Discolored soil		8	S-4
		8.5	BOTTOM OF TEST PIT (9/19/91)			



LEGEND

⊟ = Environmental Sample

* = Sample Not Recovered

☐ = Bag Sample

∿∿ = Seepage

▽ Ground Water Level as Measured on Date Shown (May Vary with Time of Year)

NOTE:
Lines representing the interface between soil/rock units of differing description are approximate only and may indicate gradual transition

LOG--ENVIRONMENTAL TEST PIT SVS-2.1/3.1

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FIGURE 2

TPENV

Ground Water	Remarks	Elev. Depth Feet	SURFACE ELEVATION IN FEET: CLASSIFICATION OF MATERIAL	Log	Depth In Feet	Samples	△ Dry Density, P.C.F. ● Natural Water Content, % 0 50 100
		0.0			0		
					2		
			Brown to light brown SILT with some subangular to angular gravel, asphalt fragments, and debris, trace sand, and organics			S-1	
					4		
			Gray, brown, and gray-green silty CLAY with trace sand and angular gravel; moist to wet				
▽					6	S-2	
		6.0	BOTTOM OF TEST PIT (9/19/91)				

0.0 2.5 5.0
Shear Strength, T.S.F. (approx.)
■ Torvane
▪ Pocket Penetrometer

LEGEND

I = 2.0" O.D. Split Spoon Sample
II = 3.0" O.D. Thin-Walled Sample
* = Sample Not Recovered
⊠ = Jar Sample
□ = Bag Sample
▪ = CBR Test Sample
~~> = Seepage

▽ Ground Water Level as Measured on Date Shown (May Vary with Time of Year)

ATTERBERG LIMITS
Liquid Limit
Natural Water Content
Plastic Limit

NOTE:
Lines representing the interface between soil/rock units of differing description are approximate only and may indicate gradual transition

LOG--GEOTECHNICAL TEST PIT SVS-5.1

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FIGURE 22

TPGEO

Ground Water	Remarks	Elev. Depth Feet	SURFACE E[illegible]VATION IN FEET: CLASSIFICATION OF MATERIAL	Log	Depth In Feet	Samples
		0.0			0	
			Broken PORCELAIN Commode		2	
			Scattered CONCRETE Fragments			
			METAL Rod			
			ASPHALT Fragments of various size scattered throughout excavation		4	
			Discolored Soil		6	S-3
		6.0	BOTTOM OF TEST PIT (9/19/91)			

⊗ Oxygen, O_2, %
Ⓣ Methane, %
0 50 100

0.0 50 100
O Photoionization Detector, p.p.m.

LEGEND

⊟ = Environmental Sample

• = Sample Not Recovered

☐ = Bag Sample

∿∿ = Seepage

▽ Ground Water Level as Measured on Date Shown (May Vary with Time of Year)

NOTE:
Lines representing the interface between soil/rock units of differing description are approximate only and may indicate gradual transition

LOG--ENVIRONMENTAL TEST PIT SVS-5.1

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FIGURE 22

TPENV

APPENDIX A

University of Oregon
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Eugene, Oregon

WORK PLAN FOR REMEDIAL INVESTIGATION AND CHARACTERIZATION SOIL SAMPLING WESTERN PARCEL, RIVERFRONT RESEARCH PARK UNIVERSITY OF OREGON

August 18, 1992

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WORK PLAN FOR REMEDIAL INVESTIGATION AND CHARACTERIZATION SOIL SAMPLING WESTERN PARCEL, RIVERFRONT RESEARCH PARK UNIVERSITY OF OREGON, EUGENE, OREGON

This Work Plan has been developed to address an additional phase of remedial investigation for the Western Parcel of the Riverfront Research Park located in Eugene, Oregon. The remedial investigation is in response to issues addressed in the report Environmental Site Assessment, Western Parcel, Riverfront Research Park, University of Oregon, submitted by L.R. Squier Associates in May, 1990.

Background

The Environmental Site Assessment identified an area within the former Western Parcel "pole yard" with visually discolored soils; identified as EWEB-2 in our previous report (refer, Figure 1). Total petroleum hydrocarbons (TPH) at 5,500 parts per million (ppm) were detected in a soil sample collected at about depth 1-foot. No polychlorinated biphenyls (PCBs) were detected in this sample. Eugene Water & Electric Board (EWEB) personnel indicated that concrete vaults were manufactured in this area and that the wood vault forms were coated with waste oil to prevent adherence of the concrete.

Pittsburgh Testing Laboratory reported creosote-like contamination detected at about depth 4 feet in a boring placed near the eastern boundary of the EWEB property, which adjoins the University of Oregon Western Parcel. This is the area where Cascade Natural Gas Corporation formerly operated a water gas plant.

Objectives

1. Characterize the EWEB-2 area by a test pit excavation. The large amount of concrete rubble in the vicinity of EWEB-2 would prevent the advancement of either a hand or hollow stem drill auger.
2. Evaluate the subsurface soils near the boundary of the EWEB and University of Oregon properties where Pittsburgh Testing Laboratory reportedly detected creosote-like material at about depth 4 feet.

3. Provide confirmation sample collection and chemical analysis to characterize the sub-surface materials for remediation and disposal requirements.

4. Document by report, remedial investigation activities and conclusions.

5. Document by report, earlier exploration for possible above ground or underground storage tank(s).

Scope of Services

Based on the foregoing, the following is a list of general work items to be performed for the remedial investigation in the Western Parcel area. The amount of material to be remediated will be evaluated by taking of vertical and lateral soil samples for chemical analyses.

1. Prepare an updated site-specific Sampling Plan and Site Safety Plan for the work to be conducted at the two locations that will describe the sampling procedures and quality control/quality assurance practices that will be implemented. The Safety Plan will be written to minimize risk during the work activity onsite. These two plans will be reviewed by the Oregon Department of Environmental Quality (DEQ) along with this work plan prior to commencement of the remedial investigation.

2. EWEB-2 Area.
Prepare an onsite temporary soil stockpile pad in the vicinity of EWEB-2. The soil stockpile pad will be constructed by placing plastic sheeting (minimum 4 mil) across the area designated for the stockpile location. Sufficient plastic sheeting will be used, such that the temporary stockpile of soil will be contained on the bermed plastic sheet placed on the concrete pad, immediately to the south of the excavation. If possible, the larger concrete rubble will be separated from excavated soils. Upon completion of characterization and verification sampling the excavated soils will be replaced into the excavation, less the segregated concrete rubble. To minimize wind disturbance or infiltration of rain water a secured plastic cover will be placed over the excavation until remediation has been completed. The plastic cover will be secured by the earlier segregated concrete rubble or other readily available concrete located onsite. Additional security is not required, as the property is fenced with a 6-foot cyclone with locked gates. The property currently consists of bare ground and is vacant.

   The track-mount backhoe will be decontaminated prior to arriving at the site. A test pit will be excavated consisting of approximately 3 cubic yards of contaminated soil and concrete rubble from the area identified as EWEB-2, using a trackhoe supplied by EWEB. The three cubic yard volume is an estimate based on observations made during previous work onsite. We estimate that the test pit excavation work will involve

excavating an area approximately 3 feet by 6 feet to about depth 3 feet. Depending on site conditions exposed during explorations, contaminated soil volume could increase.

Two discrete characteristic soil samples will be collected from the excavated test pit soils following procedures outlined in the site specific Sampling Plan. In addition, five discrete representative soil characterization samples will be collected for analytical testing from the four excavation sidewalls and the base of the excavation.

The two discrete characterization samples collected from the excavated soils, along with two of the characterization samples collected from the sidewall and bottom of the excavation, will be submitted to a qualified environmental laboratory (by chain of custody) for analysis of TPH concentration, using a modified U.S. Environmental Protection Agency (EPA) Method 418.1. The samples from the excavation will be from the most visible contaminated areas observed or the area with the highest HNU photoionization detector readings. In addition, these four samples will analyzed for volatile organic compounds, by EPA Method 8240, and for lead, chromium, and cadmium by EPA 6000 and 7000 series methods. The other three verification samples will be archived by the laboratory until the analytical results from the four characterization samples are known. Analysis of these three samples will be dependent on the analytical results obtained from the four characterization samples.

3. Western Boundary Area.
An exploratory trench will be excavated to about depth 5 feet on the University of Oregon Western Parcel, near the boundary with the EWEB property (refer, Figure 1). The excavation will extend approximately 30 feet south and then 20 feet to the southwest as indicated on Figure 1, to evaluate the presence of creosote-like material observed earlier by Pittsburgh Testing Laboratory.

Excavated materials will be temporarily placed adjacent to the exploration trench. The excavation materials will be visually examined for evidence of creosote-like materials. The sidewalls and bottom of the exploration trench will also be examined visually for the reported creosote-like material. If contamination is observed, soil samples for chemical analysis by EPA Method 8270, will be collected in the area of greatest visual discoloration. If observed contamination is significant, the excavation will cease with the trench backfilled with the excavated materials. A maximum of two soil samples will be collected following procedures outlined in the site specific Sampling Plan. Upon completion of the exploratory trench and the collection of soil samples, if indicated, the trench will be backfilled with the excavated materials.

The track-mounted backhoe will be decontaminated by hot water rinse or scraping prior to excavation of the trench and will again be decontaminated prior to leaving the site.

The hot water rinse and scrapings will be contained on plastic sheeting and, at DEQ's request, be placed back into the excavation.

4. A report will be prepared to summarize the work conducted during the explorations, the soil sampling, and the analytical testing for this project. This report will also include the results of the earlier magnetic exploration for fuel tanks in the southwest part of the site. Five copies of our report will be submitted.

Schedule

We estimate that the explorations/sampling phase will take one day to complete. The results from the analytical testing should be received within 14 days of submittal of the soil samples to the analytical laboratory. A written draft report will be transmitted approximately three weeks following completion of the field work. A final report will be submitted two weeks after receipt of draft report comments.

Additional Laboratory Analysis

Samples analyzed from the EWEB-2 area that contain total volatile organic compounds or metals above DEQ regulated levels may need to be analyzed for leachable concentrations by the Toxicity Characteristic Leaching Procedure (TCLP) method. This will discussed with DEQ and agreed to by the University and DEQ before the additional analysis is scheduled. The cost of this additional analysis is not included in the remedial investigation project cost estimate.

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SAMPLING PLAN FOR AN ENVIRONMENTAL INVESTIGATION AT THE UNIVERSITY OF OREGON RIVERFRONT RESEARCH PARK WESTERN PARCEL LOCATED IN EUGENE, OREGON

The initial and perhaps most critical element in a program designed to evaluate the physical and chemical properties at a site is the Sampling Plan. The intent of this Sampling Plan is to assure appropriate sampling methodologies and procedures with respect to pertinent regulatory, scientific and engineering objectives. This Sampling Plan was designed by Squier Associates, Inc., geoenvironmental consultants retained by the State of Oregon acting by and through the State Board of Higher Education. A copy of this Sampling Plan should be maintained by the University of Oregon as part of the permanent record concerning the site.

Site Identification/Location

Property Owner	Oregon State Board of Higher Education
Property Description	University of Oregon Riverfront Research Park, Western Parcel
The property is located	in Eugene, Oregon, in the area bounded by the Willamette River on the north, the Millrace outfall and University property on the east, the Southern Pacific Railroad right-of-way and tracks on the south, and Eugene Water & Electric Board property on the west.

Sampling Plan Goals

The purpose of a Sampling Plan is to document methodologies and procedures utilized in obtaining potentially contaminated representative samples at the site; to assist in maintaining quality assurance/quality control (QA/QC) for the sampling program; and to provide for personnel safety. The sampling protocol outlined in this Sampling Plan will provide for collection of representative chemical/physical samples at the site. This plan was written also to comply with regulations of the Oregon Department of Environmental Quality (DEQ) and the United States Environmental Protection Agency (EPA).

Sampling Objectives

The objective of this Sampling Plan is to document and detail the sampling protocol, quality assurance, and quality control for collecting representative samples at the project site.

The specific objectives for the Western Parcel are:

- evaluate the possible presence of waste oils, cadmium, lead, chromium, and volatile organic compounds in the vicinity of test pit location EWEB-2 (refer, Figure 2, Site Plan).
- evaluate the possible presence of coal tars at the western boundary of the Western Parcel, in the vicinity of where the water gas plant operated, on the property currently owned by the Eugene Water & Electric Board.

Additional specific objectives of the Sampling Plan for this area are to:

- establish quality assurance and quality control for obtaining representative samples;
- provide for appropriate chemical analysis;
- evaluate the level of personnel safety required for the project.

Sampling Design and Protocol

Selection of chemical/physical parameters to be measured are based on a review of past and current practices at the site, prior studies conducted at the site, and information from regulatory agency files and/or other sources. Additional parameters may be required to document specific characteristics of the site.

Chemical Parameters Tested

Selection of the chemical parameters to be measured were based on known past and present practices utilized by companies that have conducted operations at the site. The parameters were chosen to provide a measure of the hazardous contaminants present at the sample locations. The parameters include specific and general indicator parameters. Additional chemical parameters may be added, or existing parameters deleted, where chemical data or other information indicates a change is advised. A change in the chemical parameters to be analyzed will be mutually agreed to by the University and DEQ. Based on the foregoing, samples will be analyzed for the following specific and general parameters:

Samples will be collected for analysis of selected priority pollutant total metals, volatile organic compounds, and TPH in the EWEB-2 area and for semi-volatile organic compounds (PNAs) in the Western Boundary Trench, as evaluated during field observation.

EWEB-2 Excavation

Chemical	Method	Detection Limit (soil)
1. Cadmium	EPA Method 6010	2.5 ppm
2. Chromium	EPA Method 6010	2.5 ppm
3. Lead	EPA Method 7740	0.25 ppm
4. TPH	418.1 Modified	20 ppm
5. Volatile Organic Cmpds	EPA Method 8240	0.004-0.200 ppm

Western Boundary Trench

Chemical	Method	Detection Limit
1. Semi-Volatile Organic Compds	EPA Method 8270	0.5-1.0 ppm

Sampling Locations

Sampling locations are determined based on a review of selected available data. In selecting locations, consideration is given to site conditions (i.e., utilities, buildings, and traffic flow patterns). The final locations will be determined in the field prior to and at the time of sampling. Initial sampling locations are identified in the Sampling Objective section of this plan.

Modification of Sampling Plan

Actual conditions encountered during sampling may require modification of the methodology used to obtain representative samples at the site. If modifications are made in the methodology, field records will be completed outlining the changes and detailing the reason(s) for modifying the methodology.

Methodology

Soil Authoritarian Samples. Soil grab samples collected from the identified areas will be collected in the following manner:

a) The site soil sampling methodology will be as described in the EPA publication SW-846, Third Edition. Authoritarian sample locations will be determined using information based on past practices at the site. Each sampling location will be physically identified by placing a numbered / dated sampling stake or marker adjacent to the

center of the sampling location. The measured distance from an easily identified point will be recorded in field notes to further document each sampling location.

b) The stainless steel trowel or barrel auger and other sampling equipment will be decontaminated prior to collecting the sample. Decontamination of equipment will be accomplished by a series of washes/rinses, as indicated below:

1) laboratory grade detergent water wash,
2) distilled water rinse, and
3) air drying.

After decontamination, the sampling equipment will be isolated or stored in clean location. The sampling personnel will wear clean disposable surgical gloves and overgloves (if necessary) when handling decontaminated sampling equipment. New gloves will be used at each sampling location.

c) A grab sample will be taken at each sample location and depth.

d) Subsurface conditions will be examined continuously, especially changes in soil classification and permeability. Observations will be noted with sample records.

e) Decontaminated sample containers will be supplied by the analytical laboratory retained. The contractor types and lid liners will be determined in accordance with the SW-846, Third Edition, analytical method used. Each sample will be transferred directly to the sample container(s). The samples will be packed into the container to minimize headspace.

f) The sample containers will be labeled, sealed, and/or secured, and stored under iced conditions.

Chain Of Custody

The consultant will maintain proper chain of custody records for the samples and will transport secured or sealed samples back to the laboratory in ice chests. If the integrity of the samples is questioned, it will be noted on the Chain of Custody form. Transfer of possession of the samples will be acknowledged on the chain of custody record by custodial signature,

dates of possession, time of transferral, and signature of the person receiving custody of the samples. The original chain of custody record will be kept with samples at all times.

Quality Assurance and Quality Control

The primary objective of this Sampling Plan is to provide for collection of representative samples from the University of Oregon, Riverfront Research Park site. Analysis of these samples will provide quantitative and qualitative information on whether selected contaminants are present at the property.

Quality Assurance and Quality Control (QA/QC) is a necessary part of this Sampling Plan to assure the meeting of this objective. Specific QA/QC objectives are to assure precision, accuracy, representativeness, comparability, and completeness for the samples collected and the analytical laboratory analyses performed on these samples. These quality control parameters are described below.

A. Precision

Precision is a measure of the scatter of the data when more than one measurement is made on the sample. Scatter is commonly attributed to sampling activities and/or chemical analyses. for duplicate measurements, precision can be expressed as the relative percent difference. Split laboratory analyses are performed to confirm reportable concentrations detected in the sample. Field duplicates or split samples will be provided for 5 percent of the samples collected to measure precision. Volatile organic compound samples, however, will be collected in duplicate.

B. Accuracy

Accuracy is a measure of the probable difference between reported test results and the true sample concentration. Insomuch as true sample concentrations are not known, a priori, accuracy for chemical compound analysis is usually inferred from recovery data as determined by sample blanks, sample spiking, and surrogate samples.

The preferred method for sample spiking is to add a known amount of the constituent of interest to a split sample in the field. Because of the inherent difficulties associated with field spiking, this method will not be employed. Rather, the laboratory will analyze surrogate samples, sample blanks, and spike additions according to accepted laboratory procedures. Perfect accuracy would be defined by 100 percent recovery.

C. Representativeness

Representativeness is a measure of how closely the measured results reflect the actual concentration of the chemical parameters in the materials sampled.

Sampling procedures are designed so that results are representative of the materials being measured. Sample handling protocols for storage, preservation and transportation have been developed to preserve the representativeness of the collected samples with particular emphasis on the minimization of volatilization of organic compounds. Proper documentation will establish that protocols have been followed, and sample identification and integrity assured. Transfer, transport, and equipment blanks and field duplicates or split samples at a frequency of 5 percent per set of samples, will be used to assess field and transport contamination, and method variation. Laboratory method blanks will be run as per laboratory QA/QC. Maximum storage times, as stated in SW-846, Third Edition, or other analytical methods used, will not be exceeded to assure representativeness.

D. Comparability

The objective of this parameter is to assure that data developed during the investigation are either directly comparable, or comparable with defined limitations, to literature data or other applicable criteria.

Comparability of the data will be maintained by using EPA defined procedures. The parameters and analytical methods, along with target quantification limits, are presented in the chemical parameters section. Actual detection limits may vary during analysis depending on the nature of the particular sample material, especially soil and sludge samples. Actual detection limits obtained will be reported by the analytical laboratory.

Analytical methods for this investigation will be performed using only approved methods contained in 40 CFR Part 136, "Guidelines Establishing Test Procedures For The Analysis of Pollutants", or EPA Methods SW-846, "Test Methods For Evaluating Solid Waste Physical Chemical Methods", Third Edition, unless an approved method does not exist for the proposed analyses.

E. Completeness

Completeness is a measure of the amount of valid data obtained from the analytical measurement system compared to the amount that was expected to be obtained. It is defined as the

total number of samples taken for which valid analytical data are obtained divided by the total number of samples collected and multiplied by 100.

Data Assessment

The quality of the data will be based upon precision, accuracy and completeness.

A. Precision

The relative percent difference (RPD) is used to assess the precision of the analytical method and is calculated using the following equation:

$$RPD = \frac{X_s - X_d}{\frac{X_s + X_d}{2}} * 100$$

where:
X_s is the analytical result in mg/l obtained for the sample.
X_d is the analytical result in mg/l obtained for the duplicate sample.

B. Accuracy

Accuracy of the data set is determined from the analysis of laboratory spiked samples. The accuracy is calculated using the following equation:

$$A = \frac{X_{ss} - X_d}{T} * 100$$

where:
A is the recovery for the added spike.
X_{ss} is the analytical result in mg/l obtained for the spiked sample.
X_d is the analytical result in mg/l obtained for the duplicate sample.
T is the true value of the added spike in mg/l.

Overall precision and accuracy will be determined for the project from the arithmetic mean of RPD and accuracy (A) for each parameter.

C. Completeness

Completeness of the data is determined using the following equation:

$$Completeness\ (\%) = \frac{Number\ of\ Samples\ Having\ Valid\ Data}{Number\ of\ Samples\ Collected} * 100$$

D. Corrective Action

If the quality control audit results in detection of unacceptable conditions or data, the project manager (PM) will be responsible for developing and initiating corrective action. The PM and principal engineer will be notified if the non-conformance is of program significance or requires special expertise above the normally assigned project team. Corrective action may include:

- Reanalyzing the samples, if holding time criteria permit.
- Resampling and reanalyzing.
- Evaluating and amending sampling and analysis procedures.
- Accepting data, acknowledging level of uncertainty or inaccuracy by flagging the data.

Specific incidence reports will address:

- Significant QA problems identified, together with recommendations.
- Corrective actions taken for any problems previously identified.

Planning For Quality Control

Field sampling personnel will make arrangements with the laboratory for sample containers compatible with chemicals to be analyzed. Chain of custody forms, sample forms, and other documentation forms will be assembled in advance of field sampling activities. Preparation and assembly of the required equipment and supplies should proceed as follows:

1. Equipment, equipment manuals, and supplies will be assembled based on the type of samples to be collected using the field equipment/supply check list.

2. Equipment will be checked for proper calibration, assembly and operation prior to mobilization. Field calibration supplies and equipment will also be checked.

3. Sampling equipment that will potentially contact sample materials will be decontaminated prior to mobilization in accordance with procedures outlined in this Sampling Plan.

4. Sampling equipment, such as trowels and bailers, will be wrapped in clean aluminum foil or plastic bag/liners during transport and storage.

5. Sampling equipment will be decontaminated in the field prior to leaving the sampling site. The field equipment/supply check list will be used to verify re-loading of sampling equipment and supplies.

6. Upon arrival at the Squier Associates office, decontaminated equipment will be returned to storage along with excess supplies.

7. Equipment and supply use forms will be filled out to document equipment and materials used. Equipment that needs to be serviced will be listed along with needed supplies to maintain project Quality Control.

Project Managers will be responsible for QA/QC to assure that these steps are followed.

Chain of Custody

Chain of custody for a sample is defined by the following criteria:

- The sample is in your possession or in your view after being in your possession.
- The sample was in your possession and was locked up, or transferred to a designated secure area by you.

Each time the sample bottles or samples change hands, both the sender and receiver will sign and date the Chain of Custody form and specify what has changed hands. After transfer of sample custody from the sampling team to the laboratory sample custodian, one copy of the chain of custody record will be given to the sampling team for placement into the project files; the second copy remains with the sample while in the laboratory and the original is placed in the laboratory's legal file. A chain of custody record will be completed for each shipment of containers.

The chain of custody record will include:

sample code number
signature of the collector
date and time of collection
waste type
signatures of persons involved in the chain of possession
dates of possession by the above persons
total number of samples received

The chain of custody record will allow reconstruction of the sample transportation chain from the initial sampler to the laboratory analyst.

Labels

All samples will be labelled on the container (not on the lid) with the sample number, name of collector, date and time of collection, media collected, requested analysis, sample preservation requirements, and place or location. Labels will be filled out at the time of collection to prevent errors.

Seals

Sample seals are generally not necessary when samples are delivered directly to the lab by the sampler. However, when samples arrive at the laboratory after working hours, or when samples are shipped to the laboratory, the seals will be affixed such that they must be broken in order to open the sample cooler. The seals should be marked, at a minimum, with the project number, date and the sampler's signature.

Field Log

A field log must be kept during sample collection. Any and all relevant information should be entered into this log. This log should include the following information:

purpose of sampling
location of sample
name and address of field contact
type of sample
suspected contaminants
number and volume of samples taken
sample code number
description of sample point
description of sampling methodology
date and time of collection
sample distribution (i.e., name of laboratory, etc.)
means of transportation of sample
means of sample preservation
references to drawings, grid points, maps, etc.
sketches of site
field observations (color, odor, soil characteristics, etc.)
field measurements taken (pH, flammability, etc.)
signature(s) of person taking data

The field data will be recorded so that the sampling process can be reconstructed from this record without reference to memory or other notes. The field log will be protected and kept in a safe place, and will be kept as a permanent record.

Corrections to Documentation

All original recorded data, chain of custody records, and other forms will be written in waterproof ink. None of these documents will be destroyed or thrown away, even if they are illegible or contain inaccuracies that require a replacement document.

If an error is made on a document, make corrections by crossing a single line through the error, entering the correct information, and initialing the correction.

Duplicates

One duplicate or split sample will be obtained for every 20 field samples taken (5 percent). A duplicate or split sample will be obtained if less than twenty samples are collected. Split samples will be analyzed to evaluate laboratory reproducibility.

Duplicate samples will provide Quality Control for sampling, transportation and analytical errors. Split samples will be obtained by splitting homogenized composite samples between two different sample containers, which will be treated separately throughout the remainder of the analytical process, except that samples for volatile organic compounds will not be field homogenized. Duplicate samples will be obtained by collecting an adjacent second sample.

Equipment Blank

Equipment blanks, consisting of ASTM type 1 (or equivalent) water will be taken for every 20 samples, or one per sampling day, whichever is less.

An equipment blank will be collected by pouring distilled water, used in field decontamination, through a decontaminated bailer or on a decontaminated hand auger or other sampling tool The equipment blank will evaluate the completeness of decontamination of the equipment used in collecting samples.

Sample Analysis Request

A sample analysis request sheet will accompany the samples to the laboratory and should include:

name of the laboratory
signature of sample custody clerk
date of shipment/receipt
sample allocation
analyses to be performed
sample field code number
number of containers
other relevant field data or comment

The sample analyses request sheet may be a part of the Chain of Custody form.

Shipping Requirements

Samples will be transported as rapidly as possible (usually within one day) to the receiving laboratory. Samples will be maintained at or about 4°C during shipment. Shipping container seal and chain of custody will be maintained.

Equipment Calibration and Maintenance

All instruments and equipment used during this project will be operated, calibrated, and maintained according to the manufacturers guidelines and recommendations. Operation, calibration and maintenance will be performed by personnel who have been properly trained in these procedures.

Instruments which fail to fall within established performance limits will be removed from use until proper maintenance/repair have been performed and have been demonstrated to be accurate. In addition, field instruments are checked prior to use, and then periodically checked in the field to verify meter calibrations. All calibration and field measurements will be recorded.

All samples will be collected and analyzed in accordance with methodology described in EPA publication SW-846, "Test Methods For Evaluating Solid Waste Physical Chemical Methods" (Third Edition), or other applicable analytical methods. In addition, accepted procedures concerning sample labels, sample seals or security, sample storage, of custody records, analytical requests, and shipping parameters will be followed. Complete field records will also be established for each sample.

Quality Control and Quality Assurance (QA/QC) in regard to sampling procedures, selection of containers, analysis parameters, sample preservation, decontamination of sampling equipment, sample labels and security, and chain of custody are also discussed in detail in other sections of this Sampling Plan.

Personnel Safety

Review of available records will determine the level of personnel protection and safety required at the site. If records are non-existent or incomplete and a risk decision cannot be made, a worst case scenario will be assumed and the site will require level "A" protection. For drilling and sampling in the area north of the railroad tracks level "C" protection is indicated. For all sampling locations presently being accessed at the Riverfront Research Park site, level "D" protection is indicated. This decision is based on the information supplied by the client and from review of available records and information. Level "C" and level "D" require the following list of equipment.

Levels of Protection

Level C. The concentration(s) and type(s) of airborne substance(s) is known and the criteria for using air purifying respirators are met. Level C equipment; used as appropriate.

1. Full-face or half-mask, air-purifying canister equipped respirators (NIOSH approved).
2. Hooded chemical-resistant clothing (overalls; two-piece chemical splash suit, disposable chemical-resistant overalls).
3. Coveralls.*
4. Gloves, outer, chemical-resistant.
5. Gloves, inner, chemical-resistant.
6. Boots (outer), chemical-resistant steel toe and shank.*
7. Boot covers, outer, chemical-resistant (disposable).*
8. Hard hat.
9. Escape mask.*
10. Two-way radios (worn under outside protective clothing).*
11. Face shield.*

*Optional, as applicable.

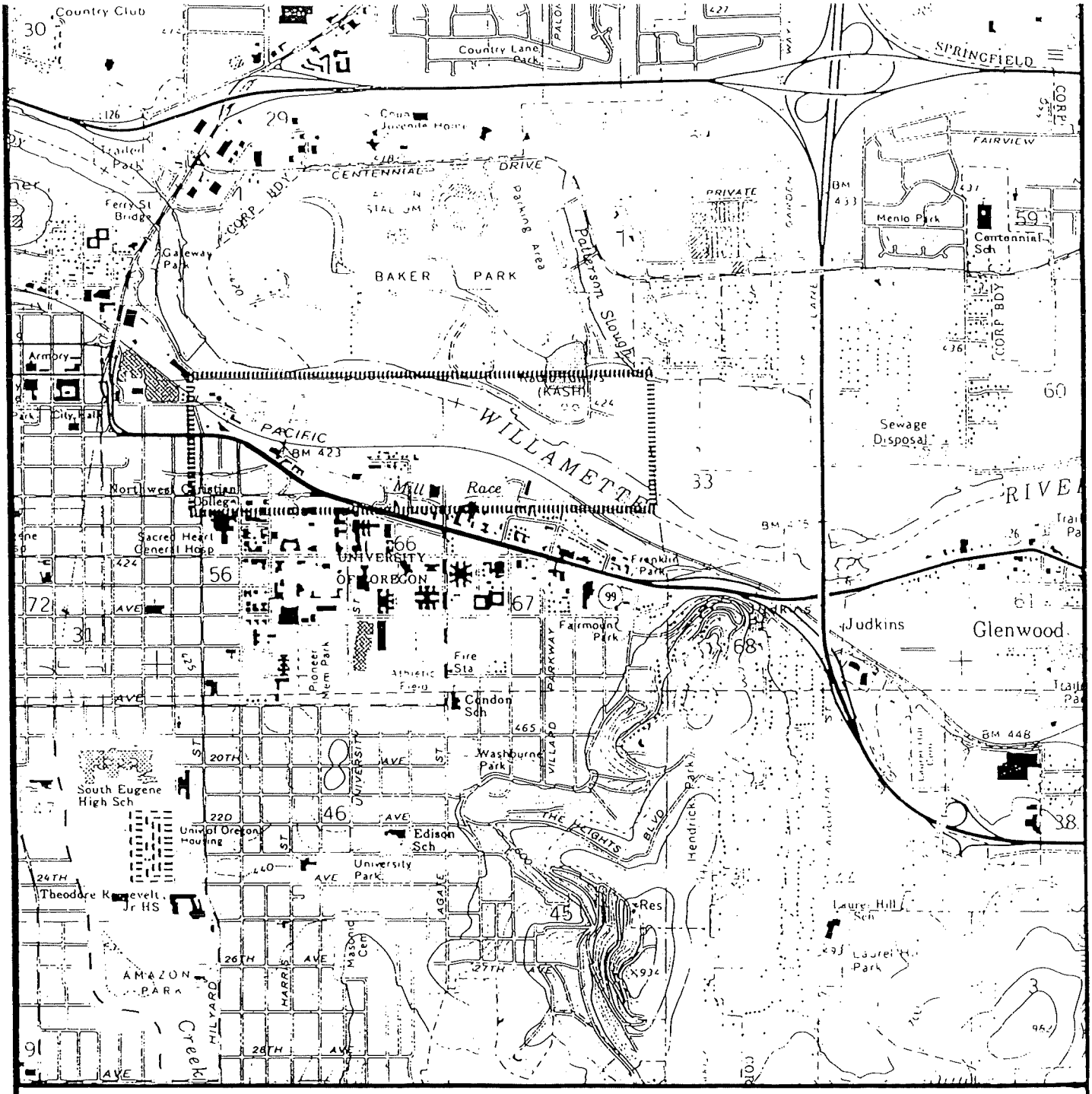
Level D. A work uniform affording minimal protection; used for nuisance contamination only. Level D equipment; used as appropriate.

(Rev. 10-5-92)

1. Coveralls.
2. Gloves.*
3. Boots/shoes, chemical-resistant steel toe and shank.
4. Boots, outer, chemical-resistant (disposable).*
5. Safety glasses or chemical splash goggles.*
6. Hard hat.
7. Escape mask.*
8. Face shield.*

*Optional, as applicable.

(Rev. 10-5-92)

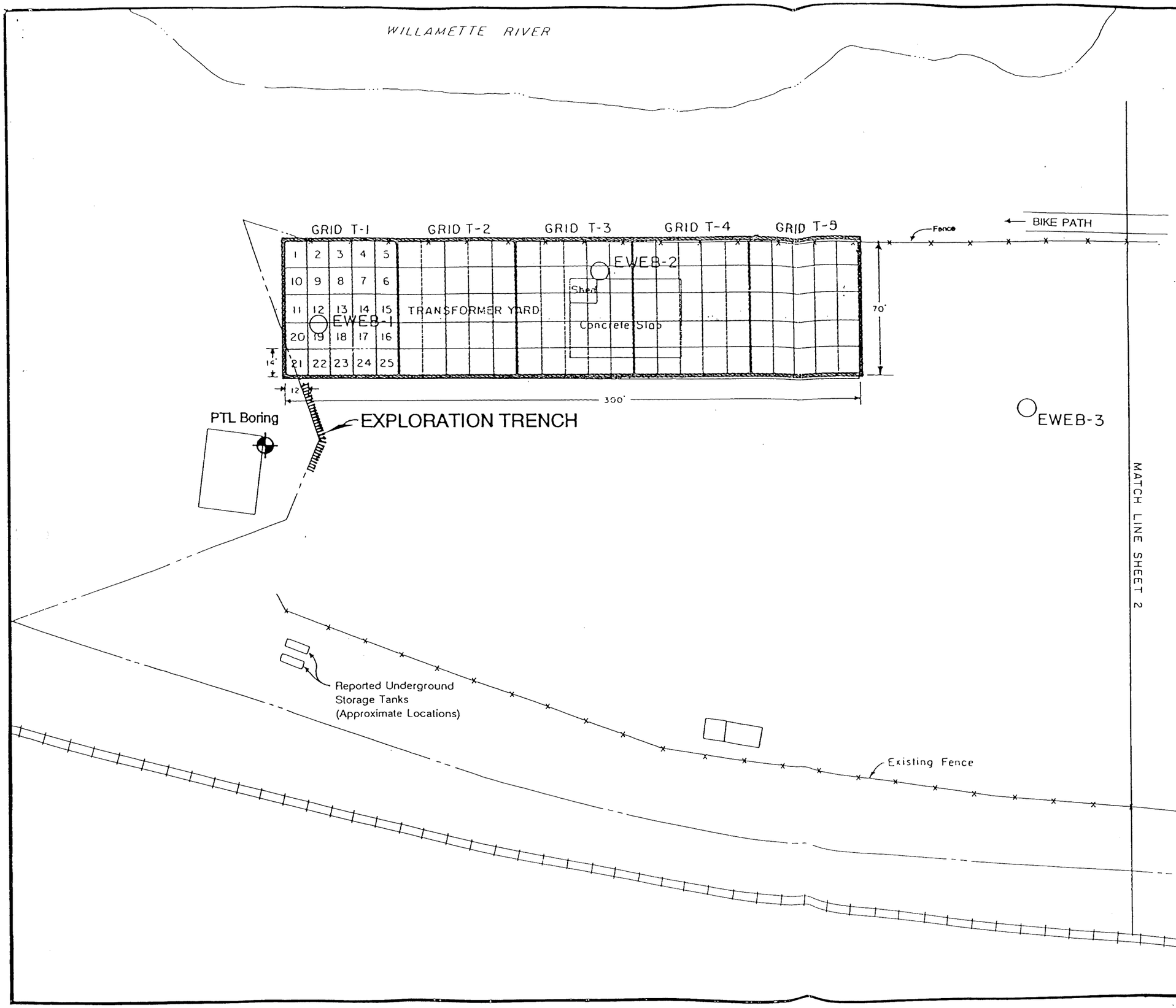


UNIVERSITY OF OREGON
RIVERFRONT RESEARCH PARK

VICINITY MAP

SQUIER ASSOCIATES
JUNE 1991 89384 6

FIGURE 1



GRID 1 T-3	2	3	4	5
10	9	8	7	6
11	12	GRID T-4 13 GRID T-6	14	15
16	17	18	19	20
21	22	23	GRID 24 T-2	GRID 25 T-1

GRID SAMPLE LOCATIONS

LEGEND

EWEB-3 . Sample locations of visually discolored soils

NOTE: Features shown are for illustrative purposes only and are approximate

N (APPROX.)

SCALE IN FEET

0 50 100

UNIVERSITY OF OREGO

WESTERN PARCE
RIVERFRONT
RESEARCH PAR

SQUIER ASSOCIATE

AUGUST 1992 89384

FIGURE

APPENDIX B

SQUIER ASSOCIATES

GEOTECHNICAL & GEOENVIRONMENTAL CONSULTANTS

4260 Galewood Street
Post Office Box 1317
Lake Oswego, Oregon
97035

503-635-4419
Fax 635-1430

QUALITY ASSURANCE REPORT

PROJECT AND SAMPLE INFORMATION

Project Name: University of Oregon
Project No.: 89384
Lab Name: Pacific Environmental Laboratory
Lab Number: 92-3291
Report date: 10/28/92
Sample No.:

Soil
EWEB-2W1, EWEB-2W2 (duplicate of EWEB-2W1), EWEB-2S, EWEB-2E, EWEB-2N, EWEB-2P1, EWEB-2P2

Water
EWEB-2EQ (equipment rinse)

ANALYTICAL METHODS

Metals, EPA 418.1, EPA 8240

CHAIN OF CUSTODY DOCUMENTATION

No discrepancies noted

SAMPLE HOLDING TIMES

Soil and water samples were extracted and analyzed within recommended holding times.

INSTRUMENT CALIBRATION

No discrepancies noted.

METHOD DETECTION LIMITS

Detection limits were within laboratory PQLs. Laboratory PQLs are typically below action levels listed in the Oregon Department of Environmental Quality (DEQ) Soil Cleanup Table.

BLANK ANALYSIS

a) Field Blanks - No field blanks collected
b) Method Blanks - Acceptable results

QUALITY CONTROL

a) Accuracy - total metals percent spike recovery for cadmium and chromium were out of control limits.

b) Precision

Field duplicate - Acceptable results

Laboratory duplicate - Acceptable results

DATA USE LIMITATIONS

No limitations noted.

PACIFIC
ENVIRONMENTAL
LABORATORY INC.

October 28, 1992

Squier Associates, Inc.
P.O. Box 1317
Lake Oswego, OR 97035

Attn: William D. Hartford

Re: JOB #89-384.8
PEL #92-3291

Enclosed is the lab report for your samples which were received on October 8, 1992.

I. Sample Description

Seven Soil Samples
One Water Sample

The samples were received under a chain of custody.

The samples were received in containers consistent with EPA protocol.

II. Quality Control

The in-house QC data you requested is enclosed.

III. Analytical Results

Test methods may include minor modifications of published methods such as detection limits or parameter lists. Solid and waste samples are reported on an "as received" basis unless otherwise noted.

Compounds not detected are listed under results as ND.

Sincerely,

Howard Holmes
Project Manager

Rob May
Project Manager

9405 S.W. Nimbus Ave. ■ Beaverton, OR 97005 ■ (503) 644-0660 ■ FAX # (503) 644-2202

PACIFIC ENVIRONMENTAL LABORATORY INC.

METHOD: Total Metals per EPA 3050, 6010
Results in mg/kg (ppm)

Compound	EWEB-2W1	EWEB-2W2	EWEB-2E	EWEB-2P1	EWEB-2P2
Cadmium	ND	ND	ND	ND	ND
Chromium	12	9.8	7.3	8.9	12
Lead	12	12	6.8	11	11

Compound	Method Blank	Detection Limit
Cadmium	ND	2.5
Chromium	ND	2.5
Lead	ND	2.5

METHOD: Total Metals per EPA 3005, 6010
Results in mg/L (ppm)

Compound	EWEB-2EQ	Method Blank	Detection Limit
Cadmium	ND	ND	0.050
Chromium	ND	ND	0.050
Lead	ND	ND	0.050

METHOD: Total Petroleum Hydrocarbons per EPA 418.1
Results in mg/kg (ppm)

Sample I.D.	TPH
EWEB-2W1	260
EWEB-2W2	450
EWEB-2E	520
EWEB-2P1	200
EWEB-2P2	350
Method Blank	ND
Detection Limit	20

PACIFIC
ENVIRONMENTAL
LABORATORY INC.

METHOD: Total Petroleum Hydrocarbons per EPA 418.1
Results in mg/L (ppm)

Sample I.D.	TPH
EWEB-2EQ	41
Detection Limit	1.5
Method Blank	ND
Detection Limit	0.50

9405 S.W. Nimbus Ave. ■ Beaverton, OR 97005 ■ (503) 644-0660 ■ FAX # (503) 644-2202

METHOD: Volatile Organic Compounds per EPA 8240 (GC/MS)
Results in ug/kg (ppb)

Compound	EWEB-2W1	EWEB-2W2	EWEB-2E	EWEB-2P1	EWEB-2P2
Acetone	ND	ND	ND	ND	ND
Acrolein	ND	ND	ND	ND	ND
Acrylonitrile	ND	ND	ND	ND	ND
Benzene	ND	ND	ND	ND	ND
Bromodichloromethane	ND	ND	ND	ND	ND
Bromoform	ND	ND	ND	ND	ND
Bromomethane	ND	ND	ND	ND	ND
2-Butanone	ND	ND	ND	ND	ND
Carbon disulfide	ND	ND	ND	ND	ND
Carbon tetrachloride	ND	ND	ND	ND	ND
Chlorobenzene	ND	ND	ND	ND	ND
Chloroethane	ND	ND	ND	ND	ND
Chloroform	ND	ND	ND	ND	ND
Chloromethane	ND	ND	ND	ND	ND
Dibromochloromethane	ND	ND	ND	ND	ND
Dibromomethane	ND	ND	ND	ND	ND
1,4-Dichloro-2-butene	ND	ND	ND	ND	ND
Dichlorobenzenes (total)	ND	ND	ND	ND	ND
Dichlorodifluoromethane	ND	ND	ND	ND	ND
1,1-Dichloroethane	ND	ND	ND	ND	ND
1,2-Dichloroethane	ND	ND	ND	ND	ND
1,1-Dichloroethene	ND	ND	ND	ND	ND
cis-1,2-Dichloroethene	ND	ND	ND	ND	ND
trans-1,2-Dichloroethene	ND	ND	ND	ND	ND
1,2-Dichloropropane	ND	ND	ND	ND	ND
cis-1,3-Dichloropropene	ND	ND	ND	ND	ND
trans-1,3-Dichloropropene	ND	ND	ND	ND	ND
Ethyl Methacrylate	ND	ND	ND	ND	ND
Ethylbenzene	ND	ND	ND	ND	ND
2-Hexanone	ND	ND	ND	ND	ND
Iodomethane	ND	ND	ND	ND	ND
4-Methyl-2-pentanone	ND	ND	ND	ND	ND
Methylene chloride	ND	ND	ND	ND	ND
Styrene	ND	ND	ND	ND	ND
1,1,2,2-Tetrachloroethane	ND	ND	ND	ND	ND
Tetrachloroethene	ND	ND	ND	ND	ND
Toluene	ND	ND	ND	ND	ND
1,1,1-Trichloroethane	ND	ND	ND	ND	ND
1,1,2-Trichloroethane	ND	ND	ND	ND	ND
Trichloroethene	ND	ND	ND	ND	ND
Trichlorofluoromethane	ND	ND	ND	ND	ND
1,2,3-Trichloropropane	ND	ND	ND	ND	ND
Vinyl acetate	ND	ND	ND	ND	ND
Vinyl chloride	ND	ND	ND	ND	ND
Xylenes (total)	ND	ND	ND	ND	ND

METHOD: Volatile Organic Compounds per EPA 8240 (GC/MS)
Results in ug/kg (ppb)

Compound	Method Blank	Detection Limit
Acetone	ND	10
Acrolein	ND	100
Acrylonitrile	ND	50
Benzene	ND	2.0
Bromodichloromethane	ND	2.0
Bromoform	ND	2.0
Bromomethane	ND	10
2-Butanone	ND	7.5
Carbon disulfide	ND	2.0
Carbon tetrachloride	ND	2.0
Chlorobenzene	ND	2.0
Chloroethane	ND	10
Chloroform	ND	2.0
Chloromethane	ND	10
Dibromochloromethane	ND	2.0
Dibromomethane	ND	2.0
1,4-Dichloro-2-butene	ND	50
Dichlorobenzenes (total)	ND	2.0
Dichlorodifluoromethane	ND	5.0
1,1-Dichloroethane	ND	2.0
1,2-Dichloroethane	ND	2.0
1,1-Dichloroethene	ND	2.0
cis-1,2-Dichloroethene	ND	2.0
trans-1,2-Dichloroethene	ND	2.0
1,2-Dichloropropane	ND	2.0
cis-1,3-Dichloropropene	ND	2.0
trans-1,3-Dichloropropene	ND	2.0
Ethyl Methacrylate	ND	2.0
Ethylbenzene	ND	2.0
2-Hexanone	ND	5.0
Iodomethane	ND	2.0
4-Methyl-2-pentanone	ND	5.0
Methylene chloride	ND	5.0
Styrene	ND	2.0
1,1,2,2-Tetrachloroethane	ND	2.0
Tetrachloroethene	ND	2.0
Toluene	ND	2.0
1,1,1-Trichloroethane	ND	2.0
1,1,2-Trichloroethane	ND	2.0
Trichloroethene	ND	2.0
Trichlorofluoromethane	ND	2.0
1,2,3-Trichloropropane	ND	2.0
Vinyl acetate	ND	10
Vinyl chloride	ND	5.0
Xylenes (total)	ND	2.0

PACIFIC ENVIRONMENTAL LABORATORY INC.

METHOD: Volatile Organic Compounds per EPA 8240 (GC/MS)
Results in ug/L (ppb)

Compound	EWEB-2EQ	Method Blank	Detection Limit
Acetone	ND	ND	10
Acrolein	ND	ND	100
Acrylonitrile	ND	ND	50
Benzene	ND	ND	2.0
Bromodichloromethane	ND	ND	2.0
Bromoform	ND	ND	2.0
Bromomethane	ND	ND	10
2-Butanone	ND	ND	7.5
Carbon disulfide	ND	ND	2.0
Carbon tetrachloride	ND	ND	2.0
Chlorobenzene	ND	ND	2.0
Chloroethane	ND	ND	10
Chloroform	ND	ND	2.0
Chloromethane	ND	ND	10
Dibromochloromethane	ND	ND	2.0
Dibromomethane	ND	ND	2.0
1,4-Dichloro-2-butene	ND	ND	50
Dichlorobenzenes (total)	ND	ND	2.0
Dichlorodifluoromethane	ND	ND	5.0
1,1-Dichloroethane	ND	ND	2.0
1,2-Dichloroethane	ND	ND	2.0
1,1-Dichloroethene	ND	ND	2.0
cis-1,2-Dichloroethene	ND	ND	2.0
trans-1,2-Dichloroethene	ND	ND	2.0
1,2-Dichloropropane	ND	ND	2.0
cis-1,3-Dichloropropene	ND	ND	2.0
trans-1,3-Dichloropropene	ND	ND	2.0
Ethyl Methacrylate	ND	ND	2.0
Ethylbenzene	ND	ND	2.0
2-Hexanone	ND	ND	5.0
Iodomethane	ND	ND	2.0
4-Methyl-2-pentanone	ND	ND	5.0
Methylene chloride	ND	ND	5.0
Styrene	ND	ND	2.0
1,1,2,2-Tetrachloroethane	ND	ND	2.0
Tetrachloroethene	ND	ND	2.0
Toluene	ND	ND	2.0
1,1,1-Trichloroethane	ND	ND	2.0
1,1,2-Trichloroethane	ND	ND	2.0
Trichloroethene	ND	ND	2.0
Trichlorofluoromethane	ND	ND	2.0
1,2,3-Trichloropropane	ND	ND	2.0
Vinyl acetate	ND	ND	10
Vinyl chloride	ND	ND	5.0
Xylenes (total)	ND	ND	2.0

8240 Surrogate Recoveries (%)

Compound	EWEB-2W1	EWEB-2W2	EWEB-2E	EWEB-2P1	EWEB-2P2	Method Blank
4-Bromofluorobenzene (74-121%)	92	100	89	90	96	95
1,2-Dichloroethane-d4 (70-121%)	96	105	98	100	98	104
Toluene-d8 (81-117%)	93	97	95	93	95	98

Compound	EWEB-2EQ	Method Blank
4-Bromofluorobenzene (86-115%)	95	96
1,2-Dichloroethane-d4 (76-114%)	101	104
Toluene-d8 (88-110%)	99	101

SQUIER ASSOCIATES

GEOTECHNICAL &
GEOENVIRONMENTAL
CONSULTANTS

4260 Galewood Street
Post Office Box 1317
Lake Oswego, Oregon
97035

503-635-4419
Fax 635-4430

QUALITY ASSURANCE REPORT

PROJECT AND SAMPLE INFORMATION

Project Name: University of Oregon
Project No.: 89384
Lab Name: Pacific Environmental Laboratory
Lab Number: 92-3292
Report date: 11/4/92
Sample No.:
Soil
EX3-S1, EX8-S1, EX1-S1

ANALYTICAL METHODS

TPH-HCID, TPH-G, TPH-D, TPH-418.1M, PAH, TCLP (PAH)

CHAIN OF CUSTODY DOCUMENTATION

No discrepancies noted.

SAMPLE HOLDING TIMES

Soil and water samples were extracted and analyzed within recommended holding times.

INSTRUMENT CALIBRATION

No discrepancies noted.

METHOD DETECTION LIMITS

Detection limits were within laboratory PQLs, except for PAH analysis for EX8-S1 and EX3-S1, at 2.5 ppm and 25 ppm, due to matrix interference. Laboratory PQLs are typically below action levels listed in the Oregon Department of Environmental Quality (DEQ) Soil Cleanup Table, except for certain PAH compounds which include: benzo(a)anthracene, benzo(a)pyrene, chrysene, dibenzo(a,h)anthracene, indeno(1,2,3-cd)pyrene. However, Oregon Administrative Rules indicate that laboratory PQLs are considered acceptable when PQLs are above Soil Cleanup Table levels.

BLANK ANALYSIS

a) Field Blanks - No field blanks collected
b) Method Blanks - Acceptable results

QUALITY CONTROL

a) Accuracy - Surrogate recovery is out of control limits for TPH-D analysis on sample EX1-S1, as noted by the analytical laboratory.

b) Precision

Field duplicate - no field duplicates taken

Laboratory duplicate - Acceptable results

DATA USE LIMITATIONS

No limitations noted.

PACIFIC
ENVIRONMENTAL
LABORATORY INC.

November 4, 1992

Squier Associates, Inc.
P.O. Box 1317
Lake Oswego, OR 97035

Attn: William D. Hartford

Re: JOB #89-384.28 WOA
PEL #92-3292

Enclosed is the lab report for your samples which were received on October 8, 1992.

I. Sample Description

Three Soil Samples

The samples were received under a chain of custody.

The samples were received in containers consistent with EPA protocol.

II. Quality Control

The in-house QC data you requested is enclosed.

III. Analytical Results

Test methods may include minor modifications of published methods such as detection limits or parameter lists. Solid and waste samples are reported on an "as received" basis unless otherwise noted.

Compounds not detected are listed under results as ND.

Sincerely,

Howard Holmes
Project Manager

Robert R. May
Rob May
Project Manager

9405 S.W. Nimbus Ave. ■ Beaverton, OR 97005 ■ (503) 644-0660 ■ FAX # (503) 644-2202

PACIFIC ENVIRONMENTAL LABORATORY INC.

METHOD: TPH-HCID per Oregon DEQ
Results in mg/kg (ppm)

Compound	EX3-S1	EX8-S1	EX1-S1	Method Blank	Detection Limit
Diesel	Detected	ND	Detected	ND	50
Gasoline	Detected	ND	ND	ND	20
Heavy/Bunker	Detected	Detected	Detected	ND	--

TPH-HCID Surrogate Recoveries (%)

Compound	EX3-S1	EX8-S1	EX1-S1	Method Blank
1-chlorooctadecane (50-150%)	101	76	79	78

METHOD: TPH-G per Oregon DEQ
Soil results in mg/kg (ppm)

Compound	EX3-S1	Detection Limit	Method Blank	Detection Limit
Gasoline	ND	10	ND	5.0

TPH-G Surrogate Recoveries (%)

Compound	EX3-S1	Method Blank
4-Bromofluorobenzene (63-126%)	85	89
Trifluorotoluene (50-150%)	61	88

PACIFIC ENVIRONMENTAL LABORATORY INC.

METHOD: TPH-D per Oregon DEQ
Results in mg/kg (ppm)

Compound	EX1-S1	Method Blank	Detection Limit
Diesel/related	170(i)	ND	25

Compound	EX3-S1	Detection Limit
Diesel/related	2,000(j)	100

TPH-D Surrogate Recoveries (%)

Compound	EX1-S1	Method Blank
1-chlorooctadecane (50-150%)	123	45(a)

Compound	EX3-S1
1-chlorooctadecane (50-150%)	134

(a) Surrogate recovery is out of control limits.

(i) This sample contains a heavy petroleum product. The product cannot be quantitated by this method.

(j) This sample contains a light petroleum product. The product cannot be quantitated by this method.

METHOD: TPH-D per Oregon DEQ
Results in mg/kg (ppm)

Compound	Method Blank(y)	Detection Limit
Diesel/related	ND	25

TPH-D Surrogate Recoveries (%)

Compound	Method Blank
1-chlorooctadecane (50-150%)	92

(y) Method blank was reextracted due to low surrogate recovery on original blank.

METHOD: TPH-418.1M per Oregon DEQ
Results in mg/kg (ppm)

Sample I.D.	TPH
EX3-S1	960
EX8-S1	1,200
EX1-S1	ND
Method Blank	ND
Detection Limit	20

METHOD: PAH's per EPA 8270
Results in mg/kg (ppm)

Compound	EX1-S1	Method Blank	Detection Limit
Acenaphthene	ND	ND	0.50
Acenaphthylene	ND	ND	0.50
Anthracene	ND	ND	0.50
Benzo(a)anthracene	1.2	ND	0.50
Benzo(a)pyrene	2.2	ND	0.50
Benzo(b)fluoranthene	4.1	ND	0.50
Benzo(g,h,i)perylene	1.5	ND	0.50
Benzo(k)fluoranthene	1.1	ND	0.50
Chrysene	1.2	ND	0.50
Dibenzo(a,h)anthracene	ND	ND	0.50
Fluoranthene	2.8	ND	0.50
Fluorene	ND	ND	0.50
Indeno(1,2,3-cd)pyrene	1.6	ND	0.50
2-Methylnaphthalene	0.95	ND	0.50
Naphthalene	2.6	ND	0.50
Phenanthrene	1.4	ND	0.50
Pyrene	2.8	ND	0.50

Compound	EX8-S1	Detection Limit(g)
Acenaphthene	ND	2.5
Acenaphthylene	ND	2.5
Anthracene	ND	2.5
Benzo(a)anthracene	ND	2.5
Benzo(a)pyrene	ND	2.5
Benzo(b)fluoranthene	ND	2.5
Benzo(g,h,i)perylene	ND	2.5
Benzo(k)fluoranthene	ND	2.5
Chrysene	ND	2.5
Dibenzo(a,h)anthracene	ND	2.5
Fluoranthene	ND	2.5
Fluorene	ND	2.5
Indeno(1,2,3-cd)pyrene	ND	2.5
2-Methylnaphthalene	ND	2.5
Naphthalene	ND	2.5
Phenanthrene	ND	2.5
Pyrene	ND	2.5

(g) Detection limit is raised due to matrix interference.

METHOD: PAH's per EPA 8270 - continued
Results in mg/kg (ppm)

Compound	EX3-S1	Detection Limit(g)
Acenapthene	ND	25
Acenaphthylene	ND	25
Anthracene	ND	25
Benzo(a)anthracene	ND	25
Benzo(a)pyrene	ND	25
Benzo(b)fluoranthene	44	25
Benzo(g,h,i)perylene	35	25
Benzo(k)fluoranthene	ND	25
Chrysene	ND	25
Dibenzo(a,h)anthracene	ND	25
Fluoranthene	ND	25
Fluorene	ND	25
Indeno(1,2,3-cd)pyrene	31	25
2-Methylnaphthalene	ND	25
Naphthalene	ND	25
Phenanthrene	ND	25
Pyrene	ND	25

(g) Detection limit is raised due to matrix interference.

8270 Surrogate Recoveries (%)

Compound	EX1-S1	EX8-S1	EX3-S1	Method Blank	Range
2-Fluorobiphenyl	92	114	112	88	30-115
Nitrobenzene-d5	85	98	83	56	23-120
p-Terphenyl-d14	129	101	97	79	18-137

METHOD: T.C.L.P. per EPA 1311, PAH's per EPA 8270
Results in mg/L (ppm)

Compound	EX8-S1	Method Blank	Detection Limit
Acenaphthylene	ND	ND	0.0050
Acenapthene	ND	ND	0.0050
Anthracene	ND	ND	0.0050
Benzo(a)anthracene	ND	ND	0.0050
Benzo(a)pyrene	ND	ND	0.0050
Benzo(b)fluoranthene	ND	ND	0.0050
Benzo(g,h,i)perylene	ND	ND	0.0050
Benzo(k)fluoranthene	ND	ND	0.0050
Chrysene	ND	ND	0.0050
Dibenzo(a,h)anthracene	ND	ND	0.0050
Fluoranthene	ND	ND	0.0050
Fluorene	ND	ND	0.0050
Indeno(1,2,3-cd)pyrene	ND	ND	0.0050
2-Methylnaphthalene	ND	ND	0.0050
Naphthalene	ND	ND	0.0050
Phenanthrene	ND	ND	0.0050
Pyrene	ND	ND	0.0050

8270 Surrogate Recoveries (%)

Compound	EX8-S1	Method Blank	Range
Nitrobenzene-d5	100	97	35-114
2-Fluorobiphenyl	68	79	43-116
Terphenyl-d14	79	91	33-141

PACIFIC
ENVIRONMENTAL
LABORATORY INC.

November 23, 1992

Squier Associates, Inc.
P.O. Box 1317
Lake Oswego, OR 97035

Attn: William D. Hartford

Re: Requested Quality Control Data - Revised

Enclosed is the in-house quality control data you requested on PEL project number 92-3291.

Note: Lab blank results and Surrogate Recoveries are included in the final report.

QUALITY CONTROL DEFINITIONS

LAB BLANK RESULTS

A Lab Blank is a laboratory-generated sample which assesses the degree to which laboratory operations and procedures cause false-positive analytical results for your sample.

No target parameters were detected in the lab blank associated with your sample at the reporting limit levels noted on the data sheets in the final report.

SURROGATE STANDARD

A surrogate standard (i.e., a chemical compound not expected to occur in an environmental sample) is added to each sample, blank, and matrix spike sample just prior to extraction or processing. The recovery of the surrogate standard is used to monitor for unusual matrix effects, gross sample processing errors, etc. Surrogate recovery is evaluated for acceptance by determining whether the measured concentration falls within accepted limits.

PACIFIC ENVIRONMENTAL LABORATORY INC.

The recovery of Matrix Spike compounds are calculated as follows:

$$\text{Matrix Spike Recovery} = \frac{SSR - SR}{SA} \times 100$$

Where,

SSR = Spiked Sample Result
SR = Sample Result
SA = Spike Added

Relative Percent Difference (RPD) of the recoveries of each compound in the matrix spike and matrix spike duplicate are calculated as follows:

$$\text{Relative Percent Difference} = \frac{|MSR - MSDR|}{(1/2)(MSR + MSDR)} \times 100$$

Where,

MSR = Matrix Spike Recovery
MSDR = Matrix Spike Duplicate Recovery

Relative Percent Difference (RPD) of duplicate analysis are calculated as follows:

$$\text{Relative Percent Difference} = \frac{|S - D|}{(S + D)/2} \times 100$$

Where,

S = First Sample Value (original)
D = Second Sample Value (duplicate)

If you should have any questions concerning this report, please contact me.

Sincerely,

Howard Boorse
QA/QC Manager

PACIFIC ENVIRONMENTAL LABORATORY INC.

BATCH METHOD SPIKE RESULTS FOR TOTAL METALS PER EPA 3005, 6010 RESULTS IN MG/L (PPM)

Compound	Spike Level	Spike Result	Percent Recovery
Cadmium	0.080	0.070	88
Chromium	0.16	0.14	88

BATCH MATRIX SPIKE AND MATRIX SPIKE DUPLICATE RESULTS FOR TOTAL METALS PER EPA 3005, 6010. RESULTS IN MG/L (PPM)

Compound	Spike Level	Sample Result	Spike Result	Spike Dup. Result
Cadmium	0.080	ND	0.068	0.067
Chromium	0.16	ND	0.14	0.13

Compound	% Recovery Spike	% Recovery Spike Dup.	Relative % Difference
Cadmium	85	84	1.2
Chromium	88	81	8.3

BATCH DUPLICATE RESULTS FOR TOTAL METALS PER EPA 3005, 6010 RESULTS IN MG/L (PPM)

Compound	Sample Result	Duplicate Result	Relative % Difference
Cadmium	ND	ND	0
Chromium	ND	ND	0

BATCH METHOD SPIKE RESULTS FOR TOTAL METALS PER EPA 3005, 7000 SERIES. RESULTS IN MG/L (PPM)

Compound	Spike Level	Spike Result	Percent Recovery
Lead	0.80	0.71	89

PACIFIC ENVIRONMENTAL LABORATORY INC.

BATCH DUPLICATE ANALYSIS AND MATRIX SPIKE RESULTS FOR TOTAL METALS PER EPA 3005, 7000 SERIES. RESULTS IN MG/L (PPM)

Compound	Sample Result	Duplicate Result	Relative % Difference
Lead	ND	ND	0

Compound	Sample Result	Spike Level	Spike Result	Spike Dup. Result
Lead	ND	0.80	0.73	0.73

Compound	Percent Recovery	% Recovery Duplicate	Relative % Difference
Lead	91	91	0

BATCH METHOD SPIKE RESULTS FOR TOTAL METALS PER EPA 3050, 6010 RESULTS IN MG/KG (PPM)

Compound	Spike Level	Spike Result	Percent Recovery
Cadmium	0.16	0.14	88
Chromium	0.32	0.34	106

BATCH MATRIX SPIKE AND MATRIX SPIKE DUPLICATE RESULTS FOR TOTAL METALS PER EPA 3050, 6010. RESULTS IN MG/KG (PPM)

Compound	Spike Level	Sample Result	Spike Result	Spike Dup. Result
Cadmium	8.0	ND	5.6	6.0
Chromium	16	12	21	26

Compound	% Recovery Spike	% Recovery Spike Dup.	Relative % Difference
Cadmium	70*	75	6.9
Chromium	56*	88	44

* Out of control limits.

BATCH DUPLICATE RESULTS FOR TOTAL METALS PER EPA 3050, 6010 RESULTS IN MG/KG (PPM)

Compound	Sample Result	Duplicate Result	Relative % Difference
Cadmium	ND	ND	0
Chromium	12	12	0

BATCH METHOD SPIKE RESULTS FOR TOTAL METALS PER EPA 3050, 7000 SERIES. RESULTS IN MG/KG (PPM)

Compound	Spike Level	Spike Result	Percent Recovery
Lead	1.6	1.4	88

BATCH DUPLICATE ANALYSIS AND MATRIX SPIKE RESULTS FOR TOTAL METALS PER EPA 3050, 7000 SERIES. RESULTS IN MG/KG (PPM)

Compound	Sample Result	Duplicate Result	Relative % Difference
Lead	11	10	9.5

Compound	Sample Result	Spike Level	Spike Result	Spike Dup. Result
Lead	11	80	81	84

Compound	Percent Recovery	% Recovery Duplicate	Relative % Difference
Lead	88	91	3.4

LABORATORY CONTROL SPIKE AND DUPLICATE RESULTS FOR TPH 418.1 PER EPA. RESULTS IN MG/KG (PPM)

Compound	Spike Level	Spike Result	Spike Recovery %
TPH	198	190	96

Compound	Sample Result	Duplicate Result	Relative % Difference
TPH	27,000	42,000	43
TPH	15,000	17,000	12

BATCH MATRIX SPIKE AND MATRIX SPIKE DUPLICATE RESULTS FOR TPH PER EPA 418.1. RESULTS IN MG/L (PPM)

Compound	Spike Level	Sample Result	Spike Result	Spike Dup. Result
TPH	10	ND	8.8	9.5

Compound	% Recovery Spike	% Recovery Spike Dup.	Relative % Difference
TPH	88	95	8

BATCH MATRIX SPIKE AND MATRIX SPIKE DUPLICATE RESULTS FOR VOLATILE ORGANIC COMPOUNDS PER EPA 8240. RESULTS IN UG/KG (PPB)

Compound	Spike Level	Sample Result	Spike Result	Spike Dup. Result
1,1-Dichloroethene	50	ND	53	51
Benzene	50	ND	50	48
Trichloroethene	50	ND	49	46
Toluene	50	ND	48	45
Chlorobenzene	50	ND	50	48

Compound	% Recovery Spike	% Recovery Spike Dup.	Relative % Difference
1,1-Dichloroethene	106	102	3.8
Benzene	100	96	4.1
Trichloroethene	98	92	6.3
Toluene	96	90	6.4
Chlorobenzene	100	96	4.1

PACIFIC ENVIRONMENTAL LABORATORY INC.

BATCH MATRIX SPIKE AND MATRIX SPIKE DUPLICATE RESULTS FOR VOLATILE ORGANIC COMPOUNDS PER EPA 8240. RESULTS IN UG/L (PPB)

Compound	Spike Level	Sample Result	Spike Result	Spike Dup. Result
1,1-Dichloroethene	50	ND	50	48
Benzene	50	ND	52	52
Trichloroethene	50	ND	52	51
Toluene	50	ND	51	50
Chlorobenzene	50	ND	50	51

Compound	% Recovery Spike	% Recovery Spike Dup.	Relative % Difference
1,1-Dichloroethene	100	96	4.1
Benzene	104	104	0.0
Trichloroethene	104	102	1.9
Toluene	102	100	2.0
Chlorobenzene	100	102	2.0

CHAIN OF CUSTODY RECORD

Job Number 89-384.8				# Containers	Parameters to be Tested											
Job Name																
Location Eugene, OR																
Sample I.D.	Sample Type	Date	Time		VOC, 8240	TPH 418.1	Total Metals, Pb, Cr, Cd									
1) EWEB-2W1	soil	10/7/92		2	✓	✓	✓									
2) EWEB-2W2	soil	10/7/92		2	✓	✓	✓									
3) EWEB-2S	soil	10/7/92		2	Archive											
4) EWEB-2E	soil	10/7/92		2	✓	✓	✓									
5) EWEB-2N	soil	10/7/92		2	Archive											
6) EWEB-2P1	soil	10/7/92		2	✓	✓	✓									
7) EWEB-2P2	soil	10/7/92		2	✓	✓	✓									
8) EWEB-2EQ	Water	10/7/92		2	✓	✓	✓									
9)																
10)																
Total Number Containers				16	Sampler Signatures											
Split/Duplicate Samples (Name/Firm) None					William D. Hartford											

Sample Relinquished by (Signature)	Inclusive Dates from	to	Time	Sample Received by (Signature)	Container Sealed Y	N	4°C Y	N
William D. Hartford	10/7/92	10/7/92	17:51	[signature]	✓		✓	
[signature]	10/8/92	10/8/92	10:13	[signature]				
[signature]	10/8/92	10/8/92	1050	[signature]				

Comment: 40% 10% discount, complete QA/QC see Howard Holmes

Send Report to: W. D. Hartford

Laboratory Number: 92 3291

CHAIN OF CUSTODY RECORD

SQUIER ASSOCIATE

APPENDIX C

LEVEL II ENVIRONMENTAL SITE ASSESSMENT of the property at

901-933 FRANKLIN BLVD. in EUGENE, OREGON

May 17, 1990

Prepared by

RUSS FETROW ENGINEERING, INC.
GeoEnvironmental Division

2535 B Prairie Road
Eugene, Oregon 97402

Phone: (503) 689-8110

Russ Fetrow Engineering Inc.
GeoEnvironmental Division Office

2535B Prairie Road, Eugene, Oregon 97402
(503) 689-8110 Fax (503) 689-1524

May 17, 1990

Laurita Ruth
c/o Larry Anderson
Attorney at Law
P.O. Box 848
Eugene, OR 97440

Dear Laurita:

Enclosed please find a report presenting the results of a Level II Environmental Site Assessment performed on your property located at 901-933 Franklin Blvd. in Eugene, Oregon.

If you have any questions, please do not hesitate to contact our office.

Sincerely,

RUSS FETROW ENGINEERING, INC.
GeoEnvironmental Division

Paul S. Rosenberg

Paul S. (Max) Rosenberg, P.G.
Manager, Underground Storage Tank Department

Enclosure

INTRODUCTION

This report presents the results of the Environmental Site Assessment performed by Russ Fetrow Engineering, Inc. (RFEI), at the subject property located at 901-933 Franklin Blvd. in Eugene, Oregon. The property is currently owned by Laurita Ruth. A location map of the area is presented in Figure 1. A site plan of the subject property is presented in Figure 2.

The purpose of this assessment was to identify potential environmental liabilities currently associated with the subject property, specifically with respect to the strict liability and lien provision of Oregon Revised Statutes (ORS) 466.567. This report is not intended to establish the compliance status of the subject property with respect to other state or federal environmental regulations.

The scope of this investigation was divided into two levels. Level I involved: (1) review of historical ownership and land use of the subject property; (2) review of aerial photographs; (3) review of local and state agency's records; (4) a walkover survey of the subject property, including visual inspection for asbestos-containing materials; and (5) review of abutting properties for potential chemical trespass. Level II included: (1) a review of published information concerning groundwater in the area; and (2) a limited field investigation involving the installation of three soil borings and soil and groundwater sampling from those borings. The boring locations were selected based on information collected during the Level I assessment.

The professional services of RFEI have been rendered using the degree of care and skill ordinarily exercised under similar circumstances by reputable environmental consulting firms practicing in this or similar locations. No other warranty, expressed or implied, is made.

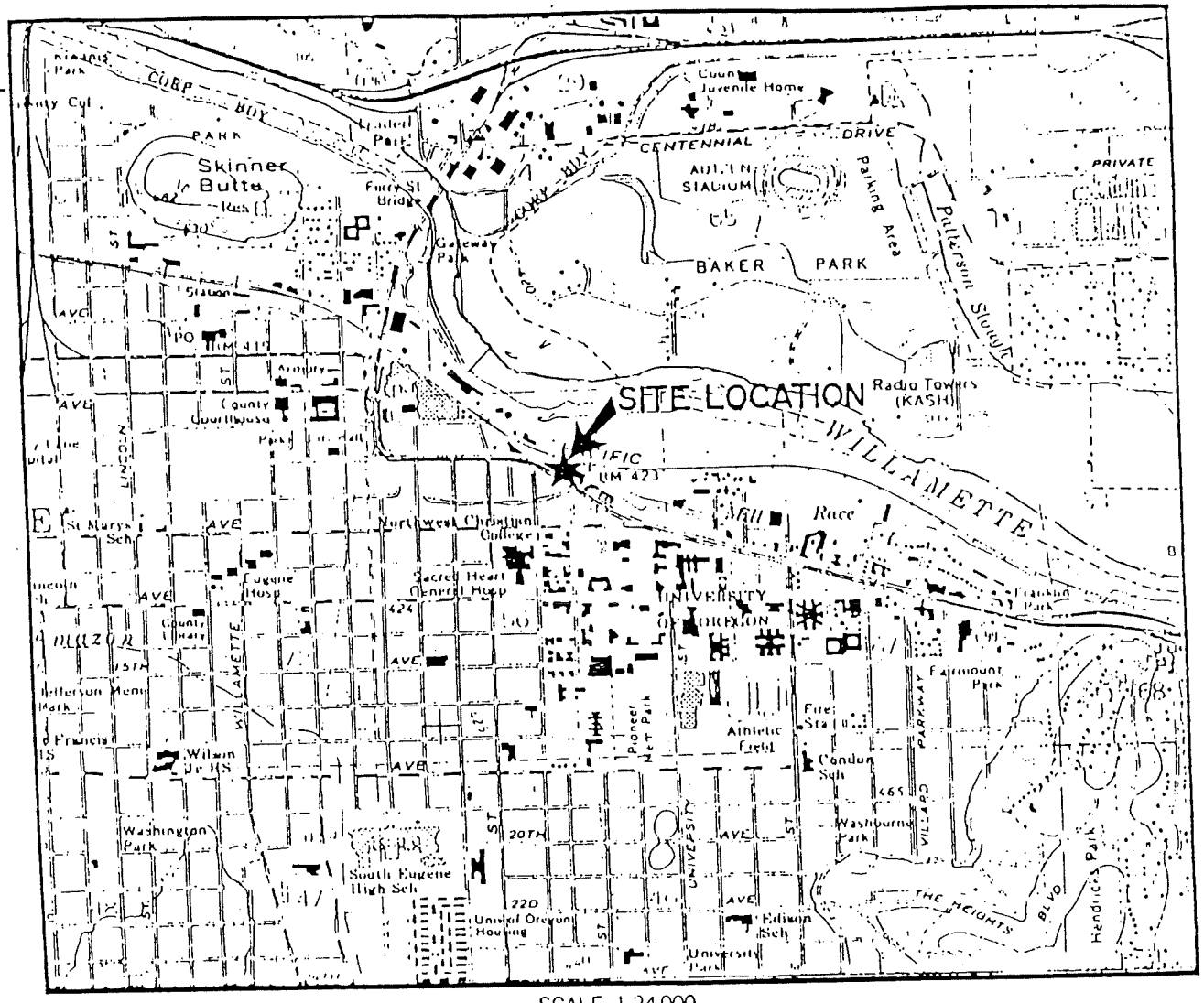
LEVEL I

SITE DESCRIPTION AND PHYSICAL SETTING

The subject property is located at 901-933 Franklin Blvd. in Eugene, Oregon. It is presently occupied by a vacant service garage and several small adjoining buildings and offices (see

131063

SITE LOCATION MAP



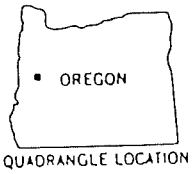
SCALE 1:24000

1 MILE

7000 FEET

1 KILOMETER

CONTOUR INTERVAL 20 FEET



QUADRANGLE LOCATION

EUGENE EAST QUADRANGLE
OREGON – LANE CO.
7.5 MINUTE SERIES (TOPOGRAPHIC)

901-933 FRANKLIN BLVD.
EUGENE, OREGON

RUSS FETROW ENGINEERING, INC.
2535 B PRAIRIE ROAD EUGENE, OREGON 97402
(503) 689-8110

FIGURE 1

Site Plan on Figure 2). The garage and offices comprise one large building located on the east end of the property. The property is elongate in shape and is comprised of Tax Lot 100 in the SE 1/4 of the NE 1/4 of Section 32, Township 17S, Range 3W, Willamette Meridian, Lane County, Oregon. The property also lies within the Hilyard Shaw Donation Land Claim No. 56. Copies of the tax lot and city sewer maps of the area can be found in Appendix A.

The subject property is bounded to the south by Franklin Blvd., to the north by the Southern Pacific Railway, to the east by the Mill Race waterway, Louie's Restaurant and the Eugene Water and Electric Board (EWEB) hog fuel plant, and to the west by a vacant lot.

? U of O Power Plant

SITE HISTORY

The history of ownership has been determined by a review of deeds on microfilm available at the Lane County Courthouse and by an interview with Laurita Ruth, the current owner. Historical land use was determined and verified by a review of aerial photographs (1936, '44, '52, '68, '75, and '87) and Sanborn Fire Insurance Maps (1949, and 1958) obtained from the University of Oregon Map Library. Additional information regarding building activity at the property has been gathered from the City of Eugene Planning and Engineering Departments, Eugene Police Department, and conversations with the owner. Copies of the deeds, aerial photographs, and police department emergency record search are included in Appendices B, C, and D, respectively.

Deed Search

The history of the property, as far as can be determined by recorded deeds, is summarized below:

DATE	GRANTOR	GRANTEE
3/31/32	H.L. Brown	Eugene Sand & Gravel Co.
12/30/44	M & R Properties (formerly Eugene Sand and Gravel Co.)	Harry B. Ruth
---	Harry B. Ruth	Catherine A. Ruth
7/22/71	Catherine A. Ruth	W. Wallace Ruth

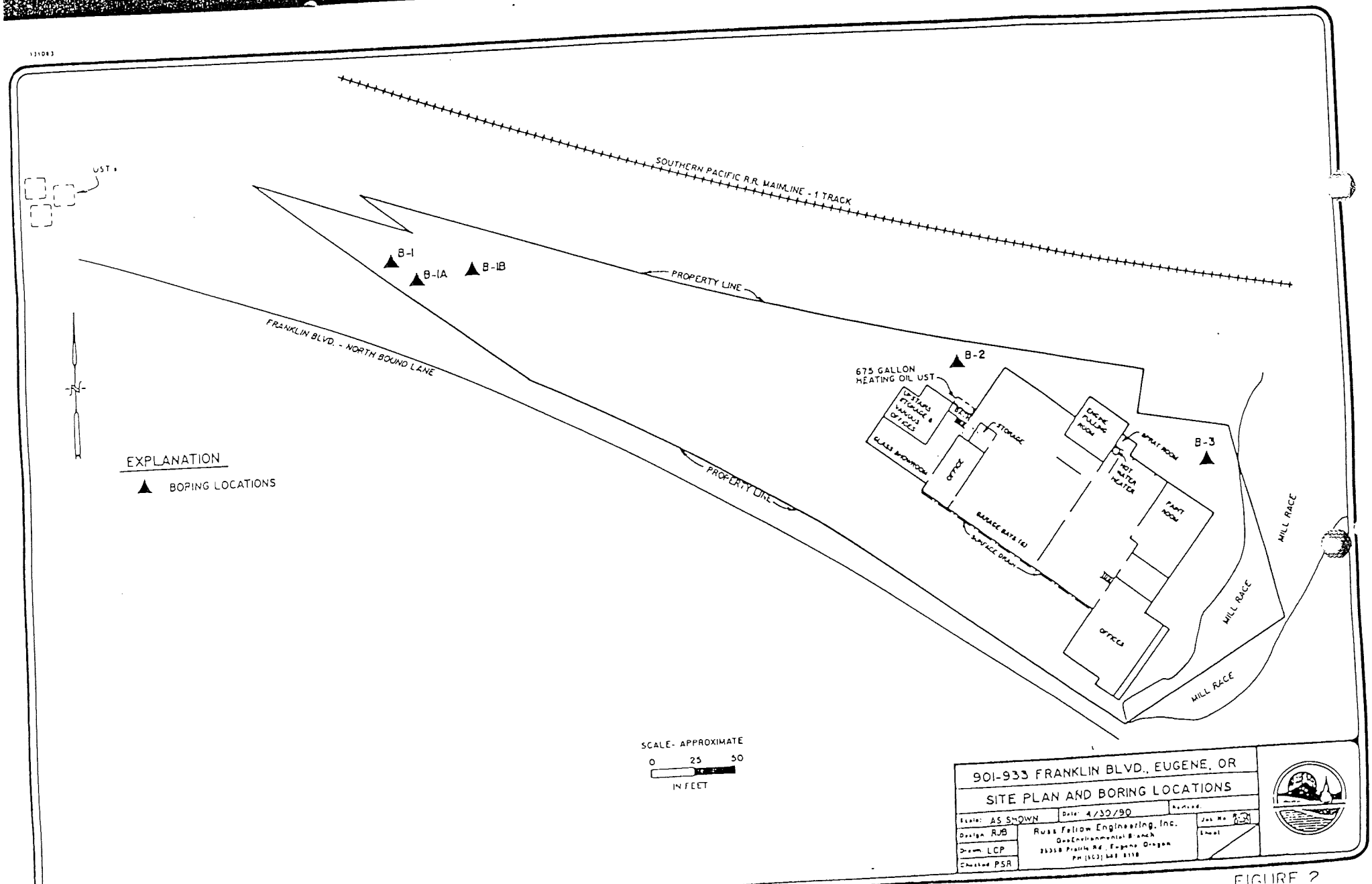

SOUTHERN PACIFIC R.R. MAINLINE - 1 TRACK
UST
B-1
B-1A
B-1B
PROPERTY LINE
FRANKLIN BLVD. - NORTH BOUND LANE
PROPERTY LINE
B-2
675 GALLON HEATING OIL UST
STORAGE
OFFICE
GLASS SHOWROOM
GARAGE BAYS (6)
SERVICE DRIVE
DESIGN DRAFTING ROOM
HOT WATER HEATER
PAINT ROOM
B-3
MILL RACE
MILL RACE
MILL RACE
OFFICES
EXPLANATION
BORING LOCATIONS
SCALE- APPROXIMATE
0 25 50
IN FEET
901-933 FRANKLIN BLVD., EUGENE, OR
SITE PLAN AND BORING LOCATIONS
Scale: AS SHOWN
Date: 4/30/90
Design RJB
Drawn LCP
Checked PSR
Russ Fellom Engineering, Inc.
GeoEnvironmental Branch
Eugene Oregon

FIGURE 2

DATE	GRANTOR	GRANTEE
---	W. Wallace Ruth	Pearl E. Ruth
10/16/86	Pearl E. Ruth	Pearl E. Ruth
		Laurita M. Allen (Ruth)

In summary, the property has been passed down through the Ruth family since Harry B. Ruth first took ownership of the property from Eugene Sand and Gravel Co. in 1944. Present and sole ownership of the property, according to Laurita Ruth, belongs to her. Laurita Ruth reported to us that a recent deed transferred all ownership of the property to her, however, no recent deed records were found during our record review.

Aerial Photo and Sanborn Map Review

Aerial photographs dating from 1936 and 1944 show the property virtually undeveloped. The Southern Pacific Railroad is not present in the 1936 photograph, but is visible in the 1944 photograph. Franklin Blvd. was relocated southward between 1936 and 1944.

The 1952 aerial photograph shows a building on the east end of the property. Many automobiles are present on the west half of the lot. A dark colored section is present extending from the western half of the building to the west end of the lot. This discoloring may be due to oiling of the unpaved lot in an effort to suppress dust. The 1949 Sanborn Fire Insurance Map shows buildings on the east end of the property labeled "Truck Sales and Service (gas and oil)." It also shows the building to the east of the property, now occupied by Louie's Restaurant, as an auto shop.

The 1958 Sandborn Map still shows the Truck Sales and Service buildings, however, the reference to gas and oil is gone. The Crystal Ice Building is not present on the 1949 or 1958 Sandborn Map. The 1968 aerial photograph shows the buildings at the same location on the east end of the property and the addition of a large building to the west of the property, presumably the "Crystal Ice Building". The lot is not paved.

In the 1975 aerial photograph the Crystal Ice Building is no longer present and the lot is paved. Many vehicles are parked in the west end of the lot. Presumably, the vehicles represent a Mack Truck sales (Pitchford Mack) reported to have occupied the premises at that time.

The most recent aerial photograph of the site, taken in 1987, shows the property much as it looks today. In 1987, the property was used as a motor home dealership (Joe Romania). A large number of motorhomes can be seen parked on the west end of the property.

Local Agency Files

No fires or related emergencies have been reported at the subject property. However, the Eugene Department of Public Safety lists two underground storage tanks (UST's) at 933 Franklin Boulevard. The size of the tanks and the products stored are reported to be a 675 gallon fuel oil tank and a 1,000 gallon gasoline tank[1].

Department of Environmental Quality Records

Neither the subject property or the abutting neighbors are listed by the Oregon Department of Environmental Quality (DEQ) as sites where a suspected or confirmed release of hazardous material has occurred. The site is not included on the DEQ list of underground storage tank facilities, nor is it included on the DEQ list of leaking underground storage tanks.

U. S. Environmental Protection Agency Records

The Environmental Protection Agency (EPA) CERCLIS list, dated April 23, 1990, includes two nearby facilities. Day Island Landfill, located approximately three-quarter miles east northeast of the subject property (opposite side of Willamette River), and the University of Oregon Riverfront Research Park, located to the east of the subject property.

---

1 During the site walk-over survey no evidence of the 1,000 gallon gasoline UST could be found on the premises. Additionally, the owner reported that she contracted a company to locate the 1,000 gallon UST. The company was unable to locate a tank.

SITE SURVEY

A walkover survey was conducted on April 6, 1990, by Suzanne Pearce, Debbie Unfried, and Randall Boese of Russ Fetrow Engineering, Inc. The walkover survey focused on features of the site that may be related to potential environmental liabilities, including: 1) staining of soil or asphalt; 2) the presence of hazardous materials on the property or on neighboring properties; 3) odor or appearance of any surface waters; and 4) depressions, filler caps, and vent lines that might indicate the presence of underground storage tanks. Areas and features referred to in the following text are shown on Figure 2.

Observations

Exterior:

The perimeter of the property was inspected for potential environmental impact. The abutting properties to the south of the site, across Franklin Blvd., are residential in nature and pose minimal risk for impacting the property. However, the west end of the property abuts a vacant lot that contains evidence of underground storage tanks, such as tank fill ports and a pump island. A below-ground release from these tanks could impact the subject property. To the east and across the mill race waterway the property abuts two properties. These include a former auto shop that is now a restaurant, and the EWEB hog fuel plant. The Southern Pacific Railroad borders the property to the north.

Inside the property perimeter, the entire surface is covered with asphaltic concrete or concrete except for a small grassy area near the extreme east end of the property. Several overhead power and phone lines cross over the property. Transformer boxes on poles inside the property were observed to have no evidence of leakage. A concrete pad located behind the northeast portion of the building was observed to have deep surface cracks. A small area (approximately 10 square feet) behind the pad was observed to be void of vegetation. Some surface staining was also visible in this area. A boring was attempted in this area by Kenner Drilling Company on December 15, 1990. However, the boring was abandoned at a depth of 2.5 feet due to the presence of a diesel odor emanating from the bore hole (see Appendix E for Driller's Memorandum). A depression or excavated area was present just

outside the fence beyond the property line. One partially full, rusty 55 gallon drum was present behind the building. Contents of the drum are unknown.

Interior:

The building was surveyed on a room by room basis. The steam cleaning room or spray room was observed to have a large crack and stain on the floor (see Site Plan in Figure 2 for room locations). Floor cracks and staining were also observed in the paint room, engine pulling room, and main garage area. Upstairs areas throughout the building appeared to be used mainly as storage areas. Stain rings were noticed in some areas. Old fluorescent tube lights are predominant throughout the building. In the showroom and the western portion of the building, 9 X 9 floor tiles are present which may contain asbestos. Ceilings in office areas are made of acoustic tiles and these may also contain asbestos.

MEETING APRIL 11, 1990

Following the completion of the Level I assessment, a meeting was held between the property owner (Laurita Ruth), the City of Eugene (represented by Kent Doud), and RFEI. The purpose of the meeting was for RFEI to present the Level I findings and to discuss and decide upon the final number and locations of subsurface borings and samples. The installation of three boring was agreed to. The locations of the borings, and the environmental liabilities they hoped to assess, were planned as follows: Boring B-1, to be placed at the extreme west end of the property to assess potential impact from neighboring underground storage tanks; Boring B-2, to be placed near the northwest corner of building to assess the potential impact of any of below-ground petroleum release from the known on-site heating oil UST and to assess potential sub-surface impacts of past steam cleaning activities on the property; and Boring B-3, to be placed near the northeast corner of the building to assess Kenner Drilling findings and also to assess past steam cleaning activities.

PHASE II

LOCAL HYDROGEOLOGY

According to the USGS Water Supply Paper for the Eugene-Springfield area (Water Supply Paper 2018), the site vicinity is underlain by unconsolidated alluvium composed of sand and gravel interspersed with mixtures of sand, silt, and clay. Depths to groundwater in this unconsolidated material ranges from about 5 to 20 feet below land surface (BLS), depending on location and time of year. The groundwater gradient in the area of the subject property is generally to the northwest, towards the Willamette River. In may parts of the Willamette Valley, a close correlation exists between the stage of the river and the depth to groundwater, indicating that the alluvial aquifer and the river are hydrologically connected.

FIELD INVESTIGATION AND SAMPLING

Methodology

Boring installation and sampling were conducted on April 17, 1990. Borings were placed as close to pre-selected drilling locations as was possible. Overhead power lines and subsurface conditions (i.e. cobbles) dictated the actual boring locations.

Drilling was accomplished with a 3.75-inch internal diameter hollow-stem auger drill rig. Soil samples were collected from five feet long continuous core barrels lowered inside of the auger stem. After five feet of drilling was accomplished, the core barrel was removed and split. Samples were then collected from a virtually undisturbed five-foot section of core. Before drilling was resumed, another clean core barrel was lowered back into the auger stem. Prior to the collection of each sample, the core barrel was scrubbed in a solution of Alconox, rinsed with potable water and then triple-rinsed with deionized water. The retrieved sample material was packed tightly into clean, airtight sample jars, which were placed immediately on ice in an insulated cooler.

Instrumental field monitoring for the presence of volatile ionizable hydrocarbons was performed using a HNU-brand, model PI 101 photo-ionization detector (PID).

Water samples were collected with a teflon bailer, which was cleaned in a manner similar to the core barrel. The bailer was lowered on clean nylon string into the auger stem and allowed to fill with water. Sample vials were filled with minimal aeration and capped without headspace (air bubbles).

All samples were delivered to Pacific Environmental Laboratory in Beaverton, Oregon. Soil samples were analyzed for Total Petroleum Hydrocarbons (TPH) by modified EPA Method 418.1. Selected soil samples were analyzed for volatile aromatic hydrocarbons (BTEX) by EPA Method 8020, or for volatile organic compounds by EPA Method 8240. Water samples were also analyzed by EPA Method 8240. Laboratory reports and chain-of-custody forms for the soil and water samples are included in Appendix F. Boring logs showing sample locations can be found in Appendix G.

Boring Installation and Sampling

Boring B-1, B-1A, and B-1B

Borings B-1, B-1A, and B-1B met with auger refusal at a depth of approximately five feet. Large cobbles or boulders present in the area at that depth prevented further drilling.

Discoloration and a diesel odor was notice in the drilling core from just below the asphaltic concrete surfacing to approximately 1.5 feet. Below 1.5 feet to the bottom of the boring no odor or discoloration was observed. Soil samples were collected from depths of one foot (sample ID B1-1) and 3 feet (sample B1-3).

Boring B-2

Boring B-2 was successfully drilled to an approximate depth of 18 feet below land surface (BLS). Groundwater was encountered in this boring. After boring completion, depth to groundwater was measured to be 13.5 feet BLS. Soil discoloration similar to that found in boring B-1 was also found in boring B-2. The soil discoloration was encountered from just below the pavement surface to approximately 3 feet in depth. No readily ionizable

hydrocarbons were detected with the PID meter in any core samples taken from the boring, including those taken of the shallow discolored soil.

Soil samples were collected from depths of 1, 7, and 17 feet. The samples identifications are B2-1, B2-7, and B2-17, respectively. One water sample was also collected (sample B2-H_2O).

Boring B-3

Boring B-3 was drilled to an approximate depth of 20 feet BLS. After boring completion, the depth to groundwater was measured to be approximately 11.5 feet BLS. The depth to groundwater in the adjacent millrace water way was estimated to be approximately 6 feet BLS, suggesting that the alluvial aquifer and millrace are not directly hydrologically connected.

Soil discoloration and odor was again found in the shallow subsurface in this boring. The discolored soil extended from the surface downward to the top of a grey silt layer at an approximate depth of 7 feet BLS. PID meter readings of 0 to 1 unit were recorded from this soil. No discoloration was observed, nor were ionizable hydrocarbons measured, in soils below a depth of 7 feet.

Soil samples were collected at depths of 4, 12, and 18 feet, having sample identifications B3-4, B3-12, and B3-18, respectively. One groundwater sample was also collected (sample B3-H_2O).

ANALYTICAL RESULTS

Soil Samples (TPH results in mg/kg, BTEX results in µg/kg)

Sample ID	TPH	Benzene	Toluene	Ethylbenz.	Xylene
Ruth-01-B1-1	2,500	NA	NA	NA	NA
Ruth-01-B1-3	170	NA	NA	NA	NA
Ruth-01-B2-1	390	NA	NA	NA	NA
Ruth-01-B2-7	BDL	NA	NA	NA	NA
Ruth-01-B2-17	12	BDL	BDL	BDL	3
*Ruth-01-B3-4	590	*	*	*	*
Ruth-01-B3-12	16	NA	NA	NA	NA
Ruth-01-B3-18	9	BDL	BDL	BDL	BDL
Detection Limit	5	1	1	1	1

*Ruth-01-B3-4 This sample was also analyzed for volatile organic compounds by EPA Method 8240. It contained 190 µg/kg of Acetone and 12 µg/kg of Toluene.

TPH = Total Petroleum Hydrocarbons
BDL = Below Detection
NA = Not Analyzed

Water Samples (results in µg/L)

Sample ID	Volatile Organic Compounds
Ruth-01-B2-H_2O	BDL
Ruth-01-B3-H_2O	BDL

Discussion of Analytical Results

Commonly, the decision making process used to assess the potential environmental liabilities associated with petroleum hydrocarbons and volatile organic compounds involves comparison of the chemical results to established cleanup standards or federal EPA health-based criteria. These standards are often used as action levels or guidelines to assess whether additional action needs to be taken.

Elevated levels of total petroleum hydrocarbons (TPH) were detected in shallow soil samples collected from all borings. Soil samples collected at depths of seven feet and below contain low to non-detectable levels of TPH. The vertical profile of the TPH levels suggests that the source of the petroleum hydrocarbons in shallow soils beneath the site can most likely be attributed to surface application of oil, possibly for dust suppression. Surface spillage is also a possible source.

Presently, no numeric cleanup standards exist for petroleum hydrocarbons in soil as a result of land application or surface spillage. It is the current practice of the Oregon Department of Environmental Quality to use the numeric soil cleanup standards established for leaking petroleum underground storage tank when assessing releases of petroleum products to the subsurface. These rules (OAR 340-122-301 to 340-122-360) establish graduated cleanup standards for gasoline, diesel, and heavy oil releases dependent on certain site-specific conditions. Shallow soil present in borings B-1, B-3, and possibly B-2 would exceed the numeric soil cleanup standard, if they were applied.

Very low levels of acetone (0.190 mg/kg) and toluene (0.012 mg/kg) were detected in the shallow soil sample collected from boring B-3. The levels detected are below federal health-based criteria for these compounds in soils of 8,000 mg/kg for acetone and 20,000 mg/kg for toluene. A low level of xylenes (0.003 mg/kg) was detected in soil collected from boring B-2 at 17 feet. This concentration is below the health-based criterium of 4,000 mg/kg.

No volatile aromatic compounds were detected in the water samples collected from borings B-2 and B-3.

CONCLUSIONS

1. No visual evidence of chemical trespass from neighboring properties was observed during the site survey.
2. Floor tiles and textured ceiling tiles within the building may contain asbestos.

3. Test borings were installed at three locations on the subject property. Subsurface soil samples collected from the borings indicate the presence of total petroleum hydrocarbons (TPH) in shallow soils beneath the site at levels in excess of numeric soil cleanup standards for certain petroleum releases. Deeper soils contain levels of TPH below analytical detection limits or below the strictest numeric soil cleanup standards. Based on the levels of total petroleum hydrocarbons found in the shallow subsurface, the Department of Environmental Quality could require additional assessment and/or cleanup at this site.

4. Very low levels of acetone and toluene, orders of magnitude below the health-based criteria established by the EPA were detected in the shallow subsurface at boring B-3.

5. A very low level of xylene was detected in soil from boring B-2 at a depth of 17 feet. The detected concentration is far below the health-based standard.

6. Groundwater samples collected from borings B-2 and B-3 detected no volatile organic compounds.

7. Due to auger refusal in borings B-1, B-1A, and B-1B, it was not possible to collect deep soil and groundwater samples near the west end of the subject property. The potential of chemical trespass from properties abuting the western portion of the subject property therefore has not been thoroughly assessed.

LIMITATIONS

The conclusions and recommendations presented in this report are based only on the observations made during field investigation, analytical results, and data provided by others. Information provided by others was used in assessing the site conditions. The accuracy of the conclusions drawn from this information is inherently based on the accuracy of the information that was provided.

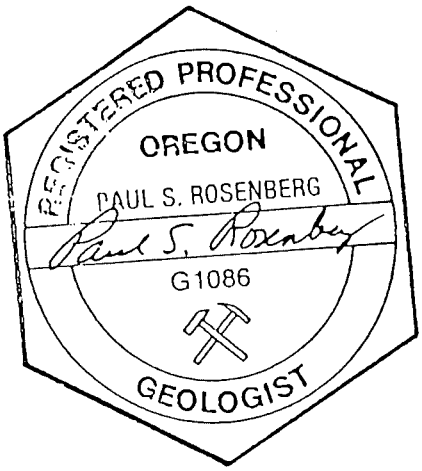
Please do not hesitate to contact us if you have any questions regarding this report or its conclusions.

Respectfully submitted,

RUSS FETROW ENGINEERING, INC.
GeoEnvironmental Division

Randall J. Boese M.S.
Randall J. Boese, GIT
Hydrogeologic Consultant

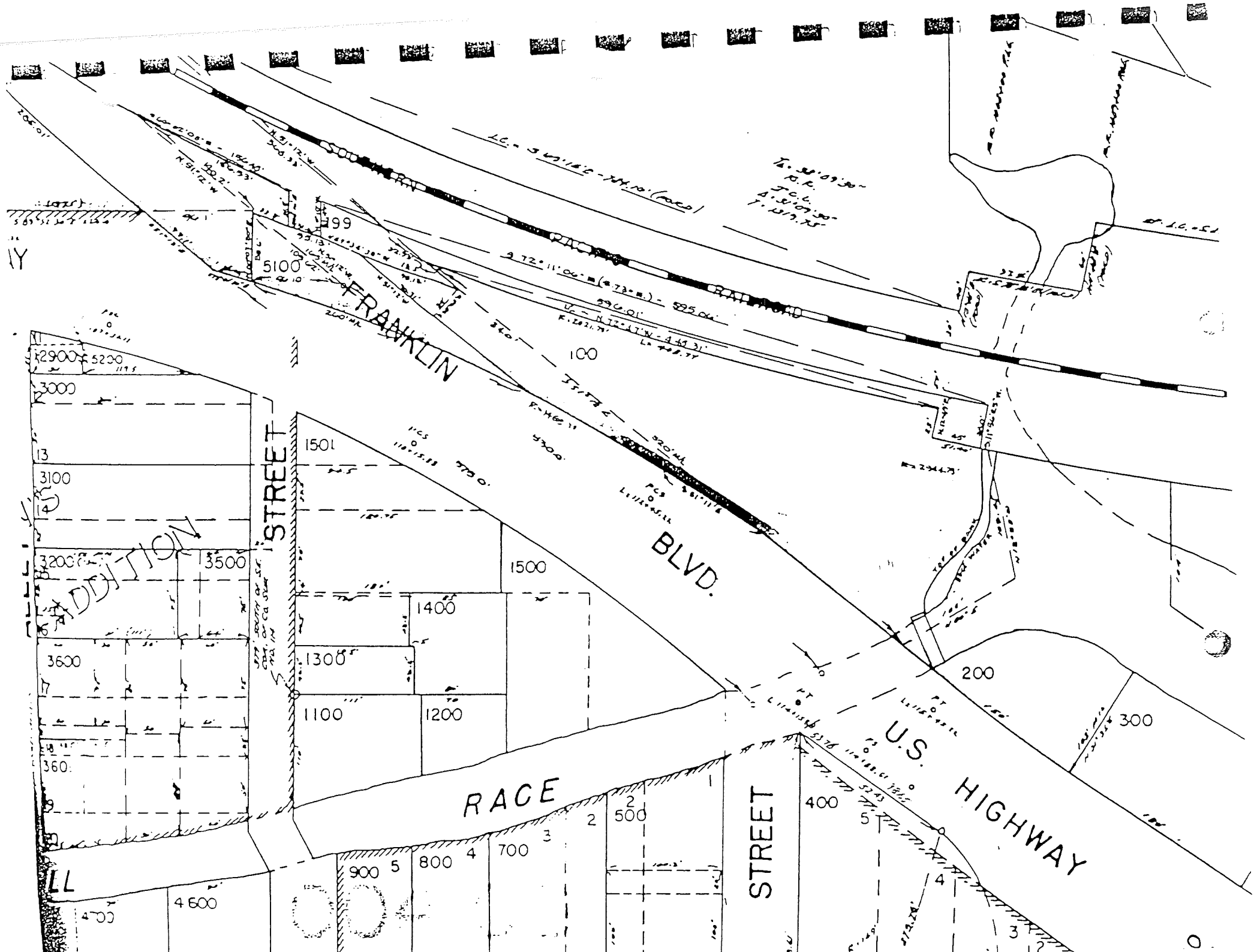
Paul S. Rosenberg
Paul S. (Max) Rosenberg, P.G.
Hydrogeologist



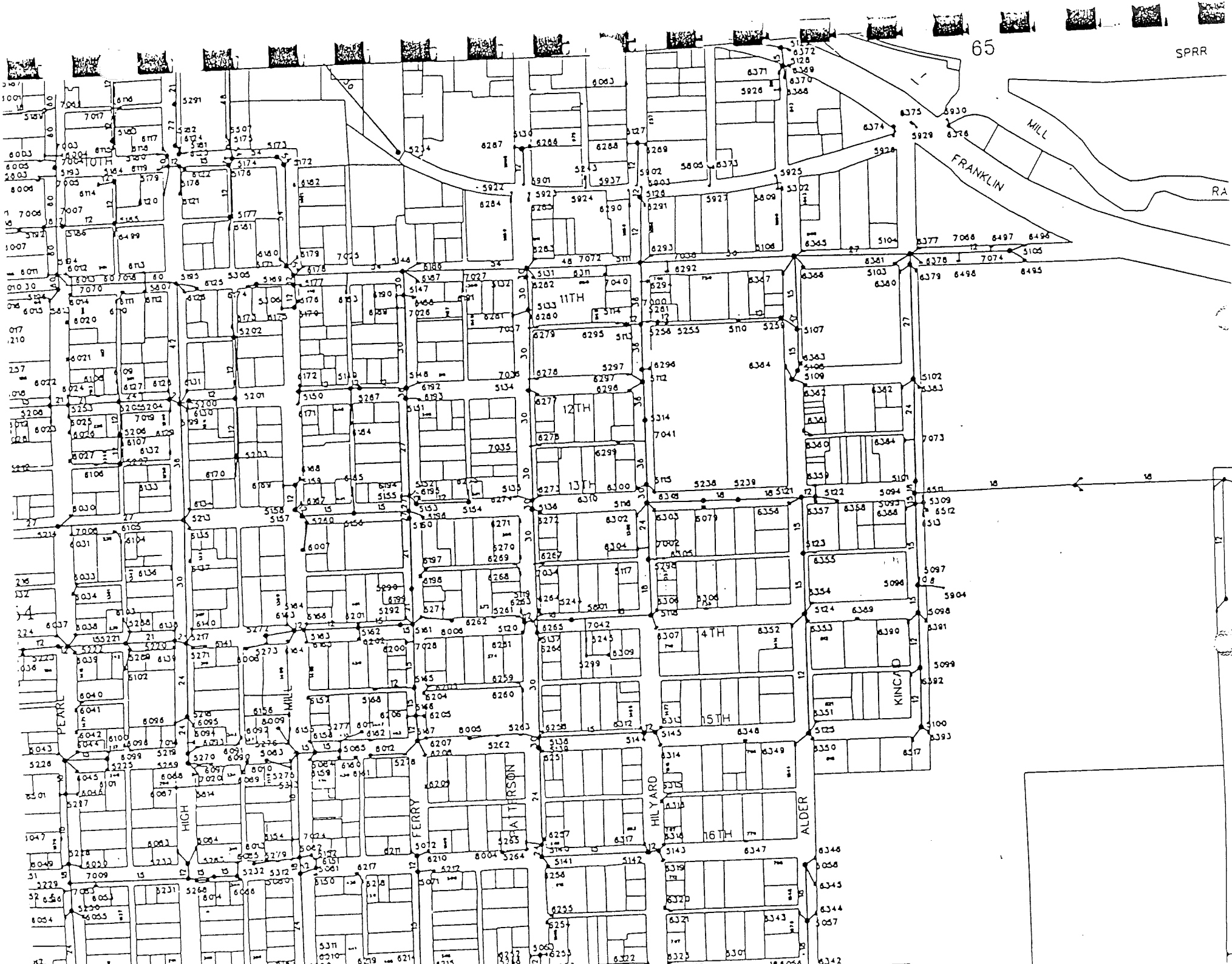
RUTH 01-01/ruth01.eas

APPENDIX A

Tax Lot and City Sewer Maps


FRANKLIN
STREET
BLVD.
RACE
STREET
U.S. HIGHWAY
RAILROAD
5100
5200
3000
3100
3200
3500
3600
1501
1500
1400
1300
1100
1200
200
300
400
500
700
800
900
4600


2ND
3RD
4TH
MILL
HIGH
WILLAMETTE RIVER
SPRR


SPRR
MILL
FRANKLIN
10TH
11TH
12TH
13TH
14TH
15TH
16TH
PEARL
HIGH
FERRY
MATTHERSON
HILYARD
ALDER
KINCAID
UNIVERSITY

APPENDIX F

Laboratory Results

PACIFIC ENVIRONMENTAL LABORATORY INC

9405 S.W. Nimbus Ave. Beaverton, OR 97005 (503) 644-0660
FAX # (503) 644-2202

April 30, 1990

Russ Fetrow Engineering
2535-B Prairie Road
Eugene, OR 97402

Attn: Randy Bóese

Re: JOB - Ruth-01-01
PEL #90-1066
P.O. #2738

Enclosed is the lab report for your samples which were received on April 20, 1990.

I. Sample Description

Eight Soil Samples
Two Water Samples

The samples were received under a chain of custody.

The samples were received in containers consistent with EPA protocol.

II. Quality Control

No project specific QC was requested. In-house QC data is available upon request.

III. Analytical Results

Test methods may include minor modifications of published methods such as detection limits or parameter lists. Solid and waste samples are reported on an "as received" basis unless otherwise noted.

Compounds not detected are listed under results as ND.

Sincerely,

Howard Holmes
Lab Manager

Joe Ingram
Chemist

PEL REPORT NUMBER: 90-1066
CLIENT: Russ Fetrow Engineering
JOB REFERENCE: Ruth-01-01
DATE: April 30, 1990
ITEMS: Eight Soil Samples
Two Water Samples

METHOD: Total Petroleum Hydrocarbons per EPA 418.1
Results in mg/kg (ppm)

Sample I.D.	T.P.H.
Ruth-01-B1-1	2,500
Ruth-01-B1-3	170
Ruth-01-B2-1	390
Ruth-01-B2-7	ND
Ruth-01-B2-17	12
Ruth-01-B3-4	590
Ruth-01-B3-12	16
Ruth-01-B3-18	9
Lab Blank	ND
Detection Limit	5

METHOD: BTEX per EPA 8020
Results in ug/kg (ppb)

Sample I.D.	Benzene	Toluene	Ethyl Benzene	Xylene	Detection Limit
Ruth-01-B2-17	ND	ND	ND	3	1
Ruth-01-B3-18	ND	ND	ND	ND	1
Lab Blank	ND	ND	ND	ND	1

CHAIN-OF-CUSTODY RECORD

PROJECT NAME Lori Ruth Roadside trans. PROJECT NO. RUTH-01-01

COLLECTED BY (Name) RJR, JRR (Signature) J R R Ramsey

SITE TYPE | SITE ID

IF YOUR SAMPLE IS MULTI-PHASED,

SHALL WE:

___ Test Each Phase separately?
___ Test only ONE Phase? Which Phase?
___ Mix All Phases by Shaking?
___ Dry Sample & Test Residual?

IF YOUR SAMPLE IS WET,

SHALL WE:

X Test As Received?
___ Dry Sample First?
___ Ash Sample First?

IF SAMPLE IS LIQUID & HAS SEDIMENT or PARTICULATE,

SHALL WE:

___ Test Filtrate Only?
___ Mix Sample by Shaking?
___ Test Particulate Only?

DO YOU NEED:

___ Special DETECTION LIMITS?

___ ppb or ___ ppm

___ Special METHODS?

TELL US What Method Number or What Method Name.

COLLECTION REMARKS: (weather, site description, etc.)

UST DEPT — ANALYSES TO BE PERFORMED

	SAMPLE ID	DATE	TIME	COMP.	GRAB	MEDIA	STATION LOCATION	TPH (EPA 418.1)	BTXE (EPA 602)	Lead by Graphite Furnace	Oil & Grease (EPA 413.2)	Hydrocarbon Scan (OR-DEQ)	pH	BTXE (EPA 8020)	Solvent Scan (EPA 8240)	NUMBER OF CONTAINERS	SAMPLE REMARKS
1	Ruth-01-B1-1	4/17/90			X	Soil		X									
2	Ruth-01-B1-3	4/17/90			X	Soil		X									
3	Ruth-01-02-1	4/17/90			X	Soil		X									
4	Ruth-01-02-7	4/17/90			X	Soil		X						X			
5	Ruth-01-02-17	4/17/90			X	Soil		X							X		ALL SAMPLES WILL BE DISPOSED OF 30 DAYS AFTER RECEIPT
6	Ruth-01-B3-7	4/17/90			X	Soil		X									
7	Ruth-01-B3-12	4/17/90			X	Soil		X						X			
8	Ruth-01-B3-18	4/17/90			X	Soil									X		
9	Ruth-01-B2-H2O	4/17/90			X	H_2O									X		
10	Ruth-01-B3-H2O	4/17/90			X	H_2O											

RELINQUISHED BY (Signature)	ORGANIZATION	DATE/TIME	RECEIVED BY (Signature)	ORGANIZATION	DATE/TIME	REMARKS
J R R Ramsey	RFEI	4/				PEI# 90-1066
RELINQUISHED BY (Signature)	ORGANIZATION	DATE/TIME	RECEIVED FOR LABORATORY BY (Signature)		DATE/TIME	
			Marietta Lindland		4/20/90 1:00	

APPENDIX G

Boring Logs

BORING LOG

PAGE 1 OF 1

BORING NO.: B-1, B-1A, B-1B

PROJECT: LAURITA RUTH REAL ESTATE TRANS.

PROJECT CODE: RUTH-01-01

LOCATION: 901-933 FRANKLIN BLVD.
EUGENE, OREGON 97401

DATE COMPLETED: 4/17/90

TOTAL DEPTH: ~4.0'

SURFACE ELEVATION:

DRILLING METHOD: 3-3/4" HSA

DRILLED BY: GEOTECH EXPLORATIONS

LOGGED BY: RJB, JRR

DEPTH	SAMPLE NUMBER/ LOCATION	PENE-TRATION BLOW COUNTS	LITHOLOGY	LITHOLOGIC DESCRIPTION	AS BUILTS
0'	B1-1 TPH = 2500 B1-3 TPH = 170			0-3.0" ASPHALTIC CONCRETE 3"-1.5' CRUSHED AGGREGATE FILL, GREY STAINED, DIESEL ODOR 1.5-4.0' BROWN CLAYEY GRAVEL TO GRAVELLY CLAY, OCCASIONAL COBBLES 4.0'-? GRAVEL WITH LARGE COBBLES OR BOULDERS - AUGER REFUSAL IN 3 BORINGS AT THIS DEPTH	
5'					
10'					
15'					
20'					
25'					
30'					

NOTES

RUSS FETROW ENGINEERING, INC.
2535 B PRAIRIE ROAD
EUGENE, OREGON 97402

BORING LOG

PAGE 1 OF 1

BORING NO. : B-2

PROJECT : LAURITA RUTH REAL ESTATE TRANS.

PROJECT CODE: RUTH-01-01

LOCATION : 901-933 FRANKLIN BLVD.
EUGENE, OREGON 97401

DATE COMPLETED : 4/17/90

TOTAL DEPTH : ~17.5'

SURFACE ELEVATION :

DRILLING METHOD : 3-3/4" HSA

DRILLED BY : GEOTECH EXPLORATIONS

LOGGED BY : RJB, JRR

DEPTH	SAMPLE NUMBER/ LOCATION	WATER DATA	LITHOLOGY	LITHOLOGIC DESCRIPTION	AS BUILTS
0'	B2-1 TPH = 390			0-3.0' CRUSHED AGGREGATE FILL, SOME CLAY, GREY STAINED, DIESEL ODOR. PID - 0 UNITS	
				3.0-6.0' CLAYEY GRAVEL, GREY, GRAVEL ROUNDED, WOOD DEBRIS (ROTTEN). PID - 0 UNITS	
5'				6.0-10.0' GREY CLAY, HIGHLY PLASTIC, STIFF TO VERY STIFF. PID - 0 UNITS	
	B2-7 TPH = BLD				
10'				10.0-15.0' CEMENTED SAND WITH TRACE PEBBLES (ROUNDED), MOIST 15-20%, SOME SILT, GREEN FROM 10'-11', BROWN FROM 11'-15'. POSSIBLE LARGE BOULDER WITH WEATHER RIND. PID - 0 UNITS	
		▼			
15'	B2-17 TPH = 12			15.0-17.5' GRAVEL WITH COBBLES, AUGER REFUSAL AT 17.5'. PID - 0 UNITS	
20'					
25'					
30'					

NOTES

▼ = STATIC WATER LEVEL

RUSS FETROW ENGINEERING, INC.
2535 B PRAIRIE ROAD
EUGENE, OREGON 97402

BORING LOG

PAGE 1 OF 1

BORING NO.: B-3

PROJECT: LAURITA RUTH REAL ESTATE TRANS.

PROJECT CODE: RUTH-01-01

LOCATION: 901-933 FRANKLIN BLVD.
EUGENE, OREGON 97401

DATE COMPLETED: 4/17/90

TOTAL DEPTH: ~20.0'

SURFACE ELEVATION:

DRILLING METHOD: 3-3/4" HSA

DRILLED BY: GEOTECH EXPLORATIONS

LOGGED BY: RJB, JRR

DEPTH	SAMPLE NUMBER/ LOCATION	WATER DATA	LITHOLOGY	LITHOLOGIC DESCRIPTION	AS BUILTS
0'				0-2.0' BROWNISH GREY SAND WITH TRACE GRAVEL. PID - 0 UNITS	
				2.0-3.0' GREY CLAY, HIGHLY PLASTIC, STIFF	
	B3-4 TPH = 590			3.0-7.0' SANDY GRAVEL, SAND COARSE, WEATHERED, DIESEL ODOR. PID - 0-1 UNITS	
5'					
				7.0-16.5' GREY SILT WITH INTERBEDS OF SAND AND OCCASIONAL GRAVEL. SAND FINE TO MEDIUM GRAINED, SOME WOOD CHIP DEBRIS AND SMALL TWIGS. PID - 0 UNITS	
10'		▼			
	B3-12 TPH = 16				
15'					
				16.5-17.0' SAND, COARSE	
	B3-18 TPH = 0			17.0-20.0' GRAVEL WITH COBBLES. PID - 0 UNITS	
20'					
25'					
30'					

NOTES

▼ = STATIC WATER LEVEL

RUSS FETROW ENGINEERING, INC.
2535 B PRAIRIE ROAD
EUGENE, OREGON 97402

SUBSURFACE ENVIRONMENTAL INVESTIGATION

LAURITA RUTH PROPERTY

---

901 - 933 FRANKLIN BOULEVARD
EUGENE, OREGON

PREPARED FOR:
WILLIAMS, FREDRICKSON, AND STARK

O-6286

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APRIL 1993

RZA AGRA, Inc.
Engineering & Environmental Services

AGRA
Earth & Environmental Group

RZA AGRA, Inc.
(Formerly: Rittenhouse-Zeman & Associates, Inc.)
Engineering & Environmental Services

7477 SW Tech Center Drive
Portland, Oregon 97223-8024
(503) 639-3400
FAX (503) 620-7892

April 29, 1993

O-6286

Williams, Fredrickson, and Stark
1600 SW 4th, Suite 900
Portland, OR 97201

Attn: Mr. Donald R. Stark

SUBJECT: **RESULTS OF ENVIRONMENTAL ASSESSMENT OF LAURITA RUTH PROPERTY, EUGENE, OREGON**

Dear Mr. Stark:

We are pleased to provide you with three copies of the final report on the subject property. We found no evidence of buried tanks at the site, or of contamination requiring remedial actions.

We appreciate the opportunity to assist you with this project. If you have any questions please feel free to contact us at 503-639-3400.

Respectfully submitted,

RZA AGRA, Inc.

Douglas A. Smith, P.G. Associate

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Appendix B	Laboratory Test Results Chain-of-Custody Records

0.0 SUMMARY

RZA AGRA, Inc. (RZA), recently completed a subsurface investigation at 901-933 Franklin Boulevard, Eugene, Oregon. The primary goal of our investigation was to determine if there were evidence of subsurface contamination at the site. Our investigation consisted of: 1) the drilling of three borings to a depth of 20 feet, and three borings to a depth of five feet, 2) collecting and analyzing soil samples from each of the six soil borings, and 3) collecting and analyzing groundwater samples from the three 20 foot borings. A ground penetrating radar survey was also performed in order to locate possible underground storage tanks (USTs).

Our Subsurface Investigation Indicated:

Site History: Prior to the subsurface investigation, the subject property was considered to have a potential for subsurface hydrocarbon contamination due to past land use. There is evidence that a service station may have operated at the site in the 1940s and/or 1950s, and the site has also been used extensively throughout its history for the servicing of automobiles and trucks.

Soils: Subsurface soil generally consists of a minimum of five feet of fill material, underlain by silty clay to silty sand, which in turn is underlain by a sandy gravel. The base of the sandy gravel was not encountered during subsurface drilling activities.

Hydrogeology: Groundwater was encountered during drilling at depths ranging from 14 to 17 feet below grade. The sandy gravel unit appears to be the shallowest groundwater saturated unit.

Results of Soil Testing: Very low levels of gasoline were detected in soil samples collected at depths of five and three feet in borings RZA-3 and RZA-5, respectively. All other soil samples tested indicated gasoline concentrations below detection limits.

Diesel and heavy oils were detected in soil samples collected from borings RZA-3, RZA-5, and RZA-6. Diesel concentrations ranged from 29.1 milligrams per kilogram (mg/kg) to 85.4 mg/kg. Heavy oils were detected at a concentration of greater than 250 mg/kg in three of the soil samples analyzed.

Results of Groundwater Testing: Each of the groundwater samples collected from the three deep soil borings were tested for aromatic volatile organic compounds (AVOCs). Concentrations of AVOCs were below detection limits in the three groundwater samples collected. Groundwater samples from borings RZA-1 and RZA-3 were tested for halogenated volatile organic compounds (HVOCs). Both samples indicated HVOC concentrations below detection limits. Groundwater collected from RZA-3 was also tested for polynuclear aromatic hydrocarbons (PAHs). All PAH concentrations were below detection limits, except napthalene which was detected at a concentration of 0.13 micrograms per liter.

Results of Ground Penetrating Radar: No Ground Penetrating Radar reflections indicative of large USTs were observed at the subject site. Some anomalous reflections were observed, but the character of the reflections were not typical for USTs.

Conclusions and Recommendations: Low levels of gasoline were detected in shallow site soils, but at concentrations below site specific numeric soil cleanup levels where there has been a release from a UST system. Testing of shallow site soils also indicated the presence of diesel and heavy oil contamination in shallow fill material near the western boundary of the subject site, and at boring location RZA-3. All three of the samples in which diesel and heavy oils were detected indicated a total non-gasoline fraction hydrocarbon concentration of greater than 250 mg/kg (EPA Method 8015-modified). This likely exceeds the numeric cleanup standard of 100 mg/kg (EPA Method 418.1) in cases of releases from UST systems at Matrix Level I sites. It should be noted that we have found no direct evidence of a release of diesel or heavy oils from a UST system. Therefore, the application of ODEQ numeric cleanup standards to this site is optional.

Previous work conducted at the site also indicated diesel or heavy oil contamination exceeding numeric soil cleanup levels in the shallow fill material. It appears that the diesel and heavy oil contamination is limited to the shallow fill material across the site. This may reflect past road oiling, which reportedly took place at the site for many years.

Groundwater underlying the subject site does not appear to have been significantly impacted by fuel hydrocarbons or volatile organic compounds. The potential for groundwater to be impacted by the shallow diesel and heavy oil present in soils is considered to be very low.

Based upon the results of our subsurface investigation, including the GPR survey, we have found no evidence of buried tanks or a contaminant release that requires remedial actions. We recommend no further environmental investigations at this time.

The preceding summary is intended for introductory and reference use only. A complete reading of this report is recommended.

1.0 INTRODUCTION

This report presents the results of our environmental site assessment conducted at 901-933 Franklin Boulevard, Eugene, Oregon (Plate 1). The property is currently owned by Ms. Laurita Ruth. The approximate site boundaries and the locations of soil boring drilled during the assessment are presented in the Site Plan (Plate 2).

1.1 Objectives and Scope-of-Work

The goals of our assessment were to determine if there were evidence of subsurface soil or groundwater contamination at the site, and to determine if underground storage tanks (USTs) were still present on the property.

The scope of work for the project included: 1) the conducting of a subsurface drilling investigation by RZA, including the collection and analysis of soil and groundwater samples, 2) the performing of a ground penetrating radar (GPR) survey by Northwest Geophysical Associates, Inc. (NGA), and 3) preparing a report documenting work on the project, with conclusions and recommendations.

This report has been prepared for the exclusive use of Williams, Fredrickson and Stark, P.C., Attorneys and Counselors at Law for specific application to this project, in accordance with generally accepted environmental engineering practices. No other warranty, expressed or implied, is made. In the event that changes in the nature, usage, or layout of the existing site and nearby properties are made, some conclusions and recommendations contained in this report may not be considered valid.

2.0 SITE CONDITIONS

The Ruth property is located north of Franklin Boulevard, adjacent to and west of the point where the Millrace crosses Franklin Boulevard (Plate 2). The University of Oregon campus is located south (across Franklin Boulevard) of the subject site. The property is generally flat-lying and is covered entirely by

structures or asphalt pavement. The large building located near the east end of the property is currently being used for retail and commercial businesses including a bookstore and an auto repair shop.

Properties to the east and west of the subject site are dominated by small commercial properties. The University of Oregon is located south of the site, and industrial properties and undeveloped land are located north of the site. The property adjacent to and north of the subject site is owned by the Southern Pacific Railroad, and a mainline railroad track is present on the property. The Willamette River is located approximately 750 feet north of the property. Based upon local physiography, the groundwater gradient at the subject site can be inferred to dip to the north-northwest.

2.1 Climate

The southern Willamette Valley has a modified marine climate with a mean annual precipitation rate at Eugene of 46 inches, 70% of which falls as rain between October and May. The average temperature in January, the coldest month, is above freezing at 39°F, and the average temperature in July, the hottest month, is 67°F.

2.2 Regional Geology

The general near-surface geology of the site has been mapped as unconsolidated Older Quaternary Alluvium (Qoal) by Frank, 1973. The Qoal is described as largely sand and gravel with mixtures of sand, silt, and clay. A log for a water supply well drilled approximately 2,500 feet northwest of the subject site indicates a thickness of the Qoal of 26 feet.

The Qoal represents ancestral Willamette River alluvial deposits consisting of lenses of lithic sand and gravel, interspersed with fine sand and silt. The permeability of the unit is generally high, but it can be extremely variable due to the discontinuous nature of the sand and gravel lenses within the unit.

The Qoal lies on an erosional surface of the Oligocene Eugene Formation. The Eugene Formation consists of fine- to coarse-grained micaceous, arkosic sandstone. The Eugene Formation was not encountered during our subsurface investigation at the site.

2.3 Regional Hydrogeology

The primary aquifers in the Eugene area are the Eugene Formation and older alluvial deposits. Both aquifers provide limited supplies of groundwater. The older alluvial deposits comprise the most productive aquifer,

but the capacity of wells drawing water is limited because the formation is thin. The Eugene Formation, which consists of cemented sandstone is a low-yielding aquifer.

3.0 SITE HISTORY

The site history was documented through a review of deeds, aerial photographs, and Sanborn Fire Insurance Maps by Fetrow Engineering, Inc. (FEI), Eugene, Oregon. The site history was compiled as part of a Level I and Level II Environmental Site Assessment.

According to FEI's report (dated May 17, 1990) the property came into the possession of the Ruth Family in 1944. Prior to 1944, the property was owned by the Eugene Sand and Gravel Company and was not developed. Development of the property first occurred between 1944 and 1952, when the building still utilized at the property was constructed. Sanborn Fire Insurance Maps indicate that the building and property were being utilized for the sale and service of trucks. FEI's report did not indicate that any changes to the existing site building were made from 1952 to present.

4.0 SUBSURFACE EXPLORATION AND CONDITIONS

The purpose of the subsurface investigation was to determine if there were evidence of subsurface soil and/or groundwater contamination at the property. Since it was not known if USTs were ever utilized at the property, areas considered to be the most likely former locations of USTs were explored. Borings RZA-1, RZA-2, RZA-3, and RZA-4 were drilled in areas considered to be likely former locations for USTs. In addition, two shallow soil borings were drilled near the western margin of the property in order to explore for the presence of petroleum hydrocarbon compounds detected in shallow site soils by FEI, and to better identify the types of hydrocarbons present.

4.1 Exploratory Methods

Our field explorations were carried out March 10, 1993. The investigation consisted of drilling three deep (20 foot) and three shallow (three to five foot) borings. Crisman Drilling, Tigard, Oregon provided drilling services for the project. The hollow-stem augers used during drilling of the borings had an inside diameter of four-inches. All drill cuttings were placed in 55-gallon drums which were labeled and are currently being stored on the north side of the building (Plate 2).

Soil samples were collected at five foot intervals from each boring while drilling. The samples were obtained using a split-spoon sampler, and standard penetration test sampling techniques. This sampling, combined

with the logging of drilling character, provided the basis of our geologic characterization of the site. Geologic boring logs showing sampling intervals and providing a graphic representation of the subsurface geology of the subject site, are provided in Appendix A.

Samples were observed and classified in the field by a geologist from our firm. Representative portions of each sample were collected, placed in air-tight, laboratory prepared Teflon-sealed containers, and were returned to RZA's in-house laboratory in Portland, Oregon. Laboratory reports and chain-of-custody records are provided in Appendix B.

Petroleum-like odors were not detected during drilling. The detection of petroleum-like odors is dependent on the olfactory sensitivity of the person classifying the sample, as well as on other factors, including air and sample temperature, wind velocity, the length of time the sample is out of the boring, product type, and the degree of product degradation. Because these constraints are not readily quantifiable, and no test standards exist, the detection of petroleum-like odors during drilling should be considered subjective information.

Each soil sample was screened for volatile organic compounds using a Photovac Microtip photoionization detector (PID). The concentrations obtained with the PID are included on the boring logs (Appendix A). The volatiles were measured by head-space methods, i.e. soils at specific intervals from the borings were placed in air-tight bags, and the probe end of the instrument was inserted through a small slit in the bag to measure the relative concentrations of volatile organic compound vapors present in the bag headspace.

Groundwater grab samples were collected from each of the three deep borings. The hollow-stem auger was then pulled back two to three feet to allow groundwater to enter the boring. Approximately three gallons of groundwater were purged from borings RZA-1 and RZA-2 prior to groundwater sampling. Due to poor recharge and very high turbidity in boring RZA-3, only 0.5 gallons of groundwater were purged prior to sampling. Purge water from the borings was mixed with drill cuttings in 55-gallon drums.

Groundwater samples collected for aromatic and halogenated volatile organic compound (AVOC and HVOC) analyses were placed in 40 milliliter glass VOA containers sealed with Teflon septa. Groundwater samples collected for polynuclear aromatic hydrocarbon (PAH) analysis were placed in one-liter bottles with Teflon caps. The groundwater samples were placed expeditiously on-ice, and were transported to RZA's

Portland office. All AVOC and HVOC analyses were conducted in RZA's in-house laboratory. PAH analyses were conducted by Pacific Environmental Laboratory Inc., Beaverton, Oregon.

4.2 Subsurface Conditions

4.2.1 Non-native Fill - Three types of non-native fill were encountered during our drilling at the site. Near the western margins of the site (boring RZA-5 and RZA-6), fill material underlying base course gravels consist of very dense, sandy gravel fill. The drill rig was unable to advance borings RZA-5 and RZA-6 beyond a depth of three feet in the fill material.

Borings RZA-2, RZA-3, and RZA-4 encountered a very stiff to hard, gravelly, sandy silt to silty sand fill. The fill material has a thickness of approximately seven feet at boring locations RZA-2 and RZA-3. The base of the fill material was not encountered in boring RZA-4.

Fill material encountered at boring location RZA-1A and RZA-1B consist of silty sand and gravel. A large concrete or rock obstruction was encountered in the fill material at a depth of seven feet in boring RZA-1A. After moving the boring location 8.5 feet to the southeast, we were able to advance the boring (RZA-1B) to a depth of 20 feet. The thickness of the fill material at RZA-1B is approximately five feet.

4.2.2 Native Soils - Native soils were first encountered at depths ranging from five to seven feet below grade. In borings RZA-1 and RZA-2 fine-grained sediments (silty clay to clayey silt) were encountered directly below the fill material. The fine-grained sediments were absent at the location of boring RZA-3. Sandy gravels were encountered in all three borings at depths ranging from eight feet in boring RZA-3 to 16 feet in boring RZA-1B.

4.2.3 Field Volatile Screening - Hydrocarbon-like odors were not detected during drilling at the site. Elevated volatile organic compound vapor concentrations were detected only in boring RZA-5. The concentration measured in the sample collected from boring RZA-5 was 17.2 parts per million.

4.2.4 Groundwater - Groundwater was encountered at a depth of approximately 17 feet in borings RZA-1B and RZA-2, and at a depth of approximately 14 feet in boring RZA-3. The groundwater gradient across the site is inferred to be to the northwest based upon local physiography and our understanding of local hydrogeology.

4.3 Ground Penetrating Radar Survey

A GPR survey was performed at the site on March 28, 1993 by Northwest Geophysical Associates, Inc. (NGA), Corvallis, Oregon. No GPR reflections which might be interpreted as a UST were identified during the survey. The final report provided by NGA has been included in Appendix C.

5.0 QUANTITATIVE CHEMICAL ANALYSES

A minimum of one soil sample from each boring was evaluated for the presence of fuel hydrocarbons by EPA Method 8015 (modified) or ODEQ Method TPH-HCID. Each groundwater sample was analyzed by EPA Method 8020, and selected groundwater samples were also analyzed by EPA Method 8010 and EPA Method 8270.

5.1 Soil Analyses

The results of soils testing are discussed briefly in Sections 5.1.1 through 5.1.3 below, and have been summarized in Table 1. Laboratory reports and chain-of-custody documents have been included in Appendix B.

5.1.1 Fuel Hydrocarbons (EPA 8015 [modified], soil) - A total of four soil samples, one each from the shallow soil borings and one sample from boring RZA-3, were analyzed for fuel hydrocarbons by EPA Method 8015 (modified). This analytical method distinguishes between gasoline, diesel, and heavy oil, and provides quantification of each fuel type using gas chromatography. The soil sample collected from boring RZA-4 indicated fuel hydrocarbon concentrations below detection limits. Soil samples collected from borings RZA-3, RZA-5, and RZA-6 contained non-gasoline fraction hydrocarbons, and soil samples from RZA-3 and RZA-5 contained low levels (<20 mg/kg) of gasoline.

5.1.2 Hydrocarbon Identification (ODEQ TPH-HCID, soil) - A total of three soil samples, one from each of the deep soil boring, were analyzed for fuel hydrocarbons by ODEQ Method TPH-HCID. This analytical method distinguishes between gasoline, diesel, and heavy oil, but does not provide quantification of each fuel type. The method uses gas chromatography with a flame ionization detector (FID). Soil samples collected from borings RZA-1 and RZA-2 indicated fuel hydrocarbon concentrations below detection limits. All three types of fuel hydrocarbons were detected in a soil sample collected at a depth of five feet in boring RZA-3.

5.2 Groundwater Analyses

The results of groundwater testing are discussed briefly in Sections 5.2.1 through 5.2.3 below, and are summarized in Table 2. Laboratory reports and chain-of-custody documents have been included in Appendix B.

5.2.1 Aromatic Volatile Organic Compounds (EPA 8020, water) - Groundwater from each of the three deep soil borings was analyzed for aromatic volatile organic compounds (AVOCs). All three groundwater samples and a sample duplicate (RZA4-A) indicated AVOC concentrations below detection limits.

5.2.2 Halogenated Volatile Organic Compounds (EPA 8010, water) - Two groundwater samples, one each from borings RZA-1 and RZA-3, were analyzed for HVOCs. Both groundwater samples indicated HVOC concentrations below detection limits.

5.2.3 Polynuclear Aromatic Hydrocarbons (EPA 8270, water) - A single groundwater sample collected from boring RZA-3 was analyzed for PAHs. Boring RZA-3 was selected for PAH analysis because it was the closest boring to the suspected location of an on-site fuel oil tank. The groundwater sample indicated PAH concentrations below detection limits, with the exception of napthalene, which was detected at a concentration of 0.13 µg/l.

6.0 STATE OF OREGON SOIL AND GROUNDWATER CLEANUP GUIDELINES

Petroleum hydrocarbon contamination in soils impacted by releases from UST systems, is typically regulated with numeric cleanup standards by the ODEQ. There is no direct evidence that any of the petroleum hydrocarbons detected during our investigation reflect releases from a UST system. Therefore, the application of the ODEQ standards in this case may be a matter of personal choice.

6.1 UST Cleanup Program Guidelines

6.1.1 Groundwater - During the Spring of 1992, the State of Oregon adopted into law, basic numeric groundwater cleanup levels for seven chemical constituents (benzene, toluene, ethylbenzene, xylene, lead, EDB and EDC) associated with gasoline or gasoline products. The cleanup levels established (OAR 340-122-242[4]) are as follows:

Constituent	Numeric Cleanup Level
Benzene	5.0 μg/l
Ethylbenzene	700 μg/l
Toluene	1,000 μg/l
Xylenes	10,000 μg/l
Lead	5 μg/l
EDB	1 μg/l
EDC	5 μg/l

ODEQ program managers have reported to RZA that as a matter of policy, ODEQ requires cleanup of BTEX constituents where they exceed BNGCLs. Lead, EDB and EDC will have to be monitored quarterly where concentrations exceed BNGCLs, but their remediation will not necessarily be required.

Thirteen carcinogenic and non-carcinogenic PAHs, typically associated with diesel product, also have been assigned numeric cleanup values. ODEQ has reported to RZA that their presence in groundwater will have to be monitored quarterly, but there is no plan at this time to require their remediation. A single groundwater sample collected from soil boring RZA-3 indicated the presence of a single non-carcinogenic PAH compound (napthalene) in site groundwater at a very low level (<1 ug/l). The basic groundwater numeric cleanup level for napthalene is 28 μg/l.

6.1.2 Soil Cleanup - In cases where soils have been impacted by contaminant releases of petroleum from underground storage tank systems, and contamination is neither extensive nor includes groundwater, soil cleanup levels can be determined by evaluating site specific parameters, as provided by Oregon Administrative Rules (OAR) 340-122-305 to 340-122-360. The five parameters provided in OAR 340-122-330 (1)-(5) are: 1) depth to groundwater, 2) mean annual precipitation, 3) soil type, 4) sensitivity of the uppermost aquifer, and 5) potential receptors. Based on data presented above, the Laurita Ruth property site matrix score would be as follows:

1) **Depth to groundwater**
Static groundwater levels in well points are approximately 14 to 17 feet below the ground surface. Groundwater levels of less than 25 feet in depth score a **"10"**.

2) **Mean annual precipitation**
Based on climatological data for the Eugene area, the mean annual precipitation is 46 inches. This results in a score of **"10"**.

3) **Soil type**
Based on the soil type containing the first aquifer, a sandy gravel, we assign a moderate rating of **"10"**.

4) Sensitivity of the uppermost aquifer
In the area of the project site the aquifer is not utilized for drinking water, but the quality is such that it could be used. This results in a score of "4".

5) Potential Receptors

(a) Based on the distance to the nearest well, and taking into account the regional and local groundwater migration direction and gradient, the distance descriptor would be considered "near".

(b) The number of people at risk, based on population of the area within 3 miles of the site would be deemed to be "many".

(c) The combination of these two factors would give the subject site a score of "10".

Matrix Score
1 >40
2 25-40
3 <25

The total score for the subject property would be 44, and Level 1 Numeric Soil Clean-up Standards would therefore apply. This would require site soils to be cleaned up to a 40 ppm standard for gasoline, as referenced to ODEQ Method TPH-G. It would also require site soils to be remediated to a 100 ppm standard for diesel and/or heavy oil contamination, as referenced to ODEQ Method TPH-D or EPA Method 418.1 (modified).

7.0 CONCLUSIONS

Based upon the results of field and laboratory testing, it appears that groundwater at the site has not been impacted by AVOC or HVOC constituents. Although napthalene was detected in groundwater, the concentration measured was near detection limits and well below basic numeric groundwater cleanup level.

Laboratory testing of very shallow site soils has indicated the presence of gasoline at a low concentration. Diesel and heavy oil concentrations also were found to be present in shallow soils, and are more widespread. There is no direct evidence that these shallow soils have been impacted from a release from a UST system, and contaminant concentrations may reflect years of road oiling over the site. The areas with elevated concentrations of petroleum hydrocarbons in shallow soils include the western margins of the property (near borings RZA-5 and RZA-6), and the area of boring RZA-3. Because there is no direct evidence of a release from a UST system, the application of soil numeric cleanup standards at this site are a matter of personal choice.

USTs were not identified through a geophysical survey of the portion of the site near the west end of the large on-site building.

Based upon the results of our subsurface assessment of the subject property, we recommend no further investigations at this time.

We are pleased to have had the opportunity to serve you on this project. If you have any questions or desire further information, please feel free to contact the undersigned.

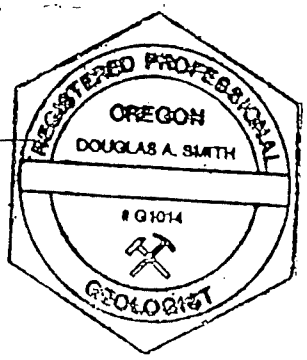
RZA AGRA, Inc.

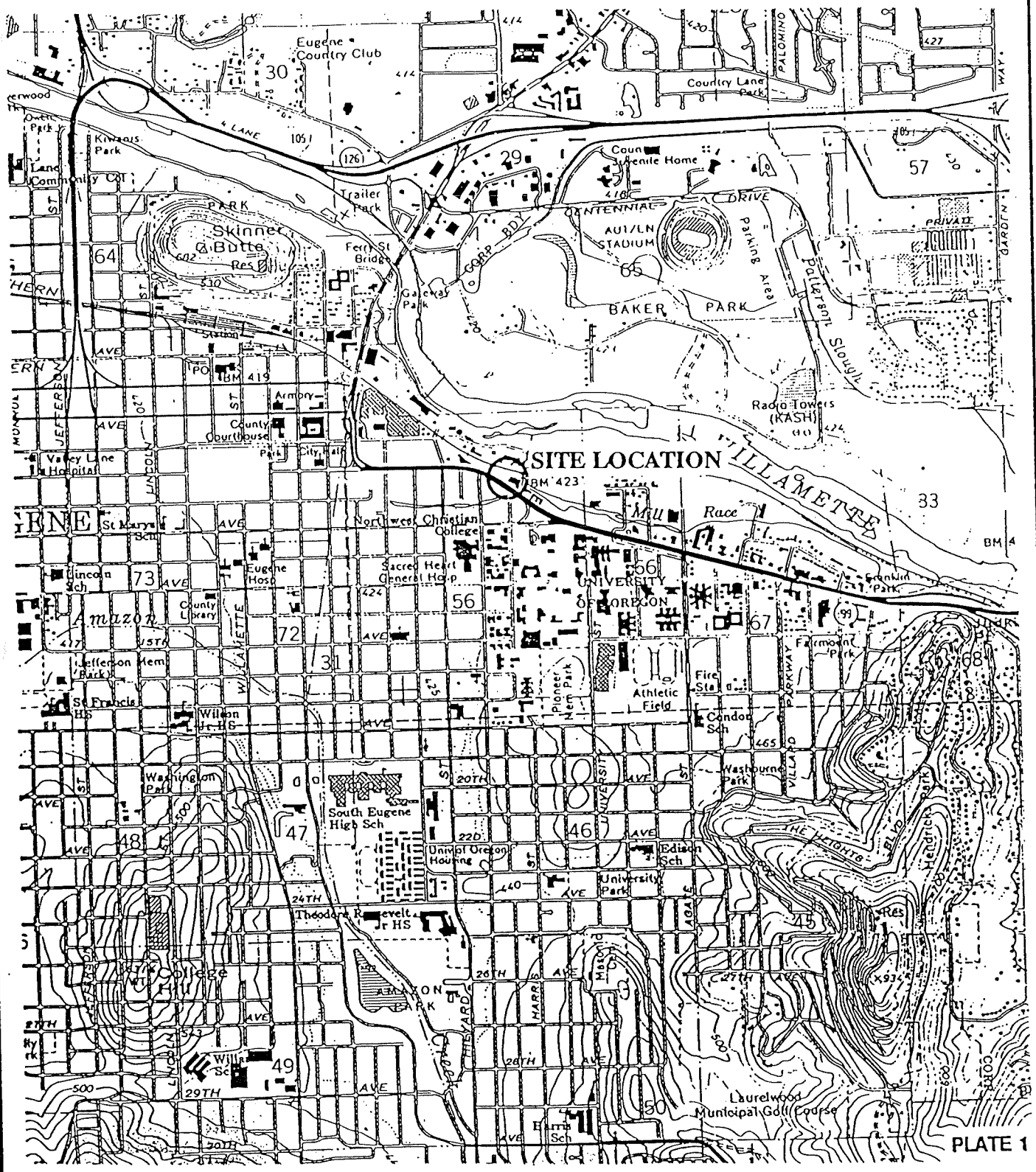
J. C. Farris / for

Leonard C. Farr Jr., Engineering/Science Staff II

Douglas Smith

Douglas A. Smith, P.G., Associate Geologist



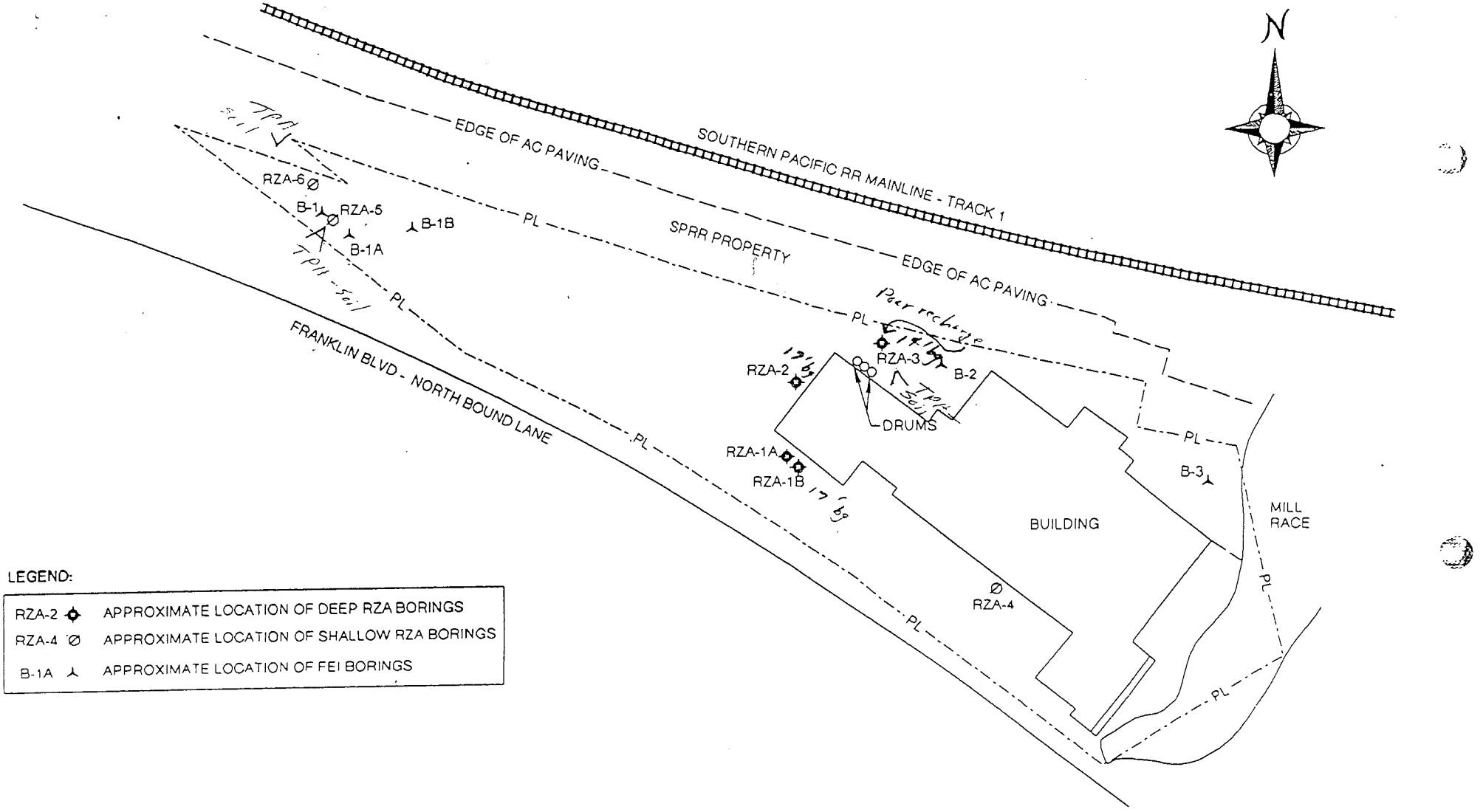


RZA AGRA	W.O. 10-6286
ENGINEERING & ENVIRONMENTAL SERVICES	DESIGN L.C.F
7477 S.W. Tech Center Dr.	DRAWN L.C.F.
Portland, Oregon 97223-8024	DATE 4-2-93
Phone (503) 639-3400 Fax (503) 620-7892	SCALE 1"=2000'

SITE VICINITY MAP
LAURITA RUTH PROPERTY
901-933 FRANKLIN BOULEVARD
EUGENE, OREGON

INTERNAL USE ONLY - FILE NAME:

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LEGEND:

RZA-2 ⊙	APPROXIMATE LOCATION OF DEEP RZA BORINGS
RZA-4 ⌀	APPROXIMATE LOCATION OF SHALLOW RZA BORINGS
B-1A ⅄	APPROXIMATE LOCATION OF FEI BORINGS

60 30 0 60 120FT

PLATE 2

RZA AGRA, Inc.
(Formerly Rittenhouse-Zemaitis & Associates, Inc.)
ENGINEERING & ENVIRONMENTAL SERVICES
7477 S.W. Tech Center Drive
Portland, Oregon 97223-8024
Phone (503) 639-3400 Fax (503) 620-7892

W.O.	106286-00
DESIGN	LF
DRAWN	ML
DATE	4/16/93
SCALE	NOTED

CAD FILE NAME: BORINGS.DGN

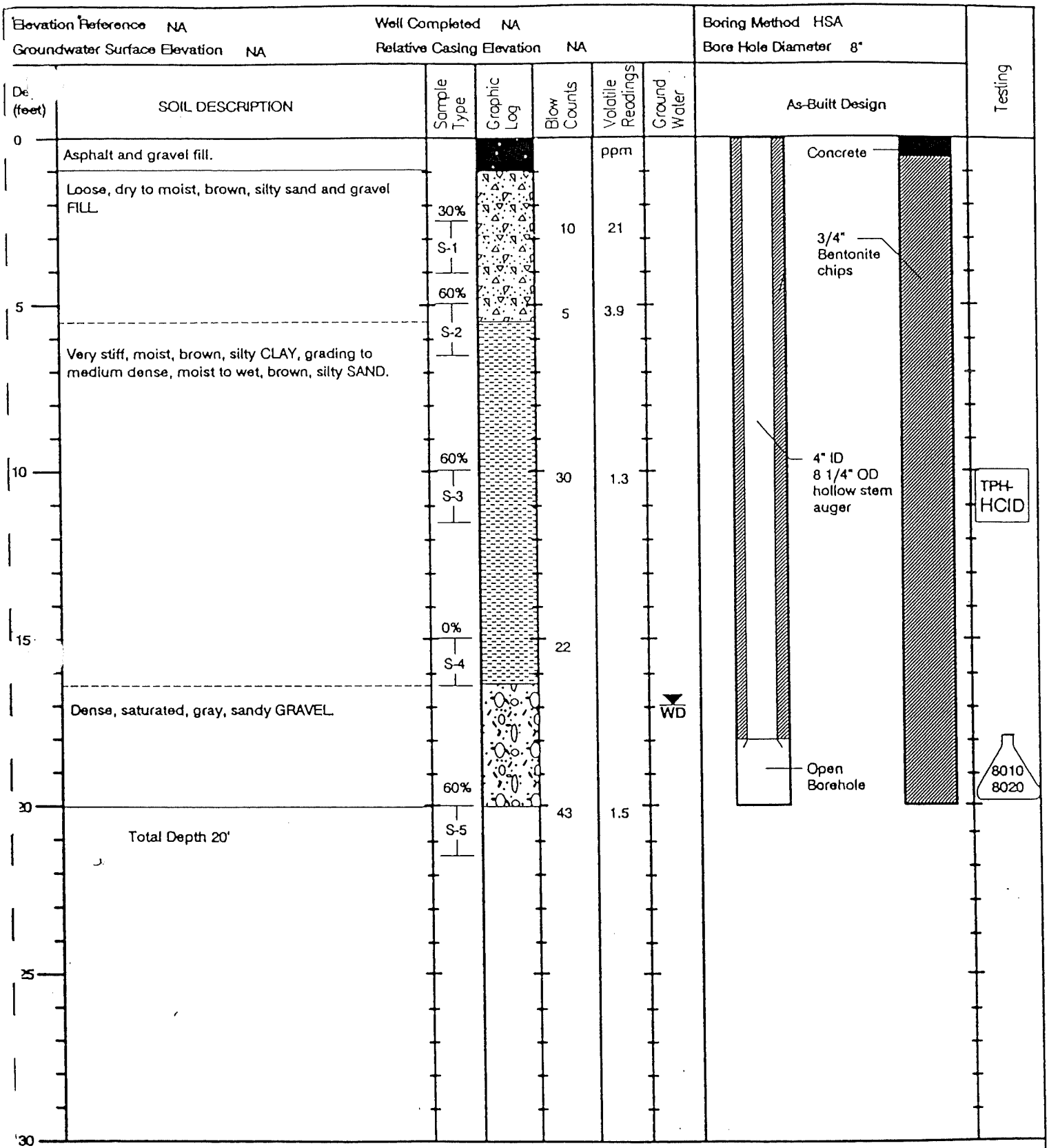
SITE PLAN
LAURITA RUTH PROPERTY
901 - 903 FRANKLIN BLVD
EUGENE, OREGON

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PROJECT LAURITA RUTH PROPERTY START CARD NO. 52694 BORING NO. RZA-1B

Elevation Reference NA | Well Completed NA | Boring Method HSA

Groundwater Surface Elevation NA | Relative Casing Elevation NA | Bore Hole Diameter 8"



LEGEND

- 2-inch O.D. split-spoon sample with % recovered
- WD — Observed groundwater level (WD = While drilling)
- SW — Observed static groundwater level
- Groundwater Analysis (EPA Method Shown)
- 8015 / 8240 — Soil Analysis (EPA Method Shown)

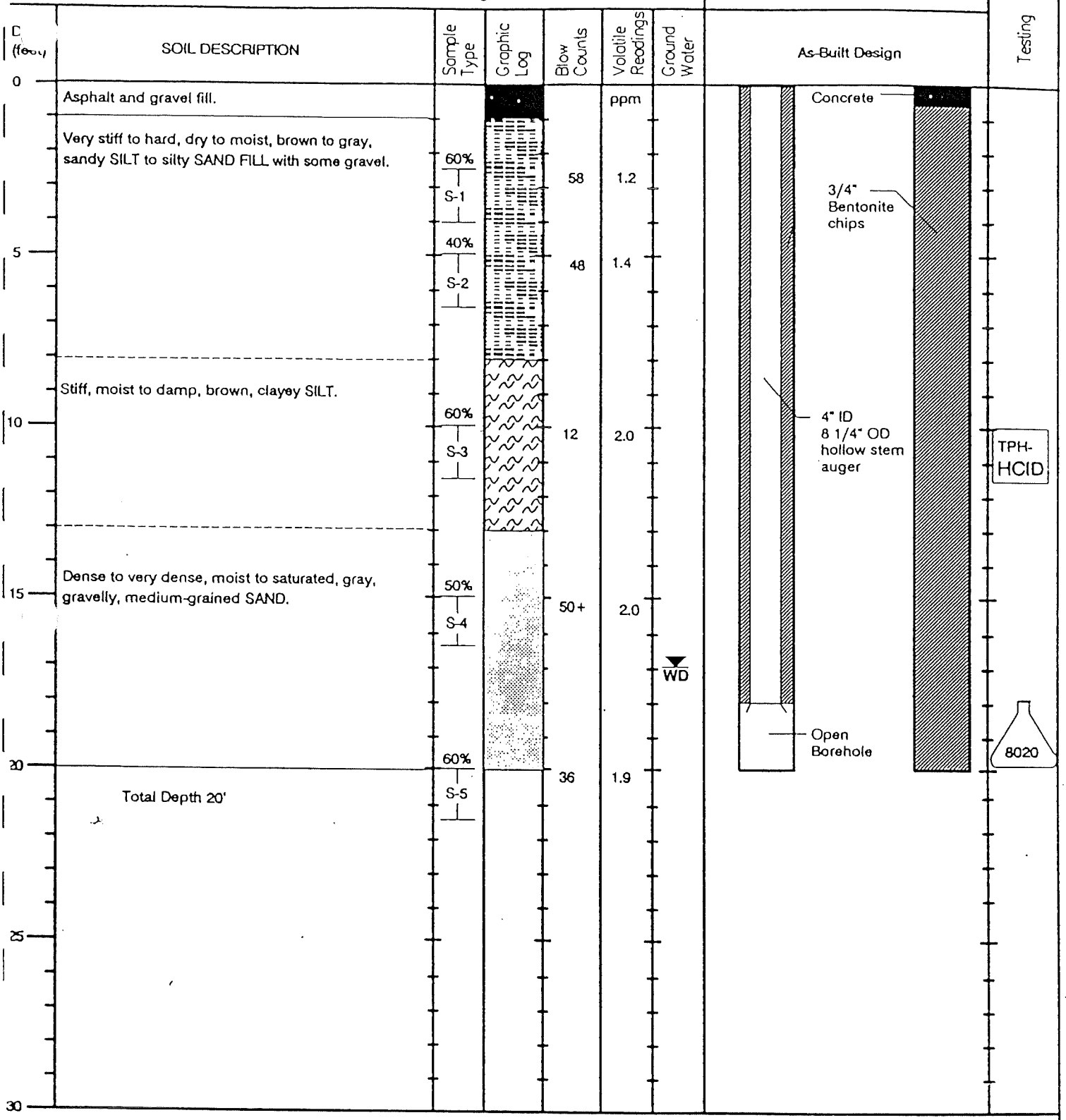
10-6286 LAURITA RUTH PROPERTY
901-933 FRANKLIN RD.
EUGENE, OREGON

RZA AGRA, Inc.
7477 SW Tech Center Drive
Portland, Oregon 97223-8024
Phone (503) 639-3400

PROJECT LAURITA RUTH PROPERTY START CARD NO. 52695 BORING NO. RZA - 2

Elevation Reference NA | Well Completed NA | Boring Method HSA

Groundwater Surface Elevation NA | Relative Casing Elevation NA | Bore Hole Diameter 8"



LEGEND

- 2-Inch O.D. split-spoon sample with % recovered
- WD — Observed groundwater level (WD = While drilling)
- SW — Observed static groundwater level
- Groundwater Analysis (EPA Method Shown)
- 8015 / 8240 — Soil Analysis (EPA Method Shown)

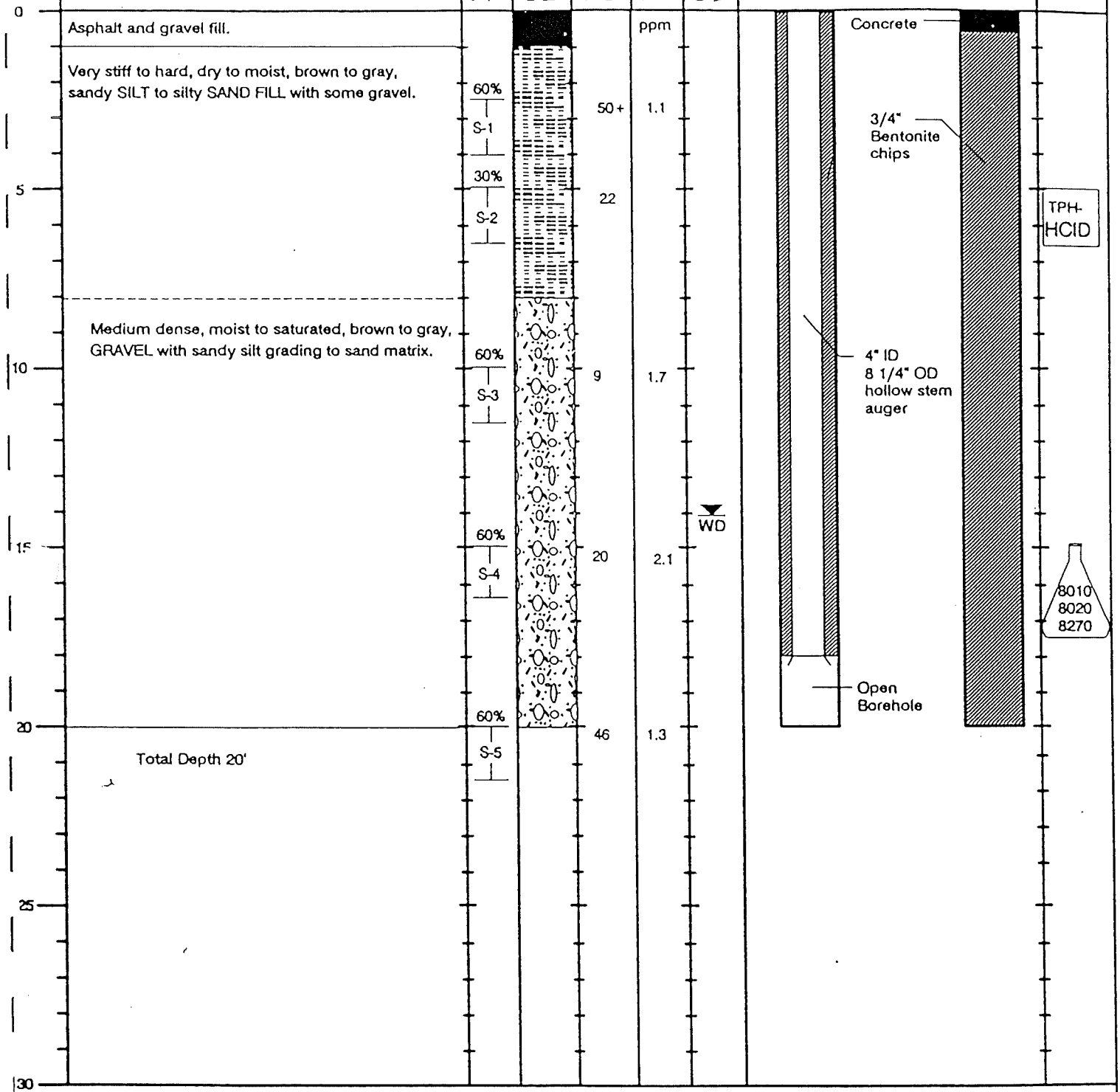
10-6286 LAURITA RUTH PROPERTY
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Phone (503) 639-3400

PROJECT LAURITA RUTH PROPERTY START CARD NO. 52696 BORING NO. RZA - 3

Elevation Reference NA | Well Completed NA | Boring Method HSA

Groundwater Surface Elevation NA | Relative Casing Elevation NA | Bore Hole Diameter 8"



LEGEND

- 2-Inch O.D. split-spoon sample with % recovered
- WD — Observed groundwater level (WD = While drilling)
- SW — Observed static groundwater level
- Groundwater Analysis (EPA Method Shown)
- 8016 / 8240 — Soil Analysis (EPA Method Shown)

10-6286 LAURITA RUTH PROPERTY
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EUGENE, OREGON

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Portland, Oregon 97223-8024
Phone (503) 639-3400

ROJECT LAURITA RUTH PROPERTY START CARD NO. NA BORING NO. RZA - 4

Elevation Reference NA
Groundwater Surface Elevation NA
Well Completed NA
Relative Casing Elevation NA
Boring Method HSA
Bore Hole Diameter 8"

Dep (feet)	SOIL DESCRIPTION	Sample Type	Graphic Log	Blow Counts	Volatile Readings	Ground Water	As-Built Design	Testing
1	Asphalt and gravel fill.				ppm		Concrete	
	Very stiff to hard, dry to moist, brown to gray, sandy SILT to silty SAND FILL with some gravel.						3/4" Bentonite chips	
		60%						
5	End of boring 5'	S-1		30	2.2			8015
10								
15								
5								
10								

LEGEND

- 2-inch O.D. split-spoon sample with % recovered
- WD — Observed groundwater level (WD = While drilling)
- SW — Observed static groundwater level
- Groundwater Analysis (EPA Method Shown)
- 8015 / 8240 — Soil Analysis (EPA Method Shown)

10-6286 LAURITA RUTH PROPERTY
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PROJECT LAURITA RUTH PROPERTY START CARD NO. NA BORING NO. RZA - 5

Elevation Reference NA | Well Completed NA | Boring Method HSA

Groundwater Surface Elevation NA | Relative Casing Elevation NA | Bore Hole Diameter 8"

De (feet)	SOIL DESCRIPTION	Sample Type	Graphic Log	Blow Counts	Volatile Readings	Ground Water	As-Built Design	Testing
0	Asphalt and gravel fill.				ppm		Concrete	
	Very dense, moist, gray, sandy gravel FILL with some large cobbles.						3/4" Bentonite chips	8015
	End of boring 3'	GRAB		50+	17.2			
5								
10								
15								
0								
5								
30								

LEGEND

- 2-inch O.D. split-spoon sample with % recovered
- WD — Observed groundwater level (WD = While drilling)
- SW — Observed static groundwater level
- Groundwater Analysis (EPA Method Shown)
- 8015 / 8240 — Soil Analysis (EPA Method Shown)

10-6286 LAURITA RUTH PROPERTY
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ROJECT LAURITA RUTH PROPERTY

START CARD NO. NA

BORING NO. RZA-6

Elevation Reference NA

Groundwater Surface Elevation NA

Well Completed NA

Relative Casing Elevation NA

Boring Method HSA

Bore Hole Diameter 8"

Depth (feet)	SOIL DESCRIPTION	Sample Type	Graphic Log	Blow Counts	Volatile Readings	Ground Water	As-Built Design	Testing
1	Asphalt and gravel fill.				ppm		Concrete	
	Very dense, moist, gray, sandy gravel FILL with some large cobbles.						3/4" Bentonite chips	8015
	End of boring 3'	GRAB		50+	1.5			
5								
10								
15								
20								
25								
30								

LEGEND

- 2-inch O.D. split-spoon sample with % recovered
- WD — Observed groundwater level (WD = While drilling)
- SW — Observed static groundwater level
- Groundwater Analysis (EPA Method Shown)
- 8015 / 8240 — Soil Analysis (EPA Method Shown)

10-6286 LAURITA RUTH PROPERTY
901-933 FRANKLIN RD.
EUGENE, OREGON

RZA AGRA, Inc.
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Phone (503) 639-3400

Drilling Started

Drilling Completed

Logged By J. FARR

Appendix B

Laboratory Test Results
Chain-of-Custody Records

RZA AGRA, Inc.

Formerly: Rittenhouse-Zeman & Associates, Inc.)
Engineering & Environmental Services

7477 SW Tech Center Drive
Portland, Oregon 97223-8024
(503) 639-3400
FAX (503) 620-7892

Report Date: March 29, 1993
Lab Report #: 4538 bh/jv
Attn: Len Farr

Project Number: 6286
Client: Williams, Fredrickson Stark, & Weisensee
Item: 3 Soil Samples

ANALYSIS
METHOD: HCID
Results in mg/kg (ppm)

	RZA2-S3	RZA2-S3 Duplicate	*RZA2-S3 Spike	% Spike Recovery
(C4-C10) Gasoline Range	<10.0	<10.0	<10.0	-
(C11-C24) Diesel Range	<25.0	<25.0	39.9	79.9
(C25-C35) Heavy Oil Range	<250	<250	<250	-
Sample Date:	3/10	3/10	3/10	
Analysis Date:	3/22	3/22	3/22	
Surrogate Recovery:				
o-Terphenyl:	124%	124%	106%	
a,a,a - Trifluorotoluene:	84.7%	83.5%	71.2%	

	RZA3-S2	RZA1-S3	Blank	Detection Limit
(C4-C10) Gasoline Range	Positive I.D.	<10.0	<10.0	10.0
(C11-C24) Diesel Range	Positive I.D.	<25.0	<25.0	25.0
(C25-C35) Heavy Oil Range	Positive I.D.	<250	<250	250
Sample Date:	3/10	3/10		
Analysis Date:	3/22	3/22	3/22	
Surrogate Recovery:				Control Limits
o-Terphenyl:	139%	130%		50% - 150%
a,a,a - Trifluorotoluene:	92.2%	89.8%		

*Spiked with 50 ppm diesel.

pectfully submitted,

RZA AGRA, INC.

Brian Tong, Chemist

AGRA
Earth & Environmental Group

RZA AGRA, Inc.

Formerly: Rittenhouse-Zeman & Associates, Inc.)
Engineering & Environmental Services

7477 SW Tech Center Drive
Portland, Oregon 97223-8024
(503) 639-3400
FAX (503) 620-7892

Report Date: March 29, 1993
Lab Report #: 4541 bh/jv
Attn: Len Farr

Project Number: 6286
Client: Williams, Fredrickson, Stark, & Weisensee
Item: 3 Soil Samples

ANALYSIS
METHOD: Modified 8015
Results in mg/kg (ppm)

	RZA5-S1	RZA6-S1	RZA4-S1	Blank	Detection Limit
(C4-C10) Gasoline Range	16.4	<10.0	<10.0	<10.0	10.0
(C11-C24) Diesel Range	61.5	29.1	<25.0**	<25.0	25.0
(C25-C35) Heavy Oil Range	>250	>250	<250	<250	250
Sample Date:	3/10	3/10	3/10		
Analysis Date:	3/22	3/22	3/22	3/22	
Surrogate Recovery:					
o-Terphenyl:	160%*	137%	141%*	50 - 150 C/L	
a,a,a - Trifluorotoluene:	93.9%	86.3%	89.9%		

*The presence of target and nontarget peaks within the retention time window of the surrogate caused elevated recovery of o-Terphenyl.

**Low levels of diesel might be present in the sample.

Respectfully submitted,

RZA AGRA, INC.

Brian Hong, Chemist

Reviewed by: SL

RZA AGRA, Inc.

(Formerly: Rittenhouse-Zeman & Associates, Inc.)
Engineering & Environmental Services

7477 SW Tech Center Drive
Portland, Oregon 97223-8024
(503) 639-3400
FAX (503) 620-7892

Report Date: April 1, 1993
Lab Report #: 4556 bh/jv
Attn: Len Farr

Project Number: 6286
Client: Williams, Fredrickson, Stark, & Weisensee
Item: 1 Soil Sample

ANALYSIS
METHOD: Modified 8015
Results in mg/kg (ppm)

	RZA3-S2	Blank	Detection Limit
(C4-C10) Gasoline Range	13.4	<10.0	10.0
(C11-C24) Diesel Range	85.4	<25.0	25.0
(C25-C35) Heavy Oil Range	>250	<250	250
Sample Date:	3/10		
Analysis Date:	3/22	3/22	
Surrogate Recovery:			
o-Terphenyl:	139%		
a,a,a - Trifluorotoluene:	92.2%		

Respectfully submitted,

RZA AGRA, INC.

Brian Hong, Chemist

Reviewed by: _____

RZA AGRA, Inc.

(Formerly: Rittenhouse-Zeman & Associates, Inc.)
Engineering & Environmental Services

7477 SW Tech Center Drive
Portland, Oregon 97223-8024
(503) 639-3400
FAX (503) 620-7892

Report Date: March 16, 1993
Lab Report #: 4510 ce/jv
C.O.C. #: 3414
Attn: Len Farr

Project Number: 6286
Client: Williams, Fredrickson, Stark, & Weisensee
Item: 2 Water Samples

ANALYSIS
EPA Methods 8010/8020
Results in ug/l (ppb)

	RZA3-A	RZA1-A	Lab Blank	Detection Limit
Bromodichloromethane	nd	nd	nd	2.00
Bromoform	nd	nd	nd	2.00
Bromomethane	nd	nd	nd	10.0
Carbon Tetrachloride	nd	nd	nd	2.00
Chlorobenzene	nd	nd	nd	2.00
Chloroethane	nd	nd	nd	10.0
2-Chloroethylvinyl ether	nd	nd	nd	2.00
Chloroform	nd	nd	nd	2.00
Chloromethane	nd	nd	nd	10.0
Dibromochloromethane	nd	nd	nd	2.00
1,2-Dibromoethane	nd	nd	nd	2.00
1,2-Dichlorobenzene	nd	nd	nd	2.00
1,3-Dichlorobenzene	nd	nd	nd	2.00
1,4-Dichlorobenzene	nd	nd	nd	2.00
1,1-Dichloroethane	nd	nd	nd	2.00
1,2-Dichloroethane	nd	nd	nd	2.00
1,1-Dichloroethene	nd	nd	nd	2.00
T-1,2-Dichloroethene	nd	nd	nd	2.00
1,2-Dichloropropane	nd	nd	nd	2.00
C-1,3-Dichloropropene	nd	nd	nd	2.00
T-1,3-Dichloropropene	nd	nd	nd	2.00
Methylene Chloride	nd	nd	nd	5.00
1,1,2,2-Tetrachloroethane	nd	nd	nd	2.00
Tetrachloroethene (PCE)	nd	nd	nd	2.00
1,1,1-Trichloroethane (TCA)	nd	nd	nd	2.00
1,1,2-Trichloroethane	nd	nd	nd	2.00
Trichloroethene (TCE)	nd	nd	nd	2.00
Trichlorofluoromethane	nd	nd	nd	2.00
Vinyl Chloride	nd	nd	nd	5.00
Benzene	nd	nd	nd	2.00
Ethylbenzene	nd	nd	nd	2.00
Toluene	nd	nd	nd	4.00
m/p-Xylene	nd	nd	nd	2.00
o-Xylene	nd	nd	nd	2.00
Sample Date:	3/10	3/10		

AGRA
Earth & Environmental Group

ANALYSIS
EPA Methods 8010/8020

Surrogate Recoveries:

	RZA3-A	RZA1-A	Control Limits
Bromochloromethane:	80.5%	82.6%	72.7%-132%
1,4 - Dichlorobutane:	99.1%	95.8%	77.7%-123%
a,a,a - Trifluorotoluene:	99.6%	100%	51.4%-133%

nd = Not Detected

Respectfully submitted,

RZA AGRA, INC.

Catherine Egan

Catherine Egan, Chemist

Reviewed by:

RZA AGRA, Inc.

(Formerly: Rittenhouse-Zeman & Associates, Inc.)
Engineering & Environmental Services

7477 SW Tech Center Drive
Portland, Oregon 97223-8024
(503) 639-3400
FAX (503) 620-7892

Report Date: March 16, 1993
Lab Report #: 4508 ce/jv
C.O.C. #: 3414
Attn: Len Farr

Project Number: 6286
Client: Williams, Fredrickson, Stark, & Weisensee
Item: 2 Water Samples

ANALYSIS
EPA Method 8020
Results in ug/l (ppb)

	RZA2-A	RZA4-A	Lab Blank	Detection Limit
Benzene	nd	nd	nd	2.00
Ethylbenzene	nd	nd	nd	2.00
Toluene	nd	nd	nd	4.00
m/p-Xylene	nd	nd	nd	2.00
o-Xylene	nd	nd	nd	2.00
Chlorobenzene	nd	nd	nd	2.00
1,2-Dichlorobenzene	nd	nd	nd	2.00
1,3-Dichlorobenzene	nd	nd	nd	2.00
1,4-Dichlorobenzene	nd	nd	nd	2.00
Sample Date:	3/10	3/10		
Analysis Date:	3/12	3/12	3/12	**Control Limits**
Surrogate Recoveries:				
Bromochloromethane:	80.6%	82.9%		72.7%-132%
1,4-Dichlorobutane:	99.4%	99.0%		77.7%-123%
a,a,a-Trifluorotoluene:	101%	101%		51.4%-133%

Respectfully submitted,

RZA AGRA, INC.

Catherine Egan, Chemist

Reviewed by

AGRA
Earth & Environmental Group

PACIFIC
ENVIRONMENTAL
LABORATORY INC.

RECEIVED MAR 2 9 1993

March 22, 1993

RZA AGRA, Inc.
7477 S.W. Tech Center Drive
Portland, OR 97223-8024

Attn: Len Farr

Re: JOB #6286
PROJECT - FRANKLIN RD
PEL #93-0728

Enclosed is the lab report for your sample which was collected per chain-of-custody on March 10, 1993. The sample was received in our lab on March 12, 1993.

I. Sample Description

One Water Sample

The sample was received under a chain of custody.

The sample was received in a container consistent with EPA protocol.

II. Quality Control

No project specific QC was requested. In-house QC data is available upon request.

III. Analytical Results

Test methods may include minor modifications of published methods such as detection limits or parameter lists. Solid and waste samples are reported on an "as received" basis unless otherwise noted.

Compounds not detected are listed under results as ND.

Sincerely,

Howard Holmes
Project Manager

Robert R. May
Rob May
Project Manager

9405 S.W. Nimbus Ave. ■ Beaverton, OR 97005 ■ (503) 644-0660 ■ FAX # (503) 644-2202

METHOD: PAH's by EPA 8270-Modified GC/MS in SIM Mode. This method is equivalent to Method 8310 for Oregon UST Fuels Program, per Rick Gates, Oregon DEQ. Detection limits are from SIM analysis.

Results in ug/L (ppb)

Analyte	RZA3-A	Detection Limit
Acenaphthene	ND	0.10
Acenaphthylene	ND	0.10
Anthracene	ND	0.10
Benzo(a)anthracene	ND	0.10
Benzo(a)pyrene	ND	0.10
Benzo(b)fluoranthene	ND	0.10
Benzo(g,h,i)perylene	ND	0.10
Benzo(k)fluoranthene	ND	0.10
Chrysene	ND	0.10
Dibenzo(a,h)anthracene	ND	0.10
Fluoranthene	ND	0.10
Fluorene	ND	0.10
Indeno(1,2,3-cd)pyrene	ND	0.20
2-Methylnaphthalene	ND	0.10
Naphthalene	0.13	0.10
Phenanthrene	ND	0.10
Pyrene	ND	0.10
Date Prepped:	03/15/93	
Date Analyzed:	03/17/93	
Surrogate Recovery (%)		Control Limit
2-Fluorobiphenyl	94	43-116
Nitrobenzene-d5	103	35-114
p-Terphenyl-d14	104	33-141

METHOD: PAH's by EPA 8270-Modified GC/MS in SIM Mode. This method is equivalent to Method 8310 for Oregon UST Fuels Program, per Rick Gates, Oregon DEQ. Detection limits are from SIM analysis.

Results in ug/L (ppb)

Analyte	Method Blank	Detection Limit
Acenaphthene	ND	0.10
Acenaphthylene	ND	0.10
Anthracene	ND	0.10
Benzo(a)anthracene	ND	0.10
Benzo(a)pyrene	ND	0.10
Benzo(b)fluoranthene	ND	0.10
Benzo(g,h,i)perylene	ND	0.10
Benzo(k)fluoranthene	ND	0.10
Chrysene	ND	0.10
Dibenzo(a,h)anthracene	ND	0.10
Fluoranthene	ND	0.10
Fluorene	ND	0.10
Indeno(1,2,3-cd)pyrene	ND	0.20
2-Methylnaphthalene	ND	0.10
Naphthalene	ND	0.10
Phenanthrene	ND	0.10
Pyrene	ND	0.10

RITTENHOUSE-ZEMAN & ASSOCIATES, INC.
EARTH & ENVIRONMENTAL CONSULTANTS

7409 S.W. Tech Center Drive, Suite
Portland, Oregon 97223-8024
(503) 639-3400 FAX: (503) 620-7892

3414 CHAIN-OF-CUSTODY RECORD / LABORATORY ANALYSES REQUEST

PROJECT: Franklin Rd JOB #: 6286
CLIENT: Williams et al
PROJ. MANAGER: Len Farr PHONE #: 639-3400
SITE ADDRESS: 901-933 Franklin Blvd
SAMPLER'S NAME: Len Farr PHONE #:
SAMPLER'S SIGNATURE: Len Farr

ANALYSIS REQUESTED: (Circle, Check Box, or Write Preferred Method in Box) OTHER: (Write In)

SAMPLE ID #	DATE	TIME	PRESERV.	MATRIX	Halogenated Volatiles EPA 601 (EPA 8010)	Aromatics (BTXE) EPA 602 (EPA 8020)	Fuel Scan/TPH by GC EPA 602-mod (8015-mod)	Volatile Organ. Compnds	GC Fingerprint	Penta/tetra-chlorophenol EPA 604 8040	Tot. Petrol. Hydrocarbons EPA 413.1, 418.1 / TLC	Total Metals ICP AA Other	EP-TOX Metals	Purgeable Organics EPA 624 8240	Base/Neut. Acids EPA 625 (8270)	pH Cond. Alk Color	NO3/NO2 N-NO3 NH3-N	Ca Mg Na K Fe Cl SO4	TOX TOC TDS COD	TPH-HCID			# of Containers	Sample Preparation	Detection Limits Desired
1. RZA2-33	3-10-93	10:45	4°C	Soil																X			2		
2. RZA3-32		12:35																		X			1		
3. RZA5-31		14:30					X																2		
4. RZA6-31		15:05					X																2		
5. RZA4-31		15:30					X																1		
6. RZA1-33		17:05																		X			2		
7. RZA2-A		11:30		Water		X									PEL								3		
8. RZA3-A		13:20			X	X																	5		
9. RZA1-A		18:00			X	X																	2		
10. RZA4-A		15:45				X																	2		

RELINQUISHED BY RZA:	RELINQUISHED BY:	RELINQUISHED BY:
Signature: Len Farr	Signature:	Signature:
Printed Name: Len Farr	Printed Name:	Printed Name:
Firm: RZA AGRA	Firm:	Firm:
Date/Time: 3-12-93/8:45	Date/Time:	Date/Time:
RECEIVED BY:	**RECEIVED BY:**	**RECEIVED BY:**
Signature: Willie Villarreal	Signature:	Signature:
Printed Name: W. Villarreal	Printed Name:	Printed Name:
Firm: RZA AGRA	Firm:	Firm:
Date/Time: 3/12/93 8:45	Date/Time:	Date/Time:

LABORATORY:
Shipping I.D. #:
Carrier:
DOT Designation:

SAMPLE RECEIPT:
Total # Containers:
Condition of Containers?
Condition of Seals?

SPECIAL INSTRUCTIONS/COMMENTS:

DISTRIBUTION: WHITE-return to RZA; YELLOW-lab; PINK-retained by RZA.

RITTENHOUSE-ZEMAN & ASSOCIATES, INC.
EARTH & ENVIRONMENTAL CONSULTANTS

7409 S.W. Tech Center Drive, Suite [illegible]
Portland, Oregon 97223-8024
(503) 639-3400 FAX: (503) 620-7892

3415

CHAIN-OF-CUSTODY RECORD / LABORATORY ANALYSES REQUEST

PROJECT: Franklin Rd JOB #: 6286
CLIENT: Williams et al
PROJ. MANAGER: Len Farr PHONE #: 639-3400
SITE ADDRESS: 901-933 Franklin Rd
SAMPLER'S NAME: Len Farr PHONE #:
SAMPLER'S SIGNATURE: Len Farr

ANALYSIS REQUESTED: (Circle, Check Box, or Write Preferred Method in Box) OTHER: (Write in)

SAMPLE ID #	DATE	TIME	PRESERV.	MATRIX	Halogenated Volatiles EPA 601 EPA 8010	Aromatics (BTX&E) EPA 602 EPA 8020	Fuel Scan/TPH by GC EPA 602-mod/8015-mod.	Volatile Organ. Compnds	GC Fingerprint	Penta/tetra-chlorophenol EPA 604 EPA 8040	Tot. Petrol. Hydrocarbons EPA 413.1, 418.1 / TLC	Total Metals ICP AA Other	EP-TOX Metals	Purgeable Organics EPA 624 8240	Base/Neut Acids EPA 625 (8270) *	pH Cond. Alk Color	NO3/NO2 N-NO3 NH3-N	Ca Mg Na K Fe Cl SO4	TOX TOC TDS COD				# of Containers	Sample Preparation	Detection Limits Desired
1. RZA3-A	3-10-93	13:20	4°C	Water											X								2		
2.																									
3.																									
4.																									
5.																									
6.																									
7.																									
8.																									
9.																									
10.																									

RELINQUISHED BY RZA:	RELINQUISHED BY:	RELINQUISHED BY:
Signature: Len Farr	Signature: Michael D. Ku	Signature:
Printed Name: Len Farr	Printed Name: Michael Ku	Printed Name:
Firm: RZA AGRA	Firm: RSD	Firm:
Date/Time: 3-12-93 / 9:50	Date/Time: 10:10 3/12	Date/Time:

RECEIVED BY:	RECEIVED BY:	RECEIVED BY:
Signature: M. Ku	Signature: Sara McClurg	Signature:
Printed Name: Michael Ku	Printed Name: Sara McClurg	Printed Name:
Firm: RSD / Transport	Firm: PEL	Firm:
Date/Time: 9:50 3/12/93	Date/Time: 3/12/93 1000	Date/Time:

LABORATORY:

Shipping I.D. #:

Carrier:

DOT Designation:

SAMPLE RECEIPT:

Total # Containers:

Condition of Containers?

Condition of Seals?

SPECIAL INSTRUCTIONS/COMMENTS:

* PAH's only

PEL # 93-0728

DISTRIBUTION: WHITE-return to RZA; YELLOW-lab; PINK-retained by RZA.

RECEIVED
JUN 9 1993
SQUIER, INC

WILLIAMS, FREDRICKSON & STARK, P. C.
ATTORNEYS AND COUNSELORS AT LAW
1600 SOUTHWEST FOURTH AVENUE, SUITE 900
PORTLAND, OREGON 97201-5578
TELEPHONE (503) 222-9966
FAX (503) 796-1009
TELEX 4742099
ANS. BACK: MEXPTO

STEVEN M. CLAUSSEN*
JOHN DUDREY
RAD LITTLEFIELD
PETER C. McCORD
MICHAEL D. McNICHOLS
DONALD R. STARK
JOHN S. THOMAS
DAVID R. WILLIAMS
MICHAEL D. WILLIAMS

EDWARD I. ENGEL
OF COUNSEL
JOHN B. LEAHY
OF COUNSEL
WENDELL GRAY
FLOYD A. FREDRICKSON
RETIRED

*ALSO ADMITTED IN WASHINGTON

May 25, 1993

IN REPLY PLEASE REFER TO FILE NO.

91050.001

A. Keith Martin, Esq.
Eugene City Attorney
101 E. Broadway, #400
Eugene, OR 97401

Re: Laurita Ruth, Eugene, Oregon
April 1993 final report
Omission of Appendix C

Dear Keith:

Enclosed please find a copy of RZA's letter to me dated May 24, 1993 together with the enclosures. As noted, please replace the current table of contents and add to the April 1993 final report the enclosed Appendix C cover sheet and copy of NGA's report. Also enclosed is RZA's rebilling dated May 19, 1993 summarizing the amounts due them.

By copy of this letter and enclosures to Laurita Ruth and Larry Anderson, I am notifying them of the omission and would ask that they update their report as well.

Very truly yours,

WILLIAMS, FREDRICKSON & STARK, P.C.

Donald R. Stark

DRS:mg
Enclosures
cc: Laurita Ruth (w/encl.)
cc: Larry Anderson (w/encl.)

mg•\drs\martin5.l25

RZA AGRA, Inc.
(Formerly: Rittenhouse-Zeman & Associates, Inc.)
Engineering & Environmental Services

7477 SW Tech Center Drive
Portland, Oregon 97223-8024
(503) 639-3400
FAX (503) 620-7892

May 19, 1993

Williams, Fredrickson, et. al.
1600 SW Fourth Ave
Suite 900
Portland, OR 97201-5578

Attn: Donald R. Stark

Statement of Account as of May 18, 1993

	Document	Date	Debit	Credit
Project: 106286-00 Review Laurita Ruth vs City Eugene 901-933 Franklin, Eugene, OR				
Invoice	6921	3-26-93	6,653.94	
Invoice	7148	4-30-93	2,361.20	
Invoice	5143	5-14-93	720.00	
		Balance	9,735.14	
		Balance due	9,735.14	

Current	31-60 days	61-90 days	91-120 days	121+ days
3,081.20	6,653.94			

RZA AGRA, Inc.

(Formerly: Rittenhouse-Zeman & Associates, Inc.)
Engineering & Environmental Services

7477 SW Tech Center Drive
Portland, Oregon 97223-8024
(503) 639-3400
FAX (503) 620-7892

May 24, 1993

O-6286

Williams, Fredrickson, and Stark
1600 SW 4th, Suite 900
Portland, OR 97201

Attn: Mr. Donald R. Stark

SUBJECT: LAURITA RUTH PROPERTY REPORT
OMISSION OF APPENDIX C

Dear Mr. Stark:

It is has come to our attention that the NGA ground penetrating radar report was not included as part of the Subsurface Environmental Investigation report for the Laurita Ruth property. Our report indicates in Section 4.3, page 8, that the final report provided by NGA has been included in Appendix C.

In order to correct this deficiency, we are providing a revised table of contents, an Appendix C cover sheet, and a copy of the NGA report. We apologize for any inconvenience this may have caused. If you have any questions please feel free to contact us at 503-639-3400.

Respectfully submitted,

RZA AGRA, Inc.

Leonard C Farr Jr

Leonard C. Farr, Jr., Engineering/Science Staff II

Appendix C

GPR Survey Report

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Appendix A	Boring Logs
Appendix B	Laboratory Test Results Chain-of-Custody Records
Appendix C	GPR Survey Report

Northwest Geophysical Associates, Inc.

PO Box 1063 Corvallis, Oregon 97339-1063
PHONE: (503) 757-7231 FAX (503) 757-7331

April 15, 1993

Mr. Donald R. Stark
Williams, Fredrickson & Stark
1600 SW 4th Ave., Suite 900
Portland, OR 97201

Re: **Ground Penetrating Radar Survey**
Ruth Property, Franklin Blvd., Eugene, Oregon

Dear Mr. Stark,

On March 28, 1993, Northwest Geophysical Associates, Inc. (NGA) conducted a ground penetrating radar (GPR) survey at the Laurita Ruth property, 901 to 903 Franklin Blvd., Eugene, Oregon. That work was conducted as part of RZA AGRA's site assessment program for Williams, Fredrickson & Stark and Mrs. Ruth.

The objective of the survey was to locate possible underground storage tanks (USTs) which may remain on the site from former "service station" operations.

This letter constitutes the final report for that survey. The attached "*Discussion of geophysical techniques - Geophysical detection of buried objects*" describes the physical principals and operation of GPR.

SUMMARY OF RESULTS:

The site on Franklin Boulevard was formerly a truck dealership with "service station" /refueling facilities on the west end of the site. In order to detect tanks remaining from those operations, a series of GPR lines were run around the perimeter of the building. GPR lines were also run inside the portion of the building which is presently a bookstore. Locations of GPR lines are shown on Figure 1, together with a site plan.

No GPR reflections indicative of large underground storage tanks were observed on the survey. Interpreted GPR anomalies are plotted on Figure 1. Most anomalous areas

noted are disturbed areas, possibly areas which have been excavated and backfilled, or possibly areas where the original fill was placed in a different fashion than the surrounding materials. Isolated reflective point anomalies often indicate pipes, utilities, boulders, or other subsurface object with restricted dimensions. Several of the reflective point anomalies at the rear (north) of the building correspond with drain pipes extending from the building to drainage lines off the property.

The area surrounding "filler pipes" at the rear of the building was examined in additional detail. Those two pipes may have been filler and/or vent pipes for a heating fuel oil tank. There was a small anomalous GPR reflection immediately adjacent to the building. That anomaly was not typical of a tank, but the presence of a small tank, immediately adjacent to the building could not be ruled out.

Ten lines were run inside the bookstore. Concern over that area is due to the uncertainty of the exact location of the former service station facilities. There is a possibility that the bookstore portion of the structure is a later addition to the building and the area may have been outside the original facilities. No GPR reflectors indicative of USTs were observed under the bookstore.

FIELD SURVEY:

GPR lines were run using a Geophysical Survey Systems, Inc. (GSSI), model SIR-3 radar control unit and a 500 MHz antenna. Fiducial marks were placed on the records at 10 foot intervals, measured with a tape laid along the survey line. A record length of 100 nanoseconds (ns) was used throughout the survey (i.e., 10 ns between scale lines).

Signal quality was generally good. Excellent records were obtained to times of 30 ns, corresponding to a depth of four to six feet. Below that signal quality degraded somewhat but was more than adequate to detect a UST to times of 60 ns (8 to 12 feet).

A survey base point, with the arbitrary coordinates of 200E, 200N, was established at the southwest corner of the building (see figure 1). All measurements were made relative to that point, measured in feet with a surveyors tape. Survey north is aligned with the building.

LIMITATIONS:

Geophysical surveys performed as part of this survey may or may not successfully detect or delineate any or all subsurface objects or features present. Locations, depths and scale of buried objects or subsurface features mapped as a result of this survey are a result of geophysical interpretation only, and should be considered as confirmed, actual, or accurate only where recovered by excavation or drilling. Use of this information is the sole responsibility of the client.

Sincerely,

Northwest Geophysical Associates, Inc.

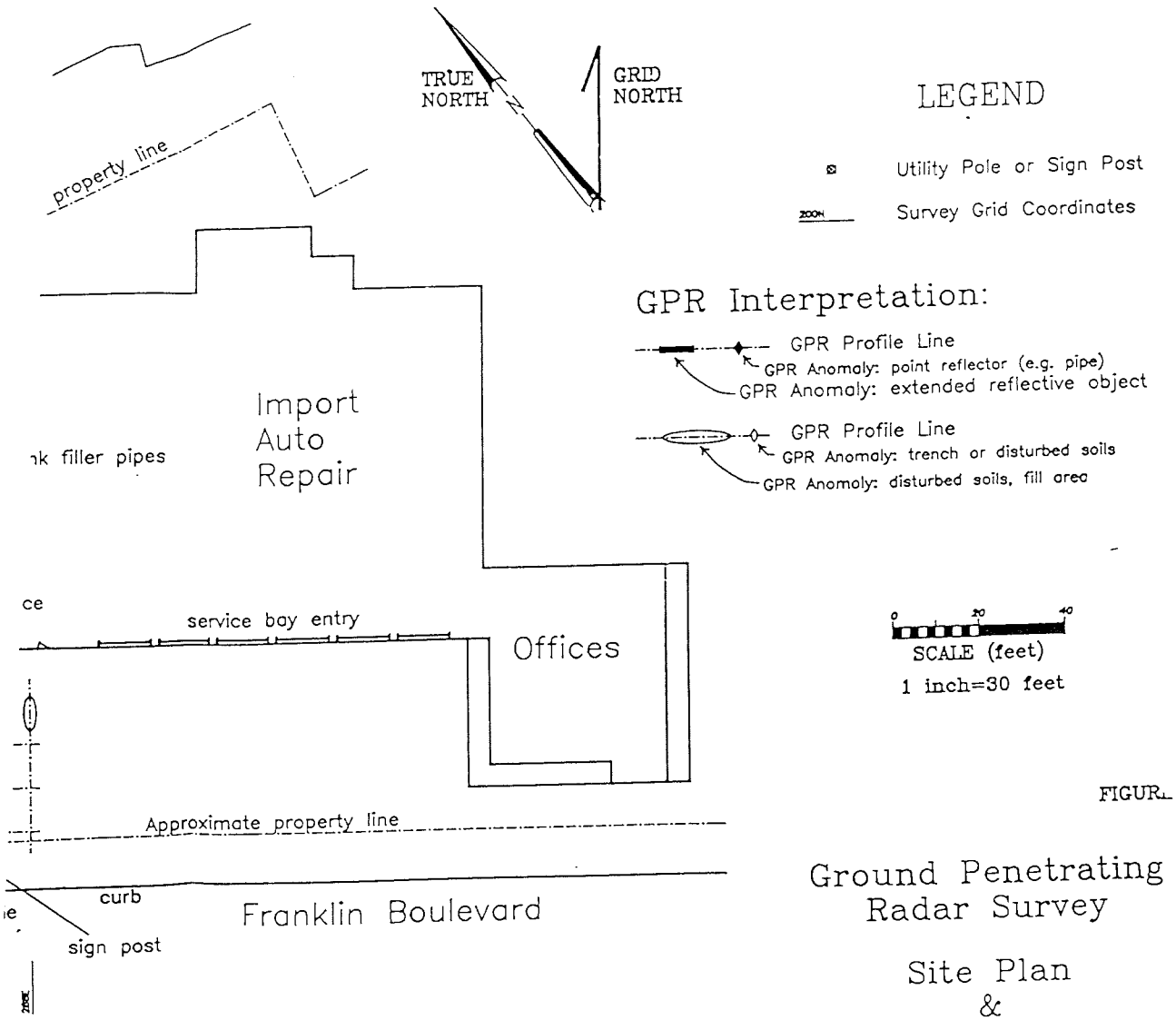
Rowland B. French
Sr. Geophysicist

FILE: C:\PROJECTS\RZA_EUG\RUTH.RPT

Attachments:

Figure 1: GPR Survey; Site Plan and Interpretation
Geophysical Detection of Buried Objects (2/9/93)

cc: Doug Smith/Len Farr
RZA AGRA



FIGUR

Ground Penetrating Radar Survey

Site Plan & Interpretation

Ruth Property
901 to 903 Franklin Blvd.
Eugene, Oregon

NGA #: 267
FILE: RUTHBAS2.DWG

DATE: March 30, 1993
REVISION: April 15, 1993

SQUIER ASSOCIATES

GEOTECHNICAL & GEOENVIRONMENTAL CONSULTANTS

4255 Oakridge Road
Post Office Box 1317
Lake Oswego, Oregon
97035

503·635·4419
Fax 635·1430

89384.7

SAMPLING PLAN FOR AN ENVIRONMENTAL INVESTIGATION AT THE UNIVERSITY OF OREGON RIVERFRONT RESEARCH PARK MILLRACE PARCEL LOCATED IN EUGENE, OREGON

The initial and perhaps most critical element in a program designed to evaluate the physical and chemical properties at a site is the Sampling Plan. The intent of this Sampling Plan is to assure appropriate sampling methodologies and procedures with respect to pertinent regulatory, scientific and engineering objectives. This Sampling Plan was designed by Squier Associates, Inc., geoenvironmental consultants retained by the State of Oregon acting by and through the State Board of Higher Education. A copy of this Sampling Plan should be maintained by the University of Oregon as part of the permanent record concerning the site.

Site Identification/Location

Property Owner	Oregon State Board of Higher Education
Property Description	University of Oregon Riverfront Research Park, Millrace Parcel
The property is located	in Eugene, Oregon, in the area bounded on the north by the Southern Pacific Railroad right-of-way; to the east by other University property; and to the south and southwest, the Millrace waterway and Franklin Boulevard.

Sampling Plan Goals

The purpose of a Sampling Plan is to document methodologies and procedures utilized in obtaining potentially contaminated representative samples at the site; to assist in maintaining quality assurance/quality control (QA/QC) for the sampling program; and to provide for personnel safety. The sampling protocol outlined in this Sampling Plan will provide for collection of representative chemical/physical samples at the site. This plan was written also to comply with regulations of the Oregon Department of Environmental Quality (DEQ) and the United States Environmental Protection Agency (EPA).

Sampling Objectives

The objective of this Sampling Plan is to document and detail the sampling protocol, quality assurance, and quality control for collecting representative samples at the project site.

The specific objectives are to:

1. evaluate for the presence of PCBs in the soils or concrete in the transformer oil spill area near the power plant substation, the transformer decommissioning area in building 132, and the transformer storage area in building 134;
2. evaluate for the presence of total arsenic, chromium, mercury, cadmium, lead and, also, volatile organic compounds in the scrap/waste storage area;
3. evaluate for the presence of petroleum products by hydrocarbon identification (TPH-HCID), in the vicinity of the Millrace, where a flat (non-colored) surface sheen was earlier observed;
4. evaluate the presence of petroleum hydrocarbons by total petroleum hydrocarbons identification (TPH-HCID) in the proposed location for new above ground petroleum tanks;
5. establish quality assurance and quality control for obtaining representative samples;
6. determine the level of personnel safety required for the project.

Sampling Design and Protocol

Selection of chemical/physical parameters to be measured are based on a review of past and current practices at the site, prior studies conducted at the site, and information from regulatory agency files and/or other sources. Additional parameters may be required to document specific characteristics of the site.

Chemical Parameters Tested

Selection of the chemical parameters to be measured were based on known past and present practices utilized by companies that have conducted operations at the site. The parameters were chosen to provide a measure of the hazardous contaminants present at the sample locations. The parameters include specific and general indicator parameters. Additional chemical parameters may be added, or existing parameters deleted, where chemical data or other information indicates a change is advised. Additions or deletions to the analytical parameters will be reviewed by DEQ and the University, and changes mutually agreed upon.

Based on the foregoing, samples will be analyzed for the following specific and general parameters:

Parameter	SW-846 Test Method	Detection Limit Soil (ppm)
PCB	8080	0.10
Volatile organic cmpds	8240	0.002-0.20
TPH-HCID	8015M	5
arsenic	7740	0.2
chromium	6010	2.5
mercury	7470	0.05
cadmium	6010	2.5
lead	7740	0.25

Sampling Locations

Sampling locations are determined based on a review of selected available data. In selecting sampling locations, consideration is given to site conditions (i.e., utilities, buildings, and traffic flow patterns). The final locations will be determined in the field prior to and at the time of sampling. At present, we have identified the following sampling locations.

The earlier ESA identified the following five areas within the Millrace Parcel as being areas of environmental concern (refer, Figure 2). The specific locations identified are:

- the transformer oil spill area near the power plant substation;
- the transformer decommissioning area in Building 132;
- the transformer storage area in Building 134;
- the scrap/waste storage area west of Building 131; and
- the area of the Millrace adjacent to the southwest corer of the power plant, where surface sheen was observed.

In addition, proactive soil sampling will be conducted at the proposed location for three above ground 30,000-gallon bunker C tanks. The proposed location for these three tanks is north of the power plant and south of the Southern Pacific Railroad right-of-way.

Modification of Sampling Plan

Actual conditions encountered during sampling may require modification of the methodology used to obtain representative samples at the site. If modifications are made in the methodology, field records will be completed outlining the changes and detailing the reason(s) for modifying the methodology.

Methodology

Soil Authoritarian Samples. Soil grab samples will be collected in the following manner:

a) The site soil sampling methodology will be as described in the EPA publication SW-846, Third Edition. Authoritarian sample locations will be determined using information based on past practices at the site. Each sampling location will be physically identified by placing a numbered/dated sampling stake or marker adjacent to the center of the sampling location. The measured distance from an easily identified point will be recorded in field notes to further document each sampling location.

b) The stainless steel trowel and auger, and other sampling equipment will be decontaminated prior to collecting the sample. Decontamination of equipment will be accomplished by a series of washes/rinses, as indicated below:

1) laboratory grade detergent water wash,
2) distilled water rinse, and
3) air drying.

After decontamination, the sampling equipment will be isolated or stored in a clean location. The sampling personnel will wear clean disposable surgical gloves and overgloves (if necessary) when handling decontaminated sampling equipment. New gloves will be used at each sampling location.

c) A grab sample will be taken at each sample location and depth.

d) Subsurface conditions will be examined continuously, especially changes in soil classification and permeability. Observations will be noted with sample records.

e) Decontaminated sample containers will be supplied by the analytical laboratory retained. The container types and lid liners will be determined in accordance with the SW-846, Third Edition, analytical method used. Each sample will be transferred directly to the sample container(s). The samples will be packed into the container to minimize headspace.

f) The sample containers will be labeled, sealed, and/or secured, and stored under iced conditions.

Soil Sampling Underlying Concreted Surfaces. Soil grab samples from below concreted surfaces will be collected in the following manner:

a) The sampling methodology will be as described in the EPA publication SW-846, Third Edition. Each sampling location will be physically identified by placing a numbered/dated sampling stake or marker adjacent to the center of the sampling location. The measured distance from an easily identified point will be recorded in field notes to further document each sampling location.

b) The stainless steel trowel and auger, and other sampling equipment will be decontaminated prior to collecting the sample. Decontamination of equipment will be accomplished by a series of washes/rinses, as indicated below:

1) laboratory grade detergent water wash,
2) distilled water rinse, and
3) air drying.

After decontamination, the sampling equipment will be isolated or stored in a clean location. The sampling personnel will wear clean disposable surgical gloves and overgloves (if necessary) when handling decontaminated sampling equipment. New gloves will be used at each sampling location.

c) A circular concrete or an asphalt cutting saw will be used to remove a section of concreted material to allow for sampling of the underlying strata.

d) A grab sample will be taken at each sample location and depth.

e) Decontaminated sample containers will be supplied by the analytical laboratory retained. The container types and lid liners will be determined in accordance with the SW-846, Third Edition, analytical method used. Each sample will be transferred directly to the sample container(s). The samples will be packed into the container to minimize headspace.

f) The sample containers will be labeled, sealed, and/or secured, and stored under iced conditions.

Surface Concrete Grab Samples. Surface concrete grab samples will be collected in the following manner:

a) The sampling methodology will be as described in EPA publication SW-846, Third Edition. The sampling areas will be physically located by a marker placed adjacent to the center of the sampling areas. The measured distance from an easily identified point will be recorded in the field notes to further record each sample location.

b) The carbide tipped chisel, stainless steel trowel, and other sampling equipment will be decontaminated immediately prior to sampling at each sampling location. Decontamination of equipment will be accomplished by a series of washes/rinses, as indicated below:

1) laboratory grade detergent water wash,
2) distilled water rinse, and
3) air drying.

After decontamination, the sampling equipment and tools will be isolated in a clean location to avoid contaminating surfaces prior to sampling. The sampling personnel will wear clean, disposable, surgical gloves and overgloves (if necessary) when handling decontaminated sampling equipment before and during sampling. New gloves will be used at each sampling location.

c) A concrete surface sample will be taken in the following manner:

1) The concrete sample will be collected from the upper surface of the concrete core and/or the surrounding edge of the core wall, within ½ inch of the surface;
2) The removed debris and concrete chips will be placed immediately into sample container(s) using new wood spatulas and a decontaminated stainless steel trowel.

d) The container types and lid liners will be determined by the SW-846, Third Edition, analytical method used. Decontaminated sample containers will be supplied by the analytical laboratory retained.

e) The sample containers will be labeled, sealed, and/or secured, and stored under iced conditions.

Stream Samples. The samples from the surface water body will be collected in the following manner:

a) The depth sampler sampling equipment to be used in collecting samples will be decontaminated prior to obtaining a sample. Decontamination of equipment will be accomplished by a series of washes/rinses, as indicated below:

1) laboratory grade detergent water wash,
2) distilled water rinse, and
3) air drying.

Disposable surgical gloves and overgloves (if necessary) will be worn and discarded after each sample is taken or when gloves come in contact with a non-decontaminated surface.

b) The open top of the sample collection container will be placed below and to within ¼-inch of the surface to collect a sample of the earlier observed sheen. When the sample container is in position, the release mechanism will be triggered to allow the sample container to completely fill.

c) When the container is full, the release mechanism will be released, sealing the sample container. The sample will be transferred to clean sample containers supplied by the analytical laboratory retained. The samples will be collected with minimum headspace in sample containers to minimize loss of volatile organic compounds. Sampling will be in accordance with accepted procedures outlined in EPA document SW-846, Third Edition.

d) The sample containers will be labeled, sealed, and/or secured, and stored under iced conditions.

Quality Assurance and Quality Control

The primary objective of this Sampling Plan is to provide for collection of representative samples from the Millrace site. Analysis of these samples will provide quantitative and qualitative information on whether selected contaminants are present at the property.

Quality Assurance and Quality Control (QA/QC) is a necessary part of this Sampling Plan to assure the meeting of this objective. Specific QA/QC objectives are to assure precision,

accuracy, representativeness, comparability, and completeness for the samples collected and the analytical laboratory analyses performed on these samples. These quality control parameters are described below.

A. Precision

Precision is a measure of the scatter of the data when more than one measurement is made on the sample. Scatter is commonly attributed to sampling activities and/or chemical analyses. For duplicate measurements, precision can be expressed as the relative percent difference. Split laboratory analyses are performed to confirm reportable concentrations detected in the sample. Field duplicates or split samples will be provided for 5 percent of the samples collected to measure precision. Volatile organic compound samples, however, will be collected in duplicate.

B. Accuracy

Accuracy is a measure of the probable difference between reported test results and the true sample concentration. Insomuch as true sample concentrations are not known, a priori, accuracy for chemical compound analysis is usually inferred from recovery data as determined by sample blanks, sample spiking, and surrogate samples.

The preferred method for sample spiking is to add a known amount of the constituent of interest to a split sample in the field. Because of the inherent difficulties associated with field spiking, this method will not be employed. Rather, the laboratory will analyze surrogate samples, sample blanks, and spike additions according to accepted laboratory procedures. Perfect accuracy would be defined by 100 percent recovery.

C. Representativeness

Representativeness is a measure of how closely the measured results reflect the actual concentration of the chemical parameters in the materials sampled.

Sampling procedures are designed so that results are representative of the materials being measured. Sample handling protocols for storage, preservation and transportation have been developed to preserve the representativeness of the collected samples with particular emphasis on the minimization of volatilization of organic compounds. Proper documentation will establish that protocols have been followed, and sample identification and integrity assured. Transfer, transport, and equipment blanks and field duplicates or split samples at a frequency of 5 percent per set of samples, will be used to assess field and transport contamination, and

method variation. Laboratory method blanks will be run as per laboratory QA/QC. Maximum storage times, as stated in SW-846, Third Edition, will not be exceeded to assure representativeness.

D. Comparability

The objective of this parameter is to assure that data developed during the investigation are either directly comparable, or comparable with defined limitations, to literature data or other applicable criteria.

Comparability of the data will be maintained by using EPA defined procedures. The parameters and analytical methods, along with target quantification limits, are presented in the chemical parameters section. Actual detection limits may vary during analysis depending on the nature of the particular sample material, especially soil and sludge samples. Actual detection limits obtained will be reported by the analytical laboratory.

Analytical methods for this investigation will be performed using only approved methods contained in 40 CFR Part 136, "Guidelines Establishing Test Procedures For The Analysis of Pollutants", or EPA Methods SW-846, "Test Methods For Evaluating Solid Waste Physical Chemical Methods", Third Edition, unless an approved method does not exist for the proposed analyses.

E. Completeness

Completeness is a measure of the amount of valid data obtained from the analytical measurement system compared to the amount that was expected to be obtained. It is defined as the total number of samples taken for which valid analytical data are obtained divided by the total number of samples collected and multiplied by 100.

Data Assessment

The quality of the data will be based upon precision, accuracy and completeness.

A. Precision

The relative percent difference (RPD) is used to assess the precision of the analytical method and is calculated using the following equation:

$$RPD = \frac{X_s - X_d}{\frac{X_s + X_d}{2}} * 100$$

where:
X_s is the analytical result in mg/l obtained for the sample.
X_d is the analytical result in mg/l obtained for the duplicate sample.

B. Accuracy

Accuracy of the data set is determined from the analysis of laboratory spiked samples. The accuracy is calculated using the following equation:

$$A = \frac{X_{ss} - X_d}{T} * 100$$

where:
A is the recovery for the added spike.
X_{ss} is the analytical result in mg/l obtained for the spiked sample.
X_d is the analytical result in mg/l obtained for the duplicate sample.
T is the true value of the added spike in mg/l.

Overall precision and accuracy will be determined for the project from the arithmetic mean of RPD and accuracy (A) for each parameter.

C. Completeness

Completeness of the data is determined using the following equation:

$$Completeness\ (\%) = \frac{Number\ of\ Samples\ Having\ Valid\ Data}{Number\ of\ Samples\ Collected} * 100$$

D. Corrective Action

If the quality control audit results in detection of unacceptable conditions or data, the project manager (PM) will be responsible for developing and initiating corrective action. The PM and principal engineer will be notified if the non-conformance is of program significance or requires special expertise above the normally assigned project team. Corrective action may include:

- Reanalyzing the samples, if holding time criteria permit.
- Resampling and reanalyzing.
- Evaluating and amending sampling and analysis procedures.
- Accepting data, acknowledging level of uncertainty or inaccuracy by flagging the data.

Specific incidence reports will address:

- Significant QA problems identified, together with recommendations.
- Corrective actions taken for any problems previously identified.

Planning For Quality Control

Field sampling personnel will make arrangements with the laboratory for sample containers compatible with chemicals to be analyzed. Chain of custody forms, sample forms, and other documentation forms will be assembled in advance of field sampling activities. Preparation and assembly of the required equipment and supplies should proceed as follows:

1. Equipment, equipment manuals, and supplies will be assembled based on the type of samples to be collected using the field equipment/supply check list.

2. Equipment will be checked for proper calibration, assembly and operation prior to mobilization. Field calibration supplies and equipment will also be checked.

3. Sampling equipment that will potentially contact sample materials will be decontaminated prior to mobilization in accordance with procedures outlined in this Sampling Plan.

4. Sampling equipment, such as trowels and bailers, will be wrapped in clean aluminum foil or plastic bag/liners during transport and storage.

5. Sampling equipment will be decontaminated in the field prior to leaving the sampling site. The field equipment/supply check list will be used to verify re-loading of sampling equipment and supplies.

6. Upon arrival at Squier Associates, decontaminated equipment will be returned to storage along with excess supplies.

7. Equipment and supply use forms will be filled out to document equipment and materials used. Equipment that needs to be serviced will be listed along with needed supplies to maintain project Quality Control.

Project Managers will be responsible for QA/QC to assure that these steps are followed.

Chain of Custody

The consultant will maintain proper chain of custody records for the samples and will transport secured or sealed samples back to the laboratory in ice chests. If the integrity of the samples is questioned, it will be noted on the Chain of Custody form. Transfer of possession of the samples will be acknowledged on the chain of custody record by custodial signature, dates of possession, time of transferral, and signature of the person receiving custody of the samples. The original chain of custody record will be kept with samples at all times.

Chain of custody for a sample is defined by the following criteria:

- The sample is in your possession or in your view after being in your possession.
- The sample was in your possession and was locked up, or transferred to a designated secure area by you.

Each time the sample bottles or samples change hands, both the sender and receiver will sign and date the Chain of Custody form and specify what has changed hands. After transfer of sample custody from the sampling team to the laboratory sample custodian, one copy of the chain of custody record will be given to the sampling team for placement into the project files; the second copy remains with the sample while in the laboratory and the original is placed in the laboratory's legal file. A chain of custody record will be completed for each shipment of containers.

The chain of custody record will include:

sample code number
signature of the collector
date and time of collection
waste type
signatures of persons involved in the chain of possession
dates of possession by the above persons
total number of samples received

The chain of custody record will allow reconstruction of the sample transportation chain from the initial sampler to the laboratory analyst.

Labels

All samples will be labeled on the container (not on the lid) with the sample number, name of collector, date and time of collection, media collected, requested analysis, sample preservation requirements, and place or location. Labels will be completed at the time of collection to prevent errors.

Seals

Sample seals are generally not necessary when samples are delivered directly to the lab by the sampler. However, when samples arrive at the laboratory after working hours, or when samples are shipped to the laboratory, the seals will be affixed such that they must be broken in order to open the sample cooler. The seals should be marked, at a minimum, with the project number, date and the sampler's signature.

Field Notes

Field notes must be kept during sample collection. Any and all relevant information should be recorded. The notes should include the following information:

purpose of sampling
location of sample
name and address of field contact
type of sample
suspected contaminants
number and volume of samples taken
sample code number
description of sample point
description of sampling methodology
date and time of collection
sample distribution (i.e., name of laboratory, etc.)
means of transportation of sample
means of sample preservation
references to drawings, grid points, maps, etc.
sketches of site
field observations (color, odor, soil characteristics, etc.)
field measurements taken (pH, flammability, etc.)
signature(s) of person taking data

The field data will be recorded so that the sampling process can be reconstructed from this record without reference to memory or other notes. The field log will be protected and kept in a safe place, and will be kept as a permanent record.

Corrections to Documentation

All original recorded data, chain of custody records, and other forms, will be permanently recorded. None of these documents will be destroyed or thrown away, even if they are illegible or contain inaccuracies that require a replacement document.

If an error is made on a document, make corrections by crossing a single line through the error, entering the correct information, and initialing the correction.

Duplicates

One duplicate or split sample will be obtained for every 20 field samples taken (5 percent). A duplicate or split sample will be obtained if less than twenty samples are collected. Split samples will be analyzed to evaluate laboratory reproducibility. Duplicate samples will provide Quality Control for sampling, transportation and analytical errors. Split samples will be obtained by splitting homogenized composite samples between two different sample containers, which will be treated separately throughout the remainder of the analytical process, except that samples for volatile organic compounds will not be field homogenized. Duplicate samples will be obtained by collecting an adjacent second sample.

Blanks

Equipment blanks consisting of ASTM type 1 (or equivalent) water will be taken for every 20 samples or one per sampling day, whichever is less.

An equipment blank will be collected by pouring distilled water, used in field decontamination, through a decontaminated bailer or on a decontaminated hand auger or other sampling tool. The equipment blank will evaluate the completeness of decontamination of the equipment used in collecting samples.

Sample Analysis Request

A sample analysis request sheet will accompany the samples to the laboratory and should include:

name of the laboratory
signature of sample custody clerk
date of shipment/receipt
sample allocation
analyses to be performed
sample field code number
number of containers
other relevant field data or comment

The sample analyses request sheet may be a part of the Chain of Custody form.

Shipping Requirements

Samples will be transported as rapidly as possible (usually within one day) to the receiving laboratory. Samples will be maintained at or about 4°C during shipment. Shipping container seal and chain of custody will be maintained.

Equipment Calibration and Maintenance

All instruments and equipment used during this project will be operated, calibrated, and maintained according to the manufacturers guidelines and recommendations. Operation, calibration and maintenance will be performed by personnel who have been properly trained in these procedures.

Instruments which fail to fall within established performance limits will be removed from use until proper maintenance/repair have been performed and have been demonstrated to be accurate. In addition, field instruments are checked prior to use, and then periodically checked in the field to verify meter calibrations. All calibration and field measurements will be recorded.

All samples will be collected and analyzed in accordance with methodology described in EPA publication SW-846, "Test Methods For Evaluating Solid Waste Physical Chemical Methods" (Third Edition). In addition, accepted procedures concerning sample labels, sample seals or

security, sample storage, of custody records, analytical requests, and shipping parameters will be followed. Complete field records will also be established for each sample.

Quality Control and Quality Assurance (QA/QC) in regard to sampling procedures, selection of containers, analysis parameters, sample preservation, decontamination of sampling equipment, sample labels and security, and chain of custody are also discussed in detail in other sections of this Sampling Plan.

Personnel Safety

Review of available records will determine the level of personnel protection and safety required at the site. If records are non-existent or incomplete and a risk decision cannot be made, a worst case scenario will be assumed and the site will require level "A" protection. For all sampling locations presently being accessed at the Millrace Parcel, level "D" protection is indicated. This decision is based on the information supplied by the client and from review of available records and information. Level "D" requires the following list of equipment.

Level of Protection

Level D. A work uniform affording minimal protection; used for nuisance contamination only. Level D equipment; used as appropriate.

1. Coveralls.
2. Gloves.*
3. Boots/shoes, chemical-resistant steel toe and shank.
4. Boots, outer, chemical-resistant (disposable).*
5. Safety glasses or chemical splash goggles.*
6. Hard hat.
7. Escape mask.*
8. Face shield.*

*Optional, as applicable.

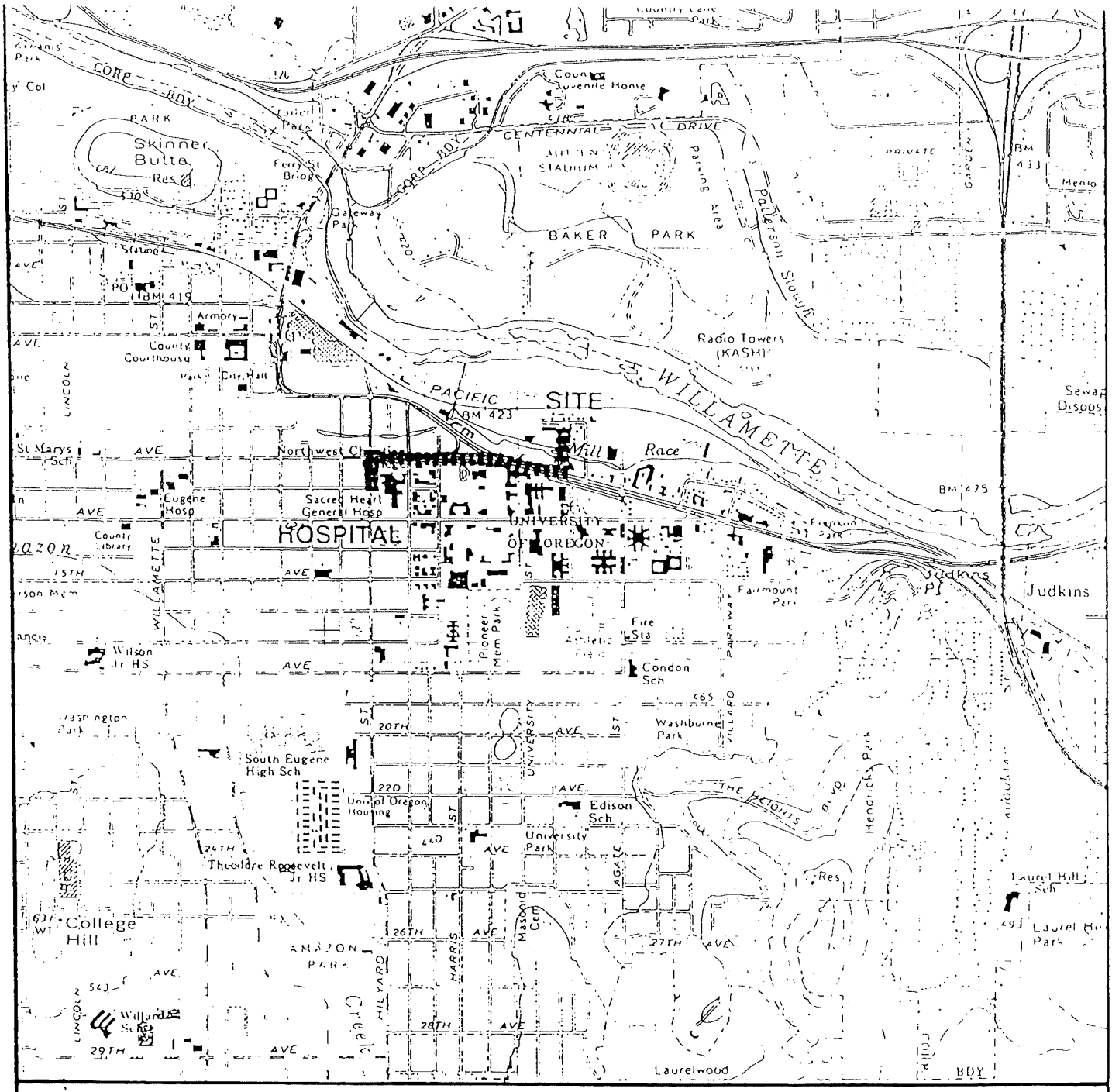
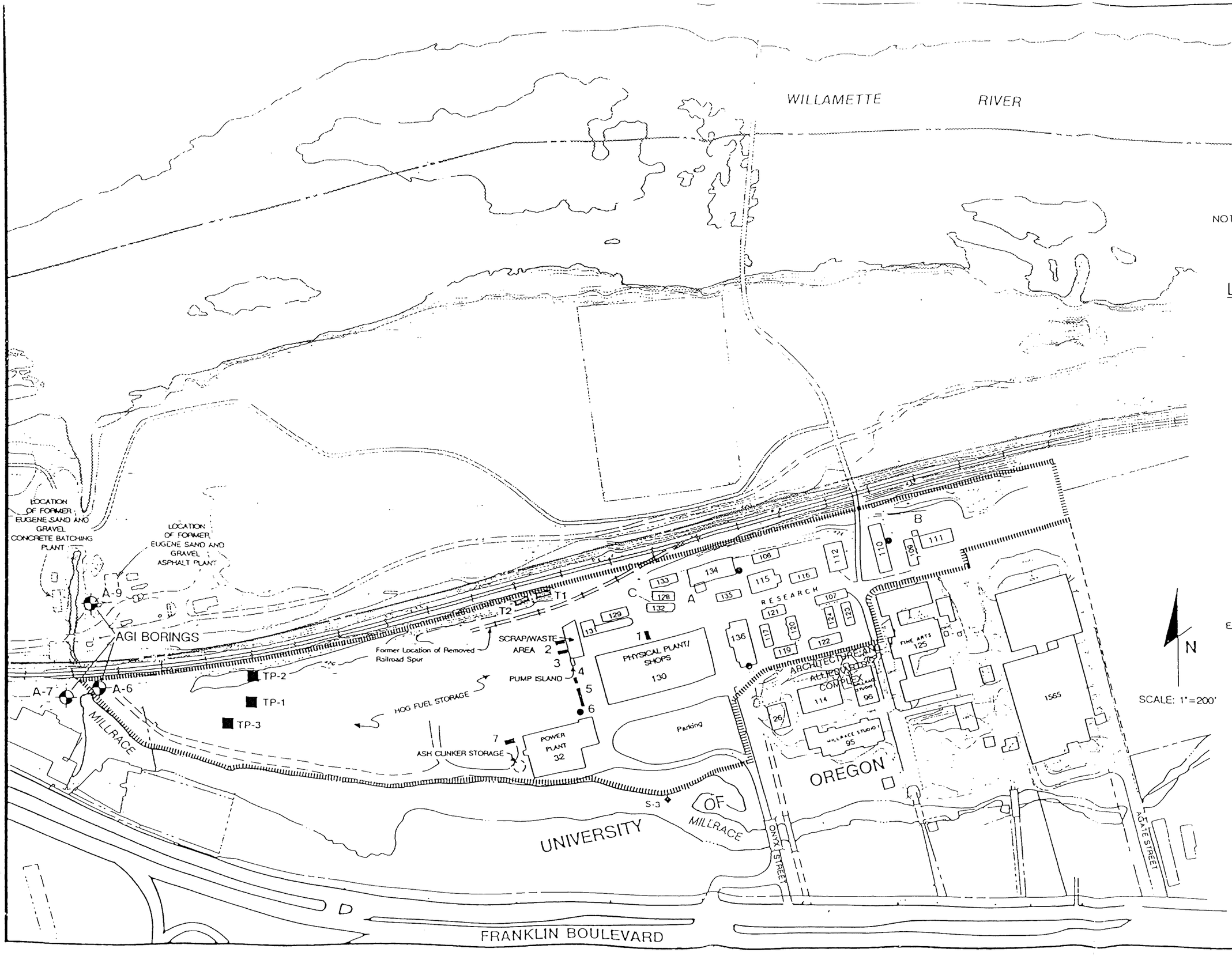

SITE
HOSPITAL
BAKER PARK
WILLAMETTE
PACIFIC
CORP. RDY.
CENTENNIAL DRIVE
Skinner Butte Park
Ferry St Bridge
Gateway Park
Armory
County Courthouse
City Hall
Eugene Hosp
Sacred Heart General Hosp
UNIVERSITY OF OREGON
Mill Race
Radio Towers (KASH)
Patterson Slough
Fairmount Park
Judkins
Pioneer Mem Park
Fire Sta
Condon Sch
Wilson Jr HS
South Eugene High Sch
Univ of Oregon Housing
Edison Sch
University Park
Washburne Park
Theodore Roosevelt Jr HS
College Hill
AMAZON PARK
Willard Sch
Laurelwood
Laurel Hill Park
Hendricks Park
Res
Judkins
BM 423
BM 475
BM 419
BM 433
WASHINGTON
OREGON
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SCALE IN FEET
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RIVERFRONT RESEARCH PARK
EUGENE, OREGON
HOSPITAL ROUTE
JANUARY 1990 89384
L R SOUIER ASSOCIATES, INC
GEOTECHNICAL CONSULTANTS

FIGURE 1



NOTE Features shown are for illustrative purposes only and are approximate

LEGEND

- 133 — University of Oregon Buildings with Identification Number
- F — Former transformer storage area
- E — Greenhouse pesticide/ herbicide storage building
- C — Former PCB electrical transformer decommission site
- Current electrical transformer locations
- 7 — Underground Storage Tanks
- Millrace Water Sample

Exploration for Methane

- TP-3 — Test Pits
- T2 — Trenches

UNIVERSITY OF OREGON

MILLRACE PARCEL SITE SKETCH

89384.7

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FIGURE 2

University of Oregon
1295 Franklin Boulevard
Eugene, Oregon

WORK PLAN FOR REMEDIAL INVESTIGATION
MILLRACE PARCEL
RIVERFRONT RESEARCH PARK
UNIVERSITY OF OREGON

August 18, 1992

(Revised October 2, 1992)

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89384.7

WORK PLAN FOR REMEDIAL INVESTIGATIONS MILLRACE PARCEL, RIVERFRONT RESEARCH PARK UNIVERSITY OF OREGON, EUGENE, OREGON

This Work Plan has been developed to conduct a subsurface remedial investigation to facilitate remediation of the Millrace Parcel of the Riverfront Research Park located in Eugene, Oregon. This remedial investigation is in response to five areas of concern identified in the Environmental Site Assessment, Millrace Parcel, Riverfront Research Park, University of Oregon, report submitted by L.R. Squier Associates in August 1990 (hereafter referred to as the earlier ESA).

Background

The earlier ESA identified the following five areas within the Millrace parcel as being areas of environmental concern (refer, Figure 2). The specific locations identified are:

- the transformer-oil spill area near the Power Plant substation,
- the transformer decommissioning area in Building 132,
- the transformer storage area in Building 134,
- the scrap/waste storage area west of Building 131, and
- the area of the Millrace adjacent to the southwest corner of the power plant, where surface sheen was earlier observed.

In addition, proactive soil sampling will be conducted at the proposed location for three above ground 30,000-gallon bunker C tanks. The proposed location for these three tanks is north of the power plant and south of the Southern Pacific right-of-way.

Objective

This phase of the remedial investigation is to further investigate five specific locations identified in the earlier ESA report, and to provide information that, if necessary, will assist in remediation of these areas.

Soil sampling in the proposed new bunker C storage tank area also will be completed to assign background soil levels of petroleum hydrocarbons, prior to placement of three above ground tanks and associated pipe ways.

Scope of Services

Based on the foregoing, the following remedial investigation tasks will be provided to assess the earlier identified areas and, if necessary, to assist in development of remediation alternatives. The investigation will consist of the collection of soil and concrete samples for chemical analyses of those parameters identified as being of concern.

1. An updated site specific Sampling and Site Safety Plans will be written for the work to be conducted at the five locations described above. The Sampling Plan will describe the sampling procedures and quality control/quality assurance (QA/QC) practices that will be conducted at each of the five locations. The Safety Plan will be written to minimize risk during the work activity onsite. These two plans will be reviewed by the Oregon Department of Environmental Quality (DEQ) along with this work plan prior to commencement of the remedial investigation.

2. Field explorations will be conducted at each of the five locations in order to obtain characteristic representative soil samples for chemical analysis. The specific methods and particular work task for each location are described below:

   PGE Substation: A subsurface investigation involving the advancement of two shallow hand auger holes will be implemented in the area identified near the Power Plant substation, where a release of polychlorinated biphenyl (PCB) oils had earlier been remediated by Portland General Electric (PGE). However, cleanup verification documentation was not available.

   The hand auger holes will be placed to an approximate depth 1.5 feet to 2.0 feet in native soil, which is estimated to be below the level of backfilled materials placed during remediation. It has been reported that PCB contaminated soil was earlier excavated to about depth 1 foot in the remediated area. The depth to native soils will be confirmed in the field and soil samples will be collected below this level.

The two discrete soil samples will be submitted by chain of custody to a qualified environmental laboratory for chemical analysis. The laboratory analysis of the soil samples for PCBs will be by U.S. Environmental Protection Agency (EPA) Method 8080.

Transformer Decommissioning Area (Building 132): The floor area in Building 132 that will be investigated consists of rough concrete. The concrete floor will be cored in three locations, within the area where PCB transformers were drained and flushed. Three samples, including one QA/QC duplicate sample, totaling four samples of concrete chips will be collected for PCB analysis. The concrete chips will be obtained using a carbide faced chisel. A soil sample will also be collected in the freshly exposed surface below each of the three concrete cores; below rock fill that may be present. The samples will consist of soil between about depth 1 inch and 7 inches below rock fill, or below surface if rock fill is not present. The concrete coring locations will be chosen by authoritarian methods agreed to by the University and DEQ, in areas where the floor appears to in failure or to obtain representative samples.

The four concrete and three soil samples will be submitted by chain of custody to a qualified environmental laboratory for chemical analysis for PCBs by EPA Method 8080.

Transformer Storage Area (Building 134): The soils to be investigated in this area are overlain by asphalt. Three asphalt cuts will be made to expose the underlying soils. Soil samples will be collected from each freshly exposed area of soil from about depth 1 inch to 7 inches below rock fill, if it exists, or below soil surface. The sample locations will be chosen by authoritarian methods agreed to by the University and DEQ.

The three soil samples will be submitted by chain of custody to a qualified environmental laboratory for chemical analysis for PCBs by EPA Method 8080.

The Scrap/Waste Storage Area: The majority of the soil samples to be collected in the scrap/waste storage area are overlain by asphalt. Four asphalt saw cuts will be removed in this area to expose the underlying soil, with a sample collected from the exposed soils. The asphalt saw cuts will be made in the area where paint materials and waste and lead batteries have been observed or reported to have been stored. In addition, two soil samples will be collected in soils adjacent to the asphalt area on the west; the downgradient surface drainage direction. The sample locations will be chosen by authoritarian methods agreed to by the University and DEQ. The soil sam-

ples will be collected at approximate depths ranging from 1.5 to 2 feet and 3 to 3.5 feet. A hand auger will be used to advance the holes to the proposed sampling depths.

The 12 soil samples will be submitted by chain of custody to a qualified environmental laboratory for chemical analysis. Initially the six shallow soil samples will be analyzed and the six samples collected at approximately 3 to 3.5 feet will be archived by the laboratory. The proposed analysis is for:

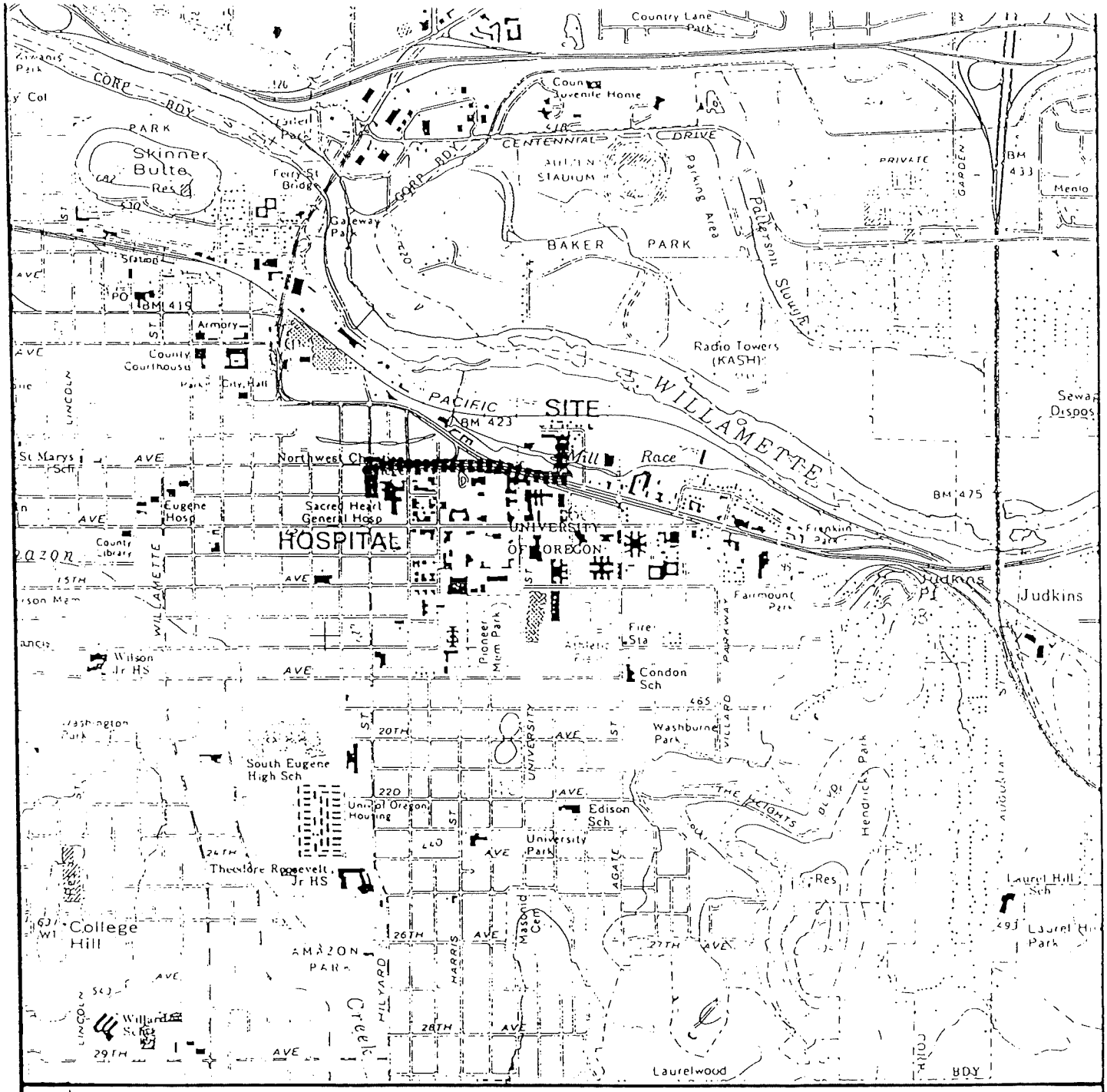
- volatile organic compounds by EPA Method 8240, and
- the five following total metals by EPA Methods of the 6000 and 7000 series.
  - arsenic
  - chromium
  - mercury
  - cadmium
  - lead

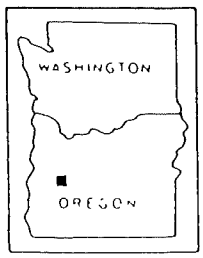
Schedule

We estimate that the field sampling tasks will take about two days to complete. The results from the analytical testing should be received within 14 days of submittal of the soil samples to the analytical laboratory. A written draft report will be transmitted approximately three weeks following completion of the field work. A final report will be submitted two weeks after receipt of draft report comments.

Additional Laboratory Analysis

Samples analyzed that contain total volatile organic compounds, metals, or PCBs above DEQ regulated levels may need to be analyzed for leachable concentrations by the toxicity Characteristic Leaching Procedure (TCLP) method. This will discussed with DEQ and agreed to by the University and DEQ before the additional analysis is scheduled. The cost of this additional analysis is not included in the remedial investigation project cost estimate.







SCALE IN FEET

0 1000 2000

RIVERFRONT RESEARCH PARK
EUGENE, OREGON

HOSPITAL ROUTE

JANUARY 1990 89384

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FIGURE 1



NOTE Features shown are for illustrative purposes only and are approximate

LEGEND

- 133 — University of Oregon Buildings with Identification Number
- F — Former transformer storage area
- E — Greenhouse pesticide/ herbicide storage building
- C — Former PCB electrical transformer decommission site
- Current electrical transformer locations
- 7 — Underground Storage Tanks
- Millrace Water Sample

Exploration for Methane

- TP-3 — Test Pits
- T2 — Trenches

UNIVERSITY OF OREGON

MILLRACE PARCEL SITE SKETCH

89384.7

L.R. SQUIER ASSOCIATES, INC.
GEOTECHNICAL CONSULTANTS

FIGURE 2

SQUIER ASSOCIATES

GEOTECHNICAL & GEOENVIRONMENTAL CONSULTANTS

4260 Galewood Street
Post Office Box 1317
Lake Oswego, Oregon
97035

503-635-4419
Fax 635-1430

QUALITY ASSURANCE REPORT

PROJECT AND SAMPLE INFORMATION

Project Name: University of Oregon
Project No.: 89384
Lab Name: Pacific Environmental Laboratory
Lab Number: 92-3290
Report date: 11/10/92
Sample No.:

Soil
WSA-S1, WSA-S1A, WSA-S2, WSA-2A, WSA-3, WSA-S3A, WSA-S4, WSA-S4A, PPA-SS, PPA-S1, PPA-S2, PPA-S3, PPA-S4, TSA-S1, TSA-S2, TSA-S3, S132-W1, S132-W2, S132-W3 (dupl. of S132-W1), S132-E1, S132-E2, S132-E3 (duplicate of S132-E2), S132-N1, S132-N2

Water
WSA-ER1 (equipment rinse)

ANALYTICAL METHODS

Metals, TCLP metals, TPH-HCID, TPH-D, TPH-418.1M, EPA 8020, EPA 8010, EPA 8240, PCBs

CHAIN OF CUSTODY DOCUMENTATION

WSA-S3 and WSA-S4 had insufficient sample volume for the analytical testing program as outlined in the chain of custody, so two alternate samples were chosen, WSA-S3A and WSA-S4A, and verbally confirmed with Squier Associates. WSA-S3A and WSA-S4 were collected from the same hand auger hole as WSA-S3 and WSA-S4, respectively.

SAMPLE HOLDING TIMES

Soil and water samples were extracted and analyzed within recommended holding times.

INSTRUMENT CALIBRATION

No discrepancies noted.

METHOD DETECTION LIMITS

Detection limits were within laboratory PQLs. Laboratory PQLs are typically below action levels listed in the Oregon Department of Environmental Quality (DEQ) Soil Cleanup Table, except for PCB analysis. However, Oregon Administrative Rules indicate that laboratory PQLs are considered acceptable when PQLs are above Soil Cleanup Table levels.

BLANK ANALYSIS

a) Field Blanks - no field blanks collected
b) Method Blanks - Acceptable results

QUALITY CONTROL

a) Accuracy - Acceptable results
b) Precision
   Field duplicate - Acceptable results
   Laboratory duplicate - Acceptable results

DATA USE LIMITATIONS

No limitations noted. Volatile organic compounds and metals were not detected in a equipment rinse sample WSA-ER1.

PACIFIC
ENVIRONMENTAL
LABORATORY INC.

November 10, 1992

Squier Associates, Inc.
P.O. Box 1317
Lake Oswego, OR 97035

Attn: William D. Hartford

Re: JOB #89384.7
PEL #92-3290

Enclosed is the lab report for your samples which were received on October 8, 1992.

I. Sample Description

Twenty Soil Samples
One Water Sample
Four Concrete Samples

The samples were received under a chain of custody.

The samples were received in containers consistent with EPA protocol.

II. Quality Control

The in-house QC data you requested is enclosed.

III. Analytical Results

Test methods may include minor modifications of published methods such as detection limits or parameter lists. Solid and waste samples are reported on an "as received" basis unless otherwise noted.

Compounds not detected are listed under results as ND.

Sincerely,

Howard Holmes
Project Manager

Rob May
Project Manager

9405 S.W. Nimbus Ave. ■ Beaverton, OR 97005 ■ (503) 644-0660 ■ FAX # (503) 644-2202

METHOD: Total Metals per EPA 3050, 6010, 7000 series
Results in mg/kg (ppm)

Compound	WSA-S4	WSA-S1	WSA-S2	WSA-S3
Arsenic	4.3	10	5.0	5.0
Cadmium	ND	ND	ND	ND
Chromium	26	8.4	9.4	30
Lead	22	9.4	9.0	60
Mercury	ND	ND	ND	ND

Compound	Method Blank	Detection Limit
Arsenic	ND	0.20
Cadmium	ND	2.5
Chromium	ND	2.5
Lead	ND	2.5
Mercury	ND	0.50

METHOD: Total Metals per EPA 3005, 6010, 7000 series
Results in mg/L (ppm)

Compound	WSA-ER1	Method Blank	Detection Limit
Arsenic	ND	ND	0.0040
Cadmium	ND	ND	0.050
Chromium	ND	ND	0.050
Lead	ND	ND	0.0050
Mercury	ND	ND	0.00050

METHOD: T.C.L.P. per EPA 1311, 3005, 6010
Results in mg/L (ppm)

Compound	WSA-S2A	Method Blank	Detection Limit
Cadmium	ND	ND	0.050
Chromium	ND	ND	0.050
Lead	ND	ND	0.10

METHOD: TPH-HCID per Oregon DEQ
Results in mg/kg (ppm)

Compound	WSA-S4A	PPA-S5	PPA-S3	PPA-S4
Diesel	ND	ND	Detected	ND
Gasoline	ND	ND	ND	ND
Heavy/Bunker	ND	ND	Detected	ND

Compound	WSA-S2	WSA-S2A	WSA-S3A	Method Blank
Diesel	ND	Detected	ND	ND
Gasoline	ND	ND	ND	ND
Heavy/Bunker	ND	Detected	ND	ND

Compound	Detection Limit
Diesel	50
Gasoline	20
Heavy/Bunker	--

TPH-HCID Surrogate Recoveries (%)

Compound	WSA-S4A	PPA-S5	PPA-S3	PPA-S4
1-chlorooctadecane (50-150%)	89	88	168(b)	97

Compound	WSA-S2	WSA-S2A	WSA-S3A	Method Blank
1-chlorooctadecane (50-150%)	96	85	98	90

(b) Surrogate recovery is out of control limits due to matrix interference.

METHOD: TPH-D per Oregon DEQ
Results in mg/kg (ppm)

Compound	WSA-S2A	Method Blank	Detection Limit
Diesel/related	1,000(i)	ND	25

(i) This sample contains a heavy petroleum product. The product cannot be quantitated by this method.

TPH-D Surrogate Recoveries (%)

Compound	WSA-S2A	Method Blank
1-chlorooctadecane (50-150%)	108	45(a)

(a) Surrogate recovery is out of control limits.

METHOD: TPH-D per Oregon DEQ
Results in mg/kg (ppm)

Compound	Method Blank(y)	Detection Limit
Diesel/related	ND	25

(y) Method Blank was re-extracted due to low surrogate recovery on original blank.

TPH-D Surrogate Recoveries (%)

Compound	Method Blank
1-chlorooctadecane (50-150%)	92

METHOD: TPH-418.1M per Oregon DEQ
Results in mg/kg (ppm)

Sample I.D.	TPH
WSA-S2A	2,300
Method Blank	ND
Detection Limit	20
PPA-S3	790
Detection Limit	20
Method Blank	ND
Detection Limit	20

METHOD: Aromatic Volatiles per EPA 8020 (GC/MS)
Soil results in ug/kg (ppb)

Compound	WSA-S2A	Detection Limit	Method Blank	Detection Limit
Benzene	ND	4.0	ND	2.0
Chlorobenzene	ND	4.0	ND	2.0
1,2-Dichlorobenzene	ND	4.0	ND	2.0
1,3-Dichlorobenzene	ND	4.0	ND	2.0
1,4-Dichlorobenzene	ND	4.0	ND	2.0
Ethylbenzene	ND	4.0	ND	2.0
Toluene	ND	4.0	ND	2.0
Total Xylenes	ND	4.0	ND	2.0

8020 Surrogate Recoveries (%)

Compound	WSA-S2A	Method Blank
4-Bromofluorobenzene (74-121%)	88	95

METHOD: Halogenated Volatile Organic Compounds per EPA 8010 (GC/MS)
Results in ug/kg (ppb)

Compound	WSA-S2A	Detection Limit
Bromodichloromethane	ND	4.0
Bromoform	ND	4.0
Bromomethane	ND	20
Carbon tetrachloride	ND	4.0
Chlorobenzene	ND	4.0
Chloroethane	ND	20
2-Chloroethyl Vinyl Ether	(y)	--
Chloroform	ND	4.0
Chloromethane	ND	20
Dibromochloromethane	ND	4.0
1,2-Dichlorobenzene	ND	4.0
1,3-Dichlorobenzene	ND	4.0
1,4-Dichlorobenzene	ND	4.0
Dichlorodifluoromethane	ND	10
1,1-Dichloroethane	ND	4.0
1,2-Dichloroethane	ND	4.0
1,1-Dichloroethene	ND	4.0
cis-1,2-Dichloroethene	ND	4.0
trans-1,2,-Dichloroethene	ND	4.0
1,2-Dichloropropane	ND	4.0
cis-1,3-Dichloropropene	ND	4.0
trans-1,3-Dichloropropene	ND	4.0
Methylene chloride	ND	10
1,1,2,2-Tetrachloroethane	ND	4.0
Tetrachloroethene	ND	4.0
1,1,1-Trichloroethane	ND	4.0
1,1,2-Trichloroethane	ND	4.0
Trichloroethene	ND	4.0
Trichlorofluoromethane	ND	4.0
Vinyl chloride	ND	10

(y) Due to low response, we are unable to calculate a result for this compound.

METHOD: Halogenated Volatile Organic Compounds per EPA 8010 (GC/MS)
Results in ug/kg (ppb) - continued

Compound	Method Blank	Detection Limit
Bromodichloromethane	ND	2.0
Bromoform	ND	2.0
Bromomethane	ND	10
Carbon tetrachloride	ND	2.0
Chlorobenzene	ND	2.0
Chloroethane	ND	10
2-Chloroethyl Vinyl Ether	(y)	--
Chloroform	ND	2.0
Chloromethane	ND	10
Dibromochloromethane	ND	2.0
1,2-Dichlorobenzene	ND	2.0
1,3-Dichlorobenzene	ND	2.0
1,4-Dichlorobenzene	ND	2.0
Dichlorodifluoromethane	ND	5.0
1,1-Dichloroethane	ND	2.0
1,2-Dichloroethane	ND	2.0
1,1-Dichloroethene	ND	2.0
cis-1,2-Dichloroethene	ND	2.0
trans-1,2,-Dichloroethene	ND	2.0
1,2-Dichloropropane	ND	2.0
cis-1,3-Dichloropropene	ND	2.0
trans-1,3-Dichloropropene	ND	2.0
Methylene chloride	ND	5.0
1,1,2,2-Tetrachloroethane	ND	2.0
Tetrachloroethene	ND	2.0
1,1,1-Trichloroethane	ND	2.0
1,1,2-Trichloroethane	ND	2.0
Trichloroethene	ND	2.0
Trichlorofluoromethane	ND	2.0
Vinyl chloride	ND	5.0

(y) Due to low response, we are unable to calculate a result for this compound.

8010 Surrogate Recoveries (%)

Compound	WSA-S2A	Method Blank
4-Bromofluorobenzene (74-121%)	88	95
1,2-Dichloroethane-d4 (70-121%)	101	104

METHOD: Volatile Organic Compounds per EPA 8240 (GC/MS)
Results in ug/kg (ppb)

Compound	WSA-S4	WSA-S1A	WSA-S2	Method Blank(1)
Acetone	ND	ND	ND	ND
Acrolein	ND	ND	ND	ND
Acrylonitrile	ND	ND	ND	ND
Benzene	ND	ND	ND	ND
Bromodichloromethane	ND	ND	ND	ND
Bromoform	ND	ND	ND	ND
Bromomethane	ND	ND	ND	ND
2-Butanone	ND	ND	ND	ND
Carbon disulfide	ND	ND	ND	ND
Carbon tetrachloride	ND	ND	ND	ND
Chlorobenzene	ND	ND	ND	ND
Chloroethane	ND	ND	ND	ND
Chloroform	ND	ND	ND	ND
Chloromethane	ND	ND	ND	ND
Dibromochloromethane	ND	ND	ND	ND
Dibromomethane	ND	ND	ND	ND
1,4-Dichloro-2-butene	ND	ND	ND	ND
Dichlorobenzenes (total)	ND	ND	ND	ND
Dichlorodifluoromethane	ND	ND	ND	ND
1,1-Dichloroethane	ND	ND	ND	ND
1,2-Dichloroethane	ND	ND	ND	ND
1,1-Dichloroethene	ND	ND	ND	ND
cis-1,2-Dichloroethene	ND	ND	ND	ND
trans-1,2-Dichloroethene	ND	ND	ND	ND
1,2-Dichloropropane	ND	ND	ND	ND
cis-1,3-Dichloropropene	ND	ND	ND	ND
trans-1,3-Dichloropropene	ND	ND	ND	ND
Ethyl Methacrylate	ND	ND	ND	ND
Ethylbenzene	ND	ND	ND	ND
2-Hexanone	ND	ND	ND	ND
Iodomethane	ND	ND	ND	ND
4-Methyl-2-pentanone	ND	ND	ND	ND
Methylene chloride	ND	ND	ND	ND
Styrene	ND	ND	ND	ND
1,1,2,2-Tetrachloroethane	ND	ND	ND	ND
Tetrachloroethene	ND	ND	ND	ND
Toluene	ND	ND	ND	ND
1,1,1-Trichloroethane	ND	ND	ND	ND
1,1,2-Trichloroethane	ND	ND	ND	ND
Trichloroethene	ND	ND	ND	ND
Trichlorofluoromethane	ND	ND	ND	ND
1,2,3-Trichloropropane	ND	ND	ND	ND
Vinyl acetate	ND	ND	ND	ND
Vinyl chloride	ND	ND	ND	ND
Xylenes (total)	ND	ND	ND	ND

METHOD: Volatile Organic Compounds per EPA 8240 (GC/MS)
Results in ug/kg (ppb) - continued

Compound	WSA-S3	Method Blank(2)	Detection Limit
Acetone	ND	ND	10
Acrolein	ND	ND	100
Acrylonitrile	ND	ND	50
Benzene	ND	ND	2.0
Bromodichloromethane	ND	ND	2.0
Bromoform	ND	ND	2.0
Bromomethane	ND	ND	10
2-Butanone	ND	ND	7.5
Carbon disulfide	ND	ND	2.0
Carbon tetrachloride	ND	ND	2.0
Chlorobenzene	ND	ND	2.0
Chloroethane	ND	ND	10
Chloroform	ND	ND	2.0
Chloromethane	ND	ND	10
Dibromochloromethane	ND	ND	2.0
Dibromomethane	ND	ND	2.0
1,4-Dichloro-2-butene	ND	ND	50
Dichlorobenzenes (total)	ND	ND	2.0
Dichlorodifluoromethane	ND	ND	5.0
1,1-Dichloroethane	ND	ND	2.0
1,2-Dichloroethane	ND	ND	2.0
1,1-Dichloroethene	ND	ND	2.0
cis-1,2-Dichloroethene	ND	ND	2.0
trans-1,2-Dichloroethene	ND	ND	2.0
1,2-Dichloropropane	ND	ND	2.0
cis-1,3-Dichloropropene	ND	ND	2.0
trans-1,3-Dichloropropene	ND	ND	2.0
Ethyl Methacrylate	ND	ND	2.0
Ethylbenzene	ND	ND	2.0
2-Hexanone	ND	ND	5.0
Iodomethane	ND	ND	2.0
4-Methyl-2-pentanone	ND	ND	5.0
Methylene chloride	ND	ND	5.0
Styrene	ND	ND	2.0
1,1,2,2-Tetrachloroethane	ND	ND	2.0
Tetrachloroethene	ND	ND	2.0
Toluene	ND	ND	2.0
1,1,1-Trichloroethane	ND	ND	2.0
1,1,2-Trichloroethane	ND	ND	2.0
Trichloroethene	ND	ND	2.0
Trichlorofluoromethane	ND	ND	2.0
1,2,3-Trichloropropane	ND	ND	2.0
Vinyl acetate	ND	ND	10
Vinyl chloride	ND	ND	5.0
Xylenes (total)	ND	ND	2.0

8240 Surrogate Recoveries (%)

Compound	WSA-S4	WSA-S1A	WSA-S2	Method Blank(1)
4-Bromofluorobenzene (74-121%)	89	96	92	95
1,2-Dichloroethane-d4 (70-121%)	102	102	99	104
Toluene-d8 (81-117%)	97	97	98	99

Compound	WSA-S3	Method Blank(2)
4-Bromofluorobenzene (74-121%)	86	95
1,2-Dichloroethane-d4 (70-121%)	100	104
Toluene-d8 (81-117%)	94	98

METHOD: Volatile Organic Compounds per EPA 8240 (GC/MS)
Results in ug/L (ppb)

Compound	WSA-ER1	Method Blank	Detection Limit
Acetone	ND	ND	10
Acrolein	ND	ND	100
Acrylonitrile	ND	ND	50
Benzene	ND	ND	2.0
Bromodichloromethane	ND	ND	2.0
Bromoform	ND	ND	2.0
Bromomethane	ND	ND	10
2-Butanone	ND	ND	7.5
Carbon disulfide	ND	ND	2.0
Carbon tetrachloride	ND	ND	2.0
Chlorobenzene	ND	ND	2.0
Chloroethane	ND	ND	10
Chloroform	ND	ND	2.0
Chloromethane	ND	ND	10
Dibromochloromethane	ND	ND	2.0
Dibromomethane	ND	ND	2.0
1,4-Dichloro-2-butene	ND	ND	50
Dichlorobenzenes (total)	ND	ND	2.0
Dichlorodifluoromethane	ND	ND	5.0
1,1-Dichloroethane	ND	ND	2.0
1,2-Dichloroethane	ND	ND	2.0
1,1-Dichloroethene	ND	ND	2.0
cis-1,2-Dichloroethene	ND	ND	2.0
trans-1,2-Dichloroethene	ND	ND	2.0
1,2-Dichloropropane	ND	ND	2.0
cis-1,3-Dichloropropene	ND	ND	2.0
trans-1,3-Dichloropropene	ND	ND	2.0
Ethyl Methacrylate	ND	ND	2.0
Ethylbenzene	ND	ND	2.0
2-Hexanone	ND	ND	5.0
Iodomethane	ND	ND	2.0
4-Methyl-2-pentanone	ND	ND	5.0
Methylene chloride	ND	ND	5.0
Styrene	ND	ND	2.0
1,1,2,2-Tetrachloroethane	ND	ND	2.0
Tetrachloroethene	ND	ND	2.0
Toluene	ND	ND	2.0
1,1,1-Trichloroethane	ND	ND	2.0
1,1,2-Trichloroethane	ND	ND	2.0
Trichloroethene	ND	ND	2.0
Trichlorofluoromethane	ND	ND	2.0
1,2,3-Trichloropropane	ND	ND	2.0
Vinyl acetate	ND	ND	10
Vinyl chloride	ND	ND	5.0
Xylenes (total)	ND	ND	2.0

8240 Surrogate Recoveries (%)

Compound	WSA-ER1	Method Blank
4-Bromofluorobenzene (86-115%)	98	99
1,2-Dichloroethane-d4 (76-114%)	101	100
Toluene-d8 (88-110%)	100	100

METHOD: PCB's per EPA 8080
Results in mg/kg (ppm)

Compound	S132-W1	S132-W2	S132-W3	S132-E1
PCB 1016	ND	ND	ND	ND
PCB 1221	ND	ND	ND	ND
PCB 1232	ND	ND	ND	ND
PCB 1242	ND	ND	ND	ND
PCB 1248	ND	ND	ND	ND
PCB 1254	ND	ND	ND	ND
PCB 1260	ND	ND	ND	ND

Compound	S132-E2	S132-E3	PPA-S1	PPA-S2	S132-N1
PCB 1016	ND	ND	ND	ND	ND
PCB 1221	ND	ND	ND	ND	ND
PCB 1232	ND	ND	ND	ND	ND
PCB 1242	ND	ND	ND	ND	ND
PCB 1248	ND	ND	ND	ND	ND
PCB 1254	ND	ND	ND	ND	ND
PCB 1260	ND	ND	ND	ND	ND

Compound	S132-N2	TSA-S1	TSA-S2	TSA-S3	Method Blank	Detection Limit
PCB 1016	ND	ND	ND	ND	ND	0.10
PCB 1221	ND	ND	ND	ND	ND	0.10
PCB 1232	ND	ND	ND	ND	ND	0.10
PCB 1242	ND	ND	ND	ND	ND	0.10
PCB 1248	ND	ND	ND	ND	ND	0.10
PCB 1254	ND	ND	ND	ND	ND	0.10
PCB 1260	ND	ND	ND	ND	ND	0.10

Compound	WSA-S2A	Method Blank	Detection Limit
PCB 1016	ND	ND	0.10
PCB 1221	ND	ND	0.10
PCB 1232	ND	ND	0.10
PCB 1242	ND	ND	0.10
PCB 1248	ND	ND	0.10
PCB 1254	ND	ND	0.10
PCB 1260	ND	ND	0.10

8080 Surrogate Recoveries (%)

Compound	S132-W1	S132-W2	S132-W3	S132-E1
2,4,5,6-Tetrachloro-m-xylene (60-140%)	98	95	100	108

Compound	S132-E2	S132-E3	PPA-S1	PPA-S2
2,4,5,6-Tetrachloro-m-xylene (60-140%)	92	93	106	98

Compound	S132-N1	S132-N2	TSA-S1	TSA-S2
2,4,5,6-Tetrachloro-m-xylene (60-140%)	98	93	100	99

Compound	TSA-S3	Method Blank(1)	WSA-S2A	Method Blank(2)
2,4,5,6-Tetrachloro-m-xylene (60-140%)	97	104	93	98

PACIFIC
ENVIRONMENTAL
LABORATORY INC.

November 23, 1992

Squier Associates, Inc.
P.O. Box 1317
Lake Oswego, OR 97035

Attn: William D. Hartford

Re: Requested Quality Control Data - Revised

Enclosed is the in-house quality control data you requested on PEL project number 92-3290.

Note: Lab blank results and Surrogate Recoveries are included in the final report.

QUALITY CONTROL DEFINITIONS

LAB BLANK RESULTS

A Lab Blank is a laboratory-generated sample which assesses the degree to which laboratory operations and procedures cause false-positive analytical results for your sample.

No target parameters were detected in the lab blank associated with your sample at the reporting limit levels noted on the data sheets in the final report.

SURROGATE STANDARD

A surrogate standard (i.e., a chemical compound not expected to occur in an environmental sample) is added to each sample, blank, and matrix spike sample just prior to extraction or processing. The recovery of the surrogate standard is used to monitor for unusual matrix effects, gross sample processing errors, etc. Surrogate recovery is evaluated for acceptance by determining whether the measured concentration falls within accepted limits.

The recovery of Matrix Spike compounds are calculated as follows:

$$\text{Matrix Spike Recovery} = \frac{SSR - SR}{SA} \times 100$$

Where,

SSR = Spiked Sample Result
SR = Sample Result
SA = Spike Added

Relative Percent Difference (RPD) of the recoveries of each compound in the matrix spike and matrix spike duplicate are calculated as follows:

$$\text{Relative Percent Difference} = \frac{|MSR - MSDR|}{(1/2)(MSR + MSDR)} \times 100$$

Where,

MSR = Matrix Spike Recovery
MSDR = Matrix Spike Duplicate Recovery

Relative Percent Difference (RPD) of duplicate analysis are calculated as follows:

$$\text{Relative Percent Difference} = \frac{|S - D|}{(S + D)/2} \times 100$$

Where,

S = First Sample Value (original)
D = Second Sample Value (duplicate)

If you should have any questions concerning this report, please contact me.

Sincerely,

Howard Boorse
QA/QC Manager

BATCH DUPLICATE RESULTS FOR TOTAL METALS PER EPA 3050, 6010
RESULTS IN MG/KG (PPM)

Compound	Sample Result	Duplicate Result	Relative % Difference
Cadmium	ND	ND	0
Chromium	12	12	0
Lead	11	13	17

BATCH MATRIX SPIKE AND MATRIX SPIKE DUPLICATE RESULTS FOR TOTAL METALS PER EPA 3050, 6010. RESULTS IN MG/KG (PPM)

Compound	Spike Level	Sample Result	Spike Result	Spike Dup. Result
Cadmium	8.0	ND	5.6	6.0
Chromium	16	12	21	26
Lead	80	11	70	81

Compound	% Recovery Spike	% Recovery Spike Dup.	Relative % Difference
Cadmium	70*	75	6.9
Chromium	56*	88	44
Lead	74*	88	17

* Out of control limits.

BATCH METHOD SPIKE RESULTS FOR TOTAL METALS PER EPA 3050, 6010
RESULTS IN MG/KG (PPM)

Compound	Spike Level	Spike Result	Percent Recovery
Cadmium	0.16	0.14	88
Chromium	0.32	0.34	106
Lead	1.6	1.4	88

BATCH DUPLICATE RESULTS FOR TOTAL METALS PER EPA 3050, 6010
RESULTS IN MG/KG (PPM)

Compound	Sample Result	Duplicate Result	Relative % Difference
Cadmium	ND	ND	0
Chromium	26	26	0
Lead	22	20	9.5

BATCH MATRIX SPIKE AND MATRIX SPIKE DUPLICATE RESULTS FOR TOTAL METALS PER EPA 3050, 6010. RESULTS IN MG/KG (PPM)

Compound	Spike Level	Sample Result	Spike Result	Spike Dup. Result
Cadmium	7.9, 7.8	ND	7.1	6.8
Chromium	16	26	37	38
Lead	79, 78	22	89	130

Compound	% Recovery Spike	% Recovery Spike Dup.	Relative % Difference
Cadmium	90	87	3.4
Chromium	69*	75	8.3
Lead	85	138*	48*

* Out of control limits.

BATCH METHOD SPIKE RESULTS FOR TOTAL METALS PER EPA 3050, 6010 RESULTS IN MG/L (PPM)

Compound	Spike Level	Spike Result	Percent Recovery
Cadmium	0.16	0.13	81
Chromium	0.32	0.32	100
Lead	1.6	1.4	88

BATCH METHOD SPIKE RESULTS FOR TOTAL METALS PER EPA 3050, 7000 SERIES. RESULTS IN MG/KG (PPM)

Compound	Spike Level	Spike Result	Percent Recovery
Arsenic	0.010	0.0094	94

BATCH DUPLICATE ANALYSIS AND MATRIX SPIKE RESULTS FOR TOTAL METALS PER EPA 3050, 7000 SERIES. RESULTS IN MG/KG (PPM)

Compound	Sample Result	Duplicate Result	Relative % Difference
Arsenic	5.4	5.5	1.8

Compound	Sample Result	Spike Level	Spike Result	Spike Dup. Result
Arsenic	5.4	5.0	12	11

Compound	Percent Recovery	% Recovery Duplicate	Relative % Difference
Arsenic	132*	112	16

* Out of control limits.

BATCH METHOD SPIKE RESULTS FOR TOTAL METALS PER EPA 3050, 7000 SERIES. RESULTS IN MG/KG (PPM)

Compound	Spike Level	Spike Result	Percent Recovery
Arsenic	0.010	0.010	100

BATCH DUPLICATE ANALYSIS AND MATRIX SPIKE RESULTS FOR TOTAL METALS PER EPA 3050, 7000 SERIES. RESULTS IN MG/KG (PPM)

Compound	Sample Result	Duplicate Result	Relative % Difference
Arsenic	4.3	6.4	39

Compound	Sample Result	Spike Level	Spike Result	Spike Dup. Result
Arsenic	4.3	5.0	10	10

Compound	Percent Recovery	% Recovery Duplicate	Relative % Difference
Arsenic	114	114	0

PACIFIC ENVIRONMENTAL LABORATORY INC.

BATCH METHOD SPIKE RESULTS FOR TOTAL METALS PER EPA 7471 RESULTS IN MG/KG (PPM)

Compound	Spike Level	Spike Result	Percent Recovery
Mercury	0.0050	0.0054	108

BATCH DUPLICATE ANALYSIS AND MATRIX SPIKE RESULTS FOR TOTAL METALS PER EPA 7471. RESULTS IN MG/KG (PPM)

Compound	Sample Result	Duplicate Result	Relative % Difference
Mercury	ND	ND	0

Compound	Sample Result	Spike Level	Spike Result	Spike Dup. Result
Mercury	ND	1.4, 1.6	1.6	1.7

Compound	Percent Recovery	% Recovery Duplicate	Relative % Difference
Mercury	114	106	7.3

BATCH METHOD SPIKE RESULTS FOR TOTAL METALS PER EPA 3005, 6010 RESULTS IN MG/L (PPM)

Compound	Spike Level	Spike Result	Percent Recovery
Cadmium	0.080	0.068	85
Chromium	0.10	0.13	130

BATCH DUPLICATE RESULTS FOR TOTAL METALS PER EPA 3005, 6010 RESULTS IN MG/L (PPM)

Compound	Sample Result	Duplicate Result	Relative % Difference
Cadmium	ND	ND	0
Chromium	ND	ND	0

BATCH MATRIX SPIKE AND MATRIX SPIKE DUPLICATE RESULTS FOR TOTAL METALS PER EPA 3005, 6010. RESULTS IN MG/L (PPM)

Compound	Spike Level	Sample Result	Spike Result	Spike Dup. Result
Cadmium	0.080	ND	0.062	0.062
Chromium	0.16	ND	0.12	0.12

Compound	% Recovery Spike	% Recovery Spike Dup.	Relative % Difference
Cadmium	78	78	0
Chromium	75	75	0

BATCH METHOD SPIKE RESULTS FOR TOTAL METALS PER EPA 3005, 7000 SERIES. RESULTS IN MG/L (PPM)

Compound	Spike Level	Spike Result	Percent Recovery
Arsenic	0.020	0.019	95
Lead	0.020	0.018	90

BATCH DUPLICATE ANALYSIS AND MATRIX SPIKE RESULTS FOR TOTAL METALS PER EPA 3005, 7000 SERIES. RESULTS IN MG/L (PPM)

Compound	Sample Result	Duplicate Result	Relative % Difference
Arsenic	ND	ND	0
Lead	ND	ND	0

Compound	Sample Result	Spike Level	Spike Result	Spike Dup. Result
Arsenic	ND	0.10	0.096	0.099
Lead	ND	0.10	0.090	0.093

Compound	Percent Recovery	% Recovery Duplicate	Relative % Difference
Arsenic	96	99	3.1
Lead	90	93	3.3

PACIFIC ENVIRONMENTAL LABORATORY INC.

BATCH METHOD SPIKE RESULTS FOR TOTAL METALS PER EPA 7470 RESULTS IN MG/L (PPM)

Compound	Spike Level	Spike Result	Percent Recovery
Mercury	0.0050	0.0046	92

BATCH DUPLICATE ANALYSIS AND MATRIX SPIKE RESULTS FOR TOTAL METALS PER EPA 7470. RESULTS IN MG/L (PPM)

Compound	Sample Result	Duplicate Result	Relative % Difference
Mercury	ND	ND	0

Compound	Sample Result	Spike Level	Spike Result	Spike Dup. Result
Mercury	ND	0.0050	0.0038	0.0048

Compound	Percent Recovery	% Recovery Duplicate	Relative % Difference
Mercury	76	96	23*

* Out of control limits.

BATCH MATRIX SPIKE AND MATRIX SPIKE DUPLICATE RESULTS FOR T.C.L.P. PER EPA 1311, 3005, 6010. RESULTS IN MG/L (PPM)

Compound	Spike Level	Sample Result	Spike Result	Spike Dup. Result
Cadmium	1.0	0.084	1.1	1.1
Chromium	5.0	ND	5.1	5.1
Lead	5.0	2.1	5.7	7.7

Compound	% Recovery Spike	% Recovery Spike Dup.	Relative % Difference
Cadmium	102	102	0
Chromium	102	102	0
Lead	72	112	43

PACIFIC ENVIRONMENTAL LABORATORY INC.

BATCH METHOD SPIKE RESULTS FOR T.C.L.P. PER EPA 1311, 3005, 6010 RESULTS IN MG/L (PPM)

Compound	Spike Level	Spike Result	Percent Recovery
Cadmium	1.0	1.0	100
Chromium	5.0	5.1	102
Lead	5.0	5.1	102

BATCH DUPLICATE ANALYSIS FOR TPH-HCID PER OREGON DEQ

Compound	Sample Result	Duplicate Result
Diesel/Related	ND	ND
Gasoline	Detected	Detected
Heavy/Bunker	ND	ND

Compound	Sample Result	Duplicate Result
Diesel/Related	Detected	Detected
Gasoline	ND	ND
Heavy/Bunker	Detected	Detected

LABORATORY CONTROL SPIKE AND DUPLICATE RESULTS FOR TPH-D PER OREGON DEQ. RESULTS IN MG/KG (PPM)

Compound	Spike Level	Spike Result	Spike Recovery %
TPH	120	120	100

Compound	Sample Result	Duplicate Result	Relative % Difference
TPH	41	38	8

LABORATORY CONTROL SPIKE AND DUPLICATE RESULTS FOR TPH-D PER OREGON DEQ. RESULTS IN MG/KG (PPM)

Compound	Spike Level	Spike Result	Spike Recovery %
TPH	120	100	83

Compound	Sample Result	Duplicate Result	Relative % Difference
TPH	ND	ND	0

LABORATORY CONTROL SPIKE AND DUPLICATE RESULTS FOR TPH 418.1M PER OREGON DEQ. RESULTS IN MG/KG (PPM)

Compound	Spike Level	Spike Result	Spike Recovery %
TPH	248	170	68

Compound	Sample Result	Duplicate Result	Relative % Difference
TPH	ND	ND	0
TPH	ND	ND	0

LABORATORY CONTROL SPIKE AND DUPLICATE RESULTS FOR TPH 418.1M PER OREGON DEQ. RESULTS IN MG/KG (PPM)

Compound	Spike Level	Spike Result	Spike Recovery %
TPH	200	180	90

Compound	Sample Result	Duplicate Result	Relative % Difference
TPH	ND	ND	0

BATCH MATRIX SPIKE AND MATRIX SPIKE DUPLICATE RESULTS FOR BTEX PER EPA 8020 (GC/MS); HALOGENATED VOLATILES PER EPA 8010 (GC/MS) RESULTS IN UG/KG (PPB)

Compound	Spike Level	Sample Result	Spike Result	Spike Dup. Result
1,1-Dichloroethene	50	ND	53	51
Benzene	50	ND	50	48
Trichloroethene	50	ND	49	46
Toluene	50	ND	48	45
Chlorobenzene	50	ND	50	48

Compound	% Recovery Spike	% Recovery Spike Dup.	Relative % Difference
1,1-Dichloroethene	106	102	3.8
Benzene	100	96	4.1
Trichloroethene	98	92	6.3
Toluene	96	90	6.4
Chlorobenzene	100	96	4.1

BATCH MATRIX SPIKE AND MATRIX SPIKE DUPLICATE RESULTS FOR VOLATILE ORGANIC COMPOUNDS PER EPA 8240. RESULTS IN UG/KG (PPB)

Compound	Spike Level	Sample Result	Spike Result	Spike Dup. Result
1,1-Dichloroethene	50	ND	53	51
Benzene	50	ND	50	48
Trichloroethene	50	ND	49	46
Toluene	50	ND	48	45
Chlorobenzene	50	ND	50	48

Compound	% Recovery Spike	% Recovery Spike Dup.	Relative % Difference
1,1-Dichloroethene	106	102	3.8
Benzene	100	96	4.1
Trichloroethene	98	92	6.3
Toluene	96	90	6.4
Chlorobenzene	100	96	4.1

BATCH MATRIX SPIKE AND MATRIX SPIKE DUPLICATE RESULTS FOR VOLATILE ORGANIC COMPOUNDS PER EPA 8240. RESULTS IN UG/L (PPB)

Compound	Spike Level	Sample Result	Spike Result	Spike Dup. Result
1,1-Dichloroethene	50	ND	50	48
Benzene	50	ND	52	52
Trichloroethene	50	ND	52	51
Toluene	50	ND	51	50
Chlorobenzene	50	ND	50	51

Compound	% Recovery Spike	% Recovery Spike Dup.	Relative % Difference
1,1-Dichloroethene	100	96	4.1
Benzene	104	104	0.0
Trichloroethene	104	102	1.9
Toluene	102	100	2.0
Chlorobenzene	100	102	2.0

MATRIX SPIKE AND SPIKE DUPLICATE RESULTS FOR PCB'S PER EPA 8080 RESULTS IN MG/KG (PPM)

Compound	Sample Result	Matrix Spike Result	Matrix Spike Dup. Result	Relative % Difference
Aroclor 1248	ND	2.8	2.7	3.5

Compound	Spike Level	Matrix Spike % Recovery	Matrix Spike Dup. % Recovery	EPA Control Limits (%)
Aroclor 1248	3.3	85	82	38-158

MATRIX SPIKE AND SPIKE DUPLICATE RESULTS FOR PCB'S PER EPA 8080 RESULTS IN MG/KG (PPM)

Compound	Sample Result	Matrix Spike Result	Matrix Spike Dup. Result	Relative % Difference
Aroclor 1248	ND	0.36	0.37	1.8

Compound	Spike Level	Matrix Spike % Recovery	Matrix Spike Dup. % Recovery	EPA Control Limits (%)
Aroclor 1248	0.33	110	112	38-158

SQUIER ASSOCIATES

GEOTECHNICAL &
GEOENVIRONMENTAL
CONSULTANTS

4260 Galewood Street
Post Office Box 1317
Lake Oswego, Oregon
97035

503·635·4419
Fax 635·1430

QUALITY ASSURANCE REPORT

PROJECT AND SAMPLE INFORMATION

Project Name: University of Oregon
Project No.: 89384
Lab Name: Pacific Environmental Laboratory
Lab Number: 92-3896
Report date: 12/14/92
Sample No.:
Soil
WSA-S3

ANALYTICAL METHODS

TCLP lead

CHAIN OF CUSTODY DOCUMENTATION

No discrepancies noted.

SAMPLE HOLDING TIMES

Soil and water samples were extracted and analyzed within recommended holding times.

INSTRUMENT CALIBRATION

No discrepancies noted

METHOD DETECTION LIMITS

Detection limits were within laboratory PQLs. Laboratory PQLs are typically below action levels listed in the Oregon Department of Environmental Quality (DEQ) Soil Cleanup Table.

BLANK ANALYSIS

a) Field Blanks - No field blanks collected
b) Method Blanks - Acceptable results

QUALITY CONTROL

a) Accuracy - Acceptable results
b) Precision
   Field duplicate - No field duplicates taken
   Laboratory duplicate - Acceptable results

DATA USE LIMITATIONS

No limitations noted.

PACIFIC
ENVIRONMENTAL
LABORATORY INC.

December 14, 1992

RECEIVED
DEC 22 1992
SQUIER, INC

Squier Associates, Inc.
P.O. Box 1317
Lake Oswego, OR 97035

Attn: William D. Hartford

Re: JOB #89384.7
PEL #92-3896

Enclosed is the lab report for your samples which were received on October 8, 1992. Additional analysis was requested on December 1, 1992.

I. Sample Description

One Water Sample
Four Concrete Samples
Twenty Soil Samples

The samples were received under a chain of custody.

The samples were received in containers consistent with EPA protocol.

II. Quality Control

The in-house QC data you requested is enclosed.

III. Analytical Results

Test methods may include minor modifications of published methods such as detection limits or parameter lists. Solid and waste samples are reported on an "as received" basis unless otherwise noted.

Compounds not detected are listed under results as ND.

Sincerely,

Howard Holmes
Project Manager

Robert R. May
Rob May
Project Manager

9405 S.W. Nimbus Ave. ■ Beaverton, OR 97005 ■ (503) 644-0660 ■ FAX # (503) 644-2202

PACIFIC
ENVIRONMENTAL
LABORATORY INC.

METHOD: T.C.L.P. per EPA 1311, 3005, 6010
Results in mg/L (ppm)

Compound	WSA-S3	Method Blank	Detection Limit
Lead	ND	ND	0.10

9405 S.W. Nimbus Ave. ■ Beaverton, OR 97005 ■ (503) 644-0660 ■ FAX # (503) 644-2202

PACIFIC
ENVIRONMENTAL
LABORATORY INC.

December 14, 1992

Squier Associates, Inc.
P.O. Box 1317
Lake Oswego, OR 97035

Attn: William Hartford

Re: Requested Quality Control Data

Enclosed is the in-house quality control data you requested on PEL project number 92-3896.

Note: Lab blank results are included in the final report.

QUALITY CONTROL DEFINITIONS

LAB BLANK RESULTS

A Lab Blank is a laboratory-generated sample which assesses the degree to which laboratory operations and procedures cause false-positive analytical results for your sample.

No target parameters were detected in the lab blank associated with your sample at the reporting limit levels noted on the data sheets in the final report.

Accuracy is measured by percent recovery as in:

$$\text{\% Recovery} = \frac{\text{(Measured Concentration)}}{\text{(Actual Concentration)}} \times 100$$

Precision is measured using duplicate tests by relative percent difference.

$$\text{RPD} = \frac{(\text{Result of Test 1} - \text{Result of Test 2})}{(\text{Result of Test 1} + \text{Result of Test 2})/2} \times 100$$

If you should have any questions concerning this report, please contact me.

Sincerely,

Howard Boorse
QA/QC Manager

BATCH METHOD SPIKE RESULTS FOR T.C.L.P. METALS PER EPA 1311, 3005, 6010. RESULTS IN MG/L (PPM)

Compound	Spike Level	Spike Result	% Recovery Spike
Lead	5.0	4.9	98

BATCH MATRIX SPIKE AND MATRIX SPIKE DUPLICATE RESULTS FOR T.C.L.P. METALS PER EPA 1311, 3005, 6010 RESULTS IN MG/L (PPM)

Compound	Spike Level	Sample Result	Spike Result	Spike Dup. Result
Lead	5.0	ND	5.0	5.1

Compound	% Recovery Spike	% Recovery Spike Dup.	Relative % Difference
Lead	100	102	2.0

CHAIN OF CUSTODY RECORD

PEL #92-3290

Job Number 89384.7				# Containers	Parameters to be Tested											
Job Name					TPH-IHC ID	EPA 8240	Total Metals EPA 6000, 7000 As, Cr, Hg, Cd, Pb	EPA 8080	Quantity HCID H:43	Wash off test pit & o.d. rinse sheen						
Location Eugene Oregon																
Sample I.D.	Sample Type	Date	Time													
1) WSA-S4	Soil	10/7/92	1450	1	X				✓	✓						
2) WSA-S4A	Soil	10/7/92	1517	4		X	X									
3) PPA-S5	Soil	10/7/92	1550	1	X				✓							
4) WSA-ER1	Water	10/7/92	1415	2		X	X									
5) S132-W1	Soil	10/7/92	9:30	1				X								
6) S132-W2	Concrete	10/7/92	9:15	1				X								
7) S132-W3	Soil	10/7/92	9:30	1				X								
8) S132-E1	Soil	10/6/92	1602	1				X								
9) S132-E2	Concrete	10/7/92	903	1				X								
10) S132-E3	Concrete	10/7/92	903	1				X								
Total Number Containers				14	Sampler Signatures											
Split/Duplicate Samples (Name/Firm)					K H & Ware											

Sample Relinquished by (Signature)	Inclusive Dates from	to	Time	Sample Received by (Signature)	Container Sealed Y	Container Sealed N	4° C Y	4° C N
K H & Ware	10/6/92	10/7/92	10:13	Bob Fabiano				
Bob Fabiano	10/8/92	10/8/92	1050	Julie Reynolds				

Comment:
Got 10% discount, complete QA/QC

Send Report to: W.D. Hartford

Laboratory Number: 92-3290

CHAIN OF CUSTODY RECORD

SQUIER ASSOCIATES

CHAIN OF CUSTODY RECORD

PEL #92-3290

Job Number 89384.7

Job Name

Location Eugene Oregon

	Sample I.D.	Sample Type	Date	Time	# of Containers	EPA 8080	EPA 8240	Total Metals As, Cr, Hg EPA 6000+7000 Cd, Pb	TPH-HCID	Quantify HCID Hits	Waste oil tests if oil range detection					
11	1) PPA-S1	Soil	10/6/92	10:58	1	X										
12	2) PPA-S2	Soil	10/6/92	11:17	1	X										
13	3) PPA-S3	Soil	10/6/92	12:00	1	~~X~~	~~X~~		X	✓						
14	4) PPA-S4	Soil	10/6/92	13:44	1	~~X~~	~~X~~		X	✓						
15	5) WSA-S1	Soil	10/6/92	16:50	2	~~X~~	~~X~~	X								
16	6) WSA-S1A	Soil	10/7/92	950	2		X									
17	7) WSA-S2	Soil	10/7/92	1055	4		X	X								
18	8) WSA-S2A	Soil	10/7/92	1042	4				X	✓	✓					
19	9) WSA-S3	Soil	10/7/92	1120	4				X	✓	✓					
20	10) WSA-S3A	Soil	10/7/92	1425	4		X	X								
	Total Number Containers				28											

Parameters to be Tested

Sampler Signatures

K. L Warren

Split/Duplicate Samples (Name/Firm)

Sample Relinquished by (Signature)	Inclusive Dates from	to	Time	Sample Received by (Signature)	Container Sealed Y	Container Sealed N	4°C Y	4°C N
K L Warren	10/6/92	10/8/92	10:13	Bob Fahrenkrug				
Bob Fahrenkrug	10/8/92	10/8/92	1050	Julie Reynolds				

Comments: U-T 10% discount, complete QA/QC see Howard Holmes

Send Report to: W. D. Hartford

Laboratory Number: 92-3290

CHAIN OF CUSTODY RECORD

SQUIER ASSOCIATES

CHAIN OF CUSTODY RECORD

Job Number 89389.7				# Containers	Parameters to be Tested: EPA 8015
Job Name					
Location: Eugene Oregon					
Sample I.D.	Sample Type	Sample Date	Sample Time		
21 1) S132-N1	Soil	10/6/92	1505	1	X
22 2) S132-N2	Concrete	10/6/92	1551	1	X
23 3) TSA-S1	Soil	10/6/92	15:00	1	X
24 4) TSA-S2	Soil	10/6/92	1511	1	X
25 5) TSA-S3	Soil	10/6/92	1537	1	X
6)					
7)					
8)					
9)					
10)					
Total Number Containers				5	Sampler Signatures: K L Warren
Split/Duplicate Samples (Name/Firm)					

Sample Relinquished by (Signature)	Inclusive Dates from	Inclusive Dates to	Time	Sample Received by (Signature)	Container Sealed Y	Container Sealed N	4°C Y	4°C N
K L Warren	10/6/92	10/8/92	10:13	Bob Fabuchon				
Bob Fabuchon	10/8/92	10/8/92	1050	Julia Reynolds				

Comment: VOA 10% discount, complete QA/QC Data

Send Report to: WD Hartford

Laboratory Number: 92-3290

CHAIN OF CUSTODY RECORD

SQUIER ASSOCIATES

CHAIN OF CUSTODY RECORD

PEL #92-3290

Job Number: 89384.7

Job Name:

Location: Eugene Oregon

Sample I.D.	Sample Type	Sample Date	Sample Time	# Containers	Parameters to be Tested: TPH-HCID	EPA 8240	Total Metals EPA 6000, 7000 As, Cr, Hg, Cd, Pb	EPA 8080	Quantify HCID TPH	Waste Characterization
1) WSA-S4	Soil	10/1/92	1450	1	X				✓	✓
2) WSA-S4A	Soil	10/1/92	1517	4		X	X			
3) PPA-S5	Soil	10/1/92	1550	1	X				✓	
4) WSA-ER1	Water	10/1/92	1415	2		X	X			
5) S132-W1	Soil	10/1/92	9:30	1				X		
6) S132-W2	Concrete	10/1/92	9:15	1				X		
7) S132-W3	Soil	10/1/92	9:30	1				X		
8) S132-E1	Soil	10/6/92	1602	1				X		
9) S132-E2	Concrete	10/1/92	903	1				X		
10) S132-E3	Concrete	10/1/92	903	1				X		
Total Number Containers				14						

Split/Duplicate Samples (Name/Firm):

Sampler Signatures: K M L Warner

Sample Relinquished by (Signature)	Inclusive Dates from	Inclusive Dates to	Time	Sample Received by (Signature)	Container Sealed Y	Container Sealed N	4° C Y	4° C N
K M L Warner	10/6/92	10/7/92	10:13	Bob Fahlin				
Bob Fahlin	10/8/92	10/8/92	1050	Julie Reynolds				

Comment: Add 10% discount, complete QA/QC

Send Report to: W.D. Hartford

Laboratory Number: 92 3290

CHAIN OF CUSTODY RECORD

SQUIER ASSOCIATES

CHAIN OF CUSTODY RECORD

PEL *92-3290

Job Number: 89384.7

Job Name:

Location: Eugene Oregon

	Sample I.D.	Sample Type	Date	Time	# Containers	EPA 8080	EPA 8240	Total Metals EPA 6000+7000 As, Cr, Hg Cd, Pb	TPH-HCID	Quantify HCID Hits	Waste oil tests if oil range detection					
						Parameters to be Tested										
11	1) PPA-S1	Soil	10/6/92	10:58	1	X										
12	2) PPA-S2	Soil	10/6/92	11:17	1	X										
13	3) PPA-S3	Soil	10/6/92	12:00	1	~~X~~			X	✓						
14	4) PPA-S4	Soil	10/6/92	13:44	1	~~X~~			X	✓						
15	5) WSA-S1	Soil	10/6/92	16:50	2	~~X~~	~~X~~	X								
16	6) WSA-S1A	Soil	10/7/92	950	2		X									
17	7) WSA-S2	Soil	10/7/92	1055	4		X	X								
18	8) WSA-S2A	Soil	10/7/92	1012	4				X	✓	✓					
19	9) WSA-S3	Soil	10/7/92	1120	4				X	✓	✓					
20	10) WSA-S3A	Soil	10/7/92	1425	4		X	X								
	Total Number Containers				28	Sampler Signatures										
	Split/Duplicate Samples (Name/Firm)					K H Z Warren										

Sample Relinquished by (Signature)	Inclusive Dates from	to	Time	Sample Received by (Signature)	Container Sealed Y	Sealed N	4°C Y	4°C N
K H Z Warren	10/6/92	10/8/92	10:13	Bob Faherty				
Bob Faherty	10/8/92	10/8/92	1050	Julie Bryson				

Comments: U+O 10% discount, complete QA/QC see Howard Holmes

Send Report to: W. D. Hartford

Laboratory Number: 92-3290

CHAIN OF CUSTODY RECORD

SQUIER ASSOCIATES

CHAIN OF CUSTODY RECORD

Job Number: 89384.7

Job Name:

Location: Eugene, Oregon

	Sample I.D.	Sample Type	Date	Time	# Containers	EPA 8270
21	1) S132-N1	Soil	10/6/92	1505	1	X
22	2) S132-N2	Concrete	10/6/92	1551	1	X
23	3) TSA-S1	Soil	10/6/92	15:00	1	X
24	4) TSA-S2	Soil	10/6/92	1511	1	X
25	5) TSA-S3	Soil	10/6/92	1537	1	X
	6)					
	7)					
	8)					
	9)					
	10)					
	Total Number Containers				5	

Parameters to be Tested

Sampler Signatures: K L Warren

Split/Duplicate Samples (Name/Firm):

Sample Relinquished by (Signature)	Inclusive Dates from	Inclusive Dates to	Time	Sample Received by (Signature)	Container Sealed Y	Container Sealed N	4°C Y	4°C N
K L Warren	10/6/92	10/8/92	10:13	Bob Fullerton				
Bob Fullerton	10/8/92	10/8/92	1050	[illegible]				

Comment: Vol O 10% discount, complete QA/QC Data

Send Report to: WD Hartford

Laboratory Number: 92-3390

CHAIN OF CUSTODY RECORD

SQUIER ASSOCIATES

SQUIER ASSOCIATES

GEOTECHNICAL &
GEOENVIRONMENTAL
CONSULTANTS

4260 Galewood Street
Post Office Box 1317
Lake Oswego, Oregon
97035

503-635-4419
Fax 635-1430

QUALITY ASSURANCE REPORT

PROJECT AND SAMPLE INFORMATION

Project Name: University of Oregon
Project No.: 93759
Lab Name: North Creek Analytical Laboratory
Lab Number: 93759
Report date: 11/10/92
Sample No.:
Soil
B-2 S-3, B-2 S-4, B-1 S-1, B-1 S-4

ANALYTICAL METHODS

TPH-HCID, TPH-418.1M, EPA 8010/8020, PCBs/EPA 8080, TCLP metals: Cd, Cr, Pb

CHAIN OF CUSTODY DOCUMENTATION

No discrepancies noted.

SAMPLE HOLDING TIMES

Soil and water samples were extracted and analyzed within recommended holding times.

INSTRUMENT CALIBRATION

No discrepancies noted.

METHOD DETECTION LIMITS

Detection limits were within laboratory PQLs. Laboratory PQLs are typically below action levels listed in the Oregon Department of Environmental Quality (DEQ) Soil Cleanup Table, except for PCB analysis. However, Oregon Administrative Rules indicate that laboratory PQLs are considered acceptable when PQLs are above Soil Cleanup Table levels.

BLANK ANALYSIS

a) Field Blanks - No field blanks collected
b) Method Blanks - Acceptable results

QUALITY CONTROL

a) AccuracyAcceptable results, except for EPA 8080 laboratory QC sample, spike recovery was outside of laboratory established control limits

b) Precision

Field duplicate

Acceptable results

Laboratory duplicate

Acceptable results, except for TPH-418.1, reported as variation due to non-conformity of soil in the brass tube sampler.

DATA USE LIMITATIONS

No limitations noted.

NORTH CREEK ANALYTICAL

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Phone (503) 624-9800 • FAX (503) 684-3782

Squier Associates
P.O. Box 1317
Lake Oswego, OR 97035
Attention: William S. Hegge

Client Project ID: #93759, Univ. of Oregon
Sample Matrix: Soil
Analysis Method: OR TPH-HCID
First Sample #: 306-7063

Sampled: Jun 11, 1993
Received: Jun 14, 1993
Extracted: Jun 15, 1993
Analyzed: Jun 15, 1993
Reported: Jun 16, 1993

HYDROCARBON IDENTIFICATION

Sample Number	Sample Description	HCID as Gasoline C7 - C10 mg/kg (ppm)	GRO Surrogate Recovery %	HCID as Diesel C10 - C28 mg/kg (ppm)	DRO Surrogate Recovery %	HCID Heavy Oil >C28 mg/kg (ppm)
306-7063	B-2 S-3	<20	87	<50	94	<100
306-7064	B-2 S-4	<20	98	<50	99	<100
306-7065	B-1 S-1	<20	77	<50	85	110
306-7066	B-1 S-4	<20	83	<50	90	<100
BLK061593	Method Blank	<20	80	<50	83	<100

Oregon TPH-HCID is a qualitative procedure which identifies petroleum products containing components in the C6 to >C28 range by Gas Chromatography using a capillary column and a Flame Ionization Detector (FID). While this method is intended to be qualitative, it can be used to eliminate the need of further analysis for those samples which demonstrate TPH levels significantly below the regulatory threshold. Surrogate recovery control limits are 50-150%.

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Philip Nerenberg
Laboratory Manager

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Attention: William S. Hegge

Project: #93759, Univ. of Oregon

Enclosed are the results from 4 soil samples received at North Creek Analytical on June 14,1993. The requested analyses are listed below:

SAMPLE #	SAMPLE DESCRIPTION	DATE OF COLLECTION	TEST METHOD
3067063	Soil, B-2 S-3	6/11/93	OR TPH-HCID
3067064	Soil, B-2 S-4	6/11/93	OR TPH-HCID
3067065	Soil, B-1 S-1	6/11/93	OR TPH 418.1 Modified OR TPH-HCID
3067066	Soil, B-1 S-4	6/11/93	OR TPH-HCID

All samples were analyzed within holding times.

Please contact me if you have any questions. In the meantime, thank you for the opportunity to work with you on this project.

Very truly yours,

NORTH CREEK ANALYTICAL

Philip Nerenberg
Laboratory Manager

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Squier Associates
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Attention: William S. Hegge

Client Project ID: #93759, Univ. of Oregon
Matrix Descript: Soil
Analysis Method: OR TPH 418.1 Modified
First Sample #: 306-7065

Sampled: Jun 11, 1993
Received: Jun 14, 1993
Extracted: Jun 16, 1993
Analyzed: Jun 16, 1993
Reported: Jun 16, 1993

DIESEL & HEAVY OIL RANGE HYDROCARBONS

Sample Number	Sample Description	Sample Result mg/kg (ppm)
306-7065	B-1 S-1	220
BLK061693	Method Blank	N.D.

Reporting Limits:	10

Analytes reported as N.D. were not detected above the stated Reporting Limit
The results reported above are on a WET WEIGHT basis.

NORTH CREEK ANALYTICAL inc

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Squier Associates
P.O. Box 1317
Lake Oswego, OR 97035
Attention: David Earl King

Project: #93759, Univ. of Oregon

Enclosed are the results from 1 soil sample received at North Creek Analytical on June 11,1993. The requested analyses are listed below:

SAMPLE #	SAMPLE DESCRIPTION	DATE OF COLLECTION	TEST METHOD
3067065	Soil, B-1 S-1	6/11/93	EPA 8010/8020 PCB's / EPA 8080 TCLP Metals: Cd, Cr, Pb

All samples were analyzed within holding times.

Please contact me if you have any questions. In the meantime, thank you for the opportunity to work with you on this project.

Very truly yours,

NORTH CREEK ANALYTICAL

Philip Nerenberg
Laboratory Manager

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Squier Associates
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Lake Oswego, OR 97035
Attention: David Earl King

Client Project ID: #93759, Univ. of Oregon
Sample Descript: Soil, B-1 S-1
Analysis Method: EPA 8010
Sample Number: 306-7065

Sampled: Jun 11, 1993
Received: Jun 11, 1993
Analyzed: Jun 24, 1993
Reported: Jun 30, 1993

HALOGENATED VOLATILE ORGANICS

Analyte	Reporting Limit mg/kg (ppm)	Sample Results mg/kg (ppm)
Bromodichloromethane	0.050	N.D.
Bromoform	0.050	N.D.
Bromomethane	0.050	N.D.
Carbon tetrachloride	0.050	N.D.
Chlorobenzene	0.050	N.D.
Chloroethane	0.050	N.D.
Chloroform	0.050	N.D.
Chloromethane	0.050	N.D.
Dibromochloromethane	0.050	N.D.
1,2-Dichlorobenzene	0.050	N.D.
1,3-Dichlorobenzene	0.050	N.D.
1,4-Dichlorobenzene	0.050	N.D.
1,1-Dichloroethane	0.050	N.D.
Dichloroethane	0.050	N.D.
1,1-Dichloroethene	0.050	N.D.
cis 1,2-Dichloroethene	0.050	N.D.
trans 1,2-Dichloroethene	0.050	N.D.
1,2-Dichloropropane	0.050	N.D.
cis-1,3-Dichloropropene	0.050	N.D.
trans-1,3-Dichloropropene	0.050	N.D.
Methylene chloride	0.25	N.D.
1,1,2,2-Tetrachloroethane	0.050	N.D.
Tetrachloroethene	0.050	N.D.
1,1,1-Trichloroethane	0.050	N.D.
1,1,2-Trichloroethane	0.050	N.D.
Trichloroethene	0.050	N.D.
Trichlorofluoromethane	0.050	N.D.
Vinyl chloride	0.050	N.D.

4-Bromofluorobenzene Surrogate Recovery, %: 98
Surrogate Recovery Control Limits are 64 - 110 %.
The results reported above are on a dry weight basis.
Analytes reported as N.D. were not detected above the stated Reporting Limit.

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Squier Associates
P.O. Box 1317
Lake Oswego, OR 97035
Attention: David Earl King

Client Project ID: #93759, Univ. of Oregon
Sample Descript: Soil, Method Blank
Analysis Method: EPA 8010
Sample Number: BLK062493

Analyzed: Jun 24, 1993
Reported: Jun 30, 1993

HALOGENATED VOLATILE ORGANICS

Analyte	Reporting Limit mg/kg (ppm)	Sample Results mg/kg (ppm)
Bromodichloromethane	0.050	N.D.
Bromoform	0.050	N.D.
Bromomethane	0.050	N.D.
Carbon tetrachloride	0.050	N.D.
Chlorobenzene	0.050	N.D.
Chloroethane	0.050	N.D.
Chloroform	0.050	N.D.
Chloromethane	0.050	N.D.
Dibromochloromethane	0.050	N.D.
1,2-Dichlorobenzene	0.050	N.D.
1,3-Dichlorobenzene	0.050	N.D.
1,4-Dichlorobenzene	0.050	N.D.
1-Dichloroethane	0.050	N.D.
-Dichloroethane	0.050	N.D.
1,1-Dichloroethene	0.050	N.D.
cis 1,2-Dichloroethene	0.050	N.D.
trans 1,2-Dichloroethene	0.050	N.D.
1,2-Dichloropropane	0.050	N.D.
cis-1,3-Dichloropropene	0.050	N.D.
trans-1,3-Dichloropropene	0.050	N.D.
Methylene chloride	0.25	N.D.
1,1,2,2-Tetrachloroethane	0.050	N.D.
Tetrachloroethene	0.050	N.D.
1,1,1-Trichloroethane	0.050	N.D.
1,1,2-Trichloroethane	0.050	N.D.
Trichloroethene	0.050	N.D.
Trichlorofluoromethane	0.050	N.D.
Vinyl chloride	0.050	N.D.

4-Bromofluorobenzene Surrogate Recovery, %: 96
Surrogate Recovery Control Limits are 64 - 110 %.
The results reported above are on a dry weight basis.
Analytes reported as N.D. were not detected above the stated Reporting Limit

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Squier Associates
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Attention: David Earl King

Client Project ID: #93759, Univ. of Oregon
Sample Descript: Soil, B-1 S-1
Analysis Method: EPA 8020
Sample Number: 306-7065

Sampled: Jun 11, 1993
Received: Jun 11, 1993
Analyzed: Jun 24, 1993
Reported: Jun 30, 1993

AROMATIC VOLATILE ORGANICS

Analyte	Reporting Limit mg/kg (ppm)	Sample Results mg/kg (ppm)
Benzene	0.050	N.D.
Chlorobenzene	0.050	N.D.
1,4-Dichlorobenzene	0.050	N.D.
1,3-Dichlorobenzene	0.050	N.D.
1,2-Dichlorobenzene	0.050	N.D.
Ethyl Benzene	0.050	N.D.
Toluene	0.050	N.D.
Xylenes	0.10	N.D.

4-Bromofluorobenzene Surrogate Recovery, %: 95
Surrogate Recovery Control Limits are 67 - 109 %.
The results reported above are on a dry weight basis.
Analytes reported as N.D. were not detected above the stated Reporting Limit.

NORTH CREEK ANALYTICAL Inc.

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Attention: David Earl King

Client Project ID: #93759, Univ. of Oregon
Sample Descript: Soil, Method Blank
Analysis Method: EPA 8020
Sample Number: BLK062493

Analyzed: Jun 24, 1993
Reported: Jun 30, 1993

AROMATIC VOLATILE ORGANICS

Analyte	Reporting Limit mg/kg (ppm)	Sample Results mg/kg (ppm)
Benzene	0.050	N.D.
Chlorobenzene	0.050	N.D.
1,4-Dichlorobenzene	0.050	N.D.
1,3-Dichlorobenzene	0.050	N.D.
1,2-Dichlorobenzene	0.050	N.D.
Ethyl Benzene	0.050	N.D.
Toluene	0.050	N.D.
Xylenes	0.10	N.D.

4-Bromofluorobenzene Surrogate Recovery, % 96
Surrogate Recovery Control Limits are 67 - 109 %
The results reported above are on a dry weight basis
Analytes reported as N.D. were not detected above the stated Reporting Limit

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Attention: David Earl King

Client Project ID: #93759, Univ. of Oregon
Sample Matrix: Soil
Analysis Method: EPA 8010/8020
Units: mg/kg (ppm)
QC Sample #: 306-7024

Analyst: P. Nerenberg

Analyzed: Jun 3, 1993
Reported: Jun 30, 1993

MATRIX SPIKE QUALITY CONTROL DATA REPORT

ANALYTE	1,1-DCE	TCE	Chloro-Benzene	Benzene	Toluene
Sample Result:	N.D.	N.D.	N.D.	N.D.	N.D.
Spike Conc. Added:	1.0	1.0	1.0	1.0	1.0
Spike Result:	1.03	0.96	0.99	0.91	0.90
Spike % Recovery:	103%	96%	99%	91%	90%
Spike Dup. Result:	1.07	0.98	1.03	0.95	0.95
Spike Duplicate % Recovery:	107%	98%	103%	95%	95%
Upper Control Limit %:	110	110	110	115	116
Lower Control Limit %:	70	70	70	61	68
Relative % Difference:	3.8%	2.1%	4.0%	4.3%	5.3%
Maximum RPD:	20	20	20	11	8.0

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Philip Nerenberg
Laboratory Manager

$$\%\ \text{Recovery:} \quad \frac{\text{Spike Result - Sample Result}}{\text{Spike Conc. Added}} \times 100$$

$$\text{Relative \% Difference:} \quad \frac{\text{Spike Result - Spike Dup. Result}}{\text{(Spike Result + Spike Dup. Result) / 2}} \times 100$$

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Squier Associates
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Attention: David Earl King

Client Project ID: #93759, Univ. of Oregon
Sample Descript: Soil, B-1 S-1
Analysis Method: EPA 8080
Sample Number: 306-7065

Sampled: Jun 11, 1993
Received: Jun 11, 1993
Extracted: Jun 23, 1993
Analyzed: Jun 25, 1993
Reported: Jun 30, 1993

POLYCHLORINATED BIPHENYLS

Analyte	Reporting Limit mg/kg (ppm)	Sample Results mg/kg (ppm)
PCB 1016	0.050	N.D.
PCB 1221	0.050	N.D.
PCB 1232	0.050	N.D.
PCB 1242	0.050	N.D.
PCB 1248	0.050	N.D.
PCB 1254	0.050	N.D.
PCB 1260	0.050	N.D.

Tetrachloro-m-xylene Surrogate Recovery, % 122
Surrogate Recovery Control Limits are 35 - 124 %
The results reported above are on a dry weight basis
Analytes reported as N.D. were not detected above the stated Reporting Limit.

NORTH CREEK ANALYTICAL Inc.

Philip Nerenberg
Laboratory Manager

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Squier Associates
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Lake Oswego, OR 97035
Attention: David Earl King

Client Project ID: #93759, Univ. of Oregon
Sample Descript: Soil, Method Blank
Analysis Method: EPA 8080
Sample Number: BLK062393

Extracted: Jun 23, 1993
Analyzed: Jun 25, 1993
Reported: Jun 30, 1993

POLYCHLORINATED BIPHENYLS

Analyte	Reporting Limit mg/kg (ppm)	Sample Results mg/kg (ppm)
PCB 1016	0.050	N.D.
PCB 1221	0.050	N.D.
PCB 1232	0.050	N.D.
PCB 1242	0.050	N.D.
PCB 1248	0.050	N.D.
PCB 1254	0.050	N.D.
PCB 1260	0.050	N.D.

Tetrachloro-m-xylene Surrogate Recovery, %: 76
Surrogate Recovery Control Limits are 35 - 124 %.
The results reported above are on a dry weight basis.
Analytes reported as N.D. were not detected above the stated Reporting Limit.

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Attention: David Earl King

Client Project ID: #93759, Univ. of Oregon
Sample Descript: Soil, B-1 S-1
Analysis Method: EPA 1311/6010/7000
Sample Number: 306-7065

Sampled: Jun 11, 1993
Received: Jun 11, 1993
TCLP Ext: Jun 25, 1993
Analyzed: Jun 29, 1993
Reported: Jun 30, 1993

TCLP Extraction Metals

Analyte	Regulatory Level mg/L (ppm)	Reporting Limit mg/L (ppm)	Sample Results mg/L (ppm)
Cadmium	1.0	0.0050	N.D.
Chromium	5.0	0.020	N.D.
Lead	5.0	0.10	N.D.

Analytes reported as N.D. were not detected above the stated Reporting Limit.

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Attention: David Earl King

Client Project ID: #93759, Univ. of Oregon
Sample Descript: Soil, Method Blank
Analysis Method: EPA 1311/6010/7000
Sample Number: BLK062593

TCLP Ext: Jun 25, 1993
Analyzed: Jun 29, 1993
Reported: Jun 30, 1993

TCLP Extraction Metals

Analyte	Regulatory Level mg/L (ppm)	Reporting Limit mg/L (ppm)	Sample Results mg/L (ppm)
Cadmium	1.0	0.0050	N.D.
Chromium	5.0	0.020	N.D.
Lead	5.0	0.10	N.D.

Analytes reported as N.D. were not detected above the stated Reporting Limit.

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Philip Nerenberg
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Attention: David Earl King

Client Project ID: #93759, Univ. of Oregon
Sample Matrix : Soil
Units: mg/L (ppm)

Analyst: B.K.O.

Digested: Jun 28, 1993
Reported: Jun 30, 1993

METALS QUALITY CONTROL DATA REPORT

ANALYTE	Cadmium	Chromium	Lead
EPA Method:	1311/6010	1311/6010	1311/6010
Date Analyzed:	6/29/93	6/29/93	6/29/93
ACCURACY ASSESSMENT			
LCS Spike Conc. Added:	1.0	1.0	1.0
LCS Spike Result:	0.86	0.81	0.75
LCS Spike % Recovery:	86	81	75
Upper Control Limit:	109	103	111
Lower Control Limit:	62	62	58
Matrix Spike Sample #:	306-1374	306-1374	306-1374
Matrix Spike % Recovery:	74	74	60
PRECISION ASSESSMENT			
Sample #:	306-1374	306-1374	306-1374
Original:	N.D.	N.D.	1.6
Duplicate:	N.D.	N.D.	1.6
Relative % Difference:	Q4	Q4	0.0

Q4 = Relative Percent Difference values are not reported at sample concentrations less than ten times (10X) the Reporting Limit.

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Philip Nerenberg
Laboratory Manager

Lab Control Sample % Recovery: $\frac{\text{Conc. of L.C.S.}}{\text{L.C.S. Spike Conc. Added}} \times 100$

Relative % Difference: $\frac{\text{Original Result - Duplicate Result}}{(\text{Original Result + Duplicate Result}) / 2} \times 100$

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Squier Associates
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Lake Oswego, OR 97035
Attention: David Earl King

Client Project ID: #93759, Univ. of Oregon
Sample Matrix: Soil

First Sample #: 306-7065

Received: Jun 11, 1993
Reported: Jun 30, 1993

TOTAL SOLIDS & MOISTURE CONTENT REPORT

Sample Number	Sample Description	Total Solids %	Moisture Content %
306-7065	B-1 S-1	72	28

The enclosed analytical results for soils, sediments and sludges, except as noted, have been converted to a DRY WEIGHT reporting basis.
To attain the wet weight "as received" equivalent, multiply the dry weight result by the decimal fraction of percent Total Solids.
The results in this report apply to the samples analyzed in accordance with the chain of custody document.
This analytical report must be reproduced in its entirety.

NORTH CREEK ANALYTICAL Inc.

Philip Nerenberg
Laboratory Manager

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Squier Associates
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Lake Oswego, OR 97035
Attention: William S. Hegge

Client Project ID: #93759, Univ. of Oregon
EPA Method: OR TPH 418.1
Sample Matrix: Soil
Units: mg/kg (ppm)

Analyst: W. Byrne

Extracted: Jun 16, 1993
Analyzed: Jun 16, 1993
Reported: Jun 16, 1993

HYDROCARBON QUALITY CONTROL DATA REPORT

ACCURACY ASSESSMENT
Laboratory Control Sample

Heating Oil

Spike Conc. Added:	25.3
Spike Result:	17.6
% Recovery:	70
Upper Control Limit %:	143
Lower Control Limit %:	57

PRECISION ASSESSMENT
Sample Duplicate

Diesel & Heavy Oil Range Hydrocarbons

Sample Number:	306-7065
Original Result:	220
Duplicate Result:	31*
Relative % Difference:	Relative Percent Difference values are not reported at sample concentration levels less than 10 times the Detection Limit.
Maximum RPD:	50

*Variation due to non-conformity of soil in the brass tube.

NORTH CREEK ANALYTICAL inc

Philip Nerenberg
Laboratory Manager

$$\%\ \text{Recovery:} \quad \frac{\text{Spike Result}}{\text{Spike Concentration Added}} \times 100$$

$$\text{Relative \% Difference:} \quad \frac{\text{Original Result - Duplicate Result}}{(\text{Original Result + Duplicate Result}) \ / \ 2} \times 100$$

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Squier Associates
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Lake Oswego, OR 97035
Attention: David Earl King

Client Project ID: #93759, Univ. of Oregon
Sample Matrix: Soil
Analysis Method: EPA 8080
Units: mg/kg (ppm)
QC Sample #: 306-1068

Analyst: J. Cooper

Extracted: Jun 23, 1993
Analyzed: Jun 25, 1993
Reported: Jun 30, 1993

MATRIX SPIKE QUALITY CONTROL DATA REPORT

ANALYTE	Aroclor 1260
Sample Result:	0.114
Spike Conc. Added:	0.067
Spike Result:	0.141
Spike % Recovery:	40%*
Spike Dup. Result:	0.149
Spike Duplicate % Recovery:	52%
Upper Control Limit %:	129
Lower Control Limit %:	43
Relative % Difference:	6.0
Maximum RPD:	50

NORTH CREEK ANALYTICAL Inc.

Philip Nerenberg
Laboratory Manager

Please Note:
*Q1 = The Spike recovery for this Q.C. sample is outside of NCA established control limits.

CHAIN OF CUSTODY RECORD

Job Number 93759

Job Name U of O

Location EUGENE

Sample I.D.	Sample Type	Sample Date	Sample Time	# Containers	TPH-HCID	appropriate OHR TPH (Please call)	635-4419	418.1 per 6-16-93	add 8010/8020 PCB's	TCLP Cd, Cr, Pb per	Docking 6/22/93				
1) B-2 S-3	soil	6/11/93	11:30	2	✓	X						7063			4-D
2) B-2 S-4	soil	6/11/93	9:45	2	✓	X						7064			
3) B-1 S-1	soil	6/11/93	12:40	2	✓	X		X				7065			
4) B-1 S-4	soil	6/11/93	12:55	2	✓	X						7066			
5)															
6)															
7)															
8)															
9)															
10)															
Total Number Containers				8											

Split/Duplicate Samples (Name/Firm)

Sampler Signatures

Sample Relinquished by (Signature)	Inclusive Dates from	to	Time	Sample Received by (Signature)	Container Sealed Y	Sealed N	4°C Y	4°C N
	6/11/93	6/11/93	17:00		X		X	
	6/11/93				X		X	

Send Report to: WILLIAM S. HEGGE

Laboratory Number: _____

CHAIN OF CUSTODY RECORD

SQUIER ASSOCIATES

APPENDIX F

SUMMARY REPORT FOR DECOMMISSIONING OF UNDERGROUND STORAGE TANKS

University of Oregon
Physical Plant
1295 Franklin Boulevard
Eugene, Oregon

October 15, 1990

OMNICON
ENVIRONMENTAL MANAGEMENT

SUMMARY REPORT FOR DECOMMISSIONING OF UNDERGROUND STORAGE TANKS

University of Oregon
Physical Plant
1295 Franklin Boulevard
Eugene, Oregon

October 15, 1990

OMNICON
ENVIRONMENTAL MANAGEMENT

89062 BLUE VIEW DRIVE
VENETA, OREGON 97487-9630 USA
(503) 935-1742

Printed on Recycled Paper

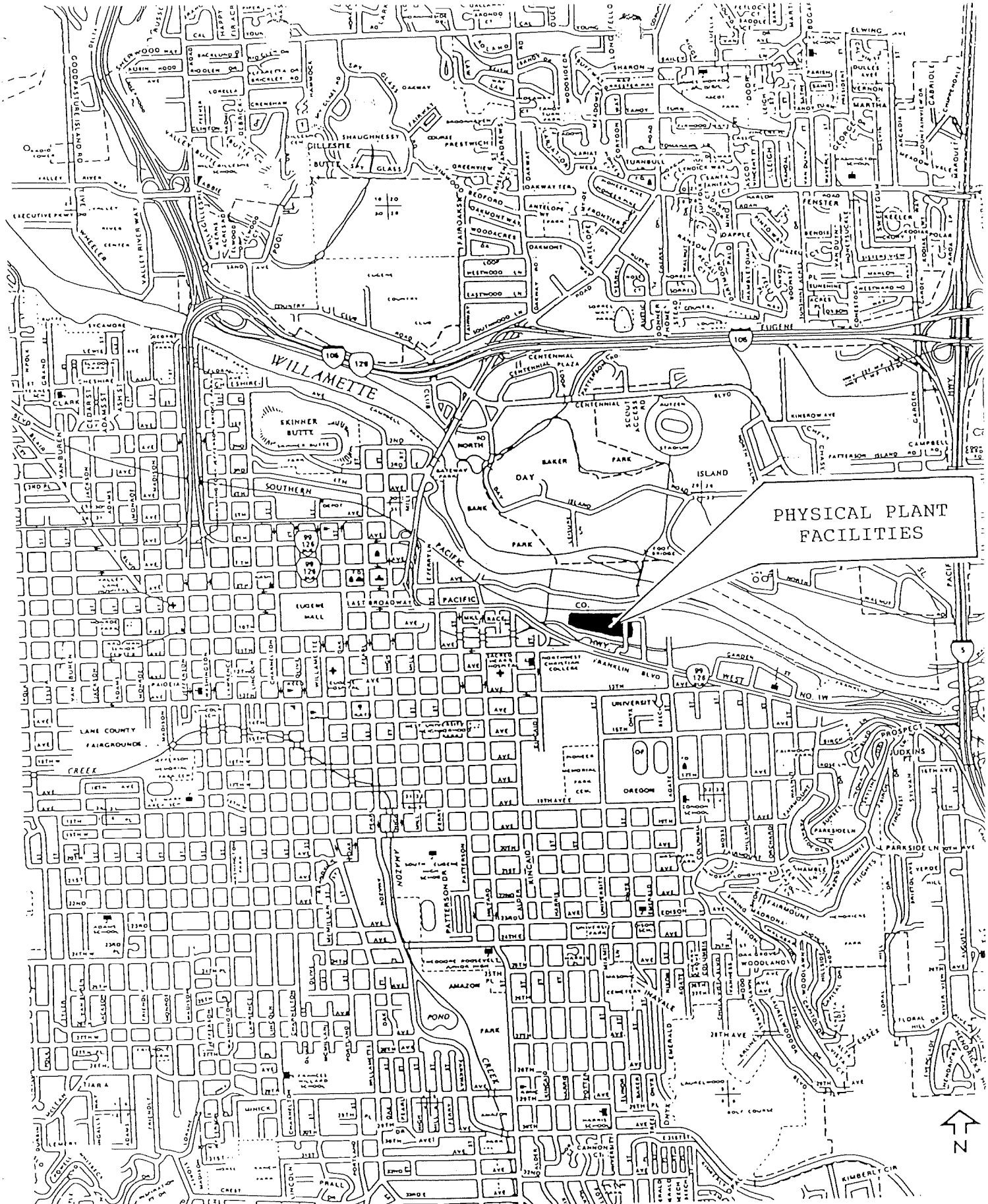


FIGURE 1: Vicinity Map

1" = 0.4 mi

SUMMARY REPORT FOR DECOMMISSIONING OF UNDERGROUND STORAGE TANKS

University of Oregon
Physical Plant
1295 Franklin Boulevard
Eugene, Oregon

INTRODUCTION.

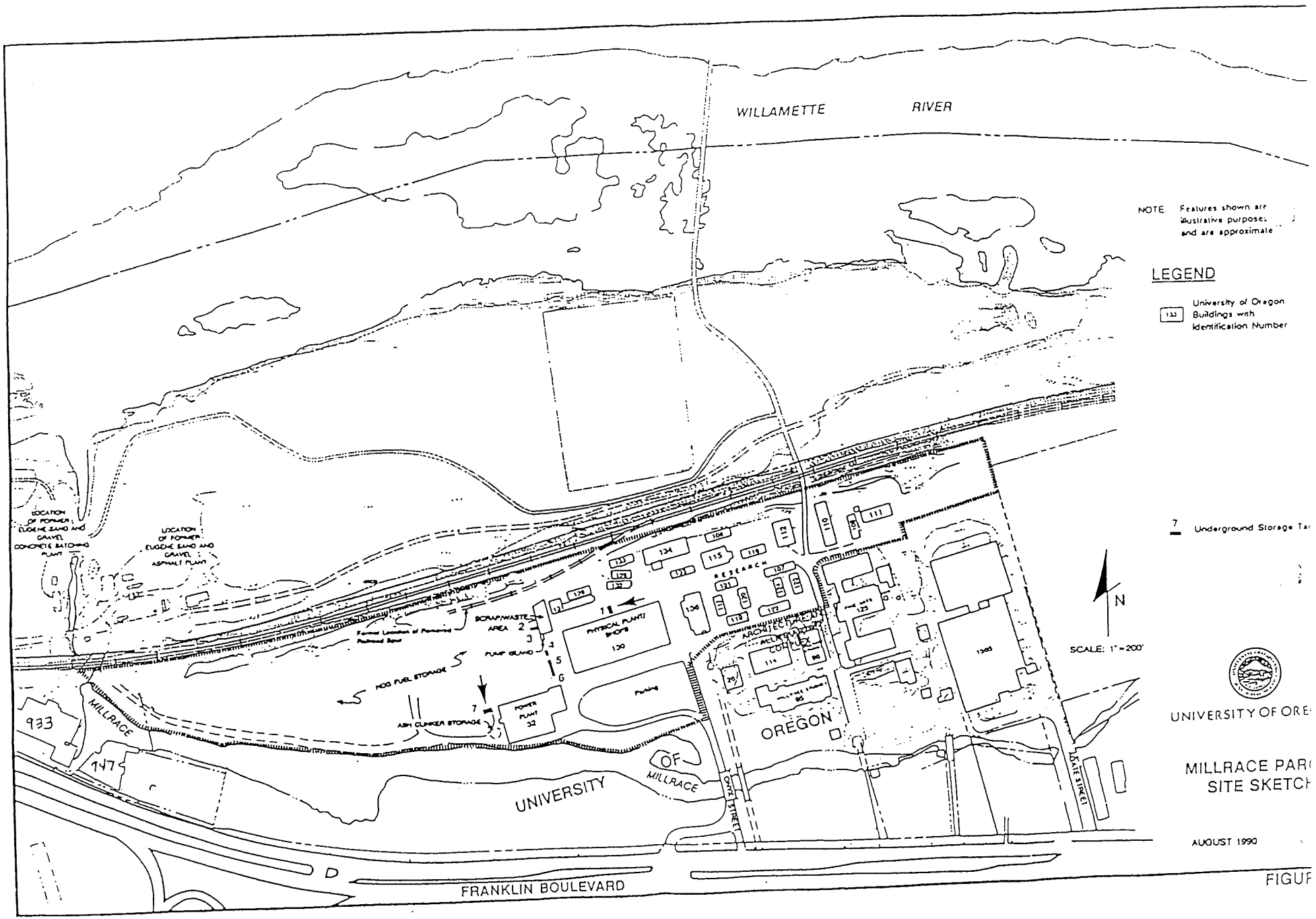
This report presents a summary of underground storage tank decommissioning operations, and subsequent site remediation activities, as required by OAR 340-122-201 through -260, and OAR 340-122-301 through -360, for two systems formerly located at the University of Oregon Physical Plant facilities.

BACKGROUND.

Two 1,000 gallon underground storage tanks were decommissioned by Staton Construction, Inc. (Eugene, OR) on September 14, 1990 (see Appendix 2 for permits).

Tank No. 1 (located at 1205 Franklin Boulevard; see Figure 2) was installed in 1961, and used to store gasoline. Tank No. 7 (1155 Franklin Boulevard; see Figure 2) was identified during a recent environmental assessment conducted at the Physical Plant facility. This tank was used to store diesel fuel; the date of installation is unknown.

OMNICON Environmental Management was retained to provide an independent assessment of environmental contaminant remediation activities occurring as part of the decommissioning process.


WILLAMETTE RIVER
NOTE: Features shown are illustrative purposes and are approximate
LEGEND
University of Oregon Buildings with Identification Number
7 Underground Storage Tar
N
SCALE: 1" = 200'
UNIVERSITY OF ORE
MILLRACE PAR
SITE SKETCH
AUGUST 1990
FIGUR
OREGON
UNIVERSITY OF MILLRACE
MILLRACE
FRANKLIN BOULEVARD
933
147
OAK STREET
AGATE STREET
RESEARCH
ARCHITECTURE
ASH CLINKER STORAGE
HOG FUEL STORAGE
POWER PLANT 32
PHYSICAL PLANT BLDGS 130
LOCATION OF FORMER EUGENE SAND AND GRAVEL CONCRETE BATCHING PLANT
LOCATION OF FORMER EUGENE SAND AND GRAVEL ASPHALT PLANT

SITE CHARACTERISTICS.

A. Surface Characteristics:

The Physical Plant facility is located on a relatively level site. Local elevations gradually decrease to the south (towards the Millrace) and to the north (towards the Willamette River) of the site.

Tank No. 1 was located in an area covered by asphaltic paving and concrete building foundations. Tank No. 7 was in an area that had no substantive surface covering (i.e., gravel or bare earth surface).

B. Subsurface Characteristics:

1. Geology. Research and observations by others (L.R. Squier Associates; 1990), and our own review of published data for the subject vicinity, indicates that the Physical Plant facility is underlain by Holocene alluvial deposits of sand and gravel with locally interspersed lenses of silt. Silts containing high concentrations of natural organic materials may be found in the upper horizons of this alluvium, the result of the site's previous marsh land characteristic.

A predominantly sandstone and siltstone bedrock underlies the alluvium. The depth to bedrock is highly variable; borings in the immediate vicinity of the Physical Plant facility indicate that bedrock can be encountered at depths of between 16 and 30 ft. Boring data also indicates that the native alluvium is

generally overlain by 4 - 10 ft of made-made fill materials, consisting of silts, sand, gravel, cobbles, organic silts, and wood fragments (L.R. Squier Associates; 1990).

The specific surficial geology encountered at each tank site is discussed elsewhere in this report.

2. Hydrology.

Water well reports, and other data from the U.S. Geological Survey, indicate that shallow water-bearing zones are present in the vicinity of the Physical Plant facility at depths of between 5 and 40 ft. Recent borings, and our experience in the vicinity, indicate the winter (high) water table at this site is, on average, located at a depth of 12 - 16 ft. These shallow groundwaters are typically referred to as a perched water system; the underlying bedrock is believed to present a general barrier to downward migration of the overlying groundwaters.

Deeper water-bearing zones have also been described in the vicinity at depths of approximately 120-150 ft, 200 ft, and 300 ft.

The regional hydrological gradient in the vicinity of this site is towards the northwest, subparalleling the flow of the Willamette River. However, local variations in water conditions, which result in flow directions different than the direction of the regional gradient, often exist. In particular, shallow groundwater components can be expected to follow the direction of the

topological grade, and may also be influenced by nearby surface waters, and underground utility and foundation excavations.

Available information suggests that an underground channel, trending to the northeast, may exist in the vicinity of the Physical Plant facility (L.R. Squier Associates; 1990). Shallow groundwaters might preferentially migrate, within this channel towards, the Willamette River. Conversely, the nearby Millrace might also serve as a point of discharge for components of the uppermost groundwater system. As a result of these local features, it is not possible to conclusively determine the precise direction of flow of shallow groundwaters, and hence, possible groundwater-borne contaminants, without additional site-specific investigation.

Groundwater use in the immediate vicinity of the subject site has historically been primarily for industrial and irrigation purposes; municipal drinking water has been supplied within the City of Eugene since at least 1911. Some domestic water wells may have been drilled in the vicinity through the mid-1960s. However, City regulations currently prohibit the use of domestic wells within City limits. It is generally believed that there are currently no active drinking water wells in the vicinity of the Physical Plant facility. Most active wells known to exist in the vicinity are used for either industrial or thermal withdrawl purposes.

C. Site Sensitivity:

Evaluation of site sensitivity and appropriate matrix cleanup levels, in accordance with OAR 340-122-325 through -335, generated the following data:

MATRIX PARAMETER	SITE CONDITION	MATRIX SCORE
Depth To Groundwater	<25 ft	10
Annual Precipitation	>40 in	10
Native Soils	moderately permeable	5
Uppermost Aquifer	potable, not currently used	4
Potential Receptors	Medium/Many	10
	TOTAL MATRIX SCORE	39

The site is therefore a Level 2 site, and the appropriate numeric soil cleanup levels (TPH) are 80 ppm for gasoline and 500 ppm for non-gasoline petroleum contaminants.

METHODOLOGY.

Personnel from OMNICON Environmental Management monitored the contaminated soil removal process, and acquired final remediation samples. Preliminary contamination monitoring was conducted with an HNU Model 101 Photoionization Detector (PID) calibrated against Benzene.

Soil samples were acquired from the excavation pits with either a

clean stainless steel trowel, or a soil recovery auger. In situations where it was not safe or practical to directly sample from the excavation pits, samples were taken from soil materials brought to the surface by the excavator bucket. Samples were placed into clean 500 ml jars having teflon lid liners and sealed. Care was taken to pack each jar tightly with sample material so as to minimize headspace and the potential for loss of volatile components.

All samples were labeled with unique identification numbers, stored at 4° C., and then hand delivered to Water Analysis & Consulting, Inc. (Eugene, OR) for laboratory analysis.

Samples were analyzed for total petroleum hydrocarbons (TPH) by EPA Method 418.1. Where appropriate, hydrocarbon identification (HCID) was conducted by GC/FID. All sampling activities and analytical procedures were conducted in strict compliance with OAR 340-122-301 through -360.

TANK REMOVAL AND INITIAL ASSESSMENT.

Tank No. 7:

The 1,000 gal diesel tank was removed without incident, and found to be structurally sound (see Photographs). Approximately 200 gal of diesel product was pumped out of the tank prior to removal, and disposed at Fuel Processors, Inc. (Portland, OR). A short vertical pipe stub was attached to the tank. However, no other piping was found, and it is not known to what this tank was originally connected

The backfill medium originally used at tank installation was medium crushed rock. No evidence of release of petroleum product was detected either visually, or by PID monitoring. A sample was acquired from the beneath where each end of the tank had been located, and sent for laboratory analysis (see Figure 3 for sampling locations). The results of these analyses are as follows:

SAMPLE ID	MATRIX	DEPTH (ft)	RESULTS (TPH; ppm)
UO-01-2	gravel	6	48
UO-02-2	gravel	6	<20

Laboratory reports, and Chain of Custody records, are located in Appendix 1 of this report.

These results indicate the presence of low concentrations of contaminants beneath where the fill neck had been located; the contamination most likely resulted from occassional tank overfills. The residual petroleum contaminants detected are well within DEQ soil matrix criteria for diesel fuel. Consequently, the tank excavation was refilled using the original backfill materials, and fresh crushed rock. The purged tank was moved to Staton Construction's yard, where it will be processed for disposal as salvage metal, and delivered to Snitzer Steel Products (Portland, OR).

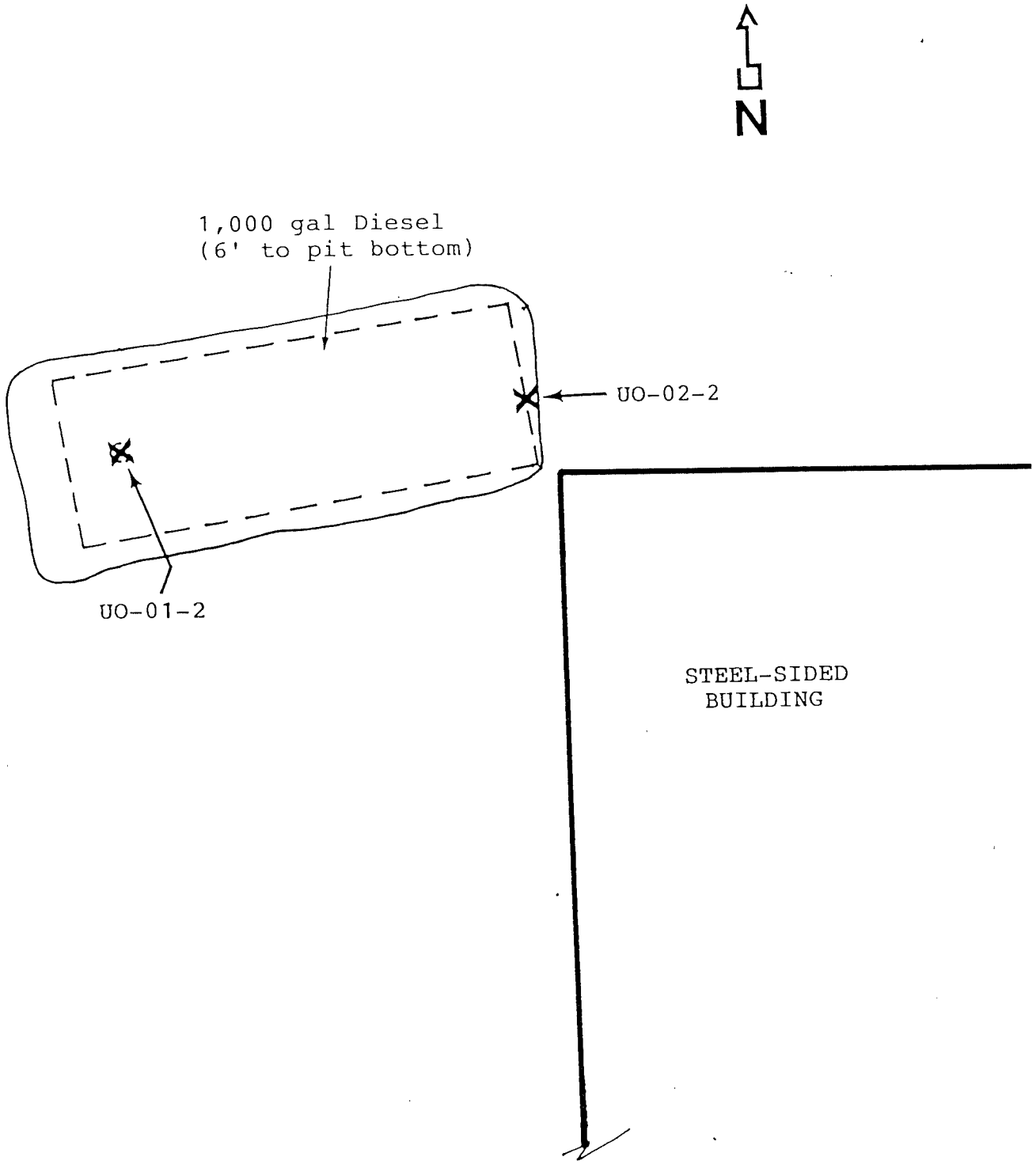
Tank No. 1:

The 1,000 gal gasoline tank was removed without incident, and found

FIGURE 3

Tank No. 7

1" = 4'



to be structurally sound (see Photographs). Approximately 30 gal of gasoline was pumped out of the tank prior to removal, and disposed at Fuel Processors, Inc. (Portland, OR).

The piping for this tank originally ran to a pump located approximately 6 ft away. This piping was found to be fully-enclosed inside a concrete trough, filled with sand. No defects in the piping were observed (see Photographs), and no evidence of product release detected (PID monitoring and visual/olfactory inspection of sand fill).

The backfill medium originally used at tank installation was a mixture of sand, gravel, and silty/sandy clay loams. Initial PID monitoring of the tank excavation detected organic vapors at the east end of the pit, beneath where the fill neck had been located. The results of this monitoring are as follows:

LOCATION FROM EAST END OF TANK (ft)	DEPTH (ft)	VAPOR CONCENTRATION (ppm)
0	6.5	15 - 20
3.5	6.5	0 - 15
5	6.5	0 - 10
0	7	30 - 50
1.5	7	90 - 100
1.5	7.5	100 - 150
4.5	8.5	150 - 200

NOTE: Tank bottom was at 6.5 ft

A sample was acquired from each end of the tank excavation and sent for laboratory analysis (see Figure 4 for sampling locations). The results of these analyses are as follows:

SAMPLE ID	LOCATION	MATRIX	DEPTH (ft)	RESULTS (TPH; ppm)
UO-01-1	west end	soil	7	<20
UO-02-1	east end	soil	8.5	218

Laboratory reports, and Chain of Custody records, are located in Appendix 1 of this report.

Hydrocarbon Identification performed on samples of the impacted soils confirmed that the contaminant was gasoline. Based upon the data acquired, it was concluded that releases of gasoline, presumably the result of chronic tank overfills, had occurred, and the residual contamination levels were in excess of current DEQ soil matrix criteria.

The purged tank was moved to Staton Construction's yard, where it will be processed for disposal as salvage metal, and delivered to Snitzer Steel Products (Portland, OR).

SITE REMEDIATION.

Personel from Staton Construction excavated contaminated soils from the tank pit on September 21, 1990. Contaminated soils were removed by backhoe and excavator (trackhoe). Remedial excavation work was monitored by OMNICON personnel. The presence of petroleum

FIGURE 4
Tank No. 1
1" = 10'

contaminants was evidenced by odor, PID detection, and the silvery-gray color of the impacted soil materials.

Soils encountered in the excavation pit are charactized as follows:

0 - 3"	depth:	asphaltic paving
3" - 6.5'	depth:	sand, gravel, small rock, construction debris
6.5' - 8.5'	depth:	medium and large rock interspersed with loose sandy silt (dark gray)
8.5' - 10'	depth:	dense clayey silt or silty clay (dark gray)
10' - 11'	depth:	bar run (small rock) and sand

The eastern two-thirds of the tank pit was excavated to a final depth of 11 ft. The northern and eastern sidewalls were then overcut until no further organic vapor was detected in the remaining soils by PID. The southern sidewall was overcut to within approximately 5 ft of the adjacent Physical Plant Shops building. Even though obviously impacted soils remained, further excavation of this sidewall was not attempted due to the extremely unstable nature of the soil materials.

The final excavation area is shown in Figure 5. No groundwater was encountered in the excavation pit. Five additional soil samples were acquired from the pit for laboratory analysis; the sampling locations are also shown in Figure 5. The analytical results for these samples is shown in Table 1.

Laboratory reports, and Chain of Custody records, are located in Appendix 1 of this report.

All contaminated soils (approximately 70 cu yd) were subsequently removed from the site and disposed of at an authorized Lane County

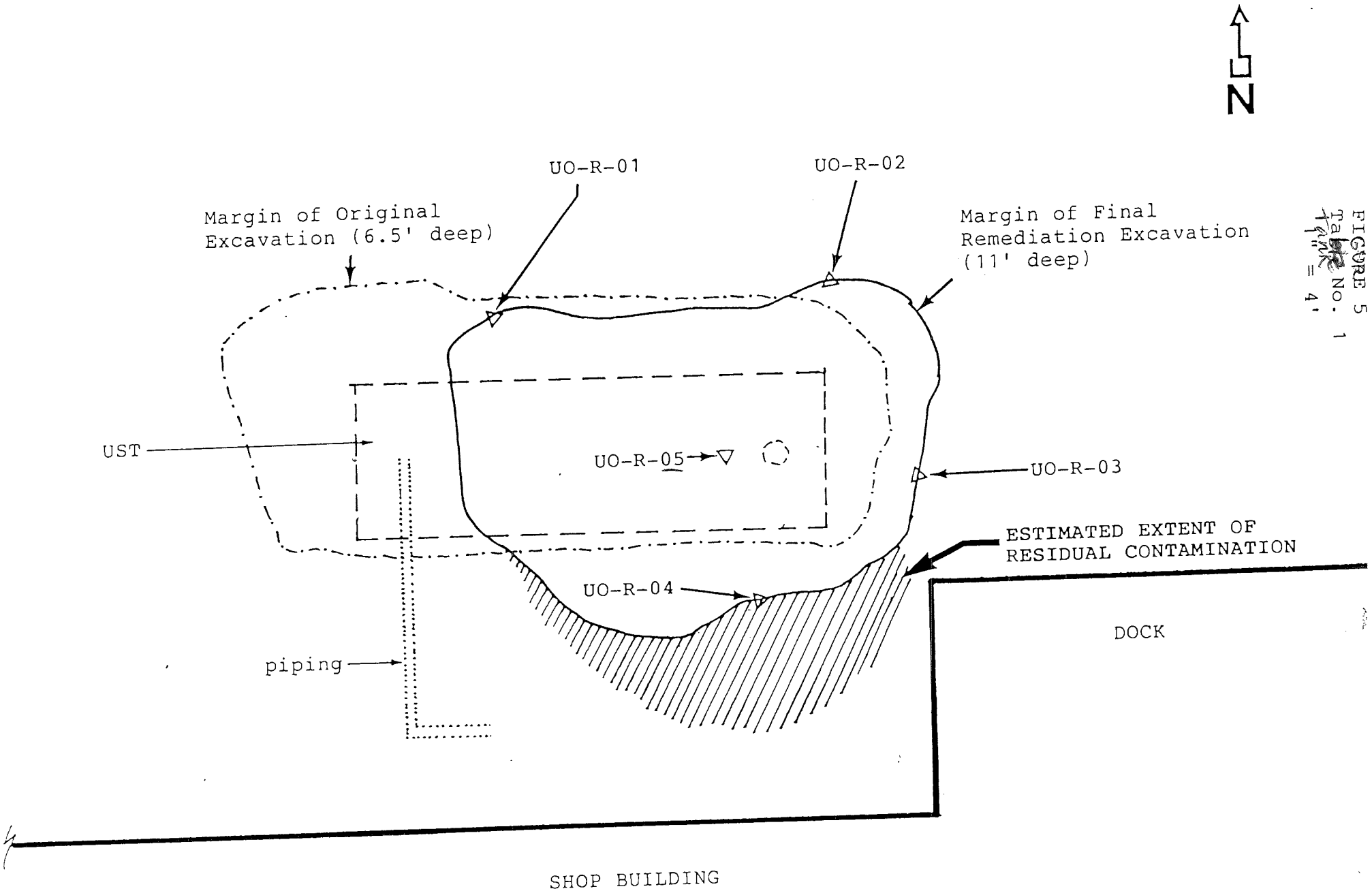


FIGURE 5
Tank No. 1
1" = 4'

TABLE 1

SAMPLE ID	LOCATION	MATRIX	DEPTH (ft)	RESULTS (TPH; ppm)
UO-R-01	West end of north sidewall	gray sandy silt, silty clay & medium/large rock	7 - 9*	<20
UO-R-02	East end of north sidewall	gray sandy silt, silty clay & medium/large rock	7 - 9*	<20
UO-R-03	Middle of east sidewall	gray sandy silt, silty clay & medium/large rock	7 - 9*	<20
UO-R-04	Middle of south sidewall	gray silty clay	8 - 9*	572
UO-R-05	Bottom	sand and bar run	11#	<20

NOTES:

* Sampled material acquired by excavator bucket; representative samples from entire bucket monitored by PID prior to taking laboratory sample.

\# Sample acquired by soil recovery auger.

solid waste facility (Short Mountain sanitary landfill, Goshen, OR; see Appendix 2). The excavation pit was closed with clean fill materials.

CONCLUSIONS AND RECOMMENDATIONS.

Tank No. 7: The results of the sampling and laboratory analyses conducted indicate that a very low concentration of residual diesel contamination is present at the west end of the tank excavation pit. This contamination is, however, well within current acceptable limits, such that no remedial action is necessary.

Tank No. 1: Analysis of post-remedial action samples indicate that all areas of the excavation pit are free of detectable levels of gasoline contamination. However, a portion of the south sidewall continues to contain concentrations of gasoline that significantly exceed current regulatory cleanup standards.

Based upon our observations made during the remediation work at this site, it appears that gasoline released as the result of tank overfilling migrated into the relatively unconsolidated soil layer immediately below the tank (6.5 - 8.5 ft depth: medium and large rock interspersed with loose sandy silt). However, the underlying horizon of silt and clay (8.5 - 10 ft depth) appears to have acted as an effective barrier against further downward migration of the contamination. No gasoline contamination was detected at depths greater than than 9.5 ft (immediately below tank); in peripheral

areas of the excavation, the contamination appears to have been confined to depths of 8.5 ft or less.

Further excavation of the south sidewall was not attempted because of the extremely unstable nature of the soils at this site, and the close proximity of the Physical Plant Shops building to the work area. Large sections of sidewall sloughed off throughout the duration of the remedial action work. This undercut the asphalt overlay, which in turn collapsed into the open pit. As the excavation continued towards the Shop building, there was concern that the foundation slab would be undermined. Tubing for the heating system of this building is embedded in the concrete foundation slabs; any significant shifting or settling of these slabs could result in costly damages to this heating system. A major undermining of the foundation slabs could potentially compromise the structural integrity of the building.

The remaining gasoline contamination appears to be confined to a soil layer that is 1.5 - 2 ft thick. Contaminant concentrations appeared to be decreasing as excavation continued in a southerly direction. Based upon the observed characteristics of contaminant migration in the other three sidewalls of the tank pit, we estimate that the residual contamination does not extend more than 3 - 6 ft to the south of the final excavation sidewall. This estimated area of residual contamination is shown schematically in Figure 5. From this estimate, we calculate that no more than 100 cu ft of soil,

contaminated to levels exceeding criteria levels, remains in the ground at this site.

There is no indication that groundwater has been impacted by the released gasoline. The relatively impermeable layer of silts and clays (8.5 - 10 ft depth) appears to have completely contained the contaminants, and prevented their downward migration into the underlying water table. In addition, there have been no groundwater users identified in the immediate vicinity who might be placed at risk if the residual contamination is left in place.

Based upon the data available, it is our opinion that the remaining contaminants can not be safely removed without jeopardizing the adjacent building. Alternate remediation methods (i.e., vapor extraction; enhanced in situ biodegradation) do not appear to be cost effective options given the relatively low concentration of contaminants, and the small size of the impacted area. We recommend that no further corrective action be undertaken at this site. It is our opinion that the residual gasoline contamination can be left in place, as allowed by OAR 340-122-355 (4), without threatening human health, safety, or welfare, or the environment.

REFERENCES

Frank, F.J., 1973. Ground Water in the Eugene-Springfield Area, Southern Willamette Valley, Oregon. Geological Survey Water Supply Paper 2018, U.S. Government Printing Office, Washington, DC.

Soil Conservation Service, September 1987. Soil Conservation Survey of Lane County, Oregon. U.S. Department of Agriculture, Soil Conservation Service, U.S. Government Printing Office, Washington, DC.

L.R. Squier Associates, Inc., August 1990. Environmental Site Assessment, Millrace Parcel, Riverfront Research Park, University of Oregon. Lake Oswego, OR.

LIMITATIONS.

The professional services performed, findings obtained and recommendations prepared by the Consultant have been in accordance with generally accepted environmental and occupational health principles and practices and in adherence with all current regulatory protocols and standards. All services have been performed using that degree of care and skill ordinarily exercised under similar circumstances by reputable environmental technolgists practicing in this or similar localities. This warranty is provided in lieu of all other warranties either expressed or implied, and is subject to the following limitations:

1. The Consultant is not responsible for the accuracy of information provided by any governmental agency, any records inspected, or any other third party contacted or interviewed pursuant to this project. The scope of the assessment provided does not purport to encompass every record, report, or other form of documentation relevant to the property being evaluated.

2. The scope of the work provided is limited to an assessment of potential contamination of soils and groundwaters underlying the property subject to evaluation. All conclusions, recommendations, and other representations as to the quality of the evaluated property have been based upon analytical data obtained from statistically representative sets of samples. Local variations in soil and water conditions may exist at the site, and the nature, extent, and impact of such variations may not become evident without additional monitoring that is beyond the scope of this assessment. The resulting conclusions and recommendations will reflect conditions present at the time of such sample acquisition only, and do not cover any conditions resulting from activities occurring at a later date.

3. All conclusions, recommendations, and other representations as to the quality of the evaluated property are opinions based upon the information acquired by, or made available to, the Consultant during the course of the assessment process. No warranty is expressly stated, or implied, regarding the condition of the soil substrate or groundwater beyond those specific points where sampling was conducted.

OMNICON ENVIRONMENTAL MANAGEMENT

Frederick W. Scalise, Ph.D.
Senior Consultant

PHOTOGRAPHS



PLATE UO001: Facing NE; Exposed gasoline UST (Tank No. 1). Note discolored soil to left of fill neck.



PLATE UO002: Facing SW; Gasoline UST work area (Tank No. 1). Tank has been removed, and is being purged.

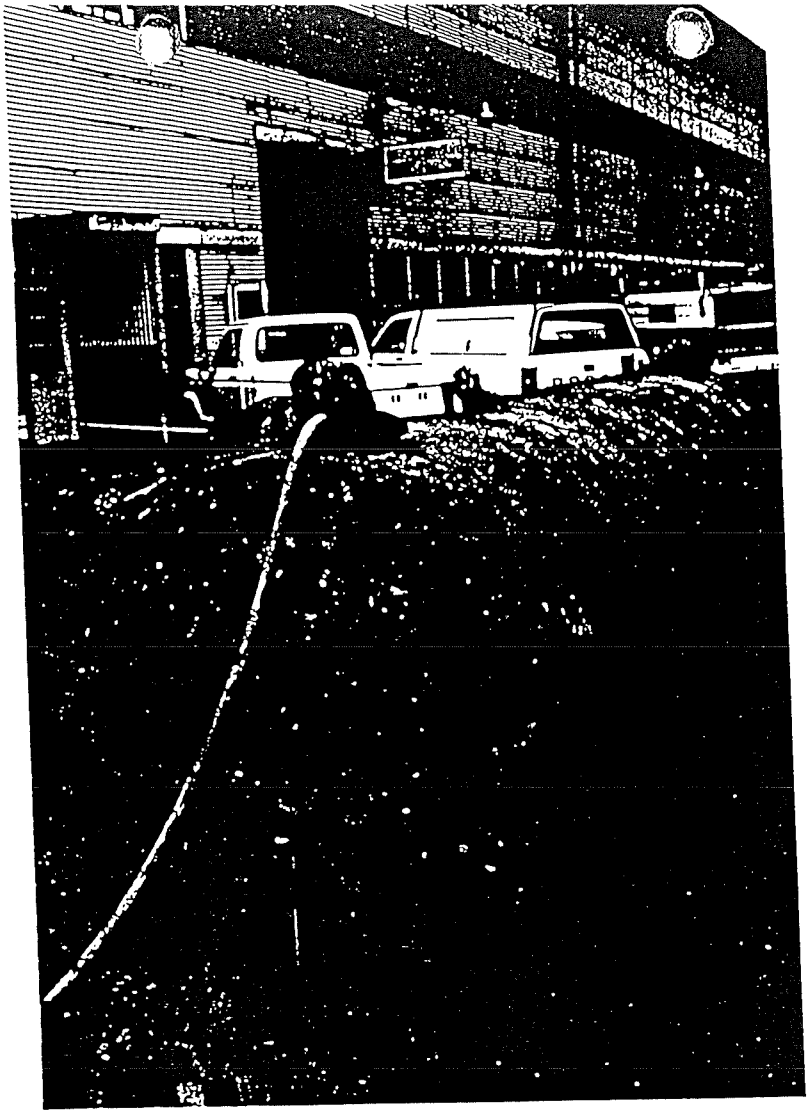


PLATE UO003: Facing SW
Removed gasoline UST
(Tank No. 1). Note
double-thickness desig

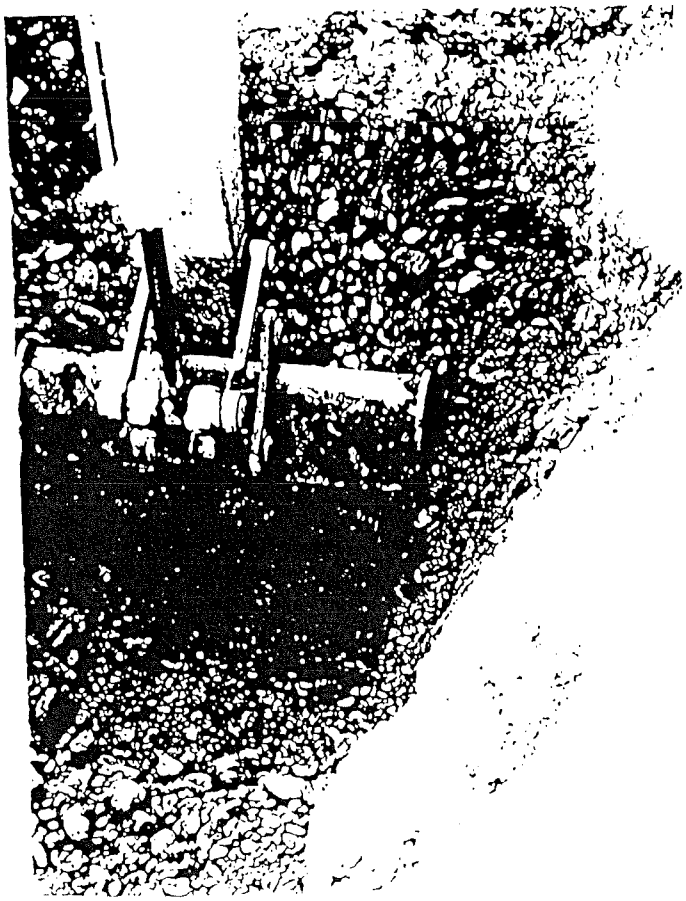


PLATE UO004: Facing E;
heavily-contaminated
soil encountered at
8.5 ft depth.
[Tank No. 1]



PLATE UO005: Facing S; fully-enclosed piping trench. [Tank No. 1]

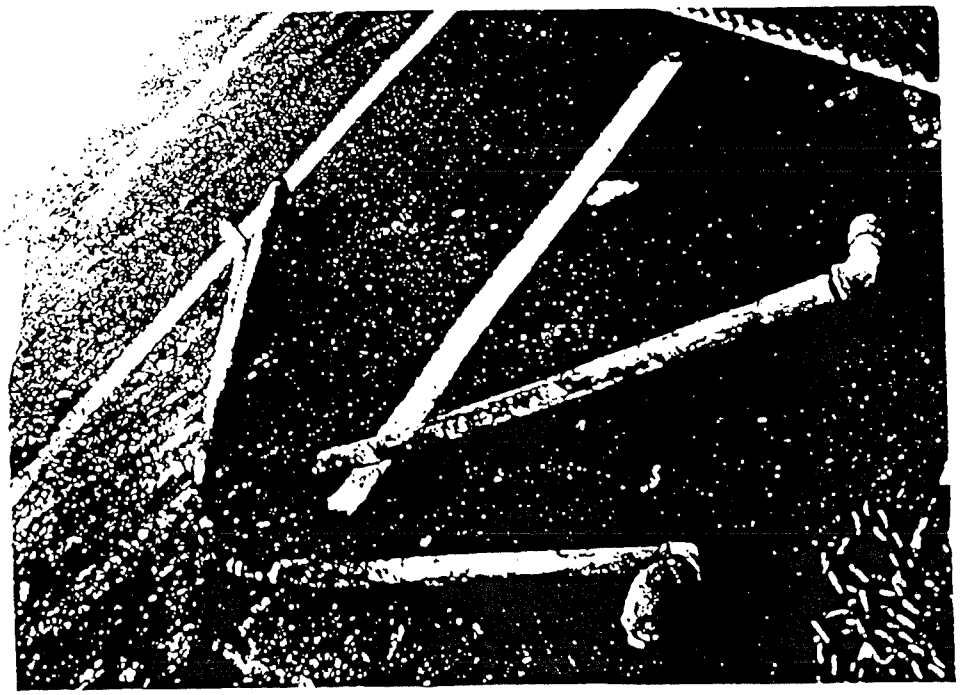


PLATE UO006: Facing SE; Removed product piping. [Tank No. 1]



PLATE UO007: Facing NE; North and East sidewalls of final excavation. [Tank No. 1]



PLATE UO008: Facing SE; South and West sidewall of final excavation. Layer of residual contamination is marked by arrows (vent pipe is in lower right corner). [Tank No. 1]

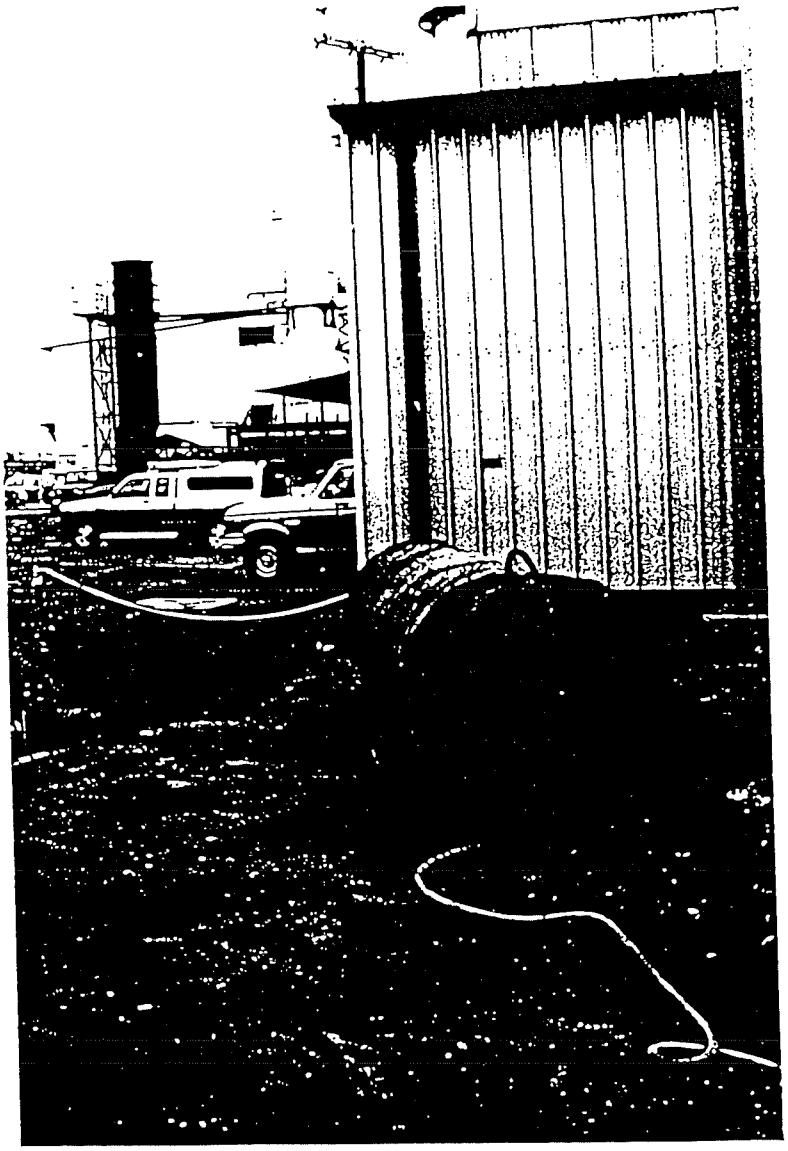


PLATE UO009: Facing NE; Removed 1,000 gal diesel UST (Tank No. 7).

APPENDIX 1

CHAIN OF CUSTODY RECORD

Job Number 03010-C.S

Job Name UO

Location UO

Sample I.D.	Sample Type	Sample Date	Sample Time	No. Containers	TPH EPA 418.1	Ignitability	HCID
1) UO-Ø1-1	soil	9/14/90	—	1	X		
2) UO-Ø1-2				1	X		
3) UO-Ø2-1				1	X		
4) UO-Ø2-2				1	X		
5) UO-waste	soil	9/14/90		1	X	X	X
6)							
7)							
8)							
9)							
10)							
Total Number Containers				5			

Parameters to be Tested

Sampler Signatures

Sample Allocation (Name/Firm)

Water Analysis + Consulting, Inc

OMNICON Environmental Mgmt

Sample Relinquished by (Signature)	Inclusive Dates from	Inclusive Dates to	Time	Sample Received by (Signature)	Container Sealed Y	Container Sealed N	4°C Y	4°C N
	9/14/90	9/14/90	1:30	K Brady	X		+	

CHAIN OF CUSTODY REC

Analysis of
- Drinking Water
- Waste Water
- Industrial Chemicals
- Solid Waste
- Bacteriology

Analytical Laboratory & Consultants
(Water Analysis & Consulting, Inc.)
304 Blair Blvd. / Eugene, OR 97402
Oregon Certified Lab #16
(503) 485-8404

Lab Report No.: 002238-42
Inv. No.: _____
Customer P.O. No.: _____

TPH: TOTAL PETROLEUM HYDROCARBONS (EPA 418.1)

Name Omnicon Environmental
Address 89062 Blueview Drive
Veneta, OR 97487

Location _____
Date Collected 9/14/90 By FS
Date Received 9/14/90
Date Analyzed 9/15/90

Samplers: ☐ Customer ☒ WACI

			Detection Limit ppm	Sample* Concentration ppm
002238	CLIENT NUMBER	UO-01-1		
☒ SOIL/SOLID	TPH		20	ND
☐ WATER	HCID "Gasoline Fraction"			
	"Non-gasoline Fraction"			
002239	CLIENT NUMBER	UO-02-1		
☒ SOIL/SOLID	TPH		20	218
☐ WATER	HCID "Gasoline Fraction"			
	"Non-gasoline Fraction"			
002240	CLIENT NUMBER	UO-01-2		
☒ SOIL/SOLID	TPH		20	48
☐ WATER	HCID "Gasoline Fraction"			
	"Non-gasoline Fraction"			
002241	CLIENT NUMBER	UO-02-2		
☒ SOIL/SOLID	TPH		20	ND
☐ WATER	HCID "Gasoline Fraction"			
	"Non-gasoline Fraction"			
002242	CLIENT NUMBER	UO-waste		
☒ SOIL/SOLID	TPH		20	38
☐ WATER	HCID "Gasoline Fraction"			
	"Non-gasoline Fraction"			
	Open Flame Ignition Test		Negative	
	CLIENT NUMBER			
☐ SOIL/SOLID	TPH			
☐ WATER	HCID "Gasoline Fraction"			
	"Non-gasoline Fraction"			

Roy E. Rose

Date 9/15/90

*N.D. means "not detected"

Analysis of
- Drinking Water
- Waste Water
- Industrial Chemicals
- Solid Waste
- Bacteriology

Analytical Laboratory & Consultants
(Water Analysis & Consulting, Inc.)
304 Blair Blvd. / Eugene, OR 97402
Oregon Certified Lab # 16
(503) 485-8404

Lab Report No.: 002242
Inv. No.: _____
Customer P.O. No.: _____

TPH: TOTAL PETROLEUM HYDROCARBONS (EPA 418.1)

Name: Omnicon Environmental
Address: 89062 Blueview Drive
Veneta, OR 97487

Location: UO
Date Collected: 9/14/90 By: FS
Date Received: 9/14/90
Date Analyzed: 9/20/90

Samplers: ☐ Customer ☒ WACI

002242

CLIENT NUMBER: UO-waste

		Detection Limit ppm	Sample* Concentration ppm
☒ SOIL/SOLID	TPH		
☐ WATER	HCID "Gasoline Fraction" C_7-C_{15}		31
	"Non-gasoline Fraction"		

CLIENT NUMBER: _____

☐ SOIL/SOLID	TPH		
☐ WATER	HCID "Gasoline Fraction"		
	"Non-gasoline Fraction"		

CLIENT NUMBER: _____

☐ SOIL/SOLID	TPH		
☐ WATER	HCID "Gasoline Fraction"		
	"Non-gasoline Fraction"		

CLIENT NUMBER: _____

☐ SOIL/SOLID	TPH		
☐ WATER	HCID "Gasoline Fraction"		
	"Non-gasoline Fraction"		

CLIENT NUMBER: _____

☐ SOIL/SOLID	TPH		
☐ WATER	HCID "Gasoline Fraction"		
	"Non-gasoline Fraction"		

CLIENT NUMBER: _____

☐ SOIL/SOLID	TPH		
☐ WATER	HCID "Gasoline Fraction"		
	"Non-gasoline Fraction"		

Roy E. Quiring

Date: 9/20/90

*N.D. means "not detected"

CHAIN OF CUSTODY RECORD

Job Number 03010-65-1

Job Name UO

Location UO

Sample I.D.	Sample Type	Sample Date	Sample Time	# Containers	Parameters to be Tested: TPH 418.1
1) UO-R-Ø1	soil	9/21/90	—	1	X
2) UO-R-Ø2	"	"		1	X
3) UO-R-Ø3	"	"		1	X
4) UO-R-Ø4	"	"		1	X
5) UO-R-Ø5	"	"		1	X
6)					
7)					
8)					
9)					
10)					
Total Number Containers				5	

Sample Allocation (Name/Firm)

Water Analysis + Consulting

Sampler Signatures

OMNICON Environmental Management

Sample Relinquished by (Signature)	Inclusive Dates from	Inclusive Dates to	Time	Sample Received by (Signature)	Container Sealed Y	Container Sealed N	Container 4°C Y	Container 4°C N
	9/21/90	9/21/90	2:30P	K. Brady	✓		✓	

CHAIN OF CUSTODY REC

Analysis of
- Drinking Water
- Waste Water
- Industrial Chemicals
- Solid Waste
- Bacteriology

Analytical Laboratory & Consultants
(Water Analysis & Consulting, Inc.)
304 Blair Blvd. / Eugene, OR 97402
Oregon Certified Lab # 16
(503) 485-8404

Lab Report No.: 002449-53
Inv. No.: _____
Customer P.O. No.: _____

TPH: TOTAL PETROLEUM HYDROCARBONS (EPA 418.1)

Name: Omnicon Environmental
Address: 89062 Blueview Drive
Veneta, OR 97487

Location: UO
Date Collected: 9/21/90 By: FS
Date Received: 9/21/90
Date Analyzed: 9/21/90

Samplers: ☐ Customer ☒ WACI

		Detection Limit ppm	Sample* Concentration ppm
002449	CLIENT NUMBER: UO-R-01		
X☐ SOIL/SOLID	TPH	20	ND
☐ WATER	HCID "Gasoline Fraction"		
	"Non-gasoline Fraction"		
002450	CLIENT NUMBER: UO-R-02		
X☐ SOIL/SOLID	TPH	20	ND
☐ WATER	HCID "Gasoline Fraction"		
	"Non-gasoline Fraction"		
002451	CLIENT NUMBER: UO-R-03		
X☐ SOIL/SOLID	TPH	20	ND
☐ WATER	HCID "Gasoline Fraction"		
	"Non-gasoline Fraction"		
002452	CLIENT NUMBER: UO-R-04		
X☐ SOIL/SOLID	TPH	20	572
☐ WATER	HCID "Gasoline Fraction"		
	"Non-gasoline Fraction"		
002453	CLIENT NUMBER: UO-R-05		
X☐ SOIL/SOLID	TPH	20	ND
☐ WATER	HCID "Gasoline Fraction"		
	"Non-gasoline Fraction"		
	CLIENT NUMBER:		
☐ SOIL/SOLID	TPH		
☐ WATER	HCID "Gasoline Fraction"		
	"Non-gasoline Fraction"		

Roxy E. Rude

Date: 9/22/90

*N.D. means "not detected"

APPENDIX 2

SEP 12 REC'D

Oregon Department of Environmental Quality
811 SW Sixth Avenue
Portland, Oregon 97204-1334
229-5559 and in Oregon 1-800-452-4011

NEIL GOLDSCHMIDT
GOVERNOR

PERMITTEE

University of Oregon
1230 Franklin Boulevard
Eugene, OR 97403

UNDERGROUND STORAGE TANK PROGRAM
TEMPORARY PERMIT

FACILITY

Facility I.D. Number: 3168

PHYSICAL PLANT
1295 FRANKLIN BLVD.
EUGENE, OR 97403

PERMIT NUMBER: BAHKC
ISSUE DATE: 05-SEP-90

Tank I.D. Number: UST-7

Tank Contents: Diesel

The Department of Environmental Quality issues this temporary permit with the understanding that the Permittee is to comply with the conditions on the reverse side of this temporary permit.

Fred Hansen
Director
Department of Environmental Quality

CONSTRUCTION PERMIT
CITY OF EUGENE

DATE	JOB ADDRESS			PERMIT TYPE & NUMBER
09/11/90	1155	FRANKLIN	BLVD	02-ALTER BUILDING
REMARKS:	RMV UNDGRN STORAGE TANK			90-03688-01-B-01
				TAX LOT NUMBER:
OWNER:	U OF O-PHYSICAL PLANT		503 346-5243	17033214 01800
	1295 FRANKLIN BLVD			UNIT VALUATION:
	EUGENE	OR 97403 0000		# 3,350.00

PERMIT: THIS PERMIT AUTHORIZES THE START OF CONSTRUCTION FOR THE STRUCTURE ALTERATION/REMODEL AS SHOWN AND DESCRIBED IN THE APPROVED PERMIT APPLICATION.

SPECIAL INSTRUCTIONS:

CONTRACTORS		TYPE
71 STATON CONSTRUCTION (3/91)	503 461 0543	PRIMARY

CONSTRUCTION	OCCUPANCY	ZONING	LAND USE	PROPOSED USE	GEOGR DISTRICT
		SO	6821		

INSPECTION DETAIL/INSTRUCTIONS

DATE	JOB ADDRESS/OWNER NAME		PERMIT TYPE & NUMB
1155	FRANKLIN	BLVD	02-ALTER BUILDING
	U OF O-PHYSICAL PLANT		90-03688-01-B-01

INSPECTION TYPE
15 FIRE REGULATION

PROJECT OWNER'S RESPONSIBILITY (AS SPECIFIED BY OSSSC)

1. START CONSTRUCTION ONLY AFTER PERMITS ARE GRANTED AND STAY WITHIN PERMIT-AUTHORIZED WORK (SECT. 301 OF UAC)
2. POST ADDRESS ON CONSTRUCTION SITE PRIOR TO CALLING FO CITY INSPECTIONS (SECT 8.005, SECT 206 OF EUGENE CODE
3. HAVE APPROVED PLANS ON PROJECT SITE AVAILABLE FOR CI INSPECTORS TO EXAMINE (SECT 305(A) OF UAC).
4. CALL THE CITY FOR REQUIRED INSPECTIONS (SECT 305(A) UAC).
5. COVER WORK ONLY AFTER INSPECTED AND APPROVED BY THE CITY INSPECTOR (SECT 305(A) OF UAC).
6. OBTAIN APPROVAL (DOCUMENTATION) FROM THE CITY PRIOR ANY DEVIATIONS FROM APPROVED PLANS (SECT 307(A) UAC).
7. USE THE PROJECT OR OCCUPY BUILDING ONLY AFTER FINAL INSPECTION AND WRITTEN APPROVAL OF CITY (SECT 307(A)
8. START THE PROJECT WITHIN 180 DAYS OF DATE OF ISSUANC OF PERMITS (SECT 303(D) UAC--I.E. PERMIT EXPIRATION).
9. MAINTAIN COMPLETED BUILDING AND STRUCTURES, INCLUDIN THE MAINTENANCE OF STRUCTURAL ASSEMBLIES, DEVICES, A SAFEGUARDS, UP TO THE STANDARDS REQUIRED BY THE CODE EDITION UNDER WHICH BUILDING WAS BUILT (SECT 104(D)).
10. USE YOUR PROJECT LOG AND PERMIT NOS AS IDENTIFICATIO WHEN CONTACTING THE CITY PERMIT & INFORMATION CENTER

LANE COUNTY SOLID WASTE

3040 DELTA HWY. NO
EUGENE, OR 97404
PHONE 341-6923

DATE: 9.21.90

CHARGE SLIP

SITE # 02 FC. I.D. SH

QTY.	DESCRIPTION	TYPE	RATE	FEE
___	2 CANS TO 3 CY	03	$ 7.50 EA	
___	CY BULK LOOSE	04	$ 2.70 CY	
___	CY BK COMP # ___	05	$ 6.75 CY	
___	CY DEMOLITION	07	$ 6.00 CY	
___	CY CONCRETE, ETC.	08	$ 9.00 CY	
___	DRUMMED WASTE	10	$ 4.00 EA	

TIRES (LIST QTY/SIZE/TYPE/RATE)

___	___	___	$___EA	
___	___	___	$___EA	
___	CY SPECIAL WASTES	16	$15.00 CY	
___	GA LIQUID WASTES	17	$ 15 GA	
___	COMPOST LOAD	18	$ 6.00 EA	
___	CY COMPOST (+3½CY)	19	$ 2.25 CY	
___	CY ASBESTOS	20	$20.00 CY	
___	GA LIQUID ASBESTOS	21	$ .20 GA	
10	CY CONTAMINATED	(22)	$15.00 CY	150.00

OTHER (LIST QUANTITY/DESCRIPTION/TYPE/RATE)

___	___	___	$___	
___	___	___	$___	
___	RECYCLING CREDIT	52	$(1.50)	

26278

TOTAL FEE: 150.00

SIGNATURE: [signature]

WASTE MGT DIV

CREDIT CARD #

077-014-007 6/90
STATON CONSTRUCTION INC

Chgd acct

LANE COUNTY SOLID WASTE

3040 DELTA HWY. NO
EUGENE, OR 97404
PHONE 341-6923

DATE: 9.21.90

CHARGE SLIP

SITE # 02 FC. I.D. SH

QTY.	DESCRIPTION	TYPE	RATE	FEE
___	2 CANS TO 3 CY	03	$ 7.50 EA	
___	CY BULK LOOSE	04	$ 2.70 CY	
___	CY BK COMP # ___	05	$ 6.75 CY	
___	CY DEMOLITION	07	$ 6.00 CY	
___	CY CONCRETE, ETC.	08	$ 9.00 CY	
___	DRUMMED WASTE	10	$ 4.00 EA	

TIRES (LIST QTY/SIZE/TYPE/RATE)

___	___	___	$___EA	
___	___	___	$___EA	
___	CY SPECIAL WASTES	16	$15.00 CY	
___	GA LIQUID WASTES	17	$ .15 GA	
___	COMPOST LOAD	18	$ 6.00 EA	
___	CY COMPOST (+3½CY)	19	$ 2.25 CY	
___	CY ASBESTOS	20	$20.00 CY	
___	GA LIQUID ASBESTOS	21	$ .20 GA	
10	CY CONTAMINATED	(22)	$15.00 CY	150.00

OTHER (LIST QUANTITY/DESCRIPTION/TYPE/RATE)

___	___	___	$___	
___	___	___	$___	
___	RECYCLING CREDIT	52	$(1.50)	

26264

TOTAL FEE: 150.00

SIGNATURE: [signature]

WASTE MGT DIV

CREDIT CARD #

077-014-005 06/91
STATON CONSTRUCTION INC

Chgd acct

LANE COUNTY SOLID W E

EUGENE, OR
PHONE 341-69

DATE: 9.21.

CHARGE SLIP

SITE # 02 FC. I.D.

QTY.	DESCRIPTION	TYPE	RATE	FEE
___	2 CANS TO 3 CY	03	$ 7.50 EA	
___	CY BULK LOOSE	04	$ 2.70 CY	
___	CY BK COMP # ___	05	$ 6.75 CY	
___	CY DEMOLITION	07	$ 6.00 CY	
___	CY CONCRETE, ETC.	08	$ 9.00 CY	
___	DRUMMED WASTE	10	$ 4.00 EA	

TIRES (LIST QTY/SIZE/TYPE/RATE)

___	___	___	$___EA	
___	___	___	$___EA	
___	CY SPECIAL WASTES	16	$15.00 CY	
___	GA LIQUID WASTES	17	$ 15 GA	
___	COMPOST LOAD	18	$ 6.00 EA	
___	CY COMPOST (+3½CY)	19	$ 2.25 CY	
___	CY ASBESTOS	20	$20.00 CY	
___	GA LIQUID ASBESTOS	21	$ .20 GA	
10	CY CONTAMINATED	(22)	$15.00 CY	150

OTHER (LIST QUANTITY/DESCRIPTION/TYPE/RAT

___	___	___	$___	
___	___	___	$___	
___	RECYCLING CREDIT	52	$(1.50)	

26284

TOTAL FEE: 150.

SIGNATURE: [signature]

CREDIT CARD #

WASTE MGT DIV

077-014-005 06/91
STATON CONSTRUCTION INC

Chgd acct

LANE COUNTY SOLID WASTE

3040 DELTA HWY NO.
EUGENE, OR 97404
PHONE 341-6923

DATE: 9.21.90

CHARGE SLIP

SITE # 02 ~~FG~~ I.D. SH

QTY.	DESCRIPTION	TYPE	RATE	FEE
____	2 CANS TO 3 CY	03	$ 7.50 EA	____
____	CY BULK LOOSE	04	$ 2.70 CY	____
____	CY BK COMP # ____	05	$ 6.75 CY	____
____	CY DEMOLITION	07	$ 6.00 CY	____
____	CY CONCRETE, ETC.	08	$ 9.00 CY	____
____	DRUMMED WASTE	10	$ 4.00 EA	____

TIRES (LIST QTY/SIZE/TYPE/RATE)

____	____	____	$____ EA	____
____	____	____	$____ EA	____
____	CY SPECIAL WASTES	16	$15.00 CY	____
____	GA LIQUID WASTES	17	$ .15 GA	____
____	COMPOST LOAD	18	$ 6.00 EA	____
____	CY COMPOST (+3½ CY)	19	$ 2.25 CY	____
____	CY ASBESTOS	20	$20.00 CY	____
____	GA LIQUID ASBESTOS	21	$ 20 GA	____
10	CY CONTAMINATED	22	$15.00 CY	150.00

OTHER (LIST QUANTITY/DESCRIPTION/TYPE/RATE)

____	____	____	$____	____
____	____	____	$____	____
____	RECYCLING CREDIT	52	$(1.50)	(____)

26288

TOTAL FEE: 150.00

SIGNATURE [signature] HOTO

CREDIT CARD #

WASTE NOT OIT

077-C14-006 06/91
STATON CONSTRUCTION INC

[illegible]

REPORT OF
SUPPLEMENTAL ASSESSMENT ACTIVITIES

University of Oregon Physical Plant
Underground Gasoline Storage Tank

BACKGROUND. This is a report for supplemental assessment activities conducted for residual soil contamination associated with a 1,000 gal gasoline underground storage tank that was decommissioned on September 14, 1990. This additional assessment work was performed at the request of Oregon Department of Environmental Quality officials, to demonstrate that contaminants had not migrated beyond the area estimated in our original decommissioning report. Our original report (OMNICON; "Summary Report for Decommissioning of Underground Storage Tanks", October 15, 1991) is incorporated into this document by reference.

FIELD OPERATIONS. An attempt to complete a boring on the south side of the Physical Plant Shops building was made, with a solid stem auger, on March 27, 1991. Rock fill materials (up to 12" diameter) were encountered immediately below the asphalt, and prevented the completion of a patent borehole. A hollow stem auger was subsequently brought to the site on April 2, 1991, to complete the assessment borings.

Boring No. 1 was located on the south side of the Shops building, due south of where residual soil contaminants were present in the tank excavation pit (see Figure 1). The auger was advanced to 8.5 ft, the same depth that contaminants had been localized to in the tank excavation pit.

DEPTH (ft)	SOIL TYPE	PID (ppm)
0	asphalt	0
0.5 - 5	river rock fill	0
5 - 6	brown clayey silts	0
7	moist gray silty clay	0
8	blue-gray clayey sands	0

Three attempts were made to obtain a core sample with a split spoon sampler. Rocks in the borehole each time plugged the end of the spoon and prevented the recovery of sample material. A sample (UOB-01; blue-gray clayey sand) was subsequently obtained from the teeth of the bit when the auger was withdrawn. The sample was removed from the bit with a stainless steel trowel,

packed into a glass soil jar, and sealed with a teflon-lined lid. Sample handling was conducted as described previously in our original report. All analyses were conducted in accordance with OAR 340-122-350 (December 1990).

An attempt to bore to a depth of 10 ft at location No. 1 was thwarted by auger refusal, presumably the result of large rocks present in the soil.

A low hanging canopy, and existing underground utilities, impeded drilling on the north side of the Shop building. The canopy made it impossible to place a boring between the tank excavation pit and the building foundation; utilities resulted in Boring No. 3 being placed farther west than desired.

Boring No. 2 was located as shown in Figure 1 and Figure 2. The auger was advanced to 8.5 ft, withdrawn, and a sample (UOB-02) obtained from the teeth of the bit.

DEPTH (ft)	SOIL TYPE	PID (ppm)
0	asphalt	0
0.5 - 4	river rock fills	0
5	dark gray clay	0
6 - 7	brown silty clay	0
8	moist brown silty clay	0
8.5	moist brown silty clay with seams of dark gray silty clay	0

Boring No. 3 was located as indicated in Figures 1 and 2. The auger was advanced to 8.5 ft, and a sample obtained as before.

DEPTH (ft)	SOIL TYPE	PID (ppm)
0	asphalt	0
0.5 - 4	river rock fills	0
5	brown clayey silts	0
7	moist brown silty clay	0
8.5	brown silty clay with sand and seams of dark gray clay	0

RESULTS. No petroleum contaminants were detected in any of the recovered soil samples.

CONCLUSIONS/RECOMMENDATIONS. As described in our original report, it was not possible to remove a small pocket of gasoline contamination that was present in the southeast sidewall of the tank excavation pit. The highly unstable soils encountered at this site precluded excavating any closer to the Shop building due the risk of shifting of the building foundation. Such shifting could jeopardize the structural safety of the building, and/or cause irreparable damage to the heating system tubing that is embedded in the foundation slab.

It is not feasible to core through the building floor to obtain additional samples due to the presence of closely-spaced heating tubes in the slab. In addition, the large rock fill materials present to a depth of at least 4.5 ft are likely to make boring with hand-held augers impossible.

The data presented in this report supports our original conclusions. A small pocket of inaccessible contamination, estimated to be no larger than 100 cu ft in volume, is present adjacent to the Shop building. This pocket is confined to a 1 ft thick layer at a depth of 8 - 9 ft. The evidence obtained to date indicates that this pocket is fully contained both vertically and laterally. No evidence of actual or threatened impact to groundwater has been found to exist. The likelihood of human contact with this material is extremely low.

It remains our opinion that this pocket of gasoline can be allowed to remain in the soil without any threat to human health, safety or welfare, or the environment.



Respectfully submitted,

Frederick W. Scalise, Ph.D., CHMM

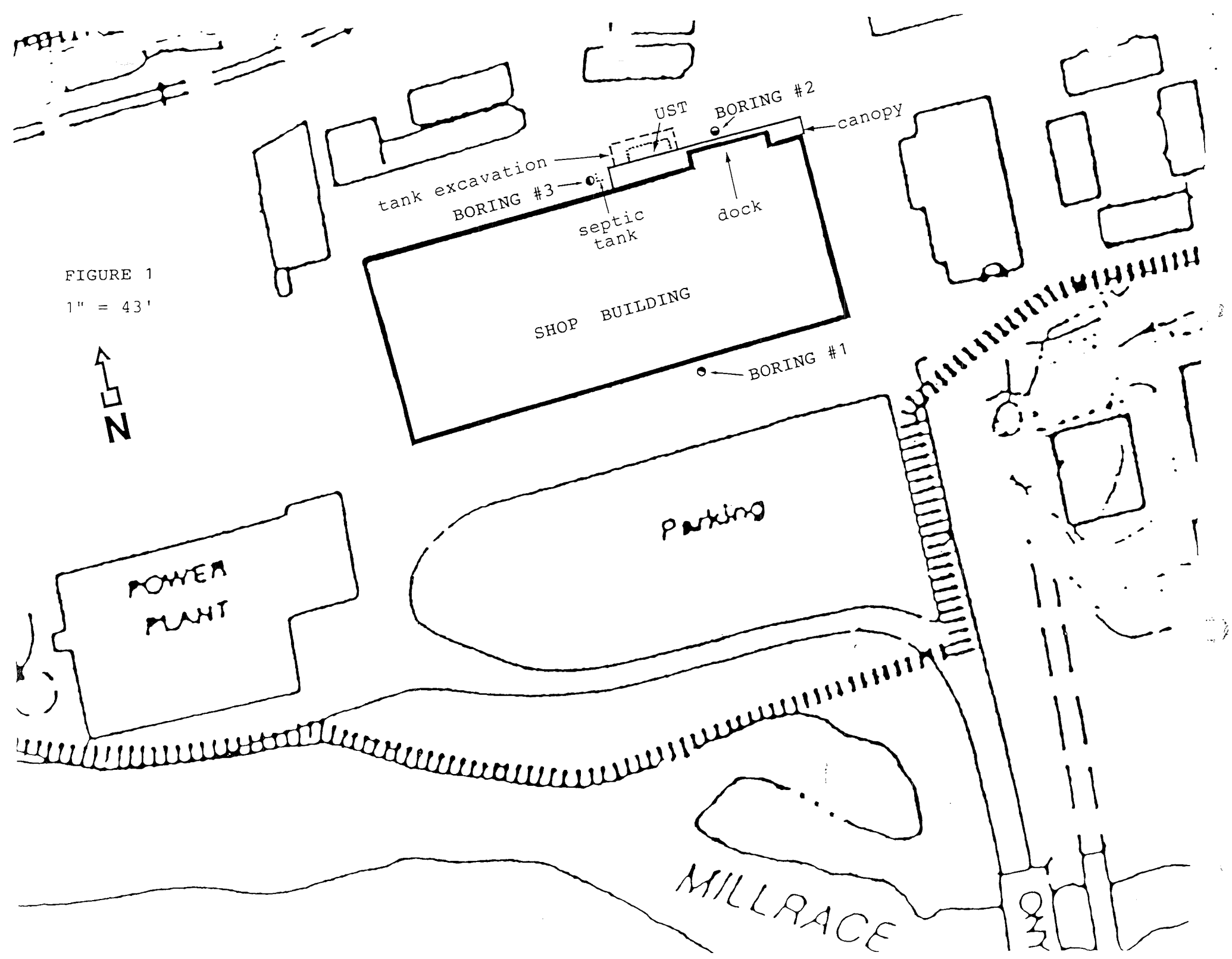
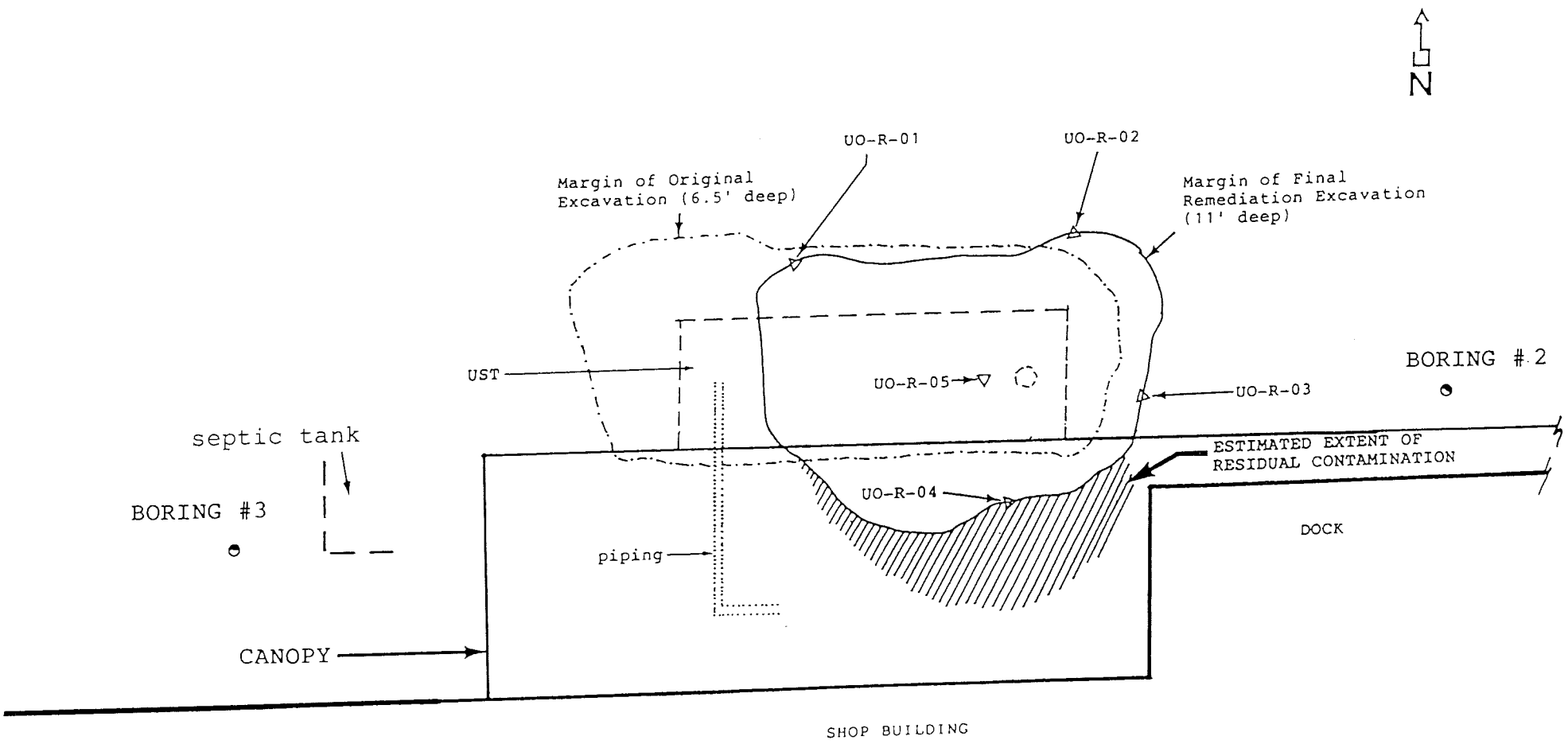

UST
BORING #2
canopy
tank excavation
BORING #3
septic tank
dock
SHOP BUILDING
BORING #1
N
POWER PLANT
Parking
MILLRACE

FIGURE 1

1" = 43'

FIGURE 2

1" = 5.5'


N
UO-R-01
UO-R-02
Margin of Original
Excavation (6.5' deep)
Margin of Final
Remediation Excavation
(11' deep)
UST
UO-R-05
UO-R-03
BORING #2
septic tank
BORING #3
ESTIMATED EXTENT OF
RESIDUAL CONTAMINATION
UO-R-04
DOCK
piping
CANOPY
SHOP BUILDING

CHAIN OF CUSTODY RECORD

Job Number ———

Job Name UO

Location Eugene, OR

Sample I.D.	Sample Type	Sample Date	Sample Time	Preservatives	Parameters to be Tested: OR TPH/HCID	Parameters to be Tested: OR TPH-G *
1) UOB-01	Soil	4/2/91	11:00A		X	X
2) UOB-02	"	"	1:00P		X	X
3) UOB-03	"	"	2:45P		X	X
4)						
5)						
6)						
7)						
8)						
9)						
10)						

Total Number Containers 3

Sampler Signatures

Sample Allocation (Name/Firm)

Water Analysis + Consulting, Inc.

OMNICON Environmental Mgmt

Sample Relinquished by (Signature)	Inclusive Dates from	Inclusive Dates to	Time	Sample Received by (Signature)	Container Sealed Y	Container Sealed N	4°C Y	4°C N
	4/2/91	4/2/91	3:00P	K Brady	X		X	

* TPH-G only if contaminant detected in HCID

CHAIN OF CUSTODY RECORD

Analysis of
- Drinking Water
- Waste Water
- Industrial Chemicals
- Solid Waste
- Bacteriology

Analytical Laboratory & Consultants
(Analysis & Consulting, Inc.)
304 Blair Blvd. / Eugene, OR 97402
Oregon Certified Lab #16
(503) 485-8404

Lab Report No.: 008011-3

Inv. No.: _____

Customer P.O. No.: _____

TPH: TOTAL PETROLEUM HYDROCARBONS (Oregon DEQ)

Company Name: Omnicon Environmental
Address: 89062 Blue View Drive
Veneta, OR 97487
Attention: Fred Scalise

Location: VO
Date Collected: 4/2/91 By: Scalise
Date Received: 4/2/91 Time Received: 1500
Date Analyzed: 4/8/91

Samplers: ☐ Customer ☒ WACI

		Surrogate Recovery %	Detection Limit ppm	Sample* Concentration ppm
LAB NUMBER 008011	TPH-HCID Gasoline		20	ND
CLIENT NUMBER VOB-01	Diesel and related products		50	ND
☒ SOIL/SOLID	Bunker C and related products			ND
☐ WATER		92%		
	TPH-G			
	TPH-D			
	TPH-418.1 Modified			
LAB NUMBER 008012	TPH-HCID Gasoline		20	ND
CLIENT NUMBER VOB-02	Diesel and related products		50	ND
☒ SOIL/SOLID	Bunker C and related products			ND
☐ WATER		62%		
	TPH-G			
	TPH-D			
	TPH-418.1 Modified			
LAB NUMBER 008013	TPH-HCID Gasoline		20	ND
CLIENT NUMBER VOB-03	Diesel and related products		50	ND
☒ SOIL/SOLID	Bunker C and related products			ND
☐ WATER		71%		
	TPH-G			
	TPH-D			
	TPH-418.1 Modified			

Roy E. White
Analyst

Date: 4/8/91

*N D means "not detected"

UNIVERSITY OF OREGON

RECEIVED
MAY 8 - 1991
SQUIER, INC.

May 2, 1991

Bruce Scherzinger
Department of Environmental Quality
Willamette Valley Region
750 Front St., NE, Suite 120
Salem, OR 97310

RE: LUST No. 20-90-4218;
UST Permit No. AEFGG

Dear Mr. Scherzinger:

In November 1990 the University of Oregon submitted a report that described a cleanup project for one of our underground storage tanks, referenced as UST-1 with permit number AEFGG. Subsequently, you requested in a letter dated March 4, 1991 that we provide additional information pertaining to the full extent of the contamination. The University has conducted a supplemental assessment to further characterize the soil contamination. This letter and the accompanying report detail the results of the additional work.

The University contracted with OMNICON Environmental Management to perform the supplemental assessment and prepare a written report of their findings. A copy of the report is enclosed. Any figure references in this letter relate to the OMNICON report.

The original purpose of the additional assessment was to identify the boundaries of the contamination zone, and if possible, more accurately quantify the amount of gasoline that had leaked into the soil. However, as noted in our initial report, the close proximity to an important building limited our ability to delineate the contamination zone. Consequently, the scope of the assessment was modified to include only a determination of the maximum boundary.

OMNICON completed three borings on April 2, 1991. The borings were located on the east, south, and west sides of the original excavation (Figure 1). A boring was not taken on the north side since the previous assessment had indicated that contamination was confined in the southern direction. OMNICON placed the drill points at the closest horizontal distance from the excavation, taking into account the potential for damage to the structure and surrounding utility lines.

During the drilling, photoionization detector (PID) measurements were taken as the bit was advanced. Soil samples were obtained at a depth of 8-9 feet in each of the borings. The three samples were analyzed for TPH-HCID. Chain-of-custody and analytical documentation are included in the OMNICON report.

No contamination was detected in any of the PID readings or soil samples. OMNICON personnel stated that they did not observe any unusual discoloration or odor in the borings.

Based upon this information, it appears that the contamination is fully confined adjacent to and possibly beneath a portion of the building. The structure is a slab-on-grade construction with no crawlspace. Our Physical Plant personnel do not recall any odors of gasoline within the building. OMNICON believes the new data supports the original conclusion that the contamination is contained at a depth of 8-9 feet and comprises no more than 100 cubic feet in soil volume. There is no evidence that the contamination has spread to an accessible area or impacted groundwater. The same problems that were experienced in characterizing the extent of contamination would limit the potential for human contact.

Because of the close building proximity, the University cannot proceed with further excavation without jeopardizing the building. Concrete corings through the slab would probably damage the embedded heating tubes. Even though a pocket of contamination exceeds soil matrix levels, it does not apparently threaten human health, safety, or the environment. Therefore, the University requests that the contamination remain in place.

Sincerely,

Thomas R. Hicks
Associate Director, Public Safety

TRH/trh

Enclosure

cc: Carey Drayton
Jim Hickam
Diane Wiley

OMNICON
ENVIRONMENTAL MANAGEMENT

REPORT OF
SUPPLEMENTAL ASSESSMENT ACTIVITIES

University of Oregon Physical Plant
Underground Gasoline Storage Tank

16 April 1991

RECEIVED
MAY 21 1991

Oregon

DEPARTMENT OF
ENVIRONMENTAL
QUALITY

May 15, 1991

Willamette Valley Region

Mr. Thomas Hicks
Environmental Health & Safety
1295 Franklin Blvd.
Eugene, OR 97403

Re: LUST # 20-90-4218
U of O Physical Plant
Eugene, OR
Lane County

Dear Mr. Hicks:

The Department of Environmental Quality (DEQ) has completed a review of your May 2, 1991, report regarding the cleanup of petroleum contaminated soil at the above-referenced facility. Based upon the information in that report, including:

1. The groundwater table was not encountered in the excavation;

2. The majority of the soil remaining in the excavation has TPH values within Level 2 cleanup standards for gasoline and diesel; and

3. A pocket of contamination still exists on this property which exceeds currently required cleanup levels for this site, but which the DEQ approves leaving pursuant to OAR 340-122-355(4) since the removal of this contamination would endanger structures on the property or be prohibitively expensive, and the contamination does not threaten human health, safety, welfare and the environment;

The DEQ has determined that the petroleum release at this site appears to be cleaned up in accordance with OAR 340-122-305 through 360, and that no further action is required at this time.

UNIVERSITY
PLANNING
MAY 22 1991

BARBARA ROBERTS
Governor

750 Front St. NE
Suite 120
Salem, OR 97310
(503) 378-8240

However, you should be aware that DEQ's approval to leave a pocket of contamination is based on the site conditions described in the report as they exist today. Should conditions (land use) change allowing access to the contamination, you are responsible for further evaluation of the remaining contamination and any cleanup necessary at that time. You are also responsible for notifying any potential purchaser of the property about this remaining pocket of contamination.

Furthermore, DEQ's determination will not be applicable if new or undisclosed facts show that the cleanup does not comply with the referenced rules. DEQ's determination also does not apply to any conditions at the site other than the release of the petroleum product specifically addressed in your report.

Please note that pursuant to OAR 340-122-360(2), a copy of your report must be retained until ten (10) years after the first transfer of the property. If you have any questions, please feel free to contact me at (503) 378-8240.

Sincerely,

Bart D. Collinsworth
Environmental Specialist

BDC\jtc
20904218.fin

cc: Mike Anderson, ECD

APPENDIX G

SQUIER ASSOCIATES

GEOTECHNICAL &
GEOENVIRONMENTAL
CONSULTANTS

4260 Galewood Street
Post Office Box 1317
Lake Oswego, Oregon
97035

503-635-4419
Fax 635-1430

September 16, 1991

Work Plan Summary

Project: University of Oregon Riverfront Research Park, Project No. 89384.61
Address: 1295 Franklin Boulevard
(Client contact address adjoining project site)
Location: Eugene, Oregon 97403 Telephone: (503) 356-5566

Goal: To evaluate the possibility of subsurface environmental contaminants on the North of the Railroad Track Parcel

Objectives: 1) Observe the Eugene Water & Electric Board (EWEB) steam line trench excavation for evidence of subsurface environmental contaminants.

2) Excavate five test pits in areas where earlier vapor sampling and subsurface water samples indicated the possibility of contaminants.

Procedure: 1) Observe EWEB trench excavation which will be from EWEB steam vault to Southern Pacific right-of-way.

a) Utilize HNU meter and Edmont explosimeter/O_2 sensor to assist visual observations. Note: up to 5 percent methane was obtained from analysis of soil vapor sample (refer, Additional Environmental Investigation, Parcel North of the Railroad Tracks (AEI). This report by reference becomes part of this work plan summary.)

b) If subsurface disposal is visually observed or detected with the HNU meter or explosimeter/O_2 sensor, additional excavation may be performed or excavation temporarily stopped to evaluate observations made. EWEB personnel will be responsible for stop work order.

c) Samples will be collected of observed contamination, subject to evaluation by Safety Officer. Samples will be collected using a 2-inch barrel auger as stated in the sampling plan written for this project. The Sampling Plan becomes a part of this Work Plan by reference.

2) Excavate shallow test pits in the areas identified as locations SVS-2, SVS-3, SVS-5, SVS-7, and SVS-8, in the AEI report. The excavations depths will be at least 1 foot deeper than stated in Table 2, AEI report. The excavations will be about 6 feet wide by 12 feet in length. The test pits will be excavated by Staton Construction using a track-mount backhoe with a 2-yard bucket. The backhoe bucket will be decontaminated by steam cleaning and wire brush scraping prior to arriving onsite. The backhoe bucket will be wire brush scraped between excavations. Staton personnel will be medically monitored and OSHA trained and a safety plan will be supplied by Staton for their personnel safety.

a) Relocate test pits SVS-2 through SVS-8, except for SVS-4, using north corrected compass and tape. A north-south east-west coordinate will be set up onsite referencing the southeast corner of the EWEB (as accomplished during AEI).

b) Secure with safety tape each test pit during excavation and until backfilled with native materials.

c) Visually observe each excavation and also measure vapor with an HNU meter and explosimeter/O_2 sensor. Both excavated soils and test pit excavations will be monitored.

d) If environmental contamination is found or observed, samples will be collected dependent upon approval by site safety officer.

e) Test pits will be backfilled by end of day and not allowed to remain open for safety.

SQUIER ASSOCIATES

GEOTECHNICAL &
GEOENVIRONMENTAL
CONSULTANTS

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89384.61

SAMPLING PLAN FOR AN ENVIRONMENTAL INVESTIGATION AT THE UNIVERSITY OF OREGON RIVERFRONT RESEARCH PARK LOCATED IN EUGENE, OREGON

The initial and perhaps most critical element in a program designed to evaluate the physical and chemical properties at a site is the Sampling Plan. The intent of this Sampling Plan is to assure appropriate sampling methodologies and procedures with respect to pertinent regulatory, scientific and engineering objectives. This Sampling Plan was designed by Squier Associates, Inc., geoenvironmental consultants retained by the State of Oregon acting by and through the State Board of Higher Education. A copy of this Sampling Plan should be maintained by the University of Oregon as part of the permanent record concerning the site.

Site Identification/Location

Property Owner	Oregon State Board of Higher Education
Property Description	University of Oregon Riverfront Research Park
The property is located	in Eugene, Oregon, in the area bounded by Southern Pacific Railroad tracks to the south and the Willamette River to the north (Parcel North of the Railroad Tracks)

Sampling Plan Goals

The purpose of a Sampling Plan is to document methodologies and procedures utilized in obtaining potentially contaminated representative samples at the site; to assist in maintaining quality assurance/quality control (QA/QC) for the sampling program; and to provide for personnel safety. The sampling protocol outlined in this Sampling Plan will provide for collection of representative chemical/physical samples at the site. This plan was written also to comply with regulations of the Oregon Department of Environmental Quality (DEQ) and the United States Environmental Protection Agency (EPA).

Sampling Objectives

The objective of this Sampling Plan is to document and detail the sampling protocol, quality assurance, and quality control for collecting representative samples at the project site.

The specific objectives for the parcel north of the railroad tracks is:

- evaluate possible buried chemical waste in the area north of the railroad tracks at locations identified in the report dated July 1991, as test pits SVS-2, SVS-3, SVS-5, SVS-7, and SVS-8.
- evaluate possible contamination in the area proposed for the EWEB steam line extension trench.

Additional specific objectives of the Sampling Plan for this area are to:

- establish quality assurance and quality control for obtaining representative samples; and
- determine the level of personnel safety required for the project.

Sampling Design and Protocol

Selection of chemical/physical parameters to be measured are based on a review of past and current practices at the site, prior studies conducted at the site, and information from regulatory agency files and/or other sources. Additional parameters may be required to document specific characteristics of the site.

Chemical Parameters Tested

Selection of the chemical parameters to be measured were based on known past and present practices utilized by companies that have conducted operations at the site. The parameters were chosen to provide a measure of the hazardous contaminants present at the sample locations. The parameters include specific and general indicator parameters. Additional chemical parameters may be added, or existing parameters deleted, where chemical data or other information indicates a change is advised. Based on the foregoing, samples will be analyzed for the following specific and general parameters:

Samples may be collected, if appropriate, for analysis of selected priority pollutant total metals or Toxic Characteristic Leachability Procedure (TCLP) metals, volatile organic compounds, and/or other chemicals, as determined during field observation.

Chemical	Method	Detection Limit (soil)
1. Antimony	EPA Method 7740	0.5 ppm
2. Arsenic	EPA Method 7740	0.3 ppm
3. Beryllium	EPA Method 6010	1.0 ppm
4. Cadmium	EPA Method 6010	1.0 ppm
5. Chromium	EPA Method 6010	1.0 ppm
6. Copper	EPA Method 6010	1.0 ppm
7. Lead	EPA Method 7740	0.5 ppm
8. Mercury	EPA Method 7470	0.1 ppm
9. Nickel	EPA Method 6010	5.0 ppm
10. Selenium	EPA Method 7740	0.3 ppm
11. Silver	EPA Method 6010	1.0 ppm
12. Thallium	EPA Method 7740	0.5 ppm
13. Zinc	EPA Method 6010	1.0 ppm

Compound	Method	Detection Limit
1. Volatile Organic Cmpds	EPA Method 8240	0.002-0.200 ppm
2. As field determined	EPA SW-846 Method	SW-846 manual

Sampling Locations

Sampling locations are determined based on a review of selected available data. In selecting sampling locations, consideration is given to site conditions (i.e., utilities, buildings, and traffic flow patterns). The final locations will be determined in the field prior to and at the time of sampling. Initial sampling locations are identified in the Sampling Objective section of this plan.

Modification of Sampling Plan

Actual conditions encountered during sampling may require modification of the methodology used to obtain representative samples at the site. If modifications are made in the methodology, field records will be completed outlining the changes and detailing the reason(s) for modifying the methodology.

Methodology

Soil Authoritarian Samples. Soil grab samples collected from the identified areas will be collected in the following manner:

a) The site soil sampling methodology will be as described in the EPA publication SW-846, Third Edition. Authoritarian sample locations will be determined using

information based on past practices at the site. Each sampling location will be physically identified by placing numbered/dated sampling stakes or markers adjacent to the center of the sampling location. The measured distance from an easily identified point will be recorded in field notes to further document each sampling location.

b) The barrel auger and other sampling equipment will be decontaminated at the Squier laboratory before being transported to the site. Equipment decontamination will be accomplished by washing in a non-phosphate detergent solution, rinsing with distilled water and air drying.

   After decontamination, the sampling equipment, including brass sleeves, will be stored in separate clean plastic bags until used. The sampling personnel will wear clean disposable surgical gloves and overgloves (if necessary) when handling decontaminated sampling equipment. New gloves will be used at each sampling location.

c) A grab sample will be taken at each sample location and depth.

d) Subsurface conditions will be examined continuously, especially changes in soil classification and permeability. Observations will be noted with sample records.

e) The soil core sampling apparatus consists of a 6" brass sampling sleeve which is advanced by a 2" modified barrel auger. The auger is used to advance the hole to the desired depth. A clean sampling sleeve is than placed on the modified sampling apparatus and driven into the soil to collect a sample. The sleeve ends are sealed with teflon or aluminum foil, capped, and taped.

f) The containers will be labeled, sealed, and stored under refrigerated conditions (4°C).

Chain Of Custody

The consultant will maintain proper chain of custody records for the samples and will transport secured or sealed samples back to the laboratory in ice chests. If the integrity of the samples is questioned, it will be noted on the Chain of Custody form. Transfer of possession

of the samples will be acknowledged on the chain of custody record by custodial signature, dates of possession, time of transferral, and signature of the person receiving custody of the samples. The original chain of custody record will be kept with samples at all times.

Quality Assurance and Quality Control

The primary objective of this Sampling Plan is to provide for collection of representative samples from the University of Oregon, Riverfront Research Park site. Analysis of these samples will provide quantitative and qualitative information on whether selected contaminants are present at the property.

Quality Assurance and Quality Control (QA/QC) is a necessary part of this Sampling Plan to assure the meeting of this objective. Specific QA/QC objectives are to assure precision, accuracy, representativeness, comparability, and completeness for the samples collected and the analytical laboratory analyses performed on these samples. These quality control parameters are described below.

A. Precision

Precision is a measure of the scatter of the data when more than one measurement is made on the sample. Scatter is commonly attributed to sampling activities and/or chemical analyses. for duplicate measurements, precision can be expressed as the relative percent difference. Split laboratory analyses are performed to confirm reportable concentrations detected in the sample. Field duplicates or split samples will be provided for 5 percent of the samples collected to measure precision. Volatile organic compound samples, however, will be collected in duplicate.

B. Accuracy

Accuracy is a measure of the probable difference between reported test results and the true sample concentration. Insomuch as true sample concentrations are not known, a priori, accuracy for chemical compound analysis is usually inferred from recovery data as determined by sample blanks, sample spiking, and surrogate samples.

The preferred method for sample spiking is to add a known amount of the constituent of interest to a split sample in the field. Because of the inherent difficulties associated with field spiking, this method will not be employed. Rather, the laboratory will analyze surrogate sam-

ples, sample blanks, and spike additions according to accepted laboratory procedures. Perfect accuracy would be defined by 100 percent recovery.

C. Representativeness

Representativeness is a measure of how closely the measured results reflect the actual concentration of the chemical parameters in the materials sampled.

Sampling procedures are designed so that results are representative of the materials being measured. Sample handling protocols for storage, preservation and transportation have been developed to preserve the representativeness of the collected samples with particular emphasis on the minimization of volatilization of organic compounds. Proper documentation will establish that protocols have been followed, and sample identification and integrity assured. Transfer, transport, and equipment blanks and field duplicates or split samples at a frequency of 5 percent per set of samples, will be used to assess field and transport contamination, and method variation. Laboratory method blanks will be run as per laboratory QA/QC. Maximum storage times, as stated in SW-846, Third Edition, or other analytical methods used, will not be exceeded to assure representativeness.

D. Comparability

The objective of this parameter is to assure that data developed during the investigation are either directly comparable, or comparable with defined limitations, to literature data or other applicable criteria.

Comparability of the data will be maintained by using EPA defined procedures. The parameters and analytical methods, along with target quantification limits, are presented in the chemical parameters section. Actual detection limits may vary during analysis depending on the nature of the particular sample material, especially soil and sludge samples. Actual detection limits obtained will be reported by the analytical laboratory.

Analytical methods for this investigation will be performed using only approved methods contained in 40 CFR Part 136, "Guidelines Establishing Test Procedures For The Analysis of Pollutants", or EPA Methods SW-846, "Test Methods For Evaluating Solid Waste Physical Chemical Methods", Third Edition, unless an approved method does not exist for the proposed analyses.

E. Completeness

Completeness is a measure of the amount of valid data obtained from the analytical measurement system compared to the amount that was expected to be obtained. It is defined as the total number of samples taken for which valid analytical data are obtained divided by the total number of samples collected and multiplied by 100.

Data Assessment

The quality of the data will be based upon precision, accuracy and completeness.

A. Precision

The relative percent difference (RPD) is used to assess the precision of the analytical method and is calculated using the following equation:

$$RPD = \frac{X_s - X_d}{\frac{X_s + X_d}{2}} * 100$$

where:
X_s is the analytical result in mg/l obtained for the sample.
X_d is the analytical result in mg/l obtained for the duplicate sample.

B. Accuracy

Accuracy of the data set is determined from the analysis of laboratory spiked samples. The accuracy is calculated using the following equation:

$$A = \frac{X_{ss} - X_d}{T} * 100$$

where:
A is the recovery for the added spike.
X_{ss} is the analytical result in mg/l obtained for the spiked sample.
X_d is the analytical result in mg/l obtained for the duplicate sample.
T is the true value of the added spike in mg/l.

Overall precision and accuracy will be determined for the project from the arithmetic mean of RPD and accuracy (A) for each parameter.

C. Completeness

Completeness of the data is determined using the following equation:

$$Completeness\ (\%) = \frac{Number\ of\ Samples\ Having\ Valid\ Data}{Number\ of\ Samples\ Collected} * 100$$

D. Corrective Action

If the quality control audit results in detection of unacceptable conditions or data, the project manager (PM) will be responsible for developing and initiating corrective action. The PM and principal engineer will be notified if the non-conformance is of program significance or requires special expertise above the normally assigned project team. Corrective action may include:

- Reanalyzing the samples, if holding time criteria permit.
- Resampling and reanalyzing.
- Evaluating and amending sampling and analysis procedures.
- Accepting data, acknowledging level of uncertainty or inaccuracy by flagging the data.

Specific incidence reports will address:

- Significant QA problems identified, together with recommendations.
- Corrective actions taken for any problems previously identified.

Planning For Quality Control

Field sampling personnel will make arrangements with the laboratory for sample containers compatible with chemicals to be analyzed. Chain of custody forms, sample forms, and other documentation forms will be assembled in advance of field sampling activities. Preparation and assembly of the required equipment and supplies should proceed as follows:

1. Equipment, equipment manuals, and supplies will be assembled based on the type of samples to be collected using the field equipment/supply check list.

2. Equipment will be checked for proper calibration, assembly and operation prior to mobilization. Field calibration supplies and equipment will also be checked.

3. Sampling equipment that will potentially contact sample materials will be decontaminated prior to mobilization in accordance with procedures outlined in this Sampling Plan.

4. Sampling equipment, such as trowels and bailers, will be wrapped in clean aluminum foil or plastic bag/liners during transport and storage.

5. Sampling equipment will be decontaminated in the field prior to leaving the sampling site. The field equipment/supply check list will be used to verify re-loading of sampling equipment and supplies.

6. Upon arrival at the Squier Associates office, decontaminated equipment will be returned to storage along with excess supplies.

7. Equipment and supply use forms will be filled out to document equipment and materials used. Equipment that needs to be serviced will be listed along with needed supplies to maintain project Quality Control.

Project Managers will be responsible for QA/QC to assure that these steps are followed.

Chain of Custody

Chain of custody for a sample is defined by the following criteria:

- The sample is in your possession or in your view after being in your possession.
- The sample was in your possession and was locked up, or transferred to a designated secure area by you.

Each time the sample bottles or samples change hands, both the sender and receiver will sign and date the Chain of Custody form and specify what has changed hands. After transfer of sample custody from the sampling team to the laboratory sample custodian, one copy of the chain of custody record will be given to the sampling team for placement into the project files; the second copy remains with the sample while in the laboratory and the original is placed in the laboratory's legal file. A chain of custody record will be completed for each shipment of containers.

The chain of custody record will include:

sample code number
signature of the collector
date and time of collection
waste type
signatures of persons involved in the chain of possession
dates of possession by the above persons
total number of samples received

The chain of custody record will allow reconstruction of the sample transportation chain from the initial sampler to the laboratory analyst.

Labels

All samples will be labelled on the container (not on the lid) with the sample number, name of collector, date and time of collection, media collected, requested analysis, sample preservation requirements, and place or location. Labels will be filled out at the time of collection to prevent errors.

Seals

Sample seals are generally not necessary when samples are delivered directly to the lab by the sampler. However, when samples arrive at the laboratory after working hours, or when samples are shipped to the laboratory, the seals will be affixed such that they must be broken in order to open the sample cooler. The seals should be marked, at a minimum, with the project number, date and the sampler's signature.

Field Log

A field log must be kept during sample collection. Any and all relevant information should be entered into this log. This log should include the following information:

purpose of sampling
location of sample
name and address of field contact
type of sample
suspected contaminants
number and volume of samples taken
sample code number
description of sample point
description of sampling methodology
date and time of collection
sample distribution (i.e., name of laboratory, etc.)
means of transportation of sample
means of sample preservation
references to drawings, grid points, maps, etc.
sketches of site
field observations (color, odor, soil characteristics, etc.)
field measurements taken (pH, flammability, etc.)
signature(s) of person taking data

The field data will be recorded so that the sampling process can be reconstructed from this record without reference to memory or other notes. The field log will be protected and kept in a safe place, and will be kept as a permanent record.

Corrections to Documentation

All original recorded data, chain of custody records, and other forms will be written in waterproof ink. None of these documents will be destroyed or thrown away, even if they are illegible or contain inaccuracies that require a replacement document.

If an error is made on a document, make corrections by crossing a single line through the error, entering the correct information, and initialing the correction.

Duplicates

One duplicate or split sample will be obtained for every twenty field samples taken (5 percent). A duplicate or split sample will be obtained if less than twenty samples are collected. Split samples will be analyzed to evaluate laboratory reproducibility.

Duplicate samples will provide Quality Control for sampling, transportation and analytical errors. Split samples will be obtained by splitting homogenized composite samples between two different sample containers, which will be treated separately throughout the remainder of the analytical process, except that samples for volatile organic compounds will not be field homogenized. Duplicate samples will be obtained by collecting an adjacent second sample.

Blanks

Travel, transfer, and equipment blanks consisting of ASTM type 1 (or equivalent) water will be taken for every ten samples or one per sampling day, whichever is greater. An unopened travel blank containing laboratory ASTM type 1 (or equivalent) water will be subjected to the same handling, temperature and conditions of collected samples. Laboratory analysis of this sample evaluates environmental impacts on the quality of the collected samples.

A transfer blank containing laboratory ASTM type 1 (or equivalent) water will be field transferred from one sample container to another container. This is to measure the impact on the collected samples of the site environment.

An equipment blank will be collected by pouring distilled water, used in field decontamination, through a decontaminated bailer or on a decontaminated hand auger or other sampling tool. The equipment blank will evaluate the completeness of decontamination of the equipment used in collecting samples.

Sample Analysis Request

A sample analysis request sheet will accompany the samples to the laboratory and should include:

name of the laboratory
signature of sample custody clerk
date of shipment/receipt
sample allocation
analyses to be performed
sample field code number
number of containers
other relevant field data or comment

The sample analyses request sheet may be a part of the Chain of Custody form.

Shipping Requirements

Samples will be transported as rapidly as possible (usually within one day) to the receiving laboratory. Samples will be maintained at or about 4°C during shipment. Shipping container seal and chain of custody will be maintained.

Equipment Calibration and Maintenance

All instruments and equipment used during this project will be operated, calibrated, and maintained according to the manufacturers guidelines and recommendations. Operation, calibration and maintenance will be performed by personnel who have been properly trained in these procedures.

Instruments which fail to fall within established performance limits will be removed from use until proper maintenance/repair have been performed and have been demonstrated to be accurate. In addition, field instruments are checked prior to use, and then periodically checked in the field to verify meter calibrations. All calibration and field measurements will be recorded.

All samples will be collected and analyzed in accordance with methodology described in EPA publication SW-846, "Test Methods For Evaluating Solid Waste Physical Chemical Methods" (Third Edition), or other applicable analytical methods. In addition, accepted procedures concerning sample labels, sample seals or security, sample storage, of custody records,

analytical requests, and shipping parameters will be followed. Complete field records will also be established for each sample. Copies of the various data record sheets are presented in Appendix A.

Quality Control and Quality Assurance (QA/QC) in regard to sampling procedures, selection of containers, analysis parameters, sample preservation, decontamination of sampling equipment, sample labels and security, and chain of custody are also discussed in detail in other sections of this Sampling Plan.

Personnel Safety

Review of available records will determine the level of personnel protection and safety required at the site. If records are non-existent or incomplete and a risk decision cannot be made, a worst case scenario will be assumed and the site will require level "A" protection. For drilling and sampling in the area north of the railroad tracks level "C" protection is indicated. For all sampling locations presently being accessed at the Riverfront Research Park site, level "D" protection is indicated. This decision is based on the information supplied by the client and from review of available records and information. Level "C" and level "D" require the following list of equipment.

Levels of Protection

Level C. The concentration(s) and type(s) of airborne substance(s) is known and the criteria for using air purifying respirators are met. Level C equipment; used as appropriate.

1. Full-face or half-mask, air-purifying canister equipped respirators (NIOSH approved).
2. Hooded chemical-resistant clothing (overalls; two-piece chemical splash suit, disposable chemical-resistant overalls).
3. Coveralls.*
4. Gloves, outer, chemical-resistant.
5. Gloves, inner, chemical-resistant.
6. Boots (outer), chemical-resistant steel toe and shank.*
7. Boot covers, outer, chemical-resistant (disposable).*
8. Hard hat.
9. Escape mask.*
10. Two-way radios (worn under outside protective clothing).*
11. Face shield.*

*Optional, as applicable.

Level D. A work uniform affording minimal protection; used for nuisance contamination only. Level D equipment; used as appropriate.

1. Coveralls.
2. Gloves.*
3. Boots/shoes, chemical-resistant steel toe and shank.
4. Boots, outer, chemical-resistant (disposable).*
5. Safety glasses or chemical splash goggles.*
6. Hard hat.
7. Escape mask.*
8. Face shield.*

*Optional, as applicable.

APPENDIX H

QUALITY ASSURANCE REPORT

PROJECT AND SAMPLE INFORMATION

Project Name:	University of Oregon
Project No.:	89384.61
Lab Name:	Pacific Environmental Laboratory
Lab Number:	91-2870
Report date:	10/3/91
Sample No.:	Soil TP-20, SVS-2.1 S-4, SVS-5.1 S-3a, SVS-5.1 S-3b, SVS-7.1, SVS-8.1, SVS-2.1 S-2, SVS-2.1 S-3

ANALYTICAL METHODS

TPH-HCID, 23 Priority Metals (Total), EPA 8240, Total Metals

CHAIN OF CUSTODY DOCUMENTATION

No discrepancies noted

SAMPLE HOLDING TIMES

Soil samples were extracted and analyzed within recommended holding times.

INSTRUMENT CALIBRATION

No discrepancies noted.

METHOD DETECTION LIMITS

Detection limits were within laboratory PQLs. Laboratory PQLs are typically below action levels listed in the Oregon Department of Environmental Quality (DEQ) Soil Cleanup Table.

BLANK ANALYSIS

a) Field Blanks - no field blanks collected
b) Method Blanks - Acceptable results

QUALITY CONTROL

a) Accuracy - Acceptable results
b) Precision
   Field duplicate - Acceptable results
   Laboratory duplicate - Acceptable results

DATA USE LIMITATIONS

Acetone detected in soil sample SVS-2.1,S-4 at 0.310 ppm, detection limit 0.1 ppm. Due to volatility and water solubility of acetone and age of suspected release (1960s), this value is suspect, and probably a laboratory artifact.

QUALITY ASSURANCE REPORT

PROJECT AND SAMPLE INFORMATION

Project Name:	University of Oregon
Project No.:	89384.61
Lab Name:	Pacific Environmental Laboratory
Lab Number:	91-3615
Report date:	11/26/91
Sample No.:	Soil SVS-2.1 S-4

ANALYTICAL METHODS

TCLP Metals

CHAIN OF CUSTODY DOCUMENTATION

No discrepancies noted

SAMPLE HOLDING TIMES

Soil samples were extracted and analyzed within recommended holding times.

INSTRUMENT CALIBRATION

No discrepancies noted.

METHOD DETECTION LIMITS

Detection limits were within laboratory PQLs. Laboratory PQLs are typically below action levels listed in the Oregon Department of Environmental Quality (DEQ) Soil Cleanup Table.

BLANK ANALYSIS

a) Field Blanks - no field blanks collected
b) Method Blanks - Acceptable results

QUALITY CONTROL

a) Accuracy - Acceptable results
b) Precision
   Field duplicate - no field duplicates taken
   Laboratory duplicate - Acceptable results

DATA USE LIMITATIONS

No limitations noted.

PACIFIC
ENVIRONMENTAL
LABORATORY INC.

9405 S.W. Nimbus Ave. Beaverton, OR 97005 (503) 644-0660
FAX # (503) 644-2202

October 3, 1991

Squier Associates, Inc.
P.O. Box 1317
Lake Oswego, OR 97035

Attn: Bill Hartford

Re: JOB #89-384.61
PROJECT - U of O
PEL #91-2870

Enclosed is the lab report for your samples which were received on September 20, 1991.

I. Sample Description

Eight Soil Samples

The samples were received under a chain of custody.

The samples were received in containers consistent with EPA protocol.

II. Quality Control

The in-house QC data you requested is enclosed.

III. Analytical Results

Test methods may include minor modifications of published methods such as detection limits or parameter lists. Solid and waste samples are reported on an "as received" basis unless otherwise noted.

Compounds not detected are listed under results as ND.

Sincerely,

Howard Holmes
Lab Manager

Howard Boorse
QA/QC Manager

PACIFIC ENVIRONMENTAL LABORATORY INC.

PEL REPORT NUMBER: 91-2870
CLIENT: Squier Associates, Inc.
JOB REFERENCE: 89-384.61
PROJECT: U of O
DATE: October 3, 1991
ITEMS: Eight Soil Samples

METHOD: Total Metals per EPA 3005, 3050, 6010, 7000 series
Results in mg/kg (ppm)

Compound	SVS-2.1,S-4	Lab Blank	Detection Limit
Aluminum	20,000	ND	5
Antimony	ND	ND	16
Arsenic	6.8	ND	0.2
Barium	110	ND	0.8
Beryllium	ND	ND	0.8
Cadmium	ND	ND	0.8
Calcium	1,900	ND	1
Chromium	27	ND	0.8
Cobalt	23	ND	4
Copper	12	ND	0.8
Iron	18,000	ND	3
Lead	18	ND	4
Magnesium	1,800	ND	1
Manganese	360	ND	0.8
Mercury	ND	ND	0.4
Nickel	6	ND	4
Potassium	430	ND	40
Selenium	0.32	ND	0.2
Silver	ND	ND	0.8
Sodium	94	ND	8
Thallium	ND	ND	0.8
Vanadium	41	ND	4
Zinc	37	ND	0.8

PACIFIC ENVIRONMENTAL LABORATORY INC.

PEL REPORT NUMBER: 91-2870
CLIENT: Squier Associates, Inc.
JOB REFERENCE: 89-384.61
PROJECT: U of O
DATE: October 3, 1991
ITEMS: Eight Soil Samples

METHOD: Total Metals per EPA 3050, 6010, 7000 series
Results in mg/kg (ppm)

Compound	SVS-5.1, S-3a	SVS-5.1, S-3b	SVS-7.1
Arsenic	4.5	5.1	9.6
Beryllium	ND	--	--
Cadmium	ND	ND	ND
Chromium	22	21	19
Copper	13	18	26
Lead	17	11	45
Nickel	8	--	--
Zinc	50	--	--

Compound	SVS-8.1	Lab Blank	Detection Limit
Arsenic	4.1	ND	0.2
Beryllium	--	ND	0.8
Cadmium	ND	ND	0.8
Chromium	16	ND	0.8
Copper	19	ND	0.8
Lead	14	ND	4
Nickel	--	ND	4
Zinc	--	ND	0.8

PACIFIC ENVIRONMENTAL LABORATORY INC.

PEL REPORT NUMBER: 91-2870
CLIENT: Squier Associates, Inc.
JOB REFERENCE: 89-384.61
PROJECT: U of O
DATE: October 3, 1991
ITEMS: Eight Soil Samples

METHOD: TPH-HCID per Oregon DEQ
Detection limits in mg/kg (ppm)

Sample I.D.	Gasoline	Diesel	Bunker/ Related
TP-20	ND	ND	Detected
Lab Blank	ND	ND	ND
Detection Limit	20	50	--

TPH-HCID Surrogate Recoveries (%)

Sample I.D.	1-chlorooctadecane
TP-20	101
Control limits	50-150

PACIFIC ENVIRONMENTAL LABORATORY INC.

PEL REPORT NUMBER: 91-2870
CLIENT: Squier Associates, Inc.
JOB REFERENCE: 89-384.61
PROJECT: U of O
DATE: October 3, 1991
ITEMS: Eight Soil Samples

METHOD: Volatiles per EPA 8240
Results in ug/kg (ppb)

Compound	SVS-2.1, S-4	Lab Blank	Detection Limit
Acetone	310	ND	100
Acrolein	ND	ND	200
Acrylonitrile	ND	ND	100
Benzene	ND	ND	4.0
Bromodichloromethane	ND	ND	4.0
Bromoform	ND	ND	4.0
Bromomethane	ND	ND	20
2-Butanone	ND	ND	200
Carbon disulfide	ND	ND	4.0
Carbon tetrachloride	ND	ND	4.0
Chlorobenzene	ND	ND	4.0
Chlorodibromomethane	ND	ND	4.0
Chloroethane	ND	ND	20
Chloroform	ND	ND	4.0
Chloromethane	ND	ND	20
Dibromomethane	ND	ND	4.0
Dichlorobenzenes	ND	ND	4.0
Dichlorodifluoromethane	ND	ND	4.0
1,1-Dichloroethane	ND	ND	4.0
1,2-Dichloroethane	ND	ND	4.0
1,1-Dichloroethene	ND	ND	4.0
cis-1,2-Dichloroethene	ND	ND	4.0
trans-1,2-Dichloroethene	ND	ND	4.0
1,2-Dichloropropane	ND	ND	4.0
cis-1,3-Dichloropropene	ND	ND	4.0
trans-1,3-Dichloropropene	ND	ND	4.0
Ethylbenzene	ND	ND	4.0
2-Hexanone	ND	ND	4.0
Methylene chloride	ND	ND	4.0
4-Methyl-2-pentanone	ND	ND	4.0
Styrene	ND	ND	4.0
1,1,2,2-Tetrachloroethane	ND	ND	4.0
Tetrachloroethene	ND	ND	4.0
Toluene	ND	ND	4.0
1,1,1-Trichloroethane	ND	ND	4.0
1,1,2-Trichloroethane	ND	ND	4.0
Trichloroethene	ND	ND	4.0
Trichlorofluoromethane	ND	ND	4.0
1,2,3,-Trichloropropane	ND	ND	4.0
Vinyl acetate	ND	ND	20
Vinyl chloride	ND	ND	20
Xylene	ND	ND	4.0

PACIFIC ENVIRONMENTAL LABORATORY INC.

PEL REPORT NUMBER: 91-2870
CLIENT: Squier Associates, Inc.
JOB REFERENCE: 89-384.61
PROJECT: U of O
DATE: October 3, 1991
ITEMS: Eight Soil Samples

8240 Surrogate Recoveries (%)

Sample I.D.	1,2-Dichloroethane-d4	Toluene-d8
SVS-2.1,S-4	99	91
EPA Limits	70-121	81-117

Sample I.D.	4-Bromofluorobenzene
SVS-2.1,S-4	87
EPA Limits	74-121

PACIFIC
ENVIRONMENTAL
LABORATORY INC.

9405 S.W. Nimbus Ave. Beaverton, OR 97005 (503) 644-0660
FAX # (503) 644-2202

October 3, 1991

Squier Associates, Inc.
P.O. Box 1317
Lake Oswego, OR 97035

Attn: Bill Hartford

Re: Requested Quality Control Data

Enclosed is the in-house quality control data you requested on PEL project number 91-2870.

NOTE: Lab Blank results and Surrogate Recoveries are included in the final report.

QUALITY CONTROL DEFINITIONS

LAB BLANK RESULTS

A Lab Blank is a laboratory-generated sample which assesses the degree to which laboratory operations and procedures cause false-positive analytical results for your sample.

No target parameters were detected in the lab blank associated with your sample at the reporting limit levels noted on the data sheets in the final report.

SURROGATE STANDARDS

A surrogate standard (i.e., a chemical compound not expected to occur in an environmental sample) is added to each sample, blank, and matrix spike sample just prior to extraction or processing. The recovery of the surrogate standard is used to monitor for unusual matrix effects, gross sample processing errors, etc. Surrogate recovery is evaluated for acceptance by determining whether the measured concentration falls within accepted limits.

Accuracy is measured by percent recovery as in:

$$\% \text{ Recovery} = \frac{(\text{measured concentration})}{(\text{Actual Concentration})} \times 100$$

Precision is measured using duplicate tests by relative percent difference.

$$\text{RPD} = \frac{(\text{Result of Test 1} - \text{Result of Test 2})}{(\text{Result of Test 1} + \text{Result of Test 2})/2} \times 100$$

If you should have any questions concerning this report please contact me.

Sincerely,

Howard Boorse
QA/QC Director

clr

PACIFIC ENVIRONMENTAL LABORATORY INC.

PEL REPORT NUMBER: QC Data for PEL project 91-2870
CLIENT: Squier Associates, Inc.
PROJECT: U of O
DATE: October 3, 1991

BATCH DUPLICATE RESULTS FOR TOTAL METALS PER EPA 3005, 3050, 6010, 7000 SERIES RESULTS IN MG/KG (PPM)

Compound	Sample Result	Duplicate Result	Relative Percent Difference
Aluminum	20,000	20,000	0
Antimony	ND	ND	0
Arsenic	6.8	7.1	4.3
Barium	110	130	17
Beryllium	ND	ND	0
Cadmium	ND	ND	0
Calcium	1,900	2,000	5.1
Chromium	27	27	0
Cobalt	20	23	14
Copper	12	15	22
Iron	18,000	21,000	15
Lead	18	12	40
Magnesium	1,800	2,200	20
Manganese	330	320	3.1
Mercury	ND	ND	0
Nickel	6	7	15
Potassium	430	430	0
Selenium	0.32	0.30	6.4
Silver	ND	ND	0
Sodium	94	93	1.1
Thallium	ND	ND	0
Vanadium	ND	ND	0
Zinc	37	37	0

PACIFIC ENVIRONMENTAL LABORATORY INC.

PEL REPORT NUMBER: QC Data for PEL project 91-2870
CLIENT: Squier Associates, Inc.
PROJECT: U of O
DATE: October 3, 1991

BATCH MATRIX SPIKE AND MATRIX SPIKE DUPLICATE RESULTS FOR TOTAL METALS PER EPA 3050, 6010, 7000 SERIES RESULTS IN MG/KG (PPM)

Compound	Spike Level	Sample Result	Spike Result	Spike Dup Result
Aluminum	10	270	--	--
Arsenic	0.125	0.094	0.199	0.191
Antimony	1.0	ND	ND	ND
Barium	10	1.47	10.8	11.5
Beryllium	0.5	ND	0.465	0.438
Cadmium	0.5	ND	0.386	0.416
Calcium	10	27	--	--
Chromium	1	0.380	1.18	1.16
Cobalt	2.5	0.319	2.37	2.30
Copper	1.25	0.168	1.35	1.28
Iron	5	250	--	--
Lead	2.5	0.249	2.38	2.53
Magnesium	10	25	--	--
Manganese	2.5	4.59	6.44	5.08
Mercury	0.25	ND	0.297	0.281
Nickel	2.5	0.086	2.11	2.14
Potassium	2	6.0	10	12
Selenium	0.25	0.005	0.306	--
Silver	0.5	ND	0.027	0.032
Sodium	10	1.46	11.8	11.3
Thallium	0.25	ND	0.11	0.18
Vanadium	2.5	ND	1.49	1.54
Zinc	2.5	0.517	2.54	2.52

PACIFIC ENVIRONMENTAL LABORATORY INC.

PEL REPORT NUMBER: QC Data for PEL project 91-2870
CLIENT: Squier Associates, Inc.
PROJECT: U of O
DATE: October 3, 1991

BATCH MATRIX SPIKE AND MATRIX SPIKE DUPLICATE RESULTS FOR TOTAL METALS PER EPA 3050, 6010, 7000 SERIES RESULTS IN MG/KG (PPM)

Compound	Percent Recovery Spike	Percent Recovery Spike Dup	Relative Percent Difference
Aluminum	*	*	--
Arsenic	84	78	4.1
Antimony	0	0	0
Barium	93	100	6.3
Beryllium	93	88	6.0
Cadmium	77	83	7.5
Calcium	*	*	--
Chromium	80	78	1.7
Cobalt	82	73	3.0
Copper	95	89	5.3
Iron	*	*	--
Lead	85	91	6.1
Magnesium	*	*	--
Manganese	74	20	24
Mercury	119	112	5.5
Nickel	81	82	1.4
Potassium	200	300	18
Selenium	120	--	--
Silver	5.4	6.4	17
Sodium	10.3	98	4.3
Thallium	44	72	48
Vanadium	60	62	3.3
Zinc	81	80	0.8

* Concentration of the analyte in the sample is too high to determine matrix spike recovery.

PACIFIC ENVIRONMENTAL LABORATORY INC.

PEL REPORT NUMBER: QC Data for PEL project 91-2870
CLIENT: Squier Associates, Inc.
PROJECT: U of O
DATE: October 3, 1991

BATCH DUPLICATE RESULTS FOR TPH-HCID PER OREGON DEQ

Analysis	Sample Result	Duplicate Result	Relative Percent Difference
TPH	Gasoline Detected	Gasoline Detected	0
	Diesel Detected	Diesel Detected	0
	Bunker/Related Det.	Bunker/Related Det.	0

BATCH MATRIX SPIKE AND MATRIX SPIKE DUPLICATE RESULTS FOR VOLATILES PER EPA 8240
RESULTS IN ug/kg (ppm)

Compound	Spike Level	Sample Result	Spike Result	Spike Dup Result
1,1-Dichloroethene	50	ND	46	44
Benzene	50	ND	53	52
Trichloroethene	50	ND	48	46
Toluene	50	69	121	121
Chlorobenzene	50	ND	50	49

Compound	Percent Recovery Spike	Percent Recovery Spike Dup	Relative Percent Difference
1,1-Dichloroethene	92	88	4.4
Benzene	106	104	1.9
Trichloroethene	96	92	4.3
Toluene	104	104	0.0
Chlorobenzene	100	98	2.0

CHAIN OF CUSTODY RECORD

Job Number 24-32761

Job Name U of O

Location Eugene

Sample I.D.	Sample Type	Sample Date	Sample Time	# Containers	Parameters to be Tested: TPH-HCID	23 priority pollut. total metals	1414 8270	aa, be, cd, cr, cu, ni, pb, zn Total	as, cd, cr, cu, pb Total		arsenic					
1) TP-20	soil	9/18/91	10:45	1	✓											
2) SVS-2.1, S-4	soil	9/18/91	1327	1		✓	✓									
3) SVS-5.1, S-3a	soil	9/18/91	1450	1				✓								
4) SVS-5.1, S-3b	soil	9/18/91	1450	1					✓							
5) SVS-7.1	soil	9/18/91	1147	1					✓							
6) SVS-8.1	soil	9/18/91	1005	1					✓							
7) SVS-2.1, S-2	soil	9/18/91	1308	1							✓					
8) SVS-2.1, S-3	soil	9/18/91	1315	1							✓					
9)																
10)																
Total Number Containers				8	Sampler Signatures											
Sample Allocation (Name/Firm)					William D. Hartford											
Ncal																

(5-4)

Sample Relinquished by (Signature)	Inclusive Dates from	to	Time	Sample Received by (Signature)	Container Sealed Y	N	4°C Y	N
W D Hartford	9/18/91	9/20/91	13 35	Brenda Parker-Jones	X		X	
Brenda Parker-Jones	9/20/91	9/20/91	1440	Julie Reynolds				

CHAIN OF CUSTODY RECORD

ALL SAMPLES WILL BE DISPOSED OF 30 DAYS AFTER RECEIPT

PER 91-2870

L.R. SQUIER ASSOCIATES, INC.
GEOTECHNICAL CONSULTANTS

PACIFIC
ENVIRONMENTAL
LABORATORY INC.

9405 S.W. Nimbus Ave. Beaverton, OR 97005 (503) 644-0660
FAX # (503) 644-2202

November 26, 1991

Squier Associates, Inc.
P.O. Box 1317
Lake Oswego, OR 97035

Attn: Bill Hartford

Re: JOB #89-384.61
PROJECT - U. of O.
PEL #91-3615

Enclosed is the lab report for your samples which were received on September 20, 1991. Additional analyses were requested on November 14, 1991.

I. Sample Description

Eight Soil Samples

The samples were received under a chain of custody.

The samples were received in containers consistent with EPA protocol.

II. Quality Control

The in-house QC data you requested in enclosed.

III. Analytical Results

Test methods may include minor modifications of published methods such as detection limits or parameter lists. Solid and waste samples are reported on an "as received" basis unless otherwise noted.

Compounds not detected are listed under results as ND.

Sincerely,

Howard Holmes
Lab Manager

Howard Boorse
QA/QC Manager

PACIFIC ENVIRONMENTAL LABORATORY INC.

PEL REPORT NUMBER: 91-3615
CLIENT: Squier Associates, Inc.
JOB REFERENCE: 89-384.61
PROJECT: U. of O.
DATE: November 26, 1991
ITEMS: Eight Soil Samples

METHOD: T.C.L.P. per EPA 1311, 6010, 7000 Series
Results in mg/L (ppm)

Sample I.D.	Cadmium	Chromium	Lead
SVS-2.1, S-4	ND	ND	0.007
Lab Blank	ND	ND	ND
Detection Limit	0.003	0.01	0.003

PACIFIC
ENVIRONMENTAL
LABORATORY INC.

9405 S.W. Nimbus Ave. Beaverton, OR 97005 (503) 644-0660
FAX # (503) 644-2202

November 26, 1991

Squier Associates, Inc.
P.O. Box 1317
Lake Oswego, OR 97035

Attn: Bill Hartford

Re: Requested Quality Control Data

Enclosed is the in-house quality control data you requested on PEL project number 91-3615.

NOTE: Lab Blank results are included in the final report.

QUALITY CONTROL DEFINITIONS

LAB BLANK RESULTS

A Lab Blank is a laboratory-generated sample which assesses the degree to which laboratory operations and procedures cause false-positive analytical results for your sample.

No target parameters were detected in the lab blank associated with your sample at the reporting limit levels noted on the data sheets in the final report.

SURROGATE STANDARDS

A surrogate standard (i.e., a chemical compound not expected to occur in an environmental sample) is added to each sample, blank, and matrix spike sample just prior to extraction or processing . The recovery of the surrogate standard is used to monitor for unusual matrix effects, gross sample processing errors, etc. Surrogate recovery is evaluated for acceptance by determining whether the measured concentration falls within accepted limits.

Accuracy is measured by percent recovery as in:

$$\% \text{ Recovery} = \frac{(\text{measured concentration})}{(\text{Actual Concentration})} \times 100$$

Precision is measured using duplicate tests by relative percent difference.

$$\text{RPD} = \frac{(\text{Result of Test 1} - \text{Result of Test 2})}{(\text{Result of Test 1} + \text{Result of Test 2})/2} \times 100$$

If you should have any questions concerning this report please contact me.

Sincerely,

Howard Boorse
QA/QC Director

clr

PACIFIC ENVIRONMENTAL LABORATORY INC.

PEL REPORT NUMBER: QC Data for PEL project 91-3615
CLIENT: Squier Associates, Inc.
PROJECT: U. of O.
DATE: November 26, 1991

BATCH DUPLICATE ANALYSIS AND MATRIX SPIKE RESULTS FOR T.C.L.P. PER EPA 1311, 6010, 7000 SERIES RESULTS IN MG/L (PPM)

Metal	Sample Result	Duplicate Result	Relative Percent Difference
Arsenic	ND	ND	0
Barium	0.07	0.09	25
Cadmium	ND	ND	0
Chromium	ND	ND	0
Lead	ND	ND	0
Mercury	ND	ND	0
Selenium	ND	ND	0
Silver	ND	ND	0

Metal	Sample Result	Spike Level	Spike Result	Percent Recovery
Arsenic	ND	5	4.9	98
Barium	0.07	10	10	99
Cadmium	ND	1	0.91	91
Chromium	ND	5	4.4	88
Lead	ND	5	4.4	88
Mercury	ND	0.0022	0.0021	95
Selenium	ND	1	0.9	90
Silver	ND	5	0.75	15

CHAIN OF CUSTODY RECORD

Job Number 29-327-61

Job Name U of O

Location Eugene

Sample I.D.	Sample Type	Sample Date	Sample Time	# Containers	Parameters to be Tested: TPH-HCID	23 priority pollutant total metals	MTH 8270	cd, cr, pb, zn, TCLP	as, cd, cr, pb, TCLP		cr-hex					
1) TP-20	Soil	9/18/91	10:45	1	✓											
(5-4) 2) SVS-2.1, S-4	Soil	9/18/91	1327	1		✓	✓									
3) SVS-5.1, S-3a	Soil	9/18/91	1450	1				✓								
4) SVS-5.1, S-3b	Soil	9/18/91	1450	1					✓							
5) SVS-7.1	Soil	9/18/91	1147	1					✓							
6) SVS-8.1	Soil	9/18/91	1005	1					✓							
7) SVS-2.1, S-2	Soil	9/18/91	1308	1							✓					
8) SVS-2.1, S-3	Soil	9/18/91	1315	1							✓					
9)																
10)																
Total Number Containers				8												

Sampler Signatures: William D. Hunt

Sample Allocation (Name/Firm): None

Sample Relinquished by (Signature)	Inclusive Dates from	to	Time	Sample Received by (Signature)	Container Sealed Y	N	4°C Y	N
W D Hunt	9/18/91	9/20/91	1335	Linda Pilkey-Jarvis	X		X	
Linda Pilkey-Jarvis	9/20/91	9/20/91	1440	Julie Reynolds				

CHAIN OF CUSTODY RECORD

ALL SAMPLES WILL BE DISPOSED OF 30 DAYS AFTER RECEIPT

PER 91-2870

L.R. SQUIER ASSOCIATES, INC.
GEOTECHNICAL CONSULTANTS

ECSI #1018

SUBSURFACE INVESTIGATION
WESTERN PARCEL
for
UNIVERSITY OF OREGON
RIVERFRONT RESEARCH PARK

Prepared for:

University of Oregon
Office of Environmental Health and Safety
5224 University of Oregon
Eugene, Oregon 97403-5524

Prepared By:

Bergeson-Boese & Associates, Inc.
65 Centennial Loop
Eugene, Oregon 97401
(541) 484-9484

September 9, 1998

RECEIVED
SEP 15 1998
WESTERN REGION / EUGENE
DEPT ENVIRONMENTAL QUALITY

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Appendix I: Purge Water Disposal Receipt

1.0 SCOPE AND PURPOSE

Bergeson-Boese & Associates, Inc. (BB&A) was retained by the University of Oregon to perform a subsurface investigation of the western boundary of the area identified as the Western Parcel at the University of Oregon Riverfront Research Park facility. The purpose of this investigation was to measure and sample for the presence of petroleum hydrocarbons in soil and groundwater at the project site. The area of investigation is shown on the site map designated as Figure 1.

The investigation in the vicinity of the western boundary of the Western Parcel was performed to assess the potential for near surface petroleum hydrocarbon contamination associated with the historical operations on the subject property and the potential for on-site migration of petroleum hydrocarbons in both soil and groundwater associated with the historical operation of a manufactured gas plant on the west contiguous property currently owned by the Eugene Water and Electric Board (EWEB).

Shallow soil impact by petroleum hydrocarbons had been detected in exploratory backhoe trenches completed near the western boundary during a previous phase of the Riverfront Research Park Remedial Investigation (RI) completed by Squire Associates, Inc. In addition, petroleum hydrocarbon contamination has been detected in soil samples collected from both the vadose (i.e., unsaturated) zone and saturated zone on the west contiguous EWEB property during an investigation performed by PTI Environmental Services (Currently Exponent). Details of these investigations were presented to the Department of Environmental Quality (DEQ) in reports titled *Environmental Investigations Through August 1993, Riverfront Research Park, University of Oregon* dated September 1993 and *Initial Site Investigation Report, Former Manufactured Gas Plant Site, Eugene, Oregon* dated February 1996. The background information presented in these two (2) documents is not restated in this report but is incorporated by reference as a basis for the investigative tasks performed in the vicinity of the western property boundary.

The subsurface investigation performed near the western property boundary of the Western Parcel included the collection of subsurface soil and groundwater samples for laboratory analysis from soil borings completed using a hollow stem auger drill rig, the collection of near surface soil samples for laboratory analysis from test pit excavations completed using a

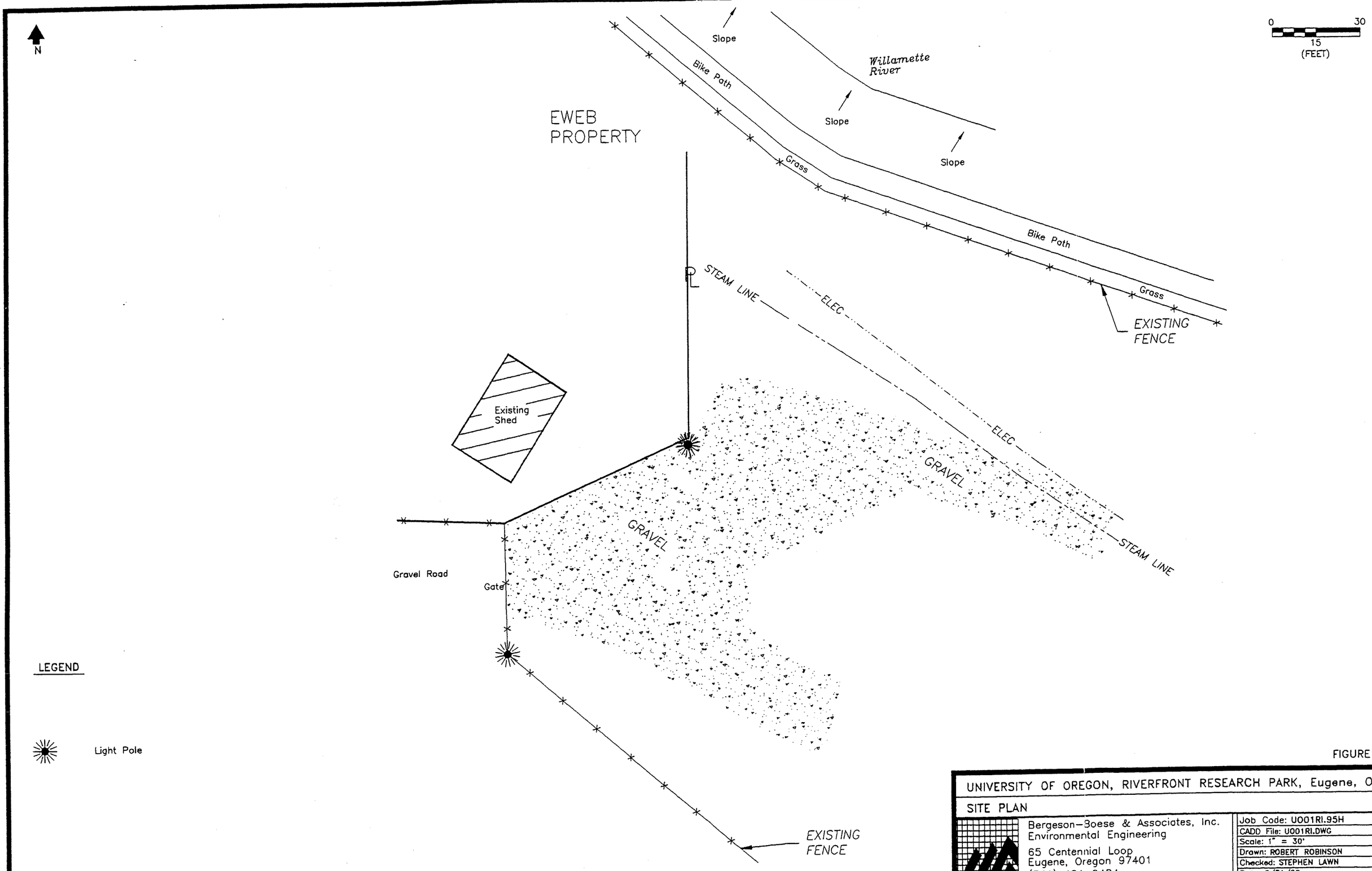


FIGURE 1

UNIVERSITY OF OREGON, RIVERFRONT RESEARCH PARK, Eugene, OR

SITE PLAN

Bergeson–Boese & Associates, Inc.
Environmental Engineering
65 Centennial Loop
Eugene, Oregon 97401
(541) 484–9484

Job Code: U001RI.95H
CADD File: U001RI.DWG
Scale: 1" = 30'
Drawn: ROBERT ROBINSON
Checked: STEPHEN LAWN
Date: 8/21/98

backhoe, and the collection of groundwater samples for laboratory analysis from five (5) permanent monitoring wells completed to the top of the bedrock layer beneath the project site.

The subsurface investigation was performed in accordance with workplans submitted to the DEQ for approval. These workplans include *Subsurface Investigation Workplan, Western Parcel and Former Asphalt Batch Plant, for University of Oregon Riverfront Research Park* dated July 16, 1996, and *Monitoring Well Installation* dated August 21, 1997.

2.0 SOIL BORINGS

Four (4) soil borings were completed at the project site for the collection of subsurface soil and groundwater samples. Initially, the soil borings were attempted using a Model 5400 Geoprobe® utilizing hydraulic direct push/percussion probing techniques. However, probe refusal occurred due to the coarse subsurface materials encountered. Alternatively, the soil borings were completed using a Canterra CT-150 drill rig using conventional hollow stem auger drilling techniques. The locations of the soil borings are shown on Figure 2. The soil borings were completed on December 16, 1996. The first two (2) attempts to drill soil boring B-3 were abandoned within the first three (3) feet after contacting large pieces of buried concrete foundation. The successful attempt to drill soil boring B-3 was designated as B-3C. Soil boring B-1 was re-drilled to a deeper depth on December 19, 1996.

Soil samples were collected for evaluation of subsurface lithology at five (5) foot sampling intervals using split spoon core samplers advanced into undisturbed native soils ahead of the lead auger. Soil borings B-2 and B-3C were advanced to 15 feet below land surface (BLS) to the top of the water table. Soil boring B-1 was initially advanced to 15 feet BLS, but was re-drilled to a final depth of 25 feet BLS. Soil boring B-4 was completed to a depth of 27 feet BLS at which the top of the bedrock underlying the project site was encountered. Subsurface soil materials consisted of gravel fill, silty clay, sandy gravels, coarse gravels, and sandstone. Boring logs detailing the subsurface materials encountered at each soil boring location are included in Appendix A.

N

0 30
15
(FEET)

Slope

Bike Path

Willamette River

Slope

Slope

EWEB PROPERTY

Grass

Bike Path

Grass

EXISTING FENCE

STEAM LINE

ELEC

B-3C

Existing Shed

B-4

B-1

GRAVEL

GRAVEL

ELEC

STEAM LINE

Gravel Road

Gate

B-2

EXISTING FENCE

LEGEND

Light Pole

B-1 Soil Boring Location and Identification Number

FIGURE 2

UNIVERSITY OF OREGON, RIVERFRONT RESEARCH PARK, Eugene, OR

LOCATIONS OF SOIL BORINGS

Bergeson-Boese & Associates, Inc.
Environmental Engineering
65 Centennial Loop
Eugene, Oregon 97401
(541) 484-9484

Job Code: U001RI.95H	
CADD File: U001RI.DWG	
Scale: 1" = 30'	
Drawn: ROBERT ROBINSON	
Checked: STEPHEN LAWN	
Date: 8/21/98	

The split spoon soil sample collected from the sandstone bedrock at soil boring B-4 was dry indicating that the bedrock is a confining layer separating the groundwater present in the saturated materials above the bedrock from deeper water bearing formations. Only the upper one half (0.5) foot of the bedrock formation was penetrated during drilling of the soil borings. The total thickness of the bedrock formation was not characterized during this investigation.

Obvious petroleum hydrocarbon impact to shallow subsurface soils was noted during drilling at soil boring B-2 at the interval ranging from approximately two (2) to five (5) feet BLS. The area of impact consisted of silty clay. The soils appeared to be impacted by waste oil type petroleum hydrocarbons. The vertical extent of the soil impact appeared to be limited to above six (6) feet BLS. Petroleum impact was also noted at soil boring B-4 at approximately 20 feet BLS which was approximately five (5) feet below the top of the water table. Based on the indication of petroleum hydrocarbon impact beneath the water table at soil boring B-4, soil boring B-1 was re-drilled to a depth of approximately 25 feet BLS. Obvious petroleum hydrocarbon impact was also noted at approximately 20 feet BLS at soil boring B-1. In addition to visual indications of petroleum hydrocarbon impact, the soil cuttings were screened using a photoionization detector (PID). The PID measured positive readings in the areas of obvious visual petroleum hydrocarbon impact. There were no positive PID readings noted during screening of drill cuttings that had no visual indications of petroleum hydrocarbon impact.

Soil cuttings were drummed and left on-site for future disposal at an authorized facility. Upon completion of sample collection activities, the soil probes were backfilled with bentonite in accordance with the requirements of the Oregon Department of Water Resources (DWR).

2.1 Soil Sample Collection and Analysis

Soil samples were collected for laboratory analysis from each soil boring. The soil samples were collected from near surface soils, from intervals of obvious soil impact, and at the soil/groundwater interface. Soil samples were collected from the split spoon sampler and placed in clean laboratory-supplied glassware. The samples were given a unique identification, logged onto a formal chain-of-custody form, placed on synthetic ice in a cooler, and delivered to Pacific Northwest Laboratories in Eugene, Oregon, for analysis.

The field indications of the shallow petroleum hydrocarbon impact detected at the location of soil boring B-2 indicated waste oil impact. The type of petroleum hydrocarbon impact at soil boring B-4 was not readily identified by field observations. The soil sample collected at 20 feet BLS at soil boring B-4 was analyzed for total petroleum hydrocarbon (TPH) identification using Oregon Administrative Rules (OAR)/DEQ Method TPH-HCID. The analytical results of the TPH identification are presented in Table 1. Copies of the laboratory reports and chain-of-custody records are included in Appendix B.

Table 1 - Results of TPH Identification

ND = Not detected at or above the laboratory method reporting limits

SAMPLE ID	OAR/DEQ METHOD TPH-HCID		
	Gasoline	Diesel	Bunker/Related
UO-SS-B4-20'	ND	DETECTED	ND

The results of the TPH identification analysis indicates that the petroleum hydrocarbons present at soil boring B-4 are diesel-type petroleum hydrocarbons.

All of the soil samples collected from the soil borings were analyzed for diesel-type and heavier fraction TPH using OAR/DEQ Method 418.1 Modified. The results of the soil sample analysis for TPH is presented in Table 2. Copies of the laboratory reports and chain-of-custody records are included in Appendix B.

Table 2 - Soil Boring TPH Soil Sample Results

Units = mg/kg (ppm)
ND = Not detected at or above the method reporting limit
Reference Level = Level 2 Soil Matrix Cleanup Standards given in OAR 340-122-335

SAMPLE I.D. AND SAMPLE INTERVAL	TPH 418.1 MODIFIED
UO-SS-B1-4' (3-5 FEET BLS)	ND
UO-SS-B1-15' (14-16 FEET BLS)	ND
UO-SS-B1-20' (19-21 FEET BLS)	ND
UO-SS-B1-25' (24-26 FEET BLS)	ND
UO-SS-B2-5' (4-6 FEET BLS)	6,600
UO-SS-B2-7' (6-8 FEET BLS)	ND
UO-SS-B2-15' (14-16 FEET BLS)	ND
UO-SS-B3C-2' (1-3 FEET BLS)	97
UO-SS-B3C-7' (6-8 FEET BLS)	62
UO-SS-B3C-15' (14-16 FEET BLS)	20
UO-SS-B4-2' (1-3 FEET BLS)	ND
UO-SS-B4-15' (14-16 FEET BLS)	ND
UO-SS-B4-20' (19-21 FEET BLS)	120
UO-SS-B4-25' (24-26 FEET BLS)	43
UO-SS-B4-26.5' (26.5-27 FEET BLS)	ND
REFERENCE LEVEL	500

The results of the soil samples collected from the soil borings and analyzed for TPH indicate a shallow layer of elevated petroleum hydrocarbon impact at the location of soil boring B-2. The soil sample results also indicate that this layer is limited vertically. Detectable concentrations of TPH were also present in all three (3) soil samples collected from soil boring B-3C with the concentrations declining with depth. TPH was also detected in the soil

samples collected beneath the water table at 20 and 25 feet BLS at soil boring B-4. No detectable concentrations of TPH were present in the soil samples collected at 15 feet BLS (i.e., soil/groundwater interface) and at 26.5 feet BLS at soil boring B-4 indicating that the petroleum hydrocarbon impact detected at soil boring B-4 is limited in vertical extent. Although there were field indications of petroleum hydrocarbon impact at 20 feet BLS at soil boring B-1, the analytical results indicate no detectable concentrations of petroleum hydrocarbons above the laboratory method reporting limit of 20 mg/kg (ppm).

Although the DEQ has not established cleanup values for TPH not related to a release from an underground storage tank (UST) system, the numeric cleanup standards given in OAR 340-122-335 are presented as soil cleanup reference levels for TPH impact at this site. Based on an evaluation of site specific parameters given in OAR 340-122-330, the Level 2 soil matrix cleanup level of 500 mg/kg (ppm) for diesel and heavier molecular weight petroleum hydrocarbons is appropriate for this project site. Only the soil sample collected at five (5) feet BLS at soil boring B-2 exceeds the soil cleanup reference level of 500 mg/kg (ppm). The TPH impact at 20 and 25 feet BLS at soil boring B-4 appears to be related to groundwater impact (see Section 2.2).

Selected soil samples from soil boring B-4 and B-1 were also analyzed for the volatile aromatic petroleum hydrocarbons benzene, toluene, ethylbenzene, and xylenes (BTEX) using Environmental Protection Agency (EPA) Method 8020. The soil sample collected from impacted soils at boring B-2 was characterized for waste oil constituents, the results which are presented later in this section (See Table 5). The analytical results of the BTEX soil analysis are presented in Table 3. Copies of the laboratory reports and chain-of-custody records are included in Appendix B.

Table 3 - Soil BTEX Results

Units = µg/kg (ppb)
ND = Not detected at or above the laboratory method reporting limit
Reference Level = Numeric Soil Cleanup Levels given in OAR 340-122-045

SAMPLE I.D.	BENZENE	TOLUENE	ETHYLBENZENE	XYLENES
UO-SS-B1-20	ND	ND	ND	ND
UO-SS-B4-20	ND	ND	170	90
REFERENCE LEVEL	100	80,000	100,000	800,000

The analytical results of the selected soil samples analyzed for BTEX constituents indicate that ethylbenzene and xylenes were detected in the soil sample collected from 20 feet BLS at soil boring B-4. The concentrations were well below the numeric soil cleanup reference levels given in OAR 340-122-045.

Selected soil samples collected from soil borings B-1, B-2, and B-4 were also analyzed for polynuclear aromatic hydrocarbons (PAHs) using EPA Method 8310. The analytical results of the PAH soil analysis are summarized in Table 4. Copies of the laboratory reports and chain-of-custody records are included in Appendix B.

Table 4 - PAH Soil Sample Results

Units = µg/kg (ppb)
ND = Not detected at or above the laboratory method reporting limit
Reference Level = Numeric Soil Cleanup Level given in OAR 340-122-045
NS = No standard

Only detected PAH compounds are presented in this table. A full list of PAH compounds analyzed is presented in the laboratory reports included in Appendix B.

COMPOUND	UO-SS-B1-20'	UO-SS-B2-5'	UO-SS-B4-20'	REFERENCE LEVEL
NAPHTHALENE	ND	200	420	30,000
ACENAPHTHYLENE	ND	ND	18	NS
ACENAPHTHENE	ND	ND	30	2,000,000
FLUORENE	ND	ND	24	2,000,000
PHENANTHRENE	ND	150	ND	NS
ANTHRACENE	ND	ND	15	20,000,000
FLUORANTHENE	25	ND	61	8,000,000
PYRENE	39	330	85	6,000,000
BENZO(A)ANTHRACENE	ND	ND	23	100
CHRYSENE	ND	ND	67	100

Low levels of PAH compounds were detected in each soil sample selected for PAH analysis. However, none of the detected concentrations exceeded the numeric soil cleanup levels given in OAR 340-122-045. As previously described, the soil samples collected from 20 feet BLS at soil boring B-1 and B-4 were collected from saturated soils below the water table. The detected PAH concentrations at these locations are suspected to be related to groundwater impact.

The soil sample collected from soil boring B-2 which appears to be impacted by waste oil type petroleum hydrocarbons was characterized for hazardous constituents associated with waste oil including volatile organic compounds (VOCs) using EPA Method 8240, polychlorinated biphenyls (PCBs) using EPA Method 8080, and the leachable toxic metals arsenic, barium, cadmium, chromium, lead, mercury, selenium, and silver, using the toxicity characteristic leaching procedure (TCLP) EPA Method 1311 and EPA 7000 series. The analytical results of the waste characterization are summarized in Table 5. Copies of the laboratory reports and chain-of-custody records are included in Appendix B.

Table 5 - Waste Oil Characterization

Units = mg/kg (ppm), mg/L (ppm) for TCLP results
ND = Not detected at or above the laboratory method reporting limit

Only detected compounds are presented in this table. A full list of compounds analyzed is presented in the laboratory reports included in Appendix B.

SAMPLE I.D.	VOCs	PCBs	TCLP METALS
UO-SS-B2-5'	ND	ND	BARIUM 0.9

The analytical results of the waste characterization indicates no detectable concentrations of VOCs and PCBs were present in the soil sample collected at five (5) feet BLS at soil boring B-2. Only the toxic leachable metal barium was detected in the TCLP extract. The detected concentration of 0.9 mg/L is well below the EPA criteria of 100 mg/L for barium for toxicity characteristic hazardous wastes. Based on the results of the waste characterization, the petroleum contaminated soil in the vicinity of soil boring B-2 is not a characteristic hazardous waste.

2.2 Groundwater Sample Collection and Analysis

Groundwater samples were collected from the soil boring locations using the hollow stem auger as a temporary well casing. Groundwater samples were collected at discrete depths based on the location of the bottom of the hollow stem auger. Prior to the collection of

groundwater samples for laboratory analysis, approximately three (3) casing volumes of water were removed from the hollow stem auger. The groundwater samples were collected using a clean disposable bailer. Groundwater samples were transferred from the bailer into clean laboratory-supplied glassware with appropriate preservatives, given a unique sample identification, logged onto a formal chain-of-custody form, placed on synthetic ice in a cooler and delivered to Pacific Northwest Laboratories in Eugene, Oregon, for analysis.

The groundwater samples were analyzed for BTEX compounds using EPA Method 8020 and PAH compounds using EPA Method 8310. The analytical results of the groundwater samples are summarized in Table 6. Copies of the laboratory reports and chain-of-custody records are included in Appendix B.

Table 6 - Soil Boring Groundwater Sample Results

Units = µg/L (ppb)
ND = Not detected at or above the laboratory method reporting limit

Only detected PAH compounds are presented in this table. A full list of PAH compounds analyzed is presented in the laboratory reports included in Appendix B.

COMPOUND	UO-B1-H20 (15 FT)	UO-B1-H20-2 (20FT)	UO-B1-H20-3 (20 FT) DUP	UO-B2-H20 (15 FT)	UO-B3C-H20 (15 FT)	UO-B4-H20 (15 FT)	UO-B4-H20-2 (20 FT)
Benzene	ND	3.8	4.1	ND	ND	ND	8.4
Toluene	ND	ND	ND	ND	ND	ND	12
Ethyl-benzene	ND	5.9	7.0	ND	ND	ND	790
Xylenes	ND	5.4	4.4	ND	ND	ND	780
Naphthalene	ND	120	100	ND	ND	0.5	3,800
Acenaph-thylene	ND	ND	ND	ND	ND	0.34	ND
Fluorene	ND	1.3	1.3	ND	ND	ND	34
Fluoranthene	ND	1.1	1.0	ND	ND	ND	50
Anthracene	ND	0.36	0.32	ND	ND	ND	ND
Pyrene	ND	1.7	1.7	ND	ND	ND	70
Benzo(a)-anthracene	ND	ND	ND	ND	ND	ND	26
Chrysene	ND	2.4	1.8	ND	ND	ND	68
Benzo(g,h,i)-perylene	ND	ND	0.23	ND	ND	ND	ND

The analytical results of the groundwater samples indicate groundwater impact beneath the site at the locations of the soil boring B-1 and B-2, specifically at 20 feet BLS. Although there was no obvious confining layer encountered during drilling, the groundwater impact appears

to be confined to the area of the 20 feet BLS interval. Groundwater samples collected at soil borings B-1 and B-4 at 20 feet BLS contained levels of dissolved petroleum hydrocarbons (i.e., BTEX and PAH compounds) which exceed applicable groundwater cleanup standards (i.e., maximum contaminant levels). However, the groundwater samples collected from 15 feet BLS either have no detectable concentrations of BTEX and PAH compounds (i.e., sample UO-B1-H20 -15 feet) or low levels of PAH compounds (i.e., UO-B4-H20 -15 feet).

Due to the difference in water quality at 15 feet BLS and 20 feet BLS at the locations of soil borings B-1 and B-4, the general water quality parameters pH using EPA Method 150.1 and conductivity using EPA Method 120.1 were analyzed to assess if there were additional indications of water quality differences between the two (2) depths. The results of the water quality testing are presented in Table 7. Copies of the laboratory reports and chain-of-custody records are included in Appendix B.

Table 7 - General Water Quality Parameters

Units = standard units for pH, μmhos/cm for conductivity
NA = Not analyzed

SAMPLE I.D.	pH	CONDUCTIVITY
UO-B1-H20 (15 FEET)	NA	330
UO-B1-H20-2 (20 FEET)	6.3	420
UO-B2-H20 (15 FEET)	NA	310
UO-B3C-H20 (15 FEET)	NA	240
UO-B4-H20 (15 FEET)	6.5	410
UO-B4-H20-2 (20 FEET)	6.5	470

The general water quality parameters did not indicate a significant difference between the groundwater sampled at 15 feet BLS and the groundwater sampled at 20 feet BLS; specifically there was little difference in the water quality parameters collected at 15 feet BLS and 20 feet

BLS at the location of soil boring B-4. However, soil boring B-4 had the greatest difference in dissolved petroleum hydrocarbons concentrations at those two (2) depths.

Based on the laboratory results of soil and groundwater samples collected during the soil boring investigation, it was determined that additional investigative activities would be required to characterize the full magnitude and extent of soil and groundwater impact at the western property boundary of the Western Parcel. The additional activities included shallow test pit excavations to delineate the horizontal extent of the waste oil impact in the vicinity of soil boring B-2 (see Section 3.1), the completion of shallow test pit excavations in the area of the original test trenches completed by Squire Associates since this impact was not detected during the soil boring investigation (see Section 3.2), and the installation of groundwater monitoring wells to delineate the horizontal extent of the groundwater impact and to determine the groundwater flow direction and gradient (See Section 4.0).

2.3 Field Quality Control/Quality Assurance (QA/QC)

Quality assurance/quality control (QA/QC) procedures were practiced throughout the soil boring investigation to maximize data accuracy and representativeness and minimize interferences from sample handling which may reduce the quality of the data. The QA/QC program components performed in the field included decontamination of sampling and field monitoring equipment, sample logging and chain-of-custody procedures, sample labeling, and implementation of general procedures to ensure that samples are properly obtained, preserved, and shipped.

In order to prevent cross-contamination, all equipment was steam cleaned or thoroughly cleansed with a dilute non-phosphate detergent solution (Alconox) and rinsed with potable water and distilled water before probing and sampling. New, clean disposable bailers were used to collect samples at each soil boring.

A trip blank and a field blank (equipment blank) were prepared and analyzed as part of the investigation to assess potential interferences from field sampling and handling procedures. The trip blank was analyzed for BTEX compounds and the field blank was analyzed for BTEX compounds and PAH compounds. No target compounds were detected in either the trip blank

or the field blank. Copies of the laboratory reports and chain-of-custody records are included in Appendix B. The results of the blank analysis indicates that there were no outside interferences on the samples and that the decontamination procedures were sufficient.

A duplicate sample was collected during the collection of groundwater samples from the soil borings. The duplicate samples were collected from soil boring B-1 at a depth of 20 feet. A comparison of the analytical results indicates relative percent differences (RPDs) of less than 20% for compounds detected in both samples. The results of the duplicate sample evaluation indicates appropriate field collection techniques and laboratory handling and analysis.

3.0 TEST PIT EXCAVATIONS

Two (2) periods of test pit excavation activities were performed at the subject property. The first event was performed to delineate the horizontal extent of the shallow waste oil impact in the vicinity of soil boring B-2. The second test pit excavation event was performed to confirm the presence of near surface petroleum hydrocarbon contamination near the west property boundary of the Western Parcel. The locations of the test pit excavations are shown on Figure 3.

3.1 Shallow Waste Oil Impact

Three (3) shallow test pit excavations were completed in the vicinity of soil boring B-2 to delineate the horizontal extent of the waste oil impact discovered in the vicinity of soil boring B-2. The vertical extent of the impact was identified during the soil boring investigation. The test pits were excavated using a backhoe. The locations of the test pits are shown on Figure 3. The subsurface lithology was logged onto a test pit log. Copies of the test pit logs are included in Appendix C.

Test pit TP-1 was completed east of soil boring B-2 in the gravel roadway. There were indications of numerous events of oiled gravel along the gravel road to a depth of approximately four (4) feet BLS. Clay and loam were encountered below four (4) feet BLS. A soil sample was collected for laboratory analysis from undisturbed native soils at six (6) feet BLS in test pit TP-1.

N

0 30
15
(FEET)

EWEB
PROPERTY

Slope

Bike Path

Willamette
River

Slope

Slope

Gross

Bike Path

Gross

EXISTING
FENCE

STEAM LINE

ELEC

ELEC

TP-4

TP-5

Existing
Shed

TP-6

GRAVEL

GRAVEL

STEAM LINE

Gravel Road

Gate

TP-2

TP-3

TP-1

Estimated Extent of
Waste Oil Impact

EXISTING
FENCE

LEGEND

Light Pole

TP-3 Test Pit Location and Identification Number

FIGURE 3

UNIVERSITY OF OREGON, RIVERFRONT RESEARCH PARK, Eugene, OR

LOCATIONS OF TEST PIT EXCAVATIONS

Bergeson-Boese & Associates, Inc.
Environmental Engineering
65 Centennial Loop
Eugene, Oregon 97401
(541) 484-9484

Job Code: U001RI.95H	
CADD File: U001RI.DWG	
Scale: 1" = 30'	
Drawn: ROBERT ROBINSON	
Checked: STEPHEN LAWN	
Date: 8/21/98	

Test pit TP-2 was completed north of soil boring B-2 to a depth of approximately six (6) feet BLS. There were no visual indications of waste oil impact at test pit TP-2. However, there was a layer of black sand underlain by a thin layer of white ash at approximately four and one half (4.5) feet BLS. Soil samples were collected for laboratory analysis from the black sand and also from the white ash layer at test pit TP-2. A soil sample was also collected at a depth of six (6) feet BLS from fine brown sand.

Test pit TP-3 was completed south of soil boring B-2 to a depth of six (6) feet BLS. There were no indications of waste oil impact at this test pit. A soil sample was collected for laboratory analysis from five and one half (5.5) feet BLS.

The soil samples collected from the test pits were analyzed for TPH using OAR/DEQ Method 418.1 Modified. The results of the soil sample analysis for TPH is presented in Table 8. Copies of the laboratory reports and chain-of-custody records are included in Appendix D.

Table 8 - Test Pit TPH Soil Sample Results

Units = mg/kg (ppm)
ND = Not detected at or above the laboratory method reporting limit
Reference Level = Level 2 soil matrix cleanup level in OAR 340-122-335

SAMPLE I.D.	TPH 418.1 MODIFIED
UO-RI-TP1-6'	ND
UO-RI-TP2-4.5'	100
UO-RI-TP2-5'	ND
UO-RI-TP2-6'	ND
UO-RI-TP3-5.5'	ND
SOIL CLEANUP LEVEL	500

The analytical results indicate that detectable concentrations of TPH were present in the soil sample collected from the black sand at four and one half (4.5) feet BLS in test pit TP-2. The detected concentration is below the Level 2 soil matrix reference level of 500 mg/kg (ppm).

In addition to the analysis for TPH, soil sample UO-RI-TP2-5' (white ash) was analyzed for toxic leachable metals using TCLP EPA Method 1311 and 7000 series. The results of the soil sample analysis for TCLP metals are summarized in Table 9. Copies of the laboratory reports and chain-of-custody records are included in Appendix D.

Table 9 - Test Pit TCLP Metals Results

Units = mg/L (ppm)
ND = Not detected at or above the laboratory method reporting limit

Only detected compounds are presented in this table. A full list of compounds analyzed is presented in the laboratory reports included in Appendix D.

SAMPLE I.D.	TCLP METALS
UO-RI-TP2-5'	SILVER 0.13

The analytical results of the TCLP analysis indicates that only silver was detected in the TCLP leachate. The detected concentration of 0.13 mg/L is much lower than the EPA criteria of 5 mg/L for silver for toxicity characteristic hazardous wastes.

Based on the results of the sampling performed at the test pits completed in the vicinity of soil boring B-2, an estimate of the extent of the waste oil soil impact above the soil cleanup reference level of 500 mg/kg (ppm) is approximately 176 cubic yards based on a surface area of approximately 2,380 square feet and an average interval of impact of two (2) feet (See Figure 3 for estimate of impact area).

3.2 Near Surface Impact at Property Boundary

Three (3) test pit excavations were completed in the vicinity of the western property boundary to confirm the presence of shallow impact detected during a previous investigation performed by Squire Associates. The test pit excavations were completed using a backhoe. The locations of the test pits are shown on Figure 3.

There were visual indications of impact at test pit excavations TP-4 and TP-5 with "worst case" impact located at approximately two (2) feet BLS at test pit TP-5. The impact appeared to be associated with petroleum hydrocarbon staining in gravels that also appeared to contain boiler residue (i.e., clinkers). Brown silty clay with no obvious petroleum hydrocarbon impact was present at approximately 4.5 feet BLS in test pit TP-5. There were no indications of impact at test pit TP-6.

Soil samples were collected from test pit TP-5 and the "worst case" sample was analyzed for TPH identification using OAR/DEQ Method TPH-HCID. The analytical results of the TPH type identification are presented in Table 10. Copies of the laboratory reports and chain-of-custody records are included in Appendix D.

Table 10 - Test Pit Results of TPH Identification

ND = Not detected at or above the laboratory method reporting limits

* Hydrocarbons detected in the gasoline range were reported by the laboratory to not be typical of gasoline.

SAMPLE ID	OAR/DEQ METHOD TPH-HCID		
	Gasoline	Diesel	Bunker/Related
UO-WP-TP5-2'	DETECTED*	ND	DETECTED

The results of the TPH identification analysis indicates that the petroleum hydrocarbons present in test pit TP-5 are gasoline-type petroleum hydrocarbons which are not typical of gasoline fuel and bunker/related petroleum hydrocarbons.

Based on the TPH identification results, soil samples UO-WP-TP5-2' and UO-WP-TP5-4.5' were analyzed for gasoline-type petroleum hydrocarbons using OAR/DEQ Method TPH-G, for bunker/related petroleum hydrocarbons using OAR/DEQ Method TPH 418.1 Modified, and for PAH compounds using DEQ Method GC/MS SIM (Modified EPA Method 8270). The analytical results are summarized in Table 11. Copies of the laboratory reports and chain-of-custody records are included in Appendix D.

Table 11 - Test Pit Petroleum Hydrocarbon Characterization

Units = mg/kg (ppm)
ND = Not detected at or above the laboratory method reporting limit

Only detected PAH compounds are presented in this table. A full list of PAH compounds analyzed is presented in the laboratory reports included in Appendix D.

COMPOUND OR ANALYSIS	UO-WP-TP5-2'	UO-WP-TP5-4.5'	
TPH-G	ND	ND	
TPH 418.1 Modified	1,000	26	
Naphthalene	2	ND	
Acenaphthylene	7	ND	
Fluorene	0.3	ND	
Fluoranthene	2.8	ND	
Phenanthrene	0.94	ND	
Anthracene	0.98	ND	
Pyrene	3.3	ND	
Benzo(a)anthracene	2.9	0.073	Q
Chrysene	5.2	0.08	
Benzo(b)fluoranthene	14	0.13	Q
Benzo(k)fluoranthene	7.4	0.073	
Benzo(a)pyrene	10	0.016	Q
Ideno(1,2,3-cd)pyrene	17	0.13	
Dibenz(a,h)anthracene	4.1	ND	Q
Benzo(g,h,i) perylene	25	0.21	

The analytical results indicate elevated concentrations of TPH and PAH compounds at two (2) feet BLS at test pit TP-5. A large percentage of the detected PAH compounds are carcinogenic compounds with low numeric soil cleanup reference levels as presented in OAR 340-122-045. Detectable concentrations of TPH and PAH compounds are still present at concentrations in excess of the numeric soil cleanup standards in the soil sample collected from four and one half (4.5) feet BLS at test pit TP-5.

Additional analytical testing was performed on the sample collected from test pit TP-5 at two (2) feet BLS to characterize the soils for hazardous constituents associated with waste oil including VOCs using EPA Method 8240, PCBs using EPA Method 8080, and the leachable toxic metals arsenic, cadmium, chromium, and lead using the TCLP EPA Method 1311 and EPA 7000 series. The analytical results of the waste characterization are summarized in Table 12. Copies of the laboratory reports and chain-of-custody records are included in Appendix D.

Table 12 - Test Pit Sample Waste Characterization

Units = mg/kg (ppm), mg/L (ppm) for TCLP results
ND = Not detected at or above the laboratory method reporting limit

Only detected compounds are presented in this table. A full list of compounds analyzed is presented in the laboratory reports included in Appendix D.

SAMPLE I.D.	VOCs	PCBs	TCLP METALS
UO-WP-TP5-2'	METHYLENE CHLORIDE 0.047 TETRACHLORETHENE 0.029 XYLENES 0.011	ND	ND

The results of the waste characterization indicate that there are low levels of VOCs present in the soil sample collected from test pit TP-5 at two (2) feet BLS. The sample results indicate that the impacted soils are not characteristic hazardous wastes.

4.0 MONITORING WELLS

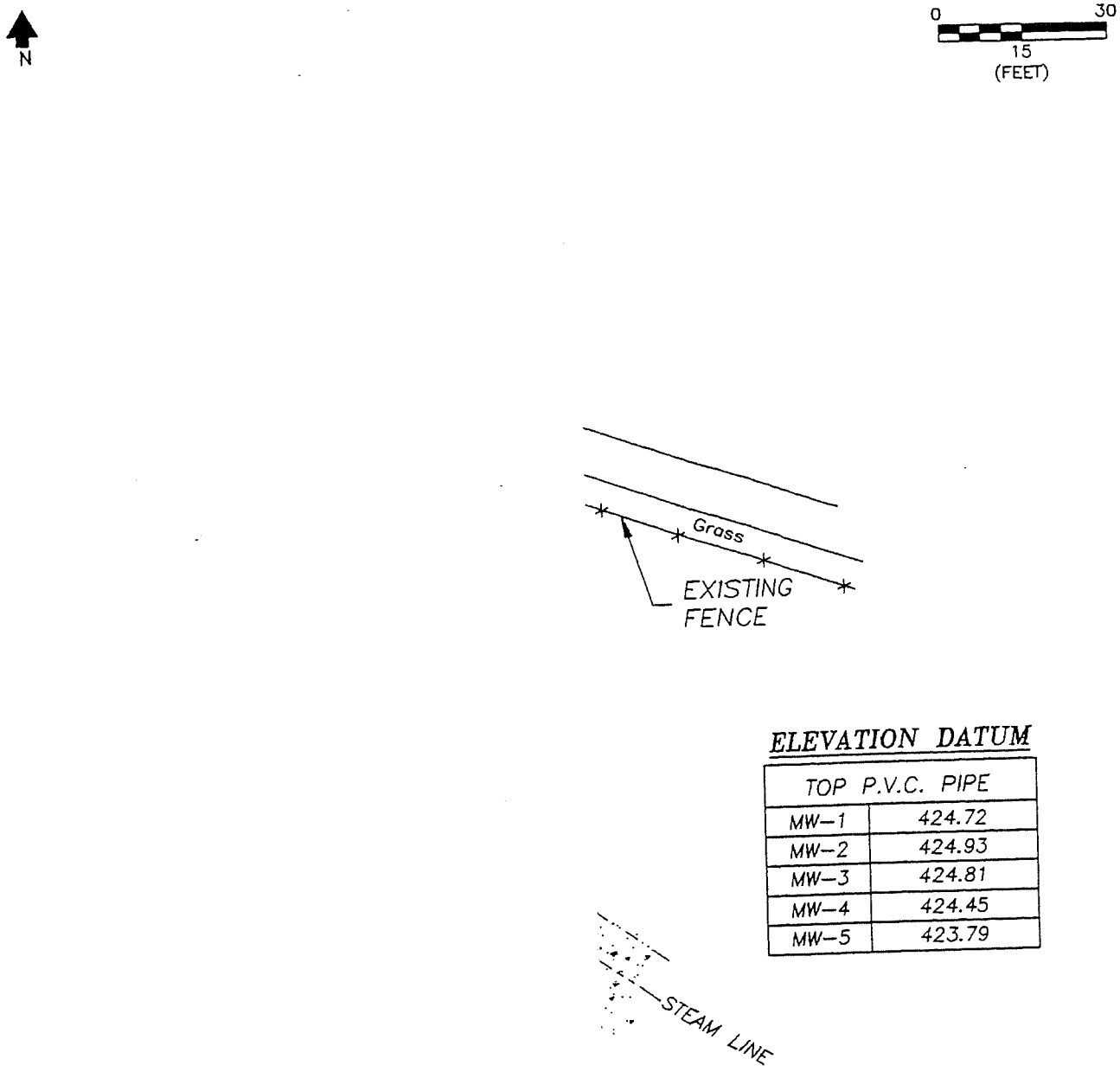
Five (5) two (2) inch diameter groundwater monitoring wells were installed at the subject site in September 1997. The locations of the monitoring wells are shown on Figure 4. The wells were installed to allow the collection of representative groundwater samples from the area of the west property boundary of the Western Parcel and to determine the groundwater flow direction and gradient.

4.1 Monitoring Well Installation

The monitoring wells were installed in borings completed by Jones Drilling utilizing air rotary drilling techniques. The borings were completed to the top of the bedrock underlying the subject site at depths of 24 to 26.5 feet BLS. Subsurface materials encountered at the monitoring well locations consisted of gravels, clay, silty clay, sandstone, and general fill materials. The wells were completed using two (2) inch diameter flush threaded schedule 40 PVC screen and casing. The well screen consists of 15 feet of 0.02 inch slotted PVC. Filter material consisted of #10-20 silica sand placed to approximately two (2) feet above the top of the well screen interval. The borehole was then sealed using 3/8 inch hole plug bentonite. The wells were completed with locking caps in flush mount vaults. Details of the subsurface lithology encountered at each monitoring well location and the well construction details are presented on monitoring well completion logs included in Appendix E.

4.2 Well Development

Well development was performed, at least 24 hours after well installation, in order to remove fine-grained material (silt, clay and fine sand) from the well screen, filter pack, and formation near the groundwater monitoring well, and to remove any water introduced during drilling and well construction procedures. Well development consisted of the removal of at least three (3) boring volumes of water at each monitoring well location until water purged from the well was essentially free of turbidity and measurements of pH, conductivity, and temperature stabilized within 10%. Groundwater produced during well development was contained in labeled drums for future disposal in an authorized manner.



ELEVATION DATUM

TOP P.V.C. PIPE	
MW–1	424.72
MW–2	424.93
MW–3	424.81
MW–4	424.45
MW–5	423.79

LEGEND

MW–1 — Monitoring Well Location and Identification Numbers

Light Pole

FIGURE 4

GON, RIVERFRONT RESEARCH PARK, Eugene, OR

TORING WELLS

oese & Associates, Inc.
al Engineering

ial Loop
gon 97401
9484

Job Code: U001RI.95H
CADD File: U001RI.DWG
Scale: 1" = 30'
Drawn: ROBERT ROBINSON
Checked: STEPHEN LAWN
Date: 8/21/98

4.3 Determination of Groundwater Flow Direction and Gradient

Upon completion of the installation of the monitoring wells, the locations of the wells and the top of the well casings were surveyed by a licensed professional surveyor from Branch Engineering. The information from this survey resulted in some changes to the base map that had previously been utilized for the site. The base map now reflects the data reported by the recent Branch Engineering survey.

Prior to groundwater sampling performed on September 30, 1997, static water levels were measured to the nearest 0.01 foot at each monitoring well using an electronic water level probe. The static water levels were compared to the surveyed well casing elevations to calculate the water table elevation. The water table elevation data is presented in Table 13.

Table 13 - Water Level Elevations (9/30/97)

Elevations are in feet above mean sea level.

MONITORING WELL	ELEVATION OF TOP OF CASING	DEPTH TO WATER (SEPTEMBER 30, 1997)	WATER TABLE ELEVATION
MW-1	424.72	16.40	408.32
MW-2	424.93	16.84	408.09
MW-3	424.81	16.78	408.03
MW-4	424.45	20.77	403.68
MW-5	423.79	20.93	402.86

The groundwater elevation data was used to create a groundwater contour elevation map presenting the groundwater flow direction and gradient for September 30, 1997. The groundwater contour elevation map is presented as Figure 5. Based on the groundwater elevation data collected on September 30, 1997, the groundwater flow direction is towards the north-northeast with a gradient of 0.057.

N

0 30
15
(FEET)

General Direction of Groundwater Flow

EWEB PROPERTY

Slope

Bike Path

Willamette River

Slope

Slope

Grass

Bike Path

Grass

EXISTING FENCE

MW-5 (402.86)

STEAM LINE

ELEC

403.00

404.00

405.00

406.00

407.00

408.00

409.00

MW-4 (403.68)

MW-3 (408.83)

MW-2 (408.09)

MW-1 (408.32)

GRAVEL

GRAVEL

Existing Shed

Gravel Road

Gate

EXISTING FENCE

ELEVATION DATUM

TOP P.V.C. PIPE	
MW-1	424.72
MW-2	424.93
MW-3	424.81
MW-4	424.45
MW-5	423.79

LEGEND

MW-1 — Monitoring Well Location and Identification Numbers

Light Pole

—403.00— Groundwater Elevation Contour Line Feet Above Mean Sea Level Dashed Where Infered

(402.61) Groundwater Elevation At Well

FIGURE 5

UNIVERSITY OF OREGON, RIVERFRONT RESEARCH PARK, Eugene, OR

GROUNDWATER ELEVATION CONTOUR MAP, September 30, 1997

Bergeson-Boese & Associates, Inc.
Environmental Engineering
65 Centennial Loop
Eugene, Oregon 97401
(541) 484-9484

Job Code: U001RI.95H	
CADD File: U001RI.DWG	
Scale: 1" = 30'	
Drawn: ROBERT ROBINSON	
Checked: STEPHEN LAWN	
Date: 8/21/98	

4.4 Groundwater Sample Collection and Analysis

Prior to sample collection, the monitoring wells were purged of a minimum of three (3) well casing volumes to ensure that groundwater samples collected for subsequent laboratory analysis were representative of the groundwater beneath the site. Well casing volumes were calculated by multiplying the height of the water column in each monitoring well by 0.16 gallons/foot for the two (2) inch diameter wells. The value was then multiplied by three (3) to obtain the minimum purge volume. The groundwater was purged from the well using a submersible pump. The discharge tube of the submersible pump was set into an empty calibrated 2.5 gallon bucket to determine the purge rate and the total volume of water purged from each well. Purged groundwater was contained in labeled drums for future disposal in an authorized manner.

The stabilized results of the field measured parameters of pH, conductivity, and temperature are presented in Table 14.

Table 14 - Field Parameter Groundwater Measurements

Units = standard units for pH, μmhos/cm for conductivity, degrees C for temperature

MONITORING WELL	pH	TEMPERATURE	CONDUCTIVITY
MW-1	7.1	16.8	253
MW-2	7.4	16.4	244
MW-3	7.1	16.7	311
MW-4	7.2	19.9	319
MW-5	7.1	19.2	316

The measurements of pH at each monitoring well provided readings which were near neutral and were relatively consistent across the site. Temperature readings were higher at monitoring wells MW-4 and MW-5 than at the other monitoring wells. This may be related to the proximity of monitoring wells MW-4 and MW-5 to the subsurface steam line (See Figure 4). Conductivity readings were generally consistent across the site.

Groundwater samples for laboratory analysis were collected from each monitoring well using a clean disposable bailer. Groundwater samples were transferred from the bailer into clean laboratory-supplied glassware with appropriate preservatives, given a unique sample identification, logged onto a formal chain-of-custody form, placed on synthetic ice in a cooler and delivered to Pacific Northwest Laboratories in Eugene, Oregon, for analysis.

The groundwater samples were analyzed for BTEX compounds using EPA Method 8020 and PAH compounds using EPA Method 8310. The analytical results of the groundwater samples are summarized in Table 15. Copies of the laboratory reports and chain-of-custody records are included in Appendix F.

Table 15 - Monitoring Well Groundwater Sample Results

Units = µg/L (ppb)
ND = Not detected at or above the laboratory method reporting limit

Only detected PAH compounds are presented in this table. A full list of PAH compounds analyzed is presented in the laboratory reports included in Appendix B.

COMPOUND	997-UO-001 (MW-1)	997-UO-002 (MW-2)	997-UO-003 (MW-4)	997-UO-004 (MW-3)	997-UO-005 (MW-3) DUP	997-UO-006 (MW-5)
Benzene	ND	ND	ND	4.6	4.2	9.7
Toluene	ND	ND	ND	22	21	2.4
Ethylbenzene	ND	ND	ND	280	260	450
Xylenes	ND	ND	ND	350	310	44
Naphthalene	ND	ND	ND	620	660	870
Fluorene	ND	ND	ND	7.0	7.0	8.0
Fluoranthene	ND	ND	ND	ND	ND	3.0
Anthracene	ND	ND	ND	ND	ND	2.0
Pyrene	ND	ND	ND	ND	3.0	4.0
Benzo(a) anthracene	ND	ND	ND	ND	ND	1.0
Ideno(1,2,3-cd) pyrene	ND	ND	ND	ND	1.0	ND
Chrysene	ND	ND	ND	3.0	4.0	3.0

The analytical results indicate that detectable concentrations of BTEX and PAH compounds were present in the groundwater samples collected from monitoring wells MW-3 and MW-5 at levels which exceed applicable groundwater cleanup standards (i.e., maximum contaminant

levels). No BTEX or PAH compounds were detected in the three (3) eastern monitoring wells at the subject site.

4.5 Field Quality Assurance/Quality Control (QA/QC)

QA/QC procedures were practiced throughout the collection of groundwater samples from the monitoring wells to maximize data accuracy and representativeness and minimize interferences from sample handling which may reduce the quality of the data. The QA/QC program components performed in the field included decontamination of sampling and field monitoring equipment, sample logging and chain-of-custody procedures, sample labeling, and implementation of general procedures to ensure that samples are properly obtained, preserved, and shipped.

In order to prevent cross-contamination the submersible pump was thoroughly cleansed with a dilute non-phosphate detergent solution (Alconox) and rinsed with potable water and distilled water before initial use and between each monitoring well. New, clean disposable bailers were used to collect samples at each monitoring well.

A trip blank and a field blank (equipment blank) were prepared and analyzed as part of the investigation to assess potential interferences from field sampling and handling procedures. The trip blank was analyzed for BTEX compounds and the field blank was analyzed for BTEX compounds and PAH compounds. No BTEX or PAH compounds were detected in either the trip blank or the field blank. Copies of the laboratory reports and chain-of-custody records are included in Appendix F. The results of the blank analysis indicates that there were no outside interferences on the samples and that the decontamination procedures were sufficient.

A duplicate sample was collected during the collection of groundwater samples from the monitoring wells. The duplicate samples were collected from monitoring well MW-3. A comparison of the analytical results indicates relative percent differences (RPDs) of less than 20% for compounds detected in both samples. The results of the duplicate sample evaluation indicates appropriate field collection techniques and laboratory handling and analysis.

4.6 Additional Groundwater Sampling at Monitoring Wells MW-3 and MW-5

Additional groundwater samples were collected from monitoring wells MW-3 and MW-5 at the Western Parcel at the University of Oregon Riverfront Research Park project site on April 7, 1998. The split samples were collected during a sampling event conducted by Exponent at the adjacent Eugene Water and Electric Board (EWEB) site which included the collection of groundwater samples from monitoring wells MW-3 and MW-5 from the University of Oregon property. Split samples were collected from monitoring wells MW-3 and MW-5 by BB&A during this sampling event.

Prior to sampling the groundwater monitoring wells, static water level measurements (depth to water) were measured from the top of the well casing (i.e., reference point) at all five (5) on-site monitoring wells by Exponent using an electronic water level indicator. The water table elevations were calculated using the depth to water measurements and the surveyed elevation for the top of each well casing. The water table elevation data is presented in Table 16. The surface of the water table was contoured to determine groundwater flow direction and gradient which is presented on Figure 6.

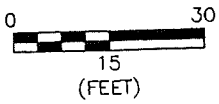
Table 16 - Water Level Elevations (4/7/98)

Elevations are in feet above mean sea level.

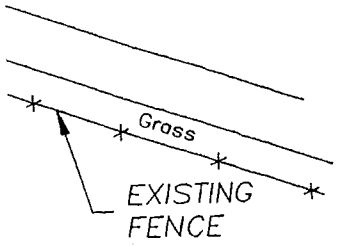
MONITORING WELL	ELEVATION OF TOP OF CASING	DEPTH TO WATER (APRIL 7, 1998)	WATER TABLE ELEVATION
MW-1	424.72	16.03	408.69
MW-2	424.93	16.50	408.43
MW-3	424.81	16.40	408.41
MW-4	424.45	19.46	404.99
MW-5	423.79	21.18	402.61

Based on the groundwater elevation data collected on April 7, 1998, the groundwater flow beneath the site is to the north-northeast, towards the Willamette River. This correlates to the data from the September 1997 sampling event.



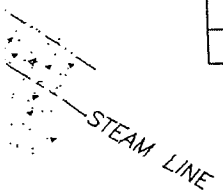


Gener
Groun



ELEVATION DATUM

TOP P.V.C. PIPE	
MW–1	424.72
MW–2	424.93
MW–3	424.81
MW–4	424.45
MW–5	423.79



LEGEND

MW–1 — Monitoring Well Location and Identification Numbers

Light Pole

—403.00— Groundwater Elevation Contour Line Feet Above Mean Sea Level Dashed Where Infered

(402.61) Groundwater Elevation At Well

FIGURE 6

GON, RIVERFRONT RESEARCH PARK, Eugene, OR

/ATION CONTOUR MAP, April 7, 1998

Boese & Associates, Inc.
ital Engineering

nial Loop
egon 97401
-9484

Job Code: U001RI.95H
CADD File: U001RI.DWG
Scale: 1" = 30'
Drawn: ROBERT ROBINSON
Checked: STEPHEN LAWN
Date: 8/21/98

Groundwater samples were collected by Exponent from monitoring wells MW-3 and MW-5 for laboratory analysis after purging three (3) well casing volumes from the monitoring wells. The groundwater samples for PAH compounds and metals were collected using a low pressure peristaltic pump. Samples collected for volatile aromatic hydrocarbons were collected using a bailer. Samples collected for dissolved metals were filtered in the field using a 0.45 micron filter. The split samples were transferred to clean, laboratory supplied glassware with appropriate preservatives, labeled with a unique identification, logged onto a chain-of-custody form, placed on synthetic ice in an ice chest, and delivered to Pacific Northwest Laboratories in Eugene, Oregon, for analysis.

The split groundwater samples from monitoring wells MW-3 and MW-5 were analyzed for BTEX compounds using EPA Method 8020, PAH compounds using DEQ Method GC/MS SIM (modified EPA Method 8270), and total and dissolved metals using EPA Methods 7000 series.

The analytical results of the split groundwater samples collected from monitoring wells MW-3 and MW-5 are summarized in Table 17. Only compounds detected in the groundwater samples are presented in Table 17. A complete list of compounds analyzed are presented in the laboratory report. A copy of the laboratory report and chain-of-custody record are included in Appendix G.

Table 17 - Summary of Split Groundwater Sample Results

Units = µg/L (ppb)
ND = Not detected at or above the method reporting limit

COMPOUND	MW-3	MW-5
Benzene	ND	11
Toluene	30	5.9
Ethylbenzene	130	790
Xylenes	460	90
Naphthalene	240	930
Acenaphthylene	1.5	1.4
Acenaphthene	0.4	7.4
Fluorene	0.48	3.7
Fluoranthene	0.27	0.67
Phenanthrene	0.48	5.2
Anthracene	0.22	1.1
Pyrene	0.36	0.78
Total Metals	ND	ND
Dissolved Metals	ND	ND

The analytical results from the split sampling event indicate that dissolved BTEX and PAH compounds are still present in the groundwater in the vicinity of monitoring wells MW-3 and MW-5 which are located adjacent to the western property boundary (See Figure 6). Some of the heavier molecular weight PAH compounds that were detected during the September 1997 sampling event were not detected in the groundwater samples during this sampling event. No total or dissolved metals were detected in the groundwater split samples.

5.0 DATA VALIDATION

Pacific Northwest Laboratories and Oregon Analytical Laboratories have established Quality Assurance (QA) Programs to ensure that all laboratory results are reliable, properly documented, and legally defensible. The objectives of the QA Programs include accuracy, precision, and completeness.

The laboratory analyses for this project were performed in accordance with procedures established by the DEQ and presented in the Oregon Administrative Rules and EPA analytical methods presented in *Test Methods for Evaluating Solid Waste, Physical/Chemical Methods, SW-846*.

The data validation review ensured that the analytical testing that was requested on the chain-of-custody forms was actually analyzed, that the samples were extracted and analyzed within the required holding times, that surrogate and matrix spike recoveries were within the required criteria, and that no contaminants of concern were detected in the laboratory method blanks.

Based on a review of the QA/QC data provided by each laboratory along with the analytical results, the data is determined to be valid with the following qualifications. Elevated TPH and BTEX concentrations from the soil boring investigation are estimated since the surrogate recoveries could not be calculated due to matrix interference (i.e., elevated contamination concentrations). In addition, laboratory reporting limits for nondetected constituents were raised for some BTEX and PAH results that had elevated contamination. The laboratory method reporting limits were low enough to meet our objectives at sample locations with low or no detectable concentrations of contamination.

6.0 WASTE DISPOSAL

Soil cuttings generated during the completion of the soil borings and monitoring wells were placed in 55-gallon open top drums for temporary storage at the subject property. A review of the analytical results indicated that the soil cuttings were not hazardous waste and could be disposed of as petroleum contaminated soil. An application for disposal of petroleum contaminated soil was submitted to Valley Landfills, Inc. in Corvallis, Oregon. The drummed

soil cuttings were transported to Coffin Butte Landfill located north of Corvallis, Oregon, on April 7, 1998. The drummed soil cuttings totaled 4.31 tons of petroleum contaminated solid waste. A copy of the disposal receipt for the soil cuttings is included in Appendix H.

Groundwater purged from the groundwater monitoring wells during development and sampling were temporarily stored in 55-gallon drums at the subject property. In addition, steam cleaning water generated during decontamination activities performed during the investigation were temporarily stored in 55-gallon drums at the subject property. A review of the analytical results indicated that the purge water and steam cleaning water were not hazardous wastes. Approximately 350 gallons of waste water were transported off-site for recycling by Oil Re-Refining Co. Inc. of Woodland, Washington, on March 26, 1998. The waste water was consigned to Fuel Processors in Portland, Oregon. A copy of the disposal receipt is included in Appendix I.

7.0 CONCLUSIONS

The results of this investigation support the following conclusions:

1. Near surface waste oil impact is located in the vicinity soil boring B-2 at concentrations in excess of the soil reference level of 500 mg/kg. The vertical extent of the impact has been identified and the horizontal extent of the impact has been estimated based on the results of shallow test pit excavations. Groundwater has not been impacted as a result of this shallow soil impact.

2. Groundwater is impacted in the vicinity of the western property boundary at the Western Parcel. Groundwater impact was initially detected during the soil boring investigation and later confirmed with analysis of groundwater samples collected from five (5) groundwater monitoring wells installed at the subject site. The groundwater data collected at the site suggests that the impact is the result of migration of dissolved petroleum hydrocarbons associated with historical operations at the west contiguous property (i.e., manufactured gas plant). The magnitude and extent of the groundwater impact on the subject site has been delineated.

No dissolved petroleum hydrocarbons were detected in the three (3) eastern monitoring wells completed on the subject site (i.e., monitoring wells MW-1, MW-2, and MW-4). The northeast-southwest line formed by these three (3) monitoring wells establish an eastern limit of the contamination on the Western Parcel.

3. Near surface petroleum hydrocarbon impact is present in a limited area along the western property boundary. Based on the presence of clinkers, this petroleum hydrocarbon impact is suspected to be the result of the disposal of material from the catalytic ovens at the former manufactured gas plant. This near surface impact contained elevated levels of PAH compounds.

8.0 RECOMMENDATIONS

Based on the results of this investigation, the following recommendations are made:

1. Based on the results of this investigation and prior work performed by Squire Associates, no further investigation is recommended for the portion of the Western Parcel that lies east of the three (3) monitoring wells that contained no detectable concentrations of dissolved BTEX and PAH compounds. It is requested that the DEQ issue a determination in concurrence with this recommendation. Previous negotiations with the DEQ has concluded that the DEQ would issue site closure for that portion of the Western Parcel that has been shown to be free of contamination.

2. A focused Remedial Investigation/Feasibility Study (RI/FS) should be performed on the portion of the Western Parcel located west of the line established by monitoring wells MW-1, MW-2, and MW-4. The focused RI/FS should address the soil and groundwater impact that is present on this small portion of the Western Parcel. The focused RI/FS should be performed to evaluate and select an appropriate remedial action(s) addressing the soil and groundwater impact that is protective of public health, safety, and welfare, and the environment.

The focused RI/FS will be designed to meet the requirements of a Remedial Investigation, Risk Assessments, and Feasibility Study as presented in OAR 340-122-080 through 085. The RI/FS will be focused since a large portion of the Remedial Investigation has been performed. The Risk Assessment will evaluate current and future land and groundwater use, ecological risks, and human risks posed by the contamination present in soil and groundwater at the western portion of the Western Parcel. A conceptual model will be developed to address contaminants of concern, the affected media (i.e., soil and groundwater), potential exposure pathways, and potential receptor populations.

The focused feasibility study will evaluate and select an appropriate remedial action meeting the objectives of current and future use of the subject site while being protective of public health, safety, and welfare, and the environment. A remedial action screening will be performed to identify technically feasible remedies for consideration at the subject site. There will then be a comparative evaluation of alternatives using the balancing factors identified in the January 10, 1997, revisions to Division 122: Hazardous Substance Remedial Action Rules.

The focused RI/FS may be incorporate data being generated by the concurrent investigation being performed at the adjacent property to the west (i.e., EWEB property). A Draft Focused RI/FS Report will be submitted to the DEQ for comments. Upon approval of the Focused RI/FS Report by the DEQ, there will be a period of public comment before the selected remedial action will be implemented.

If you have any questions regarding the information presented in this report, please do not hesitate to contact me at your earliest convenience.

Sincerely,

Bergeson-Boese & Associates, Inc.

Stephen Lawn
Hazardous Materials Specialist

APPENDIX A

Soil Boring Logs

BORING LOG

BORING NO.: B-1
PROJECT CODE: U001RI.95H
CADD FILE: U001RI.DWG
PROJECT: UNIVERSITY OF OREGON
LOCATION: RIVERFRONT RESEARCH PARK
WESTERN PARCEL INVESTIGATION, Eugene, Oregon

TOTAL DEPTH: 25'
SURFACE ELEVATION: N/A
DRILLING METHOD: 4 1/4" I.D. Hollow Stem Auger
DRILLED BY: Pacific Northwest Drilling
LOGGED BY: STEPHEN LAWN
DATE COMPLETED: 12/16/96
REDRILLED: 12/19/96 TO A DEPTH OF 25'

DEPTH (feet)	SAMPLE IDENTIFICATION AND LAB RESULTS	PID HEAD SPACE	STANDARD PENETRATION (n)	H_2O LEVEL	LITHOLOGIC DESCRIPTION
0					GRAVEL (GM); crushed rock (roadway). CONCRETE 36"
					GRAVEL (GM); fill
	U0-SS-B1-4'				SILTY CLAY (CL)
5					SANDY GRAVEL (GM); with metal wire, gray areas. No PID.
					GRAVEL (GM); with some brown silt and some wire.
					GRAVEL (GM); fill, wire.
10					
				WD	
					GRAVEL (GM); with some silt.
15	U0-SS-B1-15'				
					Indications of petroleum impact.
20	U0-SS-B1-20'				
25	U0-SS-B1-25'				
30					
35					
40					

LITHOLOGY

BOREHOLE ABANDONMENT

LEGEND

NOTES:

NOTE: CLASSIFICATION OF SOILS BASED ON THE UNITED SOILS CLASSIFICATION SYSTEM.

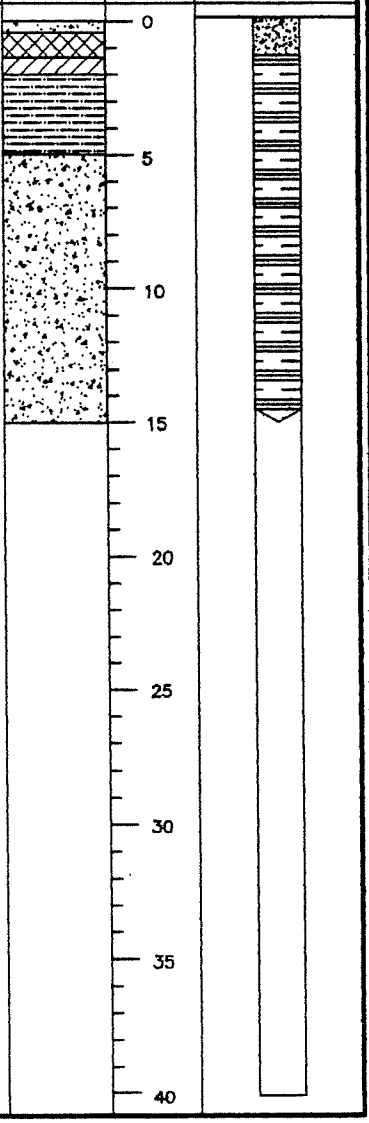
Bergeson-Boese & Associates, Inc.
Environmental Engineering
65 Centennial Loop
Eugene, Oregon 97401
(541) 484-9484

BORING LOG

BORING NO.: B-2
PROJECT CODE: U001RI.95H
CADD FILE: U001RI.DWG
PROJECT: UNIVERSITY OF OREGON
LOCATION: RIVERFRONT RESEARCH PARK
WESTERN PARCEL INVESTIGATION, Eugene, Oregon

TOTAL DEPTH: 15'
SURFACE ELEVATION: N/A
DRILLING METHOD: 4 1/4" I.D. Hollow Stem Auger
DRILLED BY: Pacific Northwest Drilling
LOGGED BY: STEPHEN LAWN
DATE COMPLETED: 12/16/96

DEPTH (feet)	SAMPLE IDENTIFICATION AND LAB RESULTS	PID HEAD SPACE	STANDARD PENETRATION (n)	H_2O LEVEL	LITHOLOGIC DESCRIPTION
0					GRAVEL (GM); fill.
					CONCRETE 36"
					ASPHALT
					SILTY CLAY (CL); black, oily.
5	U0-SS-B2-5'				SANDY GRAVEL (GM); brown.
	U0-SS-B2-7'				
10					
				WD	
15	U0-SS-B2-15'				
20					
25					
30					
35					
40					



LEGEND

NOTES:

Bergeson-Boese & Associates, Inc.
Environmental Engineering
65 Centennial Loop
Eugene, Oregon 97401
(541) 484-9484

NOTE: CLASSIFICATION OF SOILS BASED ON THE UNITED SOILS CLASSIFICATION SYSTEM.

BORING LOG

BORING NO.: B-3C
PROJECT CODE: UO01RI.95H
CADD FILE: UO01RI.DWG
PROJECT: UNIVERSITY OF OREGON
LOCATION: RIVERFRONT RESEARCH PARK
WESTERN PARCEL INVESTIGATION, Eugene, Oregon

TOTAL DEPTH: 15'
SURFACE ELEVATION: N/A
DRILLING METHOD: 4 1/4" I.D. Hollow Stem Auger
DRILLED BY: Pacific Northwest Drilling
LOGGED BY: STEPHEN LAWN
DATE COMPLETED: 12/16/96

DEPTH (feet)	SAMPLE IDENTIFICATION AND LAB RESULTS	PID HEAD SPACE	STANDARD PENETRATION (n)	H_2O LEVEL	LITHOLOGIC DESCRIPTION	LITHOLOGY	DEPTH (feet)	BOREHOLE ABANDONMENT
0					GRAVEL (GM); with silty sand.		0	
	UO-SS-B3C-2'				SANDSTONE (SM); weathered, orange-brown.			
					GRAVEL (GM); with silty sand.			
5							5	
	UO-SS-B3C-7'				SILTY CLAY (CL); brown, moist.			
					SANDY GRAVEL (GM); wire.			
10							10	
				WD				
15	UO-SS-B3C-15'						15	
20							20	
25							25	
30							30	
35							35	
40							40	

LEGEND

NOTES:

NOTE: CLASSIFICATION OF SOILS BASED ON THE UNITED SOILS CLASSIFICATION SYSTEM.

Bergeson-Boese & Associates, Inc.
Environmental Engineering
65 Centennial Loop
Eugene, Oregon 97401
(541) 484-9484

BORING LOG

BORING NO.: B-4
PROJECT CODE: U001RI.95H
CADD FILE: U001RI.DWG
PROJECT: UNIVERSITY OF OREGON
LOCATION: RIVERFRONT RESEARCH PARK
WESTERN PARCEL INVESTIGATION, Eugene, Oregon

TOTAL DEPTH: 27'
SURFACE ELEVATION: N/A
DRILLING METHOD: 4 1/4" I.D. Hollow Stem Auger
DRILLED BY: Pacific Northwest Drilling
LOGGED BY: STEPHEN LAWN
DATE COMPLETED: 12/16/96

DEPTH (feet)	SAMPLE IDENTIFICATION AND LAB RESULTS	PID HEAD SPACE	STANDARD PENETRATION (n)	H_2O LEVEL	LITHOLOGIC DESCRIPTION	LITHOLOGY	DEPTH (feet)	BOREHOLE ABANDONMENT
0					GRAVEL (GM)		0	
	UO-SS-B4-2'				SANDSTONE (SM); weathered, orange-brown, basalt gravels.			
					GRAVEL (GM); with brown silty clay.			
5							5	
10							10	
				WD				
15	UO-SS-B4-15'						15	
20	UO-SS-B4-20'				Obvious hydrocarbon staining and odor.		20	
25	UO-SS-B4-25'						25	
	UO-SS-B4-26.5'				SANDSTONE (SM); weathered, orange-brown, with gray fine sand, mottling, dry.			
30							30	
35							35	
40							40	

LEGEND

NOTES:

NOTE: CLASSIFICATION OF SOILS BASED ON THE UNITED SOILS CLASSIFICATION SYSTEM.

Bergeson-Boese & Associates, Inc.
Environmental Engineering
65 Centennial Loop
Eugene, Oregon 97401
(541) 484-9484

APPENDIX B

Soil Boring Laboratory Reports and Chain-of-Custody Records

Pacific Northwest Laboratories
Environmental Analysis

65 Centennial Loop
Eugene, Oregon 97401

(503) 484-4493
Fax: (503) 484-4188

December 27, 1996

University of Oregon
Office of Public Safety
ATTN: Kay Coots
1319 E. 15th Avenue
Eugene, OR 97403

RE: PNL Report Number: 6697
Client Project No.: UO01RI.95H

Please find enclosed the report prepared for the laboratory analyses you requested.

The samples were received under a chain-of-custody. Soil samples are analyzed on an "as received" basis unless otherwise indicated.

Please contact us at the above address or phone number to obtain additional sample containers and coolers.

Thank you for selecting Pacific Northwest Laboratories for your analytical needs. We look forward to serving you in the future.

Sincerely,

Pacific Northwest Laboratories

Craig Biersdorff

Craig Biersdorff, Laboratory Director

Enclosure

Pacific Northwest Laboratories
65 Centennial Loop
Eugene, Oregon 97401
(541) 484-4493 Fax: 484-4188

LABORATORY REPORT

PNL REPORT NUMBER:	6697
CLIENT:	University of Oregon
CLIENT PROJECT NUMBER:	UO01RI.95H
SITE LOCATION:	Western Parcel, University of Oregon Eugene, OR
ITEMS ANALYZED:	8 / 9 soil; 3 water
DATE SAMPLES COLLECTED:	December 16, 1996
DATE ANALYSIS COMPLETED:	December 26, 1996
DATE SAMPLES DISCARDED:	December 30, 1996

METHOD: Conductivity per EPA 120.1
Results presented in umhos/cm
ND = Compound not detected

SAMPLE I.D.	RESULT
UO-B1-H2O	330
UO-B3C-H2O	240
UO-B2-H2O	310

METHOD: TPH per Oregon DEQ 418.1 Modified
Results and Method Reporting Limits (MRL) presented in mg/kg (ppm)
ND = Compound not detected

SAMPLE I.D.	RESULT	MRL
UO-SS-B1-4'	ND	20
UO-SS-B1-15'	ND	20
UO-SS-B3C-2'	97	
UO-SS-B3C-7'	62	
UO-SS-B3C-15	20	
UO-SS-B2-5'	6,600	
UO-SS-B2-7'	ND	20
UO-SS-B2-15	ND	20
LAB BLANK	ND	20

PNL REPORT NUMBER: 6697

METHOD: BTEX per EPA 8020
Results and Method Reporting Limits (MRL) presented in ug/L (ppb)
ND = Compound not detected

	UO-B1-H2O		UO-B3C-H2O		UO-B2-H2O	
COMPOUND	RESULT	MRL	RESULT	MRL	RESULT	MRL
Benzene	ND	1.0	ND	1.0	ND	1.0
Toluene	ND	1.0	ND	1.0	ND	1.0
Ethylbenzene	ND	1.0	ND	1.0	ND	1.0
Xylenes	ND	1.0	ND	1.0	ND	1.0

	LAB BLANK	
COMPOUND	RESULT	MRL
Benzene	ND	1.0
Toluene	ND	1.0
Ethylbenzene	ND	1.0
Xylenes	ND	1.0

Surrogate Recoveries
(4-Bromofluorobenzene)

SAMPLE ID	Percent	Acceptance Limits
UO-B1-H2O	89	69-117
UO-B3C-H2O	93	
UO-B2-H2O	87	
LAB BLANK	92	

PNL REPORT NUMBER: 6697

METHOD: TCLP 8 Metals per EPA 1311
Results and Method Reporting Limits (MRL) presented in mg/L (ppm)
ND = Compound not detected

		UO-SS-B2-5'		LAB BLANK	
ANALYTE	METHOD	RESULT	MRL	RESULT	MRL
Arsenic	7061	ND	0.05	ND	0.005
Barium	7081	0.9		ND	0.1
Cadmium	7130	ND	0.1	ND	0.1
Chromium	7190	ND	0.5	ND	0.5
Lead	7420	ND	0.5	ND	0.5
Mercury	7470	ND	0.001	ND	0.001
Selenium	7741	ND	0.05	ND	0.005
Silver	7760	ND	0.05	ND	0.05

METHOD: PCB's per EPA 8080
Results and Method Reporting Limits (MRL) presented in mg/kg (ppm)
ND = Compound not detected

	UO-SS-B2-5'		LAB BLANK	
COMPOUND	RESULT	MRL	RESULT	MRL
PCB-1016	ND	1.0	ND	0.25
PCB-1221	ND	1.0	ND	0.25
PCB-1232	ND	1.0	ND	0.25
PCB-1242	ND	1.0	ND	0.25
PCB-1248	ND	1.0	ND	0.25
PCB-1254	ND	1.0	ND	0.25
PCB-1260	ND	1.0	ND	0.25

Surrogate Recoveries
(Tetrachloro-m-xylene)

SAMPLE ID	Percent	Acceptance Limits
UO-SS-B2-5'	78	58-148
LAB BLANK	70	

PNL REPORT NUMBER: 6697 Analysis completed: 12/19/96

METHOD: Volatile Organic Compounds per EPA 8240
Results and Method Reporting Limits (MRL) presented in ug/kg (ppb)
ND = Compound not detected

COMPOUND	UO-SS-B2-5' RESULT	UO-SS-B2-5' MRL	METHOD BLANK RESULT	METHOD BLANK MRL
Chloromethane	ND	50	ND	10
Bromomethane	ND	50	ND	10
Vinyl Chloride	ND	50	ND	10
Chloroethane	ND	50	ND	10
Dichlorodifluoromethane	ND	50	ND	10
Trichlorofluoromethane	ND	50	ND	10
Methylene Chloride	ND	50	ND	10
Acetone	ND	50	ND	10
Carbon disulfide	ND	25	ND	5
1,1-Dichloroethene	ND	25	ND	5
1,1-Dichloroethane	ND	25	ND	5
trans-1,2-Dichloroethene	ND	25	ND	5
cis-1,2-Dichloroethene	ND	25	ND	5
Chloroform	ND	25	ND	5
1,2-Dibromoethane	ND	25	ND	5
1,2-Dichloroethane	ND	25	ND	5
2-Butanone	ND	50	ND	10
1,1,1-Trichloroethane	ND	25	ND	5
Carbon Tetrachloride	ND	25	ND	5
Bromodichloromethane	ND	25	ND	5
1,2-Dichloropropane	ND	25	ND	5
cis-1,3-Dichloropropene	ND	25	ND	5
Trichloroethene	ND	25	ND	5
Dibromochloromethane	ND	25	ND	5
1,1,2-Trichloroethane	ND	25	ND	5
Benzene	ND	25	ND	5
trans-1,3-Dichloropropene	ND	25	ND	5
Bromoform	ND	25	ND	5
4-Methyl-2-pentanone	ND	50	ND	10
2-Hexanone	ND	50	ND	10
Tetrachloroethene	ND	25	ND	5
1,1,2,2-Tetrachloroethane	ND	25	ND	5
Toluene	ND	25	ND	5
Chlorobenzene	ND	25	ND	5
Ethylbenzene	ND	25	ND	5
Xylenes (total)	ND	25	ND	5
Styrene	ND	25	ND	5
1,3-Dichlorobenzene	ND	25	ND	5
1,4-Dichlorobenzene	ND	25	ND	5
1,2-Dichlorobenzene	ND	25	ND	5

PNL REPORT NUMBER: 6697

QUALITY CONTROL REPORT
Method 8240 - Soil Analysis

Surrogate Recoveries
(percent)

	DBFM	TOL	BFB
LCS	104	100	97
UO-SS-B2-5'	115	97	56
UO-SS-B2-5' RE	105	97	68
Method Blank	106	100	94

Acceptance Limits

DBFM	= Dibromofluoromethane	70-121
TOL	= Toluene-d8	81-117
BFB	= 4-Bromofluorobenzene	74-121

Pacific Northwest Laboratories

65 Centennial Loop (503) 484-1993
Eugene, Oregon 97401 Fax: (503) 484-4188

CHAIN OF CUSTODY RECORD

Client/Company: Bergeson-Beese & Assoc. Inc.
Project Manager: Stephen Lawn
Project Code: UOØIR1.95H
Collected By: Stephen Lawn

Site Location: University of Oregon
Site Address: Western Parcel
Billing Address:
P.O.No.:
Phone No.:

Lab Project Number: 6697

Samples Refrigerated (Yes) No
Samples in Proper Containers (Yes) No
RUSH Yes (No)

COMMENTS: Notify Stephen if Soil samples greater than 500ppm

	SAMPLE I.D.	DATE	TIME	MATRIX: SOIL	WATER	OTHER	NUMBER OF CONTAINERS	TPH-HCID OAR/DEQ	TPH-Gasoline OAR/DEQ	TPH-Diesel OAR/DEQ	TPH-418.1 Modified OAR/DEQ	TPH 418.1	Volitile Organics EPA 624/8240/8260	PAH DEQ GC/MS SIM	BTEX EPA 602/8020	Pesticides EPA 608/8080	Flashpoint EPA 1010	Semi-Volatile Organics EPA 625/8270	Lead 7421	TCLP Metals (3/8)/1311	PCBS 608/8080	pH	PAH 8310	Conductivity	REMARKS
1	UO-SS-B1-4'	12-16		X			2				X														
2	UO-SS-B1-15'	12-16		X			2				X														
3	UO-B1-H2O	12-16			X		6								X								X	X	
4	UO-SS-B3C-2'	12-16		X			2				X														
5	UO-SS-B3C-7'	12-16		X			2				X														
6	UO-SS-B3C-15	12-16		X			2				X														
7	UO-B3C-H2O	12-16			X		8								X								X	X	
8	UO-SS-B2-5'	12-16		X			4				X		(X)							(X)	(X)		X		added waste oil characteri 12/19/96 CB (X)
9	UO-SS-B2-7'	12-16		X			2				X														
10	UO-SS-B2-10'	12-16		X			2																		Hold - run if 7' is over 500ppm
11	UO-SS-B2-15	12-16		X			2				X														
12	UO-B2-H2O	12-16			X		6								X								X	X	
13																									
14																									

ANALYSES TO BE PERFORMED

RELINQUISHED BY:	COMPANY	DATE / TIME	RECEIVED BY:	COMPANY	DATE / TIME
[signature]	BB&A	12-16-96 1650	[signature]	PNL	12/16/96 1650
RELINQUISHED BY:	COMPANY	DATE / TIME	RECEIVED BY:	COMPANY	DATE / TIME
RELINQUISHED BY:	COMPANY	DATE / TIME	RECEIVED BY:	COMPANY	DATE / TIME

Pacific Northwest Laboratories
Environmental Analysis

65 Centennial Loop
Eugene, Oregon 97401

(503) 484-4493
Fax: (503) 484-4188

December 30, 1996

University of Oregon
Office of Public Safety
ATTN: Kay Coots
1319 E. 15th Avenue
Eugene, OR 97403

RE: PNL Report Number: 6714
Client Project No.: UO01RI.95H

Please find enclosed the report prepared for the laboratory analyses you requested.

The samples were received under a chain-of-custody. Soil samples are analyzed on an "as received" basis unless otherwise indicated.

Please contact us at the above address or phone number to obtain additional sample containers and coolers.

Thank you for selecting Pacific Northwest Laboratories for your analytical needs. We look forward to serving you in the future.

Sincerely,

Pacific Northwest Laboratories

Craig Biersdorff

Craig Biersdorff, Laboratory Director

Enclosure

Pacific Northwest Laboratories
65 Centennial Loop
Eugene, Oregon 97401
(541) 484-4493 Fax: 484-4188

LABORATORY REPORT

PNL REPORT NUMBER:	6714
CLIENT:	University of Oregon
CLIENT PROJECT NUMBER:	UO01RI.95H
SITE LOCATION:	Western Parcel, University of Oregon Eugene, OR
ITEMS ANALYZED:	6 soil; 6 water
DATE SAMPLES COLLECTED:	December 19, 1996
DATE ANALYSIS COMPLETED:	December 27, 1996
DATE SAMPLES DISCARDED:	January 2, 1997

METHOD: TPH per Oregon DEQ 418.1 Modified
Results and Method Reporting Limits (MRL) presented in mg/kg (ppm)
ND = Compound not detected

SAMPLE I.D.	RESULT	MRL
UO-SS-B4-2'	ND	20
UO-SS-B4-15'	ND	20
UO-SS-B4-25'	43	
UO-SS-B4-26.5'	ND	20
UO-SS-B1-20	ND	20
UO-SS-B1-25	ND	20
LAB BLANK	ND	20

PNL REPORT NUMBER: 6714

METHOD: BTEX per EPA 8020
Results and Method Reporting Limits (MRL) presented in ug/L (ppb)
ND = Compound not detected

COMPOUND	UO-B4-H2O RESULT	UO-B4-H2O MRL	UO-B1-H2O-2 RESULT	UO-B1-H2O-2 MRL	UO-B1-H2O-3 RESULT	UO-B1-H2O-3 MRL
Benzene	ND	1.0	3.8		4.1	
Toluene	ND	1.0	ND	1.0	ND	1.0
Ethylbenzene	ND	1.0	5.9		7.0	
Xylenes	ND	1.0	5.4		4.4	

COMPOUND	UO-EB-H2O RESULT	UO-EB-H2O MRL	UO-TB RESULT	UO-TB MRL	LAB BLANK RESULT	LAB BLANK MRL
Benzene	ND	1.0	ND	1.0	ND	1.0
Toluene	ND	1.0	ND	1.0	ND	1.0
Ethylbenzene	ND	1.0	ND	1.0	ND	1.0
Xylenes	ND	1.0	ND	1.0	ND	1.0

Surrogate Recoveries
(4-Bromofluorobenzene)

SAMPLE ID	Percent	Acceptance Limits
UO-B4-H2O	90	69-117
UO-B1-H2O-2	*	
UO-B1-H2O-3	*	
UO-EB-H2O	89	
UO-TB	94	
LAB BLANK	93	

* Unable to calculate Surrogate Recovery due to matrix interference.

PNL REPORT NUMBER: 6714

METHOD: BTEX per EPA 8020
Results and Method Reporting Limits (MRL) presented in ug/kg (ppb)
ND = Compound not detected

	UO-SS-B1-20		LAB BLANK	
COMPOUND	RESULT	MRL	RESULT	MRL
Benzene	ND	25	ND	25
Toluene	ND	25	ND	25
Ethylbenzene	ND	25	ND	25
Xylenes	ND	25	ND	25

Surrogate Recoveries
(4-Bromofluorobenzene)

SAMPLE ID	Percent	Acceptance Limits
UO-SS-B1-20	84	12-162
LAB BLANK	108	

METHOD: Conductivity per EPA 120.1
Results presented in umhos/cm
ND = Compound not detected

SAMPLE I.D.	RESULT
UO-B1-H2O-2	420

METHOD: pH per EPA 150.1

SAMPLE I.D.	RESULT
UO-B1-H2O-2	6.3

Pacific Northwest Laboratories

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Eugene, Oregon 97401
(503) 484-4493
Fax: (503) 484-4188

CHAIN OF CUSTODY RECORD

Client/Company: Bergeson-Boese & Assoc. Inc.
Project Manager: Stephen Lawn
Project Code: U001R1.954
Collected By: Stephen Lawn

Site Location: UofO Riverfront Research Park
Site Address: Western Parcel
Billing Address:
P.O.No.:
Phone No.:

Lab Project Number: 6714

Samples Refrigerated: (Yes) No
Samples in Proper Containers: (Yes) No
RUSH: Yes (No)

COMMENTS:

	SAMPLE I.D.	DATE	TIME	MATRIX: SOIL	MATRIX: WATER	MATRIX: OTHER	NUMBER OF CONTAINERS	TPH-HCID OAR/DEQ	TPH-Gasoline OAR/DEQ	TPH-Diesel OAR/DEQ	TPH-418.1 Modified OAR/DEQ	TPH 418.1	Volitile Organics EPA 624/8240/8260	PAH DEQ GC/MS SIM	BTEX EPA 602/8020	Pesticides EPA 608/8080	Flashpoint EPA 1010	Semi-Volatile Organics EPA 625/8270	Lead 7421	TCLP Metals (3)/(8)/1311	PCB's 608/8080	pH, cond.	PAH 8310			REMARKS
1	UO-SS-B4-2'	12-19		X			2				X															
2	UO-SS-B4-15'	12-19		X			2				X															
3	UO-SS-B4-25'	12-19		X			1				X															
4	UO-SS-B4-26.5'	12-19		X			2				X					SL										
5	UO-B4-H2O	12-19	SL		X		3								X								X			
6	UO-B4-H2O-2	12-19	SL		X		5									SL							X			
7	[illegible]																									
8	UO-SS-B1-20	12-19		X			2				X				X								X			
9	UO-SS-B1-25	12-19		X			2				X															
10	UO-B1-H2O-2	12-19			X		8								X							X	X			
11	UO-B1-H2O-3	12-19			X		7								X								X			
12	UO-EB-H2O	12-19			X		3								X								X			
13	[illegible]																									
14	UO-TB	12-19			X		2								X											

ANALYSES TO BE PERFORMED

RELINQUISHED BY:	COMPANY	DATE / TIME	RECEIVED BY:	COMPANY	DATE / TIME
[signature]	B&A	12-19-96 1720	[signature]	PNL	12/19/96 1720
RELINQUISHED BY:	COMPANY	DATE / TIME	RECEIVED BY:	COMPANY	DATE / TIME
RELINQUISHED BY:	COMPANY	DATE / TIME	RECEIVED BY:	COMPANY	DATE / TIME

Pacific Northwest Laboratories
Environmental Analysis

65 Centennial Loop
Eugene, Oregon 97401

(503) 484-4493
Fax: (503) 484-4188

December 30, 1996

University of Oregon
Office of Public Safety
ATTN: Kay Coots
1319 E. 15th Avenue
Eugene, OR 97403

RE: PNL Report Number: 6713
Client Project No.: UO01RI.95H

Please find enclosed the report prepared for the laboratory analyses you requested.

The samples were received under a chain-of-custody. Soil samples are analyzed on an "as received" basis unless otherwise indicated.

Please contact us at the above address or phone number to obtain additional sample containers and coolers.

Thank you for selecting Pacific Northwest Laboratories for your analytical needs. We look forward to serving you in the future.

Sincerely,

Pacific Northwest Laboratories

Craig Biersdorff

Craig Biersdorff, Laboratory Director

Enclosure

Pacific Northwest Laboratories
65 Centennial Loop
Eugene, Oregon 97401
(541) 484-4493 Fax: 484-4188

LABORATORY REPORT

PNL REPORT NUMBER:	6713
CLIENT:	University of Oregon
CLIENT PROJECT NUMBER:	UO01RI.95H
SITE LOCATION:	Western Parcel, U of O Riverfront RP Eugene, OR
ITEMS ANALYZED:	1 soil; 2 water
DATE SAMPLES COLLECTED:	December 19, 1996
DATE ANALYSIS COMPLETED:	December 27, 1996
DATE SAMPLES DISCARDED:	January 2, 1997

METHOD: TPH-HCID per Oregon DEQ
Method Reporting Limits (MRL) presented in mg/kg (ppm)
ND = Compound not detected
NA = Not Applicable

SAMPLE I.D.	GASOLINE	DIESEL	BUNKER/ RELATED
UO-SS-B4-20	ND	DETECTED	ND
LAB BLANK	ND	ND	ND
MRL	20	50	NA

Surrogate Recoveries
(o-Terphenyl)

SAMPLE ID	Percent	Acceptance Limits
UO-SS-B4-20	114	50-150
LAB BLANK	100	

PNL REPORT NUMBER: 6713

METHOD: TPH per Oregon DEQ 418.1 Modified
Results and Method Reporting Limits (MRL) presented in mg/kg (ppm)
ND = Compound not detected

SAMPLE I.D.	RESULT	MRL
UO-SS-B4-20	120	
LAB BLANK	ND	20

METHOD: BTEX per EPA 8020
Results and Method Reporting Limits (MRL) presented in ug/L (ppb)
ND = Compound not detected

	UO-B4-H2O-2		LAB BLANK	
COMPOUND	RESULT	MRL	RESULT	MRL
Benzene	8.4		ND	1.0
Toluene	12		ND	1.0
Ethylbenzene	790		ND	1.0
Xylenes	780		ND	1.0

Surrogate Recoveries
(4-Bromofluorobenzene)

SAMPLE ID	Percent	Acceptance Limits
UO-B4-H2O-2	*	69-117
LAB BLANK	91	

* Unable to calculate Surrogate Recovery due to matrix interference.

PNL REPORT NUMBER: 6713

METHOD: BTEX per EPA 8020
Results and Method Reporting Limits (MRL) presented in ug/kg (ppb)
ND = Compound not detected

	UO-SS-B4-20		LAB BLANK	
COMPOUND	RESULT	MRL	RESULT	MRL
Benzene	ND	25	ND	25
Toluene	ND	25	ND	25
Ethylbenzene	170		ND	25
Xylenes	90		ND	25

Surrogate Recoveries
(4-Bromofluorobenzene)

SAMPLE ID	Percent	Acceptance Limits
UO-SS-B4-20	113	12-162
LAB BLANK	108	

METHOD: Conductivity per EPA 120.1
Results presented in umhos/cm
ND = Compound not detected

SAMPLE I.D.	RESULT
UO-B4-H2O-2	470
UO-B4-H2O	410

METHOD: pH per EPA 150.1

SAMPLE I.D.	RESULT
UO-B4-H2O-2	6.5
UO-B4-H2O	6.5

Pacific Northwest Laboratories

65 Centennial Loop
Eugene, Oregon 97401
(503) 484-4493
Fax: (503) 484-4188

CHAIN OF CUSTODY RECORD

Client/Company: Bergeson-Boese & Assoc. Inc.
Project Manager: Stephen Lawn
Project Code: UOØIR1,95H
Collected By: Stephen Lawn

Site Location: UofO Riverfront RF
Site Address: Western Parcel
Billing Address:
P.O.No.:
Phone No.:

Lab Project Number: 6713

Samples Refrigerated Yes No
Samples in Proper Containers Yes No
RUSH Yes No

COMMENTS:

	SAMPLE I.D.	DATE	TIME	MATRIX: SOIL	MATRIX: WATER	MATRIX: OTHER	NUMBER OF CONTAINERS	TPH-HCID OAR/DEQ	TPH-Gasoline OAR/DEQ	TPH-Diesel OAR/DEQ	TPH-418.1 Modified OAR/DEQ	TPH 418.1	Volitile Organics EPA 624/8240/8260	PAH DEQ GC/MS SIM	BTEX EPA 602/8020	Pesticides EPA 608/8080	Flashpoint EPA 1010	Semi-VolatileOrganics EPA 625/8270	Lead 7421	TCLP Metals (3)/(8)/1311	PCB'S 608/8080	pH	Conductivity	PAH 8310	REMARKS
1	UO-B4-H2O-2	12/19/96			X		3							X	X							X	X		
2	UO-SS-B4-20	12/19/96		X			4	X			X			X	X									X	
3	UO-B4-H2O	12/19/96			X		1															X	X		
4																									
5																									
6																									
7																									
8																									
9																									
10																									
11																									
12																—									
13																									
14																									

ANALYSES TO BE PERFORMED

RELINQUISHED BY:	COMPANY	DATE / TIME	RECEIVED BY:	COMPANY	DATE / TIME
[signature]	BB&A	12-19-96 1300	Craig Bursdorf	PNL	12/19/96 1300
RELINQUISHED BY:	COMPANY	DATE / TIME	RECEIVED BY:	COMPANY	DATE / TIME
RELINQUISHED BY:	COMPANY	DATE / TIME	RECEIVED BY:	COMPANY	DATE / TIME

OAL

PACIFIC NORTHWEST LABORATORY
65 CENTENNIAL LOOP
EUGENE, OR 97401

ANALYST REVIEW BY: KMM DATE: 01/08/97

DATA PACK REVIEW BY: SL DATE: 1/8/97

CRAIG BIERSDORFF

P/C:U001R1.95H

POLYNUCLEAR AROMATIC HYDROCARBONS BY EPA METHOD 8310

SAMPLE ID:	UO-SS-B4-20	UO-SS-B1-20
OAL ID: 25-J483-	54580	54581
SAMPLE DATE:	12/19/96	12/19/96
RESULTS	ATTACHED	ATTACHED

NA = NOT ANALYZED

OREGON ANALYTICAL LABORATORY
A Division of Portland General Electric
14855 S.W. Old Scholls Ferry Road, Beaverton, OR 97007
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OAL

PACIFIC NORTHWEST LABORATORY
65 CENTENNIAL LOOP
EUGENE, OR 97401

ANALYST REVIEW BY: KZM DATE: 01/08/97

DATA PACK REVIEW BY: SL DATE: 1/8/97

CRAIG BIERSDORFF

P/C:U001R1.95H

POLYNUCLEAR AROMATIC HYDROCARBONS
BY EPA METHOD 8310

SAMPLE ID:	U0-B4-H20	U0-B4-H20-2	U0-B1-H20-2	U0-B1-H20-3	U0-EB-H20
OAL ID: 25-J483-	54582	54583	54584	54585	54586
SAMPLE DATE:	12/19/96	12/19/96	12/19/96	12/19/96	12/19/96
RESULTS	ATTACHED	ATTACHED	ATTACHED	ATTACHED	ATTACHED

NA = NOT ANALYZED

OREGON ANALYTICAL LABORATORY
A Division of Portland General Electric
14855 S.W. Old Scholls Ferry Road, Beaverton, OR 97007
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OAL

POLYNUCLEAR AROMATIC HYDROCARBONS

by EPA METHOD 8310

Matrix	Soil
Client ID	UO-SS-B4-20
OAL ID	25-J483-54580
Date Sampled	12/19/96
Date Extracted	12/24/96
Date Analyzed	1/2/97
% Solids	81.9

Review by: DMW

Date: 01/08/97

CAS #	Analyte	Result (ug/kg)	Reporting Limit (ug/kg)
91-20-3	**Naphthalene**	**420**	**10**
208-96-8	**Acenaphthylene**	**18**	**10**
83-32-9	**Acenaphthene**	**30**	**10**
86-73-7	**Fluorene**	**24**	**10**
85-01-8	Phenanthrene	ND	10
120-12-7	**Anthracene**	**15**	**10**
206-44-0	**Fluoranthene**	**61**	**10**
129-00-0	**Pyrene**	**85**	**10**
56-55-3	**Benzo[a]anthracene**	**23**	**5**
218-01-9	**Chrysene**	**67**	**5**
205-99-2	Benzo[b]fluoranthene	ND	5
207-08-9	Benzo[k]fluoranthene	ND	5
50-32-8	Benzo[a]pyrene	ND	5
53-70-3	Dibeno[a,h]anthracene	ND	5
191-24-2	Benzo[g,h,i]perylene	ND	5
193-39-5	Indeno[1,2,3-cd]pyrene	ND	5

	Surrogate	% Recovery
191-07-1	Coronene	104

ND = None Detected

Results reported on a dry weight basis

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OAL

POLYNUCLEAR AROMATIC HYDROCARBONS

by EPA METHOD 8310

Matrix	Soil
Client ID	UO-SS-B1-20
OAL ID	25-J483-54581
Date Sampled	12/19/96
Date Extracted	12/24/96
Date Analyzed	1/2/97
% Solids	74.5

Review by: KJM

Date: 01/08/97

CAS #	Analyte	Result (ug/kg)	Reporting Limit (ug/kg)
91-20-3	Naphthalene	ND	11
208-96-8	Acenaphthylene	ND	11
83-32-9	Acenaphthene	ND	11
86-73-7	Fluorene	ND	11
85-01-8	Phenanthrene	ND	11
120-12-7	Anthracene	ND	11
206-44-0	**Fluoranthene**	**25**	**11**
129-00-0	**Pyrene**	**39**	**11**
56-55-3	Benzo[a]anthracene	ND	5
218-01-9	Chrysene	ND	5
205-99-2	Benzo[b]fluoranthene	ND	5
207-08-9	Benzo[k]fluoranthene	ND	5
50-32-8	Benzo[a]pyrene	ND	5
53-70-3	Dibeno[a,h]anthracene	ND	5
191-24-2	Benzo[g,h,i]perylene	ND	5
193-39-5	Indeno[1,2,3-cd]pyrene	ND	5

	Surrogate	% Recovery
191-07-1	Coronene	91

ND = None Detected

Results reported on a dry weight basis

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POLYNUCLEAR AROMATIC HYDROCARBONS

by EPA METHOD 8310

Batch Laboratory Control Sample (LCS) Results

for

OAL ID # 25-J483-54580 through 25-J483-45481

Matrix	SOIL	Review by: KJM
OAL Batch QC ID	LCS1220P	
Date Extracted	12/20/96	Date: 01/08/97
Date Analyzed	12/26/96	

CAS #	Analyte	% Recovery
91-20-3	Naphthalene	102
208-96-8	Acenaphthylene	94
83-32-9	Acenaphthene	96
86-73-7	Fluorene	101
85-01-8	Phenanthrene	105
120-12-7	Anthracene	83
206-44-0	Fluoranthene	101
129-00-0	Pyrene	107
56-55-3	Benzo[a]anthracene	97
218-01-9	Chrysene	99
205-99-2	Benzo[b]fluoranthene	97
207-08-9	Benzo[k]fluoranthene	100
50-32-8	Benzo[a]pyrene	70
53-70-3	Dibeno[a,h]anthracene	133
191-24-2	Benzo[g,h,i]perylene	101
193-39-5	Indeno[1,2,3-cd]pyrene	97

	Surrogate	% Recovery
191-07-1	Coronene	84

ND = None Detected

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OAL

POLYNUCLEAR AROMATIC HYDROCARBONS

by EPA METHOD 8310

Matrix	Method Blank
Client ID	-
OAL ID	MB1224I
Date Sampled	-
Date Extracted	12/24/96
Date Analyzed	12/26/96
% Solids	-

Review by: KM

Date: 01/08/97

CAS #	Analyte	Result (ug/kg)	Reporting Limit (ug/kg)
91-20-3	Naphthalene	ND	10
208-96-8	Acenaphthylene	ND	10
83-32-9	Acenaphthene	ND	10
86-73-7	Fluorene	ND	10
85-01-8	Phenanthrene	ND	10
120-12-7	Anthracene	ND	10
206-44-0	Fluoranthene	ND	10
129-00-0	Pyrene	ND	10
56-55-3	Benzo[a]anthracene	ND	5
218-01-9	Chrysene	ND	5
205-99-2	Benzo[b]fluoranthene	ND	5
207-08-9	Benzo[k]fluoranthene	ND	5
50-32-8	Benzo[a]pyrene	ND	5
53-70-3	Dibeno[a,h]anthracene	ND	5
191-24-2	Benzo[g,h,i]perylene	ND	5
193-39-5	Indeno[1,2,3-cd]pyrene	ND	5

	Surrogate	% Recovery
191-07-1	Coronene	77

ND = None Detected

Results reported on a dry weight basis

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OAL

PACIFIC NORTHWEST LABORATORY
65 CENTENNIAL LOOP
EUGENE, OR 97401

ANALYST REVIEW BY: RJ DATE: 1/17/97

DATA PACK REVIEW BY: SL DATE: 1/17/97

CRAIG BIERSDORFF

P/C:U001R1.95H

POLYNUCLEAR AROMATIC HYDROCARBONS
BY EPA METHOD 8310

SAMPLE ID:	U0-B4-H20	U0-B4-H20-2	U0-B1-H20-2	U0-B1-H20-3	U0-EB-H20
OAL ID: 25-J483-	54582	54583	54584	54585	54586
SAMPLE DATE:	12/19/96	12/19/96	12/19/96	12/19/96	12/19/96
RESULTS	ATTACHED	ATTACHED	ATTACHED	ATTACHED	ATTACHED

NA = NOT ANALYZED

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OAL

POLYNUCLEAR AROMATIC HYDROCARBONS

by EPA METHOD 8310

Matrix	Water	Review by: JLM
Client ID	UO-B4-H2O	
OAL ID	25-J483-54582	Date: 01/08/97
Date Sampled	12/19/96	
Date Extracted	12/24/96	
Date Analyzed	12/26/96	

CAS #	Analyte	Result (ug/L)	Reporting Limit (ug/L)
91-20-3	**Naphthalene**	**0.5**	**0.25**
208-96-8	**Acenaphthylene**	**0.34**	**0.25**
83-32-9	Acenaphthene	ND	0.25
86-73-7	Fluorene	ND	0.25
85-01-8	Phenanthrene	ND	0.25
120-12-7	Anthracene	ND	0.25
206-44-0	Fluoranthene	ND	0.25
129-00-0	Pyrene	ND	0.25
56-55-3	Benzo[a]anthracene	ND	0.1
218-01-9	Chrysene	ND	0.1
205-99-2	Benzo[b]fluoranthene	ND	0.1
207-08-9	Benzo[k]fluoranthene	ND	0.1
50-32-8	Benzo[a]pyrene	ND	0.1
53-70-3	Diben[a,h]anthracene	ND	0.1
191-24-2	Benzo[g,h,i]perylene	ND	0.1
193-39-5	Indeno[1,2,3-cd]pyrene	ND	0.1

	Surrogate	% Recovery
191-07-1	Coronene	75

ND = None Detected

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POLYNUCLEAR AROMATIC HYDROCARBONS

by EPA METHOD 8310

Matrix	Water	Review by: KDN
Client ID	UO-B4-H2O-2	
OAL ID	25-J483-54583	Date: 01/09/97
Date Sampled	12/19/96	
Date Extracted	12/24/96	
Date Analyzed	12/26/96	

CAS #	Analyte	Result (ug/L)	Reporting Limit (ug/L)
91-20-3	**Naphthalene**	**3800**	**27**
208-96-8	Acenaphthylene	ND	27
83-32-9	Acenaphthene	ND	27
86-73-7	**Fluorene**	**34**	**27**
85-01-8	Phenanthrene	ND	27
120-12-7	Anthracene	ND	27
206-44-0	**Fluoranthene**	**50**	**27**
129-00-0	**Pyrene**	**70**	**27**
56-55-3	**Benzo[a]anthracene**	**26**	**11**
218-01-9	**Chrysene**	**68**	**11**
205-99-2	Benzo[b]fluoranthene	ND	11
207-08-9	Benzo[k]fluoranthene	ND	11
50-32-8	Benzo[a]pyrene	ND	11
53-70-3	Diben[a,h]anthracene	ND	11
191-24-2	Benzo[g,h,i]perylene	ND	11
193-39-5	Indeno[1,2,3-cd]pyrene	ND	11

	Surrogate	% Recovery
191-07-1	Coronene	MI

ND = None Detected
MI=Matrix Interference

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OAL

POLYNUCLEAR AROMATIC HYDROCARBONS

by EPA METHOD 8310

Matrix	Water
Client ID	UO-B1-H2O-2
OAL ID	25-J483-54584
Date Sampled	12/19/96
Date Extracted	12/24/96
Date Analyzed	1/10/97

Review by: KS

Date: 1/15/97

CAS #	Analyte	Result (ug/L)	Reporting Limit (ug/L)
91-20-3	**Naphthalene**	**120**	**0.34**
208-96-8	Acenaphthylene	ND	0.34
83-32-9	Acenaphthene	ND	0.34
86-73-7	**Fluorene**	**1.3**	**0.34**
85-01-8	Phenanthrene	ND	0.34
120-12-7	**Anthracene**	**0.36**	**0.34**
206-44-0	**Fluoranthene**	**1.1**	**0.34**
129-00-0	**Pyrene**	**1.7**	**0.34**
56-55-3	Benzo[a]anthracene	ND	0.14
218-01-9	**Chrysene**	**2.4**	**0.14**
205-99-2	Benzo[b]fluoranthene	ND	0.14
207-08-9	Benzo[k]fluoranthene	ND	0.14
50-32-8	Benzo[a]pyrene	ND	0.14
53-70-3	Diben[a,h]anthracene	ND	0.14
191-24-2	Benzo[g,h,i]perylene	ND	0.14
193-39-5	Indeno[1,2,3-cd]pyrene	ND	0.14

	Surrogate	% Recovery
191-07-1	Coronene	92

ND = None Detected
MI = Matrix Interference

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OAL

POLYNUCLEAR AROMATIC HYDROCARBONS

by EPA METHOD 8310

Matrix	Water
Client ID	UO-B1-H2O-3
OAL ID	25-J483-54585
Date Sampled	12/19/96
Date Extracted	12/24/96
Date Analyzed	1/10/97

Review by: RJ

Date: 1/15/97

CAS #	Analyte	Result (ug/L)	Reporting Limit (ug/L)
91-20-3	**Naphthalene**	**100**	**0.31**
208-96-8	Acenaphthylene	ND	0.31
83-32-9	Acenaphthene	ND	0.31
86-73-7	**Fluorene**	**1.3**	**0.31**
85-01-8	Phenanthrene	ND	0.31
120-12-7	**Anthracene**	**0.32**	**0.31**
206-44-0	**Fluoranthene**	**1**	**0.31**
129-00-0	**Pyrene**	**1.7**	**0.31**
56-55-3	Benzo[a]anthracene	ND	0.12
218-01-9	**Chrysene**	**1.8**	**0.12**
205-99-2	Benzo[b]fluoranthene	ND	0.12
207-08-9	Benzo[k]fluoranthene	ND	0.12
50-32-8	Benzo[a]pyrene	ND	0.12
53-70-3	Diben[a,h]anthracene	ND	0.12
191-24-2	**Benzo[g,h,i]perylene**	**0.23**	**0.12**
193-39-5	Indeno[1,2,3-cd]pyrene	ND	0.12

	Surrogate	% Recovery
191-07-1	Coronene	105

ND = None Detected
MI = Matrix Interference

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POLYNUCLEAR AROMATIC HYDROCARBONS

by EPA METHOD 8310

Matrix	Water
Client ID	UO-EB-H2O
OAL ID	25-J483-54586
Date Sampled	12/19/96
Date Extracted	12/24/96
Date Analyzed	12/26/96

Review by: KW

Date: 01/08/97

CAS #	Analyte	Result (ug/L)	Reporting Limit (ug/L)
91-20-3	Naphthalene	ND	0.25
208-96-8	Acenaphthylene	ND	0.25
83-32-9	Acenaphthene	ND	0.25
86-73-7	Fluorene	ND	0.25
85-01-8	Phenanthrene	ND	0.25
120-12-7	Anthracene	ND	0.25
206-44-0	Fluoranthene	ND	0.25
129-00-0	Pyrene	ND	0.25
56-55-3	Benzo[a]anthracene	ND	0.1
218-01-9	Chrysene	ND	0.1
205-99-2	Benzo[b]fluoranthene	ND	0.1
207-08-9	Benzo[k]fluoranthene	ND	0.1
50-32-8	Benzo[a]pyrene	ND	0.1
53-70-3	Diben[a,h]anthracene	ND	0.1
191-24-2	Benzo[g,h,i]perylene	ND	0.1
193-39-5	Indeno[1,2,3-cd]pyrene	ND	0.1

	Surrogate	% Recovery
191-07-1	Coronene	72

ND = None Detected

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OAL

POLYNUCLEAR AROMATIC HYDROCARBONS

by EPA METHOD 8310

Batch Laboratory Control Sample (LCS) Results

for

OAL ID # 25-J483-54582 through 25-J483-54586

Matrix	Water	Review by: KTM
OAL Batch QC ID	LCS1219H	
Date Extracted	12/19/96	Date: 01/08/97
Date Analyzed	12/19/96	

CAS #	Analyte	% Recovery
91-20-3	Naphthalene	101%
208-96-8	Acenaphthylene	94%
83-32-9	Acenaphthene	97%
86-73-7	Fluorene	101%
85-01-8	Phenanthrene	106%
120-12-7	Anthracene	99%
206-44-0	Fluoranthene	101%
129-00-0	Pyrene	110%
56-55-3	Benzo[a]anthracene	101%
218-01-9	Chrysene	101%
205-99-2	Benzo[b]fluoranthene	98%
207-08-9	Benzo[k]fluoranthene	96%
50-32-8	Benzo[a]pyrene	92%
53-70-3	Dibeno[a,h]anthracene	50%
191-24-2	Benzo[g,h,i]perylene	43%
193-39-5	Indeno[1,2,3-cd]pyrene	80%

	Surrogate	% Recovery
191-07-1	Coronene	84

ND = None Detected

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OAL

POLYNUCLEAR AROMATIC HYDROCARBONS

by EPA METHOD 8310

Matrix	Method Blank	Review by: KJL
Client ID	-	
OAL ID	MB1224H	Date: 01/08/97
Date Sampled	-	
Date Extracted	12/24/96	
Date Analyzed	1/2/97	
% Solids	-	

CAS #	Analyte	Result (ug/kg)	Reporting Limit (ug/kg)
91-20-3	Naphthalene	ND	10
208-96-8	Acenaphthylene	ND	10
83-32-9	Acenaphthene	ND	10
86-73-7	Fluorene	ND	10
85-01-8	Phenanthrene	ND	10
120-12-7	Anthracene	ND	10
206-44-0	Fluoranthene	ND	10
129-00-0	Pyrene	ND	10
56-55-3	Benzo[a]anthracene	ND	5
218-01-9	Chrysene	ND	5
205-99-2	Benzo[b]fluoranthene	ND	5
207-08-9	Benzo[k]fluoranthene	ND	5
50-32-8	Benzo[a]pyrene	ND	5
53-70-3	Dibeno[a,h]anthracene	ND	5
191-24-2	Benzo[g,h,i]perylene	ND	5
193-39-5	Indeno[1,2,3-cd]pyrene	ND	5

	Surrogate	% Recovery
191-07-1	Coronene	80

ND = None Detected
Results reported on a dry weight basis

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OAL

POLYNUCLEAR AROMATIC HYDROCARBONS

by EPA METHOD 8310

Batch Matrix Spike (MS/MSD) Results

for

OAL ID # 25-J483-54582 through 25-J483-54586

Matrix	Water	Review by: KM
OAL Batch QC ID	54442	
Date Extracted	12/19/96	Date: 01/08/97
Date Analyzed	12/19/96	

CAS #	Analyte	Sample Result	MS % Rec.	MSD % Rec.	RPD
91-20-3	Naphthalene	ND	101	98	3
208-96-8	Acenaphthylene	ND	88	85	3
83-32-9	Acenaphthene	ND	92	88	4
86-73-7	Fluorene	ND	96	91	5
85-01-8	Phenanthrene	ND	94	89	5
120-12-7	Anthracene	ND	87	83	5
206-44-0	Fluoranthene	ND	74	74	0
129-00-0	Pyrene	ND	78	80	3
56-55-3	Benzo[a]anthracene	ND	42	46	9
218-01-9	Chrysene	ND	43	46	7
205-99-2	Benzo[b]fluoranthene	ND	24	27	12
207-08-9	Benzo[k]fluoranthene	ND	23	26	12
50-32-8	Benzo[a]pyrene	ND	21	23	9
53-70-3	Dibeno[a,h]anthracene	ND	19	21	10
191-24-2	Benzo[g,h,i]perylene	ND	15	16	6
193-39-5	Indeno[1,2,3-cd]pyrene	ND	15	17	13
	Surrogate				
191-07-1	Coronene	84	84	85	

ND = None Detected

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Pacific Northwest Laboratories

65 Centennial Loop
Eugene, Oregon 97401
(503) 484-4493
Fax: (503) 484-4188

CHAIN OF CUSTODY RECORD

Client/Company: _____
Project Manager: _____
Project Code: UO#1R1.95H
Collected By: _____

Site Location: _____
Site Address: _____
Billing Address: _____
P.O.No.: _____
Phone No.: _____

Lab Project Number: _____

Samples Refrigerated (Yes) No
Samples in Proper Containers (Yes) No
RUSH Yes (No)

COMMENTS:
Need low detection limits

ANALYSES TO BE PERFORMED

	SAMPLE I.D.	DATE	TIME	MATRIX: SOIL	MATRIX: WATER	MATRIX: OTHER	NUMBER OF CONTAINERS	PAH 8310	REMARKS
1	UO-SS-B4-20	12/19/96		X			1	X	54580
2	UO-SS-B1-20	12/19/96		X			1	X	54581
3	UO-B4-H_2O	12/19/96			X		3	X	54582
4	UO-B4-H_2O-2	12/19/96			X		1	X	54583
5	UO-B1-H_2O-2	12/19/96			X		1	X	54584
6	UO-B1-H_2O-3	12/19/96			X		2	X	54585
7	UO-FB-H_2O	12/19/96			X		1	X	54586
8									
9									
10									
11									
12									
13									
14									

25-J483-

RELINQUISHED BY:	COMPANY	DATE / TIME	RECEIVED BY:	COMPANY	DATE / TIME
Jay Burdett	PNL	12/20/96 1600		Mid Valley Delv.	
RELINQUISHED BY:	COMPANY	DATE / TIME	RECEIVED BY:	COMPANY	DATE / TIME
	Mid Valley Delv.				
RELINQUISHED BY:	COMPANY	DATE / TIME	RECEIVED BY:	COMPANY	DATE / TIME
			[illegible]	CAL	12/23/96 1130

OAL

PACIFIC NORHTWEST LABORATORY
65 CENTENNIAL LOOP
EUGENE, OR 97401

ANALYST REVIEW BY: KTL DATE: 12/27/96

DATA PACK REVIEW BY: SL DATE: 12/27/96

CRAIG BIERSDORFF

POLYNUCLEAR AROMATIC HYDROCARBONS BY EPA METHOD 8310

SAMPLE ID:	UO-B1-H2O	UO-B3C-H2O	UO-B2-H2O
OAL ID: 25-J483-	54441	54442	54443
SAMPLE DATE:	12/16/96	12/16/96	12/16/96
RESULTS	ATTACHED	ATTACHED	ATTACHED

NA = NOT ANALYZED

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POLYNUCLEAR AROMATIC HYDROCARBONS

by EPA METHOD 8310

Matrix	Water
Client ID	UO-B1-H2O
OAL ID	25-J483-54441
Date Sampled	12/16/96
Date Extracted	12/19/96
Date Analyzed	12/19/96

Review by: KDZ

Date: 12/27/96

CAS #	Analyte	Result (ug/L)	Reporting Limit (ug/L)
91-20-3	Naphthalene	ND	0.25
208-96-8	Acenaphthylene	ND	0.25
83-32-9	Acenaphthene	ND	0.25
86-73-7	Fluorene	ND	0.25
85-01-8	Phenanthrene	ND	0.25
120-12-7	Anthracene	ND	0.25
206-44-0	Fluoranthene	ND	0.25
129-00-0	Pyrene	ND	0.25
56-55-3	Benzo[a]anthracene	ND	0.1
218-01-9	Chrysene	ND	0.1
205-99-2	Benzo[b]fluoranthene	ND	0.1
207-08-9	Benzo[k]fluoranthene	ND	0.1
50-32-8	Benzo[a]pyrene	ND	0.1
53-70-3	Diben[a,h]anthracene	ND	0.1
191-24-2	Benzo[g,h,i]perylene	ND	0.1
193-39-5	Indeno[1,2,3-cd]pyrene	ND	0.1

	Surrogate	% Recovery
191-07-1	Coronene	84

ND = None Detected

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POLYNUCLEAR AROMATIC HYDROCARBONS

by EPA METHOD 8310

Matrix	Water	Review by: LZm
Client ID	UO-B3C-H2O	
OAL ID	25-J483-54442	Date: 12/27/96
Date Sampled	12/16/96	
Date Extracted	12/19/96	
Date Analyzed	12/19/96	

CAS #	Analyte	Result (ug/L)	Reporting Limit (ug/L)
91-20-3	Naphthalene	ND	0.25
208-96-8	Acenaphthylene	ND	0.25
83-32-9	Acenaphthene	ND	0.25
86-73-7	Fluorene	ND	0.25
85-01-8	Phenanthrene	ND	0.25
120-12-7	Anthracene	ND	0.25
206-44-0	Fluoranthene	ND	0.25
129-00-0	Pyrene	ND	0.25
56-55-3	Benzo[a]anthracene	ND	0.1
218-01-9	Chrysene	ND	0.1
205-99-2	Benzo[b]fluoranthene	ND	0.1
207-08-9	Benzo[k]fluoranthene	ND	0.1
50-32-8	Benzo[a]pyrene	ND	0.1
53-70-3	Diben[a,h]anthracene	ND	0.1
191-24-2	Benzo[g,h,i]perylene	ND	0.1
193-39-5	Indeno[1,2,3-cd]pyrene	ND	0.1

	Surrogate	% Recovery
191-07-1	Coronene	84

ND = None Detected

OREGON ANALYTICAL LABORATORY

A Division of Portland General Electric

14855 S.W. Old Scholls Ferry Road, Beaverton, OR 97007

Phone 503-590-5300 • Fax 503-590-1404

Printed on recycled paper

OAL

POLYNUCLEAR AROMATIC HYDROCARBONS

by EPA METHOD 8310

Matrix	Water
Client ID	UO-B2-H2O
OAL ID	25-J483-54443
Date Sampled	12/16/96
Date Extracted	12/19/96
Date Analyzed	12/19/96

Review by: KM

Date: 12/27/96

CAS #	Analyte	Result (ug/L)	Reporting Limit (ug/L)
91-20-3	Naphthalene	ND	0.25
208-96-8	Acenaphthylene	ND	0.25
83-32-9	Acenaphthene	ND	0.25
86-73-7	Fluorene	ND	0.25
85-01-8	Phenanthrene	ND	0.25
120-12-7	Anthracene	ND	0.25
206-44-0	Fluoranthene	ND	0.25
129-00-0	Pyrene	ND	0.25
56-55-3	Benzo[a]anthracene	ND	0.1
218-01-9	Chrysene	ND	0.1
205-99-2	Benzo[b]fluoranthene	ND	0.1
207-08-9	Benzo[k]fluoranthene	ND	0.1
50-32-8	Benzo[a]pyrene	ND	0.1
53-70-3	Diben[a,h]anthracene	ND	0.1
191-24-2	Benzo[g,h,i]perylene	ND	0.1
193-39-5	Indeno[1,2,3-cd]pyrene	ND	0.1

	Surrogate	% Recovery
191-07-1	Coronene	87

ND = None Detected

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OAL

POLYNUCLEAR AROMATIC HYDROCARBONS

by EPA METHOD 8310

Matrix	Method Blank	Review by: KM
Client ID	-	
OAL ID	MB1219H	Date: 12/27/96
Date Sampled	-	
Date Extracted	12/19/96	
Date Analyzed	12/19/96	

CAS #	Analyte	Result (ug/L)	Reporting Limit (ug/L)
91-20-3	Naphthalene	ND	0.25
208-96-8	Acenaphthylene	ND	0.25
83-32-9	Acenaphthene	ND	0.25
86-73-7	Fluorene	ND	0.25
85-01-8	Phenanthrene	ND	0.25
120-12-7	Anthracene	ND	0.25
206-44-0	Fluoranthene	ND	0.25
129-00-0	Pyrene	ND	0.25
56-55-3	Benzo[a]anthracene	ND	0.1
218-01-9	Chrysene	ND	0.1
205-99-2	Benzo[b]fluoranthene	ND	0.1
207-08-9	Benzo[k]fluoranthene	ND	0.1
50-32-8	Benzo[a]pyrene	ND	0.1
53-70-3	Diben[a,h]anthracene	ND	0.1
191-24-2	Benzo[g,h,i]perylene	ND	0.1
193-39-5	Indeno[1,2,3-cd]pyrene	ND	0.1

	Surrogate	% Recovery
191-07-1	Coronene	75

ND = None Detected

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OAL

POLYNUCLEAR AROMATIC HYDROCARBONS

by EPA METHOD 8310

Batch Laboratory Control Sample (LCS) Results

for

OAL ID # 25-J483-54441 through 54443

Matrix	Water	Review by: KM
OAL Batch QC ID	LCS1219H	
Date Extracted	12/19/96	Date: 12/27/96
Date Analyzed	12/19/96	

CAS #	Analyte	% Recovery
91-20-3	Naphthalene	101%
208-96-8	Acenaphthylene	94%
83-32-9	Acenaphthene	97%
86-73-7	Fluorene	101%
85-01-8	Phenanthrene	106%
120-12-7	Anthracene	99%
206-44-0	Fluoranthene	101%
129-00-0	Pyrene	110%
56-55-3	Benzo[a]anthracene	101%
218-01-9	Chrysene	101%
205-99-2	Benzo[b]fluoranthene	98%
207-08-9	Benzo[k]fluoranthene	96%
50-32-8	Benzo[a]pyrene	92%
53-70-3	Dibeno[a,h]anthracene	50%
191-24-2	Benzo[g,h,i]perylene	43%
193-39-5	Indeno[1,2,3-cd]pyrene	80%

	Surrogate	% Recovery
191-07-1	Coronene	84

ND = None Detected

OREGON ANALYTICAL LABORATORY

A Division of Portland General Electric

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OAL

POLYNUCLEAR AROMATIC HYDROCARBONS

by EPA METHOD 8310

Batch Matrix Spike (MS/MSD) Results

for

OAL ID # 25-J483-54441 through 54443

Matrix	Water	Review by: KZM
OAL Batch QC ID	54442	
Date Extracted	12/19/96	Date: 12/27/96
Date Analyzed	12/19/96	

CAS #	Analyte	Sample Result	MS % Rec.	MSD % Rec.	RPD
91-20-3	Naphthalene	ND	101	98	3
208-96-8	Acenaphthylene	ND	88	85	3
83-32-9	Acenaphthene	ND	92	88	4
86-73-7	Fluorene	ND	96	91	5
85-01-8	Phenanthrene	ND	94	89	5
120-12-7	Anthracene	ND	87	83	5
206-44-0	Fluoranthene	ND	74	74	0
129-00-0	Pyrene	ND	78	80	3
56-55-3	Benzo[a]anthracene	ND	42	46	9
218-01-9	Chrysene	ND	43	46	7
205-99-2	Benzo[b]fluoranthene	ND	24	27	12
207-08-9	Benzo[k]fluoranthene	ND	23	26	12
50-32-8	Benzo[a]pyrene	ND	21	23	9
53-70-3	Dibeno[a,h]anthracene	ND	19	21	10
191-24-2	Benzo[g,h,i]perylene	ND	15	16	6
193-39-5	Indeno[1,2,3-cd]pyrene	ND	15	17	13
	Surrogate				
191-07-1	Coronene	84	84	85	

ND = None Detected

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OAL

PACIFIC NORHTWEST LABORATORY
65 CENTENNIAL LOOP
EUGENE, OR 97401

ANALYST REVIEW BY: KM DATE: 01/02/97

DATA PACK REVIEW BY: KMB DATE: 1/3/97

CRAIG BIERSDORFF
484-4493/FAX 484-4188
6697

POLYNUCLEAR AROMATIC HYDROCARBONS
BY EPA METHOD 8310

SAMPLE ID:	UO-SS-B2-5'
OAL ID: 25-J483-	54444
SAMPLE DATE:	12/16/96
RESULTS	ATTACHED

NA = NOT ANALYZED

OREGON ANALYTICAL LABORATORY
A Division of Portland General Electric
14855 S.W. Old Scholls Ferry Road, Beaverton, OR 97007
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OAL

POLYNUCLEAR AROMATIC HYDROCARBONS

by EPA METHOD 8310

Matrix	Soil
Client ID	UO-SS-B2-5'
OAL ID	25-J483-54444
Date Sampled	12/16/96
Date Extracted	12/20/96
Date Analyzed	12/26/96
% Solids	84.1

Review by: KMN

Date: 01/02/97

CAS #	Analyte	Result (ug/kg)	Reporting Limit (ug/kg)
91-20-3	**Naphthalene**	**200**	**100**
208-96-8	Acenaphthylene	ND	100
83-32-9	Acenaphthene	ND	100
86-73-7	Fluorene	ND	100
85-01-8	**Phenanthrene**	**150**	**100**
120-12-7	Anthracene	ND	100
206-44-0	Fluoranthene	ND	100
129-00-0	**Pyrene**	**330**	**100**
56-55-3	Benzo[a]anthracene	ND	40
218-01-9	Chrysene	ND	40
205-99-2	Benzo[b]fluoranthene	ND	40
207-08-9	Benzo[k]fluoranthene	ND	40
50-32-8	Benzo[a]pyrene	ND	40
53-70-3	Dibeno[a,h]anthracene	ND	40
191-24-2	Benzo[g,h,i]perylene	ND	40
193-39-5	Indeno[1,2,3-cd]pyrene	ND	40

	Surrogate	% Recovery
191-07-1	Coronene	MI

MI=Matrix Interference
ND = None Detected
Results reported on a dry weight basis

OREGON ANALYTICAL LABORATORY
A Division of Portland General Electric
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OAL

POLYNUCLEAR AROMATIC HYDROCARBONS

by EPA METHOD 8310

Batch Laboratory Control Sample (LCS) Results

for

OAL ID # 25-J483-54444

Matrix	SOIL	Review by: KMM
OAL Batch QC ID	LCS1220P	
Date Extracted	12/20/96	Date: 01/02/97
Date Analyzed	12/26/96	

CAS #	Analyte	% Recovery
91-20-3	Naphthalene	102
208-96-8	Acenaphthylene	94
83-32-9	Acenaphthene	96
86-73-7	Fluorene	101
85-01-8	Phenanthrene	105
120-12-7	Anthracene	83
206-44-0	Fluoranthene	101
129-00-0	Pyrene	107
56-55-3	Benzo[a]anthracene	97
218-01-9	Chrysene	99
205-99-2	Benzo[b]fluoranthene	97
207-08-9	Benzo[k]fluoranthene	100
50-32-8	Benzo[a]pyrene	70
53-70-3	Dibeno[a,h]anthracene	133
191-24-2	Benzo[g,h,i]perylene	101
193-39-5	Indeno[1,2,3-cd]pyrene	97

	Surrogate	% Recovery
191-07-1	Coronene	84

ND = None Detected

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A Division of Portland General Electric
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OAL

POLYNUCLEAR AROMATIC HYDROCARBONS

by EPA METHOD 8310

Matrix	Method Blank	Review by: KM
Client ID	-	
OAL ID	MB1220P	Date: 01/02/97
Date Sampled	-	
Date Extracted	12/20/96	
Date Analyzed	12/26/96	
% Solids	-	

CAS #	Analyte	Result (ug/kg)	Reporting Limit (ug/kg)
91-20-3	Naphthalene	ND	10
208-96-8	Acenaphthylene	ND	10
83-32-9	Acenaphthene	ND	10
86-73-7	Fluorene	ND	10
85-01-8	Phenanthrene	ND	10
120-12-7	Anthracene	ND	10
206-44-0	Fluoranthene	ND	10
129-00-0	Pyrene	ND	10
56-55-3	Benzo[a]anthracene	ND	5
218-01-9	Chrysene	ND	5
205-99-2	Benzo[b]fluoranthene	ND	5
207-08-9	Benzo[k]fluoranthene	ND	5
50-32-8	Benzo[a]pyrene	ND	5
53-70-3	Dibeno[a,h]anthracene	ND	5
191-24-2	Benzo[g,h,i]perylene	ND	5
193-39-5	Indeno[1,2,3-cd]pyrene	ND	5

	Surrogate	% Recovery
191-07-1	Coronene	76

ND = None Detected
Results reported on a dry weight basis

OREGON ANALYTICAL LABORATORY
A Division of Portland General Electric
14855 S.W. Old Scholls Ferry Road, Beaverton, OR 97007
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Pacific Northwest Laboratories

65 Centennial Loop
Eugene, Oregon 97401
(503) 484-4493
Fax: (503) 484-4188

CHAIN OF CUSTODY RECORD

Client/Company: _____
Project Manager: _____
Project Code: UOPIR1.95H
Collected By: _____

Site Location: _____
Site Address: _____
Billing Address: _____
P.O.No.: _____
Phone No.: _____

Lab Project Number: 6697

Samples Refrigerated (Yes) No
Samples in Proper Containers (Yes) No
RUSH Yes (No)

COMMENTS:

	SAMPLE I.D.	DATE	TIME	MATRIX: SOIL	MATRIX: WATER	MATRIX: OTHER	NUMBER OF CONTAINERS	TPH-HCID OAR/DEQ	TPH-Gasoline OAR/DEQ	TPH-Diesel OAR/DEQ	TPH-418.1 Modified OAR/DEQ	TPH 418.1	Volitile Organics EPA 624/8240/8260	PAHDEQ GC/MS SIM	BTEX EPA 602/8020	Pesticides EPA 608/8080	Flashpoint EPA 1010	Semi-VolatileOrganics EPA 625/8270	Lead 7421	TCLP Metals (3)/(8)/1311	PCB'S 608/8080	pH	PAH 8310			REMARKS
1	UO-B1-H_2O	12/16/96			X		2																X			
2	UO-B3C-H_2O				X		9																X			extra bottles for QC
3	UO-B2-H_2O				X		2																X			
4	UO-SS-B2-5'			X			1																X			
5																										
6																										
7																										
8	FYI:																									
9	More samples																									
10	will be coming																									
11	Monday 12/19/96.																									
12																										
13																										
14																										

RELINQUISHED BY:	COMPANY	DATE / TIME	RECEIVED BY:	COMPANY	DATE / TIME
Clay Bandoff	PNL	12/17/96 4:00pm	Mid Valley Delivery		
RELINQUISHED BY:	COMPANY	DATE / TIME	RECEIVED BY:	COMPANY	DATE / TIME
	Mid Valley Delivery	12-18-96 1137	Brian Lewis	OAL	
RELINQUISHED BY:	COMPANY	DATE / TIME	RECEIVED BY:	COMPANY	DATE / TIME

APPENDIX C

Test Pit Logs

TEST PIT LOG

TEST PIT NO.: TP-1
PROJECT CODE: U001RI
CADD FILE: U001RI.DWG
PROJECT: UNIVERSITY OF OREGON
LOCATION: WEST PARCEL

TOTAL DEPTH: 6'
SURFACE ELEVATION: N/A
EXCAVATE METHOD: Backhoe
EXCAVATED BY: Pacific Northwest Const. & Remediation
LOGGED BY: STEPHEN LAWN
DATE COMPLETED: 3/18/97

DEPTH (feet)	SAMPLE IDENTIFICATION AND LAB RESULTS	H_2O LEVEL	LITHOLOGIC DESCRIPTION	DEPTH (feet) LITHOLOGY	TEST PIT ELEVATION
0			GRAVEL GRAVEL (GM); oiled, odor. GRAVEL (GM) GRAVEL (GM); oiled, odor. SAND (SM); fine. GRAVEL (GM); oiled, odor. CLAY (CL); large cobbles in clay matrix. LOAM (OL); fine sand and loam.	0 5	
5	TP1-6'				
10				10	
15				15	
20				20	
25				25	
30				30	
35				35	
40				40	

LEGEND

NOTES:

NOTE: CLASSIFICATION OF SOILS BASED ON THE UNITED SOILS CLASSIFICATION SYSTEM.

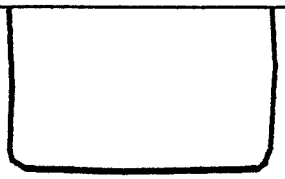
Bergeson-Boese & Associates, Inc.
Environmental Engineering
65 Centennial Loop
Eugene, Oregon 97401
(541) 484-9484

TEST PIT LOG

TEST PIT NO.: TP-2
PROJECT CODE: U001RI.95H
CADD FILE: U001RI.DWG
PROJECT: UNIVERSITY OF OREGON
LOCATION: WEST PARCEL

TOTAL DEPTH: 6'
SURFACE ELEVATION: N/A
EXCAVATE METHOD: Backhoe
EXCAVATED BY: Pacific Northwest Const. & Remediation
LOGGED BY: STEPHEN LAWN
DATE COMPLETED: 3/17/97

DEPTH (feet)	SAMPLE IDENTIFICATION AND LAB RESULTS	H_2O LEVEL	LITHOLOGIC DESCRIPTION	DEPTH (feet) LITHOLOGY	TEST PIT ELEVATION
0			GRAVEL (GM); fill.		
			SAND (SM); black, cobbles, wood.		
5			SAND (SM); white ash.		
			SAND (SM); fine, brown.		
10					
15					
20					
25					
30					
35					
40					



LEGEND

NOTES:

Bergeson–Boese & Associates, Inc.
Environmental Engineering
65 Centennial Loop
Eugene, Oregon 97401
(541) 484–9484

NOTE: CLASSIFICATION OF SOILS BASED ON THE UNITED SOILS CLASSIFICATION SYSTEM.

TEST PIT LOG

TEST PIT NO.: TP-3
PROJECT CODE: U001RI.95H
CADD FILE: U001RI.DWG
PROJECT: UNIVERSITY OF OREGON
LOCATION: WEST PARCEL

TOTAL DEPTH: 6'
SURFACE ELEVATION: N/A
EXCAVATE METHOD: Backhoe
EXCAVATED BY: Pacific Northwest Const. & Remediation
LOGGED BY: STEPHEN LAWN
DATE COMPLETED: 3/17/97

DEPTH (feet)	SAMPLE IDENTIFICATION AND LAB RESULTS	H_2O LEVEL	LITHOLOGIC DESCRIPTION	DEPTH (feet) LITHOLOGY		TEST PIT ELEVATION
0			SAND (SM); gray, rock hard.		0	
5			SAND (SM); brown.		5	
10					10	
15					15	
20					20	
25					25	
30					30	
35					35	
40					40	

LEGEND

NOTES:

NOTE: CLASSIFICATION OF SOILS BASED ON THE UNITED SOILS CLASSIFICATION SYSTEM.

Bergeson–Boese & Associates, Inc.
Environmental Engineering
65 Centennial Loop
Eugene, Oregon 97401
(541) 484–9484

APPENDIX D

Test Pit Laboratory Reports and Chain-of-Custody Records

Pacific Northwest Laboratories
Environmental Analysis

65 Centennial Loop
Eugene, Oregon 97401

(503) 484-4493
Fax: (503) 484-4188

April 3, 1997

University of Oregon
Office of Public Safety
ATTN: Kay Coots
1319 E. 15th Avenue
Eugene, OR 97403

RE: PNL Report Number: 6972
Client Project No.: UO01RI.95H

Please find enclosed the report prepared for the laboratory analyses you requested.

The samples were received under a chain-of-custody. Soil samples are analyzed on an "as received" basis unless otherwise indicated.

Please contact us at the above address or phone number to obtain additional sample containers and coolers.

Thank you for selecting Pacific Northwest Laboratories for your analytical needs. We look forward to serving you in the future.

Sincerely,

Pacific Northwest Laboratories

Craig Biersdorff

Craig Biersdorff, Laboratory Director

Enclosure

Pacific Northwest Laboratories
65 Centennial Loop
Eugene, Oregon 97401
(541) 484-4493 Fax: 484-4188

LABORATORY REPORT

PNL REPORT NUMBER:	6972
CLIENT:	University of Oregon
CLIENT PROJECT NUMBER:	UO01RI.95H
SITE LOCATION:	Western Parcel, University of Oregon Eugene, OR
ITEMS ANALYZED:	5 soil
DATE SAMPLES COLLECTED:	March 18, 1997
DATE ANALYSIS COMPLETED:	April 3, 1997

METHOD: TPH per Oregon DEQ 418.1 Modified
Results and Method Reporting Limits (MRL) presented in mg/kg (ppm)
ND = Compound not detected

SAMPLE I.D.	RESULT	MRL
UO-RI-TP1-6'	ND	20
UO-RI-TP2-4.5'	100	
UO-RI-TP2-5'	ND	20
UO-RI-TP2-6'	ND	20
UO-RI-TP3-5.5'	ND	20
LAB BLANK	ND	20

METHOD: TCLP 8 Metals per EPA 1311
Results and Method Reporting Limits (MRL) presented in mg/L (ppm)
ND = Compound not detected

		UO-RI-TP2-5'		LAB BLANK	
ANALYTE	METHOD	RESULT	MRL	RESULT	MRL
Arsenic	7061	ND	0.05	ND	0.005
Barium	7081	ND	1.0	ND	0.1
Cadmium	7130	ND	0.1	ND	0.1
Chromium	7190	ND	0.5	ND	0.5
Lead	7420	ND	0.5	ND	0.5
Mercury	7470	ND	0.001	ND	0.001
Selenium	7741	ND	0.05	ND	0.002
Silver	7760	0.13		ND	0.05

Pacific Northwest Laboratories

65 Centennial Loop
Eugene, Oregon 97401
(503) 484-4493
Fax: (503) 484-4188

CHAIN OF CUSTODY RECORD

Client/Company: Bergeson-Boese & Assoc.
Project Manager: Stephen Lawn
Project Code: U0#R1, 95H
Collected By: Stephen Lawn

Site Location: Western Parcel
Site Address: University of Oregon
Billing Address:
P.O.No.:
Phone No.:

Lab Project Number: 6972

Samples Refrigerated (Yes) No
Samples in Proper Containers (Yes) No
RUSH Yes (No)

COMMENTS:

	SAMPLE I.D.	DATE	TIME	MATRIX: SOIL	MATRIX: WATER	MATRIX: OTHER	NUMBER OF CONTAINERS	TPH-HCID OAR/DEQ	TPH-Gasoline OAR/DEQ	TPH-Diesel OAR/DEQ	TPH-418.1 Modified OAR/DEQ	TPH 418.1	Volitile Organics EPA 624/8240/8260	PAH DEQ GC/MS SIM	BTEX EPA 602/8020	Pesticides EPA 608/8080	Flashpoint EPA 1010	Semi-VolatileOrganics EPA 625/8270	Lead 7421	TCLP Metals (3)(6)/1311	PCBS 608/8080	pH				REMARKS
1	U0-R1-TP1-6'	3-18-97		X			1				X															
2	U0-R1-TP2-4.5'	3-18-97		X			1				X															
3	U0-R1-TP2-5'	3-18-97		X			1				X									X						HOLD —
4	U0-R1-TP2-6'	3-18-97		X			1				X															Rm 3-19-97
5	U0-R1-TP3-5.5'	3-19-97		X			1				X															
6																										
7																										
8																										
9																										
10																										
11																										
12																										
13																										
14																										

ANALYSES TO BE PERFORMED

RELINQUISHED BY:	COMPANY	DATE / TIME	RECEIVED BY:	COMPANY	DATE / TIME
	BB&A	3-18-97 1501	Gary Burdoff	PNL	3/19/97 1501
RELINQUISHED BY:	COMPANY	DATE / TIME	RECEIVED BY:	COMPANY	DATE / TIME
RELINQUISHED BY:	COMPANY	DATE / TIME	RECEIVED BY:	COMPANY	DATE / TIME

Pacific Northwest Laboratories
Environmental Analysis

65 Centennial Loop
Eugene, Oregon 97401

(503) 484-4493
Fax: (503) 484-4188

June 13, 1997

University of Oregon
Office of Public Safety
ATTN: Kay Coots
1319 E. 15th Avenue
Eugene, OR 97403

RE: PNL Report Number: 7247
Client Project No.: UO01RI.95H

Please find enclosed the report prepared for the laboratory analyses you requested.

The samples were received under a chain-of-custody. Soil samples are analyzed on an "as received" basis unless otherwise indicated.

Please contact us at the above address or phone number to obtain additional sample containers and coolers.

Thank you for selecting Pacific Northwest Laboratories for your analytical needs. We look forward to serving you in the future.

Sincerely,

Pacific Northwest Laboratories

Craig Biersdorff

Craig Biersdorff, Laboratory Director

Enclosure

Pacific Northwest Laboratories
65 Centennial Loop
Eugene, Oregon 97401
(541) 484-4493 Fax: 484-4188

LABORATORY REPORT

PNL REPORT NUMBER:	7247
CLIENT:	University of Oregon
CLIENT PROJECT NUMBER:	UO01RI.95H
SITE LOCATION:	Western Parcel, University of Oregon Eugene, OR
ITEMS ANALYZED:	2 soil
DATE SAMPLES COLLECTED:	June 5, 1997
DATE ANALYSIS COMPLETED:	June 12, 1997
DATE SAMPLES DISCARDED:	June 19, 1997

METHOD: TPH-HCID per Oregon DEQ
Method Reporting Limits (MRL) presented in mg/kg (ppm)
ND = Compound not detected
NA = Not Applicable

SAMPLE I.D.	GASOLINE	DIESEL	BUNKER/ RELATED
UO-WP-TP5-2'	DETECTED**	ND	DETECTED
LAB BLANK	ND	ND	ND
MRL	20	50	NA

Surrogate Recoveries (o-Terphenyl)

SAMPLE ID	Percent	Acceptance Limits
UO-WP-TP5-2'	*	50-150
LAB BLANK	101	

* Unable to calculate Surrogate Recovery due to matrix interference.
** Hydrocarbons detected in the gasoline hydrocarbon range are not typical of gasoline.

PNL REPORT NUMBER: 7247

METHOD: TPH-G per Oregon DEQ
Results and Method Reporting Limits (MRL) presented in mg/kg (ppm)
ND = Compound not detected

SAMPLE I.D.	RESULT	MRL
UO-WP-TP5-2'	ND	20***
UO-WP-TP5-4.5'	ND	10
LAB BLANK	ND	10

Surrogate Recoveries
(4-Bromofluorobenzene)

SAMPLE ID	Percent	Acceptance Limits
UO-WP-TP5-2'	56	50-150
UO-WP-TP5-4.5'	72	
LAB BLANK	106	

*** MRL raised due to matrix interference.

METHOD: TPH per Oregon DEQ 418.1 Modified
Results and Method Reporting Limits (MRL) presented in mg/kg (ppm)
ND = Compound not detected

SAMPLE I.D.	RESULT	MRL
UO-WP-TP5-2'	1,000	
UO-WP-TP5-4.5'	26	
LAB BLANK	ND	20

METHOD: TCLP Metals per EPA 1311
Results and Method Reporting Limits (MRL) presented in mg/L (ppm)
ND = Compound not detected

		UO-WP-TP5-2'		LAB BLANK	
ANALYTE	METHOD	RESULT	MRL	RESULT	MRL
Arsenic	7061	ND	0.005	ND	0.005
Cadmium	7130	ND	0.1	ND	0.1
Chromium	7190	ND	0.5	ND	0.5
Lead	7420	ND	0.5	ND	0.5

PNL REPORT NUMBER: 7247

METHOD: PCB's per EPA 8080
Results and Method Reporting Limits (MRL) presented in mg/kg (ppm)
ND = Compound not detected

	UO-WP-TP5-2'		LAB BLANK	
COMPOUND	RESULT	MRL	RESULT	MRL
PCB-1016	ND	2.5	ND	2.5
PCB-1221	ND	2.5	ND	2.5
PCB-1232	ND	2.5	ND	2.5
PCB-1242	ND	2.5	ND	2.5
PCB-1248	ND	2.5	ND	2.5
PCB-1254	ND	2.5	ND	2.5
PCB-1260	ND	2.5	ND	2.5

Surrogate Recoveries
(Tetrachloro-m-xylene)

SAMPLE ID	Percent	Acceptance Limits
UO-WP-TP5-2'	112	57-141
LAB BLANK	91	

PNL REPORT NUMBER: 7247

METHOD: PAH Analysis per OR-DEQ GCMS-SIM
Results and Method Reporting Limits (MRL) presented in ug/kg (ppb)
ND = Compound not detected

Analysis completed: 6/6/97

COMPOUND	UO-WP-TP5-2' RESULT	MRL	UO-WP-TP5-4.5' RESULT	MRL	METHOD BLANK RESULT	MRL
Naphthalene	2000		ND	67	ND	67
Acenaphthylene	7000		ND	67	ND	67
Acenaphthene	ND	200	ND	67	ND	67
Fluorene	300		ND	67	ND	67
Phenanthrene	940		ND	67	ND	67
Anthracene	980		ND	67	ND	67
Fluoranthene	2800		ND	67	ND	67
Pyrene	3300		ND	67	ND	67
Benzo(a)anthracene	2900		73		ND	67
Chrysene	5200		80		ND	67
Benzo(b)fluoranthene	14000		130		ND	67
Benzo(k)fluoranthene	7400		73		ND	67
Benzo(a)pyrene	10000		160		ND	67
Indeno(1,2,3-cd)pyrene	17000		130		ND	67
Dibenz(a,h)anthracene	4100		ND	67	ND	67
Benzo(g,h,i)perylene	25000		210		ND	67

Surrogate Recoveries (percent)

	NBZ	FBP	TPH
METHOD BLANK	71	86	85
UO-WP-TP5-2'	89	91	82
UO-WP-TP5-4.5'	63	71	72

		QC Limits
NBZ	= Nitrobenzene-d5	23-120
FBP	= 2-Flurobiphenyl	30-115
TPH	= Terphenyl-d14	18-137

PNL REPORT NUMBER: 7247 Analysis completed: 6/12/97

METHOD: Volatile Organic Compounds per EPA 8240
Results and Method Reporting Limits (MRL) presented in ug/kg (ppb)
ND = Compound not detected

COMPOUND	UO-WP-TP5-2' RESULT	UO-WP-TP5-2' MRL	METHOD BLANK RESULT	METHOD BLANK MRL
Chloromethane	ND	20	ND	10
Bromomethane	ND	20	ND	10
Vinyl Chloride	ND	20	ND	10
Chloroethane	ND	20	ND	10
Dichlorodifluoromethane	ND	20	ND	10
Trichlorofluoromethane	ND	20	ND	10
Methylene Chloride	47		ND	10
Acetone	ND	20	ND	10
Carbon disulfide	ND	10	ND	5
1,1-Dichloroethene	ND	10	ND	5
1,1-Dichloroethane	ND	10	ND	5
trans-1,2-Dichloroethene	ND	10	ND	5
cis-1,2-Dichloroethene	ND	10	ND	5
Chloroform	ND	10	ND	5
1,2-Dibromoethane	ND	10	ND	5
1,2-Dichloroethane	ND	10	ND	5
2-Butanone	ND	20	ND	10
1,1,1-Trichloroethane	ND	10	ND	5
Carbon Tetrachloride	ND	10	ND	5
Bromodichloromethane	ND	10	ND	5
1,2-Dichloropropane	ND	10	ND	5
cis-1,3-Dichloropropene	ND	10	ND	5
Trichloroethene	ND	10	ND	5
Dibromochloromethane	ND	10	ND	5
1,1,2-Trichloroethane	ND	10	ND	5
Benzene	ND	10	ND	5
trans-1,3-Dichloropropene	ND	10	ND	5
Bromoform	ND	10	ND	5
4-Methyl-2-pentanone	ND	20	ND	10
2-Hexanone	ND	20	ND	10
Tetrachloroethene	29		ND	5
1,1,2,2-Tetrachloroethane	ND	10	ND	5
Toluene	ND	10	ND	5
Chlorobenzene	ND	10	ND	5
Ethylbenzene	ND	10	ND	5
Xylenes (total)	11		ND	5
Styrene	ND	10	ND	5
1,3-Dichlorobenzene	ND	10	ND	5
1,4-Dichlorobenzene	ND	10	ND	5
1,2-Dichlorobenzene	ND	10	ND	5

PNL REPORT NUMBER: 7247

QUALITY CONTROL REPORT
Method 8240 - Soil Analysis

Surrogate Recoveries (percent)

	DBFM	TOL	BFB	
METHOD BLANK	102	101	88	
UO-WP-TP5-2'	115	97	61	*
UO-WP-TP5-2' RE	102	97	64	*

			QC Limits
DBFM	=	Dibromofluoromethane	70-121
TOL	=	Toluene-d8	81-117
BFB	=	4-Bromofluorobenzene	74-121

* - Surrogate recoveries outside QC limits due to sample matrix interference.

Pacific Northwest Laboratories

65 Centennial Loop
Eugene, Oregon 97401
(503) 484-4493
Fax: (503) 484-4188

CHAIN OF CUSTODY RECORD

Client/Company: Bergeson-Brose & Assoc. Inc
Project Manager: Stephen Lawn
Project Code: UO01R1.95H
Collected By: Stephen Lawn

Site Location: UofO - Western Parcel
Site Address:
Billing Address:
P.O.No.:
Phone No.:

Lab Project Number: 7247

Samples Refrigerated Yes No
Samples in Proper Containers Yes No
RUSH Yes No

COMMENTS:

	SAMPLE I.D.	DATE	TIME	MATRIX: SOIL	MATRIX: WATER	MATRIX: OTHER	NUMBER OF CONTAINERS	TPH-HCID OAR/DEQ	TPH-Gasoline OAR/DEQ	TPH-Diesel OAR/DEQ	TPH-418.1 Modified OAR/DEQ	TPH 418.1	Volatile Organics EPA 624/8240/8260	PAH DEQ GC/MS SIM	BTEX EPA 602/8020	Pesticides EPA 608/8080	Flashpoint EPA 1010	Semi-Volatile Organics EPA 625/8270	Lead 7421	TCLP Metals (3)/(4)/1311	PCB'S 608/8080	pH	TCLP Arsenic			REMARKS
1	UO-WP TP4-	6-5		X			1																			HOLD
2	UO-WP-TP-4-4.5	6-5		X			1																			HOLD
3	UO-WP-TP5-2'	6-5		X			1	X	X		X		X	X						X	X		X			Quantify TPH
4	UO-WP-TP5-4.5	6-5		X			1		X		X			X												
5																										
6																										Perform
7																										W.O. characterization
8																										on TP5-2'
9																										
10																										
11																										
12																										
13																										
14																										

RELINQUISHED BY:	COMPANY	DATE / TIME	RECEIVED BY:	COMPANY	DATE / TIME
	BB&A	6-5-97 1740	Gary Burdyk	PNL	6/6/97 0800
RELINQUISHED BY:	COMPANY	DATE / TIME	RECEIVED BY:	COMPANY	DATE / TIME
RELINQUISHED BY:	COMPANY	DATE / TIME	RECEIVED BY:	COMPANY	DATE / TIME

APPENDIX E

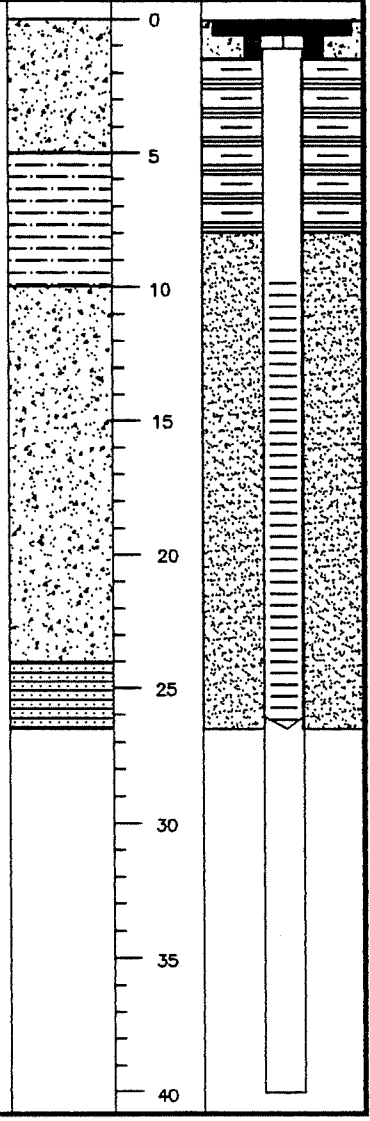
Monitoring Well Completion Logs

MONITORING WELL COMPLETION LOG

WELL IDENTIFICATION: MW-1
START CARD NO.: W94740
PROJECT CODE: U001RI.95H
CADD FILE: U001RI-L.DWG
PROJECT: RIVERFRONT RESEARCH PARK
LOCATION: WESTERN PARCEL
EUGENE, OREGON

TOTAL DEPTH: 26.5'
SURFACE ELEVATION: N/A
DRILLING METHOD: 6" AIR ROTARY
DRILLED BY: JONES DRILLING
LOGGED BY: STEPHEN LAWN
DATE COMPLETED: 9/17/97

DEPTH (feet)	SAMPLE IDENTIFICATION AND LAB RESULTS	PID HEAD SPACE	STANDARD PENETRATION (n)	H_2O LEVEL	LITHOLOGIC DESCRIPTION
0					GRAVEL (GM); fill.
5					CLAY (CL); silty, brown.
10					GRAVEL (GM); sandy. Gravels are well rounded. Sand is medium to fine grained.
15				WD	
20					
25					BEDROCK; weathered, orange-brown.
30					
35					
40					



LEGEND

WD Water Level in borehole during drilling (i.e. first encountered)

WELL DESIGN
SCREEN/RISER: 2" Flush-Threaded Sch. 40 PVC
SCREEN SIZE: 0.020" Slotted Screen
FILTER PACK: 10-20 CSSI Sand
SEAL: 3/8" Holeplug Bentonite
COMPLETION: Flush Mounted Vault
NOTES:

NOTE: CLASSIFICATION OF SOILS BASED ON THE UNIFIED SOILS CLASSIFICATION SYSTEM.

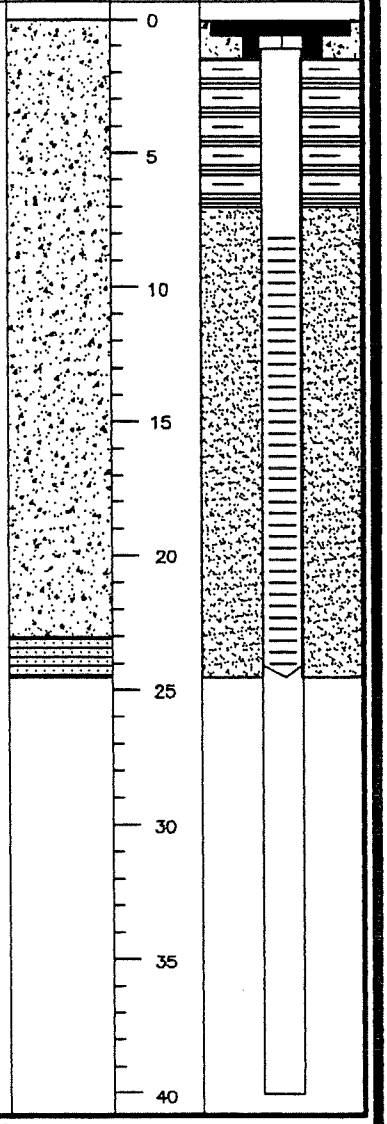
Bergeson-Boese & Associates
Environmental Engineering
65 Centennial Loop
Eugene, Oregon 97401
(541) 484-9484

MONITORING WELL COMPLETION LOG

WELL IDENTIFICATION: MW-2
START CARD NO.: W94741
PROJECT CODE: U001RI.95H
CADD FILE: U001RI-L.DWG
PROJECT: RIVERFRONT RESEARCH PARK
LOCATION: WESTERN PARCEL
EUGENE, OREGON

TOTAL DEPTH: 24.5'
SURFACE ELEVATION: N/A
DRILLING METHOD: 6" AIR ROTARY
DRILLED BY: JONES DRILLING
LOGGED BY: STEPHEN LAWN
DATE COMPLETED: 9/17/97

DEPTH (feet)	SAMPLE IDENTIFICATION AND LAB RESULTS	PID HEAD SPACE	STANDARD PENETRATION (n)	H_2O LEVEL	LITHOLOGIC DESCRIPTION
0					GRAVEL (GM); rounded, some sand.
5					Small pieces of wire in cuttings.
10					Well rounded gravels with some medium to fine grained sand.
15				WD	
20					BEDROCK; weathered, orange-brown.
25					
30					
35					
40					



LEGEND

WD Water Level in borehole during drilling (i.e. first encountered)

WELL DESIGN
SCREEN/RISER: 2" Flush-Threaded Sch. 40 PVC
SCREEN SIZE: 0.020" Slotted Screen
FILTER PACK: 10-20 CSSI Sand
SEAL: 3/8" Holeplug Bentonite
COMPLETION: Flush Mounted Vault
NOTES:

NOTE: CLASSIFICATION OF SOILS BASED ON THE UNIFIED SOILS CLASSIFICATION SYSTEM.

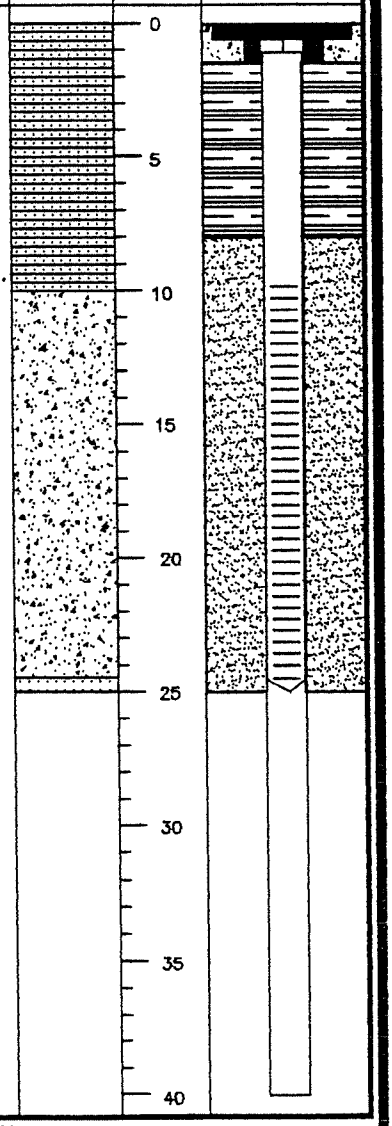
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Environmental Engineering
65 Centennial Loop
Eugene, Oregon 97401
(541) 484-9484

MONITORING WELL COMPLETION LOG

WELL IDENTIFICATION: MW-3
START CARD NO.: W94742
PROJECT CODE: U001RI.95H
CADD FILE: U001RI-L.DWG
PROJECT: RIVERFRONT RESEARCH PARK
LOCATION: WESTERN PARCEL
EUGENE, OREGON

TOTAL DEPTH: 25'
SURFACE ELEVATION: N/A
DRILLING METHOD: 6" AIR ROTARY
DRILLED BY: JONES DRILLING
LOGGED BY: STEPHEN LAWN
DATE COMPLETED: 9/18/97

DEPTH (feet)	SAMPLE IDENTIFICATION AND LAB RESULTS	PID HEAD SPACE	STANDARD PENETRATION (n)	H_2O LEVEL	LITHOLOGIC DESCRIPTION
0					FILL; Eugene formation sandstone, orange-brown.
5					
10					Trace wood. GRAVEL (GM); sub-angular to rounded, sandy.
15				WD ▼	
20					Trace wood.
25					BEDROCK; weathered, orange-brown.
30					
35					
40					



LEGEND

WD Water Level in borehole during drilling (i.e. first encountered)

WELL DESIGN
SCREEN/RISER: 2" Flush-Threaded Sch. 40 PVC
SCREEN SIZE: 0.020" Slotted Screen
FILTER PACK: 10-20 CSSI Sand
SEAL: 3/8" Holeplug Bentonite
COMPLETION: Flush Mounted Vault
NOTES:

NOTE: CLASSIFICATION OF SOILS BASED ON THE UNIFIED SOILS CLASSIFICATION SYSTEM.

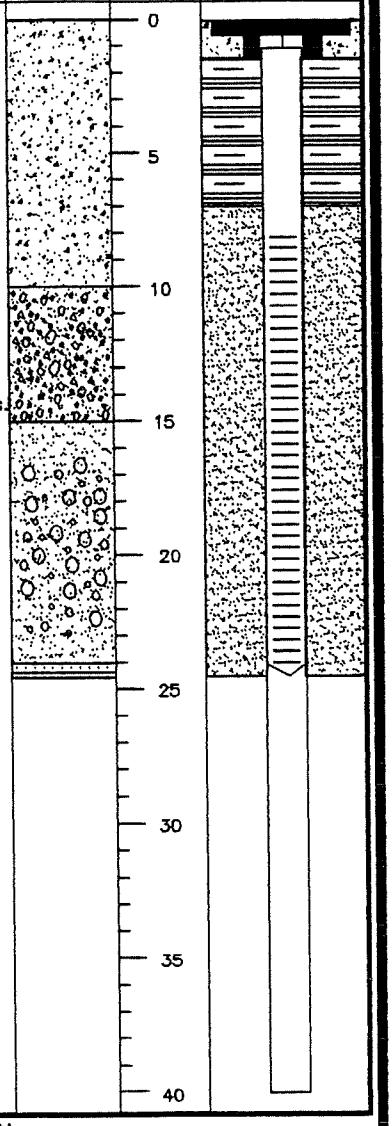
Bergeson-Boese & Associates
Environmental Engineering
65 Centennial Loop
Eugene, Oregon 97401
(541) 484-9484

MONITORING WELL COMPLETION LOG

WELL IDENTIFICATION: MW-4
START CARD NO.: W94743
PROJECT CODE: U001RI.95H
CADD FILE: U001RI-L.DWG
PROJECT: RIVERFRONT RESEARCH PARK
LOCATION: WESTERN PARCEL
EUGENE, OREGON

TOTAL DEPTH: 24.5'
SURFACE ELEVATION: N/A
DRILLING METHOD: 6" AIR ROTARY
DRILLED BY: JONES DRILLING
LOGGED BY: STEPHEN LAWN
DATE COMPLETED: 9/17/97

DEPTH (feet)	SAMPLE IDENTIFICATION AND LAB RESULTS	PID HEAD SPACE	STANDARD PENETRATION (n)	H_2O LEVEL	LITHOLOGIC DESCRIPTION
0					GRAVEL (GM); fill, crushed rock, with silty clay.
5					
10					GRAVEL (GM); well rounded, with some sand.
15				WD	GRAVEL (GM); sandy, with large round cobbles.
20					
25					BEDROCK; weathered, orange-brown.
30					
35					
40					



LEGEND

WD Water Level in borehole during drilling (i.e. first encountered)

WELL DESIGN
SCREEN/RISER: 2" Flush-Threaded Sch. 40 PVC
SCREEN SIZE: 0.020" Slotted Screen
FILTER PACK: 10-20 CSSI Sand
SEAL: 3/8" Holeplug Bentonite
COMPLETION: Flush Mounted Vault
NOTES:

NOTE: CLASSIFICATION OF SOILS BASED ON THE UNIFIED SOILS CLASSIFICATION SYSTEM.

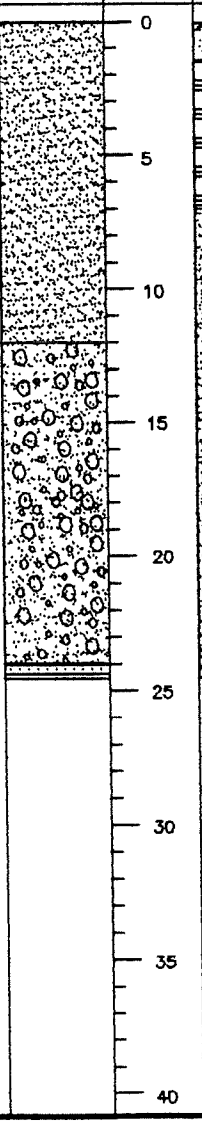
Bergeson-Boese & Associates
Environmental Engineering
65 Centennial Loop
Eugene, Oregon 97401
(541) 484-9484

MONITORING WELL COMPLETION LOG

WELL IDENTIFICATION: MW-5
START CARD NO.: W94744
PROJECT CODE: U001RI.95H
CADD FILE: U001RI-L.DWG
PROJECT: RIVERFRONT RESEARCH PARK
LOCATION: WESTERN PARCEL
EUGENE, OREGON

TOTAL DEPTH: 24'
SURFACE ELEVATION: N/A
DRILLING METHOD: 6" AIR ROTARY
DRILLED BY: JONES DRILLING
LOGGED BY: STEPHEN LAWN
DATE COMPLETED: 9/18/97

DEPTH (feet)	SAMPLE IDENTIFICATION AND LAB RESULTS	PID HEAD SPACE	STANDARD PENETRATION (n)	H_2O LEVEL	LITHOLOGIC DESCRIPTION
0					SAND (SM); brown, medium grained.
5					
10					GRAVEL (GM); sandy, with cobbles. Hydrocarbon odor.
15				WD	
20					Sheen on water.
25					BEDROCK; blue gray sandstone.
30					
35					
40					



LEGEND

WD Water Level in borehole during drilling (i.e. first encountered)

WELL DESIGN
SCREEN/RISER: 2" Flush-Threaded Sch. 40 PVC
SCREEN SIZE: 0.020" Slotted Screen
FILTER PACK: 10-20 CSSI Sand
SEAL: 3/8" Holeplug Bentonite
COMPLETION: Flush Mounted Vault
NOTES:

Bergeson-Boese & Associates
Environmental Engineering
65 Centennial Loop
Eugene, Oregon 97401
(541) 484-9484

NOTE: CLASSIFICATION OF SOILS BASED ON THE UNIFIED SOILS CLASSIFICATION SYSTEM.

APPENDIX F

Monitoring Well Sampling Laboratory Reports and Chain-of-Custody Records

Pacific Northwest Laboratories
Environmental Analysis

65 Centennial Loop
Eugene, Oregon 97401

(503) 484-4493
Fax: (503) 484-4188

October 14, 1997

University of Oregon
ATTN: Kay Coots
Office of Environmental Health & Safety
5224 University of Oregon
Eugene, OR 97403-5224

RE: PNL Report Number: 7636
Client Project No.: UO01RI.95H

Please find enclosed the report prepared for the laboratory analyses you requested.

The samples were received under a chain-of-custody. Soil samples are analyzed on an "as received" basis unless otherwise indicated.

Please contact us at the above address or phone number to obtain additional sample containers and coolers.

Thank you for selecting Pacific Northwest Laboratories for your analytical needs. We look forward to serving you in the future.

Sincerely,

Pacific Northwest Laboratories

Craig Biersdorff

Craig Biersdorff, Laboratory Director

Enclosure

Pacific Northwest Laboratories
65 Centennial Loop
Eugene, Oregon 97401
(541) 484-4493 Fax: 484-4188

LABORATORY REPORT

PNL REPORT NUMBER:	7636
CLIENT:	University of Oregon
CLIENT PROJECT NUMBER:	UO01RI.95H
SITE LOCATION:	Western Parcel, University of Oregon Eugene, OR
ITEMS ANALYZED:	8 water
DATE SAMPLES COLLECTED:	September 30, 1997
DATE ANALYSIS COMPLETED:	October 13, 1997
DATE SAMPLES DISCARDED:	October 14, 1997

METHOD: BTEX per EPA 8020
Results and Method Reporting Limits (MRL) presented in ug/L (ppb)
ND = Compound not detected

	997-UO-001		997-UO-002		997-UO-003	
COMPOUND	RESULT	MRL	RESULT	MRL	RESULT	MRL
Benzene	ND	1.0	ND	1.0	ND	1.0
Toluene	ND	1.0	ND	1.0	ND	1.0
Ethylbenzene	ND	1.0	ND	1.0	ND	1.0
Xylenes	ND	1.0	ND	1.0	ND	1.0

	997-UO-004		997-UO-005		997-UO-006	
COMPOUND	RESULT	MRL	RESULT	MRL	RESULT	MRL
Benzene	4.6		4.2		9.7	
Toluene	22		21		2.4	
Ethylbenzene	280		260		450	
Xylenes	350		310		44	

(continued on next page)

PNL REPORT NUMBER: 7636

METHOD: BTEX per EPA 8020
Results and Method Reporting Limits (MRL) presented in ug/L (ppb)
ND = Compound not detected

COMPOUND	997-UO-007 RESULT	997-UO-007 MRL	997-UO-008 RESULT	997-UO-008 MRL	LAB BLANK RESULT	LAB BLANK MRL
Benzene	ND	1.0	ND	1.0	ND	1.0
Toluene	ND	1.0	ND	1.0	ND	1.0
Ethylbenzene	ND	1.0	ND	1.0	ND	1.0
Xylenes	ND	1.0	ND	1.0	ND	1.0

Surrogate Recoveries
(4-Bromofluorobenzene)

SAMPLE ID	Percent	Acceptance Limits
997-UO-001	94	71-121
997-UO-002	98	
997-UO-003	97	
997-UO-004	*	
997-UO-005	*	
997-UO-006	*	
997-UO-007	94	
997-UO-008	95	
LAB BLANK	110	

* Unable to calculate Surrogate Recovery due to matrix interference.

OAL

L3688

Sample Summary

Sample ID	Lab #	Matrix	Sampled	Received
997-UO-001	L3688-1	water	09/30/97 16:42	10/02/97
997-UO-002	L3688-2	water	09/30/97 16:42	10/02/97
997-UO-003	L3688-3	water	09/30/97 16:42	10/02/97
997-UO-004	L3688-4	water	09/30/97 16:42	10/02/97
997-UO-005	L3688-5	water	09/30/97 16:42	10/02/97
997-UO-006	L3688-6	water	09/30/97 16:42	10/02/97
997-UO-007	L3688-7	water	09/30/97 16:42	10/02/97

Definition of Terms

D	Reported value is based on a dilution.
MI	Matrix interference.
ND	Analytical result was below the reporting limit.

OREGON ANALYTICAL LABORATORY
A Division of Portland General Electric
14855 S.W. Old Scholls Ferry Road, Beaverton, OR 97007
Phone 503 590 5300 • Fax 503 590 1404

Printed on recycled paper

OAL

L3688

Project: *U001 R1.95H*

Client: *Pacific Northwest Laboratory*
Contact: *Stephen Lawn*

Polynuclear Aromatic Hydrocarbons (PNA)

by EPA 8310

Sample ID / Analyte	Matrix	Result	Reporting Limit	Units (ppb)	Comment	Lab Number
					Sampled: *09/30/97* Extracted: *10/06/97* Analyzed: *10/21/97*	
997-UO-001	*Water*					*L3688-1*
Acenaphthene		ND	0.25	µg/L		
Acenaphthylene		ND	0.25	µg/L		
Anthracene		ND	0.25	µg/L		
Benzo[a]anthracene		ND	0.10	µg/L		
Benzo[a]pyrene		ND	0.10	µg/L		
Benzo[b]fluoranthene		ND	0.10	µg/L		
Benzo[g,h,i]perylene		ND	0.10	µg/L		
Benzo[k]fluoranthene		ND	0.10	µg/L		
Chrysene		ND	0.10	µg/L		
Dibenz[a,h]anthracene		ND	0.10	µg/L		
Fluoranthene		ND	0.25	µg/L		
Fluorene		ND	0.25	µg/L		
Indeno[1,2,3-cd]pyrene		ND	0.10	µg/L		
Naphthalene		ND	0.25	µg/L		
Phenanthrene		ND	0.25	µg/L		
Pyrene		ND	0.25	µg/L		

Surrogate	Recovery	Limit
Coronene	67.%	50. - 150.

OREGON ANALYTICAL LABORATORY
A Division of Portland General Electric
14855 S.W. Old Scholls Ferry Road, Beaverton, OR 97007
Phone 503-590-5300 • Fax 503-590-1404

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OAL

L3688

Project: *U001 R1.95H*

Client: *Pacific Northwest Laboratory*
Contact: *Stephen Lawn*

Polynuclear Aromatic Hydrocarbons (PNA)

by EPA 8310

Sample ID / Analyte	Matrix	Result	Reporting Limit	Units (ppb)	Comment	Lab Number
					Sampled: *09/30/97* Extracted: *10/06/97* Analyzed: *10/21/97*	
997-UO-002	*Water*					*L3688-2*
Acenaphthene		ND	0.25	µg/L		
Acenaphthylene		ND	0.25	µg/L		
Anthracene		ND	0.25	µg/L		
Benzo[a]anthracene		ND	0.10	µg/L		
Benzo[a]pyrene		ND	0.10	µg/L		
Benzo[b]fluoranthene		ND	0.10	µg/L		
Benzo[g,h,i]perylene		ND	0.10	µg/L		
Benzo[k]fluoranthene		ND	0.10	µg/L		
Chrysene		ND	0.10	µg/L		
Dibenz[a,h]anthracene		ND	0.10	µg/L		
Fluoranthene		ND	0.25	µg/L		
Fluorene		ND	0.25	µg/L		
Indeno[1,2,3-cd]pyrene		ND	0.10	µg/L		
Naphthalene		ND	0.25	µg/L		
Phenanthrene		ND	0.25	µg/L		
Pyrene		ND	0.25	µg/L		
Surrogate					Recovery	Limit
Coronene					65.%	50. - 150.

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Client: *Pacific Northwest Laboratory*
Contact: *Stephen Lawn*

Project: *U001 R1.95H*

Polynuclear Aromatic Hydrocarbons (PNA)

by EPA 8310

Sample ID / Analyte	Matrix / Result	Reporting Limit	Units (ppb)	Comment	Lab Number
				Sampled: *09/30/97* Extracted: *10/06/97* Analyzed: *10/21/97*	
997-UO-003	*Water*				*L3688-3*
Acenaphthene	ND	0.25	µg/L		
Acenaphthylene	ND	0.25	µg/L		
Anthracene	ND	0.25	µg/L		
Benzo[a]anthracene	ND	0.10	µg/L		
Benzo[a]pyrene	ND	0.10	µg/L		
Benzo[b]fluoranthene	ND	0.10	µg/L		
Benzo[g,h,i]perylene	ND	0.10	µg/L		
Benzo[k]fluoranthene	ND	0.10	µg/L		
Chrysene	ND	0.10	µg/L		
Dibenz[a,h]anthracene	ND	0.10	µg/L		
Fluoranthene	ND	0.25	µg/L		
Fluorene	ND	0.25	µg/L		
Indeno[1,2,3-cd]pyrene	ND	0.10	µg/L		
Naphthalene	ND	0.25	µg/L		
Phenanthrene	ND	0.25	µg/L		
Pyrene	ND	0.25	µg/L		
Surrogate: Coronene				Recovery: 62.%	Limit: 50. - 150.

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Client: *Pacific Northwest Laboratory*
Contact: *Stephen Lawn*

Project: *U001 R1.95H*

Polynuclear Aromatic Hydrocarbons (PNA)

by EPA 8310

Sample ID / Analyte	*Matrix* / Result	Reporting Limit	Units (ppb)	Comment	*Lab Number*
997-UO-004	*Water*			**Sampled:** *09/30/97* **Extracted:** *10/06/97* **Analyzed:** *10/23/97*	*L3688-4*
Acenaphthene	ND	2.0	µg/L	D	
Acenaphthylene	ND	2.0	µg/L	D	
Anthracene	ND	2.0	µg/L	D	
Benzo[a]anthracene	ND	1.0	µg/L	D	
Benzo[a]pyrene	ND	1.0	µg/L	D	
Benzo[b]fluoranthene	ND	1.0	µg/L	D	
Benzo[g,h,i]perylene	ND	1.0	µg/L	D	
Benzo[k]fluoranthene	ND	1.0	µg/L	D	
Chrysene	**3.0**	**1.0**	**µg/L**	D	
Dibenz[a,h]anthracene	ND	1.0	µg/L	D	
Fluoranthene	ND	2.0	µg/L	D	
Fluorene	**7.0**	**2.0**	**µg/L**	D	
Indeno[1,2,3-cd]pyrene	ND	1.0	µg/L	D	
Naphthalene	**620**	**2.0**	**µg/L**	D	
Phenanthrene	ND	2.0	µg/L	D	
Pyrene	ND	2.0	µg/L	D	
Surrogate			Recovery	Limit	
Coronene			MI	50. - 150.	

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Client: *Pacific Northwest Laboratory*
Contact: *Stephen Lawn*

Project: *U001 R1.95H*

Polynuclear Aromatic Hydrocarbons (PNA)

by EPA 8310

Sample ID / Analyte	*Matrix* / Result	Reporting Limit	Units (ppb)	Comment	*Lab Number*
997-UO-005	*Water*			**Sampled:** *09/30/97* **Extracted:** *10/06/97* **Analyzed:** *10/23/97*	*L3688-5*
Acenaphthene	ND	2.0	µg/L	D	
Acenaphthylene	ND	2.0	µg/L	D	
Anthracene	ND	2.0	µg/L	D	
Benzo[a]anthracene	ND	1.0	µg/L	D	
Benzo[a]pyrene	ND	1.0	µg/L	D	
Benzo[b]fluoranthene	ND	1.0	µg/L	D	
Benzo[g,h,i]perylene	ND	1.0	µg/L	D	
Benzo[k]fluoranthene	ND	1.0	µg/L	D	
Chrysene	**4.0**	**1.0**	**µg/L**	D	
Dibenz[a,h]anthracene	ND	1.0	µg/L	D	
Fluoranthene	ND	2.0	µg/L	D	
Fluorene	**7.0**	**2.0**	**µg/L**	D	
Indeno[1,2,3-cd]pyrene	**1.0**	**1.0**	**µg/L**	D	
Naphthalene	**660**	**2.0**	**µg/L**	D	
Phenanthrene	ND	2.0	µg/L	D	
Pyrene	**3.0**	**2.0**	**µg/L**	D	

Surrogate	Recovery	Limit
Coronene	MI	50. - 150.

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Client: *Pacific Northwest Laboratory*

Contact: *Stephen Lawn*

Project: *U001 R1.95H*

Polynuclear Aromatic Hydrocarbons (PNA)

by EPA 8310

Sample ID / Analyte	*Matrix* / Result	Reporting Limit	Units (ppb)	Comment	*Lab Number*
997-UO-006	*Water*			**Sampled:** *09/30/97* **Extracted:** *10/06/97* **Analyzed:** *10/23/97*	*L3688-6*
Acenaphthene	ND	2.0	µg/L	D	
Acenaphthylene	ND	2.0	µg/L	D	
Anthracene	**2.0**	**2.0**	**µg/L**	D	
Benzo[a]anthracene	**1.0**	**1.0**	**µg/L**	D	
Benzo[a]pyrene	ND	1.0	µg/L	D	
Benzo[b]fluoranthene	ND	1.0	µg/L	D	
Benzo[g,h,i]perylene	ND	1.0	µg/L	D	
Benzo[k]fluoranthene	ND	1.0	µg/L	D	
Chrysene	**3.0**	**1.0**	**µg/L**	D	
Dibenz[a,h]anthracene	ND	1.0	µg/L	D	
Fluoranthene	**3.0**	**2.0**	**µg/L**	D	
Fluorene	**8.0**	**2.0**	**µg/L**	D	
Indeno[1,2,3-cd]pyrene	ND	1.0	µg/L	D	
Naphthalene	**870**	**2.0**	**µg/L**	D	
Phenanthrene	ND	2.0	µg/L	D	
Pyrene	**4.0**	**2.0**	**µg/L**	D	
Surrogate Coronene				Recovery MI	Limit 50. - 150.

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Client: *Pacific Northwest Laboratory*
Contact: *Stephen Lawn*

Project: *U001 R1.95H*

Polynuclear Aromatic Hydrocarbons (PNA)

by EPA 8310

Sample ID	Matrix	Analyte	Result	Reporting Limit	Units (ppb)	Comment	Lab Number
						Sampled: *09/30/97* Extracted: *10/06/97* Analyzed: *10/21/97*	
997-UO-007	*Water*						*L3688-7*
		Acenaphthene	ND	0.25	µg/L		
		Acenaphthylene	ND	0.25	µg/L		
		Anthracene	ND	0.25	µg/L		
		Benzo[a]anthracene	ND	0.10	µg/L		
		Benzo[a]pyrene	ND	0.10	µg/L		
		Benzo[b]fluoranthene	ND	0.10	µg/L		
		Benzo[g,h,i]perylene	ND	0.10	µg/L		
		Benzo[k]fluoranthene	ND	0.10	µg/L		
		Chrysene	ND	0.10	µg/L		
		Dibenz[a,h]anthracene	ND	0.10	µg/L		
		Fluoranthene	ND	0.25	µg/L		
		Fluorene	ND	0.25	µg/L		
		Indeno[1,2,3-cd]pyrene	ND	0.10	µg/L		
		Naphthalene	ND	0.25	µg/L		
		Phenanthrene	ND	0.25	µg/L		
		Pyrene	ND	0.25	µg/L		
		Surrogate				Recovery	Limit
		Coronene				64.%	50. - 150.

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Pacific Northwest Laboratories

65 Centennial Loop
Eugene, Oregon 97401
(503) 484-4493
Fax: (503) 484-4188

CHAIN OF CUSTODY RECORD

Client/Company: Bergeson-Boese & Assoc. Inc.
Project Manager: Stephen Lawn
Project Code: U001R1.95H
Collected By: Stephen Lawn

Site Location: Western Parcel
Site Address: University of Oregon
Billing Address:
P.O.No.:
Phone No.:

Lab Project Number:

Samples Refrigerated ~~Yes~~ No
Samples in Proper Containers (Yes) No
RUSH Yes No

COMMENTS:

	SAMPLE I.D.	DATE	TIME	MATRIX: SOIL	MATRIX: WATER	MATRIX: OTHER	NUMBER OF CONTAINERS	TPH-HCID OAR/DEQ	TPH-Gasoline OAR/DEQ	TPH-Diesel OAR/DEQ	TPH-418.1 Modified OAR/DEQ	TPH 418.1	Volatile Organics EPA 624/8240/8260	PAHDEQ GC/MS SIM	BTEX EPA 602/8020	PCBs 608/8080	Flashpoint EPA 1010	Semi-VolatileOrganics EPA 625/8270	Lead 7421	TCLP Metals (3)/(8)/1311	pH	PAH EPA 8310				REMARKS
1	997-UO-001	9-30	1642		X		3								X							X				
2	997-UO-002	9-30	1726		X		3								X							X				
3	997-UO-003	9-30	1759		X		3								X							X				
4	997-UO-004	9-30	1835		X		3								X							X				obvious oil impact
5	997-UO-005	9-30	1842		X		3								X							X				
6	997-UO-006	9-30	1915		X		4								X							X				
7	997-UO-007	9-30	2000		X		3								X							X				
8	997-UO-008	9-30	0920		X		2								X											
9																										
10																										
11																										
12																										
13																										
14																										

ANALYSES TO BE PERFORMED

RELINQUISHED BY:	COMPANY	DATE / TIME	RECEIVED BY:	COMPANY	DATE / TIME
[signature]	BB&A	~~20~~ 9-30-97 2040	Cathy Eichner	PNL	10/01/97 9:00
RELINQUISHED BY:	COMPANY	DATE / TIME	RECEIVED BY:	COMPANY	DATE / TIME
RELINQUISHED BY:	COMPANY	DATE / TIME	RECEIVED BY:	COMPANY	DATE / TIME

APPENDIX G

Additional Groundwater Sampling Laboratory Reports and Chain-of-Custody Records

Pacific Northwest Laboratories
Environmental Analysis

65 Centennial Loop
Eugene, Oregon 97401

(541) 484-4493
Fax: (541) 484-4188

May 4, 1998

University of Oregon
ATTN: Kay Coots
Office of Environmental Health & Safety
5224 University of Oregon
Eugene, OR 97403-5224

RE: PNL Report Number: 8398
Client Project No.: UO01RI.95H

Please find enclosed the report prepared for the laboratory analyses you requested.

The samples were received under a chain-of-custody. Soil samples are analyzed on an "as received" basis unless otherwise indicated.

Please contact us at the above address or phone number to obtain additional sample containers and coolers.

Thank you for selecting Pacific Northwest Laboratories for your analytical needs. We look forward to serving you in the future.

Sincerely,

Pacific Northwest Laboratories

Craig Biersdorff

Craig Biersdorff, Laboratory Director

Enclosure

Pacific Northwest Laboratories
65 Centennial Loop
Eugene, Oregon 97401
(541) 484-4493 Fax: 484-4188

LABORATORY REPORT

PNL REPORT NUMBER:	8398
CLIENT:	University of Oregon
CLIENT PROJECT NUMBER:	UO01RI.95H
SITE LOCATION:	Western Parcel, University of Oregon Eugene, OR
ITEMS ANALYZED:	2 water
DATE SAMPLES COLLECTED:	April 7, 1998
DATE ANALYSIS COMPLETED:	May 1, 1998
DATE SAMPLES DISCARDED:	May 1, 1998

METHOD: BTEX per EPA 8020
Results and Method Reporting Limits (MRL) presented in ug/L (ppb)
ND = Compound not detected

	UO-MW3		UO-MW5		LAB BLANK	
COMPOUND	RESULT	MRL	RESULT	MRL	RESULT	MRL
Benzene	ND	1.0	11		ND	1.0
Toluene	30		5.9		ND	1.0
Ethylbenzene	130		790		ND	1.0
Xylenes	460		90		ND	1.0

Surrogate Recoveries
(4-Bromofluorobenzene)

SAMPLE ID	Percent	Acceptance Limits
UO-MW3	134	81-137
UO-MW5	122	
LAB BLANK	102	

PNL REPORT NUMBER: 8398

METHOD: Total Metals
Results and Method Reporting Limits (MRL) presented in mg/L (ppm)
ND = Compound not detected

ANALYTE	METHOD	UO-MW3 RESULT	UO-MW3 MRL	UO-MW5 RESULT	UO-MW5 MRL	LAB BLANK RESULT	LAB BLANK MRL
Antimony	7041	ND	5	ND	5	ND	5
Arsenic	7061	ND	5	ND	5	ND	5
Thallium	7841	ND	5	ND	5	ND	5
Beryllium	7091	ND	1	ND	1	ND	1
Cadmium	7131	ND	1	ND	1	ND	1
Chromium	7191	ND	5	ND	5	ND	5
Copper	7210	ND	50	ND	50	ND	50
Lead	7421	ND	5	ND	5	ND	5
Mercury	7470	ND	1	ND	1	ND	1
Nickel	7520	ND	100	ND	100	ND	100
Selenium	7741	ND	10	ND	10	ND	10
Silver	7760	ND	50	ND	50	ND	50
Zinc	7950	ND	100	ND	100	ND	100

METHOD: Dissolved Metals
Results and Method Reporting Limits (MRL) presented in mg/L (ppm)
ND = Compound not detected

ANALYTE	METHOD	UO-MW3 RESULT	UO-MW3 MRL	UO-MW5 RESULT	UO-MW5 MRL	LAB BLANK RESULT	LAB BLANK MRL
Antimony	7041	ND	5	ND	5	ND	5
Arsenic	7061	ND	5	ND	5	ND	5
Thallium	7841	ND	5	ND	5	ND	5
Beryllium	7091	ND	1	ND	1	ND	1
Cadmium	7131	ND	1	ND	1	ND	1
Chromium	7191	ND	5	ND	5	ND	5
Copper	7210	ND	50	ND	50	ND	50
Lead	7421	ND	5	ND	5	ND	5
Mercury	7470	ND	1	ND	1	ND	1
Nickel	7520	ND	100	ND	100	ND	100
Selenium	7741	ND	10	ND	10	ND	10
Silver	7760	ND	50	ND	50	ND	50
Zinc	7950	ND	100	ND	100	ND	100

PNL REPORT NUMBER: 8398

METHOD: PAH Analysis per OR-DEQ GCMS-SIM
Results and Method Reporting Limits (MRL) presented in ug/L (ppb)
ND = Compound not detected

Analysis completed: 4/16/98

COMPOUND	UO-MW3 RESULT	UO-MW3 MRL	UO-MW5 RESULT	UO-MW5 MRL	METHOD BLANK RESULT	METHOD BLANK MRL
Naphthalene	240		930		ND	1.0
Acenaphthylene	1.5		1.4		ND	0.10
Acenaphthene	0.40		7.4		ND	0.10
Fluorene	0.48		3.7		ND	0.10
Phenanthrene	0.48		5.2		ND	0.10
Anthracene	0.22		1.1		ND	0.10
Fluoranthene	0.27		0.67		ND	0.10
Pyrene	0.36		0.78		ND	0.10
Benzo(a)anthracene	ND	0.10	ND	0.10	ND	0.10
Chrysene	ND	0.10	ND	0.10	ND	0.10
Benzo(b)fluoranthene	ND	0.10	ND	0.10	ND	0.10
Benzo(k)fluoranthene	ND	0.10	ND	0.10	ND	0.10
Benzo(a)pyrene	ND	0.10	ND	0.10	ND	0.10
Indeno(1,2,3-cd)pyrene	ND	0.10	ND	0.10	ND	0.10
Dibenz(a,h)anthracene	ND	0.10	ND	0.10	ND	0.10
Benzo(g,h,i)perylene	ND	0.10	ND	0.10	ND	0.10

Surrogate Recoveries (percent)

	NBZ	FBP	TPH
METHOD BLANK	75	82	108
LCS	72	72	103
UO-MW3	82	71	100
UO-MW5	93	81	103

		QC Limits
NBZ	= Nitrobenzene-d5	35-114
FBP	= 2-Flurobiphenyl	43-116
TPH	= Terphenyl-d14	33-141

PNL REPORT NUMBER: 8398

QUALITY CONTROL REPORT
Method PAH/OR-DEQ - Water Analysis

Sample / Duplicate Sample
ug/L (ppb)

Sample ID: 8398-2 (UO-MW5) Date acquired: 4/16/98

Compound	Sample Result	Duplicate Sample Result	RPD
Naphthalene	927	884	5
Acenaphthylene	1.45	1.36	6
Acenaphthene	7.40	7.28	2
Fluorene	3.73	3.56	5
Phenanthrene	5.19	5.0	5
Anthracene	1.13	1.00	12
Fluoranthene	0.67	0.65	3
Pyrene	0.78	0.76	3
Benzo(a)anthracene	ND	ND	—
Chrysene	ND	ND	—
Benzo(b)fluoranthene	ND	ND	—
Benzo(k)fluoranthene	ND	ND	—
Benzo(a)pyrene	ND	ND	—
Indeno(1,2,3-cd)pyrene	ND	ND	—
Dibenz(a,h)anthracene	ND	ND	—
Benzo(g,h,i)perylene	ND	ND	—

Note: The duplicate sample analysis used for this QC batch may not be from this project.

PNL REPORT NUMBER: 8398

QUALITY CONTROL REPORT
Method PAH/OR-DEQ - Water Analysis

Laboratory Control Sample
ug/L (ppb)

Sample ID: 041498-LCSW Date acquired: 4/16/98

Spiked Analyte	Blank Result	LCS Spike Amount	LCS Result	LCS Percent Recovery	Recovery Limits
Naphthalene	0.0	2.00	1.35	68	20-89
Acenaphthylene	0.0	2.00	1.49	75	30-88
Acenaphthene	0.0	2.00	1.49	75	32-99
Fluorene	0.0	2.00	1.53	77	36-99
Phenanthrene	0.0	2.00	1.72	86	44-105
Anthracene	0.0	2.00	1.81	91	38-102
Fluoranthene	0.0	2.00	1.83	92	49-112
Pyrene	0.0	2.00	1.78	89	52-105
Benzo(a)anthracene	0.0	2.00	2.11	106	54-112
Chrysene	0.0	2.00	2.01	101	58-109
Benzo(b)fluoranthene	0.0	2.00	1.96	98	55-119
Benzo(k)fluoranthene	0.0	2.00	2.07	104	72-109
Benzo(a)pyrene	0.0	2.00	2.07	104	56-104
Indeno(1,2,3-cd)pyrene	0.0	2.00	2.48	124	55-124
Dibenz(a,h)anthracene	0.0	2.00	2.31	116	41-128
Benzo(g,h,i)perylene	0.0	2.00	2.27	114	48-119

Eugene, Oregon 97401 Fax: (541) 484-0268

Client/Company: Bergeson-Beese & Assoc. Inc
Project Manager: Stephen Lawn
Project Code: UOP1R1.95H
Collected By: Stephen Lawn and

Site Location: University of Oregon
Site Address: 8th and Hilyard
Billing Address: Western Parcel
P.O.No.:
Phone No.:

Lab Project Number: 8398

Samples Refrigerated: (Yes) No
Samples in Proper Containers: (Yes) No
RUSH: Yes (No)

COMMENTS: Paul Beeson - ~~PTI~~ Exponent

Split sample w/ Exponent

ANALYSES TO BE PERFORMED

	SAMPLE I.D.	DATE	TIME	MATRIX: SOIL	MATRIX: WATER	MATRIX: OTHER	NUMBER OF CONTAINERS	NWTPH-HCID ODEQ/MDOE	NWTPH-Gasoline-x ODEQ/MDOE	NWTPH-Diesel-x ODEQ/MDOE			Volatile Organics EPA 624/8240/8260	PAH GC/MS SIM ODEQ	BTEX EPA 602/8020	PCBs 608/8080	Flashpoint EPA 1010	Semi-VolatileOrganics EPA 625/8270	Lead 7421	TCLP Metals (3)/(8)/1311	pH	Priority Pollutant 13 metals	CP metals - high			REMARKS
1	UO-MW3	4-7-98	1458		X		6							X	X							X	X		
2	UO-MW5	4-7-98	1535		X		6							X	X							X	X		
3																									
4																									
5																									
6																									
7																									
8																									
9																									
10																									
11																									
12																									
13																									
14																									

RELINQUISHED BY:	COMPANY	DATE / TIME	RECEIVED BY:	COMPANY	DATE / TIME
Stephen Lawn	BB&A	4-7-98 1640	Jana Schmidt	PAL	4/7/98 1646
RELINQUISHED BY:	COMPANY	DATE / TIME	RECEIVED BY:	COMPANY	DATE / TIME
RELINQUISHED BY:	COMPANY	DATE / TIME	RECEIVED BY:	COMPANY	DATE / TIME

APPENDIX H

Drill Cuttings Disposal Receipt

VALLEY LANDFILLS, INC.
PO BOX 307
CORVALLIS, OR 97339

Telephone : 541-753-9067

W&I RI 95H
JL

APRIL 7, 1998

BERGESON-BOESE ASSOC, INC.
65 CENTENNIAL LOOP
EUGENE, OR 97401

Account No.: BERGBO
Time In : 12:10
Time Out : 12:41
Ticket No.: 172824
Site : 1 COFFIN BUTTE LANDF
Truck No.: 1
Card ID BERGB01
Origin 05

COMMODITY	UNITS	RATE		$ WASTE	$ TAX	$ AMOUNT
PHF PETROLEUM HANDL	1.00	50.0000	per EA	50.00	.00	50.00
47 DIESEL CONTAMIN	4.31	22.5000	per TON	96.98	.00	96.98
[Gross: 23,160	Tare:	14,540		Net: 8,620]		
Totals >>>>>>>>>>>>				146.98	.00	146.98
				TOTAL DUE $		146.98

Customer signature

Generator

COMMENT: 54

APPENDIX I

Purge Water Disposal Receipt

OIL RE-REFINING CO., INC.

No. 60749

Bozarth
Box 1407
odland, WA 98674
A # WAD 980986012

24 Hour Emergency
(503) 286-8352
1-800-367-8894
Weslow Parcel

Cust. I.D. 5936
Call Back

Generator: University of Oregon / Name: Steve / Contact: Date 3-26-98	**Billing Address**
87th W. Linsey / Address: Eugene / City: OR / State: 97403 / Zip: 484-4924 / Phone	Bronson - Boise 65 Centennial Loop Eugene OR 9740
Consigned To: Fuel Processors	**Profile Date:**
Destination: Union Gap WA 20 E. Hand OR	CK# P.O.#
Via Carrier: ORECO	Load Ticket #
Driver: M.L. Truck No.: 3034 Miles Run:	

Drums	Description	Weight	Rate Per Gallon	Rate Per Hour	Charge Paid
50	Combustible liquid NOS NA 1993 III Used oil Emulsified oil and Water		.50		175.00
	TRANSported For Recycling				
	Total				175.00

VOC1 RQ .95 lb

Customer warrants that the waste petroleum products being transferred by the above collector do not contain any contaminants including, without limitation, pesticides, chlorinated solvents at concentrations greater than 1000 PPM, PCB's at greater concentrations greater than 2 PPM (or 50 PPM with Manifest), or any other material classified as hazardous waste by 40 CFR part 261, Subparts C and D (implementing the Federal Resource Conservation and Recovery Act) or by any equivalent State hazardous waste or hazardous substance classification program. Should laboratory tests find this waste product not in compliance with 40 CFR Part 261, customer (generator) agrees to pay for all disposal costs incurred.

Signed X

Date 3-26-98

PM

Oregon
John A. Kitzhaber, M.D., Governor

Department of Environmental Quality
Western Region Eugene Office
1102 Lincoln Street, Suite 210
Eugene, OR 97401
(541) 686-7838
FAX (541) 686-7551
TTY (541) 687-5603

March 7, 2001

Kay Coots, Director
Office of Environmental Health and Safety
University of Oregon
1230 Franklin Boulevard
Eugene, OR 97403

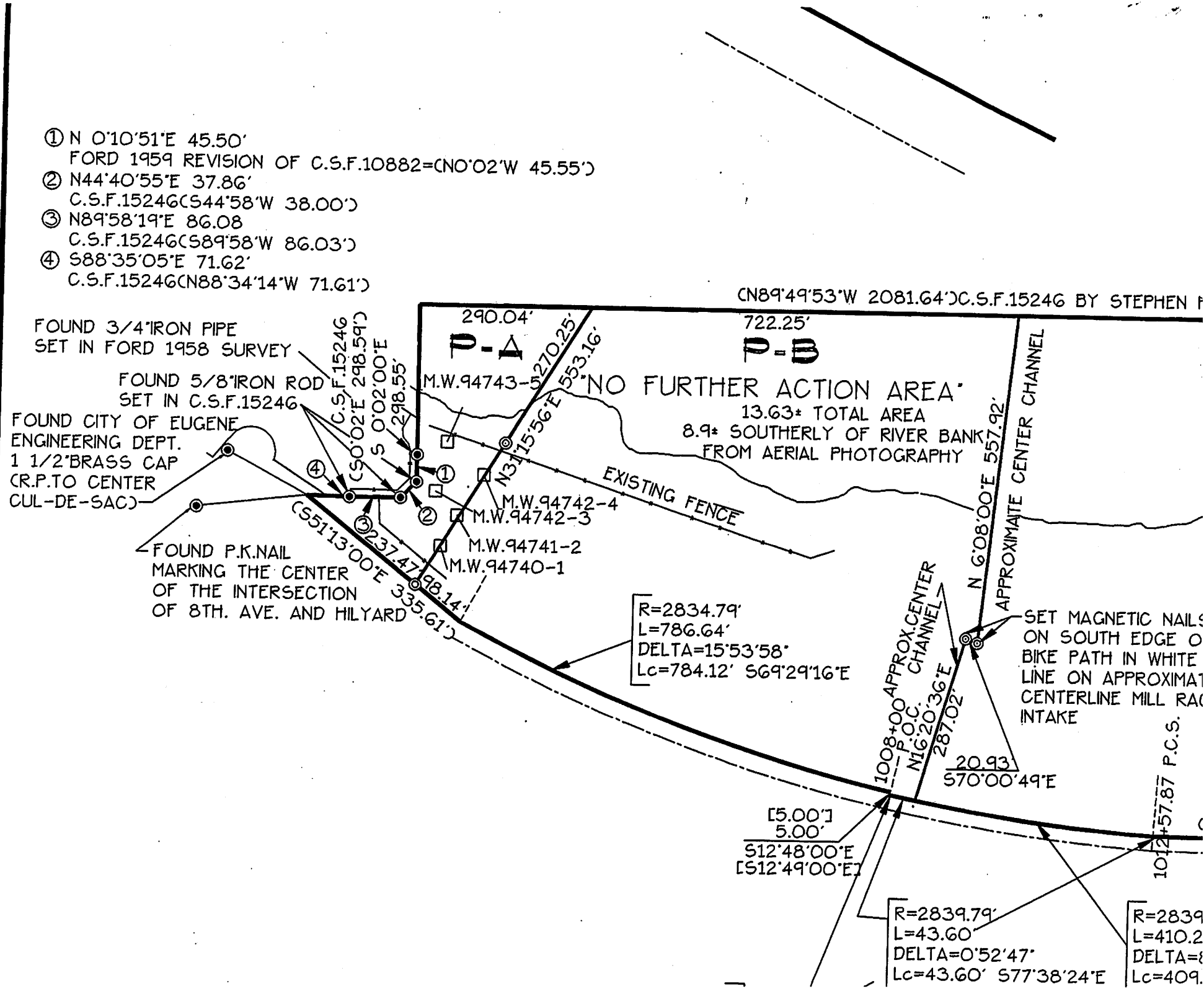
RE: No Further Action
Area P-B of the Western Parcel
University of Oregon Riverfront Research Park

Dear Ms. Coots:

The Oregon Department of Environmental Quality (DEQ) has reviewed the March 22, 2000 letter transmitting a surveyors map of the Western Parcel provided to us on your behalf by Bergeson-Boese & Associates (BB&A). BB&A recommended no further action ("NFA") for the eastern portion of the Western Parcel study area in a January 7, 1999 report entitled *Subsurface Investigation of Western Parcel.* DEQ requested that a survey be performed to delineate the area of the Western Parcel proposed for NFA in a January 7, 1999 letter to the University of Oregon. The March 22 letter from BB&A responds to the DEQ's request.

Parcel P-B was investigated by Squire Associates[1] on behalf of the University of Oregon between 1992 and 1993 and results supported that significant concentrations of hazardous constituents that may have been associated with previous site uses are not present.
Based on our evaluation of the information previously submitted to the Department, DEQ has determined that under the Oregon Environmental Cleanup Law, ORS 465.200 et seq., no further action is required to investigate the eastern portion of the Western Parcel designated as Parcel P-B on the surveyors map attached to the March 22, 2000 BB&A letter, unless new or previously undisclosed information becomes available.

[1] Squire Associated, 1993, *Environmental Investigations Through August 1993, Riverfront Research Park, University of Oregon*, September.


① N 0°10'51"E 45.50'
FORD 1959 REVISION OF C.S.F.10882=(NO°02'W 45.55')
② N44°40'55"E 37.86'
C.S.F.15246(S44°58'W 38.00')
③ N89°58'19"E 86.08
C.S.F.15246(S89°58'W 86.03')
④ S88°35'05"E 71.62'
C.S.F.15246(N88°34'14"W 71.61')
(N89°49'53"W 2081.64')C.S.F.15246 BY STEPHEN
FOUND 3/4"IRON PIPE
SET IN FORD 1958 SURVEY
FOUND 5/8"IRON ROD
SET IN C.S.F.15246
FOUND CITY OF EUGENE
ENGINEERING DEPT.
1 1/2"BRASS CAP
(R.P.TO CENTER
CUL-DE-SAC)
FOUND P.K.NAIL
MARKING THE CENTER
OF THE INTERSECTION
OF 8TH. AVE. AND HILYARD
290.04'
P-A
722.25'
P-B
"NO FURTHER ACTION AREA"
13.63± TOTAL AREA
8.9± SOUTHERLY OF RIVER BANK
FROM AERIAL PHOTOGRAPHY
(S0°02'E 298.59')
S 0°02'00"E
298.55'
N31°15'56"E 553.16'
M.W.94743-5
M.W.94742-4
M.W.94742-3
M.W.94741-2
M.W.94740-1
EXISTING FENCE
(S51°13'00"E 335.61')
237.47
98.14'
R=2834.79'
L=786.64'
DELTA=15°53'58"
Lc=784.12' S69°29'16"E
N 6°08'00"E 557.92'
APPROXIMATE CENTER CHANNEL
APPROX.CENTER
CHANNEL
SET MAGNETIC NAILS
ON SOUTH EDGE O
BIKE PATH IN WHITE
LINE ON APPROXIMAT
CENTERLINE MILL RA
INTAKE
1008+00
P.O.C.
N16°20'36"E
287.02'
20.93'
S70°00'49"E
1012+57.87 P.C.S.
[5.00']
5.00'
S12°48'00"E
[S12°49'00"E]
R=2839.79'
L=43.60'
DELTA=0°52'47"
Lc=43.60' S77°38'24"E
R=2839
L=410.2
DELTA=
Lc=409.

DRAFT

STAFF REPORT

CONDITIONAL NO FURTHER ACTION RECOMMENDATION

For the

AREA P-A UPLAND PORTION OF THE WESTERN PARCEL - RIVERFRONT RESEARCH PARK, UNIVERSITY OF OREGONEUGENE, OREGON

ECSI 1018

Prepared by the

OREGON DEPARTMENT OF ENVIRONMENTAL QUALITY
Western Region Office
September 2009

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1. INTRODUCTION

Portions of this staff report were compiled by the University of Oregon, however the conclusions of the report represent the position of the Department of Environmental Quality. The documents upon which this staff report is based are listed in Appendix A (Administrative Record Index).

The University of Oregon (UO) conducted site investigation and cleanup activities between 1984 and 2006 at the Riverfront Research Park property located in Eugene, Oregon. In order to most efficiently address specific environmental concerns and issues associated with various parts of the Riverfront Research Park, the UO separated the property into several separate parcels.

Under an agreement with the Department of Environmental Quality's Voluntary Cleanup Program (DEQ) the UO has completed investigations and cleanup activities that have supported DEQ "no further action" (NFA) determinations for all but two areas. One of the remaining areas is referred to as the Power Plant Basement and is not addressed in this report. The second remaining area is described below.

The property described in this report is called the Western Parcel Area P-A. It encompasses a total area of 1.9 acres. The upland 0.9 acres of Area P-A is the subject of this report. Since additional assessment remains to be done on the Riverbank Sub-Area of Area P-A (Area P-A Riverbank), it will be part of a future decision document. The Figure 2 Site Plan illustrates Area P-A of the Western Parcel. Figure 3 illustrates the areas of Area P-A Upland and Area P-A Riverbank and presents the locations of many of the soil and groundwater samples from the site.

The majority of the site is currently fenced and consists of relatively flat graveled areas with limited grassy vegetation. The northern boundary includes an asphalt-paved path used for walking, running, and biking (bike path, also along the western boundary) and narrow grassy vegetation strip north of the bike path.

1.1 Scope and Role of the No Further Action Recommendation

The risk screening and recommended basis for a final determination on the site was developed in accordance with Oregon Revised Statutes (ORS) 465.200 et. seq. and Oregon Administrative Rules (OAR) Chapter 340, Division 122, Sections 010 through 115.

The recommendation for "no further action" is based on the administrative record for this Site. A copy of the Administrative Record Index is attached as Appendix A. This report summarizes the more detailed information contained in the various reports summarized in Appendix A.

2. SITE HISTORY AND DESCRIPTION

2.1 Site Location and Land Use

The site consists of a 0.9-acre lot. The property is located in the 700 block of E 8th Avenue, in Eugene, Oregon, with a legal description of T17S, R3W, Section 32, Tax Lot 5300, Lane County. The site is located in a mixed use area neighborhood encompassing commercial, industrial, office and residential, and recreations/park land uses.

Land immediately west of the site is used for Eugene Water and Electric Board (EWEB) operations and offices. Land to the south/southwest consists of mixed commercial, residential, and industrial uses, as well as the federal courthouse. The UO Riverfront Research Park owns the adjacent land to the east of Area P-A (i.e., Area P-B of the Western Parcel) as well as adjoining property east of Area P-B. Although the Western Parcel of the Riverfront Research Park is currently undeveloped, future development as office space and ancillary facilities (e.g., parking) is considered reasonably likely. The nearest residential development is approximately ¼-mile west of the Site. The Western Parcel is bounded to the north by the Willamette River.

The site is a relatively level area covered with unmaintained grassy vegetation, crushed rock and some additional small concrete pads and/or footings associated with former structures. The approximate ground elevation is 430 feet above mean sea level. A bike path/walkway separates the Site from the EWEB property to the west. Another bike path, oriented northwest/southeast is located near the boundary of the upland area with the riverbank area of the Site. The riverbank portion of the Site (Area P-A Riverbank) is located north of the site and consists of a steep bank with a narrow bench at its base at the shoreline of the Willamette River. A Union Pacific Railroad right-of-way forms the southern boundary of the site.

Currently, the site is not developed and is not being used. The bike paths crossing the northern part of the property and bounding the western part of Area P-A are used for recreational purposes and similar future uses of these features are expected.

The site is part of the Riverfront Research Park project that is a cooperative effort of the UO and private developers to build a university-related research park on a state-owned site adjacent to the university campus on the south bank of the Willamette River.

2.2 Physical Setting

2.2.1 Climate

Eugene receives approximately 50 inches of precipitation annually.[1] The majority of the precipitation falls between November and March, with monthly totals ranging from 0.6 to 8.5 inches. Precipitation totals for the remainder of the year are generally less than 3 inches per month. The average annual temperature is approximately 52°F.

2.2.2 Geology

Based on boring logs from investigations on the site and on EWEB property to the west, as well as test pits and other geotechnical borings completed nearby, three general geologic units underlie the site: fill, alluvium, and bedrock. These units are described in more detail below. A generalized cross section of the Site is presented in Figure 4. Note: Plan shows clay, gravel, and bedrock.

2.2.2.1 Fill

Fill materials underlying the site typically consist of variable mixtures of silt, sand, gravel, crushed rock, and bedrock rock fragments (e.g., sandstone). The fill is estimated to vary in thickness from four to 12 feet beneath the site , with increasing thickness toward the break in slope toward the Willamette River.

2.2.2.2 Alluvium

Coarse-grained alluvial deposits underlie the fill and range in thickness from approximately 10 to 15 feet beneath the site. The alluvium is dominated by a basal, coarse-grained, silty sandy gravel unit in contactt with the underlying bedrock. The lower portion of the alluvium is saturated with shallow groundwater.

---

[1] Climatography of the United States No. 81 Monthly Station Normals of Temperature, Precipitation, and Heating and Cooling Degree Days 1971-2000, Oregon. U.S. Department of Commerce, National Oceanic and Atmospheric Administration (NOAA), National Environmental Satellite, Data, and Information Services (NESDIS) and national Climatic Data Center (NCDC), 2002.

2.2.2.3 Sandstone Bedrock

A fine-grained, tan to greenish-brown sandstone bedrock underlies the site at depths ranging from around 23–26 feet below land surface (BLS). The bedrock is locally weathered and is dry to moist. The bedrock underlies all areas beneath and surrounding the site, and is visible to the northeast where it crops out to form the bed of the Willamette River as well as other areas.

The bedrock represents the Eugene Formation of Oligocene age, recognized regionally in the literature (USGS 1973). Logs of wells completed in the area indicate that the bedrock is at least 420 feet thick in the study area and regional geologic studies indicate that the Eugene Formation may be up to 15,000 feet in total thickness (USGS, 1973).

2.2.3 Hydrogeology and Groundwater Flow

2.2.3.1 Hydrogeology

Regional descriptions of the bedrock formation indicate that it generally yields little water to wells and that available water is typically of poor quality and often saline (USGS 1973). Deeper sections of the bedrock may contain hydraulically productive zones. However, most groundwater production in the region occurs from alluvial systems in central portions of the Willamette Valley, and these areas are hydraulically isolated and separate from the limited shallow groundwater zone beneath the Site.

The bedrock beneath the site consists of dry or moist sandstone that is expected to retard vertical groundwater movement based on regional information and observations during drilling activities at and near the site. These hydraulic characteristics of the bedrock strongly contrast with the loose and highly permeable nature of the overlying alluvium. Shallow groundwater occurs beneath the site within the coarse-grained and unconsolidated alluvial deposits and fill present above the older consolidated sandstone bedrock.

Field observations and the contrast in relative permeability between the alluvium and the bedrock indicate that the shallow groundwater beneath the locality of the facility may be considered perched water, which is generally isolated from any deeper groundwater systems.

The thickness of the uppermost saturated interval within the alluvium ranges from approximately three to 12 feet and varies with location and season. The thickness of the uppermost saturated interval tends to be greater and exhibit less seasonal variation beneath the southern part of the site, near groundwater monitoring wells MW-1, MW-2, and MW-3. The saturated interval thins to the north toward the Willamette River and exhibits a steeper hydraulic gradient in the riverbank area.

2.2.3.2 Groundwater Flow

The shallow groundwater flows north-northeast beneath the site and ultimately discharges to the Willamette River. Groundwater elevation data collected from the Site indicate that the shallow groundwater flow directions and gradients are generally consistent through all seasons, but elevations vary somewhat. Depth-to-water beneath Area P-A ranges from approximately 10 to 20 feet below ground surface and varies with location and season. As expected, the highest groundwater levels are observed in the winter and early spring during the period of highest precipitation, and the lowest levels in the late summer and fall.

The groundwater levels in the shallow alluvial system fluctuate generally with changing stages of the Willamette River; which, in turn, are strongly controlled by upstream dam discharges. These changes may result in periodic variable flow direction or stagnant flow conditions locally along the river.

2.2.4 Surface Water and Stormwater Features

The site is bound on the north by the Willamette River, which flows in a northwesterly direction. No other surface water features are present within the site.

Stormwater runoff from the site is conveyed by overland sheet flow and no stormwater is currently directly conveyed by gutters, ditches, or drains.

2.2.5 Groundwater and Surface Water Beneficial Use Determination

Beneficial uses for the water-bearing zone beneath the property west of Area P-A was evaluated as part of a Remedial Investigation (RI) performed by EWEB that included Area P-A and the nearby Willamette River. The Beneficial Use Determination concluded the following:

- No drinking water wells are located at the Site or within ¼ mile, nor are any future nearby wells reasonably likely. All domestic use water within that distance is provided by EWEB. No future domestic use of the underlying aquifer is reasonably likely.

- One historical non-contact cooling water intake on the Willamette River is located near the Site; two irrigation water intakes are located approximately one mile downstream of the Site. There is no known nearby domestic use of water from the Willamette River.

- Groundwater discharging to surface water is the only known beneficial use of the aquifer. Groundwater from the Site discharges to the Willamette River.

- Beneficial uses of the Willamette River in the area of the Site include habitat, recreation, irrigation, and aesthetic value.

The site is currently undeveloped. Reasonably likely future use of the site is research park office space and public recreational use, which is restricted to activities along the bike path. Other properties in the area are expected to remain public lands, multi family residential, and industrial. Conditions at the site are unlikely to preclude any of these uses for nearby properties.

One beneficial use that is not addressed in this document is the discharge of contaminated groundwater from the site to the river. Based on assessment efforts to date, no upland cleanup action will be required to protect ecological receptors along the river, as the risk posed to wildlife by site-related contaminants is extremely low. This exposure pathway will be evaluated along with the rest of the Riverbank Sub-Area of Area P-A at a later date.

2.3 Site Operations

2.3.1 Former Eugene Sand and Gravel Operations

Historically, Area P-A was part of an aggregate quarry formerly owned and operated by Eugene Sand and Gravel Company. Use of the Western Parcel occurred as early as 1900, though the timing of when such operations began is not known. Eugene Sand and Gravel Company operations included gravel screening, sediment settling, a concrete batch plant, and pre-form concrete products. Eugene Sand and Gravel Company also installed two tanks in the southeast part of the site that were used for storage and dispensing of petroleum motor fuel(s). The aggregate and concrete products operations also included a service/maintenance shop which is believed to have been located in the southwestern part of the Western Parcel, possibly within the site.

The UO acquired the Western Parcel in 1968 and subsequently removed remaining buildings and equipment from the property. Between 1975 and June 1990 the site was included in property leased to the Eugene Water and Electric Board (EWEB). EWEB stored transformers in the northern part of the site. EWEB also stored utility poles and waste oil on Area P-B. These materials were subsequently removed from the Western Parcel and Parcels P-A and P-B have remained vacant and undeveloped. EWEB used waste oil to treat concrete forms used to build utility vaults on this portion of the property.

2.3.2 Former Eugene Manufactured Gas Plant

Core operations of a former manufactured gas plant (MGP) were mostly located off-site on the property to the west of the site. The eastern edge of the former MGP operations occurred beneath the west end of the site.

The former MGP was constructed in 1906 as a coal carbonization process facility and operated in that mode from approximately 1907 until 1910, when it was converted to a carbureted water-gas plant. The early plant consisted of coal gas benches positioned inside a rectangular structure located on the contiguous property west of the site. Other early plant structures included the relatively small gas holder, also located on the contiguous property to the west of Area P-A. The plant was expanded and converted to the water-gas operation in 1910–11. A two-story brick and steel building referred to as the main brick building was constructed in the central portion (core area) of the former MGP and housed water-gas units. Other structures reportedly erected in 1910–11 included the large gas holder (the original holder was converted to a relief holder), coke shed, meter and office buildings, aboveground oil storage tanks, underground ammonia well/tar well structure (tar tank) and oxide platform, and aboveground purifiers (Byllesby & Company 1918). The plant was used to manufacture gas until approximately 1950, when it was converted for the storage and supply of propane-air gas.

2.3.3 Areas of Investigation

The site has not been used for any operations or for storage of equipment and/or materials since June 1990 at the termination of EWEB's lease. Environmental investigations of the site have been completed to evaluate former facilities and operations that represent areas of potential existing releases or past releases. Specific areas of investigation on the site are described below.

2.3.3.1 Former Transformer Storage Area

EWEB stored unused transformers in the northern part of the Site. Transformers were drained off-site prior to storage and soil samples were collected to confirm that the transformers did not leak. In 1990 a composite soil sample was collected from the transformer storage area. The sample was analyzed for polychlorinated bi-phenyls (PCBs) and total petroleum hydrocarbons (TPH). No PCBs were detected in the sample. A concentration of 40 mg/kg of TPH was reported for the analysis, which was attributed to former dust suppression practices.

In October 2008, two soil samples were collected in the former transformer area to verify the previous results were representative of current conditions. One sample contained 209 mg/kg

diesel range TPH, and 150 mg/kg heavy oil range TPH. The second sample did not detect any TPH compounds. Neither sample contained any detectable PCBs.

2.3.3.2 Underground Storage Tanks

A 1990 Environmental Site Assessment identified the possible historical presence of two fuel tanks, either underground or above ground, at the southwest corner of the Western Parcel. The 1990 ESA report also noted that fuel tanks and pumps were previously located near the southwest corner of the property, outside of the fenced area.

In 2001, a fuel product line was encountered during completion of test pits excavated to investigate the extent of impact to shallow soils in the vicinity of the former service shop and scale house. Further investigation of the fuel product line was performed using a magnetic locator. The magnetic locator found indications of a truck scale and the fill spout of an abandoned UST. The depth of the UST was 11 feet below land surface (BLS) and the top of the UST was at three feet BLS. The empty UST was estimated to have a storage capacity of at least 5,000 gallons and was most likely abandoned in-place prior to the regulatory requirements to register USTs.

The abandoned UST was permanently decommissioned by removal on June 7, 2001, and confirmation soil samples were collected from native soils beneath each end of the former UST. The confirmation soil samples were analyzed for TPH identification using Northwest Method NWTPH-HCID. No gasoline-range, diesel-range, or heavier oil-range petroleum hydrocarbons were detected in the samples at concentrations above respective laboratory method reporting limits (MRLs). Additional test pits were excavated south of the scale house foundation, but no indication of an additional UST was detected (see also section 2.3.3.2).

No other USTs were identified on the site, despite investigations involving test pits and a geophysical survey.

2.3.3.3 Former Service Shop, Scale House, and West Gate

Eugene Sand and Gravel structures included a service shop for the repair and maintenance of vehicles and equipment located at the southwest corner of the Western Parcel, a truck scale and several other structures. Copies of 1964 and 1968 Sanborn Fire Insurance Maps for the site identify a scale house with "gas and oil" in the area of the former truck scale (and UST discussed in section 2.3.3.2). In addition, an office with "gas and oil" is identified southeast of the truck

scale. A large building located east of the office building is identified as a truck repair building with "oil and grease" storage, a tire repair area, and an oil and equipment parking area.

Near surface soil impact characterized by discontinuous layers contaminated with used oil was detected in the southern part of the site. The impact may have been associated with the scale house and shop area operated by Eugene Sand and Gravel Company as part of the former operations, or with periodic road oiling of the historical gravel road over time.

Waste oil contamination was noted near the former service shop and scale house (near B-2 on Figure 3). Waste oil contamination was limited to the top four feet of shallow soil, beneath which was clean soil, indicating a limited vertical impact. The worst-case soil sample contained 6,600 ppm total petroleum contamination, with low levels of PAHs. No VOCs, PCBs, or leachable metals (except barium) were detected in the sample.

Additional heavy oil and diesel range contaminants were encountered in soils between five and seven feet below ground surface immediately adjacent to the gate on the west end of the property. Contamination did not extend to groundwater in this area and no VOCs or PAHs were detected above applicable DEQ risk based concentrations (RBC's, or generic cleanup levels[2]).

2.3.3.4 Former Suspected MGP-Related Wastes North of West Entrance Gate

Contaminated soil suspected to be associated with former MGP operations is present along the west property boundary. Historical investigations identified a small area containing heavy oil-range petroleum impact at approximately 1000 ppm. Soil impact in this area was limited to the top few feet. PAHs benzo(a)pyrene and dibenzo(a,h)anthracene exceeded risk based concentrations for site workers and construction/excavation workers. In 2006, UO removed approximately 33 tons of contaminated soil, and shipped it off-site for disposal. Post-cleanup confirmation samples contained no PAHs at concentrations exceeding applicable RBCs.

2.3.4 Contaminants of Potential Concern (COPC)

A Contaminant of Interest (COI) is any chemical that could be at a site based on the types of operations that occurred there or on analytical data indicating the chemical is present. If the

[2] DEQ has generic cleanup levels for several types of land uses and activities. These include residential use, urban residential use, industrial/commercial (also known as "occupational") use, and construction and excavation work.

chemical is present, it is compared to DEQ generic risk-based concentrations. If a chemical exceeds risk based concentrations, it is considered a Contaminant of Potential Concern (COPC). If a chemical is identified as a COPC, some action must be taken, either a cleanup action or additional assessment of the risk posed by the chemical.

The following table presents the chemicals that were considered COI's or COPCs for the site.

Area	Contaminant of Interest	Contaminants of Potential Concern Soil	Contaminant of Potential Concern Groundwater
Former Transformer Storage Area.	Petroleum hydrocarbons PCBs	none	Benzo(a)pyrene
Fuel Storage Tank(s)	Petroleum Hydrocarbons VOCs PAHs	none	none
Former Service Shop, Scale House, and West Gate	Petroleum Hydrocarbons Metals VOCs PAHs	none	none
Former Suspected MGP-Related Wastes North of West Entrance Gate	Hydrocarbons VOCs PAHs Phenols Mercury Cyanide ammonia	Benzo(a)pyrene Dibenzo(a,h)anthracene	Naphthalene

3. RESULTS OF INVESTIGATIONS

3.1 Nature and Extent of Contamination

3.1.1 Soil

Soil contamination at the site is limited to localized areas on the west end of the site including the Former Transformer Storage Area, the Fuel Storage Tanks Area, the Former Service Shop,

Scale House, and West Gate, and the Former Suspected MGP-Related Wastes North of West Entrance Gate. Soil contamination in these areas is fairly limited both vertically and horizontally, as described in Sections 2.3.4.1-2.3.4.4. Soil contamination consists of hydrocarbons and PAHs, with only two PAHs, benzo(a)pyrene and dibenz(a,h)anthracene, exceeding RBCs for construction workers.

3.1.2 Groundwater

Periodic groundwater monitoring in five on-site monitoring wells from 1997-2008 indicated that groundwater beneath the northwest portion of the site contains petroleum hydrocarbons, VOCs, and PAHs. Two PAHs, benzo(a)pyrene and naphthalene, exceed RBCs for direct contact for construction/excavation workers during historical sampling events. No RBCs were exceeded in groundwater sampling that occurred during 2008. However, DEQ considers benzo(a)pyrene and naphthalene to exceed the RBC since we do not have four consecutive clean quarters for the chemicals.

3.1.3 NAPL

During the Initial Site Investigation of the former MGP conducted in 1995 by EWEB, 15 borings were completed off-site at the former MGP site, on property west of the site. Non-Aqueous Phase Liquids (NAPL, also referred to as "free product") as "blebs" in groundwater were observed in eight of the borings which indicated the presence of NAPL over much of the core area of the former MGP, including the eastern portion of the former MGP west of the site. Where encountered, NAPL was noted over much of the saturated gravel interval between the surface of the water table and the top of the underlying Eugene Formation bedrock.

NAPL occurs as Dense Non-Aqueous Phase Liquids (DNAPL), with specific gravity greater than water, and Light Non-Aqueous Phase Liquids (LNAPL), with a specific gravity less than water. LNAPL had been previously detected in monitoring well UO-MW-5 while DNAPL occurs in other off-site monitoring wells on the EWEB site.

Quarterly NAPL assessments were conducted by EWEB at groundwater monitoring wells UO-MW-5 on the site and off-site wells MW-4 and MW-5 located on adjacent EWEB property between May of 1998 and October of 2001. NAPL was initially encountered in all three (3) wells. No NAPL was observed at UO-MW-5 between September of 1998 and January of 2000 and NAPL assessment at this location was discontinued.

The LNAPL observed in UO-MW-5 does not pose an easily quantifiable risk, as there is no well developed methodology for evaluating risk from free product. However, the only potential

human health risk posed by the LNAPL beneath the site would be by direct contact to construction/excavation workers, who are also placed at risk by naphthalene and benzo(a)pyrene in the groundwater. The remedy that will be applied at the site to mitigate the risk from these chemicals will also protect construction or excavation workers from exposure to LNAPL.

3.2 Locality of the Facility

The locality of the facility (LOF) is defined in Oregon Cleanup Rules as "any point where a human or an ecological receptor contacts, or is reasonably likely to come into contact with, facility-related hazardous substances" (OAR 340-122-115[34]). The locality of the facility for a particular environmental medium includes both the current spatial extent of hazardous substances and the projected future extent, if chemicals are expected to migrate. Using chemical data generated during site investigation and routine groundwater monitoring, the LOF covers the majority of the site, with a strip along the boundary between Area P-A and Area P-B outside the LOF boundary. The LOF extends off-site to the west, on EWEB property, and includes the former MGP site. A site plan illustrating the on-site portion of the LOF is presented in Figure 6.

3.3 Risk Assessment

A risk screening was performed to evaluate the potential risks to human health and the environment, and to assist with evaluation of the need and, if required, potential options for remedial action at the Site. The risk assessment included a human health risk screening, an exposure assessment, a toxicity assessment, and an ecological assessment.

3.3.1 Human Health Risk Screening

A Conceptual Site Model (CSM) was developed to identify and evaluate potential exposure pathways between impacted media (e.g., soil and groundwater) and potential receptors (e.g., people working on the property) in the vicinity of the site. Contaminant concentrations for each environmental medium were compared with DEQ RBCs as screening values to determine which media and contaminants may pose potential risk to human health. RBCs for commercial and construction/excavation worker receptor scenarios were chosen as screening values since they are protective of current and future land use (including recreational uses). Other potential receptors within the LOF are recreational users who spend less time at the site than workers under the industrial and commercial scenarios.

3.3.1.1 Conceptual Site Model

The Conceptual Site Model (CSM) considers the contaminant source, the categories of people who could come into contact with contaminants, and how they could come into contact with contaminants in order to determine if a cleanup action must occur. Specific elements of the CSM are presented in the following sub-sections.

3.3.1.1.1 Potential Receptors

The subject property and contiguous properties are zoned public use and special development (i.e., research park) that includes development for commercial office space and research facility use. Given the primary land use of the subject property and in the general vicinity, an occupational exposure scenario is considered appropriate for this Site.

Subsurface utilities are located within the boundaries of the subject property. Shallow electric and steam lines (i.e., less than 10 feet deep) are located in the northern portion of the subject property. New utilities for the property development are anticipated to enter the property from the west along the gravel road at the south portion of the site. Excavation and construction workers could be exposed to residual contamination during excavation activities in the south and middle portions of the site.

Deeper excavation work (i.e. greater than 10 to 15 feet) in the vicinity of the northwest corner of the site near monitoring well UO-MW-5 is not considered reasonably likely due to setback rules cited in Eugene City Code for the Riverfront Research Park Special Development District.

According to EWEB, the existing electric and steam utility lines are well above the seasonal high groundwater level. Excavation and construction workers are considered to be potential receptors for soil contact under current and future conditions. Results of the potential receptor evaluation are summarized in Table 7.

3.3.1.1.2 Exposure Assessment

People can be exposed to chemicals at contaminated sites through a number of exposure pathways including direct contact with contaminated soil (e.g., incidental ingestion of soil or soil dust and skin contact during gardening or construction work), ingestion of contaminated

groundwater, and inhalation of vapors from the volatilization of contaminants present in soil or groundwater.

This exposure assessment evaluated current and reasonably likely future site use scenarios where humans might be exposed to contaminants in soil and groundwater. The exposure potential for each soil and groundwater exposure pathway is evaluated in the following subsections.

Incidental Ingestion, Inhalation, and Dermal Contact of Soil

Direct contact with residual contaminated soil may result in chemical intake from a variety of incidental exposure pathways. Since residual TPH soil impact was detected in areas less than three feet deep, the potential for incidental ingestion, inhalation, and dermal contact with subsurface contaminated soil is present for occupational receptors, excavation workers, and construction workers.

Volatilization of Soil Contaminants to Outdoor Air

Volatilization of soil contaminants to outdoor air is an indirect exposure pathway which evaluates the potential for volatile subsurface contaminants to impact outdoor air. Since there are volatile constituents in the soil, this pathway is considered complete.

Vapor Intrusion of Soil Contaminants to Indoor Air

This pathway evaluates the potential for volatile soil contaminants underlying a structure to impact indoor air quality. Since there are volatile constituents in the soil, this pathway is considered complete.

Leaching of Soil Contamination to Groundwater

Since groundwater is neither currently used as a source of potable water nor considered a likely future use of groundwater resources, the potential for leachate from soil contaminants to impact groundwater at levels exceeding groundwater ingestion and inhalation RBCs at the tap is not considered a relevant exposure pathway.

Volatilization of Groundwater Contaminants to Outdoor Air

Dissolved petroleum hydrocarbons may volatilize at the water table surface and migrate as vapor within the unsaturated zone. The majority of exterior surfaces at the subject property are currently unpaved and the CSM considers volatilization to outdoor air as a relevant exposure pathway at the subject property.

Vapor Intrusion of Groundwater Contaminants to Indoor Air

Dissolved-phase contaminants may volatilize at the water table surface and migrate as vapor within the unsaturated zone and enter indoor spaces. While the subject property is currently undeveloped, future development may include buildings in areas of groundwater impact. The

CSM considers vapor intrusion into indoor air as a relevant exposure pathway under future development conditions.

Groundwater Ingestion and Inhalation from Tap Water

Groundwater ingestion does not occur at the site and is not reasonably likely to in the future.

Municipally supplied potable water is presently provided to the subject and surrounding properties by EWEB. Given the availability of municipally-supplied potable water and the high capital costs associated with water well installation, future development of the shallow groundwater resources is considered unlikely.

Groundwater in an Excavation

This exposure pathway considers inhalation and dermal contact of groundwater contaminants by construction and excavation workers exposed to groundwater in excavations or trenches. This pathway is considered complete at the site.

3.3.1.2 Summary of Potential Exposure Pathways

A summary of relevant exposure pathways considered by the CSM is presented in Table 7.

The results of the evaluation of potential exposure pathways and receptor scenarios identified the following applicable pathways and receptor scenarios in the site:

- Soil ingestion, dermal contact, and inhalation for site workers, construction and excavation workers;
- Volatilization to outdoor air from soil and groundwater for occupational receptors;
- Vapor intrusion into buildings from soil and groundwater for occupational receptors; and
- Groundwater in an excavation for construction and excavation workers.

3.3.2 Risk-Based Screening Levels

3.3.2.1 Generic Risk-Based Concentrations (RBCs)

The COPC have been identified as TPH and related constituents associated with the former MGP operations and the activities of the former sand and gravel operations including fueling and vehicle maintenance. Based upon the applicable exposure pathways and receptor scenarios identified for the subject property, the most stringent RBCs for these scenarios have been determined from Appendix A of the 2003 RBDM Guidance Document and subsequent updates.[3] The generic RBCs are conservative screening levels for all of the applicable receptor scenarios

[3] The most recent update (January 2009) of the RBCs were used in this document.

and exposure pathways. The most stringent generic RBCs for potential pathways of exposure and receptor scenarios applicable for the site are presented in Table 9.

The outcome of the screening is presented below:

- No chemicals are present at concentrations that pose a risk by volatilization to indoor or outdoor air.
- No chemicals are present in soil at levels that pose a direct contact risk for site workers, construction workers, or excavation workers
- Benzo(a)pyrene and naphthalene exceed risk based concentrations for direct exposure by excavation and construction workers (in historical analytical data).

3.3.2.2 Assessment of Residual Soil and Groundwater Contamination

Residual risk is risk that remains at a site at the conclusion of cleanup activities, or the risk at a site in absence of institutional or engineering controls. Since the likely remedy at the site will be institutional controls, the residual risk is the current risk, which is around twenty times the acceptable risk level for excavation/construction workers. The use of safe work practices and proper personal protective equipment by construction or excavation workers could mitigate this risk.

3.3.3 Ecological Risk Assessment

In November 1999, EWEB submitted a document entitled *Technical Memorandum, Level I (Scoping) Ecological Risk Assessment* which was prepared for the contiguous property to the west of Area P-A. The ecological risk assessment was completed in general accordance with *Oregon Department of Environmental Quality, Guidance For Ecological Risk Assessment, April 1997.* A Level I Scoping Ecological Risk Assessment is a conservative qualitative determination of whether there is any reason to believe that ecological receptors and/or exposure pathways are present or potentially present at or in the locality of the facility, which includes part of Area P-A. Scoping is intended to identify sites that are obviously devoid of ecological important species or habitats and/or where exposure pathways are obviously incomplete. If no significant species or habitats are identified in the Scoping Level risk assessment, Oregon's ecological risk assessment guidance stipulates that no additional ecological evaluation is required.

With respect to the LOF on the site, the Level I Ecological Scoping concluded the following:

- Moles were identified as the ecological receptor with the greatest potential for exposure to impacted soils. Moles are not considered an ecologically important species in this setting.
- Other receptors such as birds may visit the Site.
- Paving or gravel (?) on the upland portion of the Site limits terrestrial habitat.
- A narrow vegetated area paralleling the bikepath is considered the only significant habitat for ecological receptors. This corridor was assumed to be clean fill soils associated with bikepath construction.

Thus, no exposure pathway to contaminated media exists for the receptors in this area.

3.4 Hot Spot Determination

Oregon cleanup rules require the identification of "hot spots" of contamination. The rules also require that the remedial action selected for a site treat hot spots to the extent feasible. For soil, hot spots are defined as areas with contaminants that pose a human health risk greater than 1×10^{-4}, or a non-cancer hazard quotient greater than 10 (that is, the contaminants are present at a concentration 10 times higher than that which could cause a non-cancer health impact). For water, hot spots are defined by having contaminants that would have a significant adverse effect on the beneficial use of the water (e.g., exceed safe drinking water standards in a domestic water well), and for which treatment would be likely to restore the beneficial use within a reasonable time.

3.4.1 Groundwater

The residual groundwater impacts the site do not meet hot spot criteria since contaminants in groundwater are unlikely to pose a significant adverse effect on beneficial uses of the groundwater.

3.4.2 Contaminated Soil

Residual concentrations of contaminants in the site soils do not exceed respective RBCs, therefore, the soils do not meet the hot spot criteria.

4. PROPOSED ACTION

DEQ proposes a remedy consisting of developing a site specific health and safety plan to ensure that future construction/excavation workers safely manage exposure to contaminated groundwater through work practices and proper protective equipment.

Under Oregon cleanup rule (OAR 340-122-0090) the DEQ must select a remedy that is protective of human health and the environment, and must considers the effectiveness, implementation risk, implementability, cost, and long-term reliability. With the exception of hot spots of contamination, Oregon law and cleanup rules specify that where two or more remedies are protective, the least expensive remedy generally is preferred. DEQ considered these balancing factors and concluded that the proposed remedy is effective at abating risk, is adequately reliable in the long term, is implementable and has a much lower cost than other approaches to preventing the risk to construction/excavation workers.

5. CONCLUSIONS AND RECOMMENDATIONS

Based on the Site investigations and previously-conducted excavation and disposal of the most contaminated soil, the risk assessment demonstrates that site conditions pose an unacceptable risk only to future excavation/construction workers by direct exposure to groundwater. These risks may be easily managed by employing safe working practices, working under a site health and safety plan, and using proper protective equipment.

- DEQ recommends issuing a Conditional No Further Action (NFA) determination for the upland portion of upland portion of Area P-A of the Riverfront Research Park site. The condition of the NFA determination will be that: The U of O prepare a DEQ-approved site specific health and safety plan detailing safe work practices and proper protective equipment to be employed any time that groundwater is encountered during construction or utility work; and,

- The U of O will require all future construction companies and/or workers working at the site implement the health and safety plan.

DEQ will hold a 30-day public comment period during October 2009, during which the public may provide input on the proposed remedy for the site.Upon closure of the public comment

period, and once the site specific health and safety plan has been completed, DEQ will reference and attach it to the Conditional No Further Action (NFA) determination letter.

- The NFA shall be recorded to the deed of the property with Lane County.
- The site status should be changed in ECSI to reflect the NFA determination.

PEER REVIEW SUMMARY

Technical documents pertaining to investigation and cleanup of the site have been reviewed by a technical team at DEQ. The team consists of the project manager/geologist and a toxicologist. The team unanimously supports the recommended remedial action.

_____

Geoff Brown, R.G., Project Manager

_____

Toxicologist

_____

Max Rosenberg, R.G., Western Region Cleanup Program Manager

APPENDIX A

ADMINISTRATIVE RECORD INDEX

The Administrative Record consists of the documents on which the recommended remedial action for the Site is based. Additional background and supporting information can be found in the project files located at DEQ Western Region Offices in Eugene, Oregon.

ADMINISTRATIVE RECORD TO BE INCLUDED HERE

L.R. Squier Associates, Inc., Environmental Site Assessment, Western Parcel, Riverfront Research Park, UO. May 1990.

Oregon Department of Environmental Quality, No Further Action Area P-B of the Western Parcel. March 7, 2001.

Oregon Department of Environmental Quality, Interoffice Memorandum, UO, Riverfront Research Park, Western Parcel File Summary and Recommendations. January 1992.

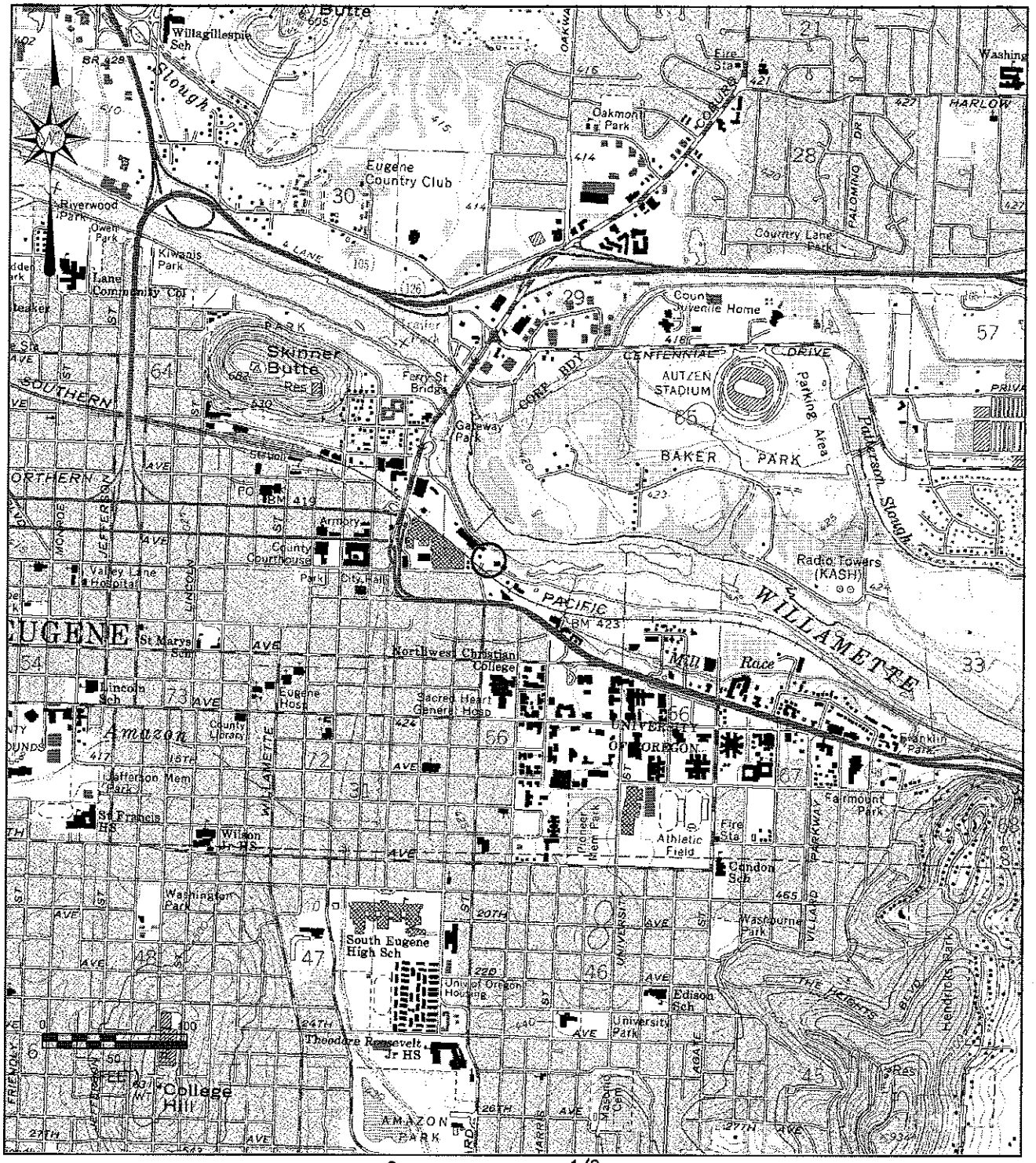
Squier Associates, Inc., Work Plan for Remedial Investigation. 1992.

Squier Associates, Inc., Environmental Investigations Through August 1993, Riverfront Research Park, UO. September 1993.

Bergeson-Boese & Associates, Inc., Subsurface Investigation, Western Parcel, for UO Riverfront Research Park. September 1998.

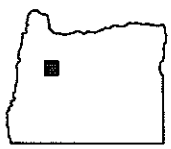
Bergeson-Boese & Associates, Inc., Summary of Additional Site Investigation, Area P-A of the Western Parcel, for UO Riverfront Research Park. May 2006.

Ninyo & Moore, Subsurface Assessment Report, UO West Research Park, Proposed Oregon Research Institute. December 2008.



SITE

Figure 1



OREGON

SOURCE: USGS TOPOGRAPHIC QUADRANGEL
SERIES: 7.5 MINUTES; EUGENE EAST, OREGON

UNIVERSITY OF OREGON RIVERFRONT RESEARCH PARK

SITE LOCATION MAP

Bergeson-Boese & Associates, Inc.
Comprehensive Environmental Services

32986 Roberts Court
Coburg, Oregon 97408
(541) 484-9484

25195 SW Parkway Ave., Suite207
Wilsonville, Oregon 97070
(503) 570-9484

Job Code:	UO01RIFS.04HW
File:	UO01RIFS.04HW.FIG1
Scale:	As Noted
Drawn:	Mark Riedel-Bash
Checked:	Dan Mumford
Date:	2/12/09

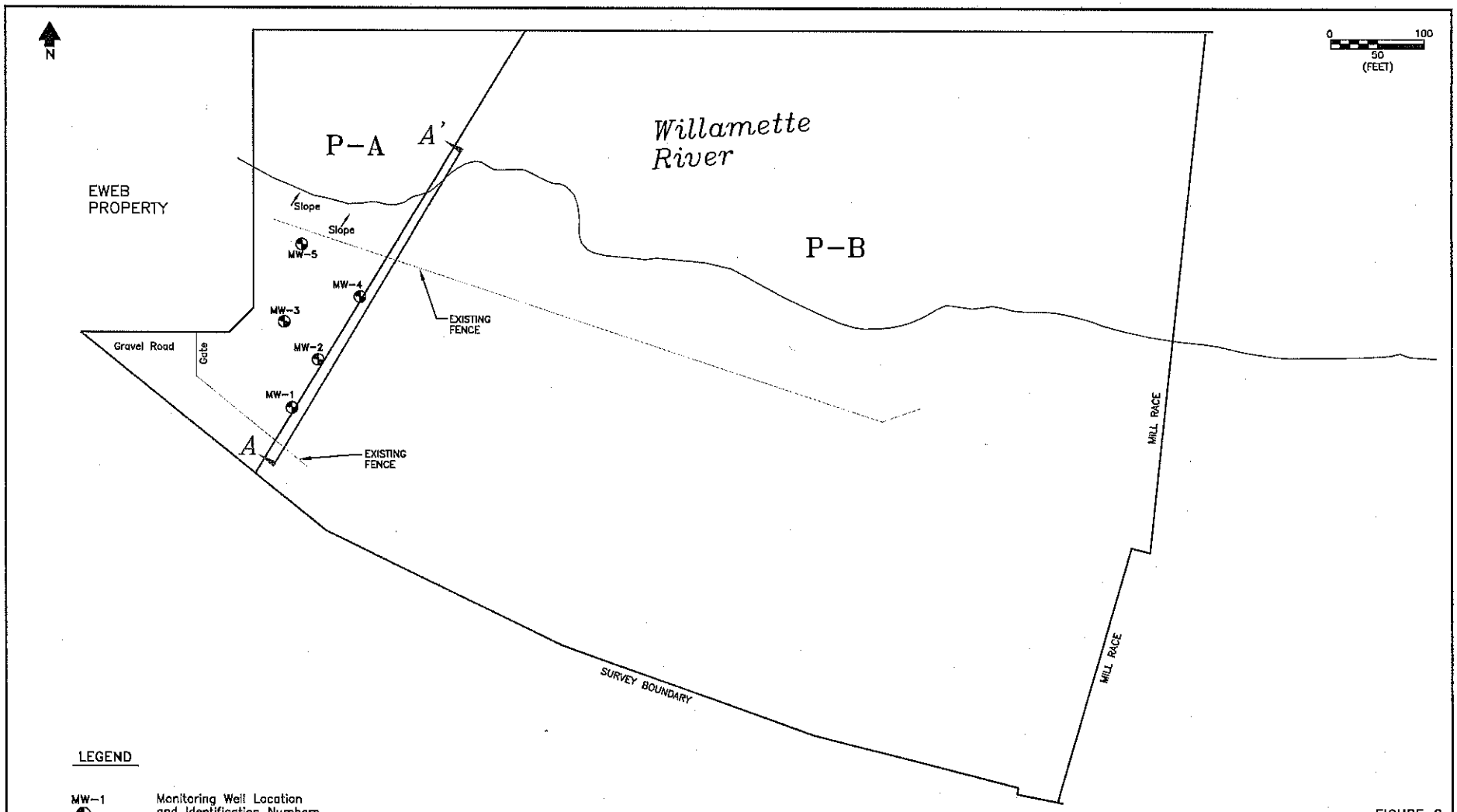


FIGURE 2

RIVERFRONT RESEARCH PARK, Eugene, OR

SITE PLAN OF WESTERN PARCEL AREA

Bergeson-Boese & Associates, Inc.
Comprehensive Environmental Services
32988 Roberts Court
Coburg, Oregon 97408
(541) 484-9484
28195 SW Parkway Ave., Suite207
Wilsonville, Oregon 97070
(503) 570-9484

Job Code: U001	
CADD File: U001	
Scale: 1"=100'	
Drawn: KATHYRN DAVIS DESIGNS.	
Checked: DAN MUMFORD	
Date: 06/02/08	

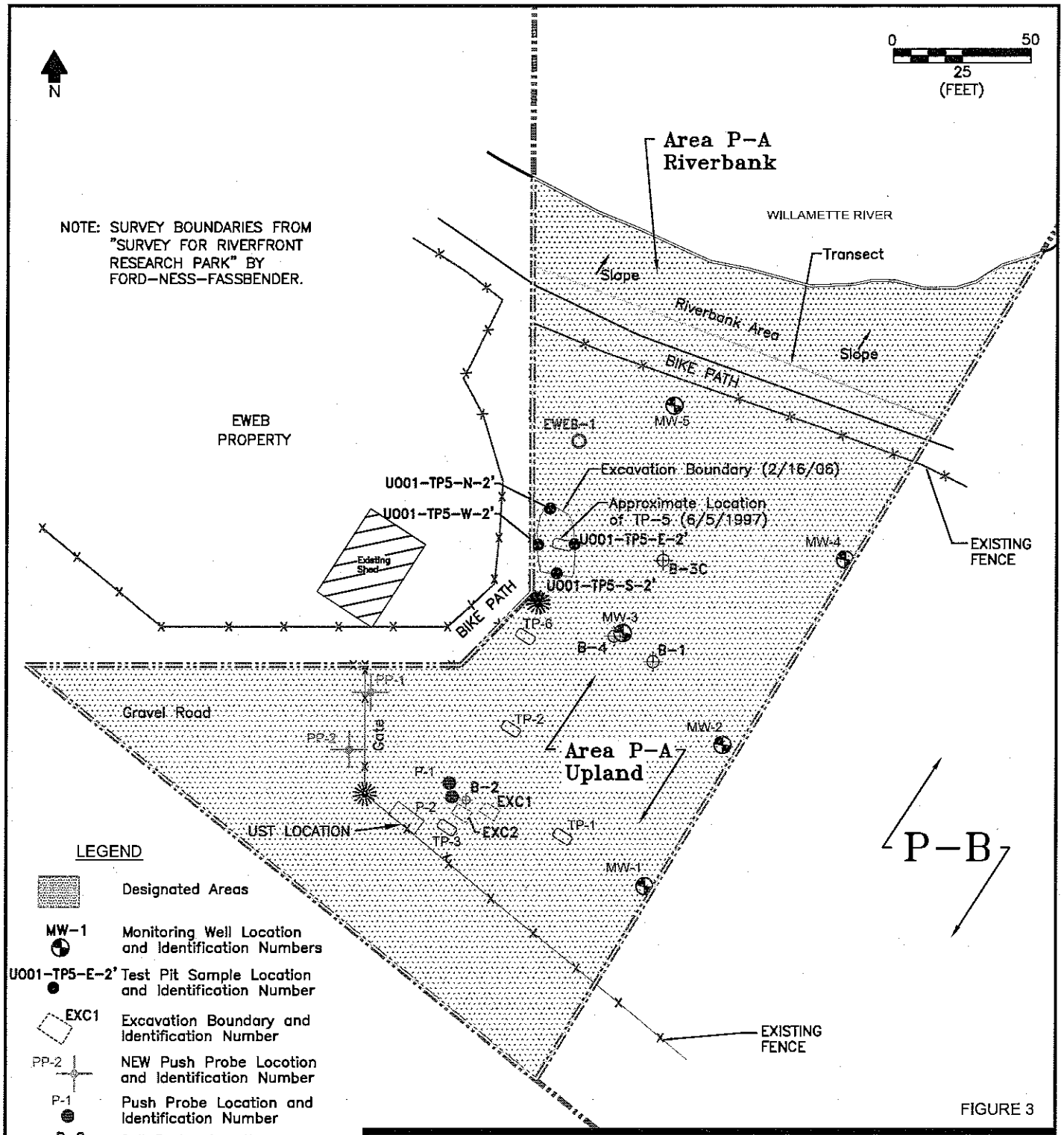


FIGURE 3

RIVERFRONT RESEARCH PROJECT, Eugene, OR

SITE PLAN FOR AREA P-A UPLAND & AREA P-A RIVERBANK

Bergeson-Boese & Associates, Inc.
Comprehensive Environmental Services
32986 Roberts Court
Coburg, Oregon 97408
(541) 484-9484
25195 SW Parkway Ave., Suite207
Wilsonville, Oregon 97070
(503) 570-9484

Job Code:	U001RIFS.04HW
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Checked:	DAN MUMFORD
Date:	02/11/09

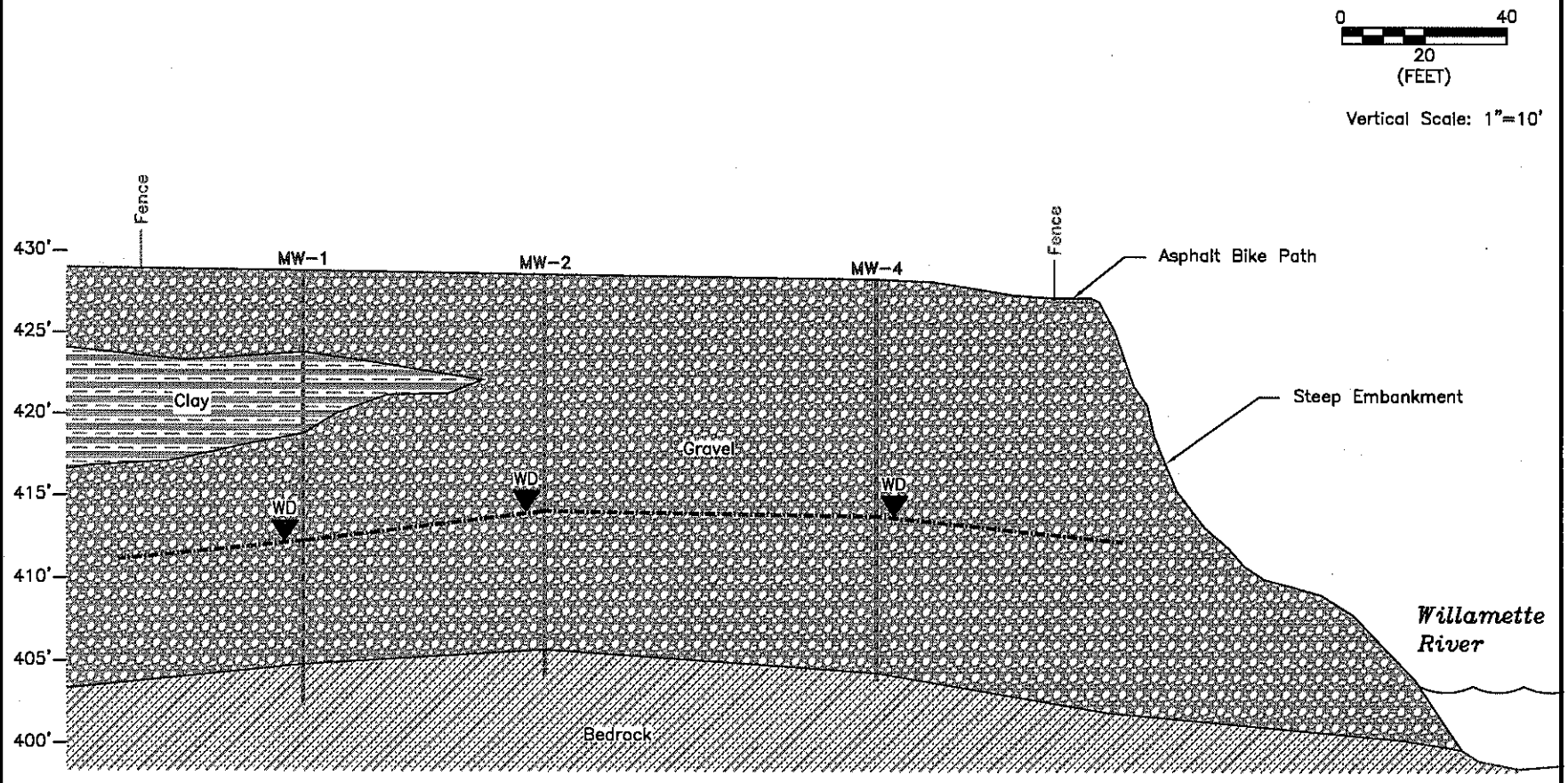


FIGURE 4

LEGEND

WD ▼ Depth to Water in borehole during drilling

RIVERFRONT RESEARCH PARK, Eugene, OR

CROSS SECTION A–A'

Bergeson-Boese & Associates, Inc.
Comprehensive Environmental Services
32986 Roberts Court
Coburg, Oregon 97408
(541) 484-9484
25195 SW Parkway Ave., Suite207
Wilsonville, Oregon 97070
(503) 570-9484

Job Code:	U001RIFS.04HW
CADD File:	U001RIFS.04HW
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Drawn:	KATHRYN DAVIS DESIGNS
Checked:	DAN MUMFORD
Date:	02/11/09

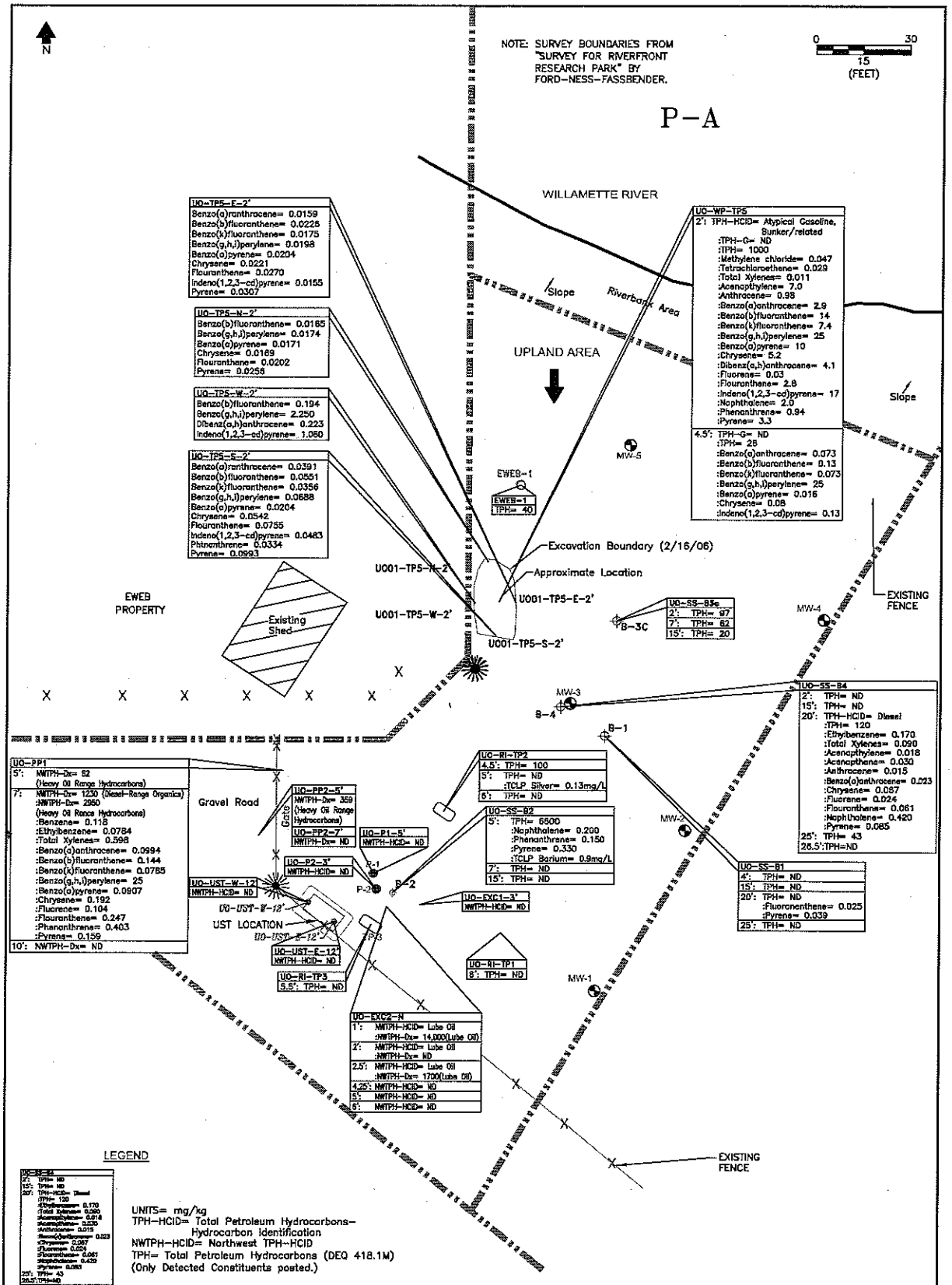


FIGURE 5

RIVERFRONT RESEARCH PROJECT, Eugene, OR

SITE PLAN WITH ANALYTICAL RESULTS FOR SOIL SAMPLES

Bergeson-Boese & Associates, Inc.
Comprehensive Environmental Services
32585 Roberts Court, Coburg, Oregon 97408 (541) 484-9484
25195 SW Parkway Ave., Suite207, Wilsonville, Oregon 97070 (503) 570-9484

Job Code:	UO01RIFS.04HW
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Checked:	DAN MUMFORD
Date:	08/02/08

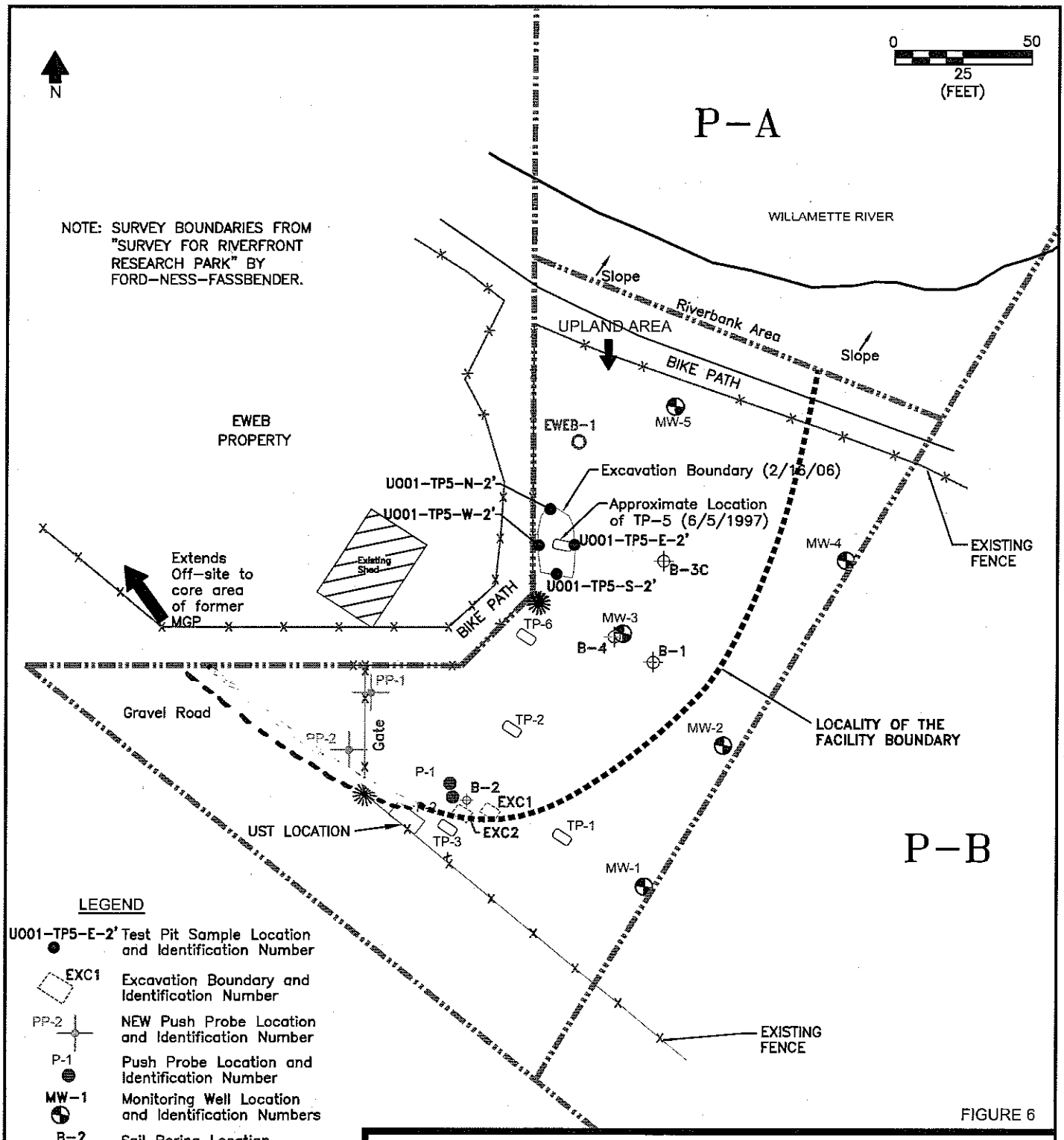


FIGURE 6

RIVERFRONT RESEARCH PROJECT, Eugene, OR

LOCALITY OF THE FACILITY (UPLAND AREA)

Bergeson-Boese & Associates, Inc.
Comprehensive Environmental Services
32986 Roberts Court
Coburg, Oregon 97408
(541) 484-9484
25195 SW Parkway Ave., Suite207
Wilsonville, Oregon 97070
(503) 570-9484

Job Code:	U001RIFS.04HW
CADD File:	U001RI.95U
Scale:	1"=50'
Drawn:	KATHRYN DAVIS DESIGNS
Checked:	DAN MUMFORD
Date:	06/02/08

Table 1. Summary of Analytical Results for Soil Samples in Area of Former Service Shop, Scale House, and West Gate

TPH = Total Petroleum Hydrocarbons
SM = Standard Method
NWTPH = Northwest Total Petroleum Hydrocarbons method
HCID = Hydrocarbon Identification
Dx = Diesel and Extended Range
VOC = Volatile Organic Compounds
BTEX = Benzene, toluene, ethylbenzene, and total xylenes
PAHs = Polynuclear Aromatic Hydrocarbons
ND = Not detected at or above laboratory method reporting limit
RBC = Most stringent Risk-Based Concentration applicable to site
NE = Not established
Shaded where not analyzed

	TPH SM 418.1M (mg/kg)	NWTPH -HCID	NWTPH-Dx (mg/kg)		VOCs or BTEX (µg/kg)	PAH results and RBCs (µg/kg)	PCBs	Leachable Heavy Metals (mg/l)
			Diesel	Heavy Oil				
UO-SS-B2-5'	6600				ND	Naphthalene – 200 (RBC = $26X10^3$) Phenanthrene – 150 (RBC NE) Pyrene – 330 (RBC = $6.7X10^6$)	ND	Ba – 0.9
UO-SS-B2-5'	ND							
UO-SS-B2-15'	N7							
UO-RI-TP1-6'	ND							
UO-RI-TP2-4.5'	100							Ag – 0.13
UO-RI-TP2-5'	ND							
UO-RI-TP2-6'	ND							
UO-RI-TP3-5.5'	ND							
UO-P1-5'	ND							
UO-P1-5'	ND							
WP-EXC1-3'		ND						
WP-EXC2-N-1'		Lube Oil	ND	14000	ND		ND	ND
WP-EXC2-N-2'		Lube Oil	ND	ND				
WP-EXC2-N-2.5'		Lube Oil	ND	1700				
WP-EXC2-N-4.25'		ND						
WP-EXC2-N-5'		ND						
WP-EXC2-N-6'		ND						

Table 1. Summary of Analytical Results for Soil Samples in Area of Former Service Shop, Scale House, and West Gate (continued)

TPH = Total Petroleum Hydrocarbons
SM = Standard Method
NWTPH = Northwest Total Petroleum Hydrocarbons method
HCID = Hydrocarbon Identification
Dx = Diesel and Extended Range
VOC = Volatile Organic Compounds
BTEX = Benzene, toluene, ethylbenzene, and total xylenes
PAHs = Polynuclear Aromatic Hydrocarbons
ND = Not detected at or above laboratory method reporting limit
RBC = Most stringent Risk-Based Concentration applicable to site
NE = Not establishedShaded where not analyzed

	TPH SM 418.1M (mg/kg)	NWTPH -HCID	NWTPH-Dx (mg/kg)		VOCs or BTEX Results and RBCs (µg/kg)	PAH Results and RBCs (µg/kg)
			Diesel	Heavy Oil		
UO-PP1-5'			ND	62		
UO-PP1-7'			1230	2950	Benzene – 118 (RBC = 1,200) Ethylbenzene – 78.4 (RBC = 12,000) Total Xylenes – 598 (RBC = $19X10^6$)	Benzo(a)anthracene – 99.4 (RBC = 21,000) Benzo(b)fluoranthene – 144 (RBC = 21,000) Benzo(k)fluoranthene – 78.5 (RBC = 210,000) Benzo(a)pyrene 0.0907 (RBC = 2,100) Chrysene – 0.192 (RBC = $2.1X10^6$) Fluoranthene – 247 (RBC = $8.9X10^5$) Fluorene – 104 (RBC = $12X10^6$) Pyrene – 159 (RBC = $6.7X10^6$) Phenanthrene – 403 (RBC NE)
UO-PP1-10'			ND	ND		
UO-PP2-5'			ND	ND		
UO-PP2-7'			ND	ND		

Table 2. Summary of Area P-A Groundwater Sample Results –Exploratory Borings

Units = µg/L (ppb)
ND = Not detected at or above the laboratory method reporting limit
Only PAH compounds detected in groundwater samples are included in this table.

COMPOUND	UO-B1-H2O (15 ft.)	UO-B1-H2O-2 (20 ft.)	UO-B1-H2O-3 (Dup.)	UO-B2-H2O (15 Ft.)	UO-B3C-H2O	UO-B4-H2O (15 Ft.)	UO-B4-H2O (20 Ft.)	RBC
Benzene	ND	3.8	4.1	ND	ND	ND	8.4	1,700
Toluene	ND	ND	ND	ND	ND	ND	12	9,100
Ethylbenzene	ND	5.9	7.0	ND	ND	ND	790	4,200
Xylenes	ND	5.4	4.4	ND	ND	ND	780	22,000
Naphthalene	ND	120	100	ND	ND	0.5	3,800	470
Acenaphthene	ND	ND	ND	ND	ND	ND	ND	230
Acenaphthylene	ND	ND	ND	ND	ND	0.34	ND	NE
Fluorene	ND	1.3	1.3	ND	ND	ND	34	14,000
Fluoranthene	ND	1.1	1.0	ND	ND	ND	50	9,600
Anthracene	ND	0.36	0.36	ND	ND	ND	ND	79,000
Pyrene	ND	1.7	1.7	ND	ND	ND	70	5,800
Chrysene	ND	2.4	1.8	ND	ND	ND	68	910
Benzo(a)pyrene	ND	ND	ND	ND	ND	ND	ND	0.53
Benzo(g,h,i)perylrene	ND	ND	ND	ND	ND	ND	ND	NE
Benzo(a)anthracene	ND	ND	ND	ND	ND	ND	26	9.1

Table 3. Summary of Area P-A Groundwater Sample Results –Groundwater Monitoring Wells UO-MW-1, UO-MW-2, and UO-MW-4

Units = µg/L (ppb)
ND = Not detected at or above the laboratory method reporting limit
Only PAH compounds detected in September 1997 samples from groundwater monitoring wells UO-MW-3 and UO-MW-5 are included in this table.

COMPOUND	997-UO-001 (MW-1)	997-UO-002 (MW-2)	997-UO-004 (MW-4)
Benzene	ND	ND	ND
Toluene	ND	ND	ND
Ethylbenzene	ND	ND	ND
Xylenes	ND	ND	ND
Naphthalene	ND	ND	ND
Fluorene	ND	ND	ND
Fluoranthene	ND	ND	ND
Anthracene	ND	ND	ND
Pyrene	ND	ND	ND
Chrysene	ND	ND	ND
Benzo(a)anthracene	ND	ND	ND
Indeno(1,2,3-cd) pyrene	ND	ND	ND

Table 4. Summary of Area P-A Groundwater Sample Results – Groundwater Monitoring Wells UO-MW-3 and UO-MW-5

Units = µg/L (ppb)
ND = Not detected at or above the laboratory method reporting limit J = Estimated value (non-quantitative)
RBC = groundwater in excavation RBC >s= RBC is greater than the theoretical saturation point for this compound in water

Compound	UO-MW-3								UO-MW-5								RBC
	Sept. 1997	April 1998	July 1998	Oct. 1998	January 1999	July 1999	January 2000	June 2004	Sept. 1997	April 1998	July 1998	Oct. 1998	January 1999	July 1999	January 2000	June 2004	
Benzene	4.2	ND	141	5.35	ND	1.74	16.4	ND	9.7	ND	10.5	18.2	ND	9.78	0.839	3.37	1700
Toluene	21	ND	434	60.8 J	ND	4.44 J	24.0	ND	2.4	ND	ND	ND	ND	ND	ND	ND	210000
Ethylbenzene	260	107	170	116	3.9	41.1	62.0	43.6	450	564	710	654	612 J	734	11.8	52.0	4400
Xylenes	310	398	463	187	9.61	37.8	148	93.2	44	38.6	71.8	69.6	57.6 J	53.1	11.1	11.6	23000
Acenaphthene	ND	0.574	317	ND	0.103	1.08 J	1.17	0.428	ND	ND	ND	6.3	ND	ND	2.42	8.54	>s
Acenaphthylene	ND	2.8	ND	ND	ND	0.623	0.724	0.250	ND	ND	ND	ND	ND	ND	0.369	ND	ne
Anthracene	ND	0.23	ND	0.227	ND	0.164	0.249	0.109	2.0	1.17	ND	ND	ND	0.169	0.278	1.14	>s
Benz[a]anthracene	ND	ND	ND	ND	ND	ND	ND	ND	1.0	ND	ND	ND	ND	ND	ND	ND	9.1
Benzo[a]pyrene	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	**1.08**	0.53
Benzo[b]fluoranthene	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	>s
Benzo[ghi]perylene	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	>s
Benzo[k]fluoranthene	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	>s	>s
Chrysene	4.0	ND	ND	ND	ND	ND	ND	0.106	3.0	ND	ND	ND	ND	ND	ND	ND	>s
Dibenz(a,h]anthracene	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ne
Fluoranthene	ND	0.279	ND	0.255	ND	0.186	0.273	0.224	3.0	0.75	ND	ND	ND	0.267	0.250	2.46	>s
Fluorene	7.0	0.887	ND	ND	ND	0.572	0.868	0.345	8.0	ND	ND	ND	ND	0.165	1.22	4.41	>s
Indeno[1,2,3-cd]pyrene	1.0	BD	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	>s
Naphthalene	**660**	**1350**	151 J	256	ND	38.4 J	66.8	ND	**870**	**2050**	**1400**	**1440**	**8500**	1.15	**577**	18.4	500
Phenanthrene	ND	0.62	ND	0.705	ND	0.358	0.446	ND	ND	7.5	ND	ND	ND	0.85	1.59	4.50	ne
Pyrene	3.0	0.385	ND	0.353	ND	0.294	0.329	0.426	**4.0**	1.06	ND	ND	0.749	0.496	0.306	4.07	>s

Table 5. Summary of Area P-A Groundwater Sample Results – October 2008

Units = µg/L (ppb)
ND = Not detected at or above the laboratory method reporting limit
RBC = Groundwater in Excavation RBC
NE = Not established
Only PAH compounds detected in groundwater samples from exploratory borings plus phenanthrene included

COMPOUND	MW-1	MW-2	MW-3	MW-4	MW-5	RBC
NWTPH-Gx	ND	ND	288	ND	693	
NWTPH-Dx	ND	ND	1150	ND	1540	22,000
Benzene	ND	ND	ND	ND	4.76	1,700
Toluene	ND	ND	ND	ND	ND	210,00
Ethylbenzene	ND	ND	28.1	ND	30.8	4,400
Xylenes	ND	ND	15.06	ND	15.31	23,000
Naphthalene	ND	ND	38.5	ND	7.22	500
Acenaphthene	ND	ND	0.749	ND	1.56	>s
Acenaphthylene	ND	ND	0.316	ND	0.121	NE
Fluorene	ND	ND	0.465	ND	0.467	>s
Fluoranthene	ND	ND	0.155	ND	0.176	>s
Anthracene	ND	ND	0.138	ND	0.0996	>s
Pyrene	ND	ND	0.467	ND	0.448	>s
Phenanthrene	ND	ND	ND	ND	0.250	NE
Chrysene	ND	ND	ND	ND	ND	>s
Benzo(a)pyrene	ND	ND	ND	ND	ND	0.53
Benzo(g,h,i)perylrene	ND	ND	ND	ND	ND	NE
Benzo(a)anthracene	ND	ND	ND	ND	ND	9.1

Table 6. Soil Sample Results for Interim Removal Action

Units = mg/kg (ppm)
NE = Not established
Bold = Value exceeds RBC
RBC = Most stringent value from Appendix A of RBDM for Construction/Excavation Worker and Occupational Receptor Scenarios for contact with shallow soils, volatilization to outdoor air, and vapor intrusion into buildings

	Original Sample (1997)	Confirmation Samples (2006)				RBC
	UO-WP-TP5-2'	UO01-TP5-N-2'	UO01-TP5-W-2'	UO01-TP5-E-2'	UO01-TP5-S-2'	
Naphthalene	2	<0.0153	<0.157	<0.0146	<0.0297	26
Acenapthene	<0.200	<0.0153	<0.157	<0.0146	<0.0297	16,000
Acenaphthylene	7	<0.0153	<0.157	<0.0146	<0.0297	NE
Anthracene	0.98	<0.0153	<0.157	<0.0146	<0.0297	90,000
Benzo(a)anthracene	2.9	<0.0153	<0.157	0.0159	0.0391	21
Benzo(a)pyrene	**10**	0.0171	<0.157	0.0204	0.0562	**2.1**
Benzo(b)fluoranthene	14	0.0165	0.194	0.0226	0.0551	21
Benzo(ghi)perylene	25	0.0174	2.250	0.0198	0.0688	NE
Benzo(k)fluoranthene	7.4	<0.0153	<0.157	0.0175	0.0365	210
Chrysene	5.2	0.0168	<0.157	0.0221	0.0542	2,100
Dibenzo(a,h)anthracene	**4.1**	<0.0153	0.223	<0.0146	<0.0297	**2.1**
Fluoranthene	2.8	0.0202	<0.157	0.0270	0.0755	8,900
Fluorene	0.3	<0.0153	<0.157	<0.0146	<0.0297	12,000
Indeno(1,2,3-cd)pyrene	17	<0.0153	1.060	0.0155	0.0483	21
Phenanthrene	0.94	<0.0153	<0.157	<0.0146	0.0334	NE
Pyrene	3.3	0.0256	<0.157	0.0307	0.0993	6,700

Table 7. Evaluation of Potential Receptors

Receptor Scenario	Selected	Reason for Inclusion or Exclusion
Residential	No	Property is currently zoned for special and research development that does not include residential. Contiguous properties are also commercial or industrial in nature. No residential developments are within the close vicinity of the subject property. Future zone changes to the subject and contiguous properties are not considered likely.
Urban Residential	No	Property is currently zoned for special and research development that does not include residential. The size of the subject property buffers contiguous properties from the release. Future zone changes to the subject and contiguous properties are not considered likely.
Occupational	Yes	Current use of contiguous properties is for commercial/industrial activities. Future development will consist of commercial/research use. Future zone changes are not considered likely.
Recreational	Yes	Bike pathway.
Excavation Worker/ Construction Worker	Yes	Subsurface utilities are located in the area of the releases. Future construction activities at the subject property will be performed. Deep subsurface work at the far northwest corner of the Site is not reasonably likely.

Table 8. Summary of Conceptual Site Model Potential Exposure Pathways

Pathway	Potential Receptors	Exposure Potential		Comments
		Current Use	Future Use	
Incidental Ingestion, Inhalation, and Dermal Contact of Soil	Excavation and Construction Worker	Yes	Yes	Subsurface utilities are currently present to a depth of six (6) feet BLS. Future utility development is expected.
Volatilization of Soil Contaminants to Outdoor Air	Occupational	Yes	Yes	Residual TPH impact represents on-going source of volatile compounds.
Vapor Intrusion of Soil Contaminants to Indoor Air	Occupational	No	Yes	The Site is currently undeveloped. Future development may be near the areas of residual TPH soil impact.
Leaching of Soil Contaminants to Groundwater	None	No	No	Subject property connected with municipally-supplied potable water. Future development of shallow aquifer unlikely.
Vapor Intrusion of Groundwater Contaminants to Indoor Air	Occupational	No	Yes	The Site is currently undeveloped. Dissolved volatile contaminants are present in area of planned future development.
Volatilization of Groundwater Contaminants to Outdoor Air	Occupational	Yes	Yes	Dissolved volatile contaminants present in groundwater.
Ingestion and Inhalation from Tapwater	None	No	No	Subject property connected with municipally-supplied potable water. Future development of shallow aquifer unlikely.
Groundwater in Excavation	Construction/ Excavation Worker	No	Yes	Current utilities are above high groundwater level. Future utilities in the south portion of the subject property may extend to the water table. Future development of deep subsurface utilities in the vicinity of the northwest corner of the subject property is not reasonably likely due to setback requirements.

Table 9. Proposed the site RBCs for Detected COPC

RBC = Most stringent RBC for applicable exposure pathways and receptors
Applicable Exposure Pathways:

- SI Soil Ingestion, Dermal Contact, and Inhalation - Occupational
- VIB Vapor Intrusion of Contaminants to Indoor Air - Occupational Receptor
- C/W Direct Contact - Construction and/or Excavation Worker Receptor
- VOA Volatilization to Outdoor Air

>S = Concentration exceeds solubility of compound in water
NS = No RBC standard for this compound

COPC	Soil (mg/kg)		Groundwater (ug/l)	
	Soil RBC	Pathway	Groundwater RBC	Pathway
Diesel Range TPH	23,000	C/W	9,700	c/w
Benzene	1.2	VIB	1,700	C/W
Toluene	24,000	C/W	200,000	C/W
Ethylbenzene	12	C/W	4,200	C/W
Xylenes	19,000	C/W	22,000	C/W
Acenaphthene	16,000	C/W	25,000	c/w
Acenaphthylene	NS		NS	
Naphthalene	26	VOA	470	C/W
Fluorene	12,000	C/W	14,000	c/w
Fluoranthene	8,900	C/W	9,600	c/w
Anthracene	90,000	C/W	79,000	c/w
Pyrene	6,700	C/W	5,800	c/w
Chrysene	2,100	C/W	910	c/w
Benzo(a)pyrene	2.1	C/W	0.53	C/W
Benzo(b)fluoranthene	21	C/W	5.2	c/w
Benzo(a)anthracene	21	C/W	9.1	C/W
Benzo(g,h,i)perylene	NS		NS	
Benzo(k)fluoranthene	210	C/W	49	c/w
Ideno(1,2,3-cd)pyrene	21	C/W	2.9	c/w
Dibenzo(ah)anthracene	2.1	C/W	0.21	C/W

Oregon
Theodore Kulongoski, Governor

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October 29, 2010

Diane Wiley
University of Oregon Riverfront Research Park
1276 University of Oregon
Eugene, Oregon, 97403-1276

Regarding: **Conditional No Further Action Determination**
UO Riverfront Research Park
Western Parcel P/A - Upland
Eugene, Oregon
ECSI 1018

Dear Ms. Wiley:

Based on our review of ECSI File 1018, the Department of Environmental Quality (DEQ) has determined that no further action is required at the Site. Our review of the available information is summarized in the attached Staff Memorandum. Our determination is based on the regulations and facts as we now understand them, including but not limited to the following:

1. Historical operations at the site resulted in the release of petroleum products and byproducts of a manufactured gas plant on the western margin of the site resulted in soil and groundwater contamination.
2. The University of Oregon removed shallow contaminated soils on the western portion of the site. Some soil contaminants remain, however not at concentrations that pose a risk to future site workers or construction workers.
3. Groundwater monitoring activities demonstrated that groundwater contaminants are limited to the western portion of Parcel P/A.
4. Groundwater contaminants pose a potential risk to future excavation/construction workers. No other unacceptable risks are present on the upland portion of Parcel P/A.
5. DEQ determined that the risks to future excavation and construction workers could be easily managed by employing safe work practices, as documented in the attached Site Management Plan (SMP).
6. The U of O shall require all future construction companies and/or workers at the site to implement the site management plan.
7. With the implementation of the Site Management Plan, no unacceptable risk remains on the upland portion of the Western Parcel P/A and No Further Action will be required on the upland portion of the site.
8. This determination applies only to the upland portion of the site, as described in the attached Staff Report. The riverbank portion of the site will be addressed at a future time. The full rationale of this decision is presented in the attached Staff Report.

DEQ concludes that based on the information presented to date, the Site is currently protective of public health and the environment. The site requires no further action beyond the implementation of the SMP under the Oregon Environmental Cleanup Law, ORS 465.200 et seq., unless new or previously undisclosed information becomes available. We will update the Environmental Cleanup Site Information System (ECSI) database to reflect this decision.

The Riverfront Research Park property was placed on DEQ's Inventory of sites that have a confirmed release and need additional investigation on December 3, 1991 as required by ORS 465.225. The facility will remain on the Inventory as required by ORS 465.230(2) as long as the unacceptable risk at the site is controlled by engineering and institutional controls. We will update the Environmental Cleanup Site Information System (ECSI) database to reflect this decision.

If you have any questions about this letter, please contact Geoff Brown at (541) 686-7819.

Sincerely,

Paul S. Rosenberg, R.G.
Western Region Environmental Cleanup Manager

Attachments: Staff Memorandum
Site Management Plan

cc: Geoffrey Brown
Toby Scott, PBS

STAFF REPORT

CONDITIONAL NO FURTHER ACTION RECOMMENDATION

For the

AREA P-A UPLAND PORTION OF THE WESTERN PARCEL - RIVERFRONT RESEARCH PARK, UNIVERSITY OF OREGONEUGENE, OREGON

ECSI 1018

Prepared by:

Geoff Brown, Project Manager

Approved by:

12/29/10

Max Rosenberg, Western Region Environmental Cleanup Manager

Prepared by the

OREGON DEPARTMENT OF ENVIRONMENTAL QUALITY
Western Region Office
September 2009

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1. INTRODUCTION

Portions of this staff report were compiled by the University of Oregon, however the conclusions of the report represent the position of the Department of Environmental Quality. The documents upon which this staff report is based are listed in Appendix A (Administrative Record Index).

The University of Oregon (UO) conducted site investigation and cleanup activities between 1984 and 2006 at the Riverfront Research Park property located in Eugene, Oregon. In order to most efficiently address specific environmental concerns and issues associated with various parts of the Riverfront Research Park, the UO separated the property into several separate parcels.

Under an agreement with the Department of Environmental Quality's Voluntary Cleanup Program (DEQ) the UO has completed investigations and cleanup activities that have supported DEQ "no further action" (NFA) determinations for all but two areas. One of the remaining areas is referred to as the Power Plant Basement and is not addressed in this report. The second remaining area is described below.

The property described in this report is called the Western Parcel Area P-A. It encompasses a total area of 1.9 acres. The upland 0.9 acres of Area P-A is the subject of this report. Since additional assessment remains to be done on the Riverbank Sub-Area of Area P-A (Area P-A Riverbank), it will be part of a future decision document. The Figure 2 Site Plan illustrates Area P-A of the Western Parcel. Figure 3 illustrates the areas of Area P-A Upland and Area P-A Riverbank and presents the locations of many of the soil and groundwater samples from the site.

The majority of the site is currently fenced and consists of relatively flat graveled areas with limited grassy vegetation. The northern boundary includes an asphalt-paved path used for walking, running, and biking (bike path, also along the western boundary) and narrow grassy vegetation strip north of the bike path.

1.1 Scope and Role of the No Further Action Recommendation

The risk screening and recommended basis for a final determination on the site was developed in accordance with Oregon Revised Statutes (ORS) 465.200 et. seq. and Oregon Administrative Rules (OAR) Chapter 340, Division 122, Sections 010 through 115.

The recommendation for "no further action" is based on the administrative record for this Site. A copy of the Administrative Record Index is attached as Appendix A. This report summarizes the more detailed information contained in the various reports summarized in Appendix A.

2. SITE HISTORY AND DESCRIPTION

2.1 Site Location and Land Use

The site consists of a 0.9-acre lot. The property is located in the 700 block of E 8th Avenue, in Eugene, Oregon, with a legal description of T17S, R3W, Section 32, Tax Lot 5300, Lane County. The site is located in a mixed use area neighborhood encompassing commercial, industrial, office and residential, and recreations/park land uses.

Land immediately west of the site is used for Eugene Water and Electric Board (EWEB) operations and offices. Land to the south/southwest consists of mixed commercial, residential, and industrial uses, as well as the federal courthouse. The UO Riverfront Research Park owns the adjacent land to the east of Area P-A (i.e., Area P-B of the Western Parcel) as well as adjoining property east of Area P-B. Although the Western Parcel of the Riverfront Research Park is currently undeveloped, future development as office space and ancillary facilities (e.g., parking) is considered reasonably likely. The nearest residential development is approximately ¼-mile west of the Site. The Western Parcel is bounded to the north by the Willamette River.

The site is a relatively level area covered with unmaintained grassy vegetation, crushed rock and some additional small concrete pads and/or footings associated with former structures. The approximate ground elevation is 430 feet above mean sea level. A bike path/walkway separates the Site from the EWEB property to the west. Another bike path, oriented northwest/southeast is located near the boundary of the upland area with the riverbank area of the Site. The riverbank portion of the Site (Area P-A Riverbank) is located north of the site and consists of a steep bank with a narrow bench at its base at the shoreline of the Willamette River. A Union Pacific Railroad right-of-way forms the southern boundary of the site.

Currently, the site is not developed and is not being used. The bike paths crossing the northern part of the property and bounding the western part of Area P-A are used for recreational purposes and similar future uses of these features are expected.

The site is part of the Riverfront Research Park project that is a cooperative effort of the UO and private developers to build a university-related research park on a state-owned site adjacent to the university campus on the south bank of the Willamette River.

2.2 Physical Setting

2.2.1 Climate

Eugene receives approximately 50 inches of precipitation annually.[1] The majority of the precipitation falls between November and March, with monthly totals ranging from 0.6 to 8.5 inches. Precipitation totals for the remainder of the year are generally less than 3 inches per month. The average annual temperature is approximately 52°F.

2.2.2 Geology

Based on boring logs from investigations on the site and on EWEB property to the west, as well as test pits and other geotechnical borings completed nearby, three general geologic units underlie the site: fill, alluvium, and bedrock. These units are described in more detail below. A generalized cross section of the Site is presented in Figure 4. Note: Plan shows clay, gravel, and bedrock.

2.2.2.1 Fill

Fill materials underlying the site typically consist of variable mixtures of silt, sand, gravel, crushed rock, and bedrock rock fragments (e.g., sandstone). The fill is estimated to vary in thickness from four to 12 feet beneath the site , with increasing thickness toward the break in slope toward the Willamette River.

2.2.2.2 Alluvium

Coarse-grained alluvial deposits underlie the fill and range in thickness from approximately 10 to 15 feet beneath the site. The alluvium is dominated by a basal, coarse-grained, silty sandy gravel unit in contactt with the underlying bedrock. The lower portion of the alluvium is saturated with shallow groundwater.

---

[1] Climatography of the United States No. 81 Monthly Station Normals of Temperature, Precipitation, and Heating and Cooling Degree Days 1971-2000, Oregon. U.S. Department of Commerce, National Oceanic and Atmospheric Administration (NOAA), National Environmental Satellite, Data, and Information Services (NESDIS) and national Climatic Data Center (NCDC), 2002.

2.2.2.3 Sandstone Bedrock

A fine-grained, tan to greenish-brown sandstone bedrock underlies the site at depths ranging from around 23–26 feet below land surface (BLS). The bedrock is locally weathered and is dry to moist. The bedrock underlies all areas beneath and surrounding the site, and is visible to the northeast where it crops out to form the bed of the Willamette River as well as other areas.

The bedrock represents the Eugene Formation of Oligocene age, recognized regionally in the literature (USGS 1973). Logs of wells completed in the area indicate that the bedrock is at least 420 feet thick in the study area and regional geologic studies indicate that the Eugene Formation may be up to 15,000 feet in total thickness (USGS, 1973).

2.2.3 Hydrogeology and Groundwater Flow

2.2.3.1 Hydrogeology

Regional descriptions of the bedrock formation indicate that it generally yields little water to wells and that available water is typically of poor quality and often saline (USGS 1973). Deeper sections of the bedrock may contain hydraulically productive zones. However, most groundwater production in the region occurs from alluvial systems in central portions of the Willamette Valley, and these areas are hydraulically isolated and separate from the limited shallow groundwater zone beneath the Site.

The bedrock beneath the site consists of dry or moist sandstone that is expected to retard vertical groundwater movement based on regional information and observations during drilling activities at and near the site. These hydraulic characteristics of the bedrock strongly contrast with the loose and highly permeable nature of the overlying alluvium. Shallow groundwater occurs beneath the site within the coarse-grained and unconsolidated alluvial deposits and fill present above the older consolidated sandstone bedrock.

Field observations and the contrast in relative permeability between the alluvium and the bedrock indicate that the shallow groundwater beneath the locality of the facility may be considered perched water, which is generally isolated from any deeper groundwater systems.

The thickness of the uppermost saturated interval within the alluvium ranges from approximately three to 12 feet and varies with location and season. The thickness of the uppermost saturated interval tends to be greater and exhibit less seasonal variation beneath the southern part of the site, near groundwater monitoring wells MW-1, MW-2, and MW-3. The saturated interval thins to the north toward the Willamette River and exhibits a steeper hydraulic gradient in the riverbank area.

2.2.3.2 Groundwater Flow

The shallow groundwater flows north-northeast beneath the site and ultimately discharges to the Willamette River. Groundwater elevation data collected from the Site indicate that the shallow groundwater flow directions and gradients are generally consistent through all seasons, but elevations vary somewhat. Depth-to-water beneath Area P-A ranges from approximately 10 to 20 feet below ground surface and varies with location and season. As expected, the highest groundwater levels are observed in the winter and early spring during the period of highest precipitation, and the lowest levels in the late summer and fall.

The groundwater levels in the shallow alluvial system fluctuate generally with changing stages of the Willamette River; which, in turn, are strongly controlled by upstream dam discharges. These changes may result in periodic variable flow direction or stagnant flow conditions locally along the river.

2.2.4 Surface Water and Stormwater Features

The site is bound on the north by the Willamette River, which flows in a northwesterly direction. No other surface water features are present within the site.

Stormwater runoff from the site is conveyed by overland sheet flow and no stormwater is currently directly conveyed by gutters, ditches, or drains.

2.2.5 Groundwater and Surface Water Beneficial Use Determination

Beneficial uses for the water-bearing zone beneath the property west of Area P-A was evaluated as part of a Remedial Investigation (RI) performed by EWEB that included Area P-A and the nearby Willamette River. The Beneficial Use Determination concluded the following:

- No drinking water wells are located at the Site or within ¼ mile, nor are any future nearby wells reasonably likely. All domestic use water within that distance is provided by EWEB. No future domestic use of the underlying aquifer is reasonably likely.

- One historical non-contact cooling water intake on the Willamette River is located near the Site; two irrigation water intakes are located approximately one mile downstream of the Site. There is no known nearby domestic use of water from the Willamette River.

- Groundwater discharging to surface water is the only known beneficial use of the aquifer. Groundwater from the Site discharges to the Willamette River.

- Beneficial uses of the Willamette River in the area of the Site include habitat, recreation, irrigation, and aesthetic value.

The site is currently undeveloped. Reasonably likely future use of the site is research park office space and public recreational use, which is restricted to activities along the bike path. Other properties in the area are expected to remain public lands, multi family residential, and industrial. Conditions at the site are unlikely to preclude any of these uses for nearby properties.

One beneficial use that is not addressed in this document is the discharge of contaminated groundwater from the site to the river. Based on assessment efforts to date, no upland cleanup action will be required to protect ecological receptors along the river, as the risk posed to wildlife by site-related contaminants is extremely low. This exposure pathway will be evaluated along with the rest of the Riverbank Sub-Area of Area P-A at a later date.

2.3 Site Operations

2.3.1 Former Eugene Sand and Gravel Operations

Historically, Area P-A was part of an aggregate quarry formerly owned and operated by Eugene Sand and Gravel Company. Use of the Western Parcel occurred as early as 1900, though the timing of when such operations began is not known. Eugene Sand and Gravel Company operations included gravel screening, sediment settling, a concrete batch plant, and pre-form concrete products. Eugene Sand and Gravel Company also installed two tanks in the southeast part of the site that were used for storage and dispensing of petroleum motor fuel(s). The aggregate and concrete products operations also included a service/maintenance shop which is believed to have been located in the southwestern part of the Western Parcel, possibly within the site.

The UO acquired the Western Parcel in 1968 and subsequently removed remaining buildings and equipment from the property. Between 1975 and June 1990 the site was included in property leased to the Eugene Water and Electric Board (EWEB). EWEB stored transformers in the northern part of the site. EWEB also stored utility poles and waste oil on Area P-B. These materials were subsequently removed from the Western Parcel and Parcels P-A and P-B have remained vacant and undeveloped. EWEB used waste oil to treat concrete forms used to build utility vaults on this portion of the property.

2.3.2 Former Eugene Manufactured Gas Plant

Core operations of a former manufactured gas plant (MGP) were mostly located off-site on the property to the west of the site. The eastern edge of the former MGP operations occurred beneath the west end of the site.

The former MGP was constructed in 1906 as a coal carbonization process facility and operated in that mode from approximately 1907 until 1910, when it was converted to a carbureted water-gas plant. The early plant consisted of coal gas benches positioned inside a rectangular structure located on the contiguous property west of the site. Other early plant structures included the relatively small gas holder, also located on the contiguous property to the west of Area P-A. The plant was expanded and converted to the water-gas operation in 1910–11. A two-story brick and steel building referred to as the main brick building was constructed in the central portion (core area) of the former MGP and housed water-gas units. Other structures reportedly erected in 1910–11 included the large gas holder (the original holder was converted to a relief holder), coke shed, meter and office buildings, aboveground oil storage tanks, underground ammonia well/tar well structure (tar tank) and oxide platform, and aboveground purifiers (Byllesby & Company 1918). The plant was used to manufacture gas until approximately 1950, when it was converted for the storage and supply of propane-air gas.

2.3.3 Areas of Investigation

The site has not been used for any operations or for storage of equipment and/or materials since June 1990 at the termination of EWEB's lease. Environmental investigations of the site have been completed to evaluate former facilities and operations that represent areas of potential existing releases or past releases. Specific areas of investigation on the site are described below.

2.3.3.1 Former Transformer Storage Area

EWEB stored unused transformers in the northern part of the Site. Transformers were drained off-site prior to storage and soil samples were collected to confirm that the transformers did not leak. In 1990 a composite soil sample was collected from the transformer storage area. The sample was analyzed for polychlorinated bi-phenyls (PCBs) and total petroleum hydrocarbons (TPH). No PCBs were detected in the sample. A concentration of 40 mg/kg of TPH was reported for the analysis, which was attributed to former dust suppression practices.

In October 2008, two soil samples were collected in the former transformer area to verify the previous results were representative of current conditions. One sample contained 209 mg/kg

diesel range TPH, and 150 mg/kg heavy oil range TPH. The second sample did not detect any TPH compounds. Neither sample contained any detectable PCBs.

2.3.3.2 Underground Storage Tanks

A 1990 Environmental Site Assessment identified the possible historical presence of two fuel tanks, either underground or above ground, at the southwest corner of the Western Parcel. The 1990 ESA report also noted that fuel tanks and pumps were previously located near the southwest corner of the property, outside of the fenced area.

In 2001, a fuel product line was encountered during completion of test pits excavated to investigate the extent of impact to shallow soils in the vicinity of the former service shop and scale house. Further investigation of the fuel product line was performed using a magnetic locator. The magnetic locator found indications of a truck scale and the fill spout of an abandoned UST. The depth of the UST was 11 feet below land surface (BLS) and the top of the UST was at three feet BLS. The empty UST was estimated to have a storage capacity of at least 5,000 gallons and was most likely abandoned in-place prior to the regulatory requirements to register USTs.

The abandoned UST was permanently decommissioned by removal on June 7, 2001, and confirmation soil samples were collected from native soils beneath each end of the former UST. The confirmation soil samples were analyzed for TPH identification using Northwest Method NWTPH-HCID. No gasoline-range, diesel-range, or heavier oil-range petroleum hydrocarbons were detected in the samples at concentrations above respective laboratory method reporting limits (MRLs). Additional test pits were excavated south of the scale house foundation, but no indication of an additional UST was detected (see also section 2.3.3.2).

No other USTs were identified on the site, despite investigations involving test pits and a geophysical survey.

2.3.3.3 Former Service Shop, Scale House, and West Gate

Eugene Sand and Gravel structures included a service shop for the repair and maintenance of vehicles and equipment located at the southwest corner of the Western Parcel, a truck scale and several other structures. Copies of 1964 and 1968 Sanborn Fire Insurance Maps for the site identify a scale house with "gas and oil" in the area of the former truck scale (and UST discussed in section 2.3.3.2). In addition, an office with "gas and oil" is identified southeast of the truck

scale. A large building located east of the office building is identified as a truck repair building with "oil and grease" storage, a tire repair area, and an oil and equipment parking area.

Near surface soil impact characterized by discontinuous layers contaminated with used oil was detected in the southern part of the site. The impact may have been associated with the scale house and shop area operated by Eugene Sand and Gravel Company as part of the former operations, or with periodic road oiling of the historical gravel road over time.

Waste oil contamination was noted near the former service shop and scale house (near B-2 on Figure 3). Waste oil contamination was limited to the top four feet of shallow soil, beneath which was clean soil, indicating a limited vertical impact. The worst-case soil sample contained 6,600 ppm total petroleum contamination, with low levels of PAHs. No VOCs, PCBs, or leachable metals (except barium) were detected in the sample.

Additional heavy oil and diesel range contaminants were encountered in soils between five and seven feet below ground surface immediately adjacent to the gate on the west end of the property. Contamination did not extend to groundwater in this area and no VOCs or PAHs were detected above applicable DEQ risk based concentrations (RBC's, or generic cleanup levels[2]).

2.3.3.4 Former Suspected MGP-Related Wastes North of West Entrance Gate

Contaminated soil suspected to be associated with former MGP operations is present along the west property boundary. Historical investigations identified a small area containing heavy oil-range petroleum impact at approximately 1000 ppm. Soil impact in this area was limited to the top few feet. PAHs benzo(a)pyrene and dibenzo(a,h)anthracene exceeded risk based concentrations for site workers and construction/excavation workers. In 2006, UO removed approximately 33 tons of contaminated soil, and shipped it off-site for disposal. Post-cleanup confirmation samples contained no PAHs at concentrations exceeding applicable RBCs.

2.3.4 Contaminants of Potential Concern (COPC)

A Contaminant of Interest (COI) is any chemical that could be at a site based on the types of operations that occurred there or on analytical data indicating the chemical is present. If the

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[2] DEQ has generic cleanup levels for several types of land uses and activities. These include residential use, urban residential use, industrial/commercial (also known as "occupational") use, and construction and excavation work.

chemical is present, it is compared to DEQ generic risk-based concentrations. If a chemical exceeds risk based concentrations, it is considered a Contaminant of Potential Concern (COPC). If a chemical is identified as a COPC, some action must be taken, either a cleanup action or additional assessment of the risk posed by the chemical.

The following table presents the chemicals that were considered COI's or COPCs for the site.

Area	Contaminant of Interest	Contaminants of Potential Concern Soil	Contaminant of Potential Concern Groundwater
Former Transformer Storage Area.	Petroleum hydrocarbons PCBs	none	Benzo(a)pyrene
Fuel Storage Tank(s)	Petroleum Hydrocarbons VOCs PAHs	none	none
Former Service Shop, Scale House, and West Gate	Petroleum Hydrocarbons Metals VOCs PAHs	none	none
Former Suspected MGP-Related Wastes North of West Entrance Gate	Hydrocarbons VOCs PAHs Phenols Mercury Cyanide ammonia	Benzo(a)pyrene Dibenzo(a,h)anthracene	Naphthalene

3. RESULTS OF INVESTIGATIONS

3.1 Nature and Extent of Contamination

3.1.1 Soil

Soil contamination at the site is limited to localized areas on the west end of the site including the Former Transformer Storage Area, the Fuel Storage Tanks Area, the Former Service Shop,

Scale House, and West Gate, and the Former Suspected MGP-Related Wastes North of West Entrance Gate. Soil contamination in these areas is fairly limited both vertically and horizontally, as described in Sections 2.3.4.1-2.3.4.4. Soil contamination consists of hydrocarbons and PAHs, with only two PAHs, benzo(a)pyrene and dibenz(a,h)anthracene, exceeding RBCs for construction workers.

3.1.2 Groundwater

Periodic groundwater monitoring in five on-site monitoring wells from 1997-2008 indicated that groundwater beneath the northwest portion of the site contains petroleum hydrocarbons, VOCs, and PAHs. Two PAHs, benzo(a)pyrene and naphthalene, exceed RBCs for direct contact for construction/excavation workers during historical sampling events. No RBCs were exceeded in groundwater sampling that occurred during 2008. However, DEQ considers benzo(a)pyrene and naphthalene to exceed the RBC since we do not have four consecutive clean quarters for the chemicals.

3.1.3 NAPL

During the Initial Site Investigation of the former MGP conducted in 1995 by EWEB, 15 borings were completed off-site at the former MGP site, on property west of the site. Non-Aqueous Phase Liquids (NAPL, also referred to as "free product") as "blebs" in groundwater were observed in eight of the borings which indicated the presence of NAPL over much of the core area of the former MGP, including the eastern portion of the former MGP west of the site. Where encountered, NAPL was noted over much of the saturated gravel interval between the surface of the water table and the top of the underlying Eugene Formation bedrock.

NAPL occurs as Dense Non-Aqueous Phase Liquids (DNAPL), with specific gravity greater than water, and Light Non-Aqueous Phase Liquids (LNAPL), with a specific gravity less than water. LNAPL had been previously detected in monitoring well UO-MW-5 while DNAPL occurs in other off-site monitoring wells on the EWEB site.

Quarterly NAPL assessments were conducted by EWEB at groundwater monitoring wells UO-MW-5 on the site and off-site wells MW-4 and MW-5 located on adjacent EWEB property between May of 1998 and October of 2001. NAPL was initially encountered in all three (3) wells. No NAPL was observed at UO-MW-5 between September of 1998 and January of 2000 and NAPL assessment at this location was discontinued.

The LNAPL observed in UO-MW-5 does not pose an easily quantifiable risk, as there is no well developed methodology for evaluating risk from free product. However, the only potential

human health risk posed by the LNAPL beneath the site would be by direct contact to construction/excavation workers, who are also placed at risk by naphthalene and benzo(a)pyrene in the groundwater. The remedy that will be applied at the site to mitigate the risk from these chemicals will also protect construction or excavation workers from exposure to LNAPL.

3.2 Locality of the Facility

The locality of the facility (LOF) is defined in Oregon Cleanup Rules as "any point where a human or an ecological receptor contacts, or is reasonably likely to come into contact with, facility-related hazardous substances" (OAR 340-122-115[34]). The locality of the facility for a particular environmental medium includes both the current spatial extent of hazardous substances and the projected future extent, if chemicals are expected to migrate. Using chemical data generated during site investigation and routine groundwater monitoring, the LOF covers the majority of the site, with a strip along the boundary between Area P-A and Area P-B outside the LOF boundary. The LOF extends off-site to the west, on EWEB property, and includes the former MGP site. A site plan illustrating the on-site portion of the LOF is presented in Figure 6.

3.3 Risk Assessment

A risk screening was performed to evaluate the potential risks to human health and the environment, and to assist with evaluation of the need and, if required, potential options for remedial action at the Site. The risk assessment included a human health risk screening, an exposure assessment, a toxicity assessment, and an ecological assessment.

3.3.1 Human Health Risk Screening

A Conceptual Site Model (CSM) was developed to identify and evaluate potential exposure pathways between impacted media (e.g., soil and groundwater) and potential receptors (e.g., people working on the property) in the vicinity of the site. Contaminant concentrations for each environmental medium were compared with DEQ RBCs as screening values to determine which media and contaminants may pose potential risk to human health. RBCs for commercial and construction/excavation worker receptor scenarios were chosen as screening values since they are protective of current and future land use (including recreational uses). Other potential receptors within the LOF are recreational users who spend less time at the site than workers under the industrial and commercial scenarios.

3.3.1.1 Conceptual Site Model

The Conceptual Site Model (CSM) considers the contaminant source, the categories of people who could come into contact with contaminants, and how they could come into contact with contaminants in order to determine if a cleanup action must occur. Specific elements of the CSM are presented in the following sub-sections.

3.3.1.1.1 Potential Receptors

The subject property and contiguous properties are zoned public use and special development (i.e., research park) that includes development for commercial office space and research facility use. Given the primary land use of the subject property and in the general vicinity, an occupational exposure scenario is considered appropriate for this Site.

Subsurface utilities are located within the boundaries of the subject property. Shallow electric and steam lines (i.e., less than 10 feet deep) are located in the northern portion of the subject property. New utilities for the property development are anticipated to enter the property from the west along the gravel road at the south portion of the site. Excavation and construction workers could be exposed to residual contamination during excavation activities in the south and middle portions of the site.

Deeper excavation work (i.e. greater than 10 to 15 feet) in the vicinity of the northwest corner of the site near monitoring well UO-MW-5 is not considered reasonably likely due to setback rules cited in Eugene City Code for the Riverfront Research Park Special Development District.

According to EWEB, the existing electric and steam utility lines are well above the seasonal high groundwater level. Excavation and construction workers are considered to be potential receptors for soil contact under current and future conditions. Results of the potential receptor evaluation are summarized in Table 7.

3.3.1.1.2 Exposure Assessment

People can be exposed to chemicals at contaminated sites through a number of exposure pathways including direct contact with contaminated soil (e.g., incidental ingestion of soil or soil dust and skin contact during gardening or construction work), ingestion of contaminated

groundwater, and inhalation of vapors from the volatilization of contaminants present in soil or groundwater.

This exposure assessment evaluated current and reasonably likely future site use scenarios where humans might be exposed to contaminants in soil and groundwater. The exposure potential for each soil and groundwater exposure pathway is evaluated in the following subsections.

Incidental Ingestion, Inhalation, and Dermal Contact of Soil

Direct contact with residual contaminated soil may result in chemical intake from a variety of incidental exposure pathways. Since residual TPH soil impact was detected in areas less than three feet deep, the potential for incidental ingestion, inhalation, and dermal contact with subsurface contaminated soil is present for occupational receptors, excavation workers, and construction workers.

Volatilization of Soil Contaminants to Outdoor Air

Volatilization of soil contaminants to outdoor air is an indirect exposure pathway which evaluates the potential for volatile subsurface contaminants to impact outdoor air. Since there are volatile constituents in the soil, this pathway is considered complete.

Vapor Intrusion of Soil Contaminants to Indoor Air

This pathway evaluates the potential for volatile soil contaminants underlying a structure to impact indoor air quality. Since there are volatile constituents in the soil, this pathway is considered complete.

Leaching of Soil Contamination to Groundwater

Since groundwater is neither currently used as a source of potable water nor considered a likely future use of groundwater resources, the potential for leachate from soil contaminants to impact groundwater at levels exceeding groundwater ingestion and inhalation RBCs at the tap is not considered a relevant exposure pathway.

Volatilization of Groundwater Contaminants to Outdoor Air

Dissolved petroleum hydrocarbons may volatilize at the water table surface and migrate as vapor within the unsaturated zone. The majority of exterior surfaces at the subject property are currently unpaved and the CSM considers volatilization to outdoor air as a relevant exposure pathway at the subject property.

Vapor Intrusion of Groundwater Contaminants to Indoor Air

Dissolved-phase contaminants may volatilize at the water table surface and migrate as vapor within the unsaturated zone and enter indoor spaces. While the subject property is currently undeveloped, future development may include buildings in areas of groundwater impact. The

CSM considers vapor intrusion into indoor air as a relevant exposure pathway under future development conditions.

Groundwater Ingestion and Inhalation from Tap Water

Groundwater ingestion does not occur at the site and is not reasonably likely to in the future.

Municipally supplied potable water is presently provided to the subject and surrounding properties by EWEB. Given the availability of municipally-supplied potable water and the high capital costs associated with water well installation, future development of the shallow groundwater resources is considered unlikely.

Groundwater in an Excavation

This exposure pathway considers inhalation and dermal contact of groundwater contaminants by construction and excavation workers exposed to groundwater in excavations or trenches. This pathway is considered complete at the site.

3.3.1.2 Summary of Potential Exposure Pathways

A summary of relevant exposure pathways considered by the CSM is presented in Table 7.

The results of the evaluation of potential exposure pathways and receptor scenarios identified the following applicable pathways and receptor scenarios in the site:

- Soil ingestion, dermal contact, and inhalation for site workers, construction and excavation workers;
- Volatilization to outdoor air from soil and groundwater for occupational receptors;
- Vapor intrusion into buildings from soil and groundwater for occupational receptors; and
- Groundwater in an excavation for construction and excavation workers.

3.3.2 Risk-Based Screening Levels

3.3.2.1 Generic Risk-Based Concentrations (RBCs)

The COPC have been identified as TPH and related constituents associated with the former MGP operations and the activities of the former sand and gravel operations including fueling and vehicle maintenance. Based upon the applicable exposure pathways and receptor scenarios identified for the subject property, the most stringent RBCs for these scenarios have been determined from Appendix A of the 2003 RBDM Guidance Document and subsequent updates.[3] The generic RBCs are conservative screening levels for all of the applicable receptor scenarios

[3] The most recent update (January 2009) of the RBCs were used in this document.

and exposure pathways. The most stringent generic RBCs for potential pathways of exposure and receptor scenarios applicable for the site are presented in Table 9.

The outcome of the screening is presented below:

- No chemicals are present at concentrations that pose a risk by volatilization to indoor or outdoor air.
- No chemicals are present in soil at levels that pose a direct contact risk for site workers, construction workers, or excavation workers
- Benzo(a)pyrene and naphthalene exceed risk based concentrations for direct exposure by excavation and construction workers (in historical analytical data).

3.3.2.2 Assessment of Residual Soil and Groundwater Contamination

Residual risk is risk that remains at a site at the conclusion of cleanup activities, or the risk at a site in absence of institutional or engineering controls. Since the likely remedy at the site will be institutional controls, the residual risk is the current risk, which is around twenty times the acceptable risk level for excavation/construction workers. The use of safe work practices and proper personal protective equipment by construction or excavation workers could mitigate this risk.

3.3.3 Ecological Risk Assessment

In November 1999, EWEB submitted a document entitled *Technical Memorandum, Level I (Scoping) Ecological Risk Assessment* which was prepared for the contiguous property to the west of Area P-A. The ecological risk assessment was completed in general accordance with *Oregon Department of Environmental Quality, Guidance For Ecological Risk Assessment, April 1997.* A Level I Scoping Ecological Risk Assessment is a conservative qualitative determination of whether there is any reason to believe that ecological receptors and/or exposure pathways are present or potentially present at or in the locality of the facility, which includes part of Area P-A. Scoping is intended to identify sites that are obviously devoid of ecological important species or habitats and/or where exposure pathways are obviously incomplete. If no significant species or habitats are identified in the Scoping Level risk assessment, Oregon's ecological risk assessment guidance stipulates that no additional ecological evaluation is required.

With respect to the LOF on the site, the Level I Ecological Scoping concluded the following:

- Moles were identified as the ecological receptor with the greatest potential for exposure to impacted soils. Moles are not considered an ecologically important species in this setting.
- Other receptors such as birds may visit the Site.
- Paving or gravel (?) on the upland portion of the Site limits terrestrial habitat.
- A narrow vegetated area paralleling the bikepath is considered the only significant habitat for ecological receptors. This corridor was assumed to be clean fill soils associated with bikepath construction.

Thus, no exposure pathway to contaminated media exists for the receptors in this area.

3.4 Hot Spot Determination

Oregon cleanup rules require the identification of "hot spots" of contamination. The rules also require that the remedial action selected for a site treat hot spots to the extent feasible. For soil, hot spots are defined as areas with contaminants that pose a human health risk greater than 1×10^{-4}, or a non-cancer hazard quotient greater than 10 (that is, the contaminants are present at a concentration 10 times higher than that which could cause a non-cancer health impact). For water, hot spots are defined by having contaminants that would have a significant adverse effect on the beneficial use of the water (e.g., exceed safe drinking water standards in a domestic water well), and for which treatment would be likely to restore the beneficial use within a reasonable time.

3.4.1 Groundwater

The residual groundwater impacts the site do not meet hot spot criteria since contaminants in groundwater are unlikely to pose a significant adverse effect on beneficial uses of the groundwater.

3.4.2 Contaminated Soil

Residual concentrations of contaminants in the site soils do not exceed respective RBCs, therefore, the soils do not meet the hot spot criteria.

4. PROPOSED ACTION

DEQ proposes a remedy consisting of developing a site specific health and safety plan to ensure that future construction/excavation workers safely manage exposure to contaminated groundwater through work practices and proper protective equipment.

Under Oregon cleanup rule (OAR 340-122-0090) the DEQ must select a remedy that is protective of human health and the environment, and must considers the effectiveness, implementation risk, implementability, cost, and long-term reliability. With the exception of hot spots of contamination, Oregon law and cleanup rules specify that where two or more remedies are protective, the least expensive remedy generally is preferred. DEQ considered these balancing factors and concluded that the proposed remedy is effective at abating risk, is adequately reliable in the long term, is implementable and has a much lower cost than other approaches to preventing the risk to construction/excavation workers.

5. CONCLUSIONS AND RECOMMENDATIONS

Based on the Site investigations and previously-conducted excavation and disposal of the most contaminated soil, the risk assessment demonstrates that site conditions pose an unacceptable risk only to future excavation/construction workers by direct exposure to groundwater. These risks may be easily managed by employing safe working practices, working under a site health and safety plan, and using proper protective equipment.

- DEQ recommends issuing a Conditional No Further Action (NFA) determination for the upland portion of upland portion of Area P-A of the Riverfront Research Park site. The condition of the NFA determination will be that: The U of O prepare a DEQ-approved site specific health and safety plan detailing safe work practices and proper protective equipment to be employed any time that groundwater is encountered during construction or utility work; and,

- The U of O will require all future construction companies and/or workers working at the site implement the health and safety plan.

DEQ will hold a 30-day public comment period during October 2009, during which the public may provide input on the proposed remedy for the site.Upon closure of the public comment

period, and once the site specific health and safety plan has been completed, DEQ will reference and attach it to the Conditional No Further Action (NFA) determination letter.

- The NFA shall be recorded to the deed of the property with Lane County.
- The site status should be changed in ECSI to reflect the NFA determination.

APPENDIX A

ADMINISTRATIVE RECORD INDEX

The Administrative Record consists of the documents on which the recommended remedial action for the Site is based. Additional background and supporting information can be found in the project files located at DEQ Western Region Offices in Eugene, Oregon.

ADMINISTRATIVE RECORD TO BE INCLUDED HERE

L.R. Squier Associates, Inc., Environmental Site Assessment, Western Parcel, Riverfront Research Park, UO. May 1990.

Oregon Department of Environmental Quality, No Further Action Area P-B of the Western Parcel. March 7, 2001.

Oregon Department of Environmental Quality, Interoffice Memorandum, UO, Riverfront Research Park, Western Parcel File Summary and Recommendations. January 1992.

Squier Associates, Inc., Work Plan for Remedial Investigation. 1992.

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PTI., Initial site investigation report, former manufactured gas plant site, Eugene, Oregon. Prepared for Eugene Water & Electric Board, Eugene, Oregon. 1996

Bergeson-Boese & Associates, Inc., Subsurface Investigation, Western Parcel, for UO Riverfront Research Park. September 1998.

Exponent, Level I (scoping) ecological risk assessment, technical memorandum, November 1999.

Exponent, Land and beneficial water use survey, former Eugene MGP site, December 2000.

Exponent, Phase I remedial investigation report, former manufactured gas plant site, Eugene, Oregon, December 2000.

Bergeson-Boese & Associates, Inc., Summary of Additional Site Investigation, Area P-A of the Western Parcel, for UO Riverfront Research Park. May 2006.

Ninyo & Moore, Subsurface Assessment Report, UO West Research Park, Proposed Oregon Research Institute. December 2000

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Table 1. Summary of Analytical Results for Soil Samples in Area of Former Service Shop, Scale House, and West Gate

TPH = Total Petroleum Hydrocarbons
SM = Standard Method
NWTPH = Northwest Total Petroleum Hydrocarbons method
HCID = Hydrocarbon Identification
Dx = Diesel and Extended Range
VOC = Volatile Organic Compounds
BTEX = Benzene, toluene, ethylbenzene, and total xylenes
PAHs = Polynuclear Aromatic Hydrocarbons
ND = Not detected at or above laboratory method reporting limit
RBC = Most stringent Risk-Based Concentration applicable to site
NE = Not established
Shaded where not analyzed

	TPH SM 418.1M (mg/kg)	NWTPH -HCID	NWTPH-Dx (mg/kg)		VOCs or BTEX (µg/kg)	PAH results and RBCs (µg/kg)	PCBs	Leachable Heavy Metals (mg/l)
			Diesel	Heavy Oil				
UO-SS-B2-5'	6600				ND	Naphthalene – 200 (RBC = $26X10^3$) Phenanthrene – 150 (RBC NE) Pyrene – 330 (RBC = $6.7X10^6$)	ND	Ba – 0.9
UO-SS-B2-5'	ND							
UO-SS-B2-15'	N7							
UO-RI-TP1-6'	ND							
UO-RI-TP2-4.5'	100							Ag – 0.13
UO-RI-TP2-5'	ND							
UO-RI-TP2-6'	ND							
UO-RI-TP3-5.5'	ND							
UO-P1-5'	ND							
UO-P1-5'	ND							
WP-EXC1-3'		ND						
WP-EXC2-N-1'		Lube Oil	ND	14000	ND		ND	ND
WP-EXC2-N-2'		Lube Oil	ND	ND				
WP-EXC2-N-2.5'		Lube Oil	ND	1700				
WP-EXC2-N-4.25'		ND						
WP-EXC2-N-5'		ND						
WP-EXC2-N-6'		ND						

Table 1. Summary of Analytical Results for Soil Samples in Area of Former Service Shop, Scale House, and West Gate (continued)

TPH = Total Petroleum Hydrocarbons
SM = Standard Method
NWTPH = Northwest Total Petroleum Hydrocarbons method
HCID = Hydrocarbon Identification
Dx = Diesel and Extended Range
VOC = Volatile Organic Compounds
BTEX = Benzene, toluene, ethylbenzene, and total xylenes
PAHs = Polynuclear Aromatic Hydrocarbons
ND = Not detected at or above laboratory method reporting limit
RBC = Most stringent Risk-Based Concentration applicable to site
NE = Not establishedShaded where not analyzed

	TPH SM 418.1M (mg/kg)	NWTPH -HCID	NWTPH-Dx (mg/kg)		VOCs or BTEX Results and RBCs (µg/kg)	PAH Results and RBCs (µg/kg)
			Diesel	Heavy Oil		
UO-PP1-5'			ND	62		
UO-PP1-7'			1230	2950	Benzene – 118 (RBC = 1,200) Ethylbenzene – 78.4 (RBC = 12,000) Total Xylenes – 598 (RBC = $19X10^6$)	Benzo(a)anthracene – 99.4 (RBC = 21,000) Benzo(b)fluoranthene – 144 (RBC = 21,000) Benzo(k)fluoranthene – 78.5 (RBC = 210,000) Benzo(a)pyrene 0.0907 (RBC = 2,100) Chrysene – 0.192 (RBC = $2.1X10^6$) Fluoranthene – 247 (RBC = $8.9X10^6$) Fluorene – 104 (RBC = $12X10^6$) Pyrene – 159 (RBC = $6.7X10^6$) Phenanthrene – 403 (RBC NE)
UO-PP1-10'			ND	ND		
UO-PP2-5'			ND	ND		
UO-PP2-7'			ND	ND		

Table 2. Summary of Area P-A Groundwater Sample Results –Exploratory Borings

Units = µg/L (ppb)
ND = Not detected at or above the laboratory method reporting limit
Only PAH compounds detected in groundwater samples are included in this table.

COMPOUND	UO-B1-H2O (15 ft.)	UO-B1-H2O-2 (20 ft.)	UO-B1-H2O-3 (Dup.)	UO-B2-H2O (15 Ft.)	UO-B3C-H2O	UO-B4-H2O (15 Ft.)	UO-B4-H2O (20 Ft.)	RBC
Benzene	ND	3.8	4.1	ND	ND	ND	8.4	1,700
Toluene	ND	ND	ND	ND	ND	ND	12	9,100
Ethylbenzene	ND	5.9	7.0	ND	ND	ND	790	4,200
Xylenes	ND	5.4	4.4	ND	ND	ND	780	22,000
Naphthalene	ND	120	100	ND	ND	0.5	3,800	470
Acenaphthene	ND	ND	ND	ND	ND	ND	ND	230
Acenaphthylene	ND	ND	ND	ND	ND	0.34	ND	NE
Fluorene	ND	1.3	1.3	ND	ND	ND	34	14,000
Fluoranthene	ND	1.1	1.0	ND	ND	ND	50	9,600
Anthracene	ND	0.36	0.36	ND	ND	ND	ND	79,000
Pyrene	ND	1.7	1.7	ND	ND	ND	70	5,800
Chrysene	ND	2.4	1.8	ND	ND	ND	68	910
Benzo(a)pyrene	ND	ND	ND	ND	ND	ND	ND	0.53
Benzo(g,h,i)perylrene	ND	ND	ND	ND	ND	ND	ND	NE
Benzo(a)anthracene	ND	ND	ND	ND	ND	ND	26	9.1

Table 3. Summary of Area P-A Groundwater Sample Results –Groundwater Monitoring Wells UO-MW-1, UO-MW-2, and UO-MW-4

Units = µg/L (ppb)
ND = Not detected at or above the laboratory method reporting limit
Only PAH compounds detected in September 1997 samples from groundwater monitoring wells UO-MW-3 and UO-MW-5 are included in this table.

COMPOUND	997-UO-001 (MW-1)	997-UO-002 (MW-2)	997-UO-004 (MW-4)
Benzene	ND	ND	ND
Toluene	ND	ND	ND
Ethylbenzene	ND	ND	ND
Xylenes	ND	ND	ND
Naphthalene	ND	ND	ND
Fluorene	ND	ND	ND
Fluoranthene	ND	ND	ND
Anthracene	ND	ND	ND
Pyrene	ND	ND	ND
Chrysene	ND	ND	ND
Benzo(a)anthracene	ND	ND	ND
Indeno(1,2,3-cd) pyrene	ND	ND	ND

Table 4. Summary of Area P-A Groundwater Sample Results – Groundwater Monitoring Wells UO-MW-3 and UO-MW-5

Units = µg/L (ppb)
ND = Not detected at or above the laboratory method reporting limit
J = Estimated value (non-quantitative)
RBC = groundwater in excavation RBC
>s= RBC is greater than the theoretical saturation point for this compound in water

Compound	UO-MW-3								UO-MW-5								RBC
	Sept. 1997	April 1998	July 1998	Oct. 1998	January 1999	July 1999	January 2000	June 2004	Sept. 1997	April 1998	July 1998	Oct. 1998	January 1999	July 1999	January 2000	June 2004	
Benzene	4.2	ND	141	5.35	ND	1.74	16.4	ND	9.7	ND	10.5	18.2	ND	9.78	0.839	3.37	1700
Toluene	21	ND	434	60.8 J	ND	4.44 J	24.0	ND	2.4	ND	ND	ND	ND	ND	ND	ND	210000
Ethylbenzene	260	107	170	116	3.9	41.1	62.0	43.6	450	564	710	654	612 J	734	11.8	52.0	4400
Xylenes	310	398	463	187	9.61	37.8	148	93.2	44	38.6	71.8	69.6	57.6 J	53.1	11.1	11.6	23000
Acenaphthene	ND	0.574	317	ND	0.103	1.08 J	1.17	0.428	ND	ND	ND	6.3	ND	ND	2.42	8.54	>s
Acenaphthylene	ND	2.8	ND	ND	ND	0.623	0.724	0.250	ND	ND	ND	ND	ND	ND	0.369	ND	ne
Anthracene	ND	0.23	ND	0.227	ND	0.164	0.249	0.109	2.0	1.17	ND	ND	ND	0.169	0.278	1.14	>s
Benz[a]anthracene	ND	ND	ND	ND	ND	ND	ND	ND	1.0	ND	ND	ND	ND	ND	ND	ND	9.1
Benzo[a]pyrene	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	**1.08**	0.53
Benzo[b]fluoranthene	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	>s
Benzo[ghi]perylene	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	>s
Benzo[k]fluoranthene	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	>s	>s
Chrysene	4.0	ND	ND	ND	ND	ND	ND	0.106	3.0	ND	ND	ND	ND	ND	ND	ND	>s
Dibenz(a,h]anthracene	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ne
Fluoranthene	ND	0.279	ND	0.255	ND	0.186	0.273	0.224	3.0	0.75	ND	ND	ND	0.267	0.250	2.46	>s
Fluorene	7.0	0.887	ND	ND	ND	0.572	0.868	0.345	8.0	ND	ND	ND	ND	0.165	1.22	4.41	>s
Indeno[1,2,3-cd]pyrene	1.0	BD	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	>s
Naphthalene	**660**	**1350**	151 J	256	ND	38.4 J	66.8	ND	**870**	**2050**	**1400**	**1440**	**8500**	1.15	**577**	18.4	500
Phenanthrene	ND	0.62	ND	0.705	ND	0.358	0.446	ND	ND	7.5	ND	ND	ND	0.85	1.59	4.50	ne
Pyrene	3.0	0.385	ND	0.353	ND	0.294	0.329	0.426	4.0	1.06	ND	ND	0.749	0.496	0.306	4.07	>s

Table 5. Summary of Area P-A Groundwater Sample Results – October 2008

Units = µg/L (ppb)
ND = Not detected at or above the laboratory method reporting limit
RBC = Groundwater in Excavation RBC
NE = Not established
Only PAH compounds detected in groundwater samples from exploratory borings plus phenanthrene included

COMPOUND	MW-1	MW-2	MW-3	MW-4	MW-5	RBC
NWTPH-Gx	ND	ND	288	ND	693	
NWTPH-Dx	ND	ND	1150	ND	1540	22,000
Benzene	ND	ND	ND	ND	4.76	1,700
Toluene	ND	ND	ND	ND	ND	210,00
Ethylbenzene	ND	ND	28.1	ND	30.8	4,400
Xylenes	ND	ND	15.06	ND	15.31	23,000
Naphthalene	ND	ND	38.5	ND	7.22	500
Acenaphthene	ND	ND	0.749	ND	1.56	>s
Acenaphthylene	ND	ND	0.316	ND	0.121	NE
Fluorene	ND	ND	0.465	ND	0.467	>s
Fluoranthene	ND	ND	0.155	ND	0.176	>s
Anthracene	ND	ND	0.138	ND	0.0996	>s
Pyrene	ND	ND	0.467	ND	0.448	>s
Phenanthrene	ND	ND	ND	ND	0.250	NE
Chrysene	ND	ND	ND	ND	ND	>s
Benzo(a)pyrene	ND	ND	ND	ND	ND	0.53
Benzo(g,h,i)perylrene	ND	ND	ND	ND	ND	NE
Benzo(a)anthracene	ND	ND	ND	ND	ND	9.1

Table 6. Soil Sample Results for Interim Removal Action

Units = mg/kg (ppm)
NE = Not established
Bold = Value exceeds RBC
RBC = Most stringent value from Appendix A of RBDM for Construction/Excavation Worker and Occupational Receptor Scenarios for contact with shallow soils, volatilization to outdoor air, and vapor intrusion into buildings

	Original Sample (1997)	Confirmation Samples (2006)				RBC
	UO-WP-TP5-2'	UO01-TP5-N-2'	UO01-TP5-W-2'	UO01-TP5-E-2'	UO01-TP5-S-2'	
Naphthalene	2	<0.0153	<0.157	<0.0146	<0.0297	26
Acenapthene	<0.200	<0.0153	<0.157	<0.0146	<0.0297	16,000
Acenaphthylene	7	<0.0153	<0.157	<0.0146	<0.0297	NE
Anthracene	0.98	<0.0153	<0.157	<0.0146	<0.0297	90,000
Benzo(a)anthracene	2.9	<0.0153	<0.157	0.0159	0.0391	21
Benzo(a)pyrene	**10**	0.0171	<0.157	0.0204	0.0562	**2.1**
Benzo(b)fluoranthene	14	0.0165	0.194	0.0226	0.0551	21
Benzo(ghi)perylene	25	0.0174	2.250	0.0198	0.0688	NE
Benzo(k)fluoranthene	7.4	<0.0153	<0.157	0.0175	0.0365	210
Chrysene	5.2	0.0168	<0.157	0.0221	0.0542	2,100
Dibenzo(a,h)anthracene	**4.1**	<0.0153	0.223	<0.0146	<0.0297	**2.1**
Fluoranthene	2.8	0.0202	<0.157	0.0270	0.0755	8,900
Fluorene	0.3	<0.0153	<0.157	<0.0146	<0.0297	12,000
Indeno(1,2,3-cd)pyrene	17	<0.0153	1.060	0.0155	0.0483	21
Phenanthrene	0.94	<0.0153	<0.157	<0.0146	0.0334	NE
Pyrene	3.3	0.0256	<0.157	0.0307	0.0993	6,700

Table 7. Evaluation of Potential Receptors

Receptor Scenario	Selected	Reason for Inclusion or Exclusion
Residential	No	Property is currently zoned for special and research development that does not include residential. Contiguous properties are also commercial or industrial in nature. No residential developments are within the close vicinity of the subject property. Future zone changes to the subject and contiguous properties are not considered likely.
Urban Residential	No	Property is currently zoned for special and research development that does not include residential. The size of the subject property buffers contiguous properties from the release. Future zone changes to the subject and contiguous properties are not considered likely.
Occupational	Yes	Current use of contiguous properties is for commercial/industrial activities. Future development will consist of commercial/research use. Future zone changes are not considered likely.
Recreational	Yes	Bike pathway.
Excavation Worker/ Construction Worker	Yes	Subsurface utilities are located in the area of the releases. Future construction activities at the subject property will be performed. Deep subsurface work at the far northwest corner of the Site is not reasonably likely.

Table 8. Summary of Conceptual Site Model Potential Exposure Pathways

Pathway	Potential Receptors	Exposure Potential		Comments
		Current Use	Future Use	
Incidental Ingestion, Inhalation, and Dermal Contact of Soil	Excavation and Construction Worker	Yes	Yes	Subsurface utilities are currently present to a depth of six (6) feet BLS. Future utility development is expected.
Volatilization of Soil Contaminants to Outdoor Air	Occupational	Yes	Yes	Residual TPH impact represents on-going source of volatile compounds.
Vapor Intrusion of Soil Contaminants to Indoor Air	Occupational	No	Yes	The Site is currently undeveloped. Future development may be near the areas of residual TPH soil impact.
Leaching of Soil Contaminants to Groundwater	None	No	No	Subject property connected with municipally-supplied potable water. Future development of shallow aquifer unlikely.
Vapor Intrusion of Groundwater Contaminants to Indoor Air	Occupational	No	Yes	The Site is currently undeveloped. Dissolved volatile contaminants are present in area of planned future development.
Volatilization of Groundwater Contaminants to Outdoor Air	Occupational	Yes	Yes	Dissolved volatile contaminants present in groundwater.
Ingestion and Inhalation from Tapwater	None	No	No	Subject property connected with municipally-supplied potable water. Future development of shallow aquifer unlikely.
Groundwater in Excavation	Construction/ Excavation Worker	No	Yes	Current utilities are above high groundwater level. Future utilities in the south portion of the subject property may extend to the water table. Future development of deep subsurface utilities in the vicinity of the northwest corner of the subject property is not reasonably likely due to setback requirements.

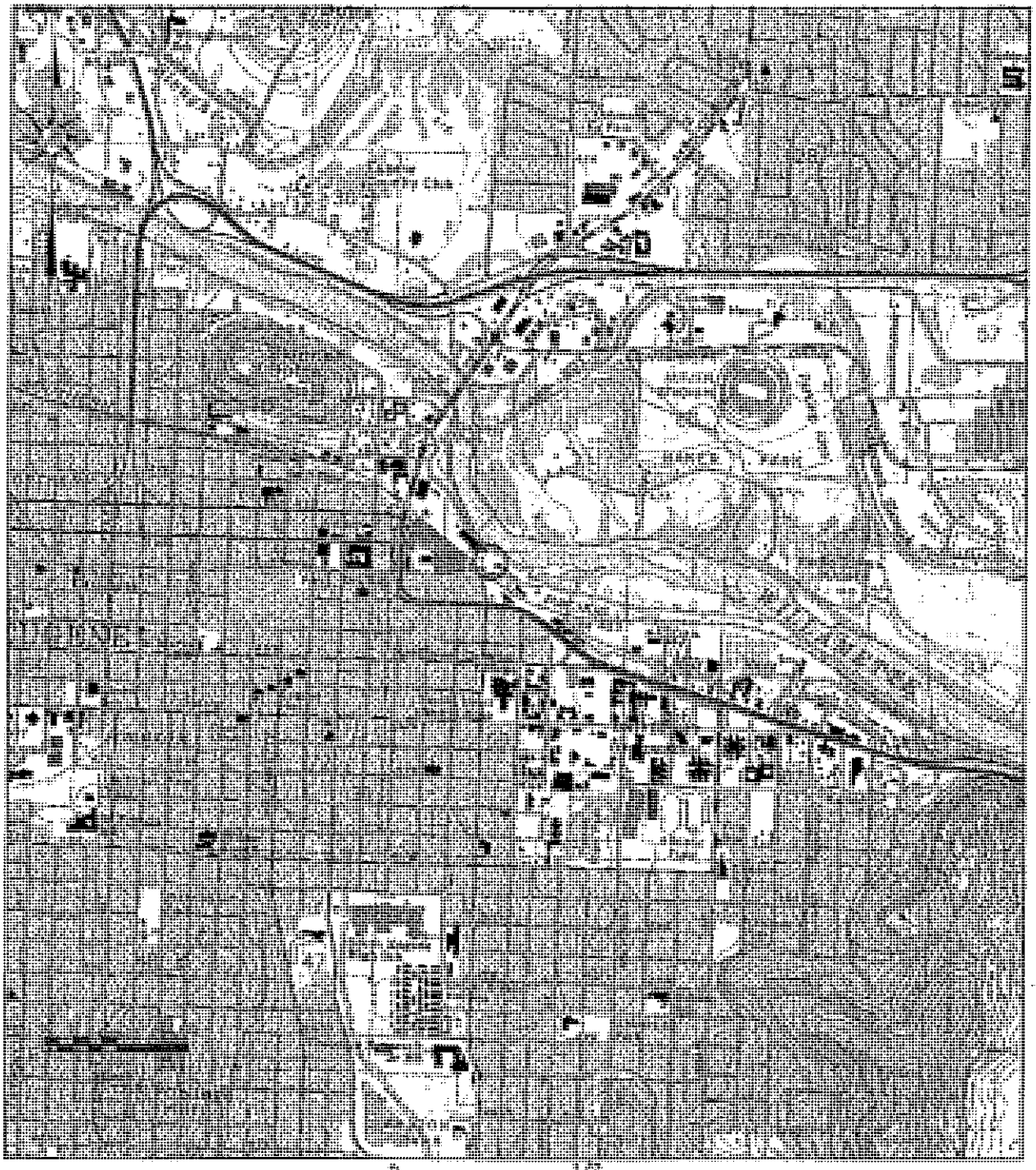
Table 9. Proposed the site RBCs for Detected COPC

RBC = Most stringent RBC for applicable exposure pathways and receptors
Applicable Exposure Pathways:

- SI Soil Ingestion, Dermal Contact, and Inhalation - Occupational
- VIB Vapor Intrusion of Contaminants to Indoor Air - Occupational Receptor
- C/W Direct Contact - Construction and/or Excavation Worker Receptor
- VOA Volatilization to Outdoor Air

>S = Concentration exceeds solubility of compound in water
NS = No RBC standard for this compound

COPC	Soil (mg/kg)		Groundwater (ug/l)	
	Soil RBC	Pathway	Groundwater RBC	Pathway
Diesel Range TPH	23,000	C/W	9,700	c/w
Benzene	1.2	VIB	1,700	C/W
Toluene	24,000	C/W	200,000	C/W
Ethylbenzene	12	C/W	4,200	C/W
Xylenes	19,000	C/W	22,000	C/W
Acenaphthene	16,000	C/W	25,000	c/w
Acenaphthylene	NS		NS	
Naphthalene	26	VOA	470	C/W
Fluorene	12,000	C/W	14,000	c/w
Fluoranthene	8,900	C/W	9,600	c/w
Anthracene	90,000	C/W	79,000	c/w
Pyrene	6,700	C/W	5,800	c/w
Chrysene	2,100	C/W	910	c/w
Benzo(a)pyrene	2.1	C/W	0.53	C/W
Benzo(b)fluoranthene	21	C/W	5.2	c/w
Benzo(a)anthracene	21	C/W	9.1	C/W
Benzo(g,h,i)perylene	NS		NS	
Benzo(k)fluoranthene	210	C/W	49	c/w
Ideno(1,2,3-cd)pyrene	21	C/W	2.9	c/w
Dibenzo(ah)anthracene	2.1	C/W	0.21	C/W



SITE

0 1/4 1/2 (MILE)

Figure 1



OREGON

SOURCE: USGS TOPOGRAPHIC QUADRANGEL
SERIES: 7.5 MINUTES; EUGENE EAST, OREGON

UNIVERSITY OF OREGON RIVERFRONT RESEARCH PARK

SITE LOCATION MAP

Bergeson-Boese & Associates, Inc.
Comprehensive Environmental Services

32986 Roberts Court
Coburg, Oregon 97408
(541) 484-8484

25195 SW Parkway Ave., Suite207
Wilsonville, Oregon 97070
(503) 570-8484

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Drawn: Mark Riedel-Bash
Checked: Dan Mumford
Date: 2/12/09

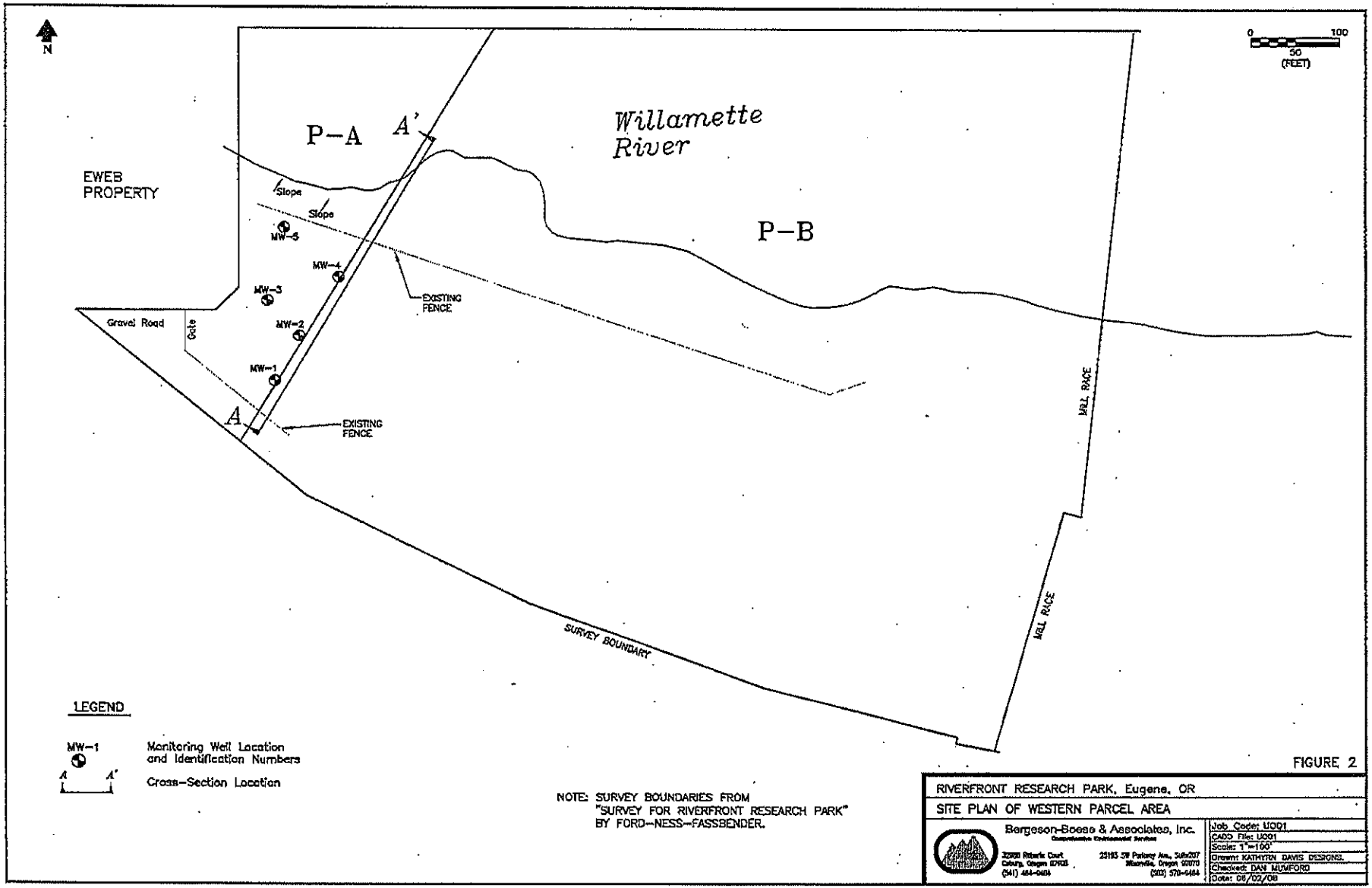


FIGURE 2

RIVERFRONT RESEARCH PARK, Eugene, OR

SITE PLAN OF WESTERN PARCEL AREA

Bergeson-Beese & Associates, Inc.
Comprehensive Environmental Services
32928 Roberts Court
Coburg, Oregon 97408
(541) 484-0404
25195 SW Parkway Ave., Suite 207
Wilsonville, Oregon 97070
(503) 570-0484

Job Code: U001
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Scale: 1"=100'
Drawn: KATHRYN DAVIS DESIGNS
Checked: DAN MUMFORD
Date: 06/02/08

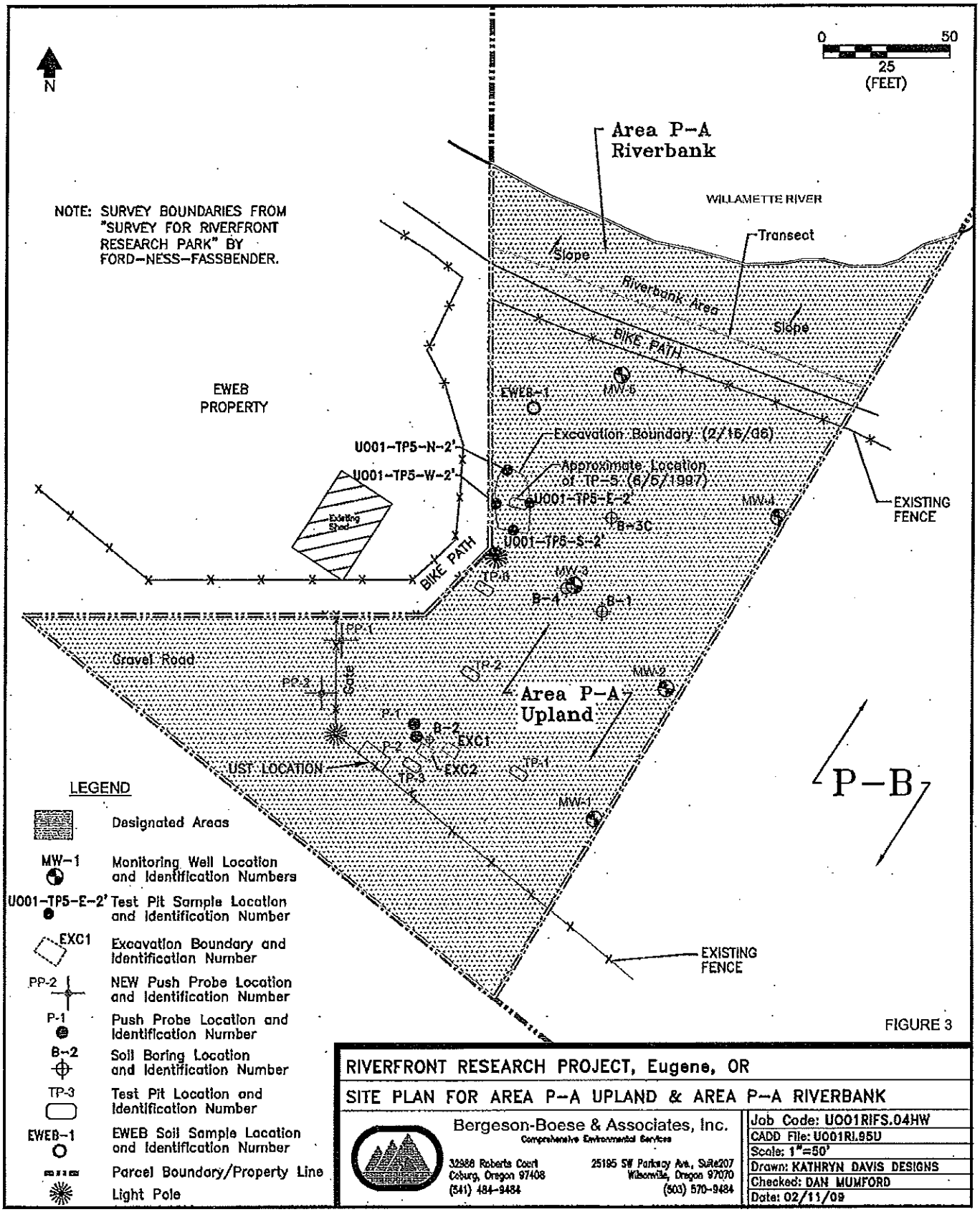


FIGURE 3

RIVERFRONT RESEARCH PROJECT, Eugene, OR

SITE PLAN FOR AREA P-A UPLAND & AREA P-A RIVERBANK

Bergeson-Boese & Associates, Inc.
Comprehensive Environmental Services
32988 Roberts Court
Coburg, Oregon 97408
(541) 484-9484
25195 SW Parkway Ave., Suite207
Wilsonville, Oregon 97070
(503) 570-9484

Job Code:	U001RIFS.04HW
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Scale:	1"=50'
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Checked:	DAN MUMFORD
Date:	02/11/09

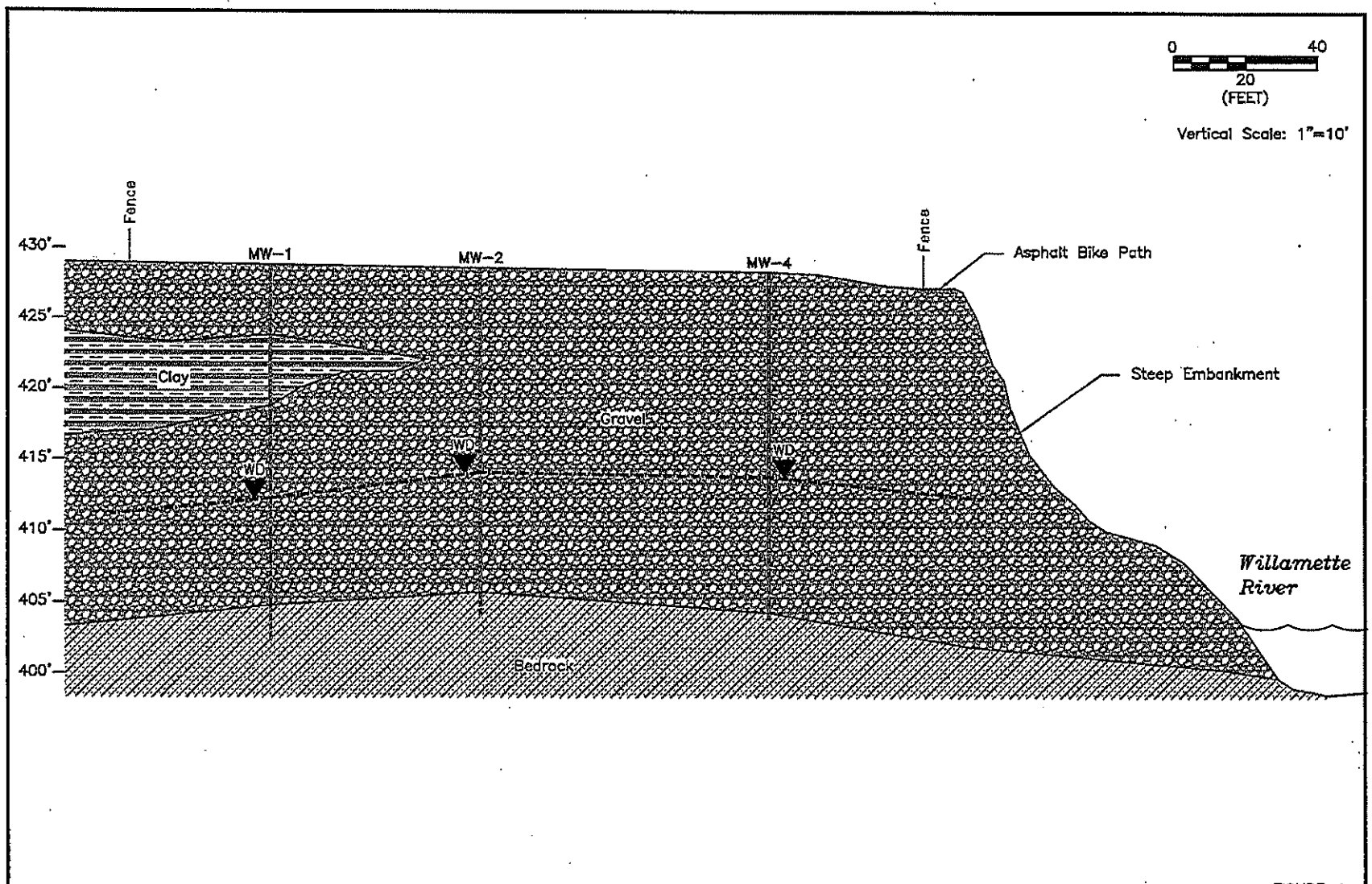


FIGURE 4

LEGEND

WD ▼ Depth to Water in borehole during drilling

RIVERFRONT RESEARCH PARK, Eugene, OR

CROSS SECTION A–A'

Bergeson-Boese & Associates, Inc.
Comprehensive Environmental Services
32986 Roberts Court
Coburg, Oregon 97408
(541) 484-9484
25195 SW Parkway Ave., Suite207
Wilsonville, Oregon 97070
(503) 570-9484

Job Code: U001RIFS.04HW	
CADD File: U001RIFS.04HW	
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Drawn: KATHRYN DAVIS DESIGNS	
Checked: DAN MUMFORD	
Date: 02/11/09	

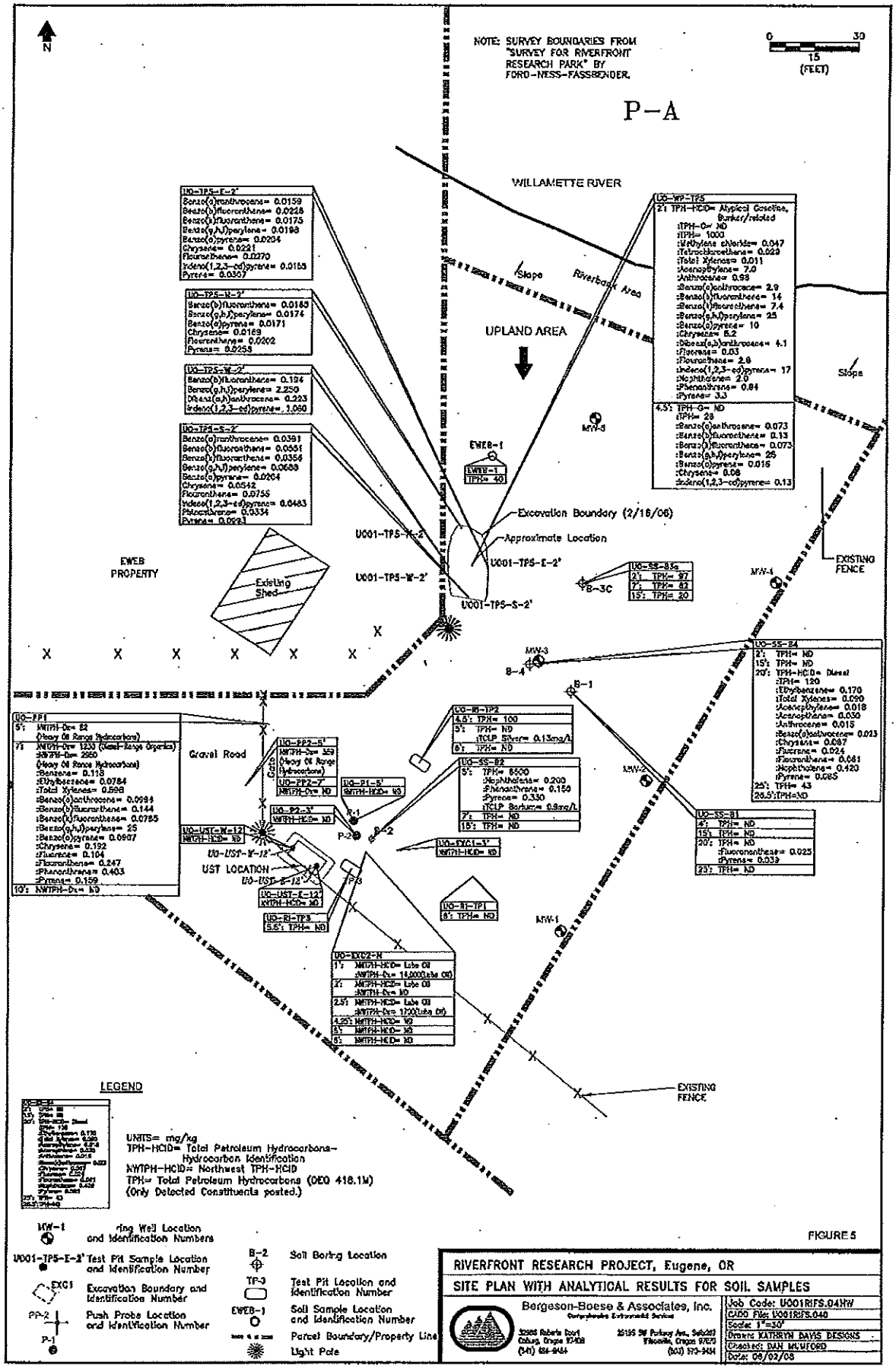


FIGURE 5

RIVERFRONT RESEARCH PROJECT, Eugene, OR

SITE PLAN WITH ANALYTICAL RESULTS FOR SOIL SAMPLES

Bergeson-Boese & Associates, Inc.
Environmental Services
32665 Roberts Road, Coburg, Oregon 97408 (541) 686-9444
25195 SW Parkway Ave., Suite 310, Wilsonville, Oregon 97070 (503) 570-9444

Job Code:	UG01RIFS.04HW
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Drawn:	KATHRYN DAVIS DESIGNS
Checked:	DAN MUFFORD
Date:	06/02/08

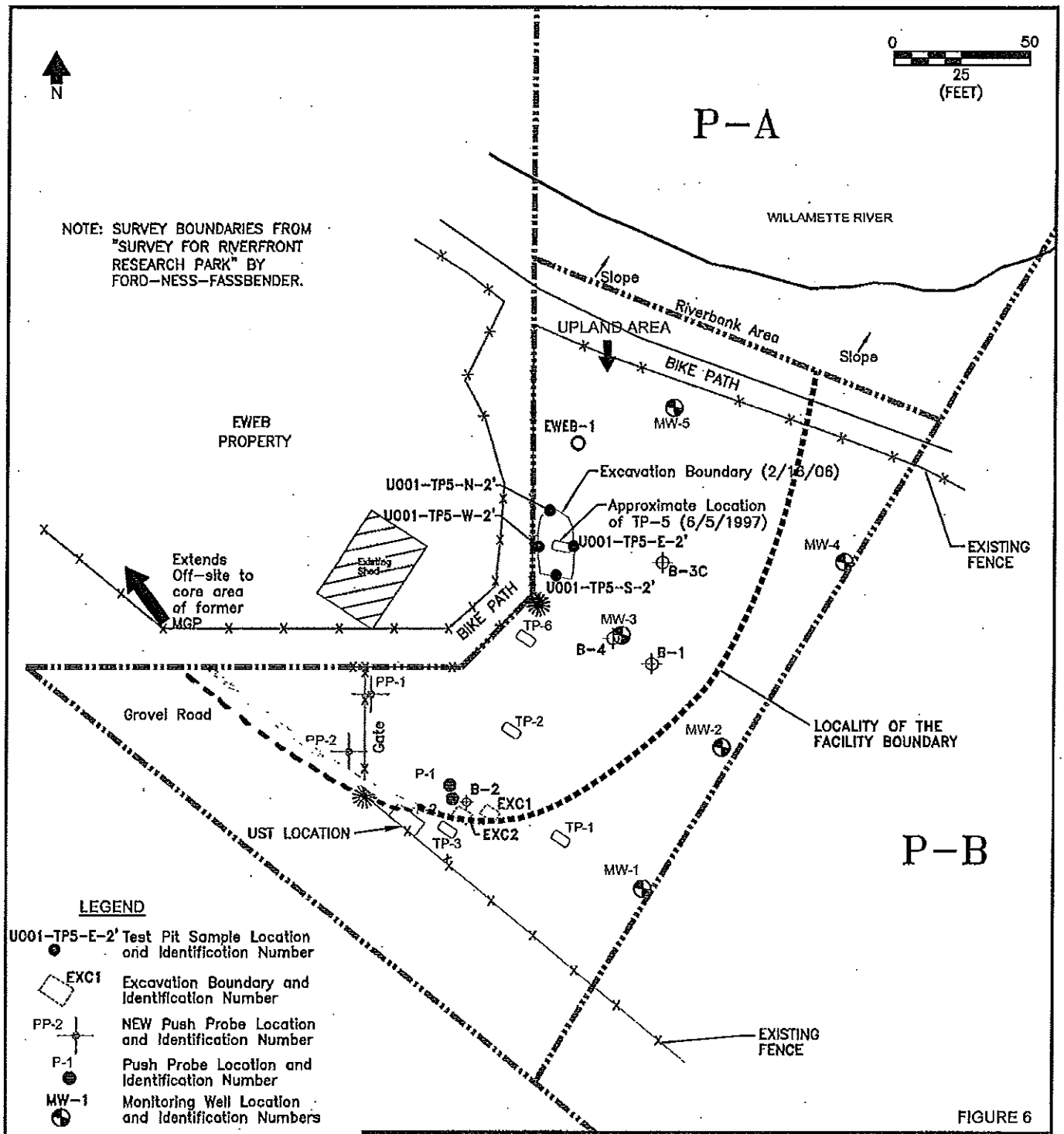


FIGURE 6

RIVERFRONT RESEARCH PROJECT, Eugene, OR

LOCALITY OF THE FACILITY (UPLAND AREA)

Bergeson-Boese & Associates, Inc.
Comprehensive Environmental Services
32986 Roberts Court
Coburg, Oregon 97408
(541) 484-9484
25195 SW Parkway Ave., Suite207
Wilsonville, Oregon 97070
(503) 570-9484

Job Code:	U001RIFS.04HW
CADD File:	U001RI.95U
Scale:	1"=50'
Drawn:	KATHRYN DAVIS DESIGNS
Checked:	DAN MUMFORD
Date:	06/02/08

Response to Public Comments

Draft Staff Report for Area P-A Upland Portion of Western Parcel – Riverfront Research Park, University of Oregon

ECSI 1018

DEQ received the following written public comments during the formal public comment period:

1. DEQ should require a Soil and Groundwater Management Plan for the site.
   UO prepared a Soil and Groundwater Management Plan for the site in November of 2009. This document is attached to the Staff Report.
2. Locality of Facility should be revised near the southwest corner of the site.
   DEQ reviewed available data for the site. The revised LOF is presented in the Staff Report.
3. DEQ missed documents in the administrative record index.
   DEQ has included the referenced documents in the Administrative Record index.
4. DEQ should change the wording in Section 2.3.1 regarding storage of treated wood poles and/or forms.
   DEQ declined to change the wording of this paragraph.

Eugene Water & Electric Board

500 East 4th Avenue/Post Office Box 10148
Eugene, Oregon 97440-2148
(541) 484-2411
www.eweb.org

November 2, 2009

Mr. Geoff Brown
Project Manager
Oregon Department of Environmental Quality, Western Region
165 East 7th Ave., Suite 100
Eugene, OR 97401

Subject: EWEB Comments on Draft Staff Report for Area P-A Upland Portion of the Western Parcel – Riverfront Research Park, University of Oregon, Eugene, Oregon (ECSI #1018), September 2009

Dear Geoff,

EWEB comments on the subject draft Staff Report are attached for the Department's consideration. These comments reflect consensus of the EWEB project team currently addressing environmental conditions on the EWEB property adjacent to the University of Oregon (UO) property covered in the draft Staff Report.

Because similar historic activities occurred on the EWEB property and the UO property before their respective ownerships, the Department should use a uniform and consistent approach to managing the environmental conditions on each property. EWEB's first two comments are designed to achieve a uniform approach that will ensure that future development and land use activities in the area remain protective of human health and the environment. EWEB's third comment is to make the Administrative Record for the draft Staff Report complete, and the fourth comment is to ensure that historic activities are described accurately.

EWEB comments are as follows:

1. Inclusion of Soil and Groundwater Management in the Proposed Action

The Staff Report indicates that soil meets generic risk-based concentrations (RBCs) for excavation and construction workers listed on Table 9. Three additional sample locations[1], not included in the Staff Report, are located in the west portion of Upland Area P-A. Samples from these locations also meet the excavation and construction worker RBCs. However, concentrations in these additional samples and other site samples exceed RBCs based on residential, urban residential and occupational use. Therefore, in the event of future excavations on the site, soil and groundwater should be managed appropriately based on concentrations of constituents of potential concern. DEQ should consider including in the proposed action and site remedy a soil and groundwater management plan to ensure proper management and disposal of these media should they be excavated.

[1] Samples from locations BH-5A (PTI 1996) and TCC-3 and TCC-4 (Ninyo & Moore 2008)

Rely on us.

2. Southwestern Delineation of the Locality of Facility

DEQ should consider revising the Locality of the Facility (LOF) proposed in the Staff Report for the southwest portion of the Upland Area P-A site. The extent of soils exceeding RBCs has not been precisely defined in this area. Based on sampling on the adjacent EWEB property and historical operations at that property and in the area, EWEB proposed an LOF for the adjacent property to be located as shown on Figure 3 of the Land and Beneficial Water Use Survey (Exponent 2000). DEQ approved this LOF. The LOF for the adjacent EWEB property should inform the limits of the LOF at the Upland Area P-A site. The LOF adjustment would move the boundary of the LOF for the Upland Area P-A slightly farther south on the westernmost portion of the site (including the gravel road area) so it is consistent with the LOF for the adjacent EWEB property.

3. Additions to the Administrative Record

Because the Staff Report relies on key information and documentation in EWEB reports, these reports should be listed as part of the Administrative Record Index in Appendix A. See OAR 340-122-0110(a). The EWEB documents that should be listed include: Initial Site Investigation Report (February 1996); Level I (Scoping) Ecological Risk Assessment (November 1999); Land and Beneficial Water Use Survey (December 2000); and, Phase I Remedial Investigation Report (December 2000). Fundamental elements of the site characterization and conceptual model from these documents are relied on in the Staff Report, and the documents are cited in the Staff Report.

4. Correction Regarding EWEB Activity on Western Parcel Property

In the second paragraph of Section 2.3.1, the fourth sentence reads: "EWEB also stored treated wood poles and waste oil on Area P-B." The sentence should be revised to reflect available information on site use by EWEB (Environmental Investigations Through 1993, Riverfront Research Park, University of Oregon, Squire Associates Inc. September 20, 1993). Based on this information, the sentence should be revised to read: "On Area P-B, EWEB also stored treated wood poles and some wood forms that were coated with waste oil and used to construct small concrete structures." With this revision, the last sentence in the second paragraph is redundant and should be deleted.

Please call me at (541) 484-2411 if you have questions regarding these comments.

Sincerely,

Debbie Spresser

Ms. Debbie Spresser
Environmental Specialist
Eugene Water & Electric Board

cc: Project file – Eugene Former MGP Site

SITE:
Western Parcel of the Riverfront Research Park Project
Hilyard St. and E 8th Ave. (Approximately)
Eugene, Oregon

1.0 INTRODUCTION

1.1 Purpose

This purpose of this Site Management Plan (SMP) is to clarify the roles and responsibilities regarding environmental conditions that may be encountered when potentially contaminated soil or shallow groundwater is disturbed at the site. The property owner is responsible to characterize and manage potentially impacted media according to applicable state and federal regulations. The property owner also has the responsibility to see that there is a health and safety plan (HASP) available to communicate to site workers, contractors and subcontractors and their representatives the anticipated nature, level, and degree of potential chemical and physical hazards that could be encountered while working on the project site. The HASP identifies procedures designed to minimize the risk of chemical exposure or physical injuries by a combination of personal protective equipment (PPE), engineering controls, and safe work practices.

1.2 Property/Facility Description and Status

The site is legally described as tax lot 5300 in the southeast quarter of the northwest quarter of Section 32, T17S, R3W of the Willamette Meridian. The site is listed on the Oregon Department of Environmental Quality's (DEQ's) Environmental Cleanup Site Information (ECSI) database as Riverfront Research Park Site - ECSI Site ID Number 1018. The University of Oregon (UO) completed extensive investigative and cleanup activities between 1984 and 2006 at the Riverfront Research Park property. In order to most efficiently address specific environmental concerns and issues associated with various parts of the Riverfront Research Park, the UO divided the property into several separate parcels.

In an agreement with DEQ, under its Voluntary Cleanup Program (VCP,) the UO has completed investigations and cleanup activities that have culminated in an Oregon DEQ "no further action" (NFA) determination for all but one remaining area of the Western Parcel of the Research Park (Area P-A). The investigative work has been completed on Area P-A and the DEQ has recently issued a NFA conditioned on maintaining a HASP that details safe work practices when shallow groundwater is encountered.

1.3 Contaminants of Concern

The contaminants of potential concern (COPC) have been identified as total petroleum hydrocarbons (TPH) and related constituents associated with the adjacent manufactured gas plant (MGP) site (ECSI # 1723) located directly west of Area P-A, and former sand and gravel operations. TPH constituents naphthalene and benzo(a)pyrene have historically been detected in groundwater monitoring wells on Parcel P-A. Recent sampling (2004 and 2008) did not detect these constituents above their risk-based concentrations. However, the DEQ has determined that these constituents may be present in the shallow groundwater based on the historic levels in on-site wells in Parcel P-A adjacent to the MGP site.

1.4 Notification and Acknowledgement

The property owner is responsible for notifying all contractors of the site conditions and provide them with a copy of this document and any supplemental HASPs created for a specific work activity at the site. All contractors must read and acknowledge in writing that they have read, understood and agree to abide by the HASP document(s). When soil or groundwater is encountered, then the HASP is to be reviewed immediately by onsite workers to determine any required precautions are to be implemented. Contingency arrangements are also provided for emergency situations. Any individual who refuses to abide by the requirements of this HASP will not be allowed to work on the site.

2.0 SAFETY BRIEFINGS AND HAZARD COMMUNICATION

Before fieldwork begins, all field personnel must be briefed on the potential site hazards, individual work assignments, and the provisions of this HASP as part of a "tailgate" safety meeting. Subcontractors will also attend the tailgate safety meeting. All field personnel are required to sign the HASP at the completion of the tailgate meeting indicating that they attended the on-site safety meeting. The meeting may also include the following:

- Site-specific requirements imposed by the property owner or facility operator.
- Evacuation plan and/or designated meeting place in case of an emergency.

3.0 GENERAL JOB ACTIVITIES WITH MINIMUM PPE REQUIREMENTS

Job activities which will have the potential to encounter shallow groundwater include excavation, drilling, test pit excavation, and collecting samples from the drill hole/boring hole/test pit/excavations (note: other activities not specifically listed above may also disturb site soils). The chemical hazards identified are from direct contact (ingestion, inhalation, and dermal contact) with TPH and related constituents naphthalene and benzo(a)pyrene. Groundwater may be encountered at the site at depths greater than 15 feet below ground surface.

3.1 Drilling. To reduce the risk associated with drilling, all personnel working around the drill rig must be wearing a hard hat, steel toed boots, eye protection, and hearing protection at all times. (If drilling into the shallow groundwater see below for additional requirements).

3.2 Test Pitting/Trenching/Excavation. Site workers must wear high visibility vests, a hard hat, steel toed boots, eye protection, gloves (OSHA Level D PPE) and communicate with the equipment operator using a set of simple pre-determined hand signals. When vehicles or heavy equipment must operate near an excavation, the sides of the excavation may have to be shored or braced as necessary to withstand forces exerted by the superimposed load and the earth pressure. If shoring is required for the contractor to perform work, a shoring system must be designed and implemented by a person with the necessary training and experience to fulfill the OSHA defined role of a "competent person" on an excavation site. Secure barriers or highly visible tape must be installed at the edges of the excavations over four (4) feet in depth.

3.3 Shallow Groundwater. If shallow groundwater is anticipated to be encountered and workers need to be in close contact with the groundwater media, workers will need to wear the following PPE in addition to Level D as specified above: splash protection for eyes and face, coated tyvek coveralls, chemical resistant gloves and boots.

3.4 PPE Contingency Plan

In the event that conditions at the site change significantly, typically caused by the presence of chemicals or contamination, site personnel will cease all work immediately and exit the work area. The person in charge of field operations will communicate with the UO project manager, and they will assess the new conditions to determine how to proceed with sufficient worker protection.

4.0 CONTAINMENT OF SUSPECTED CONTAMINATED MEDIA

Because construction actions associated with development of the property could involve the excavation of potentially impacted soils and groundwater, it is appropriate that this plan for safe work practices be followed.

If suspected contaminated soil is encountered, the subcontractor will expose the soil using a backhoe or excavator. The excavated soil will be removed and stored on a visqueen-covered area with berms. All soil suspected to be contaminated will be segregated and covered with visqueen. If deemed necessary, excavated soil and the excavated area will be fenced off with construction fencing until all excavation activities are concluded.

If dewatering activities need to be performed on site, groundwater will be pumped into a storage tank until sampling and and characterization is conducted to determine the appropriate treatment and/or disposition of the water.

Procedures in the site Contaminated Media Management Plan (CMMP) will be used to guide the sampling, characterization and management of media suspected of being contaminated. The temporary storage of excavaed media will be constructed to isolate the media from potential site storm water during grading and/or excavation activities.

5.0 SITE CONTROL/WORK ZONES

Access to hazardous and potentially hazardous areas must be controlled to reduce the probability of occurrence of physical injury and chemical exposure of field personnel, visitors, and the public. A hazardous or potentially hazardous area includes any area where (1) borings are being drilled with direct drive equipment or powered augers, (2) excavating operations with heavy equipment are being performed, (3) any area that has been identified where exposure to shallow groundwater is likely.

Entry to hazardous areas shall be limited to individuals who must work in those areas. Unofficial visitors must not be permitted to enter hazardous areas while work in those areas is in progress. Official visitors should be discouraged from entering hazardous areas, but may be allowed to enter only if they agree to abide by the provisions of this document and project specific HASP and CMMP documents.

6.0 DECONTAMINATION

Field decontamination of personnel and equipment is not required except when contamination is obvious (visually or by odor). Disposable garments should be properly disposed of as solid waste. If soil or groundwater comes in contact with the skin it should be thoroughly rinsed using a mild detergent and water. Reuseable equipment should be cleaned using Alconox-type detergent and rinsed with clean water.

Attachment B

Historical Site Figures

MAUL
FOSTER
ALONGI

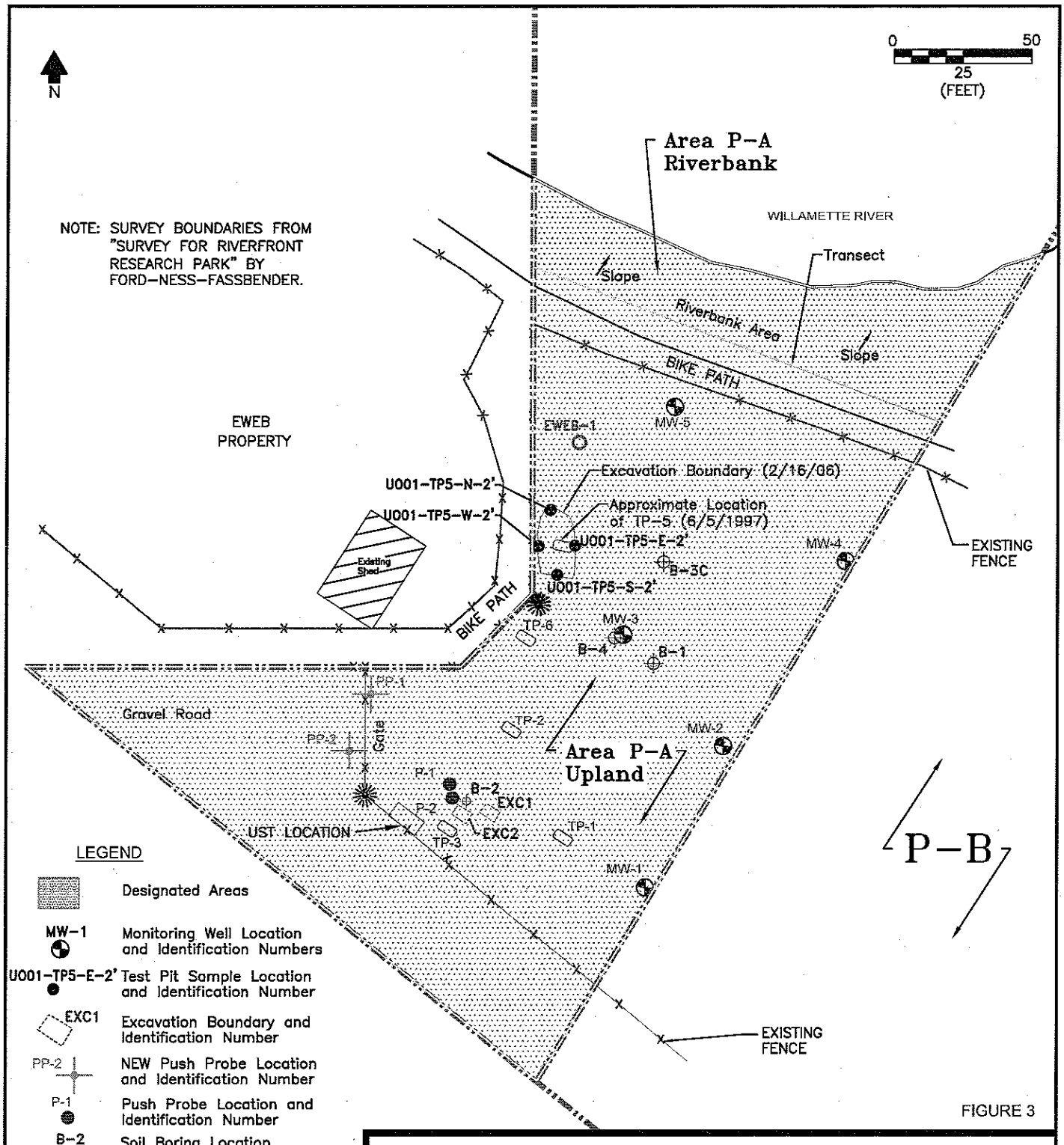


FIGURE 3

RIVERFRONT RESEARCH PROJECT, Eugene, OR

SITE PLAN FOR AREA P-A UPLAND & AREA P-A RIVERBANK

Bergeson-Boese & Associates, Inc.
Comprehensive Environmental Services
32986 Roberts Court
Coburg, Oregon 97408
(541) 484-9484
25195 SW Parkway Ave., Suite207
Wilsonville, Oregon 97070
(503) 570-9484

Job Code:	U001RIFS.04HW
CADD File:	U001RI.95U
Scale:	1"=50'
Drawn:	KATHRYN DAVIS DESIGNS
Checked:	DAN MUMFORD
Date:	02/11/09

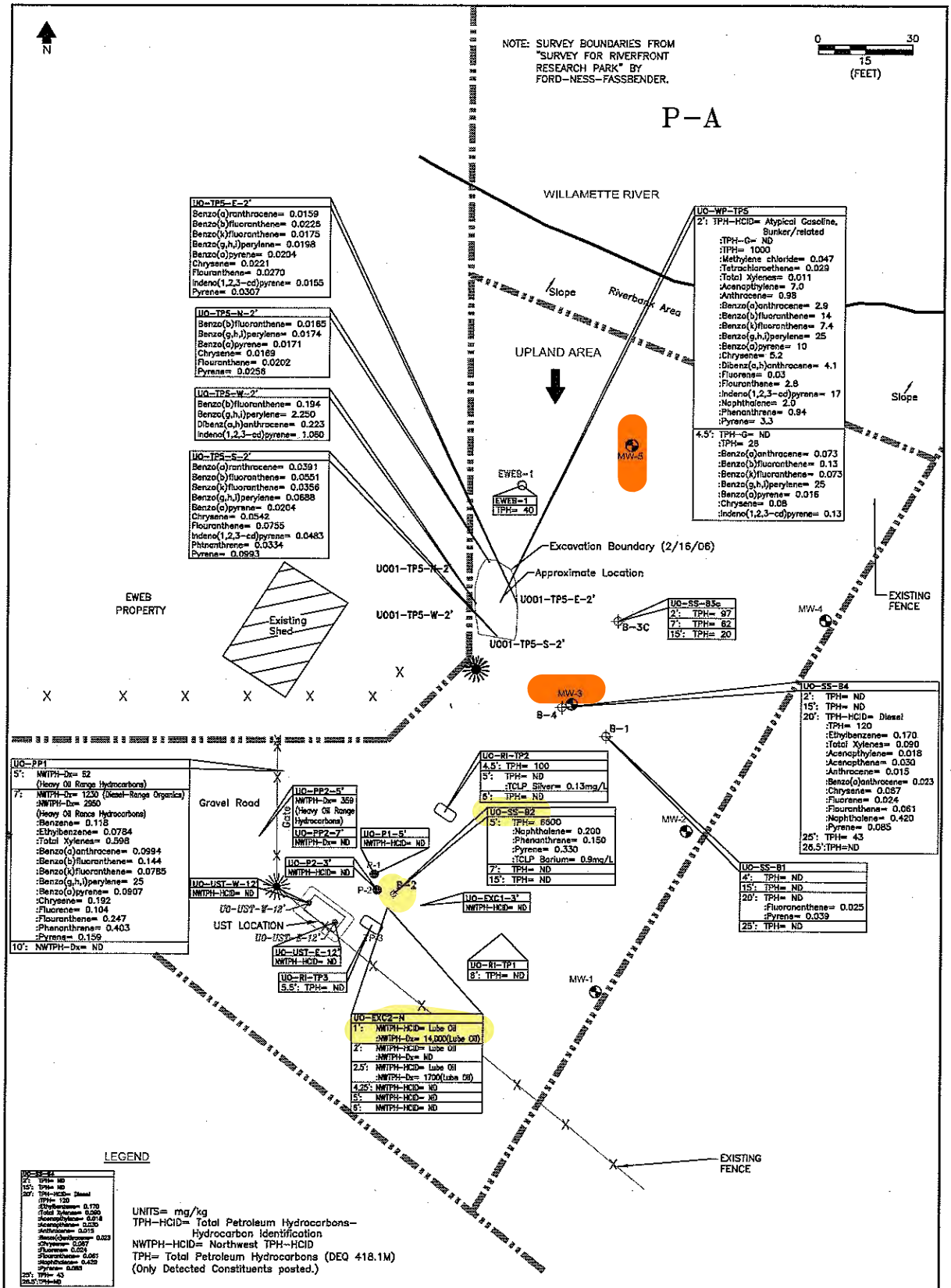


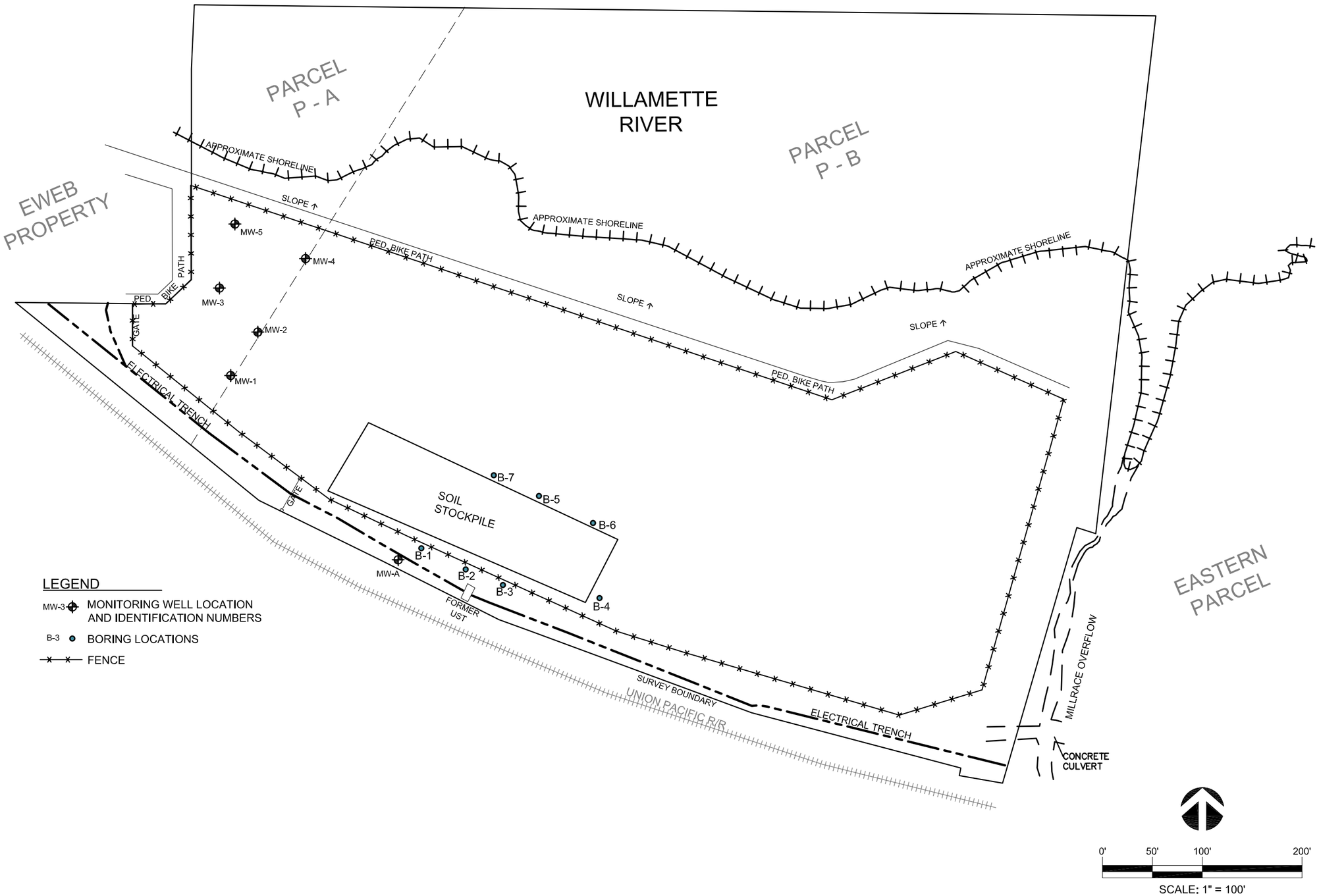
FIGURE 5

RIVERFRONT RESEARCH PROJECT, Eugene, OR

SITE PLAN WITH ANALYTICAL RESULTS FOR SOIL SAMPLES

Bergeson-Boese & Associates, Inc.
Comprehensive Environmental Services
32585 Roberts Court, Coburg, Oregon 97408, (541) 484-9484
25195 SW Parkway Ave., Suite207, Wilsonville, Oregon 97070, (503) 570-9484

Job Code:	U001RIFS.04HW
CADD File:	U001RIFS.040
Scale:	1"=30'
Drawn:	KATHRYN DAVIS DESIGNS
Checked:	DAN MUMFORD
Date:	06/02/08



PBS
Engineering + Environmental
390 NE Emerson Avenue
Bend, OR 97701
541.388.9290 Main
541.382.5116 Fax
www.pbsenv.com

FORMER UST INVESTIGATION
WESTERN PARCEL
RIVERFRONT RESEARCH PARK
EUGENE, OREGON

PROJECT:	80484.000 P3
DATE:	MARCH 2011
FIGURE:	2

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