DRAFT

EARLY RI ACTIVITIES - QUALITY ASSURANCE PROJECT PLAN - VOLUME I

RPAC - Portland Site

May 27, 1999

Submitted to:
Oregon Department of Environmental Quality
811 SW 6th Avenue
Portland, Oregon 97204

Prepared for:
Rhone-Poulenc AG Company
1600 Perimeter Park, Suite 400
Morrisville, North Carolina 27560

Prepared by:
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May 27, 1999
92C0804A/41

Eric Blischke
Environment Policy Analyst
Department of Environmental Quality
811 SW 6th Ave.
Portland, Oregon 97204

Subject: Submittal of Draft Early RI Activities – Quality Assurance Project Plan RPAC, Portland Site

Dear Eric:

On behalf of Rhône Poulenc AG Company (RPAC), URS Greiner Woodward Clyde (URS) is submitting one unbound and four bound copies of the enclosed Draft Early RI Activities – Quality Assurance Project Plan (QAPP). This is one of five documents that address the Early RI activities at the RPAC Portland Site required by the DEQ. Three Field Sampling Plans, this QAPP and URS' HASP comprise the Early RI Activities Sampling and Analysis Plan required by DEQ.

If you have any questions, please don't hesitate to give one of the undersigned a call at (503) 222-7200.

Sincerely,
URS GREINER WOODWARD CLYDE

For
Roger Gresh, P.G.
Project Manager

Mike Edwards, P.E.
Project Engineer

Enclosures

cc: R. Ferguson, RPAC (w/enclosures)
J. Benedict, CHBH&L (w/enclosures)
M. Kent, DEQ – NW Region (w/enclosures)

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June 16, 1999

Rec'd 6/22/99

Mr. Robert L. Ferguson
Rhone-Poulenc Ag Company
HS & EA Department
PO Box 12014
Research Triangle Park, NC 27709

RE: Approved Project Plans for Early Remedial Investigation Activities – Rhone Poulenc Site

Dear Mr. Ferguson:

The Oregon Department of Environmental Quality (DEQ) has reviewed the final Well Inventory Field Sampling Plan submitted on your behalf by URS Greiner Woodward Clyde. DEQ received this document on June 11, 1999. The changes made to this document adequately address DEQ comments presented in my letter dated June 4, 1999. Consequently, this document should be considered approved. It is our expectation that well inventory activities will begin on July 1, 1999.

In addition, DEQ has reviewed the Quality Assurance Project Plan and Health and Safety Plan. These documents were submitted on May 28, 1999. DEQ has no comments on these plans. Consequently, these plans should also be considered approved. However, DEQ reserves the right to request modification of these plans if necessary during the course of the early remedial activities.

If you have any questions regarding this matter, please feel free to contact me at (503) 229-5648.

Sincerely,

Eric L. Blischke
Project Manager
Waste Management and Cleanup Division

CC: Paul Slyman, DEQ/WMCD
Dave St. Louis, DEQ/NWR
Mavis Kent, DEQ/NWR
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URS Greiner Woodward Clyde Project Engineer, *Mike Edwards*
URS Greiner Woodward Clyde Project Geologist, *Jeff Wallace*
URS Greiner Woodward Clyde Project Field Manager, *Chris Moody*
Project Files

DRAFT

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This Quality Assurance Project Plan (QAPP) is part of the Sampling and Analysis Plan (SAP) required by the Oregon Department of Environmental Quality (DEQ) for the Early Remedial Investigation (RI) activities in the vicinity of the Rhone-Poulenc AG Company (RPAC) Portland facility. The RPAC property is located at 6200 NW St. Helens Road in Portland, Oregon.

The purpose of the QAPP is to assure production of high-quality data that meet project objectives and requirements and accurately characterize measurement parameters. The QAPP provides protocols for collecting samples, measuring and controlling data, and documenting field and laboratory methods so that the data are technically and legally defensible.

The Early RI SAP is composed of three major components: three Early RI Field Sampling Plans (FSPs); this Early RI QAPP; and the URS Greiner Woodward-Clyde (URS) Health and Safety Plan. The Early RI FSPs present the detailed scope of work associated with Early RI field activities (e.g., sampling methods, sampling locations and the procedures to be used for other field operations. This QAPP describes the analytical data quality objectives (DQOs), laboratory analytical procedures, quality assurance/quality control (QA/QC) procedures, and data quality evaluation criteria for the Early RI activities.

Sampling and analysis procedures for the Early RI activities are designed to be sufficient to satisfy the DQOs identified in this document. This QAPP presents the analytical methods and associated QA/QC procedures selected to meet the DQOs. The Early RI activities will include collection and analysis of groundwater and possibly NAPL samples, if any NAPL is encountered. Chemical analysis will be completed in a laboratory and in the field in accordance with the FSPs and this QAPP. Detailed field procedures for groundwater and NAPL sample collection and field measurements are described in the FSPs.

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The project organization is setup to allow for efficient and effective communication between all involved parties and task levels. The project management structure for implementation of the Early RI activities is discussed below. The Project Manager of the RPAC property is Robert Ferguson. Mr. Ferguson has the responsibility of representing the property owner's (RPAC) interest and authorizing Early RI work to be conducted at the RPAC property. Mr. Ferguson will be in communication primarily with the URS Greiner Project Manager.

Roger Gresh is the URS Project Manager. He is responsible for the Early RI activities being completed in accordance with the FSPs and QAPP. He will communicate with the RPAC Project Manage and provide the primary communication with the DEQ project manager. He will also oversee all of the Early RI work and be in communication with the Project Engineer, Field Manager and Quality Assurance Officer at URS.

The URS Project Engineer is Mike Edwards. He is also responsible for the Early RI activities being completed in accordance with the FSPs and QAPP. He will communicate with the DEQ and RPAC Project Manager if Mr. Gresh is unavailable. He will also oversee all of the Early RI work and be in communication with the Field Manager and Quality Assurance (QA) Officer in the absence of Mr. Gresh.

The URS Field Manager, Chris Moody, will oversee all field data collection activities. He will coordinate and direct drilling, groundwater monitoring well installation, and media sampling activities in accordance with the FSPs and QAPP. Mr. Moody will be responsible for URS field employees and subcontracted employees.

The URS QA Officer (Project Chemist), Karen Schadler, will be responsible for ensuring that all data collected for Early RI activities meet the quality standards set forth in the QAPP. She will be in charge of data validation and data review. Ms. Schadler will report to the URS Project Manager and be in communication with the Field Project Manager, the Subcontract Laboratory Project Manager, and the URS Database Manager.

The subcontract analytical laboratory will be North Creek Analytical Inc. (NCA) for all the Early RI groundwater analyses except Method 8290. The NCA Laboratory Project Manager will be Deborah Griffiths. She will receive media samples from URS and oversee that NCA analyses be conducted in accordance with the appropriate methods and that quality assurance is maintained.

The subcontract analytical laboratory for the analysis of Method 8290 will be Quanterra Inc. Their Laboratory Project Manager will be Bonnie McNeill. She will receive media samples from the RPAC property and oversee that laboratory analysis be conducted in accordance with the appropriate method and that quality assurance is maintained.

In the event that North Creek Analytical Inc is unable to fulfill project or contractual agreements, Quanterra Incorporated has been designated as the backup laboratory and will be used as approved by the URS Project Manager or URS QA Officer.

The DQOs will be achieved and documented using the procedures and criteria set forth in this document. For each measurement used to obtain quantitative data, a set of quality objectives is described. The data quality parameters presented in this section are precision, accuracy (bias), representativeness, comparability, completeness, and sensitivity (PARCCS). PARCCS can be applied to both field and laboratory analytical measurements to ensure that data of known and appropriate quality are obtained, to support specific decisions or regulatory actions.

Project-specific control limits for these parameters are presented in Appendix B. Required QA/QC sample frequency and calibration requirements are summarized for all laboratory analysis in Tables 6-1 and 6-2.

3.1 PRECISION

Precision is defined as the degree of agreement between or among independent, similar, or repeated measures. Precision is expressed in terms of analytical variability. For this project, analytical variability will be measured as the relative percent difference (RPD) or coefficient of variation between analytical lab replicates and between the matrix spike (MS) and matrix spike duplicate (MSD) analyses. Monitoring variability will be measured by analysis of blind field replicate samples.

Precision will be calculated as the RPD as follows:

$$\%RPD_i = \frac{2|O_i - D_i|}{(O_i + D_i)} \times 100\%$$

Where:

$\%RPD_i$ = *Relative percent difference for compound i*

O_i = *Value of compound i in original sample*

D_i = *Value of compound i in duplicate sample*

The resultant RPD will be compared to acceptance criteria and deviations from specified limits reported. If the objective criteria are not met, the laboratory will supply a justification of why the acceptability limits were exceeded and implement the appropriate corrective actions. The RPD will be reviewed during data quality review, and deviations from the specified limits will be noted and the effect on reported data commented upon by the data reviewer.

3.2 ACCURACY

Accuracy is the amount of agreement between a measured value and the true value. It will be measured as the percent recovery of the MS/MSD and organic surrogate compounds. Additional potential bias will be quantitated by the analysis of blank samples (e.g., method, equipment and trip blanks).

Accuracy shall be calculated as percent recovery of analytes as follows:

$$\%R_i = (Y_i \div X_i) \times 100\%$$

Where:

$\%R_I$ = *percent recovery for compound I*

Y_I = *measured analyte concentration in sample I (measured – original sample concentration)*

X_I = *known analyte concentration in sample I*

The resultant percent recoveries will be compared to acceptance criteria and deviations from specified limits will be reported. If the objective criteria are not met, the laboratory will supply a justification of why the acceptability limits were exceeded and implement the appropriate corrective actions. Percent recoveries will be reviewed during data quality review, and deviations from the specified limits will be noted and the effect on reported data commented upon by the data reviewer.

3.3 REPRESENTATIVENESS

Representativeness is the degree to which sample results represent the system under study. This component is generally considered during the design phase of a program. This program will use the results of all analyses to evaluate the data in terms of its intended use. Site locations for sampling are placed using a biased approach to maximize the likelihood of locating and identifying site contamination, if present. Areas of apparent contamination have been selected for determination of potential impacts from past activities.

3.4 COMPARABILITY

Comparability is the degree to which data from one study can be compared with data from other similar studies, reference values (such as background), reference materials, and screening values. This goal will be achieved by using standard techniques to collect and analyze representative samples and by reporting analytical results in appropriate units.

3.5 COMPLETENESS

Completeness for usable data is defined as the percentage of usable data out of the total amount of data generated. Because the number of samples that will be collected to measure each parameter exceeds that required for the analysis, approximately 100 percent completeness is anticipated. When feasible, the amount of sample collected will be sufficient to reanalyze the sample, should the initial results not meet QC requirements. Less than 100 percent completeness could result if sufficient chemical contamination exists to require sample dilutions, resulting in an increase in the project-required detection/quantitation limits for some parameters. Highly

contaminated environments can also be sufficiently heterogeneous to prevent the achievement of specified precision and accuracy criteria. The target goal for completeness shall be 98 percent for both the field and fixed laboratory analytical methods. Completeness for quality data shall be 95 percent for each individual analytical method. Quality data is data obtained in a sample batch for which all QC criteria were met. Completeness will be calculated as follows:

$$\%C = \frac{A}{I} x100\%$$

Where:

$\%C$ = *Percent completeness (analytical)*

A = *Actual number of samples collected/valid analyses obtained*

I = *Intended number of samples/analyses requested*

Non-valid data (i.e., data qualified as "R" rejected) will be identified during the QA review (Section 10.3).

3.6 SENSITIVITY

The sensitivity of the analytical methods (i.e., method detection limits) identified for this project is sufficient to allow comparison of project results to decision criteria. Analytical method reporting limits for all requested analytes are listed in Appendix B.

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The overall DQOs for the site investigation at the RPAC property are to develop and implement procedures for field measurements, laboratory analyses, and reporting that will provide additional site data to a degree of quality consistent with its intended use. This includes:

- Develop an understanding of the nature and extent of lateral and vertical contamination across the site vicinity.
- Identify the potential contamination migration pathways within the site vicinity.
- Determine whether RPAC constituents are migrating via groundwater to the Willamette River.
- Identify and monitor presence of NAPL in monitoring wells.

In addition, it should be noted that existing (historical) groundwater data also will be used to identify the chemicals of potential concern for the site and develop exposure point concentrations. Data collected from the Early RI will be used along with the data obtained from the Source Area RI to prepare a risk assessment and to evaluate compliance with regulatory screening levels.

4.1 CHEMICALS OF POTENTIAL CONCERN

Based on previous activities in the vicinity of the RPAC site, chemicals of potential concern (COPCs) in groundwater are presented in Table 4-1.

TABLE 4-1
Chemicals of Potential Concern

CLASS	CHEMICAL
VOCs	1,1,2,2-Tetrachloroethane; 1,1-Dichloroethane; 1,2-Dichlorobenzene; 1,2-Dichloroethane; 1,3-Dichlrobenzene; 1,4-Dichlorobenzene; Benzene; Chlorobenzene; Chloroform; Cis-1,2-dichloroethene; Ethylbenzene; Isobutanol: Methylene Chloride; Tetrachloroethene; Toluene; Trichloroethene; Vinyl Chloride; Xylene
Phenols	2,4,6-Trichlorophenol; 2,4-Dichlorophenol; 2,4-Dinitrophenol; 2-Chlorophenol; Pentachlorophenol
Pesticides	Aldrin; Alpha-BHC; beta-BHC; Chlordane; DDD; DDE; DDT; Delta-BHC; Dieldrin; Endrin; gamma-BHC (Lindane); Heptachlor; Hexachlorobenzene; Toxaphene
PCBs	Arochlor 1254
Metals	Arsenic; Cadmium; Chromium; Copper; Lead; Mercury; Nickel; Vanadium; Zinc
Herbicides	2,4,5-T; 2,4,5-TP; 2,4-D; 2,4-db; Bromoxynil; Dichloroprop; Dinseb
Dioxin/Furans	PCDD/PCDF

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4.2 DATA QUALITY LEVELS

The Early RI scope of work includes: an integrity assessment of all monitoring wells and the installation of new monitoring wells for inclusion in the DEQ's Groundwater Monitoring Plan. Data must be of sufficient quality to meet the DQOs defined above.

Two levels of data quality and analysis are applicable for these Early RI activities:

- Screening Level Data
- Definitive Data

4.2.1 Screening Level Data

Field Measurements. Chemical field measurement results will be used to assess site conditions for workers health and safety, determine the presence or absence of NAPL, and evaluate groundwater conditions for sample collection and natural attenuation studies. Field measurement methodology is discussed in the FSPs.

4.2.2 Definitive Data

Fixed laboratory data meet a higher level of stringency and will be used to confirm the presence of COPCs and to evaluate the potential for natural attenuation. Specific procedures are discussed later in this document. To generate data of sufficient quality for these uses, the following approach for analytical laboratory data for groundwater and NAPL samples will be followed:

- The fixed laboratory is currently accredited by the state. Accreditation and validation documentation is on file at URS.
- Applicable SW-846 methods will be used where available. If SW-846 methods are not available, other standard methods will be used.
- Quality control samples and procedures will be utilized by the laboratory for analysis.
- Contract Laboratory Program-like data packages (Level III) will be generated for all samples requiring complete raw data packages and documentation sufficient to perform a complete data quality review. As recommended by U.S. Environmental Protection Agency (EPA) guidance, documentation will be retained in the project files for a minimum of 10 years from the time of receipt from the laboratory.
- Data quality review will be performed on the analytical data according to the procedures specified in this document.

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4.3 ANALYTICAL METHODS

To meet DQOs, samples collected at the RPAC site will be analyzed according to EPA SW-846 methods, except as specified. Analytical methods (method, analyte, and CAS#) are presented in Appendix A of this document. Laboratories performing these methods, their address, and points of contact are listed in Table 4-2.

TABLE 4-2
Project Laboratories

LABORATORY	ADDRESS	CONTACT	METHOD (ANALYSIS)
North Creek Analytical, Inc.	9405 SW Nimbus Avenue Beaverton, OR 97008	Deborah Griffith	8041,8081,8082,8141,8151,8260,8270,600, 7000,Natural Attenuation Parameters, NWTPH-Dx
Quanterra Incorporated	880 Riverside Parkway West Sacramento, CA 95605	Bonnie McNeill	8290

4.4 ANALYTICAL METHOD DETECTION LIMITS, QUANTITATION LIMITS, AND REPORTING LIMITS

Laboratory results/project limits for the COPCs must be able to be compared reliably to decision action levels; therefore, method quantitation limits must be less than applicable matrix-specific action levels. Method detection limits (MDL), quantitation limits (MQL), and reporting limits (MRL) are defined below.

Method Detection Limit. A generic term that identifies the lower limit at which one can differentiate a measurement from background noise. The MDL is the minimum concentration of an analyte that can be measured and reported with 99 percent confidence that the analyte concentration is greater than. Method detection limit studies have been performed by the fixed laboratory and are acceptable for this project.

Method Quantitation Limit. A generic term that identifies the lower limit at which a measurement can be quantified with a certain degree of confidence. The MQL is the minimum concentration of an analyte that can be determined (measured and reported). Due to the significant amount of error associated with results calculated at the MDL, the MQL is established at a factor no lower than 3.18 times the MDL. This factor is based on the acceptable amount of error the data user is willing to accept for the data generated. The MQL represents the value that the laboratory has demonstrated the ability to reliably quantitate target analytes within a prescribed performance criterion for the method performed. The MQLs is usually equivalent to the concentration of the lowest calibration standard in the initial calibration curve. The MQLs are significantly less than applicable decision criteria and are therefore acceptable for this project.

Method Reporting Limit. The MRL is a threshold value at which a laboratory reports a result of non-detected (ND). The MRL may be based on project-specific concentrations, regulatory action levels, or sensitivity capability of method and instrument. The MRLs are adjusted based

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on the sample matrix and any necessary sample dilutions. Operationally, the MRLs and the MQLs are the same due to sample matrix and any necessary dilutions. Routine laboratories MRLs for all target analytes are listed in Appendix B.

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Procedures for collecting samples take into account such issues as: sample handling and preservation; sample documentation; field QA/QC requirements; decontamination procedures; and sample custody. Specific information regarding sampling procedures (e.g. sample preservation and handling; sample documentation; decontamination procedures; and sample custody) is discussed in the FSPs.

5.1 FIELD MEASUREMENT METHODS

Monitoring well groundwater will be screened/monitored during sampling for specific conductance, pH, temperature, oxidation/reduction potential (ORP), and dissolved oxygen (DO). All test kits and instruments will be calibrated daily or according to the manufacturers' instructions. The standard operating procedures (SOPs) are included in the FSPs.

5.2 FIELD MEASUREMENT INSTRUMENT CALIBRATION PROCEDURES

Several types of field instruments will be used during the Early RI activities. Calibration and general maintenance of all field instruments will be the responsibility of the Field Manager. All calibration procedures and measurements will be made in accordance with manufacturers' specifications. Field instruments will be checked and calibrated prior to their use on site, and batteries will be charged and checked daily, where applicable. Instrument calibrations will be performed at the beginning of each workday and checked and recalibrated if necessary throughout the course of the day according to manufacturer's specifications or if deemed necessary by sampling personnel. Special attention will be given to instruments that may drift with change in ambient temperature. A calibration check will be conducted at the end of each sampling day.

Equipment that fails calibration and/or becomes otherwise inoperable during the field investigation will be removed from service and segregated to prevent inadvertent use. Such equipment will be properly tagged to indicate that it should not be used until repaired. Equipment that cannot be repaired or recalibrated will be replaced. More detail on field preventative maintenance is provided in the FSPs.

All documentation pertinent to the calibration and/or maintenance of field equipment will be maintained in an active field logbook. Logbook entries regarding the status of field equipment will contain, but will not necessarily be limited to, the following information:

- Date and time of calibration
- Name of person conducting calibration
- Type of equipment being serviced and identification (make, model and serial number)
- Reference standard used for calibration (such as pH of buffer solutions)
- Calibration and/or maintenance procedure used
- Other pertinent information

5.3 SAMPLE HANDLING, CONTAINERS, PRESERVATION, AND HOLDING TIMES

Sample containers, preservation, and holding times for water samples are summarized in Table 5-1 of this document. Water samples will be collected in glass or plastic containers supplied by the project laboratories. NAPL samples will be collected in 8-ounce glass containers (no preservatives) supplied by the project laboratories and will meet holding times summarized in Table 5-1. All containers will have Teflon-lined seals or septa to assure adequate sealing of the bottles.

Commercially available pre-cleaned jars will be used and the contracted analytical laboratory will maintain a record of certification from the supplier. The bottle shipment documentation will record batch numbers for the bottles. With this documentation, bottles can be traced to the supplier and bottle wash analysis results can be reviewed. The bottle wash documentation will be archived by the supplier for a period of five years.

Prior to shipment to the field, the contract laboratory will add the required preservatives to the sample bottles. Sample preservation procedures are used to maintain the character of analytes as sampled during storage and shipment. Regardless of the nature of the sample, absolute stability for all constituents cannot be achieved. Preservation techniques, such as pH control and refrigeration, may retard physiochemical and biochemical changes. As a general rule, analyzing the sample as soon as possible is the best way to minimize physiochemical and biochemical changes.

All samples will be placed in the appropriate sample container and refrigerated (on ice or ice-substitute in a cooler) immediately upon sample collection. The samples will be transferred to the contract laboratories as soon as possible using the chain of custody procedures described in the FSPs. Upon receipt at the contract laboratories, a cooler receipt form will be filled out to document sample condition. The laboratories are required to meet all specified holding times and should make every effort to prepare and analyze the samples immediately after they are received.

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TABLE 5-1
Fixed Laboratory Container, Preservation, And Holding Times

METHOD	ANALYSIS	CONTAINER	PRESERVATION	HOLDING TIME
8041	Phenols	1 liter Amber Glass Bottle	4°C	7/40 days[1]
8081	Organochlorinated Pesticides	1 liter Amber Glass Bottle	4°C	7/40 days[1]
8082	Polychlorinated Biphenyl's (PCBs)	1 liter Amber Glass Bottle	4°C	7/40 days[1]
8141A	Organophosphorous Pesticides	1 liter Amber Glass Bottle	4°C	7/40 days[1]
8151A	Chlorinated Herbicides	1 liter Amber Glass Bottle	4°C	7/40 days[1]
8290	Dioxins/Furans	2 - 1 liter Amber Glass Bottle	4°C	7/45 days[1]
8260B	Volatile Organic Compounds (VOC)	3 – 40 mL glass vial	4°C, HCl to pH < 2	14 days
8270	Semi-Volatile Organic Compounds (sVOC)	1 liter Amber Glass Bottle	4°C	7/40 days[1]
6010/6020, 7000, 200.7	Metals or Major Cations	1liter HDPE[2]	4°C, HNO3 to pH < 2	180 days
7470/7471	Mercury	250 mL HDPE[2] or glass	4°C, HNO3 to pH < 2	28 days
310.1	Alkalinity (Total)	250 mL HDPE[2]	4°C, H2SO4 to pH < 2	14 days
300.0	Anions – Chloride, Nitrate, Nitrite, Sulfate	1 liter HDPE[2]	4°C	2 days[3]
350.1	Ammonia	250 mL HDPE[2]	4°C	28 days
376.1	Sulfide	500 mL HDPE[2]	4°C	7 days[3]
415.2	Total Organic Carbon	250 mL HDPE[2]	4°C, H2SO4 to pH < 2	28 days
360.1	Dissolved Oxygen	250 mL BOD Bottle	4°C, ZnAc and NaOH to pH > 9	1 day[3]
GC/FID	Methane	2 – 40 mL glass vial	4°C, HCl to pH < 2	7 days
8015	Isobutyl Alcohol	2 – 40 mL glass vial	4°C, HCl to pH < 2	7 days
410.4	Chemical Oxygen Demand (COD)	125 mL HDPE[2]	4°C, H2SO4 to pH < 2	28 days
405.1	Biological Oxygen Demand (BOD)	500 mL HDPE[2]	4°C, H2SO4 to pH < 2	2 days[3]
NWTPH - Dx	Total Petroleum Hydrocarbons – Diesel Range Organics	1 liter Amber Glass Bottle	4°C	7 days
SM 9215	Total Heterotrophic Plate Count	125 mL plastic Sterile Collection Vessel	4°C, Dechlorinated	1 day[3]

Notes:

[1]Number of days from time of collection until extraction, then number of day from time of extraction until analysis.

[2]HDPE – High Density Polyethylene Bottles.

[3]Due to short holding time, sample will need to be shipped to the laboratory the same day sampled.

Field QC and laboratory QC samples will be employed to evaluate data quality. Quality control samples are controlled samples introduced into the analysis stream whose results are used to review data quality and to calculate the accuracy and precision of the chemical analysis program. The purpose of each type of QC sample, collection and analysis frequency, and evaluation criteria are described in this section. Collection and analysis frequency are summarized in Tables 6-1 and 6-2. Laboratory control limits are listed in Appendix B.

Quality control procedures for the fixed laboratories' analyses will be consistent with the requirements described in the laboratories' protocols and methods. These requirements are defined in SOPs as part of each laboratory's QA program plan. Methods for establishing the quality of laboratory measurements and sample results will generally conform to SW-846 QC requirements and quality criteria (when available). All QC measurements and data assessment for this project will be conducted on samples from and within batches of samples from this project alone; in other words, no "other project" samples will be used with samples from this project for assessment of data quality.

6.1 FIELD QUALITY CONTROL SAMPLES

Field QC checks are accomplished through the analysis of controlled samples that are introduced to the laboratory from the field. In general, equipment blanks will be collected when reusable, non-disposable sampling equipment is being used for the sampling event. At least one equipment blank needs to be prepared each day for each matrix type when equipment is decontaminated in the field. Trip blanks are required only if no other blanks will be collected for VOC analysis and when water samples are being collected. If trip blanks are required, one is submitted to the laboratory for analysis with every shipment of samples for VOC analysis. Equipment blanks, trip blanks, temperature blanks, field replicates/duplicates, and matrix spike/matrix spike duplicates (MS/MSD) will be collected and submitted to the fixed laboratories, where applicable, to provide a means of assessing the quality of data resulting from the field sampling program.

6.1.1 Equipment Blanks

Equipment blanks are collected to determine the potential for cross-contamination of samples during collection. Equipment blanks will be collected at a rate of one per day per matrix when non-dedicated sampling equipment is used in the field. Equipment blanks will be obtained by passing HPLC organic-free water (for organics) or deionized water (for inorganics) through or over the decontaminated sampling device used that day.

All equipment blanks will be submitted blind to the laboratory, with sample numbers that are indistinguishable from primary samples. Quality control criteria and corrective actions are the same as for method blanks. Blank samples will be analyzed for the same parameters as the associated field samples.

6.1.2 Trip Blanks

Trip blanks will be used to evaluate whether the shipping and handling procedures are introducing contaminants into the samples, and if cross-contamination in the form of volatile organic compound (VOC) migration has occurred between the collected samples. A minimum of one trip blank will be submitted to the laboratory for analysis with every shipment of VOC analysis aqueous samples. Trip blanks are 40-mL vials that have been filled with HPLC grade water by the laboratory and shipped with the empty sample containers to the site prior to sampling. At no time after their preparation are the sample containers to be opened until they are returned to the laboratory. Each trip blank will be inspected for bubbles and overall condition, which will be noted in the field notebook. Each trip blank will be assigned a number to identify the cooler it accompanies, which will be recorded in the field logbook and on the chain of custody form.

The trip blanks will be indistinguishable from the other samples and will be prepared using sample containers and labels identical to those used for the primary samples. Quality control criteria for trip blanks are the same as for method blanks.

6.1.3 Temperature Blanks

One temperature blank will be prepared and submitted to the fixed laboratory with each cooler. The temperature blank will consist of a sample vial containing water, which will be packed in the cooler in the same manner as the rest of the samples. The temperature blank will be used to measure the cooler temperature upon receipt at the laboratory.

6.1.4 Field Replicate/Duplicate Samples

Field replicate samples are collected simultaneously with a sample from the same source to check for sampling reproducibility. A field replicate sample is treated independently of its counterpart in order to assess the laboratory performance through comparison of the results. At least 5 percent of the field samples will be replicates. At least one replicate will be collected for each matrix. Field replicate samples will be submitted blind with sample numbers undistinguishable from primary samples. Control limits for field duplicate precision are 30 percent relative percent difference (RPD) for aqueous samples and 50 percent relative percent difference (RPD) for non-aqueous samples. Quality control criteria for field replicates and calculations and reporting of RPD are described in Section 3.

6.1.5 Matrix Spike/Matrix Spike Duplicates

Matrix spikes and matrix spike duplicates (MS/MSDs) are used to assess sample matrix interference and analytical errors, as well as to measure the accuracy and precision of the

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analysis. The MS/MSDs will be collected and analyzed at a rate of five percent of the field samples for each analytical method or at least one for each analytical batch, whichever is greater.

Because MS/MSD samples measure the matrix interference of a specific matrix, only MS/MSD samples from this investigation will be analyzed, and not samples from other projects. The MS/MSD samples will be analyzed for the same parameters as the associated field samples in the same QC analytical batch. MS/MSD samples will be spiked at the laboratory and not in the field. Results will be expressed as a percent recovery of the known spiked amount (and RPD for the MS/MSD pairs). The laboratory acceptance criteria are presented in Appendix B.

Generally, a specific sample location will be used to collect field QC samples; however, it may not be possible to collect field replicates and MS/MSD samples at some sample locations because of the limited volume of material available. In those instances, MS/MSD samples will be collected from a different location.

TABLE 6-1
Field Quality Control Sample Collection Summary
Water and/or NAPL

SAMPLE TYPE	FREQUENCY
Equipment Blanks	1/day/matrix when non-dedicated equipment is used in the field
Trip Blanks	1/cooler for VOC analysis, aqueous
Temperature Blanks	1/cooler
Field Replicates	5 percent per matrix
Matrix Spike/Matrix Spike Duplicates	5 percent per matrix

6.2 LABORATORY QUALITY CONTROL SAMPLES

Laboratory QC checks are accomplished through analyzing initial and continuing calibration samples, method blanks, surrogate spikes, laboratory control samples (LCS), and laboratory duplicate samples. Not all project laboratories are performing methods that require the above QC sample types. Typically, these samples are not required for non-SW-846 methods (e.g., American Society for Testing and Materials [ASTM] methods). Method-specific QC samples are summarized in Table 6-2. Laboratory control limits for QC samples are included Appendix B.

6.2.1 Initial and Continuing Calibration Samples

Laboratory instrument calibration and maintenance requirements are summarized in Table 6-2 and discussed in Section 9.

6.2.2 Method Blanks

Method blanks are used to check for laboratory contamination and instrument bias. Laboratory method blanks will be analyzed with each sample batch. Results will be compared to those samples within the same analytical batch.

Quality control criteria require that no contaminants be detected in the blank(s). If a chemical (contamination) is detected, the action taken will follow the laboratory SOPs as modified. Blank samples will be analyzed for the same parameters as the associated field samples.

6.2.3 Laboratory Control Samples

Laboratory control samples (LCS) are used to monitor the laboratory's day-to-day performance of routine analytical methods, independent of matrix effects. The LCS are prepared by spiking reagent water or silica sand with standard solutions prepared independently of those used in establishing instrument calibration. The LCS are extracted and analyzed with each batch of samples. Results are compared on a per-batch basis to pre-established control limits and are used to evaluate laboratory performance for precision and accuracy. Laboratory control samples may also be used to identify any background interference or contamination of the analytical system that may lead to the reporting of elevated concentration levels or false positive measurements.

6.2.4 Laboratory Duplicate Samples

Precision of the analytical system is evaluated by using laboratory duplicates. Laboratory duplicates are two portions of a single homogeneous sample analyzed for the same parameter. Laboratory duplicates will be prepared and analyzed with project samples as listed in Tables 6-2.

6.2.5 Surrogate Spikes

Surrogates spikes are used to evaluate accuracy, method performance, and extraction efficiency. Surrogate compounds are compounds not normally found in the environmental samples; however, they are similar to the target analytes in chemical composition and behavior in the analytical process. Samples for organics analysis will be spiked with surrogate compounds consistent with the requirements described in the laboratory SOPs.

Since sample characteristics will affect the percent recovery, the percent recovery is a measurement of accuracy of the overall analytical method on each individual sample. The percent recovery of surrogates is calculated concurrently with the analytes of interest, using the equation in Section 3.2.

TABLE 6-2
Fixed Laboratory Quality Control Sample Summary
Water and/or NAPL

METHOD	METHOD BLANKS[a]	LABORATORY DUPLICATES (percent)	MS/MSD [a,b] (percent)	LCS (BLANK SPIKE) [a]	SURROGATE	INITIAL CALIBRATION	INITIAL CALIBRATION VERIFICATION[a]	CONTINUING CALIBRATION STANDARD
Phenols	1/batch	1/batch	5 or 1/batch	1/batch	All samples	5-pt	1/curve	After every 10 samples
Pest/PCBs	1/batch	1/batch	5 or 1/batch	1/batch	All samples	5-pt	1/curve	After every 10 samples
Herbicides	1/batch	1/batch	5 or 1/batch	1/batch	All samples	6-pt	1/batch	After every 10 samples
Dioxins/Furans	1/batch	NA	5 or 1/batch	1/batch	NA	5-pt	1/batch	Prior to sample analysis
VOCs	1/batch	5 percent	5 or 1/batch	1/batch	All samples	9-pt	Every 12 hours	After every 12 hours
SVOCs	1/batch	1/batch	5 or 1/batch	1/batch	All samples	5-pt	With every new standard set	After every 12 hours
NWTPH-Dx	1/batch	1/7 samples	5 or 1/batch	5 percent	All samples	5-pt	1/batch	After every 10 samples
Metals	1/batch	1/batch	1/batch (MS only)	1/batch	NA	3-pt with blank	1/curve	After every 10 samples[c]
Mercury	1/batch	1/batch	1/batch (MS only)	1/batch	NA	3-pt with blank	1/curve	After every 10 samples[c]
Alkalinity	1/batch	1/batch	5 or 1/batch	1/batch	NA	NA	1/batch	After every 10 samples
Nitrite, Nitrate, Sulfate, Chloride	1/batch	1/batch	5 or 1/batch	1/batch	NA	7-pt	1/curve	After every 10 samples
Ammonia	1/batch	1/batch	NA	1/batch	NA	Method Standard Additions (1)	2/batch	After every 10 samples
Sulfide	1/batch	1/batch	5 or 1/batch	1/batch	NA	5-pt	NA	NA
TOC	1/batch	1/batch	1/batch (MS only)	1/batch	NA	1-pt	2/batch	After every 10 samples
Dissolved Oxygen	NA	1/batch	NA	NA	NA	1-pt	NA	NA
Methane	1/batch	1/batch	5 or 1/batch	1/batch	NA	3-pt	1/curve	After every 10 samples
BOD	1/batch	1/batch	NA	1/batch	NA	1-pt	NA	NA
COD	1/batch	1/batch	NA	1/batch	NA	7-pt	2/batch	After every 10 samples
Major Cations	1/batch	1/batch	1/batch (MS only)	1/batch	NA	4-pt	1/curve	After every 10 samples
Total Heterotrophic Plate Count	1/batch	1/batch	NA	1/batch	NA	NA	NA	NA

NA: Not Applicable
a. Batch is equivalent to 20 or fewer samples prepared and analyzed together with common QC samples
b. LCS/LCD is substituted when there is insufficient sample for MS/MSD.
c. Continuing calibration blank samples are analyzed immediately after continuing calibration standards.

This section describes the analytical procedures to be used by the fixed laboratory. The analytical methods and associated QA/QC procedures were selected based on consideration of the DQOs. The analytical methods, calibration procedures, and QC measurements and criteria are based on current analytical protocols in the following:

- EPA SW-846 (SW-846) Test Methods for Evaluation of Solid Waste (EPA 1994c)
- American Society for Testing and Materials (ASTM Annual Updates)
- Methods for the Chemical Analysis of Water and Wastes (EPA 1979)
- Laboratory-specific SOPs

Table 7-1 summarizes the laboratory extraction methods, cleanup method, and instrument/detector used in this project.

Laboratory QA will be implemented and maintained as described in this document and according to the contract laboratories' QA plans and SOPs. Analytical methods are listed in Appendix A of this document. Quality control samples are described in Section 6 of this QAPP. Analytical method target analytes, routine reporting limits, and control limits are listed in Appendix B.

The methods selected are sufficient to meet the project DQOs. While a best effort will be made to achieve the project DQOs, there may be cases in which it is not possible to meet the specified goals. Any limitation in data quality due to analytical problems (e.g., elevated detection limits due to highly contaminated samples) will be identified and discussed in data evaluation reports.

7.1 MATRIX INTERFERENCE

Some of the aqueous samples submitted for analysis may have physical or chemical interference (i.e. LNAPL and DNAPL). The extent of matrix interference will vary considerably from source to source, depending upon the water sampled. Therefore, the laboratories will analyze the samples in a homogenous state unless otherwise denoted on the chain-of-custody or by the URS QA Officer.

7.2 NON-AQUEOUS PHASE LIQUID ANALYTICAL APPROACH

Non-aqueous phase liquid (NAPL) samples are high concentration samples that will be analyzed differently than soil and water samples. Because percent levels of organic constituents are expected, routine reporting limits are not applicable to this matrix; however, sample preparation, instrument calibration, quantitation limits and corrective actions are the same as for soil samples.

The analyst will examine the NAPL sample for color and/or composition and will use their best judgement to establish an initial dilution factor based upon a visual inspection of the sample. The initial analytical data will be reviewed to determine if the dilution was appropriate (e.g., the majority of the detected compounds were within the linear range of the instrument). If the initial analysis has no hits, then the analyst will reanalyze the NAPL sample at a lower dilution until a

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majority of the detectable compounds are within the calibration range. If after the initial analysis, there are compounds demonstrated above the calibration range, the NAPL sample will be reanalyzed at a greater dilution to bring them within the calibration range. A sample may have up to two analyses performed at different dilution factors.

The reporting limits will be the quantitation limit adjusted based upon the dilution factor or factors applied to each individual sample. Matrix spikes, matrix spike duplicates, and laboratory duplicates will not be analyzed with NAPL samples. Soil surrogate control limits as listed in Appendix B will be used to evaluate surrogate recovery and determine corrective actions

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TABLE 7-1
Fixed Laboratory Method Summary
Extraction Methods, Cleanup Methods, and instrument/detector specifications

ANALYTE	METHOD REFERENCE	EXTRACTION METHOD	CLEANUP METHOD	INSTRUMENT/ DETECTOR
Phenols	EPA 8041	Soil – Sonication Water – Continuous or Sep Funnel	NA	GC/FID
Chlorinated Pesticides/PCBs	EPA 8081/8082	Soil – Sonication Water – Continuous or Sep Funnel	GPC Florisil (optional)	GC/ECD
Phosphorous Pesticides	EPA 1658/8141A	Soil – Sonication Water – Continuous or Sep Funnel	NA	GC/FPD
Chlorinated Herbicides	EPA 8151A	Soil – Shaker Water – Continuous or Sep Funnel	GPC	GC/ECD
Dioxins/Furans	EPA 8290	Soxhlet	Silica gel and Alumina	GC/MS
VOCs	EPA 8260B	Soil – Methanol Extraction Soil/Water - Purge and Trap	None	GC/MS
SVOCs	EPA 8270	Soil – Sonication Water – Continuous or Sep Funnel	GPC	GC/MS
Diesel-Range Hydrocarbons	NWTPH-Dx	Soil – Sonication, Water – Sep Funnel	Silica gel (option) and Sulfuric acid (option)	GC/FID
Metals	EPA 6010/6020 & 7000	Acid digestion	NA	ICP/ICP-MS
Mercury	EPA 7470/7471	Acid digestion	NA	CV - AA
Alkalinity	EPA 310.1	NA	NA	Titration
Anions in Water - Nitrate, Nitrite, Sulfate, Chloride	EPA 300.0	NA	NA	Ion Chromatograph
Ammonia	EPA 350.1	NA	NA	Ion Selective Electrode
Sulfide in Water	EPA 376.2	NA	NA	Ultraviolet Spectrophotometer
Total Organic Carbon	EPA 415.2	H2SO4	NA	IR (Carbonaceous analyzer)
Dissolved Oxygen	EPA 360.1	NA	NA	DO Meter
Methane	GC/FID	Headspace	NA	GC/FID
BOD	EPA 410.4	NA	NA	DO Meter
COD	EPA 405.1	NA	NA	UV/VIS Spectrophotometer
Major Cations	EPA 200.7	300.5 AD	NA	ICP – 6010
Total Heterotrophic Plate Count	SM 9215	NA	NA	NA

NA: Not Applicable

Analytical instrument calibration and maintenance will be conducted in accordance with the QC requirements identified in each laboratory SOP and QA plan, and the manufacturers' instructions. General requirements are discussed below.

8.1 STANDARD SOLUTIONS

A critical element in the generation of quality data is the purity/quality, and tractability of the standard solutions and reagents used in the analytical operations. To ensure the highest purity possible, all primary reference standards and standard solutions will be obtained from the National Bureau of Standards, the EPA repository, or other reliable commercial source. The laboratories will maintain a written record of the supplier, lot number, concentration, receipt date, preparation date, preparer's name, method of preparation, expiration date, and all other pertinent information for all standards, standard solutions, and individual standard preparation logs.

Standard solutions will be validated prior to use. Validation procedures can range from a check for chromatographic purity to verification of the concentration of the standard solution using another standard solution prepared at a different time or obtained from a different source. Stock and working standard solutions will be checked regularly for signs of deterioration, such as discoloration, formation of precipitates, or change of concentration. Care will be exercised in the proper storage and handling of standard solutions, and all containers will be labeled as to compound, concentration, solvent, expiration date, and preparation data (initials of preparer/date of preparation). Reagents will be examined for purity by subjecting an aliquot or subsample to the corresponding analytical method.

8.2 BALANCES

Analytical balances will be calibrated annually according to manufacturer's instructions and have a calibration check before each use by laboratory personnel. Balance calibration shall be documented in appropriate hardbound logbooks with pre-numbered pages.

8.3 REFRIGERATORS

All refrigerators will be monitored for proper temperature by measuring and recording internal temperatures on a daily basis. At a minimum, thermometers used for these measurements will be calibrated annually, according to manufacturers' instructions.

8.4 WATER SUPPLY SYSTEM

The project laboratories will maintain an appropriate water supply system that is capable of furnishing ASTM Type II polished water to the various analytical areas.

8.5 LABORATORY INSTRUMENTS

As stated in SW-846 and applicable laboratory SOPs, calibration of all analytical instrumentation is required to ensure that the analytical system is operating correctly and functioning at the sensitivity required to meet project-specific DQOs. Each instrument will be calibrated with standard solutions appropriate to the instrument and analytical method, in accordance with the methodology specified and at the QC frequency specified in the project laboratory SOPs.

The calibration and maintenance history of the mobile and fixed project laboratory instrumentation is an important aspect of the project's overall QA/QC program. As such, all initial and continuing calibration procedures will be implemented by trained personnel following the manufacturer's instructions and in accordance with applicable EPA protocols to ensure the equipment is functioning within the tolerances established by the manufacturer and the method-specific analytical requirements.

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Field and laboratory instrumentation will be examined and tested prior to being put into service and will be maintained according to the manufacturer's instructions. Sampling personnel will maintain a supply of typical maintenance replacement items available in the field to help prevent downtime because of equipment malfunctions. Examples of typical equipment maintenance items may include but not be limited to filters, tubing, fittings, sample containers, and calibration standards.

9.1 FIELD INSTRUMENTS

The field equipment or instruments, if utilized, will be serviced before the project is initiated and at regular intervals during the project as required by the manufacturers. Manufacturer's instructions will be followed for any additional equipment that is required for the project.

9.2 LABORATORY INSTRUMENTS

All laboratory instruments will be maintained as specified in the QA plans submitted by the project laboratories and according to manufacturers' instructions.

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The ultimate responsibility for maintaining quality throughout the RPAC project rests with the URS Project Manager. The day-to-day responsibility for assuring the quality of field and laboratory data rests with the Field Manager, the URS QA Officer, and the Laboratory Project Manager.

Any nonconformances with the established QC procedures will be expeditiously identified and controlled. Where procedures are not in compliance with the established protocol, corrective actions will be taken immediately. Subsequent work, which depends on the nonconforming activity, will not be performed until the identified nonconformance is corrected. Immediate corrective actions will be noted in field logbooks, memoranda, or other documentation. Problems not subject to immediate action will require formal corrective action. Conditions that require correction actions include, but are not limited to:

- Failure to follow procedures established in the FSPs, QAPP, or Final Work Plan that may apply to this task.
- Failure to meet any of the DQOs for field or laboratory activities.

Reports will contain a quality assurance section that will include a discussion of, at a minimum, corrective actions taken and any deviations from the FSPs, QAPP, or Final Work Plan.

10.1 FIELD CORRECTIVE ACTION

The Field Manager will review the procedures being implemented in the field for consistency with the established protocols. Sample collection, preservation, labeling, etc., will be checked for completeness. Where procedures are not strictly in compliance with the established protocol, the deviations will be field documented and reported to the URS QA Officer. Corrective actions will be defined and documented, as appropriate, by the Field Manager and the Project Manager. Upon implementation of the corrective action, the Field Manager will provide the URS QA Officer with a written memo documenting field implementation. The memo will become part of the RPAC project file.

10.2 LABORATORY CORRECTIVE ACTION

The laboratory QA Data Reviewer will review the data generated to ensure that all QC samples have been run as specified in the protocol. Recoveries of LCS, surrogates, and MS samples will be reviewed for method accuracy. The RPD of laboratory duplicates and MSD samples will be reviewed for method precision. The results will be evaluated against the control limits listed in Appendix B.

Laboratory personnel will be alerted that corrective actions are necessary if any of the following occur:

- The QC data is outside the warning or acceptance windows for precision and accuracy established for LCS. The laboratory project manager will contact the URS QA Officer to discuss out-of-control data sets.
- Blanks contain contaminants at concentrations above the detection limits.
- Undesirable trends are detected in matrix spike or LCS percent recoveries, RPDs, or surrogates percent recoveries.
- Unusual changes in detection limits are observed.
- Deficiencies are detected by the laboratory QA Manager during internal or external audits, or from the results of performance evaluation samples.

If the analyst identifies any nonconformances in the analytical methodologies or quality control sample results, corrective actions will be implemented immediately. Specific corrective actions are outlined in each laboratory Quality Assurance Manual (QAM). Corrective action procedures will be handled initially at the bench level by the analyst, who will review the preparation or extraction procedure for possible errors, check the instrument calibration, spike and calibration mixes, instrument sensitivity, etc. The analyst will immediately notify his/her supervisor of the identified problem and the investigation that is being conducted. If the problem persists or cannot be identified, the matter will be referred to the laboratory supervisor and laboratory QA Manager for further investigation. Once resolved, full documentation of the corrective action procedure will be filed by the laboratory QA Manager, and if data are affected, the URS QA Officer will be provided a corrective action memo for inclusion into the project file.

Corrective action may include, but will not be limited to, the following:

- Reanalyzing suspect samples if holding time criteria permit
- Retrieving the archived sample for analysis
- Evaluating and amending sampling and/or analytical procedures (with URS consultation)
- Accepting data with an acknowledged level of uncertainty (with URS consultation)
- Recalibrating analytical instruments
- Evaluating and attempting to identify limitations of the data

10.3 CORRECTIVE ACTIONS FOLLOWING DATA EVALUATION

The URS QA Officer will review the field and laboratory data generated for this project to ensure that all project quality assurance objectives are met. If any nonconformances are found in the field procedures, sample collection procedures, field documentation procedures, laboratory analytical and documentation procedures, and data evaluation and quality review procedures, the impact of those nonconformances on the overall project QA objectives will be assessed.

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Appropriate actions, including reanalysis, will be recommended to the Project Manager so that the project objectives can be accomplished. Data deemed unacceptable by the Project Manager following the implementation of the required corrective action measures, will not be accepted and further follow-up corrective actions will be explored.

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The chemical data reduction and review process for this project will include data generation, reduction, and two levels of QA review. The project laboratory QA reviewer will conduct the first level of review before submittal of the data to the URS QA officer. After receipt of the data packages, the URS QA Officer or a designee will conduct an independent data quality review. Data quality review responsibilities are summarized in Table 11-1.

TABLE 11-1
Data Quality Responsibilities

TASK	PROJECT LABORATORIES	URS QA OFFICER
Laboratory data quality review and data reduction	X	
Independent data quality review		X
Quality Control Summary Report		X

11.1 SCREENING LEVEL DATA REDUCTION, REVIEW, AND DELIVERABLES

Screening Level Data will be reviewed to a lesser degree than fixed laboratory data. The URS QA Officer will review screening data field records and compare results with those of the fixed laboratories.

11.2 FIXED LABORATORY DATA REDUCTION, REVIEW, AND DELIVERABLES

Data generated by the fixed analytical laboratories will undergo generation, reduction, and review procedures described in the laboratory QA plans and SOPs. Data generated by the laboratories will undergo a comprehensive data review by a URS QA reviewer or designee.

11.2.1 Data Reduction Procedures

The fixed laboratory will perform in-house analytical data reduction under the direction of the laboratory QA Manager. Data reduction will be conducted as follows:

- Raw data produced by the analyst will be processed and reviewed for attainment of QC criteria as outlined in this document and/or established EPA methods, for overall reasonableness, and for transcription or calculations errors.
- After entry into the Laboratory Information Management System (LIMS), a computerized report will be generated and sent to the laboratory QA data reviewer.

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- The laboratory QA data reviewer will decide whether any sample reanalysis is required and the laboratory Project Manager will discuss reanalysis with the URS QA Officer as soon as possible.
- Upon acceptance of the preliminary reports by the laboratory QA data review, final hard copy reports will be generated. Final hard copy reports will be available within 30 calendar days of sample submittal.

Laboratory data reduction procedures will be those adopted, where appropriate, from *Test Methods for Evaluation of Solid Waste, Physical/Chemical Methods, SW-846 (EPA, 1994 and updates)* and those described in the laboratory QAM provided in Appendix D and E. The data reduction steps will be documented, signed, and dated by the analyst.

Laboratory qualifiers as described and defined in the laboratory QA plans will include, but not limited to:

- Concentrations below required reporting limits
- Estimated concentration due to poor spike recovery
- Concentrations of the chemical also found in laboratory blank
- Other sample-specific qualifiers necessary to describe QC conditions

The laboratories will maintain detailed procedures for laboratory record keeping in order to support the validity of all analytical work. Each data report package submitted to URS will contain the laboratories' written certification that the requested analytical method was run and that all QA/QC checks were performed. The laboratory program administrator will provide URS with QC reports of their external audits if appropriate, which will become part of the central project files.

11.2.2 Data Review

The laboratory QA data reviewer, who has the initial responsibility for the correctness and completeness of the data, will conduct the laboratory review. The laboratory QA data reviewer will evaluate the quality of the work based on this document and an established set of laboratory guidelines to ensure the following:

- Sample preparation information is correct and complete
- Analysis information is correct and complete
- Appropriate procedures have been followed
- Analytical results are correct and complete
- QC sample results are within appropriate QC limits

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- Laboratory blanks are within appropriate QC limits
- Special sample preparation and analytical requirements have been met
- Documentation is complete (all anomalies in the preparation and analysis have been documented; holding times are documented)

11.2.3 Electronic Data Deliverables

Electronic data deliverables (EDD) will be in the form of GIS/KEY© Electronic data management system (EDMS). The files will be of a DBF III or compatible file format. The EDD file (labdata.dbf) will have the structure described in the Structure Notes Table, Appendix C.

11.2.4 Hard Copy (Paper) Deliverables

To ensure that project chemical data is sufficient to meet both qualitative and quantitative DQOs, laboratory data deliverables that will permit a data quality assessment consistent with the requirements of the EPA Contract Laboratory Program (CLP) are required.

The laboratory will prepare and retain full analytical and associated QC documentation. The laboratory will report the data as an analytical batch of 20 samples or less, along with associated QC reporting data. The analytical data will be provided in a complete CLP-type deliverable data format. The analytical results will be submitted to URS at the same time as the EDD.

Information provided in the hard copy will be sufficient to review the data with respect to:

- Holding times and conditions
- Detection/quantitation limits
- Surrogate recoveries
- Replicate analyses (laboratory duplicates and MS/MSDs)
- Precision and accuracy
- Representativeness
- Comparability
- Completeness

The laboratory will also provide the following hard copy information for each analytical data package submitted for the RPAC project:

- Cover sheet listing the samples included in the report, narrative comments describing problems encountered in analysis, and identification of any analyses not meeting quality control criteria, including holding times.

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- Chain of custody forms and cooler receipt forms.
- Tabulated results of inorganic and organic compounds identified and quantified, with reporting limits for all analytes. All analytes will be reported for each sample as a detected concentration or as not detected above the specific limits of quantitation, which must be stated. The laboratory will also report dilution factors, date of extraction, extraction batch number, date of analysis, and analytical batch number for each sample. Tentatively identified compounds will not be reported.
- Analytical results for QC sample spikes, laboratory duplicates, initial and continuing calibration verifications of standards and laboratory blanks, standard procedural blanks, LCS, surrogates, laboratory reference materials, ICP interference check samples, and detection limit check samples.
- Raw data system printouts (or legible photocopies) identifying date of reported analysis, analyst, parameters analyzed, calibration curves, calibration verifications, method blanks, any reported sample dilutions, cleanup logs, laboratory duplicates, spikes, control samples, sample spiking levels, preparation/extraction logs, run logs, and chromatograms.
- Chromatograms will be labeled with analyte peaks, internal standards, and surrogate standards where applicable.
- Mass calibration and mass spectral tuning will be reported for gas chromatography/mass spectroscopy (GC/MS) analyses.

The narrative accompanying the data package will include the identification of samples not meeting total QC criteria as specified in this QAPP, and/or the laboratory QA plans, and cautions regarding non-quantitative use or unsuitability due to out-of-control QC results. Data reduction and QC review steps will be documented, signed, and dated by an authorized representative.

11.3 INDEPENDENT DATA QUALITY REVIEW

The second level of review will be performed by URS and will include a review of laboratory performance criteria and sample-specific criteria. Additionally, URS will determine whether the DQOs have been met, and will calculate the data completeness for the project. One hundred percent of the project laboratories' data will be reviewed.

The data quality review will include evaluation of precision, accuracy, representativeness, comparability, completeness, sampling documentation, holding times, instrument calibration, and tuning, as described below. Full data validation will only be performed on a per method per sample delivery group (SDG) basis as a URS option. Data that will need to undergo full data validation will be determined by URS following the initial data quality review.

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Data quality review is a process to determine if the data meet project-specific DQOs. If the DQOs are not met, data usability is further evaluated. Quality review of a data set involves several steps:

1. Reviewing the laboratory data package for transcription errors, misidentifications, or miscalculations
2. Assessing the reliability of data based on quality control sample results
3. Verification that requirements contained in the project planning documents have been met

The data quality review process for this project will follow the procedures in *EPA's Functional Guidelines For Organic Data Review and Inorganic Review (EPA 1994)*, as appropriate. The data quality review will include verification of the following:

- Compliance with the QAPP
- Proper sample collection and handling procedures
- Holding times
- Field QC results
- Detection limits
- Laboratory blank analysis
- Instrument calibration verification (initial and continuing)
- LCS/LCD percent recoveries and relative percent differences
- MS/MSD percent recoveries and relative percent differences
- Surrogate spikes percent recoveries
- Data completeness and format
- Data qualifiers assigned by the laboratories

Qualifiers will be added to data during the review as necessary. Qualifiers applied to the data as a result of the independent review will be limited to:

U The analyte was analyzed for but was not detected above the reporting limit.

J The analyte was positively identified; the associated numerical value is an estimate of the concentration of the analyte in the sample.

UJ The analyte was not detected above the reporting limit. However, the reporting limit is approximate and may or may not represent the actual limit of quantitation necessary to accurately and precisely measure the analyte in the sample.

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

Results of the QA review and/or validation will be included in a data quality review report that will provide a basis for meaningful interpretation of the data quality and evaluate the need for corrective actions and/or comprehensive data validation. This report will be used to generate the quality control summary report.

11.4 QUALITY CONTROL SUMMARY REPORT

Quality control summary reports will be prepared by the URS QA Officer and submitted to the Project Manager, or designee, for review. The reports will summarize the data results collected or received, any corrective actions (encountered and/or resolved) during the reporting period, and data assessment. The quality control summary reports will be included in the project file and incorporated as part of the Early RI Quarterly Reports.

The analytical data will be qualified by reviewing the laboratory's standard analytical data package. The data quality review will involve checking the laboratory data package against criteria established in this document. The data will be considered valid if they meet the criteria established in this document for the following elements:

- Precision
- Accuracy
- Representativeness
- Comparability
- Completeness

The QC summary report will include evaluation of sampling documentation/representativeness, technical holding times, instrument calibration and tuning, field and laboratory blank sample analyses, method QC sample results, field replicates, compound identification and quantitation, elevated reporting limits, and a summary of qualified data.

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Proper communication between field personnel, project management personnel, laboratory personnel, and RPAC personnel will ensure that the proper methods and techniques are used throughout the project.

The URS QA Officer will be responsible for initiating audits, selecting the audit team, and overseeing audit implementation.

The Field Manager is responsible for supervising and checking that samples are collected and handled in accordance with this management plan and that documentation of work is adequate and complete.

The laboratory QA Manager has the responsibility of ensuring that the analytical laboratory is following in-house performance and system audits under their in-house QA/QC guidelines. Any irregularities found in their performance and system audits will be dealt with by the laboratory immediately. The laboratory QA Manager will also regularly conduct the following internal audits:

- Technical audit including reviews of calibration and equipment monitoring records, laboratory logbooks, maintenance records, and instrument control charts
- Data quality audit reviews, including all aspects of data collection, reporting, and review
- Management system audits verifying that management and supervisory staff are effectively implementing and monitoring all QC activities necessary to support the laboratory QA program

The URS Project Manager is responsible for overseeing that the project performance satisfies the QA objectives as set forth in this document.

Reports and technical correspondence will be peer reviewed by qualified individuals before being finalized.

12.1 AUDIT TYPES

12.1.1 Surveillance Audits

Surveillance audits are the continual or frequent monitoring of the status of a project and the analysis of records to ensure that specified requirements are being fulfilled. The Project Manager, or designee, throughout the project will conduct surveillance audits so that the project performance satisfies the objectives set forth in the SAP.

12.1.2 Technical Systems Audits

Technical Systems Audits (TSA), if conducted during this project, are thorough and systematic on-site qualitative audits where facilities, equipment, personnel, training, procedures, and record keeping are examined for conformance to the SAP. Ideally, the TSA is conducted after the work

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has commenced, but before it has progressed very far, thus giving the opportunity for corrective action. The TSA will be conducted if the Field Manager or the URS QA officer identifies the need.

12.2 AUDIT PROCEDURE

This section provides requirements and guidance for performing internal and external audits to verify compliance with the elements of this document.

The URS Project Manager and, if appropriate, other audited entity (e.g., Field Manager, Laboratory Supervisor) will be notified by the URS QA Officer of an audit a reasonable time before the audit is performed. This notification will be in writing and will include information such as the general scope and schedule of the audit, and the name of the audit team leader. The URS QA Officer may serve as the "audit team".

A pre-audit conference will be conducted at the audit site with the appropriate manager or designated representative (e.g., Field Manager, Laboratory Supervisor). The purpose of the conference will be to confirm the audit scope, present the audit plan, discuss the audit sequence, and plan for the post-audit conference.

The audit team will then implement the audit. Selected elements of the SAP will be audited to the depth necessary to evaluate the effectiveness of implementation. Checklists prepared by the audit team and approved by the URS QA Officer will be sufficiently detailed to document major audit components. Conditions requiring immediate corrective action will be reported immediately to the URS QA Officer.

At the conclusion of the audit, a post-audit conference will be held with the Field Manager or Laboratory Supervisor, or their designated representative, to present audit findings and clarify any misunderstandings. The audit team leader will concisely state a list of audit findings. The findings will be acknowledged by signature of the Project Manager or designated representative upon completion of the post-audit conferences.

An audit report will be prepared by the audit team leader and signed by the URS QA Officer. The report will include the following:

- Description of the audit scope
- Identification of the audit team
- Persons contacted during pre-audit, audit, and post-audit activities
- A summary of audit results, including an evaluation statement regarding the effectiveness of the SAP elements which were audited
- Details of findings and program deficiencies

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- Recommendations for corrective actions with a copy to the Project Manager and others as appropriate

12.3 AUDIT RESPONSE

The Project Manager, or designee, will respond to the audit report within a reasonable amount of time. The response will clearly state the corrective action for each finding, including action to prevent recurrence and the date the corrective action will be completed.

12.4 FOLLOW-UP ACTION

Follow-up action by the URS QA officer (e.g. evaluating the adequacy of the Project Manager's response or evaluating that the corrective action was identified and accomplished) may be accomplished through written communications, re-audits, or other appropriate means. When all corrective actions have been verified, a memo will be sent to the Project Manager signifying the satisfactory closeout of the audit.

12.5 AUDIT RECORDS

Original records generated for all audits will be retained in the central project files. Records will include audit reports, written replies, the record of completion of corrective actions, and documents associated with the conduct of audits that support audit findings and corrective actions, as appropriate.

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ASTM Annual Updates. Annual Book of ASTM Standards. American Society for Testing and Materials.

EPA - see U.S. Environmental Protection Agency

U.S. Environmental Protection Agency (EPA). 1979. Methods for the Chemical Analysis of Water and Wastes. EPA600/4-79-020.

————. 1994. USEPA Contract Laboratory Program National Functional Guidelines For Inorganic Data Review.

————. 1994. USEPA Contract Laboratory Program National Functional Guidelines For Inorganic Data Review.

————. 1994c. Test Methods for Evaluation of Solid Waste, Vol. II: Field Manual Physical/Chemical Methods (SW-846). Office of Solid Waste and Emergency Response, U.S. Environmental Protection Agency, Washington, D.C., 3rd edition and Revised Update II, September 1994.

————. No date. RCRA Corrective Action Program. Data Review Guidance Manual. EPA Region IX.

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Data Quality Objectives For North Creek Analytical, Inc.

Method	Analyte	MDL	MRL	Units	Surr. %R	DUP RPD	Matrix Spike %R	Matrix Spike RPD	Blank Spike %R	Blank Spike RPD
Polychlorinated Biphenyls per EPA Method 8082 in Soil										
EPA 8082	Aroclor 1016	20	67	ug/kg dry wt	-	-	57-132	50	57-132	50
EPA 8082	Aroclor 1221	40	134	ug/kg dry wt	-	-	-	-	-	-
EPA 8082	Aroclor 1232	20	67	ug/kg dry wt	-	-	-	-	-	-
EPA 8082	Aroclor 1242	20	67	ug/kg dry wt	-	-	-	-	-	-
EPA 8082	Aroclor 1248	20	67	ug/kg dry wt	-	-	-	-	-	-
EPA 8082	Aroclor 1254	20	67	ug/kg dry wt	-	-	-	-	-	-
EPA 8082	Aroclor 1260	20	67	ug/kg dry wt	-	-	60-136	50	60-136	50
EPA 8082	2,4,5,6-Tetrachloro-m-xylene			Surrogate	63-119	-	-	-	-	-
EPA 8082	Decachlorobiphenyl			Surrogate	52-131	-	-	-	-	-
Polychlorinated Biphenyls per EPA Method 8082 in Water										
EPA 8082	Aroclor 1016	0.25	0.5	ug/l	-	-	60-133	50	75-125	50
EPA 8082	Aroclor 1221	0.5	1	ug/l	-	-	-	-	-	-
EPA 8082	Aroclor 1232	0.25	0.5	ug/l	-	-	-	-	-	-
EPA 8082	Aroclor 1242	0.25	0.5	ug/l	-	-	-	-	-	-
EPA 8082	Aroclor 1248	0.25	0.5	ug/l	-	-	-	-	-	-
EPA 8082	Aroclor 1254	0.25	0.5	ug/l	-	-	-	-	-	-
EPA 8082	Aroclor 1260	0.25	0.5	ug/l	-	-	62-144	50	75-125	50
EPA 8082	2,4,5,6-Tetrachloro-m-xylene			Surrogate	44-119	-	-	-	-	-
EPA 8082	Decachlorobiphenyl			Surrogate	54-128	-	-	-	-	-

Data Quality Objectives For North Creek Analytical, Inc.

Method	Analyte	MDL	MRL	Units	Surr. %R	DUP RPD	Matrix Spike %R	Matrix Spike RPD	Blank Spike %R	Blank Spike RPD
Organophosphorus Pesticides per EPA Method 8141A in Soil										
EPA 8141A	Azinphos methyl	20	40	ug/kg dry wt	-	-	-	-	-	-
EPA 8141A	Bolstar	20	40	ug/kg dry wt	-	-	-	-	-	-
EPA 8141A	Chlorpyrifos	20	40	ug/kg dry wt	-	-	-	-	-	-
EPA 8141A	Coumaphos	20	40	ug/kg dry wt	-	-	-	-	-	-
EPA 8141A	Demeton	20	40	ug/kg dry wt	-	-	-	-	-	-
EPA 8141A	Diazinon	20	40	ug/kg dry wt	-	-	-	-	-	-
EPA 8141A	Dichlorvos	20	40	ug/kg dry wt	-	-	44-167	50	44-167	50
EPA 8141A	Disulfoton	20	40	ug/kg dry wt	-	-	-	-	-	-
EPA 8141A	Ethoprop	20	40	ug/kg dry wt	-	-	59-137	50	59-137	50
EPA 8141A	EPN	20	40	ug/kg dry wt	-	-	-	-	-	-
EPA 8141A	Fensulfothion	20	40	ug/kg dry wt	-	-	-	-	-	-
EPA 8141A	Fenthion	20	40	ug/kg dry wt	-	-	-	-	-	-
EPA 8141A	Malathion	20	40	ug/kg dry wt	-	-	-	-	-	-
EPA 8141A	Mevinphos	20	40	ug/kg dry wt	-	-	-	-	-	-
EPA 8141A	Naled	20	40	ug/kg dry wt	-	-	-	-	-	-
EPA 8141A	Parathion-methyl	20	40	ug/kg dry wt	-	-	62-143	50	62-143	50
EPA 8141A	Parathion-ethyl	20	40	ug/kg dry wt	-	-	-	-	-	-
EPA 8141A	Phorate	20	40	ug/kg dry wt	-	-	-	-	-	-
EPA 8141A	Ronnel	20	40	ug/kg dry wt	-	-	-	-	-	-
EPA 8141A	Stirophos (Tetrachlorvinphos)	20	40	ug/kg dry wt	-	-	54-158	50	54-158	50
EPA 8141A	Tokuthion (Prothiofos)	20	40	ug/kg dry wt	-	-	-	-	-	-
EPA 8141A	Trichloronate	20	40	ug/kg dry wt	-	-	-	-	-	-
EPA 8141A	TBP			Surrogate	47-155	-	-	-	-	-
EPA 8141A	TPP			Surrogate	48-156	-	-	-	-	-
Organophosphorus Pesticides per EPA Method 8141A in Water										
EPA 8141A	Azinphos methyl	0.4	1	ug/l	-	30	-	-	-	-
EPA 8141A	Bolstar	0.4	1	ug/l	-	30	-	-	-	-
EPA 8141A	Chlorpyrifos	0.4	1	ug/l	-	30	-	-	-	-
EPA 8141A	Coumaphos	0.4	1	ug/l	-	30	-	-	-	-
EPA 8141A	Demeton	0.4	1	ug/l	-	30	-	-	-	-
EPA 8141A	Diazinon	0.4	1	ug/l	-	30	-	-	-	-
EPA 8141A	Dichlorvos	0.4	1	ug/l	-	30	35-144	50	35-144	50
EPA 8141A	Disulfoton	0.4	1	ug/l	-	30	-	-	-	-
EPA 8141A	Ethoprop	0.4	1	ug/l	-	30	51-145	50	51-145	50
EPA 8141A	Fensulfothion	0.8	2	ug/l	-	30	-	-	-	-
EPA 8141A	Fenthion	0.4	1	ug/l	-	30	-	-	-	-
EPA 8141A	Malathion	0.4	1	ug/l	-	30	-	-	-	-
EPA 8141A	Mevinphos	0.4	1	ug/l	-	30	-	-	-	-
EPA 8141A	Naled	0.4	1	ug/l	-	30	-	-	-	-
EPA 8141A	Parathion-methyl	0.4	1	ug/l	-	30	60-142	50	60-142	50
EPA 8141A	Parathion-ethyl	0.4	1	ug/l	-	30	-	-	-	-
EPA 8141A	Phorate	0.4	1	ug/l	-	30	-	-	-	-
EPA 8141A	Ronnel	0.4	1	ug/l	-	30	-	-	-	-
EPA 8141A	Stirophos (Tetrachlorvinphos)	0.4	1	ug/l	-	30	40-161	50	40-161	50
EPA 8141A	Tokuthion (Prothiofos)	0.4	1	ug/l	-	30	-	-	-	-
EPA 8141A	Trichloronate	0.4	1	ug/l	-	30	-	-	-	-
EPA 8141A	TBP			Surrogate	64-132	-	-	-	-	-
EPA 8141A	TPP			Surrogate	65-138	-	-	-	-	-

Data Quality Objectives For North Creek Analytical, Inc.

Method	Analyte	MDL	MRL	Units	Surr. %R	DUP RPD	Matrix Spike %R	Matrix Spike RPD	Blank Spike %R	Blank Spike RPD
EPA 8270C	Phenanthrene	0.07	0.33	mg/kg dry wt	-	50	-	-	-	-
EPA 8270C	Phenol	0.07	0.33	mg/kg dry wt	-	50	5-112	60	5-112	60
EPA 8270C	Pyrene	0.07	0.33	mg/kg dry wt	-	50	52-130	60	52-130	60
EPA 8270C	1,2,4-Trichlorobenzene	0.07	0.33	mg/kg dry wt	-	50	44-142	60	44-142	60
EPA 8270C	2,4,5-Trichlorophenol	0.07	0.33	mg/kg dry wt	-	50	-	-	-	-
EPA 8270C	2,4,6-Trichlorophenol	0.07	0.33	mg/kg dry wt	-	50	-	-	-	-
EPA 8270C	2-Fluorobiphenyl			Surrogate	44-146	-	-	-	-	-
EPA 8270C	2-Fluorophenol			Surrogate	42-126	-	-	-	-	-
EPA 8270C	Nitrobenzene-d5			Surrogate	42-126	-	-	-	-	-
EPA 8270C	Phenol-d6			Surrogate	42-131	-	-	-	-	-
EPA 8270C	p-Terphenyl-d14			Surrogate	49-150	-	-	-	-	-
EPA 8270C	2,4,6-Tribromophenol			Surrogate	48-119	-	-	-	-	-

Data Quality Objectives For North Creek Analytical, Inc.

Method	Analyte	MDL	MRL	Units	Surr. %R	DUP RPD	Matrix Spike %R	Matrix Spike RPD	Blank Spike %R	Blank Spike RPD
Semivolatile Organic Compounds per EPA Method 8270C in Water										
EPA 8270C	Acenaphthene	3	5	ug/l	-	-	47-145	60	47-145	60
EPA 8270C	Acenaphthylene	3	5	ug/l	-	-	-	-	-	-
EPA 8270C	Anthracene	3	5	ug/l	-	-	-	-	-	-
EPA 8270C	Benzo (a) anthracene	3	5	ug/l	-	-	-	-	-	-
EPA 8270C	Benzo (a) pyrene	3	5	ug/l	-	-	-	-	-	-
EPA 8270C	Benzo (b) fluoranthene	3	5	ug/l	-	-	-	-	-	-
EPA 8270C	Benzo (ghi) perylene	3	5	ug/l	-	-	-	-	-	-
EPA 8270C	Benzo (k) fluoranthene	3	5	ug/l	-	-	-	-	-	-
EPA 8270C	Benzoic Acid	5	50	ug/l	-	-	-	-	-	-
EPA 8270C	Benzyl alcohol	5	10	ug/l	-	-	-	-	-	-
EPA 8270C	4-Bromophenyl phenyl ether	3	5	ug/l	-	-	-	-	-	-
EPA 8270C	Butyl benzyl phthalate	3	5	ug/l	-	-	-	-	-	-
EPA 8270C	4-Chloro-3-methylphenol	3	5	ug/l	-	-	22-147	60	22-147	60
EPA 8270C	4-Chloroaniline	5	20	ug/l	-	-	-	-	-	-
EPA 8270C	Bis(2-chloroethoxy)methane	5	10	ug/l	-	-	-	-	-	-
EPA 8270C	Bis(2-chloroethyl)ether	3	5	ug/l	-	-	-	-	-	-
EPA 8270C	Bis(2-chloroisopropyl)ether	5	10	ug/l	-	-	-	-	-	-
EPA 8270C	2-Chloronaphthalene	3	5	ug/l	-	-	-	-	-	-
EPA 8270C	2-Chlorophenol	5	5	ug/l	-	-	23-134	60	23-134	60
EPA 8270C	4-Chlorophenyl phenyl ether	3	5	ug/l	-	-	-	-	-	-
EPA 8270C	Chrysene	3	5	ug/l	-	-	-	-	-	-
EPA 8270C	Di-n-butyl phthalate	3	5	ug/l	-	-	-	-	-	-
EPA 8270C	Di-n-octyl phthalate	5	5	ug/l	-	-	-	-	-	-
EPA 8270C	Dibenzo (a,h) anthracene	3	5	ug/l	-	-	-	-	-	-
EPA 8270C	Dibenzofuran	3	5	ug/l	-	-	-	-	-	-
EPA 8270C	1,2-Dichlorobenzene	3	5	ug/l	-	-	-	-	-	-
EPA 8270C	1,3-Dichlorobenzene	3	5	ug/l	-	-	-	-	-	-
EPA 8270C	1,4-Dichlorobenzene	3	5	ug/l	-	-	20-124	60	20-124	60
EPA 8270C	3,3'-Dichlorobenzidine	5	5	ug/l	-	-	-	-	-	-
EPA 8270C	2,4-Dichlorophenol	5	5	ug/l	-	-	-	-	-	-
EPA 8270C	Diethyl phthalate	3	5	ug/l	-	-	-	-	-	-
EPA 8270C	2,4-Dimethylphenol	10	10	ug/l	-	-	-	-	-	-
EPA 8270C	Dimethyl phthalate	3	5	ug/l	-	-	-	-	-	-
EPA 8270C	4,6-Dinitro-2-methylphenol	5	10	ug/l	-	-	-	-	-	-
EPA 8270C	2,4-Dinitrophenol	15	25	ug/l	-	-	-	-	-	-
EPA 8270C	2,4-Dinitrotoluene	3	5	ug/l	-	-	39-139	60	39-139	60
EPA 8270C	2,6-Dinitrotoluene	3	5	ug/l	-	-	-	-	-	-
EPA 8270C	Bis(2-ethylhexyl)phthalate	10	10	ug/l	-	-	-	-	-	-
EPA 8270C	Fluoranthene	3	5	ug/l	-	-	-	-	-	-
EPA 8270C	Fluorene	3	5	ug/l	-	-	-	-	-	-
EPA 8270C	Hexachlorobenzene	3	5	ug/l	-	-	-	-	-	-
EPA 8270C	Hexachlorobutadiene	5	10	ug/l	-	-	-	-	-	-
EPA 8270C	Hexachlorocyclopentadiene	5	10	ug/l	-	-	-	-	-	-
EPA 8270C	Hexachloroethane	5	10	ug/l	-	-	-	-	-	-
EPA 8270C	Indeno (1,2,3-cd) pyrene	3	5	ug/l	-	-	-	-	-	-
EPA 8270C	Isophorone	3	5	ug/l	-	-	-	-	-	-
EPA 8270C	2-Methylnaphthalene	3	5	ug/l	-	-	-	-	-	-
EPA 8270C	2-Methylphenol	5	10	ug/l	-	-	-	-	-	-
EPA 8270C	3-,4-Methylphenol	5	5	ug/l	-	-	-	-	-	-
EPA 8270C	Naphthalene	3	5	ug/l	-	-	-	-	-	-
EPA 8270C	2-Nitroaniline	3	5	ug/l	-	-	-	-	-	-
EPA 8270C	3-Nitroaniline	5	10	ug/l	-	-	-	-	-	-
EPA 8270C	4-Nitroaniline	5	10	ug/l	-	-	-	-	-	-
EPA 8270C	Nitrobenzene	3	5	ug/l	-	-	-	-	-	-
EPA 8270C	2-Nitrophenol	5	5	ug/l	-	-	-	-	-	-
EPA 8270C	4-Nitrophenol	10	25	ug/l	-	-	0-132	60	0-132	60
EPA 8270C	N-Nitrosodi-n-propylamine	5	10	ug/l	-	-	0-230	60	0-230	60
EPA 8270C	N-Nitrosodiphenylamine	3	5	ug/l	-	-	-	-	-	-
EPA 8270C	Pentachlorophenol	5	10	ug/l	-	-	14-176	60	14-176	60

Data Quality Objectives For North Creek Analytical, Inc.

Method	Analyte	MDL	MRL	Units	Surr. %R	DUP RPD	Matrix Spike %R	Matrix Spike RPD	Blank Spike %R	Blank Spike RPD
EPA 8260B	1,2,4-Trimethylbenzene	0.119	1	ug/l	-	-	-	-	-	-
EPA 8260B	1,3,5-Trimethylbenzene	0.171	1	ug/l	-	-	-	-	-	-
EPA 8260B	Vinyl chloride	0.31	1	ug/l	-	-	-	-	-	-
EPA 8260B	o-Xylene	0.091	1	ug/l	-	-	-	-	-	-
EPA 8260B	m,p-Xylene	0.262	2	ug/l	-	-	-	-	-	-
EPA 8260B	4-BFB			Surrogate	75-135	-	-	-	-	-
EPA 8260B	1,2-DCA-d4			Surrogate	70-135	-	-	-	-	-
EPA 8260B	Dibromofluoromethane			Surrogate	80-125	-	-	-	-	-
EPA 8260B	Toluene-d8			Surrogate	80-120	-	-	-	-	-

Data Quality Objectives For North Creek Analytical, Inc.

Method	Analyte	MDL	MRL	Units	Surr. %R	DUP RPD	Matrix Spike %R	Matrix Spike RPD	Blank Spike %R	Blank Spike RPD
Semivolatile Organic Compounds per EPA Method 8270C in Soil										
EPA 8270C	Acenaphthene	0.07	0.33	mg/kg dry wt	-	50	47-145	60	47-145	60
EPA 8270C	Acenaphthylene	0.07	0.33	mg/kg dry wt	-	50	-	-	-	-
EPA 8270C	Anthracene	0.07	0.33	mg/kg dry wt	-	50	-	-	-	-
EPA 8270C	Benzo (a) anthracene	0.07	0.33	mg/kg dry wt	-	50	-	-	-	-
EPA 8270C	Benzo (a) pyrene	0.07	0.33	mg/kg dry wt	-	50	-	-	-	-
EPA 8270C	Benzo (b) fluoranthene	0.07	0.33	mg/kg dry wt	-	50	-	-	-	-
EPA 8270C	Benzo (ghi) perylene	0.07	0.33	mg/kg dry wt	-	50	-	-	-	-
EPA 8270C	Benzo (k) fluoranthene	0.07	0.33	mg/kg dry wt	-	50	-	-	-	-
EPA 8270C	Benzoic Acid	0.5	1	mg/kg dry wt	-	50	-	-	-	-
EPA 8270C	Benzyl alcohol	0.07	0.33	mg/kg dry wt	-	50	-	-	-	-
EPA 8270C	4-Bromophenyl phenyl ether	0.07	0.33	mg/kg dry wt	-	50	-	-	-	-
EPA 8270C	Butyl benzyl phthalate	0.07	0.33	mg/kg dry wt	-	50	-	-	-	-
EPA 8270C	4-Chloro-3-methylphenol	0.07	0.33	mg/kg dry wt	-	50	22-147	60	22-147	60
EPA 8270C	4-Chloroaniline	0.5	2	mg/kg dry wt	-	50	-	-	-	-
EPA 8270C	Bis(2-chloroethoxy)methane	0.07	0.33	mg/kg dry wt	-	50	-	-	-	-
EPA 8270C	Bis(2-chloroethyl)ether	0.07	0.33	mg/kg dry wt	-	50	-	-	-	-
EPA 8270C	Bis(2-chloroisopropyl)ether	0.07	0.33	mg/kg dry wt	-	50	-	-	-	-
EPA 8270C	2-Chloronaphthalene	0.07	0.33	mg/kg dry wt	-	50	-	-	-	-
EPA 8270C	2-Chlorophenol	0.07	0.33	mg/kg dry wt	-	50	23-134	60	23-134	60
EPA 8270C	4-Chlorophenyl phenyl ether	0.07	0.33	mg/kg dry wt	-	50	-	-	-	-
EPA 8270C	Chrysene	0.07	0.33	mg/kg dry wt	-	50	-	-	-	-
EPA 8270C	Di-n-butyl phthalate	0.5	1	mg/kg dry wt	-	50	-	-	-	-
EPA 8270C	Di-n-octyl phthalate	0.07	0.33	mg/kg dry wt	-	50	-	-	-	-
EPA 8270C	Dibenzo (a,h) anthracene	0.07	0.33	mg/kg dry wt	-	50	-	-	-	-
EPA 8270C	Dibenzofuran	0.07	0.33	mg/kg dry wt	-	50	-	-	-	-
EPA 8270C	1,2-Dichlorobenzene	0.5	1	mg/kg dry wt	-	50	-	-	-	-
EPA 8270C	1,3-Dichlorobenzene	0.5	1	mg/kg dry wt	-	50	-	-	-	-
EPA 8270C	1,4-Dichlorobenzene	0.5	1	mg/kg dry wt	-	50	20-124	60	20-124	60
EPA 8270C	3,3´-Dichlorobenzidine	0.5	1	mg/kg dry wt	-	50	-	-	-	-
EPA 8270C	2,4-Dichlorophenol	0.07	0.33	mg/kg dry wt	-	50	-	-	-	-
EPA 8270C	Diethyl phthalate	0.07	0.33	mg/kg dry wt	-	50	-	-	-	-
EPA 8270C	2,4-Dimethylphenol	0.5	1	mg/kg dry wt	-	50	-	-	-	-
EPA 8270C	Dimethyl phthalate	0.07	0.33	mg/kg dry wt	-	50	-	-	-	-
EPA 8270C	4,6-Dinitro-2-methylphenol	0.5	1	mg/kg dry wt	-	50	-	-	-	-
EPA 8270C	2,4-Dinitrophenol	0.5	2	mg/kg dry wt	-	50	-	-	-	-
EPA 8270C	2,4-Dinitrotoluene	0.07	0.33	mg/kg dry wt	-	50	39-139	60	39-139	60
EPA 8270C	2,6-Dinitrotoluene	0.07	0.33	mg/kg dry wt	-	50	-	-	-	-
EPA 8270C	Bis(2-ethylhexyl)phthalate	2	2	mg/kg dry wt	-	50	-	-	-	-
EPA 8270C	Fluoranthene	0.07	0.33	mg/kg dry wt	-	50	-	-	-	-
EPA 8270C	Fluorene	0.07	0.33	mg/kg dry wt	-	50	-	-	-	-
EPA 8270C	Hexachlorobenzene	0.07	0.33	mg/kg dry wt	-	50	-	-	-	-
EPA 8270C	Hexachlorobutadiene	0.5	1	mg/kg dry wt	-	50	-	-	-	-
EPA 8270C	Hexachlorocyclopentadiene	0.5	1	mg/kg dry wt	-	50	-	-	-	-
EPA 8270C	Hexachloroethane	0.5	1	mg/kg dry wt	-	50	-	-	-	-
EPA 8270C	Indeno (1,2,3-cd) pyrene	0.07	0.33	mg/kg dry wt	-	50	-	-	-	-
EPA 8270C	Isophorone	0.07	0.33	mg/kg dry wt	-	50	-	-	-	-
EPA 8270C	2-Methylnaphthalene	0.07	0.33	mg/kg dry wt	-	50	-	-	-	-
EPA 8270C	2-Methylphenol	0.07	0.33	mg/kg dry wt	-	50	-	-	-	-
EPA 8270C	3-,4-Methylphenol	0.07	0.33	mg/kg dry wt	-	50	-	-	-	-
EPA 8270C	Naphthalene	0.07	0.33	mg/kg dry wt	-	50	-	-	-	-
EPA 8270C	2-Nitroaniline	0.07	0.33	mg/kg dry wt	-	50	-	-	-	-
EPA 8270C	3-Nitroaniline	0.5	1	mg/kg dry wt	-	50	-	-	-	-
EPA 8270C	4-Nitroaniline	0.07	0.33	mg/kg dry wt	-	50	-	-	-	-
EPA 8270C	Nitrobenzene	0.07	0.33	mg/kg dry wt	-	50	-	-	-	-
EPA 8270C	2-Nitrophenol	0.07	0.33	mg/kg dry wt	-	50	-	-	-	-
EPA 8270C	4-Nitrophenol	0.5	1	mg/kg dry wt	-	50	0-132	60	0-132	60
EPA 8270C	N-Nitrosodi-n-propylamine	0.07	0.33	mg/kg dry wt	-	50	0-230	60	0-230	60
EPA 8270C	N-Nitrosodiphenylamine	0.07	0.33	mg/kg dry wt	-	50	-	-	-	-
EPA 8270C	Pentachlorophenol	0.5	1	mg/kg dry wt	-	50	14-176	60	14-176	60

Data Quality Objectives For North Creek Analytical, Inc.

Method	Analyte	MDL	MRL	Units	Surr. %R	DUP RPD	Matrix Spike %R	Matrix Spike RPD	Blank Spike %R	Blank Spike RPD
EPA 8260B	1,2,4-Trimethylbenzene	11.9	100	ug/kg dry wt	-	-	-	-	-	-
EPA 8260B	1,3,5-Trimethylbenzene	17.1	100	ug/kg dry wt	-	-	-	-	-	-
EPA 8260B	Vinyl chloride	155	500	ug/kg dry wt	-	-	-	-	-	-
EPA 8260B	o-Xylene	9.1	100	ug/kg dry wt	-	-	-	-	-	-
EPA 8260B	m,p-Xylene	26.2	200	ug/kg dry wt	-	-	-	-	-	-
EPA 8260B	4-BFB			Surrogate	70-130	-	-	-	-	-
EPA 8260B	1,2-DCA-d4			Surrogate	65-135	-	-	-	-	-
EPA 8260B	Dibromofluoromethane			Surrogate	65-130	-	-	-	-	-
EPA 8260B	Toluene-d8			Surrogate	70-120	-	-	-	-	-

Data Quality Objectives For North Creek Analytical, Inc.

Method	Analyte	MDL	MRL	Units	Surr. %R	DUP RPD	Matrix Spike %R	Matrix Spike RPD	Blank Spike %R	Blank Spike RPD
Volatile Organic Compounds per EPA Method 8260B in Water										
EPA 8260B	Acetone	5.471	25	ug/l	-	-	-	-	-	-
EPA 8260B	Benzene	0.121	1	ug/l	-	-	80-125	25	80-125	25
EPA 8260B	Bromobenzene	0.165	1	ug/l	-	-	-	-	-	-
EPA 8260B	Bromochloromethane	0.217	1	ug/l	-	-	-	-	-	-
EPA 8260B	Bromodichloromethane	0.141	1	ug/l	-	-	-	-	-	-
EPA 8260B	Bromoform	0.161	1	ug/l	-	-	-	-	-	-
EPA 8260B	Bromomethane	0.606	10	ug/l	-	-	-	-	-	-
EPA 8260B	2-Butanone	1.601	25	ug/l	-	-	-	-	-	-
EPA 8260B	n-Butylbenzene	0.132	1	ug/l	-	-	-	-	-	-
EPA 8260B	sec-Butylbenzene	0.092	1	ug/l	-	-	-	-	-	-
EPA 8260B	tert-Butylbenzene	0.168	1	ug/l	-	-	-	-	-	-
EPA 8260B	Carbon disulfide	0.322	10	ug/l	-	-	-	-	-	-
EPA 8260B	Carbon tetrachloride	0.218	1	ug/l	-	-	-	-	-	-
EPA 8260B	Chlorobenzene	0.14	1	ug/l	-	-	80-125	25	80-125	25
EPA 8260B	Chloroethane	0.381	5	ug/l	-	-	-	-	-	-
EPA 8260B	Chloroform	0.423	1	ug/l	-	-	-	-	-	-
EPA 8260B	Chloromethane	0.274	5	ug/l	-	-	-	-	-	-
EPA 8260B	2-Chlorotoluene	0.165	1	ug/l	-	-	-	-	-	-
EPA 8260B	4-Chlorotoluene	0.118	1	ug/l	-	-	-	-	-	-
EPA 8260B	1,2-Dibromo-3-chloropropane	0.336	1	ug/l	-	-	-	-	-	-
EPA 8260B	Dibromochloromethane	0.099	1	ug/l	-	-	-	-	-	-
EPA 8260B	1,2-Dibromoethane	0.09	1	ug/l	-	-	-	-	-	-
EPA 8260B	Dibromomethane	0.127	1	ug/l	-	-	-	-	-	-
EPA 8260B	1,2-Dichlorobenzene	0.087	1	ug/l	-	-	-	-	-	-
EPA 8260B	1,3-Dichlorobenzene	0.125	1	ug/l	-	-	-	-	-	-
EPA 8260B	1,4-Dichlorobenzene	0.176	1	ug/l	-	-	-	-	-	-
EPA 8260B	Dichlorodifluoromethane	0.324	5	ug/l	-	-	-	-	-	-
EPA 8260B	1,1-Dichloroethane	0.214	1	ug/l	-	-	-	-	-	-
EPA 8260B	1,2-Dichloroethane	0.185	1	ug/l	-	-	-	-	-	-
EPA 8260B	1,1-Dichloroethene	0.151	1	ug/l	-	-	70-135	25	70-135	25
EPA 8260B	cis-1,2-Dichloroethene	0.187	1	ug/l	-	-	-	-	-	-
EPA 8260B	trans-1,2-Dichloroethene	0.194	1	ug/l	-	-	-	-	-	-
EPA 8260B	1,2-Dichloropropane	0.272	1	ug/l	-	-	-	-	-	-
EPA 8260B	1,3-Dichloropropane	0.266	1	ug/l	-	-	-	-	-	-
EPA 8260B	2,2-Dichloropropane	0.292	1	ug/l	-	-	-	-	-	-
EPA 8260B	1,1-Dichloropropene	0.219	1	ug/l	-	-	-	-	-	-
EPA 8260B	cis-1,3-Dichloropropene	0.113	1	ug/l	-	-	-	-	-	-
EPA 8260B	trans-1,3-Dichloropropene	0.177	1	ug/l	-	-	-	-	-	-
EPA 8260B	Ethylbenzene	0.143	1	ug/l	-	-	-	-	-	-
EPA 8260B	Hexachlorobutadiene	0.263	2	ug/l	-	-	-	-	-	-
EPA 8260B	2-Hexanone	0.572	10	ug/l	-	-	-	-	-	-
EPA 8260B	Isopropylbenzene	0.175	1	ug/l	-	-	-	-	-	-
EPA 8260B	p-Isopropyltoluene	0.134	1	ug/l	-	-	-	-	-	-
EPA 8260B	4-Methyl-2-pentanone	0.485	5	ug/l	-	-	-	-	-	-
EPA 8260B	Methylene chloride	2	5	ug/l	-	-	-	-	-	-
EPA 8260B	Naphthalene	0.104	1	ug/l	-	-	-	-	-	-
EPA 8260B	n-Propylbenzene	0.114	1	ug/l	-	-	-	-	-	-
EPA 8260B	Styrene	0.154	1	ug/l	-	-	-	-	-	-
EPA 8260B	1,1,1,2-Tetrachloroethane	0.252	1	ug/l	-	-	-	-	-	-
EPA 8260B	1,1,2,2-Tetrachloroethane	0.269	1	ug/l	-	-	-	-	-	-
EPA 8260B	Tetrachloroethene	0.27	1	ug/l	-	-	-	-	-	-
EPA 8260B	Toluene	0.115	1	ug/l	-	-	80-125	25	80-125	25
EPA 8260B	1,2,3-Trichlorobenzene	0.081	1	ug/l	-	-	-	-	-	-
EPA 8260B	1,2,4-Trichlorobenzene	0.174	1	ug/l	-	-	-	-	-	-
EPA 8260B	1,1,1-Trichloroethane	0.1	1	ug/l	-	-	-	-	-	-
EPA 8260B	1,1,2-Trichloroethane	0.246	1	ug/l	-	-	-	-	-	-
EPA 8260B	Trichloroethene	0.359	1	ug/l	-	-	70-130	25	70-130	25
EPA 8260B	Trichlorofluoromethane	0.245	1	ug/l	-	-	-	-	-	-
EPA 8260B	1,2,3-Trichloropropane	0.144	1	ug/l	-	-	-	-	-	-

Data Quality Objectives For North Creek Analytical, Inc.

Method	Analyte	MDL	MRL	Units	Surr. %R	DUP RPD	Matrix Spike %R	Matrix Spike RPD	Blank Spike %R	Blank Spike RPD
Chlorinated Herbicides per EPA Method 1658/ 8151A in Soil										
EPA 8151A	2,4-D	0.03	0.04	mg/kg dry wt	-	50	41-141	50	41-141	50
EPA 8151A	2,4-DB	0.014	0.02	mg/kg dry wt	-	50	-	-	-	-
EPA 8151A	2,4,5-T	0.037	0.05	mg/kg dry wt	-	50	-	-	-	-
EPA 8151A	2,4,5-TP (Silvex)	0.043	0.05	mg/kg dry wt	-	50	51-116	50	51-116	50
EPA 8151A	Bromoxynil	TBD	TBD	mg/kg dry wt	-	51	51-117	51	51-117	51
EPA 8151A	Dalapon	0.048	0.05	mg/kg dry wt	-	50	-	-	-	-
EPA 8151A	Dicamba	0.0082	0.02	mg/kg dry wt	-	50	-	-	-	-
EPA 8151A	Dichlorprop	0.008	0.01	mg/kg dry wt	-	50	-	-	-	-
EPA 8151A	Dinoseb	0.0088	0.01	mg/kg dry wt	-	50	-	-	-	-
EPA 8151A	MCPA	0.747	1	mg/kg dry wt	-	50	-	-	-	-
EPA 8151A	MCPP	0.972	1	mg/kg dry wt	-	50	-	-	-	-
EPA 8151A	2,4-DCAA			Surrogate	31-136	-	-	-	-	-
Chlorinated Herbicides per EPA Method 1658/8151A in Water										
EPA 8151A	2,4-D	0.773	2	ug/l	-	50	34-136	50	34-136	50
EPA 8151A	2,4-DB	2.55	4	ug/l	-	50	-	-	-	-
EPA 8151A	2,4,5-T	0.58	1	ug/l	-	50	-	-	-	-
EPA 8151A	2,4,5-TP (Silvex)	0.62	1	ug/l	-	50	34-123	50	34-123	50
EPA 8151A	Bromoxynil	TBD	TBD	ug/l	-	51	51-117	51	51-117	51
EPA 8151A	Dalapon	6.69	10	ug/l	-	50	-	-	-	-
EPA 8151A	Dicamba	0.779	1	ug/l	-	50	-	-	-	-
EPA 8151A	Dichlorprop	0.584	1	ug/l	-	50	-	-	-	-
EPA 8151A	Dinoseb	1.52	2	ug/l	-	50	-	-	-	-
EPA 8151A	MCPA	59.7	200	ug/l	-	50	-	-	-	-
EPA 8151A	MCPP	38.9	200	ug/l	-	50	-	-	-	-
EPA 8151A	2,4-DCAA			Surrogate	24-135	-	-	-	-	-

Data Quality Objectives For North Creek Analytical, Inc.

Method	Analyte	MDL	MRL	Units	Surr. %R	DUP RPD	Matrix Spike %R	Matrix Spike RPD	Blank Spike %R	Blank Spike RPD
Volatile Organic Compounds per EPA Method 8260B in soil (standard methanol "mid level" extraction)										
EPA 8260B	Acetone	547	2500	ug/kg dry wt	-	-	-	-	-	-
EPA 8260B	Benzene	12.1	100	ug/kg dry wt	-	-	60-135	25	80-135	25
EPA 8260B	Bromobenzene	16.5	100	ug/kg dry wt	-	-	-	-	-	-
EPA 8260B	Bromochloromethane	21.7	100	ug/kg dry wt	-	-	-	-	-	-
EPA 8260B	Bromodichloromethane	14.1	100	ug/kg dry wt	-	-	-	-	-	-
EPA 8260B	Bromoform	16.1	100	ug/kg dry wt	-	-	-	-	-	-
EPA 8260B	Bromomethane	60.6	1000	ug/kg dry wt	-	-	-	-	-	-
EPA 8260B	2-Butanone	160.1	2500	ug/kg dry wt	-	-	-	-	-	-
EPA 8260B	n-Butylbenzene	13.2	100	ug/kg dry wt	-	-	-	-	-	-
EPA 8260B	sec-Butylbenzene	9.2	100	ug/kg dry wt	-	-	-	-	-	-
EPA 8260B	tert-Butylbenzene	16.8	100	ug/kg dry wt	-	-	-	-	-	-
EPA 8260B	Carbon disulfide	32.2	1000	ug/kg dry wt	-	-	-	-	-	-
EPA 8260B	Carbon tetrachloride	21.8	100	ug/kg dry wt	-	-	-	-	-	-
EPA 8260B	Chlorobenzene	14	100	ug/kg dry wt	-	-	65-125	25	80-135	25
EPA 8260B	Chloroethane	38.1	500	ug/kg dry wt	-	-	-	-	-	-
EPA 8260B	Chloroform	42.3	100	ug/kg dry wt	-	-	-	-	-	-
EPA 8260B	Chloromethane	27.4	500	ug/kg dry wt	-	-	-	-	-	-
EPA 8260B	2-Chlorotoluene	16.5	100	ug/kg dry wt	-	-	-	-	-	-
EPA 8260B	4-Chlorotoluene	11.8	100	ug/kg dry wt	-	-	-	-	-	-
EPA 8260B	1,2-Dibromo-3-chloropropane	33.6	100	ug/kg dry wt	-	-	-	-	-	-
EPA 8260B	Dibromochloromethane	9.9	100	ug/kg dry wt	-	-	-	-	-	-
EPA 8260B	1,2-Dibromoethane	9	100	ug/kg dry wt	-	-	-	-	-	-
EPA 8260B	Dibromomethane	12.7	100	ug/kg dry wt	-	-	-	-	-	-
EPA 8260B	1,2-Dichlorobenzene	8.7	100	ug/kg dry wt	-	-	-	-	-	-
EPA 8260B	1,3-Dichlorobenzene	12.5	100	ug/kg dry wt	-	-	-	-	-	-
EPA 8260B	1,4-Dichlorobenzene	17.6	100	ug/kg dry wt	-	-	-	-	-	-
EPA 8260B	Dichlorodifluoromethane	32.4	500	ug/kg dry wt	-	-	-	-	-	-
EPA 8260B	1,1-Dichloroethane	21.4	100	ug/kg dry wt	-	-	-	-	-	-
EPA 8260B	1,2-Dichloroethane	18.5	100	ug/kg dry wt	-	-	-	-	-	-
EPA 8260B	1,1-Dichloroethene	15.1	100	ug/kg dry wt	-	-	60-135	25	60-150	25
EPA 8260B	cis-1,2-Dichloroethene	18.7	100	ug/kg dry wt	-	-	-	-	-	-
EPA 8260B	trans-1,2-Dichloroethene	19.4	100	ug/kg dry wt	-	-	-	-	-	-
EPA 8260B	1,2-Dichloropropane	27.2	100	ug/kg dry wt	-	-	-	-	-	-
EPA 8260B	1,3-Dichloropropane	26.6	100	ug/kg dry wt	-	-	-	-	-	-
EPA 8260B	2,2-Dichloropropane	29.2	100	ug/kg dry wt	-	-	-	-	-	-
EPA 8260B	1,1-Dichloropropene	21.9	100	ug/kg dry wt	-	-	-	-	-	-
EPA 8260B	cis-1,3-Dichloropropene	11.3	100	ug/kg dry wt	-	-	-	-	-	-
EPA 8260B	trans-1,3-Dichloropropene	17.7	100	ug/kg dry wt	-	-	-	-	-	-
EPA 8260B	Ethylbenzene	14.3	100	ug/kg dry wt	-	-	-	-	-	-
EPA 8260B	Hexachlorobutadiene	26.3	200	ug/kg dry wt	-	-	-	-	-	-
EPA 8260B	2-Hexanone	57.2	1000	ug/kg dry wt	-	-	-	-	-	-
EPA 8260B	Isopropylbenzene	17.5	100	ug/kg dry wt	-	-	-	-	-	-
EPA 8260B	p-Isopropyltoluene	13.4	100	ug/kg dry wt	-	-	-	-	-	-
EPA 8260B	4-Methyl-2-pentanone	48.5	500	ug/kg dry wt	-	-	-	-	-	-
EPA 8260B	Methylene chloride	200	500	ug/kg dry wt	-	-	-	-	-	-
EPA 8260B	Naphthalene	10.4	100	ug/kg dry wt	-	-	-	-	-	-
EPA 8260B	n-Propylbenzene	11.4	100	ug/kg dry wt	-	-	-	-	-	-
EPA 8260B	Styrene	15.4	100	ug/kg dry wt	-	-	-	-	-	-
EPA 8260B	1,1,1,2-Tetrachloroethane	25.2	100	ug/kg dry wt	-	-	-	-	-	-
EPA 8260B	1,1,2,2-Tetrachloroethane	26.9	100	ug/kg dry wt	-	-	-	-	-	-
EPA 8260B	Tetrachloroethene	27	100	ug/kg dry wt	-	-	-	-	-	-
EPA 8260B	Toluene	11.5	100	ug/kg dry wt	-	-	60-125	25	80-130	25
EPA 8260B	1,2,3-Trichlorobenzene	8.1	100	ug/kg dry wt	-	-	-	-	-	-
EPA 8260B	1,2,4-Trichlorobenzene	17.4	100	ug/kg dry wt	-	-	-	-	-	-
EPA 8260B	1,1,1-Trichloroethane	10	100	ug/kg dry wt	-	-	-	-	-	-
EPA 8260B	1,1,2-Trichloroethane	24.6	100	ug/kg dry wt	-	-	-	-	-	-
EPA 8260B	Trichloroethene	35.9	100	ug/kg dry wt	-	-	60-125	25	70-135	25
EPA 8260B	Trichlorofluoromethane	24.5	100	ug/kg dry wt	-	-	-	-	-	-
EPA 8260B	1,2,3-Trichloropropane	14.4	100	ug/kg dry wt	-	-	-	-	-	-

Data Quality Objectives For North Creek Analytical, Inc.

Method	Analyte	MDL	MRL	Units	Surr. %R	DUP RPD	Matrix Spike %R	Matrix Spike RPD	Blank Spike %R	Blank Spike RPD
EPA 8270C	Phenanthrene	3	5	ug/l	-	-	-	-	-	-
EPA 8270C	Phenol	3	5	ug/l	-	-	5-112	60	5-112	60
EPA 8270C	Pyrene	3	5	ug/l	-	-	55-133	60	55-133	60
EPA 8270C	1,2,4-Trichlorobenzene	3	5	ug/l	-	-	44-142	60	44-142	60
EPA 8270C	2,4,5-Trichlorophenol	5	5	ug/l	-	-	-	-	-	-
EPA 8270C	2,4,6-Trichlorophenol	5	5	ug/l	-	-	-	-	-	-
EPA 8270C	2-Fluorobiphenyl			Surrogate	26-135	-	-	-	-	-
EPA 8270C	2-Fluorophenol			Surrogate	6-124	-	-	-	-	-
EPA 8270C	Nitrobenzene-d5			Surrogate	23-147	-	-	-	-	-
EPA 8270C	Phenol-d6			Surrogate	11-130	-	-	-	-	-
EPA 8270C	p-Terphenyl-d14			Surrogate	38-149	-	-	-	-	-
EPA 8270C	2,4,6-Tribromophenol			Surrogate	19-126	-	-	-	-	-

Data Quality Objectives For North Creek Analytical, Inc.

Method	Analyte	MDL	MRL	Units	Surr. %R	DUP RPD	Matrix Spike %R	Matrix Spike RPD	Blank Spike %R	Blank Spike RPD
Conventional Chemistry Parameters per APHA/EPA Methods in Soil										
EPA 150.1/9040A	pH			pH Units	-	-	-	-	-	-
Conventional Chemistry Parameters per APHA/EPA Methods in Water										
EPA 310.1	Total Alkalinity	1	10	mg/l	-	20	85-115	-	85-115	-
EPA 350.3	Ammonia-Nitrogen	0.098	0.1	mg/l	-	20	-	-	85-115	-
EPA 360.1	Dissolved Oxygen		1	mg/l	-	20	-	-	-	-
EPA 376.1	Sulfide	0.2	1	mg/l	-	20	75-125	-	50-150	-
EPA 405.1	Biochemical Oxygen Demand	1.78	4	mg/l	-	40	-	-	75-125	-
EPA 410.4	Chemical Oxygen Demand	4.048	5	mg/l	-	20	-	-	75-125	
EPA 415.1	Total Organic Carbon	0.461	3	mg/l	-	20	70-130	-	85-115	-
EPA 9060	Total Organic Carbon	1	5	mg/l	-	20	-	-	75-125	-
SM5210A	Carbonaceous BOD	2	4	mg/l	-	40	-	-	75-125	-
Anions per EPA Method 300.0 in Water										
EPA 300.0	Chloride	0.042	0.5	mg/l	-	20	75-125	40	85-115	-
EPA 300.0	Nitrate-Nitrogen	0.0049	0.1	mg/l	-	20	75-125	40	85-115	-
EPA 300.0	Nitrite-Nitrogen	0.0145	0.1	mg/l	-	20	75-125	40	85-115	-
EPA 300.0	Sulfate	0.0475	1	mg/l	-	20	75-125	40	85-115	-
Alcohols by GC/FID in Water	Methane		50	ppm/v	-	-	50-150	20	-	-
Microbiological Parameters per APHA Standard Methods in Water										
SM 9215	Total Heterotrophic Plate Count	1	1	CFU/ml	-	20	-	-	-	-

TABLE 1 REPORTING LIMITS FOR QUANTERRA, INCORPORATED (West Sacramento)

Parameter	Method	Analyte	Water[1] pg/L	Soil[2] pg/g
Dioxins/Furans	SW8290	Dioxins		
		2,3,7,8-TCDD	10	1.0
		1,2,3,7,8-PeCDD	50	5.0
		1,2,3,4,7,8-HxCDD	50	5.0
		1,2,3,6,7,8-HxCDD	50	5.0
		1,2,3,7,8,9-HxCDD	50	5.0
		1,2,3,4,6,7,8-HpCDD	50	5.0
		OCDD	100	10
		Furans		
		2,3,7,8-TCDF	10	1.0
		1,2,3,7,8-PeCDF	50	5.0
		2,3,4,7,8-PeCDF	50	5.0
		1,2,3,4,7,8-HxCDF	50	5.0
		1,2,3,6,7,8-HxCDF	50	5.0
		1,2,3,7,8,9-HxCDF	50	5.0
		2,3,4,6,7,8-HxCDF	50	5.0
		1,2,3,4,6,7,8-HpCDF	50	5.0
		1,2,3,4,7,8,9-HpCDF	50	5.0
		OCDF	100	10

Note: "Totals" values are available upon client request.

[1] = Based upon 1 liter sample aliquot. Sensitivity of the method depends on the level of interferences rather than instrumental limitations. Typical waste samples may have higher reporting limits and may require additional cleanup techniques.
[2] = Based upon 10 gram sample aliquot. Maximum CRQLs for samples "as received." Correction for moisture content may raise reporting limits above these levels. Typical waste samples may have higher reporting limits and may require additional cleanup techniques.

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TABLE 2 QUANTERRA INC. (West Sacramento) LABORATORY CONTROL LIMITS FOR MATRIX SPIKES, MATRIX SPIKE DUPLICATES, AND LABORATORY CONTROL SAMPLES

		Spike Amount		Laboratory-Established Control Limits			
				Percent Recovery (%)		Relative Percent Difference (%)	
Analytical Method	Spiking Compounds	Water (pg/L)	Soil/Sediments (pg/g)	Water	Soil/Sediments	Water	Soil/Sediments
SW8290	2,3,7,8-TCDD	200	20	73-144	50-150	50	50
	2,3,7,8-TCDF	200	20	70-135	50-150	50	50
	1,2,3,7,8-PeCDD	1000	100	85-131	50-150	50	50
	1,2,3,7,8-PeCDF	1000	100	79-136	50-150	50	50
	2,3,4,7,8-PeCDF	1000	100	56-154	50-150	50	50
	1,2,3,4,7,8-HxCDD	1000	100	58-146	50-150	50	50
	1,2,3,6,7,8-HxCDD	1000	100	80-131	50-150	50	50
	1,2,3,7,8,9-HxCDD	1000	100	60-154	50-150	50	50
	1,2,3,4,7,8-HxCDF	1000	100	77-124	50-150	50	50
	1,2,3,6,7,8-HxCDF	1000	100	69-135	50-150	50	50
	1,2,3,7,8,9-HxCDF	1000	100	58-141	50-150	50	50
	2,3,4,6,7,8-HxCDF	1000	100	58-140	50-150	50	50
	1,2,3,4,6,7,8-HpCDD	1000	100	78-134	50-150	50	50
	1,2,3,4,6,7,8-HpCDF	1000	100	80-115	50-150	50	50
	1,2,3,4,7,8,9-HpCDF	1000	100	68-151	50-150	50	50
	OCDD	2000	200	73-144	50-150	50	50
	OCDF	2000	200	64-152	50-150	50	50
(d)(f)	^{13}C-2,3,7,8-TCDD	2000	200	40-135	40-135	N/A	N/A
(d)(f)	^{13}C-1,2,3,7,8-PeCDD	2000	200	40-135	40-135	N/A	N/A
(d)(f)	^{13}C-1,2,3,7,8-PeCDF	2000	200	40-135	40-135	N/A	N/A
(d)(f)	^{13}C-2,3,7,8-TCDF	2000	200	40-135	40-135	N/A	N/A
(d)(f)	^{13}C-1,2,3,6,7,8-HxCDD	2000	200	40-135	40-135	N/A	N/A
(d)(f)	^{13}C-1,2,3,4,7,8-HxCDF	2000	200	40-135	40-135	N/A	N/A
(d)(f)	^{13}C-1,2,3,4,6,7,8-HpCDD	2000	200	40-135	40-135	N/A	N/A
(d)(f)	^{13}C-1,2,3,4,6,7,8-HpCDF	2000	200	40-135	40-135	N/A	N/A
(d)(f)	^{13}C-OCDD	4000	400	40-135	40-135	N/A	N/A

(d) = Method default control limits. Signal-to-noise is also evaluated for data acceptability.
(f) = These labelled analytes are spiked into all samples.
Control limits are subject to change. Control limits effective as of April 1999. (RH 6/1/99)

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Method 8041
Phenols by Gas Chromatography

ANALYTE	CAS #
4-Cloro-3-methylphenol	59-50-7
2-Chlorophenol	95-57-8
2,4-Dichlorophenol	120-83-2
2,6-Dichlorophenol	87-65-0
2,4-Dimethylphenol	105-67-9
Dinoseb (DNBP)	88-85-7
2,4-Dinitrophenol	51-28-5
2-Methyl-4,6-dinitrophenol	534-52-1
2-Methylphenol (o-Cresol)	95-48-7
3-Methylphenol (m-Cresol)	108-39-4
4-Methylphenol (p-Cresol)	106-44-5
2-Nitrophenol	88-75-5
4-Nitrophenol	100-02-7
Pentachlorophenol	85-86-5
Phenol	108-95-2
2,3,4,6-Tetrachlorophenol	58-90-2
2,4,5-Trichlorophenol	95-95-4
2,4,6-Trichlorophenol	88-06-2

SCOEPA00006450

Method 8081A
Organochlorine Pesticides by Gas Chromatography

ANALYTE	CAS #
Aldrin	309-00-2
α-BHC	319-84-6
β-BHC	319-85-7
γ-BHC (Lindane)	58-89-9
δ-BHC	319-86-8
α-Chlordane	5103-71-9
γ-Chlordane	5103-74-2
Chlordane – not otherwise specified	57-74-9
4,4'-DDD	72-54-8
4,4'-DDE	72-55-9
4,4'-DDT	50-29-3
Dieldrin	60-57-1
Endrosulfan I	959-98-8
Endrosulfan II	33213-65-9
Endrosulfan Sulfate	1031-07-8
Endrin	72-20-8
Endrin Aldehyde	7421-93-4
Endrin Ketone	53494-70-5
Heptachlor	76-44-8
Heptachlor Epoxide	1024-57-3
Hexachlorobenzene	118-74-1
Methoxychlor	72-43-5
Toxaphene	8001-35-2

Method 8082
Polychlorinated BiPhenyls (PCBs) by Gas Chromatography

ANALYTE	CAS #
Aroclor 1016	126-11-2
Aroclor 1221	11104-28-2
Aroclor 1232	11141-16-5
Aroclor 1242	53469-21-9
Aroclor 1248	12672-29-6
Aroclor 1254	11097-69-1
Aroclor 1260	11096-82-5

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Method 8141A
Organophosphorus Compounds by Gas Chromatography

ANALYTE	CAS #
Azinphos-methyl	86-50-0
Bolstar (Sulprofos)	35400-43-2
Chlorpyrifos	2921-88-2
Coumaphos	56-72-4
Demeton-O	8065-48-3
Demeton-S	8065-48-3
Diazinon	333-41-5
Dichlorvos (DDVP)	62-73-7
Disulfoton	298-04-4
EPN	2104-64-5
Ethoprop	13194-48-4
Fensulfothion	115-90-2
Fenthion	55-38-9
Malathion	121-75-5
Mevinphos	7786-34-7
Naled	300-76-5
Parathion, ethyl	56-38-2
Parathion, methyl	298-00-0
Phorate	298-02-2
Ronnel	299-84-3
Stirophos (Tetrachlorovinphos)	22248-79-9
Tokithion (Protothiofos)	34643-46-4
Trichloronate	327-98-0

Method 8151A
Chlorinated Herbicides by Gas Chromatography

ANALYTE	CAS #
2,4-D	94-75-7
2,4-DB	94-82-6
2,4,5-TP (Silvex)	93-72-1
2,4,5-T	93-76-5
Bromoxynil	1689-84-5
Dalapon	75-99-0
Dicamba	1918-00-9
Dichloroprop	120-36-5
Dinoseb	88-85-7
MCPA	94-74-6
MCPP	93-65-2

SCOEPA00006452

Method 8290
Polychlorinated Dibenzodioxins (PCDDs) and Polychlorinated Dibenzofurans (PCDFs) by High Resolution Gas Chromatography & High Resolution Mass Spectrometry

ANALYTE	CAS #
2,3,7,8-Tetrachlorodibenzo-p-dioxin (TCDD)	1746-01-6
1,2,3,7,8-Pentachlorodibenzo-p-dioxin (PeCDD)	40321-76-4
1,2,3,6,7,8-Hexachlorodibenzo-p-dioxin (HxCDD)	57653-85-7
1,2,3,4,7,8-Hexachlorodibenzo-p-dioxin (HxCDD)	39227-28-6
1,2,3,7,8,9-Hexachlorodibenzo-p-dioxin (HxCDD)	19408-74-3
1,2,3,4,6,7,8-Heptachlrodibenzo-p-dioxin (HpCDD)	35822-39-4
1,2,3,4,6,7,8,9-Octachlorodibenzo-p-dioxin (OCDD)	3268-87-9
2,3,7,8-Tetrachlorodibenzofuran (TCDF)	51207-31-9
1,2,3,7.8-Pentachlorodibenzofuran (PeCDF)	57117-41-6
2,3,4,7,8-Pentachlorordibenzofurna (PeCDF)	57117-31-4
1,2,3,6,7,8-Hexachlorodibenzofuran (HxCDF)	57117-44-9
1,2,3,7,8,9-Hexachlorodibenzofuran (HxCDF)	72918-21-9
1,2,3,4,7,8-Hexachlorodibenzofuran (HxCDF)	70648-26-9
2,3,4,6,7,8-Hexachlorodibenzofuran (HxCDF)	60851-34-5
1,2,3,4,6,7,8,-Heptachlorodibenzofuran (HpCDF)	67562-39-4
1,2,3,4,,7,8,9-Heptachlorodibenzofuran (HpCDF)	55673-89-7
1,2,3,4,6,7,8,9-Octachlorodibenzofuran	39001-02-0

SCOEPA00006453

Method 6010/6020/7000 Series and Major Cations Metals

ANALYTE	CAS #
Aluminum	7429-90-5
Antimony	7440-36-0
Arsenic	7440-38-2
Barium	7440-39-3
Beryllium	7440-41-7
Boron	7440-42-8
Cadmium	7440-43-9
Calcium	7440-70-2
Chromium	7440-47-3
Cobalt	7440-48-4
Copper	7440-50-8
Iron	7439-89-6
Lead	7439-92-1
Magnesium	7439-95-4
Manganese	7439-96-5
Mercury	7439-97-6
Molybdenum	7439-98-7
Nickel	7440-02-0
Potassium	7440-09-7
Selenium	7782-49-2
Silver	7440-22-4
Sodium	7440-23-5
Thallium	7440-28-0
Tin	7440-31-5
Vanadium	7440-62-2
Zinc	7440-66-6

SCOEPA00006454

Method 8260B
Volatile Organic Compounds by Gas Chromatography & Mass Spectrometry

ANALYTE	CAS #	ANALYTE	CAS #
Acetone	67-64-1	1,3-Dichloropropane	142-28-9
Benzene	107-05-1	2,2-Dichloropropane	594-20-7
Bromobenzene	108-86-1	1,1-Dichloropropene	563-58-6
Bromochloromethane	598-31-2	Cis-1,3-Dichloropropene	10061-01-5
Bromodichloromethane	74-97-5	Trans-1,3-Dichloropropene	10061-02-6
Bromoform	460-00-4	Ethylbenzene	100-41-4
Bromomethane	75-25-2	Hexachlorobutadiene	87-68-3
2-Butanone (MEK)	71-36-3	2-Hexanone	591-78-6
n-Butylbenzene	104-51-8	Iodomethane	74-88-4
Sec-Butylbenzene	135-98-8	Isopropylbenzene (Cumene)	98-82-8
Tert-Butylbenzene	98-06-6	p-Isopropyltoluene (p-Cumene)	99-87-6
Carbon disulfide	75-65-0	Methylene Chloride	75-09-2
Carbon Tetrachloride	75-15-0	4-Methyl-2-pentanone (MIBK)	108-10-1
Chlorobenzene	302-17-0	Naphthalene	91-20-3
Chloroethane	124-48-1	n-Propylbenzene	103-65-1
Chloroform	67-66-3	Styrene	100-42-5
Chloromethane	74-87-3	1,1,1,2-Tetrachloroethane	630-20-6
2-Chlorotoluene	95-49-8	1,1,2,2-Tetrachloroethane	79-34-5
4-Chlorotoluene	106-43-4	Tetrachloroethene	127-18-4
Dibromochloromethane	124-48-1	Toluene	108-88-3
1,2-Dibromo-3-chloropropane	96-12-8	1,2,3-Trichlorobenzene	87-61-6
1,2-Dibromoethane	106-93-4	1,2,4-Trichlorobenzene	120-82-1
Dibromomethane	74-95-3	1,1,1-Trichloroethane	71-55-6
1,2-Dichlorobenzene	95-50-1	1,1,2-Trichloroethane	79-00-5
1,3-Dichlorobenzene	541-73-1	Trichloroethene (Trichloroethylene)	79-01-6
1,4-Dichlorobenzene	106-46-7	Trichlorofluoromethane	75-69-4
Dichlorodifluoromethane	75-71-8	1,2,3-Trichloropropane	96-18-4
1,1-Dichloroethane	75-34-3	1,2,4-Trimethylbenzene	95-63-6
1,2-Dichloroethane	107-06-2	1,3,5-Trimethylbenzene	108-67-8
1,1-Dichloroethene	75-35-4	Vinyl Chloride	75-01-4
Cis-1,2,-Dichloroethene	156-59-2	o-Xylene	95-47-6
Trans-1,2-Dichloroethene	156-60-5	m-Xylene	108-38-3
1,2-Dichloropropane	78-87-5	p-Xylene	106-42-3

SCOEPA00006455

Method 8270B
Semivolatile Organic Compounds by Gas Chromatography & Mass Spectrometry

ANALYTE	CAS #	ANALYTE	CAS #
Acenaphthene	83-32-9	4,6-Dinitro-2-methylphenol	534-52-1
Acenaphthylene	208-96-8	2,4-Dinitrophenol	51-28-5
Anthracene	120-12-7	2,4-Dinitrotoluene	121-14-2
Benz(a)anthracene	56-55-3	2,6-Dinitrotoluene	606-20-2
Benz(b)fluoranthene	205-99-2	Di-n-octyl phthalate	117-84-0
Benz(k)fluoranthene	207-08-9	Fluoranthene	206-44-0
Benz(g,h,i)perylene	191-24-2	Fluorene	86-73-7
Benz(a)pyrene	50-32-8	Hexachlorobenzene	118-74-1
Benzoic Acid	65-85-0	Hexachlorobutadiene	87-68-3
Benzyl Alcohol	100-51-6	Hexachlorocyclopentadiene	77-47-4
Bis(2-Chloroethoxy)methane	111-91-1	Hexachloroethane	67-72-1
Bis(2-Chloroethyl) ether	111-44-4	Indeno(1,2,3-cd)pyrene	193-39-5
Bis(2-Chloroisopropyl) ether	108-60-1	Isophorone	78-59-1
Bis(2-Ethylhexyl) phthalate	117-81-7	2-Methylnaphthalene	91-57-6
4-Bromophenyl phenyl ether	101-55-3	2-Methylphenol (o-Cresol)	95-48-7
Butyl benzyl phthalate	85-68-7	3-Methylphenol (m-Cresol)	108-39-4
4-Chloroaniline	106-47-8	4-Methylphenol (p-Cresol)	106-44-5
4-Chloro-3-methylphenol	59-50-7	Naphthalene	91-20-3
2-Chloronaphthalene	91-58-7	2-Nitroaniline	88-74-4
2-Chlorophenol	95-57-8	3-Nitroaniline	99-09-2
4-Chlorophenyl phenyl ether	7005-72-3	4-Nitroaniline	100-01-6
Chrysene	218-01-9	Nitrobenzene	98-95-3
Dibenz(a,h)anthracene	53-70-3	2-Nitrophenol	88-75-5
Dibenzofuran	132-64-9	4-Nitrophenol	100-02-7
Di-n-butyl phthalate	84-74-2	N-Nitrosodiphenylamine	86-30-6
1,2-Dichlorobenzene	95-50-1	N-Nitrosodi-n-propylamine	621-64-7
1,3-Dichlorobenzene	541-73-1	Pentachlorophenol	87-86-5
1,4-Dichlorobenzene	106-46-7	Phenanthrene	85-01-8
3,3'-Dichlorobenzidine	91-94-1	Phenol	108-95-2
2,4-Dichlorophenol	120-83-2	Pyrene	120-00-0
Diethyl phthalate	84-66-2	1,2,4-Trichlorobenzene	120-82-1
2,4-Dimethylphenol	105-67-9	2,4,5-Trichlorophenol	95-95-4
Dimethyl phthalate	131-11-3	2,4,6-Trichlorophenol	88-06-2

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Natural Attenuation Parameters

METHOD	ANALYTE	CAS #
EPA 310.1	Alkalinity	477520-60-0
EPA 300.0	Chloride	1-00-3
	Nitrate	25-90-0
	Nitrite	15-90-0
	Sulfate	3-03-5
EPA 350.1	Ammonia	310-90-0
EPA 376.2	Sulfide	1055-70-0
EPA 415.2	TOC	1-01-2
EPA 405.1	COD	1-00-4
8015	Isobutyl Alcohol	78-83-1
GC/FID Headspace	Methane	74-82-8

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Data Quality Objectives For North Creek Analytical, Inc.

Method	Analyte	MDL	MRL	Units	Surr. %R	DUP RPD	Matrix Spike %R	Matrix Spike RPD	Blank Spike %R	Blank Spike RPD
Diesel and Heavy Range Hydrocarbons per NWTPH-Dx Method in Water										
NWTPH-Dx	Diesel Range Organics	0.125	0.25	mg/l	-	50	-	-	50-150	50
NWTPH-Dx	Heavy Oil Range Hydrocarbons	0.25	0.5	mg/l	-	50	-	-	50-150	50
NWTPH-Dx	1-Chlorooctadecane			Surrogate	50-150	-	-	-	-	-
Alcohols by GC/FID Headspace Analysis in Soil										
EPA 8015	Isobutyl alcohol	1	10	mg/kg			50-150	25		
Alcohols by GC/FID Headspace Analysis in Water										
EPA 8015	Isobutyl alcohol	1	10	mg/l			50-150	25		

Data Quality Objectives For North Creek Analytical, Inc.

Method	Analyte	MDL	MRL	Units	Surr. %R	DUP RPD	Matrix Spike %R	Matrix Spike RPD	Blank Spike %R	Blank Spike RPD
Total Metals per EPA 6000/7000 Series Methods in Soil										
EPA 6010A	Aluminum	5	5	mg/kg dry wt	-	40	75-125	-	80-120	-
EPA 6010A	Barium	0.15	0.5	mg/kg dry wt	-	40	75-125	-	80-120	-
EPA 6010A	Beryllium	0.5	0.5	mg/kg dry wt	-	40	75-125	-	80-120	-
EPA 6010A	Cadmium	0.25	0.5	mg/kg dry wt	-	40	75-125	-	80-120	-
EPA 6010A	Calcium	1.1	5	mg/kg dry wt	-	40	75-125	-	80-120	-
EPA 6010A	Chromium	0.3	0.5	mg/kg dry wt	-	40	75-125	-	80-120	-
EPA 6010A	Cobalt	1.25	1.25	mg/kg dry wt	-	40	75-125	-	80-120	-
EPA 6010A	Copper	0.5	0.5	mg/kg dry wt	-	40	75-125	-	80-120	-
EPA 6010A	Iron	4.8	5	mg/kg dry wt	-	40	75-125	-	80-120	-
EPA 6010A	Lead	3.05	10	mg/kg dry wt	-	40	75-125	-	80-120	-
EPA 6010A	Magnesium	5	5	mg/kg dry wt	-	40	75-125	-	80-120	-
EPA 6010A	Manganese	0.1	0.5	mg/kg dry wt	-	40	75-125	-	80-120	-
EPA 6010A	Nickel	0.3	1.25	mg/kg dry wt	-	40	75-125	-	80-120	-
EPA 6010A	Potassium	46.1	50	mg/kg dry wt	-	40	75-125	-	80-120	-
EPA 6010A	Silver	0.015	1	mg/kg dry wt	-	40	75-125	-	80-120	-
EPA 6010A	Sodium	5.3	50	mg/kg dry wt	-	40	75-125	-	80-120	-
EPA 6010A	Vanadium	1	1	mg/kg dry wt	-	40	75-125	-	80-120	-
EPA 6010A	Zinc	1	1	mg/kg dry wt	-	40	75-125	-	80-120	-
EPA 6020	Antimony	0.0334	0.5	mg/kg dry wt	-	40	75-125	-	80-120	-
EPA 6020	Arsenic	0.11205	0.5	mg/kg dry wt	-	40	75-125	40	80-120	-
EPA 6020	Selenium	0.10253	0.5	mg/kg dry wt	-	40	75-125	-	80-120	-
EPA 6020	Thallium	0.0957	0.5	mg/kg dry wt	-	40	75-125	-	80-120	-
EPA 7471A	Mercury	0.025	0.05	mg/kg dry wt	-	40	75-125	15	80-120	-
Dissolved Metals per EPA 6000/7000 Series Methods in Water										
EPA 6010A	Aluminum	0.163	0.1	mg/l	-	20	75-125	-	80-120	-
EPA 6010A	Calcium	0.022	0.1	mg/l	-	20	75-125	-	80-120	-
EPA 6010A	Iron	0.096	0.1	mg/l	-	20	75-125	-	80-120	-
EPA 6010A	Magnesium	0.061	0.1	mg/l	-	20	75-125	-	80-120	-
EPA 6010A	Manganese	0.002	0.01	mg/l	-	20	75-125	-	80-120	-
EPA 6010A	Potassium	0.922	1	mg/l	-	20	75-125	-	80-120	-
EPA 6010A	Sodium	0.106	1	mg/l	-	20	75-125	-	80-120	-
EPA 6020	Antimony	6.7E-05	0.001	mg/l	-	20	75-125	-	80-120	-
EPA 6020	Arsenic	0.00022	0.001	mg/l	-	20	75-125	-	80-120	-
EPA 6020	Barium	4.6E-05	0.002	mg/l	-	20	75-125	-	80-120	-
EPA 6020	Beryllium	7.6E-05	0.001	mg/l	-	20	75-125	-	80-120	-
EPA 6020	Cadmium	3.2E-05	0.001	mg/l	-	20	75-125	-	80-120	-
EPA 6020	Chromium	0.00015	0.001	mg/l	-	20	75-125	-	80-120	-
EPA 6020	Cobalt	2E-05	0.002	mg/l	-	20	75-125	-	80-120	-
EPA 6020	Copper	6.6E-05	0.002	mg/l	-	20	75-125	-	80-120	-
EPA 6020	Lead	3.9E-05	0.001	mg/l	-	20	75-125	-	80-120	-
EPA 6020	Nickel	3.7E-05	0.002	mg/l	-	20	75-125	-	80-120	-
EPA 6020	Selenium	0.00021	0.001	mg/l	-	20	75-125	-	85-115	-
EPA 6020	Silver	7.5E-05	0.001	mg/l	-	20	75-125	-	80-120	-
EPA 6020	Thallium	0.00019	0.001	mg/l	-	20	75-125	-	80-120	-
EPA 6020	Vanadium	0.00015	0.005	mg/l	-	20	75-125	-	80-120	-
EPA 6020	Zinc	0.00012	0.005	mg/l	-	20	75-125	-	80-120	-
EPA 7470A	Mercury	0.0002	0.0002	mg/l	-	20	75-125	-	80-120	-

Data Quality Objectives For North Creek Analytical, Inc.

Method	Analyte	MDL	MRL	Units	Surr. %R	DUP RPD	Matrix Spike %R	Matrix Spike RPD	Blank Spike %R	Blank Spike RPD
Phenols per EPA Method 8041 in Soil										
EPA 8041	4-Chloro-3-methylphenol	0.5	1	mg/kg dry wt	-	-	70-130	50	70-130	50
EPA 8041	2-Chlorophenol	0.5	1	mg/kg dry wt	-	-	70-130	50	70-130	50
EPA 8041	Cresols	1	2	mg/kg dry wt	-	-	-	-	-	-
EPA 8041	2,4-Dichlorophenol	0.5	1	mg/kg dry wt	-	-	-	-	-	-
EPA 8041	2,6-Dichlorophenol	0.5	1	mg/kg dry wt	-	-	-	-	-	-
EPA 8041	2,4-Dimethylphenol	0.5	1	mg/kg dry wt	-	-	-	-	-	-
EPA 8041	4,6-Dinitro-2-methylphenol	0.5	1	mg/kg dry wt	-	-	-	-	-	-
EPA 8041	2,4-Dinitrophenol	2	2.5	mg/kg dry wt	-	-	-	-	-	-
EPA 8041	Dinoseb	0.5	1	mg/kg dry wt	-	-	-	-	-	-
EPA 8041	2-Nitrophenol	0.5	1	mg/kg dry wt	-	-	-	-	-	-
EPA 8041	4-Nitrophenol	0.5	1	mg/kg dry wt	-	-	70-130	50	70-130	50
EPA 8041	Pentachlorophenol	0.5	1	mg/kg dry wt	-	-	70-130	50	70-130	50
EPA 8041	Phenol	0.5	1	mg/kg dry wt	-	-	70-130	50	70-130	50
EPA 8041	2,3,4,6-Tetrachlorophenol	0.5	1	mg/kg dry wt	-	-	-	-	-	-
EPA 8041	2,4,5-Trichlorophenol	0.5	1	mg/kg dry wt	-	-	-	-	-	-
EPA 8041	2,4,6-Trichlorophenol	0.5	1	mg/kg dry wt	-	-	-	-	-	-
EPA 8041	2-Fluorophenol			Surrogate	70-130	-	-	-	-	-
EPA 8041	2,4,6-Tribromophenol			Surrogate	70-130	-	-	-	-	-
Phenols per EPA Method 8041 in Water										
EPA 8041	4-Chloro-3-methylphenol	10	25	ug/l	-	-	-	-	23-97	50
EPA 8041	2-Chlorophenol	10	25	ug/l	-	-	-	-	27-123	50
EPA 8041	Cresols	10	25	ug/l	-	-	-	-	-	-
EPA 8041	2,4-Dichlorophenol	10	25	ug/l	-	-	-	-	-	-
EPA 8041	2,6-Dichlorophenol	10	25	ug/l	-	-	-	-	-	-
EPA 8041	2,4-Dimethylphenol	10	25	ug/l	-	-	-	-	-	-
EPA 8041	4,6-Dinitro-2-methylphenol	10	25	ug/l	-	-	-	-	-	-
EPA 8041	2,4-Dinitrophenol	30	62.5	ug/l	-	-	-	-	-	-
EPA 8041	Dinoseb	10	25	ug/l	-	-	-	-	-	-
EPA 8041	2-Nitrophenol	10	25	ug/l	-	-	-	-	-	-
EPA 8041	4-Nitrophenol	10	25	ug/l	-	-	-	-	10-80	50
EPA 8041	Pentachlorophenol	10	25	ug/l	-	-	-	-	50-150	50
EPA 8041	Phenol	10	25	ug/l	-	-	-	-	12-110	50
EPA 8041	2,3,4,6-Tetrachlorophenol	10	25	ug/l	-	-	-	-	-	-
EPA 8041	2,4,5-Trichlorophenol	10	25	ug/l	-	-	-	-	-	-
EPA 8041	2,4,6-Trichlorophenol	10	25	ug/l	-	-	-	-	-	-
EPA 8041	2-Fluorophenol			Surrogate	22-83	-	-	-	-	-
EPA 8041	2,4,6-Tribromophenol			Surrogate	42-141	-	-	-	-	-

Data Quality Objectives For North Creek Analytical, Inc.

Method	Analyte	MDL	MRL	Units	Surr. %R	DUP RPD	Matrix Spike %R	Matrix Spike RPD	Blank Spike %R	Blank Spike RPD
Organochlorine Pesticides per EPA Method 8081A in Soil										
EPA 8081	Aldrin	3.35	6.7	ug/kg dry wt	-	-	64-136	50	64-136	50
EPA 8081	alpha-BHC	3.35	6.7	ug/kg dry wt	-	-	-	-	-	-
EPA 8081	beta-BHC	3.35	6.7	ug/kg dry wt	-	-	-	-	-	-
EPA 8081	delta-BHC	3.35	6.7	ug/kg dry wt	-	-	-	-	-	-
EPA 8081	gamma-BHC (Lindane)	3.35	6.7	ug/kg dry wt	-	-	62-140	50	62-140	50
EPA 8081	alpha-Chlordane	3.35	6.7	ug/kg dry wt	-	-	-	-	-	-
EPA 8081	Chlordane (tech)	75	150	ug/kg dry wt	-	-	-	-	-	-
EPA 8081	gamma-Chlordane	3.35	6.7	ug/kg dry wt	-	-	-	-	-	-
EPA 8081	4,4´-DDD	3.35	6.7	ug/kg dry wt	-	-	-	-	-	-
EPA 8081	4,4´-DDE	3.35	6.7	ug/kg dry wt	-	-	-	-	-	-
EPA 8081	4,4´-DDT	3.35	6.7	ug/kg dry wt	-	-	65-130	50	65-130	50
EPA 8081	Dieldrin	3.35	6.7	ug/kg dry wt	-	-	70-135	50	70-135	50
EPA 8081	Endosulfan I	3.35	6.7	ug/kg dry wt	-	-	-	-	-	-
EPA 8081	Endosulfan II	3.35	6.7	ug/kg dry wt	-	-	-	-	-	-
EPA 8081	Endosulfan sulfate	3.35	6.7	ug/kg dry wt	-	-	-	-	-	-
EPA 8081	Endrin	3.35	6.7	ug/kg dry wt	-	-	65-135	50	65-135	50
EPA 8081	Endrin aldehyde	3.35	6.7	ug/kg dry wt	-	-	-	-	-	-
EPA 8081	Heptachlor	3.35	6.7	ug/kg dry wt	-	-	48-124	50	48-124	50
EPA 8081	Heptachlor epoxide	3.35	6.7	ug/kg dry wt	-	-	-	-	-	-
EPA 8081	Hexachlorobenzene	TBD	TBD	ug/kg dry wt	-	-	-	-	-	-
EPA 8081	Methoxychlor	3.35	6.7	ug/kg dry wt	-	-	-	-	-	-
EPA 8081	Toxaphene	100	200	ug/kg dry wt	-	-	-	-	-	-
EPA 8081	Endrin ketone	3.35	6.7	ug/kg dry wt	-	-	-	-	-	-
EPA 8081	2,4,5,6-Tetrachloro-m-xylene			Surrogate	63-119	-	-	-	-	-
EPA 8081	Decachlorobiphenyl			Surrogate	52-131	-	-	-	-	-
Organochlorine Pesticides per EPA Method 8081A in Water										
EPA 8081	Aldrin	0.05	0.1	ug/l	-	-	50-150	50	49-123	50
EPA 8081	alpha-BHC	0.05	0.1	ug/l	-	-	-	-	-	-
EPA 8081	beta-BHC	0.05	0.1	ug/l	-	-	-	-	-	-
EPA 8081	delta-BHC	0.05	0.1	ug/l	-	-	-	-	-	-
EPA 8081	gamma-BHC (Lindane)	0.05	0.1	ug/l	-	-	50-150	50	47-138	50
EPA 8081	alpha-Chlordane	0.05	0.1	ug/l	-	-	-	-	-	-
EPA 8081	Chlordane (tech)	0.5	1	ug/l	-	-	-	-	-	-
EPA 8081	gamma-Chlordane	0.05	0.1	ug/l	-	-	-	-	-	-
EPA 8081	4,4´-DDD	0.05	0.1	ug/l	-	-	-	-	-	-
EPA 8081	4,4´-DDE	0.05	0.1	ug/l	-	-	-	-	-	-
EPA 8081	4,4´-DDT	0.05	0.1	ug/l	-	-	50-150	50	77-127	50
EPA 8081	Dieldrin	0.05	0.1	ug/l	-	-	50-150	50	84-135	50
EPA 8081	Endosulfan I	0.05	0.1	ug/l	-	-	-	-	-	-
EPA 8081	Endosulfan II	0.05	0.1	ug/l	-	-	-	-	-	-
EPA 8081	Endosulfan sulfate	0.05	0.1	ug/l	-	-	-	-	-	-
EPA 8081	Endrin	0.05	0.1	ug/l	-	-	50-150	50	81-132	50
EPA 8081	Endrin aldehyde	0.05	0.1	ug/l	-	-	-	-	-	-
EPA 8081	Heptachlor	0.05	0.1	ug/l	-	-	50-150	50	48-125	50
EPA 8081	Heptachlor epoxide	0.05	0.1	ug/l	-	-	-	-	-	-
EPA 8081	Hexachlorobenzene	TBD	TBD	ug/l	-	-	-	-	-	-
EPA 8081	Methoxychlor	0.05	0.1	ug/l	-	-	-	-	-	-
EPA 8081	Toxaphene	1.25	2.5	ug/l	-	-	-	-	-	-
EPA 8081	Endrin ketone	0.05	0.1	ug/l	-	-	-	-	-	-
EPA 8081	2,4,5,6-Tetrachloro-m-xylene			Surrogate	45-116	-	-	-	-	-
EPA 8081	Decachlorobiphenyl			Surrogate	54-128	-	-	-	-	-

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STRUCTURE NOTES FOR LABDATA.DBF, GIS/Key VERSION 2.3

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FILE LAYOUT FOR ELECTRONIC DOWN LOAD TO GIS/Key

Remark	Required	Justify	Field Name 10 Character	Type	Len	Dec	Notes (Default parameters)
user	X *	L	SITE_ID	C	15		Well or sampling location as labeled on the GIS\Key Map. An entry in SITE_ID is required for all Primary results, duplicates, and splits. Spike results may be associated with samples from another location, and therefore SITE_ID is not required although recommended if appropriate. The import routine requires all sites to be in the project database.
user	X *	L	SP_ID	C	7		Sample Period (EVENT_ID) is used to group QA/QC data to within the data range of the sample period. An entry in the EVENT_ID field is required for Blanks, Control Samples and Spikes. The import routine requires the EVENT_ID to be defined in the project database.
lab	X		SAMP_TYPE	C	1		Sample types are <W>ater, <S>oil, Sediment, Solid. Others sample types can be added, but these are not supported by GIS\Key. The import routine requires < W, S> entry.
lab	X	L	RES_CODE	C	4		Preliminary code used to determine the type of chemical result. See notes at end of table for details of valid entries. RES_CODE is used by the GIS/Build routine to derive the GIS\Key RES_TYPE and RES_CLASS fields. Initially assigned by the lab and modified as required by the user to reflect sample status not known by the lab.
GIS	internal		RES_CLASS	C	1		Assigned by GIS/Build from the RES_CODE field, this code refers to the type of result received from the lab. Allowable RES_CLASS entries are <P>rimary/duplicate/split|<C>ontrol sample|<B>lank sample| and <S>pike sample.
GIS	internal	L	RES_TYPE	C	3		Assigned by GIS/Build from the RES_CODE field, this code works in conjunction with RES_CLASS to describe the type of result. It consists of a one character code, a test sequence number, and a result occurrence.
lab			RES_COLUMN	C	1		The column number of a multiple column test. RES_COLUMN should = 0 for the result set of record of a record. This corresponds to a RES_CODE result set occurrence = 0 for the result set of record. For other result sets, the column number of the test should be given. Used primarily for IRPIMS reporting.
lab	X*	L	RES_ORIG	C	3		Points to the originating result of a result set of record in a multiple column or dilution test. A result set of the record may be a combination of one or more column/dilution tests. The RES_ORIG points to the result in the test run from which the result of the record came and should equal the last 3 characters of the RES_CODE for that result. Used primarily for IRPIMS reporting.
lab	X*		SURROG_FLG	L	1		The field is set to "T" for a surrogate result and "F" for all other result types.
user		L	SAMP_ID	C	15		SAMP_ID is the unique identifier provided to the laboratory on the sample bottle.
user		L	SAMP_ID2	C	15		SAMP_ID2 is used ONLY for Field Spike Duplicates or for Blind Control Sample Duplicates.
user	X *		SAMP_DATE	D	8		Date sample was collected (mm/dd/yy format). Required for all results except blanks, spikes and control samples.
lab/user	X *		SAMP_TIME	C	5		Time sample was collected (##:## 24hr format). Required for all primary, duplicate, split and surrogate results but not required for blank, spike, and control sample results. If not required and not specified, the import routine enters a default of 00:00.
user	X *		SAMP_DEPTH	N	8	3	Depth below ground surface in meters (metric) or feet (American) at which sample was collected. Required for SAMP_TYPE = <S>, Recommended for SAMP_TYPE = <W>. Depths above ground surface are assigned a negative number. Note that primary key in American version is based on depth measurements to a hundredth of a foot only.
user			S_DEPTH	N	8	3	Depth below ground surface in feet to the top of the sample interval range.
user			E_DEPTH	N	8	3	Depth below ground surface in feet to the bottom of the sample interval range.
user	X *	L	CASE_ID	C	5		Case and blank Ids or case and QA/QC IDs are used to associate primary results with quality control results. CASE_ID is a required entry for quality control data and should be entered for primary results if quality control data is being entered. For small projects, many GIS\Key users use sampling event as CASE_ID. IRPIMS projects should enter the IRPIMS site in the CASE_ID.
lab/user	X*	L	SDG_ID	C	25		SDG or sample delivery group ID. This field (in combination with CASE_ID) is used to associate rinsate blank results with primary results. Required for rinsate blanks.

* = Conditionally required, see Notes column for more detail.

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FILE LAYOUT FOR ELECTRONIC DOWN LOAD TO GIS/Key

Remark	Required	Justify	Field Name 10 Character	Type	Len	Dec	Notes (Default parameters)
lab	X*	L	QAQC_ID	C	25		QA/QC Batch ID's are normally assigned only by labs. This field is used to associate laboratory quality control results (i.e. method blanks, lab blanks, matrix spikes, control samples) with primary results. QAQC_ID entries must uniquely identify each batch of samples analyzed by the laboratory and may not be repeated. Required for method blanks.
lab/ user	X*	L	BLANK_ID	C	25		Field Blank identifier. BLANK_ID is used in combination with CASE_ID to associate field blank results with primary results. Required for field blanks.
user	X	L	TCL_ID	C	10		TCL ID, or Template Constituent List is required for all results. A TCL is a data entry template which groups sample results into logical sets. The user defines a TCL to include a lab code (LAB_ID) and optionally a test method (METHOD_ID) and a list of chemicals with reporting limits. GIS/Build can automatically assign a TCL, if METHOD_ID and LAB_ID are provided.
GIS/ user	X		TCL_TYPE	C	1		TCL Type. Used to differentiate lists of chemicals having the same test method and lab. GIS/Build assigns the GIS/Key default value to this field if it is left blank.
lab/user		L	METHOD_ID	C	10		Test Method identification. The import routine will generate error messages if the METHOD_ID is not in the GIS\Key database.
lab		L	EXTRACTION	C	6		Extraction method code. The import routine requires definition of entries in the GIS/Key database.
user		L	LAB_ID	C	5		Lab ID code. The Import routine requires codes to be defined in GIS\Key database. Lab ID codes must be incorporated into the definition of a TCL_ID.
GIS	internal	R	SEQ_NUM	C	3		Used to order the compounds in a TCL (SEQ_NUM=1 for the first compound on a TCL). When editing results after data import, the sequence number controls the order in which the results are viewed. GIS/Build assigns a SEQ_NUM based on the SEQ_NUM of the chemicals defined in the TCL. If a TCL definition is not found in the project, the SEQ_NUM assignment is based on the order within the TCL in LABDATA.dbf.
user	X *	L	SPLIT_ID	C	10		SPLIT_ID records the TCL_ID of the first split sample of the primary sample. This field is left blank unless the record is for a primary result and a split sample was analyzed. A split sample result entered as a separate record will be orphaned unless this field is filled in for the primary result record.
user	X *	L	SPLIT_ID2	C	10		SPLIT_ID2 records the TCL_ID of the second split sample of the primary sample. This field is left blank unless the record is for a primary result and a second split sample was analyzed. The second split result, entered as a separate record, will be orphaned unless this field is filled in for the primary result record.
lab		L	LSAMP_ID	C	15		Lab sample ID.
lab		L	LSAMP_ID2	C	15		Lab sample ID of duplicates, entered by the lab for known-control sample duplicates and lab spike duplicates.
lab	X *	R	LAB_CAS_ID	C	11		CAS Registry number assigned by the Lab for the constituent. Either a LAB_CAS_ID or a LAB_CHEM must be included with each record. The import routine requires any LAB_CAS_ID to match a CAS_NUM in GIS\Key COMPOUND.DBF.
GIS	internal	R	CAS_NUM	C	11		CAS number from the GIS\Key compound.dbf. This is internally assigned based on a match with LAB_CHEM or LAB_CAS_ID, with preference given to LAB_CAS_ID
lab	X *	L	LAB_CHEM	C	40		Constituent name from lab. Either a LAB_CAS_ID or a LAB_CHEM must be included with each result. If LAB_CHEM is used, then it must match a GIS\Key COMPOUND.DBF alias.
GIS	internal	L	NAME	C	40		Constituent name assigned by comparing LAB_CHEM to COMPOUND.DBF. If LAB_CAS_ID is used without a matching LAB_CHEM, NAME is assigned based on alias 0 in GIS\Key Database.
GIS	internal	R	ALIAS_NUM	C	2		Alias numbers are internally assigned by comparing LAB_CAS_ID and LAB_CHEM to COMPOUND.DBF.
lab	X *	L	CONC	C	11		Utilized to store constituent concentrations for primary results, duplicates, splits & blanks and concentrations added to spikes and control samples. The field is left blank for surrogates. Warning code generated when CONC and LIMIT1 are both left blank for primary results.

* = Conditionally required, see Notes column for more detail.

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FILE LAYOUT FOR ELECTRONIC DOWN LOAD TO GIS/Key

Remark	Required	Justify	Field Name 10 Character	Type	Len	Dec	Notes (Default parameters)
							duplicates, splits and blanks. Stored as a character string to preserve significant figures. May be expressed in scientific notation (e.g. 1.3E03). All entries must be numeric with the exception of "E" (i.e. scientific notation), "+", or a "+/-". A "+" after concentration amount means greater than while a concentration followed by "+/-" and a number expresses an uncertainty factor.
lab	X *	L	LIMIT1	C	10		Detection Limit 1 for a sample result. Stored as a character string to preserve the significant figures. May be expressed in scientific notation (e.g. 1.3E03). Required for primary results, duplicates, splits & blanks if CONC is blank. Left blank for control samples, matrix spikes and surrogates. All entries must be numeric with the exception of "E" (i.e. scientific notation) or "?". A "?" means that the detection limit is unknown The entered detection limit should reflect dilution. Generally, LIMIT1 refers to the method detection limit. However, GIS\Key places no restrictions on the use of this field.
lab	X *	L	DL_FLAG	C	2		Place a {<} in this field if the result is non-detect, otherwise leave it blank. Required for primary results, duplicates, splits and blanks. The field is left blank for control samples, matrix spikes and surrogates. For IRPIMS files, DL_FLAG corresponds to the PARVQ field. DL_FLAG corresponds to RF_FLAG on the data entry screen.
lab	X *	L	UNITS	C	5		Reported units of concentration. GIS\Key can automatically convert concentrations in mg/l, mg/kg, ug/l, ug/kg, ppm, ppb, and %. Other units are allowed but will generate warning codes.
lab		L	LIMIT2	C	10		Practical quantitation limit for a blank or primary sample result. Format limitations for LIMIT2 are the same as described for LIMIT1. The entered quantitation limit should reflect dilution. GIS\Key places no restrictions on the use of this field.
lab		L	INSTRUMENT	C	20		Identifying number or name of laboratory equipment used to perform the analysis. Used primarily for Air Force reporting.
lab		L	CALIBRATE	C	20		Calibration reference number for the test. Used primarily for Air Force reporting.
GIS	internal		SPIKE_DUP	L	1		Flag indicating a spike control sample duplicate record. Information is combined in the same record as the spike or control sample.
lab/ user		L	TEST_ORIG	C	3		Used for spikes to identify the res_code of the sample that was spiked.
lab		L	S_CONC	C	9		Concentration of surrogate added to Primary or QA/QC samples.
lab	X *		RECOVER	N	3		Constituent Recovery in %. Required for spike, surrogate, and control sample results. The field is left blank for primary samples, duplicates, splits and blanks. Supplied by the Lab for surrogates, lab matrix spikes and known control samples.
lab	X *		D_RECOVER	N	3		Duplicate constituent recovery in %. Required for spike and control sample duplicates results. The field is left blank for primary sample, duplicates, splits, blanks, and surrogates. Supplied by the Lab for lab matrix spikes and known control samples.
lab/user		L	T_CONC	C	11		Target concentration for spikes (i.e. calculated total of concentration in sample plus concentration spiked).
lab		L	R_CONC	C	11		Measured concentration in control samples and spiked samples. Supplied by the Lab for lab matrix spikes, field matrix spikes, blind control samples and known control samples.
lab		L	D_CONC	C	11		Measured concentration in duplicate control samples and spiked samples. Supplied by the Lab for lab matrix spikes, field matrix spikes, blind control samples, and known control samples.
lab			RPD	N	3		Relative Percent Difference (RPD). Supplied by the Lab for matrix spike and control samples that are run in duplicate. When RES_CODEs DL#/DF#/DB#/DK# are used, the RPD is entered with these records.
lab			B_RECOVER	N	3		Lower percent recovery goal for surrogates, spikes, and control samples and spikes reported by the Laboratory.
lab			E_RECOVER	N	3		Upper percent recovery goal for surrogates, spikes, and control samples reported by the Laboratory.
lab			MAX_RPD	N	3		Maximum relative percent difference goal for control samples and spikes reported by the Laboratory.
lab/user	X		PF_CODE	C	1		Preparation Fraction Code: The import routine requires the preparation fraction to be specified and to match a user-defined code in GIS\Key database, standard codes include "T" (total), "D" (dissolved fraction), "A": Acid Rain Extraction, "C" TCLP Extraction, "E" EPTOX Extraction,

* = Conditionally required, see Notes column for more detail.

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FILE LAYOUT FOR ELECTRONIC DOWN LOAD TO GIS/Key

Remark	Required	Justify	Field Name 10 Character	Type	Len	Dec	Notes (Default parameters)
							"S": California Wet Extraction, "W": Deionized Water Extraction.
lab			CR_C	C	1		CLP data concentration "C" column. The import routine requires entry to match a code defined in GIS\Key Database.
lab		L	CR_M	C	2		CLP data method "M" column. The import routine requires entry to match a code defined in GIS\Key Database.
lab		L	CR_Q	C	3		CLP data qualifier "Q" column. The import routine requires entry(s) to match 1 character code(s) defined in the GIS\Key Database.
user		L	ER_Q	C	3		Expert review data qualifier. The import routine requires entry(s) to match 1 character code(s) defined in the GIS\Key Database.
user		L	ER_R1	C	2		Expert review reason 1 "R1" code. The import routine requires entry to match a defined code in GIS\Key Database.
user		L	ER_R2	C	2		Expert review reason 2 "R2" code. The import routine requires entry to match a defined code in GIS\Key Database.
user		L	ER_R3	C	2		Expert review reason 3 "R3" code. The suggested use of this field is to track updates. The import routine requires entry to match a defined code in GIS\Key Database.
user			FILTERED	C	1		Was sample field filtered, <Y>es or <N>o. It is the user's responsibility to ensure that preparation fraction codes reflect field filtering status.
user			PRESERVED	C	1		Sample preservation code, "H" = HCl, "N" = HNO3, "S" = H2S04, "U" = unknown, "" = none, and "O" = other sample preservation code.
user			ICED	C	1		Field preservation Code, "Y" = stored/shipped on Ice, "N" = stored/shipped at ambient temperature.
lab	*	L	CUSTODY	C	25		Chain of custody ID. Used to associate travel blanks with primary samples. Required for travel blanks.
lab	*		DILUTION	N	7	2	Dilution factor for sample run ranging from 0.01 to 9999. A required field for all primary results, duplicates, splits and blank results. The field is left blank for all other results.
GIS/user	X*		PROG_TYPE	C	1		Program codes are required for all results. The import routine requires codes to be defined in GIS\Key Database. Program codes must be identical for all chemical results for a particular TCL. GIS/Build assigns the GIS/Key default value to this field if it is left blank.
lab			RECEIVED	D	8		Date sample was received by the Lab (mm/dd/yy format).
lab			REC_TIME	C	5		Time sample was received by the Lab (##:## 24hr format).
lab			PREPARED	D	8		Date sample was prepared or extracted by the Lab (mm/dd/yy format).
lab			PREP_TIME	C	5		Time sample was prepared or extracted by the Lab (##:## 24hr format).
lab			TESTED	D	8		Date sample was analyzed by the Lab (mm/dd/yy format for American Version).
lab			TEST_TIME	C	5		Time sample was analyzed by the Lab (##:## 24hr format).
lab			REPORTED	D	8		Date sample was reported by the Lab (mm/dd/yy format for American Version).
lab			APPROVED	D	8		Date sample was result approved by the Lab (mm/dd/yy format for American Version).
lab/ user		L	LOT_NUMBER	C	4		IRPIMS lot control number (LOTCTLNUM) used to associate primary samples with QC.
lab/ user		L	SA_CODE	C	3		IRPIMS sample type code (SA_CODE) used to identify the type of sample collected.
lab/ user		L	MATRIX	C	2		IRPIMS sampling matrix code.
lab/ user			BASIS	C	1		Used to indicate whether results are reported on a (W)et or (D)ry basis. Required for soil results.
lab/ user			MOISTURE	N	4	1	Percent moisture of a soil sample.
GIS	internal	L	EXC_CODE	C	30		Exception codes are generated by the import routine to alert the user to problems in the LABDATA.DBF file which must be addressed before

* = Conditionally required, see Notes column for more detail.

STRUCTURE NOTES FOR LABDATA.DBF, GIS/Key VERSION 2.3

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FILE LAYOUT FOR ELECTRONIC DOWN LOAD TO GIS/Key

Remark	Required	Justify	Field Name 10 Character	Type	Len	Dec	Notes (Default parameters)
							the data can be appended to the project database.
GIS	internal	L	WARN_CODE	C	20		Warning codes are generated by the import routine to alert the user to possible problems in LABDATA.DBF file. Warning codes do not prevent user from appending LABDATA.DBF file to the project database.
GIS	internal		BUILD_FLAG	C	1		Internal flag used during the GIS\Build process.
lab/ user		L	NOTE	C	20		Lab/user notes for samples (i.e. placed in CSAMPLE.DBF). May be expanded to 50 characters.
lab/user		L	TEST_NOTE	C	20		Lab/user notes for tests (i.e. placed in CTEST.DBF). May be expanded to 50 characters.

RES CODES:

PP0<1-9> Primary Results
PD[1-9]<1-9> Duplicate
PS[1-2]<1-9> Split
BF[1-9]<1-9> Field Blanks
BL[1-9]<1-9> Lab Blanks
BM[1-9]<1-9> Method Blanks
BR[1-9]<1-9> Rinsate Blanks
BT[1-9]<1-9> Travel Blanks
CB[1-9]<1-9> Blind Control Sample
CK[1-9]<1-9> Known Control Sample
SL[1-9]<1-9> Lab Spike
SF[1-9]<1-9> Field Spike
DL[1-9]<1-9> Duplicate Lab Spike
DF[1-9]<1-9> Duplicate Field Spike
DB[1-9]<1-9> Duplicate Blind Control Sample
DK[1-9]<1-9> Duplicate Known Control Sample
Numbers in [] denote test sequence numbers
Numbers in <> denote result set occurrence

WARNING CODES:

BA= BASIS should be 'W'et or 'D'ry for soil results
CI= No entry in case id for a primary sample
DL= No detection limit and no conc
DP= Sample Depth = 0 or not within range of S_DEPTH & E_DEPTH
PF= PF_CODE not defined in project
PS= No primary sample for duplicate or split
PT= PROG_TYPE not defined in project
SD= No entry in sample date for a rinsate or field blank
RE= B_RECOVER > E_RECOVER
TM= Invalid TEST_TIME for rinsate or lab blank
TT= TCL_TYPE not defined in project
U= No entry in UNITS

EXCEPTION CODES: (an exc_code indicates bad or missing data)

AN = No entry in ALIAS_NUM
BI= No entry in BLANK_ID (for a field blank)
CI= No entry in CASE_ID
CN= Cas Number is not found in COMPOUND.DBF
CU= No entry in CUSTODY (for a trip blank)
DI= DILUTION < = 0
DP= Sample depth precision > 2 (not allowed for American or unspecified project)
DR= Duplicate record
HT= Holding times out of sequence (SAMP_DATE, RECEIVED, PREPARED, TESTED and REPOR
LB= No entry in LAB_ID
PF= Invalid in PF_CODE
PS= No primary sample for duplicate or split
PT = Invalid in PROG_TYPE
QC = No entry in QAQC_ID (for a lab blank, method blank, spike or control sample)
RC= Invalid RES_CODE
SD= No entry in SAMP_DATE
SG= No entry in SDG_ID (for a rinsate blank)
SI= No entry in SITE_ID
SK= No spike duplicate match or invalid spike dup fields
SP= No entry in SP_ID(event) or 3rd character of id is not a '-'
ST= Invalid SAMP_TYPE
TC= No entry in TCL_ID
TM= SAMP_TIME format invalid

* = Conditionally required, see Notes column for more detail.

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FILE LAYOUT FOR ELECTRONIC DOWN LOAD TO GIS/Key

DUPLICATE RECORD KEY FOR PRIMARIES, DUPLICATES AND SPLITS (RES_CODE = PP0#, PD##, PS##):

SAMP_TYPE + SITE_ID + SAMP_DATE + SAMP_TIME(water) or SAMP_DEPTH(soil) + RES_CODE + TCL_ID + PF_CODE + CAS_NUM

Index file = EXPRI.IDX TO use in FOXPRO enter: USE EXCDATA INDEX EXCPRI

DUPLICATE RECORD KEY FOR BLANKS (RES_CODE = BR##, BM##, BT##, BF##):

SAMP_TYPE + CASE_ID + BLANK_ID + RES_CODE + TCL_ID + PF_CODE + CAS_NUM

Index file = EXCQC.IDX TO use in FOXPRO enter: USE EXCDATA INDEX EXCQC

DUPLICATE RECORD KEY FOR SPIKES AND CONTROL SAMPLES (RES_CODE = SF##, SL##, CB##, CK##):

SAMP_TYPE + CASE_ID + QAQC_ID + RES_CODE + TCL_ID + PF_CODE + CAS_NUM

Index file = EXCQC.IDX

ASSIGNING RES_CODE SEQUENCE NUMBERS [1-9]:

The test sequence number refers to a sample sequence used to differentiate test results that otherwise have the same primary key. For example, a test sequence number of 2 for a duplicate sample would mean that the result set is for the second of 2 duplicate samples originating from the same primary sample. A test sequence number of 2 for a method blank would mean that 2 method blanks were run for the same batch (QAQC_ID). Note that matrix spikes and control samples and their duplicates should always have matching test sequence numbers.

ASSIGNING RES_CODE RESULT SET OCCURRENCES <1-9>:

The result set occurrence is used to differentiate multiple column or dilution runs of the same sample and test method that otherwise have the same primary key. Occurrence = 1 is the set of record and the set used for reporting and graphics.

ASSIGNING RES_ORIG CODES

RES_ORIG codes are equal to the last three characters of RES_CODES for all results except when multiple column/dilution runs are being reported and the result being reported is for the combined "best estimate" result. In this case, the RES_ORIG code equals the last three characters of the RES_CODE of the originating column/dilution run.

ADDITIONAL GUIDANCE FOR FIELD/LAB MATRIX SPIKE DUPLICATES AND BLIND/KNOWN CONTROL SAMPLE DUPLICATES:

Field/lab matrix spike duplicate and blind/known control sample duplicate concentrations are always entered in the D_CONC field, with recoveries in the D_RECOVER field. Spike and control sample duplicates may be entered as individual records using RES_CODEs DL##, DF##, DB##, DK##, or can be combined with the record storing the original spike or control sample when using RES_CODEs SL##, SF##, CB##, CK##.

* = Conditionally required, see Notes column for more detail.

STRUCTURE NOTES FOR LABDATA.DBF, GIS/Key VERSION 2.3

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FILE LAYOUT FOR ELECTRONIC DOWN LOAD TO GIS/Key

SUMMARY OF CHANGES MADE FROM VERSION 1.5B TO VERSION 2.3

1.) The following fields were added:

ICED, S_DEPTH, E_DEPTH, BLANK_ID, EXTRACTION, INSTRUMENT, CALIBRATE, RES_COLUMN, RES_ORIG, TEST_ORIG, B_RECOVER, E_RECOVER, MAX_RPD, SA_CODE, TCL_TYPE, LOT_NUMBER, MATRIX, MOISTURE, LIMIT1, LIMIT2

2.) The following fields were deleted:

REPLICATE, SPK_CONC, DET_LIMIT, PQ_LIMIT

3.) The following fields were changed as described:

DET_LIMIT Replaced by LIMIT1

PQ_IIMIT Replaced by LIMIT2

RES_CODE: Changed from 3 to 4 characters with new definitions.

RES_TYPE: Definitions changed (internal use only).

SDG_ID: Changed from 8 to 25 characters. Function of this field changed to focus on the association of primary samples with rinsate blanks.

QAQC_ID: Changed from 8 to 25 characters. Function of field changed to focus exclusively on the association of method blanks, control samples and matrix spikes to primary samples.

CONC: The function of the CONC field for primary, duplicate, split and blank results in unchanged. For control samples and matrix spikes, the CONC field is now used to store the concentration added to the sample, therefore eliminating the SPK_CONC field.

DL_FLAG: Changed from 1 to 2 characters to accommodate IRPIMS data in the PARVQ field.

PRESERVED: This field is no longer used to store the "iced" status samples. The iced status is now stored in the field ICED.

CUSTODY: Changed from 8 to 25 characters. The function of this field expanded to associate travel blanks to primary samples.

* = Conditionally required, see Notes column for more detail.

EARLY RI ACTIVITIES - HEALTH AND SAFETY PLAN

RPAC - Portland Site

May 27, 1999

Submitted to:

Oregon Department of Environmental Quality
811 SW 6th Avenue
Portland, Oregon 97204

Prepared for:

Rhone-Poulenc AG Company
1600 Perimeter Park, Suite 400
Morrisville, North Carolina 27560

Prepared by:

URS Greiner Woodward Clyde
111 S.W. Columbia, Suite 900
Portland, Oregon 97201
(503) 222-7200
92CO804A

URS Greiner Woodward Clyde
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111 SW Columbia, Suite 900
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Offices Worldwide

May 27, 1999
92C0804A/41

Eric Blischke
Environment Policy Analyst
Department of Environmental Quality
811 SW 6th Ave.
Portland, Oregon 97204

Subject: Submittal of Health and Safety Plan
RPAC, Portland Site

Dear Eric:

On behalf of Rhône Poulenc AG Company (RPAC), URS Greiner Woodward Clyde (URS) is submitting one unbound and four bound copies of the enclosed URS Health and Safety Plan for the RPAC Portland Site. Three Field Sampling Plans, a QAPP and this HASP comprise the Early RI Activities Sampling and Analysis Plan required by DEQ.

If you have any questions, please don't hesitate to give one of the undersigned a call at (503) 222-7200.

Sincerely,
URS GREINER WOODWARD CLYDE

For

Roger Gresh, P.G.
Project Manager

Mike Edwards, P.E.
Project Engineer

Enclosures

cc: R. Ferguson, RPAC (w/enclosures)
J. Benedict, CHBH&L (w/enclosures)
M. Kent, DEQ – NW Region (w/enclosures)

S:\PROJECTS\92C0804A\TASK41\DEQCOVLTR.DOC 05/27/99

Oregon
John A. Kitzhaber, M.D., Governor

Department of Environmental Quality
811 SW Sixth Avenue
Portland, OR 97204-1390
(503) 229-5696
TDD (503) 229-6993

JOB FILE
5292C0804A-00

June 16, 1999

Rec'd 6/22/99

Mr. Robert L. Ferguson
Rhone-Poulenc Ag Company
HS & EA Department
PO Box 12014
Research Triangle Park, NC 27709

RE: Approved Project Plans for Early Remedial Investigation Activities – Rhone Poulenc Site

Dear Mr. Ferguson:

The Oregon Department of Environmental Quality (DEQ) has reviewed the final Well Inventory Field Sampling Plan submitted on your behalf by URS Greiner Woodward Clyde. DEQ received this document on June 11, 1999. The changes made to this document adequately address DEQ comments presented in my letter dated June 4, 1999. Consequently, this document should be considered approved. It is our expectation that well inventory activities will begin on July 1, 1999.

In addition, DEQ has reviewed the Quality Assurance Project Plan and Health and Safety Plan. These documents were submitted on May 28, 1999. DEQ has no comments on these plans. Consequently, these plans should also be considered approved. However, DEQ reserves the right to request modification of these plans if necessary during the course of the early remedial activities.

If you have any questions regarding this matter, please feel free to contact me at (503) 229-5648.

Sincerely,

Eric L. Blischke
Project Manager
Waste Management and Cleanup Division

CC: Paul Slyman, DEQ/WMCD
Dave St. Louis, DEQ/NWR
Mavis Kent, DEQ/NWR
Roger Gresh, URS Greiner Woodward Clyde
Jim Benedict, Cable, Huston, Benedict and Haagensen

HEALTH AND SAFETY PLAN
FOR
RHÔNE-POULENC AG COMPANY
REMEDIAL INVESTIGATION/FEASIBILITY STUDY

Project Number: 52-92C0804A.00

Rhône-Poulenc AG Company Project Manager: Bob Ferguson

URS Greiner Woodward Clyde Project Manager: Roger Gresh

Corporate Health and Safety Officer: Mark Litzinger

Site Safety Officer: Chris Moody or authorized designee

Field Coordinator: Chris Moody

Start Date: June 1, 1999

Expiration Date: June 1, 2003

APPROVALS:

URS Project Manager	5-26-99 Date
Corporate Health and Safety Officer	5/27/99 Date

EARLY RI ACTIVITIES - HEALTH AND SAFETY PLAN

RPAC - Portland Site

May 27, 1999

Submitted to:

Oregon Department of Environmental Quality
811 SW 6th Avenue
Portland, Oregon 97204

Prepared for:

Rhone-Poulenc AG Company
1600 Perimeter Park, Suite 400
Morrisville, North Carolina 27560

Prepared by:

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111 S.W. Columbia, Suite 900
Portland, Oregon 97201
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Attachment 1 Health and Safety Forms and Incident Reports (HS-102)
Attachment 2 Drilling Safety Guidelines
Attachment 3 Heat Stress Operating Procedure (HS-201)

SCOEPA00006477

Visitors ?

This Health and Safety Plan (HSP) establishes health and safety requirements and guidelines for safety of URS Greiner Woodward Clyde personnel during the conduct of all phases of the remedial investigation (RI) field activities associated with the collection of soil, water, sediment, and biota samples at the Rhône-Poulenc AG Company (RPAC) property in the city of Portland, Oregon (Figure 1-1). The remedial investigation is being conducted on an inactive manufacturing facility.

Safeguards to protect personnel health and safety are key components in the successful completion of the RI. In addition to project personnel, contract personnel and visitors will, or may have, access to the property during investigation activities.

This plan is in compliance with applicable sections of 29 CFR 1910.120 and was prepared for exclusive use by employees of URS Greiner Woodward Clyde (URS). Subcontractors may adhere to their own independent plan, as long as it is as stringent as URS's, or they may adapt this plan, with amendments to cover activities not covered herein. This HSP shall not be used for work other than that described herein; nor shall it be modified or used after the expiration date without written approval by the RPAC Project Manager (PM), and the Health and Safety Corporate Manager (HSM). In addition, firms or persons not under contract to URS without written approval shall not use this HSP by URS's Executive Vice President-Practice. This HSP is not valid unless it is signed and dated by the PM and the HSM. This plan is for use in conjunction with URS's Health & Safety Manual which contains the Illness and Injury Prevention Program (IIPP) provisions for URS employees.

Subcontractors may use their own HSP if such a provision is contained in a written agreement with URS. General health and safety requirements prepared by subcontractors must meet or exceed those contained in this HSP, and address equipment operations and/or activities not addressed in the URS plan, as appropriate to their activities.

SCOEPA00006479

This section discusses the responsibility for the PM, site safety officer (SSO), CHSO and all other RI personnel. This plan is intended for use by URS and other RPAC RI personnel only. Each contractor and subcontractor will be responsible for the safe and healthful performance of work by each of its employees and support personnel who work at the RPAC property.

2.1 PROJECT MANAGER: Roger Gresh

The PM has the responsibility of implementing this HSP. The PM will comply with applicable regulations and ensure that the operations and procedures proceed according to URS's Health and Safety Program. The PM has the authority to suspend work, limit work, or direct changes in work practices when work conditions or work practices become too hazardous and endanger employee and/or community health and safety. The PM also has the authority to remove individuals from the site for engaging in activities that jeopardize the health and/or safety of themselves or others. The PM shall require the compliance of health and safety regulations by subcontractor personnel, however URS is not responsible for assuring their compliance. The PM will maintain a documentation file of safety inspections.

The SSO reports directly to the PM and keeps him/her abreast of the daily activities. The SSO is responsible for assisting the PM in carrying out the health and safety requirements detailed in this plan.

2.2 SITE SAFETY OFFICER: Chris Moody

Personnel on site will be informed at all times of who the designated SSO is.

The SSO will perform the following functions:

- Inspect equipment, machines, tools, the use of chemicals, substances or mixtures, work procedures, and work sites to identify potential hazards.
- Provide technical assistance and conduct safety meetings to personnel working at the site on the safe and healthful use of chemicals, hazardous substances, and mixtures used at the work area.
- Document initial and subsequent accident and injury reports for review and analysis by the CHSO. Copies of reports will be maintained by PM.
- Complete and return all information sheets to the HSO. This includes the Compliance Agreement Signature Sheet (Attachment 1), the Acknowledgement Signature Sheet (Attachment 1) and the Safety Completion Form (Section 6.4).
- Direct day-to-day health and safety activities in the field. The SSO must be present at the work site whenever work is being performed by URS employees or its subcontractors (the CHSO is responsible for advising the PM and SSO on health and safety matters and monitoring compliance).
- Implement the air monitoring program activities as described in this plan.
- Assist the PM in all aspects of implementing the HSP.

- Maintain a list of addresses and telephone numbers of emergency assistance units (ambulance service, police, and hospitals) (Section 9.4), and will inform other members of the field team of the existence and location of this list.

The SSO has the authority to temporarily suspend field activities, if health and safety of personnel are endangered. The SSO also has the authority to advise the dismissal of site RI personnel who do not adhere to this HSP.

The SSO will conduct periodic safety meetings. These meetings will review work schedules, any new or unusual hazards as well as telephone, alarm, shower, and emergency assembly locations. If additional health and safety information is necessary, questions will be addressed to CHSO.

2.3 HEALTH AND SAFETY CORPORATE MANAGER Mark Litzinger, CIH (206) 674-1874

The health and safety manager (HSM) is the health and safety professional who coordinates all aspects of the health and safety program for URS. In addition, the HSM is responsible for the following activities:

- Planning, organizing, directing, coordinating, reviewing, and evaluating the URS health and safety program
- Supervising the employee health and safety training program
- Advising on matters of health and safety and providing recommendations for solving health and safety problems
- Reviewing and approving all site safety plans and modifications
- If warranted, evaluating site operations to ensure compliance with the site HASP and taking corrective actions when necessary

2.4 FIELD COORDINATOR: Chris Moody

The supervisor for the field operations (e.g., drilling, excavation, well construction) and procedures shall assume the role of the Field Coordinator (FC). The FC retains overall site authority, except in the event of personnel exposure to contaminants. The FC conducts safety meetings in conjunction with the SSO, implements standard operating procedures for drilling, etc. operations and works with the SSO on site to enforce the provisions of the HSP. The FC shall be responsible for the following:

- Inspect the work area with the SSO prior to commencement of work and periodically throughout the workday to identify potential hazards and develop safe work practices necessary for employee protection.

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- Implement the Accident Prevention Program in his/her area of supervision and be responsible for the employees' actions at work. Serious incidents or injuries must be reported to the SSO immediately.
- Conduct staff training and employee orientation on health and safety related activities. The FC shall instruct employees in recognizing the chemical and physical hazards of the project and in the methods and means to avoid injury and illness.
- Shall not permit employees to work in an unsafe place unless for the purpose of making it safe and then only after proper precautions have been taken to protect employees while doing the work.
- Notify employees when safety devices shall be donned, and when personal protective equipment upgrades are necessary.
- Allow only those employees qualified by training or experience to operate equipment, machines, vehicles or tools.
- Report safety deficiencies and potential hazards to the PM and the SSO.

There could be buried electrical and/or telephone transmission lines present on the property. The FC shall contact Utility Notification Center (UNC) at (503) 246-6699 three days prior to field work commencing in order to locate all buried cables and utilities. The following information will be requested from the UNC:

- Which county or city the operation will occur in
- Address and cross-streets for each operation
- Location of any specific features that will need to be marked
- Thomas Guide reference
- Specific date and time the operation will begin
- Supervisor-in-charge of the operation
- Permit number to break ground
- Any special instructions
- Type of work to be done
- Who the work is being done for and by whom
- Additionally, a private underground locating service will be used to identify subsurface utilities prior to all drilling and excavation activities on private property.

2.5 FIELD PERSONNEL

Field personnel shall perform drilling operations, work around the exclusion zone, and observe all applicable guidelines in the HSP. The field personnel shall be responsible for the following:

- Report work-related injuries or illnesses to their supervisors immediately, regardless of severity

- Use personal protective equipment and safety devices which have been provided for use in performing work assignments, and replace or repair defective equipment items and parts
- Report defective equipment immediately to the supervisor, such as a safeguard or safety device which is not operational or is missing
- Report unsafe or dangerous conditions in the work area to the supervisor
- Follow the HSP guidelines in addition to the supervisor's standard operating procedures for drilling operations
- Conduct self in a professional and responsible manner while in the work area.

Any questions involving safety procedures should be directed to the SSO. The SSO will direct any questions regarding RPAC health and safety operations to the HSM.

2.6 RESPONSIBLE INDIVIDUALS

Rhône-Poulenc AG Company Site Manager:	Bob Ferguson
Project Manager:	Roger Gresh – URS
Health and Safety Corporate Manager :	Mark Litzinger – URS
Site Safety Officer:	Chris Moody – URS or authorized designee
Field Coordinator:	Chris Moody – URS

URS personnel that maintain current with the medical surveillance program and health and safety training requirements are authorized for RPAC work.

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The RPAC property was an agricultural chemical formulation and manufacturing facility that produced and packaged primarily herbicides and insecticides. The property is located in a heavy industrial area in northwest Portland. Operations ceased in 1990. The RPAC facility is directly adjacent to the Gould Superfund site, the Metro Solid Waste Transfer Station, and across NW 61st Street from a bulk petroleum fuel terminal operated by GATX. These facilities and the surrounding area are commonly referred to as the Doane Lake Industrial Area

The RI will focus on the RPAC property, and off-site areas potentially downgradient of RPAC. In the past, the property has been investigated as three discrete areas known as the Herbicide Area, Insecticide Area and Lake Area. Previous investigations of soils, groundwater, surface water, and sediment collected in the Herbicide Area, Insecticide Area, and Lake Area have documented the presence of RPAC-related chemical constituents in these matrices. The Insecticide Area is expected to pose the highest risk to worker health and safety. Persistent chlorinated pesticides such as 4,4-DDT, aldrin, heptachlor and metal-containing products such as Atlas A (sodium arsenite) were manufactured in this area. Manufacturing operations in the Herbicide Area included a variety of chlorophenoxy herbicides such 2,4-D, MCPA, and 2, 4, 5-TP (Silvex). Raw materials used in the manufacturing processes included organic solvents and chlorophenols. The Lake Area portion of the RPAC site is part of the Gould Superfund Site. Battery wastes have been disposed of in the area and elevated levels of metals are present in soils (primarily lead and arsenic).

The predominant contaminants detected at the RPAC site are discussed in more detail in Section 5. The highest concentrations appear to be present in groundwater and soil samples from the former insecticide/herbicide process areas, while lower levels were detected in sediment and surface waters from the areas adjacent to the property. A list of previously detected compounds for the various media is given in Table 3-1. The potential exposure risks associated with the above constituents are: inhalation, ingestion and dermal contact. Current site conditions suggest that inhalation exposure is expected to be of primary concern.

Intrusive soil sampling will be performed that may emit volatile organic constituents or contaminated dust, which may affect the primary pathway (i.e., inhalation). The presence of organic vapors will be monitored using a PID/FID portable air monitoring unit and/or CGI as warranted. Respirators with dust filters and organic vapor filters will be worn during activities that could produce dust. In addition, soils will be wetted, as necessary, to control dust emissions during aggressive drilling and excavation (surface soil sampling activities).

Secondary exposure pathways of concern for these constituents would be incidental ingestion of soil, water or sediment, and dermal absorption. Protection against the incidental ingestion pathway will be addressed by prohibiting eating, smoking or tobacco chewing in the exclusion and decontamination zones and requiring all field personnel to decontaminate themselves upon leaving the exclusion zone. Dermal absorption will be limited by wearing proper personal protective equipment (PPE) (refer to Section 7.0 for descriptions of various zones).

The following off-site properties will be accessed during the RI activities:

- Willamette riverfront (Elf Atochem Property)
- NL/Gould Electronics Property

- Wacker Siltronics Property
- ESCO Inc. Property
- Metro Property
- Burlington Northern Railroad Property
- Pacific Gas and Electric Property
- Schnitzer Investment Property

Activities located off the RPAC site will be coordinated with each site's facility manager, to identify and address potential hazards at those sites.

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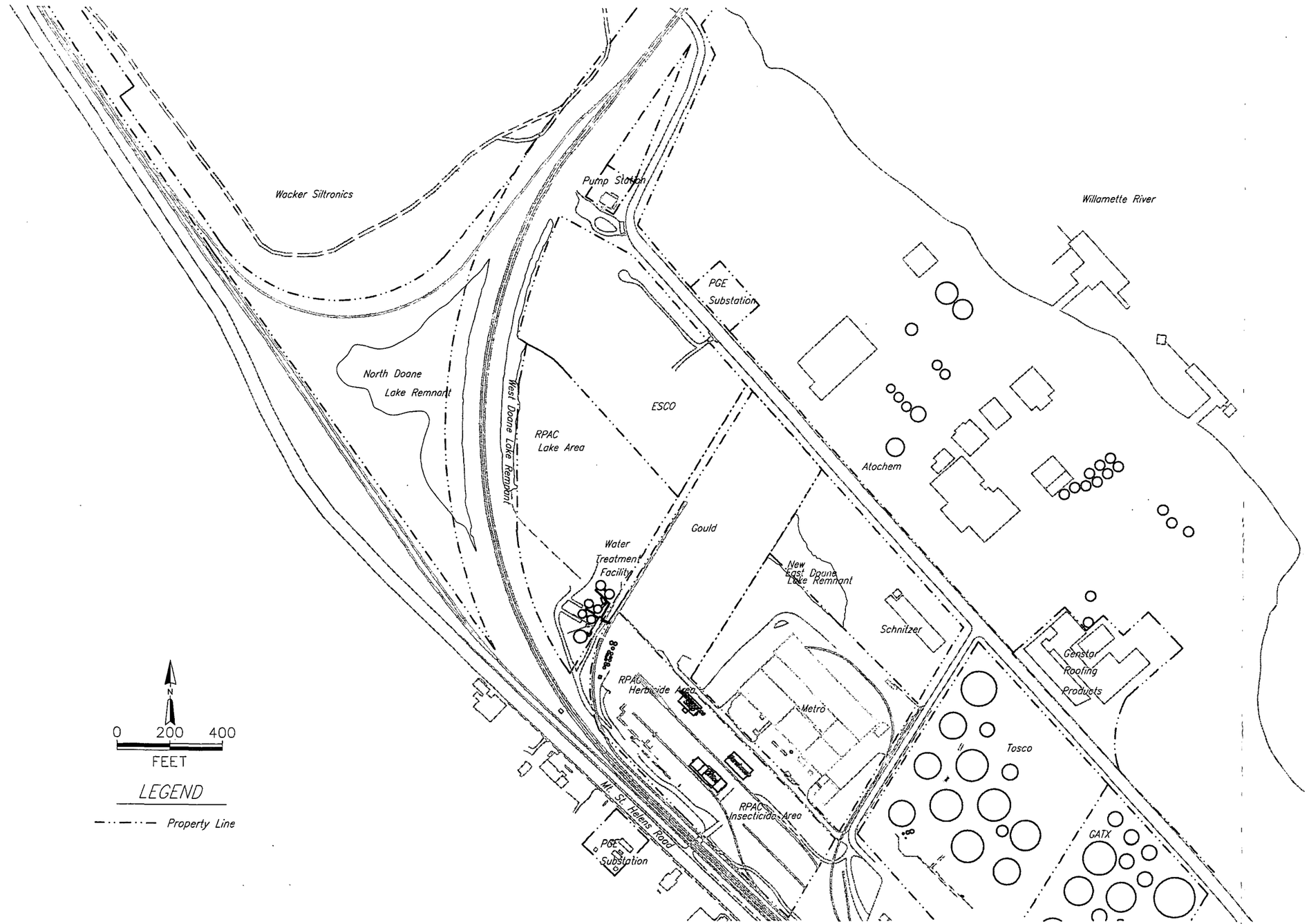
TABLE 3-1
RPAC-Related Constituents by Media

Media	Potential Contaminant
Soil and Groundwater	■ Lindane (gamma BHC)
	Aldrin
	■ Toxaphene (Chlorinated Camphene)
	■ DDT
	2,4-dichlorophenol
	4-chloro-o-cresol
	Arsenic
	Mercury
	2,4-dichlorophenoxyacetic acid (2,4-D)
	Bromoxynil octanoate
	1,2-dichlorobenzene (1,2-DCB)
	Xylenes (total)
	* 2,3,7,8-TCDD (dioxin)
Surface Water and Sediment	Endrin
	Endrin aldehyde
	4,4'-DDD
	** Dieldrin
	4-chlorophenol
	4-chloro-o-cresol
	Arsenic
	Lead
	Mercury
	2,4-D
	2,4,5-TP
Surface Water and Sediment	2,4,5-trichlorophenoxyacetic acid (2,4,5-T)
	2,4-DB
	Ethylbenzene
	Xylenes (total)
	** TCDD (total) (dioxin)
	TCDF (total)

Notes:

■ Identified by sources other than OSHA and ACGIH to be a suspected or confirmed carcinogen.
NL None listed.
* Known carcinogen.
**Known carcinogen, teratogen, or mutagen.



URS Greiner Woodward Clyde	TITLE: Site Map Rhone–Poulenc AG Company Portland, OR	DWN: jgdp CHKD: DATE: 5/26/99	DES.: jgdp APPD: REV.: 3	PROJECT NO.: 5292C0804A FIGURE NO.: 1–1

The purpose of the RI is to collect soil, water, sediment, and biota samples for laboratory analysis to characterize site conditions. This work will be completed using established uniform health and safety guidelines for field operations. The field work will involve the following activities:

- Implementation of this HSP (i.e., implementing response levels and contingency plans - Section 9, and decontamination - Section 10)
- Field reconnaissance (e.g., general site observation, surveying)
- Soil sampling
- Borehole drilling for soil sampling and/or monitoring well installation
- Drilling operations observation
- Monitoring well sampling
- Surface water sampling (using a boat)
- Sediment sampling (using a boat)
- Biota sampling
- Cone Penetration Testing
- Reconnaissance groundwater sampling

The "Buddy System" shall be used on site to:

- Warn partner of an impending hazard
- Establish a time to communicate if either partner will be out of sight from the other person for an extended amount of time
- Provide aid in case of injury, and notify appropriate personnel of accidents

Confined space entry will not be completed during the RI. Therefore, it is not addressed in this HSP.

4.1 FIELD RECONNAISSANCE

During the RI, there will be several circumstances under which "field reconnaissance" will be performed. "Field reconnaissance" is defined as general observation, surveying and, in general, non-intrusive gathering of information on the current condition of the property. The primary hazards associated with field reconnaissance activities are listed below. The SSO will assess the hazards in the work zone and implement the appropriate procedures before work commences.

Hazard	Precaution
Inhalation Exposure	SSO will monitor the breathing zone with a photoionization prior to field reconnaissance activities. Dusty conditions will be evaluated visually.
Dermal and Eye Contact	Gloves will be worn when contact with soil, sediment or water is likely. Appropriate eye protection will be worn when dusty conditions are present. Dusty conditions will be evaluated visually.
Physical Injury	Hard hats and steel toed boots will be worn at all times in the work zone. The buddy system will be used at all times.

4.2 SOIL SAMPLING

Soil samples will be collected in the Herbicide Area, Insecticide Area and Lake Area and non-RPAC property. Sampling will consist of surface and subsurface soil collection. Subsurface soil collection hazards are discussed in more detail in the Drilling section; however, the following primary hazards are appropriate. The SSO will assess the hazards in the work zone and implement appropriate procedures before work commences.

Hazard	Precaution
Inhalation Exposure	SSO will monitor the breathing zone with a photoionization instrument. Respirators with appropriate cartridges (see Section 8) will be worn.
Dermal and Eye Contact	Coveralls and gloves will be worn at all times in the work zone. Appropriate eye protection will be worn when at all times.
Physical Injury	Hard hats and steel toed boots will be worn at all times in the work zone. The buddy system will be used at all times.

4.3 DRILLING AND MONITORING WELL INSTALLATION

Several soil borings will be drilled and monitoring wells installed as part of the RPAC RI. These activities will both take place on the RPAC property and on nearby offsite property including Elf Atochem, NL/Gould, Wacker Siltronics, ESCO, Schnitzer, Metro, BNRR, PumpStation. The primary hazards associated with drilling and monitoring well installation are listed below. The SSO will assess the hazards in the work zone and implement the appropriate procedures before work commences.

Hazard	Precaution
Inhalation Exposure	SSO will monitor the breathing zone with a photoionization instrument. Respirators with appropriate cartridges (see Section 8) will be worn.
Dermal and Eye Contact	Coveralls and gloves will be worn at all times in the work zone. Appropriate eye protection will be worn at all times.
Physical Injury	Hard hats and steel toed boots will be worn at all times in the work zone. Good housekeeping and caution around the drill rig will be required. The buddy system will be used at all times.
Underground or Aboveground Utilities and Structures	Underground Service Alert will be notified before subsurface intrusion occurs. Personnel will avoid work near overhead obstructions.
Noise	Hearing protection shall be worn at all times when near operating heavy equipment.

The drilling operations will be subcontracted; however, URS will be observing drilling operations.

4.4 MONITORING WELL AND RECONNAISSANCE GROUNDWATER SAMPLING

Monitoring wells will be installed in order to assess non-aqueous phase liquids (NAPLs), ascertain the direction of groundwater flow, assess RPAC-related constituents in groundwater on RPAC property and off, assess the extent of perched groundwater in the Insecticide Area and evaluate previously collected slug test data. The primary hazards associated with monitoring well sampling are listed below. The SSO will assess the hazards in the work zone and implement the appropriate procedures before work commences.

Hazard	Precaution
Inhalation Exposure	SSO will monitor the breathing zone with an photoionization instrument.
Dermal and Eye Contact	Coated coveralls and water resistant gloves (double layered) will be worn at all times in the work zone. Appropriate eye protection will be worn to limit eye exposure to splashed water.
Physical Injury	Hard hats and steel toed boots will be worn at all times in the work zone. The buddy system will be used at all times.

4.5 SURFACE WATER, SEDIMENT, AND BIOTA SAMPLING

Sampling of surface water and sediments will occur in North Doane Lake (NDL) and the Willamette River. Sampling locations for both media will coincide. The composition and relative abundance of benthic macroinvertebrates will be collected and analyzed from NDL and West Doane Lake (WDL). For some of the sampling locations, a boat may be required. When a boat is used for sampling, an appropriately sized vessel will be selected so that the weight of personnel and equipment will not capsize the vessel. The primary hazards associated with surface soil, sediment and biota sampling are listed below. The SSO will assess the hazards in the work zone and implement the appropriate procedures before work commences.

Hazard	Precaution
Inhalation Exposure	SSO will monitor the breathing zone with a photoionization instrument.
Dermal and Eye Contact	Coated coveralls and water resistant gloves (double layered) will be worn at all times in the work zone. When wading, rubber hip boots or chest waders will be worn over the coated coveralls. Appropriate eye protection will be worn to limit eye exposure to splashed water and sediment.
Physical Injury	Hard hats and steel toed boots will be worn at all times in the work zone. The buddy system will be used at all times.
Work over Water	Wear U.S. Coast Guard approved life vests. (See operating procedure HS-210 or Section 5.4.8 for work over water)

4.6 CONE PENETRATION TESTING

Cone Penetration testing (CPT) will be collected in the Lake Area and on non-RPAC property.

Subsurface soil sampling will not occur; therefore the following primary hazards are appropriate. The SSO will assess the hazards in the work zone and implement the appropriate procedures before work commences.

Hazard	Precaution
Inhalation Exposure	SSO will monitor the breathing zone with a photoionization instrument and a combustible gas indicator. Respirators with appropriate cartridges (see Section 8) will be worn.
Dermal and Eye Contact	Coveralls and gloves will be worn at all times in the work zone. Appropriate eye protection will be worn when at all times.
Physical Injury	Hard hats and steel toed boots will be worn at all times in the work zone. The buddy system will be used at all times.

4.7 ADDITIONAL RI DATA COLLECTION

Additional data collection may be needed to complete the RI/FS. Several data collection activities are dependent upon the findings of investigative activities planned for the first round of data collection. If any of these additional sampling activities involve unique health and safety issues (e.g., night work) not detailed in this HSP, an addendum to this HSP will be completed.

4.8 WORK EFFORT

Multiple teams consisting of up to three people per team will conduct the field activities. The actual number of teams and personnel will depend on the final schedule adopted for the field activities.

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This section identifies the known and potential hazards (i.e., chemical, physical, and biological) that might be encountered while performing the RI activities. These were listed, with their respective PEL, STEL and/or TLV, in Table 3-1.

Of the hazards or hazardous situations noted in this section, there does not appear to be any situation that cannot be adequately controlled. Physical hazards can be minimized by educating the workers about the potential hazards and limiting access to the work area. Chemical and biological hazards can be reduced or controlled by educating the workers about the hazards, using protective equipment supplemented with air monitoring and implementing safe work practices.

5.1 CHEMICAL EXPOSURE

The presence of hazardous materials at a site, as well as actions taken to address these materials, can cause the release of hazardous substances. Vapor concentrations may occasionally exceed the currently recognized health standards. Because of this possibility, full-face respirator protection with organic and mercury vapor cartridges and High Efficiency Particulate Air (HEPA) dust filters must be available and used on site. A photoionization instrument (PID) will be used to monitor the breathing zone. If the breathing zone readings exceed 20 ppm in the absence of full-shift time weighted averages above background, the work zone will be evacuated, all work will be stopped, and the HSO will be notified. Full-face respirators with organic vapor/mercury vapor/pesticide cartridges and HEPA dust filters will be worn during all intrusive work performed in the Insecticide Area, and during groundwater sampling activities a wells with known layers of Non-Aqueous Phase Liquids (NAPL). This exposure is expected to be minimal.

5.1.1 Chemical Properties

The following paragraphs discuss the properties of the key hazardous substances which a worker potentially could become exposed.

Lead. Physical properties: bluish-gray, soft metal, can react vigorously with oxidizing materials. Elemental lead is not expected on the property; it could be present as lead-contaminated media. Lead is a suspected carcinogen and is poisonous by ingestion. Human systemic effects by ingestion and inhalation are: loss of appetite, anemia, malaise, insomnia, headache, irritability, muscle and joint pains, tremors, hallucinations and distorted perceptions, muscle weakness, gastritis and liver changes. The major organ systems affected are the nervous system, blood system and kidneys. Reversible kidney damage can occur from acute exposure. Chronic exposure can lead to irreversible vascular sclerosis, tubular cell atrophy, and interstitial fibrosis. Severe toxicity can cause sterility, abortion and neonatal mortality and morbidity. Teratogen, reproductive and mutation data are reported. For industry, inhalation exposure is more important, since upon inhalation, absorption takes place easily from the respiratory tract and symptoms tend to develop more quickly.

Arsenic. Physical properties: silvery to black, brittle, crystalline and amorphous metalloid. Elemental arsenic is not expected on the property; it could be present as arsenic-contaminated

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media. Arsenic is a confirmed human carcinogen producing liver tumors. Poison by subcutaneous, intramuscular and intraperitoneal routes. Human systemic skin and gastrointestinal effects by ingestion. Arsenic if flammable in the form of dust when exposed to heat or flame or by chemical reaction with powerful oxidizers such as bromates, chlorates, iodates, peroxides.

Mercury. Physical properties: silvery, heavy mobile liquid. A liquid metallic element that is a vapor at room temperature. Elemental mercury is not expected on the property; it could be present as mercury-contaminated media. Mercury is poison by inhalation. Corrosive to skin, eyes, and mucous membranes. Human systemic effects by inhalation: wakefulness, muscle weakness, anorexia, headache, tinnitus, hypermotility, diarrhea, liver changes, and dermatitis, fever. Is an experimental teratogen, demonstrates experimental reproductive effects and is a questionable carcinogen with experimental tumorigenic data. Reacts with ammonia, violently with acetylenic compounds, metals and is incompatible with oxidants. When heated emits toxic fumes of mercury vapor. Based upon maximum soil concentrations, vapor mercury is not expected to post a health risk.

Pesticides. Many pesticide active ingredients have elements of more than one chemical group, so placing them in families that share toxicological effects can be difficult. The term pesticides is used for any substance, organic or inorganic, used to destroy or inhibit the action of plant or animal pests. Insecticides and herbicides are discussed below.

Insecticides. A type of pesticide designed to control insect life that is harmful to man, either directly as disease vectors or indirectly as destroyers of crops, food products or textile fabrics. General types are as follows: (1) inorganic: arsenic, lead and copper (inorganic compounds and mixtures); the use of these has diminished sharply in recent years because of the development of more effective types less toxic to man. (2) Natural organic compounds, such as rotenone and pyrethrins. These are relatively harmless to man since they quickly decompose to nontoxic compounds, nicotine, copper naphthenate, and petroleum derivatives. (3) Synthetic organic compounds: (a) chlorinated hydrocarbons such as DDT, dieldrin, chlordane, lindane, p-dichlorobenzene; (b) the organic esters of phosphorus (the parathions and related substances). (4) Of comparatively recent development are pyrethroids, or insect growth regulators. Insecticides are toxic to humans in varying degrees. Most of the organophosphorus types are highly toxic, but are reasonably biodegradable. The chlorinated hydrocarbons resist biodegradation; their use has been restricted and in some cases (e.g., DDT) banned due to their harmful ecological effects.

Herbicides. A type of pesticide, either organic or inorganic, used to destroy unwanted vegetation, especially various types of weeds, grasses, and woody plants. Until 1924 inorganics such sodium chlorate, sodium chloride, ammonium sulfamate, arsenic, and boron compounds were used. At that time, more specific organic compounds were introduced: 2,4-dichlorophenoxyacetic acid (2,4-D). Herbicides may be of two major types: (1) selective, such as 2,4-D, 2,4,5-T, phenols, carbamates and urea derivatives, permitting elimination of weeds without injury to the crop, and (2) nonselective, comprising soil sterilants (sodium compounds) and silvicides (ammonium sulfamate). The latter kill woody plants and trees. Some types act as overstimulating growth hormones. Many herbicides are highly toxic and should be handled and applied with care; use of chlorinated types may be restricted.

Aromatic Hydrocarbons (volatile organic compounds). (Benzene, toluene, diphenyl, xylene). Physical properties: clear to light yellow liquid, mobile, aromatic odors, miscible with alcohol and ether. Inhalation exposure and skin contact. Immediate effects include: irritation of respiratory tract; can cause headache, vertigo, kidney dysfunction, central nervous system excitement or depression, slurred speech, emotional swings, tremors, incoordination, impotence, fatigue and in high concentrations, coma. Long term effects: dermatitis, brain damage, carcinogens, suspect mutagens, teratogens, blood and bone damage, paralysis, convulsions, central and peripheral nervous system damage, liver and kidney damage and hearing loss.

5.1.2 Dermal and Eye Contact

Repeated daily contact with contaminated soil, sediment and water would be expected to irritate the skin and eyes and, perhaps over a long period of time, lead to the development of skin lesions or eye damage. For this reason direct skin and eye contact with potentially contaminated soils, sediment and water shall be avoided by wearing protective gloves, rubber boots, disposable coveralls and eye protection. However, if dermal contact does occur, the exposed skin areas shall be washed with soap and water and rinsed thoroughly, as soon as possible. If the eyes are affected, they will be immediately rinsed with abundant distilled or deionized water to remove the particles and irrigate the affected eye(s).

5.1.3 Ingestion Exposure

RPAC-related constituents can enter the body by ingestion. Since it is not known whether or not the soil is contaminated, there will be no drinking and/or eating within the contaminated work area. Prior to eating or before leaving the site, personnel will wash their hands and faces and remove their outer coveralls. Eating, drinking, or smoking will not be allowed within 25 feet of the Exclusion Zone. Smoking is NOT allowed on the property, except in areas designated for that purpose.

5.2 PHYSICAL HAZARDS

The physical hazards associated with the project include noise, heavy equipment operation, falling, tripping, fire, explosion, weather conditions, contact with utility distribution lines or traffic.

5.2.1 Noise

Working near drilling equipment can subject workers to excessive levels of noise. Ideally, personnel who do not need to be near noisy equipment should stay as far away as possible to lower their risk to noise-induced hearing loss. Site personnel who must work next to this equipment will wear hearing protection such as ear plugs or muffs to reduce their exposure. Periodic noise monitoring may be conducted with the use of a sound level meter or a sound dosimeter. However, equipment operators and those working near operating heavy equipment will be required to wear hearing protection at all times.

5.2.2 Heavy Equipment

The rotating shafts associated with the drilling equipment create pinch points which can cause serious injury. In all cases, rotating shafts or gears should be covered to prevent accidental contact. In some cases, where rotating parts cannot be adequately guarded, only experienced operators should be allowed to work around these rotating parts. Personnel who must work around rotating equipment should not wear loose fitting clothes that could become easily caught. Protective clothing such as "Tyvek" coveralls and nitrile gloves should be duct-taped at the wrist and ankles to help create a tighter fit.

5.2.3 Falling and Tripping

The ground around the work area may become uneven over time and may be cluttered with pieces of equipment. These situations can result in workers falling or tripping and subsequently injuring themselves. To reduce this risk, the SSO will report trip hazards to the FC and have the hazards taken care of immediately by removal or barricading the hazard.

Slip, trip, or fall hazards may be present when sampling in the lakes; thick mud and numerous submerged logs are present in these shallow lakes. Caution will be used when walking through the shallows as will secure footing while sampling to prevent falling into the water. The dip net handle will be used to test water depth before stepping forward into unknown areas.

A team member (properly attired in the same PPE) will be used as a shore person to provide additional security for samplers wading in the lake shallows. In the event that a person falls into the water, the shore "guard's" responsibility will be to provide help in aiding the fallen person to safety. A throwable buoy and safety line will be available at the collection location to aid in this effort if needed. A long pole or boat hook will also be available as an aid in reaching the fallen person.

5.2.4 Fire Hazard/Explosion

Although trace levels of solvent constituents are present, they are not expected to be combustible. A PID will be utilized to monitor the presence of volatile constituents. There will be no open flame or smoking within the exclusion zone. If the PID indicates high levels of volatile gasses, monitoring with a Combustible Gas Indicator (CGI) will be conducted. If measurements with a CGI indicate the presence of combustible gas levels equal to or exceeding 10% LEL in the work area, the following action must be taken:

- Extinguish all possible ignition sources in the work area. Shut down electrically and fuel powered motors.
- Move personnel at least 100 feet away, upwind, from work area.
- Extend a 25' sampling line so you are able to monitor levels from a safe distance, and return to work area only if the CGI alarm goes off and remains off for at least 15 minutes.
- Monitor area before re-entry, using CGI.
- Contact the CHSO, SSO and PM.

The explosivity action level is 10 percent of the Lower Explosive Level (LEL) for hexane calibrated CGIs and 10 percent of the LEL for methane calibrated CGIs. The CGI alarm must be set to sound at the action level. The alarm will be kept at the more conservative manufacturer's setting of 10 percent. This setting is based upon a lack of data on which volatiles are actually being monitored (in relation to their individual response characteristics).

5.2.5 Weather Conditions

Due to the combination of protective clothing and climate conditions, heat stress is a potential health hazard. Bottled water will be available at the decontamination areas so that personnel can conveniently consume fluids. A modified decontamination procedure will be in effect so that workers will not have to completely remove all contaminated garments prior to consuming water.

Heat stress can result when protective clothing decreases natural body ventilation. If temperatures exceed 75°F while protective coveralls are being worn, heat stress monitoring should be employed. Monitoring would include watching the workers for visible signs of heat stress, taking the oral temperature after their 15-minute break and taking the heart rate of workers. The heart rate should be taken twice daily and the results should be recorded. If no temperatures are elevated at the end of the first week of activity, temperature monitoring frequency may be decreased at the discretion of the SSO (URS H&S Manual Operation Procedure HS-201 is attached).

Cold stress may pose a hazard to personnel working in cool water collecting sediment and/or surface water samples. The "buddy system" will be used to monitor one another, and frequent breaks will be used to protect against cold, if necessary.

The area may also be subject to low temperatures, rain, and winds during portions of the RI. Care will be taken to limit cold exposure by providing proper protective clothing, access to warm shelter, and a work regimen that may limit periods of outdoor activity.

Cold weather can cause hypothermia and frostbite. Hypothermia is a cold-induced decrease in the core body temperature that produces shivering, numbness, drowsiness, muscular weakness, and, if severe enough, death. Frostbite results from the construction of blood vessels in the extremities, which decreases the supply of warming blood. This drop in blood supply may result in the formation of ice crystals in the tissues, causing tissue damage.

When conditions warrant, field personnel will wear appropriate cold weather clothing (i.e., insulated coveralls, wool socks, insulated, hard-toe boots, long underwear, saran-coated coveralls).

High winds may affect some operations. Soil excavation work (e.g., surface soil sampling and drilling) will be conducted with consideration of minimizing dust generation and will be stopped if visible clouds of dust cannot be contained. Water may be used to suppress dust during excavation work. Operations using overhead cranes or booms will be stopped if wind conditions are excessive.

If necessary, the local U.S. National Weather Service will be contacted at (503) 236-7575 for local wind and weather conditions.

5.2.6 Buried Utilities

There may be a number of buried electrical and telephone transmission lines at the site. The underground utility locations will be located prior to drilling operations (refer to Attachment 2). The boring locations will be shifted if necessary to avoid the underground obstructions.

5.2.7 Traffic

When a work site encroaches upon public streets, the possibility of an individual being injured or struck by vehicular traffic must be considered. Therefore, personnel must always be alert when moving vehicles from a protected area. In addition, barricades and devices must be used to warn traffic. Individuals that are directing or controlling traffic should wear a bright reflector vest to become more visible to drivers. This is expected to be a minimal hazard since RI activities are not expected to take place in areas of vehicular traffic, other than RI equipment.

5.2.8 Boat Safety

Appropriate boat safety must be adhered to including use of a life jacket and lifeline. The use of personal protective equipment such as protective suits and boots require greater caution when working on or from a boat. Personnel should evaluate work task duties and maneuvers to prevent slips, trips and falls. Utilization of a boat requires that personnel be familiar and experienced with the operation and towing procedures of a boat. The operator of a boat must follow all state, federal rules and regulations known as "Rules of the Road" that apply to inland waterways. If a motor boat is to be operated, all applicable registration or inspections shall be required to operate such a vessel.

Prior to the commencement of work over water, the weather forecast should be checked to prepare for inclement weather or threatening storms. If thunder storms or high wind conditions occur where safe boat operation is hampered, the boat shall be docked or taken ashore as soon as possible. The following items shall be carried in the boat at all times:

- U.S. Coast Guard approved life jacket or vest
- Fire extinguisher
- Drinking water
- First Aid kit and Coast Guard approved flare kit
- Communication devices: radio (either VHF or CB depending on location), horn system, or cellular telephone.

5.3 BIOLOGICAL HAZARD

Standing water provides a breeding ground for numerous types of pest organisms, including mosquitoes. The use of insect repellents before donning PPE will be encouraged if insect pests are present at the time of sampling. Poison oak may be present throughout the site. Appropriate clothing should be worn to prevent exposure to poison oak.

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URS employees must obtain health and safety clearances before beginning work at the site. To obtain clearance, an employee must have: (1) been certified within the past 12 months by a URS approved physician as being physically fit to wear respiratory protective devices and to work with the hazardous chemical substances identified on this site. The Site Safety Officer will contact the Corporate Safety Officer to determine additional tests required for this job including lead, arsenic and mercury, (2) successfully completed a 40-hour basic health and safety training course approved by URS, (3) passed a respirator fit test with amyl nitrite and/or irritant smoke as indicators. Site managers and supervisors must have successfully completed an 8-hour manager's health and safety course in addition to all other clearance requirements. Additionally, all personnel will be trained in the requirements of the HSP emergency procedures. URS employees will be required to attend a site safety orientation conducted by the SSO. URS employees will also be required to attend any RPAC-lead site orientation meetings.

URS subcontractor employees must also have similar medical, training, and respirator fit clearances and may be required to provide proof of clearance before beginning work.

The names of all URS and subcontractor employees that perform work at the site must be recorded and the records will be maintained in the health and safety file of the project administration office (Compliance Agreement –Attachment 1).

6.1 SAFETY BRIEFING

Before RI work commences on the RPAC property, all URS and subcontractor employees assigned to work in the exclusion zone must be briefed by the SSO. The SSO giving the briefing should test the workers knowledge and understanding of the provision of this HSP and shall not allow anyone who does not appear to understand the provisions perform work in exclusion areas. The dates of briefing sessions and attendees must be recorded (Acknowledgement Signature Sheet — Attachment 1) and the records maintained in the health and safety file of the project administration office (i.e., URS/Portland).

Area safety orientation/training meetings must be convened: (1) before the field work begins on a weekly basis, (2) when there are modifications to the Health and Safety Plan that are applicable to field personnel, or (3) when additional personnel begin field work. The meetings will be attended by those workers involved in carrying out the project and who will be affected by changes being implemented. The meeting agenda should include the following items as appropriate:

- Review of the HSP
- Verification of medical and safety training
- Distribution of modifications to the HSP
- Signatures of attendees, acknowledging receipt and understanding of the HSP and the compliance agreement

6.2 DISTRIBUTION OF THE HEALTH AND SAFETY PLAN

A copy of this HSP must be provided to each URS and subcontractor employee assigned to work at the site, as well as to an authorized representative of each firm contracted by URS to perform work on RPAC property, before any work begins. Individuals assigned to work on the property must acknowledge receipt of the HSP and agree to comply with its provisions in writing.

The following records will be maintained on-site by the SSO in the Health and Safety Field Logbook, and copies will be sent to the RPAC SSO and URS HSO:

- A list of personnel qualified to work, according to the compliance statement
- A signature sign-in sheet of all personnel entering and exiting the exclusion zone
- This Health and Safety Plan with compliance agreements
- Copy of Hazardous Waste Operations Training Certificates
- Copies of medical clearance letters and all other medical monitoring performed such as heat stress monitoring
- Exposure monitoring data from the direct reading instruments

6.3 INCIDENT REPORTING

Injuries, exposures, illnesses, safety infractions, and other incidences specified in the Health and Safety Manual must be reported to a HSO within 24 hours of occurrence. Attachment 1 contains the form and additional information on incident reporting.

6.4 SAFETY COMPLETION REPORT

Upon completion of the work covered by this plan, a Safety Completion Report is to be submitted to the HSO within five working days. The report should include a critical evaluation of this HSP and all approved notifications, names, and affiliations of individuals who worked on the property, exposure monitoring data with monitoring dates and decisions made, summary of incidences and action taken, if any, and recommendations for improving health and safety for similar projects.

6.5 VISITOR CLEARANCES

Visitors will not be allowed within the exclusion zone unless they comply with the safety requirements of this HSP. Barrier tape will be used to delineate the exclusion and contamination reduction zone where visitors are not allowed to enter.

6.6 POSTING REQUIREMENTS

The following information shall be posted or readily available on site:

- This Health and Safety Plan
- Emergency phone numbers (Section 9.4)
- Directions to the nearest hospital (Section 9.5)
- Drilling Safety operating procedure (HS-203)
- Heat Stress operating procedure (HS-201)

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The following paragraphs detail the specific RPAC site control requirements for the described RI field activities.

The RPAC property is surrounded by a chain-link fence. Access is controlled by RPAC personnel. All personnel must sign in and out with the RPAC representative. The SSO will maintain a daily log of URS personnel and subcontractors working at the property.

Access to hazardous and potentially hazardous areas or spill locations 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) field personnel are required to wear respirators, (2) borings are being drilled with powered augers, or (3) excavating operations with heavy equipment are being performed.

Limited access zones or exclusion zones are the most highly contaminated portion of the property. The outer boundary of the exclusion zone will be established according to the location of potentially hazardous substances, drainage, leachate, spilled material and visible discoloration. The perimeter must be clearly marked by physical barriers. Access control is established at the periphery of the exclusion zone to regulate the flow of personnel and equipment into and out of the zone and to verify implementation of proper entering and exiting procedures. No one will be allowed into the exclusion zone without the appropriate protective equipment and required training.

The boundaries of hazardous and potentially hazardous areas must be identified by cordons, barricades, or emergency traffic cones or posts, depending on the conditions. If such areas are left unattended, signs warning of the danger and forbidding entry must be placed around the perimeter of the site. This is especially important if the work areas are accessible to the public, or are off the RPAC site. Trenches and other large holes must be guarded with wooden or metal barricades spaced no further than 20 feet apart and connected with yellow or yellow and black nylon tape not less than 3/4 of an inch wide. The barricades must be placed no less than two feet from the edge of the excavation or hole.

Entry of 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, follow orders issued by the SSO, and are informed of the potential dangers that could be encountered in the areas. The SSO has the authority to deny access to anyone if he/she fails to meet the provisions included in this plan.

Activities taking place off the RPAC site will be coordinated with each of the facilities managers.

The personal protective equipment specified in this HSP will be provided for all URS field personnel on an as-needed basis. The following requirements are in accordance with OSHA regulations. All subcontractors are responsible for ensuring that their respective employees comply with all Federal, State, and/or local health and safety standards, laws, and rules. The SSO for URS will assist in these matters, but it is the responsibility of the subcontractors to ensure compliance.

Level D Personal Protective Equipment

- Uncoated coveralls must be worn during: (1) intrusive operations (e.g., drilling, soil sampling), (2) when dealing with obviously contaminated soil, and (3) during dusty conditions.
- Coated coveralls must be worn when: (1) liquids are encountered, (2) conditions are wet, and (3) drum handling.
- Safety goggles or glasses, or face shield, must be worn when working within 10 feet of operating equipment (e.g., drill rig, pressure washers), during dusty conditions or water-related sampling activities. The goggles must be splash-proof. The safety glasses need not be worn when suited in a full-face respirator.
- Nitrile or neoprene gloves with latex gloves underneath. The two layers of gloves must be worn when handling contaminated soil or water. They must be worn during drilling and digging operations into soil and conducting water-related sampling activities.
- Neoprene or butyl rubber safety boots, calf-length, with steel toe, must be worn when walking on soil suspected to be contaminated, when working within 10 feet of operating equipment.
- Rubber hip boots or chest waders must be worn when wading.
- Hard hat must be worn at all times.
- Steel toed shoes/boots must be worn at all times during drilling operations
- Earplugs will be worn by any individuals working within close proximity of heavy equipment.

Level C Personal Protective Equipment

- All the above Level D equipment.
- NIOSH-approved full-face respirators with either; (Herbicide and Lake Areas): pesticide/organic vapor and high efficiency dust cartridges; or, (Insecticide Area): combination mercury vapor/pesticide and high efficiency dust cartridges (if available). Respirators must be worn when the action levels (see Section 9.2) are reached or exceeded, or when personnel are engaged in an activity that could create dust.

Additional Safety Equipment

- First Aid Kit will be available at the site.
- Fire extinguisher (10 LB rating or more) will be available at the site and placed in a readily accessible location, close to the work area.

- Barricades will be established to designate the decontamination and exclusion zone areas.

Facial hair must not interfere with respiratory protection equipment. Beards and/or mustaches will not be permitted on the site.

8.1 PROTECTIVE MEASURES

During all activities (excluding Field Reconnaissance) in the Insecticide Area, Level C PPE must be worn.

8.1.1 Field Reconnaissance

During the field reconnaissance activities, Level D personal protective equipment (PPE) will be worn and used. If conditions warrant (i.e., response levels, Section 9), upgrade to Level C may be necessary. The specific equipment is listed below as they relate to the potential hazard. Dusty conditions are not anticipated as part of this PPE evaluation.

Hazard	Personal Protective Equipment
Chemical/Inhalation Exposure	None, unless response levels are met and Level C PPE are required.
Dermal and Eye Contact	Uncoated coveralls, during dusty conditions. Coated coveralls, during wet conditions. Nitrile or neoprene gloves with latex gloves underneath, when in contact with soil, sediment or water. Safety goggles or glasses, when dusty conditions are present.
Physical Injury	Hard hats. Steel toed boots.

8.1.2 Surface Soil Sampling

During the soil sampling activities, Level C PPE will be worn and used. The specific equipment is listed below as it relates to the potential hazard. Dusty conditions are not anticipated as part of this PPE evaluation.

Hazard	Personal Protective Equipment
Chemical/Inhalation Exposure	Level C PPE.
Dermal and Eye Contact	Uncoated coveralls. Coated coveralls, during wet conditions. Nitrile or neoprene gloves with latex gloves underneath. Safety goggles or glasses.
Physical Injury	Hard hats. Steel toed boots.

8.1.3 Drilling and Monitoring Well Installation

During drilling operations, Level C PPE will be worn and used within the exclusion zone.

Additional safety guidelines for drilling are given in Attachment 2. The SSO must be present during drilling activities and will monitor the work area with a photoionization detector (PID) or flame ionization detector (FID) and particulate counter. Level D PPE must be worn during well installation. If conditions warrant (i.e., response levels, Section 9), upgrade to Level C may be necessary. The specific equipment is listed below as it relates to the potential hazard.

Hazard	Personal Protective Equipment
Chemical/Inhalation Exposure	Level C PPE during drilling or if response levels are met during well installation.
Dermal and Eye Contact	Uncoated coveralls. Coated coveralls, during wet conditions. Nitrile or neoprene gloves with latex gloves underneath. Safety goggles or glasses.
Physical Injury	Hard hats. Steel toed boots.
Noise	Earplugs.

8.1.4 Monitoring Well Sampling

During the monitoring well sampling activities, Level D PPE will be worn and used. If conditions warrant (i.e., response levels, Section 9, or the known presence of NAPL in a well), upgrade to Level C may be necessary. The specific equipment is listed below as it relates to the potential hazard.

Hazard	Personal Protective Equipment
Chemical/Inhalation Exposure	None, unless response levels are met and Level C PPE are required.
Dermal and Eye Contact	Coated coveralls. Nitrile or neoprene gloves with latex gloves underneath. Safety goggles or glasses.
Physical Injury	Hard hats. Steel toed boots.

8.1.5 Surface Water, Sediment, and Biota Sampling

During surface water, sediment and biota sampling, Level D PPE will be worn and used. If conditions warrant (i.e., response levels, Section 9), upgrade to Level C may be necessary. The specific equipment is listed below as it relates to the potential hazard.

Hazard	Personal Protective Equipment
Chemical/Inhalation Exposure	None, unless response levels are met and Level C PPE are required.
Dermal and Eye Contact	Coated coveralls. Rubber hip boots or chest waders over the coated coveralls, if wading. Nitrile or neoprene gloves with latex gloves underneath. Safety goggles or glasses.
Physical Injury	Hard hats. Steel toed boots.

8.1.6 Cone Penetration Testing

During the CPT activities, Level D PPE will be worn and used. If conditions warrant (i.e., response levels, Section 9), upgrade to Level C may be necessary. The specific equipment is listed below as it relates to the potential hazard.

Hazard	Personal Protective Equipment
Chemical/Inhalation Exposure	None, unless response levels are met and Level C PPE are required.
Dermal and Eye Contact	Coated coveralls. Nitrile or neoprene gloves with latex gloves underneath. Safety goggles or glasses.
Physical Injury	Hard hats. Steel toed boots.

8.1.7 Additional RI Data Collection

Additional data collection may be needed to complete the RI/FS. Several data collection activities are dependent upon the findings of investigative activities planned for the first round of data collection. Additional data collection may be conducted. If any of these additional sampling activities involve unique health and safety issues, not detailed in this HSP, an addendum to this HSP will be completed.

8.2 PERSONAL MONITORING

Personal monitoring will not be performed.

The purpose of this section of the HSP is to address actions field personnel will take in responding to emergencies. Equipment to be used, response levels, and action plans are discussed below.

9.1 DIRECT READING EQUIPMENT

The following direct reading instruments or equipment will be on site:

- CGI - a CGI with LEL and 0-500 ppm scales is the preferred instrument to measure explosive levels at the site. The explosivity action level is 10 percent of the LEL.
- Particulate counter – to ascertain if dust levels exceed 5 mg/m^3 during initial surface soil sampling activities.
- PID/FID - the preferred instruments for monitoring total organic vapor concentrations at the site during water sampling, drilling and excavation operations. At each monitoring location, the ambient background reading (15 minute average) will be measured upwind of the work zone.

Monitoring must be performed by individuals trained in the use and care of the required instruments. Due to the fact that toxicity levels are considerably lower then explosivity action levels, monitoring efforts should focus initially on detection of toxic vapors. The presence of explosive levels of gases and vapors should be monitored only when gas/vapor concentrations exceed the ppm range of the monitoring instruments and when explosive levels are expected (e.g., inside tanks and other enclosed spaces).

During drilling operations, vapor should be measured periodically. The sample intake orifice or the detector must be positioned in a safe place downwind of the borehole and the instrument alarm should be set to sound at the action level. If the alarm sounds while monitoring continuously for toxic concentrations, the sample intake orifice or detector should be moved so that vapor concentrations in the breathing zone of individuals closest to the boring are measured. Decisions regarding respirator use should be based on vapor concentrations. If the alarm sounds while continuously monitoring fire explosive concentrations, initiate shut-down and evacuation procedures immediately.

If at any time a contaminant level of 20 ppm is reached and sustained, the job will be shut down. A trained worker in a self-contained breathing apparatus (SCBA) will enter the work area and seal the boring hole and decontaminate the equipment.

9.2 RESPONSE LEVELS

Worker exposure Response Level I requires the use of direct reading instruments. Response Level II will require the use of complete respiratory protection and may require evacuation of field personnel from the work zone by the Site Safety Officer. Each of the response levels and associated actions are described below.

9.2.1 Response Level I

If a PID/FID reading of 10 ppm above background or greater is reached and sustained in the breathing zone, the field actions that will be performed at Response Level I to protect site personnel are:

- Workers within the zone will wear the appropriate respiratory protection
- The SSO will continue monitoring the immediate area (spoil pile, worker breathing zone, etc.)
- If a sustained particulate counter measurement exceeding 5.0 mg/m^3 is reached and cannot be brought below this level by engineering controls, an APR as described in 8.0, "Level C Personal Protective Equipment," will be used.
- Emissions monitoring will continue as necessary

9.2.2 Response Level II

Response Level II is triggered by reaching or exceeding a sustained level of 20 ppm above background on the PID/FID or 10 percent of the LEL in the work area. Field actions that will be implemented include the following:

- An air-blow horn will be sounded to indicate evacuation is required.
- Workers within the zone will stop work and move upwind until the SSO determines that the organic levels have decreased below 20 ppm or less than 10 percent of LEL. Workers outside the zone will be warned and will move upwind.
- The SSO will continue to monitor immediate perimeter of the drilling area and exclusion zone.
- If any suspect field conditions (e.g., white powder, silvery material) exist and/or laboratory analysis results are received from sampling, the HSO or CHSO will be contacted to determine appropriate protective measures.

9.2.3 Summary

A photoionization/flame ionization instrument will be used during sampling and drilling operations to test for the presence of volatile materials. Combustible gas indicator readings will be taken during any field operations to test for the presence of oxygen deficient or flammable atmospheres. Ambient monitoring will be conducted according to the following guidelines:

Dust Monitoring	Action
0 to 5 mg/m^3	Continue operations
Above 5 mg/m^3	Upgrade to Level C PPE
Photoionization/Flame Ionization Instruments	
0 to 10 ppm above background	Continue operations
10 to 20 ppm above background	Investigate cause of readings and continue operations if PPE is adequate
20 ppm above background	Stop operations and investigate
Combustible Gas Indicators	
0 to 10% LEL - general work area	Continue operations
>10% LEL - general work area	Stop operations and ventilate area

9.3 CONTINGENCY PLANS

The following contingency plans will address possible site emergencies. The 911 emergency number system can be used for all necessary emergency personnel. The Emergency Contingency Plan also addresses emergency procedures. This document was used to develop this section. Personnel will report to the URS SSO or FC immediately in the event of any type of site emergency.

Telephones available for emergencies are located in the RPAC office area and in the maintenance shop. URS will also have a phone in the command post/office area or support zone.

9.3.1 Fire

In the event of a fire, the site alarm will be activated. Personnel will immediately leave the work area and reassemble at the gas station across the street. The local fire department will be called using the 911 emergency number. Site personnel will not re-enter any burning buildings, but will wait for the arrival of the fire department.

RPAC personnel have been trained to respond to fires on site. URS personnel have not been trained to fight chemical fires, therefore, they will retreat to the gas station across the street and not fight the fire.

9.3.2 Medical Emergency

The site alarm will be activated if a medical emergency develops. Personnel should then report to the SSO for further instruction. A medical emergency may require notification of the hospital and/or ambulance service. The 911 emergency number can be used for both.

9.3.3 Emergency Decontamination

An injured worker may or may not require extensive decontamination prior to removal from the area. This decision should be made by the SSO, or authorized designee. Emergency decontamination showers are available in case of exposure to toxic chemicals. These showers are located throughout the plant area. The locations of the nearest safety showers will be addressed in the daily safety meetings.

RPAC also has first aid/CPR trained personnel on site. The RPAC Site Safety Manager can be contacted for assistance with first aid/CPR trained personnel.

9.3.4 Release Incident

Due to the use of chemicals (e.g., waste water treatment nutrients) at the RPAC facility, a chemical release is possible. The site alarm may or may not be required, depending on the quantity of material spilled or leaked. URS personnel and subcontractors will not assist in the cleanup of a chemical release, but shall respond to any alarm appropriately.

9.4 EMERGENCY NOTIFICATION LIST

In the event of fire, explosion, accident or injury, the SSO or other site personnel will contract the appropriate emergency response group. The emergency telephone numbers listed below are for obtaining emergency services at the Rhône-Poulenc AG Company site.

Fire Emergency	911
Rescue Emergency	911
Poison Control	(800) 962-1253
Emanuel Hospital and Health Center 2801 N. Gantenbein Avenue Portland, Oregon	(503) 280-4128
Mark Litzinger	(206) 674-1874
Roger Gresh	(503) 948-7251

9.5 DIRECTIONS FROM SITE TO HOSPITAL

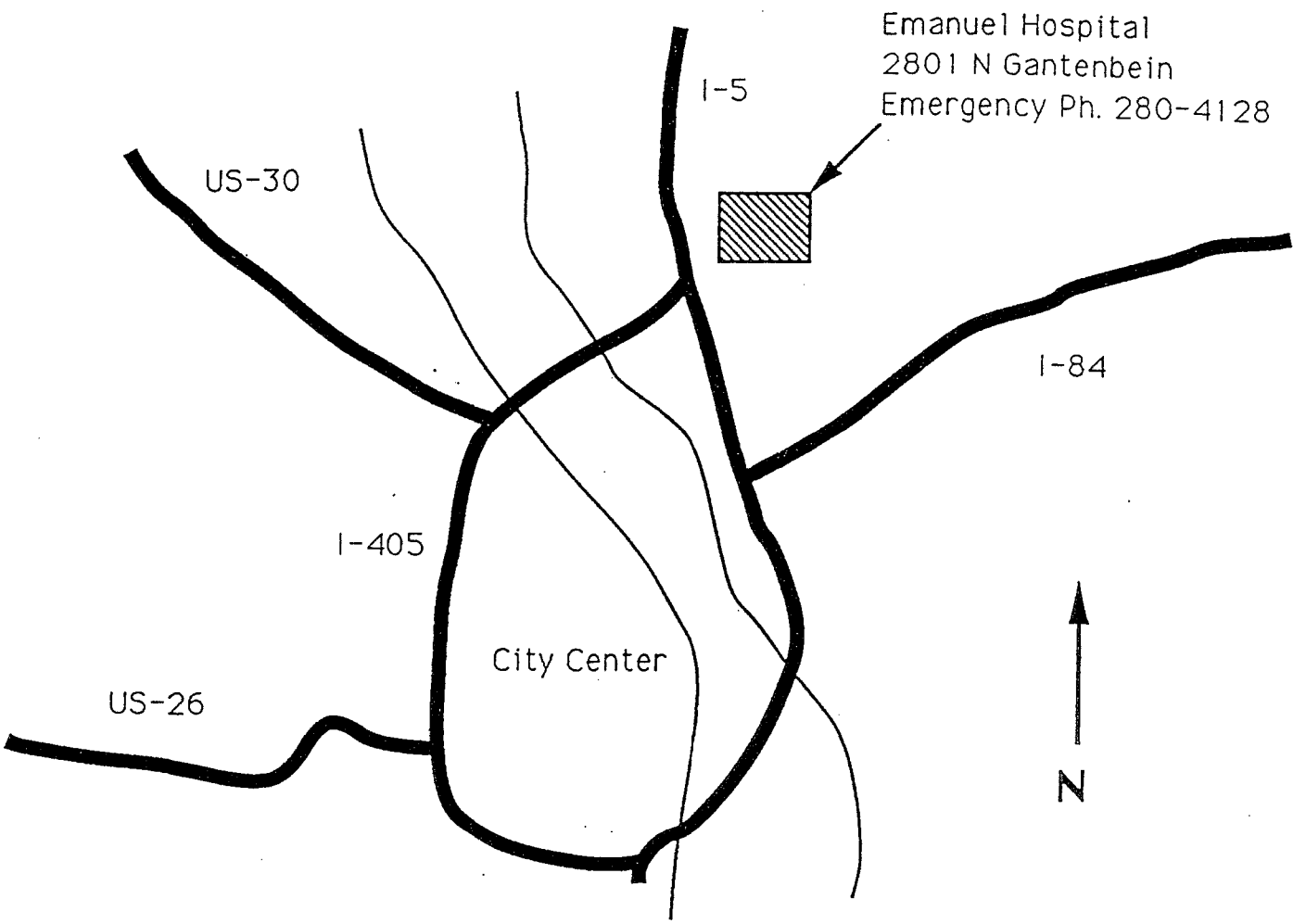
Exit site and turn left (south) on St. Helens Road, U.S. 30. Proceed south about 4 miles to intersection with I-405. Take the I-5/Seattle North direction heading east on I-405. Take the Kerby Street Exit off the 405 Bridge and follow the signs to Emanuel Hospital and Health Center Emergency entrance (see attached figure 9-1). The hospital address is: 2801 N. Gantenbein Avenue. The 24-hour Emergency Service phone is: 503-280-4128.

9.6 FIRST AID PROCEDURES

On-site medical treatment or First Aid may be administered by the SSO or other personnel who have been certified in First Aid. General First Aid procedures include:

- Remove the injured or exposed person(s) from immediate danger.

FIGURE 9-1
Location of Emanuel Hospital



Specific Off Ramps:

I-5 Southbound -take Alberta exit to Vancouver go south on Vancouver

I-5 Northbound - take Coliseum/Broadway exit

Highway 26 or 30 - take I-405 northbound to Kerby exit

I-84 Westbound - get on I-5 going north follow instructions above

Decontamination of equipment and personnel is necessary to confine the contaminants to the exclusion zone. Prior to leaving the exclusion zone, all personnel will remove and clean or discard protective equipment and all transported tools and equipment will be cleaned to remove grease, oil, or encrusted dirt. URS will provide the necessary components for personnel and equipment decontamination.

The decontamination station will be located in the contamination reduction zone. The location of the decontamination station will be designated by the SSO with consultation from the PM. Criteria used in selecting a decontamination station will be:

- Upwind location in relation to the exclusion zone
- Ease of containment of contaminated materials
- Access to water
- Accessibility to on-site personnel

The SSO will evaluate the location of the decontamination area on a daily basis to account for change in wind direction, and location of activities. The area will be cordoned off in a similar manner to the exclusion zone. An effective decontamination area can be established by spreading a water-proof ground sheet and using several large 30 gallon tubs for personal decontamination.

The decontamination area for activities during intrusive activities such as surface soil sampling or drilling in the source areas will be constructed as three separate stations.

- Station One - Equipment Drop
- Station Two - Wash and Rinse
- Station Three - Removal

The decontamination operations conducted at each station and the order of activities is discussed below. During groundwater sampling, CPT advancement, and reconnaissance and monitoring well sampling, the SSO will determine the best decontamination operations to employ.

10.1 STATION ONE – EQUIPMENT DROP

Personnel will place tools, devices, containers, instruments, radios, and clipboards onto plastic sheets. These plastic sheets will be decontaminated and stored in plastic bags later.

10.2 STATION TWO – WASH AND RINSE

Personnel will step into a plastic tub of liquid soap and water washing solution. Personnel and their partners will scrub each others' coveralls, gloves, and boots using long handled brushes. Respirators and hard hats will be washed and rinsed in separate liquid soap and water tubs. The personnel will then step into a plastic tub of rinse water and rinse the coated coveralls, boots and gloves thoroughly. Personnel will then step out of the tub and dry-off. Boots and gloves remain on.

10.3 STATION THREE – REMOVAL

The protective equipment will be removed in the following order:

- Tape from boots and gloves

- Outer glove
- Remove boots if there are feet in the coveralls
- Remove the coveralls before the boots if there are no feet in them
- Remove the inner glove

Used coveralls will be taken off inside out, placed in a plastic bag and then disposed of at the appropriate area. Prior to eating or drinking, personnel will wash their hands and faces with soap and water. Material should be removed from skin using a mild detergent and water. Hot water is more effective than cold water and liquid dishwashing detergent is more effective than hand soap. All contaminated water will be left on-site for the duration of the job.

10.4 EQUIPMENT DECONTAMINATION

All major reusable equipment and other tools used for work will be decontaminated prior to leaving the exclusion zone. Cleaning will normally consist of scrubbing to remove encrusted materials, followed by a soap and water wash and potable water rinse. Containers of detergent solutions for cleaning tools, boots, and gloves will be available in the exclusion zone. Decontamination of equipment will be performed at a designated area within the contamination zone.

Sampling equipment, augers, vehicle undercarriages and tires should be steam or power cleaned. The steam cleaner is also a convenient source of hot water for personnel and protective equipment cleaning.

10.5 DECONTAMINATION WASTE

Decontamination waste will be contained by placing in a plastic bag, sealing the bag and placing the bag in a labeled 55-gallon drum. Drummed waste will be accumulated with other RI waste for characterization and appropriate disposal.

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INDIVIDUAL COMPLIANCE AGREEMENT SIGNATURE SHEET
EMPLOYEE ACKNOWLEDGEMENT SIGNATURE SHEET
INCIDENT REPORTS (HS-102)

INDIVIDUAL COMPLIANCE AGREEMENT

I the undersigned, have received a copy of the health and safety plan for the Rhône-Poulenc site. I have read the plan, understand it, and agree to comply with all of the health and safety requirements within. I understand that I may be prohibited from working on the project for non-conformance with any of the requirements.

PRINTED NAME: _____

COMPANY NAME: _____

SIGNATURE: _____

DATE: _____

NOTE: MAKE COPIES AS NECESSARY

EMPLOYEE ACKNOWLEDGMENT

I hereby certify that I have ready and understand the safety and health guidelines contained in URS's RPAC Project Health and Safety Plan.

_____
Employee Name

_____ _____
Signature Date

In case of emergency, please contact:

1. _____
Name Relationship Phone Number

2. _____
Name Relationship Phone Number

Received by:

_____
Site Safety Officer

_____ _____
Signature Date

OPERATING PROECEDURE NO. HS-102

102.0 INCIDENT REPORTS

102.1 PURPOSE

All health and safety incidents shall be reported to URSGWC management and health and safety staff. The prompt investigation and reporting of incidents will reduce the risk of future incidents, better protect URSGWC employees, and reduce URSGWC liability.

102.2 DEFINITIONS

A health and safety incident is any event listed below:

- Illness resulting from chemical exposure or suspected chemical exposure.
- Physical injury, including both those that do and do not require medical attention to URSGWC employees or subcontractors.
- Fire, explosions, and flashes resulting from activities performed by URSGWC and its subcontractors.
- Property damage resulting from activities performed by URSGWC and its subcontractors.
- Vehicular accidents occurring on-site, while travelling to and from client locations, or with any company-owned vehicle.
- Infractions of safety rules and requirements.
- Unexpected chemical exposures.
- Complaints from the public regarding URSGWC field operations.

102.2 REPORTING PROCEDURES

Reporting procedures are discussed in Section 9 of this Health and Safety Plan.

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The drilling rig operator is responsible for drill rig maintenance and safety. The following information is provided as general guidelines for safe practices.

OFF-ROAD MOVEMENT FOR DRILL RIGS

The following safety guidelines relate to off-road movement of drill rigs:

- Before moving a drill rig, first walk the route of travel, inspecting for depressions, slumps, gullies, ruts, and similar obstacles.
- Always check the brakes of a drill rig carrier before traveling, particularly on rough, uneven, or hilly ground.
- Discharge all passengers before moving a drill rig on rough or hilly terrain.
- Engage the front axle for 4x4 or 6x6 vehicle or carriers when traveling off the highway on a hilly terrain.
- Use caution when traveling on a side-hill. Conservatively evaluate the side-hill capability of drill rigs, because the arbitrary addition of drilling tools may raise the center of mass. When possible, travel directly uphill or downhill.
- Attempt to cross obstacles such as small logs, small erosion channels or ditches squarely, not at an angle.
- When lateral or overhead clearance is close, use the assistance of someone on the ground as a guide.
- After the drilling has been moved to a new drilling site, set all brakes and/or locks. When grades are steep, block the wheels.
- Never travel off-road with the mast (derrick) of the drill rig in the raised or partially raised position.
- Tie down loads on the drill rig and supporting trucks during transports.

OVERHEAD AND BURIED UTILITIES

Special precaution must be taken when drilling on a site with electrical power lines and other utilities in the vicinity. Electricity can shock, burn, and result in death.

Overhead and buried utilities should be located, noted, and emphasized on all boring location plans and assignment sheets. When overhead electrical power lines exist at or near a drilling site or project, consider all wires to be alive and dangerous.

Watch for sagging power lines before entering a site. Do not lift power lines to gain entrance. Telephone the appropriate utility company and ask them to lift or raise the lines and de-energize (turn off power) them.

Walk completely around the drill rig before raising the drill rig mast on a site in the vicinity of power lines. Determine what the minimum distance from any point on the drill rig to the nearest power line will be when the mast is raised and/or is being raised. Do not raise the mast or operate the drill rig if this distance is less than 20 feet. Remember that hoist lines and overhead power lines can move toward each other by the wind.

- Decontaminate affected personnel, if necessary, and render first aid, if necessary.
- The SSO will assess the situation to determine if the victim needs transport to the local hospital. It should be realized that serious injuries (e.g., heat stroke) may not always be apparent; if there is any question as to the severity of the injury, an ambulance should be called for transport of the victim to the hospital. Emergency telephone numbers are listed in Section 9.4.
- Evacuate other personnel on-site to a safe place until the Site Manager (assisted by the SSO) determines that it is safe for work to resume.
- Report the accident to the Project Manager immediately.

If there are any questions concerning the safety of drilling on the site in the vicinity of overhead power lines, telephone the power company. The power company will provide expert advice at the drilling site as a public service and at no cost.

Underground electrical lines are as dangerous as overhead lines. Be aware and always suspect the existence of underground utilities such as electrical power, gas, petroleum, telephone, sewer, and water. Ask for assistance:

- If a sign warning of underground utilities is located on a site boundary; do not assume that underground utilities are located on or near the boundary, or property line under the sign telephone the utility company and check it out. The underground utilities may be a considerable distance away from the warning sign.
- Always contact the owners of utility lines or the nearest underground utility location service before drilling. The utility personnel should determine the location of underground lines, and mark and flag these locations. Determine, with the utility personnel what specific precautions must be taken to assure safety.

CLEARING THE WORK AREA

Prior to drilling, adequate site cleaning and leveling should be performed to accommodate the drill rig and supplies and provide a safe working area. Drilling should not be commenced when tree limbs, unstable ground or site obstructions result in unsafe tool handling conditions.

HOUSEKEEPING ON AND AROUND THE DRILL RIG

To complete the first requirement for safe field operations, the safety supervisor or the drilling crew must understand and fulfill his responsibility for maintenance and "housekeeping" on an around the drill rig. Suitable storage locations should be provided for all tools, materials, and supplies. Therefore, they can be conveniently and safely handled without hitting or falling on a member of the drill crew or a visitor.

Avoid storing or transporting tools, materials, or supplies within or on the mast of the drill rig. Pipe, drill rods, bits, casing, augers, and similar drill tools should be stacked in an orderly manner on racks or sills to prevent spreading, rolling, or sliding.

Penetration hammers or other types of driving hammers should be placed at a safe location on the ground or secured to prevent movement when not in use. Work areas, platforms, walkways, scaffolding, and other access ways should be kept free of materials, obstructions, and substances such as ice, excess grease, or oil that could cause a surface to become slick or otherwise hazardous. Keep all controls, control linkages, warning and operation lights and lenses, free of oil, grease, and/or ice.

Do not store gasoline in any portable container other than a non-sparking, red container with a flame arrestor in the fill spout. The word "gasoline" must be clearly visible on the container.

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USE OF HAND TOOLS

There are many kinds of hand tools that can be used on or around a drill rig. The most important rule is "use the tool for its intended purpose." The following are a few specific and general suggestions that apply to the safe use of several hand tools often used on and around drill rigs.

- When a tool becomes damaged, either repair it before using it again or discard it.
- When using a hammer, any kind of hammer, for any purpose, wear safety glasses and require all others near you to do the same.
- When using a chisel, any kind of chisel, for any purpose, wear safety glasses and require all others around you to do the same.
- Keep all tools cleaned and stored in an orderly manner when not in use.
- Replace hook and heel jaws when they become visibly worn.
- When breaking tool joints on the ground or on a drilling platform, position your hands so that your fingers will not be caught between the wrench handle and the ground or the platform, should the wrench slip or the joint suddenly let go.

3-6 USE OF HOISTS, WIRE ROPE, AND HOISTING HARDWARE

The use of wire line hoists, wire rope, and hoisting hardware should be performed as stipulated by the American Iron and Steel Institute's Wire RPE Users Manual.

All wire ropes and fittings should be visually inspected during use, and thoroughly inspected at least once a week for: abrasion, broken wires, wear, reduction in rope diameter, reduction in wire diameter, fatigue, corrosion, damage from heat, improper weaving, jamming, crushing, bird caging, kinking, core protrusion and damage to lifting hardware, and any other feature that would lead to failure. Wire ropes should be replaced when an inspection indicates excessive damage according to the Wire RPE Users Manual.

If a ball-bearing type hoisting swivel is used to hoist drill rods, swivel bearings should be inspected and lubricated on a daily basis to assure that the swivel freely rotates under load. If a rod slipping device is used to hoist drill rods, do not drill through or rotate drill rods through the slipping device. Do not hoist more than 1 foot (0.3 m) of the drill rod column above the top of the mast and do not hoist a rod column with loss took joints while the rod column is being supported by a slipping device. If drill rods slip back into the borehole, do not attempt to break the fall of the rods with your hands.

Most sheaves on drill rigs are stationary with a single part line. The number of line parts should never be increased without first consulting with the manufacturer of the drill rig. Wire ropes must be properly matched with each sheave.

The following procedures and precautions must be understood and implemented for safe of wire ropes and rigging hardware:

Use tool handling hoists only for vertical lifting of tools (except when angle hole drilling). Do not use tool handling hoists to pull on objects away from the drill rig; however, drills may be moved by using the main hoist as the wire rope is spooled through property sheaves according to the manufacturer's recommendations.

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When stuck tools or similar loads cannot be raised with a hoist, disconnect the hoist line and connect the stuck tools directly to the feed mechanism of the drill. Do not use hydraulic leveling jacks for added pull to the hoist line or the feed mechanism of the drill.

When attempting to pull out a mired vehicle or drill rig carrier, only use a winch on the front or rear of the vehicle or drill rig carrier and stay as far away as possible from the wire rope. Do not attempt to use tool hoists to pull out a mired vehicle or a drill rig carrier.

Minimize the shock loading of a wire rope - apply loads smoothly and steadily. The following general safety principles should be observed.

- Protect wire rope from sharp corners or edges
- Replace faulty guides and rollers
- Replace worn sheaves or worn sheave bearings
- Replace damaged safety latches on safety hooks before using.
- Know the safe working load of the equipment and tackle being used, and never exceed this limit
- Periodically inspect and test clutches and brakes of hoists
- Know, and do not exceed the rated capacity of hooks, rings, links, swivels, shackles, and other lifting aids.
- Always wear gloves when handling wire ropes
- Do not use your hands to guide wire ropes on hoist drums
- Following the installation of a new wire rope, first lift a light load to allow the wire rope to adjust
- Never carry out any hoisting operations when the weather conditions will create hazards to personnel, the public, or property
- Never leave a load suspended in the air when the hoist is unattended
- Keep you hands away from hoists, wire rope, hoisting hooks, sheaves, and pinch points when the slack is being taken up, and when the load is being hoisted
- Never hoist the load over the head, body, or feet of any personnel.

USE OF AUGERS

The following general procedures should be used when advancing a boring with continuous flight or hollow-stem augers:

- Prepare to start an auger boring with the drill rig level, the clutch or hydraulic rotation control disengaged, the transmission in low gear, and the engine running at a low RPM
- The operator and tool handler should establish a system of responsibility for the series of various activities required for auger drilling, such as connecting and disconnecting auger sections, and inserting and removing the auger fork. The operator must assure that the tool handler is well away from the auger column and that the auger fork has been removed before starting rotation.

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- Only use the manufacturer's recommended method of securing the auger to the power coupling. Do not touch the coupling or the auger with your hands, a wrench, or any other tool during rotation.
- Whenever possible, use tool hoists to handle auger sections
- Never place your hands or fingers under the bottom of an auger section when hoisting the auger over the top of the auger section in the ground or other hard surface such as the drill rig platform
- Never allow your feet to get under the auger section that is being hoisted
- When rotating augers, stay clear of the rotating auger and other rotating components of the drill rig. Never reach behind or around a rotating auger for any reason.
- Never use your hands or feet to move cuttings away from the auger
- Augers should be cleaned only when the drill rig is in neutral, and the augers have stopped from rotating

START-UP PROCEDURES

All drill rig personnel and visitors should be instructed to "stand clear" of the drill rig immediately prior to and during the starting of an engine. Before starting a drill rig engine, make sure that all of the gear boxes are in neutral, all hoist levers are disengaged, all hydraulic levers are in the correct non-actuating positions, and the cathead rope is not on the cathead.

SAFETY DURING DRILLING OPERATIONS

Safety requires the attention and cooperation of every worker and site visitor. The following procedures are related to safety during drilling operations:

Do not drive the drill rig from hole to hole with the mast in the raised position. Before raising the mast (derrick), look up to check for overhead obstructions.

Before raising the mast, clear all drill rig personnel (with the exception of the operator) and visitors from the areas immediately to the rear and the sides of the mast. In addition, inform them that the mast is being raised.

Before the mast of a drill rig is raised and drilling is commenced, the drill rig must first be leveled and stabilized with leveling jacks and/or solid crabbing. The drill rig should be re-leveled if it settles after the initial set up. Lower the mast only when leveling jacks are down, and Do not raise the leveling jack pads until the mast is completely lowered. Before starting drilling operations, secure and/or lock the mast, if required by the drill manufacturer's recommendations.

The drill rig operator should operate a drill rig only from the position of the controls. The operator should shut down the drill engine before leaving the vicinity of the drill. "Horsing around" within the vicinity of the drill rig and tool and supply storage areas is strictly prohibited, even when the drill rig is shut down. Watch for slippery ground when mounting/dismounting the platform. Drilling operations should be terminated during an electrical storm. Consuming alcoholic beverages, depressants, stimulants, or any other chemical substance while on the job is strictly prohibited.

All unattended boreholes must be adequately covered or otherwise protected to prevent drill rig personnel, site visitors or animals from stepping or falling into the hole. When the drilling project has been completed, all open boreholes should be covered, protected or backfilled adequately and according to local or state regulations.

SAFETY WHEN LIFTING

Be careful when lifting heavy objects. Before lifting, approach the object by bending at the knees, keeping your back in a vertical position and unarched while obtaining a firm footing. Grasp the object firmly with both hands and stand slowly and squarely while keeping your back vertical and unarched. Perform the lifting with the muscles in your legs, not with the muscles in your lower back.

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HS-201 HEAT STRESS

PURPOSE

The purpose of this Operating Procedure is to provide general information on heat stress and the methods that can be utilized to prevent or minimize the occurrence of heat stress.

Adverse climatic conditions are important considerations in planning and conducting site operations. Ambient temperature effects can include physical discomfort, reduced efficiency, personal injury, and increased accident probability. Heat stress is of particular concern while wearing impermeable protective garments, since these garments inhibit evaporative body cooling.

TYPES OF HEAT STRESS

Heat stress is the combination of environmental and physical work factors that constitute the total heat load imposed on the body. The environmental factors of heat stress are the air temperature, radiant heat exchange, air movement, and water vapor pressure. Physical work contributes to the total heat stress of the job by producing metabolic heat in the body in proportion to the intensity of the work. The amount and type of clothing also affects heat stress.

Heat strain is the series of physiological responses to heat stress. When the strain is excessive for the exposed individual, a feeling of discomfort or distress may result, and, finally, a heat disorder may ensue. The severity of strain will depend not only on the magnitude of the prevailing stress, but also on the age, physical fitness, degree of acclimatization, and dehydration of the worker.

Heat disorder is a general term used to describe one or more of the heat-related disabilities or illnesses shown in Table 201-1.

METHODS OF CONTROLLING HEAT STRESS

As many of the following control measures, as appropriate, should be utilized to aid in controlling heat stress:

- Provide for adequate liquids to replace lost body fluids. Encourage personnel to drink more than the amount required to satisfy thirst. Thirst satisfaction is not an accurate indicator of adequate salt and fluid replacement.
- Replace body fluids primarily with water, with commercial mixes such as Gatorade or Quick Kick used only as a portion of the replacement fluids. Avoid excessive use of caffeine drinks such as coffee, colas or tea.
- Establish a work regimen that will provide adequate rest periods for cooling down. The heat exposure Threshold Limit Values (TLV) may be used for guidelines.
- Provide shaded work areas, if possible.
- Wear cooling devices such as vortex tubes or cooling vests.
- Consider adjusting work hours to avoid the worst heat of the day.
- Take breaks in a cool rest area.

- Remove any impermeable protective garments during rest periods.
- Do not assign other tasks to personnel during rest periods.
- Inform personnel of the importance of adequate rest, acclimation, and proper diet in the prevention of heat stress.

MONITORING

203.1.10 Temperature

The ambient temperature will be monitored on a daily basis at the site during the hottest portion of each day field activities are occurring. Corrective measures such as increasing the rest periods and intake of water will be determined using this data.

REFERENCES

- American Conference of Governmental Industrial Hygienists, Threshold Limit Values for Chemical Substances and Physical Agents, 1992-1993.
- EPA, Standard Operating Safety Guides, 1992, Pages 91-93.
- National Institute for Occupational Safety and Health, Criteria for a Recommended Standard: Occupational Exposure to Hot Environments, 1986.

TABLE 201-1
Classification, Medical Aspects, and Prevention of Heat Illness

Category and Clinical Features	Predisposing Factors	Underlying Physiological Disturbances	Treatment	Prevention
Temperature Regulation Heatstroke **Heatstroke:** • Hot, dry skin; usually red, mottled, or cyanotic; • Rectal temperature 40.5°C (104°F) and over; • Confusion, loss of consciousness, convulsions, rectal temperature continues to rise; fatal if treatment is delayed.	• Sustained exertion in heat by unacclimatized workers; • Lack of physical fitness and obesity; • Recent alcohol intake • Dehydration; • Individual susceptibility; and • Chronic cardiovascular disease	Failure of the central drive for sweating (cause unknown) leading to loss of evaporative cooling and an uncontrolled accelerating rise in t_{re}; there may be partial rather then complete failure of sweating.	• Immediate and rapid cooling by immersion in chilled water with massage or by wrapping in wet sheet with vigorous fanning with cool dry air; • Avoid overcooling; • Treat shock if present	• Medical screening of workers, selection based on health and physical fitness; • Acclimatization for 5-7 days by graded work and heat exposure; • Monitoring workers during sustained work in severe heat
Circulatory Hypostasis Heat Syncope Fainting while standing erect and immobile in heat.	Lack of acclimatization	Pooling of blood in dilated vessels of skin and lower parts of body.	• Remove to cooler area; • Rest in recumbent position; • Recovery prompt and complete	Acclimatization; intermittent activity to assist venous return to heat

Category and Clinical Features	Predisposing Factors	Underlying Physiological Disturbances	Treatment	Prevention
Water and or Salt Depletion				
a) **Heat Cramps** Painful spasms of muscles used during work (arms, legs, or abdominal); onset during or after work hours.	• Heavy sweating during hot work; • Drinking large volumes of water without replacing salt loss	• Loss of body salt in sweat, • Water intake dilutes electrolytes; • Water enters muscles, causing spasm	Salted liquids by mouth or more prompt relief by IV infusion.	Adequate salt intake with meals; for unacclimatized workers, supplement salt intake at meals.
b) **Heat Exhaustion** • Fatigue, nausea, headache, giddiness • Skin clammy and moist; complexion pale, muddy, or hectic flush; • May faint on standing with rapid steady pulse and low blood pressure; • Oral temperature normal or low, but rectal temperature usually elevated (37.5-38.5°C or 99.5-101.3°F); water restriction type: urine volume small, highly concentrated; salt restriction type; urine less concentrated; chlorides less than 3 g/L.	• Sustained exertion in heat; • Lack of acclimatization; and • Failure to replace water lost in sweat	• Dehydration from deficiency of water; • Depletion of circulating blood volume; • Circulatory strain from competing demands for blood flow to skin and to active muscles	• Remove to cooler environment; • Rest in recumbent position • Administer fluids by mouth; • Keep at rest until urine volume indicates that water balances have been restored	• Acclimatize workers using a breaking-in schedule for 5-7 days; • Supplement dietary salt only during acclimatization; • Ample drinking water to be available at all times and to be taken frequently during work day

Category and Clinical Features	Predisposing Factors	Underlying Physiological Disturbances	Treatment	Prevention
Skin Eruptions				
a) Heat Rash: (malaria rubra, or "prickly heat") Profuse tiny raised red vesicles (blisterlike) on affected areas; prickling sensations during heat exposure.	Unrelieved exposure to humid heat with skin continuously wet from unevaporated sweat.	Plugging of sweat gland ducts with sweat retention and inflammatory reaction.	• Mild drying lotions; • Skin cleanliness to prevent infection	Cool sleeping quarters to allow skin to dry between heat exposures
b) Anhidrotic Heat Exhaustion: (malaria profunda) Extensive areas of skin which do not sweat on heat exposure, but present gooseflesh appearance, which subsides with cool environments; associated with incapacitation in heat.	Weeks or months of constant exposure to climatic heat with previous history of extensive heat rash and sunburn.	• Skin trauma (heat rash; sunburn) causes sweat retention deep in skin; • Reduced evaporative cooling causes heat intolerance	• No effective treatment available for anhidrotic areas of skin; • Recovery of sweating occurs gradually on return to cooler climate	• Treat heat rash and avoid further skin trauma by sunburn; • Provide periodic relief from sustained heat
Behavioral Disorders				
a) Heat Fatigue - Transient Impaired performance of skilled sensorimotor, mental, or vigilance tasks, in heat.	Performance decrement greater in unacclimatized and unskilled worker.	Discomfort and physiologic strain.	Not indicated unless accompanied by other heat illness.	Acclimatization and training for work in the heat
b) Heat Fatigue - Chronic Reduced performance capacity; lowering of self-imposed standards of social behavior (e.g., alcoholic over-indulgence); Inability to concentrate, etc.	Workers at risk come from temperature climates for long residence in tropical latitudes.	Psychosocial stresses probably as important as heat stress; may involve hormonal imbalance but no positive evidence.	Medical treatment for serious causes; speedy relief of symptoms on returning home.	Orientation on life in hot regions (customs, climate, living conditions, etc.)

FINAL

EARLY RI ACTIVITIES - WELL INVENTORY FIELD SAMPLING PLAN

RPAC - Portland Site

June 10, 1999

Submitted to:
Oregon Department of Environmental Quality
811 SW 6th Avenue
Portland, Oregon 97204

Prepared for:
Rhone-Poulenc AG Company
1600 Perimeter Park, Suite 400
Morrisville, North Carolina 27560

Prepared by:
URS Greiner Woodward Clyde
111 S.W. Columbia, Suite 900
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June 10, 1999
92C0804A/41

Eric Blischke
Environment Policy Analyst
Department of Environmental Quality
811 SW 6th Ave.
Portland, Oregon 97204

Subject: Submittal of Final
Early RI Activities –
Well Inventory
Field Sampling Plan
RPAC, Portland Site

Dear Eric:

On behalf of Rhône Poulenc AG Company (RPAC), URS Greiner Woodward Clyde (URS) is submitting one unbound and four bound copies of the enclosed Final Early RI Activities – Well Inventory Field Sampling Plan (FSP). One of these DEQ bound copies will be sent directly to Mavis Kent of DEQ, per DEQ's request. RPAC has made revisions to this FSP in response to DEQ's June 4, 1999 comments letter and additional comments provided by Eric Blischke. This document is one of three FSPs that address the Early RI activities at the RPAC Portland Site required by the DEQ. These three FSPs, combined with the Early RI Activities QAPP and URS' HASP, constitute the Early RI Activities Sampling and Analysis Plan required by DEQ.

If you have any questions, please don't hesitate to give one of the undersigned a call at (503) 222-7200.

Sincerely,
URS GREINER WOODWARD CLYDE

Roger Gresh, P.G.
Project Manager

Chris Moody
Field Manager

Enclosures

cc: R. Ferguson, RPAC (w/enclosures)
J. Benedict, CHBH&L (w/enclosures)
M. Kent, DEQ – NW Region (w/enclosures)

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Oregon
John A. Kitzhaber, M.D., Governor

Department of Environmental Quality
811 SW Sixth Avenue
Portland, OR 97204-1390
(503) 229-5696
TDD (503) 229-6993

JOB FILE
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June 16, 1999

Rec'd 6/22/99

Mr. Robert L. Ferguson
Rhone-Poulenc Ag Company
HS & EA Department
PO Box 12014
Research Triangle Park, NC 27709

RE: Approved Project Plans for Early Remedial Investigation Activities – Rhone Poulenc Site

Dear Mr. Ferguson:

The Oregon Department of Environmental Quality (DEQ) has reviewed the final Well Inventory Field Sampling Plan submitted on your behalf by URS Greiner Woodward Clyde. DEQ received this document on June 11, 1999. The changes made to this document adequately address DEQ comments presented in my letter dated June 4, 1999. Consequently, this document should be considered approved. It is our expectation that well inventory activities will begin on July 1, 1999.

In addition, DEQ has reviewed the Quality Assurance Project Plan and Health and Safety Plan. These documents were submitted on May 28, 1999. DEQ has no comments on these plans. Consequently, these plans should also be considered approved. However, DEQ reserves the right to request modification of these plans if necessary during the course of the early remedial activities.

If you have any questions regarding this matter, please feel free to contact me at (503) 229-5648.

Sincerely,

Eric L. Blischke
Project Manager
Waste Management and Cleanup Division

CC: Paul Slyman, DEQ/WMCD
Dave St. Louis, DEQ/NWR
Mavis Kent, DEQ/NWR
Roger Gresh, URS Greiner Woodward Clyde
Jim Benedict, Cable, Huston, Benedict and Haagensen

FINAL

EARLY RI ACTIVITIES - WELL INVENTORY FIELD SAMPLING PLAN

RPAC - Portland Site

June 10, 1999

Submitted to:
Oregon Department of Environmental Quality
811 SW 6th Avenue
Portland, Oregon 97204

Prepared for:
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1600 Perimeter Park, Suite 400
Morrisville, North Carolina 27560

Prepared by:
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Appendices

Appendix A **Standard Operating Procedures**

SOP-1 Methodology for Water Level Determination
SOP-2 Equipment Decontamination

Appendix B **Forms**

This document is one of three Field Sampling Plans (FSPs) that address the Early Remedial Investigation (RI) activities to be completed in the vicinity of the Rhone-Poulenc AG Company (RPAC) facility. The RPAC property is located at 6200 N.W. St. Helens Road in Portland, Oregon (Figure 1-1). The Early RI activities will be completed as required by the Consent Order (the Order) between the Oregon Department of Environmental Quality (DEQ) and RPAC. As required by DEQ, RPAC prepared this FSP as a stand-alone document.

This FSP describes the monitoring well and staff gauge activities that RPAC will conduct in accordance with DEQ's RI Work Plan and Groundwater Monitoring Plan (E&E, 1999). These activities will include an assessment of well or monitoring point integrity, groundwater level measurements, and evaluation of any free product, if present, in the wells. The inventory results will be used in the determination of new well installations and selection of wells for the comprehensive groundwater sampling rounds.

The other two FSPs, which address other stages of the Early RI activities related to the push-probe investigation/monitoring well installation and the comprehensive groundwater monitoring, will be submitted to DEQ under separate cover. These three FSPs, combined with the Early RI Activities Quality Assurance Project Plan (QAPP) and URS' Health and Safety Plan (HASP) constitute the Early RI Activities Sampling and Analysis Plan (SAP) required by DEQ for the RPAC site.

1.1 BACKGROUND

The RPAC facility was used for the formulation and/or manufacture of pesticides from 1943 to 1991. Chemicals used at the facility were released to the environment as a result of spills, and leaks from various surface and subsurface sources. RPAC began an investigation of the soil and groundwater during the early 1980s. DEQ provided an analysis of the site's existing investigative data in their RI Work Plan. Based on this analysis, DEQ requested that RPAC collect additional information to further evaluate the site's remedial options, described in their RI Work Plan.

The site is underlain by layers consisting of manmade fill, Holocene-age alluvium, a cemented gravel and basalt bedrock. The thickness of the fill ranges from less than a foot to 30 feet in the Lake Area, and is comprised of highly variable materials including sand, silt, gravel, clay, and debris such as metallic slag, wood, wire, and glass. Beneath the fill, the alluvium extends 50 to 80 feet, and generally consists of an upper sandy silt layer and a lower silty sand layer. The cemented gravel layer is only locally present, but may be up to 20 feet thick. The cemented gravel layer is described as dense/vesicular basalt fragments contained in a matrix with green mineralization. Basalt underlies the alluvium, and cemented gravel, where present.

The depth to groundwater at the site typically ranges from about 9 to 20 feet below ground surface (bgs). Areas of perched groundwater have been identified in the fill in the RPAC Herbicide Area and the Insecticide Area (EMCON, 1992). Generally, groundwater flow in the alluvial materials is to the north.

1.2 SCHEDULE

RPAC plans to implement this stage of the Early RI activities in a manner that quickly obtains data that will contribute to decisions about installing additional monitoring wells required by DEQ for supplemental groundwater characterization, and for use in longer term groundwater monitoring, as outlined in the Groundwater Monitoring Plan (GWMP) (E&E, 1999). RPAC will make every reasonable effort to complete the Early RI activities in accordance with the schedule presented in Attachment B – Scope of Work (SOW) from the Order.

The results of each stage of the Early RI activities, including the well inventory, will be discussed with DEQ as the work progresses. The results also will be summarized and presented in a series of technical memoranda to be submitted to DEQ with RPAC's quarterly progress reports.

1.3 SCOPE AND OBJECTIVES

The scope of the Early RI activities covered by this Well Inventory FSP includes:

- Field assessment of monitoring wells and staff gauges.
- Determination and measurement of the presence (or absence) of NAPL existing as a free product in the monitoring wells.
- Sampling and analysis of free product, if present.
- Quality assurance (e.g., checking/updating the relevant databases with current information).
- Development of a list of recommended wells to be repaired, abandoned, or replaced by an existing well or a new well and/or removed from the monitoring network.

The overall objective for this stage of the Early RI activities is to confirm the integrity and reliability of the monitoring wells and staff gauges listed in DEQ's GWMP. The objectives of this stage of the work also include evaluations of whether the wells are considered functional as monitoring points and recommendations for possible repair, abandonment or replacement. If well integrity is in question, the well will be considered for repair, replacement and/or removal from the monitoring program. DEQ has indicated that repair or replacement of monitoring wells will be necessary if the well location and depth represent a critical sampling point for the comprehensive groundwater program. Figure 1-2 summarizes the staged approach for the Early RI activities.

This FSP will address the methodologies and objectives for the activities discussed above as they relate to the following RPAC areas and off-site properties:

- The RPAC Herbicide Area
- The RPAC Lake Area
- Elf Atochem Property
- Gould Electronics Property

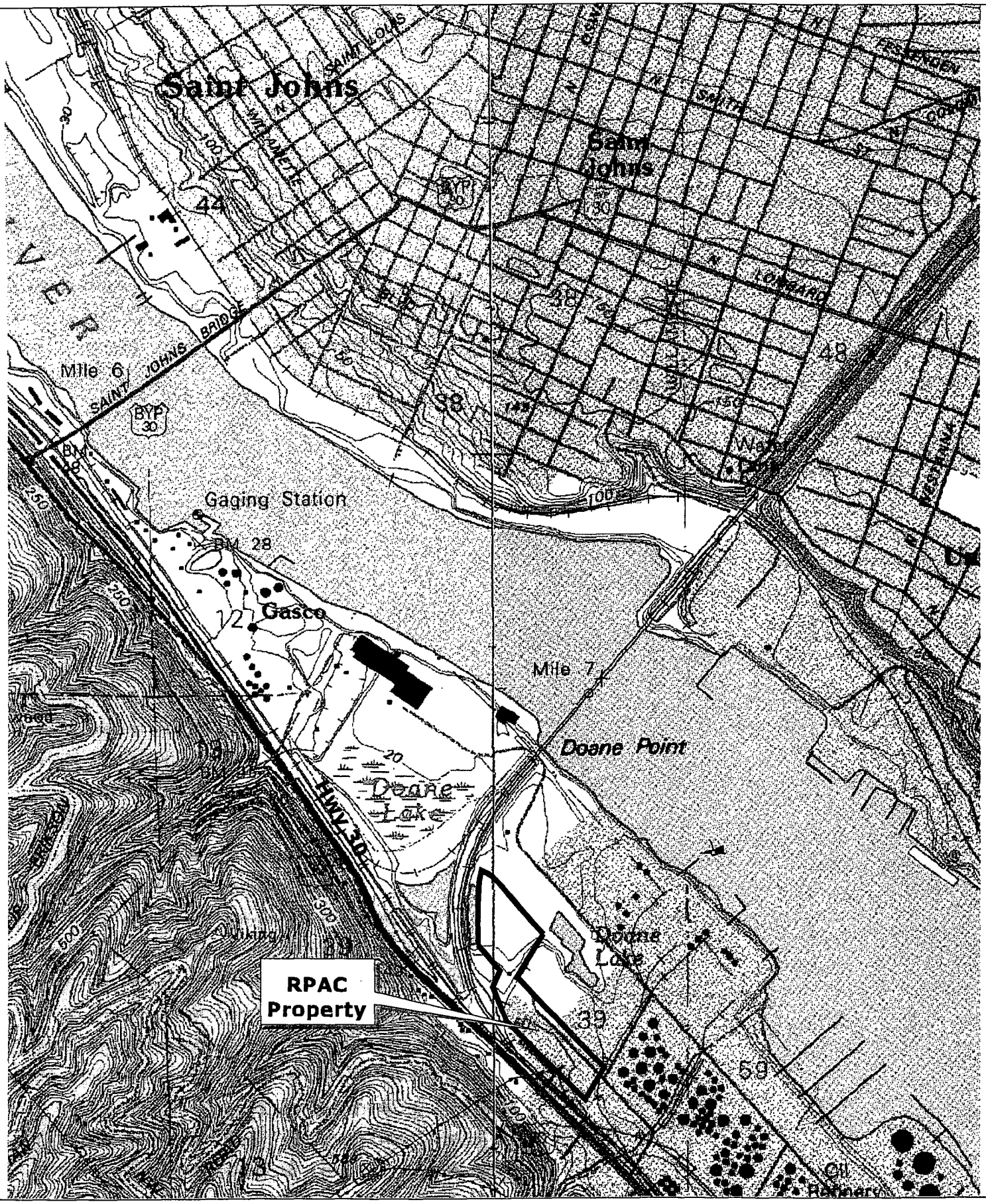
- Wacker Siltronics Property
- ESCO Inc. Property
- Metro Property
- City of Portland Property
- Burlington Northern Railroad Property
- Portland General Electric Property
- Schnitzer Investment Property

Figure 1-3 shows the location of the RPAC property and the surrounding properties.

1.4 FIELD TEAM

The Field Team will consist of a Field Manager and necessary field personnel to implement this FSP. The Field Manager will maintain or delegate responsibility for the logistical requirements of the sampling effort, including but not limited to:

- Event scheduling, coordination between URS staff, URS subcontractors, and representatives of off-site property owners.
- Delivery and shipping of sample containers and coolers.
- Quality assurance checking of sampling technique, documentation and other paperwork completed by sampling crews.
- Distribution of PPE as required by the HASP.
- Sample management and handling activities occurring at the site.



MAP SOURCE: LINNTON AND PORTLAND OREGON
USGS 7.5 MIN TOPOGRAPHIC QUADRANGLE - 1990

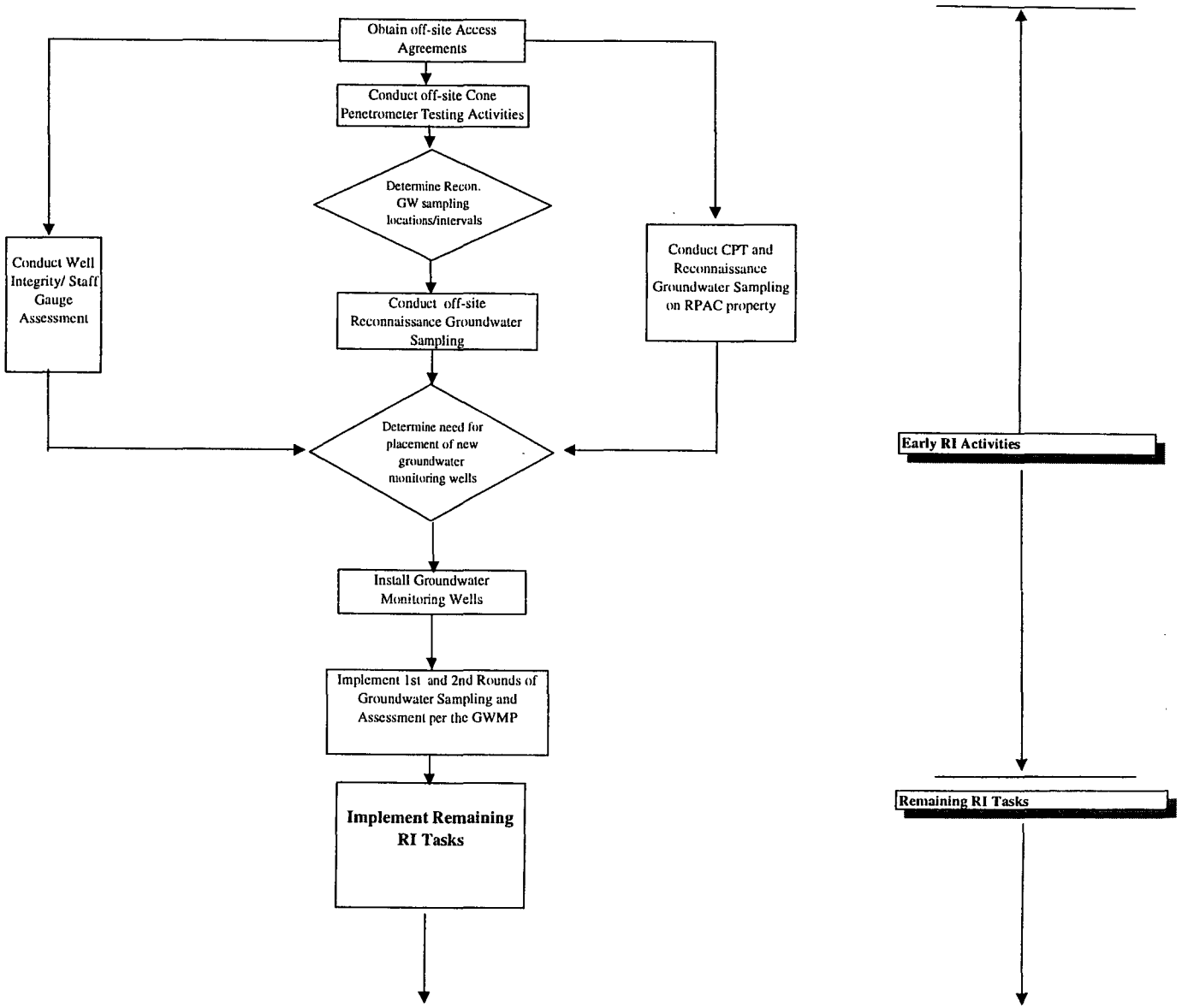
1000 0 1000 Feet

Figure 1-1
Site Vicinity

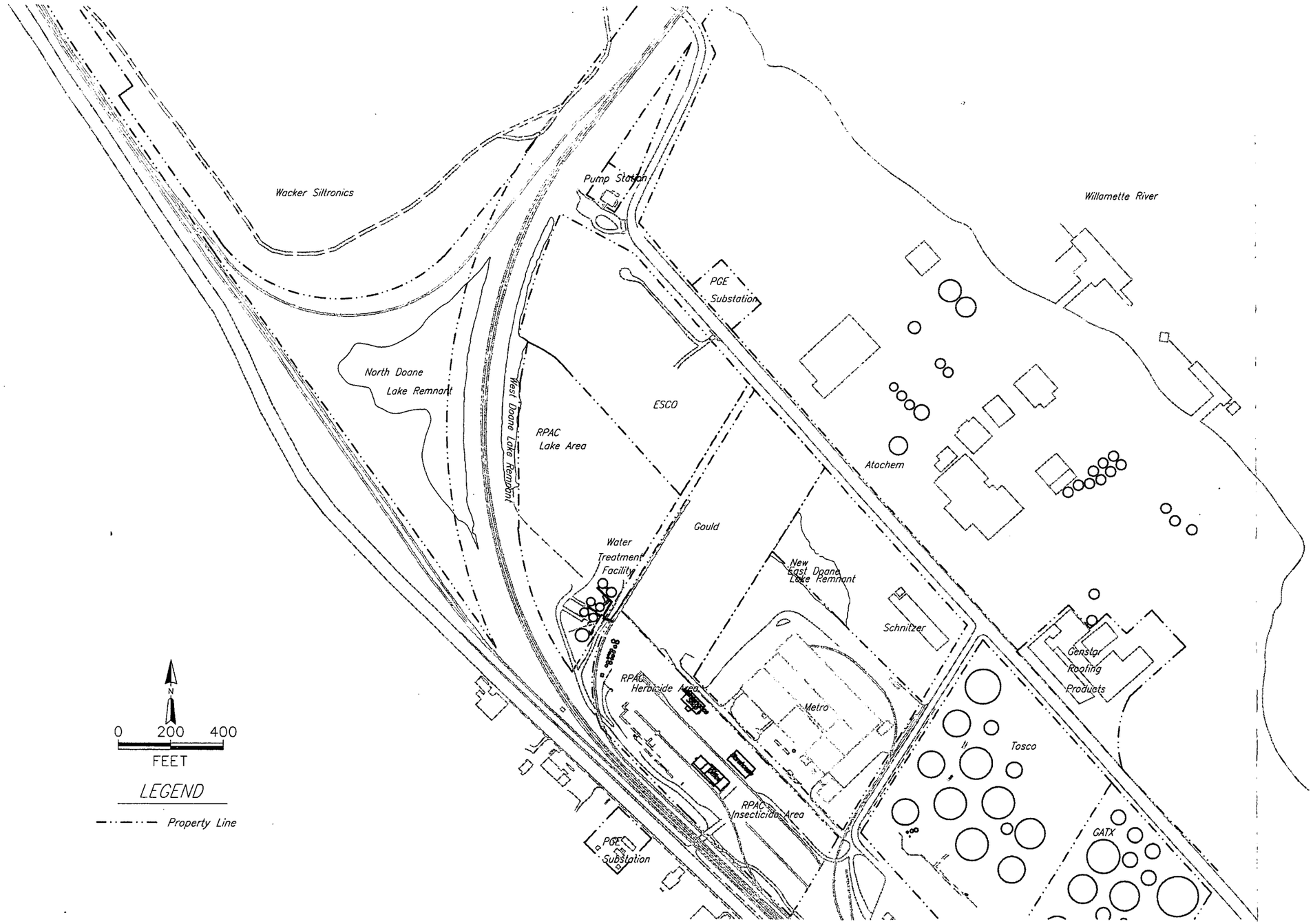
RS Greiner Woodward Clyde

SCOEPA00006538

FIGURE 1-2
Flowchart For Early RI Activities
Rhone Poulence AG Company
Portland, Oregon



S:\PROJECTS\92CD\04A\TASK4\WL_FSP\TABLES&FIGURES\FIGURE 1-2



URS Greiner Woodward Clyde	TITLE: Site Map Rhone-Poulenc AG Company Portland, OR	DWN: jgdp CHKD: DATE: 5/26/99	DES.: jgdp APPD: REV.: 3	PROJECT NO.: 5292C0804A FIGURE NO.: 1-3

2.1 METHODOLOGY

URS personnel will complete a monitoring point assessment to evaluate the integrity of the groundwater monitoring wells and staff gauges for use in groundwater level monitoring, groundwater sampling, and surface water level measurement. The monitoring wells and staff gauges to be included in the inventory are listed in Table 2-1, and are shown on Figures 2-1 through 2-3. The points to be inventoried include all locations where water quality or elevation measurements will be conducted during the RI activities.

Prior to inventorying the points located on property not owned by RPAC, access agreements will be obtained from the property owners, including; Elf Atochem, Gould Electronics, Wacker Siltronics, ESCO Inc., Metro, City of Portland, Burlington Northern Railroad, Portland General Electric, and Schnitzer Investment Properties. Table 2-1 summarizes the wells and staff gauges located at each of these off-site properties.

The two primary types of past data collected from the monitoring network include depth to water, or water-level data, and groundwater chemistry. In order to accurately characterize past and current trends in the quality of the groundwater in the vicinity of the Site, the monitoring wells must provide accurate water-level data and groundwater samples representative of aquifer conditions. Field data will be collected to determine whether each well is considered functional or non-functional as a monitoring point. The following data will be collected or verified for each monitoring point:

- Location: Monitoring points will be identified and their locations cross-checked with the current base map and/or database. This verification prevents future clerical errors.
- Belowground Condition: As part of the investigation, the belowground condition of each monitoring well will be evaluated to determine whether adequate information exists to recommend either repair/abandonment of that well, versus adequacy as a candidate for inclusion in the monitoring well network. URS personnel will first measure the depth to the water table from the measuring point (e.g., notch at top of casing) and check for NAPL per requirements described in SOP-1. A tool will then be lowered into the well to determine the total depth. An appropriate sized bailer or other equipment will be lowered to the total depth to evaluate casing/screen inner diameter integrity. An example of a belowground condition that might warrant well repair is several feet of silt at the bottom of the screen, which could be removed by well redevelopment. Examples of belowground conditions that might warrant well abandonment include a) significant difference between measured/listed original total depth for the well; b) obstruction inside well at any depth; or c) casing diameter decreased in some segment of the well.
- Aboveground Condition: The well monument or casing stick-up should be intact, with intact lids to prevent excess water buildup from precipitation or runoff. Many of the monitoring wells are located in or around active facilities and are subject to wear and tear or damage due to traffic or other factors. A monitoring well that has been damaged such that surface water can enter the casing or short-circuit the seal will not provide accurate samples and should be repaired or eliminated from the monitoring program. Monitoring wells should be locked

with an operating padlock and effective well cap. The padlock prevents vandalism, while the expanding well cap prevents surface water from entering the well casing. Staff gauges should be well anchored into the ground or to a secure feature such as a dock or piling. Examples of observed aboveground conditions that might warrant well repair include a) damaged or missing cap; b) small cracks around surface concrete pad which have allowed insignificant amounts of surface water to infiltrate down the outside of the casing; c) damaged or missing padlock; d) damaged or missing bullards; or e) slightly damaged stick-up casing. An example of observed aboveground conditions that might warrant well abandonment include large cracks around annular seal/concrete pad that appear to extend to depth.

- Access: The well or staff gauge access will be confirmed. This allows future data collection rounds to be completed with maximum efficiency and benefit to data quality. If necessary, minor brush clearing will be conducted to facilitate work at each location.
- Data Verification: The data gathered from the above activities will be compared to information in the database to verify the overall accuracy of the Site data. Monitoring wells that have inappropriate screened intervals or lack of screening interval information are not suitable for inclusion into the monitoring program, will be recommended for deletion from the program. The data verification will verify that the well has been properly surveyed and that its elevation is compatible with the monitoring well network. The datum used for each well/gauge elevation will be checked to ensure all elevation data are under the same datum set. If datum information is not available for a particular well or staff gauge, consideration will be given to resurveying that well/gauge if the well/gauge is selected for the final monitoring network.

The procedures for conducting the depth to fluid measurements and total depth measurements are included in Standard Operating Procedure SOP-1 (Appendix A).

2.2 DOCUMENTATION

The following well information will be recorded onto the field verification log. A copy of the general verification log is included in Appendix B.

- Well Identification
- Site Identification
- Well Type
- General location
- Aboveground Condition
- Measuring point description (i.e. notch on north side of casing or marked point)
- Depth to fluid measurements
- Total Depth

URS personnel will also take digital photos of each well. The photos will provide a documentation of the current conditions of the wells, and serve as a supplement to the base map for the Site.

Following the completion of the monitoring point assessment/integrity, an evaluation will be conducted to determine if singular wells should not be included in the groundwater monitoring network. This evaluation will consist of a ranking and rating procedure using the following details: surface monument/completion appearance, visible well riser appearance, lack of well screen information, discrepancies from existing diagrams, completion between two discrete lithologic zones

The deliverables for this activity will consist of a report with well information that will be organized by area and by well. Each well's section will include a typed well/staff gauge integrity log, a copy of the original well log, if available, and a photograph of the monitoring point.

A summary letter will also be delivered listing the wells determined to be ineffective in providing the monitoring data needed, and the rational used to make the decision. This summary will also include recommendations as to whether damaged wells can be repaired, which wells need to be replaced with a new well or with an alternate well for the monitoring program, or if there are wells that should be abandoned based upon their current condition.

2.3 DECONTAMINATION AND WASTE MANAGEMENT

All equipment used to collect down-hole data (i.e., water level indicator/free product interface probe or sounding tape) will be decontaminated after measurements are collected. Decontamination will prevent cross-contamination between monitoring points. Decontamination procedures will be completed in accordance with SOP-2. If a phased product is encountered, the equipment will be decontaminated with a solvent rinse.

URS personnel will use personal protective equipment (PPE) as specified in the facility Health & Safety plan. Disposable health and safety equipment (Tyvek suites, gloves, etc.) will be collected and stored in plastic refuse sacks, and DOT-approved removable head steel drums.

All decontamination fluids generated on-site will be disposed of in the RPAC water treatment system, in accordance with the facility's NPDES permit (modification in preparation). To the extent allowed by applicable waste regulations or otherwise approved by DEQ, decontamination fluids generated off-site will also be disposed of in the RPAC water treatment system.

TABLE 2-1
Groundwater and Surface Water Elevation Monitoring Points
RI/FS - Rhone Poulenc AG Company
Portland, Oregon

Site Identification	Well Identification	Top of Screen (feet bgs)	Total Depth (feet bgs)	Well Type	Well Use
ATOCHEM	W-19-D	63	68	M	S
ATOCHEM	W-19-I	44	49	M	S
ATOCHEM	W-19-S	20	25	M	S
ESCO	W-11-B	111.9	121.9	M	S
ESCO	W-11-D	81.3	91.3	M	S
ESCO	W-11-I	50	60	M	S
ESCO	W-11-S	11.5	21.5	M	S
ESCO	W-12-D	90	100	M	S
ESCO	W-12-I	49	58.5	M	S
ESCO	W-12-S	15	20	M	S
GOULD	AL1-15.0 (2)	5	15	M	S
GOULD	AL1-45.0 (2)	35	45	M	S
GOULD	AL1-69.3 (2)	64.6	69.3	M	S
GOULD	BST1W-88.0 (2)	83	88	M	S
GOULD	GM-2-I (3)	30	35	M	W
GOULD	W-1-I	40	50	M	S
GOULD	W-1-S	9	21	P	W
GOULD	W-2-S	13	18	P	W
GOULD	W-3-D	79	89	M	S
GOULD	W-3-I	30.5	40.5	M	S
GOULD	W-3-S	9	17	P	S
GOULD	W-4-I	39	49	M	S
GOULD	W-4-S	8	16	P	S
RPAC-HA	MW-1-25.8	13.3	23.6	M	S
RPAC-HA	MW-1-41.0	33.5	38.8	M	S
RPAC-HA	MW-1-56.1	43.6	53.9	M	S
RPAC-HA	MW-1-76.6	66	76	M	S
RPAC-HA	MW-2-26.0	12.5	22.8	M	S
RPAC-HA	MW-2-46.0	32.5	42.8	M	S
RPAC-HA	MW-2-61.6	48.2	58.5	M	S
RPAC-HA	MW-3-27.0	14.5	24.8	M	S
RPAC-HA	MW-3-49.0	36.5	46.8	M	S
RPAC-HA	MW-3-68.3	55.8	66.1	M	S
RPAC-HA	MW-4-27.0	13.5	23.8	M	S
RPAC-HA	MW-4-47.0	33.5	43.8	M	S
RPAC-HA	MW-4-63.3	49.8	60.1	M	S
RPAC-HA	MW-5-24.5	12	22.3	M	S
RPAC-HA	MW-5-34.3	26.7	32	M	S
RPAC-HA	MW-5-51.6	39.1	49.4	M	S
RPAC-HA	MW-8-27.0	15.4	25.1	M	S
RPAC-HA	MW-8-46.0	30.8	41	M	S
RPAC-HA	MW-8-64.0	48.8	59	M	S
RPAC-HA	MW-9-23.0	10.7	20.7	M	S
RPAC-HA	MW-9-42.0	30.7	40.7	M	S
RPAC-HA	MW-9-58.0	48.5	58.5	M	S
RPAC-HA	MW-9-80.0	70.3	80.3	M	S

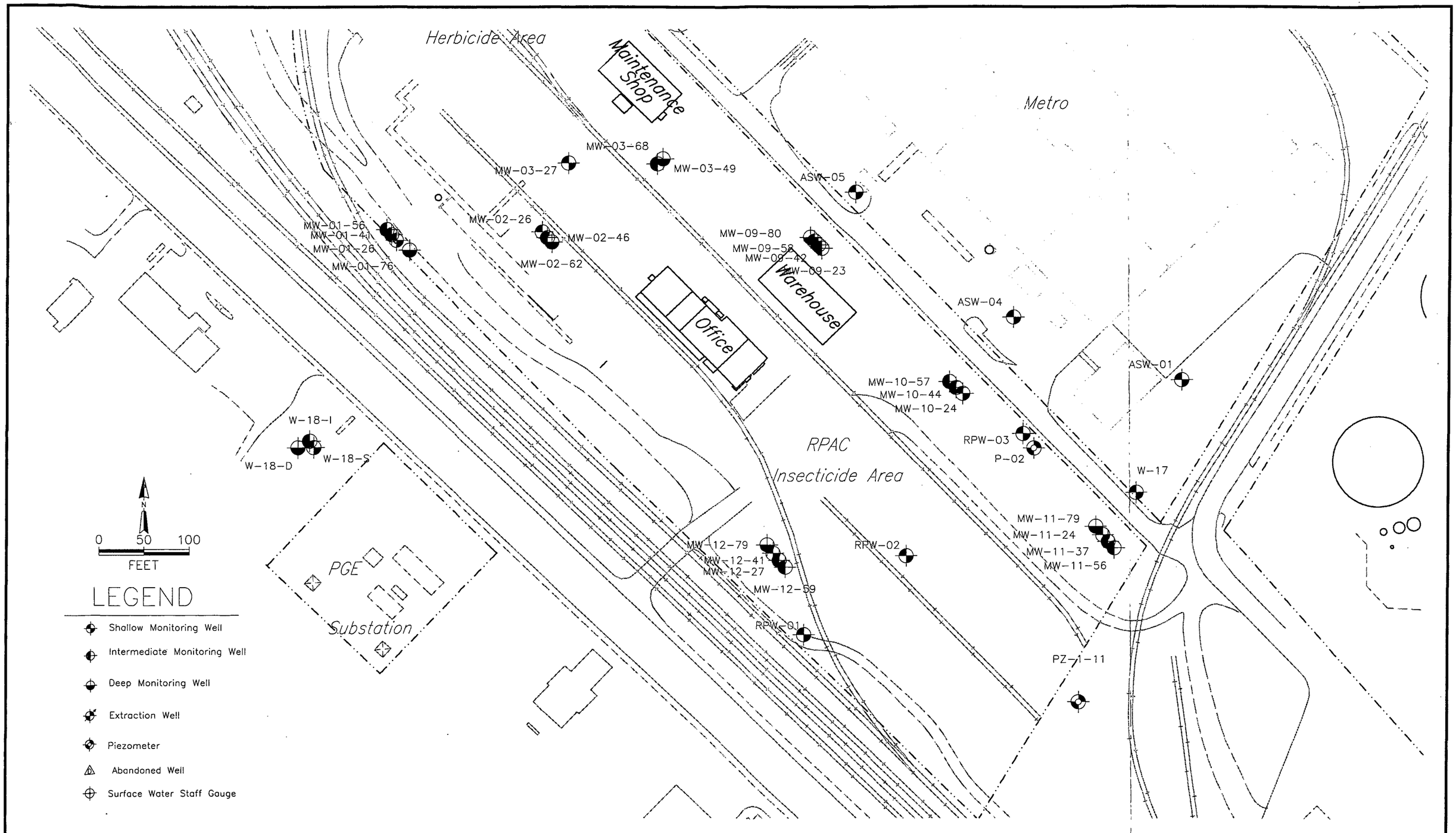
TABLE 2-1
Groundwater and Surface Water Elevation Monitoring Points
RI/FS - Rhone Poulenc AG Company
Portland, Oregon

Site Identification	Well Identification	Top of Screen (feet bgs)	Total Depth (feet bgs)	Well Type	Well Use
RPAC-HA	P-11	ND	ND	P	W
RPAC-HA	P-7	ND	ND	P	W
RPAC-HA	RPW-5	30.75		M	S
RPAC-HA	W-6-B	57.9	67.9	M	S
RPAC-HA	W-6-D	39	49	M	S
RPAC-HA	W-6-S	12.25	27.25	M	S
RPAC-IA	MW-10-24.5	12.5	22.5	M	S
RPAC-IA	MW-10-44.0	32	42	M	S
RPAC-IA	MW-10-57.5	45.5	55.5	M	S
RPAC-IA	MW-11-24.0	12	22	M	S
RPAC-IA	MW-11-37.0	25	35	M	S
RPAC-IA	MW-11-56.0	44	54	M	S
RPAC-IA	MW-11-79.0	66	76	M	S
RPAC-IA	MW-12-26.5	14.5	24.5	M	S
RPAC-IA	MW-12-41.0	29	39	M	S
RPAC-IA	MW-12-59.5	47.5	57.5	M	S
RPAC-IA	MW-12-79.5	73.5	78	M	S
RPAC-IA	PZ-1	1.5	11.5	P	W
RPAC-IA	P-2	13	18	P	W
RPAC-IA	RPW-1	38	48	M	S
RPAC-IA	RPW-2	28	38	M	S
RPAC-IA	RPW-3	43	53	M	S
RPAC-LA	AL2-17.0	7	17	M	S
RPAC-LA	AL2-32.5	27.5	32.5	M	S
RPAC-LA	AL2-46.0	40	46	M	S
RPAC-LA	AL4-46.8	36.8	46.8	M	W
RPAC-LA	AL5-19.0	9	19	M	S
RPAC-LA	AL5-35.0	29	35	M	S
RPAC-LA	AL5-62.0	52	62	M	S
RPAC-LA	AL6-96.5	91.5	96.5	M	S
RPAC-LA	BTB-4A-84.0	74	84	M	W
RPAC-LA	BTB-4B-25.0	15	24.7	M	W
RPAC-LA	BTB-4B-55.0	44.7	54.7	P	S
RPAC-LA	BST2W-B	56.3	61	M	S
RPAC-LA	BTB5-S	(1)	(1)	(1)	W
RPAC-LA	BST5W-B	69.9	74.5	M	S
RPAC-LA	GM-1-S	24	29	M	W
RPAC-LA	PP-6	15	20	M	W
RPAC-LA	PP-8	20	25	P	S
RPAC-LA	PP-11	33	38	M	S
RPAC-LA	W-8	44	54	M	S
RPAC-LA	W-9	28	38	M	S
METRO	ASW-1	7.5	17.5	M	S
METRO	ASW-2	9.5	19.5	M	S
METRO	ASW-3	ND	ND	M	W
METRO	ASW-4	8	18	M	S

TABLE 2-1
Groundwater and Surface Water Elevation Monitoring Points
RI/FS - Rhone Poulenc AG Company
Portland, Oregon

Site Identification	Well Identification	Top of Screen (feet bgs)	Total Depth (feet bgs)	Well Type	Well Use
METRO	ASW-5	7	17	M	S
METRO	ASW-6	7	17	M	W
METRO	ASW-7	5	15	M	S
METRO	W-15-D	52	62	M	S
METRO	W-15-I	28.8	38.8	M	S
METRO	W-15-S	9.8	14.8	M	S
METRO	W-17	45	50	M	W
PGE	W-18-D	59	64	M	S
PGE	W-18-I	49	54	M	S
PGE	W-18-S	25	30	M	S
PUMP STATION	W-10	60.5	70.5	M	S
SCHNITZER	W-16-D	75.5	85.5	M	S
SCHNITZER	W-16-I	40	50	M	S
SCHNITZER	W-16-S	8	13	M	S
WACKER	MW-3-I	55	60	M	S
WACKER	MW-3-S	12	27	M	S
WACKER	MW-6-S	9	24	M	S
WACKER	MW-7-S	10	25	M	S
LAKE AREA	WDLStaff	NA	NA	SG	W
BNRR	NDL Staff	NA	NA	SG	W
ATOCHEM	Willamette River Staff	NA	NA	SG	W
RPAC	A	ND	ND	E	W
RPAC	B	ND	ND	E	W
RPAC	C	ND	ND	E	W
RPAC	D	ND	ND	E	W
RPAC	E	ND	ND	E	W
RPAC	F	ND	ND	E	W
RPAC	G	ND	ND	E	W
RPAC	H	ND	ND	E	W

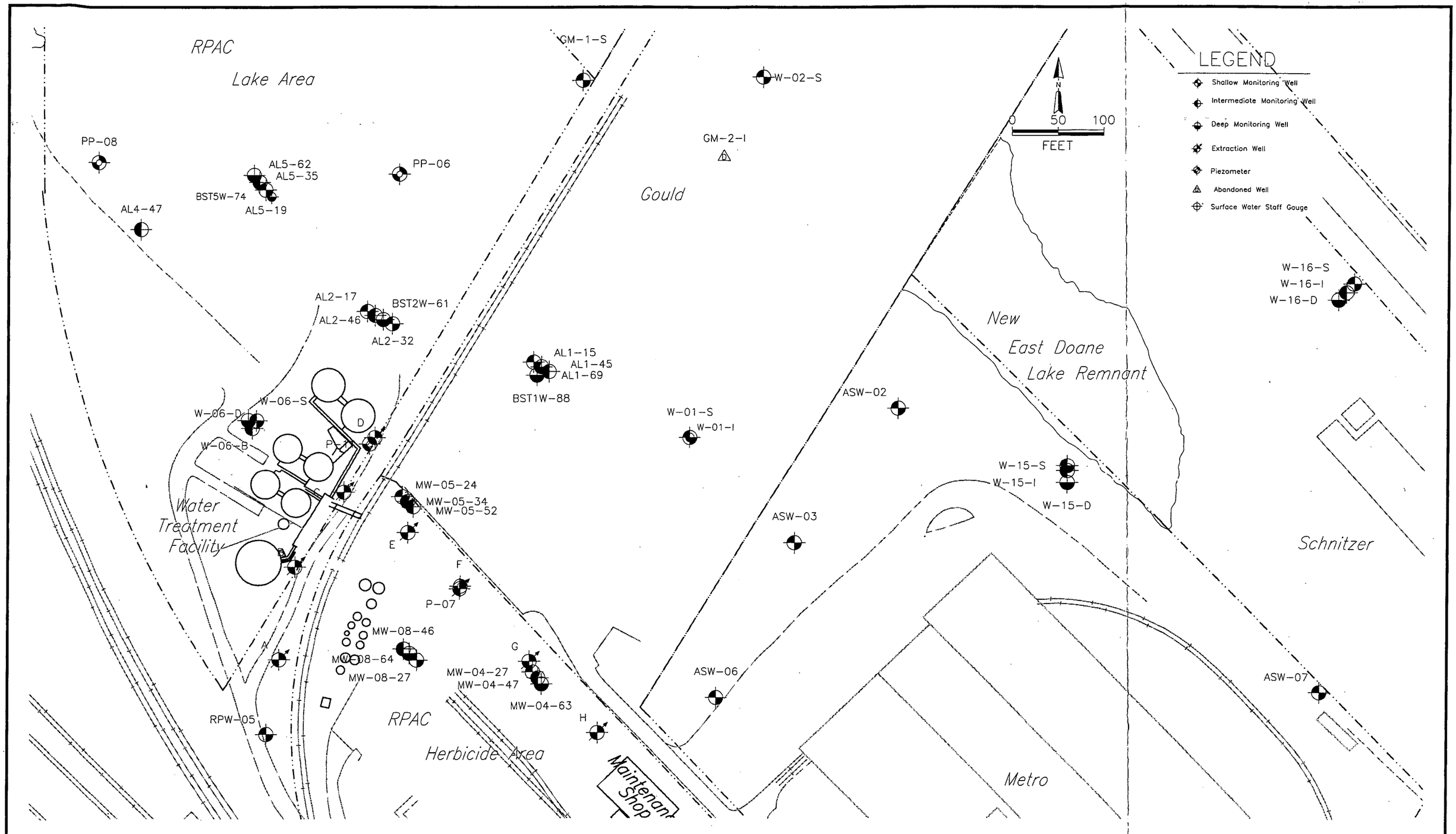
Notes:
P = Piezometer
M = Monitoring Well
SG = Staff Gauge
E = Extraction Well
ND = No Data
NA= Not Applicable
(1) Drilled May 21, 1993 by EMCON-one reconnaissance groundwater sample collected, boring backfilled
(2) Abandoned in June, 1999
(3) Previously Abandoned
S = Samples and Water Levels collected from well
W = Water levels monitored only from well



URS Greiner Woodward Clyde

TITLE:
Groundwater/Surface Water Monitoring Network – A
Rhone-Poulenc AG Company
Portland, OR

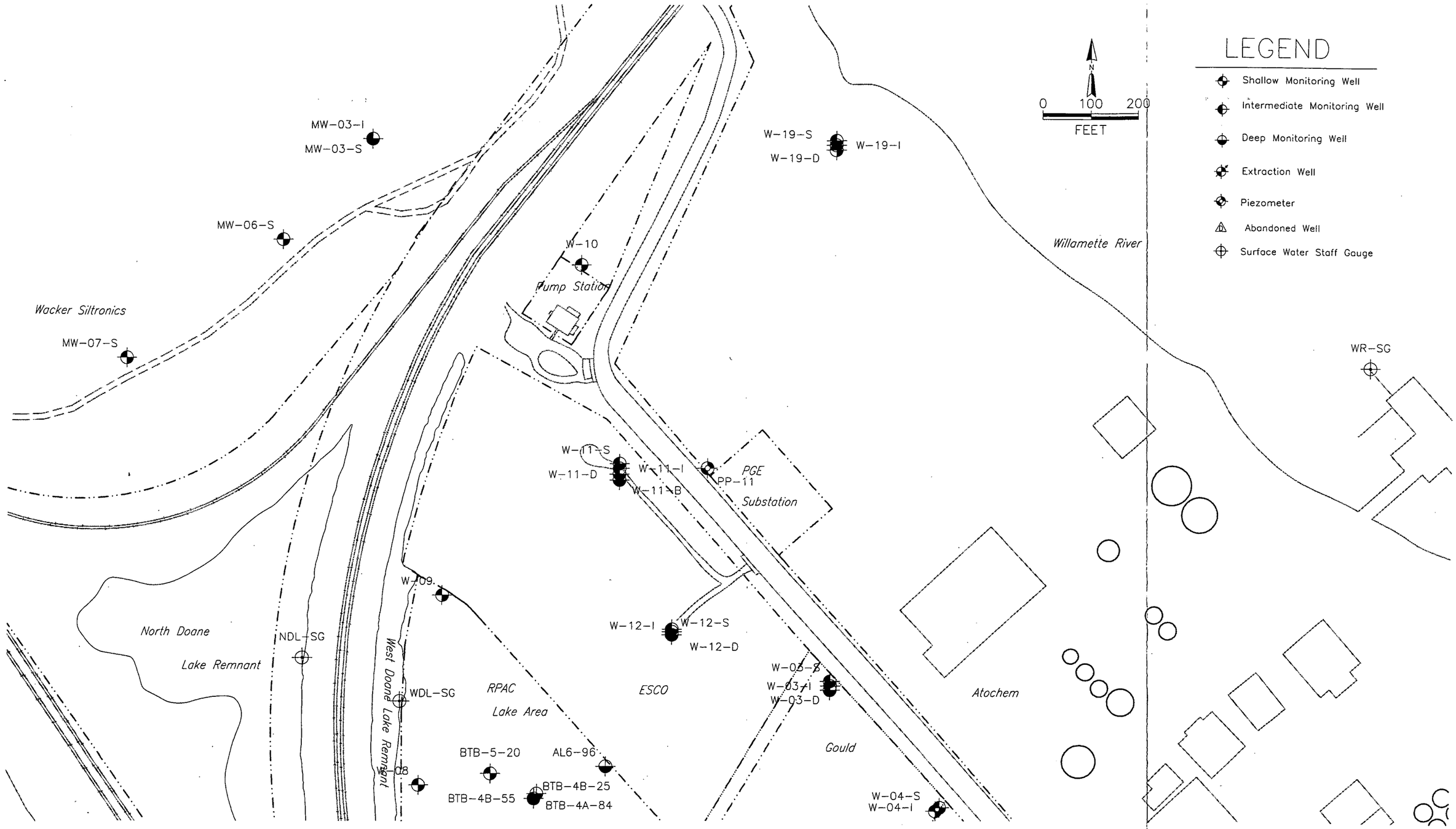
DWN: jgdp	DES.: jgdp	PROJECT NO.: 5292C0804A
CHKD:	APPD:	FIGURE NO.: 2-1
DATE: 5/26/99	REV.: 2	



URS Greiner Woodward Clyde

TITLE:
Groundwater/Surface Water Monitoring Network – B
Rhone-Poulenc AG Company
Portland, OR

DWN: jgdp	DES.: jgdp	PROJECT NO.: 5292C0804A
CHKD:	APPD:	FIGURE NO.: 2-2
DATE: 5/26/99	REV.: 2	



URS Greiner Woodward Clyde

TITLE:
Groundwater/Surface Water Monitoring Network – C
Rhone-Poulenc AG Company
Portland, OR

DWN: jgdp	DES.: jgdp	PROJECT NO.: 5292C0804A
CHKD:	APPD:	
DATE: 5/26/99	REV.: 2	FIGURE NO.: 2-3

Ecology and Environment, Inc., April, 1999. Remedial Investigation Work Plan, Rhone Poulenc AG Company, Portland, Oregon.

EMCON Northwest Inc., June 10, 1992. Rhone-Poulenc AG Company Phase II Scoping Document, Draft Report.

SCOEPA00006551

EQUIPMENT LIST

- Well keys
- Electronic water/product interface probe
- Field Notebook
- Well/Staff Gauge integrity log,
- Decontamination Supplies
- Paper towels
- Site Plan
- Measuring wheel
- Machete
- Extra 2" and 4" well caps, and padlocks
- Socket set, miscellaneous hand tools
- Bolt cutters
- Digital Camera
- PPE per URS HASP

All groundwater and surface water monitoring points on Table 2-1 will be assessed during the Early RI. The monitoring point identification will be located using site maps (Figures 2-1, 2-2, and 2-3). The data will be recorded onto a well/staff gauge integrity log.

Upon arriving at a well the following procedures will be followed:

- Note the general location of the well as compared to surrounding wells and monuments, obtaining a rough estimate of length from the nearest landmark/wells.
- Note the condition of the monument, posts, and presence/absence of padlocks and effective well caps.
- Note the access to the well e.g. presence of excessive vegetative growth, or stored equipment around the well head.
- Record the description of the measuring point (MP) (notch or marked point on north side of casing).
- Record the casing materials and condition.
- Measure depth to water and/or the presence and thickness of NAPL layers.
- Decontaminate the interface probe.
- Replace the well cap and casing cap.
- Photograph the well head, in reference to its surroundings.

Water level and fluid level measurements will be measured using an electronic water level/product interface probe. This instrument uses an electric current to indicate the fluid level by sounding a buzzer or flashing a light when water or separate phase is encountered. When the probe hits the fluid surface, the buzzer/light comes on to indicate that the fluid surface has been reached. By raising and lowering the probe, it is possible to get a reading within 0.01 of a foot. The probe will emit a different tone/light when it encounters a different phase liquid. The depth to fluid is measured from an established point on the well casing and is later subtracted from the elevation of that mark. Once the water level and/or depth to light non-aqueous phase liquids(LNAPL) has been measured, the probe will be lowered to the bottom of the well to check for dense non-aqueous phase liquids (DNAPLs). The DNAPL measurement will be conducted in the same manner as the depth to water measurement. If recoverable measurable product is detected in the well, a sample will be collected using a double-flap valve bailer for analysis. The amount of product necessary for laboratory analysis has been determined to be approximately 8 oz. A NAPL sample collected for analysis will be submitted to the laboratory for the physical characteristics of viscosity and specific gravity, and for chemical analysis for the full suite of analytes listed in Table 2-1 in DEQ's GWMP.

Depth to fluid measurements will be recorded in a field logbook, and onto the well/staff gauge integrity log, to the nearest 0.01-foot. Well designation, the time of measurement, and the full measurement calculation will also be recorded in the field log book. A dedicated electronic fluid level indicator will be used throughout the investigation to help minimize potential variability in the measurement collection.

Sampling equipment (e.g., water samplers, water level meter, etc.) will be decontaminated as follows:

1. Gross potable water rinse
2. Soap wash (dilute solution of Alconox or equivalent in potable water solution)
3. Soap wash (dilute solution of Alconox or equivalent in potable water solution)
4. Potable water rinse
5. Solvent rinse (methanol or similar) only if phase product is encountered
6. Distilled\deionized water rinse[1]

If a phased product is encountered, the probe and sounding tape will be wiped with a solvent soaked towel, during retrieval from the borehole, and the equipment will be decontaminated with a solvent rinse as described above.

Decontamination fluids will be disposed of in accordance with discussion in Section 2.2.

[1] Distilled/deionized water will be obtained from a local retail store.

SCOEPA00006555

WELL/STAFF GAUGE INTEGRITY LOG

EXISTING INFORMATION

Site ID:_____ Well Diameter: 2" 4" 6" Other:__

Well ID:_____ Well Type:_____

Top of Screen:_____Feet btoc Total Depth:_____Feet btoc

TOC Elevation:_____

INVENTORY INFORMATION

Person Conducting Inventory:_____

Date:_____ Lock/key present? Y / N ID:_____

Well Found? Y / N Well Diameter: 2" 4" 6" Other:

Surface Completion Description:

Free Product Present? Y / N LNAPL / DNAPL

Measured Depth to LNAPL: _____Feet btoc

Measured Depth to Water: _____Feet btoc

LNAPL Thickness: _____ Feet

Measure Depth to DNAPL: _____Feet btoc

Measured Total Depth: _____Feet btoc

DNAPL Thickness: _____ Feet

Location relative to nearest landmark:

Describe additional integrity issues:

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QUARTERLY PROGRESS REPORT FOR RI/FS RPAC – Portland Site

SECOND QUARTER 2000
APRIL 1, 2000 – JUNE 30, 2000

July 7, 2000

Submitted to:
Oregon Department of Environmental Quality
Northwest Region
2020 S.W. 4th Avenue, Suite 400
Portland, Oregon 97201

Prepared for:
Rhone-Poulenc AG Company
1600 Perimeter Park, Suite 400
Morrisville, North Carolina 27560

Prepared by:
URS
111 S.W. Columbia, Suite 900
Portland, Oregon 97201
(503) 222-7200
92C0804A/15

URS Corporation
The integrated resources of
URS Greiner Woodward Clyde
Dames & Moore
BRW
Radian
O'Brien-Kreitzberg
and associated firms

111 SW Columbia, Suite 900
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Tel: 503.222.7200
Fax: 503.222.4292
Offices Worldwide

July 7, 2000
92C0804A/15

Eric Blischke
Oregon Department of Environmental Quality
Northwest Region, Suite 400
2020 SW 4th Avenue
Portland, Oregon 97201-4987

Subject: Second Quarter, 2000 - Progress Report
RPAC, Portland Site

Dear Eric:

On behalf of Rhône-Poulenc AG Company (RPAC), URS Corporation (URS) is submitting four copies of the enclosed Second Quarter, 2000 - Progress Report. One of the copies is being sent directly to Mavis Kent.

This progress report is being submitted by RPAC in accordance with the July 8, 1999 Consent Order.

If you have any questions, please call (503) 222-7200.

Sincerely,
URS CORPORATION

For Roger Gresh, P.G.
Project Manager

Mike Edwards, P.E.
Project Engineer

Enclosures: Second Quarter 2000 – Progress Report for RI/FS, RPAC – Portland Site, July 7, 2000

cc: R. Ferguson, RPAC
J. Benedict, CHBH&L
M. Kent, DEQ – NW Region

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QUARTERLY PROGRESS REPORT FOR RI/FS RPAC – Portland Site

SECOND QUARTER 2000
APRIL 1, 2000 – JUNE 30, 2000

July 7, 2000

Submitted to:
Oregon Department of Environmental Quality
Northwest Region
2020 S.W. 4th Avenue, Suite 400
Portland, Oregon 97201

Prepared for:
Rhone-Poulenc AG Company
1600 Perimeter Park, Suite 400
Morrisville, North Carolina 27560

Prepared by:

URS
111 S.W. Columbia, Suite 900
Portland, Oregon 97201
(503) 222-7200
92C0804A/15

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Section 2 Current Period Reporting Activities 2-1

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2.2 Monitoring Well Abandonment Activities 2-1
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Appendices

Appendix A QA Data Validation Report
Appendix B Detections Only Tables
Appendix C Laboratory Analytical Results

On behalf of Rhône-Poulenc AG Company (RPAC), URS Corporation (URS) has prepared this Quarterly Progress Report for Remedial Investigation/Feasibility Study (RI/FS) activities associated with RPAC's Portland facility. This report covers activities conducted during the second calendar quarter of year 2000 (April 1, 2000 through June 30, 2000).

The submittal of quarterly progress reports is specified under the Consent Order (No. WMCSR-NWR-99-07) executed between RPAC and the Oregon Department of Environmental Quality (DEQ) on July 8, 1999.

2.1 GROUNDWATER SAMPLING ACTIVITIES

The Spring 2000 comprehensive groundwater sampling round began on March 20, 2000. Groundwater samples were collected from a total of 102 monitoring wells between March 20th and April 19th. The sampling activities were conducted in accordance with the procedures outlined in the Early RI Activities-Comprehensive Groundwater Monitoring Field Sampling Plan (FSP) prepared by URS and dated October 1, 1999 and any subsequent modifications approved by DEQ. Due to the failure of two wells, the sampling round is not considered complete. The round will be completed following the installation and the sampling of the new RP-03 wells, which will occur in the third quarter of 2000.

The results of the groundwater sampling activities will be summarized in a groundwater sampling report, as required by the RI Work Plan. This report will be submitted within 90 days from completion of the groundwater sampling round, as required in the Consent Order between RPAC and DEQ. The sampling round will be completed when the replacement RP-03 wells are sampled.

2.1.1 Investigative Derived Waste

Water

Approximately 1,180 gallons of water were generated during monitoring well sampling activities. Sources included groundwater removed during purging and decontamination water. All water was transported to the RPAC site for disposal to the groundwater treatment facility on the day of generation.

2.2 MONITORING WELL ABANDONMENT ACTIVITES

During the groundwater sampling round, an attempt was made to sample the RP-03 wells on April 7, 2000. The sampling device was unable to be lowered to the depth of the screen interval. The depth to the obstruction, as measured with a weighted tape was 20.13 feet below top of casing (BTOC) for the shallow well and 32.25 feet BTOC for the deep well. On April 18, 2000 an attempt was made to re-develop the wells using a water jetting procedure. This was unsuccessful and the wells were temporarily abandoned on April 24, 2000 by placing bentonite chips into each well. The deep well was permanently abandoned on May 10, 2000, and at that time a sample (WWS-03-01) of the material at the bottom of the RP-03-63 borehole was collected and analyzed for semi-volatiles by EPA Method 8270 and volatiles by EPA Method 8260.

The shallow well was permanently abandoned on May 22, 2000. As part of the abandonment procedure, a portion of the failed well casing and screen were removed intact and inspected to determine the cause of the failure. Although an actual cause was not determined, the cause appears to be physical in nature and unrelated to the contamination in the vicinity of the well screen and riser. Both of the wells in the RP-03 cluster were abandoned per Oregon WRD regulations.

The analytical results for the soil sample from RP-03-63 were validated in accordance with RPAC's DEQ-approved QAPP that RPAC submitted on May 23, 1999.

The QA Data Validation Report for this sample is included in Appendix A. The detections only tables for this soil sample is included in Appendix B, and laboratory analytical reports are included in Appendix C.

2.2.1 Investigative Derived Waste

Water

Approximately 95 gallons of water were generated during monitoring well abandonment activities. Sources included groundwater removed during the abandonment and decontamination water. All water was transported to the RPAC site for disposal to the groundwater treatment facility on the day of generation.

Soil

During the abandonment activities, six drums of soil cuttings were generated. Soil cuttings were containerized in DOT approved 55-gallon steel drums and transported to the RPAC warehouse for storage and characterization before disposal off-site. All drums were labeled on the side and lid according to requirements outlined in the FSP.

2.3 DEPARTMENT OF WATER RESOURCES WELL INSPECTION

On April 10, 2000 Mr. Kristopher Byrd from the Oregon Department of Water Resources (WRD) performed a routine well inspection on wells at the RPAC property. Mr. Bird's observations were outlined in a May 5, 2000 letter from WRD to URS. RPAC is currently evaluating a response to Mr. Bird's letter and the course of action required for these wells.

The only significant problem encountered during monitoring well sampling activities was the failure of the wells in the RP-03 well cluster. No other significant problems were encountered during field activities conducted this quarter.

SCOEPA00006564

4.1 SOIL SAMPLING ACTIVITIES

The QA Data Validation Report for the soil sample collected during abandonment of the failed deep RP-03 well is included in Appendix A. The detections only table for the soil sample is included in Appendix B. The laboratory analytical reports for the soil sample are included in Appendix C.

4.2 GROUNDWATER SAMPLING ACTIVITIES

The results of the groundwater sampling activities will be included in the groundwater sampling report, as required by the RI Work Plan, and previously mentioned in Section 2.1.

The activities planned for the next quarterly reporting period include the following:

- Installation and surveying of the two RP-03 replacement wells
- Sampling of the two RP-03 replacement wells
- Finalization of the Source Area Scoping Document
- Completion of the evaluation of the wells identified in the WRD letter and begin any necessary actions.
- Submittal of the Spring 2000 groundwater sampling report
- Initiation of the Fall 2000 groundwater sampling round

SCOEPA00006566

The analytical results for one soil sample (from abandonment of RP-03-63) collected on May 10, 2000 at the RPAC Property were subject to a quality assurance/quality control (QA/QC) review. This review included an evaluation of analytical representativeness, accuracy, precision, and completeness. Representativeness is evaluated by examining chain of custody paperwork and verifying analysis was performed within allowable holding times; accuracy is evaluated using the analytical results for blanks, surrogates, matrix spikes and blank spikes; precision is evaluated by comparison of results for primary and sample duplicate analyses and laboratory duplicate analyses; and completeness is evaluated by calculating the percentage of acceptable data.

The data quality review process followed the procedures specified in the *USEPA Contract Laboratory Program National Functional Guidelines for Organic Data Review (USEPA, October 1999) and Inorganic Data Review (USEPA, February 1994).*

North Creek Analytical, Inc. (NCA) of Beaverton, Oregon analyzed the sample for Semivolatile Organic Compounds by EPA SW-846 Method 8270C and Volatile Organic Compounds by EPA SW-846 Method 8260B.

All analytical data are usable as reported, with the exceptions noted in this review summary. Analytical deviations from the reference methods and the Quality Assurance Project Plan (QAPP, URSGWC, May 27, 1999) are presented below.

REPRESENTATIVENESS

Chain of Custody and Holding Times

Sample custody was maintained under the chain of custody (COC) forms. Forms were signed on release and receipt of the sample. The sample was properly preserved, except for the following (since temperatures are a function of preservation).

Sample WWS-03-01 was received at the NCA-Bothell laboratory at 6.2° C., although the sample was immediately refrigerated to the required storage temperature of 5° C. However, the sample was received less than two hours after sample collection, therefore it is unlikely that the sample temperature had time to decrease from the ambient temperature, and that there was any significant loss of target compounds at this temperature. No data were qualified based on the elevated temperature.

Extraction and analysis holding times were met for this sample.

ACCURACY

Initial and Continuing Calibration

Initial and continuing instrument calibration verification (ICV or CCV) were analyzed at the proper frequency. Prior to samples and quality control samples being analyzed, the laboratory analyzed calibration standards at the concentrations required by the method. The continuing calibration standard acceptance criteria was reported as the response factor percent difference (%D). Except where noted below, the %Ds were within the method control limits and USEPA validation criteria.

EPA SW-846 Method 8260B CCVs for iodomethane and 2-butanone exceeded the EPA control limit of 25% for this sample. Sample results for iodomethane and 2-butanone were non-detect; therefore, data were qualified as estimated "UJ".

Blanks

The laboratory analyzed one method blank with each analytical batch. Frequency requirements for method blanks were met. Target analytes in the method blanks were below method reporting limits.

Surrogate Recovery

All surrogate recoveries for both fractions were within project-specific control limits.

Blank Spike

Blank spikes (BS) were analyzed with each analytical batch, which meets the frequency requirement of five percent. All BS results were within the control limits reported by the laboratory and specified in the QAPP.

Matrix Spike/Matrix Spike Duplicate

Based on EPA Guidelines, no action is taken on MS/MSD organic data alone. The laboratory reported results for batch MS/MSD analyses. The percent recoveries for all parameters were within project-specific control limits.

SCOEPA00006569

PRECISION

Spike Duplicate

The laboratory analyzed batch matrix spike duplicates with each analytical batch for the organic fractions. All RPDs were within project-specific control limits.

Laboratory Duplicate

No laboratory duplicates were analyzed, as these are only required for inorganic parameters.

Field Duplicate

No field duplicates were collected during the sampling event.

COMPLETENESS

The laboratory submitted all required deliverables for the requested analyses. The reported analytical results meet the project completeness goal of 95 percent. For this sample, no data were judged to be invalid. No data were rejected; so completeness for this sampling event is 100 percent.

Based on the QA/QC review, some data were qualified as estimated ("UJ") due to analytical deviations with representativeness, precision, and/or accuracy. The following table summarizes the qualified results covered by this review:

METHOD	COC ID	ANALYTE	QUALIFIER	ANALYTICAL DEVIATIONS
8260B	WWS-03-01	2-Butanone, Iodomethane	UJ	Continuing Calibration

SCOEPA00006570

Detections Only
RP-03-63
Bottom of Borehole Sample
During Abandonment

Sample ID: WWS-03-01

Sample Location: RP-03-63 (abandonment)

Sample Depth: 60 - 61.5 feet bgs.

Date Sampled: 5/10/00

Constituent	Result	Reporting Limit	Units	Method
Naphthalene	2,820	100	ug/kg	8260B
Acenaphthene	3.49	0.330	mg/kg	8270C
Anthracene	0.909	0.330	mg/kg	8270C
Benzo (a) anthracene	0.922	0.330	mg/kg	8270C
Benzo (a) pyrene	0.377	0.330	mg/kg	8270C
Benzo (b) fluoranthene	0.378	0.330	mg/kg	8270C
Chrysene	0.719	0.330	mg/kg	8270C
Dibenzofuran	2.39	0.330	mg/kg	8270C
Fluoranthene	6.15	0.330	mg/kg	8270C
Fluorene	3.22	0.330	mg/kg	8270C
2-Methylnaphthalene	0.558	0.330	mg/kg	8270C
Naphthalene	0.530	0.330	mg/kg	8270C
Phenanthrene	10.5	1.65	mg/kg	8270C
Pyrene	4.21	0.330	mg/kg	8270C

NOTES:
1) Sample tested using EPA Methods 8260 and 8270

2) This sample was collected at the approximate 60-61.5 feet bgs depth interval during the abandonment of well RP-03-63. It is impossible to identify precisely the interval the material originated from or what is represented by this sample or these analytical results.

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24 May, 2000

Chris Moody
URS Greiner Woodward Clyde
111 SW Columbia, Suite 900
Portland, OR 97201

RE: RPAC

Enclosed are the results of analyses for samples received by the laboratory on 05/10/00 17:20. If you have any questions concerning this report, please feel free to contact me.

Sincerely,

Latonya K. Pelt

Latonya Pelt
Project Manager

Work Orders included in this report:
P005210

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URS Greiner Woodward Clyde	Project: RPAC	
111 SW Columbia, Suite 900	Project Number: 92C0804A/44	**Reported:**
Portland, OR 97201	Project Manager: Chris Moody	05/24/00 15:13

ANALYTICAL REPORT FOR SAMPLES

Sample ID	Laboratory ID	Matrix	Date Sampled	Date Received
WWS-03-01	P005210-01	Soil	05/10/00 15:35	05/10/00 17:20

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Latonya K. Pelt

Latonya Pelt, Project Manager

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URS Greiner Woodward Clyde	Project: RPAC	
111 SW Columbia, Suite 900	Project Number: 92C0804A/44	**Reported:**
Portland, OR 97201	Project Manager: Chris Moody	05/24/00 15:13

Volatile Organic Compounds per EPA Method 8260B

North Creek Analytical - Portland

Analyte	Result	Reporting Limit	Units	Dilution	Method	Prepared	Analyzed	Batch	Notes
WWS-03-01 (P005210-01) Soil					Sampled: 05/10/00	Received: 05/10/00			
Acetone	ND	2500	ug/kg dry	1	EPA 8260B	05/16/00	05/18/00	0050341	
Benzene	ND	100	"	"	"	"	"	"	
Bromobenzene	ND	100	"	"	"	"	"	"	
Bromochloromethane	ND	100	"	"	"	"	"	"	
Bromodichloromethane	ND	100	"	"	"	"	"	"	
Bromoform	ND	100	"	"	"	"	"	"	
Bromomethane	ND	1000	"	"	"	"	"	"	
2-Butanone	ND	2500	"	"	"	"	"	"	
n-Butylbenzene	ND	100	"	"	"	"	"	"	
sec-Butylbenzene	ND	100	"	"	"	"	"	"	
tert-Butylbenzene	ND	100	"	"	"	"	"	"	
Carbon disulfide	ND	1000	"	"	"	"	"	"	
Carbon tetrachloride	ND	100	"	"	"	"	"	"	
Chlorobenzene	ND	100	"	"	"	"	"	"	
Chloroethane	ND	500	"	"	"	"	"	"	
Chloroform	ND	100	"	"	"	"	"	"	
Chloromethane	ND	500	"	"	"	"	"	"	
2-Chlorotoluene	ND	100	"	"	"	"	"	"	
4-Chlorotoluene	ND	100	"	"	"	"	"	"	
1,2-Dibromo-3-chloropropane	ND	100	"	"	"	"	"	"	
Dibromochloromethane	ND	100	"	"	"	"	"	"	
1,2-Dibromoethane	ND	100	"	"	"	"	"	"	
Dibromomethane	ND	100	"	"	"	"	"	"	
1,2-Dichlorobenzene	ND	100	"	"	"	"	"	"	
1,3-Dichlorobenzene	ND	100	"	"	"	"	"	"	
1,4-Dichlorobenzene	ND	100	"	"	"	"	"	"	
Dichlorodifluoromethane	ND	500	"	"	"	"	"	"	
1,1-Dichloroethane	ND	100	"	"	"	"	"	"	
1,2-Dichloroethane	ND	100	"	"	"	"	"	"	
1,1-Dichloroethene	ND	100	"	"	"	"	"	"	
cis-1,2-Dichloroethene	ND	100	"	"	"	"	"	"	
trans-1,2-Dichloroethene	ND	100	"	"	"	"	"	"	
1,2-Dichloropropane	ND	100	"	"	"	"	"	"	
1,3-Dichloropropane	ND	100	"	"	"	"	"	"	
2,2-Dichloropropane	ND	100	"	"	"	"	"	"	
1,1-Dichloropropene	ND	100	"	"	"	"	"	"	
cis-1,3-Dichloropropene	ND	100	"	"	"	"	"	"	
trans-1,3-Dichloropropene	ND	100	"	"	"	"	"	"	

6/14/00

North Creek Analytical - Portland

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Latonya Pelt, Project Manager

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URS Greiner Woodward Clyde	Project: RPAC	
111 SW Columbia, Suite 900	Project Number: 92C0804A/44	**Reported:**
Portland, OR 97201	Project Manager: Chris Moody	05/24/00 15:13

Volatile Organic Compounds per EPA Method 8260B

North Creek Analytical - Portland

Analyte	Result	Reporting Limit	Units	Dilution	Method	Prepared	Analyzed	Batch	Notes
WWS-03-01 (P005210-01) Soil					Sampled: 05/10/00	Received: 05/10/00			
Ethylbenzene	ND	100	ug/kg dry	1	EPA 8260B	05/16/00	05/18/00	0050341	
Hexachlorobutadiene	ND	200	"	"	"	"	"	"	
2-Hexanone	ND	1000	"	"	"	"	"	"	
Iodomethane	ND	2000	"	"	"	"	"	"	
Isopropylbenzene	ND	100	"	"	"	"	"	"	
p-Isopropyltoluene	ND	100	"	"	"	"	"	"	
4-Methyl-2-pentanone	ND	500	"	"	"	"	"	"	
Methylene chloride	ND	500	"	"	"	"	"	"	
Naphthalene 5/14/00	**2820**	100	"	"	"	"	"	"	
n-Propylbenzene	ND	100	"	"	"	"	"	"	
Styrene	ND	100	"	"	"	"	"	"	
1,1,1,2-Tetrachloroethane	ND	100	"	"	"	"	"	"	
1,1,2,2-Tetrachloroethane	ND	100	"	"	"	"	"	"	
Tetrachloroethene	ND	100	"	"	"	"	"	"	
Toluene	ND	100	"	"	"	"	"	"	
1,2,3-Trichlorobenzene	ND	100	"	"	"	"	"	"	
1,2,4-Trichlorobenzene	ND	100	"	"	"	"	"	"	
1,1,1-Trichloroethane	ND	100	"	"	"	"	"	"	
1,1,2-Trichloroethane	ND	100	"	"	"	"	"	"	
Trichloroethene	ND	100	"	"	"	"	"	"	
Trichlorofluoromethane	ND	100	"	"	"	"	"	"	
1,2,3-Trichloropropane	ND	100	"	"	"	"	"	"	
1,2,4-Trimethylbenzene	ND	100	"	"	"	"	"	"	
1,3,5-Trimethylbenzene	ND	100	"	"	"	"	"	"	
Vinyl chloride	ND	100	"	"	"	"	"	"	
o-Xylene	ND	100	"	"	"	"	"	"	
m,p-Xylene	ND	200	"	"	"	"	"	"	
Surr: 4-BFB	*105 %*	*70-130*							
Surr: 1,2-DCA-d4	*93.5 %*	*70-130*							
Surr: Dibromofluoromethane	*90.4 %*	*70-130*							
Surr: Toluene-d8	*109 %*	*70-130*							

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URS Greiner Woodward Clyde	Project: RPAC	
111 SW Columbia, Suite 900	Project Number: 92C0804A/44	**Reported:**
Portland, OR 97201	Project Manager: Chris Moody	05/24/00 15:13

Semivolatile Organic Compounds per EPA Method 8270C

North Creek Analytical - Portland

Analyte	Result	Reporting Limit	Units	Dilution	Method	Prepared	Analyzed	Batch	Notes
WWS-03-01 (P005210-01) Soil					Sampled: 05/10/00	Received: 05/10/00			
Acenaphthene	**3.49**	0.330	mg/kg dry	1	EPA 8270C	05/16/00	05/17/00	0050449	
Acenaphthylene	ND	0.330	"	"	"	"	"	"	
Anthracene	**0.909**	0.330	"	"	"	"	"	"	
Benzo (a) anthracene	**0.922**	0.330	"	"	"	"	"	"	
Benzo (a) pyrene	**0.377**	0.330	"	"	"	"	"	"	
Benzo (b) fluoranthene	**0.378**	0.330	"	"	"	"	"	"	
Benzo (ghi) perylene	ND	0.330	"	"	"	"	"	"	
Benzo (k) fluoranthene	**0.391**	0.330	"	"	"	"	"	"	
Benzoic Acid	ND	1.00	"	"	"	"	"	"	
Benzyl alcohol	ND	0.330	"	"	"	"	"	"	
4-Bromophenyl phenyl ether	ND	0.330	"	"	"	"	"	"	
Butyl benzyl phthalate	ND	0.330	"	"	"	"	"	"	
4-Chloro-3-methylphenol	ND	0.330	"	"	"	"	"	"	
4-Chloroaniline	ND	2.00	"	"	"	"	"	"	
Bis(2-chloroethoxy)methane	ND	0.330	"	"	"	"	"	"	
Bis(2-chloroethyl)ether	ND	0.330	"	"	"	"	"	"	
Bis(2-chloroisopropyl)ether	ND	0.330	"	"	"	"	"	"	
2-Chloronaphthalene	ND	0.330	"	"	"	"	"	"	
2-Chlorophenol	ND	0.330	"	"	"	"	"	"	
4-Chlorophenyl phenyl ether	ND	0.330	"	"	"	"	"	"	
Chrysene	**0.719**	0.330	"	"	"	"	"	"	
Di-n-butyl phthalate	ND	1.00	"	"	"	"	"	"	
Di-n-octyl phthalate	ND	0.330	"	"	"	"	"	"	
Dibenzo (a,h) anthracene	ND	0.330	"	"	"	"	"	"	
Dibenzofuran	**2.39**	0.330	"	"	"	"	"	"	
1,2-Dichlorobenzene	ND	1.00	"	"	"	"	"	"	
1,3-Dichlorobenzene	ND	1.00	"	"	"	"	"	"	
1,4-Dichlorobenzene	ND	1.00	"	"	"	"	"	"	
3,3'-Dichlorobenzidine	ND	1.00	"	"	"	"	"	"	
2,4-Dichlorophenol	ND	0.330	"	"	"	"	"	"	
Diethyl phthalate	ND	0.330	"	"	"	"	"	"	
2,4-Dimethylphenol	ND	1.00	"	"	"	"	"	"	
Dimethyl phthalate	ND	0.330	"	"	"	"	"	"	
4,6-Dinitro-2-methylphenol	ND	1.00	"	"	"	"	"	"	
2,4-Dinitrophenol	ND	2.00	"	"	"	"	"	"	
2,4-Dinitrotoluene	ND	0.330	"	"	"	"	"	"	
2,6-Dinitrotoluene	ND	0.330	"	"	"	"	"	"	
Bis(2-ethylhexyl)phthalate	ND	2.00	"	"	"	"	"	"	
Fluoranthene	**6.15**	0.330	"	"	"	"	"	"	

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Latonya Pelt, Project Manager

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URS Greiner Woodward Clyde	Project: RPAC	
111 SW Columbia, Suite 900	Project Number: 92C0804A/44	**Reported:**
Portland, OR 97201	Project Manager: Chris Moody	05/24/00 15:13

Semivolatile Organic Compounds per EPA Method 8270C

North Creek Analytical - Portland

Analyte	Result	Reporting Limit	Units	Dilution	Method	Prepared	Analyzed	Batch	Notes
WWS-03-01 (P005210-01) Soil					Sampled: 05/10/00	Received: 05/10/00			
Fluorene	**3.22**	0.330	mg/kg dry	1	EPA 8270C	05/16/00	05/17/00	0050449	
Hexachlorobenzene	ND	0.330	"	"	"	"	"	"	
Hexachlorobutadiene	ND	1.00	"	"	"	"	"	"	
Hexachlorocyclopentadiene	ND	1.00	"	"	"	"	"	"	
Hexachloroethane	ND	1.00	"	"	"	"	"	"	
Indeno (1,2,3-cd) pyrene	ND	0.330	"	"	"	"	"	"	
Isophorone	ND	0.330	"	"	"	"	"	"	
2-Methylnaphthalene	**0.558**	0.330	"	"	"	"	"	"	
2-Methylphenol	ND	0.330	"	"	"	"	"	"	
3-,4-Methylphenol	ND	0.330	"	"	"	"	"	"	
Naphthalene	**0.530**	0.330	"	"	"	"	"	"	
2-Nitroaniline	ND	0.330	"	"	"	"	"	"	
3-Nitroaniline	ND	1.00	"	"	"	"	"	"	
4-Nitroaniline	ND	0.330	"	"	"	"	"	"	
Nitrobenzene	ND	0.330	"	"	"	"	"	"	
2-Nitrophenol	ND	0.330	"	"	"	"	"	"	
4-Nitrophenol	ND	1.00	"	"	"	"	"	"	
N-Nitrosodi-n-propylamine	ND	0.330	"	"	"	"	"	"	
N-Nitrosodiphenylamine	ND	0.330	"	"	"	"	"	"	
Pentachlorophenol	ND	1.00	"	"	"	"	"	"	
Phenanthrene 6/14/00	**10.5** D	1.65	"	5	"	"	05/18/00	"	
Phenol	ND	0.330	"	1	"	"	05/17/00	"	
Pyrene	**4.21**	0.330	"	"	"	"	"	"	
1,2,4-Trichlorobenzene	ND	0.330	"	"	"	"	"	"	
2,4,5-Trichlorophenol	ND	0.330	"	"	"	"	"	"	
2,4,6-Trichlorophenol	ND	0.330	"	"	"	"	"	"	
Surr: 2-Fluorobiphenyl	*98.5 %*	*44-146*							
Surr: 2-Fluorophenol	*76.7 %*	*42-126*							
Surr: Nitrobenzene-d5	*87.1 %*	*42-126*							
Surr: Phenol-d6	*79.4 %*	*42-131*							
Surr: p-Terphenyl-d14	*101 %*	*49-150*							
Surr: 2,4,6-Tribromophenol	*114 %*	*48-119*							

North Creek Analytical - Portland

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SKP

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URS Greiner Woodward Clyde	Project: RPAC	
111 SW Columbia, Suite 900	Project Number: 92C0804A/44	**Reported:**
Portland, OR 97201	Project Manager: Chris Moody	05/24/00 15:13

Solids Percent Dry Weight per Standard Methods

North Creek Analytical - Portland

Analyte	Result	Reporting Limit	Units	Dilution	Method	Prepared	Analyzed	Batch	Notes
WWS-03-01 (P005210-01) Soil					Sampled: 05/10/00	Received: 05/10/00			
% Solids	77.0		% by Weight	1	NCA SOP	05/11/00	05/12/00	0050327	

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URS Greiner Woodward Clyde	Project: RPAC	
111 SW Columbia, Suite 900	Project Number: 92C0804A/44	**Reported:**
Portland, OR 97201	Project Manager: Chris Moody	05/24/00 15:13

Volatile Organic Compounds per EPA Method 8260B - Quality Control

North Creek Analytical - Portland

Analyte	Result	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
Batch 0050341 - EPA 5035										
Blank (0050341-BLK1)				Prepared & Analyzed: 05/16/00						
Acetone	ND	2500	ug/kg wet							
Benzene	ND	100	"							
Bromobenzene	ND	100	"							
Bromochloromethane	ND	100	"							
Bromodichloromethane	ND	100	"							
Bromoform	ND	100	"							
Bromomethane	ND	1000	"							
2-Butanone	ND	2500	"							
n-Butylbenzene	ND	100	"							
sec-Butylbenzene	ND	100	"							
tert-Butylbenzene	ND	100	"							
Carbon disulfide	ND	1000	"							
Carbon tetrachloride	ND	100	"							
Chlorobenzene	ND	100	"							
Chloroethane	ND	500	"							
Chloroform	ND	100	"							
Chloromethane	ND	500	"							
2-Chlorotoluene	ND	100	"							
4-Chlorotoluene	ND	100	"							
1,2-Dibromo-3-chloropropane	ND	100	"							
Dibromochloromethane	ND	100	"							
1,2-Dibromoethane	ND	100	"							
Dibromomethane	ND	100	"							
1,2-Dichlorobenzene	ND	100	"							
1,3-Dichlorobenzene	ND	100	"							
1,4-Dichlorobenzene	ND	100	"							
Dichlorodifluoromethane	ND	500	"							
1,1-Dichloroethane	ND	100	"							
1,2-Dichloroethane	ND	100	"							
1,1-Dichloroethene	ND	100	"							
cis-1,2-Dichloroethene	ND	100	"							
trans-1,2-Dichloroethene	ND	100	"							
1,2-Dichloropropane	ND	100	"							
1,3-Dichloropropane	ND	100	"							
2,2-Dichloropropane	ND	100	"							

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URS Greiner Woodward Clyde	Project: RPAC	
111 SW Columbia, Suite 900	Project Number: 92C0804A/44	Reported:
Portland, OR 97201	Project Manager: Chris Moody	05/24/00 15:13

Volatile Organic Compounds per EPA Method 8260B - Quality Control

North Creek Analytical - Portland

Analyte	Result	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
Batch 0050341 - EPA 5035										
Blank (0050341-BLK1)				Prepared & Analyzed: 05/16/00						
1,1-Dichloropropene	ND	100	ug/kg wet							
cis-1,3-Dichloropropene	ND	100	"							
trans-1,3-Dichloropropene	ND	100	"							
Ethylbenzene	ND	100	"							
Hexachlorobutadiene	ND	200	"							
2-Hexanone	ND	1000	"							
Iodomethane	ND	2000	"							
Isopropylbenzene	ND	100	"							
p-Isopropyltoluene	ND	100	"							
4-Methyl-2-pentanone	ND	500	"							
Methylene chloride	ND	500	"							
Naphthalene	ND	100	"							
n-Propylbenzene	ND	100	"							
Styrene	ND	100	"							
1,1,1,2-Tetrachloroethane	ND	100	"							
1,1,2,2-Tetrachloroethane	ND	100	"							
Tetrachloroethene	ND	100	"							
Toluene	ND	100	"							
1,2,3-Trichlorobenzene	ND	100	"							
1,2,4-Trichlorobenzene	ND	100	"							
1,1,1-Trichloroethane	ND	100	"							
1,1,2-Trichloroethane	ND	100	"							
Trichloroethene	ND	100	"							
Trichlorofluoromethane	ND	100	"							
1,2,3-Trichloropropane	ND	100	"							
1,2,4-Trimethylbenzene	ND	100	"							
1,3,5-Trimethylbenzene	ND	100	"							
Vinyl chloride	ND	100	"							
o-Xylene	ND	100	"							
m,p-Xylene	ND	200	"							
Surr: 4-BFB	*1910*		"	*2000*		*95.5*	*70-130*			
Surr: 1,2-DCA-d4	*2130*		"	*2000*		*107*	*70-130*			
Surr: Dibromofluoromethane	*2050*		"	*2000*		*103*	*70-130*			
Surr: Toluene-d8	*2150*		"	*2000*		*108*	*70-130*			

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URS Greiner Woodward Clyde	Project: RPAC	
111 SW Columbia, Suite 900	Project Number: 92C0804A/44	**Reported:**
Portland, OR 97201	Project Manager: Chris Moody	05/24/00 15:13

Volatile Organic Compounds per EPA Method 8260B - Quality Control

North Creek Analytical - Portland

Analyte	Result	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
Batch 0050341 - EPA 5035										
LCS (0050341-BS1)				Prepared & Analyzed: 05/16/00						
Benzene	2910	100	ug/kg wet	2500		116	80-135			
Chlorobenzene	2610	100	"	2500		104	80-135			
1,1-Dichloroethene	3260	100	"	2500		130	60-150			
Toluene	3110	100	"	2500		124	80-130			
Trichloroethene	2630	100	"	2500		105	70-135			
Surr: 4-BFB	*1670*		"	*2000*		*83.5*	*70-130*			
Surr: 1,2-DCA-d4	*1970*		"	*2000*		*98.5*	*70-130*			
Surr: Dibromofluoromethane	*1850*		"	*2000*		*92.5*	*70-130*			
Surr: Toluene-d8	*2210*		"	*2000*		*111*	*70-130*			
Matrix Spike (0050341-MS1)		**Source: P005210-01**		Prepared: 05/16/00	Analyzed: 05/19/00					
Benzene	2760	100	ug/kg dry	3250	ND	84.5	60-135			
Chlorobenzene	2810	100	"	3250	ND	86.5	65-125			
1,1-Dichloroethene	2780	100	"	3250	ND	85.5	60-135			
Toluene	2670	100	"	3250	ND	81.8	60-125			
Trichloroethene	2760	100	"	3250	ND	84.9	60-125			
Surr: 4-BFB	*2230*		"	*2600*		*85.8*	*70-130*			
Surr: 1,2-DCA-d4	*2660*		"	*2600*		*102*	*70-130*			
Surr: Dibromofluoromethane	*2380*		"	*2600*		*91.5*	*70-130*			
Surr: Toluene-d8	*2360*		"	*2600*		*90.8*	*70-130*			
Matrix Spike Dup (0050341-MSD1)		**Source: P005210-01**		Prepared: 05/16/00	Analyzed: 05/19/00					
Benzene	2880	100	ug/kg dry	3250	ND	88.2	60-135	4.26	25	
Chlorobenzene	2900	100	"	3250	ND	89.2	65-125	3.15	25	
1,1-Dichloroethene	2590	100	"	3250	ND	79.7	60-135	7.08	25	
Toluene	2800	100	"	3250	ND	85.8	60-125	4.75	25	
Trichloroethene	2620	100	"	3250	ND	80.6	60-125	5.20	25	
Surr: 4-BFB	*2340*		"	*2600*		*90.0*	*70-130*			
Surr: 1,2-DCA-d4	*2660*		"	*2600*		*102*	*70-130*			
Surr: Dibromofluoromethane	*2460*		"	*2600*		*94.6*	*70-130*			
Surr: Toluene-d8	*2340*		"	*2600*		*90.0*	*70-130*			

North Creek Analytical - Portland

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URS Greiner Woodward Clyde	Project: RPAC	
111 SW Columbia, Suite 900	Project Number: 92C0804A/44	**Reported:**
Portland, OR 97201	Project Manager: Chris Moody	05/24/00 15:13

Semivolatile Organic Compounds per EPA Method 8270C - Quality Control

North Creek Analytical - Portland

Analyte	Result	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
Batch 0050449 - EPA 3550										
Blank (0050449-BLK1)				Prepared: 05/16/00 Analyzed: 05/17/00						
Acenaphthene	ND	0.330	mg/kg wet							
Acenaphthylene	ND	0.330	"							
Anthracene	ND	0.330	"							
Benzo (a) anthracene	ND	0.330	"							
Benzo (a) pyrene	ND	0.330	"							
Benzo (b) fluoranthene	ND	0.330	"							
Benzo (ghi) perylene	ND	0.330	"							
Benzo (k) fluoranthene	ND	0.330	"							
Benzoic Acid	ND	1.00	"							
Benzyl alcohol	ND	0.330	"							
4-Bromophenyl phenyl ether	ND	0.330	"							
Butyl benzyl phthalate	ND	0.330	"							
4-Chloro-3-methylphenol	ND	0.330	"							
4-Chloroaniline	ND	2.00	"							
Bis(2-chloroethoxy)methane	ND	0.330	"							
Bis(2-chloroethyl)ether	ND	0.330	"							
Bis(2-chloroisopropyl)ether	ND	0.330	"							
2-Chloronaphthalene	ND	0.330	"							
2-Chlorophenol	ND	0.330	"							
4-Chlorophenyl phenyl ether	ND	0.330	"							
Chrysene	ND	0.330	"							
Di-n-butyl phthalate	ND	1.00	"							
Di-n-octyl phthalate	ND	0.330	"							
Dibenzo (a,h) anthracene	ND	0.330	"							
Dibenzofuran	ND	0.330	"							
1,2-Dichlorobenzene	ND	1.00	"							
1,3-Dichlorobenzene	ND	1.00	"							
1,4-Dichlorobenzene	ND	1.00	"							
3,3'-Dichlorobenzidine	ND	1.00	"							
2,4-Dichlorophenol	ND	0.330	"							
Diethyl phthalate	ND	0.330	"							
2,4-Dimethylphenol	ND	1.00	"							
Dimethyl phthalate	ND	0.330	"							
4,6-Dinitro-2-methylphenol	ND	1.00	"							
2,4-Dinitrophenol	ND	2.00	"							
2,4-Dinitrotoluene	ND	0.330	"							

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URS Greiner Woodward Clyde	Project: RPAC	
111 SW Columbia, Suite 900	Project Number: 92C0804A/44	**Reported:**
Portland, OR 97201	Project Manager: Chris Moody	05/24/00 15:13

Semivolatile Organic Compounds per EPA Method 8270C - Quality Control

North Creek Analytical - Portland

Analyte	Result	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
Batch 0050449 - EPA 3550										
Blank (0050449-BLK1)				Prepared: 05/16/00 Analyzed: 05/17/00						
2,6-Dinitrotoluene	ND	0.330	mg/kg wet							
Bis(2-ethylhexyl)phthalate	ND	2.00	"							
Fluoranthene	ND	0.330	"							
Fluorene	ND	0.330	"							
Hexachlorobenzene	ND	0.330	"							
Hexachlorobutadiene	ND	1.00	"							
Hexachlorocyclopentadiene	ND	1.00	"							
Hexachloroethane	ND	1.00	"							
Indeno (1,2,3-cd) pyrene	ND	0.330	"							
Isophorone	ND	0.330	"							
2-Methylnaphthalene	ND	0.330	"							
2-Methylphenol	ND	0.330	"							
3-,4-Methylphenol	ND	0.330	"							
Naphthalene	ND	0.330	"							
2-Nitroaniline	ND	0.330	"							
3-Nitroaniline	ND	1.00	"							
4-Nitroaniline	ND	0.330	"							
Nitrobenzene	ND	0.330	"							
2-Nitrophenol	ND	0.330	"							
4-Nitrophenol	ND	1.00	"							
N-Nitrosodi-n-propylamine	ND	0.330	"							
N-Nitrosodiphenylamine	ND	0.330	"							
Pentachlorophenol	ND	1.00	"							
Phenanthrene	ND	0.330	"							
Phenol	ND	0.330	"							
Pyrene	ND	0.330	"							
1,2,4-Trichlorobenzene	ND	0.330	"							
2,4,5-Trichlorophenol	ND	0.330	"							
2,4,6-Trichlorophenol	ND	0.330	"							
Surr: 2-Fluorobiphenyl	*2.81*		"	*2.50*		*112*	*44-146*			
Surr: 2-Fluorophenol	*4.63*		"	*5.00*		*92.6*	*42-126*			
Surr: Nitrobenzene-d5	*2.55*		"	*2.50*		*102*	*42-126*			
Surr: Phenol-d6	*4.73*		"	*5.00*		*94.6*	*42-131*			
Surr: p-Terphenyl-d14	*2.94*		"	*2.50*		*118*	*49-150*			
Surr: 2,4,6-Tribromophenol	*4.71*		"	*5.00*		*94.2*	*48-119*			

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URS Greiner Woodward Clyde	Project: RPAC	
111 SW Columbia, Suite 900	Project Number: 92C0804A/44	**Reported:**
Portland, OR 97201	Project Manager: Chris Moody	05/24/00 15:13

Semivolatile Organic Compounds per EPA Method 8270C - Quality Control

North Creek Analytical - Portland

Analyte	Result	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
Batch 0050449 - EPA 3550										
LCS (0050449-BS1)				Prepared: 05/16/00		Analyzed: 05/18/00				
Acenaphthene	1.68	0.330	mg/kg wet	2.50		67.2	47-145			
4-Chloro-3-methylphenol	3.35	0.330	"	5.00		67.0	22-147			
2-Chlorophenol	2.86	0.330	"	5.00		57.2	23-134			
1,4-Dichlorobenzene	1.41	1.00	"	2.50		56.4	20-124			
2,4-Dinitrotoluene	1.95	0.330	"	2.50		78.0	39-139			
4-Nitrophenol	3.77	1.00	"	5.00		75.4	0-132			
N-Nitrosodi-n-propylamine	1.61	0.330	"	2.50		64.4	0-230			
Pentachlorophenol	3.02	1.00	"	5.00		60.4	14-176			
Phenol	2.55	0.330	"	5.00		51.0	5-112			
Pyrene	2.06	0.330	"	2.50		82.4	52-130			
1,2,4-Trichlorobenzene	1.84	0.330	"	2.50		73.6	44-142			
Surr: 2-Fluorobiphenyl	*2.08*		"	*2.50*		*83.2*	*44-146*			
Surr: 2-Fluorophenol	*3.54*		"	*5.00*		*70.8*	*42-126*			
Surr: Nitrobenzene-d5	*1.89*		"	*2.50*		*75.6*	*42-126*			
Surr: Phenol-d6	*3.59*		"	*5.00*		*71.8*	*42-131*			
Surr: p-Terphenyl-d14	*2.29*		"	*2.50*		*91.6*	*49-150*			
Surr: 2,4,6-Tribromophenol	*5.26*		"	*5.00*		*105*	*48-119*			
Matrix Spike (0050449-MS1)		**Source: P005189-01**		Prepared: 05/16/00		Analyzed: 05/17/00				
Acenaphthene	2.40	0.330	mg/kg dry	3.05	ND	78.7	47-145			
4-Chloro-3-methylphenol	4.52	0.330	"	6.11	ND	74.0	22-147			
2-Chlorophenol	4.06	0.330	"	6.11	ND	66.4	23-134			
1,4-Dichlorobenzene	1.84	1.00	"	3.05	ND	60.3	20-124			
2,4-Dinitrotoluene	2.67	0.330	"	3.05	ND	87.5	39-139			
4-Nitrophenol	4.97	1.00	"	6.11	ND	81.3	0-132			
N-Nitrosodi-n-propylamine	2.30	0.330	"	3.05	ND	75.4	0-230			
Pentachlorophenol	4.68	1.00	"	6.11	ND	76.6	14-176			
Phenol	3.67	0.330	"	6.11	ND	60.1	5-112			
Pyrene	2.55	0.330	"	3.05	ND	83.6	52-130			
1,2,4-Trichlorobenzene	2.24	0.330	"	3.05	ND	73.4	44-142			
Surr: 2-Fluorobiphenyl	*3.13*		"	*3.05*		*103*	*44-146*			
Surr: 2-Fluorophenol	*5.25*		"	*6.11*		*85.9*	*42-126*			
Surr: Nitrobenzene-d5	*2.79*		"	*3.05*		*91.5*	*42-126*			
Surr: Phenol-d6	*5.29*		"	*6.11*		*86.6*	*42-131*			
Surr: p-Terphenyl-d14	*3.44*		"	*3.05*		*113*	*49-150*			
Surr: 2,4,6-Tribromophenol	*7.09*		"	*6.11*		*116*	*48-119*			

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URS Greiner Woodward Clyde	Project: RPAC	
111 SW Columbia, Suite 900	Project Number: 92C0804A/44	**Reported:**
Portland, OR 97201	Project Manager: Chris Moody	05/24/00 15:13

Semivolatile Organic Compounds per EPA Method 8270C - Quality Control

North Creek Analytical - Portland

Analyte	Result	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
Batch 0050449 - EPA 3550										
Matrix Spike Dup (0050449-MSD1)		**Source: P005189-01**		Prepared: 05/16/00		Analyzed: 05/17/00				
Acenaphthene	2.25	0.330	mg/kg dry	3.05	ND	73.8	47-145	6.45	60	
4-Chloro-3-methylphenol	4.28	0.330	"	6.11	ND	70.0	22-147	5.45	60	
2-Chlorophenol	3.88	0.330	"	6.11	ND	63.5	23-134	4.53	60	
1,4-Dichlorobenzene	1.73	1.00	"	3.05	ND	56.7	20-124	6.16	60	
2,4-Dinitrotoluene	2.34	0.330	"	3.05	ND	76.7	39-139	13.2	60	
4-Nitrophenol	4.44	1.00	"	6.11	ND	72.7	0-132	11.3	60	
N-Nitrosodi-n-propylamine	2.11	0.330	"	3.05	ND	69.2	0-230	8.62	60	
Pentachlorophenol	4.40	1.00	"	6.11	ND	72.0	14-176	6.17	60	
Phenol	3.51	0.330	"	6.11	ND	57.4	5-112	4.46	60	
Pyrene	2.31	0.330	"	3.05	ND	75.7	52-130	9.88	60	
1,2,4-Trichlorobenzene	2.18	0.330	"	3.05	ND	71.5	44-142	2.71	60	
Surr: 2-Fluorobiphenyl	*3.00*		"	*3.05*		*98.4*	*44-146*			
Surr: 2-Fluorophenol	*4.68*		"	*6.11*		*76.6*	*42-126*			
Surr: Nitrobenzene-d5	*2.59*		"	*3.05*		*84.9*	*42-126*			
Surr: Phenol-d6	*4.89*		"	*6.11*		*80.0*	*42-131*			
Surr: p-Terphenyl-d14	*3.08*		"	*3.05*		*101*	*49-150*			
Surr: 2,4,6-Tribromophenol	*7.13*		"	*6.11*		*117*	*48-119*			

www.ncalabs.com

Seattle 18939 120th Avenue NE, Suite 101, Bothell, WA 98011-9508
425.420.9200 fax 425.420.9210
Spokane East 11115 Montgomery, Suite B, Spokane, WA 99206-4776
509.924.9200 fax 509.924.9290
Portland 9405 SW Nimbus Avenue, Beaverton, OR 97008-7132
503.906.9200 fax 503.906.9210
Bend 20332 Empire Avenue, Suite F-1, Bend, OR 97701-5711
541.383.9310 fax 541.382.7588

URS Greiner Woodward Clyde	Project: RPAC	
111 SW Columbia, Suite 900	Project Number: 92C0804A/44	**Reported:**
Portland, OR 97201	Project Manager: Chris Moody	05/24/00 15:13

Notes and Definitions

DET	Analyte DETECTED
ND	Analyte NOT DETECTED at or above the reporting limit
NR	Not Reported
dry	Sample results reported on a dry weight basis
wet	Sample results reported on a wet weight basis
RPD	Relative Percent Difference

URS Corporation

TRANSMITTAL

To: Cathryn Young

Company: Wacker Siltronic Corp.

Address: P.O. Box 83180
Portland, OR 97283

Project No. 52-92C0804A.00
Task No. 00015

We are sending you:

Attached via: U.S. Post Office

Under separate cover via:

Number	Item
1	Copy of the Quarterly Progress Report for RI/FS, RPAC – Portland Site, Second Quarter 2000, April 1, 2000 – June 30, 2000

Transmittal is as noted below:

- [ ] For approval
- [x] For your use
- [ ] As requested
- [ ] For review & comment
- [ ] Approved as submitted
- [ ] Approved as noted
- [ ] Returned for corrections
- [ ] Other
- [ ] Resubmit ___ copies for approval
- [ ] Submit ___ copies for distribution
- [ ] Return ___ corrected prints

Remarks:

From: L. Hamilton for Roger Gresh

Date: 7-7-00

QUARTERLY PROGRESS REPORT FOR RI/FS RPAC – Portland Site

THIRD QUARTER 2000
JULY 1, 2000 – SEPTEMBER 30, 2000

October 10, 2000

Submitted to:
Oregon Department of Environmental Quality
Northwest Region
2020 S.W. 4th Avenue, Suite 400
Portland, Oregon 97201

Prepared for:
Rhone-Poulenc AG Company
1600 Perimeter Park, Suite 400
Morrisville, North Carolina 27560

Prepared by:
URS
111 S.W. Columbia, Suite 900
Portland, Oregon 97201
(503) 222-7200
92C0804A/15

URS
111 SW Columbia, Suite 900
Portland, Oregon 97201-5814
Phone: 503-222-7200 Fax: 503-222-4292

TRANSMITTAL

To: Cathryn Young

Company: Wacker Siltronic Corp.

Address: P.O. Box 83180
Portland, OR 97283

Project No. 52-92C0804A.00
Task No. 00015

We are sending you: **Attached via:** U.S. Postal Service

Under separate cover via:

Number	Item
1	Quarterly Progress Report for RI/FS, RPAC – Portland Site, Third Quarter 2000, July 1, 2000-September 30,2000

Transmittal is as noted below:

[ ] For approval	[ ] Approved as submitted	[ ] Resubmit ___ copies for approval
[ ] For your use	[ ] Approved as noted	[ ] Submit ___ copies for distribution
[X] As requested	[ ] Returned for corrections	[ ] Return ___ corrected prints
[ ] For review & comment	[ ] Other	

Remarks:

From: Chris Moody **Date:** 10/11/00

URS

October 10, 2000
92C0804A/15

Eric Blischke
Environment Policy Analyst
Department of Environmental Quality
Northwest Region
2020 SW 4th Avenue, Suite 400
Portland, Oregon 97201-4987

Subject: Quarterly Progress Report for RI/FS
RPAC, Portland Site
Third Quarter, 2000

Dear Eric:

On behalf of Rhône-Poulenc AG Company (RPAC), URS Corporation (URS) is submitting three bound copies, and one unbound copy of the enclosed Third Quarter, 2000- Progress Report. One of the bound copies will be sent directly to Mavis Kent of DEQ, per DEQ's request.

This quarterly progress report is being submitted by RPAC in accordance with the July 8, 1999 Consent Order.

If you have any questions, please call (503) 222-7200.

Sincerely,
URS CORPORATION

Ted Wall, P.E.
Project Manager

Chris Moody, G.I.T
Project Geologist

Enclosures: Third Quarter 2000 – Progress Report for RI/FS, RPAC – Portland Site, October 10, 2000

cc: R. Ferguson, RPAC
J. Benedict, CHBH&L
R.Gresh, AMEC
M. Kent, DEQ – NW Region
D. Blount, CLB&W
K. McCaw, ESCO Corp.
E. McDaniel, SMR&H
B. Sheppard, BNSF
C. Young, Wacker Siltronic Corporation
L. Patterson, Elf Atochem North America, Inc.
A. Pardini, Schnitzer Investment Corp.
J. Baird, Air Liquide America Corp.
M. Fjordbeck, Metro

URS Corporation
111 SW Columbia, Suite 900
Portland, OR 97201-5814
Tel: 503.222.7200
Fax: 503.222.4292

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QUARTERLY PROGRESS REPORT FOR RI/FS RPAC – Portland Site

THIRD QUARTER 2000
JULY 1, 2000 – SEPTEMBER 30, 2000

October 10, 2000

Submitted to:
Oregon Department of Environmental Quality
Northwest Region
2020 S.W. 4th Avenue, Suite 400
Portland, Oregon 97201

Prepared for:
Rhone-Poulenc AG Company
1600 Perimeter Park, Suite 400
Morrisville, North Carolina 27560

Prepared by:
URS
111 S.W. Columbia, Suite 900
Portland, Oregon 97201
(503) 222-7200
92C0804A/15

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Appendix A Boring Logs
Appendix B Monitoring Well Completion Diagram

On behalf of Rhône-Poulenc AG Company (RPAC), URS Corporation (URS) has prepared this Quarterly Progress Report for Remedial Investigation/Feasibility Study (RI/FS) activities associated with RPAC's Portland facility. This report covers activities conducted during the third calendar quarter of year 2000 (July 1, 2000 through September 30, 2000).

The submittal of quarterly progress reports is specified under the Consent Order (No. WMCSR-NWR-99-07) executed between RPAC and the Oregon Department of Environmental Quality (DEQ) on July 8, 1999.

2.1 MONITORING WELL REPAIR AND ABONDONMENT ACTIVITIES

Monitoring well abandonment and repairs were completed between August 17, 2000 and September 12, 2000 in compliance with Oregon Water Resources Department (WRD) regulations. Geotech Exploration, Inc of Tualatin, Oregon and Anderson Environmental Contracting of Longview, Washington were contracted to complete monitoring well abandonment and repair activities. A total of 15 monitoring wells, 4 extraction wells, 6 piezometers and 5 lysimeters were abandoned in accordance with Oregon Administrative Rules (OAR) 690-240-0135. The 4 extraction wells were abandoned under variances from WRD. Repair of 16 wells identified by WRD as requiring upgrades has also been completed. Table 2-1 summarizes the repair and abandonment activities completed.

2.1.1 Investigative-Derived Waste

Water

Approximately 18 gallons of water were generated during monitoring well abandonment activities. Sources included groundwater removed during the abandonment and decontamination water. All water was transferred to the groundwater treatment facility on the day of generation.

Soil

During the abandonment activities, 41 drums of soil cuttings were generated. Soil cuttings were containerized in DOT approved 55-gallon steel drums and transported to the RPAC warehouse for storage and characterization pending off-site disposal. All drums were labeled on the side and lid according to requirements outlined in the FSP.

2.2 GEOPROBE SOIL PROFILING ACTIVITIES

Geoprobe soil profiling (GP0906-01) was conducted on September 6, 2000 on BNSF property. The location of the geoprobe is indicated in Figure 2-1. No soil samples were collected for laboratory analysis during the drilling activities. The boring log is included in Appendix A.

2.3 MONITORING WELL INSTALLATION ACTIVITES

Two monitoring wells, RP-03-30R and RP-03-52R were installed on September 12 and 13, 2000 on BNSF property. URS contracted Cascade Drilling Inc. (Cascade) of Portland, Oregon to provide all drilling and well development services. The work was conducted pursuant to the

TABLE 2-1
Monitoring Well Repair/Abandonment Summary (2 pages)
RPAC, Portland Site

Well ID	Well Diameter in inches	Well Depth in Feet bgs	WRD Concern # [1]	Corrective Action
PP8	2	26	1	Added Protective Bollards
Unknown - 5	2	8	2	Abandoned
BTB-4B-55	1	55	3	Added Protective Bollards
BTB-4B-25	1	25	4	Added Protective Bollards
BTB-4B-84	1	84	5	Added Protective Bollards
P-104	2	20.4	6	Abandoned
P11	2	20	7	Added Protective Bollards, Repaired Protective Casing
P10	2	23.11	8	Added Protective Bollards, Repaired Protective Casing
P9	2	19.2	9	Abandoned
Unknown - 1[2]	18	16	10	Abandoned
RPW-05	4	30	11	Added Protective Bollards
MW-7-55.7	2	55.7	12	Added Protective Bollards, Repaired Protective Casing
P7	2	21.89	13	Added Protective Bollards, Repaired Protective Casing
P103	2	29	14	Abandoned
MW-04 Cluster	2	Various	15	Added Protective Bollards
Unknown - 2[2]	18	16	16	Abandoned
RPW-04	4	40	17	Abandoned
P8	2	19.5	18	Abandoned
T-16	1	24	19	Abandoned
MW-03 cluster	2	Various	20	Added Protective Bollards
P3	2	20	21	Abandoned
P1	2	21.5	22	Abandoned
PP3	2	25	23	Abandoned
RPW-03	4	54.5	24	Repaired casing
P2	2	19	25	Abandoned
Unknown - 3[2]	18	14	26	Abandoned
RPW-02	4	38	27	Repaired casing
PZP series (6 locations)	1	60.5	28	Abandoned
MW-08 cluster	6	Various	29	Added Protective Bollards
Unknown - 4[2]	18	14.5	30	Abandoned
P6B	2	23.5	31	Abandoned
MW-01 cluster	2	Various	32	Added Protective Bollards
P5	2	22.91	33	
T1 cluster	2	Various	34	Added Protective Bollards
P6	2	30	35	Abandoned
RPW-01	4	50	36	Abandoned
W6 cluster	2 to 4	Various	37	Added Protective Bollards, Repaired Protective Casing

SCOEPA00006597

TABLE 2-1
Monitoring Well Repair/Abandonment Summary (2 pages)
RPAC, Portland Site

Well ID	Well Diameter in inches	Well Depth in Feet bgs	WRD Concern # [1]	Corrective Action
Lysimeters			*	
L-01	NA	10	Not Addressed by WRD	Abandoned
L-02	NA	8	Not Addressed by WRD	Abandoned
L-04	NA	12	Not Addressed by WRD	Abandoned
L-05	NA	14	Not Addressed by WRD	Abandoned
L-09	NA	6	Not Addressed by WRD	Abandoned

[1] WRD Concerns are outlined in a letter from Kris Byrd to URS dated May 5, 2000.
[2] Well abandoned per WRD variance
* = Not included in May 5, 2000 letter from WRD.
Well was abandoned

SCOEPA00006598

Early RI Activities-CPT, Geoprobe and Well Installation Field Sampling Plan (Final), RPAC Portland Site, URS Greiner Woodward Clyde, July 7, 1999 (FSP II). The locations and completion details for the replacement wells were approved by DEQ in a June, 21, 2000 letter to RPAC. As detailed in the FSP and the letter, both wells were completed above ground per Oregon Department of Water Resources requirements. Table 2-2 summarizes the relevant data for both monitoring wells. New well locations are identified in Figure 2-1.

TABLE 2-2
Completion Details – RP-03 Replacement Wells
RPAC, Portland Site

Well I.D.	Date Installed	Location	Screen Interval in feet bgs	Total Depth in feet bgs	Well Type
RP-03-52R	9/13/00	BNSF Property	46 - 51	52.5	Deep Alluvium
RP-03-30R	9/13/00	BNSF Property	22.4-28	30	Shallow Alluvium

The wells were installed using air rotary drilling techniques. No soil samples were collected for laboratory analysis during the drilling activities. The boring logs and monitoring well construction diagrams for the well installation activities are included in Appendix A and B, respectively.

2.3.1 Investigative-Derived Waste

Water

Approximately 100 gallons of water were generated during well installation activities. Sources included groundwater removed during drilling and decontamination water. All water was transported to the RPAC site for disposal to the groundwater treatment facility on the day of generation.

Soil

During well installation activities approximately eight drums of soil cuttings were generated. Soil cuttings were containerized in DOT approved 55-gallon steel drums and transported to the RPAC warehouse for storage and characterization before disposal off-site. All drums were labeled on the side and lid according to requirements outlined in the FSP.

2.4 MONITORING WELL DEVELOPMENT

Cascade personnel developed the replacement RP-03 wells on September 14, 2000. URS personnel observed the development activities. Water quality measurements were unable to be

SCOEPA00006599

recorded during the development activities, due to the failure of the water quality meter. Therefore water clarity and volume were recorded in the field notebook during development. Both wells were purged until silt was no longer visually present in the groundwater. A total of fifty gallons were removed from RP-03-52R, and a total of thirty gallons were removed from RP-03-30R. These purge amounts are similar to the amounts removed for the previous wells in this location.

The groundwater removed during the development activities was transported to the RPAC site for disposal to the groundwater treatment facility on the day of generation.

2.5 SOURCE AREA SCOPING DOCUMENT

The Source Area Investigation Scoping Document was submitted to DEQ on September 15, 2000, and approved by DEQ on September 22, 2000. This document describes the approach to source area soil sampling, and proposes specific soil sampling activities for the first stage of sampling.

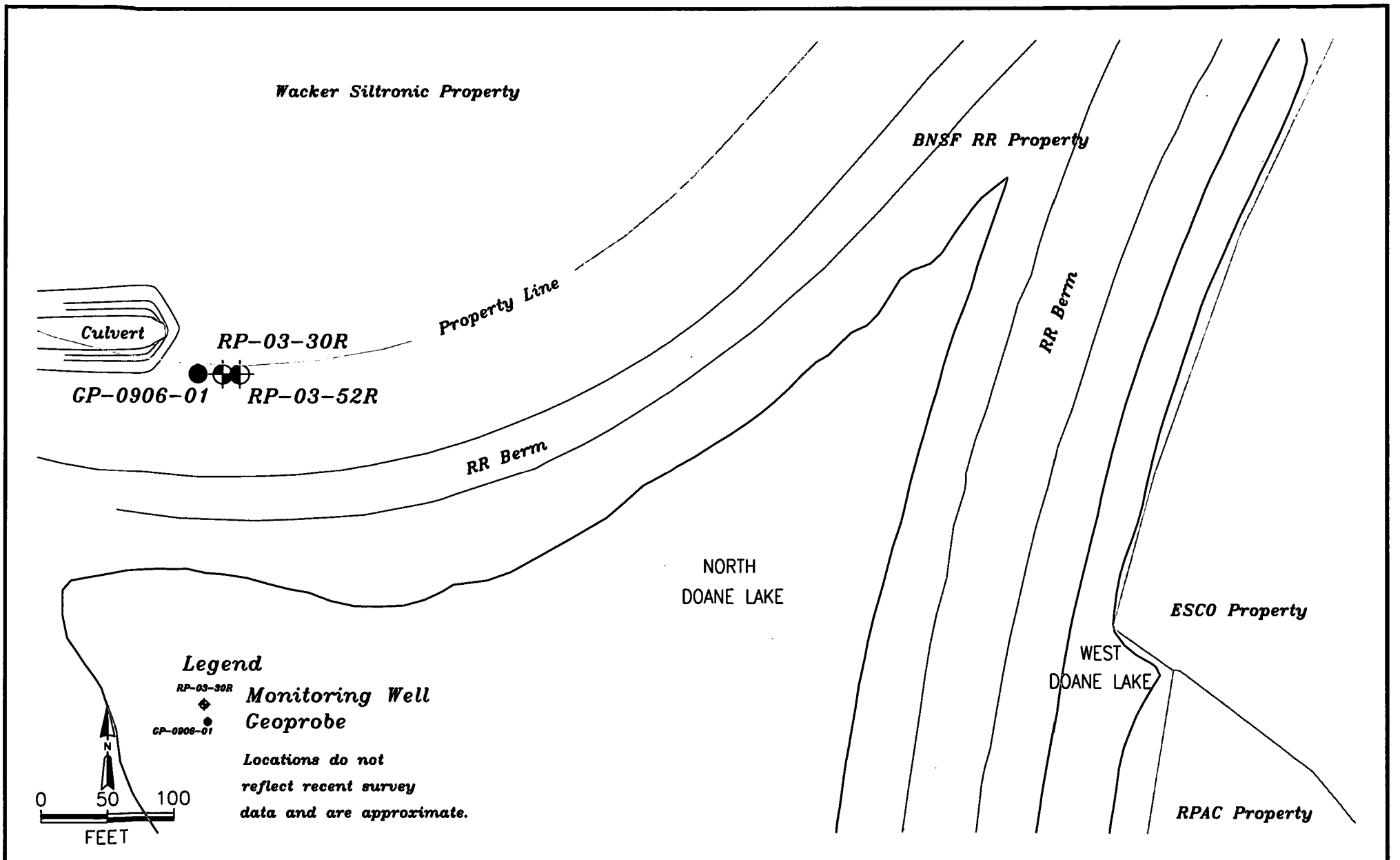
2.6 SPRING 2000 GROUNDWATER MONITORING REPORT

The Spring 2000 Groundwater Monitoring Report was submitted to DEQ on August 18, 2000. This document conveys the results of the following activities conducted during March and April of 2000:

- Tidal Influence Evaluation – March 14-20, 2000
- Water Level Monitoring – March 15-16, 2000
- Groundwater Sampling – March 21 – April 19, 2000

2.7 GROUNDWATER SAMPLING ACTIVITIES

The Fall 2000 comprehensive groundwater sampling round began on September 19, 2000. Groundwater samples will be collected from a total of 104 monitoring wells. Sampling will be conducted in compliance with the DEQ approved FSP, Early RI Activities-Comprehensive Groundwater Sampling Field Sampling Plan (Final), RPAC Portland Site, URS Greiner Woodward Clyde, October 1, 1999.



URS	TITLE: Geoprobe and New Well Locations BNSF Property Portland, OR	DWN: jgdp CHKD: cm DATE: 10/09/00	DES.: APPD: REV.: 1	PROJECT NO.: 5292C0804A FIGURE NO.: 2-1

SCOEPA00006601

No significant problems were encountered during this current reporting period.

SCOEPA00006602

4.1 BORING LOGS/MONITORING WELL COMPLETION DIAGRAMS

The boring logs generated during this reporting period are included in Appendix A. Monitoring well completion diagrams are included in Appendix B.

The activities planned for the next quarterly reporting period include the following:

- Completion of the Fall 2000 comprehensive groundwater sampling event.
- Surveying of the two RP-03 replacement wells.
- Completion of the draft Project Management Plan.
- Completion of the Stage 1 source area investigation soil sampling activities.

SCOEPA00006604

LOG OF BORING NO. GP0906-01

PROJECT: **RPAC RI/FS**
PROJECT NO: **52-92C0804A**
PROJECT LOCATION: **Portland, Oregon**
CLIENT NAME: **Rhone-Poulenc**
DATE STARTED: **September 6, 2000**
DATE COMPLETED: **September 6, 2000**
DRILLING CONTRACTOR: **Cascade**
DRILLER: **Bill, George**
DRILLING METHOD: **Direct Push**
SAMPLING METHOD: **2"-Diameter OD Macro-Core, 4' Long**

WATER LEVEL: ▼ **24.00 ft**

TOTAL DEPTH : **51.00 ft**
WEATHER: **Clear**
FIELD ENGINEER: **Don Coberly**
CHECKED BY: **Chris Moody**

SAMPLE TYPE KEY:
- Relatively undisturbed sample
- Disturbed sample
- Sample attempt with no recovery
- SPT split spoon sample
- Bag Sample

SAMPLER DRIVEN (in)	FINES CONTENT (%)	DRY DENSITY (pcf)	MOISTURE CONTENT (%)	BLOWS PER FOOT	SAMPLE TYPE	ELEVATION (ft.)	DEPTH (ft.)	USCS	DESCRIPTION	REMARKS
									CLEARED BRUSH ON SILTY GRAVEL FILL.	
							0		**BLACK SILTY GRAVEL**, frags to 1 inch, [dry].	S-1
48								SM/ SP	**BROWN ORGANIC SILTY SAND**, with some granules to 1/2" and roots, no stain/odor, predominantly fine-grained, loose, [dry].	
48							5		*Grades to slightly damp.*	S-2
48									*Grades to less silty, some clay stringers.*	S-3
									Grades to more clay.	
							10	ML/ CL	**DARK BROWN SILTY CLAY**, scattered gravel, no stain/odor, firm, [damp].	
								SP	**DARK BROWN TO BLACK SAND**, medium grained with trace fines, well-sorted, loose, [damp].	
48								SM	**BROWN-DARK BROWN SILTY SAND**, with granules to 1/2", loose, [damp].	S-4
							15	SP CL	**BROWN ORGANIC SAND**, medium grained, well-sorted, oxidized rust color at 14.5'.	
48									**DARK GREY-GREY CLAY**, some silt with scattered wood frags, low toughness, medium plasticity, [damp].	S-5
									Organic-chemical odor at 16', varigated stain.	
									Grades to mottled brown-grey,	
									Creosote odor at about 19', variegated stain.	
48							20	ML/ CL	**GREY TO GREY-BROWN CLAYEY SILT**, some very fine-grained sand and wood frags, low toughness, medium plasticity, creosite odor, sheen when wet, [damp].	S-6
									Grades to mottled.	
							▼		*Grades to more brown-colored.*	
							25	SM	**GREY TO BROWN SILTY SAND**, very fine grained, creosite	S-7

NOTES:

URS

LOG OF BORING GP0906-01

LOB3 G:\163\GINTPR-11062000\RHONEP.GPJ URSPDX1.GDT 10/10/00 port

PROJECT: **RPAC RI/FS**
PROJECT NO: **52-92C0804A**
PROJECT LOCATION: **Portland, Oregon**

FIELD ENGINEER: **Don Coberly**
CHECKED BY: **Chris Moody**

SAMPLE TYPE KEY:
- Relatively undisturbed sample
- Disturbed sample
- Sample attempt with no recovery
- SPT split spoon sample
- B Bag sample

SAMPLER DRIVEN (in)	FINES CONTENT (%)	DRY DENSITY (pcf)	MOISTURE CONTENT (%)	BLOWS PER FOOT	SAMPLE TYPE	ELEVATION(ft.)	DEPTH (ft.)	USCS	GRAPHIC SYMBOL	DESCRIPTION	REMARKS
48							25			odor, loose, [saturated].	
								CL		*Fines begin to increase at about 26', with slight trace of NAPL-brown.*	
48							30			**BROWN CLAY**, trace silt, low toughness, low plasticity, [damp]. *Grades to slightly less damp, moderate toughness, moderate plasticity.* *Grades to more silt at 29.5'.* *Softer stringer with very fine sand to about 30.5', slightly grey, slight creosote odor.*	S-8
48							35	SP/ SM		**GREY TO BROWN SAND**, very fine grained with some silt, well-sorted, soft, [saturated]. *Grades to firmer with some clay at 33' to 33.5'.* *Grades to coarser sand, F-M grained, [saturated].*	S-9
48										*Grades to brown, no stain or sheen, retains slight creosote odor.* *Grades to finer grained.*	S-10
48							40	SP		**BROWN SAND**,well sorted, no stain or sheen, creosote odor, loose to firm, [saturated].	S-11
48							45			*Grades to more compact.*	S-12
36							50			*Grades to brown to black and brown.*	S-13
								ML/ CL		**BROWN SILTY CLAY**, very stiff to stiff, [damp]. Driller hits black basalt (very hard) at 51', suspends drilling. Borehole terminated at 51'. Note: Pumped 36.7 lbs grout and 20 gals. water, 1 bag holeplug at surface.	

NOTES:

LOG OF BORING GP0906-01

URS

LOB3 G:\163\GINTPR-1\062000\RHONEP.GPJ URSPDX1.GDT 10/10/00 port

LOG OF BORING NO. RP-03-30R

PROJECT: **RPAC RI/FS**
PROJECT NO: **52-92C0804A**
PROJECT LOCATION: **Portland, Oregon**
CLIENT NAME: **Rhone-Poulenc**
DATE STARTED: **September 13, 2000**
DATE COMPLETED: **September 13, 2000**
DRILLING CONTRACTOR: **Cascade**
DRILLER: **Jason, Jose, Charles**
DRILLING METHOD: **Air Rotary with Casing Hammer**
SAMPLING METHOD: **2" Diameter, 3' Long Split Spoon**

WATER LEVEL: ▼ **24.00 ft**

TOTAL DEPTH : **30.00 ft**
WEATHER: **Clear**
FIELD ENGINEER: **Don Coberly**
CHECKED BY: **Chris Moody**

SAMPLE TYPE KEY:
- Relatively undisturbed sample
- Disturbed sample
- Sample attempt with no recovery
- SPT split spoon sample
- B Bag Sample

SAMPLER DRIVEN (in)	FINES CONTENT (%)	DRY DENSITY (pcf)	MOISTURE CONTENT (%)	BLOWS PER FOOT	SAMPLE TYPE	ELEVATION (ft.)	DEPTH (ft.)	USCS	GRAPHIC SYMBOL	DESCRIPTION	REMARKS
										CLEARED BRUSH ON SILTY GRAVEL FILL.	
							0	SP/ SM		**DARK BROWN TO BROWN SAND**, VF-M, trace fines, no stain or odor, loose, [slightly damp].	Logged Off Cuttings
							5				
							10				
							15				
								SM/ SC		**DARK GREY SILTY TO CLAYEY SAND**,creosote odor, [damp]. *PID on cuttings 0-0.4, BZ=0-0.1*	
							20			*Grades to wet (adding water), strong creosote odor.*	
							▼ 25				

NOTES:

URS

LOG OF BORING RP-03-30R

LOB3 G:\163\GINTPR~1\062000\RHONEP.GPJ URSPDX1.GDT 10/10/00 port

PROJECT: **RPAC RI/FS**
PROJECT NO: **52-92C0804A**
PROJECT LOCATION: **Portland, Oregon**

FIELD ENGINEER: **Don Coberly**
CHECKED BY: **Chris Moody**

SAMPLE TYPE KEY:
- Relatively undisturbed sample
- Disturbed sample
- Sample attempt with no recovery
- SPT split spoon sample
- B Bag sample

SAMPLER DRIVEN (in)	FINES CONTENT (%)	DRY DENSITY (pcf)	MOISTURE CONTENT (%)	BLOWS PER FOOT	SAMPLE TYPE	ELEVATION(ft.)	DEPTH (ft.)	USCS	GRAPHIC SYMBOL	DESCRIPTION	REMARKS
							25				
24								SM/ SP		**BROWN AND GREY SILTY SAND**, very fine grained sand with some clay, dark brown stained areas, smell of creosote, [saturated].	S-1
								CL/ ML		*Grading to VFSD at 27' to 27.5'. NAPL both as LNAPL and within water.*	
							30			**BROWN AND GREY SILTY CLAY**, mottled, low toughness, moderate plasticity, [damp]. Borehole terminated at 30' bgs.	

NOTES:

LOG OF BORING RP-03-30R

URS

LOB3 G:\163\GINTPR~1\062000\RHONEP.GPJ URSPDX1.GDT 10/10/00 port

LOG OF BORING NO. RP-03-52R

PROJECT: **RPAC RI/FS**
PROJECT NO: **52-92C0804A**
PROJECT LOCATION: **Portland, Oregon**
CLIENT NAME: **Rhone-Poulenc**
DATE STARTED: **September 12, 2000**
DATE COMPLETED: **September 12, 2000**
DRILLING CONTRACTOR: **Cascade**
DRILLER: **Jason, Jose, Charles**
DRILLING METHOD: **Air Rotary with Casing Hammer**
SAMPLING METHOD: **2" Diameter, 3' Long Split Spoon**

WATER LEVEL: ▼ **24.00 ft**

TOTAL DEPTH : **52.50 ft**
WEATHER: **Clear**
FIELD ENGINEER: **Don Coberly**
CHECKED BY: **Chris Moody**

SAMPLE TYPE KEY:
- Relatively undisturbed sample
- Disturbed sample
- Sample attempt with no recovery
- SPT split spoon sample
- B Bag Sample

SAMPLER DRIVEN (in)	FINES CONTENT (%)	DRY DENSITY (pcf)	MOISTURE CONTENT (%)	BLOWS PER FOOT	SAMPLE TYPE	ELEVATION (ft.)	DEPTH (ft.)	USCS	GRAPHIC SYMBOL	DESCRIPTION	REMARKS
										CLEARED BRUSH ON SILTY GRAVEL FILL.	
							0	SP		**LIGHT BROWN-BROWN SAND**, trace fines, no stain or odor, loose, [dry].	Logged Off Cuttings
							5			*Grades to black-brown, F-M grained, slighly damp with scattered granules and gravel to 1.5" diameter.*	
							10				
							15			*Grades to slightly more damp.*	
								ML/ CL		**GREY TO DARK GREY SILTY CLAY**, low toughness, slightly plastic, slight creosote odor.	
							20			*Grades to strong creosote odor, no NAPL or sheen. Driller adding trace water.*	
							▼				
							25				

NOTES:

URS

LOG OF BORING RP-03-52R

LOB3 G:\163\GINTPR-1\062000\RHONEP.GPJ URSPDX1.GDT 10/10/00 port

PROJECT: **RPAC RI/FS**
PROJECT NO: **52-92C0804A**
PROJECT LOCATION: **Portland, Oregon**

FIELD ENGINEER: **Don Coberly**
CHECKED BY: **Chris Moody**

SAMPLE TYPE KEY:
- Relatively undisturbed sample
- Disturbed sample
- Sample attempt with no recovery
- SPT split spoon sample
- B Bag sample

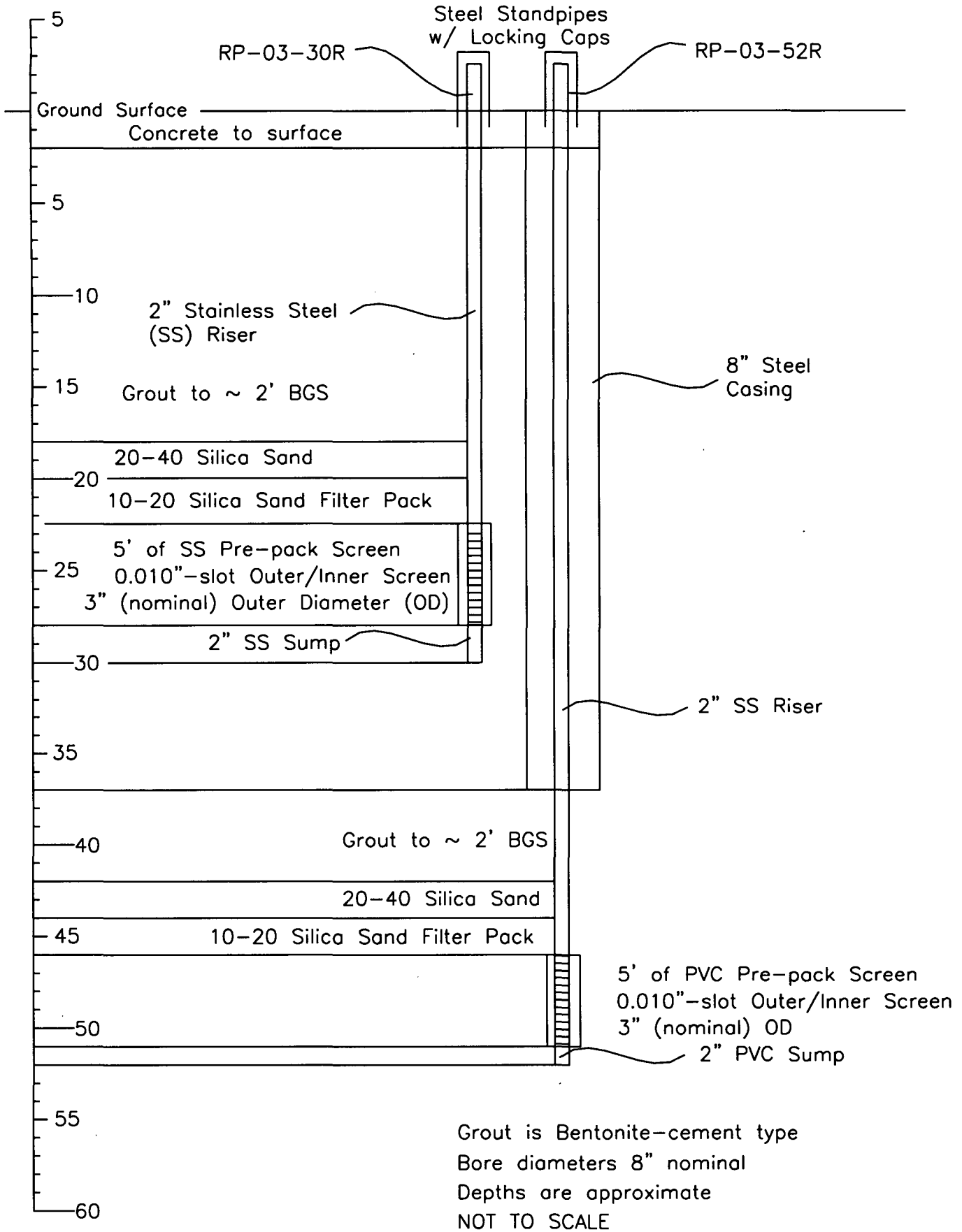
SAMPLER DRIVEN (in)	FINES CONTENT (%)	DRY DENSITY (pcf)	MOISTURE CONTENT (%)	BLOWS PER FOOT	SAMPLE TYPE	ELEVATION(ft.)	DEPTH (ft.)	USCS	GRAPHIC SYMBOL	DESCRIPTION	REMARKS
							25			*Driller still adding water.*	
							30			*Added casing at 32', creosote odor decreased to undetetable level.*	
							35				
24								SP		**BLACK TO DARK BROWN SAND**, slight trace fines, well-sorted, VF-M grained, very slight odor creosote, no stain or sheen, loose-firm (adding water previously),	
							40			*Grades to black to brown sand with no creosote odor.*	
							45				
							50				
										Driller encountered bedrock at 51'.	
										Borehole terminated at 52.5' bgs, 1.5' below bedrock surface to provide depth for sump.	

NOTES:

LOG OF BORING RP-03-52R

URS

LOB3 G:\163\GINTPR~1\062000\RHONEP.GPJ URSPDX1.GDT 10/10/00 port



URS	TITLE: Well Construction RP-03 Replacement Wells BNSF Property - Portland, OR	DWN: jgdp	DES.:	PROJECT NO.: 5292C0804A
		CHKD: cm	APPD:	FIGURE NO.: 1
		DATE: 10/9/00	REV.: 1	

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QUARTERLY PROGRESS REPORT FOR RI/FS
RPAC - Portland Site
Fourth QUARTER 2000
NOVEMBER 1, 2000 - DECEMBER 31, 2000

January 10, 2001

QUARTERLY PROGRESS REPORT FOR RI/FS
RPAC - Portland Site
Fourth QUARTER 2000
NOVEMBER 1, 2000 - DECEMBER 31, 2000

January 10, 2001

Submitted to:

Oregon Department of Environmental Quality
Northwest Region
2020 S.W. 4th Avenue, Suite 400
Portland, Oregon 97201

Prepared for:
Aventis CropScience
2 T.W. Alexander Drive
Morrisville, North Carolina 27560

Prepared by:
AMEC Earth & Environmental
7477 SW Tech Center Drive
Portland, Oregon 97223

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January 10, 2001
0-61M-107030-T15

Eric Blischke
Environment Policy Analyst
Department of Environmental Quality
Northwest Region
2020 SW 4th Avenue, Suite 400
Portland, Oregon 97201-4987

SUBJECT: QUARTERLY PROGRESS REPORT FOR RI/FS
RPAC, PORTLAND SITE
FOURTH QUARTER, 2000

Dear Eric:

On behalf of Rhône-Poulenc AG Company (RPAC), AMEC Earth & Environmental (AMEC) is submitting three bound copies, and one unbound copy of the enclosed Fourth Quarter, 2000-Progress Report. One of the bound copies will be sent directly to Mavis Kent of DEQ, per DEQ's request.

This quarterly progress report is being submitted by RPAC in accordance with the July 8, 1999 Consent Order.

If you have any questions, please call (503) 639-3400

Sincerely,

AMEC Earth & Environmental, Inc.

Scott Kranz
Hydrogeologist

Roger Gresh, P.G.
Principal

AMEC Earth & Environmental, Inc.
7477 SW Tech Center Drive
Portland, Oregon
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Enclosures: Fourth Quarter 2000 – Progress Report for RI/FS, RPAC – Portland Site, January 10, 2001

cc: R. Ferguson, RPAC
J. Benedict, CHBH&L
R.Gresh, AMEC
M. Kent, DEQ – NW Region
D. Blount, CLB&W
K. McCaw, ESCO Corp.
E. McDaniel, SMR&H
B. Sheppard, BNSF
C. Young, Wacker Siltronic Corporation
L. Patterson, Elf Atochem North America, Inc.
A. Pardini, Schnitzer Investment Corp.
J. Baird, Air Liquide America Corp.

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Appendix A Fall 2000 Groundwater Monitoring Technical Memorandum
Appendix B Filling of EX-1 Technical Memorandum

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1.0 INTRODUCTION

On behalf of Rhône-Poulenc AG Company (RPAC), which is now known as Aventis CropScience, AMEC Earth & Environmental (AMEC) has prepared this Quarterly Progress Report for Remedial Investigation/Feasibility Study (RI/FS) activities associated with RPAC's Portland facility. This report covers activities conducted during the fourth calendar quarter of year 2000 (November 1, 2000 through December 31, 2000).

The submittal of quarterly progress reports is specified under the Consent Order (No. WMCSR-NWR-99-07) executed between RPAC and the Oregon Department of Environmental Quality (DEQ) on July 8, 1999.

2.0 CURRENT REPORTING ACTIVITIES

2.1 Investigative-Derived Waste Disposal

Investigative-derived waste generated during the abandonment of 15 monitoring wells, 4 extraction wells, 6 piezometers, and 5 lysimeters and during the installation of 2 new monitoring wells was transported to approved hazardous waste disposal facilities. Triad Transport, Inc. transported 34 55-gallon drums of investigative-derived waste to the Safety-Kleen, Inc. Aragonite facility for disposal on November 13, 2000. Onyx Environmental Services, L.L.C. transported 10 55-gallon drums of investigative-derived waste to the Chemical Waste Management, Inc. Arlington facility for disposal on November 9, 2000.

2.2 Groundwater Resampling

The Fall 2000 Groundwater Monitoring event was completed October 19, 2000. Groundwater samples were recollected at monitoring wells RP-01-31, PR-01-51, RP-01-65, RP-03-25, RP-03-65, RP-06-87, AL-06-96, and MW-05-65 during November 28 and 29, 2000 as part of the Fall 2000 groundwater sampling event. Resampling of the select groundwater monitoring wells was necessary because of laboratory contamination of the original samples collected for herbicide analysis (EPA Method 8151) caused by North Creek Analytical, Inc. Sampling was conducted in compliance with the DEQ approved Field Sampling Plan (FSP). The results will be included with the Preliminary Long Term Groundwater Monitoring Plan currently scheduled for delivery to DEQ in early 2001.

2.2.1 Investigative-Derived Waste

Water
Approximately 140 gallons of water were generated during the Fall 2000 groundwater sampling activities. Sources included groundwater removed during purging and decontamination water. All water was transported to the RPAC site for disposal to the groundwater treatment facility on the day of generation.

Solids
One drum of waste was generated during groundwater sampling activities, including personal protective equipment and dedicated sample tubing. The wastes were containerized in a

Department of Transportation (DOT) approved 55-gallon steel drums and transported to the RPAC warehouse for storage and characterization before disposal off-site. The drum was labeled on the side and lid according to requirements outlined in the FSP.

2.3 Stage 1 Source Area Soil Sampling

Stage 1 of the source area soils characterization activities were completed in the Herbicide Area, Insecticide Area, and Lake Area at the RPAC facility. Source area soil sampling activities were completed in accordance with the Source Area Investigation Scoping Document and FSP, submitted to the DEQ on September 15, 2000. A total of 96 primary soil samples, duplicate soil samples, and equipment rinsate blanks were collected from 46 soil sample locations. All soil and water samples were submitted to the AMEC Earth & Environmental laboratory for analysis. The analytical results from the soil samples have not been received and the survey of the sample locations has not been completed.

2.3.1 Investigative-Derived Waste

Water
Approximately 600 gallons of water were generated during soil sampling activities. Sources included decontamination water and water used during concrete coring. All water was transported to the RPAC site for disposal to the groundwater treatment facility on the day of generation.

Soil
During soil sampling activities approximately 15 drums of soil cuttings and solid wastes were generated. Soil cuttings and solid wastes were containerized in DOT approved 55-gallon steel drums and transported to the RPAC warehouse for storage and characterization before disposal off-site. All drums were labeled on the side and lid according to requirements outlined in the FSP.

2.4 Fall 2000 Groundwater Monitoring Technical Memorandum

A technical memorandum describing the Fall 2000 groundwater monitoring activities has been prepared in accordance with the Consent Order (the Order) between the DEQ and RPAC. Groundwater monitoring activities included in the report include:

- Groundwater level monitoring, completed October 2 – 3, 2000;
- Groundwater Sampling, completed September 19 – October 17, 2000; and
- Groundwater Resampling (due to laboratory contamination, completed November 28 – 29, 2000.

The Fall 2000 Groundwater Monitoring Technical Memorandum has been included in Appendix A.

2.5 Filling Of Excavation EX-1

The EX-1 pit was excavated in the Lake Area on RPAC property as part of past remedial activities at the Gould Superfund Site. The amended record of decision for the Gould

Superfund Site required the filling of the excavation. The remaining portions of excavation EX-1 were backfilled by the placement of 11,216 loose cubic yards of soil backfill during 9 days between September 25, 2000 and November 22, 2000.

A technical memorandum describing the filling of the excavation designated EX-1 has been prepared. The backfilling activities described in the memorandum include:

- Placement of shot rock backfill;
- Water level monitoring; and
- Placement of soil backfill.

The Filling of EX-1 Technical Memorandum has been included in Appendix B.

3.0 SIGNIFICANT PROBLEMS ENCOUNTERED

No significant problems were encountered during this current reporting period.

4.0 ACTIVITIES PLANNED FOR THE NEXT REPORTING PERIOD

The activities planned for the next quarterly reporting period (First Quarter 2001) include the following:

- Surveying of the Stage 1 Source Area Sampling soil boring locations.
- Completion of Stage 1 Source Area Sampling soil boring logs and Technical Memorandum.
- Completion of the Second Draft Project Management Plan.
- Completion of the Preliminary Long Term Groundwater Monitoring Plan.
- Conduct Fall 2000 groundwater data validation.
- Conduct Stage 1 (conceptual) groundwater transport evaluation.
- Conduct Source Area Stage 1 soil data validation.

This quarterly progress report is being submitted by RPAC in accordance with the July 8, 1999 Consent Order.

If you have any questions, please call (503) 639-3400

Sincerely,

AMEC Earth & Environmental, Inc.

Scott Kranz
Hydrogeologist

Roger Gresh, P.G.
Principal

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APPENDIX A

FALL 2000 GROUNDWATER MONITORING TECHNICAL MEMORANDUM RPAC - PORTLAND SITE JANUARY 10, 2001

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FALL 2000 GROUNDWATER MONITORING TECHNICAL MEMORANDUM

RPAC - Portland Site

January 9, 2001

Submitted to:
Oregon Department of Environmental Quality
Northwest Region
2020 S.W. 4th Avenue, Suite 400
Portland, Oregon 97201

Prepared for:
Rhone-Poulenc AG Company
2 T.W. Alexander Drive
Research Triangle Park, North Carolina 27709

Prepared by:
URS
111 S.W. Columbia, Suite 900
Portland, Oregon 97201
(503) 222-7200
52-92C0804A/43

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1.0 INTRODUCTION

This Technical Memorandum addresses a portion of the Early Remedial Investigation (RI) activities to be completed in accordance with the Consent Order (the Order) between the Oregon Department of Environmental Quality (DEQ) and the Rhone-Poulenc AG Company (RPAC). The RPAC property is located at 6200 N.W. St. Helens Road in Portland, Oregon. This Technical Memorandum discusses the field activities related to the Fall 2000 groundwater monitoring round.

RPAC conducted the following groundwater monitoring activities in September, October, and November 2000:

- Water level monitoring – October 2 - 3, 2000
- Groundwater sampling – September 19 – October 17, 2000
- Due to laboratory contamination several wells were re-sampled – November 28 - 29, 2000

Note: Additional documentation regarding this resampling event will be submitted to DEQ under separate cover.

2.0 WATER LEVEL MONITORING

The final list of wells monitored during the Fall 2000 monitoring event is provided in Table 2-1, and was approved by DEQ via a letter dated April 3, 2000. The list includes a total of 127 wells and 2 staff gauges.

The groundwater elevation measurements were collected at the following RPAC areas and off-site properties:

- RPAC Herbicide Area
- RPAC Insecticide Area
- RPAC Lake Area
- Atofina Property
- Gould Electronics Property
- Burlington Northern and Santa Fe Railroad Company Property
- Wacker Siltronic Property
- ESCO Inc. Property
- Metro Property
- Schnitzer Investment Property
- Kinder Morgan Property
- PGE Property
- City of Portland Property

Due to access constraints, water level measurements were initiated after some on-site well sampling had occurred. To avoid potential impact to water levels from well purging/sampling,

three days of recovery time was allowed to pass between sampling at these wells and the water level measurement event.

2.1 Methodology

Depth to water measurements were conducted in accordance with the procedures described in the Early RI Activities-Comprehensive Groundwater Monitoring Field Sampling Plan (FSP), Dated October 1, 1999. Generally, levels were measured using an electronic level probe, capable of measuring the depth to groundwater to the nearest 0.01 feet. The measurements were referenced to a fixed reference point at the top of the well casing. The measurements were recorded on a water level form with the date and time of measurement. If non-aqueous phase liquid (NAPL) was suspected to be present in a well, based on the results of the monitoring well inventory conducted in early 1997, the well was checked for the presence of NAPL using an oil/water interface probe. Each probe was decontaminated with a non-phosphatic detergent and water wash followed by a dilute methanol rinse and a de-ionized water final rinse before checking each well.

The groundwater elevations were then determined by subtracting the depth to groundwater from the elevation of the measuring point (usually the rim of the well casing). The groundwater elevation data and the depth to groundwater data are summarized in Table 2-1.

3.0 GROUNDWATER SAMPLING

On September 19, 2000, URS field personnel began conducting the groundwater sampling activities at the RPAC site in Portland, Oregon in accordance with the Early RI Activities – Comprehensive Groundwater Monitoring Field Sampling Plan, October 1, 1999.

3.1 Sampling Locations

Groundwater samples were collected from a total of 102 monitoring wells between September 19 and October 17, 2000. These wells are located on or in the vicinity of the RPAC property. Table 3-1 summarizes the parameters for which the samples were analyzed during the Fall 2000 event.

3.2 Sampling Procedure

Groundwater sampling activities were generally conducted in accordance with the procedures described in the Early RI Activities-Comprehensive Groundwater Monitoring FSP, dated October 1, 1999. Prior to sampling each well, and immediately after removing the well cap, the air column in the well was measured and evaluated for the presence of organic vapors or hydrogen sulfide using a photoionization detector. Groundwater elevations, presence of NAPL, and well depth were determined using an electronic interface probe as discussed above. If light non-aqueous phase liquids (LNAPLs) or dense non-aqueous phase liquids (DNAPLs) were detected, a column of

water from that interval of the well was collected using a disposable double-check valve bailer, which was then examined for color, background odor, thickness of NAPL or product sheen.

The total depth (TD) of each well was measured using a graduated tape and weight to ensure that the well's correct identification was recorded. The tape and bailers were lowered slowly into the well to minimize disturbance of the water column.

If sufficient NAPL was present in a well, a sample of the NAPL was collected for analysis. Aqueous phase groundwater samples were not collected from wells where NAPL samples were collected.

Three methods were used to purge monitoring wells prior to sampling. Wells with slow recharge or in which NAPL was detected were purged using disposable tubing attached to a peristaltic pump. Volatile organic compounds (VOC) samples were collected using a disposable double check valve bailer equipped with a low flow bottom-emptying device for wells purged with a peristaltic pump. Shallow wells with slow recharge were purged of at least three casing volumes until field parameter measurements (pH, conductivity, dissolved oxygen, and temperature) stabilized within 10%, or the wells purged dry. All other wells were purged using a portable 2-inch submersible pump equipped with disposable tubing. Regardless of pump equipment, the intake was placed in the center of the bottom 5 feet of the screen interval.

Low flow purge methods were utilized at each well location where pumps were used. Purge water was pumped from the screened interval at rates ranging from approximately 0.25 to 1 liter per minute. Purge water was directed into a flow-through cell. The field meters were placed in the flow through cell to collect continuous readings of pH, conductivity, temperature, and dissolved oxygen. Prior to sampling, field parameters were recorded at approximately 5-minute intervals until measurements generally stabilized within 10% for three consecutive readings or the well purged dry. If a well purged dry, a sample was collected as soon as adequate water returned to the well to make sampling feasible, generally a return of 80% of the static water level.

The sample bottles were filled directly from the pump discharge tubing. VOCs were collected at lower flow rates to minimize agitation of the sample. Dissolved metals samples were field-filtered using a 0.45-micron filter placed directly on the end of the pump discharge tubing.

3.3 Sample Handling

Filled sample bottles were packed and placed in coolers with blue-ice immediately following sample collection for transport to the laboratory. Temperature blanks were placed in each cooler containing samples. Chain-of-custody forms were filled out at the end of each day and placed inside the appropriate cooler. Custody seals were placed on the coolers and the coolers were then taped shut.

Samples were shipped daily via laboratory-provided courier to North Creek Analytical (NCA) for laboratory analysis. The samples requiring analysis by EPA method 8290 were sent to Columbia Analytical Services (CAS).

3.4 QA/QC Requirements

URS personnel collected the following quality assurance/quality control (QA/QC) samples to verify the accuracy and effectiveness of the laboratory methods and to check field decontamination methods and sample handling procedures.

Rinsate Samples

A rinsate sample was collected for each laboratory batch. A laboratory batch is defined as 20 samples per analysis and coincided with the sample delivery group. A total of 6 rinsate samples were collected. Rinsate samples were collected at the following wells: RPW-02, RP-06-87, AL-2-32, MW-08-46, W-12-D, and W-16-D. The rinsate samples were analyzed for the same parameters as the primary samples.

Blind Duplicates

One blind duplicate was collected for each sample delivery group. A total of 7 blind duplicates were collected at the following locations: W-18-D, MW-02-62, MW-08-46, AL-2-32, W-12-D, RP-06-87, and W-16-D. The blind duplicates were analyzed for the same parameters as the primary samples.

Trip Blanks

One trip blank accompanied each cooler containing bottles/samples that were to be analyzed for VOCs, or samples requiring EPA Methods 8141, 8151, 8260, and 8270 throughout sampling activities and shipment to the laboratory. A total of 17 trip blanks accompanied samples to the laboratory throughout the sampling event.

Matrix Spike Samples

A total of 6 matrix spike/matrix spike duplicate (MS/MSD) samples were collected at the following locations: W-18-D, MW-08-64, AL2-32, W-12-D, RP-06-87, and W-16-D. The MS/MSD samples were analyzed for the same parameters as the primary samples.

Temperature blanks were placed in each cooler to assure that appropriate preservation of samples occurred.

3.5 Documentation

All groundwater sampling procedures and other field observations were completed by URS personnel and recorded onto a well-specific "Groundwater Sampling Data Sheet," dated and signed by the field personnel. Appendix A contains the typed groundwater sampling data sheets for the fall sampling round. All sample identifications used on the chain-of-custody documentation were recorded on groundwater sampling data sheets and in a daily logbook.

Field observations made and data generated in conjunction with the sample collection were entered in the daily logbook. Deviations from the sampling plan were noted on both data sheets and logbooks.

3.6 Decontamination Procedure

All non-dedicated sampling equipment (e.g., pumps, water level meter, etc.) were decontaminated prior to use at each well location as follows:

- Potable water rinse
- Soap wash (dilute solution of Liquinox or equivalent in potable water solution)
- De-ionized water rinse
- Dilute methanol/de-ionized water rinse
- De-ionized water rinse[1]

The above mentioned solutions were sequentially pumped through the portable submersible pumps.

3.7 Treatment and Disposal of Investigation-Derived Waste (IDW)

All purge water and decontamination fluids were contained in Department of Transportation (DOT)-approved 55-gallon drums at each well location. Water was transported in the drums and pumped into RPAC's onsite treatment system at the end of each sampling day. A total volume of 1,420 gallons was generated and pumped into the treatment system during the fall sampling round.

Disposable tubing, bailers, twine and personal protective equipment (PPE) such as gloves and tyvek suits were placed in plastic lined drums in the RPAC warehouse at the end of each day. Seven drums of debris were generated during the fall sampling round. The debris was classified as listed hazardous waste and disposed of at the Waste Management, Inc. facility in Arlington, Oregon.

3.8 Deviations from the Field Sampling Plan

3.8.1 Water Level Monitoring

The groundwater extraction system was not shut down during the water level monitoring round in order to accurately describe the effects of the system on the shallow aquifer. The final list of the wells that were monitored was updated during the Spring 2000 monitoring event, based on the results of the monitoring well inventory.

[1] De-ionized water was obtained in five-gallon containers from Aqua Cool Bottled Water.

3.8.2 Groundwater Sampling

The final list of wells that were sampled and the relevant parameters were updated, based on the results of the monitoring well inventory and the Spring 2000 monitoring event. Peristaltic pumps or disposable bailers were used to collect samples from wells that contained NAPL in order to avoid the gross contamination of the down hole centrifugal pump. Disposable bailers were used to purge and collect samples from shallow wells with slow recharge. Shallow wells requiring the use of bailers were purged using the typical method of removing at least three casing volumes or until field parameter stabilization or the well purged dry. Low flow purge methods were utilized at all other well locations.

3.8.3 Field QA/QC Requirements

The frequency of collection for all QA/QC samples was updated to approximately one per batch, with the exception of trip blanks.

3.9 Field Observations

The following unanticipated field observations were made during the Fall 2000 monitoring round:

- DNAPL was detected and sampled from monitoring well MW-02-26, and was pink in color.
- DNAPL was detected in MW-05-34.
- LNAPL was detected in MW-08-27 with a thickness of 3.6 feet.
- DNAPL 6 inches thick was detected and sampled from monitoring well MW-08-46, and was dark brown in color. During the transfer to the sampling container from the bailer, some mixing with groundwater occurred and some of the product floated to the top of the sampling container.
- The groundwater collected from MW-2-26 and RP-02-30 effervesced when placed into sample containers preserved with HCL.
- There was a hydrogen sulfide (rotten egg) odor detected in RP-01-65, RPW-03, RP-04-16, W-11-B, and W-16-30.
- A creosote like odor was observed in MW-06-S.
- W-19-S was completely dry.
- The following wells were pumped or bailed dry during purging activities: MW-01-26, MW-4-27, W-06-S, AL2-17, RP-05-15, W-15-S, PP-08, AL5-19, W-08-25, W-04-S, W-12-I, RP-01-31, RP-03-S, RP-06-30, MW-03-85, RP-02-30, and W-16-I.

3.10 Re-Sampling Event

Laboratory contamination of samples from one batch sent for 8151 analysis necessitated the re-sampling of the following wells on November 28-29, 2000: RP-01-65, RP-01-51, RP-01-31, RP-

03-25, RP-03-65, RP-06-87, RP-06-30, MW-05-65, and AL-6-96. Samples were collected consistent with methods used during initial sampling during the Fall 2000 monitoring event.

TABLES

Table 2-1
Depth to Water Summary
Fall 2000 Groundwater Monitoring Round
RPAC, Portland, OR

Monitoring Point ID	Type	Location / Property	Depth to Water (feet BMP)	Time	Date	Measuring Point Elevation (Feet AMSL)	Water Table Elevation (Feet AMSL)	NAPL Thickness (inches)
A	Well	HERBICIDE AREA	21.77	15:29	10/3/00	'	'	None
AL2-17	Well	LAKE AREA	15.58	11:11	10/2/00	41.77	26.19	None
AL2-32	Well	LAKE AREA	17.38	11:12	10/2/00	41.41	24.03	None
AL2-46	Well	LAKE AREA	17.65	11:13	10/2/00	41.77	24.12	None
AL4-47	Well	LAKE AREA	15.96	11:29	10/2/00	40.24	24.28	None
AL5-19	Well	LAKE AREA	15.74	11:19	10/2/00	40.07	24.33	None
AL5-35	Well	LAKE AREA	15.85	11:20	10/2/00	39.54	23.69	None
AL5-62	Well	LAKE AREA	15.92	11:21	10/2/00	39.59	23.67	None
AL6-96	Well	LAKE AREA	18.1	11:56	10/2/00	38.72	20.62	None
ASW-01A	Well	METRO	7.48	12:37	10/2/00	38.81	NM	None
ASW-03	Well	METRO	13.71	12:59	10/2/00	41.02	27.31	None
ASW-04	Well	METRO	9.06	12:46	10/2/00	40.76	31.7	None
ASW-05	Well	METRO	NM	NR	10/2/00	'	'	None
ASW-06	Well	METRO	9.56	12:57	10/2/00	40.10	30.54	None
ASW-07	Well	METRO	NM	NA	10/2/00	NA	NM	NA
ASW-08	Well	METRO	6.97	13:11	10/2/00	36.72	NM	NA
B	Well	HERBICIDE AREA	17.89	15:28	10/3/00	'	'	None
BST2W-61	Well	LAKE AREA	17.16	11:14	10/2/00	41.13	23.97	None
BST5W-74	Well	LAKE AREA	16.41	11:22	10/2/00	39.84	23.43	None
BTB-4A-84	Well	LAKE AREA	17.85	11:52	10/2/00	39.50	21.65	None
BTB-4B-25	Well	LAKE AREA	12.29	11:53	10/2/00	39.54	27.25	None
BTB-4B-55	Well	LAKE AREA	18.17	11:54	10/2/00	39.81	21.64	None
C	Well	HERBICIDE AREA	18.62	15:26	10/3/00	'	'	1.67
D	Well	HERBICIDE AREA	19.31	15:24	10/3/00	'	'	None
E	Well	HERBICIDE AREA	19.25	15:23	10/3/00	'	'	5.3
F	Well	HERBICIDE AREA	22.75	15:22	10/3/00	'	'	None
G	Well	HERBICIDE AREA	19.25	15:21	10/3/00	'	'	None
H	Well	HERBICIDE AREA	22.63	15:20	10/3/00	'	'	None
MW-01-26	Well	HERBICIDE AREA	16.98	9:28	10/2/00	49.89	32.91	None
MW-01-41	Well	HERBICIDE AREA	17.7	9:29	10/2/00	49.53	31.83	None
MW-01-56	Well	HERBICIDE AREA	17.92	9:30	10/2/00	49.70	31.78	None
MW-01-76	Well	HERBICIDE AREA	20.30	9:26	10/2/00	47.70	27.40	None
MW-02-26	Well	HERBICIDE AREA	16.15	10:00	10/2/00	48.09	31.94	None
MW-02-46	Well	HERBICIDE AREA	15.96	10:09	10/2/00	47.91	31.95	None
MW-02-62	Well	HERBICIDE AREA	15.58	10:08	10/2/00	48.00	32.42	None
MW-03-27	Well	HERBICIDE AREA	16.56	10:25	10/2/00	48.32	31.76	None
MW-03-49	Well	HERBICIDE AREA	16.6	10:24	10/2/00	48.28	31.68	None
MW-03-68	Well	HERBICIDE AREA	16.58	10:23	10/2/00	48.25	31.67	None
MW-03-85	Well	WACKER	20.56	14:35	10/2/00	35.54	14.98	None
MW-03-I	Well	WACKER	21.29	14:33	10/2/00	36.43	15.14	None
MW-03-S	Well	WACKER	16.05	14:34	10/2/00	36.35	20.3	None
MW-04-27	Well	HERBICIDE AREA	19.05	10:28	10/2/00	47.53	28.48	None
MW-04-47	Well	HERBICIDE AREA	18.79	10:27	10/2/00	47.65	28.86	None
MW-04-63	Well	HERBICIDE AREA	18.6	10:26	10/2/00	48.00	29.4	None
MW-05-24	Well	HERBICIDE AREA	11.81	10:46	10/2/00	37.83	26.02	None
MW-05-34	Well	HERBICIDE AREA	11.9	10:45	10/2/00	37.83	25.93	1.31
MW-05-52	Well	HERBICIDE AREA	13.54	10:44	10/2/00	37.7	24.16	None
MW-05-70	Well	HERBICIDE AREA	14.34	10:43	10/2/00	38.33	23.99	None
MW-06-S	Well	WACKER	15.86	14:38	10/2/00	36.37	20.51	None
MW-07-S	Well	WACKER	18.62	14:40	10/2/00	37.32	18.7	None
MW-08-27	Well	HERBICIDE AREA	23.95	10:36	10/2/00	48.23	24.28	None
MW-08-46	Well	HERBICIDE AREA	20.51	10:35	10/2/00	48.11	27.6	None
MW-08-64	Well	HERBICIDE AREA	20.3	10:34	10/2/00	47.97	27.67	None
MW-09-23	Well	HERBICIDE AREA	15.88	10:21	10/2/00	47.03	31.15	None

Table 2-1
Depth to Water Summary
Fall 2000 Groundwater Monitoring Round
RPAC, Portland, OR

Monitoring Point ID	Type	Location / Property	Depth to Water (feet BMP)	Time	Date	Measuring Point Elevation (Feet AMSL)	Water Table Elevation (Feet AMSL)	NAPL Thickness (inches)
MW-09-42	Well	HERBICIDE AREA	16.56	10:20	10/2/00	47.64	31.08	None
MW-09-58	Well	HERBICIDE AREA	15.42	10:19	10/2/00	46.21	30.79	None
MW-09-80	Well	HERBICIDE AREA	16.27	10:17	10/2/00	46.67	30.4	None
MW-10-24	Well	INSECTICIDE AREA	14.71	9:47	10/2/00	46.21	31.5	None
MW-10-44	Well	INSECTICIDE AREA	15.05	9:48	10/2/00	46.54	31.49	None
MW-10-57	Well	INSECTICIDE AREA	15.04	9:49	10/2/00	46.66	31.62	None
MW-11-24	Well	INSECTICIDE AREA	12.22	9:43	10/2/00	44.01	31.79	None
MW-11-37	Well	INSECTICIDE AREA	11.79	9:42	10/2/00	43.80	32.01	None
MW-11-56	Well	INSECTICIDE AREA	11:53	9:41	10/2/00	43.63	43.13	None
MW-11-79	Well	INSECTICIDE AREA	11.86	9:40	10/2/00	44.14	32.28	None
MW-12-27	Well	INSECTICIDE AREA	16.92	9:20	10/2/00	50.22	33.3	None
MW-12-41	Well	INSECTICIDE AREA	16.82	9:19	10/2/00	50.08	33.26	None
MW-12-59	Well	INSECTICIDE AREA	16.4	9:17	10/2/00	49.58	33.18	None
MW-12-79	Well	INSECTICIDE AREA	17.09	9:21	10/2/00	50.08	32.99	None
NDL-SG	Staff Gauge	BNSF	1.2	15:00	10/2/00	27.46	26.26	None
P-07	Well	HERBICIDE AREA	19.18	10:31	10/2/00	1	1	3.83
P-10	Piezometer	HERBICIDE AREA	13.78	10:50	10/2/00	1	1	None
P-11	Piezometer	HERBICIDE AREA	14.7	10:52	10/2/00	39.29	24.59	None
PP-08	Piezometer	LAKE AREA	13.68	11:30	10/2/00	37.76	24.08	None
PP-11	Piezometer	ATOFINA	NM	15:18	10/2/00	36.52		None
PZ-02-40	Piezometer	City of Portland	36.82	9:00	10/2/00	64.53	27.71	None
PZ-1-11	Piezometer	INSECTICIDE AREA	10.1	9:11	10/2/00	45.28	35.18	None
RP-01-31	Well	BNSF	27.49	14:15	10/2/00	35.38	7.89	None
RP-01-51	Well	BNSF	27.5	14:16	10/2/00	35.28	7.78	None
RP-01-65	Well	BNSF	27.32	14:17	10/2/00	35.00	7.68	None
RP-02-31	Well	ATOFINA	32.68	15:28	10/2/00	40.12	7.44	None
RP-02-49	Well	ATOFINA	32.53	15:29	10/2/00	39.83	7.30	None
RP-02-66	Well	ATOFINA	32.8	15:30	10/2/00	39.70	6.9	None
RP-03-DR	Well	WACKER	19.65	14:47	10/2/00	39.50	19.85	None
RP-03-SR	Well	WACKER	18.28	14:48	10/2/00	39.53	21.25	None
RP-04-16	Piezometer	BNSF	11.78	11:35	10/2/00	33.66	21.88	None
RP-04-41	Well	BNSF	16.31	11:34	10/2/00	34.10	17.79	None
RP-05-16	Piezometer	BNSF	15.67	11:03	10/2/00	40.54	24.87	None
RP-06-30	Well	BNSF	20.1	14:49	10/2/00	37.20	17.1	None
RP-06-87	Well	BNSF	27.42	14:50	10/2/00	37.10	9.68	None
RPW-02	Well	INSECTICIDE AREA	15.92	9:36	10/2/00	47.07	31.15	None
RPW-03	Well	INSECTICIDE AREA	12.2	9:45	10/2/00	43.94	31.74	None
RPW-05	Well	INSECTICIDE AREA	21.02	10:55	10/2/00	49.83	28.81	None
SG-WDL	Staff Gauge	BNSF	-0.2	15:48	10/2/00	26.74	26.94	None
W-03-D	Well	GOULD	14.09	13:47	10/2/00	32.47	18.38	None
W-03-I	Well	GOULD	10.25	13:48	10/2/00	32.93	22.68	None
W-03-S	Well	GOULD	9.17	13:49	10/2/00	34.17	25.00	None
W-04-89	Well	GOULD	12.8	13:42	10/2/00	35.94	23.14	None
W-04-I	Well	GOULD	10.86	13:55	10/2/00	32.52	21.66	None
W-04-S	Well	GOULD	8.17	13:56	10/2/00	32.57	24.4	None
W-06-B	Well	LAKE AREA	15.95	11:06	10/2/00	39.96	24.01	None
W-06-D	Well	LAKE AREA	13.65	11:07	10/2/00	41.10	27.45	None
W-06-S	Well	LAKE AREA	14.05	11:08	10/2/00	39.55	25.5	None
W-08	Well	LAKE AREA	12.72	11:38	10/2/00	35.87	23.15	None
W-08-26	Well	LAKE AREA	13.02	11:29	10/2/00	38.66	25.64	None
W-08-74	Well	LAKE AREA	15.62	11:40	10/2/00	38.77	23.15	None
W-09	Well	LAKE AREA	11.63	11:45	10/2/00	34.88	23.25	None
W-09-116	Well	LAKE AREA	19.77	11:46	10/2/00	38.12	18.35	None
W-09-86	Well	LAKE AREA	20	11:47	10/2/00	38.54	18.54	None
W-10	Well	COP PUMP STATION	20.75	14:11	10/2/00	31.99	11.24	None
W-11-B	Well	ESCO	28.73	13:16	10/3/00	41.33	12.6	None

Table 2-1
Depth to Water Summary
Fall 2000 Groundwater Monitoring Round
RPAC, Portland, OR

Monitoring Point ID	Type	Location / Property	Depth to Water (feet BMP)	Time	Date	Measuring Point Elevation (Feet AMSL)	Water Table Elevation (Feet AMSL)	NAPL Thickness (inches)
W-11-D	Well	ESCO	28.03	13:14	10/3/00	40.09	12.06	None
W-11-I	Well	ESCO	28.13	13:13	10/3/00	40.28	12.15	None
W-11-S	Well	ESCO	15.73	13:12	10/3/00	40.90	25.17	None
W-12-D	Well	ESCO	23.5	13:06	10/3/00	41.63	18.13	None
W-12-I	Well	ESCO	22.15	13:07	10/3/00	41.66	19.51	None
W-12-S	Well	ESCO	15.43	13:09	10/3/00	41.41	25.98	None
W-15-D	Well	METRO	13.8	13:16	10/2/00	40.53	26.73	None
W-15-I	Well	METRO	13.48	13:17	10/2/00	40.72	27.24	None
W-15-S	Well	METRO	13.55	13:18	10/2/00	40.82	27.27	None
W-16-31	Well	SCHNITZER	7.85	13:24	10/2/00	33.70	25.85	None
W-16-D	Well	SCHNITZER	12.13	13:25	10/2/00	35.44	23.31	None
W-16-I	Well	SCHNITZER	13.03	13:26	10/2/00	35.42	22.39	None
W-16-S	Well	SCHNITZER	9.33	6:43	10/2/00	35.07	25.67	None
W-18-D	Well	PGE	23.42	9:08	10/2/00	55.70	32.28	None
W-18-I	Well	PGE	22.04	9:07	10/2/00	54.73	32.69	None
W-18-S	Well	PGE	22.42	9:06	10/2/00	55.23	32.81	None
W-19-D	Well	ATOFINA	27.21	15:31	10/2/00	34.80	7.59	None
W-19-I	Well	ATOFINA	27.41	15:32	10/2/00	34.80	7.39	None
W-19-S	Well	ATOFINA	dry 25.85	15:33	10/2/00	34.80		None
KM-MW-2	Well	KINDER MORGAN	27.36	8:47	10/2/00	50.68	23.32	None
KM-MW-5	Well	KINDER MORGAN	NM	12:31	10/2/00	50.78		None

Notes:
BMP = Below Measuring Point. The measuring point usually corresponds to the top of casing (TOC) reference used in previous reports.
NM = Not Measured
NA = Not Applicable
NR = Not Recorded
[1] = Survey data not available
All elevations are in feet Above Mean Sea Level (AMSL) in COP (City of Portland) datum

SCOEPA00006635

Table 3-1

Groundwater Sampling Analysis
Fall 2000 Groundwater Monitoring Round
RPAC, Portland, OR

Container	3 voas HCl preserved	1 liter amber unpreserved	1 liter amber unpreserved	1 liter amber unpreserved	1 liter amber	3 voas HCl preserved	1 liter amber unpreserved	2 - 1 liter amber	250 ml nitric preserved			500 ml poly unpreserved		500 ml NaOH & Zinc Acetate preserved	1 liter poly unpreserved	250 ml poly sulfuric acid preserved			3 voas HCl preserved	1 liter amber HCl preserved	120 ml container
W-18-S		X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
W-18-I		X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
W-18-D		X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
MW-12-27		X	X	X	X																
MW-12-41		X	X	X	X																
MW-12-59		X	X	X	X																
MW-12-79		X	X	X	X																
RPW-02		X	X	X	X																
MW-01-76		X				X	X														
MW-01-26		X				X	X					X	X	X	X	X	X	X	X		X
MW-01-41		X				X	X			X	X	X	X	X	X	X	X	X	X		X
MW-01-26		X				X	X					X	X	X	X	X	X	X	X		X
MW-02-26	X	X	X	X	X	X	X		X												
MW-02-46		X				X	X			X	X										
MW-02-62		X				X	X														
MW-08-27	X	X				X	X	X				X	X	X	X	X	X	X	X		X
MW-01-56		X				X	X					X	X	X	X	X	X	X	X		X
MW-08-64	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X		X

SCOEPA00006636

Table 3-1

Groundwater Sampling Analysis
Fall 2000 Groundwater Monitoring Round
RPAC, Portland, OR

Container	3 voas HCl preserved	1 liter amber unpreserved	1 liter amber unpreserved	1 liter amber unpreserved	1 liter amber	3 voas HCl preserved	1 liter amber unpreserved	2 - 1 liter amber	250 ml nitric preserved		500 ml poly unpreserved		500 ml NaOH & Zinc Acetate preserved	1 liter poly unpreserved	250 ml poly sulfuric acid preserved			3 voas HCl preserved	1 liter amber HCl preserved	120 ml container
RPW-05		X			X	X														
MW-04-47		X			X	X		X												
MW-04-63		X			X	X														
MW-04-27		X			X	X														
MW-09-58			X	X	X	X		X												
MW-09-80		X	X	X	X	X		X			X	X	X	X	X	X	X	X		X
MW-08-46	X	X			X	X	X				X	X	X	X	X	X	X	X		X
MW-09-42		X	X	X	X	X		X	X	X	X	X	X	X	X	X	X	X		X
MW-09-23		X	X	X	X	X		X			X	X	X	X	X	X	X	X		X
MW-11-24		X	X	X																
MW-11-37		X	X	X					X	X										
MW-11-56		X	X	X																
MW-11-79		X	X	X																
RPW-03		X	X	X					X	X										
MW-10-24		X	X	X	X				X	X										
MW-10-44		X	X	X	X				X	X										
MW-10-57		X	X	X	X															
MW-03-68		X				X	X													

SCOEPA00006637

Table 3-1

Groundwater Sampling Analysis
Fall 2000 Groundwater Monitoring Round
RPAC, Portland, OR

Container	3 voas HCl preserved	1 liter amber unpreserved	1 liter amber unpreserved	1 liter amber unpreserved	1 liter amber unpreserved	1 liter amber	3 voas HCl preserved	1 liter amber unpreserved	2 - 1 liter amber	250 ml nitric preserved			500 ml poly unpreserved	500 ml poly unpreserved	500 ml NaOH & Zinc Acetate preserved	1 liter poly unpreserved	250 ml poly sulfuric acid preserved			3 voas HCl preserved	1 liter amber HCl preserved	120 ml container
Monitoring Well ID	8015 - DRO/GRO	8011 Organochlorine Pesticides	8081 Organochlorine Pesticides	8082 Organochlorine Pesticides	8151 Organochlorine Herbicides	8151 Chlorinated Herbicides	8260 VOCs	8270 Semi-Volatile Organic Compounds	1630 Dissolved Mercury	6010 Metals	7470 Mercury	6020 Metals	8260 Volatile Organic Compounds	8270 Semi-Volatile Organic Compounds	8270 Semi-Volatile Organic Compounds	8310 Metals	8260 VOCs	418.2 Organic Carbon	350.3 Ammonia	6010 Metals	8270 Semi-Volatile Organic Compounds	SM 2215 Total Heterotrophic Bacteria
MW-03-49		X				X	X															
MW-03-27		X				X	X															
ASW-01A		X	X	X	X																	
ASW-04		X	X	X	X																	
ASW-06		X	X	X	X																	
MW-05-24	X	X				X	X					X	X	X	X	X	X	X	X	X	X	X
MW-05-34	X	X				X	X					X	X	X	X	X	X	X	X	X	X	X
MW-05-34	X	X	X	X	X	X	X	X	X													
MW-05-52	X	X				X	X					X	X	X	X	X	X	X	X	X	X	X
MW-05-65	X	X				X	X														X	
W-06-I		X				X	X	X	X													
W-06-D									X													
W-06-S									X													
AL2-46	X	X				X	X	X	X			X	X	X	X	X	X	X	X	X		X
Laboratory Water	X	X	X	X	X	X	X	X	X													
AL2-17	X	X				X	X	X	X			X	X	X	X	X	X	X	X	X	X	X
AL2-32	X	X				X	X	X	X	X	X	X	X	X	X	X	X	X	X	X		X
BST2W-61	X	X				X	X															

SCOEPA0000638

Table 3-1

Groundwater Sampling Analysis
Fall 2000 Groundwater Monitoring Round
RPAC, Portland, OR

Container	3 voas HCl preserved	1 liter amber unpreserved	1 liter amber unpreserved	1 liter amber unpreserved	1 liter amber	3 voas HCl preserved	1 liter amber unpreserved	2 - 1 liter amber	250 ml nitric preserved		500 ml poly unpreserved	500 ml NaOH & Zinc Acetate preserved	1 liter poly unpreserved	250 ml poly sulfuric acid preserved		3 voas HCl preserved	1 liter amber HCl preserved	120 ml container
PP-08		X			X	X												
BST5W-74		X			X	X												
AL5-62		X			X	X		X			X	X	X	X	X	X	X	X
AL5-35		X			X	X		X			X	X	X	X	X	X	X	X
AL5-19		X			X	X		X			X	X	X	X	X	X	X	X
W-08-80		X			X	X					X	X	X	X	X	X	X	X
W-08-55		X			X	X	X		X	X								
W-08-25		X			X	X	X		X	X								
RP-04-41		X			X	X	X	X			X	X	X	X	X	X	X	X
RP-04-16		X			X	X	X	X			X	X	X	X	X	X	X	X
RP-05-15		X			X	X		X										
MW-03-1	x	X			X	X		X	X	X								
MW-03-27	x	X			X	X		X										
MW-03-85	x	X			X	X		X										
MW-06-S	x	X			X	X	X											
MW-07-S	x	X			X	X	X											
RP-03-25		X			X	X	X	X										
W-09-125		X			X	X												

SCOEPA00006639

Table 3-1

Groundwater Sampling Analysis
Fall 2000 Groundwater Monitoring Round
RPAC, Portland, OR

Container / Monitoring Point ID	3 voas HCl preserved	1 liter amber unpreserved	1 liter amber unpreserved	1 liter amber unpreserved	1 liter amber unpreserved	1 liter amber	3 voas HCl preserved	1 liter amber unpreserved	2 - 1 liter amber	250 ml nitric preserved			500 ml poly unpreserved		500 ml NaOH & Zinc Acetate preserved	1 liter poly unpreserved	250 ml poly sulfuric acid preserved			3 voas HCl preserved	1 liter amber HCl preserved	120 ml container
W-09-100		X				X	X															
W-09		X				X	X	X														
AL6-96		X				X	X															
W-15-D						X	X		X													
W-15-I						X	X		X	X	X											
W-15-S						X	X		X	X	X											
W12-D		X				X	X															
W-12-S		X				X	X															
W-12-I		X				X	X			X	X											
W-11-S		X	X	X	X	X	X		X			X	X	X	X	X	X	X	X	X		X
W-11-D		X	X	X	X	X	X		X			X	X	X	X	X	X	X	X	X		X
W-11-I		X	X	X	X	X	X		X	X	X	X	X	X	X	X	X	X	X	X		X
W-11-B		X	X	X	X	X	X															
W-04-85		X				X	X		X	X	X											
W-04-I		X				X	X		X			X	X	X	X	X	X	X	X	X		
W-04-S		X				X	X			X	X	X	X	X	X	X	X	X	X	X		X
W-03-I		X	X	X	X	X	X															
W-03-S		X	X	X	X	X	X			X	X											

SCOEPA00006640

Table 3-1

Groundwater Sampling Analysis
Fall 2000 Groundwater Monitoring Round
RPAC, Portland, OR

Container	3 voas HCl preserved	1 liter amber unpreserved	1 liter amber unpreserved	1 liter amber unpreserved	1 liter amber	3 voas HCl preserved	1 liter amber unpreserved	2 - 1 liter amber	250 ml nitric preserved			500 ml poly unpreserved		500 ml NaOH & Zinc Acetate preserved	1 liter poly unpreserved	250 ml poly sulfuric acid preserved			3 voas HCl preserved	1 liter amber HCl preserved	120 ml container
W-03-D		X	X	X	X	X	X														
RP-06-87		X				X	X		X	X	X	X	X	X	X	X	X	X	X		X
RP-06-30		X				X	X		X	X	X										
W-10							X														
RP-01-65		X	X	X	X	X	X		X			X	X	X	X	X	X	X	X		X
RP-01-51		X	X	X	X	X	X		X			X	X	X	X	X	X	X	X		X
RP-01-31		X	X	X	X	X	X		X	X	X	X	X	X	X	X	X	X	X		X
W-19-D		X				X	X		X			X	X	X	X	X	X	X	X		X
W-19-I		X				X	X		X	X	X	X	X	X	X	X	X	X	X		X
W-19-S		X				X	X		X	X	X	X	X	X	X	X	X	X	X		X
RP-02-65		X				X	X		X												
RP-02-49		X				X	X		X			X	X	X	X	X	X	X	X		X
RP-02-30		X				X	X		X	X	X	X	X	X	X	X	X	X	X		X
W-16-D		X	X	X	X		X		X												
W-16-I		X	X	X	X		X		X	X	X										
W-16-30		X	X	X	X		X		X												

SCOEPA00006641

GROUNDWATER SAMPLING DATA SHEET

1:05pm started

Well Number: W-18-I Sample Number: 152-GW-01 Date: 9-19-00

Project: RPAC Project Number: 92C0804A Task: 20C

Weather Conditions: Overcast Observations/Comments:

P.I.D. Reading: ∅ Measuring Point (MP):

Calibration Date of P.I.D.: 9/19/00 Elevation of MP:

P.I.D. Standard Calibration Used: 100ppm Isobutylene Elevation of Water:

Combustible Gas Reading: Well Diameter: 4"

Well Depth: ~~21.97~~ 54' Top of Screen 49
9-19-00 NM

Water Depth: 21.97

Feet of Water:

Gallons per Foot:

Well Diameter	Gallons per casing foot
2 inches	0.16
3 inches	0.367
4 inches	0.65

Well Volume: Low flow purge method

Purge Volume:

Observation for LNAPL: NONE

Observation for DNAPL: NONE

Observation and condition of the well: Good Condition

Pump hoses and/or bailer ropes were new, cleaned or dedicated?

pH meter:

Eh meter:

Conductivity meter:

Calibration Date:

QA/QC samples:

Purge Method:

Sample Method:

Water Disposal:

Sampler(s):

General Comments:

NM 9-19-00

Field Parameters	Before Purging	Volume 1	Volume 2	Volume 3	Volume 4	Volume 5	Sample
Time	1:07pm	1:13pm	1:18pm	1:23pm	1:28pm	1:33pm	
pH	4.83	5.23	5.3	5.29	5.16	5.18	
Conductivity	25.9	25.4	25.5	25.3	25.5	25.9	
Eh							
Temperature	13.0°C	12.8°C	13.5°C	14.4	14.0	14.7	
Turbidity/color							
Dissolved Oxygen	6.34	4.23	4.27	4.51	3.90	3.99	

Analyses	Method	Bottle Type	Preservative	Number	Number MS/MSD

92C0804A\FORMS\GWSAMP.FRM 2/21/95

N

GROUNDWATER SAMPLING DATA SHEET

Well Number: MW-12-27 Sample Number: 153-GW-01 Date: 9/20/00

Project: RPAC Project Number: 92C0804A Task: 20C

Weather Conditions: Sunny 80° Observations/Comments:

P.I.D. Reading: Ø

Calibration Date of P.I.D.: 9/20/00

P.I.D. Standard Calibration Used: 100 PPM Isobutylene

Combustible Gas Reading:

Well Depth: 26.5' recorded 26.65' meas

Water Depth: 17.23'

Feet of Water:

Gallons per Foot:

Well Volume:

Purge Volume:

Observation for LNAPL: none

Observation for DNAPL: none

Observation and condition of the well:

Pump hoses and/or bailer ropes were new, cleaned or dedicated?

M asuring Point (MP):

Elevation of MP:

Elevation of Water:

Well Diameter: 2"

Well Diameter	Gallons per casing foot
2 inches	0.16
3 inches	0.367
4 inches	0.65

pH meter: Horiba U20

Eh meter: "

Conductivity meter: "

Calibration Date: 9/20/00

QA/QC samples: —

Purge Method: low flow

Sample Method: 2" submersible pump

Water Disposal: Treatment System

Sampler(s): Don

General Comments: Clarity: Cloudy-tan Sample: 11:05
Ferrous Iron: Ø

Field Parameters	Before Purging	Volume 1	Volume 2	Volume 3	Volume 4	Volume 5	Volume 6 ~~Sample~~
Time	~~10:55~~ 10:25	10:30	10:35	10:40	10:45	10:50	10:55
pH	6.03	6.01	5.81	5.74	5.74	5.78	5.82
Conductivity	15.7	15.1	18.2	19.9	21.5	22.4	22.5
Eh							
Temperature	14.82	14.64	14.94	15.3	15.06	15.14	15.21
Turbidity/color							
Dissolved Oxygen	5.5	3.50	1.69	1.23	.80	0.49	0.46

MW 10:25

Analyses	Method	Bottle Type	Preservative	Number	Number MS/MSD

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SCOEPA00006644

1 9/20/00

GROUNDWATER SAMPLING DATA SHEET

Well Number: MW-12-41 Sample Number: 154-GW-01 Date: 9/20/00

Project: RPAC Project Number: 92C0804A Task: 20C

Weather Conditions: Sunny 80° Observations/Comments:

P.I.D. Reading: Ø

Calibration Date of P.I.D.: 9/20/00

P.I.D. Standard Calibration Used: 100PPM Isobutylene

Combustible Gas Reading:

Well Depth: 41' recorded ~~41.2~~ 40.65' meas.

Water Depth: 17.05'

Feet of Water:

Gallons per Foot:

Well Volume:

Purge Volume:

Observation for LNAPL: none

Observation for DNAPL: none.

Observation and condition of the well:

Pump hoses and/or bailer ropes were new, cleaned or dedicated?

Measuring Point (MP):

Elevation of MP:

Elevation of Water:

Well Diameter: 2"

Well Diameter	Gallons per casing foot
2 inches	0.16
3 inches	0.367
4 inches	0.65

pH meter: Horiba U22

Eh meter: "

Conductivity meter: "

Calibration Date: 9/20/00

QA/QC samples: —

Purge Method: low flow

Sample Method: 2" Submersible pump

Water Disposal: Treatment System

Sampler(s): KRR

General Comments: clarity: clear-colorless Sampled at 10:20
Ferrous Iron: 0

Field Parameters	Before Purging	Volume 1	Volume 2	Volume 3	Volume 4	Volume 5	~~Sample~~ volume 6
Time	9:41	9:46	9:51	9:56	10:00	10:05	10:10
pH	6.11	6.10	5.91	5.57	5.39	5.28	5.23
Conductivity	27.4	29.1	30.2	31.1	~~8.80~~	32.6	33.2
Eh					31.9		
Temperature	14.19	14.2	14.51	14.55	14.56	14.58	14.61
Turbidity/color							
Dissolved Oxygen	4.57	1.75	0.93	0.81	0.77	0.72	0.69

Analyses	Method	Bottle Type	Preservative	Number	Number MS/MSD

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SCOEPA00006645

nw / 9/20/00

GROUNDWATER SAMPLING DATA SHEET

Well Number: MW-12-59 Sample Number: 155-6w-01 Date: 9/20/00

Project: RPAC Project Number: 92C0804A Task: 20C

Weather Conditions: Sunny 80° Observations/Comments:

P.I.D. Reading: Ø

Calibration Date of P.I.D.: 9/20/00

P.I.D. Standard Calibration Used: 100ppm Isobutylene

Combustible Gas Reading:

Well Depth: 59' recorded 62' measured

Water Depth: 16.57'

Feet of Water:

Gallons per Foot:

Well Volume:

Purge Volume:

Observation for LNAPL: none

Observation for DNAPL: none

Observation and condition of the well:

Pump hoses and/or bailer ropes were new, cleaned or dedicated?

Measuring Point (MP):

Elevation of MP:

Elevation of Water:

Well Diameter: 2"

Well Diameter	Gallons per casing foot
2 inches	0.16
3 inches	0.367
4 inches	0.65

pH meter: Horiba U22

Eh meter: "

Conductivity meter: "

Calibration Date: 9/20/00

QA/QC samples:

Purge Method: low-flow

Sample Method: 2" submersible pump

Water Disposal: Treatment System

Sampler(s): RRR

General Comments: Clarity: silty tan (9:41)
Ferrous Iron: Ø

Field Parameters	Before Purging	Volume 1	Volume 2	Volume 3	Volume 4	Volume 5	Sample
Time	9:40	9:45	9:50	9:55			10:05
pH	5.04	5.25	5.29	5.31			
Conductivity	25.1	25.3	24.9	24.7			
Eh							
Temperature	14.7	14.8	15.0	15.0			
Turbidity/color							
Dissolved Oxygen	9.04	6.93	6.32	6.31			

Analyses	Method	Bottle Type	Preservative	Number	Number MS/MSD
	8041				
	8081/8082				
	8141				

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GROUNDWATER SAMPLING DATA SHEET

Well Number: MW-12-79 (B) Sample Number: 156-GW-01 Date: 9/20/00

Project: RPAC Project Number: 92C0804A Task: 20C

Weather Conditions: Sunny 80°C Observations/Comments:

P.I.D. Reading: Ø

Calibration Date of P.I.D.: 9/20/00

P.I.D. Standard Calibration Used: 100PPM Isobutylene

Combustible Gas Reading:

Well Depth: 79' recorded 82.37' meas (81.55 sediment begins)

Water Depth: 17.25

Feet of Water:

Gallons per Foot:

Well Volume:

Purge Volume:

Observation for LNAPL: none

Observation for DNAPL: none

Observation and condition of the well:

Pump hoses and/or bailer ropes were new, cleaned or dedicated?

Measuring Point (MP):

Elevation of MP:

Elevation of Water:

Well Diameter: 2"

Well Diameter	Gallons per casing foot
2 inches	0.16
3 inches	0.367
4 inches	0.65

pH meter: Horiba U20

Eh meter: "

Conductivity meter: "

Calibration Date: 9/20/00

QA/QC samples:

Purge Method: low flow

Sample Method: 2" Submersible pump

Water Disposal: Treatment System

Sampler(s):

General Comments: Clarity: Cloudy tan
Ferrous Iron: ~~0~~ 1.4 [11:17 MW 9/20]

Field Parameters	Before Purging	Volume 1	Volume 2	Volume 3	Volume 4	Volume 5	Sample
Time	10:41	10:46	10:51	10:57	11:03		11:10
pH	5.71	5.66	5.73	5.78	5.87		
Conductivity	27.3	26.9	26.9	26.9	26.9		
Eh							
Temperature	15.5	14.7	15.0	15.1	15.1		
Turbidity/color	~~15~~						
Dissolved Oxygen	5.64	1.34	0.64	0.53	0.51		

Analyses	Method	Bottle Type	Preservative	Number	Number MS/MSD

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GROUNDWATER SAMPLING DATA SHEET

Well Number: RPW-02 Sample Number: 157-GW-01 Date: 9/20/00

Project: RPAC Project Number: 92C0804A Task: 20C

Weather Conditions: overcast 80° Observations/Comments:

P.I.D. Reading: Ø

Calibration Date of P.I.D.: 9/20/00

P.I.D. Standard Calibration Used: 100ppm Isobutylene

Combustible Gas Reading:

Well Depth: 37.50' measured

Water Depth: 14.28

Feet of Water:

Gallons per Foot:

Well Volume:

Purge Volume:

Observation for LNAPL: none

Observation for DNAPL: none

Observation and condition of the well:

Pump hoses and/or bailer ropes were new, cleaned or dedicated?

Measuring Point (MP):

Elevation of MP:

Elevation of Water:

Well Diameter: 4"

Well Diameter	Gallons per casing foot
2 inches	0.16
3 inches	0.367
4 inches	0.65

pH meter: Horiba U20

Eh meter: "

Conductivity meter: "

Calibration Date: 9/20/00

QA/QC samples: RB

Purge Method: low flow

Sample Method: 2" submersible pump

Water Disposal: treatment system

Sampler(s): KRR

General Comments: Rinsate Blank : 157-GW-03
Ferrous Iron = 0.6 mg/L

Field Parameters	Before Purging	Volume 1	Volume 2	Volume 3	Volume 4	Volume 5	Sample
Time	12:18	12:23	12:28	12:33			13:10
pH	6.02	5.98	5.96	5.96			
Conductivity	17.0	15.5	15.2	15.4			
Eh	~~15.5~~						
Temperature	~~15.2~~ 16.8	17.0	17.1	17.1			
Turbidity/color							
Dissolved Oxygen	1.03	1.36	1.49	1.50			

Analyses	Method	Bottle Type	Preservative	Number	Number MS/MSD

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5th Farthest North

GROUNDWATER SAMPLING DATA SHEET

Well Number: MW-1-76 Sample Number: 158-GW-01 Date: 9/20/00

Project: RPAC Project Number: 92C0804A Task: 20C

Weather Conditions: overcast humid 80° Observations/Comments:

P.I.D. Reading: Ø

Calibration Date of P.I.D.: 9/20/00

P.I.D. Standard Calibration Used: 100 PPM Isobutylene

Combustible Gas Reading:

Well Depth: 70.64

Water Depth: 20.09

Feet of Water:

Gallons per Foot:

Well Volume:

Purge Volume:

Observation for LNAPL: none

Observation for DNAPL: none

Observation and condition of the well:

Pump hoses and/or bailer ropes were new, cleaned or dedicated?

Measuring Point (MP):

Elevation of MP:

Elevation of Water:

Well Diameter: 2"

Well Diameter	Gallons per casing foot
2 inches	0.16
3 inches	0.367
4 inches	0.65

pH meter:

Eh meter:

Conductivity meter:

Calibration Date:

QA/QC samples:

Purge Method:

Sample Method:

Water Disposal:

Sampler(s):

General Comments:

Field Parameters	Before Purging	Volume 1	Volume 2	Volume 3	Volume 4	Volume 5	Sample
Time	12:33	12:46	12:61	12:56	1:05	1:58	13:25
pH	5.65	5.82	5.87	5.90	6.03	6.09	
Conductivity	39.5	39.2	39.1	39.0	38.8	39.1	
Eh							
Temperature	15.6	16.3	16.5	16.9	17.4	17.4	
Turbidity/color							
Dissolved Oxygen	3.58	2.93	3.25	3.72	4.61	4.85	

Analyses	Method	Bottle Type	Preservative	Number	Number MS/MSD
Phenols	8041	1 L amber	—	1	—
Ch Herb	8151	1 L amber	—	1	—
VOCs	8260	voas	—	3	—

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SCOEPA00006649

3rd farthest North

GROUNDWATER SAMPLING DATA SHEET

Well Number: MW-01-25.8 Sample Number: 159-GW-01 Date: 9/20/00

Project: RPAC Project Number: 92C0804A Task: 20C

Weather Conditions: Overcast Observations/Comments:

P.I.D. Reading: Ø

Calibration Date of P.I.D.: 9/20/00

P.I.D. Standard Calibration Used: 100 PPM Isobutylene

Combustible Gas Reading:

Well Depth: 24.37

Water Depth: 18.15'

Feet of Water: 24.37 - 18.15 = 6.22 ft

Gallons per Foot: 0.16 gal

Well Volume: 0.93 gal (6.22 ft x 0.16 gal/ft)

Purge Volume: ~~4-4 bailers~~

Observation for LNAPL: none

Observation for DNAPL: none

Observation and condition of the well:

Pump hoses and/or bailer ropes were new, cleaned or dedicated?

General Comments: ~~1.92~~ 2.92 ft of sediment @ btm

Measuring Point (MP):

Elevation of MP:

Elevation of Water:

Well Diameter: 2"

Well Diameter	Gallons per casing foot
2 inches	0.16
3 inches	0.367
4 inches	0.65

pH meter:

Eh meter:

Conductivity meter:

Calibration Date:

QA/QC samples:

Purge Method:

Sample Method: Bailer on 9/22/00

Water Disposal:

Sampler(s): DC, MN, NM

MEAS TD on 9.20 = 24.37

meas TD on 9.21 = 27.29

Field Parameters	Before Purging	Volume 1	Volume 2	Volume 3	Volume 4	Volume 5	Sample
~~Time~~ Gallons		1	2	3		9/22	13:00
pH		5.95					
Conductivity		224.4					
Eh							
Temperature		17.93					
Turbidity/color							
Dissolved Oxygen		11.66					

Analyses	Method	Bottle Type	Preservative	Number	Number MS/MSD
Phenols	8041	1 L Amber	—	1	—
Chl Herb	8151	1 L Amber	—	1	—
VOCs	8260	3 voas	—	3	—
Major Cat.	6010B	250 ml	Nitric	1	—
AN/Anions	300/310.1	500 ml Poly	—	1	—
Sulfide	376.1	500 ml Poly	Zn Acetate + NaOH	1	-
BOD + COD	405.1	1 L Poly	—	1	—
TOC/COD/	410.4/415.2	250 ml poly	sulfuric acid	1	—
~~Ammonia~~	350.1				
~~TO~~ methane	GC/FID	voas	—	3	—
				1	—

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2nd Furthest North

GROUNDWATER SAMPLING DATA SHEET

Well Number: MW-01-41 Sample Number: 160-6W-01 Date: 9/20/00

Project: RPAC Project Number: 92C0804A Task: 20C

Weather Conditions: _____ Observations/Comments: _____

P.I.D. Reading: Ø

Calibration Date of P.I.D.: 9/20/00

P.I.D. Standard Calibration Used: _____

Combustible Gas Reading: _____

Well Depth: 42.06

Water Depth: 17.70'

Feet of Water: _____

Gallons per Foot: _____

Well Volume: _____

Purge Volume: _____

Observation for LNAPL: none

Observation for DNAPL: none

Observation and condition of the well: _____

Pump hoses and/or bailer ropes were new, cleaned or dedicated?

Measuring Point (MP): _____

Elevation of MP: _____

Elevation of Water: _____

Well Diameter: 2"

Well Diameter	Gallons per casing foot
2 inches	0.16
3 inches	0.367
4 inches	0.65

pH meter: _____

Eh meter: _____

Conductivity meter: _____

Calibration Date: _____

QA/QC samples: _____

Purge Method: _____

Sample Method: _____

Water Disposal: _____

Sampler(s): _____

General Comments: Ferrous Iron Ø

Field Parameters	Before Purging	Volume 1	Volume 2	Volume 3	Volume 4	Volume 5	Sample
Time	2:21	2:26	2:33	2:39	2:44	2:47	15:00
pH	6.29	5.73	5.38	5.33	5.30	5.30	
Conductivity	34.2	36.9	37.9	38.1	38.0	38.0	
Eh							
Temperature	15.04	~~2.~~ 15.29	15.65	15.78	15.79	15.86	
Turbidity/color							
Dissolved Oxygen	5.63	2.11	1.27	0.85	0.68	0.67	

Analyses	Method	Bottle Type	Preservative	Number	Number MS/MSD

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Furthest North

GROUNDWATER SAMPLING DATA SHEET

Well Number: MW-01-56 Sample Number: 161-GW-01 Date: 9/20/00

Project: RPAC Project Number: 92C0804A Task: 20C

Weather Conditions: overcast 80° Observations/Comments:

P.I.D. Reading: Ø

Calibration Date of P.I.D.: 9/20/00

P.I.D. Standard Calibration Used:

Combustible Gas Reading:

Well Depth: 57.22' measured

Water Depth: 17.95'

Feet of Water:

Gallons per Foot:

Well Volume:

Purge Volume:

Observation for LNAPL: None

Observation for DNAPL: None

Observation and condition of the well:

Pump hoses and/or bailer ropes were new, cleaned or dedicated?

Measuring Point (MP):

Elevation of MP:

Elevation of Water:

Well Diameter:

Well Diameter	Gallons per casing foot
2 inches	0.16
3 inches	0.367
4 inches	0.65

pH meter: Horiba U20

Eh meter: "

Conductivity meter: "

Calibration Date: 9/20/00

QA/QC samples: —

Purge Method:

Sample Method:

Water Disposal:

Sampler(s): RRR

General Comments: Ferrous Iron Ø

Field Parameters	Before Purging	Volume 1	Volume 2	Volume 3	Volume 4	Volume 5	Sample
Time	2:20	2:26	12:31	2:39	2:43 PM		14.55
pH	5.68	5.55	5.47	5.5	5.52		
Conductivity	21.7	21.4	21.4	21.4	21.4		
Eh							
Temperature	15.1	14.4	14.6	14.6	14.6		
Turbidity/color							
Dissolved Oxygen	5.90	3.91	3.06	2.81	~~3.3~~ 2.83		

Analyses	Method	Bottle Type	Preservative	Number	Number MS/MSD

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Table 2-1
Depth to Water Summary
Fall 2000 Groundwater Monitoring Round
RPAC, Portland, OR

Monitoring Point ID	Type	Location / Property	Depth to Water (feet BMP)	Time	Date	Measuring Point Elevation (Feet AMSL)	Water Table Elevation (Feet AMSL)	NAPL Thickness (inches)
W-11-D	Well	ESCO	28.03	13:14	10/3/00	40.09	12.06	None
W-11-I	Well	ESCO	28.13	13:13	10/3/00	40.28	12.15	None
W-11-S	Well	ESCO	15.73	13:12	10/3/00	40.90	25.17	None
W-12-D	Well	ESCO	23.5	13:06	10/3/00	41.63	18.13	None
W-12-I	Well	ESCO	22.15	13:07	10/3/00	41.66	19.51	None
W-12-S	Well	ESCO	15.43	13:09	10/3/00	41.41	25.98	None
W-15-D	Well	METRO	13.8	13:16	10/2/00	40.53	26.73	None
W-15-I	Well	METRO	13.48	13:17	10/2/00	40.72	27.24	None
W-15-S	Well	METRO	13.55	13:18	10/2/00	40.82	27.27	None
W-16-31	Well	SCHNITZER	7.85	13:24	10/2/00	33.70	25.85	None
W-16-D	Well	SCHNITZER	12.13	13:25	10/2/00	35.44	23.31	None
W-16-I	Well	SCHNITZER	13.03	13:26	10/2/00	35.42	22.39	None
W-16-S	Well	SCHNITZER	9.33	6:43	10/2/00	35.07	25.67	None
W-18-D	Well	PGE	23.42	9:08	10/2/00	55.70	32.28	None
W-18-I	Well	PGE	22.04	9:07	10/2/00	54.73	32.69	None
W-18-S	Well	PGE	22.42	9:06	10/2/00	55.23	32.81	None
W-19-D	Well	ATOFINA	27.21	15:31	10/2/00	34.80	7.59	None
W-19-I	Well	ATOFINA	27.41	15:32	10/2/00	34.80	7.39	None
W-19-S	Well	ATOFINA	dry 25.85	15:33	10/2/00	34.80		None
KM-MW-2	Well	KINDER MORGAN	27.36	8:47	10/2/00	50.68	23.32	None
KM-MW-5	Well	KINDER MORGAN	NM	12:31	10/2/00	50.78		None

Notes:
BMP = Below Measuring Point. The measuring point usually corresponds to the top of casing (TOC) reference used in previous reports.
NM = Not Measured
NA = Not Applicable
NR = Not Recorded
[1] = Survey data not available
All elevations are in feet Above Mean Sea Level (AMSL) in COP (City of Portland) datum

SCOEPA00006653

Table 2-1
Depth to Water Summary
Fall 2000 Groundwater Monitoring Round
RPAC, Portland, OR

Monitoring Point ID	Type	Location / Property	Depth to Water (feet BMP)	Time	Date	Measuring Point Elevation (Feet AMSL)	Water Table Elevation (Feet AMSL)	NAPL Thickness (inches)
A	Well	HERBICIDE AREA	21.77	15:29	10/3/00	'	'	None
AL2-17	Well	LAKE AREA	15.58	11:11	10/2/00	41.77	26.19	None
AL2-32	Well	LAKE AREA	17.38	11:12	10/2/00	41.41	24.03	None
AL2-46	Well	LAKE AREA	17.65	11:13	10/2/00	41.77	24.12	None
AL4-47	Well	LAKE AREA	15.96	11:29	10/2/00	40.24	24.28	None
AL5-19	Well	LAKE AREA	15.74	11:19	10/2/00	40.07	24.33	None
AL5-35	Well	LAKE AREA	15.85	11:20	10/2/00	39.54	23.69	None
AL5-62	Well	LAKE AREA	15.92	11:21	10/2/00	39.59	23.67	None
AL6-96	Well	LAKE AREA	18.1	11:56	10/2/00	38.72	20.62	None
ASW-01A	Well	METRO	7.48	12:37	10/2/00	38.81	NM	None
ASW-03	Well	METRO	13.71	12:59	10/2/00	41.02	27.31	None
ASW-04	Well	METRO	9.06	12:46	10/2/00	40.76	31.7	None
ASW-05	Well	METRO	NM	NR	10/2/00	'	'	None
ASW-06	Well	METRO	9.56	12:57	10/2/00	40.10	30.54	None
ASW-07	Well	METRO	NM	NA	10/2/00	NA	NM	NA
ASW-08	Well	METRO	6.97	13:11	10/2/00	36.72	NM	NA
B	Well	HERBICIDE AREA	17.89	15:28	10/3/00	'	'	None
BST2W-61	Well	LAKE AREA	17.16	11:14	10/2/00	41.13	23.97	None
BST5W-74	Well	LAKE AREA	16.41	11:22	10/2/00	39.84	23.43	None
BTB-4A-84	Well	LAKE AREA	17.85	11:52	10/2/00	39.50	21.65	None
BTB-4B-25	Well	LAKE AREA	12.29	11:53	10/2/00	39.54	27.25	None
BTB-4B-55	Well	LAKE AREA	18.17	11:54	10/2/00	39.81	21.64	None
C	Well	HERBICIDE AREA	18.62	15:26	10/3/00	'	'	1.67
D	Well	HERBICIDE AREA	19.31	15:24	10/3/00	'	'	None
E	Well	HERBICIDE AREA	19.25	15:23	10/3/00	'	'	5.3
F	Well	HERBICIDE AREA	22.75	15:22	10/3/00	'	'	None
G	Well	HERBICIDE AREA	19.25	15:21	10/3/00	'	'	None
H	Well	HERBICIDE AREA	22.63	15:20	10/3/00	'	'	None
MW-01-26	Well	HERBICIDE AREA	16.98	9:28	10/2/00	49.89	32.91	None
MW-01-41	Well	HERBICIDE AREA	17.7	9:29	10/2/00	49.53	31.83	None
MW-01-56	Well	HERBICIDE AREA	17.92	9:30	10/2/00	49.70	31.78	None
MW-01-76	Well	HERBICIDE AREA	20.30	9:26	10/2/00	47.70	27.40	None
MW-02-26	Well	HERBICIDE AREA	16.15	10:00	10/2/00	48.09	31.94	None
MW-02-46	Well	HERBICIDE AREA	15.96	10:09	10/2/00	47.91	31.95	None
MW-02-62	Well	HERBICIDE AREA	15.58	10:08	10/2/00	48.00	32.42	None
MW-03-27	Well	HERBICIDE AREA	16.56	10:25	10/2/00	48.32	31.76	None
MW-03-49	Well	HERBICIDE AREA	16.6	10:24	10/2/00	48.28	31.68	None
MW-03-68	Well	HERBICIDE AREA	16.58	10:23	10/2/00	48.25	31.67	None
MW-03-85	Well	WACKER	20.56	14:35	10/2/00	35.54	14.98	None
MW-03-I	Well	WACKER	21.29	14:33	10/2/00	36.43	15.14	None
MW-03-S	Well	WACKER	16.05	14:34	10/2/00	36.35	20.3	None
MW-04-27	Well	HERBICIDE AREA	19.05	10:28	10/2/00	47.53	28.48	None
MW-04-47	Well	HERBICIDE AREA	18.79	10:27	10/2/00	47.65	28.86	None
MW-04-63	Well	HERBICIDE AREA	18.6	10:26	10/2/00	48.00	29.4	None
MW-05-24	Well	HERBICIDE AREA	11.81	10:46	10/2/00	37.83	26.02	None
MW-05-34	Well	HERBICIDE AREA	11.9	10:45	10/2/00	37.83	25.93	1.31
MW-05-52	Well	HERBICIDE AREA	13.54	10:44	10/2/00	37.7	24.16	None
MW-05-70	Well	HERBICIDE AREA	14.34	10:43	10/2/00	38.33	23.99	None
MW-06-S	Well	WACKER	15.86	14:38	10/2/00	36.37	20.51	None
MW-07-S	Well	WACKER	18.62	14:40	10/2/00	37.32	18.7	None
MW-08-27	Well	HERBICIDE AREA	23.95	10:36	10/2/00	48.23	24.28	None
MW-08-46	Well	HERBICIDE AREA	20.51	10:35	10/2/00	48.11	27.6	None
MW-08-64	Well	HERBICIDE AREA	20.3	10:34	10/2/00	47.97	27.67	None
MW-09-23	Well	HERBICIDE AREA	15.88	10:21	10/2/00	47.03	31.15	None

Table 2-1
Depth to Water Summary
Fall 2000 Groundwater Monitoring Round
RPAC, Portland, OR

Monitoring Point ID	Type	Location / Property	Depth to Water (feet BMP)	Time	Date	Measuring Point Elevation (Feet AMSL)	Water Table Elevation (Feet AMSL)	NAPL Thickness (inches)
MW-09-42	Well	HERBICIDE AREA	16.56	10:20	10/2/00	47.64	31.08	None
MW-09-58	Well	HERBICIDE AREA	15.42	10:19	10/2/00	46.21	30.79	None
MW-09-80	Well	HERBICIDE AREA	16.27	10:17	10/2/00	46.67	30.4	None
MW-10-24	Well	INSECTICIDE AREA	14.71	9:47	10/2/00	46.21	31.5	None
MW-10-44	Well	INSECTICIDE AREA	15.05	9:48	10/2/00	46.54	31.49	None
MW-10-57	Well	INSECTICIDE AREA	15.04	9:49	10/2/00	46.66	31.62	None
MW-11-24	Well	INSECTICIDE AREA	12.22	9:43	10/2/00	44.01	31.79	None
MW-11-37	Well	INSECTICIDE AREA	11.79	9:42	10/2/00	43.80	32.01	None
MW-11-56	Well	INSECTICIDE AREA	11:53	9:41	10/2/00	43.63	43.13	None
MW-11-79	Well	INSECTICIDE AREA	11.86	9:40	10/2/00	44.14	32.28	None
MW-12-27	Well	INSECTICIDE AREA	16.92	9:20	10/2/00	50.22	33.3	None
MW-12-41	Well	INSECTICIDE AREA	16.82	9:19	10/2/00	50.08	33.26	None
MW-12-59	Well	INSECTICIDE AREA	16.4	9:17	10/2/00	49.58	33.18	None
MW-12-79	Well	INSECTICIDE AREA	17.09	9:21	10/2/00	50.08	32.99	None
NDL-SG	Staff Gauge	BNSF	1.2	15:00	10/2/00	27.46	26.26	None
P-07	Well	HERBICIDE AREA	19.18	10:31	10/2/00	'	'	3.83
P-10	Piezometer	HERBICIDE AREA	13.78	10:50	10/2/00	'	'	None
P-11	Piezometer	HERBICIDE AREA	14.7	10:52	10/2/00	39.29	24.59	None
PP-08	Piezometer	LAKE AREA	13.68	11:30	10/2/00	37.76	24.08	None
PP-11	Piezometer	ATOFINA	NM	15:18	10/2/00	36.52		None
PZ-02-40	Piezometer	City of Portland	36.82	9:00	10/2/00	64.53	27.71	None
PZ-1-11	Piezometer	INSECTICIDE AREA	10.1	9:11	10/2/00	45.28	35.18	None
RP-01-31	Well	BNSF	27.49	14:15	10/2/00	35.38	7.89	None
RP-01-51	Well	BNSF	27.5	14:16	10/2/00	35.28	7.78	None
RP-01-65	Well	BNSF	27.32	14:17	10/2/00	35.00	7.68	None
RP-02-31	Well	ATOFINA	32.68	15:28	10/2/00	40.12	7.44	None
RP-02-49	Well	ATOFINA	32.53	15:29	10/2/00	39.83	7.30	None
RP-02-66	Well	ATOFINA	32.8	15:30	10/2/00	39.70	6.9	None
RP-03-DR	Well	WACKER	19.65	14:47	10/2/00	39.50	19.85	None
RP-03-SR	Well	WACKER	18.28	14:48	10/2/00	39.53	21.25	None
RP-04-16	Piezometer	BNSF	11.78	11:35	10/2/00	33.66	21.88	None
RP-04-41	Well	BNSF	16.31	11:34	10/2/00	34.10	17.79	None
RP-05-16	Piezometer	BNSF	15.67	11:03	10/2/00	40.54	24.87	None
RP-06-30	Well	BNSF	20.1	14:49	10/2/00	37.20	17.1	None
RP-06-87	Well	BNSF	27.42	14:50	10/2/00	37.10	9.68	None
RPW-02	Well	INSECTICIDE AREA	15.92	9:36	10/2/00	47.07	31.15	None
RPW-03	Well	INSECTICIDE AREA	12.2	9:45	10/2/00	43.94	31.74	None
RPW-05	Well	INSECTICIDE AREA	21.02	10:55	10/2/00	49.83	28.81	None
SG-WDL	Staff Gauge	BNSF	-0.2	15:48	10/2/00	26.74	26.94	None
W-03-D	Well	GOULD	14.09	13:47	10/2/00	32.47	18.38	None
W-03-I	Well	GOULD	10.25	13:48	10/2/00	32.93	22.68	None
W-03-S	Well	GOULD	9.17	13:49	10/2/00	34.17	25.00	None
W-04-89	Well	GOULD	12.8	13:42	10/2/00	35.94	23.14	None
W-04-I	Well	GOULD	10.86	13:55	10/2/00	32.52	21.66	None
W-04-S	Well	GOULD	8.17	13:56	10/2/00	32.57	24.4	None
W-06-B	Well	LAKE AREA	15.95	11:06	10/2/00	39.96	24.01	None
W-06-D	Well	LAKE AREA	13.65	11:07	10/2/00	41.10	27.45	None
W-06-S	Well	LAKE AREA	14.05	11:08	10/2/00	39.55	25.5	None
W-08	Well	LAKE AREA	12.72	11:38	10/2/00	35.87	23.15	None
W-08-26	Well	LAKE AREA	13.02	11:29	10/2/00	38.66	25.64	None
W-08-74	Well	LAKE AREA	15.62	11:40	10/2/00	38.77	23.15	None
W-09	Well	LAKE AREA	11.63	11:45	10/2/00	34.88	23.25	None
W-09-116	Well	LAKE AREA	19.77	11:46	10/2/00	38.12	18.35	None
W-09-86	Well	LAKE AREA	20	11:47	10/2/00	38.54	18.54	None
W-10	Well	COP PUMP STATION	20.75	14:11	10/2/00	31.99	11.24	None
W-11-B	Well	ESCO	28.73	13:16	10/3/00	41.33	12.6	None

TABLES

03-25, RP-03-65, RP-06-87, RP-06-30, MW-05-65, and AL-6-96. Samples were collected consistent with methods used during initial sampling during the Fall 2000 monitoring event.

Field observations made and data generated in conjunction with the sample collection were entered in the daily logbook. Deviations from the sampling plan were noted on both data sheets and logbooks.

3.6 Decontamination Procedure

All non-dedicated sampling equipment (e.g., pumps, water level meter, etc.) were decontaminated prior to use at each well location as follows:

- Potable water rinse
- Soap wash (dilute solution of Liquinox or equivalent in potable water solution)
- De-ionized water rinse
- Dilute methanol/de-ionized water rinse
- De-ionized water rinse[1]

The above mentioned solutions were sequentially pumped through the portable submersible pumps.

3.7 Treatment and Disposal of Investigation-Derived Waste (IDW)

All purge water and decontamination fluids were contained in Department of Transportation (DOT)-approved 55-gallon drums at each well location. Water was transported in the drums and pumped into RPAC's onsite treatment system at the end of each sampling day. A total volume of 1,420 gallons was generated and pumped into the treatment system during the fall sampling round.

Disposable tubing, bailers, twine and personal protective equipment (PPE) such as gloves and tyvek suits were placed in plastic lined drums in the RPAC warehouse at the end of each day. Seven drums of debris were generated during the fall sampling round. The debris was classified as listed hazardous waste and disposed of at the Waste Management, Inc. facility in Arlington, Oregon.

3.8 Deviations from the Field Sampling Plan

3.8.1 Water Level Monitoring

The groundwater extraction system was not shut down during the water level monitoring round in order to accurately describe the effects of the system on the shallow aquifer. The final list of the wells that were monitored was updated during the Spring 2000 monitoring event, based on the results of the monitoring well inventory.

[1] De-ionized water was obtained in five-gallon containers from Aqua Cool Bottled Water.

3.8.2 Groundwater Sampling

The final list of wells that were sampled and the relevant parameters were updated, based on the results of the monitoring well inventory and the Spring 2000 monitoring event. Peristaltic pumps or disposable bailers were used to collect samples from wells that contained NAPL in order to avoid the gross contamination of the down hole centrifugal pump. Disposable bailers were used to purge and collect samples from shallow wells with slow recharge. Shallow wells requiring the use of bailers were purged using the typical method of removing at least three casing volumes or until field parameter stabilization or the well purged dry. Low flow purge methods were utilized at all other well locations.

3.8.3 Field QA/QC Requirements

The frequency of collection for all QA/QC samples was updated to approximately one per batch, with the exception of trip blanks.

3.9 Field Observations

The following unanticipated field observations were made during the Fall 2000 monitoring round:

- DNAPL was detected and sampled from monitoring well MW-02-26, and was pink in color.
- DNAPL was detected in MW-05-34.
- LNAPL was detected in MW-08-27 with a thickness of 3.6 feet.
- DNAPL 6 inches thick was detected and sampled from monitoring well MW-08-46, and was dark brown in color. During the transfer to the sampling container from the bailer, some mixing with groundwater occurred and some of the product floated to the top of the sampling container.
- The groundwater collected from MW-2-26 and RP-02-30 effervesced when placed into sample containers preserved with HCL.
- There was a hydrogen sulfide (rotten egg) odor detected in RP-01-65, RPW-03, RP-04-16, W-11-B, and W-16-30.
- A creosote like odor was observed in MW-06-S.
- W-19-S was completely dry.
- The following wells were pumped or bailed dry during purging activities: MW-01-26, MW-4-27, W-06-S, AL2-17, RP-05-15, W-15-S, PP-08, AL5-19, W-08-25, W-04-S, W-12-I, RP-01-31, RP-03-S, RP-06-30, MW-03-85, RP-02-30, and W-16-I.

3.10 Re-Sampling Event

Laboratory contamination of samples from one batch sent for 8151 analysis necessitated the re-sampling of the following wells on November 28-29, 2000: RP-01-65, RP-01-51, RP-01-31, RP-

water from that interval of the well was collected using a disposable double-check valve bailer, which was then examined for color, background odor, thickness of NAPL or product sheen.

The total depth (TD) of each well was measured using a graduated tape and weight to ensure that the well's correct identification was recorded. The tape and bailers were lowered slowly into the well to minimize disturbance of the water column.

If sufficient NAPL was present in a well, a sample of the NAPL was collected for analysis. Aqueous phase groundwater samples were not collected from wells where NAPL samples were collected.

Three methods were used to purge monitoring wells prior to sampling. Wells with slow recharge or in which NAPL was detected were purged using disposable tubing attached to a peristaltic pump. Volatile organic compounds (VOC) samples were collected using a disposable double check valve bailer equipped with a low flow bottom-emptying device for wells purged with a peristaltic pump. Shallow wells with slow recharge were purged of at least three casing volumes until field parameter measurements (pH, conductivity, dissolved oxygen, and temperature) stabilized within 10%, or the wells purged dry. All other wells were purged using a portable 2-inch submersible pump equipped with disposable tubing. Regardless of pump equipment, the intake was placed in the center of the bottom 5 feet of the screen interval.

Low flow purge methods were utilized at each well location where pumps were used. Purge water was pumped from the screened interval at rates ranging from approximately 0.25 to 1 liter per minute. Purge water was directed into a flow-through cell. The field meters were placed in the flow through cell to collect continuous readings of pH, conductivity, temperature, and dissolved oxygen. Prior to sampling, field parameters were recorded at approximately 5-minute intervals until measurements generally stabilized within 10% for three consecutive readings or the well purged dry. If a well purged dry, a sample was collected as soon as adequate water returned to the well to make sampling feasible, generally a return of 80% of the static water level.

The sample bottles were filled directly from the pump discharge tubing. VOCs were collected at lower flow rates to minimize agitation of the sample. Dissolved metals samples were field-filtered using a 0.45-micron filter placed directly on the end of the pump discharge tubing.

3.3 Sample Handling

Filled sample bottles were packed and placed in coolers with blue-ice immediately following sample collection for transport to the laboratory. Temperature blanks were placed in each cooler containing samples. Chain-of-custody forms were filled out at the end of each day and placed inside the appropriate cooler. Custody seals were placed on the coolers and the coolers were then taped shut.

Samples were shipped daily via laboratory-provided courier to North Creek Analytical (NCA) for laboratory analysis. The samples requiring analysis by EPA method 8290 were sent to Columbia Analytical Services (CAS).

3.4 QA/QC Requirements

URS personnel collected the following quality assurance/quality control (QA/QC) samples to verify the accuracy and effectiveness of the laboratory methods and to check field decontamination methods and sample handling procedures.

Rinsate Samples

A rinsate sample was collected for each laboratory batch. A laboratory batch is defined as 20 samples per analysis and coincided with the sample delivery group. A total of 6 rinsate samples were collected. Rinsate samples were collected at the following wells: RPW-02, RP-06-87, AL-2-32, MW-08-46, W-12-D, and W-16-D. The rinsate samples were analyzed for the same parameters as the primary samples.

Blind Duplicates

One blind duplicate was collected for each sample delivery group. A total of 7 blind duplicates were collected at the following locations: W-18-D, MW-02-62, MW-08-46, AL-2-32, W-12-D, RP-06-87, and W-16-D. The blind duplicates were analyzed for the same parameters as the primary samples.

Trip Blanks

One trip blank accompanied each cooler containing bottles/samples that were to be analyzed for VOCs, or samples requiring EPA Methods 8141, 8151, 8260, and 8270 throughout sampling activities and shipment to the laboratory. A total of 17 trip blanks accompanied samples to the laboratory throughout the sampling event.

Matrix Spike Samples

A total of 6 matrix spike/matrix spike duplicate (MS/MSD) samples were collected at the following locations: W-18-D, MW-08-64, AL2-32, W-12-D, RP-06-87, and W-16-D. The MS/MSD samples were analyzed for the same parameters as the primary samples.

Temperature blanks were placed in each cooler to assure that appropriate preservation of samples occurred.

3.5 Documentation

All groundwater sampling procedures and other field observations were completed by URS personnel and recorded onto a well-specific "Groundwater Sampling Data Sheet," dated and signed by the field personnel. Appendix A contains the typed groundwater sampling data sheets for the fall sampling round. All sample identifications used on the chain-of-custody documentation were recorded on groundwater sampling data sheets and in a daily logbook.

1.0 INTRODUCTION

This Technical Memorandum addresses a portion of the Early Remedial Investigation (RI) activities to be completed in accordance with the Consent Order (the Order) between the Oregon Department of Environmental Quality (DEQ) and the Rhone-Poulenc AG Company (RPAC). The RPAC property is located at 6200 N.W. St. Helens Road in Portland, Oregon. This Technical Memorandum discusses the field activities related to the Fall 2000 groundwater monitoring round.

RPAC conducted the following groundwater monitoring activities in September, October, and November 2000:

- Water level monitoring – October 2 - 3, 2000
- Groundwater sampling – September 19 – October 17, 2000
- Due to laboratory contamination several wells were re-sampled – November 28 - 29, 2000

Note: Additional documentation regarding this resampling event will be submitted to DEQ under separate cover.

2.0 WATER LEVEL MONITORING

The final list of wells monitored during the Fall 2000 monitoring event is provided in Table 2-1, and was approved by DEQ via a letter dated April 3, 2000. The list includes a total of 127 wells and 2 staff gauges.

The groundwater elevation measurements were collected at the following RPAC areas and off-site properties:

- RPAC Herbicide Area
- RPAC Insecticide Area
- RPAC Lake Area
- Atofina Property
- Gould Electronics Property
- Burlington Northern and Santa Fe Railroad Company Property
- Wacker Siltronic Property
- ESCO Inc. Property
- Metro Property
- Schnitzer Investment Property
- Kinder Morgan Property
- PGE Property
- City of Portland Property

Due to access constraints, water level measurements were initiated after some on-site well sampling had occurred. To avoid potential impact to water levels from well purging/sampling,

three days of recovery time was allowed to pass between sampling at these wells and the water level measurement event.

2.1 Methodology

Depth to water measurements were conducted in accordance with the procedures described in the Early RI Activities-Comprehensive Groundwater Monitoring Field Sampling Plan (FSP), Dated October 1, 1999. Generally, levels were measured using an electronic level probe, capable of measuring the depth to groundwater to the nearest 0.01 feet. The measurements were referenced to a fixed reference point at the top of the well casing. The measurements were recorded on a water level form with the date and time of measurement. If non-aqueous phase liquid (NAPL) was suspected to be present in a well, based on the results of the monitoring well inventory conducted in early 1997, the well was checked for the presence of NAPL using an oil/water interface probe. Each probe was decontaminated with a non-phosphatic detergent and water wash followed by a dilute methanol rinse and a de-ionized water final rinse before checking each well.

The groundwater elevations were then determined by subtracting the depth to groundwater from the elevation of the measuring point (usually the rim of the well casing). The groundwater elevation data and the depth to groundwater data are summarized in Table 2-1.

3.0 GROUNDWATER SAMPLING

On September 19, 2000, URS field personnel began conducting the groundwater sampling activities at the RPAC site in Portland, Oregon in accordance with the Early RI Activities – Comprehensive Groundwater Monitoring Field Sampling Plan, October 1, 1999.

3.1 Sampling Locations

Groundwater samples were collected from a total of 102 monitoring wells between September 19 and October 17, 2000. These wells are located on or in the vicinity of the RPAC property. Table 3-1 summarizes the parameters for which the samples were analyzed during the Fall 2000 event.

3.2 Sampling Procedure

Groundwater sampling activities were generally conducted in accordance with the procedures described in the Early RI Activities-Comprehensive Groundwater Monitoring FSP, dated October 1, 1999. Prior to sampling each well, and immediately after removing the well cap, the air column in the well was measured and evaluated for the presence of organic vapors or hydrogen sulfide using a photoionization detector. Groundwater elevations, presence of NAPL, and well depth were determined using an electronic interface probe as discussed above. If light non-aqueous phase liquids (LNAPLs) or dense non-aqueous phase liquids (DNAPLs) were detected, a column of

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Tables

Table 2-1 Depth to Water Summary
Table 3-1 Groundwater Sampling Analysis

Appendices

Appendix A Groundwater Sampling Data Sheets

GROUNDWATER SAMPLING DATA SHEET 9/27 FWW

Well Number: MW-09-23 Sample Number: 178-GW-01 Date: 9/26

Project: RPAC Project Number: 92C0804A Task: 20C

Weather Conditions: clear Observations/Comments:

P.I.D. Reading: Ø

Calibration Date of P.I.D.: 9-25

P.I.D. Standard Calibration Used: 100ppm isobut.

Combustible Gas Reading:

Well Depth:

Water Depth: 15.99'

Feet of Water: 26.11'

Gallons per Foot:

Well Volume:

Purge Volume:

Observation for LNAPL: None

Observation for DNAPL: None

Observation and condition of the well:

Pump hoses and/or bailer ropes were new, cleaned or dedicated?

Disposible, dedicated tubing

General Comments: Hard btm

Measuring Point (MP):

Elevation of MP:

Elevation of Water:

Well Diameter: 2" Stainless

Well Diameter	Gallons per casing foot
2 inches	0.16
3 inches	0.367
4 inches	0.65

pH meter: Horiba u2

Eh meter: "

Conductivity meter: "

Calibration Date: 9-26

QA/QC samples:

Purge Method: Low flow

Sample Method: 2" Sub pump

Water Disposal: H_2O treatment

Sampler(s): RRR, DMC, NJM, MN

Field Parameters	Before Purging	Volume 1	Volume 2	Volume 3	Volume 4	Volume 5	Sample
Time	1429	1432	1437	1442	1447	1452	
pH		6.61	6.54	6.62	6.66	6.67	
Conductivity		52.8	45.1	57.1	69.9	72.3	
Eh							
Temperature		15.24	15.44	15.60	15.65	15.63	
Turbidity/color							
Dissolved Oxygen		~~1.6~~ 0.94	0.41	0.35	0.34	0.32	

Analyses	Method	Bottle Type	Preservative	Number	Number MS/MSD
Phenols	8041	↑	—		
O.C. Pest	8081		—		
PCBs	8082		—		
O.P. Pest	8141		—		
C. Herb	8151	Amber	—		
VOCs	8260B	VOAS	HCL		
Dioxin	8290	250	—		
Total	6010B	250mL	Nitric		

92C0804A\FORMS\GWSAMP.FRM 2/21/95

300, 310.1, 376.1, 405.1, 410.4, 415.2, 350.1, GF/FID. Plate Count

GROUNDWATER SAMPLING DATA SHEET

mw 9/27

Well Number: MW-09-42 Sample Number: 177-GW-01 Date: 9/26

Project: RPAC Project Number: 92C0804A Task: 20C

Weather Conditions: clear Observations/Comments:

P.I.D. Reading: ∅

Calibration Date of P.I.D.: 9-25

P.I.D. Standard Calibration Used:

Combustible Gas Reading:

Well Depth:

Water Depth: 16.83'

Feet of Water: 44.882'

Gallons per Foot:

Well Volume:

Purge Volume:

Observation for LNAPL: None

Observation for DNAPL: None

Observation and condition of the well:

Pump hoses and/or bailer ropes were new, cleaned or dedicated?
Dedicated, disposible tubing

Measuring Point (MP):

Elevation of MP:

Elevation of Water:

Well Diameter: 2inch (stainless)

Well Diameter	Gallons per casing foot
2 inches	0.16
3 inches	0.367
4 inches	0.65

pH meter: Horiba U2

Eh meter: " "

Conductivity meter: "

Calibration Date: 9/26

QA/QC samples:

Purge Method: Low flow

Sample Method: 2" Sub pump.

Water Disposal: Water treatment.

Sampler(s): RRR, DMC, NJM, MN

General Comments: soft btm

Field Parameters	Before Purging	Volume 1	Volume 2	Volume 3	Volume 4	Volume 5	Sample
Time	1422	1427	14:32	1437	1442	1447	1452
pH		6.05	5.95	5.91	6.0	6.11	6.23
Conductivity		81.6	81.2	80.9	81.1	81.3	81.2
Eh							
Temperature		16.4°c	16.6	17.0	17.3	17.5	17.8
Turbidity/color							
Dissolved Oxygen		1.45	1.25	1.12	0.97	0.96	0.96

Analyses	Method	Bottle Type	Preservative	Number	Number MS/MSD
Phenols	8041	Amber	—	1	
O.C. Pest	8081	Amber	—	1	
PCBs	8082	Amber	—	↳ share	
O.P. Pest	8141	Amber	—	1	
C. Herb	8151	Amber	—	1	
VOCs	8260B	VOAS	HCl	3	
Dioxin	8290	Amber	—	1	
Metals	6020	250 mL	Nitric	1	
Mercury	7470	250 mL	↓		
Total	60108	250 mL	↓		

200.7, 310.1, 376.1, 405.1, 410.4, 415.2, 350.1, GCFID, Plate Count

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GROUNDWATER SAMPLING DATA SHEET

Well Number: MW-3-49 Sample Number: 180-GW-01 Date: 9/27/00

Project: RPAC Project Number: 92C0804A Task: 20C

Weather Conditions: clear Observations/Comments:

P.I.D. Reading:

Calibration Date of P.I.D.:

P.I.D. Standard Calibration Used:

Combustible Gas Reading:

Well Depth: 50.76 - 0.54 = 50.22'

Water Depth: 17.32 - 0.54 = 16.78'

Feet of Water: 50

Gallons per Foot:

Well Volume:

Purge Volume:

Observation for LNAPL: none

Observation for DNAPL: none

Observation and condition of the well: O.K.

Pump hoses and/or bailer ropes were new, cleaned or dedicated?
tubing dedicated, pump decon

Measuring Point (MP):

Elevation of MP:

Elevation of Water:

Well Diameter:

Well Diameter	Gallons per casing foot
2 inches	0.16
3 inches	0.367
4 inches	0.65

pH meter: Horiba U20

Eh meter: "

Conductivity meter: "

Calibration Date: 9/27/00

QA/QC samples: —

Purge Method: low flow

Sample Method: 2" submersible pump

Water Disposal: water treatment

Sampler(s): RRR, OMC, MN

General Comments: Black particle discharged in 1st 2 min purging
Ferrous Iron 4.8 mg/L

Field Parameters	Before Purging	Volume 1	Volume 2	Volume 3	Volume 4	Volume 5	Sample
Time	8:56	9:04	9:10	9:16	9:21		9:30
pH	5.83	6.15	6.30	6.30	6.30		
Conductivity	0.273	25.1	0.226	0.218	0.213		
Eh							
Temperature	15.2	15.7	15.8	15.8	15.8		
Turbidity/color							
Dissolved Oxygen	3.48	0.69	0.62	0.59	0.56		

Analyses	Method	Bottle Type	Preservative	Number	Number MS/MSD
Phenols	8041	1 L Amber	—	1	—
Chl Herb	8151	"	—	1	—
VOCs	8260B	voas	HCl	3	—

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GROUNDWATER SAMPLING DATA SHEET

Well Number: MW-3-68 Sample Number: 179-GW-01 Date: 9/27/00

Project: RPAC Project Number: 92C0804A Task: 20C

Weather Conditions: clear Observations/Comments:

P.I.D. Reading: ∅ Measuring Point (MP):

Calibration Date of P.I.D.: 9/27/00 Elevation of MP:

P.I.D. Standard Calibration Used: 100 ppm Isobutylene Elevation of Water:

Combustible Gas Reading: Well Diameter: 2"

Well Depth: 65.07 - ~~0.55~~ 0.54 = ~~64.52'~~ 64.52' nm 9/27

Water Depth: 17.32 - ~~0.55~~ 0.54 = ~~16.77'~~ 16.76'

Feet of Water:

Gallons per Foot:

Well Diameter	Gallons per casing foot
2 inches	0.16
3 inches	0.367
4 inches	0.65

Well Volume:

Purge Volume:

Observation for LNAPL: none

Observation for DNAPL: none

Observation and condition of the well: O.K.

pH meter: Horiba U20

Eh meter: "

Conductivity meter: "

Calibration Date: 9/27/00

QA/QC samples: —

Purge Method: low flow

Sample Method: 2" submersible pump

Water Disposal: water treatment

Sampler(s): KRK, DMC, MKJ

Pump hoses and/or bailer ropes were new, cleaned or dedicated?

tubing dedicated, pump decon

General Comments: Red substance discharged at 1st purge
0.4 Ferrous iron mg/L

Field Parameters	Before Purging	Volume 1	Volume 2	Volume 3	Volume 4	Volume 5	Sample
Time	8:55	9:03	9:10	9:15	9:20		9:25
pH	6.08	6.18	6.25	6.31	6.35		
Conductivity	41.2	43.5	41.7	40.7	40.2		
Eh							
Temperature	14.64	15.06	15.15	15.15	15.14		
Turbidity/color							
Dissolved Oxygen	4.64	1.97	1.52	1.51	1.44		

Analyses	Method	Bottle Type	Preservative	Number	Number MS/MSD
Phenols	8041	1 L Amber	—	1	—
Chl Herb	8151	"	—	1	—
VOCs	8260B	VOAs	HCl	3	—

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SCOEPA00006668

GROUNDWATER SAMPLING DATA SHEET

Well Number: MW-4-63 Sample Number: 182-GW-01 Date: 9/27/00

Project: RPAC Project Number: 92C0804A Task: 20C

Weather Conditions: clear 80° Observations/Comments:

P.I.D. Reading: Ø Measuring Point (MP):

Calibration Date of P.I.D.: 9/27/00 Elevation of MP:

P.I.D. Standard Calibration Used: 100 PPM Isobutylene Elevation of Water:

Combustible Gas Reading: Well Diameter: 2"

Well Depth: 65.00 - 0.54 = 64.46'

Water Depth: 19.39 - 0.54 = 18.85'

Feet of Water:

Gallons per Foot:

Well Diameter	Gallons per casing foot
2 inches	0.16
3 inches	0.367
4 inches	0.65

Well Volume:

Purge Volume:

Observation for LNAPL: none

Observation for DNAPL: none

Observation and condition of the well: o.k.

pH meter: Horiba U20

Eh meter:

Conductivity meter: "

Calibration Date: 9/27/00

QA/QC samples: —

Purge Method: low flow

Sample Method: 2" submersible pump

Water Disposal: water treatment

Sampler(s): MN, DMC, KRR

Pump hoses and/or bailer ropes were new, cleaned or dedicated? tubing dedicated, pump decon

General Comments: 1130 SAMP TIME.

Field Parameters	Before Purging	Volume 1	Volume 2	Volume 3	Volume 4	Volume 5	1127 ~~Sample~~ 1150
Time	10:52	11:00	11:05	11:10	1117	1122	~~1115~~
pH	6.15	5.91	5.99	6.09	6.10	6.10	6.14
Conductivity	33.50	33.3	33.2	33.2	33.3	33.2	33.2
Eh							
Temperature	15.70	15.5	15.7	15.9	15.8	15.7	15.7
Turbidity/color							
Dissolved Oxygen	5.28	1.14	0.82	0.74	0.56	0.48	0.46

Analyses	Method	Bottle Type	Preservative	Number	Number MS/MSD
Phenols	8041	1L Amber	—	1	—
Chl Herb	8151	"	—	1	—
VOCS	8260B	VOA	HCl	3	—

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GROUNDWATER SAMPLING DATA SHEET

Well Number: MW-3-27 Sample Number: 181-GW-01 Date: 9/27/00

Project: RPAC Project Number: 92C0804A Task: 20C

Weather Conditions: clear Observations/Comments:

P.I.D. Reading: Ø

Calibration Date of P.I.D.: 7/27/00

P.I.D. Standard Calibration Used: 100 PPM Isobutylene

Combustible Gas Reading:

Well Depth: 28.32' - 0.54 = 27.78'

Water Depth: 17.28' - 0.54 = 16.74'

Feet of Water:

Gallons per Foot:

Well Volume:

Purge Volume:

Observation for LNAPL: none

Observation for DNAPL: none

Observation and condition of the well: o.k.

Pump hoses and/or bailer ropes were new, cleaned or dedicated?

dedicated tubing, decon pump

Measuring Point (MP):

Elevation of MP:

Elevation of Water:

Well Diameter: 2"

Well Diameter	Gallons per casing foot
2 inches	0.16
3 inches	0.367
4 inches	0.65

pH meter: Horiba U20

Eh meter: "

Conductivity meter: "

Calibration Date: 9/27/00

QA/QC samples: —

Purge Method: low flow

Sample Method: 2" submersible pump

Water Disposal: water treatment

Sampler(s): RKR, OMC, MW

General Comments:

Field Parameters	Before Purging	Volume 1	Volume 2	Volume 3	Volume 4	Volume 5	Sample
Time	9:45	9:50	9:55	10:00	10:05		10:10
pH	5.66	5.78	5.91	5.96	5.97		
Conductivity	0.181	0.198	0.213	0.222	0.228		
Eh							
Temperature	16.6	16.8	17.3	17.5	17.5		
Turbidity/color							
Dissolved Oxygen	2.46	0.85	0.65	0.57	0.55		

Analyses	Method	Bottle Type	Preservative	Number	Number MS/MSD
Phenols	8041	1 L Amber	—	1	—
Chl Herb	8151	"	—	1	—
VOCs	8260B	VOAs	HCl	3	—

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SCOEPA00006670

GROUNDWATER SAMPLING DATA SHEET

Well Number: MW-4-27 Sample Number: 184-GW-01 Date: 9/27/00

Project: RPAC Project Number: 92C0804A Task: 20C

Weather Conditions: clear 80° Observations/Comments:

P.I.D. Reading: 0 Measuring Point (MP):

Calibration Date of P.I.D.: 9/27/00 Ele ation of MP:

P.I.D. Standard Calibration Used: 100 ppm Isobutylene Elevation of Water:

Combustible Gas Reading: Well Diameter: 2"

Well Depth: 29.10-0.54=28.56

Water Depth: 19.75-0.54=19.21

Feet of Water:

Gallons per Foot:

Well Diameter	Gallons per casing foot
2 inches	0.16
3 inches	0.367
4 inches	0.65

Well Volume:

Purge Volume:

Observation for LNAPL: none

Observation for DNAPL: none

Observation and condition of the well: O.K.

pH meter: Horiba U20

Eh meter: "

Conductivity meter: "

Calibration Date: 9/27

QA/QC samples: —

Purge Method: low flow

Sample Method: 2" Submersible pump

Water Disposal: water treatment

Sampler(s): MN, DMC, RKR

Pump hoses and/or bailer ropes were new, cleaned or dedicated?

dedicated

General Comments:

Field Parameters	Before Purging	Volume 1	Volume 2	Volume 3	Volume 4	Volume 5	Sample
Time	1205	1208	1216	1225	1234	1235	1250
pH		6.40	6.37	6.37	6.34	pump	
Conductivity		35.8	35.7	35.9	36.3		
Eh						DRY	
Temperature		17.20	17.04	18.25	18.67		
Turbidity/color							
Dissolved Oxygen		2.70	0.87	0.55	0.48		

Analyses	Method	Bottle Type	Preservative	Number	Number MS/MSD
Phenols	8041	1 L Amber	—	1	—
Chl Herb	8151	"	—	1	—
VOCS	8260B	VOAs	HCl	3	—

92C0804A\FORMS\GWSAMP.FRM 2/21/95

GROUNDWATER SAMPLING DATA SHEET

Well Number: MW-4-47 Sample Number: 183-GW-01 Date: 9/27/00

Project: RPAC Project Number: 92C0804A Task: 20C

Weather Conditions: clear 80° Observations/Comments:

P.I.D. Reading: Ø

Calibration Date of P.I.D.: 9/27/00

P.I.D. Standard Calibration Used: 100 ppm Isobutylene

Combustible Gas Reading:

Well Depth: 44.65 - 0.54 = 44.11

Water Depth: 19.49 - 0.54 = 18.94

Feet of Water: -

Gallons per Foot:

Well Volume:

Purge Volume:

Observation for LNAPL: none

Observation for DNAPL: none

Observation and condition of the well: O.K.

Pump hoses and/or bailer ropes were new, cleaned or dedicated?
tubing dedicated, pump decon

Measuring Point (MP):

Elevation of MP:

Elevation of Water:

Well Diameter: 2"

Well Diameter	Gallons per casing foot
2 inches	0.16
3 inches	0.367
4 inches	0.65

pH meter: Horiba U20

Eh meter: "

Conductivity meter: "

Calibration Date: 9/27/00

QA/QC samples: —

Purge Method: low flow

Sample Method: 2" submersible pump

Water Disposal: Water Treatment

Sampler(s): MN, DMC, KRR

General Comments:

MW 9/27

Field Parameters	Before Purging	Volume 1	Volume 2	Volume 3	Volume 4	Volume 5	~~Sample~~	
Time	10:55	11:00	11:02	11:06	11:11	1117	1122	1127
pH	6.77	5.91	6.71	6.59	6.47	6.47	6.49	6.51
Conductivity	65.7	33.3	73.4	77.3	88.8	94.1	96.7	98.1
Eh								
Temperature	15.76	15.5	16.08	16.22	16.36	16.44	16.46	16.49
Turbidity/color								
Dissolved Oxygen	3.75	1.14	1.74	1.40	0.98	0.62	0.49	0.44

Analyses	Method	Bottle Typ	Preservative	Number	Number MS/MSD
Phenols	8041	1 L Amber	—	1	—
Chl Herb	8151	"	—	1	—
VOCs	8260B	VOAs	HCl	3	—
Dioxin	8290	1 L Amber	—	2	—

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1132 TIME
6.55 pH
98.8 SC
0.38 DO_2
16.45°C T

SAMP TIME 1140

1137 6.59 pH
99.6 SC
0.37 DO_2
16.52 T°C

SCOEPA00006672

GROUNDWATER SAMPLING DATA SHEET

Well Number: W-15-S Sample Number: 20C-GW-01 Date: 9/29

Project: RPAC Project Number: 92C0804A Task: 20C

Weather Conditions: Cloudy Observations/Comments:

P.I.D. Reading: Ø Measuring Point (MP):

Calibration Date of P.I.D.: 9-28-00 Elevation of MP:

P.I.D. Standard Calibration Used: ~~9-28~~ 100 ppm isobutylene Elevation of Water:

Combustible Gas Reading: Well Diameter: 2" PVC

TD Well Depth: 15.65"

DTW Water Depth: 13.54"

Feet of Water: (15.65 - 13.54) = 2.11 x .16 = 0.33 gal

Gallons per Foot:

Well Diameter	Gallons per casing foot
2 inches	0.16
3 inches	0.367
4 inches	0.65

Well Volume:

Purge Volume:

Observation for LNAPL: None

Observation for DNAPL: None

Observation and condition of the well: Good

pH meter: Horiba U-2

Eh meter: "

Conductivity meter: "

Calibration Date: 9-29

QA/QC samples: —

Purge Method: ~~Low flow~~ Bailer

Sample Method: ~~2" Solo pump~~ Bailer

Water Disposal: H2O Treatment

Sampler(s): DMC, NJM, MG

Pump hoses and/or bailer ropes were new, cleaned or dedicated?

Dedicated tube

Decon pump

General Comments: Hard bottom

Commence purging @ 923 / Sample time @

Well dry after 2 gallons

Field Parameters	Before Purging	Volume 1	Volume 2	Volume 3	Volume 4	Volume 5	Sample
Time		923					
pH		6.81					
Conductivity		66.1					
Eh							
Temperature		13.95					
Turbidity/color							
Dissolved Oxygen		~~11.6~~					

NJM - 9/29/00 - water saturated ~~air~~ air

Analyses	Method	Bottle Type	Preservative	Number	Number MS/MSD
Chl. Herb	8151	Amber	—	1	
VOCs	8260B	VOAs	HCl	3	
Dioxin/Furans	8290	Amber	—	2	
Mercury/Metals	7470/6020	250mL Poly	Nitric	1	

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Bail dry @ ~ 0.3 gal @ 0935 hrs 9.29.00; allow to recharge over weekend

NJM

SCOEPA00006673

GROUNDWATER SAMPLING DATA SHEET

Well Number: RP-05-15 Sample Number: 2C7-6 [illegible] Date: 10/4

Project: RPAC Project Number: 92C0804A Task: 20C

Weather Conditions: Sunny Observations/Comments:

P.I.D. Reading: Ø Measuring Point (MP):

Calibration Date of P.I.D.: 10/4 Elevation of MP:

P.I.D. Standard Calibration Used: Elevation of Water:

Combustible Gas Reading: Well Diameter: 2"

Well Depth:

Water Depth:

Feet of Water:

Gallons per Foot:

Well Diameter	Gallons per casing foot
2 inches	0.16
3 inches	0.367
4 inches	0.65

Well Volume: pH meter:

Purge Volume: Eh meter:

Observation for LNAPL: none Conductivity meter:

Observation for DNAPL: none Calibration Date:

Observation and condition of the well: QA/QC samples: —

Purge Method: Bailer

Pump hoses and/or bailer ropes were new, cleaned or dedicated? Sample Method: Bailer

dedicated bailer Water Disposal: none

Sampler(s): KKR, MW

General Comments: Sample time 14:15

Field Parameters	Before Purging	Volume 1	Volume 2	Volume 3	Volume 4	Volume 5	Sample
Time	14:40	wrong page					
pH	9.38						
Conductivity	0.408						
Eh							
Temperature	15.81						
Turbidity/color	LS						
Dissolved Oxygen	4.99						

Analyses	Method	Bottle Type	Preservative	Number	Number MS/MSD
8290	Dioxin	2 1 liter	–	2	
8151	Chl Herb	1 liter	–	1	
8041	Phenols	1 liter	–	1	
8260B	VOCs	VOAs	HCl	3	

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SCOEPA00006674

GROUNDWATER SAMPLING DATA SHEET 10/2

Well Number: MW-05-65 Sample Number: 186-6W-00 Date: 9-28-00

Project: RPAC Project Number: 92C0804A Task: 20C

Weather Conditions: CLEAR Observations/Comments:

P.I.D. Reading: Ø

Calibration Date of P.I.D.: 9-28

P.I.D. Standard Calibration Used: Isobutylene

Combustible Gas Reading:

Well Depth: 73.7-58 = 73.12'

Water Depth: 15.08-58 = 14.50'

Feet of Water:

Gallons per Foot:

Well Volume:

Purge Volume:

Observation for LNAPL: None

Observation for DNAPL: None

Observation and condition of the well:

Pump hoses and/or bailer ropes were new, cleaned or dedicated?

Dedicated tubing

Decon pump.

Measuring Point (MP):

Elevation of MP:

Elevation of Water:

Well Diameter: 2inch PVC

Well Diameter	Gallons per casing foot
2 inches	0.16
3 inches	0.367
4 inches	0.65

pH meter: Horiba U2

Eh meter: "

Conductivity meter: "

Calibration Date: 9-28

QA/QC samples:

Purge Method: 2" submersible

Sample Method: 2" submersible

Water Disposal: treatment facility

Sampler(s): RRR, NM, DMC

General Comments:

Field Parameters	Before Purging	Volume 1	Volume 2	Volume 3	Volume 4	Volume 5	Sample
Time	9:35	0938	0943	0948	0953		1000 Sampling time.
pH		7.01	7.24	7.29	7.35		
Conductivity		80.6	80.3	80.8	80.8		
Eh							
Temperature		15.50	16.09	16.18	16.22		
Turbidity/color							
Dissolved Oxygen		1.57	0.58	0.52	0.47		

Analyses	Method	Bottle Type	Preservative	Number	Number MS/MSD
8015 IBA	8015	3x40mL VOA	HCL	3	
8041 Phenols	8041	1x1000mL amb	—	1	
Chlor Herbi	8151	"	"	1	
VOCs	8260B	3x40mL VOA	HCL	3	
Diesel	NWTPH-Dx	1x1000mL amb	HCL		

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SCOEPA00006675

GROUNDWATER SAMPLING DATA SHEET MW 9/27

Well Number: mw-08-28 Sample Number: 186-NA-04 Date: 9/26/00

Project: RPAC Project Number: 92C0804A Task: 20C

Weather Conditions: clear, Observations/Comments:

P.I.D. Reading: 1450 ppm Measuring Point (MP):

Calibration Date of P.I.D.: 9/26/00 Elevation of MP:

P.I.D. Standard Calibration Used: 100 PPM Isobutylene Elevation of Water:

Combustible Gas Reading: Well Diameter: 2 ~~6~~ " MW 9/26/00

Well Depth: MW 9/26/00 ~~27.58~~ 27.03'

Product ~~Water~~ Depth: MW 9/26/00 ~~21.15~~ 20.60' to 23.70'

Feet of Water:

Gallons per Foot:

Well Diameter	Gallons per casing foot
2 inches	0.16
3 inches	0.367
4 inches ~~6 in~~	0.65

Well Volume: pH meter:

Purge Volume: Eh meter:

Observation for LNAPL: yes, indicated 3.1' Conductivity meter:

Observation for DNAPL: none indicated Calibration Date:

Observation and condition of the well: O.K. QA/QC samples: ~~MS/MSD~~ MW 9/26/00

Purge Method:

Pump hoses and/or bailer ropes were new, cleaned or dedicated? Sample Method: MW 9/26/00 ~~Bailer~~

peristaltic pump w/ dedicated hose used Water Disposal: water treatment

Sampler(s): KRR, DMC, KJM, MW

General Comments: no odor on probe, Bailed free product - Brown, clear collected 1L amber, no GW samples collected strong odor

Field Parameters	Before Purging	Volume 1	Volume 2	Volume 3	Volume 4	Volume 5	Sample
Time	~~10:05~~	~~10:10~~	~~10:15~~				
pH	~~5.04~~	~~5.13~~	~~5.25~~				
Conductivity	~~26.6~~	~~24.4~~	~~22.9~~	wrong well MW 9/26/00			
Eh	MW 9/26/00						
Temperature	~~15.7~~	~~16.3~~	~~16.9~~				
Turbidity/color							
Dissolved Oxygen	~~5.24~~	~~1.20~~	~~0.88~~				

Analyses	Method	Bottle Type	Preservative	Number	Number MS/MSD
MW 9/26	~~8015~~	~~VOA (3)~~	~~HCl~~	~~3~~	

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SCOEPA00006676

GROUNDWATER SAMPLING DATA SHEET

MW 1 of 2

Well Number: MW-05-24 Sample Number: 187-GW-01 Date: 9/28

Project: RPAC Project Number: 92C0804A Task: 20C

Weather Conditions: CLEAR Observations/Comments:

P.I.D. Reading: 240 ppm

Calibration Date of P.I.D.: 9-28-00

P.I.D. Standard Calibration Used:

Combustible Gas Reading:

Well Depth:

Water Depth: 12.7-.54= ~~15.08-.58 = 4.50'~~

Feet of Water: 26.4-.54 =

Gallons per Foot:

Well Volume:

Purge Volume:

Observation for LNAPL: None

Observation for DNAPL: None

Observation and condition of the well:

Pump hoses and/or bailer ropes were new, cleaned or dedicated?

Dedicated tubing

Decon. pump

Measuring Point (MP):

Elevation of MP:

Elevation of Water:

Well Diameter: 2 Stainless

Well Diameter	Gallons per casing foot
2 inches	0.16
3 inches	0.367
4 inches	0.65

pH meter: Horiba U2

Eh meter: "

Conductivity meter: "

Calibration Date: 9-28-00

QA/QC samples:

Purge Method: Low flow

Sample Method: 2" sub. pump

Water Disposal: Water treatment

Sampler(s): DMC RRR NMA

General Comments: ~8" lt brn silt @ base of well, strong odor.

Field Parameters	Before Purging	Volume 1	Volume 2	Volume 3	Volume 4	Volume 5	Sample
Time	1101	1104	1109	1114	1120		1130 ST.
pH		6.36	6.18	6.12	6.07		
Conductivity		15.6	15.7	15.5	15.3		
Eh							
Temperature		15.53	16.22	16.47	16.66		
Turbidity/color							
Dissolved Oxygen		1.09	0.50	0.45	0.42		

Analyses	Method	Bottle Type	Preservative	Number	Number MS/MSD
IBA	8015	3x40mL VOA	HCl		
phenols	8041	1x 1000mL amb	—		
chlor herbs	8151	"	—		
VOCs	8260	3x 40mL VOA	HCl		
tot metals	6010B	1x250mL poly	HNO_3		
anions/alk	300/310.1	1x500mL poly	—		
sulfide	376.1	1x500mL poly	NaOH + ZnOAc		
BOD	405.1	1x1000mL poly	—		
COD/OC/NH_3	410.4/415.2/350.1	1x250mL poly	H_2SO_4		
methane	GC/FID	3x40mL VOA	HCl		
		1x100mL amb	HCl		

Plate count SM 9215 1x120 ml F

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SCOEPA00006677

GROUNDWATER SAMPLING DATA SHEET

Well Number: MW-05-52 Sample Number: 187 Date: 9-28-00

Project: RPAC Project Number: 92C0804A Task: 20C

Weather Conditions: CLEAR Observations/Comments:

P.I.D. Reading: 3.0

Calibration Date of P.I.D.: 9-28-00

P.I.D. Standard Calibration Used: 100ppm Isobutane

Combustible Gas Reading:

Well Depth: 53.05'-.54' =

Water Depth: 14.26'-.54' =

Feet of Water:

Gallons per Foot:

Well Volume:

Purge Volume:

Observation for LNAPL: None

Observation for DNAPL: None.

Observation and condition of the well:

Pump hoses and/or bailer ropes were new, cleaned or dedicated?
disposible, dedicated tubing
decon. pump.

General Comments: Water is clear w/ slightly yellow tint

Measuring Point (MP):

Elevation of MP:

Elevation of Water:

Well Diameter: 2" Stainless

Well Diameter	Gallons per casing foot
2 inches	0.16
3 inches	0.367
4 inches	0.65

pH meter: Horiba U2

Eh meter: "

Conductivity meter: "

Calibration Date: 9-28-00

QA/QC samples:

Purge Method: Low flow

Sample Method: 2" Sub. pump

Water Disposal: treatment facility

Sampler(s): RRR, NM, DMC

NM 9-28-00

Field Parameters	Before Purging	Volume 1	Volume 2	Volume 3	Volume 4	Volume 5		Sample	
Time		0939	0944	0949	0954	1005	1010	1015	1020
pH		5.29	5.47	5.68	5.90	6.14	6.19	6.22	
Conductivity		42.0	44.8	54.9	72.3	95.5	~~114.0~~ 111.0	115.0	
Eh									
Temperature		15.90	16.20	16.70	17.00	17.3	17.3	17.4	
Turbidity/color									
Dissolved Oxygen		3.50	2.23	1.43	1.64	0.78	0.70	0.71	

Analyses	Method	Bottle Type	Preservative	Number	Number MS/MSD
LBA	8015	3x 40mL VOA	HCl	3	
Pheols	8041	1x 1000mL amb	—	1	
chlor herbs	8151	"	—	1	
VOCs	8260B	3x 40mL VOA	HCl	3	
metals (total)	6010B	1x 250ml poly	HNO_3	1	
anions/alk	300/310.1	1x 500 ml poly	—	1	
sulfide	376.1	1x 500 ml poly	NaOH/ZnOAc		
BOD	405	1x 1000ml poly	—		Plate count SM9215 1x 120 ml plas.
COD/OC/NH_3	410.4/415.2/350.1	1x250ml poly	H_2SO_4		
~~GC/FID~~ methane	GC/FID	3x 40 mL VOA	HCl		
[illegible]	[illegible]	[illegible]	HCl		

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Intermediate.

GROUNDWATER SAMPLING DATA SHEET

Well Number: W-6-Ø I mw 10/2 Sample Number: 140-GW-01 Date: 9/28

Project: RPAC Project Number: 92C0804A Task: 20C

Weather Conditions: Cloudy Observations/Comments:

P.I.D. Reading: 0.0

Calibration Date of P.I.D.: 9/28

P.I.D. Standard Calibration Used: 100ppm isobutane.

Combustible Gas Reading:

Well Depth: 48.59' TOC

Water Depth: 13.91' TOC

Feet of Water:

Gallons per Foot:

Well Volume:

Purge Volume:

Observation for LNAPL: NONE OBSERVED

Observation for DNAPL: NONE OBSERVED

Observation and condition of the well:

Pump hoses and/or bailer ropes were new, cleaned or dedicated?

Dedicated tubing.

Decontam. pump.

General Comments: SAMPLE TIME 1440

Measuring Point (MP):

Elevation of MP:

Elevation of Water:

Well Diameter: 4" PVC

Well Diameter	Gallons per casing foot
2 inches	0.16
3 inches	0.367
4 inches	0.65

pH meter: Horiba U2

Eh meter: "

Conductivity meter: "

Calibration Date: 9/28.

QA/QC samples: —

Purge Method: Low flow

Sample Method: 2" Sub pump.

Water Disposal: H_2O treatment

Sampler(s): RRR, DMC, NJM

Field Parameters	Before Purging	Volume 1	Volume 2	Volume 3	Volume 4	Volume 5	Sample
Time		1415	1420	1425	1430		1440
pH		6.78	6.88	6.86	6.94		
Conductivity		34.7	34.6	34.2	33.9		
Eh							
Temperature		14.81	14.99	15.68	16.25		
Turbidity/color							
Dissolved Oxygen		1.09	0.55	0.50	0.49		

Analyses	Method	Bottle Type	Preservative	Number	Number MS/MSD
8041	Phenols	Amber	—	1	
8151	Chl. Herb.	Amber	—	1	
8260B	VOCs	VOAS	HCl	3	
8270	Semi-Vol	Amber	—	1	
8290	Dioxins	Amber	—	2	

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GROUNDWATER SAMPLING DATA SHEET

Well Number: MW-05-34 Sample Number: 188-GW-01 Date: 9-28-00

Project: RPAC Project Number: 92C0804A Task: 20C

Weather Conditions: CLEAR Observations/Comments:

P.I.D. Reading: 281 ppm

Calibration Date of P.I.D.: 9-28

P.I.D. Standard Calibration Used: 100

Combustible Gas Reading:

Well Depth: 34.4' - .54' = 33.86'

Water Depth: 12.66' - .54' = 12.12'

Feet of Water:

Gallons per Foot:

Well Volume:

Purge Volume:

Observation for LNAPL: None

Observation for DNAPL: ~~None~~ 5 inch

Observation and condition of the well:

Pump hoses and/or bailer ropes were new, cleaned or dedicated? disposible dedicated tubing decon. pump

General Comments: ~5 inch DNAPL - Dark brown w/ odor

Measuring Point (MP):

Elevation of MP:

Elevation of Water:

Well Diameter:

Well Diameter	Gallons per casing foot
2 inches	0.16
3 inches	0.367
4 inches	0.65

pH meter: Horiba U2

Eh meter: "

Conductivity meter: "

Calibration Date: 9-28-00

QA/QC samples:

Purge Method: Low Flow

Sample Method: 2" sub pump

Water Disposal: Water Treatment

Sampler(s): DMC, RRR, NJM

Field Parameters	Before Purging	Volume 1	Volume 2	Volume 3	Volume 4	Volume 5	Sample
Time	1040	1043	1049	1054	1101		1110 SAMP TIME
pH	4.95	~~44.3~~	4.93	4.91	4.93		
Conductivity		44.3	41.0	39.5	37.0		
Eh							
Temperature		16.2	16.8	16.9	17.0		
Turbidity/color							
Dissolved Oxygen		0.89	0.59	0.53	0.51		

Analyses	Method	Bottle Type	Preservative	Number	Number MS/MSD
18A	8015	3 x 40 mL VOA	HCl		
Phenols	8041	1 x 1000 mL Amb	—		
Chlor herbs	8151	"	"		
VOCs	8260	3 x 40 mL VOA	HCl		
tot metals	6010B	2 x 250 mL poly	HNO_3		
anions/alk	300/310.1	1 x 500 mL poly			
Sulfide	376.1	1 x 500 mL poly	NaOH + ZnOAc		
BOD	405.1	1 x 1000 mL poly	—		
COD/OC/NH_3	410.4/415.2/350.1	1 x 250 mL poly	H_2SO_4		
Methane	6C/F10	3 x 40 ml VOA	HCl		
Diesel	NWTPH-Dx	1 x 1000 ml Amb	HCl		

Plate Count SM 9215 1 x 120 ml plcs

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Shallow

GROUNDWATER SAMPLING DATA SHEET

Well Number: W-06-S Sample Number: 192-GW-01 Date: 9/28

Project: RPAC Project Number: 92C0804A Task: 20C

Weather Conditions: cloudy Observations/Comments:

P.I.D. Reading: 0.0

Calibration Date of P.I.D.: 9-28

P.I.D. Standard Calibration Used: 100ppm isobutylene

Combustible Gas Reading:

Well Depth: 28.99' TOC

Water Depth: 14.32' TOC

Feet of Water:

Gallons per Foot:

Well Volume:

Purge Volume:

Observation for LNAPL: NONE OBSERVED

Observation for DNAPL: NONE OBSERVED

Observation and condition of the well:

Pump hoses and/or bailer ropes were new, cleaned or dedicated?

dedicated tubing

decon. pump

Measuring Point (MP):

Elevation of MP:

Elevation of Water:

Well Diameter: 2" PVC

Well Diameter	Gallons per casing foot
2 inches	0.16
3 inches	0.367
4 inches	0.65

pH meter: Horiba U2

Eh meter: "

Conductivity meter: "

Calibration Date: 9-28

QA/QC samples: —

Purge Method: low flow

Sample Method: 2" sub pump

Water Disposal: water treatment

Sampler(s): DMC, RPR, NJM

General Comments: SAMPLE TIME 1600.
WATER SL YELLOW, SL TURBID

Field Parameters	Before Purging	Volume 1	Volume 2	Volume 3	Volume 4	Volume 5	Sample
Time	1523	1525	1530	1535	1540	1545	1600
pH		6.09	6.27	6.33	6.35		
Conductivity		32.6	32.8	34.4	34.0		
Eh							
Temperature		15.6	16.3	17.2	17.3	WELL DRY	
Turbidity/color							
Dissolved Oxygen		2.32	1.20	1.39	1.76		

Analyses	Method	Bottle Type	Preservative	Number	Number MS/MSD
8290	Dioxins	Amber	—	2	

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SCOEPA00006681

Deepest.

GROUNDWATER SAMPLING DATA SHEET

Well Number: W-6-~~B~~ D mk 10/2 Sample Number: 191-GW-01 Date: 9/28

Project: RPAC Project Number: 92C0804A Task: 20C

Weather Conditions: Cloudy Observations/Comments:

P.I.D. Reading: 0.0

Calibration Date of P.I.D.: 9-28

P.I.D. Standard Calibration Used: 100ppm isobutane

Combustible Gas Reading:

Well Depth: 70.44 'TOC

Water Depth: 16.14 'TOC

Feet of Water:

Gallons per Foot:

Well Volume:

Purge Volume:

Observation for LNAPL: NONE

Observation for DNAPL: NONE.

Observation and condition of the well:

Pump hoses and/or bailer ropes were new, cleaned or dedicated?
Dedicated tubing
Decon. pump

Measuring Point (MP):

Elevation of MP:

Elevation of Water:

Well Diameter: 4" ~~Stainless~~ PVC

Well Diameter	Gallons per casing foot
2 inches	0.16
3 inches	0.367
4 inches	0.65

pH meter: Horiba U2

Eh meter: "

Conductivity meter: "

Calibration Date: 9-28

QA/QC samples: —

Purge Method: Low flow

Sample Method: 2" Sub pump

Water Disposal: H2O treatment

Sampler(s): AKM, RRR, DMC

General Comments: SAMPLE TIME 1450 HRS.

Field Parameters	Before Purging	Volume 1	Volume 2	Volume 3	Volume 4	Volume 5	Sample	
Time	~~1415~~	1415	1420	1425	1430	1440	1445	1450 ST.
pH		6.25	6.37	6.43	6.40	6.40	6.38	
Conductivity		82.9	91.7	94.3	95.5	95.5	95.6	
Eh								
Temperature		15.7	~~14.99~~	15.80	15.90	15.8	15.8	
Turbidity/color			15.80					
Dissolved Oxygen		2.16	1.54	1.09	0.78	0.71	0.74	

Analyses	Method	Bottle Type	Preservative	Number	Number MS/MSD
8290	Dioxins	Amber	—	2	

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GROUNDWATER SAMPLING DATA SHEET

Well Number: W-15-Ø I NM 9/29/00 Sample Number: 194-GW-01 Date: 9/29

Project: RPAC Project Number: 92C0804A Task: 20C

Weather Conditions: Cloudy Observations/Comments: ~~Clear~~ Yellow & turbid

P.I.D. Reading: Ø

Calibration Date of P.I.D.: 9-28

P.I.D. Standard Calibration Used: 100ppm Isobutylene

Combustible Gas Reading:

TD Well Depth: 39.80'

DTW Water Depth: 13.57'

Feet of Water:

Gallons per Foot:

Well Volume:

Purge Volume:

Observation for LNAPL: None

Observation for DNAPL: None

Observation and condition of the well: AOK!

Pump hoses and/or bailer ropes were new, cleaned or dedicated?
Dedicated tube
Decon. pump.

Measuring Point (MP):

Elevation of MP:

Elevation of Water:

Well Diameter: 2" PVC

Well Diameter	Gallons per casing foot
2 inches	0.16
3 inches	0.367
4 inches	0.65

pH meter: Horiba U2

Eh meter: "

Conductivity meter: "

Calibration Date: 9-29-00

QA/QC samples: —

Purge Method: Low Flow

Sample Method: 2" sub. pump

Water Disposal: H_2O treatment

Sampler(s): DMC, NJM, MN

General Comments: Hard bottom Fe^{2+}: 7.0 mg/L.
Commence purging @ 1020 / Sample time @ 1050

Field Parameters	Before Purging	Volume 1	Volume 2	Volume 3	Volume 4	Volume 5	Sample
Time	1020	1025	1030	1035	1040	1045	
pH	5.43	5.49	5.58	5.62	5.64	5.64	
Conductivity	0.86	0.89	0.939	0.942	0.942	0.942	
Eh							
Temperature	13.6	13.7	13.9	13.9	14.0	14.0	
Turbidity/color							
Dissolved Oxygen	0.90	0.71	0.50	0.45	0.44	0.43	

Analyses	Method	Bottle Type	Preservative	Number	Number MS/MSD
Chlor. Herbic.	8151	Amber	—	1	
VOCs.	8260B	VOAS	HCl	3	
Dioxins/Furins	8290	Amber	—	2	
Mercury/Metals	7470/6020	250ml Poly	Nitric	1	

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SCOEPA00006683

GROUNDWATER SAMPLING DATA SHEET

Well Number: W-15-D Sample Number: 193-GW-01 Date: 9-29-00

Project: RPAC Project Number: 92C0804A Task: 20C

Weather Conditions: Cloudy Observations/Comments:

P.I.D. Reading: ϕ Measuring Point (MP):

Calibration Date of P.I.D.: 9-28-00 Elevation of MP:

P.I.D. Standard Calibration Used: 100 ppm Isobutylene Elevation of Water:

Combustible Gas Reading: Well Diameter: 4" PVC

TD Well Depth: 63.35'

DTW Water Depth: 13.97'

Feet of Water:

Gallons per Foot:

Well Volume:

Purge Volume:

Observation for LNAPL: None

Observation for DNAPL: None

Observation and condition of the well: Good.

Well Diameter	Gallons per casing foot
2 inches	0.16
3 inches	0.367
4 inches	0.65

pH meter: Horiba U2

Eh meter: "

Conductivity meter: "

Calibration Date: 9-29

QA/QC samples: —

Purge Method: Low flow

Sample Method: 2" sub pump

Water Disposal: H2O treatment

Sampler(s): DMC, NJM, MN

Pump hoses and/or bailer ropes were new, cleaned or dedicated?

Dedicated tube

Decon. pump

General Comments: Ferrous Iron 2.6

Commence purging @ 9:15 / Sample time @ 955

Field Parameters	Before Purging	Volume 1	Volume 2	Volume 3	Volume 4	Volume 5	Sample	
Time	918	923	928	933	938	943	948	950
pH	5.02	5.00	5.04	5.14	5.17	5.19	5.20	5.20
Conductivity	56.4	56.3	56.1	55.8	55.8	55.8	55.8	55.8
Eh								
Temperature	13.3	13.4	13.6	14.3	14.5	14.5	14.5	14.4
Turbidity/color								
Dissolved Oxygen	1.65	1.07	1.02	0.76	0.71	0.65	0.60	0.59

Analyses	Method	Bottle T...	Preservative	Number	Number MS/MSD
Chl. Herb	8151	Amber	—	1	
VOCs	8260B	VOAs	HCl	3	
Dioxin/Furans	8290	Amber	—	2	
~~Mercury/Metals~~	~~7470/6020~~	~~250 mL poly~~	~~Nitric~~	~~1~~	

M 29/00

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SCOEPA00006684

GROUNDWATER SAMPLING DATA SHEET

Well Number: ASW-01A Sample Number: 196-GW-01 Date: 9.29.00

Project: RPAC Project Number: 92C0804A Task: 20C

Weather Conditions: cloudy, 60s. Observations/Comments:

P.I.D. Reading: 0.0

Calibration Date of P.I.D.: 9/28/00

P.I.D. Standard Calibration Used: 100 ppm isobutylene

Combustible Gas Reading:

Well Depth: 16.90' TOC

Water Depth: 8.66' TOC

Feet of Water: 8.24'

Gallons per Foot: 0.1632

Well Volume: 1.33

Purge Volume:

Observation for LNAPL: none observed

Observation for DNAPL: none observed

Observation and condition of the well:

Pump hoses and/or bailer ropes were new, cleaned or dedicated?
dedicated disposable bailer

General Comments: SAMPLE TIME = 1345

Measuring Point (MP): TOC

Elevation of MP:

Elevation of Water:

Well Diameter: 2"

Well Diameter	Gallons per casing foot
2 inches	0.16
3 inches	0.367
4 inches	0.65

pH meter: Horiba U22

Eh meter:

Conductivity meter:

Calibration Date: 9/29/00

QA/QC samples:

Purge Method: bailer

Sample Method: bailer

Water Disposal: water treatment

Sampler(s): NM, MN, DMC

Fe^{+2} =

Field Parameters	Before Purging	Volume 1	Volume 2	Volume 3	Volume 4	Volume 5	vol Sample
Time		1320	13.25	13:30	13:35	13:40	13:43
pH		5.90	5.76	5.70	5.67	5.68	5.67
Conductivity		23.0	20.6	20.2	19.9	19.8	19.9
Eh							
Temperature		15.27	15.12	15.07	15.08	15.03	15.04
Turbidity/color							
Dissolved Oxygen		4.20	3.45	3.09	2.91	3.6	4.45

Analyses	Method	Bottle Type	Preservative	Number	Number MS/MSD
Phenols	8041	1x 1000mL amb	—		
OC Pests /PCBs	8081/8082	1x 1000mL amb	—		
OG Phosphorus	8141	1x 1000mL amb	—		

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SCOEPA00006685

GROUNDWATER SAMPLING DATA SHEET

Well Number: ASW-~~04~~ 06 DMC 9-29-00 Sample Number: 195-GW-01 Date: 9-29-00

Project: RPAC Project Number: 92C0804A Task: 20C

Weather Conditions: CLOUDY, 60s. Observations/Comments:

P.I.D. Reading: N/A

Calibration Date of P.I.D.: —

P.I.D. Standard Calibration Used: —

Combustible Gas Reading: —

Well Depth: 16.40

Water Depth: 9.91

Feet of Water: 16.40 - 9.91 = 6.49

Gallons per Foot: .1632

Well Volume: 6.49 x .1632 = 1.05 gal/cv

Purge Volume:

Observation for LNAPL: none observed

Observation for DNAPL: none observed

Observation and condition of the well:

Pump hoses and/or bailer ropes were new, cleaned or dedicated?
dedicated disposable bailer

Measuring Point (MP): TOC

Elevation of MP:

Elevation of Water:

Well Diameter: 2" PVC

Well Diameter	Gallons per casing foot
2 inches	0.16
3 inches	0.367
4 inches	0.65

pH meter: HORIBA U22

Eh meter:

Conductivity meter:

Calibration Date: 9-29-00

QA/QC samples:

Purge Method: BAILER

Sample Method: BAILER

Water Disposal: WATER TREATMENT

Sampler(s): DMC, NM, MN

General Comments: 1150 SAMPLE TIME. Fe^{+2} = 4.0 mg/L.
WATER GRAY, TURBID, FINES.

Field Parameters	Before Purging	Volume 1	Volume 2	Volume 3	Volume 4	Volume 5	Sample
Time		1044	1046	1048	1050		
pH		6.85	6.69	6.69	6.70		
Conductivity		0.156	0.154	0.158	0.164		
Eh							
Temperature		17.01	16.81	16.51	16.31		
Turbidity/color							
Dissolved Oxygen		2.62	2.87	2.15	2.21		

Analyses	Method	Bottle Type	Preservative	Number	Number MS/MSD
~~8021~~ Phenols	8041	1x1000 mL amb	—		
OC Pests/PCBs	8081/8082	1x 1000 mL amb	—		
OG Phosphorous	8141	1x 1000 mL amb	—		

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SCOEPA00006686

GROUNDWATER SAMPLING DATA SHEET

Well Number: 4L2-32 Sample Number: 200-GW-01 Date: 10/3

Project: RPAC Project Number: 92C0804A Task: 20C

Weather Conditions: overcast Observations/Comments:

P.I.D. Reading: Ø Measuring Point (MP):

Calibration Date of P.I.D.: 10/3/00 Elevation of MP:

P.I.D. Standard Calibration Used: 100 ppm isobutylene Elevation of Water:

Combustible Gas Reading: Well Diameter: 2"

Well Depth: 34.77

Water Depth: 17.37

Feet of Water:

Gallons per Foot:

Well Diameter	Gallons per casing foot
2 inches	0.16
3 inches	0.367
4 inches	0.65

Well Volume:

Purge Volume:

Observation for LNAPL: none

Observation for DNAPL: none

Observation and condition of the well:

Pump hoses and/or bailer ropes were new, cleaned or dedicated?

pump decon, tubing dedicated

pH meter: Horiba U20

Eh meter: "

Conductivity meter: "

Calibration Date: 10/03/00

QA/QC samples: Dup, Rinsate, MS/MSD

Purge Method: low flow

Sample Method: 2" submersible

Water Disposal: water treatment

Sampler(s): RRR, NM, MM

General Comments:

Field Parameters	Before Purging	Volume 1	Volume 2	Volume 3	Volume 4	Volume 5	Sample	
Time	11am	11:07	11:12	11:17	11:23	[illegible]	11:36	11:40
pH	5.75	5.86	5.83	5.87	5.66	5.86	5.67	
Conductivity	0.829	0.832	0.839	0.828	0.829	0.827	0.826	
Eh								
Temperature	15°C	16.4	16.2	16.8	17.0	17.2	17.4	
Turbidity/color								
Dissolved Oxygen	1.5	0.80	0.80	0.81	0.80	0.81	0.81	

Analyses	Method	Bottle Type	Preservative	Number	Number MS/MSD

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GROUNDWATER SAMPLING DATA SHEET

Well Number: A62-17 Sample Number: 199-GW-01 Date: 10/3

Project: RPAC Project Number: 92C0804A Task: 20C

Weather Conditions: overcast Observations/Comments:

P.I.D. Reading: Ø Measuring Point (MP):

Calibration Date of P.I.D.: 10/3/00 Elevation of MP:

P.I.D. Standard Calibration Used: 100PPM Isobutylene Elevation of Water:

Combustible Gas Reading: Well Diameter: 2"

Well Depth: 20'

Water Depth: 17.61'

Feet of Water:

Gallons per Foot:

Well Diameter	Gallons per casing foot
2 inches	0.16
3 inches	0.367
4 inches	0.65

Well Volume:

Purge Volume:

Observation for LNAPL: none

Observation for DNAPL: none

Observation and condition of the well:

pH meter: Horiba U26

Eh meter: "

Conductivity meter: "

Calibration Date: 10/03/00

QA/QC samples: MS/MSD for NATPH only

Purge Method: — not purged

Sample Method: Bailed

Water Disposal: Water treatment

Sampler(s): RRR, NM, MN

Pump hoses and/or bailer ropes were new, cleaned or dedicated?

dedicated bailer

General Comments: 9:35 pump on 9:55 well dry 10:15 pump on again 10:20 well dry 10:45 bailed samples w/out further purge

Field Parameters	Before Purging	Volume 1	Volume 2	Volume 3	Volume 4	Volume 5	Sample
Time	~~9:53~~ 10:20						10:35 ~~45~~
pH	6.79						
Conductivity	0.175						
Eh							
Temperature	16.84						
Turbidity/color							
Dissolved Oxygen	3.63						

Analyses	Method	Bottle Type	Preservative	Number	Number MS/MSD

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dry, more samples bailed at 1430 dry will go to recharge tomorrow 10/4 9:00 2.6' water, bailed until dry

GROUNDWATER SAMPLING DATA SHEET

Well Number: AL2-46 Sample Number: 198-GW-01 Date: 10/3

Project: RPAC Project Number: 92C0804A Task: 20C

Weather Conditions: overcast Observations/Comments:

P.I.D. Reading: 15.3 Measuring Point (MP):

Calibration Date of P.I.D.: 10/3/00 Elevation of MP:

P.I.D. Standard Calibration Used: 100 ppm isobutylene Elevation of Water:

Combustible Gas Reading: Well Diameter: 2"

Well Depth: 45.75

Water Depth: 17.66'

Feet of Water:

Gallons per Foot:

Well Diameter	Gallons per casing foot
2 inches	0.16
3 inches	0.367
4 inches	0.65

Well Volume:

Purge Volume:

Observation for LNAPL: none

Observation for DNAPL: none

Observation and condition of the well:

pH meter: Horiba U20

Eh meter: "

Conductivity meter: "

Calibration Date: 10/3/00

QA/QC samples: —

Purge Method: lowflow

Sample Method: 2" submersible pump

Water Disposal: water treatment

Sampler(s): RER, WM, MN

Pump hoses and/or bailer ropes were new, cleaned or dedicated?

pump decon, dedicated tubing

General Comments: silty grey
Ferrous 2.8

Field Parameters	Before Purging	Volume 1	Volume 2	Volume 3	Volume 4	Volume 5	Sample
Time	9:54	10:03	10:08	10:13	10:18		10:25
pH	6.04	5.93	5.91	5.92	5.93	5.94	
Conductivity	0.294	0.308	0.308	0.307	0.306	0.308	
Eh							
Temperature	14.8	16.5	16.8	17.0	17.0	17.06	
Turbidity/color							
Dissolved Oxygen	1.29	0.83	0.75	0.69	0.66	0.70	

Analyses	Method	Bottle Type	Preservative	Number	Number MS/MSD

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SCOEPA00006689

GROUNDWATER SAMPLING DATA SHEET

NW 10/2

Well Number: ASW-04 Sample Number: 197-GW-01 Date: 9/29/00

Project: RPAC Project Number: 92C0804A Task: 20C

Weather Conditions: Cloudy, 60's. Observations/Comments:

P.I.D. Reading: 0.0

Calibration Date of P.I.D.: 9.28.00

P.I.D. Standard Calibration Used: 100ppm isobutylene

Combustible Gas Reading: —

Well Depth: 18.62' TOC

Water Depth: 10.14' TOC

Feet of Water: 8.48

Gallons per Foot: .1632

Well Volume: 1.38 gal/CV

Purge Volume:

Observation for LNAPL: none observed

Observation for DNAPL: none observed

Observation and condition of the well:

Pump hoses and/or bailer ropes were new, cleaned or dedicated?
dedicated disposable bailer.

Measuring Point (MP): TOC

Elevation of MP:

Elevation of Water:

Well Diameter: 2"

Well Diameter	Gallons per casing foot
2 inches	0.16
3 inches	0.367
4 inches	0.65

pH meter: Horiba U-22

Eh meter:

Conductivity meter:

Calibration Date: 9.29.00

QA/QC samples:

Purge Method: bailer

Sample Method: bailer

Water Disposal: treatment system

Sampler(s): DMC, NW, NM

General Comments:

Field Parameters	Before Purging	Volume 1	Volume 2	Volume 3	Volume 4	Volume 5	Sample
Time		1:55	1:58	2:01	2:03	2:05	2:07 14:15
pH		6.52	6.64	6.71	6.74	6.78	6.79
Conductivity		29.1	29.4	29.7	30.4	31.1	31.3
Eh							
Temperature		15.21	15.05	15.06	14.95	14.97	15.0
Turbidity/color							
Dissolved Oxygen		3.68	4.79	5.82	5.65	5.35	2.90

Analyses	Method	Bottle Type	Preservative	Number	Number MS/MSD
Phenols	8041	1x1000mL amb	—		
OC Pests/ PCBs	8081/8082	1x1000mL amb	—		
OG Phosphorus	8141	1x1000mL amb	—		

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SCOEPA00006690

GROUNDWATER SAMPLING DATA SHEET

Well Number: 46-5-62 Sample Number: 202-GW-01 Date: 10/4/00

Project: RPAC Project Number: 92C0804A Task: 20C

Weather Conditions: Sunny 60s Observations/Comments:

P.I.D. Reading: 10.8 Measuring Point (MP): TOC

Calibration Date of P.I.D.: 10/4/00 Elevation of MP:

P.I.D. Standard Calibration Used: 100 ppm isobutylene Elevation of Water:

Combustible Gas Reading: Well Diameter: 2" Ø

Well Depth: 63.60' TOC

Water Depth: 15.94' TOC

Feet of Water:

Gallons per Foot:

Well Diameter	Gallons per casing foot
2 inches	0.16
3 inches	0.367
4 inches	0.65

Well Volume:

Purge Volume:

Observation for LNAPL: trace LNAPL, brown

Observation for DNAPL: none observed

Observation and condition of the well:

pH meter: HORIBA U/22

Eh meter:

Conductivity meter:

Calibration Date: 10/4/00

QA/QC samples:

Purge Method: 2" submersible

Sample Method: 2" submersible

Water Disposal: treatment facility

Sampler(s): DMC, VM

Pump hoses and/or bailer ropes were new, cleaned or dedicated?
decomed pump, disposable tubing

General Comments: 0940 SAMPLE TIME

Field Parameters	Before Purging	Volume 1	Volume 2	Volume 3	Volume 4	Volume 5	Sample
Time	0908	0910	0915	0920	0925	0930	0940
pH		6.58	6.64	6.64	6.66	6.67	
Conductivity		0.125	0.125	0.123	0.122	0.121	
Eh							
Temperature		14.68	15.26	15.62	15.84	15.93	
Turbidity/color							
Dissolved Oxygen		1.49	0.54	0.46	0.44	0.48	

Analyses	Method	Bottle Type	Preservative	Number	Number MS/MSD
Phenols	8041	1x1000 mL amb	—		
Chlor herbs	8151	1x1000 mL amb	—		
VOCs	8260 B	3x40 mL VOA	HCl		
Dioxins/Furans	8290	2x1000 mL amb	—		
Metals total	6010 B	1x250 mL poly	HNO_3		
Anions / Alk	300 / 310.1	1x500 mL poly	—		
Sulfide	376.1	1x500 mL poly	NaOH / ZnOAc		
BOD	405.1	1x1000 mL poly	—		
COD/OC/NH_3	410.4/415.2/350.1	1x250 ml poly	H_2SO_4		
Methane	EC FID	3x40 ml VOA	HCl		

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GROUNDWATER SAMPLING DATA SHEET

Well Number: BST2W-6 | Sample Number: [illegible] | Date: 10/3/00

Project: RPAC | Project Number: 92C0804A | Task: 20C

Weather Conditions: overcast | Observations/Comments:

P.I.D. Reading: 6.3

Calibration Date of P.I.D.: 10/3/00

P.I.D. Standard Calibration Used: 100 ppm isobutylene

Combustible Gas Reading:

Well Depth: 63.15'

Water Depth: 17.17'

Feet of Water:

Gallons per Foot:

Well Volume:

Purge Volume:

Observation for LNAPL: none

Observation for DNAPL: none

Observation and condition of the well:

Pump hoses and/or bailer ropes were new, cleaned or dedicated? deconpump, dedicated tubing

Measuring Point (MP):

Elevation of MP:

Elevation of Water:

Well Diameter: 2"

Well Diameter	Gallons per casing foot
2 inches	0.16
3 inches	0.367
4 inches	0.65

pH meter: Horiba U20

Eh meter: "

Conductivity meter: "

Calibration Date: 10/3/00

QA/QC samples:

Purge Method: low flow

Sample Method: 2" submersible pump

Water Disposal: water treatment

Sampler(s): KRR, NM, MW

General Comments:

Field Parameters	Before Purging	Volume 1	Volume 2	Volume 3	Volume 4	Volume 5	Sample
Time	11:15	11:23	11:31	11:45	12:00		~~2:00~~ 12:15
pH	6.97	6.90	6.89	6.89	6.89		
Conductivity	85.8	92.7	0.114	0.127	0.128		
Eh							
Temperature	14.92	16.04	16.82	16.96	17.06		
Turbidity/color							
Dissolved Oxygen	2.63	0.67	0.49	0.41	0.40		

Analyses	Method	Bottle Type	Preservative	Number	Number MS/MSD

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GROUNDWATER SAMPLING DATA SHEET

Well Number: AL-5-19 Sample Number: 212-GW-01 Date: 10/4/00

Project: RPAC Project Number: 92C0804A Task: 20C

Weather Conditions: clear Observations/Comments:

P.I.D. Reading:

Calibration Date of P.I.D.: 10/4

P.I.D. Standard Calibration Used: 100 ppm Isobutylene

Combustible Gas Reading:

Well Depth: 21.51' TOC

Water Depth: 15.61' TOC

Feet of Water: 21.51 - 15.61 = 5.90

Gallons per Foot: 0.1632

Well Volume: 0.1632 x 5.9 = 0.96 gal = 1 gal

Purge Volume:

Observation for LNAPL:

Observation for DNAPL:

Observation and condition of the well:

Pump hoses and/or bailer ropes were new, cleaned or dedicated?

~~Dedicated hose~~ disposable bailer

~~Decon pump~~

Measuring Point (MP):

Elevation of MP:

Elevation of Water:

Well Diameter:

Well Diameter	Gallons per casing foot
2 inches	0.16
3 inches	0.367
4 inches	0.65

pH meter: Horiba U22

Eh meter: Horiba U22

Conductivity meter: Horiba U22

Calibration Date: 10/4/00

QA/QC samples: —

Purge Method: ~~low flow~~ bailer

Sample Method: ~~2" submersible pump~~ bailer

Water Disposal: Water treatment

Sampler(s): NJM, RRR, DMC, MN

General Comments: well dry @ ~2.6 gals @ 1055 hrs 10/4/00
Sample 10/5 10:20

Field Parameters	Before Purging	Volume 1	Volume 2	Volume 3	Volume 4	Volume 5	Sample
Time		1049	1051	1055	well dry		
pH		6.81	6.84	6.86			
Conductivity		0.402	.415	.427			
Eh							
Temperature		15.39	14.55	14.79			
Turbidity/color							
Dissolved Oxygen		5.3	2.59	3.26			

Analyses	Method	Bottle Type	Preservative	Number	Number MS/MSD
Phenols	8041	1 x 1000 mL amb	—		
Chlor Herbs	8151	1 x 1000 mL amb	—		
VOCs	8260 B	3 x 40 mL VOA	HCl		
Dioxins / Furans	8290	2 x 1000 mL amb	—		
Metals Total	6010 B	1 x 250 mL poly	HNO_3		
Anions / Alk	300/310.1	1 x 500 mL poly	—		
Sulfide	376.1	1 x 500 mL poly	NaOH / ZnAc		
BOD	405.1	1 x 1000 mL poly			
COD/OC / VFA	400.4/415.2/350.1	1 x 250 mL poly	H_2SO_4		
Methane	6C FID	3 x 40 mL VOA	HCl		

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GROUNDWATER SAMPLING DATA SHEET

Well Number: PP08 Sample Number: 211-6w-01 Date: 10/4

Project: RPAC Project Number: 92C0804A Task: 20C

Weather Conditions: Sunny Observations/Comments:

P.I.D. Reading: 0

Calibration Date of P.I.D.: 10/4

P.I.D. Standard Calibration Used:

Combustible Gas Reading:

Well Depth: 25.6'

Water Depth: 13.58'

Feet of Water:

Gallons per Foot:

Well Volume:

Purge Volume:

Observation for LNAPL: none

Observation for DNAPL: none

Observation and condition of the well:

Pump hoses and/or bailer ropes were new, cleaned or dedicated?
dedicated bailer

Measuring Point (MP):

Elevation of MP:

Elevation of Water:

Well Diameter: 2" PVC

Well Diameter	Gallons per casing foot
2 inches	0.16
3 inches	0.367
4 inches	0.65

pH meter: Horiba U20

Eh meter: "

Conductivity meter: "

Calibration Date: 10/4

QA/QC samples: —

Purge Method: bailed

Sample Method: Bailer

Water Disposal: water treatment system

Sampler(s): RRR, MN

General Comments: ~~sample time:~~ bailed dry 14:45, allow to recharge until tomorrow
Sampled 10/5 10 am

Field Parameters	Before Purging	Volume 1	Volume 2	Volume 3	Volume 4	Volume 5	Sample
Time	14:40						
pH	6.38						
Conductivity	0.408						
Eh							
Temperature	15.81						
Turbidity/color							
Dissolved Oxygen	4.99						

Analyses	Method	Bottle Ty	Preservative	Number	Number MS/MSD

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SCOEPA00006694

GROUNDWATER SAMPLING DATA SHEET

Well Number: AL-5-35 Sample Number: 204-GW-01 Date: 10/4

Project: RPAC Project Number: 92C0804A Task: 20C

Weather Conditions: clear Observations/Comments:

P.I.D. Reading: 0

Calibration Date of P.I.D.: 10/4

P.I.D. Standard Calibration Used: 100ppm Isobutylene

Combustible Gas Reading:

Well Depth:

Water Depth:

Feet of Water:

Gallons per Foot:

Well Volume:

Purge Volume:

Observation for LNAPL:

Observation for DNAPL:

Observation and condition of the well:

Pump hoses and/or bailer ropes were new, cleaned or dedicated?

Dedicated hose

decon. pump

General Comments: Yellowish color slightly turbid.

Measuring Point (MP):

Elevation of MP:

Elevation of Water:

Well Diameter:

Well Diameter	Gallons per casing foot
2 inches	0.16
3 inches	0.367
4 inches	0.65

pH meter: Horiba U22

Eh meter: ↓

Conductivity meter:

Calibration Date: 10/4/00

QA/QC samples: —

Purge Method: Low flow

Sample Method: 2" submersible pump

Water Disposal: Water treatment.

Sampler(s): NJM, DMC, MN RRR

Field Parameters	Before Purging	Volume 1	Volume 2	Volume 3	Volume 4	Volume 5	Sample
Time	1032	1038	1043	1048			1050
pH	5.87	5.99	6.02	6.03			
Conductivity	0.691	0.700	0.702	0.704			
Eh							
Temperature	15.7	16.3	16.4	16.6			
Turbidity/color							
Dissolved Oxygen	1.07	0.64	0.64	0.66			

Analyses	Method	Bottle Type	Preservative	Number	Number MS/MSD
Phenols	8041	1 x 1000mL amb	—		
Chlor Herbs	8151	1 x 1000mL amb	—		
VOCs	8200B	3 x 40mL VOA ~~1000mL~~	HCl		
Dioxins/Furans	8290	1 x 1000mL ~~poly amb~~	—		
Metals Total	6010B	1 x 250mL poly	HNO_3		
Anions/Alk	300/310.1	1 x 500mL poly	—		
Sulfide	376.1	1 x 500mL poly	NaOH/ZnOAc		
BOD	405.1	1 x 1000mL poly	—		
COD/TOC/NH_3	410.4/415.2/350.1	1 x 250mL poly	H_2SO_4		
Methane	6C FID	3x40mL VOA	HCl		
Nitrate/Nitrite	Sm 4216	1x250mL plastic	—		

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GROUNDWATER SAMPLING DATA SHEET

Well Number: BSTSW-74 Sample Number: 203-GW-01 Date: 10/4/00

Project: RPAC Project Number: 92C0804A Task: 20C

Weather Conditions: 60s, sunny Observations/Comments:

P.I.D. Reading: 26.7

Calibration Date of P.I.D.: 10/4/00

P.I.D. Standard Calibration Used: 100 ppm isobutylene

Combustible Gas Reading:

Well Depth: 77.11' TOC

Water Depth: 16.43' TOC

Feet of Water:

Gallons per Foot:

Well Volume:

Purge Volume:

Observation for LNAPL: none observed

Observation for DNAPL: ~3', black

Observation and condition of the well:

Pump hoses and/or bailer ropes were new, cleaned or dedicated?

decomed pump. dedicated/disposable tubing

Measuring Point (MP): TOC

Elevation of MP:

Elevation of Water:

Well Diameter: 2"ø

Well Diameter	Gallons per casing foot
2 inches	0.16
3 inches	0.367
4 inches	0.65

pH meter: HORIBA U-22

Eh meter:

Conductivity meter:

Calibration Date: 10/4/00

QA/QC samples:

Purge Method: 2" submersible

Sample Method: 2" submersible

Water Disposal: treatment facility

Sampler(s): DM, NM

General Comments: 0945 SAMPLE TIME. Fe^{+2} = 2.6 ppm

Field Parameters	Before Purging	Volume 1	Volume 2	Volume 3	Volume 4	Volume 5	Sample
Time	0910	0912	0917	0922	0927	0932	0945
pH		6.41	6.53	6.58	6.60	6.60	
Conductivity		0.179	0.180	0.186	0.192	0.195	
Eh							
Temperature		14.80°c	15.5°	16.0	16.1	16.1	
Turbidity/color							
Dissolved Oxygen		4.00	0.92	0.70	0.63	0.61	

Analyses	Method	Bottle Type	Preservative	Number	Number MS/MSD
Phenols	8041	1x 1000 mL amb	none		
Chlor herbs	8151	1x 1000 mL amb	none		
VOCs	8260B	3x 40 mL VOA	HCl		

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GROUNDWATER SAMPLING DATA SHEET

Well Number: RP-04-41 Sample Number: 266 Date: 10/4

Project: RPAC Project Number: 92C0804A Task: 20C

Weather Conditions: Clear 70s Observations/Comments:

P.I.D. Reading: 235ppm

Calibration Date of P.I.D.: 10/4

P.I.D. Standard Calibration Used: 100ppm Isobutylene

Combustible Gas Reading:

Well Depth: 43.83'

Water Depth: 10.63'

Feet of Water:

Gallons per Foot:

Well Volume:

Purge Volume:

Observation for LNAPL: None

Observation for DNAPL: None

Observation and condition of the well:

Pump hoses and/or bailer ropes were new, cleaned or dedicated?
Dedicated hosing
Decon. pump.

Measuring Point (MP):

Elevation of MP:

Elevation of Water:

Well Diameter: 2 inch

Well Diameter	Gallons per casing foot
2 inches	0.16
3 inches	0.367
4 inches	0.65

pH meter: Horiba U22

Eh meter:

Conductivity meter:

Calibration Date: 10/4

QA/QC samples: —

Purge Method: 2" Sub pump

Sample Method:

Water Disposal: H2O treatment.

Sampler(s): NJM, DMC,

General Comments:

Field Parameters	Before Purging	Volume 1	Volume 2	Volume 3	Volume 4	Volume 5	Sample
Time	1400	1405	1410	1415	1420	1425	1440
pH	6.64	6.57	6.53	6.45	6.45	6.34	
Conductivity	37.6	36.4	36.4	35.8	35.3	34.6	
Eh							
Temperature	13.07	14.28	14.07	14.71	14.93	15.03	
Turbidity/color							
Dissolved Oxygen	1.47	0.74	0.60	0.50	0.49	0.45	

Analyses	Method	Bottle Type	Preservative	Number	Number MS/MSD
Phenols	8041	1 x 1000 ml amb			
Chl. Herb	8151	1 x 1000 mL amb			
VOCs	8260B	3 x 40 mL VOA			
Semi Vol	8270	2x 1000 mL Amb			
Dioxins/Furans	8290	2x 1000 mL Amb			
Total Metals	6010B	1 x 250 mL poly			
Anions/Alk	300.1/310.1	1 x 500 mL poly			
Sulfide	376.1	1 x 500 mL poly			
BOD	405.1	1 x 1000 mL poly			
COD/Org. Carbon/Nitrate	410.4/415.2/300.1	1 x 250 mL poly			
Methane	GC/FID	3 x 40 mL VOA			

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GROUNDWATER SAMPLING DATA SHEET

Well Number: RP-04-16 Sample Number: 205-GW-01 Date: 10/4

Project: RPAC Project Number: 92C0804A Task: 20C

Weather Conditions: clear 70s Observations/Comments:

P.I.D. Reading: 10.8 ppm

Calibration Date of P.I.D.: 10/4/00

P.I.D. Standard Calibration Used:

Combustible Gas Reading:

Well Depth: 18.81' TOC

Water Depth: 11.68' TOC

Feet of Water: 7.13' = 18.81'-11.68'

Gallons per Foot: 0.16

Well Volume: 0.16 x 7.13 = 1.14' = 1 gallon +

Purge Volume:

Observation for LNAPL: None

Observation for DNAPL: None

Observation and condition of the well:

Pump hoses and/or bailer ropes were new, cleaned or dedicated?

Bailers dedicated

bailer ropes = new

General Comments: H_2O gray + turbid

Measuring Point (MP):

Elevation of MP:

Elevation of Water:

Well Diameter: 2 inch

Well Diameter	Gallons per casing foot	
2 inches	0.16	1.1405
3 inches	0.367	
4 inches	0.65	

pH meter: Horiba U22

Eh meter:

Conductivity meter: ↓

Calibration Date: 10/4

QA/QC samples: —

Purge Method: new bailer

Sample Method: Bailer

Water Disposal: H_2O treatment

Sampler(s):

Field Parameters	Before Purging	Volume 1	Volume 2	Volume 3	Volume 4	Volume 5	Sample
Time		12:06	12:08	1210	1412	1415	1430
pH		5.05	5.02	5.70	5.83	5.88	
Conductivity		0.190	0.148	0.147	0.150	.146	
Eh							
Temperature		14.5	13.9	13.8	13.7	13.7	
Turbidity/color							
Dissolved Oxygen		6.60	3.67	4.68	3.53	4.59	

Analyses	Method	Bottle Type	Preservative	Number	Number MS/MSD

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GROUNDWATER SAMPLING DATA SHEET

Well Number: W-08-25 Sample Number: 216-GW-01 Date: 10/5/00

Project: RPAC Project Number: 92C0804A Task: 20C

Weather Conditions: SUNNY, 60S. Observations/Comments:

P.I.D. Reading:

Calibration Date of P.I.D.: 10/05/00

P.I.D. Standard Calibration Used: 100 ppm isobutylene

Combustible Gas Reading:

Well Depth: 28.50

Water Depth: 13.27

Feet of Water: 15.23 x .1632 = 2.5 gal

Gallons per Foot: .1632

Well Volume: 2.5 gal

Purge Volume:

Observation for LNAPL: none

Observation for DNAPL: none

Observation and condition of the well: O.K.

Pump hoses and/or bailer ropes were new, cleaned or dedicated?

Measuring Point (MP): TOC

Elevation of MP:

Elevation of Water:

Well Diameter: 2"

Well Diameter	Gallons per casing foot
2 inches	0.16
3 inches	0.367
4 inches	0.65

pH meter:

Eh meter:

Conductivity meter:

Calibration Date:

QA/QC samples: —

Purge Method: bailer

Sample Method: bailer

Water Disposal: water treatment

Sampler(s): RKR, DMC, MAN

General Comments: Ferrous: 4
Sample 12:25

Field Parameters	Before Purging	Volume 1	Volume 2	Volume 3	Volume 4	Volume 5	Sample
Time		1100	1110	WELL DRY @ 4.5 gal.			
pH		6.98	6.98				
Conductivity	0.423 →	~~0.423~~	0.637				
~~Eh~~ GAL OUT		2.5	~~5.045~~	~~7.5~~	~~10.0~~	DMC 10/5/00	
Temperature		13.53	13.00				
Turbidity/color		~~18~~					
Dissolved Oxygen		2.55	1.15				

Analyses	Method	Bottle Type	Preservative	Number	Number MS/MSD
phenols	8041	1x 1000mL amb	—		
Chlor herbs	8151	1x 1000mL amb	—		
VOCs	8260	3x 40mL VOAs	HCl		
SVOCs	8270	1x 1000mL amb	—		
metals / Hg (diss)	6020/7470	1x 250mL poly	HNO_3		

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GROUNDWATER SAMPLING DATA SHEET

Well Number: W-09 Sample Number: 215-GW-01 Date: 10/6

Project: RPAC Project Number: 92C0804A Task: 20C

Weather Conditions: Clear 80° Observations/Comments:

P.I.D. Reading: 0

Calibration Date of P.I.D.: 10/6

P.I.D. Standard Calibration Used: 100ppm Isobutylene

Combustible Gas Reading:

Well Depth: 38.48' TOC

Water Depth: 11.59' TOC

Feet of Water:

Gallons per Foot:

Well Volume:

Purge Volume:

Observation for LNAPL: None

Observation for DNAPL: None

Observation and condition of the well:

Pump hoses and/or bailer ropes were new, cleaned or dedicated?
Dedicated tubing
Decon. pump.

General Comments: Ferrous 1.2

Measuring Point (MP):

Elevation of MP:

Elevation of Water:

Well Diameter: 4"

Well Diameter	Gallons per casing foot
2 inches	0.16
3 inches	0.367
4 inches	0.65

pH meter: Horiba U22

Eh meter:

Conductivity meter:

Calibration Date: 10/6

QA/QC samples: —

Purge Method: 2" Sub. pump

Sample Method: 2" Sub. pump.

Water Disposal: H_2O Treatment

Sampler(s): NJM, DMC

Field Parameters	Before Purging	Volume 1	Volume 2	Volume 3	Volume 4	Volume 5	Sample
Time	11:25	11:30	11:35	1140	1145	1150	1155
pH	6.87	6.91	6.93	6.93	6.99	7.04	
Conductivity	0.353	0.347	0.346	0.345	0.335	0.327	
Eh							
Temperature	14.36	14.88	14.96	14.98	15.3	15.52	
Turbidity/color							
Dissolved Oxygen	0.72	0.57	0.48	0.47	0.44	0.42	

Analyses	Method	Bottle Type	Preservative	Number	Number MS/MSD
Phenols	8041	1x 1000mL Amb	—		
Chlor. Herb.	8151	1x 1000mL Amb	—		
VOCs	8260B	3x VOA	HCl		
Semi vol	8270	1x 1000mL Amb	—		

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GROUNDWATER SAMPLING DATA SHEET

Well Number: W-8-55 Sample Number: 210-OW-01 Date: 10/5/00

Project: RPAC Project Number: 92C0804A Task: 20C

Weather Conditions: Sunny 60° Observations/Comments:

P.I.D. Reading: 0 Measuring Point (MP): TOC

Calibration Date of P.I.D.: 10/5/00 Elevation of MP:

P.I.D. Standard Calibration Used: 100PPM Isobutylene Elevation of Water:

Combustible Gas Reading: Well Diameter: 4"

Well Depth: 52.92

Water Depth: 11.41'

Feet of Water:

Gallons per Foot:

Well Diameter	Gallons per casing foot
2 inches	0.16
3 inches	0.367
4 inches	0.65

Well Volume:

Purge Volume:

Observation for LNAPL: none

Observation for DNAPL: none

Observation and condition of the well: O.K.

pH meter: Horiba U20

Eh meter: "

Conductivity meter: "

Calibration Date: 10/5/00

QA/QC samples: —

Purge Method: low flow

Sample Method: 2" submersible pump

Water Disposal: Water Treatment

Sampler(s): RLR, DMC, MN

Pump hoses and/or bailer ropes were new, cleaned or dedicated? dedicated tubing decon pump

General Comments: grey silt on probe, no odor

Field Parameters	Before Purging	Volume 1	Volume 2	Volume 3	Volume 4	Volume 5	Sample	
Time	9:27	0932	0937	0942	0947	0952	0957	1002
pH	6.27	6.35	6.36	6.37	6.37	6.38	6.40	6.41
Conductivity	1.05	1.10	1.14	1.14	1.14	1.14	1.14	1.15
Eh								
Temperature	13.16	13.37	13.53	13.81	14.42	14.75	14.79	14.96
Turbidity/color								
Dissolved Oxygen	3.14	0.80	0.83	0.63	0.86	0.56	0.69	0.52

Analyses	Method	Bottle Type	Preservative	Number	Number MS/MSD
Phenols	8041	1x1000mL amb	—		
Chlor herbs	8151	1x1000mL amb	—		
VOCs	8260B	3x40mL VOAs	HCl		
SVOCs	8270	1x1000mL amb	—		
metals / Hg (diss)	6020/7470	1x250mL poly	HNO_3		

Time	1007	1012	1022
pH	6.40	6.40	6.41
SC	1.14	1.14	1.14
T	15.32	15.33	15.33
[illegible]	[illegible]	[illegible]	[illegible]

SAMPLE TIME 1025 Fe^{+2} = 4.6

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SCOEPA00006701

GROUNDWATER SAMPLING DATA SHEET

Well Number: W-8-74 (W-3-80) Sample Number: 209-GW-01 Date: 10/5/00

Project: RPAC Project Number: 92C0804A Task: 20C

Weather Conditions: Sunny 60° Observations/Comments:

P.I.D. Reading: Ø

Calibration Date of P.I.D.: 10/5/00

P.I.D. Standard Calibration Used: 100 ppm Isobutylene

Combustible Gas Reading:

Well Depth: 77.20

Water Depth: 15.68'

Feet of Water:

Gallons per Foot:

Well Volume:

Purge Volume:

Observation for LNAPL: none

Observation for DNAPL: none

Observation and condition of the well: O.K.

Pump hoses and/or bailer ropes were new, cleaned or dedicated?

dedicated tubing

decon pump

General Comments: 1000 SAMPLE TIME

Measuring Point (MP): TOC

Elevation of MP:

Elevation of Water:

Well Diameter: 2"

Well Diameter	Gallons per casing foot
2 inches	0.16
3 inches	0.367
4 inches	0.65

pH meter: Horiba U20

Eh meter: "

Conductivity meter: "

Calibration Date: 10/5

QA/QC samples: —

Purge Method: low flow

Sample Method: 2" submersible pump

Water Disposal: water treatment

Sampler(s): RKR, OMC, MN

Fe^{+2} = 3.0

Field Parameters	Before Purging	Volume 1	Volume 2	Volume 3	Volume 4	Volume 5	Sample	
Time	9:25	0930	0935	0940	0945	0950	0955	1000
pH	6.33	6.85	6.89	6.91	6.91	6.92	0.92	SAMPEL
Conductivity	0.098	0.112	0.112	0.115	0.117	0.118	0.119	
Eh								
Temperature	13.2	13.6	13.7	13.8	13.8	13.8	13.8	
Turbidity/color								
Dissolved Oxygen	4.62	1.54	1.09	0.94	0.82	0.77	0.72	

Analyses	Method	Bottle Type	Preservative	Number	Number MS/MSD
Phenols	8041	1x1000mL amb	—		
Chlor herbs	8151	1x1000mL amb	—		
VOCs	8260	3x 40 mL VOA	HCl		
metals tot	6010 B	1x250 ml poly	HNO_3		
anions/alk	300°/310.1	1x 500 ml poly	—		
sulfide	376.1	1x500ml poly	NaOH / ~~ZnOAc~~ ZnOAc		
BOD	405.1	1x1000 ml poly			

COD/OC/NH_3

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GROUNDWATER SAMPLING DATA SHEET

Well Number: W-9-86 Sample Number: 214-GW-01 Date: 10/6

Project: RPAC Project Number: 92C0804A Task: 20C

Weather Conditions: Clear 70s Observations/Comments:

P.I.D. Reading: Ø

Calibration Date of P.I.D.: 10/6/00

P.I.D. Standard Calibration Used: 100ppm Isobytylene

Combustible Gas Reading:

Well Depth: 88.20' TOC

Water Depth: 20.15' TOC

Feet of Water:

Gallons per Foot:

Well Volume:

Purge Volume:

Observation for LNAPL: NONE

Observation for DNAPL: NONE

Observation and condition of the well: GOOD

Pump hoses and/or bailer ropes were new, cleaned or dedicated?
Dedicated hosing
Decon pump

Measuring Point (MP):

Elevation of MP:

Elevation of Water:

Well Diameter: 2"

Well Diameter	Gallons per casing foot
2 inches	0.16
3 inches	0.367
4 inches	0.65

pH meter: Horiba U22

Eh meter:

Conductivity meter:

Calibration Date: 10-6-00

QA/QC samples:

Purge Method: 2" Sub. pump

Sample Method:

Water Disposal: H2O Treatment

Sampler(s): NJM, DMC,

General Comments: SAMPLE TIME: 1050 Fe^{+2} = 0.0

Field Parameters	Before Purging	Volume 1	Volume 2	Volume 3	Volume 4	Volume 5	Sample
Time	1020	1025	1030	1035	1040	1045	1050 ST
pH	5.67	5.79	5.85	5.86	5.86	5.87	
Conductivity	58.1	61.8	65.5	65.8	65.3	64.2	
Eh							
Temperature	13.8	14.0	14.4	14.5	14.6	14.7	
Turbidity/color							
Dissolved Oxygen	1.82	1.04	0.80	0.75	0.68	0.66	

Analyses	Method	Bottle Type	Preservative	Number	Number MS/MSD
Phenols	8041	1x 1000mL Amb.	—		
Chl. Herbic.	8151	1x 1000mL Amb			
VOCs	8260B	3 VOAs	HCL		

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GROUNDWATER SAMPLING DATA SHEET

Well Number: W-9-116 Sample Number: 213-GW-01 Date: 10/6

Project: RPAC Project Number: 92C0804A Task: 20C

Weather Conditions: Clear 70s Observations/Comments:

P.I.D. Reading: Ø

Calibration Date of P.I.D.: 10-6-00

P.I.D. Standard Calibration Used: 100ppm Isobutylene

Combustible Gas Reading:

Well Depth: 120.87' TOC

Water Depth: 19.92' TOC

Feet of Water:

Gallons per Foot:

Well Volume:

Purge Volume:

Observation for LNAPL: None

Observation for DNAPL: None.

Observation and condition of the well: Good.

Pump hoses and/or bailer ropes were new, cleaned or dedicated?
Dedicated hosing
Decon. pump

Measuring Point (MP):

Elevation of MP:

Elevation of Water:

Well Diameter: 2"

Well Diameter	Gallons per casing foot
2 inches	0.16
3 inches	0.367
4 inches	0.65

pH meter: Horiba U22

Eh meter: ↓

Conductivity meter: ↓

Calibration Date: 10-6

QA/QC samples: —

Purge Method: 2" sub. pump

Sample Method: ↓

Water Disposal: H_2O Treatment

Sampler(s): NM, DMC

General Comments: Sample time: 1045 Fe^{+2} = 1.6 mg/L

Field Parameters	Before Purging	Volume 1	Volume 2	Volume 3	Volume 4	Volume 5	Sample
Time	1020	1025	1030	1035	1040		1045
pH	6.32	6.36	6.33	6.32	6.32		
Conductivity	0.263	0.356	3.98	0.409	0.411		
Eh							
Temperature	13.67	13.66	14.22	14.86	14.68		
Turbidity/color							
Dissolved Oxygen	3.23	0.35	0.57	0.54	0.54		

Analyses	Method	Bottle Typ	Preservative	Number	Number MS/MSD
Phenols	8041	1 x 1000mL Amb	—		
Chlor. Herb	8151	1 x 1000 mL Amb	—		
VOCs	8260B	3x VOAs	HCl		

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GROUNDWATER SAMPLING DATA SHEET

Well Number: W-04-I Sample Number: 218-GW-01 Date: 10/9

Project: RPAC Project Number: 92C0804A Task: 20C

Weather Conditions: Raining Observations/Comments:

P.I.D. Reading: Ø

Calibration Date of P.I.D.: 10/9

P.I.D. Standard Calibration Used: 100PPM Isobutylene

Combustible Gas Reading:

Well Depth: 50.70'

Water Depth: 10.89'

Feet of Water:

Gallons per Foot:

Well Volume:

Purge Volume:

Observation for LNAPL: none

Observation for DNAPL: none

Observation and condition of the well: o.k.

Pump hoses and/or bailer ropes were new, cleaned or dedicated?
decon pump, dedicated tubing

Measuring Point (MP): TOC

Elevation of MP:

Elevation of Water:

Well Diameter: 4"

Well Diameter	Gallons per casing foot
2 inches	0.16
3 inches	0.367
4 inches	0.65

pH meter: Horiba U22

Eh meter: "

Conductivity meter: "

Calibration Date: 10/9

QA/QC samples: —

Purge Method: low flow

Sample Method: 2" submersible pump

Water Disposal: water treatment

Sampler(s): OMC, MN, NM

General Comments: Ferrous 2.6
Sample time 10:20

Field Parameters	Before Purging	Volume 1	Volume 2	Volume 3	Volume 4	Volume 5	Sample	
Time	9.33	9.37	9.42	9.47	9.55	10:00	10:10	10:15
pH								
Conductivity	0.663	0.662	0.662	0.656	0.658	0.659	0.658	0.657
Eh								
Temperature	14.0	14.0	14.0	14.7	14.8	15.0	15.6	15.8
Turbidity/color								
Dissolved Oxygen	2.04	1.41	1.20	0.98	0.91	0.82	0.72	0.68

Analyses	Method	Bottle Type	Preservative	Number	Number MS/MSD

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GROUNDWATER SAMPLING DATA SHEET

Well Number: MW-4-89 Sample Number: 217-GW-01 Date: 10/9/00

Project: RPAC Project Number: 92C0804A Task: 20C

Weather Conditions: Raining Observations/Comments:

P.I.D. Reading: Ø Measuring Point (MP): TOC

Calibration Date of P.I.D.: 10/9/00 Elevation of MP:

P.I.D. Standard Calibration Used: 100 PPM Isobutylene Elevation of Water:

Combustible Gas Reading: Well Diameter: 4"

Well Depth: 91.95'

Water Depth: 12.85'

Feet of Water:

Gallons per Foot:

Well Diameter	Gallons per casing foot
2 inches	0.16
3 inches	0.367
4 inches	0.65

Well Volume:

Purge Volume:

Observation for LNAPL: none

Observation for DNAPL: none

Observation and condition of the well: O/K.

pH meter: U22 Horiba

Eh meter: "

Conductivity meter: "

Calibration Date: 10/9/00

QA/QC samples: —

Purge Method: low flow

Sample Method: 2" submersible pump

Water Disposal: water treatment

Sampler(s): DMC, NM, MN

Pump hoses and/or bailer ropes were new, cleaned or dedicated?

decon pump, dedicated tube

General Comments: Ferrous 1.6

Field Parameters	Before Purging	Volume 1	Volume 2	Volume 3	Volume 4	Volume 5	Sample
Time	0856	9:02	9:07	9:12	9:17	9:22	9:25
pH	~~13.76~~ 6.5	6.90	6.92	6.94	6.96	6.98	
Conductivity	~~8~~ 77.9	88.20	86.2	83.4	80.9	80.1	
Eh							
Temperature	13.76	14.28	14.47	14.48	14.50	14.52	
Turbidity/color							
Dissolved Oxygen	3.68						

Analyses	Method	Bottle Type	Preservative	Number	Number MS/MSD

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GROUNDWATER SAMPLING DATA SHEET

Well Number: W-03-S Sample Number: 220-GW-01 Date: 10/9

Project: RPAC Project Number: 92C0804A Task: 20C

Weather Conditions: overcast, some showers Observations/Comments:

P.I.D. Reading: Ø

Calibration Date of P.I.D.: 10/9

P.I.D. Standard Calibration Used: 100ppm isobutylene

Combustible Gas Reading:

Well Depth: 20.90'

Water Depth: 9.25'

Feet of Water:

Gallons per Foot:

Well Volume:

Purge Volume:

Observation for LNAPL: none

Observation for DNAPL: none

Observation and condition of the well: o.k.

Pump hoses and/or bailer ropes were new, cleaned or dedicated?

General Comments: 1325 SAMP TIME Fe^{+2} = 0.0

Measuring Point (MP):

Elevation of MP:

Elevation of Water:

Well Diameter: 4"

Well Diameter	Gallons per casing foot
2 inches	0.16
3 inches	0.367
(4 inches)	0.65

pH meter: Horiba U20

Eh meter: "

Conductivity meter: "

Calibration Date: 10/9

QA/QC samples:

Purge Method:

Sample Method:

Water Disposal:

Sampler(s): DMC, MN, NM

Field Parameters	Before Purging	Volume 1	Volume 2	Volume 3	Volume 4	Volume 5	Sample
Time	1305	1305	1310	1315	1320		1325 SAMP TIME
pH		8.25	7.86	7.84	7.88		
Conductivity		44.7	41.2	41.5	41.9		
Eh							
Temperature		15.37	16.26	16.56	16.61		
Turbidity/color							
Dissolved Oxygen		2.77	0.50	0.46	0.45		

Analyses	Method	Bottle Type	Preservative	Number	Number MS/MSD
Phenols	8041	1x1000mL amb	none		
OC Pests/PCBs	8081/8082	"	"		
OG Pests	8141	"	"		
Chlor herbs	8151	"	"		
VOCs	8260B	3x40mL VOA	HCl		
metals/Hg	6020/7470	1x250mL poly	HNO_3		

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GROUNDWATER SAMPLING DATA SHEET

Well Number: W-04-S Sample Number: 219-6W-01 Date: 10/9

Project: RPAC Project Number: 92C0804A Task: 20C

Weather Conditions: Raining Observations/Comments:

P.I.D. Reading: Ø

Calibration Date of P.I.D.: 10/9

P.I.D. Standard Calibration Used: 100PPM Isobutylene

Combustible Gas Reading:

Well Depth: 20.33'

Water Depth: 9.11'

Feet of Water:

Gallons per Foot:

Well Volume:

Purge Volume:

Observation for LNAPL: none

Observation for DNAPL: none

Observation and condition of the well: o.k.

Pump hoses and/or bailer ropes were new, cleaned or dedicated?

dedicated bailer

General Comments: Ferrous Ø

Measuring Point (MP): TOC

Elevation of MP:

Elevation of Water:

Well Diameter: 4"

Well Diameter	Gallons per casing foot
2 inches	0.16
3 inches	0.367
4 inches	0.65

pH meter: Horiba U22

Eh meter: "

Conductivity meter: "

Calibration Date: 10/9

QA/QC samples:

Purge Method: lowflow ⇒ dry well

Sample Method: bailer

Water Disposal: Water Treatment

Sampler(s): DMC, NM, MN

1055 SAMP TIME

Field Parameters	Before Purging	Volume 1	Volume 2	Volume 3	Volume 4	Volume 5	Sample
Time	10:13	10:20	10:25	10:30			
pH	8.904	9.17	9.29	well dry			
Conductivity	56.5	53.4	50.9				
Eh							
Temperature	15.53	16.48	17.59				
Turbidity/color							
Dissolved Oxygen	1.24	0.67	0.66				

Analyses	Method	Bottle Ty	Preservative	Number	Number MS/MSD

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GROUNDWATER SAMPLING DATA SHEET

Well Number: W-03-F Sample Number: 222-GW-01 Date: 10/9

Project: RPAC Project Number: 92C0804A Task: 20C

Weather Conditions: overcast, some showers Observations/Comments:

P.I.D. Reading: Ø

Calibration Date of P.I.D.: 10/9

P.I.D. Standard Calibration Used: 100 PPM isobutylene

Combustible Gas Reading:

Well Depth: 42.37'

Water Depth: 10.20'

Feet of Water:

Gallons per Foot:

Well Volume:

Purge Volume:

Observation for LNAPL: none

Observation for DNAPL: none.

Observation and condition of the well: O.K.

Pump hoses and/or bailer ropes were new, cleaned or dedicated?

General Comments: SAMPLE TIME: 1430

Measuring Point (MP):

Elevation of MP:

Elevation of Water:

Well Diameter: 4"

Well Diameter	Gallons per casing foot
2 inches	0.16
3 inches	0.367
4 inches	0.65

pH meter: Horiba U20

Eh meter: "

Conductivity meter: "

Calibration Date: 10/9

QA/QC samples: –

Purge Method:

Sample Method:

Water Disposal: Water treatment

Sampler(s): DMC, MN, NM

Fe^{+2} = 8.0 mg/L

DMC 10/9/00

Field Parameters	Before Purging	Volume 1	Volume 2	Volume 3	Volume 4	Volume 5	Sample	
Time	~~1305~~ 2:03	1305	~~6~~ 1405	14:10	1415	1420	1425	1430
pH		8.25	6.34	6.31	6.30	6.29	6.29	SAMP
Conductivity		44.7	0.694	0.699	0.703	0.704	0.701	TIME
Eh								
Temperature		13.37	14.19	14.43	15.09	15.49	15.78	
Turbidity/color			~~14.19~~					
Dissolved Oxygen		2.77	2.13	0.59	0.46	0.43	0.42	

Analyses	Method	Bottle Type	Preservative	Number	Number MS/MSD
Phenols	8041	1x1000mL amb	None		
OC Pests / PCBs	8081 / 8082	"	"		
OG Pests	8141	"	"		
Chlor herbs	8151	"	"		
VOCs	8260B	3x40mL VOA	HCl		

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GROUNDWATER SAMPLING DATA SHEET

Well Number: W-03-D Sample Number: 221-GW-01 Date: 10/9

Project: RPAC Project Number: 92C0804A Task: 20C

Weather Conditions: overcast, someshowers Observations/Comments:

P.I.D. Reading: Ø

Calibration Date of P.I.D.: 10/9

P.I.D. Standard Calibration Used: 100ppm isobutylene

Combustible Gas Reading:

Well Depth: 91.62'

Water Depth: 14.07'

Feet of Water:

Gallons per Foot:

Well Volume:

Purge Volume:

Observation for LNAPL: none

Observation for DNAPL: none

Observation and condition of the well: O.k.

Pump hoses and/or bailer ropes were new, cleaned or dedicated?

General Comments: 1340 SAMPLE TIME Fe^{+2} = 0.4 mg/L

Measuring Point (MP):

Elevation of MP:

Elevation of Water:

Well Diameter: 4"

Well Diameter	Gallons per casing foot
2 inches	0.16
3 inches	0.367
4 inches	0.65

pH meter: Horiba U20

Eh meter: "

Conductivity meter: "

Calibration Date: 10/9/00

QA/QC samples: —

Purge Method: low flow

Sample Method: 2" submersible pump

Water Disposal: Water treatment

Sampler(s): DMC, MW, NM

Field Parameters	Before Purging	Volume 1	Volume 2	Volume 3	Volume 4	Volume 5	Sample	
Time	1258	1300	1305	1310	1315	1320	1325	1330
pH		7.10	6.97	6.98	6.99	6.99	6.98	6.97
Conductivity		44.2	41.8	42.0	42.2	41.9	41.7	41.4
Eh								
Temperature		14.3	14.4	14.8	14.9	15.0	15.0	15.0
Turbidity/color								
Dissolved Oxygen		5.20	2.29	1.84	1.49	1.36	1.22	1.14

Analyses	Method	Bottle Type	Preservative	Number	Number MS/MSD
phenols	8041	1x1000mL amb	—		
OC Pests/PCBs	8081/8082	1x 1000mL amb	—		
OG Pests	8141	1x 1000mL amb	—		
Chlor herbs	8151	1x 1000mL amb	—		
VOCs	8260B	3x 40mL VOA	HCl		

TIME 1335
pH 6.97
SC 41.2
T 15.1

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GROUNDWATER SAMPLING DATA SHEET

Well Number: W-12-5 Sample Number: 224-6W-01 Date: 10/10/00

Project: RPAC Project Number: 92C0804A Task: 20C

Weather Conditions: low 60s, drizzly Observations/Comments:

P.I.D. Reading: 0.0

Calibration Date of P.I.D.: 10/10/00

P.I.D. Standard Calibration Used: 100 ppm isobutylene

Combustible Gas Reading: N/A

Well Depth: 22.50

Water Depth: 15.46

Feet of Water: 22.50 - 15.46 = 7.04 ft

Gallons per Foot: 0.1632 gal/ft

Well Volume: 1.15 gal/CV

Purge Volume:

Observation for LNAPL: none observed

Observation for DNAPL: none observed

Observation and condition of the well:

Pump hoses and/or bailer ropes were new, cleaned or dedicated?
dedicated disposable bailer

Measuring Point (MP): TOC

Elevation of MP:

Elevation of Water:

Well Diameter: 2" ϕ

Well Diameter	Gallons per casing foot
2 inches	0.16
3 inches	0.367
4 inches	0.65

pH meter: HORIBA U-22

Eh meter:

Conductivity meter:

Calibration Date: 10/10/00

QA/QC samples:

Purge Method: dedicated disposable bailer

Sample Method: " " "

Water Disposal: treatment plant

Sampler(s): DMC, RRR, NM, MN

General Comments: Sample time 10:40 $Fe^{+2} = \phi$

Field Parameters	Before Purging	Volume 1	Volume 2	Volume 3	Volume 4	Volume 5	Sample
Time		10:13	10:17	10:20	10:23	10:27	10:40
pH		8.67	8.62	8.62	8.62	8.67	
Conductivity		73.3	76.5	77.5	79.9	81.9	
~~Eh~~ Gallons		1.2	~~1.2~~ 2.4	~~1.2~~ 3.6	~~1.2~~ 4.8	6.0	
Temperature		13.7	13.7	13.7	13.5	13.5	
Turbidity/color							
Dissolved Oxygen		3.55	3.30	4.29	2.87	3.46	

Analyses	Method	Bottle Type	Preservative	Number	Number MS/MSD
Phenols	8041	1x 1000 mL amb	none		
Chlor herbs	8151	1x 1000 mL amb	none		
VOCs	8260B	3x 40 mL VOAs	HCl		

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GROUNDWATER SAMPLING DATA SHEET

Well Number: W-12-D Sample Number: 223-GW-01 Date: 10/10/00

Project: RPAC Project Number: 92C0804A Task: 20C

Weather Conditions: Low 60s, drizzly Observations/Comments:

P.I.D. Reading: 0.0

Calibration Date of P.I.D.: 10/10/00

P.I.D. Standard Calibration Used: 100 ppm isobutylene

Combustible Gas Reading: N/A

Well Depth: 104.60' TOC

Water Depth: ~~23.11 DTW~~ 10/10/00 DMC / 23.12 DTW

Feet of Water:

Gallons per Foot:

Well Volume:

Purge Volume:

Observation for LNAPL: NO LNAPL (check w/bailer)

Observation for DNAPL: NO DNAPL

Observation and condition of the well:

Pump hoses and/or bailer ropes were new, cleaned or dedicated?
deconned pump, dedicated/disposable bailer

Measuring Point (MP): TOC

Elevation of MP:

Elevation of Water:

Well Diameter: 4" ϕ

Well Diameter	Gallons per casing foot
2 inches	0.16
3 inches	0.367
4 inches	0.65

pH meter: HORIBA U-22

Eh meter:

Conductivity meter:

Calibration Date: 10/10/00

QA/QC samples: DUP/MS/MSD/RINSATE.

Purge Method: low-flow

Sample Method: 2" submersible

Water Disposal: treatment system

Sampler(s): DMC, RRR, NM, MN

General Comments: Sample time 10:35

Field Parameters	Before Purging	Volume 1	Volume 2	Volume 3	Volume 4	Volume 5	Volume 6	Sample
Time	1000	10:06	10:11	10:16	10:21	10:26	10:31	10.36
pH		6.81	6.97	7.04	7.14	7.23	7.28	7.28
Conductivity		39.9	39.6	39.6	39.7	39.6	39.7	39.6
Eh								
Temperature		13.27	13.50	13.59	13.83	14.10	14.05	13.98
Turbidity/color								
Dissolved Oxygen		1.10	0.74	0.77	0.77	0.65	0.62	0.63

Analyses	Method	Bottle Type	Preservative	Number	Number MS/MSD
Phenols	8041	1x 1000mL amb	none		
Chlor herbs	8151	1x 1000mL amb	none		
VOCs	8260B	3x 40mL VOA	HCl		

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GROUNDWATER SAMPLING DATA SHEET

Well Number: W-11-B Sample Number: 226-GW-01 Date: 10/10/00

Project: RPAC Project Number: 92C0804A Task: 20C

Weather Conditions: low 60s, cloudy. Observations/Comments:

P.I.D. Reading: 0.0 ppm

Calibration Date of P.I.D.: 10/10/00

P.I.D. Standard Calibration Used: 100ppm isobutylene

Combustible Gas Reading: N/A

Well Depth: 124.42' TOC

Water Depth: 28.80' TOC

Feet of Water:

Gallons per Foot:

Well Volume:

Purge Volume:

Observation for LNAPL: none observed

Observation for DNAPL: none observed

Observation and condition of the well:

Pump hoses and/or bailer ropes were new, cleaned or dedicated?
decomed pump, dedicated/disposable tubing

General Comments: 1420 SAMPLE TIME.

Measuring Point (MP): TOC

Elevation of MP:

Elevation of Water:

Well Diameter: 4"ø

Well Diameter	Gallons per casing foot
2 inches	0.16
3 inches	0.367
4 inches	0.65

pH meter: HORIBA U-22

Eh meter:

Conductivity meter:

Calibration Date: 10/10/00

QA/QC samples: none

Purge Method: low-flow

Sample Method: 2" submersible

Water Disposal: treatment plant.

Sampler(s): RRR DMC, WM, MN

Fe^{+2} = 4.0 mg/L

Field Parameters	Before Purging	Volume 1	Volume 2	Volume 3	Volume 4	Volume 5	Sample	
Time	1337	1339	1344	1349	1354	1359	1404	1420
pH		5.97	6.04	6.08	6.12	6.13	6.13	6.13
Conductivity		0.214	0.288	0.308	0.321	0.325	0.327	0.327
Eh								
Temperature		13.7	13.8	14.1	14.5	14.7	14.7	14.7
Turbidity/color								
Dissolved Oxygen		5.65	2.41	1.47	1.12	1.07	0.92	0.86

Analyses	Method	Bottle Type	Preservative	Number	Number MS/MSD
Phenols	8041	1x1000mL amb	—		
OC Pests / PCBs	8081 / 8082	1x1000mL amb	—		
OP Pests	8141	1x1000mL amb	—		
Chlor herbs	8151	1x1000mL amb	—		
VOCs	8260B	3x 40mL VOA	HCl		

TIME 1415
pH 6.13
SC 0.321
T 14.7

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SCOEPA00006713

GROUNDWATER SAMPLING DATA SHEET

MN 10/10

Well Number: W-12-I Sample Number: ~~224-GW-01~~ 225-GW-01 Date: 10/10/00

Project: RPAC Project Number: 92C0804A Task: 20C

Weather Conditions: low 60s, drizzly Observations/Comments:

P.I.D. Reading: 0.0

Calibration Date of P.I.D.: 10/10/00

P.I.D. Standard Calibration Used: 100ppm isobutylene

Combustible Gas Reading: N/A

Well Depth: 60.78' TOC

Water Depth: 22.68' TOC

Feet of Water:

Gallons per Foot:

Well Volume:

Purge Volume:

Observation for LNAPL: none observed

Observation for DNAPL: none observed

Observation and condition of the well:

Pump hoses and/or bailer ropes were new, cleaned or dedicated?

~~decanned pump, dedicated disposable tubing~~

dedicated bailer

General Comments: 11:30 Sample time

Ferrous 2.0

Measuring Point (MP): TOC

Elevation of MP:

Elevation of Water:

Well Diameter: 2" ϕ

Well Diameter	Gallons per casing foot
2 inches	0.16
3 inches	0.367
4 inches	0.65

pH meter: HORIBA U-22

Eh meter:

Conductivity meter:

Calibration Date: 10/10/00

QA/QC samples:

Purge Method: low-flow

Sample Method: ~~2" submersible~~ bail MN 10/10/00

Water Disposal: treatment plant

Sampler(s): DMC, RER, NM, MN

started bailing

Field Parameters	Before Purging	Volume 1	Volume 2	Volume 3	Volume 4	Volume 5	11:1 Sample	11:16
Time	1000	10:05	10:10	10:28	10:30	11:00	~~10:50~~	well dry
pH		5.34	well dry	5.96	well dry	6.72	7.23	
Conductivity		0.117		0.113		0.115	0.113	
~~Eh~~ Gallons				3/4 gall				
Temperature		13.3		13.7		12.89	12.86	
Turbidity/color								
Dissolved Oxygen		2.19		~~3.5~~ 2.54		5.52	2.42	

Analyses	Method	Bottle Type	Preservative	Number	Number MS/MSD
Phenols	8041	1x1000 mL amb	none		
Chlor herbs	8151	1x1000 mL amb	none		
VOCs	8260B	3x40 mL VOA	HCl		
metals/Hg DOS	6020/7470	1x250 mL poly	HNO_3		

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GROUNDWATER SAMPLING DATA SHEET

Well Number: W-11-5 Sample Number: 228-GW-01 Date: 10/10/00

Project: RPAC Project Number: 92C0804A Task: 20C

Weather Conditions: low 60s, cloudy Observations/Comments:

P.I.D. Reading: 10.9 ppm

Calibration Date of P.I.D.: 10/10/00

P.I.D. Standard Calibration Used: 100 ppm isobutylene

Combustible Gas Reading: N/A

Well Depth: 25.05' TOC

Water Depth: ~~16.25~~ 15.75' 10/10/00 TOC ~~9.30~~ 9.30 SPET

Feet of Water: ~~25.05 - 16.25~~ = ~~8.80~~ ft

Gallons per Foot: 0.1632 gal/ft

Well Volume: ~~1.44~~ 1.51 SPET. gal/CV

Purge Volume:

Observation for LNAPL: none observed

Observation for DNAPL: none observed

Observation and condition of the well:

Pump hoses and/or bailer ropes were new, cleaned or dedicated?

dedicated disposable bailer, line

General Comments: SAMPLE TIME 1505

Measuring Point (MP): TOC

Elevation of MP:

Elevation of Water:

Well Diameter: 2" ø

Well Diameter	Gallons per casing foot
2 inches	0.16
3 inches	0.367
4 inches	0.65

pH meter: HORIBA U-22

Eh meter:

Conductivity meter:

Calibration Date: 10/10/00

QA/QC samples:

Purge Method: dedicated disposable bailer

Sample Method: " " "

Water Disposal: treatment plant

Sampler(s): RRR, DMC, NM, MN

Fe^{+2} = 0.2

Field Parameters	Before Purging	Volume 1	Volume 2	Volume 3	Volume 4	Volume 5	Sample
Time		1445	1449	1452	1455	1458	1505
pH		11.56	11.59	11.61	11.57	11.59	
Conductivity		0.116	0.117	0.115	0.117	0.117	
~~Eh~~ GAL OUT		1.4	2.8	4.2	5.6	7.0	
Temperature		13.51	14.53	13.59	13.62	13.59	
Turbidity/color							
Dissolved Oxygen		3.19	4.22	4.59	5.05	4.00	

Analyses	Method	Bottle Type	Preservative	Number	Number MS/MSD
Phenols	8041	1x 1000 mL amb	—		
OC Pests/PCBs	8081/8082	1x 1000 mL amb	—		
OP Pests	8141	1x 1000 mL amb	—		
Chlor herbs	8151	1x 1000 mL amb	—		
VOCs	8260 B	3x 40 mL VOA	HCl		
Dioxins/Furans	8290	2x 1000 mL amb	—		
Metals + trace (TOT)	6010 B	1x 250 mL poly	HNO_3		
anions/alk	300/310.1	1x 500 mL poly	—		
sulfide	376.1	1x 500 mL poly	NaOH + ZnOAc		
BOD	405.1	1x 1000 mL poly	—		
COD/oil/grease	[illegible]	1x 250 mL poly	H_2SO_4		
Methane	GC FID	3x 40 mL VOA	HCl		
plate count	SM9215	1x 120 mL plas			

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GROUNDWATER SAMPLING DATA SHEET

Well Number: W-11-D Sample Number: 227-6W-01 Date: 10/10/00

Project: RPAC Project Number: 92C0804A Task: 20C

Weather Conditions: low 60s, cloudy Observations/Comments:

P.I.D. Reading: 0.0

Calibration Date of P.I.D.: 10/10/00

P.I.D. Standard Calibration Used: 100ppm isobutylene

Combustible Gas Reading: N/A

Well Depth: 83.45' TOC

Water Depth: 28.35' TOC

Feet of Water:

Gallons per Foot:

Well Volume:

Purge Volume:

Observation for LNAPL: none observed

Observation for DNAPL: none observed

Observation and condition of the well:

Pump hoses and/or bailer ropes were new, cleaned or dedicated?
deconned pump, dedicated/disposable tubing

Measuring Point (MP): TOC

Elevation of MP:

Elevation of Water:

Well Diameter: 4" ø

Well Diameter	Gallons per casing foot
2 inches	0.16
3 inches	0.367
4 inches	0.65

pH meter: HORIBA U-22

Eh meter:

Conductivity meter:

Calibration Date: 10/10/00

QA/QC samples: none

Purge Method: low-flow

Sample Method: 2" submersible

Water Disposal: treatment system.

Sampler(s): DAC, RRR, MN, NM

General Comments: purge water lt brn, extremely turbid.
1425 SAMP TIME Fe^{+2} = 4.0 mg/L

Field Parameters	Before Purging	Volume 1	Volume 2	Volume 3	Volume 4	Volume 5	Sample	
Time	1346	1348	1353	1358	1403	1409	1414	1419
pH		6.81	6.91	6.81	6.78	6.77	6.77	6.78
Conductivity		0.429	0.427	0.392	0.373	0.242	0.242	0.242
Eh								
Temperature		13.59	14.38	14.51	14.72	14.55	14.46	14.39
Turbidity/color								
Dissolved Oxygen		4.60	0.87	0.50	0.42	0.43	0.43	0.43

Analyses	Method	Bottle Typ	Preservative	Number	Number MS/MSD
Phenols	8041	1x 1000 mL amb	—		
OC Pests/PCBs	8081/8082	1x 1000 mL amb	—		
OP Pests	8141	1x 1000 mL amb	—		
Chlor herbs	8151	1x 1000mL amb	—		
VOCs	8260 B	3x 40 mL VOA	HCl		
Dioxins/furans	8290	2x 1000mL amb	—		
metals + trace (TOT)	6010 B	1x 250mL poly	HNO_3		
anions/alk	300/310.1	1x 500 mL poly	—		
sulfide	376.1	1x 500mL poly	NaOH + ZnOAc		
BOD	405.1	1x 1000 mL poly	—		
methane	GCFID	3x40 mL poly	HCl		
plate count	SM9215	1x120mL plas	—		

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GROUNDWATER SAMPLING DATA SHEET

Well Number: W-10 Sample Number: 230-GW-01 Date: 10/11

Project: RPAC Project Number: 92C0804A Task: 20C

Weather Conditions: overcast Observations/Comments:

P.I.D. Reading: none taken, cap off when arrived

Calibration Date of P.I.D.: N/A

P.I.D. Standard Calibration Used: N/A

Combustible Gas Reading:

Well Depth: 71.85'

Water Depth: 20.91'

Feet of Water:

Gallons per Foot:

Well Volume:

Purge Volume:

Observation for LNAPL: none

Observation for DNAPL: none

Observation and condition of the well: O.K., no cap,

Pump hoses and/or bailer ropes were new, cleaned or dedicated?

dedicated tubing, decon pump

Measuring Point (MP): TOC

Elevation of MP:

Elevation of Water:

Well Diameter: 4"

Well Diameter	Gallons per casing foot
2 inches	0.16
3 inches	0.367
4 inches	0.65

pH meter: Horiba U22

Eh meter:

Conductivity meter: "

Calibration Date: 10/11

QA/QC samples: —

Purge Method: low flow

Sample Method: 2" submersible pump

Water Disposal: water treatment

Sampler(s): DMC, RRR, NM, MN

General Comments: Ferrous: 4.0 mg/L

Sample time 10:25

Field Parameters	Before Purging	Volume 1	Volume 2	Volume 3	Volume 4	Volume 5	Sample
Time	9:56	10:01	10:06	10:11	10:16	10:21	10:25
pH	5.92	6.00	6.02	6.09	6.17	6.20	
Conductivity	0.498	0.501	0.504	0.522	0.531	0.534	
Eh							
Temperature	12.85	13.31	13.89	14.21	14.34	14.36	
Turbidity/color							
Dissolved Oxygen	3.43	0.87	0.67	0.57	0.54	0.51	

Analyses	Method	Bottle Type	Preservative	Number	Number MS/MSD
8260B	VOCs	Voas	HCl	3	—

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GROUNDWATER SAMPLING DATA SHEET

Well Number: W-11-I Sample Number: 229-GW-01 Date: 10/10/00

Project: RPAC Project Number: 92C0804A Task: 20C

Weather Conditions: low 60s, cloudy Observations/Comments:

P.I.D. Reading: 0.0

Calibration Date of P.I.D.: 10/10/00

P.I.D. Standard Calibration Used: 100 ppm isobutylene

Combustible Gas Reading: N/A

Well Depth: 62.00' TOC

Water Depth: 28.25' TOC

Feet of Water:

Gallons per Foot:

Well Volume:

Purge Volume:

Observation for LNAPL: none observed

Observation for DNAPL: none observed

Observation and condition of the well:

Pump hoses and/or bailer ropes were new, cleaned or dedicated?
dedicated disposable tubing, decanned pump

General Comments: 1525 SAMPLE TIME. Fe^{2+} =

Measuring Point (MP): TOC

Elevation of MP:

Elevation of Water:

Well Diameter: 2" ϕ

Well Diameter	Gallons per casing foot
2 inches	0.16
3 inches	0.367
4 inches	0.65

pH meter: HORIBA U-22

Eh meter:

Conductivity meter:

Calibration Date: 10/10/00

QA/QC samples: none

Purge Method: low-flow

Sample Method: 2" submersible

Water Disposal: treatment plant

Sampler(s): RRR, DMC, MN, VM

Field Parameters	Before Purging	Volume 1	Volume 2	Volume 3	Volume 4	Volume 5	Sample
Time	1449	1451	1456	1501	1506		
pH		5.78	5.82	5.85	WELL		
Conductivity		70.0	90.9	93.4	DRY.		
Eh							
Temperature		13.8	14.5	14.7			
Turbidity/color							
Dissolved Oxygen		2.65	1.07	1.01			

Analyses	Method	Bottle Type	Preservative	Number	Number MS/MSD
Phenols	8041	1x1000mL amb	—		
OC Pests/PCBs	8081/8082	1x1000mL amb	—		
OP Pests	8141	1x1000mL amb	—		
Chlor herbs	8151	1x1000mL amb	—		
VOCs	8260B	3x40 mL VOA	HCl		
Dioxins/furans	8290	2x1000 mL amb	—		
metals + trace (TOT)	6010B	1x 250mL poly	HNO_3		
metals + Hg (DISS)	6020/7470	1x 250 mL poly	HNO_3		
anions/alk	300/310.1	1x500 mL poly	—		
sulfide	376.1	1x500 mL poly	NaOH+ZnOAc		

COD/OC/NH_3 410.4/415.2/350.1 1x250
methane 6CFID 3x40ml
plate count SM 9215 1x120

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GROUNDWATER SAMPLING DATA SHEET

Well Number: RP-01-51 Sample Number: 232-GW-01 Date: 10/11/00

Project: RPAC Project Number: 92C0804A Task: 20C

Weather Conditions: low 60s, cloudy Observations/Comments:

P.I.D. Reading: 0.0

Calibration Date of P.I.D.: 10/11/00

P.I.D. Standard Calibration Used: 100 ppm isobutylene

Combustible Gas Reading: N/A

Well Depth: 53.20' TOC

Water Depth: 27.78' TOC

Feet of Water:

Gallons per Foot:

Well Volume:

Purge Volume:

Observation for LNAPL: none observed

Observation for DNAPL: none observed

Observation and condition of the well:

Pump hoses and/or bailer ropes were new, cleaned or dedicated?
deconned pump, dedicated disposable tubing

General Comments: Sample time: 1320

Measuring Point (MP): TOC

Elevation of MP:

Elevation of Water:

Well Diameter: 2" ϕ PVC

Well Diameter	Gallons per casing foot
2 inches	0.16
3 inches	0.367
4 inches	0.65

pH meter: HORIBA U-22

Eh meter:

Conductivity meter:

Calibration Date: 10/11/00

QA/QC samples: none

Purge Method: low-flow

Sample Method: 2" submersible

Water Disposal: treatment system

Sampler(s): DMC, RRR, NM, MN

Fe^{+2} = 0.0 mg/L

Field Parameters	Before Purging	Volume 1	Volume 2	Volume 3	Volume 4	Volume 5	Sample	
Time	1242	1243	1248	1253	1258	1303	1308	1313
pH		5.97	5.95	6.36	6.62	6.68	6.69	6.70
Conductivity		0.256	0.378	0.390	0.396	0.399	0.401	0.401
Eh								
Temperature		12.6	12.6	12.7	12.7	12.7	12.7	12.7
Turbidity/color								
Dissolved Oxygen		5.85	1.30	5.66	1.01	0.78	0.74	0.70

Analyses	Method	Bottle Type	Preservative	Number	Number MS/MSD
Phenols	8041	1x1000mL amb	none		
OC Pests / PCBs	8081 / 8082	1x1000mL amb	"		
OP Pests	8141	1x 1000mL amb	"		
Chlor herbs	8151	1x 1000mL amb	"		
VOCs	8260B	3X 40mL VOA	HCl		
dioxins / furans	8290	2X 1000mL amb	none		
Metals + trace el.	6010B	1x 250mL poly	HNO_3		
anions / alk	300 / 310.1	1X 500mL poly	none		
sulfide	376.1	1X 500mL poly	NaOH + HOAc		
BOD	405.1	1X 1000mL poly	none		
COD / [illegible]	[illegible]	1x 250mL poly	H_2SO_4		

methane GC/FID 3x40mL V
plate count SM 9215 1x120mL

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SCOEPA00006719

GROUNDWATER SAMPLING DATA SHEET

Well Number: RP-01-65 Sample Number: 231-GW-01 Date: 10/11/00

Project: RPAC Project Number: 92C0804A Task: 20C

Weather Conditions: low 60s, cloudy Observations/Comments:

P.I.D. Reading: 0.0

Calibration Date of P.I.D.: 10/11/00

P.I.D. Standard Calibration Used: 100 ppm isobutylene

Combustible Gas Reading: N/A

Well Depth: 68.25' TOC

Water Depth: 27.55' TOC

Feet of Water:

Gallons per Foot:

Well Volume:

Purge Volume:

Observation for LNAPL: none observed

Observation for DNAPL: none observed

Observation and condition of the well:

Pump hoses and/or bailer ropes were new, cleaned or dedicated?
deconned pump, dedicated disposable tubing

Measuring Point (MP): TOC

Elevation of MP:

Elevation of Water:

Well Diameter: 2" ϕ PVC

Well Diameter	Gallons per casing foot
2 inches	0.16
3 inches	0.367
4 inches	0.65

pH meter: Horiba U-22

Eh meter:

Conductivity meter:

Calibration Date: 10/11/00

QA/QC samples: none

Purge Method: low-flow

Sample Method: 2" submersible

Water Disposal: treatment system

Sampler(s): DMC, RRP, NM, MN

General Comments: sample time: 1305 Fe^{+2} = 0.0
rotten-egg smell to purge water

Field Parameters	Before Purging	Volume 1	Volume 2	Volume 3	Volume 4	Volume 5	Sample
Time	1237	1240	1245	1250	1255	1300	1305 SAMP TIME
pH		6.04	6.01	6.00	5.98	5.98	
Conductivity		0.529	0.549	0.577	0.592	0.598	
Eh							
Temperature		12.18	12.91	12.94	12.96	12.98	
Turbidity/color							
Dissolved Oxygen		2.30	0.69	0.53	0.48	0.47	

Analyses	Method	Bottle Ty	Preservative	Number	Number MS/MSD
Phenols	8041	1x1000mL amb	none		
OC pests/PCBs	8081/8082	1x1000mL amb	"		
OP pests	8141	1x 1000mL amb	"		
Chlor herbs	8151	1x 1000mL amb	"		
VOCs	8260	3x 40 mL VOAs	HCl		
Dioxin/furans	8290	2x 1000mL amb	"		
metals + trace els	6010B	1x 250mL poly	HNO_3		
anions/alk	300/310.1	1x 500mL poly	none		
sulfide	376.1	1x 500mL poly	NaOH+HOAC		
BOD	405.1	1x 1000mL poly	none		
[illegible]	[illegible]	1x 250 mL poly	H_2SO_4		

methane GC/FID 3x40mL VOAs HCl
plate count SM9215 1x 120 mL plas —

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GROUNDWATER SAMPLING DATA SHEET

Well Number: RP-03-D Sample Number: 234-GW-01 Date: 10/12/00

Project: RPAC Project Number: 92C0804A Task: 20C

Weather Conditions: 50s, cloudy, no rain Observations/Comments:

P.I.D. Reading: 0.0

Calibration Date of P.I.D.: 10/12/00

P.I.D. Standard Calibration Used: 100 ppm isobutylene

Combustible Gas Reading: N/A

Well Depth: 54.98' TOC

Water Depth: 19.55' TOC

Feet of Water:

Gallons per Foot:

Well Volume:

Purge Volume:

Observation for LNAPL: none observed

Observation for DNAPL: none observed

Observation and condition of the well:

Pump hoses and/or bailer ropes were new, cleaned or dedicated?
deconned pump, dedicated disposable tubing.

Measuring Point (MP): TOC

Elevation of MP:

Elevation of Water:

Well Diameter: 2" Ø

Well Diameter	Gallons per casing foot
2 inches	0.16
3 inches	0.367
4 inches	0.65

pH meter: HORIBA U-22

Eh meter:

Conductivity meter:

Calibration Date: 10/12/00

QA/QC samples: none

Purge Method: low-flow

Sample Method: 2" submersible

Water Disposal: treatment plant

Sampler(s): RRR, NM, MN, DMC

General Comments: sample time: 0920 Fe^{+2} = 0.0

Field Parameters	Before Purging	Volume 1	Volume 2	Volume 3	Volume 4	Volume 5	Sample
Time	0852	0854	0859	0904	0909	0914	0920
pH		6.14	6.19	6.16	6.16	6.16	sample time
Conductivity		88.5	88.5	87.2	86.2	85.9	
Eh							
Temperature		12.24	12.80	13.04	13.06	13.07	
Turbidity/color							
Dissolved Oxygen		6.29	0.86	0.57	0.52	0.51	

Analyses	Method	Bottle Type	Preservative	Number	Number MS/MSD
Phenols	8041	1x1000 mL amb	—		
Chlor herbs	8151	1x1000 mL amb	—		
VOCs	8260 B	3x 40 mL VOA	HCl		
SVOCs	8270	1x 1000 mL amb	—		
Dioxins / furans	8290	2x 1000 mL amb	—		

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GROUNDWATER SAMPLING DATA SHEET

Well Number: RP-01-31 Sample Number: ~~231~~ 233-GW-01 Date: 10/11/00

Project: RPAC Project Number: 92C0804A Task: 20C

Weather Conditions: low 60s, cloudy Observations/Comments:

P.I.D. Reading: 0.0

Calibration Date of P.I.D.: 10/11/00

P.I.D. Standard Calibration Used: 100 ppm isobutylene

Combustible Gas Reading: N/A

Well Depth: 33.45' TOC

Water Depth: 27.74' TOC

Feet of Water: 5.71'

Gallons per Foot: 0.1632

Well Volume: 0.93 = ~ 1 gal

Purge Volume:

Observation for LNAPL: none observed

Observation for DNAPL: none observed

Observation and condition of the well:

Pump hoses and/or bailer ropes were new, cleaned or dedicated?
dedicated disposable bailer, line

Measuring Point (MP): TOC

Elevation of MP:

Elevation of Water:

Well Diameter: 2" ϕ PVC

Well Diameter	Gallons per casing foot
2 inches	0.16
3 inches	0.367
4 inches	0.65

pH meter: HORIBA U-22

Eh meter:

Conductivity meter:

Calibration Date: 10/11/00

QA/QC samples: none

Purge Method: bailer

Sample Method: bailer

Water Disposal: treatment system

Sampler(s): DMC, RRR, NM, MN

General Comments: sample time: 1340 Fe^{+2} = 0.0

Field Parameters	Before Purging	Volume 1	Volume 2	Volume 3	Volume 4	Volume 5	Sample
Time		1251	1254	well dry	1307	well dry	
pH		6.77	6.96	@2gals.	6.97	@3gals	
Conductivity		61.9	55.6	1254 hrs	54.2	1307 hrs.	
~~Eh~~ GAL OUT		1	2		3		
Temperature		12.3	11.8		11.92		
Turbidity/color							
Dissolved Oxygen		8.00	6.00		3.66		

Analyses	Method	Bottle Type	Preservative	Number	Number MS/MSD
Phenols	8041	1x1000mL amb	none		
OC Pests / PCBs	8081 / 8082	1x1000mL amb	"		
OP Pests	8141	1x 1000mL amb	"		
Chlor herbs	8151	1x 1000mL amb	"		
VOCs	8260B	3x 40mL VOA	HCl		
dioxins / furans	8290	2x 1000mL amb	none		
metals + trace elts	6010 B	1x 250mL poly	HNO_3		
metals + Hg	6020/7470	1x 250mL poly	HNO_3	COD/OC/NH_3	410.4/415.2/350.1 1x250mL
anions / alk	300/310.1	1x 500mL poly	none	methane	GCFID 3x40mL
sulfide	376.1	1x 500mL poly	NaOH + HOAc	plate count	SM 9215 1x120mL pla
[illegible]	[illegible]	1x 1000mL [illegible]	none		

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SCOEPA00006722

GROUNDWATER SAMPLING DATA SHEET

Well Number: RP-06-87 Sample Number: 236-GW-01 Date: 10/12/00

Project: RPAC Project Number: 92C0804A Task: 20C

Weather Conditions: overcast Observations/Comments:

P.I.D. Reading: Ø

Calibration Date of P.I.D.: 10/12/00

P.I.D. Standard Calibration Used: 100 ppm isobutylene

Combustible Gas Reading: N/A

Well Depth: 89.20'

Water Depth: 27.82'

Feet of Water:

Gallons per Foot:

Well Volume:

Purge Volume:

Observation for LNAPL: none

Observation for DNAPL: none

Observation and condition of the well: O.K.

Pump hoses and/or bailer ropes were new, cleaned or dedicated?
deconned pump, dedicated disposable tubing

Measuring Point (MP): TOC

Elevation of MP:

Elevation of Water:

Well Diameter: 2" PVC

Well Diameter	Gallons per casing foot
(2 inches)	0.16
3 inches	0.367
4 inches	0.65

pH meter: HORIBA U-22

Eh meter:

Conductivity meter:

Calibration Date: 10/12/00

QA/QC samples: DUP, RINSATE, MS, MSD

Purge Method: low-flow

Sample Method: 2" submersible

Water Disposal: treatment plant

Sampler(s): RRR, DMC, NM, MW

General Comments: Ferrous: 4.0 mg/L
Sample time 1315

Field Parameters	Before Purging	Volume 1	Volume 2	Volume 3	Volume 4	Volume 5	Sample	
Time	12:39	12:44	12:49	12:54	12:59	1304	1309	1315
pH	5.13	5.21	5.31	5.30	5.29	5.27	5.27	
Conductivity	0.309	0.349	0.440	0.475	0.491	0.496	0.499	
Eh								
Temperature	12.80	13.20	13.90	14.10	14.1	14.1	14.2	
Turbidity/color								
Dissolved Oxygen	2.25	1.61	1.13	0.99	0.75	0.82	0.78	

Analyses	Method	Bottle Type	Preservative	Number	Number MS/MSD
Phenols	8041	1x 1000mL amb	none		
Chlor herbs	8151	1x 1000mL amb	none		
VOCs	8260 B	3x 40mL VOAs	HCl		
Dioxins / furans	8290	2x 1000mL amb	none		
metals / Hg DISS	6020 / 7470	1x 250mL poly	HNO_3		
metals / trace TOT	6010 B	1x 250mL poly	HNO_3		
anions / alk	300 / 310-1	1x 500mL poly	none		
sulfide	376.1	1x 500mL poly	NaOH + HOAc		
BOD	405.1	1x 1000mL poly	none		
COD / OC / NH_3	410.4 / 4152 / 350.1	1x 250mL poly	H_2SO_4		

plate count SM9215 1x 120 mL plac

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GROUNDWATER SAMPLING DATA SHEET

Well Number: RP-03-5 Sample Number: 235-GW-01 Date: 10/12/00

Project: RPAC Project Number: 92C0804A Task: 20C

Weather Conditions: 50s, cloudy, no rain Observations/Comments:

P.I.D. Reading: 0.0 ppm

Calibration Date of P.I.D.: 10/12/00

P.I.D. Standard Calibration Used: 100 ppm isobutylene

Combustible Gas Reading: N/A

Well Depth: 32.44' TOC

Water Depth: 18.21' TOC

Feet of Water: 32.44 - 18.21 = 16.23 ft

Gallons per Foot: .1632 gal/ft

Well Volume: 16.23 x .1632 = 2.3 gal

Purge Volume:

Observation for LNAPL: none observed

Observation for DNAPL: none observed

Observation and condition of the well:

Pump hoses and/or bailer ropes were new, cleaned or dedicated?
dedicated disposable bailer

General Comments: SAMPLE TIME: 0945

Measuring Point (MP): TOC

Elevation of MP:

Elevation of Water:

Well Diameter: 2" ϕ

Well Diameter	Gallons per casing foot
2 inches	0.16
3 inches	0.367
4 inches	0.65

pH meter: HORIBA U-22

Eh meter:

Conductivity meter:

Calibration Date: 10/12/00

QA/QC samples: none

Purge Method: bailer

Sample Method: bailer

Water Disposal: treatment plant

Sampler(s): NM, MW, RRR, DMC

Fe^{+2} = 3.8 mg/L

Field Parameters	Before Purging	Volume 1	Volume 2	Volume 3	Volume 4	Volume 5	Sample
Time		0848	0854	0908	0924	well dry.	
pH		5.52	5.53	5.60	5.62	allow 15	
Conductivity		0.093	0.895	0.844	0.821	mins prior	
~~Ft~~ GAL OUT		2.3	4.6	6.9	9.2	to sampling.	
Temperature		11.7	11.6	11.7	11.7		
Turbidity/color							
Dissolved Oxygen		5.01	4.50	6.32	6.63		

Analyses	Method	Bottle Ty,	Preservative	Number	Number MS/MSD
Phenols	8041	1x 1000 mL amb	none		
Chlor herbs	8151	1x 1000 mL amb	..		
VOCs	8260 B	3x 40 mL VOA	HCl		
SVOCs	8270	1x 1000 mL amb	none		
Dioxins/furans	8290	2x 1000 mL amb	..		

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SCOEPA00006724

GROUNDWATER SAMPLING DATA SHEET

Well Number: AL-6-96 Sample Number: 238-GW-01 Date: 10/12/00

Project: RPAC Project Number: 92C0804A Task: 20C

Weather Conditions: 50s, cloudy Observations/Comments:

P.I.D. Reading: 0.0

Calibration Date of P.I.D.: 10/12/00

P.I.D. Standard Calibration Used: 100 ppm isobutylene

Combustible Gas Reading: N/A

Well Depth: 98.85' TOC

Water Depth: 18.15' TOC

Feet of Water:

Gallons per Foot:

Well Volume:

Purge Volume:

Observation for LNAPL: none observed.

Observation for DNAPL: none observed.

Observation and condition of the well:

Pump hoses and/or bailer ropes were new, cleaned or dedicated?
deconned pump, dedicated/disposable tubing

Measuring Point (MP): TOC

Elevation of MP:

Elevation of Water:

Well Diameter: 2"ø

Well Diameter	Gallons per casing foot
2 inches	0.16
3 inches	0.367
4 inches	0.65

pH meter: HORIBA U-22

Eh meter:

Conductivity meter:

Calibration Date: 10/12/00

QA/QC samples: none

Purge Method: low-flow

Sample Method: 2" submersible

Water Disposal: treatment facility

Sampler(s): DMC, RRR, MN

General Comments: 1510 SAMPLE TIME Fe^{+2} = 1.8 mg/L.
initial purge water turbid, gray; silty

Field Parameters	Before Purging	Volume 1	Volume 2	Volume 3	Volume 4	Volume 5	Sample
Time	1443	1445	1450	1455	1500	1505	1510
pH		6.60	6.60	6.60	6.60	6.60	SAMPLE TIME
Conductivity		0.392	0.430	0.435	0.439	0.441	
Eh							
Temperature		14.2	15.44	15.65	15.70	15.73	
Turbidity/color							
Dissolved Oxygen		5.00	0.72	0.60	0.57	0.54	

Analyses	Method	Bottle Type	Preservative	Number	Number MS/MSD
Phenols	8041	1x1000 mL amb	none		
Chlor herbs	8151	1x1000mL amb	none		
VOCs	8260B	3x 40mL VOA	HCl.		

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SCOEPA00006725

GROUNDWATER SAMPLING DATA SHEET

Well Number: RP-06-30 Sample Number: 237-GW-01 Date: 10/12/00

Project: RPAC Project Number: 92C0804A Task: 20C

Weather Conditions: overcast Observations/Comments:

P.I.D. Reading: 0

Calibration Date of P.I.D.: 10/12/00

P.I.D. Standard Calibration Used: 100 ppm isobutylene

Combustible Gas Reading: N/A

Well Depth: 33.00'

Water Depth: ~~33.00'~~ MN 10/12 20.25'

Feet of Water:

Gallons per Foot:

Well Volume:

Purge Volume:

Observation for LNAPL: none

Observation for DNAPL: none

Observation and condition of the well: o.k.

Pump hoses and/or bailer ropes were new, cleaned or dedicated?

dedicated bailer

General Comments: sample time: 1340

Ferrous!

Measuring Point (MP): TOC

Elevation of MP:

Elevation of Water:

Well Diameter: 2" PVC

Well Diameter	Gallons per casing foot
2 inches	0.16
3 inches	0.367
4 inches	0.65

pH meter: HORIBA U-22

Eh meter:

Conductivity meter:

Calibration Date: 10/12/00

QA/QC samples: none

Purge Method:

Sample Method:

Water Disposal: treatment plant

Sampler(s): RRR, DMC, NA, MN

Fe^{+2} = 3.8 mg/L

Field Parameters	Before Purging	Volume 1	Volume 2	Volume 3	Volume 4	Volume 5	Sample
Time		12:49	12:52	13:17	1319		
pH		6.44	well dry	6.92	well dry		
Conductivity		59.2		61.3			
~~Eh~~ Gallons		2	2.5X	6	9		
Temperature		11.35	MN 10/12	10.45			
Turbidity/color							
Dissolved Oxygen		7.03		4.99			

Analyses	Method	Bottle Type	Preservative	Number	Number MS/MSD
Phenols	8041	1x1000mL amb	none		
Chlor herbs	8151	1x1000mL amb	"		
VOCs	8260B	3x40mL VOA	HCl		
Dioxins/furans	8290	2x1000mL amb	none		
metals/Hg DISS	6020/7470	1x250mL poly	HNO_3		

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GROUNDWATER SAMPLING DATA SHEET

Well Number: MW-03-27 Sample Number: 242-GW-01 Date: 10/13/00

Project: RPAC Project Number: 92C0804A Task: 20C

Weather Conditions: overcast, drizzle Observations/Comments:

P.I.D. Reading: Ø

Calibration Date of P.I.D.: 10/13/00

P.I.D. Standard Calibration Used: 100 ppm Isobutylene

Combustible Gas Reading:

Well Depth: 32.37'

Water Depth: 16.10'

Feet of Water:

Gallons per Foot:

Well Volume:

Purge Volume:

Observation for LNAPL: none

Observation for DNAPL: none

Observation and condition of the well:

Pump hoses and/or bailer ropes were new, cleaned or dedicated?

dedicated bailer

General Comments: Sample time 12:00
Ferrous 2.6

Measuring Point (MP): TOC

Elevation of MP:

Elevation of Water:

Well Diameter:

Well Diameter	Gallons per casing foot
2 inches	0.16
3 inches	0.367
4 inches	0.65

pH meter: Horiba U22

Eh meter:

Conductivity meter:

Calibration Date: 10/13/00

QA/QC samples: —

Purge Method: bail

Sample Method: bail

Water Disposal: Water Treatment

Sampler(s): DMC, MN, NM

Field Parameters	Before Purging	Volume 1	Volume 2	Volume 3	Volume 4	Volume 5	Sample
Time		11:34		1148	1154	1158	12:00
pH		6.65	6.49	6.61	6.58	6.59	
Conductivity		65.8	71.0	73.9	75.5	75.2	
~~Eh~~ Gallons		2.4	4.8	7.2	9.6	12.0	
Temperature		11.25	11.14	11.08	11.07	11.10	
Turbidity/color							
Dissolved Oxygen		2.76	2.05	2.43	2.10	2.12	

Analyses	Method	Bottle Type	Preservative	Number	Number MS/MSD
Isobutylalc	8015	voas	HCl	3	—
Phenols	8041	1 L amber	—	1	—
Chl Herb	8151	1 L Amber	—	1	—
VOCs	8260B	voas	HCl	3	—
Dioxin/Furan	8290	1 L Amber	—	2	—
					—

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GROUNDWATER SAMPLING DATA SHEET

Well Number: MW-03-I Sample Number: 241-GW-01 Date: 10/13/00

Project: RPAC Project Number: 92C0804A Task: 20C

Weather Conditions: overcast, drizzle Observations/Comments:

P.I.D. Reading: Ø Measuring Point (MP):

Calibration Date of P.I.D.: 10/13/00 Elevation of MP:

P.I.D. Standard Calibration Used: 100ppm Isobutylene Elevation of Water:

Combustible Gas Reading: Well Diameter:

Well Depth: 61.78'

Water Depth: 21.48'

Feet of Water:

Gallons per Foot:

Well Diameter	Gallons per casing foot
2 inches	0.16
3 inches	0.367
4 inches	0.65

Well Volume:

Purge Volume:

Observation for LNAPL: none

Observation for DNAPL: none

Observation and condition of the well:

pH meter: Horiba U22

Eh meter:

Conductivity meter:

Calibration Date: 10/13/00

QA/QC samples: —

Purge Method: low flow

Sample Method: 2" submersible pump

Water Disposal: Water Treatment

Sampler(s): PMC, MN, NM

Pump hoses and/or bailer ropes were new, cleaned or dedicated?

decon pump, dedicated tubing

General Comments: Sample Time: 11:45

Ferrous: 1.8

Field Parameters	Before Purging	Volume 1	Volume 2	Volume 3	Volume 4	Volume 5	Sample
Time		11:18	1123	1127	11:32	11:37	11:45
pH		6.31	6.38	6.41	6.44	6.52	
Conductivity		0.218	0.223	0.220	0.208	0.198	
Eh							
Temperature		11.7	12.4	12.6	12.9	13.3	
Turbidity/color							
Dissolved Oxygen		2.61	1.21	1.00	1.05	0.96	

Analyses	Method	Bottle Type	Preservative	Number	Number MS/MSD
Isobutyl alcohol	8015	voas	HCl	3	—
Phenols	8041	1 Lamber	—	1	—
Chl Herb	8151	1 Lamber	—	1	—
VOCs	8260B	voas	HCl	3	—
Dioxin/Furan	8290	1 Lamber	—	2	—
Metals/merc	6020/7470	Poly-Filtered	nitric	1	—

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GROUNDWATER SAMPLING DATA SHEET

Well Number: MW-06-S Sample Number: 24C-6W-01 Date: 10/13/00

Project: RPAC Project Number: 92C0804A Task: 20C

Weather Conditions: overcast, some drizzle Observations/Comments:

P.I.D. Reading: Ø Measuring Point (MP): TOC

Calibration Date of P.I.D.: 10/13/00 Elevation of MP:

P.I.D. Standard Calibration Used: 100 PPM Isobutylene Elevation of Water:

Combustible Gas Reading: Well Diameter: 2" PVC

Well Depth: 30.40' Hard bottom

Water Depth: 15.97'

Feet of Water:

Gallons per Foot:

Well Diameter	Gallons per casin
2 inches	0.16
3 inches	0.367
4 inches	0.65

Well Volume: 2.3 gallons

Purge Volume:

Observation for LNAPL: none

Observation for DNAPL: none

Observation and condition of the well: O.K.

Pump hoses and/or bailer ropes were new, cleaned or dedicated?

dedicated bailer

pH meter: Horiba U22

Eh meter: "

Conductivity meter: "

Calibration Date: 10/13/00

QA/QC samples: —

Purge Method: Bail

Sample Method: Bail

Water Disposal: water treatment

Sampler(s): DMC, MN

General Comments: Sample time : 10:30 creosote smell on probe

Ferrous : Fe^{+2} : 4.0 water yellowish brown w/creosote smell

Field Parameters	Before Purging	Volume 1	Volume 2	Volume 3	Volume 4	Volume 5	Sample
Time		10:03	10:08	10:12	10:16	10:20	10:30
pH		6.20	6.29	6.31	6.36	6.37	
Conductivity		89.6	~~X~~125.0	135.0	141.0	141.0	
~~Eh~~ Gallons		2.3					
Temperature		11.74	11.64	11.62	11.61	11.63	
Turbidity/color							
Dissolved Oxygen		3.45	3.3	3.45	3.58	3.45	

Analyses	Method	Bottle Type	Preservative	Number	Number MS/MSD
Isobutylalc	8015	voas	HCl	3	—
Phenols	8041	1L Amber	—	1	—
Chl Herb	8151	1L Amber	—	1	—
VOCs	8260B	voas	HCl	3	—
Semi Vol	8270	1L Amber	—	1	—

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GROUNDWATER SAMPLING DATA SHEET

Well Number: MW-07-5 Sample Number: 239-GW-01 Date: 10/13/00

Project: RPAC Project Number: 92C0804A Task: 20C

Weather Conditions: overcast, some drizzle Observations/Comments:

P.I.D. Reading: 0 Measuring Point (MP): TOC

Calibration Date of P.I.D.: 10/13/00 Elevation of MP:

P.I.D. Standard Calibration Used: 100 PPM Isobutylene Elevation of Water:

Combustible Gas Reading: Well Diameter: 2" PVC

Well Depth: 31.15'

Water Depth: 18.70'

Feet of Water:

Gallons per Foot:

Well Diameter	Gallons per casing foot
(2 inches)	0.16
3 inches	0.367
4 inches	0.65

Well Volume:

Purge Volume:

Observation for LNAPL: none

Observation for DNAPL: none

Observation and condition of the well: O.K.

pH meter: Hor.ba U22

Eh meter: "

Conductivity meter: "

Calibration Date: 10/13/00

QA/QC samples: —

Purge Method: Bail

Sample Method: Bail

Water Disposal: Water Treatment

Sampler(s): DMC, MN

Pump hoses and/or bailer ropes were new, cleaned or dedicated?

dedicated bailer

General Comments: Ferrous 2.2 mg/L

Sample time 0935

Field Parameters	Before Purging	Volume 1	Volume 2	Volume 3	Volume 4	Volume 5	Sample
Time		0910	0915	0920	0925	0930	0935
pH		5.92	5.90	5.90	5.90	5.90	
Conductivity		58.4	57.9	58.9	58.9	59.0	
~~Eh~~ Gallons		2	4	6	8	10	
Temperature		12.31	12.18	12.17	12.17	12.20	
Turbidity/color							
Dissolved Oxygen		2.77	2.21	2.28	2.09	2.25	

Analyses	Method	Bottle Type	Preservative	Number	Number MS/MSD
Isobutyl alc	8015	voas	HCl	3	—
Phenols	8041	1L Amber	—	1	—
Chl Herb	8151	1L Amber	—	1	—
VOCs	8260B	voas	HCl	3	—
Semi Vol	8270	1L Amber	—	1	—

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GROUNDWATER SAMPLING DATA SHEET

Well Number: RP-02-49 Sample Number: 244-GW-01 Date: 10/16

Project: RPAC Project Number: 92C0804A Task: 20C

Weather Conditions: 50s, drizzly. Observations/Comments:

P.I.D. Reading: 0.0

Calibration Date of P.I.D.: 10/16/00

P.I.D. Standard Calibration Used: 100 ppm isobutylene

Combustible Gas Reading: N/a

Well Depth: 52.05' TOC

Water Depth: 32.20' TOC

Feet of Water:

Gallons per Foot:

Well Volume:

Purge Volume:

Observation for LNAPL: none observed

Observation for DNAPL: none observed

Observation and condition of the well:

Pump hoses and/or bailer ropes were new, cleaned or dedicated?
deconned pump, dedicated / disposable bailer.

General Comments: 1000 SAMP TIME

Measuring Point (MP): TOC

Elevation of MP:

Elevation of Water:

Well Diameter: 2"

Well Diameter	Gallons per casing foot
2 inches	0.16
3 inches	0.367
4 inches	0.65

pH meter: HORIBA U-22

Eh meter:

Conductivity meter:

Calibration Date: 10/16/00

QA/QC samples: none

Purge Method: low-flow

Sample Method: 2" submersible

Water Disposal: treatment plant

Sampler(s): RRR, DMC, NM

Fe^{+2} = 0.4

Field Parameters	Before Purging	Volume 1	Volume 2	Volume 3	Volume 4	Volume 5	Sample
Time	0930	0933	0938	0943	0948	0953	1000 SAMP TIME
pH		5.85	5.82	5.81	5.81	5.82	
Conductivity		2.29	2.59	2.63	2.64	2.64	
Eh							
Temperature		14.31	15.42	15.63	15.66	15.72	
Turbidity/color							
Dissolved Oxygen		5.01	1.06	0.77	0.84	0.77	

Analyses	Method	Bottle Type	Preservative	Number	Number MS/MSD
Phenols	8041	1x1000mL amb	—		
Chlor herbs	8151	1x1000mL amb	—		
VOCs	8260	3x 40mL VOA	HCl		
Dioxins/furans	8290	2x 1000mL amb	—		
metals/trace TOT	6020.B	1x 250mL poly	HNO_3		
anions/alk	300/310.1	1x 500mL poly	—		
sulfide	376.1	1x 500mL poly	NaOH + ZnOAc		
BOD	405.1	1x1000mL poly	—		
COD/OC/NH_3	410.4/415.2/350.1	1x250mL poly	H_2SO_4		
Methane	GC FID	3x 40mL VOA	HCl		

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SCOEPA00006731

GROUNDWATER SAMPLING DATA SHEET

Well Number: MW-03-85 Sample Number: 243-GW-01 Date: 10/13/00

Project: RPAC Project Number: 92C0804A Task: 20C

Weather Conditions: overcast, drizzle Observations/Comments:

P.I.D. Reading: 0 Measuring Point (MP): TOC

Calibration Date of P.I.D.: 10/13/00 Elevation of MP:

P.I.D. Standard Calibration Used: 100 PPM Isobutylene Elevation of Water:

Combustible Gas Reading: Well Diameter: 2"

Well Depth: 83.80'

Water Depth: 20.79'

Feet of Water:

Gallons per Foot:

Well Diameter	Gallons per casing foot
2 inches	0.16
3 inches	0.367
4 inches	0.65

Well Volume:

Purge Volume:

Observation for LNAPL: none

Observation for DNAPL: none

Observation and condition of the well: o.k.

pH meter: Horiba U22

Eh meter:

Conductivity meter:

Calibration Date: 10/13/00

QA/QC samples: —

Purge Method: low flow

Sample Method: 2" submersible pump

Water Disposal: Water Treatment

Sampler(s): DMC, MN, NM

Pump hoses and/or bailer ropes were new, cleaned or dedicated? decon pump, dedicated tubing

General Comments: Sample time: 12:15
Ferrous: 2.8

Field Parameters	Before Purging	Volume 1	Volume 2	Volume 3	Volume 4	Volume 5	Sample
Time	11:03	11:06	11:12	11:17	11:23	11:25	12:15
pH		6.59	6.66	6.65	6.65	dry	
Conductivity		0.146	0.147	0.146	0.145		
Eh							
Temperature		11.82	11.92	12.72	13.33		
Turbidity/color							
Dissolved Oxygen		2.98	1.32	0.8	0.61		

Analyses	Method	Bottle Type	Preservative	Number	Number MS/MSD
Isobutyl alc	8015	VOAs	HCl	3	—
Phenols	8041	1 L Amber	—	1	—
Chl Herb	8151	1 L Amber	—	1	—
VOCs	8260B	VOAs	HCl	3	—
Dioxin/Furan	8290	1 L Amber	—	2	—

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GROUNDWATER SAMPLING DATA SHEET

Well Number: RP-02-65 Sample Number: 245-GW-01 Date: 10/16

Project: RPAC Project Number: 92C0804A Task: 20C

Weather Conditions: 50s, drizzly Observations/Comments:

P.I.D. Reading: 0.0

Calibration Date of P.I.D.: 10/16/00

P.I.D. Standard Calibration Used: 100 ppm isobutylene

Combustible Gas Reading: N/a

Well Depth: 68.60' TOC

Water Depth: 32.47' TOC

Feet of Water:

Gallons per Foot:

Well Volume:

Purge Volume:

Observation for LNAPL: none observed

Observation for DNAPL: none observed

Observation and condition of the well:

Pump hoses and/or bailer ropes were new, cleaned or dedicated?
deconned pump, dedicated/disposable tubing

Measuring Point (MP): TOC

Elevation of MP:

Elevation of Water:

Well Diameter: 2"

Well Diameter	Gallons per casing foot
2 inches	0.16
3 inches	0.367
4 inches	0.65

pH meter: HORIBA U-22

Eh meter:

Conductivity meter:

Calibration Date: 10/16/00

QA/QC samples: none

Purge Method: low-flow

Sample Method: 2" submersible

Water Disposal: treatment plant

Sampler(s): RRR, DMC, NM

General Comments: SAMPE TIME 1010 Fe^{+2}: 0.2

Field Parameters	Before Purging	Volume 1	Volume 2	Volume 3	Volume 4	Volume 5	Sample	
Time	0925	0928	0933	0938	0943	0948	0953	0958
pH		5.21	5.12	5.17	5.19	5.19	5.18	5.18
Conductivity		6.80	6.85	6.90	6.91	6.91	6.91	6.92
Eh								
Temperature		14.2	15.0	15.7	16.0	16.1	16.2	16.2
Turbidity/color								
Dissolved Oxygen		2.20	1.03	0.82	0.75	0.69	0.65	0.63

Analyses	Method	Bottle Type	Preservative	Number	Number MS/MSD
Phenols	9041	1x 1000mL amb	—		
Chlor herbs	8151	1x 1000mL amb	—		
VOCs	8260	3x 40mL VOA	HCl		
Dioxins/furans	8290	2x 1000mL amb	—		

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GROUNDWATER SAMPLING DATA SHEET

Well Number: RP-02-30 Sample Number: 246-GW-01 Date: 10/16

Project: RPAC Project Number: 92C0804A Task: 20C

Weather Conditions: drizzly, 50s. Observations/Comments:

P.I.D. Reading: 0.0 ppm

Calibration Date of P.I.D.: 10/16/00

P.I.D. Standard Calibration Used: 100 ppm isobutylene

Combustible Gas Reading: n/a

Well Depth: 34.20' TOC

Water Depth: 32.52' TOC

Feet of Water: 34.20 - 32.52 = 1.68 ft

Gallons per Foot: 0.1632 gal/ft

Well Volume: 0.27 gal/cV.

Purge Volume:

Observation for LNAPL: none observed

Observation for DNAPL: none observed

Observation and condition of the well:

Pump hoses and/or bailer ropes were new, cleaned or dedicated?
dedicated disposable bailer + line

Measuring Point (MP): TOC

Elevation of MP:

Elevation of Water:

Well Diameter: 2" Ø PVC

Well Diameter	Gallons per casing foot
2 inches	0.16
3 inches	0.367
4 inches	0.65

pH meter: HORIBA U-22

Eh meter:

Conductivity meter:

Calibration Date: 10/16/00

QA/QC samples: none

Purge Method: bailer

Sample Method: bailer

Water Disposal: treatment system

Sampler(s): RRR, DMC, NM

General Comments: SAMPLE TIME 1025

Field Parameters	Before Purging	Volume 1	Volume 2	Volume 3	Volume 4	Volume 5	Sample
Time		well dry	1000				
pH		@ NO.3	6.45				
Conductivity		gal e	0.837				
Eh		0940					
Temperature		hrs..	14.07				
Turbidity/color							
Dissolved Oxygen			3.5				

Analyses	Method	Bottle Type	Preservative	Number	Number MS/MSD
Phenols	8041	1x1000mL amb	—		
Chlor herbs	8151	1x1000mL amb	—		
VOCs	8260	3x40 mL VOA	HCl		
dioxins/furans	8290	2x1000mL amb	—		
metals/Hg DISS	6020/7470	1x250mL poly	HNO_3		
metals/trace TOT	6010B	1x250mL poly	HNO_3		
anions/alk	300/310.1	1x500 mL poly	—		
sulfide	376.1	1x500 mL poly	NaOH + ZnOAc	plate count	SM9215 1x120mL plas
BOD	405.1	1x1000mL poly	—		
COD/oc/NH_3	410.4/415.2/330.1	1x250mL poly	H_2SO_4		

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SCOEPA00006734

GROUNDWATER SAMPLING DATA SHEET

Well Number: W-19-D Sample Number: 247-GW-01 Date: 10/16

Project: RPAC Project Number: 92C0804A Task: 20C

Weather Conditions: 50s, drizzle cloudy, no rain

Observations/Comments:

P.I.D. Reading: 0.0 ppm

Calibration Date of P.I.D.: 10/16/00

P.I.D. Standard Calibration Used: 100 ppm isobutylene

Combustible Gas Reading: n/a

Well Depth: 68.75' TOC

Water Depth: 26.99' TOC

Feet of Water:

Gallons per Foot:

Well Volume:

Purge Volume:

Observation for LNAPL: none observed

Observation for DNAPL: none observed

Observation and condition of the well:

Pump hoses and/or bailer ropes were new, cleaned or dedicated?
deconned pump, dedicated disposable tubing.

General Comments: 1315 SAMPLE TIME Fe^{+2} = 0.0

Measuring Point (MP): TOC

Elevation of MP:

Elevation of Water:

Well Diameter: 4"ø PVC

Well Diameter	Gallons per casing foot
2 inches	0.16
3 inches	0.367
4 inches	0.65

pH meter: HORIBA U-22

Eh meter:

Conductivity meter:

Calibration Date: 10/16/00

QA/QC samples: none

Purge Method: low-flow

Sample Method: 2" submersible

Water Disposal: treatment system

Sampler(s): RRR, NM, DMC

Field Parameters	Before Purging	Volume 1	Volume 2	Volume 3	Volume 4	Volume 5	Sample	
Time	1238	1241	1246	1251	1256	1301	1306	1311
pH		5.30	5.75	5.79	5.79	5.80	5.80	5.80
Conductivity		0.466	0.471	0.474	0.479	0.483	0.486	0.494
Eh								
Temperature		14.4	14.5	14.7	14.6	14.6	14.6	14.6
Turbidity/color								
Dissolved Oxygen		5.41	1.23	0.87	0.81	0.75	0.71	0.68

Analyses	Method	Bottle Type	Preservative	Number	Number MS/MSD
Phenols	8041	1x 1000 mL amb	—		
Chlor herbs	8151	1x 1000 mL amb	—		
VOCs	8260B	3x 40 mL VOAs	HCl		
Dioxins / furans	8290	2x 1000 mL amb	—		
metals / trace TOT	6010B	1x 250 mL poly	HNO_3		
anions / alk	300 / 310.1	1x 500 mL poly	—		
sulfide	376.1	1x 500 mL poly	NaOH + ~~NaOAc~~	ZnOAc	
BOD	405.1	1x 1000 mL poly	—		~~1316~~
COD / OC / NH_3	410.4 / 415.2 / 350.2	1x 250 mL poly	H_2SO_4		
methane	GC FID	3x 40 mL VOA	HCl		~~1413~~

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SCOEPA00006735

GROUNDWATER SAMPLING DATA SHEET

Well Number: W-19-I Sample Number: 248-GW-01 Date: 10/16

Project: RPAC Project Number: 92C0804A Task: 20C

Weather Conditions: 50s, partly cloudy, no rain

Observations/Comments:

P.I.D. Reading: 0.0 ppm

Calibration Date of P.I.D.: 10/16/00

P.I.D. Standard Calibration Used: 100 ppm isobutylene

Combustible Gas Reading: n/a

Well Depth: 51.00' TOC

Water Depth: 27.35' TOC

Feet of Water:

Gallons per Foot:

Well Volume:

Purge Volume:

Observation for LNAPL: none observed

Observation for DNAPL: none observed

Observation and condition of the well:

Pump hoses and/or bailer ropes were new, cleaned or dedicated?
deconned pump, dedicated/disposable tubing

General Comments: 1325 SAMPLE TAKE

Measuring Point (MP): TOC

Elevation of MP:

Elevation of Water:

Well Diameter: 4" ϕ PVC

Well Diameter	Gallons per casing foot
2 inches	0.16
3 inches	0.367
4 inches	0.65

pH meter: HORIBA U-22

Eh meter:

Conductivity meter:

Calibration Date: 10/16/00

QA/QC samples: none

Purge Method: low-flow

Sample Method: 2" submersible

Water Disposal: treatment facility

Sampler(s): RRR, NM, DMC

Fe^{+2} = 0.0

Field Parameters	Before Purging	Volume 1	Volume 2	Volume 3	Volume 4	Volume 5	Sample	
Time	1249	1251	1256	1301	1306	1311	1316	1321
pH		6.44	6.22	6.21	6.09	6.07	6.08	6.10
Conductivity		0.722	0.769	0.860	0.884	0.891	0.889	0.885
Eh								
Temperature		14.23	14.68	15.11	15.28	15.33	15.31	15.33
Turbidity/color								
Dissolved Oxygen		6.40	2.16	1.11	0.82	0.70	0.65	0.65

Analyses	Method	Bottle Type	Preservative	Number	Number MS/MSD
phenols	8041	1x1000mL amb	—		
chlor herbs	8151	1x1000mL amb	—		
VOCs	8260B	3x40mL VOA	HCl		
dioxins/furans	8290	2x1000mL amb	—		
metals/Hg DISS	6020/7470	1x250mL poly	HNO_3		
metals/trace TOT	6010B	1x250mL poly	HNO_3		
anions/alk	300/310.1	1x500mL poly	none		
sulfide	376.1	1x500mL poly	NaOH + ZnOAc	plate count SM9215	1x120mL plat.
BOD	405.1	1x1000mL poly	—		
nn/no/NH3	410.4/415.2/350.1	1x250mL poly	H_2SO_4		

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SCOEPA00006736

GROUNDWATER SAMPLING DATA SHEET

Well Number: W-19-S Sample Number: N/A Date: 10/16

Project: RPAC Project Number: 92C0804A Task: 20C

Weather Conditions: 60, mostly cloudy. Observations/Comments:

P.I.D. Reading: 0.0

Calibration Date of P.I.D.: 10/16/00

P.I.D. Standard Calibration Used: 100 ppm isobutylene

Combustible Gas Reading: N/A

Well Depth: 26.15' TOC

Water Depth: well dry

Feet of Water:

Gallons per Foot:

Well Volume:

Purge Volume:

Observation for LNAPL: none observed

Observation for DNAPL: none observed

Observation and condition of the well:

Pump hoses and/or bailer ropes were new, cleaned or dedicated?

n/a.

Measuring Point (MP): TOC

Elevation of MP:

Elevation of Water:

Well Diameter: 4" ϕ

Well Diameter	Gallons per casing foot
2 inches	0.16
3 inches	0.367
4 inches	0.65

pH meter: N/A

Eh meter:

Conductivity meter:

Calibration Date:

QA/QC samples:

Purge Method:

Sample Method:

Water Disposal:

Sampler(s):

General Comments:

Field Parameters	Before Purging	Volume 1	Volume 2	Volume 3	Volume 4	Volume 5	Sample
Time							
pH							
Conductivity							
Eh							
Temperature							
Turbidity/color							
Dissolved Oxygen							

Analyses	Method	Bottle Type	Preservative	Number	Number MS/MSD
Phenols	8041	1x1000 mL amb	—		
Chlor herbs	8151	1x1000 mL amb	—		
VOCs	8260 B	3x 40 mL VOA	HCl		
Dioxin/furans	8290	2x1000 mL amb	—		
metals/Hg DISS	6020/7470	1x 250 mL poly	HNO_3		
metals/trace TOT	6010 B	1x 250 mL poly	HNO_3		
anions/alk	300/310.1	1x 500 mL poly	none		
sulfide	376.1	1x 500 mL poly	NaOH + ZnOAc		
BOD	405.1	1x1000 mL poly	—		
COD/TOC/NH_3	410.4/415.2/350.1	1x250 mL poly	H_2SO_4		

no samples collected well dry

~~Plate count~~ SM 9215 1x120 mL plas —

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SCOEPA00006737

GROUNDWATER SAMPLING DATA SHEET

Well Number: W-16-D Sample Number: 249-GW-01 Date: 10/17/00

Project: RPAC Project Number: 92C0804A Task: 20C

Weather Conditions: Sunny, 60 Observations/Comments:

P.I.D. Reading: 0.0

Calibration Date of P.I.D.: 10/17/00

P.I.D. Standard Calibration Used: 100ppm isobutylene

Combustible Gas Reading: n/a

Well Depth: 88.70' TOC

Water Depth: 12.09' TOC

Feet of Water:

Gallons per Foot:

Well Volume:

Purge Volume:

Observation for LNAPL: none observed

Observation for DNAPL: none observed

Observation and condition of the well:

Pump hoses and/or bailer ropes were new, cleaned or dedicated?
deconned pump, dedicated/disposable tubing.

General Comments: Sample time: 1010

Measuring Point (MP): TOC

Elevation of MP:

Elevation of Water:

Well Diameter: 4"ø PVC

Well Diameter	Gallons per casing foot
2 inches	0.16
3 inches	0.367
4 inches	0.65

pH meter: HORIBA U-22

Eh meter:

Conductivity meter:

Calibration Date: 10/17/00

QA/QC samples: RINSATE, MS, MSD, DUP.

Purge Method: low-flow

Sample Method: 2" submersible

Water Disposal: treatment system

Sampler(s): RRR DMC, NM, MN

Fe^{+2} = 1.0 mg/L

Field Parameters	Before Purging	Volume 1	Volume 2	Volume 3	Volume 4	Volume 5	Sample	
Time	0928	0930	0935	0940	0945	0950	0955	1000
pH		6.55	6.98	7.10	7.17	7.19	7.23	7.26
Conductivity		47.3	46.7	46.5	46.4	46.8	46.4	46.2
Eh								
Temperature		13.09	13.26	13.32	13.38	13.51	13.96	14.12
Turbidity/color								
Dissolved Oxygen		5.35	1.64	1.41	1.58	1.44	1.36	1.42

Analyses	Method	Bottle T	Preservative	Number	Number MS/MSD
Phenols	8041	1x1000mL amb	—		
OC Pests/~~PCBs~~	8081/~~8082~~	1x 1000mL amb	—		
OP Pests	8141	1x 1000mL amb	—		
VOCs	8260 B	3x 40mL VOA	HCl		
Dioxins/furans	8290	2x 1000mL amb	—		

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SCOEPA00006738

GROUNDWATER SAMPLING DATA SHEET

Well Number: W-16-S Sample Number: 250-GW-01 Date: 10/17/00

Project: RPAC Project Number: 92C0804A Task: 20C

Weather Conditions: Sunny, 60° Observations/Comments:

P.I.D. Reading: 0.0 Measuring Point (MP): TOC

Calibration Date of P.I.D.: 10/17/00 Elevation of MP:

P.I.D. Standard Calibration Used: 100 ppm isobutylene Elevation of Water:

Combustible Gas Reading: n/a Well Diameter: 2" ø PVC

Well Depth: 33.50' TOC

Water Depth: 5.62' TOC

Feet of Water:

Gallons per Foot:

Well Diameter	Gallons per casing foot
2 inches	0.16
3 inches	0.367
4 inches	0.65

Well Volume:

Purge Volume:

Observation for LNAPL: none observed

Observation for DNAPL: none observed

Observation and condition of the well:

Pump hoses and/or bailer ropes were new, cleaned or dedicated?

decomed pump, dedicated disposable tubing

pH meter: HORIBA U-22

Eh meter:

Conductivity meter:

Calibration Date: 10/17/00

QA/QC samples: none

Purge Method: low-flow

Sample Method: 2" submersible

Water Disposal: treatment system

Sampler(s): RRR, DMC, NM, MN

General Comments: SAMPLE TIME: 1025 Fe^{+2} = 2.8 mg/L

Field Parameters	Before Purging	Volume 1	Volume 2	Volume 3	Volume 4	Volume 5	Sample
Time	0933	0938	0948	0958	1008	1018	1025 SAMP.
pH		6.50	6.49	6.50	6.55	6.62	TIME
Conductivity		0.311	0.313	0.314	0.314	0.313	
Eh							
Temperature		14.7	14.6	14.7	15.1	15.4	
Turbidity/color							
Dissolved Oxygen		2.50	1.93	1.69	1.55	1.58	

Analyses	Method	Bottle Type	Preservative	Number	Number MS/MSD
Phenols	8041	1x 1000 mL amb	—		
OC Pests	8081	1x 1000 mL amb	—		
OP Pests	8141	1x 1000 mL amb	—		
VOCs	8260B	3x 40 mL VOA	HCl		
Dioxins/Furans	8290	2x 1000 mL amb	—		

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GROUNDWATER SAMPLING DATA SHEET

Well Number: N-16-I Sample Number: 251-GW-01 Date: 10/17/00

Project: RPAC Project Number: 92C0804A Task: 20C

Weather Conditions: 60s, Sunny. Observations/Comments:

P.I.D. Reading: 0.0 ppm

Calibration Date of P.I.D.: 10/17/00

P.I.D. Standard Calibration Used: 100 ppm isobutylene

Combustible Gas Reading: n/a

Well Depth: 54.05' TOC

Water Depth: 11.98' TOC

Feet of Water:

Gallons per Foot:

Well Volume:

Purge Volume:

Observation for LNAPL: none observed

Observation for DNAPL: none observed

Observation and condition of the well:

Pump hoses and/or bailer ropes were new, cleaned or dedicated?
deconned pump, dedicated disposable bailer

General Comments: 1130 SAMPLE TIME.

Measuring Point (MP): TOC

Elevation of MP:

Elevation of Water:

Well Diameter: 2"ø PVC

Well Diameter	Gallons per casing foot
2 inches	0.16
3 inches	0.367
4 inches	0.65

pH meter: HORIBA U-22

Eh meter:

Conductivity meter:

Calibration Date: 10/17/00

QA/QC samples: none

Purge Method: low-flow

Sample Method: 2" submersible

Water Disposal: treatment system

Sampler(s): DMC, RRR, NM, MN

Fe^{+2} = 3.6 mg/L

Field Parameters	Before Purging	Volume 1	Volume 2	Volume 3	Volume 4	Volume 5	Sample
Time	1055	1057	1102	1107	1112	~~1117~~ 1114	
pH		6.85	6.79	6.79	6.77	WELL	
Conductivity		77.0	76.9	76.8	77.1	DRY	
Eh							
Temperature		13.85	13.85	14.16	14.53		
Turbidity/color							
Dissolved Oxygen		5.83	1.53	1.10	0.97		

Analyses	Method	Bottle Type	Preservative	Number	Number MS/MSD
Phenols	8041	1x1000mL amb	—		
OC Pests	8081	1x 1000mL amb	—		
OP Pests	8141	1x 1000mL amb	—		
VOCs	8260B	3x 40mL VOA	HCl		
Dioxins/Furans	8290	2x 1000mL amb	—		

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APPENDIX B

FILLING OF EX-1 TECHNICAL MEMORANDUM
RPAC - PORTLAND SITE
JANUARY 10, 2001

amec

APPENDIX B

FILLING OF EX-1 TECHNICAL MEMORANDUM
RPAC - PORTLAND SITE
JANUARY 10, 2001

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FILLING OF EX-1
TECHNICAL MEMORANDUM
RPAC - PORTLAND SITE

January 9, 2001

Submitted to:
Oregon Department of Environmental Quality
Northwest Region
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52-92C0804A/50

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Appendix C Laboratory Analytical Chemistry Results

This Technical Memorandum has been prepared to describe the filling of the excavation designated EX-1, located in the Lake Area on Rhône-Poulenc AG Company (RPAC) property.

1.1 BACKGROUND INFORMATION

The RPAC Lake Area is located adjacent to the Gould Superfund Site. Figure 1-1 depicts the site plan. The EX-1 pit was excavated as part of past remedial activities at the Gould Site. The excavation was roughly circular in shape and had a surface area of approximately 31,000 square feet. The pit naturally filled with water during all portions of the year. The amended record of decision (AROD) for the Gould Superfund Site required the filling of the excavation. The Oregon Department of Environmental Quality (DEQ) requested in a May 7, 1999 letter transmitted to Chip Humphrey of the United States Environmental Protection Agency (USEPA) Region 10, that a technical memorandum that provides specifications for the backfill utilized in EX-1 be provided to DEQ prior to filling.

A letter describing the specifications for the fill materials and a description of the methods for filling of the excavation was provided by RPAC to Eric Blischke of DEQ on June 22, 1999. This letter stated that the preferred method for backfilling the excavation would be placement of shot rock fill directly into the excavation without dewatering. It was determined that the shot rock would meet both the design requirements of the on-site containment facility (OCF) being constructed as part of the AROD adjacent to EX-1, and DEQ's requirement that the groundwater flow rates and gradient not be significantly altered by the fill.

DEQ approved the placement of the shot rock fill without dewatering in a letter to RPAC dated July 8, 1999 with the following three conditions:

1. Placement of a lower permeability material above the shot rock fill,
2. The fill does not preclude future investigative or remedial activities for the RPAC site, and
3. Monitoring of water levels prior to and during placement of the fill material.

1.2 SCOPE OF WORK

In general, the scope of work consisted of placing shot rock and soil fill into EX-1 until the pit was completely filled such that the top of the fill met the grade of the adjacent soils. Filling was conducted in such a manner that the water did not overtop the pit.

2.1 PLACEMENT OF SHOT ROCK BACKFILL

The excavation EX-1 was filled with shot rock from the bottom of the pit up to a point approximately 4 feet on average below the adjacent grade. The material was delivered to the site and pushed into EX-1. End-dumping the rock directly into the excavation did not occur. There were no compaction requirements for this material, other than it must provide an adequate foundation to attain compaction requirements for the overlying soil fill. The shot rock utilized was a 9-inch minus material that had an average particle size ranging from 4 to 6 inches in diameter, and had less than 10% by weight smaller than ¾-inch nominal diameter.

Shot rock backfilling activities occurred on 13 days between December 7, 1999 and December 27, 1999. The amount of shot rock backfill placed during this time was 26,762 tons. Approximately 2,000 tons were placed each day backfilling activities occurred. The water located in the excavation did not overbank the sides of the excavation at any time.

Upon reaching the proper grade on December 27th with the shot rock fill, the shot rock was leveled and subjected to track walking with 2 passes of a bulldozer Caterpillar Model D8-k. At that time the decision to postpone placement of the soil backfill until next year was made, due to the fact that wet weather would not allow proper compaction of the soil backfill. Table 2-1 is a time line for the backfilling activities.

2.2 WATER LEVEL MONITORING ACTIVITIES

During placement of the shot rock, water level measurements were collected using an electronic water level meter capable of measuring to an accuracy of 0.01 feet. Measurements were collected from two shallow wells located adjacent to EX-1 (BTB-4B-25 and AL5-19). Depth to water measurements were recorded on a field data sheet and are summarized in Table 2-2. Water levels were also measured at a temporary staff gauge located in EX-1.

Table 2-2 also summarizes the change in elevation from the three monitoring points, in between collection dates, as well as the total change in elevation observed. The water elevations are further depicted in Chart 2-1. As seen on Chart 2-1, the placement of shot rock into EX-1 raised the level of water in the excavation, thus raising the elevation of the shallow groundwater at the same rate. On December 22, 1999 the level of the shot rock was higher than the level of water in the excavation, precluding additional measurements of the water within EX-1.

2.3 PLACEMENT OF SOIL BACKFILL

The remainder of EX-1 above 4-feet below grade was filled with soil fill consisting of non-organic materials that had a Uniform Soil Classification System (USCS) designation of SC, SM, SP, SW, or any combination thereof. Maximum particle size did not exceed 3 inches. The material was spread in even lifts, with the loose lift thickness not exceeding 10 inches. The material was compacted to at least 90% of maximum dry density as determined by ASTM D1557. Appendix A contains copies of the compaction test data for both soil sources utilized for

backfilling. Appendix B contains copies of the daily field reports, which document that the compaction requirements were met. A sample of this material from each source utilized was sent for laboratory chemical analysis of heavy metals, volatile organics, and total petroleum hydrocarbons (TPH). Appendix C contains the analytical chemistry results for both soil sources utilized.

Soil backfilling activities occurred on 9 days between September 25, 2000 to November 22, 2000. The length of backfilling activities was due to the fact that only three days of placement occurred until the original source of the backfill ran out. A second source was located and tested as required. The amount of soil backfill placed during this time was 11,216 loose cubic yards. Approximately 1,200 loose cubic yards were placed each day backfilling activities occurred.

To promote runoff the final grade of the EX-1 fill was sloped slightly.

TABLES

TABLE 2-1
PROJECT TIMELINE

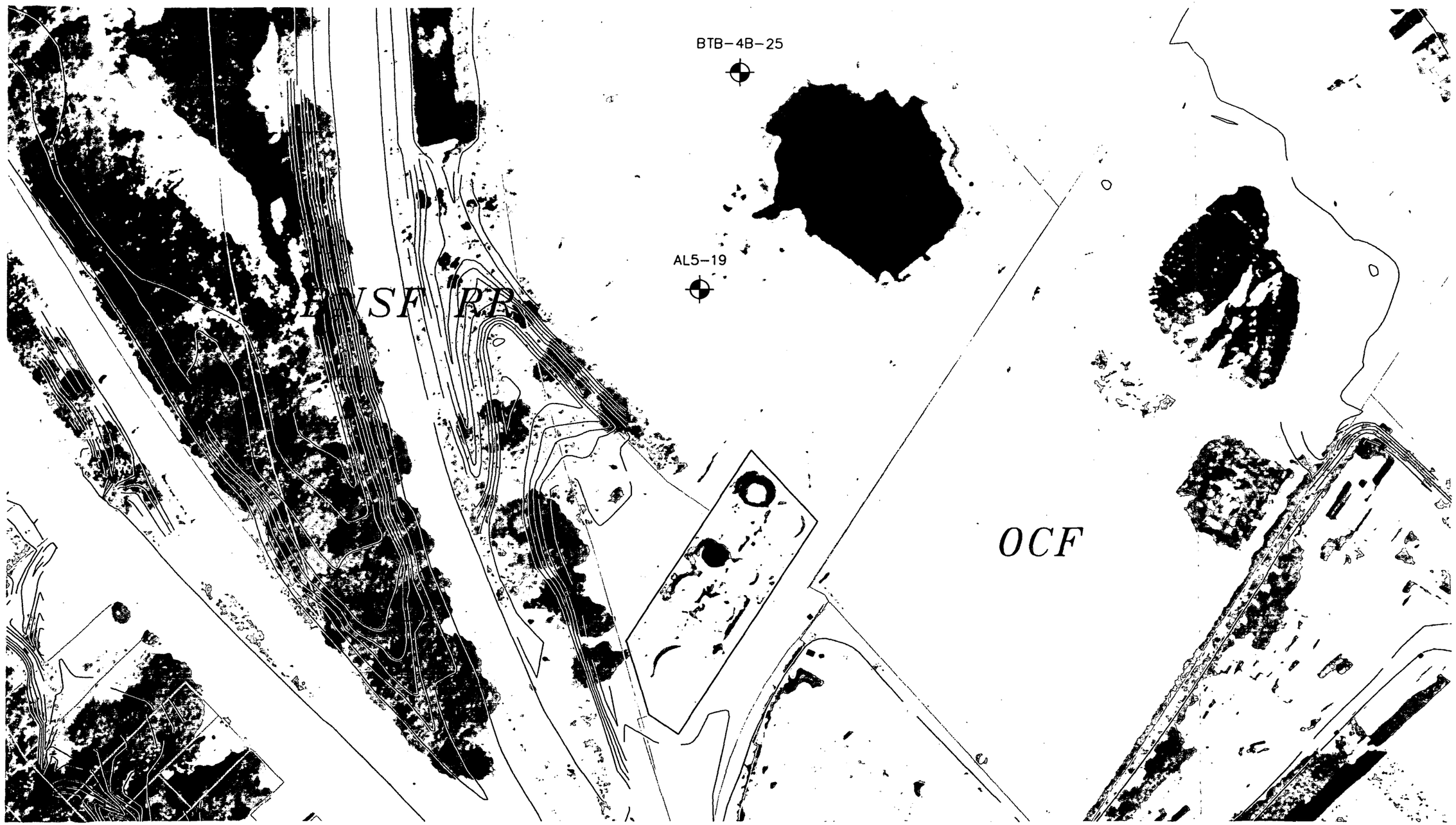
DATE	SITE ACTIVITIES
12/6/99	Mob to Site D8-k dozer 2000 gallon H2O Truck
12/7/99	Place rock on road and begin fill lake with pit run. 213.56 tons gravel placed on road.
12/8/99	Continue placing pit run.
12/9/99	"
12/10/99	"
12/13/99	"
12/14/99	"
12/15/99	"
12/16/99	"
12/17/99	"
12/20/99	"
12/21/99	½ day due to broken scale.
12/22/99	Continue placing pit run.
12/23-24/99	Holiday
12/27/99	Finish placement of pit run. Demobilize for year. 26,762 tons placed.
9/24/00	Remobilize to site D-7H dozer, 84" smooth drum roller.
9/25/00	Begin placement of soil fill from Gobal Quarry. Material compacted to meet specifications.
9/26/00	Continue placing soil fill.
9/27/00	"
9/28/00	" Gobal Quarry runs out of soil fill. Final loads rejected by URS. Look for alternate source of soil fill. 3,480 loose cubic yards placed.
10/03/00	Reject rock from Morse Brothers. Angell Quarry selected for remainder of the soil fill. Submit samples to North Creek Analytical for required analysis.
10/10/00	Samples from Angell fail.
10/18/00	URS resample Angell material. Material fails again.
10/31/00	URS sample Angell Quarry from separate area away from the working pit. Material fails again.
11/01-15/00	Decide to go with Cobb Rock for remainder of soil fill. Envirocon run analytical. Material passes all testing criteria and was approved by URS for placement.
11/16/00	Begin placement of soil fill.
11/17/00	Continue soil fill placement.
11/20/00	"
11/21/00	"
11/22/00	" Finish placement of soil fill. 7,736.61 loose cubic yards placed.
11/23/00	Demobilize from site.

TABLE 2-2
Groundwater and Surface Water Measurements
Filling of EX-1

Date	BTB-4B-25				AL5-19				EX-1					
	DTW BTB-4B-25	TOC Elevation	SWL Elevation	Elevation Change	DTW AL5-19	TOC Elevation	SWL Elevation	Elevation Change	EX-1	Bench Correct	Lake Level	TOC Elevation	Lake Elevation	Elevation Change
12/7/99	9.84	39.54	29.70	NA	13.90	40.07	26.17	NA	9.24	1.57	7.67	39.54	31.87	
12/9/99	9.12	39.54	30.42	0.72	13.34	40.07	26.73	0.56	9.34	2.15	7.19	39.54	32.35	0.48
12/10/99	8.98	39.54	30.56	0.14	13.41	40.07	26.66	-0.07	8.88	2.02	6.86	39.54	32.68	0.33
12/13/99	8.97	39.54	30.57	0.01	13.31	40.07	26.76	0.10	9.39	2.97	6.42	39.54	33.12	0.44
12/15/99	8.27	39.54	31.27	0.70	13.15	40.07	26.92	0.16	8.15	2.00	6.15	39.54	33.39	0.27
12/17/99	7.51	39.54	32.03	0.76	13.09	40.07	26.98	0.06	7.34	1.90	5.44	39.54	34.10	0.71
12/21/99	7.41	39.54	32.13	0.10	12.98	40.07	27.09	0.11	7.66	2.08	5.58	39.54	33.96	-0.14
12/23/99	7.63	39.54	31.91	-0.22	13.96	40.07	26.11	-0.98						
12/27/99	8.19	39.54	31.35	-0.56	12.30	40.07	27.77	1.66						
Total Change			1.65				1.60						2.09	

Notes:
DTW-Depth to Water
TOC Elevation- Top of Casing Elevation
SWL Elevation-Static Water Level Elevation
Elevation Change measured from the previous measurement
All measurements in feet above mean sea level- City of Portland datum

FIGURES



URS

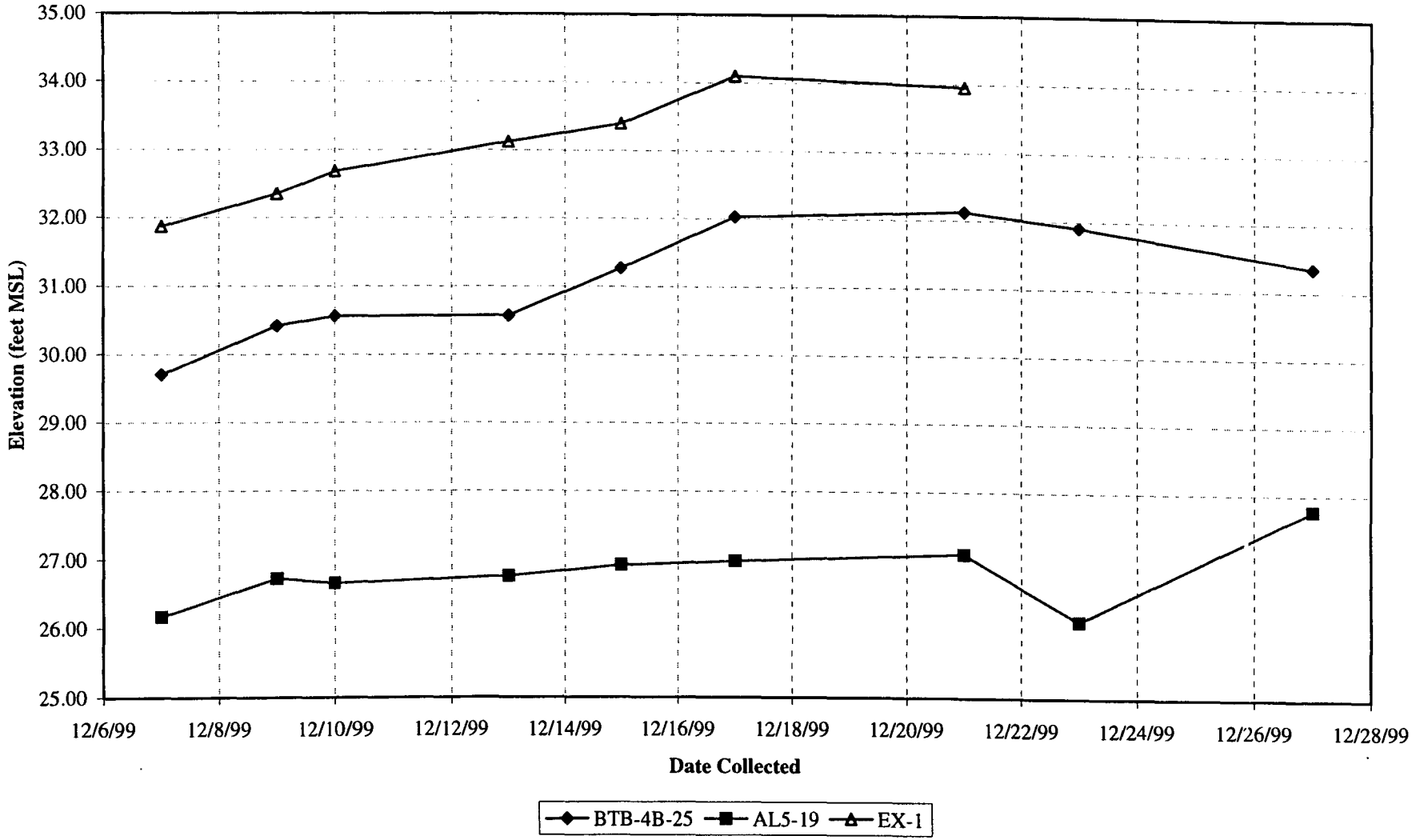
TITLE:
Site Plan
EX-1 Vicinity
Portland, OR

0 50 100
FEET

DWN: jgdp	DES.:	PROJECT NO.: 52-92C0804A
CHKD:	APPD:	
DATE: 1/9/01	REV.: 1	FIGURE NO.: 1-1

CHARTS

Chart 2-1
Water Elevation During Filling of EX-1



SCOEPA00006755

121.5
13-5

COMPACTION TEST DATA

Dames & Moore

PAGE NO. ____ OF ____

Job No. ____ Client RPAC Sample ____ Depth ____

Location Portland Sampled ____ By ____

Soil Cobb 1"-⌀ Brown clayey gravels w/sand Passing ¼" ____ % Sp. Gr. ____

Tested 11-8-00 By AD Computed ____ By ____ Checked ____ By ____
11-9-00

TYPE OF COMPACTION	CYLINDER CU. FT.	RAMMER LBS.	DROP INCHES	LAYERS	BLOWS PER LAYER
☐ ASTM D1557	1/30	10	18	5	25
☒ ASTM D1557	1/13.33	10	18	5	56
☐ ASTM D698	1/30	5½	12	3	25
☐					

POINT NO.	PENETROMETER: NEEDLE SIZE	PENETROMETER: RESISTANCE READING / RESISTANCE LBS./SQ.IN.	WT. OF MOLD & SOIL / MOLD WT. / WT. OF SOIL	WET DENSITY IN LBS./CU.FT.	MOISTURE DETERMINATION: DISH NO.	WET WT. / -DRY WT. / MOISTURE WT.	DRY WT. / -DISH WT. / DRY SOIL WT.	% MOISTURE	DRY DENSITY IN LBS./CU.FT.
	A		24.88 / 14.68 / 10.20	136.0	1001	520.1 / 484.0 / 36.1	484.0 / 187.0 / 297	12.2	121.2
	B		22.61 / 12.37 / 10.24	136.5	2A	504.6 / 460.2 / 44.4	460.2 / 190.1 / 269.5	16.5	117.2
	C		24.75 / 14.50 / 9.75	130.0	1.7m	303.0 / 290.9 / 12.1	290.9 / 170.3 / 120.6	10.0	118.2

Air dry

959P.1 (2) (6-86) ☐ NOTES OR CALCULATIONS ON REVERSE SIDE

SCOEPA00006756

121.5

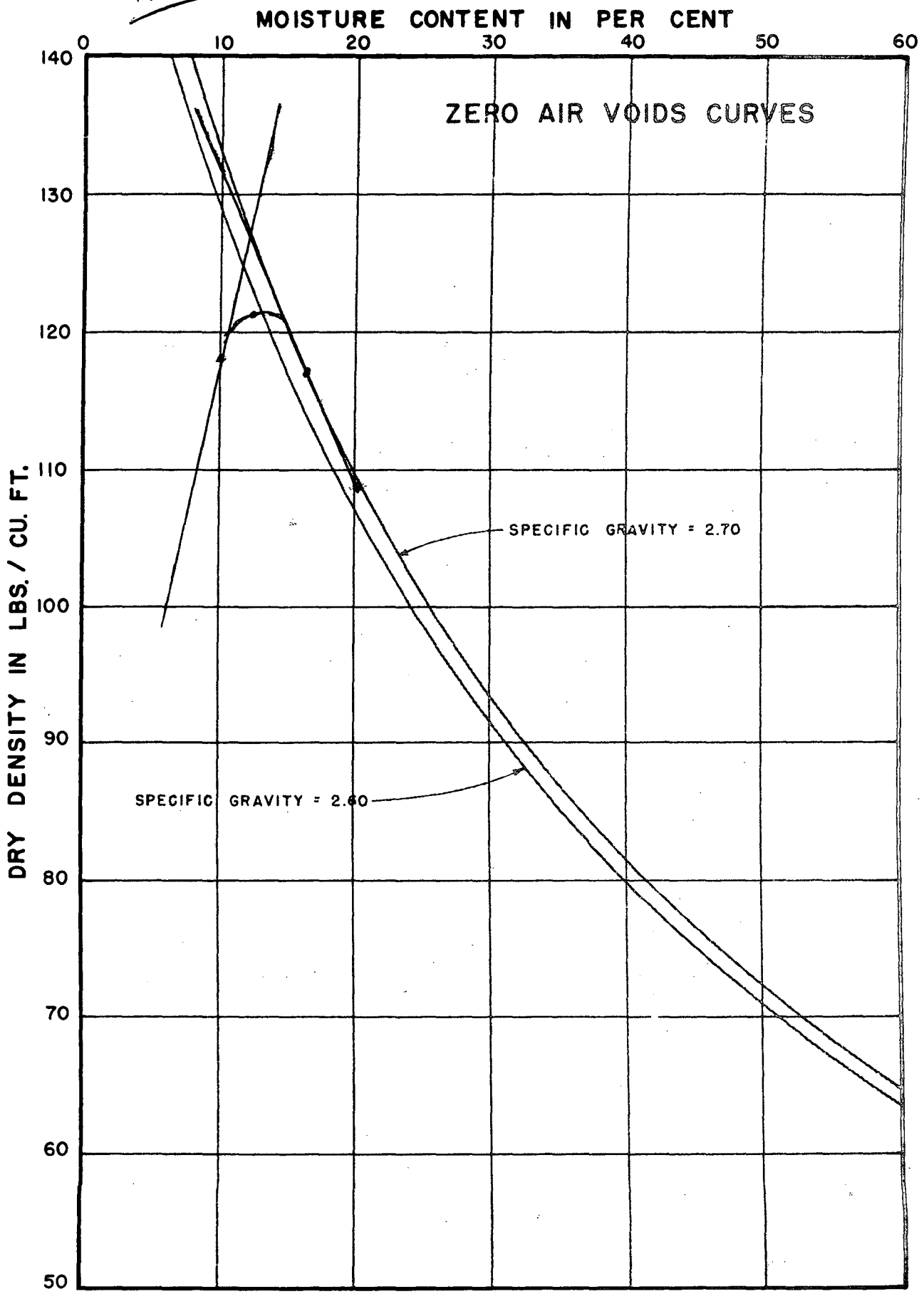
135

FILE RPA

SUBJECT: MOISTURE - DENSITY DATA

COBB Rock 1'-0

SHEET ___ OF ___



REVISIONS
BY ___ DATE ___ TO EO ___
BY ___ DATE ___ TO EO ___

BY ___ DATE ___
CHECKED BY ___
COPY TO EO ___

DAMES & MOORE

SCOEPA00006757

Greg Rollins

COMPACTION TEST DATA

PAGE NO. ____ OF ____

Dames & Moore

Job No. ____ Client ____ Sample ____ Depth ____

Location ____ Sampled ____ By ____

Soil Brown Fine sandy clayey gravels Passing ¼" ____ % Sp. Gr. ____

Tested 12-22-99 By DSD Computed ____ By ____ Checked ____ By ____

TYPE OF COMPACTION	CYLINDER CU. FT.	RAMMER LBS.	DROP INCHES	LAYERS	BLOWS PER LAYER
☐ ASTM D1557	1/30	10	18	5	25
☒ ASTM D1557	1/13.33	10	18	5	56
☐ ASTM D698	1/30	5½	12	3	25
☐					

POINT NO.	PENETROMETER NEEDLE SIZE	PENETROMETER RESISTANCE READING / RESISTANCE LBS./SQ.IN.	WT. OF MOLD & SOIL / MOLD WT. / WT. OF SOIL	WET DENSITY IN LBS./CU.FT.	MOISTURE DETERMINATION DISH NO.	WET WT. -DRY WT. / MOISTURE WT.	DRY WT. -DISH WT. / DRY SOIL WT.	% MOISTURE	DRY DENSITY IN LBS./CU.FT.
2	A		25.30 / 14.67 / 10.63	141.7	2A	543.4 / 507.0 / 36.4	507.0 / 170.4 / 336.6	10.8	127.9
3	B		22.69 / 12.37 / 10.32	137.6		599.8 / 557.7 / 42.1	557.7 / 272.1 / 285.6	14.7	120.0
1			24.18 / 14.07 / 10.11	134.8		539.9 / 513.6 / 26.3	513.6 / 170.5 / 343.1	7.7	125.[illegible]

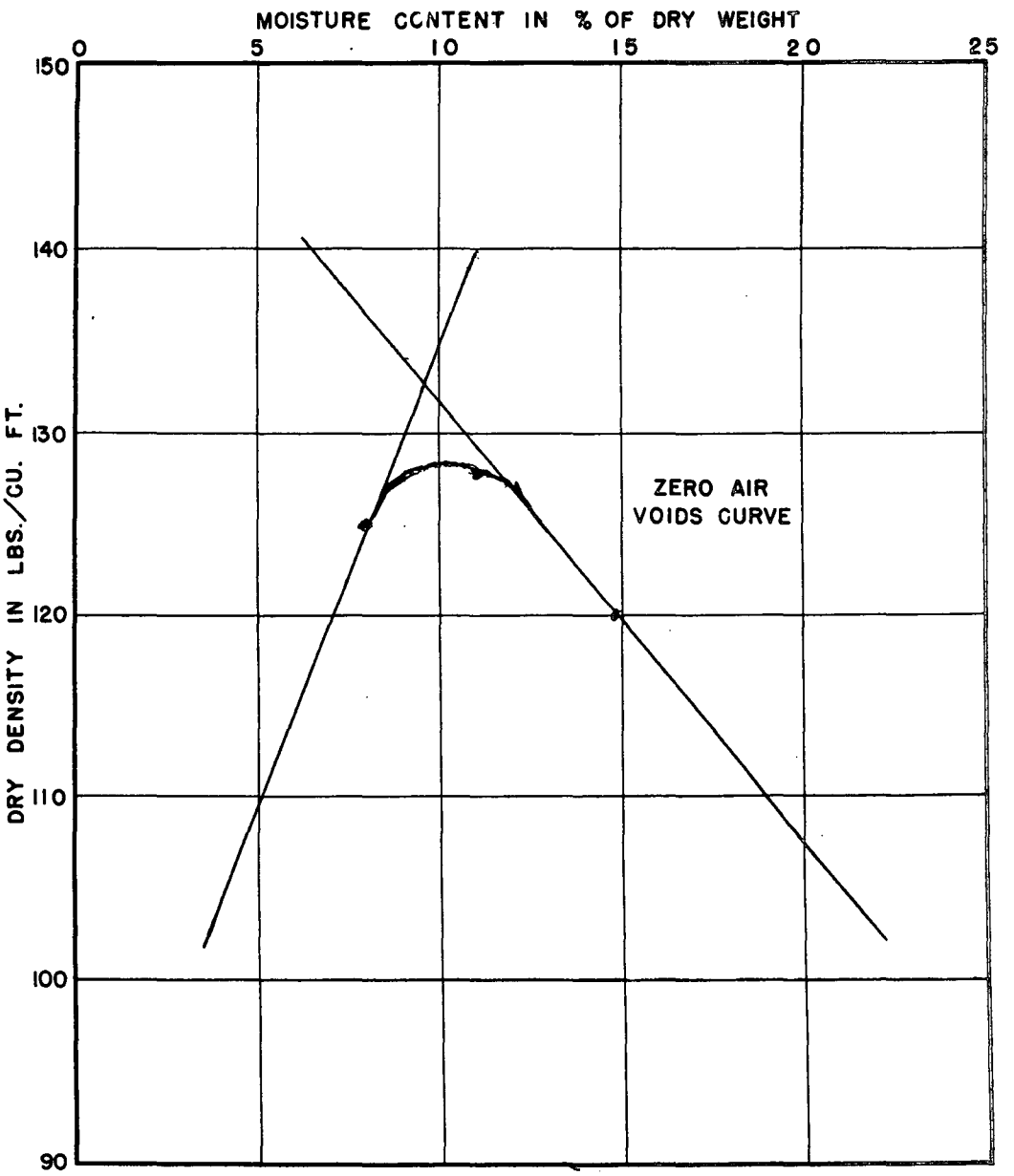
Dry pt

959P.1 (2) (6-86)

☐ NOTES OR CALCULATIONS ON REVERSE SIDE

SCOEPA00006758

SAMPLE NO._____ DEPTH_____ ELEVATION_____
SOIL Brown very fine clayey gravels
LOCATION_____
OPTIMUM MOISTURE CONTENT 10.0
MAXIMUM DRY DENSITY 128.0
METHOD OF COMPACTION ASTM D1557-



COMPACTION TEST DATA

DRAWN BY_____ DATE_____
CHECKED BY_____ DATE_____
REVISION 2 BY_____ DATE_____
REVISION 1 BY_____ DATE_____
FILE_____

DAMES & MOORE

956.1 (REV. 4-57)

PLATE

SCOEPA00006759

SCOEPA00006760

DAILY FIELD REPORT

☒ Monitoring Fill or Backfill
☐ Monitoring Footing Excavations

Job No.	
Page	1 of 1
Report Sequence No.	1

Job Location: Portland, OR	Client or Owner: RPAC	Date: 9-25-89	Day of Week: monday
General Location of Fill: EX-1 PIT	Purpose of Fill or Nature of Structure to be Supported	D & M Engineer: CM	HRS Charged (SITE): 7.0
General Contractor	Grading or Earthwork Contractor: Envirocon Inc.	HRS Charged (TRAVEL): .5	
Contractor's Shift: 8-4 7:00-	Contractor's Superintendent or Foreman: David Jacobs		
Source and Description of Fill Material: Import	Superintendents Acknowledgment of Site Visit and Hours	Assistants: DD	HRS Charged: 7.5
Weather: Sunny 60°-80°±			

APPROXIMATE YARDAGE

Total Required	Placed this Shift	Total To Date

Test Number	Test Location	Elevation	Required % of Maximum Dry Density	Maximum Dry Density lbs/cu. ft.	Fill Moisture %	Test Dry Density lbs/cu. ft.	% of Maximum Dry Density	Remarks
	NO TESTS TODAY							

SUPPLEMENTARY REPORT (Describe equipment used for hauling, spreading, watering, conditioning and compacting, also report thickness of lifts, and number of roller trips.)

As requested by Envirocon Inc., URS on site at 7:30 AM - The purpose of the site visit was to start monitoring the placement and compaction of Import Fill going into the EX-1 pit. A total of 11 end dumps & belly dumps were hauling in soil, the material was being spread out using a Caterpillar D7H LGP and compaction was with a single vibratory steel drum. Some of the early loads had organics mixed in with the soil. I explained that the organics were not acceptable and if continued will be sent away. Round trip the trucks are taking about 1 hour & 40 minutes - Very slow.

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SCOEPA00006761

DAILY FIELD REPORT

☐ Monitoring Fill or Backfill

☐ Monitoring Footing Excavations

Job No.	
Page	1 of 1
Report Sequence No.	2

Job Location: Portland, OR	Client or Owner: RPAC		
General Location of Fill: Ex-1 Pit	Purpose of Fill or Nature of Structure to be Supported	Date: 9-26-00	Day of Week: Tuesday
General Contractor	Grading or Earthwork Contractor: Envirocon Inc.	D & M Engineer: CM	HRS Charged (SITE): 3.5
Contractor's Shift: Day	Contractor's Superintendent or Foreman: David Jacobs	HRS Charged (TRAVEL): 2 Trips	1.0
Source and Description of Fill Material: Import	Superintendents Acknowledgment of Site Visit and Hours	Assistants: JD	HRS Charged: 4.5
Weather: Sunny 80°±			

APPROXIMATE YARDAGE		
Total Required	Placed this Shift	Total To Date

Test Number	Test Location: Ex-1 Pit	Elevation ±	Required % of Maximum Dry Density	Maximum Dry Density lbs/cu. ft.	Fill Moisture %	Test Dry Density lbs/cu. ft.	% of Maximum Dry Density	Remarks
1	West end	-2'	90%	128.0	12.1	122.7	95.1	✓
2	" "	-2'	↓	↓	13.1	116.4	90.9	✓
3	" "	-2'	↓	↓	12.6	123.3	96.3	✓
4	West middle	-2'	↓	↓	13.9	113.7	88.8	Fail
5	" "	-2'			12.6	118.1	92.3	Re-Test 9-27

SUPPLEMENTARY REPORT (Describe equipment used for hauling, spreading, watering, conditioning and compacting, also report thickness of lifts, and number of roller trips.)

As requested, I was back on site at 9:00 A.M. to continue monitor & test the placement of the fill being placed in the Ex-1 pit. Same equipment on site except they added a water truck. In the AM Envirocon said they had six trucks.

Arrived back on site at 1:00 P.M. took some compaction tests (see above for results) Failing tests were recompacted and then re-tested.

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DAILY FIELD REPORT

☐ Monitoring Fill or Backfill

☐ Monitoring Footing Excavations

Job No.	
Page	1 of 1
Report Sequence No.	3

Job Location: Portland, OR	Client or Owner: RPAC		
General Location of Fill: Ex-1 Pit	Purpose of Fill or Nature of Structure to be Supported	Date: 9-27-00	Day of Week: Wed.
General Contractor	Grading or Earthwork Contractor: Environ Inc.	D & M Engineer: Cam	HRS Charged (SITE): 4.0
Contractor's Shift: Day	Contractor's Superintendent or Foreman: David Jacobs	HRS Charged (TRAVEL): 2 visits	1.0
Source and Description of Fill Material: Import	Superintendents Acknowledgment of Site Visit and Hours	Assistants: SD	HRS Charged: 5.0
Weather: Sunny 75°±			

APPROXIMATE YARDAGE		
Total Required	Placed this Shift	Total To Date

Test Number	Test Location	Elevation ±	Required % of Maximum Dry Density	Maximum Dry Density lbs/cu. ft.	Fill Moisture %	Test Dry Density lbs/cu. ft.	% of Maximum Dry Density	Remarks
	Ex-1 Pit							
6	North end	-2'	90%	128.0	12.0	122.5	95.7	✓
7	North middle	-2'	↓	↓	11.2	127.1	99.3	✓
8	West middle	-2'			11.3	127.7	99.8	✓
9	south middle	-2'			13.9	116.7	91.1	✓
10	south middle	-2'			14.0	117.3	91.6	✓
11	East middle	-2'			14.3	116.1	90.7	✓
12	East end	-2'			12.9	118.0	92.2	✓
13	East end	-2'			12.8	115.7	90.4	✓

SUPPLEMENTARY REPORT (Describe equipment used for hauling, spreading, watering, conditioning and compacting, also report thickness of lifts, and number of roller trps.)

As requested, I was back on site at 8:45 AM. to continue to monitor and test the fill being placed in the Ex-1 Pit - Same equipment on site - A.M. according to Henry with Environcon 5 trucks importing soil this morning.

I arrived back on site at 1:45 P.M. continuing to monitor & test fill being placed - According to Environcon again only 5 trucks importing soil -

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DAILY FIELD REPORT

☐ Monitoring Fill or Backfill

☐ Monitoring Footing Excavations

Job No.	
Page	1 of 2
Report Sequence No.	4

Job Location: Portland OR	Client or Owner: RPAC		
General Location of Fill: Ex-1 pit	Purpose of Fill or Nature of Structure to be Supported	Date: 9-28-00	Day of Week: Thursday
General Contractor	Grading or Earthwork Contractor: Environcon Inc.	D & M Engineer: Cm	HRS Charged (SITE): 5-0
Contractor's Shift: Day	Contractor's Superintendent or Foreman: David Jacobi	HRS Charged (TRAVEL): 2 visits	1-0
Source and Description of Fill Material: Import	Superintendents Acknowledgment of Site Visit and Hours	Assistants: DD	HRS Charged: 6-0
Weather: Sunny 70°±			

APPROXIMATE YARDAGE		
Total Required	Placed this Shift	Total To Date

Test Number	Test Location	Elevation	Required % of Maximum Dry Density	Maximum Dry Density lbs/cu. ft.	Fill Moisture %	Test Dry Density lbs/cu. ft.	% of Maximum Dry Density	Remarks
~~1~~								
	No Tests							

SUPPLEMENTARY REPORT (Describe equipment used for hauling, spreading, watering, conditioning and compacting, also report thickness of lifts, and number of roller trips.)

As requested URS back on site at 8:30 Am - The Purpose was to continue to monitor & test the fill being placed located at Ex-1 pit - Same equipment on site. Not much material placed since yesterday afternoon's visit no tests taken this morning. * 5 Trucks running Am. Arrival back on site at 2:30 p.m. upon arrival the last load brought in ~~contained~~ consisted of Brown silts with gravels, cobbles & boulders with a mixture of organics (Wood pieces) This material not acceptable, I placed a phone call to Environcon's office and told them that the material will not be allowed on site and will be sent back upon arrival (Note: The URS soils report states that maximum particle size should not exceed 3" in diameter.

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DAILY FIELD REPORT

☐ Monitoring Fill or Backfill
☐ Monitoring Footing Excavations

Job No.			
Page 2 of 2			
Client or Owner: RPA	General Contractor	Report Sequence No. 4	
Grading or Earthwork Contractor: Envirocon Inc.	Weather: p.m. mostly cloudy	Date: 9-28-00	Day of Week: Thursday
Source and Description of Fill Material	Superintendents Acknowledgment of Site Visit and Hours	D & M Engineer: CM	HRS Charged (SITE)
		HRS Charged (TRAVEL): 3 visits 1.0	

→ Continued from page 1 -

I placed a phone call into chris moody (URS project manager) and explained to him the situation of soils arriving on site - He agreed with my recommendation.

* At 3:10 a truck arrived with the same material, this truck was sent back.

* At 3:30 two more trucks arrived with the same material, these two trucks remained on site and the truck sent back was back on site with the same load. The trucking people (mike), Envirocon David Jacobs, chris moody URS and myself all spoke and in the end Envirocon & URS agreed with my decision to send the trucks back. The trucking people are sending out two more truck loads from a different area of the pit for my observation. Two more trucks arrived at 6:15 p.m., I let them dump there loads and closely observed what material they brought on site - * still not acceptable not as bad as the earlier material, but still large gravels & organics mixed in a silty soil.

Spoke with the trucking people and envirocon they will search for another source, possible shut down tomorrow.

F-39 1/89

- mike - 360-606-5600 - 208 Ext. CM

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DAILY FIELD REPORT

☒ Monitoring Fill or Backfill
☐ Monitoring Footing Excavations

Job No. 52-92C0806400
Page 1 of 1

Job Location: PORTLAND RPAC	Client or Owner: RPAC	Report Sequence No.	
General Location of Fill: DEPRESSION NW OF FACILITY	Purpose of Fill or Nature of Structure to be Supported: BACKFILL DEPRESSION	Date: 11/16/00	Day of Week: THUR
General Contractor	Grading or Earthwork Contractor: ENVIROCON	D & M Engineer: JOD/DJD	HRS Charged (SITE): 1.5
Contractor's Shift: DAY	Contractor's Superintendent or Foreman	HRS Charged (TRAVEL): 1.5	
Source and Description of Fill Material: CASS QUARRY, 1/2" MUNUS	Superintendents Acknowledgment of Site Visit and Hours	Assistants: —	HRS Charged: —
Weather: CLEAR, 40°			

APPROXIMATE YARDAGE		
Total Required	Placed this Shift	Total To Date

Test Number	Test Location	Elevation	Required % of Maximum Dry Density	Maximum Dry Density lbs/cu. ft.	Fill Moisture %	Test Dry Density lbs/cu. ft.	% of Maximum Dry Density	Remarks
1	SE CORNER	1?6-12"	90%	121.5	10.8	114.7	94.4	✓
2	E EDGE	LIFT			11.5	116.2	95.7	✓
3	N EDGE				13.8	118.9	97.9	✓
4	MIDDLE				10.1	110.7	91.1	✓
5	W EDGE				11.6	117.8	96.9	✓
6	SW CORNER				12.2	113.8	93.7	✓

SUPPLEMENTARY REPORT (Describe equipment used for hauling, spreading, watering, conditioning and compacting, also report thickness of lifts, and number of roller trips.)

OPT MOISTURE = 13.5

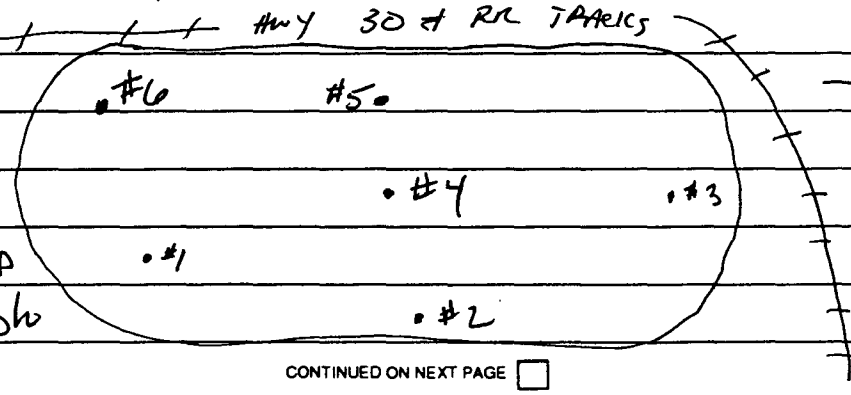
ARRIVED ON-SITE @ 0800 HRS. FIRST 4 TRUCKS BEGAN PLACING ROCK @ 0815. PLANNED TO RETURN WHEN READY FOR COMPACTION TESTING. RETURNED @ 1325 AFTER FIRST 6-12" LIFT HAD BEEN PLACED & COMPACTED.

ANY 30 + RR TRACKS

CAT D7H LGP

VIBROMAX 11D2

ALL TESTS PASSED



Jim O Dahnesh

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DAILY FIELD REPORT

☐ Monitoring Fill or Backfill

☐ Monitoring Footing Excavations

Job No.	52-92C0806A.00
Page	1 of 1
Job Location	PORTLAND RPAC
Client or Owner	RPAC
Report Sequence No.	
General Location of Fill	DEPRESSION NW OF FACILITY
Purpose of Fill or Nature of Structure to be Supported	BACKFILL DEPRESSION
Date	11/17/00
Day of Week	FRI
General Contractor	
Grading or Earthwork Contractor	ENVIROCON
D & M Engineer	JOD
HRS Charged (SITE)	1.5
Contractor's Shift	DAY
Contractor's Superintendent or Foreman	
HRS Charged (TRAVEL)	1.5
Source and Description of Fill Material	1/2" MINUS, CASS QUARRY
Superintendents Acknowledgment of Site Visit and Hours	
Assistants	
HRS Charged	
Weather	CLEAR, 35°

APPROXIMATE YARDAGE

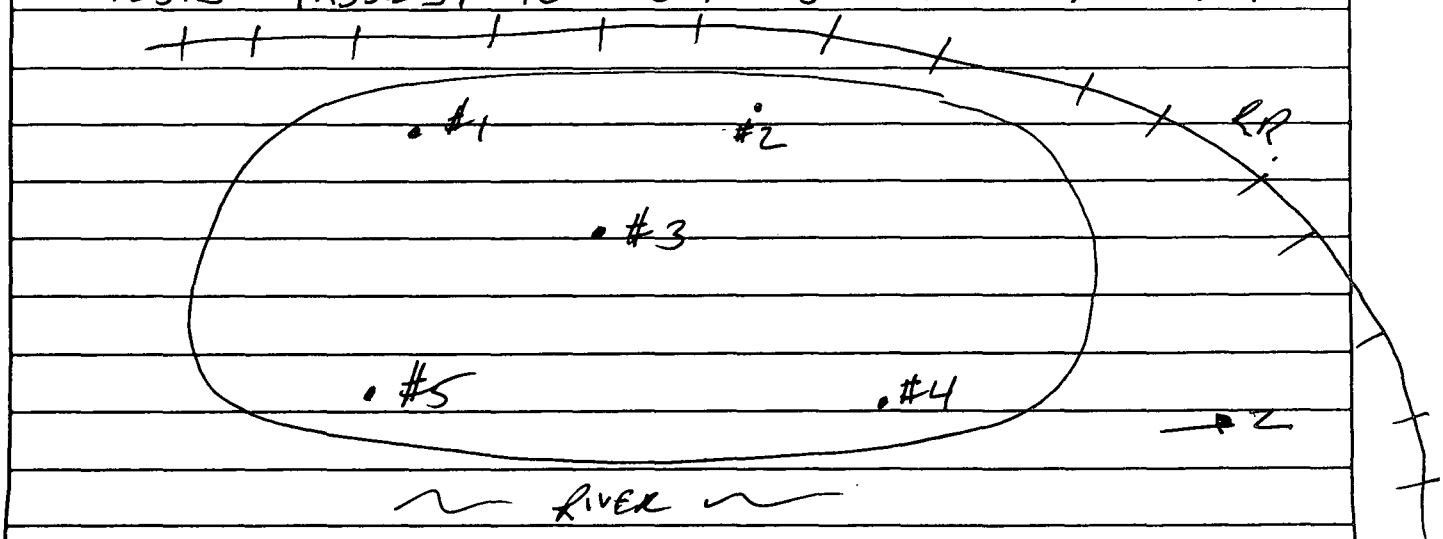
Total Required	Placed this Shift	Total To Date

Test Number	Test Location	Elevation	Required % of Maximum Dry Density	Maximum Dry Density lbs/cu. ft.	Fill Moisture %	Test Dry Density lbs/cu. ft.	% of Maximum Dry Density	Remarks
1	SW CORNER	2ND LIFT	90%	121.5	12.9	121.0	99.6	✓
2	W EDGE	↓	↓	↓	12.4	117.6	96.7	✓
3	CENTER	↓	↓	↓	11.6	112.3	92.4	✓
4	NE CORNER	↓	↓	↓	11.7	116.0	95.5	✓
5	SE CORNER	↓	↓	↓	10.3	112.9	92.9	✓

SUPPLEMENTARY REPORT (Describe equipment used for hauling, spreading, watering, conditioning and compacting, also report thickness of lifts, and number of roller trips.)

JAMES DAGKOWSKI

ARRIVED ON-SITE @ 0900 HRS. TESTED THE COMPACTION OF THE 2ND LIFT. ALL COMPACTION TESTS PASSED. TO TEST 3RD LIFT FRI PM



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F-38 1/89

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SCOEPA00006767

☐ Monitoring Fill or Backfill

☐ Monitoring Footing Excavations

DAILY FIELD REPORT

Job No.	52-9260806A.00
Page	1 of 1
Report Sequence No.	

Job Location: PORTLAND RPAC	Client or Owner: RPAC		
General Location of Fill: DEPRESSION NW OF FACILITY	Purpose of Fill or Nature of Structure to be Supported: BACKFILL DEPRESSION	Date: 11/17/00	Day of Week: FRI
General Contractor:	Grading or Earthwork Contractor: ENVIRO CON	D & M Engineer: JOD	HRS Charged (SITE): 1.0
Contractor's Shift: DAY	Contractor's Superintendent or Foreman:	HRS Charged (TRAVEL): 1.5	
Source and Description of Fill Material: CASS QUARRY 1/2" MINUS	Superintendents Acknowledgment of Site Visit and Hours	Assistants	HRS Charged
Weather: SUNNY, 45°			

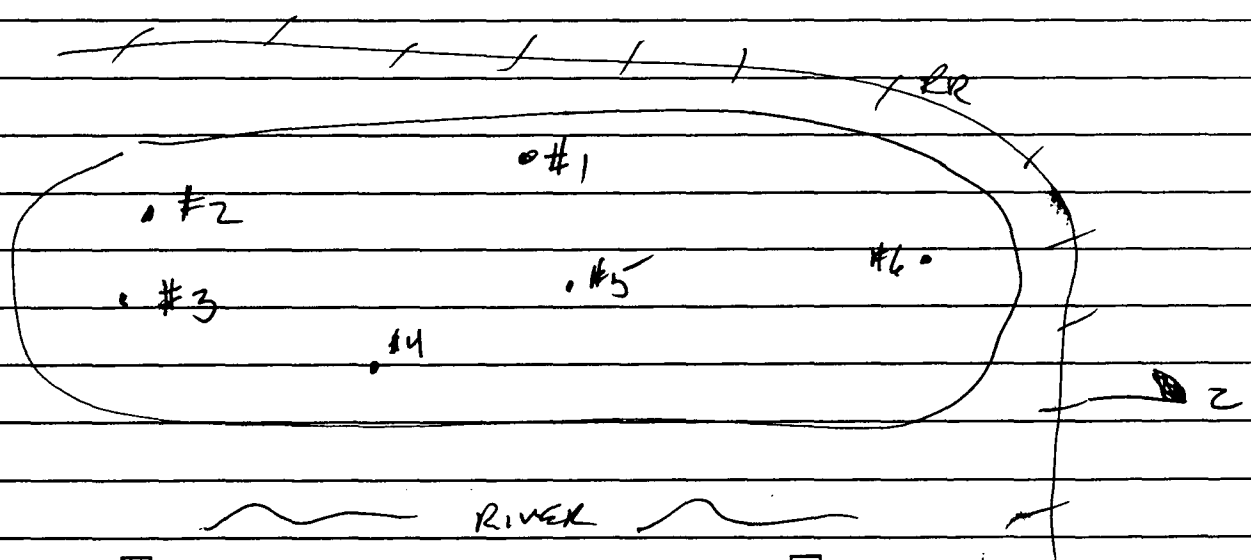
APPROXIMATE YARDAGE		
Total Required	Placed this Shift	Total To Date

Test Number	Test Location	Elevation	Required % of Maximum Dry Density	Maximum Dry Density lbs/cu. ft.	Fill Moisture %	Test Dry Density lbs/cu. ft.	% of Maximum Dry Density	Remarks
1	W EDGE	320 LIFT	90.0%	121.5	13.4	117.3	96.6	✓
2	SW CORNER	↓	↓	↓	12.9	121.0	99.6	✓
3	S EDGE				12.9	120.5	99.2	✓
4	E/SE CORNER/EDGE				11.7	118.0	97.1	✓
5	MIDDLE				11.3	111.0	91.4	✓
6	N EDGE				12.5	110.8	91.2	✓

SUPPLEMENTARY REPORT (Describe equipment used for hauling, spreading, watering, conditioning and compacting, also report thickness of lifts, and number of roller trips)

JAMES DABKOWSKI

ARRIVED ON-SITE @ 1615 HRS TO TEST COMPACTION. ALL COMPACTION TESTS PASSED



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DAILY FIELD REPORT

☐ Monitoring Fill or Backfill

☐ Monitoring Footing Excavations

Job No.	52-92008006A.0
Page	1 of 1
Report Sequence No.	

Client or Owner: PORTLAND RPAC	General Contractor: ENVIROCON		
Grading or Earthwork Contractor: ENVIROCON	Weather: SUNNY, WINDY 45°	Date: 11/20/00	Day of Week: MON
Source and Description of Fill Material: CASS QUARRY 1/2" MINUS	Superintendents Acknowledgment of Site Visit and Hours	D & M Engineer: JOD	HRS Charged (SITE): 1.0
JAMES DABKOWSKI		HRS Charged (TRAVEL): 1.0	

ARRIVED ON-SITE @ 1300 HRS. TO TEST COMPACTION OF FILL MATERIAL. ALL COMPACTION TESTS PASSED. NEXT CHECK MON PM / TUES AM

	LOC	REQ	MAX DRY DENSITY	MOISTURE	TEST D.D.	%	REMARKS
1	CENTER	90%	121.5	11.6	114.2	94.0	✓
2	N. CENTER	↓	↓	10.8	118.4	97.4	✓
3	NE CORNER			10.6	119.2	98.1	✓
4	S. CENTER			11.6	116.9	96.2	✓
5	SW CORNER			12.4	116.1	95.5	✓

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DAILY FIELD REPORT

☐ Monitoring Fill or Backfill

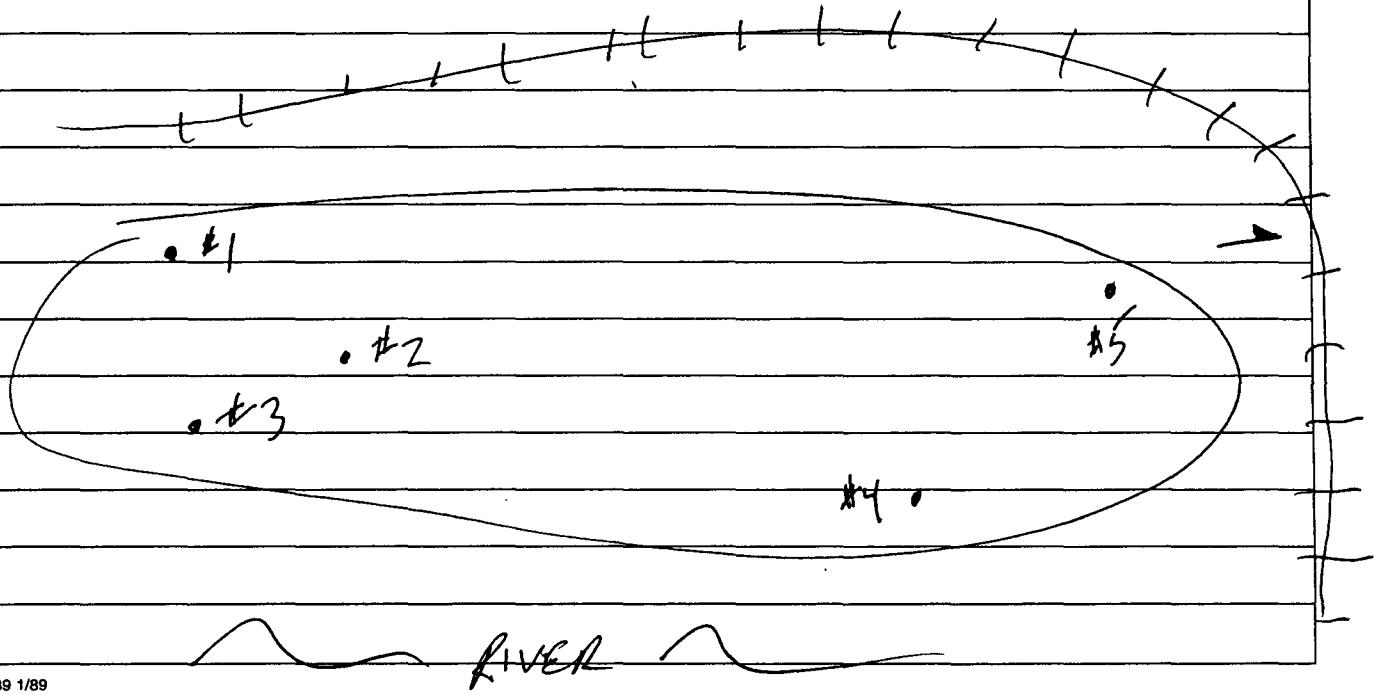
☐ Monitoring Footing Excavations

Job No.	52-92C0866A.00
Page	1 of 1
Report Sequence No.	

Client or Owner: PORTLAND RPAC	General Contractor: ENVIROCON		
Grading or Earthwork Contractor	Weather: CLEAR, 40°+/-	Date: 11/21/00	Day of Week: TUES
Source and Description of Fill Material: GLASS QUARRY 1/2" MINUS	Superintendents Acknowledgment of Site Visit and Hours	D & M Engineer: JOD	HRS Charged (SITE): 1.0
JAMES DABKOWSKI			HRS Charged (TRAVEL): 1.5

ARRIVED ON-SITE @ 1600 HRS TO TEST THE COMPACTION OF THE FILL. ALL COMPACTION TESTS PASSED. THE GULLY TO THE NW OF THE SITE HAS BEEN ENTIRELY FILLED IN.

	LOC	REQ	MAX DRY DENSITY	MOISTURE	TEST D.D.	%	RESULT
1	SW CORNER	90%	121.5	11.0	115.8	95.3	✓
2	S CENTER	↓	↓	15.6	115.2	94.8	✓
3	SE CORNER	↓	↓	10.2	117.7	96.9	✓
4	NE EDGE	↓	↓	16.3	116.6	96.0	✓
5	NW CORNER	↓	↓	15.9	112.0	92.2	✓



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DAILY FIELD REPORT

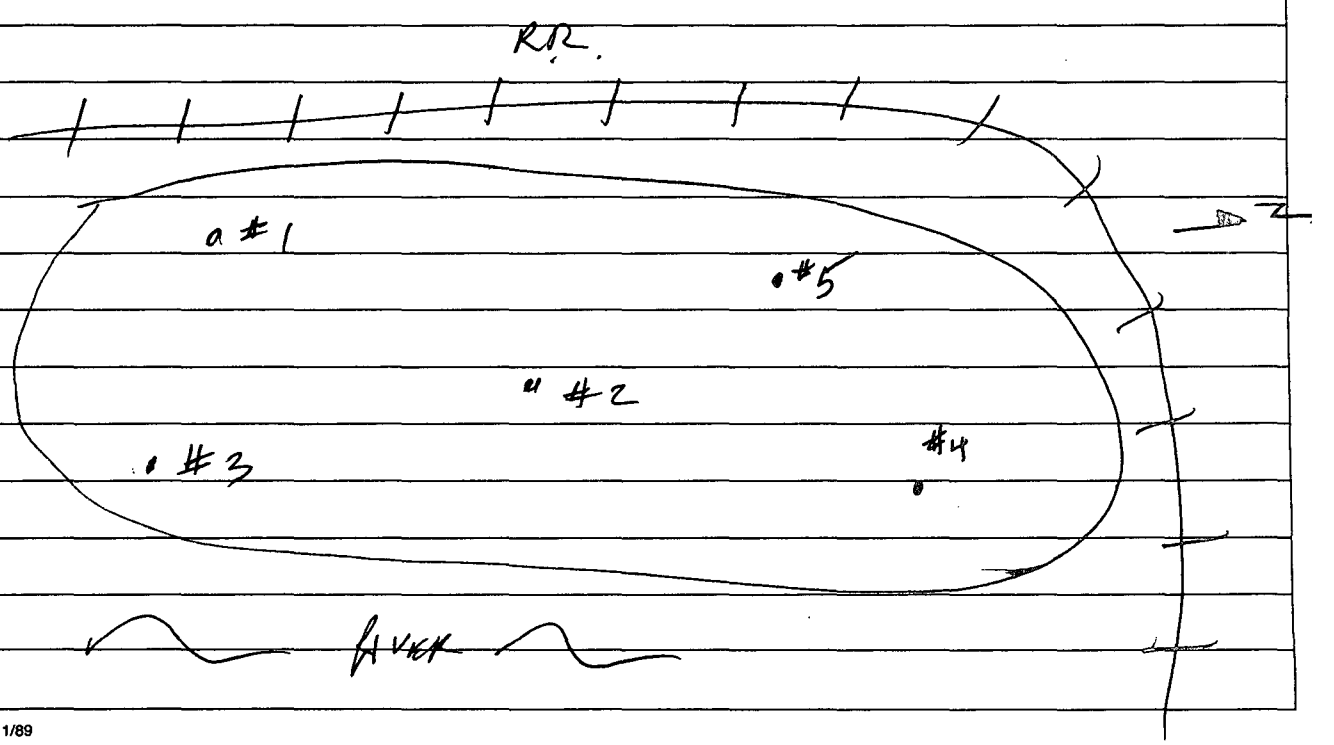
☐ Monitoring Fill or Backfill
☐ Monitoring Footing Excavations

Job No.	52-92C08C6A.00
Page	1 of 1
Report Sequence No.	

Client or Owner: PORTLAND RAIL	General Contractor: ENVIROCON		
Grading or Earthwork Contractor	Weather: P. CLOUDY 42°	Date: 11/21/00	Day of Week: TUES
Source and Description of Fill Material: CASS QUARRY 1/2" MINUS	Superintendents Acknowledgment of Site Visit and Hours	D & M Engineer: JOA	HRS Charged (SITE): 1.0
JAMES DABKOWSKI			HRS Charged (TRAVEL): 1.5

ARRIVED ON-SITE @ 0850 HRS TO TEST THE COMPACTION OF THE FILL. ALL COMPACTION TESTS PASSED

LOC	REQ	MAX DRY DENSITY	MOISTURE	TEST D. DENSITY	%	RESULT
1 SW CORNER	90%	121.5	10.7	109.4	90.0	✓
2 CENTER	↓	↓	10.2	117.7	96.9	✓
3 SE CORNER	↓	↓	10.5	117.1	96.4	
4 NE CORNER	↓	↓	11.9	118.4	97.4	
5 NW CORNER	↓	↓	10.5	115.1	94.7	



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DAILY FIELD REPORT

☐ Monitoring Fill or Backfill

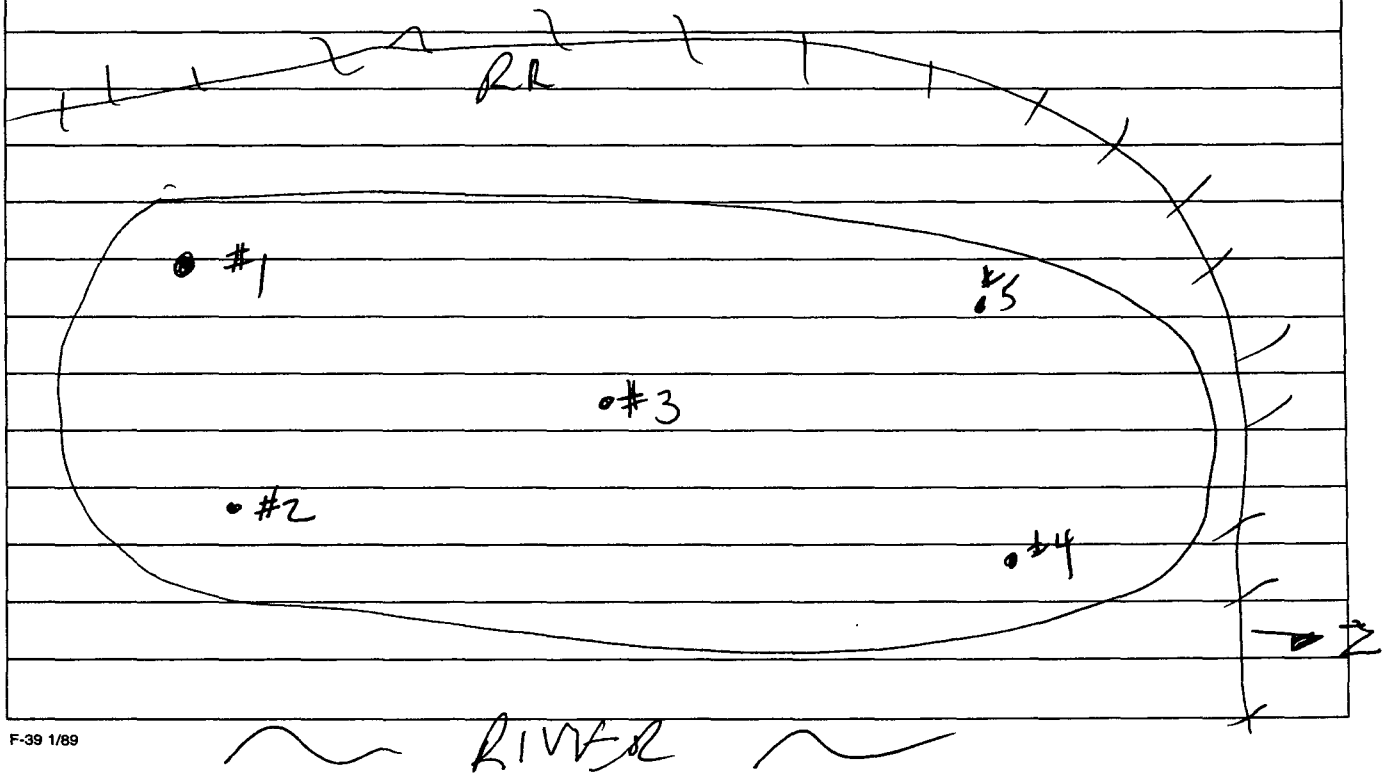
☐ Monitoring Footing Excavations

Job No.	52-9210806A.00
Page	1 of 1

Client or Owner: PORTLAND RPAC	General Contractor: ENVIROCON	Report Sequence No.	
Grading or Earthwork Contractor	Weather: CLEAR, 45°	Date: 11/22/00	Day of Week: WED
Source and Description of Fill Material: CASS QUARRY 1/2" MINUS	Superintendents Acknowledgment of Site Visit and Hours	D & M Engineer: JOD	HRS Charged (SITE): 1.0
JAMES DABKOWSKI		HRS Charged (TRAVEL): 1.5	

ARRIVED ON-SITE @ 0830 HRS TO TEST THE COMPACTION OF THE FILL. ALL COMPACTION TESTS PASSED. FINAL GRADING IN PROGRESS.

#	LOC	REQ	MAX DRY DENSITY	MOISTURE	TEST D.D.	%	RESULT
1	SW CORNER	90%	121.5	14.9	117.3	96.6	✓
2	SE CORNER	↓	↓	12.9	121.0	99.8	✓
3	CENTER	↓	↓	14.0	115.7	95.3	✓
4	NE CORNER	↓	↓	13.4	121.0	99.7	✓
5	NW CORNER	↓	↓	16.2	111.3	91.6	✓



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SCOEPA00006773

15 November, 2000

Jeff Johnson
Envirocon
10400 N. Burgard Way
Portland, OR 97203

RE: Cobb

Enclosed are the results of analyses for samples received by the laboratory on 11/06/00 16:07. If you have any questions concerning this report, please feel free to contact me.

Sincerely,

DRAFT REPORT
DATA IS SUBJECT TO CHANGE

Work Orders included in this report:

P0K0111

Envirocon 10400 N. Burgard Way Portland, OR 97203	Project: Cobb Project Number: 11/6/00 Project Manager: Jeff Johnson	Reported: 11/15/00 15:59

ANALYTICAL REPORT FOR SAMPLES

Sample ID	Laboratory ID	Matrix	Date Sampled	Date Received
DRAFT: Cobb Soil fill	P0K0111-01	Soil	11/06/00 16:15	11/06/00 16:07

Envirocon	Project: Cobb	
10400 N. Burgard Way	Project Number: 11/6/00	Reported:
Portland, OR 97203	Project Manager: Jeff Johnson	11/15/00 15:59

DRAFT: Gasoline Hydrocarbons per NW TPH-Gx Method

North Creek Analytical - Portland

Analyte	Result	Reporting Limit	Units	Dilution	Method	Prepared	Analyzed	Batch	Notes
DRAFT: Cobb Soil fill (P0K0111-01) Soil					Sampled: 11/06/00	Received: 11/06/00			
Gasoline Range Hydrocarbons	ND	2.00	mg/kg dry	1	NW TPH-Gx	11/07/00	11/07/00	0110244	
Surr: 4-BFB	*84.9 %*	*50-150*							

Envirocon	Project: Cobb	
10400 N. Burgard Way	Project Number: 11/6/00	Reported:
Portland, OR 97203	Project Manager: Jeff Johnson	11/15/00 15:59

DRAFT: Diesel and Heavy Range Hydrocarbons per NWTPH-Dx Method

North Creek Analytical - Portland

Analyte	Result	Reporting Limit	Units	Dilution	Method	Prepared	Analyzed	Batch	Notes
DRAFT: Cobb Soil fill (P0K0111-01) Soil					Sampled: 11/06/00	Received: 11/06/00			
Diesel Range Organics	ND	25.0	mg/kg dry	1	NWTPH-Dx	11/08/00	11/10/00	0110272	
Heavy Oil Range Hydrocarbons	ND	50.0	"	"	"	"	"	"	
Surr: 1-Chlorooctadecane	*91.1 %*	*50-150*							

Envirocon	Project: Cobb	
10400 N. Burgard Way	Project Number: 11/6/00	Reported:
Portland, OR 97203	Project Manager: Jeff Johnson	11/15/00 15:59

DRAFT: Total Metals per EPA 6000/7000 Series Methods

North Creek Analytical - Portland

Analyte	Result	Reporting Limit	Units	Dilution	Method	Prepared	Analyzed	Batch	Notes
DRAFT: Cobb Soil fill (P0K0111-01) Soil					Sampled: 11/06/00 Received: 11/06/00				
Arsenic	ND	0.500	mg/kg dry	1	EPA 6020	11/08/00	11/14/00	0110324	
Barium	89.1	0.500	"	"	EPA 6010A	11/08/00	11/12/00	0110323	
Cadmium	0.932	0.500	"	"	"	"	11/12/00	"	
Chromium	1.86	0.500	"	"	"	"	"	"	
Lead	ND	10.0	"	"	"	"	"	"	
Mercury	ND	0.100	"	"	EPA 7471A	11/08/00	11/08/00	0110282	
Selenium	ND	0.500	"	"	EPA 6020	11/08/00	11/14/00	0110324	
Silver	ND	1.00	"	"	EPA 6010A	11/08/00	11/12/00	0110323	

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.

Envirocon	Project: Cobb	
10400 N. Burgard Way	Project Number: 11/6/00	Reported:
Portland, OR 97203	Project Manager: Jeff Johnson	11/15/00 15:59

DRAFT: Volatile Organic Compounds per EPA Method 8260B

North Creek Analytical - Portland

Analyte	Result	Reporting Limit	Units	Dilution	Method	Prepared	Analyzed	Batch	Notes
DRAFT: Cobb Soil fill (P0K0111-01) Soil					Sampled: 11/06/00 Received: 11/06/00				
Acetone	ND	1000	ug/kg dry	1	EPA 8260B	11/07/00	11/08/00	0110246	
Benzene	ND	100	"	"	"	"	"	"	
Bromobenzene	ND	100	"	"	"	"	"	"	
Bromochloromethane	ND	100	"	"	"	"	"	"	
Bromodichloromethane	ND	100	"	"	"	"	"	"	
Bromoform	ND	100	"	"	"	"	"	"	
Bromomethane	ND	500	"	"	"	"	"	"	
2-Butanone	ND	1000	"	"	"	"	"	"	
n-Butylbenzene	ND	500	"	"	"	"	"	"	
sec-Butylbenzene	ND	100	"	"	"	"	"	"	
tert-Butylbenzene	ND	100	"	"	"	"	"	"	
Carbon disulfide	ND	1000	"	"	"	"	"	"	
Carbon tetrachloride	ND	100	"	"	"	"	"	"	
Chlorobenzene	ND	100	"	"	"	"	"	"	
Chloroethane	ND	100	"	"	"	"	"	"	
Chloroform	ND	100	"	"	"	"	"	"	
Chloromethane	ND	500	"	"	"	"	"	"	
2-Chlorotoluene	ND	100	"	"	"	"	"	"	
4-Chlorotoluene	ND	100	"	"	"	"	"	"	
1,2-Dibromo-3-chloropropane	ND	500	"	"	"	"	"	"	
Dibromochloromethane	ND	100	"	"	"	"	"	"	
1,2-Dibromoethane	ND	100	"	"	"	"	"	"	
Dibromomethane	ND	100	"	"	"	"	"	"	
1,2-Dichlorobenzene	ND	100	"	"	"	"	"	"	
1,3-Dichlorobenzene	ND	100	"	"	"	"	"	"	
1,4-Dichlorobenzene	ND	100	"	"	"	"	"	"	
Dichlorodifluoromethane	ND	500	"	"	"	"	"	"	
1,1-Dichloroethane	ND	100	"	"	"	"	"	"	
1,2-Dichloroethane	ND	100	"	"	"	"	"	"	
1,1-Dichloroethene	ND	100	"	"	"	"	"	"	
cis-1,2-Dichloroethene	ND	100	"	"	"	"	"	"	
trans-1,2-Dichloroethene	ND	100	"	"	"	"	"	"	
1,2-Dichloropropane	ND	100	"	"	"	"	"	"	
1,3-Dichloropropane	ND	100	"	"	"	"	"	"	
2,2-Dichloropropane	ND	100	"	"	"	"	"	"	
1,1-Dichloropropene	ND	100	"	"	"	"	"	"	
cis-1,3-Dichloropropene	ND	100	"	"	"	"	"	"	
trans-1,3-Dichloropropene	ND	100	"	"	"	"	"	"	
Ethylbenzene	ND	100	"	"	"	"	"	"	

DRAFT REPORT

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.

SCOEPA00006779

Envirocon	Project: Cobb	
10400 N. Burgard Way	Project Number: 11/6/00	Reported:
Portland, OR 97203	Project Manager: Jeff Johnson	11/15/00 15:59

DRAFT: Volatile Organic Compounds per EPA Method 8260B

North Creek Analytical - Portland

Analyte	Result	Reporting Limit	Units	Dilution	Method	Prepared	Analyzed	Batch	Notes
DRAFT: Cobb Soil fill (P0K0111-01) Soil						Sampled: 11/06/00	Received: 11/06/00		
Hexachlorobutadiene	ND	200	ug/kg dry	1	EPA 8260B	11/07/00	11/08/00	0110246	
2-Hexanone	ND	1000	"	"	"	"	"	"	
Isopropylbenzene	ND	200	"	"	"	"	"	"	
p-Isopropyltoluene	ND	200	"	"	"	"	"	"	
4-Methyl-2-pentanone	ND	500	"	"	"	"	"	"	
Methyl tert-butyl ether	ND	100	"	"	"	"	"	"	
Methylene chloride	ND	500	"	"	"	"	"	"	
Naphthalene	ND	200	"	"	"	"	"	"	
n-Propylbenzene	ND	100	"	"	"	"	"	"	
Styrene	ND	100	"	"	"	"	"	"	
1,1,1,2-Tetrachloroethane	ND	100	"	"	"	"	"	"	
1,1,2,2-Tetrachloroethane	ND	100	"	"	"	"	"	"	
Tetrachloroethene	ND	100	"	"	"	"	"	"	
Toluene	ND	100	"	"	"	"	"	"	
1,2,3-Trichlorobenzene	ND	100	"	"	"	"	"	"	
1,2,4-Trichlorobenzene	ND	100	"	"	"	"	"	"	
1,1,1-Trichloroethane	ND	100	"	"	"	"	"	"	
1,1,2-Trichloroethane	ND	100	"	"	"	"	"	"	
Trichloroethene	ND	100	"	"	"	"	"	"	
Trichlorofluoromethane	ND	100	"	"	"	"	"	"	
1,2,3-Trichloropropane	ND	100	"	"	"	"	"	"	
1,2,4-Trimethylbenzene	ND	100	"	"	"	"	"	"	
1,3,5-Trimethylbenzene	ND	100	"	"	"	"	"	"	
Vinyl chloride	ND	100	"	"	"	"	"	"	
o-Xylene	ND	100	"	"	"	"	"	"	
m,p-Xylene	ND	200	"	"	"	"	"	"	
Surr: 4-BFB	*116 %*	*70-130*							
Surr: 1,2-DCA-d4	*111 %*	*70-130*							
Surr: Dibromofluoromethane	*102 %*	*70-130*							
Surr: Toluene-d8	*112 %*	*70-130*							

Envirocon	Project: Cobb	
10400 N. Burgard Way	Project Number: 11/6/00	Reported:
Portland, OR 97203	Project Manager: Jeff Johnson	11/15/00 15:59

DRAFT: Miscellaneous Physical/Conventional Chemistry Parameters

North Creek Analytical - Portland

Analyte	Result	Reporting Limit	Units	Dilution	Method	Prepared	Analyzed	Batch	Notes
DRAFT: Cobb Soil fill (P0K0111-01) Soil					Sampled: 11/06/00	Received: 11/06/00			
% Solids	85.9	1.00	% by Weight	1	NCA SOP	11/10/00	11/10/00	0110370	

Envirocon 10400 N. Burgard Way Portland, OR 97203	Project: Cobb Project Number: 11/6/00 Project Manager: Jeff Johnson	Reported: 11/15/00 15:59

Notes and Definitions

Q-02	The spike recovery for this QC sample is outside of established control limits due to sample matrix interference.
Q-14	The Spike Recovery and/or RPD is outside of control limits due to a non-homogeneous sample matrix.
Q-19	The spike recovery for this QC sample is outside of established control limits due to a non-homogeneous matrix in the native sample.
DET	Analyte DETECTED
ND	Analyte NOT DETECTED at or above the reporting limit
NR	Not Reported
dry	Sample results reported on a dry weight basis
wet	Sample results reported on a wet weight basis
RPD	Relative Percent Difference

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Environmental Laboratory Network
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9405 S.W. Nimbus Avenue, Beaverton, OR 97008-7132 (503) 906-9200 FAX 906-9210
20532 Empire Avenue, Suite F-1, Bend, OR 97701-5711 (541) 383-9310 FAX 382-7588

CHAIN OF CUSTODY REPORT

Work Order #: P0K0111

CLIENT: ENVIROCON
REPORT TO: JEFF JOHNSON
ADDRESS: 10400 N. Burgard WAY
PORT OR 97203
PHONE: 503 285-6164 FAX: 285-6245

INVOICE TO: SAME

P.O. NUMBER:

PROJECT NAME:
PROJECT NUMBER:
SAMPLED BY: JEFF JOHNSON

TURNAROUND REQUEST in Business Days*
Organic & Inorganic Analyses: 10 | 7 | 5 | 4 | 3 | 2 | 1 | <1 (STD.)
Petroleum Hydrocarbon Analyses: 5 | 4 | 3 | 2 | 1 | <1 (STD.)
OTHER — Please Specify
*Turnaround Requests less than standard may incur Rush Charges.

REQUESTED ANALYSES

CLIENT SAMPLE IDENTIFICATION	SAMPLING DATE/TIME	8260	TOTAL METALS RCRA 8	TPH-DLG										MATRIX (W, S, O)	# OF CONT.	COMMENTS	NCA WO ID
1 Cobb soil fill		X	X	X										S	2	Please have samples done as close to 3 days as can. Please send results over as become available. Thanks	
2.																	
3.																	
4.																	
5.																	
6.																	
7.																	
8.																	
9.																	
10.																	
11.																	
12.																	
13.																	
14.																	
15.																	

RELINQUISHED BY: Steve Shepherd	DATE: 11-6-00	RECEIVED BY:		DATE: 11-6-00	
PRINT NAME: Steve Shepherd	FIRM: ENVIROCON	TIME: 15:30	PRINT NAME: Sarah Passarge	FIRM: NCA	TIME: 16:0
RELINQUISHED BY:	DATE:	RECEIVED BY:		DATE:	
PRINT NAME:	FIRM:	TIME:	PRINT NAME:	FIRM:	TIME:

ADDITIONAL REMARKS:

TEMP: 11.6

CDC REV 3/99

PAGE OF

FROM : NORTH CREEK ANALYTICAL

SCOEPA00006783

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Spokane East 11115 Montgomery, Suite B, Spokane, WA 99206 4776
509.924.9700 fax 509.924.9790
Portland 9405 SW Nimbus Avenue, Beaverton, OR 97008-7132
503.906.9200 fax 503.906.9210
Bend 20332 Empire Avenue, Suite F-1, Bend, OR 97701-5711
541.383.9310 fax 541.387.7588

12 October, 2000

David Jacobs
Envirocon
10400 N. Burgard Way
Portland, OR 97203

RE: none given

Enclosed are the results of analyses for samples received by the laboratory on 10/03/00 17:07. If you have any questions concerning this report, please feel free to contact me.

Sincerely,

Howard Holmes
Project Manager

Work Orders included in this report:
P010076

North Creek Analytical, Inc.
Environmental Laboratory Network

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Envirocon	Project: none given	
10400 N. Burgard Way	Project Number: none given	Reported:
Portland, OR 97203	Project Manager: David Jacobs	10/12/00 08:02

ANALYTICAL REPORT FOR SAMPLES

Sample ID	Laboratory ID	Matrix	Date Sampled	Date Received
URS-RHONE-MORSE FILL	P010075-01	Soil	10/02/00 15:00	10/03/00 17:07

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Envirocon 10400 N. Burgard Way Portland, OR 97203	Project: none given Project Number: none given Project Manager: David Jacobs	Reported: 10/12/00 08:02

Gasoline Hydrocarbons per NW TPH-Gx Method
North Creek Analytical - Portland

Analyte	Result	Reporting Limit	Units	Dilution	Method	Prepared	Analyzed	Batch	Notes
URS-RHONE-MORSE FILL (P010075-01) Soil					Sampled: 10/02/00	Received: 10/03/00			
Gasoline Range Hydrocarbons	6.86	4.00	mg/kg dry	1	NW TPH-Gx	10/05/00	10/05/00	0100946	
Surr: 4-BFB	*79.8 %*	*50-150*							

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Envirocon	Project: none given	
10400 N. Burgard Way	Project Number: none given	Reported:
Portland, OR 97203	Project Manager: David Jacobs	10/12/00 08:02

Diesel and Heavy Range Hydrocarbons per NWTPH-Dx Method

North Creek Analytical - Portland

Analyte	Result	Reporting Limit	Units	Dilution	Method	Prepared	Analyzed	Batch	Notes
URS-RHONE-MORSE FILL (P010075-01) Soil					Sampled: 10/02/00	Received: 10/03/00			
Diesel Range Organics	ND	25.0	mg/kg dry	1	NWTPH-Dx	10/07/00	10/08/00	0101043	
Heavy Oil Range Hydrocarbons	ND	50.0	"	"	"	"	"	"	
Surr: 1-Chlorooctadecane	*102 %*	*50-150*							

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Envirocon	Project: none given	
10400 N. Burgard Way	Project Number: none given	Reported:
Portland, OR 97203	Project Manager: David Jacobs	10/12/00 08:02

Miscellaneous Physical/Conventional Chemistry Parameters
North Creek Analytical - Portland

Analyte	Result	Reporting Limit	Units	Dilution	Method	Prepared	Analyzed	Batch	Notes
URS-RHONE-MORSE FILL (P010075-01) Soil					Sampled: 10/02/00	Received: 10/03/00			
% Solids	82.8	1.00	% by Weight	1	NCA SOP	10/09/00	10/10/00	0101076	

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Envirocon	Project: none given	
10400 N. Burgard Way	Project Number: none given	Reported:
Portland, OR 97203	Project Manager: David Jacobs	10/12/00 08:02

Total Metals by EPA 6000/7000 Series Methods

North Creek Analytical - Bothell

Analyte	Result	Reporting Limit	Units	Dilution	Method	Prepared	Analyzed	Batch	Notes
URS-RHONE-MORSE FILL (P010075-01) Soil						Sampled: 10/02/00	Received: 10/03/00		
Arsenic	**0.402**	0.368	mg/kg dry	1	EPA 6020	10/06/00	10/10/00	0J06006	
Barium	**113**	3.68	"	"	"	"	"	"	
Cadmium	**0.469**	0.368	"	"	"	"	"	"	
Chromium	**2.76**	0.368	"	"	"	"	10/10/00	"	
Lead	**3.40**	0.368	"	"	"	"	10/10/00	"	
Mercury	ND	0.100	"	"	EPA 7471A	10/10/00	10/11/00	0J10027	
Selenium	**0.991**	0.368	"	"	EPA 6020	10/06/00	10/10/00	0J06006	
Silver	ND	0.368	"	"	"	"	"	"	

North Creek Analytical - Portland

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Envirocon	Project: none given	
10400 N. Burgard Way	Project Number: none given	Reported:
Portland, OR 97203	Project Manager: David Jacobs	10/12/00 08:02

Volatile Organic Compounds by EPA Method 8260B

North Creek Analytical - Bothell

Analyte	Result	Reporting Limit	Units	Dilution	Method	Prepared	Analyzed	Batch	Notes
URS-RIIONE-MORSE FILL (P010075-01) Soil					Sampled: 10/02/00	Received: 10/03/00			
Acetone	ND	1.00	mg/kg dry	1	EPA 8260B	10/03/00	10/11/00	0J04020	
Benzene	ND	0.100	"	"	"	"	"	"	
Bromobenzene	ND	0.100	"	"	"	"	"	"	
Bromochloromethane	ND	0.100	"	"	"	"	"	"	
Bromodichloromethane	ND	0.100	"	"	"	"	"	"	
Bromoform	ND	0.100	"	"	"	"	"	"	
Bromomethane	ND	0.100	"	"	"	"	"	"	
2-Butanone	ND	1.00	"	"	"	"	"	"	
n-Butylbenzene	ND	0.100	"	"	"	"	"	"	
sec-Butylbenzene	ND	0.100	"	"	"	"	"	"	
tert-Butylbenzene	ND	0.100	"	"	"	"	"	"	
Carbon disulfide	ND	0.100	"	"	"	"	"	"	
Carbon tetrachloride	ND	0.100	"	"	"	"	"	"	
Chlorobenzene	ND	0.100	"	"	"	"	"	"	
Chloroethane	ND	0.100	"	"	"	"	"	"	
Chloroform	ND	0.100	"	"	"	"	"	"	
Chloromethane	ND	0.500	"	"	"	"	"	"	
2-Chlorotoluene	ND	0.100	"	"	"	"	"	"	
4-Chlorotoluene	ND	0.100	"	"	"	"	"	"	
Dibromochloromethane	ND	0.100	"	"	"	"	"	"	
1,2-Dibromo-3-chloropropane	ND	0.500	"	"	"	"	"	"	
1,2-Dibromoethane	ND	0.100	"	"	"	"	"	"	
Dibromomethane	ND	0.100	"	"	"	"	"	"	
1,2-Dichlorobenzene	ND	0.100	"	"	"	"	"	"	
1,3-Dichlorobenzene	ND	0.100	"	"	"	"	"	"	
1,4-Dichlorobenzene	ND	0.100	"	"	"	"	"	"	
Dichlorodifluoromethane	ND	0.100	"	"	"	"	"	"	
1,1-Dichloroethane	ND	0.100	"	"	"	"	"	"	
1,2-Dichloroethane	ND	0.100	"	"	"	"	"	"	
1,1-Dichloroethene	ND	0.100	"	"	"	"	"	"	
cis-1,2-Dichloroethene	ND	0.100	"	"	"	"	"	"	
trans-1,2-Dichloroethene	ND	0.100	"	"	"	"	"	"	
1,2-Dichloropropane	ND	0.100	"	"	"	"	"	"	
1,3-Dichloropropane	ND	0.100	"	"	"	"	"	"	
2,2-Dichloropropane	ND	0.100	"	"	"	"	"	"	
1,1-Dichloropropene	ND	0.100	"	"	"	"	"	"	
cis-1,3-Dichloropropene	ND	0.100	"	"	"	"	"	"	
trans-1,3-Dichloropropene	ND	0.100	"	"	"	"	"	"	
Ethylbenzene	ND	0.100	"	"	"	"	"	"	

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Howard Holmes, Project Manager

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Envirocon	Project: none given	
10400 N. Burgard Way	Project Number: none given	Reported:
Portland, OR 97203	Project Manager: David Jacobs	10/12/00 08:02

Volatile Organic Compounds by EPA Method 8260B

North Creek Analytical - Bothell

Analyte	Result	Reporting Limit	Units	Dilution	Method	Prepared	Analyzed	Batch	Notes
URS-RHONE-MORSE FILL (P010075-01) Soil					Sampled: 10/02/00 Received: 10/03/00				
Hexachlorobutadiene	ND	0.100	mg/kg dry	1	EPA 8260B	10/03/00	10/11/00	0J04020	
2-Hexanone	ND	1.00	"	"	"	"	"	"	
Isopropylbenzene	ND	0.100	"	"	"	"	"	"	
p-Isopropyltoluene	ND	0.100	"	"	"	"	"	"	
Methylene chloride	ND	1.00	"	"	"	"	"	"	
4-Methyl-2-pentanone	ND	1.00	"	"	"	"	"	"	
Naphthalene	ND	0.100	"	"	"	"	"	"	
n-Propylbenzene	ND	0.100	"	"	"	"	"	"	
Styrene	ND	0.100	"	"	"	"	"	"	
1,1,1,2-Tetrachloroethane	ND	0.100	"	"	"	"	"	"	
1,1,2,2-Tetrachloroethane	ND	0.100	"	"	"	"	"	"	
Tetrachloroethene	ND	0.100	"	"	"	"	"	"	
Toluene	ND	0.100	"	"	"	"	"	"	
1,2,3-Trichlorobenzene	ND	0.100	"	"	"	"	"	"	
1,2,4-Trichlorobenzene	ND	0.100	"	"	"	"	"	"	
1,1,1-Trichloroethane	ND	0.100	"	"	"	"	"	"	
1,1,2-Trichloroethane	ND	0.100	"	"	"	"	"	"	
Trichloroethene	ND	0.100	"	"	"	"	"	"	
Trichlorofluoromethane	ND	0.100	"	"	"	"	"	"	
1,2,3-Trichloropropane	ND	0.100	"	"	"	"	"	"	
1,2,4-Trimethylbenzene	ND	0.100	"	"	"	"	"	"	
1,3,5-Trimethylbenzene	ND	0.100	"	"	"	"	"	"	
Vinyl chloride	ND	0.100	"	"	"	"	"	"	
m,p-Xylene	ND	0.200	"	"	"	"	"	"	
o-Xylene	ND	0.100	"	"	"	"	"	"	
Surr: 1,2-DCA-d4	*83.2 %*	*70-130*							
Surr: Toluene-d8	*84.9 %*	*70-130*							
Surr: 4-BFB	*89.5 %*	*70-130*							

North Creek Analytical - Portland

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Envirocon	Project: none given	
10400 N. Burgard Way	Project Number: none given	Reported:
Portland, OR 97203	Project Manager: David Jacobs	10/12/00 08:02

Physical Parameters by APHA/ASTM/EPA Methods

North Creek Analytical - Bothell

Analyte	Result	Reporting Limit	Units	Dilution	Method	Prepared	Analyzed	Batch	Notes
URS-RHONE-MORSE FILL (P010075-01) Soil					Sampled: 10/02/00	Received: 10/03/00			
Dry Weight	84.1	1.00	%	1	BSOPSPL003R	10/04/00	10/05/00	0104048	

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Envirocon 10400 N. Burgard Way Portland, OR 97203	Project: none given Project Number: none given Project Manager: David Jacobs	Reported: 10/12/00 08:02

Gasoline Hydrocarbons per NW TPH-Gx Method - Quality Control

North Creek Analytical - Portland

Analyte	Result	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
Batch 0100946 - EPA 5035										
Blank (0100946-BLK1)				Prepared & Analyzed: 10/05/00						
Gasoline Range Hydrocarbons	ND	4.00	mg/kg wet							
Surr: 4-BFB	*2.59*		"	*2.50*		*104*	*50-150*			
LCS (0100946-BS1)				Prepared & Analyzed: 10/05/00						
Gasoline Range Hydrocarbons	61.9	4.00	mg/kg wet	62.5		99.0	50-150			
Surr: 4-BFB	*3.12*		"	*2.50*		*125*	*50-150*			
Duplicate (0100946-DUP1)		Source: P010003-01		Prepared & Analyzed: 10/05/00						
Gasoline Range Hydrocarbons	ND	4.00	mg/kg dry		ND			15.7	50	
Surr: 4-BFB	*3.35*		"	*3.61*		*92.8*	*50-150*			
Duplicate (0100946-DUP2)		Source: P010013-06		Prepared & Analyzed: 10/05/00						
Gasoline Range Hydrocarbons	ND	4.00	mg/kg dry		ND			0	50	
Surr: 4-BFB	*1.79*		"	*2.80*		*63.9*	*50-150*			

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Envirocon 10400 N. Burgard Way Portland, OR 97203	Project: none given Project Number: none given Project Manager: David Jacobs	Reported: 10/12/00 08:02

Diesel and Heavy Range Hydrocarbons per NWTPH-Dx Method - Quality Control

North Creek Analytical - Portland

Analyte	Result	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
Batch 0101043 - EPA 3550 Fuels										
Blank (0101043-BLK1)				Prepared: 10/07/00 Analyzed: 10/09/00						
Diesel Range Organics	ND	25.0	mg/kg wet							
Heavy Oil Range Hydrocarbons	ND	50.0	"							
Surr: 1-Chlorooctadecane	*4.32*		"	*4.80*		*90.0*	*50-150*			
LCS (0101043-BS1)				Prepared: 10/07/00 Analyzed: 10/09/00						
Diesel Range Organics	116	25.0	mg/kg wet	129		89.9	50-150			
Heavy Oil Range Hydrocarbons	74.7	50.0	"	79.0		94.6	50-150			
Surr: 1-Chlorooctadecane	*4.39*		"	*4.80*		*91.5*	*50-150*			
Duplicate (0101043-DUP1)		Source: P010073-11		Prepared & Analyzed: 10/07/00						
Diesel Range Organics	ND	25.0	mg/kg dry		ND				50	
Heavy Oil Range Hydrocarbons	ND	50.0	"		ND			8.82	50	
Surr: 1-Chlorooctadecane	*5.25*		"	*5.40*		*97.2*	*50-150*			
Duplicate (0101043-DUP2)		Source: P010075-01		Prepared & Analyzed: 10/07/00						
Diesel Range Organics	ND	25.0	mg/kg dry		ND				50	
Heavy Oil Range Hydrocarbons	ND	50.0	"		ND			22.7	50	
Surr: 1-Chlorooctadecane	*6.05*		"	*5.80*		*104*	*50-150*			

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Envirocon	Project: none given	
10400 N. Burgard Way	Project Number: none given	Reported:
Portland, OR 97203	Project Manager: David Jacobs	10/12/00 08:02

Miscellaneous Physical/Conventional Chemistry Parameters - Quality Control

North Creek Analytical - Portland

Analyte	Result	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
Batch 0101076 - Dry Weight										
Duplicate (0101076-DUP1)		Source: P010225-06		Prepared: 10/09/00	Analyzed: 10/10/00					
% Solids	81.8	1.00	% by Weight		88.7			8.09	10	
Duplicate (0101076-DUP2)		Source: P010075-01		Prepared: 10/09/00	Analyzed: 10/10/00					
% Solids	89.7	1.00	% by Weight		82.8			8.00	10	

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Envirocon	Project: none given	
10400 N. Burgard Way	Project Number: none given	Reported:
Portland, OR 97203	Project Manager: David Jacobs	10/12/00 08:02

Total Metals by EPA 6000/7000 Series Methods - Quality Control

North Creek Analytical - Bothell

Analyte	Result	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
Batch 0J06006 - EPA 3050B										
Blank (0J06006-BLK1)				Prepared: 10/06/00 Analyzed: 10/10/00						
Arsenic	ND	0.500	mg/kg wet							
Barium	ND	5.00	"							
Cadmium	ND	0.500	"							
Chromium	ND	0.500	"							
Lead	ND	0.500	"							
Selenium	ND	0.500	"							
Silver	ND	0.500	"							
LCS (0J06006-BS1)				Prepared: 10/06/00 Analyzed: 10/10/00						
Arsenic	23.9	0.500	mg/kg wet	25.0		95.6	70-130			
Barium	26.0	5.00	"	25.0		104	80-120			
Cadmium	24.7	0.500	"	25.0		98.8	70-130			
Chromium	24.2	0.500	"	25.0		96.8	80-120			
Lead	24.7	0.500	"	25.0		98.8	80-120			
Selenium	23.5	0.500	"	25.0		94.0	70-130			
Silver	23.9	0.500	"	25.0		95.6	40-130			
Matrix Spike (0J06006-MS1)		Source: B0J0017-09		Prepared: 10/06/00 Analyzed: 10/10/00						
Arsenic	19.2	0.368	mg/kg dry	20.1	1.90	86.1	70-130			
Barium	58.7	3.68	"	20.1	36.5	110	70-130			
Cadmium	19.6	0.368	"	20.1	ND	96.8	70-130			
Chromium	23.7	0.368	"	20.1	10.1	67.7	70-130			Q-01
Lead	23.8	0.368	"	20.1	3.80	99.5	70-130			
Selenium	17.6	0.368	"	20.1	0.500	85.1	70-130			
Silver	16.7	0.368	"	20.1	ND	82.8	40-130			
Matrix Spike Dup (0J06006-MSD1)		Source: B0J0017-09		Prepared: 10/06/00 Analyzed: 10/10/00						
Arsenic	19.0	0.368	mg/kg dry	20.1	1.90	85.1	70-130	1.05	20	
Barium	71.5	3.68	"	20.1	36.5	174	70-130	19.7	20	Q-01
Cadmium	19.6	0.368	"	20.1	ND	96.8	70-130	0	20	
Chromium	28.9	0.368	"	20.1	10.1	93.5	70-130	19.8	20	
Lead	24.5	0.368	"	20.1	3.80	103	70-130	2.90	20	
Selenium	17.9	0.368	"	20.1	0.500	86.6	70-130	1.69	20	
Silver	17.2	0.368	"	20.1	ND	85.3	40-130	2.95	50	

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Envirocon	Project: none given	
10400 N. Burgard Way	Project Number: none given	Reported:
Portland, OR 97203	Project Manager: David Jacobs	10/12/00 08:02

Total Metals by EPA 6000/7000 Series Methods - Quality Control

North Creek Analytical - Bothell

Analyte	Result	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
Batch 0J10027 - EPA 7471A										
Blank (0J10027-BLK1)				Prepared: 10/10/00	Analyzed: 10/11/00					
Mercury	ND	0.100	mg/kg wet							
LCS (0J10027-BS1)				Prepared: 10/10/00	Analyzed: 10/11/00					
Mercury	0.487	0.100	mg/kg wet	0.500		97.4	80-120			
Matrix Spike (0J10027-MS1)		Source: B0J0007-01		Prepared: 10/10/00	Analyzed: 10/11/00					
Mercury	0.740	0.100	mg/kg dry	0.681	ND	98.9	80-120			
Matrix Spike Dup (0J10027-MSD1)		Source: B0J0007-01		Prepared: 10/10/00	Analyzed: 10/11/00					
Mercury	0.715	0.100	mg/kg dry	0.679	ND	95.5	80-120	3.44	20	

North Creek Analytical - Portland

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Envirocon	Project: none given	
10400 N. Burgard Way	Project Number: none given	Reported:
Portland, OR 97203	Project Manager: David Jacobs	10/12/00 08:02

Volatile Organic Compounds by EPA Method 8260B - Quality Control

North Creek Analytical - Bothell

Analyte	Result	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
Batch 0J04020 - EPA 5030B [P/T]										
Blank (0J04020-BLK1)				Prepared: 10/03/00 Analyzed: 10/04/00						
Methyl tert-butyl ether	ND	5.00	mg/kg wet							
Benzene	ND	0.100	"							
Chlorobenzene	ND	0.100	"							
1,2-Dibromoethane	ND	0.100	"							
1,1-Dichloroethene	ND	0.100	"							
Ethylbenzene	ND	0.100	"							
Naphthalene	ND	0.100	"							
Toluene	ND	0.100	"							
Trichloroethene	ND	0.100	"							
m,p-Xylene	ND	0.200	"							
o-Xylene	ND	0.100	"							
Surr: 1,2-DCA-d4	*1.99*		"	*2.00*		*99.5*	*70-130*			
Surr: Toluene-d8	*2.06*		"	*2.00*		*103*	*70-130*			
Surr: 4-BFB	*2.05*		"	*2.00*		*102*	*70-130*			
LCS (0J04020-BS1)				Prepared: 10/03/00 Analyzed: 10/04/00						
Benzene	0.992	0.100	mg/kg wet	1.00		99.2	70-130			
Chlorobenzene	1.02	0.100	"	1.00		102	70-130			
1,1-Dichloroethene	0.940	0.100	"	1.00		94.0	70-130			
Toluene	1.06	0.100	"	1.00		106	70-130			
Trichloroethene	0.956	0.100	"	1.00		95.6	70-130			
Surr: 1,2-DCA-d4	*2.04*		"	*2.00*		*102*	*70-130*			
Surr: Toluene-d8	*2.14*		"	*2.00*		*107*	*70-130*			
Surr: 4-BFB	*2.09*		"	*2.00*		*104*	*70-130*			
Matrix Spike (0J04020-MS1)		Source: B010752-01		Prepared: 10/03/00 Analyzed: 10/06/00						
Benzene	1.26	0.100	mg/kg dry	1.25	ND	101	70-130			
Chlorobenzene	1.17	0.100	"	1.25	ND	93.6	70-130			
1,1-Dichloroethene	1.32	0.100	"	1.25	ND	106	70-130			
Toluene	1.19	0.100	"	1.25	ND	95.2	70-130			
Trichloroethene	1.28	0.100	"	1.25	ND	102	70-130			
Surr: 1,2-DCA-d4	*2.58*		"	*2.51*		*103*	*70-130*			
Surr: Toluene-d8	*2.42*		"	*2.51*		*96.4*	*70-130*			
Surr: 4-BFB	*2.55*		"	*2.51*		*102*	*70-130*			

North Creek Analytical - Portland

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Howard Holmes, Project Manager

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Envirocon	Project: none given	
10400 N. Burgard Way	Project Number: none given	Reported:
Portland, OR 97203	Project Manager: David Jacobs	10/12/00 08:02

Volatile Organic Compounds by EPA Method 8260B - Quality Control

North Creek Analytical - Bothell

Analyte	Result	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
Batch 0J04020 - EPA 5030B [P/T]										
Matrix Spike Dup (0J04020-MSD1)		Source: B010752-01		Prepared: 10/03/00		Analyzed: 10/06/00				
Benzene	1.22	0.100	mg/kg dry	1.25	ND	97.6	70-130	3.23	15	
Chlorobenzene	1.16	0.100	"	1.25	ND	92.8	70-130	0.858	15	
1,1-Dichloroethene	1.24	0.100	"	1.25	ND	99.2	70-130	6.25	15	
Toluene	1.18	0.100	"	1.25	ND	94.4	70-130	0.844	15	
Trichloroethene	1.19	0.100	"	1.25	ND	95.2	70-130	7.29	15	
Surr: 1,2-DCA-d4	*2.50*		"	*2.51*		*99.6*	*70-130*			
Surr: Toluene-d8	*2.41*		"	*2.51*		*96.0*	*70-130*			
Surr: 4-BFB	*2.52*		"	*2.51*		*100*	*70-130*			

North Creek Analytical - Portland

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Envirocon	Project: none given	
10400 N. Burgard Way	Project Number: none given	Reported:
Portland, OR 97203	Project Manager: David Jacobs	10/12/00 08:02

Physical Parameters by APHA/ASTM/EPA Methods - Quality Control

North Creek Analytical - Bothell

Analyte	Result	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
Batch 0J04048 - Dry Weight										
Blank (0J04048-BLK1)				Prepared: 10/04/00 Analyzed: 10/05/00						
Dry Weight	99.8	1.00	%							

North Creek Analytical - Portland

The results in this report apply to the samples analyzed in accordance with the chain of custody document. This analytical report must be reproduced in its entirety.

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Envirocon	Project: none given	
10400 N. Burgard Way	Project Number: none given	Reported:
Portland, OR 97203	Project Manager: David Jacobs	10/12/00 08:02

Notes and Definitions

Q-01	The spike recovery for this QC sample is outside of established control limits. Review of associated batch QC indicates the recovery for this analyte does not represent an out-of-control condition for the batch.
DET	Analyte DETECTED
ND	Analyte NOT DETECTED at or above the reporting limit
NR	Not Reported
dry	Sample results reported on a dry weight basis
wet	Sample results reported on a wet weight basis
RPD	Relative Percent Difference

North Creek Analytical - Portland

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Howard Holmes, Project Manager

SCOEPA00006801

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20332 Empire Avenue, Suite F-1, Bend, OR 97701-5711 (541) 383-9310 FAX 382-7588

CHAIN OF CUSTODY REPORT

Work Order #: P010075

CLIENT: ENVIRUCON

REPORT TO: DAVID JACOBS

ADDRESS: 10400 N BURGARD WAY
PORTLAND OR 97203

PHONE: (503) 285-6164 FAX: 503-285-6205

INVOICE TO: SAME AS ABOVE

P.O. NUMBER:

PROJECT NAME:

PROJECT NUMBER:

SAMPLED BY: David Jacobs

TURNAROUND REQUEST in Business Days*

Organic & Inorganic Analyses: 10 | 7 | 5 | 4 | 3 | 2 | 1 | <1 (STD.)

Petroleum Hydrocarbon Analyses: 5 | 4 | 3 | 2 | 1 | <1 (STD.)

OTHER Please Specify

*Turnaround Requests less than standard may incur Rush Charges.

REQUESTED ANALYSES

CLIENT SAMPLE IDENTIFICATION	SAMPLING DATE/TIME	8260	TOTAL METALS RCRA 8	TPH-D+G										MATRIX (W, S, O)	# OF CONT	COMMENTS	NCA ID
1. URS-RHONE-	10/2 3:00 PM	X	X	X										S	1	PLEASE HAVE SAMPLES DONE AS CLOSE TO 3 DAYS AS CAN. PLEASE SEND RESULTS OVER AS BECOME AVAILABLE	
2. MORSE FILL		~~X~~	~~X~~	~~X~~													
3.																	
4.																	
5.																	
6.																	
7.																	
8.																	
9.																	
10.																	
11.																	
12.																	
13.																	
14.																	
15.																	

RELINQUISHED BY: David Jacobs		DATE: 10/3/00	RECEIVED BY: Bob Fahrbach		DATE: 10/3
PRINT NAME: DAVID JACOBS	FIRM: ENVIRUCON	TIME: 14:30	PRINT NAME: Bob Fahrbach	FIRM: NCA	TIME: 14:3
RELINQUISHED BY:		DATE:	RECEIVED BY:		DATE:
PRINT NAME:	FIRM:	TIME:	PRINT NAME:	FIRM:	TIME:

ADDITIONAL REMARKS:

TEMP: <0

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December 21, 1999

David Jacobs
Envirocon
10400 N. Burgard Way
Portland, OR 97203

NCA PROJECT # P912198

Dear David Jacobs

Enclosed are the results of analyses for sample(s) received by the laboratory on December 9, 1999. If you have any questions concerning this report, please feel free to contact me.

Sincerely,

Howard Holmes
Project Manager

North Creek Analytical, Inc.
Environmental Laboratory Network

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Envirocon	Project:	n/a	Sampled:	12/9/99
10400 N. Burgard Way	Project Number:	n/a	Received:	12/9/99
Portland, OR 97203	Project Manager:	David Jacobs	Reported:	12/21/99 08:23

ANALYTICAL REPORT FOR SAMPLES:

Sample Description	Laboratory Sample Number	Sample Matrix	Date Sampled
Bucket 1- soil fill	P912198-01	Soil	12/9/99
Bucket 2- soil fill	P912198-02	Soil	12/9/99

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Envirocon	Project:	n/a	Sampled:	12/9/99
10400 N. Burgard Way	Project Number:	n/a	Received:	12/9/99
Portland, OR 97203	Project Manager:	David Jacobs	Reported:	12/21/99 08:23

Gasoline Hydrocarbons per NW TPH-Gx Method
North Creek Analytical - Portland

Analyte	Batch Number	Date Prepared	Date Analyzed	Surrogate Limits	Reporting Limit	Result	Units	Notes[A]
Bucket 1- soil fill			**P912198-01**				**Soil**	
Gasoline Range Hydrocarbons	1290350	12/13/99	12/13/99		2.50	ND	mg/kg dry	
Surrogate: 4-BFB	"	"	"	*50.0-150*		*85.6*	%	
Bucket 2- soil fill			**P912198-02**				**Soil**	
Gasoline Range Hydrocarbons	1290350	12/13/99	12/13/99		2.50	ND	mg/kg dry	
Surrogate: 4-BFB	"	"	"	*50.0-150*		*79.9*	%	

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

Howard Holmes, Project Manager

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Envirocon	Project:	n/a	Sampled:	12/9/99
10400 N. Burgard Way	Project Number:	n/a	Received:	12/9/99
Portland, OR 97203	Project Manager:	David Jacobs	Reported:	12/21/99 08:23

Diesel and Heavy Range Hydrocarbons per NWTPH-Dx Method
North Creek Analytical - Portland

Analyte	Batch Number	Date Prepared	Date Analyzed	Surrogate Limits	Reporting Limit	Result	Units	Notes*
Bucket 1- soil fill			**P912198-01**				**Soil**	
Diesel Range Organics	1290430	12/15/99	12/16/99		25.0	ND	mg/kg dry	
Heavy Oil Range Hydrocarbons	"	"	"		50.0	ND	"	
Surrogate: 1-Chlorooctadecane	"	"	"	*50.0-150*		*85.1*	%	
Bucket 2- soil fill			**P912198-02**				**Soil**	
Diesel Range Organics	1290430	12/15/99	12/16/99		25.0	ND	mg/kg dry	
Heavy Oil Range Hydrocarbons	"	"	"		50.0	ND	"	
Surrogate: 1-Chlorooctadecane	"	"	"	*50.0-150*		*86.9*	%	

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

Howard Holmes, Project Manager

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Envirocon	Project:	n/a	Sampled:	12/9/99
10400 N. Burgard Way	Project Number:	n/a	Received:	12/9/99
Portland, OR 97203	Project Manager:	David Jacobs	Reported:	12/21/99 08:23

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

Analyte	Batch Number	Date Prepared	Date Analyzed	Specific Method	Reporting Limit	Result	Units	Notes*
Bucket 1- soil fill			**P912198-01**				**Soil**	
Barium	1290445	12/15/99	12/16/99	EPA 6010A	0.500	20.2	mg/kg dry	
Cadmium	"	"	12/15/99	EPA 6010A	0.500	ND	"	
Chromium	"	"	"	EPA 6010A	0.500	8.16	"	
Lead	"	"	"	EPA 6010A	10.0	ND	"	
Silver	"	"	"	EPA 6010A	1.00	ND	"	
Arsenic	1290370	12/13/99	12/18/99	EPA 6020	0.500	ND	"	
Selenium	"	"	12/17/99	EPA 6020	0.500	ND	"	
Mercury	1290361	12/14/99	12/14/99	EPA 1631	0.100	ND	"	
Bucket 2- soil fill			**P912198-02**				**Soil**	
Barium	1290445	12/15/99	12/16/99	EPA 6010A	0.500	18.5	mg/kg dry	
Cadmium	"	"	12/15/99	EPA 6010A	0.500	ND	"	
Chromium	"	"	"	EPA 6010A	0.500	8.87	"	
Lead	"	"	"	EPA 6010A	10.0	ND	"	
Silver	"	"	"	EPA 6010A	1.00	ND	"	
Arsenic	1290370	12/13/99	12/18/99	EPA 6020	0.500	ND	"	
Selenium	"	"	12/17/99	EPA 6020	0.500	ND	"	
Mercury	1290361	12/14/99	12/14/99	EPA 1631	0.100	ND	"	

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

Howard Holmes, Project Manager

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Envirocon	Project:	n/a	Sampled:	12/9/99
10400 N. Burgard Way	Project Number:	n/a	Received:	12/9/99
Portland, OR 97203	Project Manager:	David Jacobs	Reported:	12/21/99 08:23

Volatile Organic Compounds per EPA Method 8260B
North Creek Analytical - Portland

Analyte	Batch Number	Date Prepared	Date Analyzed	Surrogate Limits	Reporting Limit	Result	Units	Notes*
Bucket 1- soil fill			**P912198-01**				**Soil**	
Acetone	1290340	12/14/99	12/15/99		1000	ND	ug/kg dry	
Benzene	"	"	"		100	ND	"	
Bromobenzene	"	"	"		100	ND	"	
Bromochloromethane	"	"	"		100	ND	"	
Bromodichloromethane	"	"	"		100	ND	"	
Bromoform	"	"	"		200	ND	"	
Bromomethane	"	"	"		500	ND	"	
2-Butanone	"	"	"		1000	ND	"	
n-Butylbenzene	"	"	"		100	ND	"	
sec-Butylbenzene	"	"	"		100	ND	"	
tert-Butylbenzene	"	"	"		100	ND	"	
Carbon disulfide	"	"	"		1000	ND	"	
Carbon tetrachloride	"	"	"		200	ND	"	
Chlorobenzene	"	"	"		100	ND	"	
Chloroethane	"	"	"		100	ND	"	
Chloroform	"	"	"		100	ND	"	
Chloromethane	"	"	"		500	ND	"	
2-Chlorotoluene	"	"	"		100	ND	"	
4-Chlorotoluene	"	"	"		100	ND	"	
1,2-Dibromo-3-chloropropane	"	"	"		200	ND	"	
Dibromochloromethane	"	"	"		100	ND	"	
1,2-Dibromoethane	"	"	"		100	ND	"	
Dibromomethane	"	"	"		100	ND	"	
1,2-Dichlorobenzene	"	"	"		100	ND	"	
1,3-Dichlorobenzene	"	"	"		100	ND	"	
1,4-Dichlorobenzene	"	"	"		100	ND	"	
Dichlorodifluoromethane	"	"	"		500	ND	"	
1,1-Dichloroethane	"	"	"		100	ND	"	
1,2-Dichloroethane	"	"	"		100	ND	"	
1,1-Dichloroethene	"	"	"		100	ND	"	
cis-1,2-Dichloroethene	"	"	"		100	ND	"	
trans-1,2-Dichloroethene	"	"	"		100	ND	"	
1,2-Dichloropropane	"	"	"		100	ND	"	
1,3-Dichloropropane	"	"	"		100	ND	"	
2,2-Dichloropropane	"	"	"		100	ND	"	
1,1-Dichloropropene	"	"	"		100	ND	"	
cis-1,3-Dichloropropene	"	"	"		100	ND	"	
trans-1,3-Dichloropropene	"	"	"		100	ND	"	

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Envirocon	Project:	n/a	Sampled:	12/9/99
10400 N. Burgard Way	Project Number:	n/a	Received:	12/9/99
Portland, OR 97203	Project Manager:	David Jacobs	Reported:	12/21/99 08:23

Volatile Organic Compounds per EPA Method 8260B
North Creek Analytical - Portland

Analyte	Batch Number	Date Prepared	Date Analyzed	Surrogate Limits	Reporting Limit	Result	Units	Notes*
Bucket 1- soil fill (continued)			**P912198-01**				**Soil**	
Ethylbenzene	1290340	12/14/99	12/15/99		100	ND	ug/kg dry	
Hexachlorobutadiene	"	"	"		200	ND	"	
2-Hexanone	"	"	"		1000	ND	"	
Isopropylbenzene	"	"	"		100	ND	"	
p-Isopropyltoluene	"	"	"		100	ND	"	
4-Methyl-2-pentanone	"	"	"		500	ND	"	
Methylene chloride	"	"	"		500	ND	"	
Naphthalene	"	"	"		500	ND	"	
n-Propylbenzene	"	"	"		100	ND	"	
Styrene	"	"	"		100	ND	"	
1,1,1,2-Tetrachloroethane	"	"	"		100	ND	"	
1,1,2,2-Tetrachloroethane	"	"	"		100	ND	"	
Tetrachloroethene	"	"	"		100	ND	"	
Toluene	"	"	"		100	ND	"	
1,2,3-Trichlorobenzene	"	"	"		100	ND	"	
1,2,4-Trichlorobenzene	"	"	"		100	ND	"	
1,1,1-Trichloroethane	"	"	"		100	ND	"	
1,1,2-Trichloroethane	"	"	"		100	ND	"	
Trichloroethene	"	"	"		100	ND	"	
Trichlorofluoromethane	"	"	"		100	ND	"	
1,2,3-Trichloropropane	"	"	"		100	ND	"	
1,2,4-Trimethylbenzene	"	"	"		100	ND	"	
1,3,5-Trimethylbenzene	"	"	"		100	ND	"	
Vinyl chloride	"	"	"		100	ND	"	
o-Xylene	"	"	"		100	ND	"	
m,p-Xylene	"	"	"		200	ND	"	
Surrogate: 4-BFB	"	"	"	*70.0-130*		*94.6*	*%*	
Surrogate: 1,2-DCA-d4	"	"	"	*65.0-135*		*131*	"	
Surrogate: Dibromofluoromethane	"	"	"	*65.0-130*		*106*	"	
Surrogate: Toluene-d8	"	"	"	*70.0-120*		*113*	"	

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Envirocon	Project:	n/a	Sampled:	12/9/99
10400 N. Burgard Way	Project Number:	n/a	Received:	12/9/99
Portland, OR 97203	Project Manager:	David Jacobs	Reported:	12/21/99 08:23

Volatile Organic Compounds per EPA Method 8260B
North Creek Analytical - Portland

Analyte	Batch Number	Date Prepared	Date Analyzed	Surrogate Limits	Reporting Limit	Result	Units	Notes*
Bucket 2- soil fill			**P912198-02**				**Soil**	
Acetone	1290340	12/14/99	12/15/99		1000	ND	ug/kg dry	
Benzene	"	"	"		100	ND	"	
Bromobenzene	"	"	"		100	ND	"	
Bromochloromethane	"	"	"		100	ND	"	
Bromodichloromethane	"	"	"		100	ND	"	
Bromoform	"	"	"		200	ND	"	
Bromomethane	"	"	"		500	ND	"	
2-Butanone	"	"	"		1000	ND	"	
n-Butylbenzene	"	"	"		100	ND	"	
sec-Butylbenzene	"	"	"		100	ND	"	
tert-Butylbenzene	"	"	"		100	ND	"	
Carbon disulfide	"	"	"		1000	ND	"	
Carbon tetrachloride	"	"	"		200	ND	"	
Chlorobenzene	"	"	"		100	ND	"	
Chloroethane	"	"	"		100	ND	"	
Chloroform	"	"	"		100	ND	"	
Chloromethane	"	"	"		500	ND	"	
2-Chlorotoluene	"	"	"		100	ND	"	
4-Chlorotoluene	"	"	"		100	ND	"	
1,2-Dibromo-3-chloropropane	"	"	"		200	ND	"	
Dibromochloromethane	"	"	"		100	ND	"	
1,2-Dibromoethane	"	"	"		100	ND	"	
Dibromomethane	"	"	"		100	ND	"	
1,2-Dichlorobenzene	"	"	"		100	ND	"	
1,3-Dichlorobenzene	"	"	"		100	ND	"	
1,4-Dichlorobenzene	"	"	"		100	ND	"	
Dichlorodifluoromethane	"	"	"		500	ND	"	
1,1-Dichloroethane	"	"	"		100	ND	"	
1,2-Dichloroethane	"	"	"		100	ND	"	
1,1-Dichloroethene	"	"	"		100	ND	"	
cis-1,2-Dichloroethene	"	"	"		100	ND	"	
trans-1,2-Dichloroethene	"	"	"		100	ND	"	
1,2-Dichloropropane	"	"	"		100	ND	"	
1,3-Dichloropropane	"	"	"		100	ND	"	
2,2-Dichloropropane	"	"	"		100	ND	"	
1,1-Dichloropropene	"	"	"		100	ND	"	
cis-1,3-Dichloropropene	"	"	"		100	ND	"	
trans-1,3-Dichloropropene	"	"	"		100	ND	"	

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Envirocon	Project: n/a	Sampled:	12/9/99
10400 N. Burgard Way	Project Number: n/a	Received:	12/9/99
Portland, OR 97203	Project Manager: David Jacobs	Reported:	12/21/99 08:23

Volatile Organic Compounds per EPA Method 8260B
North Creek Analytical - Portland

Analyte	Batch Number	Date Prepared	Date Analyzed	Surrogate Limits	Reporting Limit	Result	Units	Notes*
Bucket 2- soil fill (continued)			**P912198-02**				**Soil**	
Ethylbenzene	1290340	12/14/99	12/15/99		100	ND	ug/kg dry	
Hexachlorobutadiene	"	"	"		200	ND	"	
2-Hexanone	"	"	"		1000	ND	"	
Isopropylbenzene	"	"	"		100	ND	"	
p-Isopropyltoluene	"	"	"		100	ND	"	
4-Methyl-2-pentanone	"	"	"		500	ND	"	
Methylene chloride	"	"	"		500	ND	"	
Naphthalene	"	"	"		500	ND	"	
n-Propylbenzene	"	"	"		100	ND	"	
Styrene	"	"	"		100	ND	"	
1,1,1,2-Tetrachloroethane	"	"	"		100	ND	"	
1,1,2,2-Tetrachloroethane	"	"	"		100	ND	"	
Tetrachloroethene	"	"	"		100	ND	"	
Toluene	"	"	"		100	ND	"	
1,2,3-Trichlorobenzene	"	"	"		100	ND	"	
1,2,4-Trichlorobenzene	"	"	"		100	ND	"	
1,1,1-Trichloroethane	"	"	"		100	ND	"	
1,1,2-Trichloroethane	"	"	"		100	ND	"	
Trichloroethene	"	"	"		100	ND	"	
Trichlorofluoromethane	"	"	"		100	ND	"	
1,2,3-Trichloropropane	"	"	"		100	ND	"	
1,2,4-Trimethylbenzene	"	"	"		100	ND	"	
1,3,5-Trimethylbenzene	"	"	"		100	ND	"	
Vinyl chloride	"	"	"		100	ND	"	
o-Xylene	"	"	"		100	ND	"	
m,p-Xylene	"	"	"		200	ND	"	
Surrogate: 4-BFB	"	"	"	*70.0-130*		*99.6*	%	
Surrogate: 1,2-DCA-d4	"	"	"	*65.0-135*		*140*	"	*1*
Surrogate: Dibromofluoromethane	"	"	"	*65.0-130*		*111*	"	
Surrogate: Toluene-d8	"	"	"	*70.0-120*		*118*	"	

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Envirocon	Project:	n/a	Sampled:	12/9/99
10400 N. Burgard Way	Project Number:	n/a	Received:	12/9/99
Portland, OR 97203	Project Manager:	David Jacobs	Reported:	12/21/99 08:23

Dry Weight Determination
North Creek Analytical - Portland

Sample Name	Lab ID	Matrix	Result	Units
Bucket 1- soil fill	P912198-01	Soil	89.7	%
Bucket 2- soil fill	P912198-02	Soil	88.2	%

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Envirocon	Project: n/a	Sampled:	12/9/99
10400 N. Burgard Way	Project Number: n/a	Received:	12/9/99
Portland, OR 97203	Project Manager: David Jacobs	Reported:	12/21/99 08:23

Gasoline Hydrocarbons per NW TPH-Gx Method/Quality Control
North Creek Analytical - Portland

Analyte	Date Analyzed	Spike Level	Sample Result	QC Result	Units	Reporting Limit Recov. Limits	Recov. %	RPD Limit	RPD %	Notes*
Batch: 1290350	**Date Prepared: 12/13/99**				**Extraction Method: EPA 5035**					
Blank	**1290350-BLK1**									
Gasoline Range Hydrocarbons	12/16/99			ND	mg/kg dry	2.50				
Surrogate: 4-BFB	"	*5.00*		*5.60*	"	*50.0-150*	*112*			
LCS	**1290350-BS1**									
Gasoline Range Hydrocarbons	12/13/99	62.5		77.5	mg/kg dry	50.0-150	124			
Surrogate: 4-BFB	"	*5.00*		*3.84*	"	*50.0-150*	*76.8*			
Duplicate	**1290350-DUP1**		**P912198-01**							
Gasoline Range Hydrocarbons	12/13/99		2.59	5.36	mg/kg dry			50.0	69.7	
Surrogate: 4-BFB	"	*5.57*		*4.91*	"	*50.0-150*	*88.2*			
Duplicate	**1290350-DUP2**		**P912217-01**							
Gasoline Range Hydrocarbons	12/13/99		8.56	7.70	mg/kg dry			50.0	10.6	
Surrogate: 4-BFB	"	*6.64*		*5.52*	"	*50.0-150*	*83.1*			

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Envirocon	Project: n/a	Sampled:	12/9/99
10400 N. Burgard Way	Project Number: n/a	Received:	12/9/99
Portland, OR 97203	Project Manager: David Jacobs	Reported:	12/21/99 08:23

Diesel and Heavy Range Hydrocarbons per NWTPH-Dx Method/Quality Control
North Creek Analytical - Portland

Analyte	Date Analyzed	Spike Level	Sample Result	QC Result	Units	Reporting Limit / Recov. Limits	Recov. %	RPD Limit	RPD %	Notes*
Batch: 1290430	**Date Prepared: 12/15/99**				**Extraction Method: TPH-D Extraction**					
Blank	**1290430-BLK1**									
Diesel Range Organics	12/15/99			ND	mg/kg dry	25.0				
Heavy Oil Range Hydrocarbons	"			ND	"	50.0				
Surrogate: 1-Chlorooctadecane	"	*5.00*		*4.08*	"	*50.0-150*	*81.6*			
LCS	**1290430-BS1**									
Diesel Range Organics	12/15/99	127		120	mg/kg dry	50.0-150	94.5			
Heavy Oil Range Hydrocarbons	"	66.0		68.8	"	50.0-150	104			
Surrogate: 1-Chlorooctadecane	"	*5.00*		*4.75*	"	*50.0-150*	*95.0*			
Duplicate	**1290430-DUP1**		**P912200-01**							
Diesel Range Organics	12/16/99		ND	ND	mg/kg dry			50.0		
Heavy Oil Range Hydrocarbons	"		ND	ND	"			50.0		
Surrogate: 1-Chlorooctadecane	"	*6.07*		*4.77*	"	*50.0-150*	*78.6*			
Duplicate	**1290430-DUP2**		**P912279-01**							
Diesel Range Organics	12/15/99		ND	ND	mg/kg dry			50.0		
Heavy Oil Range Hydrocarbons	"		ND	ND	"			50.0		
Surrogate: 1-Chlorooctadecane	"	*5.49*		*4.97*	"	*50.0-150*	*90.5*			

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Envirocon	Project:	n/a	Sampled:	12/9/99
10400 N. Burgard Way	Project Number:	n/a	Received:	12/9/99
Portland, OR 97203	Project Manager:	David Jacobs	Reported:	12/21/99 08:23

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

Analyte	Date Analyzed	Spike Level	Sample Result	QC Result	Units	Reporting Limit / Recov. Limits	Recov. %	RPD Limit	RPD %	Notes*
Batch: 1290361	**Date Prepared: 12/14/99**				**Extraction Method: EPA 7471**					
Blank	**1290361-BLK1**									
Mercury	12/14/99			ND	mg/kg dry	0.100				
LCS	**1290361-BS1**									
Mercury	12/14/99	0.500		0.472	mg/kg dry	80.0-120	94.4			
Duplicate	**1290361-DUP1**		**P912217-01**							
Mercury	12/14/99		ND	ND	mg/kg dry			40.0		
Matrix Spike	**1290361-MS1**		**P912217-01**							
Mercury	12/14/99	0.664	ND	0.509	mg/kg dry	75.0-125	76.7			
Batch: 1290370	**Date Prepared: 12/13/99**				**Extraction Method: EPA 3050**					
Blank	**1290370-BLK1**									
Arsenic	12/17/99			ND	mg/kg dry	0.100				
Selenium	"			ND	"	0.100				
LCS	**1290370-BS1**									
Arsenic	12/17/99	10.0		9.60	mg/kg dry	80.0-120	96.0			
Selenium	"	10.0		9.35	"	80.0-120	93.5			
Duplicate	**1290370-DUP1**		**P912078-05**							
Arsenic	12/18/99				mg/kg dry			40.0		
Selenium	12/17/99				"			40.0		
Matrix Spike	**1290370-MS1**		**P912078-05**							
Arsenic	12/18/99				mg/kg dry	75.0-125				
Selenium	12/17/99				"	75.0-125				
Batch: 1290445	**Date Prepared: 12/15/99**				**Extraction Method: EPA 3050**					
Blank	**1290445-BLK1**									
Barium	12/16/99			ND	mg/kg dry	0.500				
Cadmium	12/15/99			ND	"	0.500				
Chromium	"			ND	"	0.500				
Lead	"			ND	"	10.0				
Silver	"			ND	"	1.00				

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Envirocon	Project:	n/a	Sampled:	12/9/99
10400 N. Burgard Way	Project Number:	n/a	Received:	12/9/99
Portland, OR 97203	Project Manager:	David Jacobs	Reported:	12/21/99 08:23

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

Analyte	Date Analyzed	Spike Level	Sample Result	QC Result	Units	Reporting Limit Recov. Limits	Recov. %	RPD Limit	RPD %	Notes*
LCS	**1290445-BS1**									
Barium	12/16/99	50.0		49.2	mg/kg dry	80.0-120	98.4			
Cadmium	12/15/99	20.0		17.9	"	80.0-120	89.5			
Chromium	"	50.0		45.6	"	80.0-120	91.2			
Lead	"	100		94.5	"	80.0-120	94.5			
Silver	"	100		96.5	"	80.0-120	96.5			
Duplicate	**1290445-DUP1**		**P912198-01**							
Barium	12/16/99		20.2	29.3	mg/kg dry			40.0	36.8	
Cadmium	12/15/99		ND	ND	"			40.0		
Chromium	"		8.16	6.82	"			40.0	17.9	
Lead	"		ND	ND	"			40.0		
Silver	"		ND	ND	"			40.0		
Matrix Spike	**1290445-MS1**		**P912198-01**							
Barium	12/16/99	55.7	20.2	81.9	mg/kg dry	75.0-125	111			
Cadmium	12/15/99	22.3	ND	19.6	"	75.0-125	87.9			
Chromium	"	55.7	8.16	57.9	"	75.0-125	89.3			
Lead	"	111	ND	103	"	75.0-125	92.8			
Silver	"	111	ND	99.2	"	75.0-125	89.4			

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Envirocon	Project:	n/a	Sampled:	12/9/99
10400 N. Burgard Way	Project Number:	n/a	Received:	12/9/99
Portland, OR 97203	Project Manager:	David Jacobs	Reported:	12/21/99 08:23

Volatile Organic Compounds per EPA Method 8260B/Quality Control
North Creek Analytical - Portland

Analyte	Date Analyzed	Spike Level	Sample Result	QC Result	Units	Reporting Limit Recov. Limits	Recov. %	RPD Limit	RPD %	Notes*
Batch: 1290340	**Date Prepared: 12/14/99**				**Extraction Method: EPA 5035**					
Blank	**1290340-BLK1**									
Acetone	12/14/99			ND	ug/kg dry	1000				
Benzene	"			ND	"	100				
Bromobenzene	"			ND	"	100				
Bromochloromethane	"			ND	"	100				
Bromodichloromethane	"			ND	"	100				
Bromoform	"			ND	"	200				
Bromomethane	"			ND	"	500				
2-Butanone	"			ND	"	2500				
n-Butylbenzene	"			ND	"	100				
sec-Butylbenzene	"			ND	"	100				
tert-Butylbenzene	"			ND	"	100				
Carbon disulfide	"			ND	"	1000				
Carbon tetrachloride	"			ND	"	200				
Chlorobenzene	"			ND	"	100				
Chloroethane	"			ND	"	100				
Chloroform	"			ND	"	100				
Chloromethane	"			ND	"	500				
2-Chlorotoluene	"			ND	"	100				
4-Chlorotoluene	"			ND	"	100				
1,2-Dibromo-3-chloropropane	"			ND	"	200				
Dibromochloromethane	"			ND	"	100				
1,2-Dibromoethane	"			ND	"	100				
Dibromomethane	"			ND	"	100				
1,2-Dichlorobenzene	"			ND	"	100				
1,3-Dichlorobenzene	"			ND	"	100				
1,4-Dichlorobenzene	"			ND	"	100				
Dichlorodifluoromethane	"			ND	"	500				
1,1-Dichloroethane	"			ND	"	100				
1,2-Dichloroethane	"			ND	"	100				
1,1-Dichloroethene	"			ND	"	100				
cis-1,2-Dichloroethene	"			ND	"	100				
trans-1,2-Dichloroethene	"			ND	"	100				
1,2-Dichloropropane	"			ND	"	100				
1,3-Dichloropropane	"			ND	"	100				
2,2-Dichloropropane	"			ND	"	100				
1,1-Dichloropropene	"			ND	"	100				
cis-1,3-Dichloropropene	"			ND	"	100				

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

Howard Holmes, Project Manager

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Envirocon	Project:	n/a	Sampled:	12/9/99
10400 N. Burgard Way	Project Number:	n/a	Received:	12/9/99
Portland, OR 97203	Project Manager:	David Jacobs	Reported:	12/21/99 08:23

Volatile Organic Compounds per EPA Method 8260B/Quality Control
North Creek Analytical - Portland

Analyte	Date Analyzed	Spike Level	Sample Result	QC Result	Units	Reporting Limit / Recov. Limits	Recov. %	RPD Limit	RPD %	Notes*
Blank (continued)	**1290340-BLK1**									
trans-1,3-Dichloropropene	12/14/99			ND	ug/kg dry	100				
Ethylbenzene	"			ND	"	100				
Hexachlorobutadiene	"			ND	"	200				
2-Hexanone	"			ND	"	1000				
Isopropylbenzene	"			ND	"	100				
p-Isopropyltoluene	"			ND	"	100				
4-Methyl-2-pentanone	"			ND	"	500				
Methylene chloride	"			ND	"	500				
Naphthalene	"			ND	"	500				
n-Propylbenzene	"			ND	"	100				
Styrene	"			ND	"	100				
1,1,1,2-Tetrachloroethane	"			ND	"	100				
1,1,2,2-Tetrachloroethane	"			ND	"	100				
Tetrachloroethene	"			ND	"	100				
Toluene	"			ND	"	100				
1,2,3-Trichlorobenzene	"			ND	"	100				
1,2,4-Trichlorobenzene	"			ND	"	100				
1,1,1-Trichloroethane	"			ND	"	100				
1,1,2-Trichloroethane	"			ND	"	100				
Trichloroethene	"			ND	"	100				
Trichlorofluoromethane	"			ND	"	100				
1,2,3-Trichloropropane	"			ND	"	100				
1,2,4-Trimethylbenzene	"			ND	"	100				
1,3,5-Trimethylbenzene	"			ND	"	100				
Vinyl chloride	"			ND	"	100				
o-Xylene	"			ND	"	100				
m,p-Xylene	"			ND	"	200				
Surrogate: 4-BFB	"	*2000*		*1430*	"	*70.0-130*	*71.5*			
Surrogate: 1,2-DCA-d4	"	*2000*		*2020*	"	*65.0-135*	*101*			
Surrogate: Dibromofluoromethane	"	*2000*		*1660*	"	*65.0-130*	*83.0*			
Surrogate: Toluene-d8	"	*2000*		*1670*	"	*70.0-120*	*83.5*			
LCS	**1290340-BS1**									
Benzene	12/14/99	2500		2620	ug/kg dry	80.0-135	105			
Chlorobenzene	"	2500		2570	"	80.0-135	103			
1,1-Dichloroethene	"	2500		2760	"	60.0-150	110			
Toluene	"	2500		2630	"	80.0-130	105			
Trichloroethene	"	2500		2520	"	70.0-135	101			

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

Howard Holmes, Project Manager

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Envirocon	Project:	n/a	Sampled:	12/9/99
10400 N. Burgard Way	Project Number:	n/a	Received:	12/9/99
Portland, OR 97203	Project Manager:	David Jacobs	Reported:	12/21/99 08:23

Volatile Organic Compounds per EPA Method 8260B/Quality Control
North Creek Analytical - Portland

Analyte	Date Analyzed	Spike Level	Sample Result	QC Result	Units	Reporting Limit Recov. Limits	Recov. %	RPD Limit	RPD %	Notes*
LCS (continued)	**1290340-BS1**									
Surrogate: 4-BFB	*12/14/99*	*2000*		*1840*	*ug/kg dry*	*70.0-130*	*92.0*			
Surrogate: 1,2-DCA-d4	*"*	*2000*		*2480*	*"*	*65.0-135*	*124*			
Surrogate: Dibromofluoromethane	*"*	*2000*		*2060*	*"*	*65.0-130*	*103*			
Surrogate: Toluene-d8	*"*	*2000*		*2100*	*"*	*70.0-120*	*105*			
Matrix Spike	**1290340-MS1**		**P912217-01**							
Benzene	12/14/99	3320	ND	3020	ug/kg dry	60.0-135	91.0			
Chlorobenzene	"	3320	ND	3040	"	65.0-125	91.6			
1,1-Dichloroethene	"	3320	ND	2980	"	60.0-135	89.8			
Toluene	"	3320	ND	3060	"	60.0-125	92.2			
Trichloroethene	"	3320	ND	2850	"	60.0-125	85.8			
Surrogate: 4-BFB	*"*	*2660*		*2230*	*"*	*70.0-130*	*83.8*			
Surrogate: 1,2-DCA-d4	*"*	*2660*		*2930*	*"*	*65.0-135*	*110*			
Surrogate: Dibromofluoromethane	*"*	*2660*		*2490*	*"*	*65.0-130*	*93.6*			
Surrogate: Toluene-d8	*"*	*2660*		*2510*	*"*	*70.0-120*	*94.4*			
Matrix Spike Dup	**1290340-MSD1**		**P912217-01**							
Benzene	12/14/99	3320	ND	3080	ug/kg dry	60.0-135	92.8	25.0	1.96	
Chlorobenzene	"	3320	ND	3050	"	65.0-125	91.9	25.0	0.327	
1,1-Dichloroethene	"	3320	ND	3180	"	60.0-135	95.8	25.0	6.47	
Toluene	"	3320	ND	3170	"	60.0-125	95.5	25.0	3.52	
Trichloroethene	"	3320	ND	2900	"	60.0-125	87.3	25.0	1.73	
Surrogate: 4-BFB	*"*	*2660*		*2360*	*"*	*70.0-130*	*88.7*			
Surrogate: 1,2-DCA-d4	*"*	*2660*		*2980*	*"*	*65.0-135*	*112*			
Surrogate: Dibromofluoromethane	*"*	*2660*		*2590*	*"*	*65.0-130*	*97.4*			
Surrogate: Toluene-d8	*"*	*2660*		*2610*	*"*	*70.0-120*	*98.1*			

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Envirocon	Project:	n/a	Sampled:	12/9/99
10400 N. Burgard Way	Project Number:	n/a	Received:	12/9/99
Portland, OR 97203	Project Manager:	David Jacobs	Reported:	12/21/99 08:23

Notes and Definitions

#	Note
1	Surrogate recovery is above control limits. Since no analytes were detected in the sample, the quality of the data has not been affected.
DET	Analyte DETECTED
ND	Analyte NOT DETECTED at or above the reporting limit
NR	Not Reported
dry	Sample results reported on a dry weight basis
Recov.	Recovery
RPD	Relative Percent Difference

North Creek Analytical - Portland

Howard Holmes, Project Manager

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20332 Empire Avenue, Suite F-1, Bend, OR 97701-5711 (541) 383-9310 FAX 382-7588

10 & day

CHAIN OF CUSTODY REPORT

Work Order #: P912198

CLIENT: ENVIRACON
REPORT TO: DAVID JACOBS
ADDRESS: 10400 N BURGARD WAY
PORTLAND OR 97203
PHONE: (503) 285-6164 FAX: 503-285-6205

INVOICE TO: SAME AS ABOVE
P.O. NUMBER:

PROJECT NAME:
PROJECT NUMBER:
SAMPLED BY: David Jacobs

TURNAROUND REQUEST in Business Days*
Organic & Inorganic Analyses: 10 (STD.) | 7 | 5 | 4 | 3 | 2 | 1 | <1
Petroleum Hydrocarbon Analyses: 5 (STD.) | 4 | 3 | 2 | 1 | <1
OTHER — Please Specify
*Turnaround Requests less than standard may incur Rush Charges.

REQUESTED ANALYSES

CLIENT SAMPLE IDENTIFICATION	SAMPLING DATE/TIME	8260	TOTAL METALS RCRA 5	TAH-D+G										MATRIX (W, S, O)	# OF CONT.	COMMENTS	NCA ID
1. BUCKET 1 - SOIL FILL	12/9/99 8:10 AM	X	X	X										S	2		
2. BUCKET 2 - SOIL FILL	12/9/99 8:15 AM	X	X	X										S	2		
3.																	
4.																	
5.																	
6.																	
7.																	
8.																	
9.																	
10.																	
11.																	
12.																	
13.																	
14.																	
15.																	

RELINQUISHED BY: David Jacobs	DATE: 12/9	RECEIVED BY: [illegible]	DATE: 12-9-99
PRINT NAME: DAVID JACOBS	FIRM: ENVIRACON	TIME: 1430	PRINT NAME: [illegible]	FIRM: NCA	TIME: 1430
RELINQUISHED BY: [illegible]	DATE: 12-9-99	RECEIVED BY: Jim Roberts	DATE: 12/9/99
PRINT NAME: [illegible]	FIRM: NCA	TIME:	PRINT NAME: ROBERTS	FIRM: NCA	TIME: 1740

ADDITIONAL REMARKS:
TEMP:
PAGE 1 OF 1

COC REV 3/99

SCOEPA00006821

LETTER OF TRANSMITTAL

TO:

Wacker Siltronic Corporation PO Box 83180 Portland, OR 97283	Date:	August 22, 2002
	Job No:	0-61M-10703-0/Task
	Attn:	Cathryn Young
	RE:	RPAC - Portland Site

WE ARE SENDING YOU: ☐ Attached ☒ Under Separate Cover via US Mail

Copies	Dated	Description
1 CD	7/31/02	Complete copy of the Focused Spring 2002 Groundwater Characterization Event Groundwater Monitoring Report
1	7/31/02	Hard copy of text, tables, and figures for the above report

THESE ARE TRANSMITTED as checked below:

☐ For Review ☐ For Approval ☒ For Your Use ☐ As Requested

REMARKS:

AMEC Earth & Environmental, Inc.
7376 SW Durham Road
Portland, Oregon
USA 97224
Tel +1 (503) 639-3400
Fax +1 (503) 620-7892

www.amec.com

C:\Documents and Settings\lplank\Desktop\My RPAC Stuff\Young TRANSMITTAL.doc

amec

)CUSED SPRING 2002 GROUNDWATER CHARACTERIZA
GROUNDWATER MONITORING REPORT
RPAC - PORTLAND SITE

July 31, 2002

Submitted to:

amec

July 31, 2002

0-61M-10703-0/
Task 43

Contents:
Focused Spring 2002 Groundwater
Characterization Event
Groundwater Monitoring Report

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FOCUSED SPRING 2002 GROUNDWATER CHARACTERIZATION EVENT GROUNDWATER MONITORING REPORT RPAC - PORTLAND SITE

July 31, 2002

Submitted to:

Oregon Department of Environmental Quality
Northwest Region
2020 S.W. 4th Avenue, Suite 400
Portland, Oregon 97201

Prepared for:

RPAC
One Copely Parkway, Suite 309
Morrisville, North Carolina 27560

Prepared by:

AMEC Earth & Environmental, Inc.
7376 S.W. Durham Road
Portland, Oregon 97224

0-61M-10703-0/Task 43

July 31, 2002

0-61M-10703-0/Task 43

Eric L. Blischke
Oregon Department of Environmental Quality
Northwest Region
2020 SW Fourth Avenue, Suite 400
Portland, Oregon 97201-4987

Dear Mr. Blischke:

Re: Focused Spring 2002 Groundwater Characterization Event Groundwater Monitoring Report RPAC - Portland Site

On behalf of RPAC, AMEC Earth & Environmental, Inc. (AMEC) is submitting to the Oregon Department of Environmental Quality (DEQ) the enclosed Focused Spring 2002 Groundwater Characterization Event Groundwater Monitoring Report (Spring 2002 GMR) for the Spring 2002 groundwater characterization activities conducted at the subject site.

Field activities were completed in general accordance with the DEQ-approved Focused Spring 2002 Groundwater Characterization Field Sampling Plan (Spring 2002 FSP) dated March 8, 2002. The final list of groundwater monitoring wells and laboratory analyses proposed were approved by DEQ in a letter dated March 14, 2002. The DEQ-approved Project Management Plan (dated March 30, 2001) identifies the purpose of the focused groundwater characterization event.

Included in the Spring 2002 GMR are tables, including a comparison of planned versus actual sampling activities, groundwater physical parameters (field measurements), groundwater and surface water elevation data, and analytical results. Although there were some minor variations from the Spring 2002 FSP, none of these variations adversely affect the quality of the Spring 2002 groundwater characterization data.

The Spring 2002 GMR figures include groundwater elevation and constituent analytical results for Spring 2002. A copy of the completed Groundwater Sampling Field Forms, a complete table of validated analytical results, and detailed data validation reports are included as appendices. Figures with selected analytical results from groundwater samples for shallow, intermediate, and deep alluvium and basalt investigative zones are also included as an appendix.

One hard copy of the entire report (including extensive data tables) is enclosed per DEQ's request. Three copies of this report, including both hard copy portions and electronic portions on compact disk (CD), are enclosed. Table 5 and Appendices A, B, C, D, E, and F are provided on CD in Portable Document Format (PDF). In addition, a Microsoft Excel version of the analytical data table (Appendix F, Table F-1) is provided on the enclosed CD. The PDF files

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Portland, Oregon
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can be accessed using Adobe® Acrobat® or Reader® software. Please contact us if you have any trouble accessing or navigating between the electronic files.

Please contact Roger Gresh at (503) 639-3400 if you have any questions regarding this report.

Sincerely,

AMEC Earth & Environmental, Inc.

Roger Gresh, P.G.
Project Manager

Teresa Wilson
Project Geologist

James B. Feild, Ph.D., R.G., R.H.
Senior Hydrogeologist

HWN/jm

Encl.: Focused Spring 2002 Groundwater Characterization Event Groundwater Monitoring Report

c: R. Ferguson, RPAC
J. Benedict, CHBH&L

REGISTERED PROFESSIONAL
OREGON
JAMES B. FEILD
No. G1962
GEOLOGIST

SCOEPA00006827

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Appendices

Appendix A Completed Groundwater Sampling Field Forms, Focused Spring 2002 Groundwater Characterization Event (provided on CD)

Appendix B Focused Spring 2002 Groundwater Characterization Event 90-Day Investigation-Derived Waste Log (provided on CD)

Appendix C Data Validation Report for Focused Spring 2002 Groundwater Characterization Event, PCDD/PCDF Results, RPAC - Portland Site (provided on CD)

Appendix D Data Validation Report for Focused Spring 2002 Groundwater Characterization Event, Excluding PCDD/PCDF Results and Data Validation Report for Sample MW-08-27 Focused Spring 2002 Groundwater Characterization Event, Excluding PCDD/PCDF, RPAC - Portland Site (provided on CD)

Appendix E Groundwater Constituent Analytical Result Figures, Focused Spring 2002 Groundwater Characterization Event (provided on CD)

Appendix F Final Validated Spring 2002 Groundwater Characterization Event Analytical Results (provided on CD)

SCOEPA00006829

1.0 INTRODUCTION

The Focused Spring 2002 Groundwater Characterization Event was completed between April 2, 2002 and May 3, 2002 at the RPAC Portland Site. The groundwater characterization event was conducted in accordance with the Final Focused Spring 2002 Groundwater Characterization Field Sampling Plan dated March 8, 2002 (Spring 2002 FSP). The Spring 2002 FSP was approved by the Department of Environmental Quality (DEQ) in a letter dated March 14, 2002. The RPAC property is located at 6200 NW St. Helens Road in Portland, Oregon.

The final list of monitoring wells to be sampled during the Spring 2002 groundwater sampling event was provided to DEQ in the Spring 2002 FSP. The scope of work included groundwater sample collection at 61 monitoring wells and water level measurements at 123 monitoring wells and 3 staff gauges.

The following groundwater characterization activities were completed in April and May 2002:

- Water level measurements - April 2, 3, and May 3, 2002
- Groundwater sampling - April 4 through April 23, and May 3, 2002

This Focused Spring 2002 Groundwater Characterization Event Groundwater Monitoring Report (Spring 2002 GMR) includes tables that provide a comparison of planned versus actual sampling activities, groundwater and surface water elevation measurements, groundwater physical parameters (field measurements), and detected analytical results. The Spring 2002 GMR figures include groundwater elevation results for Spring 2002. A copy of the completed Groundwater Sampling Field Forms, 90-Day Investigation-Derived Waste Log, detailed data validation reports, and a complete table of validated analytical results are included as Appendices A, B, C,D, and F. Figures with selected analytical results from groundwater samples collected in the shallow, intermediate, and deep alluvium and basalt investigative zones are included as Appendix E.

2.0 WATER LEVEL MONITORING PROGRAM

Groundwater and surface water level measurements were collected at the following RPAC areas and off-site properties on April 2 and 3, 2002:

- RPAC Herbicide Area;
- RPAC Insecticide Area;
- RPAC Lake Area;

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- ATOFINA Chemicals, Inc. Property;
- Gould Electronics Property;
- Burlington Northern and Santa Fe Railway Company Property;
- Wacker Siltronic Property (Wacker);
- ESCO Inc. Property;
- Metro Property;
- Schnitzer Investment Property;
- Kinder Morgan Property; and
- City of Portland Property.

Depth to water measurements collected on April 2 and 3, 2002, are presented in Table 2, Groundwater Elevation and NAPL Thickness Measurements, April 2002. Depth to water measurements were collected in general accordance with the procedures described in Standard Operating Procedure 1 (SOP-1), Methodology for Water Level Determination, included in Appendix A of the Spring 2002 FSP. Variations from the Spring 2002 FSP regarding water level measurements are discussed in Section 7.1 of this Spring 2002 GMR.

Four additional monitoring wells were installed at the Wacker property during the Spring 2002 groundwater characterization event, in accordance with the Monitoring Well Installation at Wacker Property Field Sampling Plan (Well Installation FSP) dated February 28, 2002 (and addendum dated March 15, 2002). Water level measurements at these newly installed monitoring wells, RP-07-30, RP-07-55, RP-07-84, and RP-07-119, along with selected nearby monitoring wells, were collected on May 3, 2002. The measurements from the May 3, 2002 activities are presented in Table 3, Groundwater Elevation and NAPL Thickness Measurements for Select Wells Following Wacker Property Well Installation Activities, May 2002.

Depth to groundwater was measured at each monitoring well using an electronic water level probe, with the exception of MW-08-27, which was monitored using an electronic interface probe. The water level or interface probe was lowered to the bottom of the monitoring well to measure the total well depth. The measurements were referenced to a surveyed measuring point mark, typically on the top of the north side of the well casing. The water level and interface probe have potential accuracies of 0.01 foot. The measurements were recorded on a Water Level and NAPL Thickness Measurement Form with the date and time of measurement and the field staff responsible for the recording.

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For wells with evidence of NAPL upon retrieval of the water level probe, wells where NAPL was detected in year 2000 or 2001 groundwater characterization events, and wells with a total depth greater than 100 feet, a disposable bailer was used to determine whether NAPL was present, in accordance to the procedures specified in the Spring 2002 FSP.

The electronic water level probe and interface probe were decontaminated after each measurement according to the procedures described in Section 5.0 of this Spring 2002 GMR and in SOP-3 Decontamination Procedure, included in Appendix A of the Spring 2002 FSP. Disposable bailers were contained and handled as investigative-derived waste (IDW). The IDW procedures followed are further described in Section 6.0 of this Spring 2002 GMR.

Surface water elevations were measured at three surface water staff gauges during the Spring 2002 groundwater characterization event: SG-NDL, SG-NDP, and SG-WDL in North Doane Lake, the Northwest Drainage Pond, and West Doane Lake, respectively. The SG-NDL, SG-NDP, and SG-WDL staff gauges were read with the aid of binoculars (as necessary) from the shore near the edge of each surface water feature. The surveyed measuring point is the top of the gauge for each location. The direct gauge reading (DGR) was recorded for each location, along with the top of gauge reading (TOG). The resulting depth to water measurement was calculated by subtracting the DGR from the TOG. All measurements and calculations were recorded on the Water Level and NAPL Thickness Measurement Form, along with the date and time the measurement was collected.

3.0 GROUNDWATER SAMPLING PROGRAM

Groundwater sampling was conducted from April 4 through April 23 and on May 3, 2002. Groundwater sampling was performed in general accordance with the procedures specified in the Spring 2002 FSP. Information regarding sampling locations, procedures, handling, and Quality Assurance/Quality Control (QA/QC) requirements is provided in the following sections. Variations from the Spring 2002 FSP regarding groundwater sampling are discussed in Section 7.2 of this Spring 2002 GMR. None of the variations represent any negative effect on the quality of the Spring 2002 analytical data.

3.1 Sampling Locations

Groundwater samples were collected from 61 monitoring wells located on or in the vicinity of the RPAC property. Table 1 summarizes the monitoring wells sampled and the analyses requested from the laboratory during the Spring 2002 characterization event.

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3.2 Sampling Procedure

Groundwater sampling activities were generally conducted in accordance with the procedures described within the Spring 2002 FSP, including SOP-2 (Methodology for Groundwater Sampling), SOP-3 (Decontamination Procedure), and SOP- 4 (Field Measurement of Groundwater Parameters).

Prior to sampling each monitoring well, and immediately after removing the well cap, the air column in the monitoring well was evaluated for the presence of organic vapors using a photoionization detector (PID). Depth to groundwater was measured using an electronic water level probe. Total depth of each monitoring well was checked to confirm well identification. The PID reading, depth to groundwater, and total depth were recorded on the Groundwater Sampling Field Forms, included as Appendix A.

In general, aqueous phase groundwater samples were not collected from monitoring wells where NAPL was detected at a measurable thickness (greater than a sheen). Under the direction of RPAC, a light NAPL (LNAPL) sample was collected from MW-08-27. The sample was collected with a disposable bailer on April 23, 2002, and submitted for laboratory analysis as indicated on Table 1.

Three methods were used to purge monitoring wells prior to sampling: submersible (Grundfos) pump; peristaltic pump; or disposable bailer. The submersible pump was the preferred method for purging; however, monitoring wells with slow recharge, shallow wells, or where the submersible pump was not effective (typically due to gas or air in the water column), were purged using disposable tubing attached to a peristaltic pump or with a disposable bailer. Disposable bailers were used to purge and sample two monitoring wells where recharge was too slow to use a submersible pump and depth to water was too great to facilitate use of a peristaltic pump.

The submersible pump was a 2-inch diameter, stainless steel, portable pump equipped with chemically inert internal parts (Teflon) and disposable tubing and powered by a portable generator. The peristaltic pump was equipped with disposable tubing and powered by a 12-volt battery or portable generator. The disposable, single check-valve bailers used were composed of polyethylene plastic.

During groundwater sampling at each monitoring well, the submersible or peristaltic pump intake was placed at the approximate midpoint of the screened interval. Low flow purge methods were utilized, when possible, at each monitoring well location where a pump was used. Purge water was pumped from the screened interval at rates ranging from approximately 0.2 to 0.4 liters per minute. Purge water was directed into a flow-through cell. A Yellow Springs Instruments® model YSI-650XL sonde and controller were used in the flow-through cell to collect continuous readings

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of physical parameters, including pH, specific conductivity, temperature, dissolved oxygen (DO), and oxidation-reduction potential (ORP). Prior to sampling, field parameters were recorded at approximately 3- to 5- minute intervals until measurements generally stabilized (within limits specified in the FSP) for three consecutive readings or the monitoring well was purged dry. If after 30 minutes of purging parameters had not stabilized, purging was discontinued and a sample was collected. If a well was purged dry, a groundwater sample was collected as soon as adequate water returned to the well to make groundwater sampling feasible.

After disconnecting the pump discharge tubing from the influent side of the flow-through cell, the sample bottles were filled directly from the pump discharge tubing. Dissolved metals samples were field-filtered using a 0.45-micron filter placed directly on the end of the pump discharge tubing, or by filling an unpreserved plastic bottle and filtering into a preserved bottle using the peristaltic pump. Turbidity was measured following sample collection at each location, using the Hach® model 2100P portable turbidimeter. Ferrous iron measurements were collected through the use of a Hach® colorimetric ferrous iron test kit. Groundwater field measurements for the Spring 2002 groundwater characterization event are summarized on Table 4.

The interface probe, electronic water level probe, pump, pump cable, and flow-through cell were decontaminated after sampling each monitoring well according to the procedure described in Section 5.0. Disposable tubing used with the submersible and peristaltic pumps, and disposable bailers, were contained and handled as IDW. IDW handling procedures are discussed in Section 6.0 of this Spring 2002 GMR.

3.3 Sample Handling

Filled groundwater sample bottles were labeled and capped and bottles were placed in re-sealable plastic bags or bubble wrap. The samples were then placed in coolers with "blue ice" and packing material (as appropriate to prevent breakage) immediately following sample collection for transport to the laboratory. Temperature blanks were placed in each cooler containing samples. Chain-of-custody forms were completed for each day and placed inside or taped to the outside of the appropriate cooler.

The groundwater samples were transferred daily from the sampling locations to the AMEC Portland office or directly to the laboratory by AMEC staff. Samples collected for analysis of total Heterotrophic plate count and diesel-degrading bacteria were delivered directly to the laboratory within the 24-hour holding time by AMEC personnel. The remaining groundwater samples were transported from the AMEC Portland office on a next-day basis by a laboratory-provided courier or stored in a refrigerator or iced cooler pending shipment to the appropriate contract laboratory.

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The primary laboratories utilized include the following:

Primary Laboratories Utilized

Laboratory	Analysis Type
Triangle Labs	Dioxins/Furans
Food Quality Labs	Total Heterotrophic Plate Count, Diesel-Degrading Bacteria
North Creek Analytical (NCA)	VOCs, Phenols, Pesticides, Herbicides, Metals, Total Petroleum Hydrocarbons (TPH), Natural Attenuation Parameters

Other laboratories, including Severn Trent Laboratories in Sacramento, California (STL), and Sound Analytical Services (SAS) in Tacoma, Washington, were used for analysis of specific QC samples.

3.4 QA/QC Requirements

QC samples were collected in general accordance with the Spring 2002 FSP, and the QC samples included field duplicates, interlaboratory split samples, performance evaluation samples, rinsate blanks, trip blanks, and laboratory QC samples. In addition, temperature blanks were placed in each cooler as a check on preservation of samples. The QC samples were analyzed for volatile organic compounds (VOCs) (EPA Method 8260B), phenols (EPA Method 8041), herbicides (EPA Method 8151A), dioxins/furans (EPA Method 8290), metals (EPA Method 6020), and pesticides (EPA Method 8081A). QC samples were not collected for natural attenuation parameter methods, including major cations by EPA Method 6010A and fuels by NWTPH-Dx. As an additional QC measure, "double-blind" field sample identifications were utilized. Samples collected in the field and associated QC samples were numbered sequentially, without an indication of the well identification. QA review of this data is provided in the data validation reports and have been included as Appendix C and Appendix D.

3.4.1 Rinsate Samples

Rinsate samples were collected after groundwater sampling and equipment decontamination at monitoring wells W-11-S, MW-10-57, and MW-05-52. The rinsate samples were collected by pumping deionized water through the submersible pump. The rinsate samples were submitted for analysis of volatile organic compounds (VOCs) (EPA Method 8260B), phenols (EPA Method 8041), herbicides (EPA Method 8151A), dioxins/furans (EPA Method 8290), metals (EPA Method 6020), and pesticides (EPA Method 8081A).

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3.4.2 Field Duplicate Samples

Blind duplicates were collected at three monitoring wells, including RP-01-51, MW-09-42, and AL2-46. The blind duplicates were submitted for analysis of selected parameters included in the primary sample's analytical suite.

3.4.3 Interlaboratory Split Samples

Interlaboratory split samples were collected at four monitoring wells, including RP-01-65, MW-09-42, AL2-46, and RP-07-84, and submitted to STL. The interlaboratory split samples were submitted for analysis of VOCs (EPA Method 8260B), phenols (EPA Method 8041), herbicides (EPA Method 8151A), dioxins/furans (EPA Method 8290), metals (EPA Method 6020), and pesticides (EPA Method 8081A).

3.4.4 Performance Evaluation Samples

One performance evaluation sample (comprised of sample bottles prepared by a third-party laboratory [Resource Technology Corporation of Soldier Springs, Wyoming] with known concentrations of selected site constituents) was submitted to NCA and STL for analysis. The performance evaluation sample was submitted for analysis of VOCs (EPA Method 8260B), phenols (EPA Method 8041), herbicides (EPA Method 8151A), metals (EPA Method 6020), and pesticides (EPA Method 8081A).

3.4.5 Trip Blanks

One trip blank accompanied each cooler containing bottles/samples that were to be analyzed for VOCs (EPA Method 8260B). Throughout the sampling event a total of 15 trip blanks accompanied samples that were submitted to the laboratory.

3.4.6 Laboratory QC Samples

Additional sample quantity for matrix spike/matrix spike duplicate (MS/MSD) was collected at five monitoring wells, including RP-01-51, W-15-I, MW-09-42, AL2-46, and RP-02-49. The MS/MSD samples were submitted for analysis of VOCs (EPA Method 8260B), phenols (EPA Method 8041), herbicides (EPA Method 8151A), dioxins/furans (EPA Method 8290), pesticides (EPA Method 8081A), and metals (EPA Method 6020).

4.0 DOCUMENTATION

All groundwater sampling procedures, field data, and observations were recorded on loose-leaf project-specific forms and/or a bound field log book. Specific information was recorded as follows.

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- The initial round of water level and total well depth measurements was recorded on a Water Level and NAPL Thickness Measurement Form. Each entry was dated and initialed by the field individual responsible for filling out the form.
- Groundwater sampling information, well condition, and field parameters for each monitoring well, as well as bottles filled for specific analyses, were recorded on a well-specific Groundwater Sampling Field Form. Each form was dated and signed by the field individual responsible for filling out the form. Most of the pertinent information regarding groundwater sampling at each monitoring well was recorded on the Groundwater Sampling Field Forms. Copies of the completed groundwater sampling field forms are included in this Spring 2002 GMR as Appendix A.
- A chronological log of field activities, including equipment calibration, on-site personnel, weather conditions, field observations, variations from the FSP, waste handling, and other pertinent information, was recorded in a bound, weatherproof field log book in permanent ink. The individual responsible for entering information into the log book initialed and dated each page.
- Field sample identification numbers, associated monitoring wells, and analyses requested for each sample were recorded on an ongoing basis on a loose-leaf Sample Identification Matrix Form. The Sample Identification Matrix Form provides a cross-reference for field sample identification versus monitoring well identification.
- Handling of investigation-derived waste (IDW) was recorded on a daily basis on a 90-Day Investigation Derived Waste Log form. The completed 90-Day Investigation Derived Waste Log form has been included as Appendix B.

5.0 DECONTAMINATION PROCEDURE

The interface probe and electronic water level probe were decontaminated after collecting water level measurements at each monitoring well with a non-phosphatic detergent (Alconox) and water wash, a methanol rinse, and a deionized water final rinse. At monitoring wells where NAPL was present or suspected, hexane was used in addition to methanol for equipment decontamination.

The submersible pump cable and external housing were decontaminated after sampling at each monitoring well using a non-phosphatic detergent (Alconox) and water wash, a methanol rinse, and a deionized water final rinse. The pump itself was decontaminated by pumping the following series of solutions through the pump: water with detergent; deionized water; methanol; and a final deionized water rinse. At monitoring wells where NAPL was present or suspected, hexane was used in addition to methanol for equipment decontamination. The pump was washed with hexane prior

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to the Alconox wash. The peristaltic pump did not require decontamination, as only disposable tubing came into contact with purge or sample water.

Deionized water used for decontamination activities was obtained from the AMEC Portland office's generic mixed bed deionizer system. This deionized water was contained in a 65-gallon poly tank, equipped with a spigot and clean tubing, located in the back of a field sampling cargo van during sampling activities.

Decontamination water was contained using buckets, plastic bags, and plastic sheeting, and transferred to a 125-gallon portable storage tank for transport to the RPAC facility. Decontamination water was handled as IDW in the same manner as purge water.

6.0 TREATMENT AND DISPOSAL OF INVESTIGATION-DERIVED WASTE (IDW)

All purge water and decontamination fluids were initially contained in 5-gallon plastic buckets with lids at each monitoring well location. The buckets were emptied into a 125-gallon portable storage tank in the back of a field pickup truck. Water was transported in the storage tank and pumped into RPAC's on-site treatment system at the end of each sampling day. Approximately 443 gallons of purge water and decontamination fluid (363 gallons in April and 80 gallons in May) were generated and pumped into the treatment system during the Spring 2002 groundwater characterization event.

Disposable tubing, bailers, string, plastic sheeting, and personal protective equipment (PPE) such as gloves and Tyvek suits were placed in 55-gallon closeable open-top steel drums stored in the RPAC warehouse at the end of each day. A total of seven full and partially filled drums (six in April, one in May) were used to contain the solid waste.

7.0 VARIATIONS FROM THE FIELD SAMPLING PLAN

Although groundwater sampling was generally conducted according to the Spring 2002 FSP, field conditions prompted some minor variations from the planned activities. Variations from the planned activities are discussed in the sections below and are summarized on Table 1 of this Spring 2002 GMR. None of these variations from the Spring 2002 FSP adversely affected the quality of the Spring 2002 groundwater characterization event data.

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7.1 Water Level Monitoring

Water level, total depth, and NAPL thickness measurements were collected from 123 monitoring wells (including the RP-07 series monitoring wells.) and three staff gauges, as specified in the Spring 2002 FSP. One difference from the Spring 2002 FSP is explained below.

The FSP indicated that the proposed monitoring wells RP-07-S, RP-07-I, RP-07-D, and RP-07-B would be included within the Spring 2002 groundwater characterization event, pending successful installation of the wells prior to start of the sampling event. The proposed monitoring wells RP-07-S, RP-07-I, RP-07-D, and RP-07-B were renamed to RP-07-30, RP-07-55, RP-07-84, and RP-07-119, respectively, following installation. Because of delays in obtaining access to the Wacker property, monitoring wells RP-07-30, RP-07-55, RP-07-84, and RP-07-119 could not be completed and developed until after the start of the sampling event. Water level measurements and groundwater samples were collected from these monitoring wells on May 3, 2002. In addition, groundwater level measurements were recorded at nearby monitoring wells on May 3, 2002. The groundwater elevation and NAPL thickness measurements collected on May 3, 2002, were recorded within a bound field log book or directly onto the Groundwater Sampling Field Form.

7.2 Groundwater Sampling

Groundwater samples were collected and submitted for analytical testing from 61 monitoring wells during the Spring 2002 groundwater characterization event. The minor variations that occurred in the Spring 2002 groundwater sampling program compared to the Spring 2002 FSP are listed below:

- The Spring 2002 FSP indicated that the sample containers designated as MS and MSD analysis would be labeled with a -07 and -08 modifier, respectively. However, the MS/MSD designations were not used, and on the chain-of-custody form the primary sample was noted to have extra volume for the MS/MSD analysis. This variation from the FSP was adopted as requested by the analytical service providers.
- Two monitoring wells, W-08-26 and RP-02-49, were re-sampled during the groundwater characterization event. An error in the sample bottle set from the initial sample collected on April 16, 2002, prompted a re-sampling of monitoring well W-08-26 on April 18, 2002 for total and dissolved metals. Monitoring well RP-02-49 was re-sampled for herbicides on May 3, 2002. The second sample was requested by the analytical laboratory, due to problems during the analysis of the original sample from monitoring well RP-02-49 collected April 4, 2002.

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- Because samples were in the continuous custody of AMEC staff, signed, self-adhesive chain-of-custody seals were not used during the sampling event when transporting the samples from the Site to the AMEC Portland office. However, sample transport containers (coolers) were taped closed prior to shipment to the analytical laboratory from the AMEC Portland office.
- A sample of LNAPL measured in monitoring well MW-08-27, collected under the direction of RPAC, was submitted for laboratory analysis. The results of this analysis are reported in Table 5 and Table F-1 in Appendix F.

7.3 Field QA/QC Requirements

Field QA/QC samples were collected generally as discussed in the Spring 2002 FSP. One minor variation from the FSP occurred. The Spring 2002 FSP states that field duplicate samples will be collected by alternating between the primary sample and the duplicate as each bottle is filled. At monitoring wells where duplicate samples were collected, the entire primary sample was collected first, to ensure that sufficient sample volume was obtained, followed by the field duplicates and interlaboratory duplicates.

8.0 DATA QUALITY EVALUATION

RPAC performed a data quality evaluation of the analytical results from the Spring 2002 groundwater samples. The results of the evaluation are presented in the Data Validation Reports for the Focused Spring 2002 Groundwater Characterization Event, included with this Spring 2002 GMR as Appendices C and D.

The purpose of the data quality evaluation was to identify and explain data usability issues discovered during verification and validation of the analytical results, and to identify corrective actions necessary to improve data quality for future sampling events. The data evaluation was based on findings of the data verification and validation process, and any communications with the analytical laboratories about those findings. Verification and validation were performed on 100% of the laboratory data for Spring 2002. The purpose of the data verification was to make certain that the data quality indicators and analytical detection limits met project requirements and to verify the data were transferred accurately from the laboratory to the project database. Full validation according to USEPA National Functional Guidelines for Data Review, modified for SW-846 method requirements, performed on laboratory analytical results for Spring 2002 groundwater samples exceeded requirements agreed upon in correspondence between AMEC and DEQ dated January 16, February 9, and March 23, 2001.

Based on the validation reports, the lab performance and data quality appear to be acceptable, overall, for the Spring 2002 groundwater analytical data. All the dioxin

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data generated during the Spring 2002 event was found to be usable (Appendix C). Approximately 1.5 percent of the analytical data, other than dioxin data, was qualified as unusable data, as a result of the verification process (Appendix D).

9.0 RESULTS

The results of the water level monitoring are summarized in Section 9.1 below and are presented in the following tables and figures:

- Tables of water level measurements, including NAPL thickness and calculated groundwater elevations (Table 2 and Table 3); and
- Groundwater elevation figures (Figures 1 through 4).

The water quality analytical results are summarized in Section 9.2 below and are presented in the following tables and figures:

- A summary table of field measurements (Table 4);
- A summary table of the analytes detected during the Spring 2002 groundwater sampling event (Table 5);
- Figures showing analytical results for selected constituents (Appendix E, Figures E-1 through E-52); and
- A complete table of all analytical results for the Spring 2002 groundwater sampling event (Appendix F).

9.1 Water Level Monitoring Results

The groundwater or surface water elevation was determined at each monitoring well, or staff gauge location, by subtracting the measured depth to water from the elevation of the measuring point. Water level measurements are included in Table 2 and Table 3. Groundwater elevations at the monitoring wells ranged from 8.90 to 39.32 feet above mean sea level, City of Portland Datum (ft AMSL).

Figures 1 through 4 present contours of groundwater elevations in each of the four investigative zones: shallow alluvium; intermediate alluvium; deep alluvium; and basalt. The shallow alluvium figure includes surface water elevations for North Doane Lake, West Doane Lake, and the Northwest Drainage Pond. The static water level measured at MW-08-27 was not included in the shallow alluvium figure, due to the presence of LNAPL. In general, the static water level will be depressed within a well with LNAPL present, due to the weight of the column of LNAPL above the groundwater.

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Water level measurements collected in Spring 2002 suggest groundwater elevations are higher, in general, than those measured during the Spring and Fall 2001 monitoring events by approximately 3 to 4 feet.

9.2 Groundwater Analytical Results

Field measurements of groundwater physical parameters are summarized in Table 4 and on field data sheets in Appendix A. Laboratory analytical results are presented in tabular form on Table 5 and in Appendix F. The analytical results from groundwater samples collected during the focused Spring 2002 groundwater characterization event are posted adjacent to monitoring well locations for selected constituents on the figures included in Appendix E.

The volatile organic compounds (VOCs) included on the groundwater figures in Appendix E are 1,2-dichlorobenzene (E-1 through E-4), benzene (E-5 through E-8), and trichloroethene (TCE) (E-9 through E-12). Similar to the Spring 2001 groundwater sampling event, VOCs in groundwater were detected near the northern corner of the RPAC Herbicide Area and wastewater treatment facility (southwestern corner of the Lake Area) and near the southern end of West Doane Lake. VOCs were detected in all four investigative zones in these areas, and primarily in the intermediate and deep alluvium and basalt north of these areas and north of the RPAC Site.

The phenolic compounds included on the groundwater figures in Appendix E are 2,4-dichlorophenol (E-13 through E-16) and phenol (E-17 through E-20). 2,4-dichlorophenol was detected in all four investigative zones, with the highest concentrations in the shallow and intermediate alluvium south of West Doane Lake, in the Lake Area and in the deep alluvium near the northern corner of the Herbicide Area. Phenol was not detected within any wells sampled within the four investigative zones.

The pesticide COPCs included on the groundwater figures in Appendix E are 4,4'-DDE (E-21 through E-24), 4,4'-DDT (E-25 through E-28), and Dieldrin (E-29 through E-32). The analytical results from groundwater samples indicate 4,4'-DDE and 4,4'-DDT were not detected. Dieldrin was detected in shallow alluvium monitoring wells within and just north and northeast of the Insecticide Area.

The metal compounds, included on the groundwater figures in Appendix E are dissolved chromium (E-33 through E-36) and dissolved arsenic (E-37 through E-40). Similar to the Spring 2001 groundwater sampling event, dissolved chromium and dissolved arsenic were detected in groundwater samples at monitoring wells located within the Insecticide Area, Herbicide Area, and Lake Area of the RPAC property and downgradient from the RPAC property. Dissolved chromium and arsenic were detected within all four investigative zones.

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The herbicides included on the groundwater figures in Appendix E are 2,4-D (E-41 through E-44) and silvex (E-45 through E-48). 2,4-D was detected in the northwestern quarter of the Herbicide Area, the southern half of the Lake Area, and south of West Doane Lake. 2,4-D concentrations were detected within all four investigative zones. Silvex was detected within wells screened within all four investigative zones, within the Herbicide Area and Lake Area of the RPAC property and downgradient from the RPAC property. This distribution pattern of 2,4-D and silvex is similar to that identified from Spring 2001 groundwater analytical results.

The dioxin included on the groundwater figures in Appendix E is 2,3,7,8-TCDD (E-49 through E-52). In general, 2,3,7,8-TCDD was detected near the northern half of the RPAC Herbicide Area, near the wastewater treatment facility, and south of West Doane Lake, primarily in the alluvium investigative zones with lower concentrations at depth. The analytical results from Spring 2002 indicate dioxins and furans were not detected in most groundwater samples analyzed for dioxins/furans.

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LIMITATIONS

This report was prepared exclusively for RPAC by AMEC Earth & Environmental, Inc. The quality of information, conclusions and estimates contained herein is consistent with the level of effort involved in AMEC services and based on: i) information available at the time of preparation; ii) data supplied by outside sources; and iii) the assumptions, conditions and qualifications set forth in this report. This report is intended to be used by RPAC only, subject to the terms and conditions of its contract with AMEC. Any other use of, or reliance on, this report by any third party is at that party's sole risk.

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TABLES

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TABLE 1
Planned Versus Actual Sampling and Analysis
Focused Spring 2002 Groundwater Characterization Event
RPAC - Portland Site

Location		Planned Measurement and Sampling Requirements									Variations From Plan (See Note Below)
SITE ID	Property Owner	Water Level Measurement	NAPL Measurement if Present	VOCs by EPA 8260B	Phenols by EPA 8041 OR 8270C-SIM	Herbicides by EPA 8151A	Dioxins/ Furans by EPA 8290	Metals by EPA 6020	Pesticides by EPA 8081A	Natural Attenuation	
AL2-17	RPAC	X	X	X	X	X	X			X	As planned
AL2-32	RPAC	X	X	X	X	X	X	X		X	As planned
AL2-46	RPAC	X	X	X	X	X	X			X	As planned
AL4-47	RPAC	X	X								As planned
AL5-19	RPAC	X	X								As planned
AL5-35	RPAC	X	X								As planned
AL5-62	RPAC	X	X								As planned
AL6-96	RPAC	X	X								As planned
ASW-01A	Metro	X	X						X		As planned
ASW-04	Metro	X	X								As planned
ASW-05	Metro	X	X								As planned
ASW-06	Metro	X	X								As planned
ASW-08	Metro	X	X								As planned
BST2W-61	RPAC	X	X	X	X	X				X	As planned
BST5W-74	RPAC	X	X								As planned
BTB-4A-84	RPAC	X	X								As planned
BTB-4B-25	RPAC	X	X								As planned
BTB-4B-55	RPAC	X	X								As planned
KM-MW-2	Kinder Morgan	X	X								As planned
KM-MW-5	Kinder Morgan	X	X								As planned
MW-01-26	RPAC	X	X								As planned
MW-01-41	RPAC	X	X								As planned
MW-01-56	RPAC	X	X								As planned
MW-01-76	RPAC	X	X								As planned
MW-02-26	RPAC	X	X								As planned
MW-02-46	RPAC	X	X								As planned
MW-02-62	RPAC	X	X								As planned
MW-03-27	RPAC	X	X								As planned
MW-03-49	RPAC	X	X								As planned
MW-03-68	RPAC	X	X								As planned
MW-03-81	Wacker	X	X	X		X	X				As planned
MW-03-I	Wacker	X	X	X		X	X	X			As planned
MW-03-S	Wacker	X	X	X		X					As planned
MW-04-27	RPAC	X	X	X	X	X				X	As planned
MW-04-47	RPAC	X	X	X	X	X	X			X	As planned
MW-04-63	RPAC	X	X								As planned
MW-05-24	RPAC	X	X								As planned

TABLE 1
Planned Versus Actual Sampling and Analysis
Focused Spring 2002 Groundwater Characterization Event
RPAC - Portland Site

Location		Planned Measurement and Sampling Requirements									Variations From Plan (See Note Below)
SITE ID	Property Owner	Water Level Measurement	NAPL Measurement if Present	VOCs by EPA 8260B	Phenols by EPA 8041 OR 8270C-SIM	Herbicides by EPA 8151A	Dioxins/ Furans by EPA 8290	Metals by EPA 6020	Pesticides by EPA 8081A	Natural Attenuation	
MW-05-34	RPAC	X	X								As planned
MW-05-52	RPAC	X	X	X	X	X	X			X	As planned
MW-05-70	RPAC	X	X	X	X	X	X			X	As planned
MW-06-S	Wacker	X	X								As planned
MW-07-S	Wacker	X	X								As planned
MW-08-27	RPAC	X	X	X	X	X	X	X	X		NAPL sample collected (Only)
MW-08-46	RPAC	X	X								As planned
MW-08-64	RPAC	X	X								As planned
MW-09-23	RPAC	X	X	X	X	X	X		X	X	As planned
MW-09-42	RPAC	X	X	X	X	X	X	X	X	X	As planned
MW-09-58	RPAC	X	X	X	X	X	X			X	As planned
MW-09-80	RPAC	X	X				X			X	As planned
MW-10-24	RPAC	X	X					X	X	X	As planned
MW-10-44	RPAC	X	X						X	X	As planned
MW-10-57	RPAC	X	X						X	X	As planned
MW-11-24	RPAC	X	X						X	X	As planned
MW-11-37	RPAC	X	X					X	X	X	As planned
MW-11-56	RPAC	X	X							X	As planned
MW-11-79	RPAC	X	X							X	As planned
MW-12-27	RPAC	X	X								As planned
MW-12-41	RPAC	X	X								As planned
MW-12-59	RPAC	X	X								As planned
MW-12-79	RPAC	X	X								As planned
P-07	RPAC	X	X								As planned
P-10	RPAC	X	X								As planned
P-11	RPAC	X	X								As planned
PP-08	RPAC	X	X								As planned
PZ-02-40	Portland	X	X								As planned
PZ-1-11	RPAC	X	X								As planned
RP-01-31	BN/SF	X	X	X		X	X	X		X	As planned
RP-01-51	BN/SF	X	X	X		X	X	X		X	As planned
RP-01-65	BN/SF	X	X	X		X	X			X	As planned
RP-02-31	Atofina	X	X	X		X	X	X			As planned
RP-02-49	Atofina	X	X	X		X	X	X			Well resampled for herbicides
RP-02-66	Atofina	X	X	X		X	X				As planned
RP-03-30R	BN/SF	X	X	X			X				As planned

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TABLE 1
Planned Versus Actual Sampling and Analysis
Focused Spring 2002 Groundwater Characterization Event
RPAC - Portland Site

Location		Planned Measurement and Sampling Requirements									Variations From Plan (See Note Below)
SITE ID	Property Owner	Water Level Measurement	NAPL Measurement if Present	VOCs by EPA 8260B	Phenols by EPA 8041 OR 8270C-SIM	Herbicides by EPA 8151A	Dioxins/ Furans by EPA 8290	Metals by EPA 6020	Pesticides by EPA 8081A	Natural Attenuation	
RP-03-52R	BN/SF	X	X	X		X	X				As planned
RP-04-16	RPAC	X	X	X	X	X	X			X	As planned
RP-04-41	RPAC	X	X	X	X	X	X			X	As planned
RP-05-16	RPAC	X	X								As planned
RP-06-30	BN/SF	X	X	X		X		X			As planned
RP-06-87	BN/SF	X	X	X		X	X	X			As planned
RP-07-S (30)	Wacker	X	X	X	X	X	X	X		X	Sampled following well installation
RP-07-I (55)	Wacker	X	X	X	X	X	X	X		X	Sampled following well installation
RP-07-D (84)	Wacker	X	X	X	X	X	X	X		X	Sampled following well installation
RP-07-B (119)	Wacker	X	X	X	X	X	X	X		X	Sampled following well installation
RPW-02	RPAC	X	X						X		As planned
RPW-03	RPAC	X	X								As planned
RPW-05	RPAC	X	X								As planned
W-03-D	Gould	X	X								As planned
W-03-I	Gould	X	X	X		X					As planned
W-03-S	Gould	X	X								As planned
W-04-89	Gould	X	X				X	X			As planned
W-04-I	Gould	X	X								As planned
W-04-S	Gould	X	X								As planned
W-06-B	RPAC	X	X								As planned
W-06-D	RPAC	X	X								As planned
W-06-S	RPAC	X	X								As planned
W-08	RPAC	X	X	X		X				X	As planned
W-08-26	RPAC	X	X	X		X		X		X	Well resampled for total and dissolved metals
W-08-74	RPAC	X	X	X		X				X	As planned
W-09	RPAC	X	X								As planned
W-09-116	RPAC	X	X	X		X				X	As planned
W-09-86	RPAC	X	X								As planned
W-10	Portland	X	X								As planned
W-11-B	ESCO	X	X	X		X	X			X	As planned
W-11-D	ESCO	X	X	X		X	X			X	As planned
W-11-I	ESCO	X	X	X		X	X	X		X	As planned
W-11-S	ESCO	X	X	X		X	X			X	As planned

TABLE 1
Planned Versus Actual Sampling and Analysis
Focused Spring 2002 Groundwater Characterization Event
RPAC - Portland Site

Location		Planned Measurement and Sampling Requirements									Variations From Plan (See Note Below)
SITE ID	Property Owner	Water Level Measurement	NAPL Measurement if Present	VOCs by EPA 8260B	Phenols by EPA 8041 OR 8270C-SIM	Herbicides by EPA 8151A	Dioxins/ Furans by EPA 8290	Metals by EPA 6020	Pesticides by EPA 8081A	Natural Attenuation	
W-12-D	ESCO	X	X								As planned
W-12-I	ESCO	X	X								As planned
W-12-S	ESCO	X	X								As planned
W-15-D	Metro	X	X	X		X				X	As planned
W-15-I	Metro	X	X	X		X	X	X		X	As planned
W-15-S	Metro	X	X	X		X	X	X		X	As planned
W-16-31	Schnitzer	X	X	X	X	X	X				As planned
W-16-D	Schnitzer	X	X								As planned
W-16-I	Schnitzer	X	X	X		X	X	X			As planned
W-16-S	Schnitzer	X	X								As planned
W-18-D	PGE	X	X		X					X	As planned
W-18-I	PGE	X	X							X	As planned
W-18-S	PGE	X	X							X	As planned
W-19-D	Atofina	X	X	X		X				X	As planned
W-19-I	Atofina	X	X	X		X		X			As planned
W-19-S	Atofina	X	X	X		X		X			As planned
SG-NDL	BN/SF	X									As planned
SG-NDP	Wacker	X									As planned
SG-WDL	BN/SF	X									As planned

Note: An explanation for the minor variations from the Field Sampling Planis included in Section 7.0 of the Focused Spring 2002 GMR
NAPL Non-aqueous-phase liquid
VOCs Volatile organic compounds
EPA Environmental Protection Agency
X Planned for measurement or analysis during Focused Spring 2002 Groundwater Characterization Event
X Analytical parameters added beyond those proposed in Spring 2002 FSP.

TABLE 2
Groundwater Elevation and NAPL Thickness Measurements, April 2002
Focused Spring 2002 Groundwater Characterization Event
RPAC - Portland Site

Site ID	Type	Location/Property	Depth to Water (Feet BMP)	Date	Time	Measuring Point Elevation (Feet AMSL)	Groundwater Elevation (Feet AMSL)	LNAPL Thickness (Feet)	DNAPL Thickness (Feet)
AL2-17	Well	RPAC - LAKE AREA	11.71	4/2/2002	16:03	41.77	30.06	None	None
AL2-32	Well	RPAC - LAKE AREA	13.82	4/2/2002	15:59	41.41	27.59	None	None
AL2-46	Well	RPAC - LAKE AREA	14.08	4/2/2002	16:05	41.77	27.69	None	None
AL4-47	Well	RPAC - LAKE AREA	12.60	4/2/2002	15:24	40.24	27.64	None	None
AL5-19	Well	RPAC - LAKE AREA	12.20	4/2/2002	15:07	40.07	27.87	None	None
AL5-35	Well	RPAC - LAKE AREA	12.50	4/2/2002	15:09	39.54	27.04	None	None
AL5-62	Well	RPAC - LAKE AREA	12.61	4/2/2002	15:12	39.59	26.98	None	None
AL6-96	Well	RPAC - LAKE AREA	15.29	4/2/2002	14:42	38.72	23.43	None	None
ASW-01A	Well	METRO	6.16	4/2/2002	14:15	38.81	32.65	None	None
ASW-04	Well	METRO	6.83	4/2/2002	14:28	40.76	33.93	None	None
ASW-05	Well	METRO	7.57	4/2/2002	13:28	*	NA	None	None
ASW-06	Well	METRO	6.26	4/2/2002	13:43	40.10	33.84	None	None
ASW-08	Well	METRO	6.50	4/2/2002	14:07	36.72	30.22	None	None
BST2W-61	Well	RPAC - LAKE AREA	13.61	4/2/2002	16:08	41.13	27.52	None	None
BST5W-74	Well	RPAC - LAKE AREA	13.18	4/2/2002	15:19	39.84	26.66	None	None
BTB-4A-84	Well	RPAC - LAKE AREA	14.94	4/2/2002	14:55	39.50	24.56	None	None
BTB-4B-25	Well	RPAC - LAKE AREA	9.57	4/2/2002	14:51	39.54	29.97	None	None
BTB-4B-55	Well	RPAC - LAKE AREA	15.21	4/2/2002	14:52	39.81	24.60	None	None
KM-MW-2	Well	KINDER MORGAN	23.49	4/2/2002	09:10	50.68	27.19	None	None
KM-MW-5	Well	KINDER MORGAN	21.99	4/2/2002	09:14	50.78	28.79	None	None
MW-01-26	Well	RPAC - HERBICIDE AREA	10.57	4/2/2002	13:38	49.89	39.32	None	None
MW-01-41	Well	RPAC - HERBICIDE AREA	12.71	4/2/2002	13:40	49.53	36.82	None	None
MW-01-56	Well	RPAC - HERBICIDE AREA	12.96	4/2/2002	13:42	49.70	36.74	None	None
MW-01-76	Well	RPAC - HERBICIDE AREA	15.51	4/2/2002	13:36	47.70	32.19	None	None
MW-02-26	Well	RPAC - HERBICIDE AREA	11.67	4/3/2002	09:32	48.09	36.42	None	None
MW-02-46	Well	RPAC - HERBICIDE AREA	11.51	4/3/2002	09:30	47.91	36.40	None	None
MW-02-62	Well	RPAC - HERBICIDE AREA	11.09	4/3/2002	09:27	48.00	36.91	None	None
MW-03-27	Well	RPAC - HERBICIDE AREA	12.43	4/3/2002	09:12	48.29	35.86	None	None
MW-03-49	Well	RPAC - HERBICIDE AREA	12.39	4/3/2002	09:04	48.28	35.89	None	None
MW-03-68	Well	RPAC - HERBICIDE AREA	12.31	4/3/2002	09:06	48.25	35.94	None	None
MW-03-81	Well	WACKER	18.41	4/2/2002	09:41	35.54	17.13	None	None
MW-03-I	Well	WACKER	18.94	4/2/2002	09:33	36.43	17.49	None	None
MW-03-S	Well	WACKER	11.86	4/2/2002	09:36	36.35	24.49	None	None

TABLE 2
Groundwater Elevation and NAPL Thickness Measurements, April 2002
Focused Spring 2002 Groundwater Characterization Event
RPAC - Portland Site

Site ID	Type	Location/Property	Depth to Water (Feet BMP)	Date	Time	Measuring Point Elevation (Feet AMSL)	Groundwater Elevation (Feet AMSL)	LNAPL Thickness (Feet)	DNAPL Thickness (Feet)
MW-04-27	Well	RPAC - HERBICIDE AREA	14.81	4/3/2002	09:52	47.53	32.72	None	None
MW-04-47	Well	RPAC - HERBICIDE AREA	14.51	4/3/2002	09:55	47.65	33.14	None	None
MW-04-63	Well	RPAC - HERBICIDE AREA	14.59	4/3/2002	09:59	48.00	33.41	None	None
MW-05-24	Well	RPAC - HERBICIDE AREA	7.60	4/3/2002	10:20	37.83	30.23	None	None
MW-05-34	Well	RPAC - HERBICIDE AREA	7.78	4/3/2002	10:23	37.83	30.05	None	None
MW-05-52	Well	RPAC - HERBICIDE AREA	10.00	4/3/2002	10:26	37.70	27.70	None	None
MW-05-70	Well	RPAC - HERBICIDE AREA	10.82	4/3/2002	10:36	38.33	27.51	None	None
MW-06-S	Well	WACKER	11.36	4/2/2002	10:14	36.37	25.01	None	None
MW-07-S	Well	WACKER	12.44	4/2/2002	10:06	37.32	24.88	None	None
MW-08-27	Well	RPAC - HERBICIDE AREA	23.25	4/9/2002	15:30	48.23	24.98	6.63**	None
MW-08-46	Well	RPAC - HERBICIDE AREA	16.15	4/3/2002	10:35	48.11	31.96	None	None
MW-08-64	Well	RPAC - HERBICIDE AREA	15.98	4/3/2002	10:25	47.97	31.99	None	None
MW-09-23	Well	RPAC - HERBICIDE AREA	12.55	4/3/2002	08:50	47.03	34.48	None	None
MW-09-42	Well	RPAC - HERBICIDE AREA	13.30	4/3/2002	08:53	47.64	34.34	None	None
MW-09-58	Well	RPAC - HERBICIDE AREA	12.29	4/3/2002	08:55	46.21	33.92	None	None
MW-09-80	Well	RPAC - HERBICIDE AREA	12.49	4/3/2002	08:47	46.67	34.18	None	None
MW-10-24	Well	RPAC - INSECTICIDE AREA	11.69	4/2/2002	15:24	46.21	34.52	None	None
MW-10-44	Well	RPAC - INSECTICIDE AREA	12.04	4/2/2002	15:26	46.54	34.50	None	None
MW-10-57	Well	RPAC - INSECTICIDE AREA	11.95	4/2/2002	15:28	46.66	34.71	None	None
MW-11-24	Well	RPAC - INSECTICIDE AREA	9.44	4/2/2002	14:52	44.01	34.57	None	None
MW-11-37	Well	RPAC - INSECTICIDE AREA	9.14	4/2/2002	14:54	43.80	34.66	None	None
MW-11-56	Well	RPAC - INSECTICIDE AREA	8.59	4/2/2002	14:56	43.63	35.04	None	None
MW-11-79	Well	RPAC - INSECTICIDE AREA	8.57	4/2/2002	14:59	44.14	35.57	None	None
MW-12-27	Well	RPAC - INSECTICIDE AREA	12.85	4/2/2002	13:20	50.22	37.37	None	None
MW-12-41	Well	RPAC - INSECTICIDE AREA	12.69	4/2/2002	13:25	50.08	37.39	None	None
MW-12-59	Well	RPAC - INSECTICIDE AREA	12.14	4/2/2002	13:26	49.58	37.44	None	None
MW-12-79	Well	RPAC - INSECTICIDE AREA	12.82	4/2/2002	13:15	50.08	37.26	None	None
P-07	Piezometer	RPAC - HERBICIDE AREA	14.59	4/3/2002	10:03	46.27	31.68	None	None
P-10	Piezometer	RPAC	9.44	4/3/2002	09:13	40.19	30.75	None	None
P-11	Piezometer	RPAC - HERBICIDE AREA	9.50	4/3/2002	09:03	39.29	29.79	None	None
PP-08	Piezometer	RPAC - LAKE AREA	10.26	4/2/2002	15:29	37.76	27.50	None	None
PZ-02-40	Piezometer	RTE 30/ COP ROW	36.29	4/2/2002	09:30	64.53	28.24	None	None
PZ-1-11	Piezometer	BNSF	6.46	4/2/2002	12:55	45.28	38.82	None	None

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TABLE 2
Groundwater Elevation and NAPL Thickness Measurements, April 2002
Focused Spring 2002 Groundwater Characterization Event
RPAC - Portland Site

Site ID	Type	Location/Property	Depth to Water (Feet BMP)	Date	Time	Measuring Point Elevation (Feet AMSL)	Groundwater Elevation (Feet AMSL)	LNAPL Thickness (Feet)	DNAPL Thickness (Feet)
RP-01-31	Well	BNSF	25.21	4/2/2002	08:50	35.38	10.17	None	None
RP-01-51	Well	BNSF	25.15	4/2/2002	08:53	35.28	10.13	None	None
RP-01-65	Well	BNSF	24.95	4/2/2002	08:56	35.00	10.05	None	None
RP-02-31	Well	ATOFINA	30.41	4/2/2002	10:15	40.12	9.71	None	None
RP-02-49	Well	ATOFINA	30.15	4/2/2002	10:17	39.83	9.68	None	None
RP-02-66	Well	ATOFINA	30.41	4/2/2002	10:20	39.70	9.29	None	None
RP-03-30R	Well	BNSF	14.84	4/2/2002	10:45	36.61	21.77	None	None
RP-03-52R	Well	BNSF	17.10	4/2/2002	10:42	36.60	19.50	None	None
RP-04-16	Piezometer	BNSF	9.88	4/2/2002	15:37	33.66	23.78	None	None
RP-04-41	Well	BNSF	7.37	4/2/2002	15:41	34.10	26.73	None	None
RP-05-16	Piezometer	BNSF	11.92	4/2/2002	16:11	40.54	28.62	None	None
RP-06-30	Well	BNSF	16.60	4/2/2002	11:03	37.10	20.50	None	None
RP-06-87	Well	BNSF	25.41	4/2/2002	11:00	37.20	11.79	None	None
RPW-02	Well	RPAC - INSECTICIDE AREA	9.99	4/2/2002	15:37	47.07	37.08	None	None
RPW-03	Well	RPAC - INSECTICIDE AREA	9.19	4/2/2002	15:13	43.94	34.75	None	None
RPW-05	Well	RPAC - HERBICIDE AREA	15.91	4/3/2002	09:24	49.83	33.92	None	None
SG-NDL	Staff Gauge	NORTH DOANE LAKE	4.05	4/3/2002	13:10	27.46	23.41	None	None
SG-NDP	Staff Gauge	NW DRAINAGE POND	5.66	4/2/2002	10:36	24.81	19.15	None	None
SG-WDL	Staff Gauge	WEST DOANE LAKE	2.12	4/2/2002	14:30	26.74	24.62	None	None
W-03-D	Well	GOULD	11.82	4/2/2002	12:08	32.47	20.65	None	None
W-03-I	Well	GOULD	8.04	4/2/2002	12:04	32.93	24.89	None	None
W-03-S	Well	GOULD	9.39	4/2/2002	11:57	34.17	24.78	None	None
W-04-89	Well	GOULD	10.68	4/2/2002	11:44	35.94	25.26	None	None
W-04-I	Well	GOULD	9.05	4/2/2002	11:31	32.52	23.47	None	None
W-04-S	Well	GOULD	6.85	4/2/2002	11:34	32.57	25.72	None	None
W-06-B	Well	RPAC - LAKE AREA	12.40	4/2/2002	15:59	39.96	27.56	None	None
W-06-D	Well	RPAC - LAKE AREA	9.65	4/2/2002	16:02	41.10	31.45	None	None
W-06-S	Well	RPAC - LAKE AREA	10.10	4/2/2002	15:57	39.55	29.45	None	None
W-08	Well	RPAC - LAKE AREA	8.32	4/2/2002	14:25	35.87	27.55	None	None
W-08-26	Well	RPAC - LAKE AREA	9.71	4/2/2002	14:20	38.66	28.95	None	None
W-08-74	Well	RPAC - LAKE AREA	12.54	4/2/2002	14:22	38.77	26.23	None	None
W-09	Well	RPAC - LAKE AREA	7.30	4/2/2002	14:11	34.88	27.58	None	None
W-09-116	Well	RPAC - LAKE AREA	17.26	4/2/2002	14:08	38.12	20.86	None	None

TABLE 2
Groundwater Elevation and NAPL Thickness Measurements, April 2002
Focused Spring 2002 Groundwater Characterization Event
RPAC - Portland Site

Site ID	Type	Location/Property	Depth to Water (Feet BMP)	Date	Time	Measuring Point Elevation (Feet AMSL)	Groundwater Elevation (Feet AMSL)	LNAPL Thickness (Feet)	DNAPL Thickness (Feet)
W-09-86	Well	RPAC - LAKE AREA	17.60	4/2/2002	14:04	38.54	20.94	None	None
W-10	Well	PUMP STATION	18.62	4/2/2002	09:11	31.99	13.37	None	None
W-11-B	Well	ESCO	26.46	4/2/2002	10:39	41.33	14.87	None	None
W-11-D	Well	ESCO	25.95	4/2/2002	10:43	40.09	14.14	None	None
W-11-I	Well	ESCO	25.78	4/2/2002	10:41	40.28	14.50	None	None
W-11-S	Well	ESCO	9.70	4/2/2002	10:45	40.90	31.20	None	None
W-12-D	Well	ESCO	20.76	4/2/2002	10:58	41.63	20.87	None	None
W-12-I	Well	ESCO	20.62	4/2/2002	11:02	41.66	21.04	None	None
W-12-S	Well	ESCO	11.79	4/2/2002	10:55	41.41	29.62	None	None
W-15-D	Well	METRO	11.34	4/2/2002	13:59	40.53	29.19	None	None
W-15-I	Well	METRO	10.68	4/2/2002	13:57	40.72	30.04	None	None
W-15-S	Well	METRO	10.82	4/2/2002	13:55	40.82	30.00	None	None
W-16-31	Well	SCHNITZER	6.80	4/2/2002	11:47	33.70	26.90	None	None
W-16-D	Well	SCHNITZER	10.18	4/2/2002	11:52	35.44	25.26	None	None
W-16-I	Well	SCHNITZER	10.10	4/2/2002	11:50	35.42	25.32	None	None
W-16-S	Well	SCHNITZER	7.11	4/2/2002	11:54	35.07	27.96	None	None
W-18-D	Well	UPGRADIENT	18.41	4/2/2002	08:55	55.70	37.29	None	None
W-18-I	Well	UPGRADIENT	16.89	4/2/2002	08:50	54.73	37.84	None	None
W-18-S	Well	UPGRADIENT	16.32	4/2/2002	08:52	55.23	38.91	None	None
W-19-D	Well	ATOFINA	24.42	4/2/2002	09:59	35.12	10.70	None	None
W-19-I	Well	ATOFINA	24.85	4/2/2002	09:55	35.34	10.49	None	None
W-19-S	Well	ATOFINA	24.63	4/2/2002	09:58	35.20	10.57	None	None

BMP Below Measuring Point
NA Not Applicable
AMSL Above Mean Sea Level, in City of Portland (COP) datum
LNAPL Light Non-Aqueous-Phase Liquid
DNAPL Dense Non-Aqueous-Phase Liquid
* Measuring Point Elevation Not Available
** An estimated NAPL thickness of 8.5 feet and a depth to water of 23.14 feet BMP were recorded on April 3, 2002, using an electronic water level probe; this monitoring well was re-measured using an interface probe on April 9, 2002, with results as indicated in this table.

Note: Groundwater Elevations have not been adjusted for potential displacement by LNAPL. NAPL was measured within bailers retrieved from monitoring wells, on well sounding equipment, and/or through the use of an interface probe. This is considered to approximate the thickness of NAPL in the monitoring well. The NAPL thickness measured within bailers retrieved from monitoring wells does not represent the actual thickness of NAPL in the formation.

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TABLE 3
Groundwater Elevation and NAPL Thickness Measurements
For Select Wells Following Wacker Property Well Installation Activities, May 2002
Focused Spring 2002 Groundwater Characterization Event
RPAC - Portland Site

Site ID	Type	Location/Property	Depth to Water (Feet BMP)	Date	Time	Measuring Point Elevation (Feet AMSL)	Groundwater Elevation (Feet AMSL)	LNAPL Thickness (Feet)	DNAPL Thickness (Feet)
RP-01-31	Well	BNSF	23.86	5/3/2002	16:19	35.38	11.52	None	None
RP-01-51	Well	BNSF	23.91	5/3/2002	16:20	35.28	11.37	None	None
RP-01-65	Well	BNSF	23.75	5/3/2002	16:21	35.00	11.25	None	None
RP-02-31	Well	ATOFINA	29.46	5/3/2002	14:53	40.12	10.66	None	None
RP-02-66	Well	ATOFINA	29.41	5/3/2002	14:55	39.70	10.29	None	None
RP-06-30	Well	BNSF	16.82	5/3/2002	16:13	37.10	20.28	None	None
RP-06-87	Well	BNSF	24.55	5/3/2002	16:14	37.20	12.65	None	None
RP-07-30	Well	WACKER	23.71	5/3/2002	11:00	35.26	11.55	None	None
RP-07-55	Well	WACKER	26.30	5/3/2002	12:15	35.20	8.90	None	None
RP-07-84	Well	WACKER	26.32	5/3/2002	13:15	35.22	8.90	None	None
RP-07-119	Well	WACKER	26.23	5/3/2002	9:30	35.13	8.90	None	None
W-19-D	Well	ATOFINA	23.48	5/3/2002	15:20	35.12	11.64	None	None
W-19-I	Well	ATOFINA	23.79	5/3/2002	15:15	35.34	11.55	None	None
W-19-S	Well	ATOFINA	23.42	5/3/2002	15:10	35.20	11.78	None	None

BMP Below Measuring Point
AMSL Above Mean Sea Level, in City of Portland (COP) datum
LNAPL Light Non-Aqueous-Phase Liquid
DNAPL Dense Non-Aqueous-Phase Liquid
Note: Wells other than the RP-07 series well cluster were added to this groundwater level monitoring event to facilitate correlation to April water level monitoring event.

TABLE 4
Groundwater Field Measurements
Focused Spring 2002 Groundwater Characterization Event
RPAC - Portland Site

Field Sheet Well Number	Database Site ID	Date	Approx. Start Time	Approx. Finish Time	Purge Rate (L/min)	pH (SU)	Specific Conductivity (mS)	Temp (C)	Dissolved Oxygen (mg/L)	ORP (mV)	Turbidity (NTUs)	Ferrous Iron (mg/L)
AL2-17	AL2-17	4/22/2002	11:04	11:30	0.3	6.97	1.334	13.81	0.93	-162.2	--	--
AL2-32	AL2-32	4/19/2002	12:15	13:30	0.3	6.7	11.74	18.49	1.92	-94.2	16.7	6.0
AL2-46	AL2-46	4/22/2002	09:15	10:05	0.3	7.05	1.765	17.59	0.58	-117.1	16.3	3.7
ASW-01A	ASW-01A	4/11/2002	14:00	14:45	0.3	5.96	0.266	13.27	5.30	17.5	7.16	0.0
BST2W-61	BST2W-61	4/19/2002	13:50	14:45	0.3	6.98	2.077	17.54	2.11	-114.5	9.68	2.4
MW-03-81	MW-03-81	4/16/2002	10:40	12:00	0.3	7.12	0.699	12.62	2.38	6.7	18.7	3.8
MW-03-I	MW-03-I	4/16/2002	09:50	10:35	0.3	6.86	1.616	12.90	4.95	13.2	6.56	4.8
MW-03-S	MW-03-S	4/16/2002	08:50	09:50	0.3	6.62	0.305	10.50	1.52	17.9	119	5.4
MW-04-27	MW-04-27	4/19/2002	09:40	10:26	0.3	6.75	2.657	14.30	2.67	-90.2	3.49	4.0
MW-04-47	MW-04-47	4/19/2002	08:50	09:48	0.3	6.76	1.263	16.87	1.46	-54.4	12.7	3.8
MW-05-52	MW-05-52	4/22/2002	14:15	14:43	0.3	6.7	0.458	16.36	1.74	-55.5	4.29	2.6
MW-05-70	MW-05-70	4/22/2002	13:00	13:54	0.3	7.92	0.624	15.97	1.42	-103.7	15.4	0.6
W-08-26	W-08-26	4/16/2002	13:20	14:50	0.3	7.25	4.640	12.88	0.22	13.8	30.1	4.1
W-08-26	W-08-26	4/18/2002	11:10	12:15	0.3	6.93	3.195	13.32	2.69	-164.7	44.1	--
MW-09-23	MW-09-23	4/17/2002	13:40	14:48	0.3	7.15	0.568	13.24	1.07	221.0[3]	3.36	5.1
MW-09-42	MW-09-42	4/17/2002	11:05	12:15	0.3	7.08	0.652	17.36	3.35	218.1[3]	6.85	3.2
MW-09-58	MW-09-58	4/18/2002	08:30	09:43	0.3	7.01	0.247	15.57	2.74	-65.3	47.6	2.2
MW-09-80	MW-09-80	4/18/2002	10:00	10:40	0.3	7.13	0.263	14.79	0.78	-20.3	62.8	0.4
MW-10-24	MW-10-24	4/15/2002	08:45	09:45	0.3	6.96	0.266	12.65	4.11	1.0	5.38	0.0
MW-10-44	MW-10-44	4/15/2002	09:45	10:50	0.3	6.76	0.372	15.90	1.60	-5.6	11.4	6.4
MW-10-57	MW-10-57	4/15/2002	10:45	11:45	0.3	7.42	0.293	14.59	0.75	5.6	6.80	3.6
MW-11-24	MW-11-24	4/12/2002	13:15	14:13	0.3	7.2	0.547	12.48	1.46	-7.8	2.37	0.0
MW-11-37	MW-11-37	4/12/2002	11:05	11:50	0.2	6.92	0.309	15.68	0.98	-8.7	20.5	0.0
MW-11-56	MW-11-56	4/12/2002	10:15	11:04	0.3	7.67	0.354	14.21	0.66	-27.7	12.2	3.2
MW-11-79	MW-11-79	4/12/2002	14:20	15:00	0.3	7.64	0.288	13.99	0.54	-13.4	1.52	1.3
RP-01-31	RP-01-31	4/5/2002	14:00	14:30	0.3	6.78	0.365	18.04	0.00[3]	-22.4	--[2]	--[1]
RP-01-51	RP-01-51	4/8/2002	08:40	09:30	0.3	6.92	3.149	14.85	0.14	-29.4	5.44	0.4
RP-01-65	RP-01-65	4/5/2002	12:00	13:45	0.3	6.55	4.495	14.32	0.01[3]	-19.2	0.75	0.0
RP-02-31	RP-02-31	4/4/2002	14:40	15:00	+	--	--	--	--	--	--[2]	--[1]
RP-02-49	RP-02-49	4/4/2002	15:00	15:30	0.2	6.03	22.32	18.83	0.10	-28.0	8.44	0.0
RP-02-49	RP-02-49	5/3/2002	14:50	15:45	0.3	5.97	35.67	17.55	0.83	116.8	11.6	--
RP-02-66	RP-02-66	4/4/2002	13:45	14:40	0.2	5.09	53.93	17.80	0.38	-21.4	1.51	--
RP-03-30R	RP-03-30R	4/10/2002	12:40	13:15	0.3	7.15	0.436	15.65	1.60	-36.5	4.04	4.0
RP-03-52R	RP-03-52R	4/10/2002	11:50	12:30	0.3	6.72	0.613	14.66	1.46	-10.8	1.46	0.5
RP-04-16	RP-04-16	4/18/2002	14:10	14:45	0.3	6.70	0.518	10.17	0.64	-68.6	3.71	3.0
RP-04-41	RP-04-41	4/18/2002	13:15	14:22	0.3	6.58	0.310	13.88	1.12	64.7	15.3	0.0
RP-06-30	RP-06-30	4/10/2002	09:50	10:33	0.2	7.16	0.388	12.24	0.64	-46.1	1.17	4.2
RP-06-87	RP-06-87	4/10/2002	09:00	09:30	0.4	7.12	2.649	13.36	7.87	-23.8	7.98	4.2
RP-07-S (30)	RP-07-30	5/3/2002	11:00	12:15	0.2	6.37	0.985	13.99	2.11	9.1	1.27	4.6
RP-07-I (55)	RP-07-55	5/3/2002	12:15	13:00	0.2	6.39	1.444	16.23	2.61	-1.0	15.2	3.8
RP-07-D (84)	RP-07-84	5/3/2002	13:15	14:00	0.2	6.60	5.806	16.14	4.04	53.8	163	0.0
RP-07-B (119)	RP-07-119	5/3/2002	09:30	10:58	0.2	6.45	3.099	14.65	0.66	-11.8	1.33	0.2
RPW-02	RPW-02	4/12/2002	09:00	09:50	0.2	7.35	0.419	15.90	1.66	-29.7	3.40	2.2
W-03-I	W-03-I	4/8/2002	13:20	14:15	0.2	5.79	4.387	15.78	0.91	-46.5	11.3	7.8

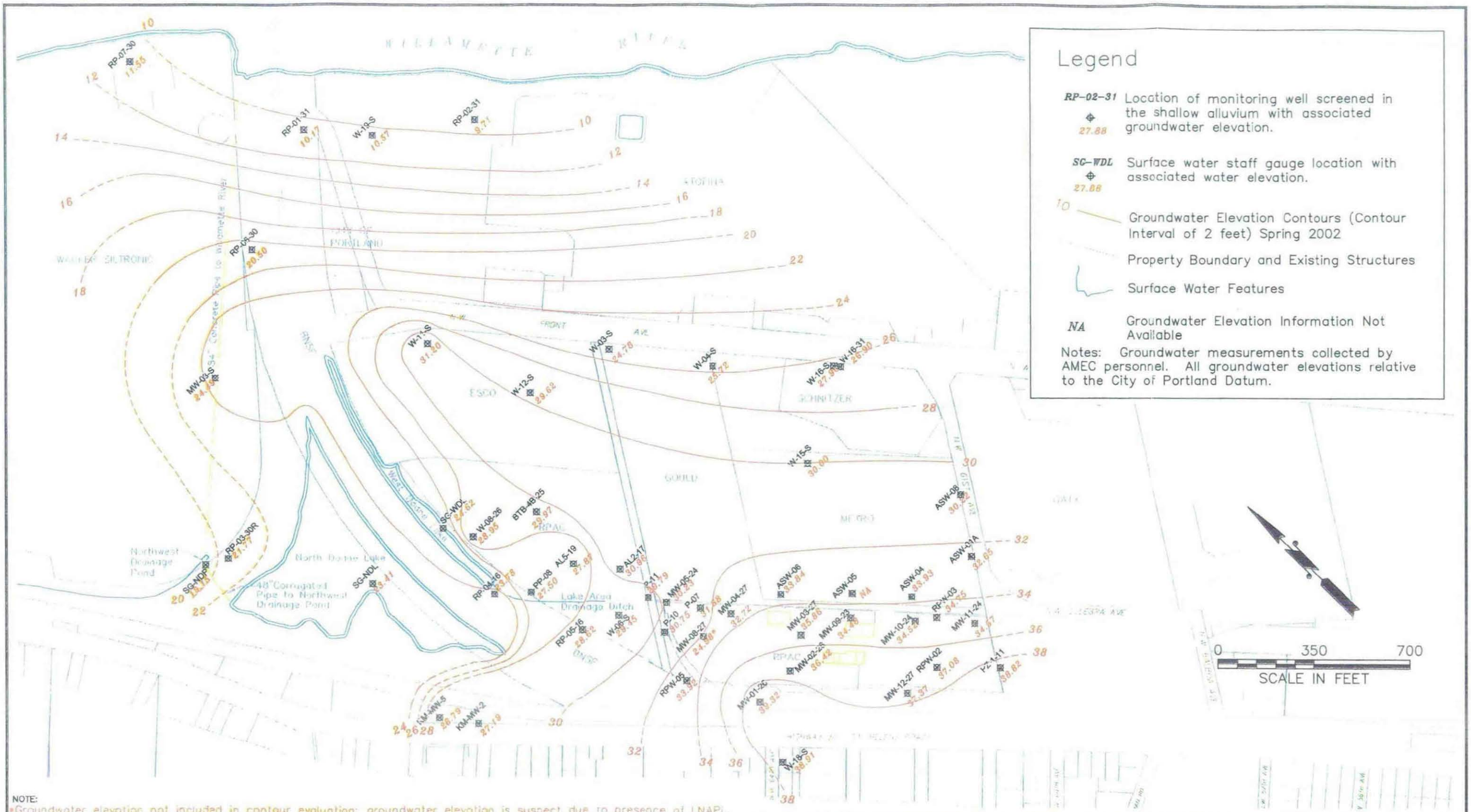
TABLE 4
Groundwater Field Measurements
Focused Spring 2002 Groundwater Characterization Event
RPAC - Portland Site

Field Sheet Well Number	Database Site ID	Date	Approx. Start Time	Approx. Finish Time	Purge Rate (L/min)	pH (SU)	Specific Conductivity (mS)	Temp (C)	Dissolved Oxygen (mg/L)	ORP (mV)	Turbidity (NTUs)	Ferrous Iron (mg/L)
W-04-89	W-04-89	4/8/2002	14:45	15:30	0.3	6.89	0.573	14.97	0.49	-48.5	27.5	4.0
W-08	W-08	4/17/2002	09:00	09:50	0.3	6.69	6.791	14.28	0.14	215.7[3]	5.56	4.8
W-08-74	W-08-74	4/16/2002	13:20	14:10	0.3	7.26	0.695	13.80	4.40	23.4	1.67	5.0
W-09-116	W-09-116	4/15/2002	14:00	15:20	0.3	6.87	2.333	13.95	3.85	24.6	3.32	3.0
W-11-B	W-11-B	4/9/2002	09:45	11:45	0.3	7.25	2.72	13.62	7.14	-54.5	16.5	4.6
W-11-D	W-11-D	4/9/2002	09:15	10:15	0.3	6.97	3.86	14.99	5.03	-29.4	500	2.8
W-11-I	W-11-I	4/9/2002	11:30	12:35	0.3	6.91	0.937	15.35	1.26	-59.6	1.33	5.2
W-11-S	W-11-S	4/9/2002	11:02	12:55	0.3	12.34	1.084	11.53	2.33	-57.9	1.47	0.0
W-15-D	W-15-D	4/11/2002	11:45	12:30	0.2	6.37	0.584	14.31	1.35	-1.4	8.92	4.0
W-15-I	W-15-I	4/11/2002	09:00	10:20	0.3	6.41	3.357	17.03	1.24	-41.6	16.7	6.4
W-15-S	W-15-S	4/11/2002	10:45	11:30	0.2	7.12	0.536	12.84	0.73	-19.9	1.01	0.0
W-16-31	W-16-31	4/8/2002	10:35	11:30	0.3	7.14	1.809	15.88	0.0	-129.4	68.2	6.4
W-16-I	W-16-I	4/8/2002	11:30	11:50	0.2	6.87	0.580	14.46	0.0	-74.4	11.0	6.0
W-18-D	W-18-D	4/4/2002	09:00	09:48	0.3	7.33	0.257	13.35	2.75	-31.6	1.58	0.8
W-18-I	W-18-I	4/4/2002	10:45	12:30	0.2	6.59	0.226	13.41	0.44	-39.6	19.8	0.0
W-18-S	W-18-S	4/4/2002	09:10	11:30	0.2	6.48	0.335	14.92	0.58	-45.3	3.26	0.0
W-19-D	W-19-D	4/5/2002	08:30	09:45	0.2	6.65	3.609	14.48	0.00	-17.8	18.2	0.0
W-19-I	W-19-I	4/5/2002	08:30	11:00	0.3	6.52	4.648	15.52	0.00[3]	-19.1	6.88	0.0
W-19-S	W-19-S	4/5/2002	08:30	09:50	+	--	--	--	--	--	HT	--

+	Well purged dry
--	Groundwater not tested for this parameter, or information is not applicable or was not recorded
--[1]	Groundwater was too turbid to obtain readings
--[2]	Out of range
[3]	Measurement suspect due to equipment-related problems
HT	Very high turbidity (based on visual observation)
ORP	Oxidation-reduction potential
L/min	Liters per minute
BMP	Below measuring point
SU	Standard pH units
uS	MicroSiemens
C	Degrees Celsius
mg/L	Milligrams per liter
mV	Millivolts

Notes: a) Field measurements are indicative of steady state conditions and were the final measurements before groundwater sample collection.
b) Field measurements for pH, specific conductivity, temperature, dissolved oxygen, and ORP were collected using a YSI 600XL sonde and controller. Field turbidity measurements were collected using a Hach model 2100P portable turbidimeter. Ferrous iron measurements were obtained using a Hach field test kit.

FIGURES



NOTE:
*Groundwater elevation not included in contour evaluation; groundwater elevation is suspect due to presence of LNAPL.

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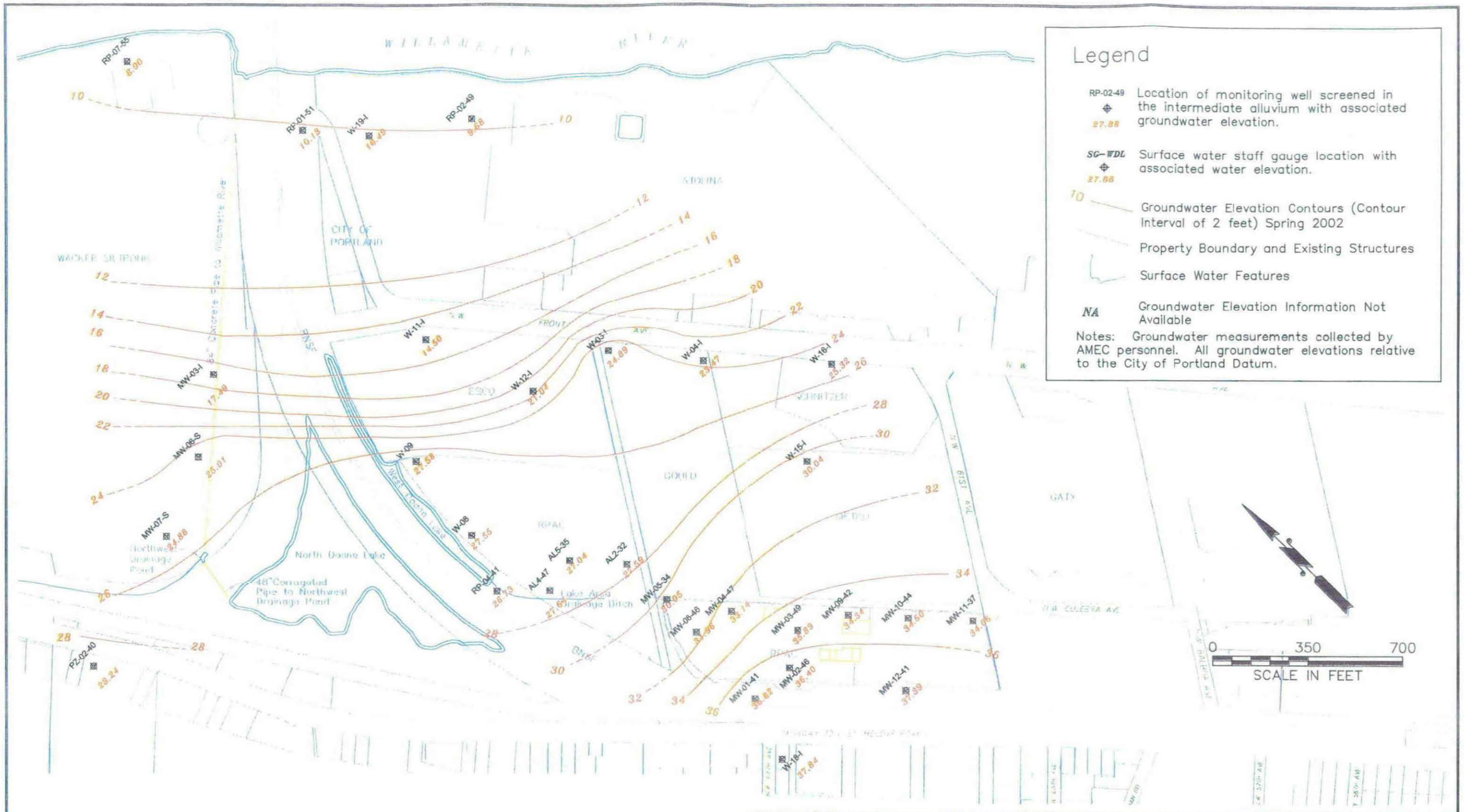
7376 S.W. Durham Road
Portland, OR, U.S.A. 97224

W.O.	0-61M-10703T43
DESIGN	JF
DRAWN	HWN
DATE	JULY 2002
SCALE	1"=350'

FIGURE 1
GROUNDWATER ELEVATION MAP
SHALLOW ALLUVIUM
SPRING 2002
RPAC - PORTLAND SITE

AMEC DRAWING NO. K:\10000\10700\10703\Task 43 Groundwater Monitoring\2002 Spring GMR\Figures\Spring_2002_GW_Shallow.dwg



Legend

RP-02-49 — Location of monitoring well screened in the intermediate alluvium with associated groundwater elevation.

SC-WDL 27.88 — Surface water staff gauge location with associated water elevation.

10 — Groundwater Elevation Contours (Contour Interval of 2 feet) Spring 2002

Property Boundary and Existing Structures

Surface Water Features

NA — Groundwater Elevation Information Not Available

Notes: Groundwater measurements collected by AMEC personnel. All groundwater elevations relative to the City of Portland Datum.

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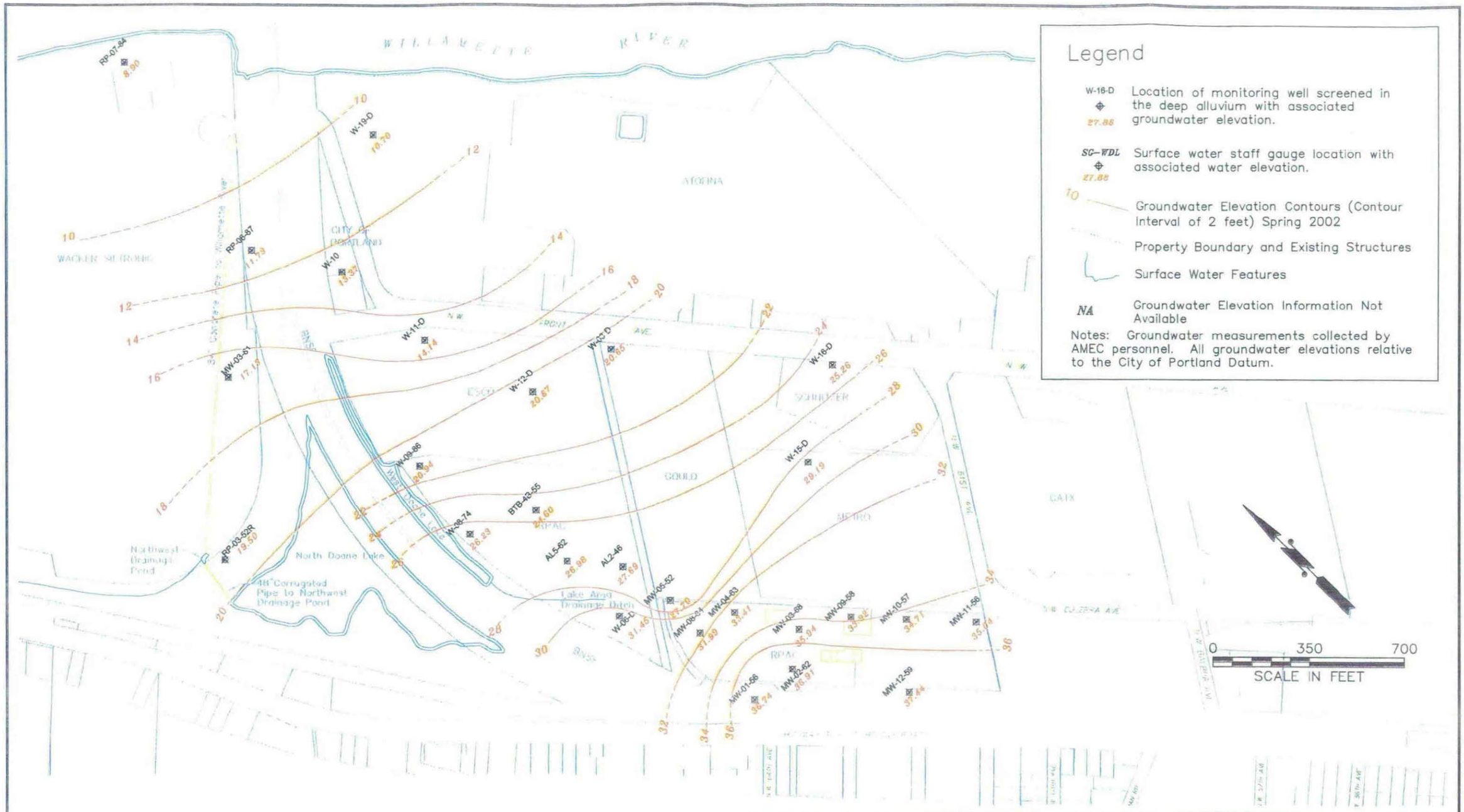
W.O.	0-61M-10703T43
DESIGN	JF
DRAWN	HWN
DATE	JULY 2002
SCALE	1"=350'

FIGURE 2
GROUNDWATER ELEVATION MAP
INTERMEDIATE ALLUVIUM
SPRING 2002
RPAC - PORTLAND SITE

AMEC DRAWING NO. K:\10000\10700\10703\Task 43 Groundwater Monitoring\2002 Spring GMR\Figures\Spring_2002_GW_Intermediate.dwg



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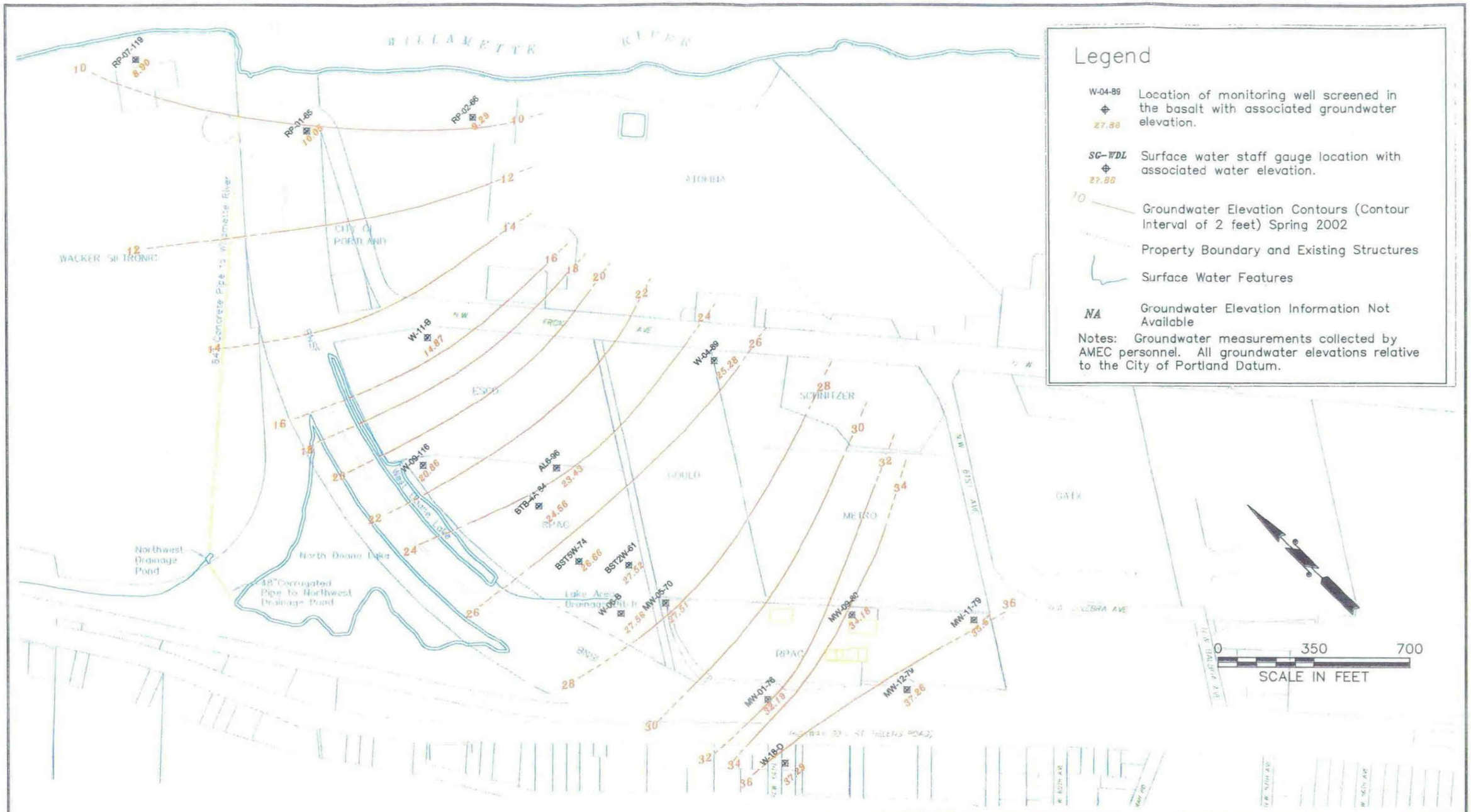
W.O.	0-61M-10703T43
DESIGN	JF
DRAWN	HWN
DATE	JULY 2002
SCALE	1"=350'

FIGURE 3
GROUNDWATER ELEVATION MAP
DEEP ALLUVIUM
SPRING 2002
RPAC-PORTLAND SITE

AMEC DRAWING NO. K:\10000\10700\10703\Task 43 Groundwater Monitoring\2002 Spring GMR\Figures\Spring_2002_GW_Deep.dwg



Legend

W-04-89 — Location of monitoring well screened in the basalt with associated groundwater elevation.

SG-WDL 27.88 — Surface water staff gauge location with associated water elevation.

10 — Groundwater Elevation Contours (Contour Interval of 2 feet) Spring 2002

Property Boundary and Existing Structures

Surface Water Features

NA — Groundwater Elevation Information Not Available

Notes: Groundwater measurements collected by AMEC personnel. All groundwater elevations relative to the City of Portland Datum.

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W.O.	0-61M-10703T43
DESIGN	TARW
DRAWN	HWN
DATE	JULY 2002
SCALE	1"=350'

FIGURE 4
GROUNDWATER ELEVATION MAP
BASALT
SPRING 2002
RPAC-PORTLAND SITE

AMEC DRAWING NO. K:\10000\10700\10703\Task 43 Groundwater Monitoring\2002 Spring GMR\Figures\Spring_2002_GW_Basalt.dwg

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DANE LAKE LEVEL II AQUATIC ECOLOGICAL RISK ASSE
RPAC - PORTLAND SITE

October 15, 2002

Submitted to:

amec

NORTH DOANE LAKE LEVEL II AQUATIC ECOLOGICAL RISK ASSESSMENT
RPAC - PORTLAND SITE

October 15, 2002

Submitted to:

Oregon Department of Environmental Quality
Northwest Region
2020 S.W. 4th Avenue, Suite 400
Portland, Oregon 97201

Prepared for:

RPAC
One Copely Parkway, Suite 309
Morrisville, North Carolina 27560

Submitted by:

AMEC Earth & Environmental, Inc.
7376 S.W. Durham Road
Portland, Oregon 97224

0-61M-10703-0/Task 23

amec

October 15, 2002

0-61M-10703-0/Task 23

Eric L. Blischke
Oregon Department of Environmental Quality
Northwest Region
2020 SW Fourth Avenue, Suite 400
Portland, Oregon 97201-4987

Dear Mr. Blischke:

Re: North Doane Lake Level II Aquatic Ecological Risk Assessment
RPAC - Portland Site

On behalf of RPAC, AMEC Earth & Environmental, Inc. (AMEC) is submitting to the Oregon Department of Environmental Quality (DEQ) the enclosed North Doane Lake Level II Aquatic Ecological Risk Assessment (NDL Level II AERA). One clipped copy and three hard copies of the report are enclosed per DEQ's request.

Please contact Roger Gresh at (503) 639-3400 if you have any questions regarding this report.

Sincerely,

AMEC Earth & Environmental, Inc.

Roger Gresh, P.G.
Project Manager

Kristin Lawrence
Risk Assessor

HWN/lmp

Encl.: North Doane Lake Level II Aquatic Ecological Risk Assessment

c: R. Ferguson, RPAC
J. Benedict, CHBH&L

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Appendix E Environmental Science & Assessment, LLC Memorandum

SCOEPA00006868

LIST OF ACRONYMS

AMEC	AMEC Earth and Environmental, Inc.
CDD	Chlorinated dibenzo-dioxin
COI	Constituent of Interest
CPEC	Constituent of Potential Ecological Concern
CSM	Conceptual Site Model
DEQ	Oregon Department of Environmental Quality
EC	Environmental Concentration
E&E	Ecology and Environment, Inc.
EPA	U.S. Environmental Protection Agency
ERA	Ecological Risk Assessment
ES&A	Environmental Science & Assessment LLC
FSP	Field Sampling Plan
HASP	Health and Safety Plan
HSI	Habitat Suitability Index .
IRAM	Interim Remedial Action Measure
MDL	Maximum Method Detection Limit
NDL	North Doane Lake
NDP	Northwest Drainage Pond
NMFS	National Marine Fisheries Service
ODFW	Oregon Department of Fish and Wildlife
ONHP	Oregon Natural Heritage Program
PBT	Persistent Bioaccumulative Toxin
PER	Potential Ecological Receptors
QAPP	Quality Assurance Project Plan
RI	Remedial Investigation
RIWP	Remedial Investigation Work Plan
RRIWP	Remaining Remedial Investigation Work Plan
SLV	Screening Level Values
TMDP	Technical/Management Decision Points
TCDD	Tetrachlorinated dibenzo-dioxin
TEQ	Toxicity Equivalent
TOC	Total Organic Carbon
UCL	Upper Confidence Limit
USFWS	U.S. Fish and Wildlife Service
VOC	Volatile Organic Compound
WDL	West Doane Lake

SCOEPA00006869

EXECUTIVE SUMMARY

This North Doane Lake Level II Aquatic Ecological Risk Assessment (NDL Level II AERA) was prepared by AMEC Earth and Environmental, Inc. (AMEC) in accordance with Department of Environmental Quality (DEQ) guidelines. A Level I ERA for the terrestrial component of the ecological risk assessment was performed by DEQ and is included in the RI Work Plan prepared by E&E on behalf of DEQ (RIWP) (DEQ 1999). The northeastern portion of the Property (NDL area) is the only area that contains terrestrial habitat. Due to the area's small size and marginal habitat quality, DEQ (1999) concluded that a Level II ERA is not warranted for the terrestrial habitat. Without completing a Level I Aquatic ERA, DEQ also concluded that a Level II ERA is warranted for the aquatic ecosystem in the NDL area and the Willamette River. This Level II ERA evaluates the potential risk associated with NDL. The Level II ERA for the Willamette River will be completed at a later date.

The NDL Level II AERA integrates information on impacted media, Constituent of Potential Ecological Concern (CPECs), ecological receptors, preliminary candidate assessment endpoints, and known ecological effects into a set of complete exposure pathways likely to contribute to ecological risk at the Survey Area. This information can be to support one of three Technical/Management Decision Points (TMDPs) at the Site:

- No further ecological investigations at the ERA survey area;
- Continuation of the risk assessment process at the next level; or
- Undertake (beyond Level I only) a removal or remedial action.

Surface water and sediment are the potentially impacted media identified in this NDL Level II AERA. The only CPEC identified is total dioxin expressed as equivalent 2,3,7,8-TCDD TEQ. Site-specific ecological receptors identified for the Level II Survey Area were: black-tailed deer, beaver, great blue heron, common merganser, and mallard. The preliminary candidate assessment endpoints are: protection of terrestrial mammalian wildlife (black-tail deer and beaver) and water birds (great blue heron, common merganser, and mallard) from adverse effects to growth, reproduction or survival at the population level.

The exposure pathways most likely to be complete in the Level II Survey Area and, therefore, the most useful in identifying unacceptable ecological heath risks are:

- Black-tailed deer are potentially exposed to surface water via direct ingestion of surface water as drinking water. They also are potentially exposed to sediment

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(via ingestion) and surface water (via dermal absorption), but these pathways are expected to be minor and unlikely to pose a measurable risk.

- Beaver are potentially exposed to surface water via direct ingestion and dermal absorption. They also are exposed to sediment (via ingestion and dermal exposure), though these pathways are expected to be minor and unlikely to pose a measurable risk.
- The great blue heron is potentially exposed to surface water via direct ingestion; sediment via direct ingestion; and indirect ingestion of CPECs in prey and food items. Dermal absorption of CPECs in surface water and sediment are also potentially complete pathways, but these pathways are expected to be minor and unlikely to pose a measurable risk.
- The common merganser is potentially exposed to surface water via direct ingestion and dermal absorption; sediment via direct ingestion; and ingestion of CPECs in food.
- The mallard is potentially exposed to surface water via direct ingestion and dermal absorption, and to sediment via direct ingestion.

Based on the current information, RPAC proposes to perform a modified Level III / IV ERA for the Level II ERA Survey Area to focus the ecological risk assessment on the health effects of total dioxin expressed as equivalent 2,3,7,8-TCDD TEQ (the only CPEC) on the five preliminary candidate assessment endpoints. The scope of work for the modified Level III / IV ERA will be provided in the NDL Level III / IV ERA Work Plan. This work plan is anticipated to be completed in Spring 2003, and it is anticipated that the work plan will include sampling of surface water, sediment and tissue of biota for select COPCs.

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1.0 INTRODUCTION

This NDL Level II AERA was prepared by AMEC Earth and Environmental, Inc. (AMEC). The RPAC property is located at 6200 N.W. St. Helens Road in Portland, Oregon (see Figure 1). The geographic area evaluated in the Level II ERA (Level II ERA Survey Area) includes North Doane Lake (NDL) and the North Drainage Pond (NDP) area. This area is part of the RPAC Site and is adjacent to the northeast corner of the RPAC property (Figure 2). The purpose of this NDL Level II AERA is to collect and present those data and information needed to support effective risk management decisions for the Site. This NDL Level II AERA considers methodologies set forth in the Oregon Department of Environmental Quality's (DEQ's) *Guidance for Ecological Risk Assessment* (1998, 2000, 2001) and EPA guidance on risk assessment. This NDL Level II AERA also follows the protocol and procedures, as applicable, described in the following:

- The Consent Order (the Order) between the DEQ and RPAC dated July 8, 1999;
- Remedial Investigation Work Plan (RIWP) prepared by Ecology and Environment, Inc. (E&E) on behalf of DEQ (DEQ, 1999);
- The Draft Remaining Remedial Investigation Work Plan (Draft RRIWP) (AMEC, 2001a);
- The Final RPAC Project Management Plan (PMP) (AMEC, 2001b);
- DEQ's letter dated January 18, 2001 in response to the Draft RRIWP;
- RPAC's Response dated February 5, 2002 to DEQ's January 18, 2002 letter;
- RPAC's Second Response dated March 19, 2002 to DEQ's January 18, 2002 letter;
- The Level II ERA Site Survey Field Sampling Plan (FSP) dated April 1, 2002 (AMEC, 2002);
- The site-specific Health and Safety Plan (HASP) dated June 13, 2001 (AMEC, 2001c); and
- The site-specific Revised Quality Assurance Project Plan (QAPP) dated June 13, 2001 (AMEC, 2001d).

The DEQ ERA process consists of four distinct levels:

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- Level I Scoping
- Level II Screening
- Level III Baseline
- Level IV Field Baseline

Within and between these levels are a number of Technical/Management Decision Points (TMDPs). Based on the information developed and presented within a given level, these TMDPs determine one of three recommendations:

- No further ecological investigations at the ERA survey area, or
- Continuation of the risk assessment process at the next level, or
- Undertake (beyond Level I only) a removal or remedial action.

A Level I Scoping ERA was conducted for the RPAC Site by DEQ (1999). Based on the Level I ERA results (described in Section 1.3 below), the DEQ concluded a Level II ERA was needed. Six objectives were identified by DEQ for the NDL Level II AERA (DEQ, 2001):

1. Provide a comprehensive site description;
2. Identify: (a) site-specific ecologically important potential receptors; (b) relevant and complete exposure pathways between each source media of concern and these receptors; and (c) constituents of potential ecological concern (CPECs) from among the constituents of interest (COIs) previously identified for the Site;
3. Describe the physiochemical and toxicological properties of each CPEC, the related exposure pathways, and the potential adverse effects associated with each CPEC;
4. Define ecologically appropriate assessment endpoints;
5. Establish potential exposure links (i.e., transport pathways) between CPECs and site-specific potential receptors by means of a preliminary conceptual site model (CSM); and
6. Evaluate the potential for unacceptable site-related ecological risk.

To accomplish these NDL Level II AERA objectives, RPAC completed three main tasks:

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1. Existing information was reviewed (Sections 1.1 through 1.3);

2. A site survey was conducted (Section 2.0); and

3. NDL Level II AERA results were evaluated and summarized (Section 3.0).

Conclusions for the Level II ERA Survey Area were developed based on the results of these three tasks (see Section 4.0). DEQ (2001) also recommended that a regional map, a local map, and maps illustrating various site features accompany the Level II ERA. These maps are included as Figures 1 and 2.

1.1 Site Description and History

This section briefly describes the RPAC Site's physical features and relevant aspects of the Site's history. The area surrounding the RPAC property was once dominated by lakes, including Kittridge and Doane Lakes, which were interconnected through sloughs. Kittridge and Doane Lakes were filled as industrial development in the area occurred. The Tualatin Mountains adjoin the industrially developed area to the southwest and reach elevations of approximately 1,100 feet above mean sea level at their peak.

Surface water bodies at the RPAC Site currently include West Doane Lake (WDL), NDL, and a drainage pond (NDP) located north of NDL. The current understanding of hydrologic interaction between these water bodies is discussed below. A detailed study of the hydrology and hydrogeology of this area is in progress. When complete, it will be incorporated into the report for the Groundwater Transport Evaluation, which is part of the RPAC Site RI activities.

Inflow to WDL has historically included runoff from the RPAC facility, received via a drainage ditch leading from near the RPAC facility to the south end of the lake (the Lake Area Drainage Ditch). Stormwater runoff from the immediate area of the drainage ditch is currently directed to WDL. Historically, WDL outflow was directed to a drainage ditch extending from the north end of the lake to the Willamette River; however, this discharge was stopped in 1980 and the lake currently has no surface discharge. Water discharges from WDL to groundwater and is lost through evaporation. It is anticipated that WDL will be filled in as part of the site remedy; therefore, WDL is not included in the Level II ERA Survey Area.

NDL receives inflow from groundwater, stormwater runoff, and from one or more intermittent streams originating from higher elevations west of the railroad tracks and Highway 30. Under high water level conditions, discharge from NDL flows into a large-

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diameter pipe at the lake's northwest corner that directs flow into the NDP. Surface water from NDL also discharges to groundwater and is subject to evaporation.

The NDP receives inflow from NDL via the pipe mentioned above, from an intermittent stream west of the pond, and potentially from groundwater. The NDP discharges to an 84-inch-diameter pipe installed by the City of Portland (City) that directs flow to the Willamette River via City Outfall 22C, located just north of the steel railroad bridge. The pond water is also subject to evaporation. The NDP will be included considered part of NDL in this risk evaluation, due to their proximity and the direct surface water flow from NDL to NDP.

1.2 Summary of Level I ERA

A Level I ERA for the terrestrial component of the ecological risk assessment was performed by DEQ and is included in the RIWP (DEQ 1999). The northeastern portion of the Site (NDL and NDP area) is the only area that contains some terrestrial habitat. Blackberry bushes, grass, and wild peas provide the dominant plant cover in this habitat. While deer (Odocoileus hemionus), nutria (Myocastor coypus), and beaver (Castor canadensis) occur on the Site, the area is too small (approximately 13 acres) to support populations of these larger animals. Due to the area's small size and marginal habitat quality, the potential for significant terrestrial ecological risks to wildlife populations is considered unlikely. DEQ (1999) concluded that a Level II ERA is not warranted for the terrestrial habitat.

Without completing a Level I Aquatic ERA, DEQ also concluded that a Level II ERA is warranted for the NDL and Willamette River aquatic ecosystems. This Level II ERA only evaluates the potential risk associated with NDL. The Level II ERA for the Willamette River will be completed at a later date. The required scoping information that would have been collected for NDL during a Level I ERA, had such been performed, is incorporated into this NDL Level II AERA.

2.0 SITE SURVEY

The principal objective of the Level II ERA Site Survey was to verify and supplement existing information on wildlife and plant species presence and habitat condition. General habitat condition, plant species presence, plant community composition, percent plant cover, and signs or sightings of mammals, birds, amphibians, and reptiles were noted. Presence or potential presence of Federal and State protected "special status" receptors were noted, as was the presence of invasive plant species and non-native mammals, birds, amphibians, and reptiles. Direct observations and habitat evaluation model techniques were used in compiling the initial list of potential ecological (wildlife) receptors (PERs) for the ERA.

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AMEC and a subcontracted biologist from Environmental Site & Assessment (ES&A) conducted the Level II ERA Site Survey during Spring 2002, when plant and wildlife species diversity and numbers of individuals were expected to be maximal.

The Level II ERA Site Survey was conducted during three time periods (March 15, 2002, May 23, 2002, and June 17, 2002) and involved the following specific tasks:

- Mapping habitats;
- Identifying PERs present in each habitat; and
- Completing quantitative habitat suitability models for selected PERs.

A summary of data collected during the Level II ERA Site Survey, including a list of identified aquatic and terrestrial plants and animals, and signs of a given animal's presence (e.g., tracks in mud), is provided in Tables 1 and 2. Photographs of the area and vicinity are also included in Appendix A.

2.1 Habitat Mapping

The purpose of habitat mapping is to delineate and characterize wildlife habitat type and condition in the survey area (NDL and NDP). AMEC and DEQ agreed that a Level II Terrestrial ERA was not warranted and that a Level 2 Aquatic ERA was the appropriate next step for the Site (see Section 1.2). The habitat mapping is part of scoping information that would have been collected for NDL during a Level I Aquatic ERA, had such been performed. Therefore, the habitat mapping is incorporated into this NDL Level II AERA. The survey area was mapped according to habitat units listed in DEQ's ERA guidance for Level I Scoping (DEQ 1998). Completed Level I Scoping Attachments providing details for each of these habitat units can be found in Appendix B. Five primary habitat types were identified for the Level II ERA Survey Area: wooded; scrub/shrub; wetland; aquatic lentic (non-flowing); and aquatic lotic (flowing). Figure 2 illustrates the geographic extent of each habitat unit within the survey area. Site descriptions for each habitat type are summarized below. The location where each of the numbered photos was taken, and the direction in which each photo was taken are shown on Figure 2.

Terrestrial - Wooded Habitat Unit: A strip of wooded habitat runs along the railroad track on the southeast side of the survey area (Photo 1). Also, a small stand of trees grows along the northern border of the survey area (Figure 2, Photo 2). This habitat type covers approximately 2.5 acres or 18% of the survey area. Black cottonwood (Populus balsamifera spp. trichocarpa), red alder (Alnus rubra), and big-leaf maple (Acer macrophyllum) are the dominant tree species (Photo 3). The typical diameter at breast height (DBH) of these trees is 3 to 12 inches (Photo 4). English Ivy (Hedera

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helix) is a dominant understory species in this habitat. Flora and fauna observed or considered likely to be present in this habitat type are listed in Tables 1 and 2.

Terrestrial - Scrub/Shrub Habitat Unit: This habitat unit is composed of shrub and scrub vegetation and covers approximately 2.5 acres or 18% of the survey area. It has been altered by humans at some time in the past and currently is not regularly managed. This habitat type surrounds the NDP and occupies the non-forested banks of NDL (Figure 2 and Photos 5 - 7). Plant species found in this habitat are typical weed species, such as Scotchbroom (Cytisus scoparius) and Himalayan blackberry (Rubus discolor) (Photos 2, 8, and 9). Flora and fauna observed or considered likely to be present in this habitat type are listed in Tables 1 and 2.

Aquatic - Wetland Habitat Unit: Aquatic wetland habitats in the Level II ERA Survey Area were identified but not formally delineated. There are three variables in identifying or delineating wetlands: vegetation; soil type; and hydrology (United States Corps of Engineers, 1987). Vegetation and hydrology were used to identify wetlands during the Site Survey. Soil type was, however, not classified (Photos 10 and 11). Potential wetlands are identified in Figure 2 and represent approximately 10% of the area surveyed (approximately 1 acre). Species found here are common obligatory wetland species such as softstem bulrush (Schoenoplectus tabernaemontani), sedge (Carex spp.), reed canary grass (Phalaris arundinacea), and Himalayan blackberries. Flora and fauna observed or considered likely to be present in these wetland areas are listed in Tables 1 and 2.

Aquatic - Lentic Habitat Unit: Lentic habitats are non-flowing water bodies such as lakes, ponds, and reservoirs. NDL is the lentic habitat of the survey area (Photos 2, and 12 - 15) and represents approximately 54% of the area surveyed or 7 acres (Figure 2). Nutria (Myocastor coypus), mallards (Anas platyrhynchos), and Canada geese (Branta canadensis) are the most common species observed in NDL. Black-tailed deer (Odocoileus hemionus) tracks and great blue heron (Ardea herodias) tracks were identified at the border of NDL. Flora and fauna observed in these wetland areas or considered likely to be present are listed in Tables 1 and 2.

Aquatic - Lotic Habitat Unit: Lotic habitats are flowing water bodies such as rivers, streams, intermittent streams, or dry washes. The lotic habitat in the survey area (Figure 2) is the NDP (Photos 16 - 18 on Figure 2). During Fall 2001, this area was better characterized as a deeply pooled pond area; however, winter floods appear to have deposited a large gravel bar in the "pond" and it is now better characterized as a lotic habitat. Lotic habitat for the survey area covers approximately 0.1% of the area surveyed and is characterized by a narrow, shallow stream, which flows into a culvert. Flora and fauna observed in this habitat or considered likely to be present are listed in Tables 1 and 2.

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2.2 Identifying Potential Ecological Receptors (PERs)

Prior to conducting the Level II ERA Site Survey, a list of all wildlife species previously identified was compiled. Wildlife species not previously identified but potentially present (e.g., American robins) (Turdus migratorius) were added to this list. Five fields of information are included on the list: species common name; species scientific name; species classification (e.g., mammal); indication of presence (e.g., direct observation); and habitat unit where species was identified.

Three primary lines of evidence were used to identify new PERs and confirm/refute the presence of wildlife species previously identified:

1. Direct observation of wildlife species at the time of the Site Survey;
2. Physical evidence that wildlife species have at one time physically been in the Level II ERA Survey Area (such as nests, game trails, or scat); and
3. Identification of appropriate habitat in the Level II ERA Survey Area needed to support wildlife species.

The first two lines of evidence are qualitative in that they simply list without quantifying numbers of wildlife individuals present. The third line of evidence (habitat identification) uses a quantitative method to assess the likelihood of a given species in a given habitat and is discussed in the next section.

Flora and fauna identified from the March 15, 2002, May 23, 2002 and June 17, 2002 field surveys and other sources are presented in Tables 1 and 2, respectively. As specified on Tables 1 and 2, other sources include:

- Oregon Natural Heritage Program (ONHP) Database Search, October 15, 2001;
- Oregon Department of Fish and Wildlife (ODFW) Survey Letter for NDL, December 10, 1996;
- Woodward-Clyde Consultants species surveys (June 1993 and January 1995); and
- Table 1 from RPAC - Portland Site Natural Resources Evaluation conducted by Environmental Science & Assessment LLC (ES&A), (2002).

These documents are included in the above order in Appendix C.

A primary objective of the Level II ERA Site Survey was to determine whether any wildlife or plant species currently listed in ONHP's database of threatened, endangered, and "sensitive" species, are present or likely to occur in the Level II ERA

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Survey Area. ONHP defines "sensitive" wildlife species as those naturally-reproducing native animals that may become threatened or endangered throughout all or any significant portion of their range in Oregon, according to Oregon's Sensitive Species Rule (OAR 635-100-040). Two amphibian species that are on the ONHP list as "sensitive" species were sighted within 2 miles of the RPAC property. These two species are the northern red-legged frog (Rana aurora aurora) and the northwestern pond turtle (Clemmys marmorata marmorata). Because both species are commonly associated with lakes and ponds, RPAC contracted ES&A to evaluate their potential presence. The field survey results for these two species are summarized below and detailed in ES&A's June 14, 2002 memorandum (Appendix E).

2.2.1 Northern Red-legged Frog

ODFW lists the northern red-legged frog as a State sensitive species and US Fish and Wildlife Service (USFWS) lists them as a Federal "species of concern." The northern red-legged frog may have habitat requirements similar to NDL and NDP. However, according to the ONHP database, the northern red-legged frog was reportedly sighted east of Northwest Mill Pond Road and West of Miller Road (ONHP 2001, Appendix C). This location is approximately 2.5 miles southwest of the Level II ERA Survey Area on the other side of Forest Park in a watershed completely unconnected to the Level II ERA Survey Area. Despite this fact, particular attention was given to evaluating the potential presence of this species using the first two lines of evidence.

Northern red-legged frogs typically are found in forested wetlands and breed in cool well-shaded ponds, lakes, beaver ponds or slow streams, 1.6 to 6.6 feet (0.5 to 2 meters) deep. Their breeding season is in winter to early spring (Cockran and Thoms, 1996). The best method to determine presence or absence of northern red-legged frogs is to survey for egg masses during middle to late February to mid-March (depending on air and water temperature conditions in the Willamette Valley). Each egg mass is usually attached to a submerged branch, stem, or other vegetation. Eggs typically hatch in late March to April.

The early egg-laying amphibians in this area of the Willamette Valley are the northern red-legged frog, the long-toed salamander (Ambystoma macrodactylum), the Pacific treefrog (Hyla regilla), and the northwestern salamander (Ambystoma gracile). Eggs and egg masses of the northern red-legged frog are very distinctive from those of other aquatic amphibians that may deposit eggs during the same time period. Northern red-legged frogs are the first amphibians to lay their eggs (late winter). The egg mass is a soft jelly ball (but holds together when held in the palm of your hand), varying from grapefruit to cantaloupe-sized mass. Individual eggs are black above and white below. The eggs are very large and each has a wide layer of jelly. The egg is 3 millimeters (mm) in diameter.

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Long-toed salamander eggs are large and surrounded by a thick jelly layer. The masses are the size of a small plum and are often attached to a stem. Individual eggs are black or brown above and white or cream below. The egg is 2 mm in diameter. The distinctive characteristics are the egg mass size, egg size, and how the egg mass is attached to the vegetation.

Pacific treefrog eggs are in a soft, tight, rounded mass (up to 4 centimeters [cm] in diameter). Each small egg has only a thin layer of jelly, so eggs are packed closely together within the cluster. Individual eggs are tan to gray-brown above and yellow-gold or cream below. The egg is 1.5 mm in diameter. The distinctive characteristics are the egg mass size, closely packed eggs in the mass, size of egg, and color.

Northwestern salamander eggs are massed in a very firm ball of jelly, which has a smooth or slightly wavy surface. Egg masses are small orange- to small grapefruit-sized. When first laid, the eggs are tan above and cream or pale gold below. Green algae often grow inside the inner jelly layer of each egg. The egg is 2 mm in diameter. The distinctive characteristics are the egg mass size, firmness of the mass, and egg color.

Northern red-legged frog tadpoles typically metamorphose in late May or June to early July (Cockran and Thoms, 1996). Tadpoles eat aquatic algae and other organic debris. Adults eat aquatic macroinvertebrates, beetles, isopods, and insect larvae (Csuti, B. et.al., 1997).

The ES&A survey for northern red-legged frogs was conducted on March 15, 2002 and involved the following items:

- Surveying for northern red-legged frog egg masses within the water bodies in question. Evaluating suitability of habitat in the area for all life stages of northern red-legged frogs (hatchling, tadpole, juvenile, and adult).
- If egg masses are found, determine if they are in fact northern red-legged frog egg masses. Long-toed salamanders and Northwestern salamanders may also be laying their eggs during late February to mid-March.
- If northern red-legged frog egg masses are found, check for adults from late July to early September.

During the March 15, 2002 ES&A survey, the water levels were very high in NDL, which could have been the result of the newly constructed beaver dam at the northwest corner of NDL. The outlet for water to flow from NDL to the NDP is located in the northwest corner below the beaver dam. The beaver dam blocked the previous water path to the outfall, and this resulted in a higher than previously observed water

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level within the NDP. Because beaver dams in lotic settings often remain functional for considerable periods of time, the NDL conditions encountered during the NDL Level II AERA field activities are considered representative.

Northern red-legged frog egg masses were not found during the field survey. No egg masses of any kind were found within the areas surveyed. Suitable habitat is not present in the swift waters of NDP. Habitat is present at NDL to support all life stages of northern red-legged frogs (hatchling, tadpole, juvenile, and adult). This habitat includes moist deciduous forests and forested wetlands along well-shaded pond or lake edges (Cockran and Thoms, 1996).

2.2.2 Northwestern Pond Turtles

The northwestern pond turtle and the painted turtle (Chrysemys picta) are the two native freshwater turtles in the Pacific Northwest. The painted turtle is common and the northwestern pond turtle is listed as a State "sensitive" species. Effort was made to determine which, if either, of these species is present in the survey area. The best time to survey for the northwestern pond turtle is during a sunny day (above 60°F) in early spring. During this time, turtles have emerged from hibernation and can be found basking in the immediate area in which they have over-wintered.

A survey for northwestern pond turtles was conducted on May 23, 2002 at the NDL site. The NDP was also surveyed for the potential presence of pond turtles; however, due to the small size of the waterbody and shady conditions, this location was not optimal for observing basking pond turtles. The entire perimeter of NDL was surveyed. There are numerous areas within the lake that contain suitable basking platforms (e.g., floating logs) where turtles might be found during suitable weather conditions.

The survey consisted of viewing the lake through binoculars and walking the perimeter of the lake along a railroad easement. At the time of the pond turtle survey, numerous areas of large woody debris could be seen scattered throughout the lake edges. The abundance of large woody debris is an indication that this area provides suitable habitat for turtles common in the Willamette Valley. The survey was conducted in early afternoon. The weather was clear with a slight breeze with temperatures around 65°F. One large female painted turtle was found basking on a large log during the field survey (Figure 2). No other turtles were observed.

2.3 Habitat Suitability Index Modeling

A quantitative field assessment of habitats and their suitability for use by selected wildlife species was performed using Habitat Suitability Index (HSI) models. HSI models are routinely used by wildlife managers to evaluate habitat suitability for wildlife

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use as foraging and reproductive areas. Information provided by these HSI models is expected to improve the ERA and exposure assessment for the RPAC Site by:

1. Identifying scenarios where habitat value is important;
2. Providing supplemental habitat information collected under procedures described in Sections 3.1 and 3.2 of this NDL Level II AERA;
3. Guiding selection of appropriate PERs and candidate endpoint receptors (Tasks 4 and 6, respectively, of DEQ's Level II ERA process); and
4. Providing data to generate spatially explicit descriptions of habitat quality as appropriate for specific assessment endpoints.

HSI models were originally developed by the USFWS in the early 1980's in order to provide standardized methods to document the quality and quantity of habitat for selected wildlife species. HSI models are based on measurements of particular variables (habitat attributes) judged necessary for important life requisites of individual species, such as habitat type, habitat structure, suitable foraging substrate, and spatial arrangements between habitat features. HSI models are unique compared to other wildlife management models in that HSI models are constrained to habitat information only, with an emphasis on quantitative relationships between key environmental variables and habitat suitability. HSI species' models vary in generality and precision, due in part to the amount of available quantitative habitat information and the frequent qualitative nature of the existing information. Each variable is entered into a mathematical formula, or formulas, to determine a final HSI score from 0.0 to 1.0 (optimal). The higher the HSI score, the more suitable, or optimal the habitat in question is for the particular species.

Habitat information collected during the Level II ERA Site Survey was used as input to the calculations performed in the HSI modeling activities. The following five wildlife species were chosen for habitat suitability modeling for the RPAC Level II ERA Site Survey: mallard; great blue heron; beaver (Castor canadensis); black-tailed deer; and. Mallards require aquatic habitat in either forested or non-forested areas. Great blue herons require aquatic habitat and prefer aquatic habitats near forested areas. Beavers require aquatic habitat with woody and herbaceous vegetation. These species were chosen because the habitat required by each of these species is present in the Level II ERA Survey Area; therefore, they could be potential ecological receptors. For the deer HSI, the white-tailed deer (Odocoileus virginianus) HSI model was used as a surrogate for the black-tailed deer that is common in the area and use habitat similar to that of the white-tailed deer. The HIS models, as well as further description on habitat requirements for each species, are presented in Appendix D.

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Diving ducks have been identified as present by ODFW (1996) and Woodward-Clyde Consultants (1993) but have not been observed at the RPAC Site by AMEC or ES&A. The DEQ RIWP (1999) includes diving ducks as an ecological receptor. An attempt was made to complete an HSI model for a diving duck, but no applicable model was available.

Table 2.3 presents the summary HSI scores for the five species selected for habitat suitability analysis. A model overview, completed HSI data sheets, and HSI model calculations for each species are presented in Appendix D. The principal literature source for information provided in the Appendix D HSI model overview for each species is available on-line (see USFWS HSI Model Biological Report for each species at www.nwrc.gov/wdb/pub/hsi/hsiindex.htm). USFWS cautions that HSI models should be viewed as hypotheses of species-habitat relationships, rather than statements of proven cause and effect relationships. Their value is to serve as a basis for improved risk decision-making through increased understanding of habitat relationships.

Table 2.3: Summary of Habitat Suitability Index Results

Species	HSI score
Mallard	0.6
Great Blue Heron	0.4
Beaver	0.8
White-tailed Deer	1.0

HSI scores for the Site range between 0.0 and 1.0. A score of 1.0 represents high quality habitat and a score of 0.0 represents unsuitable habitat. Mallard, beaver, and great blue heron are all species typically found in partially developed urban to rural habitats. HSI scores for these species were in the mid-range, indicating that habitat quality in the Level II ERA Survey Area is fair but not ideal for these species (Appendix D, Tables D-1 to D-3).

White-tailed deer received a high HSI score of 1.0 (Appendix D, Table D-4). This indicates that the surrogate (black-tailed deer) for this species is likely to be present in the Level II ERA Survey Area for extended periods of time. This is consistent with visual observations of the common black-tailed deer in the Level II ERA Survey Area during Site visits.

3.0 SCREENING RESULTS

Information collected during the Site Survey and previously existing information were the basis for the NDL Level II AERA analysis discussed in this section.

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3.1 Updated Site Description

Section 1.1 briefly describes the physical features of the RPAC Site prior to the Level II Site Survey (Section 2.0). Five primary habitat types were identified for the Level II ERA Survey Area: wooded; scrub/shrub; wetland; aquatic lentic (non-flowing); and aquatic lotic (flowing). The percent cover of each habitat type is as follows: 18% wooded; 18% scrub/shrub; 10% wetland; 54% non-flowing aquatic; and <1% flowing aquatic habitat. Figure 2 illustrates the geographic area of each of these habitat types within the Survey Area.

The dominant plants found in the Survey Area were reed canary grass, English ivy, Himalayan blackberry, red alder, and black cottonwood. All but black cottonwood are species common in disturbed areas. Reed canary grass, English ivy, and Himalayan blackberry are non-native, invasive species that out-compete native vegetation. The number and type of animals present in the Survey Area are representative of this region. A more detailed description of habitats and species in the Survey Area was provided in Section 2.0 above. Overall, the Level II ERA Survey Area represents moderate to low value habitat to common native fauna.

3.2 Site-specific Ecological Receptors

In order to refine the list of potential ecological receptors identified in the RIWP (DEQ, 1999), AMEC requested information from ONHP (2002) on the known or suspected presence of Federal and State listed species (i.e., sensitive, threatened, and/or endangered) and their habitats within a 2-mile radius of the Site. DEQ guidance (1998) recommends contacting USFWS and ODFW for this information. However, USFWS and ODFW were not contacted because they communicated to AMEC on previous projects that they defer to ONHP. Photocopies of ONHP responses are presented in Appendix C. According to the ONHP letter, 13 listed species were identified within a 2-mile radius of the Site (Table 3.2).

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Table 3.2: Federal and State Protected Species Listed by ONHP

Common Name	Scientific Name	Federal Listed Status	State Listed Status
Coho salmon (Lower Columbia River/SW Washington)	*Oncorhynchus kisutch*	Candidate	Endangered
Chinook salmon (Lower Columbia River spring run)	*Oncorhynchus tshawytscha*	Threatened	Not Warranted
Chinook salmon (Lower Columbia River fall run)	*Oncorhynchus tshawytscha*	Threatened	Sensitive-critical
Steelhead (Lower Columbia River Winter Run)	*Oncorhynchus mykiss*	Threatened	Sensitive-critical
Yellow-billed cuckoo	*Coccyzus americanus*	Candidate	Sensitive-critical
Tricolored blackbird	*Progne sibis*	Species of Concern	Sensitive-peripheral or naturally rare
Pacific western big-eared bat	*Corynorhinus townsendii townsendii*	Species of Concern	Sensitive-critical
Pacific pallid bat	*Anthozous pallidus pacificus*	Species of Concern	Sensitive-vulnerable/ undetermined
Northern red-legged frog	*Rana aurora aurora*	Species of Concern	Sensitive-critical
Northwest pond turtle	*Clemmys marmorata marmorata*	Species of Concern	Sensitive-critical
White-topped aster	*Aster curtus*	Species of Concern	Threatened
Tall bugbane	*Cimicifuga elata*	Not Warranted	Candidate
Bristly sedge	*Carex comosa*	Not Warranted	Not Warranted

Information on current distributions of each of the four salmonid species listed in Table 3.2 was obtained from the National Marine Fisheries Service (NMFS) status review for each species. These status reviews contain the scientific information used by NMFS to determine whether a species should be listed. Information within these status reviews represents the most current and credible data.

Coho Salmon: The Lower Columbia River/Southwest Washington Coho salmon is a federal candidate species and is listed in the State of Oregon as endangered. NMFS (1995) identified the Clackamas River (a tributary of the Willamette) as the only water body containing a viable population of potentially natural Coho. In 1999, Oregon listed the Coho as endangered and identified the Sandy River (a tributary of the Columbia River near Troutdale, Oregon) as a second water body containing a viable population

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of potentially natural Coho. Both of these locations are upstream from Portland. Furthermore, the Level II ERA Survey Area can not be accessed by Coho salmon due to a culvert. As there is no navigable channel between the Level II ERA Survey Area and the Willamette, the exposure pathway from potentially impacted Site media to spawning, rearing, and migrating Coho salmon is incomplete.

Chinook Salmon (spring run): As with other salmonids, spring and fall run Chinook are recognized as two separate species under the Endangered Species Act (ESA); therefore they must be addressed separately in this Level II AERA. The spring run Chinook primarily spawn in upstream reaches of rivers and streams (NMFS, 1998). The closest population of spring run Chinook is approximately 40 miles upstream from the Site in the headwaters of the Molalla River (NMFS, 1998). Furthermore, the Level II ERA Survey Area can not be accessed by spring run Chinook salmon due to a culvert. As there is no navigable channel between the Level II ERA Survey Area and the Willamette, the exposure pathway from potentially impacted Site media to spawning, rearing, and migrating Coho salmon is incomplete.

Chinook Salmon (fall run): According to NMFS's most recent data on populations of fall run Chinook salmon (1998), fall run Chinook salmon are not present in the Willamette River watershed. The closest fall Chinook population is in the Columbia River watershed approximately 20 miles upstream at the confluence of the Columbia River and Washougal River. Furthermore, there is no navigable channel between the Level II ERA Survey Area and the Willamette. Therefore, the exposure pathway from potentially impacted Site media to spawning, rearing, and migrating Coho salmon is incomplete.

Steelhead (winter run): The closest downstream population is approximately 25 miles upstream from the Site, on the Clackamas River (NMFS, 1996). Furthermore, there is no navigable channel between the Level II ERA Survey Area and the Willamette. Therefore, the exposure pathway from potentially impacted media to spawning, rearing, and migrating Coho salmon is incomplete.

Yellow-billed Cuckoo: The yellow-billed cuckoo was last reported in Portland in 1985, where it was identified by sound along the Columbia River from the mouth of the Willamette River north to the Portland Airport (ONHP, 2001). The yellow-billed cuckoo has not been observed in Portland Harbor. In 1985 it was heard calling; however, it was not visually identified (ONHP, 2001). Prior to 1985, the yellow-billed cuckoo had not been observed in Portland since 1940, when two birds were seen (ONHP, 2001). The typical range of the yellow-billed cuckoo includes San Francisco, Southern California, Arizona, and Utah (Stokes, 1996). Oregon is not a part of its typical range. Populations in the western and central regions are on the decline (Stokes, 1996). Given this evidence, it is unlikely that the yellow-billed cuckoo is present in the Level II

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Survey Area. Therefore, the exposure pathway from potentially impacted Site media to the yellow-billed cuckoo is incomplete.

Tricolored Blackbird: The tricolored blackbird was last observed in 1985 at the St. Johns Landfill near the confluence of the Willamette River and the Columbia River in Portland (OHNP, 2001). Prior to 1985 only a handful of birds had inhabited the landfill site since 1967 (Adamus et.al., 2001). The tricolored blackbird has not been observed in Portland Harbor (ONHP, 2001). The colony observed at the St. Johns Landfill was about 250 miles north of the next nearest nesting areas, which are in the Rogue River Valley (ONHP, 2001). Given the historical sparse presence of the tricolored blackbird in the Portland area, its potential occurrence at the Level II Survey Area is considered unlikely. Therefore, the exposure pathway from potentially impacted media to the tricolored blackbird is incomplete.

Pacific Western Big-Eared Bat: The last recorded sighting of a Pacific western big-eared bat in Oregon was in 1928. This specimen is part of the museum collection housed at Puget Sound Museum of Natural History and was recorded as having been collected from Tigard, Oregon. The cave reportedly occupied by the Pacific western big-eared bat has been destroyed by vandals. The potential presence of Pacific western big-eared bats at this Site is considered extremely unlikely and, thus, there is no exposure pathway.

Pacific Pallid Bat: The only sighting of a Pacific pallid bat in Portland occurred in mid-August, 1927 when a large number of Pacific pallid bats were seen flying around a church tower. Since Pacific pallid bats have not been observed in the area for 75 years, it is extremely unlikely that they might ever be present at the Level II Survey Area and, thus, there is no exposure pathway.

Northern Red-legged Frog: Because suitable habitat for the northern red-legged frog is present at the Site, a survey effort was conducted to further evaluate its potential presence at the Level II Survey Area. According to the ONHP database, the nearest northern red-legged frog sighting was approximately 2.5 miles southwest of the Level II Survey Area, east of Northwest Mill Pond Road and west of Miller Road (ONHP 2001, Appendix C). This location is on the other side of Forest Park in a watershed completely unconnected to the Level II ERA Survey Area. Although the nearest known northern red-legged frog presence is 2.5 miles away, a survey for northern red-legged frog egg masses within the waterbodies in question was conducted on March 15, 2002. The best method to determine the presence of northern red-legged frogs is to survey for egg masses from mid- to late February to mid-March. No northern red-legged frog egg masses were found during the field survey. In fact, no egg masses of any kind were found within the Level II Survey Area. Suitable habitat is present at NDL to support all life stages of the northern red-legged frog; however, it appears that

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this habitat is not being utilized. Based on the current information provided by ONHP and the results of the northern red-legged frog survey, the potential for the northern red-legged frog to be present at the Level II Survey Area is considered unlikely and, thus, there is no exposure pathway.

Northwestern Pond Turtle: The northwestern pond turtle is listed as a State "sensitive" species. Because of its listed status and its known presence in the Portland Area (ONHP, 2001), a survey was conducted to determine its potential occurrence in the Level II Survey Area. The best time to survey for the northwestern pond turtle is during a sunny day (above 60°F) in early spring. A survey for northwestern pond turtles was conducted on May 23, 2002 at NDL and NDP. The weather was clear with temperatures around 65°F. During the survey, the only turtle observed was one large female painted turtle. Based on information gathered during the field visit, the potential for northwestern pond turtles to occur at the Level II Survey Area is considered unlikely and, thus, there is no exposure pathway.

White-topped Aster: White-topped aster was last observed in Portland in 1898 (OHNP, 2001). It is assumed that this plant population has been extirpated. The potential for this plant to occur at the site is extremely unlikely and, thus, there is no exposure pathway.

Tall Bugbane: Tall Bugbane was last observed in Portland in 1904 (ONHP, 2001). Tall Bugbane is found in moist forests at low to middle elevations from southern British Columbia south to northwestern Oregon. Given that Tall Bugbane has not been observed in Portland for nearly 100 years and that Portland is on the edge of its potential habitat, the potential presence of this plant at the Site is extremely unlikely and, thus, there is no exposure pathway.

Bristly Sedge (also known as Longhair Sedge): Bristly Sedge was last observed in Portland in 1887 (ONHP, 2001). Currently, Oregon is not part of its typical range (NRCS, 2002). Since it has been over 100 years since the Bristly Sedge has been observed in Oregon, it is extremely unlikely that it might be present at the Level II Survey Area and, thus, there is no exposure pathway.

The Site survey was used to evaluate the potential presence of ONHP listed species, as well as other sensitive receptors defined in Task 4(b) of the Level I guidance (DEQ, 1998). Selection of site-specific ecological receptors was based on the following criteria:

- Habitat type in which each species is found: It is desirable for the ecological receptors to be associated with all major habitat types found on the site;

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- Degree to which organisms are likely to be exposed to potentially impacted media: Potential exposure is defined primarily by habitat requirements, and susceptibility is scored according to the dependence of a species on the potentially contaminated media. Species judged to be most susceptible will be selected as ecological receptors;
- Taxonomic classification: It is desirable for animals from different vertebrate categories (e.g., birds and mammals) to be represented in the list of ecological receptors;
- Trophic status (food source): Potential susceptibility to bioaccumulative compounds is indicated by trophic status, and those species judged to be most susceptible will be selected as ecological receptors;
- Human value: Those species with a high potential for significant consumptive use are considered for ecological receptor selection. Also, endangered and threatened species are considered to have a high value to humans and would have a high priority for ecological receptor selection;
- Site presence: Confirmed site presence is desirable, in order that the ecological receptors be considered relevant for assessment of site-related impacts (assuming that no species is absent due to toxic effects); and
- HSI score: An HSI score of 0.3 and above indicates the presence of suitable habitat on the site for potential use by a species. It is, thus, another factor indicating the relevance of a particular species for the assessment of potential site-related constituent effects.

Based on the above criteria, the ecological receptors proposed in the RIWP (DEQ 1999), and the reported field data, the following species were selected as representative site-specific potential ecological receptors for the NDL Level II AERA:

- Black-tailed deer were selected because they are herbivorous mammals that do not submerse themselves in aquatic habitats, but use terrestrial and aquatic habitat present in the Level II ERA Survey Area to meet their life requisites;
- Beavers were selected because they are herbivorous aquatic mammals that submerse themselves in aquatic habitats, and use terrestrial and aquatic habitat present in the Level II ERA Survey Area to meet their life requisites;
- Great blue heron were selected because they are piscivorous (fish-eating) aquatic birds that do not submerse themselves in aquatic habitats, but use terrestrial and aquatic habitat present in the Level II ERA Survey Area to meet their life requisites;

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- Common mergansers were selected because they are piscivorous aquatic birds that submerse themselves in aquatic habitats, and use terrestrial and aquatic habitat present in the Level II ERA Survey Area to meet their life requisites; and
- Mallard ducks were selected because they are omnivorous aquatic birds that use terrestrial and aquatic habitat present in the Level II ERA Survey Area to meet their life requisites.

These species were selected as the endpoint receptors for the candidate assessment endpoints (Section 3.6).

3.3 Constituents of Potential Ecological Concern

The CEPC selection process includes three steps: statistical analysis of Site data; calculation of an Environmental Concentration (EC); and screening of COIs. Each of these steps is discussed separately in the following sections.

3.3.1 Statistical Analysis

NDL surface water and sediment were selected as media of potential concern in the RIWP (DEQ, 1999); therefore, surface water and sediment analytical results were evaluated as part of the NDL Level II AERA. Constituent concentrations from surface water collected from August 1986 through February 1995 were used in this evaluation and represent all surface water samples for NDL collected to date for laboratory analysis. Constituent concentrations from sediment samples collected in NDL (July 1986 through February 1995) were used in this evaluation and represent all sediment samples for NDL collected to date for laboratory analysis.

The surface water and sediment data sets were analyzed using SiteStat®, a commercially available statistics software package. The summary includes the total number of samples analyzed for a given constituent, the number of times the constituent was detected, minimum concentration, arithmetic mean, geometric mean, maximum method detection limit (MDL), maximum concentration, standard error, the 90% upper confidence limit (90% UCL) of the arithmetic mean concentration, the logarithmic 90% UCL, and an analysis of distribution type at the 99% confidence level. The analysis of distribution type used the Wilk Shapiro Test when the sample size was less than 50 and the D'Agostino Test when the sample size was greater than 50. If the distribution type is "normal", the 90% UCL is used in the EC selection process (Section 3.3.2). However, if the distribution type is "lognormal", "unknown" or "normal/lognormal", the logarithmic 90% UCL is used instead in the EC selection process. Tables 3 and 4 present a statistical summary of surface water and sediment COI concentration data, respectively.

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Samples from the various media were analyzed by DEQ- or EPA-approved laboratory methods designed to quantify the constituents' concentrations in each abiotic environmental medium. As a result of the analytical procedures, a constituent may be detected in a sample and its concentration measured, or detected but not able to be quantified, or not detected at all. The data sets include several constituents that were detected in some of the samples but not all of them (e.g., 32 surface water samples were analyzed for benzo(a)pyrene, but benzo(a)pyrene was detected in only 1 sample). Alternatives for the treatment of non-detect analytical results include:

1. Assuming the COI is present at the MDL;
2. Assuming the COI is not present and the concentration is zero; or
3. Assuming a concentration of one-half the MDL.

While the first or third alternative may result in a biased (high) EC because the chemical may be absent altogether, the bias is likely to be less with alternative 3 than alternative 1. Using a concentration of zero or one-half the detection limit may also result in a biased (low) EC because the chemical could be present, but at a level below laboratory capabilities to detect and quantify the concentration, though as above, the bias will be less with alternative 3. Consequently, for this assessment, when a constituent for any given chemical analysis was not detected in a given sample, it was assumed to be present at a concentration equal to one-half the MDL concentration.

3.3.2 Calculation of the Environmental Concentration

An EC is a constituent-specific and media-specific upper-bound estimate of the concentration that a given receptor is likely to contact on a regular basis. According to DEQ guidance (Section (8)(a) of Level II - Screening, DEQ, 2001), the 90% UCL is most frequently utilized as the EC in surface water and sediment. The 90% UCL was calculated for each CPEC in accordance with EPA algorithms (EPA Supplemental Guidance to RAGS: Calculating the Concentration Term, 1992). EPA (1992) states that the distribution of a data set be identified as either a normal or lognormal distribution, and the appropriate distribution selected for the EC calculation. Therefore, the 90% UCL or the logarithmic 90% UCL was used for the EC, as appropriate, and 90% UCL of either the normal or lognormal distribution was referred to simply as the 90% UCL.

In some cases, the 90% UCL may exceed the maximum concentration detected for certain constituents. As EPA's Risk Assessment Guidance for Superfund, Volume I, Human Health Evaluation Manual (Part A) (1989) explains:

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"If there is great variability in measured or modeled concentration values (such as when too few samples are taken or when model inputs are uncertain), the upper confidence limit on the average concentration will be high, and conceivably could be above the maximum detected or modeled value. In these cases, the maximum detected or modeled value should be used to estimate exposure concentrations." (pg. 6-22)

Therefore, in circumstances where the maximum concentration is lower than the 90% UCL, the maximum concentration replaces the 90% UCL as the EC for both surface water and sediment.

3.3.3 Screening of Constituents of Interest

OAR 340-122-080(5) allows for pre-baseline screening of constituents. Prior to the screening process, constituents detected at a site are designated as COIs. COIs are screened in the NDL Level II AERA on the basis of frequency of detection, background levels and a chemistry-toxicity evaluation to determine whether they qualify as CPECs. COIs eliminated through the screening process require no further risk evaluation. COIs not eliminated through the screening process are considered CPECs that should be carried forward in the ERA. All constituents detected at least once were considered in the selection process for CPECs. Each of the screening procedures for surface water and sediment is described below.

Frequency of Detection

If a COI was detected in less than 5% of the samples site-wide in a given medium, it was not selected as a CPEC (DEQ, 2001). None of the COIs were detected at a frequency of less than 5%; therefore, no COI was screened-out using this procedure.

Background Concentration

Naturally occurring or non-anthropogenic constituents such as metals can be eliminated if they are below naturally-occurring background levels (OAR 340-122-045(6)). None of the COIs in surface water or sediment were screened out using this procedure, because site-specific background data have not been collected to date.

Chemistry-Toxicity Screen

DEQ guidance recommends a chemistry-toxicity screen be performed in order to assess the "potential for risk to be posed by exposure to: (a) individual COIs, (b) multiple COIs simultaneously within a given medium, and (c) individual or multiple COIs within different media" (DEQ, 2001). Each of these is discussed separately below.

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Individual COIs

DEQ Screening Level Values (SLVs) (2001) were used for the surface water and sediment chemistry-toxicity screen. Tables 3 and 4 summarize which SLVs were used for the chemistry-toxicity screens of each data set. The DEQ (2001) guidance states that the chemistry-toxicity screen for individual COIs can be conducted by calculating the ratio of the EC to the SLV, which is referred to in the guidance as a T_{ij}. This is illustrated in the following equation:

$T_{ij} = EC \div SLV$

The T_{ij} is then compared to Q, which has a value of 1 for sites where threatened or endangered species are found, and a value of 5 for sites with no threatened or endangered species. No threatened or endangered species were identified in the Level II Survey Area (Section 3.2). Therefore, the T_{ij}'s calculated for surface water and sediment in Tables 3 and 4 were compared to a Q of 5 in Table 5. The following CPECs were identified in the individual COI screening: the toxicity equivalent for 2,3,7,8-tetrachlorodibenzo-p-dioxin (2,3,7,8-TCDD TEQ); barium; cadmium; and zinc)

Multiple COIs in a Given Medium

The DEQ (2001) guidance indicates that the chemistry-toxicity screen for multiple COIs in a given medium be conducted by comparing the ratio of T_{ij} / T_i to $(1/N_{ij}) \times Q$, except when $T_j < Q$, where T_i is the sum of T_{ij}s (or the ratios of the ECs to the SLVs for each COI), and N_{ij} is the total number of COIs in the medium of interest. The screening for multiple COIs in a given medium was performed for common aquatic species that are likely to be exposed to surface water and sediment (Table 5). Lead and manganese were retained as new CPECs in a given medium through this evaluation.

COIs in Surface Water and Sediment

DEQ guidance (2001) also suggests a screening to determine if a given COI should be retained as a CPEC because its cumulative toxicity in multiple media exceeds an unacceptable threshold. This screening is performed by summing the T_{ij} values for all media for a given COI. No COIs were retained as new CPECs in any media through this evaluation (Table 5).

Bioaccumulation Screen

DEQ (2001) suggests that a bioaccumulation screen be performed for persistent bioaccumulative toxins (PBTs) such as dioxins and mercury. Dioxins are the PBTs that have been analyzed for and detected at this Site. Total dioxin expressed as

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equivalent 2,3,7,8-TCDD TEQ was retained as a CPEC because it is considered a PBT.

CPEC Selection Summary

COIs are screened on the basis of frequency of detection, background levels, and a chemistry-toxicity evaluation to determine whether they qualify as CPECs. The chemistry-toxicity evaluation assesses the "potential for risk to be posed by exposure to: (a) individual COIs, (b) multiple COIs simultaneously within a given medium, and (c) individual or multiple COIs within different media". Therefore, if a COI is selected as a CPEC in any of these steps in the chemistry-toxicity evaluation, it is selected as a CPEC in all media of concern. In this case, if a COI is a CPEC in surface water, sediment, or both, it will be a CPEC in surface water and sediment.

The following COIs were identified as CPECs: barium, cadmium, lead, manganese, zinc, and total dioxin expressed as equivalent 2,3,7,8-TCDD TEQ (Table 5). However, RPAC has reviewed extensive historical information regarding products and raw materials for the RPAC facility, and the five inorganic elements (barium, cadmium, lead, manganese, and zinc) were not used at the facility. Therefore, total dioxin expressed as equivalent 2,3,7,8-TCDD TEQ is the only source-related CPEC and the only CPEC selected through the DEQ guidance-driven Level II ERA process for the RPAC NDL ERA.

3.4 Relevant and Complete Exposure Pathways

DEQ (2001) states that, "Only those pathways that are complete and are expected to contribute substantially to exposures to ecologically important receptors should be addressed." Complete pathways are defined by four components:

1. A source and mechanism of chemical release (e.g., spills);
2. A retention or transport medium (e.g., groundwater);
3. A point of potential contact with the impacted medium, referred to as the exposure point (e.g., surface water); and
4. An exposure route (e.g., dermal contact with surface water).

If any one of the components is missing, the pathway is not considered complete and, therefore, no risk will be evaluated for that pathway.

The Level I ERA identified complete exposure pathways for surface water and sediment only. Pathways for groundwater and soil in the Level II Survey Area were

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eliminated from further consideration, because no point of potential contact between potential ecological receptors and groundwater or soil was identified in the Level I ERA. Furthermore, direct exposure to groundwater and soil would not be expected to contribute substantially to exposure for the following reasons:

- There is no access to groundwater until it reaches the Willamette River as surface water.
- Exposure to impacted soils could only occur in the upland RPAC Property, which is outside the Level II Survey Area and represents low quality habitat and was eliminated as an area of potential ecological concern in the Level I ERA.

The likelihood that receptors are exposed to CPECs capable of bioaccumulation and/or biomagnification within the food chain (an indirect/secondary exposure pathway) was identified as unknown in the Level I ERA. The dietary exposure pathway for CPECs capable of bioaccumulating and/or biomagnifying is retained as a possible complete pathway in the NDL Level II AERA for PBTs.

The DEQ guidance (2001) identifies the following exposure routes for surface water, sediment, or the food chain that may contribute substantially to exposure: direct contact; root contact; and ingestion. Terrestrial plants are not ecological receptors of concern in this NDL Level II AERA; therefore, root contact by terrestrial plants is not considered to contribute substantially to exposure. The following surface water, sediment, and food chain exposure pathways discussed by DEQ (2001, Table 1) are identified as potentially complete:

- Direct contact with surface water by aquatic ecological receptors;
- Ingestion of surface water by terrestrial and aquatic ecological receptors;
- Direct contact with sediment by aquatic ecological receptors;
- Ingestion of sediment by aquatic ecological receptors; and
- Ingestion of aquatic and terrestrial species by higher trophic level terrestrial and aquatic consumers.

3.5 Known Ecological Effects

In accordance with DEQ guidelines (2001), factors affecting the toxicological behavior of CPECs with respect to the ecological receptors potentially present at the Site are discussed below. The only CPEC selected in Section 3.3 is total dioxin expressed as equivalent 2,3,7,8-TCDD TEQ.

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2,3,7,8-TCDD belongs to a family of 75 chlorinated dibenzo-dioxin (CDD) compounds referred to as polychlorinated dioxins (ASTDR, 1998). CDDs have varying harmful effects. 2,3,7,8-TCDD is most toxic CDD to animals (ASTDR, 1998). CDDs have natural and antropogenic sources. CDDs are naturally released during forest fires and volcanic activity. CDDs may be produced in sanitary sewage treatment systems and in many industrial processes, including during the chlorine bleaching process used by pulp and paper mills. Industrial, municipal, and domestic incineration and combustion of fossil fuels also produce CDDs. CDDs are produced as a byproduct of the manufacture of 2,4,5-TCP. 2,4,5-TCP was used to produce 2,4,5-T, which was used as an herbicide and a component of agent orange (ASTDR, 1998). Combustion and incineration release ash-like particles containing CDDs into the air, which ultimately settle out from the air. Larger particles are deposited near the source while smaller particles may be transported larger distances. CDDs in soil will bind to the soil and are not likely to contaminate groundwater. However, other chemicals that might be present at contaminated sites may dissolve CDDs, making it easier for them to move through soil and into the groundwater (ASTDR, 1998). A small portion of CDDs can be broken down by sunlight and atmospheric chemicals (ASTDR, 1998).

Plants take up only a small amount of CDDs through their roots (ASTDR, 1998). Most CDDs on plants come from pesticide application or atmospheric deposition. Animals feeding on these plants can accumulate CDDs in their body tissues and milk. CDDs can also biomagnify in the aquatic food chain (ASTDR, 1998). CDDs can be stored in body fat and the liver for years. 2,3,7,8-TCDD and other highly chlorinated CDDs are found in higher concentrations in fat than other CDDs, such as DCDDs and TrCDDs. 2,3,7,8-TCDD breaks down very slowly in animals. It can take 7 to 12 years for half of it to be removed (ASTDR, 1998).

Animal studies suggest that 2,3,7,8-TCDD has a negative effect on the reproductive system and development (ASTDR, 1998). CDDs that do not have chlorine atoms in the 2, 3, 7,and 8 positions are less toxic than 2,3,7,8-TCDD (ASTDR, 1998). CDDs that have chlorines in the 2, 3, 7, and 8 positions have effects that are similar to 2,3,7,8-TCDD, but higher doses are required before negative effects occur. There is a difference in sensitivity among animals for some effects. In some animals such as rats, rabbits, minks, hamsters, and guinea pigs a single large dose of 2,3,7,8-TCDD can cause death (ASTDR, 1998). Exposure of some animals to non-lethal doses of 2,3,7,8-TCDD has resulted in weight-loss, biochemical and degenerative changes in the liver, hair loss, swelling of the face, weakened immune systems, and moderate to severe chloracne (ASTDR, 1998). Chloracne is a severe skin disease with acne-like lesions. Chloracne is the most common result of human exposure to at least 10 times average background levels of 2,3,7,8-TCDD. Other effects include: red skin rashes;

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discoloration; excessive body hair; and alteration in the liver's ability to metabolize hemoglobin, lipids, sugar, and protein (ASTDR, 1998).

3.6 Candidate Assessment Endpoints

Final selection of assessment endpoints, if necessary, is completed during Task (1) of the Level III Baseline ERA. This section is intended to begin focusing the risk assessment on site-specific ecological features and resources should such an assessment be warranted. An assessment endpoint consists of two primary components: an endpoint receptor (e.g., great blue heron) and a measurable attribute (e.g., reproductive success). Assessment endpoints can be expressed at the individual, population, community, or ecosystem level. Based on information collected to date, candidate assessment endpoints for the NDL ERA are: protection of terrestrial mammalian wildlife (black-tail deer and beaver) and water birds (great blue heron, common merganser, and mallard) from adverse effects to growth, reproduction or survival at the population level. Five site-specific wildlife species were selected as endpoint receptors. The black-tailed deer (an herbivorous mammal) was selected as an endpoint receptor because it has an HSI score greater than 0.3, it represents a unique feeding guild, and it is present year-round at the Site. The beaver (an herbivorous mammal) was selected as an endpoint receptor because it has an HSI score greater than 0.3, it represents a unique feeding guild, and it is present year-round at the Site. The great blue heron (avian piscivore) was selected as an endpoint receptor because it has an HSI score greater than 0.3, it represents a unique feeding guild; it is proposed in the RIWP (DEQ, 1999) as an entity to protect, and it is present year-round at the Site. The common merganser (avian piscivore) was selected as an endpoint receptor because it is proposed in the RIWP (DEQ, 1999) as an entity to protect and it is present year-round at the Site. The mallard (avian omnivore) was selected as an endpoint receptor because it has an HSI score greater than 0.3, it represents a unique feeding guild; it is proposed in the RIWP (DEQ, 1999) as an entity to protect, and it is present year-round at the Site.

Reproduction at the population level was selected as the measurable attribute for each of these proposed endpoint receptors because there are no threatened or endangered species at the Survey Area. Therefore, the health of the population, not the individual, is the appropriate level of protection.

3.7 Preliminary Ecological Conceptual Site Model

This section integrates information on impacted media, CPECs, ecological receptors, preliminary candidate assessment endpoints, and known ecological effects into a set of complete exposure pathways likely to contribute to ecological risk at the Survey Area. This NDL Level II AERA assumes potentially impacted media consist of surface

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water and sediment (Section 1.3). Total dioxin expressed as equivalent 2,3,7,8-TCDD TEQ was identified as the only CPEC (Section 3.3). Site-specific ecological receptors identified for the Level II Survey Area are black-tailed deer, beaver, great blue heron, common merganser, and mallard (Section 3.2). Preliminary candidate assessment endpoints are those identified in (Section 3.6). This information assists in focusing on the following exposure pathways, which are most likely to be complete (Section 3.4):

- Black-tailed deer are potentially exposed to surface water via direct ingestion of surface water as drinking water. They also are potentially exposed to sediment (via ingestion) and surface water (via dermal absorption), but these pathways are expected to be minor and unlikely to pose a measurable risk.
- Beaver are potentially exposed to surface water via direct ingestion and dermal absorption. They also are exposed to sediment (via ingestion and dermal exposure), though these pathways are expected to be minor and unlikely to pose a measurable risk.
- The great blue heron is potentially exposed to surface water via direct ingestion; sediment via direct ingestion; and indirect ingestion of CPECs in prey and food items. Dermal absorption of CPECs in surface water and sediment are also potentially complete pathways, but these pathways are expected to be minor and unlikely to pose a measurable risk.
- The common merganser is potentially exposed to surface water via direct ingestion and dermal absorption; sediment via direct ingestion; and ingestion of CPECs in food.
- The mallard is potentially exposed to surface water via direct ingestion and dermal absorption, and to sediment via direct ingestion.

Figure 3 illustrates the potentially complete exposure pathways for these ecological receptor endpoints for the NDL ERA.

4.0 CONCLUSIONS

Based on the current information, RPAC proposes to perform a modified Level III / IV ERA for the Level II ERA Survey Area to focus the ecological risk assessment on the health effects of total dioxin expressed as equivalent 2,3,7,8-TCDD TEQ (the only CPEC) on the five preliminary candidate assessment endpoints. The preliminary candidate assessment endpoints are: protection of terrestrial mammalian wildlife (black-tail deer and beaver) and water birds (great blue heron, common merganser, and mallard) from adverse effects to growth, reproduction or survival at the population level. The exposure pathways most likely to be complete and, therefore, the most useful in identifying unacceptable ecological heath risks are:

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- Black-tailed deer are potentially exposed to surface water via direct ingestion of surface water as drinking water. They also are potentially exposed to sediment (via ingestion) and surface water (via dermal absorption), but these pathways are expected to be minor and unlikely to pose a measurable risk.
- Beaver are potentially exposed to surface water via direct ingestion and dermal absorption. They also are exposed to sediment (via ingestion and dermal exposure), though these pathways are expected to be minor and unlikely to pose a measurable risk.
- The great blue heron is potentially exposed to surface water via direct ingestion; sediment via direct ingestion; and indirect ingestion of CPECs in prey and food items. Dermal absorption of CPECs in surface water and sediment are also potentially complete pathways, but these pathways are expected to be minor and unlikely to pose a measurable risk.
- The common merganser is potentially exposed to surface water via direct ingestion and dermal absorption; sediment via direct ingestion; and ingestion of CPECs in food.
- The mallard is potentially exposed to surface water via direct ingestion and dermal absorption, and to sediment via direct ingestion.

The scope of work for the modified Level III / IV ERA will be provided in the NDL Level III / IV ERA Work Plan. This work plan is anticipated to be completed in Spring 2003.

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SCOEPA00006902

LIMITATIONS

This report was prepared exclusively for RPAC by AMEC Earth & Environmental, Inc. (AMEC). The quality of information, and conclusions contained herein, are consistent with the level of effort involved in AMEC services and based on: i) information available at the time of preparation; ii) data supplied by outside sources; and iii) the assumptions, conditions and qualifications set forth in this report. This report is intended to be used by RPAC only, subject to the terms and conditions of its contract with AMEC. Any other use of, or reliance on, this report by any third party is at that party's sole risk.

SCOEPA00006903

TABLE 1
List of Flora Identified
RPAC - Portland Site

Common Name	*Scientific Name*	Classification	Indication of Presence*
Reed canary grass*	*Phalaris arundinacea*	grass	1,5
Tall fescue	*Lolium arundinaceum*	grass	5
Tall oatgrass	*Arrhenatherum elatius*	grass	2
Velvetgrass	*Holcus lanatus*	grass	2
Bittersweet nightshade *	*Solanum dulcamara*	herb	2,5
Bracken fern	*Pteridium aquilinum*	herb	2
Chickory	*Cichorium intybus*	herb	2
Field horsetail	*Equisetum arvense*	herb	2
Common duckweed	*Lemna minor*	herb	2
Common St. John's-wort	*Hypericum perforatum*	herb	2
Creeping buttercup	*Ranunculus repens*	herb	2
English ivy*	*Hedera helix*	herb	1
Field mustard	*Brassica rapa*	herb	2
Lady fern	*Athyrium filix-femina*	herb	2
Field bindweed	*Convolvulus arvensis*	herb	2
Oxeye daisy	*Leucanthemum vulgare*	herb	2
Pacific waterleaf	*Hydrophyllum tenuipes*	herb	2
Youth on age	*Tolmiea menziesii*	herb	2
Queen Anne's lace	*Daucus carota*	herb	2
Red clover	*Trifolium pratense*	herb	2
Rose spirea	*Spiraea douglasii var. douglasii*	herb	2
Stinging nettle	*Urtica dioica*	herb	2
Tall bugbane	*Cimicifuga elata*	herb	4
Western swordfern	*Polystichum munitum*	herb	1
Wooly hedgenettle	*Stachys byzantina*	herb	2
Yellow salsify	*Tragopogon dubius*	herb	2
Soft rush (Lamp rush)	*Juncus effusus var. brunneus*	rush	2
Longhair sedge	*Carex comosa*	sedge	4
Slough sedge	*Carex obnupta*	sedge	2
Canada thistle	*Cirsium arvense*	shrub	2
California blackberry	*Rubus ursinus spp. Macropetalus*	shrub	2
English holly	*Ilex aquafolium*	shrub	2
Cutleaf blackberry	*Rubus laciniatus*	shrub	2
California hazelnut	*Corylus cornuta var. californica*	shrub	5
Himalayan blackberry*	*Rubus discolor*	shrub	1,5
Nootka rose	*Rosa nutkana*	shrub	2
Tall oregon grape (Hollyleaved barberry)	*Mahonia aquifolium*	shrub	2
Pacific poison oak	*Toxicodendron diversilobum*	shrub	2,5
Red elderberry	*Sambucus racemosa*	shrub	5
Redflower currant	*Ribes sanguineum*	shrub	2
Redosier dogwood	*Cornus sericea*	shrub	2,5
Rose	*Rosa spp*	shrub	5
Scotch broom*	*Cytisus scoparius*	shrub	2,5
Common snowberry	*Symphoricarpos albus*	shrub	2
Unidentified hawthorn	*Crataegus spp.*	shrub	5
Willow spp.	*Salix spp.*	shrub	5
Big leaf maple	*Acer macrophyllum*	tree	1,5

TABLE 1
List of Flora Identified
RPAC - Portland Site

Common Name	*Scientific Name*	Classification	Indication of Presence*
Birch	*Betula spp.*	tree	5
Sweet cherry	*Prunus avium*	tree	5
Bitter cherry	*Prunus emarginata*	tree	5
Black cottonwood	*Populus balsamifera spp. Trichocarpa*	tree	1,5
Douglas fir	*Psuedotsuga menziesii*	tree	2
Englis holly	*Ilex aquifolium*	tree	2,5
Pacific madrone	*Arbutus menziesii*	tree	2,5
Oregon ash	*Fraxinus latifolia*	tree	2,5
Oregon white oak	*Quercus garryana*	tree	5
Red alder	*Alnus rubra*	tree	1,5
Vine maple	*Acer circinatum*	tree	2,5

<u>* KEY FOR INDICATION OF PRESENCE</u>

1- observed- dominant species

2- observed

3- ODFW, December 1996

4- ONHP, October 2001

5- Woodward-Clyde Surveys, 1993,1995

TABLE 2
List of Fauna Identified
RPAC - Portland Site

Common Name	*Scientific Name*	Classification	Indication of Presence*
Bullfrog	*Rana catesbeiana*	amphibian	5,7
Red Legged Frog	*Rana a. aurora*	amphibian	5,6
Brown Bullhead	*Ictalurus nebulosus (Ameiurus nebulosus)*	fish	2
Carp	*Cyprinus carpio*	fish	2
Chinook Salmon	*Oncorhynchus tshawytscha*	fish	6
Coho Salmon	*Oncorhynchus kisutch*	fish	6
Steelhead	*Oncorhynchus mykiss*	fish	6
Stickleback	*unknown*	fish	7
Beaver	*Castor canadensis*	mammal	2,7
Black-tailed or mule deer	*Odocoileus hemionus*	mammal	1,4,7
California Ground Squirrel	*Spermophilus beecheyi*	mammal	7
Nutria* or coypu	*Myocastor coypus*	mammal	1,5,7
Pacific Pallid Bat	*Antrozous pallidus pacificus*	mammal	6
Pacific Western Big-eared Bat	*Plecotus townsendii*	mammal	6
Racoon	*Procyon lotor*	mammal	5,7
White-tailed deer	*Odocoileus virginianus*	mammal	2
Northwestern Pond Turtle	*Clemmys marmorata marmorata*	reptile	6
Painted Turtle	*Chrysemys picta*	reptile	2,5
American or Common Crow	*Corvus brachyrhynchos*	bird	7
American Goldfinch	*Carduelis tristis*	bird	7
American Robin	*Turdus migratorius*	bird	2,7
Baltimore Oreole	*Icterus galbula*	bird	7
Barn Swallow	*Hirundo rustica*	bird	7
Bewicks Wren	*Thryomanes bewickii*	bird	7
Black-headed Grosbeak	*Pheuciticus melanocephalus*	bird	7
Brown-headed cowbird	*Molothrus ater*	bird	7
Bufflehead	*Bucephala albeola*	bird	5,7
Bushtit	*Psaltriparus minimus*	bird	7
Canada Goose	*Branta canadensis*	bird	1,7
Common Yellowthroat	*Geothlypis trichas*	bird	7
Downy Woodpecker	*Picoides pubesceus*	bird	7
Grasshopper Sparrow	*Ammodramus savannarum*	bird	7
Great Blue Heron	*Ardea herodias*	bird	2
European Starling	*Sturnus vulgaris*	bird	7
Hooded Merganser	*Lophodytes cucullatus*	bird	5
House Finch	*Carpodacus mexicanus*	bird	2,7
Killdeer	*Charadrius vociferus*	bird	7
Mallard	*Anas platyrhynchos*	bird	1,5,7
Mourning Dove	*Zenaida macroura*	bird	2,7
Orange-crowned Warbler	*Vermivora celata*	bird	7
Pied-billed Grebe	*Podilymbus podiceps*	bird	5
Red-winged Blackbird	*Agelaius phoeniceus*	bird	2,3,7
Ring-necked Duck	*Aythya collaris*	bird	5,7
Rufus-sided towhee	*Pipilo erythrophthalmus*	bird	2,7
Scrub Jay	*Aphelocoma coerulescens*	bird	7
Song Sparrow	*Melospiza melodia*	bird	7
Spotted Sandpiper	*Actitis macularia*	bird	7

TABLE 2
List of Fauna Identified
RPAC - Portland Site

Common Name	*Scientific Name*	Classification	Indication of Presence*
Stellar Jay	*Cyanocitta stelleri*	bird	2,7
Tree Swallow	*Iridoprocne bicolor*	bird	2,7
Tricolored Blackbird	*Agelaius tricolor*	bird	6
Turkey Vulture	*Cathartes aura*	bird	7
Violet-green swallow	*Tachycineta thalassina*	bird	7
White-crowned Sparrow	*Zonotrichia leucophrys*	bird	7
Willow Fly Catcher	*Empidonax traillii*	bird	7
Wilsons Warbler	*Wilsonia pusilla*	bird	7
Wood Duck	*Aix sponsa*	bird	5
Yellow Billed Cuckoo	*Coccyzus americanus*	bird	6
Macroinvertebrate	*Helobdella sp.*	macroinvert	7
Macroinvertebrate	*Erpobdellidae punctata*	macroinvert	7
Macroinvertebrate	*Limnodrilus hoffmeisteri*	macroinvert	7
Macroinvertebrate	*Limnodrilus udekemianus*	macroinvert	7
Macroinvertebrate	*Ilyodrilus templetoni*	macroinvert	7
Macroinvertebrate	*Dero sp.*	macroinvert	7
Macroinvertebrate	*Nais sp.*	macroinvert	7
Macroinvertebrate	*Hyalella azteca*	macroinvert	7
Macroinvertebrate	*Crangonyx richmondensis richmondensis*	macroinvert	7
Macroinvertebrate	*Haliplus sp.*	macroinvert	7
Macroinvertebrate	*Ephemeroptera*	macroinvert	7
Macroinvertebrate	*Diptera*	macroinvert	7
Macroinvertebrate	*Ceratopogonidae sp.*	macroinvert	7
Macroinvertebrate	*Chironomus sp.*	macroinvert	7
Macroinvertebrate	*Chironomidae*	macroinvert	7
Macroinvertebrate	*Chaoborus punctipennis*	macroinvert	7
Macroinvertebrate	*Chaoborus albipes*	macroinvert	7
Macroinvertebrate	*Chaoborus americanus*	macroinvert	7
Macroinvertebrate	*Stratiomyiidae*	macroinvert	7
Macroinvertebrate	*Hydracarina sp.*	macroinvert	7
Macroinvertebrate	*Sphaeriidae*	macroinvert	7
Macroinvertebrate	*Zoniagrion sp.*	macroinvert	7
Macroinvertebrate	*Musculium sp.*	macroinvert	7
Macroinvertebrate	*Gyraulus sp.*	macroinvert	7
Macroinvertebrate	*Physella sp*	macroinvert	7
Macroinvertebrate	*Turbellaria sp.*	macroinvert	7
Macroinvertebrate	*Planariidae*	macroinvert	7
Copepod	Copepoda	macroinvert	7
Ostracod	Ostracoda	macroinvert	7
Waterfleas	Cladocera	macroinvert	7
nematode	nematode	macroinvert	7
Water Boatmen	*Corixidae*	macroinvert	7
Backswimmers	*Notonectidae*	macroinvert	7

<u>* KEY FOR INDICATION OF PRESENCE</u>

1- observed- dominant species

2- observed

3- observed flying

4- tracks, burrows, sign of feeding

5- ODFW, December1996

6- ONHP,October 2001

7- Woodward-Clyde Surveys, 1993,1995

TABLE 3
Statistical Summary and Comparison of NDL COI Surface Water Concentration Data to Ecological Screening Level Values
RPAC - Portland Site

Analyte	Hits	Total # of Samples	Minimum (mg/kg)	Mean (mg/kg)	Logarithmic Mean (mg/kg)	Standard Deviation	Maximum MDL (mg/kg)	Maximum (mg/kg)	90% UCL (mg/kg)	Log 90% UCL (mg/kg)	Distribution 99% Condfidence	Frequency of Detection (%)	EC (mg/kg)	SLV (mg/kg)	T_{ij}	T_{ij}/T_j
Dioxins																
1,2,3,4,6,7,8-Heptachlorodibenzofura	1	3	4.30E-08	2.07E-08	1.57E-08	1.94E-08	2.10E-08	4.30E-08	4.18E-08	6.03E-07	Normal/Lognormal	33	4.30E-08	NA	NA	NA
1,2,3,4,6,7,8-HpCDD	3	3	5.10E-08	8.50E-08	7.70E-08	4.81E-08	0.00E+00	1.40E-07	1.37E-07	2.88E-07	Normal/Lognormal	100	1.40E-07	NA	NA	NA
2,3,7,8-TCDD	1	3	8.20E-09	3.95E-09	3.01E-09	3.68E-09	3.70E-09	8.20E-09	7.96E-09	1.04E-07	Normal/Lognormal	33	8.20E-09	7.60E-06	1.08E-03	7.89E-05
2,3,7,8-TCDD TEQ	3	3	1.14E-09	4.77E-09	2.69E-09	6.01E-09	0.00E+00	1.17E-08	1.13E-08	6.11E-06	Normal/Lognormal	100	1.17E-08	7.60E-06	1.54E-03	1.13E-04
Heptachlorodibenzofuran	3	3	4.10E-08	9.17E-08	7.86E-08	6.14E-08	0.00E+00	1.60E-07	1.59E-07	6.95E-07	Normal/Lognormal	100	1.60E-07	NA	NA	NA
Heptachlorodibenzo-p-dioxins	3	3	1.40E-07	2.40E-07	2.16E-07	1.40E-07	0.00E+00	4.00E-07	3.92E-07	8.84E-07	Normal/Lognormal	100	4.00E-07	NA	NA	NA
Octachlorodibenzofuran	3	3	6.40E-08	1.05E-07	9.63E-08	5.67E-08	0.00E+00	1.70E-07	1.67E-07	3.25E-07	Normal/Lognormal	100	1.70E-07	NA	NA	NA
Octachlorodibenzo-p-dioxin	3	3	5.70E-07	9.37E-07	8.58E-07	4.95E-07	0.00E+00	1.50E-06	1.48E-06	2.81E-06	Normal/Lognormal	100	1.50E-06	NA	NA	NA
Tetrachlorodibenzofuran	1	3	6.10E-09	3.58E-09	3.21E-09	2.18E-09	4.70E-09	6.10E-09	5.96E-09	1.37E-08	Normal/Lognormal	33	6.10E-09	NA	NA	NA
Tetrachlorodibenzo-p-dioxin	1	3	8.20E-09	4.05E-09	3.17E-09	3.60E-09	4.30E-09	8.20E-09	7.97E-09	7.97E-08	Normal/Lognormal	33	8.20E-09	NA	NA	NA
Inorganics																
Arsenic	3	7	6.40E-03	4.42E-03	3.83E-03	2.56E-03	5.00E-03	8.40E-03	5.82E-03	6.88E-03	Normal/Lognormal	43	6.88E-03	1.50E-01	4.59E-02	3.35E-03
Barium	1	1	2.27E-02	2.27E-02	2.27E-02	0.00E+00	0.00E+00	2.27E-02	NA	NA	Unknown	100	2.27E-02	4.00E-03	5.68E+00	4.15E-01
Calcium	1	1	1.74E+01	1.74E+01	1.74E+01	0.00E+00	0.00E+00	1.74E+01	NA	NA	Unknown	100	1.74E+01	1.16E+02	1.50E-01	1.10E-02
Chromium	3	6	2.20E-03	1.58E-03	1.14E-03	1.29E-03	1.00E-03	3.60E-03	2.36E-03	4.82E-03	Normal/Lognormal	50	3.60E-03	1.10E-02	3.27E-01	2.39E-02
Lead	2	7	8.10E-03	4.51E-03	3.44E-03	3.96E-03	5.00E-03	1.20E-02	6.67E-03	8.55E-03	Lognormal	29	8.55E-03	2.50E-03	3.42E+00	2.50E-01
Magnesium	1	1	4.35E+00	4.35E+00	4.35E+00	0.00E+00	0.00E+00	4.35E+00	NA	NA	Unknown	100	4.35E+00	8.20E+01	5.30E-02	3.88E-03
Manganese	1	1	3.47E-01	3.47E-01	3.47E-01	0.00E+00	0.00E+00	3.47E-01	NA	NA	Unknown	100	3.47E-01	1.20E-01	2.89E+00	2.11E-01
Sodium	1	1	3.60E+01	3.60E+01	3.60E+01	0.00E+00	0.00E+00	3.60E+01	NA	NA	Unknown	100	3.60E+01	6.80E+02	5.29E-02	3.87E-03
Zinc	2	7	2.20E-02	1.29E-02	1.11E-02	7.29E-03	2.00E-02	2.40E-02	1.68E-02	2.08E-02	Normal/Lognormal	29	2.08E-02	1.20E-01	1.73E-01	1.27E-02
Pesticides																
2,4,5-T	3	3	7.90E-03	8.57E-03	8.54E-03	8.33E-04	0.00E+00	9.50E-03	9.47E-03	9.61E-03	Normal/Lognormal	100	9.50E-03	NA	NA	NA
2,4-D	3	3	1.30E-01	1.40E-01	1.40E-01	1.00E-02	0.00E+00	1.50E-01	1.51E-01	1.52E-01	Normal/Lognormal	100	1.50E-01	NA	NA	NA
Silvex	3	3	1.40E-04	1.87E-04	1.83E-04	4.16E-05	0.00E+00	2.20E-04	2.32E-04	2.63E-04	Normal/Lognormal	100	2.20E-04	NA	NA	NA
Volatiles																
Benzene	1	4	7.00E-04	9.25E-04	5.75E-04	1.07E-03	5.00E-03	7.00E-04	1.80E-03	1.32E-02	Normal/Lognormal	25	7.00E-04	1.30E-01	5.38E-03	3.94E-04
Chlorobenzene	3	7	7.60E-04	1.45E-03	1.25E-03	9.43E-04	5.00E-03	3.10E-03	1.96E-03	2.20E-03	Normal/Lognormal	43	2.20E-03	5.00E-02	4.41E-02	3.22E-03
o-Dichlorobenzene	3	3	3.40E-03	4.43E-03	4.26E-03	1.62E-03	0.00E+00	6.30E-03	6.20E-03	7.84E-03	Normal/Lognormal	100	6.30E-03	1.40E-02	4.50E-01	3.29E-02
p-Dichlorobenzene	3	3	1.70E-03	2.17E-03	2.09E-03	7.23E-04	0.00E+00	3.00E-03	2.95E-03	3.57E-03	Normal/Lognormal	100	3.00E-03	1.50E-02	2.00E-01	1.46E-02
Toluene	1	4	1.00E-03	4.38E-04	3.54E-04	3.75E-04	5.00E-04	1.00E-03	7.45E-04	1.32E-03	Unknown	25	1.00E-03	9.80E-03	1.02E-01	7.46E-03
Xylene (total)	2	4	1.00E-03	7.75E-04	7.24E-04	3.20E-04	1.00E-03	1.10E-03	1.04E-03	1.30E-03	Normal/Lognormal	50	1.10E-03	1.30E-02	8.46E-02	6.19E-03

$1/N_{ij}$= 0.036 $\bar{T}_j$= 1.37E+01

Notes:
MDL: Method detection limit
UCL: Upper confidence limit
EC: Exposure concentration
SLV: Screening Level Value
Tij: Toxicity Ratio for COI *i* in medium *j*
Tj: Toxicity in medium *j*
Nij: Total number of *i* COIs in medium *j*
NA: Value not applicable/available

TABLE 4
Statistical Summary and Comparison of NDL COI Sediment Concentration Data to Ecological Screening Level Values
RPAC - Portland Site

Analyte	Hits	Total # of Samples	Minimum (mg/kg)	Mean (mg/kg)	Logarithmic Mean (mg/kg)	Standard Deviation	Maximum MDL (mg/kg)	Maximum (mg/kg)	90% UCL (mg/kg)	Log 90% UCL (mg/kg)	Distribution 99% Condfidence	Frequency of Detection (%)	EC (mg/kg)	SLV (mg/kg)	T_{ij}	T_{ij}/T_j
Dioxins																
1,2,3,4,6,7,8-Heptachlorodibenzofuran	5	5	1.30E-05	1.34E-05	1.34E-05	8.94E-07	0.00E+00	1.50E-05	1.40E-05	1.40E-05	Unknown	100	1.40E-05	NA	NA	NA
1,2,3,4,6,7,8-HpCDD	5	5	6.90E-05	6.98E-05	6.98E-05	4.47E-07	0.00E+00	7.00E-05	7.01E-05	7.01E-05	Unknown	100	7.00E-05	NA	NA	NA
2,3,7,8-TCDD	5	5	2.90E-06	4.20E-06	4.03E-06	1.32E-06	0.00E+00	6.00E-06	5.10E-06	5.53E-06	Normal/Lognormal	100	5.53E-06	8.50E-07	6.51E+00	6.02E-02
2,3,7,8-TCDD TEQ	3	3	4.90E-06	6.81E-06	6.64E-06	1.80E-06	0.00E+00	8.47E-06	8.77E-06	1.04E-05	Normal/Lognormal	100	8.47E-06	8.50E-07	9.96E+00	9.23E-02
2,3,7,8-Tetrachlorodibenzofuran	5	5	2.70E-06	6.04E-06	5.27E-06	3.13E-06	0.00E+00	9.40E-06	8.18E-06	1.22E-05	Normal/Lognormal	100	9.40E-06	NA	NA	NA
Heptachlorodibenzofuran	5	5	4.00E-05	4.18E-05	4.18E-05	1.64E-06	0.00E+00	4.30E-05	4.29E-05	4.30E-05	Unknown	100	4.30E-05	NA	NA	NA
Heptachlorodibenzo-p-dioxins	5	5	1.50E-04	1.52E-04	1.52E-04	4.47E-06	0.00E+00	1.60E-04	1.55E-04	1.55E-04	Unknown	100	1.55E-04	NA	NA	NA
Hexachlorodibenzofuran	5	5	2.00E-05	2.00E-05	2.00E-05	0.00E+00	0.00E+00	2.00E-05	2.00E-05	2.00E-05	Unknown	100	2.00E-05	NA	NA	NA
Hexachlorodibenzo-p-dioxin	5	5	1.90E-05	2.24E-05	2.22E-05	3.21E-06	0.00E+00	2.60E-05	2.46E-05	2.50E-05	Normal/Lognormal	100	2.50E-05	NA	NA	NA
Octachlorodibenzofuran	5	5	3.50E-05	3.78E-05	3.77E-05	3.03E-06	0.00E+00	4.10E-05	3.99E-05	4.00E-05	Normal/Lognormal	100	4.00E-05	NA	NA	NA
Octachlorodibenzo-p-dioxin	5	5	6.50E-04	8.02E-04	7.98E-04	8.73E-05	0.00E+00	8.60E-04	8.62E-04	8.74E-04	Normal/Lognormal	100	8.60E-04	NA	NA	NA
Pentachlorodibenzofuran	5	5	3.40E-05	5.32E-05	5.03E-05	1.95E-05	0.00E+00	8.00E-05	6.66E-05	7.49E-05	Normal/Lognormal	100	7.49E-05	NA	NA	NA
Pentachlorodibenzo-p-dioxin	3	5	6.40E-06	4.96E-06	4.03E-06	3.05E-06	3.50E-06	8.50E-06	7.05E-06	1.39E-05	Normal/Lognormal	60	8.50E-06	NA	NA	NA
Tetrachlorodibenzofuran	5	5	6.10E-05	1.02E-04	9.57E-05	3.97E-05	0.00E+00	1.50E-04	1.30E-04	1.52E-04	Normal/Lognormal	100	1.50E-04	NA	NA	NA
Tetrachlorodibenzo-p-dioxin	5	5	3.70E-05	6.68E-05	6.14E-05	2.84E-05	0.00E+00	1.00E-04	8.63E-05	1.07E-04	Normal/Lognormal	100	1.00E-04	NA	NA	NA
Inorganics																
Arsenic	5	5	1.04E+01	1.22E+01	1.20E+01	2.05E+00	0.00E+00	1.54E+01	1.36E+01	1.37E+01	Normal/Lognormal	100	1.37E+01	4.00E+00	3.44E+00	3.18E-02
Cadmium	5	5	1.80E-01	1.96E-01	1.95E-01	1.67E-02	0.00E+00	2.20E-01	2.07E-01	2.08E-01	Normal/Lognormal	100	2.08E-01	3.00E-03	6.94E+01	6.43E-01
Chromium	5	5	7.60E+00	8.80E+00	8.69E+00	1.55E+00	0.00E+00	1.05E+01	9.87E+00	1.00E+01	Normal/Lognormal	100	1.00E+01	3.70E+01	2.71E-01	2.51E-03
Lead	5	5	2.58E+01	2.80E+01	2.77E+01	4.39E+00	0.00E+00	3.58E+01	3.10E+01	3.11E+01	Unknown	100	3.11E+01	3.50E+01	8.89E-01	8.23E-03
Zinc	5	5	3.43E+01	4.35E+01	4.25E+01	1.02E+01	0.00E+00	5.43E+01	5.05E+01	5.23E+01	Normal/Lognormal	100	5.23E+01	3.00E+00	1.74E+01	1.62E-01
Volatiles																
Benzene	5	5	1.50E-03	2.32E-02	3.63E-03	4.85E-02	0.00E+00	1.10E-01	5.65E-02	3.73E+00	Unknown	100	1.10E-01	3.92E+00	2.81E-02	2.60E-04
Chlorobenzene	6	10	6.20E-03	2.95E-01	1.07E-02	6.31E-01	4.00E-03	1.80E+00	5.71E-01	7.87E+01	Lognormal	60	1.80E+00	NA	NA	NA
o-Dichlorobenzene	2	5	7.10E-03	1.32E-02	4.79E-03	2.08E-02	1.00E-01	7.10E-03	2.75E-02	8.17E-01	Lognormal	40	7.10E-03	NA	NA	NA
p-Dichlorobenzene	3	5	1.40E-02	2.60E-02	7.22E-03	4.19E-02	2.00E-03	1.00E-01	5.47E-02	1.22E+01	Lognormal	60	1.00E-01	NA	NA	NA
	$1/N_{ij}$=	0.042													T_j=	1.08E+02

Notes:
MDL: Method detection limit
UCL: Upper confidence limit
EC: Exposure concentration
SLV: Screening Level Value
Tij: Toxicity Ratio for COI *i* in medium *j*
Tj: Toxicity in medium *j*
Nij: Total number of *i* COIs in medium *j*
NA: Value not applicable/available

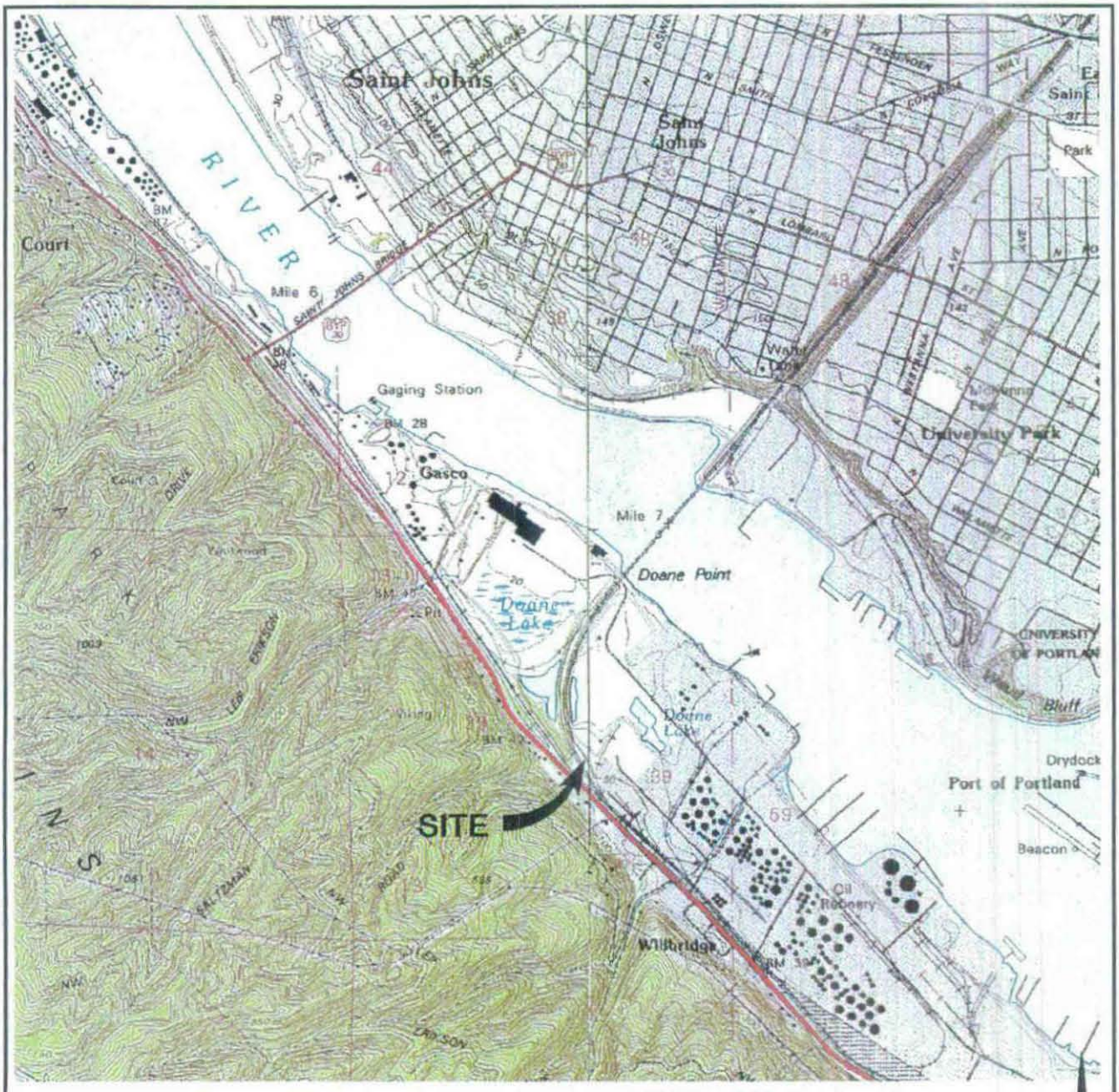
TABLE 5
Selection of CPECs
RPAC - Portland Site

Analyte	Medium	Frequency of Detection (%)	T_{ij}	T_{ij} /T_j	$1/N_{ij}$	Is Frequency of Detection >5? Is T_{ij} > Q? Is T_{ij}/T_i > ($1/N_{ij}$ x Q)?[1]	Is COI a CPEC?
2,3,7,8-TCDD	Sediment	100	6.51E+00	6.02E-02	2.08E-01	YES	
2,3,7,8-TCDD	Surface Water	33	1.08E-03	7.89E-05	1.79E-01	NO	
2,3,7,8-TCDD	Total	100	6.51E+00	NA	NA	YES	YES
2,3,7,8-TCDD TEQ	Sediment	100	9.96E+00	9.23E-02	2.08E-01	YES	
2,3,7,8-TCDD TEQ	Surface Water	100	1.54E-03	1.13E-04	1.79E-01	NO	
2,3,7,8-TCDD TEQ	Total	100	9.97E+00	NA	NA	YES	YES
Arsenic	Sediment	100	3.44E+00	3.18E-02	2.08E-01	NO	
Arsenic	Surface Water	43	4.59E-02	3.35E-03	1.79E-01	NO	
Arsenic	Total	100	3.48E+00	NA	NA	NO	no
Barium	Sediment	NT	NT	NT	NT	NT	
Barium	Surface Water	100	5.68E+00	4.15E-01	1.79E-01	YES	
Barium	Total	100	5.68E+00	NA	NA	YES	YES
Benzene	Sediment	100	2.81E-02	2.60E-04	2.08E-01	NO	
Benzene	Surface Water	25	5.38E-03	3.94E-04	1.79E-01	NO	
Benzene	Total	100	3.34E-02	NA	NA	NO	no
Cadmium	Sediment	100	6.94E+01	6.43E-01	2.08E-01	YES	
Cadmium	Surface Water	0	ND	ND	ND	ND	
Cadmium	Total	100	6.94E+01	NA	NA	YES	YES
Calcium	Sediment	NT	NT	NT	NT	NT	
Calcium	Surface Water	100	1.50E-01	1.10E-02	1.79E-01	NO	
Calcium	Total	100	1.50E-01	NA	NA	NO	no
Chlorobenzene	Sediment	60	NA	NA	4.17E-02	NO	
Chlorobenzene	Surface Water	43	4.41E-02	3.22E-03	1.79E-01	NO	
Chlorobenzene	Total	43	4.41E-02	NA	NA	NO	no
Chromium	Sediment	100	2.71E-01	2.51E-03	2.08E-01	NO	
Chromium	Surface Water	50	3.27E-01	2.39E-02	1.79E-01	NO	
Chromium	Total	100	5.99E-01	NA	NA	NO	no
Lead	Sediment	100	8.89E-01	8.23E-03	2.08E-01	NO	
Lead	Surface Water	29	3.42E+00	2.50E-01	1.79E-01	YES	
Lead	Total	100	4.31E+00	NA	NA	NO	YES
Magnesium	Sediment	NT	NT	NT	NT	NT	
Magnesium	Surface Water	100	5.30E-02	3.88E-03	1.79E-01	NO	
Magnesium	Total	100	5.30E-02	NA	NA	NO	no
Manganese	Sediment	NT	NT	NT	NT	NT	
Manganese	Surface Water	100	2.89E+00	2.11E-01	1.79E-01	YES	
Manganese	Total	100	2.89E+00	NA	NA	NO	YES
o-Dichlorobenzene	Sediment	40	NA	NA	4.17E-02	NO	
o-Dichlorobenzene	Surface Water	100	4.50E-01	3.29E-02	1.79E-01	NO	
o-Dichlorobenzene	Total	100	4.50E-01	NA	NA	NO	no
p-Dichlorobenzene	Sediment	60	NA	NA	4.17E-02	NO	
p-Dichlorobenzene	Surface Water	100	2.00E-01	1.46E-02	1.79E-01	NO	
p-Dichlorobenzene	Total	100	2.00E-01	NA	NA	NO	no
Sodium	Sediment	NT	NT	NT	NT	NT	
Sodium	Surface Water	100	5.29E-02	3.87E-03	1.79E-01	NO	
Sodium	Total	100	5.29E-02	NA	NA	NO	no
Toluene	Sediment	0	ND	ND	ND	ND	
Toluene	Surface Water	25	1.02E-01	7.46E-03	1.79E-01	NO	
Toluene	Total	25	1.02E-01	NA	NA	NO	no
Xylene (total)	Sediment	0	ND	ND	ND	ND	
Xylene (total)	Surface Water	50	8.46E-02	6.19E-03	1.79E-01	NO	
Xylene (total)	Total	50	8.46E-02	NA	NA	NO	no
Zinc	Sediment	100	1.74E+01	1.62E-01	2.08E-01	YES	
Zinc	Surface Water	29	1.73E-01	1.27E-02	1.79E-01	NO	
Zinc	Total	100	1.76E+01	NA	NA	YES	YES

[1] No threatened or endangered species have been identified in the Level 2 Survey Area; therefore, Q = 5.

NT - Analyte not tested in this media

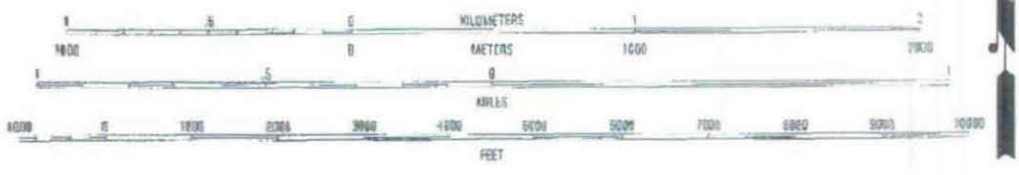
ND - Analyte was tested for but not detected in this media



LINNTON, OR
45122-F7-TF-024
1990

PORTLAND, OR-WA
45122-E6-TF-024
1990

QUADRANGLE LOCATION



SOURCE: USGS QUAD SHEET: LINTON AND PORTLAND, OREG.

amec

7376 SW Durham Road
Portland, OR, U.S.A. 97224-7307

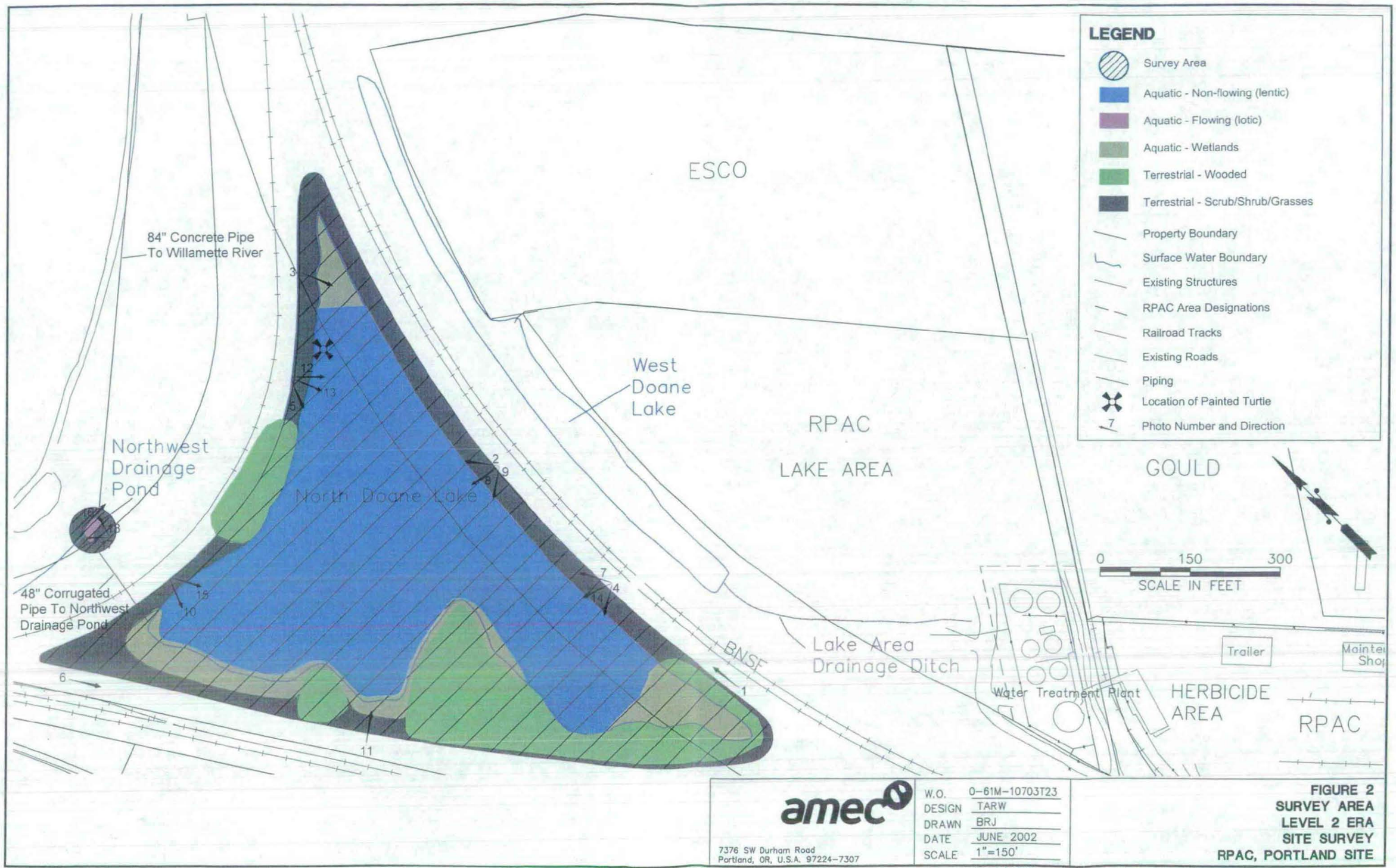
W.O.	0-61M-107030T23
DESIGN	FK
DRAWN	BRJ
DATE	JAN. 2002
SCALE	1:24,000

FIGURE 1

RPAC PORTLAND SITE PROPERTY LOCATION

RPAC, PORTLAND, OR

AMEC DRAWING NO. K:\10000\10700\10703\DWG\Site Location – Clipped Quads.dwg



amec

7376 SW Durham Road
Portland, OR, U.S.A. 97224-7307

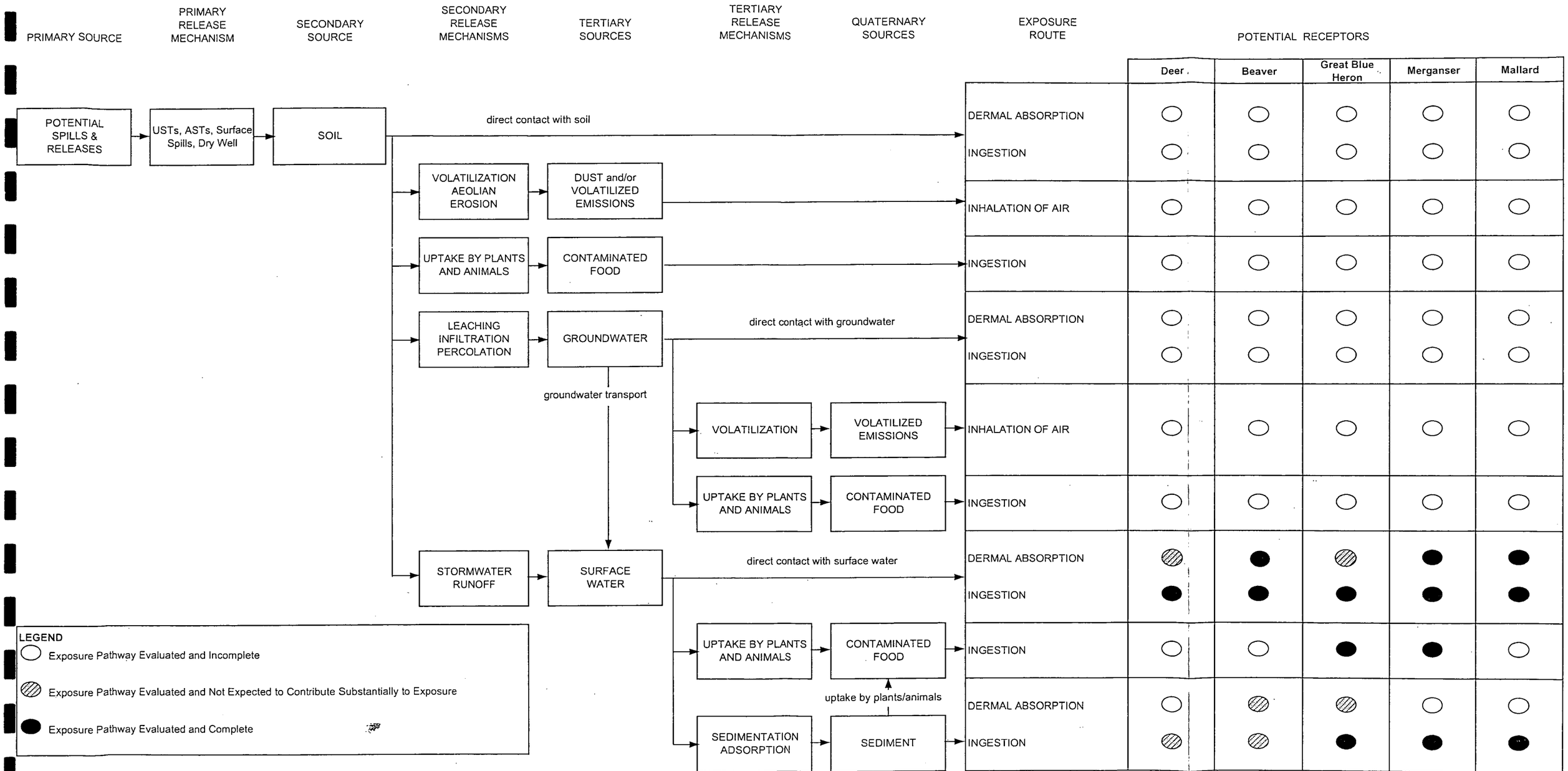
W.O.	0-61M-10703T23
DESIGN	TARW
DRAWN	BRJ
DATE	JUNE 2002
SCALE	1"=150'

FIGURE 2
SURVEY AREA
LEVEL 2 ERA
SITE SURVEY
RPAC, PORTLAND SITE

K:\10000\10700\10703\Task 23 ERA\Bio Survey FSP\Survey Area - Level 2 ERA Site Survey.dwg

Figure 3

Preliminary Ecological Conceptual Site Model



APPENDIX A

Photo Log

SCOEPA00006917

Photo 1:

Terrestrial - wooded habitat along train tracks.

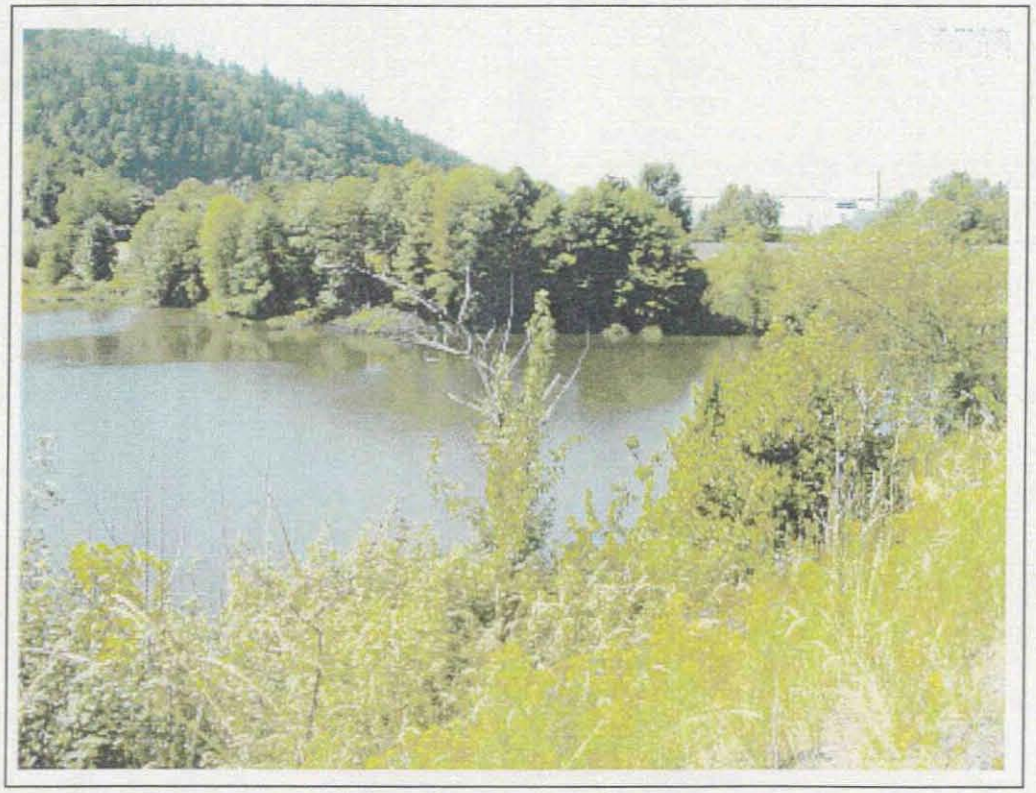


Photo 2:

Terrestrial - scrub/shrub habitat in foreground.

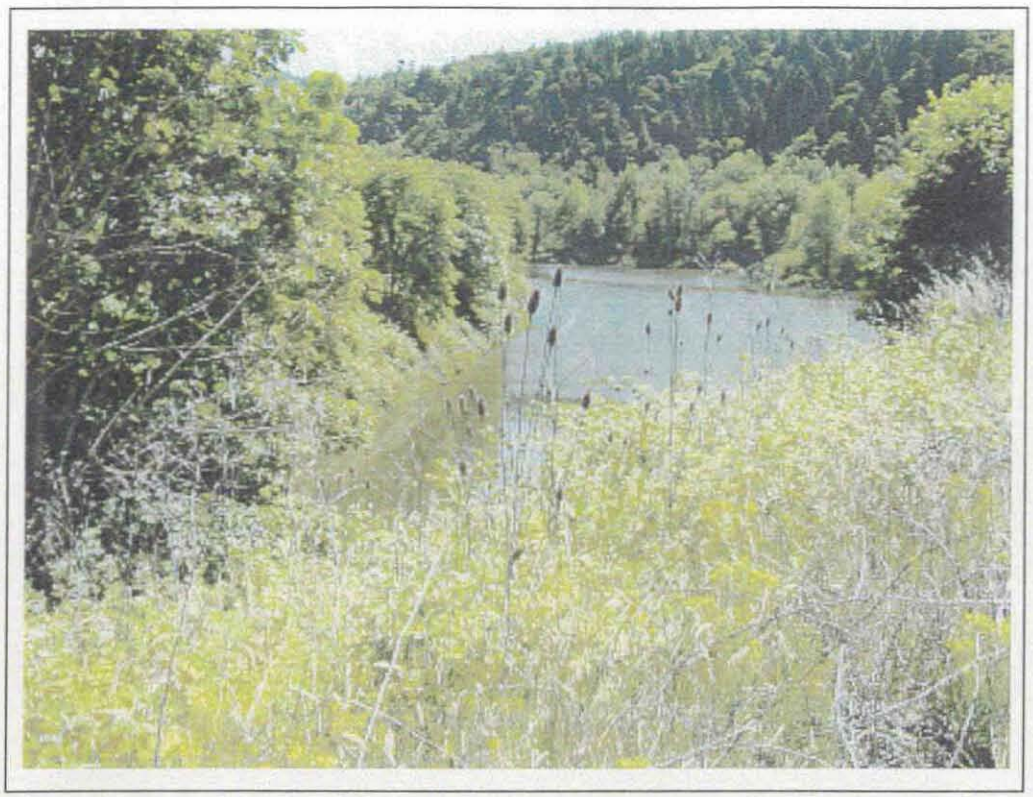


Photo 3:

Scrub/ shrub habitat in foreground.

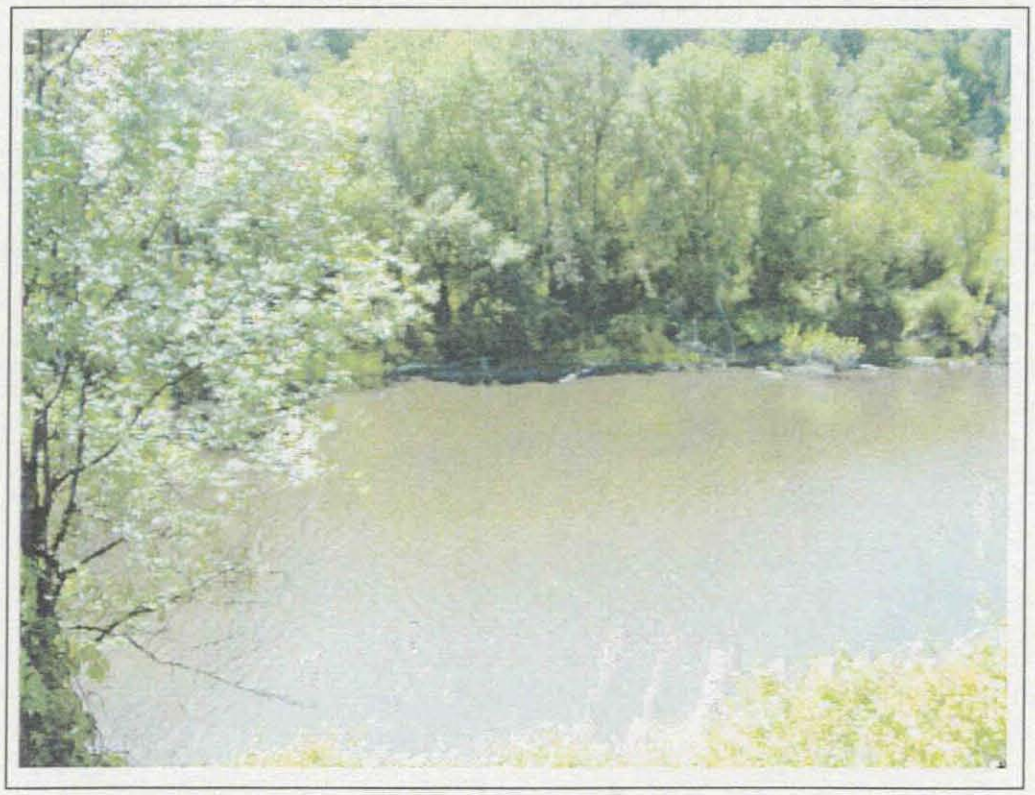


Photo 4:

Terrestrial - wooded habitat.

Photo 5:

Terrestrial - scrub/shrub habitat in foreground.

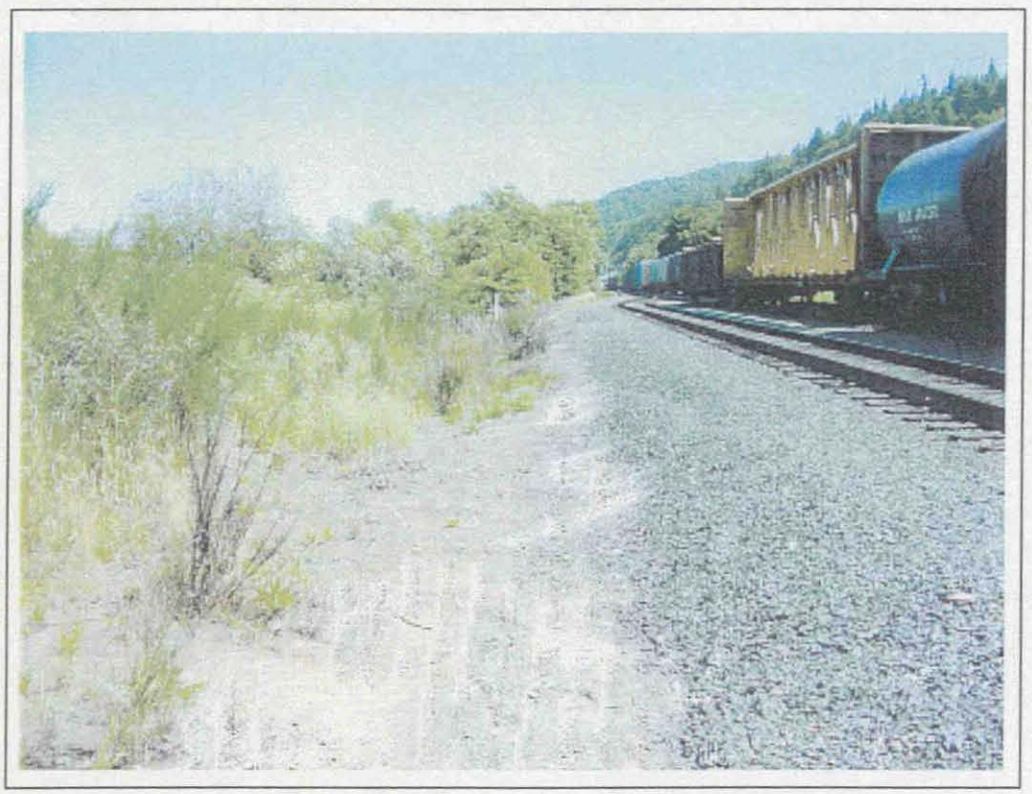


Photo 6:

Terrestrial - scrub/shrub habitat adjacent to railroad tracks.

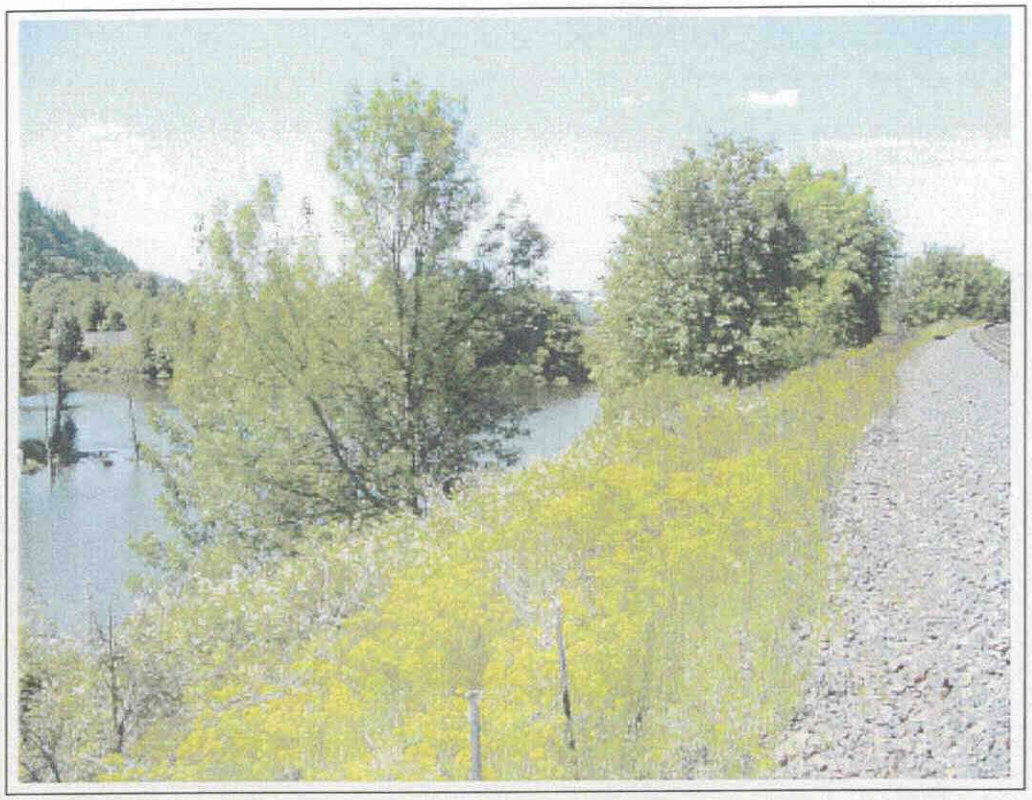


Photo 7:

Illustration of terrestrial - scrub/shrub habitat .

Photo 8:

Terrestrial - scrub/shrub habitat in foreground.

Photo 9:

Terrestrial - scrub/shrub habitat in foreground.

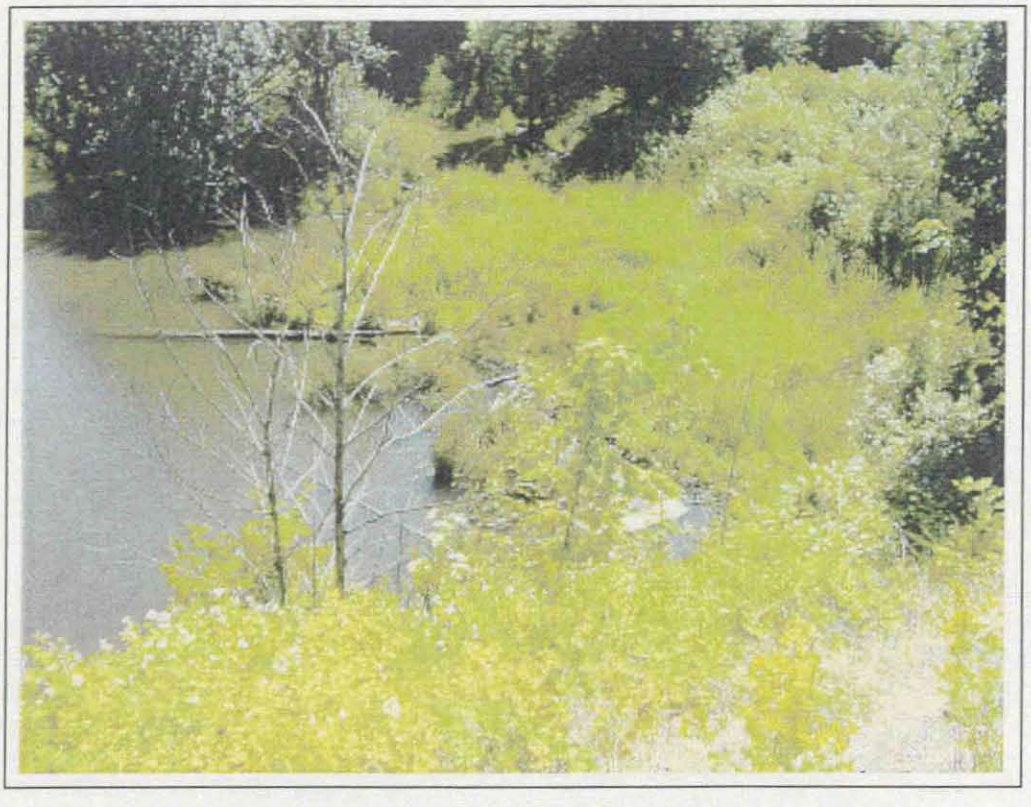


Photo 10:

Illustration of aquatic - wetland habitat.

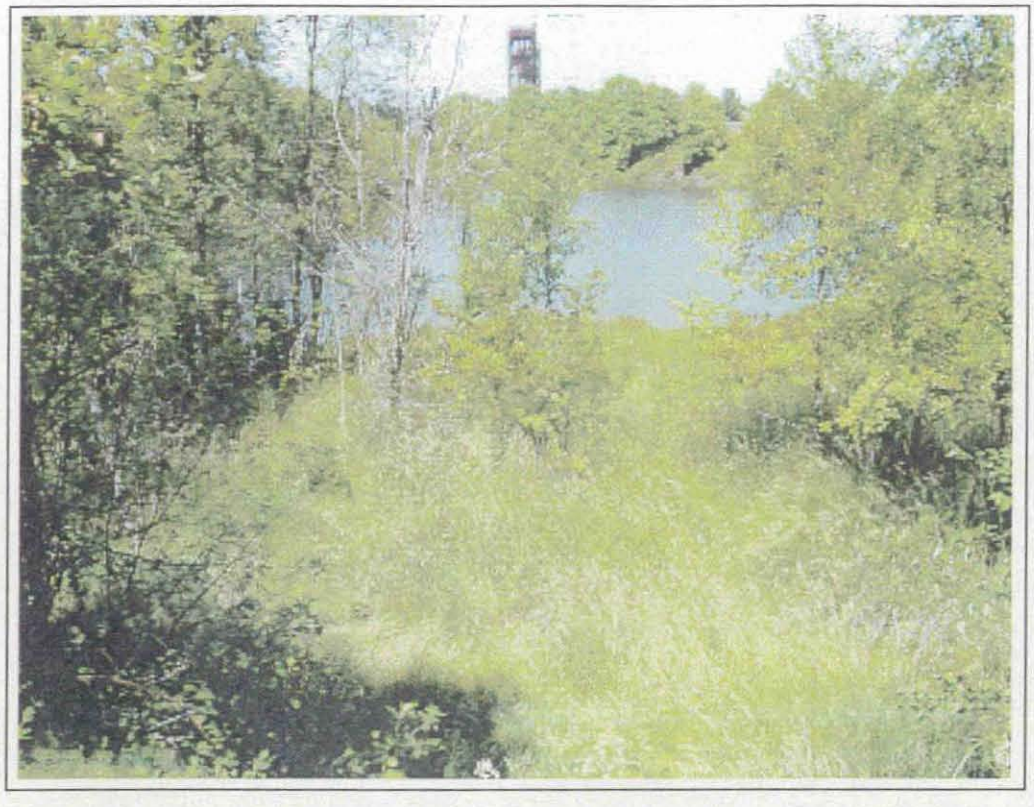


Photo 11:

Illustration of aquatic - wetland habitat.

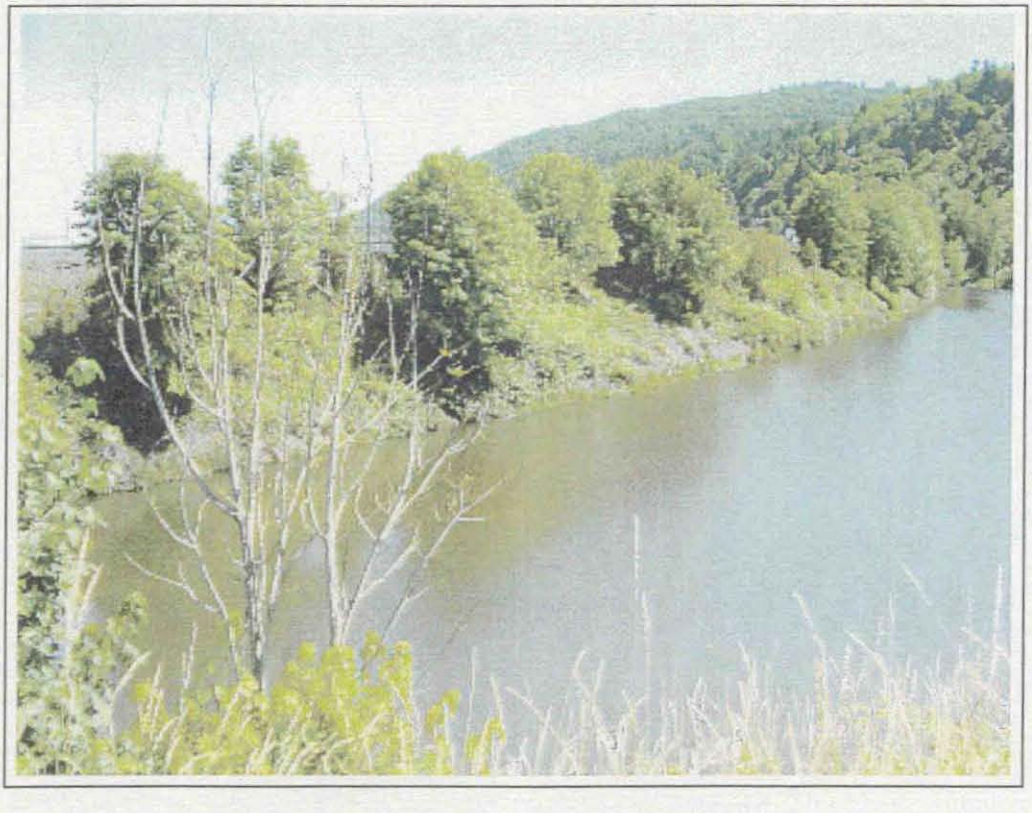


Photo 12:

Illustration of aquatic - lentic habitat.

Photo 13:

Illustration of aquatic - lentic habitat.

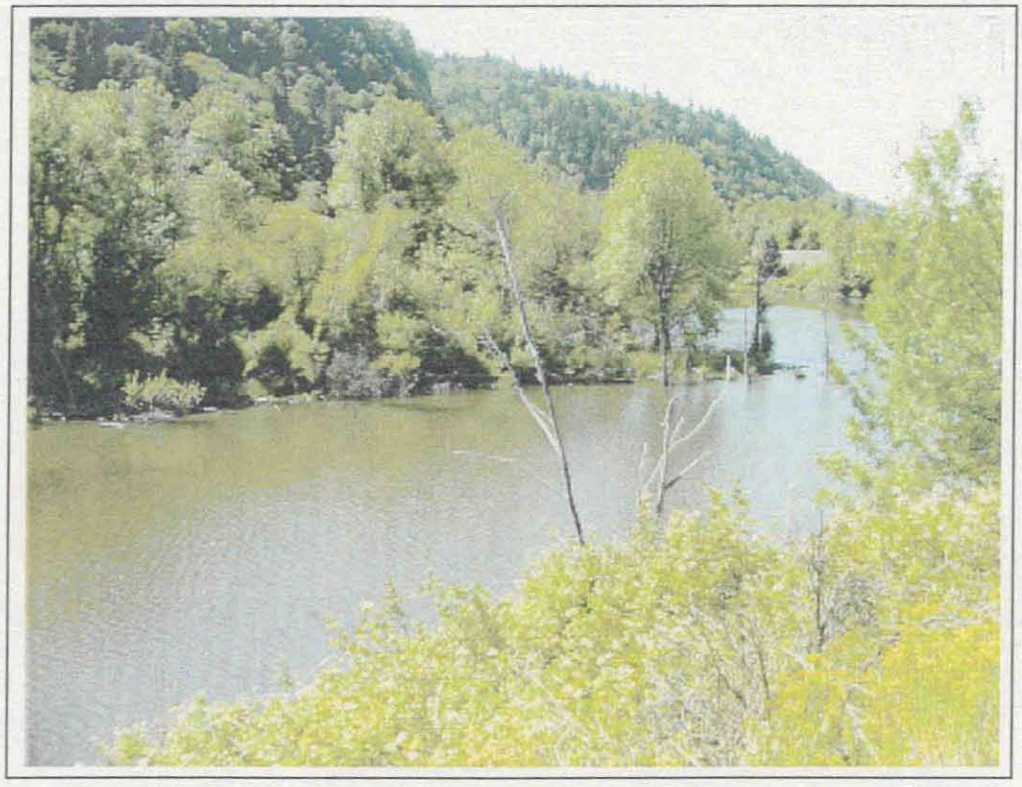


Photo 14:

Illustration of aquatic - lentic habitat.

Photo 15:

Aquatic - lentic habitat/ terrestrial - wooded habitat.

Photo 16:

Illustration of aquatic - lotic habitat (includes gravel bar).

Photo 17:

Aquatic - lotic habitat surrounded by scrub/ shrub and grassland.

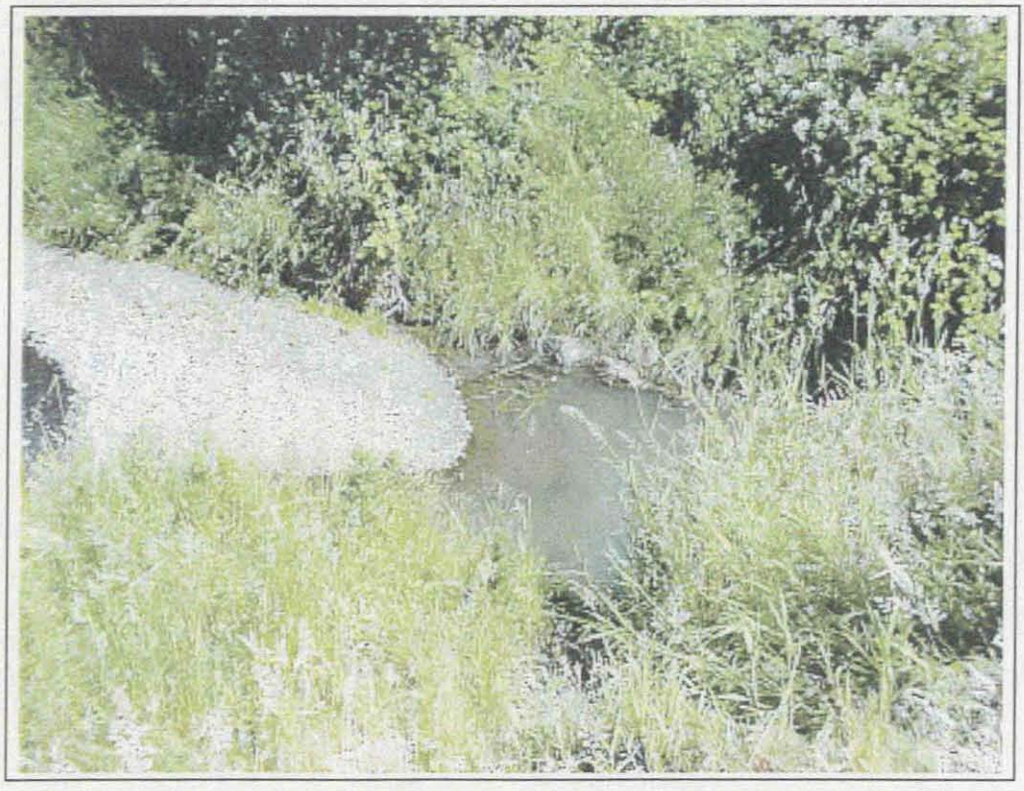


Photo 18:

Aquatic - lotic habitat.

APPENDIX B

Level I Ecological Risk Assessment Attachments

SCOEPA00006928

LEVEL I - SCOPING
ATTACHMENT 1
Ecological Scoping Checklist

Site Name	RPAC- Portland Site
Date of Site Visit	3/15/02, 5/23/02, 6/17/02
Site Location	6200 N.W. St. Helens Road, Portland, OR
Site Visit Conducted by	Kristin Lawrence

Part 1

CONTAMINANTS OF INTEREST Types, Classes or Specific Hazardous Substances Known or Suspected[1]	Onsite	Adjacent to or in locality of the facility[2]
Pesticides	Yes	Yes
Dioxins	Yes	Yes
Inorganics	Yes	Yes
Volatiles	Yes	Yes

[1] As defined by OAR 340-122-115(34)
[2] As defined by OAR 340-122-115(38)

Part 2

OBSERVED IMPACTS ASSOCIATED WITH THE SITE		Findings
Onsite vegetation (None, Limited, Extensive)		None
Vegetation in the locality of the site (None, Limited, Extensive)		None
Onsite wildlife such as amphibians, birds, mammals (None, Limited, Extensive)		None
Wildlife in the locality of the site (None, Limited, Extensive)		None
Other readily observable impacts (None, Limited, Extensive - Discuss Below)	P	Extensive-See Discussion (Photo 6)

Discussion:
Habitat type at the subject site and in the general vicinity would most accurately be characterized as scrub-shrub/wooded. The land has been physically altered from its natural state, but there are no observed impacts resulting from chemical stressors.

Part 3

SPECIFIC EVALUATION OF ECOLOGICAL RECEPTORS/HABITAT		Findings
Terrestrial - Wooded		
Percent of site		18%
Dominant vegetation type (Evergreen, Deciduous, Mixed)	P	Mixed (Photo 14)
Prominent tree size at breast height, i.e., 4' (<6"; 6" to 12"; >12")		3" to 12"
Evidence/observation of wildlife (Macroinvertebrates, Reptiles, Amphibians, Birds, Mammals, Other)		Birds, Mammals See Tables 1 & 2 for list of Species
Terrestrial - Scrub/Shrub/Grasses		
Percent of site		18%
Dominant vegetation type (Scrub, Shrub, Grasses, other)	P	Grasses/Shrub (Photo 2)
Prominent height of vegetation (<2'; 2' to 5'; >5')		1' to 3'
Density of vegetation (Dense, Patchy, Sparse)	P	Dense (Photo 3)
Evidence/observation of wildlife (Macroinvertebrates, Reptiles, Amphibians, Birds, Mammals, Other)		Birds, Mammals See Tables 1 & 2 for list of Species
Terrestrial - Ruderal		
Percent of site		0%
Dominant vegetation type (Landscaped, Agricultural, Bare ground)	P	
Prominent height of vegetation (<0'; 0' to 2'; 2' to 5'; >5')		
Density of vegetation (Dense, Patchy, Sparse)	P	
Evidence/observation of wildlife (Macroinvertebrates, Reptiles, Amphibians, Birds, Mammals, Other)		

LEVEL I - SCOPING
ATTACHMENT 1
Ecological Scoping Checklist

Site Name	RPAC- Portland Site
Date of Site Visit	3/15/02, 5/23/02, 6/17/02
Site Location	6200 N.W. St. Helens Road, Portland, OR
Site Visit Conducted by	Kristin Lawrence

SPECIFIC EVALUATION OF ECOLOGICAL RECEPTORS/HABITAT		Findings
Aquatic - Non-flowing (lentic)		
Percent of site		54%
Type of water bodies (Lakes, Ponds, Vernal pools, Impoundments, Canal)		Lake
Size, average depth, trophic status of water bodies		7 acres, 3' to 10'
Source water (River, Stream, Groundwater, Industrial discharge, Surface water runoff)		Groundwater
Water discharge point (None, River, Stream, groundwater, Wetlands impoundment)		Northwest Drainage Pond
Nature of bottom (Muddy, Rocky, Sand, Concrete, Other)	P	Muddy
Vegetation present (Submerged, Emergent, Floating)	P	Submerged, Emergent (Photo 10)
Obvious wetlands present (Yes/No)		Yes
Evidence/observation of wildlife (Macroinvertebrates, Reptiles, Amphibians, Birds, Mammals, Other)		Macroinvertebrates, Reptiles, Birds, Mammals See Tables 1 & 2
Aquatic - Flowing (lotic)		
Percent of site		0.1%
Type of water bodies (River, Stream, Intermittent Stream, Dry wash, Ditch, Channel)		Stream
Size, average depth, approximate flow rate (cfs)	P	< 0.25 acres, 4" (Photo 18)
Source water (River, Stream, Groundwater, Industrial discharge, Surface water runoff)		Stream and Lake
Bank environment (cover: Vegetated/bare; slope: Steep/Gradual; height (ft):)		Vegetated; Steep; 20 ft.
Tidal influence (Yes/No)		No
Water discharge point (None, River, Stream, groundwater, Wetlands impoundment)		River
Nature of bottom (Muddy, Rocky, Sand, Concrete, Other)		Rocky
Vegetation present (Submerged, Emergent, Floating)	P	Emergent (Photo 16)
Obvious wetlands present (Yes/No)		No
Evidence/observation of wildlife (Macroinvertebrates, Reptiles, Amphibians, Birds, Mammals, Other)		Birds, Amphibians See Tables 1 & 2 for list of Species
Aquatic - Wetland		
Obvious or designated wetlands present (Yes / No)		Yes
Wetland suspected at site is/has (Adjacent to water body, in Floodplain, Standing water, Dark wet soil, Mud cracks, Debris lines, Water Marks)	P	Adjacent to water body (Photo 10)
Vegetation present (Submerged, Emergent, Floating)	P	Emergent (Photo 10)
Size, average depth		1 acre
Source water (River, Stream, Groundwater, Industrial discharge, Surface water runoff)		Groundwater
Water discharge point (None, River, Stream, groundwater, Wetlands impoundment)		Lake
Tidal influence (Yes/No)		No
Evidence/observation of wildlife (Macroinvertebrates, Reptiles, Amphibians, Birds, Mammals, Other)		Reptiles, Mammals, Birds See Tables 1 & 2 for list of Species

Part 4

ECOLOGICALLY IMPORTANT SPECIES / HABITATS OBSERVED
Waterfowl
Deer
Beaver

Note:
P: Photo Documentation Preferred

LEVEL I - SCOPING
ATTACHMENT 2
Evaluation of Receptor-pathway Interactions

EVALUATION OF RECEPTOR-PATHWAY INTERACTIONS	Y	N	U
Are hazardous substances present or potentially present in surface waters?	X		
AND			
Are ecologically important species or habitats present?	X		
AND			
Could hazardous substances reach these receptors via surface water?	X		
When answering the above questions, consider the following: • Known or suspected presence of hazardous substances in surface waters. • Ability of hazardous substance to migrate to surface waters. • Terrestrial receptors may be dermally exposed to water-borne contaminants as a result of wading or swimming in contaminated waters. Aquatic receptors may be exposed through osmotic exchange, respiration or ventilation of surface waters. • Contaminants may be taken up by terrestrial plants whose roots are in contact with surface waters. • Terrestrial receptors may ingest water-borne contaminants if contaminated surface waters are used as a drinking water source.			
Are hazardous substances present or potentially present in groundwater?	X		
AND			
Are ecologically important species or habitats present?		X	
AND			
Could hazardous substances reach these receptors via groundwater?		X	
When answering the above questions, consider the following: • Known or suspected presence of hazardous substances in groundwater. • Ability of hazardous substance to migrate to groundwater. • Potential for hazardous substances to migrate via groundwater and discharge into habitats and/or surface waters. • Contaminants may be taken up by terrestrial and rooted aquatic plants whose roots are in contact with groundwater present within the root zone (~ 1m depth). • Terrestrial receptors generally will not contact groundwater unless it is discharged to the surface.			
Are hazardous substances present or potentially present in sediment?	X		
AND			
Are ecologically important species or habitats present?	X		
AND			
Could hazardous substances reach these receptors via contact with sediment?	X		
When answering the above questions, consider the following: • Known or suspected presence of hazardous substances in sediment. • Ability of hazardous substance to leach or erode from surface soils and be carried into sediment via surface runoff. • Potential for contaminated groundwater to upwell, through and deposit contaminants in sediment. • If sediments are present in an area that is only periodically inundated with water, terrestrial species may be dermally exposed during dry periods. Aquatic receptors may be directly exposed to sediments or may be exposed through osmotic exchange, respiration or ventilation of sediment pore waters. • Terrestrial plants may be exposed to sediment in an area that is only periodically inundated with water. • If sediments are present in an area that is only periodically inundated with water, terrestrial species may have direct access to sediment for the purposes of incidental ingestion. Aquatic receptors may regularly or incidentally ingest sediment while foraging.			
Are hazardous substances present or potentially present in surface soils?		X	
AND			
Are ecologically important species or habitats present?	X		
AND		X	
Could hazardous substances reach these receptors via incidental ingestion of or dermal contact with surficial soils?			
When answering the above questions, consider the following: • Known or suspected presence of hazardous substances in surficial (~ 1m depth) soils. • Ability of hazardous substance to migrate to surficial soils. • Significant exposure via dermal contact would generally be limited to organic contaminants which are lipophilic and cross epidermal barriers. • Exposure of terrestrial plants to contaminants present in particulates deposited on leaf and stem surfaces by rain striking contaminated soils (i.e., rain splash) • Contaminants in bulk soil may partition into soil solution, making them available to roots. • Incidental ingestion of contaminated soil could occur while animals grub for food resident in the soil, feed on plant matter covered with contaminated soil or while grooming themselves clean of soil.			

Y = yes; N = no; U = unknown (counts as a Y)

LEVEL I - SCOPING
ATTACHMENT 2
Evaluation of Receptor-pathway Interactions

EVALUATION OF RECEPTOR-PATHWAY INTERACTIONS	Y	N	U
Are hazardous substances present or potentially present in soils?		X	
AND			
Are ecologically important species or habitats present?	X		
AND		X	
Could hazardous substances reach these receptors via vapors or fugitive dust carried in surface are or confined in burrows			
When answering the above questions, consider the following: • Volatility of the hazardous substance (volatile chemicals generally have Henry's Law constant > 10^{-5} atm-m^3/mol and molecular weight < 200 g/mol). • Exposure via inhalation of is most important to organisms that burrow in contaminated soils, given the limited amounts of air present to dilute vapors and an absence of air movement to disperse gases. • Exposure via inhalation of fugitive dust is particularly applicable to ground-dwelling species that could be exposed to dust disturbed by their foraging or burrowing activities or by wind movement. • Foliar uptake of organic vapors would be limited to those contaminants with relatively high vapor pressures. • Exposure of terrestrial plants to contaminants present in particulates deposited on leaf and stem surfaces.			
Are hazardous substances present or potentially present in prey or food items of ecologically important receptors?			
AND	X		
Are ecologically important species or habitats present?	X		
AND			
Could hazardous substances reach these receptors via consumption of food items?	X		
When answering the above questions, consider the following: • Higher trophic level terrestrial and aquatic consumers and predators may be exposed through consumption of contaminated food sources. • In general, organic contaminants with log K_{ow} > 3.5 may accumulate in terrestrial mammals and those with a log K_{ow} >5 may accumulate in vertebrates.			

Y = yes; N = no; U = unknown (counts as a Y)

APPENDIX C

Information on Species Observed or Potentially Present in the Survey Area

SCOEPA00006934

Oregon NATURAL HERITAGE PROGRAM

A Cooperative Project of :

The Nature Conservancy.

1322 SE Morrison Street
Portland, OR 97214-2423
VOICE/FAX (503) 731-3070

October 15, 2001

Kristin Lawrence
AMEC Earth & Environmental
7477 SW Tech Center Drive
Portland, OR 97223-8025

Dear Ms. Lawrence:

Thank you for requesting information from the Oregon Natural Heritage Program (ONHP). We have conducted a data system search for rare, threatened and endangered plant and animal records for your Rhone Poulenc Project in Township 1 North, Range 1 West, Section 13 - W.M.

Thirteen (13) records were noted within a two-mile radius of your project and are included on the enclosed computer printout. A key to the fields is also included.

Please remember that the lack of rare element information from a given area does not mean that there are no significant elements there, only that there is no information known to us from the site. To assure that there are no important elements present, you should inventory the site, at the appropriate season.

Please note that at this time ONHP does not have comprehensive computerized records available for all anadromous fish in Oregon. I have listed below the species that may be present within the waterways contained in the project area. I have also included their listing by the National Marine Fisheries Service (NMFS). For more information on anadromous fish you may wish to contact NMFS at: 525 NE Oregon Street; Portland, Oregon 97232-2737. Please also note that the U.S. Fish and Wildlife Service now has jurisdiction over coastal cutthroat trout.

Coastal cutthroat trout (Columbia River/SW Washington)	*Oncorhynchus clarki clarki*	Proposed Threatened
Coho salmon (Lower Columbia River)	*Oncorhynchus kisutch*	Candidate
Steelhead (Lower Columbia River)	*Oncorhynchus mykiss*	Threatened
Steelhead (Upper Willamette River)	*Oncorhynchus mykiss*	Threatened
Chinook salmon (Lower Columbia River)	*Oncorhynchus tshawytscha*	Threatened
Chinook salmon (Upper Willamette River)	*Oncorhynchus tshawytscha*	Threatened

This data is confidential and for the specific purposes of your project and is **not to be distributed**.

If you need additional information or have any questions, please do not hesitate to contact me.

Sincerely,

Cliff Alton
Conservation Information Assistant

encl.: invoice
computer printout and data key

Oregon NATURAL HERITAGE PROGRAM

A Cooperative Project of :

The Nature Conservancy.

1322 SE Morrison Street
Portland, OR 97214-2423
VOICE/FAX (503) 731-3070

Invoice Number: H-101501-CWA3
Budget Center: 1370246300/4613

INVOICE

TO: AMEC Earth & Environmental
7477 SW Tech Center Drive
Portland, OR 97223-8025

ATTN: Accounts Payable

DATE: October 15, 2001

RE: Data system search for rare, threatened and endangered plants and animals in the vicinity of Township 1 North, Range 1 West, Section 13 - W.M. Requested by Kristin Lawrence for the Rhone Poulenc Project.

For services and products:

Computer records (13 @ $0.50/record)	$ 6.50
Computer fee (flat rate)	$ 20.00
Staff time (0.5 hours @ $50.00/hour)	$ 25.00
TOTAL DUE:	**$ 51.50**

Please make checks payable to: **Oregon Natural Heritage Program**

Please include invoice number at top of page with payment.

Terms: **Net 30**

NAME: RANA AURORA AURORA
COMMON NAME: NORTHERN RED-LEGGED FROG
EO-CODE: AAABH01021*181 LAST OBS: 2000-02-24 FED STATUS: SOC
COUNTY(s): MULTNOMAH FIRST OBS: 2000-02-05 STATE STATUS: SU/SV
QUAD NAMES: LINNTON LAT: 453214N SIZE:
PHYSIOGRAPHIC PROV: WV LONG: 1224654W MINELEV (Feet): 400
T-R-S: 001N001W 26 QUADCODE: 4512257 MAXELEV (Feet):
T-R-S COMMENTS: SW4 PRECISION: M
EO-RANK/COMM: :
DIRECTIONS: E OF NW MILL POND ROAD AND W OF NW MILLER ROAD.
DESCRIPTION:
EO-DATA: 2000: POPULATION ESTIMATES: 1156 TO 1734 ADULTS FROGS.
EOTYPE:
COMMENTS: ACCORDING TO SPINKS T1N, R1W, SEC. 26, NW4, BUT ACCORDING TO THE MAP IN APPENDIX B IS AT SW4.
ANNUAL OBSERVATION:
OWNER: PRIVATE
MANAGED AREA:
MANAGE COMM:
PROT COMM:
BEST SOURCE: SPINKS, KYLE. 2000. NORTHERN RED-LEGGED FORG SURVEY REPORT OF FOREST HEIGHTS, TRACT W. 13 PAGES. UNPUBLISHED REPORT.

NAME: COCCYZUS AMERICANUS
COMMON NAME: YELLOW-BILLED CUCKOO
EO-CODE: ABNRB02020*026 LAST OBS: 1985 FED STATUS: C
COUNTY(s): MULTNOMAH FIRST OBS: 1923-06-08 STATE STATUS: SC
QUAD NAMES: PORTLAND LAT: 453712N SIZE: 0
PHYSIOGRAPHIC PROV: WV LONG: 1224300W MINELEV (Feet): 10
T-R-S: 002N001E 32 QUADCODE: 4512256 MAXELEV (Feet):
T-R-S COMMENTS: PRECISION: G
EO-RANK/COMM: D :
DIRECTIONS: PORTLAND-ALONG THE COLUMBIA RIVER FROM THE MOUTH OF THE WILLAMETTE N TO WHAT IS NOW THE PORTLAND AIRPORT
DESCRIPTION: COLUMBIA RIVER BOTTOMLANDS
EO-DATA: 1985: 1 CUCKOO HEARD. 1940: 2 BIRDS ON 7-27. 1923: AT LEAST 12 BIRDS ON 6-8.
EOTYPE:
COMMENTS: OBSERVERS: MIKE HOUCK (1985), W.H. TELFER (1940), GABRIELSON AND JEWETT (1923).
ANNUAL OBSERVATION:
OWNER: PRIVATE
MANAGED AREA:
MANAGE COMM:
PROT COMM:
BEST SOURCE: HOUCK, MIKE. PORTLAND AUDUBON SOCIETY.

NAME: AGELAIUS TRICOLOR
COMMON NAME: TRICOLORED BLACKBIRD
EO-CODE: ABPBXB0020*002 LAST OBS: 1985 FED STATUS: SOC
COUNTY(s): MULTNOMAH FIRST OBS: 1983 STATE STATUS: SP
QUAD NAMES: PORTLAND LAT: 453550N SIZE: 0
PHYSIOGRAPHIC PROV: WV LONG: 1224305W MINELEV (Feet): 20
T-R-S: 001N001E 05 QUADCODE: 4512256 MAXELEV (Feet):
T-R-S COMMENTS: PRECISION: M
EO-RANK/COMM: C :
DIRECTIONS: ST. JOHNS LANDFILL IN PORTLAND
DESCRIPTION: DENSE HIMALAYAN BLACKBERRIES ADJACENT TO A BLIND SLOUGH W/ SPARSE TREE COVER ALONG THE SLOUGH MARGINS
EO-DATA: 1985: A COLONY OF 20-30 BIRDS PRESENT DURING THE NESTING SEASON. 1983: 36 BIRDS OBSERVED 6/25-7/31, APPARENTLY NESTING.
EOTYPE:
COMMENTS: REPORTED BY HOUCK ET AL. THIS COLONY WOULD BE ABOUT 250 MI N OF THE CLOSEST NESTING AREAS IN THE ROGUE RIVER VALLEY
ANNUAL OBSERVATION:
OWNER: CITY

MANAGED AREA:
MANAGE COMM:
PROT COMM:
BEST SOURCE: HOUCK ET AL. 1983. AMERICAN BIRDS. 37(6):1022. HOUCK. 1985. PERSONAL COMMUNICATION W/ONHDB

NAME: ONCORHYNCHUS KISUTCH POP 1
COMMON NAME: COHO SALMON (LOWER COLUMBIA RIVER/SW WASHINGTON COAST RUNS)

EO-CODE: AFCHA02031*037 LAST OBS: 1999-PRE FED STATUS: C
COUNTY(s): COLUMBIA FIRST OBS: STATE STATUS: LE
MULTNOMAH
CLACKAMAS
QUAD NAMES: OREGON CITY LAT: SIZE:
GLADSTONE
LAKE OSWEGO
PORTLAND
LINNTON
SAUVIE ISLAND
ST HELENS
PHYSIOGRAPHIC PROV: LONG: MINELEV (Feet):
T-R-S: QUADCODE: 4512235 MAXELEV (Feet):
4512245
4512246
4512256
4512257
4512267
4512277
T-R-S COMMENTS: PRECISION: M
EO-RANK/COMM: :
DIRECTIONS: SCAPPOOSE BAY, MULTNOMAH CHANNEL, WILLAMETTE RIVER
DESCRIPTION:
EO-DATA: ODFW DISTRIBUTION MAPS USED TO CREATE THE 1:24,000 COVERAGE
EOTYPE: REARING & MIGRATION - fish
COMMENTS: DISTRIBUTION INFORMATION USED IN THIS EOR WAS DERIVED FROM ODFW GEOGRAPHIC RESOURCES DATA PRODUCED AND DISTRIBUTED IN 1999. UNLESS SPECIFIC DATA EXISTS IN THE DATA FIELD, THE INFORMATION PRESENTED IN THIS EOR REPRESENTS THE "BEST PROFESSIONAL JUDGMENT" BY ODFW'S DISTRICT FISHERIES BIOLOGIST; THE PRESENCE OF COHO IN DESCRIBED AREAS SHOULD BE CONSIDERED UNDOCUMENTED BUT AS HAVING A POTENTIAL OF BEING PRESENT.
ANNUAL OBSERVATION:
OWNER:
MANAGED AREA:
MANAGE COMM:
PROT COMM:
BEST SOURCE: 2000 ODFW GEOGRAPHIC RESOURCES DATA; MASSEY, JAY; BENNETT, DON.

NAME: ONCORHYNCHUS TSHAWYTSCHA POP 21
COMMON NAME: CHINOOK SALMON - LOWER COLUMBIA RIVER SPRING RUN
EO-CODE: AFCHA0205W*006 LAST OBS: 1999-PRE FED STATUS: LT
COUNTY(s): CLACKAMAS FIRST OBS: STATE STATUS:
MULTNOMAH
COLUMBIA
QUAD NAMES: OREGON CITY LAT: SIZE:
GLADSTONE
LAKE OSWEGO
PORTLAND
LINNTON
SAUVIE ISLAND
ST HELENS
PHYSIOGRAPHIC PROV: LONG: MINELEV (Feet):
T-R-S: QUADCODE: 4512235 MAXELEV (Feet):
4512245
4512246
4512256
4512257

4512267
4512277
T-R-S COMMENTS: PRECISION: M
EO-RANK/COMM: :
DIRECTIONS: SCAPPOOSE BAY, MULTNOMAH CHANNEL, WILLAMETTE RIVER
DESCRIPTION:
EO-DATA: SPRING RUN; ODFW DISTRIBUTION MAPS USED TO CREATE THE 1:24,000 COVERAGE
EOTYPE: REARING & MIGRATION - fish
COMMENTS: DISTRIBUTION INFORMATION USED IN THIS EOR WAS DERIVED FROM ODFW GEOGRAPHIC RESOURCES DATA PRODUCED AND DISTRIBUTED IN 1999. UNLESS SPECIFIC DATA EXISTS IN THE DATA FIELD, THE INFORMATION PRESENTED IN THIS EOR REPRESENTS THE "BEST PROFESSIONAL JUDGMENT" BY ODFW'S DISTRICT FISHERIES BIOLOGIST; THE PRESENCE OF CHINOOK IN DESCRIBED AREAS SHOULD BE CONSIDERED UNDOCUMENTED BUT AS HAVING A POTENTIAL OF BEING PRESENT.
ANNUAL OBSERVATION:
OWNER:
MANAGED AREA:
MANAGE COMM:

PROT COMM:
BEST SOURCE: 2000 ODFW GEOGRAPHIC RESOURCES DATA; MASSEY, JAY; BENNETT, DON.

NAME: ONCORHYNCHUS TSHAWYTSCHA POP 22
COMMON NAME: CHINOOK SALMON - LOWER COLUMBIA RIVER FALL RUN
EO-CODE: AFCHA0205Y*006 LAST OBS: 1999-PRE FED STATUS: LT
COUNTY(s): CLACKAMAS FIRST OBS: STATE STATUS: SC
MULTNOMAH
COLUMBIA
QUAD NAMES: OREGON CITY LAT: SIZE:
GLADSTONE
LAKE OSWEGO
PORTLAND
LINNTON
SAUVIE ISLAND
PHYSIOGRAPHIC PROV: LONG: MINELEV (Feet):
T-R-S: QUADCODE: 4512235 MAXELEV (Feet):
4512245
4512246
4512256
4512257
4512267
T-R-S COMMENTS: PRECISION: M
EO-RANK/COMM: :
DIRECTIONS: SCAPPOOSE BAY & TRIBUTARIES, WILLAMETTE RIVER & TRIBUTARIES
DESCRIPTION:
EO-DATA: FALL RUN; ODFW DISTRIBUTION MAPS USED TO CREATE THE 1:24,000 COVERAGE
EOTYPE: REARING & MIGRATION - fish
COMMENTS: DISTRIBUTION INFORMATION USED IN THIS EOR WAS DERIVED FROM ODFW GEOGRAPHIC RESOURCES DATA PRODUCED AND DISTRIBUTED IN 1999. UNLESS SPECIFIC DATA EXISTS IN THE DATA FIELD, THE INFORMATION PRESENTED IN THIS EOR REPRESENTS THE "BEST PROFESSIONAL JUDGMENT" BY ODFW'S DISTRICT FISHERIES BIOLOGIST; THE PRESENCE OF CHINOOK IN DESCRIBED AREAS SHOULD BE CONSIDERED UNDOCUMENTED BUT AS HAVING A POTENTIAL OF BEING PRESENT.
ANNUAL OBSERVATION:
OWNER:
MANAGED AREA:
MANAGE COMM:
PROT COMM:
BEST SOURCE: 2000 ODFW GEOGRAPHIC RESOURCES DATA; MASSEY, JAY; BENNETT, DON; CALDWELL, DICK.

NAME: ONCORHYNCHUS MYKISS POP 27
COMMON NAME: STEELHEAD - LOWER COLUMBIA RIVER WINTER RUN
EO-CODE: AFCHA02132*001 LAST OBS: 1999-PRE FED STATUS: LT
COUNTY(s): CLACKAMAS FIRST OBS: STATE STATUS: SC
MULTNOMAH
COLUMBIA
QUAD NAMES: OREGON CITY LAT: SIZE:

GLADSTONE
LAKE OSWEGO
PORTLAND
LINNTON
SAUVIE ISLAND
ST HELENS
PHYSIOGRAPHIC PROV: LONG: MINELEV (Feet):
T-R-S: QUADCODE: 4512235 MAXELEV (Feet):
4512245
4512246
4512256
4512257
4512267
4512277
T-R-S COMMENTS: PRECISION: M
EO-RANK/COMM: :
DIRECTIONS: SCAPPOOSE BAY, MULTNOMAH CHANNEL, WILLAMETTE RIVER
DESCRIPTION:
EO-DATA: WINTER RUN: ODFW DISTRIBUTIION MAPS USED TO CREATE THE 1:24,000 COVERAGE
EOTYPE: REARING & MIGRATION - fish
COMMENTS: DISTRIBUTION INFORMATION USED IN THIS EOR WAS DERIVED FROM ODFW GEOGRAPHIC RESOURCES DATA PRODUCED AND DISTRIBUTED IN 1999. UNLESS SPECIFIC DATA EXISTS IN THE DATA FIELD, THE INFORMATION PRESENTED IN THIS EOR REPRESENTS THE "BEST PROFESSIONAL JUDGMENT" BY ODFW'S DISTRICT FISHERIES BIOLOGIST; THE PRESENCE OF STEELHEAD IN DESCRIBED AREAS SHOULD BE CONSIDERED UNDOCUMENTED BUT AS HAVING A POTENTIAL OF BEING PRESENT.

ANNUAL OBSERVATION:
OWNER:
MANAGED AREA:
MANAGE COMM:
PROT COMM:
BEST SOURCE: 2000 ODFW GEOGRAPHIC RESOURCES DATA; MASSEY, JAY; BENNETT, DON.

NAME: CORYNORHINUS TOWNSENDII TOWNSENDII
COMMON NAME: PACIFIC WESTERN BIG-EARED BAT
EO-CODE: AMACC08015*071 LAST OBS: 1928-09-05 FED STATUS: SOC
COUNTY(s): MULTNOMAH FIRST OBS: 1914 STATE STATUS: SC
QUAD NAMES: PORTLAND LAT: 453220N SIZE: 0
PHYSIOGRAPHIC PROV: WV LONG: 1223800W MINELEV (Feet): 150
T-R-S: 001N001E 25 QUADCODE: 4512256 MAXELEV (Feet):
T-R-S COMMENTS: PRECISION: G
EO-RANK/COMM: D :
DIRECTIONS: PORTLAND - ON THE E SIDE
DESCRIPTION:
EO-DATA: ADULT MALE IN THE JEWETT COLLECTION WAS CAPTURED 9-5-28, A FEW MI FROM A CAVE ON THE E SIDE OF PORTLAND THAT WAS USED BY HUNDREDS OF BATS IN 1914, BUT WAS LATER DESTROYED BY VANDALS
EOTYPE:
COMMENTS:
ANNUAL OBSERVATION:
OWNER: PRIVATE
MANAGED AREA:
MANAGE COMM:
PROT COMM:
BEST SOURCE: BAILEY. 1936. MAMMALS OF OREGON. MASSER & CROSS. 1981. NOTES ON THE DISTRIBUTION OF OREGON BATS

NAME: ANTROZOUS PALLIDUS PACIFICUS
COMMON NAME: PACIFIC PALLID BAT
EO-CODE: AMACC10011*016 LAST OBS: 1927-08 FED STATUS: SOC
COUNTY(s): MULTNOMAH FIRST OBS: 1927 STATE STATUS: SV
QUAD NAMES: PORTLAND LAT: 453045N SIZE: 0
PHYSIOGRAPHIC PROV: WV LONG: 1224130W MINELEV (Feet): 150
T-R-S: 001S001E 04 QUADCODE: 4512256 MAXELEV (Feet):
T-R-S COMMENTS: PRECISION: G

EO-RANK/COMM: :
DIRECTIONS: PORTLAND
DESCRIPTION:
EO-DATA: LEO SIMON REPORTED A LARGE NUMBER OF PALLID BATS FLYING AROUND A CHURCH TOWER ON AN EVENING IN MID-AUGUST, 1927. DATE INDICATES A BREEDING COLONY
EOTYPE:
COMMENTS:
ANNUAL OBSERVATION:
OWNER:
MANAGED AREA:
MANAGE COMM:
PROT COMM:
BEST SOURCE: BAILEY. 1936. MAMMALS & LIFE ZONES OF OREGON

NAME: CLEMMYS MARMORATA MARMORATA
COMMON NAME: NORTHWESTERN POND TURTLE
EO-CODE: ARAAD02031*041 LAST OBS: FED STATUS: SOC
COUNTY(s): MULTNOMAH FIRST OBS: STATE STATUS: SC
QUAD NAMES: PORTLAND LAT: 453045N SIZE: 0
PHYSIOGRAPHIC PROV: WV LONG: 1224130W MINELEV (Feet):
T-R-S: 001S001E 04 QUADCODE: 4512256 MAXELEV (Feet):
T-R-S COMMENTS: PRECISION: G
EO-RANK/COMM: D :
DIRECTIONS: PORTLAND
DESCRIPTION:
EO-DATA: SPECIES RECORDED AT THIS SITE, PER ST. JOHN. DATES NOT SPECIFIED
EOTYPE:
COMMENTS:
ANNUAL OBSERVATION:
OWNER:
MANAGED AREA:
MANAGE COMM:
PROT COMM:
BEST SOURCE: ST. JOHN, ALAN. 1984. HERPETOLOGY OF THE LOWER WILLAMETTE VALLEY

NAME: ASTER CURTUS
COMMON NAME: WHITE-TOPPED ASTER
EO-CODE: PDAST0T0R0*006 LAST OBS: 1898-08 FED STATUS: SOC
COUNTY(s): MULTNOMAH FIRST OBS: 1898 STATE STATUS: LT
QUAD NAMES: PORTLAND LAT: 453045N SIZE: 0
PHYSIOGRAPHIC PROV: WV LONG: 1224130W MINELEV (Feet): 100
T-R-S: 001S001E 04 QUADCODE: 4512256 MAXELEV (Feet):
T-R-S COMMENTS: PRECISION: G
EO-RANK/COMM: :
DIRECTIONS: PORTLAND. NO FURTHER INFORMATION.
DESCRIPTION: NO HABITAT DATA.
EO-DATA: HERBARIUM COLLECTION: NO NAME, 08-09-98, NO #, WS
EOTYPE:
COMMENTS: THIS POPULATION ASSUMED EXTIRPATED.
ANNUAL OBSERVATION:
OWNER:
MANAGED AREA:
MANAGE COMM:
PROT COMM:
BEST SOURCE: HERBARIUM COLLECTION AT WS

NAME: CIMICIFUGA ELATA
COMMON NAME: TALL BUGBANE
EO-CODE: PDRAN07030*017 LAST OBS: 1904-06-30 FED STATUS:
COUNTY(s): MULTNOMAH FIRST OBS: 1882 STATE STATUS: C
QUAD NAMES: PORTLAND LAT: 453045N SIZE:
PHYSIOGRAPHIC PROV: WV LONG: 1224130W MINELEV (Feet):

T-R-S: 001S001E 4 QUADCODE: 4512256 MAXELEV (Feet):
T-R-S COMMENTS: ON OUR TOPO MAP SEC 48 PRECISION: G
EO-RANK/COMM: :
DIRECTIONS: PORTLAND
DESCRIPTION:
EO-DATA: HERBARIUM COLLECTION: HENDERSON S.N., 6-13-82, 6-22-82, ORE; DRAKE AND DICKSON S.N., 5-88, F; DRAKE AND GORMAN 14, 7-4-90, ORE; HOWELL S.N., 6-20-91, MO; GORMAN S.N., 6-30-04, ORE
EOTYPE:
COMMENTS:
ANNUAL OBSERVATION:
OWNER:
MANAGED AREA:
MANAGE COMM:
PROT COMM:
BEST SOURCE: GORMAN COLLECTION

NAME: CAREX COMOSA
COMMON NAME: BRISTLY SEDGE
EO-CODE: PMCYP032Y0*005 LAST OBS: 1887-03-06 FED STATUS:
COUNTY(s): MULTNOMAH FIRST OBS: 1887-03-06 STATE STATUS:
QUAD NAMES: PORTLAND LAT: 453342N SIZE:
PHYSIOGRAPHIC PROV: WV LONG: 1224243W MINELEV (Feet): 20
T-R-S: 001N001E 20 QUADCODE: 4512256 MAXELEV (Feet):
T-R-S COMMENTS: PRECISION: M
EO-RANK/COMM: :
DIRECTIONS: "[SWAN] ISLAND" [BRACKETED INFORMATION CAME FROM THE CAREX WORKING GROUP-ONHP/SV, 5/97]
DESCRIPTION:
EO-DATA:
EOTYPE:
COMMENTS: HERBARIUM COLLECTION: L.F. HENDERSON, S.N., 3-6-1887, ORE-16644.
ANNUAL OBSERVATION:
OWNER: PRIVATE
MANAGED AREA:
MANAGE COMM:
PROT COMM:
BEST SOURCE: HENDERSON COLLECTION

13 Records listed.

KEY TO PRINTOUT

NAME AND COMMON NAME: The scientific and common name of the species.

EO-CODE (element occurrence code): Unique Heritage Program code for this occurrence. The first 10 characters are the code for the species, and the last 3 are the occurrence number.

COUNTY(S): County name(s)

QUAD NAMES: Name of the USGS 7.5' topographic quadrangle map(s) where the record is mapped.

PHYSIOGRAPHIC PROVINCE: Code for physiographic province.

- **BM** = Ochoco, Blue and Wallowa Mts.
- **BR** =Basin and Range
- **CR** = Coast Range
- **CB** = Columbia Basin
- **EC** = East slope of the Cascades
- **KM** = Klamath Mountains
- **HP** = High Lava Plains
- **OU** = Owyhee uplands
- **WC** = West slope and crest of the Cascades
- **WV** = Willamette Valley

T-R-S: Township, Range and Section, with township first, range second and section third (a space appears between range and section). 004S029E 32 = Township 4S, Range 29E, Section 32. Fractional townships and ranges are further defined in the T-R COMMENTS field.

T-R-S COMMENTS: Comments relating to township, range or section(s), e.g. SE4NE4 or SENE=SE 1/4 of the NE 1/4

LASTOBS: Last reported sighting date, in the form YYYY-MM-DD

FIRSTOBS: First reported sighting date for this occurrence in the form YYYY-MM-DD

LAT: latitude, North

LONG: longitude, West

QUADCODE: Heritage Program code for the USGS 7.5' topo map

FED STATUS: US Fish and Wildlife Service status

- **LE** = listed endangered
- **LT** = listed threatened
- **PE** = proposed endangered
- **PT** = proposed threatened
- **SOC** = species of concern
- **C** = candidate for listing with enough information available for listing

STATE STATUS: For animals, Oregon Department of Fish and Wildlife status

- **LE**=listed endangered
- **PE**=proposed endangered
- **PT**=proposed threatened
- **SC** or **C**=sensitive-critical
- **SV** or **V**=sensitive-vulnerable
- **SP** or **P**=sensitive peripheral or naturally rare
- **SU** or **U**=sensitive-undetermined.

SIZE: in acres, whole numbers. 0=unknown

MINELEV: Minimum elevation, in feet.

MAXELEV: Maximum elevation, in feet.

PRECISION: Second (S) = exact location; Minute (M) = location known to nearest 1.5 miles; General (G) = location known to nearest 5 miles.

EO-RANK/COMM: Relative quality of this occurrence (A=best site, B=good population or site, C=fair or small population, D=marginal or destroyed occurrence)

DIRECTIONS: Site name and direction to site

DESCRIPTION: Habitat information, e.g. aspect, slope, soils, associated species, community type, etc.

EO-DATA: Species and population biology - numbers, age, nesting success, vigor, phenology, disease, etc.

EOTYPE: For animals, type of occurrence (e.g. roost, nest, etc.)

COMMENTS: Miscellaneous comments

ANNUAL OBSERVATIONS: Summary of yearly observations

OWNER: federal, state, private, etc.

MANAGED AREA: BLM district, USFS Forest, Private Preserve, etc.

MANAGE COMM: Comments on how the site is managed.

PROT COMM (Protection Comments): Comments regarding protectibility and threats.

BEST SOURCE: Best source of information for this occurrence.

COPY

Orego

December 10, 1996

DEPARTMENT
FISH AND
WILDLIFE

HABITAT
CONSERVATION
DIVISION

Mavis D. Kent
Oregon Department of Environmental Quality
2020 SW Fourth Avenue
Portland, OR 97201-4987

Re: Rhone-Poulenc; Remedial Investigation and Feasibility Study

Dear Mavis:

This letter responds to your request for Oregon Department of Fish and Wildlife (ODFW) to comment on the likely future quality and value of the habitat of North Doane Lake and the nearby stretch of Willamette River and the groundwater roles in supporting these habitats.

North Doane Lake

North Doane Lake provides habitat for abundant primary producer and secondary consumer organisms. Primary production, dominated by aquatic macrophytes and filamentous green algae coupled with emergent macrophytes are abundant in the shallow areas and a diverse assemblage of sedges, rushes, and other aquatic plants is present. Secondary production is high and numerous consumer organisms occupy North Doane Lake. These include turtles (likely painted turtles, classified as sensitive in Oregon). A preliminary survey of the macroinvertebrate population showed high species richness and abundant populations. Wildlife species observed included ring-necked duck, mallard, wood duck, bufflehead, pied-billed grebe, hooded merganser, great blue heron, nutria, raccoon, bullfrog and redlegged frog (classified as sensitive in Oregon).[1]

Such areas, especially within the urban growth boundary, are becoming less and less available over time because of filling of wetlands through urbanization. Additionally, this wetland location on the edge of a forest habitat (Forest Park) increases its value as wildlife habitat.

Nearby Stretch of the Willamette River

Wetland aquatic vegetation, primarily reed canary grass, willows, and purple loosestrife, is prevalent along the shoreline. Canada geese (including goslings) were observed in June 1993. Abundant signs of beaver, nutria, black tailed deer, raccoon opossum, small rodents, ducks, geese, great blue heron, Pacific tree frog and bullfrogs,

[1] Section on Ecological Risk Assessment for RI/FS Workplan. May 1994.

John A. Kitzhaber
Governor

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and band tailed pigeons utilize the shoreline. Riparian vegetation is intact along this shoreline including Himalayan blackberry, cottonwoods, willows, Oregon ash, and bigleaf maple.[1] This area is part of the Willamette River Greenway an initiative by the City of Portland and Metro to protect and enhance Willamette River riparian habitat. The Greenway plan designates this area as low wildlife value but as a major fish producer.

Future of these Habitats

ODFW has insufficient information to evaluate the likely future of these habitats at this time. We are not able to evaluate the future of these urban wildlife habitats until we have more information about exposure pathways and risk of contamination from RPAC related constituents for evaluation of ecological risk assessment.

Goundwater Influence

We understand these habitats may receive groundwater or surface water laden constituents at or near benchmark levels. From the Woodward Clyde report it appears North Doane Lake receives most of its water through Forest Park surface water runoff, however, groundwater contribution rates and sources to the lake is unclear. Until we have more information about water inflow, contaminant mobilization and associated risks in terms of contaminant impact on these habitats we cannot postulate on *future* quality and value of these habitats. Clearly, if these habitats are receiving elevated levels of toxic constituents such that fish and wildlife might bioaccumulate these toxins, the value of these habitats is significanty reduced or is even risky to wildlife. Therefore, an important, unanswered question is; given these areas are currently at benchmark levels for contaminant loading, are these habitats increasing, decreasing or remaining the same in terms of inputs of RPAC related constituents?

I hope this helps with your evaluation. If you have questions, please do not hesitate to call me (tel. 872-5255 ext. 5592) or Holly Michael, ODFW, Clackamas (tel. 657-2000). Thank you for the opportunity to comment.

Sincerely,

Greg Robart

Greg Robart
Water Quality Coordinator
Habitat Conservation Division

[1] Section on Ecological Risk Assessment for RI/FS Workplan. May 1994.

c Woodward Clyde - Lynn Sharp

TABLE X

RELATIVE ABUNDANCES [1] (%) OF MACROINVERTEBRATES COLLECTED IN NORTH DOANE LAKE
USING A PETITE PONAR SAMPLER
JANUARY 30, 1995
RHONE-POULENC AG. CO. SITE

TAXON	STATION NUMBER:REPLICATE NUMBER								
	NDL-1:R1	NDL-1:R2	NDL-1:R3	NDL-2:R1	NDL-2:R2	NDL-2:R3	NDL-3:R1	NDL-3:R2	NDL-3:R3
Ephemeroptera									
Unid. Ephemeroptera									
Diptera									
Unid. diptera pupa									
Ceratopogonidae									
Unid. Ceratopogonidae Type 1				1		0.5			
Unid. Ceratopogonidae Type 2		1		1.5	2.5	2.5			
Unid. Ceratopogonidae Type 3									
Chironomidae									
Chironomus sp.	5	7	14	4	2.5	5.5	42	11	32
Unid. Chironomidae Type 2					9	2.5	3	1	
Unid. Chironomidae Type 3			1						
Unid. Chironomidae Type 4	2					4			4
Unid. Chironomidae Type 6	1								
Unid. Chironomidae Type 7	4								7
Unid. Chironomidae Type 9									1
Unid. Chironomidae Type 10									1
Chaoboridae									
Chaoborus punctipennis	16		4			0.5		2	5
Chaoborus albipes									2
Chaoborus americanus									
Stratiomyiidae									
Unid. Stratiomyiidae									
Odonata									
Zygoptera									
Coenagrioidae									
Zoniagrion sp.	1								

Notes: (1) Relative abundance = (# in taxon/Total # of individuals counted) x 100.
(2) Not part of 100 count, but observed in sample.

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TABLE X

RELATIVE ABUNDANCES [1] (%) OF MACROINVERTEBRATES COLLECTED IN NORTH DOANE LAKE
USING A PETITE PONAR SAMPLER
JANUARY 30, 1995
RHONE-POULENC AG. CO. SITE

	STATION NUMBER:REPLICATE NUMBER								
TAXON	NDL-1:R1	NDL-1:R2	NDL-1:R3	NDL-2:R1	NDL-2:R2	NDL-2:R3	NDL-3:R1	NDL-3:R2	NDL-3:R3
Incidental organisms *									
copepods	rare		occ			rare		rare	
ostracods					rare		rare	occ	rare
cladocerans				rare					
nematodes				rare	occ	occ	mod	rare	
Corixidae (water boatmen)									
Notonectidae (backswimmers)									
fish (stickleback)									
frog (tadpole)									

* non-benthic biota observed in sample

Notes: (1) Relative abundance = (# in taxon/Total # of individuals counted) x 100.
(2) Not part of 100 count, but observed in sample.

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TABLE X

RELATIVE ABUNDANCES [1] (%) OF MACROINVERTEBRATES COLLECTED IN NORTH DOANE LAKE
USING A PETITE PONAR SAMPLER
JANUARY 30, 1995
RHONE-POULENC AG. CO. SITE

TAXON	STATION NUMBER:REPLICATE NUMBER								
	NDL-1:R1	NDL-1:R2	NDL-1:R3	NDL-2:R1	NDL-2:R2	NDL-2:R3	NDL-3:R1	NDL-3:R2	NDL-3:R3
Arachnoidea									
Hydracarina Type 1									
Hydracarina Type 2									
Hydracarina Type 3									
Mollusca									
Bivalvia									
Sphaeriidae									
Musculium sp.	27	39	38	5	12	8	16	44	9.5
Unid. Sphaeriidae									
Gastropoda									
Planorbidae									
Gyraulus sp.		1					2	2	3
Physidae									
Physella sp.									
Platyhelminthes									
Turbellaria									
Unid. Turbellarian				1.5		1			
Tricladida									
Planariidae									
Unid. Planariidae							1	1	
Total count for replicate	100	99	99	132	119	163	93	114	105

Notes: (1) Relative abundance = (# in taxon/Total # of individuals counted) x 100.
(2) Not part of 100 count, but observed in sample.

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TABLE X

RELATIVE ABUNDANCES [1] (%) OF MACROINVERTEBRATES COLLECTED IN BOTH NORTH WEST DOANE LAKES
USING A KICK-NET SAMPLER
SEPTEMBER 25, 1993
RHONE-POULENC AG. CO. SITE

TAXON	STATION NUMBER:REPLICATE NUMBER NDL:1 of 2	NDL:2 of 2	WDL:1 of 1
Annelida			
Hirudinea			
Rynchobdellida			
Glossiphiniidae			
Helobdella sp.	1	1	
Pharyngobdellida			
Erpobdellidae			
Erpobdella punctata	1	3 noted	
Oligochaeta			
Haplotaxida			
Tubificidae			
Limnodrilus hoffmeisteri	1	8	7
Limnodrilus udekemianus			
Ilyodrilus templetoni	2	3	4
Naididae			
Dero sp.	3		
Nais sp.			
Arthropoda			
Crustacea			
Amphipoda			
Gammaridae			
Hyatella azteca	16	18	29
Crangonyx richmondensis richmondensis		2	7
Insecta			
Coleoptera			
Haliplidae			
Haliplus sp.		1.5	

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Notes: (1) Relative abundance = (# of individuals in taxon/Total # of individuals counted) (approx. 100) x 100.

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TABLE X

[redacted] RELAT[redacted]ABU[redacted]ANC[redacted]%) O[redacted]ACR[redacted]ERT[redacted]RATES [redacted] IN [redacted] NORTH WEST DOANE LAKES

USING A KICK-NET SAMPLER

SEPTEMBER 25, 1993

RHONE-POULENC AG. CO. SITE

STATION NUMBER:REPLICATE NUMBER

TAXON	NDL:1 of 2	NDL:2 of 2	WDL:1 of 1
Ephemeroptera			
Unid. Ephemeroptera			1
Diptera			
Unid. diptera pupa			
Ceratopogonidae			
Unid. Ceratopogonidae Type 1			
Unid. Ceratopogonidae Type 2	1	1	4
Unid. Ceratopogonidae Type 3	2	1	3
Chironomidae			
Chironomus sp.	2	1.5	33
Unid. Chironomidae Type 2			
Unid. Chironomidae Type 3			
Unid. Chironomidae Type 4	1		
Unid. Chironomidae Type 6			
Unid. Chironomidae Type 7			
Unid. Chironomidae Type 9			
Unid. Chironomidae Type 10			
Chaoboridae			
Chaoborus punctipennis			
Chaoborus albipes			
Chaoborus americanus			1
Stratiomyiidae			
Unid. Stratiomyiidae			
Odonata			
Zygoptera			
Coenagrioidae			
Zoniagrion sp.		1.5	

Notes: (1) Relative abundance = (# of individuals in taxon/Total # of individuals counted) (approx. 100) x 100.

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TABLE X

RELATIVE ABUNDANCES [1] (%) OF MACROINVERTEBRATES COLLECTED IN WEST DOANE LAKE
USING A PETITE PONAR SAMPLER
JANUARY 30, 1995
RHONE-POULENC AG. CO. SITE

TAXON	STATION NUMBER:REPLICATE NUMBER								
	WDL-1:R1	WDL-1:R2	WDL-1:R3	WDL-2:R1	WDL-2:R2	WDL-2:R3	WDL-3:R1	WDL-3:R2	WDL-3:R3
Arachnoidea									
Hydracarina Type 1									
Hydracarina Type 2									
Hydracarina Type 3									
Mollusca									
Bivalvia									
Sphaeriidae									
Musculium sp.									
Unid. Sphaeriidae									
Gastropoda									
Planorbidae									
Gyraulus sp.									
Physidae									
Physella sp.									
Platyhelminthes									
Turbellaria									
Unid. Turbellarian									
Tricladida									
Planariidae									
Unid. Planariidae									
Total count for replicate	102	92	96	103	8 *	96	109	92	94

Notes: (1) Relative abundance = (# of individuals in taxon/Total # of individuals counted) x 100.

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TABLE X

RELATIVE ABUNDANCE (%) OF MACROINVERTEBRATES COLLECTED IN WEST DOANE LAKE
USING A PETITE PONAR SAMPLER
JANUARY 30, 1995
RHONE-POULENC AG. CO. SITE

	STATION NUMBER:REPLICATE NUMBER								
TAXON	WDL-1:R1	WDL-1:R2	WDL-1:R3	WDL-2:R1	WDL-2:R2	WDL-2:R3	WDL-3:R1	WDL-3:R2	WDL-3:R3
Incidental organisms *									
copepods			rare	mod	occ	few	occ	occ	occ
ostracods									
cladocerans									
nematodes			rare						
Corixidae (water boatmen)									
Notonectidae (backswimmers)									
fish (stickleback)									
frog (tadpole)									

* non-benthic biota observed in sample

Notes: (1) Relative abundance = (# of individuals in taxon/Total # of individuals counted) x 100.

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TABLE X

RELATIVE ABUNDANCES [1] (%) OF MACROINVERTEBRATES COLLECTED IN WEST DOANE LAKE
USING A PETITE PONAR SAMPLER
JANUARY 30, 1995
RHONE-POULENC AG. CO. SITE

	STATION NUMBER:REPLICATE NUMBER								
TAXON	WDL-1:R1	WDL-1:R2	WDL-1:R3	WDL-2:R1	WDL-2:R2	WDL-2:R3	WDL-3:R1	WDL-3:R2	WDL-3:R3
Annelida									
Hirudinea									
Rynchobdellida									
Glossiphiniidae									
Helobdella sp.									
Pharyngobdellida									
Erpobdellidae									
Erpobdella punctata									
Oligochaeta									
Haplotaxida									
Tubificidae									
Limnodrilus hoffmeisteri		7	1	12	13		3	16	3
Limnodrilus udekemianus			2						
Ilyodrilus templetoni	87	89	76	28		10	50	61	24
Naididae									
Dero sp.	3	1	4	7		7		4	2
Nais sp.									
Arthropoda									
Crustacea									
Amphipoda									
Gammaridae									
Hyatella azteca								1	
Crangonyx richmondensis richmondensis									
Insecta									
Coleoptera									
Haliplidae									
Haliplus sp.									

Notes: (1) Relative abundance = (# of individuals in taxon/Total # of individuals counted) x 100.

TABLE X

RELATIVE ABUNDANCES [1] (%) OF MACROINVERTEBRATES COLLECTED IN WEST DOANE LAKE
USING A PETITE PONAR SAMPLER
JANUARY 30, 1995
RHONE-POULENC AG. CO. SITE

TAXON	STATION NUMBER:REPLICATE NUMBER								
	WDL-1:R1	WDL-1:R2	WDL-1:R3	WDL-2:R1	WDL-2:R2	WDL-2:R3	WDL-3:R1	WDL-3:R2	WDL-3:R3
Ephemeroptera									
Unid. Ephemeroptera									
Diptera									
Unid. diptera pupa		1 noted	2					1	
Ceratopogonidae									
Unid. Ceratopogonidae Type 1				1					
Unid. Ceratopogonidae Type 2			1	5		4		1	1
Unid. Ceratopogonidae Type 3									
Chironomidae									
Chironomus sp.	8	3	9	39	87	77	48	14	68
Unid. Chironomidae Type 2				9		1			1
Unid. Chironomidae Type 3									
Unid. Chironomidae Type 4									
Unid. Chironomidae Type 6									
Unid. Chironomidae Type 7									
Unid. Chironomidae Type 9									
Unid. Chironomidae Type 10									
Chaoboridae									
Chaoborus punctipennis									
Chaoborus albipes									
Chaoborus americanus									
Stratiomyiidae									
Unid. Stratiomyiidae	2		4					1	
Odonata									
Zygoptera									
Coenagrioidae									
Zoniagrion sp.									

Notes: (1) Relative abundance = (# of individuals in taxon/Total # of individuals counted) x 100.

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TABLE X

RELATIVE ABUNDANCES [1] (%) OF MACROINVERTEBRATES COLLECTED IN BOTH NORTH WEST DOANE LAKES
USING A KICK-NET SAMPLER
SEPTEMBER 25, 1993
RHONE-POULENC AG. CO. SITE

STATION NUMBER:REPLICATE NUMBER

TAXON	NDL:1 of 2	NDL:2 of 2	WDL:1 of 1
Arachnoidea			
Hydracarina Type 1			1
Hydracarina Type 2			1
Hydracarina Type 3			1
Mollusca			
Bivalvia			
Sphaeriidae			
Musculium sp.			
Unid. Sphaeriidae	55	52	
Gastropoda			
Planorbidae			
Gyraulus sp.	16	6	
Physidae			
Physella sp.	1 noted	1	
Platyhelminthes			
Turbellaria			
Unid. Turbellarian			
Tricladida			
Planariidae			
Unid. Planariidae		3	8
Total count for replicate	118	130	109

Notes: (1) Relative abundance = (# of individuals in taxon/Total # of individuals counted) (approx. 100) x 100.

Apndl93.xls
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TABLE X

RELATIVE ABUNDANCE (%) MACROINVERTEBRATES COLLECTED IN BOTH NORTH WEST DOANE LAKES
USING A KICK-NET SAMPLER
SEPTEMBER 25, 1993
RHONE-POULENC AG. CO. SITE

STATION NUMBER:REPLICATE NUMBER

TAXON	NDL:1 of 2	NDL:2 of 2	WDL:1 of 1
Incidental organisms *			
copepods	occ	mod	few
ostracods	occ		occ
cladocerans		occ	many
nematodes			
Corixidae (water boatmen)		2 noted	30 noted
Notonectidae (backswimmers)			1 noted
fish (stickleback)	5 noted		
frog (tadpole)	1 noted		

* non-benthic biota observed in sample

Notes: (1) Relative abundance = (# of individuals in taxon/Total # of individuals counted) (approx. 100) x 100.

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Table 1 (continued)

bufflehead (*Bucephala albeola*)
bushtit (*Psaltriparus minimus*)
Canada goose (*Branta canadensis*)
common yellowthroat (*Geothlypis trichas*)
downy woodpecker (*Picoides pubescens*)
European starling (*Sturnus vulgaris*)
house finch (*Carpodacus mexicanus*)
killdeer (*Charadrius vociferus*)
mallard (*Anas plathrhynchos*)
mourning dove (*Zenaida macroura*)
northern oriole (*Icterus glabula*)
orange-crowned warbler (*Vermivora celata*)
red-winged blackbird (*Agelaius phoeniceus*)
ring-necked duck (*Aythya collaris*)
rufous-sided towhee (*Pipilo erythrophthalmus*)
savannah sparrow (*Ammodramus savannarum*)
scrub jay (*Aphelocoma coerulescens*)
song sparrow (*Melospiza melodia*)
spotted sandpiper (*Actitis macularia*)
Stellers jay (*Cyanocitta stelleri*)
tree swallow (*Tachycineta bicolor*)
turkey vulture (*Cathartes aura*)
violet-green swallow (*Tachycineta thalassina*)
white-crowned sparrow (*Zonotrichia leucophrys*)
willow flycatcher (*Empidonax*
Wilsons warbler (*Wilsonia pusilla*)

Mammals

beaver (*Castor canadensis*)
black-tailed deer (*Odocoileus hemoinus*)
California ground squirrel (*Spermophilus beecheyi*)
nutria (*Myocastor coypus*)
raccoon (*Procyon lotor*)

SCOEPA00006957

Table 1
Plants and Wildlife Observed
During the Field Reconnaissance

Plants

bigleaf maple (*Acer macrophyllum*)
birch (*Betula*)
bird cherry (*Prunus avium*)
bitter cherry (*Prunus emarginata*)
black cottonwood (*Populus balsamifera*)
hawthorn (*Crataegus*)
hazel (*Corylus cornuta*)
Himalayan blackberry (*Rubus discolor*)
holly (*Ilex*)
madrone (*Arbutus menziesii*)
nightshade (*Solanum dulcamara*)
Oregon ash (*Fraxinus latifolius*)
Oregon white oak (*Quercus garryana*)
poison oak (*Toxicodendron diversiloba*)
red alder (*Alnus rubra*)
red elderberry (*Sambucus racemosa*)
redosier dogwood (*Cornus stolonifera*)
reed canarygrass (*Phalaris arundinacea*)
rose (*Rosa*)
Scotch broom (*Cytisus scoparius*)
tall fescue (*Festuca arundinacea*)
vineleaf maple (*Acer circinatum*)
willow (*Salix*)

Animals

Amphibians

bullfrog (*Rana catesbeiana*)

Birds

American crow (*Corvus brachyrhynchos*)
American goldfinch (*Carduelis tristis*)
American robin (*Turdus migratorius*)
barn swallow (*Hirundo rustica*)
Bewicks wren (*Thryomanes bewickii*)
black-headed grosbeak (*Pheucticus melanocephalus*)
brown-headed cowbird (*Molothrus ater*)

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APPENDIX D

Habitat Suitability Index Models for Selected Species

SCOEPA00006960

MALLARD MODEL OVERVIEW

Mallards require aquatic habitat in either forested or non-forested areas. Because aquatic habitat is present in the Level II ERA Survey Area, mallards are potential ecological receptors. Mallard use of both forested and non-forested wetland habitat require different HSI models to evaluate the habitat quality of these structurally distinct cover types. Both models recognize cover, reproductive requirements, and water interspersion as the most important components defining habitat quality for mallard.

This model was initially developed for the evaluation of mallard winter habitat use in the Lower Mississippi Valley. This model is based on the major assumption that available food is the key factor that influences winter density of mallards. The model produces index values that are assumed to be proportional to the area's ability to provide required food resources for wintering mallards. The number of mallards/hectare/day that an area can support is assumed to be directly proportional to increasing HSI values.

Flooding and availability of adequate food resources are the principal requirements for suitable mallard winter habitat. In most situations, the absence of surface water within potentially suitable feeding sites renders those sites unsuitable for use by mallards, regardless of the type or amount of food resources available. Major winter foods of mallards are grouped into four categories: (1) cultivated grain, (2) mast, (3) invertebrates, and (4) seeds of indigenous vegetation. These food resources are provided within three major cover types: (1) cropland, (2) palustrine forested wetlands, and (3) non-forested palustrine, riverine, or lacustrine wetlands. The mallard HSI model is organized around these cover types.

Variables V1 through V3 in the following mallard HSI model describe the suitability of various cropland cover types as a food source. Suitability is influenced by type of crop present, cropland management, and the extent of cropland flooding.

Variables V4 through V6 measure the suitability of the food component in palustrine forested wetlands. Bottomland forested sites provide a diversity of mallard winter foods including mast, seeds of other vegetation, and invertebrates. The availability of all food sources to foraging mallards is influenced by the duration of winter flooding, as the major factor contributing to the productivity of bottomland hardwoods is the alteration of dry and flooded conditions. Sites that are permanently flooded or have more stable water regimes are less productive than bottomland hardwoods subjected to alternating flooded and dry conditions. Winter flooding directly influences the availability of food and foraging conditions for winter mallards.

Variables V4 through V7 are based on the following assumptions:

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- V4 - Sites with 50% to 80% tree canopy cover represent optimum stand density.
- V5 - The value of canopy density is directly modified by the index used to represent the abundance of oak species (V6).
- V6 - The diversity of oak species present directly modifies the value representative of total tree canopy closure and the proportion of the canopy composed of oak species. A low diversity of oak species may be compensated for if these trees compose a large proportion of the total tree canopy. Conversely, a relatively low abundance of oaks in the overstory may be compensated for if these trees are of several species.
- V7 - The average number of days flooded during the winter period is used to modify the food value determined for the stand. Bottomland hardwoods that are not flooded may represent unsuitable foraging sites for wintering mallards regardless of the density of trees or abundance and diversity of oak species.

Variables V8 through V11 reflect the food component and habitat suitability of all non-forested lacustrine, riverine, and palustrine habitats. The model is based on the assumption that on a long term basis, nonforested wetlands managed specifically for waterfowl use have a greater probability of meeting winter food requirements than do wetlands subject to uncontrolled fluctuations in water level. Nonforested wetlands that contain a high percentage of herbaceous vegetation are assumed to provide plant and invertebrate foods for wintering mallards. Food potential is assumed to increase as density of herbaceous vegetation increases to 50% canopy cover (V8). Invertebrate abundance is assumed to be directly related to hydrophyte structure and surface area, with peak invertebrate production associated with aquatic plants that have relatively large leaf and stem surface areas (V9).

Variables V10 and V11 indicate the importance of the water regime. It is assumed that moist-soil management intended for enhancement of food conditions for wintering mallards reflects beneficial changes in vegetative growth form as well as species composition. As a result of variation in water levels (V10), seasonally, temporarily, intermittently, and artificially flooded wetlands support a greater diversity and abundance of herbaceous vegetation, contain higher nutrient levels and have greater invertebrate productivity than do permanently flooded, intermittently exposed and semi-permanently flooded wetlands. Nonforested wetlands that do not have surface water present during the winter period are assumed to provide unsuitable foraging opportunities and represent unsatisfactory conditions for wintering mallards (V11).

MODEL ASSUMPTIONS

In addition to those assumptions noted in the proceeding text, the mallard HSI model is based upon the following major assumptions:

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- The quality and availability of food is the most influential characteristic that defines winter habitat suitability for mallards.
- Optimum food conditions can exist only if cultivated grains, acorn mast, and invertebrates are present within the evaluation area. If one or more of these food components are absent or unavailable, winter food conditions are assumed to be less than optimum.
- Sites that are subjected to frequent flooding represent potentially optimum habitat. Areas that flood with less frequency may actually produce more food, but because of the infrequency of flowing are unavailable as suitable foraging habitat on a long-term basis.
- Specific techniques of moist-soil management are not described in the model. It is assumed that management, in terms of manipulation of surface water and vegetative composition, can increase the abundance and quality of food for wintering mallards where winter flooding and the abundance or quality of food are less than ideal.
- Optimum habitat composition is assumed to provide suitable distribution of foraging habitats, food diversity, and cover availability.

MODEL LIMITATIONS

- The model does not address a minimum area required for a specific cover type, or complex of cover types, necessary before they are suitable for winter use by mallards.
- The current model addresses winter flooding resulting from headwater and backwater flooding. The availability of isolated wetlands in small basins and depressions is not addressed. These small wetlands, however, are a highly important component of winter habitat.
- The model does not address water quality or its influence on wetland productivity and habitat suitability for wintering mallards.

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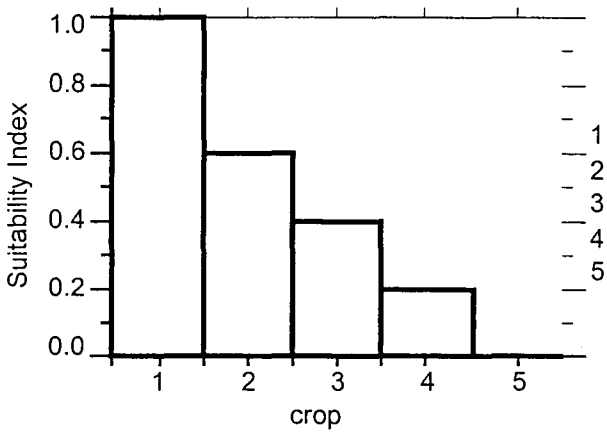
Table D-1
Habitat Suitability Index: **Mallard Duck**
RPAC Level 2 ERA Site Survey

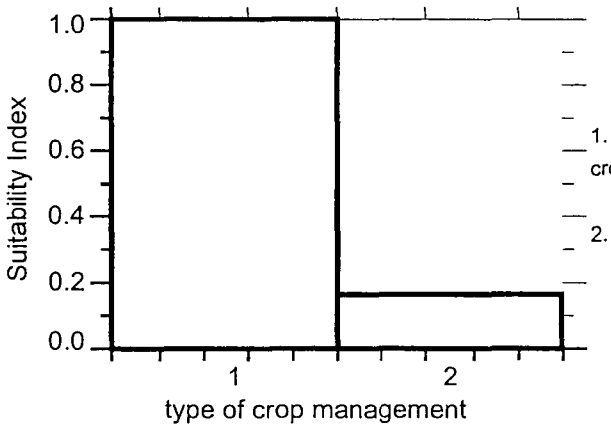
V1 Habitat variables used to evaluate food availability in cropland cover types - Type of crop



Score 1

1. Corn
2. Rice
3. Milo
4. Soybeans
5. Nongrain (e.g., cotton)

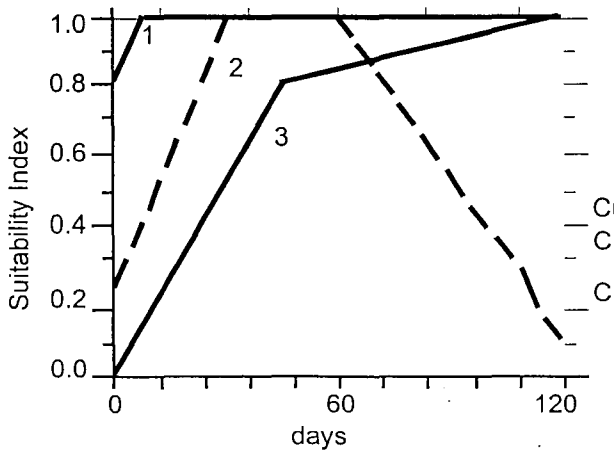
V2 Habitat variables used to evaluate food availability in cropland cover types - Crop Management



Score 0.7

1. Crop residues or standing crops remain on ground surface
2. Fall tilled

V3 Habitat variables used to evaluate food availability in cropland cover types - Mean # of days flooded during winter

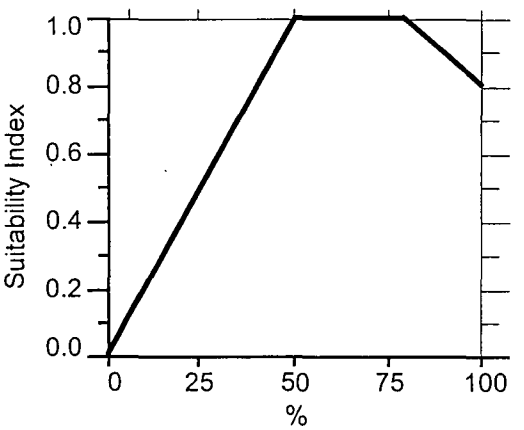


Score 1

Curve 1, corn
Curve 2, soybeans
Curve 3, other crops

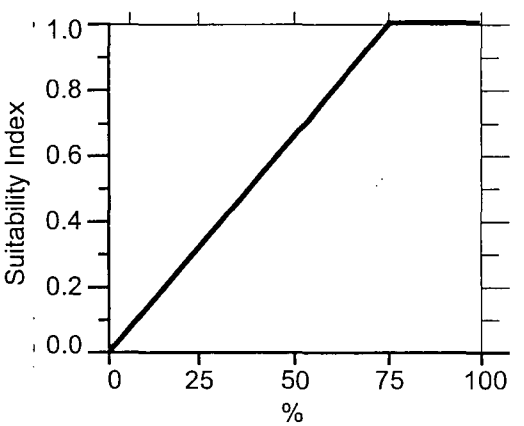
Table D-1
Habitat Suitability Index: **Mallard Duck**
RPAC Level 2 ERA Site Survey

V4 Percent canopy cover of trees



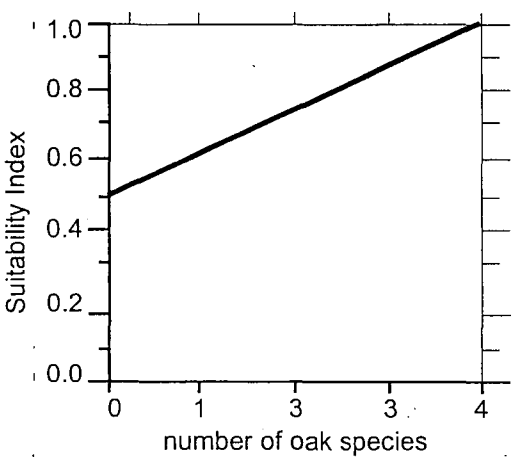
Score 0.07

V5 Porportion of tree canopy composed of oak species > 25 cm dbh



Score NA

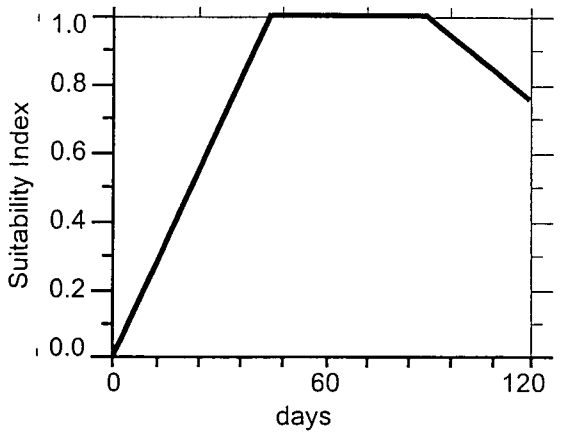
V6 Number of Oak species



Score 0.5

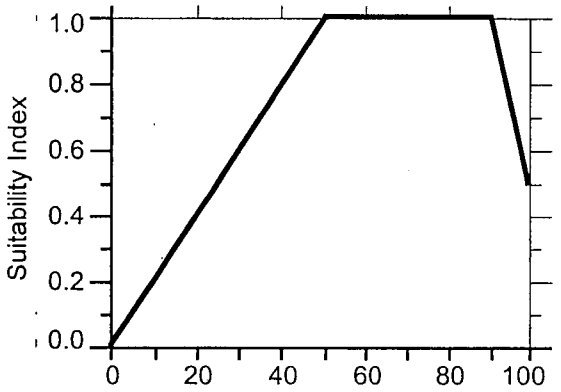
Table D-1
Habitat Suitability Index: **Mallard Duck**
RPAC Level 2 ERA Site Survey

V7 Mean number of days flooded during winter period (Nov. 1 - Feb. 28)



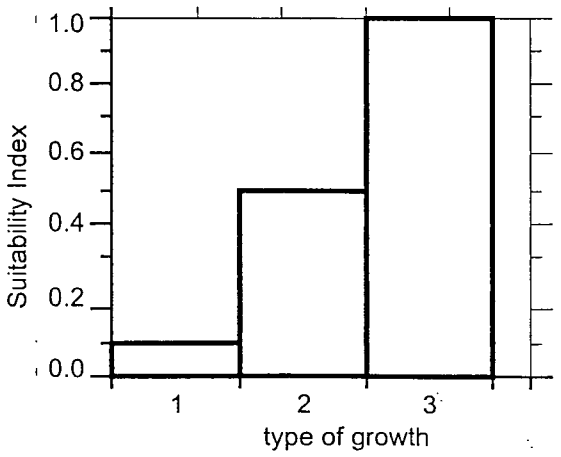
Score 1

V8 Percent canopy cover of hervaceous vegtation



Score 0.4

V9 Dominant growth of aquatic vegtation



1. Minimum stem or leaf surface area in water column or in contact with water surface (e.g., American lotus)
2. Erect stems with one to few broad leaves, majority of biomass is above water surface (e.g., bulrush)
3. Branched stems with broad leaves, large percentage of biomass in water column or in contact with water surface (e.g., smartweed)

Score 0.5

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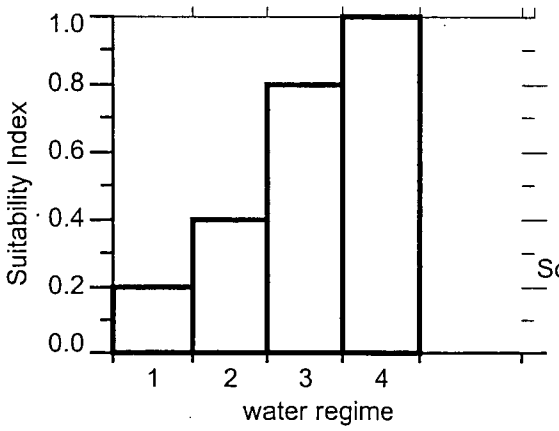
Table D-1
Habitat Suitability Index: **Mallard Duck**
RPAC Level 2 ERA Site Survey

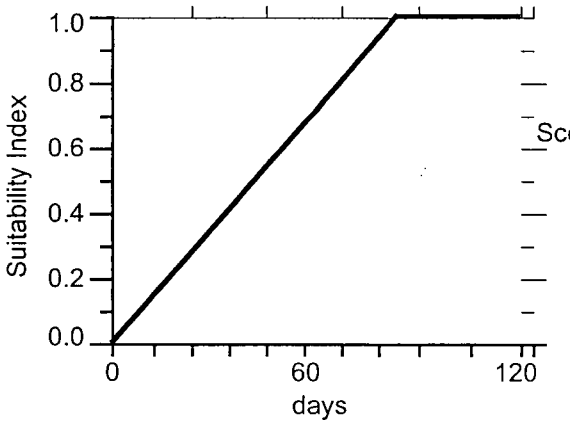
V10 Water regime



1. Permanently flooded
2. Intermittently exposed
3. Semipermanently flooded
4. Seasonally, temporarily, intermittently, and artificially flooded

Score 1

V11 Mean number of flood days during winter period (Nov. 1 - Feb. 2)



Score 0.8

Food Suitability Index

Cropland SI = V1 * V2 * V3 = 0.7
Forested Wetland SI = $(V4xV5xV6)^{1/2}xV7$ = 0.19
Non-forested Wetland SI = $((V8xV9)^{1/2}xV10)xV1$ 0.36

HSI = (Crop SI x % cover) + (Forested SI x % cover) + (Non-forested SI x % cover)

Crop cover in study area = 0

Forested cover in study area = 0.1

Non-forested cover in study area = 0.9

HSI = 0.01

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GREAT BLUE HERON MODEL OVERVIEW

Great blue herons require aquatic habitat and prefer aquatic habitats near forested areas. Because aquatic habitat adjacent to a forested area is present in the Level II ERA Survey Area, great blue herons could be potential ecological receptors. The great blue heron model for habitat suitability is based on an area's potential to serve as foraging and nesting habitat. The foraging habitat of an area is evaluated by determining if there exists a body of water with a suitable prey base and a disturbance-free zone up to 100 m around the site. The variables used to evaluate a potential foraging site include the presence of suitable forage fish, water conditions suitable for the foraging activity of this wading bird, and the likelihood that the aquatic habitat will be free from human disturbance during the reproductive season or while the birds are in residency.

The model only evaluates the quality of treeland habitats near water as potential nest sites, even though great blue herons occasionally nest on artificial structures, the ground, cliffs, and in shrubs and young trees. The variables used to evaluate reproductive potential of an area include the presence of suitable treeland habitats, the likelihood that these habitats will be free from human disturbance during the reproductive season, and the distance between the treeland habitats and active heronries and between treeland habitats and foraging sites.

A total of six variables are included in this HSI model. Variables V1 through V3 determine a Foraging Index (FI) score. Variables V1, V4, V5, and V6 determine a Reproductive Index (RI) score. All six variables are used to determine a final HSI score.

MODEL ASSUMPTIONS

The basic assumptions about habitat criteria important to the great blue heron are based on descriptive and correlative relationships as described and compiled from a wide variety of studies, from different seasons of the year, from different years, and from various breeding and foraging sites throughout North America. Primary assumptions for the great blue heron HSI model include the following:

- Treelands near water (within 250 feet of water) are assumed to be the principal nest sites.
- Suitability characteristics of these treelands are important parameters in the model.
- Species and tree height are insignificant factors in determining how herons select nest sites.
- Tree limb structure suitable for nest placement, proximity to established heronries, proximity to food sources, and frequency of human disturbance during the

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breeding season are important criteria for determining where herons select nest sites.

- Only aquatic areas are considered suitable foraging sites, even though great blue herons sometimes feed in upland sites. The presence of fish, a suitable foraging substrate, distance to heronry, and level of human disturbance around the foraging site are the significant evaluation variables.
- Habitat variables describing treeland habitat can be combined arithmetically to evaluate the potential usefulness of tree groves as nest sites. Habitat variables for aquatic habitat can be combined arithmetically to evaluate the quality of aquatic habitats as foraging sites. A single HSI can be developed to evaluate habitats that provide both nesting and foraging opportunities for great blue herons.

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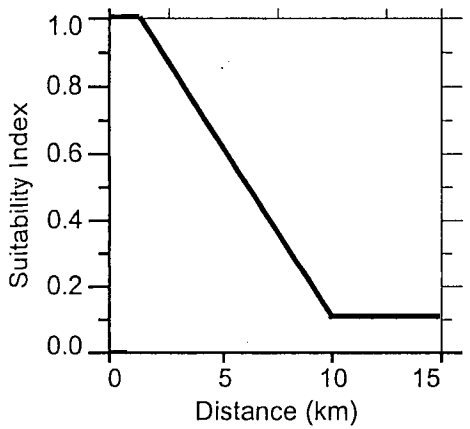
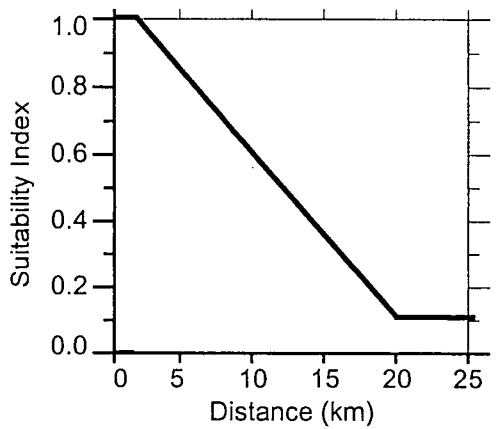
Table D-2
Habitat Suitability Index: **Great Blue Heron**
RPAC Level 2 ERA Site Survey

V1 Distance between foraging areas and potential heronries



Score: 1

V6 Proximity of a potential nest site to an occupied heron nest site



Score: 0.75

V2 = 1.0 if potential foraging habitats usually have shallow, clear water with firm substrate and small fish.
V2 = 0.0 if potential foraging habitats do not have these conditions.

Score: 0.5

V3 = 1.0 if there usually is no human disturbance near foraging zone 4 hours after sunrise/before sunset; or foraging zone is 100 m from human activities & 50 m from road w/ occsional, slow-moving traffic.
V3 = 0.0 if potential foraging habitats do not have these conditions.

Score: 1

V4 = 1.0 if potential treeland habitats usually 0.4 ha in are located over water or within 250 m of water; 5 m high with branches at least 2.5 cm in diameter & open canopy.
V4 = 0.0 if potential treeland habitats do not have these conditions.

Score: 1

V5 = 1.0 if breeding season exclusion zone has radius of 250 m on land or 150 m on water
V5 = 0.0 if breeding season exclusion zone is not free from human disturbance

Score: 0.5

HSI Calculations

$HSI = (V1xV2xV3xV4xV5xV6)^{1/2}$

HSI = 0.43

BEAVER MODEL OVERVIEW

Beavers require aquatic habitat with woody and herbaceous vegetation. The Level II ERA Survey Area meets this habitat requirement. The beaver HSI model considers water and winter food as the only life requisites because the cover and reproductive needs of this species are assumed to be identical with water requirements. It also is assumed that all of the beaver habitat requirements can be provided within each cover type in which it occurs. Due to the foraging behavior of the beaver, the application of this model and determination of habitat units vary by cover type. For beaver habitat in riverine, lacustrine, and wetland cover types, the model considers the area of the cover type plus a 200-meter (m) (656 ft) band of habitat on each side of the riverine channel or surrounding the water body or wetland.

Woody and herbaceous vegetation comprise the diet of the beaver. Herbaceous vegetation is a highly preferred food source throughout the year, if it is available. Woody vegetation may be consumed during any season, although its highest utilization occurs from late fall through early spring. It is assumed that woody vegetation (trees and/or shrubs) is more limiting than herbaceous vegetation in providing an adequate food source. The following nine variables comprise the beaver HSI model:

V1 Percent tree canopy closure = the percent of the ground surface shaded by a vertical projection of the canopies of woody vegetation 2 5.0 m (16.5 ft) in height.

V2 Percent of trees in 2.5 to 15.2 cm (1 to 6 inches) dbh size class = the percent of trees with a diameter at breast height (dbh) of 2.5 to 15.2 cm (1 to 6 inches).

V3 Percent shrub crown cover = the percent of the ground surface shaded by a vertical projection of the canopies of woody vegetation < 5 m (16.5 ft) in height.

V4 Average height of shrub canopy = the average height from the ground surface to the top of those shrubs that comprise the uppermost shrub canopy.

V5 Species composition of woody vegetation (trees and/or shrubs).

V6 Percent of lacustrine surface dominated by yellow and/or white water lily = the percent of the surface dominated by yellow water lily (Nymphaea variegatum) and/or white water lily (N. odorata).

V7 Percent stream gradient = vertical drop in meters or feet per kilometer or mile of stream or river channel).

V8 Average water fluctuation on an annual basis.

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V9 Shoreline development factor (a ratio relating the relative edge of a water body to its area. To obtain a value for the shoreline development factor (SDF), divide the length of the shoreline by the length of the circumference of a circle with the same area as the water body. A circle would have a SDF equal to 1.0. The greater the deviation from a circular shape, the greater the SDF value will be. Values of 3 or more are assumed to be optimum for beavers).

MODEL ASSUMPTIONS

Principal assumptions for the beaver HSI model are that potential beaver habitat must contain a permanent source of water. Lakes and reservoirs that have extreme annual or seasonal fluctuations in the water level are assumed to be unsuitable beaver habitat. Similarly, intermittent streams, or streams that have major fluctuations in discharge or a stream channel gradient of 15% or more are unsuitable as year-round beaver habitat.

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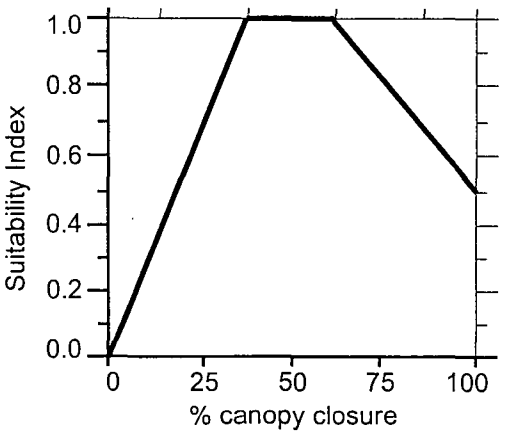
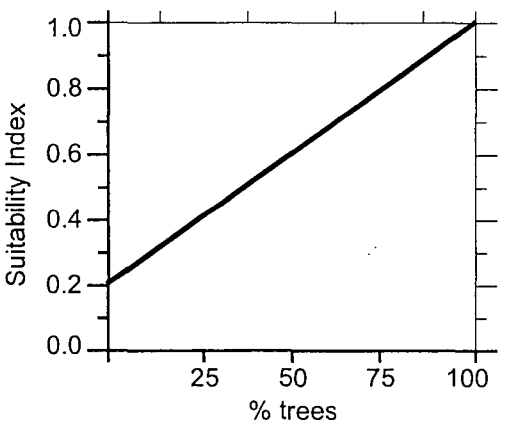
Table D-3
Habitat Suitability Index: **Beaver**
RPAC Level 2 ERA Site Survey

V1 Percent tree canopy closure



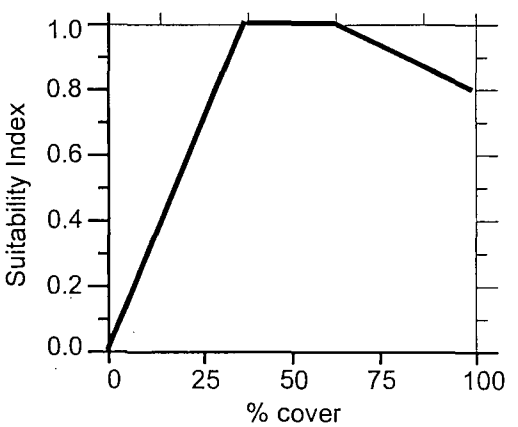
Score: 0.7

V2 Percent of trees in 1 to 6 inch dbh size class



Score: 0.3

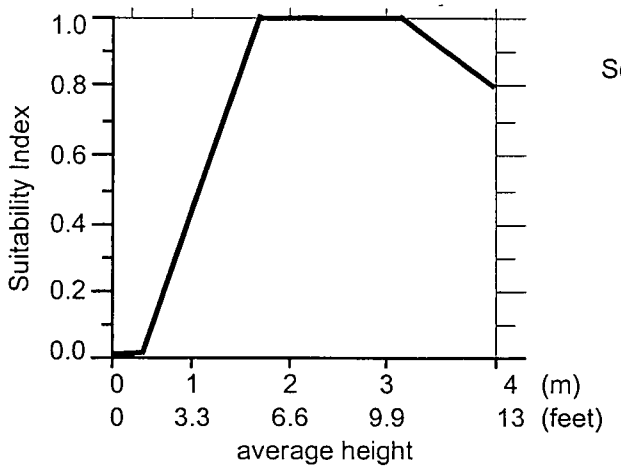
V3 Percent shrub crown cover



Score: 1

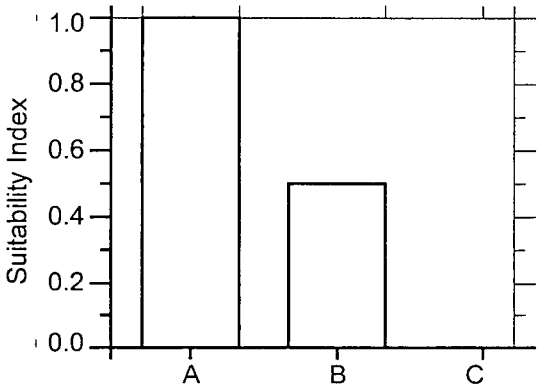
Table D-3
Habitat Suitability Index: **Beaver**
RPAC Level 2 ERA Site Survey

V4 Average height of shrub canopy



Score: 1

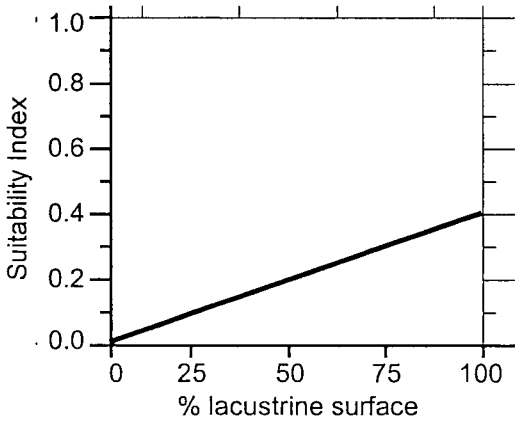
V5 Species composition of woody vegetation



Score: 1

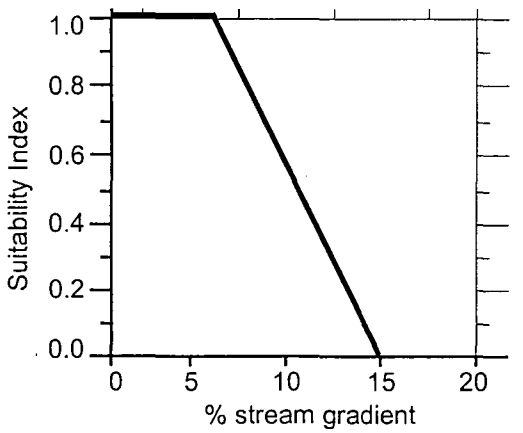
Species A:
Species B:
Species C:

V6 Percent lucustrine surface dominated by yellow or white water lily



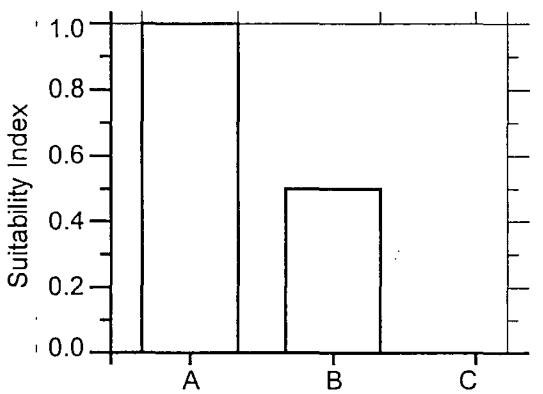
Score: 0

V7 Percent stream gradient



Score: 1

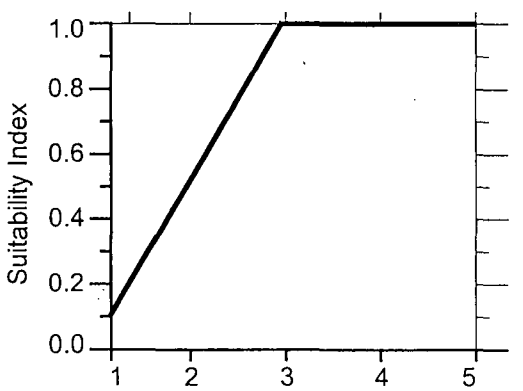
V8 Average water fluctuation on annual basis



Score: 0.8

Species A:
Species B:
Species C:

V9 Shoreline development factor



Score: NA

Table D-3
Habitat Suitability Index: **Beaver**
RPAC Level 2 ERA Site Survey

HSI calculations

Winter Food Life Requisite (LR) for riverine habitat = b+c/1.5 = 2.0

$b = [(V1xV2)^{1/2}XV5]^{1/2}+[(V3xV4)^{1/2}xV5]^{1/2} = 1.676947$

$c = 0.5 \times [(V1xV2)^{1/2}XV5]^{1/2}+[(V3xV4)^{1/2}xV5]^{1/2} = 1.338474$

Water LR for riverine habitat = V7 or V8, whichever is lower = 0.8

HSI = Lowest Life Requisite

HSI = 0.8

WHITE-TAILED DEER MODEL OVERVIEW

This model (PAM HEP HSI MODEL, Palmer 1987, PA Game Commission) was designed to evaluate year-round white-tailed deer habitat in agricultural areas in the Piedmont and Coastal Plain physiographic regions of Pennsylvania. The model was also designed for mixed oak or northern hardwood forest alone or interspersed with agricultural and/or rangeland in areas where winter thermal cover is not required. Habitat required by white-tailed deer are similar to black-tailed deer and found in the Level II ERA survey area. Therefore, the white-tailed deer HSI model was completed as a surrogate for black-tailed deer. This model includes both cover and food variables when assigning an HSI value. The HSI model for white-tailed deer habitat assumes the life requisites of food and cover are limiting. Water is not assumed to be a limiting factor. Habitat requirements during the summer are assumed to be provided by the same habitat features that provide essential winter forage and cover.

This HSI model is designed to assess habitat suitability for relatively large forest landscapes using generalized species-habitat relationships and stand-level vegetation inventory. Its purpose is to predict relative changes in white-tailed deer habitat supply at the landscape level over long time periods and for integration with forest management planning. The model is not designed to provide an accurate prediction of habitat suitability or use at the stand level or accurate population density estimates.

HSI MODEL VARIABLES AND COMPONENTS

Cover

Cover for white-tailed deer is described by both habitat (e.g., food type) and spatial features (e.g., distance). Structural features such as tree/shrub canopy closure (V2) provide thermal cover, which reduces wind and snow depth and escape cover (V4). Areas with dense tree and shrub closures are also more secure against predators. The value of cover is reduced if the cover is not within range of a feeding area, defined as areas low in tree canopy closure and high in shrub cover. In summer, feeding areas also provide abundant forbs or grasses. The distance of forest/shrub cover to the nearest feeding area (V3B) is an important spatial feature.

Foraging Habitat

Winter foraging cover is described by tree/shrub cover (V1, V2) and agricultural or herbaceous rangeland cover (V3, V5). Mast is provided by appropriate tree species with a diameter at breast height (dbh) of 12 inches or greater. The foraging component includes regenerating deciduous trees/shrubs which come up after fire or forest harvesting. Shrub thickets and understory provide browse. Shrub cover which constitutes 30% or 40% of the woody vegetation is considered suitable habitat.

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Woodland openings, agricultural land, and herbaceous fields are important grazing areas and should make up 15% to 30% of the forest area. Agricultural crops, when available, generally make up a significant portion of the diet. Optimum food value exists when herbaceous cover is 50% or greater. The value of foraging cover is reduced if the foraging area is not within a certain distance of tree/shrub escape cover.

MODEL ASSUMPTIONS

Winter is the critical period determining white-tailed deer habitat supply. Habitat for spring to fall seasons, which encompass calving, summer activities and reproduction, is not limiting or is obtained in the same areas as those where winter food and cover are obtained.

White tailed deer are able to migrate freely to their winter range from their summer range.

Shrub species have the same value as food and this value does not diminish throughout the winter. Shrub height also has no bearing on forage suitability.

The energetic cost of travel is assumed to be great such that food is useless if it is not within a certain distance of tree/shrub escape cover and vice versa. This cost can be in terms of predatory loss and energetic expense.

Water and minerals are not a limiting winter resource.

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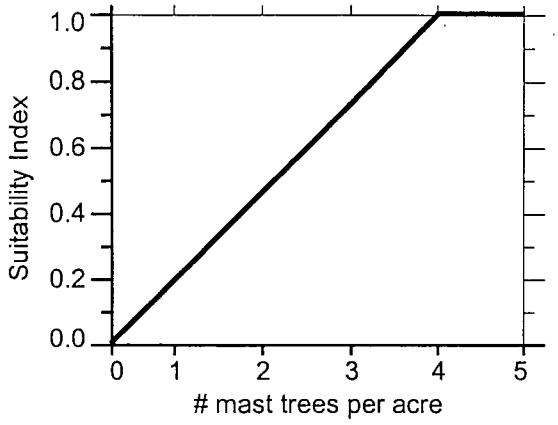
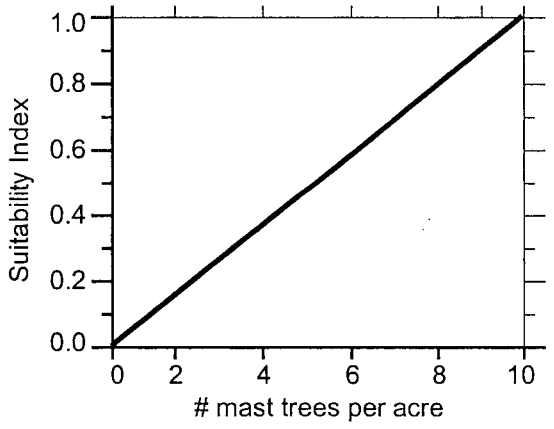
Table D-4
Habitat Suitability Index: **Deer**
RPAC Level 2 ERA Site Survey

V1A Number of mast producing trees (≥ 12") per acre (oak and hickory)



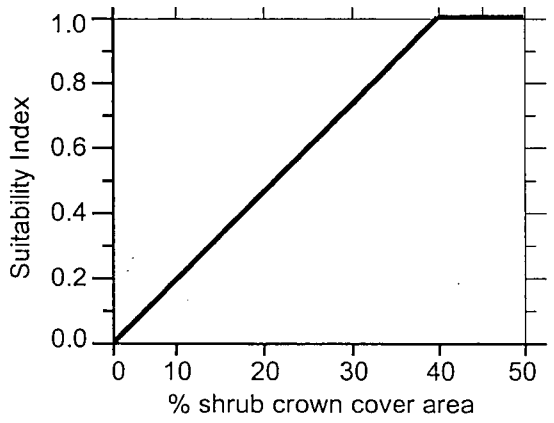
Score: 1

V1B Number of mast producing trees (≥ 12") per acre (cherry, beech, red oak)



Score: NA

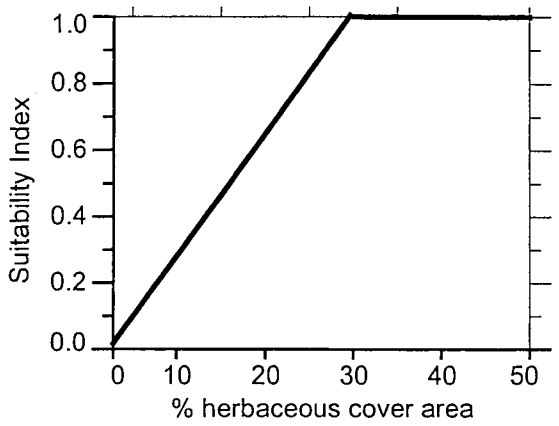
V2 Percent of area in shrub crown cover >5' in forests and shrub land



Score: 1

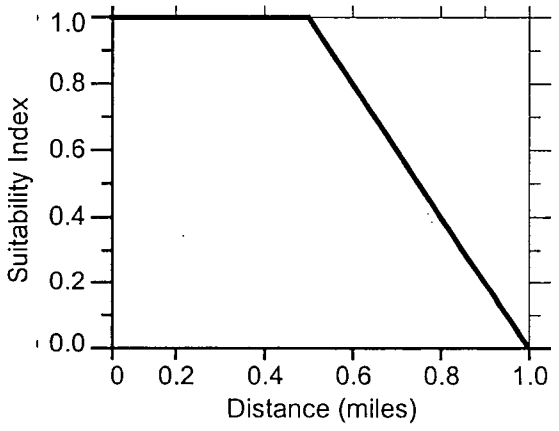
Table D-4
Habitat Suitability Index: **Deer**
RPAC Level 2 ERA Site Survey

V3A Percent of area in herbaceous cover in 0.1 to 9 acres within forest or shrub land



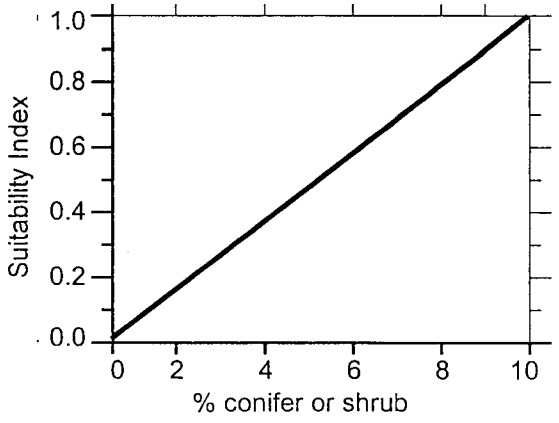
Score: 1

V3B Average distance of forest/shrub land to agricultral or herbaceous rangeland



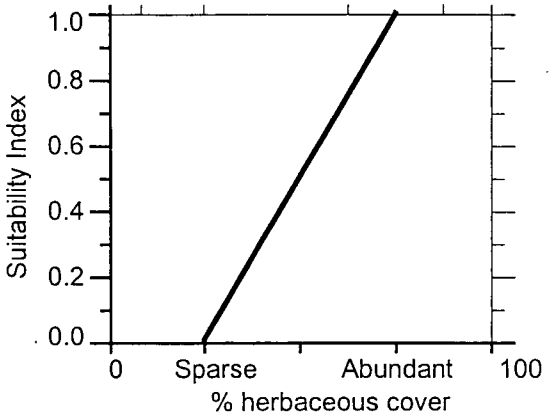
Score: 1

V4 Percent of area confer stands or shrub thickets (≥0.1 acre) covering ground



Score: 1

V5 Percent of area herbaceous cover in agricultural or herbaceous rangeland



Score: 1

HSI calculations

HSI = Lowest Life Requisite of V1 through V5

HSI =1.0

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APPENDIX E

Environmental Science & Assessment, LLC Memorandum

SCOEPA00006983

Environmental Science & Assessment, LLC

MEMORANDUM

DATE: June 14, 2002

TO: Scott Kranz and Kristin Lawrence, AMEC

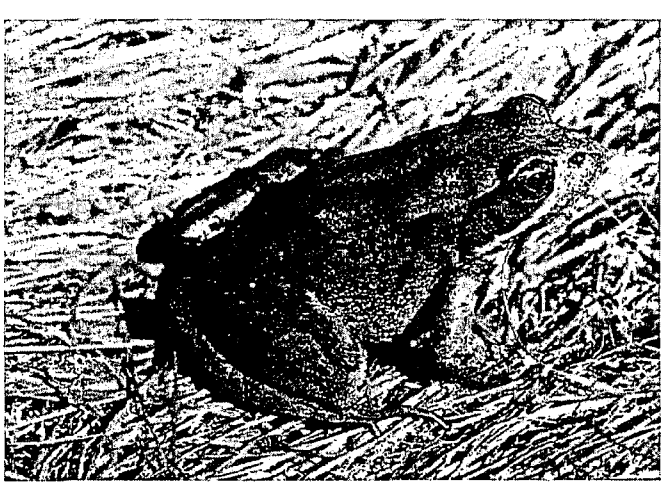
FROM: Jean Ochsner

RE: RPAC – Portland Site Natural Resource Evaluation

Environmental Science & Assessment, LLC (ES&A) was contracted to evaluate for presence of northern red-legged frogs (*Rana aurora aurora*) and northwestern pond turtle (*Clemmys marmorata marmorata*) at North Doane Lake and Northwestern Drainage Pond located within the RPAC – Portland Site. The northern red-legged frog and northwestern pond turtle are listed in the Oregon Natural Heritage Program's (ONHP) database as occurring within a 2-mile radius of the project site. The Oregon Department of Fish and Wildlife (ODFW) lists both species as State Sensitive species and US Fish and Wildlife Service (USFWS) lists them as Federal Species of Concern (SOC) under the Endangered Species Act. Due to the federal status as an SOC, presence of the northern red-legged frogs and northwestern pond turtle is a concern when evaluating ecological risks for sensitive receptors.

SPECIES INFORMATION

Northern Red-Legged Frog



Source of photo: Corkran and Thoms, 1996.

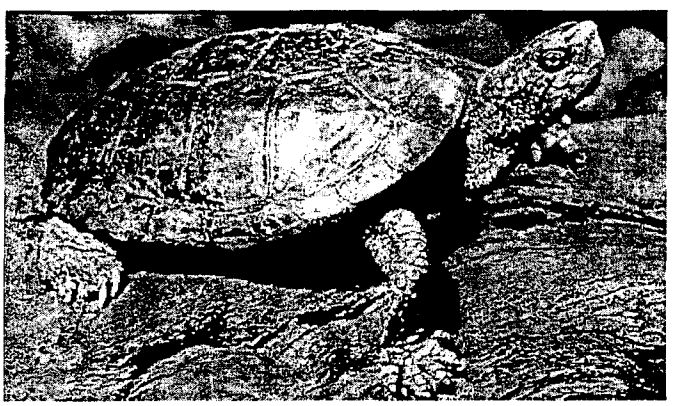
The northern red-legged frog as an adult is a medium-sized frog and is reddish to olive above with flecks of small black spots (Marshall *et. al.*, 1996). The hidden locations of the hind legs and lower abdomen are pinkish-red, hence the name 'red-legged' frog.

Northern red-legged frogs typically are found in forested wetlands and breed in cool water 1.6 to 6.6 feet (0.5 to 2 meters) deep (usually well-shaded ponds or lake edges, beaver ponds or slow streams) in winter to early spring (Corkran and Thoms, 1996).

The best method to determine the presence of northern red-legged frogs is to survey for egg masses from mid- to late February to mid-March, depending on air and water temperature conditions in the Willamette Valley. Each egg mass is usually attached to a submerged branch, stem or other vegetation. Eggs and egg masses are very distinctive from those of other aquatic amphibians that may deposit eggs during the same time period.

Eggs typically hatch late March to April. Tadpoles typically metamorphose in late May or June to early July (Cockran and Thoms, 1996). Tadpoles eat aquatic algae and other organic debris. Adult northern red-legged frogs eat aquatic macroinvertebrates, beetles, isopods, and insect larvae (Csuti, B. *et. al.*, 1997).

Western Pond Turtle



Source of photo: Behler and King, 1979.

The northwestern pond turtle is one of two native freshwater turtles in the Pacific Northwest. The painted turtle (*Chrysemys picta*) is more brightly colored. The carapace (upper shell) of the pond turtle is olive or dark brown to blackish. The plastron (ventral shell) varies from cream-yellow, with or without dark blotches, to brown or solid black (Marshall *et. al.*, 1996).

The Western pond turtle typically prefers small lakes, marshes and sluggish streams and rivers. The turtles require basking sites such as logs, rocks, mudbanks, or cattail mats and frequent bodies of water with muddy or rocky bottoms. Nests can be several hundred meters from water in a variety of vegetation types (Csuti, B. *et. al.*, 1997). One to thirteen eggs are laid in terrestrial nests from late May to August. Nesting sites are typically on southerly slopes above the ordinary high water line in compact soils having high clay content and sparse vegetation comprised of short grasses and forbs (Marshall *et. al.*, 1996). Eggs hatch in approximately twelve weeks. Hatchlings are thought to overwinter in the nest and emerge in the spring (Csuti, B. *et. al.*, 1997).

The Western pond turtle is a scavenger and opportunistic predator. The turtles eat both plant and animal food and prefer mostly small invertebrates. Adults readily consume carrion, insects, earthworms, mollusks, crayfish, tadpoles and frogs, and infrequently consume plant material (Marshall *et. al.*, 1996; Csuti, B. *et. al.*, 1997).

The best time to survey for northwestern pond turtle is during a sunny day (above 60°F) in early spring. During this time turtles have emerged from hibernation and can be found basking in the immediate area in which they have over wintered.

SURVEY METHODS AND FINDINGS

Northern Red-Legged Frog Survey

A survey for northern red-legged frog egg masses within the waterbodies in question was conducted on March 15, 2002. Areas determined to be suitable to support northern red-legged frog egg masses were surveyed in North Doane Lake and the Northwest Drainage Pond. These areas contained in-water vegetation in which the frogs could attach their egg masses (Figure 1). The survey consisted of carefully wading through shallow areas next to vegetation and visually assessing for the presence of egg masses.

At the time of the survey the water levels were very high in North Doane Lake, which was the result of periodic rainfall. The water level within the Northwest Drainage Pond was not only high, but water velocity was also swift.

No northern red-legged frog egg masses were found during the field survey. In fact, no egg masses of any kind were found within the areas surveyed. It should be noted that suitable habitat is present at North Doane Lake to support all life stages of northern red-legged frogs (hatchling, tadpole, juvenile and adult). This habitat includes moist deciduous forests and forested wetlands along well-shaded pond or lake edges (Cockran and Thoms, 1996).

As a part of the field survey, native and non-native vegetation, mammals, birds and herptiles were noted during the field investigation. Table 1 contains an inventory of vegetation and wildlife species found (or signs of wildlife) at the site.

Western Pond Turtle Survey

A survey for northwestern pond turtles was conducted on May 23, 2002 at the North Doane Lake site. The Northwestern Drainage Pond was also surveyed for potential presences of the pond turtle, however due to the small size of the waterbody and shady conditions this location was not optimal for observing basking pond turtles. The entire perimeter of the North Doane Lake was surveyed. There are numerous areas within the lake that contain suitable basking platforms (i.e., floating logs) where turtles can be found during suitable weather conditions. The survey consisted of viewing the lake through binoculars and walking the perimeter of the lake along a railroad easement.

At the time of the pond turtle survey, water levels in North Doane Lake had dropped considerably since the previous field survey in March. Numerous areas of large woody debris could be seen scattered throughout the lake edges. The survey was conducted in early afternoon. The weather was clear with a slight breeze with temperatures around 65°F.

One large female painted turtle was found basking on a large log during the field survey (Figure 1). No other turtles observed. It should be noted that suitable habitat is present at North Doane Lake to support all life stages of northwestern pond turtle (hatchling,

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juvenile and adult). This habitat included ponds with basking sites such as floating logs, rocks, and mud banks (Marshall *et. al.*, 1996).

As a part of the field survey, native and non-native vegetation, mammals, birds and herptiles were noted during the field investigation. Table 1 contains an inventory of vegetation and wildlife species found (or signs of wildlife) at the site.

RECOMMENDATIONS

Based on information gathered during the field visits March and May of 2002, it appears that the federal species of concern, northern red-legged frogs and northwestern pond turtle, are not present at North Doane Lake and Northwestern Drainage Pond. However, these species could utilize these waterbodies during other times of the year, or the presence of these species may not have been detected during the two field surveys. Also, due to the high water conditions, this year may not have been optimal for northern red-legged frogs at these particular locations.

In order to better confirm actual presence of the northwestern pond turtle, a trapping effort would assist in identifying any additional turtle species found in North Doane Lake and Northwestern Drainage Pond. An additional survey for northern red-legged frog adults would also help confirm if these species are located within these waterbodies.

As a side note, though native painted turtles are not listed as a species of concern, trapping, rehabilitating and relocation of any painted the turtles that may occupy North Doane Lake and the Northwestern Drainage Pond is recommended. These turtles may be at risk because of potential bioaccumulation of toxics in their tissues. Long term exposure can result in death as a result of health problems related to toxic exposure (Beilke, e-mail communication, 2002).

References:

Behler, John L. and F.W. King. 1979. The Audubon Society Field Guide to North American Reptiles and Amphibians. Chanticleer Press, Inc., New York.

Beilke, Sue. Herpetologist. Portland, Oregon. E-mail Communication of May 23, 2002.

Cockran, C.C. and C. Thoms. 1996. *Amphibians of Oregon, Washington and British Columbia, A Field Identification Guide*. Lone Pine Publishing, Edmonton, Alberta, Canada.

Csuti, B., A.J. Kimerling, T.A. O'Neil, M.M. Shaughnessy, E.P. Gaines, and M.M. Huso. 1997. *Atlas of Oregon Wildlife – Distribution, Habitat, and Natural History.* Oregon State University Press, Corvallis, Oregon.

Marshall, D.B., M.W. Chilcote, and H. Weeks. 1996. *Species at Risk: sensitive, threatened and endangered vertebrates of Oregon*. 2nd edition. Oregon Department of Fish and Wildlife (ODFW), Portland, Oregon.

Table 1: RPAC Site Visit on March 15 and May 23, 2002
Northern Red-legged Frog and Northwestern Pond Turtle Surveys
& General Site Observations

Vegetation - Native		
Stratum	**Common Name**	***Scientific Name***
Trees	Douglas Fir	*Pseudotsuga menziesii*
	Red Alder	*Alnus rubra*
	Madrone	*Arbutus menziesii*
	Bigleaf Maple	*Acer macrophyllum*
	Oregon ash	
Shrubs	Snowberry	*Symphoricarpos albus*
	Douglas spirea (Hardhack)	*Spiraea douglasii*
	Red-flowering currant	*Ribes sanguineum*
	Red-osier dogwood	
Herbaceous	Common rush	*Juncus effusus*
	Sedge (slough or sitka)	*Carex obnupta or C. sitchensis*
	Nootka rose	*Rosa nutkana*
	Swordfern	*Polystichum munitum*
	Creeping buttercup	*Ranunculus repens*
	Stinging nettle	*Urtica dioica*
	Piggy-back plant	*Tolmiea menziesii*
	Bracken fern	*Pteridium aquilinum*
	Pacific waterleaf	*Hydrophyllum tenuipes*
Vegetation - Non-native		
Shrubs	Himalayan blackberry	*Rubus discolor*
	Evergreen blackberry	*Rubus laciniatus*
	Scotch broom	*Cytisus scoparius*
	English holly	*Ilex aquafolium*
	Canada thistle	*Cirsium arvense*
Herbaceous	Reed canarygrass	*Phalaris arundinacea*
	English ivy	*Hedera helix*
	Queen Anne's lace	*Daucus carota*
	Morning glory	*Convolvulus arvensis*
	Chickory	
	Field Mustard	*Brassica campestris*
	Bittersweet nightshade	*Solanum dulcamara*
Mammals - Native		
	Beaver	*Castor canadensis*
	Deer	*Odocoileus hemionus*
Mammals - Non-native		
	Nutria	*Myocastor coypus*
Birds - Native		
	Canada Goose	*Branta canadensis*
	Mallard (adult + juveniles)	*Anas platyrhynchos*
	Stellar's Jay	*Cyanocitta stelleri*
	Red-winged blackbird	*Agelaius phoeniceus*
	Robin	*Turdus migratorius*
	House Finch	*Carpodacus mexicanus*
	Mourning dove	*Zenaida macroura*
	Great blue heron	*Ardea herodias*
Birds - Non-native		
	none	
Herptiles - Native		
	Painted turtle (female)	Chrysemys picta
Herptiles - Non-native		
	none	
Fish - Native		
	none	
Fish - Non-native		
	Brown bullhead	*Ictalurus nebulosus*
	Carp?	*Cyprinus carpio*

LETTER OF TRANSMITTAL

TO:

Wacker Siltronic Corporation PO Box 83180 Portland, OR 97283	Date:	October 15, 2002
	Job No:	0-61M-10703-0/Task 23
	Attn:	Cathryn Young
	RE:	RPAC - Portland Site

WE ARE SENDING YOU: ☐ Attached ☒ Under Separate Cover via US Mail

Copies	Dated	Description
1	10/15/02	North Doane Lake Level II Aquatic Ecological Risk Assessment

THESE ARE TRANSMITTED as checked below:

☐ For Review ☐ For Approval ☒ For Your Use ☐ As Requested

REMARKS:

AMEC Earth & Environmental, Inc.
7376 SW Durham Road
Portland, Oregon
USA 97224
Tel +1 (503) 639-3400
Fax +1 (503) 620-7892

www.amec.com

C:\Documents and Settings\lplank\Desktop\My RPAC Stuff\Young TRANSMITTAL.doc

amec

RP-07 SERIES MONITORING WELL INSTALLATION
TECHNICAL MEMORANDUM
RPAC – PORTLAND SITE

September 11, 2002

Submitted to:

Oregon Department of Environmental Quality
Northwest Region
2020 S.W. 4th Avenue, Suite 400
Portland, Oregon 97201

Prepared for:

RPAC
One Copely Parkway, Suite 309
Morrisville, NC 27560

Submitted by:

AMEC Earth & Environmental, Inc.
7376 SW Durham Road
Portland, Oregon 97224

0-61M-10703-0/Task 43

September 11, 2002

0-61M-10703-0/Task 43

Mr. Eric Blischke
Coordinator, Portland Harbor
Department of Environmental Quality
2020 S.W. 4th Avenue
Portland, Oregon 97201

Dear Mr. Blischke:

Re: RP-07 Series Monitoring Well Installation Technical Memorandum
RPAC - Portland, Site

On behalf of RPAC, AMEC Earth & Environmental, Inc. (AMEC) is submitting to the Oregon Department of Environmental Quality (DEQ) one unbound and three bound copies of the above-referenced document. This RP-07 Series Monitoring Well Installation Technical Memorandum (TM) has been produced to document the installation of four monitoring wells at the Wacker Siltronic Corporation (Wacker) property. The monitoring wells were installed at the request of the DEQ, as stated in the DEQ letter dated January 18, 2002 that provided comments to the RPAC December 6, 2001 Draft Remaining RI Work Plan (RRIWP).

The monitoring well installation was completed in general accordance with the DEQ-approved Monitoring Well Installation at Wacker Property Field Sampling Plan (FSP) dated February 28, 2002 and the Addendum #1 to the FSP dated March 15, 2002. Sampling and monitoring of these wells were completed during the Focused Spring 2002 Groundwater Characterization event, conducted during April and May 2002. The DEQ's objective for the RP-07 series monitoring well cluster installation and sampling, provided to RPAC in the January 18, 2002 letter and subsequent telephone conversations, is to provide additional characterization of the groundwater hydraulic gradient and groundwater quality on the Wacker property. The agreement by RPAC to undertake the installation and sampling of the RP-07 series monitoring wells on Wacker property does not constitute any acceptance of responsibility by RPAC for the alleged presence of any constituents in the groundwater on Wacker property.

Included in the TM are a discussion of well installation and development procedures and subsurface conditions encountered while drilling. Copies of the completed as-built well diagrams and boring logs, Well Development Logs, and the 90-Day Investigation-Derived Waste Logs have been included as appendices.

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If you have any questions, please contact Roger Gresh at (503) 639-3400.

Sincerely,

AMEC Earth & Environmental, Inc.

Roger T. Gresh, P.G.
Project Manager

Scott Kranz, R.G.
Senior Hydrogeologist

REGISTERED PROFESSIONAL
OREGON
SCOTT KRANZ
No. G1944
GEOLOGIST

Enclosure: RP-07 Series Monitoring Well Installation Technical Memorandum

c: R. Ferguson, RPAC
J. Benedict, CHBH&L
Cathryn Young, Wacker Siltronics

SK/jm

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1.0 INTRODUCTION

The installation of a new cluster of four monitoring wells (RP-07 series wells) on the Wacker Siltronics Corporation (Wacker) property was completed between April 15 and May 2, 2002 as part of the RPAC Site Remedial Investigation/Feasibility Study. The RPAC property is located at 6200 N.W. St. Helens Road in Portland, Oregon. The Wacker property is located on the Willamette River north of the RPAC property at 7200 N.W. Front Avenue. Figure 1-1 shows the RPAC Site and the location of the new monitoring wells.

Per DEQ's request in their January 18, 2002 letter, RPAC agreed to install a monitoring well cluster on Wacker property near the location of direct-push boring P-8, completed on behalf of NW Natural in August 2001 and included in the Data Package for Focused Remedial Investigation, Wacker Siltronic Property, prepared by Hahn and Associates, Inc. (HAI) and dated November 20, 2001 (HAI, 2001). The agreement by RPAC to undertake the installation and sampling of the RP-07 series monitoring wells on Wacker property does not constitute any acceptance of responsibility by RPAC for the alleged presence of any constituents in the groundwater on Wacker property.

This RP-07 Series Monitoring Well Installation Technical Memorandum (TM) describes the tasks and procedures for installation and development of a cluster of four monitoring wells on Wacker property. The work was conducted generally according to procedures outlined in the Monitoring Well Installation at Wacker Property Field Sampling Plan (FSP) (AMEC, 2002a), Addendum #1 to the FSP (AMEC, 2002b), site-specific Revised Quality Assurance Project Plan (QAPP) dated June 13, 2001 (AMEC, 2001a), and the site-specific Revised Health and Safety Plan (HASP) dated June 13, 2001 (AMEC, 2001b).

The sampling and analysis of groundwater samples collected from these monitoring wells are discussed in the Spring 2002 Groundwater Monitoring Report (Spring 2002 GMR) dated July 31, 2002 (AMEC, 2002c).

2.0 MONITORING WELL INSTALLATION

This TM addresses the monitoring well installation, monitoring well development, and a monitoring well location and measuring point elevation survey. A description of these tasks is included in the following sections.

Four monitoring wells were installed near the location of previous NW Natural groundwater sampling point P-8 (HAI, 2001). The monitoring wells were installed as a cluster of wells, with an approximate 10-foot separation between each monitoring well location. These monitoring wells are located north of the Wacker administration

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building in a landscaped area between the building and the Willamette River. Monitoring well designations had been temporarily assigned to the proposed wells for clarity during planning. These designations, RP-07-S, RP-07-I, RP-07-D, and RP-07-B, were changed to include the actual completion depths of each well, with the final designations of RP-07-30, RP-07-55, RP-07-84, RP-07-119, respectively.

The monitoring wells were completed approximately as follows:

- Monitoring well RP-07-30 was completed to a depth of approximately 30 feet below ground surface (bgs);
- Monitoring well RP-07-55 was completed to a depth of approximately 55 feet bgs;
- Monitoring well RP-07-84 was originally drilled to a depth of 114 feet bgs; however, the well was completed at a depth of approximately 84 feet bgs as agreed to by DEQ; and
- Monitoring well RP-07-119 was completed to a depth of approximately 119 feet bgs.

As-built well diagrams and boring logs are included in Appendix A.

The monitoring well boring that originally was to be completed in the basalt investigative zone was completed in the deep alluvium zone (above the basalt zone) at 84 feet bgs. This boring was drilled to 114 feet bgs without encountering basalt bedrock, and the drilling equipment could not be used to advance the boring deeper. Because the boring could not be advanced to basalt bedrock, the boring was completed as a deep alluvium zone well (RP-07-84). The boring was backfilled with coated bentonite chips to 85 feet bgs prior to completing the monitoring well.

2.1 Drilling and Sampling Methodologies

Prior to drilling, as part of setup activities, plywood sheeting was laid out in the work area and over the lawn to provide equipment access to the drill location and to minimize damage to the landscaping. Monitoring well installation activities were performed from April 15 to May 2, 2002. Drilling services were provided by Cascade Drilling, Inc. (Clackamas, Oregon).

Monitoring wells RP-07-30 and RP-07-55 were installed using hollow stem auger drilling methods. Monitoring wells RP-07-84 and RP-07-119 were installed using air rotary drilling methods. To characterize lithology, soil samples were collected at 5-foot intervals with a split-spoon sampler while drilling the intermediate monitoring well RP-07-55. Soil samples were not collected from the boring for monitoring well RP-07-30. While drilling monitoring wells RP-07-84 and RP-07-119, grab samples were collected

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from the drilling rig cyclone to confirm lithologic contacts in the alluvium and in the basalt. Drilling character and relative penetration rates also were used to qualitatively log subsurface lithologies in the three borings where discrete samples were not collected. No soil samples were submitted for laboratory chemical analysis.

A grab water sample was collected April 29, 2002 from RP-07-119 above the alluvium-basalt contact at a depth interval of 108 to 110 feet bgs. An inflatable packer was placed approximately 3 feet above the bottom of the advanced steel casing, and a groundwater sample was collected with a decontaminated submersible pump after purging approximately 125 gallons of groundwater. The sample was collected at a low flow rate (less than 1 gallon per minute [gpm]). The groundwater sample was submitted for analysis of the following constituents:

- Volatile organic compounds (EPA Method 8260)
- Phenols (EPA Method 8041)
- Herbicides (EPA Method 8151A)
- Pesticides (EPA Method 8081A)
- Dioxins/furans (EPA Method 8290)
- Total and dissolved metals

Groundwater samples were also collected from the RP-07 series monitoring wells as part of the Focused Spring 2002 Groundwater Monitoring Event on May 3, 2002, and reported in the Spring 2002 GMR submitted to DEQ on July 31, 2002. The groundwater samples collected May 3, 2002, were submitted for analysis of the following constituents:

- Volatile organic compounds (EPA Method 8260)
- Phenols (EPA Method 8041)
- Herbicides (EPA Method 8151A)
- Dioxins/furans (EPA Method 8290)
- Total and dissolved metals
- Natural attenuation parameters (various methods)

2.2 Well Construction

Following the completion of drilling and sampling activities for each boring, monitoring wells were installed in the boreholes using the following completion materials:

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Casing and Screen

- A sump consisting of a 0.5-foot threaded cap at the bottom of the well (included with the pre-pack well screen);
- A screened interval consisting of a 5-foot length of 2-inch inner diameter 0.010-inch slotted PVC casing, with a pre-pack filter of #10/20 silica sand; and
- A blank casing to the top of the well consisting of 2-inch inner diameter Schedule 40 PVC threaded well casing, and a locking well cap.

Annulus

- Supplementary silica sand filter pack (in addition to the pre-pack filter), #10/20 grain size, to approximately 2 feet above the screened interval;
- If grout was used, approximately 2 feet of fine #20/40 sand was placed above the filter pack, which was placed as a transition layer prior to the placement of the grout seal;
- The seal installed at monitoring wells RP-07-30 and RP-07-55 consisted of bentonite chips from the top of the filter pack to within 2 feet of the ground surface; and
- The seal installed at monitoring wells RP-07-84 and RP-07-119 consisted of a bentonite grout seal (30% solids) from the top of the #20/40 sand transition layer to the ground surface. The grout was then allowed to settle and set-up overnight, and the resultant annulus void was filled with bentonite chips to within 2 feet of the ground surface. The bentonite chips were hydrated in approximately 2-foot lifts using clean tap water during placement of the chips.

Well Head Completion

- A flush-mount monument was installed to protect the monitoring well at ground surface; and
- A concrete seal was installed from the top of the bentonite seal to the top of the flush-mount monument.

Following well installation, the plywood was removed, the work area was cleaned, and all remaining wastes generated were contained and removed from the Wacker property.

The lawn impacted by the drilling operations was repaired by RPAC (via a contracted landscaping specialist, TruGreen LandCare of Fairview, Oregon) on May 17, 2002.

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The damaged sod was removed, soil was added to raise grade in the damaged area, and new sod was installed on both the north and east sides of the Wacker building near the RP-07 series monitoring wells. The work was guaranteed by TruGreen LandCare for any potentially defective or improperly installed materials for a period of 1 year.

2.3 Monitoring Well Development

The monitoring wells were developed following installation to flush out particulates that may remain in the filter pack material after installation and to ensure that the monitoring wells were all in communication with the surrounding formation. Development of all four monitoring wells was conducted on May 1 and 2, 2002.

Monitoring well development procedures included surging each monitoring well with a surge block, and purging a minimum of five to eight well volumes of water. Monitoring well development activities were recorded on the Well Development Logs included in Appendix B.

2.4 Survey

Following completion of well installation, a licensed surveyor, OTAK (Lake Oswego, Oregon), surveyed the location and elevation of each newly installed monitoring well on May 15, 2002. The survey data were collected in a coordinate system consistent with other RPAC Site wells (i.e., Oregon State Plane, North NAD83). The survey data were entered into the project database and quality checked.

3.0 SUBSURFACE CONDITIONS

In general, three stratigraphic units were encountered (beneath topsoil and fill material) during the RP-07 series monitoring well installation. They are listed in sequence from top to bottom below:

- Fine-grained alluvial silts, sandy silts, and sand (generally corresponding to the project-defined shallow and intermediate investigative zones).
- Coarse-grained alluvial materials consisting of sandy gravels (generally corresponding to the project-defined deep investigative zone).
- Fractured basalt bedrock (generally corresponding to the project-defined basalt investigative zone).

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3.1 Fine-Grained Unconsolidated Alluvial Deposits

Fine-grained alluvial deposits were encountered beneath the topsoil and fill material to a depth of 67 to 71 feet bgs. Topsoil was less than 1 foot in thickness, and fill material (primarily sandy silt) was noted below the topsoil to a depth of approximately 10 feet bgs. The fine-grained alluvium is stratified with laterally discontinuous beds of clayey silts, silts, sandy silts, and sands. A sandy silt and sand with wood debris (possible fill) were encountered between 20 and 30 feet bgs in RP-07-84 and RP-07-119. In all four borings, saturated sediments were first encountered in the fine-grained, unconsolidated alluvial deposits between 25 and 30 feet bgs.

3.2 Coarse-Grained Unconsolidated Alluvial Deposits

Coarse-grained alluvial deposits, situated beneath the fine-grained alluvial deposits, were encountered at 70 feet bgs in RP-07-84 and 67 feet bgs in RP-07-119. This unit consists of saturated, unconsolidated, poorly graded gravel with occasional cobbles stratified with thin gravelly sand or sand lenses. The gravels are subrounded to rounded, well graded (fine to coarse-grained gravels), and are composed primarily of volcanic clasts (80% to 90%) with minor quartzite and metamorphic and sedimentary clasts (10% to 20%). The contact between this unit and the fine-grained deposits described above is distinct.

A dramatic increase in water production was observed within this unit. Groundwater was discharged from the boreholes at a rate of 75 to 100 gpm while drilling in the gravel.

3.3 Basalt

Basalt bedrock was encountered beneath the alluvium at 108.5 feet bgs at monitoring well RP-07-119. Drill cuttings and drilling character indicated that the contact between the overlying alluvial deposits and the basalt is distinct, and any weathered zone that may occur above the basalt would be thin (less than 0.5 feet thick). Although the basalt was encountered at 108.5 feet bgs at monitoring well RP-07-119, basalt was not encountered above 114 feet bgs at monitoring well RP-07-84 (located approximately 30 feet from monitoring well RP-07-119), and it appears the alluvium/basalt contact is either irregular or sloped. The basalt is hard to very hard, slightly to moderately weathered, and is dark gray. The reddish-brown iron and manganese oxide coatings noted on the surface of some of the cuttings would indicate that the basalt is fractured. A decrease in water production was noted below 112 feet bgs.

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4.0 DOCUMENTATION

All monitoring well installation procedures, lithologic descriptions, and observations were recorded on loose-leaf boring log forms and/or a bound logbook. Specific information was recorded as follows.

4.1 Field Logbooks

Field notes were collected to document the procedures performed by field personnel during the RP-07 series monitoring well installation activities. The field logbook is the main source of documentation for field activities. Observations specific to each monitoring well boring were documented on the boring log form.

Entries made in the field logbook included items such as: project name and number; reasons for fieldwork; relevant field observations; date and time of sampling; names of field personnel on site; presence of persons on-site not related to the sampling activities; any change in scope from the FSP; and the type and level of health and safety equipment used.

4.2 Boring Log Form

Field observations, weather conditions, sample intervals, sample recovery, sample identification number, analytical methods, soil and rock descriptions, and PID measurements were recorded on the soil boring logs. Soil boring logs are included on the as-built well diagrams in Appendix A.

4.3 Well Development Log Form

The Well Development Log form was used to record the well development method, volume of water removed from each well, and water clarity during development. Well development logs are included in Appendix B.

4.4 Photographs

Photographs were taken for the purpose of documenting location, appearance, proximity to Wacker site buildings and topographic features, field activities, or other relevant field observations for which notes or sketches were inadequate.

5.0 DECONTAMINATION

All equipment used to collect down-hole measurements that may come into contact with formation water (e.g., water level probe) was decontaminated between each use.

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Disposable equipment (e.g., bailers and dedicated tubing used with submersible pumps) was disposed of as investigation-derived waste (IDW) (Section 6.0). Sampling and measurement equipment were decontaminated as follows:

- Soap wash (dilute solution of Alconox or equivalent in potable water solution);
- Potable water rinse; and
- Rinse with distilled or deionized water.

Because NAPL was not present, a methanol rinse was not included in the decontamination procedure. The augers, casing drill rods, bits, and other drilling equipment were steam cleaned prior to arrival at the site and between borings. Drilling equipment was contained on a flatbed truck and transported for decontamination at the RPAC property in a designated bermed area designed and constructed for equipment decontamination. Debris was removed from the drilling rig over plastic sheeting at the drill location before transporting the rig to the bermed area at the RPAC property for decontamination using a steam cleaner. The drilling rig was generally dry during transport. The resultant decontamination water from the bermed area drains into a sump, which then drains through a pipeline that leads to the RPAC water treatment system.

6.0 TREATMENT AND DISPOSAL OF IDW

IDW generated during the RP-07 series monitoring well installation included soil cuttings, groundwater generated during drilling and well development activities, decontamination liquid, personal protective equipment (PPE), disposable sampling equipment, and other miscellaneous solid waste. All waste generated was recorded on the 90-Day Investigation-Derived Waste Log. The 90-Day Investigation Derived Waste Logs are included in Appendix C.

Water used to decontaminate probe rods, sampling equipment, and associated drilling tools was contained and discharged into the RPAC on-site water treatment system at the end of each day. Groundwater generated while drilling RP-07-84 and RP-07-119 with the air rotary rig was contained temporarily in portable tanks, transported to the RPAC facility, and discharged to the water treatment system. Approximately 11,800 gallons of groundwater and 350 gallons of decontamination water were generated during the RP-07 series monitoring well drilling and installation activities. Another 320 gallons of groundwater were generated during monitoring well development activities. A total of approximately 12,470 gallons of water were discharged to the RPAC water treatment system, for which Daily Water Disposal Logs are included in Appendix C.

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Soil cuttings generated during the monitoring well drilling activities were stored in 55-gallon drums. The soil cuttings were transported to the RPAC waste storage facility on the day of generation. During the RP-07 series monitoring well installation, 56 drums containing soil cuttings were generated.

A small quantity of personal protective equipment (PPE) (e.g., gloves) and debris (e.g., paper towels and rags, plastic tubing) were placed in drums at the end of each day. During the well installation and development activities, less than one drum of IDW containing PPE and debris was generated. This IDW was consolidated with IDW generated from the same area during the Spring 2002 groundwater characterization event.

7.0 VARIATIONS FROM FIELD SAMPLING PLAN

Although drilling and well installation were generally conducted according to the FSP and the applicable SOPs, there were some variations from the planned activities. The variations from the FSP are provided below. None of these variations adversely affected well construction or data collection during these well installation activities.

- As suggested by the DEQ, the deep alluvium investigative zone monitoring well (RP-07-84) was completed at 84 feet bgs (at least 30 feet above the basalt bedrock). The monitoring well was planned to be completed in silty sand material generally encountered above the basalt. Basalt was not encountered in this boring, which had a total depth of 114 feet bgs. Instead a thick sequence of gravels was encountered at approximately 70 feet bgs. This boring was backfilled with coated bentonite pellets from 85 to 112 feet bgs. A variance was obtained from the Oregon Department of Water Resources to use the coated bentonite pellets. The FSP had proposed completing this well (RP-07-D) just above the basalt bedrock.
- In lieu of completing a deep alluvium well just above the basalt contact, a grab water sample was collected from the cased boring just above the basalt at 108 to 110 feet while drilling monitoring well RP-07-119. An inflatable packer was used to isolate the water in the casing from the groundwater within the sample interval at the bottom of the casing. The grab groundwater sampling was not included in the FSP for the RP-07 series monitoring wells.
- The basalt bedrock was encountered at a greater depth than anticipated, and the proposed monitoring well RP-07-B was completed at a depth of 119 feet bgs, with a screened interval from 114 to 119 feet bgs.
- Soil samples were collected at 5-foot intervals with a split-spoon sampler from RP-07-I rather than RP-07-D as proposed in the FSP. Due to unanticipated

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subsurface conditions, the boring that originally was intended to be completed in the basalt was completed as a deep alluvium well (RP-07-84).

- Centralizers were not installed at monitoring wells RP-07-84 and RP-07-119. The monitoring well construction details in the FSP for RP-07-D and RP-07-B proposed placing a centralizer 5 feet above the well screen. Because the monitoring wells were constructed with pre-packed well screens, well construction and function do not appear to be affected.
- Fine #20/40 silica sand, rather than bentonite chips, was placed above the filter pack when grout was used for the well seal. The drillers were concerned that bentonite chips would bridge at the drive shoe at the bottom of the steel casing, and they suggested installing a 1 to 2 foot thick layer of fine sand as a transition between the grout and the sand filter pack. The fine sand prevented the grout from infiltrating the filter pack in the same manner as bentonite chips, and did not bridge at the bottom of the casing.
- Due to low well productivity, only three well volumes of water were recovered from RP-07-30 during well development. This well was pumped or bailed dry and allowed to recharge several times during the monitoring well development.
- The turbidity meter was not used during development to measure clarity of the discharge water. During the initial readings, the turbidity was greater than the scale on the meter, and visual observations of water clarity were noted in the field notes.

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8.0 REFERENCES

AMEC, 2001a. Revised Quality Assurance Project Plan, RPAC - Portland Site, prepared for Aventis CropScience, prepared by AMEC Earth and Environmental, submitted to Oregon Department of Environmental Quality, June 13, 2001.

AMEC, 2001b. Revised Health and Safety Plan, RPAC - Portland Site, prepared for Aventis CropScience, prepared by AMEC Earth and Environmental, submitted to Oregon Department of Environmental Quality, June 13, 2001.

AMEC, 2002a. Monitoring Well Installation at Wacker Property, RPAC - Portland Site, prepared for Aventis CropScience, prepared by AMEC Earth and Environmental, submitted to Oregon Department of Environmental Quality, February 28, 2002.

AMEC, 2002b. Addendum #1, Monitoring Well Installation at Wacker Property, RPAC - Portland Site, prepared for Aventis CropScience, prepared by AMEC Earth and Environmental, submitted to Oregon Department of Environmental Quality, March 15, 2002.

AMEC, 2002c. Focused Spring 2002 Groundwater Characterization Event Groundwater Monitoring Report, prepared for RPAC, prepared by AMEC Earth and Environmental, submitted to Oregon Department of Environmental Quality, July 31, 2002.

Hahn and Associates, Inc. (HAI), 2001. Data Package for Focused Remedial Investigation, Wacker Siltronic Corporation Property, 7200 N.W. Front Avenue, Portland, Oregon, prepared for NW Natural, prepared by Hahn and Associates, Inc., submitted to Oregon Department of Environmental Quality, November 20, 2001.

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LIMITATIONS

This report was prepared exclusively for RPAC by AMEC Earth & Environmental, Inc. (AMEC). The quality of information, conclusions and estimates contained herein is consistent with the level of effort involved in AMEC services and based on: i) information available at the time of preparation, ii) data supplied by outside sources, and iii) the assumptions, conditions and qualifications set forth in this report. This report is intended to be used by RPAC only, subject to the terms and conditions of its contract with AMEC. Any other use of, or reliance on, this report by any third party is at that party's sole risk.

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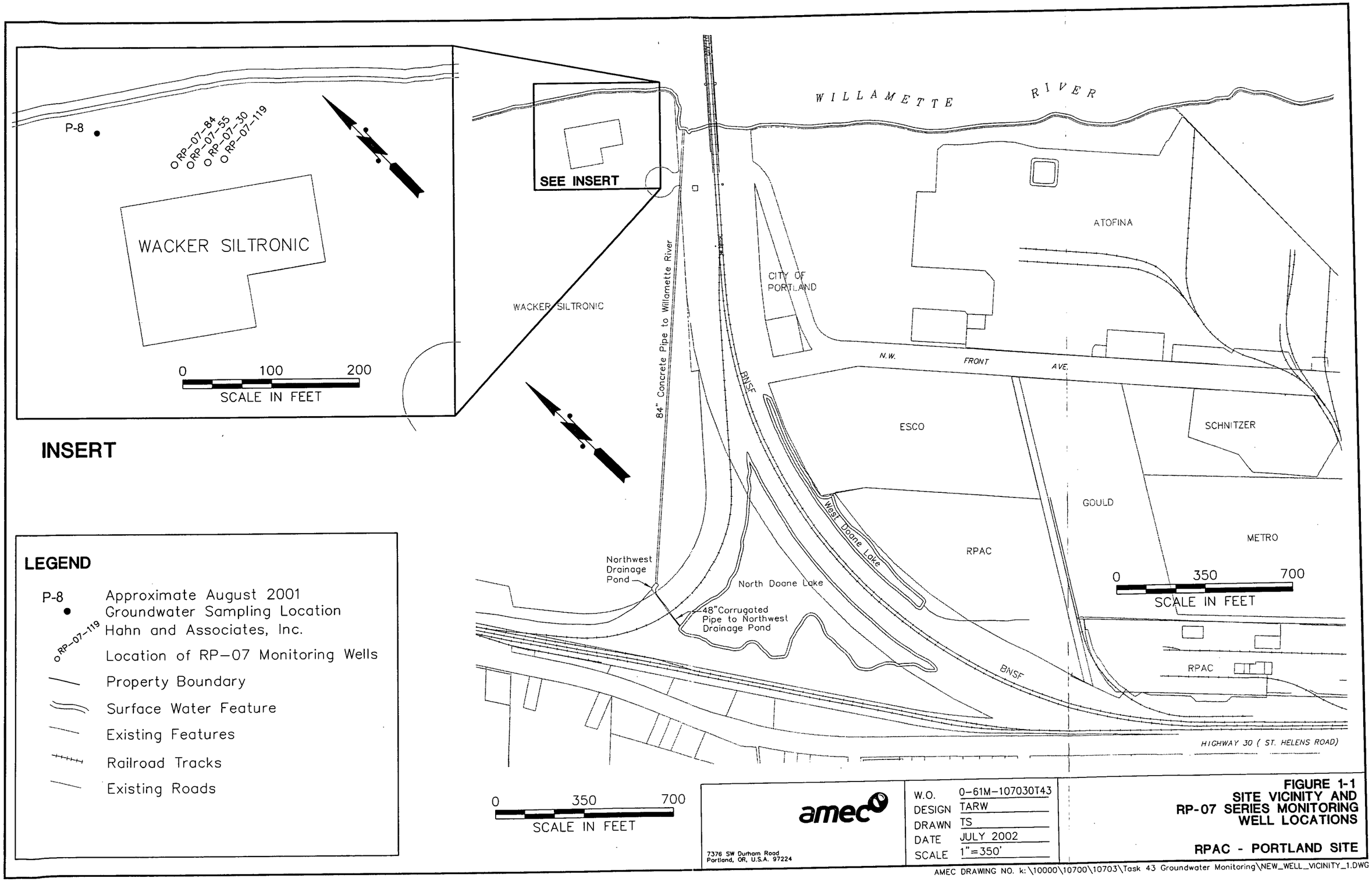
FIGURES


INSERT
P-8
RP-07-84
RP-07-55
RP-07-30
RP-07-119
WACKER SILTRONIC
0 100 200
SCALE IN FEET
SEE INSERT
WACKER SILTRONIC
WILLAMETTE RIVER
84" Concrete Pipe to Willamette River
BNSF
CITY OF PORTLAND
ATOFINA
N.W. FRONT AVE.
ESCO
SCHNITZER
GOULD
METRO
RPAC
West Doane Lake
North Doane Lake
Northwest Drainage Pond
48"Corrugated Pipe to Northwest Drainage Pond
0 350 700
SCALE IN FEET
RPAC
BNSF
HIGHWAY 30 (ST. HELENS ROAD)
LEGEND
P-8 Approximate August 2001 Groundwater Sampling Location Hahn and Associates, Inc.
RP-07-119 Location of RP-07 Monitoring Wells
Property Boundary
Surface Water Feature
Existing Features
Railroad Tracks
Existing Roads
0 350 700
SCALE IN FEET
amec
7376 SW Durham Road
Portland, OR, U.S.A. 97224
W.O. 0-61M-107030T43
DESIGN TARW
DRAWN TS
DATE JULY 2002
SCALE 1"=350'
FIGURE 1-1
SITE VICINITY AND
RP-07 SERIES MONITORING
WELL LOCATIONS
RPAC - PORTLAND SITE
AMEC DRAWING NO. k:\10000\10700\10703\Task 43 Groundwater Monitoring\NEW_WELL_VICINITY_1.DWG

APPENDIX A

As-built Well Diagrams and Boring Logs

Elevation Reference: City of Portland Datum
Relative Ground Surface Elevation: Approximately 35.50 Feet
Well Completed: 4/22/02
Casing Elevation: 35.26 Feet
Boring Method: Hollow Stem Auger
Borehole Diameter: 11.75"

Depth (feet)	SOIL DESCRIPTION	Sample Number	Sample Type	Blow Counts	Volatile Readings (ppm)	Ground Water	AS-BUILT DESIGN	ANALYSES
0	Topsoil.						Flush Mounted Monument; Concrete Surface Seal; Locking Cap; Bentonite Chips; Casing (2-inch ID, Schedule 40 PVC)	
5								
10	SANDY SILT (ML), brown, some clay (possible FILL).							
15								
20	SANDY SILT (ML), dark gray, some clay.					SW	10/20 Colorado Silica Sand	
25	SANDY SILT (ML), mottled dark gray and brown, some clay. Total depth = 30.0 feet.						Screen (2.0-inch ID Schedule 40 PVC Prepack with 10/20 Colorado Silica Sand with 0.010-inch slots); Threaded End Cap	RPAC SUITE-I
30								

PROJECT NUMBER: 0-61M-10703-0 T43

LEGEND

SW — Static groundwater level measured on 5/3/02

RPAC SUITE-I — Groundwater Analysis (8260B, 8041, 8151A, 8290, 6020 Total & Dissolved Metals, NAP) Groundwater sample collected on 5/3/02

RPAC
Portland, Oregon

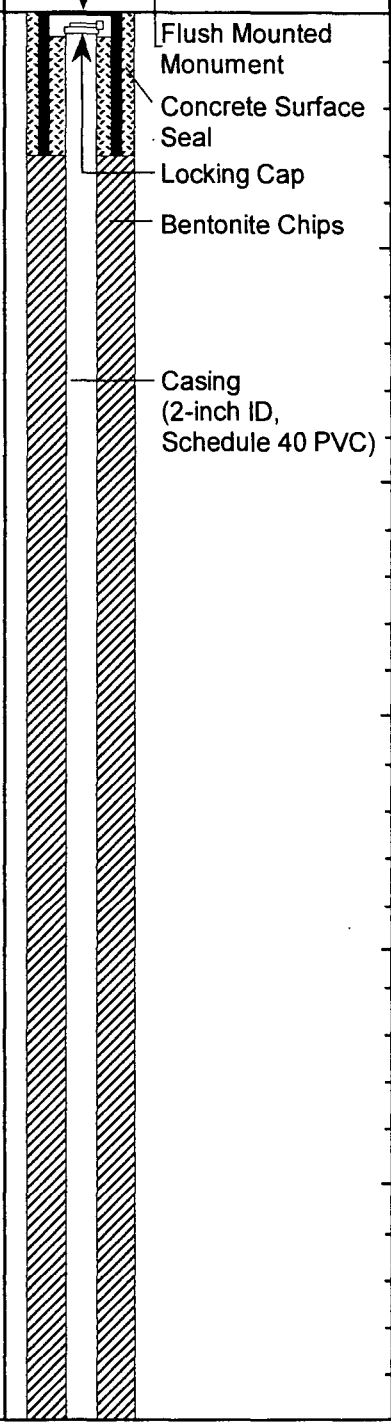
AMEC EARTH & ENVIRONMENTAL, INC.
7376 SW Durham Road
Portland, Oregon 97224
Phone (503) 639-3400 FAX (503) 620-7892

Drilling Started: 4/22/02 Drilling Completed: 4/22/02 Logged By: L. Janczak

\10703\RP730.DRW

Elevation Reference: City of Portland Datum
Relative Ground Surface Elevation: Approximately 35.50 Feet
Well Completed: 4/22/02
Casing Elevation: 35.20 Feet
Boring Method: Hollow Stem Auger
Borehole Diameter: 11.75"

Depth (feet)	SOIL DESCRIPTION	Sample Number	Sample Type	Blow Counts	Volatile Readings (ppm)	Ground Water	AS-BUILT DESIGN	ANALYSES
0	Topsoil.							
5	SANDY SILT (ML), medium stiff, damp, brown to gray, some clay and roots, (possibly oxidized FILL material).			10	0.3			
10	SANDY SILT (ML), soft, damp to moist, gray to brown, some clay and roots, (clay content and moisture decreases).			5	0.1			
15	CLAYEY SILT (ML), soft, damp to moist, gray to brown, some sand, (clay content decreases and moisture increases).			4	0.5			
20	SILT (ML), medium stiff, moist, dark brown, some sand (<20%).			10	0.3			
25	SAND (SP), medium dense, moist, dark gray to black, fine-grained, some silt (<10%).			13	0.2	SW		
30								



PROJECT NUMBER: 0-61M-10703-0 T43

LEGEND

2.0-inch OD split-spoon sample with % recovered

Static groundwater level measured on 5/3/02

RPAC SUITE-I Groundwater Analysis (8260B, 8041, 8151A, 8290, 6020 Total & Dissolved Metals, NAP)
Groundwater sample collected on 5/3/02

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7376 SW Durham Road
Portland, Oregon 97224
Phone (503) 639-3400 FAX (503) 620-7892

Drilling Started: 4/22/02 Drilling Completed: 4/22/02 Logged By: L. Janczak

\10703\RP755.DRW

Elevation Reference: City of Portland Datum
Relative Ground Surface Elevation: Approximately 35.50 Feet
Well Completed: 4/22/02
Casing Elevation: 35.20 Feet
Boring Method: Hollow Stem Auger
Borehole Diameter: 11.75"

Depth (feet)	SOIL DESCRIPTION	Sample Number	Sample Type	Blow Counts	Volatile Readings (ppm)	Ground Water	AS-BUILT DESIGN	ANALYSES
30	SAND (SP), medium dense, damp to moist, dark gray to black, fine- to medium- grained, some silt (<10%). Organic odor.			12	0.1		Bentonite Chips; Casing (2-inch ID, Schedule 40 PVC)	
35	SILT (ML), medium stiff, wet, gray to brown, some fine-grained sand (approximately 20%).			15	0.0			
40	SILTY SAND (SM), loose, wet, brown and gray mottled, fine-grained sand.			4	0.0			
45	SAND (SP), medium dense, wet, brown, fine-grained.			9	0.0		10/20 Colorado Silica Sand	
50	SAND (SP), loose, wet, brown, fine-grained.			5	0.0		Screen (2.0-inch ID Schedule 40 PVC Prepack with 10/20 Colorado Silica Sand with 0.010-inch slots)	RPAC SUITE-I
	SAND (SP), medium dense, moist, black and brown mottled, fine- to medium-grained.			16	0.1		Threaded End Cap	
55	Total depth = 55.0 feet.							
60								

PROJECT NUMBER: 0-61M-10703-0 T43

LEGEND

2.0-inch OD split-spoon sample with % recovered

Static groundwater level measured on 5/3/02

RPAC SUITE-I — Groundwater Analysis (8260B, 8041, 8151A, 8290, 6020 Total & Dissolved Metals, NAP)
Groundwater sample collected on 5/3/02

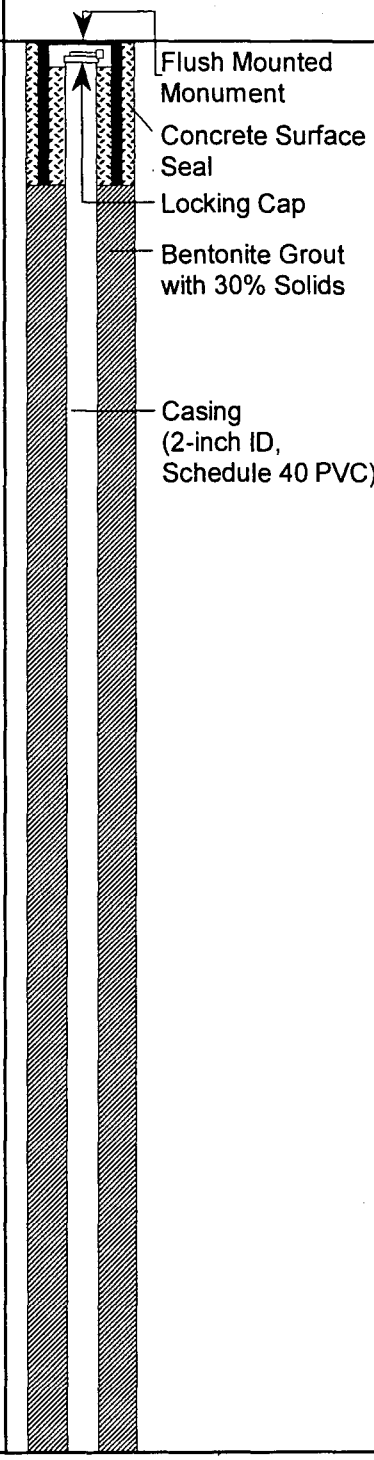
RPAC
Portland, Oregon

AMEC EARTH & ENVIRONMENTAL, INC.
7376 SW Durham Road
Portland, Oregon 97224
Phone (503) 639-3400 FAX (503) 620-7892

Drilling Started: 4/22/02 Drilling Completed: 4/22/02 Logged By: L. Janczak \10703\RP755P2.DRW

Elevation Reference: City of Portland Datum
Relative Ground Surface Elevation: Approximately 35.50 Feet
Well Completed: 4/22/02
Casing Elevation: 35.22 Feet
Boring Method: Air Rotary
Borehole Diameter: 7.0"

Depth (feet)	SOIL DESCRIPTION	Sample Number	Sample Type	Blow Counts	Volatile Readings (ppm)	Ground Water	AS-BUILT DESIGN	ANALYSES
0	Topsoil.							
5								
10	SAND (SP), dry, dark brown to gray.							
	SAND (SP), dry, dark gray, poorly sorted with some silt, approximately 10% gravel, grain-size increases.							
15	SANDY SILT (ML), dry, dark gray with some organics.							
	SILT (ML), dry to moist, dark gray with some clay.							
20								
25						SW		
	SAND (SP), dry, dark gray, poorly sorted with some silt, gravel, and wood debris. Encountered large piece of wood - difficult drilling.					WD		
30								



PROJECT NUMBER: 0-61M-10703-0 T43

LEGEND

WD — Encountered groundwater level while drilling

SW — Static groundwater level measured on 5/3/02

RPAC SUITE-I — Groundwater Analysis (8260B, 8041, 8151A, 8290, 6020 Total & Dissolved Metals, NAP) Groundwater sample collected on 5/3/02

RPAC
Portland, Oregon

AMEC EARTH & ENVIRONMENTAL, INC.
7376 SW Durham Road
Portland, Oregon 97224
Phone (503) 639-3400 FAX (503) 620-7892

Drilling Started: 4/15/02 Drilling Completed: 4/22/02 Logged By: J. Fassio/L. Janczak

\10703\RP784.DRW

Elevation Reference: City of Portland Datum
Relative Ground Surface Elevation: Approximately 35.50 Feet
Well Completed: 4/22/02
Casing Elevation: 35.22 Feet
Boring Method: Air Rotary
Borehole Diameter: 7.0"

Depth (feet)	SOIL DESCRIPTION	Sample Number	Sample Type	Blow Counts	Volatile Readings (ppm)	Ground Water	AS-BUILT DESIGN	ANALYSES
30	SANDY SILT (ML), wet, dark gray, (approximately 20% sand).						Bentonite Grout with 30% Solids; Casing (2-inch ID, Schedule 40 PVC)	
35	SANDY SILT (ML), dense, wet, dark gray.							
40								
45								
50	SANDY SILT (ML), wet, dark brown.							
55								
60	SILTY SAND (SM), wet, dark brown, sand content increases.							

LEGEND

WD — Encountered groundwater level while drilling

SW — Static groundwater level measured on 5/3/02

RPAC SUITE-I — Groundwater Analysis (8260B, 8041, 8151A, 8290, 6020 Total & Dissolved Metals, NAP)
Groundwater sample collected on 5/3/02

PROJECT NUMBER: 0-61M-10703-0 T43

RPAC
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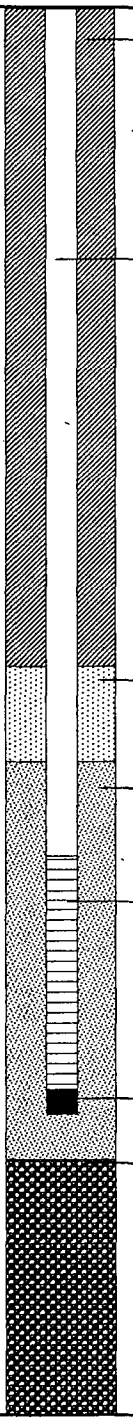
7376 SW Durham Road
Portland, Oregon 97224
Phone (503) 639-3400 FAX (503) 620-7892

Drilling Started: 4/15/02 Drilling Completed: 4/22/02 Logged By: J. Fassio/L. Janczak \10703\RP784P2.DRW

Elevation Reference: City of Portland Datum
Relative Ground Surface Elevation: Approximately 35.50 Feet
Well Completed: 4/22/02
Casing Elevation: 35.22 Feet
Boring Method: Air Rotary
Borehole Diameter: 7.0"

Depth (feet)	SOIL DESCRIPTION	Sample Number	Sample Type	Blow Counts	Volatile Readings (ppm)	Ground Water	AS-BUILT DESIGN	ANALYSES
60								
65								
70	GRAVELLY SAND (SP), wet, dark brown and black.							
	SANDY GRAVEL (GP), wet, dark brown and black, (approximately 80% basalt gravel, 20% mixture of chert, quartz, and scorria). Producing large amounts of water.							
75	SANDY GRAVEL (GP), dense, wet, mottled black and brown, mostly basalt gravel. SANDY GRAVEL (GP), medium dense, wet, mottled black and brown. Producing large amounts of water.							
80	GRAVELLY SAND (SP), wet, mottled black and brown, (gravel constists of approximately 80% basalt, 20% quartz, granite, and chert).							RPAC SUITE-I
85	GRAVELLY SAND (SP), dense, wet, mottled black and brown, sand is approximately 90% basalt.							
90								



PROJECT NUMBER: 0-61M-10703-0 T43

LEGEND

WD — Encountered groundwater level while drilling

SW — Static groundwater level measured on 5/3/02

RPAC SUITE-I — Groundwater Analysis (8260B, 8041, 8151A, 8290, 6020 Total & Dissolved Metals, NAP) Groundwater sample collected on 5/3/02

RPAC
Portland, Oregon

AMEC EARTH & ENVIRONMENTAL, INC.
7376 SW Durham Road
Portland, Oregon 97224
Phone (503) 639-3400 FAX (503) 620-7892

Drilling Started: 4/15/02 Drilling Completed: 4/22/02 Logged By: J. Fassio/L. Janczak

\10703\RP784P3.DRW

Elevation Reference: City of Portland Datum
Relative Ground Surface Elevation: Approximately 35.50 Feet
Well Completed: 4/22/02
Casing Elevation: 35.22 Feet
Boring Method: Air Rotary
Borehole Diameter: 7.0"

Depth (feet)	SOIL DESCRIPTION	Sample Number	Sample Type	Blow Counts	Volatile Readings (ppm)	Ground Water	AS-BUILT DESIGN	ANALYSES
90	SILTY SAND (SM), dense, wet, dark brown to black, fine-grained with gravel (basalt, quartz, and chert). (Approximately 70% sand, 20% silt, 10% gravel.)						Coated Bentonite Pellets (55 gallons) used to seal boring from 85.0-112.0 feet BGS. (As casing pulled out due to sediment caving. Total depth =112.0 feet.)	
95	SANDY GRAVEL (GP), dense, wet, dark brown to black, with silt. (Approximately 70% basalt, quartz, and granite gravel, 25% sand, 5% silt). Sand content decreases below 97.0 feet.							
100								
105	GRAVEL (GW), very dense, dark brown to black, with some sand and silt. (Approximately 95% gravel, 5% sand and silt).							
110	SANDY GRAVEL (GP), very dense, wet, dark brown to black with sand and silt. (Approximately 70% gravel, 20% sand, 10% silt.)						Bottom 2.0 feet of borehole caved/ heave from 112.0-114.0 feet.	
	Total depth = 114.0 feet.							
115								
120								

LEGEND

WD — Encountered groundwater level while drilling

SW — Static groundwater level measured on 5/3/02

RPAC SUITE-J — Groundwater Analysis (8260B, 8041, 8151A, 8290, 6020 Total & Dissolved Metals, NAP) Groundwater sample collected on 5/3/02

PROJECT NUMBER: 0-61M-10703-0 T43

RPAC
Portland, Oregon

AMEC EARTH & ENVIRONMENTAL, INC.
7376 SW Durham Road
Portland, Oregon 97224
Phone (503) 639-3400 FAX (503) 620-7892

Drilling Started: 4/15/02 Drilling Completed: 4/22/02 Logged By: J. Fassio/L. Janczak \10703\RP784P4.DRW

Elevation Reference: City of Portland Datum
Relative Ground Surface Elevation: Approximately 35.50 Feet
Well Completed: 5/1/02
Casing Elevation: 35.13 Feet
Boring Method: 5.0" Tri-cone Air Rotary from 0.0-101.0', 5.0" ODEX Percussion Button Bit w/Under-reamer from 101.0-119.4'
Borehole Diameter: 6.0"

Depth (feet)	SOIL DESCRIPTION	Sample Number	Sample Type	Blow Counts	Volatile Readings (ppm)	Ground Water	AS-BUILT DESIGN	ANALYSES
0	Grass and rooty topsoil.						Flush Mounted Monument; Concrete Surface Seal; Locking Cap; Bentonite Chips (3/8"), hydrated Total = 2,400 lbs Bentonite Chips; VOID at 7.0-8.0 feet BGS; Casing (2-inch ID, Schedule 40 PVC)	
	SILTY SAND (SM), loose, damp, gray, fine-grained, poorly graded.							
	NOTE: Subsurface lithology logged by visual inspection of drill cuttings return and drilling character (no discrete soil samples collected).							
5								
	Drilling soil column while injecting clean water.							
	CLAYEY SILT (ML), soft, moist, gray.							
10								
	Gradational contact.							
	SAND with gravel (SP), medium dense, moist, medium- to coarse- grained, poorly graded, some organic woody debris. (Poor cuttings return - displacing into formation).							
15								
20								
25	Return cuttings becoming wet - unconfined groundwater encountered while drilling.					WD; SW		
	Gradational contact.							
30								

LEGEND

WD — Encountered groundwater level while drilling

SW — Static groundwater level measured on 5/3/02

RPAC SUITE-I — Groundwater Analysis (8260B, 8041, 8151A, 8290, 6020 Total & Dissolved Metals, NAP) Groundwater sample collected on 5/3/02

RPAC SUITE-II — Groundwater Analysis (8260B, 8041, 8151A, 8290, 6020 Total & Dissolved Metals, 8081A) Groundwater sample collected on 4/29/02

PROJECT NUMBER: 0-61M-10703-0 T43

RPAC
Portland, Oregon

AMEC EARTH & ENVIRONMENTAL, INC.
7376 SW Durham Road
Portland, Oregon 97224
Phone (503) 639-3400 FAX (503) 620-7892

Drilling Started: 4/24/02 Drilling Completed: 5/1/02 Logged By: S. Bourcy \10703\RP7119.DRW

Elevation Reference: City of Portland Datum
Relative Ground Surface Elevation: Approximately 35.50 Feet
Well Completed: 5/1/02
Casing Elevation: 35.13 Feet
Boring Method: 5.0" Tri-cone Air Rotary from 0.0-101.0', 5.0" ODEX Percussion Button Bit w/Under-reamer from 101.0-119.4'
Borehole Diameter: 6.0"

Depth (feet)	SOIL DESCRIPTION	Sample Number	Sample Type	Blow Counts	Volatile Readings (ppm)	Ground Water	AS-BUILT DESIGN	ANALYSES
30	SILTY SAND (SM), loose, wet to saturated, medium to dark gray, fine-grained, rounded to subrounded, poorly graded. Gradational change at approximately 34.5 feet.						Bentonite Chips (3/8"), hydrated VOID at 31.0 feet Casing (2-inch ID, Schedule 40 PVC)	
35	CLAYEY SILT (ML), soft, wet, mottled brown, low to medium plasticity, trace very fine-grained sand and mica. (Poor cuttings return - displacing into formation.) Very poor cuttings return.						Bentonite Grout with 30% Solids (Wt = 10.3 lbs/gal, Ratio - 50 gal water : 100 lbs grout per batch mixed)	
40								
45								
	Gradational change at 48.0-48.5 feet.							
50	SILTY SAND (SM), loose to medium dense, wet to saturated, gray-brown, fine-grained, rounded to subrounded, poorly graded. (Sand consists of primarily volcanic fragments.)							
55	SILT content decreasing (<10-15%). Brown return water. Discharge water production increased to approximately 15 gpm below 54.0 feet. SAND (SP), loose to medium dense, saturated, gray-brown, fine-grained, poorly graded with trace silt (approximately 10%).							
60								

LEGEND

WD — Encountered groundwater level while drilling

SW — Static groundwater level measured on 5/3/02

RPAC SUITE-I — Groundwater Analysis (8260B, 8041, 8151A, 8290, 6020 Total & Dissolved Metals, NAP) Groundwater sample collected on 5/3/02

RPAC SUITE-II — Groundwater Analysis (8260B, 8041, 8151A, 8290, 6020 Total & Dissolved Metals, 8081A) Groundwater sample collected on 4/29/02

PROJECT NUMBER: 0-61M-10703-0 T43

RPAC
Portland, Oregon

AMEC EARTH & ENVIRONMENTAL, INC.
7376 SW Durham Road
Portland, Oregon 97224
Phone (503) 639-3400 FAX (503) 620-7892

Drilling Started: 4/24/02 Drilling Completed: 5/1/02 Logged By: S. Bourcy \10703\RP7119P2.DRW

Elevation Reference: City of Portland Datum
Relative Ground Surface Elevation: Approximately 35.50 Feet
Well Completed: 5/1/02
Casing Elevation: 35.13 Feet
Boring Method: 5.0" Tri-cone Air Rotary from 0.0-101.0', 5.0" ODEX Percussion Button Bit w/Under-reamer from 101.0-119.4'
Borehole Diameter: 6.0"

Depth (feet)	SOIL DESCRIPTION	Sample Number	Sample Type	Blow Counts	Volatile Readings (ppm)	Ground Water	AS-BUILT DESIGN	ANALYSES
60	SAND with trace silt (SP), medium dense, saturated, gray-brown, fine-grained, rounded to subrounded, poorly graded.						Bentonite Grout with 30% Solids (Wt = 10.3 lbs/gal; Ratio - 50 gal water : 100 lbs grout per batch mixed)	
65	Discharge water production increased to approximately 50 gpm below 67.0 feet with little fines (cleaner discharge water). Contact at 67.0 feet.						Casing (2-inch ID, Schedule 40 PVC)	
	SANDY GRAVEL (GW), very dense, saturated, fine- to coarse-grained sand, fine gravel (<2.0 inch diameter), rounded to subrounded, well-graded, unconsolidated, 90% of sand/clasts volcanic.							
70	Discharge water production increased to approximately 75-100 gpm below 70.0 feet. Gravel becoming coarser - possible occasional cobbles (harder drilling).							
75	Large cobble or boulder encountered between 76.0 and 77.0 feet. Drill casing difficult to advance.							
80	SANDY GRAVEL with occasional cobbles (GW), very dense, saturated, coarse-grained, rounded to subrounded, some gravel elongated, well-graded, unconsolidated sand and gravel primarily volcanic fragments (approximately 90%).							
85	Possible thin, stratified GRAVELLY SAND (SP) interbeds. (Based on visual observation of cuttings return and drill character.)							
90								

LEGEND

WD — Encountered groundwater level while drilling

SW — Static groundwater level measured on 5/3/02

RPAC SUITE-I — Groundwater Analysis (8260B, 8041, 8151A, 8290, 6020 Total & Dissolved Metals, NAP) Groundwater sample collected on 5/3/02

RPAC SUITE-II — Groundwater Analysis (8260B, 8041, 8151A, 8290, 6020 Total & Dissolved Metals, 8081A) Groundwater sample collected on 4/29/02

PROJECT NUMBER: 0-61M-10703-0 T43

RPAC
Portland, Oregon

AMEC EARTH & ENVIRONMENTAL, INC.
7376 SW Durham Road
Portland, Oregon 97224
Phone (503) 639-3400 FAX (503) 620-7892

Drilling Started: 4/24/02 Drilling Completed: 5/1/02 Logged By: S. Bourcy \10703\RP711P3.DRW

Elevation Reference: City of Portland Datum
Relative Ground Surface Elevation: Approximately 35.50 Feet
Well Completed: 5/1/02
Casing Elevation: 35.13 Feet
Boring Method: 5.0" Tri-cone Air Rotary from 0.0-101.0', 5.0" ODEX Percussion Button Bit w/Under-reamer from 101.0-119.4'
Borehole Diameter: 6.0"

Depth (feet)	SOIL DESCRIPTION	Sample Number	Sample Type	Blow Counts	Volatile Readings (ppm)	Ground Water	AS-BUILT DESIGN	ANALYSES
90	GRAVELLY SAND (SP) interbedded with SANDY GRAVEL (GW); sand content increases below 90.5 feet. Discharge water gray-brown, approximately 75-100 gpm.						Bentonite Grout with 30% Solids (Wt = 10.3 lbs/gal, Ratio - 50 gal water : 100 lbs grout per batch mixed) Total Bentonite Grout used = 650 gallons	
95								
	Trip-out 5.0-inch tri-cone bit, replace with 5.0-inch ODEX under-reamer percussion button bit at 101.0 feet. Difficulty getting ODEX bit to "kick out" below bottom of 6.0-inch casing, sand and gravel binding bit.						Casing (2-inch ID, Schedule 40 PVC)	
100								
105	Resumed drilling on 4/29/02. Had 7.0 feet of SAND/GRAVEL heave up inside 6.0-inch casing - ream out. Discharge water changes to reddish brown at 108.0 feet.							
	Contact into BASALT at 108.5-109.0 feet. BASALT, massive, hard to very hard, slightly to moderately weathered, reddish brown, fractured, some Fe/Mn oxidation coating fracture surfaces.							RPAC SUITE-II
110	Pumped approximately 100-125 gallons water prior to collecting discrete groundwater sample (060-01@1330 on 4/29/02) using inflatable packer/ submersible pump system. Bottom of pump at 108.0 feet below ground surface.						20/40 Colorado Silica Sand (Transition Layer) 10/20 Colorado Silica Sand	
115	Discharge water production decreases below 112.0 feet. Basalt grades to dark gray and discharge water changes to gray-brown at 114.0-115.5 feet. Basalt grades to reddish brown and discharge water changes to reddish brown at 115.5 feet.						Screen (2.0-inch ID Schedule 40 PVC Prepack with 10/20 Colorado Silica Sand with 0.010-inch slots)	RPAC SUITE-I
120	Total depth = 119.4 feet.						Threaded End Cap	

LEGEND

WD — Encountered groundwater level while drilling

SW — Static groundwater level measured on 5/3/02

RPAC SUITE-I — Groundwater Analysis (8260B, 8041, 8151A, 8290, 6020 Total & Dissolved Metals, NAP) Groundwater sample collected on 5/3/02

RPAC SUITE-II — Groundwater Analysis (8260B, 8041, 8151A, 8290, 6020 Total & Dissolved Metals, 8081A) Groundwater sample collected on 4/29/02

PROJECT NUMBER: 0-61M-10703-0 T43

RPAC
Portland, Oregon

AMEC EARTH & ENVIRONMENTAL, INC.
7376 SW Durham Road
Portland, Oregon 97224
Phone (503) 639-3400 FAX (503) 620-7892

Drilling Started: 4/24/02 Drilling Completed: 5/1/02 Logged By: S. Bourcy \10703\RP7119P4.DRW

APPENDIX B

Well Development Logs

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WELL DEVELOPMENT LOG

Project Name: RPAC - PDX Wacker Well Install Project Number: 0-61M-107030 T43

Date: 1 May 2002 Completed By: H. Bullock

Well Name: RP-07-S; RP-07-30

Well Development Method: whale pump & bailing

Contractor Name: Cascade

Static Water Level Before Development (ft): 23.2' Depth of Well (toc): 30'

Inside Diameter (in): 2" Volume of Water in Filter Pack and Well (gal): ~~~12~~ 7

HB 5/1/02

Time Start Development: 1315

Sediment in Well Bottom (in): Start: trace Finish: —

~~Time Start Development:~~

Time	Pumping Rate	Surveyed (Y/N)	Total Volume	Turbidity (NTU)	Notes
1315	~2 gpm	yes	~2 gallons	NA	DK grey to brown water
1435	~1 gpm	↓	~8 gallons	↓	
1515	~1 gpm	↓	~2 gallons	↓	silty
5/2/02 1035	—	↓	~12 gallons	↓	bailing
1410	—	↓	~18 gallons	↓	" "

Volume of Water Removed from Well (gal): ~~7~~ >20 gallons HB 5/1/02

Time Complete Development: 1410

Static Water Level After Development (ft): 23.71'

Notes: Pump failure several times. Very silty. Well dried up ~every 3 gallons.

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WELL DEVELOPMENT LOG

Project Name: RPAC-PDX Wacker Well Install Project Number: 0-61M-107030 T43

Date: 1 May 2002 Completed By: H. Bullock

Well Name: RP-07-I ; RP-07-55

Well Development Method: Sub. Whale pump

Contractor Name: Cascade

Static Water Level Before Development (ft): 25.5' Depth of Well (toc): 55'

Inside Diameter (in): 2" Volume of Water in Filter Pack and Well (gal): ~46 gal.

Time Start Development: 1530 HB 5/2/02

Sediment in Well Bottom (in): Start: trace Finish: —

Time Start Development:

Time	Pumping Rate	Surveyed (Y/N)	Total Volume	Turbidity (NTU)	Notes
1530	~1 gpm	Yes	30 gal.	NA	
1615	~1 gpm	↓	50 gal.	NA	Clears up in ~3 gal. Drawdown ~15' in well.

Volume of Water Removed from Well (gal): 50 gal.

Time Complete Development: 1645

Static Water Level After Development (ft): 26.30

Notes:

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WELL DEVELOPMENT LOG

Project Name: RPAC - PDX Wacker Well Install. Project Number: 0-61M-107030 T43

Date: 2 May 2002 Completed By: H. Bullock

Well Name: RP-07-D; RP-07-84

Well Development Method: Sub. whale pump & Inertia (BK) Hand Pump

Contractor Name: Cascade

Static Water Level Before Development (ft): 25.92' Depth of Well (toc): —

Inside Diameter (in): 2" Volume of Water in Filter Pack and Well (gal): ~~21~~ 12 HB 5/2/02

Time Start Development: 0830

Sediment in Well Bottom (in): Start: trace Finish: —

Time Start Development:

Time	Pumping Rate	Surveyed (Y/N)	Total Volume	Turbidity (NTU)	Notes
0830	~1 gpm	yes	~18 gal.	—	H2O removed from ~30-48' bgs
					H2O med. brown
					No evidence of grout
					clears up in ~2 gal.
1030	<1 gpm		~25 gal.		
5/2/02 1235	—		30 gal.		Inertia hand pump
~~1315~~ 1255	—		60 gal.		
HB 2May02					

Volume of Water Removed from Well (gal): > 60 gal.

Time Complete Development: 1315

Static Water Level After Development (ft): 26.32'

Notes:

amec

WELL DEVELOPMENT LOG

Project Name: RPAC-PDX Wacker Well Install. Project Number: 0-61M-107030 T43

Date: 2 May 2002 Completed By: H. Bullock

Well Name: RP-07-B ; RP-07-119

Well Development Method: 2" grundfos

Contractor Name: Cascade

Static Water Level Before Development (ft): — Depth of Well (toc): —

Inside Diameter (in): 2" Volume of Water in Filter Pack and Well (gal): 17.5 HB 5/2/02 ~ ~~20~~ gal.

Time Start Development: 1220

Sediment in Well Bottom (in): Start: — Finish: —

Time Start Development:

Time	Pumping Rate	Surveyed (Y/N)	Total Volume	Turbidity (NTU)	Notes
1220	1 gpm	Yes	80 gal.	—	very clean water

Volume of Water Removed from Well (gal): 80 gal.

Time Complete Development: 1330

Static Water Level After Development (ft): 26.23'

Notes:

APPENDIX C

Daily Water Disposal and 90-Day Investigation Derived Waste Logs

DAILY WATER DISPOSAL LOG LOG

RI/FS

RPAC - Portland Site

Date	Area/Location(s)		Type of Waste	Activity Description	Volume Generated/Transferred (Give Units of Measure)
4/16/02	OS	MONITORING WELL/ BORING RP-07-84	GROUND H_2O GENERATED WHILE DRILLING BORING RP-07-84		330 GALLONS
4/17/02	OS	MONITORING WELL BORING # RP-07-84	GROUND H_2O GENERATED WHILE DRILLING BORING RP-07-84		1,265 GALLONS
4/18/02	OS	MONITORING WELL BORING # RP-07-84	GROUND H_2O GENERATED WHILE DRILLING BORING RP-07-84		2,100 GALLONS
4/19/02	OS	MONITORING WELL BORING # RP-07-84	DECON H_2O	PRESSURE WASH DECON PAD ON RPAC PROPERTY	≈ 50-GALLONS
4/22/02	OS	BORINGS RP-07-55 + RP-07-30	DRILL H_2O (GROUND H_2O) GENERATED WHILE DRILLING	BORINGS RP-07-55 + RP-07-30	≈ 100-GALLONS
4/24/02	OS	BORING RP-07-119	DRILL/GROUND H_2O BORING RP-07-119	GENERATED DRILLING	≈ 1,200-GALLONS
4/25/02	OS	BORING RP-07-119	"	"	≈ 1,400-GALLONS
4/26/02	OS	BORING RP-07-119	"	"	≈ 3,000-GALLONS
4/29/02	OS	BORING RP-07-119	"	"	≈ 2,400-GALLONS
4/30/02	OS	BORING RP-07-119	DECON H_2O TO CLEAN DRILL PIPE, CASING + CLEAN OUT 600-GAL. POLY TANKS TO TRANSFER H_2O		≈ 200-GALLONS

Notes: LA = Lake Area
IA = Insecticide Area
HA = Herbicide Area
OS = OffSite

DAILY WATER DISPOSAL LOG LOG

RI/FS

RPAC - Portland Site

Date	Area/Location(s)		Type of Waste	Activity Description	Volume Generated/Transferred (Give Units of Measure)
5/1/02	OS	DECON DRILL RIG	DECON H_2O	DECON OF DRILL RIG AFTER COMPLETION OF BORING RP-07-119	≈ 100 - GALLONS
5/1/02	OS	BORINGS RP-07-30, RP-07-55	PURGE / DEVELOPMENT H_2O	→	70 - GALLONS
5/2/02	OS	BORINGS RP-07-30, RP-07-55, RP-07-84 + RP-07-119	PURGE / DEVELOPMENT H_2O	→	250 - GALLONS

Notes: LA = Lake Area
IA = Insecticide Area
HA = Herbicide Area
OS = OffSite

90-DAY INVESTIGATION DERIVED WASTE LOG
RI/FS
Aventis CropScience
RPAC-Portland Site

Lot #	Date 1st Accumulated	90-Day Limit (Day 1st accumulated +90 days)	Station ID	Type of Waste	How Generated	Samples Collected during activity for Lab Analysis ?	Approximate Amount (Give Units of Measure)
1	4/15/02		RP-07-B (84)	Soil cuttings	Wacker MW Installation	Y/N	55 gal drum
2	4/16/02			Soil cuttings		Y/N	55 gal drum
3						Y/N	
4						Y/N	
5				~~groundwater~~		Y/N	~~55 gal drum~~
6						Y/N	
7						Y/N	
8						Y/N	
9						Y/N	
10				Soil/H_2O mix		Y/N	55 gal drum
11						Y/N	
12						Y/N	
13						Y/N	
14	4/17/02			Soil cuttings		Y/N	55 gal drum
15						Y/N	
16						Y/N	

JBW 9/5/02

pumped into treatment system

90-DAY INVESTIGATIC ERIVED WASTE LOG

RI/FS
Aventis CropScience
RPAC-Portland Site

Lot #	Date 1st Accumulated	90-Day Limit (Day 1st accumulated +90 days)	Station ID	Type of Waste	How Generated	Samples Collected during activity for Lab Analysis ?	Approximate Amount (Give Units of Measure)
17	4/17/02		RP-D1-B(84)	Soil cuttings	Wacker MW Installation	Y/N	55 gal drum
18						Y/N	55 gal drum
19						Y/N	
20						Y/N	
21						Y/N	
22				groundwater		Y/N	1,250 gal pumped to system
23	4/18/02		RP-07-B(84)	groundwater	Wacker MW Installation	Y/N	2,100 gal pumped to system
24	4/18/02		RP-07-B(84)	Soil cuttings		Y/N	55 gal drum
25						Y/N	
26						Y/N	
27						Y/N	
28						Y/N	
29						Y/N	
30						Y/N	
31						Y/N	
32						Y/N	

AEW 9/5/02

90-DAY INVESTIGATIC ERIVED WASTE LOG

R

Aventis CropScience

RPAC-Portland Site

Lot #	Date 1st Accumulated	90-Day Limit (Day 1st accumulated +90 days)	Station ID	Type of Waste	How Generated	Samples Collected during activity for Lab Analysis ?	Approximate Amount (Give Units of Measure)
33	4/18/02		RP-07-B(84)	Soil cuttings	Wacker MW Installation	Y/N	55 gal drum
34						Y/N	
~~35~~ (JPW 9/5/02)				~~groundwater~~		~~Y/N~~	~~55 gal drum~~
36				Soil cuttings		Y/N	
37	4/22/02		RP-07-55 and RP-07-30	Soil cuttings	Wacker MW Installation	Y/N	55 gal drum
38						Y/N	
39						Y/N	
40						Y/N	
41						Y/N	
42						Y/N	
43						Y/N	
~~44~~ (JPW 9/5/02)	~~4/22/02~~		~~RP-07-55 & RP-07-30~~	~~groundwater~~	~~Wacker MW Installation~~	~~Y/N~~	~~300 gal~~ pumped into system
45	4/23/02		RP-07-84/ RP-07-55 & RP-07-30	Soil cuttings	Wacker MW Installation	Y/N	55 gal drum
46						Y/N	
47						Y/N	
48						Y/N	

90-DAY INVESTIGATION DERIVED WASTE LOG
RI/FS
Aventis CropScience
RPAC-Portland Site

Lot #	Date 1st Accumulated	90-Day Limit (Day 1st accumulated +90 days)	Station ID	Type of Waste	How Generated	Samples Collected during activity for Lab Analysis ?	Approximate Amount (Give Units of Measure)
9	4/25/02		RP-07-119	SOIL/DRILL CUTTINGS	WACKER WELL DRILLING / INSTALLATION	Y/N	55-GALLON DOT DRUM
						Y/N	
						Y/N	
						Y/N	
						Y/N	
						Y/N	
						Y/N	
						Y/N	
						Y/N	
4	4/26/02		RP-07-119	SOIL/DRILL CUTTINGS	WACKER WELL DRILLING / INSTALLATION	Y/N	55-GALLON DOT DRUM
						Y/N	
						Y/N	
						Y/N	
3	4/29/02		RP-07-119	SOIL/DRILL CUTTINGS	WACKER WELL DRILLING / INSTALLATION	Y/N	55-GALLON DOT DRUM
						Y/N	
						Y/N	

90-DAY INVESTIGATION DERIVED WASTE LOG
RI/FS
Aventis CropScience
RPAC-Portland Site

Lot #	Date 1st Accumulated	90-Day Limit (Day 1st accumulated +90 days)	Station ID	Type of Waste	How Generated	Samples Collected during activity for Lab Analysis ?	Approximate Amount (Give Units of Measure)
	4/26/02 4/30/02 ?		RP-07-119	SEDIMENT FILTERS FROM DRILL H_2O	FILTERING DRILL H_2O @ RPAC SITE	Y/N	55-GALLON DOT DRUM
	↓		↓	↓	↓	Y/N	↓
	↓		↓	↓	↓	Y/N	↓
2	5/01/02		RP-07-119	SEDIMENT	SEDIMENT SCRAPED OFF DECON PAD FROM DRILL/DECON H_2O	Y/N	55-GALLON DOT DRUM
	↓		↓	↓	↓	Y/N	55-GAL DOT DRUM ONLY 1/3 FULL (≈ 20-GAL)
2	5/02/02		RP-07-119	SOIL	SOIL TO SET MONUMENT (DUG-OUT)	Y/N	≈ 25-GAL IN 55-GAL DRUM
	5/02/02		RP-07-SERIES ALL WELLS	PPE	PPE-DRILLING	Y/N	≈ 25-GAL IN 55-GAL DRUM
						Y/N	
						Y/N	
						Y/N	
						Y/N	
						Y/N	
						Y/N	
						Y/N	
						Y/N	
						Y/N	

amec

REMAINING REMEDIAL INVESTIGATION TECHNICAL MEMORANDUM RPAC - PORTLAND SITE

February 4, 2003

Submitted to:

amec

February 4, 2003

0-61M-10703-0/
Task 59

Contents:

RRI TM

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REMAINING REMEDIAL INVESTIGATION
TECHNICAL MEMORANDUM
RPAC - PORTLAND SITE

February 4, 2003

Submitted to:

Oregon Department of Environmental Quality
811 S.W. 6th Ave.
Portland, Oregon 97204

Prepared for:

RPAC
One Copely Parkway, Suite 309
Morrisville, North Carolina 27560

Submitted by:

AMEC Earth & Environmental, Inc.
7376 SW Durham Road
Portland, Oregon 97224

0-61M-10703-0/Task 59

February 4, 2003

0-61M-10703-0/Task 59

Eric L. Blischke
Oregon Department of Environmental Quality
811 S.W. 6th Ave.
Portland, Oregon 97204

Dear Mr. Blischke:

Re: Remaining Remedial Investigation Technical Memorandum
RPAC - Portland Site

On behalf of RPAC, AMEC Earth & Environmental, Inc. (AMEC) is submitting to the Oregon Department of Environmental Quality (DEQ) the enclosed Remaining Remedial Investigation (RRI) Technical Memorandum (TM) for the June 26 through August 23, 2002 field sampling activities conducted at the RPAC Portland Site (Site). Field activities were completed in general accordance with the Final RRI Work Plan (which includes the Final RRI Field Sampling Plan [RRI FSP]) dated May 24, 2002, conditional approval of the work plan by the DEQ in a letter dated June 14, 2002, and RPAC's response letter dated June 28, 2002.

Included in the RRI TM are tables with descriptions of the Site reconnaissance activities, a comparison of planned versus actual sampling activities, field measurements and observations, and analytical results. Although there were some minor variations from the RRI FSP, none of these variations affect the quality of the RRI field sampling event results. In addition to the activities and results from the RRI sampling event, analytical results and information from the Willamette River seepage meter water sample collected on September 24, 2002 have been included within the RRI TM.

The figures in the RRI TM include the Site location, Site reconnaissance information, and sampling locations for sediment, surface water, soil, and outfall discharge water sampling activities. A copy of the completed sampling event field forms, sediment and soil boring logs, detailed data validation reports, and complete tables of validated analytical results are included as appendices. Figures with concentrations of selected preliminary constituents of potential concern (PCOPCs) analytical results for sediment, surface water, soil, discharge water, and seepage meter samples are also included as Appendix E.

One hard copy of the entire report (including all analytical results) is enclosed per DEQ's request. Three copies of this report, including both partial hard copy portions and partial electronic portions on compact disk (CD), are enclosed. Appendices A through I are provided on CD in Portable Document Format (PDF). The PDF files can be accessed using Adobe® Acrobat® or Reader® software. Please contact us if you have any trouble accessing or navigating between the electronic files.

AMEC Earth & Environmental, Inc.
7376 SW Durham Road
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Please contact Roger Gresh at (503) 639-3400 if you have any questions regarding this report.

Sincerely,

AMEC Earth & Environmental, Inc.

REGISTERED PROFESSIONAL GEOLOGIST
OREGON
SCOTT KRANZ
No. G1844

Roger Gresh, P.G. for
Project Manager

Scott Kranz, R.G.
Senior Hydrogeologist

Heidi Nelson, EIT for
Environmental Engineering Staff

Encl: Remaining Remedial Investigation Technical Memorandum

HWN/clh

c: R. Ferguson, RPAC
J. Benedict, CHBH&L

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1.0 INTRODUCTION

The remaining remedial investigation (RRI) sampling event was conducted in accordance with the Final RRI Work Plan (Work Plan) (which includes the Final RRI Field Sampling Plan [RRI FSP]) dated May 24, 2002 (AMEC 2002a). The Department of Environmental Quality (DEQ) provided conditional approval of the work plan in a letter dated June 14, 2002 (DEQ, 2002a). RPAC responded to the DEQ's letter, addressing the unresolved issues within the work plan in a letter dated June 28, 2002 (AMEC 2002b). The RRI Technical Memorandum (RRI TM) describes the RRI field sampling activities completed at the RPAC Site (Site) and includes the validated analytical results from the sediment, soil, and surface water sampling activities. The RPAC property is located at 6200 N.W. St. Helens Road in Portland, Oregon (Figure 1).

The scope of work completed during the RRI sampling event includes the following:

- Site reconnaissance activities at North Doane Lake (NDL), West Doane Lake (WDL), Northwest Drainage Pond (NDP), the Willamette River near the City of Portland Outfalls, and the immediate Site vicinity;
- Sediment sampling activities at WDL for laboratory analysis;
- Surface water sampling activities at WDL and NDP for laboratory analysis;
- Soil sampling activities at the historical drainage ditch (HDD) between WDL and the Willamette River for laboratory analysis; and
- Water sampling activities at City of Portland Outfalls 22B and 22C for laboratory analysis.

The RRI field activities were completed during two field events: site reconnaissance work and field sampling activities. The site reconnaissance work, which included a qualitative investigation of the Site was completed June 26, 2002 through June 28, 2002, and field sampling activities for sediment, surface water, soil, and outfall discharge water were completed August 13 through August 23, 2002 at the Site.

In addition to the work completed in accordance with the RRI FSP, a water sample was collected on September 24, 2002 at the Willamette River seepage meter location, WR-SM3. The seepage meter sampling was conducted in accordance with a letter submitted to DEQ on September 18, 2002 (AMEC, 2002e) with subsequent approval by the DEQ in a letter dated September 20, 2002 (DEQ, 2002b).

The following tasks identified in the RRI FSP are not included within this RRI TM: sediment, groundwater, surface water, and tissue sampling in the NDL and NDP.

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These tasks, not performed during the 2002 sampling event, are scheduled for completion in 2003. The analytical results and field observations of the RRI field activities to be completed at NDL and NDP will be submitted as an addendum to the RRI TM.

The RRI TM includes a summary of the activities conducted during the RRI field sampling events and the seepage meter sampling event and the associated analytical results, as well as a general discussion of the analytical results in comparison to preliminary screening values for human health and ecological receptors for select preliminary constituents of potential concern (PCOPCs). The preliminary screening values are not intended to serve as cleanup goals or to specify the level of risk at the Site. Furthermore, exceedances of the preliminary screening values do not represent any known unacceptable level of risk at the Site. The Human Health Risk Assessment (HHRA) and Ecological Risk Assessment (ERA) will evaluate site-specific potential risks associated with final COPCs at the Site. The preliminary screening values for human health receptors for soil and sediment are based on the United States Environmental Protection Agency (USEPA) Region IX Preliminary Remediation Goals for industrial soil (Soil PRGs) (USEPA, 2002a). The preliminary screening values for human health receptors for surface water, including outfall discharge water and seepage meter water, are USEPA Region IX Preliminary Remediation Goals for tap water (Tap Water PRGs) (USEPA, 2002a). The preliminary screening values for ecological receptors for soil are the most protective value of the DEQ Guidance for Risk Assessment Level II Screening Values for soil (DEQ, 2001). The preliminary screening values for ecological receptors for sediment are the most protective values, between freshwater or bioaccumulation values, of the DEQ Guidance for Risk Assessment Level II Screening Values for sediment (DEQ, 2001). The preliminary screening values for ecological receptors for surface water, including outfall discharge water and seepage meter water, are the most protective value of the DEQ Guidance for Risk Assessment Level II Screening Values for surface water (DEQ, 2001). The preliminary screening values for the RPAC PCOPCs are listed in Table 1.

Appendices A through D and F through I include: a copy of the Site reconnaissance photograph log; completed field sampling forms; soil and sediment boring logs; validation reports for sediment, surface water, soil, outfall discharge water, and the seepage meter sample analytical results; and complete tables of the validated analytical results.

The distribution of analytical results, presented in figures, for select PCOPCs for sediment, surface water, outfall discharge water, seepage meter water, and soil are provided in Appendix E. The PCOPCs for the constituent distribution figures in Appendix E were selected to represent each respective PCOPC chemical class (e.g.,

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volatile organic compounds [VOCs], metals, etc.) and are generally consistent with the PCOPCs provided in recent reports. The PCOPCs were selected based on prevalence in the environment, perceived abundance at the RPAC facility, and physical properties such as mobility, solubility in water, and toxicity. Analytical results exceeding the assigned preliminary screening values for human health and ecological receptors are posted in alternate colors on the figures presented in Appendix E.

2.0 FIELD ACTIVITIES

The RRI field activities were conducted in accordance with the site-specific Revised Quality Assurance Project Plan (QAPP) dated June 13, 2001 (AMEC, 2001a), the site-specific Health and Safety Plan (HASP) dated June 13, 2001 (AMEC, 2001b), as well as the QAPP and HASP Addenda (AMEC, 2002d; AMEC 2002c).

2.1 Site Reconnaissance

A site reconnaissance was conducted in the RRI investigation areas on June 26 through June 28, 2002. In general, site reconnaissance is the process of gathering qualitative data at specific points of interest. The investigation areas for the RRI field activities include NDL, NDP, WDL, Lake Area Drainage Ditch (LADD), HDD, and portions of the Willamette River bank near City of Portland Outfalls 22B and 22C. Through the reconnaissance work, qualitative information was gathered: to support the HHRA and the ERA; to support nature and extent characterization; to assess accessibility of each area with respect to future sampling activities; and to gain greater understanding of surface water and groundwater systems for the groundwater transport evaluation (GTE) at the Site.

2.1.1 Reconnaissance Procedure

During the reconnaissance efforts, the field team inspected the entire shoreline of each water body and noted potential inflow sources and outflow destinations. The inspection of NDL and WDL were performed from a kayak, paddling close to the shoreline of each water body. The remaining area was inspected on foot. Thick brush and blackberry thickets limited inspection along the shore of WDL and NDL. Where feasible, the field team cleared the areas that had large amounts of brush to aid in the inspection.

The reconnaissance field team noted existing area features and items of interest, including: culverts; noticeable sheens not associated with plant decay; soil/sediment discoloration and/or odor; and general habitat descriptions. The field team also noted

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sampling access for pending sediment and surface water activities, including ingress routes and existing boat launch locations.

The information acquired during the site reconnaissance activities was documented in a field logbook, as specified in the RRI FSP. In addition, specific features were recorded through sketches and photographs, and located using a hand-held global positioning system (GPS) unit.

2.1.2 Reconnaissance Results

The results of the reconnaissance activities are presented in the sections below. Descriptions of select photographs have been included in Table 2, with corresponding photographs in Appendix A and photograph locations shown on Figure 2. In addition to the photographs, specific points of interest have been summarized in Table 2 with their locations shown on Figure 2. All photograph references in this section are directed to the photographs presented in Appendix A.

Historical Drainage Ditch (HDD)

The HDD is located between the Burlington Northern Santa Fe (BNSF) railroad tracks and N.W. Front Avenue, northeast of WDL. The ditch at one time served as an overflow channel for WDL, and was reportedly cut off from WDL in 1980. Discharge from the north end of WDL to the HDD had been blocked by an earthen berm (Photo 1). A 24-inch diameter metal culvert pipe was observed at the northeast end of the HDD and runs northeast beneath N.W. Front Avenue to the bank of the Willamette River (Photo 2). A 4-inch diameter PVC pipe is nested inside the culvert pipe and disappears beneath the ground south of the culvert. As-built plans confirmed that this is the NPDES permitted 4-inch pipe that discharges treated effluent from the RPAC water treatment facility to an outfall in the Willamette River.

The HDD appears to have been filled between the north end of WDL and the southern boundary of the City of Portland Guilds Lake Pump Station (pump station), and no surface features were observed to identify the location of the HDD in this area. A petroleum and natural gas pipeline right-of-way crosses beneath the HDD at this location (Photo 3). The HDD was visible from N.W. Front Avenue to the pump station. The northern portion of the ditch was deeper, at 4 to 7 feet below grade than the southern portion, at 2 to 3 feet below grade. The ditch did not contain any surface water during the reconnaissance.

The HDD area is covered by grasses and blackberry brambles with isolated cottonwood or alder trees (Photo 4). Access to the HDD was possible from an unpaved road located south of the pump station.

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WDL and the LADD

The LADD extends from just north of the RPAC water treatment plant to the south end of WDL. The LADD at one time directed storm and wastewater flow from the facility to WDL.

Pipes or culverts were not observed along the banks of WDL. The former outflow to the HDD was blocked by earthen berms. Plastic and metal pipes used for the former pond aeration system were visible along the eastern bank of WDL. A 24-inch culvert pipe was observed at the southern end of the LADD that was formerly part of the facility stormwater system. A 4-inch PVC pipe and electrical conduit, which appear to be components for the former WDL aeration system, run through the LADD (Photo 5). Surface water was not observed in the LADD during the reconnaissance. The northern end of the LADD is covered with a heavy thicket of blackberry brambles (Photo 6), and a complete reconnaissance of the LADD area was not possible.

When left undisturbed, no sheens were observed on the water surface of WDL; however, when the sediments were disturbed a sheen appeared on the water surface and a sulfur-like odor was noted. Reddish-brown water and sediments were observed near the WDL-101 sampling location. Overall, the sediment in the lake was dark grey to black in color. Fill material consisting of brick, concrete, and cinder was noted on the bank adjacent to the ESCO property (Photo 7).

The banks of WDL were covered with blackberry brambles and brush. Access to WDL was possible from trails at the south end of WDL or leading to a stairway near the WDL staff gauge.

NDL

NDL is completely surrounded by a 40- to 50-foot-high embankment constructed for the BNSF railroad tracks. Any surface water overflow from NDL flows into the NDP through a 48-inch corrugated metal culvert pipe, which extends beneath the BNSF railroad track embankment near the western corner of the lake (Photo 8). No other inflow or outflow pipes were visible along the banks of NDL. A possible seep and marshy area were noted on the west bank of NDL adjacent to the railroad embankment. Water draining from this marshy area flows into NDL from three channels (Photos 9, 10, and 11). Surface runoff also flows into a ponded area, which appears to have been dammed by animals such as beavers, near the western corner of NDL (Photo 12). The ponded area was dry during the reconnaissance. No sheens or unusual odors were noted in the NDL area.

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Trees cover the banks of the western and southern corners of NDL with a thick understory of brush. The north and west banks are covered by berry brambles, poison oak, and other species of shrubs as well as scattered trees. As previously mentioned, a marshy area also was observed along the west bank.

Access to NDL was possible from an access road constructed for the RP-03 monitoring well series, and then following a trail over the railroad track embankment to the western corner of NDL. No roads lead directly to NDL, and access is only possible by crossing the railroad tracks on foot.

NDP

Surface water flows into the NDP from an ephemeral stream that runs along Highway 30 (Photo 13). Surface water from the 48-inch corrugated metal culvert overflow pipe from NDL also discharges into NDP (Photo 14). Water discharges from the NDP into an 84-inch concrete culvert pipe and ultimately into the Willamette River (Photo 15). During the reconnaissance, water had backed up and ponded behind the 84-inch culvert, and any flow out of NDP was not detectable. A wooden grate on the 84-inch culvert pipe prevents large trees and branches from blocking the pipe. During the time of the reconnaissance, no water was flowing out of NDL from the 48-inch corrugated metal culvert. A small seep was noted from the slope near the base of the 84-inch culvert pipe (Photo 16), indicating groundwater discharge into NDP. During subsequent field activities at the NDP in August 2002, the ephemeral stream was dry; water was still discharging from the NDP into the 84-inch culvert.

A sheen was noted on the water surface and a petroleum-like odor was detected when the sediments near the 48-inch metal culvert pipe were disturbed. Four to five feet of soft silt sediment has accumulated at the outflow from the 48-inch culvert. The accumulation of sediments may have been deposited from the ephemeral stream entering NDP, or through the culvert.

The NDP area is wooded to the west and covered by grasses and berry brambles to the east.

Willamette River Bank

The following four outfalls were observed along the banks of the Willamette River within approximately 300 feet northwest and 500 feet southeast of the BNSF railroad bridge:

- City of Portland Outfall 22C, 84-inch concrete culvert pipe that discharges flow from NDP (Photo 17);

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- City of Portland Outfall 22B, 24-inch corrugated metal pipe that discharges stormwater runoff from portions of N.W. Front Avenue (Photo 18);
- A 48-inch corrugated metal culvert pipe of unknown origin (Photo 19); and
- A mostly buried pipe also of unknown origin (Photo 20).

Discharge was observed from the City of Portland Outfalls 22C and 22B at rates of approximately 5 to 10 gallons per minute. Although not measured, the discharge from Outfall 22C at the river was substantially greater than the inflow of water into the 84-inch pipe near the NDP, indicating that additional water enters or infiltrates into the 84-inch pipe between the NDP and the river.

A channel has developed through the river beach sand in front of City of Portland Outfall 22B (Photo 21). A sheen was observed on the water below City of Portland Outfall 22C. No water was observed flowing out of the 48-inch corrugated metal culvert pipe and the buried pipe, and no evidence of channeling, seeps or erosion was observed at the outfall in front of the 48-inch metal culvert pipe.

A 4-inch PVC pipe nested in a 6-inch steel casing was observed to extend out of a red metal box (Photo 22), run above ground surface for 30 to 40 feet parallel to the beach along the slope of the bank, and disappear into a thicket of blackberry brambles. No visible outfall was observed from the 4-inch PVC pipe. As mentioned above, as-built plans confirm that this is the NPDES permitted 4-inch PVC pipe that discharges treated effluent from the RPAC waste treatment facility directly into the Willamette River below the low tide level of the river.

The bank to the southeast of the BNSF railroad bridge was covered by blackberry brambles and scattered trees. Northwest of the BNSF railroad bridge, the bank is covered by rock (rip-rap) and blackberry brambles.

Highway 30 Area

An unnamed creek flows to the southeast in a ditch adjacent to Highway 30 from the Koppers facility to the NDP. The creek flows into the ditch from a 48-inch corrugated metal culvert pipe (Photo 23) which trends beneath the railroad tracks and Highway 30 to the City of Portland Police Bureau vehicle storage facility. The Linton 7.5-Minute US Geographical Survey (USGS) Quadrangle (1961) indicates that the creek originates from the Tualatin Mountains and flows to the northeast beneath Highway 30 and into a marshy area located at the current site of the Walker Siltronic Corporation facility. Some time after the 1961 survey, the creek was diverted to the ditch. The creek appears to originate from a ravine that cuts into the Tualatin Mountains located to the west of Highway 30 (Photo 24). A second concrete culvert pipe, which is mostly filled

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with sediment, was observed at the same location (Photo 25). The second concrete pipe appears to originate from the northwest, possibly from the Koppers facility (Photo 26). Most, if not all, of the surface water flow in the ditch appears to come from the 48-inch culvert pipe. At the time of the reconnaissance, 0.5 to 1.5 feet of water was present in the ditch; however, during a later August 2002 visit to the Site the ditch was dry. The banks along the creek are heavily wooded, with a thick understory of blackberry brambles and other scrubs (Photo 27).

Another culvert pipe crosses under Highway 30 (Photo 28) from the Kinder Morgan facility located west of Highway 30. Surface runoff from this culvert pipe flows northwest along a drainage ditch between Highway 30 and the BNSF railroad tracks. The drainage ditch ends approximately 650 feet to the northwest of the culvert pipe at a location directly across the railroad tracks from a seep and marsh on the west bank of NDL. No culvert pipe or outflow ditch was observed where the drainage ditch ends.

2.2 West Doane Lake Sediment Investigation

Sediment sampling was conducted in WDL on August 14 and 15, 2002 in general accordance with the procedures described within the RRI FSP.

2.2.1 Sampling Locations

Sediment samples were collected from four locations in WDL. The sediment sampling locations WDL-101-S, WDL-102-S, WDL-103-S, and WDL-104-S are shown on Figure 3. Sediment samples were collected at four depth intervals at sediment sampling locations WDL-101-S and WDL-104-S, and at five depth intervals at sediment sampling locations WDL-102-S and WDL-103-S. To collect the volume of sediment required for observation and analysis, five borings were advanced at WDL-101-S, and three borings were advanced at sediment sampling locations WDL-102-S, WDL-103-S, and WDL-104-S.

2.2.2 Sampling Procedures

Sediment sampling was conducted in general accordance with the standard operating procedures provided in the RRI FSP, and as described below.

Field Procedure

Sediment samples were collected using a clear polyethylene terephthlate glycol (PETG) sample liner driven into the sediment by hand. A stainless steel direct push core barrel with a PETG liner was used when the liner itself could not be advanced further by hand. The shallow sediment collected at sediment sampling location WDL-

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101-S at 0.0 to 0.5 feet below the water-sediment interface (bwsi) was collected using a decontaminated shovel. Each boring was advanced until refusal and all borings collapsed after sampling.

The first boring at each sediment sampling location was used to determine subsequent sampling intervals at each location. Sediment samples were collected at intervals from 0.0 to 0.5 feet bwsi and 0.5 to 4 feet bwsi at each location. Additional sediment sampling intervals were selected from the total depth of the borings and the characteristics of the sediment observed in the field. Sediment sample intervals were selected where a sheen, odor, or organic residual was observed and included sediment at sample locations WDL-101-S (4 to 6 feet bwsi), WDL-102-S (7 to 9 feet bwsi), WDL-103-S (6 to 7.5 feet bwsi), and WDL-104-S (4 to 6 feet bwsi). An additional sediment sample was collected at each sampling location below the sheen or organic residual layer, for vertical characterization. A sediment sample was collected where a change in sediment consistency from very soft to soft was observed at 4 to 6 feet bwsi at sediment sampling location WDL-103-S and where a color change from black to gray was observed at 4 to 7 feet bwsi at sediment sampling location WDL-102-S. The change in sediment consistency and color was assumed to represent the change in historical fill activities within WDL. The sediment cores were advanced until refusal by gravel, with the total depths for the cores ranging from 7.5 to 11 feet bwsi. The gravel appeared to be consistent with the ballast for the BNSF railroad tracks immediately north of WDL; this is logically presumed to be the extent of sediment depth in WDL.

Sediment samples were transferred within the capped PETG sample liner to the designated sample processing area. Disposable surfaces (e.g., plastic sheeting and/or aluminum foil) were used to prevent cross contamination between sediment samples. The PETG sample liners were opened using a utility knife. A 4-ounce container provided by the contract laboratory was filled immediately with sediment from the sample liner for sampling locations requiring VOC analysis. A portion of the sediment from the sample liner was transferred into doubled resealable plastic bags, enclosing air while sealing, for organic vapor and non-aqueous phase liquid (NAPL) screening. Organic vapor concentrations were measured using a photoionization detector (PID) and recorded on the sediment boring logs. The sample was inspected visually using an ultraviolet (UV) light for the presence of NAPL. Observations of an organic residual or a NAPL residual, if detected, were recorded on the sediment boring logs.

Disposable materials were used whenever possible during sample collection and staging. The non-disposable sampling equipment was decontaminated prior to use and between each new sample interval. Waste generated during the sampling

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procedure, including personal protective equipment (PPE), was handled in accordance with the waste handling procedures described in the RRI FSP.

Sampling containers were labeled following the appropriate sample labeling procedure described in the RRI FSP. Field documentation was completed for each sample location including a sediment sampling form (Appendix B-1), the sediment boring log (Appendix C-1), the sample identification matrix form, and a chain-of-custody documentation form. Additional samples for quality assurance/quality control (QA/QC) were collected according to the QAPP.

Sample Handling and Analysis

Filled sediment sample jars were labeled and capped and the jars were placed in bubble wrap to prevent breakage. The samples were then placed in coolers with "blue ice" and packing material (as appropriate to prevent breakage) immediately following sample collection for transport to the laboratory. Temperature blanks were placed in each of the coolers. Chain-of-custody forms were completed for each day and placed inside or taped to the outside of the appropriate cooler.

All sediment samples were collected and submitted to the contract laboratories in accordance with the procedures described in the RRI FSP, the Project QAPP, and the QAPP Addendum (AMEC 2002d). The sediment samples collected were submitted for the following analyses:

- Organochlorine insecticides by USEPA Method 8081A;
- VOCs by USEPA Method 8260B;
- Chlorinated herbicides by USEPA Method 8151A;
- Dioxins/furans (PCDD/PCDF) by USEPA Method 1613B;
- Semivolatile organic compounds (SVOCs), including phenols, by USEPA Method 8270C;
- Metals by USEPA Methods 6010, 6020, and 7471;
- Total Solids (TS) and Total Volatile Solids (TVS) by USEPA Methods 160.3 and160.4, respectively;
- Particle size, including silt/clay fraction, by American Society of Testing and Materials (ASTM) D422;
- Ammonia by USEPA Method 350.2;
- Total Organic Carbon (TOC) by USEPA Method 9060; and

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- Acid Volatile Sulfide by USEPA Method 9030B.

In addition, sediment samples collected at WDL-101-S from 0.0 to 0.5 bwsi, WDL-101-S from 4 to 6 feet bwsi, WDL-102-S from 0.5 to 4 feet bwsi, WDL-103-S from 0.0 to 0.5, and WDL-103-S from 7.5 to 9 feet bwsi, were screened for PCBs by USEPA Method 8082.

The sediment samples were transferred daily from the Site to the AMEC Portland office or directly to the laboratory by AMEC staff. The sediment samples at the AMEC Portland office were stored in a refrigerator or iced cooler pending next-day transport to the appropriate contract laboratory by a laboratory-provided courier or common carrier.

Severn Trent Laboratories in Tacoma, Washington (STL) was the primary laboratory for the sampling event. Other laboratories, including TLI Laboratories in Sacramento, California (TLI), and North Creek Analytical in Portland, Oregon (NCA - Portland), were used for analysis of specific QC samples.

QA/QC Requirements

QC samples were collected for sediment in general accordance with the RRI FSP. One of each of the following QC samples was collected: rinsate sample; field duplicate sample; interlaboratory split sample; performance evaluation (PE) sample; and laboratory QC sample. The QC samples were analyzed for VOCs (USEPA Method 8260B), insecticides (USEPA Method 8081A), herbicides (USEPA Method 8151A), SVOCs (USEPA Method 8270C), dioxins/furans (USEPA 1613B), and metals (USEPA Methods 6010, 6020, and 7471). One trip blank was submitted and analyzed for VOCs by USEPA Method 8260B on each day that sampling for VOC analysis occurred. A quality assurance (QA) review of the analytical data associated with the QA/QC samples is provided in the data validation reports in Appendix D.

Minor Variations from the RRI FSP

The minor variations from the RRI FSP including planned versus actual sampling locations and analysis are provided in Table 3 and are discussed further below:

- A particle size distribution sample was not collected at sediment sampling location WDL-101-S at 4 to 6 feet bwsi due to low sample recovery and volume.
- The screening of polychlorinated biphenyls (PCBs) by USEPA Method 8082 was added for select samples from WDL, as indicated above. The possible presence of PCBs within several samples was discovered through column interference

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during the laboratory analysis of the sediments by USEPA Method 8081A. The PCBs in selected samples were quantified using a screening procedure, following laboratory notification.

- Sediment sampling intervals were adjusted from the intervals provided in the RRI FSP in order to provide adequate vertical characterization, as requested by DEQ (DEQ 2002a). As mentioned above, the sample intervals were altered to include residual organic layers or a change in consistency or color, and were intended to include sediment both above and below any potential historical lake bottom sediments.

The minor variations from the RRI FSP did not affect the quality of the sediment samples and analytical results.

2.2.3 Results

The results from field measurements and the analytical results from sediment samples are used to characterize the sediment encountered in WDL. The results of the sediment sampling are summarized below.

Field Results

Field measurements of sediment physical parameters collected at WDL sediment sampling locations WDL-101-S, WDL-102-S, WDL-103-S, and WDL-104-S of the sediment physical parameters are summarized in Table 4A with sediment sampling field forms included in Appendix B-1. An organic residual was detected using a UV light detection method, and a sheen was observed, at sediment sample locations WDL-101-S at 4 to 6 feet bwsi, WDL-103-S at 6 to 7.5 feet bwsi, and WDL-104-S at 4 to 6 feet bwsi. The sediment sample collected at sediment sample location WDL-101-S at 6 to 8 feet bwsi also tested positive for an organic residual through the UV-light reading, but evidence of a sheen was not observed in the sample. A free-phase NAPL was not observed within the WDL sediments. The most elevated VOC headspace reading was detected at sample location WDL-101-S at 4 to 6 feet bwsi. VOC headspace readings are also recorded on the sediment boring logs, included as Appendix C-1.

There was a change in the sediment consistency in each of the sediment boring locations, noted on the sediment boring logs, between 4 and 6 feet bwsi. The consistency change, from very soft to soft, was interpreted as an indicator of historical fill activities at WDL, with the overlying very soft sediments being the remnants of the most recent fill activities.

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Laboratory Results

The laboratory analytical results for WDL sediment samples are presented in tabular form on Table 5, detections only, and in Appendix F. The analytical results for selected PCOPCs from the sediment samples are posted adjacent to sampling locations on figures included in Appendix E. The preliminary screening values discussed in this section, provided on Table 1, are not intended as cleanup goals or to indicate the level of risk at the RPAC Site, but rather are used for discussion and presentation purposes only.

The concentrations of VOCs detected in sediment samples are displayed on Figure E-1, Appendix E, including 1,2-dichlorobenzene, benzene, and trichloroethylene (TCE). 1,2-Dichlorobenzene was detected at each of the four sediment boring locations completed in WDL. Benzene and TCE were not detected above the method detection limits at any of the sediment sampling locations.

The concentrations of herbicide PCOPCs detected in sediment samples are displayed on Figure E-4, Appendix E, including 2,4-D and silvex. All detected concentrations of 2,4-D and silvex were below the preliminary screening values for human health. Silvex was detected at sample locations WDL-101-S and WDL-102-S at various depth intervals; however, it was not detected at the deepest interval in either location. Silvex was not detected in sediment samples collected at sediment sampling locations WDL-103 and WDL-104.

The concentrations of SVOCs detected in sediment samples are displayed on Figure E-7, Appendix E, including 2,4-dichlorophenol and phenol. Concentrations of 2,4-dichlorophenol did not exceed the preliminary screening value for human health. Phenol was detected in sediment samples from all four sediment sampling locations. Preliminary screening values are not available for phenol.

The concentrations of dioxin congener 2,3,7,8-TCDD in sediment samples are displayed on Figure E-10, Appendix E. 2,3,7,8-TCDD concentrations were detected at all sediment sample locations. 2,3,7,8-TCDD concentrations exceeded or equaled the preliminary screening value for human health in 16 of 18 sediment samples, and exceeded the preliminary screening value for ecological receptors in all 18 sediment samples. At all sampling locations, concentrations decreased rapidly with depth.

The concentrations of insecticide PCOPCs in sediment samples are displayed on Figure E-13, Appendix E, including 4,4'-DDE, 4,4'-DDT, and dieldrin. 4,4'-DDE was detected above the method detection limit at one sediment sampling location, WDL-104-S at 4 to 6 feet bwsi, at a concentration of 0.536 milligrams per kilogram (mg/kg),

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which exceeds the preliminary screening value for ecological receptors. 4,4'-DDT was detected above the ecological receptor preliminary screening value in 3 of 18 samples, and above the human health preliminary screening value in 1 of 18 samples. Dieldrin was detected at one location, WDL-104-S at 4 to 6 feet bwsi at a concentration of 0.423 mg/kg, which exceeds the preliminary screening values for both human health and ecological receptors. Insecticides included on the Appendix E figures were detected in 4 of 18 sediment samples.

The concentrations of metal constituents in sediment samples are displayed on Figure E-16, Appendix E, including arsenic, chromium, and mercury. In general, the concentrations of arsenic detected in WDL exceeded the preliminary screening values for human health (16 of 18 samples) and ecological receptors (17 of 18 samples). The most elevated concentration of chromium was detected at WDL-104-S at 4 to 6 feet bwsi. In general, chromium concentrations were below the preliminary screening values for human health (2 of 18 samples), and above the preliminary screening values for ecological receptors (16 of 18 samples). In general, mercury concentrations in the WDL sediment samples were above the preliminary screening values for ecological receptors (13 of 18 samples) and human health (all 18 samples). Metals concentrations were generally highest in samples collected from the south end of WDL, although variation across the four sampling locations is apparent.

Five sediment samples were screened for PCBs following notification by the analytical laboratory of probable PCB interference within the samples, as discussed in Section 2.2.2. PCB analysis was performed for sediment samples collected at sediment sampling locations WDL-101-S at 0.0 to 0.5 feet bwsi, WDL-101-S at 4 to 6 feet bwsi, WDL-102-S at 0.5 to 4 feet bwsi, and WDL-103-S at 0.0 to 0.5 feet bwsi and at 7.5 to 9 feet bwsi. PCBs were detected in all five samples, at concentrations ranging from 0.03 to 13.9 mg/kg. The most elevated concentration of Aroclor 1248 was detected at WDL-101-S at 0.0 to 0.5 feet bwsi, at 13.9 mg/kg. The only detected concentration of Aroclor 1254, 4.84 mg/kg, was found at WDL-101-S at 4 to 6 feet bwsi, which exceeded the preliminary screening value for ecological receptors only. The only detected concentration of Aroclor 1260, 0.0309 mg/kg, was found at sample location WDL-103-S at 7.5 to 9 feet bwsi.

2.3 WDL and NDP Surface Water Investigation

Surface water sampling was conducted in WDL and NDP on August 14, 2002 in general accordance with the procedures described within the RRI FSP.

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2.3.1 Sampling Locations

Four surface water samples were collected at sampling locations in WDL and the NDP, including WDL-101-W, WDL-102-W, WDL-103-W, and NDP-101-W, as displayed on Figure 4. Surface water sample locations WDL-101-W, WDL-102-W, and WDL-103-W were in close proximity to sediment sample locations WDL-101-S, WDL-102-S, and WDL-103-S. The WDL sampling locations were also in close proximity to historical WDL surface water sampling locations.

2.3.2 Sampling Procedures

Surface water sampling in WDL and the NDP was conducted in general accordance with the standard operating procedures outlined in the RRI FSP, and as described below. Surface water samples were collected prior to collection of sediment samples in WDL to minimize the potential for suspended sediment (likely increased during sediment sampling activities) to affect surface water analytical results and field measurements.

Field Procedure

Surface water grab samples were collected using a peristaltic pump and disposable tubing. The surface water in WDL and the NDP was shallow (less than 1 foot deep), and the water was assumed to be thoroughly mixed throughout the water column, allowing for collection of a representative sample of the entire water column. The surface water samples were collected directly into the appropriate sample containers. Forty-milliliter (40 mL) sample vials for VOC analysis were filled first, followed by sample bottles for the remaining tests. The intake tubing was set to a depth just below the water surface. Sampling containers were labeled following the appropriate sample labeling procedure described in the RRI FSP. Field documentation was completed for each sample location including surface water sampling worksheets, the sample identification matrix form, and a chain-of-custody documentation form. Surface water sample field forms are provided in Appendix B-2. Additional samples for QA/QC were collected according to the QAPP.

Sampling equipment was decontaminated following sample collection at each location, according to the decontamination procedures outlined in the RRI FSP. Waste generated during the sampling procedure, including PPE, was handled in accordance with the waste handling procedures described within the RRI FSP.

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Sample Handling and Analysis

Filled surface water sample containers were labeled and capped and the sample jars were placed in resealable plastic bags or bubble wrap to prevent breakage. The samples were then placed in coolers with "blue ice", temperature blanks, and packing material (as appropriate to prevent breakage) immediately following sample collection for transport to the laboratory. Completed chain-of-custody forms were placed inside or taped to the outside of the cooler.

All surface water samples were collected and submitted to the contract laboratories in accordance with the procedures described in the RRI FSP, the Project QAPP, and the QAPP Addendum. Samples of surface water were submitted for the following analyses:

- Organochlorine insecticides by USEPA Method 8081A;
- VOCs by USEPA Method 8260B;
- Chlorinated herbicides by USEPA Method 8151A;
- Dioxins/furans by USEPA Method 1613B;
- SVOCs, including phenols, by USEPA Method 8270C;
- Metals by USEPA Methods 6010, 6020, and 7470A;
- Anions (chloride, nitrate, nitrite, orthophosphate, and sulfate) by USEPA Method 300.0;
- Total Suspended Solids (TSS) by USEPA Method 160.2;
- pH (hydrogen ion) by USEPA Method 150.1;
- Alkalinity by USEPA Method 310.1; and
- Hardness by APHA Standard Methods for the Examination of Water and Wastewater, Method No. 2340B.

The surface water samples were transferred daily from the Site to the AMEC Portland office or directly to the laboratory by AMEC staff. The surface water samples at the AMEC Portland office were stored in a refrigerator or iced cooler pending next-day transport to the appropriate contract laboratory by a laboratory-provided courier or common carrier.

STL was the primary laboratory for the sampling event. Other laboratories, including TLI and NCA - Portland, were used for analysis of specific QC samples.

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QA/QC Requirements

QC samples were collected for surface water in general accordance with the RRI FSP. One field duplicate sample and one matrix spike and matrix spike duplicate (MS/MSD) were collected at surface water sampling location WDL-101-W and analyzed for VOCs (USEPA Method 8260B), SVOCs (USEPA Method 8270C), herbicides (USEPA Method 8151A), dioxins/furans (USEPA Method 1613B), metals (USEPA Methods 6010, 6020, and 7470A), and insecticides (USEPA Method 8081A). An inter-laboratory duplicate sample was also collected from WDL-101-W and submitted to the secondary laboratory and analyzed for VOCs (USEPA Method 8260B), SVOCs (USEPA Method 8270C), herbicides (USEPA Method 8151A), dioxins/furans (USEPA Method 1613B), metals (USEPA Methods 6010, 6020, and 7470A), and insecticides (USEPA Method 8081A). In addition, one trip blank was submitted to the primary laboratory for VOC analysis by USEPA Method 8260B. A QA review of the analytical data associated with the QA/QC samples is provided in the data validation reports in Appendix D.

Minor Variations from the RRI FSP

The minor variations from the RRI FSP including planned versus actual sampling locations and analysis, are provided in Table 3 and are discussed further below:

- The proposed surface water sample at location WDL-104-W was not collected. Surface water was not observed at the proposed sampling location during the sampling event.
- The NDP surface water sample NDP-101-W was added to the sampling event. The additional surface water sample was collected to provide additional information and future correlations between the outfall discharge water sample collected at the City of Portland Outfall 22C and the NDP surface water body.

The minor variations from the RRI FSP did not affect the quality of the surface water samples and analytical results.

2.3.3 Results

The results from field measurements and the analytical results from surface water samples are used to characterize the surface water encountered in WDL and NDP. The results of the surface water sampling are summarized below.

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Field Results

Field measurements of the surface water physical parameters are summarized in Table 4B and field data sheets are included in Appendix B-2. The results indicate that, at the time of sampling, the surface water in WDL at the three sampling locations was limited in dissolved oxygen (DO), with a maximum DO concentration of 0.09 milligrams per liter (mg/L). The low DO concentrations, along with negative oxidation reduction potentials, indicate a large sediment oxygen demand within WDL. No visible surface water flow was observed at sampling locations WDL-102-W, WDL-103-W, and at NDP-101-W.

Laboratory Results

Laboratory analytical results for surface water samples are presented in Table 6, detections only, and in Appendix G. The analytical results for selected PCOPCs from the surface water samples are posted adjacent to sampling locations on figures included in Appendix E. The preliminary screening values discussed in this section, provided on Table 1, are not intended as cleanup goals or to indicate the level of risk at the RPAC Site, but rather are used for discussion and presentation purposes only.

The concentrations of VOCs detected in surface water samples are displayed on Figure E-2, Appendix E, including 1,2-dichlorobenzene, benzene, and TCE. 1,2-dichlorobenzene, benzene, and TCE were not detected at or above the method detection limit at any of the WDL surface water sample locations. Benzene was detected at surface water sample location NDP-101-W, at a concentration of 1.47 micrograms per liter (µg/L), which exceeded the preliminary screening value for human health. 1,2-Dichlorobenzene and TCE were not detected above the method detection limit in the surface water sampled collected at NDP.

The concentrations of herbicide PCOPCs detected in surface water are displayed on Figure E-5, Appendix E, including 2,4-D and silvex. 2,4-D was detected at all three WDL surface water sample locations. Silvex was detected at surface water sampling locations WDL-101-W and WDL-103-W. 2,4-D and silvex concentrations were generally at least two orders of magnitude below the preliminary screening values for human health. 2,4-D and silvex were not detected above the method detection limit at NDP surface water sampling location NDP-101-W.

The concentrations of SVOCs detected in surface water are displayed on Figure E-8, Appendix E, including 2,4-dichlorophenol and phenol. 2,4-Dichlorophenol was detected at concentrations below preliminary screening values at all three WDL surface water sample locations. 2,4-Dichlorophenol was not detected at or above the

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method detection limit at the NDP surface water sampling location. Phenol was not detected above the method detection limit at any of the WDL or NDP surface water sampling locations. Preliminary screening values are not available for phenol.

The concentrations of dioxin congener 2,3,7,8-TCDD detected in surface water are displayed on Figure E-11, Appendix E. 2,3,7,8-TCDD was detected at WDL surface water sampling location WDL-101-W at an estimated concentration of 340 picograms per liter (pg/L), exceeding the preliminary screening value for human health. 2,3,7,8-TCDD was not detected above the method detection limit at WDL-102-W, WDL-103-W, or NDP-101-W.

The concentrations of pesticide PCOPCs detected in surface water are displayed on Figure E-14, Appendix E, including 4,4'-DDE, 4,4'-DDT, and dieldrin. 4,4'-DDE, 4,4'-DDT, and dieldrin were not detected above method detection limits at any of the WDL or NDP surface water sampling locations. The analytical results for 4,4'-DDT were rejected for surface water samples collected at surface water sampling locations WDL-102-W and WDL-103-W during the data validation process (see Appendix D-1).

The concentrations of metal constituents detected in surface water are displayed on Figure E-17, Appendix E, including arsenic, chromium, and mercury. Arsenic was detected at concentrations above preliminary screening values for human health at all of the surface water sampling locations in WDL and NDP. Chromium was detected at surface water sampling locations in WDL and NDP, with concentrations at WDL-101-W and WDL-103-W exceeding the preliminary screening value for ecological receptors. Mercury was not detected above the method detection limit at any surface water sampling locations in WDL or NDP; however, two mercury results for surface water samples collected at sampling locations WDL-101-W and WDL-103-W were rejected during the data validation process (see Appendix D-1).

2.4 Historical Drainage Ditch Soil Investigation

Soil sampling was conducted in the HDD between WDL and N.W. Front Avenue in general accordance with the procedures described within the RRI FSP.

2.4.1 Sampling Locations

One soil sample was collected from three sampling locations in the HDD, including soil sampling locations HDD-101, HDD-102, and HDD-103, at the estimated location of the HDD bottom. The sampling locations were based on historical aerial photographs where the HDD was visible. One depth interval was sampled each at HDD-101 and HDD-103. Two depth intervals were sampled at HDD-102, one at the estimated

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location of the HDD bottom and one additional sample was collected from below the estimated HDD bottom for possible future laboratory analysis. The soil sampling locations and depths are depicted on Figure 5.

2.4.2 Sampling Procedures

Soil sampling in the HDD was conducted in general accordance with the standard operating procedures outlined in the RRI FSP, and as described below.

Field Procedure

Soil samples were collected using a hand auger at all soil sampling locations. An exploratory boring was advanced at each location in an attempt to identify the boundary between accumulated fill material and the historical ditch bottom. Sampling intervals were determined by a change in the physical characteristics found in the exploratory boring.

The soil grab samples were transferred directly from the hand auger into the appropriate sample container. A portion of the soil from the hand auger was also transferred into doubled resealable plastic bags, enclosing air while sealing, for organic vapor and NAPL screening. Organic vapor headspace concentrations were measured using a PID and recorded on the soil boring logs. The sample was inspected visually and using an UV light for the presence of NAPL. Observations of an organic residual and/or a free-phase NAPL, if detected, were recorded on the soil sampling forms.

Sampling equipment was decontaminated following sample collection at each location, according to the decontamination procedures outlined in the RRI FSP. Waste generated during the sampling procedure, including PPE, was handled in accordance with the waste handling procedures described within the RRI FSP.

Sampling containers were labeled following the appropriate sample labeling procedure described in the RRI FSP. Field documentation was completed for each sample location including a soil sampling form (Appendix B-3), the soil boring log (Appendix C-2), the sample identification matrix form, and a chain-of-custody documentation form. Additional samples for QA/QC were collected according to the Project QAPP and QAPP Addendum.

Sample Handling and Analysis

Filled soil sample jars were labeled and capped and the sampling jars were placed in bubble wrap to prevent breakage. The samples were then placed in coolers with "blue

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ice" and packing material immediately following sample collection for transport to the laboratory. Temperature blanks were placed in each of the coolers. Chain-of-custody forms were completed for each day and placed inside or taped to the outside of the appropriate cooler.

All soil samples were collected and submitted to the contract laboratories in accordance with the procedures described in the RRI FSP, the Project QAPP, and the QAPP Addendum.

The soil samples collected were submitted for the following analyses:

- Organochlorine insecticides by USEPA Method 8081A;
- VOCs by USEPA Method 8260B;
- Chlorinated herbicides by USEPA Method 8151A;
- Dioxins/furans by USEPA Method 8290;
- SVOCs, including phenols, by USEPA Method 8270C; and
- Metals by USEPA Methods 6010, 6020, and 7470A.

In addition, the soil sample collected at soil sampling location HDD-102 at 0.2 to 1.5 feet below ground surface (bgs), was screened for PCBs by USEPA Method 8082.

The soil samples were transferred from the Site to the AMEC Portland office or directly to the laboratory by AMEC staff. The soil samples at the AMEC Portland office were stored in a refrigerator or iced cooler pending next-day transport to the appropriate contract laboratory by a laboratory-provided courier or common carrier.

STL was the primary laboratory for the sampling event. Other laboratories, including TLI and NCA - Portland, were used for analysis of specific QC samples.

QA/QC Requirements

QC samples were collected for soil in general accordance with the RRI FSP. One of each of the following QC samples was collected: rinsate sample, field duplicate sample, interlaboratory split sample, and a laboratory QC sample. These samples were analyzed for VOCs (USEPA Method 8260B), insecticides (USEPA Method 8081A), herbicides (USEPA Method 8151A), SVOCs (USEPA Method 8270C), dioxins/furans (USEPA Method 8290), and metals (USEPA Methods 6010, 6020, and 7470A). One trip blank was submitted and analyzed for VOCs by USEPA Method 8260B. A QA review of the analytical data associated with the QA/QC samples is provided in the data validation reports provided in Appendix D.

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Minor Variations from the RRI FSP

The minor variations from the RRI FSP, including planned versus actual sampling locations and analysis, are provided in Table 3 and are discussed further below:

- The analysis for PCBs by USEPA Method 8082 was added for soil sampling location HDD-102 at 0.2 to 1.5 feet bgs. The possible presence of PCBs within the sample was discovered through column interference during the laboratory analysis of the sample by USEPA Method 8081A. The PCBs were quantified using screening techniques following notification by the laboratory.
- One additional sample was collected at HDD-102 from 5.5 to 6 feet bgs. The additional sample was collected and submitted to the analytical laboratory as a hold sample, to be run pending receipt of the results of the upper depth interval at HDD-102. The sample was unintentionally analyzed at the analytical laboratory for dioxins/furans by USEPA Method 8290.

The minor variations from the RRI FSP did not affect the quality of the HDD soil samples and analytical results.

2.4.3 Results

The results from field measurements and the analytical results from soil samples are used to characterize the soil encountered in the HDD. The results of the soil sampling are summarized below.

Field Results

Field measurements of the soil physical parameters are summarized in Table 4A and on field data sheets provided in Appendix B-3. The field measurements at the soil sampling locations indicate that neither an organic residual nor a free-phase NAPL was present at the HDD sample locations.

Laboratory Results

Laboratory analytical results for the HDD soil samples are presented on Table 7, detections only, and in Appendix H. The analytical results for selected PCOPCs from the soil samples collected during the RRI field sampling event are posted adjacent to sampling locations on the figures included in Appendix E. The preliminary screening values discussed in this section, provided on Table 1, are not intended as cleanup goals or to indicate the level of risk at the RPAC Site, but rather are used for discussion and presentation purposes only.

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The concentrations of VOCs detected in soil samples are displayed on Figure E-3, Appendix E, including 1,2-dichlorobenzene, benzene, and TCE. 1,2-Dichlorobenzene was detected only at HDD soil sampling location HDD-103, at a concentration below the human health preliminary screening value. The VOC constituents included on the Appendix E figures were not detected at soil sampling locations HDD-101 and HDD-102.

The concentrations of herbicide PCOPCs detected in soil samples are displayed on Figure E-6, Appendix E, including 2,4-D and silvex. 2,4-D was detected only at HDD soil sampling location HDD-102, at a concentration below the human health preliminary screening values. Silvex was not detected at any of the HDD soil sampling locations.

The concentrations of SVOCs detected in soil samples are displayed on Figure E-9, Appendix E, including 2,4-dichlorophenol and phenol. 2,4-Dichlorophenol and phenol concentrations were not detected above the method detection limit for any of the HDD soil sampling locations.

The concentrations of dioxin congener 2,3,7,8-TCDD detected in soil samples are displayed on Figure E-12, Appendix E. Estimated concentrations of 2,3,7,8-TCDD were detected at each of the locations sampled along the HDD, below the preliminary human health and ecological screening values.

The concentrations of insecticide PCOPCs detected in soil samples are displayed on Figure E-15, Appendix E, including 4,4'-DDE, 4,4'-DDT, and dieldrin. 4,4'-DDE and 4,4'-DDT were detected at HDD soil sampling locations HDD-102 and HDD-103. The 4,4'-DDE concentration detected at soil sampling location HDD-102, and the 4,4'-DDT concentrations at soil sample locations HDD-102 and HDD-103, exceeded the preliminary screening values for ecological receptors only. Dieldrin was also detected, at a concentration below the human health and ecological preliminary screening values, at HDD-102. Insecticides included on the Appendix E figures were not detected above the method detection limit at the northernmost HDD soil sampling location HDD-101.

The concentrations of metal PCOPCs detected in soil samples are displayed on Figure E-18, Appendix E, including arsenic, chromium, and mercury. Arsenic concentrations were detected above both human health and ecological preliminary screening values at HDD-101 and HDD-102. Chromium was detected at all three soil sampling locations at concentrations above the preliminary screening value for ecological receptors and below the human health preliminary screening value. Concentrations of

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mercury were detected at HDD-102 and HDD-103 at concentrations greater than both the human health and ecological preliminary screening values.

The soil sample collected at HDD soil sampling location HDD-102 at 0.2 to 1.5 feet bgs was screened for PCBs by USEPA Method 8082 following notification by the analytical laboratory of possible PCB interference during analysis of USEPA Method 8081A. PCBs, however, were not found to be present above the method detection limit in this sample.

2.5 City Outfall Discharge Water and Seepage Meter Water Investigation

Outfall discharge water sampling and seepage meter water sampling was conducted along the shore and within the Willamette River, respectively, as further described below and in general accordance with the procedures described within the RRI FSP. Outfall discharge sampling was conducted on August 13, 2002, and seepage meter sampling was conducted on September 24, 2002.

2.5.1 Sampling Locations

The outfall discharge water samples CO-22C-01 and CO-22B-01 were collected from City of Portland Outfalls CO-22C and CO-22B, respectively. In addition, one water sample was collected from the seepage meter installed in the sediments of the Willamette River, sample locations WR-SM3. The locations of the two City of Portland outfalls and the seepage meter are shown on Figure 4.

2.5.2 Sampling Procedures

Outfall discharge water sampling was conducted in general accordance with the surface water sampling standard operating procedure (SOP-10), Appendix A of the RRI FSP. The seepage meter sampling was conducted in accordance with the letter describing the collection of water from the seepage meter dated September 18, 2002, and subsequent correspondence from the DEQ dated September 20, 2002.

Field Procedure

The outfall discharge water samples were collected during a non-stormwater event. No precipitation had occurred in the vicinity of the Site within at least 72 hours prior to sample collection. Water was discharging steadily from each of the culvert pipes at the time of sampling. Sample containers were filled directly at a point in the middle of the stream of water exiting each culvert pipe. Forty-milliliter (40 mL) sample vials for VOC analysis were filled first, followed by the appropriate containers for the remaining analytical tests.

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Sampling containers were labeled following the appropriate sample labeling procedure described in the RRI FSP. Field documentation was completed for each sample location including the surface water and outfall sampling worksheet (completed sampling worksheet forms have been included in Appendix B-4), the sample identification matrix form, and a chain-of-custody documentation form. Additional samples for QA/QC were collected according to the Project QAPP and QAPP Addendum.

The seepage meter water sample was collected using disposable tubing. The water was drawn through the tubing with the use of a peristaltic pump. Forty-milliliter (40 mL) sample vials for VOC analysis were filled first, followed by the appropriate containers for the remaining tests. Sample containers were filled over a two-hour time interval to reduce the velocity of water entering the seepage meter. The seepage meter sampling was started 1 hour following high tide, as requested by the DEQ. Sampling containers were labeled in general accordance with procedures described in the RRI FSP. Field documentation was completed for the sample, including the surface water and outfall sampling worksheet (completed sampling worksheet forms have been included in Appendix B-4) and a chain-of-custody documentation form.

Sample Handling and Analysis

For both the outfall discharge water samples and the seepage meter water sample, the filled sample containers were labeled and capped and the jars were placed in resealable plastic bags or bubble wrap to reduce breakage. The samples were then placed in coolers with "blue ice", temperature blanks, and packing material (as appropriate to prevent breakage) immediately following sample collection for transport to the laboratory. Completed chain-of-custody forms were placed inside or taped to the lid of the cooler.

All samples were collected and submitted to the contract laboratories in accordance with the procedures described in the RRI FSP, the Project QAPP, and the QAPP Addendum. The outfall discharge and seepage meter water samples were submitted for the following analyses:

- Organochlorine Insecticides by USEPA Method 8081A;
- VOCs by USEPA Method 8260B;
- Chlorinated herbicides by USEPA Method 8151A;
- Dioxins/furans by USEPA Method 1613B;
- SVOCs, including phenols, by USEPA Method 8270C;

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- Metals by USEPA Methods 6010, 6020, and 7470A;
- Anions (chloride, nitrate, nitrite, orthophosphate, and sulfate) by USEPA Method 300.0 (Note: for the seepage meter sample, orthophosphate was analyzed by USEPA Method 365.2);
- TSS by USEPA Method 160.2;
- pH by USEPA Method 150.1;
- Alkalinity by USEPA Method 310.1; and
- Hardness by APHA Standard Methods for the Examination of Water and Wastewater, Method No. 2340B.

The outfall discharge water samples were transferred from the Site to the AMEC Portland office where they were stored in an iced cooler pending shipment to the appropriate contract laboratory. STL was the primary laboratory for the outfall discharge water samples. The seepage meter sample was transported from the Site to the AMEC Portland office where it was stored in an iced cooler and delivered the following day to NCA - Portland and TLI for the appropriate analysis.

QA/QC Requirements

QA/QC samples were collected for outfall discharge water in general accordance with the RRI FSP. One field duplicate sample and one MS/MSD were collected at outfall discharge water sampling location CO-22C-01 and analyzed for VOCs (USEPA Method 8260B), SVOCs (USEPA Method 8270C), herbicides (USEPA Method 8151A), dioxins/furans (USEPA Method 1613B), metals (USEPA Methods 6010, 6020, and 7470A), and insecticides (USEPA Method 8081A). In addition, one trip blank was submitted to the primary laboratory for VOC analysis by USEPA Method 8260B. A QA review of the analytical data associated with the QA/QC samples is provided in the data validation reports in Appendix D.

One field duplicate sample was collected in addition to the seepage meter water sample. A QA review of the analytical data associated with the QA/QC samples is provided in the data validation reports in Appendix D.

Minor Variations from the RRI FSP

The minor variations from the RRI FSP including planned versus actual sampling and analysis are provided in Table 3 and are discussed further below:

- Additional surface water parameters, including anions, TSS, pH, alkalinity, and hardness, were added to the two outfall discharge water sampling locations. The

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additional surface water parameters were added to allow correlation to the other water samples collected during the sampling event.

The minor variations from the RRI FSP did not affect the quality of the water samples and analytical results.

2.5.3 Results

The results from field measurements and the analytical results from surface water samples are used to characterize the water encountered. The results of the outfall discharge water and seepage meter water sampling activities are summarized below.

Field Results

Field measurements of the outfall discharge water physical parameters are summarized in Table 4B and on field data sheets are provided in Appendix B-4. The results indicate that the outfall discharge water physical parameters vary between each of the outfall sample locations. The higher flow rate was estimated at City of Portland outfall sampling location CO-22C-01, at 8 gallons per minute (gpm).

Field measurements were not proposed for the seepage meter water sample at sampling location, WR-SM3.

Laboratory Results

Laboratory analytical results for the outfall discharge and seepage meter water samples are presented in tabular form on Table 8, detections only, and in Appendix I. The analytical results for selected PCOPCs from the discharge water samples and the seepage meter sample are posted adjacent to sampling locations on the figures included in Appendix E. The preliminary screening values discussed in this section, provided on Table 1, are not intended as cleanup goals or to indicate the level of risk at the RPAC Site, but rather are used for discussion and presentation purposes only. The results from each sampling location are discussed separately in the sections below.

City of Portland Outfall 22B

The PCOPCs 1,2-dichlorobenzene, 2,4-D, 2,4-dichlorophenol, and 4,4'-DDE were detected at concentrations that were generally an order of magnitude below the human health and ecological preliminary screening values at the City of Portland Outfall 22B. One PCOPC, arsenic, was detected at a concentration that exceeded the preliminary screening value for human health.

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City of Portland Outfall 22C

The PCOPCs 1,2-dichlorobenzene, benzene, and arsenic were detected at City of Portland Outfall 22C. Benzene and arsenic were detected at concentrations greater than the respective screening values for human health. 1,2-Dichlorobenzene was detected below the human health and ecological preliminary screening values by more than two orders of magnitude.

Willamette River Seepage Meter

The VOC, SVOC, and insecticides were not detected above the laboratory method detection limit at the Willamette River seepage meter sample location, WR-SM3. Organic chemicals detected at the seepage meter sampling location include the dioxins/furans 1,2,3,4,6,7,8,9-OCDD and total TCDF and the herbicide dichlorprop. In addition, various metals were detected at seepage meter sample location WR-SM3, as provided in Table 8.

3.0 INVESTIGATION-DERIVED WASTE (IDW)

Approximately 44 gallons of decontamination water were generated and dumped into the RPAC wastewater treatment system during the RRI sampling event.

Disposable tubing, bailers, string, plastic sheeting, and PPE (i.e., gloves and Tyvek suits) were placed in a 55-gallon closeable open-top steel drum stored in the RPAC warehouse. One drum of IDW was generated during the RRI sampling event. The drum was transported off-site to the CWM Arlington, Oregon facility.

A total of five full and/or partially filled drums were used to contain the solid waste generated during the RRI sampling event and seepage meter sampling event. Each of the five drums consisted of a distinct waste stream: PPE and tubing; sediment IDW and liners at high-range concentrations; sediment IDW and liners at low-range concentrations; soil IDW; and PPE and tubing from the seepage meter sampling event. Upon approval of the waste profiles, the drums were transported to the CWM Arlington, Oregon facility for treatment and disposal via landfill.

The documentation for waste generation during the RRI sampling event is included as Appendix B-5.

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4.0 DATA QUALITY EVALUATION

RPAC performed a data quality evaluation of the analytical results from the RRI sampling event. The results of the evaluation are presented in the data validation reports for the RRI sampling event included as Appendix D.

The purpose of the data quality evaluation was to identify and explain data usability issues discovered during verification and validation of the analytical results, and to identify corrective actions necessary to improve data quality for future sampling events. The data evaluation was based on findings of the data verification and validation process, and any communications with the analytical laboratories about those findings. Verification and validation were performed on 100% of the laboratory data to expedite the verification process. The purpose of the data verification was to make certain that the data quality indicators and analytical detection limits met project requirements and to verify the data were transferred accurately from the laboratory to the project database. Full validation according to USEPA National Functional Guidelines for Data Review, modified for SW-846 method requirements, performed on laboratory analytical results for the RRI samples exceeded requirements agreed upon in correspondence between AMEC and DEQ dated January 16, February 9, and March 23, 2001.

Based on the validation reports, the laboratory performance and data quality appear to be acceptable, overall, for the RRI field sampling event and seepage meter sampling event analytical data, with the following exceptions:

- For USEPA Method 8270C, approximately 5% of WDL sediment, 3% of WDL and NDP surface water, 2% of HDD soil, and 3% of outfall discharge sample data were found to be unusable as a result of the validation process (see Appendix D for details);
- For USEPA Method 7470A, two WDL surface water sample analytical results were determined to be unusable (see Appendix D for details); and
- For USEPA Method 8081A, approximately 3% of the insecticide sample data for all water samples were found to be unusable through the validation process (see Appendix D for details).

Several of the methods provided analytical results having elevated method detection limits. The elevated method detection limits were unavoidable within the laboratory due to the large variance in concentrations between the samples.

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The analytical results for the PCB screening by USEPA Method 8082 associated with the RRI sampling event samples were not validated, as the samples were analyzed for screening purposes only.

5.0 SUMMARY, CONCLUSIONS, AND RECOMMENDATIONS

The completed scope of work included site reconnaissance activities at NDL, WDL, NDP, the Willamette River near the two City of Portland outfalls, and the immediate Site vicinity; sediment sampling at WDL; surface water sampling at WDL and NDP; soil sampling at the HDD; non-stormwater sampling at the City of Portland Outfalls 22B and 22C; and seepage meter water sampling from the sampling location in the Willamette River. The preliminary screening values discussed in this section, provided on Table 1, are not intended as cleanup goals or to indicate the level of risk at the RPAC Site, but rather are used for discussion and presentation purposes only. The following is a summary of the results of the investigation and sampling activities:

- The reconnaissance work conducted at the Site provided qualitative information that will support: the HHRA and the ERA; nature and extent characterization; future sampling activities; and a greater understanding of surface water and groundwater systems for the GTE at the Site.
- An evaluation of the WDL sediment sample analytical results indicates the most elevated concentrations of 1,2-dichlorobenzene, 2,4-dichlorophenol, 2,4-D, and silvex were detected at the southern end of WDL, within the deeper sediment intervals. Of these constituents, none were detected at concentrations exceeding the preliminary screening values for human health or ecological receptors with the exception of 1,2-dichlorobenzene, which exceeded the human health preliminary screening value at WDL-101-S. 2,3,7,8-TCDD concentrations were detected within the sediments at levels exceeding the preliminary screening values for human health and ecological receptors. Metals PCOPCs included on the Appendix E figures were detected at all sampling locations, typically at concentrations that exceed human health and/or ecological receptor preliminary screening values. Free-phase NAPL was not observed to be present within the sediments. An organic residual was identified using field screening methods within WDL sediment samples from WDL-101-S, WDL-103-S, and WDL-104-S.
- An evaluation of the WDL surface water analyses indicates that the VOC and insecticide PCOPCs included on the Appendix E figures were not detected above the method detection limits at any of the surface water sampling locations. Herbicides and SVOCs were not detected at concentrations greater than the human health or ecological preliminary screening values. 2,3,7,8-TCDD was detected above the preliminary screening value for human health at surface water

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sampling location WDL-101-W. Arsenic was detected at each of the surface water sampling locations, at concentrations above the preliminary screening value for human health. Chromium was detected at each of the surface water sampling locations, at concentrations above the preliminary screening value for ecological receptors at surface water sampling locations WDL-101-W and WDL-103-W.

- An evaluation of the NDP surface water indicates that benzene and arsenic were present at concentrations exceeding the preliminary screening values for human health. Herbicide, SVOC, dioxin/furan, and insecticide PCOPCs included on the Appendix E figures were not detected above the method detection limits. Chromium was detected at a concentration below the human health and ecological preliminary screening values.
- An evaluation of the analytical results from soil samples collected in the HDD indicate that VOC, herbicide, dioxin/furan, and SVOC PCOPCs included on the Appendix E figures were not detected above the method detection limit or were present at concentrations below the preliminary screening values. A concentration of 4,4'-DDE was detected, above the preliminary screening value for ecological receptors, at soil sampling location HDD-102. 4,4'-DDT was detected at soil sampling locations HDD-102 and HDD-103, near the southern end of the HDD, at concentrations exceeding the preliminary screening value for ecological receptors. Insecticides were not detected above the method detection limit at the northernmost sample along the ditch, HDD-101. Arsenic was detected at all sampling locations and exceeded the human health and ecological preliminary screening values at sampling locations HDD-101 and HDD-102. Mercury was detected at soil sampling locations HDD-102 and HDD-103 at levels exceeding the preliminary screening values for human health and ecological receptors. Chromium was detected at all three soil sampling locations and exceeded the preliminary screening value for ecological receptors only.
- An evaluation of the surface water sample collected at the City of Portland Outfall 22B indicates arsenic was detected above the preliminary screening value for human health. VOC, herbicide, dioxin/furan, insecticide, and SVOC PCOPCs included on the Appendix E figures were not detected above the method detection limit or were present at concentrations below the preliminary screening values.
- An evaluation of the sample collected at the City of Portland Outfall 22C indicates that benzene and arsenic concentrations were present above the human health screening values. Herbicide, SVOC, dioxin/furan, and insecticide PCOPCs included on the Appendix E figures were not detected above the method detection limit at the outfall.

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- Organic chemicals detected at the seepage meter sampling location include the dioxins/furans 1,2,3,4,6,7,8,9-OCDD and total TCDF and the herbicide dichlorprop. In addition, various metals were detected at seepage meter sample location WR-SM3.
- Over 98% of the analytical results for the RRI sampling activities reported in this Technical Memorandum were deemed to be acceptable through the validation process.

Following review of the results, as listed above and based on the information presented in this TM, the following additional conclusions have been made regarding the Site:

- The benzene detected in surface water at NDP and in the downgradient discharge from the City of Portland Outfall 22C is due to a non-RPAC source.
- The polynuclear aromatic hydrocarbons (PAHs) detected in the surface water sample collected from the NDP and City of Portland Outfall 22C are due to a non-RPAC source.
- The presence of chlorobenzene at concentrations higher than dichlorobenzene at City of Portland Outfall 22B are most likely due to a non-RPAC source.
- The presence of 2,3,7,8-TCDD in the WDL surface water sample collected at surface water sample location WDL-101-W likely is due to entrained sediment within the surface water, due to disturbances of the sediments during sampling within the shallow water column.
- Additional sampling is not necessary or planned for the sediments within WDL, the surface water within WDL, the soils within the HDD, the discharge water at the City of Portland outfalls, or the seepage meter located within the Willamette River.

Following an evaluation of the field and analytical results, along with the conclusions presented above, RPAC proposes the following:

- Additional investigation near WDL will be conducted during an upcoming NAPL investigation.

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LIMITATIONS

This report was prepared exclusively for RPAC by AMEC Earth & Environmental, Inc. (AMEC). The quality of information, and conclusions contained herein are consistent with the level of effort involved in AMEC services and based on: i) information available at the time of preparation; ii) data supplied by outside sources; and iii) the assumptions, conditions and qualifications set forth in this report. This report is intended to be used by RPAC only, subject to the terms and conditions of its contract with AMEC. Any other use of, or reliance on, this report by any third party is at that party's sole risk.

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TABLES

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TABLE 1
Screening Values for Preliminary Constituents of Potential Concern
Remaining Remedial Investigation Field Sampling Event
RPAC - Portland Site

Constituent Class	PCOPC	CAS #	Human Health						Ecological								
			Screening Value for Surface Water	Units	Ref	Screening Value For Soil/Sediments	Units	Ref	Screening Value for Surface Water	Units	Ref	Screening Value For Sediments	Units	Ref	Screening Value For Soils	Units	Ref
VOCs	1,1,2,2-Tetrachloroethane	79-34-5	0.055	µg/L	a	0.93	mg/kg	d	2400	µg/L	f	NA	NA	g	NA	NA	h
VOCs	1,1-Dichloroethane	75-34-3	810	µg/L	a	1700	mg/kg	d	47	µg/L	f	NA	NA	g	NA	NA	h
VOCs	1,1-Dichloroethene	75-35-4	340	µg/L	a	410	mg/kg	d	25	µg/L	f	1.59	mg/kg	g	3750	mg/kg	h
VOCs	1,2,3-Trichloropropane	96-18-4	0.0056	µg/L	a	0.011	mg/kg	d	NA	NA	f	NA	NA	g	NA	NA	h
VOCs	1,2,4-Trimethylbenzene	95-63-6	12	µg/L	a	170	mg/kg	d	NA	NA	f	NA	NA	g	NA	NA	h
VOCs	1,2-Dichlorobenzene	95-50-1	370	µg/L	a	370	mg/kg	d	14	µg/L	f	NA	NA	g	NA	NA	h
VOCs	1,2-Dichloroethane	107-06-2	0.12	µg/L	a	0.60	mg/kg	d	20000	µg/L	f	3.43	mg/kg	g	70	mg/kg	h
VOCs	1,3,5-Trimethylbenzene	108-67-8	12	µg/L	a	70	mg/kg	d	NA	NA	f	NA	NA	g	NA	NA	h
VOCs	1,3-Dichlorobenzene	541-73-1	5.5	µg/L	a	63	mg/kg	d	71	µg/L	f	NA	NA	g	NA	NA	h
VOCs	1,4-Dichlorobenzene	106-46-7	0.50	µg/L	a	7.9	mg/kg	d	15	µg/L	f	NA	NA	g	20	mg/kg	h
VOCs	Benzene	71-43-2	0.34	µg/L	a	1.3	mg/kg	d	130	µg/L	f	3.92	mg/kg	g	3300	mg/kg	h
VOCs	Chlorobenzene	108-90-7	110	µg/L	a	530	mg/kg	d	50	µg/L	f	NA	NA	g	40	mg/kg	h
VOCs	Chloroform	67-66-3	6.2	µg/L	a	12	mg/kg	d	1200	µg/L	f	3.66	mg/kg	g	1875	mg/kg	h
VOCs	cis-1,2-Dichloroethene	156-59-2	61	µg/L	a	150	mg/kg	d	590	µg/L	f	5.76	mg/kg	g	2500	mg/kg	h
VOCs	Ethylbenzene	100-41-4	2.9	µg/L	a	20	mg/kg	d	7.3	µg/L	f	0.004	mg/kg	g	NA	NA	h
VOCs	Methyl Chloride	74-87-3	1.5	µg/L	a	2.6	mg/kg	d	NA	NA	f	NA	NA	g	NA	NA	h
VOCs	Methylene chloride	75-09-2	4.3	µg/L	a	21	mg/kg	d	2200	µg/L	f	0.93	mg/kg	g	730	mg/kg	h
VOCs	Tetrachloroethene	127-18-4	0.66	µg/L	a	3.4	mg/kg	d	840	µg/L	f	0.28	mg/kg	g	10	mg/kg	h
VOCs	Toluene	108-88-3	720	µg/L	a	520	mg/kg	d	9.8	µg/L	f	5.3	mg/kg	g	200	mg/kg	h
VOCs	Trichloroethene	79-01-6	0.028	µg/L	a	0.11	mg/kg	d	3000	µg/L	f	0.14	mg/kg	g	40	mg/kg	h
VOCs	Vinyl chloride	75-01-4	0.020	µg/L	a	0.75	mg/kg	d	1300	µg/L	f	0.03	mg/kg	g	20	mg/kg	h
VOCs	Xylene	1330-20-7	210	µg/L	a	420	mg/kg	d	13	µg/L	f	NA	NA	g	100	mg/kg	h
Herbicides	2-(2-Methyl-4-chlorophenoxy) propionic acid	93-65-2	36	µg/L	a	620	mg/kg	d	NA	NA	f	NA	NA	g	NA	NA	h
Herbicides	2,4,5-T	93-76-5	360	µg/L	a	6200	mg/kg	d	NA	NA	f	NA	NA	g	NA	NA	h
Herbicides	2,4,5-TP (Silvex)	93-72-1	290	µg/L	a	4900	mg/kg	d	NA	NA	f	NA	NA	g	NA	NA	h
Herbicides	2,4-D	94-75-7	360	µg/L	a	7700	mg/kg	d	NA	NA	f	NA	NA	g	NA	NA	h
Herbicides	2,4-DB	94-82-6	290	µg/L	a	4900	mg/kg	d	NA	NA	f	NA	NA	g	NA	NA	h
Herbicides	2-Methyl-4-chlorophenoxyacetic acid	94-74-6	18	µg/L	a	310	mg/kg	d	NA	NA	f	NA	NA	g	NA	NA	h
Herbicides	Bromoxynil	1689-84-5	730	µg/L	a	12000	mg/kg	d	NA	NA	f	NA	NA	g	NA	NA	h
Herbicides	delta-BHC	319-86-8	NA	NA	a	NA	NA	d	NA	NA	f	NA	NA	g	NA	NA	h
Herbicides	Dichlorprop	120-36-5	NA	NA	a	NA	NA	d	NA	NA	f	NA	NA	g	NA	NA	h
Herbicides	Dinoseb	88-85-7	36	µg/L	a	620	mg/kg	d	NA	NA	f	NA	NA	g	NA	NA	h
SVOCs	2,4,6-Trichlorophenol	88-06-2	3.6	µg/L	a	62	mg/kg	d	970	µg/L	f	NA	NA	g	10	mg/kg	h
SVOCs	2,4-Dichlorophenol	120-83-2	110	µg/L	a	1800	mg/kg	d	3650	µg/L	f	NA	NA	g	20	mg/kg	h
SVOCs	2,4-Dinitrophenol	51-28-5	73	µg/L	a	1200	mg/kg	d	NA	NA	f	NA	NA	g	20	mg/kg	h
SVOCs	2,6-Dichlorophenol	87-65-0	NA	NA	a	NA	NA	d	NA	NA	f	NA	NA	g	NA	NA	h
SVOCs	2-Chlorophenol	95-57-8	30	µg/L	a	240	mg/kg	d	2000	µg/L	f	NA	NA	g	60	mg/kg	h
SVOCs	2-Methylphenol	95-48-7	1800	µg/L	a	31000	mg/kg	d	13	µg/L	f	NA	NA	g	50	mg/kg	h
SVOCs	Benzo (a) Anthracene	56-55-3	0.092	µg/L	a	2.1	mg/kg	d	0.027	µg/L	f	0.032	mg/kg	g	NA	NA	h
SVOCs	Benzo (a) Pyrene	50-32-8	0.0092	µg/L	a	0.21	mg/kg	d	0.014	µg/L	f	0.032	mg/kg	g	125	mg/kg	h
SVOCs	Benzo (b) Fluoranthene	205-99-2	0.092	µg/L	a	2.1	mg/kg	d	NA	NA	f	NA	NA	g	NA	NA	h
SVOCs	bis (2-Ethylhexyl) phalate	117-81-7	4.8	µg/L	a	120	mg/kg	d	3.0	µg/L	f	0.33	mg/kg	g	4.5	mg/kg	h
SVOCs	Chrysene	218-01-9	9.2	µg/L	a	210	mg/kg	d	NA	NA	f	0.057	mg/kg	g	NA	NA	h
SVOCs	Dibenzofuran	132-64-9	24	µg/L	a	3100	mg/kg	d	3.7	µg/L	f	5.1	mg/kg	g	0.002	mg/kg	h
SVOCs	Naphthalene	91-20-3	6.2	µg/L	a	190	mg/kg	d	620	µg/L	f	0.176	mg/kg	g	10	mg/kg	h
SVOCs	Pentachlorophenol	87-86-5	0.56	µg/L	a	9.0	mg/kg	d	15	µg/L	f	0.37	mg/kg	g	3	mg/kg	h
Dioxin/Furans	1,2,3,4,6,7,8,9-OCDF	39001-02-0	NA	NA	a	NA	NA	d	NA	NA	f	NA	NA	g	NA	NA	h
Dioxin/Furans	1,2,3,4,6,7,8-HpCDD	35822-46-9	NA	NA	a	NA	NA	d	NA	NA	f	NA	NA	g	NA	NA	h
Dioxin/Furans	1,2,3,4,6,7,8-HpCDF	67562-39-4	NA	NA	a	NA	NA	d	NA	NA	f	NA	NA	g	NA	NA	h
Dioxin/Furans	1,2,3,4,7,8,9-HpCDF	55673-89-7	NA	NA	a	NA	NA	d	NA	NA	f	NA	NA	g	NA	NA	h
Dioxin/Furans	1,2,3,4,7,8-HxCDD	39227-28-6	NA	NA	a	NA	NA	d	NA	NA	f	NA	NA	g	NA	NA	h
Dioxin/Furans	1,2,3,4,7,8-HxCDF	70648-26-9	NA	NA	a	NA	NA	d	NA	NA	f	NA	NA	g	NA	NA	h
Dioxin/Furans	1,2,3,6,7,8-HxCDD	57653-85-7	NA	NA	a	NA	NA	d	NA	NA	f	NA	NA	g	NA	NA	h
Dioxin/Furans	1,2,3,6,7,8-HxCDF	57117-44-9	NA	NA	a	NA	NA	d	NA	NA	f	NA	NA	g	NA	NA	h
Dioxin/Furans	1,2,3,7,8,9-HxCDD	19408-74-3	NA	NA	a	NA	NA	d	NA	NA	f	NA	NA	g	NA	NA	h
Dioxin/Furans	1,2,3,7,8,9-HxCDF	72918-21-9	NA	NA	a	NA	NA	d	NA	NA	f	NA	NA	g	NA	NA	h
Dioxin/Furans	1,2,3,7,8-PeCDD	40321-76-4	NA	NA	a	NA	NA	d	NA	NA	f	NA	NA	g	NA	NA	h
Dioxin/Furans	1,2,3,7,8-PeCDF	57117-41-6	NA	NA	a	NA	NA	d	NA	NA	f	NA	NA	g	NA	NA	h
Dioxin/Furans	2,3,4,6,7,8-HxCDF	60851-34-5	NA	NA	a	NA	NA	d	NA	NA	f	NA	NA	g	NA	NA	h
Dioxin/Furans	2,3,4,7,8-PeCDF	57117-31-4	NA	NA	a	NA	NA	d	NA	NA	f	NA	NA	g	NA	NA	h
Dioxin/Furans	2,3,7,8-TCDD	1746-01-6	0.45	pg/L	a	16	pg/g	d	7600	pg/l	f	0.85	pg/g	g	55	pg/g	h
Dioxin/Furans	2,3,7,8-TCDF	51207-31-9	NA	NA	a	NA	NA	d	NA	NA	f	NA	NA	g	NA	NA	h
Insecticides	4,4'-DDD	72-54-8	0.28	µg/L	a	10	mg/kg	d	0.0010	µg/L	f	0.003	mg/kg	g	0.01	mg/kg	h
Insecticides	4,4'-DDE	72-55-9	0.20	µg/L	a	7.0	mg/kg	d	20	µg/L	f	0.0003	mg/kg	g	0.01	mg/kg	h
Insecticides	4,4'-DDT	50-29-3	0.20	µg/L	a	7.0	mg/kg	d	0.001	µg/L	f	0.0003	mg/kg	g	0.01	mg/kg	h
Insecticides	Aldrin	309-00-2	0.0040	µg/L	a	0.10	mg/kg	d	0.06	µg/L	f	0.04	mg/kg	g	25	mg/kg	h
Insecticides	alpha-BHC	319-84-6	0.011	µg/L	a	0.36	mg/kg	d	2.2	µg/L	f	NA	NA	g	NA	NA	h
Insecticides	beta-BHC	319-85-7	0.037	µg/L	a	1.3	mg/kg	d	2.2	µg/L	f	0.22	mg/kg	g	NA	NA	h

TABLE 1
Screening Values for Preliminary Constituents of Potential Concern
Remaining Remedial Investigation Field Sampling Event
RPAC - Portland Site

Constituent Class	PCOPC	CAS #	Human Health						Ecological								
			Screening Value for Surface Water	Units	Ref	Screening Value For Soil/Sediments	Units	Ref	Screening Value for Surface Water	Units	Ref	Screening Value For Sediments	Units	Ref	Screening Value For Soils	Units	Ref
Insecticides	Chlordane (tech)	57-74-9	NA	NA	a	NA	NA	d	0.0043	µg/L	f	0.0045	mg/kg	g	9	mg/kg	h
Insecticides	Dieldrin	60-57-1	0.0042	µg/L	a	0.11	mg/kg	d	0.056	µg/L	f	0.003	mg/kg	g	0.3	mg/kg	h
Insecticides	Endosulfan	115-29-7	220	µg/L	a	3700	mg/kg	d	0.056	µg/L	f	0.11	mg/kg	g	20	mg/kg	h
Insecticides	Endrin	72-20-8	11	µg/L	a	180	mg/kg	d	0.036	µg/L	f	0.003	mg/kg	g	0.04	mg/kg	h
Insecticides	gamma-BHC (Lindane)	58-89-9	0.052	µg/L	a	1.7	mg/kg	d	0.08	µg/L	f	0.0009	mg/kg	g	8	mg/kg	h
Insecticides	Heptachlor	76-44-8	0.015	µg/L	a	0.38	mg/kg	d	0.0038	µg/L	f	0.01	mg/kg	g	15	mg/kg	h
Insecticides	Heptachlor Epoxide	1024-57-3	0.0074	µg/L	a	0.19	mg/kg	d	0.0038	µg/L	f	0.0006	mg/kg	g	NA	NA	h
Insecticides	Hexachlorobenzene	118-74-1	0.042	µg/L	a	1.1	mg/kg	d	NA	NA	f	0.1	mg/kg	g	1000	mg/kg	h
Insecticides	Malathion	121-75-5	730	µg/L	a	12000	mg/kg	d	0.1	µg/L	f	NA	NA	g	NA	NA	h
Insecticides	Methoxychlor	72-43-5	180	µg/L	a	3100	mg/kg	d	0.03	µg/L	f	0.99	mg/kg	g	500	mg/kg	h
Insecticides	Toxaphene	8001-35-2	0.061	µg/L	a	1.6	mg/kg	d	0.0002	µg/L	f	2.55	mg/kg	g	1000	mg/kg	h
Metals	Arsenic	7440-38-2	0.000045	mg/L	a	7	mg/kg	e	0.15	mg/L	f	4	mg/kg	g	10	mg/kg	h
Metals	Cadmium	7440-43-9	0.018	mg/L	a	450	mg/kg	d	0.0022	mg/L	f	0.003	mg/kg	g	4	mg/kg	h
Metals	Chromium*	7440-47-3	0.11	mg/L	a	450	mg/kg	d	0.011	mg/L	f	37	mg/kg	g	410	mg/kg	h
Metals	Copper	7440-50-8	1.5	mg/L	a	41000	mg/kg	d	0.009	mg/L	f	10	mg/kg	g	50	mg/kg	h
Metals	Iron	7439-89-6	11	mg/L	a	100000	mg/kg	d	1	mg/L	f	NA	NA	g	10	mg/kg	h
Metals	Lead	7439-92-1	0.015	mg/L	b	750	mg/kg	d	0.0025	mg/L	f	35	mg/kg	g	16	mg/kg	h
Metals	Manganese (non-food)	7439-96-5	0.88	mg/L	a	19000	mg/kg	d	0.12	mg/L	f	1100	mg/kg	g	100	mg/kg	h
Metals	Mercury and compounds	7439-97-6	0.002	mg/L	c	0.07	mg/kg	e	0.0008	mg/L	f	0.2	mg/kg	g	0.1	mg/kg	h
Metals	Nickel	7440-02-0	0.73	mg/L	a	20000	mg/kg	d	0.052	mg/L	f	18	mg/kg	g	30	mg/kg	h
Metals	Vanadium	7440-62-2	0.26	mg/L	a	7200	mg/kg	d	0.02	mg/L	f	NA	NA	g	2	mg/kg	h
Metals	Zinc	7440-66-6	11	mg/L	a	100000	mg/kg	d	0.12	mg/L	f	3	mg/kg	g	50	mg/kg	h
PCBs	Aroclor 1254	11097-69-1	0.034	µg/L	a	0.74	mg/kg	d	0.033	µg/L	f	0.007	mg/kg	g	0.7	mg/kg	h

Notes:

PCOPC	Preliminary Constituent of Potential Concern
CAS #	Chemical Abstract Service number
Ref	reference (see below)
PCBs	polychlorinated biphenyls
VOCs	volatile organic compounds
SVOCs	semi-volatile organic compounds
NA	no screening value available
µg/L	micrograms per liter
mg/L	milligrams per liter
mg/kg	milligrams per kilogram
pg/L	picograms per liter
pg/g	picograms per gram
*	Most protective of chromium III and chromium VI screening value used where Total Chromium value was not available

Note: Values are generally given in number of significant figures provided in source, with the exception of USEPA Region IX PRGs (see below), which are typically rounded to 2 significant digits in this table

Reference Key:

a	USEPA Region IX Preliminary Remediation Goals (PRGs), tap water (October 2002)
b	USEPA National Primary Drinking Water Regulations, Action Level (July 2002)
c	USEPA National Primary Drinking Water Regulations, Maximum Contaminant Level (MCL) (July 2002)
d	USEPA Region IX PRGs, industrial soil
e	DEQ Default Background Concentrations for Metals (October 2002)
f	DEQ ERA Level II Screening Level Values, most protective value for surface water (December 2001)
g	DEQ ERA Level II Screening Level Values, most protective freshwater or bioaccumulative value for sediments (December 2001)
h	DEQ ERA Level II Screening Level Values, most protective value for soil (December 2001)

TABLE 2
Summary of Items of Interest Identified During the Site Reconnaissance
Remaining Remedial Investigation Field Sampling Event
RPAC - Portland Site

Location Name[1]	Notes on Item of Interest at Location
Photo 1	Location for WDL sample WDL-104-S designated by the stake near the earthen berm on the north end of WDL
Photo 2	Culvert pipe exposed at the end of the HDD at N.W. Front Avenue
Photo 3	View of the location where a petroleum pipeline and natural gas pipeline passes beneath the railroad tracks on the south end of the HDD
Photo 4	HDD at N.W. Front Avenue, view to the east
Photo 5	4-inch PVC pipe in the LADD
Photo 6	View of LADD to the south of WDL
Photo 7	Photo of exposed brick, concrete and cinder material covering the bank of WDL adjacent to ESCO site
Photo 8	Culvert pipe between NDL and NDP (View from the NDL side of the culvert pipe)
Photo 9	First inlet channel from marshy area on west bank of NDL
Photo 10	Second inlet from marshy area on the west bank of NDL
Photo 11	Third inlet from marshy area on the west bank of NDL
Photo 12	Ponded area within the marshy area, the western corner of NDL overflows back into this area during high water stages (winter and spring)
Photo 13	Ephemeral stream adjacent to Highway 30, near NDP
Photo 14	Metal culvert pipe between NDP and NDL at the drainage pond side
Photo 15	84-inch concrete pipe flowing to the Willamette River at the NDP
Photo 16	Seepage coming into NDP near the 84-inch culvert pipe
Photo 17	84-inch concrete culvert outfall to Willamette River, designated as City Outfall 22C
Photo 18	Brush-covered 24-inch metal pipe, City Outfall 22B to Willamette River
Photo 19	48-inch culvert pipe of unknown origin near N.W. Front Avenue along the shore of Willamette River
Photo 20	Buried pipe filled with silt along the shore of the Willamette River
Photo 21	Channel in bank of Willamette River in front of City Outfall 22B
Photo 22	PVC pipe within a steel sleeve found beneath a metal box along the bank of the Willamette River, used to discharge treated effluent from the RPAC waste water treatment facility
Photo 23	48-inch diameter culvert beneath Highway 30 and railroad tracks at northwest end of the creek that flows into the NDP
Photo 24	View to the west from the culvert pipe in Photo 23, showing the City of Portland facility, and the ravine in the Tualatin Mountains that drains to the culvert, creek, and NDP
Photo 25	Concrete culvert filled with sediment located at the northwest end of a creek flowing into the NDP
Photo 26	View to the northwest from the bank above the culvert pipe shown in Photo 25, showing the Koppers facility
Photo 27	Northwest end of the ditch entering the NDP. (View to the southeast.)
Photo 28	Culvert pipe beneath Highway 30. The ditch extends to the west near the railroad tracks to the Kinder Morgan facility.
24" Culvert Pipe-A	24-inch culvert pipe beneath N.W. Front Avenue between HDD and Willamette River
24" Culvert Pipe-B	24-inch culvert pipe at end of LADD from near RPAC wastewater treatment plant; the ditch is choked with brambles; a 4-inch PVC pipe and electrical conduit runs through the culvert pipe
48" Culvert Pipe-C	48-inch culvert pipe on bank of Willamette River - unknown origin
48" Culvert Pipe-D	48-inch culvert pipe beneath Highway 30 at the northwest end of creek flowing into the NDP
Buried Pipe	Buried pipe on bank of Willamette River
Channel 1	Inlet channel in marshy area on the western bank of NDL - Channel 1
Channel 2	Second inlet in marshy area
Channel 3	Third inlet in marshy area

TABLE 2
Summary of Items of Interest Identified During the Site Reconnaissance
Remaining Remedial Investigation Field Sampling Event
RPAC - Portland Site

Location Name[1]	Notes on Item of Interest at Location
Creek	Creek flowing into NDP
Culvert Pipe-E	Culvert pipe beneath Highway 30 to ditch near railroad tracks
Culvert Pipe-F	Concrete culvert pipe filled with sediment located at the northwest end of a creek flowing into the NDP
Earthen Berm	Berm between WDL and HDD
HDD-101	Sample location HDD-101, in HDD near N.W. Front Avenue
HDD-102	Sample location HDD-102, near cottonwood tree in grass-covered ditch - marked with stake and pink ribbon.
HDD-103	Sample location HDD-103, area covered with grass
NDL-101	Proposed sample location NDL-101
NDL-102	Proposed sample location NDL-102
NDL-103	Proposed sample location NDL-103
NDL-104	Proposed sample location NDL-104
NDL-SDG	NDL staff gauge
Outfall 22B	City of Portland Outfall 22B on Willamette River bank
Outfall 22C	City of Portland Outfall 22C on Willamette River bank
Seep-A	Seep near 84" culvert pipe at NDP
Seep-B	Seep in the marshy area on the west bank of NDL
WDL-101	Sample location WDL-101 near south end of WDL
WDL-102	Sample location WDL-102 near WDL staff gauge
WDL-103	Sample location WDL-103-S area, near aeration pipe going into WDL from east bank at this location
WDL-104	Sample location WDL-104 near north end WDL

Notes:

1 Location name presented corresponds with the locations depicted on Figure 2 and the photographs presented in Appendix A

NDL: North Doane Lake
NDP: Northwest Drainage Pond
WDL: West Doane Lake
HDD: Historical Drainage Ditch
LADD: Lake Area Drainage Ditch

TABLE 3
Planned Versus Actual Sampling Locations and Analyses
Remaining Remedial Investigation Field Sampling Event
RPAC - Portland Site

Sediment Sample Locations

Sample Location	Sample Depth (feet bwsi)	Laboratory Field ID	VOCs by EPA 8260B	SVOCs by EPA 8270C	Herbicides by EPA 8151A	Dioxins/ Furans by EPA 1613B	Metals by EPA 6010/6020/ 7471	Insecticides by EPA 8081A	PCBs by EPA 8082	Total Solids and Total Volatile Solids by EPA 160.3 and 160.4	Total Organic Carbon by EPA 9060	Ammonia by EPA 350.2	Acid Volatile Sulfide by EPA 9030B	Particle Size by ASTM D422	Minor Variations From Field Sampling Plan
WDL-101-S	0-0.5	007-01	X	X	X	X	X	X	X	X	X	X	X	X	PCBs by EPA Method 8082 added, sampling interval determined in field
WDL-101-S	4-6	008-01	X	X	X	X	X	X	X	X	X	X	X		PCBs by EPA Method 8082 added, Particle size not analyzed due to minimal sample volume
WDL-101-S	6-8	009-01	X	X	X	X	X	X		X	X	X	X	X	As planned, sampling interval determined in field
WDL-101-S	0.5-4	010-01	X	X	X	X	X	X		X	X	X	X	X	As planned, sampling interval determined in field
WDL-102-S	0-0.5	011-01	X	X	X	X	X	X		X	X	X	X	X	As planned, sampling interval determined in field
WDL-102-S	0.5-4	012-01	X	X	X	X	X	X	X	X	X	X	X	X	PCBs by EPA Method 8082 added, sampling interval determined in field
WDL-102-S	4-7	013-01	X	X	X	X	X	X		X	X	X	X	X	As planned, sampling interval determined in field
WDL-102-S	7-9	014-01	X	X	X	X	X	X		X	X	X	X	X	As planned, sampling interval determined in field
WDL-102-S	9-11	015-01	X	X	X	X	X	X		X	X	X	X	X	As planned, sampling interval determined in field
WDL-103-S	0-0.5	016-01	X	X	X	X	X	X	X	X	X	X	X	X	PCBs by EPA Method 8082 added, sampling interval determined in field
WDL-103-S	0.5-4	017-01	X	X	X	X	X	X		X	X	X	X	X	As planned, sampling interval determined in field
WDL-103-S	4-6	018-01	X	X	X	X	X	X		X	X	X	X	X	As planned, sampling interval determined in field
WDL-103-S	6-7.5	019-01	X	X	X	X	X	X		X	X	X	X	X	As planned, sampling interval determined in field
WDL-103-S	7.5-9	020-01	X	X	X	X	X	X	X	X	X	X	X	X	PCBs by EPA Method 8082 added, sampling interval determined in field
WDL-104-S	0-0.5	021-01	X	X	X	X	X	X		X	X	X	X	X	As planned, sampling interval determined in field
WDL-104-S	0.5-4	022-01	X	X	X	X	X	X		X	X	X	X	X	As planned, sampling interval determined in field
WDL-104-S	4-6	023-01	X	X	X	X	X	X		X	X	X	X	X	As planned, sampling interval determined in field
WDL-104-S	6-7.5	024-01	X	X	X	X	X	X		X	X	X	X	X	As planned, sampling interval determined in field

Surface Water Sample Locations

Sample Location	Sample Depth (feet bws)	Laboratory Field ID	VOCs by EPA 8260B	SVOCs by EPA 8270C	Herbicides by EPA 8151A	Dioxins/ Furans by EPA 1613B	Metals by EPA 6010/6020/ 7470A	Insecticides by EPA 8081A	Alkalinity by EPA 310.1	Anions by EPA 300.0	Total Suspended Solids by EPA 160.2	pH by EPA 150.1	Hardness by Method 2340B	Minor Variations From Field Sampling Plan
WDL-101-W	0.5	001-01	X	X	X	X	X	X	X	X	X	X	X	As planned
WDL-102-W	0.7	002-01	X	X	X	X	X	X	X	X	X	X	X	As planned
WDL-103-W	0.2	003-01	X	X	X	X	X	X	X	X	X	X	X	As planned
WDL-104-W	NA	NA												Proposed sample not collected, sample location was dry
NDP-101-W	0.1	006-01	X	X	X	X	X	X	X	X	X	X	X	Sample location added to plan for future correlation

Soil Sample Locations

Sample Location	Sample Depth (feet bgs)	Laboratory Field ID	VOCs by EPA 8260B	SVOCs by EPA 8270C	Herbicides by EPA 8151A	Dioxins/ Furans by EPA 8290	Metals by EPA 6010/6020/ 7470A	Incesticides by EPA 8081A	PCBs by EPA 8082	Minor Variations From Field Sampling Plan
HDD-101	0.5-1.5	025-01	X	X	X	X	X	X		As planned
HDD-102	0.2-1.5	026-01	X	X	X	X	X	X	X	PCBs by EPA 8082 added
HDD-102	5.5-6	028-01				X				Sample interval added during field activities
HDD-103	4-5	027-01	X	X	X	X	X	X		As planned

Outfall Discharge Water and Seepage Meter Sample Locations

Sample Location	Sample Depth (feet bws)	Laboratory Field ID	VOCs by EPA 8260B	SVOCs by EPA 8270C	Herbicides by EPA 8151A	Dioxins/ Furans by EPA 1613B	Metals by EPA 6010/6020/ 7470A	Insecticides by EPA 8081A	Alkalinity by EPA 310.1	Anions by EPA 300.0	Total Suspended Solids by EPA 160.2	pH by EPA 150.1	Hardness by Method 2340B	Minor Variations From Field Sampling Plan
CO-22C-01	0.1	004-01	X	X	X	X	X	X	X	X	X	X	X	Additional Parameters Added
CO-22B-01	0.1	005-01	X	X	X	X	X	X	X	X	X	X	X	Additional Parameters Added
WR-SM3	NA	NA	X	X	X	X	X	X	X	X	X	X	X	Orthophosphate analyzed by EPA 365.2

Notes:

bwsi	Below Water-Sediment Interface
bgs	Below Ground Surface
bwsi	Below Water Surface
VOCs	Volatile Organic Compounds
SVOCs	Semi-volatile Organic Compounds
PCBs	Polychlorinated Biphenyls
EPA	Environmental Protection Agency
ASTM	American Society of Testing and Materials
NA	Not Applicable
X	Parameter Analyzed

Minor Variation from RRI Field Sampling Plan

TABLE 4A
Field Measurements for Sediment and Soil Sampling Locations
Remaining Remedial Investigation Field Sampling Event
RPAC - Portland Site

Sediment Sample Locations

Sample Location	Sample Depth Interval (feet bwsi)	Date Sampled	Time Sampled	VOC Headspace Reading (ppm)[1]	NAPL Detection[2]	Sediment Color	Sediment Odor	Organic Matter Present in Media	Additional Notes
WDL-101-S	0-0.5	8/14/2002	8:15	0.0	Negative	Dark Brown	None	Plants/Wood Debris	
WDL-101-S	4-6	8/14/2002	9:45	25.6	Positive	Dark Brown	Present	Plant Material	Sheen on Water and Blebs in Sediment, positive identification of an organic residual observed
WDL-101-S	6-8	8/14/2002	9:45	0.0	Positive	Grey	Slight	None	Positive identification of an organic residual observed, no free-phase NAPL observed
WDL-101-S	0.5-4	8/14/2002	9:17	0.4	Negative	Brown	Slight	None	
WDL-102-S	0-0.5	8/14/2002	11:15	1.8	Negative	Black	None	None	
WDL-102-S	0.5-4	8/14/2002	11:25	0.2	Negative	Black	None	Plant Matter	
WDL-102-S	4-7	8/14/2002	12:30	6.9	Negative	Dark Brown	Present	None	Rocks within Sample
WDL-102-S	7-9	8/14/2002	12:30	5.3	Negative	Grey Mottled	Present	None	
WDL-102-S	9-11	8/14/2002	13:05	1.6	Negative	Grey	None	None	
WDL-103-S	0-0.5	8/15/2002	8:30	2.9	Negative	Brown	None	Plant Debris	
WDL-103-S	0.5-4	8/15/2002	9:30	0.2	Negative	Brown	None	None	
WDL-103-S	4-6	8/15/2002	9:30	0.9	Negative	Brown	Present	Plants	
WDL-103-S	6-7.5	8/15/2002	10:00	20.4	Positive	Brown	Present	Plants	Sheen in Sediment
WDL-103-S	7.5-9	8/15/2002	10:30	12.8	Negative	Grey	Slight	Plant Debris	Rocks within Sample
WDL-104-S	0-0.5	8/15/2002	10:45	0.0	Negative	Grey	None	None	
WDL-104-S	0.5-4	8/15/2002	11:15	0.4	Negative	Brown	None	Wood Debris	
WDL-104-S	4-6	8/15/2002	12:00	12.8	Positive	Grey	Present	Wood Material	Sheen in Sediment
WDL-104-S	6-7.5	8/15/2002	12:00	4.8	Negative	Grey	Present	Woody Debris	

Soil Sample Locations

Sample Location	Sample Depth Interval (feet bgs)	Date Sampled	Time Sampled	VOC Headspace Reading (ppm)[1]	NAPL Detection[2]	Soil Color	Soil Odor	Organic Matter Present in Media	Additional Notes
HDD-101	0.5-1.5	8/16/2002	8:30	0.0	Negative	Brown	None	Some Rootlets	
HDD-102	0.2-1.5	8/16/2002	10:30	0.0	Negative	Light Brown	None	Rootlets	
HDD-102	5.5-6	8/16/2002	11:30	2.0	Negative	Black	None	Wood Debris	
HDD-103	4-5	8/16/2002	11:00	0.0	Negative	Dark Grey to Black	None	Wood Debris	

Notes:

1	VOCs measured with photoionization detector (PID)
2	Ultraviolet (UV) light used for field NAPL detection
NAPL	Non-aqueous phase liquid
bwsi	Below water-sediment interface
bgs	Below ground surface
ppm	Parts per million
VOC	Volatile organic compound
UV	Ultra-violet

TABLE 4B
Field Measurements for Surface Water and Discharge Water Sampling Locations
Remaining Remedial Investigation Field Sampling Event
RPAC - Portland Site

Surface Water Sample Locations

Sample Location	Date Sampled	Time Sampled	pH (SU)	Specific Conductivity (mS)	Temperature (C)	Dissolved Oxygen (mg/L)	ORP (mV)	Turbidity (NTUs)	Ferrous Iron (mg/L)	Notes
WDL-101-W	8/13/2002	9:30	7.14	784	17.74	0.09	-126.0	50	0.0	Algae floating on water surface
WDL-102-W	8/13/2002	11:30	7.32	820	23.75	0.08	-140.0	10	0.0	No visible surface water flow
WDL-103-W	8/13/2002	12:15	8.87	794	25.37	0.06	-32.6	--	--	No visible surface water flow
NDP-101-W	8/13/2002	15:43	6.27	260	19.32	4.41	-12.4	--	3.2	No visible surface water flow, algae on water surface.

Outfall Discharge Water Sample Locations

Sample Location	Date Sampled	Time Sampled	pH (SU)	Specific Conductivity (mS)	Temperature (C)	Dissolved Oxygen (mg/L)	ORP (mV)	Turbidity (NTUs)	Ferrous Iron (mg/L)	Notes
CO-22C-01	8/13/2002	14:15	6.84	530	14.25	3.11	-78.3	40	7.4	Discharge water flow rate estimated to be 8 gpm
CO-22B-01	8/13/2002	15:15	7.01	739	13.76	1.73	-98.8	24	5.4	Discharge water flow rate estimated to be 6 gpm

Notes:

--	Groundwater not tested for this parameter, or information is not applicable or was not recorded
SU	Standard pH units
mS	MilliSiemens
C	Degrees Celsius
mg/L	Milligrams per Liter
ORP	Oxidation Reduction Potential
mV	Millivolts
NTUs	Nephelometric Turbidity Units
gpm	Gallons Per Minute
Notes:	Field measurements for pH, specific conductivity, temperature, dissolved oxygen, and ORP were collected using a YSI 600XL sonde and controller.
	Field turbidity measurements were collected using a Hach model 2100P portable turbidimeter.
	Ferrous iron measurements were obtained using a Hach Field test Kit.

Table 5
Final Validated Sediment Results, Detections Only
RPAC - Portland Site

WDL-101-S Depth: 0.0-0.5 feet

Analysis: 160.3 Sample Date: 08/14/02 Time: 08:15

Compound	Concentration	Units	MDL	MRL	Qualifiers
% Solids	30.17	%		0.01	

Analysis: 160.4 Sample Date: 08/14/02 Time: 08:15

Compound	Concentration	Units	MDL	MRL	Qualifiers
Total volatile solids	27.2	%		0.1	

Analysis: 1613B Sample Date: 08/14/02 Time: 08:15

Compound	Concentration	Units	MDL	MRL	Qualifiers
1,2,3,4,6,7,8-HpCDD	7900	pg/g	0.73		J
1,2,3,4,6,7,8-HpCDF	1700	pg/g	0.73		J
1,2,3,4,7,8,9-HpCDF	160	pg/g	0.73		J
1,2,3,4,7,8-HxCDD	140	pg/g	1.5		J
1,2,3,6,7,8-HxCDD	1700	pg/g	1.0		J
1,2,3,7,8,9-HxCDD	370	pg/g	0.99		J
1,2,3,4,7,8-HxCDF	240	pg/g	0.85		J
1,2,3,6,7,8-HxCDF	230	pg/g	7.3		J
2,3,4,6,7,8-HxCDF	140	pg/g	7.3		J
1,2,3,4,6,7,8,9-OCDD	36000	pg/g	2.9		J
1,2,3,4,6,7,8,9-OCDF	4100	pg/g	1.5		J
1,2,3,7,8-PeCDD	310	pg/g	0.73		J
1,2,3,7,8-PeCDF	240	pg/g	0.73		J
2,3,4,7,8-PeCDF	300	pg/g	0.73		J
2,3,7,8-TCDD	2400	pg/g	0.36		J
2,3,7,8-TCDF	510	pg/g	0.20		J

Analysis: 350.2 Sample Date: 08/14/02 Time: 08:15

Compound	Concentration	Units	MDL	MRL	Qualifiers
Ammonia (as N)	250	mg/kg	3	3	

Analysis: 6010 Sample Date: 08/14/02 Time: 08:15

Compound	Concentration	Units	MDL	MRL	Qualifiers
Aluminum	15800	mg/kg	57.9	57.9	
Barium	147	mg/kg	2.89	2.89	
Calcium	137000	mg/kg	579	579	
Cobalt	38.2	mg/kg	2.89	2.89	
Copper	199	mg/kg	5.79	5.79	
Iron	37500	mg/kg	57.9	57.9	
Lead	996	mg/kg	5.79	5.79	
Magnesium	10400	mg/kg	579	579	
Manganese	1270	mg/kg	5.79	5.79	
Molybdenum	325	mg/kg	5.79	5.79	
Potassium	1310	mg/kg	579	579	

SCOEPA00007084

Table 5
Final Validated Sediment Results, Detections Only
RPAC - Portland Site

WDL-101-S Depth: 0.0-0.5 feet

Analysis: 6020 Sample Date: 08/14/02 Time: 08:15

Compound	Concentration	Units	MDL	MRL	Qualifiers
Arsenic	45.3	mg/kg	0.314	2.89	
Cadmium	4.1	mg/kg	0.0205	1.45	
Chromium	336	mg/kg	0.102	2.89	
Lead	1000	mg/kg	0.013	1.45	
Nickel	885	mg/kg	0.0819	2.89	
Vanadium	475	mg/kg	0.22	2.89	
Zinc	732	mg/kg	0.0946	8.68	

Analysis: 7471 Sample Date: 08/14/02 Time: 08:15

Compound	Concentration	Units	MDL	MRL	Qualifiers
Mercury	1.55	mg/kg	0.0394	0.06	J

Analysis: 8081A Sample Date: 08/14/02 Time: 08:15

Compound	Concentration	Units	MDL	MRL	Qualifiers
4,4'-DDD	1	mg/kg	0.588	0.588	N
Endosulfan I	0.523	mg/kg	0.294	0.294	N
Endosulfan sulfate	2.98	mg/kg	0.588	0.588	N

Analysis: 8082 Sample Date: 08/14/02 Time: 08:15

Compound	Concentration	Units	MDL	MRL	Qualifiers
Aroclor 1248	13.9	mg/kg	0.294	0.588	

Analysis: 8151A Sample Date: 08/14/02 Time: 08:15

Compound	Concentration	Units	MDL	MRL	Qualifiers
2,4-D	123	mg/kg	0.00765	0.0196	
2,4-DB	33.4	mg/kg	0.00551	0.0196	
Dichlorprop	1.71	mg/kg	0.00728	0.0196	
MCPA	22.3	mg/kg	0.00863	0.0196	
MCPP	10.5	mg/kg	0.00385	0.0196	
2,4,5-T	0.801	mg/kg	0.00901	0.0295	
2,4,5-TP(Silvex)	0.399	mg/kg	0.00736	0.0295	

SCOEPA00007085

Table 5
Final Validated Sediment Results, Detections Only
RPAC - Portland Site

WDL-101-S Depth: 0.0-0.5 feet

Analysis: 8270C Sample Date: 08/14/02 Time: 08:15

Compound	Concentration	Units	MDL	MRL	Qualifiers
Acenaphthene	0.0467	mg/kg	0.0208	0.042	N
Benzo(a)pyrene	0.104	mg/kg	0.0247	0.042	J
Benzo(ghi)perylene	0.22	mg/kg	0.00693	0.042	
Benzofluoranthenes	0.542	mg/kg	0.0185	0.084	
2-Chlorophenol	0.554	mg/kg	0.063	0.42	J
1,2-Dichlorobenzene	0.128	mg/kg	0.0433	0.42	J
2,4-Dichlorophenol	1.76	mg/kg	0.0462	0.42	J
Bis(2-Ethylhexyl) pthalate	0.215	mg/kg	0.172	0.42	J
Fluoranthene	1.05	mg/kg	0.0196	0.042	
2-Methylnaphthalene	0.0471	mg/kg	0.00655	0.042	
Phenanthrene	0.158	mg/kg	0.00895	0.042	
Pyrene	0.574	mg/kg	0.0139	0.042	
2,4,6-Trichlorophenol	0.248	mg/kg	0.0559	1.05	J

Analysis: 9030B Sample Date: 08/14/02 Time: 08:15

Compound	Concentration	Units	MDL	MRL	Qualifiers
Sulfide	572	mg/kg	2	2	

Analysis: 9060 Sample Date: 08/14/02 Time: 08:15

Compound	Concentration	Units	MDL	MRL	Qualifiers
Total Organic Carbon	184000	mg/kg	256	641	

Analysis: D 2216-90 Sample Date: 08/14/02 Time: 08:15

Compound	Concentration	Units	MDL	MRL	Qualifiers
Percent moisture	65.8	%	0.10		

Table 5
Final Validated Sediment Results, Detections Only
RPAC - Portland Site

WDL-101-S Depth: 0.5-4 feet

Analysis: 160.3 Sample Date: 08/14/02 Time: 09:17

Compound	Concentration	Units	MDL	MRL	Qualifiers
% Solids	38.66	%		0.01	

Analysis: 160.4 Sample Date: 08/14/02 Time: 09:17

Compound	Concentration	Units	MDL	MRL	Qualifiers
Total volatile solids	18.4	%		0.1	

Analysis: 1613B Sample Date: 08/14/02 Time: 09:17

Compound	Concentration	Units	MDL	MRL	Qualifiers
1,2,3,4,6,7,8-HpCDD	7000	pg/g	0.80		J
1,2,3,4,6,7,8-HpCDF	2400	pg/g	0.80		
1,2,3,4,7,8,9-HpCDF	250	pg/g	0.80		
1,2,3,4,7,8-HxCDD	290	pg/g	1.6		
1,2,3,6,7,8-HxCDD	1300	pg/g	1.1		
1,2,3,7,8,9-HxCDD	750	pg/g	1.1		
1,2,3,4,7,8-HxCDF	280	pg/g	0.93		J
1,2,3,6,7,8-HxCDF	420	pg/g	8.0		
1,2,3,7,8,9-HxCDF	33	pg/g	8.0		
2,3,4,6,7,8-HxCDF	230	pg/g	8.0		
1,2,3,4,6,7,8,9-OCDD	33000	pg/g	3.2		J
1,2,3,4,6,7,8,9-OCDF	4900	pg/g	1.6		
1,2,3,7,8-PeCDD	370	pg/g	0.80		
1,2,3,7,8-PeCDF	370	pg/g	0.80		
2,3,4,7,8-PeCDF	370	pg/g	0.80		
2,3,7,8-TCDD	1800	pg/g	0.39		J
2,3,7,8-TCDF	360	pg/g	0.21		

Analysis: 350.2 Sample Date: 08/14/02 Time: 09:17

Compound	Concentration	Units	MDL	MRL	Qualifiers
Ammonia (as N)	290	mg/kg	4	4	

Analysis: 6010 Sample Date: 08/14/02 Time: 09:17

Compound	Concentration	Units	MDL	MRL	Qualifiers
Aluminum	15100	mg/kg	35.3	35.3	
Barium	171	mg/kg	1.76	1.76	
Calcium	126000	mg/kg	353	353	
Cobalt	20.7	mg/kg	1.76	1.76	
Copper	63.2	mg/kg	3.53	3.53	
Iron	30400	mg/kg	35.3	35.3	
Lead	888	mg/kg	3.53	3.53	
Magnesium	4710	mg/kg	353	353	
Manganese	932	mg/kg	3.53	3.53	
Molybdenum	291	mg/kg	3.53	3.53	
Potassium	1020	mg/kg	353	353	
Sodium	691	mg/kg	353	353	

SCOEPA00007087

Table 5
Final Validated Sediment Results, Detections Only
RPAC - Portland Site

WDL-101-S Depth: 0.5-4 feet

Analysis: 6020 Sample Date: 08/14/02 Time: 09:17

Compound	Concentration	Units	MDL	MRL	Qualifiers
Arsenic	37.4	mg/kg	0.191	1.76	
Cadmium	1.06	mg/kg	0.0125	0.882	
Chromium	143	mg/kg	0.0624	1.76	
Lead	1030	mg/kg	0.00794	0.882	
Nickel	389	mg/kg	0.0499	1.76	
Vanadium	222	mg/kg	0.134	1.76	
Zinc	450	mg/kg	0.0577	5.29	

Analysis: 7471 Sample Date: 08/14/02 Time: 09:17

Compound	Concentration	Units	MDL	MRL	Qualifiers
Mercury	0.544	mg/kg	0.0198	0.0301	J

Analysis: 8081A Sample Date: 08/14/02 Time: 09:17

Compound	Concentration	Units	MDL	MRL	Qualifiers
Heptachlor epoxide	0.292	mg/kg	0.2	0.2	N

Analysis: 8151A Sample Date: 08/14/02 Time: 09:17

Compound	Concentration	Units	MDL	MRL	Qualifiers
2,4-D	93.8	mg/kg	0.00511	0.0131	
2,4-DB	63.3	mg/kg	0.00368	0.0131	
Dichlorprop	0.912	mg/kg	0.00486	0.0131	
MCPA	8.86	mg/kg	0.00576	0.0131	
MCPP	2.59	mg/kg	0.00257	0.0131	
Pentachlorophenol	0.142	mg/kg	0.00377	0.0131	J
2,4,5-T	0.48	mg/kg	0.00602	0.0197	J

Analysis: 8260B Sample Date: 08/14/02 Time: 09:17

Compound	Concentration	Units	MDL	MRL	Qualifiers
1,2-Dichlorobenzene	1.19	mg/kg	0.397	0.794	
1,4-Dichlorobenzene	0.685	mg/kg	0.397	0.794	
Ethylbenzene	0.797	mg/kg	0.397	0.794	
Naphthalene	0.86	mg/kg	0.397	0.794	
1,2,4-Trimethylbenzene	1.21	mg/kg	0.397	0.794	J
1,3,5-Trimethylbenzene	0.601	mg/kg	0.397	0.794	
m,p-Xylene	1.36	mg/kg	0.794	1.59	

SCOEPA00007088

Table 5
Final Validated Sediment Results, Detections Only
RPAC - Portland Site

WDL-101-S Depth: 0.5-4 feet

Analysis: 8270C Sample Date: 08/14/02 Time: 09:17

Compound	Concentration	Units	MDL	MRL	Qualifiers
Acenaphthene	0.654	mg/kg	0.0125	0.0252	
2-Chlorophenol	47.8	mg/kg	0.0378	0.252	J
1,2-Dichlorobenzene	51.3	mg/kg	0.026	0.252	J
1,3-Dichlorobenzene	1.96	mg/kg	0.0353	0.252	
1,4-Dichlorobenzene	13.3	mg/kg	0.0404	0.252	J
2,4-Dichlorophenol	70.6	mg/kg	0.0277	0.252	J,N
Bis(2-Ethylhexyl) pthalate	0.834	mg/kg	0.103	0.252	J
Fluoranthene	2.26	mg/kg	0.0118	0.0252	
2-Methylnaphthalene	3.86	mg/kg	0.00393	0.0252	J
2-Methylphenol	12.9	mg/kg	0.0303	0.252	J
Naphthalene	1.88	mg/kg	0.0118	0.0252	J
Di-n-octyl phthalate	1.06	mg/kg	0.0656	0.252	N
Phenanthrene	0.39	mg/kg	0.00537	0.0252	
Phenol	5.01	mg/kg	0.0504	0.252	J
1,2,4-Trichlorobenzene	0.353	mg/kg	0.0209	0.252	J,N
2,4,5-Trichlorophenol	1.87	mg/kg	0.0454	0.252	J,N
2,4,6-Trichlorophenol	0.465	mg/kg	0.0335	0.631	J,N

Analysis: 9030B Sample Date: 08/14/02 Time: 09:17

Compound	Concentration	Units	MDL	MRL	Qualifiers
Sulfide	2970	mg/kg	2	2	

Analysis: 9060 Sample Date: 08/14/02 Time: 09:17

Compound	Concentration	Units	MDL	MRL	Qualifiers
Total Organic Carbon	26100	mg/kg	268	670	

Analysis: D 2216-90 Sample Date: 08/14/02 Time: 09:17

Compound	Concentration	Units	MDL	MRL	Qualifiers
Percent moisture	68.8	%	0.10		

SCOEPA00007089

Table 5
Final Validated Sediment Results, Detections Only
RPAC - Portland Site

WDL-101-S Depth: 4-6 feet

Analysis: 160.3 Sample Date: 08/14/02 Time: 08:45

Compound	Concentration	Units	MDL	MRL	Qualifiers
% Solids	46.48	%		0.01	

Analysis: 160.4 Sample Date: 08/14/02 Time: 08:45

Compound	Concentration	Units	MDL	MRL	Qualifiers
Total volatile solids	13.9	%		0.1	

Analysis: 1613B Sample Date: 08/14/02 Time: 08:45

Compound	Concentration	Units	MDL	MRL	Qualifiers
1,2,3,4,6,7,8-HpCDD	31000	pg/g	0.59		J
1,2,3,4,6,7,8-HpCDF	81000	pg/g	0.59		J
1,2,3,4,7,8,9-HpCDF	6600	pg/g	0.59		J
1,2,3,4,7,8-HxCDD	1100	pg/g	1.2		J
1,2,3,6,7,8-HxCDD	5900	pg/g	0.82		J
1,2,3,7,8,9-HxCDD	1800	pg/g	0.80		J
1,2,3,4,7,8-HxCDF	6700	pg/g	0.69		J
1,2,3,6,7,8-HxCDF	10000	pg/g	5.9		J
1,2,3,7,8,9-HxCDF	310	pg/g	5.9		J
2,3,4,6,7,8-HxCDF	8900	pg/g	5.9		J
1,2,3,4,6,7,8,9-OCDD	220000	pg/g	2.3		J
1,2,3,4,6,7,8,9-OCDF	280000	pg/g	1.2		J
1,2,3,7,8-PeCDD	7900	pg/g	0.59		J
1,2,3,7,8-PeCDF	23000	pg/g	0.59		J
2,3,4,7,8-PeCDF	23000	pg/g	0.59		J
2,3,7,8-TCDD	510000	pg/g	0.29		J
2,3,7,8-TCDF	37000	pg/g	0.16		J

Analysis: 350.2 Sample Date: 08/14/02 Time: 08:45

Compound	Concentration	Units	MDL	MRL	Qualifiers
Ammonia (as N)	320	mg/kg	3	3	

Analysis: 6010 Sample Date: 08/14/02 Time: 08:45

Compound	Concentration	Units	MDL	MRL	Qualifiers
Aluminum	19400	mg/kg	39.2	39.2	
Antimony	99.7	mg/kg	19.6	19.6	
Barium	209	mg/kg	1.96	1.96	
Calcium	48600	mg/kg	392	392	
Cobalt	24.7	mg/kg	1.96	1.96	
Copper	134	mg/kg	3.92	3.92	
Iron	56300	mg/kg	39.2	39.2	
Lead	4340	mg/kg	3.92	3.92	
Magnesium	6460	mg/kg	392	392	
Manganese	1100	mg/kg	3.92	3.92	
Molybdenum	249	mg/kg	3.92	3.92	
Potassium	1510	mg/kg	392	392	
Silver	5.42	mg/kg	3.92	3.92	

SCOEPA00007090

Table 5
Final Validated Sediment Results, Detections Only
RPAC - Portland Site

WDL-101-S Depth: 4-6 feet

Analysis: 6020 Sample Date: 08/14/02 Time: 08:45

Compound	Concentration	Units	MDL	MRL	Qualifiers
Arsenic	294	mg/kg	0.213	1.96	
Cadmium	8.45	mg/kg	0.0139	0.981	
Chromium	275	mg/kg	0.0694	1.96	
Lead	4530	mg/kg	0.00883	0.981	
Nickel	321	mg/kg	0.0555	1.96	
Vanadium	128	mg/kg	0.149	1.96	
Zinc	1240	mg/kg	0.0641	5.88	

Analysis: 7471 Sample Date: 08/14/02 Time: 08:45

Compound	Concentration	Units	MDL	MRL	Qualifiers
Mercury	94.9	mg/kg	2.68	4.08	J

Analysis: 8081A Sample Date: 08/14/02 Time: 08:45

Compound	Concentration	Units	MDL	MRL	Qualifiers
4,4'-DDD	18.2	mg/kg	3.98	3.98	N
4,4'-DDT	6.28	mg/kg	3.98	3.98	N
Endrin aldehyde	20.2	mg/kg	3.98	3.98	

Analysis: 8082 Sample Date: 08/14/02 Time: 08:45

Compound	Concentration	Units	MDL	MRL	Qualifiers
Aroclor 1254	4.84	mg/kg	0.155	0.994	

Analysis: 8151A Sample Date: 08/14/02 Time: 08:45

Compound	Concentration	Units	MDL	MRL	Qualifiers
2,4-D	791	mg/kg	0.00556	0.0143	
2,4-DB	21.6	mg/kg	0.00401	0.0143	
MCPA	72	mg/kg	0.00627	0.0143	
2,4,5-T	118	mg/kg	0.00655	0.0214	
2,4,5-TP(Silvex)	14.7	mg/kg	0.00535	0.0214	

SCOEPA00007091

Table 5
Final Validated Sediment Results, Detections Only
RPAC - Portland Site

WDL-101-S Depth: 4-6 feet

Analysis: 8260B Sample Date: 08/14/02 Time: 08:45

Compound	Concentration	Units	MDL	MRL	Qualifiers
sec-Butylbenzene	1.37	mg/kg	0.429	0.857	
Chlorobenzene	2.43	mg/kg	0.429	0.857	
1,2-Dichlorobenzene	268	mg/kg	0.429	0.857	
1,3-Dichlorobenzene	17.7	mg/kg	0.429	0.857	
1,4-Dichlorobenzene	74.4	mg/kg	0.429	0.857	
Ethylbenzene	5.21	mg/kg	0.429	0.857	
Isopropylbenzene	1.71	mg/kg	0.429	0.857	
4-isopropyltoluene	0.806	mg/kg	0.429	0.857	
Naphthalene	0.66	mg/kg	0.429	0.857	
Toluene	5.12	mg/kg	0.429	0.857	
1,2,3-Trichlorobenzene	4.09	mg/kg	0.429	0.857	
1,2,4-Trichlorobenzene	20.4	mg/kg	0.429	0.857	
1,2,4-Trimethylbenzene	29.1	mg/kg	0.429	0.857	
1,3,5-Trimethylbenzene	12.3	mg/kg	0.429	0.857	
m,p-Xylene	19.7	mg/kg	0.857	1.71	
o-Xylene	3.46	mg/kg	0.429	0.857	

Analysis: 8270C Sample Date: 08/14/02 Time: 08:45

Compound	Concentration	Units	MDL	MRL	Qualifiers
Acenaphthene	3.95	mg/kg	0.141	0.285	J
Benzo(a)pyrene	3.69	mg/kg	0.167	0.285	J
Benzo(ghi)perylene	2	mg/kg	0.0471	0.285	J,N
Benzofluoranthenes	4.14	mg/kg	0.126	0.571	J,N
2-Chlorophenol	6.6	mg/kg	0.428	2.85	J
Chrysene	4.64	mg/kg	0.167	0.571	J
1,2-Dichlorobenzene	1150	mg/kg	0.294	2.85	J
1,3-Dichlorobenzene	63	mg/kg	0.399	2.85	J
1,4-Dichlorobenzene	321	mg/kg	0.457	2.85	
2,4-Dichlorophenol	718	mg/kg	0.314	2.85	J
Bis(2-Ethylhexyl) pthalate	5.89	mg/kg	1.17	2.85	J
Fluoranthene	24.3	mg/kg	0.133	0.285	J
Fluorene	6.39	mg/kg	0.133	0.285	J,N
Hexachlorobenzene	59.8	mg/kg	0.314	2.85	J
Indeno(1,2,3-cd)pyrene	1.31	mg/kg	0.0665	0.285	J
2-Methylnaphthalene	23.9	mg/kg	0.0445	0.285	J
Naphthalene	5.47	mg/kg	0.134	0.285	J
Phenanthrene	8.22	mg/kg	0.0608	0.285	J
1,2,4-Trichlorobenzene	38.9	mg/kg	0.237	2.85	J
2,4,5-Trichlorophenol	32.4	mg/kg	0.514	2.85	J
2,4,6-Trichlorophenol	6.49	mg/kg	0.379	7.13	J,N

Analysis: 9030B Sample Date: 08/14/02 Time: 08:45

Compound	Concentration	Units	MDL	MRL	Qualifiers
Sulfide	261	mg/kg	2	2	

SCOEPA00007092

Table 5
Final Validated Sediment Results, Detections Only
RPAC - Portland Site

WDL-101-S Depth: 4-6 feet

Analysis: 9060 Sample Date: 08/14/02 Time: 08:45

Compound	Concentration	Units	MDL	MRL	Qualifiers
Total Organic Carbon	40800	mg/kg	250	625	

Analysis: D 2216-90 Sample Date: 08/14/02 Time: 08:45

Compound	Concentration	Units	MDL	MRL	Qualifiers
Percent moisture	57.7	%	0.10		

Table 5
Final Validated Sediment Results, Detections Only
RPAC - Portland Site

WDL-101-S Depth: 6-8 feet

Analysis: 160.3 Sample Date: 08/14/02 Time: 09:45

Compound	Concentration	Units	MDL	MRL	Qualifiers
% Solids	49.59	%		0.01	

Analysis: 160.4 Sample Date: 08/14/02 Time: 09:45

Compound	Concentration	Units	MDL	MRL	Qualifiers
Total volatile solids	12	%		0.1	

Analysis: 1613B Sample Date: 08/14/02 Time: 09:45

Compound	Concentration	Units	MDL	MRL	Qualifiers
1,2,3,4,6,7,8-HpCDD	450	pg/g	0.48		J
1,2,3,4,6,7,8-HpCDF	1300	pg/g	0.48		J
1,2,3,4,7,8,9-HpCDF	62	pg/g	0.48		J
1,2,3,6,7,8-HxCDD	53	pg/g	0.67		J
1,2,3,4,7,8-HxCDF	81	pg/g	0.56		J
1,2,3,6,7,8-HxCDF	79	pg/g	4.8		J
2,3,4,6,7,8-HxCDF	57	pg/g	4.8		J
1,2,3,4,6,7,8,9-OCDD	4400	pg/g	1.9		J
1,2,3,4,6,7,8,9-OCDF	430	pg/g	0.96		J
1,2,3,7,8-PeCDD	61	pg/g	0.48		J
1,2,3,7,8-PeCDF	150	pg/g	0.48		J
2,3,4,7,8-PeCDF	140	pg/g	0.48		J
2,3,7,8-TCDD	4700	pg/g	0.24		J
2,3,7,8-TCDF	250	pg/g	0.13		J

Analysis: 350.2 Sample Date: 08/14/02 Time: 09:45

Compound	Concentration	Units	MDL	MRL	Qualifiers
Ammonia (as N)	400	mg/kg	4	4	

Analysis: 6010 Sample Date: 08/14/02 Time: 09:45

Compound	Concentration	Units	MDL	MRL	Qualifiers
Aluminum	10700	mg/kg	36.8	36.8	
Antimony	106	mg/kg	18.4	18.4	
Barium	157	mg/kg	1.84	1.84	
Calcium	52100	mg/kg	368	368	
Cobalt	23.5	mg/kg	1.84	1.84	
Copper	228	mg/kg	3.68	3.68	
Iron	32600	mg/kg	36.8	36.8	
Lead	3500	mg/kg	3.68	3.68	
Magnesium	5720	mg/kg	368	368	
Manganese	935	mg/kg	3.68	3.68	
Molybdenum	84.7	mg/kg	3.68	3.68	
Potassium	736	mg/kg	368	368	

SCOEPA00007094

Table 5
Final Validated Sediment Results, Detections Only
RPAC - Portland Site

WDL-101-S Depth: 6-8 feet

Analysis: 6020 Sample Date: 08/14/02 Time: 09:45

Compound	Concentration	Units	MDL	MRL	Qualifiers
Arsenic	402	mg/kg	0.2	1.84	
Cadmium	11.6	mg/kg	0.0131	0.921	
Chromium	239	mg/kg	0.0652	1.84	
Lead	3710	mg/kg	0.00829	0.921	
Nickel	504	mg/kg	0.0521	1.84	
Vanadium	98.1	mg/kg	0.14	1.84	
Zinc	1610	mg/kg	0.0602	5.53	

Analysis: 7471 Sample Date: 08/14/02 Time: 09:45

Compound	Concentration	Units	MDL	MRL	Qualifiers
Mercury	14.8	mg/kg	2.3	3.51	J

Analysis: 8081A Sample Date: 08/14/02 Time: 09:45

Compound	Concentration	Units	MDL	MRL	Qualifiers
4,4'-DDT	18.5	mg/kg	7.96	7.96	

Analysis: 8151A Sample Date: 08/14/02 Time: 09:45

Compound	Concentration	Units	MDL	MRL	Qualifiers
2,4-D	636	mg/kg	0.00521	0.0134	
2,4-DB	28.6	mg/kg	0.00376	0.0134	
MCPA	73.1	mg/kg	0.00588	0.0134	
2,4,5-T	39.3	mg/kg	0.00614	0.0201	

Analysis: 8260B Sample Date: 08/14/02 Time: 09:45

Compound	Concentration	Units	MDL	MRL	Qualifiers
sec-Butylbenzene	2.08	mg/kg	0.406	0.812	
Chlorobenzene	1.1	mg/kg	0.406	0.812	
1,2-Dichlorobenzene	525	mg/kg	0.406	0.812	
1,3-Dichlorobenzene	30.4	mg/kg	0.406	0.812	
1,4-Dichlorobenzene	138	mg/kg	0.406	0.812	
Ethylbenzene	12.6	mg/kg	0.406	0.812	
Isopropylbenzene	3.68	mg/kg	0.406	0.812	
Naphthalene	1.03	mg/kg	0.406	0.812	
Toluene	2.18	mg/kg	0.406	0.812	
1,2,3-Trichlorobenzene	3.54	mg/kg	0.406	0.812	
1,2,4-Trichlorobenzene	19.5	mg/kg	0.406	0.812	
1,2,4-Trimethylbenzene	72.6	mg/kg	0.406	0.812	
1,3,5-Trimethylbenzene	34	mg/kg	0.406	0.812	
m,p-Xylene	56	mg/kg	0.812	1.62	
o-Xylene	8.83	mg/kg	0.406	0.812	

Table 5
Final Validated Sediment Results, Detections Only
RPAC - Portland Site

WDL-101-S Depth: 6-8 feet

Analysis: 8270C Sample Date: 08/14/02 Time: 09:45

Compound	Concentration	Units	MDL	MRL	Qualifiers
Acenaphthene	2.39	mg/kg	0.124	0.251	J,N
Acenaphthylene	1.27	mg/kg	0.109	0.251	J
Anthracene	1.1	mg/kg	0.0632	0.251	J
Benzo(a)pyrene	1.99	mg/kg	0.147	0.251	J
Benzo(ghi)perylene	1.45	mg/kg	0.0414	0.251	J,N
Benzofluoranthenes	4.18	mg/kg	0.11	0.502	J
2-Chlorophenol	6.79	mg/kg	0.376	2.51	
Chrysene	4.79	mg/kg	0.147	0.502	J
Dibenzofuran	1.07	mg/kg	0.291	2.51	J
1,2-Dichlorobenzene	1060	mg/kg	0.258	2.51	J
1,3-Dichlorobenzene	29.5	mg/kg	0.351	2.51	J
1,4-Dichlorobenzene	307	mg/kg	0.401	2.51	
2,4-Dichlorophenol	567	mg/kg	0.276	2.51	
Fluoranthene	7.26	mg/kg	0.117	0.251	J
Hexachlorobenzene	6.85	mg/kg	0.276	2.51	J,N
Indeno(1,2,3-cd)pyrene	0.901	mg/kg	0.0585	0.251	J,N
2-Methylnaphthalene	5.98	mg/kg	0.0391	0.251	J
Naphthalene	1.85	mg/kg	0.117	0.251	J
Phenanthrene	6.96	mg/kg	0.0534	0.251	J
Pyrene	7.46	mg/kg	0.0828	0.251	J
1,2,4-Trichlorobenzene	37.4	mg/kg	0.208	2.51	J
2,4,5-Trichlorophenol	23.3	mg/kg	0.452	2.51	J
2,4,6-Trichlorophenol	12.4	mg/kg	0.334	6.27	J

Analysis: 9060 Sample Date: 08/14/02 Time: 09:45

Compound	Concentration	Units	MDL	MRL	Qualifiers
Total Organic Carbon	66600	mg/kg	275	688	

Analysis: D 2216-90 Sample Date: 08/14/02 Time: 09:45

Compound	Concentration	Units	MDL	MRL	Qualifiers
Percent moisture	47.9	%	0.10		

SCOEPA00007096

Table 5
Final Validated Sediment Results, Detections Only
RPAC - Portland Site

WDL-102-S Depth: 0.0-0.5 feet

Analysis: 160.3 Sample Date: 08/14/02 Time: 11:15

Compound	Concentration	Units	MDL	MRL	Qualifiers
% Solids	37.13	%		0.01	

Analysis: 160.4 Sample Date: 08/14/02 Time: 11:15

Compound	Concentration	Units	MDL	MRL	Qualifiers
Total volatile solids	13.9	%		0.1	

Analysis: 1613B Sample Date: 08/14/02 Time: 11:15

Compound	Concentration	Units	MDL	MRL	Qualifiers
1,2,3,4,6,7,8-HpCDD	5600	pg/g	0.57		J
1,2,3,4,6,7,8-HpCDF	1100	pg/g	0.57		
1,2,3,4,7,8,9-HpCDF	90	pg/g	0.57		J
1,2,3,4,7,8-HxCDD	200	pg/g	1.2		
1,2,3,6,7,8-HxCDD	2900	pg/g	0.80		
1,2,3,7,8,9-HxCDD	1400	pg/g	0.78		
1,2,3,4,7,8-HxCDF	230	pg/g	0.67		J
1,2,3,6,7,8-HxCDF	140	pg/g	5.7		
1,2,3,7,8,9-HxCDF	8.5	pg/g	5.7		
2,3,4,6,7,8-HxCDF	90	pg/g	5.7		
1,2,3,4,6,7,8,9-OCDD	16000	pg/g	2.3		J
1,2,3,4,6,7,8,9-OCDF	3100	pg/g	1.1		
1,2,3,7,8-PeCDD	290	pg/g	0.57		
1,2,3,7,8-PeCDF	180	pg/g	0.57		
2,3,4,7,8-PeCDF	210	pg/g	0.57		
2,3,7,8-TCDD	1600	pg/g	0.28		J
2,3,7,8-TCDF	330	pg/g	0.15		

Analysis: 350.2 Sample Date: 08/14/02 Time: 11:15

Compound	Concentration	Units	MDL	MRL	Qualifiers
Ammonia (as N)	1500	mg/kg	3	3	

Analysis: 6010 Sample Date: 08/14/02 Time: 11:15

Compound	Concentration	Units	MDL	MRL	Qualifiers
Aluminum	14100	mg/kg	47.9	47.9	
Barium	149	mg/kg	2.4	2.4	
Calcium	92500	mg/kg	479	479	
Cobalt	24	mg/kg	2.4	2.4	
Copper	142	mg/kg	4.79	4.79	
Iron	33600	mg/kg	47.9	47.9	
Lead	889	mg/kg	4.79	4.79	
Magnesium	9210	mg/kg	479	479	
Manganese	1080	mg/kg	4.79	4.79	
Molybdenum	485	mg/kg	4.79	4.79	
Potassium	994	mg/kg	479	479	

Table 5
Final Validated Sediment Results, Detections Only
RPAC - Portland Site

WDL-102-S Depth: 0.0-0.5 feet

Analysis: 6020 Sample Date: 08/14/02 Time: 11:15

Compound	Concentration	Units	MDL	MRL	Qualifiers
Arsenic	32	mg/kg	0.26	2.4	
Cadmium	2.66	mg/kg	0.017	1.2	
Chromium	261	mg/kg	0.0848	2.4	
Lead	1000	mg/kg	0.0108	1.2	
Nickel	419	mg/kg	0.0678	2.4	
Vanadium	207	mg/kg	0.182	2.4	
Zinc	700	mg/kg	0.0784	7.19	

Analysis: 7471 Sample Date: 08/14/02 Time: 11:15

Compound	Concentration	Units	MDL	MRL	Qualifiers
Mercury	0.933	mg/kg	0.0261	0.0398	

Analysis: 8081A Sample Date: 08/14/02 Time: 11:15

Compound	Concentration	Units	MDL	MRL	Qualifiers
Heptachlor epoxide	0.602	mg/kg	0.462	0.462	N

Analysis: 8151A Sample Date: 08/14/02 Time: 11:15

Compound	Concentration	Units	MDL	MRL	Qualifiers
2,4-D	68.7	mg/kg	0.00601	0.0154	
2,4-DB	39.3	mg/kg	0.00433	0.0154	
Dichlorprop	1.43	mg/kg	0.00571	0.0154	
MCPA	17	mg/kg	0.00677	0.0154	
MCPP	13	mg/kg	0.00302	0.0154	
Pentachlorophenol	0.074	mg/kg	0.00443	0.0154	
2,4,5-T	0.366	mg/kg	0.00707	0.0231	J
2,4,5-TP(Silvex)	0.366	mg/kg	0.00578	0.0231	

Analysis: 8260B Sample Date: 08/14/02 Time: 11:15

Compound	Concentration	Units	MDL	MRL	Qualifiers
1,2-Dichlorobenzene	0.517	mg/kg	0.442	0.884	J

SCOEPA00007098

Table 5
Final Validated Sediment Results, Detections Only
RPAC - Portland Site

WDL-102-S Depth: 0.0-0.5 feet

Analysis: 8270C Sample Date: 08/14/02 Time: 11:15

Compound	Concentration	Units	MDL	MRL	Qualifiers
Acenaphthene	0.343	mg/kg	0.0153	0.031	J
Anthracene	0.148	mg/kg	0.00781	0.031	J,N
2-Chlorophenol	8.02	mg/kg	0.0465	0.31	J
1,2-Dichlorobenzene	5.36	mg/kg	0.0319	0.31	J
1,3-Dichlorobenzene	0.335	mg/kg	0.0434	0.31	J
1,4-Dichlorobenzene	1.85	mg/kg	0.0496	0.31	J
2,4-Dichlorophenol	48.9	mg/kg	0.0341	0.31	J,N
Dimethylphthalate	0.296	mg/kg	0.0341	0.31	J
Fluoranthene	3.66	mg/kg	0.0145	0.031	J
Fluorene	0.309	mg/kg	0.0145	0.031	J
2-Methylnaphthalene	1.94	mg/kg	0.00483	0.031	J
2-Methylphenol	2.57	mg/kg	0.0372	0.31	J,N
Naphthalene	1.03	mg/kg	0.0145	0.031	J
Phenanthrene	0.505	mg/kg	0.0066	0.031	J
Phenol	2.6	mg/kg	0.062	0.31	J
Pyrene	1.28	mg/kg	0.0102	0.031	J
1,2,4-Trichlorobenzene	0.191	mg/kg	0.0257	0.31	J,N
2,4,5-Trichlorophenol	0.55	mg/kg	0.0558	0.31	J
2,4,6-Trichlorophenol	1.54	mg/kg	0.0412	0.775	J

Analysis: 9030B Sample Date: 08/14/02 Time: 11:15

Compound	Concentration	Units	MDL	MRL	Qualifiers
Sulfide	1100	mg/kg	2	2	

Analysis: 9060 Sample Date: 08/14/02 Time: 11:15

Compound	Concentration	Units	MDL	MRL	Qualifiers
Total Organic Carbon	102000	mg/kg	246	615	

Analysis: D 2216-90 Sample Date: 08/14/02 Time: 11:15

Compound	Concentration	Units	MDL	MRL	Qualifiers
Percent moisture	56.4	%	0.10		

SCOEPA00007099

Table 5
Final Validated Sediment Results, Detections Only
RPAC - Portland Site

WDL-102-S Depth: 0.5-4 feet

Analysis: 160.3 Sample Date: 08/14/02 Time: 11:25

Compound	Concentration	Units	MDL	MRL	Qualifiers
% Solids	31.82	%		0.01	

Analysis: 160.4 Sample Date: 08/14/02 Time: 11:25

Compound	Concentration	Units	MDL	MRL	Qualifiers
Total volatile solids	21.1	%		0.1	

Analysis: 1613B Sample Date: 08/14/02 Time: 11:25

Compound	Concentration	Units	MDL	MRL	Qualifiers
1,2,3,4,6,7,8-HpCDD	4500	pg/g	0.84		
1,2,3,4,6,7,8-HpCDF	1400	pg/g	0.84		
1,2,3,4,7,8,9-HpCDF	100	pg/g	0.84		
1,2,3,4,7,8-HxCDD	110	pg/g	1.7		
1,2,3,6,7,8-HxCDD	390	pg/g	1.2		
1,2,3,7,8,9-HxCDD	260	pg/g	1.1		
1,2,3,4,7,8-HxCDF	180	pg/g	0.98		J
1,2,3,6,7,8-HxCDF	150	pg/g	8.4		
2,3,4,6,7,8-HxCDF	96	pg/g	8.4		
1,2,3,4,6,7,8,9-OCDD	29000	pg/g	3.3		J
1,2,3,4,6,7,8,9-OCDF	4600	pg/g	1.7		
1,2,3,7,8-PeCDD	220	pg/g	0.84		
1,2,3,7,8-PeCDF	210	pg/g	0.84		
2,3,4,7,8-PeCDF	210	pg/g	0.84		
2,3,7,8-TCDD	1700	pg/g	0.41		J
2,3,7,8-TCDF	390	pg/g	0.23		

Analysis: 350.2 Sample Date: 08/14/02 Time: 11:25

Compound	Concentration	Units	MDL	MRL	Qualifiers
Ammonia (as N)	4200	mg/kg	7	7	

Analysis: 6010 Sample Date: 08/14/02 Time: 11:25

Compound	Concentration	Units	MDL	MRL	Qualifiers
Aluminum	14500	mg/kg	56.7	56.7	
Barium	140	mg/kg	2.83	2.83	
Calcium	87800	mg/kg	567	567	
Cobalt	25.1	mg/kg	2.83	2.83	
Copper	163	mg/kg	5.67	5.67	
Iron	43400	mg/kg	56.7	56.7	
Lead	526	mg/kg	5.67	5.67	
Magnesium	14300	mg/kg	567	567	
Manganese	1010	mg/kg	5.67	5.67	
Molybdenum	1190	mg/kg	5.67	5.67	
Potassium	959	mg/kg	567	567	
Sodium	2470	mg/kg	567	567	

SCOEPA00007100

Table 5
Final Validated Sediment Results, Detections Only
RPAC - Portland Site

WDL-102-S Depth: 0.5-4 feet

Analysis: 6020 Sample Date: 08/14/02 Time: 11:25

Compound	Concentration	Units	MDL	MRL	Qualifiers
Arsenic	42.3	mg/kg	0.308	2.83	
Cadmium	3.05	mg/kg	0.0201	1.42	
Chromium	317	mg/kg	0.1	2.83	
Lead	589	mg/kg	0.0128	1.42	
Nickel	450	mg/kg	0.0802	2.83	
Vanadium	200	mg/kg	0.215	2.83	
Zinc	585	mg/kg	0.0927	8.5	

Analysis: 7471 Sample Date: 08/14/02 Time: 11:25

Compound	Concentration	Units	MDL	MRL	Qualifiers
Mercury	0.921	mg/kg	0.0374	0.0569	

Analysis: 8082 Sample Date: 08/14/02 Time: 11:25

Compound	Concentration	Units	MDL	MRL	Qualifiers
Aroclor 1248	3.64	mg/kg	0.0683	0.137	

Analysis: 8151A Sample Date: 08/14/02 Time: 11:25

Compound	Concentration	Units	MDL	MRL	Qualifiers
2,4-D	119	mg/kg	0.00733	0.0188	
2,4-DB	23.8	mg/kg	0.00529	0.0188	
Dichlorprop	0.742	mg/kg	0.00698	0.0188	
MCPA	31.9	mg/kg	0.00827	0.0188	
MCPP	11.3	mg/kg	0.00369	0.0188	
2,4,5-T	0.593	mg/kg	0.00864	0.0283	
2,4,5-TP(Silvex)	0.213	mg/kg	0.00706	0.0283	

Analysis: 8260B Sample Date: 08/14/02 Time: 11:25

Compound	Concentration	Units	MDL	MRL	Qualifiers
Ethylbenzene	1.35	mg/kg	0.561	1.12	
m,p-Xylene	2.82	mg/kg	1.12	2.24	

SCOEPA00007101

Table 5
Final Validated Sediment Results, Detections Only
RPAC - Portland Site

WDL-102-S Depth: 0.5-4 feet

Analysis: 8270C Sample Date: 08/14/02 Time: 11:25

Compound	Concentration	Units	MDL	MRL	Qualifiers
Acenaphthene	0.117	mg/kg	0.0173	0.0349	J
Anthracene	0.12	mg/kg	0.00879	0.0349	J,N
2-Chlorophenol	40.5	mg/kg	0.0523	0.349	J
1,2-Dichlorobenzene	0.477	mg/kg	0.0359	0.349	J
2,4-Dichlorophenol	19.7	mg/kg	0.0384	0.349	J,N
Dimethylphthalate	1.33	mg/kg	0.0384	0.349	J
Bis(2-Ethylhexyl) pthalate	0.808	mg/kg	0.143	0.349	J
Fluoranthene	1.31	mg/kg	0.0163	0.0349	J
Fluorene	0.129	mg/kg	0.0163	0.0349	J
2-Methylnaphthalene	0.317	mg/kg	0.00544	0.0349	J
2-Methylphenol	8.06	mg/kg	0.0419	0.349	J
Naphthalene	0.132	mg/kg	0.0163	0.0349	J
Phenanthrene	0.289	mg/kg	0.00743	0.0349	J
Pyrene	0.451	mg/kg	0.0115	0.0349	J
2,4,6-Trichlorophenol	0.493	mg/kg	0.0464	0.872	J

Analysis: 9030B Sample Date: 08/14/02 Time: 11:25

Compound	Concentration	Units	MDL	MRL	Qualifiers
Sulfide	929	mg/kg	2	2	

Analysis: 9060 Sample Date: 08/14/02 Time: 11:25

Compound	Concentration	Units	MDL	MRL	Qualifiers
Total Organic Carbon	114000	mg/kg	263	658	

Analysis: D 2216-90 Sample Date: 08/14/02 Time: 11:25

Compound	Concentration	Units	MDL	MRL	Qualifiers
Percent moisture	70.4	%	0.10		

Table 5
Final Validated Sediment Results, Detections Only
RPAC - Portland Site

WDL-102-S Depth: 4-7 feet

Analysis: 160.3 Sample Date: 08/14/02 Time: 12:30

Compound	Concentration	Units	MDL	MRL	Qualifiers
% Solids	74.6	%		0.1	

Analysis: 160.4 Sample Date: 08/14/02 Time: 12:30

Compound	Concentration	Units	MDL	MRL	Qualifiers
Total volatile solids	3.4	%		0.1	

Analysis: 1613B Sample Date: 08/14/02 Time: 12:30

Compound	Concentration	Units	MDL	MRL	Qualifiers
1,2,3,4,6,7,8-HpCDD	77	pg/g	0.34		
1,2,3,4,6,7,8-HpCDF	18	pg/g	0.34		
1,2,3,6,7,8-HxCDD	4.8	pg/g	0.47		J
1,2,3,4,7,8-HxCDF	3.7	pg/g	0.39		J
1,2,3,4,6,7,8,9-OCDD	680	pg/g	1.3		
1,2,3,4,6,7,8,9-OCDF	40	pg/g	0.68		
2,3,7,8-TCDD	6.9	pg/g	0.17		
2,3,7,8-TCDF	2.1	pg/g	0.091		

Analysis: 350.2 Sample Date: 08/14/02 Time: 12:30

Compound	Concentration	Units	MDL	MRL	Qualifiers
Ammonia (as N)	620	mg/kg	3	3	

Analysis: 6010 Sample Date: 08/14/02 Time: 12:30

Compound	Concentration	Units	MDL	MRL	Qualifiers
Aluminum	10300	mg/kg	23.7	23.7	
Barium	185	mg/kg	1.19	1.19	
Calcium	2540	mg/kg	237	237	
Cobalt	11.7	mg/kg	1.19	1.19	
Copper	38.1	mg/kg	2.37	2.37	
Iron	23100	mg/kg	23.7	23.7	
Lead	268	mg/kg	2.37	2.37	
Magnesium	2290	mg/kg	237	237	
Manganese	221	mg/kg	2.37	2.37	
Molybdenum	7.63	mg/kg	2.37	2.37	
Potassium	510	mg/kg	237	237	
Sodium	1300	mg/kg	237	237	

Analysis: 6020 Sample Date: 08/14/02 Time: 12:30

Compound	Concentration	Units	MDL	MRL	Qualifiers
Arsenic	12.2	mg/kg	0.129	1.19	
Cadmium	0.444	mg/kg	0.0084	0.593	
Chromium	28.3	mg/kg	0.042	1.19	
Lead	289	mg/kg	0.00534	0.593	
Nickel	19.4	mg/kg	0.0336	1.19	
Vanadium	83.6	mg/kg	0.0901	1.19	
Zinc	277	mg/kg	0.0388	3.56	

SCOEPA00007103

Table 5
Final Validated Sediment Results, Detections Only
RPAC - Portland Site

WDL-102-S Depth: 4-7 feet

Analysis: 7471 Sample Date: 08/14/02 Time: 12:30

Compound	Concentration	Units	MDL	MRL	Qualifiers
Mercury	0.0848	mg/kg	0.0128	0.0194	

Analysis: 8151A Sample Date: 08/14/02 Time: 12:30

Compound	Concentration	Units	MDL	MRL	Qualifiers
2,4-D	1.01	mg/kg	0.00324	0.00833	J
2,4-DB	1.59	mg/kg	0.00234	0.00833	J
MCPA	0.269	mg/kg	0.00366	0.00833	J
MCPP	0.249	mg/kg	0.00163	0.00833	J
2,4,5-TP(Silvex)	0.0175	mg/kg	0.00312	0.0125	

Analysis: 8270C Sample Date: 08/14/02 Time: 12:30

Compound	Concentration	Units	MDL	MRL	Qualifiers
Acenaphthene	0.0284	mg/kg	0.00818	0.0165	
Anthracene	0.0363	mg/kg	0.00416	0.0165	N
Benzo(a)anthracene	0.159	mg/kg	0.0101	0.033	N
Benzo(a)pyrene	0.212	mg/kg	0.0097	0.0165	J,N
Benzo(ghi)perylene	0.237	mg/kg	0.00273	0.0165	
Benzofluoranthenes	0.626	mg/kg	0.00727	0.033	
2-Chlorophenol	0.239	mg/kg	0.0248	0.165	J
Chrysene	0.338	mg/kg	0.0097	0.033	
Dibenzo(a,h)anthracene	0.0641	mg/kg	0.00385	0.0165	N
1,2-Dichlorobenzene	0.0376	mg/kg	0.017	0.165	
2,4-Dichlorophenol	0.564	mg/kg	0.0182	0.165	J
Fluoranthene	0.698	mg/kg	0.00772	0.0165	
Fluorene	0.0257	mg/kg	0.00772	0.0165	N
Indeno(1,2,3-cd)pyrene	0.188	mg/kg	0.00385	0.0165	
2-Methylnaphthalene	0.0213	mg/kg	0.00258	0.0165	
2-Methylphenol	0.38	mg/kg	0.0198	0.165	
Phenanthrene	0.304	mg/kg	0.00352	0.0165	
Pyrene	0.616	mg/kg	0.00545	0.0165	

Analysis: 9030B Sample Date: 08/14/02 Time: 12:30

Compound	Concentration	Units	MDL	MRL	Qualifiers
Sulfide	86.6	mg/kg	2	2	

Analysis: 9060 Sample Date: 08/14/02 Time: 12:30

Compound	Concentration	Units	MDL	MRL	Qualifiers
Total Organic Carbon	12100	mg/kg	280	701	

Analysis: D 2216-90 Sample Date: 08/14/02 Time: 12:30

Compound	Concentration	Units	MDL	MRL	Qualifiers
Percent moisture	26.4	%	0.10		

SCOEPA00007104

Table 5
Final Validated Sediment Results, Detections Only
RPAC - Portland Site

WDL-102-S Depth: 7-9 feet

Analysis: 160.3 Sample Date: 08/14/02 Time: 12:30

Compound	Concentration	Units	MDL	MRL	Qualifiers
% Solids	54.88	%		0.01	

Analysis: 160.4 Sample Date: 08/14/02 Time: 12:30

Compound	Concentration	Units	MDL	MRL	Qualifiers
Total volatile solids	9.3	%		0.1	

Analysis: 1613B Sample Date: 08/14/02 Time: 12:30

Compound	Concentration	Units	MDL	MRL	Qualifiers
1,2,3,4,6,7,8-HpCDD	91	pg/g	0.44		
1,2,3,4,6,7,8-HpCDF	200	pg/g	0.44		
1,2,3,6,7,8-HxCDD	9.0	pg/g	0.62		
1,2,3,4,7,8-HxCDF	6.2	pg/g	0.51		J
1,2,3,6,7,8-HxCDF	6.6	pg/g	4.4		J
2,3,4,6,7,8-HxCDF	4.7	pg/g	4.4		J
1,2,3,4,6,7,8,9-OCDD	860	pg/g	1.8		
1,2,3,4,6,7,8,9-OCDF	150	pg/g	0.89		
1,2,3,7,8-PeCDF	5.0	pg/g	0.44		N - EMPC data
2,3,4,7,8-PeCDF	7.4	pg/g	0.44		J
2,3,7,8-TCDD	110	pg/g	0.22		
2,3,7,8-TCDF	9.0	pg/g	0.12		

Analysis: 350.2 Sample Date: 08/14/02 Time: 12:30

Compound	Concentration	Units	MDL	MRL	Qualifiers
Ammonia (as N)	350	mg/kg	4	4	

Analysis: 6010 Sample Date: 08/14/02 Time: 12:30

Compound	Concentration	Units	MDL	MRL	Qualifiers
Aluminum	24100	mg/kg	32.7	32.7	
Barium	202	mg/kg	1.63	1.63	
Beryllium	0.669	mg/kg	0.654	0.654	
Calcium	4870	mg/kg	327	327	
Cobalt	19.7	mg/kg	1.63	1.63	
Copper	49	mg/kg	3.27	3.27	
Iron	36300	mg/kg	32.7	32.7	
Lead	52.9	mg/kg	3.27	3.27	
Magnesium	5780	mg/kg	327	327	
Manganese	397	mg/kg	3.27	3.27	
Molybdenum	3.99	mg/kg	3.27	3.27	
Potassium	1340	mg/kg	327	327	
Sodium	7050	mg/kg	327	327	

SCOEPA00007105

Table 5
Final Validated Sediment Results, Detections Only
RPAC - Portland Site

WDL-102-S Depth: 7-9 feet

Analysis: 6020 Sample Date: 08/14/02 Time: 12:30

Compound	Concentration	Units	MDL	MRL	Qualifiers
Arsenic	84.3	mg/kg	0.177	1.63	
Cadmium	0.0278	mg/kg	0.0116	0.817	
Chromium	53.8	mg/kg	0.0578	1.63	
Lead	89.4	mg/kg	0.00735	0.817	
Nickel	55.7	mg/kg	0.0462	1.63	
Vanadium	148	mg/kg	0.124	1.63	
Zinc	276	mg/kg	0.0534	4.9	

Analysis: 7471 Sample Date: 08/14/02 Time: 12:30

Compound	Concentration	Units	MDL	MRL	Qualifiers
Mercury	0.394	mg/kg	0.0226	0.0343	

Analysis: 8151A Sample Date: 08/14/02 Time: 12:30

Compound	Concentration	Units	MDL	MRL	Qualifiers
2,4-D	0.244	mg/kg	0.00466	0.012	J
2,4-DB	0.513	mg/kg	0.00336	0.012	J
Pentachlorophenol	0.422	mg/kg	0.00344	0.012	

Analysis: 8260B Sample Date: 08/14/02 Time: 12:30

Compound	Concentration	Units	MDL	MRL	Qualifiers
1,2-Dichlorobenzene	18.4	mg/kg	0.365	0.729	
1,3-Dichlorobenzene	0.512	mg/kg	0.365	0.729	
1,4-Dichlorobenzene	4.13	mg/kg	0.365	0.729	
Ethylbenzene	1.15	mg/kg	0.365	0.729	
1,2,4-Trimethylbenzene	1.35	mg/kg	0.365	0.729	
m,p-Xylene	5.03	mg/kg	0.729	1.46	
o-Xylene	1.2	mg/kg	0.365	0.729	

SCOEPA00007106

Table 5
Final Validated Sediment Results, Detections Only
RPAC - Portland Site

WDL-102-S Depth: 7-9 feet

Analysis: 8270C Sample Date: 08/14/02 Time: 12:30

Compound	Concentration	Units	MDL	MRL	Qualifiers
Acenaphthene	0.881	mg/kg	0.0115	0.0232	
Anthracene	0.889	mg/kg	0.00584	0.0232	
Benzo(a)anthracene	0.547	mg/kg	0.0141	0.0464	
Benzo(a)pyrene	0.545	mg/kg	0.0136	0.0232	J
Benzo(ghi)perylene	0.542	mg/kg	0.00383	0.0232	N
Benzofluoranthenes	1.4	mg/kg	0.0102	0.0464	
2-Chlorophenol	0.292	mg/kg	0.0348	0.232	
Chrysene	1.7	mg/kg	0.0136	0.0464	
1,2-Dichlorobenzene	111	mg/kg	0.0239	0.232	J
1,3-Dichlorobenzene	2.17	mg/kg	0.0325	0.232	
1,4-Dichlorobenzene	31.4	mg/kg	0.0371	0.232	J
2,4-Dichlorophenol	1.54	mg/kg	0.0255	0.232	J,N
Fluoranthene	1.24	mg/kg	0.0108	0.0232	
Indeno(1,2,3-cd)pyrene	0.208	mg/kg	0.0054	0.0232	
Isophorone	0.329	mg/kg	0.0325	0.232	J
2-Methylnaphthalene	0.893	mg/kg	0.00362	0.0232	J
2-Methylphenol	1.53	mg/kg	0.0278	0.232	N
3 & 4-Methylphenol	0.519	mg/kg	0.0343	0.464	J,N
Naphthalene	0.603	mg/kg	0.0109	0.0232	J
Phenanthrene	3.61	mg/kg	0.00494	0.0232	
Phenol	0.137	mg/kg	0.0464	0.232	J,N
Pyrene	3.1	mg/kg	0.00765	0.0232	
2,4,5-Trichlorophenol	0.407	mg/kg	0.0417	0.232	N
2,4,6-Trichlorophenol	0.504	mg/kg	0.0308	0.58	N

Analysis: 9030B Sample Date: 08/14/02 Time: 12:30

Compound	Concentration	Units	MDL	MRL	Qualifiers
Sulfide	124	mg/kg	2	2	

Analysis: 9060 Sample Date: 08/14/02 Time: 12:30

Compound	Concentration	Units	MDL	MRL	Qualifiers
Total Organic Carbon	26700	mg/kg	288	721	

Analysis: D 2216-90 Sample Date: 08/14/02 Time: 12:30

Compound	Concentration	Units	MDL	MRL	Qualifiers
Percent moisture	43.5	%	0.10		

SCOEPA00007107

Table 5
Final Validated Sediment Results, Detections Only
RPAC - Portland Site

WDL-102-S Depth: 9-11 feet

Analysis: 160.3 Sample Date: 08/14/02 Time: 13:05

Compound	Concentration	Units	MDL	MRL	Qualifiers
% Solids	66.47	%		0.01	

Analysis: 160.4 Sample Date: 08/14/02 Time: 13:05

Compound	Concentration	Units	MDL	MRL	Qualifiers
Total volatile solids	5.4	%		0.1	

Analysis: 1613B Sample Date: 08/14/02 Time: 13:05

Compound	Concentration	Units	MDL	MRL	Qualifiers
1,2,3,4,6,7,8,9-OCDD	16	pg/g	1.3		
2,3,7,8-TCDD	3.2	pg/g	0.16		

Analysis: 350.2 Sample Date: 08/14/02 Time: 13:05

Compound	Concentration	Units	MDL	MRL	Qualifiers
Ammonia (as N)	200	mg/kg	3	3	

Analysis: 6010 Sample Date: 08/14/02 Time: 13:05

Compound	Concentration	Units	MDL	MRL	Qualifiers
Aluminum	25000	mg/kg	25.3	25.3	
Barium	168	mg/kg	1.27	1.27	
Beryllium	0.725	mg/kg	0.506	0.506	
Calcium	4410	mg/kg	253	253	
Cobalt	15.2	mg/kg	1.27	1.27	
Copper	51.8	mg/kg	2.53	2.53	
Iron	26500	mg/kg	25.3	25.3	
Lead	55.1	mg/kg	2.53	2.53	
Magnesium	5180	mg/kg	253	253	
Manganese	253	mg/kg	2.53	2.53	
Molybdenum	22.5	mg/kg	2.53	2.53	
Potassium	1220	mg/kg	253	253	
Sodium	7310	mg/kg	253	253	

Analysis: 6020 Sample Date: 08/14/02 Time: 13:05

Compound	Concentration	Units	MDL	MRL	Qualifiers
Arsenic	17.7	mg/kg	0.137	1.27	
Chromium	30.3	mg/kg	0.0448	1.27	
Lead	50.4	mg/kg	0.0057	0.633	
Nickel	25.1	mg/kg	0.0358	1.27	
Vanadium	89	mg/kg	0.0962	1.27	
Zinc	119	mg/kg	0.0414	3.8	

Analysis: 7471 Sample Date: 08/14/02 Time: 13:05

Compound	Concentration	Units	MDL	MRL	Qualifiers
Mercury	0.122	mg/kg	0.019	0.0289	

SCOEPA00007108

Table 5
Final Validated Sediment Results, Detections Only
RPAC - Portland Site

WDL-102-S Depth: 9-11 feet

Analysis: 8081A Sample Date: 08/14/02 Time: 13:05

Compound	Concentration	Units	MDL	MRL	Qualifiers
4,4'-DDD	0.175	mg/kg	0.137	0.137	N

Analysis: 8151A Sample Date: 08/14/02 Time: 13:05

Compound	Concentration	Units	MDL	MRL	Qualifiers
2,4-D	0.583	mg/kg	0.00373	0.00959	
2,4-DB	0.109	mg/kg	0.00269	0.00959	
MCPP	0.0479	mg/kg	0.00188	0.00959	

Analysis: 8270C Sample Date: 08/14/02 Time: 13:05

Compound	Concentration	Units	MDL	MRL	Qualifiers
1,2-Dichlorobenzene	6.19	mg/kg	0.191	1.86	J
1,4-Dichlorobenzene	3.03	mg/kg	0.297	1.86	J
Fluoranthene	0.186	mg/kg	0.0868	0.186	
Pyrene	0.241	mg/kg	0.0613	0.186	

Analysis: 9030B Sample Date: 08/14/02 Time: 13:05

Compound	Concentration	Units	MDL	MRL	Qualifiers
Sulfide	12.5	mg/kg	2	2	

Analysis: 9060 Sample Date: 08/14/02 Time: 13:05

Compound	Concentration	Units	MDL	MRL	Qualifiers
Total Organic Carbon	39700	mg/kg	273	682	

Analysis: D 2216-90 Sample Date: 08/14/02 Time: 13:05

Compound	Concentration	Units	MDL	MRL	Qualifiers
Percent moisture	23.2	%	0.10		

Table 5
Final Validated Sediment Results, Detections Only
RPAC - Portland Site

WDL-103-S Depth: 0.0-0.5 feet

Analysis: 160.3 Sample Date: 08/15/02 Time: 08:30

Compound	Concentration	Units	MDL	MRL	Qualifiers
Dry Weight	28.08	%	0.01	0.01	

Analysis: 160.4 Sample Date: 08/15/02 Time: 08:30

Compound	Concentration	Units	MDL	MRL	Qualifiers
Total volatile solids	23.5	%	0.1	0.1	

Analysis: 1613B Sample Date: 08/15/02 Time: 08:30

Compound	Concentration	Units	MDL	MRL	Qualifiers
1,2,3,4,6,7,8-HpCDD	12000	pg/g	1.0		
1,2,3,4,6,7,8-HpCDF	2800	pg/g	1.0		
1,2,3,4,7,8,9-HpCDF	270	pg/g	1.0		
1,2,3,4,7,8-HxCDD	220	pg/g	2.1		
1,2,3,6,7,8-HxCDD	1400	pg/g	1.5		
1,2,3,7,8,9-HxCDD	450	pg/g	1.4		
1,2,3,4,7,8-HxCDF	470	pg/g	1.2		J
1,2,3,6,7,8-HxCDF	370	pg/g	10		
1,2,3,7,8,9-HxCDF	23	pg/g	10		J
2,3,4,6,7,8-HxCDF	240	pg/g	10		
1,2,3,4,6,7,8,9-OCDD	51000	pg/g	4.1		J
1,2,3,4,6,7,8,9-OCDF	8000	pg/g	2.1		
1,2,3,7,8-PeCDD	490	pg/g	1.0		
1,2,3,7,8-PeCDF	690	pg/g	1.0		
2,3,4,7,8-PeCDF	390	pg/g	1.0		
2,3,7,8-TCDD	2600	pg/g	0.51		
2,3,7,8-TCDF	740	pg/g	0.28		

Analysis: 350.2 Sample Date: 08/15/02 Time: 08:30

Compound	Concentration	Units	MDL	MRL	Qualifiers
Ammonia (as N)	640	mg/kg	12	12	

Analysis: 6010 Sample Date: 08/15/02 Time: 08:30

Compound	Concentration	Units	MDL	MRL	Qualifiers
Aluminum	21700	mg/kg	5.56	61.8	
Barium	218	mg/kg	0.124	3.09	
Calcium	122000	mg/kg	4.14	618	
Cobalt	28	mg/kg	0.309	3.09	
Copper	189	mg/kg	1.42	6.18	
Iron	42000	mg/kg	0.495	61.8	J
Magnesium	10300	mg/kg	6.74	618	
Manganese	1290	mg/kg	1.85	6.18	
Molybdenum	1120	mg/kg	0.989	6.18	
Potassium	1590	mg/kg	55.6	618	
Silver	1.09	mg/kg	0.495	6.18	
Sodium	1280	mg/kg	106	618	

SCOEPA00007110

Table 5
Final Validated Sediment Results, Detections Only
RPAC - Portland Site

WDL-103-S Depth: 0.0-0.5 feet

Analysis: 6020 Sample Date: 08/15/02 Time: 08:30

Compound	Concentration	Units	MDL	MRL	Qualifiers
Arsenic	40	mg/kg	0.35	3.22	
Cadmium	2.96	mg/kg	0.0229	1.61	
Chromium	339	mg/kg	0.114	3.22	
Lead	1490	mg/kg	0.0145	1.61	
Nickel	448	mg/kg	0.0912	3.22	
Vanadium	231	mg/kg	0.245	3.22	
Zinc	797	mg/kg	0.105	9.66	

Analysis: 7471 Sample Date: 08/15/02 Time: 08:30

Compound	Concentration	Units	MDL	MRL	Qualifiers
Mercury	1.15	mg/kg	0.0457	0.0695	

Analysis: 8081A Sample Date: 08/15/02 Time: 08:30

Compound	Concentration	Units	MDL	MRL	Qualifiers
beta-BHC	0.174	mg/kg	0.173	0.173	N
4,4'-DDD	0.714	mg/kg	0.346	0.346	N
Endosulfan II	0.391	mg/kg	0.346	0.346	N

Analysis: 8082 Sample Date: 08/15/02 Time: 08:30

Compound	Concentration	Units	MDL	MRL	Qualifiers
Aroclor 1248	4.02	mg/kg	0.0864	0.173	

Analysis: 8151A Sample Date: 08/15/02 Time: 08:30

Compound	Concentration	Units	MDL	MRL	Qualifiers
2,4-D	34.4	mg/kg	0.00846	0.0217	
2,4-DB	16.1	mg/kg	0.0061	0.0217	
Dichlorprop	0.411	mg/kg	0.00805	0.0217	
MCPA	10.5	mg/kg	0.00955	0.0217	
MCPP	6	mg/kg	0.00426	0.0217	
Pentachlorophenol	0.0391	mg/kg	0.00624	0.0217	
2,4,5-T	0.215	mg/kg	0.00997	0.0326	
2,4,5-TP(Silvex)	0.107	mg/kg	0.00815	0.0326	

SCOEPA00007111

Table 5
Final Validated Sediment Results, Detections Only
RPAC - Portland Site

WDL-103-S Depth: 0.0-0.5 feet

Analysis: 8270C Sample Date: 08/15/02 Time: 08:30

Compound	Concentration	Units	MDL	MRL	Qualifiers
Acenaphthene	0.168	mg/kg	0.023	0.0465	
Anthracene	0.245	mg/kg	0.0117	0.0465	
Benzo(a)pyrene	0.257	mg/kg	0.0273	0.0465	
Benzo(ghi)perylene	0.209	mg/kg	0.00767	0.0465	
Benzofluoranthenes	0.526	mg/kg	0.0205	0.093	
2-Chlorophenol	1.39	mg/kg	0.0697	0.465	
Dibenzofuran	0.116	mg/kg	0.0539	0.465	
1,2-Dichlorobenzene	1.12	mg/kg	0.0479	0.465	
1,4-Dichlorobenzene	0.601	mg/kg	0.0744	0.465	
2,4-Dichlorophenol	11.7	mg/kg	0.0511	0.465	
2,4-Dimethylphenol	0.0635	mg/kg	0.0511	0.465	N
Fluoranthene	0.647	mg/kg	0.0217	0.0465	J
Fluorene	0.248	mg/kg	0.0217	0.0465	
Indeno(1,2,3-cd)pyrene	0.128	mg/kg	0.0581	0.116	J
2-Methylnaphthalene	0.684	mg/kg	0.0581	0.116	
2-Methylphenol	0.99	mg/kg	0.0558	0.465	
3 & 4-Methylphenol	0.112	mg/kg	0.0688	0.93	N
Naphthalene	0.336	mg/kg	0.0218	0.0465	
Pentachlorophenol	0.83	mg/kg	0.0976	0.465	
Phenanthrene	0.761	mg/kg	0.0099	0.0465	
Phenol	1.06	mg/kg	0.093	0.465	
Pyrene	0.989	mg/kg	0.0153	0.0465	
2,4,6-Trichlorophenol	0.684	mg/kg	0.0618	1.16	

Analysis: 9030B Sample Date: 08/15/02 Time: 08:30

Compound	Concentration	Units	MDL	MRL	Qualifiers
Sulfide	22	mg/kg	2	2	

Analysis: 9060 Sample Date: 08/15/02 Time: 08:30

Compound	Concentration	Units	MDL	MRL	Qualifiers
Total Organic Carbon	88500	mg/kg	504	1260	

Analysis: D 2216-90 Sample Date: 08/15/02 Time: 08:30

Compound	Concentration	Units	MDL	MRL	Qualifiers
Percent moisture	76.0	%	0.10		

SCOEPA00007112

Table 5
Final Validated Sediment Results, Detections Only
RPAC - Portland Site

WDL-103-S Depth: 0.5-4 feet

Analysis: 160.3 Sample Date: 08/15/02 Time: 09:30

Compound	Concentration	Units	MDL	MRL	Qualifiers
Dry Weight	73.44	%	0.01	0.01	

Analysis: 160.4 Sample Date: 08/15/02 Time: 09:30

Compound	Concentration	Units	MDL	MRL	Qualifiers
Total volatile solids	4.9	%	0.1	0.1	

Analysis: 1613B Sample Date: 08/15/02 Time: 09:30

Compound	Concentration	Units	MDL	MRL	Qualifiers
1,2,3,4,6,7,8-HpCDD	2000	pg/g	0.71		
1,2,3,4,6,7,8-HpCDF	830	pg/g	0.71		
1,2,3,4,7,8,9-HpCDF	69	pg/g	0.71		
1,2,3,4,7,8-HxCDD	53	pg/g	1.5		
1,2,3,6,7,8-HxCDD	210	pg/g	0.99		
1,2,3,7,8,9-HxCDD	130	pg/g	0.97		
1,2,3,4,7,8-HxCDF	160	pg/g	0.83		J
1,2,3,6,7,8-HxCDF	100	pg/g	7.1		
2,3,4,6,7,8-HxCDF	70	pg/g	7.1		
1,2,3,4,6,7,8,9-OCDD	13000	pg/g	2.8		
1,2,3,4,6,7,8,9-OCDF	2200	pg/g	1.4		
1,2,3,7,8-PeCDD	120	pg/g	0.71		
1,2,3,7,8-PeCDF	130	pg/g	0.71		
2,3,4,7,8-PeCDF	120	pg/g	0.71		
2,3,7,8-TCDD	840	pg/g	0.35		
2,3,7,8-TCDF	250	pg/g	0.19		J

Analysis: 350.2 Sample Date: 08/15/02 Time: 09:30

Compound	Concentration	Units	MDL	MRL	Qualifiers
Ammonia (as N)	140	mg/kg	3	3	

Analysis: 6010 Sample Date: 08/15/02 Time: 09:30

Compound	Concentration	Units	MDL	MRL	Qualifiers
Aluminum	12100	mg/kg	2.1	23.4	
Barium	182	mg/kg	0.0468	1.17	
Calcium	30800	mg/kg	1.57	234	
Cobalt	17.4	mg/kg	0.117	1.17	
Copper	77.5	mg/kg	0.538	2.34	
Iron	30400	mg/kg	0.187	23.4	J
Magnesium	5520	mg/kg	2.55	234	
Manganese	944	mg/kg	0.701	2.34	
Molybdenum	170	mg/kg	0.374	2.34	
Potassium	1110	mg/kg	21	234	
Silver	0.479	mg/kg	0.187	2.34	
Sodium	2090	mg/kg	39.9	234	

Table 5
Final Validated Sediment Results, Detections Only
RPAC - Portland Site

WDL-103-S Depth: 0.5-4 feet

Analysis: 6020 Sample Date: 08/15/02 Time: 09:30

Compound	Concentration	Units	MDL	MRL	Qualifiers
Arsenic	15.4	mg/kg	0.127	1.17	
Cadmium	0.918	mg/kg	0.0083	0.585	
Chromium	169	mg/kg	0.0414	1.17	
Lead	284	mg/kg	0.00526	0.585	
Nickel	131	mg/kg	0.0331	1.17	
Vanadium	79.4	mg/kg	0.0888	1.17	
Zinc	471	mg/kg	0.0382	3.51	

Analysis: 7471 Sample Date: 08/15/02 Time: 09:30

Compound	Concentration	Units	MDL	MRL	Qualifiers
Mercury	0.234	mg/kg	0.0176	0.0268	

Analysis: 8081A Sample Date: 08/15/02 Time: 09:30

Compound	Concentration	Units	MDL	MRL	Qualifiers
4,4'-DDT	0.26	mg/kg	0.126	0.126	

Analysis: 8151A Sample Date: 08/15/02 Time: 09:30

Compound	Concentration	Units	MDL	MRL	Qualifiers
2,4-D	4.45	mg/kg	0.0034	0.00873	
2,4-DB	11.2	mg/kg	0.00245	0.00873	
Dichlorprop	0.0585	mg/kg	0.00323	0.00873	
MCPA	1.27	mg/kg	0.00383	0.00873	
MCPP	1.15	mg/kg	0.00171	0.00873	

Table 5
Final Validated Sediment Results, Detections Only
RPAC - Portland Site

WDL-103-S Depth: 0.5-4 feet

Analysis: 8270C Sample Date: 08/15/02 Time: 09:30

Compound	Concentration	Units	MDL	MRL	Qualifiers
Acenaphthene	0.0862	mg/kg	0.00831	0.0168	
Acenaphthylene	0.0336	mg/kg	0.00732	0.0168	
Anthracene	0.0919	mg/kg	0.00423	0.0168	
Benzo(a)anthracene	0.381	mg/kg	0.021	0.042	
Benzo(a)pyrene	0.456	mg/kg	0.00985	0.0168	
Benzo(ghi)perylene	0.355	mg/kg	0.00277	0.0168	
Benzofluoranthenes	0.791	mg/kg	0.00738	0.0336	
2-Chlorophenol	0.203	mg/kg	0.0252	0.168	
Chrysene	0.409	mg/kg	0.021	0.042	
Dibenzo(a,h)anthracene	0.144	mg/kg	0.00391	0.0168	J
Dibenzofuran	0.0484	mg/kg	0.0195	0.168	
1,2-Dichlorobenzene	1.05	mg/kg	0.0173	0.168	
1,4-Dichlorobenzene	0.342	mg/kg	0.0269	0.168	
2,4-Dichlorophenol	1.28	mg/kg	0.0185	0.168	
Fluoranthene	0.777	mg/kg	0.00784	0.0168	J
Fluorene	0.114	mg/kg	0.00784	0.0168	
Indeno(1,2,3-cd)pyrene	0.14	mg/kg	0.021	0.042	J
2-Methylnaphthalene	0.278	mg/kg	0.021	0.042	
2-Methylphenol	2.07	mg/kg	0.0201	0.168	
Naphthalene	0.22	mg/kg	0.00785	0.0168	
Phenanthrene	0.293	mg/kg	0.00357	0.0168	
Phenol	0.161	mg/kg	0.0336	0.168	
Pyrene	0.579	mg/kg	0.00554	0.0168	
1,2,4-Trichlorobenzene	0.0293	mg/kg	0.0139	0.168	N
2,4,6-Trichlorophenol	0.0489	mg/kg	0.0223	0.42	N

Analysis: 9060 Sample Date: 08/15/02 Time: 09:30

Compound	Concentration	Units	MDL	MRL	Qualifiers
Total Organic Carbon	8450	mg/kg	252	630	

Analysis: D 2216-90 Sample Date: 08/15/02 Time: 09:30

Compound	Concentration	Units	MDL	MRL	Qualifiers
Percent moisture	65.0	%	0.10		

SCOEPA00007115

Table 5
Final Validated Sediment Results, Detections Only
RPAC - Portland Site

WDL-103-S Depth: 4-6 feet

Analysis: 160.3 Sample Date: 08/15/02 Time: 09:30

Compound	Concentration	Units	MDL	MRL	Qualifiers
Dry Weight	45.89	%	0.01	0.01	

Analysis: 160.4 Sample Date: 08/15/02 Time: 09:30

Compound	Concentration	Units	MDL	MRL	Qualifiers
Total volatile solids	1.5	%	0.1	0.1	

Analysis: 1613B Sample Date: 08/15/02 Time: 09:30

Compound	Concentration	Units	MDL	MRL	Qualifiers
1,2,3,4,6,7,8-HpCDD	1000	pg/g	0.49		
1,2,3,4,6,7,8-HpCDF	420	pg/g	0.49		
1,2,3,4,7,8,9-HpCDF	34	pg/g	0.49		
1,2,3,4,7,8-HxCDD	26	pg/g	1.0		
1,2,3,6,7,8-HxCDD	110	pg/g	0.69		
1,2,3,7,8,9-HxCDD	42	pg/g	0.67		
1,2,3,4,7,8-HxCDF	95	pg/g	0.57		J
1,2,3,6,7,8-HxCDF	50	pg/g	4.9		
2,3,4,6,7,8-HxCDF	38	pg/g	4.9		
1,2,3,4,6,7,8,9-OCDD	6800	pg/g	2.0		
1,2,3,4,6,7,8,9-OCDF	1100	pg/g	0.99		
1,2,3,7,8-PeCDD	63	pg/g	0.49		
1,2,3,7,8-PeCDF	73	pg/g	0.49		
2,3,4,7,8-PeCDF	64	pg/g	0.49		
2,3,7,8-TCDD	460	pg/g	0.24		
2,3,7,8-TCDF	140	pg/g	0.13		

Analysis: 350.2 Sample Date: 08/15/02 Time: 09:30

Compound	Concentration	Units	MDL	MRL	Qualifiers
Ammonia (as N)	170	mg/kg	3	3	

Analysis: 6010 Sample Date: 08/15/02 Time: 09:30

Compound	Concentration	Units	MDL	MRL	Qualifiers
Aluminum	11300	mg/kg	3.6	40	
Barium	341	mg/kg	0.08	2	
Calcium	16500	mg/kg	2.68	400	
Cobalt	13.6	mg/kg	0.2	2	
Copper	66.5	mg/kg	0.92	4	
Iron	31200	mg/kg	0.32	40	J
Magnesium	5670	mg/kg	4.36	400	
Manganese	1060	mg/kg	1.2	4	
Molybdenum	88.5	mg/kg	0.64	4	
Potassium	887	mg/kg	36	400	
Silver	0.941	mg/kg	0.32	4	
Sodium	1090	mg/kg	68.3	400	

SCOEPA00007116

Table 5
Final Validated Sediment Results, Detections Only
RPAC - Portland Site

WDL-103-S Depth: 4-6 feet

Analysis: 6020 Sample Date: 08/15/02 Time: 09:30

Compound	Concentration	Units	MDL	MRL	Qualifiers
Arsenic	7.73	mg/kg	0.217	2	
Cadmium	1	mg/kg	0.0142	1	
Chromium	155	mg/kg	0.0708	2	
Lead	210	mg/kg	0.009	1	
Nickel	140	mg/kg	0.0566	2	
Vanadium	66.1	mg/kg	0.152	2	
Zinc	1590	mg/kg	0.0654	6	

Analysis: 7471 Sample Date: 08/15/02 Time: 09:30

Compound	Concentration	Units	MDL	MRL	Qualifiers
Mercury	0.0877	mg/kg	0.0222	0.0338	

Analysis: 8081A Sample Date: 08/15/02 Time: 09:30

Compound	Concentration	Units	MDL	MRL	Qualifiers
Aldrin	0.134	mg/kg	0.101	0.101	N
4,4'-DDD	0.371	mg/kg	0.202	0.202	N

Analysis: 8151A Sample Date: 08/15/02 Time: 09:30

Compound	Concentration	Units	MDL	MRL	Qualifiers
2,4-D	1.59	mg/kg	0.00527	0.0135	
2,4-DB	2	mg/kg	0.0038	0.0135	
MCPA	0.601	mg/kg	0.00595	0.0135	
MCPP	0.455	mg/kg	0.00265	0.0135	

SCOEPA00007117

Table 5
Final Validated Sediment Results, Detections Only
RPAC - Portland Site

WDL-103-S Depth: 4-6 feet

Analysis: 8270C Sample Date: 08/15/02 Time: 09:30

Compound	Concentration	Units	MDL	MRL	Qualifiers
Acenaphthene	0.0485	mg/kg	0.0133	0.0268	
Acenaphthylene	0.0178	mg/kg	0.0117	0.0268	N
Anthracene	0.0536	mg/kg	0.00676	0.0268	
Benzo(a)anthracene	0.27	mg/kg	0.0335	0.067	
Benzo(a)pyrene	0.421	mg/kg	0.0157	0.0268	
Benzo(ghi)perylene	0.37	mg/kg	0.00442	0.0268	
Benzofluoranthenes	0.716	mg/kg	0.0118	0.0536	
2-Chlorophenol	0.0534	mg/kg	0.0402	0.268	
Chrysene	0.395	mg/kg	0.0335	0.067	
Dibenzo(a,h)anthracene	0.163	mg/kg	0.00625	0.0268	J
Dibenzofuran	0.0428	mg/kg	0.0311	0.268	
1,2-Dichlorobenzene	0.552	mg/kg	0.0276	0.268	
1,4-Dichlorobenzene	0.224	mg/kg	0.0429	0.268	
2,4-Dichlorophenol	0.337	mg/kg	0.0295	0.268	
2,4-Dimethylphenol	0.0391	mg/kg	0.0295	0.268	
Fluoranthene	0.54	mg/kg	0.0125	0.0268	J
Fluorene	0.0761	mg/kg	0.0125	0.0268	
Indeno(1,2,3-cd)pyrene	0.426	mg/kg	0.0335	0.067	J
2-Methylnaphthalene	0.157	mg/kg	0.0335	0.067	
2-Methylphenol	0.59	mg/kg	0.0322	0.268	
Naphthalene	0.135	mg/kg	0.0125	0.0268	
Phenanthrene	0.156	mg/kg	0.00571	0.0268	
Pyrene	0.448	mg/kg	0.00885	0.0268	

Analysis: 9030B Sample Date: 08/15/02 Time: 09:30

Compound	Concentration	Units	MDL	MRL	Qualifiers
Sulfide	38	mg/kg	2	2	

Analysis: 9060 Sample Date: 08/15/02 Time: 09:30

Compound	Concentration	Units	MDL	MRL	Qualifiers
Total Organic Carbon	4990	mg/kg	234	586	

Analysis: D 2216-90 Sample Date: 08/15/02 Time: 09:30

Compound	Concentration	Units	MDL	MRL	Qualifiers
Percent moisture	49.4	%	0.10		

SCOEPA00007118

Table 5
Final Validated Sediment Results, Detections Only
RPAC - Portland Site

WDL-103-S Depth: 6-7.5 feet

Analysis: 160.3 Sample Date: 08/15/02 Time: 10:00

Compound	Concentration	Units	MDL	MRL	Qualifiers
Dry Weight	33.31	%	0.01	0.01	

Analysis: 160.4 Sample Date: 08/15/02 Time: 10:00

Compound	Concentration	Units	MDL	MRL	Qualifiers
Total volatile solids	7.1	%	0.1	0.1	

Analysis: 1613B Sample Date: 08/15/02 Time: 10:00

Compound	Concentration	Units	MDL	MRL	Qualifiers
1,2,3,4,6,7,8-HpCDD	7000	pg/g	0.64		J
1,2,3,4,6,7,8-HpCDF	25000	pg/g	0.64		J
1,2,3,4,7,8,9-HpCDF	1200	pg/g	0.64		J
1,2,3,4,7,8-HxCDD	220	pg/g	1.3		J
1,2,3,6,7,8-HxCDD	1100	pg/g	0.89		J
1,2,3,7,8,9-HxCDD	270	pg/g	0.86		J
1,2,3,4,7,8-HxCDF	1700	pg/g	0.74		J
1,2,3,6,7,8-HxCDF	1300	pg/g	6.4		J
1,2,3,7,8,9-HxCDF	70	pg/g	6.4		J
2,3,4,6,7,8-HxCDF	1400	pg/g	6.4		J
1,2,3,4,6,7,8,9-OCDD	58000	pg/g	2.5		J
1,2,3,4,6,7,8,9-OCDF	59000	pg/g	1.3		J
1,2,3,7,8-PeCDD	1300	pg/g	0.64		J
1,2,3,7,8-PeCDF	5900	pg/g	0.64		J
2,3,4,7,8-PeCDF	3100	pg/g	0.64		J
2,3,7,8-TCDD	110000	pg/g	0.31		J
2,3,7,8-TCDF	16000	pg/g	0.17		J

Analysis: 350.2 Sample Date: 08/15/02 Time: 10:00

Compound	Concentration	Units	MDL	MRL	Qualifiers
Ammonia (as N)	420	mg/kg	5	5	

Analysis: 6010 Sample Date: 08/15/02 Time: 10:00

Compound	Concentration	Units	MDL	MRL	Qualifiers
Aluminum	26400	mg/kg	4.69	52.1	
Antimony	51.6	mg/kg	4.69	26	
Barium	406	mg/kg	0.104	2.6	
Calcium	65100	mg/kg	3.49	521	
Cobalt	35.2	mg/kg	0.26	2.6	
Copper	187	mg/kg	1.2	5.21	
Iron	73100	mg/kg	0.417	52.1	J
Magnesium	10800	mg/kg	5.68	521	
Manganese	2400	mg/kg	1.56	5.21	
Molybdenum	313	mg/kg	0.833	5.21	
Potassium	1880	mg/kg	46.8	521	
Silver	2.14	mg/kg	0.417	5.21	
Sodium	9060	mg/kg	89	521	

SCOEPA00007119

Table 5
Final Validated Sediment Results, Detections Only
RPAC - Portland Site

WDL-103-S Depth: 6-7.5 feet

Analysis: 6020 Sample Date: 08/15/02 Time: 10:00

Compound	Concentration	Units	MDL	MRL	Qualifiers
Arsenic	167	mg/kg	0.283	2.6	
Cadmium	4.22	mg/kg	0.0185	1.3	
Chromium	482	mg/kg	0.0922	2.6	
Lead	2270	mg/kg	0.0117	1.3	
Nickel	381	mg/kg	0.0737	2.6	
Vanadium	134	mg/kg	0.198	2.6	
Zinc	1070	mg/kg	0.0852	7.81	

Analysis: 7471 Sample Date: 08/15/02 Time: 10:00

Compound	Concentration	Units	MDL	MRL	Qualifiers
Mercury	0.591	mg/kg	0.0379	0.0577	

Analysis: 8081A Sample Date: 08/15/02 Time: 10:00

Compound	Concentration	Units	MDL	MRL	Qualifiers
4,4'-DDD	41.9	mg/kg	0.586	0.586	N
Methoxychlor	17.2	mg/kg	2.93	2.93	

Analysis: 8151A Sample Date: 08/15/02 Time: 10:00

Compound	Concentration	Units	MDL	MRL	Qualifiers
2,4-D	4.25	mg/kg	0.00738	0.019	J
2,4-DB	1.13	mg/kg	0.00532	0.019	J
MCPA	1.92	mg/kg	0.00833	0.019	J
MCPP	0.273	mg/kg	0.00371	0.019	J
2,4,5-T	0.322	mg/kg	0.00869	0.0284	J

Analysis: 8260B Sample Date: 08/15/02 Time: 10:00

Compound	Concentration	Units	MDL	MRL	Qualifiers
1,2-Dichlorobenzene	29.3	mg/kg	0.549	1.1	
1,3-Dichlorobenzene	1.13	mg/kg	0.549	1.1	
1,4-Dichlorobenzene	7.53	mg/kg	0.549	1.1	
Ethylbenzene	0.975	mg/kg	0.549	1.1	
1,2,4-Trichlorobenzene	0.719	mg/kg	0.549	1.1	
1,2,4-Trimethylbenzene	3.88	mg/kg	0.549	1.1	
1,3,5-Trimethylbenzene	1.44	mg/kg	0.549	1.1	
m,p-Xylene	3.69	mg/kg	1.1	2.2	
o-Xylene	1.04	mg/kg	0.549	1.1	

SCOEPA00007120

Table 5
Final Validated Sediment Results, Detections Only
RPAC - Portland Site

WDL-103-S Depth: 6-7.5 feet

Analysis: 8270C Sample Date: 08/15/02 Time: 10:00

Compound	Concentration	Units	MDL	MRL	Qualifiers
Anthracene	0.285	mg/kg	0.0964	0.382	
Benzo(a)pyrene	1.28	mg/kg	0.224	0.382	
Benzo(ghi)perylene	1.82	mg/kg	0.0631	0.382	
Benzofluoranthenes	1.4	mg/kg	0.168	0.765	
2-Chlorophenol	1.28	mg/kg	0.574	3.82	
Chrysene	0.837	mg/kg	0.478	0.956	
1,2-Dichlorobenzene	7.28	mg/kg	0.394	3.82	
1,4-Dichlorobenzene	3.43	mg/kg	0.612	3.82	
2,4-Dichlorophenol	10.1	mg/kg	0.421	3.82	
Fluoranthene	1.32	mg/kg	0.179	0.382	J
Fluorene	0.423	mg/kg	0.179	0.382	
Indeno(1,2,3-cd)pyrene	1.53	mg/kg	0.478	0.956	J
2-Methylphenol	2.73	mg/kg	0.459	3.82	
Naphthalene	0.221	mg/kg	0.179	0.382	
Phenanthrene	1.01	mg/kg	0.0814	0.382	
Pyrene	1.82	mg/kg	0.126	0.382	
1,2,4-Trichlorobenzene	1.79	mg/kg	0.317	3.82	

Analysis: 9030B Sample Date: 08/15/02 Time: 10:00

Compound	Concentration	Units	MDL	MRL	Qualifiers
Sulfide	200	mg/kg	2	2	

Analysis: 9060 Sample Date: 08/15/02 Time: 10:00

Compound	Concentration	Units	MDL	MRL	Qualifiers
Total Organic Carbon	160000	mg/kg	455	1140	

Analysis: D 2216-90 Sample Date: 08/15/02 Time: 10:00

Compound	Concentration	Units	MDL	MRL	Qualifiers
Percent moisture	60.7	%	0.10		

Table 5
Final Validated Sediment Results, Detections Only
RPAC - Portland Site

WDL-103-S Depth: 7.5-9 feet

Analysis: 160.3 Sample Date: 08/15/02 Time: 10:30

Compound	Concentration	Units	MDL	MRL	Qualifiers
Dry Weight	52.96	%	0.01	0.01	

Analysis: 160.4 Sample Date: 08/15/02 Time: 10:30

Compound	Concentration	Units	MDL	MRL	Qualifiers
Total volatile solids	10.3	%	0.1	0.1	

Analysis: 1613B Sample Date: 08/15/02 Time: 10:30

Compound	Concentration	Units	MDL	MRL	Qualifiers
1,2,3,4,6,7,8-HpCDD	180	pg/g	0.46		
1,2,3,4,6,7,8-HpCDF	430	pg/g	0.46		
1,2,3,4,7,8,9-HpCDF	20	pg/g	0.46		
1,2,3,6,7,8-HxCDD	14	pg/g	0.64		J
1,2,3,4,7,8-HxCDF	67	pg/g	0.54		J
1,2,3,6,7,8-HxCDF	19	pg/g	4.6		
1,2,3,4,6,7,8,9-OCDD	1900	pg/g	1.8		
1,2,3,4,6,7,8,9-OCDF	370	pg/g	0.92		
1,2,3,7,8-PeCDF	15	pg/g	0.46		J
2,3,7,8-TCDD	19	pg/g	0.23		
2,3,7,8-TCDF	7.9	pg/g	0.12		

Analysis: 350.2 Sample Date: 08/15/02 Time: 10:30

Compound	Concentration	Units	MDL	MRL	Qualifiers
Ammonia (as N)	240	mg/kg	5	5	

Analysis: 6010 Sample Date: 08/15/02 Time: 10:30

Compound	Concentration	Units	MDL	MRL	Qualifiers
Aluminum	37700	mg/kg	3.19	35.5	
Barium	191	mg/kg	0.0709	1.77	
Beryllium	0.757	mg/kg	0.0709	0.709	
Calcium	4550	mg/kg	2.38	355	
Cobalt	27	mg/kg	0.177	1.77	
Copper	66.5	mg/kg	0.816	3.55	
Iron	38800	mg/kg	0.284	35.5	J
Magnesium	6950	mg/kg	3.87	355	
Manganese	350	mg/kg	1.06	3.55	
Molybdenum	20.6	mg/kg	0.567	3.55	
Potassium	1560	mg/kg	31.9	355	
Sodium	10600	mg/kg	60.6	355	

Table 5
Final Validated Sediment Results, Detections Only
RPAC - Portland Site

WDL-103-S Depth: 7.5-9 feet

Analysis: 6020 Sample Date: 08/15/02 Time: 10:30

Compound	Concentration	Units	MDL	MRL	Qualifiers
Arsenic	74.2	mg/kg	0.193	1.77	
Chromium	57.1	mg/kg	0.0628	1.77	
Lead	74.1	mg/kg	0.00798	0.886	
Nickel	62.9	mg/kg	0.0502	1.77	
Vanadium	170	mg/kg	0.135	1.77	
Zinc	209	mg/kg	0.058	5.32	

Analysis: 7471 Sample Date: 08/15/02 Time: 10:30

Compound	Concentration	Units	MDL	MRL	Qualifiers
Mercury	0.282	mg/kg	0.0206	0.0314	

Analysis: 8081A Sample Date: 08/15/02 Time: 10:30

Compound	Concentration	Units	MDL	MRL	Qualifiers
Endosulfan I	0.172	mg/kg	0.0369	0.0369	N

Analysis: 8082 Sample Date: 08/15/02 Time: 10:30

Compound	Concentration	Units	MDL	MRL	Qualifiers
Aroclor 1260	0.0309	mg/kg	0.00288	0.0184	

Analysis: 8151A Sample Date: 08/15/02 Time: 10:30

Compound	Concentration	Units	MDL	MRL	Qualifiers
2,4-DB	0.243	mg/kg	0.00318	0.0113	
Pentachlorophenol	0.112	mg/kg	0.00326	0.0113	N
2,4,5-T	0.0499	mg/kg	0.0052	0.017	N

Analysis: 8260B Sample Date: 08/15/02 Time: 10:30

Compound	Concentration	Units	MDL	MRL	Qualifiers
1,2-Dichlorobenzene	63.3	mg/kg	0.348	0.695	
1,3-Dichlorobenzene	2.8	mg/kg	0.348	0.695	
1,4-Dichlorobenzene	18.7	mg/kg	0.348	0.695	
Ethylbenzene	2.45	mg/kg	0.348	0.695	
n-Propylbenzene	1.29	mg/kg	0.348	0.695	
Toluene	0.418	mg/kg	0.348	0.695	
1,2,4-Trichlorobenzene	1.27	mg/kg	0.348	0.695	
1,2,4-Trimethylbenzene	8.71	mg/kg	0.348	0.695	
1,3,5-Trimethylbenzene	2.85	mg/kg	0.348	0.695	
m,p-Xylene	9.31	mg/kg	0.695	1.39	
o-Xylene	2.55	mg/kg	0.348	0.695	

SCOEPA00007123

Table 5
Final Validated Sediment Results, Detections Only
RPAC - Portland Site

WDL-103-S Depth: 7.5-9 feet

Analysis: 8270C Sample Date: 08/15/02 Time: 10:30

Compound	Concentration	Units	MDL	MRL	Qualifiers
Acenaphthene	0.73	mg/kg	0.0119	0.0241	
Anthracene	1.71	mg/kg	0.00607	0.0241	
Benzo(a)anthracene	1.02	mg/kg	0.0301	0.0602	
Benzo(ghi)perylene	0.607	mg/kg	0.00397	0.0241	
2-Chlorophenol	1.27	mg/kg	0.0361	0.241	
Chrysene	1.16	mg/kg	0.0301	0.0602	
Dibenzofuran	0.36	mg/kg	0.0279	0.241	
1,2-Dichlorobenzene	30.5	mg/kg	0.0248	0.241	
1,3-Dichlorobenzene	1.01	mg/kg	0.0337	0.241	
1,4-Dichlorobenzene	7.71	mg/kg	0.0385	0.241	
2,4-Dichlorophenol	1.35	mg/kg	0.0265	0.241	
Fluoranthene	1.77	mg/kg	0.0112	0.0241	J
Fluorene	1.49	mg/kg	0.0112	0.0241	
2-Methylnaphthalene	0.635	mg/kg	0.0301	0.0602	
2-Methylphenol	8.49	mg/kg	0.0289	0.241	
3 & 4-Methylphenol	2.96	mg/kg	0.0356	0.481	
Naphthalene	0.489	mg/kg	0.0113	0.0241	
Nitrobenzene	0.092	mg/kg	0.033	0.241	J,N
Phenanthrene	4.21	mg/kg	0.00513	0.0241	
Phenol	1.43	mg/kg	0.0481	0.241	
Pyrene	3.29	mg/kg	0.00794	0.0241	
1,2,4-Trichlorobenzene	0.0672	mg/kg	0.02	0.241	N
2,4,5-Trichlorophenol	0.169	mg/kg	0.0433	0.241	N

Analysis: 9030B Sample Date: 08/15/02 Time: 10:30

Compound	Concentration	Units	MDL	MRL	Qualifiers
Sulfide	9	mg/kg	2	2	

Analysis: 9060 Sample Date: 08/15/02 Time: 10:30

Compound	Concentration	Units	MDL	MRL	Qualifiers
Total Organic Carbon	34700	mg/kg	492	1230	

Analysis: D 2216-90 Sample Date: 08/15/02 Time: 10:30

Compound	Concentration	Units	MDL	MRL	Qualifiers
Percent moisture	45.9	%	0.10		

SCOEPA00007124

Table 5
Final Validated Sediment Results, Detections Only
RPAC - Portland Site

WDL-104-S Depth: 0.0-0.5 feet

Analysis: 160.3 Sample Date: 08/15/02 Time: 10:45

Compound	Concentration	Units	MDL	MRL	Qualifiers
Dry Weight	74.08	%	0.01	0.01	

Analysis: 160.4 Sample Date: 08/15/02 Time: 10:45

Compound	Concentration	Units	MDL	MRL	Qualifiers
Total volatile solids	5.4	%	0.1	0.1	

Analysis: 1613B Sample Date: 08/15/02 Time: 10:45

Compound	Concentration	Units	MDL	MRL	Qualifiers
1,2,3,4,6,7,8-HpCDD	240	pg/g	0.34		
1,2,3,4,6,7,8-HpCDF	87	pg/g	0.34		
1,2,3,4,7,8,9-HpCDF	6.4	pg/g	0.34		J
1,2,3,4,7,8-HxCDD	5.3	pg/g	0.68		J
1,2,3,6,7,8-HxCDD	21	pg/g	0.47		
1,2,3,7,8,9-HxCDD	8.0	pg/g	0.45		
1,2,3,4,7,8-HxCDF	16	pg/g	0.39		J
1,2,3,6,7,8-HxCDF	11	pg/g	3.4		
2,3,4,6,7,8-HxCDF	8.6	pg/g	3.4		
1,2,3,4,6,7,8,9-OCDD	1600	pg/g	1.3		
1,2,3,4,6,7,8,9-OCDF	220	pg/g	0.67		
1,2,3,7,8-PeCDD	14	pg/g	0.34		
1,2,3,7,8-PeCDF	18	pg/g	0.34		
2,3,4,7,8-PeCDF	19	pg/g	0.34		
2,3,7,8-TCDD	87	pg/g	0.17		
2,3,7,8-TCDF	43	pg/g	0.090		

Analysis: 350.2 Sample Date: 08/15/02 Time: 10:45

Compound	Concentration	Units	MDL	MRL	Qualifiers
Ammonia (as N)	200	mg/kg	2	2	

Analysis: 6010 Sample Date: 08/15/02 Time: 10:45

Compound	Concentration	Units	MDL	MRL	Qualifiers
Aluminum	5490	mg/kg	2.2	24.5	
Barium	110	mg/kg	0.0489	1.22	
Boron	18	mg/kg	16.5	48.9	
Calcium	35200	mg/kg	1.64	245	
Cobalt	13.4	mg/kg	0.122	1.22	
Copper	47.5	mg/kg	0.563	2.45	
Iron	18400	mg/kg	0.196	24.5	
Magnesium	29000	mg/kg	2.67	245	
Manganese	3500	mg/kg	0.734	2.45	
Molybdenum	77.4	mg/kg	0.391	2.45	
Potassium	480	mg/kg	22	245	
Silver	0.872	mg/kg	0.196	2.45	
Sodium	433	mg/kg	41.8	245	

Table 5
Final Validated Sediment Results, Detections Only
RPAC - Portland Site

WDL-104-S Depth: 0.0-0.5 feet

Analysis: 6020 Sample Date: 08/15/02 Time: 10:45

Compound	Concentration	Units	MDL	MRL	Qualifiers
Arsenic	4.57	mg/kg	0.133	1.22	
Chromium	297	mg/kg	0.0433	1.22	
Lead	156	mg/kg	0.00551	0.612	
Nickel	237	mg/kg	0.0346	1.22	
Vanadium	55.5	mg/kg	0.093	1.22	
Zinc	86.1	mg/kg	0.04	3.67	

Analysis: 7471 Sample Date: 08/15/02 Time: 10:45

Compound	Concentration	Units	MDL	MRL	Qualifiers
Mercury	0.121	mg/kg	0.0136	0.0208	

Analysis: 8151A Sample Date: 08/15/02 Time: 10:45

Compound	Concentration	Units	MDL	MRL	Qualifiers
2,4-D	2.41	mg/kg	0.00325	0.00835	
2,4-DB	2.21	mg/kg	0.00234	0.00835	
MCPA	0.535	mg/kg	0.00367	0.00835	
MCPP	0.274	mg/kg	0.00164	0.00835	

Analysis: 8260B Sample Date: 08/15/02 Time: 10:45

Compound	Concentration	Units	MDL	MRL	Qualifiers
1,2,4-Trimethylbenzene	0.307	mg/kg	0.268	0.537	

Table 5
Final Validated Sediment Results, Detections Only
RPAC - Portland Site

WDL-104-S Depth: 0.0-0.5 feet

Analysis: 8270C Sample Date: 08/15/02 Time: 10:45

Compound	Concentration	Units	MDL	MRL	Qualifiers
Acenaphthene	0.0476	mg/kg	0.00835	0.0169	
Anthracene	0.0431	mg/kg	0.00425	0.0169	
Benzo(a)anthracene	0.355	mg/kg	0.0211	0.0422	
Benzo(a)pyrene	0.758	mg/kg	0.0099	0.0169	
Benzo(ghi)perylene	0.646	mg/kg	0.00278	0.0169	
Benzofluoranthenes	1.04	mg/kg	0.00742	0.0337	
2-Chlorophenol	0.0369	mg/kg	0.0253	0.169	
Chrysene	0.469	mg/kg	0.0211	0.0422	
1,2-Dichlorobenzene	0.054	mg/kg	0.0174	0.169	J
2,4-Dichlorophenol	0.664	mg/kg	0.0186	0.169	
Bis(2-Ethylhexyl) pthalate	0.187	mg/kg	0.0692	0.169	J
Fluoranthene	0.55	mg/kg	0.00788	0.0169	J
Fluorene	0.0219	mg/kg	0.00788	0.0169	
Indeno(1,2,3-cd)pyrene	0.629	mg/kg	0.0211	0.0422	J
2-Methylnaphthalene	0.0715	mg/kg	0.0211	0.0422	
2-Methylphenol	0.0589	mg/kg	0.0202	0.169	
3 & 4-Methylphenol	0.0257	mg/kg	0.025	0.337	N
Naphthalene	0.0551	mg/kg	0.0079	0.0169	
Phenanthrene	0.127	mg/kg	0.00359	0.0169	
Phenol	0.107	mg/kg	0.0337	0.169	
Pyrene	0.542	mg/kg	0.00557	0.0169	
2,4,6-Trichlorophenol	0.0342	mg/kg	0.0224	0.422	

Analysis: 9030B Sample Date: 08/15/02 Time: 10:45

Compound	Concentration	Units	MDL	MRL	Qualifiers
Sulfide	4	mg/kg	2	2	

Analysis: 9060 Sample Date: 08/15/02 Time: 10:45

Compound	Concentration	Units	MDL	MRL	Qualifiers
Total Organic Carbon	10700	mg/kg	229	573	

Analysis: D 2216-90 Sample Date: 08/15/02 Time: 10:45

Compound	Concentration	Units	MDL	MRL	Qualifiers
Percent moisture	25.5	%	0.10		

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Table 5
Final Validated Sediment Results, Detections Only
RPAC - Portland Site

WDL-104-S Depth: 0.5-4 feet

Analysis: 160.3 Sample Date: 08/15/02 Time: 11:15

Compound	Concentration	Units	MDL	MRL	Qualifiers
Dry Weight	77.86	%	0.01	0.01	

Analysis: 160.4 Sample Date: 08/15/02 Time: 11:15

Compound	Concentration	Units	MDL	MRL	Qualifiers
Total volatile solids	2.5	%	0.1	0.1	

Analysis: 1613B Sample Date: 08/15/02 Time: 11:15

Compound	Concentration	Units	MDL	MRL	Qualifiers
1,2,3,4,6,7,8-HpCDD	67	pg/g	0.31		
1,2,3,4,6,7,8-HpCDF	23	pg/g	0.31		
1,2,3,6,7,8-HxCDD	4.7	pg/g	0.43		J
1,2,3,4,7,8-HxCDF	6.2	pg/g	0.36		J
1,2,3,6,7,8-HxCDF	4.2	pg/g	3.1		J
2,3,4,6,7,8-HxCDF	4.1	pg/g	3.1		J
1,2,3,4,6,7,8,9-OCDD	450	pg/g	1.2		
1,2,3,4,6,7,8,9-OCDF	47	pg/g	0.62		
1,2,3,7,8-PeCDF	7.0	pg/g	0.31		
2,3,4,7,8-PeCDF	6.8	pg/g	0.31		
2,3,7,8-TCDD	16	pg/g	0.15		
2,3,7,8-TCDF	7.2	pg/g	0.083		

Analysis: 350.2 Sample Date: 08/15/02 Time: 11:15

Compound	Concentration	Units	MDL	MRL	Qualifiers
Ammonia (as N)	66	mg/kg	2	2	

Analysis: 6010 Sample Date: 08/15/02 Time: 11:15

Compound	Concentration	Units	MDL	MRL	Qualifiers
Aluminum	2370	mg/kg	2.15	23.9	
Barium	78.5	mg/kg	0.0477	1.19	
Calcium	5690	mg/kg	1.6	239	
Cobalt	14.5	mg/kg	0.119	1.19	
Copper	30.1	mg/kg	0.549	2.39	
Iron	14300	mg/kg	0.191	23.9	
Magnesium	28500	mg/kg	2.6	239	
Manganese	386	mg/kg	0.716	2.39	
Molybdenum	36.1	mg/kg	0.382	2.39	
Potassium	218	mg/kg	21.5	239	
Silver	0.227	mg/kg	0.191	2.39	
Sodium	241	mg/kg	40.8	239	

Table 5
Final Validated Sediment Results, Detections Only
RPAC - Portland Site

WDL-104-S Depth: 0.5-4 feet

Analysis: 6020 Sample Date: 08/15/02 Time: 11:15

Compound	Concentration	Units	MDL	MRL	Qualifiers
Arsenic	1.65	mg/kg	0.13	1.19	
Chromium	85.5	mg/kg	0.0423	1.19	
Lead	48.1	mg/kg	0.00537	0.597	
Nickel	293	mg/kg	0.0338	1.19	
Vanadium	34.3	mg/kg	0.0907	1.19	
Zinc	53	mg/kg	0.039	3.58	

Analysis: 7471 Sample Date: 08/15/02 Time: 11:15

Compound	Concentration	Units	MDL	MRL	Qualifiers
Mercury	0.184	mg/kg	0.0147	0.0223	

Analysis: 8081A Sample Date: 08/15/02 Time: 11:15

Compound	Concentration	Units	MDL	MRL	Qualifiers
Heptachlor epoxide	0.00204	mg/kg	0.00118	0.00118	

Analysis: 8151A Sample Date: 08/15/02 Time: 11:15

Compound	Concentration	Units	MDL	MRL	Qualifiers
2,4-D	8.48	mg/kg	0.00305	0.00784	
2,4-DB	4.67	mg/kg	0.0022	0.00784	
MCPA	1.64	mg/kg	0.00345	0.00784	
MCPP	0.579	mg/kg	0.00154	0.00784	
2,4,5-T	0.0298	mg/kg	0.0036	0.0118	N

Analysis: 8260B Sample Date: 08/15/02 Time: 11:15

Compound	Concentration	Units	MDL	MRL	Qualifiers
1,2-Dichlorobenzene	0.248	mg/kg	0.236	0.473	
n-Propylbenzene	0.433	mg/kg	0.236	0.473	
1,2,4-Trimethylbenzene	6.66	mg/kg	0.236	0.473	
1,3,5-Trimethylbenzene	3.79	mg/kg	0.236	0.473	

Table 5
Final Validated Sediment Results, Detections Only
RPAC - Portland Site

WDL-104-S Depth: 0.5-4 feet

Analysis: 8270C Sample Date: 08/15/02 Time: 11:15

Compound	Concentration	Units	MDL	MRL	Qualifiers
Acenaphthene	0.103	mg/kg	0.00832	0.0168	
Acenaphthylene	0.0124	mg/kg	0.00733	0.0168	
Anthracene	0.0624	mg/kg	0.00423	0.0168	
Benzo(a)anthracene	1.23	mg/kg	0.021	0.042	
Benzo(a)pyrene	1.75	mg/kg	0.00986	0.0168	
Benzo(ghi)perylene	0.118	mg/kg	0.00277	0.0168	
Chrysene	1.57	mg/kg	0.021	0.042	
Dibenzo(a,h)anthracene	1.59	mg/kg	0.00392	0.0168	J
Dibenzofuran	0.0296	mg/kg	0.0195	0.168	
1,2-Dichlorobenzene	0.523	mg/kg	0.0173	0.168	
1,4-Dichlorobenzene	0.0834	mg/kg	0.0269	0.168	
2,4-Dichlorophenol	0.246	mg/kg	0.0185	0.168	
Fluoranthene	1.38	mg/kg	0.00785	0.0168	J
Fluorene	0.0535	mg/kg	0.00785	0.0168	N
Indeno(1,2,3-cd)pyrene	0.335	mg/kg	0.021	0.042	J
Isophorone	0.222	mg/kg	0.0235	0.168	
2-Methylnaphthalene	0.431	mg/kg	0.021	0.042	
3 & 4-Methylphenol	0.325	mg/kg	0.0249	0.336	N
Naphthalene	0.464	mg/kg	0.00786	0.0168	
Di-n-butylphthalate	0.257	mg/kg	0.146	0.42	J
Phenanthrene	0.256	mg/kg	0.00358	0.0168	
Pyrene	1.5	mg/kg	0.00555	0.0168	

Analysis: 9030B Sample Date: 08/15/02 Time: 11:15

Compound	Concentration	Units	MDL	MRL	Qualifiers
Sulfide	32	mg/kg	2	2	

Analysis: 9060 Sample Date: 08/15/02 Time: 11:15

Compound	Concentration	Units	MDL	MRL	Qualifiers
Total Organic Carbon	4800	mg/kg	244	610	

Analysis: D 2216-90 Sample Date: 08/15/02 Time: 11:15

Compound	Concentration	Units	MDL	MRL	Qualifiers
Percent moisture	19.5	%	0.10		

Table 5
Final Validated Sediment Results, Detections Only
RPAC - Portland Site

WDL-104-S Depth: 4-6 feet

Analysis: 160.3 Sample Date: 08/15/02 Time: 12:00

Compound	Concentration	Units	MDL	MRL	Qualifiers
Dry Weight	59.68	%	0.01	0.01	

Analysis: 160.4 Sample Date: 08/15/02 Time: 12:00

Compound	Concentration	Units	MDL	MRL	Qualifiers
Total volatile solids	0.00079	%	0.00001	0.00001	

Analysis: 1613B Sample Date: 08/15/02 Time: 12:00

Compound	Concentration	Units	MDL	MRL	Qualifiers
1,2,3,4,6,7,8-HpCDD	6300	pg/g	0.45		
1,2,3,4,6,7,8-HpCDF	1100	pg/g	0.45		
1,2,3,4,7,8,9-HpCDF	81	pg/g	0.45		
1,2,3,4,7,8-HxCDD	58	pg/g	0.92		
1,2,3,6,7,8-HxCDD	300	pg/g	0.62		
1,2,3,7,8,9-HxCDD	150	pg/g	0.61		
1,2,3,4,7,8-HxCDF	220	pg/g	0.52		J
1,2,3,6,7,8-HxCDF	100	pg/g	4.5		
2,3,4,6,7,8-HxCDF	83	pg/g	4.5		
1,2,3,4,6,7,8,9-OCDD	55000	pg/g	1.8		J
1,2,3,4,6,7,8,9-OCDF	1900	pg/g	0.90		
1,2,3,7,8-PeCDD	61	pg/g	0.45		
1,2,3,7,8-PeCDF	130	pg/g	0.45		
2,3,4,7,8-PeCDF	92	pg/g	0.45		
2,3,7,8-TCDD	1000	pg/g	0.22		
2,3,7,8-TCDF	190	pg/g	0.12		

Analysis: 350.2 Sample Date: 08/15/02 Time: 12:00

Compound	Concentration	Units	MDL	MRL	Qualifiers
Ammonia (as N)	310	mg/kg	3	3	

Analysis: 6010 Sample Date: 08/15/02 Time: 12:00

Compound	Concentration	Units	MDL	MRL	Qualifiers
Aluminum	6520	mg/kg	2.85	31.7	
Barium	108	mg/kg	0.0633	1.58	
Calcium	18100	mg/kg	2.12	317	
Cobalt	19.4	mg/kg	0.158	1.58	
Copper	158	mg/kg	0.729	3.17	
Iron	39100	mg/kg	0.253	31.7	
Magnesium	19300	mg/kg	3.45	317	
Manganese	3740	mg/kg	0.95	3.17	
Molybdenum	306	mg/kg	0.507	3.17	
Potassium	486	mg/kg	28.5	317	
Silver	2.98	mg/kg	0.253	3.17	
Sodium	2250	mg/kg	54.1	317	

Table 5
Final Validated Sediment Results, Detections Only
RPAC - Portland Site

WDL-104-S Depth: 4-6 feet

Analysis: 6020 Sample Date: 08/15/02 Time: 12:00

Compound	Concentration	Units	MDL	MRL	Qualifiers
Arsenic	28.8	mg/kg	0.172	1.58	
Cadmium	3.06	mg/kg	0.0112	0.792	
Chromium	640	mg/kg	0.0561	1.58	
Lead	982	mg/kg	0.00713	0.792	
Nickel	441	mg/kg	0.0448	1.58	
Vanadium	62.7	mg/kg	0.12	1.58	
Zinc	705	mg/kg	0.0518	4.75	

Analysis: 7471 Sample Date: 08/15/02 Time: 12:00

Compound	Concentration	Units	MDL	MRL	Qualifiers
Mercury	0.515	mg/kg	0.0196	0.0299	

Analysis: 8081A Sample Date: 08/15/02 Time: 12:00

Compound	Concentration	Units	MDL	MRL	Qualifiers
4,4'-DDD	1.32	mg/kg	0.161	0.161	
4,4'-DDE	0.536	mg/kg	0.161	0.161	
Dieldrin	0.423	mg/kg	0.161	0.161	

Analysis: 8151A Sample Date: 08/15/02 Time: 12:00

Compound	Concentration	Units	MDL	MRL	Qualifiers
2,4-D	1.41	mg/kg	0.00416	0.0107	
2,4-DB	0.588	mg/kg	0.003	0.0107	
MCPA	1.9	mg/kg	0.00469	0.0107	

Analysis: 8260B Sample Date: 08/15/02 Time: 12:00

Compound	Concentration	Units	MDL	MRL	Qualifiers
1,2-Dichlorobenzene	1.17	mg/kg	0.335	0.67	
Naphthalene	0.346	mg/kg	0.335	0.67	
Toluene	0.504	mg/kg	0.335	0.67	
1,2,4-Trimethylbenzene	1.72	mg/kg	0.335	0.67	
1,3,5-Trimethylbenzene	0.797	mg/kg	0.335	0.67	
m,p-Xylene	0.71	mg/kg	0.67	1.34	

Table 5
Final Validated Sediment Results, Detections Only
RPAC - Portland Site

WDL-104-S Depth: 4-6 feet

Analysis: 8270C Sample Date: 08/15/02 Time: 12:00

Compound	Concentration	Units	MDL	MRL	Qualifiers
Acenaphthene	0.164	mg/kg	0.0105	0.0212	
Benzo(a)anthracene	1.69	mg/kg	0.0265	0.053	
Benzo(a)pyrene	3.07	mg/kg	0.0125	0.0212	
Benzo(ghi)perylene	2.79	mg/kg	0.0035	0.0212	
Benzofluoranthenes	4.78	mg/kg	0.00934	0.0424	
2-Chlorophenol	0.52	mg/kg	0.0318	0.212	
Chrysene	1.99	mg/kg	0.0265	0.053	
Dibenzo(a,h)anthracene	2.52	mg/kg	0.00494	0.0212	J
Dibenzofuran	0.0452	mg/kg	0.0246	0.212	
1,2-Dichlorobenzene	3.58	mg/kg	0.0219	0.212	
1,3-Dichlorobenzene	0.0529	mg/kg	0.0297	0.212	
1,4-Dichlorobenzene	0.823	mg/kg	0.0339	0.212	R
2,4-Dichlorophenol	3.61	mg/kg	0.0233	0.212	
Bis(2-Ethylhexyl) pthalate	0.289	mg/kg	0.087	0.212	J
Fluoranthene	2.08	mg/kg	0.00991	0.0212	J
Fluorene	0.217	mg/kg	0.00991	0.0212	
Indeno(1,2,3-cd)pyrene	3.24	mg/kg	0.0265	0.053	J
2-Methylnaphthalene	0.911	mg/kg	0.0265	0.053	
2-Methylphenol	2.13	mg/kg	0.0255	0.212	
3 & 4-Methylphenol	0.114	mg/kg	0.0314	0.424	N
Naphthalene	1.95	mg/kg	0.00993	0.0212	
Di-n-butylphthalate	0.304	mg/kg	0.185	0.53	J
Phenanthrene	0.705	mg/kg	0.00452	0.0212	
Phenol	6.88	mg/kg	0.0424	0.212	
Pyrene	1.8	mg/kg	0.007	0.0212	
1,2,4-Trichlorobenzene	0.106	mg/kg	0.0176	0.212	
2,4,5-Trichlorophenol	0.0402	mg/kg	0.0382	0.212	N

Analysis: 9030B Sample Date: 08/15/02 Time: 12:00

Compound	Concentration	Units	MDL	MRL	Qualifiers
Sulfide	210	mg/kg	2	2	

Analysis: 9060 Sample Date: 08/15/02 Time: 12:00

Compound	Concentration	Units	MDL	MRL	Qualifiers
Total Organic Carbon	33900	mg/kg	513	1280	

Analysis: D 2216-90 Sample Date: 08/15/02 Time: 12:00

Compound	Concentration	Units	MDL	MRL	Qualifiers
Percent moisture	44.3	%	0.10		

Table 5
Final Validated Sediment Results, Detections Only
RPAC - Portland Site

WDL-104-S Depth: 6-7.5 feet

Analysis: 160.3 Sample Date: 08/15/02 Time: 12:00

Compound	Concentration	Units	MDL	MRL	Qualifiers
Dry Weight	69.50	%	0.01	0.01	

Analysis: 160.4 Sample Date: 08/15/02 Time: 12:00

Compound	Concentration	Units	MDL	MRL	Qualifiers
Total volatile solids	3.7	%	0.1	0.1	

Analysis: 1613B Sample Date: 08/15/02 Time: 12:00

Compound	Concentration	Units	MDL	MRL	Qualifiers
1,2,3,4,6,7,8-HpCDD	52	pg/g	0.35		
1,2,3,4,6,7,8-HpCDF	53	pg/g	0.35		
1,2,3,4,6,7,8,9-OCDD	550	pg/g	1.4		
1,2,3,4,6,7,8,9-OCDF	75	pg/g	0.70		
1,2,3,7,8-PeCDF	7.4	pg/g	0.35		
2,3,7,8-TCDD	70	pg/g	0.17		
2,3,7,8-TCDF	10	pg/g	0.093		

Analysis: 350.2 Sample Date: 08/15/02 Time: 12:00

Compound	Concentration	Units	MDL	MRL	Qualifiers
Ammonia (as N)	170	mg/kg	2	2	

Analysis: 6010 Sample Date: 08/15/02 Time: 12:00

Compound	Concentration	Units	MDL	MRL	Qualifiers
Aluminum	10600	mg/kg	2.23	24.8	
Barium	89.6	mg/kg	0.0495	1.24	
Calcium	3990	mg/kg	1.66	248	
Cobalt	18.6	mg/kg	0.124	1.24	
Copper	36.2	mg/kg	0.57	2.48	
Iron	22300	mg/kg	0.198	24.8	
Magnesium	3040	mg/kg	2.7	248	
Manganese	247	mg/kg	0.743	2.48	
Molybdenum	32	mg/kg	0.396	2.48	
Potassium	695	mg/kg	22.3	248	
Silver	0.391	mg/kg	0.198	2.48	
Sodium	2090	mg/kg	42.3	248	

Analysis: 6020 Sample Date: 08/15/02 Time: 12:00

Compound	Concentration	Units	MDL	MRL	Qualifiers
Arsenic	46.4	mg/kg	0.134	1.24	
Chromium	44	mg/kg	0.0438	1.24	
Lead	345	mg/kg	0.00557	0.619	
Nickel	45.2	mg/kg	0.035	1.24	
Vanadium	80.3	mg/kg	0.0941	1.24	
Zinc	103	mg/kg	0.0405	3.71	

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Table 5
Final Validated Sediment Results, Detections Only
RPAC - Portland Site

WDL-104-S Depth: 6-7.5 feet

Analysis: 7471 Sample Date: 08/15/02 Time: 12:00

Compound	Concentration	Units	MDL	MRL	Qualifiers
Mercury	0.345	mg/kg	0.018	0.0274	

Analysis: 8081A Sample Date: 08/15/02 Time: 12:00

Compound	Concentration	Units	MDL	MRL	Qualifiers
4,4'-DDD	0.235	mg/kg	0.135	0.135	N

Analysis: 8151A Sample Date: 08/15/02 Time: 12:00

Compound	Concentration	Units	MDL	MRL	Qualifiers
2,4-D	1.5	mg/kg	0.00322	0.00826	
2,4-DB	0.437	mg/kg	0.00232	0.00826	
MCPA	1.78	mg/kg	0.00363	0.00826	

Analysis: 8260B Sample Date: 08/15/02 Time: 12:00

Compound	Concentration	Units	MDL	MRL	Qualifiers
Chlorobenzene	0.846	mg/kg	0.274	0.549	
1,2-Dichlorobenzene	4.08	mg/kg	0.274	0.549	
1,3-Dichlorobenzene	0.397	mg/kg	0.274	0.549	
1,4-Dichlorobenzene	1.55	mg/kg	0.274	0.549	
n-Propylbenzene	0.386	mg/kg	0.274	0.549	
1,2,4-Trichlorobenzene	1.42	mg/kg	0.274	0.549	
1,2,4-Trimethylbenzene	1.49	mg/kg	0.274	0.549	
1,3,5-Trimethylbenzene	0.409	mg/kg	0.274	0.549	

Table 5
Final Validated Sediment Results, Detections Only
RPAC - Portland Site

WDL-104-S Depth: 6-7.5 feet

Analysis: 8270C Sample Date: 08/15/02 Time: 12:00

Compound	Concentration	Units	MDL	MRL	Qualifiers
Acenaphthene	1.79	mg/kg	0.0945	0.191	
Acenaphthylene	0.275	mg/kg	0.0833	0.191	
Anthracene	2.53	mg/kg	0.0481	0.191	
Benzo(a)anthracene	2.63	mg/kg	0.239	0.477	
Benzo(a)pyrene	2.33	mg/kg	0.112	0.191	
Benzo(ghi)perylene	1.05	mg/kg	0.0315	0.191	
Benzofluoranthenes	3.25	mg/kg	0.084	0.382	
Chrysene	2.82	mg/kg	0.239	0.477	
1,2-Dichlorobenzene	69.6	mg/kg	0.197	1.91	
1,3-Dichlorobenzene	2.65	mg/kg	0.267	1.91	
1,4-Dichlorobenzene	18.7	mg/kg	0.306	1.91	
2,4-Dichlorophenol	2.32	mg/kg	0.21	1.91	
Fluoranthene	3.43	mg/kg	0.0892	0.191	J
Fluorene	2.64	mg/kg	0.0892	0.191	
Indeno(1,2,3-cd)pyrene	2.17	mg/kg	0.239	0.477	J
2-Methylnaphthalene	1.56	mg/kg	0.239	0.477	
2-Methylphenol	6.22	mg/kg	0.229	1.91	
3 & 4-Methylphenol	0.398	mg/kg	0.283	3.82	N
Naphthalene	0.867	mg/kg	0.0894	0.191	
Phenanthrene	5.71	mg/kg	0.0407	0.191	
Pyrene	5.05	mg/kg	0.063	0.191	
1,2,4-Trichlorobenzene	2.03	mg/kg	0.158	1.91	

Analysis: 9030B Sample Date: 08/15/02 Time: 12:00

Compound	Concentration	Units	MDL	MRL	Qualifiers
Sulfide	110	mg/kg	2	2	

Analysis: 9060 Sample Date: 08/15/02 Time: 12:00

Compound	Concentration	Units	MDL	MRL	Qualifiers
Total Organic Carbon	14000	mg/kg	448	1120	

Analysis: D 2216-90 Sample Date: 08/15/02 Time: 12:00

Compound	Concentration	Units	MDL	MRL	Qualifiers
Percent moisture	28.3	%	0.10		

SCOEPA00007136

Definitions

MDL	Method Detection Limit
MRL	Method Reporting Limit
mg/kg	milligrams per kilogram (ppm)
pg/g	picograms per gram (ppt)

Analytical Qualifiers

U	The analyte was not detected above the method detection limit or quantitation limit. In the case of blank contamination, the analyte is considered to be less than the stated result.
J	The analyte was positively identified, but the associated concentration is an estimate.
N	Presumptive evidence of analyte presence was detected, but not all identification criteria were met. The presence of the analyte and the associated numerical concentration are both uncertain.
R	Results for the analyte are unusable due to serious deficiencies in the sample analysis. The presence or absence of the analyte cannot be verified.

TABLE 6
Final Validated Surface Water Results, Detections Only
RPAC - Portland Site

WDL-101-W

Analysis: 150.1 Sample Date: 08/13/02 Time: 09:30

Compound	Concentration	Units	MDL	MRL	Qualifiers
pH	7.80	SU			

Analysis: 160.2 Sample Date: 08/13/02 Time: 09:30

Compound	Concentration	Units	MDL	MRL	Qualifiers
Total suspended solids	75	mg/l	10	10	

Analysis: 1613B Sample Date: 08/13/02 Time: 09:30

Compound	Concentration	Units	MDL	MRL	Qualifiers
1,2,3,4,6,7,8-HpCDD	780	pg/l	11		
1,2,3,4,6,7,8-HpCDF	380	pg/l	19		J
1,2,3,4,6,7,8,9-OCDD	4300	pg/l	36		
1,2,3,4,6,7,8,9-OCDF	1100	pg/l	61		
2,3,7,8-TCDD	340	pg/l	3.1		J
2,3,7,8-TCDF	67	pg/l	1.2		

Analysis: 2340B Sample Date: 08/13/02 Time: 09:30

Compound	Concentration	Units	MDL	MRL	Qualifiers
Hardness	89	mg/l	0.01	0.01	

Analysis: 300.0 Sample Date: 08/13/02 Time: 09:30

Compound	Concentration	Units	MDL	MRL	Qualifiers
Chloride	99.9	mg/l	1	3	
Sulfate	83.3	mg/l	1	3	

Analysis: 310.1 Sample Date: 08/13/02 Time: 09:30

Compound	Concentration	Units	MDL	MRL	Qualifiers
Alkalinity	270	mg/l	5	5	

Analysis: 6010 Sample Date: 08/13/02 Time: 09:30

Compound	Concentration	Units	MDL	MRL	Qualifiers
Aluminum	1.59	mg/l	0.009	0.1	
Antimony	0.0462	mg/l	0.009	0.05	
Barium	0.0468	mg/l	0.0002	0.005	
Boron	5.04	mg/l	0.0675	0.2	
Calcium	22.5	mg/l	0.0067	1	
Cobalt	0.0011	mg/l	0.0005	0.005	
Copper	0.0203	mg/l	0.0023	0.01	
Iron	3.58	mg/l	0.0008	0.1	
Magnesium	6.7	mg/l	0.0109	1	
Manganese	0.355	mg/l	0.003	0.01	
Molybdenum	6.06	mg/l	0.0016	0.01	
Potassium	16.3	mg/l	0.0899	1	
Silicon dioxide	12	mg/l	0.0075	0.05	
Sodium	219	mg/l	0.171	1	

SCOEPA00007138

TABLE 6
Final Validated Surface Water Results, Detections Only
RPAC - Portland Site

WDL-101-W

Analysis: 6020 Sample Date: 08/13/02 Time: 09:30

Compound	Concentration	Units	MDL	MRL	Qualifiers
Arsenic	0.0222	mg/l	0.000109	0.001	
Cadmium	0.00113	mg/l	0.0000071	0.0005	
Chromium	0.0282	mg/l	0.0000354	0.001	
Lead	0.141	mg/l	0.0000045	0.0005	
Nickel	0.0673	mg/l	0.0000283	0.001	
Vanadium	0.0259	mg/l	0.000076	0.001	
Zinc	0.0689	mg/l	0.0000327	0.003	

Analysis: 8081A Sample Date: 08/13/02 Time: 09:30

Compound	Concentration	Units	MDL	MRL	Qualifiers
Endosulfan I	0.0127	ug/l	0.00952	0.00952	N
Heptachlor epoxide	0.0242	ug/l	0.00952	0.00952	J

Analysis: 8151A Sample Date: 08/13/02 Time: 09:30

Compound	Concentration	Units	MDL	MRL	Qualifiers
2,4-D	1.85	ug/l	0.0448	0.143	
2,4-DB	1.09	ug/l	0.0516	0.143	
MCPA	0.817	ug/l	0.0263	0.0951	
MCPP	6.35	ug/l	0.0352	0.0951	
2,4,5-TP(Silvex)	0.276	ug/l	0.0191	0.0951	

Analysis: 8260B Sample Date: 08/13/02 Time: 09:30

Compound	Concentration	Units	MDL	MRL	Qualifiers
Acetone	7.26	ug/l	2.5	5	

Analysis: 8270C Sample Date: 08/13/02 Time: 09:30

Compound	Concentration	Units	MDL	MRL	Qualifiers
Anthracene	0.123	ug/l	0.0144	0.0958	N
2,4-Dichlorophenol	0.212	ug/l	0.144	0.958	
Bis(2-Ethylhexyl) pthalate	1.24	ug/l	0.623	0.958	J
Fluoranthene	0.156	ug/l	0.0182	0.0958	

SCOEPA00007139

TABLE 6
Final Validated Surface Water Results, Detections Only
RPAC - Portland Site

WDL-102-W

Analysis: 150.1 Sample Date: 08/13/02 Time: 11:30

Compound	Concentration	Units	MDL	MRL	Qualifiers
pH	9.30	SU			

Analysis: 160.2 Sample Date: 08/13/02 Time: 11:30

Compound	Concentration	Units	MDL	MRL	Qualifiers
Total suspended solids	35	mg/l	10	10	

Analysis: 1613B Sample Date: 08/13/02 Time: 11:30

Compound	Concentration	Units	MDL	MRL	Qualifiers
1,2,3,4,6,7,8,9-OCDD	570	pg/l	36		J

Analysis: 2340B Sample Date: 08/13/02 Time: 11:30

Compound	Concentration	Units	MDL	MRL	Qualifiers
Hardness	37	mg/l	0.01	0.01	

Analysis: 300.0 Sample Date: 08/13/02 Time: 11:30

Compound	Concentration	Units	MDL	MRL	Qualifiers
Chloride	79.8	mg/l	1	3	
Sulfate	85.2	mg/l	1	3	

Analysis: 310.1 Sample Date: 08/13/02 Time: 11:30

Compound	Concentration	Units	MDL	MRL	Qualifiers
Alkalinity	170	mg/l	5	5	

Analysis: 6010 Sample Date: 08/13/02 Time: 11:30

Compound	Concentration	Units	MDL	MRL	Qualifiers
Aluminum	0.352	mg/l	0.009	0.1	
Antimony	0.0322	mg/l	0.009	0.05	
Barium	0.0179	mg/l	0.0002	0.005	
Boron	3.94	mg/l	0.0675	0.2	
Calcium	9.17	mg/l	0.0067	1	
Copper	0.0105	mg/l	0.0023	0.01	
Iron	0.539	mg/l	0.0008	0.1	
Magnesium	3.5	mg/l	0.0109	1	
Manganese	0.0614	mg/l	0.003	0.01	
Molybdenum	5.16	mg/l	0.0016	0.01	
Potassium	12.8	mg/l	0.0899	1	
Silicon dioxide	3.25	mg/l	0.0075	0.05	
Sodium	167	mg/l	0.171	1	

SCOEPA00007140

TABLE 6
Final Validated Surface Water Results, Detections Only
RPAC - Portland Site

WDL-102-W

Analysis: 6020 Sample Date: 08/13/02 Time: 11:30

Compound	Concentration	Units	MDL	MRL	Qualifiers
Arsenic	0.0167	mg/l	0.000109	0.001	
Cadmium	0.000832	mg/l	0.0000071	0.0005	
Chromium	0.00915	mg/l	0.0000354	0.001	
Lead	0.00472	mg/l	0.000045	0.0005	
Nickel	0.028	mg/l	0.0000283	0.001	
Vanadium	0.0271	mg/l	0.000076	0.001	
Zinc	0.0175	mg/l	0.0000327	0.003	

Analysis: 8081A Sample Date: 08/13/02 Time: 11:30

Compound	Concentration	Units	MDL	MRL	Qualifiers
beta-BHC	0.0105	ug/l	0.0096	0.0096	J,N
Heptachlor epoxide	0.0105	ug/l	0.0096	0.0096	J,N

Analysis: 8151A Sample Date: 08/13/02 Time: 11:30

Compound	Concentration	Units	MDL	MRL	Qualifiers
2,4-D	0.614	ug/l	0.0452	0.144	
2,4-DB	0.355	ug/l	0.0521	0.144	
MCPP	3.38	ug/l	0.0355	0.096	

Analysis: 8260B Sample Date: 08/13/02 Time: 11:30

Compound	Concentration	Units	MDL	MRL	Qualifiers
Acetone	5.69	ug/l	2.5	5	

Analysis: 8270C Sample Date: 08/13/02 Time: 11:30

Compound	Concentration	Units	MDL	MRL	Qualifiers
2,4-Dichlorophenol	0.25	ug/l	0.143	0.956	

TABLE 6
Final Validated Surface Water Results, Detections Only
RPAC - Portland Site

WDL-103-W

Analysis: 150.1 Sample Date: 08/13/02 Time: 12:15

Compound	Concentration	Units	MDL	MRL	Qualifiers
pH	9.31	SU			

Analysis: 160.2 Sample Date: 08/13/02 Time: 12:15

Compound	Concentration	Units	MDL	MRL	Qualifiers
Total suspended solids	34	mg/l	5	5	

Analysis: 2340B Sample Date: 08/13/02 Time: 12:15

Compound	Concentration	Units	MDL	MRL	Qualifiers
Hardness	45	mg/l	0.01	0.01	

Analysis: 300.0 Sample Date: 08/13/02 Time: 12:15

Compound	Concentration	Units	MDL	MRL	Qualifiers
Chloride	78.5	mg/l	1	3	
Nitrate	0.18	mg/l	0.1	0.3	
Sulfate	85.2	mg/l	1	3	

Analysis: 310.1 Sample Date: 08/13/02 Time: 12:15

Compound	Concentration	Units	MDL	MRL	Qualifiers
Alkalinity	170	mg/l	5	5	

Analysis: 6010 Sample Date: 08/13/02 Time: 12:15

Compound	Concentration	Units	MDL	MRL	Qualifiers
Aluminum	0.623	mg/l	0.009	0.1	
Antimony	0.0262	mg/l	0.009	0.05	
Barium	0.0234	mg/l	0.0002	0.005	
Boron	4.15	mg/l	0.0675	0.2	
Calcium	11.9	mg/l	0.0067	1	
Copper	0.0123	mg/l	0.0023	0.01	
Iron	0.973	mg/l	0.0008	0.1	
Magnesium	3.73	mg/l	0.0109	1	
Manganese	0.086	mg/l	0.003	0.01	
Molybdenum	5.4	mg/l	0.0016	0.01	
Potassium	13.6	mg/l	0.0899	1	
Silicon dioxide	4.82	mg/l	0.0075	0.05	
Sodium	177	mg/l	0.171	1	

Analysis: 6020 Sample Date: 08/13/02 Time: 12:15

Compound	Concentration	Units	MDL	MRL	Qualifiers
Arsenic	0.0174	mg/l	0.000109	0.001	
Cadmium	0.000961	mg/l	0.0000071	0.0005	
Chromium	0.0143	mg/l	0.0000354	0.001	
Lead	0.0787	mg/l	0.0000045	0.0005	
Nickel	0.0358	mg/l	0.0000283	0.001	
Vanadium	0.0283	mg/l	0.000076	0.001	
Zinc	0.0443	mg/l	0.0000327	0.003	

SCOEPA00007142

TABLE 6
Final Validated Surface Water Results, Detections Only
RPAC - Portland Site

WDL-103-W

Analysis: 8151A Sample Date: 08/13/02 Time: 12:15

Compound	Concentration	Units	MDL	MRL	Qualifiers
2,4-D	0.755	ug/l	0.045	0.143	
2,4-DB	0.812	ug/l	0.0518	0.143	
MCPP	3.76	ug/l	0.0354	0.0955	
2,4,5-TP(Silvex)	0.172	ug/l	0.0192	0.0955	

Analysis: 8260B Sample Date: 08/13/02 Time: 12:15

Compound	Concentration	Units	MDL	MRL	Qualifiers
Acetone	6.48	ug/l	2.5	5	

Analysis: 8270C Sample Date: 08/13/02 Time: 12:15

Compound	Concentration	Units	MDL	MRL	Qualifiers
2,4-Dichlorophenol	0.197	ug/l	0.144	0.957	

TABLE 6
Final Validated Surface Water Results, Detections Only
RPAC - Portland Site

NDP-101-W

Analysis: 150.1 Sample Date: 08/13/02 Time: 15:45

Compound	Concentration	Units	MDL	MRL	Qualifiers
pH	6.54	SU			

Analysis: 160.2 Sample Date: 08/13/02 Time: 15:45

Compound	Concentration	Units	MDL	MRL	Qualifiers
Total suspended solids	93	mg/l	10	10	

Analysis: 1613B Sample Date: 08/13/02 Time: 15:45

Compound	Concentration	Units	MDL	MRL	Qualifiers
1,2,3,4,6,7,8,9-OCDD	820	pg/l	36		

Analysis: 2340B Sample Date: 08/13/02 Time: 15:45

Compound	Concentration	Units	MDL	MRL	Qualifiers
Hardness	110	mg/l	0.01	0.01	

Analysis: 300.0 Sample Date: 08/13/02 Time: 15:45

Compound	Concentration	Units	MDL	MRL	Qualifiers
Chloride	14	mg/l	0.1	0.3	
Sulfate	1.56	mg/l	0.1	0.3	

Analysis: 310.1 Sample Date: 08/13/02 Time: 15:45

Compound	Concentration	Units	MDL	MRL	Qualifiers
Alkalinity	160	mg/l	5	5	

Analysis: 6010 Sample Date: 08/13/02 Time: 15:45

Compound	Concentration	Units	MDL	MRL	Qualifiers
Aluminum	1.78	mg/l	0.009	0.1	
Barium	0.0964	mg/l	0.0002	0.005	
Boron	0.121	mg/l	0.0675	0.2	
Calcium	27.2	mg/l	0.0067	1	
Cobalt	0.00952	mg/l	0.0005	0.005	
Copper	0.0111	mg/l	0.0023	0.01	
Iron	22.3	mg/l	0.0008	0.1	
Magnesium	9.38	mg/l	0.0109	1	
Manganese	2.66	mg/l	0.003	0.01	
Molybdenum	0.0441	mg/l	0.0016	0.01	
Potassium	2.27	mg/l	0.0899	1	
Silicon dioxide	35.4	mg/l	0.0075	0.05	
Sodium	25.3	mg/l	0.171	1	

SCOEPA00007144

TABLE 6
Final Validated Surface Water Results, Detections Only
RPAC - Portland Site

NDP-101-W

Analysis: 6020 Sample Date: 08/13/02 Time: 15:45

Compound	Concentration	Units	MDL	MRL	Qualifiers
Arsenic	0.0116	mg/l	0.000109	0.001	J
Cadmium	0.000016	mg/l	0.0000071	0.0005	
Chromium	0.00404	mg/l	0.0000354	0.001	
Lead	0.00527	mg/l	0.0000045	0.0005	
Nickel	0.00441	mg/l	0.0000283	0.001	
Vanadium	0.021	mg/l	0.000076	0.002	J
Zinc	0.0345	mg/l	0.0000327	0.003	

Analysis: 8151A Sample Date: 08/13/02 Time: 15:45

Compound	Concentration	Units	MDL	MRL	Qualifiers
MCPP	0.35	ug/l	0.0359	0.0971	

Analysis: 8260B Sample Date: 08/13/02 Time: 15:45

Compound	Concentration	Units	MDL	MRL	Qualifiers
Acetone	2.95	ug/l	2.5	5	
Benzene	1.47	ug/l	0.5	1	
Naphthalene	5.89	ug/l	0.5	1	
Toluene	0.563	ug/l	0.5	1	

Analysis: 8270C Sample Date: 08/13/02 Time: 15:45

Compound	Concentration	Units	MDL	MRL	Qualifiers
Acenaphthene	9.53	ug/l	0.0154	0.0961	
Anthracene	0.184	ug/l	0.0144	0.0961	
Benzo(a)anthracene	0.141	ug/l	0.0423	0.0961	
Benzo(ghi)perylene	0.163	ug/l	0.0327	0.0961	
Benzofluoranthenes	0.453	ug/l	0.0365	0.192	
Chrysene	0.25	ug/l	0.024	0.0961	
Dibenzofuran	1.01	ug/l	0.134	0.961	
Fluoranthene	1.59	ug/l	0.0183	0.0961	
Fluorene	1.16	ug/l	0.0134	0.0961	
Indeno(1,2,3-cd)pyrene	0.136	ug/l	0.0288	0.0961	
Pyrene	1.57	ug/l	0.0134	0.0961	

SCOEPA00007145

TABLE 6
Final Validated Surface Water Results, Detections Only
RPAC - Portland Site

Definitions

( )	Estimated concentration that is greater than the MDL but less than the MRL.
MDL	Method Detection Limit
MRL	Method Reporting Limit
mg/l	milligrams per liter (ppm)
ug/l	micrograms per liter (ppb)
pg/l	picograms per liter (ppq)

Analytical Qualifiers

U	The analyte was not detected above the method detection limit or quantitation limit. In the case of blank contamination, the analyte is considered to be less than the stated result.
J	The analyte was positively identified, but the associated concentration is an estimate.
N	Presumptive evidence of analyte presence was detected, but not all identification criteria were met. The presence of the analyte and the associated numerical concentration are both uncertain.
R	Results for the analyte are unusable due to serious deficiencies in the sample analysis. The presence or absence of the analyte cannot be verified.

Table 7
Final Validated Soil Results, Detections Only
RPAC - Portland Site

HDD-101 Depth: 0.5-1.5 feet

Analysis: 6010 Sample Date: 08/16/02 Time: 08:30

Compound	Concentration	Units	MDL	MRL	Qualifiers
Aluminum	19400	mg/kg	2.13	23.7	
Barium	156	mg/kg	0.0474	1.18	
Beryllium	0.631	mg/kg	0.0474	0.474	
Calcium	3570	mg/kg	1.59	237	
Cobalt	21	mg/kg	0.118	1.18	
Copper	29.6	mg/kg	0.545	2.37	
Iron	41000	mg/kg	0.189	23.7	
Magnesium	6500	mg/kg	2.58	237	
Manganese	336	mg/kg	0.71	2.37	
Molybdenum	12.5	mg/kg	0.379	2.37	
Potassium	1940	mg/kg	21.3	237	
Sodium	444	mg/kg	40.5	237	

Analysis: 6020 Sample Date: 08/16/02 Time: 08:30

Compound	Concentration	Units	MDL	MRL	Qualifiers
Arsenic	11.8	mg/kg	0.129	1.18	
Chromium	25.2	mg/kg	0.0419	1.18	
Lead	18.8	mg/kg	0.0053	0.592	
Nickel	22	mg/kg	0.0335	1.18	
Vanadium	108	mg/kg	0.09	1.18	
Zinc	107	mg/kg	0.0387	3.55	

Analysis: 8260B Sample Date: 08/16/02 Time: 08:30

Compound	Concentration	Units	MDL	MRL	Qualifiers
Toluene	0.000749	mg/kg	0.000596	0.00119	J
Trichlorofluoromethane	0.00307	mg/kg	0.000596	0.00119	J

Analysis: 8290 Sample Date: 08/16/02 Time: 08:30

Compound	Concentration	Units	MDL	MRL	Qualifiers
1,2,3,4,6,7,8-HpCDD	26	pg/g			J
1,2,3,4,6,7,8-HpCDF	4.1	pg/g			J
1,2,3,4,6,7,8,9-OCDD	240	pg/g			J
1,2,3,4,6,7,8,9-OCDF	11	pg/g			J
2,3,7,8-TCDD	1.2	pg/g			J
2,3,7,8-TCDF	0.99	pg/g			J

Analysis: D 2216-90 Sample Date: 08/16/02 Time: 08:30

Compound	Concentration	Units	MDL	MRL	Qualifiers
Percent moisture	14.9	%			J

Table 7
Final Validated Soil Results, Detections Only
RPAC - Portland Site

HDD-102 Depth: 0.2-1.5 feet

Analysis: 6010 Sample Date: 08/16/02 Time: 10:30

Compound	Concentration	Units	MDL	MRL	Qualifiers
Aluminum	14700	mg/kg	2.06	22.9	
Barium	177	mg/kg	0.0458	1.15	
Calcium	3040	mg/kg	1.53	229	
Cobalt	11.8	mg/kg	0.115	1.15	
Copper	35.5	mg/kg	0.527	2.29	
Iron	35100	mg/kg	0.183	22.9	
Magnesium	4020	mg/kg	2.5	229	
Manganese	284	mg/kg	0.687	2.29	
Molybdenum	15	mg/kg	0.366	2.29	
Potassium	1310	mg/kg	20.6	229	
Sodium	89.9	mg/kg	39.1	229	

Analysis: 6020 Sample Date: 08/16/02 Time: 10:30

Compound	Concentration	Units	MDL	MRL	Qualifiers
Arsenic	46.5	mg/kg	0.124	1.15	
Chromium	32.9	mg/kg	0.0405	1.15	
Lead	43.6	mg/kg	0.00515	0.573	
Nickel	20.1	mg/kg	0.0324	1.15	
Vanadium	101	mg/kg	0.087	1.15	
Zinc	90.7	mg/kg	0.0374	3.44	

Analysis: 7471 Sample Date: 08/16/02 Time: 10:30

Compound	Concentration	Units	MDL	MRL	Qualifiers
Mercury	0.284	mg/kg	0.0118	0.0179	

Analysis: 8081A Sample Date: 08/16/02 Time: 10:30

Compound	Concentration	Units	MDL	MRL	Qualifiers
4,4'-DDD	0.348	mg/kg	0.0433	0.0433	
4,4'-DDE	0.0395	mg/kg	0.00217	0.00217	
4,4'-DDT	0.801	mg/kg	0.0433	0.0433	
Dieldrin	0.00475	mg/kg	0.00217	0.00217	N
Endosulfan sulfate	0.00357	mg/kg	0.00217	0.00217	N
Endrin Ketone	0.00495	mg/kg	0.00217	0.00217	
Heptachlor epoxide	0.00141	mg/kg	0.00108	0.00108	N

Analysis: 8151A Sample Date: 08/16/02 Time: 10:30

Compound	Concentration	Units	MDL	MRL	Qualifiers
2,4-D	0.0229	mg/kg	0.00279	0.00715	

Analysis: 8260B Sample Date: 08/16/02 Time: 10:30

Compound	Concentration	Units	MDL	MRL	Qualifiers
Trichlorofluoromethane	0.0039	mg/kg	0.000752	0.0015	

Table 7
Final Validated Soil Results, Detections Only
RPAC - Portland Site

HDD-102 Depth: 0.2-1.5 feet

Analysis: 8270C Sample Date: 08/16/02 Time: 10:30

Compound	Concentration	Units	MDL	MRL	Qualifiers
Acenaphthylene	0.0339	mg/kg	0.0064	0.0147	J
Anthracene	0.0254	mg/kg	0.0037	0.0147	
Benzo(a)anthracene	0.0671	mg/kg	0.00896	0.0294	
Benzo(a)pyrene	0.201	mg/kg	0.00862	0.0147	J
Benzo(ghi)perylene	0.13	mg/kg	0.00242	0.0147	
Benzofluoranthenes	0.231	mg/kg	0.00646	0.0294	
Benzoic acid	0.327	mg/kg	0.0499	0.734	J
Chrysene	0.149	mg/kg	0.00862	0.0294	
Dibenzo(a,h)anthracene	0.0328	mg/kg	0.00342	0.0147	
Fluoranthene	0.211	mg/kg	0.00686	0.0147	
Indeno(1,2,3-cd)pyrene	0.126	mg/kg	0.00342	0.0147	
2-Methylnaphthalene	0.0241	mg/kg	0.00229	0.0147	J
Naphthalene	0.0452	mg/kg	0.00687	0.0147	J
Phenanthrene	0.0891	mg/kg	0.00313	0.0147	
Pyrene	0.272	mg/kg	0.00485	0.0147	

Analysis: 8290 Sample Date: 08/16/02 Time: 10:30

Compound	Concentration	Units	MDL	MRL	Qualifiers
1,2,3,4,6,7,8-HpCDD	240	pg/g			J
1,2,3,4,6,7,8-HpCDF	200	pg/g			J
1,2,3,4,7,8,9-HpCDF	44	pg/g			J
1,2,3,6,7,8-HxCDD	13	pg/g			J
1,2,3,7,8,9-HxCDD	6.4	pg/g			J
1,2,3,4,7,8-HxCDF	160	pg/g			J
1,2,3,6,7,8-HxCDF	50	pg/g			J
2,3,4,6,7,8-HxCDF	9.80	pg/g			J
1,2,3,4,6,7,8,9-OCDD	2800	pg/g			J
1,2,3,4,6,7,8,9-OCDF	400	pg/g			J
1,2,3,7,8-PeCDF	88	pg/g			J
2,3,4,7,8-PeCDF	35	pg/g			J
2,3,7,8-TCDD	4.1	pg/g			J
2,3,7,8-TCDF	61	pg/g			J

Analysis: D 2216-90 Sample Date: 08/16/02 Time: 10:30

Compound	Concentration	Units	MDL	MRL	Qualifiers
Percent moisture	12.9	%			J

Table 7
Final Validated Soil Results, Detections Only
RPAC - Portland Site

HDD-102 Depth: 5.5-6 feet

Analysis: 8290 Sample Date: 08/16/02 Time: 11:30

Compound	Concentration	Units	MDL	MRL	Qualifiers
1,2,3,4,6,7,8-HpCDD	38	pg/g			J
1,2,3,4,6,7,8-HpCDF	140	pg/g			J
1,2,3,4,7,8,9-HpCDF	46	pg/g			J
1,2,3,4,7,8-HxCDF	470	pg/g			J
1,2,3,6,7,8-HxCDF	140	pg/g			J
1,2,3,7,8,9-HxCDF	8.9	pg/g			J
2,3,4,6,7,8-HxCDF	19	pg/g			J
1,2,3,4,6,7,8,9-OCDD	500	pg/g			J
1,2,3,4,6,7,8,9-OCDF	98	pg/g			J
1,2,3,7,8-PeCDF	380	pg/g			J
2,3,4,7,8-PeCDF	97	pg/g			J
2,3,7,8-TCDD	2.8	pg/g			J
2,3,7,8-TCDF	56	pg/g			J

Analysis: D 2216-90 Sample Date: 08/16/02 Time: 11:30

Compound	Concentration	Units	MDL	MRL	Qualifiers
Percent moisture	30.3	%			J

Table 7
Final Validated Soil Results, Detections Only
RPAC - Portland Site

HDD-103 Depth: 4-5 feet

Analysis: 6010 Sample Date: 08/16/02 Time: 11:00

Compound	Concentration	Units	MDL	MRL	Qualifiers
Aluminum	26600	mg/kg	2.63	29.2	
Barium	152	mg/kg	0.0584	1.46	
Beryllium	0.514	mg/kg	0.0584	0.584	
Calcium	6960	mg/kg	1.95	292	
Cobalt	19.5	mg/kg	0.146	1.46	
Copper	55.3	mg/kg	0.671	2.92	
Iron	38000	mg/kg	0.233	29.2	
Magnesium	6060	mg/kg	3.18	292	
Manganese	391	mg/kg	0.875	2.92	
Molybdenum	3.69	mg/kg	0.467	2.92	
Potassium	1020	mg/kg	26.2	292	
Sodium	1690	mg/kg	49.8	292	

Analysis: 6020 Sample Date: 08/16/02 Time: 11:00

Compound	Concentration	Units	MDL	MRL	Qualifiers
Arsenic	6.36	mg/kg	0.158	1.46	
Chromium	44.9	mg/kg	0.0516	1.46	
Lead	33.5	mg/kg	0.00656	0.729	
Nickel	30.1	mg/kg	0.0413	1.46	
Vanadium	150	mg/kg	0.111	1.46	
Zinc	136	mg/kg	0.0477	4.38	

Analysis: 7471 Sample Date: 08/16/02 Time: 11:00

Compound	Concentration	Units	MDL	MRL	Qualifiers
Mercury	0.383	mg/kg	0.0166	0.0252	

Analysis: 8081A Sample Date: 08/16/02 Time: 11:00

Compound	Concentration	Units	MDL	MRL	Qualifiers
4,4'-DDD	0.15	mg/kg	0.00304	0.00304	
4,4'-DDE	0.00819	mg/kg	0.00304	0.00304	
4,4'-DDT	0.0492	mg/kg	0.00304	0.00304	

Analysis: 8260B Sample Date: 08/16/02 Time: 11:00

Compound	Concentration	Units	MDL	MRL	Qualifiers
Carbon disulfide	0.00409	mg/kg	0.00102	0.00204	
Chlorobenzene	0.00501	mg/kg	0.00102	0.00204	
1,2-Dichlorobenzene	0.00584	mg/kg	0.00102	0.00204	
Toluene	0.0012	mg/kg	0.00102	0.00204	
Trichlorofluoromethane	0.0033	mg/kg	0.00102	0.00204	

Table 7
Final Validated Soil Results, Detections Only
RPAC - Portland Site

HDD-103 Depth: 4-5 feet

Analysis: 8270C Sample Date: 08/16/02 Time: 11:00

Compound	Concentration	Units	MDL	MRL	Qualifiers
Acenaphthene	0.048	mg/kg	0.0103	0.0208	
Acenaphthylene	0.0794	mg/kg	0.00905	0.0208	
Anthracene	0.0969	mg/kg	0.00523	0.0208	N
Benzo(a)anthracene	0.107	mg/kg	0.0127	0.0415	N
Benzo(a)pyrene	0.0858	mg/kg	0.0122	0.0208	J
Benzo(ghi)perylene	0.132	mg/kg	0.00343	0.0208	N
Benzofluoranthenes	0.188	mg/kg	0.00913	0.0415	
Chrysene	0.158	mg/kg	0.0122	0.0415	
1,2-Dichlorobenzene	0.624	mg/kg	0.0214	0.208	J
2-Methylnaphthalene	0.114	mg/kg	0.00324	0.0208	J
Naphthalene	0.3	mg/kg	0.00972	0.0208	J
Phenanthrene	0.359	mg/kg	0.00442	0.0208	
Pyrene	0.539	mg/kg	0.00685	0.0208	

Analysis: 8290 Sample Date: 08/16/02 Time: 11:00

Compound	Concentration	Units	MDL	MRL	Qualifiers
1,2,3,4,6,7,8-HpCDD	200	pg/g			J
1,2,3,4,6,7,8-HpCDF	210	pg/g			J
1,2,3,4,7,8,9-HpCDF	9.20	pg/g			J
1,2,3,6,7,8-HxCDD	12	pg/g			J
1,2,3,4,7,8-HxCDF	26	pg/g			J
1,2,3,6,7,8-HxCDF	21	pg/g			J
2,3,4,6,7,8-HxCDF	4.7	pg/g			J
1,2,3,4,6,7,8,9-OCDD	2800	pg/g			J
1,2,3,4,6,7,8,9-OCDF	290	pg/g			J
1,2,3,7,8-PeCDF	12	pg/g			J
2,3,4,7,8-PeCDF	6.8	pg/g			J
2,3,7,8-TCDD	3.3	pg/g			J
2,3,7,8-TCDF	9	pg/g			J

Analysis: D 2216-90 Sample Date: 08/16/02 Time: 11:00

Compound	Concentration	Units	MDL	MRL	Qualifiers
Percent moisture	46.1	%			J

Table 7
Final Validated Soil Results, Detections Only
RPAC - Portland Site

Definitions

MDL	Method Detection Limit
MRL	Method Reporting Limit
mg/kg	milligrams per kilogram (ppm)
pg/g	picograms per gram (ppt)

Analytical Qualifiers

U	The analyte was not detected above the method detection limit or quantitation limit. In the case of blank contamination, the analyte is considered to be less than the stated result.
J	The analyte was positively identified, but the associated concentration is an estimate.
N	Presumptive evidence of analyte presence was detected, but not all identification criteria were met. The presence of the analyte and the associated numerical concentration are both uncertain.
R	Results for the analyte are unusable due to serious deficiencies in the sample analysis. The presence or absence of the analyte cannot be verified.

TABLE 8

Final Validated Discharge Water and Seepage Meter Results, Detections Only

RPAC - Portland Site

CO-22C-01

Analysis: 150.1 Sample Date: 08/13/02 Time: 14:15

Compound	Concentration	Units	MDL	MRL	Qualifiers
pH	6.92	SU			

Analysis: 160.2 Sample Date: 08/13/02 Time: 14:15

Compound	Concentration	Units	MDL	MRL	Qualifiers
Total suspended solids	47	mg/l	5	5	

Analysis: 2340B Sample Date: 08/13/02 Time: 14:15

Compound	Concentration	Units	MDL	MRL	Qualifiers
Hardness	290	mg/l	0.01	0.01	

Analysis: 300.0 Sample Date: 08/13/02 Time: 14:15

Compound	Concentration	Units	MDL	MRL	Qualifiers
Chloride	30.8	mg/l	1	3	
Sulfate	4.71	mg/l	1	3	

Analysis: 310.1 Sample Date: 08/13/02 Time: 14:15

Compound	Concentration	Units	MDL	MRL	Qualifiers
Alkalinity	360	mg/l	5	5	

Analysis: 6010 Sample Date: 08/13/02 Time: 14:15

Compound	Concentration	Units	MDL	MRL	Qualifiers
Barium	0.0569	mg/l	0.0002	0.005	
Boron	0.0737	mg/l	0.0675	0.2	
Calcium	70.8	mg/l	0.0067	1	
Cobalt	0.00274	mg/l	0.0005	0.005	
Copper	0.045	mg/l	0.0023	0.01	
Iron	19.1	mg/l	0.0008	0.1	
Magnesium	26.7	mg/l	0.0109	1	
Manganese	3.47	mg/l	0.003	0.01	
Molybdenum	0.0136	mg/l	0.0016	0.01	
Potassium	4.77	mg/l	0.0899	1	
Selenium	0.00408	mg/l	0.0038	0.05	
Silicon dioxide	42.6	mg/l	0.0075	0.05	
Silver	0.00118	mg/l	0.0008	0.01	
Sodium	36.1	mg/l	0.171	1	

Analysis: 6020 Sample Date: 08/13/02 Time: 14:15

Compound	Concentration	Units	MDL	MRL	Qualifiers
Arsenic	0.00114	mg/l	0.0000224	0.001	J
Nickel	0.00223	mg/l	0.0000283	0.001	

Analysis: 8081A Sample Date: 08/13/02 Time: 14:15

Compound	Concentration	Units	MDL	MRL	Qualifiers
gamma-BHC (Lindane)	0.0143	ug/l	0.00703	0.00977	N
delta-BHC	0.00776	ug/l	0.00229	0.00977	

TABLE 8

Final Validated Discharge Water and Seepage Meter Results, Detections Only

RPAC - Portland Site

CO-22C-01

Analysis: 8151A Sample Date: 08/13/02 Time: 14:15

Compound	Concentration	Units	MDL	MRL	Qualifiers
MCPP	0.163	ug/l	0.0355	0.0959	

Analysis: 8260B Sample Date: 08/13/02 Time: 14:15

Compound	Concentration	Units	MDL	MRL	Qualifiers
Acetone	3.56	ug/l	2.5	5	
Benzene	3.15	ug/l	0.5	1	
Chlorobenzene	0.605	ug/l	0.5	1	
Isopropylbenzene	0.577	ug/l	0.5	1	
Naphthalene	13.4	ug/l	0.5	1	

Analysis: 8270C Sample Date: 08/13/02 Time: 14:15

Compound	Concentration	Units	MDL	MRL	Qualifiers
Acenaphthene	32.5	ug/l	0.0154	0.096	J
Acenaphthylene	0.182	ug/l	0.0144	0.096	J
Anthracene	0.456	ug/l	0.0144	0.096	
Dibenzofuran	1.72	ug/l	0.134	0.96	
Fluoranthene	2.05	ug/l	0.0182	0.096	
Fluorene	6.26	ug/l	0.0134	0.096	
Naphthalene	0.688	ug/l	0.0211	0.096	
Phenanthrene	0.243	ug/l	0.0211	0.096	
Pyrene	2.09	ug/l	0.0134	0.096	

TABLE 8
Final Validated Discharge Water and Seepage Meter Results, Detections Only
RPAC - Portland Site

CO-22B-01

Analysis: 150.1 Sample Date: 08/13/02 Time: 15:15

Compound	Concentration	Units	MDL	MRL	Qualifiers
pH	6.9	SU			

Analysis: 160.2 Sample Date: 08/13/02 Time: 15:15

Compound	Concentration	Units	MDL	MRL	Qualifiers
Total suspended solids	39	mg/l	5	5	

Analysis: 2340B Sample Date: 08/13/02 Time: 15:15

Compound	Concentration	Units	MDL	MRL	Qualifiers
Hardness	160	mg/l	0.01	0.01	

Analysis: 300.0 Sample Date: 08/13/02 Time: 15:15

Compound	Concentration	Units	MDL	MRL	Qualifiers
Chloride	151	mg/l	1	3	
Sulfate	43.2	mg/l	1	3	

Analysis: 310.1 Sample Date: 08/13/02 Time: 15:15

Compound	Concentration	Units	MDL	MRL	Qualifiers
Alkalinity	200	mg/l	5	5	

Analysis: 6010 Sample Date: 08/13/02 Time: 15:15

Compound	Concentration	Units	MDL	MRL	Qualifiers
Aluminum	0.171	mg/l	0.009	0.1	
Barium	0.0447	mg/l	0.0002	0.005	
Boron	1.35	mg/l	0.0675	0.2	
Calcium	44.2	mg/l	0.0067	1	
Copper	0.0116	mg/l	0.0023	0.01	
Iron	16	mg/l	0.0008	0.1	
Magnesium	12.1	mg/l	0.0109	1	
Manganese	2.44	mg/l	0.003	0.01	
Molybdenum	0.687	mg/l	0.0016	0.01	
Potassium	7.71	mg/l	0.0899	1	
Silicon dioxide	42.5	mg/l	0.0075	0.05	
Sodium	141	mg/l	0.171	1	

Analysis: 6020 Sample Date: 08/13/02 Time: 15:15

Compound	Concentration	Units	MDL	MRL	Qualifiers
Antimony	0.00101	mg/l	0.0000224	0.003	
Arsenic	0.00576	mg/l	0.000109	0.001	J
Cadmium	0.000122	mg/l	0.0000071	0.0005	
Lead	0.00508	mg/l	0.0000045	0.0005	
Nickel	0.00262	mg/l	0.0000283	0.001	
Vanadium	0.00889	mg/l	0.000076	0.002	J
Zinc	0.0249	mg/l	0.0000327	0.003	

SCOEPA00007156

TABLE 8
Final Validated Discharge Water and Seepage Meter Results, Detections Only
RPAC - Portland Site

CO-22B-01

Analysis: 8081A Sample Date: 08/13/02 Time: 15:15

Compound	Concentration	Units	MDL	MRL	Qualifiers
Aldrin	0.00407	ug/l	0.00117	0.0102	
4,4'-DDE	0.00904	ug/l	0.00397	0.0203	N
Heptachlor epoxide	0.00712	ug/l	0.0038	0.0102	N

Analysis: 8151A Sample Date: 08/13/02 Time: 15:15

Compound	Concentration	Units	MDL	MRL	Qualifiers
2,4-D	0.591	ug/l	0.0463	0.148	
2,4-DB	0.433	ug/l	0.0534	0.148	
MCPA	0.157	ug/l	0.0272	0.0984	
MCPP	0.689	ug/l	0.0364	0.0984	
4-Nitrophenol	0.571	ug/l	0.0459	0.148	
Pentachlorophenol	0.157	ug/l	0.0286	0.0984	
2,4,5-T	0.305	ug/l	0.059	0.197	N

Analysis: 8260B Sample Date: 08/13/02 Time: 15:15

Compound	Concentration	Units	MDL	MRL	Qualifiers
Chlorobenzene	9.18	ug/l	0.5	1	
1,2-Dichlorobenzene	0.864	ug/l	0.5	1	
1,4-Dichlorobenzene	1.24	ug/l	0.5	1	
Methylene chloride	0.532	ug/l	0.5	1	

Analysis: 8270C Sample Date: 08/13/02 Time: 15:15

Compound	Concentration	Units	MDL	MRL	Qualifiers
Acenaphthene	0.345	ug/l	0.0158	0.099	J
2-Chlorophenol	1.15	ug/l	0.168	0.99	
1,2-Dichlorobenzene	0.742	ug/l	0.158	0.99	
1,4-Dichlorobenzene	1.11	ug/l	0.149	0.99	
2,4-Dichlorophenol	10.6	ug/l	0.149	0.99	
2,4-Dimethylphenol	1.42	ug/l	0.149	0.99	
Fluoranthene	0.125	ug/l	0.0188	0.099	
2-Methylnaphthalene	0.243	ug/l	0.149	0.99	
Naphthalene	0.132	ug/l	0.0218	0.099	
Phenanthrene	0.139	ug/l	0.0218	0.099	N
Pyrene	0.104	ug/l	0.0139	0.099	
2,4,5-Trichlorophenol	0.558	ug/l	0.109	0.99	N
2,4,6-Trichlorophenol	0.453	ug/l	0.119	0.99	

SCOEPA00007157

TABLE 8
Final Validated Discharge Water and Seepage Meter Results, Detections Only
RPAC - Portland Site

WR-SM3

Analysis: 160.2 Sample Date: 09/24/02 Time: 10:00

Compound	Concentration	Units	MDL	MRL	Qualifiers
Total suspended solids	11	mg/l	8.86	10.0	

Analysis: 1613B Sample Date: 09/24/02 Time: 10:00

Compound	Concentration	Units	MDL	MRL	Qualifiers
1,2,3,4,6,7,8,9-OCDD	33.2	pg/l	17.9	6.7	
Total TCDF	6.9	pg/l	6.06	0.5	

Analysis: 200.7 Sample Date: 09/24/02 Time: 10:00

Compound	Concentration	Units	MDL	MRL	Qualifiers
Aluminum	0.219	mg/l	0.0415	0.100	
Calcium	105	mg/l	0.182	1.00	
Iron	5.04	mg/l	0.00900	0.100	
Magnesium	41.9	mg/l	0.0540	0.100	
Potassium	4.62	mg/l	0.114	1.00	
Silicon	16.6	mg/l	0.0433	1.00	
Sodium	129	mg/l	0.276	10.0	

Analysis: 200.8 Sample Date: 09/24/02 Time: 10:00

Compound	Concentration	Units	MDL	MRL	Qualifiers
Antimony	0.00015	mg/l	0.000126	0.00100	
Barium	0.118	mg/l	0.0000910	0.00100	
Cobalt	0.00573	mg/l	0.0000200	0.00100	
Copper	0.0366	mg/l	0.000210	0.00200	
Lead	0.00597	mg/l	0.000177	0.00100	
Manganese	6.31	mg/l	0.000136	0.0200	
Molybdenum	0.024	mg/l	0.000355	0.00500	
Nickel	0.00582	mg/l	0.000242	0.00200	
Selenium	0.00058	mg/l	0.000566	0.00100	
Silver	0.00006	mg/l	0.0000460	0.00100	
Thallium	0.00023	mg/l	0.0000310	0.00100	
Zinc	0.0951	mg/l	0.00102	0.00500	

Analysis: 2340B Sample Date: 09/24/02 Time: 10:00

Compound	Concentration	Units	MDL	MRL	Qualifiers
Hardness	435	mg/l	0.0791	0.660	

Analysis: 300.0 Sample Date: 09/24/02 Time: 10:00

Compound	Concentration	Units	MDL	MRL	Qualifiers
Chloride	333	mg/l	2.40	50.0	
Sulfate	3.56	mg/l	0.0634	1.00	

Analysis: 310.1 Sample Date: 09/24/02 Time: 10:00

Compound	Concentration	Units	MDL	MRL	Qualifiers
Alkalinity	210	mg/l	0.172	10.0	

SCOEPA00007158

TABLE 8
Final Validated Discharge Water and Seepage Meter Results, Detections Only
RPAC - Portland Site

WR-SM3

Analysis: 365.2 Sample Date: 09/24/02 Time: 10:00

Compound	Concentration	Units	MDL	MRL	Qualifiers
Orthophosphorus	0.00524	mg/l	0.00141	0.0100	

Analysis: 8151A Sample Date: 09/24/02 Time: 10:00

Compound	Concentration	Units	MDL	MRL	Qualifiers
Dichlorprop	0.906	ug/l	0.500	1.00	

Definitions

( )	Estimated concentration that is greater than the MDL but less than the MRL.
MDL	Method Detection Limit
MRL	Method Reporting Limit
mg/l	milligrams per liter (ppm)
ug/l	micrograms per liter (ppb)
pg/l	picograms per liter (ppq)

Analytical Qualifiers

U	The analyte was not detected above the method detection limit or quantitation limit. In the case of blank contamination, the analyte is considered to be less than the stated result.
J	The analyte was positively identified, but the associated concentration is an estimate.
N	Presumptive evidence of analyte presence was detected, but not all identification criteria were met. The presence of the analyte and the associated numerical concentration are both uncertain.
R	Results for the analyte are unusable due to serious deficiencies in the sample analysis. The presence or absence of the analyte cannot be verified.

SCOEPA00007159

FIGURES

amec

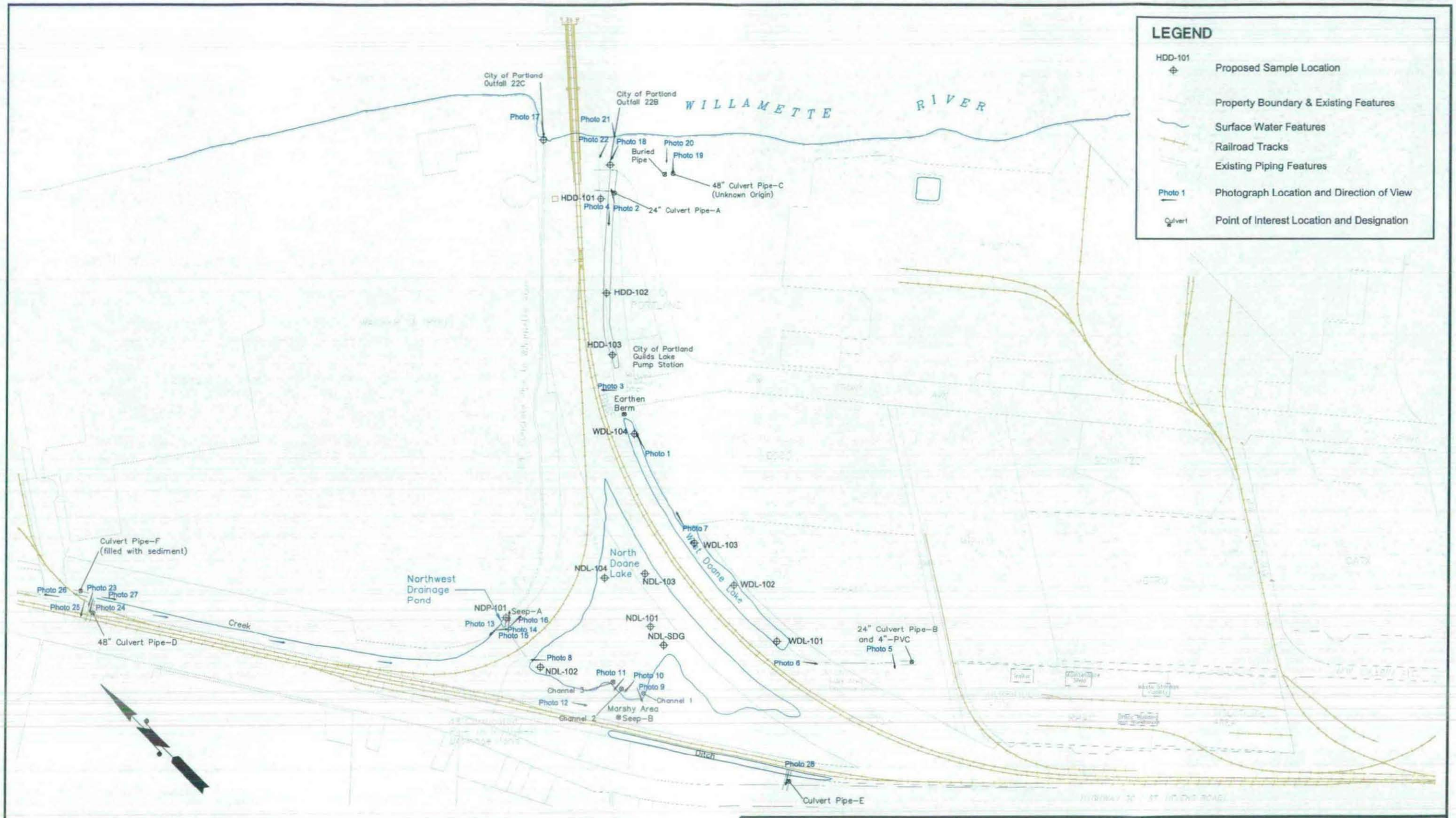
7376 SW Durham Road
Portland, OR, U.S.A. 97224-7307

W.O.	0-61M-10703T59
DESIGN	HWN
DRAWN	HWN
DATE	DECEMBER 2002
SCALE	1"=300'

FIGURE 1
SITE AND VICINITY MAP

RPAC - PORTLAND SITE

AMEC DRAWING NO. K:\10000\10700\10703\Task 59 Remaining RI Work Plan\RRI - TM\Figures\Figure_1.dwg



Note: Locations recorded by AMEC field personnel and not by registered land surveyor. Locations indicated should be considered approximate.

amec

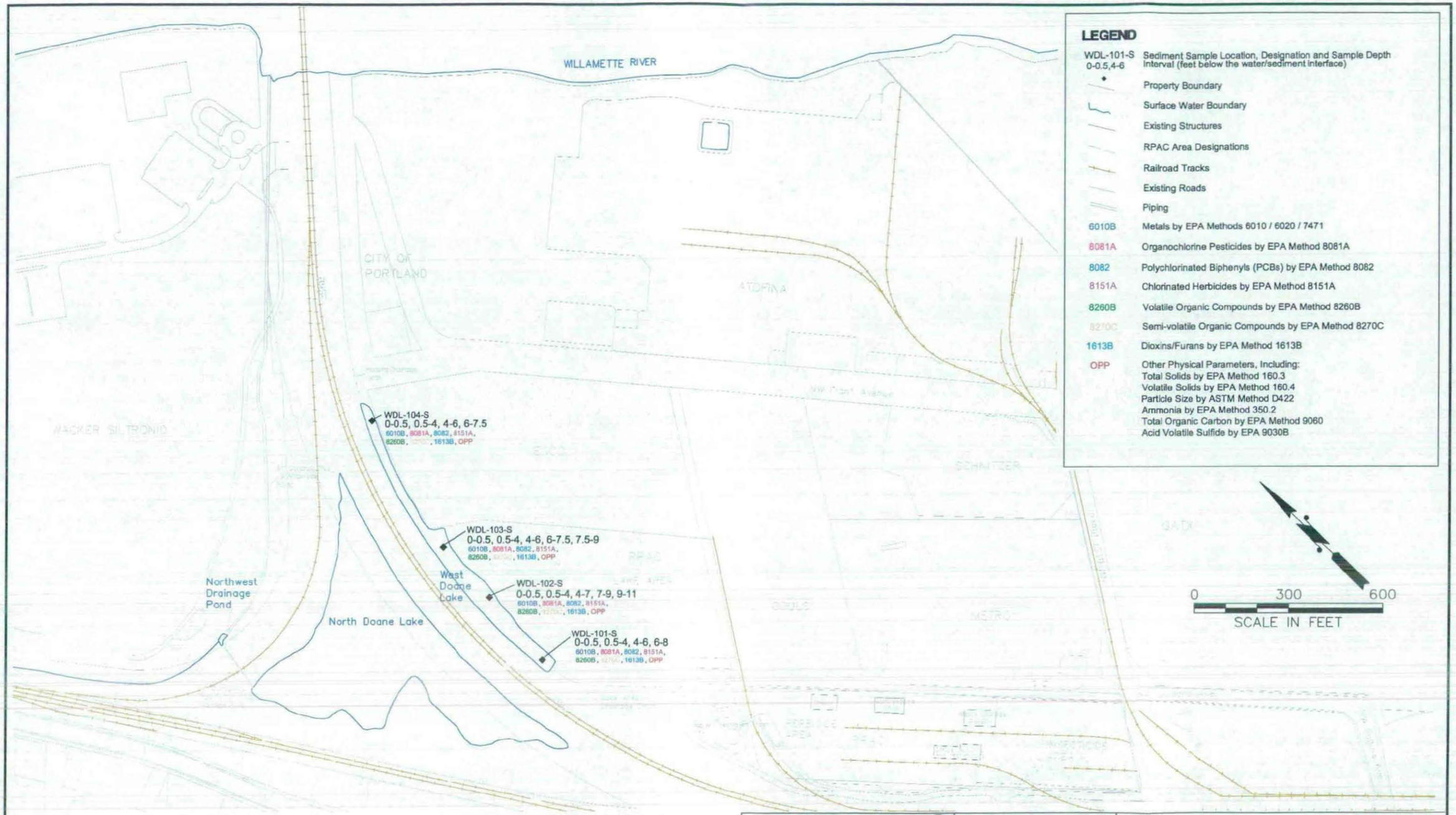
7376 S.W. Durham Road
Portland, OR, U.S.A. 97224

W.O.	0-61M-10703T59
DESIGN	JF
DRAWN	BRJ
DATE	DECEMBER 2002
SCALE	1"=350'

FIGURE 2
SITE RECONNAISSANCE OVERVIEW

RPAC - PORTLAND SITE

AMEC DRAWING NO. K:\10000\10700\10703\Task 59 Remaining RI Work Plan\RRI-M\Figures\Recon Photo Log.dwg



LEGEND

WDL-101-S 0-0.5,4-6	Sediment Sample Location, Designation and Sample Depth Interval (feet below the water/sediment interface)
	Property Boundary
	Surface Water Boundary
	Existing Structures
	RPAC Area Designations
	Railroad Tracks
	Existing Roads
	Piping
6010B	Metals by EPA Methods 6010 / 6020 / 7471
8081A	Organochlorine Pesticides by EPA Method 8081A
8082	Polychlorinated Biphenyls (PCBs) by EPA Method 8082
8151A	Chlorinated Herbicides by EPA Method 8151A
8260B	Volatile Organic Compounds by EPA Method 8260B
8270C	Semi-volatile Organic Compounds by EPA Method 8270C
1613B	Dioxins/Furans by EPA Method 1613B
OPP	Other Physical Parameters, Including: Total Solids by EPA Method 160.3 Volatile Solids by EPA Method 160.4 Particle Size by ASTM Method D422 Ammonia by EPA Method 350.2 Total Organic Carbon by EPA Method 9060 Acid Volatile Sulfide by EPA 9030B

Note: WDL-101-S at 4 to 6 feet below the water/sediment interface was not analyzed for particle size distribution due to insufficient sample volume. PCBs were screened by EPA Method 8082 for select sediment samples that indicated PCB interference during EPA Method 8081A analysis.

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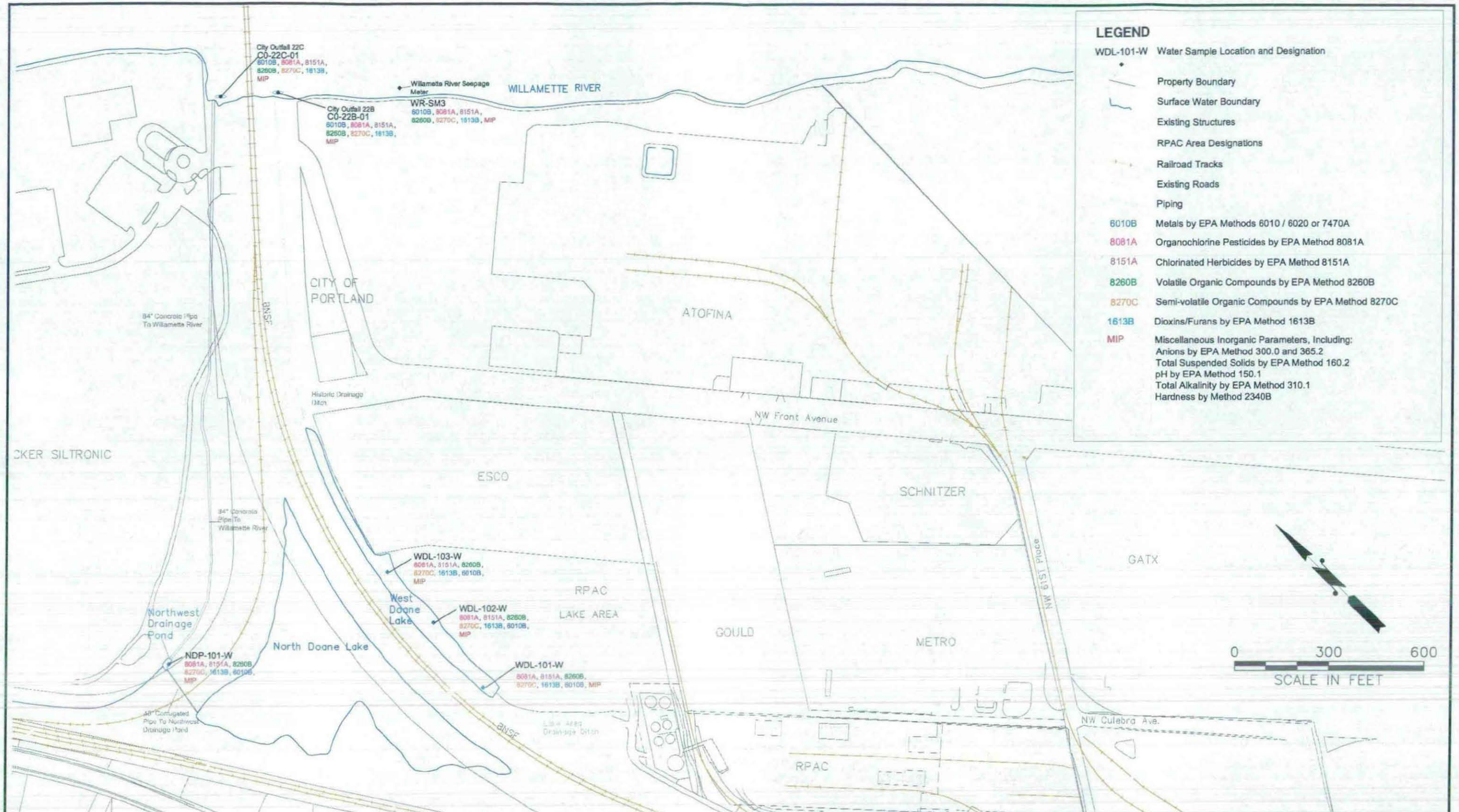
Portland, OR, U.S.A. 97224-7307

W.O.	0-61M-10703T59
DESIGN	HWN
DRAWN	HWN
DATE	DECEMBER 2002
SCALE	1"=300'

FIGURE 3
SEDIMENT SAMPLING LOCATIONS INCLUDING SAMPLING DEPTHS AND ANALYTE LIST
RPAC - PORTLAND SITE

AMEC DRAWING NO. K:\10000\10700\10703\Task 59 Remaining RI Work Plan\RRI – TM\Figures\Figure_3.dwg



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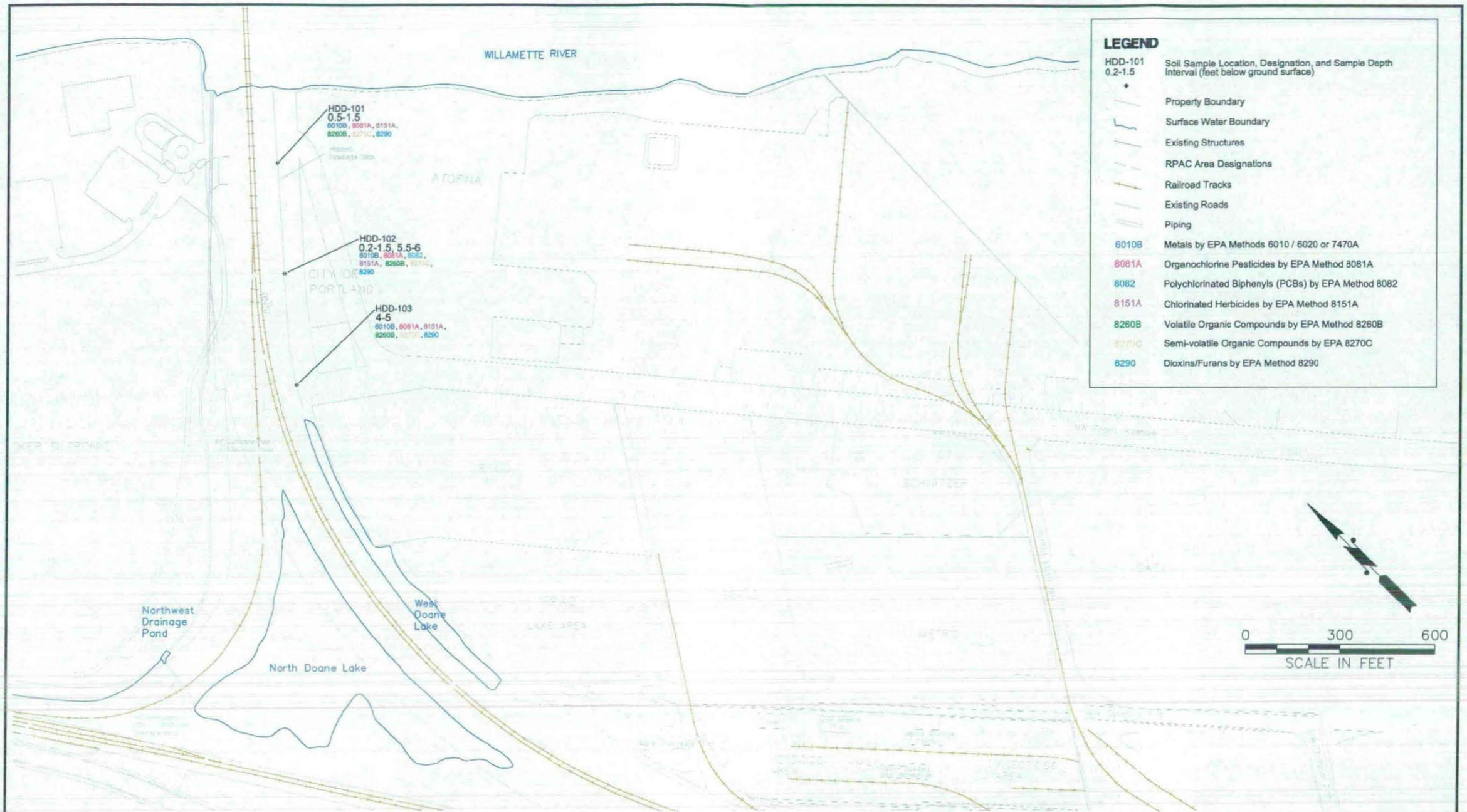
W.O.	0-61M-10703T59
DESIGN	HWN
DRAWN	HWN
DATE	DECEMBER 2002
SCALE	1"=300'

FIGURE 4
SURFACE WATER, OUTFALL DISCHARGE WATER AND SEEPAGE METER WATER SAMPLING LOCATIONS AND ANALYTE LIST
RPAC - PORTLAND SITE

AMEC DRAWING NO. K:\10000\10700\10703\Task 59 Remaining RI Work Plan\RRI-TM\Figures\Figure_4.dwg



LEGEND

HDD-101 0.2-1.5	Soil Sample Location, Designation, and Sample Depth Interval (feet below ground surface)
	Property Boundary
	Surface Water Boundary
	Existing Structures
	RPAC Area Designations
	Railroad Tracks
	Existing Roads
	Piping
6010B	Metals by EPA Methods 6010 / 6020 or 7470A
8081A	Organochlorine Pesticides by EPA Method 8081A
8082	Polychlorinated Biphenyls (PCBs) by EPA Method 8082
8151A	Chlorinated Herbicides by EPA Method 8151A
8260B	Volatile Organic Compounds by EPA Method 8260B
8270C	Semi-volatile Organic Compounds by EPA 8270C
8290	Dioxins/Furans by EPA Method 8290

Note: PCBs were screened by EPA Method 8082 sample location HDD-102 at 5.5 to 6 feet below ground surface.

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W.O.	0-61M-10703T59
DESIGN	HWN
DRAWN	HWN
DATE	DECEMBER 2002
SCALE	1"=300'

FIGURE 5
SOIL SAMPLING LOCATIONS INCLUDING SAMPLING DEPTHS AND ANALYTE LIST
RPAC - PORTLAND SITE

AMEC DRAWING NO. K:\10000\10700\10703\Task 59 Remaining RI Work Plan\RRI - TM\Figures\Figure_5.dwg

LETTER OF TRANSMITTAL

TO:

Wacker Siltronic Corporation PO Box 83180 Portland, OR 97283	Date:	February 11, 2003
	Job No:	0-61M-10703-0/Task 59
	Attn:	Cathryn Young
	RE:	RPAC - Portland Site

WE ARE SENDING YOU: ☐ Attached ☒ Under Separate Cover via US Mail

Copies	Dated	Description
1	2/4/03	Remaining Remedial Investigation

THESE ARE TRANSMITTED as checked below:

☐ For Review ☐ For Approval ☒ For Your Use ☐ As Requested

REMARKS:

AMEC Earth & Environmental, Inc.
7376 SW Durham Road
Portland, Oregon
USA 97224
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amec

FINAL GROUNDWATER CHARACTERIZATION REPORT
RPAC - PORTLAND SITE

March 28, 200~~2~~3

Submitted to:

amec

March 28, 2003

0-61M-10703-0/
Task 43

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Final Groundwater Characterization Report

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FINAL GROUNDWATER CHARACTERIZATION REPORT
RPAC - PORTLAND SITE

March 28, 200~~2~~3

Submitted to:

Oregon Department of Environmental Quality
2020 S.W. 4th Ave., Suite 400
Portland, Oregon 97201

Submitted for:

RPAC
One Copely Parkway, Suite 309
Morrisville, North Carolina 27560

Submitted by:

AMEC Earth & Environmental, Inc.
7376 S.W. Durham Road
Portland, Oregon 97224

0-61M-10703-0/Task 43

LETTER OF TRANSMITTAL

TO:

Wacker Siltronic Corporation PO Box 83180 Portland, OR 97283	Date:	April 10, 2003
	Job No:	0-61M-10703-0/Task 43
	Attn:	Cathryn Young
	RE:	RPAC - Portland Site

WE ARE SENDING YOU: ☐ Attached ☒ Under Separate Cover via US Mail

Copies	Dated	Description
1 CD	3/28/03	Final Groundwater Characterization Report

THESE ARE TRANSMITTED as checked below:

☐ For Review ☐ For Approval ☒ For Your Use ☐ As Requested

REMARKS:

On behalf of RPAC, AMEC recently submitted to Oregon Department of Environmental Quality a Final Groundwater Characterization Report (GCR) for the RPAC - Portland Site dated March 28, 2003. However, the cover page of the report was dated March 28, 2001. The remainder of the report (cover letter, document footers, etc.) has the correct date.

We respectfully request that all recipients of this document adjust the date on the cover sheet with a handwritten notation. We have enclosed a compact disk (CD) with a corrected version of the electronic document. Even though there are no other changes, please dispose of the CD that accompanied the GCR and replace with the enclosed CD.

We apologize for the inconvenience. If you have any questions, please contact Roger Gresh at (503) 639-3400.

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March 28, 2003

0-61M-10703-0/Task 43

Tom Roick
Project Manager, Cleanup & Portland Harbor
Oregon Department of Environmental Quality
2020 S.W. 4th Avenue, Suite 400
Portland, Oregon 97201

Dear Mr. Roick:

Re: Response to DEQ Comments on Draft Groundwater Characterization Report, and Submittal of Final Groundwater Characterization Report RPAC - Portland Site

On behalf of RPAC, AMEC Earth & Environmental, Inc. (AMEC) is submitting to the Oregon Department of Environmental Quality (DEQ) the enclosed Final Groundwater Characterization Report (GCR). This letter serves as cover for the GCR as well as a response to DEQ's letter dated January 28, 2003, that includes DEQ's comments to RPAC's Draft Groundwater Characterization Report (Draft GCR) dated December 2, 2002.

Responses to selected DEQ comments are provided below. DEQ's text from the January 28 letter is provided in italics, and each comment (as appropriate) is followed by RPAC's respective response. The comments are numbered in this letter to facilitate future reference. Note that some responses indicate that appropriate changes have been made within the GCR text; where possible, section references from the GCR document are given for ease of reference.

GENERAL COMMENTS

...DEQ agrees with or acknowledges the following observations:

DEQ Comment 1a:

> *DEQ agrees that some conditions that may have influenced contaminant distribution may no longer exist, such as overflow from the dam at the eastern end of WDL, and direct discharge of high concentration waste into WDL. However, the report should describe in more detail what these conditions are and how those conditions are influencing today's observed distribution. Although this evaluation may be presented in the next modeling document, it is important to evaluate and understand these relationships as modeling typically is based upon contaminant movement away from source areas.*

RPAC Response: A brief discussion of conditions that may have influenced the distribution of RPAC-related constituents in groundwater has been added to a new Section 3.4 of the GCR.

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DEQ Comment 1b:

The data supports the idea of a preferential flow path that coincidentally parallels the railroad tracks.

RPAC Response: The GCR does not include mention that a preferential flow path parallels the railroad tracks. The railroad "ballast" (or fill material) that was installed across former Doane Lake early this century extends into groundwater and may represent an area of increased hydraulic conductivity. However, this fill material does not extend to the Willamette River, because former Doane Lake did not extend to the Willamette River. Any fill material that was installed beneath the tracks between former Doane Lake and the beginning of the railroad bridge is likely above the groundwater elevation. Therefore, the railroad ballast (fill) is not considered to be a complete migration pathway for groundwater from the vicinity of the RPAC property to the Willamette River. The groundwater flow at the RPAC Site follows a path consistent with the geological and surface water features in the area. For example, a trough or depression on the top of the basalt zone (discussed in Section 3.4 of the GCR) appears to trend to the north, somewhat parallel to the railroad tracks, and may have an influence on the groundwater flow path. The fact that groundwater flow appears to parallel the railroad tracks is a coincidence and not the result of a preferential flow path associated with the railroad fill material.

DEQ Comment 2:

Despite the presentation of the data however, the Groundwater Report does not provide adequate justification for the conclusion that no additional groundwater monitoring is required at the Rhone Poulenc site and that all data quality objectives (DQOs) have been met. Although there appears to be sufficient groundwater data to support the RI and perform the risk assessment, DEQ does not believe that there is adequate data to fully evaluate trends in contaminant concentration (this includes understanding the seasonal variability of groundwater contaminant concentrations and performing a statistical evaluation of the groundwater data) or evaluate contaminant fate and transport processes in the alluvial WBZ downgradient from source areas. This information will be needed to evaluate contaminant discharges to the Willamette River, evaluate the effectiveness of the groundwater extraction and treatment system and evaluate remedial action alternatives in the FS.

RPAC Response: RPAC agrees with the DEQ that there are sufficient groundwater data to support the RI and perform the risk assessment. It is, therefore, unclear why DEQ feels that there are not enough data to evaluate fate and transport, a component of characterization. RPAC has added further justification and clarification of DQO satisfaction, where appropriate, in the GCR.

However, RPAC has conducted an additional assessment of natural attenuation parameters since submittal of the Draft GCR (during development of the Bioremediation Evaluation Work Plan), and proposes additional groundwater data collection for evaluation of natural attenuation at the RPAC Site. RPAC has, therefore, prepared a groundwater monitoring plan for submittal to DEQ under separate cover. The Post-Characterization Groundwater Monitoring Plan (PCGMP) will include specific objectives for the post-characterization monitoring, as well as a

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Field Sampling Plan with a detailed list of monitoring wells and analyses. Other than monitoring for natural attenuation purposes, the PCGMP will be designed to provide additional data for the feasibility study, for evaluating the potential for chemical constituent migration to potential receptors and confirming the stability of the chemical distribution in groundwater.

Contaminant Fate and Transport

There are a number of areas where further data will be required to evaluate contaminant fate and transport processes at the Rhone Poulenc site. These include:

DEQ Comment 3a:

> *Groundwater transport to North Doane Lake and the Willamette River: Additional groundwater data are needed to evaluate groundwater contaminant discharges to the Willamette River and North Doane Lake. Monitoring data will be needed to confirm the groundwater modeling results. The groundwater transport issue needs to be resolved before the hot spot determination can be made.*

RPAC Response: Groundwater analytical results from monitoring wells located near surface water bodies do not represent concentrations of constituents discharging to surface water. The data needs for the Groundwater Transport Evaluation (GTE), which will include modeling of constituent transport to surface water, have been considered and groundwater data presented in the GCR are considered sufficient to conduct the GTE. However, additional groundwater and outfall discharge samples will be collected in the PCGMP, and any post-characterization groundwater results that are inconsistent with previous results and are validated prior to the start of modeling may be considered in the GTE.

DEQ Comment 3b:

> *The role of the clay layer downgradient of the site: Some constituents are at higher concentrations beneath the clay layer, while others are higher above the clay layer. The clay layer is depicted as extending to the Willamette River, and perhaps beneath it, and may have a pivotal role in movement of contamination into the river. This factor needs to be evaluated as part of the source control evaluation. The fate and transport evaluation needs to address how all of these geologic, release, distribution, and degradation factors affect contamination movement and eventual discharge to the Willamette River.*

RPAC Response: Constituents in groundwater detected above and below the clayey silt layer will be addressed in the GTE.

DEQ Comment 3c:

> *Preferential Flow Pathways: The fate and transport analysis must also take into account preferential flow pathways. Rhone Poulenc contaminants have been detected in storm drain manholes along Front Avenue, City of Portland outfalls 22-B and 22-C, and an old pipe discharge along the riverbank. This indicates contamination is moving along these features and discharging into the river, albeit at low concentrations. This has been overlooked in any discussion of contaminant distribution and movement. The Groundwater Report should*

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evaluate whether the somewhat isolated contamination detected near former East Doane Lake (EDL) may be contributing to the storm water pathway.

RPAC Response: The GCR now includes a brief discussion of potential preferential flow pathways, presented in a new Section 3.4, and how these preferential flow pathways may have affected constituent distribution. The preferential flow pathway discussion summarizes the following information regarding two perceived preferential flow paths for groundwater, as well as the information provided above regarding the railroad track fill material. Preferential flow pathways will be considered further in the GTE.

Storm drain pipes associated with City of Portland Outfalls 22B and 22C have been previously evaluated for their potential to discharge RPAC-related constituents. RPAC collected water samples of the discharge from the City of Portland Outfalls 22B and 22C, representing non-stormwater discharge, in August 2002. Results of the discharge sampling are included in the Remaining Remedial Investigation Technical Memorandum (RRI TM) dated February 4, 2003. The few RPAC constituents detected in the outfall samples were at concentrations below ecological screening values. Based on the recent outfall discharge results, it does not appear that water impacted by RPAC constituents is currently discharging via Outfalls 22B and 22C, and therefore these storm drain pipes may not represent preferential flow paths for groundwater.

The Historic Drainage Ditch (HDD), located between West Doane Lake (WDL) and the Willamette River, at one time served as an overflow channel for WDL and was reportedly cut off from WDL in 1980. Soil from beneath the HDD, as reported in the RRI TM, generally did not contain RPAC constituents at concentrations greater than screening values. Because the HDD received only occasional overflow from WDL during storm events, and soil sampling results indicated no significant impact, RPAC does not believe the HDD currently or historically represented a source to groundwater or a preferential flow path affecting the distribution of constituents in groundwater.

AMEC conducted a reconnaissance of the Willamette River bank during June 2002, as reported in the RRI TM, and found no evidence of any "old pipe discharge" along the river bank or on the beach. The only discharge pipes with visual evidence of significant discharge were Outfalls 22B and 22C. A 48-inch corrugated metal culvert pipe of unknown origin and a mostly buried pipe also of unknown origin were encountered during the reconnaissance. However, no water was observed flowing out of the 48-inch corrugated metal culvert pipe or the buried pipe, and no evidence of channeling, seeps or erosion was observed at these outfalls. These pipes would contribute little, if any, to the overall discharges in this area.

Further, based on the most recent outfall discharge results, constituents from the former EDL area do not appear to be discharging from the storm drain that flows to Outfall 22B. However, additional outfall discharge sampling is proposed in the PCGMP.

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Groundwater Contaminant Concentration Trends

DEQ Comment 4:

The chemical concentration trends presented in Appendices C and D are valuable. The text concludes that there are mostly constant or decreasing concentration trends. Although some of these trends may exist, some of the trends noted appear to be taken out of context, or do not appear to DEQ to constitute trends. For some wells, there are only four data points and for other wells there are large gaps in time. The limited number of data points makes it difficult to draw definitive conclusions. The same limitation in data points applies to apparent decreasing trends as well as increasing trends. Eight data points (generally over a two or four year period) is typically a minimum amount to statistically determine trends. Additional data points are required to support conclusions regarding statistical trends in concentrations.

RPAC Response: RPAC agrees that the limited number of data points makes it difficult to draw definitive conclusions with regards to groundwater chemistry trends. The evaluation of PCOPC concentration changes provided in the GCR does not and did not intend to include a statistical analysis. The GCR provides a qualitative interpretation of concentration changes based on the data available for those instances where trends are observable from the relative changes in concentration. The analytical results from any additional groundwater monitoring will be considered in evaluation of groundwater concentration changes in the Remedial Investigation (RI) report, as data are available prior to commencement of the RI report preparation. However, there are no current plans to undertake a statistical analysis in development of the RI report.

DEQ Comment 5:

The Groundwater Report states that benzene concentrations have remained fairly constant in the AL5 monitoring well cluster when they have actually increased at AL5-35, which is the approximate depth of non-aqueous phase liquids (NAPL) in this area of the site. Also, 1,2-dichlorobenzene appears to be present in AL5-35 at high concentrations that are increasing over time. The Groundwater Report states that there are no increasing trends for herbicides, when Silvex is increasing in RP-06-87, MW-04-27, W-11-D, RP-02-66, RP-01-51, and RP-01-65. These increases maybe more important than the apparent decreases, as they are near sources and in the down gradient end of the groundwater contamination plume near the Willamette River.

RPAC Response: As DEQ stated in Comment 4, the limited number of data points makes it difficult to draw definitive conclusions; however, benzene concentrations in the AL5 monitoring well cluster show slight increases (AL5-35) and decreases (AL5-19, AL5-62, and BST5W-74). However, overall, these increases and decreases were not considered to constitute notable changes consistent with other temporal change interpretations in the GCR.

As stated in the GCR, 1,2-dichlorobenzene concentrations at AL5-35 have shown an increase since 1995. However, the 1,2-dichlorobenzene concentrations in AL5-19, AL5-62, and BSTW-74 have remained relatively unchanged or have decreased slightly.

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Silvex in W-11-D, RP-02-66, RP-01-51, and RP-01-65 does appear to have increased during the last two of the four most recent sampling events. However, at this time there are too few data points to indicate a long-term increasing trend that would warrant discussion. Constituent concentration trends indicate that the increases in these wells are a short-term fluctuation. Decreasing concentrations noted for silvex in RP-01-65 and MW-04-27 prior to the Spring 2001 sampling event would suggest a possibility of short-term fluctuation in silvex concentrations. In addition, at this time, the magnitude of the silvex increases in RP-02-66, RP-01-51, RP-01-65, and W-11-D is not great enough to indicate an appreciable change in concentrations that would warrant discussion.

As mentioned previously, the GCR provides a qualitative interpretation of concentration changes based on the data available for those instances where consistent trends are observable. Some additional discussion has been added to the text in the GCR; however, the overall conclusions regarding trends of 1,2-dichlorobenzene, benzene, and silvex have not been modified in response to DEQ's comment. Additional groundwater data will be collected as part of the PCGMP, and constituent temporal changes will be reevaluated, as appropriate, in the report.

DEQ Comment 6:

> *Further characterization is required to fully evaluate the conflicting trends in contaminant concentrations -decreasing concentrations in areas near the source area but increasing concentrations in the alluvial WBZ downgradient of the source area -observed at the Rhone Poulenc site.*

RPAC Response: As stated previously, groundwater data sufficient for characterization of nature and extent, and for use in the GTE, have been collected. Although analysis of temporal changes is not a specific DQO of the PCGMP, additional monitoring data that may clarify trends in these concentration changes will be considered in development of the RI report.

SPECIFIC COMMENTS

Section 1.3, Data Quality Objectives

DEQ Comment 7:

> *The list of data quality objectives (DQOs) presented in this section is incomplete. Other DQOs identified in the groundwater monitoring plan section of the DEQ work plan include identification of COPCs and evaluating contaminant migration to the Willamette River. The text should include a succinct statement of how the DQOs have been met.*

RPAC Response: The list of DQOs provided in the GCR is consistent with those listed in the DEQ-approved Draft Extended Groundwater Characterization Monitoring Plan (March 2, 2001). Additional DQOs of the groundwater monitoring program that were identified in the RI Work Plan include identification of PCOPCs and evaluating constituent migration to the Willamette River. COPCs will be identified as part of the risk assessment process based on existing groundwater and other media analytical results; the constituents discussed in this GCR are still considered preliminary, as discussed in Section 2.0. Migration of RPAC-related constituents to

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the Willamette River will be addressed as part of the GTE, and may be evaluated using a combination of groundwater analytical results, groundwater modeling, and surface water analytical results. Concentrations of constituents that may be entering surface water bodies can not be determined from monitoring well groundwater data alone. Clarification of DQOs has been provided in the GCR, Section 1.3.

DEQ Comment 8:

This section describes a set of additional activities to be performed but does not discuss how these will be performed or whether additional groundwater data is required to support these activities. These include the groundwater extraction treatment system evaluation, the bioremediation evaluation and the assessment of groundwater transport to North Doane Lake (NDL) and the Willamette River.

RPAC Response: The satisfaction of DQOs and the need for additional groundwater data have been discussed in responses provided above and clarified in the GCR, Section 1.3. The GCR does not include details of how additional work will be performed, but does address the adequacy of data for each specified activity.

Section 2.0, Preliminary Constituents of Potential Concern

DEQ Comment 9:

The DEQ work plan identified a comprehensive list of preliminary contaminants of potential concern (PCOPCs). Some of these chemicals have been eliminated. The report should describe how this was done. Without this discussion, it is not possible to confirm chemicals that were screened out as PCOPCs. Although DEQ is in general agreement with the PCOPCs that were identified in the Groundwater Report, the failure to fully outline the screening process raises the possibility (perhaps small) that a chemical not evaluated in this report may have an important contribution to risk that would prompt the need for additional data. The report does state that this is a preliminary list of COPCs, and that a final list will be developed in the risk assessment process. Also, the report should include a screening approach that considers surface water (i.e., AWQCs, surface water SLVs). Some of these numbers may be lower than tap water PRGs. This is particularly true for chemicals that have the potential to bioconcentrate in fish tissue. To account for this exposure route, national ambient water quality criteria for fish consumption should be used as screening values. In addition, ecological screening was not discussed in the Groundwater Report. If ecological screening is to occur at another time, it was not stated. The results of the ecological risk assessment will be a significant element in evaluating site cleanup.

RPAC Response: The PCOPC discussion in the Draft GCR references other DEQ-approved documents for details regarding PCOPC development; however, additional details have now been provided in the GCR, Section 2.0.

The concentrations of PCOPCs in groundwater adjacent to a surface water feature are not representative of water at the sediment interface, and any evaluation of groundwater and surface water interaction will consider both groundwater and surface water analytical results. Further, screening of groundwater against surface water criteria is more appropriately

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performed as part of the ecological risk assessment than in the GCR, where screening was provided primarily for presentation and discussion purposes. The distributions of select PCOPCs in groundwater are provided in the GCR as distribution figures in Appendix C, with PCOPC concentrations posted. However, in response to DEQ's request, analytical results for constituents included in Appendix C from groundwater samples collected near the Willamette River have been screened against ten times the surface water ecological receptor (DEQ Level II freshwater chronic SLVs; December 2001) and human health screening criteria (National Recommended Water Quality Criteria for human health, consumption of water plus organism; November 2002). As stated in the GCR, screening values are not intended as cleanup goals or to indicate the level of risk at the RPAC Site, but rather are used for discussion and presentation purposes only. An evaluation of groundwater discharge to surface water, including the Willamette River and NDL, will be included in the GTE.

Section 3.0, Groundwater Evaluation

DEQ Comment 10:

EPA Region 9 PRGs were used for human health screening (Table 3-2). However, the October 2000 PRGs were updated by EPA in October 2002. The current PRGs should be used for screening with the following exceptions: Since publication of the 2002 PRGs, EPA has withdrawn the new toxicity factors for ethylbenzene and PCE; DEQ considers it appropriate to use the old 2000 PRGs for screening these chemicals.

RPAC Response: The Revised GCR includes screening of constituent concentrations against the most recent (2002) PRGs, with exceptions as noted by DEQ (Table 3-2).

DEQ Comment 11:

The PRGs for herbicides are incorrect in Table 3-2. It appears that the chemical names may have been shifted relative to the CAS numbers and PRGs. It also appears that the correct (2000) PRGs were used in developing the figures in Appendix C.

RPAC Response: The Revised GCR includes a corrected Table 3-2, using the most recent (2002) PRGs.

DEQ Comment 12:

The statement that the fill does not extend to the Willamette River is inaccurate. The cross sections in this regard are also inaccurate. For example, the upper 20 - 30 feet of the Wacker property near the river is fill (RP-07 location). This should be depicted on the cross section even though much of the fill placed near the Willamette River is hydraulically placed river sediments and thus may be indistinguishable from the alluvium. However, a silt unit is typically encountered at the base of the fill. This may be significant with respect to contaminant transport and should be discussed.

RPAC Response: A comprehensive review of available boring logs was completed to address and further interpret lithologic unit (Fill/Shallow Alluvium Zone, Alluvium Zone, and Basalt Zone) presence and thickness. The RP-07 monitoring well cluster located on the Wacker property

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along the Willamette River terrace, has been interpreted to contain approximately 25 feet of fill material and Figures 3-6 and 3-10 have been revised to include this fill unit. All of the cross sections have been re-evaluated and revised using the Groundwater Modeling System (GMS, version 3.1) software program, which is currently being used for groundwater modeling and future data collection/evaluation purposes. The correlation of subsurface conditions was based upon information provided on the RPAC Site boring logs. The most reliable data were obtained from the boring logs where continuous and/or discrete soil/rock core samples were collected from individual borings. At many monitoring well boring locations only grab samples of return drill cuttings were collected, and were considered accordingly. Variability noted on the boring logs is the result of numerous field logging personnel, and the drilling and sampling methodologies used. All of these details were given much consideration and attention for the geologic interpretations made, and for the development of the revised geologic cross sections.

All cross section lines, except E-E', were modified slightly, so that cross section lines intersect individual monitoring wells or well clusters. In the Draft GCR, some data presented on the cross sections were obtained from wells offsetting the transect lines up to 250 linear feet. Due to the spatial and vertical variability of the site geology, the revised cross sections presented in the Final GCR directly intersect boring locations, and borings are not projected to the cross section transect. Refer to Section 3.1 and Geologic Cross Section Figures 3-6 through 3-10 for further discussion and graphical presentation of RPAC Site subsurface conditions. Additional evaluations with respect to subsurface geologic conditions and their role in constituent fate and transport will be addressed in the GTE.

Section 3.1.3, Basalt Characterization Zone

DEQ Comment 13:

> *The report should discuss the flow top/gravel zone that is present at the basalt alluvium interface. Does this unit behave more like the basalt or the alluvium or something different altogether? How is this unit characterized? Is it similar to the gravels encountered at RP-07 on the Wacker site.*

RPAC Response: The uppermost surface of the basalt beneath the RPAC Site is generally characterized as moderately weathered to partially decomposed, and at some locations exhibits soil-like properties. Some of the historic boring logs have identified this thin layer as an "alluvial gravel", and it is characterized as consisting of subangular to angular basalt gravels/fragments in a clay matrix. This layer is thin (<5 feet thick) and somewhat discontinuous. A detailed review of boring logs indicates that some of these interpretations may be incorrect. The interpretations made were in part due to limited or non-discrete and/or in-situ sample collection and drilling methodologies used at many locations during past explorations. The uppermost, weathered to partially decomposed basalt was identified and classified as a portion of the Basalt Characterization Zone. The uppermost basalt surface is completely different in physical characteristics than the alluvial gravel encountered elsewhere. At locations where alluvial gravel was encountered, the lithology was generally described as rounded to subrounded gravel in a silty sand or sand matrix. This alluvium is generally thicker, discontinuous, and consists primarily of basalt clasts with minor quantities of terrestrial gravel such as quartz and monzonite, supporting the presence of an alluvial depositional feature. Sections 3.1.2 and 3.1.3 of the GCR include further discussion.

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DEQ Comment 14:

The term "poorly fractured" is unfamiliar and its meaning is not clear. Does this term distinguish fresh or relatively fresh basalt from weathered basalt or does it infer that the fractures are not well developed in that they are discontinuous? If there are few fractures, a better descriptive term would be widely spaced fractures or massive basalt.

RPAC Response: The term "poorly fractured" was a typographical error and has been replaced with standard descriptors for rock discontinuities; in this case, "slightly fractured" (also synonymous with "widely spaced'). The descriptive criteria refer to the density or natural fracture/joint spacing occurring within a base length of rock. The number of fractures is divided by the length and is reported as fractures per foot or fractures per meter, which is then correlated to the appropriate descriptor. The fracture density is independent of rock weathering descriptors. Clarification of fracture density and weathering conditions encountered within the basalt zone at the RPAC Site are discussed in GCR Section 3.1.3.

Section 3.1.4, Vertical Hydraulic Gradient

DEQ Comment 15:

An upward gradient between the basalt and the alluvium has been identified at a few locations (e.g., W-11, MW-11). This is consistent with the geologic and hydrogeological setting of the site and important to chemical migration and needs to be discussed further in the Groundwater Report.

RPAC Response: The water level for the Shallow Alluvium/Fill monitoring well W-11-S on Figures 3-3 and 3-5 was mislabeled in the GCR. The gradient at W-11-S between the Shallow Alluvium/Fill and the Alluvium Zone depicted on these figures should be downward. This error has been corrected in the Revised GCR. The vertical gradient between the Alluvium and Basalt Zones at W-11 is nearly neutral. RPAC agrees that there is a slight upward gradient between the Basalt and Alluvium Zones during the Spring 2002 monitoring event at monitoring well cluster MW-11. The localized, slight upward gradient at MW-11 does not appear be significant to the overall hydrogeologic characteristics of the site, and the description of the overall vertical gradient in Section 3.1.4 remains the same in the Final GCR.

Section 3.3, Constituent Distribution and Temporal Changes

DEQ Comment 16:

This section should include a qualitative discussion of contaminant concentration changes that could be due to different sampling methodologies, contactors and analytical methods.

RPAC Response: RPAC has included such a discussion in Section 3.2 of the GCR.

DEQ Comment 17:

Somewhere in this section there should be a discussion of the limited areal coverage of the basalt groundwater monitoring network. For example, elevated levels of 1,2-

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dichlorobenzene have been detected in the deep alluvium at the RP-06 and W-15 locations. These locations are on the lateral edges of the dissolved VOC plume. Is it possible that the basalt WBZ is contaminated in these areas as well? DEQ is not recommending additional basalt monitoring wells, rather that the uncertainty should be acknowledged and discussed.

RPAC Response: In any groundwater monitoring program, the groundwater quality information available is limited to the locations where monitoring wells are present or where samples have been collected. A statement to this effect has been added to the GCR. Although basalt wells may not be located directly adjacent to each and every alluvium monitoring well where PCOPCs are detected, basalt wells are located downgradient from these locations and the basalt monitoring network is sufficient for characterization of groundwater for the RI. Should additional information in specific areas be required for remedial design, additional monitoring wells may be installed in those specific areas, as necessary and appropriate.

Section 3.3.1, VOC Distribution and Temporal Changes

DEQ Comment 18:

1,2-Dichlorobenzene: The dichlorobenzene analysis should note that results are reported via SVOC and VOC analyses. This may influence the observed contaminant concentration trends.

RPAC Response: Overall, 1,2-dichlorobenzene results are from EPA Method 8260B analytical test methods. EPA Method 8270 results are only presented for a few monitoring wells where this laboratory method provided the only available data for the October 1990 groundwater sampling event. This is indicated on Figures D-2, D-3, and D-4 where EPA Method 8270 results are presented, and are clearly labeled. The 1,2-dichlorobenzene distribution figures (Appendix C) include only EPA Method 8260B results.

DEQ Comment 19:

Summary of VOC Distribution and Temporal Changes: The report states "downgradient VOC concentrations are decreasing or remaining stable over time." There are examples of increases in 1,2-dichlorobenzene concentrations downgradient of the source area. These include monitoring wells W-19 (deep and intermediate), AL-5-35, AL-5-65, and W-10.

RPAC Response: RPAC disagrees with DEQ's assessment that increasing trends of 1,2-dichlorobenzene groundwater concentrations were noted in monitoring wells W-19-I and D, AL5-62, and W-10. RPAC agrees that 1,2-dichlorobenzene concentrations have increased over the last two of the four most recent sampling events in monitoring well AL5-35, located downgradient of the source area. As stated previously, the GCR provides a qualitative interpretation of concentration changes based on the data available for those instances where trends are observable, and changes in concentration during the four most recent sampling events generally were not considered to constitute a "trend". However, the text in the GCR has been changed to read "downgradient VOC concentrations are generally decreasing or remaining stable over time."

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DEQ Comment 20:

The Temporal figures presented in Appendix D are very useful. However, monitoring well W- 19 should be added to the appendix because there is groundwater data that goes back to 1990 at this location and it is near the Willamette River.

RPAC Response: RPAC has added the temporal data for monitoring well W-19, and included these data in Appendix D.

Section 3.3.2, Phenolic Constituent Distribution and Temporal Changes

DEQ Comment 21:

2,4-Dichlorophenol: The 2,4-dichlorophenol distribution should be contrasted with that of 1,2- dichlorobenzene (either here or in Section 4.4). Concentrations of 2,4-dichlorophenol are very high close in the source area but rapidly attenuate. Concentrations in the shallow fill at MW-5 and alluvial deposits at RP-04 help delineate the main source area. However, concentrations drop rapidly downgradient of MW-5, downgradient of RP-04 and in the alluvial zone at MW-5. This may be significant for understanding contaminant fate and transport processes. In addition, the Groundwater Report should discuss the pronounced decline in 2,4-dichlorophenol concentrations at the RP-04 location. Is this decline related to the well installation in some way or is it a factor of contaminant fate and transport processes or the make up of the source area?

RPAC Response: RPAC has included this discussion in Section 3.3.2 of the GCR. There is no evidence to suggest the decline in 2,4-dichlorophenol at RP-04 location is related to well installation procedures.

DEQ Comment 22:

DEQ does not agree with the statement that pentachlorophenol and 2-chlorophenol detections beyond the BNSF railroad and the LA are unrelated to historical operations. These constituents were detected historically in W-11-D, MW-04, W-09, MW-06, and AL5.

RPAC Response: Pentachlorophenol was not detected in the monitoring wells listed in DEQ's comment. There are other potential sources of pentachlorophenol north of the railroad tracks, including the former MGP operations at the NW Natural/Gasco property. RPAC maintains that pentachlorophenol north of the railroad tracks may not be related to historical RPAC operations.

2-Chlorophenol has been detected in all of the monitoring wells listed in DEQ's comment except MW-06-S. Most detections of 2-chlorophenol in groundwater are from samples collected more than 10 years ago. However, based on the detection of 2-chlorophenol at monitoring wells in the IA, the detection of 2-chlorophenol at monitoring well ASW-06 (at Metro) cannot be ruled out as unrelated to RPAC. The GCR text regarding 2-chlorophenol has been modified.

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Section 3.3.3, Herbicide Distribution and Temporal Changes

DEQ Comment 23:

DEQ disagrees with the statement that 2,4-D detections at RP-01 are not related to site detections, or is a laboratory error. 2,4-D was detected in W-11-S and W-11-D. 2,4-D has been detected in water discharging to the river via the storm drain and leakage along an old pipeline on the river bank.

RPAC Response: 2,4-D has been detected in W-11-S in one sample in 1995 at a concentration of 0.32 micrograms per liter (µg/L) and in one sample in 2001 at 1.13 µg/L, and has not been otherwise detected above reporting limits of 0.773 and 0.5 µg/L. The project database shows no record of 2,4-D having been detected at W-11-I, W-11-D, or W-11-B. In August 2002, 2,4-D was detected in City of Portland Outfall 22B at a concentration of 0.591 µg/L. The detection at RP-01-65, located downgradient of the W-11 wells, was 380 µg/L in Fall 2000, and was below reporting limits of 0.773, 0.179, and 0.5 µg/L in Spring 2000, Spring 2001, and Spring 2002, respectively. Concentrations of 2,4-D greater than 10 µg/L are not found in any characterization zone beyond the AL2 monitoring well cluster. The results at the RP-01 monitoring well cluster, at monitoring wells between the southern LA and RP-01, and at Outfall 22B, all indicate no 2,4-D concentrations near the magnitude of the concentration reported at RP-01-65 in Fall 2000. Therefore, it is not likely that the 2,4-D concentration in RP-01-65 from Fall 2000 is accurate. A summary of this information has been provided in the Final GCR; however, the conclusion regarding the source of the concentration at RP-01-65 has not been modified.

DEQ Comment 24:

DEQ does not agree that only decreasing trends are seen wherever 2,4-D is detected, as there appear to be increasing trends at AL5 MW-04 and W-11.

RPAC Response: 2,4-D concentration trends were re-evaluated for monitoring wells AL5, MW-04 and W-11. No distinct or quantitative increasing trends were identified (as noted by DEQ); in fact, the concentrations fluctuate. The GCR text has not been modified in response to DEQ's comment.

Section 3.3.4, Dioxin/Furan Distribution and Temporal Changes

DEQ Comment 25:

Summary of Dioxin/Furan Distribution and Temporal Changes: The statement about "industrial or municipal sources distinct from RPAC" needs further justification. Given the widespread occurrence of dioxin and furans at the Rhone Poulenc site, detailed analysis that supports this conclusion must be provided.

RPAC Response: The content in the GCR regarding dioxin distribution is intended to be a summary of a brief evaluation conducted for the purposes of the GCR. Further evaluation and justification will be provided in the RI report. The GCR text has not been modified.

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Section 3.3.5, Insecticide Distribution and Temporal Changes

DEQ Comment 26:

Dieldrin: This discussion should note that chlorinated pesticides, such as dieldrin, tend to be long lived in the environment. As a result, the groundwater concentrations of dieldrin have not changed appreciably over time.

RPAC Response: RPAC agrees with DEQ's assessment of dieldrin characteristics. However, this is typically considered a fate and transport issue, and for consistency of the content of the GCR, discussion of chemical properties will be provided in the GTE and/or the RI report, as appropriate. The GCR text has not been modified.

Section 3.3.6: Metal Distribution and Temporal Changes

DEQ Comment 27:

The sentence regarding dissolved arsenic detections at RP-02-31 needs some clarification and/or further justification.

RPAC Response: A typographical error was made in the statement "The distribution of dissolved arsenic concentrations demonstrates dissolved arsenic concentrations detected at monitoring well RP-02-31 **appear to be** associated with an RPAC source." Instead, the statement was intended to say ".....dissolved arsenic concentrations detected at monitoring well RP-02-31 **does not appear to be** associated with an RPAC source." This statement has been corrected in the GCR text. This is supported by the fact that much lower concentrations were present in wells located upgradient and along the groundwater flow path axis from RP-02-31.

Sections 4.2 - 4.4: Natural Attenuation

DEQ Comment 28:

Although the Groundwater Report makes a good case for natural attenuation being an explanation for apparent groundwater contamination plume stability, it is hard to understand this through dozens of graphs. It would be more useful to contour the natural attenuation data with respect to the NAPL source zone and groundwater contamination plume. John Wilson, one of the long time contributors to the field of natural attenuation, uses contouring to depict the changes in natural attenuation parameters with respect to groundwater contaminant plumes and sources.

RPAC Response: Figures including contours for the natural attenuation parameters/data for the RPAC Site will be presented in the Draft Bioremediation Work Plan.

DEQ Comment 29:

In the past it has been difficult to determine how to depict contamination at this site by contouring. The data presentation in this report narrows to specific chemicals and natural attenuation parameters that could be depicted with contouring. It would be useful to see the

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NAPL source area and dissolved plume compared to natural attenuation parameters that could show area of active attenuation processes and anaerobic versus aerobic zones.

RPAC Response: Comparison of the NAPL source area and dissolved groundwater plume to natural attenuation parameters may be presented and discussed in the Bioremediation Evaluation Work Plan or Report, as appropriate.. The comparison will be limited to available data collected to date.

DEQ Comment 30:

Natural attenuation monitoring should continue in the wells that are used to identify the axis of the groundwater contamination plume in preparation for the FS.

RPAC Response: Natural attenuation parameters are proposed to be collected from selected monitoring wells located along the groundwater flow path, and are identified and discussed in the PCGMP.

Section 5.0, Summary and Conclusions

DEQ Comment 31:

The report, here and elsewhere, refers to the area of the site "beyond N.W. Front Avenue." The report should acknowledge the existence of the Willamette River and note which chemical are discharging to the Willamette River at concentrations exceeding AWQC and/or surface water SLVs.

RPAC Response: RPAC has relabeled monitoring well clusters located "beyond N.W. Front Avenue" as "the distal monitoring wells". Essentially, the distal monitoring wells are defined as the furthest downgradient RPAC Site monitoring well clusters (RP-01, RP-02, RP-07, and W-19) located adjacent to the Willamette River. However, the GCR does not include identification of chemicals discharging to the Willamette River, regardless of screening values, because groundwater quality at monitoring wells is not representative of water quality at the sediment interface. As stated previously, the GTE will address potential migration of constituents in groundwater to surface water.

DEQ Comment 32:

Concentrations of phenols decrease rapidly with depth.

RPAC Response: RPAC agrees and has clarified this in the GCR text.

DEQ Comment 33:

The summary should include more detail regarding chemical fate and transport processes and how these impacts observed contaminant distributions (see General Comments.

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RPAC Response: A discussion of potential influences on constituent distribution in groundwater has been provided in a new Section 3.4 in the GCR. This information is also now summarized in Section 5.0 of the GCR.

DEQ Comment 34:

On page 35, the discussion of NAPL occurrence should be folded into the first bullet item. This is a major factor in controlling the distribution of groundwater contaminants.

RPAC Response: RPAC has made the requested change.

DEQ Comment 35:

DQO Satisfaction: As stated in the General Comments, this discussion requires further justification. The Groundwater Report fails to provide sufficient analysis to determine that the DQOs have been satisfied. This not only includes DQOs that DEQ believes require further characterization (i.e.; FS GETS evaluation, contaminant fate and transport), but also DQOs that DEQ tends to agree have been met such as nature and extent and supporting the risk assessment.

RPAC Response: As stated previously in this letter (under "General Comments"), further justification of DQO satisfaction has been provided in the GCR.

DEQ Comment 36:

Temporal Patterns: Contaminant concentrations do increase at some locations, particularly in the alluvial WBZ downgradient of the source area.

RPAC Response: The conclusions in the GCR have been modified as appropriate.

DEQ Comment 37:

DEQ disagrees that the conditions that facilitated dioxin transport no longer exist. Elevated levels of dissolved dichlorobenzenes may continue to facilitate contaminant transport.

RPAC Response: The potential for facilitated transport is being further evaluated as part of the Bioremediation Evaluation, and may also be addressed in the GTE. The statement in the GCR regarding current conditions for facilitated transport of dioxins has been removed.

DEQ Comment 38:

Table 3-1: Though this is generally an excellent table, DEQ would like to see an additional column: Date Installed.

RPAC Response: Per DEQ's request, RPAC has included the well installation dates in Table 3-1.

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DEQ Comment 39:

Table 3-2: As stated earlier, this table should also include surface water screening criteria that are protective of aquatic receptors including protection of the benthic community and fish consumption exposure pathways.

RPAC Response: As stated previously, groundwater results from wells near the Willamette River have been compared to surface water screening criteria. The results of this screening, including the screening values used, are presented in Table 3-3 of the GCR.

DEQ Comment 40:

Table 3-3a and b: These tables are a useful addition. Constituent analysis of NAPL should be included when available.

RPAC Response: A list of analytical test methods and a discussion of validated NAPL and residual NAPL soil and groundwater results collected to date will be submitted under separate cover in the NAPL Evaluation Work Plan (NAPL WP). Please note that Tables 3-3a and 3-3b have been renumbered to Tables 4-4a and 4-4b in the GCR.

DEQ Comment 41:

Figure 3-3: The water elevations in the vicinity of NDL are anomalous due to the influence of NDL on shallow groundwater and could benefit from some additional interpretation.

RPAC Response: A brief explanation for the groundwater elevation "anomaly" measured in three shallow alluvial monitoring wells located near the Northwest Drainage Pond (NDP) is provided in Section 3.1.2. The groundwater depression that is present in the vicinity of the NDP will be discussed in further detail in the pending GTE.

Figures 3-6 through 3-10:

These cross sections could also benefit from some additional interpretation that considers the influences of stratigraphy on fate and transport of contaminants in groundwater.

DEQ Comment 42a:

Cross Sections A-A' and E-E' should acknowledge that (fill) is present at the RP-07 location to a depth of -25'.

RPAC Response: Additional, comprehensive reviews of boring logs and geologic interpretations were completed. DEQ is correct in regards to the fill material present at RP-02. The fill present at the RP-07 monitoring well cluster extends to a depth of approximately 25 feet, and has been added to Cross Sections A-A' (Figure 3-6) and E-E' (Figure 3-10). Inadvertently, the fill material was also not projected across the length of Cross Section E-E', which has been corrected to reflect this subsurface condition.

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DEQ Comment 42b:

The Cross Sections should include a cross section that goes along the axis of the groundwater plume and through RP-01, which has the highest groundwater concentrations and at least on the surface seems like it is along the axis of the groundwater contaminant plume. They should consider taking C-C' through RP-01, bending at AL6-96.

RPAC Response: RPAC has considered the change to Cross Section C-C' suggested by DEQ and, as previously discussed in this letter, modifications to the cross section transect location have been made to directly intersect additional well clusters. Cross section C-C' was modified to bend from W-12 to W-11 then terminate at RP-02. This was done in lieu of taking C-C' through RP-01 from AL6-96 because it provides better aerial RPAC Site coverage and supports the conceptual three-dimensional groundwater model. Both the A-A' and C-C' cross sections generally parallel the groundwater flow path and, with the inclusion of monitoring well cluster W-11, intersect the constituent distribution axis (refer to Figure 3-5).

DEQ Comment 42c:

Cross Section E-E'. There appear to be discrepancies between this cross section and C-C'. RP-02 and RP-07 are common to both, and the discrepancies are with RP-02 on both sections. There is no surface fill on E-E', and C-C' shows 7 or 8 feet of fill. A silt layer is shown intersecting RP-02 below the second screened interval in C-C', but at the first screened interval in E-E'. This would mean a big difference in one or the other cross section, depending on where this silt was really intercepted in RP-02.

RPAC Response: RPAC agrees and has corrected the discrepancies identified by DEQ, and has further expanded the geologic boring log review to correlate information provided on the cross sections, Figures 3-6 through 3-10.

DEQ Comment 43:

Figure C-23 showing the distribution of 2,3,7,8-TCDD. The concentration in W-19-1 of 0.55 pg/l exceeds the screening criteria of 0.45 pg/l, therefore should be shown in green and not purple.

RPAC Response: The drafting error has been corrected on Figure C-23.

DEQ Comment 44:

Please have a revised Groundwater Characterization Report that includes a proposed groundwater monitoring program that addresses the following data needs:

- *Evaluate contaminant concentration trends through a series of statistical analyses;*
- *Evaluate contaminant discharges to the Willamette River;*
- *Evaluate the effectiveness of the groundwater extraction and treatment system;*
- *Evaluate remedial action alternatives in the feasibility study;*

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- *Evaluate natural attenuation parameters along the groundwater contamination plume axis, adjacent to the Willamette River, at the margins of the NAPL, and near WDL and NDL.*

RPAC Response: As mentioned previously, RPAC has prepared a groundwater monitoring plan for submittal to DEQ under separate cover. The PCGMP will include specific objectives for the post-characterization monitoring, as well as a Field Sampling Plan with a detailed list of monitoring wells and analyses.

Please contact Roger Gresh at (503) 639-3400 if you have any questions regarding the GCR.

Sincerely,

AMEC Earth & Environmental, Inc.

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No. G1904

Attachment: Final Groundwater Characterization Report

TARW/lp

c: R. Ferguson, RPAC
J. Benedict, CHBH&L

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EXECUTIVE SUMMARY

The Final Groundwater Characterization Report (GCR) presents an evaluation of the analytical results from groundwater samples collected during the Remedial Investigation/Feasibility Study (RI/FS) at the RPAC Portland Site, including a discussion of the distribution of constituents in groundwater, along with geological information, groundwater elevations, and a summary of natural attenuation parameters in groundwater. The results from all groundwater samples collected from individual monitoring wells at the RPAC Site were used in the evaluation. The primary purpose of this document is to provide a characterization of the nature and extent of the preliminary constituents of potential concern (PCOPCs) in the groundwater at the RPAC Site.

The distribution of PCOPCs in groundwater at the RPAC property is associated with general manufacturing activities that previously occurred in each area of the RPAC property. Sufficient validated groundwater analytical results are now available to satisfy the nature and extent, human heath and ecological risk assessment (HHRA and ERA), hot spot assessment, and groundwater transport evaluation (GTE) Data Quality Objectives (DQOs) of the groundwater characterization portion of the RPAC Site RI. Additional groundwater sampling is planned for the RPAC Site to evaluate natural attenuation, to provide additional data for the FS, and to evaluate the potential for chemical constituent migration to receptors. A separate Post-Characterization Groundwater Monitoring Plan (PCGMP) is being prepared for submittal to DEQ that provides information regarding additional groundwater data collection.

Non-aqueous phase liquid (NAPL) or NAPL residual has been identified in a limited portion of the RPAC property. Further NAPL investigation to fully characterize NAPL at the Site will be proposed in the forthcoming NAPL Evaluation Work Plan.

In general, the limited number of discernable temporal patterns or trends in PCOPC concentrations over time demonstrate the relative stability of the solute phase groundwater plumes at the RPAC Site. Increases that have been observed are generally not seen over more than two sampling events. For certain PCOPCs, concentration decreases have been observed.

Natural attenuation field measurements and analytical results from groundwater samples demonstrate microbial activity is present but variable at the RPAC Site and microbial populations range from very low to extremely high. Although variable, the laboratory and field analytical results demonstrate that natural attenuation is occurring at the RPAC Site and that PCOPCs are being reduced in concentration. Additional natural attenuation evaluation activities will be conducted as part of the Bioremediation Evaluation, as well as groundwater sampling to be conducted under the PCGMP.

Several mechanisms appear to affect the transport of constituents at the RPAC Site, including a preferential flow path related to the hydrogeology at the Site. Possible

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preferential flow paths include a trough in the basalt within the Lake Area, the historic drainage ditch, a storm sewer along N.W. Front Avenue, railroad fill material, and shallow fill material. However, characterization results and other information indicate that, other than the basalt trough, these features are not providing a significant flow path for groundwater constituent migration. Preferential flow pathways will be considered further in the GTE. Potential facilitated transport mechanisms, which may have contributed to the current constituent distribution in groundwater, will be evaluated as part of the Bioremediation Evaluation and Section 3.4 of the GCR.

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1.0 INTRODUCTION

The Final Groundwater Characterization Report (GCR) presents an evaluation of the analytical results from groundwater samples collected during the Remedial Investigation/Feasibility Study (RI/FS) at the RPAC Portland Site, including a discussion of the distribution of constituents in groundwater, along with geological information, groundwater elevations, and a summary of natural attenuation parameters in groundwater. The primary purpose of this document is to provide a characterization of the nature and extent of the preliminary constituents of potential concern (PCOPCs) in the groundwater at the RPAC Site. The results from all groundwater samples collected from individual monitoring wells at the RPAC Site were used in the evaluation. The RPAC property is located at 6200 N.W. St. Helens Road in Portland, Oregon.

When developing the GCR, RPAC considered the following:

- The Consent Order (the Order) between the Oregon Department of Environmental Quality (DEQ) and RPAC dated July 8, 1999;
- The Remedial Investigation Work Plan, Rhone-Poulenc AG Company, Portland, Oregon (RI Work Plan) dated April 1999 (DEQ 1999);
- The Draft Extended Groundwater Characterization Plan (EGCP) dated March 2, 2001 (AMEC 2001a); and
- The Final RPAC Project Management Plan (PMP) dated March 30, 2001 (AMEC 2001b).

Five groundwater characterization events were conducted: Spring and Fall 2000; Spring and Fall 2001; and Spring 2002. The Fall 2001 event included groundwater and surface water level measurements only and not sampling for laboratory analysis. The analytical results from groundwater samples collected prior to 2000 have been considered in evaluation of groundwater characterization of the RPAC Site; however, because constituent concentrations in groundwater change over time (e.g., due to natural biodegradation processes and groundwater migration), specific emphasis has been placed on the more recent groundwater analytical results in this evaluation. The final validated analytical results from the recent groundwater characterization events are presented in the following documents:

- Final Spring and Fall 2000 Groundwater Data and Evaluation (2000 Groundwater Report) dated July 31, 2001 (AMEC 2001d);
- Focused Spring 2001 Groundwater Characterization Event, Groundwater Monitoring Report (Spring 2001 GMR) dated October 4, 2001 (AMEC 2001e);

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- Fall 2001 Groundwater Monitoring Report (Fall 2001 GMR) dated January 11, 2002 (AMEC 2002a); and
- Focused Spring 2002 Groundwater Characterization Event Groundwater Monitoring Report (Spring 2002 GMR) dated July 31, 2002 (AMEC 2002d).

1.1 Site Description

The RPAC property is located in Section 30 of Range 1W, Township 1N and is presented on the RPAC Site location map, Figure 1-1. The Site is located in a heavily industrialized area northwest of Portland, southwest of the Willamette River. The area surrounding the RPAC property was once predominated by lakes, including Kittridge and Doane Lakes, which were interconnected through sloughs. Kittridge and Doane Lakes were filled as industrial development in the area occurred. The Tualatin Mountains adjoin the industrially developed area to the southwest and reach elevations of approximately 1,100 feet above mean sea level at their peak.

The RPAC property historically has been separated, for the purpose of investigation, into three areas identified as the Insecticide Area (IA), the Herbicide Area (HA), and the Lake Area (LA). The IA is located at the southern portion of the RPAC property and was used for the manufacturing, storage, and formulation of insecticides and their components. The HA is located adjacent to and northwest of the IA, and was used for the manufacturing, formulation, storage, and handling of herbicides and their components. The LA is located north of the primary RPAC facility. The administrative buildings and maintenance facility were in the HA. Adjacent to the LA is a remnant of Doane Lake known as West Doane Lake (WDL). An additional remnant of Doane Lake, North Doane Lake (NDL), is located in a triangular-shaped property northwest of the LA. Both WDL and NDL are located on property owned by Burlington Northern and Santa Fe Railway Company (BNSF). Groundwater monitoring wells are located on RPAC property and on adjacent and nearby properties, including property owned by the City of Portland, Wacker Siltronic Corporation, Schnitzer Investment Corporation, ATOFINA Chemicals, Inc., ESCO Corporation (ESCO), Gould Electronics (Gould), Metro, and BNSF. The Gould and Schnitzer properties, along with the LA portion of the RPAC property, are part of the Gould Superfund Site.

1.2 Site History

The RPAC industrial facility was used for the formulation and/or manufacture of insecticides and/or herbicides from 1943 to 1991. Extensive investigation of the soil and groundwater has been conducted on the RPAC property. DEQ provided an analysis of the RPAC property's investigative results in the RI Work Plan (DEQ 1999). Based on their review of the investigative results, DEQ requested RPAC collect

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additional information to characterize further the RPAC property and to evaluate the RPAC property's remedial options.

Early operations at the RPAC facility included the formulation of railroad right-of-way treatment liquids, fertilizer and insecticide mixtures, and sodium arsenite liquids. In the early 1950s the formulation of organic products, including phenoxy herbicides, DDT, endrin, aldrin, and heptachlor began and operations were expanded in 1956 to include the manufacture and formulation of 2,4-D acid and esters. During the 1960s, manufacture and formulation of MCPA acid and esters, and 2,4-DB acid occurred at the RPAC facility, and in 1971 the manufacture of bromoxynil products was added.

Prior to 1966, treated wastewater was discharged to WDL, and from 1966 to 1975 treated wastewater was discharged to the Willamette River. Beginning in 1977, treated wastewater was discharged to a City of Portland publicly owned treatment works (POTW). RPAC began operation of a shallow groundwater extraction and treatment system in 1984, which discharges to the Willamette River under a National Pollution Discharge Elimination System (NPDES) permit issued by DEQ.

RPAC and DEQ entered into the Order (No. ESCR-NWR-99-07) in July 1999. The purpose of the Order was to evaluate the nature and extent of potential releases at the RPAC facility and to characterize and develop remedial measures to address soil, sediment, groundwater, and surface water potentially impacted in the locality of the RPAC facility. RPAC has been conducting the RI in compliance with the RI/FS process provided in OAR 340-122-010 through 340-122-115, the scope of work provided in the Order, relevant United States Environmental Protection Agency (USEPA) documents and other relevant guidance documents.

1.3 Data Quality Objectives

The EGCP describes the Data Quality Objectives (DQOs) for the Spring 2001 and Fall 2001 groundwater characterization events. These DQOs can be applied to all recent (2000 through 2002) groundwater data collected and to all the RI data collection activities for characterizing groundwater in general. The DQOs in the EGCP are to provide additional information for:

- Characterizing nature and extent of the RPAC PCOPCs in groundwater;
- Conducting the human health risk assessment (HHRA);
- Conducting the ecological risk assessment (ERA);
- Conducting the groundwater hot spot assessment;
- Conducting the groundwater transport evaluation (GTE); and

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- Evaluating natural attenuation processes.

Sufficient validated groundwater analytical results are now available to satisfy the nature and extent, HHRA, ERA, hot spot assessment, and GTE DQOs. These specific RI-related activities can be conducted without further groundwater sample collection and analysis. The nature and extent component of the RI is presented in this GCR. The evaluation of groundwater data for use in the HHRA, ERA, hot spot assessment, and GTE will be presented in the appropriate documents associated with these assessments and evaluations.

Although the DQOs have been met for most of the RI-related activities listed above, additional groundwater chemistry data would be useful in evaluation of natural attenuation processes. For this reason, additional groundwater monitoring will be conducted at the RPAC Site as proposed in the Post-Characterization Groundwater Monitoring Plan (PCGMP) for the RPAC Site, to be submitted to DEQ under separate cover. The specific DQOs for the additional groundwater monitoring will be included in the PCGMP. In addition, as appropriate based on the schedule of individual components, relevant groundwater data collected under the PCGMP may be incorporated into other RI activities (e.g., groundwater elevation data collected prior to commencement of the GTE may be considered in development of the GTE).

Additional DQOs of the groundwater monitoring program that were identified in the RI Work Plan include identification of PCOPCs and evaluating constituent migration to the Willamette River. COPCs will be identified as part of the risk assessment process based on existing groundwater analytical results; the constituents discussed in this GCR are still considered preliminary, as discussed in Section 2.0. Migration of RPAC-related constituents to the Willamette River will be addressed as part of the GTE, and may be evaluated using a combination of groundwater analytical results, groundwater modeling, and surface water analytical results.

Additional activities related to groundwater that are planned for the RPAC Site, other than those mentioned above, include an evaluation for a groundwater extraction and treatment system (GETS) interim remedial action measure (IRAM), and a non-aqueous phase liquid (NAPL) evaluation to compete the characterization of NAPL at the RPAC Site. These evaluations may include use of groundwater information from the project database, but were not defined as specific DQOs for groundwater characterization. Existing data are sufficient to conduct both of these evaluations.

2.0 PRELIMINARY CONSTITUENTS OF POTENTIAL CONCERN

PCOPCs were identified through a screening process described in the RI Work Plan (DEQ 1999). The purpose of the preliminary screening was "to identify likely COPCs

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and assess potential exposure routes and data gaps." This included a comparison of maximum detected concentrations of each detected chemical in groundwater to USEPA Region IX Preliminary Remediation Goals for residential exposures (PRGs) (USEPA 1998a), and comparison of maximum detected concentrations of each detected chemical in soil with values protective of migration to groundwater, assuming a dilution attenuation factor of 1 (USEPA 1998a).

Prior to the Spring and Fall 2000 groundwater monitoring events, RPAC completed additional screening to eliminate PCOPCs that had never been detected in groundwater samples collected at the RPAC property or in the vicinity. Current groundwater PCOPCs are summarized in Table 2-1. The PCOPCs presented in Tables 2-1 and 3-2 are considered preliminary; the final COPCs for the Site will be determined through the risk assessment process. The final COPC list will be based on analytical results from all media to be included in the RPAC Site risk assessments (both HHRA and ERA), including groundwater, soil, surface water, and sediment. The final COPC list will be generated independently of the PCOPC list, and any constituents that may have been eliminated from the PCOPC list during preliminary screenings will be included in the risk assessment screening for final COPCs.

3.0 GROUNDWATER EVALUATION

The analytical results from groundwater samples have been compared to preliminary screening values. The preliminary screening values are not intended to serve as cleanup goals or to specify the level of risk at the RPAC Site, but rather are used for discussion and presentation purposes only. The HHRA and ERA will evaluate site-specific potential risks associated with final COPCs at the RPAC Site. The preliminary screening values were assigned primarily from the USEPA Region IX Preliminary Remediation Goals for tap water (Tap Water PRGs) (USEPA 2002), with alternate values where Tap Water PRGs were not available or not applicable. The preliminary screening values used in this report are listed in Table 3-2. Table 3-2 also includes detailed notes regarding the source of each preliminary screening value.

In addition to the screening above, the wells near the Willamette River were also compared to surface water screening values. However, the concentrations of PCOPCs in groundwater near a surface water feature are not representative of water discharging into the surface water. An evaluation of groundwater discharge to surface water, including the Willamette River and NDL, will be included in the GTE, and evaluation of groundwater and surface water interaction at the RPAC Site (a component of the GTE) will consider both groundwater and surface water analytical results. Further, screening of groundwater against surface water criteria is more appropriately performed as part of the ERA than as part of groundwater

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characterization, where screening is provided primarily for presentation and discussion purposes.

Selected groundwater analytical results have been screened against surface water screening values for ecological receptors and human consumption of organisms. The results of this screening, including only those analytical results that exceed one or more of the surface water screening values, are presented in Table 3-3. The two sets of surface water screening values used are equivalent to ten times the: EPA National Recommended Water Quality Criteria, "consumption of water and organisms" values for human health screening (November 2002); and DEQ ERA Level II Screening Level Values, most protective value for surface water (December 2001). The groundwater analytical results screened against these surface water values are those collected from Spring 2000, Fall 2000, Spring 2001, and Spring 2002, from monitoring wells in the RP-01, RP-02, RP-07, and W-19 well clusters. Because evaluation of potential groundwater migration to ecological receptors will be conducted as part of the ERA, an evaluation or discussion of the groundwater comparison to surface water screening values has not been provided in this GCR.

This section provides a summary of the hydrogeologic setting at the RPAC Site, a description of the groundwater characterization activities conducted by RPAC, the distribution and temporal changes of selected PCOPCs, and preliminary information regarding the nature and extent of NAPL.

3.1 Summary of Hydrogeologic Setting

Historically, groundwater samples and monitoring well completion intervals at the Site have been assigned to an investigation zone depending on depth of sample collection or completion depth of the monitoring well, including fill, shallow alluvium, intermediate alluvium, deep alluvium, and basalt. Groundwater monitoring reports submitted to DEQ in recent years, including the most recently submitted Spring 2002 GMR, have maintained these designations. During completion of the GCR, the lithologic logs and historic groundwater elevations were reviewed in relation to the investigation zones.

The result of the evaluation led to the assignment of three characterization zones that more closely reflect the hydrogeology at the Site, including the Fill/Shallow Alluvium, Alluvium, and Basalt characterization zones. The selection of the characterization zone designation for groundwater samples and monitoring well completion intervals was based on the following criteria: soil type or lithology at the depth of sample collection; groundwater elevation changes relative to completion depths; and sampling location. The characterization zone designations were selected to enhance the descriptions of groundwater flow and constituent transport, and to provide a more hydrogeologically representative analysis of groundwater characterization. The

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characterization zone designation is based on a comprehensive review of available boring logs. As such, there is some variability or discrepancies due to differences in sampling and drilling methodologies and field personnel interpretations. The characterization zone selected for each monitoring well is presented on Figure 3-1.

Following the review of the boring logs, subsurface geologic and hydrogeologic information was correlated between individual monitoring well clusters and projected across the RPAC Site. Based upon this information, simplified geologic cross sections (Figures 3-5 through 3-10) were created using the Borehole Module of the Groundwater Modeling System (GMS, version 3.1) software.

3.1.1 Fill/Shallow Alluvium Characterization Zone

The fill/shallow alluvium characterization zone (Fill/Shallow Alluvium Zone) has been defined as a zone of relatively shallow groundwater (generally no more than 30 feet below ground surface [bgs]) that appears to function somewhat hydrologically independent of alluvial material encountered at greater depths. The Fill/Shallow Alluvium Zone is generally laterally continuous along the groundwater flow path throughout the RPAC Site (presented on cross sections Figure 3-6 and 3-8) and extends to the bank of the Willamette River. However, the Fill/Shallow Alluvium Zone is either not laterally continuous or not present in other portions of the RPAC Site. The hydrologic independence of this zone appears to be associated with areas of significant historical fill events, including the former Doane Lake area, a portion of the HA, and a portion of the terrace above the Willamette River that extends from RP-02 to RP-07. The range of the fill is presented in the simplified geological cross sections presented on Figures 3-6 through 3-10, with the location of the cross sections presented on Figure 3-5. The fill material varies in depth across the Site, with the fill areas reaching 30 feet in depth within the LA. The fill material is approximately 25 feet deep at the RP-07 well cluster located on the Wacker property and forms the terrace/bank above and along the Willamette River. Fill material was not noted in monitoring well logs upgradient to the Site.

The fill material consists of variable amounts of sand, silt, clay, organic matter and occasional gravel, and miscellaneous debris. The shallow alluvium underlies the fill material and consists primarily of interbedded sandy silts and silty sands with occasional discontinuous inter-fingered layers or lenses of sand and clayey silt.

Groundwater monitoring wells completed in the Fill/Shallow Alluvium Zone were selected on the basis of the following criteria:

1. Groundwater elevation measurements collected at monitoring wells completed in the Fill/Shallow Alluvium Zone indicate a distinct change in groundwater elevation

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in relation to a monitoring well completed in the alluvium characterization zone (Alluvium Zone) completed at the same well cluster (see Appendix A, Figures A-6, A-7, and A-10 as examples);

2. Boring and well construction logs display the sampling location (or screened section of well) within fill material or above what appears to be a semi-permeable layer of sandy silt, silty sand, organic silt, or clay; and/or

3. Groundwater sample depth and monitoring well screened zone are similar to nearby sampling locations designated within the Fill/Shallow Alluvium Zone.

The sampling locations designated within the Fill/Shallow Alluvium Zone are shown on Figure 3-1 and listed in Table 3-1. Groundwater elevations for the Fill/Shallow Alluvium Zone from the Spring 2002 groundwater characterization event are shown on Figure 3-2. The groundwater elevations depicted on Figure 3-2 vary slightly from the elevations presented in the Spring 2002 GMR, due to the variance in the Fill/Shallow Alluvium Zone data set.

3.1.2 Alluvium Characterization Zone

The Alluvium Zone has been defined as the intermediate/deep alluvial deposits between ground surface (if the Fill/Shallow Alluvium Zone is absent) or the bottom of the Fill/Shallow Alluvium Zone, and the underlying basalt. The Alluvium Zone is laterally continuous beneath the RPAC Site. The simplified geology within the Alluvium Zone is presented in Figures 3-6 through 3-10. The Alluvium Zone generally consists of discontinuous fine-grained sandy silt and/or silty sand interbedded with clayey silt and silt lenses.

At some locations gravel was encountered below the fine-grained material and overlies the uppermost surface of the basalt bedrock. The gravel is included in the Alluvium Zone when encountered. Based upon a review and correlation of the well logs included along the cross section lines, the origin of the gravel near the river is interpreted to be different geologically in nature and character than the origin of the gravel elsewhere. The gravel encountered at the RP-06, RP-07, and W-19 well cluster locations appears to be deposited by fluvial processes, and also represents the thickest accumulation of these gravels. The gravel from some of the other wells that intersect the cross section profiles appears to be derived from, and the result of, chemical and physical weathering processes acting on the uppermost surface of the basalt and/or may represent possible colluvial slope wash, derived from the flanks of the Tualatin Mountains. The alluvial gravel overlying basalt bedrock is not laterally continuous across the RPAC Site. Identification of the alluvial gravel is based upon the presence of rounded to subrounded clasts in a silty sand or sand matrix, increased

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water production rates noted during drilling, general lack of fines (clay/silt), and the presence of minor amounts (<15%-20%) of terrestrial clasts including quartz, quartzite, and monzonite. In general, the presence of the more significant alluvial gravel deposits underlying the Site coincide with the presence of localized depressions on the basalt surface. Portions of this gravel may possibly represent re-worked Troutdale Gravel Aquifer sediments or older alluvium derived from the Willamette River and deposited in scour depressions incised on the surface of the basalt.

Basalt rock is encountered at greater depths in the LA and forms a NW/SE trending trough; consequently, the Alluvium Zone is thicker in this area, as shown on Figure 3-6 between monitoring well clusters W-08 and W-09, and on Figure 3-8 between monitoring well clusters BST2W/AL2 and AL6. For the purposes of this report, the lithology within the geological cross sections has been simplified (for example, sandy silt and silty sand have been depicted together as sandy silt).

Groundwater monitoring wells completed in the Alluvium Zone were selected on the basis of the following criteria:

1. Groundwater elevation measurements collected at monitoring wells completed in the Alluvium Zone indicate a distinct change in groundwater elevation in relation to a monitoring well completed in the Fill/Shallow Alluvium Zone and/or basalt characterization zone (Basalt Zone) completed at the same well cluster (see Appendix A, Figures A-2 and A-6 as examples);

2. Boring and well construction logs display the sampling location or screened section of the monitoring well are within alluvial material and do not appear to be associated with fill or basalt; and/or

3. Groundwater sample depth and monitoring well screened zone are similar to nearby sampling locations designated within the Alluvium Zone.

The groundwater sampling locations designated in the Alluvium Zone are shown on Figure 3-1 and listed in Table 3-1. Groundwater elevations for the Alluvium Zone from the Spring 2002 groundwater characterization event are shown on Figure 3-3. The groundwater elevation contours depicted on Figure 3-3 vary slightly from the elevation maps presented in the Spring 2002 GMR, due to the variance in the Alluvium Zone data set. The groundwater elevation contours on Figure 3-3 also depict a groundwater depression at monitoring wells MW-06-S, MW-07-S and the RP-03 well cluster located near the Northwest Drainage Pond (NDP). This is likely due to year-round infiltration of groundwater into the NDP, which subsequently results in the localized depression of the water table in this area. Groundwater flow in the NDP area will be further evaluated as part of the GTE.

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3.1.3 Basalt Characterization Zone

The Basalt Zone has been defined as the crystalline volcanic rock below the alluvial deposits at the RPAC Site. The Basalt Zone is laterally continuous, and slightly undulated throughout the RPAC Site, and generally is found at a depth ranging from approximately 60 to 120 feet bgs. The extent of fracturing in the basalt at the RPAC Site varies from very intensely fractured to slightly fractured and the basalt is generally slightly weathered to fresh, with the uppermost surface (generally less than 4 feet thick) being generally intensely weathered to decomposed rock, which exhibits soil-like properties. Because the uppermost basalt surface is decomposed at some locations, and exhibits soil-like properties, portions of this unit historically have been logged/interpreted to be alluvial gravel. In fact, what has been interpreted to be alluvium at some locations appears to be intensely weathered to decomposed basalt. This revised interpretation is supported by the many previous explorations that have identified subangular to angular basalt clast/fragments in a clay matrix in many monitoring well borings drilled on the Site. This layer is not considered "gravel", but rather represents weathered basalt and, therefore has been included within the Basalt Characterization Zone. The distinction between the decomposed basalt and alluvial gravels is complex, and the interpretations were dependent upon interpretations made by numerous individual logging personnel and drilling/sampling methods used through many past subsurface explorations, as was discussed in Section 3.1 of this GCR.

The simplified geology of the Basalt Zone is shown on Figures 3-6 through 3-10. A significant increase in depth of the basalt layer occurs within the LA and near N.W. Front Avenue, as shown on Figures 3-6 and 3-8.

Groundwater monitoring wells completed in the Basalt Zone were selected on the basis of the following criteria:

1. Boring and well construction logs indicate the sample location or screened section of well is in basalt; and/or

2. Previous designation within the basalt beneath the RPAC Site (in cases where no boring logs were available).

The groundwater sampling locations and monitoring wells completed in the Basalt Zone are shown on Figure 3-1 and listed in Table 3-1. Groundwater elevations for the Basalt Zone from the Spring 2002 groundwater characterization event are shown on Figure 3-4. The groundwater elevation contours depicted on Figure 3-4 vary slightly from the elevations presented in the Spring 2002 GMR, due to the variance in the Basalt Zone data set.

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3.1.4 Vertical Hydraulic Gradient

The substantial quantity of groundwater elevation measurements collected over the last decade at the RPAC Site demonstrate that a downward vertical hydraulic gradient is generally present from the Fill/Shallow Alluvium to the Alluvium and Basalt Zones, and is observed primarily from the area near the southwestern RPAC property boundary to the northern LA property boundary, as observed at monitoring well clusters MW-01, W-08, W-09, and W-18 (see Figures 3-2, 3-3, and 3-4, in addition to Appendix A Figures A-1, A-7, and A-11) and during the recent monitoring events. The magnitude of the vertical hydraulic gradient typically decreases from the northern LA property boundary toward the Willamette River. Groundwater elevations collected at monitoring wells adjacent to the Willamette River generally show a neutral vertical hydraulic gradient, as observed at monitoring well clusters RP-01, RP-02, and RP-07 (see Figures 3-2, 3-3, and 3-4, in addition to Appendix A Figures A-3 and A-4). A slight upward vertical gradient between the Basalt and the Alluvium Zones was observed at monitoring well cluster MW-11, Spring 2002, but appears to be localized.

3.2 Groundwater Characterization Activities

Groundwater characterization activities in the vicinity of the RPAC facility began in 1982 and have included several focused, as well as comprehensive, groundwater sampling efforts. Recent groundwater characterization events, conducted under the current Order, include the Spring 2000, Fall 2000, Spring 2001, Fall 2001, and Spring 2002 groundwater characterization events. The Fall 2001 groundwater characterization event included only groundwater and surface water level measurements.

The Spring 2000 and Fall 2000 groundwater characterization events were completed in accordance with the Final Early RI Activities Comprehensive Groundwater Monitoring - Field Sampling Plan (URS 1999) and subsequent correspondence between RPAC and DEQ. The Spring 2001 and Spring 2002 groundwater characterization events were conducted as specified in the EGCP (AMEC 2001a) and subsequent correspondence, as well as event-specific field sampling plans (AMEC 2001c; AMEC 2002b). The scope of each of these groundwater characterization events was approved by DEQ prior to implementation. RPAC has maintained sampling protocols consistent with industry standards throughout groundwater data collection, and the four most recent events, conducted Spring 2000 through Spring 2002, were conducted using generally consistent standard operating procedures and analytical testing methods. This was done to reduce potential variability in sampling methods and protocols. Overall, potential variability based on use of different

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analytical test methods throughout the duration of the project does not appear to exceed average variability of data sets.

Additional groundwater characterization events included the direct-push groundwater sampling event conducted in 1999 at the RPAC Site (designated as GGW-x locations; see Table 3-1 and Figure 3-1). A summary of groundwater investigations conducted prior to the 1999 direct-push investigation is included in Table 2-1 of the RI Work Plan (DEQ 1999). The dates when groundwater samples were collected at each monitoring well, piezometer, and temporary well point are included in Table 3-1. The groundwater sampling locations include 159 monitoring wells or piezometers (both existing and abandoned) and 45 direct-push or other one-time sampling locations, for a total of 204 groundwater sampling locations. These groundwater sampling locations, sample collection dates, and analytical methods for each sampling date are included in Appendix B.

3.3 Constituent Distribution and Temporal Changes

This section includes a discussion of the distribution of selected chemicals in each PCOPC chemical class, and a qualitative evaluation of temporal changes for each chemical class.

Recently installed monitoring wells at the RPAC Site have been sampled only during the recent groundwater characterization events: Spring 2000 through Spring 2002. Although a large quantity of groundwater analytical results exist for the RPAC Site prior to 2000, these recent groundwater characterization events are considered most representative of the current groundwater conditions (nature and extent).

The seasonal groundwater elevation condition for recent groundwater characterization events was: Spring 2000 - relatively high groundwater elevation; Fall 2000 - relatively low groundwater elevation; Spring 2001 - relatively low groundwater elevation; and Spring 2002 - relatively high groundwater elevation. The Spring 2001 groundwater characterization event was conducted during a drought year and, therefore, constitutes a low groundwater elevation season. The concentrations of select PCOPCs, provided in Appendix D, does not demonstrate a discernable pattern between the PCOPC concentrations and the seasonal groundwater elevation conditions for these recent groundwater characterization events.

The distribution of select PCOPCs from the recent groundwater characterization events are provided in Appendix C, Figures C-1 through C-36. The PCOPCs for the constituent distribution figures were selected to represent each respective PCOPC chemical class (e.g., volatile organic compounds [VOCs], metals) and are generally consistent with the figures provided in the recent GMRs. These PCOPCs were

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selected originally for discussion purposes prior to the Spring 2001 groundwater characterization event and were based on prevalence in the environment, perceived abundance at the RPAC facility, and physical properties such as mobility, solubility in water, and toxicity. Similar compounds were selected for discussion in the RI Work Plan (DEQ 1999). Dissolved mercury has been removed from the PCOPC list because dissolved mercury has not been regularly detected in groundwater at the RPAC Site. Dissolved arsenic distribution has been added to the Appendix C figures. The distribution of select PCOPCs is presented for each characterization zone, including Fill/Shallow Alluvium, Alluvium, and Basalt.

The analytical results for groundwater samples at select monitoring well clusters and for select PCOPCs were evaluated to determine if significant changes in groundwater PCOPC concentrations have occurred and if a temporal pattern to the PCOPC concentrations is present. The analytical results from all groundwater samples collected at the select monitoring well locations were included in the evaluation of temporal patterns. The monitoring well locations selected were distributed along the general groundwater flow path from the RPAC property to the furthest downgradient RPAC Site monitoring well clusters (RP-01, RP-02, RP-07, and W-19) located adjacent to the Willamette River. These four well clusters are herein referred to as "the distal monitoring wells". Of the selected monitoring wells, only those with sufficient analytical results and a discernable trend are discussed in the sections below. In general, the GCR provides a qualitative interpretation of concentration changes based on the data available for those instances where trends are observable, and changes in concentration during the four most recent sampling events (considered to be representative of the current groundwater conditions) generally were not considered to constitute a "trend". Temporal changes in the select PCOPC concentrations are presented in Appendix D, Figures D-1 through D-44.

The evaluation of lateral and vertical extent of PCOPCs is based on distribution of sampling locations and actual analytical results from groundwater sampling. As with any groundwater monitoring program, the groundwater quality information available is limited to the locations where monitoring wells are present or where samples have been collected. Although the general direction of groundwater flow has been considered, a detailed evaluation of groundwater transport (GTE), including modeling of constituent transport and analysis of the interaction between groundwater and surface water, is currently in process and will be submitted to DEQ under separate cover at a later date. Therefore, a prediction of future extent of PCOPCs cannot be included in this report.

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3.3.1 VOC Distribution and Temporal Changes

The distribution of concentrations for select VOCs from groundwater samples collected during the Spring 2000 through Spring 2002 groundwater characterization events is provided in Appendix C, Figures C-1 through C-3 for 1,2-dichlorobenzene, Figures C-4 through C-6 for benzene, and Figures C-7 through C-9 for trichloroethene (TCE). The temporal changes for VOCs at select monitoring well clusters are presented in Appendix D, Figures D-1 through D-4 for 1,2-dichlorobenzene, Figures D-5 through D-8 for benzene, and Figures D-9 through D-12 for TCE.

1,2-Dichlorobenzene

1,2-Dichlorobenzene was detected in groundwater samples collected from the Fill/Shallow Alluvium, Alluvium, and Basalt zones, at locations extending from the southern end of the HA to the distal monitoring wells, following the general direction of groundwater flow. The most elevated concentrations of dissolved-phase 1,2-dichlorobenzene were detected in groundwater samples collected from the northern corner of the HA and along the Lake Area Drainage Ditch. These are areas that are at or near locations where NAPL has been observed during recent monitoring events (Table 3-4b) or where NAPL was observed during previous drilling (Table 3-4a, Figure 3-11).

Concentrations of 1,2-dichlorobenzene generally decrease with depth in the HA, and generally increase with depth in the LA and further downgradient. 1,2-Dichlorobenzene was detected in samples from Basalt zone monitoring wells in an area extending generally from the northern corner of the HA to the distal monitoring wells. 1,2-Dichlorobenzene was not detected upgradient from the RPAC property. Concentrations of 1,2-dichlorobenzene were detected east to the Schnitzer property and west to monitoring wells near the Northwest Drainage Pond. However, concentrations exceeding the preliminary screening value for 1,2-dichlorobenzene were detected only in a relatively narrow section of the Site, originating at relatively shallow depths in the HA and near the Lake Area Drainage Ditch and extending into the deep Alluvium Zone and Basalt Zone to the distal monitoring wells. Concentrations exceeding the preliminary screening value for 1,2-dichlorobenzene are differentiated by color on Figures C-1 through C-3 in Appendix C.

In general, notable trends or site-wide changes over time of 1,2-dichlorobenzene concentrations in groundwater have not been observed. Notable changes were observed at a few individual monitoring wells within well clusters, whereas other monitoring well clusters did not show a notable change. Changes in 1,2-dichlorobenzene concentration were observed at monitoring well AL5-35 (Appendix D, Figure D-1), in the LA, where 1,2-dichlorobenzene concentrations have increased

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overall between 1995 and 2000. However, the 1,2-dichlorobenzene concentrations in the Fill/Shallow Alluvium (AL5-19), the deep Alluvium (AL5-62), and Basalt (BSTW-74) monitoring wells located at this well cluster have remained relatively unchanged or show slight decreases. Concentrations have varied since 1996 at monitoring well MW-04-27, with some recent elevated concentrations. Concentrations at monitoring well MW-05-34 demonstrate that 1,2-dichlorobenzene has decreased since 1992. Monitoring well MW-09-23 also shows an overall decrease in concentration of 1,2-dichlorobenzene since 1992.

Where possible, 1,2-dichlorobenzene results are reported from EPA Method 8260. However, EPA Method 8270 results are presented on Figures D-3 and D-4 (Appendix D) for the October 1990 groundwater characterization event from a few monitoring wells (W-11-D, W-18-I, W-19-I, and W-19-D) where this laboratory method provides the only available 1,2-dichlorobenzene data for that sampling event.

Benzene

Benzene has been detected in groundwater samples collected from all three characterization zones, at locations extending from the southern end of the HA to the distal monitoring wells, following the general direction of groundwater flow. In general, the most elevated concentrations of benzene have been found at or near areas where NAPL has been observed or where NAPL was observed during previous drilling. Concentrations of benzene generally decrease with depth in the HA, and generally increase with depth in the LA, particularly in the Alluvium Zone along the Lake Area Drainage Ditch to WDL and further downgradient. Concentrations of benzene were detected east to the Schnitzer property, in the Fill/Shallow Alluvium Zone only, and west to MW-06-S near the Northwest Drainage Pond (Alluvium Zone). Benzene concentrations from groundwater samples collected during recent groundwater characterization events exceeding the preliminary screening value are differentiated by color on Figures C-4 through C-6 in Appendix C.

Overall, benzene concentrations at the AL5 monitoring well cluster have remained fairly constant since 1995, as shown in Appendix D, Figure D-5. Although benzene concentrations appear to increase slightly in AL5-35, benzene concentration decreases of a similar magnitude are apparent in AL5-62 and BST5W-74. Benzene concentrations at the MW-05 monitoring well cluster in the HA also have remained fairly constant since the first benzene analysis in 1989, with the exception of monitoring well MW-05-34. Benzene concentrations at monitoring well MW-05-34 decreased between 1989 and 2000, despite the fact that NAPL was observed at monitoring well MW-05-34 during recent sampling events (Table 3-4b). Benzene concentrations at ESCO property Alluvium Zone monitoring wells W-11-S and W-11-I also have remained constant (at low concentrations or not detected) since 1995, as

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shown on Figure D-7, Appendix D. Benzene concentrations have decreased significantly at the ESCO property Alluvium Zone monitoring well W-11-D since 1990, and at LA monitoring well RP-04-41 (recent sampling events only), from 3,030 micrograms per liter (µg/L) to 276 µg/L, as shown on Figure D-6, Appendix D. Overall, the notable trends show decreasing benzene concentrations throughout all areas of the RPAC Site.

TCE

TCE has been detected in groundwater samples collected from all three characterization zones, and generally from areas in and downgradient from the northern corner of the HA. The most upgradient detections of TCE were found in the central portion of the HA at the MW-03 monitoring well cluster. The most downgradient detections of TCE were found in the distal monitoring wells, specifically at the RP-07, RP-01, and W-19 monitoring well clusters. TCE was generally not detected at monitoring wells between the LA and N.W. Front Avenue in the Fill/Shallow Alluvium Zone. The TCE was detected at low concentrations between the LA and N.W. Front Avenue in the Alluvium Zone.

In general, the most elevated concentrations of TCE were detected at or near areas where NAPL has been observed during recent monitoring events (Table 3-4b) or where NAPL was observed during drilling (Table 3-4a, Figure 3-11). Concentrations of TCE generally decrease with depth in the HA, and generally increase with depth in the LA and further downgradient (although overall concentrations are significantly lower at downgradient sampling locations). Concentrations of TCE were detected east to the W-15 monitoring well cluster at the Metro property, and TCE was not detected west of WDL, or at the south end of WDL at the RP-04 monitoring well cluster. Concentrations exceeding the preliminary screening value for TCE are differentiated by color on Figures C-7 through C-9 in Appendix C.

TCE concentrations at the MW-05 and AL5 monitoring well clusters in the HA and LA, respectively, have remained fairly constant over time, with the exception of monitoring well MW-05-34 (Appendix D, Figure D-9). TCE concentrations at MW-05-34 have decreased overall between 1991 and 2000 by over 50%, despite the observation of NAPL in MW-05-34 during recent sampling events (Table 3-4b). As with 1,2-dichlorobenzene and benzene, TCE concentrations have decreased overall in the ESCO property Alluvium Zone well W-11-D since 1990, as shown in Appendix D, Figure D-11. Recent TCE concentrations indicate the concentrations are lower than earlier samples collected in 1996 at monitoring well BST5W-74. Overall there are no notable trends of any TCE concentration increases across the RPAC Site, but rather, decreases in some areas.

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Cis-1,2-Dichloroethene (cis-1,2-DCE)

Another VOC in groundwater evaluated at the RPAC Site is cis-1,2-dichloroethene, which is a degradation product of TCE. Cis-1,2-DCE has been detected in groundwater in the HA and LA and further downgradient. These locations are often coincident with TCE detection locations. Few detections of cis-1,2-DCE were found at monitoring wells in the Fill/Shallow Alluvium Zone. The highest concentrations of cis-1,2-DCE generally appear in the northern HA and the southern portion of the LA. The presence of cis-1,2-DCE is an indicator of anaerobic biodegradation of TCE. Additional discussion of potential degradation of constituents in groundwater is provided in Section 4.0 below.

Summary of VOC Distribution and Temporal Changes

In general, the distribution of VOCs during recent groundwater characterization events appears consistent with a pattern expected for surface releases in the manufacturing areas of the northern portion of the HA and within or near the Lake Area Drainage Ditch in the southern portion of the LA. The distribution of the remaining VOC PCOPCs, described in Table 2-1, correlate very closely with the overall VOC trends described above. The VOC constituent concentrations demonstrate that VOCs are detected along the general direction of groundwater flow, from locations within the HA towards the location where the railroad tracks cross N.W. Front Avenue. However, downgradient VOC concentrations are generally decreasing or remaining stable over time.

Concentrations of VOCs show an increase in depth at the southern end of the LA, where the Alluvium Zone thickens due to the increasing depth to basalt, as presented on Figures 3-6 and 3-8. Within the area of the deeper basalt in the LA, a clayey silt layer begins at approximately 25 feet bgs at the southern half of the LA, which appears to be acting as a semi-confining layer to the lateral groundwater flow. As a result, the groundwater and dissolved-phase constituents begin to follow a flow path of least resistance, through the deeper sandy silts and, at times, into the basalt. Concentrations of 1,2-dichlorobenzene, provided on cross sections prepared along the groundwater flow path, Figures 3-6 and 3-8, demonstrate a preferential flow path beneath the clayey silt layer in the LA Alluvium Zone and extends to the distal monitoring wells located adjacent to the Willamette River

VOC concentrations have generally remained fairly constant over time since first analyzed in groundwater at the RPAC Site, with a few exceptions that are typically reductions in concentration over time. Further evaluation of the transport of VOCs and other PCOPCs will be conducted as part of the RI Report for the RPAC Site, following completion of the groundwater transport evaluation. Additional evaluation of temporal

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changes in VOC concentrations also will be conducted as part of the natural attenuation evaluation (see Section 4.0).

3.3.2 Phenolic Constituent Distribution and Temporal Changes

The distribution of concentrations for select phenolics from groundwater samples collected during the Spring 2000 through Spring 2002 groundwater characterization events is provided in Appendix C, Figures C-10 through C-12 for 2,4-dichlorophenol and Figures C-13 through C-15 for phenol. The temporal changes for phenolics at select monitoring well clusters are presented in Appendix D, Figures D-13 through D-16 for 2,4-dichlorphenol and Figures D-17 through D-20 for phenol.

2,4-Dichlorophenol

2,4-Dichlorophenol has been detected in groundwater samples collected from the Fill/Shallow Alluvium and Alluvium Zones, and one detection was reported in the Basalt zone. 2,4-Dichlorophenol was not detected in any RPAC Site monitoring wells downgradient of N.W. Front Avenue or northwest of the BNSF railroad tracks. 2,4-Dichlorophenol was primarily detected in groundwater in the southern portion of the LA and the northeastern portion of the HA. The lateral extent of 2,4-dichlorophenol decreases with depth, with detections at depth in the Alluvium Zone limited to monitoring well MW-05-52 in the northern corner of the HA and monitoring well AL2-46 in the southern portion of the LA. The most upgradient 2,4-dichlorophenol detections were encountered in the Alluvium Zone, within the southeastern corner of the HA. The most downgradient detection of 2,4-dichlorophenol in the Fill/Shallow Alluvium Zone was encountered at the ESCO property. The most downgradient detections of 2,4-dichlorophenol in the Alluvium Zone were found near the southern end of WDL and the Lake Area Drainage Ditch.

In general, the most elevated concentrations of 2,4-dichlorophenol have been found at or near areas where NAPL has been observed during recent groundwater characterization events (Table 3-4b) or where NAPL was observed during drilling (Table 3-4a). Concentrations of 2,4-dichlorophenol generally decrease with depth in the HA, with no detections in the Basalt zone, and generally increase with depth within the Alluvium Zone at the RP-04 and AL2 monitoring well clusters. Concentrations of 2,4-dichlorophenol decrease immediately downgradient of the MW-5, RP-04, and AL2 well clusters, and the migration of 2,4-dichlorophenol from the source area appears to be limited. The 2,4-dichlorophenol concentrations exceeding the preliminary screening value are differentiated by color on Figures C-10 through C-12 in Appendix C.

Changes in 2,4-dichlorophenol concentrations over time are not readily discernable. Variations in method detection limits, the potential influence of NAPL at some

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groundwater sampling locations (including monitoring well MW-05-34), and the limited area of the RPAC Site with detected concentrations of 2,4-dichlorophenol all inhibit interpretation of changes in concentration over time. Concentrations of 2,4-dichlorophenol at monitoring well MW-04-27 show several elevated concentrations of the constituent during recent events; however, the results vary greatly between sampling events. The only discernable temporal change was at the HA monitoring well cluster MW-05, at monitoring wells MW-05-34 and MW-05-52, where the 2,4-dichlorophenol concentrations appear to be decreasing. Recent results for monitoring well RP-04-41 demonstrate that 2,4-dichlorophenol concentrations are decreasing overall. There is no evidence to suggest that the decline in 2,4-dichlorophenol at the RP-04 location is related to well installation procedures. Overall, the distribution of 2,4-dichlorophenol is confined to the Fill/Shallow Alluvium and Alluvium Zones in the northern portion of the RPAC facility and near the LA Drainage Ditch.

Phenol

Phenol has been detected in groundwater samples collected from the Alluvium Zone. Minor phenol detections were reported in the Fill/Shallow Alluvium and Basalt zones, with two detections in the Fill/Shallow Alluvium Zone and one in the Basalt zone. Phenol was not detected in any RPAC Site monitoring wells downgradient of N.W. Front Avenue or northwest of the BNSF railroad tracks. The lateral extent of phenol appears to decrease with depth, similar to 2,4-dichlorophenol. In general, the most elevated concentrations of phenol have been found at or near areas where NAPL has been observed during recent groundwater characterization events, including HA monitoring wells MW-02-26, MW-05-34, MW-08-27, and P-07, and near the Lake Area Drainage Ditch. Concentrations of phenol generally decrease with depth in the HA and increase with depth in the LA, similar to VOC constituents. Phenol concentrations exceeding the preliminary screening value are differentiated by color on Figures C-13 through C-15 in Appendix C.

Similar to 2,4-dichlorophenol, temporal changes in phenol concentration are not readily discernable. In general, at the limited monitoring wells where phenol has been detected, the concentrations have not changed significantly. One exception is at HA monitoring well cluster MW-05 where there is a general decrease in phenol concentrations between 1992 and present. In addition, historic concentrations detected at W-09 exhibit a decrease in concentration between 1982 and 1993.

Other Phenolic Constituent Distribution and Temporal Changes

The distribution of phenolics in groundwater appears to be limited to a small area, and phenols generally have not been detected during recent sampling events. The phenolic PCOPC pentachlorophenol has been detected beyond the BNSF railroad

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tracks and found outside of the LA. These pentachlorophenol detections may not be related to historic operations on the RPAC property. In addition, the phenolic PCOPC 2-chlorophenol has been detected at the Metro property. Potential sources of off-property phenolic PCOPCs will be evaluated and discussed further in the GTE and/or the RI report, as appropriate.

Summary of Phenolic Constituent Distribution and Temporal Changes

Except for pentachlorophenol, the distribution of phenols during recent groundwater characterization events generally appears consistent with a pattern expected for surface releases in the manufacturing areas of the northern portion of the HA and within or near the Lake Area Drainage Ditch in the southern portion of the LA, with rapid attenuation downgradient and with depth from the relatively higher concentrations near the source areas. The remaining phenolic PCOPCs, described in Table 2-1, correlate with the overall phenolic trends described above. The phenolic constituent concentrations demonstrate that phenolics are not migrating appreciably from the presumed release area. This distribution pattern is in contrast to that of VOCs such as 1,2-dichlorobenzene, which has been detected along the general direction of groundwater flow, from locations within the HA to the distal monitoring wells.

The lateral extent of phenols decreases with depth and is generally limited to the northern portion of the HA and the area near the Lake Area Drainage Ditch. The decrease in phenol concentrations downgradient from the release area demonstrates natural attenuation is acting on the phenol constituents. Natural attenuation trends for the Site are discussed further in Section 4.0. Similar to most PCOPCs, the overall trend is one of stable or decreasing phenol concentrations over time at the RPAC Site.

3.3.3 Herbicide Distribution and Temporal Changes

The distribution of concentrations for select herbicides from groundwater samples collected during the Spring 2000 through Spring 2002 groundwater characterization events is provided in Appendix C, Figures C-16 through C-18 for 2,4-D and Figures C-19 through C-21 for 2,4,5-TP (silvex). The temporal changes for herbicides at select monitoring well clusters are presented in Appendix D, Figures D-21 through D-24 for 2,4-D and Figures D-25 through D-28 for silvex.

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2,4-D

Concentrations of 2,4-D were detected in groundwater samples collected from the Fill/Shallow Alluvium, Alluvium, and Basalt zones, at groundwater sampling locations within the HA and the southern half of the LA. The highest concentrations of 2,4-D were detected in groundwater samples collected from the northern corner of the HA and along the Lake Area Drainage Ditch, where NAPL has been observed during recent monitoring events (Table 3-4b) or where NAPL was observed during drilling (Table 3-4a). 2,4-D was not detected in the distal monitoring wells within the Fill/Shallow Alluvium and Alluvium Zones. In addition, 2,4-D was not detected during recent groundwater characterization events in the IA, south of the RPAC property, or west of NDL. 2,4-D was detected north of N.W. Front Avenue at monitoring well RP-01-65 during the Fall 2000 groundwater characterization event at a concentration of 380 µg/L. Previous and subsequent groundwater samples collected at monitoring well RP-01-65 (including Spring 2000, 2001, and 2002) have shown no detectable 2,4-D concentrations. Concentrations of 2,4-D greater than 10 µg/L are not found in any characterization zone beyond the AL2 monitoring well cluster. The results at the RP-01 monitoring well cluster and at monitoring wells between the southern LA and RP-01, all indicate no 2,4-D concentrations near the magnitude of the concentration reported at RP-01-65 in Fall 2000. Therefore, it is not likely that the 2,4-D concentration in RP-01-65 from Fall 2000 is accurate or related to a source other than RPAC. Overall, concentrations of 2,4-D are limited to a very narrow and localized area, and the concentrations decrease rapidly with depth.

In general, 2,4-D decreasing concentration trends have been observed. In particular, the analytical results from groundwater samples collected at monitoring well clusters MW-05, MW-09, and RP-04 all show decreasing concentrations of 2,4-D.

Silvex

Silvex (2,4,5-TP) was detected in the Fill/Shallow Alluvium Zone, at two monitoring wells located in the southeastern and northwestern portions of the LA. In the Alluvium Zone, the area with detectable concentrations of silvex appears to be similar to the area with 1,2-dichlorobenzene detections. Detectable concentrations of silvex occur along the western edge of the HA and the Lake Area Drainage Ditch, and are encountered along the groundwater flow path north of N.W. Front Avenue. Detectable silvex concentrations extend to the distal monitoring wells in both the Alluvium and Basalt Zones. Silvex concentrations increase with depth in the northern LA area and further downgradient. Silvex was detected to the east at the Metro property and Gould property. Silvex was detected above the preliminary screening level at two locations: monitoring well AL2-32 at the south end of the LA and monitoring well MW-04-27 at

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the northwest portion of the HA. In general, appreciable changes in silvex concentrations in groundwater over time have not been observed.

Summary of Herbicide Constituent Distribution and Temporal Changes

The distribution of herbicides in groundwater varies greatly, depending on the constituent. Detections of 2,4-D appear to be localized and generally do not extend beyond the LA. Other PCOPC herbicides, including 2,4-DB, 2,4,5-T and bromoxynil show similar trends to those observed for 2,4-D. Natural attenuation processes are reducing the concentrations of these herbicides. Silvex does not follow the same distribution pattern observed for 2,4-D. Silvex concentrations indicate that silvex follows the general path of groundwater flow, and extends to the distal monitoring wells, similar to the distribution seen for VOC constituents. Dichlorprop (2,4-DP) also shows similar trends to those observed for silvex and VOCs. Overall, in cases where data are available prior to the Spring 2000 monitoring event, there are no trends of increasing herbicide concentrations at the RPAC Site, with the exception of MW-04-27, which exhibits fluctuating concentrations that constitute an overall increase.

3.3.4 Dioxin/Furan Distribution and Temporal Changes

The distribution of concentrations for select dioxin/furan congeners from groundwater samples collected during the Spring 2000 through Spring 2002 groundwater characterization events is provided in Appendix C, Figures C-22 through C-24 for 2,3,7,8-TCDD.

2,3,7,8-TCDD

2,3,7,8-TCDD was detected in groundwater samples collected from all three characterization zones, but generally only at areas in and immediately downgradient of the northern portion of the HA and along the Lake Area Drainage Ditch. In the Fill/Shallow Alluvium Zone, 2,3,7,8-TCDD was not detected in groundwater downgradient from N.W. Front Avenue or northwest of the BNSF railroad tracks. The most upgradient detections of 2,3,7,8-TCDD were found in the central portion of the HA at a maximum of 0.0918 nanograms per liter (ng/L) at MW-02-26, located within the Fill/Shallow Alluvium Zone. Detections of 2,3,7,8-TCDD did occur at trace concentrations within the Alluvium and Basalt Zones at one or more of the distal monitoring wells (RP-01, RP-02, and W-19).

In general, the most elevated concentrations of 2,3,7,8-TCDD were found at or near areas where NAPL has been observed during recent monitoring events (Table 3-4b) or where NAPL was observed during drilling (Table 3-4a). Concentrations of 2,3,7,8-TCDD generally decrease with depth across the RPAC Site.

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Summary of Dioxin/Furan Distribution and Temporal Changes

In general, the analytical results demonstrate dioxin/furan constituents follow a similar flow path as that described above for the VOC constituents. The water solubility for dioxins/furans, however, is low and in most cases dioxin/furan constituents are considered immobile in groundwater. Therefore, the presence of the dioxins or furans beyond the HA and LA areas may be associated with historical conditions that enabled facilitated transport to occur. This concept of facilitated transport will be evaluated further in both the Bioremediation Evaluation and the GTE.

Examination of the pattern of dioxin/furan congeners in groundwater samples from the RPAC Site indicates that while the dioxin/furan on portions of the Site originated from manufacture of chlorinated herbicides, the dioxin/furan on other portions of the Site appear to have originated from industrial or municipal sources distinct from RPAC. Congener patterns consistent with chlorinated herbicide manufacturing are limited to the RPAC facility and the LA, and are characterized by a predominance of 2,3,7,8-TCDD and 2,3,7,8-TCDF or of non-2,3,7,8-substituted TCDD and TCDF congeners. Congener patterns consistent with combustion sources and other nonspecific industrial sources are found in other areas of the RPAC Site, and are characterized by the presence of a wide range of congeners at different chlorination levels, and a predominance of OCDD. Further evaluation of dioxin/furan sources will be provided in the RI report for the RPAC Site.

3.3.5 Insecticide Distribution and Temporal Changes

The distribution of concentrations for select insecticides from groundwater samples collected during the Spring 2000 through Spring 2002 groundwater characterization events is provided in Appendix C, Figures C-25 through C-27 for 4-4'-DDE, Figures C-28 through C-30 for 4,4'-DDT, and Figures C-31 through C-33 for dieldrin. The temporal changes for these insecticides at select monitoring well clusters are presented in Appendix D, Figures D-29 through D-32 for 4,4'-DDE, Figures D-33 through D-36 for 4,4'-DDT, and Figures D-37 through D-40 for dieldrin.

4,4'-DDE

4,4'-DDE was detected in one groundwater sample in the IA, from monitoring well MW-10-24 during the Spring 2001 sampling event. 4,4'-DDE was not detected in groundwater samples collected during subsequent groundwater characterization events at the RPAC Site. The analytical results of groundwater samples collected at the RPAC Site demonstrate 4,4'-DDE is immobile, and is not persistent at the RPAC Site. 4,4'-DDE is generally considered a product of degradation of 4,4'-DDT,

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suggesting natural attenuation processes are actively degrading 4,4'-DDT at the RPAC Site.

4,4'-DDT

4,4'-DDT has only been detected once during the recent groundwater characterization events, at monitoring well RPW-02 in the central portion of the IA. The concentration at monitoring well RPW-02 was only slightly above the preliminary screening level for 4,4'-DDT. Subsequent groundwater samples collected at monitoring well RPW-02 indicate 4,4'-DDT was not detected above the method detection limit. The analytical results of groundwater samples collected at the RPAC Site demonstrate 4,4'-DDT is immobile, relatively insoluble, and is not persistent at the RPAC Site.

Dieldrin

Dieldrin was not detected in samples collected during the recent groundwater characterization events at monitoring wells completed in the Fill/Shallow Alluvium and Basalt zones. Dieldrin concentrations have been detected in groundwater collected at monitoring wells completed in the Alluvium Zone within the northern half of the IA area and the southeastern corner of the Metro property. The analytical results from groundwater characterization event samples demonstrate dieldrin is confined within a relatively narrow area and is relatively immobile.

The concentration of dieldrin has decreased over time at monitoring well MW-09-23. No other notable changes in dieldrin concentration have been observed.

Summary of Insecticide Constituent Distribution and Temporal Changes

In general, the distribution of insecticides in groundwater appears to be very limited, and generally localized to the IA. Insecticide constituents are relatively immobile and generally have not been detected appreciably downgradient of the IA. The analytical results for groundwater samples analyzed for insecticides indicate insecticide PCOPCs generally do not exceed the preliminary screening values.

3.3.6 Metal Distribution and Temporal Changes

The distribution of concentrations for select metals from groundwater samples collected during the Spring 2000 through Spring 2002 groundwater characterization events is provided in Appendix C, Figures C-34 through C-36 for dissolved arsenic. The temporal changes for metals at select monitoring well clusters are presented in Appendix D, Figures D-41 through D-44 for dissolved arsenic.

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Dissolved arsenic has been detected within the Fill/Shallow Alluvium, Alluvium, and Basalt zones in all areas of the RPAC Site. The analytical results from groundwater samples at the RPAC Site indicate dissolved arsenic was detected upgradient of RPAC property, southwest of St. Helens Road, suggesting naturally occurring dissolved arsenic is present at the RPAC Site. The distribution of dissolved arsenic concentrations demonstrates dissolved arsenic concentrations detected at monitoring well RP-02-31 does not appear to be associated with an RPAC source. Dissolved arsenic concentrations detected in wells located upgradient and along the axis of the groundwater flow path from RP-02-31 were well below concentrations detected at monitoring well RP-02-31. The dissolved arsenic concentrations detected in the Spring 2002 event at monitoring well RP-02-31 reflect the highest concentrations from all of the RPAC Site wells tested during that event. Based upon a review of the RP-02 boring logs, approximately 15 feet of fill material was placed in this area, and the dissolved arsenic concentrations at this well may possibly be related to historical fill activities. In general, distinguishable changes over time in dissolved arsenic concentrations in groundwater have not been observed.

Summary of Metal Constituent Distribution and Temporal Changes

Overall, the distribution of PCOPC dissolved metals in groundwater, including dissolved chromium and dissolved vanadium, do not follow any specific trend and concentrations vary greatly between sampling events. The analytical results from groundwater samples collected at the RPAC Site indicate dissolved and total metals have been detected across the entire Site, with the exception of mercury. Concentrations of metals detected at upgradient monitoring well locations provides evidence that naturally occurring concentrations of dissolved and total PCOPC metals are present at the RPAC Site.

3.4 Factors Influencing Constituent Distribution in Groundwater

Several mechanisms appear to have affected the transport of constituents at the RPAC Site, including a preferential flow path related to the hydrogeology at the Site. Features that have been discussed as possible preferential flow paths include a trough in the basalt within the Lake Area, a historic drainage ditch extending from WDL to the Willamette River, a storm sewer along N.W. Front Avenue, railroad fill material, and shallow fill material. These features are discussed briefly in this section. Preferential flow pathways will be considered further in the GTE.

Storm drain pipes associated with City of Portland Outfalls 22B and 22C have been previously evaluated for their potential to discharge RPAC-related constituents. RPAC collected water samples of the discharge from the City of Portland Outfalls 22B and 22C, representing non-stormwater discharge, in August 2002. Results of the

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discharge sampling are included in the Remaining Remedial Investigation Technical Memorandum (RRI TM) dated February 4, 2003. The few RPAC constituents detected in the outfall samples were at concentrations below ecological screening values. Based on the recent outfall discharge results, it does not appear that water impacted by RPAC constituents is currently discharging via Outfalls 22B and 22C and, therefore, these storm drain pipes may not represent preferential flow paths for groundwater. However, additional sampling of non-stormwater discharge from Outfalls 22B and 22C is proposed in the PCGMP.

The Historic Drainage Ditch (HDD), located between WDL and the Willamette River, at one time served as an overflow channel for WDL and was reportedly cut off from WDL in 1980. Soil from beneath the HDD, as reported in the RRI TM, generally did not contain RPAC constituents at concentrations greater than screening values. Because it received only occasional overflow during storm events from WDL, and soil sampling results indicated no significant impact, RPAC does not believe the HDD currently or historically represented a source to groundwater or a preferential flow path affecting the distribution of constituents in groundwater.

RPAC conducted a reconnaissance of the Willamette River bank during June 2002, as reported in the RRI TM. The only discharge pipes with visual evidence of significant discharge were Outfalls 22B and 22C. A 48-inch corrugated metal culvert pipe of unknown origin and a mostly buried pipe also of unknown origin were encountered during the reconnaissance. However, no water was observed flowing out of the 48-inch corrugated metal culvert pipe or the buried pipe, and no evidence of channeling, seeps, or erosion was observed at these outfalls. These pipes would contribute little, if any, to the overall discharges in this area or to the distribution of constituents in groundwater.

The railroad "ballast" (or fill material) that was installed across former Doane Lake early this century extends into groundwater and may represent an area of increased hydraulic conductivity. However, this fill material does not extend to the Willamette River, because former Doane Lake did not extend to the Willamette River. Any fill material that was installed beneath the tracks between former Doane Lake and the beginning of the railroad bridge is likely above the groundwater elevation. Therefore, the railroad ballast (fill) is not considered to be a complete migration pathway for groundwater from the vicinity of the RPAC property to the Willamette River. The groundwater flow at the RPAC Site follows a path consistent with the geological and surface water features in the area. The fact that groundwater flow appears to parallel the railroad tracks is a coincidence and not the result of a preferential flow path.

A trough or depression on the top of the basalt in the northern portion of the Lake Area appears to trend to the north, somewhat parallel to the railroad tracks. This geologic

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feature, visible on Figures 3-6 and 3-8, may have an influence on the groundwater flow path. This is consistent with VOC and other constituent distributions that indicate increasing concentrations with depth along the groundwater flow path beyond where the groundwater flow path intersects the basalt trough. This feature and its potential influence on the fate and transport of constituents in groundwater at the RPAC Site will be discussed further in the GTE and the RI report.

3.5 NAPL

A description of the distribution of NAPL at the RPAC Site is included in the Draft Source Area Soils Characterization Report submitted to DEQ on June 17, 2002 (AMEC 2002c). A summary of the NAPL information presented in the soils report is included below, and on Tables 3-4a and 3-4b and Figure 3-11, to help complete the evaluation of PCOPC distribution in groundwater. A scope of work for additional NAPL investigation, and a discussion of validated NAPL and residual NAPL soil and groundwater results collected to date, will be submitted as a NAPL Evaluation Work Plan (NAPL Work Plan), under separate cover.

The results of a comprehensive review of borings logs and other information for the observation of NAPL or NAPL residual are summarized in Tables 3-4a and 3-4b. A description of NAPL or NAPL residual encountered during various soil investigations and monitoring well installations is included in Table 3-4a. A description of NAPL observed in groundwater within monitoring wells is included in Table 3-4b. The occurrence of NAPL or NAPL residual in soil and groundwater is displayed on Figure 3-11. This includes information from several investigative events over a period of approximately 20 years.

Field observations exhibit that NAPL or NAPL residual has been observed in the northern portion of the HA and along the Lake Area Drainage Ditch as depicted on Figure 3-11. One reported field observation of NAPL was also made in the IA. NAPL or NAPL residual in soil has been detected at depths ranging from approximately 2 to 60 feet bgs in the HA, at depths ranging from approximately 13 to 45 feet bgs in the LA, and at 25 feet bgs in the IA (Figure 3-11).

4.0 NATURAL ATTENUATION

Groundwater samples were submitted for analysis of specific natural attenuation parameters to assess the presence and effectiveness of natural attenuation processes that demonstrate the reduction of the current PCOPCs concentrations through biodegradation. The information available for the evaluation of evidence for past biotic attenuation and the potential for future biotic attenuation processes includes selected physical, chemical, geochemical, and biological parameters. A preliminary evaluation

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of biodegradation processes was completed upon examination of the following Site conditions in groundwater:

- Spatial distributions of constituents;
- Physical, chemical, and geochemical conditions; and
- The populations of bacteria that consume varying carbon sources.

The physical, chemical, geochemical, and/or biological characteristics of groundwater typically will vary with respect to time and spatially in an area with elevated PCOPC concentrations in groundwater. To account for seasonal fluctuations in constituent distributions and groundwater flows, groundwater samples are collected under both wet season and dry season conditions. The five most recent groundwater characterization events were the Spring 2000, Fall 2000, Spring 2001, Fall 2001, and Spring 2002, and are considered most representative of current groundwater conditions. The evaluation of biodegradation processes was conducted with analytical results from the Spring 2000, Fall 2000, Spring 2001, and Spring 2002 groundwater characterization events, with some regard to the analytical results prior to 2000.

Natural attenuation processes such as biodegradation, dispersion, sorption, and volatilization, affect the fate and transport of constituents in all hydrologic systems. Natural attenuation is achieved when naturally occurring processes, such as biodegradation bring about a reduction in the total mass, toxicity, mobility, volume, or concentration of a constituent dissolved in groundwater. Natural attenuation will be able to fit into a larger remedial scheme at the RPAC Site. Understanding the underlying geochemical and biological processes at the RPAC Site will also lead to remedial activities that incorporate enhanced biodegradation.

Biodegradation occurs under two basic conditions: aerobic/anoxic (in the presence of oxygen or other readily used electron acceptors such as nitrate or sulfate); and anaerobic (in the absence of readily used electron acceptors). Both aerobic and anaerobic conditions can be favorable for biodegradation, depending on the type of constituent. For example, electron-rich organic compounds in groundwater, such as diesel fuel, gasoline, and PAHs, generally are most susceptible to biodegradation under aerobic conditions, whereas anaerobic conditions are conducive to the biodegradation of some chlorinated compounds, such as TCE.

The physical, chemical, geochemical, and biological characteristics of groundwater typically will vary temporarily and spatially. This initial evaluation of biodegradation processes at the RPAC Site for nature and extent characterization purposes is qualitative and was completed by evaluating temporal and spatial changes in groundwater characteristics. A more comprehensive natural attenuation evaluation will

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be conducted as part of the Bioremediation Evaluation, for which a work plan will be submitted to DEQ under separate cover at a later date

4.1 Physical and Chemical Groundwater Conditions

The results from physical, chemical, geochemical, and biological parameters and measurements for groundwater samples collected at the RPAC Site are summarized on Table 4-1. In addition, the laboratory and field analytical results for the recent groundwater characterization events have been summarized on the Appendix E figures, Figures E-1 through E-33.

The analytical results from groundwater samples collected in the Fill/Shallow Alluvium, Alluvium, and Basalt zones were considered in the assessment of biodegradation processes. Emphasis was placed on PCOPC, geochemical, and biological results collected from the Alluvium Zone, because the Alluvium Zone results provide a more complete data set, and because natural attenuation will play a large role in the Alluvium Zone with respect to site remedy. In addition, the Alluvium Zone is considered to more closely represent natural site hydrogeologic conditions, compared to the Fill/Shallow Alluvium Zone that has been manipulated by outside factors. In addition, a majority of groundwater transport at the RPAC site occurs in the Alluvium Zone.

4.2 Redox Relationships

The oxidation-reduction (redox) conditions at the Site were inferred from the ORP and concentrations of several electron acceptors or reduced products, including oxygen (electron acceptor), nitrate (electron acceptor), ferrous iron (Fe^{2+}, reduced product), sulfate (electron acceptor), sulfide (reduced product), and methane (reduced product). Electron acceptors are chemical species that are reduced by bacteria during the bacterial respiration process by which bacteria derive energy (Wiedemeier, T.H., et al, 1998). As an example, aerobic bacteria utilize oxygen as their primary electron acceptor. The utilization of terminal electron acceptors for bacterial respiration typically proceeds in the following order: oxygen, nitrate, ferric iron (iron [III]), manganese (IV), sulfate, and carbon dioxide; as each acceptor is depleted, respiration focuses on the next acceptor. Under aerobic conditions oxygen is the primary electron acceptor and under strongly anaerobic conditions sulfate and carbon dioxide are the primary electron acceptors.

4.2.1 Redox Mediators

In addition to electron acceptors, electron donors were also monitored to aid in the evaluation of microbial processes responsible for biodegradation. Microorganisms

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obtain energy for new cell production and for the maintenance of existing cells through the mediation of redox reactions involving the transfer of electrons from an electron donor to an electron acceptor. In general, the electron donor is an organic compound while the electron acceptor is inorganic. Biodegradation of carbon sources (electron donor), such as diesel-range organics, therefore, can lead to consumption of available oxygen and nitrate (electron receptors), driving the subsurface into an anaerobic state. TOC can serve as an indicator of the carbon available for biodegradation.

4.2.2 Redox Indicators

Groundwater samples collected at selected monitoring wells were analyzed for the following natural attenuation parameters: oxidation reduction potential (ORP); dissolved oxygen (DO); pH; temperature; conductivity; nitrate; sulfate; sulfide; ferrous iron; total iron; total alkalinity; dissolved methane; chloride; ammonia as nitrogen; and orthophosphate. Groundwater samples from select monitoring wells also were analyzed for total aerobic heterotrophic bacteria and diesel-degrading bacteria. Electron acceptors, reduced products, and ORP results are summarized in Table 4-1 and are discussed in more detail below.

ORP

The measured values of ORP ranged from oxidizing (up to 250 millivolts [mV] at MW-10-24 in the Alluvium Zone) to reducing (down to -165 mV in the Fill/Shallow Alluvium Zone). The distribution of ORP measurements collected during the recent groundwater characterization events are shown in Appendix E, Figures E-10 through E-12. ORP measurements prove that reducing conditions are present in the Alluvium Zone at the eastern boundary of the LA (near monitoring well cluster AL2) and at the northern end of the ESCO property (near monitoring well cluster W-11). In the Fill/Shallow Alluvium Zone, ORP measurements demonstrate the reducing conditions occur from the northern boundary of the HA extending west to the BNSF and Wacker properties. In the Basalt zone, ORP measurements demonstrate that reducing conditions occur at the eastern boundary of the LA, the northern boundary of the HA, and at the northern boundary of the ESCO property.

DO

The DO concentrations measured at the RPAC Site indicate the DO varies between high water level and low water level seasons and also varies greatly between characterization zones. The distribution of DO measurements collected during the recent groundwater characterization events are shown in Appendix E, Figures E-13 through E-15. DO concentrations detected in the Alluvium Zone are greater at the upgradient monitoring locations, southwest of the RPAC property near monitoring well

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cluster W-18, than DO concentrations detected on the RPAC property in the HA and LA. Relatively elevated DO concentrations were detected near N.W. Front Avenue, and at the ESCO property monitoring locations. Within the Fill/Shallow Alluvium Zone, the DO concentrations measured do not appear to follow a distinct spatial trend. In general, relatively lower DO concentrations were detected within the Basalt zone in the IA and near N.W. Front Avenue.

Nitrate

Nitrate can be either naturally occurring or the result of releases of nitrate salt or mineral acids. Nitrate concentrations were not detected above the method detection limit at most groundwater monitoring locations in the Alluvium Zone. Nitrate concentrations were detected in the Alluvium Zones southwest of the RPAC property at the upgradient monitoring well cluster W-18. Nitrate was detected at the southern portion of the HA, the LA, and at the distal monitoring wells. Nitrate concentrations detected within the Basalt zone provides evidence that nitrate exists southwest of the RPAC property at upgradient monitoring well cluster W-18, at monitoring well MW-11 in the IA, and in the HA at monitoring well MW-09. The nitrate concentrations in the Basalt zone have generally decreased during recent sampling events. In general, nitrate-reducing conditions are exhibited in all characterization zones across the Site. The most recent nitrate concentrations detected at select monitoring well locations are depicted in Appendix E, Figures E-16 through E-18.

Ferrous Iron

Ferrous iron is formed during the reduction of ferric iron. Ferrous iron is detected throughout the Alluvium Zone. The distribution of ferrous iron in groundwater from the recent groundwater characterization events is depicted in Appendix E, Figures E-25 through E-27. Elevated ferrous iron concentrations were detected in the Alluvium Zone at the northeastern boundaries of the IA and the HA, in the LA, and at the ESCO, Gould, Wacker, and BNSF properties. During recent groundwater characterization events, the elevated ferrous iron concentrations were also detected near N.W. Front Avenue at monitoring wells RP-07-55 and RP-01-51. Concentrations slightly above the method detection limit have been reported at upgradient monitoring well locations southwest of the RPAC property, in the IA and at the distal monitoring wells. Concentrations were not detected above the method detection limit south of the RPAC property boundary. In the Fill/Shallow Alluvium Zone, elevated ferrous iron concentrations were detected along the groundwater flow path between monitoring well clusters MW-01 to the distal monitoring wells and at the Schnitzer property monitoring well cluster W-16. Based on the field analytical results, iron-reducing conditions are present in areas with small DO concentrations and negative ORP.

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Sulfate

Sulfate can be either naturally occurring or the result of releases of sulfate salts or mineral acids. The analytical results from natural attenuation groundwater samples indicate sulfate was detected across the RPAC Site. The sulfate results from the recent groundwater characterization events are depicted in Appendix E, Figures E-19 through E-21. Sulfate concentrations are generally increasing with depth from the southern portion of the LA following the groundwater flow path towards N.W. Front Avenue. Sulfate concentrations demonstrate the presence of historical sulfate sources at various locations across the Site. A discernable trend is not observed for the sulfate concentrations detected within the Fill/Shallow Alluvium Zone. In the Basalt zone, lower sulfate concentrations were detected at the RPAC property with higher sulfate concentrations detected north of N.W. Front Avenue.

Sulfide

Sulfide is a product of natural sulfate reduction, although sulfides are occasionally associated with an anthropogenic source. The sulfide results in groundwater from the four most recent sampling events are depicted in Appendix E, Figures E-22 through E-24. In the Alluvium Zone, sulfide was detected across much of the RPAC Site, with higher concentrations at the northern end of the HA, and in the LA. Within the Fill/Shallow Alluvium Zone, elevated sulfide concentrations were detected in the HA, the LA, and at the ESCO property monitoring wells. In the Basalt zone, the distribution of sulfide concentrations was similar to the Alluvium Zone. Sulfate-reduction appears to be occurring at locations with the highest sulfide concentrations. Areas with increased sulfide concentrations generally correspond to areas with anaerobic conditions.

Methane

Methane is produced during anaerobic decay of organic or humic materials in the subsurface, and is an indicator of strongly reducing electrochemical conditions. Methane concentrations were detected across the RPAC Site, with the exception of upgradient monitoring locations, as depicted in Appendix E, Figures E-28 through E-30. Elevated concentrations of methane were detected in the Alluvium Zone at the eastern boundaries of the IA and the HA, and at the eastern boundary of the LA. The highest methane concentrations were detected at the northern end of the ESCO property and at the RP-02 monitoring well cluster located near the Willamette River. The methane concentrations decrease with depth at the HA and IA and increase with depth at locations in the LA and in RP-02. In the Fill/Shallow Alluvium Zone methane concentrations increase from below the method detection limit south of the RPAC property to elevated concentrations at the RPAC property and downgradient. In the

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Basalt zone, methane concentrations increase from below the method detection limit in the southwest of the RPAC property to the highest concentrations detected in the LA and to the distal monitoring wells. The elevated concentrations of methane provide evidence that methanogenesis is occurring and a methanogenic environment exists at the Site. In general, methane was detected in areas where anaerobic conditions were detected.

4.3 Biological Activity

Aerobic heterotrophic and diesel-degrading bacteria were enumerated at several locations across the Site. Bacteria plate counts ranged from no colonies detected to 600,000 colony forming units per milliliter (cfu/mL) at monitoring well RP-07-30 and 14,000 cfu/mL at monitoring well W-11-D for aerobic heterotrophic and diesel-degrading bacteria respectively. Elevated bacteria plate counts were also detected at monitoring well RP-07-84 and monitoring well RP-01-31, located between the ESCO property and the Willamette River along the groundwater flow path.

Bacteria require a carbon source by which to synthesize biomass. An increase in biomass will increase the efficiency for natural attenuation. Total organic carbon (TOC) was detected at concentrations below the method detection limit to 575 milligrams per liter (mg/L). Elevated TOC levels are generally associated with areas of high PCOPC impact at the Site.

The nutrients necessary for biological growth include available nitrogen (often measured in the form of ammonia) and orthophosphate. Ammonia is available sparingly in the groundwater across most of the Site. In the Alluvium Zone, ammonia and orthophosphate appear to be limited at most locations sampled across the Site. These areas are also the areas where larger carbon loads, or TOC concentrations were detected.

Carbon dioxide is formed as the product of biological oxidation of organic carbon. Alkalinity concentrations tend to become elevated as biological activity increases due to increased production and buffering of carbon dioxide in the groundwater. In the Alluvium Zone, alkalinity concentrations historically have been detected as high as 2,200 mg/L (at monitoring well W-16-I). The alkalinity concentrations detected during recent sampling events ranged from 28 to 1,360 mg/L. Lower alkalinity concentrations are observed at upgradient monitoring locations. The elevated alkalinity concentrations across the Site support the observation that biodegradation is occurring at the RPAC Site.

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4.4 Evaluating Biodegradation

To better understand the relationship of geochemical, biological, and PCOPC parameters across the Site, the groundwater analytical results from the Alluvium Zone at monitoring wells W-18, MW-11, MW-04, MW-05, AL5-35, W-09-116, W-11, and RP-01 were reviewed. These monitoring points follow the general groundwater flow path from the RPAC property to north of N.W. Front Avenue. The constituents evaluated in this discussion include 2,4-D, 2,4-DP, 2,4,5-T, silvex, 1,2-dichlorobenzene, benzene, 2,4-dichlorophenol, and diesel-range organics.

The geochemical and biological data demonstrates that conditions are favorable for biodegradation processes at the RPAC Site. In addition, the geochemical and biological trends demonstrate that conditions resulting from biodegradation exist.

4.4.1 Relating Constituent Distribution to Geochemical and Biological Indicator Trends

Analytical results obtained during sampling events under low water conditions (Spring 2001) and high water conditions (Spring 2002) were evaluated to provide additional insight to geochemistry changes. At several of the monitoring well cluster locations, the analytical results exist for samples that have been collected at multiple depths within a characterization zone. The analytical results from groundwater samples collected during the recent groundwater characterization events are summarized in Table 4-1, Table 4-2 (for the select monitoring wells screened within the Alluvium Zone), and in Appendix C Figures C-1 through C-39 and Appendix E Figures E-1 through E-33.

Monitoring Well Cluster W-18

Monitoring well cluster W-18 is the upgradient monitoring location at the RPAC Site, located southwest of the RPAC property across St. Helens Road, and the results from the W-18 monitoring well cluster are indicative of "baseline" conditions at the Site, for the majority of the constituents. Analytical results from the Spring 2001 monitoring event show groundwater entering the RPAC Site in the vicinity of monitoring well cluster W-18 to be aerobic in nature. During the groundwater characterization event conducted in Spring 2002, however, the dissolved oxygen and ORP analytical results provide evidence towards an anoxic groundwater condition in shallow and deeper groundwater at monitoring well cluster W-18. No appreciable decline in electron acceptors (i.e., nitrate, ferric iron, sulfate) and no appreciable increases in reduced products (i.e., ferrous iron, sulfide, methane) between the Spring 2001 and 2002 sampling events were observed, thus demonstrating a marginal anoxic redox environment.

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Monitoring Well Cluster MW-11

The analytical results from the recent groundwater characterization event indicate that at monitoring well cluster MW-11 in the IA, the groundwater sampled from monitoring wells MW-11-24 and MW-11-37 is relatively aerobic in character. The groundwater sample collected in the Alluvium Zone at monitoring well MW-11-56 is more anaerobic in character, as demonstrated by lower ORP, DO, nitrate, sulfate, and higher ferrous iron and methane concentrations than those concentrations detected at monitoring wells MW-11-24 and MW-11-37.

Monitoring Well Cluster MW-04

The negative ORP values, depressed nitrate concentrations, and elevated sulfide and ferrous iron concentrations measured at monitoring wells MW-04-27 and MW-04-47 demonstrate anaerobic conditions are present. Methane concentrations were detected at fairly elevated concentrations at monitoring well MW-04-27. Sulfide concentrations increased markedly at monitoring well MW-04-47 between the Spring 2001 and Spring 2002 sampling events. Chloride was detected at monitoring well MW-04-27 during the Spring 2001 sampling event at a relatively high concentration, coinciding with an increase in the concentrations of several chlorinated constituents.

Monitoring Well Cluster MW-05

Analytical results at monitoring well MW-05-52 indicate low concentrations of reduced species (sulfide, ferrous iron, and methane), low DO concentrations, and a near neutral ORP (7.4 to -55.5 mV). The geochemical data demonstrate an anoxic state exists at monitoring well MW-05-52, which remains relatively unchanged seasonally.

Monitoring Well Cluster W-11

The analytical results from groundwater samples collected at monitoring well W-11-I provide evidence of reducing conditions based on methane and ferrous iron concentrations detected. The analytical results at monitoring well W-11-D show that the deeper groundwater is only moderately anaerobic. Moderately elevated methane and ferrous iron concentrations are evidence of somewhat anaerobic conditions at monitoring well W-11-D. Increases in the DO concentrations and decreases in the sulfide and methane concentrations demonstrate groundwater sampled at monitoring wells MW-11-I and MW-11-D became slightly less anaerobic between the Spring 2001 (dry season) and Spring 2002 (wet season) monitoring events.

1,2-Dichlorobenzene, benzene, and diesel-range organics were detected consistently at monitoring well W-11-I with benzene concentrations exhibiting a decreasing trend.

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Trace levels of 1,2-dichlorobenzene were detected at monitoring well W-11-D. Elevated chloride concentrations have been detected historically at monitoring well W-11-I, but the results from recent groundwater samples indicate chloride concentrations have decreased.

Ammonia and orthophosphate concentrations are detected at trace concentrations at monitoring well W-11-D. Ammonia and orthophosphate concentrations in monitoring well W-11-I demonstrate ammonia is relatively abundant and orthophosphate is limited.

Monitoring Well Cluster RP-01

Anoxic conditions exist at monitoring well RP-01-31 (one of the distal RPAC Site monitoring wells), indicated by the near neutral ORP, the presence of nitrate, and the deficiency of sulfide, ferrous iron, and methane. Monitoring well RP-01-51 demonstrates a moderately reducing environment, based on the slightly elevated concentrations of sulfide, ferrous iron, and methane. The groundwater geochemistry at the RP-01 monitoring well cluster has remained generally the same between monitoring events.

4.4.2 Evaluation of Constituent Fate and Putative Degradation Products

One method for evaluating analytical results is to compare ratios of constituents and putative degradation products. Analytical results from locations near and downgradient of areas of highest constituent impact can also be contrasted. As an example, the reductive dechlorination of TCE, were it to occur, would produce cis-1,2-DCE and vinyl chloride (VC) downgradient of the highly impacted area.

Another method for examining the analytical results is to compare the fate of select constituents to the fate of analogues that are known to degrade under differing conditions. Examples of analogue compounds to compare include 2,4-D versus 2,4-DP and 2,4,5-T versus silvex.

TCE/DCE Dechlorination

The ratio of TCE to either cis-1,2-DCE or VC appears heavily weighted toward TCE in analytical results from Spring 2000, Fall 2000, and Spring 2001 at two monitoring wells, MW-04-27 and MW-05-52, located in the HA. This area is near where elevated TCE concentrations in groundwater have been detected at the Site. In addition, the TCE concentrations at monitoring wells MW-04-27 and MW-05-52 are higher than the cis-1,2-DCE concentrations, which are higher than VC concentrations. In contrast, analytical results from monitoring wells W-10 and W-19-D, located in a downgradient

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position between the ESCO property and the Willamette River, indicate the ratios of TCE to cis-1,2-DCE and TCE to VC concentrations are reversed. VC was detected at concentrations higher than cis-1,2-DCE, which was detected at concentrations higher than TCE.

Monitoring well AL2-46 lies within the LA, between the two sets of wells described above. At AL2-46, the ratios of TCE concentrations to cis-1,2-DCE concentrations and of TCE concentrations to VC concentrations have decreased between 1995 and 2002. One conclusion that can be reasonably drawn from these data is that reductive dechlorination of TCE and cis-1,2-DCE is occurring in the areas of the Site where anaerobic conditions are observed. As mentioned above, these observations will be evaluated further in the Bioremediation Evaluation.

Differential Fate or Transport of 2,4-D and 2,4-DP, 2,4,5-T and Silvex in the Alluvium Zone

In the Alluvium Zone, the phenoxyacetate 2,4-D concentrations were concentrated in the areas at the eastern boundary of the LA, in the northern corner of the HA, and at the west end of the Lake Area Drainage Ditch. 2,4-D concentrations do not appear to be migrating downgradient, as discussed in Section 3.3. Concentrations of phenoxypropionate 2,4-DP, a 2,4-D analogue, were detected along the northeastern boundary of the IA and the HA, in the LA, and downgradient near N.W. Front Avenue.

In the Alluvium Zone, the phenoxyacetate 2,4,5-T is present at the highest concentration of 1,030 µg/L at monitoring well RP-04-16, located at the west end of the Lake Area Drainage Ditch. 2,4,5-T is also detected along the northeastern edge of the IA and the HA, and in the LA. Like 2,4-D, 2,4,5-T does not appear to be migrating downgradient within the Alluvium Zone. In comparison, the phenoxyproprionate silvex is detected at its highest concentrations in alluvium at the south corner of LA (at monitoring well AL2-32) and at the northeastern boundary of the HA (at monitoring well MW-04-27), as described in Section 3.3.3. Silvex is also detected across the LA, at ESCO, and downgradient near N.W. Front Avenue

The distribution of 2,4-DP concentrations in the Alluvium Zone appear to extend from the RPAC property to near N.W. Front Avenue, while the 2,4-D distribution does not. The situation for silvex and 2,4,5-T is analogous. This distribution occurs despite 2,4-D and historical 2,4,5-T concentrations detected on the RPAC property, which are higher than the 2,4-DP and historical silvex concentrations on the RPAC property.

The solubility in water for 2,4-D, 2,4-DP, 2,4,5-T, and silvex are similar (ranging from about 100 mg/L to about 650 mg/L). Therefore, differential transport due to solubility differences would not appear to play a role. The different fate characteristics for the

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compounds could, however, play a significant role in differential transport. Phenoxyacetate-type herbicides (i.e., 2,4-D and 2,4,5-T) have been shown to biodegrade under anaerobic conditions (Mikesell and Boyd 1985) and anaerobic conditions appear to be well established at several locations at the Site. In contrast, phenoxypropionate-type herbicides (i.e., 2,4-DP and silvex) have been shown to biodegrade under aerobic conditions but not anaerobically (Degher, et al. 1997). Therefore, the analytical results support the premise that 2,4-D and 2,4,5-T biodegrade under the predominantly anaerobic conditions of the Site, whereas 2,4-DP and silvex do not, which might explain the apparent differential transport.

Chloride

Chloride is produced in the subsurface during biodegradation of chlorinated pesticides, herbicides, and chlorinated precursor compounds. There are also anthropogenic sources of chloride, such as salts and mineral acids. The chloride results in groundwater from the groundwater characterization events are depicted in Appendix E, Figure E-31 through E-33. Within the Alluvium Zone, chloride concentrations are the lowest in the IA and southwest of the RPAC property at monitoring well cluster W-18. Chloride concentrations detected in the Alluvium Zone generally increase within the northern portion of the LA and extends to the distal RPAC Site monitoring wells with elevated concentrations at the downgradient boundary of the IA and HA. Elevated chloride concentrations within the Alluvium Zone were detected in the LA, and on the Gould and ATOFINA properties. In general, the chloride concentrations decrease with depth within the HA and increase with depth within the LA and at the distal monitoring locations . Chloride concentrations detected in the Fill/Shallow Alluvium Zone exhibit concentrations peaking in the LA. The distribution of chloride at the RPAC Site is similar to the distribution of VOCs. Chloride concentrations detected in the Basalt zone demonstrate an increase in chloride concentrations from upgradient locations to some of the distal well locations.

4.4.3 Natural Attenuation Summary

The groundwater at the upgradient monitoring well cluster W-18 shows variations between an aerobic and anaerobic state. Based on the DO concentrations, groundwater becomes anaerobic to the north, in the direction of groundwater flow. The geochemical data show that anaerobic conditions are present in groundwater at areas with increased concentrations of PCOPCs and at areas downgradient of the impacted areas based on: 1) negative ORP measurements; 2) nitrate and sulfate depletion; and 3) sulfide, ferrous iron, and methane enrichment. Decreases in aerobic bacteria plate count results also support a site-wide move toward more anaerobic groundwater conditions from 2000 to 2002.

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The most elevated concentrations of diesel-range organics are located in areas that are at or near locations where NAPL has been observed during recent monitoring events (Table 3-4b) or where NAPL was observed during drilling (Table 3-4a, Figure 3-11), which have historically been in the northern portion of the HA and the southern portion of the LA along the Lake Area Drainage Ditch. The higher concentrations of diesel-range organics also correspond with the higher 2,4-D and other constituent concentrations. Areas of higher diesel-range organics concentrations generally correspond to areas with more anaerobic conditions. This would be expected because diesel-range organics can serve as an easily biodegradable carbon source that would consume available oxygen and nitrate, driving the subsurface into an anaerobic state.

A generalized decrease in the ORP was observed at many of the monitoring points between the Spring 2001 and Spring 2002 monitoring events. Unlike other monitoring locations, the groundwater chemistry at the LA monitoring well W-09-116, and ESCO property monitoring well W-11, clearly moved from more anaerobic to less anaerobic conditions in the time between the monitoring events of Spring 2001 and Spring 2002.

5.0 SUMMARY AND CONCLUSIONS

Sampling and analysis events for groundwater have been conducted in the vicinity of the RPAC facility since 1982. The analytical results from all of these groundwater samples collected at the RPAC Site were used to characterize the lateral and vertical extent of PCOPCs at the RPAC Site. This evaluation focused on the analytical results from the recent groundwater characterization events, because the recent results are most representative of existing Site conditions. The analytical results from groundwater samples have been compared to preliminary screening values. Groundwater characterization zones have been defined as the Fill/Shallow Alluvium Zone, the Alluvium Zone, and the Basalt zone. These zones have been defined to more closely reflect the hydrogeology as related to the geology at the Site.. Outlined below is a groundwater characterization summary.

- The general groundwater flow direction at the RPAC Site is to the north and northeast, from the wells upgradient of the RPAC property to the distal RPAC Site monitoring wells located near the Willamette River.
- In general, VOCs in groundwater extend along the groundwater flow direction from the HA at the RPAC property to some distal monitoring wells . Concentrations of VOCs generally decrease with depth across the RPAC property to the LA, and generally increase with depth toward the distal monitoring wells .
- In general, phenols in groundwater extend from the northern portion of the HA to the LA, and do not extend to the distal RPAC Site monitoring wells. Concentrations of phenols generally decrease rapidly with depth in the HA and

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increase with depth in the southern portion of the LA, with rapid attenuation downgradient and with depth from the LA.

- In general, the extent of herbicides varies based on the constituent. Some constituents remain very localized within the HA and southern LA. Others extend to distal monitoring well locations. The herbicide constituents that extend into the LA and to the distal RPAC Site monitoring wells tend to increase with depth, similar to VOCs, beyond the southern portion of the LA. Herbicides at most monitoring locations have exhibited an overall decreasing trend in concentrations since 1991.
- 2,3,7,8-TCDD was detected in groundwater samples collected from all three characterization zones, generally at and immediately downgradient of the northern portion of the HA and along the Lake Area Drainage Ditch. The dioxin/furan detections on other portions of the Site appear to have originated from industrial or municipal sources distinct from RPAC. Further evaluation of dioxin/furan sources will be provided in the RI report for the RPAC Site.
- In general, insecticides are localized within the IA and within a close proximity of the IA, and do not demonstrate mobility in groundwater.
- In general, metals in groundwater do not show any specific patterns or trends. Metals are detected at locations upgradient of the RPAC Site, which are representative of background concentrations at the RPAC Site.
- Groundwater elevation measurements and the analytical results from groundwater samples collected at the RPAC Site demonstrate a preferential flow path is present at the RPAC Site. Groundwater impacted by PCOPCs originating from the northern portion of the HA and the Lake Area Drainage Ditch, the area where NAPL has been observed, flows north towards the location where the railroad tracks cross N.W. Front Avenue. This is likely due to the presence of a trough in the top of the basalt layer that underlies the alluvium at the RPAC Site, as well as gravel and weathered basalt that overly the basalt layer. Other features that have been discussed as potential preferential flow pathways, such as the railroad fill material, storm drains, the HDD, and shallow fill material, do not appear to have significantly influenced the distribution of groundwater constituents and, therefore, are not preferential flow pathways. Preferential flow pathways will be further evaluated as part of the GTE and in the RI report.

The primary conclusions regarding the groundwater characterization are summarized below.

- The distribution of PCOPCs on the RPAC property is associated with general manufacturing activities that previously occurred in each area of the RPAC property. The distribution of the constituents in groundwater demonstrates a correlation with the occurrence of NAPL, with the most elevated concentrations

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detected at the monitoring wells located in the vicinity of the NAPL. Additional investigation of the occurrence and chemical content of NAPL is planned with the NAPL Evaluation.

- The available groundwater information satisfies the nature and extent, HHRA, ERA, hot spot assessment, and GTE DQOs. These specific RI-related activities can be conducted without further groundwater sample collection and analysis. The evaluation of groundwater data for use in the HHRA, ERA, hot spot assessment, and GTE will be presented in the appropriate documents associated with these assessments and evaluations.
- Although the DQOs have been met for most of the RI-related activities, additional groundwater chemistry data would be useful in evaluation of natural attenuation processes. For this reason, additional groundwater monitoring will be conducted at the RPAC Site as proposed in the PCGMP for the RPAC Site, to be to DEQ submitted under separate cover.
- The presence of dioxins beyond the HA and LA areas may be the result of facilitated transport; this will be further evaluated as part of the Bioremediation Evaluation and/or GTE.
- Natural attenuation is occurring at the RPAC Site. The conditions present show that the environment supports primarily anaerobic biodegradation. Certain PCOPCs are being reduced in concentration at the Site. Additional review of the natural attenuation activities will be provided in the work plan for the Bioremediation Evaluation, scheduled for preparation in 2003; and
- In general, the limited number of discernable temporal patterns or trends in PCOPC concentrations over time demonstrates the relative stability of the solute phase groundwater plumes at the RPAC Site.

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LIMITATIONS

This report was prepared exclusively for RPAC by AMEC Earth & Environmental, Inc. (AMEC). The quality of information, and conclusions contained herein are consistent with the level of effort involved in AMEC services and based on: i) information available at the time of preparation; ii) data supplied by outside sources; and iii) the assumptions, conditions and qualifications set forth in this report. This report is intended to be used by RPAC only, subject to the terms and conditions of its contract with AMEC. Any other use of, or reliance on, this report by any third party is at that party's sole risk.

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TABLES

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TABLE 2-1
Preliminary Constitutents of Potential Concern for Groundwater
RPAC - Portland Site

CLASS	CONSTITUENT
VOCs	1,1,2,2-Tetrachloroethane
	1,1-Dichloroethane
	1,2-Dichlorobenzene
	1,2-Dichloroethane
	1,3-Dichlorobenzene
	1,4-Dichlorobenzene
	Benzene
	Chlorobenzene
	Chloroform
	cis-1,2-Dichloroethene
	Ethylbenzene
	Isobutyl Alcohol
	Methylene Chloride
	Tetrachloroethene
	Toluene
	Trichloroethene
	Vinyl Chloride
	Xylene
Phenols	2,4,6-Trichlorophenol
	2,4-Dichlorophenol
	2,4-Dinitrophenol
	2-Chlorophenol
	Pentachlorophenol
Insecticides	4,4'-DDD
	4,4'-DDE
	4,4'-DDT
	Aldrin
	alpha-BHC
	beta-BHC
	Chlordane
	delta-BHC
	Dieldrin
	Endrin
	gamma-BHC (Lindane)
	Heptachlor
	Hexachlorobenzene
	Toxaphene

TABLE 2-1
Preliminary Constitutents of Potential Concern for Groundwater
RPAC - Portland Site

CLASS	CONSTITUENT
Metals	Arsenic
	Cadmium
	Chromium
	Copper
	Lead
	Mercury
	Nickel
	Vanadium
	Zinc
Herbicides	2,4,5-T
	2,4,5-TP (Silvex)
	2,4-D
	2,4-DB
	Bromoxynil
	Dichlorprop
	Dinoseb
Dioxins/Furans	PCDD/PCDF
PCBs	Aroclor 1254

VOCs	volatile organic compounds
PCBs	polychlorinated biphenyls
PCDD	polychlorinated dioxin
PCDF	polychlorinated dibenzofuran

TABLE 3-1
Groundwater Sampling Locations and Sample Collection Dates
Groundwater Characterization Report
RPAC - Portland Site

Location ID	Date Installed	Location Type[1]	Sample Depth[2]	General Location[3]	Characterization Zone[4]	Dates Sample Collected
A	01/03/84	Extraction Well	26.5	HA	F/SA	03/12/96
AL1-15	03/02/95	Monitoring Well	15	GOULD	F/SA	03/28/95, 06/01/99
AL1-45	03/07/95	Monitoring Well	45	GOULD	A	03/29/95, 06/01/99
AL1-69	01/20/95	Monitoring Well	69.3	GOULD	A	03/28/95, 06/01/99
AL2-17	03/09/95	Monitoring Well	17	LA	F/SA	03/29/95, 10/26/95, 03/31/00, 10/03/00, 10/05/00, 07/05/01, 07/06/01, 04/22/02, 04/23/02
AL2-32	03/07/95	Monitoring Well	32.5	LA	A	03/30/95, 10/26/95, 03/31/00, 10/03/00, 07/05/01, 04/19/02
AL2-46	03/09/95	Monitoring Well	46	LA	A	03/29/95, 10/26/95, 03/30/00, 10/03/00, 07/05/01, 04/22/02
AL4-47	01/26/95	Monitoring Well	46.8	LA	A	03/24/95
AL5-19	03/09/95	Monitoring Well	19	LA	F/SA	04/03/95, 10/27/95, 04/04/00, 10/05/00
AL5-35	03/10/95	Monitoring Well	35	LA	A	04/03/95, 10/27/95, 04/04/00, 10/04/00
AL5-62	03/16/95	Monitoring Well	62	LA	A	04/03/95, 10/27/95, 04/04/00, 10/04/00
AL6-96	12/08/95	Monitoring Well	96.5	LA	A	12/19/95, 04/10/00, 10/12/00, 11/28/00
ASW-01	08/08/88	Monitoring Well	17	METRO	A	08/09/88, 03/22/95
ASW-01A	09/13/91	Monitoring Well	unknown	METRO	A	03/29/00, 09/29/00, 06/22/01, 04/11/02
ASW-02	08/08/88	Monitoring Well	19	METRO	A	08/09/88
ASW-03	NA	Monitoring Well	unknown	METRO	A	08/09/88, 03/17/89, 03/22/95
ASW-04	03/15/89	Monitoring Well	18	METRO	A	03/17/89, 03/22/95, 03/29/00, 09/29/00
ASW-05	03/15/89	Monitoring Well	15	METRO	A	03/17/89
ASW-07	03/15/89	Monitoring Well	15	SCHNITZER	A	03/16/89
B	01/05/84	Monitoring Well	22.5	HA	F/SA	03/12/96
BST1W-88	02/28/95	Extraction Well	88	GOULD	B	03/28/95, 06/02/99
BST2W-61	01/19/95	Monitoring Well	61	LA	B	11/23/94, 03/30/95, 10/26/95, 04/03/00, 10/03/00, 07/05/01, 04/19/02
BST5W-74	02/28/95	Monitoring Well	74.5	LA	B	04/03/95, 10/27/95, 04/04/00, 10/04/00
BTB-4A-84	05/19/93	Monitoring Well	84	LA	B	04/03/95, 12/19/95
BTB-4B-25	05/25/93	Monitoring Well	25	LA	F/SA	04/03/95
BTB-4B-55	05/25/93	Monitoring Well	55	LA	A	04/03/95
C	01/06/84	Extraction Well	24	HA	F/SA	03/12/96
D	12/30/84	Extraction Well	22	HA	F/SA	03/12/96
E	01/11/84	Extraction Well	28.5	HA	A	03/12/96
F	01/12/84	Extraction Well	24	HA	A	06/12/96
G	01/10/84	Extraction Well	25.5	HA	A	03/12/96
GGW-001	08/30/99	Temporary Well Point	82-85	LA	A	08/30/99
GGW-001	08/30/99	Temporary Well Point	95-98	LA	A	08/31/99
GGW-002	08/26/99	Temporary Well Point	73-76	LA	A	08/26/99
GGW-003	08/27/99	Temporary Well Point	22-25	LA	A	08/27/99, 08/30/99
GGW-003	08/27/99	Temporary Well Point	66-69	LA	A	08/26/99, 08/27/99
GGW-004	08/27/99	Temporary Well Point	53-56	LA	A	08/27/99
GGW-005	09/01/99	Temporary Well Point	56-59	LA	A	09/01/99

TABLE 3-1
Groundwater Sampling Locations and Sample Collection Dates
Groundwater Characterization Report
RPAC - Portland Site

Location ID	Date Installed	Location Type[1]	Sample Depth[2]	General Location[3]	Characterization Zone[4]	Dates Sample Collected
GGW-006	08/27/99	Temporary Well Point	36-39	LA	A	08/27/99
GGW-006	08/27/99	Temporary Well Point	47-50	LA	A	08/27/99
GGW-007	10/19/99	Temporary Well Point	24-27	ESCO	F/SA	10/18/99, 10/19/99
GGW-008	09/01/99	Temporary Well Point	51-54	GOULD	A	08/31/99
GGW-009	08/31/99	Temporary Well Point	25-28	GOULD	F/SA	08/31/99
GGW-009	08/31/99	Temporary Well Point	65-68	GOULD	A	09/01/99
GGW-009	08/31/99	Temporary Well Point	88-91	GOULD	A	09/01/99, 09/02/99
GGW-010	10/25/99	Temporary Well Point	27-30	ATOFINA	A	10/25/99, 10/26/99
GGW-010	10/25/99	Temporary Well Point	36-39	ATOFINA	A	10/25/99, 10/26/99
GGW-010	10/25/99	Temporary Well Point	47-50	ATOFINA	A	10/25/99, 10/26/99
GGW-011	10/22/99	Temporary Well Point	54-57	WACKER	A	10/20/99, 10/22/99
GGW-011	10/22/99	Temporary Well Point	87.5-90.5	WACKER	A	10/20/99, 10/22/99
GGW-013	10/27/99	Temporary Well Point	36-39	ATOFINA	A	10/26/99, 10/27/99
GGW-014	10/27/99	Temporary Well Point	46-49	ATOFINA	A	10/26/99, 10/27/99
GGW-015	10/26/99	Temporary Well Point	27-30	ATOFINA	A	10/27/99, 10/28/99
GGW-015	10/26/99	Temporary Well Point	44-47	ATOFINA	A	10/25/99, 10/26/99
GGW-016	10/28/99	Temporary Well Point	30-33	ATOFINA	A	10/27/99, 10/28/99
GGW-016	10/28/99	Temporary Well Point	42-45	ATOFINA	A	10/27/99, 10/28/99
GGW-022	10/21/99	Temporary Well Point	22-25	WACKER	A	10/20/99, 10/21/99
GGW-022	10/21/99	Temporary Well Point	62-65	WACKER	A	10/20/99, 10/21/99
GGW-023	10/21/99	Temporary Well Point	14-17	WACKER	A	10/20/99, 10/21/99
GGW-024	10/25/99	Temporary Well Point	25-28	WACKER	F/SA	10/24/99, 10/25/99
GGW-024	10/25/99	Temporary Well Point	82-85	WACKER	A	10/24/99, 10/25/99
GGW-025	10/21/99	Temporary Well Point	25-28	BNSF	A	10/20/99, 10/21/99
GGW-025	10/21/99	Temporary Well Point	43-46	BNSF	A	10/20/99, 10/21/99
GGW-026	10/19/99	Temporary Well Point	27-30	BNSF	A	10/18/99, 10/19/99, 10/25/99
GGW-026	10/19/99	Temporary Well Point	48-51	BNSF	A	10/18/99, 10/19/99, 10/25/99
GGW-027	10/20/99	Temporary Well Point	21-24	BNSF	F/SA	10/19/99
GGW-027	10/20/99	Temporary Well Point	72-75	BNSF	A	10/19/99, 10/20/99
GGW-028	10/18/99	Temporary Well Point	12-15	LA	F/SA	10/17/99, 10/18/99
GGW-028	10/18/99	Temporary Well Point	36-39	LA	A	10/17/99, 10/18/99
GGW-028	10/18/99	Temporary Well Point	50-53	LA	A	10/17/99, 10/18/99
GM-1-S	07/05/90	Monitoring Well	unknown	LA	F/SA	08/23/90, 08/24/90, 08/26/90, 08/27/90, 10/24/90, 03/01/94
GM-2-I	06/27/90	Monitoring Well	unknown	GOULD	F/SA	10/26/90, 10/23/92
H	01/09/84	Extraction Well	26.5	HA	A	03/12/96

TABLE 3-1
Groundwater Sampling Locations and Sample Collection Dates
Groundwater Characterization Report
RPAC - Portland Site

Location ID	Date Installed	Location Type[1]	Sample Depth[2]	General Location[3]	Characterization Zone[4]	Dates Sample Collected
MW-01-26	12/12/88	Monitoring Well	23.6	HA	F/SA	03/22/00, 09/22/00
MW-01-41	12/12/88	Monitoring Well	38.8	HA	A	01/26/89, 02/27/89, 04/24/89, 06/12/91, 03/23/00, 09/20/00
MW-01-56	12/05/88	Monitoring Well	53.9	HA	A	01/25/89, 02/27/89, 04/24/89, 06/12/91, 03/24/00, 09/20/00
MW-01-76	05/23/91	Monitoring Well	76	HA	B	06/14/91, 07/09/91, 08/07/91, 03/22/00, 09/21/00
MW-02-26	12/22/88	Monitoring Well	22.8	HA	A	01/30/89, 02/27/89, 04/25/89, 06/10/91, 09/25/00
MW-02-46	12/21/88	Monitoring Well	42.8	HA	A	01/30/89, 02/28/89, 04/25/89, 06/10/91, 03/23/00, 09/25/00
MW-02-62	12/19/88	Monitoring Well	58.5	HA	A	01/30/89, 02/28/89, 04/25/89, 06/10/91, 03/23/00, 09/25/00
MW-03-27	11/09/88	Monitoring Well	24.8	HA	A	01/31/89, 02/28/89, 04/25/89, 06/10/91, 03/21/95, 03/29/00, 09/27/00
MW-03-49	11/08/88	Monitoring Well	46.8	HA	A	01/26/89, 02/28/89, 04/25/89, 06/10/91, 03/21/95, 03/29/00, 09/27/00
MW-03-68	10/31/88	Monitoring Well	66	HA	A	01/31/89, 02/28/89, 04/25/89, 06/10/91, 03/22/95, 03/29/00, 09/27/00
MW-03-81	02/16/00	Monitoring Well	80	WACKER	A	04/06/00, 10/13/00, 06/25/01, 04/16/02
MW-03-I	06/25/90	Monitoring Well	60	WACKER	A	10/17/90, 04/06/00, 10/13/00, 06/25/01, 04/16/02
MW-03-S	11/09/88	Monitoring Well	27	WACKER	F/SA	10/17/90, 04/06/00, 10/13/00, 06/25/01, 04/16/02
MW-04-27	12/02/88	Monitoring Well	23.8	HA	A	02/08/89, 03/06/89, 04/26/89, 06/11/91, 03/31/95, 03/27/00, 09/27/00, 07/05/01, 04/19/02
MW-04-47	11/30/88	Monitoring Well	43.8	HA	A	01/31/89, 02/28/89, 04/25/89, 06/11/91, 03/31/95, 03/27/00, 09/27/00, 07/05/01, 04/19/02
MW-04-63	11/29/88	Monitoring Well	60.1	HA	A	01/31/89, 02/28/89, 04/25/89, 06/11/91, 03/31/95, 03/27/00, 09/27/00
MW-05-24	11/16/88	Monitoring Well	22.3	HA	F/SA	02/08/89, 03/01/89, 04/26/89, 06/11/91, 03/30/00, 09/28/00
MW-05-34	11/15/88	Monitoring Well	32	HA	F/SA	02/09/89, 03/01/89, 04/26/89, 06/11/91, 12/14/95, 09/28/00
MW-05-52	11/14/88	Monitoring Well	49.4	HA	A	02/08/89, 02/09/89, 03/01/89, 04/26/89, 06/11/91, 12/14/95, 03/30/00, 09/28/00, 07/06/01, 04/22/02
MW-05-70	01/31/00	Monitoring Well	70	HA	B	03/30/00, 09/28/00, 11/29/00, 07/06/01, 04/22/02
MW-06-S	07/23/86	Monitoring Well	unknown	WACKER	A	04/06/00, 10/13/00
MW-07-56	12/29/88	Monitoring Well	53.5	HA	A	01/25/89, 02/27/89, 04/24/89, 06/13/91
MW-07-S	NA	Monitoring Well	unknown	WACKER	A	10/17/90, 04/06/00, 10/13/00
MW-08-27	02/28/90	Monitoring Well	25.1	HA	F/SA	06/12/91, 03/23/00
MW-08-46	01/12/89	Monitoring Well	41	HA	A	02/06/89, 03/01/89, 04/27/89, 07/05/89, 07/06/89, 07/07/89, 06/12/91, 03/28/00, 09/26/00
MW-08-64	01/09/89	Monitoring Well	59	HA	A	02/07/89, 03/06/89, 04/27/89, 06/26/89, 06/27/89, 06/28/89, 06/12/91, 03/24/00, 09/26/00
MW-09-23	05/10/91	Monitoring Well	20.7	HA	A	06/13/91, 07/09/91, 08/07/91, 08/04/93, 09/10/93, 10/28/93, 03/21/95, 03/28/00, 09/26/00, 07/02/01, 04/17/02
MW-09-42	05/10/91	Monitoring Well	40.7	HA	A	06/13/91, 07/08/91, 08/07/91, 08/04/93, 09/10/93, 10/28/93, 03/21/95, 03/28/00, 09/26/00, 07/02/01, 04/17/02
MW-09-58	05/09/91	Monitoring Well	58.5	HA	A	06/13/91, 07/08/91, 08/07/91, 08/03/93, 09/10/93, 10/28/93, 03/21/95, 03/27/00, 09/26/00, 07/02/01, 04/18/02
MW-09-80	06/04/91	Monitoring Well	80.3	HA	B	06/13/91, 07/09/91, 08/07/91, 08/03/93, 09/10/93, 10/28/93, 03/22/95, 03/27/00, 10/05/00, 07/02/01, 04/18/02
MW-10-24	06/22/93	Monitoring Well	22.5	IA	A	08/05/93, 09/09/93, 10/28/93, 03/23/95, 03/29/00, 09/25/00, 06/29/01, 04/15/02
MW-10-44	06/21/93	Monitoring Well	42	IA	A	08/05/93, 09/10/93, 10/28/93, 03/23/95, 03/29/00, 09/25/00, 06/29/01, 04/15/02

TABLE 3-1
Groundwater Sampling Locations and Sample Collection Dates
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RPAC - Portland Site

Location ID	Date Installed	Location Type[1]	Sample Depth[2]	General Location[3]	Characterization Zone[4]	Dates Sample Collected
MW-10-57	06/22/93	Monitoring Well	55.5	IA	A	08/05/93, 09/10/93, 10/28/93, 03/23/95, 03/29/00, 09/25/00, 06/29/01, 04/15/02
MW-11-24	06/25/93	Monitoring Well	22	IA	A	08/04/93, 09/09/93, 10/27/93, 03/23/95, 03/28/00, 09/22/00, 06/28/01, 04/12/02
MW-11-37	06/25/93	Monitoring Well	35	IA	A	08/04/93, 09/09/93, 10/27/93, 03/23/95, 03/28/00, 09/22/00, 06/28/01, 04/12/02
MW-11-56	06/24/93	Monitoring Well	54	IA	A	08/04/93, 09/09/93, 10/27/93, 03/23/95, 03/28/00, 09/22/00, 06/28/01, 04/12/02
MW-11-79	07/22/93	Monitoring Well	76.6	IA	B	08/04/93, 09/09/93, 10/27/93, 03/23/95, 03/28/00, 09/22/00, 06/28/01, 04/12/02
MW-12-27	06/17/93	Monitoring Well	24.5	IA	A	08/03/93, 09/08/93, 10/27/93, 04/11/95, 03/22/00, 09/20/00
MW-12-41	06/17/93	Monitoring Well	39	IA	A	08/03/93, 09/08/93, 10/27/93, 03/22/00, 09/20/00
MW-12-59	06/17/93	Monitoring Well	57.5	IA	A	08/03/93, 09/08/93, 10/27/93, 03/22/00, 09/20/00
MW-12-79	07/13/93	Monitoring Well	78	IA	B	08/02/93, 09/09/93, 10/27/93, 03/22/00, 09/20/00
P-02	01/01/80	Piezometer	18	IA	A	03/23/95
P-07	NA	Piezometer	unknown	HA	A	01/01/82
P-103	12/27/83	Piezometer	29	HA	A	03/24/95, 05/09/95, 07/31/95
P-104	12/27/83	Piezometer	20.4	LA	F/SA	10/23/92
P-11	NA	Piezometer	unknown	HA	F/SA	01/01/82
PP-06	06/15/81	Piezometer	20	LA	F/SA	01/01/82, 12/29/86, 02/21/87, 09/29/88, 05/01/89, 10/13/89, 05/10/90, 10/23/90, 11/13/90, 10/21/92
PP-08	06/23/81	Piezometer	25	LA	A	01/01/82, 12/30/86, 02/21/87, 10/19/88, 05/01/89, 10/13/89, 05/10/90, 11/13/90, 10/21/92, 03/27/95, 04/03/00, 10/05/00
PP-11	07/08/81	Piezometer	38	ATOFINA	A	01/01/82, 12/29/86, 02/25/87
PZ-1-11	03/15/95	Piezometer	11.5	IA	F/SA	03/24/95
RP-01-31	02/10/00	Monitoring Well	30	BNSF	A	04/17/00, 10/11/00, 11/28/00, 06/26/01, 04/05/02
RP-01-51	02/09/00	Monitoring Well	50	BNSF	A	04/17/00, 10/11/00, 11/28/00, 06/26/01, 04/08/02
RP-01-65	02/08/00	Monitoring Well	64	BNSF	B	04/17/00, 10/11/00, 11/28/00, 06/26/01, 04/05/02
RP-02-31	02/03/00	Monitoring Well	30	ATOFINA	A	04/18/00, 10/16/00, 06/19/01, 04/04/02
RP-02-49	02/03/00	Monitoring Well	48	ATOFINA	A	04/18/00, 10/16/00, 06/19/01, 04/04/02, 05/03/02
RP-02-66	02/02/00	Monitoring Well	65	ATOFINA	B	04/18/00, 10/16/00, 06/19/01, 04/04/02
RP-03-26	02/17/00	Monitoring Well	25	BNSF	A	04/07/00
RP-03-30R	09/13/00	Monitoring Well	28	BNSF	A	10/12/00, 11/28/00, 06/27/01, 04/10/02
RP-03-52R	09/12/00	Monitoring Well	51	BNSF	A	10/12/00, 11/28/00, 06/27/01, 04/10/02
RP-04-16	01/13/00	Monitoring Well	15	BNSF	A	04/05/00, 10/04/00, 07/03/01, 04/18/02
RP-04-41	02/22/00	Monitoring Well	40	BNSF	A	04/05/00, 10/04/00, 07/03/01, 04/18/02
RP-05-16	01/13/00	Monitoring Well	15	BNSF	A	04/05/00, 10/04/00
RP-06-30	02/08/00	Monitoring Well	29.5	BNSF	F/SA	04/14/00, 10/12/00, 11/29/00, 06/27/01, 04/10/02
RP-06-87	02/07/00	Monitoring Well	86	BNSF	A	04/14/00, 10/12/00, 11/29/00, 06/27/01, 04/10/02
RP-07-119	05/01/02	Monitoring Well	119	WACKER	B	04/29/02, 05/03/02
RP-07-30	04/22/02	Monitoring Well	24.5	WACKER	F/SA	05/03/02
RP-07-55	04/22/02	Monitoring Well	54.5	WACKER	A	05/03/02
RP-07-84	04/22/02	Monitoring Well	83	WACKER	A	05/03/02
RPW-01	07/01/81	Monitoring Well	48	IA	A	01/01/82

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Groundwater Characterization Report
RPAC - Portland Site

Location ID	Date Installed	Location Type[1]	Sample Depth[2]	General Location[3]	Characterization Zone[4]	Dates Sample Collected
RPW-02	06/30/81	Monitoring Well	38	IA	A	01/01/82, 10/17/90, 08/05/93, 09/10/93, 10/28/93, 03/22/00, 09/20/00, 06/28/01, 04/12/02
RPW-03	06/29/81	Monitoring Well	53	IA	A	01/01/82, 08/05/93, 09/10/93, 10/28/93, 03/23/95, 03/28/00, 09/22/00
RPW-04	07/02/81	Monitoring Well	38.5	HA	A	01/01/82, 06/01/84, 09/18/86, 12/14/86, 02/26/87, 09/30/88, 05/01/89, 10/13/89, 05/10/90, 11/13/90
RPW-05	06/16/81	Monitoring Well	40.75	HA	A	01/01/82, 01/25/89, 02/27/89, 04/25/89, 06/12/91, 03/27/00, 09/27/00
TB-01-22	04/30/91	Temporary Well Point	23.5	HA	A	04/30/91
TB-02	04/30/91	Temporary Well Point	23.5	HA	A	04/30/91
TB-03-23	05/01/91	Temporary Well Point	23.5	HA	A	05/01/91
TB-04-23	05/02/91	Temporary Well Point	23.5	HA	A	05/03/91
UB-3	NA	Temporary Well Point	18-22	HA	A	01/14/98
UB-4	NA	Temporary Well Point	18-22	HA	A	01/15/98
W-01-I	01/27/82	Monitoring Well	50	GOULD	A	08/28/86, 12/10/86, 02/17/87, 10/23/92
W-02-S	01/26/82	Monitoring Well	18	GOULD	F/SA	12/22/86, 02/17/87, 10/26/90, 10/23/92
W-03-D	12/02/86	Monitoring Well	89	GOULD	A	08/27/86, 12/17/86, 12/21/86, 02/19/87, 12/21/87, 10/25/90, 12/11/96, 04/12/00, 10/09/00
W-03-I	01/29/82	Monitoring Well	40.5	GOULD	A	10/25/90, 03/30/95, 12/12/96, 04/12/00, 10/09/00, 06/26/01, 04/08/02
W-03-S	01/01/82	Monitoring Well	17	GOULD	F/SA	12/29/86, 02/19/87, 10/25/90, 03/29/95, 12/11/96, 04/12/00, 10/09/00
W-04-89	01/26/00	Monitoring Well	88	GOULD	A	04/12/00, 10/09/00, 06/26/01, 04/08/02
W-04-I	02/01/82	Monitoring Well	49	GOULD	A	08/27/86, 12/11/86, 02/21/87, 12/12/96, 04/12/00, 10/09/00
W-04-S	01/01/82	Monitoring Well	16	GOULD	F/SA	12/11/86, 02/21/87, 12/12/96, 04/12/00, 10/09/00
W-06-B	08/05/86	Monitoring Well	67.9	LA	B	09/04/86, 12/15/86, 02/22/87, 06/12/91, 07/09/91, 08/07/91, 03/27/95, 03/30/00, 09/28/00
W-06-D	06/22/81	Monitoring Well	49	LA	A	01/01/82, 09/04/86, 12/15/86, 02/22/87, 02/08/89, 03/01/89, 04/26/89, 06/12/91, 03/30/00, 09/28/00
W-06-S	07/23/86	Monitoring Well	27.25	LA	A	09/04/86, 12/12/86, 02/22/87, 02/07/89, 03/01/89, 04/26/89, 06/12/91, 03/30/00, 09/28/00
W-07-S	07/24/86	Monitoring Well	15	LA	F/SA	10/24/90, 11/13/90, 10/21/92, 03/01/94
W-07-I	06/18/81	Monitoring Well	54	LA	A	01/01/82, 09/15/86, 12/18/86, 02/26/87, 09/30/88, 05/01/89, 10/13/89, 05/10/90
W-07-D	06/28/90	Monitoring Well	70	LA	A	09/05/86, 12/22/86, 02/26/87, 10/24/90, 10/21/92, 02/24/94
W-08	06/24/81	Monitoring Well	54	LA	A	01/01/82, 09/15/86, 12/21/86, 02/26/87, 10/23/90, 10/22/92, 04/04/00, 10/05/00, 07/03/01, 04/17/02
W-08-26	01/18/00	Monitoring Well	25	LA	F/SA	04/05/00, 10/06/00, 07/02/01, 04/16/02, 04/18/02
W-08-74	01/19/00	Monitoring Well	73	LA	B	04/04/00, 10/05/00, 07/03/01, 04/16/02
W-09	06/25/81	Monitoring Well	38	LA	F/SA	01/01/82, 08/29/86, 12/18/86, 02/23/87, 10/22/92, 04/10/00, 10/06/00
W-09-116	01/21/00	Monitoring Well	115.5	LA	A	04/07/00, 10/06/00, 06/29/01, 04/15/02
W-09-86	01/25/00	Monitoring Well	85	LA	A	04/07/00, 10/06/00
W-10	07/06/81	Monitoring Well	70.5	COP	A	01/01/82, 06/01/84, 09/18/86, 12/21/86, 02/25/87, 09/29/88, 05/01/89, 10/13/89, 05/10/90, 10/18/90, 11/13/90, 10/22/92, 03/27/95, 12/15/95, 04/14/00, 10/11/00
W-11-B	08/15/86	Monitoring Well	121.9	ESCO	B	09/03/86, 12/16/86, 02/24/87, 04/11/00, 10/10/00, 06/21/01, 04/09/02

TABLE 3-1
Groundwater Sampling Locations and Sample Collection Dates
Groundwater Characterization Report
RPAC - Portland Site

Location ID	Date Installed	Location Type[1]	Sample Depth[2]	General Location[3]	Characterization Zone[4]	Dates Sample Collected
W-11-D	07/29/86	Monitoring Well	91.3	ESCO	A	09/16/86, 01/20/87, 02/25/87, 10/22/90, 04/05/95, 04/11/00, 10/10/00, 06/21/01, 04/09/02
W-11-I	07/03/86	Monitoring Well	60	ESCO	A	09/03/86, 12/16/86, 02/24/87, 10/22/90, 04/04/95, 04/11/00, 10/10/00, 06/21/01, 04/09/02
W-11-S	07/23/86	Monitoring Well	21.5	ESCO	F/SA	09/03/86, 12/17/86, 02/24/87, 04/04/95, 04/11/00, 10/10/00, 06/21/01, 04/09/02
W-12-D	01/09/87	Monitoring Well	100	ESCO	A	01/21/87, 02/23/87, 10/22/90, 04/04/95, 12/19/95, 04/11/00, 10/10/00
W-12-I	01/09/87	Monitoring Well	58.5	ESCO	A	01/21/87, 02/23/87, 10/22/90, 04/04/95, 12/18/95, 04/11/00, 10/10/00
W-12-S	01/12/87	Monitoring Well	20	ESCO	F/SA	10/22/90, 04/11/00, 10/10/00
W-15-D	08/12/86	Monitoring Well	62	METRO	A	09/17/86, 12/14/86, 02/19/87, 10/23/90, 10/24/90, 04/10/00, 09/29/00, 06/22/01, 06/29/01, 04/11/02
W-15-I	08/12/86	Monitoring Well	38.8	METRO	A	09/17/86, 12/14/86, 02/19/87, 08/09/88, 10/24/90, 04/10/00, 09/29/00, 06/20/01, 04/11/02
W-15-S	07/24/86	Monitoring Well	14.8	METRO	A	09/17/86, 12/17/86, 02/19/87, 10/24/90, 04/10/00, 10/04/00, 06/20/01, 06/22/01, 04/11/02
W-16-31	02/11/00	Monitoring Well	30	SCHNITZER	F/SA	04/19/00, 10/17/00, 06/22/01, 04/08/02
W-16-D	12/19/86	Monitoring Well	85.5	SCHNITZER	A	12/30/86, 02/18/87, 04/05/95, 12/19/96, 04/19/00, 10/17/00
W-16-I	12/19/86	Monitoring Well	50	SCHNITZER	A	12/30/86, 02/18/87, 04/05/95, 12/19/96, 04/19/00, 10/17/00, 06/22/01, 06/27/01, 04/08/02
W-16-S	12/29/86	Monitoring Well	13	SCHNITZER	F/SA	12/30/86, 02/18/87, 04/05/95, 12/19/96
W-17	06/18/90	Monitoring Well	50	METRO	A	10/22/90
W-18-D	07/17/90	Monitoring Well	64	OFFSITE W	B	10/15/90, 03/21/00, 09/19/00, 06/18/01, 04/04/02
W-18-I	07/18/90	Monitoring Well	54	OFFSITE W	A	10/16/90, 03/21/00, 09/19/00, 06/18/01, 04/04/02
W-18-S	07/19/90	Monitoring Well	30	OFFSITE W	A	10/16/90, 03/21/00, 09/19/00, 06/19/01, 04/04/02
W-19-D	07/10/90	Monitoring Well	67.5	ATOFINA	A	10/18/90, 03/28/95, 12/20/95, 04/02/98, 04/18/00, 10/16/00, 06/20/01, 04/05/02
W-19-I	06/20/90	Monitoring Well	49	ATOFINA	A	10/18/90, 03/28/95, 12/20/95, 04/02/98, 04/18/00, 10/16/00, 06/20/01, 04/05/02
W-19-S	06/21/90	Monitoring Well	25	ATOFINA	A	03/28/95, 04/02/98, 04/18/00, 04/05/02

Notes:

NA Boring Log not available

[1]LOCATION TYPE

Monitoring Well, Extraction Well or Piezometer	Monitoring well, extraction well or piezometer - permanent installation (although may have been abandoned)
Temporary Well Point	One-time sampling location, such as direct-push or during drilling

[2]SAMPLE DEPTH

Bottom of screened interval for monitoring wells, or discrete depth interval for one-time sampling locations

[3]GENERAL LOCATION

LA	RPAC LAKE AREA
HA	RPAC HERBICIDE AREA
IA	RPAC INSECTICIDE AREA
OFFSITE W	OFFSITE TO THE WEST OF THE RPAC PROPERTY
COP	CITY OF PORTLAND

[4]CHARACTERIZATION DEPTH

F/SA	FILL/SHALLOW ALLUVIUM ZONE
A	ALLUVIUM ZONE
B	BASALT ZONE

TABLE 3-2
Preliminary Screening Values Associated with Preliminary Constituents of Potential Concern
Groundwater Characterization Report
RPAC - Portland Site

Chemical Class	Analyte	CAS #	Groundwater Screening Value	Units	Ref
Dioxin/Furans	1,2,3,4,6,7,8,9-OCDF	39001-02-0	NA	ng/L	a
Dioxin/Furans	1,2,3,4,6,7,8-HpCDD	35822-46-9	NA	ng/L	a
Dioxin/Furans	1,2,3,4,6,7,8-HpCDF	67562-39-4	NA	ng/L	a
Dioxin/Furans	1,2,3,4,7,8,9-HpCDF	55673-89-7	NA	ng/L	a
Dioxin/Furans	1,2,3,4,7,8-HxCDD	39227-28-6	NA	ng/L	a
Dioxin/Furans	1,2,3,4,7,8-HxCDF	70648-26-9	NA	ng/L	a
Dioxin/Furans	1,2,3,6,7,8-HxCDD	57653-85-7	NA	ng/L	a
Dioxin/Furans	1,2,3,6,7,8-HxCDF	57117-44-9	NA	ng/L	a
Dioxin/Furans	1,2,3,7,8,9-HxCDD	19408-74-3	NA	ng/L	a
Dioxin/Furans	1,2,3,7,8,9-HxCDF	72918-21-9	NA	ng/L	a
Dioxin/Furans	1,2,3,7,8-PeCDD	40321-76-4	NA	ng/L	a
Dioxin/Furans	1,2,3,7,8-PeCDF	57117-41-6	NA	ng/L	a
Dioxin/Furans	2,3,4,6,7,8-HxCDF	60851-34-5	NA	ng/L	a
Dioxin/Furans	2,3,4,7,8-PeCDF	57117-31-4	NA	ng/L	a
Dioxin/Furans	2,3,7,8-TCDD	1746-01-6	4.48E-04	ng/L	a
Dioxin/Furans	2,3,7,8-TCDF	51207-31-9	NA	ng/L	a
Herbicides	2,4,5-T	93-76-5	3.65E+02	µg/L	a
Herbicides	2,4,5-TP (Silvex)	93-72-1	2.92E+02	µg/L	a
Herbicides	2,4-D	94-75-7	3.65E+02	µg/L	a
Herbicides	2,4-DB	94-82-6	2.92E+02	µg/L	a
Herbicides	2,4-DP (Dichlorprop)	120-36-5	NA	µg/L	a
Herbicides	Bromoxynil	1689-84-5	7.30E+02	µg/L	a
Herbicides	Dinoseb	88-85-7	3.65E+01	µg/L	a
Insecticides	4,4'-DDD	72-54-8	2.80E-01	µg/L	a
Insecticides	4,4'-DDE	72-55-9	1.98E-01	µg/L	a
Insecticides	4,4'-DDT	50-29-3	1.98E-01	µg/L	a
Insecticides	Aldrin	309-00-2	3.95E-03	µg/L	a
Insecticides	alpha-BHC	319-84-6	1.07E-02	µg/L	a
Insecticides	beta-BHC	319-85-7	3.74E-02	µg/L	a
Insecticides	Chlordane (tech)	57-74-9	NA	µg/L	a
Insecticides	delta-BHC	319-86-8	NA	µg/L	a
Insecticides	Dieldrin	60-57-1	4.20E-03	µg/L	a
Insecticides	Endrin	72-20-8	1.09E+01	µg/L	a
Insecticides	gamma-BHC (Lindane)	58-89-9	5.17E-02	µg/L	a
Insecticides	Heptachlor	76-44-8	1.49E-02	µg/L	a
Insecticides	Hexachlorobenzene	118-74-1	4.20E-02	µg/L	a
Insecticides	Toxaphene	8001-35-2	6.11E-02	µg/L	a
Metals	Arsenic	7440-38-2	2.00E+00	µg/L	d
Metals	Cadmium	7440-43-9	1.82E+01	µg/L	a
Metals	Chromium*	7440-47-3	1.09E+02	µg/L	a
Metals	Copper	7440-50-8	1.46E+03	µg/L	a
Metals	Lead	7439-92-1	1.50E+01	µg/L	b
Metals	Mercury and compounds	7439-97-6	2.00E+00	µg/L	c
Metals	Nickel	7440-02-0	7.30E+02	µg/L	a
Metals	Vanadium	7440-62-2	2.55E+02	µg/L	a
Metals	Zinc	7440-66-6	1.09E+04	µg/L	a
PCBs	Aroclor 1254	11097-69-1	3.36E-02	µg/L	a

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TABLE 3-2
Preliminary Screening Values Associated with Preliminary Constituents of Potential Concern
Groundwater Characterization Report
RPAC - Portland Site

Chemical Class	Analyte	CAS #	Groundwater Screening Value	Units	Ref
SVOCs	2,4,6-Trichlorophenol	88-06-2	3.65E+00	µg/L	a
SVOCs	2,4-Dichlorophenol	120-83-2	1.09E+02	µg/L	a
SVOCs	2,4-Dinitrophenol	51-28-5	7.30E+01	µg/L	a
SVOCs	2-Chlorophenol	95-57-8	3.04E+01	µg/L	a
SVOCs	Pentachlorophenol	87-86-5	5.60E-01	µg/L	a
VOCs	1,1,2,2-Tetrachloroethane	79-34-5	5.53E-02	µg/L	a
VOCs	1,1-Dichloroethane	75-34-3	8.11E+02	µg/L	a
VOCs	1,2-Dichlorobenzene	95-50-1	3.70E+02	µg/L	a
VOCs	1,2-Dichloroethane	107-06-2	1.23E-01	µg/L	a
VOCs	1,3-Dichlorobenzene	541-73-1	5.48E+00	µg/L	a
VOCs	1,4-Dichlorobenzene	106-46-7	5.02E-01	µg/L	a
VOCs	Benzene	71-43-2	3.36E-01	µg/L	a
VOCs	Chlorobenzene	108-90-7	1.06E+02	µg/L	a
VOCs	Chloroform	67-66-3	6.17E+00	µg/L	a
VOCs	cis-1,2-Dichloroethene	156-59-2	6.08E+01	µg/L	a
VOCs	Ethylbenzene	100-41-4	1.34E+03	µg/L	f
VOCs	Isobutyl alcohol	78-83-1	1.83E+03	µg/L	a
VOCs	m,p-Xylene	1330-20-7	2.10E+02	µg/L	e
VOCs	Methyl chloride (chloromethane)	74-87-3	1.51E+00	µg/L	a
VOCs	o-Xylene	95-47-6	2.10E+02	µg/L	e
VOCs	Tetrachloroethene (PCE)	127-18-4	1.08E+00	µg/L	f
VOCs	Toluene	108-88-3	7.23E+02	µg/L	a
VOCs	Trichloroethene (TCE)	79-01-6	2.80E-02	µg/L	a
VOCs	Vinyl chloride	75-01-4	1.98E-02	µg/L	a

NA No applicable screening value available
ng/L nanograms per liter
µg/L micrograms per liter

Reference Key:

a USEPA Region IX Preliminary Remediation Goals (PRGs), tap water (October 2002)
b USEPA National Primary Drinking Water Regulations, Action Level (July 2002)
c USEPA National Primary Drinking Water Regulations, Maximum Contaminant Level (MCL) (July 2002)
d DEQ Default Background Concentrations for Metals (October 2002)
e There is no PRG available; the PRG for xylenes has been listed and can be used as a surrogate
f 2000 PRG; according to DEQ, EPA has withdrawn the new toxicity factors for ethylbenzene and PCE, and the 2000 PRG should be used
* Because total chromium PRG values are not available, the screening value for hexavalent chromium (Cr+6) has been used

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TABLE 3-3
Comparison of Selected Groundwater Analytical Results Against Surface Water Screening Values
Spring 2000 - Spring 2002
RPAC - Portland Site

Characterization Zone	Location	Date	Analytical Method	CAS#	Analyte	Concentration	Units	Method Detection Limit (MDL)	Method Reporting Limit (MRL)	Expert Review Qualifier	10x Human Health Consumption of Water + Organism (AWQC)[a]	10x Ecological Screening Values for Surface Water[b]
A	RP-01-51	4/17/2000	8260B	75-35-4	1,1-Dichloroethene	0.65	µg/L	0.151	1		0.57	250
A	RP-01-51	4/8/2002	8260B	75-35-4	1,1-Dichloroethene	0.74	µg/L	0.302	2		0.57	250
B	RP-01-65	4/17/2000	8260B	75-35-4	1,1-Dichloroethene	1.61	µg/L	0.151	1		0.57	250
B	RP-01-65	10/11/2000	8260B	75-35-4	1,1-Dichloroethene	1.55	µg/L	0.755	5		0.57	250
B	RP-01-65	6/26/2001	8260B	75-35-4	1,1-Dichloroethene	1.85	µg/L	0.755	5		0.57	250
B	RP-01-65	4/5/2002	8260B	75-35-4	1,1-Dichloroethene	2	µg/L	0.755	5		0.57	250
A	W-19-D	4/18/2000	8260B	75-35-4	1,1-Dichloroethene	4.75	µg/L	0.151	1		0.57	250
A	W-19-D	10/16/2000	8260B	75-35-4	1,1-Dichloroethene	3.35	µg/L	0.755	5		0.57	250
A	W-19-D	6/20/2001	8260B	75-35-4	1,1-Dichloroethene	0.93	µg/L	0.151	1		0.57	250
A	W-19-D	4/5/2002	8260B	75-35-4	1,1-Dichloroethene	2.95	µg/L	0.755	5		0.57	250
A	W-19-I	4/18/2000	8260B	75-35-4	1,1-Dichloroethene	1.8	µg/L	0.151	1	J	0.57	250
A	W-19-I	10/16/2000	8260B	75-35-4	1,1-Dichloroethene	1.56	µg/L	0.302	2		0.57	250
A	W-19-I	4/5/2002	8260B	75-35-4	1,1-Dichloroethene	1.04	µg/L	0.302	2		0.57	250
A	RP-01-51	4/17/2000	8260B	95-50-1	1,2-Dichlorobenzene	227	µg/L	0.174	2		27000	140
A	RP-01-51	10/11/2000	8260B	95-50-1	1,2-Dichlorobenzene	150	µg/L	0.087	1		27000	140
A	RP-01-51	4/8/2002	8260B	95-50-1	1,2-Dichlorobenzene	197	µg/L	0.174	2		27000	140
B	RP-01-65	4/17/2000	8260B	95-50-1	1,2-Dichlorobenzene	640	µg/L	0.87	10		27000	140
B	RP-01-65	10/11/2000	8260B	95-50-1	1,2-Dichlorobenzene	537	µg/L	0.435	5		27000	140
B	RP-01-65	6/26/2001	8260B	95-50-1	1,2-Dichlorobenzene	722	µg/L	0.435	5		27000	140
B	RP-01-65	4/5/2002	8260B	95-50-1	1,2-Dichlorobenzene	546	µg/L	0.435	5		27000	140
B	RP-07-119	5/3/2002	8260B	95-50-1	1,2-Dichlorobenzene	248	µg/L	0.172	2		27000	140
A	RP-07-84	5/3/2002	8260B	95-50-1	1,2-Dichlorobenzene	426	µg/L	0.859	10		27000	140
A	W-19-D	4/18/2000	8260B	95-50-1	1,2-Dichlorobenzene	830	µg/L	0.87	10		27000	140
A	W-19-D	10/16/2000	8260B	95-50-1	1,2-Dichlorobenzene	861	µg/L	0.435	5		27000	140
A	W-19-D	4/5/2002	8260B	95-50-1	1,2-Dichlorobenzene	657	µg/L	0.435	5		27000	140
A	W-19-I	4/18/2000	8260B	95-50-1	1,2-Dichlorobenzene	329	µg/L	0.435	5	J	27000	140
A	W-19-I	10/16/2000	8260B	95-50-1	1,2-Dichlorobenzene	312	µg/L	0.174	2		27000	140
A	W-19-I	4/5/2002	8260B	95-50-1	1,2-Dichlorobenzene	188	µg/L	0.174	2		27000	140
B	RP-01-65	4/17/2000	8260B	106-46-7	1,4-Dichlorobenzene	187	µg/L	1.76	10		4000	150
B	RP-01-65	10/11/2000	8260B	106-46-7	1,4-Dichlorobenzene	180	µg/L	0.88	5		4000	150
B	RP-01-65	6/26/2001	8260B	106-46-7	1,4-Dichlorobenzene	207	µg/L	0.88	5		4000	150
B	RP-01-65	4/5/2002	8260B	106-46-7	1,4-Dichlorobenzene	171	µg/L	0.88	5		4000	150
A	W-19-D	4/18/2000	8260B	106-46-7	1,4-Dichlorobenzene	244	µg/L	1.76	10		4000	150
A	W-19-D	10/16/2000	8260B	106-46-7	1,4-Dichlorobenzene	248	µg/L	0.88	5		4000	150
A	W-19-D	4/5/2002	8260B	106-46-7	1,4-Dichlorobenzene	201	µg/L	0.88	5		4000	150
A	RP-01-31	4/5/2002	8290	1746-01-6	2,3,7,8-TCDD	0.0045	ng/l	5.81	1.4	J	0.00005	76
A	RP-02-31	10/16/2000	8290	1746-01-6	2,3,7,8-TCDD	0.0009	ng/l	0.4	0.4		0.00005	76
A	RP-02-31	4/4/2002	8290	1746-01-6	2,3,7,8-TCDD	0.0031	ng/l	5.81	0.4	J	0.00005	76
B	RP-02-66	4/4/2002	8290	1746-01-6	2,3,7,8-TCDD	0.0052	ng/l	5.81	1.7	J	0.00005	76
A	W-19-I	10/16/2000	8290	1746-01-6	2,3,7,8-TCDD	0.00055	ng/l	0.5	0.5		0.00005	76
A	RP-01-31	10/11/2000	6010A	7429-90-5	Aluminum	23700	µg/L	0.015	0.1		NA	870
A	RP-01-31	6/26/2001	6010A	7429-90-5	Aluminum	136000	µg/L	1	1		NA	870
A	RP-01-31	4/5/2002	6010A	7429-90-5	Aluminum	50600	µg/L	0.0415	0.1		NA	870
A	RP-02-31	10/16/2000	6010A	7429-90-5	Aluminum	1030	µg/L	0.015	0.1		NA	870
A	RP-02-49	10/16/2000	6010A	7429-90-5	Aluminum	1080	µg/L	0.015	0.1		NA	870
A	RP-07-55	5/3/2002	6010A	7429-90-5	Aluminum	1250	µg/L	0.0415	0.1		NA	870
A	RP-07-84	5/3/2002	6010A	7429-90-5	Aluminum	6100	µg/L	0.0415	0.1		NA	870

TABLE 3-3
Comparison of Selected Groundwater Analytical Results Against Surface Water Screening Values
Spring 2000 - Spring 2002
RPAC - Portland Site

Characterization Zone	Location	Date	Analytical Method	CAS#	Analyte	Concentration	Units	Method Detection Limit (MDL)	Method Reporting Limit (MRL)	Expert Review Qualifier	10x Human Health Consumption of Water + Organism (AWQC)[a]	10x Ecological Screening Values for Surface Water[b]
A	W-19-I	10/16/2000	6010A	7429-90-5	Aluminum	1760	µg/L	0.015	0.1		NA	870
A	RP-01-31	6/26/2001	6020	7440-38-2	Arsenic	34.4	µg/L	0.00022	0.001		0.18	1500
A	RP-01-31	4/5/2002	6020	7440-38-2	Arsenic	23.7	µg/L	0.000663	0.001		0.18	1500
A	RP-01-51	6/26/2001	6020	7440-38-2	Arsenic	6.19	µg/L	0.00022	0.001		0.18	1500
A	RP-01-51	4/8/2002	6020	7440-38-2	Arsenic	14.4	µg/L	0.000663	0.001		0.18	1500
A	RP-02-31	6/19/2001	6020	7440-38-2	Arsenic	140	µg/L	0.00247	0.0112	J	0.18	1500
A	RP-02-31	4/4/2002	6020	7440-38-2	Arsenic	140	µg/L	0.000663	0.001		0.18	1500
A	RP-02-49	6/19/2001	6020	7440-38-2	Arsenic	4.23	µg/L	0.00022	0.001	J	0.18	1500
A	RP-02-49	4/4/2002	6020	7440-38-2	Arsenic	7.99	µg/L	0.000663	0.001		0.18	1500
B	RP-07-119	5/3/2002	6020	7440-38-2	Arsenic	1.19	µg/L	0.000663	0.001		0.18	1500
F/SA	RP-07-30	5/3/2002	6020	7440-38-2	Arsenic	1.84	µg/L	0.000663	0.001		0.18	1500
A	RP-07-55	5/3/2002	6020	7440-38-2	Arsenic	9.78	µg/L	0.000663	0.001		0.18	1500
A	RP-07-84	5/3/2002	6020	7440-38-2	Arsenic	3.82	µg/L	0.000663	0.001		0.18	1500
A	W-19-I	6/20/2001	6020	7440-38-2	Arsenic	3.17	µg/L	0.00022	0.001	J	0.18	1500
A	W-19-I	4/5/2002	6020	7440-38-2	Arsenic	6.52	µg/L	0.000663	0.001		0.18	1500
A	W-19-S	4/5/2002	6020	7440-38-2	Arsenic	86	µg/L	0.000663	0.001		0.18	1500
A	RP-01-31	4/17/2000	6020	7440-38-2	Arsenic - Dissolved	3.25	µg/L	0.00022	0.001		0.18	1500
A	RP-01-31	10/11/2000	6020	7440-38-2	Arsenic - Dissolved	9.7	µg/L	0.00022	0.001		0.18	1500
A	RP-01-31	6/26/2001	6020	7440-38-2	Arsenic - Dissolved	4.29	µg/L	0.00022	0.001		0.18	1500
A	RP-01-31	4/5/2002	6020	7440-38-2	Arsenic - Dissolved	4.28	µg/L	0.000663	0.001		0.18	1500
A	RP-01-51	6/26/2001	6020	7440-38-2	Arsenic - Dissolved	5.11	µg/L	0.00022	0.001		0.18	1500
A	RP-01-51	4/8/2002	6020	7440-38-2	Arsenic - Dissolved	11.6	µg/L	0.000663	0.001		0.18	1500
A	RP-02-31	4/18/2000	6020	7440-38-2	Arsenic - Dissolved	73.9	µg/L	0.00022	0.001		0.18	1500
A	RP-02-31	10/16/2000	6020	7440-38-2	Arsenic - Dissolved	154	µg/L	0.00147	0.00667		0.18	1500
A	RP-02-31	6/19/2001	6020	7440-38-2	Arsenic - Dissolved	127	µg/L	0.00277	0.0126	J	0.18	1500
A	RP-02-31	4/4/2002	6020	7440-38-2	Arsenic - Dissolved	132	µg/L	0.000663	0.001		0.18	1500
A	RP-02-49	6/19/2001	6020	7440-38-2	Arsenic - Dissolved	3.89	µg/L	0.00022	0.001	J	0.18	1500
A	RP-02-49	4/4/2002	6020	7440-38-2	Arsenic - Dissolved	3.77	µg/L	0.000663	0.001		0.18	1500
A	RP-07-55	5/3/2002	6020	7440-38-2	Arsenic - Dissolved	9.11	µg/L	0.000663	0.001		0.18	1500
A	W-19-I	4/18/2000	6020	7440-38-2	Arsenic - Dissolved	2.29	µg/L	0.00022	0.001		0.18	1500
A	W-19-I	6/20/2001	6020	7440-38-2	Arsenic - Dissolved	2.92	µg/L	0.00022	0.001	J	0.18	1500
A	W-19-I	4/5/2002	6020	7440-38-2	Arsenic - Dissolved	5.57	µg/L	0.000663	0.001		0.18	1500
A	W-19-S	4/18/2000	6020	7440-38-2	Arsenic - Dissolved	1.35	µg/L	0.00022	0.001		0.18	1500
A	W-19-S	4/5/2002	6020	7440-38-2	Arsenic - Dissolved	1.03	µg/L	0.000663	0.001		0.18	1500
B	RP-01-65	4/17/2000	8260B	71-43-2	Benzene	27.4	µg/L	0.121	1		22	1300
B	RP-01-65	6/26/2001	8260B	71-43-2	Benzene	41.4	µg/L	0.605	5		22	1300
A	W-19-I	6/20/2001	6020	7440-43-9	Cadmium	2.93	µg/L	0.000032	0.001		NA	22
A	W-19-I	10/16/2000	6020	7440-43-9	Cadmium - Dissolved	2.88	µg/L	0.000032	0.001		NA	22
A	W-19-S	4/5/2002	6020	7440-47-3	Chromium	203	µg/L	0.000292	0.001		NA	110
A	W-19-S	4/5/2002	6020	7440-50-8	Copper	336	µg/L	0.00017	0.002		13000	90
A	RP-01-31	10/11/2000	6010A	7439-89-6	Iron	50300	µg/L	0.03	0.1		NA	10000
A	RP-01-31	6/26/2001	6010A	7439-89-6	Iron	393000	µg/L	0.96	1		NA	10000
A	RP-01-31	4/5/2002	6010A	7439-89-6	Iron	126000	µg/L	0.225	2.5		NA	10000
A	RP-02-31	4/18/2000	6010A	7439-89-6	Iron	51700	µg/L	0.96	1		NA	10000
A	RP-02-31	10/16/2000	6010A	7439-89-6	Iron	85700	µg/L	0.3	1		NA	10000
F/SA	RP-07-30	5/3/2002	6010A	7439-89-6	Iron	11900	µg/L	0.009	0.1		NA	10000
A	RP-07-55	5/3/2002	6010A	7439-89-6	Iron	10300	µg/L	0.009	0.1		NA	10000

TABLE 3-3
Comparison of Selected Groundwater Analytical Results Against Surface Water Screening Values
Spring 2000 - Spring 2002
RPAC - Portland Site

Characterization Zone	Location	Date	Analytical Method	CAS#	Analyte	Concentration	Units	Method Detection Limit (MDL)	Method Reporting Limit (MRL)	Expert Review Qualifier	10x Human Health Consumption of Water + Organism (AWQC)[a]	10x Ecological Screening Values for Surface Water[b]
A	RP-07-84	5/3/2002	6010A	7439-89-6	Iron	12400	µg/L	0.009	0.1		NA	10000
A	RP-01-31	6/26/2001	6020	7439-92-1	Lead	51.4	µg/L	0.000039	0.001	J	NA	25
A	RP-01-31	4/5/2002	6020	7439-92-1	Lead	31.9	µg/L	0.000107	0.001		NA	25
A	RP-02-31	4/4/2002	6020	7439-92-1	Lead	42.7	µg/L	0.000107	0.001		NA	25
A	W-19-S	4/5/2002	6020	7439-92-1	Lead	298	µg/L	0.000535	0.005		NA	25
A	RP-01-31	10/11/2000	6010A	7439-96-5	Manganese	1820	µg/L	0.002	0.01		NA	1200
A	RP-01-31	6/26/2001	6010A	7439-96-5	Manganese	6970	µg/L	0.002	0.01		NA	1200
A	RP-01-31	4/5/2002	6010A	7439-96-5	Manganese	2200	µg/L	0.0039	0.01		NA	1200
A	RP-01-51	4/17/2000	6010A	7439-96-5	Manganese	4140	µg/L	0.002	0.01		NA	1200
A	RP-01-51	10/11/2000	6010A	7439-96-5	Manganese	3040	µg/L	0.002	0.01		NA	1200
A	RP-01-51	6/26/2001	6010A	7439-96-5	Manganese	3240	µg/L	0.002	0.01		NA	1200
A	RP-01-51	4/8/2002	6010A	7439-96-5	Manganese	2940	µg/L	0.0039	0.01		NA	1200
B	RP-01-65	10/11/2000	6010A	7439-96-5	Manganese	2010	µg/L	0.002	0.01		NA	1200
B	RP-01-65	6/26/2001	6010A	7439-96-5	Manganese	2100	µg/L	0.002	0.01		NA	1200
B	RP-01-65	4/5/2002	6010A	7439-96-5	Manganese	3340	µg/L	0.0039	0.01		NA	1200
A	RP-02-31	4/18/2000	6010A	7439-96-5	Manganese	7840	µg/L	0.002	0.01		NA	1200
A	RP-02-31	10/16/2000	6010A	7439-96-5	Manganese	5840	µg/L	0.002	0.01		NA	1200
A	RP-02-49	4/18/2000	6010A	7439-96-5	Manganese	25200	µg/L	0.02	0.1		NA	1200
A	RP-02-49	10/16/2000	6010A	7439-96-5	Manganese	14300	µg/L	0.02	0.1		NA	1200
F/SA	RP-07-30	5/3/2002	6010A	7439-96-5	Manganese	2990	µg/L	0.0039	0.01		NA	1200
A	RP-07-55	5/3/2002	6010A	7439-96-5	Manganese	12900	µg/L	0.039	0.1		NA	1200
A	RP-07-84	5/3/2002	6010A	7439-96-5	Manganese	8640	µg/L	0.0039	0.01		NA	1200
A	W-19-I	4/18/2000	6010A	7439-96-5	Manganese	20200	µg/L	0.02	0.1		NA	1200
A	W-19-I	10/16/2000	6010A	7439-96-5	Manganese	16800	µg/L	0.02	0.1		NA	1200
A	RP-01-31	6/26/2001	6020	7440-62-2	Vanadium	249	µg/L	0.00015	0.005	J	NA	200
A	W-19-S	4/5/2002	6020	7440-62-2	Vanadium	539	µg/L	0.00035	0.005		NA	200
A	W-19-D	4/18/2000	8260B	75-01-4	Vinyl chloride	32.3	µg/L	0.31	1		20	13000
A	W-19-D	10/16/2000	8260B	75-01-4	Vinyl chloride	60.5	µg/L	1.55	5		20	13000
A	W-19-D	4/5/2002	8260B	75-01-4	Vinyl chloride	21.6	µg/L	1.55	5		20	13000
A	W-19-I	10/16/2000	8260B	75-01-4	Vinyl chloride	24.7	µg/L	0.62	2		20	13000

a EPA National Recommended Water Quality Criteria, consumption of water and organisms values for human health screening (November 2002)
b DEQ ERA Level II Screening Level Values, most protective value for surface water (December 2001)
Constituent concentration exceeds highlighted screening value.

µg/L micrograms per liter
ng/l nanograms per liter

Characterization Zones

F/SA Fill/Shallow Alluvium Zone
A Alluvium Zone
B Basalt Zone

Note

This table includes groundwater analytical results from monitoring wells in the RP-01, RP-02, RP-07, and W-19 clusters, from Spring 2000 through Spring 2002, that exceed one or more of the surface water screening values shown. Groundwater analytical results that did not exceed these screening values were excluded from the table. Groundwater results exceeding surface water screening values, or 10 times surface water screening values, at monitoring well locations do not represent concentrations discharging to surface water.

TABLE 3-4a
Non-Aqueous Phase Liquid Occurrence in Soil Boring Logs
RPAC - Portland Site

SOIL BORING LOG ID	NAPL DEPTH(S)	NOTES	LITHOLOGY
AL4-47	19'-22'	Dark brown, viscous NAPL, heavy iridescent sheen	Sandy silt/silty sand
B	21.75'-21.80'	Black, very thick product below water in bailer	Sand
B-05	32'	Brown free product	Sand
BST1W-88	20'-22'	Unknown	Unknown
BST2W-61	17.5'-23.5'	Dark brown IDOR bleb visible	Silt/sandy silt
BST-3	18'-19'	Dark blebs "bleed" out of iridescent sheen spots, IDOR	Sandy silt/silty sand
C	24.63'-25.30'	Black product below water in bailer	Sandy silt
DB-01	8.5'-15.5'	Visible blobs of product	Sandy silt
DNB-02	13.5'-17.5'	Heavily discolored with black streaks	Sandy silt/silty sand
E	27.34'-27.51'	Dark brown product below water in bailer	Sandy silt/sand
F	25.43'-25.50'	Dark brown product above water in bailer	Sand
G-1	18'-20' 33.5'-34'	~20 brown NAPL blebs ~50 brown NAPL blebs	Fine sandy silt with clay, micaceous Sand with silt, micaceous
G-2	16'-26' 30'-32' 40'-42'	Discontinuous presence of NAPL blebs Thin LNAPL layer and dark brown NAPL blebs	Fine sandy silt, micaceous Silty sand, micaceous
G-3	9.5'-10.5' 16'-17' 20'-24'	8 NAPL blebs 3 NAPL blebs 2 NAPL blebs and ~30 faint NAPL blebs	Dark gray sand, micaceous Medium brown silt with sand Medium gray sandy silt, micaceous
G-4	10'-11' 12'-14' 30'-32' 34'-36' 42'-44'	NAPL blebs, continuous sheen Abundant (>30) NAPL blebs; faint continuous sheen NAPL blebs and sheen NAPL blebs and sheen Brown NAPL blebs, faint sheen	Dark gray sand, micaceous Medium brown silt with sand Medium brown, silty fine sand, micaceous
G-5	6'-8' 17.5'-34' 24'-26' & 38'-40' 42'-44' 46'-48'	Brown NAPL blebs, continuous sheen Various amounts of NAPL blebs and sheen LNAPL floating on water at top of tube, sheen LNAPL floating on water and DNAPL at bottom of water Brown NAPL blebs, continuous sheen	Dark gray, sandy silt with gravel, micaceous Medium brown, silty sand, micaceous

TABLE 3-4a
Non-Aqueous Phase Liquid Occurrence in Soil Boring Logs
RPAC - Portland Site

SOIL BORING LOG ID	NAPL DEPTH(S)	NOTES	LITHOLOGY
G-6	17'-19' 17'-21' 27'-31' 37'-39'	Layer of dark brown LNAPL NAPL blebs, sheen Dark brown NAPL blebs, continuous sheen ~15 dark brown NAPL blebs, continuous sheen	Light brown sand with silt Dark gray sand with silt, micaceous
G-7	18'-20' 28'-30'	2 NAPL blebs, faint sheen ~10 NAPL blebs, sheen	Medium brown, fine sandy silt, micaceous
G-8	16'-18' 23'-24'	>50 NAPL blebs ~10 NAPL blebs	Medium brown, fine sandy silt, micaceous Medium brown sand with silt, micaceous
G-9	32'-36' 40'-42'	NAPL blebs, continuous sheen >100 NAPL blebs, continuous sheen	Medium brown, silty sand, micaceous
G-10	13'-18' 16'-18'	Brown NAPL blebs, sheen LNAPL floating on water at top of sample	Medium brown silty sand
G-11	10', 13', 19', & 24'-26' 24'-26'	NAPL blebs, sheen LNAPL floating on water at top of tube	Sandy silt, micaceous
G-12	30.5'-32	~10 brown NAPL blebs, continuous sheen	Medium gray silty sand, micaceous
G-14	19'-22'	NAPL blebs, sheen	Sandy silt/silty sand
G-15	33'-34'	~100 brown NAPL blebs	Dark grayish brown silty sand, micaceous
G-16	15'-20' 45.5'	Brown NAPL blebs Saturated with brown NAPL	Dark gray/brown fine sandy silt Dark grayish brown, with no mica. Basalt at 47'
G-17	13'-20', 24'-28', & 38'-39' 14'-20'	NAPL blebs LNAPL floating on water at top of sample	Medium brown sandy silt, micaceous
HA-01	12'-19'	NAPL blebs noted in soil and water	Fine-grained clayey, silty sands and clayey sandy silts
HA-03	15'-24'	Some disseminated NAPL blebs and NAPL observed visually at 20'-22'	Silty sand to sandy silt
HA-04	15'	Strong odor and visual evidence of NAPLs (sheen and blebs)	Clayey, sandy silt
HA-07	12'	Sheen, odor, and NAPL blebs noted	Clayey silt with trace fine-grained sand
HA-08	20'-25'	Honey brown to dark brown NAPL blebs, strong sheen to water	Fine-grained, poorly graded micaceous sand with trace silt
HA-201	10'-15'	Dark brown NAPL blebs	Light gray, clayey silt
HA-203	8'-11'	NAPL blebs noted	Clayey silt

TABLE 3-4a
Non-Aqueous Phase Liquid Occurrence in Soil Boring Logs
RPAC - Portland Site

SOIL BORING LOG ID	NAPL DEPTH(S)	NOTES	LITHOLOGY
HE-10	1.9'	Floating product on water	Sand (fill)
HE-14	3'	Product streaks	Clayey silt (fill)
HE-8	4'-6'	Product streaks in soil	Clayey silt (fill)
HSB-2	30'	Abundant brown, viscous DNAPL	Silty sand
HSB-3	20'&22'	Abundant NAPL visible as dark viscous liquid, dark brown NAPL blebs with sheen	Silty sand to sandy silt
ITB-15	25'	Faint brown NAPL-saturated areas	Silty sand, fine-grained
MW-03-68	see notes (-->)	Fill to 2' included "gravel-size green foundry slag and sand" and "two squashed barrels lying on their sides without tops"; reddish FeOX staining at 2'-6', 10'-11', 48'-49', 58'-59' -- handwriting on log copy calls this DNAPL at 58'	Silt, sandy silt, sand, sandy clayey silt (63'-65'), basalt gravel below 65', basalt at 67.7'
MW-05-34	31.3'-34.3'	Bailer full of dark brown product	Silty sand
MW-05-52	sheen at 11.3'-11.7', strong sheen from 15.4'-16.1', trace sheen 18'-19.5', no sheen, trace dark brn free product at 30.5'-31', no sheen below	Missing first page of log... reddish FeOX staining at 11'	Sandy silt, silty sand, sand, gravel at 47', basalt at 52'
MW-05-70	NAPL in cuttings drum noted at 35', NAPL globules in water at 45'-49'	Odor from 5' to gw (15'), PID readings max 149 ppm at 25'	Silty sand/sandy silt, silt (10' to 33'), silty sand, sand, 1/2" clay lens, gravel at 49', basalt at 60.5'
MW-08-27	slight sheen 2.6'-2.9', slight sheen on wet soil 6.5'-9', 11.5'-12.2', free product as brown beads 18.5'-21.5', diminished visible product to slight sheen on soil 21.5'-23', sheen on soil and water surface at 23'-27'	FeOX red mottling with no product sheen 13.3'-15.2' Brown beads of free product @18.5'-21.5'	Clayey sandy silt 2.9'-3.5', sandy silt, silty sand
MW-08-46	45.7'-46'	Dark brown product below water in bailer	Silty sand
MW-08-64	sandy slurry with sheen (?) at 13.3'-13.6', silver sheen on surface at 18'-22.5', 23.2'-24', slight sheen on fine sand horizon at 25.5', slight sheen on surface at 45'-45.4', slight sheen at 50.1' (0.1' thick), slight sheen at 55'-55.3' and 56.1'-56.5'	Red brown FeOX and black organic grain coloration at 11.5'-13', reddish FeOX coloration on blebs at 13.6'-14'; red brown FeOX blebs with no sheen at 25.5'-27'; "dark brown product below water in bailer 45.7'-46' on 5/4/93" handwritten on log; red brown FeO	Fill to 15', sandy silt, silty sand, cemented gravel in clay matrix at 60-61.5', basalt gravel and sand to at least 63.5'

TABLE 3-4a
Non-Aqueous Phase Liquid Occurrence in Soil Boring Logs
RPAC - Portland Site

SOIL BORING LOG ID	NAPL DEPTH(S)	NOTES	LITHOLOGY
P-07	14.91'-15.60'	Dark brown product above water in bailer	Sandy silt
P-100	17.05'-17.36'	Dark brown product above water in bailer	Sandy silt
RP-04-16	15'	NAPL globules	Sand; black, coarse, rounded, loose
RP-04-41	15' 24'	Visible sheen with NAPL globules NAPL globules	Sand; black, fine to coarse Silt; dark gray, trace very fine sand
T-04	19'-24'	Dark brown free product	Sandy silt
T-08	14'-24'	Core saturated with dark brown free product	Sandy silt
T-09	21'-29'	Dark brown free product beading on soil & floating on water	Sandy silt
T-10	23.2'-25.5'	Dark brown free product in core, floating & sinking dk brown free product	Sandy silt, sand
T-11	22.3'-29'	Transparent product coating length of core	Sandy silt
T-12	19'-29'	Brown product in core	Sandy silt
T-13	19'-24'	Brown product beads	Sandy silt
T-17	2.2'-3'	Brown, oily-feeling perched water, product in water sample	Gravelly sand (fill)
T-19	9'-14'	Minor free brown product in sandier horizons	Sandy silt
T-20	19'-24'	Dark brown product in sandier horizons	Sandy silt
TP-3	7.5'-8.4'	Brown blobs of product	Gravelly silt (fill)
TP-8	5'-8.5'	Floating black product, product flows freely from sidewall	Sandy gravel (fill)

NAPL = Non-aqueous phase liquid
IDOR = Indeterminate density organic residual
DNAPL = Dense non-aqueous phase liquid
LNAPL = Light non-aqueous phase liquid
N/A = Not applicable
FeOX = Iron Oxide
PID = Photoionization Detector

Note: Information contained in this table was obtained directly from soil boring and test pit logs.

TABLE 3-4b
Non-Aqueous Phase Liquid Occurrence in Groundwater Monitoring Wells
RPAC - Portland Site

MONITORING WELL ID	Monitoring Event Detected					NAPL OCCURRENCE
	Spring 2000	Fall 2000	Spring 2001	Fall 2001	Spring 2002	
AL5-62		X				A trace of LNAPL was detected in this well during groundwater monitoring activities.
BST5W-74		X				Approximately 2 feet of DNAPL was detected in this well during groundwater monitoring activities.
C	X					1.67 feet of DNAPL was detected in this well during groundwater monitoring activities.
E	X					5.3 feet of DNAPL was detected in this well during groundwater monitoring activities.
MW-02-26	X	X				10 feet and 1.5 feet DNAPL were detected in this well during groundwater sampling activities in Spring 2000 and Fall 2000, respectively.
MW-05-34	X	X	X	X		During the Spring 2000 groundwater sampling event a trace of DNAPL was detected, and 0.4 feet of DNAPL was detected during the Fall 2000 groundwater sampling activities. In Spring 2001 0.17 feet of DNAPL was detected. In Fall 2001 LNAPL and DNAPL were detected on the probe but not in the bailer.
MW-05-52				X		LNAPL and DNAPL were detected on probe but not in bailer. The well had a slight odor.
MW-08-27		X	X	X	X	Approximately 3.1 feet of LNAPL was detected in this well during the Fall 2000 groundwater sampling activities and 3 feet of DNAPL was detected during the Spring 2001 groundwater sampling activities. Greater than 2.5 feet of LNAPL and 0.05 feet of DNAPL were detected during the Fall 2001 groundwater sampling activities. An estimated NAPL thickness of 8.5 feet was recorded during the Spring 2002 sampling event on April 3, 2002 using an electronic water level probe; this well was re-measured using an interface probe on April 9, 2002, measuring 6.63 feet of LNAPL.

TABLE 3-4b
Non-Aqueous Phase Liquid Occurrence in Groundwater Monitoring Wells
RPAC - Portland Site

MONITORING WELL ID	Monitoring Event Detected					NAPL OCCURRENCE
	Spring 2000	Fall 2000	Spring 2001	Fall 2001	Spring 2002	
MW-08-46	X	X	X	X		Approximately 0.4 feet of DNAPL was detected in this well during the Spring 2000 groundwater sampling activities and 0.5 feet of DNAPL during the Fall 2000 groundwater sampling activities. Approximately 0.25 feet and 0.02 feet of DNAPL were detected during the Spring and Fall 2001 groundwater sampling activities, respectively.
P-07	X		X	X		Approximately 3.83 feet of DNAPL was detected during the Spring 2000 groundwater sampling activities. During the Spring 2001 sampling event 3.5 feet of DNAPL was detected and in Fall 2001 0.6 feet of LNAPL and 0.07 feet of DNAPL were detected.
RP-03-30R				X		NAPL was detected on probe, but not in bailer.
W-08	X					Approximately 0.01 feet of LNAPL was detected in this well during the Spring 2000 groundwater sampling event.

NAPL = Non-aqueous phase liquid
LNAPL = Light non-aqueous phase liquid
DNAPL = Dense non-aqueous phase liquid
N/A = Not applicable

Note: Information contained in this table was obtained from groundwater monitoring field notes of Spring 2000 through Spring 2002.

TABLE 4-1
Groundwater Natural Attenuation Parameter Results
RPAC - Portland Site

Monitoring Well ID	Sample Date	pH	ORP	Dissolved Oxygen	Nitrate	Ferrous Iron	Sulfate	Sulfide	Methane	Alkalinity	Chloride	COD	TOC	Heterotrophic Plate Count	Diesel Degrading Bacteria	Ammonia as Nitrogen	Ortho-phosphate
		(SU)	(mV)	(mg/L)	(mg/L)	(mg/L)	(mg/L)	(mg/L)	(µg/L)	(mg/L)	(mg/L)	(mg/L)	(mg/L)	(cfu/mL)	(cfu/mL)	(mg/L)	(mg/L)
AL2-17	3/31/00	7.06	NT	0.55	0.0570	6.0	6.08	<6.0	1190	914	30.8	68.5	<4.61	12700	NT	1.07	NT
AL2-17	10/3/00	6.79	NT	3.63	NT	NT	NT	NT	1250	NT	NT	73.5	21.2	NT	NT	0.666	NT
AL2-17	7/5/01	6.72	-83.7	1.20	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT
AL2-17	4/22/02	6.97	-162.2	0.93	NT	NT	NT	22.4	7.63	NT	NT	63.6	20.6	680	380	1.45	NT
AL2-32	3/31/00	6.61	NT	0.23	<0.0049	4.0	62.8	<0.40	1740	1200	1830	142	47.3	1410	NT	0.318	NT
AL2-32	10/3/00	5.67	NT	0.81	<0.0049	NT	65.6	2.40	2580	1140	1780	211	59.6	310	NT	0.460	NT
AL2-32	7/5/01	6.52	-58.9	1.20	<0.0049	4.6	64.8	14.8	15.2	1350	2080	190	63.9	7	120	0.151	0.0136
AL2-32	4/19/02	6.70	-94.2	1.92	0.175	6.0	63.7	27.0	11.3	1360	1830	284	95.0	2400	36	0.169	0.0204
AL2-46	3/30/00	7.02	NT	1.29	<0.0049	4.0	40.1	<0.200	433	818	338	265	107	805	NT	<0.0060	NT
AL2-46	10/3/00	5.93	NT	0.66	<0.0049	2.8	33.6	3.20	587	800	209	356	108	310	NT	<0.0060	NT
AL2-46	7/5/01	6.88	-76.0	1.70	<0.0049	3.0	37.6	22.9	4.47	856	432	280	70.8	17	5	<0.0060	0.0125
AL2-46	4/22/02	7.05	-117.1	0.58	<0.0365	3.7	29.9	4.08	3.44	810	203	146	49.5	5200	38	<0.0258	0.340
AL5-19	4/3/95	6.75	NT	1.40	NT	NT	NT	NT	NT	NT	NT	189	39.8	NT	NT	4.40	<0.050
AL5-19	4/4/00	7.18	NT	1.50	<0.049	4.8	<0.475	3.20	5930	796	1020	141	10.8	5200	NT	3.33	NT
AL5-19	10/5/00	6.86	NT	3.26	0.138	NT	5.41	0.80	2470	671	922	143	49.0	1100	NT	4.01	NT
AL5-35	4/3/95	6.21	NT	1.70	NT	NT	NT	NT	NT	NT	NT	52.3	9.70	NT	NT	<0.1	0.0830
AL5-35	10/27/95	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT
AL5-35	4/4/00	6.32	NT	0.71	<0.049	3.8	225	<0.200	3430	706	1610	51.2	<4.61	245	NT	0.357	NT
AL5-35	10/4/00	6.05	NT	0.66	<0.0049	NT	214	3.20	1110	608	1460	21.0	9.30	5	NT	0.540	NT
AL5-62	4/3/95	6.61	NT	1.20	NT	NT	NT	NT	NT	NT	NT	63.7	13.4	NT	NT	0.510	0.0850
AL5-62	4/4/00	6.79	NT	0.36	0.112	4.5	0.31	<0.200	8540	364	128	64.2	<4.61	73	NT	<0.0060	NT
AL5-62	10/4/00	6.67	NT	0.40	<0.0049	NT	0.38	2.40	3650	389	116	44.4	13.6	55	NT	<0.0060	NT
AL6-96	4/10/00	6.72	NT	1.68	NT	1.8	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT
AL6-96	10/12/00	6.60	NT	0.54	NT	1.8	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT
ASW-01A	3/29/00	5.80	NT	1.40	NT	0.0	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT
ASW-01A	9/29/00	5.67	NT	4.45	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT
ASW-01A	6/22/01	5.62	96.2	0.70	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT
ASW-01A	4/11/02	5.96	17.5	5.30	NT	0.0	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT
ASW-04	3/29/00	6.96	NT	1.70	NT	2.2	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT
ASW-04	9/29/00	6.79	NT	2.90	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT
ASW-06	3/30/00	6.76	NT	1.94	NT	4.2	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT
ASW-06	9/29/00	6.70	NT	2.21	NT	4.0	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT
BSTW-61	4/3/00	6.52	NT	0.26	NT	1.2	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT
BSTW-61	10/3/00	6.89	NT	0.40	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT
BSTW-61	7/5/01	6.84	-61.8	2.40	NT	1.2	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT
BSTW-61	4/19/02	6.98	-114.5	2.11	NT	2.4	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT
BST5W-74	4/3/95	6.85	NT	1.15	NT	NT	NT	NT	NT	NT	NT	129	30.7	NT	NT	<0.1	0.100
BST5W-74	4/4/00	6.90	NT	1.72	NT	2.6	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT
BST5W-74	10/4/00	6.60	NT	0.61	NT	2.6	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT
MW-01-26	3/22/00	6.26	NT	5.92	4.71	0.0	7.79	<0.200	<1.00	28.0	1.94	87.3	12.2	30000	NT	0.030	NT
MW-01-26	9/20/00	5.95	NT	11.66	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT
MW-01-41	3/23/00	6.42	NT	1.31	0.581	0.0	21.5	<0.200	<1.00	150	11.3	<4.05	<0.461	35	NT	<0.0060	NT
MW-01-41	9/20/00	5.30	NT	0.67	0.667	0.0	2.24	0.32	<1.00	165	10.8	3.70	2.47	31	NT	<0.0060	NT
MW-01-56	3/24/00	6.54	NT	3.03	2.88	0.0	17.0	<0.200	<1.00	73.0	24.6	<4.05	<0.461	5	NT	<0.0060	NT
MW-01-56	9/20/00	5.52	NT	2.83	3.16	0.0	16.4	0.80	<1.00	74.2	4.50	<1.80	0.730	19	NT	<0.0060	NT
MW-01-76	3/22/00	8.34	NT	4.66	NT	0.0	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT
MW-01-76	9/20/00	6.09	NT	4.85	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT

TABLE 4-1
Groundwater Natural Attenuation Parameter Results
RPAC - Portland Site

Monitoring Well ID	Sample Date	pH	ORP	Dissolved Oxygen	Nitrate	Ferrous Iron	Sulfate	Sulfide	Methane	Alkalinity	Chloride	COD	TOC	Heterotrophic Plate Count	Diesel Degrading Bacteria	Ammonia as Nitrogen	Ortho-phosphate
		(SU)	(mV)	(mg/L)	(mg/L)	(mg/L)	(mg/L)	(mg/L)	(µg/L)	(mg/L)	(mg/L)	(mg/L)	(mg/L)	(cfu/mL)	(cfu/mL)	(mg/L)	(mg/L)
MW-02-26	9/25/00	6.89	NT	0.34	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT
MW-02-46	3/23/00	6.71	NT	1.07	NT	4.0	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT
MW-02-46	9/25/00	6.46	NT	0.70	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT
MW-02-62	3/23/00	7.34	NT	2.53	NT	0.0	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT
MW-02-62	9/25/00	6.69	NT	0.50	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT
MW-03-49	3/29/00	6.84	NT	1.41	NT	3.8	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT
MW-03-49	9/27/00	6.30	NT	0.56	NT	4.8	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT
MW-03-68	3/29/00	6.98	NT	2.82	NT	0.0	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT
MW-03-68	9/27/00	6.35	NT	1.44	NT	0.4	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT
MW-03-81	4/6/00	--	--	--	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT
MW-03-81	10/13/00	6.65	NT	0.61	NT	2.8	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT
MW-03-81	6/25/01	6.66	-112.5	1.90	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT
MW-03-81	4/16/02	7.12	6.7	2.38	NT	3.8	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT
MW-03-27	3/29/00	6.50	NT	1.37	NT	1.6	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT
MW-03-27	9/27/00	5.97	NT	0.55	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT
MW-03-S	4/6/00	6.52	NT	0.87	NT	3.6	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT
MW-03-S	10/13/00	6.59	NT	2.12	NT	2.6	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT
MW-03-S	6/25/01	6.60	-120.0	0.60	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT
MW-03-S	4/16/02	6.62	17.9	1.52	NT	5.4	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT
MW-03-I	4/6/00	6.72	NT	2.40	NT	4.0	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT
MW-03-I	6/25/01	6.58	-104.0	1.00	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT
MW-03-I	10/13/01	6.52	NT	0.96	NT	1.8	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT
MW-03-I	4/16/02	6.86	13.2	4.95	NT	4.8	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT
MW-04-27	2/8/89	6.75	NT	NT	NT	NT	34.0	NT	NT	NT	61.0	NT	NT	NT	NT	NT	NT
MW-04-27	3/6/89	6.75	NT	NT	NT	NT	22.0	NT	NT	NT	47.0	NT	NT	NT	NT	NT	NT
MW-04-27	4/26/89	6.67	NT	NT	NT	NT	70.8	NT	NT	NT	123	NT	NT	NT	NT	NT	NT
MW-04-27	6/11/91	6.43	NT	1.80	NT	NT	NT	NT	NT	761	NT	NT	99.2	NT	NT	0.320	0.160
MW-04-27	3/31/95	6.11	NT	2.00	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT
MW-04-27	3/27/00	6.77	NT	1.79	NT	4.0	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT
MW-04-27	9/27/00	6.34	NT	0.48	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT
MW-04-27	7/5/01	6.49	-53.8	1.20	<0.0049	4.4	98.2	21.2	9900	597	570	772	99.6	1100	800	0.096	0.00796
MW-04-27	4/19/02	6.75	-90.2	2.67	<0.0365	4.0	40.5	12.9	6760	613	290	254	84.8	39	35	<0.0258	0.00712
MW-04-47	1/31/89	6.39	NT	NT	NT	NT	254	NT	NT	NT	184	NT	NT	NT	NT	NT	NT
MW-04-47	2/28/89	6.55	NT	NT	NT	NT	268	NT	NT	NT	171	NT	NT	NT	NT	NT	NT
MW-04-47	4/25/89	6.51	NT	NT	NT	NT	192	NT	NT	NT	195	NT	NT	NT	NT	NT	NT
MW-04-47	6/11/91	6.76	NT	1.40	NT	NT	NT	NT	NT	213	NT	NT	2.40	NT	NT	<0.05	0.160
MW-04-47	3/31/95	6.61	NT	2.70	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT
MW-04-47	3/27/00	7.02	NT	1.29	NT	2.3	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT
MW-04-47	9/27/00	6.51	NT	0.44	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT
MW-04-47	7/5/01	6.67	-21.5	1.20	<0.0049	3.4	17.1	<0.200	434	283	210	<3.6	1.89	43	70	<0.0060	0.0268
MW-04-47	4/19/02	6.76	-54.4	1.46	<0.0365	3.8	12.1	11.5	616	268	151	7.78	1.51	180	130	<0.0258	0.0594
MW-04-63	1/31/89	6.76	NT	NT	NT	NT	15.0	NT	NT	NT	3.70	NT	NT	NT	NT	NT	NT
MW-04-63	2/28/89	6.63	NT	NT	NT	NT	<5.00	NT	NT	NT	34.0	NT	NT	NT	NT	NT	NT
MW-04-63	4/25/89	6.84	NT	NT	NT	NT	<5.00	NT	NT	NT	22.3	NT	NT	NT	NT	NT	NT
MW-04-63	6/11/91	6.79	NT	1.70	NT	NT	NT	NT	NT	164	NT	NT	476	NT	NT	0.050	0.150
MW-04-63	3/31/95	6.65	NT	5.40	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT
MW-04-63	3/27/00	7.13	NT	0.43	NT	1.6	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT
MW-04-63	9/27/00	6.14	NT	0.46	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT

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Monitoring Well ID	Sample Date	pH	ORP	Dissolved Oxygen	Nitrate	Ferrous Iron	Sulfate	Sulfide	Methane	Alkalinity	Chloride	COD	TOC	Heterotrophic Plate Count	Diesel Degrading Bacteria	Ammonia as Nitrogen	Ortho-phosphate
		(SU)	(mV)	(mg/L)	(mg/L)	(mg/L)	(mg/L)	(mg/L)	(µg/L)	(mg/L)	(mg/L)	(mg/L)	(mg/L)	(cfu/mL)	(cfu/mL)	(mg/L)	(mg/L)
MW-05-24	2/8/89	6.00	NT	NT	NT	NT	76.0	NT	NT	NT	190	NT	NT	NT	NT	NT	NT
MW-05-24	3/1/89	5.88	NT	NT	NT	NT	64.0	NT	NT	NT	178	NT	NT	NT	NT	NT	NT
MW-05-24	4/26/89	6.20	NT	NT	NT	NT	116	NT	NT	NT	234	NT	NT	NT	NT	NT	NT
MW-05-24	6/11/91	6.03	NT	1.50	NT	NT	NT	NT	NT	128	NT	NT	120	NT	NT	0.330	0.160
MW-05-24	3/30/00	5.87	NT	0.62	0.0570	3.6	64.3	5.60	347	266	49.3	439	177	<1	NT	0.017	NT
MW-05-24	9/28/00	6.07	NT	0.42	<0.0049	NT	58.4	4.96	647	589	61.5	592	193	<1	NT	0.053	NT
MW-05-34	2/9/89	5.10	NT	NT	NT	NT	280	NT	NT	NT	615	NT	NT	NT	NT	NT	NT
MW-05-34	3/1/89	5.11	NT	NT	NT	NT	179	NT	NT	NT	440	NT	NT	NT	NT	NT	NT
MW-05-34	4/26/89	5.03	NT	NT	NT	NT	168	NT	NT	NT	478	NT	NT	NT	NT	NT	NT
MW-05-34	6/11/91	5.34	NT	1.70	NT	NT	NT	NT	NT	76.0	NT	NT	363	NT	NT	0.230	0.0900
MW-05-34	12/14/95	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	1390	249	NT	NT	<0.1	0.100
MW-05-34	3/30/00	5.79	NT	0.30	0.0911	1.6	31.9	<1.6	11.7	82.0	28.7	345	169	<1	NT	<0.0060	NT
MW-05-34	9/28/00	4.93	NT	0.51	<0.0049	NT	23.9	2.32	11.4	104	27.7	348	99.5	<1	NT	0.008	NT
MW-05-52	2/8/89	6.43	NT	NT	NT	NT	97.0	NT	NT	NT	309	NT	NT	NT	NT	NT	NT
MW-05-52	2/9/89	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT
MW-05-52	3/1/89	6.26	NT	NT	NT	NT	86.0	NT	NT	NT	336	NT	NT	NT	NT	NT	NT
MW-05-52	4/26/89	6.30	NT	NT	NT	NT	107	NT	NT	NT	409	NT	NT	NT	NT	NT	NT
MW-05-52	6/11/91	6.62	NT	1.10	NT	NT	NT	NT	NT	468	NT	NT	68.7	NT	NT	0.130	12.2
MW-05-52	12/14/95	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	479	127	NT	NT	<0.1	1.40
MW-05-52	3/30/00	6.52	NT	0.47	<0.0049	2.4	25.4	<0.200	NT	276	66.5	49.8	<0.461	12	NT	<0.0060	NT
MW-05-52	9/28/00	6.22	NT	0.71	<0.0049	NT	13.5	3.44	56.8	445	117	54.7	14.8	5.5	NT	<0.0060	NT
MW-05-52	7/6/01	6.65	7.4	1.60	<0.0049	2.6	21.2	2.24	40.4	257	77.6	55.8	14.7	18	5	0.010	10.0
MW-05-52	4/22/02	6.70	-55.5	1.74	<0.0365	2.6	37.4	3.76	57.0	325	140	47.3	12.5	1	7	<0.0258	12.1
MW-05-70	3/30/00	7.83	NT	0.31	NT	0.6	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT
MW-05-70	7/6/01	7.76	-42.5	1.40	<0.0049	0.6	34.8	3.36	461	277	63.5	6.35	1.24	720	100	<0.0060	1.14
MW-05-70	4/22/02	7.92	-103.7	1.42	<0.0365	0.6	34.2	12.9	365	284	56.1	9.34	1.39	720	36	<0.0258	1.16
MW-06-S	4/6/00	5.91	NT	1.88	NT	4.0	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT
MW-07-S	4/6/00	6.06	NT	1.75	NT	0.0	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT
MW-07-S	10/13/00	5.90	NT	2.25	NT	2.2	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT
MW-08-27	3/23/00	6.98	NT	1.55	<0.0049	0.0	60.0	31.6	308	409	579	2120	575	70	NT	7.38	NT
MW-08-46	3/28/00	5.98	NT	1.37	0.0568	0.0	9.7	<0.200	<1.00	96.0	16.8	95.9	33.0	20400	NT	<0.0060	NT
MW-08-46	9/26/00	5.48	NT	0.91	0.0525	NT	6.94	1.68	3.33	98.2	10.5	94.9	20.4	470	NT	<0.0060	NT
MW-08-64	3/24/00	8.01	NT	1.97	<0.0049	0.0	20.1	<0.200	<1.00	130	21.2	<4.05	<0.461	8450	NT	<0.0060	NT
MW-08-64	9/26/00	7.75	NT	0.61	0.0551	NT	20.3	0.80	<1.00	148	6.79	2.96	2.36	610	NT	<0.0060	NT
MW-09-23	6/13/91	6.77	NT	2.40	NT	NT	NT	NT	NT	452	NT	NT	7.10	NT	NT	<0.05	0.200
MW-09-23	7/9/91	6.59	NT	1.60	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT
MW-09-23	8/7/91	6.83	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT
MW-09-23	8/4/93	6.52	NT	2.30	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT
MW-09-23	9/10/93	6.98	NT	9.00	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT
MW-09-23	10/28/93	6.92	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT
MW-09-23	3/21/95	6.49	NT	0.30	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT
MW-09-23	3/28/00	6.82	NT	1.75	0.0667	4.4	15.3	<0.200	350	360	46.6	21.6	14.8	500	NT	<0.0060	NT
MW-09-23	9/26/00	6.67	NT	0.32	0.102	NT	9.35	<0.200	366	411	49.5	13.8	3.38	8	NT	0.014	NT
MW-09-23	7/2/01	6.71	172.1	0.50	<0.0049	4.0	9.61	18.3	1470	422	65.2	21.4	4.57	7	27	0.017	0.0104
MW-09-23	4/17/02	7.15	221.0	1.07	<0.0365	5.1	17.3	<0.499	1070	370	47.7	16.5	3.55	<1	<1	<0.0258	0.00744
MW-09-42	6/13/91	6.75	NT	1.80	NT	NT	NT	NT	NT	280	NT	NT	3.60	NT	NT	<0.05	0.100
MW-09-42	7/8/91	6.81	NT	2.80	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT
MW-09-42	8/7/91	6.87	NT	<? DB	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT

TABLE 4-1
Groundwater Natural Attenuation Parameter Results
RPAC - Portland Site

Monitoring Well ID	Sample Date	pH	ORP	Dissolved Oxygen	Nitrate	Ferrous Iron	Sulfate	Sulfide	Methane	Alkalinity	Chloride	COD	TOC	Heterotrophic Plate Count	Diesel Degrading Bacteria	Ammonia as Nitrogen	Ortho-phosphate
		(SU)	(mV)	(mg/L)	(mg/L)	(mg/L)	(mg/L)	(mg/L)	(µg/L)	(mg/L)	(mg/L)	(mg/L)	(mg/L)	(cfu/mL)	(cfu/mL)	(mg/L)	(mg/L)
MW-09-42	8/4/93	6.36	NT	3.50	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT
MW-09-42	9/10/93	7.05	NT	15.00	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT
MW-09-42	3/21/95	6.55	NT	4.20	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT
MW-09-42	3/28/00	6.80	NT	2.52	<0.0049	4.2	3.57	<0.200	266	424	43.6	16.3	15.7	900	NT	<0.0060	NT
MW-09-42	9/26/00	6.23	NT	0.96	0.0577	NT	5.97	0.24	287	382	34.4	12.6	4.63	55	NT	<0.0060	NT
MW-09-42	7/2/01	6.74	-1.7	1.00	<0.0049	4.2	7.24	<0.200	835	370	42.7	19.0	3.64	280	3500	<0.0060	0.0161
MW-09-42	4/17/02	7.08	218.1	3.35	<0.0365	3.2	9.70	<0.499	861	383	40.8	18.8	3.73	880	71	<0.0258	0.0402
MW-09-58	6/13/91	7.11	NT	4.00	NT	NT	NT	NT	NT	122	NT	NT	0.500	NT	NT	0.230	0.100
MW-09-58	7/8/91	7.30	NT	1.40	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT
MW-09-58	8/7/91	7.10	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT
MW-09-58	8/3/93	6.52	NT	2.20	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT
MW-09-58	9/10/93	7.27	NT	13.00	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT
MW-09-58	10/28/93	6.92	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT
MW-09-58	3/21/95	7.15	NT	9.35	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT
MW-09-58	3/27/00	7.06	NT	2.03	0.0867	1.5	2.77	<0.200	4.46	138	23.4	5.05	3.74	810	NT	0.060	NT
MW-09-58	9/26/00	5.78	NT	1.01	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT
MW-09-58	7/2/01	6.89	39.4	0.80	0.0240	2.0	2.61	<0.200	32.5	118	13.3	3.70	<0.100	1100	440	0.091	0.0286
MW-09-58	4/18/02	7.01	-65.3	2.74	<0.0365	2.2	2.98	<0.499	21.5	119	6.86	<4	0.812	290	11	<0.0258	0.0103
MW-09-80	6/13/91	7.28	NT	1.40	NT	NT	NT	NT	NT	132	NT	NT	1.00	NT	NT	0.500	0.220
MW-09-80	7/9/91	6.83	NT	2.20	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT
MW-09-80	8/7/91	7.02	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT
MW-09-80	8/3/93	7.79	NT	2.90	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT
MW-09-80	9/10/93	7.39	NT	17.00	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT
MW-09-80	10/28/93	6.32	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT
MW-09-80	3/22/95	6.72	NT	6.80	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT
MW-09-80	3/27/00	7.15	NT	2.20	NT	0.4	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT
MW-09-80	9/26/00	6.80	NT	0.38	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT
MW-09-80	10/5/00	7.00	NT	0.50	0.0719	0.6	0.46	<0.200	16.4	140	6.20	<1.8	0.372	190	NT	0.347	NT
MW-09-80	7/2/01	6.98	101.5	0.60	0.0350	0.8	0.61	<0.200	72.4	129	14.1	<3.6	0.367	260	630	0.349	0.115
MW-09-80	4/18/02	7.13	-20.3	0.78	<0.0365	0.4	<0.0634	<0.499	89.9	132	6.99	<4	0.923	53	9	0.409	0.130
MW-10-24	3/29/00	6.49	NT	3.08	NT	0.0	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT
MW-10-24	9/25/00	6.52	NT	0.47	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT
MW-10-24	6/29/01	6.45	250.2	0.90	0.412	0.6	14.6	<0.200	0.0925	140	17.6	<3.60	1.97	15	39	<0.0060	0.0318
MW-10-24	4/15/02	6.96	1.0	4.11	0.947	0.0	21.7	<0.499	<0.790	121	9.26	6.49	1.80	3	<1	<0.0258	0.0582
MW-10-44	3/29/00	6.55	NT	1.30	NT	4.6	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT
MW-10-44	9/25/00	6.22	NT	0.74	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT
MW-10-44	6/29/01	6.31	109.1	0.70	0.111	1.2	14.4	<0.200	<0.380	189	14.1	9.5	1.77	640	520	<0.0060	0.00704
MW-10-44	4/15/02	6.76	-5.6	1.60	0.177	6.4	15.7	<0.499	<0.790	205	6.66	8.31	1.93	89	16	<0.0258	0.0490
MW-10-57	3/29/00	7.21	NT	4.40	NT	4.4	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT
MW-10-57	9/25/00	6.97	NT	0.43	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT
MW-10-57	6/29/01	6.98	-109.1	0.70	0.0660	3.4	0.15	<0.200	2.15	152	14.9	5.56	0.595	400	680	0.609	0.0465
MW-10-57	4/15/02	7.42	5.6	0.75	<0.0365	3.6	<0.0634	<0.499	1.23	150	7.22	4.13	<0.129	250	47	0.528	0.0115

TABLE 4-1
Groundwater Natural Attenuation Parameter Results
RPAC - Portland Site

Monitoring Well ID	Sample Date	pH	ORP	Dissolved Oxygen	Nitrate	Ferrous Iron	Sulfate	Sulfide	Methane	Alkalinity	Chloride	COD	TOC	Heterotrophic Plate Count	Diesel Degrading Bacteria	Ammonia as Nitrogen	Ortho-phosphate
		(SU)	(mV)	(mg/L)	(mg/L)	(mg/L)	(mg/L)	(mg/L)	(µg/L)	(mg/L)	(mg/L)	(mg/L)	(mg/L)	(cfu/mL)	(cfu/mL)	(mg/L)	(mg/L)
MW-11-24	8/4/93	6.57	NT	2.00	NT	0.0	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT
MW-11-24	9/9/93	6.41	NT	8.00	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT
MW-11-24	10/27/93	6.72	NT	0.80	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT
MW-11-24	3/23/95	6.26	NT	1.40	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT
MW-11-24	3/28/00	6.86	NT	1.72	NT	0.0	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT
MW-11-24	9/22/00	5.85	NT	0.61	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT
MW-11-24	6/28/01	6.31	102.1	6.30	0.0200	0.0	18.5	<0.200	38.6	218	26.6	11.1	3.53	20	110	<0.0060	0.0847
MW-11-24	4/12/02	7.20	-7.8	1.46	0.711	0.0	10.4	<0.499	<0.38	284	4.11	<4	2.37	9	5	<0.0258	0.0525
MW-11-37	8/4/93	6.59	NT	3.60	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT
MW-11-37	9/9/93	6.49	NT	11.00	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT
MW-11-37	10/27/93	7.44	NT	1.70	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT
MW-11-37	3/23/95	6.05	NT	0.30	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT
MW-11-37	3/28/00	6.35	NT	0.09	NT	0.0	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT
MW-11-37	9/22/00	5.55	NT	0.51	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT
MW-11-37	6/28/01	6.42	90.4	4.00	9.44	0.0	19.0	0.24	<0.38	83.9	12.2	<3.6	1.11	770	610	<0.0060	0.0976
MW-11-37	4/12/02	6.92	-8.7	0.98	8.29	0.0	18.8	<0.499	0.635	81.6	5.14	<4	1.63	23	15	<0.0258	0.0828
MW-11-56	8/4/93	7.12	NT	3.40	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT
MW-11-56	9/9/93	6.99	NT	8.00	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT
MW-11-56	10/27/93	7.36	NT	1.00	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT
MW-11-56	3/23/95	6.55	NT	7.40	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT
MW-11-56	3/28/00	7.23	NT	0.97	NT	3.1	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT
MW-11-56	9/22/00	7.02	NT	0.50	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT
MW-11-56	6/28/01	7.12	-90.0	2.50	0.0260	2.5	6.78	<0.200	228	148	14.0	5.82	0.377	230	210	0.281	0.204
MW-11-56	4/12/02	7.67	-27.7	0.66	<0.0365	3.2	6.19	<0.499	198	142	6.59	<4	0.950	55	16	0.240	0.0235
MW-11-79	8/4/93	6.70	NT	1.60	NT	0.0	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT
MW-11-79	9/9/93	6.88	NT	5.00	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT
MW-11-79	10/27/93	7.30	NT	1.00	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT
MW-11-79	3/23/95	7.00	NT	7.80	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT
MW-11-79	3/28/00	7.38	NT	0.19	NT	0.0	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT
MW-11-79	9/22/00	6.97	NT	0.35	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT
MW-11-79	6/28/01	7.27	-35.0	4.00	0.0720	0.9	0.33	<0.200	120	124	16.9	<3.6	0.282	55	140	0.287	0.239
MW-11-79	4/12/02	7.64	-13.4	0.54	<0.0365	1.3	<0.0634	<0.499	107	122	9.01	<4	1.37	360	66	0.302	0.158
MW-12-27	3/22/02	6.19	NT	1.23	NT	0.0	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT
MW-12-27	10/2/02	5.82	NT	0.46	NT	0.0	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT
MW-12-41	3/22/00	6.19	NT	1.15	NT	0.0	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT
MW-12-41	10/2/02	5.23	NT	0.69	NT	0.0	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT
MW-12-59	3/22/00	6.80	NT	6.23	NT	0.0	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT
MW-12-59	9/20/00	5.31	NT	6.31	NT	0.0	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT
MW-12-79	3/22/00	7.11	NT	1.20	NT	1.3	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT
MW-12-79	9/20/00	5.87	NT	0.51	NT	1.4	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT
PP-08	4/3/00	6.77	NT	1.04	NT	5.2	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT
PP-08	10/4/00	6.38	NT	4.99	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT
RP-01-31	4/17/00	NT	NT	NT	0.177	NT	33.7	<0.200	1.53	172	20.2	<4.05	<0.461	7500	NT	<0.0060	NT
RP-01-31	10/11/00	6.97	NT	3.66	0.326	0.0	54.2	<0.200	<1.00	141	35.3	1.97	0.738	3200	NT	0.110	NT
RP-01-31	6/26/01	6.87	39.5	6.80	0.368	0.0	20.6	<0.200	<0.38	148	12.7	11.4	1.53	4100	11000	0.023	0.339
RP-01-31	4/5/02	6.78	-22.4	0.00	1.43	NT	30.9	<0.200	2.29	148	9.71	244	1.54	810	81	<0.0258	0.383
RP-01-51	4/17/00	NT	NT	NT	<0.0049	NT	221	1.60	37.6	554	776	22.8	<0.461	1600	NT	0.119	NT
RP-01-51	10/11/00	6.70	NT	0.70	0.0462	0.0	284	<0.200	112	571	714	30.6	10.3	54	NT	0.330	NT

TABLE 4-1
Groundwater Natural Attenuation Parameter Results
RPAC - Portland Site

Monitoring Well ID	Sample Date	pH	ORP	Dissolved Oxygen	Nitrate	Ferrous Iron	Sulfate	Sulfide	Methane	Alkalinity	Chloride	COD	TOC	Heterotrophic Plate Count	Diesel Degrading Bacteria	Ammonia as Nitrogen	Ortho-phosphate
		(SU)	(mV)	(mg/L)	(mg/L)	(mg/L)	(mg/L)	(mg/L)	(µg/L)	(mg/L)	(mg/L)	(mg/L)	(mg/L)	(cfu/mL)	(cfu/mL)	(mg/L)	(mg/L)
RP-01-51	6/26/01	6.72	-3.9	0.70	<0.0049	0.2	269	4.80	454	509	853	32.0	10.4	290	400	0.280	0.0683
RP-01-51	4/8/02	6.92	-29.4	0.14	<0.0049	0.4	256	<0.200	814	559	804	30.7	10.9	150	9	0.285	0.0919
RP-01-65	4/17/00	--	--	--	<0.0049	NT	155	<0.200	69.7	378	675	11.0	<4.61	1040	NT	<0.0060	NT
RP-01-65	10/11/00	5.98	NT	0.47	<0.0049	NT	174	<0.200	192	396	1480	14.3	3.75	150	NT	0.010	NT
RP-01-65	6/26/01	5.61	59.4	0.20	<0.0049	0.0	153	<0.200	1300	367	1710	21.4	3.32	52	480	0.018	NT
RP-01-65	4/5/02	6.55	-19.2	0.01	<0.0365	0.0	154	<0.200	1480	424	1420	28.9	5.32	8	3	<0.0258	0.0963
RP-02-31	4/18/00	NT	NT	NT	0.0673	NT	58.4	<0.200	57000	1030	1980	289	107	470	NT	3.20	NT
RP-02-31	10/16/00	6.45	NT	3.50	0.210	NT	21.5	4.63	1390	914	2200	211	37.9	1500	NT	4.34	NT
RP-02-31	6/19/01	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT
RP-02-31	4/4/02	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT
RP-02-49	4/18/00	NT	NT	NT	0.0753	NT	99.7	<0.200	654	378	10500	504	43.6	5500	NT	2.30	NT
RP-02-49	10/16/00	5.82	NT	0.77	0.330	0.4	82.0	<0.200	395	619	8390	139	15.5	400	NT	2.63	NT
RP-02-49	6/19/01	5.81	75.5	1.50	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT
RP-02-49	4/4/02	6.03	-28.0	0.10	NT	0.0	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT
RP-02-49	5/3/02	5.97	116.8	0.83	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT
RP-02-66	10/16/00	5.18	NT	0.63	NT	0.2	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT
RP-02-66	6/19/01	5.30	128.3	0.50	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT
RP-02-66	4/4/02	5.09	-21.4	0.38	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT
RP-03-30R	10/12/00	5.62	NT	6.63	NT	3.8	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT
RP-03-30R	6/27/01	6.70	-100.3	1.90	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT
RP-03-30R	4/10/02	7.15	-36.5	1.60	NT	4.0	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT
RP-03-52R	10/12/00	6.16	NT	0.51	NT	0.0	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT
RP-03-52R	6/27/01	NT	44.7	1.30	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT
RP-03-52R	4/10/02	6.72	-10.8	1.46	NT	0.5	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT
RP-04-16	4/5/00	6.70	NT	2.25	0.112	3.5	55.0	1.60	4180	318	100	85.6	40.0	1250	NT	0.223	NT
RP-04-16	10/4/00	NT	NT	NT	<0.0049	NT	64.8	<0.200	768	182	138	497	142	1000	NT	1.72	NT
RP-04-16	7/3/01	6.13	69.7	1.00	0.0270	4.6	33.7	3.60	17200	332	144	153	42.2	76	670	1.40	0.0162
RP-04-16	4/18/02	6.70	-68.6	0.64	<0.0365	3.0	27.4	3.60	12900	224	36.0	85.5	25.6	1100	81	0.254	0.00650
RP-04-41	4/5/00	6.75	NT	0.44	0.467	0.6	18.6	<0.200	<0.38	149	12.9	138	33.4	35	NT	<0.0060	NT
RP-04-41	10/4/00	NT	NT	NT	0.121	NT	16.8	1.60	1.22	143	8.25	108	26.5	330	NT	<0.0060	NT
RP-04-41	7/3/01	6.27	179.0	2.10	0.0300	0.0	17.6	1.60	<0.38	142	15.9	99.5	27.2	28	590	<0.0060	0.0877
RP-04-41	4/18/02	6.58	64.7	1.12	<0.0365	0.0	19.1	<0.499	<0.79	127	6.26	41.5	9.07	370	140	<0.0258	0.143
RP-05-16	4/5/00	5.92	NT	5.07	NT	0.0	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT
RP-05-16	10/4/00[1]	--	--	--	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT
RP-06-30	10/12/00	6.92	NT	4.99	NT	3.8	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT
RP-06-30	6/27/01	6.66	-120.7	1.30	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT
RP-06-30	4/10/02	7.16	-46.1	0.64	NT	4.2	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT
RP-06-87	4/14/00	NT	NT	NT	<0.0049	NT	103	<0.200	1000	428	997	20.0	10.1	19800	NT	<0.0060	NT
RP-06-87	10/12/00	5.27	NT	0.78	0.0459	4.0	94.2	0.37	316	398	1330	4.68	0.728	540	NT	0.010	NT
RP-06-87	6/27/01	6.73	-62.8	0.60	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT
RP-06-87	4/10/02	7.12	-23.8	7.87	NT	4.2	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT
RP-07-30	5/3/02	6.37	9.1	2.11	<0.0365	4.6	<0.0634	<0.499	10.6	301	7.42	28.9	9.34	600000	800	17.7	0.00555
RP-07-55	5/3/02	6.39	-1.0	2.61	<0.0365	3.8	1.52	<0.499	0.144	552	9.8	33.3	8.77	2200	340	3.26	0.0128
RP-07-84	5/3/02	6.60	53.8	4.04	<0.0365	0.0	88.4	<2.50	0.368	152	1130	57.8	0.285	82000	1400	<0.0258	0.0213
RP-07-119	5/3/02	6.45	-11.8	0.66	<0.0365	0.2	37.4	<0.499	0.160	148	632	<4.00	0.874	2000	10	<0.0258	0.0361
RPW-02	3/22/00	6.81	NT	1.39	NT	0.5	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT
RPW-02	9/20/00	5.96	NT	1.50	NT	0.6	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT
RPW-02	6/28/01	6.88	-43.3	1.50	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT

TABLE 4-1
Groundwater Natural Attenuation Parameter Results
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Monitoring Well ID	Sample Date	pH	ORP	Dissolved Oxygen	Nitrate	Ferrous Iron	Sulfate	Sulfide	Methane	Alkalinity	Chloride	COD	TOC	Heterotrophic Plate Count	Diesel Degrading Bacteria	Ammonia as Nitrogen	Ortho-phosphate
		(SU)	(mV)	(mg/L)	(mg/L)	(mg/L)	(mg/L)	(mg/L)	(µg/L)	(mg/L)	(mg/L)	(mg/L)	(mg/L)	(cfu/mL)	(cfu/mL)	(mg/L)	(mg/L)
RPW-02	4/12/02	7.35	-29.7	1.66	NT	2.2	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT
RPW-03	3/28/00	7.26	NT	0.98	NT	2.9	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT
RPW-03	9/22/00	7.05	NT	0.39	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT
RPW-05	3/27/00	6.54	NT	2.66	NT	0.0	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT
RPW-05	9/27/00	--	--	--	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT
W-03-S	4/12/00	8.07	NT	1.66	NT	0.4	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT
W-03-S	10/9/00	7.88	NT	0.45	NT	0.0	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT
W-03-I	4/12/00	6.28	NT	0.54	NT	7.0	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT
W-03-I	10/9/00	6.29	NT	0.42	NT	8.0	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT
W-03-I	6/26/01	6.19	-87.7	0.10	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT
W-03-I	4/8/02	5.79	-46.5	0.91	NT	7.8	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT
W-03-D	4/12/00	7.40	NT	1.88	NT	0.0	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT
W-03-D	10/9/00	6.97	NT	1.14	NT	0.4	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT
W-04-S	4/12/00	8.99	NT	1.26	<0.134	0.0	67.6	<0.200	0.288	103	10.1	28.4	<4.61	1350	NT	0.610	NT
W-04-S	10/9/00	9.29	NT	0.66	0.847	0.0	114	1.95	728	123	18.4	47.1	3.36	2800	NT	37.5	NT
W-04-I	4/12/00	6.27	NT	0.89	0.0582	8.6	241	4.00	1.11	166	1620	63.9	<4.61	400	NT	44.8	NT
W-04-I	10/9/00	NT	NT	0.68	<0.0049	2.6	245	6.85	594	126	1640	22.4	5.65	NT	NT	1.59	NT
W-04-89	10/9/00	6.98	NT	NT	NT	1.6	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT
W-04-89	6/26/01	7.22	-112.4	0.90	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT
W-04-89	4/8/02	6.89	-48.5	0.49	NT	4.0	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT
W-06-S	3/30/00	7.21	NT	1.98	NT	0.0	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT
W-06-S	9/28/00	6.35	NT	1.76	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT
W-06-D	9/28/00	6.74	NT	0.49	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT
W-06-D	3/30/02	7.20	NT	21.70	NT	0.8	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT
W-06-B	3/30/00	7.68	NT	1.66	NT	0.4	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT
W-06-B	9/28/00	6.38	NT	0.74	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT
W-08	4/4/00	6.49	NT	0.49	NT	5.0	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT
W-08	10/5/00	6.41	NT	0.46	NT	4.6	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT
W-08	7/3/01	6.31	-93.0	0.70	<0.0049	NT	158	13.6	5.12	486	3800	83.9	13.2	110	1700	22.8	0.00569
W-08	4/17/02	6.69	215.7	0.14	<0.365	4.8	94.5	5.60	1.14	702	2710	94.1	25.4	41	8	22.2	0.00965
W-08-26	4/5/00	6.96	NT	0.93	NT	3.8	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT
W-08-26	10/5/00	6.98	NT	1.15	NT	4.0	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT
W-08-26	7/2/01	6.81	-148.3	0.70	<0.0049	1.8	5.62	2.48	16.3	1160	1660	136	42.8	17	1600	5.07	0.00596
W-08-26	4/16/02	6.93	13.8	0.22	<0.0365	4.1	5.28	2.56	7.48	1010	1090	121	41.2	280	120	2.38	0.00460
W-08-26	4/18/02	7.25	-164.7	2.69	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT
W-08-74	4/4/00	7.04	NT	1.54	NT	2.8	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT
W-08-74	10/5/00	6.92	NT	0.72	0.0676	3.0	<0.475	<0.200	3060	335	146	8.14	2.30	610	NT	0.594	NT
W-08-74	7/3/01	6.76	-81.0	0.70	<0.0049	2.2	10.3	0.80	12.9	321	122	19.0	3.60	52	260	0.253	0.341
W-08-74	4/16/02	7.26	23.4	4.40	<0.0365	5.0	12.5	<0.499	9.39	300	71.5	12.4	2.53	3	<1	0.085	0.0681
W-09	8/29/86	7.00	NT	NT	<0.05	NT	5.00	NT	NT	870	1700	NT	NT	NT	NT	NT	NT
W-09	12/18/86	7.00	NT	NT	0.150	NT	6400	NT	NT	760	1900	NT	120	NT	NT	NT	NT
W-09	2/23/87	6.30	NT	NT	<0.05	NT	100	NT	NT	760	1800	NT	84.0	NT	NT	NT	NT
W-09	10/22/92	6.74	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT
W-09	4/10/00	7.50	NT	1.40	NT	1.4	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT
W-09	10/6/00	7.04	NT	0.42	NT	1.2	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT
W-09-86	10/6/00	5.87	NT	0.66	NT	0.0	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT
W-09-86	4/7/02	6.72	NT	1.70	NT	0.0	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT

TABLE 4-1
Groundwater Natural Attenuation Parameter Results
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Monitoring Well ID	Sample Date	pH	ORP	Dissolved Oxygen	Nitrate	Ferrous Iron	Sulfate	Sulfide	Methane	Alkalinity	Chloride	COD	TOC	Heterotrophic Plate Count	Diesel Degrading Bacteria	Ammonia as Nitrogen	Ortho-phosphate
		(SU)	(mV)	(mg/L)	(mg/L)	(mg/L)	(mg/L)	(mg/L)	(µg/L)	(mg/L)	(mg/L)	(mg/L)	(mg/L)	(cfu/mL)	(cfu/mL)	(mg/L)	(mg/L)
W-09-116	4/7/00	6.52	NT	0.72	NT	1.4	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT
W-09-116	10/6/00	6.32	NT	0.54	NT	1.6	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT
W-09-116	6/29/01	6.35	101.4	0.70	<0.0049	2.5	66.7	8.00	7010	507	838	21.2	2.95	390	1400	0.68	0.0383
W-09-116	4/15/02	6.87	24.6	3.85	<0.0365	3.0	60.5	<0.499	2650	458	703	16.0	2.35	99	13	0.392	0.0301
W-10	10/11/00	6.20	NT	0.51	NT	4.0	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT
W-11-S	9/3/86	11.50	NT	NT	0.0500	0.0	36.0	NT	NT	510	40.0	NT	NT	NT	NT	NT	NT
W-11-S	12/17/86	11.70	NT	NT	<0.05	0.2	30.0	NT	NT	490	39.0	NT	33.0	NT	NT	NT	NT
W-11-S	2/24/87	11.80	NT	NT	<0.05	NT	28.0	NT	NT	450	32.0	NT	29.0	NT	NT	NT	NT
W-11-S	4/4/95	11.88	NT	0.80	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT
W-11-S	4/11/00	11.76	NT	0.62	0.0587	0.0	12.4	1.60	NT	266	7.82	33.2	6.51	390	NT	2.43	NT
W-11-S	10/10/00	11.59	NT	4.00	0.0476	0.2	2.03	8.5	NT	321	8.68	75.2	6.94	4.5	NT	4.72	NT
W-11-S	6/21/01	11.81	-110.4	0.10	<0.0049	0.0	4.41	5.60	1710	290	17.6	41.0	10.3	2	6	5.10	0.0190
W-11-S	4/9/02	12.34	-57.9	2.33	<0.0365	0.0	12.5	0.80	985	241	11.2	10.3	4.52	4	<1	2.40	0.00366
W-11-I	9/3/86	6.90	NT	NT	<0.05	NT	49.0	NT	NT	540	29.0	NT	NT	NT	NT	NT	NT
W-11-I	12/16/86	7.10	NT	NT	<0.05	NT	9.00	NT	NT	490	14.0	NT	68.0	NT	NT	NT	NT
W-11-I	2/24/87	6.50	NT	NT	<0.05	NT	7.00	NT	NT	490	11.0	NT	33.0	NT	NT	NT	NT
W-11-I	10/22/90	NT	NT	NT	NT	NT	<10.0	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT
W-11-I	4/4/95	6.78	NT	0.80	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT
W-11-I	4/11/00	6.71	NT	0.25	0.0533	8.0	0.18	0.80	2730	530	28.9	36.3	8.03	330	NT	3.64	NT
W-11-I	10/10/00	5.85	NT	1.01	0.913	NT	0.81	<0.200	849	516	28.4	25.9	6.00	870	NT	2.35	NT
W-11-I	6/21/01	6.65	-118.0	0.30	1.62	6.6	3.43	1.20	3110	526	33.2	25.9	7.30	55	370	3.01	0.00401
W-11-I	4/9/02	6.91	-59.6	1.26	0.0370	5.2	0.26	0.56	534	502	31.5	18.3	7.04	110	49	3.07	0.00366
W-11-D	9/16/86	6.30	NT	NT	<0.05	4.0	200	NT	NT	780	1900	NT	NT	NT	NT	NT	NT
W-11-D	1/20/87	6.50	NT	NT	0.0500	NT	180	NT	NT	740	1400	NT	27.0	NT	NT	NT	NT
W-11-D	2/25/87	6.40	NT	NT	0.100	NT	200	NT	NT	670	1800	NT	49.0	NT	NT	NT	NT
W-11-D	10/22/90	NT	NT	NT	NT	NT	92.0	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT
W-11-D	4/5/95	6.76	NT	0.70	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT
W-11-D	4/11/00	6.96	NT	2.10	0.0894	NT	172	1.60	3810	555	874	60.3	10.8	1220	NT	0.210	NT
W-11-D	10/10/00	6.78	NT	0.43	<0.0049	4.0	209	0.37	10300	433	900	13.8	2.25	200	NT	0.020	NT
W-11-D	6/21/01	6.69	-7.9	0.60	<0.0049	2.2	196	<0.200	40000	427	961	16.7	3.03	180	14000	0.050	<0.0016
W-11-D	4/9/02	6.97	-29.4	5.03	<0.0365	2.8	216	<0.200	33300	421	824	15.3	3.13	30	17	<0.0258	0.00494
W-11-B	9/3/86	7.00	NT	NT	<0.05	NT	36.0	NT	NT	170	500	NT	NT	NT	NT	NT	NT
W-11-B	12/16/86	7.80	NT	NT	<0.05	NT	32.0	NT	NT	160	430	NT	14.0	NT	NT	NT	NT
W-11-B	2/24/87	6.80	NT	NT	<0.05	NT	28.0	NT	NT	170	380	NT	5.10	NT	NT	NT	NT
W-11-B	4/5/95	7.20	NT	5.80	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT
W-11-B	4/11/00	8.01	NT	1.44	NT	0.0	NT	NT	341	NT	NT	NT	NT	NT	NT	NT	NT
W-11-B	10/10/00	6.13	NT	0.86	NT	4.0	NT	NT	1310	NT	NT	NT	NT	NT	NT	NT	NT
W-11-B	6/21/01	6.97	-125.8	0.80	<0.0049	NT	101	1.20	6000	285	830	11.9	1.33	530	1200	0.090	<0.0016
W-11-B	4/9/02	7.25	-54.5	7.14	<0.0365	4.6	113	<0.200	1370	321	730	7.14	1.53	360	10	0.069	0.00303
W-12-S	4/11/00	11.52	NT	0.68	NT	0.0	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT
W-12-S	10/10/00	8.67	NT	3.46	NT	0.0	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT
W-12-I	4/11/00	7.26	NT	2.38	NT	3.0	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT
W-12-I	10/10/00	7.23	NT	2.42	NT	2.0	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT
W-12-D	10/10/00	7.28	NT	0.63	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT
W-12-D	4/11/02	7.42	NT	3.18	NT	1.8	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT

TABLE 4-1
Groundwater Natural Attenuation Parameter Results
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Monitoring Well ID	Sample Date	pH	ORP	Dissolved Oxygen	Nitrate	Ferrous Iron	Sulfate	Sulfide	Methane	Alkalinity	Chloride	COD	TOC	Heterotrophic Plate Count	Diesel Degrading Bacteria	Ammonia as Nitrogen	Ortho-phosphate
		(SU)	(mV)	(mg/L)	(mg/L)	(mg/L)	(mg/L)	(mg/L)	(µg/L)	(mg/L)	(mg/L)	(mg/L)	(mg/L)	(cfu/mL)	(cfu/mL)	(mg/L)	(mg/L)
W-15-S	6/22/01	NT	NT	NT	NT	0.0	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT
W-15-S	4/10/02	11.84	NT	0.88	NT	0.6	NT	NT	0.437	NT	NT	NT	NT	NT	NT	NT	NT
W-15-S	4/11/02	7.12	-19.9	0.73	0.427	0.0	46.2	<0.499	NT	93.4	7.42	24.1	5.00	330	18	<0.0258	0.138
W-15-S	9/29/02	6.81	NT	NT	NT	NT	NT	NT	0.353	NT	NT	NT	NT	NT	NT	NT	NT
W-15-I	4/10/00	6.22	NT	1.42	NT	10	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT
W-15-I	6/20/01	6.31	-157.9	0.00	NT	5.8	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT
W-15-I	4/11/02	6.41	-41.6	1.24	NT	6.4	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT
W-15-D	4/10/00	6.28	NT	2.04	NT	4.4	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT
W-15-D	6/22/01	6.11	-6.6	0.50	<0.0049	4.0	19.8	24.3	NT	179	61.2	8.99	2.72	360	380	0.010	0.234
W-15-D	6/29/01	6.02	67.2	0.70	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT
W-15-D	4/11/02	6.37	-1.4	1.35	<0.0365	4.0	26.4	<0.499	0.0106	165	68.5	4.76	2.95	470	52	<0.0258	0.00807
W-16-31	4/19/00	14.40	NT	1.59	NT	2.2	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT
W-16-31	6/22/01	7.35	-129.1	0.40	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT
W-16-31	4/8/02	7.14	-129.4	0.00	NT	6.4	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT
W-16-31	10/17/02	6.62	NT	1.58	NT	2.8	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT
W-16-S	12/30/86	7.80	NT	NT	0.320	NT	14.0	NT	NT	340	43.0	NT	16.0	NT	NT	NT	NT
W-16-S	2/18/87	11.20	NT	NT	0.110	NT	130	NT	NT	2100	25.0	NT	36.0	NT	NT	NT	NT
W-16-S	4/5/95	12.76	NT	1.00	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT
W-16-S	4/19/00	7.34	NT	1.59	NT	2.2	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT
W-16-S	10/17/00	6.62	NT	1.58	NT	2.8	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT
W-16-I	12/30/86	12.20	NT	NT	0.180	NT	71.0	NT	NT	2200	39.0	NT	56.0	NT	NT	NT	NT
W-16-I	2/18/87	7.40	NT	NT	0.0500	NT	18.0	NT	NT	410	67.0	NT	9.60	NT	NT	NT	NT
W-16-I	4/5/95	7.02	NT	0.70	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT
W-16-I	4/19/00	6.92	NT	1.13	NT	5.8	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT
W-16-I	10/17/00	6.77	NT	0.97	NT	3.6	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT
W-16-I	6/22/01	6.73	-140.7	0.50	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT
W-16-I	6/27/01	6.84	-124.0	1.00	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT
W-16-I	4/8/02	6.87	-74.4	0.00	NT	6.0	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT
W-16-D	12/30/86	7.00	NT	NT	0.310	0.6	16.0	NT	NT	220	100	NT	14.0	NT	NT	NT	NT
W-16-D	2/18/87	7.00	NT	NT	0.0600	NT	4.00	NT	NT	220	95.0	NT	4.10	NT	NT	NT	NT
W-16-D	4/5/95	7.38	NT	3.80	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT
W-16-D	4/19/00	7.54	NT	3.30	NT	0.6	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT
W-16-D	10/17/00	7.26	NT	1.42	NT	1.0	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT
W-18-S	10/16/90	NT	NT	NT	NT	NT	35.0	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT
W-18-S	3/21/00	6.54	NT	3.17	0.195	0.0	24.2	<0.200	<1.00	167	4.19	10.0	2.83	23200	NT	<0.0060	NT
W-18-S	9/19/00	--	--	--	0.310	NT	24.2	0.80	<1.00	166	3.23	2.47	3.15	2900	NT	<0.0060	NT
W-18-S	6/19/01	6.35	159.8	1.00	0.0940	0.2	26.7	<0.200	<0.38	163	4.00	6.61	2.39	130	120	<0.0060	0.0887
W-18-S	4/4/02	6.48	-45.3	0.58	0.233	0.0	23.0	<0.200	<0.38	150	3.40	13.3	3.22	16	13	<0.0258	0.0944
W-18-I	10/16/90	NT	NT	NT	NT	NT	28.0	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT
W-18-I	3/21/00	6.57	NT	2.88	2.16	0.0	17.4	<0.200	<1.00	108	3.95	<4.05	<0.461	4440	NT	<0.0060	NT
W-18-I	9/19/00	5.18	NT	3.99	2.18	NT	17.3	<0.200	<1.00	114	3.84	<1.8	0.978	750	NT	<0.0060	NT
W-18-I	6/18/01	6.26	148.5	4.90	1.80	0.2	15.9	<0.200	<0.38	93.0	5.67	<3.6	0.424	870	370	<0.0060	0.175
W-18-I	4/4/02	6.59	-39.6	0.44	1.64	0.0	15.7	<0.200	<0.38	85.1	3.57	13.3	2.35	2400	78	<0.0258	0.171
W-18-D	10/15/90	NT	NT	NT	NT	NT	19.0	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT
W-18-D	3/21/00	7.12	NT	2.70	2.00	0.0	24.0	<0.200	<1.00	108	4.52	<4.05	0.962	19	NT	<0.0060	NT
W-18-D	9/19/00	--	--	--	1.97	NT	22.4	0.72	<1.00	111	4.68	<1.8	0.893	10	NT	<0.0060	NT
W-18-D	6/18/01	6.73	97.7	6.10	1.69	0.2	19.1	<0.200	<0.38	92.0	11.9	<3.6	0.232	59	21	<0.0060	0.341
W-18-D	4/4/02	7.33	-31.6	2.75	1.64	0.8	22.0	0.32	<0.38	103	5.28	6.67	0.802	130	36	<0.0258	0.399

TABLE 4-1
Groundwater Natural Attenuation Parameter Results
RPAC - Portland Site

Monitoring Well ID	Sample Date	pH	ORP	Dissolved Oxygen	Nitrate	Ferrous Iron	Sulfate	Sulfide	Methane	Alkalinity	Chloride	COD	TOC	Heterotrophic Plate Count	Diesel Degrading Bacteria	Ammonia as Nitrogen	Ortho-phosphate
		(SU)	(mV)	(mg/L)	(mg/L)	(mg/L)	(mg/L)	(mg/L)	(µg/L)	(mg/L)	(mg/L)	(mg/L)	(mg/L)	(cfu/mL)	(cfu/mL)	(mg/L)	(mg/L)
W-19-S	4/18/00	6.08	NT	4.04	<0.253	0.0	6.72	<1.6	<3.48	74.0	189	55.9	<0.461	580	NT	<0.0060	NT
W-19-S	10/16/00	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT
W-19-S	4/5/02	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT
W-19-S	6/20/02	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT
W-19-I	4/18/00	6.28	NT	0.51	0.0649	0.0	36.5	<0.200	0.707	436	1880	52.4	4.78	390	NT	<0.0060	NT
W-19-I	10/16/00	6.10	NT	0.65	0.100	0.0	53.5	<0.200	329	377	2420	15.5	3.49	65	NT	<0.0060	NT
W-19-I	6/20/01	6.42	100.9	2.10	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT
W-19-I	4/5/02	6.52	-19.1	0.00	NT	0.0	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT
W-19-D	4/18/00	6.72	NT	1.77	<0.0049	0.0	61.4	<0.200	1.28	464	1230	41.9	<4.61	200	NT	0.017	NT
W-19-D	10/16/00	5.80	NT	0.68	<0.0049	0.0	73.5	<0.200	802	439	1240	8.63	2.93	28	NT	<0.0060	NT
W-19-D	6/20/01	6.68	134.6	1.30	<0.0049	NT	71.9	0.80	0.72	429	1230	13.8	1.88	19	600	<0.0060	0.0863
W-19-D	4/5/02	6.65	-17.8	0.00	<0.0365	0.0	79.3	0.32	1.75	454	1230	17.8	2.25	59	13	<0.0258	0.128

Notes:

--	Groundwater not tested for this parameter, or information was not recorded
NT	Not tested
cfu/mL	Colony forming units per milliliter
mg/L	Milligrams per liter
mV	Millivolts
mS	Millisiemens
SU	Standard pH units
µg/L	Micrograms per liter

[1] Field measurements suspect due to recorded sampling procedure.

TABLE 4-2
Summary of Chemical, Geochemical, and Biological Parameters at Selected Alluvium Wells
RPAC - Portland Site

Monitoring Well ID	Sample Date	pH	ORP	Dissolved Oxygen	Nitrate	Ferrous Iron	Sulfate	Sulfide	Methane	Alkalinity	Specific Conductivity	Chloride	COD	TOC	Hetero-trophic Bacteria	Diesel Degrading Bacteria	Ammonia as Nitrogen	Ortho-phosphate	2,4-D	2,4-DP	2,4,5-T	2,4,5-TP (Silvex)	1,2-Dichloro-benzene	2,4-Dichloro-phenol	Benzene	Diesel Range Organics
		(SU)	(mV)	(mg/L)	(mg/L)	(mg/L)	(mg/L)	(mg/L)	(µg/L)	(mg/L)	(mS)	(mg/L)	(mg/L)	(mg/L)	(cfu/mL)	(cfu/mL)	(mg/L)	(mg/L)	(µg/L)	(µg/L)	(µg/L)	(µg/L)	(µg/L)	(µg/L)	(µg/L)	(mg/L)
W-18-I	10/16/1990	NT	NT	NT	NT	NT	28	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	<10	<10	NT	NT
W-18-I	3/21/2000	6.57	NT	2.88	2.16	0	17.4	<0.200	<1	108	NT	3.95	<4.05	<0.461	4440	NT	<0.006	NT	<0.773	<0.584	<0.563	<0.622	<0.087	<5.0	<0.121	<0.125
W-18-I	9/19/2000	5.18	NT	3.99	2.18	NT	17.3	<0.200	<1	114	25.9	3.84	<1.8	0.978	750	NT	<0.006	NT	<0.773	<0.584	<0.563	<0.622	<0.087	<5.0	<0.121	<0.125
W-18-I	6/18/2001	6.26	148.5	4.9	1.8	0.2	15.9	<0.200	<0.38	93	0.189	5.67	<3.6	0.424	870	370	<0.006	0.175	NT	NT	NT	NT	NT	NT	NT	<0.125
W-18-I	4/4/2002	6.59	-39.6	0.44	1.64	0	15.7	<0.200	<0.38	85.1	0.226	3.57	13.3	2.35	2400	78	<0.0258	0.171	NT	NT	NT	NT	NT	NT	NT	<0.125
W-18-S	10/16/1990	NT	NT	NT	NT	NT	35	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT
W-18-S	3/21/2000	6.54	NT	3.17	0.195	0	24.2	<0.200	<1	167	1.22	4.19	9.96	2.83	23200	NT	<0.006	NT	<0.773	<0.584	<0.563	<0.622	<0.087	<5.0	<0.121	<0.125
W-18-S	9/19/2000	NT	NT	NT	0.31	NT	24.2	0.8	<1	166	NT	3.23	2.47	3.15	2900	NT	<0.006	NT	<0.773	<0.584	<0.563	<0.622	<0.087	<5.0	<0.121	<0.125
W-18-S	6/19/2001	6.35	159.8	1	0.094	0.2	26.7	<0.200	<0.38	163	0.279	4	6.61	2.39	130	120	<0.006	0.0887	NT	NT	NT	NT	NT	NT	NT	<0.125
W-18-S	4/4/2002	6.48	-45.3	0.58	0.233	0	23	<0.200	<0.38	150	0.335	3.4	13.3	3.22	16	13	<0.0258	0.0944	NT	NT	NT	NT	NT	NT	NT	<0.125
MW-11-24	8/4/1993	6.57	NT	2	NT	NT	NT	NT	NT	NT	0.714	NT	NT	NT	NT	NT	NT	NT	2.6	<2	<1.2	3.1	<1	9	2	NT
MW-11-24	9/9/1993	6.41	NT	8	NT	NT	NT	NT	NT	NT	0.769	NT	NT	NT	NT	NT	NT	NT	3.3	2.2	<0.4	2.2	1	15	2.8	NT
MW-11-24	10/27/1993	6.72	NT	0.8	NT	NT	NT	NT	NT	NT	0.820	NT	NT	NT	NT	NT	NT	NT	3.5	6.6	<0.6	3.3	1	<2	4	NT
MW-11-24	3/23/1995	6.26	NT	1.4	NT	NT	NT	NT	NT	NT	0.474	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	<10	NT	NT
MW-11-24	3/28/2000	6.86	NT	1.72	NT	0	NT	NT	NT	NT	1.71	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	<10	NT	NT
MW-11-24	9/22/2000	5.85	NT	0.61	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT
MW-11-24	6/28/2001	6.31	102.1	6.3	0.02	0	18.5	<0.200	38.6	218	0.437	26.6	11.1	3.53	20	110	<0.006	0.0847	NT	NT	NT	NT	NT	NT	NT	0.137
MW-11-24	4/12/2002	7.2	-7.8	1.46	0.711	0	10.4	<0.499	<0.38	284	0.547	4.11	<4	2.37	9	5	<0.0258	0.0525	NT	NT	NT	NT	NT	NT	NT	<0.125
MW-11-37	8/4/1993	6.59	NT	3.6	NT	NT	NT	NT	NT	NT	0.286	NT	NT	NT	NT	NT	NT	NT	<6	<1	<0.2	0.5	<1	<2	1.6	NT
MW-11-37	9/9/1993	6.49	NT	11	NT	NT	NT	NT	NT	NT	0.345	NT	NT	NT	NT	NT	NT	NT	<2	<0.8	<0.2	0.3	<1	<2	<0.5	NT
MW-11-37	10/27/1993	7.44	NT	1.7	NT	NT	NT	NT	NT	NT	0.295	NT	NT	NT	NT	NT	NT	NT	<1.8	<0.6	<0.2	0.3	<1	<2	<0.5	NT
MW-11-37	3/23/1995	6.05	NT	0.3	NT	NT	NT	NT	NT	NT	0.286	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT
MW-11-37	3/28/2000	6.35	NT	0.09	NT	0	NT	NT	NT	NT	1.11	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	<10	NT	NT
MW-11-37	9/22/2000	5.55	NT	0.51	NT	NT	NT	NT	NT	NT	32.8	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	<10	NT	NT
MW-11-37	6/28/2001	6.42	90.4	4	9.44	0	19	0.24	<0.38	83.9	0.286	12.2	<3.6	1.11	770	610	<0.006	0.0976	NT	NT	NT	NT	NT	NT	NT	<0.125
MW-11-37	4/12/2002	6.92	-8.7	0.98	8.29	0	18.8	<0.499	0.635	81.6	0.309	5.14	<4	1.63	23	15	<0.0258	0.0828	NT	NT	NT	NT	NT	NT	NT	<0.125
MW-11-56	8/4/1993	7.12	NT	3.4	NT	NT	NT	NT	NT	NT	0.380	NT	NT	NT	NT	NT	NT	NT	<1	<0.6	<0.2	<0.2	<1	<2	2.1	NT
MW-11-56	9/9/1993	6.99	NT	8	NT	NT	NT	NT	NT	NT	0.440	NT	NT	NT	NT	NT	NT	NT	1.5	<0.6	<0.2	<0.2	<1	<2	4.1	NT
MW-11-56	10/27/1993	7.36	NT	1	NT	NT	NT	NT	NT	NT	0.377	NT	NT	NT	NT	NT	NT	NT	<1	<0.6	<0.2	<0.2	<1	<2	1	NT
MW-11-56	3/23/1995	6.55	NT	7.4	NT	NT	NT	NT	NT	NT	0.341	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT
MW-11-56	3/28/2000	7.23	NT	0.97	NT	3.1	NT	NT	NT	NT	1.04	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	<10	NT	NT
MW-11-56	9/22/2000	7.02	NT	0.5	NT	NT	NT	NT	NT	NT	34.3	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	<10	NT	NT
MW-11-56	6/28/2001	7.12	-90	2.5	0.026	2.5	6.78	<0.200	228	148	0.305	14	5.82	0.377	230	210	0.281	0.204	NT	NT	NT	NT	NT	NT	NT	<0.125
MW-11-56	4/12/2002	7.67	-27.7	0.66	<0.0365	3.2	6.19	<0.499	198	142	0.354	6.59	<4	0.95	55	16	0.24	0.0235	NT	NT	NT	NT	NT	NT	NT	<0.125
MW-04-27	2/8/1989	6.75	NT	NT	NT	NT	34	NT	NT	NT	0.870	61	NT	NT	NT	NT	NT	NT	280	NT	11	18	84	303	<5	NT
MW-04-27	3/6/1989	6.75	NT	NT	NT	NT	22	NT	NT	NT	0.870	47	NT	NT	NT	NT	NT	NT	157	NT	19	31	<1	280	<1	NT
MW-04-27	4/26/1989	6.67	NT	NT	NT	NT	70.8	NT	NT	NT	1.293	123	NT	NT	NT	NT	NT	NT	206	NT	6	49	48	530	13	NT
MW-04-27	6/11/1991	6.43	NT	1.8	NT	NT	NT	NT	NT	761	1.966	NT	NT	99.2	NT	NT	0.32	0.16	4150	2120	270	210	110	9	81	NT
MW-04-27	3/31/1995	6.11	NT	2	NT	NT	NT	NT	NT	NT	1.731	NT	NT	NT	NT	NT	NT	NT	79	76	<5	180	3800	<250	190	NT
MW-04-27	3/27/2000	6.77	NT	1.79	NT	4	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	1140	<0.584	<0.563	<0.622	4850	1250	47.4	NT
MW-04-27	9/27/2000	6.34	NT	0.48	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	2740	<59	<56.9	<62.8	10700	11000	83.9	NT
MW-04-27	7/5/2001	6.49	-53.8	1.2	<0.049	4.4	98.2	21.2	10000	597	2.201	570	772	99.6	1100	800	0.096	0.00796	2700	<3.63	103	346	10200	10800	74	182
MW-04-27	4/19/2002	6.75	-90.2	2.67	<0.0365	4	40.5	12.9	6760	613	2.657	290	254	84.8	39	35	<0.0258	0.00712	376	17.2	7.83	220	7250	<2500	0.58	44.1
MW-04-47	1/31/1989	6.39	NT	NT	NT	NT	254	NT	NT	NT	1.830	184	NT	NT	NT	NT	NT	NT	<5	NT	<1	92	42	390	44	NT
MW-04-47	2/28/1989	6.55	NT	NT	NT	NT	268	NT	NT	NT	1.640	171	NT	NT	NT	NT	NT	NT	74	NT	<0.5	276	237	303	180	NT
MW-04-47	4/25/1989	6.51	NT	NT	NT	NT	192	NT	NT	NT	1.520	195	NT	NT	NT	NT	NT	NT	53	NT	<10	212	175	99	95	NT
MW-04-47	6/11/1991	6.76	NT	1.4	NT	NT	NT	NT	NT	213	0.483	NT	NT	2.4	NT	NT	<0.05	0.16	<10	<6	<2	9.4	141	1300	7.2	NT
MW-04-47	3/31/1995	6.61	NT	2.7	NT	NT	NT	NT	NT	NT	0.332	NT	NT	NT	NT	NT	NT	NT	1.5	<1	0.35	1.5	71	<0.5	<0.5	NT
MW-04-47	3/27/2000	7.02	NT	1.29	NT	2.3	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	<0.773	<0.584	<0.563	<0.622	50.9	<10	0.13	NT

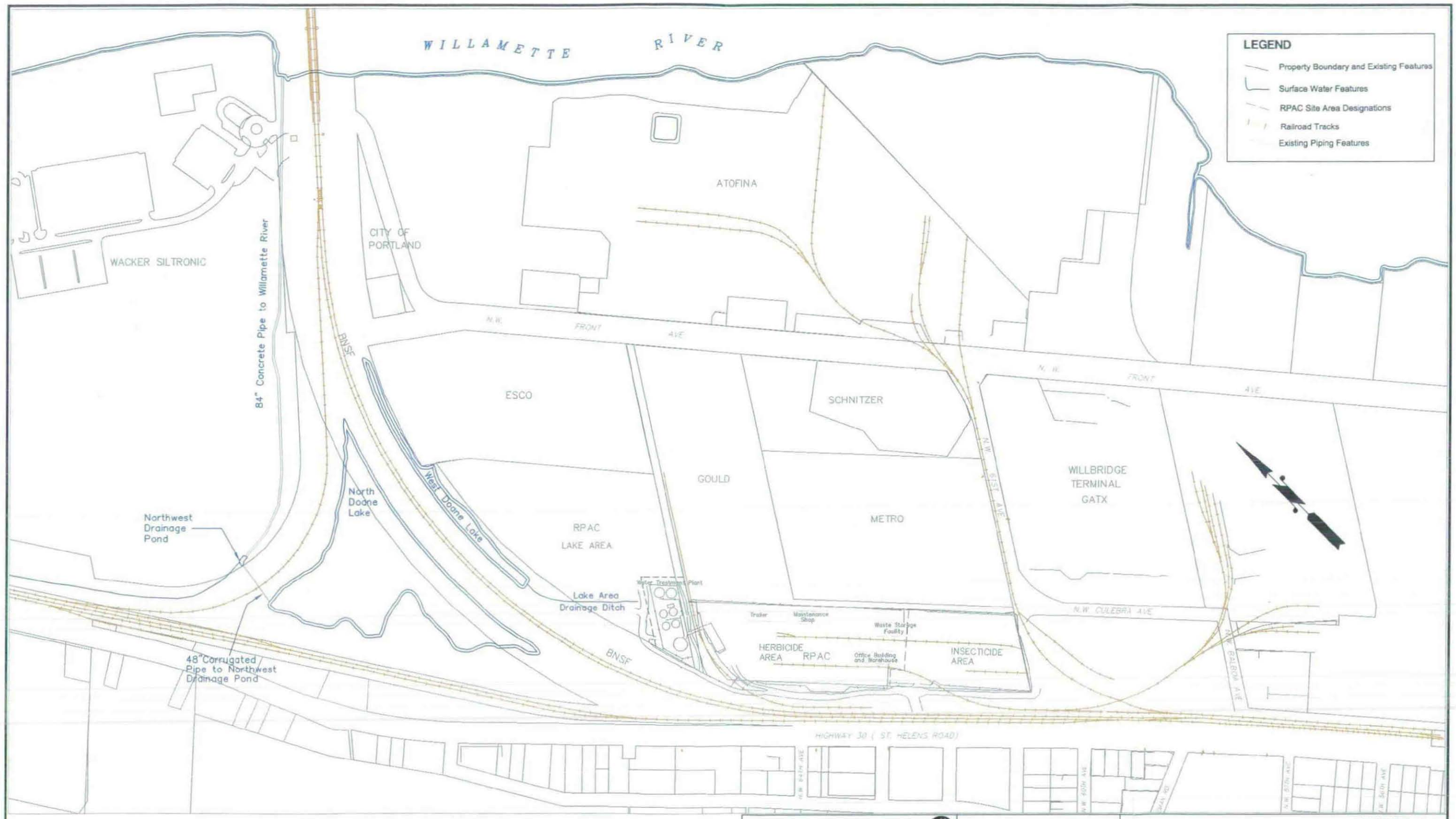
TABLE 4-2
Summary of Chemical, Geochemical, and Biological Parameters at Selected Alluvium Wells
RPAC - Portland Site

Monitoring Well ID	Sample Date	pH	ORP	Dissolved Oxygen	Nitrate	Ferrous Iron	Sulfate	Sulfide	Methane	Alkalinity	Specific Conductivity	Chloride	COD	TOC	Hetero-trophic Bacteria	Diesel Degrading Bacteria	Ammonia as Nitrogen	Ortho-phosphate	2,4-D	2,4-DP	2,4,5-T	2,4,5-TP (Silvex)	1,2-Dichloro-benzene	2,4-Dichloro-phenol	Benzene	Diesel Range Organics
		(SU)	(mV)	(mg/L)	(mg/L)	(mg/L)	(mg/L)	(mg/L)	(µg/L)	(mg/L)	(mS)	(mg/L)	(mg/L)	(mg/L)	(cfu/mL)	(cfu/mL)	(mg/L)	(mg/L)	(µg/L)	(µg/L)	(µg/L)	(µg/L)	(µg/L)	(µg/L)	(µg/L)	(mg/L)
MW-04-47	9/27/2000	6.51	NT	0.44	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	<0.773	<0.584	<0.563	<0.622	77.6	<10	0.72	NT
MW-04-47	7/5/2001	6.67	-21.5	1.2	<0.0049	3.4	17.1	<0.200	434	283	0.93	210	<3.6	1.89	43	70	<0.006	0.0268	<0.179	18.4	<0.15	1.81	165	<10	1.25	<0.125
MW-04-47	4/19/2002	6.76	-54.4	1.46	<0.0365	3.8	12.1	11.5	616	268	1.263	151	7.78	1.51	180	130	<0.0258	0.0594	17.1	25.9	4.17	1.82	191	<10	<0.147	0.217
MW-04-63	1/31/1989	6.76	NT	NT	NT	NT	15	NT	NT	NT	0.443	3.7	NT	NT	NT	NT	NT	NT	<5	NT	<1	<1	<1	<5	<1	NT
MW-04-63	2/28/1989	6.63	NT	NT	NT	NT	<5	NT	NT	NT	0.464	34	NT	NT	NT	NT	NT	NT	10	NT	<0.5	<0.5	<1	<5	3	NT
MW-04-63	4/25/1989	6.84	NT	NT	NT	NT	<5	NT	NT	NT	0.412	22.3	NT	NT	NT	NT	NT	NT	<2	NT	<0.5	<0.5	1	<5	<1	NT
MW-04-63	6/11/1991	6.79	NT	1.7	NT	NT	NT	NT	NT	164	0.344	NT	NT	476	NT	NT	0.05	0.15	<10	<6	<2	<2	<4.8	<6	<0.5	NT
MW-04-63	3/31/1995	6.65	NT	5.4	NT	NT	NT	NT	NT	NT	0.297	NT	NT	NT	NT	NT	NT	NT	1	0.44	<0.05	<0.05	<1.2	<0.5	<0.5	NT
MW-04-63	3/27/2000	7.13	NT	0.43	NT	1.6	NT	NT	NT	NT	1.04	NT	NT	NT	NT	NT	NT	NT	<0.773	<0.584	<0.563	<0.622	<0.087	<10	<0.121	NT
MW-04-63	9/27/2000	6.14	NT	0.46	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	<0.773	<0.584	<0.563	<0.622	<0.36	<10	<0.121	NT
MW-05-52	2/8/1989	6.43	NT	NT	NT	NT	97	NT	NT	NT	2.19	309	NT	NT	NT	NT	NT	NT	82000	NT	2780	<10	1890	47700	165	NT
MW-05-52	2/9/1989	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	16000	NT	<600	<2000	2180	NT	274	NT
MW-05-52	3/1/1989	6.26	NT	NT	NT	NT	86	NT	NT	NT	2.22	336	NT	NT	NT	NT	NT	NT	88100	NT	2170	520	1130	59700	124	NT
MW-05-52	4/26/1989	6.3	NT	NT	NT	NT	107	NT	NT	NT	2.24	409	NT	NT	NT	NT	NT	NT	95300	NT	1240	280	1430	47500	85.3	NT
MW-05-52	6/11/1991	6.62	NT	1.1	NT	NT	NT	NT	NT	468	1.292	NT	NT	68.7	NT	NT	0.13	12.2	44000	16000	<200	<200	1700	11000	92	NT
MW-05-52	12/14/1995	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	479	127	NT	NT	<0.1	1.4	7400	<120	200	130	4300	12000	210	NT
MW-05-52	3/30/2000	6.52	NT	0.47	<0.0049	2.4	25.4	<0.200	NT	276	NT	66.5	49.8	<0.461	12	NT	<0.006	NT	856	<0.584	<0.563	<0.622	3640	745	51	11.8
MW-05-52	9/28/2000	6.22	NT	0.71	<0.0049	NT	13.5	3.44	56.8	445	115.0	117	54.7	14.8	5.5	NT	<0.006	NT	194	<0.584	12.2	<62.8	1530	382	40.6	4.47
MW-05-52	7/6/2001	6.65	7.4	1.6	<0.0049	2.6	21.2	2.24	40.4	257	0.886	77.6	55.8	14.7	18	5	0.01	10	557	<0.173	<7.29	16.6	3990	251	33.5	1.92
MW-05-52	4/22/2002	6.7	-55.5	1.74	<0.0365	2.6	37.4	3.76	57	325	0.458	140	47.3	12.5	1	7	<0.0258	12.1	304	15.7	<50	17.5	3740	539	44	7.92
AL5-35	4/3/1995	6.21	NT	1.7	NT	NT	NT	NT	NT	NT	3.65	NT	52.3	9.7	NT	NT	<0.1	0.083	<5	15	17	<1	4300	<0.5	180	NT
AL5-35	10/27/1995	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	5.8	16	0.31	15	4500	5.9	200	NT
AL5-35	4/4/2000	6.32	NT	0.71	<0.049	3.8	225	<0.200	3430	706	6.16	1610	51.2	<4.61	245	NT	0.357	NT	2.28	5.08	<0.563	3.02	6050	21.1	229	NT
AL5-35	10/4/2000	6.05	NT	0.66	<0.049	NT	214	3.2	1110	608	0.704	1460	21	9.3	5	NT	0.54	NT	8.81	11	<1.13	4.28	6350	<20	211	NT
W-09-116	4/7/2000	6.52	NT	0.72	NT	1.4	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	<3.87	<2.92	<2.82	23.3	888	<10	114	NT
W-09-116	10/6/2000	6.32	NT	0.54	NT	1.6	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	<0.773	<0.584	<0.563	19.8	744	<10	143	NT
W-09-116	6/29/2001	6.35	101.4	0.7	<0.0049	2.5	66.7	8	7010	507	2.32	838	21.2	2.95	390	1400	0.684	0.0383	0.8	0.8	<0.15	15.8	881	NT	113	0.67
W-09-116	4/15/2002	6.87	24.6	3.85	<0.0365	3	60.5	<0.499	2650	458	2.333	703	16	2.35	99	13	0.392	0.0301	<0.5	30.6	<0.5	19.2	617	NT	46.4	0.505
W-11-D	9/16/1986	6.3	NT	NT	<0.05	4	200	NT	NT	780	8.3	1900	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT
W-11-D	1/20/1987	6.5	NT	NT	0.05	NT	180	NT	NT	740	6.3	1400	NT	27	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT
W-11-D	2/25/1987	6.4	NT	NT	0.1	NT	200	NT	NT	670	5.3	1800	NT	49	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT
W-11-D	10/22/1990	NT	NT	NT	NT	NT	92	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	740	40	340	NT
W-11-D	4/5/1995	6.76	NT	0.7	NT	NT	NT	NT	NT	NT	1.717	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	<0.5	NT	NT
W-11-D	4/11/2000	6.96	NT	2.1	0.0894	NT	172	1.6	2730	555	3.94	874	60.3	10.8	1220	NT	0.21	NT	<0.773	1.64	<0.563	26.6	360	<20	68.4	NT
W-11-D	10/10/2000	6.78	NT	0.43	<0.0049	4	209	0.368	849	433	0.242	900	13.8	2.25	200	NT	0.02	NT	<0.773	<0.584	<0.563	25.6	739	<10	27.7	NT
W-11-D	6/21/2001	6.69	-7.9	0.6	<0.0049	2.2	196	<0.200	3110	427	3.343	961	16.7	3.03	180	14000	0.05	<0.0016	<0.179	<0.173	<0.15	38.3	456	NT	44.5	0.764
W-11-D	4/9/2002	6.97	-29.4	5.03	<0.0365	2.8	216	<0.200	534	421	3.86	824	15.3	3.13	30	17	<0.0258	0.00492	<0.5	25.3	<0.5	48	437	NT	16.9	0.422
W-11-I	9/3/1986	6.9	NT	NT	<0.05	NT	49	NT	NT	540	1.1	29	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT
W-11-I	12/16/1986	7.1	NT	NT	<0.05	NT	9	NT	NT	490	0.93	14	NT	68	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT
W-11-I	2/24/1987	6.5	NT	NT	<0.05	NT	7	NT	NT	490	0.9	11	NT	33	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT
W-11-I	10/22/1990	NT	NT	NT	NT	NT	<10	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT
W-11-I	4/4/1995	6.78	NT	0.8	NT	NT	NT	NT	NT	NT	0.808	NT	NT	NT	NT	NT	NT	NT	<0.25	<0.25	<0.05	<0.05	<1	<0.5	<0.5	NT
W-11-I	4/11/2000	6.71	NT	0.25	0.0533	8	0.18	0.8	3810	530	1.05	28.9	36.3	8.03	330	NT	3.64	NT	<0.773	<0.584	<0.563	<0.622	0.57	<10	<0.121	NT
W-11-I	10/10/2000	5.85	NT	1.01	0.913	NT	0.805	<0.200	10300	516	93.4	28.4	25.9	6	870	NT	2.35	NT	<0.773	<0.584	<0.563	<0.622	1.13	<10	<0.121	NT
W-11-I	6/21/2001	6.65	-118	0.3	1.62	6.6	3.43	1.2	40000	526	0.853	33.2	25.9	7.3	55	370	3.01	0.00401	<0.179	<0.173	<0.15	<0.133	<0.087	NT	<0.121	<0.125
W-11-I	4/9/2002	6.91	-59.6	1.26	0.037	5.2	0.255	0.56	33300	502	0.937	31.5	18.3	7.04	110	49	3.07	0.00366	<0.5	<0.5	<0.5	<0.5	0.72	NT	<0.121	<0.125
RP-01-31	4/17/2000	NT	NT	NT	<1.53	NT	33.7	<0.200	1.53	172	NT	20.2	<4.05	<0.461	7500	NT	<0.006	NT	<0.773	<0.584	<0.563	<0.622	3.74	<10	0.16	NT
RP-01-31	10/11/2000	6.97	NT	3.66	0.326	0	54.2	<0.200	<1	141	54.2	35.3	1.97	0.738	3200	NT	0.11	NT	<0.773	<0.584	<0.563	<0.622	<0.087	<10	<0.121	NT
RP-01-31	6/26/2001	6.87	39.5	6.8	0.368	0	20.6	<0.200	<0.38	148	0.126	12.7	11.4	1.53	4100	11000	0.023	0.339	<0.179	<0.173	0.811	<0.133	<0.087	NT	<0.121	<0.125
RP-01-31	4/5/2002	6.78	-22.4	0.0	1.43	NT	30.9	<0.200	2.29	148	0.365	9.71	244	1.54	810	81	<0.0258	0.383	<0.5	<0.5	<0.5	<0.5	0.69	NT	<0.121	<0.125
RP-01-51	4/17/2000	NT	NT	NT	<0.0049	NT	221	<1.6	37.6	554	NT	776	22.8	<0.461	1600	NT	0.119	NT	<0.773	1.49	<0.563	7.92	227	<10	1.12	NT
RP-01-51	10/11/2000	6.7	NT	0.7	0.0462	0	284	<0.200	112	571	0.401	714	30.6	10.3	54	NT	0.33	NT	<0.773	<0.584	<0.563	6.94	150	<10	0.16	NT
RP-01-51	6/26/2001	6.72	-3.9	0.7	<0.0049	0.2	269	4.8	454	509	2.859	853	32	10.4	290	400	0.28	0.0683	<0.179	5.57	0.161	9.07	124	NT	0.18	0.305
RP-01-51	4/8/2002	6.92	-29.4	0.14	<0.0049	0.4	256	<0.200	814	559	3.149	804	30.7	10.9	150	9	0.285	0.0919	<0.5	4.04	<0.5	16.7	197	NT	0.5	0.222

Notes:

NT	Not tested
cfu/mL	Colony forming units per milliliter
mg/L	Milligrams per liter
mV	Millivolts
mS	Millisiemens
SU	Standard pH units
µg/L	Micrograms per liter

FIGURES



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7376 SW Durham Road
Portland, OR, U.S.A. 97224-7307

W.O.	0-61M-10703-0
DESIGN	HWN
DRAWN	BRJ
DATE	MARCH 2003
SCALE	1"=350'

FIGURE 1-1
SITE AND VICINITY MAP

RPAC - PORTLAND SITE

AMEC DRAWING NO. k:\10000\10700\10703\DWG\Site and Vicinity – March 2003.dwg

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Portland, OR, U.S.A. 97224

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DESIGN	TARW
DRAWN	BRJ
DATE	AUGUST 2002
SCALE	1"=350'

FIGURE 3-1
GROUNDWATER SAMPLING LOCATIONS AND MONITORING WELLS DISPLAYED BY CHARACTERIZATION ZONES
RPAC-PORTLAND SITE

AMEC DRAWING NO. K:\10000\10700\10703\Task 43 Groundwater Monitoring\GW Char Report\dwg\Figure 3-1.dwg

* Groundwater elevation not included in contour evaluation, groundwater elevation is suspect due to the presence of LNAPL.

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SCALE	1"=350'

FIGURE 3-2
GROUNDWATER ELEVATIONS
FILL / SHALLOW ALLUVIUM ZONE
SPRING 2002
RPAC-PORTLAND SITE

AMEC DRAWING NO. K:\10000\10700\10703\Task 43 Groundwater Monitoring\GW Char Report\dwg\Figure 3-2.dwg

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DESIGN	TARW
DRAWN	BRJ
DATE	AUGUST 2002
SCALE	1"=350'

FIGURE 3-3
GROUNDWATER ELEVATIONS
ALLUVIUM ZONE
SPRING 2002

RPAC - PORTLAND SITE

AMEC DRAWING NO. K:\10000\10700\10703\Task 43 Groundwater Monitoring\GW Char Report\dwg\Figure 3-3.dwg

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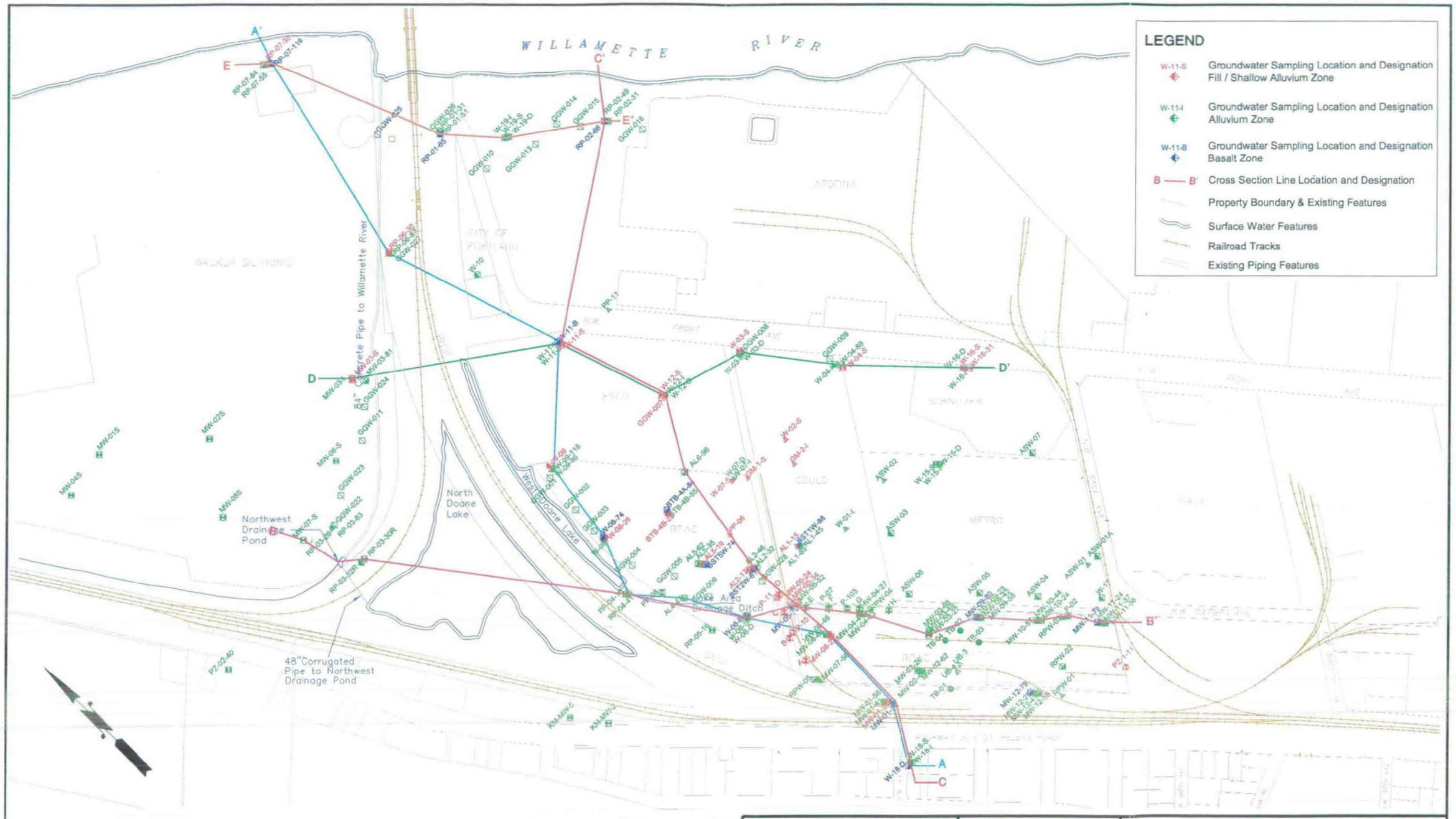
W.O.	0-61M-10703T43
DESIGN	TARW
DRAWN	BRJ
DATE	AUGUST 2002
SCALE	1"=350'

FIGURE 3-4
GROUNDWATER ELEVATIONS
BASALT ZONE
SPRING 2002
RPAC-PORTLAND SITE

AMEC DRAWING NO. K:\10000\10700\10703\Task 43 Groundwater Monitoring\GW Char Report\dwg\Figure 3-4.dwg



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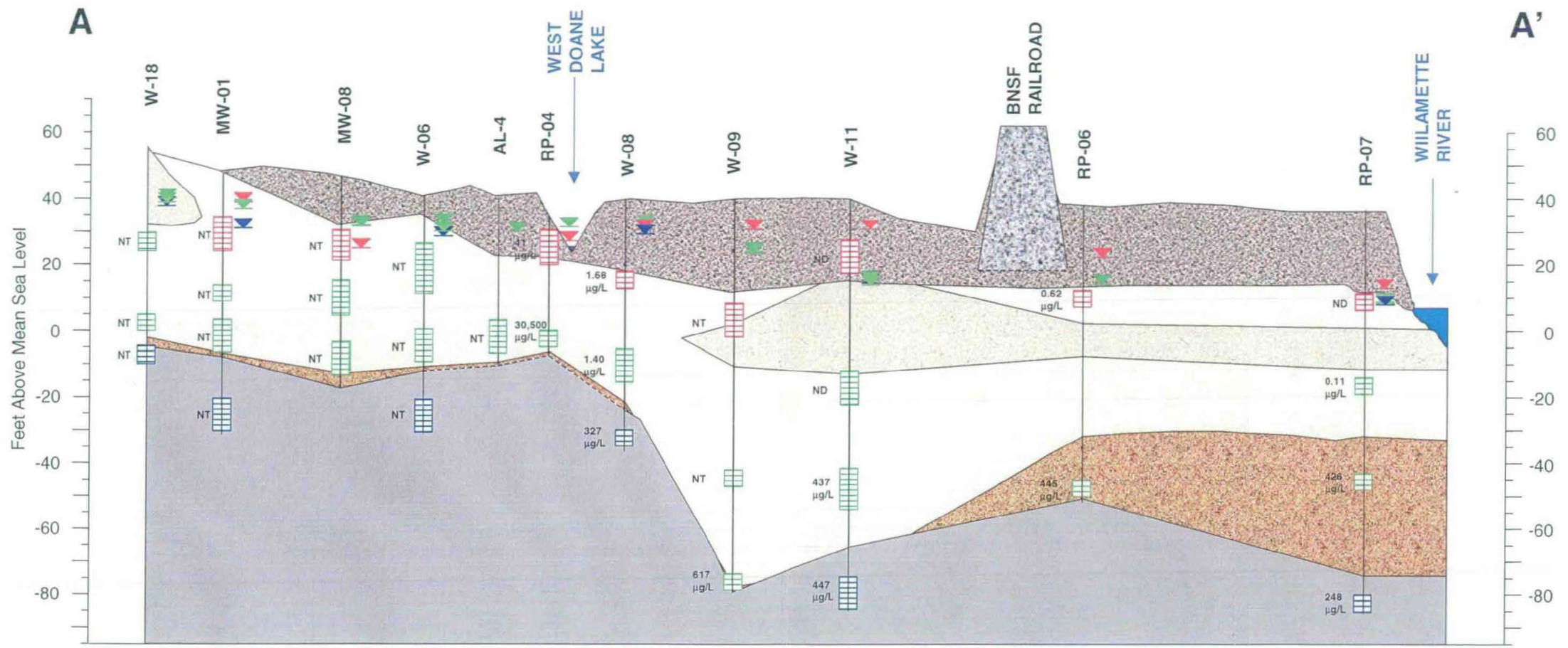
W.O.	0-61M-10703T43
DESIGN	TARW
DRAWN	BRJ
DATE	NOVEMBER 2002
SCALE	1"=350'

FIGURE 3-5
GEOLOGICAL CROSS SECTION LOCATIONS

RPAC-PORTLAND SITE

AMEC DRAWING NO. K:\10000\10700\10703\Task 43 Groundwater Monitoring\GW Char Report\dwg\Figure 3-5A.dwg



LEGEND

W-18 Monitoring well cluster number and location

Screened interval from monitoring well located in the Fill/Shallow Alluvium Characterization Zone

Screened interval from monitoring well located in the Alluvium Characterization Zone

Screened interval from monitoring well located in the Basalt Characterization Zone

Groundwater elevation from Spring 2002 survey for monitoring well screened in the Fill/Shallow Alluvium Characterization Zone

Groundwater elevation from Spring 2002 survey for monitoring well screened in the Alluvium Characterization Zone

Groundwater elevation from Spring 2002 survey for monitoring well screened in the Basalt Characterization Zone

Approximate lithologic contact (dashed where inferred)

FILL

SANDY SILT OF THE ALLUVIUM ZONE

CLAYEY SILT OF THE ALLUVIUM ZONE

GRAVEL OF THE ALLUVIUM ZONE

BASALT ZONE

µg/L micrograms per liter

ND Concentration not detected at or above the method detection limit

NT Constituent not tested for during the Spring 2002 sampling event

617 µg/L 1,2-dichlorobenzene concentration in micrograms per liter in Spring 2002

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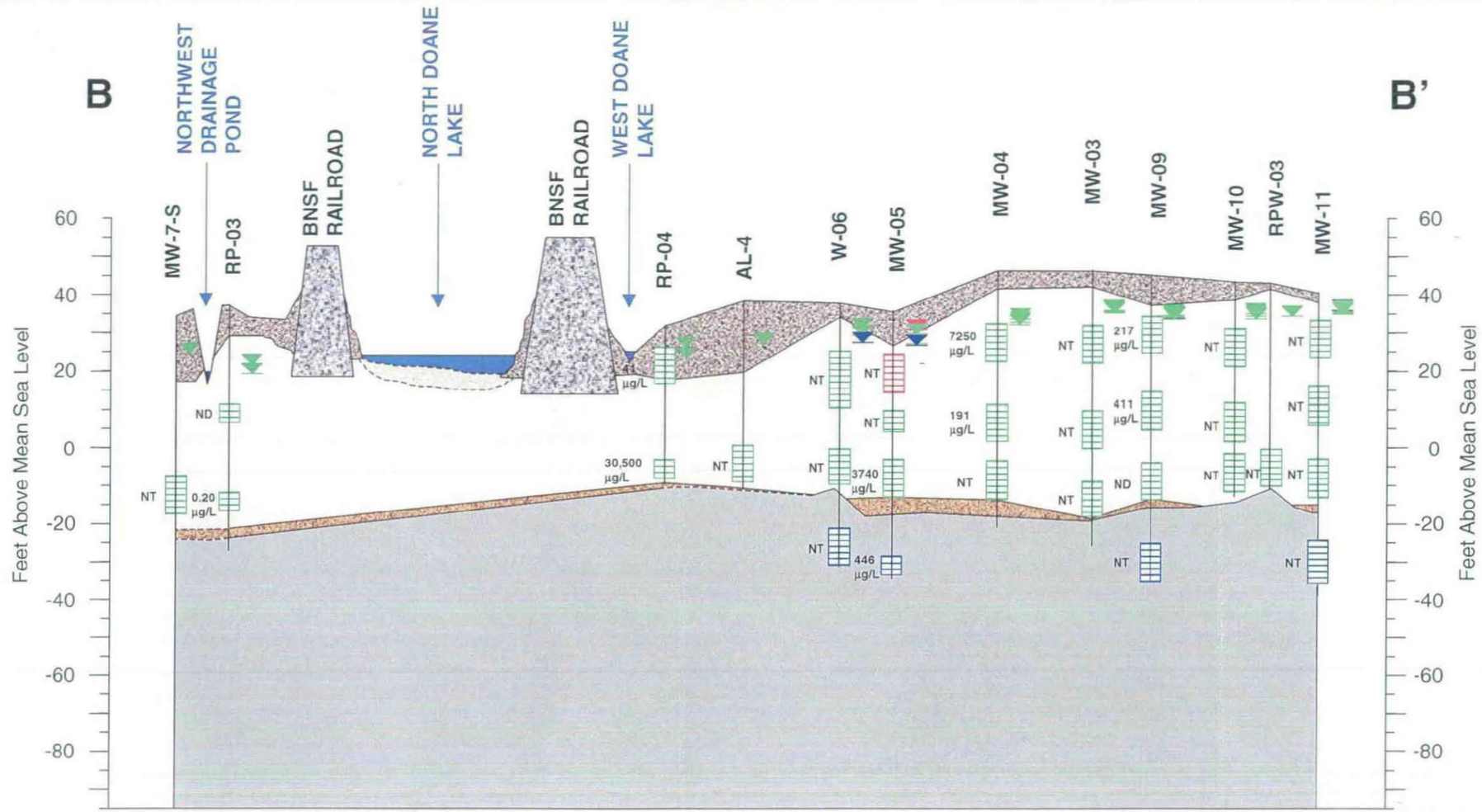
W.O.	0-61M-10793-T43
DESIGN	MVK
DRAWN	MVK
DATE	MARCH 2003
SCALE	AS NOTED

FIGURE 3-6
SIMPLIFIED GEOLOGICAL CROSS SECTION W\ GROUNDWATER ELEVATIONS AND 1,2 DCB CONCENTRATIONS FOR SPRING 2002
SECTION A - A'
RPAC - PORTLAND SITE

AMEC DRAWING NO. k:\10000\10700\10703\Task43\Groundwater Monitoring\xsections\A to A'.ppt



LEGEND

W-18 Monitoring well cluster number and location

Screened interval from monitoring well located in the Fill/Shallow Alluvium Characterization Zone

Screened interval from monitoring well located in the Alluvium Characterization Zone

Screened interval from monitoring well located in the Basalt Characterization Zone

Groundwater elevation from Spring 2002 survey for monitoring well screened in the Fill/Shallow Alluvium Characterization Zone

Groundwater elevation from Spring 2002 survey for monitoring well screened in the Alluvium Characterization Zone

Groundwater elevation from Spring 2002 survey for monitoring well screened in the Basalt Characterization Zone

Approximate lithologic contact (dashed where inferred)

FILL

SANDY SILT OF THE ALLUVIUM ZONE

CLAYEY SILT OF THE ALLUVIUM ZONE

GRAVEL OF THE ALLUVIUM ZONE

BASALT ZONE

µg/L	micrograms per liter
ND	Concentration not detected at or above the method detection limit
NT	Constituent not tested for during the Spring 2002 sampling event
617 µg/L	1,2-Dichlorobenzene concentration in micrograms per liter, Spring 2002

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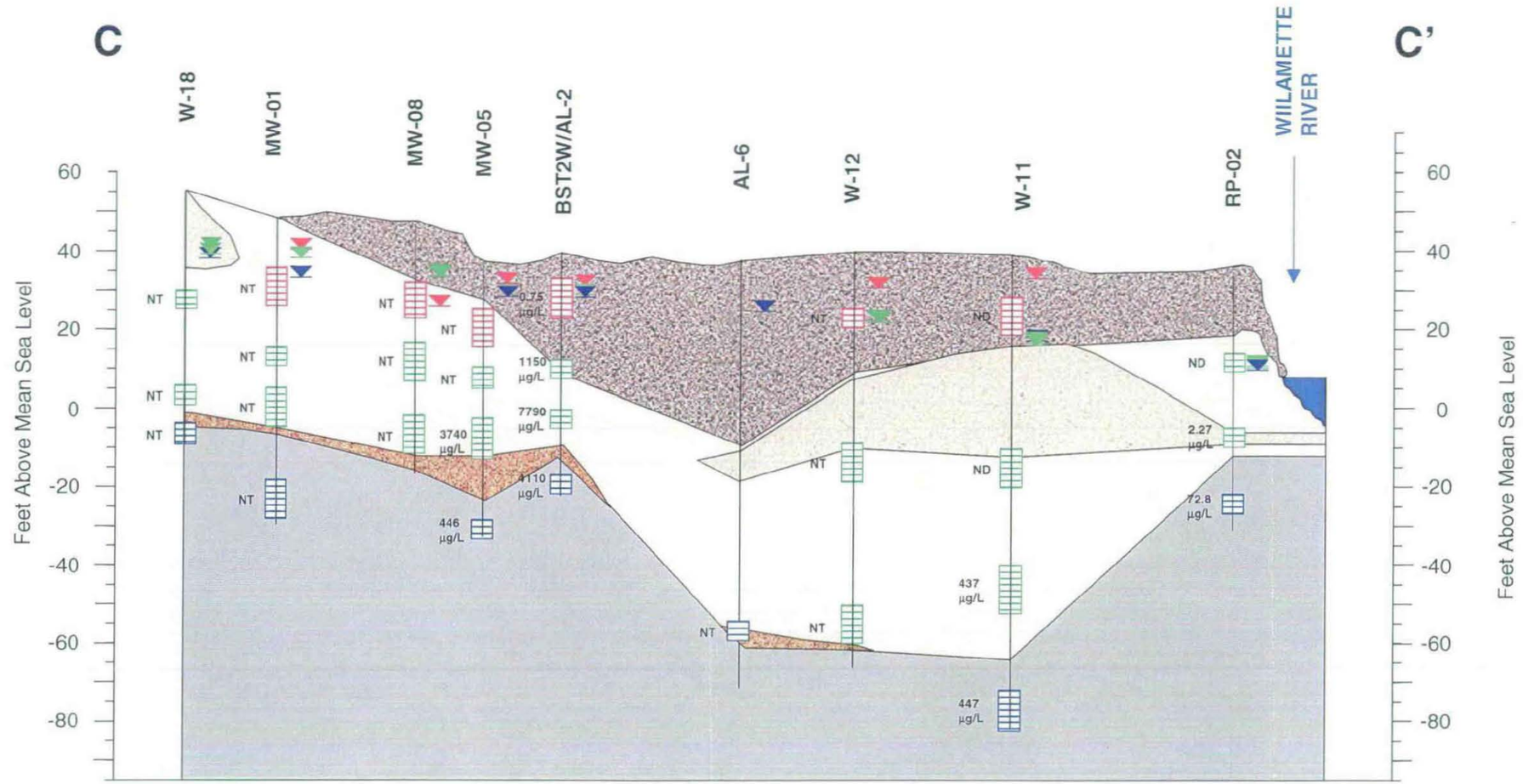
W.O.	0-61M-10793-T43
DESIGN	MVK
DRAWN	MVK
DATE	MARCH 2003
SCALE	AS NOTED

FIGURE 3-7
SIMPLIFIED GEOLOGICAL CROSS SECTION W\ GROUNDWATER ELEVATIONS AND 1,2 DCB CONCENTRATIONS FOR SPRING 2002
SECTION B - B'
RPAC - PORTLAND SITE

AMEC DRAWING NO. k:\10000\10700\10703\Task43\Groundwater Monitoring\xsections\B to B'.ppt



VERTICAL EXAGGERATION IS 10x

LEGEND

W-18 Monitoring well cluster number and location

Screened interval from monitoring well located in the Fill/Shallow Alluvium Characterization Zone

Screened interval from monitoring well located in the Alluvium Characterization Zone

Screened interval from monitoring well located in the Basalt Characterization Zone

Groundwater elevation from Spring 2002 survey for monitoring well screened in the Fill/Shallow Alluvium Characterization Zone

Groundwater elevation from Spring 2002 survey for monitoring well screened in the Alluvium Characterization Zone

Groundwater elevation from Spring 2002 survey for monitoring well screened in the Basalt Characterization Zone

Approximate lithologic contact (dashed where inferred)

FILL

SANDY SILT OF THE ALLUVIUM ZONE

CLAYEY SILT OF THE ALLUVIUM ZONE

GRAVEL OF THE ALLUVIUM ZONE

BASALT ZONE

µg/L micrograms per liter

ND Concentration not detected at or above the method detection limit

NT Constituent not tested for during the Spring 2002 sampling event

617 µg/L 1,2-Dichlorobenzene concentration in micrograms per liter, Spring 2002

amec

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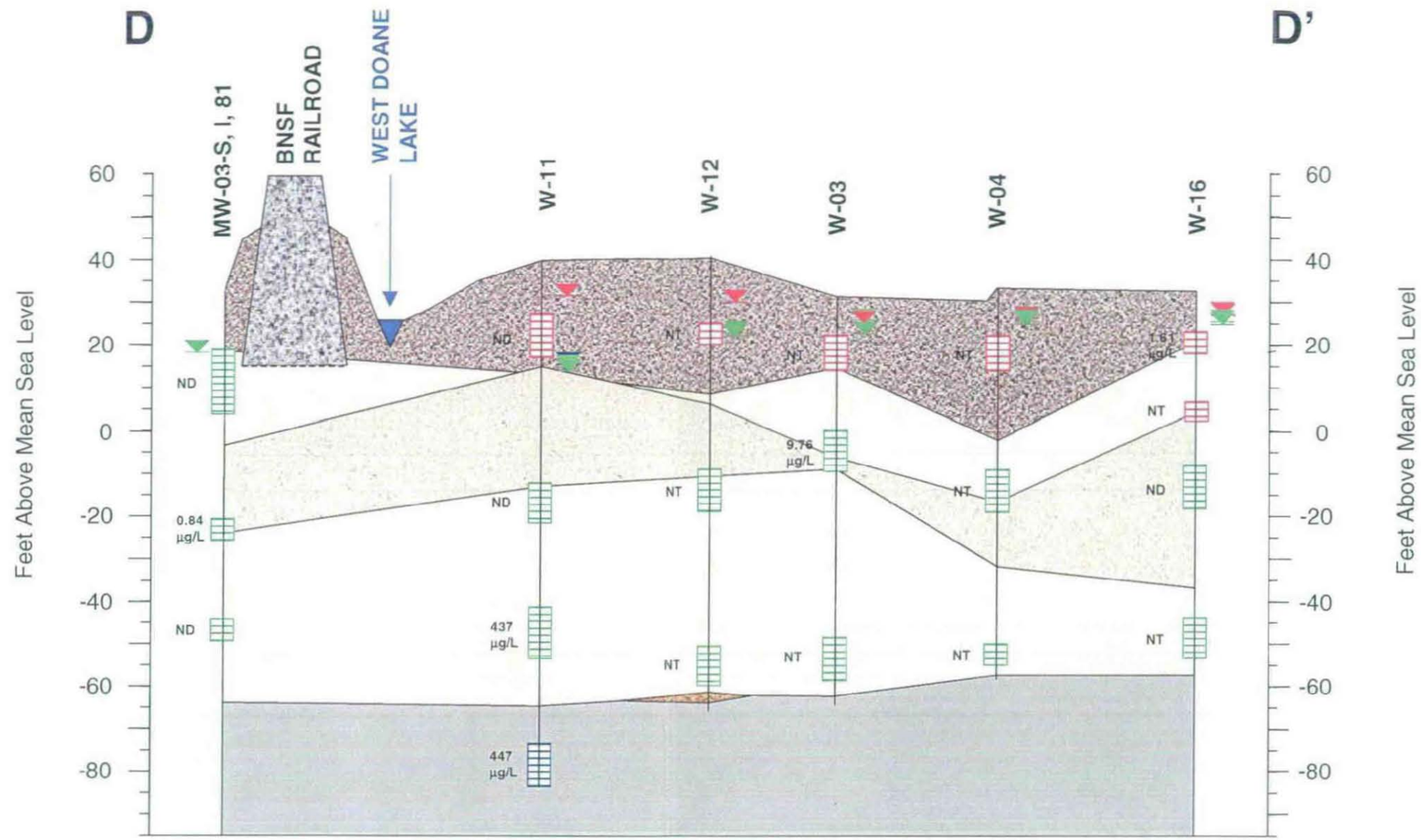
W.O.	0-61M-10793-T43
DESIGN	MVK
DRAWN	MVK
DATE	MARCH 2003
SCALE	AS NOTED

FIGURE 3-8
SIMPLIFIED GEOLOGICAL CROSS SECTION W\ GROUNDWATER ELEVATIONS AND 1,2 DCB CONCENTRATIONS FOR SPRING 2002
SECTION C - C'
RPAC - PORTLAND SITE

AMEC DRAWING NO. k:\10000\10700\10703\Task43\Groundwater Monitoring\xsections\C to C'.ppt



VERTICAL EXAGGERATION IS 10x

LEGEND

W-18 Monitoring well cluster number and location

Screened interval from monitoring well located in the Fill/Shallow Alluvium Characterization Zone

Screened interval from monitoring well located in the Alluvium Characterization Zone

Screened interval from monitoring well located in the Basalt Characterization Zone

Groundwater elevation from Spring 2002 survey for monitoring well screened in the Fill/Shallow Alluvium Characterization Zone

Groundwater elevation from Spring 2002 survey for monitoring well screened in the Alluvium Characterization Zone

Groundwater elevation from Spring 2002 survey for monitoring well screened in the Basalt Characterization Zone

Approximate lithologic contact (dashed where inferred)

FILL

SANDY SILT OF THE ALLUVIUM ZONE

CLAYEY SILT OF THE ALLUVIUM ZONE

GRAVEL OF THE ALLUVIUM ZONE

BASALT ZONE

µg/L micrograms per liter

ND Concentration not detected at or above the method detection limit

NT Constituent not tested for during the Spring 2002 sampling event

617 µg/L 1,2-Dichlorobenzene concentration in micrograms per liter, Spring 2002

amec

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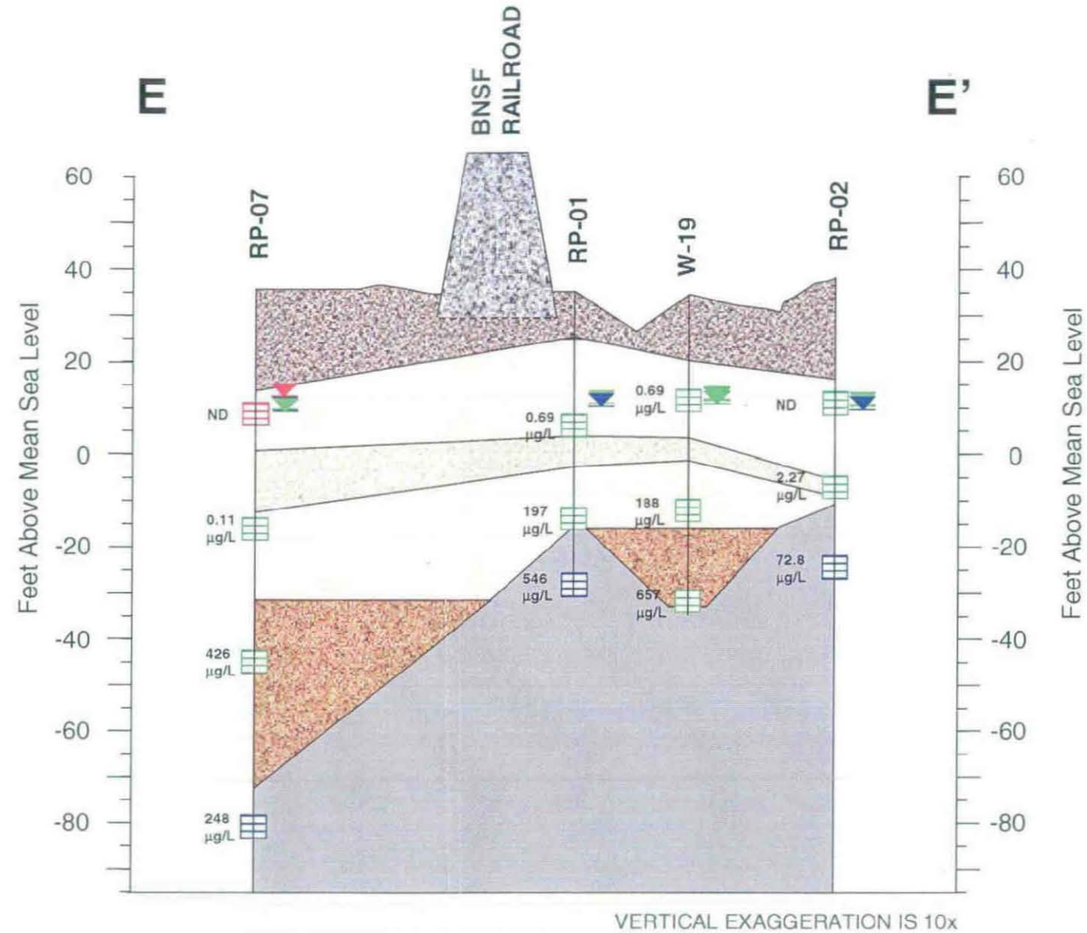
W.O.	0-61M-10793-T43
DESIGN	MVK
DRAWN	MVK
DATE	MARCH 2003
SCALE	AS NOTED

FIGURE 3-9
SIMPLIFIED GEOLOGICAL CROSS SECTION W\ GROUNDWATER ELEVATIONS AND 1,2 DCB CONCENTRATIONS FOR SPRING 2002
SECTION D - D'
RPAC - PORTLAND SITE

AMEC DRAWING NO. k:\10000\10700\10703\Task43\Groundwater Monitoring\xsections\D to D'.ppt



LEGEND

W-18 Monitoring well cluster number and location

Screened interval from monitoring well located in the Fill/Shallow Alluvium Characterization Zone

Screened interval from monitoring well located in the Alluvium Characterization Zone

Screened interval from monitoring well located in the Basalt Characterization Zone

Groundwater elevation from Spring 2002 survey for monitoring well screened in the Fill/Shallow Alluvium Characterization Zone

Groundwater elevation from Spring 2002 survey for monitoring well screened in the Alluvium Characterization Zone

Groundwater elevation from Spring 2002 survey for monitoring well screened in the Basalt Characterization Zone

Approximate lithologic contact (dashed where inferred)

FILL

SANDY SILT OF THE ALLUVIUM ZONE

CLAYEY SILT OF THE ALLUVIUM ZONE

GRAVEL OF THE ALLUVIUM ZONE

BASALT ZONE

µg/L	micrograms per liter
ND	Concentration not detected at or above the method detection limit
NT	Constituent not tested for during the Spring 2002 sampling event
617 µg/L	1,2-Dichlorobenzene concentration in micrograms per liter, Spring 2002

amec

7376 S.W. Durham Road
Portland, OR, U.S.A. 97224

W.O.	0-61M-10793-T43
DESIGN	MVK
DRAWN	MVK
DATE	MARCH 2003
SCALE	AS NOTED

FIGURE 3-10
SIMPLIFIED GEOLOGICAL CROSS SECTION W\ GROUNDWATER ELEVATIONS AND 1,2 DCB CONCENTRATIONS FOR SPRING 2002
SECTION E - E'
RPAC - PORTLAND SITE

AMEC DRAWING NO. k:\10000\10700\10703\Task43\Groundwater Monitoring\xsections\E to E'.ppt

NOTE: LOCATIONS OF FEATURES ARE APPROXIMATE.
INFORMATION PRESENTED ON THIS FIGURE IS BASED ON FIELD DOCUMENTATION.
INFORMATION INCLUDED ON FIGURE IS FROM SEVERAL INVESTIGATIVE EVENTS OVER A PERIOD OF 20 YEARS, AND MAY NOT BE REPRESENTATIVE OF CURRENT RPAC SITE CONDITIONS.

amec

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Portland, OR, U.S.A. 97224

W.O.	0-61M-107030-T43
DESIGN	HB
DRAWN	TS
DATE	NOVEMBER 2002
SCALE	1"=150'

FIGURE 3-11

NAPL OCCURRENCE IN SOIL AND GROUNDWATER

RPAC - PORTLAND, OR

AMEC DRAWING NO. k:\10000\10700\10703\Task 43 Groundwater Monitoring\GW Char Report\ dwg \ FIG3-11_DNAPL.DWG

SCOEPA00007285

LETTER OF TRANSMITTAL

TO:

Wacker Siltronic Corporation PO Box 83180 Portland, OR 97283	Date:	April 2, 2003
	Job No:	0-61M-10703-0/Task 43
	Attn:	Cathryn Young
	RE:	RPAC - Portland Site

WE ARE SENDING YOU: ☐ Attached ☒ Under Separate Cover via US Mail

Copies	Dated	Description
1	3/28/03	Final Groundwater Characterization Report

THESE ARE TRANSMITTED as checked below:

☐ For Review ☐ For Approval ☒ For Your Use ☐ As Requested

REMARKS:

AMEC Earth & Environmental, Inc.
7376 SW Durham Road
Portland, Oregon
USA 97224
Tel +1 (503) 639-3400
Fax +1 (503) 620-7892