S128.01.08/2

Project Number /TASK

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SCOEPA00013110

Oregon
Theodore Kulongoski, Governor

Department of Environmental Quality
Northwest Region Portland Office
2020 SW 4th Avenue, Suite 400
Portland, OR 97201-4987
(503) 229-5263
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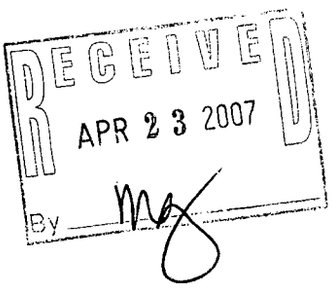
April 19, 2007

Also Sent Via E-mail



Mr. Robert J. Wyatt
Northwest Natural Gas Company
220 N.W. Second Avenue
Portland, OR 97209

Re: Proposed 2007 Groundwater Monitoring Program
Northwest Natural Gas Company Site
Portland, Oregon
ECSI No. 83

Dear Mr. Wyatt:

The Department of Environmental Quality (DEQ) has reviewed the "Proposed 2007 Groundwater Monitoring Program, NW Natural - Gasco Facility, 7900 NW St. Helens Road, Portland, Oregon" dated February 28, 2007 (the Monitoring Proposal). Hahn and Associates, Inc. (Hahn) prepared the Monitoring Proposal on behalf of the Northwest Natural Gas Company (NW Natural). The Monitoring Proposal presents NW Natural's approach for conducting groundwater monitoring in 2007 on its property (NW Natural Property or Gasco Site). Currently groundwater sampling occurs on a semi-annual or annual basis depending on the location of the monitoring well.

DEQ understands from reviewing the document that NW Natural is proposing to conduct the following work items at all existing monitoring wells at the Gasco Site:

- Measure groundwater levels and thicknesses of non-aqueous phase liquids on a quarterly basis;
- Collect groundwater samples for analysis once during the second calendar quarter of 2007; and
- Analyze groundwater samples for volatile organic compounds (VOCs), including benzene, ethylbenzene, toluene, and total xylenes (BTEX compounds); polycyclic aromatic hydrocarbons (PAHs), cyanide (total, amenable, and free forms), and metals (total concentrations of arsenic, cadmium, chromium, copper, lead, mercury, nickel, and zinc).

The Monitoring Proposal also provides flexibility for sampling new monitoring wells and/or existing monitoring wells more frequently, and for additional parameters, as needed to support the ongoing groundwater pathway source control (GSC) evaluations.

DEQ understands the Monitoring Proposal was developed with the purpose of maintaining the site-wide groundwater database for the principal chemicals of interest (COI) identified at the NW Natural Property. However, conducting groundwater sampling annually for the chemical groups listed above will not meet the needs of the GSC evaluations being conducted by NW Natural. More comprehensive and contemporaneous groundwater monitoring data are warranted. As such, DEQ does not approve the Monitoring Proposal.

In the interest of initiating groundwater monitoring as soon as practicable to support GSC evaluations, DEQ has developed a groundwater monitoring program for the Gasco Site that focuses data collection efforts on monitoring wells located with 200 feet of the shore-line. DEQ expects NW Natural to perform groundwater monitoring consistent with the program outlined below.

Monitoring Wells within 200 feet of the Shoreline

Characterizing groundwater within 200 feet of shore-line is critical for informing GSC evaluations because: 1) GSC measures are likely to be implemented within this portion of the Gasco Site; 2) complete groundwater chemistry data is essential for detailed assessment of the GSC measures being considered by NW Natural (i.e., combinations of groundwater extraction and treatment with a vertical barrier). This data can also be used, in part, to support in-water work being contemplated by the US Environmental Protection Agency.

To support GSC planning and design, DEQ will expect the following sampling and analytical work to be performed at all monitoring wells on the NW Natural Property located within 200 feet of the shoreline for a minimum of four quarters.

- Measure groundwater levels and the thicknesses of non-aqueous phase liquids; and
- Collect groundwater samples for analysis of:
  - PAHs plus 2-methylnaphthalene, dibenzofuran, and carbazole;
  - BTEX compounds;
  - Cyanide (total, amenable, and free forms);
  - Total concentrations of metals including, aluminum, antimony, arsenic, barium, beryllium, cadmium, calcium, chromium, copper, iron, lead, magnesium, manganese, mercury, nickel, potassium, selenium, silver, sodium, thallium, vanadium, and zinc; and
  - Additional groundwater characterization and treatment parameters (i.e., ammonia, carbonate, chloride, sulfate, total alkalinity [as $CaCO_3$], bicarbonate [as $CaCO_3$], and nitrate).

In addition to the parameters listed above, groundwater samples collected from selected monitoring wells (e.g, MW-17-79 and MW-19-125, and MW-5-100 and MW-20-120) should be analyzed for a complete list of VOCs.

DEQ anticipates groundwater sample collection, handling, transport, and chain-of-custody procedures; and/or laboratory analytical methods, method reporting/detection limits, and quality assurance/quality control protocols utilized for this monitoring program will be consistent with previously approved plans. Any modifications or supplements to approved plans should be provided to DEQ for review and approval.

Monitoring Wells Greater than 200 feet from the Shoreline

As mentioned above, the Monitoring Proposal was developed with the purpose of maintaining the Gasco Site COI groundwater database. DEQ approves the Monitoring Proposal for use at monitoring wells located more than 200 feet from the shoreline.

Siltronic Site Groundwater Monitoring

NW Natural and Siltronic are currently evaluating GSC measures in the northern corner of the Siltronic site. Given that the GSC measures being evaluated by NW Natural could involve this area, DEQ will expect the monitoring program outlined in this letter to be implemented by NW Natural concurrently on the Siltronic site[1]. Groundwater sampling and analysis conducted on the Siltronic site should meet the overall data collection objectives listed above. If Siltronic conducts groundwater monitoring during a similar timeframe (i.e., within one week of NW Natural) and includes any of the parameter groups DEQ has required of NW Natural (e.g., VOCs), this data can be used to meet the needs of the monitoring program. NW Natural should communicate and coordinate directly with Siltronic regarding gaining access to monitoring wells for sample collection.

Next Steps

DEQ expects NW Natural to provide: 1) written confirmation that the groundwater monitoring program outlined in this letter will be implemented at the Gasco Site, and 2) documentation of the agreement(s) reached with Siltronic to conduct and/or coordinate groundwater monitoring on the Siltronic site.

Please don't hesitate to contact me if you have any questions regarding this letter, or if I can assist in discussions regarding NW Natural performing groundwater monitoring on the Siltronic site.

Sincerely,

Dana Bayuk
Project Manager
Portland Harbor Section

Cc: Sandy Hart, NW Natural
Patty Dost, Schwabe Williamson & Wyatt
Rob Ede, Hahn & Associates
John Edwards, Anchor Environmental
Carl Stivers, Anchor Environmental
Tom McCue, Siltronic
Alan Gladstone and Bill Earle, Davis Rothwell Earle & Xochihua, P.C
James Peale, Maul Foster & Alongi, Inc.
Henning Larsen, SRS
ECSI No. 83 File

[1] Monitoring wells on Siltronic property that should be incorporated into the monitoring program include the WS-12 and WS-14 nested completions, and monitoring wells WS-8-59, WS-11-161, and WS-21-112.

DEQ-DC1

Project Number 8128.01.08/02

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SCHWABE, WILLIAMSON & WYATT
ATTORNEYS AT LAW

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RECEIVED
FEB 28 2006
By AMF

February 27, 2007

Alan Gladstone
Davis Rothwell Earle & Xochihua, P.C.
1900 Wells Fargo Center
1300 SW 5th Ave.
Portland, OR 97201

Tom McCue
Siltronic Corporation
7200 NW Front Avenue
Portland, OR 97210-3676

James Peale
Maul Foster Alongi
3121 SW Moody
Portland, OR 97239

Re: Pilot Cap Long-Term Monitoring – NW Natural "Gasco" Site
Diver Reconnaissance and Data Summary Report
Our File No.: 062655/126484

Dear Alan, Tom, and James:

Enclosed are two CDs containing Anchor's Diver Reconnaissance and Data Summary Report with respect to the NW Natural "Gasco" Site.

Very truly yours,

SCHWABE, WILLIAMSON & WYATT, P.C.

John N. Gootherts
Secretary to Patricia M. Dost

PMD:jng
Enclosures

PDX/062655/126484/JNG/1517855.1

SCOEPA00013115

Project Number 828.01.08 / 02

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PROJECT FILE

RECEIVED
DEC 19 2006
By

December 15, 2006

Alan Gladstone
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Tom McCue
Siltronic Corporation
7200 NW Front Avenue
Portland, OR 97210-3676

James Peale
Maul Foster Alongi
3121 SW Moody
Portland, OR 97239

Re: Environmental Monitoring Reports-First and Second Quarter 2006, NW Natural Gasco Property, 7900 NW St. Helens Avenue, Portland, Oregon
Our File No.: 062655/126484

Dear Alan, Tom, and James:

Enclosed are two CDs containing Hahn and Associates' Environmental Monitoring Reports for the first and second quarter of 2006.

Very truly yours,

SCHWABE, WILLIAMSON & WYATT, P.C.

John N. Goetherts
Secretary to Patricia M. Dost

PMD:jng

SCOEPA00013117

HAHN AND ASSOCIATES, INC.
ENVIRONMENTAL CONSULTANTS

December 4, 2006

RECEIVED
DEC 13 2006
Schwabe, Williamson & Wyatt

Mr. Matt McClincy
Oregon Department of Environmental Quality
Northwest Region, Portland Office
Portland Harbor Section
2020 SW Fourth Avenue, Suite 400
Portland Oregon 97201-4987

HAI Project No. 2708
DEQ ECSI File No. 84

SUBJECT: Environmental Monitoring Reports-First and Second Quarter 2006, NW Natural Gasco Property, 7900 NW St. Helens Avenue, Portland, Oregon

Dear Mr. McClincy:

On behalf of NW Natural, Hahn and Associates, Inc. is submitting two copies of the Environmental Monitoring Reports for the First and Second Quarters of 2006 at the NW Natural Gasco facility, 7900 NW St. Helens Road, Portland, Oregon. These reports contain analytical data and a description of groundwater monitoring events, including DNAPL system and weather station monitoring, as conducted at the Gasco site during this timeframe.

Should you have any questions, please contact the undersigned.

Sincerely,

Rob Ede, R.G.
Sr. Associate

robe@hahnenv.com

c: Mr. Bob Wyatt, NW Natural
Ms. Patty Dost, Schwabe, Williamson & Wyatt (4 CD)
Mr. Carl Stivers, Anchor Environmental, L.L.C. (on CD)
Mr. John Edwards, Anchor Environmental, L.L.C. (on CD)

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Project Number 328.01.08/2

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Theodore Kulongoski, Governor

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JAN 3 2006
By

PROJECT FILE

December 28, 2006

Also Sent Via E-mail

Mr. Robert J. Wyatt
Northwest Natural
220 N.W. Second Avenue
Portland, OR 97209

Re: Addendum 2, Final Phase 1 Field Sampling Approach
Groundwater Source Evaluation
Northwest Natural Gas Company Site
Portland, Oregon
ECSI No. 84

Dear Mr. Wyatt:

The Oregon Department of Environmental Quality (DEQ) reviewed the "Addendum to Offshore Final Phase I Field Sampling Approach, NW Natural, Gasco Site, Portland, Oregon" dated December 6, 2006. The December 6th addendum was supplemented by a letter dated December 20, 2006 that provided additional information and details regarding the location of Boring GS-06. The December 6th addendum and December 20th letter are collectively referred to as "Addendum 2" in this letter. Anchor Environmental, LLC prepared Addendum 2 on behalf of the Northwest Natural Gas Company (NWNG).

DEQ concurs with Anchor's determination that as proposed, Boring GS-06 is in a key location to provide data for the groundwater source control evaluation. DEQ approves Addendum 2 and its incorporation into the Phase 1 FSA[1] subject to the following conditions.

- NWNG will follow the procedures described in Addendum 2 to protect and repair the cap during and after drilling. Based on Figure 4, DEQ's expects the organo-clay mat to be avoided. Although DEQ prefers the barge to be oriented so the spuds are not placed on the cap, DEQ acknowledges that avoiding the cap may not be practicable given access limitations and working space considerations. If the spuds must be placed on the cap, DEQ understands that after Boring GS-06 is abandoned, each spud location will be marked and then repaired with one cubic yard of similar armor stone, and the effectiveness of the repair(s) will be confirmed through inspection.
- Boring GS-06 is located in an area where significant contamination occurs. The current configuration of booms deployed during drilling includes (from inner-most to outer-most): 1) sorbent booms that encircle the 8-inch conductor casing; 2) sorbent booms that surround

[1] Anchor Environmental, LLC, 2006, "Final Phase 1 Field Sampling Approach, GASCO Siltronic Groundwater Source Evaluation", September (as amended by the "Addendum to Offshore Final Phase I Field Sampling Approach, NW Natural, Gasco Site, Portland, Oregon", September 29). A work plan prepared on behalf of the Northwest Natural Gas Company.

the barge (including the spuds) and work area (i.e., area beneath the drilling platform); and 3) a containment boom that encloses the barge against the shore and prevents releases that could occur outside the sorbent boomed area, if any, from escaping to the river. Prior to initiating work at GS-06, this arrangement of sorbent/containment booms should be reviewed in anticipation of releases taking place from the spuds and borehole during drilling and when the spuds/conductor casing are retracted after drilling is complete.

- The inventory of available sorbent pads/booms should be checked prior to initiating work at GS-06 to ensure that sufficient quantities of each are available and ready for immediate use if needed.

Please don't hesitate to contact Dana Bayuk (503/229-5543) if you have any questions regarding this letter.

Sincerely,

for

Matt McClincy
Project Manager
Portland Harbor Section

Cc: Sandy Hart, NW Natural
Tom McCue, Siltronic Corporation
Patty Dost, Schwabe Williamson & Wyatt
Alan Gladstone, Davis Rothwell Earle & Xochihua, P.C.
Chris Reive, Jordan Schrader
Carl Stivers, Anchor Environmental
John Edwards, Anchor Environmental
Rob Ede, Hahn & Associates
James Peale, Maul Foster & Alongi
Cinde Donoghue, Environment International
Eric Blischke, EPA
Rene Fuentes, EPA
Chip Humphrey, EPA
Kristine Koch, EPA
Sean Sheldrake, EPA
Dana Bayuk, PHS
ECSI No. 84 File

DEQ-DC1

Project Number 6128.01.08/02

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SCHWABE, WILLIAMSON & WYATT
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RECEIVED
OCT 17 2006
By AMF

October 16, 2006

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Environmental Manager
Siltronic Corporation
7200 NW Front Avenue
Portland, OR 97210-3676

James Peale
Hydrogeologist
Maul Foster Alongi
3121 SW Moody
Portland, OR 97239

Re: Report of Completed Activities: Workplan for Proposed Additional Activities -- DNAPL Occurrence Investigation -- MW-13-61 Area, NW Natural Gasco Property, 7900 NW St. Helens Road, Portland, Oregon
Our File No.: 062655/126514

Dear Alan, Tom, and James:

At Alan Gladstone's request, enclosed are two CDs containing the above-referenced reports along with a copy of Rob Ede's cover letter to Matt McClincy dated October 6, 2006. Please contact Rob Ede if you have any questions.

Very truly yours,

Patricia M. Dost

PMD:jng
Enclosures
cc: Rob Ede

HAHN AND ASSOCIATES, INC.
ENVIRONMENTAL CONSULTANTS

RECEIVED
2006
Schwabe, Williamson & Wyatt

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OCT 16 2006
Schwabe, Williamson & Wyatt

October 6, 2006

Mr. Matt McClincy
Oregon Department of Environmental Quality
Northwest Region, Portland Office
2020 SW 4th Avenue, Suite 400
Portland, Oregon 97201-4987

HAI Project No. 2708

SUBJECT: Report of Completed Activities; Workplan for Proposed Additional Activities – DNAPL Occurrence Investigation – MW-13-61 Area, NW Natural Gasco Property, 7900 NW St. Helens Road, Portland, Oregon

Dear Mr. McClincy:

On behalf of NW Natural, Hahn and Associates, Inc. (HAI) is submitting three copies of the enclosed report documenting activities completed to date related to the investigation dense non-aqueous phase liquid (DNAPL) blebs previously identified at the MW-13-61 well location at the Gasco property. As documented in the enclosed report, well MW-13-61 has been decommissioned due to concerns regarding a failure in the annular well seal material.

In addition to documenting completed activities, the enclosed document also includes a description of additional soil boring activities that are proposed at this time to further the investigation into the extent of DNAPL at this portion of the site. NW Natural will schedule these additional activities as soon as DEQ concurrence with the enclosed work plan is received.

Please call the undersigned at (503) 796-0717 if you have any questions.

Sincerely,

Rob Ede, R.G.
Senior Associate

Enclosure

cc: Mr. Bob Wyatt, NW Natural
Ms. Patty Dost, Schwabe, Williamson & Wyatt (3 CDs)
Mr. Carl Stivers, Anchor Environmental, LLC

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Project Number 8128.01.02/02

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RECEIVED
SEP 27 2006
By

September 25, 2006

Mr. Robert J. Wyatt
Northwest Natural
220 N.W. Second Avenue
Portland, OR 97209

Re: Final Phase 1 Field Sampling Approach
Groundwater Source Evaluation
Northwest Natural Gas Company Site
Portland, Oregon

Dear Mr. Wyatt:

The Oregon Department of Environmental Quality (DEQ) has reviewed the "Final Phase 1 Field Sampling Approach, GASCO Siltronic Groundwater Source Evaluation" dated September 2006 (Phase 1 FSA). Anchor Environmental, LLC (Anchor) prepared the Phase 1 FSA on behalf of the Northwest Natural Gas Company (NWNG).

The primary objectives of the Phase 1 FSA are to collect groundwater chemistry data and general geotechnical information along the shoreline of the NWNG Site to: 1) assess the vertical and horizontal extent of site-related contamination in groundwater for comparison to data collected in the upland; and 2) the collect information on subsurface geotechnical conditions to support source control measures evaluations, including a vertical barrier.

The Phase 1 FSA also includes a description of the Phase 2 FSA scope of work. The Phase 2 FSA is proposed for implementation during the fall of 2007. Given the limited timeframe for conducting Phase 1 FSA drilling and sampling activities, DEQ is not providing comments on the sections of the document pertaining to the Phase 2 FSA. DEQ understands that NWNG will update the Phase 2 FSA for DEQ review based on the Phase I results and comments provided on the Phase 2 FSA by the Environmental Protection Agency and Portland Harbor Partners.

DEQ approves implementing the Phase 1 FSA under the following conditions:

- Given the time limitations of conducting the work and DEQ's priority for moving source control forward as efficiently as practicable, three additional borings should be added to the field sampling program (FSP). The additional borings are located where additional data is needed, or is reasonably likely to be needed.
  - An additional boring (GS-00) should be located approximately 200 feet west-southwest of the Boring GS-01 along the NWNG Site property line between U.S. Moorings. This boring will provide information in an area where additional measures may be needed to

prevent migration of contaminated groundwater onto an adjoining property and around hydraulic control and containment features constructed on the NWNG Site.

- Two borings should be located upstream of Boring GS-10 (GS-11, GS-12) adjacent to the Siltronic operable unit. Proposed boring GS-10 is located 150 feet upstream of the NWNG/Siltronic property line. The former "lowland effluent pond overflow area" extended approximately 400 feet upstream of the property line, and is considered a source DNAPL and groundwater contamination observed on the Siltronic operable unit. Borings GS-11 and GS-12 will provide additional information off-shore and upstream of the former lowland effluent pond overflow area.

- Borings GS-01, GS-03, GS-05, GS-07, GS-09, and GS-11 should be drilled to the top of the basalt to: 1) determine the thickness of the Alluvial water-bearing zone (Alluvial WBZ) at each location; 2) observe the physical nature of the basalt along the line of borings; and 3) support assessments of source control measures involving vertical barriers. Information collected on the Siltronic operable unit indicates the depth to basalt could be greater than 175 feet below mudline (bml).
- Borings GS-00, GS-02, GS-04, GS-06, GS-08, GS-010, and GS-12 should be advanced below dissolved phase groundwater contamination in the Alluvial WBZ. Observations made and data collected at monitoring well clusters WS-11, WS-12, and WS-14 on the Siltronic operable unit, provide strong evidence that DNAPL and dissolved phase groundwater contamination associated with NWNG's former operations could occur at depths greater than 100 feet and 160 feet bgs respectively. Given this information, the proposed depth of 100 feet bml is probably not sufficient to evaluate the vertical extent of groundwater contamination.
- Related to the condition above, DEQ expects that groundwater samples will be collected for analysis from depth intervals of 5, 10, 25, 50, 75, 100, 125, and 150 feet bml at every boring location, and that every other boring include a sample from 175 feet bml. More complete vertical characterization is essential for planning for future uplands and in-water groundwater monitoring and sampling work, including the Phase 2 FSA, and source control evaluations.
- The field program should be sequenced so that borings located in areas where levels of contamination are suspected to be highest (e.g., GS-04 through GS-11) are drilled and sampled first. This will allow the data from these locations to be collected during the timeframe available for conducting the work.
- It is probable that highly contaminated sediments will be encountered at shallow depths during drilling. The double-case method of drilling should be employed to reduce the potential for impacted shallow sediments to be carried down the borehole during drilling and bias the results of samples collected at depth. Using this drilling method could improve the comparability of this data to uplands groundwater data and assist in distinguishing between sediment impacts from historical direct discharge to the river, and contamination associated with groundwater transport.
- The presence and occurrence of NAPL in subsurface material should be a data collection objective of the Phase 1 (and Phase 2) FSA. In addition to visual inspection, field screening (e.g., hydrophobic dye shake test, ultraviolet fluorescence, sampler core strip test) of geologic material recovered during drilling should be included in the drilling program.

- Detailed descriptions of investigation derived waste (IDW) handling, containment, and management procedures should be provided for over-water work conducted on a barge. The procedures should include provisions for controlling sheen that may be produced during drilling and sampling activities.

The conditions listed above have been provided to clarify DEQ's understanding of the FSP items indicated and communicate our expectations regarding the data collection objectives of the Phase 1 FSA.

ADDITIONAL COMMENTS

Section 3.2.1, Page 21. The second paragraph suggests that not collecting soil samples from the same depth intervals as groundwater samples will increase the uncertainty of data interpretations with respect to the conceptual model for the site. DEQ disagrees with pre-qualifying the adequacy and/or usability of any information generated during the Phase 1 FSA before the work is complete and the data is reviewed against the data collection objectives of the project.

Section 3.6.2, 1st paragraph. NWNG indicates that the collection of shallow soil/sediment and groundwater samples may be complicated by the drilling rods sinking into material to greater than 5 feet bml/bgs. DEQ understands from this information that the driller cannot prevent this from occurring.

DEQ requests that if the above scenario occurs, the HydroPunch™ be used to collect the shallow groundwater sample before drilling proceeds (i.e., with no drill rods extended). After the shallow groundwater sample is collected drilling can proceed to 10 feet bml/bgs at which time both the 5 and 10 foot soil/sediment samples can be collected upon retrieval.

Section 3.6.2.2, Page 27. DEQ understands that a packer-based sampling system has been replaced with a HydroPunch™. A memorandum describing the HydroPunch™ method was provided separately from the Phase 1 FSA.

DEQ expects that the description of the HydroPunch™ method will be incorporated into the Phase 1 FSA addendum (see "Next Steps" below) to fully document the FSP for the project.

Section 3.6.2.2, last paragraph. In the event heavily impacted soil/sediment and/or groundwater is encountered during drilling, decontamination of sample collection equipment may be difficult.

DEQ requests that in these cases sampling equipment (e.g., pump tubing) be replaced rather than decontaminated and reused. This will reduce the amount of IDW produced from decontamination and make it easier to manage and secure the discarded items.

Table 6. This table should be revised consistent with the conditions listed above.

Table 7. DEQ requires that total (unfiltered polycyclic aromatic hydrocarbons [PAHs] and metals) will be included in the analyte list.

Although DEQ and Portland Harbor partners will consider the results of filtered PAH analysis, it is unlikely that any significant regulatory decisions will be based on these results. The decision to conduct filtered analysis of PAHs is entirely at the discretion of NWNG. Glass filters should be used if NWNG elects to collect filtered samples.

According to Table dissolved metals are to be filtered by the laboratory and preserved after filtering has occurred. This protocol has the potential to bias analytical results low as the samples will likely exhibit turbidity and the time between collection and filtering provides opportunity for sorption of metals to suspended solids.

DEQ requests that groundwater samples being analyzed for dissolved metals be filtered in the field into laboratory-supplied containers containing preservative.

Table 8. DEQ expects the laboratory method reporting limits and method detection limits shown to be consistent with those being used by the Lower Willamette Group for the Portland Harbor Remedial Investigation and Feasibility Study.

Figure 15. This figure should be revised consistent with the conditions listed above.

HydroPunch™ SOP. Prior to collecting a groundwater sample at least one casing volume will be purged from the sampler rods. DEQ also requests that, to the maximum extent practicable, all purging and sampling be performed using a pump.

NEXT STEPS

Before initiating field work DEQ expects NWNG to provide an addendum to the Phase 1 FSA that fully incorporates the conditions contained in this letter, including revised versions of Table 6, Table 7, and Figure 15. The addendum should also address DEQ's comments. DEQ's approval of the Phase 1 FSA will not be provided until the addendum has been received and reviewed for completeness.

DEQ appreciates the efforts NWNG is making to conduct near-shore drilling and sampling work during the earliest available time period.

Prior to September 27th contact me with questions regarding this letter. I will be on vacation from September 27th through October 5th. During my absence contact Dana Bayuk (503/229-5543) as needed.

Sincerely,

Matt McClincy
Project Manager
Portland Harbor Section

Cc: Sandy Hart, NW Natural
Tom McCue, Siltronic Corporation
Patty Dost, Schwabe Williamson & Wyatt
Alan Gladstone, Davis Rothwell Earle & Xochihua, P.C.
Chris Reive, Jordan Schrader
Carl Stivers, Anchor Environmental
John Edwards, Anchor Environmental
Rob Ede, Hahn & Associates
James Peale, Maul Foster Alongi
Dana Bayuk, PHS
Eric Blischke, EPA
Chip Humphrey, EPA
Kristine Koch, EPA
Sean Sheldrake, EPA
Rene Fuentes, EPA
Cinde Donoghue, Environment International

3128.01.08/02

Oregon
Theodore Kulongoski, Governor

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RECEIVED
JAN 30 2006
By

January 26, 2006

Mr. Bob Wyatt
Northwest Natural
220 NW Second Avenue
Portland, OR 97209

Subject: **Preliminary Identification of Technologies and Alternatives for Groundwater Source Control**
Gasco/Siltronic Groundwater Source Evaluation
ECSI #84

Dear Bob:

The Department of Environmental Quality (DEQ) reviewed the December 19, 2005 Preliminary Identification of Technologies and Alternatives for Groundwater Source Control prepared by Anchor Environmental, LLC.

General Comments:

The approach presented is not consistent with the Portland Harbor Joint Source Control Strategy (JSCS) in that the approach presented here assumes that it has not yet been established whether source control for upland groundwater is required and proposes evaluating in-water data and using a weight-of-evidence approach prior to establishing whether source control for groundwater is necessary. As stated in previous DEQ correspondence, DEQ considers the need to control contaminated groundwater migrating toward the Willamette River from the Gasco and Siltronic sites a high priority. The JSCS does not allow for a weight-of-evidence approach for high priority sites. Where high concentration groundwater discharge is occurring from upland, source control is required. "Sites identified as high priority should move directly into evaluation of source control alternatives and source control implementation without delay" (page 4-4 of the JSCS). Source control implementation is not only required in the restricted area along the bank where MGP waste was disposed, but also downriver where cyanide concentrations are orders of magnitude above the JSCS screening values. DEQ finds that there *is* sufficient data to evaluate and select a source control alternative that will be protective of the river without waiting for additional investigation data either upland or in-water.

Although in concept DEQ agrees with the extent of the study area, data further back from the bank can also be used in interpreting the groundwater plume moving towards and discharging into the Willamette River. The bank is the area where the groundwater leaving the site must be controlled. It would have been helpful to have the groundwater plume contoured by individual constituents at various depths using data from both within and upland from the study area.

Although the JSCS was not completed at the time this report was prepared, modifications made to the final JSCS would not change the path forward for the project. DEQ will not require NW Natural to revise the tables based on the final JSCS screening values; however, the new JSCS values should be used in future work. DEQ appreciates the detail of the screening tables and resulting synthesis into maps showing exceedances of selected COIs.

DEQ agrees that creating a short list of chemicals can be valuable; however, DEQ does not find the short list provided to be sufficient. Although the process used is presented, the report does not go through the process to demonstrate how the 4 constituents were selected. In our experience acenaphthene or phenanthrene may be observed migrating through the river sediments into the river ahead of naphthalene. Also, xylene has a lower JSCS ecological screening value of 1.8 µg/L versus 130 µg/L for benzene (although the tap water PRG for benzene is 0.35 µg/L). If the short list was only being used for mapping purposes to present the data visually, that is ok as the remainder of the data was available in the appendices. Any additional investigation should analyze for the complete suite of constituents of interest.

DEQ finds that NW Natural should move forward with evaluating the first 4 alternatives with the following suggested changes. GWSC-3 should include groundwater extraction in the high concentrations areas in addition to extraction wells located along the barrier wall to control groundwater from bypassing the barrier wall. GWSC-4 must consider groundwater treatment of a portion of the extracted groundwater as not all of the extracted groundwater will be able to be re-injected without losing some to the River. Monitored natural attenuation should be removed as an alternative for source control. This may be considered as a part of a remedial alternative at the point of the FS for the entire project but is not an effective alternative for source control to the river.

Specific Comments:

1. Introduction, first paragraph. DEQ is concerned about MGP waste that occurs across the entire Siltronic property, not only in the area where NW Natural had operational areas. There is a large amount of MGP waste in the subsurface across the entire site, and DEQ will require NW Natural to implement remedial measures across the site as appropriate.
2. Introduction. Paragraph 2. DEQ disagrees that there is insufficient data to screen down to a source control alternative. Additional data may need to be gathered to design the selected source control alternative, but there is sufficient data available to select an alternative based on the 4 identified alternatives that are acceptable to DEQ (GWSC-1 through GWSC-4).
3. Section 2. Paragraph 3. DEQ agrees that different treatment options maybe necessary depending on the suite of COIs - but as all COIs would need to be treated in the extracted groundwater and we know the general concentration ranges for the constituents, NW Natural should be able to suggest treatment technologies now without additional data. Again, final design of the selected source control technology may need additional site specific data to finalize the design. But DEQ does not believe additional data is required to select a evaluate technologies and select an appropriate technology for source control. NW Natural may need

DEQ-ECI

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to propose different treatment technology for various mixtures of groundwater such as MGP waste alone, MGP waste mixed with TCE, and/or cyanide.

4. Section 2. Paragraph 4. Source control should address all of the COIs, not only a targeted list.
5. Section 2. Paragraph 5. Because only small changes were made to the final JSCS, DEQ does not expect NW Natural to update the tables with the final JSCS screening values. It will not change the requirement for source control at the site. However for future comparisons, the December 2005 version should be used.
6. Section 2. Paragraphs 6 and 7. It is too early in the process to select individual chemicals for further evaluation when multiple chemicals exceed the screening criteria. Without showing your work to go through the process, DEQ can not agree to the shortened list of chemicals. PAHs, SVOCs, VOCs, and metals including cyanide are considered constituents of concern.
7. Section 3. The JSCS screening values are the specific risk-based source control objectives. Thus, additional offshore data will not be essential for identifying risk-based concentrations goals. This data can be used in the FS stage of the project. But for groundwater source control, the objective is to stop groundwater from the upland portion of the site with concentrations above the JSCS screening values from discharging into the river (or migrating beyond the riverbank).
8. Section 3. Objectives. The first bullet is the primary objective although it should be phrased "...at concentrations above the JSCS screening levels" instead of "...at concentrations that may pose unacceptable risk". The last 2 bullets art secondary objectives of the source control measures.
9. Section 3.1. The section upriver from WS-12 also has substantial exceedances in P-8. Thus although there is limited groundwater data in this direction, source control is necessary. In addition, the area downriver of MW-3 shows very large exceedances for cyanide. Source control should be evaluated and implemented along the entire bank of the Gasco and Siltronic properties. DEQ is willing to consider a phased approach with the first source control measure being implemented in the area NW Natural considers primary (including the entire bank of the Gasco site to capture the high concentration cyanide plume) and according to an agreed-upon schedule with DEQ, implementing the secondary area at a later date.
10. Section 3.2. DEQ does not believe that this section is appropriate for this evaluation. The objective of the source control effort is to control groundwater from the upland portion of the site. Although we recognize that there is an appreciable amount of in-water sediment contamination and that the groundwater plume extends beyond the riverbank, those issues will be evaluated as part of the in-water Portland Harbor investigation. The upland source control remedy should take into consideration potential in-water remedies in its evaluation but moves forward independent of the in-water project. Source control of the upland must be completed (or at least designed with an implementation schedule) prior to the completion of the in-water Portland Harbor record of decision (ROD).
11. Section 4. DEQ disagrees that MNA is an acceptable stand alone technology for any of the areas. In fact MNA should not be considered as a source control measure. MNA may be considered in the final FS for the project.

DEQ-ECI

12. Section 4 table 1. DEQ is not familiar with the CROW™ technology. Please provide a reference for the technology.
13. Section 5. GWSC-3. This alternative should include recovery in the high concentrations areas as well as along the barrier wall to prevent migration under or around the wall.
14. Section 5. GWSC-4. NW Natural should be aware that this alternative would require a net withdrawal of groundwater thus requiring treatment of groundwater although the amount of groundwater treatment would be significantly smaller than for a hydraulic containment alone option. Add groundwater treatment to this option.
15. Appendices. Need key to go with tables. What does WG mean? In addition, depth of the groundwater sample would be helpful in interpreting the distribution. There are many sample locations where there are 2 samples reported for the same day with widely differing results. It wasn't clear if these were perhaps from differing depths – such as P-4 (5237-010815-309 and 310) both collected on 8/15/2001. The results do not appear to be duplicates.

Please submit a focused feasibility study by March 15, 2006 to control the groundwater containing contaminants in excess of the JSCS values at the river bank along the Gasco and Siltronic sites.

Please call me at (503) 229-5538 if you have any questions.

Sincerely,

Matt McClincy
Project Manager
Portland Harbor Section

Cc: Jim Anderson, DEQ NWR
Heidi Blischke, DEQ NWR
Dana Bayuk, DEQ NWR
Kristine Koch, EPA Region X
Tom McCue, Siltronic Corporation
James Peale, Maul Foster Alongi
Alan Gladstone, Davis Rothwell Earle & Xochihua, P.C.
Chris Reive, Jordan Schrader
Carl Stivers, Anchor Environmental
John Edwards, Anchor Environmental
Patty Dost, Schwabe Williamson & Wyatt
Rob Ede, Hahn & Associates

DEQ-DCI

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Project Number 0128.01.08/02
This document should be filed in this folder.
☐ Administrative ☑ Correspondence In
☐ Correspondence Out ☐ Working
☐ CADD ☐ Health & Safety

December 19, 2005

RECEIVED
DEC 27 2005
By H.

Mr. Bob Wyatt
Northwest Natural
220 NW Second Avenue
Portland, OR 97209

Subject: **Preliminary Draft Offshore Groundwater Field Sampling Approach**
Gasco/Siltronic Groundwater Source Evaluation
ECSI #84

Dear Bob:

The Department of Environmental Quality (DEQ), the U.S. Environmental Protection Agency (EPA) and Portland Harbor Partners reviewed the October 2005 Preliminary Draft Offshore Groundwater Field Sampling Approach Gasco/Siltronic Groundwater Source Evaluation prepared by Anchor Environmental. DEQ requests that the work plan be revised to address the following review comments.

General Comments:

The report is not very easy to follow in that key elements have to be found in tables but they are not easily found in the text. This makes it hard to understand whether the individual interpretation of the tables and maps by the reviewers are the same that the authors meant for the report. Key items, such as the number of sampling locations, number of samples, depths, analyses, etc. should be clearly stated in both the text and tables.

The objectives of this work must be, at a minimum, the same objectives that are used for the rest of the deep core samples carried out by the LWG for the rest of Portland Harbor. That includes the depths, sample location criteria, and analyses. Overall the objective needs to be to characterize the sediments, contaminants, and ground water offshore of the GASCO and Wacker/Siltronic facility where characterization has not been done. This work must be able to be integrated into the LWG work being done along the rest of the Portland Harbor Site. One key element is that the objective of all or a selected subset of the borings needs to go to the basalt horizon to provide a full characterization of the ground water discharging in the alluvium. This is implied by the identified boring depths but should be clarified.

Overall the plan does not have the same level of sampling locations that were originally planned for the offshore work if done under the LWG effort. Additional borings and ground water sampling locations need to be added upstream and downstream of those presently proposed. In addition, there should be more deep sampling locations in some specific areas, such as outside of the tar body dredge area and outside and inside of the dock area.

Areas which are described in the text as "transects" should be shown as transects on the figures. As presented it is hard to find the proposed transects within a blur of other print on a map. Please add transects to the figures.

The workplan would benefit from some cross-sections along key locations with the existing data and proposed sampling depths and locations. However, DEQ is ok with deferring this data summary to the report. The data report should include sufficient cross-sections and figures that provide an understanding of the distribution of sediment and groundwater contaminants in-water and their relationship to upland sources. This summary should include the presentation of preexisting data.

An additional phase of groundwater investigation will likely be necessary to address data gaps that are apparent (e.g., nature and extent, and transition zone data) once the data from the subject work is available.

The distribution of this workplan via an electronic internet link did not work for some reviewers. Please provide 5 paper copies and 5 electronic copies on CD to DEQ for distribution of future work plans and reports related to the offshore characterization.

Specific Comments:

Section 1.1, Page 1 – Please remove the parentheticals (both instances) referring to 10 centimeters as the depth for transition zone water and the biologically active transition zone water. This has not been agreed upon.

Section 1.1, Page 2 – Establishing vertical groundwater gradients offshore is challenging, and it is not clear how data from this field effort will be used to design a monitoring program to characterize the offshore gradients. DEQ sees the need for discussions related to this objective to ensure that there is an agreement on the data necessary to achieve it.

Section 1.2.1.3, Page 4 – Cyanide should be added to the list of contaminants that are generally considered to be the primary contaminants of interest (COIs) at manufactured gas plant sites.

The list of COIs should be expanded to be consistent with the COI discussion for the Siltronic site.

Section 2.1.3, Page 9 – The second paragraph on page 9 notes that the joint source control strategy (JSCS) procedure requires a weight-of-evidence evaluation for those chemicals that exceed the JSCS screening level values (SLVs). DEQ only applies the weight-of-evidence evaluation for sites determined to be a medium priority for source control. DEQ initially evaluates upland sites to determine the priority for requiring additional evaluation or implementing upland source control measures. Sites are prioritized based on potential threats to

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the Willamette River environment. High-priority sites are expected to move forward with aggressive source control with out delay. Medium priority sites are expected to perform a weight-of-evidence evaluation to determine if source control measures are required. DEQ and EPA consider the control of contaminated groundwater at the Gasco and Siltronic sites to be a high priority.

Section 2.1.4, Page 10 – Please provide, in the legend or notes section on the figures (Figures 3 through 8), the screening values used to calculate the "hazard quotients."

Section 2.1.4, Page 11 and Figure 6 – The value for naphthalene noted at B 31 appears to be a typo. Please correct the figure. Is MW 01 in the text the same as MW 01 22 on the figures? Why is MW 01 22 not screened against human health values?

Section 2.1.4, Page 11 – The statement that the screening level for benzene is only exceed at one location, MW03 26, within the surficial water bearing zone is incorrect as there are several exceedances noted on Figure 6. This section of the plan should be corrected.

Section 3.2, Page 19 – Additional A, and B transect samples are necessary downstream of the proposed locations (i.e., GSC1, GSC2, GSC3 and GSC4 locations). Additional A and B transect samples are necessary upstream of the supplemental sample locations conducted by Maul Foster and Alongi for Siltronic (specifically at SLT5 plus 4 additional evenly spaced upstream transects adjacent to the Siltronic site. It is possible that additional transects further offshore will be necessary to define the nature and extent, and discharge zones of the groundwater plumes. NW Natural may want to consider a dynamic field plan where additional transects are added based on the quick analysis of initial samples. This worked well for the Siltronic field effort and limited the number investigation phases.

Section 3.2, Page 19 – Data from the September 15, 2005 Siltronic Supplemental Investigation Report is available. This data needs to be evaluated to determine if additional transects samples are necessary to meet the objectives of the study and to augment the data since only a limited numbed of the samples obtained by Siltronic were analyzed for an expanded chemical suite of MGP-related contaminants of interest (e.g., PAHs, cyanide and metals).

Section 3.2, Page 19 and Table 6 – The proposal to collect trident samples at depths of 10, 20 and 30 cm is a departure from the LWG approach approved by EPA. The rational for this sampling design is not presented in the work plan. During recent discussions with NW Natural regarding the monitoring plan for the pilot cap, Anchor staff raised concerns about the ability to obtain representative samples at similar intervals. DEQ's preference is to follow the approach in the EPA approved LWG work plan which requires samples at 30 and 150 cm (with 90 cm when 150 cannot be completed). Piston core samples should be adjusted to match up with the Trident sample intervals. EPA/Partners also suggest that additional groundwater sampling between the lower Trident sample and the first 25 foot Geoprobe sample are warranted.

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Table 7 – The analytical parameter list needs to be expanded to include:

- Complete volatile organic compound suite (EPA Method 8260)
- Metals (antimony, arsenic, beryllium, cadmium, chromium, copper, lead, mercury manganese, nickel, selenium, silver, thallium and zinc).
- Semivolatile organic compounds (EPA Method 8270) includes phenols
- Chlorinated herbicides and dioxin for samples collected from stations off of the Siltronic site (use methodology specified in the LWG Remedial Investigation Work Plan).

Section 3.2, Page 20 – DEQ understands that if matching pair data is not available that there may be some uncertainty in how the data relates to the conceptual site model. However, all data needs to be presented and discussed.

Section 4, Page 35 and Table 8 – This section needs to be consistent with the LWG Remedial Investigation Work Plan in both in the analytical methods used, the parameters reported and the appropriate detection limits. For example many of the detection limits identified are too high (e.g., arsenic, copper, lead and zinc) and need to be lowered.

Section 3.6.3.4, Page 28 – EPA recommends that EPA Method 5035A be used for the collection of sediment samples for volatile analysis. This method describes a closed-system purge-and-trap sample preparation process for the analysis of volatile organic compounds in solid materials (e.g., soils, sediments, and solid waste). While the method is designed for use on samples containing low levels of VOCs, procedures are also provided for collecting and preparing solid samples containing high concentrations of VOCs and for oily wastes. In addition, the method contains an appendix with pertinent information and appropriate references based on EPA's evaluation of currently available data and technology as applied to the most appropriate sample handling and preservation procedures in order to minimize the loss of VOCs during the collection and analysis of aqueous and solid materials, such as groundwater, wastewater, soils, solid waste, or sediments. These procedures are designed to minimize the losses of VOCs through the two most common mechanisms, volatilization and biodegradation. Here are the links to the method: http://www.epa.gov/epaoswer/hazwaste/test/new-meth.htm
SW 846 link-- http://www.epa.gov/epaoswer/hazwaste/test/sw846.htm

Please call me at (503) 229-5538 if you have any questions and to discuss the schedule for the revised workplan and field work.

Sincerely,

Matt McClincy
Project Manager
Portland Harbor Section

DEQ-EC!

Cc: Jim Anderson, DEQ NWR
Heidi Blischke, DEQ NWR
Chip Humphrey, EPA
Eric Blischke, EPA
Rene Fuentes, EPA
Jean Lee, Environment International
Tom McCue, Siltronic Corporation
James Peale, Maul Foster Alongi
Alan Gladstone, Davis Rothwell Earle & Xochihua, P.C.
Chris Reive, Jordan Schrader
Carl Stivers, Anchor Environmental
Patty Dost, Schwabe Williamson & Wyatt

DEQ-DC1

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Oregon
Theodore Kulongoski, Governor

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September 15, 2005

RECEIVED
SEP 22 2005
By

Mr. Bob Wyatt
Northwest Natural
220 NW Second Avenue
Portland, OR 97209

Subject: **Source Control**
Northwest Natural – GASCO Facility & Siltronic Facility
ECSI #84 and # 183

Dear Bob:

Thank you for your September 9, 2005 letter which proposes a modified schedule for the source control tasks requested in the Department of Environmental Quality (DEQ) August 2, 2005 and August 9, 2005 letters to Northwest Natural. The proposed schedule, with the exception of the groundwater source control Focused Feasibility Study (FFS), is approved.

The September 9th letter is unclear regarding the proposed schedule for completion of the draft Gasco and Siltronic groundwater source control FFS (Engineering Evaluation/Cost Analysis equivalent). The letter indicates that the draft FFS would not be completed until after the completion of the proposed off-shore plume delineation work. The attached Draft Source Control Activity Related Schedule indicates that the groundwater source control FFS would not be prepared until after the completion of the physical removal of the off-shore tar deposit scheduled to be complete by the end of October. Per the DEQ August 9, 2005 letter which addresses source control under DEQ Order No. ECVC-NWR-00-27, DEQ requires that the groundwater source control FFS be provided to DEQ within 45 days of DEQ providing comments on the technical memorandum which identifies the applicable groundwater source control technologies and alternatives.

I would also like to clarify that the submittals for the Gasco MW-16 area DNAPL source control Focused Feasibility technology screening and the Gasco and Siltronic groundwater source control Focused Feasibility technology screening not be limited to just the identification of the remedial technologies, but that the documents include the applicable remedial source control alternatives that are proposed for evaluation in the FFS.

Please contact me at (503) 229-5538 if you have any questions.

Sincerely,

Matt McClincy
Project Manager
Portland Harbor Section

Cc: Rob Ede, Hahn and Associates
Carl Stivers, Anchor
Patty Dost, Schwabe Williamson & Wyatt
Tom McCue, Siltronic Corporation
James Peal, Maul Foster Alongi
James Maul, Maul Foster Alongi
Chris Reive, Jordan Schrader
Alan Gladstone, Davis Rothwell Mullin Earle & Xochihua, P.C.
Sean Sheldrake, EPA
Kristine Koch, EPA

DEQ-DC1

Oregon
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RECEIVED
JUN 21 2005
By B

June 21, 2005

Mr. Bob Wyatt
Northwest Natural
220 NW Second Avenue
Portland, OR 97209

Project No: 1128.01.08
File To Folder: COR.

Re: Work Plan for Ambient Indoor Air Evaluation, Addendum 1
NW Natural – Siltronic Corporation
ECSI Site No. 183

Dear Bob:

The June 17, 2005 draft work plan for the first addendum to the ambient indoor air evaluation for the Siltronic Corporation facility is approved.

Please note that the work plan refers to the four outdoor samples as control/background samples. It should be noted that a portion of volatile organic compounds detected in these samples could originate from VOCs present in the vadose zone and shallow groundwater within the study area and needs to be considered when interpreting the results of the pending evaluation.

Please keep me advised of the implementation schedule.

Sincerely,

Matt McClincy
Project Manager,
Portland Harbor Section

cc: Mike Poulsen, DEQ NWR
Tom McCue, Siltronic Corporation
James Peale, Maul Foster Alongi
Chris Reive, Jordan Schrader
Alan Gladstone, William Earle Davis Rothwell Mullin Earle Xochihua
Rob Ede, Hahn and Associates
Mark Whitson, Hahn and Associates
Patty Dost, Schwabe Williamson & Wyatt

Project No: 8128.01.08
Task No.: 02
File To Folder: Conn

siltronic
perfect silicon solutions

Tom McCue
Environmental Affairs

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RECEIVED
DEC 03 2004
By MW

FAX

2004-12-03

To Chris Reive
James Peale
Alan Gladstone

From Tom McCue

Fax 503 598-7373
971 544-2140
503 222-4428

12 Page(s) incl. coversheet

[redacted]

HAHN AND ASSOCIATES, INC.
ENVIRONMENTAL CONSULTANTS

November 30, 2004

Mr. Matt McClincy
Oregon Department of Environmental Quality
Northwest Region, Portland Office
2020 SW 4th Avenue, Suite 400
Portland, Oregon 97201-4987

HAI Project No. 5237

SUBJECT: Revised Work Plan for Ambient Indoor Air Evaluation
NW Natural – Siltronic Corporation Facility
7200 NW Front Avenue, Portland, Oregon

Dear Mr. McClincy:

On behalf of NW Natural, Hahn and Associates, Inc. (HAI) is submitting the attached *Work Plan for Ambient Indoor Air Evaluation, Revision 1* (Work Plan) for air sampling work that will be conducted at the Siltronic Corporation (Siltronic) facility located at 7200 NW Front Avenue, Portland, Oregon. The Work Plan includes revisions that incorporate the Oregon Department of Environmental Quality's (DEQ) comments in a letter dated November 15, 2004 from Matt McClincy/DEQ to Bob Wyatt/NW Natural. DEQ's comments have been addressed as follows:

DEQ Comment 1. Add an additional control/background air sample at the approximate midpoint of the NW Natural Gasco Site/Siltronic Corporation property boundary.

Response: An additional control/background air sample has been added at the suggested location.

DEQ Comment 2. Siltronic Corporation points out that the sampling station # 2 is located in an area subject to exhaust from forklift and vehicle traffic which may confound the monitoring. Please discuss with Siltronic possible nearby alternative sampling stations.

Response: HAI contacted Siltronic and sample station # 2 has been moved approximately 50 feet to the northeast away from potential vehicular traffic per their suggestion.

DEQ Comment 3. Siltronic Corporation also notes that the air intake located on the roof of Fab 1 is located on the northwestern portion of the building. Please relocate sample station # 3 accordingly.

Response: Sample station # 3 has been relocated to the northwestern portion of the Fab 1 building.

DEQ Comment 4. Update Table 1 to include method detection limits (MDLs).

Response: A range of MDLs were obtained from Air Toxics Ltd. and have been included in Table 1. The MDLs for the Siltronic air evaluation should be within these ranges. However, actual MDLs may vary from the MDLs shown in Table 1.

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Following DEQ's approval of this Work Plan, HAI will proceed with the work subject to Siltronic's schedule and logistics needs. Please call the undersigned or Rob Ede at (503) 796-0717 if you have any questions.

Sincerely,

Mark W. Whitson, P.E.
Senior Environmental Engineer

Attachments

cc: Mr. Bob Wyatt, NW Natural
Ms. Patty Dost, Schwabe, Williamson & Wyatt
Mr. Tom McCue, Siltronic Corporation
Mr. Martin Rose, Clayton Group Services, Inc.

WORK PLAN
FOR
AMBIENT INDOOR AIR EVALUATION, REV. 1

NW Natural – Siltronic Corporation Facility
7200 NW Front Avenue
Portland, Oregon

November 30, 2004

Prepared for:

NW Natural
Portland, Oregon

Prepared by:

Hahn and Associates, Inc.
Portland, Oregon

Clayton Group Services
Seattle, Washington

HAI Project No. 5237

1.0 Introduction

On behalf of NW Natural, Hahn and Associates, Inc. (HAI) is submitting this revised *Work Plan for Ambient Indoor Air Evaluation* (Work Plan) for air sampling work that will be conducted at the Siltronic Corporation (Siltronic) facility located at 7200 NW Front Avenue, Portland, Oregon (Figure 1). The Work Plan, prepared by Clayton Group Services (Clayton) and HAI, describes the sampling methodology, sample collection locations, and sample analysis and reporting procedures for the ambient indoor air evaluation. The ambient indoor air evaluation is being conducted at the request of the Oregon Department of Environmental Quality (DEQ).

2.0 Background

Siltronic operates a silicon wafer fabricating facility on an 85-acre site along the western bank of the Willamette River in a section of northwest Portland zoned by the City as "Heavy Industrial". Construction of the Siltronic facility began immediately after the property was purchased by Siltronic in 1978. Construction was completed by the end of 1979, and plant operations began in March 1980.

The Siltronic property was mainly undeveloped prior to the construction of the Siltronic facility. Immediately northwest of the Siltronic site, Pacific Gas & Coke (PG&C) operated a manufactured gas plant (MGP) oil gasification facility, known as the Gasco facility, from 1913 to 1956. With the arrival of natural gas in the 1950s, PG&C changed its name to the Northwest Natural Gas Company, and more recently to NW Natural. Information regarding previous ownership of the Siltronic property and PG&C plant operations are included in the *Final Focused Remedial Investigation Work Plan* (HAI 2001).

Aerial photographs indicate that historical operations associated with oil gasification processes at the former PG&C Gasco site have potentially resulted in MGP-related impacts to the Siltronic site, with the area of primary interest being the approximate 400-foot wide strip of former low-lying property located immediately south of the present day NW Natural / Siltronic property boundary. Contaminants of interest associated with MGP byproducts and wastes include polynuclear aromatic hydrocarbons (PAHs), including naphthalene, and aromatic hydrocarbons (e.g., benzene, toluene, ethylbenzene, xylene [BTEX]). HAI has conducted a Phase I Site Characterization of contaminants in soil and groundwater at the Siltronic site to evaluate the nature and extent of potential ongoing releases of hazardous substances to Willamette River sediments (HAI 2001 and 2003).

Other potential sources of contamination on the Siltronic property are discussed in the *Phase I Site Characterization Summary Report* (HAI 2003). These potential contaminant sources include the Olympic Pipeline that utilizes two fuel lines that traverse the Siltronic site, placement of potential waste-containing fill on-site, and Siltronic operations-related chemical releases.

The Olympic Pipeline appears to have had petroleum product releases from its pipeline(s) in the western portion of the Siltronic site (HAI 2003). Of its two product pipelines, one is used to transport diesel and kerosene, while the other is used to transport gasoline. Diesel and gasoline contain BTEX and other monoaromatics. Diesel and kerosene contain PAHs and PAH-related compounds such as methylnaphthalenes. All of these petroleum products contain naphthalene (Potter and Simmons, 1998). In October 1990 on behalf of Siltronic, CH2M Hill conducted a groundwater and soil gas investigation in the vicinity of the

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pipelines and concluded that the concentrations of BTEX detected in the groundwater samples are typical of those associated with a gasoline spill or leak (CH2M Hill 1990). The highest detected concentrations of BTEX and TPH were located adjacent to the utility corridor, indicating the source of BTEX contamination may be located in that area.

Filling activities associated with the Siltronic property were initiated in May 1966 and were completed by December 1975. Approximately 1.5 million cubic yards of imported material were placed on the property as part of filling activities (Bridgewater Group, 2000). The fill consisted of rock from a quarry located across Highway 30 immediately west of the site, as well as more than 700,000 cubic yards of material dredged from the river (from an unspecified location) by the Port of Portland (PDC, 1985). The dredged sediments and potentially materials from other offsite sources may have contained chemical constituents that have impacted the Siltronic property.

Over the past twenty years, a number of incidents involving the release of hazardous substances to the environment have occurred at the Siltronic facility (HAI, 2003). On behalf of Siltronic, Maul Foster & Alongi, Inc. (MFA) has been investigating trichloroethene (TCE) soil and groundwater impacts in the northwestern portion of the site. As part of that work, MFA prepared a *Workplan for Ambient Indoor Air Evaluation – Fab 1 Building* (MFA, 2004) to evaluate the potential exposure of workers in the Fab 1 building to TCE and its breakdown products. The MFA ambient indoor air evaluation was conducted in the western portion of the Fab 1 building and included collecting a total of 6 air samples. The samples were analyzed for both chlorinated volatile organic compounds (VOCs) and aromatics such as BTEX.

3.0 Objectives

The primary objective of the ambient indoor air evaluation is to evaluate the potential exposure of workers in four on-site buildings to BTEX and naphthalene.

The secondary objective is to collect ambient indoor air TCE data (and its breakdown products) and provide the data to DEQ and Siltronic for evaluation.

4.0 Scope of Work

The scope of work includes the sampling, analysis, and reporting procedures described in this section.

4.1 Sampling

A total of 15 ambient air samples will be collected for VOC analysis (Figure 2). The ambient indoor air samples (9 samples) will be collected within Fab 1, Fab 2, Central Facilities Building (CFB), and Fab 2 Wastewater Treatment Plant (Fab 2 WWTP). Six of the 15 samples will be collected in the outdoor air as control/background samples.

Sampling will be conducted during a period of relatively low atmospheric pressure. All samples will be 8-hour time-integrated samples. Sampling will be conducted using six-liter Summa® canisters placed at approximately 4.5 feet off the ground or floor.

One data-logging weather station will be used and moved around to collect wind speed, wind direction, and barometric (atmospheric) pressure at each ambient (outdoor) sampling location (five total locations). For indoor samples, qualitative information regarding

SCOEPA00013149

ventilation system operation will be recorded to document the presence of outdoor air ventilation and building pressurization relative to the outdoors.

The sampling locations are as follows:

1. Fab 1, First Floor – Office Area. Rationale: This occupied indoor location will sample one area of the eastern portion of the Fab 1 building.

2. Fab 1, First Floor – Shipping/storage area. Rationale: This occupied indoor location will sample one area farther east in the Fab 1 building, for comparison to the other Fab 1 sample location.

3. Roof of Fab 1 – Near the outdoor air intake for the air-handling units, where applicable. Rationale: This is a control/background outdoor air comparison sample in the vicinity of Fab 1.

4. Fab 2, SubFab Level 1 – Process Area. The specific location will be determined during the sampling event. Rationale: This sample is located on the 3-foot concrete slab-on-grade without expansions and will provide a sample from within the process area at the northern portion of the building. This sample will also provide a comparison to samples collected in portions of the building that have a 6-inch concrete slab.

5. Fab 2, SubFab Level 1 – Process Area. Rationale: This occupied indoor location is located on the 3-foot concrete slab-on-grade without expansions and will provide a sample from within the process area at the southern portion of the building. This sample will also provide a comparison to samples collected in portions of the building that have a 6-inch concrete slab.

6. Fab 2, SubFab Level 1 – Office Area. Rationale: This occupied indoor location (office area) is located on the 6-inch concrete slab-on-grade with expansion joints.

7. Fab 2, SubFab Level 1 – Lobby Area. Rationale: This sample will provide a sample from the non-production area located on the 6-inch concrete slab near the entryway.

8. Roof of Fab 2 – Near the outdoor air intake for air-handling units, where applicable. Rationale: This is a control/background outdoor air comparison sample in the vicinity of Fab 2.

9. Central Facilities Building – Ground floor, northwestern portion of the building. Rationale: This indoor location will be in a 3rd occupied Siltronic building at a point near elevated benzene concentrations in groundwater. This sample will evaluate air at the northern portion of the building.

10. Central Facilities Building – Ground floor, at the southwestern portion of the building. Rationale: This sample will provide coverage in the southern portion of the building.

11. Fab 2 Wastewater Treatment Plant Building – WWTP Control Area, where applicable, furthest from wastewater treatment equipment, at the northeastern-most point possible.

SCOEPA00013150

Rationale: This indoor location will be in a 4th occupied Siltronic building near elevated benzene concentrations in groundwater.

12./13. Outdoors, At Grade, At South Property Boundary. Rationale: These are control/background outdoor air comparison samples located away from the building being sampled, and in areas likely to be representative of ambient impacts, as well as vehicular traffic and railroad operations.

14. Outdoors, At Grade, At the Guard Shack at the facility entrance. Rationale: This is a control/background outdoor air comparison sample located away from buildings being sampled, and in an area likely to be representative of ambient impacts, as well as vehicular traffic and railroad operations.

15. Outdoors, At Grade, At approximately midpoint along the Gasco Site/Siltronic property boundary. Rationale: This is a control/background outdoor air comparison sample located at the northwest portion of the Siltronic property, near the Gasco Site.

4.2 Analysis and Reporting

After sampling is complete, the canisters will be sealed and shipped to Air Toxics Ltd. laboratory in Folsom, California for analysis of VOCs using modified EPA Method TO-15. Air Toxics Ltd. is a qualified environmental analytical laboratory accredited by the U.S. Environmental Protection Agency (EPA) National Environmental Laboratory Accreditation Conference (NELAC) and participates in the National Institute for Occupational Safety and Health (NIOSH) Proficiency Analytical Testing (PAT) Program. The analytical results will be compared to DEQ's occupational risk-based concentrations (RBCs) for air (DEQ, 2003). Table 1 compares the selected laboratory's method detection limits (MDLs) and practical quantitation limits (PQLs) for the TO-15 analysis with the RBCs.

HAI and Clayton will summarize the analytical results, accompanied by a brief description of factors that can influence indoor air sampling results (e.g., building construction; operation of the building heating, ventilation, and air conditioning system; atmospheric pressure).

5.0 References

Bridgewater Group, 2000, *Supplement to DEQ's Strategy Recommendation for the Wacker Siltronic Facility*, March 13, 2000.

CH2M HILL, Inc.,1990, *Findings Report, Groundwater and Soil Gas Investigation, prepared for Wacker Siltronic Corporation, Portland, Oregon*, December 1990.

DEQ (Oregon Department of Environmental Quality), 2003, *Risk-based Decision Making for the Remediation of Petroleum-Contaminated Sites*, September 22, 2003.

HAI (Hahn and Associates, Inc.), 2001, *Final Focused Remedial Investigation Work Plan, Wacker Siltronic Corporation Property, 7200 NW Front Avenue, Portland, Oregon*, June 1, 2001.

HAI (Hahn and Associates, Inc.), 2003, *Phase I Site Characterization Summary Report, Wacker Siltronic Corporation Property, 7200 NW Front Avenue, Portland, Oregon,* November 7, 2003.

MFA (Maul Foster & Alongi, Inc.), 2004, *Workplan for Ambient Indoor Air Evaluation – Fab 1 Building, Siltronic Corporation, 7200 NW Front Avenue, Portland, Oregon,* April 26, 2004 and July 2, 2004.

PDC (Portland Development Commission), 1985, *Site History, Wacker Siltronic Corporation, Portland, Oregon, 1850-1984*, March 7, 1985.

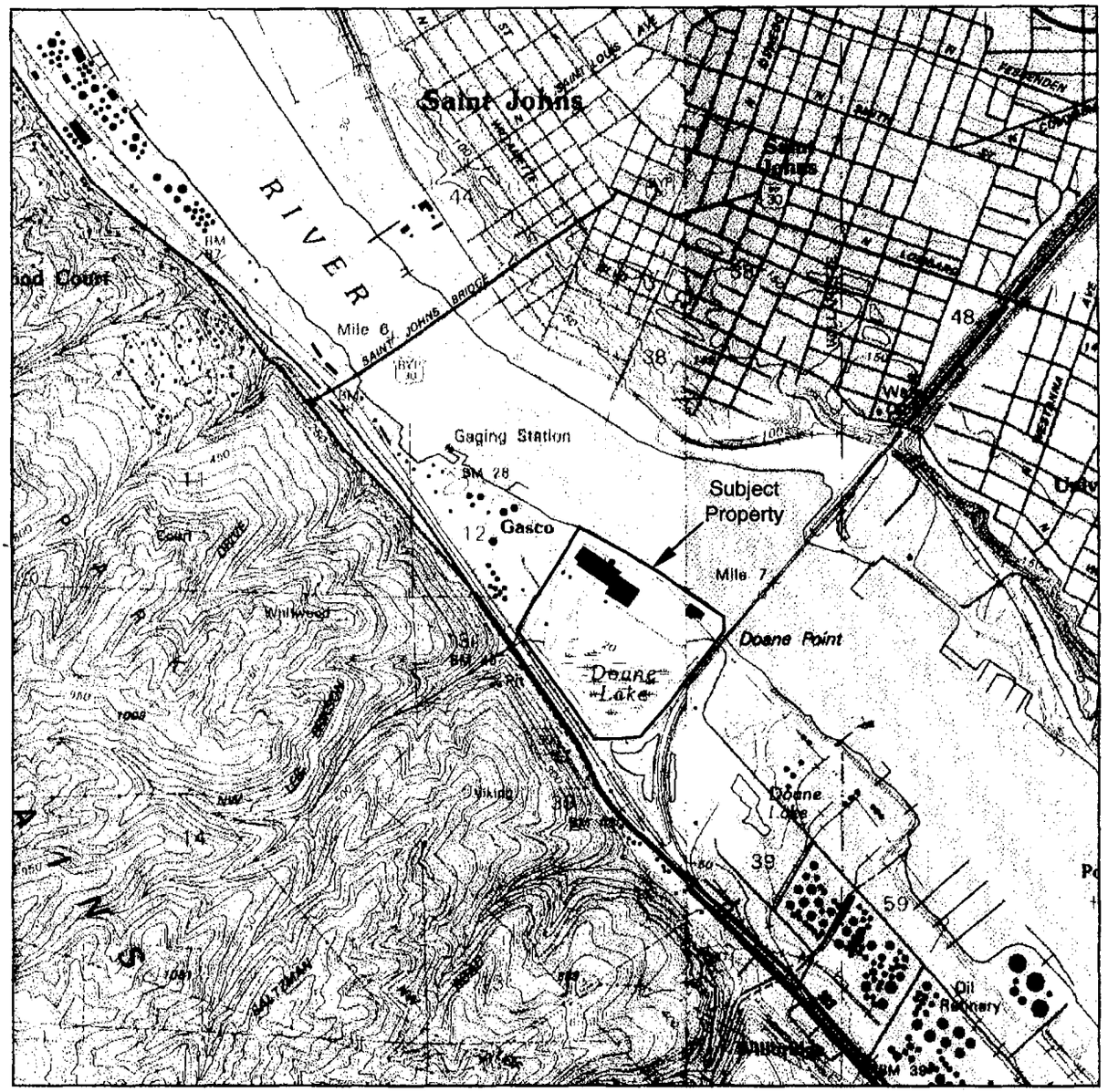
Potter and Simmons, 1998, *Composition of Petroleum Mixtures, Total Petroleum Hydrocarbon Criteria Working Group Series*, May 1998.

SCOEPA00013152

TABLE 1 - Modified USEPA Method TO-15
Analytical Limits and DEQ RBCs

Analyte	Method Detection Limit [a,b] (ug/m^3)	Practical Quantitation Limit [c] (ug/m^3)	Occupational Risk-Based Concentration (RBC_{air}) (ug/m^3)
Benzene	0.02 - 0.03	0.32	1.5
Toluene	0.02 - 0.03	0.38	1,600.
Ethybenzene	0.02 - 0.04	0.43	4,200.
m,p-Xylene	0.03 - 0.05	0.43	420[e]
o-Xylene	0.03 - 0.05	0.43	420[e]
1,2,4-Trimethylbenzene	0.02 - 0.03	0.49	25.
1,3,5-Trimethylbenzene	0.02 - 0.03	0.49	25.
Naphthalene	[d]	2.7	13.
Trichloroethene	0.01 - 0.04	0.545	0.1
cis-1,2-Dichloroethene	0.02 - 0.05	0.4	150.
trans-1,2-Dichloroethene	0.09 - 0.11	2.	290.
1,1-Dichloroethene	0.02 - 0.03	0.4	830.
Vinyl chloride	0.02 - 0.06	0.26	2.6

Notes:
ug/m^3 - micrograms per cubic meter of air
a The range of Method Detection Limits (MDLs) shown are based on information provided by Air Toxics Ltd. Actual MDLs may vary from these MDLs.
b The Summa® canisters are not certified clean to MDLs.
c The Practical Quantitation Limits (PQLs) shown are based on information provided by Air Toxics Ltd. Actual PQLs may vary from these PQLs.
d MDL not available.
e RBC is for total xylenes.



Note: Base Map from Linnton (1990) and Portland (1990), Oregon, USGS 7.5-Minute Quadrangles

N

0 2,000 4,000

Approximate Scale in Feet

FIGURE 1

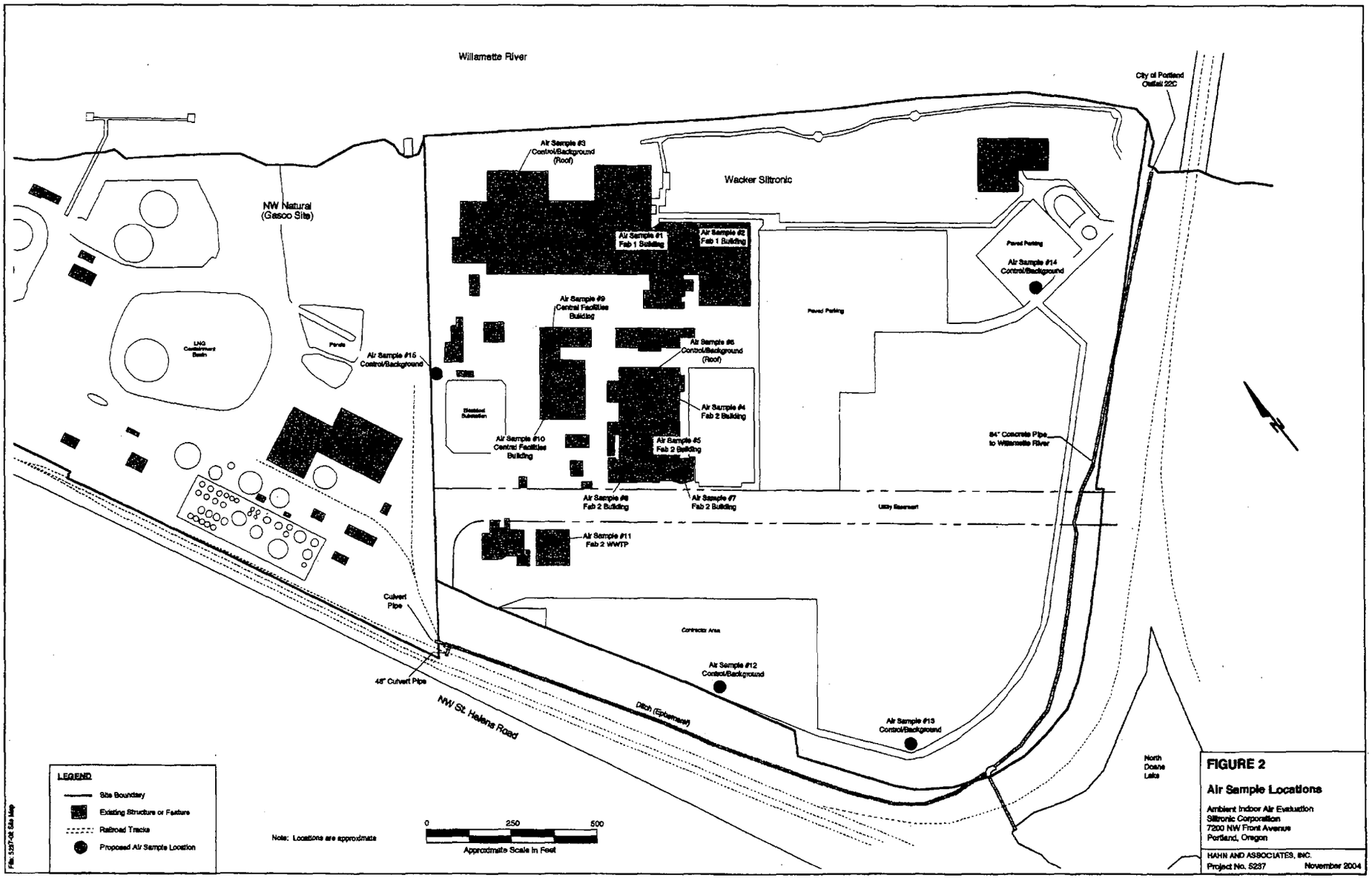
Location Map

Siltronic Corporation
7200 NW Front Avenue
Portland, Oregon

HAHN AND ASSOCIATES, INC.
Project No. 5237 November 2004

File: 5237-01 Location Map

12/03/2004 14:27 FAX 503 219 7599 SILTRONIC FAB1 UPSTAIRS 004



SCOEPA00013155

Project No: 8128.01.08
Task No.: 02
File To Folder: core

Oregon
Theodore R. Kulongoski, Governor

Department of Environmental Quality
Northwest Region Portland Office
2020 SW 4th Avenue, Suite 400
Portland, OR 97201-4987
(503) 229-5263
FAX (503) 229-6945
TTY (503) 229-5471

RECEIVED
DEC 07 2004
By

December 3, 2004

Mr. Bob Wyatt
Northwest Natural
220 NW Second Avenue
Portland, OR 97209

Re: Work Plan for Ambient Indoor Air Evaluation, Rev. 1
NW Natural – Siltronic Corporation Facility
ECSI Site No. 183

Dear Bob:

The November 30, 2004 *Work Plan for Ambient Indoor Air Evaluation, Rev. 1* for the Siltronic Corporation Facility is approved. Please keep me advised of the implementation schedule.

Sincerely,

Matt McClincy
Project Manager
Portland Harbor Section

cc: Mike Poulsen, DEQ NWR
Rob Ede, Hahn and Associates
Mark Whitson, Hahn and Associates
Patty Dost, Schwabe Williamson & Wyatt
Tom McCue, Siltronic Corporation
James Peale, Maul Foster Alongi
Chris Reive, Jordan Schrader
Alan Gladstone, William Earle Davis Rothwell Mullin Earle Xochihua

Project No: 8128.01.08
Task No. 02
File To Folder: coer

Oregon
Theodore Kulongoski, Governor

Department of Environmental Quality
Northwest Region Portland Office
2020 SW 4th Avenue, Suite 400
Portland, OR 97201-4987
(503) 229-5263
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TTY (503) 229-5471

RECEIVED
NOV 17 2004
By H.

November 15, 2004

Mr. Tom McCue
Siltronic Corporation
7200 NW Front Avenue
Portland, OR 97210

Re: Comments on NW Natural Work Plan for Ambient Indoor Air Evaluation at the Siltronic Corporation Facility
ECSI No. 183

Dear Mr. McCue:

The Department of Environmental Quality (DEQ) received comments on NW Natural's Work Plan for the Ambient Indoor Air Evaluation at the Siltronic Corporation facility prepared by Maul Foster Alongi (MFA). DEQ commented on the subject work plan in a November 15th, 2004 letter which incorporated some of MFAs review comments. DEQ elected not to incorporate a number of MFA's comments in our requests for a work plan addendum. The following are responses to paraphrased Siltronic's comments not carried forward at this time.

General Comments

1. The proposed monitoring in Fab 1 is duplicative of work Siltronic recently completed which indicated that volatile organic compounds associated with manufactured gas plant (MGP) waste were not detected above relevant risk-based levels.

   DEQ has not received the results of the Siltronic Fab 1 air monitoring. In addition, there are a number of factors that can affect vapor migration into structures. To the extent that the proposed Northwest Natural monitoring repeats Siltronic's work, DEQ considers this an opportunity to confirm the initial results.

2. NW Natural should be required to provide an estimate of soil and groundwater impacted by MGP-related constituents so that the relationship between the proposed sampling locations and potentially impacted media is clear.

   It is clear from the administrative record that apparent MGP waste is widespread on the Siltronic site and specifically within the vicinity of Fab 1 and the northern half of the site. Because of the potential for exposure to workers at the Siltronic site, DEQ requested that NW Natural conduct an initial evaluation of the indoor air exposure pathway as soon as possible. While Siltronic's comment is correct in that the NW Natural work plan should have presented the distribution of potentially impacted soil and groundwater, it is DEQ's

position that it is more important to proceed with the initial assessment at this time rather than delaying for clarification on this point. DEQ considered a conservative distribution of MGP when evaluating the proposed assessment. Should pending revisions of the Phase I Site Characterization Report and future upland remedial investigation work identify gaps in the indoor air pathway assessment, additional evaluation can be conducted at that time.

Specific Comments

1. Request that the work plan more accurately reflect the potential distribution of MGP-related waste on the Siltronic site.

   See response to General Comment 2.

2 - 3. Request for clarification in the work plan regarding Siltronic operations related to chemical releases, the extent of Siltronic's air monitoring within Fab 1 and the distribution of MGP wastes.

   Siltronic's request and clarifications are part of DEQ's administrative record.

4. The work plan does not address permissible exposure levels promulgated by the Oregon Occurpational Safey and Health Administration (OSHA).

   DEQ does not use OSHA standards for chemical exposure in its assessment of risk related to releases of hazardous substances. DEQ appreciates the potential confusion which may result from the different standards (i.e., DEQ vrs OSHA) and would be willing to participate in any risk communication discussions with Siltronic staff.

The remaining comments were either carried forward by DEQ or addressed above. Please contact me at (503) 229-5538 if you have any questions.

Sincerely,

Matt McClincy
Project Manager
Portland Harbor Section

cc: Rod Struck, DEQ NWR
Mike Poulsen, DEQ NWR
James Peale, MFA
James Maul, MFA
Chris Reive, Jordan Schrader
Alan Gladstone, Davis Rothwell Mullin Earle & Xochihua
Bob Wyatt, Northwest Natural

DEQ-DC1

Project No: 8128.01.08
Task No. 02
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Oregon
Theodore R. Kulongoski, Governor

Department of Environmental Quality
Northwest Region Portland Office
2020 SW 4th Avenue, Suite 400
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TTY (503) 229-5471

November 15, 2004

Mr. Bob Wyatt
Northwest Natural
220 NW Second Avenue
Portland, OR 97209

RECEIVED
NOV 17 2004
By H.

Re: Work Plan for Ambient Indoor Air Evaluation
NW Natural – Siltronic Corporation Facility
ECSI Site No. 183

Dear Bob:

The Department of Environmental Quality (DEQ) reviewed the October 11, 2004 Work Plan for the Ambient Indoor Air Evaluation at the Siltronic Corporation facility. The plan was prepared by Hahn and Associates, Inc. and received by DEQ on October 12, 2004. The plan responds to DEQ's request that NW Natural conduct an initial assessment of the indoor air exposure pathway for volatile organic compounds (VOCs) associated with apparent manufactured gas plant wastes at the Siltronic Corporation site. The following plan modifications are requested.

1. Add an additional control/background air sample at the approximate midpoint of the NW Natural Gasco Site/Siltronic Corporation property boundary.
2. Siltronic Corporation points out that the sampling station # 2 is located in an area subject to exhaust from forklift and vehicle traffic which may confound the monitoring. Please discuss with Siltronic possible nearby alternative sampling stations.
3. Siltronic Corporation also notes that the air intake located on the roof of Fab 1 is located on the northwestern portion of the building. Please relocate sample station # 3 accordingly.
4. Update Table 1 to include method detection limits.

Please provide a work plan addendum within the next 2 weeks that addresses these review comments. If you have any questions, I can be reached at (503) 229-5538.

Sincerely,

Matt McClincy
Project Manager
Portland Harbor Section

cc: Mike Poulsen, DEQ NWR
Rob Ede, Hahn and Associates
Patty Dost, Schwabe Williamson & Wyatt
Tom McCue, Siltronic Corporation
James Peale, Maul Foster Alongi
Chris Reive, Jordan Schrader
Alan Gladstone, William Earle Davis Rothwell Mullin Earle Xochihua

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CORR. IN

HAHN AND ASSOCIATES, INC.
ENVIRONMENTAL CONSULTANTS

October 11, 2004

Mr. Matt McClincy
Oregon Department of Environmental Quality
Northwest Region, Portland Office
2020 SW 4th Avenue, Suite 400
Portland, Oregon 97201-4987

HAI Project No. 5237

SUBJECT: Work Plan for Ambient Indoor Air Evaluation
NW Natural – Siltronic Corporation Facility
7200 NW Front Avenue, Portland, Oregon

Dear Mr. McClincy:

On behalf of NW Natural, Hahn and Associates, Inc. (HAI) is submitting this *Work Plan for Ambient Indoor Air Evaluation* (Work Plan) for air sampling work that will be conducted at the Siltronic Corporation (Siltronic) facility located at 7200 NW Front Avenue, Portland, Oregon (Figure 1). The Work Plan, prepared by Clayton Group Services (Clayton) and HAI, describes the sampling methodology, sample collection locations, and sample analysis and reporting procedures for the ambient indoor air evaluation. The ambient indoor air evaluation is being conducted at the request of the Oregon Department of Environmental Quality (DEQ).

Background

Siltronic operates a silicon wafer fabricating facility on an 85-acre site along the western bank of the Willamette River in a section of northwest Portland zoned by the City as "Heavy Industrial". Construction of the Siltronic facility began immediately after the property was purchased by Siltronic in 1978. Construction was completed by the end of 1979, and plant operations began in March 1980.

The Siltronic property was mainly undeveloped prior to the construction of the Siltronic facility. Immediately northwest of the Siltronic site, Pacific Gas & Coke (PG&C) operated a manufactured gas plant (MGP) oil gasification facility, known as the Gasco facility, from 1913 to 1956. With the arrival of natural gas in the 1950s, PG&C changed its name to the Northwest Natural Gas Company, and more recently to NW Natural. Information regarding previous ownership of the Siltronic property and PG&C plant operations are included in the *Final Focused Remedial Investigation Work Plan* (HAI 2001).

Aerial photographs indicate that historical operations associated with oil gasification processes at the former PG&C Gasco site have potentially resulted in MGP-related impacts to the Siltronic site, with the area of primary interest being the approximate 400-foot wide strip of former low-lying property located immediately south of the present day NW Natural / Siltronic property boundary. Contaminants of interest associated with MGP byproducts and wastes include polynuclear aromatic hydrocarbons (PAHs), including naphthalene, and aromatic hydrocarbons (e.g., benzene, toluene, ethylbenzene, xylene [BTEX]). HAI has conducted a Phase I Site Characterization of contaminants in soil and groundwater at the Siltronic site to evaluate the nature and extent of potential ongoing releases of hazardous substances to Willamette River sediments (HAI 2001 and 2003).

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503-796-0717 Telephone • 503-227-2209 Facsimile

Other potential sources of contamination on the Siltronic property are discussed in the *Phase I Site Characterization Summary Report* (HAI 2003). These potential contaminant sources include the Olympic Pipeline that utilizes two fuel lines that traverse the Siltronic site, placement of potential waste-containing fill on-site, and Siltronic operations-related chemical releases.

The Olympic Pipeline appears to have had petroleum product releases from its pipeline(s) in the western portion of the Siltronic site (HAI 2003). Of its two product pipelines, one is used to transport diesel and kerosene, while the other is used to transport gasoline. Diesel and gasoline contain BTEX and other monoaromatics. Diesel and kerosene contain PAHs and PAH-related compounds such as methylnaphthalenes. All of these petroleum products contain naphthalene (Potter and Simmons, 1998). In October 1990 on behalf of Siltronic, CH2M Hill conducted a groundwater and soil gas investigation in the vicinity of the pipelines and concluded that the concentrations of BTEX detected in the groundwater samples are typical of those associated with a gasoline spill or leak (CH2M Hill 1990). The highest detected concentrations of BTEX and TPH were located adjacent to the utility corridor, indicating the source of BTEX contamination may be located in that area.

Filling activities associated with the Siltronic property were initiated in May 1966 and were completed by December 1975. Approximately 1.5 million cubic yards of imported material were placed on the property as part of filling activities (Bridgewater Group, 2000). The fill consisted of rock from a quarry located across Highway 30 immediately west of the site, as well as more than 700,000 cubic yards of material dredged from the river (from an unspecified location) by the Port of Portland (PDC, 1985). The dredged sediments and potentially materials from other offsite sources may have contained chemical constituents that have impacted the Siltronic property.

Over the past twenty years, a number of incidents involving the release of hazardous substances to the environment have occurred at the Siltronic facility (HAI, 2003). On behalf of Siltronic, Maul Foster & Alongi, Inc. (MFA) has been investigating trichloroethene (TCE) soil and groundwater impacts in the northwestern portion of the site. As part of that work, MFA prepared a *Workplan for Ambient Indoor Air Evaluation – Fab 1 Building* (MFA, 2004) to evaluate the potential exposure of workers in the Fab 1 building to TCE and its breakdown products. The MFA ambient indoor air evaluation was conducted in the western portion of the Fab 1 building and included collecting a total of 6 air samples. The samples were analyzed for both chlorinated volatile organic compounds (VOCs) and aromatics such as BTEX.

Objectives

The primary objective of the ambient indoor air evaluation is to evaluate the potential exposure of workers in four on-site buildings to BTEX and naphthalene.

The secondary objective is to collect ambient indoor air TCE data (and its breakdown products) and provide the data to DEQ and Siltronic for evaluation.

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Scope of Work

The scope of work includes the sampling, analysis, and reporting procedures described in this section.

Sampling

A total of 14 ambient air samples will be collected for VOC analysis (Figure 2). The ambient indoor air samples (9 samples) will be collected within Fab 1, Fab 2, Central Facilities Building (CFB), and Fab 2 Wastewater Treatment Plant (Fab 2 WWTP). Five of the 14 samples will be collected in the outdoor air as control/background samples.

Sampling will be conducted during a period of relatively low atmospheric pressure. All samples will be 8-hour time-integrated samples. Sampling will be conducted using six-liter Summa® canisters placed at approximately 4.5 feet off the ground or floor.

One data-logging weather station will be used and moved around to collect wind speed, wind direction, and barometric (atmospheric) pressure at each ambient (outdoor) sampling location (five total locations). For indoor samples, qualitative information regarding ventilation system operation will be recorded to document the presence of outdoor air ventilation and building pressurization relative to the outdoors.

The sampling locations are as follows:

1. Fab 1, First Floor – Office Area. Rationale: This occupied indoor location will sample one area of the eastern portion of the Fab 1 building.

2. Fab 1, First Floor – Shipping Area. Rationale: This occupied indoor location will sample one area farther east in the Fab 1 building, for comparison to the other Fab 1 sample location.

3. Roof of Fab 1 – Near the outdoor air intake for the air-handling units, where applicable. Rationale: This is a control/background outdoor air comparison sample in the vicinity of Fab 1.

4. Fab 2, SubFab Level 1 – Process Area. The specific location will be determined during the sampling event. Rationale: This sample is located on the 3-foot concrete slab-on-grade without expansions and will provide a sample from within the process area at the northern portion of the building. This sample will also provide a comparison to samples collected in portions of the building that have a 6-inch concrete slab.

5. Fab 2, SubFab Level 1 – Process Area. Rationale: This occupied indoor location is located on the 3-foot concrete slab-on-grade without expansions and will provide a sample from within the process area at the southern portion of the building. This sample will also provide a comparison to samples collected in portions of the building that have a 6-inch concrete slab.

6. Fab 2, SubFab Level 1 – Office Area. Rationale: This occupied indoor location (office area) is located on the 6-inch concrete slab-on-grade with expansion joints.

7. Fab 2, SubFab Level 1 – Lobby Area. Rationale: This sample will provide a sample from the non-production area located on the 6-inch concrete slab near the entryway.

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8. Roof of Fab 2 – Near the outdoor air intake for air-handling units, where applicable. Rationale: This is a control/background outdoor air comparison sample in the vicinity of Fab 2.

9. Central Facilities Building – Ground floor, northwestern portion of the building. Rationale: This indoor location will be in a 3rd occupied Siltronic building at a point near elevated benzene concentrations in groundwater. This sample will evaluate air at the northern portion of the building.

10. Central Facilities Building – Ground floor, at the southwestern portion of the building. Rationale: This sample will provide coverage in the southern portion of the building.

11. Fab 2 Wastewater Treatment Plant Building – WWTP Control Area, where applicable, furthest from wastewater treatment equipment, at the northeastern-most point possible. Rationale: This indoor location will be in a 4th occupied Siltronic building near elevated benzene concentrations in groundwater.

12 and 13. Outdoors, At Grade, At South Property Boundary. Rationale: These are control/background outdoor air comparison samples located away from the building being sampled, and in areas likely to be representative of ambient impacts, as well as vehicular traffic and railroad operations.

14. Outdoors, At Grade, At the Guard Shack at the facility entrance. Rationale: This is a control/background outdoor air comparison sample located away from buildings being sampled, and in an area likely to be representative of ambient impacts, as well as vehicular traffic and railroad operations.

Analysis and Reporting

After sampling is complete, the canisters will be sealed and shipped to Air Toxics Ltd. laboratory in Folsom, California for analysis of VOCs using modified EPA Method TO-15. Air Toxics Ltd. is a qualified environmental analytical laboratory accredited by the U.S. Environmental Protection Agency (EPA) National Environmental Laboratory Accreditation Conference (NELAC) and participates in the National Institute for Occupational Safety and Health (NIOSH) Proficiency Analytical Testing (PAT) Program. The analytical results will be compared to DEQ's occupational risk-based concentrations (RBCs) for air (DEQ, 2003). Table 1 compares the selected laboratory's method detection limits (MDLs) and practical quantitation limits (PQLs) for the TO-15 analysis with the RBCs.

HAI and Clayton will summarize the analytical results, accompanied by a brief description of factors that can influence indoor air sampling results (e.g., building construction; operation of the building heating, ventilation, and air conditioning system; atmospheric pressure).

Following DEQ's approval of this Work Plan, HAI will proceed with the work subject to Siltronic's schedule and logistics needs. Please call the undersigned or Rob Ede at (503) 796-0717 if you have any questions.

SCOEPA00013167

Sincerely,

Mark W. Whitson, P.E.
Senior Environmental Engineer

Attachments

cc: Mr. Bob Wyatt, NW Natural
Ms. Patty Dost, Schwabe, Williamson & Wyatt
Mr. Tom McCue, Siltronic Corporation
Mr. Martin Rose, Clayton Group Services, Inc.

SCOEPA00013168

References

Bridgewater Group, 2000, *Supplement to DEQ's Strategy Recommendation for the Wacker Siltronic Facility*, March 13, 2000.

CH2M HILL, Inc.,1990, *Findings Report, Groundwater and Soil Gas Investigation, prepared for Wacker Siltronic Corporation, Portland, Oregon*, December 1990.

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MFA (Maul Foster & Alongi, Inc.), 2004, *Workplan for Ambient Indoor Air Evaluation – Fab 1 Building, Siltronic Corporation, 7200 NW Front Avenue, Portland, Oregon,* April 26, 2004.

PDC (Portland Development Commission), 1985, *Site History, Wacker Siltronic Corporation, Portland, Oregon, 1850-1984*, March 7, 1985.

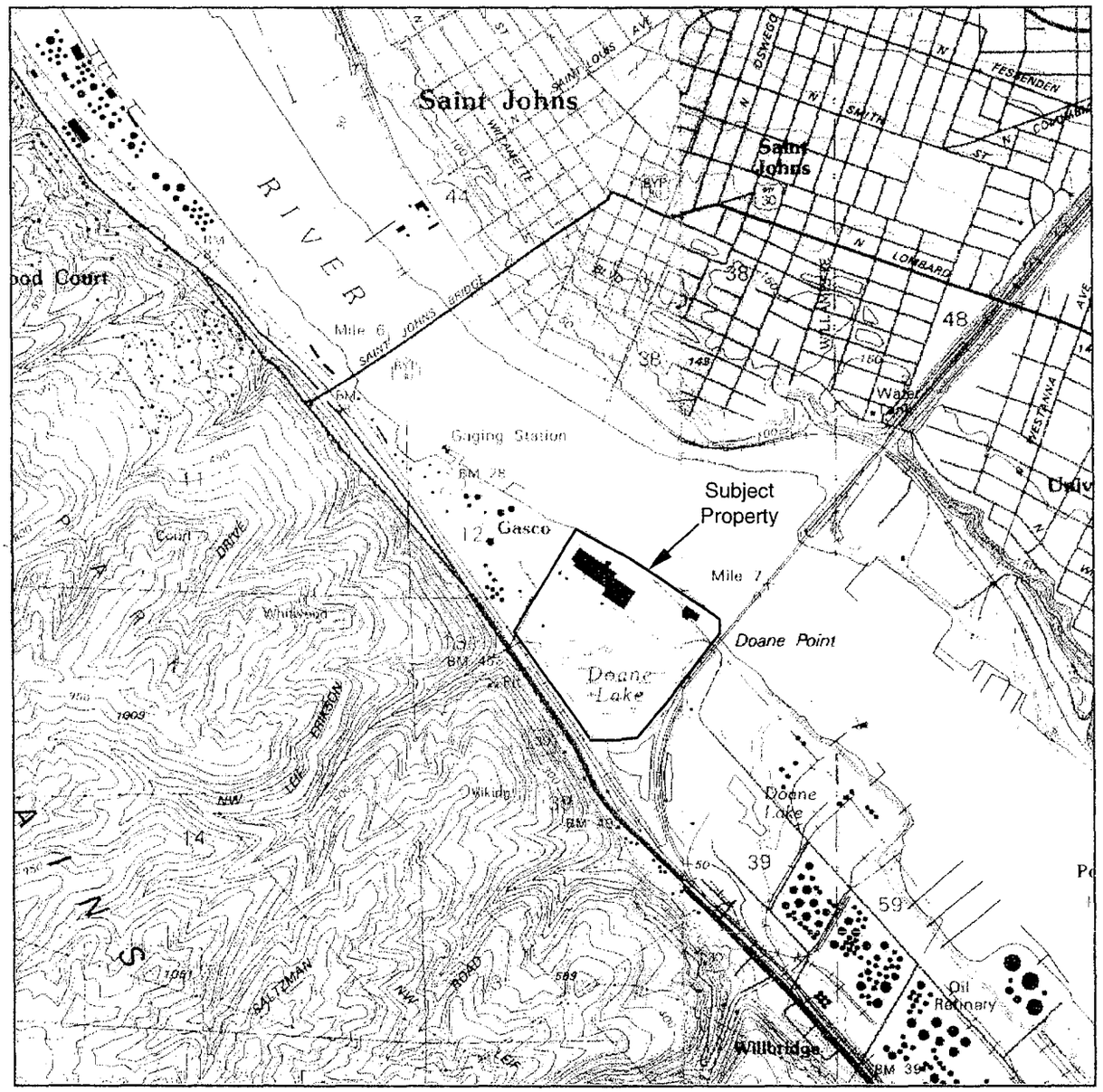
Potter and Simmons, 1998, *Composition of Petroleum Mixtures, Total Petroleum Hydrocarbon Criteria Working Group Series*, May 1998.

TABLE 1 - Modified USEPA Method TO-15
Analytical Limits and DEQ RBCs

Analyte	Practical Quantitation Limit (ug/m^3)	Occupational Risk-Based Concentration (RBC_{air}) (ug/m^3)
Benzene	0.32	1.5
Toluene	0.38	1,600.
Ethybenzene	0.43	4,200.
m,p-Xylene	0.43	420[a]
o-Xylene	0.43	420[a]
1,2,4-Trimethylbenzene	0.49	25.
1,3,5-Trimethylbenzene	0.49	25.
Naphthalene	2.7	13.
Trichloroethene	0.545	0.1
cis-1,2-Dichloroethene	0.4	150.
trans-1,2-Dichloroethene	2.	290.
1,1-Dichloroethene	0.4	830.
Vinyl chloride	0.26	2.6

Notes:
ug/m^3 - micrograms per cubic meter of air
[a] RBC is for total xylenes

SCOEPA00013170



Note: Base Map from Linnton (1990) and Portland (1990), Oregon, USGS 7.5-Minute Quadrangles

N

0 2,000 4,000

Approximate Scale in Feet

FIGURE 1

Location Map

Siltronic Corporation
7200 NW Front Avenue
Portland, Oregon

HAHN AND ASSOCIATES, INC.
Project No. 5237 October 2004

File: 5237-01 Location Map

Willamette River

City of Portland
Outfall 22C

NW Natural
(Gasco Site)

LNG
Containment
Basin

Ponds

Wacker Siltronic

Air Sample #1
Fab 1 Building

Air Sample #2
Fab 1 Building

Air Sample #3
Control/Background
(Roof)

Paved Parking

Air Sample #14
Control/Background

Air Sample #9
Central Facilities
Building

Air Sample #8
Control/Background
(Roof)

Electrical
Substation

Air Sample #4
Fab 2 Building

Air Sample #10
Central Facilities
Building

Air Sample #5
Fab 2 Building

84" Concrete Pipe
to Willamette River

Air Sample #6
Fab 2 Building

Air Sample #7
Fab 2 Building

Utility Easement

Air Sample #11
Fab 2 WWTP

Culvert
Pipe

Contractor Area

Air Sample #12
Control/Background

48" Culvert Pipe

NW St. Helens Road

Ditch (Ephemeral)

Air Sample #13
Control/Background

North
Doane
Lake

LEGEND

- Site Boundary
- Existing Structure or Feature
- Railroad Tracks
- Proposed Air Sample Location

Note: Locations are approximate

0 250 500
Approximate Scale in Feet

File: 5237-02 Site Map

FIGURE 2

Air Sample Locations

Ambient Indoor Air Evaluation
Siltronic Corporation
7200 NW Front Avenue
Portland, Oregon

HAHN AND ASSOCIATES, INC.
Project No. 5237 October 2004

SCOEPA00013172

State of Oregon
Department of Environmental Quality
811 S.W. Sixth Avenue
Portland, OR 97204

INVOICE

INVOICE #: **P04-0351**
INVOICE DATE **4/6/2004**
DUE DATE: **5/6/2004**

Anthony Bharwada
MAUL FOSTER & ALONGI, INC
7223 NE HAZEL DELL AVE, SUITE B
VANCOUVER WA 98665

INVOICE IN ACCORDANCE WITH ORS 192.420 FOR PUBLIC RECORDS ACCESS

RE: File #84 - GASCO - specific documents only

75 Photocopies @ $.25 each	$18.75
28 Oversized copies @ $.50 each	14.00
3/4 hour staff time @ $30.00 per hour	22.50
Invoice Service Charge	5.00
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Please return this portion of the invoice with your payment to:

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Attn: Business Office
811 S.W. Sixth Avenue
Portland, OR 97204

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AMOUNT PAID: _____

ECDCOPY **TC 190 2005-10040-34134-8415**

Project: 812801.08 Task: 02
On Site Work: Yes ☐ No ☒
Initials: OE Date: April 12, 2004

Oregon
Theodore R. Kulongoski, Governor

Department of Environmental Quality
Northwest Region Portland Office
2020 SW 4th Avenue, Suite 400
Portland, OR 97201-4987
(503) 229-5263
FAX (503) 229-6945
TTY (503) 229-5471

April 2, 2004

Project No: 8128.21.03 /02

File To Folder: DEQ corr

RECEIVED
APR 07 2004

Mr. Bob Wyatt
Northwest Natural
220 NW Second Avenue
Portland, OR 97209

Mr. Tom McCue
Wacker Siltronic Corporation
7200 NW Front Avenue
Portland, OR 97210

Re: Off-Site Ditch Evaluation, Phase I Site Characterization and Source Control Evaluation, Wacker Siltronic Corporation Property
ECSI No. 183

Dear Bob and Tom:

The Oregon Department of Environmental Quality (DEQ) received Hahn and Associates, Inc. March 15, 2004 letter and revised Phase I Site Characterization and Source Control Evaluation work plan. The work plan responds to DEQ's November 3, 2003 letter on the second version of the draft work plan. The March 15, 2004 work plan includes the modifications requested by DEQ, and is approved.

DEQ understands that the work plan cannot be implemented until access has been obtained from Burlington Northern Santa Fe Railway (BNSF). Implementation of the work plan is a priority for DEQ. Given the past coordination between NW Natural and BNSF on this issue, DEQ expects that access can be obtained within the next 45 days, if not earlier. Please keep me appraised regarding the status of the access negotiations.

DEQ also requests that NW Natural coordinate the timing of the sampling with Koppers, Inc. to avoid collecting the surface water samples during or shortly after batch discharges of treated water by Koppers to Doane Creek (noted as an ephemeral ditch on Figure 1).

Please contact me at (503) 229-5538 should you have any questions.

Sincerely,

Matt McClincy
Project Manager
Portland Harbor Section

cc: Rod Struck, DEQ NWR
Rob Ede, Hahn & Associates
Tom Schadt, Anchor Environmental
Jim Maul, MFA
Patricia Dost, Schwabe Williamsion & Wyatt
Dianne Dailey, Bullivant Houser Bailey

FILE COPY

Oregon

Theodore R. Kulongoski, Governor

Department of Environmental Quality
Northwest Region Portland Office
2020 SW 4th Avenue, Suite 400
Portland, OR 97201-4987
(503) 229-5263
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March 14, 2005

RECEIVED
MAR 16 2005
By

Mr. Bob Wyatt
Northwest Natural
220 NW Second Avenue
Portland, OR 97209

Mr. Tom McCue
Wacker Siltronic Corporation
7200 NW Front Avenue
Portland, OR 97210

Project No: 8128.01.08
Task No: 02
File To Folder: DEQ CORR

Re: Intended Revised Phase I Report Cross-Sections

Dear Bob and Tom:

The Department of Environmental Quality (DEQ) reviewed the intended cross-section map for the Revised Phase I Site Characterization Summary Report for the Siltronic Corporation Facility submitted to DEQ by Hahn and Associates on March 2, 2005 and the March 11, 2005 comments prepared by Maul Foster Alongi, Inc. (MFA) on behalf of Siltronic Corporation on the intended cross-sections. DEQ finds the MFA comments relevant and request that the cross-section figures be modified to address the MFA recommendations.

Please contact me at (503) 229-5538 if you have any questions.

Sincerely,

Matt McClincy
Project Manager
Cleanup and Portland Harbor Section

Cc: Rod Struck, DEQ NWR
Rob Ede, Hahn and Associates, Inc.
James Peale, Maul Foster Alongi
James Maul, Maul Foster Alongi

MAUL FOSTER ALONGI INC.
ENVIRONMENTAL & ENGINEERING CONSULTANTS
3121 SW Moody Avenue, Suite 200 | Portland, Oregon 97239 | Phone 971.544.2139 | Fax 971.544.2140 | www.MFAinc.org

January 12, 2006
Project 8128.01.08

Mr. Matt McClincy
Oregon Department of Environmental Quality
2020 SW 4th Avenue, Suite 400
Portland, Oregon 97201-4987

Re: Review of *Preliminary Identification of Technologies and Alternatives for Groundwater Source Control, NW Natural Gasco Site – Portland Oregon* (12/19/2005).
ECSI #84

Dear Matt:

On behalf of Siltronic Corporation (Siltronic), Maul Foster & Alongi, Inc. (MFA) has reviewed the above-referenced memo as submitted to the Oregon Department of Environmental Quality (DEQ). This letter provides Siltronic's general and specific comments.

NW Natural (NWN) retained Anchor Environmental, LLC (Anchor) to address impacts to the Willamette River (including its sediments, transition zone water, and underlying groundwater) due to upland and in-river disposal of manufactured gas plant (MGP) waste. The above-referenced memo (the memo) provides a general approach for controlling upland sources of MGP-related impacts to groundwater that discharges to or flows under the Willamette River. The memo was prepared in response to DEQ's November 23, 2005 request for more detail than was presented in the November 17, 2005 submittal by Anchor on the same topic.

GENERAL COMMENTS

1) The memo identifies the primary purpose of the *Interim Final Joint Source Control Strategy* (JSCS) issued by DEQ and the US Environmental Protection Agency (USEPA) as providing a framework for making upland source control decision at the Portland Harbor Superfund Site. However, the approach for source control technology identification as identified in the memo does not appear to follow the Engineering Evaluation/Cost Analysis (EE/CA) process required by the JSCS.

SCOEPA00013177

2) The memo generally avoids discussion of dense, non-aqueous phase liquid (DNAPL) characteristic of MGP waste (MGP DNAPL) present in multiple monitoring wells at the Siltronic site. NWN has developed a Focused Feasibility Study for MGP DNAPL (the DNAPL FFS) on the NWN portion of the Gasco site, but has failed to do so for the portion of the Gasco site on the Siltronic property. Characterization of the MGP DNAPL accumulation in multiple monitoring wells as an ongoing, uncontrolled source of contamination should be identified as a primary objective of groundwater source control.

3) The approach generally relies on data to be collected by the Lower Willamette Group (LWG), and therefore appears to ignore the following comment from DEQ:

> The objectives of the transition zone water sampling work adjacent to the GASCO/Siltronic site being conducted by the Lower Willamette Group and the stated objectives of the *Preliminary Draft Offshore Groundwater Field Sampling Approach* do not include the GWFFS objectives identified or inferred in the [November 17, 2005] Anchor Environmental Memorandum.

4) The memo does not include evaluation of the results of Siltronic's 2005 in-river work, which were submitted to DEQ and copied to NWN in September, 2005 (the *Supplemental Investigation Report*, MFA, 2005), although the report is referenced in the memo. During the investigation, MFA found MGP NAPL off shore that was chemically identical to DNAPL accumulations in upland monitoring wells. Samples collected approximately 450 off shore of the Siltronic site contained concentrations of MGP-related COIs well above the SLVs identified by Anchor.

SPECIFIC COMMENTS

1) In its November 23rd, 2005 response to the original memo, DEQ required that "groundwater source control screening and the identification of potential groundwater source control alternatives is not to be limited to the northern 400 feet of the Siltronic site" and that "the entire Siltronic site be considered in this evaluation". Section 3.1 (Phased Source Control) of the revised memo responds to DEQ's requirements by including the northern 400 feet of the Siltronic property in the "primary source control zone", with the remaining upstream portion of the Siltronic property included as a "secondary source control area", in which source control decisions will be based on planned offshore investigations by NWN and LWG. This approach cannot be evaluated without (a) a final (i.e., DEQ- or USEPA-approved) work plan for the offshore investigation planned by NWN and

SCOEPA00013178

(b) analysis of the LWG data. Also, the criteria by which Anchor has identified (and presumably intends to re-evaluate in the future) the difference between the primary and secondary areas are not discussed. Finally, the general approach does not address the ongoing groundwater contamination from MGP materials distributed across the Siltronic property as documented by aerial photography and confirmed by analytical data.

2) Paragraph 1 of Section 3.1 states that DEQ human health and ecological groundwater screening level values (SLVs) are exceeded along the entire Siltronic shoreline (presumably due to MGP-related impacts). Paragraph 3 of Section 3.1 states that "areas outside of the primary source control zone contain dissolved COI concentrations that are orders of magnitude lower than the concentrations in the primary zone" and that "these areas may be found not to require source controls based on the weight of evidence approaches discussed in the JSCS." The weight of evidence approach as identified in the JSCS is for ranking sites as high-, medium-, or low-priority. DEQ has already identified the entire Gasco site (including the entire Siltronic shoreline) as a high-priority site due to MGP-related impacts.

3) Section 3.2 (Information Gaps) correctly states that additional transition zone water and surface water data are needed. Siltronic suggests that NWN incorporate the data included in the Supplemental Investigation Report (MFA, 2005). Anchor further states that groundwater COIs are not expected to exceed ambient water quality criteria (AWQCs) upon reaching surface water based on modeling performed by Anchor in 2001. Siltronic provided comments on the modeling performed by Anchor (December, 2003), and identified deficiencies in Anchor's approach and assumptions for the modeling.[1] Irrespective of the modeling, data collected by MFA show that concentrations of naphthalene (a groundwater COI identified as a surrogate in this memo) in surface water are within 2% of the DEQ AWQC.

4) Section 4 states that monitored natural attenuation may be an alternative for "secondary source control zones where dissolved concentrations of COI in upland groundwater do not result in impairment of in-river beneficial uses." Identifying impairment of beneficial uses as a criterion for source control alternative selection is not consistent with the JSCS.

[1] Significantly, the modeling relied on the results of the *Phase I Site Characterization Summary Report* (Hahn and Associates, Inc., 2003), which was not accepted by DEQ as complete.

SCOEPA00013179

5) Table 1 of Section 4 identifies in-situ thermal treatment as a suitable technology for both organic constituents (PAHs and benzene) and cyanide. However, this technology is not carried forward in the evaluation (Section 4.2.2). Table 1 also identifies "Containerized Recovery of Oil Wastes (CROW ™)", which appears to be an undocumented in-situ technology. MFA suggests that Anchor provide additional information regarding this alternative.

6) Section 5. This section identifies (and presumably discards) a number of the technologies identified in Table 1 "based upon Anchor's experience at similar sites and upon a review of technologies used at similar sites nationwide." MFA is unaware of other MGP sites with a similar lateral and vertical extent of contamination.[2] It is inappropriate to discard potentially applicable alternatives without completing an EE/CA, which is required by the JSCS. DEQ should require NWN to reconsider their approach given the unique and significant size of the Gasco site.

Siltronic appreciates NWN's efforts to move ahead with Source Control while continuing their investigation of the nature and extent of MGP-related impacts on the Siltronic site, and recommends that DEQ consider the above comments during its review of the memo.

Please call either of us at (971) 544-2139 if you have questions or comments.

Sincerely,

Maul Foster & Alongi, Inc.

James G.D. Peale, RG
Senior Hydrogeologist

James J. Maul, RG
Principal Hydrogeologist

cc: Dana Bayuk, DEQ
Tom McCue, Siltronic
Chris Reive, Jordan Schrader
Alan Gladstone, Davis Rothwell Earle & Xochihua, P.C.
Bob Wyatt, NWN

[2] The lateral and vertical extent of the MGP-related contamination has not been completed.

SCOEPA00013180

MAUL FOSTER ALONGI INC.
ENVIRONMENTAL & ENGINEERING CONSULTANTS
3121 SW Moody Avenue, Suite 200 | Portland, Oregon 97239 | Phone 971.544.2139 | Fax 971.544.2140 | www.MFAinc.org

November 22, 2005
Project 8128.01.08

Mr. Matt McClincy
Oregon Department of Environmental Quality
2020 SW 4th Avenue, Suite 400
Portland, Oregon 97201-4987

Re: Siltronic Comments to *Preliminary Draft-Offshore Groundwater Field Sampling Approach – Gasco/Siltronic Groundwater Source Evaluation* by Anchor Environmental, LLC (October 2005) - Gasco Site
ECSI #84

Dear Matt:

On behalf of Siltronic Corporation (Siltronic), Maul Foster & Alongi, Inc. (MFA) has reviewed the above-referenced proposal for field sampling (the FSA), which was recently submitted to the Oregon Department of Environmental Quality (DEQ). This letter provides Siltronic's general comments on the plan.

NW Natural (NWN) retained Anchor Environmental, LLC (Anchor) to design and propose an approach for evaluating the impacts of manufactured gas plant (MGP) wastes to sediment, groundwater and transition zone water in the Willamette River. The FSA constitutes that proposal on behalf of NWN and also responds to DEQ's request to screen site data consistent with the Interim Final Joint Source Control Strategy (JSCS) document for the Portland Harbor (recently issued by DEQ and the U.S. Environmental Protection Agency [EPA]).

MGP wastes were stored upland and discharged directly to the Willamette River by Pacific Gas & Coke (PG&C), a predecessor to NWN. Waste storage and disposal occurred throughout the PG&C site and property later purchased by Siltronic. Recent investigation of the Siltronic property has confirmed substantial impacts to environmental media (including surface soil, subsurface soil, groundwater, and Willamette River sediments and surface water) from MGP wastes.

GENERAL COMMENTS

1) In their August 9, 2005 letter to NWN, DEQ required NWN to screen groundwater data to identify the full horizontal and lateral extent of impacts to be addressed in an

SCOEPA00013181

Engineering Evaluation/Cost Analysis (EE/CA). The FSA provides an initial screen of the data (using MGP-related chemicals), and concludes that almost every groundwater sampling location contains concentrations in excess of the screening values.

2) Siltronic assumes that the proposed approach will be revised following Anchor's integration of the data included in Siltronic's *Supplemental Investigation Report* (SIR), dated September 15, 2005.

3) Anchor's proposed approach relies on Hahn and Associates, Inc.'s (HAI) identification of sources of MGP-related impacts summarized in their *Updated Phase I Site Characterization Report – Siltronic Site* (HAI, 2005). However, this report has not been accepted as complete by DEQ, and underestimates the number and magnitude of MGP-related sources, as identified by MFA in their review of the report.

4) In addition, Siltronic is concerned that Anchor's proposed approach does not meet all of the stated objectives. Those objectives are restated here as follows:

The proposed primary objectives of the offshore groundwater related sampling are to understand:

1. *How the vertical and lateral extent of chemicals in groundwater beneath the river and transition zone water (water in the upper 10 cm of river sediments) may be related to chemical concentrations that have already been measured in upland shoreline groundwater. This will be done through sampling and laboratory testing of off shore groundwater and transition zone water.*

2. *How groundwater and transition zone water concentrations may be related to direct historical deposition of materials in the river. This will be done through sampling and chemical analysis of bulk sediment, and observations of waste material potentially present in those river sediments.*

3. *The chemical concentrations in the biologically active transition zone water (e.g., top10 cm) in river channel sediments that have not been directly impacted by historical deposition of waste materials in the river through collection of transition zone water for chemical analyses.*

SCOEPA00013182

The FSA proposes investigation of sediment, groundwater and transition zone water offshore of the NWN property, and incorporates the results of sediment, groundwater and transition zone water sampling either completed or planned by the Lower Willamette Group (LWG). However, the FSA does not propose to investigate MGP-related impacts upstream of the LWG's proposed investigation area (which is located upstream of Anchor's proposed investigation area).

Material data gaps, including inadequate characterization of upstream MGP-related impacts to sediment, groundwater and transition zone water, will result from the limits inherent in Anchor's proposed approach. DEQ should consider the following points in their review of the FSA:

- Upstream MGP-related impacts are suggested by the direct discharge patterns shown in aerial photographs (see Attachment 1).
- Upstream MGP-related impacts are suggested by runoff (to surface water) and infiltration (to groundwater) from MGP waste management during site filling activities (see Attachment 2).
- These upstream MGP-related impacts have been confirmed by the LWG's sediment sampling (locations 314, 315, 316, 318, 320, and 323) and by Weston's initial sampling (locations SD070, SD072, SD075, and SD077).

For the above reasons, and in the context of the screening results identified in Comment 1, Siltronic concludes that Anchor's proposed approach does not meet their stated objectives.

Please call either of us at (971) 544-2139 if you have questions or comments.

Sincerely,

Maul Foster & Alongi, Inc.

James G.D. Peale, RG
Senior Hydrogeologist

James J. Maul, RG
President and Principal Hydrogeologist

R:\8128.01 Siltronic Corp\Correspondence\08_Comments Anchor FSA 11.22.05\lf - comments on anchor fsa.doc

cc: Tom McCue; Siltronic
Chris Reive; Jordan Schrader
Alan Gladstone, Davis Rothwell Earle & Xochihua, P.C.
Bob Wyatt, Northwest Natural
Dana Bayuk, DEQ

Attachments: Aerial Photographs (1955, 1967)

SCOEPA00013184

AERIAL PHOTOGRAPHS

SCOEPA00013186

Word Processing & Document Production Form

Project #: 8128.01.05 **Task #:** 02 **Billable:** ☒ Yes ☐ No

Time Sheet Description: Anchor FSA Review

Submitted
Date & Time: 11/7/05

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Date & Time: email by 11/18 (JP to do this).

Submitted by *(Your Name)*: Peale

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- ☐ Loose Leaf

Additional directions (tabs, etc.): ADD PDFs (2 AERIAL PHOTOS) AS ATTACHMENTS.

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SCOEPA00013188

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Author:	Peale	PP	

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Comments: See attached.

I have incorporated the reviewer's comments and the document is ready for production.

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SCOEPA00013189

Anne Fleming

From: James Peale
Sent: Thursday, November 17, 2005 3:17 PM
To: Anne Fleming
Subject: FW: comments on Anchor's FSA
Attachments: 1967 Aerial Photo.pdf; 1955 Aerial Photo.pdf

Hi! Here is the link to the final of this letter. This email also includes my approval for electronic signature. Blue sheet on its way.

L:\Projects\8128.01_Siltronic Corp\08 Remedial Investigation\Task 2 - Gasco\ld - comments on anchor fsa.doc

The attached pdfs should be attached to the pdf of the text.

James G.D. Peale, RG
Senior Hydrogeologist
Maul Foster & Alongi, Inc.
3121 SW Moody Ave Ste 200
Portland OR 97239
(o) 971-544-2139 x 2118
(f) 971-544-2140
(c) 503-449-9576
www.mfainc.org

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-----Original Message-----
From: Jim Maul
Sent: Thursday, November 17, 2005 10:47 AM
To: Anne Fleming
Cc: James Peale
Subject: RE: comments on Anchor's FSA

James has my permission to send this document and use my electronic signature when he deems appropriate.

Jim

-----Original Message-----
From: James Peale
Sent: Wednesday, November 16, 2005 5:19 PM
To: 'McCue, Tom'; Gladstone, Alan; Chris Reive
Cc: Jim Maul
Subject: RE: comments on Anchor's FSA

All – please see revised with edits from Chris and me.

James G.D. Peale, RG
Senior Hydrogeologist

MAUL FOSTER ALONGI INC.
ENVIRONMENTAL & ENGINEERING CONSULTANTS
3121 SW Moody Avenue, Suite 200 | Portland, Oregon 97239 | Phone 971.544.2139 | Fax 971.544.2140 | www.MFAinc.org

September 15, 2005
Project 8128.01.08

Mr. Matt McClincy
Oregon Department of Environmental Quality
2020 SW 4th Avenue, Suite 400
Portland, Oregon 97201-4987

Re: Comments on *Updated Phase I Site Characterization Summary Report – Siltronic Corporation Property* by Hahn and Associates, Inc. (7/22/2005)
Siltronic Corporation
7200 NW Front Avenue, Portland, OR
ECSI #183

Dear Matt:

On behalf of Siltronic Corporation (Siltronic), Maul Foster & Alongi, Inc. (MFA) has reviewed the above-referenced report as submitted to the Oregon Department of Environmental Quality (DEQ). This letter provides Siltronic's general and specific comments, with text from the report included (**in bold**) where appropriate.

Northwest Natural Gas Company (NWN) retained Hahn and Associates, Inc. (HAI) to complete a remedial investigation (RI) at the Siltronic property located at 7200 NW Front Avenue, Portland, Oregon. The RI activities on the Siltronic property are required by a DEQ Order issued jointly to NWN and Siltronic (DEQ No. ECVC-NWR-00-27; hereinafter referred to as the Joint Order). The Joint Order and attached scope of work specify the activities to be completed for the RI, including determining the "vertical and horizontal extent and distribution of hazardous substance in affected media."

GENERAL COMMENTS

1. The updated report represents an improvement upon the *Phase I Site Characterization Summary Report* (HAI, 2003) in that NW Natural acknowledges ownership of and responsibility for the significant and extensive vertical and lateral impacts from manufactured gas plant (MGP) waste disposal and management on the Siltronic property. These impacts include contamination of soil and groundwater beneath the Siltronic property and the Willamette River, and contamination of Willamette River sediment (property owned by the State of Oregon) by hazardous constituents.

SCOEPA00013191

2. MFA agrees with HAI that the nature and extent of MGP contaminants of interest in the Willamette River have not been delineated and that further work is needed.

3. The updated report is still limited in scope by what appears to be an incorrect interpretation of the Joint Order. Specifically, the updated report continues to only address potential threats to Willamette River sediments, and to ignore multiple other potential sources, pathways and potential human and ecological receptors. As MFA stated in its December 22, 2003 review of HAI's initial work:

> "HAI states that the RI scope of work required by the [Joint] Order is limited to determination of the nature and extent of releases of hazardous substances to sediments. The RI scope of work as identified in Section 5 and Attachment B of the [Joint] Order is not so limited; it specifically requires identification of the vertical and horizontal extent of soil and groundwater contamination, identification of hot spots, and assessment of human and ecological risk, plus other requirements. The [Joint] Order's requirements for a complete RI have been previously noted by the DEQ in its letter to NWN dated June 26, 2001."

The effect of this limited scope is that the proposed scope of work fails to address potential threats to human health and the environment, including those posed by sediments, as required by the Joint Order. NWN is obligated to evaluate the risk to human health and the environment for all environmental media potentially impacted by MGP waste.

4. The updated report still lacks a comprehensive conceptual site model (CSM) as noted by MFA in its December 22, 2003 review and required by DEQ in their April 23, 2004 letter to NWN and Siltronic. The CSM is necessary to evaluate potential risk to human and ecological receptors from hazardous substances.

5. The updated report still lacks estimates of MGP waste volumes generated and disposed on the Siltronic property. DEQ specifically required this information in their April 23, 2004 review.

6. The updated report fails to address impacts from MGP waste that were present on the Siltronic property immediately prior to NW Natural's sale of the property. For example, the final disposition of 34,000 cubic yards of MGP waste is simply described as "unknown".

7. The updated report fails to evaluate the significance of the potential source areas as described by MFA in its March 11, 2005 letter to DEQ. For example, NWN has not characterized the nature and extent of MGP wastes that were spread and used for fill for

SCOEPA00013192

much of the Siltronic property. NWN should be required to evaluate the entire nature and extent of MGP waste impacts on the Siltronic property.

8. The updated report fails to identify inadequate characterization of the nature and extent of MGP DNAPL as a data gap. The DNAPL represents a potential hot spot in that it constitutes a "highly mobile source" and requires additional characterization and source control measures. In their August 2, 2005 letter, DEQ identified the inadequate characterization as a data gap, and required NWN to initiate further characterization of the MGP DNAPL.

9. The updated report prematurely concludes that the MGP DNAPL observed in upland borings is "disconnected and separate" relative to the NAPL observed in offshore borings, and sampled from offshore boring GP-27. As stated in MFA's February 1, 2005 letter documenting the results of the 2004 in-river work, the analytical results indicate that NAPL detected offshore is chemically indistinct from DNAPL collected from upland monitoring wells, suggesting the presence of a large body of MGP NAPL or DNAPL that has migrated into the river. Absent characterization of the nature and extent of MGP DNAPL (see comment 8, above), the conclusion that the upland MGP DNAPL and the in-river NAPL are separated is technically unsupported and premature. Consequently, the conclusion that the related contaminant transport pathway (DNAPL migration to the Willamette River and its sediments) is not potentially complete is incorrect.

10. The updated report repeats the speculation that dissolved-phase trichloroethene (TCE) (or its degradation products) can somehow change the behavior of the MGP DNAPL, without providing adequate scientific (or other) basis for that speculation. If NW Natural has data or scientific studies appropriate for this site to support its speculation, it should be required by DEQ to produce them immediately so that they can be evaluated. If not, DEQ should request that NW Natural end its speculation in reports submitted under the Joint Order.

11. Siltronic has submitted a Supplemental Investigation Report (MFA, September 8, 2005) to the DEQ that documents the results of recent upland and in-river work. The results show that a full RI to characterize the nature and extent of MGP impacts on Siltronic's property and beneath the Willamette River as required by the Joint Order is necessary.

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SPECIFIC COMMENTS

Section 1.0 – Executive Summary

The introduction indicates that the report includes updates to the CSM. No CSM (in the expected sense of a summary of sources, release mechanisms, exposure pathways, and potential receptors [both human and ecological]) was provided to the DEQ as required in its April 23, 2004 letter reviewing the Phase I Site Characterization Report.

Section 1.1 – Contaminant Sources Attributable to MGP-Related Waste Management

NWN has not responded to DEQ's requirement that NWN identify potential sources of contamination on Siltronic's property. For example, HAI identifies the former MGP Waste Disposal Lagoon as "the Former 400-foot Wide Lowland Area," which is misleading. Also, the updated report fails to consider sources of contamination resulting from waste management activities after 1962.

The updated report fails to characterize effluent pond and Waste Disposal Lagoon operations, which prevents adequate characterization of the nature and extent of MGP DNAPL. There are significant documented impacts[1] of MGP waste in groundwater and sediments that appear directly linked to the size (10 to 11 acres) and operational history of waste disposal lagoons. Also, the updated report states that the waste disposal lagoons received tar and oil, but provides volume estimates only for tar. The aerial photographs included in Appendix A show that the waste lagoons contained substantial amounts of liquid or oily waste for at least 10 years between 1952 to 1965. The effluent ponds and waste disposal lagoons contained at least 6 million gallons of liquid waste, including process water and MGP byproducts, and may have also contained as much as 3.9 million gallons of dry tar (DEQ, 1994).[2]

HAI has identified in this section two different areas (the Former Waste Disposal Lagoon and Potential Waste Disposal Pond) as having received MGP waste. HAI initially describes the waste disposed in these areas as tar or emulsifications of tar, oil, and water, but later limits the types of wastes to tar, without documentation. Absent documentation, it is premature to characterize the waste as "tar", with the apparent implication that it is less mobile or less toxic than waste effluent or oil. Further, the wide-spread extent of

[1] MGP Data Submittal, MFA Dec. 13, 2004.
[2] DEQ Interoffice Memorandum, to File from E. Blischke, April 20, 1994.

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MGP DNAPL documented by Siltronic clearly indicates that the specifically identified Waste Disposal Lagoon contained large volumes of liquid that migrated to the subsurface. Impacts observed in geotechnical borings completed in the late 1970s indicate that the MGP DNAPL had migrated prior to Siltronic's purchase of the property.

HAI's discussion of the Former Spent Oxide/Gas Purifier Waste Storage Pile indicates that contaminants of interest (COIs) related to this waste are limited to metals and cyanide. Based on the process diagrams, it seems premature to exclude hydrocarbons as COIs from spent oxide. Later, on page 18 of the updated report, hydrocarbons are included as potential COIs from this waste stream.

This section also fails to address or discuss the historical drainage ditch that existed on the perimeter of the lagoon. Review of aerial photos from 1955 indicates substantial waste releases to the Willamette River via this ditch.

Finally, it is important that DEQ require NWN to account for the final disposition of 34,000 cubic yards of waste (3,400 dump trucks). Given the nearly site-wide distribution of MGP waste on the Siltronic property, NWN's current method of accounting for this waste as "unknown" is unacceptable. If NWN can not account for this material, DEQ should assume that the 34,000 cubic yards were disposed of on Siltronic's property by NWN.

Section 1.2 – Other Contaminant Sources

This section of the updated report omits discussion of potential impacts to the Siltronic property from operations by Koppers, Inc., which included land application of waste liquids.

The section identifies potential release(s) from the Olympic Pipeline. The report titled *Findings Report – Groundwater and Soil Gas Investigation* (CH2MHill, 1990) concluded that concentrations of Total Petroleum Hydrocarbons (TPH) and BTEX[3] found in soil gas and groundwater samples were "typical of those associated with a gasoline spill or leak" but also indicated that "the specific origin of the BTEX was not conclusively determined from the chemical concentrations or chromatograms."

The CH2MHill report included the field laboratory sheets which documented odors or other characteristics. Odors characteristic of "coal tar" were noted at nine of the 28 sampling locations. The samples were identified as "black and sticky" at three of the

[3] Benzene, toluene, ethylbenzene, and xylene isomers.

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sampling locations. These observations generally corresponded to the higher concentrations of TPH and/or benzene which confirm the presence of MGP waste in this area.

This section of the updated report also identifies potential former Western Transportation Petroleum Release(s), based on "possible surface staining [was] noted on a 1970 aerial photograph." No other documentation for potential releases is provided. Earlier aerial photographs (August 29, 1968; April 1967) do not reveal surface staining in the area of Western Transportation's former operations (which ceased in the mid-1950s). The photos do show, however, significant MGP waste management on other portions of the Siltronic property. The weight of evidence indicates that the "possible surface staining" noted in the 1970 photograph is likely related to MGP waste storage or disposal activities. Further characterization of MGP-related impacts in this area is warranted.

This section also suggests that tetrachloroethene (PCE) is a contaminant of interest (COI) related to the TCE as an impurity. Since the TCE used at the Siltronic site was of relatively high technical grade, MFA recommends that NWN provide documentation regarding this allegation. The data collected by Siltronic relative to the TCE plume characterization does not support NWN's conclusion.

The subsection identifying other Siltronic-related releases (i.e., not related to TCE) is misleading in that the potential impact of these minor releases is elevated to the same level as the MGP waste impacts and the TCE release. DEQ has agreed that these releases do not require further investigation.

Section 1.3 – Hydrogeologic Framework

Groundwater occurs in three hydrologic zones beneath the Siltronic site: the unconfined surficial fill water-bearing zone (WBZ), the semi-confined alluvial WBZ, and the confined bedrock aquifers of the Columbia River Basalt Group.

This section identifies the "confined bedrock aquifers of the Columbia River Basalt Group (CRBG). The basis for characterizing the CRBG aquifer(s) as confined beneath the Siltronic site is not provided.

Vertical migration of contaminants through the silt unit has occurred at the northern portion of the Siltronic site (400-foot wide former lowland area), where the silt unit becomes thin and/or where the presence of rootlet zones has resulted in the fingering of non-aqueous phase liquid (NAPL) through the silt.

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Site characterization data indicate that the occurrence of DNAPL associated with MGP waste disposal is widespread. The vertical migration of contamination, including the DNAPL measured in the existing monitoring wells, is ample documentation of the vertical migration of DNAPL, regardless of the nature of discontinuities in the silt unit. The significant variations in the topography of the upper surface of the silt (see Figure 7 of the HAI report) suggest that the silt unit was heavily channelized prior to filling, which could create discontinuities in the silt. It is unlikely that a laterally extensive silt unit was established in the Willamette River, given the high-energy nature of the system and the periodic flooding that occurred.

Section 1.4 – Subsurface Soil/Non-Aqueous Phase Liquid

MFA expects that this section will be revised substantially based upon DEQ's requirements for additional investigation of the nature and extent of MGP DNAPL throughout the Siltronic property. However, the following clarifications should be included in the record.

Further, dense, non-aqueous liquid (DNAPL) has been identified in two alluvial WBZ wells screened to 125 feet bgs at a location between the former lowland area and the Willamette River. The area of deep DNAPL migration beneath, and down-gradient of, the former lowland area corresponds to the location of significant TCE concentrations in groundwater, suggesting the possibility of a co-solvency effect.

The suggestion ignores the fact that TCE and its degradation products were not found in WS-14-125 (one of the wells referenced above). The assertion that TCE or its degradation products (at 0.01-0.001% by weight) are enhancing the mobility of this DNAPL has not been supported by any substantial evidence and is without scientific or technical basis.

Also, the MGP DNAPL contains greater than 10 percent by weight of naphthalene and significant concentrations of monoaromatic compounds (e.g., benzene and ethylbenzene), at concentrations greater than the TCE. It is likely that the high concentrations of naphthalene and benzene in the MGP DNAPL are facilitating the transport of toxic or carcinogenic polynuclear aromatic hydrocarbons (PAHs).

Oil or tar have not been identified beneath the silt unit at portions of the site beyond the 400-foot wide former lowland area.

This statement is not a reasonable basis to limit further investigation of MGP waste-related impacts to the Former Waste Disposal Lagoon footprint. Monitoring wells (generally required for identification of NAPL in the subsurface) have not been installed

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along the eastern[4], southern or southwestern perimeter of the Former MGP Waste Disposal Lagoon. Monitoring wells have not been installed further east of the Former Waste Disposal Lagoon. The lateral and vertical extent of the MGP DNAPL has not been characterized and represents a significant gap in understanding the impacts of the MGP waste to the Siltronic property.

Direct observation of soil cores from upland and in-water borings indicate the upland DNAPL to be disconnected and separate relative to the shallow oily sediments identified at off-shore locations. Further, due to the depth of the DNAPL near the shoreline (well below the base of the river); the specific gravity of the DNAPL; and the apparent presence of a downward hydraulic gradient beneath the river, the DNAPL does not appear to be a future migration threat with regard to Willamette River sediments.

The conclusion is premature absent a complete characterization of the nature and extent of MGP DNAPL, as discussed in general comment 9.

Available observational data and historical research indicate oil or tarbearing sediments off-shore of the northern portion of the Siltronic property are likely the result of historical overflow from the former effluent ponds at the southern end of the current Gasco property via the former ditch located near the current Gasco / Siltronic property boundary (1941 to 1951), and from possible discharges related to the former lowland area via the ditch formerly located approximately 400 feet upriver from the property boundary (1951 to 1956).

Review of aerial photos confirms discharges from the 1951-1956 ditch to the Willamette River.

Section 1.5 – Groundwater Quality

Available data from in-water borings suggest the upland petroleum hydrocarbon plume is predominantly migrating beneath the river without discharge to shallow sediments, with the extent of the upland benzene and naphthalene plume components having been delineated in the upriver direction.

This conclusion is not supported by the results of the 2005 in-river work by Siltronic. The plume has not been sufficiently delineated in the upriver direction. The data suggest there

[4] Compass directions referenced by MFA in this document have been oriented to the plant, such that Plant North is perpendicular to the long axis of the Fab 1 building and bank of the Willamette River.

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may be substantial impacts from the upland petroleum hydrocarbon plume to sediment and surface water. Benzene and naphthalene were detected at respective concentrations of 629 and 9,480 micrograms per liter (ug/L) in a shallow groundwater sample collected approximately 450 feet into the channel. These data are included in the Supplemental Investigation Report (SIR) that was delivered to DEQ on September 8, 2005.

One potential source for the identified cyanide impacts could be spent oxide / purifier box wastes formerly stored at the northern end of the property. However, imported fill is another potential source for the cyanide, especially since the greatest cyanide concentrations in soil (greater than 1,000 ppm) were identified in fill at areas well away from the area where spent oxide was stored, and soils containing the highest cyanide concentrations did not contain field screening evidence of the presence of MGP-related materials (e.g., no wood chips, spent lime, prussian blue coloration, tar or oil).

Waste characteristic of purifier box residue, including MGP waste-saturated wood chips, was found in boring WS-15, confirming the potential source of cyanide. As observed by MFA and DEQ personnel during the field work, the waste-saturated wood chips took on a dark blue color after exposure to the atmosphere.

In section 1.1, the updated report states that the disposition of the 34,000 cubic yards of spent oxide is unknown. That statement is contradicted by the second sentence (above), which states that cyanide was found in soil "well away from where the spent oxide was stored", implying that there is additional process or waste disposal knowledge not included in the report. Absent documentation, the alternative hypothesis of cyanide-bearing fill material seems speculative.

Section 1.6 – Identification of Potential Contaminant Transport Pathways

Based on the preceding, potential contaminant transport pathways between the upland portion of the site and the Willamette River, to be further evaluated as part of an updated source control evaluation document, include the following:

- **Groundwater Pathway**
- **Surface Water Runoff Pathway (e.g., Site Outfalls and City of Portland Outfall 22C)**
- **Catch-Basin Sediment Transport Pathway**

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- **Soil Erosion Pathway (unarmored areas of embankment)**

As stated previously (see general comment 9), excluding potential contaminant transport pathways absent characterization of the nature and extent of the MGP DNAPL is inappropriate.

Siltronic agrees that the groundwater pathway should be further evaluated. However, absent a detailed conceptual site model (CSM) prepared consistent with DEQ guidance, it is premature to screen out other pathways based on the data set collected to date.

For instance, the MGP DNAPL present in the subsurface represents an ongoing highly mobile source of contamination to groundwater. An evaluation of source control cannot be adequately completed without characterizing the nature and extent of the DNAPL.

Section 1.7 – Preliminary Data Gap Identification

This data gap identification is incomplete given the limited amount of characterization completed to date. NWN should complete full characterization of the nature and extent of MGP waste-related impacts across the entire Siltronic property before attempting to identify or limit data gaps.

Section 2 - Introduction/2.1 - Purpose

The purpose of the Order as stated is too limited, as discussed in General Comment 2, above. While the report is intended to be part of a Focused RI, Siltronic is concerned that the language in this section may persist and subsequently limit future investigations needed to characterize the impacts related to MGP waste disposal.

Accordingly, the *Updated Phase I Site Characterization Summary Report* has been revised in response to DEQ's comments.

The updated report has been revised, but NWN has not adequately responded to DEQ's comments, given the potential magnitude of the MGP-related impacts.

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Section 3 - Background/3.3 Ownership Filling and Site Development Activities

On page 16, the updated report references ownership history from the *Site History* (PDC, 1985). MFA has identified errors in the *Site History* regarding ownership of the Siltronic property, as follows:

- NWN sold a portion of the property to Rosenfeld, Anderson and Schnitzer in 1960, not 1962 as stated in the report.

- NWN sold a portion of the property to the Western Transportation Company in 1968, which is not identified in the *Site History*.

Portions of the Siltronic property were clearly used for the storage or disposal of MGP waste by NWN, its predecessors or others following transfer of property ownership. The responsibility for characterizing MGP waste storage and disposal activities should be NWN's.

Section 3.4 – Background – PG&C Operations and Waste/By-Product Generation

PG&C owned a portion of the Siltronic property from 1939 until 1962, during which time company records and aerial photograph review indicate waste management activities were conducted on the northern portion of the Siltronic property proximate to the current NW Natural/Siltronic property boundary.

The statement should be expanded to reflect management of MGP waste on the Siltronic property independent of NWN's ownership. As written, the statement implies that NWN has no responsibility for the MGP waste following the transfer of the property.

An extensive description of the production methods used at the PG&C Gasco site as part of oil gas manufacture is provided within an August 1939 document entitled *Report on Portland Gas & Coke Company* (Ebasco Services, Inc. and PG&C Co.); a 1941 paper entitled *Aromatics, Gas and Coke from Heavy Petroleum* (Hall, 1941); and a 1952 paper entitled *Oil Gas Manufacture, A Staff-Industry Collaborative Report* (Hull and Kohlhoff, 1952).

Estimates of the waste volumes should be included if the data are available. Alternatively, copies of the referenced documents or company records should be included in this report to allow for estimating the MGP waste production volumes, since the section and

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accompanying Table 1 do not include such estimates. With respect to Table 1, it appears that the by-products were also wastes at certain points. Since large volumes of the by-products were produced, the characterization of the waste volumes is important.

The discussion of metals found in spent oxide waste omits vanadium, which is a metal often found at MGP waste sites.

Due to the large scale of operations at the Gasco site, economic recovery of many of the by-products typically wasted at other plants of this type was possible, thereby reducing the quantities of waste from this site.

The statement implies that documentation of waste production volumes is available. Characterization of the nature and extent of MGP waste and MGP DNAPL relies on estimates of waste production volumes. The documents or records should be provided to DEQ.

Page 19 includes references to block flow diagrams in Appendix B. Figure 2 (Appendix B, page 5) clearly shows "Effluent to Settling Basin" as a process output. Based on the detailed information in the above-referenced report and the well-documented byproducts optimization, this particular process output should be addressed in this section. This and other process-related omissions are inconsistent with the relatively detailed process information provided in the *Revised Baseline Ecological and Human Health Risk Assessment Report* (Anchor, 2004) prepared regarding the NW Natural property.

The text labels on the figure referenced in Appendix B (Plant Layout at Closure) are mostly illegible.

Section 3.5.1 – MGP-Related Waste Management Areas

The text indicates that company records indicate that waste management activities were conducted and documented. Copies of these records should be included with future reports investigating this area.

Section 3.5.1.1 – Former 400-Foot Wide Lowland Area

This area has been identified in correspondence from MFA to DEQ as the Former Waste Disposal Lagoon based on the following facts:

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- Review of the aerial photos (Appendix A of the report) and historical topographic maps show the eastern extent of the Lagoon bounded by a constructed berm, and bounded to the east by a ditch (referenced below). The Lagoon was a structure built by PG&C.

- As described in the report (and confirmed by the aerial photo from March 1961), the Former Waste Disposal Lagoon was fed by weirs connected to the Effluent Ponds. The lagoon was maintained subsequent to cessation of oil gasification operations.

- Aerial photo review shows the Former Waste Disposal Lagoon filled or partially filled with liquid MGP wastes over a period of 13 years (1952 through 1965).

The weight of evidence indicates that this portion of the property was actively managed by NWN or its predecessors as a Waste Disposal Lagoon[5], supporting its identification as such.

This section of the updated report represents an improvement on the previous Phase I Site Characterization report, but lacks detail regarding the following:

- Frequency of effluent pond clean-out operations.

- Frequency of effluent pond overflows to the Former Waste Disposal Lagoon.

- Measurements of oil or tar thickness during operations (implied by 1960 thickness data).

- Estimates of oil or oil/water emulsion volumes.

These data are critical to estimating the volume of MGP waste which has migrated as DNAPL to the subsurface.[6]

As such, MGP effluents were directed to the northern portion of the present-day Siltronic property between 1951 and the time of MGP closure in 1956.

Review of the aerial photos (in Appendix A) shows evidence of liquid disposal to the effluent ponds and Waste Disposal Lagoon through March of 1961. The Phase I Site

[5] The *American Heritage Dictionary of the English Language, Fourth Edition* defines lagoon as "a shallow body of liquid waste material, as in a dump."

[6] Multiple authors have identified that knowing or estimating the volume and timing of a release is critical for evaluating the nature and extent of DNAPL.

Characterization Report (HAI, 2003) suggests that the Lagoon may have received discharges throughout 1964, and the aerial photos in Appendix A suggest the presence of liquid MGP waste in 1965. It does not appear that MGP waste disposal ceased in 1956 as implied by this report.

Effluent overflows from the northern portion of the Siltronic site to the Willamette River during this timeframe, if any, would likely have occurred via the ditch at the southern end of the 400-foot wide lowland area.

Effluent overflows to the Willamette River are confirmed by review of the aerial photos (e.g., March 1955 photo in Appendix A).

Section 3.5.1.2 – Former Depression or Excavation

Given Portland Gas & Coke's (PG&C's) waste management (i.e., storage and disposal) practices in the Former Waste Disposal Lagoon, it is likely that this area received more than just "tarry waste". Available company records should be included in future reports that investigate this area. The updated report confirms that MGP waste storage and disposal activities were being carried out by PG&C well after oil gasification operations were shut down.

Section 3.5.1.3 – Spent Oxide/Purifier

As stated previously, it is important that the DEQ require NWN to account for the final disposition of 34,000 cubic yards of waste (3,400 dump trucks). Given the nearly site-wide distribution of MGP waste on the Siltronic property to account for this waste as "unknown" is unacceptable. If NWN can not account for this material it should be assumed by the DEQ that the 34,000 cubic yards that were disposed of on Siltronic's property by NWN were distributed over the property.

Section 3.5.2.1 – Former Western Transportation Terminal

The section also identifies potential former Western Transportation Petroleum Release(s), based on "possible surface staining [was] noted on a 1970 aerial photograph." No other documentation for potential releases is provided. Review of earlier aerial photographs (August 29, 1968; April 1967) does not reveal surface staining in the area of Western Transportation's former operations (which ceased in the mid-1950s). The photos do show significant MGP waste management on other portions of the Siltronic property. The

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weight of evidence indicates that the "possible surface staining" noted in the 1970 photograph is likely related to MGP waste storage or disposal activities. Further characterization of MGP-related impacts in this area is warranted.

Section 3.5.2.2 – Olympic Pipeline

The report titled *Findings Report – Groundwater and Soil Gas Investigation* (CH2MHill, 1990) concluded that concentrations of Total Petroleum Hydrocarbons (TPH) and BTEX[7] found in soil gas and groundwater samples were "typical of those associated with a gasoline spill or leak" but also indicated that "the specific origin of the BTEX was not conclusively determined from the chemical concentrations or chromatograms."

The CH2MHill report included the field laboratory sheets which documented odors or other characteristics. Odors characteristic of "coal tar" were noted at nine of the 28 sampling locations. The samples were identified as "black and sticky" at three of the sampling locations. These observations generally corresponded to the higher concentrations of TPH and/or benzene which confirm the presence of MGP waste in this area and suggest that substantial MGP impacts were present prior to the Olympic pipeline release.

Section 3.5.2.3 – Fill Material

Regarding the section on the bank repair, MFA noted the following:

- The repair work occurred in 1998, not 2000 as stated.
- As stated in the *Supplement to DEQ's Strategy Recommendation* (Bridgewater, 2000), the analytical results (specifically chromatograms) indicated that the impacts to silt were chemically more consistent with MGP waste than a petroleum product release. This significant distinction is omitted from the HAI report.

Section 3.5.2.4 – Siltronic Operations-Related Releases

The section identifies releases of other hazardous substances in connection with Siltronic's plant operations. However, the 1991 Weak Acid Storage Tank Leak, 1987

[7] Benzene, toluene, ethylbenzene, and xylene isomers.

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Organic Wastewater Overflow, and the 1997 Caustic Rinse Water Release did not result in a release of hazardous materials and should not be identified as such.

There is no historical or documented basis to conclude that the 1998 Pentachlorophenol Detection in Wastewater is related to Siltronic's operations.

Siltronic's underground TCE system was utilized between 1980 and 1983, not 1981 and 1984 as reported.

Section 3.5.3 – Summary of Potential Contaminant Sources

This section attempts to limit the duration of MGP waste storage and disposal activities in the Former Waste Disposal Lagoon to 1941-1956, which is contradicted by aerial photographs of NWN's operations. As discussed in the comments on Section 3.5.1.1 (pp 11-13), aerial photos indicate that MGP waste was managed in the Former Waste Disposal Lagoon though at least 1961. Later aerial photos indicate that MGP waste was spread as fill material over much of the site.

The duration of releases and spill associated with Siltronic's operations is constrained to 1980-1984, not 1980-1997 as reported.

Section 3.6 – Contaminants of Interest

The "other metals" identified as COIs (page 33) are previously included on page 32. Vanadium should be included as a COI related to MGP operations.

Section 3.7 – Potential Contaminant Pathways to the Willamette River

MFA understands that other potential contaminant pathways to other portions of the site may exist, but are not addressed in this updated report.

Section 4 – Field Activities

MFA's previous comments as submitted to DEQ in 2003 apply to this section.

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Section 5 – Analytical Tests

For work completed from 2003 onward, MFA submitted samples to Specialty Analytical of Tualatin, Oregon under chain-of-custody, not to Columbia Analytical.

MFA also submitted samples for analysis of metals by USEPA Methods 6010 and 7470.

Section 6.1.2 – Alluvial Deposits

Despite the depiction on the cross-sections, it is not clear that the silt unit is laterally extensive. As mentioned in the previous comment regarding Section 1.3, the topography of the upper surface of the silt suggests the potential for discontinuities in the silt unit. The presence of the MGP DNAPL at depths exceeding 100 feet bgs is evidence that the silt unit does not prevent downward migration of contaminants. The presence of the MGP DNAPL at these depths absent concentrations of TCE or its degradation products (i.e., WS-14-125) is quantitative evidence that the mobility of the MGP DNAPL is not impacted by the TCE release.

Section 6.2 – Hydrogeologic Setting

The introduction identifies the CRBG as one of three principal hydrogeologic zones. Further discussion of the CRBG is missing or was omitted.

Section 6.3.4 – Subsurface Soils

With respect to cyanide, blue coloration was identified (as observed by MFA and DEQ personnel) in soil cuttings from WS-15-85 (22 to 24 and 34.5 to 36 feet bgs) after approximately one to three days' exposure to air. The blue coloration was associated with soil cuttings that included layers of MGP waste-saturated wood chips. The wood chips were found in discrete layers, suggesting they had been placed in lifts (i.e., discrete layers) during filling activities.

However, imported fill is another potential source for the cyanide, especially since the greatest cyanide concentrations (greater than 1,000 ppm) were identified in fill at areas well away from the area where spent oxide was stored, and soils containing the highest cyanide concentrations did not contain field screening evidence of the presence of MGP-related materials (e.g., no wood chips, spent lime, prussian blue coloration, tar or oil). Further, the maximum total cyanide concentrations identified

in the fill materials at the Siltronic property (up to 15,000 ppm) do not correlate with concentrations identified in soils at the adjacent Gasco site, where cyanide impacts likely attributable to spent oxide / gas purifier wastes have been identified at concentrations of no greater than 518 ppm.

HAI's speculation regarding imported fill as a source of cyanide is based in part on the spatial distribution of cyanide impacts (last sentence). Absent more detailed documentation of the MGP waste disposal practices, the simplest interpretation (i.e., that the location of the greatest cyanide concentrations is itself indicative of a purifier box waste disposal area) is more likely.

Section 6.4 – Oil and Tar Observations

The text omits discussion of the MGP DNAPL impacts observed in the offshore borings completed by MFA in 2004.

Page 62 includes the statement:

TCE, a solvent, may be expected to entrain or otherwise increase dissolution and mobility of DNAPL in areas where commingling occurs.

The statement is misleading, inaccurate and without scientific basis. It ignores the fact that TCE and its degradation products were not found in WS-14-125 (one of the wells referenced above). Moreover, the assertion that TCE or its degradation products (at 0.01-0.001% by weight) are enhancing the mobility of this DNAPL has not been supported by any substantial evidence and is without scientific or technical basis.

The MGP DNAPL beneath the Siltronic property contains greater than 10 percent by weight of naphthalene and significant concentrations of monoaromatic compounds (e.g., benzene and ethylbenzene), at concentrations 1,000-10,000 times greater than the TCE. It is likely that the high concentrations of naphthalene and benzene in the MGP DNAPL are facilitating the transport of toxic or carcinogenic polynuclear aromatic hydrocarbons (PAHs).

The greatest vertical DNAPL penetration appears to have occurred proximate to an area where the silt surface is found to this (WS-15/B-1-8 area) and where the greatest TCE concentrations are present.

The statement is incorrect. The thickest vertical accumulation of MGP DNAPL has occurred at this location. The deepest vertical penetration has been observed in

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monitoring wells WS-14-125 (where TCE and its degradation products are not present) and in WS-11-125.

With respect to the greatest TCE concentrations (reconnaissance sample WS15-W-80; 243,000 ug/L), subsequent sampling of monitoring well WS-15-85, which is screened across the reconnaissance sampling interval, has not duplicated this result. The quarterly sampling data cited in Table 15 of the HAI updated report confirm this. Preliminary data from the August 2005 sampling event indicate that TCE was not detected in WS-15-85; previous concentrations were less that the November 2004 concentration. HAI's characterization of the area near WS-15 as "where the greatest TCE concentrations are present" is contradicted by the data, and is wrong.

The highest upland concentrations of TCE in groundwater continue to be found in monitoring well samples from WS-13-69, which is within the Former Waste Disposal Lagoon. MGP DNAPL has not been observed or measured at this location. Therefore, there is no connection between TCE concentrations and either the penetration depth or accumulated thickness of MGP DNAPL.

Further, MFA identified approximately 6 feet of DNAPL within well WS-15-85, an 85 foot deep alluvial WBZ well located further upland from the WS-11-125 and WS-15-125 locations, within the former lowland area (McClincy, Pers. Comm., 2005).

It appears that the sentence should identify riverbank well WS-11-125 and WS-***14***-125. There is no WS-15-125.

Section 6.5.2.1 – Surficial Fill WBZ – Benzene

The western portion of the site should not be exclusively identified as the Olympic Pipeline release area, since MGP wastes were also stored and disposed of throughout the Former Waste Disposal Lagoon. Benzene is also a constituent of MGP waste.

Section 7 – Conclusions

This section is a restatement of the executive summary. The previous comments regarding Section 1 apply.

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Section 7.7 – Preliminary Estimation of Additional Data Needs

To the extent that the updated report is limited to examining data needs in the context of source control related to the Willamette River, this section appears to be appropriate. However, it should not be construed as limiting future investigation, especially given the data gaps regarding the nature and extent of MGP DNAPL and MGP waste throughout the Siltronic property.

Siltronic appreciates NWN's effort to expand the Phase I Site Characterization Report. Siltronic expects that future documents will be more comprehensive in acknowledging NWN's commitment to completing the full characterization of MGP impacts on the Siltronic property.

Please call either of us at (971) 544-2139 if you have questions or comments.

Sincerely,

Maul Foster & Alongi, Inc.

James G.D. Peale, RG
Senior Hydrogeologist

James J. Maul, RG
President and Principal Hydrogeologist

cc: Tom McCue; Siltronic
Chris Reive; Jordan Schrader
Alan Gladstone, William Earle; Davis Rothwell Mullin Earle & Xochihua, P.C.
Bob Wyatt, Northwest Natural

SCOEPA00013210

FILE COPY

MAUL FOSTER ALONGI INC.
ENVIRONMENTAL & ENGINEERING CONSULTANTS
Vancouver, WA | Portland, OR | www.MFAinc.org

November 3, 2004
Project 8128.01.08

Mr. Matt McClincy
Oregon Department of Environmental Quality
2020 SW 4th Avenue, Suite 400
Portland, Oregon 97201-4987

Re: Review of *Work Plan for Ambient Indoor Air Evaluation – Siltronic Corporation Facility* (Hahn and Associates, Inc., October, 2004)

Dear Matt:

On behalf of Siltronic Corporation (Siltronic), Maul Foster & Alongi, Inc. (MFA) has reviewed the above-referenced Work Plan prepared by Hahn and Associates, Inc. (HAI) for Northwest Natural (NWN). MFA's review is intended to address omissions and provide technical information to facilitate or otherwise expedite NWN's performance of the work. It should be noted that this Work Plan repeats NWN's earlier errors through reference to inadequate and inaccurate information regarding manufactured gas plant (MGP) wastes that were included in the Phase 1 Site Characterization Summary Report (HAI 2003), which was previously commented upon by Siltronic and DEQ.

General Comments

1. Siltronic recently completed an evaluation of indoor air in Fab 1 consistent with Appendix C (Indoor Ambient Air Sampling Plan) of the *Final Remedial Investigation Work Plan* (MFA, 2004); the report is in process. The results indicate that benzene, toluene, xylene isomers, and ethylbenzene (collectively, BTEX) and naphthalene were not detected above the relevant risk-based concentrations for an occupational setting in Fab 1. While initial discussions with HAI indicated that they do not intend to duplicate MFA's work, MFA does not agree that the additional sampling proposed within Fab 1 will yield any new or useful data. In the interest of effectively managing resources and limiting additional disruption to Fab 1 operations, MFA suggests that NWN not collect the proposed Fab 1 indoor air samples.

2. In the event that DEQ determines that some additional sampling within Fab 1 is needed to determine whether there is an indoor air impact from MGP-related waste constituents, NWN should provide an estimate of soil and groundwater impacted by

SCOEPA00013212

MGP-related constituents so that an evaluation of the proposed NWN sampling can be done in the context of the DEQ guidance. A suggested starting point for this estimate is the estimated extent of MGP-related wastes provided by Siltronic in its letter dated March 25, 2004. The HAI Work Plan omits discussion or characterization of the potential sources, mechanisms or receptors as specified in the Oregon Department of Environmental Quality's (DEQ's) *Risk-Based Decision-Making for Petroleum Contaminated Sites* (DEQ, 2003). For example, only two samples are sited in areas identified as near groundwater impacted by benzene. NWN should be required to explain how the proposed sampling locations relate to the documented or assumed extent of its MGP-waste contaminant plume.

Specific Comments

1. Page 1, paragraph 4. HAI states "historical operations associated with oil gasification processes at the former PG&C Gasco site have potentially resulted in MGP-related impacts to the Siltronic site, with the area of primary interest being the approximate 400-foot wide strip of former low-lying property located immediately south of the present day NW Natural/Siltronic property boundary." This statement grossly underestimates the extent of Gasco wastes on Siltronic property. Clear evidence of MGP-related wastes being managed and placed on most of Siltronic's property, and extensive non-aqueous phase liquid (NAPL) characteristic of MGP wastes have been documented during Siltronic's investigation of its property.

The DEQ should require NWN to show the estimated extent of MGP-related waste placed on Siltronic's property on Figure 2 of the Work Plan.

2. Page 2, paragraph 1: The background section identifies "Siltronic operations-related chemical releases" as potential contaminant sources. The sentence implies that operating procedures included the intentional release of potential contaminants, which is untrue. Siltronic suggests the following rewording for the sentence: "These potential contaminant sources include the Olympic Pipeline that utilizes two fuel lines that traverse the Siltronic site, placement of potential waste-containing fill on-site, and releases or spills of process chemicals."

3. Page 2, paragraph 4: The background section states "Siltronic took samples from the western portion of Fab 1". The statement is incomplete. As described in the MFA Indoor Ambient Air Sampling Plan, Siltronic collected air samples from the western, northwestern and southeastern portions of Fab 1.

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In this section, HAI references "a number of incidents" over the past 20 years supposedly involving releases of hazardous substances to the environment. Through historical research and extensive, careful investigation, the majority of these releases have been thoroughly investigated and characterized, including the accidental release of TCE in 1983. HAI's Work Plan glosses over the extent of MGP-related wastes on Siltronic property by focusing on everything but MGP-related wastes. As per the DEQ's repeated requests, it is NWN's responsibility to fully investigate the nature and extent of those contaminant impacts.

4. Page 2, paragraph 5. The objectives discuss potential exposure to workers but later portions of the plan do not address permissible exposure levels (PELs) promulgated by the Oregon Occupational Safety and Health Administration (OSHA).

5. Table 1 - The stated PQL for TCE is greater than the relevant RBC; concentrations of TCE in air below the PQL will likely be estimated. The table does not include method detection limits as stated in the text (page 4, paragraph 7). Also, Table 1 should include the PELs.

The following specific comments address the sampling locations discussed on pages three and four of the Work Plan.

6. Location #1 will be duplicative of MFA's sample. MFA suggests eliminating this sample.

7. Sample #2 will be duplicative of MFA's sample. Furthermore, Sample #2 appears to be in the shipping area. Operations in the area include forklift traffic; the shipping area is often open to the loading area, which is subject to significant vehicle traffic. MFA suggests that analytical data from this sample will not be representative of indoor air in the context of vapor intrusion due to potential confounding factors for BTEX compounds. MFA suggests eliminating this sample.

8. Sample #3 - the air intakes are located on the roof of the northwestern portion of Fab 1.

9. Samples #3, #8, #12, #13 and #14 are background/control samples intended to identify ambient contributions of BTEX and other volatile organic compounds (VOCs) from potentially upwind sources, presuming that the wind originates from south, southwest or southeast. MFA suggests relocating sample #12 or #13 to the western portion of the Siltronic property to measure ambient contributions from the west or northwest.

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MFA requests that the DEQ require NWN to revise their Work Plan to reflect the new information from the recently completed indoor air sampling conducted by MFA and in response to the preceding comments. Additionally, as stated in DEQ's letter dated March 12, 2004, to Mr. Bob Wyatt, NWN was requested "to design and implement an assessment of the indoor air exposure pathway for VOCs associated with manufactured gas plant wastes at the Siltronic site." DEQ should require NWN to design and implement a plan based on an accurate depiction of those MGP-related wastes.

Please call either of us at (971) 544-2139 if you have questions or comments.

Sincerely,

Maul Foster & Alongi, Inc.

James G.D. Peale, RG
Senior Hydrogeologist

FOR

James J. Maul, RG
President and Principal Hydrogeologist

cc: Tom McCue; Siltronic
Chris Reive; Jordan Schrader
Alan Gladstone, William Earle; Davis Rothwell Mullin Earle & Xochihua, P.C.
Bob Wyatt, Northwest Natural

SCOEPA00013215

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Submitted
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Deadline
Date & Time: TODAY

Submitted by *(Your Name)*: Pearle

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SCOEPA00013216

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Comments:			

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PROJECT MANAGER/STAFF INITIALS: _____ DATE: _____

SAVED TO FINAL REPORT DIRECTORY: _____ DATE: _____

SCOEPA00013217

August 2, 2007

0-61M-107030/Phase 69/T2

Tom Roick
Project Manager, Cleanup & Portland Harbor
Oregon Department of Environmental Quality
2020 SW 4th Ave, Suite 400
Portland, Oregon 97201-4987

Dear Mr. Roick:

Re: Stage 1 Source Control Evaluation
Task 3 Groundwater Monitoring Modification to Scope
RP - Portland Site

On behalf of SLLI, AMEC Earth & Environmental, Inc. (AMEC) is submitting this proposed modification to the scope of work presented in the Oregon Department of Environmental Quality (DEQ)-approved Final Stage 1 Source Control Evaluation Work Plan (Stage 1 SCE WP) dated October 31, 2005. SLLI respectfully requests DEQ's timely response, as this proposed modification affects field work scheduled to begin at the Arkema, Inc. (Arkema), BNSF Railway Company (BNSF), and Siltronic Corporation (Siltronic) properties in early September 2007.

The proposed modification to the scope of work presented in the Stage 1 SCE WP only affects the scope of Task 3 (Groundwater Monitoring). The modification includes sampling of monitoring well cluster RP-24 and the addition of analytical parameters to the groundwater monitoring program.

Stage 1 SCE Task 3 Groundwater Monitoring

SLLI proposes to modify the Stage 1 SCE WP to include the collection of groundwater samples from the Stage 2 SCE monitoring well cluster RP-24 located on the Siltronic riverbank as shown on revised Figure 10. This monitoring well cluster was not installed until October 2006 and, therefore, was not included in the Stage 1 SCE WP dated October 31, 2005. Sampling this monitoring well cluster will assist in the evaluation of the data quality objectives outlined in the Stage 1 SCE WP.

To allow for improved comparability between the Stage 1 SCE Groundwater Monitoring Event and other recent Site-wide groundwater monitoring events (i.e., Summer 2006 and Spring 2007 Groundwater Monitoring Events), SLLI proposes to add the following parameters to the Task 3 Groundwater Monitoring Event:

- Dissolved organic carbon (DOC) by United States Environmental Protection Agency (EPA) Method 415.1;
- Total suspended solids (TSS) by EPA Method 160.2;

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Portland, Oregon
USA 97224
Tel +1 (503) 639-3400
Fax +1 (503) 620-7892

www.amec.com

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- Total dissolved solids (TDS) by EPA Method 160.1;
- Ethane, ethene, and carbon dioxide by RSK 175; and
- Additional total and dissolved metals to include antimony, barium, beryllium, boron, cobalt, molybdenum, selenium, silicon, silver, and titanium by EPA Methods 6010B/6020/7470A.

SLLI also proposes to modify the testing method for pesticides from gas chromatography with electron capture detection (GC/ECD) using EPA Method 8081A to analysis by High Resolution Gas Chromatography/High Resolution Mass Spectrometer (HRGC/HRMS) using Axys Analytical Services standard operating procedure, as has been done in the Portland Harbor Superfund Site program.

The remainder of the Stage 1 SCE scope of work will be unchanged.

If you have any questions or concerns, please do not hesitate to contact Roger Gresh or Christy Johnson at (503) 639-3400.

Sincerely,

AMEC Earth & Environmental, Inc.

Roger T. Gresh, P.G.
Project Manager

Christy L. Johnson, R.G.
Phase Leader

CJ/lp

Attachments: Figure 10 Proposed Groundwater Monitoring Well Locations

c: S. Dearden, sanofi-aventis US, Inc.
R. Ferguson, SLLI
J. Benedict, CHBH&L
M. Kent, DEQ

SCOEPA00013219

LEGEND

- Study Area
- RP-14 — Proposed Monitoring Well Cluster Location
- RP-07-30 — Stage 1 SCE Monitoring Location
- W-11-S — Groundwater Sampling Location and Designation
- Tax Lot Boundary & Existing Features
- Surface Water Features
- Railroad Tracks
- Existing Piping Features

* NOTE: SLLI currently does not have access from Arkema, Inc. to collect groundwater samples from Lots 3 & 4.

CLIENT: SLLI	DWN BY: LM	PROJECT: RP - PORTLAND SITE	DATE: JULY 2007	
	CHK'D BY: CJ		PROJECT NO: 0-61M-10703-0P69	
AMEC Earth & Environmental 7376 S.W. Durham Road Portland, OR. U.S.A. 97224	DATUM: NAD83	TITLE: PROPOSED GROUNDWATER MONITORING WELL LOCATIONS STAGE 1 SOURCE CONTROL EVALUATION	REV. NO.: 1	
	PROJECTION: OR SP N. Int Ft.		FIGURE No. 10	
	SCALE: 1" = 400'			

K:\10000\10700\10703\Phase 69 Source Control Evaluation\Stage 1 SCE WP\Final SCE WP\DWG\Figure_10_updated_Jul_2007.dwg – All Zones – Aug. 02, 2007 2:20pm – laura.mccoy

ATTACHMENT A

Figure 1

ATTACHMENT A

Figure 1

SCOEPA00013222

NOTE: THIS DRAWING SHOULD BE READ IN CONJUNCTION WITH THE AMEC EARTH & ENVIRONMENTAL, INC. WINTER 2006 GROUNDWATER MONITORING DATA SUBMITTAL DATED AUGUST 7, 2006 .

CLIENT: SLLI

AMEC Earth & Environmental
7376 S.W. Durham Road
Portland, OR. U.S.A. 97224

DWN BY:	DD/BRJ
CHK'D BY:	CB
DATUM:	NAD83
PROJECTION:	OR SP N. Int Ft.
SCALE:	1" = 350'

PROJECT: RP - PORTLAND SITE

TITLE: WINTER 2006 GROUNDWATER MONITORING LOCATIONS

DATE:	AUGUST 2006
PROJECT NO:	0-61M-10703-0 P-43
REV. NO.:	3
FIGURE No.	1

K:\10000\10700\10703\Phase 43 Groundwater Monitoring\2006 Winter Event\Tech Memo\A – Figure\Figure 1 Winter 2006 GW Monitoring Locations 0606.dwg – Layout1 – Aug. 08, 2006 1:25pm – doug.davis

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ATTACHMENT C

Groundwater Sampling Field Forms

ATTACHMENT C

Groundwater Sampling Field Forms

SCOEPA00013225

amec

AMEC Earth & Environmental, Inc.
GROUNDWATER SAMPLING FIELD FORM

Project Name:	2006 Winter GW Event
Project #:	0-61M-10703-0 P 43
Monitoring/Sampling Date:	3/31/06

Monitoring Well ID:	AC6-96	Field Personnel:	L. Glover, B. McGill; cuddy
Start Time:	1227	Weather Conditions:	Partly Sunny; Approx. Air Temp (F): 53

INITIAL WELL DATA & WELL PURGING INFORMATION

PID (ppm) Background:	0.0	In well Casing:	0.0
%LEL Background:	NA	In well Casing:	NA
PID Calibration Standard:	isobutylene		
PID Calibration Date:	3/31/06		
Date/Time of Measurement:	3/31/06 / 1225	Depth to Water Measuring Technique:	Solinst
Depth Well Bottom (TOC - ft.):		Detection Method of Free Product:	NA
Depth to Water Level (TOC - ft.):	14.88	Conversions Factors (casing dia. = gallons/linear ft.)	Circle One
Depth to Free Product (TOC - ft.):	NA	0.75" = 0.02	1" = 0.04
Calculated Column Height (ft.):		2" = 0.17	3" = 0.37
Casing Diameter (in.):	2	4" = 0.66	6" = 1.47
Quantity of Free Product Collected (gal.):	NA	8" = 2.61	12" = 5.88
Obsevation of sheen or LNAPL:	NA	Three Well Purge Volumes (gallons) = 3 x	=
		Method of Collecting Free Product:	NA
		Observation of DNAPL:	NA

Casing Volumes (#)	Volume Purged (liters)	Water Temperature (degree C)	Water pH (S.U.)	Specific Conductivity (~~ms~~/cm)	Turbidity (NTUs)	Dissolved Oxygen (mg/L)	ORP (mV)	Time (0:00 - 23:59)
	0	14.01	6.79	2167	Moderate	0.93	-14.9	1231
	2	14.44	6.42	2261	Slight	0.60	-22.2	1235
	4	14.35	6.38	2286	↓	0.51	-25.6	1239
	6	14.33	6.37	2312	↓	0.30	-26.8	1243
	8	14.33	6.39	2333	clear	0.24	-28.0	1247
	10	14.52	6.45	2357	↓	0.22	-30.6	1291
	12	14.51	6.48	2377	1.35	0.21	-33.1	1255

Total Purged =	Purge Pumping Rate (approx. L/m): 0.5	Well Yield: High / Moderate / Low

Purge Method (circle one): PVC Bailer / Poly Bailer / SS Bailer / Peristalic Pump / Grunfos Pump / Other = QuatVolve

Ferrous Iron (ppm):		Decontamination Method:	Methanol/DI/Alconox/DI
Instrument Type & Number:	YSI	Water Disposal:	WTP
Instrument Calibration Date & Time:	3/31/06 0800	Approx. Pump/Intake Depth:	9.4

WELL CONDITION

Casing (circle one):	Stainless Steel / Carbon Steel / PVC / Other:		
Casing Condition:	OK / NA / Needs Repairs / Repaired	Lock Condition:	OK / NA / Needs Repairs / Replaced
Cap Condition:	OK / NA / Needs Repairs / Repaired	Inner Casing Condition:	OK / NA / Needs Repairs / Repaired
Paint Condition:	OK / NA / Needs Repairs / Repaired	Monument Condition:	OK / NA / Needs Repairs / Repaired
Recommended Well Repairs:			

SAMPLING INFORMATION / DATA

Date Sampled:	3/31/06	QA/QC Sample (circle one): YES / NO	Water Chemistry Sample: YES / NO
Time Sampled:	1315	Sampling Method (circle one): SS Bailer / Poly Bailer / Grunfos Pump	
Chain-of-Custody #s:	electronic	Teflon Bailer / Peristaltic Pump / Other: QuatVolve	

Sample ID	Bottles (total)	Bottles (size)	Preservative	Destination Laboratory	Sample Transporter	Analytical Parameters
635-01			see back			
635-02						

All samples were immediately placed into a cooler and packed with ice or "Blue Ice", unless otherwise noted: YES / NO

Field Observations/Notes of Sampling Event: wasps in well
Field Replicate

CERTIFICATION STATEMENT

By signing below, the listed AMEC sampler states that the information provided on this page is accurate.

Sampler (Print): Lisa Glover Sampler Signature: Lisa Glover Date Signed:

SCOEPA00013226

amec

AMEC Earth & Environmental, Inc.
GROUNDWATER SAMPLING FIELD FORM

Project Name: 2006 Winter GW Event
Project #: 0-61M-10703-0 Phase 43
Monitoring/Sampling Date: 3/3/06

Monitoring Well ID: AGE-96 Field Personnel: L Glover, B McGillicuddy

INITIAL WELL DATA & WELL PURGING INFORMATION

Casing Volumes (#)	Volume Purged (liters)	Water Temperature (degree C)	Water pH (S.U.)	Specific Conductivity (ms)	Turbidity (NTUs)	Dissolved Oxygen (mg/L)	ORP (mV)	Time (0:00 - 23:59)

WELL CONDITION

Recommended Well Repairs/Additional Notes:

SAMPLING INFORMATION / DATA

Date Sampled:
Time Sampled:
Additional Chain-of-Custody #s:

Sample ID	Bottles (total)	Bottles (size)	Preservative	Destination Laboratory	Sample Transporter	Analytical Parameters
8502 635-01	2	1 L	None	STL-Seattle	courier	8081A
	2	1 L	None	STL-Seattle	courier	8151A
	2	1 L	None	STL-Seattle	courier	8270C
	3	40 ml	HCL	STL-Seattle	courier	8260B
	2	1 L	HCL	STL-Seattle	courier	NWTPH-Dx
	2	1 L	None	STL-Sacram	courier	dioxins/furans 1613
	1	500 ml	Nitric Acid	STL-Seattle	courier	Total 7470/6000/7000
	1	500 ml	Nitric Acid	STL-Sacram	courier	Dissolved 7470/6000/7000
	1	1 L	None	Test America	courier	405.1/310.1/300
	1	500 ml	Sulfuric Acid	STL-Seattle	courier	415.1/410.4/350.1/351.12
	1	250	NAOH + Zn	STL-Seattle	courier	376.2
	3	40 ml	HCL	STL-Seattle	courier	RSK 175
	1	1 L	None	STL-Seattle	courier	chloride/sulfate/orthophosphorus/alkalinty
	1	125ml	Na Thiosulfate	Test Am	↓	SM 9215
	1	250ml	NONE			Nitrite/Nitrate/orthophosphate

Field Observations/Notes of Sampling Event:

CERTIFICATION STATEMENT

By signing below, the listed AMEC sampler states that the information provided on this page is accurate.

Sampler (Print): LISA GLOVER Sampler Signature: Lisa Glover Date Signed: 3/31/06

SCOEPA00013227

amec	AMEC Earth & Environmental, Inc. GROUNDWATER SAMPLING FIELD FORM	Project Name: 2006 Winter GW Event
		Project #: 0-61M-10703-0 P 43
		Monitoring/Sampling Date: ~~RP OF 31~~ 3/24/06

Monitoring Well ID: RP OF 31 | Field Personnel: L. Glonek, J. Fascio, D. McGillicuddy

Start Time: 1000 | Weather Conditions: Other rain | Approx. Air Temp (F): 45

INITIAL WELL DATA & WELL PURGING INFORMATION

PID (ppm) Background: In well Casing: | PID Calibration Standard: isobutylene

%LEL Background: In well Casing: | PID Calibration Date: 3/24/06

Date/Time of Measurement: 3/24/06 / 0930 | Depth to Water Measuring Technique: Solinst

Depth Well Bottom (TOC - ft.): 31 | Detection Method of Free Product: NA

Depth to Water Level (TOC - ft.): 24.91 | Conversions Factors (casing dia. = gallons/linear ft.) Circle One

Depth to Free Product (TOC - ft.): NA | 0.75" = 0.02 1" = 0.04 2" = 0.17 3" = 0.37

Calculated Column Height (ft.): | 4" = 0.66 6" = 1.47 8" = 2.61 12" = 5.88

Casing Diameter (in.): 2 | Three Well Purge Volumes (gallons) = 3 x _____ = _____

Quantity of Free Product Collected (gal.): NA | Method of Collecting Free Product: NA

Obsevation of sheen or LNAPL: NA | Observation of DNAPL: NA

Casing Volumes (#)	Volume Purged (liters)	Water Temperature (degree C)	Water pH (S.U.)	Specific Conductivity (ms)	Turbidity (NTUs)	Dissolved Oxygen (mg/L) 6.59	ORP (mV) 21	Time (0:00 - 23:59)
	0	12.41	6.17	487	Cloudy	~~226.7~~	~~6.9~~	1005
	1.12	11.07	5.50	487	~~3.73~~ ↓	3.73	245.6	1009
	2.24	11.78	5.44	442	Slight	3.69	245.5	1013
	~~1.83~~ 3.36	11.82	5.53	419	↓	3.84	238.2	1017
	4.48	11.91	5.63	403	↓	3.66	229.4	1021
	5.60	11.89	5.67	396	↓	3.35	224.8	1025
	6.72	11.92	5.73	395	↓	3.32	219.4	1029

Total Purged = 8.96 | Purge Pumping Rate (approx. L/m): 0.28 | Well Yield: High / Moderate / Low

Purge Method (circle one): PVC Bailer / Poly Bailer / SS Bailer / Peristalic Pump / Grunfos Pump / Other = Dual valve

Ferrous Iron (ppm): 0.2 | Decontamination Method: dedicated pump

Instrument Type & Number: YSI | Water Disposal: RP drum warehouse

Instrument Calibration Date & Time: 3/24/06 0800 | Approx. Pump/Intake Depth:

WELL CONDITION

Casing (circle one): Stainless Steel Carbon Steel PVC Other:

Casing Condition: OK / NA / Needs Repairs / Repaired | Lock Condition: OK / NA / Needs Repairs / Replaced

Cap Condition: OK / NA / Needs Repairs / Repaired | Inner Casing Condition: OK / NA / Needs Repairs / Repaired

Paint Condition: OK / NA / Needs Repairs / Repaired | Monument Condition: OK / NA / Needs Repairs / Repaired

Recommended Well Repairs:

SAMPLING INFORMATION / DATA

Date Sampled: 3/24/06 | QA/QC Sample (circle one): YES / NO | Water Chemistry Sample: YES / NO

Time Sampled: 1045 | Sampling Method (circle one): SS Bailer Poly Bailer Grunfos Pump

Chain-of-Custody #s: electronic | Teflon Bailer Peristaltic Pump Other: Dual valve

Sample ID	Bottles (total)	Bottles (size)	Preservative	Destination Laboratory	Sample Transporter	Analytical Parameters
612-01						
612-03						
			see back			

All samples were immediately placed into a cooler and packed with ice or "Blue Ice", unless otherwise noted: YES / NO

Field Observations/Notes of Sampling Event: pump lines switched - had to fix all of the pumps

CERTIFICATION STATEMENT

By signing below, the listed AMEC sampler states that the information provided on this page is accurate.

Sampler (Print): LISA GLONEK | Sampler Signature: Lisa Glonek | Date Signed: 3/24/06

RP Low Sampling Field Form
K:10703\Forms\ Groundwater Sample Form.xls / RP form pg 1
PAGE 1 OF 2

SCOEPA00013228

amec

AMEC Earth & Environmental, Inc.
GROUNDWATER SAMPLING FIELD FORM

Project Name: 2006 Winter GW Event
Project #: 0-61M-10703-0 Phase 43
Monitoring/Sampling Date: 3/24/06

Monitoring Well ID: RP-01-31
Field Personnel: L. Clonek, J Fasso, B McGillicuddy

INITIAL WELL DATA & WELL PURGING INFORMATION

Casing Volumes (#)	Volume Purged (liters)	Water Temperature (degree C)	Water pH (S.U.)	Specific Conductivity (ms)	Turbidity (NTUs)	Dissolved Oxygen (mg/L)	ORP (mV)	Time (0:00 - 23:59)
	7.84	12.14	5.77	395	clear	3.14	212.3	1033
	8.96	12.07	5.79	395	↓	3.14	205.6	1037
					77.0 NTU	- before sampling		
					48.6 NT	- after sampling		

WELL CONDITION

Recommended Well Repairs/Additional Notes:

SAMPLING INFORMATION / DATA

Date Sampled: 3/24/06
Time Sampled: 1045
Additional Chain-of-Custody #s:

Sample ID	Bottles (total)	Bottles (size)	Preservative	Destination Laboratory	Sample Transporter	Analytical Parameters
612-01	2	1 L	None	STL-Seattle	courier	8081A
	2	1 L	None	STL-Seattle	courier	8151A
	2	1 L	None	STL-Seattle	courier	8270C
	3	40 ml	HCL	STL-Seattle	courier	8260B
	2	1 L	HCL	STL-Seattle	courier	NWTPH-Dx
	2	1 L	None	STL-Sacram	courier	dioxins/furans 1613
	1	500 ml	Nitric Acid	STL-Seattle	courier	Total 7470/6000/7000
	1	500 ml	Nitric Acid	STL-Sacram	courier	Dissolved 7470/6000/7000
	1	1 L	None	Test America	courier	405.1/310.1/300
	1	500 ml	Sulfuric Acid	STL-Seattle	courier	415.1/410.4/350.1/351.12
	1	250	NAOH + Zn	STL-Seattle	courier	376.2
	3	40 ml	HCL	STL-Seattle	courier	RSK 175
	1	1 L	None	STL-Seattle	courier	chloride/sulfate/~~orthophosphorus~~/alkalinty
↓	3	40ML	HCL	U of UK	↓	isotopes
↓	1	125ml	NaThiosulfate	FG	↓	SM9215
↓	1	250ml	NONE	TestAm	↓	orthophosphorus NO3/NO2

Field Observations/Notes of Sampling Event:
612-03 - 2 - 40ml - VOCs - Trip Blank

CERTIFICATION STATEMENT

By signing below, the listed AMEC sampler states that the information provided on this page is accurate.

Sampler (Print): LISA Gravatt Sampler Signature: Lisa Gravatt Date Signed: 3/24/06

SCOEPA00013229

amec

AMEC Earth & Environmental, Inc.
GROUNDWATER SAMPLING FIELD FORM

Project Name:	2006 Winter GW Event
Project #:	0-61M-10703-0 P 43
Monitoring/Sampling Date:	3/27/06

Monitoring Well ID:	RP-01-31
Field Personnel:	JOE ROCK & BARB LARY
Start Time:	11:49
Weather Conditions:	SUNNY & MILD
Approx. Air Temp (F):	58

RE SAMPLE

INITIAL WELL DATA & WELL PURGING INFORMATION

PID (ppm)	Background:	0.0	In well Casing:	0.0	PID Calibration Standard: isobutylene
%LEL	Background:	NA	In well Casing:	NA	PID Calibration Date: 3/27/06

Date/Time of Measurement: /	Depth to Water Measuring Technique:
Depth Well Bottom (TOC - ft.): 31	Detection Method of Free Product:
Depth to Water Level (TOC - ft.): 24.65	Conversions Factors (casing dia. = gallons/linear ft.) Circle One
Depth to Free Product (TOC - ft.):	0.75" = 0.02 1" = 0.04 2" = 0.17 3" = 0.37
Calculated Column Height (ft.):	4" = 0.66 6" = 1.47 8" = 2.61 12" = 5.88
Casing Diameter (in.): 2	Three Well Purge Volumes (gallons) = 3 x =
Quantity of Free Product Collected (gal.): NA	Method of Collecting Free Product: NA
Obsevation of sheen or LNAPL: NA	Observation of DNAPL: NA

Casing Volumes (#)	Volume Purged (liters)	Water Temperature (degree C)	Water pH (S.U.)	Specific Conductivity mS/cm	Turbidity DTW ~~NTUs~~	Dissolved Oxygen (mg/L)	ORP (mV)	Time (0:00 - 23:59)
	~1L	12.56	6.62	490	25.02	5.24	118.0	11:53
	~2L	12.82	5.87	401		4.23	146.2	11:57
	2.5L	12.81	5.70	387		4.01	153.7	11:59
	3.0L	12.77	5.70	380		4.05	154.3	12:01

Total Purged =	Purge Pumping Rate (approx. L/m): 250 ml/min	Well Yield: ~~High~~ / Moderate / Low

Purge Method (circle one): PVC Bailer / Poly Bailer / SS Bailer / Peristalic Pump / Grunfos Pump / Other = Ded. DUP

Ferrous Iron (ppm):	Decontamination Method: Dedicated pumps
Instrument Type & Number: YSI	Water Disposal: LP WSF
Instrument Calibration Date & Time: 3/27/06	Approx. Pump/Intake Depth:

WELL CONDITION

Casing (circle one): Stainless Steel Carbon Steel PVC Other:	
Casing Condition: OK / NA / Needs Repairs / Repaired	Lock Condition: OK / NA / Needs Repairs / Replaced
Cap Condition: OK / NA / Needs Repairs / Repaired	Inner Casing Condition: OK / NA / Needs Repairs / Repaired
Paint Condition: OK / NA / Needs Repairs / Repaired	Monument Condition: OK / NA / Needs Repairs / Repaired
Recommended Well Repairs:	

SAMPLING INFORMATION / DATA

Date Sampled: 3/27/06	QA/QC Sample (circle one): YES (NO)	Water Chemistry Sample: YES (NO)
Time Sampled: 1210	Sampling Method (circle one): SS Bailer Poly Bailer Grunfos Pump	
Chain-of-Custody #s:	Teflon Bailer Peristaltic Pump Other: dedicated DUP	

Sample ID	Bottles (total)	Bottles (size)	Preservative	Destination Laboratory	Sample Transporter	Analytical Parameters
607-01	3	40ml	TSP	H&H OK		ISOTOPE Only

All samples were immediately placed into a cooler and packed with ice or "Blue Ice", unless otherwise noted: (YES) NO

Field Observations/Notes of Sampling Event: re-sample of Isotopes because original sample was frozen + broke in Amec refrigerator

CERTIFICATION STATEMENT

By signing below, the listed AMEC sampler states that the information provided on this page is accurate.

Sampler (Print): Barb Lary Sampler Signature: BARB LARY Date Signed: 3/27/06

SCOEPA00013230

amec

AMEC Earth & Environmental, Inc.
GROUNDWATER SAMPLING FIELD FORM

Project Name:	2006 Winter GW Event
Project #:	0-61M-10703-0 Phase 43
Monitoring/Sampling Date:	

Monitoring Well ID: | Field Personnel:

INITIAL WELL DATA & WELL PURGING INFORMATION

Casing Volumes (#)	Volume Purged (liters)	Water Temperature (degree C)	Water pH (S.U.)	Specific Conductivity (ms)	Turbidity (NTUs)	Dissolved Oxygen (mg/L)	ORP (mV)	Time (0:00 - 23:59)

WELL CONDITION

Recommended Well Repairs/Additional Notes:

SAMPLING INFORMATION / DATA

Date Sampled: | Additional Chain-of-Custody #s:

Time Sampled:

Sample ID	Bottles (total)	Bottles (size)	Preservative	Destination Laboratory	Sample Transporter	Analytical Parameters
	2	1 L	None	STL-Seattle	courier	8081A
	2	1 L	None	STL-Seattle	courier	8151A
	2	1 L	None	STL-Seattle	courier	8270C
	3	40 ml	HCL	STL-Seattle	courier	8260B
	2	1 L	HCL	STL-Seattle	courier	NWTPH-Dx
	2	1 L	None	STL-Sacram	courier	dioxins/furans 1613
	1	500 ml	Nitric Acid	STL-Seattle	courier	Total 7470/6000/7000
	1	500 ml	Nitric Acid	STL-Sacram	courier	Dissolved 7470/6000/7000
	1	1 L	None	Test America	courier	405.1/310.1/300
	1	500 ml	Sulfuric Acid	STL-Seattle	courier	415.1/410.4/350.1/351.12
	1	250	NAOH + Zn	STL-Seattle	courier	376.2
	3	40 ml	HCL	STL-Seattle	courier	RSK 175
	1	1 L	None	STL-Seattle	courier	chloride/sulfate/orthophosphorus/alkalinty

Field Observations/Notes of Sampling Event:

CERTIFICATION STATEMENT

By signing below, the listed AMEC sampler states that the information provided on this page is accurate.

Sampler (Print): | Sampler Signature: | Date Signed:

SCOEPA00013231

amec	AMEC Earth & Environmental, Inc. GROUNDWATER SAMPLING FIELD FORM	Project Name: 2006 Winter GW Event Project #: 0-61M-10703-0 P 43 Monitoring/Sampling Date: 3/24/06

Monitoring Well ID: RP-01-S1 | Field Personnel: J. Fassio, L. Glowek, B. McGillicuddy

Start Time: 1040 | Weather Conditions: Partly Cloudy, Shower Approx. Air Temp (F): 50°F

INITIAL WELL DATA & WELL PURGING INFORMATION

PID (ppm) Background: 0.0 In well Casing: 0.0 | PID Calibration Standard: isobutylene

%LEL Background: — In well Casing: — | PID Calibration Date: 3/24/06 800

Date/Time of Measurement: 5/24/06 / 930 | Depth to Water Measuring Technique: Solinst

Depth Well Bottom (TOC - ft.): 51 | Detection Method of Free Product: NA

Depth to Water Level (TOC - ft.): 24.91 | Conversions Factors (casing dia. = gallons/linear ft.) Circle One

Depth to Free Product (TOC - ft.): NA | 0.75" = 0.02 1" = 0.04 2" = 0.17 3" = 0.37

Calculated Column Height (ft.): — | 4" = 0.66 6" = 1.47 8" = 2.61 12" = 5.88

Casing Diameter (in.): 2" | Three Well Purge Volumes (gallons) = 3 x _____ = _____

Quantity of Free Product Collected (gal.): NONE | Method of Collecting Free Product: NA

Obsevation of sheen or LNAPL: None | Observation of DNAPL: None

Casing Volumes (#)	Volume Purged (liters)	Water Temperature (degree C)	Water pH (S.U.)	Specific Conductivity (ms)	Turbidity (NTUs)	Dissolved Oxygen (mg/L)	ORP (mV)	Time (0:00 - 23:59)	OT
	0	11.31	6.32	2239	—	2.34	3.7	1047	25.1
	0.82	12.12	6.28	2948	—	0.69	41.3	1031	23.0
	3.04	12.09	6.38	3255	—	0.30	61.8	1055	
	4.56	12.19	6.39	3381	—	0.23	77.1	1059	
	6.08	12.35	6.31	3421	—	0.20	83.5	1104	24.9
	7.60	12.22	6.39	3481	—	0.20	87.4	1109	24.8
	9.12	11.99	6.35	3519	—	0.21	83.9	1113	25.1

Total Purged = 9.12 | Purge Pumping Rate (approx. L/m): 0.380 ml/min | Well Yield: High / Moderate / Low

Purge Method (circle one): PVC Bailer / Poly Bailer / SS Bailer / Peristalic Pump / Grunfos Pump / Other = Dual Valve

Ferrous Iron (ppm): 0.4 | Decontamination Method: Alconox, DI rinse, methanol

Instrument Type & Number: YSI #3 | Water Disposal: RP - WJF Drum

Instrument Calibration Date & Time: 800 3/24/06 | Approx. Pump/Intake Depth:

WELL CONDITION

Casing (circle one): Stainless Steel Carbon Steel (PVC) Other:

Casing Condition: (OK) / NA / Needs Repairs / Repaired | Lock Condition: (OK) / NA / Needs Repairs / Replaced

Cap Condition: (OK) / NA / Needs Repairs / Repaired | Inner Casing Condition: OK / (NA) / Needs Repairs / Repaired

Paint Condition: (OK) / NA / Needs Repairs / Repaired | Monument Condition: (OK) / NA / Needs Repairs / Repaired

Recommended Well Repairs:

SAMPLING INFORMATION / DATA

Date Sampled: 3/24/06 | QA/QC Sample (circle one): YES / (NO) | Water Chemistry Sample: (YES) / NO

Time Sampled: 10 1120 | Sampling Method (circle one): SS Bailer Poly Bailer Grunfos Pump

Chain-of-Custody #s: | Teflon Bailer Peristaltic Pump Other: Dual Valve

Sample ID	Bottles (total)	Bottles (size)	Preservative	Destination Laboratory	Sample Transporter	Analytical Parameters
613-01						
			Joe Duck			

All samples were immediately placed into a cooler and packed with ice or "Blue Ice", unless otherwise noted: YES / NO

Field Observations/Notes of Sampling Event: _____

CERTIFICATION STATEMENT

By signing below, the listed AMEC sampler states that the information provided on this page is accurate.

Sampler (Print): Joe Fassio | Sampler Signature: Joe Fassi | Date Signed: 3/24/06

SCOEPA00013232

amec

AMEC Earth & Environmental, Inc.
GROUNDWATER SAMPLING FIELD FORM

Project Name:	2006 Winter GW Event
Project #:	0-61M-10703-0 Phase 43
Monitoring/Sampling Date:	3/24/06

Monitoring Well ID: RP-01-55 | Field Personnel: J. Fassio, L. Glover, B. McGillicuddy

INITIAL WELL DATA & WELL PURGING INFORMATION

Casing Volumes (#)	Volume Purged (liters)	Water Temperature (degree C)	Water pH (S.U.)	Specific Conductivity (ms)	Turbidity (NTUs)	Dissolved Oxygen (mg/L)	ORP (mV)	Time (0:00 - 23:59)
					0.72 NTUs			

WELL CONDITION

Recommended Well Repairs/Additional Notes:

SAMPLING INFORMATION / DATA

Date Sampled: 3/24/06 | Additional Chain-of-Custody #s:

Time Sampled: 1120

Sample ID	Bottles (total)	Bottles (size)	Preservative	Destination Laboratory	Sample Transporter	Analytical Parameters
SB-01	2	1 L	None	STL-Seattle	courier	8081A
↓	2	1 L	None	STL-Seattle	courier	8151A
	2	1 L	None	STL-Seattle	courier	8270C
	3	40 ml	HCL	STL-Seattle	courier	8260B
	2	1 L	HCL	STL-Seattle	courier	NWTPH-Dx
	2	1 L	None	STL-Sacram	courier	dioxins/furans 1613
	1	500 ml	Nitric Acid	STL-Seattle	courier	Total 7470/6000/7000
	1	500 ml	Nitric Acid	STL-Sacram	courier	Dissolved 7470/6000/7000
	1	1 L	None	Test America	courier	405.1/310.1/300
	1	500 ml	Sulfuric Acid	STL-Seattle	courier	415.1/410.4/350.1/351.12
	1	250	NAOH + Zn	STL-Seattle	courier	376.2
	3	40 ml	HCL	STL-Seattle	courier	RSK 175
	1	1 L	None	STL-Seattle	courier	chloride/sulfate/orthophosphorus/alkalinty
	3	40ml	TSP	U of Ok	↓	Stable Isotopes
	1	125ml	sodium thiosulfate	FGL	↓	Plate counts
↓	1	250ml	NONE	Test Am	↓	Nitrit/Nitrat/orthophosphate

3506 .03 105.00

Field Observations/Notes of Sampling Event:

CERTIFICATION STATEMENT

By signing below, the listed AMEC sampler states that the information provided on this page is accurate.

Sampler (Print): Joe Fassio | Sampler Signature: Joe Fassio | Date Signed: 3/24/06

SCOEPA00013233

amec

AMEC Earth & Environmental, Inc.
GROUNDWATER SAMPLING FIELD FORM

Project Name:	2006 Winter GW Event
Project #:	0-61M-10703-0 P 43
Monitoring/Sampling Date:	3/27/06

Monitoring Well ID: RP-01-51 | Field Personnel: BARB LARY & JOE ROCK

Start Time: 1210 | Weather Conditions: SUNNY - HAZY | Approx. Air Temp (F):

INITIAL WELL DATA & WELL-PURGING INFORMATION

PID (ppm) Background: 0.0 | In well Casing: 0.0 | PID Calibration Standard: isobutylene

%LEL Background: NA | In well Casing: NA | PID Calibration Date: 3/27/06

Date/Time of Measurement: 3/27/06 1205 | Depth to Water Measuring Technique:

Depth Well Bottom (TOC - ft.): 51 | Detection Method of Free Product:

Depth to Water Level (TOC - ft.): 25.15 | Conversions Factors (casing dia. = gallons/linear ft.) Circle One

Depth to Free Product (TOC - ft.): NA | 0.75" = 0.02 | 1" = 0.04 | 2" = 0.17 | 3" = 0.37

Calculated Column Height (ft.): | 4" = 0.66 | 6" = 1.47 | 8" = 2.61 | 12" = 5.88

Casing Diameter (in.): 2 | Three Well Purge Volumes (gallons) = 3 x _____ = _____

Quantity of Free Product Collected (gal.): NA | Method of Collecting Free Product:

Obsevation of sheen or LNAPL: NA | Observation of DNAPL:

Casing Volumes (#)	Volume Purged (liters)	Water Temperature (degree C)	Water pH (S.U.)	Specific Conductivity (~~mS~~/cm)	Turbidity (NTUs)	Dissolved Oxygen (mg/L)	ORP (mV)	Time (0:00 - 23:59)
	1L	12.88	6.35	3331	25.33	1.63	90.1	1209
	2.25L	12.57	6.26	3289		0.65	84.0	1212
	3.40L	12.59	6.25	3330		0.38	85.5	1214
	4.80L	12.52	6.26	3366		0.33	85.9	1216
	6.00L	12.52	6.27	3402		0.34	86.4	1218

Total Purged = | Purge Pumping Rate (approx. L/m): 400 ml/min | Well Yield: (High) / Moderate / Low

Purge Method (circle one): PVC Bailer / Poly Bailer / SS Bailer / Peristalic Pump / Grunfos Pump / Other = Dual Valve

Ferrous Iron (ppm): | Decontamination Method: N/A

Instrument Type & Number: # 3 YSI | Water Disposal: to WSF

Instrument Calibration Date & Time: 3/27/06 | Approx. Pump/Intake Depth:

WELL CONDITION

Casing (circle one): Stainless Steel Carbon Steel (PVC) Other:

Casing Condition: (OK) / NA / Needs Repairs / Repaired | Lock Condition: (OK) / NA / Needs Repairs / Replaced

Cap Condition: (OK) / NA / Needs Repairs / Repaired | Inner Casing Condition: (OK) / NA / Needs Repairs / Repaired

Paint Condition: (OK) / NA / Needs Repairs / Repaired | Monument Condition: (OK) / NA / Needs Repairs / Repaired

Recommended Well Repairs:

SAMPLING INFORMATION / DATA

Date Sampled: 3/27/06 | QA/QC Sample (circle one): YES / (NO) | Water Chemistry Sample: (YES) / NO

Time Sampled: 1230 | Sampling Method (circle one): SS Bailer Poly Bailer Grunfos Pump

Chain-of-Custody #s: electronic | Teflon Bailer Peristaltic Pump Other: Dual Valve

Sample ID	Bottles (total)	Bottles (size)	Preservative	Destination Laboratory	Sample Transporter	Analytical Parameters
618-01	3	40ml	TSP	U of UL		Isotopes

All samples were immediately placed into a cooler and packed with ice or "Blue Ice", unless otherwise noted: YES / NO

Field Observations/Notes of Sampling Event: resample of isotopes because the VOAs frozen/broke in AMEC fridge

CERTIFICATION STATEMENT

By signing below, the listed AMEC sampler states that the information provided on this page is accurate.

Sampler (Print): BARB LARY | Sampler Signature: Barb Lary | Date Signed: 3/27/06

SCOEPA00013234

amec

AMEC Earth & Environmental, Inc.
GROUNDWATER SAMPLING FIELD FORM

Project Name:	2006 Winter GW Event
Project #:	0-61M-10703-0 Phase 43
Monitoring/Sampling Date:	

Monitoring Well ID: | Field Personnel:

INITIAL WELL DATA & WELL PURGING INFORMATION

Casing Volumes (#)	Volume Purged (liters)	Water Temperature (degree C)	Water pH (S.U.)	Specific Conductivity (ms)	Turbidity (NTUs)	Dissolved Oxygen (mg/L)	ORP (mV)	Time (0:00 - 23:59)

WELL CONDITION

Recommended Well Repairs/Additional Notes:

SAMPLING INFORMATION / DATA

Date Sampled: | Additional Chain-of-Custody #s:

Time Sampled:

Sample ID	Bottles (total)	Bottles (size)	Preservative	Destination Laboratory	Sample Transporter	Analytical Parameters
	2	1 L	None	STL-Seattle	courier	8081A
	2	1 L	None	STL-Seattle	courier	8151A
	2	1 L	None	STL-Seattle	courier	8270C
	3	40 ml	HCL	STL-Seattle	courier	8260B
	2	1 L	HCL	STL-Seattle	courier	NWTPH-Dx
	2	1 L	None	STL-Sacram	courier	dioxins/furans 1613
	1	500 ml	Nitric Acid	STL-Seattle	courier	Total 7470/6000/7000
	1	500 ml	Nitric Acid	STL-Sacram	courier	Dissolved 7470/6000/7000
	1	1 L	None	Test America	courier	405.1/310.1/300
	1	500 ml	Sulfuric Acid	STL-Seattle	courier	415.1/410.4/350.1/351.12
	1	250	NAOH + Zn	STL-Seattle	courier	376.2
	3	40 ml	HCL	STL-Seattle	courier	RSK 175
	1	1 L	None	STL-Seattle	courier	chloride/sulfate/orthophosphorus/alkalinty

Field Observations/Notes of Sampling Event:

CERTIFICATION STATEMENT

By signing below, the listed AMEC sampler states that the information provided on this page is accurate.

Sampler (Print): | Sampler Signature: | Date Signed: 3/27/06

SCOEPA00013235

amec	AMEC Earth & Environmental, Inc. GROUNDWATER SAMPLING FIELD FORM	Project Name: 2006 Winter GW Event Project #: 0-61M-10703-0 P 43 Monitoring/Sampling Date: 3/24/06

Monitoring Well ID: RP-01-65 | Field Personnel: J. Fassio, B. McGillicuddy, L. Glowek

Start Time: 1140 | Weather Conditions: Partly Cloudy, Shower Approx. Air Temp (F): 50°F

INITIAL WELL DATA & WELL PURGING INFORMATION

PID (ppm) Background: 0.0 In well Casing: 0.0 | PID Calibration Standard: isobutylene

%LEL Background: - In well Casing: - | PID Calibration Date: 800 3/24/06

Date/Time of Measurement: 3/24/06 / 930 | Depth to Water Measuring Technique: Solinst

Depth Well Bottom (TOC - ft.): 65 | Detection Method of Free Product: NA

Depth to Water Level (TOC - ft.): 24.80 | Conversions Factors (casing dia. = gallons/linear ft.) Circle One

Depth to Free Product (TOC - ft.): - | 0.75" = 0.02 1" = 0.04 2" = 0.17 3" = 0.37

Calculated Column Height (ft.): NA | 4" = 0.66 6" = 1.47 8" = 2.61 12" = 5.88

Casing Diameter (in.): 2" | Three Well Purge Volumes (gallons) = 3 x ____ = ____

Quantity of Free Product Collected (gal.): NA | Method of Collecting Free Product: NA

Obsevation of sheen or LNAPL: None | Observation of DNAPL: None

Casing Volumes (#)	Volume Purged (liters)	Water Temperature (degree C)	Water pH (S.U.)	Specific Conductivity (ms)	Turbidity (NTUs)	Dissolved Oxygen (mg/L)	ORP (mV)	Time (0:00 - 23:59)	DTW
	0	12.17	6.03	4521	-	0.93	138	1146	24.9
	1.6	12.05	5.94	4606	-	0.73	141.6	1150	
	3.2	11.96	5.90	4625	-	0.33	141.6	1154	24.9
	4.8	12.05	5.92	4652	-	0.24	140.0	1158	
	6.4	11.93	5.93	4655	-	0.22	139.8	1202	24.9
	Turbidity = 0.58 NTU								

Total Purged = 6.4 | Purge Pumping Rate (approx. L/m): 0.4 L/min | Well Yield: High / Moderate / Low

Purge Method (circle one): PVC Bailer / Poly Bailer / SS Bailer / Peristalic Pump / Grunfos Pump / Other = Dual Valve

Ferrous Iron (ppm): 0.0 | Decontamination Method: Alconox, DI rinse,

Instrument Type & Number: YSI | Water Disposal: RP-WSF Drum

Instrument Calibration Date & Time: 3/24/06 800 | Approx. Pump/Intake Depth:

WELL CONDITION

Casing (circle one): Stainless Steel Carbon Steel (PVC) Other:

Casing Condition: (OK) / NA / Needs Repairs / Repaired | Lock Condition: OK / (NA) / Needs Repairs / Replaced

Cap Condition: (OK) / NA / Needs Repairs / Repaired | Inner Casing Condition: OK / (NA) / Needs Repairs / Repaired

Paint Condition: (OK) / NA / Needs Repairs / Repaired | Monument Condition: (OK) / NA / Needs Repairs / Repaired

Recommended Well Repairs:

SAMPLING INFORMATION / DATA

Date Sampled: 3/24/06 | QA/QC Sample (circle one): YES / (NO) | Water Chemistry Sample (YES) / NO

Time Sampled: 1215 | Sampling Method (circle one): SS Bailer Poly Bailer Grunfos Pump

Chain-of-Custody #s: | Teflon Bailer Peristaltic Pump Other: Dual Valve

Sample ID	Bottles (total)	Bottles (size)	Preservative	Destination Laboratory	Sample Transporter	Analytical Parameters
614-01			see bulk			

All samples were immediately placed into a cooler and packed with ice or "Blue Ice", unless otherwise noted: YES / NO

Field Observations/Notes of Sampling Event: ____

CERTIFICATION STATEMENT

By signing below, the listed AMEC sampler states that the information provided on this page is accurate.

Sampler (Print): Joe Fassio | Sampler Signature: Joe Fassio | Date Signed: 3/24/06

SCOEPA00013236

amec

AMEC Earth & Environmental, Inc.
GROUNDWATER SAMPLING FIELD FORM

Project Name:	2006 Winter GW Event
Project #:	0-61M-10703-0 Phase 43
Monitoring/Sampling Date:	3/24/06

Monitoring Well ID: RP-01-65 | Field Personnel: J. Fassio, L. Glowak, B. McGillicuddy

INITIAL WELL DATA & WELL PURGING INFORMATION

Casing Volumes (#)	Volume Purged (liters)	Water Temperature (degree C)	Water pH (S.U.)	Specific Conductivity (ms)	Turbidity (NTUs)	Dissolved Oxygen (mg/L)	ORP (mV)	Time (0:00 - 23:59)

WELL CONDITION

Recommended Well Repairs/Additional Notes:

SAMPLING INFORMATION / DATA

Date Sampled: 3/24/06 | Additional Chain-of-Custody #s:

Time Sampled: 1215

Sample ID	Bottles (total)	Bottles (size)	Preservative	Destination Laboratory	Sample Transporter	Analytical Parameters
614-01	2	1 L	None	STL-Seattle	courier	8081A
	2	1 L	None	STL-Seattle	courier	8151A
	2	1 L	None	STL-Seattle	courier	8270C
	3	40 ml	HCL	STL-Seattle	courier	8260B
	2	1 L	HCL	STL-Seattle	courier	NWTPH-Dx
	2	1 L	None	STL-Sacram	courier	dioxins/furans 1613
	1	500 ml	Nitric Acid	STL-Seattle	courier	Total 7470/6000/7000
	1	500 ml	Nitric Acid	STL-Sacram	courier	Dissolved 7470/6000/7000
	1	1 L	None	Test America	courier	405.1/310.1/300
	1	500 ml	Sulfuric Acid	STL-Seattle	courier	415.1/410.4/350.1/351.12
	1	250	NAOH + Zn	STL-Seattle	courier	376.2
	3	40 ml	HCL	STL-Seattle	courier	RSK 175
	1	1 L	None	STL-Seattle	courier	chloride/sulfate/orthophosphorus/alkalinty
	3	40ml	TSP	U of OK	↓	Stable Isotopes
	1	125 ml	Sodium Thiosulfate	FGL	↓	Plate counts
	1	125ml	NONE	Test Am	↓	Nitrite/Nitrate/orthophosphorus

Field Observations/Notes of Sampling Event:

CERTIFICATION STATEMENT

By signing below, the listed AMEC sampler states that the information provided on this page is accurate.

Sampler (Print): Joe Fassio | Sampler Signature: Joe Fassio | Date Signed: 3/24/06

SCOEPA00013237

amec

AMEC Earth & Environmental, Inc.
GROUNDWATER SAMPLING FIELD FORM

Project Name:	2006 Winter GW Event
Project #:	0-61M-10703-0 P 43
Monitoring/Sampling Date:	3/27/06

Monitoring Well ID: RR06-30	Field Personnel: L. Clement, J. Rock, B. Lary
Start Time: 0903	Weather Conditions: Partly cloudy No wind Approx. Air Temp (F): 47

INITIAL WELL DATA & WELL PURGING INFORMATION

PID (ppm) Background: 0.0 In well Casing: 0.0	PID Calibration Standard: isobutylene
%LEL Background: NA In well Casing: NA	PID Calibration Date: 3/27/06
Date/Time of Measurement: 3/27/06 / 0900	Depth to Water Measuring Technique: solinist
Depth Well Bottom (TOC - ft.): 31.5	Detection Method of Free Product: NA
Depth to Water Level (TOC - ft.): 16.57	Conversions Factors (casing dia. = gallons/linear ft.) Circle One
Depth to Free Product (TOC - ft.): NA	0.75" = 0.02 1" = 0.04 2" = 0.17 3" = 0.37
Calculated Column Height (ft.):	4" = 0.66 6" = 1.47 8" = 2.61 12" = 5.88
Casing Diameter (in.): 2	Three Well Purge Volumes (gallons) = 3 x =
Quantity of Free Product Collected (gal.): NA	Method of Collecting Free Product: NA
Obsevation of sheen or LNAPL: NA	Observation of DNAPL: NA

Casing Volumes (#)	Volume Purged (liters)	Water Temperature (degree C)	Water pH (S.U.)	Specific Conductivity uS/cm	~~Turbidity~~ DTW ~~NTUs~~ ft	Dissolved Oxygen (mg/L)	ORP (mV)	Time (0:00 - 23:59)
	~2 L	11.70	6.51	456	17.92	2.89	-98.2	905
	2.0+	11.94	6.40	483	18.35	0.90	-108.7	907
	~3.4	11.82	6.36	491	18.17	0.60	-112.8	911
	~4.5	11.93	6.32	497	18.13	0.42	-114.4	914
	~5.0	11.97	6.31	495		0.40	-115.6	916
		TURB	3.02	NTUs				
		Fe^{2+}	2.40	mg/L				

Total Purged =	Purge Pumping Rate (approx. L/m) 0.360 330 ml/m Well Yield: High / Moderate / Low
Purge Method (circle one):	PVC Bailer / Poly Bailer / SS Bailer / Peristalic Pump / Grunfos Pump / Other Qualaire
Ferrous Iron (ppm): 2.40	Decontamination Method: methanol / DI / alconox / DI
Instrument Type & Number: YSI	Water Disposal: LP WSF
Instrument Calibration Date & Time: 3/27/06 0800	Approx. Pump/Intake Depth: 29.5

WELL CONDITION

Casing (circle one): Stainless Steel Carbon Steel (PVC) Other:	
Casing Condition: (OK) / NA / Needs Repairs / Repaired	Lock Condition: (OK) / NA / Needs Repairs / Replaced
Cap Condition: (OK) / NA / Needs Repairs / Repaired	Inner Casing Condition: (OK) / NA / Needs Repairs / Repaired
Paint Condition: (OK) / NA / Needs Repairs / Repaired	Monument Condition: (OK) / NA / Needs Repairs / Repaired
Recommended Well Repairs:	

SAMPLING INFORMATION / DATA

Date Sampled: 3/27/06	QA/QC Sample (circle one): YES / (NO)	Water Chemistry Sample: (YES) / NO
Time Sampled: 0945	Sampling Method (circle one): SS Bailer Poly Bailer Grunfos Pump	
Chain-of-Custody #s: electronic	Teflon Bailer Peristaltic Pump Other: Qualaire	

Sample ID	Bottles (total)	Bottles (size)	Preservative	Destination Laboratory	Sample Transporter	Analytical Parameters
615-01						
			see back			

All samples were immediately placed into a cooler and packed with ice or "Blue Ice", unless otherwise noted: YES / NO

Field Observations/Notes of Sampling Event:
615-B - Trip Blank

CERTIFICATION STATEMENT

By signing below, the listed AMEC sampler states that the information provided on this page is accurate.

Sampler (Print): BARB LARY Sampler Signature: Barb Lary Date Signed: 3/27/06

SCOEPA00013238

amec

AMEC Earth & Environmental, Inc.
GROUNDWATER SAMPLING FIELD FORM

Project Name:	2006 Winter GW Event
Project #:	0-61M-10703-0 Phase 43
Monitoring/Sampling Date:	3/27/06

Monitoring Well ID: | Field Personnel:

INITIAL WELL DATA & WELL PURGING INFORMATION

Casing Volumes (#)	Volume Purged (liters)	Water Temperature (degree C)	Water pH (S.U.)	Specific Conductivity (ms)	Turbidity (NTUs)	Dissolved Oxygen (mg/L)	ORP (mV)	Time (0:00 - 23:59)

WELL CONDITION

Recommended Well Repairs/Additional Notes:

SAMPLING INFORMATION / DATA

Date Sampled: 3/27/06 | Additional Chain-of-Custody #s:

Time Sampled: 0945

Sample ID	Bottles (total)	Bottles (size)	Preservative	Destination Laboratory	Sample Transporter	Analytical Parameters
WELS-01	2	1 L	None	STL-Seattle	courier	8081A
	2	1 L	None	STL-Seattle	courier	8151A
	2	1 L	None	STL-Seattle	courier	8270C
	3	40 ml	HCL	STL-Seattle	courier	8260B
	2	1 L	HCL	STL-Seattle	courier	NWTPH-Dx
	2	1 L	None	STL-Sacram	courier	dioxins/furans 1613
	1	500 ml	Nitric Acid	STL-Seattle	courier	Total 7470/6000/7000
	1	500 ml	Nitric Acid	STL-Sacram	courier	Dissolved 7470/6000/7000
	1	1 L	None	Test America	courier	405.1/310.1/300
	1	500 ml	Sulfuric Acid	STL-Seattle	courier	415.1/410.4/350.1/351.12
	1	250	NAOH + Zn	STL-Seattle	courier	376.2
	3	40 ml	HCL	STL-Seattle	courier	RSK 175
	1	1 L	None	STL-Seattle	courier	chloride/sulfate/orthophosphorus/alkalinty
↓	1	125ml	Na Thiosulfate	Food Quality	↓	SM 9223
	1	250ml	NONE	Test Am		Nitrite/Nitrate/orthophosphorus

Field Observations/Notes of Sampling Event:

CERTIFICATION STATEMENT

By signing below, the listed AMEC sampler states that the information provided on this page is accurate.

Sampler (Print): LISA GLOVER Sampler Signature: Lisa Glover Date Signed: 3/27/06

SCOEPA00013239

amec	AMEC Earth & Environmental, Inc. GROUNDWATER SAMPLING FIELD FORM	Project Name: 2006 Winter GW Event
		Project #: 0-61M-10703-0 P 43
		Monitoring/Sampling Date: 3/27/06

Monitoring Well ID: RP-06-87 | Field Personnel: B. LARY & J. ROCK

Start Time: 930 | Weather Conditions: CLEAR & NO WIND | Approx. Air Temp (F): ~50°F

INITIAL WELL DATA & WELL PURGING INFORMATION

PID (ppm) Background: 0.0 In well Casing: 0.0 | PID Calibration Standard: isobutylene

%LEL Background: NA In well Casing: NA | PID Calibration Date: 3/27/06

Date/Time of Measurement: 3/27/06 / 930 | Depth to Water Measuring Technique: Solinst

Depth Well Bottom (TOC - ft.): | Detection Method of Free Product: NA

Depth to Water Level (TOC - ft.): 25.33 | Conversions Factors (casing dia. = gallons/linear ft.) Circle One

Depth to Free Product (TOC - ft.): NA | 0.75" = 0.02 1" = 0.04 2" = 0.17 3" = 0.37

Calculated Column Height (ft.): | 4" = 0.66 6" = 1.47 8" = 2.61 12" = 5.88

Casing Diameter (in.): 2" | Three Well Purge Volumes (gallons) = 3 x _____ = _____

Quantity of Free Product Collected (gal.): 0 | Method of Collecting Free Product: NA

Obsevation of sheen or LNAPL: No | Observation of DNAPL: NO

Casing Volumes (#)	Volume Purged (liters)	Water Temperature (degree C)	Water pH (S.U.)	Specific Conductivity (ms)	~~Turbidity~~ DTW ~~NTUs~~	Dissolved Oxygen (mg/L)	ORP (mV)	Time (0:00-23:59)
	~500 ml	12.46	6.22	3065	25.48	0.82	-68.6	10:21
	~1.5 L	12.47	6.16	3638	25.43	0.61	-60.2	10:25
	~2.75 L	12.49	6.23	3778		0.44	-61.8	10:29
	~4.0 L	12.52	6.26	3860	25.45	0.35	-62.0	10:35
	~4.8 L	12.57	6.26	3878		0.31	-61.0	10:37
		TURB	3.55 NTUs					
		Fe^{2+}	3.40 mg/L					

Total Purged = | Purge Pumping Rate (approx. L/m): 380 ml / min | Well Yield: High / Moderate / Low

Purge Method (circle one): PVC Bailer / Poly Bailer / SS Bailer / Peristalic Pump / Grunfos Pump / Other = Dual Valve Pump

Ferrous Iron (ppm): | Decontamination Method: Methane, DI, Alcanox, DI

Instrument Type & Number: YSI | Water Disposal: RP WSF

Instrument Calibration Date & Time: 3/27/06 0800 | Approx. Pump/Intake Depth:

WELL CONDITION

Casing (circle one): Stainless Steel Carbon Steel PVC Other:

Casing Condition: OK / NA / Needs Repairs / Repaired | Lock Condition: OK / NA / Needs Repairs / Replaced

Cap Condition: OK / NA / Needs Repairs / Repaired | Inner Casing Condition: OK / NA / Needs Repairs / Repaired

Paint Condition: OK / NA / Needs Repairs / Repaired | Monument Condition: OK / NA / Needs Repairs / Repaired

Recommended Well Repairs:

SAMPLING INFORMATION / DATA

Date Sampled: 3/27/06 | QA/QC Sample (circle one): YES / NO | Water Chemistry Sample: YES / NO

Time Sampled: 10:30 | Sampling Method (circle one): SS Bailer Poly Bailer Grunfos Pump

Chain-of-Custody #s: electronic | Teflon Bailer Peristaltic Pump Other: Dual valve

Sample ID	Bottles (total)	Bottles (size)	Preservative	Destination Laboratory	Sample Transporter	Analytical Parameters
~~[illegible]~~	AG					
~~[illegible]~~			see Back			
616-a						

All samples were immediately placed into a cooler and packed with ice or "Blue Ice", unless otherwise noted: YES / NO

Field Observations/Notes of Sampling Event:

CERTIFICATION STATEMENT

By signing below, the listed AMEC sampler states that the information provided on this page is accurate.

Sampler (Print): BARB LARY | Sampler Signature: Barb Lary | Date Signed: 3/27/06

SCOEPA00013240

amec	AMEC Earth & Environmental, Inc. GROUNDWATER SAMPLING FIELD FORM	Project Name: 2006 Winter GW Event Project #: 0-61M-10703-0 Phase 43 Monitoring/Sampling Date: 3/27/06

Monitoring Well ID: | Field Personnel:

INITIAL WELL DATA & WELL PURGING INFORMATION

Casing Volumes (#)	Volume Purged (liters)	Water Temperature (degree C)	Water pH (S.U.)	Specific Conductivity (ms)	Turbidity (NTUs)	Dissolved Oxygen (mg/L)	ORP (mV)	Time (0:00 - 23:59)

WELL CONDITION

Recommended Well Repairs/Additional Notes:

SAMPLING INFORMATION / DATA

Date Sampled: 3/27/06 | Additional Chain-of-Custody #s:

Time Sampled:

Sample ID	Bottles (total)	Bottles (size)	Preservative	Destination Laboratory	Sample Transporter	Analytical Parameters
116-01 ~~[illegible]~~	2	1 L	None	STL-Seattle	courier	8081A
	2	1 L	None	STL-Seattle	courier	8151A
	2	1 L	None	STL-Seattle	courier	8270C
	3	40 ml	HCL	STL-Seattle	courier	8260B
	2	1 L	HCL	STL-Seattle	courier	NWTPH-Dx
	2	1 L	None	STL-Sacram	courier	dioxins/furans 1613
	1	500 ml	Nitric Acid	STL-Seattle	courier	Total 7470/6000/7000
	1	500 ml	Nitric Acid	STL-Sacram	courier	Dissolved 7470/6000/7000
	1	1 L	None	Test America	courier	405.1/310.1/300
	1	500 ml	Sulfuric Acid	STL-Seattle	courier	415.1/410.4/350.1/351.12
	1	250	NAOH + Zn	STL-Seattle	courier	376.2
	3	40 ml	HCL	STL-Seattle	courier	RSK 175
	1	1 L	None	STL-Seattle	courier	chloride/sulfate/orthophosphorus/alkalinty
	1	125ml	Na Thiosulfate	Food Quality	↓	SM9215
	1	150ml	NONE	Test Am	↓	Nitrite/Nitrate/Orthophosphorus

Field Observations/Notes of Sampling Event:

CERTIFICATION STATEMENT

By signing below, the listed AMEC sampler states that the information provided on this page is accurate.

Sampler (Print): | Sampler Signature: [signature] | Date Signed: 3/27/06

amec

AMEC Earth & Environmental, Inc.
GROUNDWATER SAMPLING FIELD FORM

Project Name: 2006 Winter GW Event
Project #: 0-61M-10703-0 P 43
Monitoring/Sampling Date: 3/23/06

Monitoring Well ID: R-07-30 | Field Personnel: J. Fassio, B. Lary, B. McGillicuddy
Start Time: 1100 | Weather Conditions: Cloudy | Approx. Air Temp (F): 55

INITIAL WELL DATA & WELL PURGING INFORMATION

PID (ppm) Background: 0.0 In well Casing: 0.0 | PID Calibration Standard: isobutylene
%LEL Background: ~ In well Casing: ~ | PID Calibration Date: 800 3/23/06

Date/Time of Measurement: 3/23/06 / | Depth to Water Measuring Technique: Solinst
Depth Well Bottom (TOC - ft.): 30 | Detection Method of Free Product: NA
Depth to Water Level (TOC - ft.): 23.71 | Conversions Factors (casing dia. = gallons/linear ft.) Circle One
Depth to Free Product (TOC - ft.): NA | 0.75" = 0.02 1" = 0.04 2" = 0.17 3" = 0.37
Calculated Column Height (ft.): ~ | 4" = 0.66 6" = 1.47 8" = 2.61 12" = 5.88
Casing Diameter (in.): 2" | Three Well Purge Volumes (gallons) = 3 x _____ = _____
Quantity of Free Product Collected (gal.): NONE | Method of Collecting Free Product: NA
Obsevation of sheen or LNAPL: NONE | Observation of DNAPL: NONE

Casing Volumes (#)	Volume Purged (liters)	Water Temperature (degree C)	Water pH (S.U.)	Specific Conductivity (ms)	Turbidity (NTUs)	Dissolved Oxygen (mg/L)	ORP (mV)	Time (0:00 - 23:59)	DTW
	0	14.73	6.12	873	~	0.67	-88.4	1106	24.0
	0.86	14.71	5.91	837	✓	0.77	-84.5	1110	24.1
	0.7	14.70	5.93	813	~	0.34	-87.8	1114	24.1
	1.0	14.70	6.00	795	~	0.27	-95.0	1118	24.2
	1.7	14.69	6.04	788	~	0.24	-99.3	1122	24.2
	2.4	14.78	6.09	783	~	0.20	-99.1	1126	24.2
					6.83 NTU				

Total Purged = 2.4 | Purge Pumping Rate (approx. L/m): 120 ml/min | Well Yield: High / Moderate / Low
Purge Method (circle one): PVC Bailer / Poly Bailer / SS Bailer / Peristalic Pump / Grunfos Pump / Other = Dual Valve
Ferrous Iron (ppm): 2.6 ppm | Decontamination Method:
Instrument Type & Number: YSI | Water Disposal: RP-WSF Drum
Instrument Calibration Date & Time: 800 3/23/06 | Approx. Pump/Intake Depth: ~28.8

WELL CONDITION

Casing (circle one): Stainless Steel Carbon Steel (PVC) Other:
Casing Condition: (OK) NA / Needs Repairs / Repaired | Lock Condition: OK / (NA) Needs Repairs / Replaced
Cap Condition: (OK) / NA / Needs Repairs / Repaired | Inner Casing Condition: OK / (NA) / Needs Repairs / Repaired
Paint Condition: OK / (NA) / Needs Repairs / Repaired | Monument Condition: (OK) NA / Needs Repairs / Repaired
Recommended Well Repairs:

SAMPLING INFORMATION / DATA

Date Sampled: 3/23/06 | QA/QC Sample (circle one): YES / (NO) | Water Chemistry Sample: (YES) / NO
Time Sampled: 1130 | Sampling Method (circle one): SS Bailer Poly Bailer Grunfos Pump
Chain-of-Custody #s: electronic | Teflon Bailer Peristaltic Pump Other: Dual Valve

Sample ID	Bottles (total)	Bottles (size)	Preservative	Destination Laboratory	Sample Transporter	Analytical Parameters
611-01			see back			

All samples were immediately placed into a cooler and packed with ice or "Blue Ice", unless otherwise noted: (YES) / NO
Field Observations/Notes of Sampling Event: _____

CERTIFICATION STATEMENT

By signing below, the listed AMEC sampler states that the information provided on this page is accurate.

Sampler (Print): Joe Fassio | Sampler Signature: Joe Fassio | Date Signed: 3/23/06

SCOEPA00013242

amec

AMEC Earth & Environmental, Inc.
GROUNDWATER SAMPLING FIELD FORM

Project Name:	2006 Winter GW Event
Project #:	0-61M-10703-0 Phase 43
Monitoring/Sampling Date:	3/23/06

Monitoring Well ID: RP-07-30 | Field Personnel: J. Fassio, B. Lewy, B. McGillicuddy

INITIAL WELL DATA & WELL PURGING INFORMATION

Casing Volumes (#)	Volume Purged (liters)	Water Temperature (degree C)	Water pH (S.U.)	Specific Conductivity (ms)	Turbidity (NTUs)	Dissolved Oxygen (mg/L)	ORP (mV)	Time (0:00 - 23:59)

WELL CONDITION

Recommended Well Repairs/Additional Notes:

SAMPLING INFORMATION / DATA

Date Sampled: 3/23/06 | Additional Chain-of-Custody #s:

Time Sampled: 1130

Sample ID	Bottles (total)	Bottles (size)	Preservative	Destination Laboratory	Sample Transporter	Analytical Parameters
611-01	2	1 L	None	STL-Seattle	courier	8081A
	2	1 L	None	STL-Seattle	courier	8151A
	2	1 L	None	STL-Seattle	courier	8270C
	3	40 ml	HCL	STL-Seattle	courier	8260B
	2	1 L	HCL	STL-Seattle	courier	NWTPH-Dx
	2	1 L	None	STL-Sacram	courier	dioxins/furans 1613
	1	500 ml	Nitric Acid	STL-Seattle	courier	Total 7470/6000/7000
	1	500 ml	Nitric Acid	STL-Sacram	courier	Dissolved 7470/6000/7000
	1	1 L	None	Test America	courier	405.1/310.1/300
	1	500 ml	Sulfuric Acid	STL-Seattle	courier	415.1/410.4/350.1/351.12
	1	250	NAOH + Zn	STL-Seattle	courier	376.2
	3	40 ml	HCL	STL-Seattle	courier	RSK 175
	1	1 L	None	STL-Seattle	courier	chloride/sulfate/orthophosphorus/alkalinty
	1	125ml	Na Thiosulfate	Test Am	courier	SM9215
	1	250ml	NONE	Test Am	courier	Nitrite Nitrate ortho
	3	40ml	TSP	U of OK	courier	Stable Isotopes

Field Observations/Notes of Sampling Event:

CERTIFICATION STATEMENT

By signing below, the listed AMEC sampler states that the information provided on this page is accurate.

Sampler (Print): Joe Fassio | Sampler Signature: Joe Fassio | Date Signed: 3/23/06

SCOEPA00013243

amec

AMEC Earth & Environmental, Inc.
GROUNDWATER SAMPLING FIELD FORM

Project Name: 2006 Winter GW Event
Project #: 0-61M-10703-0 P 43
Monitoring/Sampling Date: 3/31/06

Monitoring Well ID: RP-07-30 | Field Personnel: L. Glover, B. McGillicuddy
Start Time: 1010 | Weather Conditions: sunny | Approx. Air Temp (F): 50

INITIAL WELL DATA & WELL PURGING INFORMATION

PID (ppm) Background: 0.0. In well Casing: 0.0 | PID Calibration Standard: isobutylene
%LEL Background: NA In well Casing: NA | PID Calibration Date: 3/31/06
Date/Time of Measurement: 3/31/06 1009 | Depth to Water Measuring Technique: NA
Depth Well Bottom (TOC - ft.): 30 | Detection Method of Free Product: NA
Depth to Water Level (TOC - ft.): 23.42 | Conversions Factors (casing dia. = gallons/linear ft.) Circle One
Depth to Free Product (TOC - ft.): | 0.75" = 0.02 | 1" = 0.04 | 2" = 0.17 | 3" = 0.37
Calculated Column Height (ft.): | 4" = 0.66 | 6" = 1.47 | 8" = 2.61 | 12" = 5.88
Casing Diameter (in.): | Three Well Purge Volumes (gallons) = 3 x = _____
Quantity of Free Product Collected (gal.): NA | Method of Collecting Free Product: NA
Obsevation of sheen or LNAPL: NA | Observation of DNAPL: NA

Casing Volumes (#)	Volume Purged (liters)	Water Temperature (degree C)	Water pH (S.U.)	Specific Conductivity (ms/us)	Turbidity (NTUs)	Dissolved Oxygen (mg/L)	ORP (mV)	Time (0:00 - 23:59)
	0	15.20	6.54	719	Material	4.55	-80.9	1014
	0.5 480	15.09	5.75	802	Slight	1.72	-83.7	1018
	1	14.94	5.65	814	clear	0.95	-84.9	1022
	1.5	14.89	5.63	818	↓	0.5	-89.3	1026
	2.0	15.18	5.79	819	↓	0.42	-84.7	1030
	2.5	15.16	5.89	821	↓	0.38	-91.2	1034
	3.0	15.00	5.92	819	↓	0.30	-94.7	1038

Total Purged = | Purge Pumping Rate (approx. L/m): .120 | Well Yield: High / Moderate / (Low)
Purge Method (circle one): PVC Bailer / Poly Bailer / SS Bailer / Peristalic Pump / Grunfos Pump / Other = Qualibailer
Ferrous Iron (ppm): 3.8 | Decontamination Method: dedicated pump
Instrument Type & Number: YSI | Water Disposal: to WSF
Instrument Calibration Date & Time: 3/31/06 0800 | Approx. Pump/Intake Depth: 28

WELL CONDITION

Casing (circle one): Stainless Steel Carbon Steel (PVC) Other:
Casing Condition: (OK) / NA / Needs Repairs / Repaired | Lock Condition: (OK) / NA / Needs Repairs / Replaced
Cap Condition: (OK) / NA / Needs Repairs / Repaired | Inner Casing Condition: (OK) / NA / Needs Repairs / Repaired
Paint Condition: (OK) / NA / Needs Repairs / Repaired | Monument Condition: (OK) / NA / Needs Repairs / Repaired
Recommended Well Repairs: sample time 1050

SAMPLING INFORMATION / DATA

Date Sampled: 3/31/06 | QA/QC Sample (circle one): YES / (NO) | Water Chemistry Sample: (YES) / NO
Time Sampled: ~~1045~~ 1050 | Sampling Method (circle one): SS Bailer Poly Bailer Grunfos Pump
Chain-of-Custody #s: electronic | Teflon Bailer Peristaltic Pump Other: Qualibailer

Sample ID	Bottles (total)	Bottles (size)	Preservative	Destination Laboratory	Sample Transporter	Analytical Parameters
6133-01	3	40ml	~~HCl~~ HNO3	U of OK	Courier	isotopes

All samples were immediately placed into a cooler and packed with ice or "Blue Ice", unless otherwise noted: YES / NO
Field Observations/Notes of Sampling Event: re-sample for isotopes only

CERTIFICATION STATEMENT

By signing below, the listed AMEC sampler states that the information provided on this page is accurate.

Sampler (Print): Lisa Glover Sampler Signature: Lisa Glover Date Signed: 3/31/06

SCOEPA00013244

amec	AMEC Earth & Environmental, Inc. GROUNDWATER SAMPLING FIELD FORM	Project Name: 2006 Winter GW Event Project #: 0-61M-10703-0 Phase 43 Monitoring/Sampling Date:

Monitoring Well ID: | Field Personnel:

INITIAL WELL DATA & WELL PURGING INFORMATION

Casing Volumes (#)	Volume Purged (liters)	Water Temperature (degree C)	Water pH (S.U.)	Specific Conductivity (~~ms~~/uS)	Turbidity (NTUs)	Dissolved Oxygen (mg/L)	ORP (mV)	Time (0:00 - 23:59)
	3.5	15.07	5.96	816	clear	0.25	-99.1	1042
	4.0	15.08	6.06	815	5.68	0.21	-100.9	1046

WELL CONDITION

Recommended Well Repairs/Additional Notes:

SAMPLING INFORMATION / DATA

Date Sampled: 6/33-01 | Additional Chain-of-Custody #s:

Time Sampled: 1050

Sample ID	Bottles (total)	Bottles (size)	Preservative	Destination Laboratory	Sample Transporter	Analytical Parameters
	2	1 L	None	STL-Seattle	courier	8081A
	2	1 L	None	STL-Seattle	courier	8151A
	2	1 L	None	STL-Seattle	courier	8270C
	3	40 ml	HCL	STL-Seattle	courier	8260B
	2	1 L	HCL	STL-Seattle	courier	NWTPH-Dx
	2	1 L	None	STL-Sacram	courier	dioxins/furans 1613
	1	500 ml	Nitric Acid	STL-Seattle	courier	Total 7470/6000/7000
	1	500 ml	Nitric Acid	STL-Sacram	courier	Dissolved 7470/6000/7000
	1	1 L	None	Test America	courier	405.1/310.1/300
	1	500 ml	Sulfuric Acid	STL-Seattle	courier	415.1/410.4/350.1/351.12
	1	250	NAOH + Zn	STL-Seattle	courier	376.2
	3	40 ml	HCL	STL-Seattle	courier	RSK 175
	1	1 L	None	STL-Seattle	courier	chloride/sulfate/orthophosphorus/alkalinity

Field Observations/Notes of Sampling Event:

CERTIFICATION STATEMENT

By signing below, the listed AMEC sampler states that the information provided on this page is accurate.

Sampler (Print): LISA GLONEK Sampler Signature: Lisa Glonek Date Signed: 7/31/06

SCOEPA00013245

amec	AMEC Earth & Environmental, Inc. GROUNDWATER SAMPLING FIELD FORM	Project Name: 2006 Winter GW Event
		Project #: 0-61M-10703-0 P 43
		Monitoring/Sampling Date: 3/22/06

Monitoring Well ID: RP-07-55 | Field Personnel: J. Fassio, B. McGillicuddy

Start Time: 1355 | Weather Conditions: Cloudy, 50°F | Approx. Air Temp (F):

INITIAL WELL DATA & WELL PURGING INFORMATION

PID (ppm) Background: 0.0 In well Casing: 0.0 | PID Calibration Standard: isobutylene

%LEL Background: – In well Casing: – | PID Calibration Date: 3/22/06 800

Date/Time of Measurement: 3/22/06 / QA | Depth to Water Measuring Technique: Solinst

Depth Well Bottom (TOC - ft.): 55 | Detection Method of Free Product: NA

Depth to Water Level (TOC - ft.): ~~27.52~~ 28.207 | Conversions Factors (casing dia. = gallons/linear ft.) Circle One

Depth to Free Product (TOC - ft.): NA | 0.75" = 0.02 1" = 0.04 2" = 0.17 3" = 0.37

Calculated Column Height (ft.): – | 4" = 0.66 6" = 1.47 8" = 2.61 12" = 5.88

Casing Diameter (in.): 2" | Three Well Purge Volumes (gallons) = 3 x _____ = _____

Quantity of Free Product Collected (gal.): NA | Method of Collecting Free Product: NA

Obsevation of sheen or LNAPL: None | Observation of DNAPL: None

Casing Volumes (#)	Volume Purged (liters)	Water Temperature (degree C)	Water pH (S.U.)	Specific Conductivity (ms)	Turbidity (NTUs)	Dissolved Oxygen (mg/L)	ORP (mV)	Time (0:00 - 23:59)	DTW
	0	14.28	6.52	1002	–	1.68	-9.9	1404	
	0.6	14.32	6.53	1007	–	0.85	-23.4	1407	
	1.2	14.36	6.54	1014	–	0.63	-29.4	1411	
	1.8	14.34	6.55	1020	–	0.60	-34.8	1414	
	2.4	14.36	6.55	1024	–	0.51	-39.8	1417	28.3
					2.38 NTU				

Total Purged = | Purge Pumping Rate (approx. L/m): 200 ml/min | Well Yield: High / Moderate / Low

Purge Method (circle one): PVC Bailer / Poly Bailer / SS Bailer / Peristalic Pump / Grunfos Pump / Other = Dual Valve

Ferrous Iron (ppm): 3.4 ppm | Decontamination Method: Alconox, DI rinse

Instrument Type & Number: YSI | Water Disposal: Drum in RP WSF

Instrument Calibration Date & Time: 3/22/06 800 | Approx. Pump/Intake Depth:

WELL CONDITION

Casing (circle one): Stainless Steel Carbon Steel PVC Other: Dual Valve - Dedicated Pump

Casing Condition: OK / NA / Needs Repairs / Repaired | Lock Condition: OK / NA / Needs Repairs / Replaced

Cap Condition: OK / NA / Needs Repairs / Repaired | Inner Casing Condition: OK / NA / Needs Repairs / Repaired

Paint Condition: OK / NA / Needs Repairs / Repaired | Monument Condition: OK / NA / Needs Repairs / Repaired

Recommended Well Repairs:

SAMPLING INFORMATION / DATA

Date Sampled: 3/22/06 | QA/QC Sample (circle one): YES / NO | Water Chemistry Sample: YES / NO

Time Sampled: 1430 | Sampling Method (circle one): SS Bailer Poly Bailer Grunfos Pump

Chain-of-Custody #s: | Teflon Bailer Peristaltic Pump Other: Dual Valve

Sample ID	Bottles (total)	Bottles (size)	Preservative	Destination Laboratory	Sample Transporter	Analytical Parameters
608-01	27	Varies	500 Pack			

All samples were immediately placed into a cooler and packed with ice or "Blue Ice", unless otherwise noted: YES / NO

Field Observations/Notes of Sampling Event: DTW = 26.68 on 3/23/06 DTW measured on 3/22 may be in error.

CERTIFICATION STATEMENT

By signing below, the listed AMEC sampler states that the information provided on this page is accurate.

Sampler (Print): Joe Fassio | Sampler Signature: [signature] | Date Signed: 3/22/06

amec	AMEC Earth & Environmental, Inc. GROUNDWATER SAMPLING FIELD FORM	Project Name: 2006 Winter GW Event Project #: 0-61M-10703-0 Phase 43 Monitoring/Sampling Date: 3/22/06

Monitoring Well ID: RP-07-SS | Field Personnel: J. Fassio, L. Glowek, B. McGillicuddy

INITIAL WELL DATA & WELL PURGING INFORMATION

Casing Volumes (#)	Volume Purged (liters)	Water Temperature (degree C)	Water pH (S.U.)	Specific Conductivity (ms)	Turbidity (NTUs)	Dissolved Oxygen (mg/L)	ORP (mV)	Time (0:00 - 23:59)

WELL CONDITION

Recommended Well Repairs/Additional Notes:

SAMPLING INFORMATION / DATA

Date Sampled: 3/22/06 | Additional Chain-of-Custody #s:

Time Sampled: 1420

Sample ID	Bottles (total)	Bottles (size)	Preservative	Destination Laboratory	Sample Transporter	Analytical Parameters
608-01	2	1 L	None	STL-Seattle	courier	8081A
	2	1 L	None	STL-Seattle	courier	8151A
	2	1 L	None	STL-Seattle	courier	8270C
	3	40 ml	HCL	STL-Seattle	courier	8260B
	2	1 L	HCL	STL-Seattle	courier	NWTPH-Dx
	2	1 L	None	STL-Sacram	courier	dioxins/furans 1613
	1	500 ml	Nitric Acid	STL-Seattle	courier	Total 7470/6000/7000
	1	500 ml	Nitric Acid	STL-Sacram	courier	Dissolved 7470/6000/7000
	1	1 L	None	Test America	courier	405.1/310.1/300
	1	500 ml	Sulfuric Acid	STL-Seattle	courier	415.1/410.4/350.1/351.12
	1	250	NAOH + Zn	STL-Seattle	courier	376.2
	3	40 ml	HCL	STL-Seattle	courier	RSK 175
	1	1 L	None	STL-Seattle	courier	chloride/sulfate/~~orthophosphorus~~/alkalinty
	3	40 ml	TSP	U. of OK		Isotopes
	1	250 ml	None	NCA		Nitrate/nitrites/orthophosphorus
	1	125 ml	Sodium Thiosulfate	FQL		Phase count

Field Observations/Notes of Sampling Event:

CERTIFICATION STATEMENT

By signing below, the listed AMEC sampler states that the information provided on this page is accurate.

Sampler (Print): Joe Fassio | Sampler Signature: [signature] | Date Signed: 3/22/06

amec	AMEC Earth & Environmental, Inc. GROUNDWATER SAMPLING FIELD FORM	Project Name: 2006 Winter GW Event Project #: 0-61M-10703-0 P 43 Monitoring/Sampling Date: 3/23/06

Monitoring Well ID: RP-77 – 84	Field Personnel:		
Start Time: 840	Weather Conditions:	Approx. Air Temp (F):	

INITIAL WELL DATA & WELL PURGING INFORMATION

PID (ppm) Background:	In well Casing:	PID Calibration Standard: isobutylene	
%LEL Background:	In well Casing:	PID Calibration Date:	
Date/Time of Measurement: 3/23/06 1900		Depth to Water Measuring Technique:	
Depth Well Bottom (TOC - ft.):		Detection Method of Free Product:	
Depth to Water Level (TOC - ft.): 27.22		Conversions Factors (casing dia. = gallons/linear ft.) Circle One	
Depth to Free Product (TOC - ft.):		0.75" = 0.02	1" = 0.04
Calculated Column Height (ft.):		4" = 0.66	6" = 1.47
Casing Diameter (in.):		Three Well Purge Volumes (gallons) = 3 x _____ = _____	
Quantity of Free Product Collected (gal.):		Method of Collecting Free Product:	
Obsevation of sheen or LNAPL:		Observation of DNAPL:	

Casing Volumes (#)	Volume Purged (liters)	Water Temperature (degree C)	Water pH (S.U.)	Specific Conductivity (ms)	Turbidity (NTUs)	Dissolved Oxygen (mg/L)	ORP (mV)	Time (0:00 - 23:59)
		See Back						

Total Purged =	Purge Pumping Rate (approx. L/m): 380ml/min	Well Yield: High / Moderate / Low
Purge Method (circle one): PVC Bailer / Poly Bailer / SS Bailer / Peristalic Pump / Grunfos Pump / Other =		
Ferrous Iron (ppm):	Decontamination Method:	
Instrument Type & Number: YSI	Water Disposal:	
Instrument Calibration Date & Time:	Approx. Pump/Intake Depth:	

WELL CONDITION

Casing (circle one): Stainless Steel Carbon Steel PVC Other:			
Casing Condition: OK / NA / Needs Repairs / Repaired		Lock Condition: OK / NA / Needs Repairs / Replaced	
Cap Condition: OK / NA / Needs Repairs / Repaired		Inner Casing Condition: OK / NA / Needs Repairs / Repaired	
Paint Condition: OK / NA / Needs Repairs / Repaired		Monument Condition: OK / NA / Needs Repairs / Repaired	
Recommended Well Repairs:			

SAMPLING INFORMATION / DATA

Date Sampled: 3/23/06	QA/QC Sample (circle one): YES / NO	Water Chemistry Sample: (YES) / NO
Time Sampled: 945	Sampling Method (circle one): SS Bailer Poly Bailer Grunfos Pump	
Chain-of-Custody #s:	Teflon Bailer Peristaltic Pump Other: Dual Valve	

Sample ID	Bottles (total)	Bottles (size)	Preservative	Destination Laboratory	Sample Transporter	Analytical Parameters
1009-01			See Back			

All samples were immediately placed into a cooler and packed with ice or "Blue Ice", unless otherwise noted: YES / NO

Field Observations/Notes of Sampling Event: _____

CERTIFICATION STATEMENT

By signing below, the listed AMEC sampler states that the information provided on this page is accurate.

Sampler (Print): GM Sampler Signature: (Print) Joe Fassio Date Signed: 3/23/06

SCOEPA00013248

amec

AMEC Earth & Environmental, Inc.
GROUNDWATER SAMPLING FIELD FORM

Project Name:	2006 Winter GW Event
Project #:	0-61M-10703-0 Phase 43
Monitoring/Sampling Date:	RP-07-84 3/23/06

Monitoring Well ID: RP-07-84 | Field Personnel: J. Fassio, B. Lary, B. McGillicuddy

INITIAL WELL DATA & WELL PURGING INFORMATION

Casing Volumes (#)	Volume Purged (liters)	Water Temperature (degree C)	Water pH (S.U.)	Specific Conductivity (ms)	Turbidity (NTUs)	Dissolved Oxygen (mg/L)	ORP (mV)	Time (0:00 - 23:59)	DTW
	~~0~~	~~13.64~~	~~6.66~~	~~1874~~	~	~~1.76~~	~~254.2~~	~~910~~	
	0	13.65	6.35	3510	~	0.46	43.7	913	
	1.5	13.71	6.27	3519	~	0.74	31.9	917	
	3.0	13.75	6.25	3817	~	0.42	27.2	921	27.1
	4.5	13.75	6.24	3515	~	0.31	26.3	925	27.0
	6.0	13.77	6.23	3513	~	0.25	23.0	929	
	7.5	13.78	6.24	3517	~	0.23	21.1	933	27.0
	TURBIDITY:	1.84	NTUs						
	Fe^{2+}:	1.4	mg/L						

WELL CONDITION

Recommended Well Repairs/Additional Notes:

SAMPLING INFORMATION / DATA

Date Sampled: 3/23/06 | Additional Chain-of-Custody #s:

Time Sampled: 945

Sample ID	Bottles (total)	Bottles (size)	Preservative	Destination Laboratory	Sample Transporter	Analytical Parameters
609-01	2	1 L	None	STL-Seattle	courier	8081A
	2	1 L	None	STL-Seattle	courier	8151A
	2	1 L	None	STL-Seattle	courier	8270C
	3	40 ml	HCL	STL-Seattle	courier	8260B
	2	1 L	HCL	STL-Seattle	courier	NWTPH-Dx
	2	1 L	None	STL-Sacram	courier	dioxins/furans 1613
	1	500 ml	Nitric Acid	STL-Seattle	courier	Total 7470/6000/7000
	1	500 ml	Nitric Acid	STL-Sacram	courier	Dissolved 7470/6000/7000
	1	1 L	None	Test America	courier	405.1/310.1/300
	1	500 ml	Sulfuric Acid	STL-Seattle	courier	415.1/410.4/350.1/351.12
	1	250	NAOH + Zn	STL-Seattle	courier	376.2
	3	40 ml	HCL	STL-Seattle	courier	RSK 175
	1	1 L	None	STL-Seattle	courier	chloride/sulfate/orthophosphorus/alkalinty
	3	40ml	TSP	U of O		Isotope
	1	250 ml	none	Test Amer		TKN/~~orthophosphorus~~
↓	1	Bio	Na Thiosulfate	Food Qual.		

Field Observations/Notes of Sampling Event: Trip Blank = 609-03 - Time = 800

Lab Dup: 609-06

CERTIFICATION STATEMENT

By signing below, the listed AMEC sampler states that the information provided on this page is accurate.

Sampler (Print): Joe Fassio | Sampler Signature: [signature] | Date Signed: 3/23/06

SCOEPA00013249

amec	AMEC Earth & Environmental, Inc. GROUNDWATER SAMPLING FIELD FORM	Project Name: 2006 Winter GW Event
		Project #: 0-61M-10703-0 P 43
		Monitoring/Sampling Date: 3/31/06

Monitoring Well ID: RP-07-84 | Field Personnel: L Glonek, B. McCrillicuddy

Start Time: 1100 | Weather Conditions: Sunny. | Approx. Air Temp (F): 50

INITIAL WELL DATA & WELL PURGING INFORMATION

PID (ppm) Background: 0.0 In well Casing: 0.0 | PID Calibration Standard: isobutylene

%LEL Background: NA In well Casing: NA | PID Calibration Date: 3/31/06

Date/Time of Measurement: 31 / 1100 | Depth to Water Measuring Technique: Solinst

Depth Well Bottom (TOC - ft.): 84 | Detection Method of Free Product: NA

Depth to Water Level (TOC - ft.): 25.39 | Conversions Factors (casing dia. = gallons/linear ft.) Circle One

Depth to Free Product (TOC - ft.): NA | 0.75" = 0.02 1" = 0.04 2" = 0.17 3" = 0.37

Calculated Column Height (ft.): NA | 4" = 0.66 6" = 1.47 8" = 2.61 12" = 5.88

Casing Diameter (in.): 0.2 | Three Well Purge Volumes (gallons) = 3 x _____ = _____

Quantity of Free Product Collected (gal.): NA | Method of Collecting Free Product: NA

Obsevation of sheen or LNAPL: NA | Observation of DNAPL: NA

Casing Volumes (#)	Volume Purged (liters)	Water Temperature (degree C)	Water pH (S.U.)	Specific Conductivity ~~(ms)~~ µS	Turbidity (NTUs)	Dissolved Oxygen (mg/L)	ORP (mV)	Time (0:00 - 23:59)
	0	13.57	6.75	2314	clear	5.50	-44.3	1104
	1.4	13.91	6.26	2193	↓	0.45	7.3	1108
	2.8	13.88	6.21	2187	↓	0.3	12.8	1112
	4.2	13.90	6.21	2197	↓	0.17	14.2	1116
	5.6	13.86	6.24	2216	↓	0.15	14.3	1120
	7.0	13.94	6.26	2237	0.90	0.14	14.1	1124

Total Purged = 7.0 | Purge Pumping Rate (approx. L/m): 0.35 | Well Yield: High / Moderate / Low

Purge Method (circle one): PVC Bailer / Poly Bailer / SS Bailer / Peristalic Pump / Grunfos Pump / Other = Dual Valve

Ferrous Iron (ppm): 1.6 | Decontamination Method: Dedicated pumps

Instrument Type & Number: YSI | Water Disposal: RP WSF

Instrument Calibration Date & Time: 3/31/06 0800 | Approx. Pump/Intake Depth: 80

WELL CONDITION

Casing (circle one): Stainless Steel Carbon Steel PVC Other:

Casing Condition: OK / NA / Needs Repairs / Repaired | Lock Condition: OK / NA / Needs Repairs / Replaced

Cap Condition: OK / NA / Needs Repairs / Repaired | Inner Casing Condition: OK / NA / Needs Repairs / Repaired

Paint Condition: OK / NA / Needs Repairs / Repaired | Monument Condition: OK / NA / Needs Repairs / Repaired

Recommended Well Repairs:

SAMPLING INFORMATION / DATA

Date Sampled: 3/31/06 | QA/QC Sample (circle one): YES / NO | Water Chemistry Sample: YES / NO

Time Sampled: 11:30 | Sampling Method (circle one): SS Bailer Poly Bailer Grunfos Pump

Chain-of-Custody #s: electronic | Teflon Bailer Peristaltic Pump Other: Dual Valve

Sample ID	Bottles (total)	Bottles (size)	Preservative	Destination Laboratory	Sample Transporter	Analytical Parameters
634-01	3	40ml	TSP	U of OK	courier	isotopes

All samples were immediately placed into a cooler and packed with ice or "Blue Ice", unless otherwise noted: YES / NO

Field Observations/Notes of Sampling Event: re-sample of isotopes because original isotope was broke/froze

CERTIFICATION STATEMENT

By signing below, the listed AMEC sampler states that the information provided on this page is accurate.

Sampler (Print): LISA GLONEK | Sampler Signature: Lisa Glonek | Date Signed: 3/31/06

amec	AMEC Earth & Environmental, Inc. GROUNDWATER SAMPLING FIELD FORM	Project Name: 2006 Winter GW Event Project #: 0-61M-10703-0 Phase 43 Monitoring/Sampling Date:

Monitoring Well ID: | Field Personnel:

INITIAL WELL DATA & WELL PURGING INFORMATION

Casing Volumes (#)	Volume Purged (liters)	Water Temperature (degree C)	Water pH (S.U.)	Specific Conductivity (ms)	Turbidity (NTUs)	Dissolved Oxygen (mg/L)	ORP (mV)	Time (0:00 - 23:59)

WELL CONDITION

Recommended Well Repairs/Additional Notes:

SAMPLING INFORMATION / DATA

Date Sampled: | Additional Chain-of-Custody #s:

Time Sampled:

Sample ID	Bottles (total)	Bottles (size)	Preservative	Destination Laboratory	Sample Transporter	Analytical Parameters
	2	1 L	None	STL-Seattle	courier	8081A
	2	1 L	None	STL-Seattle	courier	8151A
	2	1 L	None	STL-Seattle	courier	8270C
	3	40 ml	HCL	STL-Seattle	courier	8260B
	2	1 L	HCL	STL-Seattle	courier	NWTPH-Dx
	2	1 L	None	STL-Sacram	courier	dioxins/furans 1613
	1	500 ml	Nitric Acid	STL-Seattle	courier	Total 7470/6000/7000
	1	500 ml	Nitric Acid	STL-Sacram	courier	Dissolved 7470/6000/7000
	1	1 L	None	Test America	courier	405.1/310.1/300
	1	500 ml	Sulfuric Acid	STL-Seattle	courier	415.1/410.4/350.1/351.12
	1	250	NAOH + Zn	STL-Seattle	courier	376.2
	3	40 ml	HCL	STL-Seattle	courier	RSK 175
	1	1 L	None	STL-Seattle	courier	chloride/sulfate/orthophosphorus/alkalinty

Field Observations/Notes of Sampling Event:

CERTIFICATION STATEMENT

By signing below, the listed AMEC sampler states that the information provided on this page is accurate.

Sampler (Print): LISA GLOVER Sampler Signature: Lisa Glover Date Signed: 3/31/06

SCOEPA00013251

amec

AMEC Earth & Environmental, Inc.
GROUNDWATER SAMPLING FIELD FORM

Project Name:	2006 Winter GW Event
Project #:	0-61M-10703-0 P 43
Monitoring/Sampling Date:	3/23/06

Monitoring Well ID:	RP-M-19	Field Personnel:	J. Fazio,
Start Time:	840	Weather Conditions:	Cloudy, 55°F No wind!
		Approx. Air Temp (F):	

INITIAL WELL DATA & WELL PURGING INFORMATION

PID (ppm) Background:	0.0	In well Casing: 0.0	PID Calibration Standard: isobutylene
%LEL Background:	—	In well Casing: —	PID Calibration Date: 3/23/06 800
Date/Time of Measurement:	3/23/06 1900		Depth to Water Measuring Technique:
Depth Well Bottom (TOC - ft.):	119		Detection Method of Free Product:
Depth to Water Level (TOC - ft.):	27.16		Conversions Factors (casing dia. = gallons/linear ft.) Circle One
Depth to Free Product (TOC - ft.):	NA		0.75" = 0.02 1" = 0.04 2" = 0.17 3" = 0.37
Calculated Column Height (ft.):	NA		4" = 0.66 6" = 1.47 8" = 2.61 12" = 5.88
Casing Diameter (in.):	2"		Three Well Purge Volumes (gallons) = 3 x _____ = _____
Quantity of Free Product Collected (gal.):	None		Method of Collecting Free Product: NA
Obsevation of sheen or LNAPL:	None		Observation of DNAPL: None

Casing Volumes (#)	Volume Purged (liters)	Water Temperature (degree C)	Water pH (S.U.)	Specific Conductivity (ms)	Turbidity (NTUs)	Dissolved Oxygen (mg/L)	ORP (mV)	Time (0:00 - 23:59)

Total Purged =	Purge Pumping Rate (approx. L/m):	225 ml/min Well Yield: High / Moderate (Low)
Purge Method (circle one):	PVC Bailer / Poly Bailer / SS Bailer / Peristalic Pump / Grunfos Pump / Other =	Dual Valve
Ferrous Iron (ppm):	Decontamination Method:	
Instrument Type & Number: YSI	Water Disposal:	RP-WSF Drum
Instrument Calibration Date & Time: 800 3/23/05	Approx. Pump/Intake Depth:	

WELL CONDITION

Casing (circle one): Stainless Steel Carbon Steel PVC Other:	
Casing Condition: (OK) / NA / Needs Repairs / Repaired	Lock Condition: OK / (NA) / Needs Repairs / Replaced
Cap Condition: (OK) / NA / Needs Repairs / Repaired	Inner Casing Condition: OK / (NA) / Needs Repairs / Repaired
Paint Condition: OK / (NA) / Needs Repairs / Repaired	Monument Condition: (OK) / NA / Needs Repairs / Repaired
Recommended Well Repairs:	

SAMPLING INFORMATION / DATA

Date Sampled: 3/23/06	QA/QC Sample (circle one): (YES) / NO	Water Chemistry Sample: (YES) / NO
Time Sampled: 1000	Sampling Method (circle one): SS Bailer Poly Bailer Grunfos Pump	
Chain-of-Custody #s:	Teflon Bailer Peristaltic Pump Other: Dual Valve	

Sample ID	Bottles (total)	Bottles (size)	Preservative	Destination Laboratory	Sample Transporter	Analytical Parameters
1010-01			See Back			

All samples were immediately placed into a cooler and packed with ice or "Blue Ice", unless otherwise noted (YES) / NO

Field Observations/Notes of Sampling Event:

CERTIFICATION STATEMENT

By signing below, the listed AMEC sampler states that the information provided on this page is accurate.

Sampler (Print): Joe Fazio Sampler Signature: Joe Fazio Date Signed: 3/23/06

SCOEPA00013252

amec	AMEC Earth & Environmental, Inc. GROUNDWATER SAMPLING FIELD FORM	Project Name: 2006 Winter GW Event Project #: 0-61M-10703-0 Phase 43 Monitoring/Sampling Date: ~~RP-11-119~~

Monitoring Well ID: RP-07-119 | Field Personnel: J. Fassio, B. Lary, B. McGilliguddy

INITIAL WELL DATA & WELL PURGING INFORMATION

Casing Volumes (#)	Volume Purged (liters)	Water Temperature (degree C)	Water pH (S.U.)	Specific Conductivity (ms)	Turbidity (NTUs)	Dissolved Oxygen (mg/L)	ORP (mV)	Time (0:00 - 23:59)	DT
YSI #4 →	0	13.84	6.66	1874	–	1.36	244.4	910	27.4
	0.9	14.00	6.49	1887	–	0.57	197.3	914	
	1.8	14.11	6.44	1866	–	0.36	145.5	918	27.
	2.7	14.14	6.43	1855	–	0.36	132.0	922	27.5
	3.6	14.21	6.42	1841	–	0.31	121.1	926	27.4
	4.5	14.22	6.41	1833	–	0.42	114.3	930	27.
	5.4	14.34	6.42	1827	–	0.34	108.2	934	
	6.3	14.34	6.42	1823	–	0.27	105.4	938	27.4
stopped pump @ 8 min	7.2	14.29	6.42	1815	–	0.29	101.6	942	
Reading with →	~~20.7~~ 10.0	14.13	6.25	1900	–	0.35	56.8	1000	
YSI #3	~~21.6~~ 10.9	14.14	6.25	1894	–	0.34	53.9	1009	27.2
	11.8	14.15	6.28	1885	–	0.27	50.0	1009	27.2
				TURBIDITY:	1.11 NTU				
				Fe^{2+}	0.50 mg/L				

WELL CONDITION

Recommended Well Repairs/Additional Notes:

SAMPLING INFORMATION / DATA

Date Sampled: 3/23/06 | Additional Chain-of-Custody #s:

Time Sampled: 1000

Sample ID	Bottles (total)	Bottles (size)	Preservative	Destination Laboratory	Sample Transporter	Analytical Parameters
610-01	2	1 L	None	STL-Seattle	courier	8081A
	2	1 L	None	STL-Seattle	courier	8151A
	2	1 L	None	STL-Seattle	courier	8270C
	3	40 ml	HCL	STL-Seattle	courier	8260B
	2	1 L	HCL	STL-Seattle	courier	NWTPH-Dx
	2	1 L	None	STL-Sacram	courier	dioxins/furans 1613
	1	500 ml	Nitric Acid	STL-Seattle	courier	Total 7470/6000/7000
	1	500 ml	Nitric Acid	STL-Sacram	courier	Dissolved 7470/6000/7000
	1	1 L	None	Test America	courier	405.1/310.1/300
	1	500 ml	Sulfuric Acid	STL-Seattle	courier	415.1/410.4/350.1/351.12
	1	250	NAOH + Zn	STL-Seattle	courier	376.2
	3	40 ml	HCL	STL-Seattle	courier	RSK 175
	1	1 L	None	STL-Seattle	courier	chloride/sulfate/orthophosphorus/alkalinty
	3	40ml	TSP	U of OK		Isotope
	1	250ml	none	Test Amer		TKN/orthophosphorus
	1	810	Na Thiosulfate	Food Qual.		

9
4
15
0.9
13.5

Field Observations/Notes of Sampling Event: Dup = 610-02

Took three new readings with YSI #3 YSI #4 ORP reading too high and reading on calibration solution = 90 MV on 249 MV solution

CERTIFICATION STATEMENT

By signing below, the listed AMEC sampler states that the information provided on this page is accurate.

Sampler (Print): Joe Fassio | Sampler Signature: [signature] | Date Signed: 3/23/06

amec

AMEC Earth & Environmental, Inc.
GROUNDWATER SAMPLING FIELD FORM

Project Name:	2006 Winter GW Event
Project #:	0-61M-10703-0 P 43
Monitoring/Sampling Date:	3/21/06

Monitoring Well ID:	RP-11-30	Field Personnel:	JOE F. BARB & BRENDAN
Start Time:	1130	Weather Conditions:	SHOWERS, CLOUDY
		Approx. Air Temp (F):	~48°F

INITIAL WELL DATA & WELL PURGING INFORMATION

PID (ppm) Background:	0.0	In well Casing: 0.0	PID Calibration Standard: Isobutylene 100 ppm
%LEL Background:	N/A	In well Casing:	PID Calibration Date: 3/21/06
Date/Time of Measurement:	3/21/06 1145		Depth to Water Measuring Technique:
Depth Well Bottom (TOC - ft.):	~		Detection Method of Free Product:
Depth to Water Level (TOC - ft.):	20.0' below well		Conversions Factors (casing dia. = gallons/linear ft.) Circle One
Depth to Free Product (TOC - ft.):			0.75" = 0.02 1" = 0.04 2" = 0.17 3" = 0.37
Calculated Column Height (ft.):			4" = 0.66 6" = 1.47 8" = 2.61 12" = 5.88
Casing Diameter (in.):			Three Well Purge Volumes (gallons) = 3 x _____ = _____
Quantity of Free Product Collected (gal.):			Method of Collecting Free Product:
Obsevation of sheen or LNAPL:			Observation of DNAPL:

Casing Volumes (#)	Volume Purged (liters)	Water Temperature (degree C)	Water pH (S.U.)	Specific Conductivity (ms)	Turbidity (NTUs)	Dissolved Oxygen (mg/L)	ORP (mV)	Time (0:00 - 23:59)
			see back					

Total Purged =	Purge Pumping Rate (approx. L/m):	Well Yield: High / Moderate / Low

Purge Method (circle one): PVC Bailer / Poly Bailer / SS Bailer / Peristalic Pump / Grunfos Pump / Other =

Ferrous Iron (ppm):		Decontamination Method:	
Instrument Type & Number:	YSI # 4	Water Disposal:	
Instrument Calibration Date & Time:		Approx. Pump/Intake Depth:	

WELL CONDITION

Casing (circle one):	Stainless Steel Carbon Steel (PVC) Other:		
Casing Condition:	(OK) / NA / Needs Repairs / Repaired	Lock Condition:	(OK) / NA / Needs Repairs / Replaced
Cap Condition:	(OK) / NA / Needs Repairs / Repaired	Inner Casing Condition:	(OK) / NA / Needs Repairs / Repaired
Paint Condition:	(OK) / NA / Needs Repairs / Repaired	Monument Condition:	(OK) / NA / Needs Repairs / Repaired

Recommended Well Repairs:

SAMPLING INFORMATION / DATA

Date Sampled: 3/21/06	QA/QC Sample (circle one): YES / (NO)	Water Chemistry Sample: (YES) / NO
Time Sampled:	Sampling Method (circle one): SS Bailer Poly Bailer Grunfos Pump	
Chain-of-Custody #s: electronic	Teflon Bailer Peristaltic Pump Other: Quel Valve	

Sample ID	Bottles (total)	Bottles (size)	Preservative	Destination Laboratory	Sample Transporter	Analytical Parameters
605-01			Ice	Pace		

All samples were immediately placed into a cooler and packed with ice or "Blue Ice", unless otherwise noted: YES / NO

Field Observations/Notes of Sampling Event: Continued Sampling on 3/22/06 at

CERTIFICATION STATEMENT

By signing below, the listed AMEC sampler states that the information provided on this page is accurate.

Sampler (Print): Joe Fadish Sampler Signature: [signature] Date Signed: 3/22/06

SCOEPA00013254

amec

AMEC Earth & Environmental, Inc.
GROUNDWATER SAMPLING FIELD FORM

Project Name: 2006 Winter GW Event
Project #: 0-61M-10703-0 Phase 43
Monitoring/Sampling Date: 3/21/06

Monitoring Well ID: RP-II-30 | Field Personnel: BARB, JOE F, BRENDAN

INITIAL WELL DATA & WELL PURGING INFORMATION

Casing Volumes (#)	Volume Purged (liters)	Water Temperature (degree C)	Water pH (S.U.)	Specific Conductivity ~~uos/cm~~	Turbidity ~~(NTUs)~~ DTW feet bgs	Dissolved Oxygen (mg/L)	ORP (mV)	Time (0:00 - 23:59)
N/A	0	12.45	6.13	298	20.58	1.19	-26.4	1156
	400	12.81	6.11	280	20.80	0.51	-38.4	1157
	800	13.16	6.01	269		0.28	-41.2	1159
	~1 L	13.23	5.99	265	21.56	0.28	-48.2	12:
	~1.5 L	13.15	5.95	267	21.8	0.25	-50.8	1204
	~3.0 L	13.11	5.92	271	22.30	0.33	-53.7	12 8
		3/21/06				3/22/2006		
		TURB	65.3 NTUs			6.92 = NTU		
		Fe^{2+}	3.0 mg/L			Fe^{3+}	3.2 mg/L	

WELL CONDITION

Recommended Well Repairs/Additional Notes:

~~200~~ ml/min
~~360~~
240

SAMPLING INFORMATION / DATA

RP-II-30

Date Sampled: 3/21/06
Time Sampled: 1230
Additional Chain-of-Custody #s:

Sample ID	Bottles (total)	Bottles (size)	Preservative	Destination Laboratory	Sample Transporter	Analytical Parameters	Date
605-01	2	1 L	None	STL-Seattle	courier	8081A	3/22/06
	2	1 L	None	STL-Seattle	courier	8151A	↓
	2	1 L	None	STL-Seattle	courier	8270C	↓
	3	40 ml	HCL	STL-Seattle	courier	8260B	3/21/06
	2	1 L	HCL	STL-Seattle	courier	NWTPH-Dx	3/22/06
	2	1 L	None	STL-Sacram	courier	dioxins/furans 1613	3/21/06
	1	500 ml	Nitric Acid	STL-Seattle	courier	Total 7470/6000/7000	3/22/06
	1	500 ml	Nitric Acid	STL-Sacram	courier	Dissolved 7470/6000/7000	↓
	1	1 L	None	Test America	courier	405.1/310.1/300	
	1	500 ml	Sulfuric Acid	STL-Seattle	courier	415.1/410.4/350.1/351.1 2	
	1	250	NAOH + Zn	STL-Seattle	courier	376.2	
	3	40 ml	HCL	STL-Seattle	courier	RSK 175	3/21/06
	1	1 L	None	STL-Seattle	courier	chloride/sulfate/orthophosphorus/alkalinty	
	3	40ml	TSP	U of Okla.		Isotope	3/21/06
	1	~~250~~ Bio	Na Thiosulfate	Food Qual.		SM9215	
↓	1	~~Bio~~ 250	NONE	Test Amer.		TKN/Orthophosphorus	↓

Field Observations/Notes of Sampling Event:
1220 - WELL DRIED UP - WAIT FOR RECHARGE

CERTIFICATION STATEMENT

By signing below, the listed AMEC sampler states that the information provided on this page is accurate.

Sampler (Print): BARB LAMY Sampler Signature: Barb Lamy Date Signed: 3/21/06

SCOEPA00013255

amec	AMEC Earth & Environmental, Inc. GROUNDWATER SAMPLING FIELD FORM	Project Name: 2006 Winter GW Event
		Project #: 0-61M-10703-0 P 43
		Monitoring/Sampling Date: 3/22/06

Monitoring Well ID: RP-11-~~216~~ 161 | Field Personnel: J. Fassio, B. McGillicuddy, L. Glonek

Start Time: 1045 | Weather Conditions: Cloudy, 50°F | Approx. Air Temp (F): 50°F

160 ml

INITIAL WELL DATA & WELL PURGING INFORMATION

PID (ppm) Background: 0.0 In well Casing: 0.0	PID Calibration Standard: isobutylene
%LEL Background: — In well Casing: —	PID Calibration Date: ~~0.0~~ 800 3/22/06
Date/Time of Measurement: 3/22/06 / 1030	Depth to Water Measuring Technique: Solinst
Depth Well Bottom (TOC - ft.): ~~216~~ 161	Detection Method of Free Product: NA
Depth to Water Level (TOC - ft.): 25.31	Conversions Factors (casing dia. = gallons/linear ft.) Circle One
Depth to Free Product (TOC - ft.):	0.75" = 0.02 1" = 0.04 2" = 0.17 3" = 0.37
Calculated Column Height (ft.):	4" = 0.66 6" = 1.47 8" = 2.61 12" = 5.88
Casing Diameter (in.): 2"	Three Well Purge Volumes (gallons) = 3 x _____ =
Quantity of Free Product Collected (gal.):	Method of Collecting Free Product: NA
Obsevation of sheen or LNAPL: None	Observation of DNAPL: None

Casing Volumes (#)	Volume Purged ~~(liters)~~ ml	Water Temperature (degree C)	Water pH (S.U.)	Specific Conductivity (ms)	Turbidity (NTUs)	Dissolved Oxygen (mg/L)	ORP (mV)	Time (0:00 - 23:59)	OTw
	0	13.25	7.09	343	—	1.27	98.5	10:51	25.6
	800	13.50	6.81	410	—	0.43	-52.9	1055	25.5
	1400	13.47	6.77	431	—	0.32	-88.8	1059	25.5
	2000	13.43	6.76	436	—	0.29	-97.9	1104	
	2600	13.41	6.75	439	—	0.49	-105.0	1108	
	3200	13.43	6.75	441	—	0.41	-106.9	1111	25.5
					4.74 ntu				

Total Purged = | Purge Pumping Rate (approx. L/m): 200 ml/min* | Well Yield: High / Moderate / Low

Purge Method (circle one): PVC Bailer / Poly Bailer / SS Bailer / Peristalic Pump / Grunfos Pump / Other = Dual Valve

Ferrous Iron (ppm): 3.6 ppm | Decontamination Method:

Instrument Type & Number: YSI | Water Disposal: stored in drum at RP WSF

Instrument Calibration Date & Time: 3/22/06 800 | Approx. Pump/Intake Depth:

WELL CONDITION

Casing (circle one): Stainless Steel Carbon Steel (PVC) Other:

Casing Condition: (OK) / NA / Needs Repairs / Repaired | Lock Condition: OK / (NA) / Needs Repairs / Replaced

Cap Condition: (OK) / NA / Needs Repairs / Repaired | Inner Casing Condition: OK / (NA) / Needs Repairs / Repaired

Paint Condition: OK / (NA) / Needs Repairs / Repaired | Monument Condition: (OK) / NA / Needs Repairs / Repaired

Recommended Well Repairs:

SAMPLING INFORMATION / DATA

Date Sampled: 3/22/06 | QA/QC Sample (circle one): YES / (NO) | Water Chemistry Sample: (YES) / NO

Time Sampled: 1130 | Sampling Method (circle one): SS Bailer Poly Bailer Grunfos Pump

Chain-of-Custody #s: | Teflon Bailer Peristaltic Pump Other: Dual Valve

Sample ID	Bottles (total)	Bottles (size)	Preservative	Destination Laboratory	Sample Transporter	Analytical Parameters
607-01	27	Various	Various	NCA, STL,		
				FQL		
			see back			

All samples were immediately placed into a cooler and packed with ice or "Blue Ice", unless otherwise noted: YES / NO

Field Observations/Notes of Sampling Event: * reduced pump rate to 150 ml/min at second reading. End time = 1330

CERTIFICATION STATEMENT

By signing below, the listed AMEC sampler states that the information provided on this page is accurate.

Sampler (Print): Joe Fassio | Sampler Signature: [signature] | Date Signed: 3/22/06

SCOEPA00013256

amec	AMEC Earth & Environmental, Inc. GROUNDWATER SAMPLING FIELD FORM	Project Name: 2006 Winter GW Event
		Project #: 0-61M-10703-0 Phase 43
		Monitoring/Sampling Date: 3/22/06

Monitoring Well ID: RP-11-~~216161~~ 160 | Field Personnel: J. Fassio, L. Glonek

INITIAL WELL DATA & WELL PURGING INFORMATION

Casing Volumes (#)	Volume Purged (liters)	Water Temperature (degree C)	Water pH (S.U.)	Specific Conductivity (ms)	Turbidity (NTUs)	Dissolved Oxygen (mg/L)	ORP (mV)	Time (0:00 - 23:59)

WELL CONDITION

Recommended Well Repairs/Additional Notes:

SAMPLING INFORMATION / DATA

Date Sampled: 3/22/06 | Additional Chain-of-Custody #s:

Time Sampled: 1130

Sample ID	Bottles (total)	Bottles (size)	Preservative	Destination Laboratory	Sample Transporter	Analytical Parameters
607-01	2	1 L	None	STL-Seattle	courier	8081A
	2	1 L	None	STL-Seattle	courier	8151A
	2	1 L	None	STL-Seattle	courier	8270C
	3	40 ml	HCL	STL-Seattle	courier	8260B
	2	1 L	HCL	STL-Seattle	courier	NWTPH-Dx
	2	1 L	None	STL-Sacram	courier	dioxins/furans 1613
	1	500 ml	Nitric Acid	STL-Seattle	courier	Total 7470/6000/7000
	1	500 ml	Nitric Acid	STL-Sacram	courier	Dissolved 7470/6000/7000
	1	1 L	None	Test America	courier	405.1/310.1/300
	1	500 ml	Sulfuric Acid	STL-Seattle	courier	415.1/410.4/350.1/351.12
	1	250	NAOH + Zn	STL-Seattle	courier	376.2
	3	40 ml	HCL	STL-Seattle	courier	RSK 175
	1	1 L	None	STL-Seattle	courier	chloride/sulfate/~~orthophosphorus~~/alkalinty
	3	40ml	TSP	UOK		Isotopes
	~~1~~	~~1L~~	~~None~~	~~NCA~~		~~BOD~~
	1	250ml	None	NCA		Nitrate/Nitrite/Orthophosphorus
	1		Sodium Thiosulfate	FAL		Heterotrophic plate count

Field Observations/Notes of Sampling Event:

CERTIFICATION STATEMENT

By signing below, the listed AMEC sampler states that the information provided on this page is accurate.

Sampler (Print): Joe Fassio | Sampler Signature: [signature] | Date Signed: 3/22/06

amec	AMEC Earth & Environmental, Inc. GROUNDWATER SAMPLING FIELD FORM	Project Name: 2006 Winter GW Event
		Project #: 0-61M-10703-0 P 43
		Monitoring/Sampling Date: 3/21/06

Monitoring Well ID: RP-11 Field Personnel: JOE F, BRENDAN + BARB

Start Time: 1225 Weather Conditions: SHOWERS + COOL Approx. Air Temp (F): 48°F

INITIAL WELL DATA & WELL PURGING INFORMATION

PID (ppm) Background: 0.0	In well Casing: 0.0	PID Calibration Standard:	isobutylene
%LEL Background: NA	In well Casing: NA	PID Calibration Date:	3/21/06
Date/Time of Measurement:	3/21/06 1300	Depth to Water Measuring Technique:	Probe
Depth Well Bottom (TOC - ft.):		Detection Method of Free Product:	NA
Depth to Water Level (TOC - ft.):	~~25.35~~ 25.50	Conversions Factors (casing dia. = gallons/linear ft.)	Circle One
Depth to Free Product (TOC - ft.):		0.75" = 0.02	1" = 0.04
Calculated Column Height (ft.):		4" = 0.66	6" = 1.47
Casing Diameter (in.):		Three Well Purge Volumes (gallons) = 3 x _____ = _____	
Quantity of Free Product Collected (gal.):	NA	Method of Collecting Free Product:	NA
Obsevation of sheen or LNAPL:	NA	Observation of DNAPL:	NA

Casing Volumes (#)	Volume Purged (liters)	Water Temperature (degree C)	Water pH (S.U.)	Specific Conductivity (ms)	Turbidity (NTUs)	Dissolved Oxygen (mg/L)	ORP (mV)	Time (0:00 - 23:59)

see back

Total Purged = Purge Pumping Rate (approx. L/m): Well Yield: High / Moderate / Low

Purge Method (circle one): PVC Bailer / Poly Bailer / SS Bailer / Peristalic Pump / Grunfos Pump / Other = Quick valve

Ferrous Iron (ppm):	Decontamination Method: dedicated pump
Instrument Type & Number: YSI	Water Disposal: RP WSF
Instrument Calibration Date & Time: 3/21/06	Approx. Pump/Intake Depth:

WELL CONDITION

Casing (circle one): Stainless Steel Carbon Steel PVC Other:

Casing Condition:	(OK) / NA / Needs Repairs / Repaired	Lock Condition:	(OK) / NA / Needs Repairs / Replaced
Cap Condition:	(OK) / NA / Needs Repairs / Repaired	Inner Casing Condition:	(OK) / NA / Needs Repairs / Repaired
Paint Condition:	(OK) / NA / Needs Repairs / Repaired	Monument Condition:	(OK) / NA / Needs Repairs / Repaired

Recommended Well Repairs:

SAMPLING INFORMATION / DATA

Date Sampled: 3/21/06	QA/QC Sample (circle one): YES (NO)	Water Chemistry Sample: (YES) / NO
Time Sampled: 1330	Sampling Method (circle one): SS Bailer Poly Bailer Grunfos Pump	
Chain-of-Custody #s: electronic	Teflon Bailer Peristaltic Pump Other: Quick valve	

Sample ID	Bottles (total)	Bottles (size)	Preservative	Destination Laboratory	Sample Transporter	Analytical Parameters
4.3 + 16016-01						
				see back		

All samples were immediately placed into a cooler and packed with ice or "Blue Ice", unless otherwise noted: YES / NO

Field Observations/Notes of Sampling Event: _____

CERTIFICATION STATEMENT

By signing below, the listed AMEC sampler states that the information provided on this page is accurate.

Sampler (Print): BARB LARY Sampler Signature: Barb Lary Date Signed: 3/24/06

SCOEPA00013258

amec	AMEC Earth & Environmental, Inc. GROUNDWATER SAMPLING FIELD FORM	Project Name: 2006 Winter GW Event
		Project #: 0-61M-10703-0 Phase 43
		Monitoring/Sampling Date: 3/21/06

Monitoring Well ID: RP-11-~~[illegible]~~ 216 | Field Personnel: BARB, JOEF, BRENDAN

INITIAL WELL DATA & WELL PURGING INFORMATION

Casing Volumes (#)	Volume Purged (liters)	Water Temperature (degree C)	Water pH (S.U.)	Specific Conductivity ~~(mS/cm)~~	~~Turbidity~~ DTW ~~(NTUs)~~ ft bgs	Dissolved Oxygen (mg/L)	ORP (mV)	Time (0:00 - 23:59)
N/A	~200 ml	12.48	7.04	650	25.65	0.95	-77.0	1320
	800 ml	12.87	6.42	1553	25.65	0.21	-50.3	1323
	~1.5 l	12.89	6.53	1625		0.18	-64.2	1326
	~2.0 l	12.89	6.55	1643		0.20	-68.0	1329
	2.5 l	13.02	6.54	1654		0.21	-67.6	1331
	3.25 l	13.26	6.5	1666	25.70	0.23	-66.1	1334
	4.25 l	13.32	6.53	1676		0.30	-62.1	1338
			TURB:	6.01 NTUs				
			Fe^{2+}:	2.0 mg/L				

WELL CONDITION

Recommended Well Repairs/Additional Notes:

~240 mg/L

SAMPLING INFORMATION / DATA

RP-11-~~160~~ 216

Date Sampled: 3/21/06 | Additional Chain-of-Custody #s:

Time Sampled: 1330

Sample ID	Bottles (total)	Bottles (size)	Preservative	Destination Laboratory	Sample Transporter	Analytical Parameters
606-01	2	1 L	None	STL-Seattle	courier	8081A
	2	1 L	None	STL-Seattle	courier	8151A
	2	1 L	None	STL-Seattle	courier	8270C
	3	40 ml	HCL	STL-Seattle	courier	8260B
	2	1 L	HCL	STL-Seattle	courier	NWTPH-Dx
	2	1 L	None	STL-Sacram	courier	dioxins/furans 1613
	1	500 ml	Nitric Acid	STL-Seattle	courier	Total 7470/6000/7000
	1	500 ml	Nitric Acid	STL-Sacram	courier	Dissolved 7470/6000/7000
	1	1 L	None	Test America	courier	405.1/310.1/300
	1	500 ml	Sulfuric Acid	STL-Seattle	courier	415.1/410.4/350.1/351.12
	1	250	NAOH + Zn	STL-Seattle	courier	376.2
	3	40 ml	HCL	STL-Seattle	courier	RSK 175
	1	1 L	None	STL-Seattle	courier	chloride/sulfate/~~orthophosphorus~~/alkalinty
	3	40 ml	TSP	U of OK		isotopes
	1	250 ml	NONE	Test Amer		TKN/orthophosphorus
	1	B10	Na Thiosulfate	Food Qual.		SMG215

Field Observations/Notes of Sampling Event:

CERTIFICATION STATEMENT

By signing below, the listed AMEC sampler states that the information provided on this page is accurate.

Sampler (Print): BARB LARY | Sampler Signature: Barb Lary | Date Signed: 3/21/06

amec

AMEC Earth & Environmental, Inc.
GROUNDWATER SAMPLING FIELD FORM

Project Name:	2006 Winter GW Event
Project #:	0-61M-10703-0 P 43
Monitoring/Sampling Date:	3/27/06

Monitoring Well ID:	W-03 - S	Field Personnel:	J. Rock, B. Lary, L. Glover
Start Time:	1325	Weather Conditions:	Approx. Air Temp (F):

INITIAL WELL DATA & WELL PURGING INFORMATION

PID (ppm)	Background: 0.0	In well Casing: 0.0	PID Calibration Standard:	isobutylene	
%LEL	Background:	In well Casing:	PID Calibration Date:		
Date/Time of Measurement:	3/27/06 1330		Depth to Water Measuring Technique:		
Depth Well Bottom (TOC - ft.):			Detection Method of Free Product:		
Depth to Water Level (TOC - ft.):	5.75		Conversions Factors (casing dia. = gallons/linear ft.) Circle One		
Depth to Free Product (TOC - ft.):			0.75" = 0.02	1" = 0.04	2" = 0.17	3" = 0.37
Calculated Column Height (ft.):			4" = 0.66	6" = 1.47	8" = 2.61	12" = 5.88
Casing Diameter (in.):			Three Well Purge Volumes (gallons) = 3 x _____ = _____			
Quantity of Free Product Collected (gal.):			Method of Collecting Free Product:			
Obsevation of sheen or LNAPL:			Observation of DNAPL:			

Casing Volumes (#)	Volume Purged (liters)	Water Temperature (degree C)	Water pH (S.U.)	Specific Conductivity (us/cm)	~~Turbidity~~ DTW (NTUs)	Dissolved Oxygen (mg/L)	ORP (mV)	Time (0:00 - 23:59)
	~1L	14.94	7.20	547	6.08	1.65	85.1	1336
	~2.2L	13.41	6.39	512	6.55	1.14	94.6	1340
	~3.4L	13.36	6.24	512		1.05	52.0	1344
	~4.0L	13.44	6.26	514	7.08	0.92	-2.4	1346
	~5.0L	13.50	6.38	513		0.92	-10.8	1349
	6.8L	13.51	6.47	514	7.23	0.84	-34.6	1353
							over	

Total Purged =	Purge Pumping Rate (approx. L/m): 320 ml/min 250 ml/min	Well Yield: High / Moderate / Low

Purge Method (circle one): PVC Bailer / Poly Bailer / SS Bailer / Peristalic Pump / Grunfos Pump / Other = Dual Valve

Ferrous Iron (ppm):	0.0	Decontamination Method:	Alconox, Methanol & DI Water
Instrument Type & Number:	YSI #3	Water Disposal:	LP WSF
Instrument Calibration Date & Time:		Approx. Pump/Intake Depth:	

WELL CONDITION

Casing (circle one):	Stainless Steel Carbon Steel (PVC) Other:		
Casing Condition:	(OK) / NA / Needs Repairs / Repaired	Lock Condition:	(OK) / NA / Needs Repairs / Replaced
Cap Condition:	(OK) / NA / Needs Repairs / Repaired	Inner Casing Condition:	(OK) / NA / Needs Repairs / Repaired
Paint Condition:	(OK) / NA / Needs Repairs / Repaired	Monument Condition:	(OK) / NA / Needs Repairs / Repaired
Recommended Well Repairs:			

SAMPLING INFORMATION / DATA

Date Sampled: 3/27/06	QA/QC Sample (circle one): YES / (NO)	Water Chemistry Sample: YES / (NO)
Time Sampled: 1350	Sampling Method (circle one): SS Bailer Poly Bailer Grunfos Pump	
Chain-of-Custody #s: Electronic	Teflon Bailer Peristaltic Pump Other Dual Valve	

Sample ID	Bottles (total)	Bottles (size)	Preservative	Destination Laboratory	Sample Transporter	Analytical Parameters
619-01	4	40ml	HCl	Pace		

All samples were immediately placed into a cooler and packed with ice or "Blue Ice", unless otherwise noted: YES / NO

Field Observations/Notes of Sampling Event: _____

CERTIFICATION STATEMENT

By signing below, the listed AMEC sampler states that the information provided on this page is accurate.

Sampler (Print): BARB LARY Sampler Signature: [signature] Date Signed: 3/27/06

SCOEPA00013260

amec	AMEC Earth & Environmental, Inc. GROUNDWATER SAMPLING FIELD FORM	Project Name: 2006 Winter GW Event Project #: 0-61M-10703-0 Phase 43 Monitoring/Sampling Date: 3/27/06

Monitoring Well ID: | Field Personnel:

INITIAL WELL DATA & WELL PURGING INFORMATION

Casing Volumes (#)	Volume Purged (liters)	Water Temperature (degree C)	Water pH (S.U.)	Specific Conductivity µS/cm	~~Turbidity~~ DTW ~~(NTUs)~~	Dissolved Oxygen (mg/L)	ORP (mV)	Time (0:00 - 23:59)
Cont. from	8.0L	13.50	6.71	514	7.4	0.79	-51.4	1357
	9.0L	13.52	6.74	514		0.77	-56.0	1400
back								
		TURB = 4.02 NTUs						
		Fe^{2+} = 0.0 mg/L						

WELL CONDITION

Recommended Well Repairs/Additional Notes:

SAMPLING INFORMATION / DATA

Date Sampled: 3/27/06 | Additional Chain-of-Custody #s:

Time Sampled: ~~1400~~ 1350

Sample ID	Bottles (total)	Bottles (size)	Preservative	Destination Laboratory	Sample Transporter	Analytical Parameters
619-01	2	1 L	None	STL-Seattle	courier	8081A
	2	1 L	None	STL-Seattle	courier	8151A
	2	1 L	None	STL-Seattle	courier	8270C
	3	40 ml	HCL	STL-Seattle	courier	8260B
	2	1 L	HCL	STL-Seattle	courier	NWTPH-Dx
	2	1 L	None	STL-Sacram	courier	dioxins/furans 1613
	1	500 ml	Nitric Acid	STL-Seattle	courier	Total 7470/6000/7000
	1	500 ml	Nitric Acid	STL-Sacram	courier	Dissolved 7470/6000/7000
	1	1 L	None	Test America	courier	405.1/310.1/300
	1	500 ml	Sulfuric Acid	STL-Seattle	courier	415.1/410.4/350.1/351.12
	1	250	NAOH + Zn	STL-Seattle	courier	376.2
	3	40 ml	HCL	STL-Seattle	courier	RSK 175
	1	1 L	None	STL-Seattle	courier	chloride/sulfate/orthophosphorus/alkalinty
	1	250 ml	none	Test Amer		TKN/orthophosphorus
↓	1	810	Na Thiosulf.	Food Quality		SM9215

Field Observations/Notes of Sampling Event:

CERTIFICATION STATEMENT

By signing below, the listed AMEC sampler states that the information provided on this page is accurate.

Sampler (Print): BARB LAPU | Sampler Signature: Barb Lapu | Date Signed: 3/27/06

SCOEPA00013261

amec	AMEC Earth & Environmental, Inc. GROUNDWATER SAMPLING FIELD FORM	Project Name: 2006 Winter GW Event
		Project #: 0-61M-10703-0 P 43
		Monitoring/Sampling Date: 3/27/06

Monitoring Well ID: ~~RP~~ W-03-~~4~~ | Field Personnel: B. LARY, J ROCK, L. GLONER

Start Time: 1320 | Weather Conditions: SUNNY & MILD LIGHT BREEZE | Approx. Air Temp (F): 60

INITIAL WELL DATA & WELL PURGING INFORMATION

PID (ppm) Background: 0.0 In well Casing: 0.0 | PID Calibration Standard: isobutylene

%LEL Background: In well Casing: | PID Calibration Date:

Date/Time of Measurement: 3/27/06 / 1325 | Depth to Water Measuring Technique:

Depth Well Bottom (TOC - ft.): | Detection Method of Free Product:

Depth to Water Level (TOC - ft.): 7.14 | Conversions Factors (casing dia. = gallons/linear ft.) Circle One

Depth to Free Product (TOC - ft.): | 0.75" = 0.02 1" = 0.04 2" = 0.17 3" = 0.37

Calculated Column Height (ft.): | 4" = 0.66 6" = 1.47 8" = 2.61 12" = 5.88

Casing Diameter (in.): | Three Well Purge Volumes (gallons) = 3 x _____ = _____

Quantity of Free Product Collected (gal.): | Method of Collecting Free Product:

Obsevation of sheen or LNAPL: | Observation of DNAPL:

Casing Volumes (#)	Volume Purged (liters)	Water Temperature (degree C)	Water pH (S.U.)	Specific Conductivity ~~(mS)~~ µS/cm	~~Turbidity~~ DTW ~~(NTUs)~~ ft bgs	Dissolved Oxygen (mg/L)	ORP (mV)	Time (0:00 - 23:59)
	1Lt	14.581	5.80	5066	7.68	0.53	-103.0	1410
	3Lt	14.612	5.88	5097	8.25	0.28	-108.1	1417
	4Lt	15.16	5.87	5076		0.23	-108.9	1420
	5.2L	15.46	5.93	5099		0.23	-111.9	1424
	6.2L	15.41	5.94	5090	8.49	0.21	-114.0	1427
	7.2L	15.26	5.93	5091	8.52	0.18	-111.9	1430
		TURB: 149 NTUs						

Total Purged = | Purge Pumping Rate (approx. L/m): ~ 360 ml/min | Well Yield: High / Moderate / Low

Purge Method (circle one): PVC Bailer / Poly Bailer / SS Bailer / Peristalic Pump / Grunfos Pump / Other =

Ferrous Iron (ppm): 5.5 mg/L | Decontamination Method: DI Alconox Method → Disposable Tubing

Instrument Type & Number: YSI #3 | Water Disposal: LP WSF

Instrument Calibration Date & Time: 3/27/06 | Approx. Pump/Intake Depth:

WELL CONDITION

Casing (circle one): Stainless Steel Carbon Steel PVC Other:

Casing Condition: OK / NA / Needs Repairs / Repaired | Lock Condition: OK / NA / Needs Repairs / Replaced

Cap Condition: OK / NA / Needs Repairs / Repaired | Inner Casing Condition: OK / NA / Needs Repairs / Repaired

Paint Condition: OK / NA / Needs Repairs / Repaired | Monument Condition: OK / NA / Needs Repairs / Repaired

Recommended Well Repairs:

SAMPLING INFORMATION / DATA

Date Sampled: 3/27/06 | QA/QC Sample (circle one): YES / NO | Water Chemistry Sample: YES / NO

Time Sampled: 1445 | Sampling Method (circle one): SS Bailer Poly Bailer Grunfos Pump

Chain-of-Custody #s: Cetronic | Teflon Bailer Peristaltic Pump Other: Dual Valve

Sample ID	Bottles (total)	Bottles (size)	Preservative	Destination Laboratory	Sample Transporter	Analytical Parameters
620-01						

All samples were immediately placed into a cooler and packed with ice or "Blue Ice", unless otherwise noted: YES / NO

Field Observations/Notes of Sampling Event:

CERTIFICATION STATEMENT

By signing below, the listed AMEC sampler states that the information provided on this page is accurate.

Sampler (Print): BARB LARY | Sampler Signature: Barb Lary | Date Signed: 3/27/06

SCOEPA00013262

amec

AMEC Earth & Environmental, Inc.
GROUNDWATER SAMPLING FIELD FORM

Project Name:	2006 Winter GW Event
Project #:	0-61M-10703-0 Phase 43
Monitoring/Sampling Date:	3/27/06

Monitoring Well ID: | Field Personnel:

INITIAL WELL DATA & WELL PURGING INFORMATION

Casing Volumes (#)	Volume Purged (liters)	Water Temperature (degree C)	Water pH (S.U.)	Specific Conductivity (ms)	Turbidity (NTUs)	Dissolved Oxygen (mg/L)	ORP (mV)	Time (0:00 - 23:59)

WELL CONDITION

Recommended Well Repairs/Additional Notes:

SAMPLING INFORMATION / DATA

Date Sampled: 3/27/06 | Additional Chain-of-Custody #s:
Time Sampled: 1445

Sample ID	Bottles (total)	Bottles (size)	Preservative	Destination Laboratory	Sample Transporter	Analytical Parameters
620-01	2	1 L	None	STL-Seattle	courier	8081A
	2	1 L	None	STL-Seattle	courier	8151A
	2	1 L	None	STL-Seattle	courier	8270C
	3	40 ml	HCL	STL-Seattle	courier	8260B
	2	1 L	HCL	STL-Seattle	courier	NWTPH-Dx
	2	1 L	None	STL-Sacram	courier	dioxins/furans 1613
	1	500 ml	Nitric Acid	STL-Seattle	courier	Total 7470/6000/7000
	1	500 ml	Nitric Acid	STL-Sacram	courier	Dissolved 7470/6000/7000
	1	1 L	None	Test America	courier	405.1/310.1/300
	1	500 ml	Sulfuric Acid	STL-Seattle	courier	415.1/410.4/350.1/351.12
	1	250	NAOH + Zn	STL-Seattle	courier	376.2
	3	40 ml	HCL	STL-Seattle	courier	RSK 175
	1	1 L	None	STL-Seattle	courier	chloride/sulfate/orthophosphorus/alkalinty
	1	250ml	NONE	Test Amer		TKN / orthophosphorus
	1	BIO	Na-Thiosulfate	Food Qual		SM9215

Field Observations/Notes of Sampling Event:

CERTIFICATION STATEMENT

By signing below, the listed AMEC sampler states that the information provided on this page is accurate.

Sampler (Print): BARB LARY | Sampler Signature: Barb Lary | Date Signed: 3/27/06

amec	AMEC Earth & Environmental, Inc. GROUNDWATER SAMPLING FIELD FORM	Project Name: 2006 Winter GW Event Project #: 0-61M-10703-0 P 43 Monitoring/Sampling Date: 3/27/06

Monitoring Well ID: GW03-D	Field Personnel: Joe Rock, Lisa Glanek, Barb Lary
Start Time: 1500	Weather Conditions: Sunny, Clear Approx. Air Temp (F): 60

INITIAL WELL DATA & WELL PURGING INFORMATION

PID (ppm) Background: 0.0 In well Casing: 0.0	PID Calibration Standard: isobutylene
%LEL Background: In well Casing:	PID Calibration Date: 3/27/06
Date/Time of Measurement: 3/27/06 / 15:00	Depth to Water Measuring Technique: NA
Depth Well Bottom (TOC - ft.): 94	Detection Method of Free Product: NA
Depth to Water Level (TOC - ft.): 11.27	Conversions Factors (casing dia. = gallons/linear ft.) Circle One
Depth to Free Product (TOC - ft.): NA	0.75" = 0.02 1" = 0.04 2" = 0.17 3" = 0.37
Calculated Column Height (ft.):	4" = 0.66 6" = 1.47 8" = 2.61 12" = 5.88
Casing Diameter (in.):	Three Well Purge Volumes (gallons) = 3 x _____ = _____
Quantity of Free Product Collected (gal.): 0	Method of Collecting Free Product: NA
Obsevation of sheen or LNAPL: None	Observation of DNAPL: None

Casing Volumes (#)	Volume Purged (liters)	Water Temperature (degree C)	Water pH (S.U.)	Specific Conductivity (mS/cm)	~~Turbidity~~ DTW (NTUs)	Dissolved Oxygen (mg/L)	ORP (mV)	Time (0:00 - 23:59)
4.18 NTUs	~1L+	14.35	6.57	490	11.50	4.36	-90.2	1509
	~2.3L	14.13	5.94	431		0.58	-43.4	1514
	3.3L	14.12	5.97	430	11.80	0.48	-45.5	1518
	4.3L	13.99	6.07	429		0.33	-51.4	1522
	5.3L	13.91	6.10	428	11.85	0.30	-57.7	1526
	6.3L	13.96	6.32	427		0.24	-64.7	1530
	7.3	13.93	6.48	427	11.85	0.35	-71.0	1534

Purge:

Total Purged =	Purge Pumping Rate (approx. L/m): 280 ml/min Well Yield: High / Moderate / Low
Purge Method (circle one): PVC Bailer / Poly Bailer / SS Bailer / Peristaltic Pump / Grunfos Pump / Other = Dual Valve	
Ferrous Iron (ppm): 1.0 mg/L	Decontamination Method:
Instrument Type & Number: YSI # 3	Water Disposal: RP - WTP
Instrument Calibration Date & Time: 3/27/06	Approx. Pump/Intake Depth: 84'

WELL CONDITION

Casing (circle one): Stainless Steel Carbon Steel (PVC) Other:	
Casing Condition: (OK) / NA / Needs Repairs / Repaired	Lock Condition: (OK) / NA / Needs Repairs / Replaced
Cap Condition: (OK) / NA / Needs Repairs / Repaired	Inner Casing Condition: (OK) / NA / Needs Repairs / Repaired
Paint Condition: (OK) / NA / Needs Repairs / Repaired	Monument Condition: (OK) / NA / Needs Repairs / Repaired
Recommended Well Repairs:	

SAMPLING INFORMATION / DATA

Date Sampled: 3/27/06	QA/QC Sample (circle one): YES / (NO)	Water Chemistry Sample: (YES) / NO
Time Sampled: 1545	Sampling Method (circle one): SS Bailer Poly Bailer Grunfos Pump	
Chain-of-Custody #s: electronic.	Teflon Bailer Peristaltic Pump Other: Dual valve	

Sample ID	Bottles (total)	Bottles (size)	Preservative	Destination Laboratory	Sample Transporter	Analytical Parameters
621-01						

All samples were immediately placed into a cooler and packed with ice or "Blue Ice", unless otherwise noted: (YES) / NO

Field Observations/Notes of Sampling Event: _____

CERTIFICATION STATEMENT

By signing below, the listed AMEC sampler states that the information provided on this page is accurate.

Sampler (Print): Joe Rock Sampler Signature: _____ Date Signed: 3/27/06

SCOEPA00013264

amec

AMEC Earth & Environmental, Inc.
GROUNDWATER
SAMPLING FIELD FORM

Project Name:	2006 Winter GW Event
Project #:	0-61M-10703-0 Phase 43
Monitoring/Sampling Date:	3/27/06

Monitoring Well ID: | Field Personnel:

INITIAL WELL DATA & WELL PURGING INFORMATION

Casing Volumes (#)	Volume Purged (liters)	Water Temperature (degree C)	Water pH (S.U.)	Specific Conductivity (ms)	Turbidity (NTUs)	Dissolved Oxygen (mg/L)	ORP (mV)	Time (0:00 - 23:59)

WELL CONDITION

Recommended Well Repairs/Additional Notes:

SAMPLING INFORMATION / DATA

Date Sampled: 3/27/06 | Additional Chain-of-Custody #s:

Time Sampled: 1545

Sample ID	Bottles (total)	Bottles (size)	Preservative	Destination Laboratory	Sample Transporter	Analytical Parameters
621-01	2	1 L	None	STL-Seattle	courier	8081A
	2	1 L	None	STL-Seattle	courier	8151A
	2	1 L	None	STL-Seattle	courier	8270C
	3	40 ml	HCL	STL-Seattle	courier	8260B
	2	1 L	HCL	STL-Seattle	courier	NWTPH-Dx
	2	1 L	None	STL-Sacram	courier	dioxins/furans 1613
	1	500 ml	Nitric Acid	STL-Seattle	courier	Total 7470/6000/7000
	1	500 ml	Nitric Acid	STL-Sacram	courier	Dissolved 7470/6000/7000
	1	1 L	None	Test America	courier	405.1/310.1/300
	1	500 ml	Sulfuric Acid	STL-Seattle	courier	415.1/410.4/350.1/351.12
	1	250	NAOH + Zn	STL-Seattle	courier	376.2
	3	40 ml	HCL	STL-Seattle	courier	RSK 175
	1	1 L	None	STL-Seattle	courier	chloride/sulfate/~~orthophosphorus~~/alkalinty
	1	250 ml	None	Test Amer		TKN/orthophosphorus
	1	Bio	Na Thiosulfate	Food Qual.		SM9215

Field Observations/Notes of Sampling Event:

CERTIFICATION STATEMENT

By signing below, the listed AMEC sampler states that the information provided on this page is accurate.

Sampler (Print): BARB LARY Sampler Signature: Barb Lary Date Signed: 3/27/06

SCOEPA00013265

amec	AMEC Earth & Environmental, Inc. GROUNDWATER SAMPLING FIELD FORM	Project Name: 2006 Winter GW Event
		Project #: 0-61M-10703-0 P 43
		Monitoring/Sampling Date: 3/28/2006

Monitoring Well ID: W-04-S | Field Personnel:
Start Time: 0930 | Weather Conditions: Sunny w/clouds | Approx. Air Temp (F): ~50°F

INITIAL WELL DATA & WELL PURGING INFORMATION

PID (ppm) Background: 0.0 In well Casing: 0.0 | PID Calibration Standard: isobutylene
%LEL Background: NA In well Casing: NA | PID Calibration Date: 3/28/2006
Date/Time of Measurement: 3/28/06 / 0920 | Depth to Water Measuring Technique: solinst
Depth Well Bottom (TOC - ft.): 17 | Detection Method of Free Product: NA
Depth to Water Level (TOC - ft.): 5.91 | Conversions Factors (casing dia. = gallons/linear ft.) Circle One
Depth to Free Product (TOC - ft.): NA | 0.75" = 0.02 1" = 0.04 2" = 0.17 3" = 0.37
Calculated Column Height (ft.): | 4" = 0.66 6" = 1.47 8" = 2.61 12" = 5.88
Casing Diameter (in.): 4 | Three Well Purge Volumes (gallons) = 3 x ____ = ____
Quantity of Free Product Collected (gal.): NA | Method of Collecting Free Product: NA
Obsevation of sheen or LNAPL: NA | Observation of DNAPL: NA

Casing Volumes (#)	Volume Purged (liters)	Water Temperature (degree C)	Water pH (S.U.)	Specific Conductivity (ms)	Turbidity (NTUs)	Dissolved Oxygen (mg/L)	ORP (mV)	Time (0:00 - 23:59)
	~~0.13.05~~	13.05	7.45	432	clear	1.98	141.7	0936
	0.8	12.58	6.90	423	clear	0.28	145.0	0940
	0.8	12.85	6.81	422	clear	0.34	134.5	0944
	0.8	12.70	6.98	422	clear	0.27	112.4	0948
	0.8	12.83	7.13	423	clear	0.18	84.5	0952
	0.8	12.84	7.12	422	clear	0.18	77.7	0956
	0.8	12.44	7.13	422	clear	0.11	65.1	1000

Total Purged = | Purge Pumping Rate (approx. L/m): 0.2 | Well Yield: High / Moderate / Low
Purge Method (circle one): PVC Bailer / Poly Bailer / SS Bailer / Peristalic Pump / Grunfos Pump / Other = Qualvalve
Ferrous Iron (ppm): 0.8 | Decontamination Method: Disposable tubing / DI methanol / Alcohol
Instrument Type & Number: YSI | Water Disposal: RP WSF
Instrument Calibration Date & Time: 3/28/2006 0830 | Approx. Pump/Intake Depth: 12

WELL CONDITION

Casing (circle one): Stainless Steel Carbon Steel PVC Other:
Casing Condition: OK / NA / Needs Repairs / Repaired | Lock Condition: OK / NA / Needs Repairs / Replaced
Cap Condition: OK / NA / Needs Repairs / Repaired | Inner Casing Condition: OK / NA / Needs Repairs / Repaired
Paint Condition: OK / NA / Needs Repairs / Repaired | Monument Condition: OK / NA / Needs Repairs / Repaired
Recommended Well Repairs:

SAMPLING INFORMATION / DATA

Date Sampled: 3/28/2006 | QA/QC Sample (circle one): YES / NO OK | Water Chemistry Sample: YES / NO
Time Sampled: 1010 | Sampling Method (circle one): SS Bailer Poly Bailer Grunfos Pump
Chain-of-Custody #s: electronic | Teflon Bailer Peristaltic Pump Other: Qualvalve

Sample ID	Bottles (total)	Bottles (size)	Preservative	Destination Laboratory	Sample Transporter	Analytical Parameters
6022-01			see back.			

All samples were immediately placed into a cooler and packed with ice or "Blue Ice", unless otherwise noted: YES / NO

Field Observations/Notes of Sampling Event: Low recharge; well continued to draw down, at min pump rate. ~1.5 ft during purging/sampling

CERTIFICATION STATEMENT

By signing below, the listed AMEC sampler states that the information provided on this page is accurate.

Sampler (Print): LBA Glonek Sampler Signature: Lisa Glonek Date Signed: 3/28/06

amec	AMEC Earth & Environmental, Inc. GROUNDWATER SAMPLING FIELD FORM	Project Name: 2006 Winter GW Event Project #: 0-61M-10703-0 Phase 43 Monitoring/Sampling Date: 03/28/06

Monitoring Well ID: W-04-S | Field Personnel: LG, CB, EM, JR

INITIAL WELL DATA & WELL PURGING INFORMATION

Casing Volumes (#)	Volume Purged (liters)	Water Temperature (degree C)	Water pH (S.U.)	Specific Conductivity (ms)	Turbidity (NTUs)	Dissolved Oxygen (mg/L)	ORP (mV)	Time (0:00 - 23:59)
	0.8	12.82	7.22	421	clear	0.13	47.9	1004
	0.8	12.91	7.44	421	clear	0.15	26.1	1008
					1.28			

WELL CONDITION

Recommended Well Repairs/Additional Notes:

SAMPLING INFORMATION / DATA

Date Sampled: 3/28/2006 | Additional Chain-of-Custody #s:

Time Sampled: 1010

Sample ID	Bottles (total)	Bottles (size)	Preservative	Destination Laboratory	Sample Transporter	Analytical Parameters
622-01	2	1 L	None	STL-Seattle	courier	8081A
	2	1 L	None	STL-Seattle	courier	8151A
	2	1 L	None	STL-Seattle	courier	8270C
	3	40 ml	HCL	STL-Seattle	courier	8260B
	2	1 L	HCL	STL-Seattle	courier	NWTPH-Dx
	2	1 L	None	STL-Sacram	courier	dioxins/furans 1613
	1	500 ml	Nitric Acid	STL-Seattle	courier	Total 7470/6000/7000
	1	500 ml	Nitric Acid	STL-Sacram	courier	Dissolved 7470/6000/7000
	1	1 L	None	Test America	courier	405.1/310.1/300
	1	500 ml	Sulfuric Acid	STL-Seattle	courier	415.1/410.4/350.1/351.12
	1	250	NAOH + Zn	STL-Seattle	courier	376.2
	3	40 ml	HCL	STL-Seattle	courier	RSK 175
	1	1 L	None	STL-Seattle	courier	chloride/sulfate/orthophosphorus/alkalinty
	1	125ml	~~TS~~ Na Thiosulfate	Food Quality		SM9215
	1	250ml	None	Test Am		Nitrite / Nitrate / orthophosphorus

Field Observations/Notes of Sampling Event:

CERTIFICATION STATEMENT

By signing below, the listed AMEC sampler states that the information provided on this page is accurate.

Sampler (Print): LISA GLONEK Sampler Signature: Lisa Glonek Date Signed: 3/28/06

amec

AMEC Earth & Environmental, Inc.
GROUNDWATER SAMPLING FIELD FORM

Project Name: 2006 Winter GW Event
Project #: 0-61M-10703-0 P 43
Monitoring/Sampling Date: 3/28/06

Monitoring Well ID: W-04-I
Field Personnel: Joe Rock, Lisa Cabel, Cindy Bartlett, Erin McDonnell
Start Time: 10:20
Weather Conditions: clear
Approx. Air Temp (F): 55°

INITIAL WELL DATA & WELL PURGING INFORMATION

PID (ppm) Background: 0.0 In well Casing: 0.0
PID Calibration Standard: isobutylene
%LEL Background: – In well Casing: –
PID Calibration Date: 3/28/06

Date/Time of Measurement: 3/28/06 /
Depth to Water Measuring Technique: Solinst
Depth Well Bottom (TOC - ft.):
Detection Method of Free Product: NA
Depth to Water Level (TOC - ft.): 8.01
Depth to Free Product (TOC - ft.): NA
Calculated Column Height (ft.):
Conversions Factors (casing dia. = gallons/linear ft.) Circle One
0.75" = 0.02 1" = 0.04 2" = 0.17 3" = 0.37
4" = 0.66 6" = 1.47 8" = 2.61 12" = 5.88
Casing Diameter (in.): 4"
Three Well Purge Volumes (gallons) = 3 x _____ = _____
Quantity of Free Product Collected (gal.): 0
Method of Collecting Free Product: NA
Observation of sheen or LNAPL:
Observation of DNAPL: NA

Casing Volumes (#)	Volume Purged (liters)	Water Temperature (degree C)	Water pH (S.U.)	Specific Conductivity (mS) µS	Turbidity (NTUs)	Dissolved Oxygen (mg/L)	ORP (mV)	Time (0:00 - 23:59)	
	.5 l	13.56	6.07	4654	clear	0.85	-46.3	10:23	DTW 9.50
	4.0 l	13.88	5.88	4692	Clear	0.34	-79.3	10:30	
	7.5 l	13.99	5.88	4580	Clear	0.18	-83.6	10:37	
	10.5 l	14.08	6.95	4594	Clear	0.14	-86.4	10:44	12.01
	Paused purging / too much drawdown reduced pumping rate to ~2 l/min								
	See back page			NTU = 30.9					12.41

Total Purged =
Purge Pumping Rate (approx. L/m): .5 l/min – .2 l/min
Well Yield: (High) / Moderate / Low
Purge Method (circle one): PVC Bailer / Poly Bailer / SS Bailer / Peristaltic Pump / Grunfos Pump / Other = Dual valve
Ferrous Iron (ppm): 5.3
Decontamination Method: RP WTP methanol, Alconox, DI Alconox
Instrument Type & Number: YSI #
Water Disposal: RP WTP
Instrument Calibration Date & Time: 3/28/06 8:30
Approx. Pump/Intake Depth:

WELL CONDITION

Casing (circle one): Stainless Steel Carbon Steel (PVC) Other:
Casing Condition: (OK) / NA / Needs Repairs / Repaired
Lock Condition: (OK) / NA / Needs Repairs / Replaced
Cap Condition: (OK) / NA / Needs Repairs / Repaired
Inner Casing Condition: (OK) / NA / Needs Repairs / Repaired
Paint Condition: (OK) / NA / Needs Repairs / Repaired
Monument Condition: (OK) / NA / Needs Repairs / Repaired
Recommended Well Repairs:

SAMPLING INFORMATION / DATA

Date Sampled: 3/28/06
QA/QC Sample (circle one): (YES) / NO
Water Chemistry Sample: (YES) / NO
Time Sampled: 1100 11:20 am
Sampling Method (circle one): SS Bailer Poly Bailer Grunfos Pump
Chain-of-Custody #s:
Teflon Bailer Peristaltic Pump Other: Dual valve

Sample ID	Bottles (total)	Bottles (size)	Preservative	Destination Laboratory	Sample Transporter	Analytical Parameters
628-01						
			See back page			

All samples were immediately placed into a cooler and packed with ice or "Blue Ice", unless otherwise noted: (YES) / NO

Field Observations/Notes of Sampling Event: Low well yield - drawdown during purging/sampling ~5ft

CERTIFICATION STATEMENT

By signing below, the listed AMEC sampler states that the information provided on this page is accurate.

Sampler (Print): Joe Rock Sampler Signature: Date Signed: 3/28/06

SCOEPA00013268

amec	AMEC Earth & Environmental, Inc. GROUNDWATER SAMPLING FIELD FORM	Project Name: 2006 Winter GW Event Project #: 0-61M-10703-0 Phase 43 Monitoring/Sampling Date:

Monitoring Well ID: W-04-I | Field Personnel:

INITIAL WELL DATA & WELL PURGING INFORMATION

Casing Volumes (#)	Volume Purged (liters)	Water Temperature (degree C)	Water pH (S.U.)	Specific Conductivity (~~mS~~) uS	Turbidity (NTUs)	Dissolved Oxygen (mg/L)	ORP (mV)	Time (0:00 - 23:59)
	10.75 l	16.03	6.06	4652	clear	0.12	-94.9	11:04
	11.0 l	14.73	6.02	4600	clear	0.12	-92.5	11:06
	11.8 l	14.35	5.97	4589	clear	0.11	-91.4	11:12
	12.2 l	14.40	6.02	4607	clear	0.11	-94.3	11:20

WELL CONDITION

Recommended Well Repairs/Additional Notes:

SAMPLING INFORMATION / DATA

Date Sampled: 3/28/06 | Additional Chain-of-Custody #s:

Time Sampled: 11:00 11:20 DUP

Sample ID	Bottles (total)	Bottles (size)	Preservative	Destination Laboratory	Sample Transporter	Analytical Parameters
1673-01 DUP	2	1 L	None	STL-Seattle	courier	8081A
	2	1 L	None	STL-Seattle	courier	8151A
	2	1 L	None	STL-Seattle	courier	8270C
	3	40 ml	HCL	STL-Seattle	courier	8260B
	2	1 L	HCL	STL-Seattle	courier	NWTPH-Dx
	2	1 L	None	STL-Sacram	courier	dioxins/furans 1613
	1	500 ml	Nitric Acid	STL-Seattle	courier	Total 7470/6000/7000
	1	500 ml	Nitric Acid	STL-Sacram	courier	Dissolved 7470/6000/7000
	1	1 L	None	Test America	courier	405.1/310.1/300
	1	500 ml	Sulfuric Acid	STL-Seattle	courier	415.1/410.4/350.1/351.12
	1	250	NAOH + Zn	STL-Seattle	courier	376.2
	3	40 ml	HCL	STL-Seattle	courier	RSK 175
	1	1 L	None	STL-Seattle	courier	chloride/sulfate/orthophosphorus/alkalinty

Field Observations/Notes of Sampling Event:

CERTIFICATION STATEMENT

By signing below, the listed AMEC sampler states that the information provided on this page is accurate.

Sampler (Print): Joe Rock | Sampler Signature: [signature] | Date Signed: 3/30/06

SCOEPA00013269

amec

AMEC Earth & Environmental, Inc.
GROUNDWATER SAMPLING FIELD FORM

Project Name:	2006 Winter GW Event
Project #:	0-61M-10703-0 P 43
Monitoring/Sampling Date:	3/28/06

Monitoring Well ID:	W-04-89
Field Personnel:	Joe Rock, Lisa Glenek, Erin McDonnell
Start Time:	1200
Weather Conditions:	Sunny, Clear
Approx. Air Temp (F):	55°

INITIAL WELL DATA & WELL PURGING INFORMATION

PID (ppm) Background:	0.0	In well Casing:	0.0
%LEL Background:	—	In well Casing:	—
PID Calibration Standard:	isobutylene		
PID Calibration Date:	3/28/06		
Date/Time of Measurement:	3/28/06 / 1200	Depth to Water Measuring Technique:	Solinist
Depth Well Bottom (TOC - ft.):		Detection Method of Free Product:	NA
Depth to Water Level (TOC - ft.):	10.10	Conversions Factors (casing dia. = gallons/linear ft.)	Circle One
Depth to Free Product (TOC - ft.):	NA	0.75" = 0.02 / 1" = 0.04 / 2" = (0.17) / 3" = 0.37	
Calculated Column Height (ft.):		4" = 0.66 / 6" = 1.47 / 8" = 2.61 / 12" = 5.88	
Casing Diameter (in.):	2"	Three Well Purge Volumes (gallons) = 3 x ____ = ____	
Quantity of Free Product Collected (gal.):	0	Method of Collecting Free Product:	NA
Obsevation of sheen or LNAPL:	NA	Observation of DNAPL:	NA

Casing Volumes (#)	Volume Purged (liters)	Water Temperature (degree C)	Water pH (S.U.)	Specific Conductivity (~~mS~~) uS	Turbidity (NTUs)	Dissolved Oxygen (mg/L)	ORP (mV)	Time (0:00 - 23:59)	DTW
	0.5 l	15.10	7.05	841	Clear	9.56	-117.8	12:07	10.4
	4.5 l	14.12	6.37	717	Clear	3.31	-97.6	12:15	10.5
	6.9 l	14.47	6.44	708	clear	2.22	-103.9	12:21	10.9
	8.5 l	14.58	6.54	700	clear	1.87	-112.5	12:25	
	10.1	14.50	6.61	689	Clear	1.58	-117.5	12:29	
	11.7	14.43	6.69	682	clear	1.32	-122.0	12:33	
	13.3	14.40	6.74	674	Clear	1.08	-125.5	12:37	

Total Purged =	Purge Pumping Rate (approx. L/m): ~4 l/min	Well Yield: (High) / Moderate / Low

Purge Method (circle one): PVC Bailer / Poly Bailer / SS Bailer / Peristalic Pump / Grunfos Pump / Other = DualValve

Ferrous Iron (ppm): 30	Decontamination Method: methanol, DI, Alconox, DI
Instrument Type & Number: YSI	Water Disposal: RP WTP
Instrument Calibration Date & Time: 3/28/06 0930	Approx. Pump/Intake Depth: 84'

WELL CONDITION

Casing (circle one): Stainless Steel / Carbon Steel / (PVC) / Other:	
Casing Condition: (OK) / NA / Needs Repairs / Repaired	Lock Condition: (OK) / NA / Needs Repairs / Replaced
Cap Condition: (OK) / NA / Needs Repairs / Repaired	Inner Casing Condition: (OK) / NA / Needs Repairs / Repaired
Paint Condition: (OK) / NA / Needs Repairs / Repaired	Monument Condition: (OK) / NA / Needs Repairs / Repaired
Recommended Well Repairs:	

SAMPLING INFORMATION / DATA

Date Sampled: 3/28/06	QA/QC Sample (circle one): YES / (NO)	Water Chemistry Sample: (YES) / NO
Time Sampled: 1216 0	Sampling Method (circle one): SS Bailer / Poly Bailer / Grunfos Pump	
Chain-of-Custody #s:	Teflon Bailer / Peristaltic Pump / Other: DualValve	

Sample ID	Bottles (total)	Bottles (size)	Preservative	Destination Laboratory	Sample Transporter	Analytical Parameters
624-01			See back page			

All samples were immediately placed into a cooler and packed with ice or "Blue Ice", unless otherwise noted: (YES) / NO

Field Observations/Notes of Sampling Event: Collected MS/MSD sample from this well

CERTIFICATION STATEMENT

By signing below, the listed AMEC sampler states that the information provided on this page is accurate.

Sampler (Print): Joe Rock Sampler Signature: _____ Date Signed: 3/28/06

SCOEPA00013270

amec	AMEC Earth & Environmental, Inc. GROUNDWATER SAMPLING FIELD FORM	Project Name: 2006 Winter GW Event Project #: 0-61M-10703-0 Phase 43 Monitoring/Sampling Date:

Monitoring Well ID: | Field Personnel:

INITIAL WELL DATA & WELL PURGING INFORMATION

Casing Volumes (#)	Volume Purged (liters)	Water Temperature (degree C)	Water pH (S.U.)	Specific Conductivity (~~mS~~) uS	Turbidity (NTUs)	Dissolved Oxygen (mg/L)	ORP (mV)	Time (0:00 - 23:59)
~~10:41~~	14.9	14.42	6.78	671	Clear	0.96	-128.0	12:41
12:45	16.5	14.41	6.79	670	Clear	0.97	-130.0	12:45
	18.1	14.43	6.80	671	Clear	0.99	-131.4	12:49
					2.71			

WELL CONDITION

Recommended Well Repairs/Additional Notes:

SAMPLING INFORMATION / DATA

Date Sampled: 3/28/06 | Additional Chain-of-Custody #s:

Time Sampled: 12:60

Sample ID	Bottles (total)	Bottles (size)	Preservative	Destination Laboratory	Sample Transporter	Analytical Parameters
624-01	2	1 L	None	STL-Seattle	courier	8081A
	2	1 L	None	STL-Seattle	courier	8151A
	2	1 L	None	STL-Seattle	courier	8270C
	3	40 ml	HCL	STL-Seattle	courier	8260B
	2	1 L	HCL	STL-Seattle	courier	NWTPH-Dx
	2	1 L	None	STL-Sacram	courier	dioxins/furans 1613
	1	500 ml	Nitric Acid	STL-Seattle	courier	Total 7470/6000/7000
	1	500 ml	Nitric Acid	STL-Sacram	courier	Dissolved 7470/6000/7000
	1	1 L	None	Test America	courier	405.1/310.1/300
	1	500 ml	Sulfuric Acid	STL-Seattle	courier	415.1/410.4/350.1/351.12
	1	250	NAOH + Zn	STL-Seattle	courier	376.2
	3	40 ml	HCL	STL-Seattle	courier	RSK 175
	1	1 L	None	STL-Seattle	courier	chloride/sulfate/orthophosphorus/alkalinty
↓	1	125ml	Na Thiosulfate	Food Quality	↓	SM 9215
	1	250ml	NONE	Test Am		Nitrite/Nitrate/Phosphorus

Field Observations/Notes of Sampling Event:

CERTIFICATION STATEMENT

By signing below, the listed AMEC sampler states that the information provided on this page is accurate.

Sampler (Print): Jack Rock | Sampler Signature: | Date Signed: 3/28/06

SCOEPA00013271

amec	AMEC Earth & Environmental, Inc. GROUNDWATER SAMPLING FIELD FORM	Project Name: 2006 Winter GW Event Project #: 0-61M-10703-0 P 43 Monitoring/Sampling Date: 4.3.6

Monitoring Well ID:	W-09	Field Personnel:	L. GLOVER, B. GARY, J. ELEGE
Start Time:	1100	Weather Conditions:	OVERCAST & HUMID
		Approx. Air Temp (F):	52° F

INITIAL WELL DATA & WELL PURGING INFORMATION

PID (ppm) Background:	0	In well Casing: 0	PID Calibration Standard: isobutylene
%LEL Background:		In well Casing:	PID Calibration Date:

Date/Time of Measurement: /	Depth to Water Measuring Technique: SOLINST
Depth Well Bottom (TOC - ft.):	Detection Method of Free Product: N/A
Depth to Water Level (TOC - ft.): 9.51	Conversions Factors (casing dia. = gallons/linear ft.) Circle One
Depth to Free Product (TOC - ft.):	0.75" = 0.02 1" = 0.04 2" = 0.17 3" = 0.37
Calculated Column Height (ft.):	4" = 0.66 6" = 1.47 8" = 2.61 12" = 5.88
Casing Diameter (in.): 2	Three Well Purge Volumes (gallons) = 3 x ____ = ____
Quantity of Free Product Collected (gal.):	Method of Collecting Free Product: N/A
Obsevation of sheen or LNAPL:	Observation of DNAPL: N A

Casing Volumes (#)	Volume Purged (liters)	Water Temperature (degree C)	Water pH (S.U.)	Specific Conductivity (ms)	Turbidity (NTUs)	Dissolved Oxygen (mg/L)	ORP (mV)	Time (0:00 - 23:59)
					9.26			

Total Purged = 6.5+	Purge Pumping Rate (approx. L/m): 0.2	Well Yield: High / Moderate / Low

Purge Method (circle one): PVC Bailer / Poly Bailer / SS Bailer / Peristalic Pump / Grunfos Pump / Other = DVP

Ferrous Iron (ppm): 1.2	Decontamination Method:
Instrument Type & Number: YSI	Water Disposal:
Instrument Calibration Date & Time:	Approx. Pump/Intake Depth:

WELL CONDITION

Casing (circle one): Stainless Steel Carbon Steel PVC Other:

Casing Condition: OK / NA / Needs Repairs / Repaired	Lock Condition: OK / NA / Needs Repairs / Replaced
Cap Condition: OK / NA / Needs Repairs / Repaired	Inner Casing Condition: OK / NA / Needs Repairs / Repaired
Paint Condition: OK / NA / Needs Repairs / Repaired	Monument Condition: OK / NA / Needs Repairs / Repaired

Recommended Well Repairs:

SAMPLING INFORMATION / DATA

Date Sampled: 4.3.6	QA/QC Sample (circle one): YES / NO	Water Chemistry Sample: YES / NO
Time Sampled: 1315	Sampling Method (circle one): SS Bailer Poly Bailer Grunfos Pump	
Chain-of-Custody #s: electronic	Teflon Bailer Peristaltic Pump Other: BV	

Sample ID	Bottles (total)	Bottles (size)	Preservative	Destination Laboratory	Sample Transporter	Analytical Parameters
	See Below					

All samples were immediately placed into a cooler and packed with ice or "Blue Ice", unless otherwise noted: YES / NO

Field Observations/Notes of Sampling Event: V. LOW YIELD, HAD TO PURGE @ V. LOW RATE

CERTIFICATION STATEMENT

By signing below, the listed AMEC sampler states that the information provided on this page is accurate.

Sampler (Print): L.A. GLOVER Sampler Signature: Lisa Glover Date Signed: 4/3/2006

SCOEPA00013272

amec	AMEC Earth & Environmental, Inc. GROUNDWATER SAMPLING FIELD FORM	Project Name: 2006 Winter GW Event Project #: 0-61M-10703-0 Phase 43 Monitoring/Sampling Date: 4.3.6

Monitoring Well ID: W-09 | Field Personnel: L.GLONEK, B.LAMEY, J. ELEDGE

INITIAL WELL DATA & WELL PURGING INFORMATION

Casing Volumes (#)	Volume Purged (liters)	Water Temperature (degree C)	Water pH (S.U.)	Specific Conductivity mS/cm	Turbidity DTW (ft) (~~NTUs~~)	Dissolved Oxygen (mg/L)	ORP (mV)	Time (0:00 - 23:59)
1.5		12.28	7.35	1981	9.51	1.41	-142.3	1225
2.5		12.18	7.57	1902	10.40	0.30	-179.3	1230
3.5		12.18	7.69	1868	10.80	0.29	-181.3	1235
4.5		12.17	7.80	1839	11.20	0.22	-193.0	1240
5.5		12.18	7.84	1826	11.50	0.19	-193.6	1245
6.5		12.19	7.92	1803	11.90	0.18	-194.1	1250

WELL CONDITION

Recommended Well Repairs/Additional Notes: FIX LOCK - OUTSIDE WELL CASING

SAMPLING INFORMATION / DATA

Date Sampled: | Additional Chain-of-Custody #s:

Time Sampled:

Sample ID	Bottles (total)	Bottles (size)	Preservative	Destination Laboratory	Sample Transporter	Analytical Parameters
638-01	2	1 L	None	STL-Seattle	courier	8081A
	2	1 L	None	STL-Seattle	courier	8151A
	2	1 L	None	STL-Seattle	courier	8270C
	3	40 ml	HCL	STL-Seattle	courier	8260B
	2	1 L	HCL	STL-Seattle	courier	NWTPH-Dx
	2	1 L	None	STL-Sacram	courier	dioxins/furans 1613
	1	500 ml	Nitric Acid	STL-Seattle	courier	Total 7470/6000/7000
	1	500 ml	Nitric Acid	STL-Sacram	courier	Dissolved 7470/6000/7000
	1	1 L	None	Test America	courier	405.1/310.1/300
	1	500 ml	Sulfuric Acid	STL-Seattle	courier	415.1/410.4/350.1/351.12
	1	250	NAOH + Zn	STL-Seattle	courier	376.2
	3	40 ml	HCL	STL-Seattle	courier	RSK 175
	1	1 L	None	STL-Seattle	courier	chloride/sulfate/orthophosphorus/alkalinty

Field Observations/Notes of Sampling Event:

CERTIFICATION STATEMENT

By signing below, the listed AMEC sampler states that the information provided on this page is accurate.

Sampler (Print): LISA GLONEK Sampler Signature: Lisa Glonek Date Signed: 4/3/2006

SCOEPA00013273

amec	AMEC Earth & Environmental, Inc. GROUNDWATER SAMPLING FIELD FORM	Project Name: 2006 Winter GW Event Project #: 0-61M-10703-0 P 43 Monitoring/Sampling Date: 4.3.6

Monitoring Well ID: W-09-86 | Field Personnel: L. GLONEK, J. ELEDGE, Q. BARTLETT, B. LARY
Start Time: 0900 | Weather Conditions: OVERCAST & HUMID | Approx. Air Temp (F): 52°

INITIAL WELL DATA & WELL PURGING INFORMATION

PID (ppm) Background: 0 In well Casing: 0 | PID Calibration Standard: isobutylene
%LEL Background: In well Casing: | PID Calibration Date: 4.3.06

Date/Time of Measurement: 4/3/06 / 0915 | Depth to Water Measuring Technique: SOLINST
Depth Well Bottom (TOC - ft.): | Detection Method of Free Product:
Depth to Water Level (TOC - ft.): 16.85 | Conversions Factors (casing dia. = gallons/linear ft.) Circle One
Depth to Free Product (TOC - ft.): NA | 0.75" = 0.02 1" = 0.04 2" = 0.17 3" = 0.37
Calculated Column Height (ft.): | 4" = 0.66 6" = 1.47 8" = 2.61 12" = 5.88
Casing Diameter (in.): 2 | Three Well Purge Volumes (gallons) = 3 x =
Quantity of Free Product Collected (gal.): NA | Method of Collecting Free Product: NA
Obsevation of sheen or LNAPL: NA | Observation of DNAPL: NA

Casing Volumes (#)	Volume Purged (liters)	Water Temperature (degree C)	Water pH (S.U.)	Specific Conductivity (ms)	Turbidity (NTUs)	Dissolved Oxygen (mg/L)	ORP (mV)	Time (0:00 - 23:59)
	0	11.79	6.97	551	slight	6.62	139.4	0924
	1.2	12.52	6.40	729	clear	0.85	-49.4	0928
LAG	2.4	12.64	6.44	744		0.60	-41.2	0932
increase	3.6	12.71	6.43	749		1.19	-33.1	0936
purge rate	4.8	12.78	6.41	746		2.29	-21.5	0940
	6.0	12.80	6.40	741		1.3	-14.0	0944
					3.77			

Total Purged = 6.0 | Purge Pumping Rate (approx. L/m): 0.3 | Well Yield: High / Moderate / Low
Purge Method (circle one): PVC Bailer / Poly Bailer / SS Bailer / Peristalic Pump / Grunfos Pump / Other =
Ferrous Iron (ppm): 0.8 | Decontamination Method:
Instrument Type & Number: YSI | Water Disposal: RPWSF WTP
Instrument Calibration Date & Time: 4.3.06 | Approx. Pump/Intake Depth: 83

WELL CONDITION

Casing (circle one): Stainless Steel Carbon Steel PVC Other:
Casing Condition: OK / NA / Needs Repairs / Repaired | Lock Condition: OK / NA / Needs Repairs / Replaced
Cap Condition: OK / NA / Needs Repairs / Repaired | Inner Casing Condition: OK / NA / Needs Repairs / Repaired
Paint Condition: OK / NA / Needs Repairs / Repaired | Monument Condition: OK / NA / Needs Repairs / Repaired
Recommended Well Repairs:

SAMPLING INFORMATION / DATA

Date Sampled: 4/3/06 | QA/QC Sample (circle one): YES / NO | Water Chemistry Sample: YES / NO
Time Sampled: 1015 | Sampling Method (circle one): SS Bailer Poly Bailer Grunfos Pump
Chain-of-Custody #s: electronic | Teflon Bailer Peristaltic Pump Other: Dual Valve

Sample ID	Bottles (total)	Bottles (size)	Preservative	Destination Laboratory	Sample Transporter	Analytical Parameters
636-01			Dll Back			
636-05						
636-03	4	LAG				

All samples were immediately placed into a cooler and packed with ice or "Blue Ice", unless otherwise noted: YES / NO

Field Observations/Notes of Sampling Event: collected lab split on this well
Trip Blank (636-03) will accompany split samples to Test America

CERTIFICATION STATEMENT

By signing below, the listed AMEC sampler states that the information provided on this page is accurate.

Sampler (Print): L. Glonek | Sampler Signature: Lisa Glonek | Date Signed: 4/3/04

amec	AMEC Earth & Environmental, Inc. GROUNDWATER SAMPLING FIELD FORM	Project Name: 2006 Winter GW Event Project #: 0-61M-10703-0 Phase 43 Monitoring/Sampling Date:

Monitoring Well ID: | Field Personnel:

INITIAL WELL DATA & WELL PURGING INFORMATION

Casing Volumes (#)	Volume Purged (liters)	Water Temperature (degree C)	Water pH (S.U.)	Specific Conductivity (ms)	Turbidity (NTUs)	Dissolved Oxygen (mg/L)	ORP (mV)	Time (0:00 - 23:59)

WELL CONDITION

Recommended Well Repairs/Additional Notes:

SAMPLING INFORMATION / DATA

Date Sampled: ~~LSG~~ LAG | Additional Chain-of-Custody #s:

Time Sampled:

Sample ID	Bottles (total)	Bottles (size)	Preservative	Destination Laboratory	Sample Transporter	Analytical Parameters
636-01	2	1 L	None	STL-Seattle	courier	8081A
	2	1 L	None	STL-Seattle	courier	8151A
	2	1 L	None	STL-Seattle	courier	8270C
	3	40 ml	HCL	STL-Seattle	courier	8260B
	2	1 L	HCL	STL-Seattle	courier	NWTPH-Dx
	2	1 L	None	STL-Sacram	courier	dioxins/furans 1613
	1	500 ml	Nitric Acid	STL-Seattle	courier	Total 7470/6000/7000
	1	500 ml	Nitric Acid	STL-Sacram	courier	Dissolved 7470/6000/7000
	1	1 L	None	Test America	courier	405.1/310.1/300
	1	500 ml	Sulfuric Acid	STL-Seattle	courier	415.1/410.4/350.1/351.12
	1	250	NAOH + Zn	STL-Seattle	courier	376.2
	3	40 ml	HCL	STL-Seattle	courier	RSK 175
	1	1 L	None	STL-Seattle	courier	chloride/sulfate/orthophosphorus/alkalinty
	1	125ml	Na Thiosulfate	Food Quality		SM9215
	1	250ml	NONE	Test Am		Nitrite/Nitrate/orthophosphorus
636-03	~~1~~	40ml	HCL	STL Sea + Lab split		

Field Observations/Notes of Sampling Event: Collected lab split

636-03 - ~~4 trip blanks 2 to STL Seattle + 2 to the lab split~~ LAG

Trip Blank will accompany split samples to TA.

CERTIFICATION STATEMENT

By signing below, the listed AMEC sampler states that the information provided on this page is accurate.

Sampler (Print): LISA GLOVER | Sampler Signature: Lisa Glover | Date Signed: 4/3/06

amec	AMEC Earth & Environmental, Inc. GROUNDWATER SAMPLING FIELD FORM	Project Name: 2006 Winter GW Event Project #: 0-61M-10703-0 P 43 Monitoring/Sampling Date: 4/3/06

Monitoring Well ID: W-09-116	Field Personnel: L. Glonek, B. Cary
Start Time: 905	Weather Conditions: rainy / Approx. Air Temp (F): 55

INITIAL WELL DATA & WELL PURGING INFORMATION

PID (ppm) Background: 0.0 In well Casing: 0.0	PID Calibration Standard: isobutylene
%LEL Background: NA In well Casing: NA	PID Calibration Date: 4/3/06
Date/Time of Measurement: 4/3/06 / 910	Depth to Water Measuring Technique:
Depth Well Bottom (TOC - ft.):	Detection Method of Free Product:
Depth to Water Level (TOC - ft.): 17.38 (TOC)	Conversions Factors (casing dia. = gallons/linear ft.) Circle One
Depth to Free Product (TOC - ft.):	0.75" = 0.02 1" = 0.04 2" = 0.17 3" = 0.37
Calculated Column Height (ft.):	4" = 0.66 6" = 1.47 8" = 2.61 12" = 5.88
Casing Diameter (in.): 2	Three Well Purge Volumes (gallons) = 3 x =
Quantity of Free Product Collected (gal.): NA	Method of Collecting Free Product: NA
Obsevation of sheen or LNAPL: NA	Observation of DNAPL: NA

Casing Volumes (#)	Volume Purged (liters)	Water Temperature (degree C)	Water pH (S.U.)	Specific Conductivity (mS/cm)	~~Turbidity~~ OTW (NTUs)	Dissolved Oxygen (mg/L)	ORP (mV)	Time (0:00 - 23:59)
	2.5	12.63	6.09	1901	17.48	1.12	-14.7	915
	4.1	12.59	6.05	1926	17.28	0.49	-4.9	920
	5.6	12.69	6.08	1947	17.22	0.41	-1.3	925
	7.2	12.71	6.08	1965	17.23	0.38	4.2	930
	8.8	12.69	6.08	1985	17.22	0.37	7.1	935
				NTU = 8.06				

Total Purged = 8.8	Purge Pumping Rate (approx. L/m): 320 ml/min	Well Yield: High / Moderate / Low
Purge Method (circle one): PVC Bailer / Poly Bailer / SS Bailer / Peristalic Pump / Grunfos Pump / Other = Dual Valve		
Ferrous Iron (ppm):	Decontamination Method: Methanol/DI/Alconox/DI	
Instrument Type & Number: YSI #3	Water Disposal: RP WTP	
Instrument Calibration Date & Time: 4/3/06 0800	Approx. Pump/Intake Depth: 112	

WELL CONDITION

Casing (circle one): Stainless Steel Carbon Steel PVC Other:	
Casing Condition: OK / NA / Needs Repairs / Repaired	Lock Condition: OK / NA / Needs Repairs / Replaced
Cap Condition: OK / NA / Needs Repairs / Repaired	Inner Casing Condition: OK / NA / Needs Repairs / Repaired
Paint Condition: OK / NA / Needs Repairs / Repaired	Monument Condition: OK / NA / Needs Repairs / Repaired
Recommended Well Repairs:	

SAMPLING INFORMATION / DATA

Date Sampled: 4/3/06	QA/QC Sample (circle one): YES / NO	Water Chemistry Sample: YES / NO
Time Sampled: 1050	Sampling Method (circle one): SS Bailer Poly Bailer Grunfos Pump	
Chain-of-Custody #s: electronic	Teflon Bailer Peristaltic Pump Other: Dual Valve	

Sample ID	Bottles (total)	Bottles (size)	Preservative	Destination Laboratory	Sample Transporter	Analytical Parameters
637-01			See Back			
637-03						

All samples were immediately placed into a cooler and packed with ice or "Blue Ice", unless otherwise noted: YES / NO

Field Observations/Notes of Sampling Event: Trip Blank (637-03) will accompany all primary samples (WQS) to STL Seattle → Trip blank will did not make it into cooler

CERTIFICATION STATEMENT

By signing below, the listed AMEC sampler states that the information provided on this page is accurate.

Sampler (Print): LISA GLONEK Sampler Signature: Lisa Glonek Date Signed: 4/3/06

SCOEPA00013276

amec	AMEC Earth & Environmental, Inc. GROUNDWATER SAMPLING FIELD FORM	Project Name: 2006 Winter GW Event Project #: 0-61M-10703-0 Phase 43 Monitoring/Sampling Date: 4/3/06

Monitoring Well ID: W-09-114 | Field Personnel: L Clonet, J Eledge, B Levy

INITIAL WELL DATA & WELL PURGING INFORMATION

Casing Volumes (#)	Volume Purged (liters)	Water Temperature (degree C)	Water pH (S.U.)	Specific Conductivity (ms)	Turbidity (NTUs)	Dissolved Oxygen (mg/L)	ORP (mV)	Time (0:00 - 23:59)

WELL CONDITION

Recommended Well Repairs/Additional Notes:

SAMPLING INFORMATION / DATA

Date Sampled: 4/3/06 | Additional Chain-of-Custody #s:

Time Sampled: 1050

Sample ID	Bottles (total)	Bottles (size)	Preservative	Destination Laboratory	Sample Transporter	Analytical Parameters
637-01	2	1 L	None	STL-Seattle	courier	8081A
	2	1 L	None	STL-Seattle	courier	8151A
	2	1 L	None	STL-Seattle	courier	8270C
	3	40 ml	HCL	STL-Seattle	courier	8260B
	2	1 L	HCL	STL-Seattle	courier	NWTPH-Dx
	2	1 L	None	STL-Sacram	courier	dioxins/furans 1613
	1	500 ml	Nitric Acid	STL-Seattle	courier	Total 7470/6000/7000
	1	500 ml	Nitric Acid	STL-Sacram	courier	Dissolved 7470/6000/7000
	1	1 L	None	Test America	courier	405.1/310.1/300
	1	500 ml	Sulfuric Acid	STL-Seattle	courier	415.1/410.4/350.1/351.12
	1	250	NAOH + Zn	STL-Seattle	courier	376.2
	3	40 ml	HCL	STL-Seattle	courier	RSK 175
	1	1 L	None	STL-Seattle	courier	chloride/sulfate/orthophosphorus/alkalinty
	1	125 ml	Na Thiosulfate	Food Quality		SM9215
	1	250 ml	None	Test Am		Nitrite/Nitrate/orthophosphorus

Field Observations/Notes of Sampling Event:

CERTIFICATION STATEMENT

By signing below, the listed AMEC sampler states that the information provided on this page is accurate.

Sampler (Print): LISA Clonet | Sampler Signature: Lisa Clonet | Date Signed: 4/3/06

amec	AMEC Earth & Environmental, Inc. GROUNDWATER SAMPLING FIELD FORM	Project Name: 2006 Winter GW Event
		Project #: 0-61M-10703-0 P 43
		Monitoring/Sampling Date: 3/29/06

Monitoring Well ID: W-11-B | Field Personnel: L Glonek, J. Rock, E. McDonnel

Start Time: | Weather Conditions: rainy, windy | Approx. Air Temp (F): 50

INITIAL WELL DATA & WELL PURGING INFORMATION

PID (ppm) Background: 0.0 In well Casing: 0.0 | PID Calibration Standard: isobutylene

%LEL Background: NA In well Casing: NA | PID Calibration Date: 3/29/06

Date/Time of Measurement: 3/29/06 1439 | Depth to Water Measuring Technique: Solinist

Depth Well Bottom (TOC - ft.): 124.5 | Detection Method of Free Product: NA

Depth to Water Level (TOC - ft.): 25.42 | Conversions Factors (casing dia. = gallons/linear ft.) Circle One

Depth to Free Product (TOC - ft.): NA | 0.75" = 0.02 1" = 0.04 2" = 0.17 3" = 0.37

Calculated Column Height (ft.): | 4" = 0.66 6" = 1.47 8" = 2.61 12" = 5.88

Casing Diameter (in.): 4 | Three Well Purge Volumes (gallons) = 3 x _____ = _____

Quantity of Free Product Collected (gal.): NA | Method of Collecting Free Product: NA

Obsevation of sheen or LNAPL: NA | Observation of DNAPL: NA

Casing Volumes (#)	Volume Purged (liters)	Water Temperature (degree C)	Water pH (S.U.)	Specific Conductivity (ms)	Turbidity (NTUs)	Dissolved Oxygen (mg/L)	ORP (mV)	Time (0:00 - 23:59)
	0.96	12.33	7.61	2015	high	3.30	-81.4	1456
	1.76	13.01	7.23	2450	high	0.24	-121.6	1500
	2.56	12.94	7.12	2434	~~high~~ clear	0.28	-128.8	1504
	3.36	12.94	7.09	2480	clear	0.32	-129.9	1508
	4.16	12.90	7.08	2468	clear	0.32	-127.6	1512
				NTU =	10.5			

Total Purged = | Purge Pumping Rate (approx. L/m): | Well Yield: High / Moderate / Low

Purge Method (circle one): PVC Bailer / Poly Bailer / SS Bailer / Peristalic Pump / Grunfos Pump / Other = Dual Valve

Ferrous Iron (ppm): | Decontamination Method: Methanol Alcanox DI

Instrument Type & Number: YSI | Water Disposal: RPWSF

Instrument Calibration Date & Time: 3/29/06 0830 | Approx. Pump/Intake Depth: 120

WELL CONDITION

Casing (circle one): Stainless Steel Carbon Steel PVC Other:

Casing Condition: OK / NA / Needs Repairs / Repaired | Lock Condition: OK / NA / Needs Repairs / Replaced

Cap Condition: OK / NA / Needs Repairs / Repaired | Inner Casing Condition: OK / NA / Needs Repairs / Repaired

Paint Condition: OK / NA / Needs Repairs / Repaired | Monument Condition: OK / NA / Needs Repairs / Repaired

Recommended Well Repairs:

SAMPLING INFORMATION / DATA

Date Sampled: 3/29/06 | QA/QC Sample (circle one): YES / NO | Water Chemistry Sample: YES / NO

Time Sampled: 1530 | Sampling Method (circle one): SS Bailer Poly Bailer Grunfos Pump

Chain-of-Custody #s: electronic | Teflon Bailer Peristaltic Pump Other: Dual Valve

Sample ID	Bottles (total)	Bottles (size)	Preservative	Destination Laboratory	Sample Transporter	Analytical Parameters
028-01						
			see	back		

All samples were immediately placed into a cooler and packed with ice or "Blue Ice", unless otherwise noted: YES / NO

Field Observations/Notes of Sampling Event:

CERTIFICATION STATEMENT

By signing below, the listed AMEC sampler states that the information provided on this page is accurate.

Sampler (Print): LISA GLONEK Sampler Signature: Lisa Glonek Date Signed: 3/29/06

amec	AMEC Earth & Environmental, Inc. GROUNDWATER SAMPLING FIELD FORM	Project Name: 2006 Winter GW Event Project #: 0-61M-10703-0 Phase 43 Monitoring/Sampling Date: 3/29/06

Monitoring Well ID: CN71-B | Field Personnel: L. Glonek, J. Rock, E McDonald

INITIAL WELL DATA & WELL PURGING INFORMATION

Casing Volumes (#)	Volume Purged (liters)	Water Temperature (degree C)	Water pH (S.U.)	Specific Conductivity (ms)	Turbidity (NTUs)	Dissolved Oxygen (mg/L)	ORP (mV)	Time (0:00 - 23:59)

WELL CONDITION

Recommended Well Repairs/Additional Notes:

SAMPLING INFORMATION / DATA

Date Sampled: 3/29/06 | Additional Chain-of-Custody #s:

Time Sampled: 1530

Sample ID	Bottles (total)	Bottles (size)	Preservative	Destination Laboratory	Sample Transporter	Analytical Parameters
608-01	2	1 L	None	STL-Seattle	courier	8081A
	2	1 L	None	STL-Seattle	courier	8151A
	2	1 L	None	STL-Seattle	courier	8270C
	3	40 ml	HCL	STL-Seattle	courier	8260B
	2	1 L	HCL	STL-Seattle	courier	NWTPH-Dx
	2	1 L	None	STL-Sacram	courier	dioxins/furans 1613
	1	500 ml	Nitric Acid	STL-Seattle	courier	Total 7470/6000/7000
	1	500 ml	Nitric Acid	STL-Sacram	courier	Dissolved 7470/6000/7000
	1	1 L	None	Test America	courier	405.1/310.1/300
	1	500 ml	Sulfuric Acid	STL-Seattle	courier	415.1/410.4/350.1/351.12
	1	250	NAOH + Zn	STL-Seattle	courier	376.2
	3	40 ml	HCL	STL-Seattle	courier	RSK 175
	1	1 L	None	STL-Seattle	courier	chloride/sulfate/orthophosphorus/alkalinty
	1	125ml	yes	Food Qu		SM9215
	1	250ml	None	Test Am		Nitrite/Nitrate/orthophosphorus

Field Observations/Notes of Sampling Event:

CERTIFICATION STATEMENT

By signing below, the listed AMEC sampler states that the information provided on this page is accurate.

Sampler (Print): LISA GLONEK Sampler Signature: Lisa Glonek Date Signed: 3/29/06

amec	AMEC Earth & Environmental, Inc. GROUNDWATER SAMPLING FIELD FORM	Project Name: 2006 Winter GW Event
		Project #: 0-61M-10703-0 P 43
		Monitoring/Sampling Date: 3/29/06

Monitoring Well ID: W-11-D | Field Personnel: L. Glonek, J. Lock, E. McDonell

Start Time: 1300 | Weather Conditions: rainy, windy | Approx. Air Temp (F): 45

INITIAL WELL DATA & WELL PURGING INFORMATION

PID (ppm) Background: 0.0 In well Casing: 0.0 | PID Calibration Standard: isobutylene

%LEL Background: NA In well Casing: NA | PID Calibration Date: 3/29/06

Date/Time of Measurement: 3/29/06 | Depth to Water Measuring Technique: Solinst

Depth Well Bottom (TOC - ft.): 84 | Detection Method of Free Product: NA

Depth to Water Level (TOC - ft.): 24.81 | Conversions Factors (casing dia. = gallons/linear ft.) Circle One

Depth to Free Product (TOC - ft.): NA | 0.75" = 0.02 1" = 0.04 2" = 0.17 3" = 0.37

Calculated Column Height (ft.): | 4" = 0.66 6" = 1.47 8" = 2.61 12" = 5.88

Casing Diameter (in.): 4 | Three Well Purge Volumes (gallons) = 3 x _____ = _____

Quantity of Free Product Collected (gal.): NA | Method of Collecting Free Product: NA

Obsevation of sheen or LNAPL: NA | Observation of DNAPL: NA

Casing Volumes (#)	Volume Purged (liters)	Water Temperature (degree C)	Water pH (S.U.)	Specific Conductivity (ms)	Turbidity (NTUs)	Dissolved Oxygen (mg/L)	ORP (mV)	Time (0:00 - 23:59)
	1.0	11.16	6.56	2617	clear	4.05	-58.3	1308
	2.0	12.66	6.81	3202	clear	1.87	-42.1	1312
	3.0	12.76	6.85	3372	clear	0.72	-19.4	1316
	4.0 l	12.88	6.86	3434	Clear	0.73	-1.2	1320
	5.0 l	12.90	6.83	3455	clear	0.45	15.5	1324
	6.0 l	12.97	6.77	3436	Clear	0.28	19.8	1328
	7.0 l	12.98	6.72	3431	moderate	0.23	19.4	1332

Total Purged = 9 | Purge Pumping Rate (approx. L/m): .25 l/min | Well Yield: High / Moderate / Low

Purge Method (circle one): PVC Bailer / Poly Bailer / SS Bailer / Peristalic Pump / Grunfos Pump / Other = Qualvalve

Ferrous Iron (ppm): 1.6 | Decontamination Method: methanol, DI, Alcanox, DI

Instrument Type & Number: YSI | Water Disposal: RP WTP WST

Instrument Calibration Date & Time: 3/29/06 830 | Approx. Pump/Intake Depth: 80

WELL CONDITION

Casing (circle one): Stainless Steel Carbon Steel PVC Other:

Casing Condition: OK / NA / Needs Repairs / Repaired | Lock Condition: OK / NA / Needs Repairs / Replaced

Cap Condition: OK / NA / Needs Repairs / Repaired | Inner Casing Condition: OK / NA / Needs Repairs / Repaired

Paint Condition: OK / NA / Needs Repairs / Repaired | Monument Condition: OK / NA / Needs Repairs / Repaired

Recommended Well Repairs:

SAMPLING INFORMATION / DATA

Date Sampled: 3/29/06 | QA/QC Sample (circle one): YES / NO | Water Chemistry Sample: YES / NO

Time Sampled: 1345 | Sampling Method (circle one): SS Bailer Poly Bailer Grunfos Pump

Chain-of-Custody #s: electronic | Teflon Bailer Peristaltic Pump Other: Qualvalve

Sample ID	Bottles (total)	Bottles (size)	Preservative	Destination Laboratory	Sample Transporter	Analytical Parameters
627-06						

See Back

All samples were immediately placed into a cooler and packed with ice or "Blue Ice", unless otherwise noted: YES / NO

Field Observations/Notes of Sampling Event:

CERTIFICATION STATEMENT

By signing below, the listed AMEC sampler states that the information provided on this page is accurate.

Sampler (Print): [signature] Sampler Signature: [signature] Date Signed: 3/29/06

amec	AMEC Earth & Environmental, Inc. GROUNDWATER SAMPLING FIELD FORM	Project Name: 2006 Winter GW Event Project #: 0-61M-10703-0 Phase 43 Monitoring/Sampling Date:

Monitoring Well ID: | Field Personnel:

INITIAL WELL DATA & WELL PURGING INFORMATION

Casing Volumes (#)	Volume Purged (liters)	Water Temperature (degree C)	Water pH (S.U.)	Specific Conductivity (ms)	Turbidity (NTUs)	Dissolved Oxygen (mg/L)	ORP (mV)	Time (0:00 - 23:59)
	8.0	12.97	6.68	3428	slight	0.20	16.8	1336
	9.0	12.98	6.66	3429	↓	0.21	8.4	1340
				avg =	62.6			

WELL CONDITION

Recommended Well Repairs/Additional Notes:

SAMPLING INFORMATION / DATA

Date Sampled: 3/29/06 | Additional Chain-of-Custody #s:

Time Sampled: 1345

Sample ID	Bottles (total)	Bottles (size)	Preservative	Destination Laboratory	Sample Transporter	Analytical Parameters
609-01	2	1 L	None	STL-Seattle	courier	8081A
↓	2	1 L	None	STL-Seattle	courier	8151A
	2	1 L	None	STL-Seattle	courier	8270C
	3	40 ml	HCL	STL-Seattle	courier	8260B
	2	1 L	HCL	STL-Seattle	courier	NWTPH-Dx
	2	1 L	None	STL-Sacram	courier	dioxins/furans 1613
	1	500 ml	Nitric Acid	STL-Seattle	courier	Total 7470/6000/7000
	1	500 ml	Nitric Acid	STL-Sacram	courier	Dissolved 7470/6000/7000
	1	1 L	None	Test America	courier	405.1/310.1/300
	1	500 ml	Sulfuric Acid	STL-Seattle	courier	415.1/410.4/350.1/351.12
	1	250	NAOH + Zn	STL-Seattle	courier	376.2
↓	3	40 ml	HCL	STL-Seattle	courier	RSK 175
	1	1 L	None	STL-Seattle	courier	chloride/sulfate/orthophosphorus/alkalinty
	1	250ml	NONE	Test Am	↓	nitrite/nitrate/orthophosphorus
	1	125ml	yes	Food Quality		SM9215

Field Observations/Notes of Sampling Event:

CERTIFICATION STATEMENT

By signing below, the listed AMEC sampler states that the information provided on this page is accurate.

Sampler (Print): LISA GRAVES Sampler Signature: Lisa Graves Date Signed: 3/29/06

SCOEPA00013281

amec

AMEC Earth & Environmental, Inc.
GROUNDWATER SAMPLING FIELD FORM

Project Name: 2006 Winter GW Event
Project #: 0-61M-10703-0 P 43
Monitoring/Sampling Date: 3/29/06

Monitoring Well ID: W-11-I
Field Personnel: L. Glover, J. Rock, E. McDonald
Start Time: 1120
Weather Conditions: rainy, windy, 40s Approx. Air Temp (F): 45

INITIAL WELL DATA & WELL PURGING INFORMATION

PID (ppm) Background: 0.0 In well Casing: 0.0
PID Calibration Standard: isobutylene
%LEL Background: NA In well Casing: NA
PID Calibration Date: 3/29/06
Date/Time of Measurement: 3/29/06 / 1005
Depth to Water Measuring Technique: Solinst
Depth Well Bottom (TOC - ft.):
Detection Method of Free Product: NA
Depth to Water Level (TOC - ft.): 25.04
Depth to Free Product (TOC - ft.): NA
Calculated Column Height (ft.):
Conversions Factors (casing dia. = gallons/linear ft.) Circle One
0.75" = 0.02 1" = 0.04 2" = 0.17 3" = 0.37
4" = 0.66 6" = 1.47 8" = 2.61 12" = 5.88
Casing Diameter (in.): 2
Three Well Purge Volumes (gallons) = 3 x _____ = _____
Quantity of Free Product Collected (gal.): NA
Method of Collecting Free Product: NA
Obsevation of sheen or LNAPL: NA
Observation of DNAPL: NA

Casing Volumes (#)	Volume Purged (liters)	Water Temperature (degree C)	Water pH (S.U.)	Specific Conductivity (ms)	Turbidity (NTUs)	Dissolved Oxygen (mg/L)	ORP (mV)	Time (0:00 - 23:59)
	~~6.12~~	11.38	7.93	801	clear	1.84	-91.6	~~1132~~
	+2 13	11.54	7.21	964	clear	0.48	-116.5	1136
	+2626	12.70	LAST 6.95	1033	↓	1.90	-123.8	1140
NTU = 4.08	3.9	12.74	6.81	1043	↓	0.36	-125.3	1144
	4.7	12.76	6.73	1043	↓	0.30	-127.0	1148
	~~5.5~~	12.74	6.67	1043	↓	0.30	-127.0	1152
	6.8	12.77	6.64	1042	clear	0.27	-127.4	1156

Total Purged = 6.8 Purge Pumping Rate (approx. L/m): 0.32 Well Yield: High / Moderate / Low
Purge Method (circle one): PVC Bailer / Poly Bailer / SS Bailer / Peristalic Pump / Grunfos Pump / Other = Qual valve
Ferrous Iron (ppm): 5.0 Decontamination Method: Methanol/DI/Alconox/DI
Instrument Type & Number: YSI Water Disposal: Onsite
Instrument Calibration Date & Time: 3/29/06 Approx. Pump/Intake Depth:

WELL CONDITION

Casing (circle one): Stainless Steel Carbon Steel (PVC) Other:
Casing Condition: (OK) / NA / Needs Repairs / Repaired Lock Condition: (OK) / NA / Needs Repairs / Replaced
Cap Condition: (OK) / NA / Needs Repairs / Repaired Inner Casing Condition: (OK) / NA / Needs Repairs / Repaired
Paint Condition: (OK) / NA / Needs Repairs / Repaired Monument Condition: (OK) / NA / Needs Repairs / Repaired
Recommended Well Repairs:

SAMPLING INFORMATION / DATA

Date Sampled: 3/29/06 QA/QC Sample (circle one): YES / (NO) Water Chemistry Sample: (YES) ~~NO~~
Time Sampled: 1200 Sampling Method (circle one): SS Bailer Poly Bailer Grunfos Pump
Chain-of-Custody #s: Electronic Teflon Bailer Peristaltic Pump Other: Qual valve

Sample ID	Bottles (total)	Bottles (size)	Preservative	Destination Laboratory	Sample Transporter	Analytical Parameters
0260-01						
			See Back			

All samples were immediately placed into a cooler and packed with ice or "Blue Ice", unless otherwise noted: (YES) / NO
Field Observations/Notes of Sampling Event:

CERTIFICATION STATEMENT

By signing below, the listed AMEC sampler states that the information provided on this page is accurate.
Sampler (Print): LISA GLOVER Sampler Signature: Lisa Glover Date Signed: 3/29/06

SCOEPA00013282

amec

AMEC Earth & Environmental, Inc.
GROUNDWATER SAMPLING FIELD FORM

Project Name:	2006 Winter GW Event
Project #:	0-61M-10703-0 Phase 43
Monitoring/Sampling Date:	

Monitoring Well ID: | Field Personnel:

INITIAL WELL DATA & WELL PURGING INFORMATION

Casing Volumes (#)	Volume Purged (liters)	Water Temperature (degree C)	Water pH (S.U.)	Specific Conductivity (ms)	Turbidity (NTUs)	Dissolved Oxygen (mg/L)	ORP (mV)	Time (0:00 - 23:59)

WELL CONDITION

Recommended Well Repairs/Additional Notes:

SAMPLING INFORMATION / DATA

Date Sampled: 3/29/06 | Additional Chain-of-Custody #s:

Time Sampled: 1200

Sample ID	Bottles (total)	Bottles (size)	Preservative	Destination Laboratory	Sample Transporter	Analytical Parameters
0960-01	2	1 L	None	STL-Seattle	courier	8081A
	2	1 L	None	STL-Seattle	courier	8151A
	2	1 L	None	STL-Seattle	courier	8270C
	3	40 ml	HCL	STL-Seattle	courier	8260B
	2	1 L	HCL	STL-Seattle	courier	NWTPH-Dx
	2	1 L	None	STL-Sacram	courier	dioxins/furans 1613
	1	500 ml	Nitric Acid	STL-Seattle	courier	Total 7470/6000/7000
	1	500 ml	Nitric Acid	STL-Sacram	courier	Dissolved 7470/6000/7000
	1	1 L	None	Test America	courier	405.1/310.1/300
	1	500 ml	Sulfuric Acid	STL-Seattle	courier	415.1/410.4/350.1/351.12
	1	250	NAOH + Zn	STL-Seattle	courier	376.2
	3	40 ml	HCL	STL-Seattle	courier	RSK 175
	1	1 L	None	STL-Seattle	courier	chloride/sulfate/orthophosphorus/alkalinity
	1	250ml	NONE	~~Test~~ Anatek	↓	nitrite/Nitrate/orthophosphorus
	1	125 ml	YSO	Food Quality	↓	SM9215

Field Observations/Notes of Sampling Event:

CERTIFICATION STATEMENT

By signing below, the listed AMEC sampler states that the information provided on this page is accurate.

Sampler (Print): LISA GLOVER Sampler Signature: Lisa Glover Date Signed: 3/29/06

SCOEPA00013283

amec	AMEC Earth & Environmental, Inc. GROUNDWATER SAMPLING FIELD FORM	Project Name: 2006 Winter GW Event Project #: 0-61M-10703-0 P 43 Monitoring/Sampling Date: 3/29/06

Monitoring Well ID: W-11-S	Field Personnel: L. Clonek, J. Rock & McConnell
Start Time: 1030	Weather Conditions: windy, rainy-Yuck! Approx. Air Temp (F): 45

INITIAL WELL DATA & WELL PURGING INFORMATION

PID (ppm) Background: 6.0 In well Casing: 0.0	PID Calibration Standard: isobutylene
%LEL Background: NA In well Casing: NA	PID Calibration Date: 3/29/06
Date/Time of Measurement: 3/29/06 / 1000	Depth to Water Measuring Technique: ~~ACA~~ Solinst
Depth Well Bottom (TOC - ft.): 22.5	Detection Method of Free Product: NA
Depth to Water Level (TOC - ft.): 10.05	Conversions Factors (casing dia. = gallons/linear ft.) Circle One
Depth to Free Product (TOC - ft.): NA	0.75" = 0.02 1" = 0.04 2" = 0.17 3" = 0.37
Calculated Column Height (ft.):	4" = 0.66 6" = 1.47 8" = 2.61 12" = 5.88
Casing Diameter (in.): 2	Three Well Purge Volumes (gallons) = 3 x ____ = ____
Quantity of Free Product Collected (gal.): NA	Method of Collecting Free Product: NA
Obsevation of sheen or LNAPL: NA	Observation of DNAPL: NA

Casing Volumes (#)	Volume Purged (liters)	Water Temperature (degree C)	Water pH (S.U.)	Specific Conductivity (ms)	Turbidity (NTUs)	Dissolved Oxygen (mg/L)	ORP (mV)	Time (0:00 - 23:59)
	2.0	10.39	11.21	996	clear	1.90	25.6	1024
	2.0	10.81	11.46	965	clear	0.62	-37.7	1028
	2.0	10.93	11.49	983	clear	0.43	-66.2	1032
	2.0	10.97	11.57	990	clear	0.36	-94.9	1036
	2.0	10.89	11.64	992	clear	0.32	-108.3	1040
	2.0	10.96	11.66	996	clear	0.25	-125.5	1044
	2.0	10.93	11.73	998	clear	0.23	-137.8	1048

Total Purged =	Purge Pumping Rate (approx. L/m):	Well Yield: (High / Moderate / Low
Purge Method (circle one): PVC Bailer / Poly Bailer / SS Bailer / Peristalic Pump / Grunfos Pump / Other = Qualmere		
Ferrous Iron (ppm): 0	Decontamination Method:	
Instrument Type & Number: YSI	Water Disposal: Drum	
Instrument Calibration Date & Time: 3/29/06 0800	Approx. Pump/Intake Depth: 15	

WELL CONDITION

Casing (circle one): Stainless Steel Carbon Steel (PVC) Other:	
Casing Condition: (OK) / NA / Needs Repairs / Repaired	Lock Condition: (OK) / NA / Needs Repairs / Replaced
Cap Condition: (OK) / NA / Needs Repairs / Repaired	Inner Casing Condition: (OK) / NA / Needs Repairs / Repaired
Paint Condition: (OK) / NA / Needs Repairs / Repaired	Monument Condition: (OK) / NA / Needs Repairs / Repaired
Recommended Well Repairs:	

SAMPLING INFORMATION / DATA

Date Sampled: 3/29/06	QA/QC Sample (circle one): YES / (NO)	Water Chemistry Sample: (YES) / NO
Time Sampled: ~~1025~~ 1115	Sampling Method (circle one): SS Bailer Poly Bailer Grunfos Pump	
Chain-of-Custody #s: electronic	Teflon Bailer Peristaltic Pump Other: Qualmere	

Sample ID	Bottles (total)	Bottles (size)	Preservative	Destination Laboratory	Sample Transporter	Analytical Parameters
~~W25~~						
W25-01			pel	Back		
W25-B	Trip Blank					

All samples were immediately placed into a cooler and packed with ice or "Blue Ice", unless otherwise noted: (YES) / NO

Field Observations/Notes of Sampling Event: ____

CERTIFICATION STATEMENT

By signing below, the listed AMEC sampler states that the information provided on this page is accurate.

Sampler (Print): LISA CLONEK Sampler Signature: Lisa Clonek Date Signed: 3/29/06

SCOEPA00013284

amec	AMEC Earth & Environmental, Inc. GROUNDWATER SAMPLING FIELD FORM	Project Name: 2006 Winter GW Event Project #: 0-61M-10703-0 Phase 43 Monitoring/Sampling Date: 03/29/06

Monitoring Well ID: W-11-5 | Field Personnel: Lisa G, Erin M., Joe R.

INITIAL WELL DATA & WELL PURGING INFORMATION

Casing Volumes (#)	Volume Purged (liters)	Water Temperature (degree C)	Water pH (S.U.)	Specific Conductivity (ms)	Turbidity (NTUs)	Dissolved Oxygen (mg/L)	ORP (mV)	Time (0:00 - 23:59)
	2.0	11.00	11.69	1898	clear ø.41	0.24	~~998~~ 1116	1052

WELL CONDITION

Recommended Well Repairs/Additional Notes:

SAMPLING INFORMATION / DATA

Date Sampled: 3/29/06 | Additional Chain-of-Custody #s:

Time Sampled: 1115

Sample ID	Bottles (total)	Bottles (size)	Preservative	Destination Laboratory	Sample Transporter	Analytical Parameters
625-01	2	1 L	None	STL-Seattle	courier	8081A
	2	1 L	None	STL-Seattle	courier	8151A
	2	1 L	None	STL-Seattle	courier	8270C
	3	40 ml	HCL	STL-Seattle	courier	8260B
	2	1 L	HCL	STL-Seattle	courier	NWTPH-Dx
	2	1 L	None	STL-Sacram	courier	dioxins/furans 1613
	1	500 ml	Nitric Acid	STL-Seattle	courier	Total 7470/6000/7000
	1	500 ml	Nitric Acid	STL-Sacram	courier	Dissolved 7470/6000/7000
	1	1 L	None	Test America	courier	405.1/310.1/300
	1	500 ml	Sulfuric Acid	STL-Seattle	courier	415.1/410.4/350.1/351.12
	1	250	NAOH + Zn	STL-Seattle	courier	376.2
	3	40 ml	HCL	STL-Seattle	courier	RSK 175
	1	1 L	None	STL-Seattle	courier	chloride/sulfate/orthophosphorus/alkalinity
	1	250ml	NONE	Test Am	↓	SM9215 Nitrite/Nitrate/Ortho
	1	125ml	Yes	Food Quality	↓	SM9215

Field Observations/Notes of Sampling Event:

CERTIFICATION STATEMENT

By signing below, the listed AMEC sampler states that the information provided on this page is accurate.

Sampler (Print): LISA GLONEK | Sampler Signature: Lisa Glonek | Date Signed: 3/29/06

amec	AMEC Earth & Environmental, Inc. GROUNDWATER SAMPLING FIELD FORM	Project Name: 2006 Winter GW Event Project #: 0-61M-10703-0 P 43 Monitoring/Sampling Date: 3/30/06

Monitoring Well ID: W-12-5	Field Personnel: L. Glover, J. Lack, B. McGillicuddy		
Start Time: 0945	Weather Conditions: cloudy, moran, cold	Approx. Air Temp (F): 50	

INITIAL WELL DATA & WELL PURGING INFORMATION

PID (ppm) Background: 0.0	In well Casing: 0.0	PID Calibration Standard: isobutylene	
%LEL Background: NA	In well Casing: NA	PID Calibration Date: 3/30/06	
Date/Time of Measurement: 3/30/06 0930		Depth to Water Measuring Technique: Solinst	
Depth Well Bottom (TOC - ft.): 20		Detection Method of Free Product: NA	
Depth to Water Level (TOC - ft.): 11.77		Conversions Factors (casing dia. = gallons/linear ft.) Circle One	
Depth to Free Product (TOC - ft.):		0.75" = 0.02	1" = 0.04
Calculated Column Height (ft.):		4" = 0.66	6" = 1.47
Casing Diameter (in.): 2		Three Well Purge Volumes (gallons) = 3 x ____ = ____	
Quantity of Free Product Collected (gal.): NA		Method of Collecting Free Product: NA	
Obsevation of sheen or LNAPL: NA		Observation of DNAPL: NA	

Casing Volumes (#)	Volume Purged (liters)	Water Temperature (degree C)	Water pH (S.U.)	Specific Conductivity (ms) us	Turbidity (NTUs)	Dissolved Oxygen (mg/L)	ORP (mV)	Time (0:00 - 23:59)
	0	11.99	10.88	488	slight	3.44	-82.4	0945
	2	12.31	11.36	508	↓	0.58	-125.6	0949
	4	12.35	11.54	548	↓	0.41	-169.9	0953
	6	12.36	11.61	568	clear	0.31	-188.5	0957
	8	12.34	11.65	594	↓	0.27	-203.6	1001
	10	12.34	11.66	607	↓	0.31	-211.0	1005
	12	12.34	11.68	622	↓	0.27	-218.3	1009

Total Purged = 14	Purge Pumping Rate (approx. L/m): 0.5		Well Yield: High / Moderate / Low
Purge Method (circle one): PVC Bailer / Poly Bailer / SS Bailer / Peristalic Pump / Grunfos Pump / Other = Dual Valve			
Ferrous Iron (ppm): 0.0		Decontamination Method: Methanol/DI/Alconox DI	
Instrument Type & Number: YSI		Water Disposal: LF WST	
Instrument Calibration Date & Time: 3/30/06 0800		Approx. Pump/Intake Depth: 17	

WELL CONDITION

Casing (circle one): Stainless Steel Carbon Steel PVC Other:			
Casing Condition: (OK) / NA / Needs Repairs / Repaired		Lock Condition: (OK) / NA / Needs Repairs / Replaced	
Cap Condition: (OK) / NA / Needs Repairs / Repaired		Inner Casing Condition: (OK) / NA / Needs Repairs / Repaired	
Paint Condition: (OK) / NA / Needs Repairs / Repaired		Monument Condition: (OK) / NA / Needs Repairs / Repaired	
Recommended Well Repairs: None			

SAMPLING INFORMATION / DATA

Date Sampled: 3/30/06	QA/QC Sample (circle one): (YES) NO	Water Chemistry Sample: (YES) / NO
Time Sampled: 1030	Sampling Method (circle one): SS Bailer Poly Bailer Grunfos Pump	
Chain-of-Custody #s: electronic	Teflon Bailer Peristaltic Pump Other: Dual Valve	

Sample ID	Bottles (total)	Bottles (size)	Preservative	Destination Laboratory	Sample Transporter	Analytical Parameters
629-01						
629-03						
↓						
TripBlank						

All samples were immediately placed into a cooler and packed with ice or "Blue Ice", unless otherwise noted: YES / NO

Field Observations/Notes of Sampling Event: High yielding well - water level collected MS/MSD sample

CERTIFICATION STATEMENT

By signing below, the listed AMEC sampler states that the information provided on this page is accurate.

Sampler (Print): LISA GLOVER Sampler Signature: Lisa Glover Date Signed: 3/30/06

SCOEPA00013286

amec	AMEC Earth & Environmental, Inc. GROUNDWATER SAMPLING FIELD FORM	Project Name: 2006 Winter GW Event Project #: 0-61M-10703-0 Phase 43 Monitoring/Sampling Date: 3/30/06

Monitoring Well ID: W-12-S | Field Personnel: L. Clonek, J. Rock, B. McCillicuddy

INITIAL WELL DATA & WELL PURGING INFORMATION

Casing Volumes (#)	Volume Purged (liters)	Water Temperature (degree C)	Water pH (S.U.)	Specific Conductivity (ms)	Turbidity (NTUs)	Dissolved Oxygen (mg/L)	ORP (mV)	Time (0:00 - 23:59)
	14	12.32	11.70	631	clear	0.31	-223.2	1013
				NTU =	1.36			

WELL CONDITION

Recommended Well Repairs/Additional Notes:

SAMPLING INFORMATION / DATA

Date Sampled: 3/30/06 | Additional Chain-of-Custody #s:

Time Sampled: 1030

Sample ID	Bottles (total)	Bottles (size)	Preservative	Destination Laboratory	Sample Transporter	Analytical Parameters
629-01	6 ~~2~~	1 L	None	STL-Seattle	courier	8081A
	6 ~~2~~	1 L	None	STL-Seattle	courier	8151A
	6 ~~2~~	1 L	None	STL-Seattle	courier	8270C
	9 ~~3~~	40 ml	HCL	STL-Seattle	courier	8260B
	6 ~~2~~	1 L	HCL	STL-Seattle	courier	NWTPH-Dx
	6 ~~2~~	1 L	None	STL-Sacram	courier	dioxins/furans 1613
	3 ~~1~~	500 ml	Nitric Acid	STL-Seattle	courier	Total 7470/6000/7000
	3 ~~1~~	500 ml	Nitric Acid	STL-Sacram	courier	Dissolved 7470/6000/7000
	1	1 L	None	Test America	courier	405.1/310.1/300
	1	500 ml	Sulfuric Acid	STL-Seattle	courier	415.1/410.4/350.1/351.12
	1	250	NAOH + Zn	STL-Seattle	courier	376.2
	3	40 ml	HCL	STL-Seattle	courier	RSK 175
	1	1 L	None	STL-Seattle	courier	chloride/sulfate/orthophosphorus/alkalinty
629-03	2	40ml	HCL	STL-Sea		8260B
629-01	1	125ml	NaThiosulfate	Food Quality		SM9215
	1	250ml	NONE	Test Am		Nitrite/Nitrate/orthophosphorus

Field Observations/Notes of Sampling Event:

Collected MS/MSD sample

CERTIFICATION STATEMENT

By signing below, the listed AMEC sampler states that the information provided on this page is accurate.

Sampler (Print): LISA Clonek | Sampler Signature: [signature] | Date Signed: 3/3/06

amec	AMEC Earth & Environmental, Inc. GROUNDWATER SAMPLING FIELD FORM	Project Name: 2006 Winter GW Event
		Project #: 0-61M-10703-0 P 43
		Monitoring/Sampling Date: 3/30/06

Monitoring Well ID: W-12-I | Field Personnel: L. Glonek, J. Rock
Start Time: 1025 | Weather Conditions: rain, downing | Approx. Air Temp (F): 50

INITIAL WELL DATA & WELL PURGING INFORMATION

PID (ppm) Background: ~~NA~~ 0.0 In well Casing: ~~NA~~ 0.0 | PID Calibration Standard: isobutylene
%LEL Background: NA In well Casing: NA | PID Calibration Date: 3/30/06
Date/Time of Measurement: 1020 | Depth to Water Measuring Technique: 801 inst
Depth Well Bottom (TOC - ft.): 58.5 | Detection Method of Free Product: NA
Depth to Water Level (TOC - ft.): 19.10 | Conversions Factors (casing dia. = gallons/linear ft.) Circle One
Depth to Free Product (TOC - ft.): NA | 0.75" = 0.02 1" = 0.04 2" = 0.17 3" = 0.37
Calculated Column Height (ft.): | 4" = 0.66 6" = 1.47 8" = 2.61 12" = 5.88
Casing Diameter (in.): 2 | Three Well Purge Volumes (gallons) = 3 x ____ = ____
Quantity of Free Product Collected (gal.): NA | Method of Collecting Free Product: NA
Obsevation of sheen or LNAPL: NA | Observation of DNAPL: NA

Casing Volumes (#)	Volume Purged (liters)	Water Temperature (degree C)	Water pH (S.U.)	Specific Conductivity (ms)	Turbidity (NTUs)	Dissolved Oxygen (mg/L)	ORP (mV)	Time (0:00 - 23:59)
	~~12.27~~	12.27	8.22	1003	clear	1.53	-185.9	1031
	0.8	12.73	7.45	1010	↓	0.30	-174.9	1035
	1.6	12.65	7.28	1004	↓	0.39	-172.1	1039
	2.4	12.67	7.14	998	↓	1.57	-168.8	1043
	3.2	12.73	7.08	993	↓	0.78	-166.5	1047
	4.0	12.77	7.04	988	↓	0.46	-159.4	1051
	4.8	12.76	7.01	984	↓	0.34	-155.3	1055

Total Purged = 5.6 | Purge Pumping Rate (approx. L/m): 0.2 | Well Yield: High / Moderate / Low
Purge Method (circle one): PVC Bailer / Poly Bailer / SS Bailer / Peristalic Pump / Grunfos Pump / Other = Dual Valve
Ferrous Iron (ppm): LAG ~~0.0~~ 4.0 | Decontamination Method: DI methanol Alconox DI
Instrument Type & Number: YSI | Water Disposal: LPWSF
Instrument Calibration Date & Time: 3/30/06 0800 | Approx. Pump/Intake Depth: 54

WELL CONDITION

Casing (circle one): Stainless Steel Carbon Steel PVC Other: C
Casing Condition: OK / NA / Needs Repairs / Repaired | Lock Condition: OK / NA / Needs Repairs / Replaced
Cap Condition: OK / NA / Needs Repairs / Repaired | Inner Casing Condition: OK / NA / Needs Repairs / Repaired
Paint Condition: OK / NA / Needs Repairs / Repaired | Monument Condition: OK / NA / Needs Repairs / Repaired
Recommended Well Repairs:

SAMPLING INFORMATION / DATA

Date Sampled: 3/30/06 | QA/QC Sample (circle one): YES / NO | Water Chemistry Sample: YES / NO
Time Sampled: 1115 | Sampling Method (circle one): SS Bailer Poly Bailer Grunfos Pump
Chain-of-Custody #s: electronic | Teflon Bailer Peristaltic Pump Other: Dual Valve

Sample ID	Bottles (total)	Bottles (size)	Preservative	Destination Laboratory	Sample Transporter	Analytical Parameters
630-01						
			see Back			

All samples were immediately placed into a cooler and packed with ice or "Blue Ice", unless otherwise noted: YES / NO
Field Observations/Notes of Sampling Event: well very low yield, so pumped @ low rate possible

CERTIFICATION STATEMENT

By signing below, the listed AMEC sampler states that the information provided on this page is accurate.
Sampler (Print): LISA GLONEK Sampler Signature: [signature] Date Signed: 3/30/06

amec	AMEC Earth & Environmental, Inc. GROUNDWATER SAMPLING FIELD FORM	Project Name: 2006 Winter GW Event Project #: 0-61M-10703-0 Phase 43 Monitoring/Sampling Date: 3/30/06

Monitoring Well ID: W-12-I | Field Personnel: L. Gronek, J. Rock

INITIAL WELL DATA & WELL PURGING INFORMATION

Casing Volumes (#)	Volume Purged (liters)	Water Temperature (degree C)	Water pH (S.U.)	Specific Conductivity (ms)	Turbidity (NTUs)	Dissolved Oxygen (mg/L)	ORP (mV)	Time (0:00 - 23:59)
	5.6	12.71	6.96	982	Clear	0.28	-149.7	10:59
		NTU = 7.46						

WELL CONDITION

Recommended Well Repairs/Additional Notes:

SAMPLING INFORMATION / DATA

Date Sampled: 3/30/06 | Additional Chain-of-Custody #s:

Time Sampled: 1115

Sample ID	Bottles (total)	Bottles (size)	Preservative	Destination Laboratory	Sample Transporter	Analytical Parameters
630-01	2	1 L	None	STL-Seattle	courier	8081A
	2	1 L	None	STL-Seattle	courier	8151A
	2	1 L	None	STL-Seattle	courier	8270C
	3	40 ml	HCL	STL-Seattle	courier	8260B
	2	1 L	HCL	STL-Seattle	courier	NWTPH-Dx
	2	1 L	None	STL-Sacram	courier	dioxins/furans 1613
	1	500 ml	Nitric Acid	STL-Seattle	courier	Total 7470/6000/7000
	1	500 ml	Nitric Acid	STL-Sacram	courier	Dissolved 7470/6000/7000
	1	1 L	None	Test America	courier	405.1/310.1/300
	1	500 ml	Sulfuric Acid	STL-Seattle	courier	415.1/410.4/350.1/351.12
	1	250	NAOH + Zn	STL-Seattle	courier	376.2
	3	40 ml	HCL	STL-Seattle	courier	RSK 175
	1	1 L	None	STL-Seattle	courier	chloride/sulfate/orthophosphorus/alkalinty
	1	125 ml	Na Thiosulfate	Food Quality		SM9215
	1	250 ml	None	Test Am		Nitrite/Nitrate / Orthophosphorus

Field Observations/Notes of Sampling Event:

CERTIFICATION STATEMENT

By signing below, the listed AMEC sampler states that the information provided on this page is accurate.

Sampler (Print): Lisa Gronek | Sampler Signature: Lisa Gronek | Date Signed: 3/30/06

amec	AMEC Earth & Environmental, Inc. GROUNDWATER SAMPLING FIELD FORM	Project Name: 2006 Winter GW Event Project #: 0-61M-10703-0 P 43 Monitoring/Sampling Date: 3/30/06

Monitoring Well ID: W-12-D | Field Personnel: L. Glonek, J. Rock
Start Time: 1125 | Weather Conditions: rainy | Approx. Air Temp (F): 50

INITIAL WELL DATA & WELL PURGING INFORMATION

PID (ppm) Background: 0.0 In well Casing: 2.0 | PID Calibration Standard: isobutylene
%LEL Background: NA In well Casing: NA | PID Calibration Date: 3/30/06
Date/Time of Measurement: 3/30/06 / 1205 | Depth to Water Measuring Technique: Solinst
Depth Well Bottom (TOC - ft.): 104.5 | Detection Method of Free Product: NA
Depth to Water Level (TOC - ft.): 20.06 | Conversions Factors (casing dia. = gallons/linear ft.) Circle One
Depth to Free Product (TOC - ft.): NA | 0.75" = 0.02 1" = 0.04 2" = 0.17 3" = 0.37
Calculated Column Height (ft.): | 4" = 0.66 6" = 1.47 8" = 2.61 12" = 5.88
Casing Diameter (in.): 4 | Three Well Purge Volumes (gallons) = 3 x _____ = _____
Quantity of Free Product Collected (gal.): NA | Method of Collecting Free Product: NA
Obsevation of sheen or LNAPL: NA | Observation of DNAPL: NA

Casing Volumes (#)	Volume Purged (liters)	Water Temperature (degree C)	Water pH (S.U.)	Specific Conductivity (ms)	Turbidity (NTUs)	Dissolved Oxygen (mg/L)	ORP (mV)	Time (0:00 - 23:59)
	Ø	13.31	7.87	414	clear	3.08	-106.2	1226
	0.8	13.48	6.92	406	slight	0.4	-121.9	1230
	1.6	13.57	6.68	405	↓	0.31	-18.0	1234
	2.4	13.56	6.67	406	clear	0.28	-120.4	1238
	3.2	13.80	6.82	405	Clear	Ø.31	-125.3	1242
	4.0	13.89	7.03	404	Clear	Ø.30	-141.1	1246
	4.8	13.85	6.92	405	clear	Ø.33	-132.6	1250

Total Purged = 4.8 | Purge Pumping Rate (approx. L/m): 0.2 | 7.54 | Well Yield: High / Moderate / Low
Purge Method (circle one): PVC Bailer / Poly Bailer / SS Bailer / Peristalic Pump / Grunfos Pump / Other = Qual Valve
Ferrous Iron (ppm): 2.6 | Decontamination Method: LP WSF
Instrument Type & Number: YSI | Water Disposal: Methanol / DI / Alconox / DI
Instrument Calibration Date & Time: 3/30/06 0800 | Approx. Pump/Intake Depth: 95

WELL CONDITION

Casing (circle one): Stainless Steel Carbon Steel PVC Other:
Casing Condition: OK / NA / Needs Repairs / Repaired | Lock Condition: OK / NA / Needs Repairs / Replaced
Cap Condition: OK / NA / Needs Repairs / Repaired | Inner Casing Condition: OK / NA / Needs Repairs / Repaired
Paint Condition: OK / NA / Needs Repairs / Repaired | Monument Condition: OK / NA / Needs Repairs / Repaired
Recommended Well Repairs:

SAMPLING INFORMATION / DATA

Date Sampled: 3/30/06 | QA/QC Sample (circle one): YES / NO | Water Chemistry Sample: YES / NO
Time Sampled: 1300 | Sampling Method (circle one): SS Bailer Poly Bailer Grunfos Pump
Chain-of-Custody #s: electronic | Teflon Bailer Peristaltic Pump Other: Qual Valve

Sample ID	Bottles (total)	Bottles (size)	Preservative	Destination Laboratory	Sample Transporter	Analytical Parameters
1031-01						
		see back				

All samples were immediately placed into a cooler and packed with ice or "Blue Ice", unless otherwise noted: YES / NO

Field Observations/Notes of Sampling Event:

CERTIFICATION STATEMENT

By signing below, the listed AMEC sampler states that the information provided on this page is accurate.

Sampler (Print): LISA GLONEK Sampler Signature: Lisa Glonek Date Signed: 3/30/06

SCOEPA00013290

amec	AMEC Earth & Environmental, Inc. GROUNDWATER SAMPLING FIELD FORM	Project Name: 2006 Winter GW Event Project #: 0-61M-10703-0 Phase 43 Monitoring/Sampling Date: 3/30/06

Monitoring Well ID: W-12-D | Field Personnel: C. Glonek, T. Rock

INITIAL WELL DATA & WELL PURGING INFORMATION

Casing Volumes (#)	Volume Purged (liters)	Water Temperature (degree C)	Water pH (S.U.)	Specific Conductivity (ms)	Turbidity (NTUs)	Dissolved Oxygen (mg/L)	ORP (mV)	Time (0:00 - 23:59)

WELL CONDITION

Recommended Well Repairs/Additional Notes:

SAMPLING INFORMATION / DATA

Date Sampled: 3/30/06 | Additional Chain-of-Custody #s:

Time Sampled: 1300

Sample ID	Bottles (total)	Bottles (size)	Preservative	Destination Laboratory	Sample Transporter	Analytical Parameters
631-01	2	1 L	None	STL-Seattle	courier	8081A
	2	1 L	None	STL-Seattle	courier	8151A
	2	1 L	None	STL-Seattle	courier	8270C
	3	40 ml	HCL	STL-Seattle	courier	8260B
	2	1 L	HCL	STL-Seattle	courier	NWTPH-Dx
	2	1 L	None	STL-Sacram	courier	dioxins/furans 1613
	1	500 ml	Nitric Acid	STL-Seattle	courier	Total 7470/6000/7000
	1	500 ml	Nitric Acid	STL-Sacram	courier	Dissolved 7470/6000/7000
	1	1 L	None	Test America	courier	405.1/310.1/300
	1	500 ml	Sulfuric Acid	STL-Seattle	courier	415.1/410.4/350.1/351.12
	1	250	NAOH + Zn	STL-Seattle	courier	376.2
	3	40 ml	HCL	STL-Seattle	courier	RSK 175
	1	1 L	None	STL-Seattle	courier	chloride/sulfate/orthophosphorus/alkalinty
	1	125ml	Na Thiosulfate	Food Quality	↓	SM 9215
	1	250ml	NONE	STL-Seattle	↓	Nitrite/Nitrate/orthophosphorus

Field Observations/Notes of Sampling Event:

CERTIFICATION STATEMENT

By signing below, the listed AMEC sampler states that the information provided on this page is accurate.

Sampler (Print): LKA GLONEK Sampler Signature: [signature] Date Signed: 3/30/06

amec	AMEC Earth & Environmental, Inc. GROUNDWATER SAMPLING FIELD FORM	Project Name: 2006 Winter GW Event Project #: 0-61M-10703-0 P 43 Monitoring/Sampling Date: 3/20/2006

Monitoring Well ID: WS-11-125 | Field Personnel: L. Glonek, C. Johnson, J. Fassio
Start Time: 0920 | Weather Conditions: Sunny | Approx. Air Temp (F): 50°

INITIAL WELL DATA & WELL PURGING INFORMATION

PID (ppm) Background: 0.0 In well Casing: 0.0 | PID Calibration Standard: isobutylene
%LEL Background: NA In well Casing: NA | PID Calibration Date: 3/20/2006

Date/Time of Measurement: 3/20/2006 / | Depth to Water Measuring Technique: Solinst
Depth Well Bottom (TOC - ft.): 125 | Detection Method of Free Product: NA
Depth to Water Level (TOC - ft.): 24.63 | Conversions Factors (casing dia. = gallons/linear ft.) Circle One
Depth to Free Product (TOC - ft.): NA | 0.75" = 0.02 1" = 0.04 2" = 0.17 3" = 0.37
Calculated Column Height (ft.): | 4" = 0.66 6" = 1.47 8" = 2.61 12" = 5.88
Casing Diameter (in.): 2" | Three Well Purge Volumes (gallons) = 3 x _____ = _____
Quantity of Free Product Collected (gal.): NA | Method of Collecting Free Product: NA
Obsevation of sheen or LNAPL: NA | Observation of DNAPL: NA

Casing Volumes (#)	Volume Purged (liters)	Water Temperature (degree C)	Water pH (S.U.)	Specific Conductivity (ms)	Turbidity (NTUs)	Dissolved Oxygen (mg/L)	ORP (mV)	Time (0:00 - 23:59)
	0	14.93	6.53	826	Clear	0.5	-59.3	0926
	2	15.68	6.46	871	↓	0.38	-87.3	0930
	4	15.81	6.43	883	↓	0.83	-96.0	0934
	6	15.84	6.42	882	↓	0.62	-98.3	0938
	8	15.92	6.42	881	↓	0.51	-99.9	0942
			Turbidity → 0.74					

Total Purged = 8 | Purge Pumping Rate (approx. L/m): 500ml/min | Well Yield: High / Moderate / Low
Purge Method (circle one): PVC Bailer / Poly Bailer / SS Bailer / Peristalic Pump / Grunfos Pump / Other = Dedidicated
Ferrous Iron (ppm): 5.8 | Decontamination Method: Disposable
Instrument Type & Number: YSI | Water Disposal: RP Drum warehouse, DOT Approved
Instrument Calibration Date & Time: 3/20/06 0815 | Approx. Pump/Intake Depth: 120'

WELL CONDITION

Casing (circle one): Stainless Steel Carbon Steel PVC Other:
Casing Condition: OK / NA / Needs Repairs / Repaired | Lock Condition: OK / NA / Needs Repairs / Replaced
Cap Condition: OK / NA / Needs Repairs / Repaired | Inner Casing Condition: OK / NA / Needs Repairs / Repaired
Paint Condition: OK / NA / Needs Repairs / Repaired | Monument Condition: OK / NA / Needs Repairs / Repaired
Recommended Well Repairs: NONE

SAMPLING INFORMATION / DATA

Date Sampled: 3/20/06 | QA/QC Sample (circle one): YES / NO | Water Chemistry Sample: YES / NO
Time Sampled: 1000 | Sampling Method (circle one): SS Bailer Poly Bailer Grunfos Pump
Chain-of-Custody #s: electronic | Teflon Bailer Peristaltic Pump Other: Dedicated

Sample ID	Bottles (total)	Bottles (size)	Preservative	Destination Laboratory	Sample Transporter	Analytical Parameters
601-01	19	←	Various	STL-SEA	Courier	see back
601-01	2	various	NONE	Test Am	↓	↓
601-01	1		Na Thiosulfate	Food	↓	↓
601-01	2	2	NONE	STL-SCA	↓	Dioxins
601-01	3	40ml	TSP	UCOK	↓	Isotope

All samples were immediately placed into a cooler and packed with ice or "Blue Ice", unless otherwise noted: YES / NO

Field Observations/Notes of Sampling Event:

CERTIFICATION STATEMENT

By signing below, the listed AMEC sampler states that the information provided on this page is accurate.

Sampler (Print): Lisa Glonek | Sampler Signature: LISA GLONEK | Date Signed: 3/20/2006

amec	AMEC Earth & Environmental, Inc. GROUNDWATER SAMPLING FIELD FORM	Project Name: 2006 Winter GW Event Project #: 0-61M-10703-0 Phase 43 Monitoring/Sampling Date: 3/20/2006

Monitoring Well ID: | Field Personnel:

INITIAL WELL DATA & WELL PURGING INFORMATION

Casing Volumes (#)	Volume Purged (liters)	Water Temperature (degree C)	Water pH (S.U.)	Specific Conductivity (ms)	Turbidity (NTUs)	Dissolved Oxygen (mg/L)	ORP (mV)	Time (0:00 - 23:59)

WELL CONDITION

Recommended Well Repairs/Additional Notes:

SAMPLING INFORMATION / DATA

Date Sampled: 3/20/2006 | Additional Chain-of-Custody #s:

Time Sampled: 1000

Sample ID	Bottles (total)	Bottles (size)	Preservative	Destination Laboratory	Sample Transporter	Analytical Parameters
601-01	2	1 L	None	STL-Seattle	courier	8081A
	2	1 L	None	STL-Seattle	courier	8151A
	2	1 L	None	STL-Seattle	courier	8270C
	3	40 ml	HCL	STL-Seattle	courier	8260B
	2	1 L	HCL	STL-Seattle	courier	NWTPH-Dx
	2	1 L	None	STL-Sacram	courier	dioxins/furans 1613
	1	500 ml	Nitric Acid	STL-Seattle	courier	Total 7470/6000/7000
	1	500 ml	Nitric Acid	STL-Sacram	courier	Dissolved 7470/6000/7000
	1	1 L	None	Test America	courier	405.1/~~310.1/300~~
	1	500 ml	Sulfuric Acid	STL-Seattle	courier	415.1/410.4/350.1/351.12
	1	250	NAOH + Zn	STL-Seattle	courier	376.2
	3	40 ml	HCL	STL-Seattle	courier	RSK 175
	1	1 L	None	STL-Seattle	courier	chloride/sulfate/orthophosphorus/alkalinty
	1	125ml	[illegible]	FQ		Sm9215
	3	40ml	~~[illegible]~~ BP	~~[illegible]~~		isotope
	1	250ml	~~[illegible]~~ NONE	TA		310.1/300

Field Observations/Notes of Sampling Event:

CERTIFICATION STATEMENT

By signing below, the listed AMEC sampler states that the information provided on this page is accurate.

Sampler (Print): LISA Glonek Sampler Signature: Lisa Glonek Date Signed: 3/20/2006

amec	AMEC Earth & Environmental, Inc. GROUNDWATER SAMPLING FIELD FORM	Project Name: 2006 Winter GW Event Project #: 0-61M-10703-0 P 43 Monitoring/Sampling Date: 3/20/2006

Monitoring Well ID: WS-11-161 | Field Personnel: L. Glonek, G. Johnson, J. Fassio
Start Time: 1100 | Weather Conditions: Sunny | Approx. Air Temp (F): 50

INITIAL WELL DATA & WELL PURGING INFORMATION

PID (ppm) Background: 0.0 In well Casing: 0.0 | PID Calibration Standard: isobutylene
%LEL Background: NA In well Casing: NA | PID Calibration Date: 3/20/2006
Date/Time of Measurement: 3/20/06 / 1002 / ~~[illegible]~~ | Depth to Water Measuring Technique: Solinst
Depth Well Bottom (TOC - ft.): 161 | Detection Method of Free Product: N/A
Depth to Water Level (TOC - ft.): 24.75 | Conversions Factors (casing dia. = gallons/linear ft.) Circle One
Depth to Free Product (TOC - ft.): NA | 0.75" = 0.02 1" = 0.04 2" = 0.17 3" = 0.37
Calculated Column Height (ft.): | 4" = 0.66 6" = 1.47 8" = 2.61 12" = 5.88
Casing Diameter (in.): 2 | Three Well Purge Volumes (gallons) = 3 x ____ = ____
Quantity of Free Product Collected (gal.): NA | Method of Collecting Free Product: NA
Obsevation of sheen or LNAPL: NA | Observation of DNAPL: NA

Casing Volumes (#)	Volume Purged (liters)	Water Temperature (degree C)	Water pH (S.U.)	Specific Conductivity (ms)	Turbidity (NTUs)	Dissolved Oxygen (mg/L)	ORP (mV)	Time (0:00 - 23:59)
	0	16.12	5.80	639	clear	0.33	-73.9	1107
0.8	~~1.6~~	16.20	5.71	640	↓	0.18	-81.9	1111
1.6	~~3.2~~	16.20	5.80	636	↓	0.16	-90.2	1115
2.4	~~4.8~~	16.22	5.93	633	↓	0.22	-99.5	1119
3.2	~~6.0~~	16.23	6.03	630	↓	0.42	-107.5	1123
4.0	~~7.2~~	16.29	6.14	628	↓	0.32	-113.7	1127
4.8	~~8.4~~	16.36	6.23	625	↓		-119.8	1131

Total Purged = 4.8 ~~8.4~~ | Purge Pumping Rate (approx. L/m): ~~0.4~~ 0.2 | Well Yield: High / ~~Moderate~~ / Low
Purge Method (circle one): PVC Bailer / Poly Bailer / SS Bailer / Peristalic Pump / Grunfos Pump / Other = Dual Valve
Ferrous Iron (ppm): 5.4 | Decontamination Method: Disposable Tubing
Instrument Type & Number: YSI | Water Disposal: RP Drum warehouse
Instrument Calibration Date & Time: 3/20/06 0815 | Approx. Pump/Intake Depth: 157

WELL CONDITION

Casing (circle one): Stainless Steel Carbon Steel PVC Other:
Casing Condition: OK / NA / Needs Repairs / Repaired | Lock Condition: OK / NA / Needs Repairs / Replaced
Cap Condition: OK / NA / Needs Repairs / Repaired | Inner Casing Condition: OK / NA / Needs Repairs / Repaired
Paint Condition: OK / NA / Needs Repairs / Repaired | Monument Condition: OK / NA / Needs Repairs / Repaired
Recommended Well Repairs:

SAMPLING INFORMATION / DATA

Date Sampled: 3/20/06 | QA/QC Sample (circle one): YES / NO | Water Chemistry Sample: YES / NO
Time Sampled: 1130 | Sampling Method (circle one): SS Bailer Poly Bailer ~~Grunfos Pump~~
Chain-of-Custody #s: electronic | Teflon Bailer Peristaltic Pump Other: Dual Valve

Sample ID	Bottles (total)	Bottles (size)	Preservative	Destination Laboratory	Sample Transporter	Analytical Parameters
602-01	19	various →		STL SEA	courier	various
602-01	2	various	NONE	TA	↓	various
↓	1	125ml		FQ	↓	SM9215
↓	2	1L	NONE	STL-SCA	↓	Dioxins
↓	3		BP	U of OK	↓	Isotope

All samples were immediately placed into a cooler and packed with ice or "Blue Ice", unless otherwise noted: YES / NO

Field Observations/Notes of Sampling Event:
602-03 - 2 Trip Blanks Turbidity = 0.67

CERTIFICATION STATEMENT

By signing below, the listed AMEC sampler states that the information provided on this page is accurate.

Sampler (Print): LISA GLONEK Sampler Signature: Lisa Glonek ~~Date~~ Signed: 3/20/06

SCOEPA00013294

amec	AMEC Earth & Environmental, Inc. GROUNDWATER SAMPLING FIELD FORM	Project Name: 2006 Winter GW Event Project #: 0-61M-10703-0 Phase 43 Monitoring/Sampling Date: 3/20/2006

Monitoring Well ID: MW-11-161 | Field Personnel: L. Colonel, C. Dinnion, J. Fenton

INITIAL WELL DATA & WELL PURGING INFORMATION

Casing Volumes (#)	Volume Purged (liters)	Water Temperature (degree C)	Water pH (S.U.)	Specific Conductivity (ms)	Turbidity (NTUs)	Dissolved Oxygen (mg/L)	ORP (mV)	Time (0:00 - 23:59)

WELL CONDITION

Recommended Well Repairs/Additional Notes:

SAMPLING INFORMATION / DATA

Date Sampled: 3/20/2006 | Additional Chain-of-Custody #s:

Time Sampled: 1320

Sample ID	Bottles (total)	Bottles (size)	Preservative	Destination Laboratory	Sample Transporter	Analytical Parameters
160201	2	1 L	None	STL-Seattle	courier	8081A
	2	1 L	None	STL-Seattle	courier	8151A
	2	1 L	None	STL-Seattle	courier	8270C
	3	40 ml	HCL	STL-Seattle	courier	8260B
	2	1 L	HCL	STL-Seattle	courier	NWTPH-Dx
	2	1 L	None	STL-Sacram	courier	dioxins/furans 1613
	1	500 ml	Nitric Acid	STL-Seattle	courier	Total 7470/6000/7000
	1	500 ml	Nitric Acid	STL-Sacram	courier	Dissolved 7470/6000/7000
	1	1 L	None	Test America	courier	405.1/310.1/300
	1	500 ml	Sulfuric Acid	STL-Seattle	courier	415.1/410.4/350.1/351.12
	1	250	NAOH + Zn	STL-Seattle	courier	376.2
	3	40 ml	HCL	STL-Seattle	courier	RSK 175
	1	1 L	None	STL-Seattle	courier	chloride/sulfate/orthophosphorus/alkalinty
	1	250ml	Na Thiosulfate	FQ	↓	SM9215
	3	40ml	HCl	UofOK		160.4
↓	1	250ml	None	TA		310.1 300

Field Observations/Notes of Sampling Event:

CERTIFICATION STATEMENT

By signing below, the listed AMEC sampler states that the information provided on this page is accurate.

Sampler (Print): LISA GLONEK Sampler Signature: Lisa Glonek Date Signed: 3/20/2006

amec

AMEC Earth & Environmental, Inc.
GROUNDWATER SAMPLING FIELD FORM

Project Name: 2006 Winter GW Event
Project #: 0-61M-10703-0 P 43
Monitoring/Sampling Date: 3/31/06

Monitoring Well ID: MOS-11-161 | Field Personnel: L. Glonek, B. McCullough
Start Time: 0910 | Weather Conditions: Sunny, calm | Approx. Air Temp (F): 50

INITIAL WELL DATA & WELL PURGING INFORMATION

PID (ppm) Background: 0.0 | In well Casing: 0.0 | PID Calibration Standard: isobutylene
%LEL Background: NA | In well Casing: NA | PID Calibration Date: 3/31/06
Date/Time of Measurement: 3/31/06 / 0900 | Depth to Water Measuring Technique: Solinst
Depth Well Bottom (TOC - ft.): 161 | Detection Method of Free Product: NA
Depth to Water Level (TOC - ft.): 22.79 | Conversions Factors (casing dia. = gallons/linear ft.) Circle One
Depth to Free Product (TOC - ft.): NA | 0.75" = 0.02 | 1" = 0.04 | 2" = 0.17 | 3" = 0.37
Calculated Column Height (ft.): | 4" = 0.66 | 6" = 1.47 | 8" = 2.61 | 12" = 5.88
Casing Diameter (in.): 2 | Three Well Purge Volumes (gallons) = 3 x _____ = _____
Quantity of Free Product Collected (gal.): NA | Method of Collecting Free Product: NA
Obsevation of sheen or LNAPL: NA | Observation of DNAPL: NA

Casing Volumes (#)	Volume Purged (liters)	Water Temperature (degree C)	Water pH (S.U.)	Specific Conductivity ~~(mS)~~ µS	Turbidity (NTUs)	Dissolved Oxygen (mg/L)	ORP (mV)	Time (0:00 - 23:59)
	0	13.51	7.16	581	clear	553	-20.8	0911
	1.2	16.37	6.61	608	↓	0.37	-134.3	0915
	2.4	16.42	6.62	622	↓	0.35	-147.1	0919
	3.6	16.46	6.67	613	↓	1.44	-154.1	0923
	4.8	16.39	6.70	611	↓	0.83	-157.5	0927
	6.0	16.39	6.69	603	↓	0.36	-158.6	0931
	7.2	16.25	6.71	599	0.41	0.29	-160.4	0935

Total Purged = 7.2 | Purge Pumping Rate (approx. L/m): 0.3 | Well Yield: (High) / Moderate / Low
Purge Method (circle one): PVC Bailer / Poly Bailer / SS Bailer / Peristalic Pump / Grunfos Pump / Other = Qualdrive
Ferrous Iron (ppm): 5.0 | Decontamination Method: Dedicated liners
Instrument Type & Number: YSI | Water Disposal: LPWSF
Instrument Calibration Date & Time: 3/31/06 | Approx. Pump/Intake Depth: 156

WELL CONDITION

Casing (circle one): Stainless Steel | Carbon Steel | (PVC) | Other:
Casing Condition: (OK) / NA / Needs Repairs / Repaired | Lock Condition: (OK) / NA / Needs Repairs / Replaced
Cap Condition: (OK) / NA / Needs Repairs / Repaired | Inner Casing Condition: (OK) / NA / Needs Repairs / Repaired
Paint Condition: (OK) / NA / Needs Repairs / Repaired | Monument Condition: (OK) / NA / Needs Repairs / Repaired
Recommended Well Repairs:

SAMPLING INFORMATION / DATA

Date Sampled: 3/31/06 | QA/QC Sample (circle one): YES / (NO) | Water Chemistry Sample: (YES) / NO
Time Sampled: 0940 | Sampling Method (circle one): SS Bailer | Poly Bailer | Grunfos Pump
Chain-of-Custody #s: electronic | Teflon Bailer | Peristaltic Pump | Other: Qualdrive

Sample ID	Bottles (total)	Bottles (size)	Preservative	Destination Laboratory	Sample Transporter	Analytical Parameters
632-01	3	40ml	HCl for TSR	Lancaster	courier	voa's

All samples were immediately placed into a cooler and packed with ice or "Blue Ice", unless otherwise noted: YES / NO
Field Observations/Notes of Sampling Event: re-sample because was frozen

CERTIFICATION STATEMENT

By signing below, the listed AMEC sampler states that the information provided on this page is accurate.
Sampler (Print): LISA GLONEK | Sampler Signature: Lisa Glonek | Date Signed: 3/31/06

SCOEPA00013296

amec

AMEC Earth & Environmental, Inc.
GROUNDWATER
SAMPLING FIELD FORM

Project Name:	2006 Winter GW Event
Project #:	0-61M-10703-0 Phase 43
Monitoring/Sampling Date:	

Monitoring Well ID: | Field Personnel:

INITIAL WELL DATA & WELL PURGING INFORMATION

Casing Volumes (#)	Volume Purged (liters)	Water Temperature (degree C)	Water pH (S.U.)	Specific Conductivity (ms)	Turbidity (NTUs)	Dissolved Oxygen (mg/L)	ORP (mV)	Time (0:00 - 23:59)

WELL CONDITION

Recommended Well Repairs/Additional Notes:

SAMPLING INFORMATION / DATA

Date Sampled: | Additional Chain-of-Custody #s:

Time Sampled:

Sample ID	Bottles (total)	Bottles (size)	Preservative	Destination Laboratory	Sample Transporter	Analytical Parameters
	2	1 L	None	STL-Seattle	courier	8081A
	2	1 L	None	STL-Seattle	courier	8151A
	2	1 L	None	STL-Seattle	courier	8270C
	3	40 ml	HCL	STL-Seattle	courier	8260B
	2	1 L	HCL	STL-Seattle	courier	NWTPH-Dx
	2	1 L	None	STL-Sacram	courier	dioxins/furans 1613
	1	500 ml	Nitric Acid	STL-Seattle	courier	Total 7470/6000/7000
	1	500 ml	Nitric Acid	STL-Sacram	courier	Dissolved 7470/6000/7000
	1	1 L	None	Test America	courier	405.1/310.1/300
	1	500 ml	Sulfuric Acid	STL-Seattle	courier	415.1/410.4/350.1/351.12
	1	250	NAOH + Zn	STL-Seattle	courier	376.2
	3	40 ml	HCL	STL-Seattle	courier	RSK 175
	1	1 L	None	STL-Seattle	courier	chloride/sulfate/orthophosphorus/alkalinty

Field Observations/Notes of Sampling Event:

CERTIFICATION STATEMENT

By signing below, the listed AMEC sampler states that the information provided on this page is accurate.

Sampler (Print): Lisa Gloner | Sampler Signature: Lisa Gloner | Date Signed: 9/5/06

amec	AMEC Earth & Environmental, Inc. GROUNDWATER SAMPLING FIELD FORM	Project Name: 2006 Winter GW Event Project #: 0-61M-10703-0 P 43 Monitoring/Sampling Date: 3/20/2006

Monitoring Well ID: WS-12-125 | Field Personnel: L. Glonek, C. Johnson, J. Fabio
Start Time: 1300 | Weather Conditions: Sunny | Approx. Air Temp (F): 55

INITIAL WELL DATA & WELL PURGING INFORMATION

PID (ppm) Background: 0.0 In well Casing: 0.0 | PID Calibration Standard: isobutylene
%LEL Background: NA In well Casing: NA | PID Calibration Date: 3/20/2006
Date/Time of Measurement: 3/20/2006 1300 | Depth to Water Measuring Technique: ~~NA~~ Solinst
Depth Well Bottom (TOC - ft.): 125 | Detection Method of Free Product: NA
Depth to Water Level (TOC - ft.): 26.04 | Conversions Factors (casing dia. = gallons/linear ft.) Circle One
Depth to Free Product (TOC - ft.): NA | 0.75" = 0.02 1" = 0.04 2" = 0.17 3" = 0.37
Calculated Column Height (ft.): | 4" = 0.66 6" = 1.47 8" = 2.61 12" = 5.88
Casing Diameter (in.): 2 | Three Well Purge Volumes (gallons) = 3 x _____ = _____
Quantity of Free Product Collected (gal.): NA | Method of Collecting Free Product: NA
Obsevation of sheen or LNAPL: NA | Observation of DNAPL: NA

Casing Volumes (#)	Volume Purged (liters)	Water Temperature (degree C)	Water pH (S.U.)	Specific Conductivity (ms)	Turbidity (NTUs)	Dissolved Oxygen (mg/L)	ORP (mV)	Time (0:00 - 23:59)
LAG	~~0~~	~~14.52~~	~~7.80~~	~~526~~	~~clear~~	~~7.20~~	~~-39.5~~	LAG
	0.8	17.27	6.38	722	clear	3.61	-4.1	1308
LAG	~~[illegible]~~	17.93	4.39	862	↓	0.75	4.3	1312
LAG 1.6	~~3.2~~	17.84	4.55	856	↓	0.5	-14.7	1316
	2.4	17.84	4.77	846	↓	0.41	-32	1320
	3.2	17.82	4.99	842	↓	0.31	-45.7	1324
	4.0	17.79	5.27	841	↓	0.28	-59.8	1328

OVER

Total Purged = | Purge Pumping Rate (approx. L/m): ~~0.4~~ LAG 0.2 | Well Yield: High / Moderate / Low
Purge Method (circle one): PVC Bailer / Poly Bailer / SS Bailer / Peristalic Pump / Grunfos Pump / Other = Dual valve
Ferrous Iron (ppm): 4.9 | Decontamination Method: Disposable / dedicated
Instrument Type & Number: YSI | Water Disposal: U Drum warehouse
Instrument Calibration Date & Time: 3/20/06 0815 | Approx. Pump/Intake Depth: 120

WELL CONDITION

Casing (circle one): Stainless Steel Carbon Steel PVC Other:
Casing Condition: OK / NA / Needs Repairs / Repaired | Lock Condition: OK / NA / Needs Repairs / Replaced
Cap Condition: OK / NA / Needs Repairs / Repaired | Inner Casing Condition: OK / NA / Needs Repairs / Repaired
Paint Condition: OK / NA / Needs Repairs / Repaired | Monument Condition: OK / NA / Needs Repairs / Repaired
Recommended Well Repairs:

SAMPLING INFORMATION / DATA

Date Sampled: 3/20/2006 | QA/QC Sample (circle one): YES NO | Water Chemistry Sample: YES / NO
Time Sampled: 1330 | Sampling Method (circle one): SS Bailer Poly Bailer Grunfos Pump
Chain-of-Custody #s: electronic | Teflon Bailer Peristaltic Pump Other: Dual valve

Sample ID	Bottles (total)	Bottles (size)	Preservative	Destination Laboratory	Sample Transporter	Analytical Parameters
603-01	19	various	various	Courier	STL-SEA	various
↓	2	↓	NONE	↓	TA	↓
↓	1	125	NaThiosulfate	↓	FQ	SM9215
↓	2	1L	NONE	↓	STL-SAC	Dioxins
↓	3	40ml	TSP	↓	U of OK	isotopes

All samples were immediately placed into a cooler and packed with ice or "Blue Ice", unless otherwise noted: YES / NO

Field Observations/Notes of Sampling Event:
see back page

CERTIFICATION STATEMENT

By signing below, the listed AMEC sampler states that the information provided on this page is accurate.

Sampler (Print): LISA GLONEK | Sampler Signature: [signature] | Date Signed: 3/20/06

SCOEPA00013298

amec

AMEC Earth & Environmental, Inc.
GROUNDWATER
SAMPLING FIELD FORM

Project Name: 2006 Winter GW Event
Project #: 0-61M-10703-0 Phase 43
Monitoring/Sampling Date: 3/20/06

Monitoring Well ID: | Field Personnel:

INITIAL WELL DATA & WELL PURGING INFORMATION

Casing Volumes (#)	Volume Purged (liters)	Water Temperature (degree C)	Water pH (S.U.)	Specific Conductivity (ms)	Turbidity (NTUs)	Dissolved Oxygen (mg/L)	ORP (mV)	Time (0:00 - 23:59)
	4.8	17.77	5.33	841	clear	1.36	-65.2	1332
	5.6	17.75	5.50	841	↓	0.26	-74.9	1336
	6.4	17.69	5.66	841	↓	0.24	-83.1	1340

Turbidity - 10.7 H

WELL CONDITION

Recommended Well Repairs/Additional Notes:

SAMPLING INFORMATION / DATA

Date Sampled: 3/20/06
Time Sampled: 1330
Additional Chain-of-Custody #s:

Sample ID	Bottles (total)	Bottles (size)	Preservative	Destination Laboratory	Sample Transporter	Analytical Parameters
100301	2	1 L	None	STL-Seattle	courier	8081A
	2	1 L	None	STL-Seattle	courier	8151A
	2	1 L	None	STL-Seattle	courier	8270C
	3	40 ml	HCL	STL-Seattle	courier	8260B
	2	1 L	HCL	STL-Seattle	courier	NWTPH-Dx
	2	1 L	None	STL-Sacram	courier	dioxins/furans 1613
	1	500 ml	Nitric Acid	STL-Seattle	courier	Total 7470/6000/7000
	1	500 ml	Nitric Acid	STL-Sacram	courier	Dissolved 7470/6000/7000
	1	1 L	None	Test America	courier	405.1/310.1/300
	1	500 ml	Sulfuric Acid	STL-Seattle	courier	415.1/410.4/350.1/351.12
	1	250	NAOH + Zn	STL-Seattle	courier	376.2
	3	40 ml	HCL	STL-Seattle	courier	RSK 175
	1	1 L	None	STL-Seattle	courier	chloride/sulfate/orthophosphorus/alkalinty
	3	40ml	TSP	↓ OK		stable isotope
	1	250ml	NONE	Test Am		Nitrite/Nitrate/orthophosphorus
↓	1	125ml	Na Thiosulfate	Fort Quality		SM 9215

Field Observations/Notes of Sampling Event:

CERTIFICATION STATEMENT

By signing below, the listed AMEC sampler states that the information provided on this page is accurate.

Sampler (Print): LISA GLOVER Sampler Signature: Lisa Glover Date Signed: 3/20/2006

amec	AMEC Earth & Environmental, Inc. GROUNDWATER SAMPLING FIELD FORM	Project Name: 2006 Winter GW Event Project #: 0-61M-10703-0 P 43 Monitoring/Sampling Date: 3/21/06

Monitoring Well ID: WS-12-161	Field Personnel: BARB, BRENDAN, JOE F.
Start Time: 845	Weather Conditions: PTLY CLOUDY & COOL Approx. Air Temp (F):

INITIAL WELL DATA & WELL PURGING INFORMATION

PID (ppm) Background: 0.0 In well Casing: 0.0	PID Calibration Standard: isobutylene
%LEL Background: N/A In well Casing:	PID Calibration Date: 3/21/06
Date/Time of Measurement: 3/21/06 / 850	Depth to Water Measuring Technique:
Depth Well Bottom (TOC - ft.):	Detection Method of Free Product:
Depth to Water Level (TOC - ft.): 25.61	Conversions Factors (casing dia. = gallons/linear ft.) Circle One
Depth to Free Product (TOC - ft.): NA	0.75" = 0.02 1" = 0.04 2" = 0.17 3" = 0.37
Calculated Column Height (ft.):	4" = 0.66 6" = 1.47 8" = 2.61 12" = 5.88
Casing Diameter (in.): 2"	Three Well Purge Volumes (gallons) = 3 x _____ = _____
Quantity of Free Product Collected (gal.):	Method of Collecting Free Product:
Obsevation of sheen or LNAPL:	Observation of DNAPL:

Casing Volumes (#)	Volume Purged (liters)	Water Temperature (degree C)	Water pH (S.U.)	Specific Conductivity (ms)	Turbidity (NTUs)	Dissolved Oxygen (mg/L)	ORP (mV)	Time (0:00 - 23:59)
ON	BACK							

Total Purged =	Purge Pumping Rate (approx. L/m):	Well Yield: High / Moderate / Low
Purge Method (circle one): PVC Bailer / Poly Bailer / SS Bailer / Peristalic Pump / Grunfos Pump / Other - Bladder - dedicated		
Ferrous Iron (ppm):	Decontamination Method:	
Instrument Type & Number: #4 YSI	Water Disposal:	
Instrument Calibration Date & Time: 3/21/06 8:00	Approx. Pump/Intake Depth:	

MAUL FOSTER WELL

WELL CONDITION

Casing (circle one): Stainless Steel Carbon Steel PVC Other:	
Casing Condition: OK / NA / Needs Repairs / Repaired	Lock Condition: OK / NA / Needs Repairs / Replaced
Cap Condition: OK / NA / Needs Repairs / Repaired	Inner Casing Condition: OK / NA / Needs Repairs / Repaired
Paint Condition: OK / NA / Needs Repairs / Repaired	Monument Condition: OK / NA / Needs Repairs / Repaired
Recommended Well Repairs: APPEARS TO BE IN GOOD CONDITION	

SAMPLING INFORMATION / DATA

Date Sampled: 6024-01	QA/QC Sample (circle one): YES / NO	Water Chemistry Sample: YES / NO
Time Sampled: 930	Sampling Method (circle one): SS Bailer Poly Bailer Grunfos Pump	
Chain-of-Custody #s: electronic	Teflon Bailer Peristaltic Pump Other: /	

Sample ID	Bottles (total)	Bottles (size)	Preservative	Destination Laboratory	Sample Transporter	Analytical Parameters
604-01						

All samples were immediately placed into a cooler and packed with ice or "Blue Ice", unless otherwise noted: YES / NO

Field Observations/Notes of Sampling Event: 25

CERTIFICATION STATEMENT

By signing below, the listed AMEC sampler states that the information provided on this page is accurate.

Sampler (Print): BARB LARY Sampler Signature: Barb Lary Date Signed: 3/21/06

SCOEPA00013300

amec	AMEC Earth & Environmental, Inc. GROUNDWATER SAMPLING FIELD FORM	Project Name: 2006 Winter GW Event Project #: 0-61M-10703-0 Phase 43 Monitoring/Sampling Date: 3/21/06

Monitoring Well ID: WS-12-161 | Field Personnel:

INITIAL WELL DATA & WELL PURGING INFORMATION

Casing Volumes (#)	Volume Purged (liters)	Water Temperature (degree C)	Water pH (S.U.)	Specific Conductivity ~~(uS)~~ uS/cm	~~Turbidity (NTUs)~~ DTW feet	Dissolved Oxygen (mg/L)	ORP (mV)	Time (0:00 - 23:59)
N/A	0	14.66	6.39	675	26.52	1.24	-46.8	903
	1	16.46	6.54	694	26.90	0.30	-121.7	907
	2	16.49	6.54	694		0.25	-133.7	910
	3	16.40	6.54	692		0.43	-137.9	913
	~4	16.45	6.52	691		0.60	-143.3	916
	~5.5	16.41	6.55	689	27.2	0.29	-142.1	920
	~7	16.43	6.55	690	27.1	0.26	-143.1	924
	8	16.43	6.56	690	27.18	0.22	-142.8	9:27
	TURBIDITY	2.64 NTUs						
	Fe^{2+}	3.60 mg/L			26.72			

LOW FLOW PURGING & SAMPLING

WELL CONDITION

Recommended Well Repairs/Additional Notes:

~~400+~~ ~~18~~ 320 ml/min pump rate

SAMPLING INFORMATION / DATA

Date Sampled: 3/21/06 | Additional Chain-of-Custody #s:

Time Sampled: 930

Sample ID	Bottles (total)	Bottles (size)	Preservative	Destination Laboratory	Sample Transporter	Analytical Parameters
604-01	2	1 L ✓	None	STL-Seattle	courier	8081A
	2	1 L	None	STL-Seattle	courier	8151A
	2	1 L	None	STL-Seattle	courier	8270C
	3	40 ml ✓	HCL	STL-Seattle	courier	8260B
	2	1 L	HCL	STL-Seattle	courier	NWTPH-Dx
	2	1 L	None	STL-Sacram	courier	dioxins/furans 1613
	1	500 ml	Nitric Acid	STL-Seattle	courier	Total 7470/6000/7000
	1	500 ml	Nitric Acid	STL-Sacram	courier	Dissolved 7470/6000/7000
	1	1 L	None	Test America	courier	405.1/310.1/300
	1	500 ml	Sulfuric Acid	STL-Seattle	courier	415.1/410.4/350.1/351.12
	1	250	NAOH + ~~Zn~~	STL-Seattle	courier	376.2
	3	40 ml ✓	HCL	STL-Seattle	courier	RSK 175
	1	1 L	None	STL-Seattle	courier	chloride/sulfate/orthophosphorus/alkalinty
	1	250	None	Test Amer		TKN/orthophosphorus
	3	40 ml ✓	TSP	U. of OK		for ~~enric~~ isotope
	1	3 no.	Na Thiosulfate	Food Quality		SM 9215

Field Observations/Notes of Sampling Event:

CERTIFICATION STATEMENT

By signing below, the listed AMEC sampler states that the information provided on this page is accurate.

Sampler (Print): BARB LARY | Sampler Signature: Barb Lary | Date Signed: 3/21/06

ATTACHMENT D

Data Validation Reports

D-1 Data Validation Report for the Winter 2006 Groundwater Sampling Event - Excluding PCDD/PCDF

D-2 Data Validation Report for the Winter 2006 Groundwater Sampling Event - PCDD/PCDF Results

ATTACHMENT D

Data Validation Reports

D-1 Data Validation Report for the Winter 2006 Groundwater Sampling Event - Excluding PCDD/PCDF

D-2 Data Validation Report for the Winter 2006 Groundwater Sampling Event - PCDD/PCDF Results

ATTACHMENT D-1

DATA VALIDATION REPORT FOR THE WINTER 2006 GROUNDWATER MONITORING EVENT EXCLUDING PCDD/PCDF RP - PORTLAND SITE

August 3, 2006

Submitted to:

Oregon Department of Environmental Quality
Northwest Region
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Prepared for:

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0-61M-107030/Phase 43

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ACRONYMS

%D	percent deviation or percent drift in relative response
AMEC	AMEC Earth & Environmental, Inc.
BS	blank spike
BSD	blank spike duplicate
CAR	certified analytical report
CCAL	continuing calibration
CCB	continuing calibration blank
CCV	continuing calibration verification
CLP	EPA Contract Laboratory Program
COC	chain of custody
DEQ	Oregon Department of Environmental Quality
DQI	data quality indicators
DRO	diesel range organics
Ecology	Washington State Department of Ecology
EPA	U.S. Environmental Protection Agency
GC	gas chromatography
ICAL	initial calibration
ICS	interference check sample
ICV	initial calibration verification
ID	identification
IDL	instrument detection limit
IS	internal standard
LCS	laboratory control sample
LCSD	laboratory control sample duplicate
MDL	method detection limit
MRL	method reporting limit
MS	matrix spike

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MSD	matrix spike duplicate
NWTPH-Dx	Northwest Total Petroleum Hydrocarbons-Diesel
OCP	organochlorine pesticide
OSWER	EPA Office of Solid Waste and Emergency Response
PQL	practical quantitation limit
QAPP	quality assurance project plan
QC	quality control
RL	reporting limit
RF	response factor
RPD	relative percent difference
RRF	relative response factor
RRO	residual range organics
SOP	standard operating procedure
STL	Severn Trent Laboratories, Inc.
SVOC	semivolatile organic compound
VOC	volatile organic compound

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1.0 INTRODUCTION

Fifty groundwater samples were collected from the Rhône-Poulenc (RP) Portland Site, between March 20, 2006 and April 3, 2006, for the 2006 Winter Groundwater Monitoring Event. The samples included 34 primary samples, 3 field duplicates, 1 interlaboratory split sample, 11 trip blanks, and 1 rinsate blank, which were submitted to Severn Trent Laboratories, Inc. (STL) in Tacoma, Washington, and TestAmerica Analytical Testing Corporation (TestAmerica) in Beaverton, Oregon, for analysis. STL analyzed the samples for metals by United States Environmental Protection Agency (EPA) Methods 6010B/6020; mercury by EPA Method 7470A; organochlorine pesticides by EPA Method 8081A; chlorinated herbicides by EPA Method 8151A; volatile organic compounds (VOCs) by EPA Method 8260B; and semivolatile organic compounds (SVOCs) by EPA Method 8270C; and semivolatile petroleum products by Oregon Department of Environmental Quality (DEQ)/Washington Department of Ecology (Ecology) Method NWTPH-Dx. TestAmerica analyzed the split sample and a trip blank. A list of these samples by sample location, field sample identification (ID), and laboratory sample ID is presented in Table 1.

2.0 DATA VALIDATION METHODOLOGY

This data validation has been performed with reference to EPA guidelines as given in the April 1992 final version of Guidance for Data Usability in Risk Assessment, the current EPA functional guidelines for organic and inorganic data review, and the EPA Office of Solid Waste and Emergency Response (OSWER) standard operating procedures (SOPs) for inorganic and organic data review. The EPA guidelines listed above were written specifically for the Contract Laboratory Program (CLP), and have been modified for the purposes of this data validation where they differ from EPA SW-846 Methods (EPA, 2004) quality control requirements.

AMEC Earth & Environmental, Inc.'s (AMEC's) methodology exceeded the validation procedures specified in the DEQ-approved Revised Quality Assurance Project Plan (QAPP), dated June 13, 2001 (AMEC, 2001), and the QAPP Addendum No. 1 dated August 1, 2002 (AMEC, 2002). The laboratory's certified analytical report (CAR) and supporting documentation were reviewed to assess the following: chain of custody (COC) compliance; holding time compliance; presence or absence of laboratory contamination as demonstrated by method and field blanks; accuracy and bias as demonstrated by recovery of surrogate spikes, laboratory control samples (LCS), and matrix spikes (MS); analytical precision as relative percent difference (RPD) of analyte concentration between replicate samples (i.e., laboratory duplicates) or MS and matrix

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spike duplicates (MSD); sampling precision as RPD of analyte concentration between field duplicates; calibration performance; and insofar as possible, the degree of conformance to method requirements and good laboratory practices.

In general, it is important to recognize that no analytical data are guaranteed to be correct, even if all quality control (QC) audits are passed. Strict QC serves to increase confidence in data, but any reported value may potentially contain error.

3.0 EXPLANATION OF DATA QUALITY INDICATORS

LCS Recoveries

LCS and laboratory control sample duplicates (LCSD), also known as blank spike (BS) and blank spike duplicates (BSD), are aliquots of analyte-free water or Ottawa sand that are spiked with the analytes of interest for an analytical method or a representative subset of those analytes. The spiked water or sand is then processed through the same extraction, concentration, cleanup, and analytical procedures as the samples they accompany. LCS recovery and precision are indications of a laboratory's ability to successfully perform an analytical method in an interference-free matrix. LCS recoveries should generally be within 70 to 130% acceptance limits for organic analytes and 80 to 120% for inorganic analytes.

MS Recoveries

MS and MSD are prepared by adding known amounts of the analytes of interest for an analytical method, or a representative subset of those analytes, to an aliquot of sample. The spiked sample is then processed through the same extraction, concentration, cleanup, and analytical procedures as the unspiked samples in an analytical batch.

MS recovery and precision are indications of a laboratory's ability to successfully recover an analyte in the matrix of a specific sample or closely related sample matrices. It is important not to apply MS results for any specific sample to other samples without understanding how the sample matrices are related. MS recoveries should generally be within 60 to 140% acceptance limits for organic analytes and 75 to 125% acceptance limits for inorganic analytes.

Internal Standard Recoveries

Internal standard (IS) are compounds that are added to a sample extract after all preparatory steps are completed and before instrumental analysis. These compounds

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serve as standards for qualitative analysis using relative retention time and quantitative analysis using relative response factors (RRFs). Methods that use IS calibration include requirements for changes in response to the IS relative to the initial calibration (ICAL).

For EPA Methods 8260B and 8270C, IS response must fall between 50 and 200% of the response in the ICAL. Because the area of the IS is used in the denominator of the equation for calculation of results using internal standardization, a response below 50% may indicate a possible positive bias, and a response above 200% may indicate a possible negative bias.

For EPA Method 6020 IS intensities must fall between 30 and 120% of the intensity of that IS in the ICAL standard. The intensity of the ISs for the calibration blank and instrument check standard must fall between 80 and 120% of the intensity of the IS of the ICAL standard.

Surrogate Spike Recoveries

Surrogate spikes are used to evaluate accuracy, method performance, and extraction efficiency in each individual sample. Surrogate compounds are compounds not normally found in environmental samples, but which are similar to target analytes in chemical composition and behavior in the analytical process. Surrogate recoveries generally should be within 70 to 130% acceptance limits in interference-free matrices (blanks, LCS/LCSD) and 60 to 140% acceptance limits in field samples.

Field Duplicate Results

Field duplicates are replicate samples collected at the same location and submitted in blind form to the laboratory. Field duplicates provide an indication of the reproducibility of the sampling and analysis procedures for a given sample matrix, including heterogeneity of the sample itself. RPDs between aqueous field duplicate results should be less than 30% and for soil samples less than 50% for analytes with concentrations greater than 5 times the method reporting limit (MRL) and the difference between analyte concentrations less than 5 times the MRL should be less than or equal to the corresponding MRL. A summary of field duplicate detections may be found in Table 2.

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Blank Concentrations

Blank samples are aliquots of analyte free water or Ottawa sand that are used as negative controls to verify that the sample collection, storage, preparation, and analysis system does not produce false positive results. The three types of blanks employed for this project are:

- Laboratory blanks are aliquots of analyte free water that are processed by the laboratory using exactly the same procedures as the field samples. Laboratory blanks are used to monitor for contamination introduced by the laboratory during sample preparation and analysis.
- Trip blanks are aliquots of analyte free water that are placed in sample containers at the analytical laboratory and are then sent into the field with the sample containers that are used to collect field samples. Trip blanks are not opened in the field, but accompany the field samples back to the laboratory where they are analyzed as samples. Trip blanks are used to monitor for contamination that result from sample shipping and storage. For the purpose of this project, trip blanks are prepared and analyzed for VOCs only.
- Rinsate blanks are prepared by passing analyte-free water through or over sample collection equipment and collecting the water in sample containers. Rinsate blanks are analyzed for the analytical suite required for the project. Rinsate blanks are used to monitor for possible sample contamination during the sample collection process and serve as a check on the effectiveness of field decontamination procedures.

4.0 CHAIN OF CUSTODY AND SAMPLE RECEIPT CONDITION DOCUMENTATION

4.1 Sample Receipt at STL

All samples were received at STL in good condition. Specific details of sample receipt condition and COC anomalies are described below and in Table 4.1.

STL did not document sample receipt temperatures on the COCs; however, cooler temperatures were indicated as acceptable on the associated Login Sample Receipt Check Lists.

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4.2 Sample Receipt at TestAmerica

All samples were received at TestAmerica in good condition. Specific details of sample receipt condition and COC anomalies are described in Table 4.2.

5.0 SPECIFIC DATA VALIDATION FINDINGS FOR EACH ANALYTICAL METHOD

Sections 5.1 to 5.6 of this Data Validation Report contain narrative descriptions of data validation findings and data quality limitations. Definitions of data qualifiers added during validation may be found in Table 6. Summaries of specific qualifiers added to each affected sample as a result of the data validation findings are presented in Tables 7 through 12.

5.1 Volatile Organic Compounds by EPA Method 8260B

VOC data from the Winter 2006 Ground Water Monitoring Event may be considered usable with the limitations and exceptions described below. Summaries of qualified VOC results are presented in Table 7.

5.1.1 Holding Times

All samples from this event were analyzed for VOCs within the recommended maximum holding time of 7 days for unpreserved aqueous samples and 14 days for preserved aqueous samples, except as described below.

Samples W-09-86 (636-01) and W-09-116 (637-01) were reanalyzed 1 day beyond the technical holding time of 14 days due to a high 1,2-dichlorobenzene concentrations in the original analyses. 1,2-Dichlorobenzene was the only analyte reported from the secondary dilution of these samples and AMEC J qualified the 1,2-dichlorobenzene results because of the exceeded holding time.

5.1.2 Initial Calibration

All criteria were met for the ICALs associated with analysis of samples from this monitoring event for VOCs, with the exception of the relative response factor (RRF) for isobutyl alcohol which was < 0.01 as described in Table 5.1.

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5.1.3 Continuing Calibration

Continuing calibration (CCAL) performance is evaluated in terms of percent deviation (%D), which corresponds to %D (average response factor (RF) models) or percent drift (regression fit models) from the average ICAL response. To facilitate understanding of CCAL effects on data quality to the end user, %D has been expressed as percent recovery in this narrative.

Compounds with CCAL recoveries greater than 120% and detected results were J qualified by AMEC in all associated samples to indicate a possible high bias in the results. AMEC J qualified detected results or UJ qualified nondetected results associated with compounds with CCAL recoveries less than 80% to indicate possible low bias in the sample results.

All criteria were met for the CCAL associated with analysis of samples from this monitoring event for VOCs with the exception of those described in Table 5.2. Data affected by the CCAL exceedances have been qualified by AMEC and overall data usability was not adversely affected by these exceedances.

5.1.4 Blanks

Target analytes should not be found in blank samples. Results greater than the MRL but less than 5 times the concentration found in the blank, or 10 times the amount found in the blank for methylene chloride, acetone, and 2-butanone, have been U qualified. Results between the instrument detection limit (IDL) and MRL, and less than 5 or 10 times the amount found in the blank have been U qualified at the MRL concentration.

Laboratory Blanks

No target analytes were detected in the laboratory blanks associated with the analysis of these samples for VOCs, except as described in Table 5.3. Data affected by the analyte detections these blanks have been qualified by AMEC and overall data usability was not adversely affected by these blank detections.

Trip Blanks

No target analytes were detected in the trip blanks associated with the analysis of these samples for VOCs, except as described in Table 5.4. Data affected by the analyte detections these blanks have been qualified by AMEC and overall data usability was not adversely affected by these blank detections.

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Rinsate Blanks

No target analytes were detected in the rinsate blanks associated with the analysis of these samples for VOCs, except as described in Table 5.5. Data affected by the analyte detections these blanks have been qualified by AMEC and overall data usability was not adversely affected by these blank detections.

5.1.5 LCS Recovery

All LCS recoveries associated with analysis of samples from this project for VOCs were within the QAPP-specified 70 to 130% acceptance limits, except as described in Table 5.6. Data affected by the LCS exceedances have been qualified by AMEC and overall data usability was not adversely affected by these exceedances.

5.1.6 Surrogate Standard Recoveries

Recovery of all surrogates associated with analysis of samples from this event for VOCs were acceptable, except as described in Table 5.7. Data affected by the surrogate recovery exceedances have been qualified by AMEC and overall data usability was not adversely affected by these exceedances.

5.1.7 Internal Standard Recoveries

Recovery of all IS associated with analysis of samples from this event for VOCs were between 50 and 200% of the response in the associated CCAL standard.

5.1.8 MS/MSD Recovery and Precision

All MS/MSD recoveries associated with analysis of samples from this project for VOCs were within the QAPP-specified 60 to 140% acceptance limits, except as described in Table 5.8. Data affected by the MS/MSD exceedances have been qualified by AMEC and overall data usability was not adversely affected by these exceedances.

5.1.9 Data Reporting and Analytical Procedures

The laboratory J qualified detected results with concentrations between the reporting limit (RL) and method detection limit (MDL). AMEC concurs that these results are quantitative estimates and qualified these results J on the data tables.

Sample WS-11-125 (601-01) was reanalyzed at 100-fold and 1,000-fold dilutions because of high concentrations of target compounds in the initial undiluted analysis.

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The laboratory reported cis-1,2-dichloroethene results from both dilutions in the data package. The cis-1,2-dichloroethene concentration from the 100-fold dilution is above the calibration range of the instrument. Though the results were comparable (17,000 µg/L vs. 16,000 µg/L), AMEC chose to report the cis-1,2-dichloroethene from the 1,000-fold dilution of sample WS-11-125 (601-01) on the data tables, in order to use a result that was within the calibration range of the instrument.

The laboratory did not reanalyze sample WS-11-125 (601-01) at an appropriate dilution to bring the concentration of trans-1,2-dichloroethene within the calibration range of the instrument. AMEC J qualified the detected trans-1,2-dichloroethene result from this sample because the reported concentration exceeded the instrument calibration range of the instrument by 25%.

The laboratory did not provide IS summaries in the data packages provided for review. AMEC was able to evaluate IS recoveries and retention times using the raw data.

AMEC discovered a number of low-level VOC analyte concentrations reported on the laboratory reports were not reported on the associated raw data. AMEC contacted the laboratory about this issue. The laboratory's response is given below in italics. AMEC did not have the laboratory reissue the VOC results because there was not significant difference between the original and reprocessed results (i.e., >10%).

> "*These inconsistencies are a result of minor mismatches between the MDLs that are used at the instrument level and the MDLs that exist in the LIMS system. During the time that the data was processed STL Seattle was in the process of updating MDLs. Some MDL changes were made at the instrument level during the update process and a few values very close to the STL LIMS MDL were marked as ND at in the instrument quant report. After reviewing the data, it appears that the values were correctly reported by the LIMS, although they were not visible to the analyst on the quant report. One value (for 580-1973-6) does not appear on the Chemstation quant report because of a rounding issue within the software that rounds the value prior to comparison to the MDL. The unrounded value that was below the Chemstation MDL cutoff, but the rounded value is at the cutoff.*
>
> *We will drop the MDL cutoff value in the Chemstation software to a level below the LIMS MDL, which will ensure that the values at or slightly below the MDL always show up in the quant report regardless of rounding.*

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During the regeneration of the quant reports it was noted that the recalculated report (which is necessary to detected the analytes in question) was giving slightly different values for some of the other previously reported compounds. This appears to be the result of updating of RT's since the original initial calibration for this sample set was created. Even though each initial calibration is saved on the day it was validated, the RT values at that time are not. Per STL Seattle's SOP, the RT's may be updated on the continuing calibration prior to processing a batch. Once this is done, the new values override the previous values. Due to this issue the data will not be re-processed at the clients request."

For several analytical sequences, it appeared the laboratory analyzed instrument blanks prior to method blanks. The laboratory explained: "*The purpose of the IB is to monitor the cleanliness of the spiking solutions prior to the analysis of samples and the method blank. In the past, we have been able to trace contamination back to specific spiking solutions based on comparison with the IB results. IB perhaps is a poor choice of words to describe its function, solution check sample may be more appropriate.*" Though it is commendable that the laboratory adopt additional QC measures, this solution should not be analyzed prior to the method blank. It is not good laboratory practice to treat QC samples preferentially and "clean" the instrument prior to analyzing the method blank. The laboratory should review this practice.

The initial calibration verification (ICVs) associated with the ICAL analyzed on February 27, 2006 on instrument HP did not meet acceptance limits. The laboratory reanalyzed these failing ICVs the following day. This is not good laboratory practice. The ICV should only be reanalyzed once and a new calibration should be analyzed if the second ICV does not meet acceptance limits. Project samples were not analyzed within 12-hours of the failing ICV and in AMEC's professional opinion, data usability is not adversely affected. Data usability based on CCAL exceedances is addressed in Section 5.1.3.

The laboratory did not record sample pH on the associated Aqueous Extraction Analysis Sheets. AMEC therefore assumed the sample preservation was acceptable because pre-preserved vials were used for sample collection. In addition, most samples were analyzed within seven days of sample collection.

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5.2 Chlorophenoxy Acid Herbicides by EPA Method 8151A

Chlorophenoxy Acid Herbicide (Herbicide) data from the Winter 2006 Ground Water Monitoring Event may be considered usable with the limitations and exceptions described below. Summaries of qualified herbicide results are presented in Table 8.

5.2.1 Holding Times

All samples were extracted within the EPA recommended maximum holding times of 7 days for waters, and analyzed within 45 days of extraction.

5.2.2 Initial Calibration

All ICALs associated with analysis of samples from this event for herbicides were acceptable and met all method criteria.

5.2.3 Continuing Calibration

CCAL performance is evaluated in terms of %D from the average ICAL response. To facilitate understanding of CCAL effects on data quality to the end user, %D has been expressed as percent recovery in this narrative.

CCAL recoveries should fall within 85 to 115% acceptance limits. AMEC J qualified all detected results associated with CCAL recoveries greater than 115% due to a possible high bias in the analytical results. AMEC J qualified all detected results and UJ qualified all nondetected results associated with CCAL recoveries less than 85% due to a possible low bias in the analytical results.

All CCALs associated with analysis of these samples for herbicides were within acceptance limits, except for the single case described below.

- 2,4-D recovery was low at 83% in CCAL L19092.D analyzed on April 6, 2005. AMEC UJ qualified the nondetected 2,4-D results from samples W-09-86 (636-01), W-09-116 (637-01), and W-09 (638-01) because of possible low bias in the analytical results.

5.2.4 Laboratory and Rinsate Blanks

No target analytes were detected in the laboratory and rinsate blanks associated with analysis of samples from this event for herbicides.

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5.2.5 LCS Recovery

LCS recoveries were within the QAPP-specified 70 to 130% acceptance limits except as described in Table 5.9. Data affected by the LCS exceedances have been qualified by AMEC and overall data usability was not adversely affected by these exceedances.

5.2.6 Surrogate Recoveries

All surrogate recoveries associated with analysis of these samples for herbicides were within the QAPP-specified 70 to 130% acceptance limits for analyte-free matrices and 60 to 140% acceptance limits for field sample matrices, except as described in Table 5.10. Data affected by the surrogate recovery exceedances have been qualified by AMEC and overall data usability was not adversely affected by these exceedances.

5.2.7 Internal Standard Recoveries

Recovery of all IS associated with analysis of samples from this event for herbicides were between 50 and 200% of the response in the associated CCAL standard.

5.2.8 MS/MSD Recovery and Precision

Precision and recovery were within the QAPP-specified 60 to 140% acceptance limits in all MS associated with analysis of these samples for herbicides, except as described in Table 5.11. Data affected by the MS/MSD exceedances have been qualified by AMEC and overall data usability was not adversely affected by these exceedances.

5.2.9 Data Reporting and Analytical Procedures

The laboratory J qualified detected results with concentrations between the RL and MDL. AMEC concurs that these results are quantitative estimates and qualified these results J on the data tables.

The laboratory did not provide IS summaries in the data packages provided for review. AMEC was able to evaluate IS recoveries and retention times using the raw data.

5.3 Semivolatile Organic Compounds by EPA Method 8270C

SVOC results data from the Winter 2006 Ground Water Monitoring Event may be considered usable with the limitations described below. Summaries of qualified SVOC results are presented in Table 9.

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5.3.1 Holding Times

All samples were extracted within the EPA recommended maximum holding time of 7 days for waters and analyzed within 45 days of extraction.

5.3.2 Initial Calibration

All criteria were met for the ICALs associated with analysis of samples from this monitoring event for SVOCs, except as described in Table 5.12. Data affected by the ICAL exceedances have been qualified by AMEC and overall data usability was not adversely affected by these exceedances.

5.3.3 Continuing Calibration

CCAL performance is evaluated in terms of %D, which corresponds to %D (average RF models) or percent drift (regression fit models) from the average ICAL response. To facilitate understanding of CCAL effects on data quality to the end user, %D has been expressed as percent recovery in this narrative. CCAL performance is evaluated in terms of percent recovery for linear and quadratic calibration models.

CCAL recoveries should fall within 80 to 120% acceptance limits. AMEC J qualified all detected results associated with CCAL recoveries greater than 120% due to a possible high bias in the analytical results. AMEC has J qualified all detected results and UJ qualified all nondetected results associated with CCAL recoveries less than 80% due to a possible low bias in the analytical results.

All criteria were met for the CCALs associated with analysis of samples from this monitoring event for SVOCs, except as described in Table 5.13. Data affected by the CCAL exceedances have been qualified by AMEC and overall data usability was not adversely affected by these exceedances.

5.3.4 Blanks

Target analytes should not be found in blank samples. Results greater than the MRL but less than 5 times the concentration found in the blank have been U qualified. Results between the IDL and MRL, and less than 5 times the amount found in the blank have been U qualified at the MRL concentration.

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Laboratory Blanks

No SVOCs were detected in the laboratory blanks associated with these samples, except as described in Table 5.14. Data affected by the analyte detections these blanks have been qualified by AMEC and overall data usability was not adversely affected by these blank detections.

Rinsate Blank

No SVOCs were detected in the rinsate blank (628-04) associated with these samples.

5.3.5 LCS Recovery

All LCS recoveries associated with analysis of samples from this project for SVOCs were within the QAPP-specified 70 to 130% acceptance limits, except as described in Table 5.15. Data affected by the LCS exceedances have been qualified by AMEC and overall data usability was not adversely affected by these exceedances.

5.3.6 MS/MSD Recovery and Precision

All MS/MSD recoveries associated with analysis of samples from this project for SVOCs were within the QAPP-specified 60 to 140% acceptance limits, except as described in Table 5.16. Data affected by the MS/MSD exceedances have been qualified by AMEC and overall data usability was not adversely affected by these exceedances, with the exception of the phenol result from sample W-12-S (629-01) which was not recovered in the associated MS/MSD. Non detected analytes with MS recoveries less than 10% were R qualified and rejected by AMEC as specified in Table 5.16.

5.3.7 Internal Standard Recoveries

IS recoveries were within the method-specified 50 to 200% acceptance limits.

5.3.8 Surrogate Recoveries

Recovery of all surrogates associated with analysis of samples from this event for SVOCs were acceptable, except as described in Table 5.17. As specified in EPA Method 8270C, up to one surrogate from each extraction fraction may be outside of acceptance limits without affecting data usability. Data affected by the surrogate recovery exceedances have been qualified by AMEC and overall data usability was not adversely affected by these exceedances.

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5.3.9 Data Reporting and Analytical Procedures

The laboratory J qualified detected results with concentrations between the RL and MDL. AMEC concurs that these results are quantitative estimates and qualified these results J on the data tables.

The 3-nitroaniline coefficient of determination (COD) associated with the ICAL analyzed on March 27, 2006 was 0.971. According to SW-846 Method 8000B (Section 7.5.3), in order to be an acceptable non-linear calibration, the COD must be greater than or equal to 0.99. Effects on data usability are discussed in Table 5.12 of this report.

The laboratory did not provide IS summaries in the data packages provided for review. AMEC was able to evaluate IS recoveries and retention times using the raw data.

Low-level phthalate concentrations were detected in several samples. Phthalates are common laboratory contaminants; therefore, these results should be used with caution.

The laboratory reported target analytes 4,6-dinitro-2-methylphenol and 3&4-methylphenol as 2-methyl-4,6-dinitrophenol and 3&4-cresol, respectively. AMEC has corrected this terminology in the project data base.

5.4 Organochlorine Pesticides by EPA Method 8081A

Organochlorine pesticides (OCPs) data from the Winter 2006 Ground Water Monitoring Event may be considered usable with the limitations and exceptions described below. Summaries of qualified OCP results are presented in Table 10.

5.4.1 Holding Times

All samples were extracted within the EPA recommended maximum holding times of 7 days for waters, and analyzed within 45 days of extraction.

5.4.2 4,4'-DDT/Endrin Breakdown

Breakdown is a measure of the amount of decomposition that 4,4'-DDT and endrin undergo when analyzed on the gas chromatography (GC) column. Excessive breakdown is an indication that the chromatographic system is contaminated, chemically active, or too hot. Breakdown is measured by injecting a mixture of 4,4'-DDT and endrin into the GC and dividing the sum of the areas of the breakdown

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products (4,4'-DDE and 4,4'-DDD for 4,4'-DDT, and endrin aldehyde and endrin ketone for endrin) by the sums of the areas of the breakdown products and the parent compounds. Breakdown must be less than 15% for analysis to proceed and data to be fully useable. 4,4'-DDT and endrin breakdown was less than 15% each day that samples from this project were analyzed for OCPs.

5.4.3 Initial Calibration

All ICALs associated with analysis of these samples for OCPs were acceptable.

5.4.4 Continuing Calibration

CCAL performance is evaluated in terms of %D from the average ICAL response. To facilitate understanding of CCAL effects on data quality to the end user, %D has been expressed as percent recovery in this narrative.

CCAL recoveries should fall within 85 to 115% acceptance limits. AMEC J qualified all detected results associated with CCAL recoveries greater than 115% due to a possible high bias in the analytical results. AMEC J qualified all positive results and UJ qualified all nondetected results associated with CCAL recoveries less than 85% due to a possible low bias in the analytical results.

All CCALs associated with analysis of these samples for OCPs were acceptable, except as described in Table 5.18. Data affected by the CCAL exceedances have been qualified by AMEC and overall data usability was not adversely affected by these exceedances.

5.4.5 Blanks

Target analytes should not be found in blank samples. Results greater than the MRL but less than 5 times the concentration found in the blank have been U qualified. Results between the IDL and MRL, and less than 5 or 10 times the amount found in the blank have been U qualified at the MRL concentration.

Laboratory Blanks

No target analytes were detected in the laboratory blanks associated with the analysis of these samples for OCPs, except as described in Table 5.19. Data affected by the analyte detections these blanks have been qualified by AMEC and overall data usability was not adversely affected by these blank detections.

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Rinsate Blanks

No target analytes were detected in the rinsate blanks associated with the analysis of these samples for OCPs.

5.4.6 LCS Recovery

Target analyte recoveries were within the QAPP-specified 70% to 130% acceptance limits in the LCSs associated with the analysis of these samples for OCPs, except as described in Table 5.20. Data affected by the LCS exceedances have been qualified by AMEC and overall data usability was not adversely affected by these exceedances.

5.4.7 Surrogate Recoveries

Surrogate recoveries associated with analysis of these samples for OCPs were within the QAPP-specified 60 to 140% acceptance limits, except as described in Table 5.21. Data affected by the surrogate recovery exceedances have been qualified by AMEC and overall data usability was not adversely affected by these exceedances.

5.4.8 MS/MSD Recovery and Precision

Precision and recovery were within the QAPP-specified 60 to 140% acceptance limits in all MS associated with analysis of these samples for pesticides, except as described in Table 5.22. Data affected by the MS/MSD exceedances have been qualified by AMEC and overall data usability was not adversely affected by these exceedances.

5.4.9 Data Reporting and Analytical Procedures

The laboratory J qualified detected results with concentrations between the RL and MDL. AMEC concurs that these results are quantitative estimates and qualified these results J on the data tables.

The laboratory did not provide retention time windows in the data packages provided for review. AMEC compared surrogate and reported target compound RTs to CCAL standards that bracketed the samples.

Large discrepancies were observed between numerous results reported from the primary and secondary analytical columns. The discrepancies appear related to the complex and difficult matrix of the samples. Data that were N qualified by AMEC as a result of these anomalies are summarized on Table 5.23.

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5.5 Semivolatile Petroleum Products by DEQ/Ecology Method NWTPH-Dx

Diesel-range organics (DRO) and residual range organics (RRO) data from the Winter 2006 Ground Water Monitoring Event may be considered usable with the limitations and exceptions described below. Summaries of qualified DRO and RRO results are presented in Table 11.

5.5.1 Holding Times

All samples were extracted within the EPA recommended maximum holding times of 7 days for waters and analyzed within 45 days from extraction.

5.5.2 Initial Calibration

All criteria were met for the ICALs associated with analysis of samples from this monitoring event for DRO and RRO.

5.5.3 Continuing Calibration

All criteria were met for the continuing calibrations associated with analysis of samples from this monitoring event for DRO and RRO.

5.5.4 Laboratory Blanks

DRO and RRO were not detected in the laboratory blanks associated with these samples, except for a single case summarized below.

RRO was detected in method blank MB 580-4973/1-A at 0.067 mg/L. AMEC U qualified the detected RRO results from samples WS-11-125 (601-01), WS-11-161 (602-01), and WS-12-125 (603-01) because the sample concentrations were less than 5 times the concentration detected in the blank.

5.5.5 Rinsate Blanks

DRO and RRO were not detected in the rinsate blanks associated with these samples.

5.5.6 LCS/LCSD Recovery and Precision

Recovery and precision for LCS/LCSDs associated with analysis of samples from this project for DRO and RRO were acceptable.

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5.5.7 Surrogate Recoveries

Surrogate recoveries associated with analysis of these samples for DRO and RRO were within the method-specified 50 to 150% acceptance limits.

5.5.8 MS/MSD Recovery and Precision

Precision and recovery were within the QAPP-specified 50 to 150% acceptance limits in all MS associated with analysis of these samples for NWTPH-Dx.

5.5.9 Data Reporting

The laboratory J qualified detected results with concentrations between the RL and MDL. AMEC concurs that these results are quantitative estimates and qualified these results J on the data tables.

According to the associated Prep Batch Sheet, a small amount of sample was lost during the extraction of sample W-12-D (631-01). AMEC UJ qualified the nondetected DRO and RRO results from this sample due to potential low bias in the analytical results. It should be noted that o-terphenyl surrogate recovery was acceptable at 98% and the sample results may be acceptable as reported since similar loss of surrogate and analyte would be expected.

5.6 Metals by EPA 6010B/6020 and EPA 7470A

Metals data from the Winter 2006 Ground Water Sampling Event may be considered usable with the limitations and exceptions described below. Summaries of qualified metals results may be found in Table 12.

5.6.1 Holding Times

All samples were analyzed for mercury within the recommended technical holding time of 28 days and for all other metals within the recommended technical holding time of 180 days.

5.6.2 Initial Calibration

All ICALs associated with the analysis of these samples for metals were acceptable.

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5.6.3 Initial Calibration Verification

EPA acceptance limits for metals ICVs are 90 to 110%. ICVs associated with the analysis of these samples were acceptable.

5.6.4 Continuing Calibration Verification

EPA acceptance limits for metals continuing calibration verifications (CCVs) are 90 to 110%. CCVs associated with reported data from the analysis of these samples were acceptable.

5.6.5 Inductively Coupled Plasma Interference Check Sample

All interference check samples (ICS) exhibited recoveries within the method-specified 80 to 120% acceptance limits.

5.6.6 Blanks

Target analytes should not be found in blank samples. When the concentration detected in the blank is less than the MRL, concentrations in associated samples greater than the MRL but less than 5 times the concentration detected in the blank have been U qualified by AMEC. When the absolute concentration detected in the blank is greater than the MRL, concentrations in associated samples greater than the MRL but less than 10 times the concentration detected in the blank have been U qualified by AMEC. In both cases, sample concentrations between the IDL and MRL, and less than 5 or 10 times the concentration detected in the blank have been U qualified at the MRL concentration.

Laboratory Blanks

Target analyte concentrations in laboratory blanks associated with analysis of these samples for metals are described in Table 5.24. Data affected by the analyte detections these blanks have been qualified by AMEC and overall data usability was not adversely affected by these blank detections.

Rinsate Blanks

Target analyte concentrations greater than the MDL in the rinsate blanks associated with analysis of these samples for metals are described in Table 5.25. Data affected by the analyte detections these blanks have been qualified by AMEC and overall data usability was not adversely affected by these blank detections.

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5.6.7 LCS Recovery

Recoveries were acceptable in all LCS associated with analysis of these samples for metals.

5.6.8 MS/MSD Recovery and Precision

The method-specified acceptance limits for metals MS recoveries are 75 to 125%. However, spike recovery limits are not applicable when the sample concentration exceeds the spike concentration by a factor of four or more.

Precision and recovery were acceptable in all MS associated with analysis of these samples for metals, except as described in Table 5.26. Data affected by the MS/MSD exceedances have been qualified by AMEC and overall data usability was not adversely affected by these exceedances.

5.6.9 Laboratory Duplicates

EPA CLP acceptance limits for duplicate sample analyses are ±20% RPD for sample concentrations greater than or equal to (≤) 5 times the MRL. A control limit of ± MRL is used if either the sample or duplicate result is less than 5 times the MRL.

The laboratory duplicates exhibited acceptable precision.

5.6.10 Internal Standards

IS recoveries were within the method-specified 30 to 120% acceptance limits.

5.6.11 Data Reporting and Analytical Procedures

The laboratory B qualified detected results with concentrations between the RL and IDL. AMEC concurs that these results are quantitative estimates and qualified these results J on the data tables.

The laboratory analyzes batch method blanks and LCS/LCSD samples several times during the analytical sequence. According to the laboratory, "*The blank and LCS/LCSD are analyzed multiple times by the ICP analyst in case one of the CCV/CCB brackets fails. He will report the first analysis of the blank, LCS/LCSD if there are no failures of the CCV/CCB. This is the same digest solution for the blank, LCS/LCSD analyzed multiple times.*" This procedure is not good laboratory practice. The method does not allow for reanalysis of calibration verification standards.

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According to SW-846 Method 6010B (Section 7.4), if the calibration cannot be verified within the specified limits, the sample analysis must be discontinued, the cause determined and the instrument recalibrated. The laboratory should review this practice. All project samples were bracket by acceptable CCV standards; therefore, data usability is not adversely affected.

6.0 FIELD DUPLICATE RESULTS

Three field duplicate pairs out of 34 field samples were submitted to STL. The samples were given blind IDs, so that the laboratory was not aware which samples were submitted in duplicate. Primary samples were coded with -01 appended to the blind sample ID, and duplicate samples were coded with -02 appended to the blind sample ID. Detected results for each set of field duplicates are summarized in Table 2 at the end of this document.

Precision values met the QAPP-specified acceptance limits, with RPDs for aqueous samples less than 30% for analytes with concentrations more than 5 times their practical quantitation limit (PQLs), and concentrations within one MRL for analytes with concentrations less than 5 times their PQLs, except for the three cases described below.

- A field duplicate was collected at RP-07-119. The RPDs between the detected MCPP (44%), dichloroprop (40%), 2,4,5-TP (Silvex) (41%), endrin (127%), and total vanadium (77%) results were high. In addition, the RPDs between the detected 2,4-D (36%), alpha-BHC (93%), alpha-chlordane (52%), total aluminum (59%), and dissolved aluminum (34%) results were high. The 2,4-D, alpha-BHC, alpha-chlordane, total aluminum, and dissolved aluminum concentrations in these samples were less than 5 times their associated PQLs and the differences between the concentrations were less than the MRL; therefore, data usability is not adversely affected.
- A field duplicate was collected at RP-07-84. The RPDs between the detected delta-BHC (63%), total copper (98%), and total vanadium (45%) results were high. In addition, the RPDs between the detected chloromethane (40%) and total arsenic (34%) results were high. The chloromethane and total arsenic concentrations in these samples were less than 5 times their associated PQLs and the differences between the concentrations were less than the MRL, data usability is not adversely affected.

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- A field duplicate was collected at AL6-96. The RPDs between the detected dichloroprop (32%), Silvex (31%), and DRO (71%) results were high. In addition, the RPD between the detected RRO results was high at 81%. The RRO concentrations in these samples were less than 5 times their associated PQLs and the differences between the concentrations were less than the MRL, data usability is not adversely affected.

7.0 INTERLABORATORY SPLIT SAMPLE RESULTS

Field sample W-09-86 was submitted to both STL and TestAmerica. The samples were given blind IDs, so that the primary laboratory (i.e., STL) was not aware which samples were also submitted to the QC laboratory (i.e., TestAmerica). Primary samples were coded with -01 appended to the blind sample ID, and split samples were coded with -05 appended to the blind sample ID. A summary of split sample results may be found in Table 3.

Field sample RP-07-84 (609-06) was supposed to be delivered to TestAmerica as an interlaboratory split sample but was inadvertently sent to STL. STL received two separate field samples for location RP-07-84 (609-01 and 609-06). AMEC treated the samples as a field duplicate. See Section 6.0.

TestAmerica MDLs and MRLs are generally higher than STL's. STL and TestAmerica report analyte concentrations down to the MDL or IDL; therefore, low-level concentrations comparisons could be made between reported laboratory results.

Analyte concentrations from sample RP-07-84 reported by both laboratories were generally comparable (≤50% RPD), except for the total aluminum, total chromium, total nickel, total vanadium, dissolved iron, and dissolved chromium analyses performed. In all cases, except for total vanadium, STL reported higher concentrations.

STL detected Silvex, benzene, dissolved copper, and dissolved lead at concentrations above the MDL. TestAmerica reported these analytes as nondetected above the MDLs. Because the concentrations were less than 5 times their associated MRLs and the differences between the concentrations were less than the TestAmerica MRLs, the results are acceptable.

TestAmerica detected total arsenic at a concentration above the MDL. STL reported this analyte as nondetected above the MDL. Because the concentration was less than 5 times their associated MRLs and the differences between the concentrations were less than the STL's MRLs, the results are acceptable.

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8.0 SUMMARY AND CONCLUSIONS

The data are generally usable and of good quality, with the exceptions listed below.

- The isobutyl alcohol results from sample WS-11-125 (601-01), WS-11-161 (602-01), WS-12-125 (603-01), WS-12-161 (604-01), RP-11-20 (605-01), RP-11-216 (606-01), RP-11-161 (607-01), RP-07-55 (608-01), RP-07-84 (609-01), RP-07-84 (609-06), RP-07-119 (610-01), RP-07-119 (610-02), RP-07-30 (611-01), RP-01-31 (612-01), RP-01-51 (613-01), RP-01-65 (614-01), W-09-86 (636-01), W-09-116 (637-01), and W-09 (638-01) were rejected due to very low RRF in the associated ICALs and CCALs. Because this analyte is not a primary constituent of concern, the rejected results may not impact overall data usability.
- The phenol result from sample W-12-S (629-01) was R qualified and rejected because of very low recoveries in the associated MS/MSD.
- The nondetected acid extractable compound (phenols) results from samples WS-11-161 (602-01), WS-12-125 (603-01), WS-12-161 (604-01), RP-11-30 (605-01), RP-07-55 (608-01), RP-01-51 (613-01), W-11-D (627-01), W-12-1 (630-01), AL6-96 (635-02), W-09-86 (636-01), and W-09-116 (637-01) were R qualified and rejected because of very low acid surrogate compound recoveries in these samples. The low recoveries may be indicative of laboratory performance or matrix interference.
- The delta-BHC result from sample WS-11-161 (602-01) was R qualified and rejected due to very low LCS/LCSD recoveries.

The remainder of the data is generally usable and of good quality, with the qualifications listed below.

- A portion of the VOC data was qualified due to headspace in associated sample vials (Table 4.1), holding time exceedances (Section 5.1.1), laboratory (Table 5.3), rinsate (Table 5.4), and/or trip blank (Table 5.5) contamination, low or high CCAL recoveries (Table 5.2), low or high LCS recoveries (Table 5.6), and a low surrogate recovery (Table 5.7).
- A portion of the herbicides data was qualified due to low CCAL recoveries`6666, low surrogate recoveries (Table 5.10), and low MS/MSD recoveries (Table 5.11).
- A portion of the SVOC data was qualified due to ICAL instability (Table 5.12), low or high CCAL recoveries (Table 5.13), low-level laboratory contamination

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(Table 5.14), low or high LCS recoveries (Table 5.15), low or high MS/MSD recoveries (Table 5.16), and low or high acid extractable surrogate compound recoveries (Table 5.17).

- A portion of the OCP data was qualified due to low or high CCAL recoveries (Table 5.18), low-level laboratory blank contamination (Table 5.19), low or high LCS/LCSD recoveries (Table 5.20), high or low surrogate recoveries (Table 5.21), and high percent differences between the dual-column results (Table 5.23).
- A portion of the DRO and RRO data was qualified due to a small amount of sample lost during the extraction process (Section 5.5.9) and laboratory blank contamination (Section 5.5.4).
- A portion of the metals data was qualified due to low-level laboratory (Table 5.24) or rinsate blank contamination (Table 5.25), and high or low MS recoveries (Table 5.26).

No metals, herbicides, DRO, and RRO results were rejected by AMEC due to data quality issues.

A total of 158 results out of 7,667 total results or 2.1% were rejected during data validation. Overall completeness of the data set exceeded 95%. In addition, 634 results (8.3%) were J qualified, 655 (8.5%) results were UJ qualified, 117 results (1.5%) were U qualified, and 10 results (0.1%) were N qualified.

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REFERENCES

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LIMITATIONS

This report was prepared exclusively for SLLI 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 Winter 2006 Groundwater Monitoring Event is intended to be used by SLLI for the RP - Portland Site, 6200 N.W. St. Helens Road, Portland, Oregon 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

TABLE 1
Field Samples Submitted to STL and TestAmerica with Corresponding Laboratory IDs
Winter 2006 Groundwater Monitoring Event
RP - Portland Site

Sample Location	Field Sample ID	Sample Date	Test America Sample ID	STL Sample ID	Notes
WS-11-125	601-01	03/20/2006	-	580-1935-1	
WS-11-161	602-01	03/20/2006	-	580-1935-2	
Trip Blank	602-03	03/20/2006	-	580-1935-3	Trip Blank
WS-12-125	603-01	03/20/2006	-	580-1935-4	
WS-12-161	604-01	03/21/2006	-	580-1955-1	
Trip Blank	604-03	03/21/2006	-	580-1955-2	Trip Blank
RP-11-30	605-01	03/21/2006	-	580-1955-3	
RP-11-216	606-01	03/21/2006	-	580-1955-4	
RP-11-30	605-01	03/22/2006	-	580-1959-1	
RP-11-161	607-01	03/22/2006	-	580-1959-2	
Trip Blank	607-03	03/22/2006	-	580-1959-3	Trip Blank
RP-07-55	608-01	03/22/2006	-	580-1959-4	
RP-07-84	609-01	03/23/2006	-	580-1973-1	
Trip Blank	609-03	03/23/2006	-	580-1973-2	Trip Blank
RP-07-84	609-06	03/23/2006	-	580-1973-3	Field Duplicate
RP-07-119	610-01	03/23/2006	-	580-1973-4	
RP-07-119	610-02	03/23/2006	-	580-1973-5	Field Duplicate
RP-07-30	611-01	03/23/2006	-	580-1973-6	
RP-01-31	612-01	03/24/2006	-	580-1992-1	
RP-01-51	613-01	03/24/2006	-	580-1992-2	
RP-01-65	614-01	03/24/2006	-	580-1992-3	
Trip Blank	612-03	03/24/2006	-	580-1992-4	Trip Blank
W-03-I	615-01	03/25/2006	-	580-2006-01	
Trip Blank	615-03	03/25/2006	-	580-2006-02	Trip Blank
W-03-D	616-01	03/25/2006	-	580-2006-03	
W-04-89	619-01	03/25/2006	-	580-2006-04	
W-09	620-01	03/25/2006	-	580-2006-05	
W-09-86	621-01	03/25/2006	-	580-2006-06	
W-09-116	622-01	03/28/2006	-	580-2022-1	
Trip Blank	622-03	03/28/2006	-	580-2022-2	Trip Blank
W-11-B	623-01	03/28/2006	-	580-2022-3	
W-11-D	624-01	03/28/2006	-	580-2022-4	
W-11-S	625-01	03/29/2006	-	580-2035-1	
Trip Blank	625-03	03/29/2006	-	580-2035-2	Trip Blank
W-11-I	626-01	03/29/2006	-	580-2035-3	
W-11-D	627-01	03/29/2006	-	580-2035-4	
W-11-B	628-01	03/29/2006	-	580-2035-5	
Rinsate	628-04	03/30/2006	-	580-2058-1	Rinsate blank
W-12-S	629-01	03/30/2006	-	580-2058-2	
Trip Blank	629-03	03/30/2006	-	580-2058-3	Trip blank
W-12-1	630-01	03/30/2006	-	580-2058-4	
W-12-D	631-01	03/30/2006	-	580-2058-5	
AL6-96	635-01	03/31/2006	-	580-2059-1	
AL6-96	635-02	03/31/2006	-	580-2059-2	Field Duplicate
Trip Blank	635-03	03/31/2006	-	580-2059-3	Trip Blank
W-09-86	636-01	04/03/2006	-	580-2096-1	
W-09-116	637-01	04/03/2006	-	580-2096-2	
W-09	638-01	04/03/2006	-	580-2096-3	
Trip Blank	636-03	04/03/2006	PPD0044-02	-	Trip Blank
W-09-86	636-05	04/03/2006	PPD0044-01	-	Interlaboratory Split

ID = Identification
STL = Severn Trent Laboratories, Inc.

SCOEPA00013338

TABLE 2
Summary of Field Duplicate Detections
Winter 2006 Groundwater Monitoring Event
RP - Portland Site

Analytical Method	Analyte	MRL	Primary Result	Duplicate Result	RPD
Sample RP-07-119 (610-01 and 610-02)					
VOCs	Vinyl chloride	1.0	ND	0.20	NC
	1,1-Dichloroethene	1.0	0.41	0.38	8%
	cis-1,2-dichloroethene	1.0	5.8	5.9	2%
	Chloroform	1.0	0.69	0.70	1%
	Benzene	1.0	0.17	0.16	6%
	1,2-Dichloroethane	1.0	ND	0.048	NC
	Trichloroethene	1.0	8.5	8.7	2%
	Toluene	1.0	0.44	0.42	5%
	Tetrachloroethene	1.0	0.097	ND	NC
	Chlorobenzene	1.0	13	13	0%
	o-xylene	1.0	0.085	0.083	2%
	1,3-Dichlorobenzene	1.0	6.4	5.9	8%
	1,4-Dichlorobenzene	1.0	54	47	14%
	1,2-Dichlorobenzene	1.0	170	150	13%
	1,2,4-Trichlorobenzene	1.0	0.13	0.12	8%
	1,2,3-Trichlorobenzene	1.0	0.098	0.077	24%
	Hexachlorobutadiene	1.0	0.087	0.095	9%
	Naphthalene	1.0	0.11	0.093	17%
Herbicides	MCPP	0.24	2.2	1.4	**44%**
	Dichloroprop	0.24	1.4	0.93	**40%**
	2,4-D	0.24	0.33	0.23	36%
	Pentachlorophenol	0.24	ND	0.083	NC
	Silvex (2,4,5-TP)	0.24	8.9	5.9	**41%**
Pesticides	alpha-BHC	0.0096	0.0027	0.0074	93%
	delta-BHC	0.0096	0.0094	0.011	16%
	4,4-DDT	0.019	0.0055	ND	NC
	alpha-Chlordane	0.0096	0.010	0.0059	52%
	Endrin	0.019	0.028	0.0062	**127%**
Total Metals	Total Aluminum	0.50	0.081	0.044	59%
	Total Calcium	0.50	230	230	0%
	Total Iron	0.20	0.24	0.24	0%
	Total Magnesium	0.50	58	59	2%
	Total Manganese	0.0050	0.18	0.17	6%
	Total Potassium	3.0	9.7	9.5	2%
	Total Sodium	2.0	19	18	5%
	Total Chromium	0.0020	0.0056	0.0063	12%
	Total Copper	0.0020	0.0015	0.0014	7%
	Total Lead	0.0020	0.000075	0.000080	6%
	Total Nickel	0.0020	0.0073	0.0073	0%
	Total Vanadium	0.0020	0.00058	0.0013	**77%**
Dissolved Metals	Dissolved Aluminum	0.50	0.060	0.085	34%
	Dissolved Calcium	0.50	230	240	4%
	Dissolved Iron	0.20	0.12	0.11	9%
	Dissolved Magnesium	0.50	59	61	3%
	Dissolved Manganese	0.0050	0.18	0.17	6%
	Dissolved Potassium	3.0	11	11	0%
	Dissolved Sodium	2.0	19	19	0%
	Dissolved Arsenic	0.0020	0.00056	0.00072	25%
	Dissolved Cadmium	0.0020	0.000050	ND	NC
	Dissolved Chromium	0.0020	0.0035	0.0032	9%
	Dissolved Copper	0.0020	0.00082	0.00082	0%
	Dissolved Lead	0.0020	0.000060	0.000045	29%
	Dissolved Nickel	0.0020	0.0055	0.0051	8%
	Dissolved Vanadium	0.0020	0.0033	0.0036	9%

TABLE 2
Summary of Field Duplicate Detections
Winter 2006 Groundwater Monitoring Event
RP - Portland Site

Analytical Method	Analyte	MRL	Primary Result	Duplicate Result	RPD
Sample RP-07-84 (609-01 and 609-06)					
VOCs	Chloromethane	1.0	0.24	0.36	40%
	Vinyl chloride	1.0	16	16	0%
	1,1-Dichloroethene	1.0	2.6	2.5	4%
	trans-1,2-dichloroethene	1.0	1.3	1.3	0%
	cis-1,2-dichloroethene	1.0	16	17	6%
	Chloroform	1.0	0.12	0.14	15%
	Benzene	1.0	1.7	1.7	0%
	1,2-Dichloroethane	1.0	0.13	0.13	0%
	Trichloroethene	1.0	16	17	6%
	MTBE	1.0	1.4	1.5	7%
	Toluene	1.0	0.54	0.51	6%
	Tetrachloroethene	1.0	0.18	0.17	6%
	Chlorobenzene	20	120	140	15%
	m,p-xylene	1.0	0.13	0.12	8%
	o-xylene	1.0	0.097	0.085	13%
	Isopropylbenzene	1.0	0.20	0.19	5%
	2-Ethyl-1hexanol	5	2.5	ND	NC
	1,3-Dichlorobenzene	1.0	22	23	4%
	1,4-Dichlorobenzene	20	210	240	13%
	1,2-Dichlorobenzene	20	730	750	3%
	1,2,4-Trichlorobenzene	1.0	0.35	0.35	0%
	1,2,3-Trichlorobenzene	1.0	0.22	0.20	10%
	Hexachlorobutadiene	1.0	0.12	0.096	22%
	Naphthalene	1.0	0.11	0.092	18%
Herbicides	MCPP	0.24	7.4	5.9	23%
	Dichlorprop	0.24	3.0	2.4	22%
	2,4-D	0.24	0.22	ND	NC
	Pentachlorophenol	0.24	0.27	0.21	25%
	2,4,5-TP (Silvex)	0.24	19	16	17%
Pesticides	Aldrin	0.0095	0.0051	ND	NC
	alpha-BHC	0.0095	0.050	0.058	15%
	delta-BHC	0.0095	0.021	0.011	**63%**
	gamma-BHC (Lindane)	0.0095	ND	0.0019	NC
	alpha-Chlordane	0.0095	0.0083	0.0066	23%
	4,4'-DDD	0.019	0.0047	0.0042	11%
	4,4'-DDE	0.019	0.0032	0.0038	17%
	4,4'-DDT	0.019	ND	0.012	NC
	Endosulfan I	0.019	ND	0.042	NC
	Endrin	0.019	0.012	0.011	9%
	Heptachlor	0.0095	0.0043	0.0039	10%
	Heptachlor Epoxide	0.0095	0.0054	0.0054	0%

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TABLE 2
Summary of Field Duplicate Detections
Winter 2006 Groundwater Monitoring Event
RP - Portland Site

Analytical Method	Analyte	MRL	Primary Result	Duplicate Result	RPD
Sample RP-07-84 (609-01 and 609-06)					
Total Metals	Total Aluminum	0.50	0.086	0.099	14%
	Total Calcium	0.50	470	460	2%
	Total Iron	0.20	0.89	0.86	3%
	Total Magnesium	0.50	110	110	0%
	Total Manganese	0.0050	0.39	0.38	3%
	Total Potassium	3.0	13	14	7%
	Total Sodium	2.0	61	62	2%
	Total Arsenic	0.0020	0.0017	0.0012	34%
	Total Chromium	0.0020	0.0050	0.0047	6%
	Total Copper	0.0020	0.0025	0.0073	**98%**
	Total Lead	0.0020	0.000075	0.000080	6%
	Total Nickel	0.0020	0.018	0.018	0%
	Total Vanadium	0.0020	0.0015	0.00095	**45%**
Dissolved Metals	Dissolved Aluminum	0.50	0.035	0.047	29%
	Dissolved Calcium	0.50	440	460	4%
	Dissolved Iron	0.20	0.79	0.80	1%
	Dissolved Magnesium	0.50	110	110	0%
	Dissolved Manganese	0.0050	0.40	0.41	2%
	Dissolved Potassium	3.0	15	16	6%
	Dissolved Sodium	2.0	63	64	2%
	Dissolved Arsenic	0.0020	0.0042	0.0048	13%
	Dissolved Cadmium	0.0020	0.000040	ND	NC
	Dissolved Chromium	0.0020	0.0062	0.0060	3%
	Dissolved Copper	0.0020	0.0016	0.0016	0%
	Dissolved Lead	0.0020	0.000060	0.000060	0%
	Dissolved Nickel	0.0020	0.015	0.015	0%
	Dissolved Vanadium	0.0020	0.0035	0.0033	6%

TABLE 2
Summary of Field Duplicate Detections
Winter 2006 Groundwater Monitoring Event
RP - Portland Site

Analytical Method	Analyte	MRL	Primary Result	Duplicate Result	RPD
Sample AL6-96 (635-01 and 635-02)					
	Benzene	50	24	24	0%
	Toluene	50	4.7	ND	NC
	Chlorobenzene	50	2300	2300	0%
	Ethylbenzene	50	7.0	ND	NC
	2-Ethyl-1hexanol	250	140	ND	NC
	1,3-Dichlorobenzene	50	63	61	3%
	1,4-Dichlorobenzene	50	970	950	2%
	1,2-Dichlorobenzene	50	900	880	2%
	1,2,4-Trichlorobenzene	50	15	15	0%
Herbicides	MCPP	0.24	12	15	22%
	Dichlorprop	0.24	3.1	4.3	**32%**
	2,4,5-TP (Silvex)	0.24	11	15	**31%**
Pesticides	alpha-Chlordane	0.048	0.87	0.93	7%
	alpha-BHC	0.048	0.031	0.037	18%
	delta-BHC	0.048	0.015	ND	NC
	Aldrin	0.048	ND	0.028	NC
	4,4'-DDD	0.097	2.0	2.0	0%
	4,4'-DDE	0.097	0.095	ND	NC
	4,4'-DDT	0.097	0.12	0.16	29%
	Endosulfan II	0.097	0.088	ND	NC
	Endrin Ketone	0.097	0.048	ND	NC
	Heptachlor	0.048	0.17	0.18	6%
	Heptachlor Epoxide	0.048	0.14	0.16	13%
NWTPH-Dx	DRO	0.24	1.2	0.57	**71%**
	MRO	0.48	0.16	0.068	81%
Total Metals	Total Calcium	0.50	120	120	0%
	Total Iron	0.20	1.5	1.6	6%
	Total Magnesium	0.50	57	56	2%
	Total Manganese	0.0050	9.4	9.4	0%
	Total Potassium	3.0	9.0	7.8	14%
	Total Sodium	2.0	430	430	0%
	Total Arsenic	0.0020	0.0076	0.0062	20%
	Total Chromium	0.0020	0.0041	0.0035	16%
	Total Copper	0.0020	0.0028	0.0029	4%
	Total Lead	0.0020	0.000085	0.000090	6%
	Total Nickel	0.0020	0.020	0.019	5%
	Total Vanadium	0.0020	0.00056	ND	NC
Dissolved Metals	Dissolved Calcium	0.50	140	130	7%
	Dissolved Iron	0.20	1.1	1.3	17%
	Dissolved Magnesium	0.50	66	61	8%
	Dissolved Manganese	0.0050	11	11	0%
	Dissolved Potassium	3.0	10	10	0%
	Dissolved Sodium	2.0	460	450	2%
	Dissolved Arsenic	0.0020	0.0073	0.0085	15%
	Dissolved Chromium	0.0020	0.0079	0.0075	5%
	Dissolved Copper	0.0020	0.0014	0.0015	7%
	Dissolved Lead	0.0020	0.000065	0.000075	14%
	Dissolved Nickel	0.0020	0.014	0.014	0%
	Dissolved Vanadium	0.0020	0.0034	0.0030	13%

RPD = Relative Percent Difference
NC = Not Calculable
ND = Not Detected
STL = Severn Trent Laboratories, Inc.
SVOCs = semivolatile organic compounds
VOCs = volatile organic compounds

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TABLE 3
Interlaboratory Split Samples Submitted to STL and TestAmerica
Winter 2006 Groundwater Monitoring Event
RP - Portland Site

Analyte Class	Analyte	Primary Result (STL)	Split Result (Test America)	RPD
Sample W-09-86 (636-01 and 636-05)				
SVOCs	1,2-Dichlorobenzene	150	118	24%
	1,3-Dichlorobenzene	2.7	2.87	6%
	1,4-Dichlorobenzene	35	33.2	5%
	Diethylphthalate	2.2	<2.83	NC
	Di-n-butylphthalate	1.3	<2.83	NC
Herbicides	MCPP	0.41	<16.5	NC
	Dichlorprop	0.17	<0.186	NC
	2,4,5-TP (Silvex)	0.64	<0.230	**NC**
Pesticides	Endrin	0.0058	<0.0472	NC
VOCs	Vinyl chloride	0.38	0.420	10%
	1,1-Dichloroethene	0.12	<0.14	NC
	cis-1,2-dichloroethene	0.47	0.640	31%
	Benzene	0.13	<0.060	**NC**
	Trichloroethene	0.58	0.500	15%
	Toluene	0.073	<0.120	NC
	Chlorobenzene	37	38.5	4%
	1,3-Dichlorobenzene	3.2	2.52	24%
	1,4-Dichlorobenzene	42	36.5	14%
	1,2-Dichlorobenzene	200	218	9%
NWTHP-Dx	DRO	0.13	<0.146	NC
Total Metals	Total Aluminum	0.062	0.00895	**150%**
	Total Calcium	78	78.6	1%
	Total Iron	0.11	0.130	17%
	Total Magnesium	43	44.1	3%
	Total Manganese	2.9	2.74	6%
	Total Potassium	6.1	5.41	12%
	Total Sodium	17	16.1	5%
	Total Arsenic	<0.00037	0.00410	**NC**
	Total Cadmium	0.000080	0.000110	32%
	Total Chromium	0.0047	0.000160	**187%**
	Total Lead	0.000055	<0.0000553	NC
	Total Nickel	0.0091	0.00184	**133%**
	Total Vanadium	0.0013	0.00572	**126%**
	Total Zinc	<0.0029	0.00593	NC
Dissolved Metals	Dissolved Calcium	70	77.1	10%
	Dissolved Iron	0.058	0.109	**61%**
	Dissolved Magnesium	39	41.9	7%
	Dissolved Manganese	2.6	2.95	13%
	Dissolved Potassium	5.3	5.68	7%
	Dissolved Sodium	19	16.6	13%
	Dissolved Arsenic	0.0033	0.00486	38%
	Dissolved Cadmium	0.00011	0.000105	5%
	Dissolved Chromium	0.00047	0.000126	**115%**
	Dissolved Copper	0.00039	<0.000133	**NC**
	Dissolved Lead	0.000070	<0.0000553	**NC**
	Dissolved Nickel	0.0089	0.00889	0%
	Dissolved Vanadium	0.0046	0.00533	15%
	Dissolved Zinc	<0.0029	0.00277	NC

RPD = Relative Percent Difference
DRO = Diesel Range Organics
NC = Not Calculable
STL = Severn Trent Laboratories, Inc.
SVOCs = semivolatile organic compounds
VOCs = volatile organic compounds

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TABLE 4.1
Sample Receipt at STL
Winter 2006 Groundwater Monitoring Event
RP - Portland Site

Sample Receipt Date	Receipt Issue(s)	Affected Samples	Effects on Data Usability
03/23/2006	According to the Login Sample Receipt Check List, 2 of 3 sample vials contained air bubbles.	WS-12-161 (604-01)	AMEC assumed the laboratory analyzed the vial that did not contain air bubbles. Data usability is not adversely affected.
03/24/2006	According to the Login Sample Receipt Check List, 2 of 3 sample vials contained air bubbles.	RP-11-161 (607-01)	AMEC assumed the laboratory analyzed the vial that did not contain air bubbles. Data usability is not adversely affected.
03/27/2006	4-1 liter bottles were received broken.	RP-07-84 (609-06)	Enough bottles were received to complete all analyses. Data usability is not adversely affected.
	3-1 liter bottles and 1 vial were received broken	RP-07-119 (610-02)	
04/03/2006	According to the Login Sample Receipt Check List, all 3 sample vials contained air bubbles >6mm in size.	W-12-1 (630-01)	AMEC J qualified the detected VOC results and UJ qualified the nondetected VOC result from this sample because of possible low bias in the analytical results.

Note: °C = degrees Celsius

TABLE 4.2
Sample Receipt at TestAmerica
Winter 2006 Groundwater Monitoring Event
RP - Portland Site

Sample Receipt Date	Receipt Issue(s)	Affected Samples	Effects on Data Usability
04/03/2006	According to the Sample Receipt Check the temperature of one of two coolers was recorded as 0.4°C.	W-09-86 (636-05) Trip Blank (636-03)	The laboratory did not indicate that any samples were frozen or damaged. Data usability is not adversely affected.

TABLE 5.1
Initial Calibration for Volatile Organic Compounds
Winter 2006 Groundwater Monitoring Event
RP - Portland Site

Analytes with %RSDs Greater than 15%	Effects on Data Usability
ICAL analyzed on March 20, 2006 on instrument U	
Isobutyl Alcohol RRFs < 0.01	AMEC R qualified and rejected the nondetected isobutyl alcohol results from sample WS-11-125 (601-01), WS-11-161 (602-01), WS-12-125 (603-01), WS-12-161 (604-01), RP-11-30 (605-01), RP-11-216 (606-01) because the presence of this analyte could not be confirmed due to the very low RRF.
ICAL analyzed on March 27, 2006 on instrument U	
Isobutyl Alcohol RRFs < 0.01	AMEC R qualified and rejected the nondetected isobutyl alcohol results from sample RP-11-161 (607-01), RP-07-55 (608-01), RP-07-84 (609-01), RP-07-84 (609-06), RP-07-119 (610-01), RP-07-119 (610-02), RP-07-30 (611-01), RP-01-31 (612-01), RP-01-51 (613-01), RP-01-65 (614-01) because the presence of this analyte could not be confirmed due to the very low RRF.
ICAL analyzed on April 17, 2006 on instrument AG	
Isobutyl Alcohol RRFs < 0.01	AMEC R qualified and rejected the nondetected isobutyl alcohol results from sample W-09-86 (636-01, W-09-116 (637-01), and W-09 (638-01) because the presence of this analyte could not be confirmed due to the very low RRF.

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TABLE 5.2
Continuing Calibration for Volatile Organic Compounds
Winter 2006 Groundwater Monitoring Event
RP - Portland Site

Analyte/Problem	Effects on Data Usability
CCAL analyzed March 22, 2006 on instrument U.	
The following analyte recoveries were low: Bromomethane at 72% 1,1-Dichloroethane at 29% 2,2-Dichloropropane at 39% Bromochloromethane at 61%	AMEC UJ qualified the nondetected bromomethane, 1,1-dichloroethane, 2,2-dichloropropane, bromochloromethane, and 2-ethyl-1-hexanol results from sample WS-11-125 (601-01) because of possible low bias in the analytical results.
2-Ethyl-1-hexanol at 75%	AMEC UJ qualified the nondetected bromomethane, 1,1-dichloroethane, 2,2-dichloropropane, and bromochloromethane results and J qualified the detected 2-ethyl-1-hexanol results from samples WS-11-161 (602-01) and WS-12-125 (603-01) because of possible low bias in the analytical results.
CCAL analyzed March 23, 2006 on instrument U.	
The following analyte recoveries were low: Bromomethane at 79% 1,1-Dichloroethane at 34% 2,2-Dichloropropane at 31% Bromochloromethane at 68% Carbon Tetrachloride at 76%	AMEC J qualified the bromomethane results from WS-12-161 (604-01), RP-11-30 (605-01), and RP-11-216 (606 01) and UJ qualified the nondetected 1,1-dichloroethane, 2,2-dichloropropane, bromochloromethane, and carbon tetrachloride results because of possible low bias in the analytical results.
2-Ethyl-1-hexanol at 75%	AMEC J qualified the detected 2-ethyl-1-hexanol result from sample RP-11-30 (605-01) and UJ qualified the nondetected 2-ethyl-1-hexanol result from sample WS-12-161 (604-01) because of possible low bias in the analytical results.
CCAL analyzed March 27, 2006 on instrument U.	
2-Ethyl-1-hexanol was low at 76%	AMEC J qualified the detected 2-ethyl-1-hexanol results from samples RP-11-216 (606-01), RP-11-161 (607-01), RP-07-55 (608-01), RP-07-84 (609-01) and UJ qualified the nondetected 2-ethyl-1-hexanol results from sample RP-07-84 (609-06), RP-07-119 (610-01), RP-07-119 (610-02) because of possible low bias in the analytical results.
Bromomethane was high at 148%	Bromomethane recovery was high and this analyte was not detected in the associated samples. Data usability is not adversely affected.
CCAL analyzed March 28, 2006 on instrument U.	
Bromomethane was high at 148%	Bromomethane recovery was high and this analyte was not detected in the associated samples. Data usability is not adversely affected.
1,1-Dichloroethane recovery was low at 24%	AMEC UJ qualified the nondetected result from sample RP-07-30 (611-01) because of a possible low bias in the analytical result.
CCAL analyzed March 29, 2006 on instrument U.	
1,1-Dichloroethane recovery was low at 24% 2,2-Dichloropropane recovery was low at 32%	AMEC UJ qualified the nondetected results from samples RP-01-51 (613-01), RP-01-65 (614-01) because of a possible low bias in the analytical result.
2-Ethyl-1-hexanol recovery was low at 64%	AMEC UJ qualified the nondetected results from samples RP-01-51(613-01) and J qualified the detected result from sample RP-01-65 (614-01) because of a possible low bias in the analytical result.

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TABLE 5.2
Continuing Calibration for Volatile Organic Compounds
Winter 2006 Groundwater Monitoring Event
RP - Portland Site

Analyte/Problem	Effects on Data Usability
CCAL analyzed March 30, 2006 on instrument U.	
Chloromethane recovery was high at 123%	The recovery was high and this analyte was not detected in the associated samples. Data usability is not adversely affected.
Bromomethane recovery was low at 79% 1,1-Dichloroethane recovery was low at 13% 2,2-Dichloropropane recovery was low at 30% 2-Ethyl-1-hexanol recovery was low at 80%	AMEC UJ qualified the nondetected results from samples RP-01-31 (612-01) because of a possible low bias in the analytical result.
CCAL analyzed March 30, 2006 on instrument HP.	
Bromomethane recovery was high at 148%	The recovery was high and this analyte was not detected in the associated samples. Data usability is not adversely affected.
2-Ethyl-1-hexanol recovery was low at 60%	AMEC UJ qualified the nondetected results from samples W-03-I (615-01), W-03-D (616-01), W-04-89 (619-01), W-09 (620-01), W-09-86 (621-01) because of a possible low bias in the analytical result.
CCAL analyzed April 3, 2006 on instrument HP.	
Bromomethane recovery was high at 129%	The recovery was high and this analyte was not detected in the associated samples. Data usability is not adversely affected.
1,1-Dichloroethane recovery was low at 75% 2-Ethyl-1-hexanol recovery was low at 39%	AMEC UJ qualified the nondetected results from samples W-09-116 (622-01), W-11-B (623-01), W-11-D (624-01), W-11-I (626-01), W-11-D (627-01) because of a possible low bias in the analytical result.
1,2,3-Trichlorobenzene recovery was low at 78%	AMEC J qualified the detected results from sample W-11-S (625-01) because of a possible low bias in the analytical result.
Naphthalene recovery was low at 64%	AMEC J qualified the detected results from samples W-09-116 (622-01), W-11-B (623-01) and UJ qualified the nondetected result from sample W-11-D (624-01), W-11-I (626-01), W-11-D (627-01) because of a possible low bias in the analytical result.
CCAL analyzed April 4, 2006 on instrument 5973 Inert	
Hexachlorobutadiene recovery was high at 123%.	The recovery was high and this analyte was not detected in the associated samples. Data usability is not adversely affected.
CCAL Analyzed on April 6, 2006 on instrument HP	
2-Ethyl-1-hexanol recovery was high at 130%	AMEC J qualified the detected result from sample AL6-96 (635-01) because of a possible high bias in the analytical result.
CCAL Analyzed on April 6, 2006 on instrument AG	
Bromomethane recovery was high at 143% 2-Ethyl-1-hexanol recovery was high at 173%	The recoveries were high and these analytes were not detected in the associated samples. Data usability is not adversely affected.
Bromoform recovery was low at 77%	AMEC UJ qualified the nondetected bromoform results from samples W-09-86 (636-01), W-09-116 (637-01), and W-09 (638-01) because of possible low bias in the analytical results.

TABLE 5.3
Laboratory Blank Detections for Volatile Organic Compounds
Winter 2006 Groundwater Monitoring Event
RP - Portland Site

Blank ID	Detected Analytes	Analyte Concentration (µg/L)	Affected Samples	Effects on Data Usability
MB 580-5002	1,3-Dichlorobenzene 1,2,3-Trichlorobenzene Naphthalene 2-Ethyl-1-Hexanol	0.051 0.094 0.083 3.0	WS-11-161 (602-01) WS-12-125 (603-01)	AMEC U qualified the naphthalene and 2-ethyl-1-hexanol results from these samples because the sample concentrations were less than 5 times the concentration detected in the blank.
MB 580-5004	Cis-1,2-Dichloroethene 1,2,3-Trichlorobenzene Naphthalene	0.1 0.078 0.19	WS-11-125 (601-01) WS-12-161 (604-01) RP-11-30 (605-01) RP-11-216 (606-01)	AMEC U qualified the cis-1,2-Dichloroethene and naphthalene results from samples WS-12-161 (604-01) and RP-11-30 (605-01) and the naphthalene result from sample RP-11-216 (606-01) because the sample concentrations were less than 5 times the concentration detected in the blank.
MB 580-5108	1,3-Dichlorobenzene 4-Isopropyltoluene n-Butylbenzene 1,2-Dichlorobenzene 1,2,4-Trichlorobenzene 1,2,3-Trichlorobenzene Hexachlorobutadiene Naphthalene	0.068 0.074 0.1 0.072 0.16 0.15 0.26 0.18	RP-11-161 (607-01) RP-07-55 (608-01)	AMEC U qualified the 4-isopropyltoluene, 1,2-dichlorobenzene, 1,2,4-trichlorobenzene, 1,2,3-trichlorobenzene, hexachlorobutadiene, and naphthalene results from these samples because the sample concentrations were less than 5 times the concentration detected in the blank.
			RP-07-84 (609-01) RP-07-84 (609-06) RP-07-119 (610-01) RP-07-119 (610-02)	AMEC U qualified the 1,2,4-trichlorobenzene, 1,2,3-trichlorobenzene, hexachlorobutadiene, and naphthalene results from these samples because the sample concentrations were less than 5 times the concentration detected in the blank.
MB 580-5125	1,3-Dichlorobenzene 1,2-Dichlorobenzene 1,2,3-Trichlorobenzene Naphthalene	0.082 0.13 0.067 0.078	RP-07-30 (611-01)	AMEC U qualified the 1,2-dichlorobenzene, 1,2,3-trichlorobenzene, and naphthalene results from these samples because the sample concentrations were less than 5 times the concentration detected in the blank.
MB 580-5203	1,2-Dichlorobenzene 1,2,3-Trichlorobenzene Hexachlorobutadiene Naphthalene	0.069 0.077 0.13 0.092	RP-01-51 (613-01) RP-01-65 (614-01)	AMEC U qualified the detected 1,2,3-trichlorobenzene results from samples RP-01-51 (613-01) and RP-01-65 (614-01) because the sample concentrations were less than 5 times the concentration detected in the blank.
MB 580-5241	1,2-Dichlorobenzene 1,2,3-Trichlorobenzene Hexachlorobutadiene Naphthalene	0.11 0.068 0.15 0.084	RP-01-31 (612-01)	AMEC U qualified the detected 1,2-dichlorobenzene and hexachlorobutadiene results from sample RP-01-31 (612-01) because the sample concentrations were less than 5 times the concentration detected in the blank.

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TABLE 5.3
Laboratory Blank Detections for Volatile Organic Compounds
Winter 2006 Groundwater Monitoring Event
RP - Portland Site

Blank ID	Detected Analytes	Analyte Concentration (µg/L)	Affected Samples	Effects on Data Usability
MB 580-5308	Methylene Chloride 1,3-Dichlorobenzene 1,2,4-Trichlorobenzene	0.31 0.78 0.29	W-09-116 (622-01) W-11-B (623-01) W-11-S (625-01) W-11-D (627-01)	AMEC U qualified the detected 1,3-dichlorobenzene result from samples W-09-116 (622-01), W-11-B (623-01), W-11-S (625-01) , the detected 1,2,4-trichlorobenzene result from sample W-11-S (625-01), W-11-D (627-01) because the sample concentrations were less than 5 times the concentration detected in the blank.
MB 580-5441	1,2,3-Trichlorobenzene	0.28	W-12-S (629-01) W-12-1 (630-01 W-12-D (631-01)	1,2,3-Trichlorobenzene was not detected in the associated samples. Data usability is not affected.
MB 580-5542	m&p-xylenes 1,2,4-Trimethylbenzene 1,3-Dichlorobenzene 1,2,3-Trichlorobenzene	0.27 0.21 0.086 0.29	AL6-96 (635-01) AL6-96 (635-02)	These analytes were either not detected in the assoicated samples or sample concentrations were greater than five times the concentration detected in the blank. Data usability is not adversely affected.
MB-580-5890	Toluene	0.089	W-09-86 (636-01)	AMEC U qualified the detected toluene result from sample W-09-86 (636-01) because the sample concentration was less than 5 times the concentration detected in the blank.

TABLE 5.4
Trip Blanks Detection for Volatile Organic Compounds
Winter 2006 Groundwater Monitoring Event
RP - Portland Site

Trip Blank ID	Detected Analytes	Analyte Concentration (µg/L)	Affected Samples	Effects on Data Usability
602-03	cis-1,2-Dichloroethene	0.075	WS-11-161(602-01)	AMEC U qualified the detected cis-1,2-Dichloroethene result from this sample because the concentration detected in the sample was less than 5 times the concentration detected in the blank.
604-03	Bromomethane cis-1,2-Dichloroethene Naphthalene 2-Ethyl-1-hexanol	0.33 0.072 0.1 4.6	WS-12-161 (604-01) RP-11-30 (605-01) RP-11-216 (606-01)	AMEC U qualified the detected bromomethane results from these samples; the cis-1,2-dichloroethene results from samples WS-12-161 (604-01) and RP-11-30 (605-01); the naphthalene results from sample WS-12-161 (604-01) and RP-11-216 (606-01); and the 2-ethyl-1-hexanol result from sample RP-11-30 (605-01) because the concentrations detected in the samples were less than 5 times the concentrations detected in the blank.
607-03	1,3-Dichlorobenzene 1,2-Dichlorobenzene 1,2,4-Trichlorobenzene 1,2,3-Trichlorobenzene Hexachlorobutadiene Naphthalene 2-Ethyl-1-hexanol	0.069 0.051 0.12 0.11 0.17 0.13 6.5	RP-11-161 (607-01) RP-07-55 (608-01)	AMEC U qualified the 1,2-dichlorobenzene, 1,2,4-trichlorobenzene, 1,2,3-trichlorobenzene, hexachlorobutadiene, and naphthalene results from these samples because the sample concentrations were less than 5 times the concentration detected in the blank.
				AMEC U qualified the 2-Ethyl-1-hexanol result from sample RP-11-161 (607-01) because the sample concentration was less than 5 times the concentration detected in the blank.
609-03	4-Isopropyltoluene 1,2-Dichlorobenzene 1,2,4-Trichlorobenzene 1,2,3-Trichlorobenzene Hexachlorobutadiene Naphthalene 2-Ethyl-1-hexanol	0.074 0.07 0.14 0.13 0.2 0.16 6.5	RP-07-84 (609-01) RP-07-84 (609-06) RP-07-119 (610-01) RP-07-119 (610-02)	AMEC U qualified the 1,2,4-trichlorobenzene, 1,2,3-trichlorobenzene, hexachlorobutadiene, and naphthalene results from these samples because the sample concentrations were less than 5 times the concentration detected in the blank.
			RP-07-84 (609-01)	AMEC U qualified the 2-ethyl-1-hexanol result from this sample because the sample concentration was less than 5 times the concentration detected in the blank.
			RP-07-30 (611-01)	AMEC U qualified the 1,2-dichlorobenzene, 1,2,3-trichlorobenzene, hexachlorobutadiene, naphthalene, and 2-ethyl-1-hexanol results from these samples because the sample concentrations were less than 5 times the concentration detected in the blank.

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TABLE 5.4
Trip Blanks Detection for Volatile Organic Compounds
Winter 2006 Groundwater Monitoring Event
RP - Portland Site

Trip Blank ID	Detected Analytes	Analyte Concentration (µg/L)	Affected Samples	Effects on Data Usability
612-03	1,2-Dichlorobenzene 1,2,3-Trichlorobenzene Hexachlorobutadiene 2-Ethyl-1-hexanol	0.073 0.061 0.1 2.7	RP-01-31 (612-01) RP-01-51 (613-01) RP-01-65 (614-01)	AMEC U qualified the detected 1,2,3-trichlorobenzene results from samples RP-01-51 (613-01) and RP-01-65 (614-01) because the sample concentrations were less than 5 times the concentration detected in the blank.
				AMEC U qualified the detected 1,2-dichlorobenzene and hexachlorobutadiene results from sample RP-01-31 (612-01) because the sample concentrations were less than 5 times the concentration detected in the blank.
622-03	Naphthalene	0.48	W-09-116 (622-01) W-11-B (623-01)	AMEC U qualified the detected naphthalene results from samples W-09-116 (622-01) and W-11-B (623-01) because the sample concentrations were less than 5 times the concentration detected in the blank.
625-03	Dibromochloromethane Ethylbenzene Bromoform 1,2,3-Trichlorobenzene	0.097 0.12 0.32 0.27	W-11-S (625-01) W-11-I (626-01) W-11-D (627-01) W-11-B (628-01)	AMEC U qualified the detected ethylbenzene results from samples W-11-S (625-01), W-11-I (626-01), W-11-D (627-01), and W-11-B (628-01) and the detected 1,2,3-trichlorobenzene result from sample W-11-S (625-01) because the sample concentrations were less than 5 times the concentration detected in the blank.
629-03	Chlorodibromomethane 1,2,4-Trichlorobenzene Naphthalene	0.052 0.28 0.42	W-12-S (629-01) W-12-1 (630-01) W-12-D (631-01)	AMEC U qualified the detected 1,2,4-trichlorobenzene results from sample W-12-S (629-01) and the detected naphtalene results from sample W-12-S (629-01), W-12-1 (630-01) and W-12-D (631-01) because the sample concentrations were less than 5 times the concentration detected in the blank.
635-03	1,3-Dichlorobenzene 1,2-Dichlorobenzene 2-Ethyl-1-hexanol	0.091 0.19 5.5	AL6-96 (635-01) AL6-96 (635-02)	AMEC U qualified the detected 2-ethyl-1-hexanol result from sample AL6-96 (635-01) because the sample concentration was less than 5 times the concentration detected in the blank.

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TABLE 5.5
Rinsate Blank Detections for Volatile Organic Compounds
Winter 2006 Groundwater Monitoring Event
RP - Portland Site

Rinsate Blank ID	Detected Analytes	Analyte Concentration (µg/L)	Affected Samples	Effects on Data Usability
628-04	Toluene	0.065	W-12-S (629-01)	AMEC U qualified the detected 4-Isopropyltoluene and 1,2,4-Trichlorobenzene results from sample W-12-S (629-01), the detected toluene, m,p-xylene, o-xylene and naphtalene results from sample W-12-1 (630-01) and the detected m,p-xylene, o-xylene and naphtalene results from sample W-12-D (631-01), because sample concentrations were less than 5 times the concentration detected in the rinsate blank.
	m,p-xylene	0.27	W-12-1(630-01)	
	o-xylene	0.13	W-12-D (631-01)	
	4-Isopropyltoluene	0.24		
	1,2,4-Trichlorobenzene	0.27		
	Naphthalene	0.46		

TABLE 5.6
LCS/LCSD Recoveries for Volatile Organic Compounds
Winter 2006 Groundwater Monitoring Event
RP - Portland Site

Affected Samples	Analytes With Recoveries Outside Acceptance Limits	LCS Recovery	LCSD Recovery	Effects on Data Usability
LCS/LCSD 580-5002				
WS-11-125 (601-01) WS-11-161 (602-01) WS-12-125 (603-01)	Dichlorodifluoromethane	68%	65%	AMEC UJ qualified nondetected dichlorodifluoromethane results in the associated samples because of possible low bias in the analytical results.
	Chloromethane	76%	69%	The average chloroethane recovery was within acceptance limits. Data usability is not adversely affected.
LCS/LCSD 580-5004				
WS-12-161 (604-01) RP-11-30 (605-01) RP-11-216 (606-01)	Dichlorodifluoromethane	68%	67%	AMEC UJ qualified the nondetected results from samples WS-12-161 (604-01), RP-11-30 (605-01), and RP-11-216 (606-01) because of possible low bias in the analytical results.
LCS/LCSD 580-5229				
W-03-I (615-01) W-03-D (616-01) W-04-89 (619-01)	Dichlorodifluoromethane	74%	69%	The average recovery was within acceptance limits. Data usability is not adversely affected.
W-09 (620-01) W-09-86 (621-01)	Bromomethane	132%	129%	The recoveries were high and this analyte was not detected in the associated samples. Data usability is not adversely affected.
LCS/LCSD 580-5542				
AL6-96 (635-01) AL6-96 (635-02)	2-Ethyl-1-Hexanol	159%	153%	AMEC J qualified the detected result from sample AL6-96 (635-01) because of a possible high bias in the analytical result.
LCS/LCSD 580-5890				
	2-Ethyl-1-Hexanol Bromomethane	154% 150%	173% 143%	The recoveries were high and these analytes were not detected in the associated samples. Data usability is not adversely affected.

TABLE 5.7
Surrogate Standard Recoveries for Volatile Organic Compounds
Winter 2006 Groundwater Monitoring Event
RP - Portland Site

Sample ID	Surrogates outside acceptance limits	Recovery	Effects on Data Usability
RP-01-65 (614-01)	Bromofluorobenzene (BFB)	75%	AMEC J qualified the detected isopropyl benzene, 1,2,4-trichlorobenzene, 1,2,3-trichlorobenzene, 1,3-dichlorobenzene, and 2-ethyl-1-hexanol results and UJ qualified the nondetected bromoform, bromobenzene, n-propylbenzene, isobutyl alcohol, 1,2,3-trichloropropane, 2-chlorotoluene, 1,3,5-trimethylbenzene, 4-chlorotoluene, tert-butylbenzene, 1,2,4-trimethylbenzene, sec-butylbenzene, 4-isopropyltoluene, n-butylbenzene, 1,2-dibromo-3-chloropropane, hexachlorobutadiene, and naphthalene results because of possible low bias in the analytical results.
W-04-89 (619-01)	Trifluorotoluene (TFT)	152%	The recovery was high and target analytes associated with this surrogate compound were not detected. Data usability is not adversely affected.

TABLE 5.8
MS/MSD Recovery and Precision for Volatile Organic Compounds
Winter 2006 Goundwater Monitoring Event
RP - Portland Site

Spiked Sample	Analytes with recoveries outside acceptance limits	Effect on Data Usability
W-11-D (624-01)	2-Ethyl-1-hexanol RPD > 30%	This analyte was not detected in the associated sample. Data usability is not adversely affected.
W-12-S (629-1)	Vnyl chloride (144%/142%) 2-Ethyl-1-hexanol (186%/242%)	The recoveries were high and these analytes are not detected in the associated sample. Data usability is not adversely affected.

TABLE 5.9
LCS/LCSD Recovery Chlorophenoxy Acid Herbicides
Winter 2006 Groundwater Mointoring Event
RP - Portland Site

Affected Samples	Analytes With Recoveries Outside Acceptance Limits	LCS Recovery	LCSD Recovery	Effects on Data Usability
LCS/LCSD 580-5036				
WS-11-125 (601-01) WS-11-161 (602-01) WS-12-125 (603-01) WS-12-161 (604-01) WS-11-216 (606-01)	Dalapon	47%	46%	AMEC UJ qualified the nondetected dalapon results from the associated samples because of possible low bias in the analytical results.
LCS/LCSD 580-5066				
RP-11-30 (605-01) RP-11-161 (607-01) RP-07-55 (608-01) RP-07-84 (609-01)	Dalapon	45%	46%	AMEC UJ qualified the nondetected dalapon results from the associated samples because of possible low bias in the analytical results.
RP-07-84 (609-06) RP-07-119 (610-01) RP-07-119 (610-02) RP-07-30 (611-01)	Silvex	66%	82%	The average silvex recovery was within acceptance limits at 74%. Data usability is not adversely affected.
LCS/LCSD 580-5212				
RP-01-31 (612-01) RP-01-51 (613-01) RP-01-65 (614-01)	Dinoseb	65%	65%	AMEC UJ qualified the nondetected dinoseb results from the associated samples because of possible low bias in the analytical results.
LCS/LCSD 580-5177				
W-03-I (615-01) W-03-D (616-01) W-04-89 (619-01) W-09 (620-01) W-09-86 (621-01)	Dalapon	61%	58%	AMEC UJ qualified the nondetected dalapon results from the associated samples because of possible low bias in the analytical results.
LCS/LCSD 580-5243				
W-09-116 (622-01) W-11-B (623-01) W-11-D (624-01)	Bromoxynil	66%	71%	AMEC UJ qualified the nondetected bromoxynil results from the associated samples because of possible low bias in the analytical results.

TABLE 5.10
Surrogate Recoveries for Chlorophenoxy Acid Herbicides
Winter 2006 Groundwater Monitoring Event
RP - Portland Site

Sample ID	Surrogates outside acceptance limits	Recovery	Effects on Data Usability
RP-07-84 (609-06) RP-07-119 (610-02)	2,4-Dichlorophenylacetic acid	43% 37%	AMEC J qualified the detected results and UJ qualified all nondetected results because of possible low bias in the analytical results.

TABLE 5.11
MS/MSD Recovery and Precision for Chlorophenoxy Acid Herbicides
Winter 2006 Groundwater Monitoring Event
RP - Portland Site

Spiked Sample	Analytes with recoveries outside acceptance limits	Effect on Data Usability
W-11-D (624-01)	Dalapon (70%/52%) Dinoseb (89%/52%)	AMEC UJ qualified the nondetected dalapon and dinoseb results from the spiked sample because of possible matrix interference.
W-12-S (629-01)	Dalapon (40%/46%) Bromoxynil (68%/57%)	AMEC UJ qualified the nondetected dalapon and bromoxynil results from the spiked sample because of possible matrix interference.

TABLE 5.12
Initial Calibration for Semivolatile Organic Compounds
Winter 2006 Groundwater Monitoring Event
RP - Portland Site

Analytes with Unacceptable ICALs	Effects on Data Usability
ICAL analyzed on March 24, 2006 on instrument AT	
2-nitrophenol 2,4-dichlorophenol 2-nitroaniline pentachlorophenol	AMEC UJ qualified the nondetected results from sample WS-11-125 (601-01), WS-11-161 (602-1), and WS-12-125 (603-1) because of possible bias in the analytical results.
ICAL analyzed on March 27, 2006 on instrument AK	
3-nitroaniline coefficient of determination (COD) < 0.99	AMEC UJ qualified the nondetected results for this analyte from samples WS-12-161 (604-01), RP-11-30 (605-01), RP-11-216 (606-01), RP-11-161 (607-01), RP-07-55 (608-01), RP-07-84 (609-01), RP-07-84 (609-06), RP-07-119 (610-01), RP-07-119 (610-02), RP-07-30 (611-01), RP-01-31 (612-01), RP-01-51 (613-01), RP-01-65 (614-01), W-09-116 (622-01), W-11-B (623-01), W-11-D (624-01), W-11-S (625-01), W-11-I (626-01), W-11-D (627-01), W-11-B (628-01), Rinsate (628-04), W-12-S (629-01), W-12-1 (630-01), W-12-D (631-01), AL6-96 (635-01), AL6-96 (635-02), W-09-86 (636-01), W-09-116 (637-01), W-09 (638-01) because of possible bias in the analytical results.

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TABLE 5.13
Continuing Calibration for Semivolatile Organic Compounds
Winter 2006 Groundwater Monitoring Event
RP - Portland Site

Analyte/Problem	Effects on Data Usability
CCAL analyzed March 28, 2006 on instrument AT.	
Isophorone (79%) Benzoic acid (74%) 4-Chloroaniline (69%) 2-Nitroaniline (79%) 3-Nitroaniline (76%) 4-Nitrophenol (79%)	AMEC UJ qualified the nondetected results from samples WS-11-125 (601-01), WS-11-161 (602-01), and WS-12-125 (603-01) because of possible low bias in the analytical results.
CCAL analyzed March 29, 2006 on instrument AK at 10:13	
Benzyl alcohol (79%) n-Nitroso-di-n-propylamine (77%) 4-Nitrophenol (72%)	AMEC UJ qualified the nondetected results from samples RP-01-31 (612-01), RP-01-51 (613-01), RP-01-65 (614-01) because of possible low bias in the analytical results.
CCAL analyzed March 28, 2006 on instrument AK at 13:18.	
Benzyl alcohol (79%) 2-Methylphenol (79%) n-Nitroso-di-n-propylamine (78%) 4-Chloroaniline (75%) 4-Nitrophenol (69%) 4-Nitroaniline (77%) Dibenz (a,h) anthracene (77%)	AMEC UJ qualified the nondetected results from samples RP-07-84 (609-01), RP-07-84 (609-06), RP-07-119 (610-01), RP-07-119 (610-02), and RP-07-30 (611-01) because of possible low bias in the analytical results.
CCAL analyzed March 30, 2006 on instrument AK at 11:26	
Benzyl alcohol (78%) 4-Nitrophenol (73%)	AMEC UJ qualified the nondetected results from samples WS-12-161 (604-01, RP-11-216 (606-01), RP-11-161 (607-01), RP-07-55 (608-01), W-03-I (615-01), W-03-D (616-01), W-04-89 (619-01), W-09 (620-01), and W-09-86 (621-01) because of possible low bias in the analytical results.
CCAL analyzed March 31, 2006 on instrument AK at 9:22	
Benzyl alcohol (77%) 2,4-Dinitrophenol (78%) 4-Nitrophenol (73%)	AMEC UJ qualified the nondetected results from samples RP--11-30 (605-01), W-09-116 (622-01), W-11-B (623-01), W-11-D (624-01) because of possible low bias in the analytical results.
CCAL analyzed April 5, 2006 on instrument AK at 9:48	
4-Nitrophenol (78%)	AMEC UJ qualified the nondetected results from samples W-11-S (625-01), W-11-I (626-01), W-11-D (627-01), W-11-B (628-01), W-12-S (629-01), W-12-1(630-01), W-12-D (631-01), AL6-96 (635-01), AL6-96 (635-02) because of possible low bias in the analytical results.

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TABLE 5.13
Continuing Calibration for Semivolatile Organic Compounds
Winter 2006 Groundwater Monitoring Event
RP - Portland Site

Analyte/Problem	Effects on Data Usability
CCAL analyzed April 6, 2006 on instrument AK at 19:17	
n-Nitroso-di-n-propylamine (79%) Hexachlorocyclopentadiene (74%) 2,4_Dinitrophenol (70%) 4-Nitrophenol (73%) 4,6-Dinitro-2-methylphenol (70%) Pentachlorophenol (75%)	AMEC UJ qualified the nondetected results from samples W-09-86 (636-01), W-09-116 (637-01) and W-09 (638-01) because of possible low bias in the analytical results.

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TABLE 5.14
Laboratory Blanks Detections for Semivolatile Organic Compounds
Winter 2006 Groundwater Monitoring Event
RP - Portland Site

Blank ID	Detected Analytes	Analyte Concentration (µg/L)	Affected Samples	Effects on Data Usability
MB 580-4980	Di-n-butylphthalate	0.42	WS-11-125 (601-01) WS-11-161 (602-01) WS-12-125 (603-01)	AMEC U qualified the detected di-n-butylphthalate results from these samples because the sample concentrations were less than 5 times the concentration detected in the blank.
	Bis(2-ethylhexyl)phthalate	0.63	WS-12-125 (603-01)	AMEC U qualified the detected bis(2-ethylhexyl)phthalate results from these samples because the sample concentrations were less than 5 times the concentration detected in the blank.
MB 580-5033	Di-n-butylphthalate	0.36	WS-12-161 (604-01)	AMEC U qualified the detected di-n-butylphthalate results from these samples because the sample concentrations were less than 5 times the concentration detected in the blank.
	Bis(2-ethylhexyl)phthalate	0.6	RP-11-216 (606-01)	Bis(2-ethylhexyl) phthalate was not detected in the associated samples. Data ussability is not adversely affected.
MB 580-5087	Di-n-butyl phthalate	0.36	RP-07-84 (609-01) RP--07-84 (609-06) RP-07-119 (610-01) RP-07-119 (610-02) RP-07-30 (611-01)	AMEC U qualified the detected di-n-butylphthalate results from these samples because the sample concentrations were less than 5 times the concentration detected in the blank.
MB 580-5238	Di-n-butyl phthalate	0.37	W-09-116 (622-01) W-11-B (623-01) W-11-D (624-01)	AMEC U qualified the detected di-n-butylphthalate results from samples W-09-116 (622-01) and W-11-B (623-01) because the sample concentrations were less than 5 times the concentration detected in the blank.
	Bis(2-ethylhexyl) phthalate	3.3		Bis(2-ethylhexyl) phthalate was not detected in the associated samples. Data ussability is not adversely affected.
MB 580-5359	Di-n-butyl phthalate	0.48	Rinsate (628-04) W-12-S (629-01) W-12-1 (630-01) W-12-D (631-01) AL6-96 (635-01) AL6-96 (635-02)	AMEC U qualified the detected di-n-butylphthalate results from samples W-12-S (629-01), W-12-1 (630-01), AL6-96 (635-01) and AL6-96 (635-02) because the sample concentrations were less than 5 times the concentration detected in the blank.
MB 580-5411	Di-n-butyl phthalate	2.4	W-09-86 (636-01) W-09-116 (637-01) W-09 (638-01)	AMEC U qualified the detecteddi-n-butylphthalate results from these samples because the sample concentrations were less than 5 times the concentration detected in the blank.

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TABLE 5.15
LCS Recovery for Semivolatile Organic Compounds
Winter 2006 Groundwater Monitoring Event
RP - Portland Site

Affected Samples	Analytes With Recoveries Outside Acceptance Limits	LCS Recovery	LCSD Recovery	Effects on Data Usability
LCS/LCSD 580-4980				
WS-11-125 (601-01)	Phenol	28%	29%	AMEC UJ qualified nondetected for these analytes in the associated samples because of possible low bias in the analytical results.
WS-11-161 (602-01)	Benzyl alcohol	53%	61%	
WS-12-125 (603-01)	3&4-Methylphenol	62%	65%	
	Isophorone	62%	67%	
	Benzoic acid	14%	11%	
	4-Nitrophenol	58%		
	3-Nitroaniline	125%	134%	The recovery for this analyte was high and it was not detected in the associated samples. Data usability is not adversely affected.
LCS/LCSD 580-5033				
WS-12-161 (604-01)	Phenol	41%	39%	AMEC UJ qualified the nondetected results for these analytes in the associated samples because of possible low bias in the analytical results.
RP-11-30 (605-01)	4-Nitrophenol	61%	61%	
RP-11-216 (606-01)				
RP--11-161 (607-01)	3-Nitroaniline	124%	137%	The recoveries for these analytes were high and they were not detected in the associated samples. Data usability is not adversely affected.
RP-07-55 (608-01)	N-Nitrosodiphenylamine	136%	134%	
	Bis(2-ethylhexyl) phthalate	139%	133%	
	Carbazole	133%	133%	
LCS/LCSD 580-5087				
RP-07-84 (609-01)	Phenol	30%	34%	AMEC UJ qualified the nondetected results for these analytes in the associated samples because of possible low bias in the analytical results.
RP-07-84 (609-06)	Benzyl alcohol	60%	74%	
RP-07-119 (610-01)	3&4 Methylphenol	66%	76%	
RP-07-119 (610-02)	4-Nitrophenol	52%	50%	
RP-07-30 (611-01)	Bis(2-ethylhexyl) phthalate	147%	122%	The recovery for this analyte was high and it was not detected in the associated samples. Data usability is not adversely affected.
LCS/LCSD 580-5128				
RP-01-31 (612-01)	Phenol	35%	34%	AMEC UJ qualified the nondetected results for these analytes in the associated samples because of possible low bias in the analytical results.
RP-01-51 (613-01)	Benzyl alcohol	68%	69%	
RP-01-65 (614-01)	4-Nitrophenol	59%	61%	
	N-Nitrosodiphenylamine	135%	135%	AMEC J qualified the detected N-nitrosodiphenylamine in sample RP-01-51 (613-01) because of possible high bias in the analytical results.
	3-Nitroaniline	132%	125%	The recoveries for these analytes were high and they were not detected in the associated samples. Data usability is not adversely affected.
	Carbazole	130%	135%	

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TABLE 5.15
LCS Recovery for Semivolatile Organic Compounds
Winter 2006 Groundwater Monitoring Event
RP - Portland Site

Affected Samples	Analytes With Recoveries Outside Acceptance Limits	LCS Recovery	LCSD Recovery	Effects on Data Usability
LCS/LCSD 580-5167				
W-03-I (615-01) W-03-D (616-01) W-04-89 (619-01) W-09 (620-01) W-09-86 (621-01)	Phenol Benzyl alcohol 2-Methylphenol 3 & 4 Methylphenol 4-Nitrophenol	28% 56% 70% 61% 41%	27% 50% 66% 57% 38%	AMEC UJ qualified the nondetected results for these analytes in the associated samples because of possible low bias in the analytical results.
	3-Nitroaniline 2,4-Dinitrophenol	130% 148%	135% 146%	The recoveries for these analytes were high and they were not detected in the associated samples. Data usability is not adversely affected.
LCS/LCSD 580-5238				
W-09-116 (622-01) W-11-B (623-01) W-11-D (624-01)	Phenol Benzyl alcohol 4-Nitrophenol Pentachlorophenol	32% 63% 47% 62%	35% 66% 43% 61%	AMEC UJ qualified the nondetected results for these analytes in the associated samples because of possible low bias in the analytical results.
	Di-n-octyl phthalate	71%	69%	The average di-n-octyl phthalate recovery was within acceptance limits at 70%. Data usability is not adversely affected.
LCS/LCSD 580-5285				
W-11-S (625-01) W-11-I (626-01) W-11-D (627-01)	Phenol Benzyl alcohol 4-Nitrophenol	34% 69% 59%	33% 64% 48%	AMEC UJ qualified the nondetected results for these analytes in the associated samples because of possible low bias in the analytical results.
W-11-B (628-01)	Pentachlorophenol Carbazole	79% 131%	67% 120%	The average pentachlorophenol and carbazole recoveries were within acceptance limits at 73% and 125%, respectively. Data usability is not adversely affected.
LCS/LCSD 580-5359				
W-12-S (629-01) W-12-1 (630-01) W-12-D (631-01) AL6-96 (635-01) AL6-96 (635-02)	Phenol 3&4 Methylphenol Benzyl alcohol 4-Chloroaniline 2-Nitroaniline	30% 63% 61% 89% 94%	32% 72% 47% 15% 57%	AMEC J qualified the detected phenol and 3&4-methylphenol results from sample W-12-S (629-01), the detected 3&4-methylphenol result from sample W-12-1(630-01), and the detected benzyl alcohol result from sample AL6-96 (635-02) because of possible low bias in the analitycal results.
	3-Nitroaniline 4-Nitrophenol 4-Nitroaniline Pentachlorophenol	116% 51% 102% 70%	22% 48% 35% 69%	AMEC UJ qualified the nondetected results for these analytes in the associated samples because of possible low bias in the analytical results.

TABLE 5.15
LCS Recovery for Semivolatile Organic Compounds
Winter 2006 Groundwater Monitoring Event
RP - Portland Site

Affected Samples	Analytes With Recoveries Outside Acceptance Limits	LCS Recovery	LCSD Recovery	Effects on Data Usability
LCS/LCSD 580-5411				
W-09-86 (636-01)	Di-n-butyl phthalate	151%	140%	AMEC J qualified the detected di-n-butyl phthalate results from samples W-09-86 (636-01), W-09-116 (637-01), and W-09 (638-01) because of possible high bias in the analitycal results.
W-09-116 (637-01) W-09 (638-01)	Phenol	30%	30%	AMEC UJ qualified the nondetected results for these analytes in the associated samples because of possible low bias in the analytical results.
	Benzyl alcohol	59%	56%	
	3&4 Methylphenol	65%	64%	
	Hexachlorocyclopentadiene	62%	65%	
	2,4-Dinitrophenol	55%	53%	
	4-Nitrophenol	44%	43%	
	4,6-Dinitro-2-methylphenol	62%	65%	
	Pentachlorophenol	64%	65%	
	N-Nitrosodiphenylamine	137%	128%	The recoveries for these analytes were high and they were not detected in the associated samples. Data usability is not adversely affected.
	Carbazole	136%	129%	

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TABLE 5.16
MS/MSD Recovery and Precision for Semivolatile Organic Compounds
Winter 2006 Groundwater Monitoring Event
RP - Portland Site

Spiked Sample	Analytes with recoveries outside acceptance limits	Effect on Data Usability
W-11-D (624-01)	Phenol (11%/17%) 2-Chlorophenol (53%/67%) Benzyl alcohol (46%/48%) 2-Methylphenol (38%/51%) 3&4 Methylphenol (30%/44%) 4-Chloro-3-methylphenol (50%/63%) 2,4,6-Trichlorophenol (41%/67%) 2,4-Dinitrophenol (0%/134%) 4-Nitrophenol (24%/28%) 4,6-Dinitro-2-methylphenol (30%/70%) Pentachlorophenol (22%/61%)	AMEC UJ qualified the nondetected results for these analytes from the spiked sample because of possible matrix interference.
W-12-S (629-01)	Phenol(0%/0%)	AMEC R qualified and rejected the phenol result from this sample because of possible matrix interference. It should be noted that low recovery was observed in the associated LCS which may indicate problems in the analytical system rather than matrix interference contributed to the very low MS recoveries
	2-Chlorophenol (55%/58%) Benzyl alcohol (49%/48%) 2-Methylphenol (23%/50%) 3&4 Methylphenol (32%/45%) 2,4-Dichlorophenol (41%/72%) Naphthalene (53%/50%)	AMEC J qualified the detected 2-chlorophenol, 2-methylphenol, 3&4 methylphenol, 2,4-dichlorophenol and naphthaplene results from the spiked sample because of possible matrix interference.
	4-Nitrophenol (38%/39%) 4-Nitroaniline (62%/56%)	AMEC UJ qualified the nondetected benzyl alcohol, 4-nitrophenol, and 4-nitroaniline results from the spiked sample because of possible matrix interference.
	2,4-Dinitrophenol (161%/167%)	Recoveries were high and this analyte was not detected in the unspiked sample. Data usability is not adversely affected.

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TABLE 5.17
Surrogate Recoveries for Semivolatile Organic Compounds
Winter 2006 Groundwater Monitoring Event
RP - Portland Site

Sample ID	Internal Standard Outside Acceptance Limits	Recovery	Effects on Data Usability
WS-11-125 (601-01)	2-Fluorophenol Phenol-d_5 (undiluted analysis)	52% 18%	AMEC UJ qualified the nondetected acid extractable compounds (phenols) results because of possible low bias in the analytical results.
WS-11-161 (602-01)	Phenol-d_5 2-Fluorophenol	9% 17%	AMEC R qualified and rejected the nondetected acid extractable compounds (phenols) results the presence or absence of this analytical could not be definitively determined.
WS-12-125 (603-01)	Phenol-d_5 2-Fluorophenol	7% 16%	
WS-12-161 (604-01)	Phenol-d_5 2-Fluorophenol	9% 16%	
RP-11-30 (605-01)	Phenol-d_5 2-Fluorophenol	8% 17%	AMEC R qualified and rejected the nondetected acid extractable compounds (phenols) results the presence or absence of this analytical could not be definitively determined.
RP-11-216 (606-01)	Phenol-d_5 2-Fluorophenol	10% Matrix Interference	AMEC UJ qualified the nondetected acid extractable compounds (phenols) results because of possible low bias in the analytical results.
RP-11-161 (607-01)	Phenol-d_5 2-Fluorophenol	10% 20%	AMEC J qualified the detected 3 & 4 methylphenol result and UJ qualified the nondetected acid extractable compounds (phenols) results because of possible low bias in the analytical results.
RP-07-55 (608-01)	Phenol-d_5 2-Fluorophenol	9% 18%	AMEC R qualified and rejected the nondetected acid extractable compounds (phenols) results the presence or absence of this analytical could not be definitively determined.
RP-07-84 (609-01)	Phenol-d_5 2-Fluorophenol	19% Matrix Interference	AMEC J qualified the detected 2,4-dichlorophenol result and UJ qualified the nondetected acid extractable compounds (phenols) results because of possible low bias in the analytical results.
RP-07-84 (609-06)	Phenol-d_5 2-Fluorophenol	18% Matrix Interference	
RP-07-119 (610-01)	Phenol-d_5	18%	AMEC UJ qualified the nondetected acid extractable compounds (phenols) results because of possible low bias in the analytical results.
	2-Fluorophenol	195%	AMEC J qualified the detected 2,4-dichlorophenol result because of possible high or low bias in the analytical result.
RP-07-119 (610-02)	Phenol-d_5	16%	AMEC UJ qualified all nondetected acid extractable compounds (phenols) results because of possible low bias in the analytical results.
	2-Fluorophenol	185%	AMEC J qualified the detected 2,4-dichlorophenol result because of possible high or low bias in the analytical result.

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TABLE 5.17
Surrogate Recoveries for Semivolatile Organic Compounds
Winter 2006 Groundwater Monitoring Event
RP - Portland Site

Sample ID	Internal Standard Outside Acceptance Limits	Recovery	Effects on Data Usability
RP-07-30 (611-01)	Phenol-d_5	15%	AMEC UJ qualified the nondetected acid extractable compounds (phenols) results because of possible low bias in the analytical results.
	2-Fluorophenol	24%	
RP-01-31 (612-01)	Phenol-d_5	20%	
	2-Fluorophenol	37%	
RP-01-51 (613-01)	Phenol-d_5	7%	AMEC R qualified and rejected the nondetected acid extractable compounds (phenols) results the presence or absence of this analytical could not be definitively determined.
	2-Fluorophenol	Matrix Interference	AMEC J qualified the detected 2,4-dichlorophenol result because of possible low bias in the analytical result.
RP-01-65 (614-01)	Phenol-d_5	12%	AMEC J qualified the detected 2,4-dichlorophenol result and UJ qualified all nondetected acid extractable compounds (phenols) results because of possible low bias in the analytical results.
	2-Fluorophenol	Matrix Interference	
W-09-116 (622-01)	Phenol-d_5	15%	AMEC J qualified the detected 2-methylphenol and 3&4-methylphenol results and UJ qualified the nondetected acid extractable compounds (phenols) results because of possible low bias in the analytical results.
	2-Fluorophenol	29%	
W-11-B (623-01)	Phenol-d_5	15%	AMEC UJ qualified the nondetected acid extractable compounds (phenols) results because of possible low bias in the analytical results.
	2-Fluorophenol	34%	
W-11-D (624-01)	Phenol-d_5	10%	
	2-Fluorophenol	24%	
W-11-S (625-01)	Phenol-d_5	27%	AMEC J qualified the detected phenols results and UJ qualified the nondetected phenols results because of possible low bias in the analytical results.
	2-Fluorophenol	12%	
W-11-I (626-01)	Phenol-d_5	40%	
	2-Fluorophenol	21%	
W-11-D (627-01)	Phenol-d_5	7%	AMEC R qualified and rejected the nondetected acid extractable compounds (phenols) results the presence or absence of this analytical could not be definitively determined.
	2-Fluorophenol	Matrix Interference	AMEC J qualified the detected 2,4-dichlorophenol result because of possible low bias in the analytical result.
W-11-B (628-01)	Phenol-d_5	18%	AMEC J qualified the detected phenols results and UJ qualified the nondetected phenols results because of possible low bias in the analytical results.
	2-Fluorophenol	Matrix Interference	
W-12-S (629-01)	Phenol-d_5	12%	AMEC J qualified the detected acid extractable compounds (phenols) results and UJ qualified the nondetected acid extractable compounds (phenols) results because of possible low bias
	2-Fluorophenol	23%	

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TABLE 5.17
Surrogate Recoveries for Semivolatile Organic Compounds
Winter 2006 Groundwater Monitoring Event
RP - Portland Site

Sample ID	Internal Standard Outside Acceptance Limits	Recovery	Effects on Data Usability
W-12-1 (630-01)	Phenol-d_5	5%	AMEC R qualified and rejected the nondetected acid extractable compounds (phenols) results the presence or absence of this analytical could not be definitively determined.
	2-Fluorophenol	11%	
	2,4,6-Tribromophenol	58%	AMEC J qualified the detected 3&4-methylphenol result because of possible low bias in the analytical result.
W-12-D (631-01)	Phenol-d_5	12%	AMEC UJ qualified the nondetected acid extractable compounds (phenols) results because of possible low bias in the analytical results.
	2-Fluorophenol	23%	
AL6-96 (635-01)	Phenol-d_5	10%	AMEC UJ qualified the nondetected acid extractable compounds (phenols) results because of possible low bias in the analytical results.
	2-Fluorophenol	Matrix Interference	AMEC J qualified the detected 2-methylphenol, 2,4-dichlorophenol and 4-chloro-3-methylphenol results because of possible low bias in the analytical result.
AL6-96 (635-02)	Phenol-d_5	9%	AMEC R qualified and rejected the nondetected acid extractable compounds (phenols) results the presence or absence of this analytical could not be definitively determined.
	2-Fluorophenol	Matrix Interference	AMEC J qualified the detected 2-methylphenol, 2,4-dichlorophenol and 4-chloro-3-methylphenol results because of possible low bias in the analytical result.
W-09-86 (636-01)	Phenol-d_5	5%	AMEC R qualified and rejected the nondetected acid extractable compounds (phenols) results the presence or absence of this analytical could not be definitively determined.
	2-Fluorophenol	Matrix Interference	
	2,4,6-Tribromophenol	43%	
W-09-116 (637-01)	Phenol-d_5	6%	AMEC R qualified and rejected the nondetected acid extractable compounds (phenols) results the presence or absence of this analytical could not be definitively determined.
	2-Fluorophenol	Matrix Interference	AMEC J qualified the detected acid extractable compounds (phenols) results because of possible low bias in the analytical result.
W-09 (638-01)	Phenol-d_5	18%	AMEC UJ qualified all nondetected results for the acid extractable compounds (phenols) because of possible low bias in the analytical results.
	2-Fluorophenol	189%	AMEC J qualified the detected 2-methylphenol and 2,4-dimethylphenol results because of possible low or high bias in the analytical result.

TABLE 5.18
Continuing Calibration for Organochlorine Pesticides
Winter 2006 Groundwater Monitoring Event
RP - Portland Site

Analyte/Problem	Effects on Data Usability
CCAL analyzed March 30, 2006 on instrument ECD.	
Heptachlor (128%/124%)	AMEC J qualified the detected result from sample WS-11-125 (601-01) because of a possible high bias in the analytical result.
CCAL analyzed March 31, 2006 at 15:30 on instrument ECD	
4,4'-DDT (125%/125%)	AMEC J qualified the detected 4,4'-DDT result from sample WS-11-161 (602-01), RP-07-84 (609-06), RP-07-119 (610-01), RP-07-30 (611-01) because of a possible high bias in the analytical result.
Heptachlor (127%/124%)	AMEC J qualified the detected heptachlor result from sample RP-07-84 (609-01), RP-07-84 (609-06) because of a possible high bias in the analytical result.
Methoxychlor (137%/133%)	Methoxychlor recoveries were high and these analytes were not detected in the associated sample. Data usability is not adversely affected.
CCAL analyzed March 31, 2006 at 19:05 on instrument ECD.	
delta-BHC (79%/87%)	AMEC UJ qualified the nondetected results from samples RP-01-31 (612-01), RP-01-51 (613-01), and RP-01-65 (614-01) and J qualified the detected results from sample RP-07-84 (609-06) and RP-07-30 (611-01) because of possible low bias in the analytical results.
Heptachlor (125%/110%)	AMEC J qualified the detected heptachlor result from sample RP-07-84 (609-01), RP-07-84 (609-06), RP-01-51 (613-01) and RP-01-65 (614-01) because of a possible high bias in the analytical result.
CCAL analyzed April 4, 2006 on instrument ECD	
Endrin (122%)	The high recovery was observed on the primary column and the results were reported from the secondary column. Data usability is not adversely affected.
CCAL analyzed April 10, 2006 on instrument ECD at 16:48	
Endrin (78%/82%)	AMEC J qualified the detected endrin results from sample W-09-116 (622-01), W-11-B (623-01), W-11-D (624-01) because of possible low bias in the analytical results.
CCAL analyzed April 10, 2006 on instrument ECD at 17:07	
4,4'-DDT (119%/124%)	AMEC J qualified the detected results from samples W-11-I (626-01) and W-11-D (627-01) because of possible high bias in the analytical results.
Endrin Ketone (116%)	AMEC J qualified the detected results from samples W-11-S (625-01) and W-11-I (626-01) because of possible high bias in the analytical results.
Methoxychlor (116%/121%) Endrin Aldehyde (118%) Heptachlor (131%/130%)	The recoveries were high and these analytes were not detected in the associated samples. Data usability is not adversely affected.

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TABLE 5.18
Continuing Calibration for Organochlorine Pesticides
Winter 2006 Groundwater Monitoring Event
RP - Portland Site

Analyte/Problem	Effects on Data Usability
CCAL analyzed April 10, 2006 on instrument ECD at 18:45	
4,4'-DDT (129%/122%)	AMEC J qualified the detected results from samples W-11-I (626-01) and W-11-D (627-01) because of possible high bias in the analytical results.
Endrin Ketone (121%/118%)	AMEC J qualified the detected results from samples W-11-S (625-01) and W-11-I (626-01) because of possible high bias in the analytical results.
Methoxychlor (122%/128%) Endrin Aldehyde (118%/121%) Heptachlor (129%/122%)	The recoveries were high and these analytes were not detected in the associated samples. Data usability is not adversely affected.
CCAL analyzed April 13, 2006 on instrument ECD at 09:09	
4,4'-DDT (127%)	AMEC J qualified the detected results from samples W-11-B (628-01), because of possible high bias in the analytical results.
CCAL analyzed April 18, 2006 on instrument ECD at 15:44	
gamma-Chlordane (104%/83%)	AMEC J qualified the detected result from sample W-09-116 (637-01) because of a possible low bias in the analytical result.
Endrin (121%/101%)	AMEC J qualified the detected result from sample W-09-116 (637-01) because of a possible high bias in the analytical result.
CCAL analyzed April 18, 2006 on instrument ECD at 18:21	
Methoxychlor (121%/132%) Endrin (106%/116%)	AMEC J qualified the detected endrin results from samples W-09-86 (636-01) and W-09 (638-01) because of possible high bias in the analytical results.
Endrin Ketone (116%/119%)	AMEC J qualified the detected result from sample W-09 (638-01) because of possible high bias in the analytical results.
delta-BHC (113%116%)	AMEC J qualified the detected result from sample W-09-116 (637-01) because of possible high bias in the analytical results.
4,4'-DDT (112%/122%)	AMEC J qualified the detected result from sample W-09 (638-01) because of possible high bias in the analytical results.
CCAL analyzed April 19, 2006 on instrument ECD at 09:36	
alpha-BHC (117%) Heptachlor (128%/121%)	AMEC J qualified the detected results from samples AL6-96 (635-01) and AL6-96 (635-02) because of possible high bias in the analytical results.
Aldrin (118%)	AMEC J qualified the detected results from sample AL6-96 (635-02) because of possible high bias in the analytical results.

TABLE 5.19
Laboratory Blanks Detections for Organochlorine Pesticides
Winter 2006 Groundwater Monitoring Event
RP - Portland Site

Blank ID	Detected Analytes	Analyte Concentration (µg/L)	Affected Samples	Effects on Data Usability
MB 580-5012	4,4'-DDT Endrin	0.002 0.0073	WS-11-125 (601-01) WS-12-125 (603-01) WS-12-161 (604-01) WS-11-216 (606-01) WS-11-161 (607-01) RP-07-55 (608-01)	AMEC U qualified the endrin results from these samples and the 4,4'-DDT results from samples WS-11-125 (601-01), WS-12-161 (604-01), WS-11-161 (607-01), RP-07-55 (608-01) because the sample concentrations were less than 5 times the concentration detected in the blank.
MB 580-5072	4,4'-DDT	0.002	RP-07-119 (610-01)	AMEC U qualified the 4,4'-DDT results because the sample concentrations were less than 5 times the concentration detected in the blank.
MB 580-5187	4,4'-DDT Endrin	0.015 0.0042	W-03-I (615-01) W-09 (620-01) W-09-86 (621-01)	AMEC U qualified the endrin results from these samples and the 4,4'-DDT results from samples W-03-I (615-01), W-09-86 (621-01) because the sample concentrations were less than 5 times the concentration detected in the blank.
MB 580-5253	4,4'-DDT Endrin Endrin Ketone	0.05 0.0084 0.0033	W-09-116 (622-01) W-11-B (623-01) W-11-D (624-01) W-11-S (625-01) W-11-I (626-01)	AMEC U qualified the 4,4'-DDT results from samples W-09-116 (622-01), W-11-B (623-01), W-11-I (626-01), W-11-B (628-01) because the sample concentrations were less than 5 times the concentration detected in the blank.
			W-11-B (628-01)	AMEC U qualified the endrin result from sample W-11-D (624-01), W-11-B (628-01) and the endrin ketone results from samples W-11-B (623-01), W-11-D (624-01), W-11-S (625-01), W-11-I (626-01), W-11-B (628-01) because the sample concentrations were less than 5 times the concentration detected in the blank.
MB 580-5348	Endrin	0.0042	AL6-96 (635-01) AL6-96 (635-02)	Endrin was not detected in the associated samples. Data usability is not adversely affected.
			W-12-S(629-01) W-12-1(630-01) W-12-D(631-01)	AMEC U qualified the endrin results from samples W-12-S(629-01), W-12-1(630-01) and W-12-D(631-01), because the sample concentrations were less than 5 times the concentration detected in the blank
MB 580-5429	4,4'-DDT	0.0096	W-09-86 (636-01) W-09-116 (637-01) W-09 (638-01)	4,4'-DDT was not detected in the associated samples or was detected at a concentration greater than 5 times the concentration detected in the blank. Data usability is not adversely affected.

TABLE 5.20
LCS Recovery for Organochlorine Pesticides
Winter 2006 Groundwater Monitoring Event
RP - Portland Site

Affected Samples	Analytes With Recoveries Outside Acceptance Limits	LCS Recovery	LCSD Recovery	Effects on Data Usability
LCS/LCSD 580-5072				
WS-11-161 (602-01) RP-07-84 (609-01) RP-07-84 (609-06) RP-07-119 (610-01) RP-07-119 (610-02) RP-07-30 (611-01)	alpha-BHC	61%	66%	AMEC J qualified the detected results from samples RP-07-84 (609-01), RP-07-84 (609-06), RP-07-119 (610-01), RP-07-119 (610-02) and UJ qualified the nondetected results from sample WS-11-161 (602-01), RP-07-30 (611-01) because of possible low bias in the analytical results.
	Endosulfan sulfate	54%	61%	AMEC UJ qualified the nondetected results from sample WS-11-161 (602-01), RP-07-84 (609-01), RP-07-84 (609-06), RP-07-119 (610-01), RP-07-119 (610-02), RP-07-30 (611-01) because of possible low bias in the analytical results.
	delta-BHC	5%	5%	AMEC R qualified and rejected the nondetected delta-BHC results from sample WS-11-161 (602-01) because the presence or absence of this compound could not be determined.
				AMEC J qualified the detected results from samples RP-07-84 (609-01), RP-07-84 (609-06), RP-07-119 (610-01), RP-07-119 (610-02), and RP-07-30 (611-01) because of possible low bias in the analytical results.
LCS/LCSD 580-5150				
	Endosulfan sulfate	108%	132%	The LCSD recovery was high and this analyte was not detected in the associated samples. Data usability is not adversely affected
LCS/LCSD 580-5253				
W-09-116 (622-01) W-11-B (623-01) W-11-D (624-01) W-11-S (625-01) W-11-I (626-01) W-11-D (627-01) W-11-B (628-01)	Aldrin alpha-BHC beta-BHC delta-BHC gamma-BHC 4,4'-DDD Dieldrin Endosulfan II Endosulfan sulfate Endrin Aldehyde Methoxychlor Endrin Ketone	120% 113% 109% 136% 117% 113% 112% 121% 114% 123% 141% 114%	144% 134% 132% 167% 139% 141% 138% 149% 145% 155% 165% 143%	AMEC J qualified the detected 4,4'-DDD and endosulfan II results from sample W-09-116 (622-01), the detected delta-BHC; 4,4'-DDD; endosulfan II; endrin ketone results from sample W-11-B (623-01), and the detected endrin ketone results from sample W-11-D (624-01), W-11-S (625-01), W-11-I (626-01), W-11-B (628-01); the detected alpha-BHC and 4,4'-DDD results from sample W-11-D (627-01) because of possible high bias in the analytical results.

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TABLE 5.20
LCS Recovery for Organochlorine Pesticides
Winter 2006 Groundwater Monitoring Event
RP - Portland Site

Affected Samples	Analytes With Recoveries Outside Acceptance Limits	LCS Recovery	LCSD Recovery	Effects on Data Usability
LCS/LCSD 580-5348				
	delta-BHC	69%	80%	The average recoveries (75%, 74%, 71%, and 74%) for these analytes were within acceptance limits. Data usability is not adversely affected.
	Endosulfan I	69%	78%	
	alpha-Chlordane	67%	75%	
	gamma-Chlordane	69%	78%	

TABLE 5.21
Surrogate Recoveries for Organochlorine Pesticides
Winter 2006 Groundwater Monitoring Event
RP - Portland Site

Sample ID	Surrogates outside acceptance limits	Recovery	Effects on Data Usability
WS-11-125 (601-01)	Decachlorobiphenyl (DBC)	29%/30%	AMEC J qualified the detected OCP results and UJ qualified the nondetected OCP results from this sample because of a possible low bias in the analytical results.
W-11-B (623-01)	DBC	50%/50%	AMEC J qualified the detected OCP results and UJ qualified the nondetected OCP results from this sample because of a possible low bias in the analytical results.
W-11-S (625-01)	DBC	58%/56%	AMEC J qualified the detected OCP results and UJ qualified the nondetected OCP results from this sample because of a possible low bias in the analytical results.
W-11-I (626-01)	DBC	40%/41%	AMEC J qualified the detected OCP results and UJ qualified the nondetected OCP results from this sample because of a possible low bias in the analytical results.
AL6-96 (635-01)	Tetrachloro-m-xylene (TCMX)	147%	AMEC J qualified the detected OCP results from this sample because of a possible high bias in the analytical results.
AL6-96 (635-02)	TCMX	149%	AMEC J qualified the detected OCP results from this sample because of a possible high bias in the analytical results.
W-12-S(629-01)	DBC	22%	AMEC J qualified the detected OCP results and UJ qualified the nondetected OCP results from this sample because of a possible low bias in the analytical results.
W-09 (638-01)	DBC	41%	AMEC J qualified the detected OCP results and UJ qualified the nondetected OCP results from this sample because of a possible low bias in the analytical results.

TABLE 5.22
MS/MSD Recovery and Precision for Organochlorine Pesticides
Winter 2006 Groundwater Monitoring Event
RP - Portland Site

Spiked Sample	Analytes with recoveries outside acceptance limits	Effect on Data Usability
W-11-D (624-01)	alpha-BHC (53%/56%)	AMEC UJ qualified the nondetected alpha-BHC and endosulfan sulfate results from this sample because of possible matrix interference.
	Endosulfan sulfate (42%/36%)	
	delta-BHC (4%/3%)	AMEC R qualified and rejected the nondetected delta-BHC result from this sample because of possible matrix interference.
W-12-S (629-01)	4,4'-DDD (54%/61%) alpha-Chlordane (56%/63%)	AMEC J qualified the detected 4,4'-DDD and alpha-chlordane results from this sample because of possible matrix interference.

TABLE 5.23
Data Reporting and Analitical Procedures for Organochlorine Pesticides
Winter 2006 Groundwater Monitoring Event
RP - Portland Site

Sample ID	Analytes with >40%D between results reported from the primary and secondary GC columns. AMEC N qualified the results for these analytes because their presence in the associated samples is uncertain.
WS-11-125 (601-01)	gamma-BHC (Lindane) 4,4'-DDT
WS-11-161 (602-01)	Endosulfan II 4,4'-DDT
WS-12-25 (603-01)	alpha-BHC Heptachlor epoxide
WS-12-161 (604-01)	Endosulfan I 4,4'-DDE Dieldrin Endrin 4,4'-DDD 4,4'-DDT
RP-11-216 (606-01)	alpha-BHC alpha-Chlordane
RP-07-55 (608-01)	Endosulfan II
RP-07-84 (609-01)	Aldrin alpha-BHC delta-BHC 4,4'-DDD 4,4'-DDE Heptachlor Epoxide
RP-07-84 (609-06)	alpha-BHC delta-BHC gamma-BHC (Lindane) 4,4'-DDD 4,4'-DDE 4,4'-DDT Endosulfan I Heptachlor Epoxide
RP-07-119 (610-01)	alpha-BHC delta-BHC 4,4'-DDT
RP-07-119 (610-02)	alpha-BHC delta-BHC

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TABLE 5.23
Data Reporting and Analitical Procedures for Organochlorine Pesticides
Winter 2006 Groundwater Monitoring Event
RP - Portland Site

Sample ID	Analytes with >40%D between results reported from the primary and secondary GC columns. AMEC N qualified the results for these analytes because their presence in the associated samples is uncertain.
RP-07-30 (611-01)	4,4'-DDT
RP-01-51 (613-01)	alpha-BHC Heptachlor Endrin
W-03-I (615-01)	beta-BHC Heptachlor Endosulfan II 4,4'-DDT
W-04-89 (619-01)	beta-BHC
W-09 (620-01)	gamma-BHC (Lindane) Dieldrin Endrin Endrin Ketone
W-09-116 (622-01)	Heptachlor Heptachlor Epoxide alpha-Chlordane 4,4'-DDE 4,4'-DDD 4,4'-DDT
W-11-B (623-01)	delta-BHC Heptachlor Epoxide Endosulfan II 4,4'-DDT
W-11-D (624-01)	beta-BHC
W-11-I (626-01)	4,4'-DDT
W-11-D (627-01)	alpha-BHC Endrin 4,4'-DDD alpha-Chlordane
W-11-B (628-01)	4,4'-DDT Endrin Ketone

TABLE 5.23
Data Reporting and Analitical Procedures for Organochlorine Pesticides
Winter 2006 Groundwater Monitoring Event
RP - Portland Site

Sample ID	Analytes with >40%D between results reported from the primary and secondary GC columns. AMEC N qualified the results for these analytes because their presence in the associated samples is uncertain.
AL6-96 (635-01)	alpha-BHC delta-BHC Heptachlor alpha-Chlordane 4,4'-DDE Endrin Ketone
AL6-96 (635-02)	alpha-BHC Heptachlor Aldrin alpha-Chlordane
W-12-S(629-01)	gamma-Chlordane alpha-Chlordane 4,4'-DDE Endrin 4,4'-DDT endrin aldehyde
W-12-1(630-01)	Endosulfan II
W-09-116 (637-01)	beta-BHC delta-BHC Heptachlor gamma-Chlordane 4,4'-DDE Endrin Endosulfan II
W-09 (638-01)	gamma-Chlordane alpha-Chlordane Endrin Endosulfan II 4,4'-DDT Endosulfan sulfate Endrin Ketone

TABLE 5.24
Laboratory Blanks Detections for Metals
Winter 2006 Groundater Monitoring Event
RP - Portland Site

Blank ID	Detected Analytes	Analyte Concentration (µg/L)	Affected Samples	Effects on Data Usability
MB 580-5040	Total Copper	0.027	WS-11-125 (601-01)	Analytes were either not detected or concentrations in the associated samples were more than 5 times the concentrations detected in the blanks or; data usability is not adversely affected.
	Total Lead	0.01	WS-11-161 (602-01)	
MB 580-5148	Dissolved Magnesium	52	WS-12-125 (603-01)	
	Dissolved Zinc	4.6		
MB 580-5060	Dissolved Chromium	0.031		
MB 580-5157	Dissolved Lead	0.005	WS-12-161 (604-01)	AMEC U qualified the total lead and dissolved copper results from sample WS-12-161 (604-01), RP-11-161 (607-01) because the concentrations in the associated samples were less than 5 times the concentrations detected in the blank.
	Dissolved Copper	0.076	RP-11-30 (605-01)	
	Dissolved Nickel	0.011	RP-11-216 (606-01)	
			RP-11-161 (607-01)	
			RP-07-55 (608-01)	
			RP-07-84 (609-01)	
			RP-07-84 (609-06)	
			RP-07-119 (610-01)	
MB 580-5162	Dissolved Manganese	0.99	RP-07-119 (610-02)	Dissolved magnesium concentrations in the associated samples were more than 5 times the concentration detected in the blank; data usability is not adversely affected.
MB 580-5184	Total Iron	16	RP-07-30 (611-01)	AMEC U qualified the total arsenic result from sample RP-11-30 (605-01) and the total lead results from sample RP-07-55 (608-01), RP-07-84 (609-01), RP-07-84 (609-06), RP-07-119 (610-01), RP-07-119 (610-02), and RP-07-30 (611-01) because the concentrations in the associated samples were less than 5 times the concentrations detected in the blank.
	Total Magnesium	68		
	Total Potassium	37		
	Total Zinc	6.8		
	Total Arsenic	0.14		
	Total Copper	0.027		
	Total Lead	0.019		
	Total Nickel	0.02		
MB 580-5263	Total Potassium	270	RP-01-31 (612-01)	AMEC U qualified the total zinc results from sample RP-01-31 (612-01), W-03-I (615-01), W-03-D (616-01), W-04-89 (619-01), W-09-86 (621-01), W-09-116 (622-01), W-11-B (623-01), W-11-D (624-01) because the concentrations in the associated samples were less than 5 times the concentrations detected in the blank.
	Total Zinc	15	W-03-I (615-01)	
	Total Copper	0.11	W-03-D (616-01)	
	Total Lead	0.015	W-04-89 (619-01)	
	Total Nickel	0.03	W-09-86 (621-01)	
			W-09-116 (622-01)	
			W-11-B (623-01)	
			W-11-D (624-01)	

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TABLE 5.24
Laboratory Blanks Detections for Metals
Winter 2006 Groundater Monitoring Event
RP - Portland Site

Blank ID	Detected Analytes	Analyte Concentration (µg/L)	Affected Samples	Effects on Data Usability
MB 580-5373	Dissolved Magnesium Dissolved Potassium Dissolved Zinc	45 81 6	W-19 (620-01)	AMEC U qualified the total zinc results from sample W-19 (620-01) because the concentrations in the associated samples were less than 5 times the concentrations detected in the blank.
MB 580-5410	Dissolved Potassium	62	W-11-S (625-01) W-11-I (626-01) W-11-D (627-01) W-11-B (628-01) W-12-S (629-01) W-12-1 (630-01) W-12-D (631-01) AL6-96 (635-01) AL6-96 (635-02)	Potassium concentrations in the associated samples were more than 5 times the concentration detected in the blank; data usability is not adversely affected.
MB 580-5468	Total Copper Total Lead	0.039 0.013	W-12-S (629-01) W-12-1 (630-01) W-12-D (631-01) W-11-S (625-01) W-11-I (626-01) W-11-D (627-01) W-11-B (628-01) AL6-96 (635-01) AL6-96 (635-02)	Analyte concentrations in the associated samples were more than 5 times the concentration detected in the blank; data usability is not adversely affected.
MB 580-5718	Total Aluminum Total Lead Total Nickel	40 0.005 0.011	W-09-86 (636-01) W-09-116 (637-01)	AMEC U qualified the total aluminum results from samples W-09-86 (636-01) and W-09-116 (637-01) because the concentrations in the associated samples were less than 5 times the concentrations detected in the blank.
MB 580-5639	Dissolved Sodium	840	W-09-86 (636-01) W-09-116 (637-01) W-09 (638-01)	Sodium concentration in the associated samples were more than 5 times the concentration detected in the blank; data usability is not adversely affected.

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TABLE 5.25
Rinsate Blank Detections for Metals
Winter 2006 Groundwater Monitoring Event
RP - Portland Site

Rinsate Blank ID	Detected Analytes	Analyte Concentration (µg/L)	Affected Samples	Effects on Data Usability
Rinsate (628-04)	Total Calcium	57	W-12-S (629-01)	AMEC U qualified the detected total chromium, total copper, dissolved lead, and dissolved copper results from samples W-12-S (629-01), W-12-1 (630-01), and W-12-D (631-01) and the detected total lead result from sample W-12-1 (630-01). The concentrations for these analytes in the samples were less than 5 times the blank concentration.
	Total Chromium	6.0	W-12-1 (630-01)	
	Total Copper	0.37	W-12-D (631-01)	
	Total Lead	0.06		
	Total Nickel	0.53		
	Dissolved Calcium	31		
	Dissolved Potassium	33		
	Dissolved Lead	0.14		
	Dissolved Copper	2.1		
	Dissolved Nickel	0.25		

TABLE 5.26
MS/MSD Recovery and Precision for Metals
Winter 2006 Groundwater Monitoring Event
RP - Portland Site

Spiked Sample	Analytes with recoveries outside acceptance limits	Effect on Data Usability
WS-11-125 (601-01)	Calcium (69%/122%) Potassium (144%/122%) Sodium (116%/133%) Dissolved Calcium (65%/45%) Dissolved Iron (80%/73%) Dissolved Magnesium (80%/64%)	The average calcium and sodium, and dissolved iron recoveries (96%, 125%, 76.5%) were within acceptance limits. Data usability is not adversely affected.
		AMEC J qualified the detected total potassium results from sample WS-11-125 (601-01) because of possible high bias in the analytical results.
		AMEC J qualified the detected dissolved magnesium result from sample WS-11-125 (601-01) because of a possible low bias in the analytical results.
		The background dissolved calcium (73500 µg/L) concentrations in the unspiked sample was more the 4 times the spike concentrations, data usability is not adversely affected.
W-11-D (624-01)	Total Calcium (89%/62%)	The average total recovery recoveries (75.5%) was within acceptance limits. Data usability is not adversely affected.
	Dissolved Calcium (675/86%)	The background dissolved calcium (75000 µg/L) concentration in the unspiked sample was more the 4 times the spike concentration, data usability is not adversely affected.
W-09-86 (636-01)	Total Calcium (139%)	AMEC J qualified the detected results because of possible high bias in the analytical results.
	Total Mangesium (129%)	
W-12-S (629-01)	Dissolved Sodum (61%)	The background dissolved sodium (94.8 µg/L) concentrations in the unspiked sample was more the 4 times the spike concentration (18.5 µg/L), data usability is not adversely affected.

TABLE 6
Definitions of Data Qualifiers Added as a Result of Data Validation Findings
Winter 2006 Groundwater Monitoring Event
RP - Portland Site

U	The U qualifier indicates that the analyte must be considered to be nondetected at the concentration listed. U qualifiers added during validation are typically a result of detection of target analytes in field, trip, or laboratory blanks.
UJ	The UJ qualifier indicates the reporting limit is estimated. UJ qualifiers added during validation may indicate either a high or low bias related to a QC element that exceeds required acceptance limits.
J	The J qualifier indicates that the associated result is quantitatively uncertain. J qualifiers added during validation may indicate a concentration between the method detection limit (MDL) and the method reporting limit (MRL) or sample reporting limit (SRL), or a data limitation related to a QC element that exceeds required acceptance limits.
N	The N qualifier indicates an analyte has been presumptively identified. Presumptive detection means that a chromatographic peak was detected at the correct retention time for an analyte, but that not all required identification criteria were met. The associated result is both qualitatively and quantitatively uncertain.
R	The R qualifier indicates that a result has been rejected due to serious QC problems. It is not possible to definitively determine whether the analyte is present or absent in the sample.

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TABLE 7
Data Qualifiers for Volatile Organic Compounds by EPA Method 8260B
Winter 2006 Groundwater Mointoring Event
RP - Portland Site

Analyte	(601-01) WS-11-125	(602-01) WS-11-161	(603-01) WS-12-125	(604-01) WS-12-161
1,1,1,2-Tetrachloroethane	none	none	none	none
1,1,1-Trichloroethane	none	none	none	none
1,1,2,2-Tetrachloroethane	none	none	none	none
1,1,2-Trichloroethane	none	none	none	none
1,1-Dichloroethane	UJ LC	UJ LC	UJ LC	UJ LC
1,1-Dichloroethene	none	none	none	none
1,1-Dichloropropene	none	none	none	none
1,2,3-Trichlorobenzene	none	none	none	none
1,2,3-Trichloropropane	none	none	none	none
1,2,4-Trichlorobenzene	none	none	none	none
1,2,4-Trimethylbenzene	none	none	none	none
1,2-Dibromo-3-chloropropane	none	none	none	none
1,2-Dibromoethane	none	none	none	none
1,2-Dichlorobenzene	none	J DL	J DL	none
1,2-Dichloroethane	none	none	none	J DL
1,2-Dichloropropane	none	none	none	none
1,3,5-Trimethylbenzene	none	none	none	none
1,3-Dichlorobenzene	none	none	none	none
1,3-Dichloropropane	none	none	none	none
1,4-Dichlorobenzene	J DL	none	none	none
2,2-Dichloropropane	UJ LC	UJ LC	UJ LC	UJ LC
2-Chlorotoluene	J DL	none	none	none
2-Ethyl-1-hexanol	UJ LC	UJ LC, MB	UJ LC, MB	UJ LC
4-Chlorotoluene	J DL	none	none	none
4-Isopropyltoluene	J DL	none	none	none
Benzene	none	J DL	none	J DL
Bromobenzene	none	none	none	none
Bromochloromethane	UJ LC	UJ LC	UJ LC	UJ LC
Bromodichloromethane	none	none	none	none
Bromoform	none	none	none	none
Bromomethane	UJ LC	UJ LC	UJ LC	UJ LC, TB

TABLE 7
Data Qualifiers for Volatile Organic Compounds by EPA Method 8260B
Winter 2006 Groundwater Mointoring Event
RP - Portland Site

Analyte	(601-01) WS-11-125	(602-01) WS-11-161	(603-01) WS-12-125	(604-01) WS-12-161
Carbon tetrachloride	none	none	none	UJ LC
Chlorobenzene	none	none	none	none
Chloroethane	J DL	none	none	none
Chloroform	none	none	none	none
Chloromethane	none	none	none	none
cis-1,2-Dichloroethene	none	U TB	none	U MB, TB
cis-1,3-Dichloropropene	none	none	none	none
Dibromochloromethane	none	none	none	none
Dibromomethane	none	none	none	none
Dichlorodifluoromethane	UJ LL	UJ LL	UJ LL	UJ LL
Ethylbenzene	none	none	none	none
Hexachlorobutadiene	none	none	none	none
Isobutylalcohol	R RF	R RF	R RF	R RF
Isopropylbenzene	none	none	J DL	none
m,p-Xylene	none	none	none	none
Methylene chloride	none	none	none	none
Methyl-t-Butyl Ether (MTBE)	none	none	none	none
Naphthalene	none	U MB	U MB	U MB, TB
n-Butylbenzene	none	none	none	none
n-Propylbenzene	J DL	none	none	none
o-Xylene	none	none	J DL	none
sec-Butylbenzene	none	none	none	none
Styrene	none	none	none	none
tert-Butylbenzene	none	none	none	none
Tetrachloroethene	none	none	none	none
Toluene	none	J DL	J DL	J DL
trans-1,2-Dichloroethene	J UC	none	none	none
trans-1,3-Dichloropropene	none	none	none	none
Trichloroethene	none	J DL	J DL	J DL
Trichlorofluoromethane	none	none	none	none
Vinyl chloride	none	none	none	none

TABLE 7
Data Qualifiers for Volatile Organic Compounds by EPA Method 8260B
Winter 2006 Groundwater Mointoring Event
RP - Portland Site

Analyte	(605-01) RP-11-30	(606-01) RP-11-216	(607-01) RP-11-160	(608-01) RP-07-55
1,1,1,2-Tetrachloroethane	none	none	none	none
1,1,1-Trichloroethane	none	none	none	none
1,1,2,2-Tetrachloroethane	none	none	none	none
1,1,2-Trichloroethane	none	none	none	none
1,1-Dichloroethane	UJ LC	UJ LC	none	none
1,1-Dichloroethene	none	J DL	none	none
1,1-Dichloropropene	none	none	none	none
1,2,3-Trichlorobenzene	none	none	U MB, TB	U MB, TB
1,2,3-Trichloropropane	none	none	none	none
1,2,4-Trichlorobenzene	none	none	U MB, TB	U MB, TB
1,2,4-Trimethylbenzene	J DL	J DL	none	none
1,2-Dibromo-3-chloropropane	none	none	J DL	none
1,2-Dibromoethane	none	none	none	none
1,2-Dichlorobenzene	none	none	U MB, TB	U MB, TB
1,2-Dichloroethane	none	J DL	none	none
1,2-Dichloropropane	none	none	none	none
1,3,5-Trimethylbenzene	none	none	none	none
1,3-Dichlorobenzene	none	none	none	none
1,3-Dichloropropane	none	none	none	none
1,4-Dichlorobenzene	none	none	none	none
2,2-Dichloropropane	UJ LC	UJ LC	none	none
2-Chlorotoluene	none	none	none	none
2-Ethyl-1-hexanol	UJ LC, TB	J LC	UJ LC, TB	J LC
4-Chlorotoluene	none	none	none	none
4-Isopropyltoluene	J DL	none	U MB	U MB
Benzene	none	J DL	none	none
Bromobenzene	none	none	none	none
Bromochloromethane	UJ LC	UJ LC	none	none
Bromodichloromethane	none	none	none	none
Bromoform	none	none	none	none
Bromomethane	UJ LC, TB	UJ LC, TB	none	none

TABLE 7
Data Qualifiers for Volatile Organic Compounds by EPA Method 8260B
Winter 2006 Groundwater Mointoring Event
RP - Portland Site

Analyte	(605-01) RP-11-30	(606-01) RP-11-216	(607-01) RP-11-160	(608-01) RP-07-55
Carbon tetrachloride	UJ LC	UJ LC	J DL	none
Chlorobenzene	none	none	none	none
Chloroethane	none	none	none	none
Chloroform	none	J DL	J DL	none
Chloromethane	none	none	J DL	none
cis-1,2-Dichloroethene	U MB, TB	none	none	none
cis-1,3-Dichloropropene	none	none	none	none
Dibromochloromethane	none	none	none	none
Dibromomethane	none	none	none	none
Dichlorodifluoromethane	UJ LL	UJ LL	none	none
Ethylbenzene	J DL	J DL	J DL	none
Hexachlorobutadiene	none	none	U MB, TB	U MB, TB
Isobutylalcohol	R RF	R RF	R RF	R RF
Isopropylbenzene	J DL	none	none	none
m,p-Xylene	J DL	J DL	J DL	none
Methylene chloride	none	none	none	none
Methyl-t-Butyl Ether (MTBE)	none	none	none	none
Naphthalene	U MB	U MB, TB	U MB, TB	U MB, TB
n-Butylbenzene	J DL	none	none	none
n-Propylbenzene	none	none	none	none
o-Xylene	J DL	J DL	none	none
sec-Butylbenzene	none	none	none	none
Styrene	none	none	none	none
tert-Butylbenzene	none	none	none	none
Tetrachloroethene	none	none	none	none
Toluene	none	none	J DL	J DL
trans-1,2-Dichloroethene	none	J DL	none	none
trans-1,3-Dichloropropene	none	J DL	none	none
Trichloroethene	none	none	none	none
Trichlorofluoromethane	none	none	none	none
Vinyl chloride	none	none	none	none

TABLE 7
Data Qualifiers for Volatile Organic Compounds by EPA Method 8260B
Winter 2006 Groundwater Mointoring Event
RP - Portland Site

Analyte	(609-01) RP-07-84	(609-06) RP-07-84	(610-01) RP-07-119	(610-02) RP-07-119
1,1,1,2-Tetrachloroethane	none	none	none	none
1,1,1-Trichloroethane	none	none	none	none
1,1,2,2-Tetrachloroethane	none	none	none	none
1,1,2-Trichloroethane	none	none	none	none
1,1-Dichloroethane	none	none	none	none
1,1-Dichloroethene	none	none	J DL	J DL
1,1-Dichloropropene	none	none	none	none
1,2,3-Trichlorobenzene	U MB, TB	U MB, TB	U MB, TB	U MB, TB
1,2,3-Trichloropropane	none	none	none	none
1,2,4-Trichlorobenzene	U MB, TB	U MB, TB	U MB, TB	U MB, TB
1,2,4-Trimethylbenzene	none	none	none	none
1,2-Dibromo-3-chloropropane	none	none	none	none
1,2-Dibromoethane	none	none	none	none
1,2-Dichlorobenzene	none	none	none	none
1,2-Dichloroethane	J DL	J DL	none	J DL
1,2-Dichloropropane	none	none	none	none
1,3,5-Trimethylbenzene	none	none	none	none
1,3-Dichlorobenzene	none	none	none	none
1,3-Dichloropropane	none	none	none	none
1,4-Dichlorobenzene	none	none	none	none
2,2-Dichloropropane	none	none	none	none
2-Chlorotoluene	none	none	none	none
2-Ethyl-1-hexanol	UJ LC, TB	UJ LC	UJ LC	UJ LC
4-Chlorotoluene	none	none	none	none
4-Isopropyltoluene	none	none	none	none
Benzene	none	none	J DL	J DL
Bromobenzene	none	none	none	none
Bromochloromethane	none	none	none	none
Bromodichloromethane	none	none	none	none
Bromoform	none	none	none	none
Bromomethane	none	none	none	none

TABLE 7
Data Qualifiers for Volatile Organic Compounds by EPA Method 8260B
Winter 2006 Groundwater Mointoring Event
RP - Portland Site

Analyte	(609-01) RP-07-84	(609-06) RP-07-84	(610-01) RP-07-119	(610-02) RP-07-119
Carbon tetrachloride	none	none	none	none
Chlorobenzene	none	none	none	none
Chloroethane	none	none	none	none
Chloroform	J DL	J DL	J DL	J DL
Chloromethane	J DL	J DL	none	none
cis-1,2-Dichloroethene	none	none	none	none
cis-1,3-Dichloropropene	none	none	none	none
Dibromochloromethane	none	none	none	none
Dibromomethane	none	none	none	none
Dichlorodifluoromethane	none	none	none	none
Ethylbenzene	none	J DL	none	none
Hexachlorobutadiene	U MB, TB	U MB, TB	U MB, TB	U MB, TB
Isobutylalcohol	R RF	R RF	R RF	R RF
Isopropylbenzene	J DL	J DL	none	none
m,p-Xylene	J DL	J DL	J DL	J DL
Methylene chloride	none	none	none	none
Methyl-t-Butyl Ether (MTBE)	none	none	none	none
Naphthalene	U MB, TB	U MB, TB	U MB, TB	U MB, TB
n-Butylbenzene	none	none	none	none
n-Propylbenzene	none	none	none	none
o-Xylene	J DL	J DL	J DL	J DL
sec-Butylbenzene	none	none	none	none
Styrene	none	none	none	none
tert-Butylbenzene	none	none	none	none
Tetrachloroethene	J DL	J DL	J DL	J DL
Toluene	J DL	J DL	J DL	J DL
trans-1,2-Dichloroethene	none	none	none	none
trans-1,3-Dichloropropene	none	none	none	none
Trichloroethene	none	none	none	none
Trichlorofluoromethane	none	none	none	none
Vinyl chloride	none	none	J DL	J DL

TABLE 7
Data Qualifiers for Volatile Organic Compounds by EPA Method 8260B
Winter 2006 Groundwater Mointoring Event
RP - Portland Site

Analyte	(611-01) RP-07-30	(612-01) RP-01-31	(613-01) RP-01-51	(614-01) RP-01-65
1,1,1,2-Tetrachloroethane	none	none	none	none
1,1,1-Trichloroethane	none	none	none	none
1,1,2,2-Tetrachloroethane	none	none	none	none
1,1,2-Trichloroethane	none	none	none	none
1,1-Dichloroethane	UJ LC	UJ LC	UJ LC	UJ LC
1,1-Dichloroethene	none	none	none	none
1,1-Dichloropropene	none	none	none	none
1,2,3-Trichlorobenzene	U MB, TB	none	U MB, TB	U J MB, TB, LS
1,2,3-Trichloropropane	none	none	none	UJ LS
1,2,4-Trichlorobenzene	U TB	none	none	J LS, DL
1,2,4-Trimethylbenzene	none	none	none	UJ LS
1,2-Dibromo-3-chloropropane	none	none	none	UJ LS
1,2-Dibromoethane	none	none	none	none
1,2-Dichlorobenzene	U MB, TB	U MB, TB	none	none
1,2-Dichloroethane	none	none	J DL	J DL
1,2-Dichloropropane	none	none	none	none
1,3,5-Trimethylbenzene	none	none	none	UJ LS
1,3-Dichlorobenzene	none	none	none	J LS
1,3-Dichloropropane	none	none	none	none
1,4-Dichlorobenzene	none	none	none	none
2,2-Dichloropropane	none	UJ LC	UJ LC	UJ LC
2-Chlorotoluene	none	none	none	UJ LS
2-Ethyl-1-hexanol	U TB	UJ LC	UJ LC	J LC, LS, DL
4-Chlorotoluene	none	none	none	UJ LS
4-Isopropyltoluene	none	none	none	UJ LS
Benzene	none	none	J DL	none
Bromobenzene	none	none	none	UJ LS
Bromochloromethane	none	none	none	none
Bromodichloromethane	none	none	none	none
Bromoform	none	none	none	UJ LS
Bromomethane	none	UJ LC	none	none

TABLE 7
Data Qualifiers for Volatile Organic Compounds by EPA Method 8260B
Winter 2006 Groundwater Mointoring Event
RP - Portland Site

Analyte	(611-01) RP-07-30	(612-01) RP-01-31	(613-01) RP-01-51	(614-01) RP-01-65
Carbon tetrachloride	none	none	none	none
Chlorobenzene	none	none	none	none
Chloroethane	none	none	none	none
Chloroform	none	none	J DL	J DL
Chloromethane	none	none	none	none
cis-1,2-Dichloroethene	none	none	none	none
cis-1,3-Dichloropropene	none	none	none	none
Dibromochloromethane	none	none	none	none
Dibromomethane	none	none	none	none
Dichlorodifluoromethane	none	none	none	none
Ethylbenzene	none	none	none	none
Hexachlorobutadiene	U TB	U MB, TB	none	UJ LS
Isobutylalcohol	R RF	R RF	R RF	R RF
Isopropylbenzene	none	none	J DL	J LS, DL
m,p-Xylene	none	none	none	J DL
Methylene chloride	none	none	none	none
Methyl-t-Butyl Ether (MTBE)	none	none	none	none
Naphthalene	U MB, TB	none	none	UJ LS
n-Butylbenzene	J DL	none	none	UJ LS
n-Propylbenzene	none	none	none	UJ LS
o-Xylene	J DL	none	none	none
sec-Butylbenzene	none	none	none	UJ LS
Styrene	none	none	none	none
tert-Butylbenzene	none	none	none	UJ LS
Tetrachloroethene	none	none	none	J DL
Toluene	J DL	none	J DL	J DL
trans-1,2-Dichloroethene	none	none	J DL	none
trans-1,3-Dichloropropene	none	none	none	none
Trichloroethene	none	none	none	none
Trichlorofluoromethane	none	none	none	none
Vinyl chloride	none	none	none	none

TABLE 7
Data Qualifiers for Volatile Organic Compounds by EPA Method 8260B
Winter 2006 Groundwater Mointoring Event
RP - Portland Site

Analyte	(615-01) RP-06-30	(616-01) RP-06-87	(619-01) W-03-S	(620-01) W-03-I
1,1,1,2-Tetrachloroethane	none	none	none	none
1,1,1-Trichloroethane	none	none	none	none
1,1,2,2-Tetrachloroethane	none	none	none	none
1,1,2-Trichloroethane	none	none	none	none
1,1-Dichloroethane	none	none	none	none
1,1-Dichloroethene	none	J DL	none	none
1,1-Dichloropropene	none	none	none	none
1,2,3-Trichlorobenzene	none	none	none	none
1,2,3-Trichloropropane	none	none	none	none
1,2,4-Trichlorobenzene	none	none	none	none
1,2,4-Trimethylbenzene	J DL	none	none	none
1,2-Dibromo-3-chloropropane	none	none	none	none
1,2-Dibromoethane	none	none	none	none
1,2-Dichlorobenzene	J DL	none	J DL	none
1,2-Dichloroethane	none	none	none	none
1,2-Dichloropropane	none	none	none	none
1,3,5-Trimethylbenzene	none	none	none	none
1,3-Dichlorobenzene	J DL	J DL	none	J DL
1,3-Dichloropropane	none	none	none	none
1,4-Dichlorobenzene	none	none	none	J DL
2,2-Dichloropropane	none	none	none	none
2-Chlorotoluene	none	none	none	none
2-Ethyl-1-hexanol	UJ LC	UJ LC	UJ LC	UJ LC
4-Chlorotoluene	none	none	none	none
4-Isopropyltoluene	none	none	none	none
Benzene	none	J DL	none	none
Bromobenzene	none	none	none	none
Bromochloromethane	none	none	none	none
Bromodichloromethane	none	none	none	none
Bromoform	none	none	none	none
Bromomethane	none	none	none	none

TABLE 7
Data Qualifiers for Volatile Organic Compounds by EPA Method 8260B
Winter 2006 Groundwater Mointoring Event
RP - Portland Site

Analyte	(615-01) RP-06-30	(616-01) RP-06-87	(619-01) W-03-S	(620-01) W-03-I
Carbon tetrachloride	none	none	none	none
Chlorobenzene	none	none	J DL	J DL
Chloroethane	none	none	none	none
Chloroform	none	none	none	none
Chloromethane	J DL	J DL	J DL	none
cis-1,2-Dichloroethene	none	J DL	none	none
cis-1,3-Dichloropropene	none	none	none	none
Dibromochloromethane	none	none	none	none
Dibromomethane	none	none	none	none
Dichlorodifluoromethane	none	none	none	none
Ethylbenzene	none	none	none	none
Hexachlorobutadiene	none	none	none	none
Isobutylalcohol	none	none	none	none
Isopropylbenzene	none	none	none	none
m,p-Xylene	none	none	none	J DL
Methylene chloride	none	none	none	none
Methyl-t-Butyl Ether (MTBE)	none	none	none	none
Naphthalene	J DL	none	none	none
n-Butylbenzene	none	none	none	none
n-Propylbenzene	none	none	none	none
o-Xylene	none	none	none	none
sec-Butylbenzene	none	none	none	none
Styrene	none	none	none	none
tert-Butylbenzene	none	none	none	none
Tetrachloroethene	none	none	none	none
Toluene	none	none	none	none
trans-1,2-Dichloroethene	none	none	none	none
trans-1,3-Dichloropropene	none	none	none	none
Trichloroethene	none	none	none	none
Trichlorofluoromethane	none	none	none	none
Vinyl chloride	none	J DL	none	none

TABLE 7
Data Qualifiers for Volatile Organic Compounds by EPA Method 8260B
Winter 2006 Groundwater Mointoring Event
RP - Portland Site

Analyte	(621-01) W-03-D	(622-01) W-04-S	(623-01) W-04-I	(624-01) W-04-89
1,1,1,2-Tetrachloroethane	none	none	none	none
1,1,1-Trichloroethane	none	none	none	none
1,1,2,2-Tetrachloroethane	none	none	none	none
1,1,2-Trichloroethane	none	none	none	none
1,1-Dichloroethane	none	UJ LC	UJ LC	UJ LC
1,1-Dichloroethene	none	none	none	none
1,1-Dichloropropene	none	none	none	none
1,2,3-Trichlorobenzene	none	none	none	none
1,2,3-Trichloropropane	none	none	none	none
1,2,4-Trichlorobenzene	none	none	none	none
1,2,4-Trimethylbenzene	none	none	none	none
1,2-Dibromo-3-chloropropane	none	none	none	none
1,2-Dibromoethane	none	none	none	none
1,2-Dichlorobenzene	J DL	none	J DL	none
1,2-Dichloroethane	none	none	none	none
1,2-Dichloropropane	none	none	none	none
1,3,5-Trimethylbenzene	none	none	none	none
1,3-Dichlorobenzene	none	U MB	U MB	none
1,3-Dichloropropane	none	none	none	none
1,4-Dichlorobenzene	none	none	none	none
2,2-Dichloropropane	none	none	none	none
2-Chlorotoluene	none	none	none	none
2-Ethyl-1-hexanol	UJ LC	UJ LC	UJ LC	UJ LC
4-Chlorotoluene	none	none	none	none
4-Isopropyltoluene	none	none	none	none
Benzene	none	J DL	none	none
Bromobenzene	none	none	none	none
Bromochloromethane	none	none	none	none
Bromodichloromethane	none	none	none	none
Bromoform	none	none	none	none
Bromomethane	none	none	none	none

TABLE 7
Data Qualifiers for Volatile Organic Compounds by EPA Method 8260B
Winter 2006 Groundwater Mointoring Event
RP - Portland Site

Analyte	(621-01) W-03-D	(622-01) W-04-S	(623-01) W-04-I	(624-01) W-04-89
Carbon tetrachloride	none	none	none	none
Chlorobenzene	none	J DL	none	none
Chloroethane	none	none	none	none
Chloroform	none	none	none	none
Chloromethane	none	none	J DL	none
cis-1,2-Dichloroethene	none	none	none	none
cis-1,3-Dichloropropene	none	none	none	none
Dibromochloromethane	none	none	none	none
Dibromomethane	none	none	none	none
Dichlorodifluoromethane	none	none	none	none
Ethylbenzene	none	J DL	none	J DL
Hexachlorobutadiene	none	none	none	none
Isobutylalcohol	none	none	none	none
Isopropylbenzene	none	none	none	none
m,p-Xylene	none	J DL	none	J DL
Methylene chloride	none	none	none	none
Methyl-t-Butyl Ether (MTBE)	none	none	none	none
Naphthalene	none	UJ LC, TB	UJ LC, TB	UJ LC
n-Butylbenzene	none	none	none	none
n-Propylbenzene	none	none	none	none
o-Xylene	none	J DL	none	none
sec-Butylbenzene	none	none	none	none
Styrene	none	none	none	none
tert-Butylbenzene	none	none	none	none
Tetrachloroethene	none	none	none	none
Toluene	none	none	none	none
trans-1,2-Dichloroethene	none	none	none	none
trans-1,3-Dichloropropene	none	none	none	none
Trichloroethene	none	none	none	none
Trichlorofluoromethane	none	none	none	none
Vinyl chloride	none	none	none	none

TABLE 7
Data Qualifiers for Volatile Organic Compounds by EPA Method 8260B
Winter 2006 Groundwater Mointoring Event
RP - Portland Site

Analyte	(625-01) W-11-S	(626-01) W-11-I	(627-01) W-11-D	(628-01) W-11-B
1,1,1,2-Tetrachloroethane	none	none	none	none
1,1,1-Trichloroethane	none	none	none	none
1,1,2,2-Tetrachloroethane	none	none	none	none
1,1,2-Trichloroethane	none	none	none	none
1,1-Dichloroethane	J DL	UJ LC	UJ LC	none
1,1-Dichloroethene	none	none	none	J DL
1,1-Dichloropropene	none	none	none	none
1,2,3-Trichlorobenzene	UJ LC, TB	none	none	none
1,2,3-Trichloropropane	none	none	none	none
1,2,4-Trichlorobenzene	U MB	none	U MB	none
1,2,4-Trimethylbenzene	J DL	J DL	none	none
1,2-Dibromo-3-chloropropane	none	none	none	none
1,2-Dibromoethane	none	none	none	none
1,2-Dichlorobenzene	J DL	none	none	none
1,2-Dichloroethane	none	none	none	J DL
1,2-Dichloropropane	none	none	none	none
1,3,5-Trimethylbenzene	J DL	none	none	none
1,3-Dichlorobenzene	U MB	none	none	none
1,3-Dichloropropane	none	none	none	none
1,4-Dichlorobenzene	none	none	none	none
2,2-Dichloropropane	none	none	none	none
2-Chlorotoluene	none	none	none	none
2-Ethyl-1-hexanol	none	UJ LC	UJ LC	none
4-Chlorotoluene	none	none	none	none
4-Isopropyltoluene	J DL	none	none	none
Benzene	J DL	none	J DL	none
Bromobenzene	none	none	none	none
Bromochloromethane	none	none	none	none
Bromodichloromethane	none	none	none	none
Bromoform	none	none	none	none
Bromomethane	none	none	none	none

TABLE 7
Data Qualifiers for Volatile Organic Compounds by EPA Method 8260B
Winter 2006 Groundwater Mointoring Event
RP - Portland Site

Analyte	(625-01) W-11-S	(626-01) W-11-I	(627-01) W-11-D	(628-01) W-11-B
Carbon tetrachloride	none	none	none	none
Chlorobenzene	none	none	none	none
Chloroethane	none	none	none	none
Chloroform	none	none	none	none
Chloromethane	none	none	none	none
cis-1,2-Dichloroethene	none	none	J DL	none
cis-1,3-Dichloropropene	none	none	none	none
Dibromochloromethane	none	none	none	none
Dibromomethane	none	none	none	none
Dichlorodifluoromethane	none	none	none	none
Ethylbenzene	U TB	U TB	U TB	U TB
Hexachlorobutadiene	J DL	none	none	none
Isobutylalcohol	none	none	none	none
Isopropylbenzene	J DL	none	J DL	none
m,p-Xylene	J DL	none	J DL	none
Methylene chloride	none	none	none	none
Methyl-t-Butyl Ether (MTBE)	none	none	none	none
Naphthalene	J DL	UJ LC	UJ LC	none
n-Butylbenzene	none	none	none	none
n-Propylbenzene	J DL	none	none	none
o-Xylene	J DL	J DL	J DL	none
sec-Butylbenzene	none	none	none	none
Styrene	none	none	none	none
tert-Butylbenzene	J DL	none	none	none
Tetrachloroethene	none	none	none	none
Toluene	J DL	none	none	J DL
trans-1,2-Dichloroethene	none	none	J DL	J DL
trans-1,3-Dichloropropene	none	none	none	none
Trichloroethene	none	none	J DL	J DL
Trichlorofluoromethane	none	none	none	none
Vinyl chloride	none	none	J DL	none

TABLE 7
Data Qualifiers for Volatile Organic Compounds by EPA Method 8260B
Winter 2006 Groundwater Mointoring Event
RP - Portland Site

Analyte	(629-01) W-12-S	(630-01) W-12-I	(631-01) W-12-D	(635-01) AL6-96
1,1,1,2-Tetrachloroethane	none	UJ AB	none	none
1,1,1-Trichloroethane	none	UJ AB	none	none
1,1,2,2-Tetrachloroethane	none	UJ AB	none	none
1,1,2-Trichloroethane	none	UJ AB	none	none
1,1-Dichloroethane	none	UJ AB	none	none
1,1-Dichloroethene	none	UJ AB	none	none
1,1-Dichloropropene	none	UJ AB	none	none
1,2,3-Trichlorobenzene	none	UJ AB	none	none
1,2,3-Trichloropropane	none	UJ AB	none	none
1,2,4-Trichlorobenzene	U TB, RB	UJ AB	none	J DL
1,2,4-Trimethylbenzene	none	UJ AB	none	none
1,2-Dibromo-3-chloropropane	none	UJ AB	none	none
1,2-Dibromoethane	none	UJ AB	none	none
1,2-Dichlorobenzene	none	J AB, DL	none	none
1,2-Dichloroethane	none	UJ AB	none	none
1,2-Dichloropropane	none	UJ AB	none	none
1,3,5-Trimethylbenzene	J DL	UJ AB	none	none
1,3-Dichlorobenzene	J DL	UJ AB	J DL	none
1,3-Dichloropropane	none	UJ AB	none	none
1,4-Dichlorobenzene	none	UJ AB	none	none
2,2-Dichloropropane	none	UJ AB	none	none
2-Chlorotoluene	none	UJ AB	none	none
2-Ethyl-1-hexanol	none	J AB, DL	none	UJ CH, TB, HL, DL
4-Chlorotoluene	none	UJ AB	none	none
4-Isopropyltoluene	U RB	UJ AB	none	none
Benzene	none	J AB, DL	none	J DL
Bromobenzene	none	UJ AB	none	none
Bromochloromethane	none	UJ AB	none	none
Bromodichloromethane	none	UJ AB	none	none
Bromoform	none	UJ AB	none	none
Bromomethane	none	UJ AB	none	none

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TABLE 7
Data Qualifiers for Volatile Organic Compounds by EPA Method 8260B
Winter 2006 Groundwater Mointoring Event
RP - Portland Site

Analyte	(629-01) W-12-S	(630-01) W-12-I	(631-01) W-12-D	(635-01) AL6-96
Carbon tetrachloride	none	UJ AB	none	none
Chlorobenzene	none	UJ AB	none	none
Chloroethane	none	UJ AB	none	none
Chloroform	none	UJ AB	none	none
Chloromethane	none	UJ AB	none	none
cis-1,2-Dichloroethene	none	J AB, DL	none	none
cis-1,3-Dichloropropene	none	UJ AB	none	none
Dibromochloromethane	none	UJ AB	none	none
Dibromomethane	none	UJ AB	none	none
Dichlorodifluoromethane	none	UJ AB	none	none
Ethylbenzene	J DL	UJ AB	none	J DL
Hexachlorobutadiene	none	UJ AB	none	none
Isobutylalcohol	none	UJ AB	none	none
Isopropylbenzene	J DL	UJ AB	none	none
m,p-Xylene	none	UJ AB, RB	U RB	none
Methylene chloride	none	UJ AB	none	none
Methyl-t-Butyl Ether (MTBE)	none	UJ AB	none	none
Naphthalene	U TB	UJ AB, TB, RB	U TB, RB	none
n-Butylbenzene	none	UJ AB	none	none
n-Propylbenzene	none	UJ AB	none	none
o-Xylene	none	UJ AB, RB	U RB	none
sec-Butylbenzene	none	UJ AB	none	none
Styrene	none	UJ AB	none	none
tert-Butylbenzene	none	UJ AB	none	none
Tetrachloroethene	none	UJ AB	none	none
Toluene	J DL	UJ AB, RB	none	J DL
trans-1,2-Dichloroethene	none	UJ AB	none	none
trans-1,3-Dichloropropene	none	UJ AB	none	none
Trichloroethene	J DL	UJ AB	none	none
Trichlorofluoromethane	none	UJ AB	none	none
Vinyl chloride	none	UJ AB	none	none

TABLE 7
Data Qualifiers for Volatile Organic Compounds by EPA Method 8260B
Winter 2006 Groundwater Mointoring Event
RP - Portland Site

Analyte	(635-02) AL6-96	(636-01) W-09-86	(637-01) W-09-116	(638-01) W-09
1,1,1,2-Tetrachloroethane	none	none	none	none
1,1,1-Trichloroethane	none	none	none	none
1,1,2,2-Tetrachloroethane	none	none	none	none
1,1,2-Trichloroethane	none	none	none	none
1,1-Dichloroethane	none	none	none	none
1,1-Dichloroethene	none	J DL	J DL	none
1,1-Dichloropropene	none	none	none	none
1,2,3-Trichlorobenzene	none	none	none	none
1,2,3-Trichloropropane	none	none	none	none
1,2,4-Trichlorobenzene	J DL	none	none	none
1,2,4-Trimethylbenzene	none	none	none	J DL
1,2-Dibromo-3-chloropropane	none	none	none	none
1,2-Dibromoethane	none	none	none	none
1,2-Dichlorobenzene	none	J HT	J HT	none
1,2-Dichloroethane	none	none	J DL	none
1,2-Dichloropropane	none	none	none	none
1,3,5-Trimethylbenzene	none	none	none	J DL
1,3-Dichlorobenzene	none	none	none	none
1,3-Dichloropropane	none	none	none	none
1,4-Dichlorobenzene	none	none	none	none
2,2-Dichloropropane	none	none	none	none
2-Chlorotoluene	none	none	none	none
2-Ethyl-1-hexanol	none	none	none	none
4-Chlorotoluene	none	none	none	none
4-Isopropyltoluene	none	none	none	J DL
Benzene	J DL	J DL	none	none
Bromobenzene	none	none	none	none
Bromochloromethane	none	none	none	none
Bromodichloromethane	none	none	none	none
Bromoform	none	UJ LC	UJ LC	UJ LC
Bromomethane	none	none	none	none

TABLE 7
Data Qualifiers for Volatile Organic Compounds by EPA Method 8260B
Winter 2006 Groundwater Mointoring Event
RP - Portland Site

Analyte	(635-02) AL6-96	(636-01) W-09-86	(637-01) W-09-116	(638-01) W-09
Carbon tetrachloride	none	none	none	none
Chlorobenzene	none	none	none	none
Chloroethane	none	none	none	none
Chloroform	none	none	none	none
Chloromethane	none	none	none	none
cis-1,2-Dichloroethene	none	J DL	J DL	none
cis-1,3-Dichloropropene	none	none	none	none
Dibromochloromethane	none	none	none	none
Dibromomethane	none	none	none	none
Dichlorodifluoromethane	none	none	none	none
Ethylbenzene	none	none	none	none
Hexachlorobutadiene	none	none	none	none
Isobutylalcohol	none	R RF	R RF	R RF
Isopropylbenzene	none	none	J DL	J DL
m,p-Xylene	none	none	none	none
Methylene chloride	none	none	none	none
Methyl-t-Butyl Ether (MTBE)	none	none	none	none
Naphthalene	none	none	none	J DL
n-Butylbenzene	none	none	none	none
n-Propylbenzene	none	none	none	J DL
o-Xylene	none	none	none	none
sec-Butylbenzene	none	none	none	none
Styrene	none	none	none	none
tert-Butylbenzene	none	none	none	none
Tetrachloroethene	none	none	none	none
Toluene	none	U MB	none	J DL
trans-1,2-Dichloroethene	none	none	none	none
trans-1,3-Dichloropropene	none	none	none	none
Trichloroethene	none	J DL	J DL	none
Trichlorofluoromethane	none	none	none	none
Vinyl chloride	none	J DL	J DL	none

TABLE 8
Data Qualifiers for Chlorinated Herbicides by EPA Method 8151A
Winter 2006 Groundwater Monitoring Event
RP - Portland Site

Analyte	(601-01) WS-11-125	(602-01) WS-11-161	(603-01) WS-12-125	(604-01) WS-12-161	(605-01) RP-11-30	(610-01) RP-07-119
2,4,5-T	none	none	none	none	none	none
2,4,5-TP (Silvex)	none	none	none	none	none	none
2,4-D	none	none	none	none	none	none
2,4-DB	none	none	none	none	none	none
4-Nitrophenol	none	none	none	none	none	none
Bromoxynil	none	none	none	none	none	none
Dalapon	UJ LL	UJ LL	UJ LL	UJ LL	UJ LL	UJ LL
Dicamba	none	none	none	none	none	none
Dichlorprop	none	none	none	none	none	none
Dinoseb	none	none	none	none	none	none
MCPA	none	none	none	none	none	none
MCPP	none	none	none	none	none	none
Pentachlorophenol	none	none	none	none	none	none
Analyte	**(636-01) W-09-86**	**(637-01) W-09-116**	**(638-01) W-09**	**(606-01) RP-11-216**	**(607-01) RP-11-160**	**(608-01) RP-07-55**
2,4,5-T	none	none	none	none	none	none
2,4,5-TP (Silvex)	none	none	none	none	none	none
2,4-D	UJ LC	UJ LC	UJ LC	J DL	none	none
2,4-DB	none	none	none	none	none	none
4-Nitrophenol	none	none	none	none	none	none
Bromoxynil	none	none	none	none	none	none
Dalapon	none	none	none	UJ LL	UJ LL	UJ LL
Dicamba	none	none	none	none	none	none
Dichlorprop	J DL	none	none	none	none	none
Dinoseb	none	none	none	none	none	none
MCPA	none	none	none	J DL	none	none
MCPP	none	none	none	none	none	none
Pentachlorophenol	none	none	none	none	none	none

TABLE 8
Data Qualifiers for Chlorinated Herbicides by EPA Method 8151A
Winter 2006 Groundwater Monitoring Event
RP - Portland Site

Analyte	(610-02) RP-07-119	(611-01) RP-07-30	(612-01) RP-01-31	(613-01) RP-01-51
2,4,5-T	UJ LS	none	none	none
2,4,5-TP (Silvex)	J LS	none	none	none
2,4-D	J LS, DL	none	none	none
2,4-DB	UJ LS	none	none	none
4-Nitrophenol	UJ LS	none	none	none
Bromoxynil	UJ LS	none	none	none
Dalapon	UJ LL, LS	UJ LL	none	none
Dicamba	UJ LS	none	none	none
Dichlorprop	J LS	none	none	none
Dinoseb	UJ LS	none	UJ LL	UJ LL
MCPA	UJ LS	none	none	none
MCPP	J LS	none	none	none
Pentachlorophenol	J LS, DL	none	none	J DL
Analyte	**(609-01) RP-07-84**	**(609-06) RP-07-84**	**(614-01) RP-01-65**	**(615-01) RP-06-30**
2,4,5-T	none	UJ LS	none	none
2,4,5-TP (Silvex)	none	J LS	none	none
2,4-D	J DL	UJ LS	none	none
2,4-DB	none	UJ LS	none	none
4-Nitrophenol	none	UJ LS	none	none
Bromoxynil	none	UJ LS	none	none
Dalapon	UJ LL	UJ LL, LS	none	UJ LL
Dicamba	none	UJ LS	none	none
Dichlorprop	none	J LS	none	none
Dinoseb	none	UJ LS	UJ LL	none
MCPA	none	UJ LS	none	none
MCPP	none	J LS	none	none
Pentachlorophenol	none	J LS, DL	none	none

TABLE 8
Data Qualifiers for Chlorinated Herbicides by EPA Method 8151A
Winter 2006 Groundwater Monitoring Event
RP - Portland Site

Analyte	(621-01) W-03-D	(622-01) W-04-S	(623-01) W-04-I	(624-01) W-04-89
2,4,5-T	none	none	none	none
2,4,5-TP (Silvex)	none	none	none	none
2,4-D	none	none	none	none
2,4-DB	none	none	none	none
4-Nitrophenol	none	none	none	none
Bromoxynil	none	UJ LL	UJ LL	UJ LL
Dalapon	UJ LL	none	none	UJ LM
Dicamba	none	none	none	none
Dichlorprop	none	none	none	none
Dinoseb	none	none	none	UJ LM
MCPA	none	none	none	none
MCPP	none	none	none	none
Pentachlorophenol	none	none	none	none
Analyte	**(616-01) RP-06-87**	**(619-01) W-03-S**	**(620-01) W-03-I**	**(627-01) W-11-D**
2,4,5-T	none	none	none	none
2,4,5-TP (Silvex)	none	none	none	none
2,4-D	none	none	none	none
2,4-DB	none	none	none	none
4-Nitrophenol	none	none	none	none
Bromoxynil	none	none	none	none
Dalapon	UJ LL	UJ LL	UJ LL	none
Dicamba	none	none	none	none
Dichlorprop	none	none	J DL	none
Dinoseb	none	none	none	none
MCPA	J DL	none	none	none
MCPP	none	none	none	none
Pentachlorophenol	none	none	none	none

TABLE 8
Data Qualifiers for Chlorinated Herbicides by EPA Method 8151A
Winter 2006 Groundwater Monitoring Event
RP - Portland Site

Analyte	(625-01) W-11-S	(626-01) W-11-I	(635-01) AL6-96	(635-02) AL6-96
2,4,5-T	none	none	none	none
2,4,5-TP (Silvex)	none	none	none	none
2,4-D	none	none	none	none
2,4-DB	none	none	none	none
4-Nitrophenol	none	none	none	none
Bromoxynil	none	none	none	none
Dalapon	none	none	none	none
Dicamba	none	none	none	none
Dichlorprop	none	none	none	none
Dinoseb	none	none	none	none
MCPA	none	none	none	none
MCPP	none	none	none	none
Pentachlorophenol	none	none	none	none
Analyte	**(628-01) W-11-B**	**(629-01) W-12-S**	**(630-01) W-12-I**	**(631-01) W-12-D**
2,4,5-T	none	none	none	none
2,4,5-TP (Silvex)	none	none	none	none
2,4-D	none	none	none	none
2,4-DB	none	none	none	none
4-Nitrophenol	none	none	none	none
Bromoxynil	none	UJ LM	none	none
Dalapon	none	UJ LM	none	none
Dicamba	none	none	none	none
Dichlorprop	none	none	none	none
Dinoseb	none	none	none	none
MCPA	none	none	none	none
MCPP	none	none	none	none
Pentachlorophenol	none	none	none	none

Table 9
Data Qualifiers for Semivolatile Organic Compounds by EPA Method 8270C
Winter 2006 Groundwater Monitoring Event
RP - Portland Site

Analyte	(601-01) WS-11-125	(602-01) WS-11-161	(603-01) WS-12-125	(604-01) WS-12-161	(605-01) RP-11-30
1,2,4-Trichlorobenzene	none	none	none	none	none
1,2-Dichlorobenzene	none	none	none	none	none
1,3-Dichlorobenzene	none	none	none	none	none
1,4-Dichlorobenzene	none	none	none	none	none
1-Methylnaphthalene	none	none	none	none	none
2,4,5-Trichlorophenol	UJ LS	R LS	R LS	R LS	R LS
2,4,6-Trichlorophenol	UJ LS	R LS	R LS	R LS	R LS
2,4-Dichlorophenol	UJ BC, LS	R BC, LS	R BC, LS	R LS	R LS
2,4-Dimethylphenol	UJ LS	R LS	R LS	R LS	R LS
2,4-Dinitrophenol	UJ LS	R LS	R LS	R LS	R LS
2,4-Dinitrotoluene	none	none	none	none	none
2,6-Dinitrotoluene	none	none	none	none	none
2-Chloronapthalene	none	none	none	none	none
2-Chlorophenol	UJ LS	R LS	R LS	R LS	R LS
2-Methyl-4,6-dinitrophenol	UJ LS	R LS	R LS	R LS	R LS
2-Methylnaphthalene	none	none	none	none	none
2-Methylphenol	UJ LS	R LS	R LS	R LS	R LS
2-Nitroaniline	UJ BC, LC	UJ BC, LC	UJ BC, LC	none	none
2-Nitrophenol	UJ BC, LS	R BC, LS	R BC, LS	R LS	R LS
3,3'-Dichlorobenzidine	J DL	none	none	none	none
3/4-Cresol	UJ LS, LL	R LS, LL	UJ LL	R LS	R LS
3-Nitroaniline	none	UJ LC	UJ LC	UJ BC	UJ BC
4-Bromophenylphenyl ether	none	none	none	none	none
4-Chloro-3-methylphenol	UJ LS	R LS	R LS	R LS	R LS
4-Chloroaniline	UJ LC	UJ LC	UJ LC	none	none
4-Chlorophenylphenyl ether	none	none	none	none	none
4-Nitroaniline	none	none	none	none	none
4-Nitrophenol	UJ LS	R LS	R LS	R LL, LS	R LS
Acenaphthene	none	none	J DL	none	none
Acenaphthylene	none	none	none	none	none
Anthracene	none	none	J DL	none	J DL
Benzo(a)anthracene	none	none	none	none	none
Benzo(a)pyrene	none	none	none	none	none
Benzo(ghi)perylene	none	none	none	none	none

Table 9
Data Qualifiers for Semivolatile Organic Compounds by EPA Method 8270C
Winter 2006 Groundwater Monitoring Event
RP - Portland Site

Analyte	(601-01) WS-11-125	(602-01) WS-11-161	(603-01) WS-12-125	(604-01) WS-12-161	(605-01) RP-11-30
Benzofluorantthenes	none	none	none	none	none
Benzoic acid	UJ LC	UJ LC	UJ LC	R LS	none
Benzyl alcohol	none	none	none	UJ LC	none
Bis(2-Chloroethoxy) methane	none	none	none	none	none
Bis(2-Chloroethyl) ether	none	none	none	none	none
Bis(2-chloroisopropyl) Ether	none	none	none	none	none
Bis(2-Ethylhexyl) pthalate	none	J DL	J DL	none	none
Butylbenzylphthalate	J DL	J DL	J DL	J DL	none
Carbazole	none	none	none	none	none
Chrysene	none	none	none	none	none
Dibenzo(a,h)anthracene	none	none	none	none	none
Dibenzofuran	J DL	none	none	none	none
Diethylphthalate	none	J DL	J DL	none	none
Dimethylphthalate	none	none	none	none	none
Di-n-butylphthalate	J DL	J DL	J DL	U MB	J DL
Di-n-octyl phthalate	none	none	none	none	none
Fluoranthene	none	none	none	none	none
Fluorene	none	none	J DL	none	none
Hexachlorobenzene	none	none	none	none	none
Hexachlorobutadiene	none	none	none	none	none
Hexachlorocyclopentadiene	none	none	none	none	none
Hexachloroethane	none	none	none	none	none
Indeno(1,2,3-cd)pyrene	none	none	none	none	none
Isophorone	UJ LC	UJ LC	UJ LC	none	none
Naphthalene	none	none	none	none	J DL
Nitrobenzene	none	none	none	none	none
N-Nitrosodi-n-propyl amine	none	none	none	none	none
N-Nitrosodiphenylamine	none	none	none	none	none
Pentachlorophenol	UJ BC, LS	R BC, LS	R BC, LS	R LS	R LS
Phenanthrene	none	none	none	none	none
Phenol	UJ LS	R LS	R LS	R LL, LS	R LS
Pyrene	none	none	none	none	none

Table 9
Data Qualifiers for Semivolatile Organic Compounds by EPA Method 8270C
Winter 2006 Groundwater Monitoring Event
RP - Portland Site

Analyte	(606-01) RP-11-216	(607-01) RP-11-160	(608-01) RP-07-55	(609-01) RP-07-84	(609-06) RP-07-84
1,2,4-Trichlorobenzene	none	none	none	none	none
1,2-Dichlorobenzene	none	none	none	none	none
1,3-Dichlorobenzene	none	none	none	none	none
1,4-Dichlorobenzene	none	none	none	none	none
1-Methylnaphthalene	none	none	none	none	none
2,4,5-Trichlorophenol	UJ MI	UJ LS	R LS	UJ MI	UJ MI
2,4,6-Trichlorophenol	UJ MI	UJ LS	R LS	UJ MI	UJ MI
2,4-Dichlorophenol	UJ MI	UJ LS	R LS	J MI	J MI, DL
2,4-Dimethylphenol	UJ MI	UJ LS	R LS	UJ MI	UJ MI
2,4-Dinitrophenol	UJ MI	UJ LS	R LS	UJ MI	UJ MI
2,4-Dinitrotoluene	none	none	none	none	none
2,6-Dinitrotoluene	none	none	none	none	none
2-Chloronapthalene	none	none	none	none	none
2-Chlorophenol	UJ MI	UJ LS	R LS	UJ MI	UJ MI
2-Methyl-4,6-dinitrophenol	UJ MI	UJ LS	R LS	UJ MI	UJ MI
2-Methylnaphthalene	none	none	none	none	none
2-Methylphenol	UJ MI	UJ LS	R LS	UJ MI	UJ MI
2-Nitroaniline	none	none	none	none	none
2-Nitrophenol	UJ MI	UJ LS	R LS	UJ MI	UJ MI
3,3'-Dichlorobenzidine	none	none	none	none	none
3/4-Cresol	UJ MI	J LS, DL	R LS	UJ MI, LL	UJ MI, LL
3-Nitroaniline	UJ BC	UJ BC	UJ BC	UJ BC	UJ BC
4-Bromophenylphenyl ether	none	none	none	none	none
4-Chloro-3-methylphenol	UJ MI	UJ LS	R LS	UJ MI	UJ MI
4-Chloroaniline	none	none	none	none	none
4-Chlorophenylphenyl ether	none	none	none	none	none
4-Nitroaniline	none	none	none	none	none
4-Nitrophenol	UJ LL, MI	UJ LS	R LS	UJ MI	UJ MI
Acenaphthene	none	none	none	none	none
Acenaphthylene	none	none	none	none	none
Anthracene	none	none	none	none	none
Benzo(a)anthracene	none	none	none	none	none
Benzo(a)pyrene	none	none	none	none	none
Benzo(ghi)perylene	none	none	none	none	none

Table 9
Data Qualifiers for Semivolatile Organic Compounds by EPA Method 8270C
Winter 2006 Groundwater Monitoring Event
RP - Portland Site

Analyte	(606-01) RP-11-216	(607-01) RP-11-160	(608-01) RP-07-55	(609-01) RP-07-84	(609-06) RP-07-84
Benzofluorantthenes	none	none	none	none	none
Benzoic acid	UJ MI	none	none	none	none
Benzyl alcohol	UJ LC	none	none	none	none
Bis(2-Chloroethoxy) methane	none	none	none	none	none
Bis(2-Chloroethyl) ether	none	none	none	none	none
Bis(2-chloroisopropyl) Ether	none	none	none	none	none
Bis(2-Ethylhexyl) pthalate	none	none	none	none	none
Butylbenzylphthalate	J DL	none	none	none	J DL
Carbazole	none	none	none	none	none
Chrysene	none	none	none	none	none
Dibenzo(a,h)anthracene	none	none	none	none	none
Dibenzofuran	none	none	none	none	none
Diethylphthalate	none	none	none	none	none
Dimethylphthalate	none	none	none	none	none
Di-n-butylphthalate	U MB	none	J DL	J DL	J DL
Di-n-octyl phthalate	none	none	none	none	none
Fluoranthene	none	none	none	none	none
Fluorene	none	none	none	none	none
Hexachlorobenzene	none	none	none	none	none
Hexachlorobutadiene	none	none	none	none	none
Hexachlorocyclopentadiene	none	none	none	none	none
Hexachloroethane	none	none	none	none	none
Indeno(1,2,3-cd)pyrene	none	none	none	none	none
Isophorone	none	none	none	none	none
Naphthalene	none	none	none	none	none
Nitrobenzene	none	none	none	none	none
N-Nitrosodi-n-propyl amine	none	none	none	none	none
N-Nitrosodiphenylamine	none	none	none	none	none
Pentachlorophenol	UJ MI	UJ LS	R LS	UJ MI	UJ MI
Phenanthrene	none	none	none	none	none
Phenol	UJ LL, MI	UJ LS	R LS	UJ MI	UJ MI
Pyrene	none	none	none	none	none

Table 9
Data Qualifiers for Semivolatile Organic Compounds by EPA Method 8270C
Winter 2006 Groundwater Monitoring Event
RP - Portland Site

Analyte	(610-01) RP-07-119	(610-02) RP-07-119	(611-01) RP-07-30	(612-01) RP-01-31	(613-01) RP-01-51
1,2,4-Trichlorobenzene	none	none	none	none	none
1,2-Dichlorobenzene	none	none	none	none	none
1,3-Dichlorobenzene	none	none	none	none	none
1,4-Dichlorobenzene	none	none	none	none	none
1-Methylnaphthalene	none	none	none	none	none
2,4,5-Trichlorophenol	UJ LS	UJ LS	UJ LS	UJ LS	UJ LS
2,4,6-Trichlorophenol	UJ LS	UJ LS	UJ LS	UJ LS	UJ LS
2,4-Dichlorophenol	J MI, DL	J MI, DL	UJ LS	UJ LS	UJ LS
2,4-Dimethylphenol	UJ LS	UJ LS	UJ LS	UJ LS	UJ LS
2,4-Dinitrophenol	UJ LS	UJ LS	UJ LS	UJ LS	UJ LS
2,4-Dinitrotoluene	none	none	none	none	none
2,6-Dinitrotoluene	none	none	none	none	none
2-Chloronapthalene	none	none	none	none	none
2-Chlorophenol	UJ LS	UJ LS	UJ LS	UJ LS	UJ LS
2-Methyl-4,6-dinitrophenol	UJ LS	UJ LS	UJ LS	UJ LS	UJ LS
2-Methylnaphthalene	none	none	none	none	none
2-Methylphenol	UJ LS	UJ LS	UJ LS	UJ LS	UJ LS
2-Nitroaniline	none	none	none	none	none
2-Nitrophenol	UJ LS	UJ LS	UJ LS	UJ LS	UJ LS
3,3'-Dichlorobenzidine	none	none	none	none	none
3/4-Cresol	UJ LS, LL	UJ LS, LL	UJ LS, LL	UJ LS	UJ LS
3-Nitroaniline	UJ BC	UJ BC	UJ BC	UJ BC	UJ BC
4-Bromophenylphenyl ether	none	none	none	none	none
4-Chloro-3-methylphenol	UJ LS	UJ LS	UJ LS	UJ LS	UJ LS
4-Chloroaniline	none	none	none	none	none
4-Chlorophenylphenyl ether	none	none	none	none	none
4-Nitroaniline	none	none	none	none	none
4-Nitrophenol	UJ LS	UJ LS	UJ LS	UJ LS	UJ LS
Acenaphthene	none	none	none	none	none
Acenaphthylene	none	none	none	none	none
Anthracene	none	none	J DL	none	none
Benzo(a)anthracene	none	none	none	none	none
Benzo(a)pyrene	none	none	none	none	none
Benzo(ghi)perylene	none	none	none	none	none

Table 9
Data Qualifiers for Semivolatile Organic Compounds by EPA Method 8270C
Winter 2006 Groundwater Monitoring Event
RP - Portland Site

Analyte	(610-01) RP-07-119	(610-02) RP-07-119	(611-01) RP-07-30	(612-01) RP-01-31	(613-01) RP-01-51
Benzofluorantthenes	none	none	none	none	none
Benzoic acid	none	none	none	none	none
Benzyl alcohol	none	none	none	none	none
Bis(2-Chloroethoxy) methane	none	none	none	none	none
Bis(2-Chloroethyl) ether	none	none	none	none	none
Bis(2-chloroisopropyl) Ether	none	none	none	none	none
Bis(2-Ethylhexyl) pthalate	none	none	none	none	none
Butylbenzylphthalate	J DL	none	J DL	none	none
Carbazole	none	none	none	none	none
Chrysene	none	none	none	none	none
Dibenzo(a,h)anthracene	none	none	none	none	none
Dibenzofuran	none	none	none	none	none
Diethylphthalate	J DL	J DL	none	none	none
Dimethylphthalate	none	none	none	none	none
Di-n-butylphthalate	J DL	J DL	J DL	J DL	J DL
Di-n-octyl phthalate	none	none	none	none	none
Fluoranthene	none	none	none	none	none
Fluorene	none	none	none	none	none
Hexachlorobenzene	none	none	none	none	none
Hexachlorobutadiene	none	none	none	none	none
Hexachlorocyclopentadiene	none	none	none	none	none
Hexachloroethane	none	none	none	none	none
Indeno(1,2,3-cd)pyrene	none	none	none	none	none
Isophorone	none	none	none	none	none
Naphthalene	none	none	none	none	none
Nitrobenzene	none	none	none	none	none
N-Nitrosodi-n-propyl amine	none	none	none	none	none
N-Nitrosodiphenylamine	none	none	none	none	J DL
Pentachlorophenol	UJ LS	UJ LS	UJ LS	UJ LS	UJ LS
Phenanthrene	none	none	none	none	none
Phenol	UJ LS	UJ LS	UJ LS	UJ LS	UJ LS
Pyrene	none	none	none	none	none

Table 9
Data Qualifiers for Semivolatile Organic Compounds by EPA Method 8270C
Winter 2006 Groundwater Monitoring Event
RP - Portland Site

Analyte	(614-01) RP-01-65	(615-01) RP-06-30	(616-01) RP-06-87	(619-01) W-03-S	(620-01) W-03-I
1,2,4-Trichlorobenzene	none	none	none	none	none
1,2-Dichlorobenzene	none	none	none	J DL	none
1,3-Dichlorobenzene	none	none	none	none	none
1,4-Dichlorobenzene	none	none	none	none	none
1-Methylnaphthalene	none	none	none	none	none
2,4,5-Trichlorophenol	UJ MI	none	none	none	none
2,4,6-Trichlorophenol	UJ MI	none	none	none	none
2,4-Dichlorophenol	J MI, DL	none	none	J DL	none
2,4-Dimethylphenol	UJ MI	none	none	none	none
2,4-Dinitrophenol	UJ MI	none	none	none	none
2,4-Dinitrotoluene	none	none	none	none	none
2,6-Dinitrotoluene	none	none	none	none	none
2-Chloronapthalene	none	none	none	none	none
2-Chlorophenol	UJ MI	none	none	none	none
2-Methyl-4,6-dinitrophenol	UJ MI	none	none	none	none
2-Methylnaphthalene	none	none	none	none	none
2-Methylphenol	UJ MI	none	none	none	none
2-Nitroaniline	none	none	none	none	none
2-Nitrophenol	UJ MI	none	none	none	none
3,3'-Dichlorobenzidine	none	none	none	none	none
3/4-Cresol	UJ MI	UJ LL	UJ LL	UJ LL	UJ LL
3-Nitroaniline	UJ BC	none	none	none	none
4-Bromophenylphenyl ether	none	none	none	none	none
4-Chloro-3-methylphenol	UJ MI	none	J DL	none	none
4-Chloroaniline	none	none	none	none	none
4-Chlorophenylphenyl ether	none	none	none	none	none
4-Nitroaniline	none	none	none	none	none
4-Nitrophenol	UJ MI	none	none	none	none
Acenaphthene	none	J DL	none	none	none
Acenaphthylene	none	none	none	none	none
Anthracene	none	none	none	none	none
Benzo(a)anthracene	none	none	none	none	none
Benzo(a)pyrene	none	none	none	none	none
Benzo(ghi)perylene	none	none	none	none	none

Table 9
Data Qualifiers for Semivolatile Organic Compounds by EPA Method 8270C
Winter 2006 Groundwater Monitoring Event
RP - Portland Site

Analyte	(614-01) RP-01-65	(615-01) RP-06-30	(616-01) RP-06-87	(619-01) W-03-S	(620-01) W-03-I
Benzofluorantthenes	none	none	none	none	none
Benzoic acid	UJ MI	none	none	none	none
Benzyl alcohol	none	none	none	none	none
Bis(2-Chloroethoxy) methane	none	none	none	none	none
Bis(2-Chloroethyl) ether	none	none	none	none	none
Bis(2-chloroisopropyl) Ether	none	none	none	none	none
Bis(2-Ethylhexyl) pthalate	none	none	J DL	none	none
Butylbenzylphthalate	J DL	J DL	none	J DL	J DL
Carbazole	none	none	none	none	none
Chrysene	none	none	none	none	none
Dibenzo(a,h)anthracene	none	none	none	none	none
Dibenzofuran	none	none	none	none	none
Diethylphthalate	none	none	none	none	none
Dimethylphthalate	none	none	none	none	none
Di-n-butylphthalate	J DL	J DL	J DL	J DL	J DL
Di-n-octyl phthalate	none	none	none	none	none
Fluoranthene	none	none	none	none	none
Fluorene	none	none	none	none	none
Hexachlorobenzene	none	none	none	none	none
Hexachlorobutadiene	none	none	none	none	none
Hexachlorocyclopentadiene	none	none	none	none	none
Hexachloroethane	none	none	none	none	none
Indeno(1,2,3-cd)pyrene	none	none	none	none	none
Isophorone	none	none	none	none	none
Naphthalene	none	none	none	none	none
Nitrobenzene	none	none	none	none	none
N-Nitrosodi-n-propyl amine	none	none	none	none	none
N-Nitrosodiphenylamine	none	none	none	none	none
Pentachlorophenol	UJ MI	none	none	none	none
Phenanthrene	none	none	none	none	none
Phenol	UJ MI	none	none	none	none
Pyrene	none	J DL	none	none	none

Table 9
Data Qualifiers for Semivolatile Organic Compounds by EPA Method 8270C
Winter 2006 Groundwater Monitoring Event
RP - Portland Site

Analyte	(621-01) W-03-D	(622-01) W-04-S	(623-01) W-04-I	(624-01) W-04-89	(625-01) W-11-S
1,2,4-Trichlorobenzene	none	none	none	none	none
1,2-Dichlorobenzene	none	J DL	J DL	none	none
1,3-Dichlorobenzene	none	none	none	none	none
1,4-Dichlorobenzene	none	none	none	none	none
1-Methylnaphthalene	none	none	none	none	J DL
2,4,5-Trichlorophenol	none	UJ LS	UJ LS	UJ LS	UJ LS
2,4,6-Trichlorophenol	none	UJ LS	UJ LS	UJ LS	UJ LS
2,4-Dichlorophenol	none	UJ LS	UJ LS	UJ LS	UJ LS
2,4-Dimethylphenol	none	UJ LS	UJ LS	UJ LS	J LS, DL
2,4-Dinitrophenol	none	UJ LS	UJ LS	UJ LS	UJ LS
2,4-Dinitrotoluene	none	none	none	none	none
2,6-Dinitrotoluene	none	none	none	none	none
2-Chloronapthalene	none	none	none	none	none
2-Chlorophenol	none	UJ LS	UJ LS	UJ LS	UJ LS
2-Methyl-4,6-dinitrophenol	none	UJ LS	UJ LS	UJ LS	UJ LS
2-Methylnaphthalene	none	none	none	none	none
2-Methylphenol	none	J LS	UJ LS	UJ LS	J LS, DL
2-Nitroaniline	none	none	none	none	none
2-Nitrophenol	none	UJ LS	UJ LS	UJ LS	none
3,3'-Dichlorobenzidine	none	none	none	none	none
3/4-Cresol	UJ LL	J LS	UJ LS	UJ LS, MI	J LS, DL
3-Nitroaniline	none	UJ BC	UJ BC	UJ BC	UJ BC
4-Bromophenylphenyl ether	none	none	none	none	none
4-Chloro-3-methylphenol	none	UJ LS	UJ LS	UJ LS	UJ LS
4-Chloroaniline	none	none	none	none	none
4-Chlorophenylphenyl ether	none	none	none	none	none
4-Nitroaniline	none	none	none	none	none
4-Nitrophenol	none	UJ LS	UJ LS	UJ LS	UJ LS
Acenaphthene	none	none	none	none	none
Acenaphthylene	none	none	J DL	none	none
Anthracene	none	none	none	none	none
Benzo(a)anthracene	none	none	none	none	none
Benzo(a)pyrene	none	none	none	none	none
Benzo(ghi)perylene	none	none	none	none	none

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Table 9
Data Qualifiers for Semivolatile Organic Compounds by EPA Method 8270C
Winter 2006 Groundwater Monitoring Event
RP - Portland Site

Analyte	(621-01) W-03-D	(622-01) W-04-S	(623-01) W-04-I	(624-01) W-04-89	(625-01) W-11-S
Benzofluorantthenes	none	none	none	none	none
Benzoic acid	none	UJ LS	UJ LS	UJ LS	none
Benzyl alcohol	none	none	none	none	none
Bis(2-Chloroethoxy) methane	none	none	none	none	none
Bis(2-Chloroethyl) ether	none	none	none	none	none
Bis(2-chloroisopropyl) Ether	none	none	none	none	none
Bis(2-Ethylhexyl) pthalate	none	none	none	none	none
Butylbenzylphthalate	none	none	none	none	none
Carbazole	none	none	none	none	none
Chrysene	none	none	none	none	none
Dibenzo(a,h)anthracene	none	none	none	none	none
Dibenzofuran	none	none	none	none	none
Diethylphthalate	none	none	none	none	none
Dimethylphthalate	none	none	none	none	none
Di-n-butylphthalate	J DL	J DL	J DL	none	J DL
Di-n-octyl phthalate	none	none	none	none	none
Fluoranthene	none	none	none	none	none
Fluorene	none	none	none	none	none
Hexachlorobenzene	none	none	none	none	none
Hexachlorobutadiene	none	none	none	none	none
Hexachlorocyclopentadiene	none	none	none	none	none
Hexachloroethane	none	none	none	none	none
Indeno(1,2,3-cd)pyrene	none	none	none	none	none
Isophorone	none	none	none	none	none
Naphthalene	none	none	none	none	none
Nitrobenzene	none	none	none	none	none
N-Nitrosodi-n-propyl amine	none	none	none	none	none
N-Nitrosodiphenylamine	none	none	none	none	none
Pentachlorophenol	none	UJ LS	UJ LS	UJ LS	UJ LS
Phenanthrene	none	none	none	none	none
Phenol	none	UJ LS	UJ LS	UJ LS	UJ LS
Pyrene	none	none	none	none	none

Table 9
Data Qualifiers for Semivolatile Organic Compounds by EPA Method 8270C
Winter 2006 Groundwater Monitoring Event
RP - Portland Site

Analyte	(626-01) W-11-I	(627-01) W-11-D	(628-01) W-11-B	(629-01) W-12-S	(630-01) W-12-I
1,2,4-Trichlorobenzene	none	none	none	none	none
1,2-Dichlorobenzene	none	none	none	none	none
1,3-Dichlorobenzene	none	none	none	none	none
1,4-Dichlorobenzene	none	none	none	none	none
1-Methylnaphthalene	none	none	none	J DL	none
2,4,5-Trichlorophenol	UJ LS	R MI	UJ MI	J LS, DL	R LS
2,4,6-Trichlorophenol	UJ LS	R MI	UJ MI	J LS, DL	R LS
2,4-Dichlorophenol	UJ LS	J MI, DL	J MI, DL	J LS	R LS
2,4-Dimethylphenol	UJ LS	R MI	UJ MI	J LS, DL	R LS
2,4-Dinitrophenol	UJ LS	R MI	UJ MI	UJ LS	R LS
2,4-Dinitrotoluene	none	none	none	none	none
2,6-Dinitrotoluene	none	none	none	none	none
2-Chloronapthalene	none	none	none	none	none
2-Chlorophenol	UJ LS	R MI	J MI, DL	J LS, DL	R LS
2-Methyl-4,6-dinitrophenol	UJ LS	R MI	UJ MI	UJ LS	R LS
2-Methylnaphthalene	none	none	none	none	none
2-Methylphenol	UJ LS	R MI	UJ MI	J LS	R LS
2-Nitroaniline	none	none	none	none	none
2-Nitrophenol	UJ LS	R MI	UJ MI	UJ LS	R LS
3,3'-Dichlorobenzidine	none	none	none	none	none
3/4-Cresol	UJ LS	R MI	UJ MI	J LS, LL, MI	J LS, LL, DL
3-Nitroaniline	UJ BC	UJ BC	UJ BC	UJ BC	UJ BC
4-Bromophenylphenyl ether	none	none	none	none	none
4-Chloro-3-methylphenol	UJ LS	R MI	UJ MI	UJ LS	R LS
4-Chloroaniline	none	none	none	none	none
4-Chlorophenylphenyl ether	none	none	none	none	none
4-Nitroaniline	none	none	none	none	none
4-Nitrophenol	UJ LS	R MI	UJ MI	UJ LS	R LS
Acenaphthene	none	none	none	none	none
Acenaphthylene	none	none	none	none	none
Anthracene	none	none	none	none	none
Benzo(a)anthracene	none	none	none	none	none
Benzo(a)pyrene	none	none	none	none	none
Benzo(ghi)perylene	none	none	none	none	none

Table 9
Data Qualifiers for Semivolatile Organic Compounds by EPA Method 8270C
Winter 2006 Groundwater Monitoring Event
RP - Portland Site

Analyte	(626-01) W-11-I	(627-01) W-11-D	(628-01) W-11-B	(629-01) W-12-S	(630-01) W-12-I
Benzofluorantthenes	none	none	none	none	none
Benzoic acid	UJ LS	R MI	UJ MI	UJ LS	R LS
Benzyl alcohol	none	none	none	none	none
Bis(2-Chloroethoxy) methane	none	none	none	none	none
Bis(2-Chloroethyl) ether	none	none	none	none	none
Bis(2-chloroisopropyl) Ether	none	none	none	none	none
Bis(2-Ethylhexyl) pthalate	none	none	none	J DL	none
Butylbenzylphthalate	none	none	none	none	none
Carbazole	none	none	none	none	none
Chrysene	none	none	none	none	none
Dibenzo(a,h)anthracene	none	none	none	none	none
Dibenzofuran	none	none	none	none	none
Diethylphthalate	none	none	none	none	none
Dimethylphthalate	none	none	none	none	none
Di-n-butylphthalate	none	J DL	none	J DL	J DL
Di-n-octyl phthalate	none	none	none	none	none
Fluoranthene	none	none	none	J DL	none
Fluorene	none	none	none	none	none
Hexachlorobenzene	none	none	none	none	none
Hexachlorobutadiene	none	none	none	none	none
Hexachlorocyclopentadiene	none	none	none	none	none
Hexachloroethane	none	none	none	none	none
Indeno(1,2,3-cd)pyrene	none	none	none	none	none
Isophorone	none	none	none	none	none
Naphthalene	none	none	J DL	none	none
Nitrobenzene	none	none	none	none	none
N-Nitrosodi-n-propyl amine	none	none	none	none	none
N-Nitrosodiphenylamine	none	none	none	none	none
Pentachlorophenol	UJ LS	R MI	UJ MI	UJ LS	R LS
Phenanthrene	none	none	none	none	none
Phenol	UJ LS	R MI	UJ MI	UJ LS	R LS
Pyrene	none	none	none	J DL	none

Table 9
Data Qualifiers for Semivolatile Organic Compounds by EPA Method 8270C
Winter 2006 Groundwater Monitoring Event
RP - Portland Site

Analyte	(631-01) W-12-D	(635-01) AL6-96	(635-02) AL6-96	(636-01) W-09-86	(637-01) W-09-116
1,2,4-Trichlorobenzene	none	J DL	J DL	none	J DL
1,2-Dichlorobenzene	none	none	none	none	none
1,3-Dichlorobenzene	none	none	none	none	none
1,4-Dichlorobenzene	none	none	none	none	none
1-Methylnaphthalene	none	none	none	none	none
2,4,5-Trichlorophenol	UJ LS	UJ LS	R LS	R LS	R LS
2,4,6-Trichlorophenol	UJ LS	UJ LS	R LS	R LS	J LS, DL
2,4-Dichlorophenol	UJ LS	J LS	J LS	R LS	J LS
2,4-Dimethylphenol	UJ LS	UJ LS	R LS	R LS	R LS
2,4-Dinitrophenol	UJ LS	UJ LS	R LS	R LC, LL, LS	R LC, LL, LS
2,4-Dinitrotoluene	none	none	none	none	none
2,6-Dinitrotoluene	none	none	none	none	none
2-Chloronapthalene	none	none	none	none	none
2-Chlorophenol	UJ LS	UJ LS	R LS	R LS	R LS
2-Methyl-4,6-dinitrophenol	UJ LS	UJ LS	R LS	R LC, LL, LS	R LC, LL, LS
2-Methylnaphthalene	none	none	none	none	none
2-Methylphenol	UJ LS	J LS, DL	J LS, DL	R LS	R LS
2-Nitroaniline	none	none	none	none	none
2-Nitrophenol	UJ LS	UJ LS	R LS	R LS	R LS
3,3'-Dichlorobenzidine	none	none	none	none	none
3/4-Cresol	UJ LS, LL	UJ LS, LL	R LS, LL	R LL, LS	R LL, LS
3-Nitroaniline	UJ BC	UJ BC	UJ BC	UJ BC	UJ BC
4-Bromophenylphenyl ether	none	none	none	none	none
4-Chloro-3-methylphenol	UJ LS	J LS	J LS	R LS	J LS, DL
4-Chloroaniline	none	none	none	none	none
4-Chlorophenylphenyl ether	none	none	none	none	none
4-Nitroaniline	none	none	none	none	none
4-Nitrophenol	UJ LS	UJ LS	R LS	R LC, LL, LS	R LC, LL, LS
Acenaphthene	none	none	none	none	none
Acenaphthylene	none	none	none	none	none
Anthracene	none	none	none	none	none
Benzo(a)anthracene	none	none	none	none	none
Benzo(a)pyrene	none	none	none	none	none
Benzo(ghi)perylene	none	none	none	none	none

SCOEPA00013420

Table 9
Data Qualifiers for Semivolatile Organic Compounds by EPA Method 8270C
Winter 2006 Groundwater Monitoring Event
RP - Portland Site

Analyte	(631-01) W-12-D	(635-01) AL6-96	(635-02) AL6-96	(636-01) W-09-86	(637-01) W-09-116
Benzofluorantthenes	none	none	none	none	none
Benzoic acid	UJ LS	UJ LS	R LS	R LS	R LS
Benzyl alcohol	none	none	J DL	UJ LL	UJ LL
Bis(2-Chloroethoxy) methane	none	none	none	none	none
Bis(2-Chloroethyl) ether	none	none	none	none	none
Bis(2-chloroisopropyl) Ether	none	none	none	none	none
Bis(2-Ethylhexyl) pthalate	none	none	none	none	J DL
Butylbenzylphthalate	none	none	none	none	none
Carbazole	none	none	none	none	none
Chrysene	none	none	none	none	none
Dibenzo(a,h)anthracene	none	none	none	none	none
Dibenzofuran	none	none	none	none	none
Diethylphthalate	none	none	none	none	none
Dimethylphthalate	none	none	none	none	none
Di-n-butylphthalate	none	J DL	J DL	U HL, MB	U HL, MB
Di-n-octyl phthalate	none	none	none	none	none
Fluoranthene	none	none	none	none	none
Fluorene	none	none	none	none	none
Hexachlorobenzene	none	none	none	none	none
Hexachlorobutadiene	none	none	none	none	none
Hexachlorocyclopentadiene	none	none	none	UJ LC, LL	UJ LC, LL
Hexachloroethane	none	none	none	none	none
Indeno(1,2,3-cd)pyrene	none	none	none	none	none
Isophorone	none	none	none	none	none
Naphthalene	none	J DL	J DL	none	none
Nitrobenzene	none	none	none	none	none
N-Nitrosodi-n-propyl amine	none	none	none	UJ LC	UJ LC
N-Nitrosodiphenylamine	none	none	none	none	none
Pentachlorophenol	UJ LS	UJ LS	R LS	R LC, LL, LS	R LC, LL, LS
Phenanthrene	none	none	none	none	none
Phenol	UJ LS	UJ LS	R LS	R LL, LS	R LL, LS
Pyrene	none	none	none	none	none

SCOEPA00013421

Table 9
Data Qualifiers for Semivolatile Organic Compounds by EPA Method 8270C
Winter 2006 Groundwater Monitoring Event
RP - Portland Site

Analyte	(638-01) W-09
1,2,4-Trichlorobenzene	none
1,2-Dichlorobenzene	none
1,3-Dichlorobenzene	J DL
1,4-Dichlorobenzene	none
1-Methylnaphthalene	none
2,4,5-Trichlorophenol	UJ LS
2,4,6-Trichlorophenol	UJ LS
2,4-Dichlorophenol	UJ LS
2,4-Dimethylphenol	J LS, DL
2,4-Dinitrophenol	UJ LC, LL, LS
2,4-Dinitrotoluene	none
2,6-Dinitrotoluene	none
2-Chloronapthalene	none
2-Chlorophenol	UJ LS
2-Methyl-4,6-dinitrophenol	UJ LC, LL, LS
2-Methylnaphthalene	J DL
2-Methylphenol	J LS
2-Nitroaniline	none
2-Nitrophenol	UJ LS
3,3'-Dichlorobenzidine	none
3/4-Cresol	UJ LL, LS
3-Nitroaniline	UJ BC
4-Bromophenylphenyl ether	none
4-Chloro-3-methylphenol	UJ LS
4-Chloroaniline	none
4-Chlorophenylphenyl ether	none
4-Nitroaniline	none
4-Nitrophenol	UJ LC, LL, LS
Acenaphthene	J DL
Acenaphthylene	none
Anthracene	none
Benzo(a)anthracene	none
Benzo(a)pyrene	none
Benzo(ghi)perylene	none

Table 9
Data Qualifiers for Semivolatile Organic Compounds by EPA Method 8270C
Winter 2006 Groundwater Monitoring Event
RP - Portland Site

Analyte	(638-01) W-09
Benzofluorantthenes	none
Benzoic acid	UJ LS
Benzyl alcohol	UJ LL
Bis(2-Chloroethoxy) methane	none
Bis(2-Chloroethyl) ether	none
Bis(2-chloroisopropyl) Ether	none
Bis(2-Ethylhexyl) pthalate	J DL
Butylbenzylphthalate	none
Carbazole	none
Chrysene	none
Dibenzo(a,h)anthracene	none
Dibenzofuran	none
Diethylphthalate	none
Dimethylphthalate	none
Di-n-butylphthalate	U HL, MB
Di-n-octyl phthalate	J DL
Fluoranthene	none
Fluorene	none
Hexachlorobenzene	none
Hexachlorobutadiene	none
Hexachlorocyclopentadiene	UJ LC, LL
Hexachloroethane	none
Indeno(1,2,3-cd)pyrene	none
Isophorone	none
Naphthalene	none
Nitrobenzene	none
N-Nitrosodi-n-propyl amine	UJ LC
N-Nitrosodiphenylamine	none
Pentachlorophenol	UJ LC, LL, LS
Phenanthrene	none
Phenol	UJ LL, LS
Pyrene	none

SCOEPA00013423

TABLE 10
Data Qualifiers for Organochlorine Pesticides by EPA Method 8081A
Winter 2006 Groundwater Monitoring Event
RP - Portland Site

Analyte	(601-01) WS-11-125	(602-01) WS-11-161	(603-01) WS-12-125	(604-01) WS-12-161	(605-01) RP-11-30
4,4'-DDD	UJ LS	none	none	N SC	none
4,4'-DDE	UJ LS	none	none	NJ SC, DL	none
4,4'-DDT	UJ MB, LS	NJ CH, SC	none	U MB	none
Aldrin	UJ LS	none	none	none	none
alpha-BHC	UJ LS	UJ LL	NJ SC, DL	none	none
alpha-Chlordane	UJ LS	none	none	none	none
beta-BHC	J LS, DL	none	none	J DL	none
delta-BHC	UJ LS	R LL	none	none	none
Dieldrin	UJ LS	none	none	NJ SC, DL	none
Endosulfan I	UJ LS	none	none	N SC	none
Endosulfan II	UJ LS	NJ SC, DL	none	none	J DL
Endosulfan sulfate	UJ LS	UJ LL	none	none	none
Endrin	UJ MB, LS	J DL	U MB	U MB	none
Endrin aldehyde	UJ LS	none	none	none	none
Endrin Ketone	UJ LS	none	none	none	none
gamma-BHC (Lindane)	NJ LS, SC	none	none	none	J DL
gamma-Chlordane	UJ LS	none	none	none	none
Heptachlor	J CH, LS, DL	none	none	none	none
Heptachlor epoxide	UJ LS	none	NJ SC, DL	none	none
Methoxychlor	UJ LS	none	none	none	none
Toxaphene	UJ LS	none	none	none	none

TABLE 10
Data Qualifiers for Organochlorine Pesticides by EPA Method 8081A
Winter 2006 Groundwater Monitoring Event
RP - Portland Site

Analyte	(606-01) RP-11-216	(607-01) RP-11-160	(608-01) RP-07-55	(609-01) RP-07-84	(609-06) RP-07-84
4,4'-DDD	none	none	none	NJ SC, DL	NJ SC, DL
4,4'-DDE	J DL	none	none	NJ SC, DL	NJ SC, DL
4,4'-DDT	none	U MB	U MB	none	NJ CH, SC
Aldrin	none	none	none	NJ SC, DL	none
alpha-BHC	NJ SC, DL	none	none	NJ LL, SC	NJ LL, SC
alpha-Chlordane	NJ SC, DL	none	none	J DL	J DL
beta-BHC	none	none	none	none	none
delta-BHC	none	none	none	NJ LL, SC	NJ LL, SC, LC
Dieldrin	none	none	none	none	none
Endosulfan I	none	none	none	none	N SC
Endosulfan II	none	none	NJ SC, DL	none	none
Endosulfan sulfate	none	none	none	UJ LL	UJ LL
Endrin	U MB	U MB	U MB	J DL	J DL
Endrin aldehyde	none	none	none	none	none
Endrin Ketone	none	none	none	none	none
gamma-BHC (Lindane)	none	none	none	none	NJ SC, DL
gamma-Chlordane	none	none	none	none	none
Heptachlor	none	none	none	J CH, DL	J CH, DL
Heptachlor epoxide	none	none	J DL	NJ SC, DL	NJ SC, DL
Methoxychlor	none	none	none	none	none
Toxaphene	none	none	none	none	none

TABLE 10
Data Qualifiers for Organochlorine Pesticides by EPA Method 8081A
Winter 2006 Groundwater Monitoring Event
RP - Portland Site

Analyte	(610-01) RP-07-119	(610-02) RP-07-119	(611-01) RP-07-30	(612-01) RP-01-31	(613-01) RP-01-51
4,4'-DDD	none	none	none	none	none
4,4'-DDE	none	none	J DL	none	none
4,4'-DDT	none	none	NJ CH, SC	none	J DL
Aldrin	none	none	none	none	none
alpha-BHC	NJ LL, SC, DL	NJ LL, SC, DL	UJ LL	none	NJ SC, DL
alpha-Chlordane	none	J DL	none	none	none
beta-BHC	none	none	J DL	none	none
delta-BHC	NJ LL, SC, DL	NJ LL, SC	J LL, DL, LC	UJ LC	UJ LC
Dieldrin	none	none	none	none	none
Endosulfan I	none	none	none	none	none
Endosulfan II	none	none	J DL	none	none
Endosulfan sulfate	UJ LL	UJ LL	UJ LL	none	none
Endrin	none	J DL	none	none	NJ SC, DL
Endrin aldehyde	none	none	none	none	none
Endrin Ketone	none	none	none	none	J DL
gamma-BHC (Lindane)	none	none	none	none	none
gamma-Chlordane	none	none	none	none	none
Heptachlor	none	none	none	none	NJ SC, DL, CH
Heptachlor epoxide	none	none	none	none	none
Methoxychlor	none	none	none	none	none
Toxaphene	none	none	none	none	none

TABLE 10
Data Qualifiers for Organochlorine Pesticides by EPA Method 8081A
Winter 2006 Groundwater Monitoring Event
RP - Portland Site

Analyte	(614-01) RP-01-65	(615-01) RP-06-30	(616-01) RP-06-87	(619-01) W-03-S	(620-01) W-03-I	(621-01) W-03-D
4,4'-DDD	none	none	none	none	J DL	none
4,4'-DDE	none	none	none	none	none	none
4,4'-DDT	none	U MB	none	none	none	U MB
Aldrin	none	none	none	none	none	none
alpha-BHC	none	none	none	none	J DL	none
alpha-Chlordane	none	none	none	none	none	none
beta-BHC	none	NJ SC	none	NJ SC	none	none
delta-BHC	UJ LC	none	none	none	none	none
Dieldrin	none	none	none	none	NJ SC, DL	none
Endosulfan I	none	none	none	none	none	none
Endosulfan II	none	NJ SC, DL	none	none	none	none
Endosulfan sulfate	none	none	none	none	none	none
Endrin	none	U MB	none	none	U MB	U MB
Endrin aldehyde	none	none	none	none	none	none
Endrin Ketone	none	J DL	none	none	NJ SC	none
gamma-BHC (Lindane)	none	none	none	none	NJ SC, DL	none
gamma-Chlordane	none	none	none	none	none	none
Heptachlor	J DL, CH	NJ SC	none	none	none	J DL
Heptachlor epoxide	none	none	none	none	none	none
Methoxychlor	none	none	none	none	none	none
Toxaphene	none	none	none	none	none	none

TABLE 10
Data Qualifiers for Organochlorine Pesticides by EPA Method 8081A
Winter 2006 Groundwater Monitoring Event
RP - Portland Site

Analyte	(622-01) W-04-S	(623-01) W-04-I	(624-01) W-04-89	(625-01) W-11-S	(626-01) W-11-I	(627-01) W-11-D
4,4'-DDD	NJ HL, SC, DL	J HL, DL, LS	none	UJ LS	UJ LS	NJ HL, SC
4,4'-DDE	NJ SC, DL	UJ LS	none	UJ LS	UJ LS	none
4,4'-DDT	U MB	UJ MB, LS	none	UJ LS	UJ MB, LS	J CH
Aldrin	none	UJ LS	none	UJ LS	UJ LS	none
alpha-BHC	none	UJ LS	UJ LM	UJ LS	UJ LS	NJ HL, SC
alpha-Chlordane	NJ SC, DL	UJ LS	none	UJ LS	UJ LS	N SC
beta-BHC	none	UJ LS	N SC	UJ LS	UJ LS	none
delta-BHC	none	NJ HL, LS, SC, DL	R LM	UJ LS	UJ LS	none
Dieldrin	none	UJ LS	none	UJ LS	UJ LS	none
Endosulfan I	none	UJ LS	none	UJ LS	UJ LS	none
Endosulfan II	NJ HL, SC	NJ HL, LS, SC, DL	none	UJ LS	UJ LS	none
Endosulfan sulfate	none	UJ LS	UJ LM	UJ LS	UJ LS	none
Endrin	J LC	J LC, LS	UJ LC, MB	J LS	J LS	N SC
Endrin aldehyde	none	UJ LS	none	UJ LS	UJ LS	none
Endrin Ketone	none	UJ MB, LS	UJ MB	UJ MB, LS	UJ MB, LS	none
gamma-BHC (Lindane)	none	UJ LS	none	UJ LS	UJ LS	none
gamma-Chlordane	none	UJ LS	none	UJ LS	UJ LS	none
Heptachlor	NJ SC, DL	UJ LS	none	UJ LS	UJ LS	none
Heptachlor epoxide	NJ SC, DL	NJ LS, SC, DL	none	UJ LS	UJ LS	none
Methoxychlor	none	UJ LS	none	UJ LS	UJ LS	none
Toxaphene	none	UJ LS	none	UJ LS	UJ LS	none

TABLE 10
Data Qualifiers for Organochlorine Pesticides by EPA Method 8081A
Winter 2006 Groundwater Monitoring Event
RP - Portland Site

Analyte	(628-01) W-11-B	(629-01) W-12-S	(630-01) W-12-I	(631-01) W-12-D	(635-01) AL6-96	(635-02) AL6-96
4,4'-DDD	none	J LS, LM	J DL	none	J HS	J HS
4,4'-DDE	none	NJ LS, SC, DL	none	none	NJ HS, SC, DL	none
4,4'-DDT	U MB	NJ LS, SC, DL	none	none	J HS	J HS
Aldrin	none	UJ LS	none	none	none	NJ CH, HS, SC, DL
alpha-BHC	none	UJ LS, LS	none	none	NJ CH, HS, SC, DL	NJ CH, HS, SC, DL
alpha-Chlordane	none	NJ LS, MI, SC	none	none	NJ HS, SC	NJ HS, SC
beta-BHC	none	UJ LS	none	none	none	none
delta-BHC	none	UJ LS	none	none	NJ HS, SC, DL	none
Dieldrin	none	UJ LS	none	none	none	none
Endosulfan I	none	UJ LS	none	none	none	none
Endosulfan II	none	UJ LS	NJ SC, DL	none	J HS, DL	none
Endosulfan sulfate	none	UJ LS	none	none	none	none
Endrin	U MB	UJ MB, LS	U MB	U MB	none	none
Endrin aldehyde	none	UJ LS, SC	none	none	none	none
Endrin Ketone	U MB	UJ LS	none	none	NJ HS, SC, DL	none
gamma-BHC (Lindane)	none	UJ LS	none	none	none	none
gamma-Chlordane	none	NJ LS, SC, DL	none	none	none	none
Heptachlor	none	UJ LS	none	none	NJ CH, HS, SC	NJ CH, HS, SC
Heptachlor epoxide	none	UJ LS	none	none	J HS	J HS
Methoxychlor	none	UJ LS	none	none	none	none
Toxaphene	none	UJ LS	none	none	none	none

TABLE 10
Data Qualifiers for Organochlorine Pesticides by EPA Method 8081A
Winter 2006 Groundwater Monitoring Event
RP - Portland Site

Analyte	(636-01) W-09-86	(637-01) W-09-116	(638-01) W-09
4,4'-DDD	none	none	J LS
4,4'-DDE	none	N SC	UJ LS
4,4'-DDT	none	none	NJ CH, LS, SC
Aldrin	none	none	UJ LS
alpha-BHC	none	none	UJ LS
alpha-Chlordane	none	none	NJ LS, SC
beta-BHC	none	N SC	UJ LS
delta-BHC	none	NJ CH, SC, DL	UJ LS
Dieldrin	none	none	UJ LS
Endosulfan I	none	none	UJ LS
Endosulfan II	none	N SC	NJ LS, SC
Endosulfan sulfate	none	none	NJ LS, SC
Endrin	J CH, DL	NJ CH, SC, DL	NJ CH, LS, SC
Endrin aldehyde	none	none	UJ LS
Endrin Ketone	none	none	NJ CH, LS, SC
gamma-BHC (Lindane)	none	none	UJ LS
gamma-Chlordane	none	NJ LC, SC	NJ LS, SC
Heptachlor	none	N SC	J LS
Heptachlor epoxide	none	none	UJ LS
Methoxychlor	none	none	UJ LS
Toxaphene	none	none	UJ LS

TABLE 11
Data Qualifiers for Semivolatile Petroleum Products by NWTPH-Dx
Winter 2006 Groundwater Monitoring Event
RP - Portland Site

Analyte	(601-01) WS-11-125	(602-01) WS-11-161	(603-01) WS-12-125	(604-01) WS-12-161
Diesel Range Organics	none	J DL	none	J DL
Residual Range Organics	U MB	U MB	U MB	none
Analyte	**(605-01) RP-11-30**	**(606-01) RP-11-216**	**(607-01) RP-11-160**	**(608-01) RP-07-55**
Diesel Range Organics	J DL	none	none	J DL
Residual Range Organics	none	none	none	J DL
Analyte	**(609-01) RP-07-84**	**(610-01) RP-07-119**	**(611-01) RP-07-30**	**(612-01) RP-01-31**
Diesel Range Organics	none	J DL	none	none
Residual Range Organics	none	J DL	none	none
Analyte	**(613-01) RP-01-51**	**(614-01) RP-01-65**	**(615-01) RP-06-30**	**(616-01) RP-06-87**
Diesel Range Organics	none	none	J DL	none
Residual Range Organics	J DL	J DL	J DL	none
Analyte	**(619-01) W-03-S**	**(620-01) W-03-I**	**(621-01) W-03-D**	**(622-01) W-04-S**
Diesel Range Organics	J DL	none	J DL	none
Residual Range Organics	J DL	J DL	none	J DL
Analyte	**(623-01) W-04-I**	**(624-01) W-04-89**	**(625-01) W-11-S**	**(626-01) W-11-I**
Diesel Range Organics	J DL	none	none	J DL
Residual Range Organics	J DL	none	J DL	none
Analyte	**(627-01) W-11-D**	**(628-01) W-11-B**	**(629-01) W-12-S**	**(630-01) W-12-I**
Diesel Range Organics	none	none	none	J DL
Residual Range Organics	J DL	none	none	J DL
Analyte	**(631-01) W-12-D**	**(635-01) AL6-96**	**(635-02) AL6-96**	**(636-01) W-09-86**
Diesel Range Organics	UJ LE	none	none	J DL
Residual Range Organics	UJ LE	J DL	J DL	none
Analyte	**(637-01) W-09-116**	**(638-01) W-09**		
Diesel Range Organics	none	none		
Residual Range Organics	J DL	none		

TABLE 12
Data Qualifiers for Metals by EPA 6000/7000 Methods
Winter 2006 Groundwater Monitoring Event
RP - Portland Site

Analyte		(601-01) WS-11-125	(602-01) WS-11-161	(603-01) WS-12-125	(604-01) WS-12-161
Dissolved	Aluminum	none	none	J DL	J DL
Dissolved	Calcium	none	none	none	none
Dissolved	Iron	none	none	none	none
Dissolved	Magnesium	J LM	none	none	none
Dissolved	Manganese	none	none	none	none
Dissolved	Potassium	none	none	none	none
Dissolved	Sodium	none	none	none	none
Dissolved	Zinc	none	none	none	none
Dissolved	Arsenic	none	none	none	J DL
Dissolved	Cadmium	none	none	none	none
Dissolved	Chromium	none	none	none	none
Dissolved	Copper	J DL	J DL	J DL	U MB
Dissolved	Lead	J DL	J DL	J DL	J DL
Dissolved	Nickel	none	none	none	J DL
Dissolved	Vanadium	none	J DL	none	J DL
Dissolved	Mercury	none	none	none	none
Total	Aluminum	none	none	J DL	none
Total	Calcium	none	none	none	none
Total	Iron	none	none	none	none
Total	Magnesium	none	none	none	none
Total	Manganese	none	none	none	none
Total	Potassium	J HM	none	none	none
Total	Sodium	none	none	none	none
Total	Zinc	none	none	none	none
Total	Arsenic	none	none	J DL	none
Total	Cadmium	none	none	none	none
Total	Chromium	none	none	none	none
Total	Copper	J DL	J DL	J DL	J DL
Total	Lead	J DL	J DL	J DL	U MB
Total	Nickel	J DL	none	none	none
Total	Vanadium	J DL	J DL	J DL	none
Total	Mercury	none	none	none	none

TABLE 12
Data Qualifiers for Metals by EPA 6000/7000 Methods
Winter 2006 Groundwater Monitoring Event
RP - Portland Site

Analyte		(605-01) RP-11-30	(606-01) RP-11-216	(607-01) RP-11-160	(608-01) RP-07-55
Dissolved	Aluminum	J DL	J DL	none	J DL
Dissolved	Calcium	none	none	none	none
Dissolved	Iron	none	none	none	none
Dissolved	Magnesium	none	none	none	none
Dissolved	Manganese	none	none	none	none
Dissolved	Potassium	J DL	none	J DL	none
Dissolved	Sodium	none	none	none	none
Dissolved	Zinc	none	none	none	J DL
Dissolved	Arsenic	none	J DL	none	none
Dissolved	Cadmium	none	none	none	none
Dissolved	Chromium	none	none	none	none
Dissolved	Copper	J DL	J DL	U MB	J DL
Dissolved	Lead	J DL	J DL	J DL	J DL
Dissolved	Nickel	none	none	none	none
Dissolved	Vanadium	none	none	J DL	none
Dissolved	Mercury	none	none	none	none
Total	Aluminum	none	J DL	J DL	none
Total	Calcium	none	none	none	none
Total	Iron	none	none	none	none
Total	Magnesium	none	none	none	none
Total	Manganese	none	none	none	none
Total	Potassium	none	none	J DL	none
Total	Sodium	J DL	none	none	none
Total	Zinc	none	none	none	J DL
Total	Arsenic	U MB	none	none	none
Total	Cadmium	none	none	none	none
Total	Chromium	none	none	none	none
Total	Copper	none	J DL	J DL	J DL
Total	Lead	J DL	J DL	U MB	U MB
Total	Nickel	none	none	none	none
Total	Vanadium	none	J DL	J DL	none
Total	Mercury	none	none	none	none

TABLE 12
Data Qualifiers for Metals by EPA 6000/7000 Methods
Winter 2006 Groundwater Monitoring Event
RP - Portland Site

Analyte		(609-01) RP-07-84	(609-06) RP-07-84	(610-01) RP-07-119	(610-02) RP-07-119
Dissolved	Aluminum	J DL	J DL	J DL	J DL
Dissolved	Calcium	none	none	none	none
Dissolved	Iron	none	none	J DL	J DL
Dissolved	Magnesium	none	none	none	none
Dissolved	Manganese	none	none	none	none
Dissolved	Potassium	none	none	none	none
Dissolved	Sodium	none	none	none	none
Dissolved	Zinc	none	none	J DL	none
Dissolved	Arsenic	none	none	J DL	J DL
Dissolved	Cadmium	J DL	none	J DL	none
Dissolved	Chromium	none	none	none	none
Dissolved	Copper	J DL	J DL	J DL	J DL
Dissolved	Lead	J DL	J DL	J DL	J DL
Dissolved	Nickel	none	none	none	none
Dissolved	Vanadium	none	none	none	none
Dissolved	Mercury	none	none	none	none
Total	Aluminum	J DL	J DL	J DL	J DL
Total	Calcium	none	none	none	none
Total	Iron	none	none	none	none
Total	Magnesium	none	none	none	none
Total	Manganese	none	none	none	none
Total	Potassium	none	none	none	none
Total	Sodium	none	none	none	none
Total	Zinc	none	none	none	none
Total	Arsenic	J DL	J DL	none	none
Total	Cadmium	none	none	none	none
Total	Chromium	none	none	none	none
Total	Copper	none	none	J DL	J DL
Total	Lead	U MB	U MB	U MB	U MB
Total	Nickel	none	none	none	none
Total	Vanadium	J DL	J DL	J DL	J DL
Total	Mercury	none	none	none	none

TABLE 12
Data Qualifiers for Metals by EPA 6000/7000 Methods
Winter 2006 Groundwater Monitoring Event
RP - Portland Site

Analyte		(611-01) RP-07-30	(612-01) RP-01-31	(613-01) RP-01-51	(614-01) RP-01-65
Dissolved	Aluminum	none	J DL	none	J DL
Dissolved	Calcium	none	none	none	none
Dissolved	Iron	none	none	J DL	J DL
Dissolved	Magnesium	none	none	none	none
Dissolved	Manganese	none	none	none	none
Dissolved	Potassium	none	J DL	none	none
Dissolved	Sodium	none	none	none	none
Dissolved	Zinc	none	none	none	none
Dissolved	Arsenic	none	none	none	none
Dissolved	Cadmium	none	none	J DL	J DL
Dissolved	Chromium	none	none	none	none
Dissolved	Copper	J DL	J DL	none	none
Dissolved	Lead	J DL	J DL	J DL	J DL
Dissolved	Nickel	none	J DL	none	none
Dissolved	Vanadium	none	none	none	none
Dissolved	Mercury	none	none	none	none
Total	Aluminum	none	none	none	J DL
Total	Calcium	none	none	none	none
Total	Iron	none	none	J DL	none
Total	Magnesium	none	none	none	none
Total	Manganese	none	none	none	none
Total	Potassium	none	J DL	none	none
Total	Sodium	none	none	none	none
Total	Zinc	none	U MB	none	none
Total	Arsenic	none	none	none	none
Total	Cadmium	none	none	J DL	J DL
Total	Chromium	none	none	J DL	none
Total	Copper	J DL	none	none	none
Total	Lead	U MB	J DL	J DL	J DL
Total	Nickel	none	none	none	none
Total	Vanadium	J DL	none	none	none
Total	Mercury	none	none	none	none

TABLE 12
Data Qualifiers for Metals by EPA 6000/7000 Methods
Winter 2006 Groundwater Monitoring Event
RP - Portland Site

Analyte		(615-01) RP-06-30	(616-01) RP-06-87	(619-01) W-03-S	(620-01) W-03-I
Dissolved	Aluminum	none	J DL	J DL	none
Dissolved	Calcium	none	none	none	none
Dissolved	Iron	none	none	none	none
Dissolved	Magnesium	none	none	none	none
Dissolved	Manganese	none	none	none	none
Dissolved	Potassium	J DL	none	none	none
Dissolved	Sodium	none	none	none	none
Dissolved	Zinc	none	none	none	J DL
Dissolved	Arsenic	none	none	none	none
Dissolved	Cadmium	none	J DL	none	none
Dissolved	Chromium	none	none	none	none
Dissolved	Copper	J DL	none	J DL	none
Dissolved	Lead	J DL	J DL	J DL	J DL
Dissolved	Nickel	J DL	none	none	none
Dissolved	Vanadium	none	none	J DL	J DL
Dissolved	Mercury	none	none	none	none
Total	Aluminum	J DL	J DL	J DL	none
Total	Calcium	none	none	none	none
Total	Iron	none	none	none	none
Total	Magnesium	none	none	none	none
Total	Manganese	none	none	none	none
Total	Potassium	J DL	none	none	none
Total	Sodium	none	none	none	none
Total	Zinc	U MB	U MB	UJ MB, DL	U MB
Total	Arsenic	none	none	none	none
Total	Cadmium	none	J DL	none	none
Total	Chromium	J DL	J DL	none	none
Total	Copper	J DL	none	none	none
Total	Lead	J DL	J DL	J DL	J DL
Total	Nickel	J DL	none	none	none
Total	Vanadium	none	none	J DL	none
Total	Mercury	none	none	none	none

TABLE 12
Data Qualifiers for Metals by EPA 6000/7000 Methods
Winter 2006 Groundwater Monitoring Event
RP - Portland Site

Analyte		(621-01) W-03-D	(622-01) W-04-S	(623-01) W-04-I	(624-01) W-04-89
Dissolved	Aluminum	J DL	none	J DL	none
Dissolved	Calcium	none	none	none	none
Dissolved	Iron	none	J DL	none	none
Dissolved	Magnesium	none	none	none	none
Dissolved	Manganese	none	none	none	none
Dissolved	Potassium	none	none	none	none
Dissolved	Sodium	none	none	none	none
Dissolved	Zinc	none	none	none	none
Dissolved	Arsenic	none	none	none	none
Dissolved	Cadmium	none	J DL	J DL	none
Dissolved	Chromium	none	none	none	none
Dissolved	Copper	J DL	J DL	none	J DL
Dissolved	Lead	J DL	J DL	J DL	J DL
Dissolved	Nickel	J DL	J DL	none	none
Dissolved	Vanadium	J DL	none	none	J DL
Dissolved	Mercury	none	none	none	none
Total	Aluminum	J DL	J DL	J DL	J DL
Total	Calcium	none	none	none	none
Total	Iron	none	J DL	none	none
Total	Magnesium	none	none	none	none
Total	Manganese	none	none	none	none
Total	Potassium	none	none	none	none
Total	Sodium	none	none	none	none
Total	Zinc	U MB	U MB	U MB	U MB
Total	Arsenic	none	J DL	none	none
Total	Cadmium	none	J DL	none	J DL
Total	Chromium	J DL	none	J DL	none
Total	Copper	J DL	J DL	none	none
Total	Lead	J DL	none	J DL	J DL
Total	Nickel	J DL	none	none	none
Total	Vanadium	J DL	none	J DL	none
Total	Mercury	none	none	none	none

TABLE 12
Data Qualifiers for Metals by EPA 6000/7000 Methods
Winter 2006 Groundwater Monitoring Event
RP - Portland Site

Analyte		(625-01) W-11-S	(626-01) W-11-I	(627-01) W-11-D	(628-01) W-11-B
Dissolved	Aluminum	none	none	J DL	J DL
Dissolved	Calcium	none	none	none	none
Dissolved	Iron	none	none	none	none
Dissolved	Magnesium	none	none	none	none
Dissolved	Manganese	J DL	none	none	none
Dissolved	Potassium	none	none	none	none
Dissolved	Sodium	none	none	none	none
Dissolved	Zinc	none	none	none	none
Dissolved	Arsenic	none	none	none	none
Dissolved	Cadmium	J DL	none	none	none
Dissolved	Chromium	J DL	none	none	none
Dissolved	Copper	J DL	J DL	none	none
Dissolved	Lead	J DL	J DL	J DL	J DL
Dissolved	Nickel	none	none	none	none
Dissolved	Vanadium	none	none	none	J DL
Dissolved	Mercury	none	none	none	none
Total	Aluminum	none	none	none	none
Total	Calcium	none	none	none	none
Total	Iron	none	none	none	none
Total	Magnesium	none	none	none	none
Total	Manganese	none	none	none	none
Total	Potassium	none	none	none	none
Total	Sodium	none	none	none	none
Total	Zinc	none	none	none	none
Total	Arsenic	none	none	none	J DL
Total	Cadmium	J DL	none	none	none
Total	Chromium	none	none	none	none
Total	Copper	J DL	J DL	none	J DL
Total	Lead	J DL	J DL	J DL	J DL
Total	Nickel	none	none	none	none
Total	Vanadium	none	none	none	J DL
Total	Mercury	none	none	none	none

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TABLE 12
Data Qualifiers for Metals by EPA 6000/7000 Methods
Winter 2006 Groundwater Monitoring Event
RP - Portland Site

Analyte		(629-01) W-12-S	(630-01) W-12-I	(631-01) W-12-D	(635-01) AL6-96
Dissolved	Aluminum	none	none	none	none
Dissolved	Calcium	none	none	none	none
Dissolved	Iron	none	none	none	none
Dissolved	Magnesium	J DL	none	none	none
Dissolved	Manganese	J DL	none	none	none
Dissolved	Potassium	none	none	none	none
Dissolved	Sodium	none	none	none	none
Dissolved	Zinc	none	none	none	none
Dissolved	Arsenic	none	none	none	none
Dissolved	Cadmium	J DL	none	none	none
Dissolved	Chromium	J DL	none	J DL	none
Dissolved	Copper	U RB	U RB	U RB	J DL
Dissolved	Lead	U RB	U RB	U RB	J DL
Dissolved	Nickel	none	none	none	none
Dissolved	Vanadium	none	J DL	J DL	none
Dissolved	Mercury	none	none	none	none
Total	Aluminum	none	none	J DL	none
Total	Calcium	none	none	none	none
Total	Iron	J DL	none	none	none
Total	Magnesium	J DL	none	none	none
Total	Manganese	J DL	none	none	none
Total	Potassium	none	J DL	none	none
Total	Sodium	none	none	none	none
Total	Zinc	none	none	none	none
Total	Arsenic	none	none	none	none
Total	Cadmium	J DL	none	none	none
Total	Chromium	U RB	U RB	U RB	none
Total	Copper	U RB	U RB	U RB	none
Total	Lead	J DL	U RB	J DL	J DL
Total	Nickel	none	none	none	none
Total	Vanadium	none	none	J DL	J DL
Total	Mercury	none	none	none	none

TABLE 12
Data Qualifiers for Metals by EPA 6000/7000 Methods
Winter 2006 Groundwater Monitoring Event
RP - Portland Site

Analyte		(635-02) AL6-96	(636-01) W-09-86	(637-01) W-09-116	(638-01) W-09
Dissolved	Aluminum	none	none	none	J DL
Dissolved	Calcium	none	none	none	none
Dissolved	Iron	none	J DL	none	none
Dissolved	Magnesium	none	none	none	none
Dissolved	Manganese	none	none	none	none
Dissolved	Potassium	none	none	none	J DL
Dissolved	Sodium	none	none	none	none
Dissolved	Zinc	none	none	none	none
Dissolved	Arsenic	none	none	none	none
Dissolved	Cadmium	none	J DL	none	none
Dissolved	Chromium	none	J DL	J DL	none
Dissolved	Copper	J DL	J DL	J DL	none
Dissolved	Lead	J DL	J DL	J DL	none
Dissolved	Nickel	none	none	none	none
Dissolved	Vanadium	none	none	J DL	none
Dissolved	Mercury	none	none	none	none
Total	Aluminum	none	U MB	U MB	none
Total	Calcium	none	J HM	none	none
Total	Iron	none	J DL	none	none
Total	Magnesium	none	J HM	none	none
Total	Manganese	none	none	none	none
Total	Potassium	none	none	none	J DL
Total	Sodium	none	none	none	none
Total	Zinc	none	none	none	J DL
Total	Arsenic	none	none	none	none
Total	Cadmium	none	J DL	J DL	none
Total	Chromium	none	none	none	none
Total	Copper	none	none	J DL	none
Total	Lead	J DL	J DL	J DL	none
Total	Nickel	none	none	none	none
Total	Vanadium	none	J DL	none	none
Total	Mercury	none	none	none	none

TABLE 13
Data Validation Reason Codes
Winter 2006 Groundwater Monitoring Event
RP - Portland Site

AB	Headspace in VOA vials. Analytical result may be biased low.
BC	Bad calibration curve. Analytical results may be biased.
CH	High CCV recovery. Analytical result may be biased high.
DL	Value between MDL and RL.
HL	High LCS recovery. Analytical result may be biased high.
HM	High matrix spike recovery. Analytical result may be biased high.
HS	High surrogate recovery. Analytical result may be biased high.
HT	Holding time exceeded. Analytical result may be biased low.
LC	Low CCV recovery. Analytical result may be biased low.
LE	Laboratory error. Analytical result may be biased low.
LL	Low LCS recovery. Analytical result may be biased low.
LM	Low matrix spike recovery. Analytical result may be biased low.
LS	Low surrogate recovery. Analytical result may be biased low.
MB	Method blank contamination.
MI	Matrix Interference. Analytical result may be biased.
RB	Rinsate blank contamination.
RF	Relative response factor <0.01.
SC	Difference between dual-column results > 40%.
TB	Trip blank contamination.
UC	Upper calibration level exceeded.

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ATTACHMENT D-2

DATA VALIDATION REPORT FOR THE WINTER 2006 GROUNDWATER MONITORING EVENT PCDD/PCDF RESULTS RP - Portland Site

August 3, 2006

Submitted to:

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0-61M-107030/Phase 43

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1.0 INTRODUCTION

A total of 37 groundwater samples from the Rhône-Poulenc (RP) Portland Site Winter 2006 Groundwater Monitoring Event were submitted to Severn Trent Laboratories, Inc. (STL) in Sacramento, California, or Frontier Analytical Laboratory (Frontier) in El Dorado Hills, California, for analysis of polychlorinated dioxins (PCDD) and dibenzofurans (PCDF) using United States Environmental Protection Agency (EPA) Method 1613B. The 37 water samples consisted of 33 primary samples, 3 field duplicates, and 1 rinsate blank. An aliquot of one of the primary samples was also submitted to Frontier as an interlaboratory split sample. A list of all samples by sample location, field sample identification (ID), sample collection date, STL sample ID, and Frontier sample ID may be found in Table 1.

2.0 DATA VALIDATION METHODOLOGY

Validation of these data followed the EPA Region 10 Standard Operating Procedure (SOP) for the Validation of PCDD and PCDF Data (EPA, 1996) and the National Functional Guidelines for Chlorinated Dioxin/Furan Data Review (EPA, 2002), with reference to EPA Method 1613B (EPA, 1997) and EPA Method 8290 (EPA, 1994), and exceeded the level of validation specified in the Oregon Department of Environmental Quality (DEQ)-approved Revised Quality Assurance Project Plan (QAPP) dated June 13, 2001.

In general, it is important to recognize that no analytical data are guaranteed to be correct, even if all quality control (QC) audits are passed. Strict QC serves to increase confidence in data, but any reported value may potentially contain error.

3.0 CHAIN OF CUSTODY AND SAMPLE RECEIPT CONDITION DOCUMENTATION

3.1 Sample Receipt at STL

Samples were received at STL with acceptable chain of custody (COC) documentation, intact, and within the EPA-recommended 4 degrees centigrade (°C) +/- 2°C temperature range, except as described below:

- Samples WS-11-125 (601-01), WS-11-161 (602-01), WS-12-125 (603-01), WS-12-161 (604-01), RP-11-30 (605-01), RP-11-216 (606-01), RP-11-161 (607-01), RP-07-55 (608-01), RP-01-31 (612-01), RP-01-51 (613-01),

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RP-01-65 (614-01), W-11-S (625-01), W-11-I (626-01), W-11-D (627-01), W-11-B (628-01), W-12-S (629-01), W-12-I (630-01), W-12-D (631-01), AL6-96 (635-01 and 635-02), W-09-86 (636-01), W-09-116 (637-01), W-09 (638-01), and rinsate blank 628-04 were received at the recorded temperature of 0°C. There is no indication that sample containers were broken due to the sample freezing and data usability is not adversely affected.

- Samples RP-06-30 (615-01), RP-06-87 (616-01), W-03-30 (619-01), W-03-I (620-01), W-03-D (621-01), W-04-S (622-01), W-04-I (623-01), and W-04-89 (624-01) were received at the recorded temperature of 1°C. One out of two bottles of sample RP-06-87 (616-01) were received broken. There was sufficient sample in the second bottle for analysis to proceed and data usability is not adversely affected.
- According to the sample receipt documentation, two bottles of sample RP-07-119 (610-02) were received, not one as indicated on the COC.
- According to the sample receipt documentation, the collection time for sample RP-01-31 (612-01) was listed as 10:46 on the COC and 10:45 on the sample label. Additionally, one of two bottles of this sample was received broken. There was sufficient sample in the second bottle for analysis to proceed and data usability is not adversely affected.

3.2 Sample Receipt at Frontier

Sample W-09-86 (636-05) was received by Frontier at the recorded temperature of 0°C. There is no indication that the sample container was broken due to the sample freezing and data usability is not adversely affected.

4.0 EPA METHOD 1613B

4.1 Holding Times

All samples were extracted within the method-specified holding time of one year from sample collection until extraction and all extracts were analyzed within the method specified time of one year from extraction until analysis.

4.2 GC/MS Performance Checks and Initial Calibration

Analysis of PCDD/PCDF in these samples on the primary DB-5 column was conducted under internal calibration (ICAL) 16130317061D5, ICAL 16130105069D5, and

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ICAL 16130418065D5. 2,3,7,8-Tetrachlorodibenzofuran (TCDF) detections were confirmed on the DB-225 column under ICAL DB2250915057D2. Ion abundance ratios and percent relative standard deviation for all target compounds met EPA Method 1613B requirements.

4.3 Calibration Verification

All compounds in the calibration verification standards (VER) met method requirements for percent drift in relative response (%D) and ion abundance ratios.

4.4 Laboratory Blanks

Target analytes were not detected in the laboratory and rinsate blanks associated with the analysis of these samples, except as described below:

- Total pentachlorodibenzo-p-dioxin (PeCDD) and octachlorodibenzo-p-dioxin (OCDD) were detected in the method blank associated with preparation batch 6094464 at concentrations of 7.6 picograms per liter (pg/L) and 23 pg/L, respectively. AMEC Earth & Environmental, Inc. (AMEC) U qualified the total PeCDD detection from sample RP-07-119 (610-02) and the OCDD detection from sample RP-07-30 (611-01) because the concentrations detected in the blank were more than 20% the concentrations detected in the samples.
- 1,2,3,4,6,7,8-Heptachlorodibenzo-p-dioxin (HpCDD) (3.6 pg/L), total HpCDD (6.1 pg/L), and OCDD (18 pg/L) were detected in the method blank associated with preparation batch 6203573. AMEC U qualified the 1,2,3,4,6,7,8-HpCDD, total HpCDD, and OCDD detections from sample W-12-D (631-01); the 1,2,3,4,6,7,8-HpCDD and total HpCDD detections from sample W-12-S (629-01); and the OCDD detection from sample W-12-I (630-01) because the concentrations detected in the method blank were more than 20% the concentrations detected in the samples.
- OCDD (15 pg/L), 1,2,3,4,6,7,8-hexachlorodibenzofuran (HxCDF) (4.9 pg/L), and total HxCDF (4.9 pg/L) were detected in the method blank associated with preparation batch 6109340. AMEC U qualified the OCDD detections from samples W-09-86 (636-01) and W-09 (638-01) because the concentration detected in the method blank was more than 20% the concentrations detected in the samples.

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4.5 Rinsate Blank

1,2,3,4,6,7,8-HpCDD (12 pg/L), total HpCDD (20 pg/L), OCDD (85 pg/L), total heptachlorodibenzofuran (HpCDF)(3.2 pg/L), and octachlorodibenzofuran (OCDF) (6.2 pg/L) were detected in rinsate blank 628-04. AMEC U qualified the detected total HpCDF and OCDF detections in sample W-12-D (631-01) because the concentrations detected in the rinsate blank were more than 20% the concentrations detected in the sample.

4.6 Recovery of C-13 Labeled Isotope Dilution Standards Used as Internal Standards

EPA Method 1613B uses an isotope dilution procedure for calculation of analyte concentrations. A total of 18 carbon or chlorine labeled PCDD and PCDF isomers are added to the sample or extract to monitor different aspects of the procedure. Of the 18 labeled isomers added, 15 are used as internal standards (IS) for calculation of analytical results. IS recovery problems affect all analytical results that are calculated using the affected IS, and not just the corresponding nonlabeled isomer.

Qualification of data based on IS results can seem counterintuitive in that low IS recovery implies a possible high bias in the calculated result, and high IS recovery can imply a possible low bias. The reason for this lies in the fact that low recovery implies lower than expected area counts for the IS, and high recovery implies higher than expected area counts. Because the area of the IS appears in the denominator of the equation for calculation of results using the IS technique, low IS area counts lead to high results for any calculation based on that IS, and high IS area counts lead to low results for any calculation based on that IS.

Recovery and performance of carbon labeled isotope dilution standards used as IS in all field and QC samples were within method-specified limits.

4.7 Instrument Recovery Internal Standards

The instrument recovery standards $^{13}C_{12}$-1,2,3,4-tetrachlorodibenzo-p-dioxin (TCDD) (DB-5 and DB-225 analyses) and $^{13}C_{12}$-1,2,3,7,8,9-HxCDD (DB-5 analysis only) are added to sample extracts and standards before injection into the gas chromatography/mass spectrometry (GC/MS). The instrument recovery standards are used to determine the recovery efficiency of the extraction and cleanup procedures, to determine if the GC/MS sensitivity and response are stable during the analytical run,

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and to determine if the same amount of extract was injected into the GC/MS (EPA, 1996). The $^{13}C_{12}$-1,2,3,4-TCDD recovery standard is used to calculate recoveries of the TCDD, TCDF, PeCDD, and pentachlorodibenzofuran (PeCDF). The $^{13}C_{12}$-1,2,3,7,8,9-HxCDD recovery standard is used to calculate recoveries of the HxCDD, HxCDF, HpCDD, HpCDF, OCDD, and OCDF IS.

Recovery of the sums of the instrument recovery standards in all field and QC samples were within method requirements of 25 to 400% of initial area counts.

4.8 Ongoing Precision and Recovery Samples

STL extracted and analyzed a minimum of one ongoing precision and recovery sample (OPR) with each extraction batch. This equates to a total of 9 OPR results for 33 primary samples, or approximately 27%, which exceeds the rate of 5% specified in the DEQ-approved QAPP. Recovery and precision in OPR samples associated with this project were acceptable.

4.9 Surrogate Recovery

Because STL includes additional labeled isomers beyond those used as IS in the spiking solution added to samples, the additional isomers can be used in a manner analogous to surrogate compounds in order to monitor extraction and cleanup efficiency. Qualification of data based on recovery of these isomers is more straightforward than qualification based on IS. When recovery of one of these isomers falls outside acceptance limits, only the result from the corresponding nonlabeled isomer is qualified. No data are qualified based on recovery of the $^{37}Cl_4$-2,3,7,8-TCDD cleanup standard unless recoveries of other labeled compounds are also outside acceptance limits.

4.10 Matrix Spikes

Matrix spikes (MS) are not required QC for EPA Method 1613B. In order to evaluate MS recoveries, AMEC compared them against method-specified OPR acceptance limits.

STL performed MS on samples W-04-89 (624-01) and W-12-S (629-01). All analyte recoveries were within acceptance limits.

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4.11 Data Reporting

STL J qualified data when the individual congener concentration was less than the instrument's lowest calibration level. All of STL's J qualifiers are appropriate and should be applied to the final data.

STL did not apply J qualifiers to the total homolog results. AMEC J qualified all total homolog results less than the reported sample-specific detection limit.

AMEC N qualified 2,3,7,8-TCDF results from samples RP-11-30 (605-01) and AL6-96 (635-01) because STL did not confirm the detections on a DB-225 column. The detection should be considered presumptive.

STL did not report the detected total HpCDD result from sample RP-11-30 (605-01). The concentration should be 38 pg/L, not nondetected (ND) at a concentration of 20 pg/L.

5.0 FIELD DUPLICATES

Samples RP-07-84 (609-01 and 609-06), RP-07-119 (610-01 and 610-02), and AL6-96 (635-01 and 635-02) were collected in duplicate. Target analytes were not detected in either the primary samples or in the field duplicates of RP-07-84 and RP-07-119.

2,3,7,8-TCDF and total TCDF were detected in the primary AL6-96 sample (635-01) at concentrations of 2.3 pg/L and 19 pg/L, respectively. Total TCDD was detected in the duplicate AL6-96 sample (635-02) at a concentration of 2.5 pg/L. Individual congeners were not detected in either sample at concentrations greater than the reporting limit and data usability is not adversely affected.

6.0 INTERLABORATORY SPLIT SAMPLE

Sample W-09-86 (636-01 and 636-05) was submitted to both STL and Frontier for analysis. The sample was labeled blindly, so that the primary laboratory (i.e., STL) was not aware which sample was also submitted to the QC laboratory (i.e., Frontier). Primary samples were coded with -01 appended to the blind sample ID, and split samples were coded with -05 appended to the blind sample ID. Target analytes were not detected in either the primary sample or in the interlaboratory split sample.

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7.0 SUMMARY

PCDD/PCDF data generated for the Winter 2006 Groundwater Monitoring Event are of acceptable quality and are usable with the addition of the qualifiers listed in Table 2. Most data were qualified because of analyte detections in the method blanks or analyte detections below the instrument's lowest calibration level. No data were rejected based on analytical issues.

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REFERENCES

AMEC, 2001. *Revised Quality Assurance Project Plan, RPAC - Portland Site*, prepared for Aventis CropScience, prepared by AMEC Earth & Environmental, submitted to Oregon Department of Environmental Quality, June 13, 2001.

AMEC, 2006. *Winter 2006 Groundwater Monitoring Work Plan*, prepared by AMEC Earth & Environmental, Inc., submitted to Oregon Department of Environmental Quality, March 10, 2006.

EPA, 1994. *Method 8290*, Revision 0, September 1994.

EPA, 1996. EPA *Region 10 SOP for the Validation of PCDD and PCDF Data*, Revision 2.0, January 31, 1996.

EPA, 1997. *Method 1613, Revision B. Tetra- Through Octa-Chlorinated Dioxins and Furans by Isotope Dilution HRGC/HRMS*. Federal Register, Volume 62, Number 178. September 15, 1997.

EPA, 2002. *National Functional Guidelines for Chlorinated Dioxin/Furan Data Review*, Draft Final, EPA 540-R-02-003, March 2002.

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LIMITATIONS

This report was prepared exclusively for SLLI 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 Data Validation Report for the Winter 2006 Groundwater Sampling Event, PCDD/PCDF Results is intended to be used by SLLI for the RP - Portland Site, 6200 N.W. St. Helens Road, Portland, Oregon 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
Field Samples Submitted to Severn Trent Laboratories and Frontier Analytical Laboratory with Corresponding Laboratory IDs
Winter 2006 Groundwater Monitoring Event
RP - Portland Site

Sample Location	Field Sample ID	Sample Date	STL Sample ID	STL Batch ID	Frontier Sample ID	Notes
WS-11-125	601-01	03/20/2006	G6C250183-001	6090301	-	
WS-11-161	602-01	03/20/2006	G6C250183-002		-	
WS-12-125	603-01	03/20/2006	G6C250183-003		-	
WS-12-161	604-01	03/21/2006	G6C250181-001		-	
RP-11-30	605-01	03/21/2006	G6C250181-002		-	
RP-11-216	606-01	03/21/2006	G6C250181-003		-	
RP-11-161	607-01	03/22/2006	G6C2520179-001		-	
RP-07-55	608-01	03/22/2006	G6C2520179-002		-	
RP-07-84	609-01	03/23/2006	G6C280165-001	6094464	-	
RP-07-84	609-06	03/23/2006	G6C280165-002		-	Field duplicate
RP-07-119	610-01	03/23/2006	G6C280165-003		-	
RP-07-119	610-02	03/23/2006	G6C280165-004		-	Field duplicate
RP-07-30	611-01	03/23/2006	G6C280165-005		-	
RP-01-31	612-01	03/24/2006	G6C300233-001	6096542	-	
RP-01-51	613-01	03/24/2006	G6C300233-002		-	
RP-01-65	614-01	03/24/2006	G6C300233-003		-	
RP-06-30	615-01	03/27/2006	G6C300224-001		-	
RP-06-87	616-01	03/27/2006	G6C300224-002		-	
W-03-30	619-01	03/27/2006	G6C300224-003		-	
W-03-I	620-01	03/27/2006	G6C300224-004		-	
W-03-D	621-01	03/27/2006	G6C300224-005		-	
W-04-S	622-01	03/28/2006	G6C310253-001	6101387	-	
W-04-I	623-01	03/28/2006	G6C310253-002		-	
W-04-89	624-01	03/28/2006	G6C310253-003		-	
W-11-S	625-01	03/29/2006	G6D040291-001		-	
W-11-I	626-01	03/29/2006	G6D040291-002		-	
W-11-D	627-01	03/29/2006	G6D040291-003		-	
W-11-B	628-01	03/29/2006	G6D040291-004		-	
Rinsate Blank	628-04	03/30/2006	G6D050278-001	6103573	-	Rinsate blank
W-12-S	629-01	03/30/2006	G6D050278-002		-	
W-12-I	630-01	03/30/2006	G6D050278-003		-	
W-12-D	631-01	03/30/2006	G6D050278-004		-	
AL6-96	635-01	03/31/2006	G6D050289-001		-	
AL6-96	635-02	03/31/2006	G6D050289-002		-	Field duplicate
W-09-86	636-01	04/03/2006	G6D070215-001	6109340	-	
W-09-116	637-01	04/03/2006	G6D070215-002		-	
W-09	638-01	04/03/2006	G6D070215-003		-	
W-09-86	636-05	04/03/2006	-	-	3799-001-SA	Interlaboratory split

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TABLE 2
Summary of Data Qualifiers for PCDD/PCDF Congeners
Winter 2006 Groundwater Monitoring Event
RP - Portland Site

Analyte	WS-11-125 601-01	WS-11-161 602-01	WS-12-125 603-01	WS-12-161 604-01	RP-11-30 605-01	RP-11-216 606-01
2,3,7,8-TCDD	none	none	none	none	none	none
1,2,3,7,8-PeCDD	none	none	none	none	none	none
1,2,3,4,7,8-HxCDD	none	none	none	none	none	none
1,2,3,6,7,8-HxCDD	none	none	none	none	none	none
1,2,3,7,8,9-HxCDD	none	none	none	none	none	none
1,2,3,4,6,7,8-HpCDD	J-DL	none	none	none	none	none
OCDD	none	none	none	none	none	none
2,3,7,8-TCDF	none	none	none	none	NJ-SC/DL	none
1,2,3,7,8-PeCDF	none	none	none	none	none	none
2,3,4,7,8-PeCDF	none	none	none	none	none	none
1,2,3,4,7,8-HxCDF	none	none	none	none	J-DL	none
1,2,3,6,7,8-HxCDF	none	none	none	none	none	none
1,2,3,7,8,9-HxCDF	none	none	none	none	none	none
2,3,4,6,7,8-HxCDF	none	none	none	none	none	none
1,2,3,4,6,7,8-HpCDF	none	none	none	none	J-DL	none
1,2,3,4,7,8,9-HpCDF	none	none	none	none	none	none
OCDF	none	none	none	none	J-DL	none
Total TCDD	none	none	none	none	none	none
Total PeCDD	none	none	none	none	none	none
Total HxCDD	none	none	none	none	none	none
Total HpCDD	none	none	none	none	38	none
Total TCDF	none	none	none	none	J-DL	none
Total PeCDF	none	none	none	none	none	none
Total HxCDF	none	none	none	none	J-DL	none
Total HpCDF	J-DL	none	none	none	J-DL	none

TABLE 2
Summary of Data Qualifiers for PCDD/PCDF Congeners
Winter 2006 Groundwater Monitoring Event
RP - Portland Site

Analyte	RP-11-161 607-01	RP-07-55 608-01	RP-07-84 609-01	RP-07-84 609-06	RP-07-119 610-01	RP-07-119 610-02
2,3,7,8-TCDD	none	none	none	none	none	none
1,2,3,7,8-PeCDD	none	none	none	none	none	none
1,2,3,4,7,8-HxCDD	none	none	none	none	none	none
1,2,3,6,7,8-HxCDD	none	none	none	none	none	none
1,2,3,7,8,9-HxCDD	none	none	none	none	none	none
1,2,3,4,6,7,8-HpCDD	none	none	none	none	none	none
OCDD	J-DL	none	none	none	none	none
2,3,7,8-TCDF	none	none	none	none	none	none
1,2,3,7,8-PeCDF	none	none	none	none	none	none
2,3,4,7,8-PeCDF	none	none	none	none	none	none
1,2,3,4,7,8-HxCDF	none	none	none	none	none	none
1,2,3,6,7,8-HxCDF	none	none	none	none	none	none
1,2,3,7,8,9-HxCDF	none	none	none	none	none	none
2,3,4,6,7,8-HxCDF	none	none	none	none	none	none
1,2,3,4,6,7,8-HpCDF	none	none	none	none	none	none
1,2,3,4,7,8,9-HpCDF	none	none	none	none	none	none
OCDF	none	none	none	none	none	none
Total TCDD	none	none	none	none	none	none
Total PeCDD	none	none	none	none	none	U-MB
Total HxCDD	none	none	none	none	none	none
Total HpCDD	none	none	none	none	none	none
Total TCDF	none	none	none	none	none	none
Total PeCDF	none	none	none	none	none	none
Total HxCDF	none	none	none	none	none	none
Total HpCDF	none	none	none	none	none	none

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TABLE 2
Summary of Data Qualifiers for PCDD/PCDF Congeners
Winter 2006 Groundwater Monitoring Event
RP - Portland Site

Analyte	RP-07-30 611-01	RP-01-31 612-01	RP-01-51 613-01	RP-01-65 614-01	RP-06-30 615-01	RP-06-87 616-01
2,3,7,8-TCDD	none	none	none	none	none	none
1,2,3,7,8-PeCDD	none	none	none	none	none	none
1,2,3,4,7,8-HxCDD	none	none	none	none	none	none
1,2,3,6,7,8-HxCDD	none	none	none	none	none	none
1,2,3,7,8,9-HxCDD	none	none	none	none	none	none
1,2,3,4,6,7,8-HpCDD	none	none	none	none	none	none
OCDD	U-MB	none	none	none	none	none
2,3,7,8-TCDF	none	none	none	none	none	none
1,2,3,7,8-PeCDF	none	none	none	none	none	none
2,3,4,7,8-PeCDF	none	none	none	none	none	none
1,2,3,4,7,8-HxCDF	none	none	none	none	none	none
1,2,3,6,7,8-HxCDF	none	none	none	none	none	none
1,2,3,7,8,9-HxCDF	none	none	none	none	none	none
2,3,4,6,7,8-HxCDF	none	none	none	none	none	none
1,2,3,4,6,7,8-HpCDF	none	none	none	none	none	none
1,2,3,4,7,8,9-HpCDF	none	none	none	none	none	none
OCDF	none	none	none	none	none	none
Total TCDD	none	none	none	none	none	none
Total PeCDD	none	none	none	none	none	none
Total HxCDD	none	none	none	none	none	none
Total HpCDD	none	none	none	none	none	none
Total TCDF	none	none	none	none	none	none
Total PeCDF	none	none	none	none	none	none
Total HxCDF	none	none	none	none	none	none
Total HpCDF	none	none	none	none	none	none

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TABLE 2
Summary of Data Qualifiers for PCDD/PCDF Congeners
Winter 2006 Groundwater Monitoring Event
RP - Portland Site

Analyte	W-03-30 619-01	W-03-I 620-01	W-03-D 621-01	W-04-S 622-01	W-04-I 623-01	W-04-89 624-01
2,3,7,8-TCDD	none	none	none	none	none	none
1,2,3,7,8-PeCDD	none	none	none	none	none	none
1,2,3,4,7,8-HxCDD	none	none	none	none	none	none
1,2,3,6,7,8-HxCDD	none	none	none	none	none	none
1,2,3,7,8,9-HxCDD	none	none	none	none	none	none
1,2,3,4,6,7,8-HpCDD	none	none	none	none	none	none
OCDD	none	none	none	J-DL	J-DL	none
2,3,7,8-TCDF	none	none	none	none	none	none
1,2,3,7,8-PeCDF	none	none	none	none	none	none
2,3,4,7,8-PeCDF	none	none	none	none	none	none
1,2,3,4,7,8-HxCDF	none	none	none	none	none	none
1,2,3,6,7,8-HxCDF	none	none	none	none	J-DL	none
1,2,3,7,8,9-HxCDF	none	none	none	none	none	none
2,3,4,6,7,8-HxCDF	none	none	none	none	none	none
1,2,3,4,6,7,8-HpCDF	none	none	none	none	none	none
1,2,3,4,7,8,9-HpCDF	none	none	none	none	none	none
OCDF	none	none	none	none	none	none
Total TCDD	none	none	none	none	none	none
Total PeCDD	none	none	none	none	none	none
Total HxCDD	none	none	none	none	none	none
Total HpCDD	none	none	none	none	none	none
Total TCDF	none	none	none	J-DL	none	none
Total PeCDF	none	none	none	none	none	none
Total HxCDF	none	none	none	none	none	none
Total HpCDF	none	none	none	none	none	none

TABLE 2
Summary of Data Qualifiers for PCDD/PCDF Congeners
Winter 2006 Groundwater Monitoring Event
RP - Portland Site

Analyte	W-11-S 625-01	W-11-I 626-01	W-11-D 627-01	W-11-B 628-01	W-12-S 629-01	W-12-I 630-01
2,3,7,8-TCDD	none	none	none	none	none	none
1,2,3,7,8-PeCDD	none	none	none	none	none	none
1,2,3,4,7,8-HxCDD	none	none	none	none	none	none
1,2,3,6,7,8-HxCDD	none	none	none	none	none	none
1,2,3,7,8,9-HxCDD	none	none	none	none	none	none
1,2,3,4,6,7,8-HpCDD	none	J-DL	none	none	U-MB	none
OCDD	none	none	J-DL	J-DL	none	U-MB
2,3,7,8-TCDF	none	none	none	none	none	none
1,2,3,7,8-PeCDF	none	none	none	none	none	none
2,3,4,7,8-PeCDF	none	none	none	none	none	none
1,2,3,4,7,8-HxCDF	none	none	none	none	none	none
1,2,3,6,7,8-HxCDF	none	none	none	none	none	none
1,2,3,7,8,9-HxCDF	none	none	none	none	none	none
2,3,4,6,7,8-HxCDF	none	none	none	none	none	none
1,2,3,4,6,7,8-HpCDF	none	none	none	none	none	none
1,2,3,4,7,8,9-HpCDF	none	none	none	none	none	none
OCDF	none	J-DL	none	none	none	none
Total TCDD	none	none	none	none	none	none
Total PeCDD	none	none	none	none	none	none
Total HxCDD	none	none	none	none	none	none
Total HpCDD	none	J-DL	none	none	U-MB	none
Total TCDF	none	none	none	none	none	none
Total PeCDF	none	none	none	none	none	none
Total HxCDF	none	none	none	none	none	none
Total HpCDF	none	J-DL	none	none	none	none

TABLE 2
Summary of Data Qualifiers for PCDD/PCDF Congeners
Winter 2006 Groundwater Monitoring Event
RP - Portland Site

Analyte	W-12-D 631-01	AL6-96 635-01	AL6-96 635-02	W-09-86 636-01	W-09-116 637-01	W-09 638-01
2,3,7,8-TCDD	none	none	none	none	none	none
1,2,3,7,8-PeCDD	none	none	none	none	none	none
1,2,3,4,7,8-HxCDD	none	none	none	none	none	none
1,2,3,6,7,8-HxCDD	none	none	none	none	none	none
1,2,3,7,8,9-HxCDD	none	none	none	none	none	none
1,2,3,4,6,7,8-HpCDD	U-MB	none	none	none	none	none
OCDD	U-MB	none	none	U-MB	none	U-MB
2,3,7,8-TCDF	none	NJ-SC/DL	none	none	none	none
1,2,3,7,8-PeCDF	none	none	none	none	none	none
2,3,4,7,8-PeCDF	none	none	none	none	none	none
1,2,3,4,7,8-HxCDF	none	none	none	none	none	none
1,2,3,6,7,8-HxCDF	none	none	none	none	none	none
1,2,3,7,8,9-HxCDF	none	none	none	none	none	none
2,3,4,6,7,8-HxCDF	none	none	none	none	none	none
1,2,3,4,6,7,8-HpCDF	none	none	none	none	none	none
1,2,3,4,7,8,9-HpCDF	none	none	none	none	none	none
OCDF	U-FB	none	none	none	none	none
Total TCDD	none	none	J-DL	none	none	none
Total PeCDD	none	none	none	none	none	none
Total HxCDD	none	none	none	none	none	none
Total HpCDD	U-MB	none	none	none	none	none
Total TCDF	none	none	none	none	none	none
Total PeCDF	none	none	none	none	none	none
Total HxCDF	none	none	none	none	none	none
Total HpCDF	U-FB	none	none	none	none	J-DL

PCDD/PCDF = polychlorinated dioxins/dibenzofurans

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TABLE 2
Summary of Data Qualifiers for PCDD/PCDF Congeners
Winter 2006 Groundwater Monitoring Event
RP - Portland Site

Data Qualifiers

U The U qualifier indicates that the analyte must be considered to be nondetected at the concentration listed. U qualifiers added during validation are typically a result of detections of target analytes in rinsate or laboratory blanks.

J The J qualifier indicates that the associated result is quantitatively uncertain. J qualifiers added during validation may indicate a data limitation related to a quality control element that exceeds required acceptance limits.

N The N qualifier indicates that an analyte has been presumptively identified. Presumptive detection means that a chromatographic peak was detected at the correct retention time for an analyte but that not all required identification criteria were met. The associated result is both qualitatively and quantitatively uncertain.

UJ The analyte was not detected at a concentration above the method reporting limit. However, the reporting limit is approximate and may be inaccurate or imprecise.

NJ The analysis indicates the presence of an analyte that has been tentatively identified and the associated numerical value represents its approximate concentration.

Qualification Rationale Abbreviations

AS An instrument recovery internal standard was outside the 25% to 400% acceptance limits.
DL Analyte concentration is between the MDL and MRL.
FB Analyte was detected in the rinsate blank at a concentration greater than 10% or 20% of the concentration detected in the sample.
MB Analyte was detected in a method blank at a concentration greater than 10% or 20% of the concentration detected in the sample.
SC 2,3,7,8-TCDF result did not undergo second column confirmation.

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Project Number 828.0.14 / 03

This document should be filed in this folder:

- ☐ Administrative
- ☑ Correspondence In
- ☐ Correspondence Out
- ☐ Working
- ☐ CADD
- ☐ Health & Safety

SCOEPA00013462

LETTER OF TRANSMITTAL

TO:

Maul Foster & Alongi 3121 SW Moody Avenue, Suite 200 Portland, Oregon 97239	Date: July 14, 2006
	Job No: 0-61M-107030/Phase 15
	Attn: James Peale
	RE: RP - Portland Site

WE ARE SENDING YOU: ☒ Attached ☐ Under Separate Cover via US Mail

Copies	Dated	Description
1	7/10/06	Quarterly Progress Report for RI/FS

THESE ARE TRANSMITTED as checked below:

☐ For Review ☐ For Approval ☒ For Your Use ☐ As Requested

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

K:\10000\10700\10703\Admin\Peale TRANSMITTAL Siltronic.doc

RECEIVED
JUL 17 2006
By

July 10, 2006

0-61M-107030/Phase 15

Thomas E. Roick
Project Manager, Cleanup & Portland Harbor
Department of Environmental Quality
2020 SW 4th Avenue, Suite 400
Portland, Oregon 97201-4987

Dear Mr. Roick:

Re: Quarterly Progress Report for RI/FS
Second Quarter, 2006 Progress Report
RP - Portland Site

On behalf of SLLI, AMEC Earth & Environmental, Inc. is submitting to the Oregon Department of Environmental Quality (DEQ) one hard copy of the Second Quarter, 2006 Progress Report associated with the Remedial Investigation/Feasibility Study (RI/FS) at the Rhône-Poulenc (RP) Portland Site (RP Site). This quarterly report includes activities conducted during the second quarter of calendar year 2006 (April 1 through June 30), and is prepared as specified by the Consent Order (No. WMCSR-NWR-99-07) executed between RP and DEQ in July 1999 (the Order).

CURRENT REPORTING ACTIVITIES

North Doane Lake

The Draft North Doane Lake (NDL) Level III/IV Ecological Risk Assessment Analysis Plan for Piscivorous Birds and Mammals was submitted to DEQ on April 5, 2006. A Letter Addendum to the Quality Assurance Project Plan, Addendum No. 3 for fish tissue sampling, was submitted to DEQ on May 8, 2006. Fish tissue sampling was performed June 6th through the 14th.

Outfall 22B

A response to DEQ Letter Dated March 6, 2006 City Outfall 22B Technical Memoranda was submitted to DEQ on June 8, 2006.

Implementation of the Outfall 22B IRAM has been delayed as a result of ongoing negotiations with the City of Portland to obtain access to the outfall pipe to conduct IRAM activities. SLLI is currently awaiting approval of the access agreement by the City of Portland.

Winter 2006 Groundwater Monitoring Event

Winter 2006 groundwater monitoring was performed March 20 through April 4, 2006. Results of the sampling event will be submitted to DEQ in a future technical memorandum.

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Summer 2006 Groundwater Monitoring Event

The Draft Summer 2006 Groundwater Monitoring Event Work Plan was submitted to DEQ on June 27, 2006.

Lake Area Hydrologic Investigation

The Draft Lake Area Hydrologic Investigation Work Plan (LAHI WP) was submitted to DEQ on May 16, 2006. The Draft LAHI Field Sampling Plan was presented as an appendix to the LAHI WP. DEQ approved the LAHI WP on June 19, 2006.

Lake Area Bioremediation Pilot Study and Colloid Evaluation

A Response to DEQ's March 16, 2006 Letter Titled Lake Area Bioremediation Pilot Study was submitted to DEQ on May 19, 2006. DEQ approved the work plan and response letter on May 31, 2006. Drilling activities were completed during the month of June.

Lake Area Expanded Geophysical Survey Work Plan

A Draft Expanded Lake Area Geophysical Survey Work Plan (ELAGS WP) was submitted to DEQ on March 27, 2006. DEQ approved the ELAGS WP on April 19, 2006. The geophysical survey field activities were conducted during the third week in June.

Historical Drainage Ditch/Lake Area Drainage Ditch

A response to DEQ's April 6, 2006 Letter Regarding HDD/LADD Response to DEQ Comments was submitted to DEQ on June 8, 2006.

Source Control Evaluation

The Stage 1 Source Control Evaluation (SCE) Technical Memorandum was submitted to DEQ on May 19, 2006. This memorandum presented the laboratory sample results of the completed portions of the Stage 1 SCE. SCE activities scheduled to be conducted on the Siltronic property will require negotiation of new access agreements covering the proposed work. At this time SLLI anticipates timely negotiation of an amendment to the Siltronic access agreement that will allow implementation of the RP Source Control Program (SCP) on Siltronic property as described during the June 8th DEQ meeting.

SIGNIFICANT PROBLEMS ENCOUNTERED

Access

Arkema continues to deny SLLI access to their property, preventing completion of the Stage I SCE work and other RP SCP activities. SLLI met with Arkema on April 13th to request, again, access to their property and the proposed West Front Avenue Interim Source Control Measure at the 30% design level. Arkema stated that they remain unwilling to grant access. During the June 8th meeting with DEQ, SLLI again requested assistance to gain access to Arkema's property for the purpose of completing any SCP activities. As proposed by DEQ, SLLI will

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attempt again to meet with Arkema to, request access to their property to complete the Stage 1 SCE activities. SLLI is preparing additional submittals that will accompany the meeting request, which will be made during the 3rd quarter of 2006. As of the date of this report, the lack of access to Arkema's property has delayed completion of the monitoring well installations on the beach by 11 months (until July 2007). The continuing refusal of access also will delay or make impossible the successful implementation of the SCP investigation.

Property boundary survey activities are currently being delayed by the lack of a response from the Burlington Northern Santa Fe Railway Company (BNSF) roadmaster, who has been slow to respond to phone calls to coordinate necessary work activities to be conducted within 25 feet of the centerline of the track. Property boundary survey activities are needed to support both SCP activities and the West Doane Lake (WDL) Interim Remedial Action Measure (IRAM).

Permitting

Although SLLI and the City of Portland have reached agreement on the permitting requirements for installation of three monitoring well clusters on the Willamette River beach, access to the beach to conduct the work is being prevented by denial of access to Arkema's property. Additionally, there is a 30-day notification requirement contained in the permits issued by the Division of State Lands and U.S. Army Corps of Engineers. As mentioned above, SCE work on the beach, therefore, has been delayed until July 2007.

Pending DEQ Responses

SLLI currently is awaiting responses from DEQ on the following documents submitted to DEQ more than 45 days ago:

- Final Deterministic Human Health Risk Assessment (submitted March 16, 2006) - A response is required prior to proceeding with a Hot Spot Assessment.
- Draft NDL Baseline Human Health Risk Assessment Work Plan (submitted March 30, 2006) - A response is required prior to proceeding with risk assessment activities.
- Draft NDL Level III/IV Ecological Risk Assessment Analysis Plan for Piscivorous Birds and Mammals (submitted April 5, 2006) & Letter Addendum to the Quality Assurance Project Plan, Addendum No. 3 for fish tissue sampling (submitted May 8, 2006) - A response is required prior to proceeding with risk assessment activities.

ACTIVITIES PLANNED FOR THE NEXT REPORTING PERIOD

The activities currently planned for the next quarterly reporting period (Third Quarter 2006) include the following (not in chronological order):

- Continue to work toward obtaining property access for the remaining Stage 1 SCE investigation tasks;
- Continue work toward obtaining appropriate permits to complete the WDL IRAM;
- Submit the WDL Engineering Evaluation/Cost Analysis (EE/CA) and Treatability Study;

SCOEPA00013466

- Conduct the Summer 2006 Groundwater Monitoring Event;
- Conduct fish tissue analysis from the June 2006 sampling at NDL;
- Implement the field programs for the LAHI and Bioremediation Pilot Study;
- Implement Outfall 22B IRAM Work Plan, pending receipt of City of Portland agreements;
- Submit a Final HDD/LADD Investigation Report;
- Submit the Stage II SCE Work Plan; and
- Submit the Dioxin Transport Evaluation Work Plan and implement the field program.

If you have any questions, please call Roger Gresh at (503) 639-3400.

Sincerely,

AMEC Earth & Environmental, Inc.

Teresa A.R. Wilson, R.G.
Senior Geologist

Roger Gresh, P.G.
Project Manager

TJ/lp
c: S. Dearden, sanofi aventis US, Inc.
R. Ferguson, SLLI
J. Benedict, CHBH&L
D. Blount, Landye Bennett Blumstein LLP
C. Collins, ESCO Corp.
M. Morford, Stoel Rives, LLP
J. Peale, Maul Foster & Alongi
B. Sheppard, BNSF
T. McCue, Siltronic Corporation
L. Patterson, Arkema, Inc
I. Dubrow Davidson, Schnitzer Investment Corp.
J. Baird, Air Liquide America Corp.

SCOEPA00013467

8128.01.14/03

LETTER OF TRANSMITTAL

TO:

Maul Foster & Alongi, Inc. 3121 SW Moody Avenue, Suite 200 Portland, Oregon 97239	Date:	June 13, 2006
	Job No:	0-61M-107030/Phase 43
	Attn:	James Peale
	RE:	RP - Portland Site

WE ARE SENDING YOU: ☒ Attached ☐ Under Separate Cover via Courier

Copies	Dated	Description
1	6/13/06	Draft Summer 2006 Groundwater Monitoring Event Work Plan

THESE ARE TRANSMITTED as checked below:

☒ For Review ☐ For Approval ☐ For Your Use ☐ As Requested

On behalf of SLLI, AMEC Earth & Environmental, Inc. (AMEC) is submitting to the Siltronic Corporation (Siltronic) the enclosed Draft Summer 2006 Groundwater Monitoring Event Work Plan (Work Plan) for groundwater monitoring activities to be conducted at the Siltronic property. This Work Plan is being provided to Siltronic 10 days prior to submittal to the Oregon Department of Environmental Quality (DEQ) as agreed by SLLI and Siltronic in the First Amendment to Access Agreement dated September 30, 2005. The work plan is scheduled to be submitted to DEQ on June 23, 2006.

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June 13, 2006

0-61M-107030/Phase 43

Mr. Tom Roick
Project Manager, Cleanup & Portland Harbor
Oregon Department of Environmental Quality
2020 S.W. 4th Avenue
Portland, Oregon 97201

Dear Mr. Roick:

Re: Draft Summer 2006 Groundwater Monitoring Event Work Plan
RP - Portland Site

On behalf of SLLI, AMEC Earth & Environmental, Inc. (AMEC) is submitting to the Oregon Department of Environmental Quality (DEQ) this Draft Summer 2006 Groundwater Monitoring Event Work Plan (Work Plan). Additional data collection is necessary to provide baseline data prior to designing Interim Source Control Measures (ISCMs) for installation in the vicinity of the Rhône-Poulenc (RP) site (Site), if deemed appropriate. This Work Plan summarizes the objectives, scope of work, and tentative schedule for activities.

Note that SLLI has completed its obligation for groundwater sampling under the Final Post-Characterization Groundwater Monitoring Plan (PCGMP), dated February 17, 2004 (AMEC, 2004). The PCGMP provided for two years of annual post-characterization monitoring, after which the need for continued monitoring was to be evaluated. For 2006, SLLI has proposed groundwater sampling events to meet specific data quality objectives (DQOs) for ongoing source control evaluation and remedial design. The scope of the Summer 2006 groundwater monitoring event is broader than the scope of previous post-characterization events, and includes more comprehensive laboratory analyses at most sampling locations to meet current DQOs.

Objectives

The DQOs for the Summer 2006 groundwater monitoring event are to:

1. Collect additional groundwater analytical data from wells located on the Siltronic Corporation (Siltronic) property to evaluate better the constituent distribution and groundwater transport pathways;

2. Further characterize groundwater at the Gould Electronics (Gould), Metro, and Schnitzer Investment Corporation (Schnitzer) properties to differentiate sources to groundwater;

3. Improve understanding of dioxin distribution and sources, as well as transport behavior and mechanisms, across the RP Site;

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4. Characterize groundwater that may be entering the City of Portland (COP) storm drain system (Outfall 22B);

5. Characterize groundwater north of North Doane Lake (NDL) on Siltronic Property;

6. Continue groundwater monitoring and evaluation of constituent distribution within the Lake Area (LA), which will provide data in support of the bioremediation pilot study and potential future bioremediation;

7. Collect analytical and hydrogeological data to be used in planning for potential ISCMs; and

8. Collect data from 16 wells at the Arkema property, if access is permitted, to fulfill objectives from the Stage 1 Source Control Evaluation (AMEC, 2005a).

Work Scope

The Summer 2006 groundwater monitoring event includes collection of groundwater samples from 82 monitoring wells (Figure 1, attached) located on the RP, Siltronic, Schnitzer, Arkema, ESCO Corporation (ESCO), Gould, Burlington Northern Santa Fe Railroad (BNSF), and Metro properties. Monitoring wells to be sampled during this event have been selected based on their location and amount of historical monitoring data (e.g., new wells at Siltronic). Monitoring well samples will be analyzed for the suite of constituents and natural attenuation parameters listed on the attached Table 1. Water levels will be collected from the 82 monitoring wells prior to groundwater sampling activities.

Sampling at the Siltronic, Schnitzer, ESCO, Gould, BNSF, and Metro properties will depend on access from property owners. Sampling of 16 of the 82 monitoring wells is subject to obtaining access from Arkema. If access is not granted from the property owners, the respective wells will not be sampled during this event.

Dedicated pumps have already been installed in some of the wells scheduled for sampling. The pumps are installed with dedicated tubing and air-lines, which help minimize sampling and decontamination time, and dramatically lower the potential for cross-contamination. If access is granted, dedicated dual-valve pumps will be installed in the Arkema Lots 1 and 2 monitoring wells where pumps have not yet been installed.

Field activities will be conducted in accordance with applicable standard operating procedures (SOPs) and applicable portions of the field sampling plan (FSP) already established for the RP Site in Appendix A of the Post-Characterization Groundwater Monitoring Plan (PCGMP) dated February 17, 2004 (AMEC, 2004). Revisions of the Methodology for Groundwater Sampling (SOP - 2) and the Groundwater Sampling Field Form have been attached to this Work Plan. Additionally, this Work Plan will be implemented according to procedures outlined in the Revised Quality Assurance Project Plan (QAPP) dated June 13, 2001 (AMEC, 2001), the Draft QAPP Addendum No. 1 (AMEC, 2002), the Site-Specific Health and Safety Plan (HASP) dated June 24, 2005 (AMEC, 2005b), and subsequent addenda and updates, as appropriate.

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Schedule and Reporting

Groundwater sampling is currently scheduled to begin in July 2006, pending DEQ's expedited approval of this Work Plan and access from property owners. Final laboratory results will be available approximately 10 weeks following submittal of samples to the laboratory. Validated analytical results and field sampling data will be reported to DEQ in a brief technical memorandum that will include the locations sampled and validated analytical results.

If you have any questions or comments regarding this Work Plan, please contact Roger Gresh at (503) 639-3400.

AMEC Earth & Environmental, Inc.

DRAFT FOR SILTRONIC REVIEW

Roger T. Gresh, P.G.
Project Manager

Cindy D. Bartlett, R.G.
Phase Leader

Attachments: Table 1 Groundwater Analyses
Figure 1 Proposed Summer 2006 Groundwater Monitoring Locations
Methodology for Groundwater Sampling (SOP - 2)
Groundwater Sampling Field Form

CDB/lp

c: S. Dearden, sanofi aventis US, Inc.
R. Ferguson, SLLI
J. Benedict, CHBH&L

REFERENCES

AMEC, 2001. *Revised Quality Assurance Project Plan, RPAC - Portland Site*, prepared for Aventis CropScience, prepared by AMEC Earth & Environmental, submitted to Oregon Department of Environmental Quality, June 13, 2001.

AMEC, 2002. *Draft Quality Assurance Project Plan Addendum No. 1, RPAC - Portland Site*, prepared for RPAC, prepared by AMEC Earth & Environmental, Inc. submitted to Oregon Department of Environmental Quality, August 1, 2002.

AMEC, 2004. *Final Post-Characterization Groundwater Monitoring Plan, RP - Portland Site,* prepared by AMEC Earth & Environmental, Inc. submitted to Oregon Department of Environmental Quality, February 17, 2004.

AMEC, 2005a. *Draft Stage 1 Source Control Evaluation Work Plan*, prepared by AMEC Earth & Environmental, Inc., submitted to Oregon Department of Environmental Quality, July 1, 2005.

AMEC, 2005b. *Site-Specific Health and Safety Plan*, prepared by AMEC Earth & Environmental, Inc., submitted to Oregon Department of Environmental Quality, June 24, 2005.

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LIMITATIONS

This work plan was prepared exclusively for SLLI 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 Draft Summer 2006 Groundwater Monitoring Event Work Plan is intended to be used by SLLI for the RP Portland Site, 6200 N.W. St. Helens Road, Portland, Oregon 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.

SCOEPA00013473

ATTACHMENTS

SCOEPA00013474

DRAFT

TABLE 1
Groundwater Analyses
Summer 2006 Groundwater Monitoring Event
RP - Portland Site

Monitoring Well ID	Study Area	Analyses								
		VOCs by EPA Method 8260B	SVOCs by EPA Method 8270C	Herbicides by EPA Method 8151A	Pesticides by EPA Method 8081A	Dioxins/ Furans by EPA Method 1613	TPH Diesel Range by NWTPH-Dx	Metals by EPA Methods 6010A/6020/7470A (A)	Natural Attenuation Parameters (B)	Compound Specific Isotope Analysis (GC/C/IRMS) (C)
RP-02-31	ARKEMA	X	X	X	X	X	X	X	X	X
RP-02-49	ARKEMA	X	X	X	X	X	X	X	X	X
RP-02-66	ARKEMA	X	X	X	X	X	X	X	X	X
RP-08-23	ARKEMA	X	X	X	X	X	X	X	X	X
RP-08-80	ARKEMA	X	X	X	X	X	X	X	X	X
RP-08-107	ARKEMA	X	X	X	X	X	X	X	X	X
RP-09-30	ARKEMA	X	X	X	X	X	X	X	X	X
RP-09-47	ARKEMA	X	X	X	X	X	X	X	X	X
RP-09-64	ARKEMA	X	X	X	X	X	X	X	X	X
RP-10-30	ARKEMA	X	X	X	X	X	X	X	X	X
RP-10-60	ARKEMA	X	X	X	X	X	X	X	X	X
RP-10-97	ARKEMA	X	X	X	X	X	X	X	X	X
RP-10-130	ARKEMA	X	X	X	X	X	X	X	X	X
W-19-S	ARKEMA	X	X	X	X	X	X	X	X	X
W-19-I	ARKEMA	X	X	X	X	X	X	X	X	X
W-19-D	ARKEMA	X	X	X	X	X	X	X	X	X
RP-01-31	BNSF	X	X	X	X	X	X	X	X	X
RP-01-51	BNSF	X	X	X	X	X	X	X	X	X
RP-01-65	BNSF	X	X	X	X	X	X	X	X	X
RP-03-30R	BNSF	X	X	X	X	X	X	X	X	X
RP-03-52R	BNSF	X	X	X	X	X	X	X	X	X
RP-06-30	BNSF	X	X	X	X	X	X	X	X	X
RP-06-87	BNSF	X	X	X	X	X	X	X	X	X
W-11-S	ESCO	X	X	X	X	X	X	X	X	X
W-11-I	ESCO	X	X	X	X	X	X	X	X	X
W-11-D	ESCO	X	X	X	X	X	X	X	X	X
W-11-B	ESCO	X	X	X	X	X	X	X	X	X
W-12-S	ESCO	X	X	X	X	X	X	X	X	X
W-12-I	ESCO	X	X	X	X	X	X	X	X	X
W-12-D	ESCO	X	X	X	X	X	X	X	X	X
W-03-S	Gould	X	X	X	X	X	X	X	X	X
W-03-I	Gould	X	X	X	X	X	X	X	X	X
W-03-D	Gould	X	X	X	X	X	X	X	X	X
W-04-S	Gould	X	X	X	X	X	X	X	X	X
W-04-I	Gould	X	X	X	X	X	X	X	X	X
W-04-89	Gould	X	X	X	X	X	X	X	X	X
AL2-17	Lake Area	X	X	X	X	X	X	X	X	X
AL2-32	Lake Area	X	X	X	X	X	X	X	X	X
AL2-46	Lake Area	X	X	X	X	X	X	X	X	X
BST2W-61	Lake Area	X	X	X	X	X	X	X	X	X

SCOEPA00013475

TABLE 1
Groundwater Analyses
Summer 2006 Groundwater Monitoring Event
RP - Portland Site

Monitoring Well ID	Study Area	Analyses								
		VOCs by EPA Method 8260B	SVOCs by EPA Method 8270C	Herbicides by EPA Method 8151A	Pesticides by EPA Method 8081A	Dioxins/ Furans by EPA Method 1613	TPH Diesel Range by NWTPH-Dx	Metals by EPA Methods 6010A/6020/7470A (A)	Natural Attenuation Parameters (B)	Compound Specific Isotope Analysis (GC/C/IRMS) (C)
AL5-19	Lake Area	X	X	X	X	X	X	X	X	X
AL5-35	Lake Area	X	X	X	X	X	X	X	X	X
AL5-62	Lake Area	X	X	X	X	X	X	X	X	X
BST5W-74	Lake Area	X	X	X	X	X	X	X	X	X
AL6-96	Lake Area	X	X	X	X	X	X	X	X	X
BTB-4A-84*	Lake Area	X	X	X	X	X	X	X	X	X
BTB-4B-25*	Lake Area	X	X	X	X	X	X	X	X	X
BTB-4B-55*	Lake Area	X	X	X	X	X	X	X	X	X
W-08	Lake Area	X	X	X	X	X	X	X	X	X
W-08-26	Lake Area	X	X	X	X	X	X	X	X	X
W-08-74	Lake Area	X	X	X	X	X	X	X	X	X
W-09	Lake Area	X	X	X	X	X	X	X	X	X
W-09-86	Lake Area	X	X	X	X	X	X	X	X	X
W-09-116	Lake Area	X	X	X	X	X	X	X	X	X
ASW-04	METRO	X	X	X	X	X	X	X	X	X
ASW-05	METRO	X	X	X	X	X	X	X	X	X
ASW-06	METRO	X	X	X	X	X	X	X	X	X
W-15-S	METRO	X	X	X	X	X	X	X	X	X
W-15-I	METRO	X	X	X	X	X	X	X	X	X
W-15-D	METRO	X	X	X	X	X	X	X	X	X
MW-11-24	RP	X	X	X	X	X	X	X	X	X
MW-11-37	RP	X	X	X	X	X	X	X	X	X
MW-11-56	RP	X	X	X	X	X	X	X	X	X
MW-11-79	RP	X	X	X	X	X	X	X	X	X
W-16-31	Schnitzer	X	X	X	X	X	X	X	X	X
W-16-S	Schnitzer	X	X	X	X	X	X	X	X	X
W-16-I	Schnitzer	X	X	X	X	X	X	X	X	X
W-16-D	Schnitzer	X	X	X	X	X	X	X	X	X
MW-03-S	Siltronic	X	X	X	X	X	X	X	X	X
MW-03-I	Siltronic	X	X	X	X	X	X	X	X	X
MW-03-81	Siltronic	X	X	X	X	X	X	X	X	X
RP-07-30	Siltronic	X	X	X	X	X	X	X	X	X
RP-07-55	Siltronic	X	X	X	X	X	X	X	X	X
RP-07-84	Siltronic	X	X	X	X	X	X	X	X	X
RP-07-119	Siltronic	X	X	X	X	X	X	X	X	X
RP-11-30	Siltronic	X	X	X	X	X	X	X	X	X
RP-11-160	Siltronic	X	X	X	X	X	X	X	X	X
RP-11-216	Siltronic	X	X	X	X	X	X	X	X	X

SCOEPA00013476

TABLE 1
Groundwater Analyses
Summer 2006 Groundwater Monitoring Event
RP - Portland Site

Monitoring Well ID	Study Area	Analyses								
		VOCs by EPA Method 8260B	SVOCs by EPA Method 8270C	Herbicides by EPA Method 8151A	Pesticides by EPA Method 8081A	Dioxins/ Furans by EPA Method 1613	TPH Diesel Range by NWTPH-Dx	Metals by EPA Methods 6010A/6020/7470A (A)	Natural Attenuation Parameters (B)	Compound Specific Isotope Analysis (GC/C/IRMS) (C)
WS-11-125	Siltronic	X	X	X	X	X	X	X	X	X
WS-11-161	Siltronic	X	X	X	X	X	X	X	X	X
WS-12-125	Siltronic	X	X	X	X	X	X	X	X	X
WS-12-161	Siltronic	X	X	X	X	X	X	X	X	X

Notes:

(A) Total and dissolved metals analysis for groundwater samples. Metals include: aluminum, calcium, iron, magnesium, potassium, sodium, arsenic, cadmium, chromium, copper, lead, manganese, nickel, vanadium, zinc, and mercury.

(B) Natural attenuation parameters include: microbial enumerations, total organic carbon, chemical oxygen demand, biological oxygen demand, sulfate, sulfide, total alkalinity, chloride, ammonia, TKN, nitrate/nitrite, orthophosphate, ethene, ethane, methane, total suspended solids, and total disolved solids

(C) Samples for stable isotope analysis will be collected at all wells, but samples to be run for stable isotopes will be determined at a later date.

* = Small diameter monitoring well

EPA = United States Environmental Protection Agency

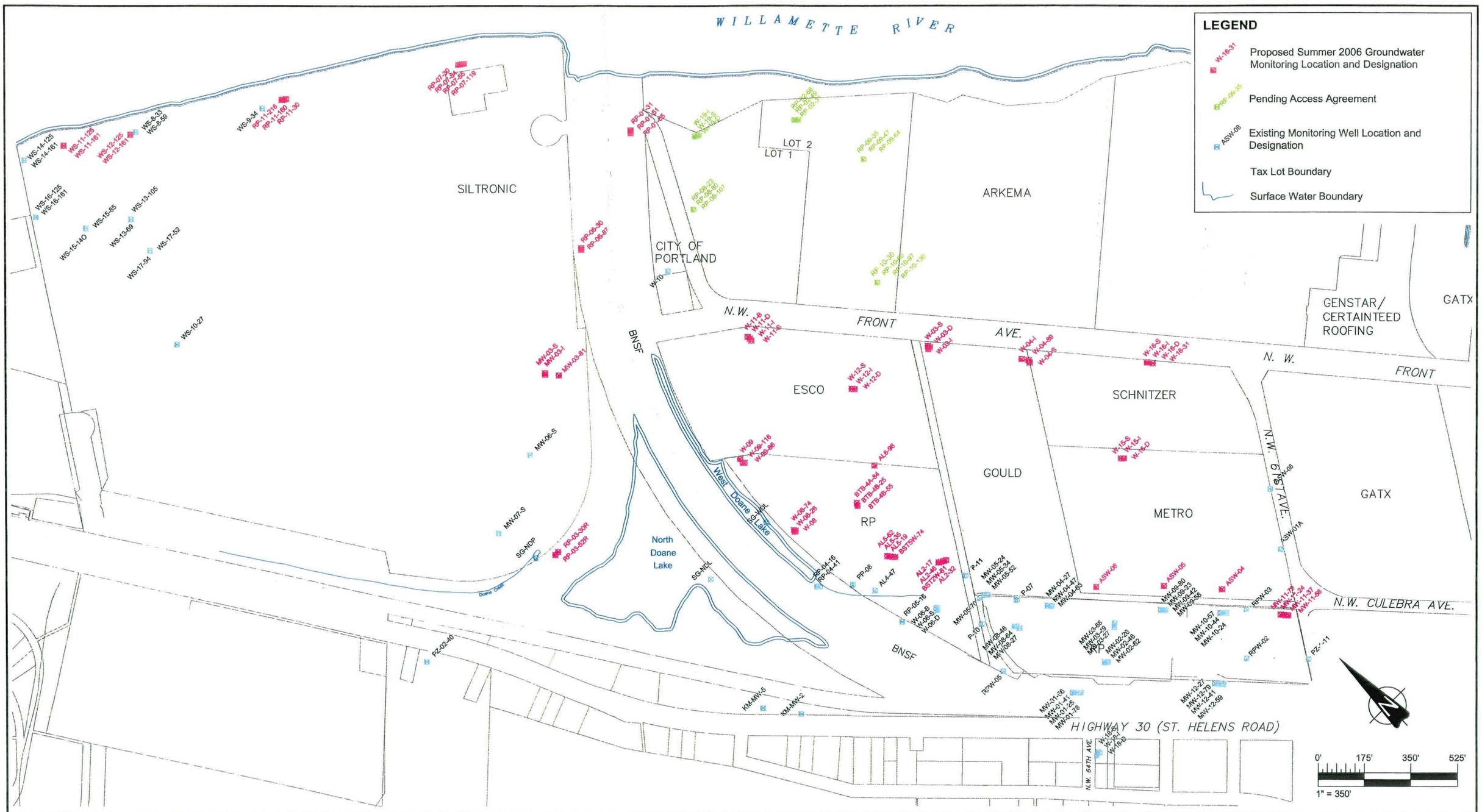
NWTPH = Northwest Total Petroleum Hydrocarbons

TPH = Total Petroleum Hydrocarbons

GC/C/IRMS = Gas Chromatography/Combustion Interface/Isotope Ratio Mass Spectrometer

VOCs = Volatile Organic Compounds

SVOCs = Semi-Volatile Organic Compounds



NOTE: THIS DRAWING SHOULD BE READ IN CONJUNCTION WITH THE AMEC EARTH & ENVIRONMENTAL, INC. DRAFT SUMMER 2006 GROUNDWATER MONITORING WORK PLAN DATED JUNE 13, 2006.

CLIENT: SLLI

AMEC Earth & Environmental
7376 S.W. Durham Road
Portland, OR. U.S.A. 97224

DWN BY:	DD
CHK'D BY:	CB
DATUM:	-
PROJECTION:	-
SCALE:	1" = 350'

PROJECT: RP - PORTLAND SITE

TITLE: PROPOSED SUMMER 2006 GROUNDWATER MONITORING LOCATIONS

DATE:	JUNE 2006
PROJECT NO:	0-61M-10703-0 P-43
REV. NO.:	2
FIGURE No.	1

K:\10000\10700\10703\Phase 43 Groundwater Monitoring\2006 Summer Event\Figure 1 Proposed Summer 2006 GW Monitoring Locations 0506.dwg – Layout1 – Jun. 13, 2006 2:03pm – doug.davis

SCOEPA00013478

RP - PORTLAND SITE
SOP - 2
METHODOLOGY FOR GROUNDWATER SAMPLING

1.0 PURPOSE

Groundwater samples are collected from monitoring wells for analysis of physical and chemical parameters, either using field observations and portable equipment or using off-Site laboratory analytical methods. Monitoring wells are purged or micro-purged prior to sample collection to ensure that water sampled is representative of the formation. The procedures in this standard operating procedure (SOP) are specific to standard monitoring wells with a single slotted interval. This method can be used when using bailers, dedicated pumps, or portable pumps.

2.0 EQUIPMENT LIST

1) Well lock keys
2) Groundwater Sampling Field Form, other appropriate Site-specific form(s), and field logbook with indelible pens
3) Electronic water level probe or interface probe (DNAPL)
4) Check-valve Teflon® bailer with new cord to measure DNAPL if present
5) Knife or scissors
6) Decontamination equipment (see RP SOP - 3 Decontamination Procedure, and sampling plan for additional Site-specific requirements)
7) Site map and Site health and safety plan (HASP), if applicable
8) PPE appropriate for Site (see HASP if applicable)
9) Submersible pump or bailer (for monitoring wells without dedicated pumps), and associated pump equipment (controller, connectors, power cord, etc.)
10) Compressed nitrogen gas source (if dual-valve pump is used)
11) Disposable discharge tubing, if necessary
12) Field water quality monitoring equipment (see RP SOP - 4 Field Measurement of Groundwater Parameters) and flow-through cell
13) Buckets or other containers for purged water
14) Sample containers, labels, packaging material

3.0 PROCEDURE

Groundwater samples can be collected using low-flow purging and sampling or standard purging and sampling methods. Low-flow purging and sampling is the preferred sampling method, however both are presented here. Standard purging and

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sampling methods may be used at wells that are not amenable to low-flow purging, such as wells with short water columns and slow recharge.

Low-Flow Purging and Sampling

This SOP emphasizes the need to minimize stress by inducing low water level drawdowns and low pumping rates in order to collect samples with minimal alterations to water chemistry. While purging and sampling, accurate measurement of physical groundwater quality parameters in the field requires a closed system in which groundwater does not come in contact with air. Dissolved oxygen (DO), oxidation-reduction potential (ORP), and pH measurements in groundwater are sensitive to reactions with the atmosphere. The flow-through cell (flow cell) is used to measure field parameters when collecting groundwater water samples from a submersible or peristaltic pump. Stabilization of indicator field parameters is used to indicate that conditions are suitable for sampling to begin. A drawdown of less than 0.3 foot is desirable.

The following sequential steps are to be completed during groundwater sampling from monitoring wells:

1) Check well for security damage or evidence of tampering and record pertinent observations. Note any maintenance tasks that should be completed, such as well cap or padlock replacement.
2) Lay out a sheet of clean plastic sheeting (visqueen) around the well monument for monitoring and sampling equipment.
3) After removing the well cap, immediately measure the air space in the well bore for the presence of volatile organic compound (VOC) vapors using a photoionization detector.
4) Measure the depth to water using an electronic water level indicator. All measurements should be referenced to a marked point on the well casing. Check the information sheet for the job to see which pump is suggested for the well (peristaltic or dual-valve pump).
5) For wells without dedicated pumps, to minimize disturbance in the water column, slowly lower the pump (or intake of the disposable tubing if using a peristaltic pump) into the well to the midpoint of the zone to be sampled using a safety cable attached to the top of the pump. Keep the pump at least 2 feet from the bottom of the well to minimize the mobilization of silt that may be present in the sump at the bottom of the well.
6) Start the pump at a low setting to minimize agitation of the water column. Measure the discharge rate. Monitor the depth to water and select a pumping rate that will allow the depth to water to stabilize with 0.3 feet or less of drawdown and at a pumping rate of 0.5 liters per minute (L/min) or less.

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7) During well purging, monitor the field parameters every three to five minutes. Purging is considered complete and sampling may begin when the field parameters have stabilized for three consecutive readings (taken at three to five minute intervals). These readings should be within the following limits:

Temperature:	3%
Conductance:	3%
pH:	+/- 0.1 pH units
DO	10% (or measurement <1 milligram per liter (mg/L)
ORP	+/- 10 millivolts

8) If after 30 minutes of purging indicator parameters have not stabilized, purging will be discontinued, and sample collection will proceed.

9) **NOTE:** If depth to water measurements do not stabilize and drawdown continues, even at a very slow pumping rate, make note of this on the Groundwater Sampling Field Form and stop low-flow purging when you have exceeded a drawdown of two feet. Discontinue low flow sampling and switch to the standard purging method, taking out three well volumes prior to sampling. If the water level falls to the level of the top of the dual-valve pump, change to a peristaltic pump. If the well is purged dry, wait for it to recharge and then take a sample.

10) The water sample must be collected before the water passes through the flow cell. Disconnect the influent tubing from the flow cell and directly fill the sample containers. Turbidity of the sample water will be measured using field instruments prior to sample collection and upon obvious visual changes in turbidity during sample collection. Groundwater samples for dissolved metals analysis will be field-filtered with a 0.45-micron filter by placing the filter directly on the end of the discharge hose from the submersible or peristaltic pump. Alternatively, water will initially be collected in a poly bottle and then filtered using a peristaltic pump into the bottles that contain preservative. If multiple analytical tests are to be performed, collect samples in order of decreasing sensitivity to handling-introduced bias (i.e., VOCs, semivolatiles, and metals). Water should be directed down the inside walls of the bottles to minimize aeration.

11) All the sample bottles will be properly labeled, protected from breakage, placed in storage bags, and placed in a cooler on ice and packed for transport to the laboratory. Samples will be shipped to the laboratory within 48 hours of collection.

12) Discard the dedicated tubing as Investigation-Derived Waste (IDW) after sampling.

13) Before securing the well, measure and record the water level.

14) Decontamination of sampling equipment is addressed in SOP - 3 Decontamination Procedure.

15) All field observations made, and data generated in conjunction with the sample collection, will be entered on a well-specific Groundwater Sampling Field Form, dated, and signed by the field personnel.

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16) Complete the chain-of-custody documentation after samples are collected, and before moving to the next well.

Standard Purge and Sampling Methods

The composition of water within the well casing and in close proximity to the well may not be entirely representative of the overall groundwater quality at the site. This is due to differing permeabilities, temperatures, and pressures between the area adjacent to the well (filter pack) and the surrounding aquifer. For these reasons, it is necessary that a well be evacuated of standing water before sampling. Purging the well clears the stagnant water from the well and allows the well to be recharged with true formation water. The following are the procedures followed for purging a well using standard (not low-flow) methods:

1) Note general conditions of the well. Check for security damage and evidence of tampering, and record pertinent observations. Note any maintenance tasks that should be completed, such as well cap or padlock replacement.
2) Lay out a sheet of clean plastic sheeting (visqueen) around the well monument for monitoring and sampling equipment.
3) After removing the well cap, immediately measure the air space in the well bore for the presence of VOC vapors using a photoionization detector.
4) Measure the depth to water and well total depth using an electronic water level indicator. All measurements should be referenced to a marked point on the well casing.
5) Using information on the total depth (TD) of the well, the diameter of the well casing, and the depth to water (DTW), the amount of water in one casing volume is calculated. The information below is used to determine the well volume fraction (WVF) in gallons per linear foot for the appropriate casing diameter.

2-inch casing:	0.163 gal/foot
4-inch casing:	0.653 gal/foot
6-inch casing:	1.5 gal/foot

The minimum purge volume = (TD-DTW) x WVF x 3 (no. of casing volumes).

6) An amount of water equivalent to three casing volumes is purged from the well with a clean bailer or a pump. The amount purged depends on the recharge rate in the well. If a well is bailed dry before the required purge volume has been removed, the well is allowed to recover and then bailed dry again. It can be assumed that water returning to the well after the second bailing is true formation water, and no further purging is necessary.
7) Monitor physical parameters (temperature, pH, and specific conductance) during purging (after removal of each sequential casing volume) with a pump, or once following purging for bailed wells.

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8) Turbidity of the sample water will be measured using field instruments prior to sample collection and upon obvious visual changes in turbidity during sample collection. Groundwater samples for dissolved metals analysis will be field-filtered with a 0.45-micron filter. Water will initially be collected in a poly bottle, and then it will be filtered using a peristaltic pump into the bottles that contain preservative. Alternatively, the filter may be placed directly on the end of the discharge hose from the submersible pump, if used. If the well is purged dry, a sample will be collected as soon as adequate water has returned to the well to make sampling feasible. If multiple analytical tests are to be performed, collect samples in order of decreasing sensitivity to handling-introduced bias (i.e., VOCs, semivolatiles, and metals). A low-turbulence discharge device will be used to elute VOC samples from bailer into sample container. Water should be directed down the inside walls of the bottles to minimize aeration.

9) All the sample bottles will be properly labeled, protected from breakage, placed in storage bags, and placed in a cooler on ice and packed for transport to the laboratory. Samples will be shipped to the laboratory within 48 hours of collection.

10) Discard the dedicated tubing as IDW after sampling.

11) Before securing the well, measure and record the water level.

12) Decontamination of sampling equipment is addressed in SOP - 3 Decontamination Procedure.

13) All field observations made and data generated in conjunction with the sample collection will be entered on a well-specific Groundwater Sampling Field Form, dated, and signed by the field personnel.

14) Complete the chain-of-custody documentation after samples are collected, and before moving to the next well.

Well purge water will be stored in an appropriately labeled poly tank and transported from the generation point to the RP wastewater treatment system for discharge in accordance with the NPDES permit dated September 15, 2003. This will occur on the day of generation. The quantity of water discharged to the RP wastewater treatment system will be recorded on the 90-Day Investigation Derived Waste Log (SOP-13).

SCOEPA00013483

amec	AMEC Earth & Environmental, Inc. GROUNDWATER SAMPLING FIELD FORM	Project Name: 2006 Summer GW Event Project #: 0-61M-10703-0 P 43 Monitoring Well ID

Field Personnel: Date :

Weather Conditions: Approx. Air Temp (F):

INITIAL WELL DATA

PID (ppm) Background: In-well Casing:	PID Calibration Standard: isobutylene 100 ppm
	PID Calibration Date:
Date/Time of Measurement: /	Depth to Water Measuring Technique:
Depth Well Bottom (TOC - ft.):	Detection Method of Free Product:
Depth to Water Level (TOC - ft.):	Conversions Factors (casing dia. = gallons/linear ft.) Circle One
Depth to Free Product (TOC - ft.):	0.75" = 0.02 1" = 0.04 2" = 0.17 3" = 0.37
Calculated Column Height (ft.):	4" = 0.66 6" = 1.47 8" = 2.61 12" = 5.88
Casing Diameter (in.):	Three Well Purge Volumes (gallons) = 3 x _____ = _____
Quantity of Free Product Collected (gal.):	Method of Collecting Free Product:
Obsevation of sheen or LNAPL:	Observation of DNAPL:

WELL CONDITION

Casing (circle one):	Stainless Steel Carbon Steel PVC Other:		
Casing Condition:	OK / NA / Needs Repairs / Repaired	Lock Condition:	OK / NA / Needs Repairs / Replaced
Cap Condition:	OK / NA / Needs Repairs / Repaired	Inner Casing Condition:	OK / NA / Needs Repairs / Repaired
Paint Condition:	OK / NA / Needs Repairs / Repaired	Monument Condition:	OK / NA / Needs Repairs / Repaired

Recommended Well Repairs:

SAMPLING INFORMATION / DATA

Field Observations/Notes of Sampling Event: _____

Sampling Information continued on Side 2

amec	AMEC Earth & Environmental, Inc. GROUNDWATER SAMPLING FIELD FORM	Project Name: 2006 Summer GW Event Project #: 0-61M-10703-0 P 43 Monitoring Well ID:

INITIAL WELL DATA & WELL PURGING INFORMATION

Time (0:00 - 23:59)	Water Temperature (degree C)	Specific Conductivity (µS/cm)	Dissolved Oxygen (mg/L)	Water pH (S.U.)	ORP mV	DTW (feet bgs)	Volume Purged (liters)

Fe 2+ (mg/L): Tubidity (NTUs): Total Purged:

Purge Pumping Rate (approx. L/m): _____ Approx. Pump/Intake Depth: _____

Well Yield: High / Moderate / Low

Purge Method (circle one): Disposable Bailer / Peristalic Pump / DV Pump / Other = _____

Sampling Method (circle one): Disposable Bailer / Peristalic Pump / DV Pump / Other = _____

Decontamination Method: _____ Water Disposal: _____

Instrument Type & Number: YSI Instrument Calibration Date & Time:

SAMPLING INFORMATION / DATA

Date Sampled: Time Sampled:

QA/QC Sample (circle one): DUP Lab MS/MSD Equip Blank Trip Blank

Sample ID	Bottles (total)	Bottles (size)	Preservative	Destination Laboratory	QA/QC Sample	Analytical Parameters
	2	1 L	None	STL-Seattle		Insecticides 8081A
	2	1 L	None	STL-Seattle		Herbicides 8151A
	2	1 L	None	STL-Seattle		SVOCs 8270C
	3	40 ml	HCL	STL-Seattle		VOCs 8260B
	2	1 L	HCL	STL-Seattle		NWTPH-Dx
	2	1 L	None	STL-Sacram		dioxins/furans 1613
	1	500 ml	Nitric Acid	STL-Seattle		Total Metals 7470/6000/7000
	1	500 ml	Nitric Acid	STL-Seattle		Dissolved Metals 7470/6000/7000
	1	1 L	None	Test America		BOD/orthophosphate
	1	250 mL	None	Test America		nitrate/nitrite
	1	500 ml	Sulfuric Acid	STL-Seattle		TOC/COD/Ammonia/TKN
	1	250	NAOH	STL-Seattle		Sulfide
	3	40 ml	HCL	STL-Seattle		RSK 175 (ethane, ethene, methane)
	1	1 L	None	STL-Seattle		chloride/sulfate/alkalinty/TDS
	1	400 ml	sterile	Food Quality		microbial enumerations
	1	1 L	None	STL-Seattle		TSS

All samples were immediately placed into a cooler and packed with ice or "Blue Ice", unless otherwise noted: YES / NO

Sample Transport (circle one): courier AMEC Delivery UPS/Fed Ex/USPS

CERTIFICATION STATEMENT

By signing below, the listed AMEC sampler states that the information provided on this page is accurate.

Sampler (Print): Sampler Signature: Date Signed:

SCOEPA00013485

TAYLOR MADE GRAPHICS (503)723-3676

Account Name and Number
AMEC

Description of Article	Weight	Tag #
P.O. #	A.B. #	

ON-TIME DELIVERY LLC
503-262-0801
7831 SE STARK ST #101
PORTLAND, OR
97215

Sender/Company Name: AMEC
Date: 6/13/06

Sender/Street or City: 7376 SW Durham Road

Quantity	Receiver Name & Address
	James Peale
	Maul Foster & Alongi
	3121 SW Moody Ave Suite 200
	Portland OR 97239

Pick up time	Deliver Time	Total Mileage	Driver
1518	1558		545

Bill To /Dept.: 061M107030 P43

Sender Signature: [signature]

Receiver Signature: X [signature]

Sub Total	
Other	
Total Charge	

SCOEPA00013486

Project Number 8128.01.14/03

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- ☐ Working
- ☐ CADD
- ☐ Health & Safety

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By

LETTER OF TRANSMITTAL

TO:

Maul Foster & Alongi 3121 SW Moody Avenue, Suite 200 Portland, Oregon 97239	Date: April 11, 2006
	Job No: 0-61M-107030/Phase 15
	Attn: James Peale
	RE: RP - Portland Site

WE ARE SENDING YOU: ☐ Attached ☐ Under Separate Cover via US Mail

Copies	Dated	Description
1	04/10/06	Quarterly Progress Report for RI/FS First Quarter, 2006 Progress Report

THESE ARE TRANSMITTED as checked below:

☐ For Review ☐ For Approval ☐ For Your Use ☐ As Requested

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

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April 10, 2006

0-61M-107030/Phase 15

Thomas E. Roick
Project Manager, Cleanup & Portland Harbor
Department of Environmental Quality
2020 SW 4th Avenue, Suite 400
Portland, Oregon 97201-4987

Dear Mr. Roick:

Re: Quarterly Progress Report for RI/FS
First Quarter, 2006 Progress Report
RP - Portland Site

On behalf of SLLI, AMEC Earth & Environmental, Inc. is submitting to the Oregon Department of Environmental Quality (DEQ) one hard copy of the First Quarter, 2006 Progress Report associated with the Remedial Investigation/Feasibility Study (RI/FS) at the Rhône-Poulenc (RP) Portland Site (RP Site). This quarterly report includes activities conducted during the first calendar quarter of year 2006 (January 1 through March 31), and is prepared as specified by the Consent Order (No. WMCSR-NWR-99-07) executed between RP and DEQ in July 1999 (the Order).

CURRENT REPORTING ACTIVITIES

Outfall 22B

Implementation of the Outfall 22B IRAM Work Plan is pending receipt of City of Portland agreements and access issues.

Spring 2005 Post-Characterization Groundwater Event

The Winter 2006 Groundwater Monitoring Event Work Plan was presented to DEQ on March 10, 2006. This work plan summarizes the objectives, scope of work, and tentative schedule for activities.

Lake Area Geophysical Survey

The Lake Area Intrusive Investigation Technical Memorandum was submitted to DEQ on January 26, 2006. The technical memorandum describes the field activities completed at the RP Site and includes the final analytical results from the samples collected during the intrusive investigation completed in February 2004. The Draft Expanded Lake Area Geophysical Survey Work Plan was submitted to DEQ on March 27, 2006. This work plan proposes an additional geophysical survey to be performed in other portions of the Lake Area.

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RP Human Health Risk Assessment

The Final Deterministic Baseline Human Health Risk Assessment (HHRA) was submitted to DEQ on March 16, 2006. The HHRA was conducted to evaluate complete or potentially complete exposure routes for the RP property.

Lake Area Bioremediation Pilot Study and Colloid Evaluation

The Draft Lake Area Bioremediation Pilot Study and Colloid Evaluation Work Plan was submitted to DEQ on January 17, 2006. This work plan provided the technical foundation and the objectives for a pilot-scale bioremediation study and a colloid evaluation related to groundwater at the former Rhône-Poulenc Site.

West Doane Lake

The Geotechnical Investigation Work Plan for Work Adjacent to WDL was submitted to DEQ on February 27, 2006. The purpose of the geotechnical work was to investigate the potential impact, if any, on the BNSF embankment of fill to be added to, and placed on WDL as part of the proposed Interim Remedial Action Measure IRAM of stabilization. The treatability study and geotechnical samples were collected and laboratory results are pending.

Historical Drainage Ditch/Lake Area Drainage Ditch

A response to a DEQ letter dated November 2, 2005 was submitted to DEQ on March 1, 2006 which provided SLLI's comments to DEQ's comments on the Draft Historical Drainage Ditch and Lake Area Drainage Ditch Evaluation Report (HDD/LADD Report).

Source Control Evaluation

The Final Stage 1 Source Control Evaluation Work Plan was submitted to DEQ on October 31, 2005. Portions of the Stage 1 SCE work proposed to be conducted at the Siltronic property, including reconnaissance sampling and well installation, was completed during November and December 2005. Additional phases of the Stage 1 SCE work have continued to be delayed pending property access and permit approval.

Significant Problems Encountered

Despite SLLI's best efforts, by letters dated November 2 and 29, 2005, Arkema has denied further access to the Arkema property. The denial of access is preventing Stage I SCE work and the completion of the SCE on the Arkema property. Pursuant to access previously granted and the Stage I SCE, SLLI installed three well clusters on Lots 1 and 2 of the Arkema property. Arkema's denial of further access has prevented sampling of these wells. On December 14, 2005, SLLI met with DEQ to request from DEQ assistance in obtaining access to the Arkema property. Subsequently, the DEQ contacted Arkema and DEQ then directed that SLLI contact Arkema and attempt to resolve the differences between Arkema and SLLI. SLLI met with Arkema on February 16, 2006 to present a proposed remedial strategy as requested by Arkema. Arkema has continued to deny access and has requested additional information. A 30% remedial design data package was provided to Arkema on March 20, 2006 along with the

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request for a second meeting. SLLI is awaiting response from Arkema regarding the scheduling of the meeting.

On December 27, 2005, the City of Portland (COP) issued its Greenway Review decision on SLLI's application to install three monitoring well clusters on the Willamette River beach, below the ordinary high water line (OHWL) pursuant the DEQ-approved Stage I SCE. The decision previously required SLLI to install the wells below grade, or move the location of the wells above the OHWL. SLLI appealed the COP decision and on February 14, 2006, SLLI and the City came to an agreement to install above ground monument well completions below the OHWL. Monuments will be installed between 15 and 17 feet NAVD as agreed to in the Appeal Decision.

NDL technical decision delays from DEQ regarding NDL fish tissue sampling during the second and third quarters of 2005, and further delays due to BNSF property access issues, prevented the fish tissue sampling at NDL from being conducted during the fourth quarter 2005, therefore missing the seasonal opportunity for sampling. Fish tissue sampling is planned for Spring 2006, pending resolution of technical issues with DEQ and finalization of property access from BNSF. No other significant problems were encountered during this current reporting period.

Activities Planned for the Next Reporting Period

The activities currently planned for the next quarterly reporting period (Second Quarter 2006) include the following (not in chronological order):

- Continue to work toward obtaining permits and property access for the remaining Stage 1 SCE investigation tasks;
- Continue work toward obtaining appropriate permits to complete the WDL IRAM;
- Submit Lake Area Hydrologic Investigation Work Plan;
- Implement Outfall 22B IRAM Work Plan, pending receipt of City of Portland agreements;
- Submit a Final HDD/LADD Investigation Report;
- Submit a Final Outfall 22B Storm Sewer Sampling Report; and
- Conduct NDL fish tissue sampling (pending property access and DEQ approval of timing).

If you have any questions, please call Roger Gresh at (503) 639-3400.

Sincerely,

AMEC Earth & Environmental, Inc.

Teresa A.R. Wilson, R.G.
Staff Geologist

Roger Gresh, P.G.
Project Manager

TJ/lp

SCOEPA00013491

c: S. Dearden, Sanofi Aventis
R. Ferguson, SLLI
J. Benedict, CHBH&L
D. Blount, Landye Bennett Blumstein LLP
C. Collins, ESCO Corp.
M. Morford, Stoel Rives, LLP
J. Peale, Maul Foster & Alongi
B. Sheppard, BNSF
T. McCue, Siltronic Corporation
L. Patterson, Arkema, Inc
I. Dubrow Davidson, Schnitzer Investment Corp.
J. Baird, Air Liquide America Corp.

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Project Number 8128.01.14

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Archives

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By MW

LETTER OF TRANSMITTAL

TO:

Maul Foster & Alongi 3121 SW Moody Avenue, Suite 200 Portland, Oregon 97239	Date: October 10, 2005 Job No: 0-61M-107030/Phase 15 Attn: James Peale RE: RP - Portland Site

WE ARE SENDING YOU: ☒ Attached ☐ Under Separate Cover via US Mail

Copies	Dated	Description
1	10/10/05	Quarterly Progress Report for RI/FS

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REMARKS:

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October 10, 2005

0-61M-107030/Phase 15

Thomas E. Roick
Project Manager, Cleanup & Portland Harbor
Department of Environmental Quality
2020 SW 4th Avenue, Suite 400
Portland, Oregon 97201-4987

Dear Mr. Roick:

Re: Quarterly Progress Report for RI/FS
Third Quarter, 2005 Progress Report
RP - Portland Site

On behalf of SLLI, AMEC Earth & Environmental, Inc. is submitting to the Oregon Department of Environmental Quality (DEQ) one hard copy of the Third Quarter, 2005 Progress Report associated with the Remedial Investigation/Feasibility Study (RI/FS) at the Rhône-Poulenc (RP) Portland Site (RP Site). This quarterly report includes activities conducted during the third calendar quarter of year 2005 (July 1 through September 30, 2005), and is prepared as specified by the Consent Order (No. WMCSR-NWR-99-07) executed between RP and DEQ in July 1999 (the Order).

CURRENT REPORTING ACTIVITIES

North Doane Lake Ecological Risk Assessment

A Response to DEQ's April 4, 2005 Letter Titled North Doane Lake Data Validation was submitted to DEQ on August 25, 2005 and a response to DEQ's letter dated June 30, 2005 was submitted on July 27, 2005. A letter transmitting the NDL Sediment Sample Analytical Batch Quality Control Tables was submitted to DEQ on September 12, 2005.

Geophysical Survey

The Lake Area Intrusive investigation field work was performed June 27 through July 6.

Investigative-Derived Waste Disposal (IDW)

Seventeen drums of IDW were transported off-site during the quarter and disposed at Chemical Waste Management of the Northwest, Inc. (CWM), in Arlington, Oregon:

- Eleven drums of PPE and debris;
- Six drums of soil, drill cuttings.

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West Doane Lake

Implementation of the Draft West Doane Lake Treatability Study Work Plan dated May 19, 2005, has been delayed due to property access issues.

Source Control Evaluation

The Draft Stage 1 Source Control Evaluation Work Plan was submitted to DEQ on July 1, 2005, and a Modification to Scope letter regarding the Siltronic property was submitted to DEQ on September 22, 2005. SCE, soil and groundwater sampling field work was performed at Arkema Lots 1 and 2 on August 9 through August 22. Additional phases of the Stage 1 SCE work have been delayed pending property access and permit approval.

Significant Problems Encountered

No significant problems were encountered during this current reporting period with the exception of property access and permitting issues.

Activities Planned for the Next Reporting Period

The activities currently planned for the next quarterly reporting period (Fourth Quarter 2005) include the following (not in chronological order):

- Conduct the Siltronic and Beach Area portions of the Stage 1 SCE investigation;
- Submit the Draft NDL Human Health Risk Assessment Work Plan;
- Finalize on-property baseline Human Health Risk Assessment;
- Submit the Spring 2005 Groundwater Monitoring Event Technical Memorandum;
- Submit a Draft Outfall 22B IRAM Work Plan and Draft Outfall 22B Storm Sewer Sampling Report; and
- Conduct NDL fish tissue sampling (pending property access and DEQ approval of timing).

If you have any questions, please call Roger Gresh at (503) 639-3400.

Sincerely,

AMEC Earth & Environmental, Inc.

Teresa A.R. Wilson, R.G.
Staff Geologist

Roger Gresh, P.G.
Project Manager

TARW/lp

SCOEPA00013496

c: R. Ferguson, SLLI
S. Dearden, Sanofi Aventis
J. Benedict, CHBH&L
D. Blount, Landye Bennett Blumstein LLP
C. Collins, ESCO Corp.
M. Morford, Stoel Rives, LLP
J. Peale, Maul Foster & Alongi
B. Sheppard, BNSF
T. McCue, Siltronic Corporation
L. Patterson, Arkema, Inc
I. Dubrow Davidson, Schnitzer Investment Corp.
J. Baird, Air Liquide America Corp.

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November 18, 2005
Project 8128.01.14

Mr. Robert Ferguson
SLLI
1 Copley Parkway
Suite 309
Morrisville, NC 25760

Re: Source Control Evaluation Work – RP Portland Site

Dear Bob:

The following letter discusses recent events at the Siltronic Corporation (Siltronic) facility related to the drilling activities performed by AMEC Earth and Environmental (AMEC) on behalf of SLLI. Maul Foster & Alongi, Inc (MFA) has identified issues related to AMEC's performance that require documentation at this time, and may warrant future actions by SLLI.

On the morning of November 14, 2005, AMEC's direct-push subcontractor Boart Longyear/Geotech (Boart) notified MFA's oversight representative that the direct-push rods had sheared and broken as they were advanced for groundwater sampling. The following information is relevant:

- The location (SIL-2) is approximately 41 feet plant east of Siltronic monitoring well WS-12-125/161.
- WS-12-125/161 delineates the plant east-lateral extent of the AWBZ plume of trichloroethene (TCE) and its degradation products emanating from the former UST area.
- Other contaminants, including benzene and naphthalene have been documented in groundwater at this location.
- The break occurred at a depth of approximately 75 feet below ground surface (bgs), below the top of the saturated zone (approximately 25 feet bgs).
- Approximately 54 feet of direct-push rod was left in the subsurface, from about 75 to about 129 feet bgs.

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- The direct-push tooling included a groundwater sampling assembly. The assembly is typically advanced in a closed configuration (i.e., groundwater cannot enter the direct-push rods), and exposed to the aquifer at the target sampling depth. The direct-push rods typically do not leak (i.e., allow infiltration of groundwater into the rods) during advancement.

- The integrity of the direct-push tooling is unknown.

- The direct-push tooling was abandoned (i.e., not recovered) in-place; grout was injected into the formation from approximately 75 feet bgs to the surface.

There is a potential for the abandoned direct-push tooling to create preferential pathways for shallower (i.e., at the 75 ft-bgs interval) impacted groundwater to contaminate deeper groundwater – through the direct-push rods, and alongside the rods. If data indicate that the direct-push tooling has created a preferential pathway, SLLI may be required to take appropriate actions to delineate the impacts.

Please call either of us at (971) 544-2139 if you have questions or comments.

Sincerely,

Maul Foster & Alongi, Inc.

James G.D. Peale, RG
Senior Hydrogeologist

James J. Maul, RG
President and Principal Hydrogeologist

cc: Tom McCue; Siltronic
Chris Reive; Jordan Schrader
Alan Gladstone; Davis Rothwell Earle & Xochihua, P.C.
James Benedict; Cable Huston Benedict Haagensen and Lloyd, LLP
Teresa Wilson; AMEC Earth & Environmental
Tom Roick, Dana Bayuk; Oregon Department of Environmental Quality

Project Number 8128.01.14/.03

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LETTER OF TRANSMITTAL

TO:

Maul Foster & Alongi 3121 SW Moody Avenue, Suite 200 Portland, Oregon 97239	Date:	January 11, 2006
	Job No:	0-61M-107030/Phase 15
	Attn:	James Peale
	RE:	RP - Portland Site

WE ARE SENDING YOU: ☒ Attached ☐ Under Separate Cover via US Mail

Copies	Dated	Description
1	1/10/06	Quarterly Progress Report for RI/FS

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January 10, 2006

0-61M-107030/Phase 15

Thomas E. Roick
Project Manager, Cleanup & Portland Harbor
Department of Environmental Quality
2020 SW 4th Avenue, Suite 400
Portland, Oregon 97201-4987

Dear Mr. Roick:

Re: Quarterly Progress Report for RI/FS
Fourth Quarter, 2005 Progress Report
RP - Portland Site

On behalf of SLLI, AMEC Earth & Environmental, Inc. is submitting to the Oregon Department of Environmental Quality (DEQ) one hard copy of the Fourth Quarter, 2005 Progress Report associated with the Remedial Investigation/Feasibility Study (RI/FS) at the Rhône-Poulenc (RP) Portland Site (RP Site). This quarterly report includes activities conducted during the fourth calendar quarter of year 2005 (October 1 through December 31, 2005), and is prepared as specified by the Consent Order (No. WMCSR-NWR-99-07) executed between RP and DEQ in July 1999 (the Order).

CURRENT REPORTING ACTIVITIES

Outfall 22B

The Draft Outfall 22B IRAM Work Plan was submitted to DEQ followed by the Final Outfall 22B IRAM Work Plan with DEQ's suggested incorporated changes on November 11, 2005.

Spring 2005 Post-Characterization Groundwater Event

The Spring 2005 Post-Characterization Groundwater Event Technical Memorandum was submitted to DEQ on December 21, 2005. This document presents the analytical data from groundwater samples collected between April 11 and May 6, 2005.

North Doane Lake Ecological Risk Assessment

As requested by DEQ, AMEC submitted a letter on December 8, 2005 containing detection and reporting limits for fish tissue analysis.

Investigative-Derived Waste Disposal (IDW)

Two drums of IDW were transported off-site during the quarter and disposed at Chemical Waste Management of the Northwest, Inc. (CWM), in Arlington, Oregon. The drums contained waste terra cotta pipe and other debris.

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Granular Activated Carbon (GAC) Management

The spent GAC used for final treatment of the effluent from the on-site wastewater treatment plant was taken out of the absorber units on November 2, 2005 and replaced with clean GAC. The spent GAC was then stored in lined and covered steel containers. DEQ confirmed on December 20, 2005 that the spent GAC was eligible for disposal as a corrective action management unit (CAMU) waste under an existing CAMU-eligibility decision originally granted in May 2003.

The spent GAC is currently awaiting transport to CWM, in Arlington, Oregon. The transport of the GAC is anticipated in January 2006.

West Doane Lake

Implementation of the characterization phase of the West Doane Lake Treatability Study Work Plan dated June 27, 2005, was completed in November 2005.

Source Control Evaluation

The Final Stage 1 Source Control Evaluation Work Plan was submitted to DEQ on October 31, 2005. Portions of the Stage 1 SCE work proposed to be conducted at the Siltronic property, including reconnaissance sampling and well installation, were completed during November and December 2005. Additional phases of the Stage 1 SCE work have continued to be delayed pending property access and permit approval.

Significant Problems Encountered

Despite SLLI's best efforts, by letters dated November 2 and 29, 2005, Arkema has denied further access to the Arkema property. The denial of access is preventing Stage I SCE work and the completion of the SCE on the Arkema property. Pursuant to access previously granted and the Stage I SCE, SLLI installed three well clusters on Lots 1 and 2 of the Arkema property. Arkema's denial of further access has prevented sampling of these wells. On December 14, 2005, SLLI met with DEQ to request from DEQ assistance in obtaining access to the Arkema property. Subsequently, the DEQ Arkema site project manager contacted Arkema and DEQ then directed that SLLI contact Arkema and attempt to resolve the differences between Arkema and SLLI. SLLI will contact Arkema in the near future.

On December 27, 2005, the City of Portland issued its Greenway Review decision on SLLI's application to install three monitoring well clusters on the Willamette River beach, below the ordinary high water line (OHWL) pursuant the DEQ Stage I SCE. The decision requires that SLLI install the wells below grade, or move the location of the wells above the OHWL. Installing the wells below grade is inconsistent with OWRD well completion requirements. A below grade completion will be seasonally submerged below surface water, limits the access for sampling during these periods, and risks surface water intrusion into the wells. SLLI has appealed the City decision.

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Technical decision delays from DEQ regarding North Doane Lake (NDL) fish tissue sampling during the second and third quarters of 2005, and further delays due to BNSF property access issues, prevented the fish tissue sampling at NDL from being conducted during the fourth quarter 2005, therefore missing the seasonal opportunity for sampling. Fish tissue sampling is planned for Spring 2006, pending resolution of technical issues with DEQ and finalization of property access from BNSF. No other significant problems were encountered during this current reporting period.

Activities Planned for the Next Reporting Period

The activities currently planned for the next quarterly reporting period (First Quarter 2006) include the following (not in chronological order):

- Continue to work toward obtaining permits and property access for the remaining Stage 1 SCE investigation tasks;
- Conduct treatability study sampling and geotechnical investigation at WDL;
- Implement Outfall 22B IRAM Work Plan, pending receipt of City of Portland agreements;
- Submit the Draft NDL Human Health Risk Assessment Work Plan;
- Finalize on-property baseline Human Health Risk Assessment;
- Submit a Final HDD/LADD Investigation Report;
- Submit a Final Outfall 22B Storm Sewer Sampling Report;
- Submit a work plan for an expanded geophysical investigation in the Lake Area;
- Submit a Lake Area Intrusive Investigation Technical Memorandum;
- Submit a Draft Lake Area Bioremediation Pilot Study and Colloid Evaluation Work Plan; and
- Conduct NDL fish tissue sampling (pending property access and DEQ approval of timing).

If you have any questions, please call Roger Gresh at (503) 639-3400.

Sincerely,

AMEC Earth & Environmental, Inc.

Teresa A.R. Wilson, R.G.
Staff Geologist

Roger Gresh, P.G.
Project Manager

TARW/lp

SCOEPA00013504

c: R. Ferguson, SLLI
S. Dearden, Sanofi Aventis
J. Benedict, CHBH&L
D. Blount, Landye Bennett Blumstein LLP
C. Collins, ESCO Corp.
M. Morford, Stoel Rives, LLP
J. Peale, Maul Foster & Alongi
B. Sheppard, BNSF
T. McCue, Siltronic Corporation
L. Patterson, Arkema, Inc
I. Dubrow Davidson, Schnitzer Investment Corp.
J. Baird, Air Liquide America Corp.

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Project Number 8108.01.14/03

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LETTER OF TRANSMITTAL

RECEIVED
FEB 1 2006
By

amec

TO:

Maul Foster & Alongi 3121 SW Moody Avenue, Suite 200 Portland, Oregon 97239	Date:	January 31, 2006
	Job No:	0-61M-107030/Phase
	Attn:	James Peale
	RE:	RP - Portland Site

WE ARE SENDING YOU: ☐ Attached ☐ Under Separate Cover via US Mail

Copies	Dated	Description
1	1/31/06	Response to Maul Foster & Alongi, Inc. Letters Dated November 18 and 21, 2005

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January 31, 2006

Mr. Tom McCue
Siltronic Corporation
7200 NW Front Avenue, MS-20
Portland, Oregon 97210-3676

Dear Tom:

Re: Response to Maul Foster & Alongi, Inc. Letters Dated November 18 and 21, 2005
Source Control Evaluation Work
RP - Portland Site

AMEC Earth & Environmental, Inc. (AMEC), on behalf of SLLI, is sending this letter in response to two letters sent on your behalf by Maul Foster & Alongi, Inc. (MFA) dated November 18 and 21, 2005, regarding work being conducted by AMEC on Siltronic Corporation (Siltronic) property. MFA's letters document events that occurred during AMEC's direct-push sampling at locations SIL-01 and SIL-04. The sampling was conducted as part of SLLI's Stage 1 Source Control Evaluation (SCE) scope of work, as presented in the Final Stage 1 SCE Work Plan dated October 31, 2005. We note that, contrary to the statement in the November 18 letter, the broken direct-push rod was located at SLLI boring location SIL-01, not SIL-02 as stated by MFA.

It should be noted that, in the case of both incidents, AMEC consulted with MFA field staff who confirmed with Mr. James Peale that the AMEC proposed method of abandonment for the broken direct-push rod by grouting in place was satisfactory to MFA. AMEC was told verbally by Ms. Scout Mauldin of MFA that Mr. Peale approved the abandonment procedure.

Although the measures taken at the locations of the broken rods are generally considered sufficient to avoid creation of a vertical migration pathway, SLLI chose to attempt to overdrill and remove the rods as a very conservative measure that could eliminate the subsurface metal rods from Siltronic's property. AMEC proposed a scope of work to Siltronic and MFA by e-mail on December 21, 2005, to overdrill at these locations using a sonic rig. The proposed scope of work and schedule were accepted by Siltronic by e-mail on December 22, 2005.

On January 11 through January 16, 2006, Boart Longyear (Boart), at the direction of AMEC, attempted to retrieve the broken rods from both boring locations SIL-01 and SIL-04 using sonic drilling methods. MFA representatives were onsite observing the overdrilling activities. Despite extensive efforts, the overdrilling activities at both locations were unsuccessful in removing the broken direct-push rods. Both borings were abandoned in accordance with State of Oregon requirements. Following is a summary of those overdrilling activities.

SIL-01

At location SIL-01, 8-inch casing was advanced by Sonic drilling to a depth of 45 feet below ground surface (bgs) and a bentonite seal was installed from approximately 42 to 45 feet bgs. After allowing the bentonite seal to hydrate for one hour, Boart continued drilling and casing the hole with 6-inch casing while advancing with a 4-inch core barrel. Boart cored from 70 to 90 feet bgs several times with the 4-inch core barrel in an attempt to trap the broken direct-push

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rods in the core barrel. After three hours of unsuccessful attempts, the boring was abandoned with 280 gallons of bentonite grout and six 50-pound bags of bentonite chips.

SIL-04

At location SIL-04, 9-inch casing was advanced to 48 feet bgs and a bentonite seal was installed from 45 to 48 feet bgs. After the seal was allowed to hydrate for one hour, 8-inch casing was advanced to 58 feet bgs, while using a 6-inch core barrel to drill ahead of the casing. Again, Boart worked for over three hours attempting to trap the direct-push rods within the core barrel and was unsuccessful. The boring was abandoned with 260 gallons of bentonite grout and seven 50-pound bags of bentonite chips.

As discussed, and agreed to at the time of the incident, AMEC felt that grouting the rods in place is protective of the groundwater, and does not anticipate any issues related to preferential pathways along or within the pipe. We welcome any guidance that MFA, based on their site experience, can give us regarding future field-related issues that may be encountered at the Siltronic property, and appreciate the cooperation and interaction provided to date.

If you have any questions, please contact Roger Gresh or Teresa Wilson at (503) 639-3400.

Sincerely,

AMEC Earth & Environmental, Inc.

Teresa A.R. Wilson
Task Manager

Roger Gresh, R.G.
Project Manager

TARW/lp

c: S. Dearden, Sanofi-Aventis
R. Ferguson, SLLI
J. Benedict, CHBH&L
J. Peale, MFA
C. Reive, Jordan Schrader
A. Gladstone, Davis Rothwell Earle & Xochihua
T. Roick, DEQ
D. Bayuk, DEQ

SCOEPA00013509

MAUL FOSTER ALONGI INC.
ENVIRONMENTAL & ENGINEERING CONSULTANTS
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October 9, 2007
Project No. 8128.01.14

Mr. Matt McClincy
Oregon Department of Environmental Quality
2020 SW 4th Avenue, Suite 400
Portland, Oregon 97201-4987

Re: Evaluation of Groundwater Discharge to the Willamette River – RP Portland Site
Portland, OR
ECSI #155

Dear Matt:

On behalf of Siltronic Corporation (Siltronic), Maul Foster & Alongi, Inc. (MFA) reviewed the October 1, 2007 letter from AMEC Earth & Environmental (AMEC) on behalf of SLLI. The letter provided an evaluation of groundwater discharge to the Willamette River offshore of the Siltronic property, and adjacent Arkema and NW Natural (NWN) properties.

The objective of the evaluation is to determine if additional in-river investigation of transition zone water (TZW) is required for the Portland Harbor Remedial Investigation (RI). The evaluation includes a review and update of the conceptual hydrogeologic model (CHM) for the Rhone-Poulenc (RP) site and downgradient properties, based on upland data (collected by individual property owners) and in-river data (collected by LWG and Siltronic). MFA has developed the following brief comments regarding the data and interpretations in the letter.

Page 5 and related Figures 2 and 3 – With respect to the extent of the Deep Alluvial Gravel (DAG), the letter omits mention of Siltronic borings WS-13, WS-15, and WS-16. The DAG was detected in these borings at thicknesses ranging from approximately two to 23 feet thick, at depths up to 234 feet below ground surface (bgs). These data suggest that the extent of the DAG is greater than what is presented in the letter. The extent of the DAG may be critical for developing the CHM.

Page 17 and related Figure 5 – The statement "...TZW samples obtained by Siltronic in Region 2 did not detect any 1,2-DCB (MFA, 2005b)" omits reference to a low-level detection of 1,2-DCB in TZW in boring GP-30, which is shown on Figure 5. Also, chlorobenzene (CB, a degradation product of dichlorobenzene isomers) was detected in

SCOEPA00013510

TZW in boring GP-27, which is slightly downstream of Region 2. While the detections of 1,2-DCB and CB were low (0.85 and 1.4 ug/L, respectively), they should be considered in the evaluation of the CHM.

Page 18 – With respect to Region 3, MFA understands that Anchor Environmental, LLC has collected TZW samples along several transects offshore of the NWN and Siltronic properties. These data would appear to be relevant, although validated data may not yet be available.

These comments are intended to assist Portland Harbor stakeholders in their evaluation of the need for additional TZW investigation by LWG. These comments do not address characterization of the lateral and vertical extent of soil and groundwater impacts on the Siltronic property from former RP operations, which is not yet complete.

Please call either of us at (971) 544-2139 if you have questions or comments.

Sincerely,

Maul Foster & Alongi, Inc.

James G.D. Peale, R.G.
Senior Hydrogeologist

James J. Maul, R.G.
Principal Hydrogeologist

cc: Matt McClincy, DEQ
Dana Bayuk, DEQ
Tom McCue, Siltronic
Chris Reive, Jordan Schrader
Alan Gladstone and William Earle, Davis Rothwell Earle & Xochihua, P.C.
Stuart Dearden, sanofi-aventis US, Inc.
Robert Ferguson, SLLI
Jim Benedict, Cable Huston Benedict Haagensen & Lloyd LLP
Roger Gresh, AMEC Earth & Environmental

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10 CELEBRATING YEARS 1996-2006

June 15, 2006
Project No. 8128.01.14

Mr. Roger Gresh
Project Manager
AMEC Earth & Environmental, Inc.
7376 SW Durham Road
Portland, Oregon 97224

Re: Draft Stage 2 Source Control Evaluation Work Plan – Siltronic Upland
RP – Portland Site
ECSI #155

Dear Mr. Gresh:

On behalf of Siltronic Corporation (Siltronic), Maul Foster & Alongi, Inc. (MFA) has reviewed the above-referenced document (the draft work plan) prepared by AMEC Earth and Environmental, Inc. (AMEC) on behalf of SLLI. The draft work plan describes proposed investigation of off-site impacts from past practices at the former Rhone-Poulenc (RP) facility. In short, the draft work plan requires significant revision prior to submittal to the Oregon Department of Environmental Quality (DEQ). In the interest of conserving resources, we offer the following comments to help focus the proposed scope of work and facilitate an acceptable amendment to the access agreement.

GENERAL COMMENTS

1. The draft work plan includes a groundwater monitoring well installation task. The basis for the proposed monitoring well locations is not provided, and several of the locations are problematic for Siltronic's current and future operations, and also (potentially) heavy equipment access. MFA recommends a site visit by AMEC staff prior to finalizing the proposed locations in a submittal to DEQ. The proposed monitoring well installation plan is the primary reason that Siltronic is not approving the draft work plan.

2. The draft work plan purports to implement a data quality objective (DQO) based approach. Typically, the DQO approach involves formulation of a problem statement or statements; supporting study questions; inputs to decisions; and decision rules. The draft work plan does not include a description of these components of the DQO approach. Further, the outcome of the draft work plan

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(e.g., the proposed monitoring well locations and sampling approach) does not appear to be based on a DQO approach.

3. A stated objective of the draft work plan is to provide data to inform the design of potential interim source control measures and other potential remedies on the Siltronic property if deemed appropriate. The draft work plan does not include a description of how the data will be evaluated to make source control decisions. Further, the draft work plan states that the investigation is being conducted in response to DEQ's February 22, 2006 request to delineate the nature and extent of RP-related constituents. MFA agrees that data for both objectives (source control evaluation and nature and extent) need to be collected. As suggested above, evaluation of the work scope in the context of the DQO process can optimize the allocation of resources and minimize duplicate data collection efforts.

4. During the April 12, 2006 meeting at Siltronic, AMEC described the proposed approach for source control measures on the RP property and downgradient locations. One technology being carried forward for further evaluation is in-situ bio-sparging. Siltronic remains opposed to application of this technology on the Siltronic property based on potential employee exposure to RP constituents of interest (COIs) such as dioxins and furans that may be mobilized to the vadose zone and/or the atmosphere by this technology. MFA recommends that AMEC further evaluate other source control measures, and revisit the proposed scope of work in the draft work plan to ensure that the data collected can be used for such evaluation.

SPECIFIC COMMENTS

1. Section 1.1 (Data Quality Objectives); Item 2. The scope of baseline hydrogeologic data for source control measure design should include data applicable to design of a wide range of potential technologies.

2. Section 1.1 (Data Quality Objectives); Item 3. The draft work plan should identify delineation of the entire lateral and vertical nature and extent as an objective (consistent with DEQ's request). Evaluation of only the "western boundary [i.e., in the direction of Route 30] of RP-related COIs" is not consistent with DEQ's request, in that the entire lateral extent should be delineated.

3. Section 1.1 (Data Quality Objectives); Item 4. The draft work plan does not identify how this objective will be met. It is presumed that the results of compound-specific isotope analysis (CSIA) for volatile organic compounds

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(VOCs) will be a line of evidence. Since CSIA is a relatively new technology, further discussion of how this objective will be met is appropriate. MFA notes that the recent CSIA results[1] show that carbon isotope ratios in the dichlorobenzene isomers and monochlorobenzene in groundwater are very similar, suggesting a unique source.

4. Section 1.1 (Data Quality Objectives); Item 5. It is important to note that trichloroethene (TCE) and its degradation products (including cis-1,2-dichloroethene [DCE]; trans-1,2-DCE, 1,1-DCE, and vinyl chloride) are RP-related COIs.

5. Section 1.2 – Scope of Work. The scope does not describe how the results of the field investigation will be analyzed to meet the objectives stated in Section 1.1.

6. Section 2.0 – Monitoring Well Installation. Several of the proposed locations could or will interfere with Siltronic operations, preventing approval of the draft work plan. MFA reiterates the need for a site visit to further evaluate impacts to Siltronic's operations.

   The rationale for the proposed locations of the monitoring well clusters near the Siltronic parking lots is not presented, and appears somewhat arbitrary. It is difficult to evaluate the proposed locations absent a discussion of groundwater flow, and based on the limited conclusions presented in the *Stage 1 Source Control Evaluation Technical Memo*. At the least, the draft work plan should include an evaluation of groundwater flow direction and a rationale based on hydrogeologic conditions.

   The rationale does not appear to be based on potential RP-COI distribution. For instance, RP-COIs were detected in reconnaissance groundwater samples and soil samples located approximately 350 feet southwest of proposed location RP-21-S, where no investigation is proposed. Since resonant sonic drilling is expensive, it may be valuable (in the context of resource management) to conduct a direct-push investigation with reconnaissance groundwater sampling for RP-COIs that can be analyzed on a rapid turn around time (TAT) basis, and use the results to optimize monitoring well locations.

   The proposed location of monitoring well cluster RP-24-S/A/G/B may require mobilization of a limited access rig due to the proximity to the river bank.

   The criteria for installing a monitoring well in a gravel unit should be explained further. For instance, what is the minimum thickness of a gravel zone that will

[1] In AMEC's *Stage 1 Source Control Evaluation Technical Memorandum* (dated 5/19/06).

trigger the decision to install a monitoring well? Will the presence of fractured basalt at the base of the Alluvium Zone trigger the decision to install a monitoring well? If a gravel well is installed, what is the anticipated vertical separation between the gravel well screen and the underlying basalt well screen?

MFA suggests collecting a minimal number of soil samples for chemical analysis to correlate sorption data with the proposed total organic carbon data.

7. Section 3 – Task 2 – Groundwater Monitoring. The frequency and duration of groundwater monitoring activities should be included.

8. Section 5 – Schedule. The schedule appears to be contingent upon completion of the Lake Area Hydrologic Investigation (LAHI). Siltronic requests an update regarding the status of the LAHI activities.

SLLI is to be commended for accelerating the investigation process. However, the draft work plan requires significant revision and should not be submitted to DEQ in its present form.

Please call either of us at (971) 544-2139 if you have questions or comments.

Sincerely,

Maul Foster & Alongi, Inc.

James G.D. Peale, RG
Senior Hydrogeologist

James J. Maul, RG
Principal Hydrogeologist

cc: Tom McCue, Siltronic
Chris Reive, Jordan Schrader
Alan Gladstone, Davis Rothwell Earle & Xochihua, P.C.

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November 21, 2005
Project 8128.01.14

Mr. Robert Ferguson
SLLI
1 Copley Parkway
Suite 309
Morrisville, NC 25760

Re: Source Control Evaluation Work – RP Portland Site
Second Drill Rod Failure

Dear Mr. Ferguson:

The following letter discusses recent events at the Siltronic Corporation (Siltronic) facility related to the drilling activities performed by AMEC Earth and Environmental (AMEC) on behalf of SLLI. Maul Foster & Alongi, Inc (MFA) has identified issues related to AMEC's performance that require documentation at this time, and may warrant future actions by SLLI.

On the morning of November 21, 2005, AMEC's direct-push subcontractor Boart Longyear/Geotech (Boart) notified MFA's oversight representative that the direct-push rods had sheared and broken as they were advanced for groundwater sampling. The following information is relevant:

- The location is approximately 225 feet plant east of, and approximately cross-gradient from monitoring well cluster RP-07.
- The break occurred at a depth of approximately 60 feet below ground surface (bgs), below the top of the saturated zone (approximately 25 feet bgs).
- Approximately 30 feet of direct-push rod was left in the subsurface, from about 60 to about 90 feet bgs.
- Groundwater from approximately 60 feet bgs has not been previously sampled at this location or upgradient of this location.
- The direct-push tooling included a groundwater sampling assembly. The assembly is typically advanced in a closed configuration (i.e., groundwater cannot enter the

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direct-push rods), and exposed to the aquifer at the target sampling depth. The direct-push rods typically do not leak (i.e., allow infiltration of groundwater into the rods) during advancement, however, the sheared rod remains open at the top and it is uncertain if it can be sealed.

- The integrity of the direct-push tooling is unknown.
- The direct-push tooling was abandoned (i.e., not recovered) in-place; grout was injected into the formation from approximately 60 feet bgs to the surface.

There is a potential for the abandoned direct-push tooling to create preferential pathways for shallower (i.e., at the 60 ft-bgs interval) impacted groundwater to contaminate deeper groundwater – through the direct-push rods, and alongside the rods. If data indicate that the direct-push tooling has created a preferential pathway, SLLI may be required to take appropriate actions to delineate the impacts.

Please call either of us at (971) 544-2139 if you have questions or comments.

Sincerely,

Maul Foster & Alongi, Inc.

James G.D. Peale, RG
Senior Hydrogeologist

James J. Maul, RG
President and Principal Hydrogeologist

cc: Tom McCue; Siltronic
Chris Reive; Jordan Schrader
Alan Gladstone; Davis Rothwell Earle & Xochihua, P.C.
James Benedict; Cable Huston Benedict Haagensen and Lloyd, LLP
Teresa Wilson; AMEC Earth & Environmental
Tom Roick, Dana Bayuk; Oregon Department of Environmental Quality

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June 28, 2007
Project No. 8128.01.12

Mr. Dana Bayuk
Oregon Department of Environmental Quality
2020 SW 4th Avenue, Suite 400
Portland, Oregon 97201-4987

Re: Siltronic Focused Feasibility Study Work Plan
Siltronic Corporation
7200 NW Front Avenue, Portland, OR
ECSI #183

Dear Dana:

On behalf of Siltronic Corporation (Siltronic), Maul Foster & Alongi, Inc. (MFA) has developed the following scope of work for a Focused Feasibility Study (FFS) for the facility located at 7200 NW Front Avenue, Portland, Oregon. This document serves as the work plan. This streamlined approach meets the project needs given the nature of the proposed work as outlined below and the extensive work already completed.

The FFS will address trichloroethylene (TCE) and its daughter products (dichloroethene isomers [DCE] and vinyl chloride [VC]) located in the upland source area, and that extend in a downgradient plume to Area 1 in the Willamette River.

The *Order Requiring Remedial Investigation and Source Control Measures* (the Order), DEQ No. VC-NWR-03-16, issued to Siltronic on February 9, 2004, requires Siltronic to implement Source Control Measures (SCMs) if it is determined that they are needed to protect human health and the environment. Section 5B of the Order states that Siltronic shall identify and evaluate source control measures, and that the DEQ will review and approve these measures pursuant to Oregon Administrative Rules (OAR) 340-122-0070 and through consultation with the United States Environmental Protection Agency (USEPA).

Through the FFS, Siltronic will select the SCM to satisfy the removal requirement of OAR 340-122-0070 as directed under the Order for this area. The FFS will be completed

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so that it generally meets the requirements of OAR 340-122-0085 and OAR 340-122-0090, and follows the guidance documents prepared by DEQ[1] and EPA.[2,3]

The approach for and timing of remediation of Area 2 (in the Willamette River) by Siltronic has not yet been determined at this time, since it is co-located with a larger area of sediment impacted by other parties. Cleanup of this area would be evaluated in a separate FFS or Engineering Evaluation/Cost Assessment (EE/CA) under USEPA jurisdiction.

Remedial Investigation Status

The Remedial Investigation (RI) report is currently under review by DEQ. The report indicates that SCMs are appropriate. Based on agency feedback during the RI Report rollout meeting in April, 2007, it does not appear that significant data gaps exist that will delay implementation of the FFS.

Additional field studies are planned to provide data to inform the FFS. The additional studies include supplemental plume delineation and collection of Manufactured Gas Product (MGP) Dense Non-Aqueous Phase Liquid (DNAPL) samples to support the conclusions of the Desorption Bench Test Report. The supplemental plume delineation will consist of completing five soil borings along the riverbank between WS-12 and WS-14. Groundwater samples and pneumatic slug tests will be analyzed to refine the estimated spatial extent of VOCs along the riverfront, and to further evaluate hydraulic properties of the formation. The additional field studies are expected to be completed during the course of the FFS so that pertinent data may be included.

Pilot Study

MFA has completed several studies prior to the FFS to guide the technology selection identification process and field testing of the most likely technology, which include a technology evaluation, a laboratory bench test, and an in-situ pilot study. The Initial Source Control Technologies Evaluation (ISCTE) (MFA, 2006) was prepared to evaluate potential technologies for applicability, short-term effectiveness, long-term effectiveness, implementability, scalability, impact of MGP waste, impacts to facility operations, design requirements, operation and maintenance, system limitations, and system cost. The

[1] DEQ, 1998. Guidance for conducting feasibility studies. Portland, Oregon. July 1.
[2] EPA. 1988. Guidance for conducting remedial investigations and feasibility studies under CERCLA. OSWER Directive 9355.3-01. Washington, D.C.. October.
[3] EPA 1993. Conducting Non-Time-Critical Removal Actions Under CERCLA, 1993.

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conclusion of the ISCTE was that bench-scale testing of bioremediation technologies was warranted.

A bioremediation bench test was performed to compare the effectiveness of several bioremediation materials with soil and groundwater from the Siltronic site. The bench test was carried out with increasing levels of TCE introduced to the system to understand the effectiveness of different products at concentrations observed at the riverbank area and in the source area. The bench test concluded that field testing of EHC® by Adventus combined with KB-1® by SiREM was warranted, in the form of a small scale pilot study.

MFA is currently preparing a Pilot Study report summarizing the data obtained during the in-situ bioremediation pilot study of EHC and KB-1 at the riverbank and in the source area. The initial data provides a high level of confidence in the success of applying the technology to address TCE and its degradation products at the site. The Pilot Study report is expected to be submitted to DEQ during July of 2007.

Description of the FFS Process

Based on the information prepared for the evaluation of treatment technologies and the success of the Pilot Study, MFA proposes to use a streamlined FS process in accordance with the DEQ FS Guidance (Section 1.4) and with the Portland Harbor Joint Source Control Strategy (JSCS) (December, 2005), Appendix A. The JSCS states that

> "... the evaluation and selection of source control measures should be based on a focused feasibility study (*e.g.*, similar to the U.S. Environmental Protection Agency [USEPA] Engineering Evaluations/Cost Analyses [EE/CA] process) performed under DEQ's cleanup rules. Under this approach, a limited number of alternatives, including any presumptive remedies, are selected for detailed analysis. Only the most qualified technologies that apply to the media or source of contamination should be discussed."

The FFS approach is proposed for two reasons. First, the FFS is not intended to identify a site-wide remedy. The FFS will address the upland source (i.e., former UST area) and downgradient plume of TCE and its degradation products associated with Area 1, but will not address the shallower sediment impacts in Area 2. Secondly, the FFS approach is proposed because a technology evaluation has already been completed.

The conclusion of the technology evaluation is that enhanced bioremediation (in the form of a permeable reactive barrier, or PRB) is the most applicable technology for TCE and its degradation products at the site. The effectiveness of enhanced bioremediation was demonstrated by a comprehensive bench test and subsequent pilot study. In the FFS, MFA

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will expand the evaluation of enhanced bioremediation to address the standard elements of a feasibility study, as applicable.

Consistent with DEQ's FS guidance, the FFS will briefly provide details of the site characterization, such as the site description, the nature and extent of contamination, identification of hot spots, and a summary of the risk evaluation. The report will include a discussion of the remedial action objectives (RAOs), general response actions, technology screening (performed in the ISCTE and supplemented with data from the bench test, pilot study, and supplemental plume delineation), and development of remedial action alternatives. Six PRB alternatives will be evaluated, two in the upland source area and four at the riverbank area. The lateral distance, number of injection rows, and injection grid location and density will be the variables used in formulating the six alternatives.

The remedial action alternatives will be compared on the basis of protectiveness (and residual risk), effectiveness, long-term reliability, implementability, implementation risk, and cost reasonableness. The evaluation will conclude with the recommendation of the remedial alternative. The recommendation would contain a preliminary assessment of applicable or relevant and appropriate laws and regulations would be achieved, impacts to facility operations, impacts to/from MGP wastes and MGP remediation measures, and the recommended points of compliance.

Coordination with Northwest Natural

Northwest Natural (NWN) is currently in the process of conducting pilot testing of control technologies to control MGP contamination that extends from the Gasco site onto the Siltronic property. NWN is considering the implementation of a hydraulic control system that may be coupled with a physical barrier to groundwater flow (i.e., sheet pile wall or deep soil mixing [DSM]). The configurations of the planned NWN systems could extend into the downgradient plume treatment area. As a result, the FFS will identify bioremediation options that can work in parallel with or otherwise be coordinated with or replaced by NWN's potential SCMs.

The potential alternatives under consideration by NWN will also be evaluated for their ability to manage the downgradient plume of TCE and its degradation products, absent implementation of a riverbank remedy by Siltronic. MFA and Siltronic will coordinate with NWN and their contractor, Anchor Environmental, to determine the potential layout of their proposed systems, and other details relevant to implementation and design of the SCMs for both parties.

Remedial Action Objectives

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Three RAOs will be addressed in the FFS for the remedial action. The RAOs will be consistent with the limits developed for the Portland Harbor in the JSCS for TCE and its daughter products. The proposed RAOs are:

- Achieve reduction of TCE, DCE, and VC in the downgradient plume to JSCS Levels or lower at riverbank.
- Reduce concentrations of TCE, DCE, and VC in the downgradient plume under the river to JSCS Levels or lower before discharge to river at Area 1.
- Reduce upland source area concentrations of TCE, DCE, and VC, and treat concentrations exceeding hot spot levels.

Schedule

MFA anticipates submitting the Draft FFS to DEQ during the third quarter 2007 (3Q 2007), assuming DEQ concurrence by July 16, 2007. The Final FFS would be submitted to DEQ early in the fourth quarter of 2007 (4Q 2007), assuming that DEQ is able to rapidly review the draft document and supply comments back to Siltronic. MFA is prepared to begin work on the FFS immediately, contingent upon DEQ review and approval of the proposed approach.

Please call either of us at (971) 544-2139 if you have questions or comments.

Sincerely,

Maul Foster & Alongi, Inc.

James G.D. Peale, R.G.
Senior Hydrogeologist

Ted Wall, P.E.
Principal Engineer

cc: Matt McClincy, DEQ
Tom McCue, Siltronic
Chris Reive, Jordan Schrader
Alan Gladstone and William Earle, Davis Rothwell Earle & Xochihua, P.C.

SCOEPA00013522

REPORT ON SUPPLEMENTAL UPLAND REMEDIAL INVESTIGATION ACTIVITIES

VOLUME 2 – APPENDICES

NW Natural – Gasco Facility
7900 NW St. Helens Road
Portland, Oregon

March 11, 2005

Project No. 2708

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ENVIRONMENTAL CONSULTANTS
ASSESSMENT
INVESTIGATION
REMEDIATION

SCOEPA00013523

REPORT ON SUPPLEMENTAL UPLAND REMEDIAL INVESTIGATION ACTIVITIES

NW Natural – Gasco Facility
7900 NW St. Helens Road
Portland, Oregon

March 11, 2005

Prepared for:

NW Natural
Portland, Oregon

Prepared by:

Hahn and Associates, Inc.
Portland, Oregon

HAI Project No. 2708

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APPENDIX A

Push Probe Boring Logs

SCOEPA00013530

HAHN & ASSOCIATES, INC. 434 NW Sixth Avenue Portland, Oregon (503) 796-0717	**SOIL BORING NUMBER**	**B-53**		
PROJECT: NW Natural Gasco Facility Portland, Oregon	HAI LOGGER:	Rob Ede	DRILL START Time: 14:30 Date: 06/07/04	DRILL FINISH Time: 16:15 Date: 06/07/04
	SAMPLING METHOD:	Macro Core		
	DRILLING METHOD:	Push Probe / Direct Push		
	EQUIPMENT TYPE	Geo-Probe 6600		
	DRILLER:	Neil Kranz		
PROJECT #: 2708	DRILLING CONTRACTOR:	Geo-Tech Explorations, Inc.		

BORING DIAMETER:	2-inch
CASING DIAMETER:	3.25" steel temp. from 0-30' bgs
SURFACE ELEVATION:	31.36
TOP OF CASING ELEVATION:	Not Applicable

ABANDONMENT DETAILS	SAMPLE NUMBER*	TIME	HEADSPACE (ppm)	LAB RESULTS Total PAHs (ppm)	CORE INTERVAL	RECOVERY INTERVAL	DEPTH (feet)	GROUNDWATER	STRATA (USCS)	SOIL DESCRIPTION
Bentonite Chips							1		GP	Grass surface Silty Sandy GRAVEL - brown, dry, plant matter/brick fragments/concrete in upper 2.5' bgs, no tar or staining, no petroleum odor, no sheen (0-2.5' bgs)
							2			
	011	14:45	0.0				3		ML	Gravelly SILT - brown, moist, some small brick fragments, black coal (carbon pitch?) fragments, no petroleum odor, no sheen (2.5-4.5' bgs)
							4			
							5			
							6			Gravelly Sandy SILT - brown, moist, clear broken glass @ 6' bgs, concrete and brick fragments @ 9' bgs, some black flecks (carbon pitch?) in silt from 7-9' bgs (3-4 mm size), no petroleum odor, no sheen (5-9' bgs)
							7			
	BAG	14:55	0.0				8			
							9			
							10			
							11			Silty GRAVEL/debris (brick/concrete) - moist, no petroleum odor, no sheen.
							12			
							13		GM	Silty Sandy GRAVEL (brick/concrete) - no petroleum odor, no sheen, sampler bent at 12-15 ' bgs push. Refusal @ 15' bgs. Hole moved 5 feet south due to debris in soil.
							14			
							15	▽		
							16			Note: Sampling below 15 feet bgs was from new hole located 5 feet south of original hole.
							17			
	BAG	16:10	0.0				18		ML	Gravelly SILT - wet, brown with orange and gray mottling, black carbon pitch flecks, sticky, slightly plastic, carbon pitch odor, no sheen (15-18'
							19			
							20			

SCOEPA00013531

HAHN & ASSOCIATES, INC. 434 NW Sixth Avenue Portland, Oregon (503) 796-0717	**SOIL BORING NUMBER**	**B-53**		
	HAI LOGGER:	Rob Ede	DRILL START	DRILL FINISH
PROJECT: NW Natural Gasco Facility Portland, Oregon	SAMPLING METHOD:	Macro Core	Time: 14:30	Time: 16:15
	DRILLING METHOD:	Push Probe / Direct Push		
	EQUIPMENT TYPE	Geo-Probe 6600		
	DRILLER:	Neil Kranz	Date: 06/07/04	Date: 06/07/04
PROJECT #: 2708	DRILLING CONTRACTOR:	Geo-Tech Explorations, Inc.		

BORING DIAMETER:	2-inch
CASING DIAMETER:	3.25" steel temp. from 0-30' bgs
SURFACE ELEVATION:	31.36
TOP OF CASING ELEVATION:	Not Applicable

ABANDONMENT DETAILS	SAMPLE NUMBER*	TIME	HEADSPACE (ppm)	LAB RESULTS Total PAHs (ppm)	CORE INTERVAL	RECOVERY INTERVAL	DEPTH (feet)	GROUNDWATER	STRATA (USCS)	SOIL DESCRIPTION
Bentonite Chips							21		ML	Gravelly SILT with brick and wood fragments - wet, pieces of concrete, pitch odor, no sheen (20-21' bgs)
							22			Gravelly Sandy SILT - black to gray, moist to wet, very slight carbon pitch odor, no sheen. Larger concrete and brick fragments at base, hard tar fragments, no sheen (21-23' bgs)
							23			
							24			
							25			
							26		GM	Silty Sandy GRAVEL - brick fragments, dark gray with some green/blue/black coloration with crumbled green/gray rock fragments and pitch (black coloration), piece of rock with copper wire embedded at 26.5' bgs, wood fragments at base.
	012	16:45	1.2				27			
							28			
							29			
							30			Refusal on rock @ 29 feet bgs. Boring terminated at 29 feet bgs. Sample prefix = 2708-040607
							31			
							32			
							33			
							34			
							35			
							36			
							37			
							38			
							39			
							40			

SCOEPA00013532

HAHN & ASSOCIATES, INC. 434 NW Sixth Avenue Portland, Oregon (503) 796-0717	**SOIL BORING NUMBER**	**B-54**		
PROJECT: NW Natural Gasco Facility Portland, Oregon	HAI LOGGER:	Rob Ede	DRILL START Time:	DRILL FINISH Time:
	SAMPLING METHOD:	Macro Core	9:20	10:10
	DRILLING METHOD:	Push Probe / Direct Push		
	EQUIPMENT TYPE	Geo-Probe 6600		
	DRILLER:	Neil Kranz	Date:	
PROJECT #: 2708	DRILLING CONTRACTOR:	Geo-Tech Explorations, Inc.	06/08/04	06/08/04

BORING DIAMETER:	2-inch
CASING DIAMETER:	Not Applicable
SURFACE ELEVATION:	30.83
TOP OF CASING ELEVATION:	Not Applicable

ABANDONMENT DETAILS	SAMPLE NUMBER*	TIME	HEADSPACE (ppm)	LAB RESULTS Total PAHs (ppm)	DEPTH (feet)	STRATA (USCS)	SOIL DESCRIPTION
Bentonite Chips					1	SM	Grass surface Silty SAND with Gravel - brown, dry, fine-grained sand, pieces of brick and concrete throughout, becomes moist and gray with wood fragments at 3.5-4.0' bgs, no petroleum odor, no sheen (0-4.5' bgs)
					2		
	013	9:30	2.6		3		
					4		
					5		
					6		Silty SAND with Gravel - concrete and brick fragments, no petroleum odor, no sheen (5-6' bgs)
					7	ML	Sandy gravelly SILT - gray with tan/orange mottling, moist, slightly plastic, angular gravels (up to 40 mm) no petroleum odor, no sheen (6-8' bgs)
	014	9:38	0.1		8		
					9		
					10		
					11		Silty GRAVEL - olive-gray to brown, very moist, concrete, vesicular basalt or slag, black sandy/silty carbon pitch, no sheen, carbon pitch odor, hydrophobic gray film in water (pitch), no oil, no tar (10-13.5' bgs)
					12		
					13		
	BAG	9:45	4.9		14		
					15		
					16	GM	Refusal on concrete at 17' bgs. Relocated boring 20 feet to the southwest for 17-20' sample.
	BAG	9:50	6.2		17		Sandy gravelly SILT - brown, moist, angular gravels up to ~ 10 mm, minor plant matter, few black patchy zones (carbon pitch), brick fragments, concrete piece at 19-19.1" bgs, below is black silty sand with gravel, apparent carbon pitch, possible tar fragments, no oil, no sheen (15-20' bgs)
					18		
					19		
	BAG	10:05	3.4		20		Refusal on wet concrete or hard rock at 20.5' bgs.

SCOEPA00013533

HAHN & ASSOCIATES, INC. 434 NW Sixth Avenue Portland, Oregon (503) 796-0717	**SOIL BORING NUMBER**	**B-55**		
PROJECT: NW Natural Gasco Facility Portland, Oregon	HAI LOGGER:	Rob Ede	DRILL START Time:	DRILL FINISH Time:
	SAMPLING METHOD:	Macro Core	9:15	13:15
	DRILLING METHOD:	Push Probe / Direct Push		
	EQUIPMENT TYPE	Geo-Probe 6600		
	DRILLER:	Neil Kranz	Date:	
PROJECT #: 2708	DRILLING CONTRACTOR:	Geo-Tech Explorations, Inc.	06/07/04	06/07/04

BORING DIAMETER:	2-inch
CASING DIAMETER:	3.25" set at 35' bgs
SURFACE ELEVATION:	32.27
TOP OF CASING ELEVATION:	Not Applicable

ABANDONMENT DETAILS	SAMPLE NUMBER*	TIME	HEADSPACE (ppm)	LAB RESULTS NW-TPH Dx (ppm)	DEPTH (feet)	STRATA (USCS)	SOIL DESCRIPTION
Bentonite Chips					1	SM	Grass surface Silty SAND with Gravel - brown, dry, no petroleum odor, no sheen (0-1' bgs)
					2	GP	GRAVEL and CONCRETE - 1-1.5' bgs
	006	9:20	588		3		Sandy silty GRAVEL in TAR matrix - moist, black, ductile (1.5-3.5' bgs)
					4		
					5	GM	
					6		
					7		Sandy silty GRAVEL in TAR matrix - black, moist, angular, large gravels (60 mm), slightly ductile, with patches of viscous, but wet (semi-liquid) tar, brown silt visible towards base of core (5-9' bgs)
					8		
	007	9:30	86		9		
					10		
Bentonite Grout					11		
					12	GM	Sandy silty GRAVEL in TAR matrix - black, moist, angular, large gravels (60 mm), slightly elastic, with patches of viscous, but wet (semi-liquid) tar, patches of black liquid oil observed when break open the semi-ductile tarry matrix (10-13' bgs)
	BAG	9:35	675.0		13		
					14		
					15		
					16		
					17	SM	Silty SAND with gravel - black, moist, not ductile, less tar (black pitch contributing to coloration?), wood fragments at 18' bgs, below which is gray silty sandy gravel, no tar or oil observed below 18' bgs (15-19" bgs)
					18		
	BAG	9:40	8.1		19	GM	
					20		

SCOEPA00013534

HAHN & ASSOCIATES, INC. 434 NW Sixth Avenue Portland, Oregon (503) 796-0717	**SOIL BORING NUMBER**	**B-55**		
PROJECT: NW Natural Gasco Facility Portland, Oregon	HAI LOGGER:	Rob Ede	DRILL START Time: 9:15	DRILL FINISH Time: 13:15
	SAMPLING METHOD:	Macro Core		
	DRILLING METHOD:	Push Probe / Direct Push		
	EQUIPMENT TYPE	Geo-Probe 6600		
	DRILLER:	Neil Kranz	Date: 06/07/04	 06/07/04
PROJECT #: 2708	DRILLING CONTRACTOR:	Geo-Tech Explorations, Inc.		

BORING DIAMETER:	2-inch
CASING DIAMETER:	3.25" set at 35' bgs
SURFACE ELEVATION:	32.27
TOP OF CASING ELEVATION:	Not Applicable

ABANDONMENT DETAILS	SAMPLE NUMBER*	TIME	HEADSPACE (ppm)	LAB RESULTS NW-TPH Dx (ppm)	DEPTH (feet)	GROUNDWATER	STRATA (USCS)	SOIL DESCRIPTION
Bentonite Grout					21		ML	Tarry SILT with few large angular gravels (30-40mm) - black, moist, semi-elastic, dry (no wet tar zones) (20-22' bgs)
					22		GP	GRAVEL with sand - gray, dry, fine grained sand, no sheen, no tar, no oil (22-22.5' bgs)
					23		PITCH	PITCH? - dark brown to black, brittle, hard, solid, dry, silt-sized particles, hydrophobic, shiny on broken surfaces (like coal), no sheen, no tar, no oil (22.5-25' bgs)
					24			
	008	9:50	7.7		25			
					26		ML	Sandy SILT - olive gray with slight brown to orange mottling, <1% mica, fine grained, few very thin rootlets, has sheen, no oil, no tar (25-27.5' bgs)
					27			
					28			
	BAG	10:10	56.2		29			
					30	▽	SP	SAND - gray, moist, fine-grained, grains have light coating of brown oil, silt layers ~10mm thick within sand, silt is olive/gray-brown, sheen (27.5-28.5' bgs)
					31			
	BAG	10:28	60.2		32			SAND - brown to silver (due to sheen on core), wet, fine grained, rainbow sheen with several patches of brown oil coating core at 32' bgs
					33		SM	
					34		SP ML	Sandy SILT - brown, moist, non-plastic, fine grained, no sheen, no oil, no tar (32-32.5' bgs)
	BAG	10:30	7.5		35			SAND - wet, grey, fine-grained, <1% mica, small (<1mm) shell fragments, no sheen, no oil, no tar (32.5-33.5) SILT - tan with orange mottling, moist, slightly plastic, no sheen, no oil, no tar (33.5-34' bgs)
					36		SP	
					37			SAND - grey, fine to medium grained, subrounded, no sheen, no oil, no tar (34-34.5)
					38			NOTE: Set 3.25 inch OD steel protective casing to 35 feet bgs @ 10:45, 6/7/04.
					39			SAND - gray, wet, fine-grained, thin brown silt layer (1/2") at 36' bgs, no sheen, no oil, no tar, no petroleum odor (35-39' bgs)
	009	11:35	6.4		40		SM	

SCOEPA00013535

HAHN & ASSOCIATES, INC. 434 NW Sixth Avenue Portland, Oregon (503) 796-0717	**SOIL BORING NUMBER**	**B-55**		
PROJECT: NW Natural Gasco Facility Portland, Oregon	HAI LOGGER:	Rob Ede	DRILL START Time:	DRILL FINISH Time:
	SAMPLING METHOD:	Macro Core	9:15	13:15
	DRILLING METHOD:	Push Probe / Direct Push		
	EQUIPMENT TYPE	Geo-Probe 6600		
	DRILLER:	Neil Kranz	Date:	
PROJECT #: 2708	DRILLING CONTRACTOR:	Geo-Tech Explorations, Inc.	06/07/04	06/07/04

ABANDONMENT DETAILS	SAMPLE NUMBER*	TIME	HEADSPACE (ppm)	LAB RESULTS NW-TPH Dx (ppm)	CORE INTERVAL	RECOVERY INTERVAL	DEPTH (feet)	GROUNDWATER	STRATA (USCS)	SOIL DESCRIPTION
							41			
							42		SP	SAND - gray, wet, fine-grained, subangular, several sandy silt layers (all less than 1" thick), few white shell fragments, ~4 layers of silt within lower 2' of core, 1 layer in upper 3' of core, no petroleum odor, no sheen (40-44.5' bgs)
							43			
Bentonite Grout	BAG	11:45	14.8				44			
							45			
							46		SM	Silty SAND - gray, wet, muscovite/mica (<1%), shell fragments (<1mm), few fine grained sand lavers (<1"), no petroleum odor, no sheen (45-47' bgs)
							47			
							48		ML	Sandy SILT - gray, moist, slightly plastic, some mica, no petroleum odor, no sheen (47-47.5' bgs)
							49		SP	SAND - gray, subangular, fine-grained, poorly graded, mica (<1%), no petroleum odor, no sheen (47.5-50' bgs)
	010	11:55					50			Boring terminated at 50' bgs. Pressure grouted from bottom to approximately 10 feet bgs. Bentonite chips from 0-10' bgs. Sample Prefix = 2708-040607-
							51			
							52			
							53			
							54			
							55			
							56			
							57			
							58			
							59			
							60			

BORING DIAMETER:	2-inch
CASING DIAMETER:	3.25" set at 35' bgs
SURFACE ELEVATION:	32.27
TOP OF CASING ELEVATION:	Not Applicable

SCOEPA00013536

HAHN & ASSOCIATES, INC. 434 NW Sixth Avenue Portland, Oregon (503) 796-0717	**SOIL BORING NUMBER**	**B-56**		
PROJECT: NW Natural Gasco Facility Portland, Oregon	HAI LOGGER:	Rob Ede / Andy Rolinger	DRILL START Time: 8:50 Date: 06/01/04	DRILL FINISH Time: 12:00 Date: 06/02/04
PROJECT #: 2708	SAMPLING METHOD:	Macro Core		
	DRILLING METHOD:	Push Probe / Direct Push		
	EQUIPMENT TYPE	Geo-Probe 6600		
	DRILLER:	Neil Kranz		
	DRILLING CONTRACTOR:	Geo-Tech Explorations, Inc.		

BORING DIAMETER:	2-inch
CASING DIAMETER:	3.25" steel temp. from 0-30' bgs
SURFACE ELEVATION:	25.74
TOP OF CASING ELEVATION:	Not Applicable

ABANDONMENT DETAILS	SAMPLE NUMBER*	TIME	HEADSPACE (ppm)	LAB RESULTS Total PAHs (ppm)	DEPTH (feet)	STRATA (USCS)	SOIL DESCRIPTION
Bentonite Chips					1	GP	Grass surface Sandy Silty GRAVEL - brown and gray, angular, dry, no petroleum odor, no sheen
					2		
	001	9:00	0.3		3	ML	Sandy Gravelly SILT - brown to orange, dry, non-plastic, 30% gravels, becoming less gravelly and slightly plastic below 3' bgs, no petroleum odor, no sheen (1.5-5' bgs)
					4		
					5		
					6		Sandy Silty GRAVEL - brown with orange to red and green mottling in silt, slightly moist, 50% gravels, sands are very fine grained, gravels are angular and up to 20mm diameter, no petroleum odor, no sheen (5-7.5' bgs)
					7		
	002	9:05	0.7		8		
					9		
					10		
Bentonite Grout					11		Sandy Silty GRAVEL - as above, silts are moist, brown wih gray mottling below 13'. Brick fragment at 14' bgs, gravels are very angular to rounded, no petroleum odor, no sheen (10-14.5' bgs)
	003	9:20	1		12	GM	
					13		
					14		
					15		
					16		Sandy Silty GRAVEL - as above to 17' bgs, large (up to 50 mm) rounded and angular gravels below 17', no petroleum odor, no sheen (15-18' bgs)
					17		
					18		
	BAG	9:35	2.4		19	SP	Gravelly SAND - dark gray, wet, fine grained rounded sand, ~ 90% sand, likely solid carbon pitch within the sand, pitch odor, no sheen (18-19' bgs)
					20		

SCOEPA00013537

HAHN & ASSOCIATES, INC. 434 NW Sixth Avenue Portland, Oregon (503) 796-0717	SOIL BORING NUMBER B-56			
PROJECT: NW Natural Gasco Facility Portland, Oregon	HAI LOGGER:	Rob Ede / Andy Rolinger	DRILL START Time:	DRILL FINISH Time:
	SAMPLING METHOD:	Macro Core	8:50	12:00
	DRILLING METHOD:	Push Probe / Direct Push		
	EQUIPMENT TYPE	Geo-Probe 6600		
	DRILLER:	Neil Kranz	Date:	Date:
PROJECT #: 2708	DRILLING CONTRACTOR:	Geo-Tech Explorations, Inc.	06/01/04	06/02/04

BORING DIAMETER:	2-inch
CASING DIAMETER:	3.25" steel temp. from 0-30' bgs
SURFACE ELEVATION:	25.74
TOP OF CASING ELEVATION:	Not Applicable

ABANDONMENT DETAILS	SAMPLE NUMBER*	TIME	HEADSPACE (ppm)	LAB RESULTS Total PAHs (ppm)	CORE INTERVAL	RECOVERY INTERVAL	DEPTH (feet)	GROUNDWATER	STRATA (USCS)	SOIL DESCRIPTION
Bentonite Grout							21		SP	SAND - gray, wet, very fine grained, poorly graded, rounded, naphthalene odor, becomes tarry (black, ductile) from 22.5 - 23' bgs. no oil identified, slight sheen. Shoe of core (~2 inches below 23' bgs is gray sand, very fine grained, few very fine rootlets, orange oxidation staining, no tar or oil observed below 23' bgs (20-23' bgs)
							22			
	BAG		35.3				23			
							24			
							25			
							26		SM	Silty SAND - gray, wet, fine-grained, less than 1% mica, subangular, no petroleum odor, no sheen (25-26' bgs)
	004	9:55	9.4				27		SP	SAND - gray, wet, poorly graded, fine-grained, no petroleum odor, no sheen (26-28.5' bgs)
							28			
							29		SM	Silty SAND - gray, wet, fine-grained, less than 1% mica, subangular, no petroleum odor, no sheen (28.5-29' bgs)
							30		SP	SAND - gray, wet, poorly graded, fine-grained, < 1% mica, no petroleum odor, no sheen (29-32' bgs)
							31			Note: Set temporary 3.25 inch OD steel protective casing to 30 feet bgs at 10:00, 6/01/04.
							32			
							33		SM	Silty SAND - gray, very moist to wet, fine-grained, less than 1% mica, subangular, no petroleum odor, no sheen (32-33' bgs)
	BAG	10:28	4.9				34		SP	SAND - gray, wet, poorly graded, very fine-grained, small white shell fragments (<1mm) at 34' bgs, no petroleum odor, no sheen (33-35' bgs)
							35			
							36		SM	Silty SAND - gray, wet, poorly graded, very fine-grained, small white shell fragments (< 1mm), plant matter (< 1%), no petroleum odor, no sheen (35-36' bgs).
							37		SP	SAND - gray, wet, poorly graded, fine-grained, mica (< 1%), no sheen, slight petroleum odor? (36-39' bgs).
							38			
	BAG	10:40	5.3				39			
							40			

SCOEPA00013538

HAHN & ASSOCIATES, INC. 434 NW Sixth Avenue Portland, Oregon (503) 796-0717	SOIL BORING NUMBER B-56			
PROJECT: NW Natural Gasco Facility Portland, Oregon PROJECT #: 2708	HAI LOGGER:	Rob Ede / Andy Rolinger	DRILL START Time: 8:50 Date: 06/01/04	DRILL FINISH Time: 12:00 Date: 06/02/04
	SAMPLING METHOD:	Macro Core		
	DRILLING METHOD:	Push Probe / Direct Push		
	EQUIPMENT TYPE	Geo-Probe 6600		
	DRILLER:	Neil Kranz		
	DRILLING CONTRACTOR:	Geo-Tech Explorations, Inc.		

BORING DIAMETER:	2-inch
CASING DIAMETER:	3.25" steel temp. from 0-30' bgs
SURFACE ELEVATION:	25.74
TOP OF CASING ELEVATION:	Not Applicable

ABANDONMENT DETAILS	SAMPLE NUMBER*	TIME	HEADSPACE (ppm)	LAB RESULTS Total PAHs (ppm)	CORE INTERVAL	RECOVERY INTERVAL	DEPTH (feet)	GROUNDWATER	STRATA (USCS)	SOIL DESCRIPTION
Bentonite Grout							41		SP	SAND - gray, wet, very fine-grained, subangular, no petroleum odor, no sheen, SILT layers at: 41' bgs (3" thick), 41.5' bgs (2" thick), and 43.5' bgs (3" thick), the Silt is gray, moist, slightly plastic (40-44.5' bgs)
							42			
							43			
							44			
	BAG	11:00	0.9				45			
							46			SAND - gray, wet, poorly graded, very fine-grained, subangular, no petroleum odor, no sheen (45-48' bgs).
							47			
							48			
	BAG	11:15	0.5				49		ML	Sandy SILT - gray, wet, slightly plastic, no petroleum odor, no sheen (48-49' bgs)
							50		SP	SAND - gray, wet, very fine-grained, poorly graded, subangular, no petroleum odor, no sheen, (49-49.5' bgs)
							51			
							52			
							53			
							54			
							55			
							56			
							57			
							58			
							59			
							60			

SCOEPA00013539

HAHN & ASSOCIATES, INC. 434 NW Sixth Avenue Portland, Oregon (503) 796-0717	**SOIL BORING NUMBER**	**B-56**		
PROJECT: NW Natural Gasco Facility Portland, Oregon	HAI LOGGER:	Rob Ede / Andy Rolinger	DRILL START Time: 8:50 Date: 06/01/04	DRILL FINISH Time: 12:00 Date: 06/02/04
PROJECT #: 2708	SAMPLING METHOD:	Macro Core		
	DRILLING METHOD:	Push Probe / Direct Push		
	EQUIPMENT TYPE	Geo-Probe 6600		
	DRILLER:	Neil Kranz		
	DRILLING CONTRACTOR:	Geo-Tech Explorations, Inc.		

ABANDONMENT DETAILS	SAMPLE NUMBER*	TIME	HEADSPACE (ppm)	LAB RESULTS Total PAHs (ppm)	CORE INTERVAL	RECOVERY INTERVAL	DEPTH (feet)	GROUNDWATER	STRATA (USCS)	SOIL DESCRIPTION
Bentonite Grout							61		SP	SAND - gray, wet, fine-grained, poorly graded, sub-angular, no petroleum odor, no sheen, Silty SAND layer at: 64.5' bgs (2" thick), the Silty Sand is gray, moist, with few white shell fragments (<1mm) (60-65'bgs)
							62			
							63			
							64			
	BAG	11:45	0.7				65			
							66			
							67			
							68			
							69			
							70			
							71		SP	SAND - gray, wet, fine to medium-grained, poorly graded, sub-angular, no petroleum odor, no sheen (70-71' bgs)
							72		SM	Silty SAND - gray, moist, very fine grained, shell fragments (<1mm) and rootlets/plant material, no petroleum odor, no sheen (71-72' bgs)
							73		ML	SILT - gray, moist, slightly plastic, very small shell fragments (<1mm), no petroleum odor, no sheen (72-73' bgs)
	BAG	12:20	1.6				74		SP	SAND - gray, wet, very fine-grained, poorly graded, no petroleum odor, no sheen (73-74' bgs)
							75		ML	Sandy SILT - gray to light brown, moist, very fine-grained sand. Silt is non-plastic, no petroleum odor, no sheen (74-75' bgs)
							76			
							77			
							78			
							79			
							80			

SCOEPA00013540

HAHN & ASSOCIATES, INC. 434 NW Sixth Avenue Portland, Oregon (503) 796-0717	**SOIL BORING NUMBER**	**B-56**		
PROJECT:	HAI LOGGER:	Rob Ede / Andy Rolinger	DRILL START	DRILL FINISH
NW Natural	SAMPLING METHOD:	Macro Core	Time:	Time:
Gasco Facility	DRILLING METHOD:	Push Probe / Direct Push	8:50	12:00
Portland, Oregon	EQUIPMENT TYPE	Geo-Probe 6600	Date:	Date:
PROJECT #: 2708	DRILLER:	Neil Kranz	06/01/04	06/02/04
	DRILLING CONTRACTOR:	Geo-Tech Explorations, Inc.		

BORING DIAMETER:	2-inch
CASING DIAMETER:	3.25" steel temp. from 0-30' bgs
SURFACE ELEVATION:	25.74
TOP OF CASING ELEVATION:	Not Applicable

ABANDONMENT DETAILS	SAMPLE NUMBER*	TIME	HEADSPACE (ppm)	LAB RESULTS Total PAHs (ppm)	CORE INTERVAL	RECOVERY INTERVAL	DEPTH (feet)	GROUNDWATER	STRATA (USCS)	SOIL DESCRIPTION
Bentonite Grout							81		SP	SAND - gray, wet, fine-grained, poorly graded, no petroleum odor, no sheen (80-83' bgs)
							82			
							83			
									SM	Silty SAND - gray, wet, very fine-grained sand, Silt (< 20%) is wet, slight naphthalene odor?, no sheen (83-84'bgs)
	BAG	13:45	6.3				84			
							85			
							86			
							87			
							88			
							89			
							90			
							91		SP	SAND - gray, wet, fine to medium-grained, no petroleum odor, no sheen (90-91' bgs)
									ML	SILT - gray, moist, slightly plastic, few shell fragments (<1mm) (91-91.5' bgs)
							92		SP	SAND - gray, wet, fine to medium-grained, no petroleum odor, no sheen (91.5-92' bgs)
							93			SILT - gray, moist, slightly plastic, with interbedded sandy SILT and SAND layers (<2" thick) (92-94.5' bgs)
	BAG	14:55	1.3						ML	
							94			
							95			
							96			
							97			
							98			
							99			
							100			

SCOEPA00013541

HAHN & ASSOCIATES, INC. 434 NW Sixth Avenue Portland, Oregon (503) 796-0717	**SOIL BORING NUMBER**	**B-56**		
PROJECT: NW Natural Gasco Facility Portland, Oregon	HAI LOGGER:	Rob Ede / Andy Rolinger	DRILL START Time:	DRILL FINISH Time:
	SAMPLING METHOD:	Macro Core	8:50	12:00
	DRILLING METHOD:	Push Probe / Direct Push		
	EQUIPMENT TYPE	Geo-Probe 6600		
	DRILLER:	Neil Kranz	Date:	Date:
PROJECT #: 2708	DRILLING CONTRACTOR:	Geo-Tech Explorations, Inc.	06/01/04	06/02/04

ABANDONMENT DETAILS	SAMPLE NUMBER*	TIME	HEADSPACE (ppm)	LAB RESULTS Total PAHs (ppm)	CORE INTERVAL	RECOVERY INTERVAL	DEPTH (feet)	GROUNDWATER	STRATA (USCS)	SOIL DESCRIPTION	
							101			SAND - gray, moist to wet, fine to medium-grained, some mica (<1%), silt layers at 102.5', 103' and 103.5 ' bgs (each approximately 2" to 4" thick). Silt is light gray, slightly plastic, with shell fragments (<1%), unusual odor (organic?) in sand at 104' to 105' bgs, no sheen (100-105' bgs)	
							102		SP		
							103				
							104				
	BAG	15:10	1.2				**105**				
							106				
							107				
							108				
							109				
							110				
Bentonite Grout							111			SAND - gray, wet, fine to medium-grained, no petroleum odor, no sheen (110-112.5' bgs)	
							112		SP		
	BAG	15:45	1.8				113				
							114				
							115				
							116				
							117				
							118				
							119				
							120				

BORING DIAMETER:	2-inch
CASING DIAMETER:	3.25" steel temp. from 0-30' bgs
SURFACE ELEVATION:	25.74
TOP OF CASING ELEVATION:	Not Applicable

SCOEPA00013542

HAHN & ASSOCIATES, INC. 434 NW Sixth Avenue Portland, Oregon (503) 796-0717	**SOIL BORING NUMBER**	**B-56**		
	HAI LOGGER:	Rob Ede / Andy Rolinger	DRILL START	DRILL FINISH
PROJECT: NW Natural Gasco Facility Portland, Oregon	SAMPLING METHOD:	Macro Core	Time: 8:50	Time: 12:00
	DRILLING METHOD:	Push Probe / Direct Push		
	EQUIPMENT TYPE	Geo-Probe 6600		
	DRILLER:	Neil Kranz	Date: 06/01/04	Date: 06/02/04
PROJECT #: 2708	DRILLING CONTRACTOR:	Geo-Tech Explorations, Inc.		

BORING DIAMETER:	2-inch
CASING DIAMETER:	3.25" steel temp. from 0-30' bgs
SURFACE ELEVATION:	25.74
TOP OF CASING ELEVATION:	Not Applicable

ABANDONMENT DETAILS	SAMPLE NUMBER*	TIME	HEADSPACE (ppm)	LAB RESULTS Total PAHs (ppm)	CORE INTERVAL	RECOVERY INTERVAL	DEPTH (feet)	GROUNDWATER	STRATA (USCS)	SOIL DESCRIPTION
Bentonite Grout							121			
							122			
							123			
							124			
							125			
							126			
							127			
							128			
							129			
							130			
							131			
							132			
							133			
							134			
							135			
							136		SP	SAND - gray, wet, fine grained, poorly graded, subangular, no petroleum odor, no sheen (135-139' bgs)
							137			
							138			
	BAG	17:45	0.8				139			NOTE: Boring activities stopped at 17:45, 6/01/04. To resume AM 6/02/04.
							140			

SCOEPA00013543

HAHN & ASSOCIATES, INC. 434 NW Sixth Avenue Portland, Oregon (503) 796-0717	SOIL BORING NUMBER B-56			
PROJECT: NW Natural Gasco Facility Portland, Oregon	HAI LOGGER:	Rob Ede / Andy Rolinger	DRILL START Time:	DRILL FINISH Time:
	SAMPLING METHOD:	Macro Core	8:50	12:00
	DRILLING METHOD:	Push Probe / Direct Push		
	EQUIPMENT TYPE	Geo-Probe 6600		
	DRILLER:	Neil Kranz	Date:	Date:
PROJECT #: 2708	DRILLING CONTRACTOR:	Geo-Tech Explorations, Inc.	06/01/04	06/02/04

BORING DIAMETER:	2-inch
CASING DIAMETER:	3.25" steel temp. from 0-30' bgs
SURFACE ELEVATION:	25.74
TOP OF CASING ELEVATION:	Not Applicable

ABANDONMENT DETAILS	SAMPLE NUMBER*	TIME	HEADSPACE (ppm)	LAB RESULTS Total PAHs (ppm)	CORE INTERVAL	RECOVERY INTERVAL	DEPTH (feet)	GROUNDWATER	STRATA (USCS)	SOIL DESCRIPTION
Bentonite Grout							141			
							142			
							143			
							144			
							145			
							146			
							147			
							148			
							149			
							150			
							151			
							152			
							153			
							154			
							155			
							156			
							157			
							158			
							159			
							160			

SCOEPA00013544

HAHN & ASSOCIATES, INC. 434 NW Sixth Avenue Portland, Oregon (503) 796-0717	**SOIL BORING NUMBER**	**B-56**		
PROJECT: NW Natural Gasco Facility Portland, Oregon	HAI LOGGER:	Rob Ede / Andy Rolinger	DRILL START Time:	DRILL FINISH Time:
	SAMPLING METHOD:	Macro Core	8:50	12:00
	DRILLING METHOD:	Push Probe / Direct Push		
	EQUIPMENT TYPE	Geo-Probe 6600		
	DRILLER:	Neil Kranz	Date:	Date:
PROJECT #: 2708	DRILLING CONTRACTOR:	Geo-Tech Explorations, Inc.	06/01/04	06/02/04

BORING DIAMETER:	2-inch
CASING DIAMETER:	3.25" steel temp. from 0-30' bgs
SURFACE ELEVATION:	25.74
TOP OF CASING ELEVATION:	Not Applicable

ABANDONMENT DETAILS	SAMPLE NUMBER*	TIME	HEADSPACE (ppm)	LAB RESULTS Total PAHs (ppm)	CORE INTERVAL	RECOVERY INTERVAL	DEPTH (feet)	GROUNDWATER	STRATA (USCS)	SOIL DESCRIPTION
Bentonite Grout							161		SP	SAND - gray, wet, fine to medium-grained sands, no petroleum odor, no sheen. Silt layers at 162' bgs (6" thick) and 164' bgs (4" thick).
							162		ML	Silt is gray, moist, slightly plastic with small shell fragments (<1mm), no petroleum odor, no sheen (160-164' bgs)
							163		SP	
	BAG	10:30	0.7				164			
							165			
							166			
							167			
							168			
							169			
							170			
							171			
							172			
							173			
							174			
							175		GP	Sandy GRAVEL - gray, wet, slightly graded, rounded to sub-angular gravel (2mm to 2in in size) no petroleum odor, no sheen. Sand is gray, wet, fine to coarse-grained, well graded, sub-rounded grains, no petroleum odor, no sheen. Large gravels are angular basalt fragments (174-176.5' bgs).
							176			
	005	11:55	0.7				177			
							178			Refusal at 179' bgs.
							179			Boring terminated at 179' bgs at 11:55 6/2/2004. Pressure grouted from bottom to approximately 10' bgs, bentonite chips from 0-10' bgs on 6/2/2004.
							180			Sample prefix = 2708-040602

SCOEPA00013545

HAHN & ASSOCIATES, INC. 434 NW Sixth Avenue Portland, Oregon (503) 796-0717	**SOIL BORING NUMBER**	**B-56A**		
PROJECT: NW Natural Gasco Facility Portland, Oregon	HAI LOGGER:	Andy Rolinger	DRILL START Time:	DRILL FINISH Time:
	SAMPLING METHOD:	Macro Core	2:25	4:00
	DRILLING METHOD:	Push Probe / Direct Push		
	EQUIPMENT TYPE	Geo-Probe 6600		
	DRILLER:	Neil Kranz	Date:	Date:
PROJECT #: 2708	DRILLING CONTRACTOR:	Geo-Tech Explorations, Inc.	06/02/04	06/04/04

BORING DIAMETER:	2-inch
CASING DIAMETER:	3.25" steel temp. from 0-30' bgs
SURFACE ELEVATION:	25.47
TOP OF CASING ELEVATION:	Not Applicable

ABANDONMENT DETAILS	SAMPLE NUMBER*	TIME	HEADSPACE (ppm)	LAB RESULTS Total PAHs (ppm)	CORE INTERVAL	RECOVERY INTERVAL	DEPTH (feet)	GROUNDWATER	STRATA (USCS)	SOIL DESCRIPTION
Bentonite Chips							1		GP	NOTE: No soil samples collected. Pushed with well point directly to groundwater sample depths. See boring log for probe B-56 for soil description.
							2			
							3		ML	
							4			
							5			
							6			
							7			
							8			
							9			
							10			
Bentonite Grout							11		GM	
							12			
							13			
							14	▽		Water levels measured: for 18' to 22' bgs screen = 13.5' bgs for 40' to 44' bgs screen = 14.5' bgs for 80' to 84' bgs screen = 15.0' bgs for 100' to 104' bgs screen = 15.7' bgs
							15	▽		
							16	▽		
							17			
							18			
							19		SP	
							20			

GROUNDWATER SAMPLE
Installed a temporary 1-inch ID stainless steel well point with a 0.010-inch slotted screen at 18 to 22 feet bgs. Following the removal of approximately 3 gallons of water, a groundwater sample (#2708-040602-101) was collected with disposable tubing/check valve at 14:45 hours, 6/2/04. Water level was measured at 13.5 feet bgs prior to sampling. After sampling, the well point was removed from the borehole and the borehole was advanced.

SCOEPA00013546

HAHN & ASSOCIATES, INC. 434 NW Sixth Avenue Portland, Oregon (503) 796-0717	**SOIL BORING NUMBER**	**B-56A**		
PROJECT: NW Natural Gasco Facility Portland, Oregon	HAI LOGGER:	Andy Rolinger	DRILL START Time:	DRILL FINISH Time:
	SAMPLING METHOD:	Macro Core	2:25	4:00
	DRILLING METHOD:	Push Probe / Direct Push		
	EQUIPMENT TYPE	Geo-Probe 6600		
	DRILLER:	Neil Kranz	Date:	Date:
PROJECT #: 2708	DRILLING CONTRACTOR:	Geo-Tech Explorations, Inc.	06/02/04	06/04/04

BORING DIAMETER:	2-inch
CASING DIAMETER:	3.25" steel temp. from 0-30' bgs
SURFACE ELEVATION:	25.47
TOP OF CASING ELEVATION:	Not Applicable

ABANDONMENT DETAILS	SAMPLE NUMBER*	TIME	HEADSPACE (ppm)	LAB RESULTS Total PAHs (ppm)	CORE INTERVAL	RECOVERY INTERVAL	DEPTH (feet)	GROUNDWATER	STRATA (USCS)	SOIL DESCRIPTION
Bentomite Grout							21		SP	
							22			
							23			
	Water Level measured for 60' to 64' bgs screen						24	▽		
							25			
							26		SM	
							27		SP	
							28			
							29		SM	
							30		SP	
							31			
							32			
							33		SM	
Probe Rod							34		SP	
							35			
							36		SM	
							37		SP	
							38			
							39			
							40			

SCOEPA00013547

HAHN & ASSOCIATES, INC. 434 NW Sixth Avenue Portland, Oregon (503) 796-0717	**SOIL BORING NUMBER**	**B-56A**		
PROJECT: NW Natural Gasco Facility Portland, Oregon	HAI LOGGER:	Andy Rolinger	DRILL START Time: 2:25	DRILL FINISH Time: 4:00
	SAMPLING METHOD:	Macro Core		
	DRILLING METHOD:	Push Probe / Direct Push		
	EQUIPMENT TYPE	Geo-Probe 6600		
	DRILLER:	Neil Kranz	Date: 06/02/04	Date: 06/04/04
PROJECT #: 2708	DRILLING CONTRACTOR:	Geo-Tech Explorations, Inc.		

BORING DIAMETER:	2-inch
CASING DIAMETER:	3.25" steel temp. from 0-30' bgs
SURFACE ELEVATION:	25.47
TOP OF CASING ELEVATION:	Not Applicable

ABANDONMENT DETAILS	SAMPLE NUMBER*	TIME	HEADSPACE (ppm)	LAB RESULTS Total PAHs (ppm)	CORE INTERVAL	RECOVERY INTERVAL	DEPTH (feet)	GROUNDWATER	STRATA (USCS)	SOIL DESCRIPTION
Heaved Formation							41			**GROUNDWATER SAMPLE** Installed a temporary 1-inch ID stainless steel well point with a 0.010-inch slotted screen at 40 to 44 feet bgs. Following the removal of approximately 2 gallons of water, a groundwater sample (#2708-040603-102) was collected with disposable tubing/check valve at 11:55 hours, 6/3/04. Water level was measured at 14.5 feet bgs prior to sampling. After sampling, the well point was removed from the borehole and the borehole was advanced.
							42		SP	
							43			
							44			
							45			
							46			
							47			
							48			
							49		ML	
Probe Rod							50		SP	
							51			
							52			
							53			
							54			
							55			
Heaved Formation							56			
							57			
							58			
							59			
							60			

SCOEPA00013548

HAHN & ASSOCIATES, INC. 434 NW Sixth Avenue Portland, Oregon (503) 796-0717	SOIL BORING NUMBER	B-56A		
PROJECT: NW Natural Gasco Facility Portland, Oregon	HAI LOGGER:	Andy Rolinger	DRILL START Time: 2:25 Date: 06/02/04	DRILL FINISH Time: 4:00 Date: 06/04/04
	SAMPLING METHOD:	Macro Core		
	DRILLING METHOD:	Push Probe / Direct Push		
	EQUIPMENT TYPE	Geo-Probe 6600		
	DRILLER:	Neil Kranz		
PROJECT #: 2708	DRILLING CONTRACTOR:	Geo-Tech Explorations, Inc.		

BORING DIAMETER:	2-inch
CASING DIAMETER:	3.25" steel temp. from 0-30' bgs
SURFACE ELEVATION:	25.47
TOP OF CASING ELEVATION:	Not Applicable

ABANDONMENT DETAILS	SAMPLE NUMBER*	TIME	HEADSPACE (ppm)	LAB RESULTS Total PAHs (ppm)	CORE INTERVAL	RECOVERY INTERVAL	DEPTH (feet)	GROUNDWATER	STRATA (USCS)	SOIL DESCRIPTION
Heaved Formation							61		SP	**GROUNDWATER SAMPLE** Installed a temporary 1-inch ID stainless steel well point with a 0.010-inch slotted screen at 60 to 64 feet bgs. Following the removal of approximately 3 gallons of water, a groundwater sample (#2708-040603-103) was collected with disposable tubing/check valve at 14:00 hours, 6/3/04. Water level was measured at 23.5 feet bgs prior to sampling. After sampling, the well point was removed from the borehole and the borehole was advanced.
							62			
							63			
							64			
							65			
							66			
							67			
							68			
							69			
							70			
Probe Rod							71		SP	
							72		SM	
							73		ML	
							74		SP	
							75		ML	
Heaved Formation							76			
							77			
							78			
							79			
							80			

SCOEPA00013549

HAHN & ASSOCIATES, INC. 434 NW Sixth Avenue Portland, Oregon (503) 796-0717	**SOIL BORING NUMBER**	**B-56A**		
PROJECT: NW Natural Gasco Facility Portland, Oregon	HAI LOGGER:	Andy Rolinger	DRILL START Time:	DRILL FINISH Time:
	SAMPLING METHOD:	Macro Core	2:25	4:00
	DRILLING METHOD:	Push Probe / Direct Push		
	EQUIPMENT TYPE	Geo-Probe 6600		
	DRILLER:	Neil Kranz	Date:	Date:
PROJECT #: 2708	DRILLING CONTRACTOR:	Geo-Tech Explorations, Inc.	06/02/04	06/04/04

BORING DIAMETER:	2-inch
CASING DIAMETER:	3.25" steel temp. from 0-30' bgs
SURFACE ELEVATION:	25.47
TOP OF CASING ELEVATION:	Not Applicable

ABANDONMENT DETAILS	SAMPLE NUMBER*	TIME	HEADSPACE (ppm)	LAB RESULTS Total PAHs (ppm)	CORE INTERVAL	RECOVERY INTERVAL	DEPTH (feet)	GROUNDWATER	STRATA (USCS)	SOIL DESCRIPTION
Heaved Formation							81		SP	**GROUNDWATER SAMPLE** Installed a temporary 1-inch ID stainless steel well point with a 0.010-inch slotted screen at 80 to 84 feet bgs. Following the removal of approximately 3 gallons of water, two groundwater samples (#2708-040603-104 & #2708-040603-105) were collected with disposable tubing/check valve at 15:15 hours and 15:30 hours, respectively, on 6/3/04. Water level was measured at 15 feet bgs prior to sampling. After sampling, the well point was removed from the borehole and the borehole was advanced.
							82			
							83			
							84		SM	
							85			
							86			
							87			
							88			
							89			
							90			
Probe Rod							91		SP	
							92		ML	
							93		SP	
							94		ML	
							95			
Heaved Formation							96			
							97			
							98			
							99			
							100			

SCOEPA00013550

HAHN & ASSOCIATES, INC. 434 NW Sixth Avenue Portland, Oregon (503) 796-0717	**SOIL BORING NUMBER**	**B-56A**		
PROJECT: NW Natural Gasco Facility Portland, Oregon	HAI LOGGER:	Andy Rolinger	DRILL START Time:	DRILL FINISH Time:
	SAMPLING METHOD:	Macro Core	2:25	4:00
	DRILLING METHOD:	Push Probe / Direct Push		
	EQUIPMENT TYPE	Geo-Probe 6600		
	DRILLER:	Neil Kranz	Date:	Date:
PROJECT #: 2708	DRILLING CONTRACTOR:	Geo-Tech Explorations, Inc.	06/02/04	06/04/04

ABANDONMENT DETAILS	SAMPLE NUMBER*	TIME	HEADSPACE (ppm)	LAB RESULTS Total PAHs (ppm)	CORE INTERVAL	RECOVERY INTERVAL	DEPTH (feet)	GROUNDWATER	STRATA (USCS)	SOIL DESCRIPTION
Heaved Formation							101		SP	**GROUNDWATER SAMPLE** Installed a temporary 1-inch ID stainless steel well point with a 0.010-inch slotted screen at 100 to 104 feet bgs. Following the removal of approximately 3 gallons of water, a groundwater sample (#2708-040604-106) was collected with disposable tubing/check valve at 8:45 hours, 6/4/04. Water level was measured at 15.7 feet bgs prior to sampling. After sampling, the well point was removed from the borehole and the borehole was advanced.
							102			
							103			
							104			
							105			
							106			
							107			
							108			
							109			
							110			
Probe Rod							111		SP	
							112			
							113			
							114			
							115			
Heaved Formation							116			
							117			
							118			
							119			
							120			

BORING DIAMETER:	2-inch
CASING DIAMETER:	3.25" steel temp. from 0-30' bgs
SURFACE ELEVATION:	25.47
TOP OF CASING ELEVATION:	Not Applicable

SCOEPA00013551

HAHN & ASSOCIATES, INC. 434 NW Sixth Avenue Portland, Oregon (503) 796-0717	SOIL BORING NUMBER	B-56A		
PROJECT: NW Natural Gasco Facility Portland, Oregon PROJECT #: 2708	HAI LOGGER:	Andy Rolinger	DRILL START Time: 2:25 Date: 06/02/04	DRILL FINISH Time: 4:00 Date: 06/04/04
	SAMPLING METHOD:	Macro Core		
	DRILLING METHOD:	Push Probe / Direct Push		
	EQUIPMENT TYPE	Geo-Probe 6600		
	DRILLER:	Neil Kranz		
	DRILLING CONTRACTOR:	Geo-Tech Explorations, Inc.		

BORING DIAMETER:	2-inch
CASING DIAMETER:	3.25" steel temp. from 0-30' bgs
SURFACE ELEVATION:	25.47
TOP OF CASING ELEVATION:	Not Applicable

ABANDONMENT DETAILS	SAMPLE NUMBER*	TIME	HEADSPACE (ppm)	LAB RESULTS Total PAHs (ppm)	CORE INTERVAL	RECOVERY INTERVAL	DEPTH (feet)	GROUNDWATER	STRATA (USCS)	SOIL DESCRIPTION
Heaved Formation							121			
							122			
							123			
							124			
							125			
							126			
							127			
							128			
Probe Rod							129			
							130			
							131			
							132			
Heaved Formation							133			
							134			
							135			
							136			
Water Sampler							137		SP	**GROUNDWATER SAMPLE (ATTEMPTED)** Installed a temporary 1-inch ID stainless steel well point with a 0.010-inch slotted screen at 136 to 140 feet bgs. Upon removal of sampling equipment, rods spit at 30' bgs. 110' of rods stuck in hole. Boring terminated at 140' bgs. Advanced 8-inch OD hollow stem auger over sheared end of probe rod to depth of 40 feet bgs. Unable to hook and remove rod. Pressure grouted hole from 40 feet bgs to approximately 10' bgs. Bentonite chips to ground surface.
							138			
							139			
							140			

SCOEPA00013552

HAHN & ASSOCIATES, INC.	SOIL BORING NUMBER	B-56B		
434 NW Sixth Avenue Portland, Oregon (503) 796-0717	HAI LOGGER:	Andy Rolinger	DRILL START	DRILL FINISH
PROJECT:	SAMPLING METHOD:	Macro Core		
NW Natural	DRILLING METHOD:	Push Probe / Direct Push	Time:	Time:
Gasco Facility	EQUIPMENT TYPE	Geo-Probe 6600	12:00	4:30
Portland, Oregon	DRILLER:	Neil Kranz	Date:	Date:
PROJECT #: 2708	DRILLING CONTRACTOR:	Geo-Tech Explorations, Inc.	06/14/04	06/14/04

BORING DIAMETER:	2-inch
CASING DIAMETER:	3.25" steel temp. from 0-30' bgs
SURFACE ELEVATION:	25.5
TOP OF CASING ELEVATION:	Not Applicable

ABANDONMENT DETAILS	SAMPLE NUMBER*	TIME	HEADSPACE (ppm)	LAB RESULTS Total PAHs (ppm)	CORE INTERVAL	RECOVERY INTERVAL	DEPTH (feet)	GROUNDWATER	STRATA (USCS)	SOIL DESCRIPTION
Bentonite Chips							1		GP	NOTE: No soil samples collected. Pushed with well point directly to groundwater sample depths. See boring log for probe B-56 for soil description.
							2			
							3		ML	
							4			
							5			
							6			
							7			
							8			
							9			
							10			
Bentonite Grout							11			
							12		GM	
							13			
							14			
							15			
							16			
	Water Level measured for 135-139' bgs screen						17	▽		
	Water Level measured for 174-178' bgs screen							▽		
							18			
							19		SP	
							20			

SCOEPA00013553

HAHN & ASSOCIATES, INC.	SOIL BORING NUMBER	B-56B		
434 NW Sixth Avenue Portland, Oregon (503) 796-0717	HAI LOGGER:	Andy Rolinger	DRILL START	DRILL FINISH
PROJECT:	SAMPLING METHOD:	Macro Core		
NW Natural	DRILLING METHOD:	Push Probe / Direct Push	Time:	Time:
Gasco Facility	EQUIPMENT TYPE	Geo-Probe 6600	12:00	4:30
Portland, Oregon	DRILLER:	Neil Kranz	Date:	Date:
PROJECT #: 2708	DRILLING CONTRACTOR:	Geo-Tech Explorations, Inc.	06/14/04	06/14/04

BORING DIAMETER:	2-inch
CASING DIAMETER:	3.25" steel temp. from 0-30' bgs
SURFACE ELEVATION:	25.5
TOP OF CASING ELEVATION:	Not Applicable

ABANDONMENT DETAILS	SAMPLE NUMBER*	TIME	HEADSPACE (ppm)	LAB RESULTS Total PAHs (ppm)	CORE INTERVAL	RECOVERY INTERVAL	DEPTH (feet)	GROUNDWATER	STRATA (USCS)	SOIL DESCRIPTION
Bentonite Grout							21		SP	
							22			
							23			
							24			
							25			
							26		SM	
							27		SP	
							28			
							29		SM	
							30		SP	
							31			
							32			
							33		SM	
							34		SP	
							35			
							36		SM	
							37		SP	
							38			
							39			
							40			

SCOEPA00013554

HAHN & ASSOCIATES, INC. 434 NW Sixth Avenue Portland, Oregon (503) 796-0717	**SOIL BORING NUMBER**	**B-56B**		
PROJECT: NW Natural Gasco Facility Portland, Oregon	HAI LOGGER:	Andy Rolinger	DRILL START Time: 12:00	DRILL FINISH Time: 4:30
	SAMPLING METHOD:	Macro Core		
	DRILLING METHOD:	Push Probe / Direct Push		
	EQUIPMENT TYPE	Geo-Probe 6600		
	DRILLER:	Neil Kranz	Date: 06/14/04	Date: 06/14/04
PROJECT #: 2708	DRILLING CONTRACTOR:	Geo-Tech Explorations, Inc.		

BORING DIAMETER:	2-inch
CASING DIAMETER:	3.25" steel temp. from 0-30' bgs
SURFACE ELEVATION:	25.5
TOP OF CASING ELEVATION:	Not Applicable

ABANDONMENT DETAILS	SAMPLE NUMBER*	TIME	HEADSPACE (ppm)	LAB RESULTS Total PAHs (ppm)	CORE INTERVAL	RECOVERY INTERVAL	DEPTH (feet)	GROUNDWATER	STRATA (USCS)	SOIL DESCRIPTION
Bentonite Grout							41		SP	
							42			
							43			
							44			
							45			
							46			
							47			
							48			
							49		ML	
							50		SP	
							51			
							52			
							53			
							54			
							55			
							56			
							57			
							58			
							59			
							60			

SCOEPA00013555

HAHN & ASSOCIATES, INC. 434 NW Sixth Avenue Portland, Oregon (503) 796-0717	**SOIL BORING NUMBER**	**B-56B**		
PROJECT: NW Natural Gasco Facility Portland, Oregon	HAI LOGGER:	Andy Rolinger	DRILL START Time: 12:00	DRILL FINISH Time: 4:30
	SAMPLING METHOD:	Macro Core		
	DRILLING METHOD:	Push Probe / Direct Push		
	EQUIPMENT TYPE	Geo-Probe 6600		
	DRILLER:	Neil Kranz	Date: 06/14/04	Date: 06/14/04
PROJECT #: 2708	DRILLING CONTRACTOR:	Geo-Tech Explorations, Inc.		

BORING DIAMETER:	2-inch
CASING DIAMETER:	3.25" steel temp. from 0-30' bgs
SURFACE ELEVATION:	25.5
TOP OF CASING ELEVATION:	Not Applicable

ABANDONMENT DETAILS	SAMPLE NUMBER*	TIME	HEADSPACE (ppm)	LAB RESULTS Total PAHs (ppm)	CORE INTERVAL	RECOVERY INTERVAL	DEPTH (feet)	GROUNDWATER	STRATA (USCS)	SOIL DESCRIPTION
Bentonite Grout							61		SP	
							62			
							63			
							64			
							65			
							66			
							67			
							68			
							69			
							70			
							71		SP	
							72		SM	
							73		ML	
							74		SP	
							75		ML	
							76			
							77			
							78			
							79			
							80			

SCOEPA00013556

HAHN & ASSOCIATES, INC.	SOIL BORING NUMBER	B-56B		
434 NW Sixth Avenue Portland, Oregon (503) 796-0717	HAI LOGGER:	Andy Rolinger	DRILL START	DRILL FINISH
PROJECT:	SAMPLING METHOD:	Macro Core		
NW Natural	DRILLING METHOD:	Push Probe / Direct Push	Time:	Time:
Gasco Facility	EQUIPMENT TYPE	Geo-Probe 6600	12:00	4:30
Portland, Oregon	DRILLER:	Neil Kranz	Date:	Date:
PROJECT #: 2708	DRILLING CONTRACTOR:	Geo-Tech Explorations, Inc.	06/14/04	06/14/04

BORING DIAMETER:	2-inch
CASING DIAMETER:	3.25" steel temp. from 0-30' bgs
SURFACE ELEVATION:	25.5
TOP OF CASING ELEVATION:	Not Applicable

ABANDONMENT DETAILS	SAMPLE NUMBER*	TIME	HEADSPACE (ppm)	LAB RESULTS Total PAHs (ppm)	CORE INTERVAL	RECOVERY INTERVAL	DEPTH (feet)	GROUNDWATER	STRATA (USCS)	SOIL DESCRIPTION
Bentonite Grout							81		SP	
							82			
							83			
							84		SM	
							85			
							86			
							87			
							88			
							89			
							90			
							91		SP	
							92		ML	
							93		SP	
							94		ML	
							95			
							96			
							97			
							98			
							99			
							100			

SCOEPA00013557

HAHN & ASSOCIATES, INC. 434 NW Sixth Avenue Portland, Oregon (503) 796-0717	SOIL BORING NUMBER	B-56B		
PROJECT:	HAI LOGGER:	Andy Rolinger	DRILL START	DRILL FINISH
NW Natural	SAMPLING METHOD:	Macro Core	Time:	Time:
Gasco Facility	DRILLING METHOD:	Push Probe / Direct Push	12:00	4:30
Portland, Oregon	EQUIPMENT TYPE	Geo-Probe 6600	Date:	Date:
PROJECT #: 2708	DRILLER:	Neil Kranz	06/14/04	06/14/04
	DRILLING CONTRACTOR:	Geo-Tech Explorations, Inc.		

BORING DIAMETER:	2-inch
CASING DIAMETER:	3.25" steel temp. from 0-30' bgs
SURFACE ELEVATION:	25.5
TOP OF CASING ELEVATION:	Not Applicable

ABANDONMENT DETAILS	SAMPLE NUMBER*	TIME	HEADSPACE (ppm)	LAB RESULTS Total PAHs (ppm)	CORE INTERVAL	RECOVERY INTERVAL	DEPTH (feet)	GROUNDWATER	STRATA (USCS)	SOIL DESCRIPTION
Bentonite Grout							101		SP	
							102			
							103			
							104			
							105			
							106			
							107			
							108			
							109			
							110			
							111		SP	
							112			
							113			
							114			
							115			
							116			
							117			
							118			
							119			
							120			

SCOEPA00013558

HAHN & ASSOCIATES, INC.	SOIL BORING NUMBER	B-56B		
434 NW Sixth Avenue Portland, Oregon (503) 796-0717	HAI LOGGER:	Andy Rolinger	DRILL START	DRILL FINISH
PROJECT: NW Natural Gasco Facility Portland, Oregon	SAMPLING METHOD:	Macro Core	Time: 12:00	Time: 4:30
	DRILLING METHOD:	Push Probe / Direct Push		
	EQUIPMENT TYPE	Geo-Probe 6600		
	DRILLER:	Neil Kranz	Date: 06/14/04	Date: 06/14/04
PROJECT #: 2708	DRILLING CONTRACTOR:	Geo-Tech Explorations, Inc.		

BORING DIAMETER:	2-inch
CASING DIAMETER:	3.25" steel temp. from 0-30' bgs
SURFACE ELEVATION:	25.5
TOP OF CASING ELEVATION:	Not Applicable

ABANDONMENT DETAILS	SAMPLE NUMBER*	TIME	HEADSPACE (ppm)	LAB RESULTS Total PAHs (ppm)	CORE INTERVAL	RECOVERY INTERVAL	DEPTH (feet)	GROUNDWATER	STRATA (USCS)	SOIL DESCRIPTION
Bentonite Grout							121			
							122			
							123			
							124			
							125			
							126			
							127			
							128			
							129			
							130			
							131			
							132			
							133			
							134			
							135			
							136			
							137		SP	**GROUNDWATER SAMPLE** Installed a temporary 1-inch ID stainless steel well point with a 0.010-inch slotted screen at 136 to 140 feet bgs. Following the removal of approximately 4 gallons of water, a groundwater sample (#2708-040614-115) was collected with disposable tubing/check valve at 13:45 hours, 6/14/04. Water level was measured at 16.9 feet bgs prior to sampling. After sampling, the well point was removed from the borehole and the borehole was advanced.
							138			
							139			
							140			

SCOEPA00013559

HAHN & ASSOCIATES, INC. 434 NW Sixth Avenue Portland, Oregon (503) 796-0717	SOIL BORING NUMBER	B-56B		
PROJECT: NW Natural Gasco Facility Portland, Oregon	HAI LOGGER:	Andy Rolinger	DRILL START Time: 12:00	DRILL FINISH Time: 4:30
	SAMPLING METHOD:	Macro Core		
	DRILLING METHOD:	Push Probe / Direct Push		
	EQUIPMENT TYPE	Geo-Probe 6600		
	DRILLER:	Neil Kranz	Date: 06/14/04	Date: 06/14/04
PROJECT #: 2708	DRILLING CONTRACTOR:	Geo-Tech Explorations, Inc.		

ABANDONMENT DETAILS	SAMPLE NUMBER*	TIME	HEADSPACE (ppm)	LAB RESULTS Total PAHs (ppm)	CORE INTERVAL	RECOVERY INTERVAL	DEPTH (feet)	GROUNDWATER	STRATA (USCS)	SOIL DESCRIPTION
							141			
							142			
							143			
							144			
							145			
							146			
							147			
							148			
Bentonite Grout							149			
							150			
							151			
							152			
							153			
							154			
							155			
							156			
							157			
							158			
							159			
							160			

BORING DIAMETER:	2-inch
CASING DIAMETER:	3.25" steel temp. from 0-30' bgs
SURFACE ELEVATION:	25.5
TOP OF CASING ELEVATION:	Not Applicable

SCOEPA00013560

HAHN & ASSOCIATES, INC. 434 NW Sixth Avenue Portland, Oregon (503) 796-0717	**SOIL BORING NUMBER**	**B-56B**		
PROJECT: NW Natural Gasco Facility Portland, Oregon	HAI LOGGER:	Andy Rolinger	DRILL START Time: 12:00 Date: 06/14/04	DRILL FINISH Time: 4:30 Date: 06/14/04
	SAMPLING METHOD:	Macro Core		
	DRILLING METHOD:	Push Probe / Direct Push		
	EQUIPMENT TYPE	Geo-Probe 6600		
	DRILLER:	Neil Kranz		
PROJECT #: 2708	DRILLING CONTRACTOR:	Geo-Tech Explorations, Inc.		

BORING DIAMETER:	2-inch
CASING DIAMETER:	3.25" steel temp. from 0-30' bgs
SURFACE ELEVATION:	25.5
TOP OF CASING ELEVATION:	Not Applicable

ABANDONMENT DETAILS	SAMPLE NUMBER*	TIME	HEADSPACE (ppm)	LAB RESULTS Total PAHs (ppm)	CORE INTERVAL	RECOVERY INTERVAL	DEPTH (feet)	GROUNDWATER	STRATA (USCS)	SOIL DESCRIPTION
Bentonite Grout							161		SP	
							162		ML	
							163		SP	
							164			
							165			
							166			
							167			
							168			
							169			
							170			
							171			
							172			
							173			
							174			
							175		GP	**GROUNDWATER SAMPLE** Installed a temporary 1-inch ID stainless steel well point with a 0.010-inch slotted screen at 174 to 178 feet bgs. Following the removal of approximately 4 gallons of water, a groundwater sample (#2708-040614-116) was collected with disposable tubing/check valve at 16:00 hours, 6/14/04. Water level was measured at 17.5 feet bgs prior to sampling. After sampling, the well point was removed from the borehole.
							176			
							177			
							178			Boring terminated at 16:30 hours, 6/14/04
							179			Pressure grouted from bottom to approximately 10' bgs on 6/15/04. Bentonite chips to top.
							180			

SCOEPA00013561

HAHN & ASSOCIATES, INC. 434 NW Sixth Avenue Portland, Oregon (503) 796-0717	**SOIL BORING NUMBER**	**B-57**		
PROJECT: NW Natural Gasco Facility Portland, Oregon	HAI LOGGER:	Rob Ede	DRILL START Time: 10:45	DRILL FINISH Time: 16:00
	SAMPLING METHOD:	Macro Core		
	DRILLING METHOD:	Push Probe / Direct Push		
	EQUIPMENT TYPE	Geo-Probe 6600		
	DRILLER:	Neil Kranz	Date:	
PROJECT #: 2708	DRILLING CONTRACTOR:	Geo-Tech Explorations, Inc.	06/08/04	06/08/04

BORING DIAMETER:	2-inch
CASING DIAMETER:	3.25" steel temporary set at 45' bgs
SURFACE ELEVATION:	31.46
TOP OF CASING ELEVATION:	Not Applicable

ABANDONMENT DETAILS	SAMPLE NUMBER*	TIME	HEADSPACE (ppm)	LAB RESULTS NW-TPH Dx (ppm)	CORE INTERVAL	RECOVERY INTERVAL	DEPTH (feet)	GROUNDWATER	STRATA (USCS)	SOIL DESCRIPTION
Bentonite Chips							1			Grass surface Silty SAND with Gravel - brown, dry, gravels up to 20 mm, rounded, angular, tarry at 2' bgs, sandy gravel in a tar matrix, tar is solid, but discontinuous with large rock fragments and concrete (0-3' bgs)
							2			
	BAG	11:00	63.5				3		SP	
							4			
							5			
							6			Silty SAND with Gravel - patchy tar, black tar in brown sand matrix (5-7.5' bgs)
							7			
							8			
	BAG	11:05	756				9			Gravelly SILT with TAR - very moist, black to brown, ductile, plastic, tar becomes somewhat liquid (black & viscous) at base of core (7.5-9.5' bgs)
							10			
Bentonite Grout							11			Gravelly SILT with TAR - moist, black to dark gray with minor brown zones, tar is observed to have zones which are more oily when broken open, thick black oil-blebs (~1 to 2 mm diameter), ductile, moderate creosote odor, some gravels have green/gray color (10-14' bgs)
							12		ML	
							13			
	BAG	11:07	249				14			
							15			
							16			Silty GRAVEL - tarry, slightly moist, dark brown to black, tar is less than 30%, non-ductile, slightly plastic, gravel/concrete zone at 17' bgs (3" thick), becoming more tarry and oily below 18' bgs, strong creosote odor (15-18.5' bgs)
							17		GM	
							18			
	BAG	11:15	117				19			
							20			

SCOEPA00013562

HAHN & ASSOCIATES, INC. 434 NW Sixth Avenue Portland, Oregon (503) 796-0717	**SOIL BORING NUMBER**	**B-57**		
PROJECT:	HAI LOGGER:	Rob Ede	DRILL START	DRILL FINISH
NW Natural	SAMPLING METHOD:	Macro Core	Time:	Time:
Gasco Facility	DRILLING METHOD:	Push Probe / Direct Push	10:45	16:00
Portland, Oregon	EQUIPMENT TYPE	Geo-Probe 6600	Date:	
PROJECT #: 2708	DRILLER:	Neil Kranz	06/08/04	06/08/04
	DRILLING CONTRACTOR:	Geo-Tech Explorations, Inc.		

BORING DIAMETER:	2-inch
CASING DIAMETER:	3.25" steel temporary set at 45' bgs
SURFACE ELEVATION:	31.46
TOP OF CASING ELEVATION:	Not Applicable

ABANDONMENT DETAILS	SAMPLE NUMBER*	TIME	HEADSPACE (ppm)	LAB RESULTS NW-TPH Dx (ppm)	DEPTH (feet)	GROUNDWATER	STRATA (USCS)	SOIL DESCRIPTION
Bentonite Grout					21		GM	Silty GRAVEL - moist, gray, gravels (~50% gravel) angular to round, up to 20 mm in size, silt is tan to dark brown, small flecks of carbon pitch?, no evidence of tar or oil, no odor, no sheen (20-21.5' bgs)
					22			
	BAG	11:20	2.5		23			Silty gravelly SAND - moist, black, hard very fine grained sand (carbon pitch?) minor tar, brick fragments, and vegetative matter, strong pitch odor (21.5-22.5' bgs), zone of oily tar (22.5-23.0' bgs)
					24			
					25			
					26			Tarry gravelly SILT - moist black tar in tan silt (~75% tar), some brick fragments, woody plant debris, strong creosote odor, tan/orange mottled silt layer (~1" thick) at 26.5' bgs (25-26.5' bgs)
					27			
	BAG	11:50	223		28		SP	SAND - moist, fine to medium grained, poorly graded, few silt layers, sand has strong sheen, minor black oily zone at base of core (26.5-27.5' bgs)
					29			
					30	▽		SAND - black, wet, medium grained, coated with black, semi-viscous oil (30-30.5' bgs)
					31		ML	SILT - olive-gray to dark-gray, moist, thin brown rootlets (<0.5mm), sheen, petroleum odor (30.5-31.5' bgs)
					32			
	BAG	13:05	173.0		33			SAND - very moist, fine sand grains, some mica, poorly graded, strong sheen and brown product coating sand grains (31.5-33' bgs)
					34		SP	
					35			
					36			SAND - gray, wet, fine grained, subangular, coated in brown oil, rainbow sheen on core (35-37'8" bgs)
					37			
	BAG		14.2		38		ML	SILT - moist, tan to brown mottled, stained orange at upper and lower margin with sands, no sheen, no oil (37'8"-37'10" bgs)
					39		SP	SAND - moist, gray to brown, wet, fine grained, some mica, poorly graded, no oil, no tar, no sheen, no petroleum odor (37'10"-40' bgs)
	BAG		18.4		40			

SCOEPA00013563

HAHN & ASSOCIATES, INC. 434 NW Sixth Avenue Portland, Oregon (503) 796-0717	**SOIL BORING NUMBER**	**B-57**		
PROJECT: NW Natural Gasco Facility Portland, Oregon	HAI LOGGER:	Rob Ede	DRILL START Time:	DRILL FINISH Time:
	SAMPLING METHOD:	Macro Core	10:45	16:00
	DRILLING METHOD:	Push Probe / Direct Push		
	EQUIPMENT TYPE	Geo-Probe 6600		
	DRILLER:	Neil Kranz	Date:	
PROJECT #: 2708	DRILLING CONTRACTOR:	Geo-Tech Explorations, Inc.	06/08/04	06/08/04

BORING DIAMETER:	2-inch
CASING DIAMETER:	3.25" steel temporary set at 45' bgs
SURFACE ELEVATION:	31.46
TOP OF CASING ELEVATION:	Not Applicable

ABANDONMENT DETAILS	SAMPLE NUMBER*	TIME	HEADSPACE (ppm)	LAB RESULTS NW-TPH Dx (ppm)	CORE INTERVAL	RECOVERY INTERVAL	DEPTH (feet)	GROUNDWATER	STRATA (USCS)	SOIL DESCRIPTION
Bentonite Grout							41		SP	SAND - gray, wet, fine-grained, minor white shell fragments interbedded with sandy silt layers from 43-44' bgs, silt is gray, wet, slightly plastic, no petroleum odor, no sheen (40-44' bgs)
							42			
							43			
	BAG	14:55	27				44			
							45			Note: Set 3.25 inch OD steel protective casing to 45 feet bgs at 15:00, 6/8/04.
							46			SAND - gray, wet, fine-grained, minor white shell fragments, silt layer at 49' bgs (~3" thick) silt is gray, slightly plastic, no odor, no sheen (45'-50' bgs)
							47			
							48			
							49			
	BAG	16:00	4.9				50			Boring terminated at 50' bgs. Pressure grouted from bottom to approximately 10' bgs, bentonite chips from 0-10' bgs.
							51			
							52			
							53			
							54			
							55			
							56			
							57			
							58			
							59			
							60			

SCOEPA00013564

HAHN & ASSOCIATES, INC. 434 NW Sixth Avenue Portland, Oregon (503) 796-0717	**SOIL BORING NUMBER**	**B-58**		
PROJECT: NW Natural Gasco Facility Portland, Oregon	HAI LOGGER:	Rob Ede	DRILL START Time: 9:45	DRILL FINISH Time: 12:00
	SAMPLING METHOD:	Macro Core		
	DRILLING METHOD:	Push Probe / Direct Push		
	EQUIPMENT TYPE	Geo-Probe 6600		
	DRILLER:	Neil Kranz	Date:	
PROJECT #: 2708	DRILLING CONTRACTOR:	Geo-Tech Explorations, Inc.	06/09/04	06/09/04

BORING DIAMETER:	2-inch
CASING DIAMETER:	Not Applicable
SURFACE ELEVATION:	Not Surveyed
TOP OF CASING ELEVATION:	Not Applicable

ABANDONMENT DETAILS	SAMPLE NUMBER*	TIME	HEADSPACE (ppm)	LAB RESULTS NW-TPH Dx (ppm)	DEPTH (feet)	STRATA (USCS)	SOIL DESCRIPTION
Bentonite Chips					1	SM	Grass surface Silty SAND with GRAVEL - brown, dry, vegetative matter, gravels are rounded to angular, no discoloration, no petroleum odor, no sheen (0-1.5' bgs)
	BAG	9:52	69.7		2		Silty sandy tarry GRAVEL - brown to black, tar is hard, but a slightly viscous liquid when broken open (liquid is black, thick) (1.5-3.0' bgs)
					3	GM	
	BAG	9:52	23.7		4		Silty sandy GRAVEL - gray to green, dry, concrete and brick fragments, no tar (3-3.5' bgs)
					5		
					6		
					7		Silty GRAVEL - gray, dry, large concrete fragments (up to 2" diameter), some pitch and tar (5-6' bgs)
	BAG	9:59	38.7		8		Gravelly SILT - gray/tan/orange, moist, silt is plastic, gravel is round to angular (0.25 to 0.5" diameter) no petroleum odor, no sheen (6-8' bgs)
					9		
					10		
Bentonite Grout					11	ML	Gravelly SILT - gray/tan/orange, moist, silt is plastic, gravel is round to angular (0.25 to 0.5" diameter) no petroleum odor, no sheen (10-11' bgs)
					12		
					13		Gravelly SILT - gray/tan/orange, moist, silt is plastic, gravel is round to angular (0.25 to 0.5" diameter) no petroleum odor, no sheen (11-12.5' bgs)
	BAG	10:05	499		14		Tarry gravelly SILT- black to orange/gray, concrete fragments mixed in, strong creosote odor (12.5-14' bgs)
					15		
					16		Tarry gravelly SILT- black to orange/gray, moist concrete fragments mixed in, strong creosote odor (15-17' bgs)
					17		
					18		Woody material with carbon pitch and GRAVEL at 17' bgs - (4 inches thick)
					19	GM	Sandy silty GRAVEL - gray and black, moist, carbon pitch, no tar or oil observed, strong pitch odor (17.5'-19.5' bgs)
	BAG	10:10	19.7		20		

SCOEPA00013565

HAHN & ASSOCIATES, INC. 434 NW Sixth Avenue Portland, Oregon (503) 796-0717	**SOIL BORING NUMBER**	**B-58**		
	HAI LOGGER:	Rob Ede	DRILL START	DRILL FINISH
PROJECT: NW Natural Gasco Facility Portland, Oregon	SAMPLING METHOD:	Macro Core	Time:	Time:
	DRILLING METHOD:	Push Probe / Direct Push	9:45	12:00
	EQUIPMENT TYPE	Geo-Probe 6600		
	DRILLER:	Neil Kranz	Date:	
PROJECT #: 2708	DRILLING CONTRACTOR:	Geo-Tech Explorations, Inc.	06/09/04	06/09/04

BORING DIAMETER:	2-inch
CASING DIAMETER:	Not Applicable
SURFACE ELEVATION:	Not Surveyed
TOP OF CASING ELEVATION:	Not Applicable

ABANDONMENT DETAILS	SAMPLE NUMBER*	TIME	HEADSPACE (ppm)	LAB RESULTS NW-TPH Dx (ppm)	DEPTH (feet)	STRATA (USCS)	SOIL DESCRIPTION
Bentonite Grout					21	ML	Gravelly sandy SILT - olive gray and tan, moist, brick fragments, some gravels have blue/green coloration (<1%), patchy black coloration (carbon pitch?), zone at 22.25' has thick black oil coating gravel, (~1" zone), gravelly silts below with no oil (20-22.5' bgs)
					22		
	BAG	10:16	1.4		23		
					24		
					25		
					26		Gravelly SILT - very moist, olive gray to black, brick fragments, black appears to be carbon pitch mixed into silt, no tar observed, strong carbon pitch odor, no sheen (25-27' bgs)
	BAG	10:32	3		27		
					28		CONCRETE - gray, dry, no tar or oil observed (27-27.5' bgs)
					29		
					30		
					31		Sandy SILT - olive gray, moist, slightly plastic, no petroleum odor, no sheen (30-30.5' bgs) Silty SAND - gray to black, very moist, interbedded with thin (<10mm) silt layers, patchy black oil present in sandy zones (30.5-33.5' bgs)
					32	SM	
					33		
	BAG	10:50	138		34		SILT - moist, olive gray and tan layers, no visible oil or tar, creosote odor (33.5-34' bgs)
					35	ML	
					36		SILT with interbedded silty sand - grey silt, tan silty sand, moist, slightly plastic, plant matter (rootlets, leaf fragments), small rounded gravels (~5mm), silty sand zones have sheen, some brown oil coating grains (35-37' bgs)
	BAG	10:54	354		37		
			44.9		38	SP	SILT - dark gray, plastic, no oil, no tar (37'-37'2" bgs) SAND - brown, wet, fine grained, poorly graded, slight sheen on upper few inches, no sheen or oil below upper few inches (37'2"-38.5' bgs)
					39		
					40		

SCOEPA00013566

HAHN & ASSOCIATES, INC. 434 NW Sixth Avenue Portland, Oregon (503) 796-0717	**SOIL BORING NUMBER**	**B-58**		
PROJECT: NW Natural Gasco Facility Portland, Oregon	HAI LOGGER:	Rob Ede	DRILL START Time:	DRILL FINISH Time:
	SAMPLING METHOD:	Macro Core	9:45	12:00
	DRILLING METHOD:	Push Probe / Direct Push		
	EQUIPMENT TYPE	Geo-Probe 6600		
	DRILLER:	Neil Kranz	Date:	
PROJECT #: 2708	DRILLING CONTRACTOR:	Geo-Tech Explorations, Inc.	06/09/04	06/09/04

ABANDONMENT DETAILS	SAMPLE NUMBER*	TIME	HEADSPACE (ppm)	LAB RESULTS NW-TPH Dx (ppm)	CORE INTERVAL	RECOVERY INTERVAL	DEPTH (feet)	GROUNDWATER	STRATA (USCS)	BORING DIAMETER: 2-inch CASING DIAMETER: Not Applicable SURFACE ELEVATION: Not Surveyed TOP OF CASING ELEVATION: Not Applicable	SOIL DESCRIPTION
Bentonite Grout	BAG	11:30	17				41 42 43 44 45		SP		SAND - gray, wet, fine-grained, poorly graded, no petroleum odor, no sheen, several olive-gray silt layers (~0.25" thick at 42.5' bgs, some grassy plant matter in silt zones) (40-44.5' bgs)
							46 47 48 49				SAND with interbedded silt - gray, wet, fine-grained, interbedded with gray silt layers, no petroleum odor, no sheen (45-47' bgs) SAND - gray, wet, fine to medium grained, subangular, minor mica, (47-49' bgs)
	BAG	11:45	77.2				50		ML		SILT - brown, moist, slightly plastic, small (<1mm) shell fragments, thin (0.5"), brown sandy silt layers, no petroleum odor, no sheen (49-50' bgs) Boring terminated at 50' bgs. Pressure grouted from bottom to approximately 10 feet bgs. bentonite chips from 0-10' bgs. Boring advanced without temporary casing since soils at depth below oil were showing no oil smear from above.
							51 52 53 54 55 56 57 58 59 60				

SCOEPA00013567

HAHN & ASSOCIATES, INC. 434 NW Sixth Avenue Portland, Oregon (503) 796-0717	**SOIL BORING NUMBER**	**B-59**		
PROJECT: NW Natural Gasco Facility Portland, Oregon	HAI LOGGER:	Rob Ede / Andy Rolinger	DRILL START Time:	DRILL FINISH Time:
	SAMPLING METHOD:	Macro Core	13:00	13:45
	DRILLING METHOD:	Push Probe / Direct Push		
	EQUIPMENT TYPE	Geo-Probe 6600		
	DRILLER:	Neil Kranz	Date: 06/09/04	Date: 06/10/04
PROJECT #: 2708	DRILLING CONTRACTOR:	Geo-Tech Explorations, Inc.		

BORING DIAMETER:	2-inch
CASING DIAMETER:	3.25" steel temp. from 0-45' bgs
SURFACE ELEVATION:	31.42
TOP OF CASING ELEVATION:	Not Applicable

ABANDONMENT DETAILS	SAMPLE NUMBER*	TIME	HEADSPACE (ppm)	LAB RESULTS NW-TPH Dx (ppm)	DEPTH (feet)	STRATA (USCS)	SOIL DESCRIPTION
Bentonite Chips					1	ML	Grass surface Gravelly sandy SILT - tan to brown, dry (0-12" bgs)
					2	TAR	Gravelly SILT and TAR - black, solid hard tar with gravels mixed in (1-2.5' bgs)
	BAG	13:05	285		3		
					4		Gravelly SILT - gray to tan with orange mottling, moist, some dark tarry patches on gravels (2.5-4' bgs)
					5		
					6		Gravelly sandy SILT - moist, gray with gray mottling, some gravels have yellow/green coloration, very moist, tar and black viscous oil surrounding gravels and in sandy zones, strong creosote odor from 6.5-7.5' bgs. (5-8' bgs)
	BAG	13:10	302		7		
	BAG	13:15	67		8	ML	
					9		Gravelly SILT - gray with orange mottling, moist, no evidence of tar or oil (7.5-8.0' bgs)
					10		
Bentonite Grout					11		Gravelly SILT - gray with orange mottling, moist, no evidence of tar or oil (10-11' bgs)
					12		Gravelly SILT with TAR - black, moist, viscous oil within the tar when broken open (11-13' bgs)
	BAG	13:20	734		13		
					14		
					15		
					16		Gravelly SILT with TAR - black viscous oil blebs within the tar when broken open (15-17.5' bgs)
					17		
					18	ML	
	BAG	13:30	83		19		Gravelly SILT - olive gray to brown, very moist, brick fragments, and carbon pitch flecks and odor, no evidence of tar or oil (17.5-19' bgs)
					20		

SCOEPA00013568

HAHN & ASSOCIATES, INC. 434 NW Sixth Avenue Portland, Oregon (503) 796-0717	**SOIL BORING NUMBER**	**B-59**		
PROJECT:	HAI LOGGER:	Rob Ede / Andy Rolinger	DRILL START	DRILL FINISH
NW Natural	SAMPLING METHOD:	Macro Core	Time:	Time:
Gasco Facility	DRILLING METHOD:	Push Probe / Direct Push	13:00	13:45
Portland, Oregon	EQUIPMENT TYPE	Geo-Probe 6600	Date:	Date:
PROJECT #: 2708	DRILLER:	Neil Kranz	06/09/04	06/10/04
	DRILLING CONTRACTOR:	Geo-Tech Explorations, Inc.		

BORING DIAMETER:	2-inch
CASING DIAMETER:	3.25" steel temp. from 0-45' bgs
SURFACE ELEVATION:	31.42
TOP OF CASING ELEVATION:	Not Applicable

ABANDONMENT DETAILS	SAMPLE NUMBER*	TIME	HEADSPACE (ppm)	LAB RESULTS NW-TPH Dx (ppm)	CORE INTERVAL	RECOVERY INTERVAL	DEPTH (feet)	GROUNDWATER	STRATA (USCS)	SOIL DESCRIPTION
Bentonite Grout	BAG	13:35	68.8				21–25		ML	Gravelly SILT - wet, olive gray to brown, brick fragments, woody material and plant matter, strong carbon pitch odor, black flecks and streaks in silt (carbon pitch?), slight sheen, no evidence of tar or oil (20-23' bgs)
							26–27		ML	Gravelly SILT - wet, olive gray to brown, brick fragments, woody material and plant matter, strong carbon pitch odor, black flecks and streaks in silt (carbon pitch?), slight sheen, no evidence of tar or oil (25-27' bgs)
	BAG	13:50	1,394				28–30		ML	Tarry SILT - very moist, black, viscous, strong creosote odor, interbedded silts and fine grained sands (27-28' bgs)
	BAG	14:00	181.0				31–35		SP	SAND - olive gray to brown, wet, fine grained, coated with oil (brown, strong petroleum odor) (30-35' bgs)
	BAG		872				36–38		SP	SAND - olive gray to brown, wet, fine grained, coated with oil (brown, strong petroleum odor) (35-38' bgs)
							38		ML	SILT - gray, moist, slightly plastic, no sheen, 1/2-inch thick with oil above, no oil below.
	BAG		134				39–40		SP	SAND - olive gray, wet, fine grained, no visible oil, strong sheen on outside of core (38-39' bgs)

SCOEPA00013569

HAHN & ASSOCIATES, INC. 434 NW Sixth Avenue Portland, Oregon (503) 796-0717	**SOIL BORING NUMBER**	**B-59**		
	HAI LOGGER:	Rob Ede / Andy Rolinger	DRILL START	DRILL FINISH
PROJECT: NW Natural Gasco Facility Portland, Oregon	SAMPLING METHOD:	Macro Core	Time: 13:00	Time: 13:45
	DRILLING METHOD:	Push Probe / Direct Push		
	EQUIPMENT TYPE	Geo-Probe 6600		
	DRILLER:	Neil Kranz	Date: 06/09/04	Date: 06/10/04
PROJECT #: 2708	DRILLING CONTRACTOR:	Geo-Tech Explorations, Inc.		

BORING DIAMETER:	2-inch
CASING DIAMETER:	3.25" steel temp. from 0-45' bgs
SURFACE ELEVATION:	31.42
TOP OF CASING ELEVATION:	Not Applicable

ABANDONMENT DETAILS	SAMPLE NUMBER*	TIME	HEADSPACE (ppm)	LAB RESULTS NW-TPH Dx (ppm)	CORE INTERVAL	RECOVERY INTERVAL	DEPTH (feet)	GROUNDWATER	STRATA (USCS)	SOIL DESCRIPTION
Bentonite Grout							41		SP	SAND - wet, olive gray, fine grained, poorly graded, mica (<1%), few very thin (<10mm) tan silt layers, no petroleum odor, no sheen, no oil (40-44' bgs)
							42			
							43			NOTE: 3.25 inch OD steel protective casing set to 45 feet bgs @ 14:45 on 6/09/04
	BAG	14:35	0.2				44			
							45			
							46		SP/ ML	SAND with interbedded SILTS - olive gray, wet, very fine sand grains, minor mica, silts are soft, slightly plastic, no petroleum odor, no sheen (45-47.5' bgs)
							47			
							48		SP	SAND - gray, wet, fine-grained, poorly graded, subangular, no petroleum odor, no sheen, (47.5-50' bgs)
							49			
	BAG	15:30					50			
							51			
							52			
							53			
							54			
							55			
							56		SP	SAND - gray, wet, fine-grained, poorly graded, subangular, thin tan silt layer (1") at 58.5' bgs, no petroleum odor, no sheen (55-60' bgs)
							57			
							58			
							59			
							60			

SCOEPA00013570

HAHN & ASSOCIATES, INC. 434 NW Sixth Avenue Portland, Oregon (503) 796-0717	SOIL BORING NUMBER B-59			
PROJECT: NW Natural Gasco Facility Portland, Oregon	HAI LOGGER:	Rob Ede / Andy Rolinger	DRILL START Time: 13:00 Date: 06/09/04	DRILL FINISH Time: 13:45 Date: 06/10/04
PROJECT #: 2708	SAMPLING METHOD:	Macro Core		
	DRILLING METHOD:	Push Probe / Direct Push		
	EQUIPMENT TYPE	Geo-Probe 6600		
	DRILLER:	Neil Kranz		
	DRILLING CONTRACTOR:	Geo-Tech Explorations, Inc.		

BORING DIAMETER:	2-inch
CASING DIAMETER:	3.25" steel temp. from 0-45' bgs
SURFACE ELEVATION:	31.42
TOP OF CASING ELEVATION:	Not Applicable

ABANDONMENT DETAILS	SAMPLE NUMBER*	TIME	HEADSPACE (ppm)	LAB RESULTS NW-TPH Dx (ppm)	CORE INTERVAL	RECOVERY INTERVAL	DEPTH (feet)	GROUNDWATER	STRATA (USCS)	SOIL DESCRIPTION
Bentonite Grout							61			
							62			
							63			
							64			
							65			
							66		SP	SAND - gray, wet, fine-grained, poorly graded, subangular, no petroleum odor, no sheen (65-70' bgs)
							67			
							68			
							69			
							70			
							71			NOTE: Boring activities stopped for the day at 17:00. Will resume in AM 6/10/04.
							72			
							73			
							74			
							75			
							76		SP	SAND - gray, wet, fine sand grains, subangular, poorly graded, no petroleum odor, no sheen (75-76.5' bgs)
							77			
							78		ML	SILT - gray, wet, stiff, plastic, reducing/organic odor, no sheen (76.5-80' bgs)
							79			
	BAG	8:40	1.6				80			

SCOEPA00013571

HAHN & ASSOCIATES, INC. 434 NW Sixth Avenue Portland, Oregon (503) 796-0717	**SOIL BORING NUMBER**	**B-59**		
PROJECT: NW Natural Gasco Facility Portland, Oregon	HAI LOGGER:	Rob Ede / Andy Rolinger	DRILL START Time: 13:00 Date: 06/09/04	DRILL FINISH Time: 13:45 Date: 06/10/04
PROJECT #: 2708	SAMPLING METHOD:	Macro Core		
	DRILLING METHOD:	Push Probe / Direct Push		
	EQUIPMENT TYPE	Geo-Probe 6600		
	DRILLER:	Neil Kranz		
	DRILLING CONTRACTOR:	Geo-Tech Explorations, Inc.		

ABANDONMENT DETAILS	SAMPLE NUMBER*	TIME	HEADSPACE (ppm)	LAB RESULTS NW-TPH Dx (ppm)	CORE INTERVAL	RECOVERY INTERVAL	DEPTH (feet)	GROUNDWATER	STRATA (USCS)	SOIL DESCRIPTION
							81			
							82			
							83			
							84			
							85			
							86		ML	SILT - gray, wet, stiff, plastic, reducing/organic odor, no sheen (85-86' bgs)
							87			
							88		SP	SAND - gray, wet, fine grained, subangular, poorly graded, no petroleum odor, no sheen (86-90' bgs)
Bentonite Grout							89			
	BAG	9:00	1.1				90			
							91			
							92			
							93			
							94			
							95			
							96			
							97		SP	SAND - gray, wet, fine grained, subangular, poorly graded, no petroleum odor, no sheen, silt layers at 96.5' bgs (4" thick), 97.5' bgs (4" thick), 98.0' bgs (3" thick), silt is gray, wet, stiff, plastic, no petroleum, no sheen (95-100' bgs)
							98			
							99			
	BAG	10:20	1.7				100			

SCOEPA00013572

HAHN & ASSOCIATES, INC. 434 NW Sixth Avenue Portland, Oregon (503) 796-0717	SOIL BORING NUMBER	B-59		
PROJECT: NW Natural Gasco Facility Portland, Oregon	HAI LOGGER:	Rob Ede / Andy Rolinger	DRILL START Time:	DRILL FINISH Time:
	SAMPLING METHOD:	Macro Core	13:00	13:45
	DRILLING METHOD:	Push Probe / Direct Push		
	EQUIPMENT TYPE	Geo-Probe 6600		
	DRILLER:	Neil Kranz	Date:	Date:
PROJECT #: 2708	DRILLING CONTRACTOR:	Geo-Tech Explorations, Inc.	06/09/04	06/10/04

ABANDONMENT DETAILS	SAMPLE NUMBER*	TIME	HEADSPACE (ppm)	LAB RESULTS NW-TPH Dx (ppm)	CORE INTERVAL	RECOVERY INTERVAL	DEPTH (feet)	GROUNDWATER	STRATA (USCS)	BORING DIAMETER: 2-inch CASING DIAMETER: 3.25" steel temp. from 0-45' bgs SURFACE ELEVATION: 31.42 TOP OF CASING ELEVATION: Not Applicable SOIL DESCRIPTION	
Bentonite Grout							101				
							102				
							103				
							104				
							105				
							106				
							107				
							108				
							109				
							110				
							111				
							112				
							113				
							114				
							115				
							116			SAND - gray, wet, fine-grained, subangular, poorly graded, no petroleum odor, no sheen (115-119' bgs)	
							117		SP		
							118				
	BAG	11:30	1.9				119				
							120				

SCOEPA00013573

HAHN & ASSOCIATES, INC. 434 NW Sixth Avenue Portland, Oregon (503) 796-0717	SOIL BORING NUMBER	B-59		
PROJECT: NW Natural Gasco Facility Portland, Oregon	HAI LOGGER:	Rob Ede / Andy Rolinger	DRILL START Time: 13:00	DRILL FINISH Time: 13:45
	SAMPLING METHOD:	Macro Core		
	DRILLING METHOD:	Push Probe / Direct Push		
	EQUIPMENT TYPE	Geo-Probe 6600		
	DRILLER:	Neil Kranz	Date: 06/09/04	Date: 06/10/04
PROJECT #: 2708	DRILLING CONTRACTOR:	Geo-Tech Explorations, Inc.		

BORING DIAMETER:	2-inch
CASING DIAMETER:	3.25" steel temp. from 0-45' bgs
SURFACE ELEVATION:	31.42
TOP OF CASING ELEVATION:	Not Applicable

ABANDONMENT DETAILS	SAMPLE NUMBER*	TIME	HEADSPACE (ppm)	LAB RESULTS NW-TPH Dx (ppm)	CORE INTERVAL	RECOVERY INTERVAL	DEPTH (feet)	GROUNDWATER	STRATA (USCS)	SOIL DESCRIPTION
Bentonite Grout							121			
							122			
							123			
							124			
							125			
							126			
							127			
							128			
							129			
							130			
							131			
							132			
							133			
							134			
							135			
							136			
							137			
							138			
							139			
							140			

SCOEPA00013574

HAHN & ASSOCIATES, INC. 434 NW Sixth Avenue Portland, Oregon (503) 796-0717	**SOIL BORING NUMBER**	**B-59**		
	HAI LOGGER:	Rob Ede / Andy Rolinger	DRILL START	DRILL FINISH
PROJECT: NW Natural Gasco Facility Portland, Oregon	SAMPLING METHOD:	Macro Core	Time:	Time:
	DRILLING METHOD:	Push Probe / Direct Push	13:00	13:45
	EQUIPMENT TYPE	Geo-Probe 6600		
	DRILLER:	Neil Kranz	Date:	Date:
PROJECT #: 2708	DRILLING CONTRACTOR:	Geo-Tech Explorations, Inc.	06/09/04	06/10/04

BORING DIAMETER:	2-inch
CASING DIAMETER:	3.25" steel temp. from 0-45' bgs
SURFACE ELEVATION:	31.42
TOP OF CASING ELEVATION:	Not Applicable

ABANDONMENT DETAILS	SAMPLE NUMBER*	TIME	HEADSPACE (ppm)	LAB RESULTS NW-TPH Dx (ppm)	CORE INTERVAL	RECOVERY INTERVAL	DEPTH (feet)	GROUNDWATER	STRATA (USCS)	SOIL DESCRIPTION
Bentonite Grout							141			
							142			
							143			
							144			
							145			
							146		SP	SAND - gray, wet, fine sand grains, subangular, poorly graded, silt layer at 145.5' bgs (2" thick) silt is grey, wet, stiff, plastic, no petroleum odor, no sheen (145-148' bgs)
							147			
							148			
							149		ML	SILT - gray, wet, plastic, stiff, with fiberous rootlets (<1%) no petroleum odor, no sheen (148-149.5' bgs)
	BAG	12:45	0.1				**150**			
							151			
							152			
							153			
							154			
							155			
							156			
							157			
							158			
							159			
							160			

SCOEPA00013575

HAHN & ASSOCIATES, INC. 434 NW Sixth Avenue Portland, Oregon (503) 796-0717	SOIL BORING NUMBER	B-59		
PROJECT: NW Natural Gasco Facility Portland, Oregon	HAI LOGGER:	Rob Ede / Andy Rolinger	DRILL START Time: 13:00 Date: 06/09/04	DRILL FINISH Time: 13:45 Date: 06/10/04
PROJECT #: 2708	SAMPLING METHOD:	Macro Core		
	DRILLING METHOD:	Push Probe / Direct Push		
	EQUIPMENT TYPE	Geo-Probe 6600		
	DRILLER:	Neil Kranz		
	DRILLING CONTRACTOR:	Geo-Tech Explorations, Inc.		

BORING DIAMETER:	2-inch
CASING DIAMETER:	3.25" steel temp. from 0-45' bgs
SURFACE ELEVATION:	31.42
TOP OF CASING ELEVATION:	Not Applicable

ABANDONMENT DETAILS	SAMPLE NUMBER*	TIME	HEADSPACE (ppm)	LAB RESULTS NW-TPH Dx (ppm)	CORE INTERVAL	RECOVERY INTERVAL	DEPTH (feet)	GROUNDWATER	STRATA (USCS)	SOIL DESCRIPTION
							161			
							162			
							163			
							164			
							165			
							166			
							167			
							168			
							169			
							170			
Bentonite Grout					↕	↕	171		SP	SAND - gray, wet, fine sand grains, subangular, poorly graded, no petroleum odor, no sheen (170-174.5' bgs)
							172			
							173			
							174			
	BAG	1:45	0.1				175			
							176			NOTE: Driller concerned about losing tooling down hole if encounter hard substrate below 175' bgs. Decide to terminate boring.
							177			
							178			
							179			Boring terminated at 175' bgs at 13:45 6/10/2004.
							180			Pressure grouted from bottom to approximately 10' bgs, bentonite chips in upper 10' bgs on 6/10/2004.

SCOEPA00013576

HAHN & ASSOCIATES, INC. 434 NW Sixth Avenue Portland, Oregon (503) 796-0717	**SOIL BORING NUMBER**	**B-59A**		
PROJECT: NW Natural Gasco Facility Portland, Oregon	HAI LOGGER:	Matt Graves / Andy Rolinger	DRILL START Time: 16:10 Date: 06/10/04	DRILL FINISH Time: 9:30 Date: 06/14/04
PROJECT #: 2708	SAMPLING METHOD:	Macro Core		
	DRILLING METHOD:	Push Probe / Direct Push		
	EQUIPMENT TYPE	Geo-Probe 6600		
	DRILLER:	Neil Kranz		
	DRILLING CONTRACTOR:	Geo-Tech Explorations, Inc.		

BORING DIAMETER:	2-inch
CASING DIAMETER:	3.25" steel temp. from 0-45' bgs
SURFACE ELEVATION:	Not Surveyed
TOP OF CASING ELEVATION:	Not Applicable

ABANDONMENT DETAILS	SAMPLE NUMBER*	TIME	HEADSPACE (ppm)	LAB RESULTS NW-TPH Dx (ppm)	CORE INTERVAL	RECOVERY INTERVAL	DEPTH (feet)	GROUNDWATER	STRATA (USCS)	SOIL DESCRIPTION
Bentonite Chips							1		MT	NOTE: No soil samples collected. Pushed with well point directly to groundwater sample depths. See boring log for probe B-59 for soil description.
							2		TAR	
							3			
							4			
							5			
							6			
							7		ML	
							8			
							9			
							10			
Bentonite Grout							11			
							12			
							13			
							14			
							15			
							16			
							17			
							18		ML	
							19			
							20			

SCOEPA00013577

HAHN & ASSOCIATES, INC. 434 NW Sixth Avenue Portland, Oregon (503) 796-0717	SOIL BORING NUMBER	B-59A		
	HAI LOGGER:	Matt Graves / Andy Rolinger	DRILL START	DRILL FINISH
PROJECT: NW Natural Gasco Facility Portland, Oregon	SAMPLING METHOD:	Macro Core	Time: 16:10	Time: 9:30
	DRILLING METHOD:	Push Probe / Direct Push		
	EQUIPMENT TYPE	Geo-Probe 6600		
	DRILLER:	Neil Kranz	Date: 06/10/04	Date: 06/14/04
PROJECT #: 2708	DRILLING CONTRACTOR:	Geo-Tech Explorations, Inc.		

BORING DIAMETER:	2-inch
CASING DIAMETER:	3.25" steel temp. from 0-45' bgs
SURFACE ELEVATION:	Not Surveyed
TOP OF CASING ELEVATION:	Not Applicable

ABANDONMENT DETAILS	SAMPLE NUMBER*	TIME	HEADSPACE (ppm)	LAB RESULTS NW-TPH Dx (ppm)	CORE INTERVAL	RECOVERY INTERVAL	DEPTH (feet)	GROUNDWATER	STRATA (USCS)	SOIL DESCRIPTION
Bentonite Grout							21		ML	
	Water Level measured for 46' to 50' bgs screen						22	▽		
							23			
	Water Level measured for 171' to 175' bgs screen							▽		
	Water Level measured for 116' to 120' bgs screen						24	▽		
	Water Level measured for 76' to 80' bgs screen						25	▽		
							26			
	Water Level measured for 144' to 148' bgs screen							▽		
	Water Level measured for 96' to 100' bgs screen						27	▽		
							28		ML	
							29			
							30			
							31		SP	
							32			
							33			
							34			
							35			
							36			
							37			
							38			
							39		ML	
							40		SP	

SCOEPA00013578

HAHN & ASSOCIATES, INC.	SOIL BORING NUMBER	B-59A		
434 NW Sixth Avenue Portland, Oregon (503) 796-0717	HAI LOGGER:	Matt Graves / Andy Rolinger	DRILL START	DRILL FINISH
PROJECT: NW Natural Gasco Facility Portland, Oregon	SAMPLING METHOD:	Macro Core	Time: 16:10	Time: 9:30
	DRILLING METHOD:	Push Probe / Direct Push		
	EQUIPMENT TYPE	Geo-Probe 6600		
	DRILLER:	Neil Kranz	Date: 06/10/04	Date: 06/14/04
PROJECT #: 2708	DRILLING CONTRACTOR:	Geo-Tech Explorations, Inc.		

BORING DIAMETER:	2-inch
CASING DIAMETER:	3.25" steel temp. from 0-45' bgs
SURFACE ELEVATION:	Not Surveyed
TOP OF CASING ELEVATION:	Not Applicable

ABANDONMENT DETAILS	SAMPLE NUMBER*	TIME	HEADSPACE (ppm)	LAB RESULTS NW-TPH Dx (ppm)	CORE INTERVAL	RECOVERY INTERVAL	DEPTH (feet)	GROUNDWATER	STRATA (USCS)	SOIL DESCRIPTION
Bentonite Grout							41		SP	**GROUNDWATER SAMPLE** Installed a temporary 1-inch ID stainless steel well point with a 0.010-inch slotted screen at 46 to 50 feet bgs. Following the removal of approximately 4 gallons of water, a groundwater sample (#2708-040611-108) was collected with disposable tubing/check valve at 10:45 hours, 6/11/04. Water level was measured at 21.65 feet bgs prior to sampling. After sampling, the well point was removed from the borehole and the borehole was advanced.
							42			
							43			
							44			
							45			
							46		SP/ ML	
							47			
							48		SP	
							49			
							50			
							51			
							52			
							53			
							54			
							55			
							56		SP	
							57			
							58			
							59			
							60			

SCOEPA00013579

HAHN & ASSOCIATES, INC. 434 NW Sixth Avenue Portland, Oregon (503) 796-0717	**SOIL BORING NUMBER**	**B-59A**		
	HAI LOGGER:	Matt Graves / Andy Rolinger	DRILL START	DRILL FINISH
PROJECT: NW Natural Gasco Facility Portland, Oregon	SAMPLING METHOD:	Macro Core	Time: 16:10	Time: 9:30
	DRILLING METHOD:	Push Probe / Direct Push		
	EQUIPMENT TYPE	Geo-Probe 6600		
	DRILLER:	Neil Kranz	Date: 06/10/04	Date: 06/14/04
PROJECT #: 2708	DRILLING CONTRACTOR:	Geo-Tech Explorations, Inc.		

BORING DIAMETER:	2-inch
CASING DIAMETER:	3.25" steel temp. from 0-45' bgs
SURFACE ELEVATION:	Not Surveyed
TOP OF CASING ELEVATION:	Not Applicable

ABANDONMENT DETAILS	SAMPLE NUMBER*	TIME	HEADSPACE (ppm)	LAB RESULTS NW-TPH Dx (ppm)	CORE INTERVAL	RECOVERY INTERVAL	DEPTH (feet)	GROUNDWATER	STRATA (USCS)	SOIL DESCRIPTION
Bentonite Grout							61			
							62			
							63			
							64			
							65			
							66		SP	
							67			
							68			
							69			
							70			
							71			
							72			
							73			
							74			
							75			
							76		SP	
							77		ML	**GROUNDWATER SAMPLE** Installed a temporary 1-inch ID stainless steel well point with a 0.010-inch slotted screen at 76 to 80 feet bgs. Following the removal of approximately 3 gallons of water, a groundwater sample (#2708-040611-109) was collected with disposable tubing/check valve at 11:45 hours, 6/11/04. Water level was measured at 24.70 feet bgs prior to sampling. After sampling, the well point was removed from the borehole and the borehole was advanced.
							78			
							79			
							80			

SCOEPA00013580

HAHN & ASSOCIATES, INC. 434 NW Sixth Avenue Portland, Oregon (503) 796-0717	**SOIL BORING NUMBER**	**B-59A**		
PROJECT: NW Natural Gasco Facility Portland, Oregon	HAI LOGGER:	Matt Graves / Andy Rolinger	DRILL START Time: 16:10	DRILL FINISH Time: 9:30
	SAMPLING METHOD:	Macro Core		
	DRILLING METHOD:	Push Probe / Direct Push		
	EQUIPMENT TYPE	Geo-Probe 6600		
	DRILLER:	Neil Kranz	Date: 06/10/04	Date: 06/14/04
PROJECT #: 2708	DRILLING CONTRACTOR:	Geo-Tech Explorations, Inc.		

BORING DIAMETER:	2-inch
CASING DIAMETER:	3.25" steel temp. from 0-45' bgs
SURFACE ELEVATION:	Not Surveyed
TOP OF CASING ELEVATION:	Not Applicable

ABANDONMENT DETAILS	SAMPLE NUMBER*	TIME	HEADSPACE (ppm)	LAB RESULTS NW-TPH Dx (ppm)	CORE INTERVAL	RECOVERY INTERVAL	DEPTH (feet)	GROUNDWATER	STRATA (USCS)	SOIL DESCRIPTION
Bentonite Grout							81			
							82			
							83			
							84			
							85			
							86		ML	
							87			
							88		SP	
							89			
							90			
							91			
							92			
							93			
							94			
							95			
							96			
							97		SP	**GROUNDWATER SAMPLE** Installed a temporary 1-inch ID stainless steel well point with a 0.010-inch slotted screen at 96 to 100 feet bgs. Following the removal of approximately 4 gallons of water, a groundwater sample (#2708-040611-110) was collected with disposable tubing/check valve at 12:45 hours, 6/11/04. Water level was measured at 27.25 feet bgs prior to sampling. After sampling, the well point was removed from the borehole and the borehole was advanced.
							98			
							99			
							100			

SCOEPA00013581

HAHN & ASSOCIATES, INC. 434 NW Sixth Avenue Portland, Oregon (503) 796-0717	SOIL BORING NUMBER	B-59A		
PROJECT: NW Natural Gasco Facility Portland, Oregon	HAI LOGGER:	Matt Graves / Andy Rolinger	DRILL START Time: 16:10 Date: 06/10/04	DRILL FINISH Time: 9:30 Date: 06/14/04
PROJECT #: 2708	SAMPLING METHOD:	Macro Core		
	DRILLING METHOD:	Push Probe / Direct Push		
	EQUIPMENT TYPE	Geo-Probe 6600		
	DRILLER:	Neil Kranz		
	DRILLING CONTRACTOR:	Geo-Tech Explorations, Inc.		

BORING DIAMETER:	2-inch
CASING DIAMETER:	3.25" steel temp. from 0-45' bgs
SURFACE ELEVATION:	Not Surveyed
TOP OF CASING ELEVATION:	Not Applicable

ABANDONMENT DETAILS	SAMPLE NUMBER*	TIME	HEADSPACE (ppm)	LAB RESULTS NW-TPH Dx (ppm)	CORE INTERVAL	RECOVERY INTERVAL	DEPTH (feet)	GROUNDWATER	STRATA (USCS)	SOIL DESCRIPTION
Bentonite Grout							101			
							102			
							103			
							104			
							105			
							106			
							107			
							108			
							109			
							110			
							111			
							112			
							113			
							114			
							115			
							116			
							117		SP	**GROUNDWATER SAMPLE** Installed a temporary 1-inch ID stainless steel well point with a 0.010-inch slotted screen at 116 to 120 feet bgs. Following the removal of approximately 4 gallons of water, a groundwater sample (#2708-040611-112) was collected with disposable tubing/check valve at 14:00 hours, 6/11/04. Water level was measured at 23.40 feet bgs prior to sampling. After sampling, the well point was removed from the borehole and the borehole was advanced.
							118			
							119			
							120			

SCOEPA00013582

HAHN & ASSOCIATES, INC.	SOIL BORING NUMBER	B-59A		
434 NW Sixth Avenue				
Portland, Oregon				
(503) 796-0717	HAI LOGGER:	Matt Graves / Andy Rolinger	DRILL START	DRILL FINISH
PROJECT:	SAMPLING METHOD:	Macro Core		
NW Natural	DRILLING METHOD:	Push Probe / Direct Push	Time:	Time:
Gasco Facility	EQUIPMENT TYPE	Geo-Probe 6600	16:10	9:30
Portland, Oregon	DRILLER:	Neil Kranz	Date:	Date:
PROJECT #: 2708	DRILLING CONTRACTOR:	Geo-Tech Explorations, Inc.	06/10/04	06/14/04

BORING DIAMETER:	2-inch
CASING DIAMETER:	3.25" steel temp. from 0-45' bgs
SURFACE ELEVATION:	Not Surveyed
TOP OF CASING ELEVATION:	Not Applicable

ABANDONMENT DETAILS	SAMPLE NUMBER*	TIME	HEADSPACE (ppm)	LAB RESULTS NW-TPH Dx (ppm)	CORE INTERVAL	RECOVERY INTERVAL	DEPTH (feet)	GROUNDWATER	STRATA (USCS)	SOIL DESCRIPTION
Bentonite Grout							121			
							122			
							123			
							124			
							125			
							126			
							127			
							128			
							129			
							130			
							131			
							132			
							133			
							134			
							135			
							136			
							137			
							138			
							139			
							140			

SCOEPA00013583

HAHN & ASSOCIATES, INC.	SOIL BORING NUMBER	B-59A		
434 NW Sixth Avenue Portland, Oregon (503) 796-0717	HAI LOGGER:	Matt Graves / Andy Rolinger	DRILL START	DRILL FINISH
PROJECT: NW Natural Gasco Facility Portland, Oregon	SAMPLING METHOD:	Macro Core	Time: 16:10	Time: 9:30
	DRILLING METHOD:	Push Probe / Direct Push		
	EQUIPMENT TYPE	Geo-Probe 6600		
	DRILLER:	Neil Kranz	Date: 06/10/04	Date: 06/14/04
PROJECT #: 2708	DRILLING CONTRACTOR:	Geo-Tech Explorations, Inc.		

BORING DIAMETER:	2-inch
CASING DIAMETER:	3.25" steel temp. from 0-45' bgs
SURFACE ELEVATION:	Not Surveyed
TOP OF CASING ELEVATION:	Not Applicable

ABANDONMENT DETAILS	SAMPLE NUMBER*	TIME	HEADSPACE (ppm)	LAB RESULTS NW-TPH Dx (ppm)	CORE INTERVAL	RECOVERY INTERVAL	DEPTH (feet)	GROUNDWATER	STRATA (USCS)	SOIL DESCRIPTION
Bentonite Grout							141			**GROUNDWATER SAMPLE** Installed a temporary 1-inch ID stainless steel well point with a 0.010-inch slotted screen at 144 to 148 feet bgs. Following the removal of approximately 3.5 gallons of water, a groundwater sample (#2708-040611-113) was collected with disposable tubing/check valve at 15:40 hours, 6/11/04. Water level was measured at 26.55 feet bgs prior to sampling. After sampling, the well point was removed from the borehole and the borehole was advanced.
							142			
							143			
							144			
							145			
							146		SP	
							147			
							148			
							149		ML	
							150			
							151			
							152			
							153			
							154			
							155			
							156			
							157			
							158			
							159			
							160			

SCOEPA00013584

HAHN & ASSOCIATES, INC. 434 NW Sixth Avenue Portland, Oregon (503) 796-0717	**SOIL BORING NUMBER**	**B-59A**		
PROJECT: NW Natural Gasco Facility Portland, Oregon	HAI LOGGER:	Matt Graves / Andy Rolinger	DRILL START Time: 16:10	DRILL FINISH Time: 9:30
	SAMPLING METHOD:	Macro Core		
	DRILLING METHOD:	Push Probe / Direct Push		
	EQUIPMENT TYPE	Geo-Probe 6600		
	DRILLER:	Neil Kranz	Date: 06/10/04	Date: 06/14/04
PROJECT #: 2708	DRILLING CONTRACTOR:	Geo-Tech Explorations, Inc.		

BORING DIAMETER:	2-inch
CASING DIAMETER:	3.25" steel temp. from 0-45' bgs
SURFACE ELEVATION:	Not Surveyed
TOP OF CASING ELEVATION:	Not Applicable

ABANDONMENT DETAILS	SAMPLE NUMBER*	TIME	HEADSPACE (ppm)	LAB RESULTS NW-TPH Dx (ppm)	CORE INTERVAL	RECOVERY INTERVAL	DEPTH (feet)	GROUNDWATER	STRATA (USCS)	SOIL DESCRIPTION
Bentonite Grout							161			
							162			
							163			
							164			
							165			
							166			
							167			
							168			
							169			
							170			
							171		SP	**GROUNDWATER SAMPLE** Installed a temporary 1-inch ID stainless steel well point with a 0.010-inch slotted screen at 171 to 175 feet bgs. Following the removal of approximately 5 gallons of water, a groundwater sample (#2708-040611-114) was collected with disposable tubing/check valve at 9:25 hours, 6/14/04. Water level was measured at 23.2 feet bgs prior to sampling. After sampling, the well point was removed from the borehole and the borehole was advanced.
							172			
							173			
							174			
							175			
							176			Boring terminated at 175' bgs at 9:30 6/14/04. Pressure grouted from bottom to approximately 10' bgs, bentonite chips to top.
							177			
							178			
							179			
							180			

SCOEPA00013585

BORING LOGS – ANCHOR ENVIRONMENTAL
WILLAMETTE RIVER BORINGS

SCOEPA00013586

ANCHOR ENVIRONMENTAL, L.L.C.

LOG OF EXPLORATORY BORING

CLIENT/PROJECT NAME: Northwest Natural "Gasco" Site | BORING #: RAA-01
PROJECT NUMBER: 000029-02 | DATE BEGAN: 7/21/04
GEOLOGIST/ENGINEER: J. Renda | DATE COMPLETED: 7/21/04
DRILLING CONTRACTOR: Geotech Explorations, Inc. | TOTAL DEPTH: 20 feet
DRILLING METHOD: Direct Push/Geoprobe | SHEET: 1 OF 1
HOLE DIAMETER: 2-inch

Field location of boring
Mudline: 0.5 feet | Latitude: 45.57977374
Staff Gage: 2.5 feet | Longitude: 122.75818444

OTHER*	WELL OR PIEZOMETER DETAILS	SAMPLING DATA: SAMPLING METHOD	SAMPLE NUMBER	RECOVERY (feet)	DEPTH SAMPLED	DEPTH IN FEET	SOIL GROUP SYMBOL (USCS)	LITHOLOGIC DESCRIPTION
						1		**SAND (SP)**; black; fine to medium sand, oil saturated, sticky, sheen.
				1.5		2		
						3		
						4		
						5		
						6		0.3 feet: **SAND (SP)**; black; fine to medium sand, oil saturated, sticky, sheen.
				3.5		7		0.2 feet: **SILT (ML)**; grayish brown; low to medium plasticity fines; no sheen.
						8		0.3 feet: **SAND (SP)**; grayish brown; fine sand.
						9		0.3 feet: **SILT (ML)**; grayish brown; as above.
						10		0.1 feet: **SAND (SP)**; grayish brown; fine to medium sand.
						11		0.6 feet: **SILT (ML)**; grayish brown; as above.
						12		0.1 feet: **SAND (SP)**; grayish brown; fine to medium sand.
				4.0		13		1.6 feet: **SILT (ML)**; grayish brown; as above.
						14		**SILT (ML)**; grayish brown; low to medium plasticity fines; trace fine sand.
						15		0.2 feet: **SAND (SP)**; grayish brown; fine to medium sand. (At base of sample interval)
						16		
						17		2.5 feet: **SILT (ML)**; grayish brown; low to medium plasticity fines; trace fine sand.
				4.5		18		
						19		2.0 feet: **SILTY SAND (SM)**; grayish brown; fine to medium sand; 10 to 20 percent nonplastic to low plasticity fines.
						20		

Remarks:

ANCHOR ENVIRONMENTAL, L.L.C.

LOG OF EXPLORATORY BORING

CLIENT/PROJECT NAME: Northwest Natural "Gasco" Site | BORING #: RAA-02
PROJECT NUMBER: 000029-02 | DATE BEGAN: 7/20/04
GEOLOGIST/ENGINEER: J. Renda | DATE COMPLETED: 7/20/04
DRILLING CONTRACTOR: Geotech Explorations, Inc. | TOTAL DEPTH: 20 feet
DRILLING METHOD: Direct Push/Geoprobe | SHEET: 1 OF: 1
HOLE DIAMETER: 2-inch

Field location of boring
Mudline: 3.2 feet | Latitude: 45.57982789
Staff Gage: 2.75 feet | Longitude: 122.75792804

OTHER*	WELL OR PIEZOMETER DETAILS	SAMPLING DATA: SAMPLING METHOD	SAMPLE NUMBER	RECOVERY (feet)	DEPTH SAMPLED	DEPTH IN FEET	SOIL GROUP SYMBOL (USCS)	LITHOLOGIC DESCRIPTION
								No recovery 0-10 feet with Geoprobe. Pushed core liner 4 feet into sediment using PVC rods w/ check valve with 0.5 feet recovery.
				0.0		1		
						2		0.5 feet: **Sandy Tar**; black; fine to medium sand in tar matrix.
						3		
						4		
						5		
						6		
				0.0		7		
						8		
						9		
						10		
						11		
						12		**SILT (ML)**; grayish brown; low to medium plasticity fines; light to medium sheen.
				3.0		13		
						14		@ approximately 1 foot from top of sample interval, 0.2 foot-thick oil/tar layer; firm, sticky.
						15		@ approximately 2.5 feet from top of sample interval, 0.2 foot-thick oil/sand layer with wood fragments.
						16		
						17		**SILT (ML)**; grayish brown; low to medium plasticity fines; trace fine sand; lenses of color change to black; spotty sheen.
				3.5		18		
						19		No sheen in bottom 1 foot of sample.
						20		

Remarks:

ANCHOR ENVIRONMENTAL, L.L.C.

LOG OF EXPLORATORY BORING

CLIENT/PROJECT NAME: Northwest Natural "Gasco" Site
PROJECT NUMBER: 000029-02
GEOLOGIST/ENGINEER: J. Renda
DRILLING CONTRACTOR: Geotech Explorations, Inc.
DRILLING METHOD: Direct Push/Geoprobe
HOLE DIAMETER: 2-inch

BORING #: RAA-03
DATE BEGAN: 7/21/04
DATE COMPLETED: 7/21/04
TOTAL DEPTH: 23 feet
SHEET: 1 OF 1

Field location of boring
Mudline: 27.4 feet
Staff Gage: 5.25 feet
Latitude: 45.58007390
Longitude: 122.75794293

OTHER*	WELL OR PIEZOMETER DETAILS	SAMPLING METHOD	SAMPLE NUMBER	RECOVERY (feet)	DEPTH SAMPLED	DEPTH IN FEET	SOIL GROUP SYMBOL (USCS)	LITHOLOGIC DESCRIPTION
				0.0	X	1		No recovery 0-8 feet with Geoprobe; rods sink to 8 feet below mudline. Pushed 3-inch outside-diameter piston core 1.5 feet into sediment on 7/22/04.
						2		0.0 to 1.5 feet: **SILT (ML)**: grayish brown; medium plasticity fines; sheen.
						3		@ 0.2 to 0.3 feet: Oil/tar layer; black; firm
						4		@ 0.6 to 0.9 feet: Oil/tar layer; black; firm
						5		@ 1.2 to 1.4 feet: Oil/tar layer; black; firm; droplets of free product.
						6		
						7		
						8		
					X	9		Stratified layers of **Sand (SP)**, **SILT (ML)**, and **SILTY SAND (SM)** in layers of 0.2 to 0.3 feet thick. Trace wood chips; trace oil specks.
						10		
				3.0		11		
						12		
						13		
					X	14		**SAND (SP)**; grayish brown; fine to medium sand; loose; no sheen or specks.
						15		
				2.0		16		
						17		
						18		
					X	19		0.5 feet: **SAND (SP)**; grayish brown; fine to medium sand.
								0.8 feet: **SILT (ML)**; grayish brown; low to medium plasticity.
								0.3 feet: **SAND (SP)**; grayish brown; fine to medium sand.
						20		0.6 feet: **SILTY SAND (SM)**; grayish brown; fine to medium sand; 20 to 30 percent nonplastic to low plasticity fines.
				3.0		21		0.5 feet: **SAND (SP)**; grayish brown; fine sand.
								0.3 feet: **SILT (ML)**; grayish brown; low to medium plasticity fines.
						22		
						23		

Remarks:

ANCHOR ENVIRONMENTAL, L.L.C.

LOG OF EXPLORATORY BORING

CLIENT/PROJECT NAME: Northwest Natural "Gasco" Site
PROJECT NUMBER: 000029-02
GEOLOGIST/ENGINEER: J. Renda
DRILLING CONTRACTOR: Geotech Explorations, Inc.
DRILLING METHOD: Direct Push/Geoprobe
HOLE DIAMETER: 2-inch

BORING #: RAA-04
DATE BEGAN: 7/21/04
DATE COMPLETED: 7/21/04
TOTAL DEPTH: 20 feet
SHEET: 1 OF 1

Field location of boring
0.5 feet
Mudline: above water
Staff Gage: 3.5 feet
Latitude: 45.57971933
Longitude: 122.75805875

OTHER*	WELL OR PIEZOMETER DETAILS	SAMPLING DATA: SAMPLING METHOD	SAMPLE NUMBER	RECOVERY (feet)	DEPTH SAMPLED	DEPTH IN FEET	SOIL GROUP SYMBOL (USCS)	LITHOLOGIC DESCRIPTION
						1		1.0 foot: **SANDY TAR with SILT**; black; fine to medium sand in tar matrix; nonplastic to low plasticity fines; trace fine to medium gravel; angular to subrounded.
						2		
				2.5				1.5 feet: **SILT (ML)**; grayish brown; nonplastic to low plasticity fines; trace fine sand; no sheen.
						3		
						4		
						5		
						6		5.0 to 6.0 feet: **SAND (SP)**; black; fine to medium sand; approximately 30 percent tar; trace fine to medium gravel.
						7		
				5.0		8		6.0 to 20.0 feet: **SILT (ML)**; grayish brown; nonplastic to low plasticity fines; trace fine sand; no sheen.
						9		
						10		
						11		
						12		
				3.0		13		
						14		
						15		
						16		
						17		
				4.5		18		
						19		
						20		

Remarks:

ANCHOR ENVIRONMENTAL, L.L.C.

LOG OF EXPLORATORY BORING

CLIENT/PROJECT NAME: Northwest Natural "Gasco" Site | BORING #: RAA-05
PROJECT NUMBER: 000029-02 | DATE BEGAN: 7/22/04
GEOLOGIST/ENGINEER: J. Renda | DATE COMPLETED: 7/22/04
DRILLING CONTRACTOR: Geotech Explorations, Inc. | TOTAL DEPTH: 20 feet
DRILLING METHOD: Direct Push/Geoprobe | SHEET: 1 OF 1
HOLE DIAMETER: 2-inch

Field location of boring
Mudline: 3.1 feet | Latitude: 45.57985022
Staff Gage: 4.9 feet | Longitude: 122.75809311

OTHER*	WELL OR PIEZOMETER DETAILS	SAMPLING DATA: SAMPLING METHOD	SAMPLE NUMBER	RECOVERY (feet)	DEPTH SAMPLED	DEPTH IN FEET	SOIL GROUP SYMBOL (USCS)	LITHOLOGIC DESCRIPTION
								1.3 feet: **TAR**; black; firm; sticky.
						1		0.3 feet: **SILT (ML)**; black; low plasticity fines; slight sheen.
								0.3 feet: **SAND (SP)**; black; fine sand, trace nonplastic to low
						2		plasticity fines.
				2.3				0.3 feet: **SILTY SAND (SM)**; black; fine to medium sand, 30 to
						3		40 percent nonplastic to low plasticity fines; trace wood
								fragments.
						4		0.1 feet: **SAND (SP)**; dark gray to black; fine to medium sand.
						5		
								1.5 feet: **SILT (ML)**; grayish brown; low to medium plasticity
						6		fines; trace wood fibers; slight sheen.
								0.5 feet: **SANDY SILT (ML)**; dark gray; low to medium plasticity
						7		fines; 15 to 20 percent fine sand; medium sheen.
				3.5				0.2 feet: **SILT (ML)**; grayish brown; low to medium plasticity
						8		fines; light sheen.
								0.1 feet: **SILT (ML)**; dark gray; low to medium plasticity fines;
						9		medium sheen.
								1.1 feet: **SILT (ML)**; grayish brown; low to medium plasticity
						10		fines; light sheen in thin lenses.
						11		**SILT (ML)**; grayish brown; low to medium plasticity fines; no sheen.
						12		
				3.5				
						13		Bottom 1 foot of interval contains lenses of fine sand 0.2 to 0.3 feet thick.
						14		
						15		
						16		
								2.0 feet: **SILT (ML)**; grayish brown; nonplastic to low plasticity
						17		fines; trace fine sand; loose; wet.
				5.0				
						18		
								2.0 feet: **SANDY SILT (ML)**; grayish brown; nonplastic to low
						19		plasticity fines; 30 to 40 percent fine sand.
						20		

Remarks:

ANCHOR ENVIRONMENTAL, L.L.C.

LOG OF EXPLORATORY BORING

CLIENT/PROJECT NAME Northwest Natural "Gasco" Site | BORING # RAA-06
PROJECT NUMBER 000029-02 | DATE BEGAN 7/20/04
GEOLOGIST/ENGINEER J. Renda | DATE COMPLETED 7/20/04
DRILLING CONTRACTOR Geotech Explorations, Inc. | TOTAL DEPTH 20 feet
DRILLING METHOD Direct Push/Geoprobe | SHEET 1 OF 1
HOLE DIAMETER 2-inch

Field location of boring
Mudline: 4.4 feet | Latitude: 45.58001600
Staff Gage: 3.0 feet | Longitude: 122.75808147

OTHER*	WELL OR PIEZOMETER DETAILS	SAMPLING DATA: SAMPLING METHOD	SAMPLE NUMBER	RECOVERY (feet)	DEPTH SAMPLED	DEPTH IN FEET	SOIL GROUP SYMBOL (USCS)	LITHOLOGIC DESCRIPTION
						1		0.5 feet: **SILT (ML)**; grayish brown; nonplastic to low plasticity fines; loose.
						2		0.8 feet: **TAR with SILTY SAND**; black; fine to medium sand with low plasticity fines in tar matrix.
				2.2		3		0.7 feet: **SANDY SILT (ML)**; grayish brown; nonplastic to low plasticity fines; 30-40 percent fine sand.
						4		0.2 feet: **SILTY SAND (SM)**; grayish brown; fine to medium sand; 20 to 30 percent nonplastic to low plasticity fines.
						5		
						6		0.5 feet: fine to medium gravel sized tar chunks; hard; brittle.
						7		2.0 feet: **SILTY SAND (SM)**; grayish brown; fine to medium sand; 20 to 30 percent nonplastic to low plasticity fines.
				5.0		8		1.5 feet: **SANDY SILT (ML)**; grayish brown; nonplastic to low plasticity fines; 30-40 percent fine sand; specks of oil/sheen.
						9		1.0 feet: **SILTY SAND (SM)**; dark grayish brown; fine to medium sand; 20 to 30 percent nonplastic to low plasticity fines; specks of oil/sheen.
						10		
						11		0.8 feet: **SILTY SAND (SM)**; dark grayish brown; fine to medium sand; 20 to 30 percent nonplastic to low plasticity fines; specks of oil/sheen.
						12		0.3 feet: **SANDY SILT (ML)**; grayish brown; medium plasticity fines; 30-40 percent fine sand; specks of oil/sheen.
				1.1		13		
						14		
						15		
						16		3.0 feet: **SILT (ML)**; grayish brown; low to medium plasticity fines; trace fine sand; lenses of color change to black; spotty sheen.
						17		2.0 feet: **SAND (SP)**; grayish brown; fine to medium sand; no sheen or spotting.
				5.0		18		
						19		
						20		

Remarks:

ANCHOR ENVIRONMENTAL, L.L.C.

LOG OF EXPLORATORY BORING

CLIENT/PROJECT NAME: Northwest Natural "Gasco" Site — BORING #: RAA-07
PROJECT NUMBER: 000029-02 — DATE BEGAN: 7/20/04
GEOLOGIST/ENGINEER: J. Renda — DATE COMPLETED: 7/20/04
DRILLING CONTRACTOR: Geotech Explorations, Inc. — TOTAL DEPTH: 20 feet
DRILLING METHOD: Direct Push/Geoprobe — SHEET: 1 OF: 1
HOLE DIAMETER: 2-inch

Field location of boring
Mudline: 16.7 feet — Latitude: 45.58011224
Staff Gage: 5.75 feet — Longitude: 122.75818444

OTHER*	WELL OR PIEZOMETER DETAILS	SAMPLING DATA: SAMPLING METHOD	SAMPLE NUMBER	RECOVERY (feet)	DEPTH SAMPLED	DEPTH IN FEET	SOIL GROUP SYMBOL (USCS)	LITHOLOGIC DESCRIPTION
						0		No recovery 0-5 feet with Geoprobe; rods sink to 5 feet below mudline in the soft sediment.
						1		
						2		
						3		
						4		
						5		
						6		**SAND (SP)**; black; fine to medium sand; stratified with 0.3 to 0.4 foot-thick layers of TAR; firm and sticky.
						7		
				3.5		8		
						9		
						10		
						11		0.5 feet: **TAR**; black; 20 to 30 percent nonplastic to low plasticity fines; firm. 0.5 feet: **SILT (ML)**; gray; medium plasticity fines.
						12		1 foot: **TAR**; black; 20 to 30 percent fine to medium sand.
				3.5		13		0.5 feet: **SAND (SP)**; grayish brown; fine to medium sand; few tar blebs; spotty sheen.
						14		0.5 feet: **SILT (ML)**; grayish brown; medium plasticity fines; slight sheen.
						15		0.5 feet: **SAND (SP)**; grayish brown; fine to medium sand; no sheen.
						16		0.5 feet: **SILT (ML)**; grayish brown; medium plasticity fines; specks of oil/sheen.
						17		2.0 feet: **SAND (SP)**; grayish brown; fine to medium sand; no sheen or spotting.
				2.5		18		
						19		
						20		

Remarks:

ANCHOR ENVIRONMENTAL, L.L.C.

LOG OF EXPLORATORY BORING

CLIENT/PROJECT NAME: Northwest Natural "Gasco" Site | BORING #: RAA-08
PROJECT NUMBER: 000029-02 | DATE BEGAN: 7/21/04
GEOLOGIST/ENGINEER: J. Renda | DATE COMPLETED: 7/21/04
DRILLING CONTRACTOR: Geotech Explorations, Inc. | TOTAL DEPTH: 20 feet
DRILLING METHOD: Direct Push/Geoprobe | SHEET: 1 OF 1
HOLE DIAMETER: 2-inch

Field location of boring
0.5 feet
Mudline: above water | Latitude: 45.57982296
Staff Gage: 3.2 feet | Longitude: 122.75845286

OTHER*	WELL OR PIEZOMETER DETAILS	SAMPLING DATA: SAMPLING METHOD	SAMPLE NUMBER	RECOVERY (feet)	DEPTH SAMPLED	DEPTH IN FEET	SOIL GROUP SYMBOL (USCS)	LITHOLOGIC DESCRIPTION
						1		1 foot: **SANDY GRAVEL (GW)**; lt brown; fine to coarse; angular to subrounded; 20 to 30 percent fine to coarse sand.
						2		1 foot: **SAND (SP)**; black; fine to medium sand; oil/tar saturated.
				2.0		3		
						4		
						5		
						6		1.5 feet: **SAND (SP)**; black; fine to medium sand; saturated with oil/tar; firm and sticky.
						7		1.5 feet: **SILTY SAND (SM)**; grayish brown; fine sand; 20 to 30 percent nonplastic to low plasticity fines; no sheen.
				3.0		8		
						9		
						10		
						11		Note: no recovery; move over 1.5 feet and core 10 to 15 feet with full recovery.
						12		**SILTY SAND (SM)**; grayish brown; fine sand; 20 to 30 percent low to medium plasticity fines; no sheen.
				5.0		13		
						14		
						15		
						16		**SILT (ML)**: grayish brown; nonplastic to low plasticity fines; 5 to 10 percent fine sand; loose, wet, no sheen or spotting.
						17		
				5.0		18		
						19		
						20		

Remarks:

ANCHOR ENVIRONMENTAL, L.L.C.

LOG OF EXPLORATORY BORING

CLIENT/PROJECT NAME: Northwest Natural "Gasco" Site | BORING #: RAA-09
PROJECT NUMBER: 000029-02 | DATE BEGAN: 7/19/04
GEOLOGIST/ENGINEER: J. Renda | DATE COMPLETED: 7/19/04
DRILLING CONTRACTOR: Geotech Explorations, Inc. | TOTAL DEPTH: 20 feet
DRILLING METHOD: Direct Push/Geoprobe | SHEET: 1 OF 2
HOLE DIAMETER: 2-inch

Field location of boring

Mudline: 0.2 feet | Latitude: 45.57990589
Staff Gage: 3.0 feet | Longitude: 122.75826530

OTHER*	WELL OR PIEZOMETER DETAILS	SAMPLING DATA: SAMPLING METHOD	SAMPLE NUMBER	RECOVERY (feet)	DEPTH SAMPLED	DEPTH IN FEET	SOIL GROUP SYMBOL (USCS)	LITHOLOGIC DESCRIPTION
						1		1.8 feet: **TAR**; black; firm; sticky.
						2		0.2 feet: **SAND (SP)**; dark gray; fine to medium sand; heavy sheen; oil droplets.
				2.0		3		
						4		
						5		
						6		**SAND (SP)**; dark gray; fine to medium sand; heavy sheen; oil droplets.
						7		
				3.5		8		
						9		
						10		
						11		**SAND (SP)**; dark gray; fine to medium sand; trace tar globs; heavy sheen; trace wood fragments.
						12		@ 12 to 14 feet; same with approximately 30 percent nonplastic fines.
				5.0		13		
						14		
						15		
						16		@ 16 feet: No sheen
						17		
				5.0		18		17.5 to 20 feet: **SILT (ML)**; grayish brown; nonplastic to low plasticity fines; trace fine sand; no sheen.
						19		@ 19 feet: 0.1 foot sand lense; fine to medium sand.
						20		@ 19.5 feet: 0.1 foot sand lense; fine to medium sand.

Remarks: A boring was advanced from 0 to 4 feet below mudline with 1.5 feet recovery. 1.5 feet of of tar was observed with sand in drive shoe. In the 4 to 8 foot interval, 2 feet of SAND was observed (2 feet recovery). Borehole was decommissioned with bentonite chips and a second boring was advanced as described above.

ANCHOR ENVIRONMENTAL, L.L.C.

LOG OF EXPLORATORY BORING

CLIENT/PROJECT NAME: Northwest Natural "Gasco" Site | BORING #: RAA-09
PROJECT NUMBER: 000029-02 | DATE BEGAN: 7/19/04
GEOLOGIST/ENGINEER: J. Renda | DATE COMPLETED: 7/19/04
DRILLING CONTRACTOR: Geotech Explorations, Inc. | TOTAL DEPTH: 20 feet
DRILLING METHOD: Direct Push/Geoprobe | SHEET: 2 OF 2
HOLE DIAMETER: 2-inch

Field location of boring
Mudline: 0.2 feet | Latitude: 45.57990589
Staff Gage: 3.0 feet | Longitude: 122.75826530

OTHER*	WELL OR PIEZOMETER DETAILS	SAMPLING DATA: SAMPLING METHOD	SAMPLE NUMBER	RECOVERY (feet)	DEPTH SAMPLED	DEPTH IN FEET	SOIL GROUP SYMBOL (USCS)	LITHOLOGIC DESCRIPTION
						21		2.5 feet: **SILT (ML)**; grayish brown; nonplastic to low plasticity fines; trace fine sand; no sheen.
						22		1.5 feet: **SILT (ML)**; grayish brown; nonplastic to low plasticity fines; trace fine sand; loose, soupy; trace wood fibers, no sheen.
				4.5		23		0.5 feet: **SAND (SP)**; grayish brown; fine to medium sand.
						24		
						25		
						26		**SILT (ML)**; grayish brown; nonplastic to low plasticity fines; trace fine sand; trace wood fragments; no sheen.
						27		
				5.0		28		@ 27 feet: 0.1 foot-thick sand lens.
						29		
						30		@ 29.5 feet: increase in plasticity and firmness.
						31		
						32		**SAND (SP)**; dark gray; fine to medium sand.
				5.0		33		
						34		
						35		@ 34.5 feet: 0.2 foot-thick silt lense; grayish brown; medium plasticity fines.
						36		
						37		**SAND (SP)**; grayish brown; fine to medium sand.
				5.0		38		
						39		
						40		

Remarks:

SCOEPA00013596

ANCHOR ENVIRONMENTAL, L.L.C.

LOG OF EXPLORATORY BORING

CLIENT/PROJECT NAME: Northwest Natural "Gasco" Site | BORING #: RAA-10
PROJECT NUMBER: 000029-02 | DATE BEGAN: 7/19/04
GEOLOGIST/ENGINEER: J. Renda | DATE COMPLETED: 7/19/04
DRILLING CONTRACTOR: Geotech Explorations, Inc. | TOTAL DEPTH: 20 feet
DRILLING METHOD: Direct Push/Geoprobe | SHEET: 1 OF 1
HOLE DIAMETER: 2-inch

Field location of boring

Mudline: 2.3 feet | Latitude: 45.580043205
Staff Gage: 2.0 feet | Longitude: 122.75827003

OTHER*	WELL OR PIEZOMETER DETAILS	SAMPLING METHOD	SAMPLE NUMBER	RECOVERY (feet)	DEPTH SAMPLED	DEPTH IN FEET	SOIL GROUP SYMBOL (USCS)	LITHOLOGIC DESCRIPTION
						1		**SAND (SP)**; black; fine to medium sand; 20 to 30 percent oil/tar; loose to firm; wet; heavy sheen.
				3.0		2		
						3		
						4		
						5		
						6		**SAND (SP)**; black; fine to medium sand; 20 to 30 percent oil/tar; loose to firm; wet; heavy sheen.
				2.0		7		
						8		
						9		
						10		
						11		**SILT (ML)**; grayish brown; medium plasticity fines; trace wood fragments.
						12		Oily specks to a depth of approximately 12 feet.
				4.0		13		
						14		
						15		
						16		2.5 feet: **SILT (ML)**: grayish brown; medium plasticity fines; trace wood fragments.
						17		1.0 feet: **SAND (SP)**; grayish brown; fine to medium sand.
				5.0		18		0.5 feet: **SANDY SILT (ML)**; grayish brown; low plasticity fines; 30 to 40 percent fine sand.
						19		0.5 feet: **SILTY SAND (SM)**; grayish brown; fine to medium sand; 20 to 30 percent low plasticity fines.
						20		0.5 feet: **SANDY SILT (ML)**; grayish brown; low plasticity fines; 30 to 40 percent fine sand.

Remarks:

ANCHOR ENVIRONMENTAL, L.L.C.

LOG OF EXPLORATORY BORING

CLIENT/PROJECT NAME: Northwest Natural "Gasco" Site | BORING #: RAA-11
PROJECT NUMBER: 000029-02 | DATE BEGAN: 7/22/04
GEOLOGIST/ENGINEER: J. Renda | DATE COMPLETED: 7/22/04
DRILLING CONTRACTOR: Geotech Explorations, Inc. | TOTAL DEPTH: 20 feet
DRILLING METHOD: Direct Push/Geoprobe | SHEET: 1 OF: 1
HOLE DIAMETER: 2-inch

Field location of boring

Mudline: 2.9 feet | Latitude: 45.58003730
Staff Gage: 2.9 feet | Longitude: 122.75844474

OTHER*	WELL OR PIEZOMETER DETAILS	SAMPLING DATA: SAMPLING METHOD	SAMPLE NUMBER	RECOVERY (feet)	DEPTH SAMPLED	DEPTH IN FEET	SOIL GROUP SYMBOL (USCS)	LITHOLOGIC DESCRIPTION
						1		1.1 feet: **TAR;** black; firm; sticky. 2.2 feet: **SAND (SP);** dark gray grading to grayish brown; fine to medium sand; slight sheen.
				3.3		2		@ approximately 2 feet from top of sample interval: 0.1 foot-thick silt lense
						3		@ approximately 3 feet from top of sample interval: 0.1 foot-thick silt lense
						4		
						5		
						6		**SAND (SP);** grayish brown; fine to medium sand; few oily specks; slight heavy sheen.
						7		@ approximately 1.9 feet from top of sample interval: 0.3 foot-thick silt lense; low to medium plasticity; sheen.
				3.3		8		@ approximately 2.9 feet from top of sample interval: 0.2 foot-thick silt lense; low to medium plasticity; sheen.
						9		
						10		
						11		0.3 feet: **SAND (SP);** grayish brown; fine to medium sand; sheen.
						12		3.7 feet: **SILT (ML);** grayish brown; low to medium plasticity fines; Oily specks to a depth of approximately 12 feet.
				4.0		13		@ 1 foot from top of sample interval: sand lense; oily, loose, laminated with silt, sand , and wood fibers.
						14		@ 1.5 feet from top of sample interval: tar chunk; hard, brittle, < 0.1 foot.
						15		@ 2.0 feet from top of sample interval: silty sand lense.
						16		2.8 feet: **SILT (ML):** grayish brown; low to medium plasticity fines; trace wood fragments.
						17		0.2 feet: **SAND (SP);** grayish brown; fine to medium sand, < 10 percent nonplastic fines.
				5.0		18		0.5 feet: **SILT (ML):** grayish brown; nonplastic to low plasticity fines.
						19		0.8 feet: **SAND (SP);** grayish brown; fine to medium sand. 0.7 feet: **SILT (ML):** grayish brown; nonplastic to low plasticity fines.
						20		

Remarks:

ANCHOR ENVIRONMENTAL, L.L.C.

LOG OF EXPLORATORY BORING

CLIENT/PROJECT NAME: Northwest Natural "Gasco" Site
PROJECT NUMBER: 000029-02
GEOLOGIST/ENGINEER: J. Renda
DRILLING CONTRACTOR: Geotech Explorations, Inc.
DRILLING METHOD: Direct Push/Geoprobe
HOLE DIAMETER: 2-inch

BORING #: RAA-12
DATE BEGAN: 7/20/04
DATE COMPLETED: 7/20/04
TOTAL DEPTH: 20 feet
SHEET: 1 OF 1

Field location of boring

Mudline: 4.3 feet
Staff Gage: 4.5 feet
Latitude: 45.58016669
Longitude: 122.75850000

OTHER*	WELL OR PIEZOMETER DETAILS	SAMPLING DATA: SAMPLING METHOD	SAMPLE NUMBER	RECOVERY (feet)	DEPTH SAMPLED	DEPTH IN FEET	SOIL GROUP SYMBOL (USCS)	LITHOLOGIC DESCRIPTION
						1		1.0 feet: **SILT (ML);** grayish brown; nonplastic fines; loose; slight sheen. 0.5 feet: **SILT (ML);** dark gray to black; low plasticity fines; heavy sheen.
						2		Note: An additional sample was collected using a Piston Core sampler. Pushed 3-inch outside-diameter piston core 3.0 feet into sediment on 7/22/04.
				1.5		3		
						4		0.0 to 0.2 feet: **SILT (ML)**: grayish brown; nonplastic fines; loose; oily sheen.
						5		0.2 to 3.0 feet: **SILT (ML)**; grayish brown; low plasticity fines; firm; slight sheen.
						6		@ 0.4 to 0.5 feet: black oily layer
						7		
				0.0		8		
						9		
						10		
						11		**SILT (ML)**; grayish brown; nonplastic to low plasticity fines; trace oil specks.
						12		@ 12 feet: 0.1 foot-thick oil/tar lense, black; firm. @ 12.1 feet: color change to dark gray/black with oily laminations.
				4.5		13		
						14		
						15		
						16		**SILT (ML)**; grayish brown; nonplastic to low plasticity fines; trace oil specks.
						17		
				5.0		18		@ 17 to 17.5 feet: **SAND (SP)**; grayish brown; fine to medium sand; slight sheen.
						19		@ 18 to 20 feet: no sheen.
						20		

Remarks:

ANCHOR ENVIRONMENTAL, L.L.C.

LOG OF EXPLORATORY BORING

CLIENT/PROJECT NAME: Northwest Natural "Gasco" Site | BORING #: RAA-13
PROJECT NUMBER: 000029-02 | DATE BEGAN: 7/20/04
GEOLOGIST/ENGINEER: J. Renda | DATE COMPLETED: 7/20/04
DRILLING CONTRACTOR: Geotech Explorations, Inc. | TOTAL DEPTH: 22 feet
DRILLING METHOD: Direct Push/Geoprobe | SHEET: 1 OF 1
HOLE DIAMETER: 2-inch

Field location of boring
Mudline: 19.9 feet | Latitude: 45.58017940
Staff Gage: 4.0 feet | Longitude: 122.75836670

OTHER*	WELL OR PIEZOMETER DETAILS	SAMPLING METHOD	SAMPLE NUMBER	RECOVERY (feet)	DEPTH SAMPLED	DEPTH IN FEET	SOIL GROUP SYMBOL (USCS)	LITHOLOGIC DESCRIPTION
				0.0		1		No recovery 0-7 feet with Geoprobe. Pushed core liner 4 feet into sediment using PVC rods w/ check valve with no recovery. Outside of core tube was coated with black oil/tar.
						2		
						3		
						4		
						5		
						6		
						7		
						8		1.0 foot: **SILT (ML);** grayish brown; nonplastic fines; loose; slight sheen.
						9		2.0 feet: **TAR**; black; silty with silt lenses and fibrous wood layers.
				4.0		10		0.4 feet: **SILT (ML);** black; nonplastic to low plasticity fines.
						11		0.3 feet: **SILT (ML);** grayish brown; nonplastic to low plasticity fines.
						12		0.3 feet: **SAND (SP);** grayish brown; fine to medium sand.
						13		2.0 feet: **SAND (SP)**; grayish brown; fine to medium sand; loose; slight spotty sheen.
						14		
				3.0		15		1.0 feet: **SILTY SAND (SM)**; grayish brown; fine to medium sand; 20 to 30 percent nonplastic to low plasticity fines; no sheen or oil specks.
						16		@ 2.5 feet from top of sample interval: 0.2 foot-thick silt lense.
						17		
						18		3.0 feet: **SAND (SP);** grayish brown; fine to medium sand; 3 specks of oil noted in top 1.5 feet of sample interval.
						19		1.8 feet: **SILTY SAND (SM);** grayish brown; fine sand; 20 to 30 percent nonplastic to low plasticity fines; no sheen or oil specks.
				5.0		20		
						21		0.2 feet: **SILT (ML);** grayish brown; nonplastic to low plasticity fines.
						22		

Remarks:

ANCHOR ENVIRONMENTAL, L.L.C.

LOG OF EXPLORATORY BORING

CLIENT/PROJECT NAME: Northwest Natural "Gasco" Site
PROJECT NUMBER: 000029-02
GEOLOGIST/ENGINEER: J. Renda
DRILLING CONTRACTOR: Geotech Explorations, Inc.
DRILLING METHOD: Direct Push/Geoprobe
HOLE DIAMETER: 2-inch

BORING #: RAA-14
DATE BEGAN: 7/20/04
DATE COMPLETED: 7/20/04
TOTAL DEPTH: 20 feet
SHEET: 1 OF 1

Field location of boring

Mudline: 31.1 feet
Staff Gage: 3.75 feet
Latitude: 45.58022110
Longitude: 122.75825230

OTHER*	WELL OR PIEZOMETER DETAILS	SAMPLING METHOD	SAMPLE NUMBER	RECOVERY (feet)	DEPTH SAMPLED	DEPTH IN FEET	SOIL GROUP SYMBOL (USCS)	LITHOLOGIC DESCRIPTION
								No recovery 0-10 feet with Geoprobe; rods sink to 10 feet below mudline. Pushed 3-inch outside-diameter piston core 1.1 feet into sediment on 7/22/04.
				1.1		1		
						2		**SILT (ML)**; grayish brown; low to medium plasticity fines; trace wood fibers; approximately 6, 0.1 foot-thick lenses of black tar; firm and sticky.
						3		
						4		
						5		
						6		
						7		
				0.0		8		
						9		
						10		
						11		10.0 to 11.5 feet: **SILT (ML)**; grayish brown; low to medium plasticity fines; loose; blebs of tar/oil.
						12		11.5 to 13.5 feet: **SILT (ML)**: grayish brown to black; low to medium plasticity fines; black dense tar laminations; trace wood fibers and wood chunks.
				5.0		13		@13.5 feet: Fine Gravel.
						14		13.5 to 14.0 feet: **SANDY SILT (ML)**; grayish brown; low to medium plasticity fines; 30 to 40 percent fine sand; no sheen or spotting.
						15		14.0 to 20.0 feet: **SAND (SP)**; grayish brown; fine sand; trace fines; no sheen or spotting.
						16		@ 14.3 to 14.5 feet: **SILT (ML)**; grayish brown; low to medium plasticity fines.
						17		
				4.0		18		@ 18.0 to 18.4 feet: **SILT (ML)**; grayish brown; low to medium plasticity fines.
						19		@ 19.0 to 19.3 feet: **SILT (ML)**; grayish brown; low to medium plasticity fines.
						20		

Remarks:

ANCHOR ENVIRONMENTAL, L.L.C.

LOG OF EXPLORATORY BORING

CLIENT/PROJECT NAME: Northwest Natural "Gasco" Site
PROJECT NUMBER: 000029-02
GEOLOGIST/ENGINEER: J. Renda
DRILLING CONTRACTOR: Geotech Explorations, Inc.
DRILLING METHOD: Direct Push/Geoprobe
HOLE DIAMETER: 2-inch

BORING #: RAA-15
DATE BEGAN: 7/21/04
DATE COMPLETED: 7/21/04
TOTAL DEPTH: 20 feet
SHEET: 1 OF 1

Field location of boring
3 feet above
Mudline: water
Staff Gage: 4.0 feet
Latitude: 45.57996370
Longitude: 122.75874391

OTHER*	WELL OR PIEZOMETER DETAILS	SAMPLING METHOD	SAMPLE NUMBER	RECOVERY (feet)	DEPTH SAMPLED	DEPTH IN FEET	SOIL GROUP SYMBOL (USCS)	LITHOLOGIC DESCRIPTION
						1		0.7 feet: **GRAVELLY SAND (SW)**; rust brown; fine to coarse sand; fine to coarse gravel; angular to rounded; nonplastic fines; moist.
						2		0.3 feet: **GRAVELLY SAND (SW)**; grayish brown; fine to coarse sand; fine to coarse gravel; angular to rounded; nonplastic fines; wet.
				1.0		3		@2.5 feet: standing water in borehole.
						4		
						5		
						6		1.0 feet: **SILT WITH SAND (ML)**; grayish brown; nonplastic fines; 20 to 30 percent fine sand; loose; spotty sheen; sluff?
						7		3.0 feet: **SILT WITH SAND (ML)**; grayish brown; nonplastic fines; 20 to 30 percent fine sand; firm; no sheen.
				4.0		8		@ 3 feet from top of sample interval: 0.1 foot-thick woody layer.
						9		
						10		
						11		**SILT WITH SAND (ML)**; grayish brown; nonplastic fines; 20 to 30 percent fine sand; firm; no sheen.
						12		
				3.0		13		
						14		
						15		
						16		No recovery
						17		
				0.0		18		
						19		
						20		

Remarks:

ANCHOR ENVIRONMENTAL, L.L.C.

LOG OF EXPLORATORY BORING

CLIENT/PROJECT NAME Northwest Natural "Gasco" Site | BORING # RAA-16
PROJECT NUMBER 000029-02 | DATE BEGAN 7/22/04
GEOLOGIST/ENGINEER J. Renda | DATE COMPLETED 7/22/04
DRILLING CONTRACTOR Geotech Explorations, Inc. | TOTAL DEPTH 20 feet
DRILLING METHOD Direct Push/Geoprobe | SHEET 1 OF 1
HOLE DIAMETER 2-inch

Field location of boring

Mudline: 2.4 feet | Latitude: 45.58024746
Staff Gage: 3.0 feet | Longitude: 122.75866807

OTHER*	WELL OR PIEZOMETER DETAILS	SAMPLING DATA: SAMPLING METHOD	SAMPLE NUMBER	RECOVERY (feet)	DEPTH SAMPLED	DEPTH IN FEET	SOIL GROUP SYMBOL (USCS)	LITHOLOGIC DESCRIPTION
						1		0.4 feet: **SILT (ML)**; dark gray to black; low plasticity fines; loose; medium to heavy sheen; 5 to 10 percent wood chips.
						2		0.8 feet: **SAND (SP)**; dark gray to black; fine to medium sand; trace fines; spotty sheen.
				2.8		3		1.2 feet: **SILT (ML)**; black; nonplastic to low plasticity fines; spotty sheen.
						4		@ 1.8 feet from top of sample interval: 0.1 foot-thick heavy sheen layer. 0.4 feet: **SAND (SP)**; dark gray to black; fine to medium sand; trace fines; spotty sheen.
						5		
						6		1.4 feet: **SILT (ML)**; grayish brown; low to medium plasticity fines; loose, light sheen.
						7		@ 0.2 feet from top of sample interval: 0.1 foot-thick black oily layer. 0.8 feet: **SAND (SP)**; grayish brown; fine to medium sand; trace fines; light sheen.
				3.2		8		1.0 feet: **SILT (ML)**; grayish brown; low to medium plasticity fines; dark gray to black banding; light sheen.
						9		
						10		
						11		0.3 feet: **SILT (ML)**; grayish brown; low to medium plasticity fines; trace fine to medium sand, no sheen or spotting.
						12		0.3 feet: **SAND (SP)**; grayish brown; fine to medium sand; trace fines; no sheen.
				3.7		13		0.7 feet: **SILT (ML)**; grayish brown; low to medium plasticity fines; no sheen.
						14		0.6 feet: **SAND (SP)**; grayish brown; fine sand; trace fines; no sheen. 1.8 feet: **SILT (ML)**; grayish brown; low to medium plasticity fines; black laminations; no sheen.
						15		
						16		**SILT (ML)**; grayish brown; low to medium plasticity fines; < 5 percent fine sand, trace root hairs; no sheen or spotting.
						17		
				5.0		18		
						19		@ 18.5 to 19.2 feet: loose, soupy.
						20		

Remarks:

ANCHOR ENVIRONMENTAL, L.L.C.

LOG OF EXPLORATORY BORING

CLIENT/PROJECT NAME: Northwest Natural "Gasco" Site
PROJECT NUMBER: 000029-02
GEOLOGIST/ENGINEER: J. Renda
DRILLING CONTRACTOR: Geotech Explorations, Inc.
DRILLING METHOD: Direct Push/Geoprobe
HOLE DIAMETER: 2-inch

BORING #: RAA-17
DATE BEGAN: 7/22/04
DATE COMPLETED: 7/22/04
TOTAL DEPTH: 21 feet
SHEET: 1 OF 1

Field location of boring

Mudline: 2.7 feet
Staff Gage: 3.0 feet

Latitude: 45.58014987
Longitude: 122.75872767

OTHER*	WELL OR PIEZOMETER DETAILS	SAMPLING DATA: SAMPLING METHOD	SAMPLE NUMBER	RECOVERY (feet)	DEPTH SAMPLED	DEPTH IN FEET	SOIL GROUP SYMBOL (USCS)	LITHOLOGIC DESCRIPTION
						1		No recovery 0-1 feet with Geoprobe; rods sink to 1 feet below mudline.
						2		0.5 feet: **SILT (ML)**; dark gray to black; nonplastic to low plasticity fines; loose, trace wood chucks; heavy sheen.
						3		1.0 feet: **SAND (SP)**; dark gray; fine to medium sand; trace fines; light sheen.
				2.5		4		0.5 feet: **SILT (ML)**; dark gray; nonplastic to low plasticity fines; loose, trace wood chucks; light sheen.
						5		0.5 feet: **SAND (SP)**; dark gray; fine to medium sand; trace fines; light sheen.
						6		
						7		**SILT (ML)**; grayish brown; low to medium plasticity fines; trace woody layers; light sheen lenses.
						8		@ 1.5 feet from top of sample interval: 0.1 foot-thick woody layer with heavy sheen.
				3.2		9		
						10		
						11		
						12		0.4 feet: **SAND (SP)**; grayish brown; fine sand; trace fines; no sheen.
						13		0.8 feet: **SILT (ML)**; grayish brown; low to medium plasticity fines; trace root hairs; no sheen or spotting.
				3.5		14		0.7 feet: **SAND (SP)**; grayish brown; fine sand; trace fines; trace spotty sheen.
						15		1.5 feet: **SILT (ML)**; grayish brown; low to medium plasticity fines; no sheen or spotting.
						16		0.1 feet: **SILT (ML)**; black; nonplastic fines; firm; brittle; no sheen or spotting.
						17		0.5 feet: **SILT (ML)**; grayish brown; low to medium plasticity fines; no sheen.
						18		0.2 feet: **SILTY SAND (SM)**; grayish brown; fine sand; nonplastic fines; loose, soupy.
				3.5		19		1.8 feet: **SILT (ML)**; grayish brown; low to medium plasticity fines.
						20		0.6 feet: **SAND (SP)**; grayish brown; fine sand; trace fines.
						21		0.4 feet: **SILT (ML)**; grayish brown; low to medium plasticity fines.

Remarks:

ANCHOR ENVIRONMENTAL, L.L.C.

LOG OF EXPLORATORY BORING

CLIENT/PROJECT NAME: Northwest Natural "Gasco" Site
PROJECT NUMBER: 000029-02
GEOLOGIST/ENGINEER: J. Renda
DRILLING CONTRACTOR: Geotech Explorations, Inc.
DRILLING METHOD: Direct Push/Geoprobe
HOLE DIAMETER: 2-inch

BORING #: RAA-18
DATE BEGAN: 7/21/04
DATE COMPLETED: 7/21/04
TOTAL DEPTH: 20 feet
SHEET: 1 OF 1

Field location of boring
4 feet above
Mudline: water
Staff Gage: 2.75 feet
Latitude: 45.57968324
Longitude: 122.75810387

OTHER*	WELL OR PIEZOMETER DETAILS	SAMPLING DATA: SAMPLING METHOD	SAMPLE NUMBER	RECOVERY (feet)	DEPTH SAMPLED	DEPTH IN FEET	SOIL GROUP SYMBOL (USCS)	LITHOLOGIC DESCRIPTION
						1		**GRAVELLY SAND (SW)**; rust brown; fine to coarse sand; fine to coarse gravel; angular to rounded; nonplastic fines; moist.
				1.2		2		
						3		
						4		
						5		
						6		5.0 to 20.0 feet: **SILT (ML)**; grayish brown; low to medium plasticity fines; 5 to 10 percent fine sand.
				1.5		7		
						8		
						9		
						10		
						11		
						12		
				4.0		13		
						14		
						15		
						16		
						17		
				4.0		18		
						19		
						20		

Remarks:

ANCHOR ENVIRONMENTAL, L.L.C.

LOG OF EXPLORATORY BORING

CLIENT/PROJECT NAME: Northwest Natural "Gasco" Site
PROJECT NUMBER: 000029-02
GEOLOGIST/ENGINEER: J. Renda
DRILLING CONTRACTOR: Geotech Explorations, Inc.
DRILLING METHOD: Direct Push/Geoprobe
HOLE DIAMETER: 2-inch

BORING #: RAA-19
DATE BEGAN: 7/22/04
DATE COMPLETED: 7/22/04
TOTAL DEPTH: 20 feet
SHEET: 1 OF 1

OTHER*	WELL OR PIEZOMETER DETAILS	SAMPLING METHOD	SAMPLE NUMBER	RECOVERY (feet)	DEPTH SAMPLED	DEPTH IN FEET	SOIL GROUP SYMBOL (USCS)	LITHOLOGIC DESCRIPTION
						1		1.4 feet: **GRAVELLY SAND (SW)**; rust brown; fine to coarse sand; fine to coarse gravel; angular to rounded; nonplastic fines.
						2		0.2 feet: **GRAVELLY SAND (SW)**; gray; fine to coarse sand; fine to coarse gravel; angular to rounded; nonplastic fines.
				2.5		3		0.6 feet: **WOOD CHIPS**; dark brown to black; 3 medium sized gravel-like tar chunks; hard.
						4		0.3 feet: **SILT (ML)**; grayish brown; low to medium plasticity fines; 5 to 10 percent fine sand; spotty sheen.
						5		
						6		0.3 feet: **SILT (ML)**; grayish brown; nonplastic fines.
						7		2.0 feet: **TAR**; black; with oil/tar saturated lenses of sand and silt.
				2.3		8		
						9		
						10		
						11		10.0 to 20.0 feet: **SILT (ML)**; gray; low to medium plastic fines; 10 to 20 percent fine sand; no sheen.
						12		
				4.0		13		
						14		
						15		
						16		
						17		
				4.5		18		
						19		
						20		

Field location of boring

Latitude: 45.57985626
Longitude: 122.75846549

Remarks:

ANCHOR ENVIRONMENTAL, L.L.C.

LOG OF EXPLORATORY BORING

CLIENT/PROJECT NAME Northwest Natural "Gasco" Site | BORING # RAA-20
PROJECT NUMBER 000029-02 | DATE BEGAN 7/22/04
GEOLOGIST/ENGINEER J. Renda | DATE COMPLETED 7/22/04
DRILLING CONTRACTOR Geotech Explorations, Inc. | TOTAL DEPTH 20 feet
DRILLING METHOD Direct Push/Geoprobe | SHEET 1 OF 1
HOLE DIAMETER 2-inch

OTHER*	WELL OR PIEZOMETER DETAILS	SAMPLING DATA: SAMPLING METHOD	SAMPLE NUMBER	RECOVERY (feet)	DEPTH SAMPLED	DEPTH IN FEET	SOIL GROUP SYMBOL (USCS)	LITHOLOGIC DESCRIPTION
						1		1.5 feet: **GRAVELLY SAND (SW)**; rust brown; fine to coarse sand; fine to coarse gravel; angular to rounded; nonplastic fines.
								0.8 feet: **TAR**; black; with oil/tar saturated lenses of sand and silt.
						2		0.2 feet: **SAND (SP)**; dark gray; fine to medium; spotty sheen.
				2.5				
						3		0.3 feet: **SILT (ML)**; grayish brown; low to medium plasticity fines; 5 to 10 percent fine sand; spotty sheen.
						4		
						5		
								5.0 to 5.5 feet: **GRAVELLY SAND (SW)**; gray; fine to coarse sand; fine to medium gravel; angular to subrounded; fine to coarse sand; spotty sheen.
						6		5.5 to 5.6 feet: **SAND (SP)**; dark gray; fine to medium sand; spotty sheen.
						7		
				5.0				5.6 to 20.0 feet: **SILT (ML);** grayish brown; nonplastic to low plasticity fines; 10 to 20 percent fine sand; trace fine sand lenses; no sheen.
						8		
						9		
						10		
								10.0 to 20.0 feet: **SILT (ML);** gray; low to medium plastic fines; 10 to 20 percent fine sand; no sheen.
						11		
						12		
				4.5		13		
						14		
						15		
						16		
						17		
				5.0		18		
						19		
						20		

Field location of boring

Latitude: 45.57975098
Longitude: 122.75829940

Remarks:

HAHN & ASSOCIATES, INC. 434 NW Sixth Avenue Portland, Oregon (503) 796-0717	**SOIL BORING NUMBER**	**AN-2-1**	
PROJECT: NW Natural Gasco Facility Portland, Oregon	HAI LOGGER: Kim Magruder/Rob Ede SAMPLING METHOD: Stainless Steel Soil Sampler DRILLING METHOD: Vibracore EQUIPMENT TYPE Same as above DRILLER: Bill Jaworski	DRILL START Time: 9:23 Date: 04/11/01	DRILL FINISH Time: 9:28 Date: 04/11/01
PROJECT #: 2708	DRILLING CONTRACTOR: Marine Sampling Systems		

BORING DIAMETER: 3-inch OD
CASING DIAMETER: N/A
SURFACE ELEVATION: Estimated to be: N/A
TOP OF CASING ELEVATION: N/A

ABANDONMENT DETAILS	SAMPLE NUMBER*	TIME	HEADSPACE (ppm)	CORE INTERVAL	RECOVERY INTERVAL	DEPTH (feet)	GROUNDWATER	STRATA (USCS)
				AN2-1A				ML
			2.0			1		
						2		
						3		
						4		
			1.4					
				AN2-1B		5		
						6		
						7		
						8		ML
			0.0					
				AN2-1C		9		
						10		
						11		
						12		
						13		
						14		
						15		

SOIL DESCRIPTION

AN2-1A (4' 2" core length)
SILT, brown, wet, soft (soupy), small fraction very fine sand (<5%), organic matter (rootlets, wood fiber), no sheen, slight hydrocarbon odor (0 to 10 cm), slight increase in sand content and slight sheen (10 to 20 cm); increased organic matter, decreased moisture content, no sheen, no hydrocarbon odor (30 to 40 cm).

SILT, as above to 3', at 3' have a 2" thick tar layer (black and oily with some elastic tar and associated oily tar), slight sheen, hydrocarbon odor, 3-inch thick sandy silt zone from 3'11" to 4'2.

AN2-1B (3' 11" core length)
SILT, olive grey with black mottling, moist, medium soft, with weathered tar layers to 5' 11" bgs, below weathered tar zone silt is olive grey, no sheen, no hydrocarbon odor.

AN2-1C (3' 3" core length)
SILT, olive grey, moist, medium soft, no sheen, no hydrocarbon odor.

Total Core Push =
Total Recovered Core Length = 11' 4"

HAHN & ASSOCIATES, INC. 434 NW Sixth Avenue Portland, Oregon (503) 796-0717	**SOIL BORING NUMBER**		**AN-2-2**	
	HAI LOGGER:	Kim Magruder/Rob Ede	DRILL START	DRILL FINISH
PROJECT: NW Natural Gasco Facility Portland, Oregon	SAMPLING METHOD:	Stainless Steel Soil Sampler	Time: 10:06	Time: 10:11
	DRILLING METHOD:	Vibracore		
	EQUIPMENT TYPE	Same as above		
	DRILLER:	Bill Jaworski	Date: 04/11/01	Date: 04/11/01
PROJECT #: 2708	DRILLING CONTRACTOR:	Marine Sampling Systems		

BORING DIAMETER: 3-inch OD
CASING DIAMETER: N/A
SURFACE ELEVATION: Estimated to be: N/A
TOP OF CASING ELEVATION: N/A

ABANDONMENT DETAILS	SAMPLE NUMBER*	TIME	HEADSPACE (ppm)	CORE INTERVAL	RECOVERY INTERVAL	DEPTH (feet)	GROUNDWATER	STRATA (USCS)	SOIL DESCRIPTION
				AN2-2A		1		ML	**AN2-2A (4' 0" core length)** SILT, light brown, wet, medium soft, several hard tar fragments with associated oil blebs (0 to 10 cm). SILT, as above, increased tar fragment content, decreased moisture (10 to 20 cm). SILT, as above, slightly moist, no tar or oil, slight sheen (30 to 40 cm). SILT, as above to 1'8", then encounter a weathered black, stiff tar layer (tar w/out the elasticity), black viscous oil below weathered tarry zone extends to base of core at 4'.
						2			
						3			
						4			
				AN2-2B		5			
						6		ML	**AN2-2B (4' 4" core length)** SILT, olive grey and black, moist, few thin fine grained sand layers, much plant material, black, weathered tar layers with viscous oil to 5' 6" bgs, below which Silt becomes olive grey with no tar or oil to base of core at 8' 4"
						7			
						8			
						9			
				AN2-2C		10			**AN2-2C (3' 8" Core length)** Sandy SILT, light brown and grey mottled, moist, some fines, plant matter, no sheen, slight odor (organic?), fine grained sand across 10'10" to 11'6" interval (moist, grey), no sheen, no odor to base of core at 12 feet bgs.
						11			
						12		S ML	Total Core Push = Total Recovered Core Length = 12' 0"
						13			
						14			
						15			

HAHN & ASSOCIATES, INC. 434 NW Sixth Avenue Portland, Oregon (503) 796-0717	**SOIL BORING NUMBER**		**AN-2-3**	
	HAI LOGGER:	Kim Magruder/Rob Ede	DRILL START	DRILL FINISH
PROJECT: NW Natural Gasco Facility Portland, Oregon	SAMPLING METHOD:	Stainless Steel Soil Sampler		
	DRILLING METHOD:	Vibracore	Time:	Time:
	EQUIPMENT TYPE	Same as above	10:40	10:45
	DRILLER:	Bill Jaworski	Date:	Date:
PROJECT #: 2708	DRILLING CONTRACTOR:	Marine Sampling Systems	04/11/01	04/11/01

BORING DIAMETER: 3-inch
CASING DIAMETER: N/A
SURFACE ELEVATION: Estimated to be: N/A
TOP OF CASING ELEVATION: N/A

ABANDONMENT DETAILS	SAMPLE NUMBER*	TIME	HEADSPACE (ppm)	CORE INTERVAL	RECOVERY INTERVAL	DEPTH (feet)	GROUNDWATER	STRATA (USCS)	SOIL DESCRIPTION
				AN2-3A		1		ML	**AN2-3A (4' 0" core length)** SILT, olive grey, wet, soft, slight sheen on outside of core, few wood chips, no sheen, no hydrocarbon odor, no product (0 to 10 cm). SILT, as above, 2 small tar fragments (10 to 20 cm)
						2			
						3			SILT, as above, slightly moist, firm, plant matter - rootlets present, very slight sheen, no hydrocarbon odor, no tar (30 to 40 cm). SILT, as above to 2'9" where layers of black weathered tar (not elastic) are present, patches of viscous oil below weathered tar zone, magnitude of oil (patchy) decreasing to base of core at 4' 0".
						4			
				AN2-3B		5			**AN2-3B (4' 0" core length)** Sandy SILT, light brown, moist, much plant matter, minor black mottling, no sheen, moderate petroleum odor to 5'10", where 4" thick weathered tar is present, tar layer contains several small leaves, tar layer is underlain by light brown sandy SILT with rootlets, no tar, no oil, no sheen (6'2" to 8').
						6			
						7			
						8			
				AN2-3C		9		ML	**AN2-3C (4' 2" core length)** Sandy SILT, as above, light brown, soft to medium-stiff, minor rootlets, no odor, no sheen, no oil, no tar, (8' to 11'10").
						10			
						11			SAND, grey, moist, very fine grained, no odor, no sheen 11' 10" to 12' 2").
						12			
			0.0			13		SP	Total Core Push = Total Recovered Core Length = 12' 2"
						14			
						15			

HAHN & ASSOCIATES, INC. 434 NW Sixth Avenue Portland, Oregon (503) 796-0717	**SOIL BORING NUMBER**		**AN-2-4**	
PROJECT: NW Natural Gasco Facility Portland, Oregon	HAI LOGGER:	Kim Magruder/Rob Ede	DRILL START Time: 15:05	DRILL FINISH Time: 15:10
	SAMPLING METHOD:	Stainless Steel Soil Sampler		
	DRILLING METHOD:	Vibracore		
	EQUIPMENT TYPE	Same as above		
	DRILLER:	Bill Jaworski	Date: 04/11/01	Date: 04/11/01
PROJECT #: 2708	DRILLING CONTRACTOR:	Marine Sampling Systems		

BORING DIAMETER: 3-inch
CASING DIAMETER: N/A
SURFACE ELEVATION: Estimated to be: N/A
TOP OF CASING ELEVATION: N/A

ABANDONMENT DETAILS	SAMPLE NUMBER*	TIME	HEADSPACE (ppm)	CORE INTERVAL	RECOVERY INTERVAL	DEPTH (feet)	GROUNDWATER	STRATA (USCS)	SOIL DESCRIPTION
				AN2-4A		1		ML	**AN2-4A (4' 0" core length)** SILT, brown, wet, very soft, brown oily blebs on outside of core, no sheen on interior, moderate petroleum odor (0 to 10 cm). SILT, as above, moist, soft, piece of wood and several blebs of brown oil product within core (10 to 20 cm). SILT, olive grey, moist, medium-soft, no visible oil product on interior of core, slight sheen (30 to 40 cm). SILT, as above to 2'7" where sand content increases and a zone of black, weathered tar (moist, non-elastic, disintegrates with pressure) surrounded by patchy viscous black oil, rootlets, sticks, twigs (2'7" to 4' 0").
						2			
						3			
						4			
				AN2-4B		5			
						6			
						7			**AN2-4B (4' 2" core length)** Sandy SILT, brown, moist, much plant material, weathered tar zone at 6'0" to 6'6"
			7.2			8		SP	SAND, grey, moist, fine grained, hydrocarbon odor, no sheen, no product (6'6" to 8'2").
				AN2-4C		9			**AN2-4C (2' 0" core length)** SAND, as above, petroleum odor, no oil, no tar, sheen on outside of core only.
			6.3			10			
						11			Total Core Push = Total Recovered Core Length = 10' 2"
						12			
						13			
						14			
						15			

APPENDIX B

Monitoring Well Construction Logs

SCOEPA00013612

HAHN & ASSOCIATES, INC. 434 NW Sixth Avenue Portland, Oregon (503) 796-0717	MONITORING WELL NUMBER OWRD # 167444	MW-16-45	
PROJECT: Northwest Natural Gasco Facility Portland, Oregon	HAI LOGGER: Matt Graves SAMPLING METHOD: 4-inch Core - Bagged DRILLING METHOD: Sonic EQUIPMENT TYPE Sonic Rig GP 24 - 300 RS DRILLER: Bruce Anderson	DRILL START Time: 10:35 Date: 20-Jul-04	DRILL FINISH Time: 14:40 Date: 20-Jul-04
PROJECT: 2708	DRILLING CONTRACTOR: Boart Longyear		

BORING DIAMETER: 6-inch
CASING DIAMETER: 2-inch
SURFACE ELEVATION: 30.81' msl
TOP OF CASING ELEVATION: 33.12' msl

WELL CONSTRUCTION DETAILS	SAMPLE NUMBER*	TIME	HEADSPACE (ppm)	LAB RESULTS TOTAL PAHs (ppm)	SPT (blows/0.5 feet)	RECOVERY (%)	DEPTH (feet)	GROUNDWATER	STRATA (USCS)	SOIL DESCRIPTION
Steel Monument							-3			
							-2			
							-1			Ground surface
Concrete							1			NOTE: No soil sampling from 0 to 24 feet bgs. See log for well MW-16-125 for soil description from 0 to 24 feet bgs.
							2			
							3			
							4			
							5			
							6			
							7			
							8			
							9			
							10			
Bentonite Grout							11			
							12			
							13			
							14			
2-inch ID Stainless Steel Casing							15			
							16			
							17			
							18			
							19			
							20			

SCOEPA00013613

HAHN & ASSOCIATES, INC. 434 NW Sixth Avenue Portland, Oregon (503) 796-0717	**MONITORING WELL NUMBER** **OWRD # 167444**	**MW-16-45**	
	HAI LOGGER:	Matt Graves	DRILL START
PROJECT:	SAMPLING METHOD:	4-inch Core - Bagged	DRILL FINISH
Northwest Natural	DRILLING METHOD:	Sonic	Time: 10:35
Gasco Facility	EQUIPMENT TYPE	Sonic Rig GP 24 - 300 RS	Time: 14:40
Portland, Oregon	DRILLER:	Bruce Anderson	Date: 20-Jul-04
PROJECT: 2708	DRILLING CONTRACTOR:	Boart Longyear	Date: 20-Jul-04

BORING DIAMETER:	6-inch
CASING DIAMETER:	2-inch
SURFACE ELEVATION:	30.81' msl
TOP OF CASING ELEVATION:	33.12' msl

WELL CONSTRUCTION DETAILS	SAMPLE NUMBER*	TIME	HEADSPACE (ppm)	LAB RESULTS TOTAL PAHs (ppm)	SPT (blows/0.5 feet)	RECOVERY (%)	DEPTH (feet)	GROUNDWATER	STRATA (USCS)	SOIL DESCRIPTION
Bentonite Grout; Chips; 20/40 Sand; 2-inch ID Stainless Steel Casing							21			
							22			
							23			
							24			
							25		ML	Sandy Gravely SILT - moist, stiff silt with fine grained sands, some angular to sub angular gravel, no petroleum odor, some sheen (24'-26' bgs)
	BAG A	12:45	0.2				26			
							27			
							28			
							29			
							30			
	BAG B	13:10	10.1				31			Sandy SILT - moist, olive grey, soft to very soft silt with very few fine grained sands, and subangular to angular gravels, petroleum odor, brown oily blebs and sheen present (30.5-32.5' bgs)
							32			
							33		ML	
							34			Sandy SILT - moist, olive grey to dark grey, soft silt with very fine grained sands, petroleum odor, brown oily blebs and sheen present (32.5'-35' bgs)
							35			
10/20 Sand Pack; 0.010- inch Stainless Steel Screen	BAG C	13:15	287.0				36			Silty SAND - wet, light brown, loose/soupy, fine grained with some interbedded silt layers, petroleum odor present, sheen pressent, brown oil present (35'-36' bgs)
							37			
							38		SM	Silty SAND - wet, light brown, loose/soupy, fine grained with some interbedded silt layers, petroleum odor present, sheen present, brown oil present (36'-41' bgs)
							39			
							40			

SCOEPA00013614

HAHN & ASSOCIATES, INC. 434 NW Sixth Avenue Portland, Oregon (503) 796-0717	MONITORING WELL NUMBER OWRD # 167444	MW-16-45	
PROJECT: Northwest Natural Gasco Facility Portland, Oregon	HAI LOGGER: Matt Graves SAMPLING METHOD: 4-inch Core - Bagged DRILLING METHOD: Sonic EQUIPMENT TYPE: Sonic Rig GP 24 - 300 RS DRILLER: Bruce Anderson	DRILL START Time: 10:35 Date: 20-Jul-04	DRILL FINISH Time: 14:40 Date: 20-Jul-04
PROJECT: 2708	DRILLING CONTRACTOR: Boart Longyear		

BORING DIAMETER:	6-inch
CASING DIAMETER:	2-inch
SURFACE ELEVATION:	30.81' msl
TOP OF CASING ELEVATION:	33.12' msl

WELL CONSTRUCTION DETAILS	SAMPLE NUMBER*	TIME	HEADSPACE (ppm)	LAB RESULTS TOTAL PAHs (ppm)	SPT (blows/0.5 feet)	RECOVERY (%)	DEPTH (feet)	GROUNDWATER	STRATA (USCS)	SOIL DESCRIPTION
10/20 Sand Pack 0.010-inchh Stainless Steel Screen	BAG D	13:50	433.0				41			
							42			
							43			
							44		SM	Silty SAND - wet, light brown, loose/soupy, fine grained with some interbedded silt layers (approximately 1/2" thick), petroleum odor present, sheen pressent, brown oil present (smearing from above?) (42'-46' bgs)
							45			
Sump Bentonite Chips	BAG E	14:15	127.0				46			
							47			Silty SAND - wet, light brown, loose/soupy, fine grained with some interbedded silt layers (approximately 1/2" thick), petroleum odor present, sheen pressent, brown oil (smearing from above?) present - but diminished as compared to 42' to 46' interval (46'-48' bgs)
	BAG F	14:35					48			
							49			NOTE: Boring terminated @ 49' bgs, 7/20/04 @ 14:40 Due to strong potential of oil smearing in the very wet, loose soils (very disturbed core) below 35 feet bgs, and lack of a protective outer casing at this location, terminate boring at 49 feet bgs and establish screen interval for shallow well on soil description from adjacent 125 foot boring (MW-16-125).
							50			
							51			
							52			
							53			Materials: 15 feet 2-inch ID, 0.010-inch slotted stainless steel screen 30 feet 2-inch diameter stainless steel blank casing 1 50# bag 20/40 sand 7 50# bags 10/20 sand 1 50# bag bentonite pellets 2 50# bags bentonite grout 1 2.5 foot stainless steel sump 1 locking cap above-grade steel monument
							54			
							55			
							56			
							57			
							58			
							59			
							60			

SCOEPA00013615

HAHN & ASSOCIATES, INC. 434 NW Sixth Avenue Portland, Oregon (503) 796-0717	MONITORING WELL NUMBER OWRD # 167443	MW-16-65	
PROJECT: Northwest Natural Gasco Facility Portland, Oregon PROJECT: 2708	HAI LOGGER: Matt Graves SAMPLING METHOD: 6-inch / 4-inch Core - Lexan Tube and Bagged DRILLING METHOD: Sonic EQUIPMENT TYPE: Sonic Rig GP 24 - 300 RS DRILLER: Bruce Anderson DRILLING CONTRACTOR: Boart Longyear	DRILL START Time: 14:00 Date: 16-Jul-04	DRILL FINISH Time: 16:20 Date: 19-Jul-04

BORING DIAMETER:	8-inch to 50' bgs; 6-inch to 68' bgs
CASING DIAMETER:	2-inch
SURFACE ELEVATION:	30.60' msl
TOP OF CASING ELEVATION:	33.11' msl

WELL CONSTRUCTION DETAILS	SAMPLE NUMBER*	TIME	HEADSPACE (ppm)	LAB RESULTS TOTAL PAHs (ppm)	Core Interval	RECOVERY (%)	DEPTH (feet)	GROUNDWATER	STRATA (USCS)	SOIL DESCRIPTION
Steel Monument							-3			
							-2			
							-1			Ground surface
Concrete							1		GP	NOTE: No soil sampling from 0 to 26 feet bgs. See log for well MW-16-125 for soil description from 0 to 26 feet bgs.
							2		SP	
							3			
							4			
							5			
							6			
							7			
							8			
							9			
Bentonite Grout							10			
2-inch ID Stainless Steel Casing							11		ML	
							12			
							13			
							14			
							15			
							16			
							17			
							18			
							19			NOTE: Stop drilling for the day at 20' bgs at 18:00, 7/16/04, resume at 8:00, 7/19/04.
							20			

SCOEPA00013616

HAHN & ASSOCIATES, INC. 434 NW Sixth Avenue Portland, Oregon (503) 796-0717	MONITORING WELL NUMBER OWRD # 167443	MW-16-65	
PROJECT: Northwest Natural Gasco Facility Portland, Oregon PROJECT: 2708	HAI LOGGER: Matt Graves SAMPLING METHOD: 6-inch / 4-inch Core - Lexan Tube and Bagged DRILLING METHOD: Sonic EQUIPMENT TYPE: Sonic Rig GP 24 - 300 RS DRILLER: Bruce Anderson DRILLING CONTRACTOR: Boart Longyear	DRILL START Time: 14:00 Date: 16-Jul-04	DRILL FINISH Time: 16:20 Date: 19-Jul-04

BORING DIAMETER:	8-inch to 50' bgs; 6-inch to 68' bgs
CASING DIAMETER:	2-inch
SURFACE ELEVATION:	30.60' msl
TOP OF CASING ELEVATION:	33.11' msl

WELL CONSTRUCTION DETAILS	SAMPLE NUMBER*	TIME	HEADSPACE (ppm)	LAB RESULTS TOTAL PAHs (ppm)	Core Interval	RECOVERY (%)	DEPTH (feet)	GROUNDWATER	STRATA (USCS)	SOIL DESCRIPTION
Bentonite Grout; 2-inch ID Stainless Steel Casing							21		ML	
							22			
							23		GP	
							24		MI	
							25		GP	
							26		ML	NOTE: Lexan Core-Barrel samples collected from 26-46' bgs. Observations across this interval are general and based on observations through the clear Lexan core sampler. Lexan Core Samples were capped, labeled, and frozen for transport to labortatory.
	A						27			SAMPLE A - (Lexan Core Tube) Olive grey, oil observed on inner Lexan surface at or near 28-28.5' bgs (26-28.5' bgs)
							28			
	A						29			
	B						30			SAMPLE B - (Lexan Core Tube) Olive grey, oil observed on inner Lexan surface at or near 29-30' bgs (28.5-31' bgs)
							31			
	B						32			SAMPLE C - (Lexan Core Tube) Light brown to brown, oil observed on inner Lexan surface from 31.5-33.5' bgs (31-33.5' bgs)
	C						33			
							34			
	C						35			SAMPLE D - (Lexan Core Tube) Light brown, oil observed on inner Lexan surface from 33.5-36' bgs (33.5-36' bgs)
	D						36			
	E						37			SAMPLE E - (Lexan Core Tube) Brown, oil observed on inner Lexan surface from 36-37' bgs (36-37' bgs)
	E						38			
	F						39			SAMPLE F - (Lexan Core Tube) Brown, oil observed on inner Lexan surface from 37-39' bgs (37-39' bgs)
	F						40			SAMPLE G - (Lexan Core Tube) Olive grey, oil observed on inner Lexan surface at 38' bgs and at 39' bgs, cleans up at 40' bgs (39-41' bgs)
	G									

SCOEPA00013617

HAHN & ASSOCIATES, INC. 434 NW Sixth Avenue Portland, Oregon (503) 796-0717	MONITORING WELL NUMBER OWRD # 167443		MW-16-65	
	HAI LOGGER:	Matt Graves	DRILL START	DRILL FINISH
PROJECT: Northwest Natural Gasco Facility Portland, Oregon	SAMPLING METHOD:	6-inch / 4-inch Core - Lexan Tube and Bagged		
	DRILLING METHOD:	Sonic	Time: 14:00	Time: 16:20
	EQUIPMENT TYPE	Sonic Rig GP 24 - 300 RS		
	DRILLER:	Bruce Anderson	Date: 16-Jul-04	Date: 19-Jul-04
PROJECT: 2708	DRILLING CONTRACTOR:	Boart Longyear		

BORING DIAMETER:	8-inch to 50' bgs; 6-inch to 68' bgs
CASING DIAMETER:	2-inch
SURFACE ELEVATION:	30.60' msl
TOP OF CASING ELEVATION:	33.11' msl

WELL CONSTRUCTION DETAILS	SAMPLE NUMBER*	TIME	HEADSPACE (ppm)	LAB RESULTS TOTAL PAHs (ppm)	Core Interval	RECOVERY (%)	DEPTH (feet)	GROUNDWATER	STRATA (USCS)	SOIL DESCRIPTION
Bentonite Grout	G						41			SAMPLE H (Lexan Core Tube) - Brown, traces of oil observed on inner Lexan surface throughout core (41-42' bgs)
	H						42			SAMPLE I (Lexan Core Tube) - Brown to olive grey, possible presence of oil on inner Lexan surface at 42' bgs (42-44' bgs)
	H						43			
	I						44			SAMPLE J (Lexan Core Tube) - Olive grey, no visible oil on inner Lexan surface(44-46' bgs)
	I						45			
	J						46			
	J	11:25					47			
							48			NOTE: 8-inch diameter steel drive casing set at 50' bgs, sealed with bentonite chips. Resume drilling through the sealed 8-inch casing with 6-inch drive casing, collecting 4-inch soil core, extruded into plastic bags.
Bentonite Chips							49			
2-inch ID Stainless Steel Casing							50			
20/40 Sand	BAG A	0.5938	14.7				51			SAND with interbedded silts - Very moist, olive grey to dark grey, soft, with fine grained sands petroleum odor and sheen present (50-52.5' bgs)
							52			
							53			SAND - moist, olive grey, medium dense, with interbedded silt layers (approximately 6" to 1' thick), petroleum odor and sheen present (52.5'-55' bgs)
							54			
10/20 Sand Pack	BAG B	14:17	2.3				55		SP	
0.010-inch Stainless Steel Screen							56			SAND with interbedded silts - moist, olive grey to dark grey, loose, with fine grained sands, petroleum odor and sheen present (55.5'-59' bgs)
							57			
							58			
							59			
	BAG C	15:20	0.0				60		SM	Silty SAND - moist, olive grey to dark grey, medium stiff, fine grained, no petroleum odor or sheen present (59'-60' bgs)

SCOEPA00013618

HAHN & ASSOCIATES, INC. 434 NW Sixth Avenue Portland, Oregon (503) 796-0717	MONITORING WELL NUMBER OWRD # 167443	MW-16-65	
	HAI LOGGER:	Matt Graves	DRILL START
PROJECT:	SAMPLING METHOD:	6-inch / 4-inch Core - Lexan Tube and Bagged	DRILL FINISH
Northwest Natural	DRILLING METHOD:	Sonic	Time: 14:00
Gasco Facility	EQUIPMENT TYPE	Sonic Rig GP 24 - 300 RS	Time: 16:20
Portland, Oregon	DRILLER:	Bruce Anderson	Date: 16-Jul-04
PROJECT: 2708	DRILLING CONTRACTOR:	Boart Longyear	Date: 19-Jul-04

BORING DIAMETER:	8-inch to 50' bgs; 6-inch to 68' bgs
CASING DIAMETER:	2-inch
SURFACE ELEVATION:	30.60' msl
TOP OF CASING ELEVATION:	33.11' msl

WELL CONSTRUCTION DETAILS	SAMPLE NUMBER*	TIME	HEADSPACE (ppm)	LAB RESULTS TOTAL PAHs (ppm)	Core Interval	RECOVERY (%)	DEPTH (feet)	GROUNDWATER	STRATA (USCS)	SOIL DESCRIPTION
10/20 Sand Pack 0.010-inch Stainless Steel Screen	K K L L						61 62 63 64 65		SM	SAMPLE K (Lexan Core Tube) - Olive grey, no visible oil (60-61' bgs) SAMPLE L (Lexan Core Tube) - Olive grey, no visible oil (61-63' bgs)
Bentonite Chips Sump							66 67			Silty SAND - moist, olive grey to dark grey, soft, little to no fines, fine sand grains, no petroleum odor or sheen present (65'-67' bgs)
	BAG D	16:15	0.0				68		ML	Sandy SILT - very moist, olive grey to dark grey, medium stiff, with fine sand grains, no petroleum odor or sheen present (67'-68' bgs)
							69 70 71 72 73 74 75 76 77 78 79 80			NOTE: Boring terminated @ 68' bgs, 7/19/04 @ 16:20

Materials:

10 feet 2-inch ID, 0.010-inch slotted stainless steel screen
58 feet 2-inch diameter stainless steel blank casing
1 50# bag 20/40 sand
5 50# bags 10/20 sand
1 50# bag bentonite pellets
7 50# bags bentonite grout
1 2.5 foot stainless steel sump
1 locking cap
above-grade steel monument

SCOEPA00013619

HAHN & ASSOCIATES, INC. 434 NW Sixth Avenue Portland, Oregon	MONITORING WELL NUMBER OWRD # 167442		MW-16-125	
(503) 796-0717	HAI LOGGER:	Andy Rolinger	DRILL START	DRILL FINISH
PROJECT:	SAMPLING METHOD:	6-inch / 4-inch Core - Bagged		
Northwest Natural	DRILLING METHOD:	Sonic	Time:	Time:
Gasco Facility	EQUIPMENT TYPE	Sonic Rig GP 24 - 300 RS	11:40	17:25
Portland, Oregon	DRILLER:	Bruce Anderson	Date:	Date:
PROJECT: 2708	DRILLING CONTRACTOR:	Boart Longyear	14-Jul-04	15-Jul-04

BORING DIAMETER:	8-inch to 57' bgs; 6-inch to 130' bgs
CASING DIAMETER:	2-inch
SURFACE ELEVATION:	30.49' msl
TOP OF CASING ELEVATION:	32.89' msl

WELL CONSTRUCTION DETAILS	SAMPLE NUMBER*	TIME	HEADSPACE (ppm)	LAB RESULTS TOTAL PAHs (ppm)	Core Interval	RECOVERY (%)	DEPTH (feet)	GROUNDWATER	STRATA (USCS)	SOIL DESCRIPTION
Steel Monument							-3			
							-2			
							-1			Ground surface
Concrete							1		GP	Sandy Silty GRAVEL - dry, tan-brown, no oil, no tar, no sheen, no petroleum odor (0-1' bgs)
							2		SP	Gravelly SAND with cobbles - dry, grey (crushed concrete), no oil, no tar, no sheen, no petroleum odor (1-2.5' bgs)
							3			Gravelly sandy SILT - moist, tan-brown, no oil, no tar, no sheen, no petroleum odor (3-4.5' bgs)
							4			
	BAG	11:50	22.9				5			Gravelly sandy SILT - moist, dark brown-grey, no oil, no tar, no sheen, no petroleum odor (4.5-5' bgs)
							6			Gravelly sandy SILT - moist, olive-grey, slightly plastic, several brick fragments and woody plant matter, no oil, no tar, no sheen, no petroleum odor (5-7.5' bgs)
							7			
							8			Gravelly sandy SILT - moist, brown, plastic, medium stiff, some rock fragments (approximately 2" diameter), no oil, no tar, no sheen, no petroleum odor (7.5-10' bgs)
							9			
	BAG	12:02	27.5				10			
2-inch ID Stainless Steel Casing							11		ML	Gravelly, cobbly, sandy SILT - moist, brown, slightly plastic silts with subrounded to angular gravels and cobbles, no oil, no tar, no sheen, slight naphthalene odor (10-12.5' bgs)
	BAG	12:10	37.9				12			
							13			Gravelly SILT - moist, brown, slightly plastc, minor zones of dark grey staining (with naphthalene odor), some black flecks (carbon pitch, carbon pitch odor), some rootlets and brick fragments. Gravels are sub-rounded to angular. Core becomes very moist and turns olive grey at 14' bgs. No oil, no tar, no sheen (12.5-15' bgs)
							14			
	BAG	12:25	42.6				15			
							16			Gravelly SILT - moist, brown, napthalene and carbon pitch odor, no oil, no tar, no sheen (15-16' bgs)
							17			Gravelly SILT - moist, brown, slightly plastic, naphthalene and carbon pitch odor, no oil, no tar, no sheen (16-18' bgs)
3/8-inch Bentonite Chips							18			
							19			Gravelly SILT - very moist, brown, plastic, carbon pitch odor, no oil, no tar, no sheen (18-20' bgs)
	BAG	12:45	36.6				20			

SCOEPA00013620

HAHN & ASSOCIATES, INC. 434 NW Sixth Avenue Portland, Oregon (503) 796-0717	MONITORING WELL NUMBER OWRD # 167442	MW-16-125	
PROJECT: Northwest Natural Gasco Facility Portland, Oregon PROJECT: 2708	HAI LOGGER: Andy Rolinger SAMPLING METHOD: 6-inch / 4-inch Core - Bagged DRILLING METHOD: Sonic EQUIPMENT TYPE: Sonic Rig GP 24 - 300 RS DRILLER: Bruce Anderson DRILLING CONTRACTOR: Boart Longyear	DRILL START Time: 11:40 Date: 14-Jul-04	DRILL FINISH Time: 17:25 Date: 15-Jul-04

BORING DIAMETER:	8-inch to 57' bgs; 6-inch to 130' bgs
CASING DIAMETER:	2-inch
SURFACE ELEVATION:	30.49' msl
TOP OF CASING ELEVATION:	32.89' msl

WELL CONSTRUCTION DETAILS	SAMPLE NUMBER*	TIME	HEADSPACE (ppm)	LAB RESULTS TOTAL PAHs (ppm)	Core Interval	RECOVERY (%)	DEPTH (feet)	GROUNDWATER	STRATA (USCS)	SOIL DESCRIPTION
							21		ML	Gravelly SILT - wet, olive grey, few brick fragments, no oil, no tar present, sheen present, strong petroleum odor (20-22.5' bgs)
							22			
							23		GP	Gravelly SILT - wet, olive grey, slight naphthalene odor, no oil, no tar present, sheen present (22.5-23' bgs)
							24		MI	Crushed CONCRETE - grey (23-23.5' bgs) Gravelly SILT - moist, olive-grey, slight naphthalene odor, black tarry oil, slight sheen present (23.5-24' bgs)
	BAG	2:25	326.0				25		GP	Crushed CONCRETE - grey (24-24.5' bgs) Gravelly SILT - moist, black with oil, tarry blebs, sheen present, petroleum odor (24.5-25' bgs)
							26		ML	Sandy SILT - moist, olive-grey, oily sheen present, no tar, petroleum odor (25-26' bgs)
							27			
							28			Sandy native SILT - moist, olive-grey, black staining in silt in rootlet zones (thin brown rootlets approximately 1 mm thick), fine grained sands, sheen present, petroleum odor (26-27.5' bgs)
							29			Sandy SILT - moist, olive grey, coated with oil, sheen present, petroleum odor (27.5-29' bgs)
	BAG	2:30	430.0				30		SP	SAND - moist, olive grey, coated with oil, sheen present, petroleum odor (29-29.5' bgs)
							31		ML	Sandy SILT - moist, black, coated with oil, interbedded sands present, sheen present, petroleum odor (29.5-30' bgs) Sandy SILT - moist, dark brown, oil present, sheen present, petroleum odor (30-31.5' bgs)
							32		SP	SAND - moist, very dark brown, fine sand grains coated with oil, sheen present, strong petroleum odor (31.5-32' bgs)
							33		ML	Sandy SILT - moist, very dark brown, coated with oil, sheen present, petroleum odor (32-34' bgs)
							34			
	BAG	3:00	623.0				35			SAND - moist, brown, fine grained, coated with brown oil, sheen present, petroleum odor (34-35' bgs)
							36			SAND - wet, dark brown, fine grained, coated with brown oil, sheen present, petroleum odor (35-37.5' bgs)
							37		SP	
							38			
							39			SAND - wet, brown, fine grained, oily sheen present, petroleum odor, no oil (37.5-40' bgs)
	BAG	3:08	211.0				40			

2-inch ID Stainless Steel Casing
Bentonite Grout

SCOEPA00013621

HAHN & ASSOCIATES, INC. 434 NW Sixth Avenue Portland, Oregon (503) 796-0717	MONITORING WELL NUMBER OWRD # 167442	MW-16-125	
	HAI LOGGER: Andy Rolinger	DRILL START	DRILL FINISH
PROJECT: Northwest Natural Gasco Facility Portland, Oregon	SAMPLING METHOD: 6-inch / 4-inch Core - Bagged DRILLING METHOD: Sonic EQUIPMENT TYPE Sonic Rig GP 24 - 300 RS DRILLER: Bruce Anderson	Time: 11:40 Date: 14-Jul-04	Time: 17:25 Date: 15-Jul-04
PROJECT: 2708	DRILLING CONTRACTOR: Boart Longyear		

BORING DIAMETER:	8-inch to 57' bgs; 6-inch to 130' bgs
CASING DIAMETER:	2-inch
SURFACE ELEVATION:	30.49' msl
TOP OF CASING ELEVATION:	32.89' msl

WELL CONSTRUCTION DETAILS	SAMPLE NUMBER*	TIME	HEADSPACE (ppm)	LAB RESULTS TOTAL PAHs (ppm)	Core Interval	RECOVERY (%)	DEPTH (feet)	GROUNDWATER	STRATA (USCS)	SOIL DESCRIPTION
2-inch ID Stainless Steel Casing							41			SAND - wet, brown, fine to medium grained, coated with oil, sheen present, petroleum odor (40-42.5' bgs)
							42		SP	
							43			SAND - wet, brown, fine to medium grained, coated with oil, sheen present, petroleum odor (42.5-44' bgs)
							44		ML?	
	BAG	3:48	20.2				45			SAND - wet, grey, fine to medium grained, napthalene odor, sheen present (44-45' bgs), evidence of silt layer at 44' (disturbed silts in sample core, saturated oil above layer, no visible oil below layer)
Bentonite Grout							46			SAND - wet, greyish brown, fine to medium sand grains, slight petroleum odor, sheen present (45-47.5' bgs)
							47		SP	
							48			SAND - wet, greyish brown, fine to medium-grained sands, slight petroleum odor, sheen present (47.5-49' bgs)
							49			
	BAG	4:17	34.0				50		ML	Sandy SILT - wet, greyish brown, medium stiff, slight petroleum odor, slight sheen present (49-50' bgs)
2-inch ID Blank PVC Casing							51			SAND with interbedded silts - wet, greyish brown, fine grained sands with thin silt layers, slight petroleum odor, slight sheen present (50-52.5' bgs)
							52			
							53			
							54			SAND with interbedded silts - wet, greyish brown, fine grained sands with thin silt layers, slight sheen present, no petroleum odor, no oil, no tar (52.5-55' bgs)
	BAG	5:00	1.8				55			
							56			SAND - wet, grey, fine sand grains, slight sheen, no petroleum odor, no oil, no tar (55-56' bgs)
							57		SP	SAND - wet, grey, fine to medium sand grains, thin interbedded silt layers from 56-57' bgs, no sheen, no petroleum odor, no oil, no tar (56-58.5' bgs)
							58			Note: 8-inch temporary casing set at an initial depth of 59 feet. Bentonite chips were then added to bottom of hole, then casing was pulled up to 57 feet to seal.
							59			SAND - wet, grey, fine to medium sand grains, no sheen, no petroleum odor, no oil, no tar (58.5-60' bgs)
	BAG	5:55	0.0				60			

SCOEPA00013622

HAHN & ASSOCIATES, INC. 434 NW Sixth Avenue Portland, Oregon (503) 796-0717	MONITORING WELL NUMBER OWRD # 167442	MW-16-125	
PROJECT: Northwest Natural Gasco Facility Portland, Oregon	HAI LOGGER: Andy Rolinger SAMPLING METHOD: 6-inch / 4-inch Core - Bagged DRILLING METHOD: Sonic EQUIPMENT TYPE Sonic Rig GP 24 - 300 RS DRILLER: Bruce Anderson	DRILL START Time: 11:40 Date: 14-Jul-04	DRILL FINISH Time: 17:25 Date: 15-Jul-04
PROJECT: 2708	DRILLING CONTRACTOR: Boart Longyear		

BORING DIAMETER:	8-inch to 57' bgs; 6-inch to 130' bgs
CASING DIAMETER:	2-inch
SURFACE ELEVATION:	30.49' msl
TOP OF CASING ELEVATION:	32.89' msl

WELL CONSTRUCTION DETAILS	SAMPLE NUMBER*	TIME	HEADSPACE (ppm)	LAB RESULTS TOTAL PAHs (ppm)	Core Interval	RECOVERY (%)	DEPTH (feet)	GROUNDWATER	STRATA (USCS)	SOIL DESCRIPTION
							61		SP	Note: Stop drilling for the day at 60' bgs at 18:00, 7/14/04, resume at 8:00, 7/15/04 with 6-inch drive casing. Protective temp. 8-inch casing dropping by its own weight below target depth of 57' bgs to 60' bgs.
							62			Note: No recovery in 60-62.5' bgs sleeve. Sands are very wet/loose and slipped out of barrel.
							63			
							64			SAND - wet, grey, fine grained, poorly graded, organic/reducing odor, no sheen, no oil, no tar (62.5-65' bgs)
	BAG	9:45	1.3				65			
							66			SAND - wet, grey, fine grained, very fine grained below 66' bgs, poorly graded, organic/reducing odor, no sheen, no oil, no tar (65-67.5' bgs)
							67			
							68			
							69			SAND - wet, grey, fine grained, poorly graded, slight organic/reducing odor, no sheen, no oil, no tar (68.5-69.5' bgs)
Bentonite Grout 2-inch ID Blank PVC Casing	BAG	9:45	0.8				70		SM	Silty SAND - wet, grey, fine grained, poorly graded, slight organic/reducing odor, no sheen, no oil, no tar (69.5-70' bgs)
							71			
							72			
							73			
							74			
							75			
							76		SP	
							77			
							78			
							79			SAND - wet, grey, fine grained, poorly graded, slight organic/reducing odor, very slight sheen, no oil, no tar (78-79' bgs)
	BAG	10:30	0.0				80		SM	Silty SAND - wet, grey, fine grained sands, slight organic/reducing odor, no sheen, no oil, no tar (79-80' bgs)

SCOEPA00013623

HAHN & ASSOCIATES, INC. 434 NW Sixth Avenue Portland, Oregon (503) 796-0717	MONITORING WELL NUMBER OWRD # 167442	MW-16-125	
PROJECT: Northwest Natural Gasco Facility Portland, Oregon PROJECT: 2708	HAI LOGGER: Andy Rolinger SAMPLING METHOD: 6-inch / 4-inch Core - Bagged DRILLING METHOD: Sonic EQUIPMENT TYPE: Sonic Rig GP 24 - 300 RS DRILLER: Bruce Anderson DRILLING CONTRACTOR: Boart Longyear	DRILL START Time: 11:40 Date: 14-Jul-04	DRILL FINISH Time: 17:25 Date: 15-Jul-04

BORING DIAMETER:	8-inch to 57' bgs; 6-inch to 130' bgs
CASING DIAMETER:	2-inch
SURFACE ELEVATION:	30.49' msl
TOP OF CASING ELEVATION:	32.89' msl

WELL CONSTRUCTION DETAILS	SAMPLE NUMBER*	TIME	HEADSPACE (ppm)	LAB RESULTS TOTAL PAHs (ppm)	DEPTH (feet)	STRATA (USCS)	SOIL DESCRIPTION
2-inch ID Blank PVC Casing; Bentonite Grout					81		Sandy SILT - wet, grey, slightly plastic, minor brown leafy plant matter, onion odor (sulfur?), no sheen, no oil, no tar (80.5-82.5' bgs)
					82		
					83	ML	SILT - moist, grey, plastic, stiff, onion odor, no sheen, no oil, no tar (83-85' bgs)
					84		
	BAG	11:30	0.0		85		
					86		
					87		
					88	SM	Silty SAND - moist, light brown, slightly plastic, stiff, onion odor, slight sheen, no oil, no tar (85-90' bgs)
					89		
	BAG	12:00	0.0		90		
					91	SP	SAND - wet, brown, fine grained, slight onion odor, no sheen, no oil, no tar (90.5-91.5' bgs)
					92	ML	Sandy SILT - wet, grey, slightly plastic, slightly stiff, fine grained sand, slight onion odor, no sheen, no oil, no tar (91.5-92.5' bgs)
					93	SM	Silty SAND - wet, grey, fine sand grains, slight onion odor, no sheen, no oil, no tar (92.5-94' bgs)
					94		
	BAG	1:10	0.0		95	ML	Sandy SILT - moist, grey, medium stiff, plastic silt, fine grained sand, onion odor, no sheen, no oil, no tar (94-95' bgs)
					96		
					97	SP	SAND - wet, grey, fine to medium-grained sand, few grey silt clasts, few white shell fragments, no petroleum odor, no sheen, no oil, no tar (95-100' bgs)
					98		
					99		
	BAG	2:00	0.1		100		

SCOEPA00013624

HAHN & ASSOCIATES, INC. 434 NW Sixth Avenue Portland, Oregon (503) 796-0717	MONITORING WELL NUMBER OWRD # 167442		MW-16-125	
	HAI LOGGER:	Andy Rolinger	DRILL START	DRILL FINISH
PROJECT: Northwest Natural Gasco Facility Portland, Oregon	SAMPLING METHOD:	6-inch / 4-inch Core - Bagged		
	DRILLING METHOD:	Sonic	Time: 11:40	Time: 17:25
	EQUIPMENT TYPE	Sonic Rig GP 24 - 300 RS		
	DRILLER:	Bruce Anderson	Date: 14-Jul-04	Date: 15-Jul-04
PROJECT: 2708	DRILLING CONTRACTOR:	Boart Longyear		

BORING DIAMETER:	8-inch to 57' bgs; 6-inch to 130' bgs
CASING DIAMETER:	2-inch
SURFACE ELEVATION:	30.49' msl
TOP OF CASING ELEVATION:	32.89' msl

WELL CONSTRUCTION DETAILS	SAMPLE NUMBER*	TIME	HEADSPACE (ppm)	LAB RESULTS TOTAL PAHs (ppm)	Core Interval	RECOVERY (%)	DEPTH (feet)	GROUNDWATER	STRATA (USCS)	SOIL DESCRIPTION
Bentonite Grout							101			SAND - wet, grey, fine grained, poorly graded, few silt clasts, few white shell fragments, no petroleum odor, no sheen, no oil, no tar (100.5-105' bgs)
							102			
							103			
							104			
	BAG	3:00	0.0				105			
Bentonite Chips							106		SP	SAND - wet, grey, fine grained, poorly graded, few silt clasts, few white shell fragments, no petroleum odor, no sheen, no oil, no tar (105-107.5' bgs)
2-inch ID Blank PVC Casing							107			
							108			
							109			SAND - moist, grey, fine grained, poorly graded, few white shell fragments, no sheen, no petroleum odor, no oil, no tar (108-110' bgs)
	BAG	4:00	0.0				110			
20/40 Sand Pack							111			SAND - moist, grey, fine grained, poorly graded, few white shell fragments, no sheen, no petroleum odor, no oil, no tar (110.5-115' bgs)
							112			
							113			
							114			
	BAG	4:00	0.1				115		SP	
10/20 Sand Pack							116			SAND - moist, grey, fine grained, poorly graded, few white shell fragments, very few silt clasts, no sheen, no petroleum odor, no oil, no tar (115.5-120' bgs)
0.010-inch Stainless Steel Screen							117			
							118			
							119			
	BAG	5:20	0.0				120			

SCOEPA00013625

HAHN & ASSOCIATES, INC. 434 NW Sixth Avenue Portland, Oregon (503) 796-0717	MONITORING WELL NUMBER OWRD # 167442	MW-16-125	
PROJECT: Northwest Natural Gasco Facility Portland, Oregon PROJECT: 2708	HAI LOGGER: Andy Rolinger SAMPLING METHOD: 6-inch / 4-inch Core - Bagged DRILLING METHOD: Sonic EQUIPMENT TYPE: Sonic Rig GP 24 - 300 RS DRILLER: Bruce Anderson DRILLING CONTRACTOR: Boart Longyear	DRILL START Time: 11:40 Date: 14-Jul-04	DRILL FINISH Time: 17:25 Date: 15-Jul-04

BORING DIAMETER:	8-inch to 57' bgs; 6-inch to 130' bgs
CASING DIAMETER:	2-inch
SURFACE ELEVATION:	30.49' msl
TOP OF CASING ELEVATION:	32.89' msl

WELL CONSTRUCTION DETAILS	SAMPLE NUMBER*	TIME	HEADSPACE (ppm)	LAB RESULTS TOTAL PAHs (ppm)	Core Interval	RECOVERY (%)	DEPTH (feet)	GROUNDWATER	STRATA (USCS)	SOIL DESCRIPTION
10/20 Sand Pack; 0.010-inch Stainless Steel Screen							121			SAND - moist, grey, fine grained, poorly graded, few white shell fragments, few silt clasts, no sheen, no petroleum odor, no oil, no tar (120.5-124' bgs)
							122			
							123			
							124			
	BAG	5:20	0.0				125		ML	Sandy SILT - moist, grey, plastic, slightly stiff, few rootlets, no petroleum odor, no sheen, no oil, no tar (124-125' bgs)
Bentonite Chips; Stainless Steel Sump							126		SP	SAND - moist, grey, fine grained, poorly graded, few silt clasts, no petroleum odor, no sheen, no oil, no tar (125-127.5' bgs)
							127			
							128			
							129			
							130			
							131			Boring terminated at 130 feet bgs on 7/16/04 Monitoring well installed to 127.5 feet bgs Materials: 10 feet 2-inch ID, 0.010-inch slotted stainless steel screen 70 feet 2-inch diameter Schedule 40 PVC blank casing 45 feet 2-inch diameter stainless steel blank casing 1 50# bag 20/40 sand 4 50# bags 10/20 sand 1 50# bag bentonite pellets 23 50# bags bentonite grout 1 2.5 foot stainless steel sump 1 locking cap above-grade steel monument
							132			
							133			
							134			
							135			
							136			
							137			
							138			
							139			
							140			

SCOEPA00013626

APPENDIX C

Well Development Records

SCOEPA00013627

Well Development Field Log

Well Number: MW-16i (MW-16-65)

Page 1 of 2 Date: 8-2-04

Project Information
Project Name: NW Natural - Gasco
HAI Project Number: 2708-10

General Information
Field Team: Matt Graves
Purge Method: PURGE PUMP (GEO-SQUIRT)
Pump Intake Depth (ft btc): 55' BTC.
Flow-Through Cell: NO
Decontamination Method: 9 STEP DECON

Well Volume Calculation (Stick-up) or Flush (circle one)

Well Depth (ft bgs)	Well Depth (ft btc)	DTW (ft btc)	Water Column (ft)	Convert Factor (gal/ft)	One Well Volume (gal)
65	68	26.11	41.89	0.17	7.14

3/4"=0.023 gal/ft 2"=0.17 gal/ft 4"=0.66 gal/ft 6"=1.5 gal/ft

General Information
Purge Water Disposition: CARBON TREATMENT ON-SITE
Field Conditions: OVERCAST, 70'S

Comments: * STOPPED PUMPING TO LET WELL RECHARGE, AFTER 70 GALLONS PURGED. GRUNDFOS USED @ 125 Hz
SHEEN ON WATER NOT PRESENT UNTIL 77 GALLONS PURGED

Well Purge Data Total Volume to Purge (gal) =

Time	Volume Purged (gallons)	Purge Rate (gpm)	DTW (ft btc)	Conductivity (uS/cm)	Temp. (°C)	pH	ORP (mV)	D.O. (mg/L)	Turbidity (NTUs)	Clarity/Color/ Remarks
	Pump On		Initial							
14:05	0		25.00	253	15.84	6.15	/	2.40	306	CL
14:17	7		48.10	327	16.05	5.80	/	1.43	197	CL
14:35	14		49.96	391	16.66	5.78	/	0.99	153	~~CL~~ MC AC/SC
15:10	21		40.85	540	15.55	5.67	/	0.93	135	AC/SC
15:22	28		48.65	589	16.19	5.64	/	1.03	133	AC/SC
16:05	35		35.50	659	17.17	5.83	/	3.90	93.1	AC/SC
16:18	42		39.72	698	16.63	5.82	/	3.27	97.4	AC/SC
16:32	49		42.95	783	15.87	5.64	/	1.52	80.2	AC/SC
9-3 7:45	56		26.03	710	15.61	6.12	/	1.98	37.3	AC
8:02	63		41.85	717	14.90	5.80	/	1.72	8.77	C
8:55	70		44.41	747	14.95	5.96	/	0.98	13.2	C
5 MIN. INTERVAL 15:20	~~71~~ 72		33.85	728	15.95	6.06	/	4.50	8.58	C
15:25	~~73~~ 74		38.71	758	16.83	5.93	/	1.98	9.48	C
15:30	~~75~~ 76		50.11	779	17.17	5.92	/	1.33	17.2	C
15:35	~~77~~ 78		57.75	731	17.30	6.01	/	2.19	13.6	C
15:40	~~79~~ 80		57.80	765	17.81	6.05	/	2.18	79.1	C
15:45	~~81~~ 82		58.20	820	17.82	6.02	/	2.46	338	CL
15:50	~~83~~ 84		58.91	787	17.84	6.01	/	3.43	326	CL
	Pump Off		Final				/			

Note: bgs= below ground surface btc=below top of casing DTW=depth to water gpm=gallons per minute
Clarity: VC=very cloudy Cl=cloudy SC=slightly cloudy AC=almost clear C=clear CC=crystal clear

Well Development Field Log

Well Number: MW-16S

Date: 8-4-04

HAI Project Number: 2708-10

Well Purge Data (continued from Page 1)

Time	Volume Purged (gallons)	Purge Rate (gpm)	DTW (ft btc)	Conductivity (uS/cm)	Temp. (°C)	pH	ORP (mV)	D.O. (mg/L)	Turbidity (NTUs)	Clarity/Color/ Remarks
13:14	51		28.88	472	18.57	6.06	/	2.33	24.6	AC
13:17	52		28.89	478	18.58	6.06	/	2.26	23.4	AC
14:00	53		28.92	480	18.59	6.07	/	2.22	21.3	AC
14:03	54		28.91	491	18.60	6.07	/	2.00	19.2	AC
14:06	55		28.90	492	18.68	6.07	/	1.98	19.4	AC
14:09	56		28.90	492	18.70	6.09	/	1.95	18.8	AC
14:12	57		28.90	492	18.73	6.08	/	1.63	19.0	AC
14:15	58		28.91	493	18.76	6.07	/	1.60	26.3	AC
14:18	59		28.91	494	18.78	6.09	/	1.54	17.3	AC
14:21	60		28.90	496	18.79	6.09	/	1.39	16.5	AC
14:24	61		28.91	497	18.81	6.08	/	1.30	15.2	AC
14:27	62		28.91	498	18.82	6.09	/	1.29	15.9	AC
14:30	63		28.90	499	18.83	6.09	/	1.30	14.0	AC
14:45	68		28.90	499	18.84	6.10	/	1.29	12.6	AC
14:55	73		28.90 ✓	502 ✓	18.93	6.12	/	1.33	11.0	AC
15:05	78		28.90 ✓	503 ✓	18.97 ✓	6.14 ✓	/	1.32 ✓	9.72 ✓	C
15:08	80		28.90 ✓	504 ✓	19.03 ✓	6.16 ✓	/	1.40 ✓	8.76 ✓	C
15:11	82		28.90 ✓	505 ✓	19.04 ✓	6.17 ✓	/	1.39 ✓	9.21 ✓	C
	Pump Off 15:12		Final 28.55							

Comments

8-4-04 PURGED AT 119 Hz.

Note: bgs= below ground surface btc=below top of casing DTW=depth to water gpm=gallons per minute
Clarity: VC=very cloudy Cl=cloudy SC=slightly cloudy AC=almost clear C=clear CC=crystal clear

SCOEPA00013629

Well Development Field Log

Well Number: MW-16S (MW-16-45)

Page 1 of 2 Date: 8-3-04

Project Information
Project Name: NW Natural - Gasco
HAI Project Number: 2708-10
General Information
Field Team: Matt Graves
Purge Method: "GEO-SQUIRT" PURGE PUMP
Pump Intake Depth (ft btc): 35
Flow-Through Cell: NO
Decontamination Method: 9-STEP DECON

Well Volume Calculation			Stick-up or Flush (circle one)		
Well Depth (ft bgs)	Well Depth (ft btc)	DTW (ft btc)	Water Column (ft)	Convert Factor (gal/ft)	One Well Volume (gal)
45	48	26.0	19	0.17	3.23

3/4"=0.023 gal/ft 2"=0.17 gal/ft 4"=0.66 gal/ft 6"=1.5 gal/ft

General Information
Purge Water Disposition: CARBON TREATMENT ON-SITE
Field Conditions: OVERCAST, 70's

Comments: * STOPPED PURGING TO ALLOW WATER TO RECHARGE.

Well Purge Data Total Volume to Purge (gal) =

Time	Volume Purged (gallons)	Purge Rate (gpm)	DTW (ft btc)	Conductivity (uS/cm)	Temp. (°C)	pH	ORP (mV)	D.O. (mg/L)	Turbidity (NTUs)	Clarity/Color/ Remarks
	Pump On		Initial							
10:30	0		26.0	379	15.09	6.71	- /	- 3.83	51.5	CL
10:35	4		35.02	470	14.73	6.40	- /	- 1.05	>1100	VC
* 11:00	8		35.11	511	15.24	6.32	- /	- 3.41	>1100	VC
* 11:25	12		35.20	563	15.05	6.16	- /	- 4.72	>1100	VC
* 11:35	16		35.90	480	15.09	6.15	- /	- 4.62	>1100	VC
* 12:00	20		36.21	461	15.16	6.19	- /	- 4.48	>1100	VC
* 12:15	24		38.16	464	15.26	6.20	- /	- 4.36	>1100	VC
* 12:40	28		38.07	457	15.16	6.18	- /	- 4.92	>1100	VC
* 13:00	32		38.12	456	15.25	6.21	- /	- 5.42	>1100	VC
* 13:25	36		38.20	454	15.33	6.19	- /	- 5.13	1005	VC
* 13:45	40		38.22	450	15.21	6.17	- /	- 4.69	>1100	VC
* 15:05	44		38.04	448	15.33	6.06	- /	- 4.20	763	VC
12:45	45		25.80	463	18.01	6.03	- /	- ~~4.64~~ 2.53 mg	77.7	SC
12:48	46		26.72	464	18.05	6.02	- /	- ~~4.64~~ 2.52 mg	62.7	SC
13:02	47		27.43	464	18.15	6.02	- /	- 2.43	51.6	SC
13:05	48		29.90	465	18.22	6.03	- /	- 2.44	38.0	AC
13:08	49		28.90	467	18.26	6.02	- /	- 2.45	34.5	AC
13:11	50		28.88	468	18.32	6.03	- /	- 2.42	35.8	AC
~~13:14~~	Pump Off		Final				-	-		

Note: bgs= below ground surface btc=below top of casing DTW=depth to water gpm=gallons per minute
Clarity: VC=very cloudy Cl=cloudy SC=slightly cloudy AC=almost clear C=clear CC=crystal clear

Well Development Field Log

Well Number: MW-16i

Date: 8-4-04

HAI Project Number: 2708-10

Well Purge Data (continued from Page 1)

Time	Volume Purged (gallons)	Purge Rate (gpm)	DTW (ft btc)	Conductivity (uS/cm)	Temp. (°C)	pH	ORP (mV)	D.O. (mg/L)	Turbidity (NTUs)	Clarity/Color/ Remarks
8-4-04										
9:20	85		26.12	356	16.02	5.74	/	3.42	31.7	AC
9:23	86		28.62	359	16.00	5.73	/	3.32	24.0	AC
9:26	87		31.32	360	16.02	5.73	/	3.28	20.9	AC
9:29	88		33.33	363	16.32	5.72	/	2.89	22.0	AC
9:32	89		34.19	637	16.87	5.74	/	3.01	18.4	C
9:35	90		36.35	638	16.88	5.76	/	3.00	12.3	C
9:38	91		37.05	639	16.90	5.77	/	2.97	8.27	C
9:41	92		38.22	641	16.91	5.77	/	2.93	8.55	C
9:44	93		38.65	644	16.92	5.78	/	2.91	9.02	C
9:47	94		38.78	643 ✓	16.93 ✓	5.78 ✓	/	2.89 ✓	8.45 ✓	C
9:50	95		38.79	644 ✓	16.95 ✓	5.79 ✓	/	2.87 ✓	8.48 ✓	C
9:53	96		39.20	645 ✓	16.95 ✓	5.79 ✓	/	2.89 ✓	8.51 ✓	C
	Pump Off 9:55		Final 38.40							

Comments

PURGED WATER FROM 8-4-04 PURGED AT 123 H_2

Note: bgs= below ground surface btc=below top of casing DTW=depth to water gpm=gallons per minute
Clarity: VC=very cloudy Cl=cloudy SC=slightly cloudy AC=almost clear C=clear CC=crystal clear

Well Development Field Log

Well Number: MW-16D (MW-16-125)

Page 1 of 2 Date: 7-28-04

Project Information	
Project Name:	GASCO
HAI Project Number:	2708-30
General Information	
Field Team:	MATT GRAVES
Purge Method:	GRUNDFOS @ 150 Hz, 123 Hz
Pump Intake Depth (ft btc):	125', 110', 100', 77', 45'
Flow-Through Cell:	NO
Decontamination Method:	9-STEP DECON

Well Volume Calculation — Stick-up or Flush (circle one)

Well Depth (ft bgs)	Well Depth (ft btc)	DTW (ft btc)	Water Column (ft)	Convert Factor (gal/ft)	One Well Volume (gal)
125	128	27.05	97.95	0.17	16.65

3/4"=0.023 gal/ft 2"=0.17 gal/ft 4"=0.66 gal/ft 6"=1.5 gal/ft

General Information	
Purge Water Disposition:	ON-SITE CARBON FILTER SYSTEM
Field Conditions:	CLEAR, SUNNY, 90's

Comments: SHEEN IN PURGE WATER FROM 0-340, MOST SHEEN @ 119 GALLONS, 0-119 GALLONS @ 125', 119-170' @ 110', 170-221' @ 45', 221-272 @ 77', 272-382 @ 100'

Well Purge Data Total Volume to Purge (gal) =

Time	Volume Purged (gallons)	Purge Rate (gpm)	DTW (ft btc)	Conductivity (uS/cm)	Temp. (°C)	pH	ORP (mV)	D.O. (mg/L)	Turbidity (NTUs)	Clarity/Color/ Remarks
	Pump On		Initial							
11:00	0		27.20	1544	14.3	6.64	/	/	42.2	CL
11:10	17		33.51	1743	14.3	6.75	/	/	106.1	AC
11:25	34		33.71	1540	14.6	6.76	/	/	31.8	AC
11:43	51		33.89	1396	14.8	6.76	/	/	26.6	AC
12:02	68		33.99	1275	15.0	6.74	/	/	12.6	AC
13:00	85		34.05	1256	14.7	6.77	/	/	30.2	AC
13:15	102		34.16	1180	15.2	6.77	/	/	11.18	C
13:30	119		34.22	1153	15.2	6.77	/	/	7.46	C
14:30	136		33.60	995	16.2	6.75	/	/	64.5	AC
14:45	153		33.82	1070	15.1	6.74	/	/	9.40	C
15:00	170		33.76	1064	15.5	6.77	/	/	7.26	C
7/29 10:15	0		26.50	314	14.9	6.48	/	/	8.60	C
10:35	187		32.08	500	14.8	6.60	/	/	4.74	C
10:47	204		32.41	1168	14.6	6.61	/	/	49.1	AC
11:02	221		32.68	1013	14.7	6.62	/	/	12.3	C
11:15	238		31.60	965	14.4	6.62	/	/	47.3	AC
11:30	255		31.88	909	14.8	6.63	/	/	14.9	C
11:40	272		32.20	894	14.5	6.63	/	/	6.25	C
	Pump Off		Final							

Note: bgs= below ground surface btc=below top of casing DTW=depth to water gpm=gallons per minute
Clarity: VC=very cloudy Cl=cloudy SC=slightly cloudy AC=almost clear C=clear CC=crystal clear

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Well Development Field Log

Well Number: MW-16D

Date: 8-2-04

HAI Project Number: 2708-3C

Well Purge Data (continued from Page 1)

Time	Volume Purged (gallons)	Purge Rate (gpm)	DTW (ft btc)	Conductivity (uS/cm)	Temp. (°C)	pH	ORP (mV)	D.O. (mg/L)	Turbidity (NTUs)	Clarity/Color/ Remarks
10:45	289		27.28	908	15.80	5.94	✓	3.35	2.64	C
11:15	306		28.49	1379	16.15	5.89	✓	1.55	3.08	C
11:35	323		27.62	1201	16.54	5.91	✓	1.41	2.08	C
12:00	340		27.70	1099	16.62	5.74	✓	1.52	1.89	C
12:25	357		27.83	1089	16.58	5.69	✓	1.48	2.20	C
12:30	362		27.77	1074	16.54	5.65	✓	1.22	1.92	C
12:35	367		27.80	1064	16.60	5.66	✓	1.05	2.21	C
12:40	372		27.76	1066 ✓	16.61 ✓	5.69 ✓	✓	1.03 ✓	2.22 ✓	C
12:45	377		27.81	1068 ✓	16.64 ✓	5.72 ✓	✓	0.99 ✓	2.20 ✓	C
13:00	382		27.80	1067 ✓	16.64 ✓	5.73 ✓	✓	0.96 ✓	2.24 ✓	C
	Pump Off 13:04		Final 26.27							

Comments

ALL WATER PURGED ON 8-2-04 PUMPED AT 123 HZ.

Note: bgs= below ground surface btc=below top of casing DTW=depth to water gpm=gallons per minute
Clarity: VC=very cloudy Cl=cloudy SC=slightly cloudy AC=almost clear C=clear CC=crystal clear

SCOEPA00013633

APPENDIX D

August 2004 Groundwater Monitoring Field Sheets

SCOEPA00013634

Low-Flow Well Sampling Field Log

Well Number: MW-1-22

Page 1 of 1

Date: 8/25/04

Project Information	
Project Name:	NW Natural - Gasco Facility
HAI Project Number:	2708-30

Sampling Information	
Field Team:	APR/MWG
Purge Method:	Low Flow
Pump Intake Depth (ft btc):	20
Flow-Through Cell:	Yes
Sampling Method:	Bladder Pump
Decontamination Method:	Rinse, Alconox, Dilute Hexane, Rinse, Dilute Nitric, Rinse, Spray Isopropanol, Rinse, Spray De-Ionized
Purge Water Disposition:	AST
Field Conditions:	
Comments:	pump @ 50 psi charge = 30 sec exhaust = 30 sec

Well Information — Stick-up or Flush (circle one)

Well Diameter (in)	Drilled Well Depth (ft bgs)	Drilled Well Depth (ft btc)	Top of Screen (ft bgs)	Top of Screen (ft btc)	Screen Interval (ft bgs)
2"	22.00	24.80	11.00	13.80	11 - 21

Purge Volume (Only applicable if pump intake is above top of screen)

Top Screen (ft btc)	Pump Intake (ft btc)	Top Screen - Pump Intake (ft)	Convert Factor (L/ft)	Minimum Purge Volume (Liters)

3/4"=0.087 L/ft 2"=0.64 L/ft 4"=2.5 L/ft 6"=5.68 L/ft

Sample Containers

Number	Type	Preservative	Analytical Parameters	Filtered?
2	1 L Amber	None	PAHs	N
3	VOAs	HCl	BTEX	N
1	500 mL	NaOH	Total and Amenable CN	N
1	250 mL	HNO_3	Total Metals	N

Well Purge Data

Time	Volume Purged (Liters)	Purge Rate (Lpm)	DTW (ft btc)	Temp. (°C)	Conductivity (uS/cm)	D.O. (mg/L)	pH	ORP (mV)	Turbidity (NTUs)	Clarity/Color/ Remarks
11:10	Pump On		18.52 Initial	-	±3%	±10%	±0.1	±10mv	±10%	<= Stabilization Criteria
11:15			18.57	15.63	2437	8.99	2.66	90.8	4.08	C
11:18	0.5		18.69	15.04	2622	0.87	2.59	98.6	3.34	C
11:21	1		18.67	14.86	2661	0.52	2.58	104.6	6.08	C
11:24	1.5		18.75	14.65	2646	0.25	2.59	111.6	2.21	C
11:27	2		18.85	14.51	2622	0.21	2.61	114.9	1.84	C
11:30	3		18.84	14.37	2602	0.18	2.62	114.6	1.38	C
11:33	3.5		18.97	14.33	2600	0.16	2.61	119.5	1.35	C
11:36	3.75		18.96	14.58	2593	0.15	2.61	121.4	1.34	C
11:30	Start Sampling		18.96							
12:22	End Sampling		18.96 Final	Sample Number:	2708-040825-MW1-22-019					

Note: bgs= below ground surface btc=below top of casing DTW=depth to water Lpm=Liters per minute
Clarity: VC=very cloudy Cl=cloudy SC=slightly cloudy AC=almost clear C=clear CC=crystal clear

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Low-Flow Well Sampling Field Log

Well Number: MW-2-32

Page 1 of 1

Date: 8/16/04

Project Information	
Project Name:	NW Natural - Gasco Facility
HAI Project Number:	2708-30

Sampling Information	
Field Team:	AR2/MWG
Purge Method:	Low Flow
Pump Intake Depth (ft btc):	~~27'~~ 27'
Flow-Through Cell:	Yes
Sampling Method:	Bladder Pump
Decontamination Method:	Rinse, Alconox, Dilute Hexane, Rinse, Dilute Nitric, Rinse, Spray Isopropanol, Rinse, Spray De-Ionized
Purge Water Disposition:	AST
Field Conditions:	Sunny, 85°
Comments:	

Well Information — Stick-up or (Flush), (circle one)

Well Diameter (in)	Drilled Well Depth (ft bgs)	Drilled Well Depth (ft btc)	Top of Screen (ft bgs)	Top of Screen (ft btc)	Screen Interval (ft bgs)
2"	32.50	31.20	21.50	20.20	21.5 - 31.5

Purge Volume (Only applicable if pump intake is above top of screen)

Top Screen (ft btc)	Pump Intake (ft btc)	Top Screen - Pump Intake (ft)	Convert Factor (L/ft)	Minimum Purge Volume (Liters)

3/4"=0.087 L/ft 2"=0.64 L/ft 4"=2.5 L/ft 6"=5.68 L/ft

Sample Containers

Number	Type	Preservative	Analytical Parameters	Filtered?
2	1 L Amber	None	PAHs	N
3	VOAs	HCl	BTEX	N
1	500 mL	NaOH	Total and Amenable CN	N
1	250 mL	HNO_3	Total Metals	N

Well Purge Data

Time	Volume Purged (Liters)	Purge Rate (Lpm)	DTW (ft btc)	Temp. (°C)	Conductivity (uS/cm)	D.O. (mg/L)	pH	ORP (mV)	Turbidity (NTUs)	Clarity/Color/ Remarks
12:08	Pump On		Initial 25.31	-	±3%	±10%	±0.1	±10mv	±10%	<= Stabilization Criteria
12:12	0.5		25.37	-9.99	103	-8.02	6.46	765.2	63.1	AC
12:17	1		25.61	-9.99	104	-5.04	6.46	897.2	99	CI
12:22	2.5		25.87	-9.99	105	-10.20	6.46	959.4	71.1	CC
12:27	3.5		26.01	-9.99	101	-12.08	6.45	870.0	27.8	CI
12:32	4		26.19	-9.99	100	-6.60	6.46	988.8	16.8	AC
12:37	4.5		26.26	-9.99	99	-8.22	6.46	974.8	12.9	AC
12:42	5		26.39	-9.99	98	-7.02	6.46	958.5	8.95	C
12:47	5.5		26.40	-9.99	97	-6.85	6.46	971.2	9.05	C
12:50	5.75		restrict flow pump	-9.99	97	-6.99	6.46	982.1	6.80	C
12:53	6		26.47	-9.99	97	-7.10	6.46	1009.3	6.72	C
12:56	6.5		restrict flow pump	-9.99	97	-6.36	6.46	1024.3	6.96	C
12:56	Start Sampling									
2:00	End Sampling		27.05 Final	Sample Number:		2708- 041604-MW2-32-009				

Note: bgs= below ground surface btc=below top of casing DTW=depth to water Lpm=Liters per minute
Clarity: VC=very cloudy CI=cloudy SC=slightly cloudy AC=almost clear C=clear CC=crystal clear

SCOEPA00013636

Low-Flow Well Sampling Field Log

Well Number: MW-2-61

Page 1 of 1

Date: 8/13/04

Project Information

Project Name: NW Natural - Gasco Facility

HAI Project Number: 2708-30

Sampling Information

Field Team: ARR & MG

Purge Method: Low Flow

Pump Intake Depth (ft btc): 51'

Flow-Through Cell: Yes

Sampling Method: Bladder Pump

Decontamination Method:
Rinse, Alconox, Dilute Hexane, Rinse, Dilute Nitric, Rinse, Spray Isopropanol, Rinse, Spray De-Ionized

Purge Water Disposition: AST

Field Conditions: Sunny, 85°

Comments: pump set @ 50 psi
30 sec charge
30 sec exhaust

Well Information — Stick-up or (Flush) (circle one)

Well Diameter (in)	Drilled Well Depth (ft bgs)	Drilled Well Depth (ft btc)	Top of Screen (ft bgs)	Top of Screen (ft btc)	Screen Interval (ft bgs)
2"	61.50	61.20	50.00	49.70	50 - 60

Purge Volume (Only applicable if pump intake is above top of screen)

Top Screen (ft btc)	Pump Intake (ft btc)	Top Screen - Pump Intake (ft)	Convert Factor (L/ft)	Minimum Purge Volume (Liters)
	51'			

3/4"=0.087 L/ft 2"=0.64 L/ft 4"=2.5 L/ft 6"=5.68 L/ft

Sample Containers

Number	Type	Preservative	Analytical Parameters	Filtered?
2	1 L Amber	None	PAHs	N
3	VOAs	HCl	BTEX	N
1	500 mL	NaOH	Total and Amenable CN	N
1	250 mL	HNO_3	Total Metals	N

Well Purge Data

Time	Volume Purged (Liters)	Purge Rate (Lpm)	DTW (ft btc)	Temp. (°C)	Conductivity (uS/cm)	D.O. (mg/L)	pH	ORP (mV)	Turbidity (NTUs)	Clarity/Color/ Remarks
7:57	Pump On		Initial 28.03	-	±3%	±10%	±0.1	±10mv	±10%	<= Stabilization Criteria
8:05	2		28.03	19.90	688	1.50	6.13	-9.7	40.5	SC
8:10	3		28.19	19.79	697	0.82	6.14	-17.0	21.9	SC
8:15	4		28.14	19.75	698	0.50	6.14	-20.0	19.9	AC
8:20	5		28.14	19.71	697	0.41	6.15	-20.9	22.6	AC
8:25	7		28.31	20.01	699	0.31	6.15	-21.9	22.1	AC
8:30	8		28.28	19.98	702	0.29	6.21	-22.2	19.6	AC
8:33	9		28.22	20.14	701	0.25	6.22	-22.6	17.3	SC
8:36	9.5		28.28	20.13	703	0.20	6.26	-23.8	17.5	AC
8:39	10 L		28.28	20.18	702	0.16	6.23	-22.1	15.7	SC
8:42	11 L		28.31	20.18	701	0.16	6.25	-21.8	14.1	SC
8:45	12 L		28.29	20.15	702	0.16	6.25	-22.5	12.2	SC
8:46	Start Sampling		28.29							
9:03	End Sampling		28.35 Final	Sample Number:	2708-040813-MW2-61-002					

Note: bgs= below ground surface btc=below top of casing DTW=depth to water Lpm=Liters per minute
Clarity: VC=very cloudy Cl=cloudy SC=slightly cloudy AC=almost clear C=clear CC=crystal clear

SCOEPA00013637

Low-Flow Well Sampling Field Log

Well Number: MW-3-26

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Date: 8/23/04

Project Information	
Project Name:	NW Natural - Gasco Facility
HAI Project Number:	2708-30
Sampling Information	
Field Team:	ACR / MWG
Purge Method:	Low Flow
Pump Intake Depth (ft btc):	25'
Flow-Through Cell:	Yes
Sampling Method:	Bladder Pump
Decontamination Method:	Rinse, Alconox, Dilute Hexane, Rinse, Dilute Nitric, Rinse, Spray Isopropanol, Rinse, Spray De-Ionized
Purge Water Disposition:	AST
Field Conditions:	
Comments:	Pump set @ 45 psi Exhaust time - 30 sec charge time - 30 sec

Well Information — Stick-up or Flush (circle one)

Well Diameter (in)	Drilled Well Depth (ft bgs)	Drilled Well Depth (ft btc)	Top of Screen (ft bgs)	Top of Screen (ft btc)	Screen Interval (ft bgs)
2"	26.00	28.90	15.00	17.90	15 - 25

Purge Volume (Only applicable if pump intake is above top of screen)

Top Screen (ft btc)	Pump Intake (ft btc)	Top Screen - Pump Intake (ft)	Convert Factor (L/ft)	Minimum Purge Volume (Liters)

3/4"=0.087 L/ft 2"=0.64 L/ft 4"=2.5 L/ft 6"=5.68 L/ft

Sample Containers

Number	Type	Preservative	Analytical Parameters	Filtered?
2	1 L Amber	None	PAHs	N
3	VOAs	HCl	BTEX	N
1	500 mL	NaOH	Total and Amenable CN	N
1	250 mL	HNO_3	Total Metals	N

Well Purge Data

Time	Volume Purged (Liters)	Purge Rate (Lpm)	DTW (ft btc)	Temp. (°C)	Conductivity (uS/cm)	D.O. (mg/L)	pH	ORP (mV)	Turbidity (NTUs)	Clarity/Color/ Remarks
10:51	Pump On		Initial 24.23	-	±3%	±10%	±0.1	±10mv	±10%	<= Stabilization Criteria
~~10:58~~										
11:05			24.54	17.74	0411	1.62	5.17	7.3	5.75	clear
11:10	0.2		24.68	17.41	399	1.01	5.67	14.8	5.56	clear
11:15	1		24.72	17.14	401	0.81	5.88	2.0	4.63	clear
11:20	1.1		24.80	17.04	389	0.73	5.98	0.1	3.77	clear
11:23	1.5		24.88	16.61	379	0.68	5.92	5.7	2.75	clear
11:26	2		25.00	16.37	377	0.56	5.90	4.4	1.98	CLEAR
11:30	2.1		25.00	16.59	379	0.50	6.01	-5.1	1.67	clear
11:33	2.5		25.03	16.77	384	0.46	6.09	-12.6	1.69	clear
11:36	2.75		25.08	16.81	389	0.44	6.11	-15.3	1.68	clear
11:39	2.9		25.08	16.81	397	0.39	6.14	-18.9	1.65	clear
11:39	Start Sampling		25.08							
12:40	End Sampling		25.47	**Sample Number:**	2708- 040823MW3-26-010					
			Final 25.47							

Note: bgs= below ground surface btc=below top of casing DTW=depth to water Lpm=Liters per minute
Clarity: VC=very cloudy Cl=cloudy SC=slightly cloudy AC=almost clear C=clear CC=crystal clear

SCOEPA00013638

Low-Flow Well Sampling Field Log

Well Number: MW-3-56

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Date: 8/23/04

Project Information	
Project Name:	NW Natural - Gasco Facility
HAI Project Number:	2708-30

Sampling Information	
Field Team:	Aer / MWG
Purge Method:	Low Flow
Pump Intake Depth (ft btc):	50'
Flow-Through Cell:	Yes
Sampling Method:	Bladder Pump
Decontamination Method:	Rinse, Alconox, Dilute Hexane, Rinse, Dilute Nitric, Rinse, Spray Isopropanol, Rinse, Spray De-Ionized
Purge Water Disposition:	AST
Field Conditions:	Rainy 60s°
Comments:	pump set @ 50psi 15 sec exhaust 15 sec charge

Well Information — Stick-up or Flush (circle one)

Well Diameter (in)	Drilled Well Depth (ft bgs)	Drilled Well Depth (ft btc)	Top of Screen (ft bgs)	Top of Screen (ft btc)	Screen Interval (ft bgs)
2"	56.00	58.90	45.00	47.90	45 - 55

Purge Volume (Only applicable if pump intake is above top of screen)

Top Screen (ft btc)	Pump Intake (ft btc)	Top Screen - Pump Intake (ft)	Convert Factor (L/ft)	Minimum Purge Volume (Liters)

3/4"=0.087 L/ft 2"=0.64 L/ft 4"=2.5 L/ft 6"=5.68 L/ft

Sample Containers

Number	Type	Preservative	Analytical Parameters	Filtered?
3	1 L Amber	None	PAHs & SVOCs	N
3	VOAs	HCl	VOCs	N
1	500 mL	NaOH	Total and Amenable CN	N
1	250 mL	HNO_3	Total Metals	N

Well Purge Data

Time	Volume Purged (Liters)	Purge Rate (Lpm)	DTW (ft btc)	Temp. (°C)	Conductivity (uS/cm)	D.O. (mg/L)	pH	ORP (mV)	Turbidity (NTUs)	Clarity/Color/ Remarks
12:50	Pump On		Initial 28.30	-	±3%	±10%	±0.1	±10mv	±10%	<= Stabilization Criteria
12:55	1		28.35	15.77	512	1.98	6.27	-56.4	144	C1
1:00	2		28.29	15.39	528	0.48	6.27	-76.1	129	C1
1:03	3.5		28.66	15.06	538	0.21	6.33	-84.8	58.0	C1
1:06	5		28.45	14.98	544	0.14	6.34	-91.8	39.2	C1
1:09	6.5		28.72	14.96	551	0.12	6.38	-106.9	32.5	C1
1:12	7.5		28.52	14.95	556	0.12	6.42	-128.4	26.4	SC
1:15	9.5		28.60	14.97	560	0.10	6.44	-139.1	23.7	SC
1:18	10.5		28.56	14.98	562	0.10	6.47	-146.1	20.4	SC
1:21	12		28.66	14.98	565	0.10	6.49	-151.5	16.6	SC
1:24	13.5		28.57	14.99	566	0.10	6.50	-154.8	15.0	SC
1:27	15		28.47	14.98	568	0.08	6.51	-156.9	14.4	SC
1:27	Start Sampling		28.47							
1:40	End Sampling		28.56 Final	Sample Number:	2708- 040823 - MW3-56-011					

Note: bgs= below ground surface btc=below top of casing DTW=depth to water Lpm=Liters per minute
Clarity: VC=very cloudy Cl=cloudy SC=slightly cloudy AC=almost clear C=clear CC=crystal clear

SCOEPA00013639

Low-Flow Well Sampling Field Log

Well Number: MW-4-35

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Date: 8/23/04

Project Information	
Project Name:	NW Natural - Gasco Facility
HAI Project Number:	2708-30
Sampling Information	
Field Team:	APR / MWG
Purge Method:	Low Flow
Pump Intake Depth (ft btc):	30'
Flow-Through Cell:	Yes
Sampling Method:	Bladder Pump
Decontamination Method:	Rinse, Alconox, Dilute Hexane, Rinse, Dilute Nitric, Rinse, Spray Isopropanol, Rinse, Spray De-Ionized
Purge Water Disposition:	AST
Field Conditions:	rainy 65°
Comments:	pump set @ 50 psi. 30 sec charge 30 sec exhaust

Well Information — Stick-up or Flush (circle one)

Well Diameter (in)	Drilled Well Depth (ft bgs)	Drilled Well Depth (ft btc)	Top of Screen (ft bgs)	Top of Screen (ft btc)	Screen Interval (ft bgs)
2"	35.00	37.80	24.00	26.80	24 - 34

Purge Volume (Only applicable if pump intake is above top of screen)

Top Screen (ft btc)	Pump Intake (ft btc)	Top Screen - Pump Intake (ft)	Convert Factor (L/ft)	Minimum Purge Volume (Liters)

3/4"=0.087 L/ft 2"=0.64 L/ft 4"=2.5 L/ft 6"=5.68 L/ft

Sample Containers

Number	Type	Preservative	Analytical Parameters	Filtered?
2	1 L Amber	None	PAHs	N
3	VOAs	HCl	BTEX	N
1	500 mL	NaOH	Total and Amenable CN	N
1	250 mL	HNO_3	Total Metals	N

Well Purge Data

Time	Volume Purged (Liters)	Purge Rate (Lpm)	DTW (ft btc)	Temp. (°C)	Conductivity (uS/cm)	D.O. (mg/L)	pH	ORP (mV)	Turbidity (NTUs)	Clarity/Color/ Remarks
2:09	Pump On		Initial 27.65	-	±3%	±10%	±0.1	±10mv	±10%	<= Stabilization Criteria
2:12	0		27.99	16.70	1079	9.25	6.83	-145.2	2.5	C
2:15	0.5			15.66	1172	0.83	6.64	-144.1		
2:30	1		28.05	16.13	1191	0.78	6.83	-150.2	4.83	C
2:33	1.75		28.27	15.19	1200	0.45	6.75	-149.5	3.02	C
2:36	2		28.43	14.92	1199	0.27	6.76	-153.1	2.71	C
2:39	3		28.51	14.86	1199	0.20	6.79	-156.1	2.29	C
2:42	3.5		28.61	14.82	1203	0.15	6.82	-160.4	1.91	C
2:45	4		28.65	14.75	1209	0.13	6.83	-160.5	2.43	C
2:48	5		28.71	14.75	1216	0.11	6.84	-163.6	1.72	C
2:48	Start Sampling		28.71							
3:10	End Sampling		28.97 Final	Sample Number:		2708- 040823-MW4-35-012				

Note: bgs= below ground surface btc=below top of casing DTW=depth to water Lpm=Liters per minute
Clarity: VC=very cloudy Cl=cloudy SC=slightly cloudy AC=almost clear C=clear CC=crystal clear

SCOEPA00013640

Low-Flow Well Sampling Field Log

Well Number: MW-4-101

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Date: 9/16/04

Project Information	
Project Name:	NW Natural - Gasco Facility
HAI Project Number:	2708-30

Sampling Information	
Field Team:	ARR / MWG
Purge Method:	Low Flow
Pump Intake Depth (ft btc):	94'
Flow-Through Cell:	Yes
Sampling Method:	Bladder Pump
Decontamination Method:	Rinse, Alconox, Dilute Hexane, Rinse, Dilute Nitric, Rinse, Spray Isopropanol, Rinse, Spray De-Ionized
Purge Water Disposition:	AST
Field Conditions:	
Comments:	pump set @ 70 psi 15 sec charge 15 sec exhaust

Well Information — Stick-up or Flush (circle one)

Well Diameter (in)	Drilled Well Depth (ft bgs)	Drilled Well Depth (ft btc)	Top of Screen (ft bgs)	Top of Screen (ft btc)	Screen Interval (ft bgs)
2"	120.00	122.60	89.50	92.10	89.5 - 99.5

Purge Volume (Only applicable if pump intake is above top of screen)

Top Screen (ft btc)	Pump Intake (ft btc)	Top Screen - Pump Intake (ft)	Convert Factor (L/ft)	Minimum Purge Volume (Liters)

3/4"=0.087 L/ft 2"=0.64 L/ft 4"=2.5 L/ft 6"=5.68 L/ft

Sample Containers

Number	Type	Preservative	Analytical Parameters	Filtered?
2	1 L Amber	None	PAHs	N
3	VOAs	HCl	BTEX	N
1	500 mL	NaOH	Total and Amenable CN	N
1	250 mL	HNO_3	Total Metals	N

Well Purge Data

Time	Volume Purged (Liters)	Purge Rate (Lpm)	DTW (ft btc)	Temp. (°C)	Conductivity (uS/cm)	D.O. (mg/L)	pH	ORP (mV)	Turbidity (NTUs)	Clarity/Color/ Remarks
9:06	Pump On		Initial 27.81	-	±3%	±10%	±0.1	±10mv	±10%	<= Stabilization Criteria
9:10	1L		27.81	17.29	697	3.12	6.62	-4.5	10.20	C
9:15	2		27.85	15.09	674	2.13	6.48	-14.2	9.51	C
9:20	4.5		27.90	14.78	665	1.17	6.48	-17.6	9.44	C
9:25	7		28.06	14.76	659	0.60	6.48	-18.7	11.0	C
9:28	8.5		27.93	14.71	655	0.50	6.49	-18.9	10.72	C
9:31	9.5		27.96	14.61	653	0.41	6.49	-18.8	11.2	C
9:34	11.0		28.0	14.55	649	0.31	6.49	-18.3	11.2	C
9:37	13.0		27.99	14.66	650	0.23	6.50	-19.2	10.75	C
9:40	14.5		28.02	14.60	646	0.21	6.49	-18.3	11.5	C
9:43	16.0		28.04	14.53	646	0.20	6.50	-18.0	10.76	C
9:44	Start Sampling		28.01							
9:55	End Sampling		28.12 Final	Sample Number:		2708- 040816-MW4-101-007				

Note: bgs= below ground surface btc=below top of casing DTW=depth to water Lpm=Liters per minute
Clarity: VC=very cloudy Cl=cloudy SC=slightly cloudy AC=almost clear C=clear CC=crystal clear

SCOEPA00013641

Low-Flow Well Sampling Field Log

Well Number: MW-4-57

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Date: 8/24/04

Project Information	
Project Name:	NW Natural - Gasco Facility
HAI Project Number:	2708-30

Sampling Information	
Field Team:	APR / MWG
Purge Method:	Low Flow
Pump Intake Depth (ft btc):	50
Flow-Through Cell:	Yes
Sampling Method:	Grundfos Pump
Decontamination Method:	Rinse, Alconox, Dilute Hexane, Rinse, Dilute Nitric, Rinse, Spray Isopropanol, Rinse, Spray De-Ionized
Purge Water Disposition:	AST
Field Conditions:	Rain - 60°
Comments:	120 Hz

Well Information — Stick-up or Flush (circle one)

Well Diameter (in)	Drilled Well Depth (ft bgs)	Drilled Well Depth (ft btc)	Top of Screen (ft bgs)	Top of Screen (ft btc)	Screen Interval (ft bgs)
2"	57.00	59.80	46.00	48.80	46 - 56

Purge Volume (Only applicable if pump intake is above top of screen)

Top Screen (ft btc)	Pump Intake (ft btc)	Top Screen - Pump Intake (ft)	Convert Factor (L/ft)	Minimum Purge Volume (Liters)

3/4"=0.087 L/ft 2"=0.64 L/ft 4"=2.5 L/ft 6"=5.68 L/ft

Sample Containers

Number	Type	Preservative	Analytical Parameters	Filtered?
3	1 L Amber	None	PAHs & SVOCs	N
3	VOAs	HCl	VOCs	N
1	500 mL	NaOH	Total and Amenable CN	N
1	250 mL	HNO_3	Total Metals	N

Well Purge Data

Time	Volume Purged (Liters)	Purge Rate (Lpm)	DTW (ft btc)	Temp. (°C)	Conductivity (uS/cm)	D.O. (mg/L)	pH	ORP (mV)	Turbidity (NTUs)	Clarity/Color/ Remarks
3:10	Pump On		28.50 Initial	-	±3%	±10%	±0.1	±10mv	±10%	<= Stabilization Criteria
3:20	3.5		30.50	15.53	1265	0.37	6.50	-100.6	5.44	C
3:23	5.5		30.45	16.11	1278	0.19	6.50	-107.1	3.96	C
3:26	9		30.59	16.21	1278	0.14	6.52	-112.2	2.20	C
3:29	12		30.60	16.27	1275	0.11	6.52	-114.6	1.48	C
3:32	15.5		30.61	16.34	1279	0.08	6.52	-116.1	0.91	C
3:35	18		30.60	16.39	1276	0.06	6.52	-117.8	0.71	C
3:38	21.5		30.63	16.32	1280	0.05	6.52	-117.7	1.03	C
3:50	Start Sampling		30.05							
3:52	End Sampling		30.51 Final	Sample Number:	2708- 040824-MW4-57-016					

Note: bgs= below ground surface btc=below top of casing DTW=depth to water Lpm=Liters per minute
Clarity: VC=very cloudy Cl=cloudy SC=slightly cloudy AC=almost clear C=clear CC=crystal clear

SCOEPA00013642

Low-Flow Well Sampling Field Log

Well Number: MW-5-32

Page 1 of 1

Date: 8/16/04

Project Information

Project Name: NW Natural - Gasco Facility

HAI Project Number: 2708-30

Sampling Information

Field Team: MWG / APR

Purge Method: Low Flow

Pump Intake Depth (ft btc): 25

Flow-Through Cell: Yes

Sampling Method: Bladder Pump

Decontamination Method:
Rinse, Alconox, Dilute Hexane, Rinse, Dilute Nitric, Rinse, Spray Isopropanol, Rinse, Spray De-Ionized

Purge Water Disposition: AST

Field Conditions:

Comments: pump set @ 30 psi
30 sec charge
30 sec exhaust

Well Information Stick-up or Flush (circle one)

Well Diameter (in)	Drilled Well Depth (ft bgs)	Drilled Well Depth (ft btc)	Top of Screen (ft bgs)	Top of Screen (ft btc)	Screen Interval (ft bgs)
2"	32.00	34.70	21.00	23.70	21 - 31

Purge Volume (Only applicable if pump intake is above top of screen)

Top Screen (ft btc)	Pump Intake (ft btc)	Top Screen - Pump Intake (ft)	Convert Factor (L/ft)	Minimum Purge Volume (Liters)

3/4"=0.087 L/ft 2"=0.64 L/ft 4"=2.5 L/ft 6"=5.68 L/ft

Sample Containers

Number	Type	Preservative	Analytical Parameters	Filtered?
2	1 L Amber	None	PAHs	N
3	VOAs	HCl	BTEX	N
1	500 mL	NaOH	Total and Amenable CN	N
1	250 mL	HNO_3	Total Metals	N

Well Purge Data

Time	Volume Purged (Liters)	Purge Rate (Lpm)	DTW (ft btc)	Temp. (°C)	Conductivity (uS/cm)	D.O. (mg/L)	pH	ORP (mV)	Turbidity (NTUs)	Clarity/Color/ Remarks
10:45	Pump On		Initial 21.05	-	±3%	±10%	±0.1	±10mv	±10%	<= Stabilization Criteria
10:50	1		22.05	-9.99	148	-5.99	6.46	672.3	38.4	~~[illegible]~~ AC
10:55	2		22.15	-9.99	158	-3.33	6.46	855	13.0	C
11:00	3		22.25	-9.99	165	-3.42	6.46	928.9	13.8	C
11:05	4		22.15	-9.99	168	-3.77	6.46	961.7	8.91	C
11:08	5		22.24	-9.99	169	-3.68	6.46	981.3	8.73	C
11:11	6		22.19	-9.99	170	-3.84	6.46	985	8.59	C
11:12	Start Sampling		22.19							
11:30	End Sampling		22.14 Final	Sample Number:		2708- 040816 - MW5-32 -008				

Note: bgs= below ground surface btc=below top of casing DTW=depth to water Lpm=Liters per minute
Clarity: VC=very cloudy Cl=cloudy SC=slightly cloudy AC=almost clear C=clear CC=crystal clear

Low-Flow Well Sampling Field Log

Well Number: MW-5-100

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Date: 8/24/04

Project Information	
Project Name:	NW Natural - Gasco Facility
HAI Project Number:	2708-30
Sampling Information	
Field Team:	ACR / MWG
Purge Method:	Low Flow
Pump Intake Depth (ft btc):	92'
Flow-Through Cell:	Yes
Sampling Method:	Grundfos Pump
Decontamination Method:	Rinse, Alconox, Dilute Hexane, Rinse, Dilute Nitric, Rinse, Spray Isopropanol, Rinse, Spray De-Ionized
Purge Water Disposition:	AST
Field Conditions:	Rain 65°
Comments:	105 Hz

Well Information — Stick-up or Flush (circle one)

Well Diameter (in)	Drilled Well Depth (ft bgs)	Drilled Well Depth (ft btc)	Top of Screen (ft bgs)	Top of Screen (ft btc)	Screen Interval (ft bgs)
2"	100.00	101.90	88.00	89.90	88 - 98

Purge Volume (Only applicable if pump intake is above top of screen)

Top Screen (ft btc)	Pump Intake (ft btc)	Top Screen - Pump Intake (ft)	Convert Factor (L/ft)	Minimum Purge Volume (Liters)

3/4"=0.087 L/ft 2"=0.64 L/ft 4"=2.5 L/ft 6"=5.68 L/ft

Sample Containers

Number	Type	Preservative	Analytical Parameters	Filtered?
3	1 L Amber	None	PAHs & SVOCs	N
3	VOAs	HCl	VOCs	N
1	500 mL	NaOH	Total and Amenable CN	N
1	250 mL	HNO_3	Total Metals	N

Well Purge Data

Time	Volume Purged (Liters)	Purge Rate (Lpm)	DTW (ft btc)	Temp. (°C)	Conductivity (uS/cm)	D.O. (mg/L)	pH	ORP (mV)	Turbidity (NTUs)	Clarity/Color/ Remarks
2:20	Pump On		Initial 21.22	-	±3%	±10%	±0.1	±10mv	±10%	<= Stabilization Criteria
2:25	3.5		21.60	14.66	888	0.57	6.34	-107.6	14.9	AC
2:30	9		21.58	15.33	874	0.21	6.31	-104.7	10.95	C
2:33	12		21.56	15.49	872	0.18	6.28	-105.0	5.66	C
2:36	15.5		21.58	15.64	876	0.17	6.31	-108.6	3.23	C
2:39	19.5		21.58	15.67	874	0.14	6.32	-111.9	2.30	C
2:39	Start Sampling		21.58							
2:51	End Sampling		21.31 Final	**Sample Number:**	2708- 040824-MW5-100-015					

Note: bgs= below ground surface btc=below top of casing DTW=depth to water Lpm=Liters per minute
Clarity: VC=very cloudy Cl=cloudy SC=slightly cloudy AC=almost clear C=clear CC=crystal clear

SCOEPA00013644

Monitoring Well Sampling Field Log

Well Number: MW-5-175

Page 1 of 2

Date: 8/24/04

Project Information	
Project Name:	NW Natural - Gasco Facility
HAI Project Number:	2708-30
Sampling Information	
Field Team:	AQR / MWG
Purge Method:	Standard
Pump Intake Depth (ft btc):	150'
Flow-Through Cell:	Yes
Sampling Method:	Grundfos Pump
Decontamination Method:	Rinse, Alconox, Dilute Hexane, Rinse, Dilute Nitric, Rinse, Spray Isopropanol, Rinse, Spray De-Ionized
Purge Water Disposition:	AST
Field Conditions:	Rain, 65°
Comments:	139 Hz

Well Information — Stick-up or Flush (circle one)

Well Diameter (in)	Drilled Well Depth (ft bgs)	Drilled Well Depth (ft btc)	Top of Screen (ft bgs)	Top of Screen (ft btc)	Screen Interval (ft bgs)
2	175	177	163	165	163 - 173

Well Volume Calculation

Well Depth (ft btc)	DTW (ft btc)	Water Column (ft)	Convert Factor (gal/ft)	One Well Volume (gal)	Three Well Volumes (gal)
177	22.05	155	0.17	26.34	79

3/4"=0.023 gal/ft 2"=0.17 gal/ft 4"=0.66 gal/ft 6"=1.5 gal/ft

Sample Containers

Number	Type	Preservative	Analytical Parameters	Filtered?
2	1 L Amber	None	PAHs	N
3	VOAs	HCl	BTEX	N
1	500 mL	NaOH	Total & Amenable CN	N
1	250 mL	HNO_3	Total Metals	N

Well Purge Data — **Total Volume to Purge (gal) =**

Time	Volume Purged (gallons)	Purge Rate (gpm)	DTW (ft btc)	Temp. (°C)	Conductivity (uS/cm)	D.O. (mg/L)	pH	ORP (mV)	Turbidity (NTUs)	Clarity/Color/ Remarks
9:10	Pump On		Initial 22.05	-	±3%	±10%	±0.1	±10mv	±10%	<= Stabilization Criteria
9:15			27.15	14.35	593	(0.29)	6.53	-146.1	1.64	C
9:20	9		27.31	14.35	592	0.13	6.67	-150.5	0.91	C
9:25	15		32.90	14.11	590	0.08	6.54	-143.7	3.94	C
9:30	21		33.75	14.02	587	0.07	6.53	-143.5	0.[illegible]	C
9:40	29		26.18	14.52	589	0.17	6.69	-129.6	15.6	C
9:50	40		26.66	15.16	582	0.11	6.59	-125.8	23.7	C
10:00	43		26.42	15.58	572	0.12	6.76	-142.7	17.5	C
10:10	47		26.55	15.88	581	0.22	6.58	-135.3	12.2	C
10:20	52		26.02	16.09	584	0.09	6.58	-135.3	11.5	C
10:30	58		25.75	16.41	584	0.07	6.66	-139.9	10.01	C
10:45	65		25.77	16.79	585	0.06	6.75	-144.6	7.07	C
11:00	70		25.49	16.99	585	0.06	6.62	-138.3	5.78	C
11:00	Start Sampling		25.49							
11:30	End Sampling		24.15 Final	**Sample Number:**	2708- 040824 - MW-5-175 - 013					

Note: bgs= below ground surface btc=below top of casing DTW=depth to water gpm=gallons per minute
Clarity: VC=very cloudy Cl=cloudy SC=slightly cloudy AC=almost clear C=clear CC=crystal clear

SCOEPA00013645

Monitoring Well Sampling Field Log

Well Number: MW-S-175

Date: 8/24/04

HAI Project Number: 2708-30

Well Purge Data (continued from Page 1)

Time	Volume Purged (gallons)	Purge Rate (gpm)	DTW (ft btc)	Temp. (°C)	Conductivity (uS/cm)	D.O. (mg/L)	pH	ORP (mV)	Turbidity (NTUs)	Clarity/Color/ Remarks
		Stabilization Criteria =>		-	±3%	±10%	±0.1	±10mv	±10%	
11:15	75		25.21	17.19	585	0.09	6.63	-140.8	4.19	C
11:25	79		25.10	17.31	586	0.06	6.66	-141.2	5.62	C
	Start Sampling									
11:30	End Sampling		24.15 Final	Sample Number: 2708-						

d surface btc=below top of casing DTW=depth to water gpm=gallons per minute
udy Cl=cloudy SC=slightly cloudy AC=almost clear C=clear CC=crystal clear

SCOEPA00013646

Low-Flow Well Sampling Field Log

Well Number: MW-8-29

Page 1 of 1

Date: 8/25/04

Project Information	
Project Name:	NW Natural - Gasco Facility
HAI Project Number:	2708-30
Sampling Information	
Field Team:	APR / MWG
Purge Method:	Low Flow
Pump Intake Depth (ft btc):	23
Flow-Through Cell:	Yes
Sampling Method:	Grundfos Pump
Decontamination Method:	Rinse, Alconox, Dilute Hexane, Rinse, Dilute Nitric, Rinse, Spray Isopropanol, Rinse, Spray De-Ionized
Purge Water Disposition:	AST
Field Conditions:	
Comments:	104 Hz

Well Information — Stick-up or Flush (circle one)

Well Diameter (in)	Drilled Well Depth (ft bgs)	Drilled Well Depth (ft btc)	Top of Screen (ft bgs)	Top of Screen (ft btc)	Screen Interval (ft bgs)
2"	29.00	31.60	18.00	20.60	18 - 28

Purge Volume (Only applicable if pump intake is above top of screen)

Top Screen (ft btc)	Pump Intake (ft btc)	Top Screen - Pump Intake (ft)	Convert Factor (L/ft)	Minimum Purge Volume (Liters)

3/4"=0.087 L/ft 2"=0.64 L/ft 4"=2.5 L/ft 6"=5.68 L/ft

Sample Containers

Number	Type	Preservative	Analytical Parameters	Filtered?
2	1 L Amber	None	PAHs	N
3	VOAs	HCl	BTEX	N
1	500 mL	NaOH	Total and Amenable CN	N
1	250 mL	HNO_3	Total Metals	N

Well Purge Data

Time	Volume Purged (Liters)	Purge Rate (Lpm)	DTW (ft btc)	Temp. (°C)	Conductivity (uS/cm)	D.O. (mg/L)	pH	ORP (mV)	Turbidity (NTUs)	Clarity/Color/ Remarks
2:57	Pump On		Initial 21.33	-	±3%	±10%	±0.1	±10mv	±10%	<= Stabilization Criteria
3:00	3.5		23.30	15.69	978	0.23	6.40	-90.0	17.4	C
3:03	6		23.03	17.19	1126	0.20	6.44	-103.2	12.5	C
3:06	6.5		23.10	17.57	1156	0.12	6.45	-102.7	10.21	C
3:09	7		23.17	18.22	1176	0.17	6.46	-98.3	10.46	C
3:12	7.5		23.22	20.13	1222	0.16	6.49	-100.7	10.69	C
3:15	9		23.40	21.05	1239	0.11	6.64	-110.6	10.38	C
3:19	13		24.28	18.58	1253	0.10	6.52	-104.7	7.37	C
3:22	17		24.54	17.02	1295	0.09	6.52	-114.6	10.53	C
3:25	20		24.50	18.09	1363	0.11	6.54	-116.7	9.63	C
3:25	Start Sampling		24.50							
3:40	End Sampling		25.85 Final	**Sample Number:**	2708-040825-MW8-29-022					

Note: bgs= below ground surface btc=below top of casing DTW=depth to water Lpm=Liters per minute
Clarity: VC=very cloudy Cl=cloudy SC=slightly cloudy AC=almost clear C=clear CC=crystal clear

Low-Flow Well Sampling Field Log

Well Number: MW-8-56

Page 1 of 1

Date: 8/25/04

Project Information	
Project Name:	NW Natural - Gasco Facility
HAI Project Number:	2708-30

Sampling Information	
Field Team:	ARR - MWG
Purge Method:	Low Flow
Pump Intake Depth (ft btc):	50'
Flow-Through Cell:	Yes
Sampling Method:	Grundfos Pump
Decontamination Method:	Rinse, Alconox, Dilute Hexane, Rinse, Dilute Nitric, Rinse, Spray Isopropanol, Rinse, Spray De-Ionized
Purge Water Disposition:	AST
Field Conditions:	
Comments:	129 H_2

Well Information — Stick-up or Flush (circle one)

Well Diameter (in)	Drilled Well Depth (ft bgs)	Drilled Well Depth (ft btc)	Top of Screen (ft bgs)	Top of Screen (ft btc)	Screen Interval (ft bgs)
2"	56.00	58.60	45.00	47.60	45 - 55

Purge Volume (Only applicable if pump intake is above top of screen)

Top Screen (ft btc)	Pump Intake (ft btc)	Top Screen - Pump Intake (ft)	Convert Factor (L/ft)	Minimum Purge Volume (Liters)

3/4"=0.087 L/ft 2"=0.64 L/ft 4"=2.5 L/ft 6"=5.68 L/ft

Sample Containers

Number	Type	Preservative	Analytical Parameters	Filtered?
2	1 L Amber	None	PAHs	N
3	VOAs	HCl	BTEX	N
1	500 mL	NaOH	Total and Amenable CN	N
1	250 mL	HNO_3	Total Metals	N

Well Purge Data

Time	Volume Purged (Liters)	Purge Rate (Lpm)	DTW (ft btc)	Temp. (°C)	Conductivity (uS/cm)	D.O. (mg/L)	pH	ORP (mV)	Turbidity (NTUs)	Clarity/Color/ Remarks
2:17	Pump On		Initial 32.17	-	±3%	±10%	±0.1	±10mv	±10%	<= Stabilization Criteria
2:20	3.5		37.10	16.06	1262	0.50	6.70	-159.3	63.7	C1
2:23	5		37.85	17.35	1244	0.20	6.71	-132.3	46.7	C1
2:26	6		38.01	18.04	1231	0.15	6.72	-141.2	35.0	SC
2:29	8		39.20	18.88	1216	0.13	6.73	-157.9	23.0	AC
2:32	9.5		39.35	18.83	1207	0.11	6.72	-149.7	19.5	AC
2:35	10		39.19	18.79	1203	0.10	6.72	-138.4	18.0	AC
2:38	11		39.08	18.98	1191	0.10	6.72	-141.0	16.7	AC
			~~39.5~~							
2:38	Start Sampling		39.08							
2:41	End Sampling		39.38 Final	Sample Number:	2708- 040825-MW-8-56-021					

Note: bgs= below ground surface btc=below top of casing DTW=depth to water Lpm=Liters per minute
Clarity: VC=very cloudy Cl=cloudy SC=slightly cloudy AC=almost clear C=clear CC=crystal clear

SCOEPA00013648

Low-Flow Well Sampling Field Log

Well Number: MW-9-29

Page 1 of 2

Date: 8/12/04

Project Information	
Project Name:	NW Natural - Gasco Facility
HAI Project Number:	2708-30

Sampling Information	
Field Team:	APR + MWG
Purge Method:	Low Flow
Pump Intake Depth (ft btc):	
Flow-Through Cell:	Yes
Sampling Method:	Bladder Pump
Decontamination Method:	Rinse, Alconox, Dilute Hexane, Rinse, Dilute Nitric, Rinse, Spray Isopropanol, Rinse, Spray De-Ionized
Purge Water Disposition:	AST
Field Conditions:	
Comments:	

Well Information — Stick-up or (Flush) (circle one)

Well Diameter (in)	Drilled Well Depth (ft bgs)	Drilled Well Depth (ft btc)	Top of Screen (ft bgs)	Top of Screen (ft btc)	Screen Interval (ft bgs)
2"	29.00	28.70	18.00	17.70	18 - 28

Purge Volume (Only applicable if pump intake is above top of screen)

Top Screen (ft btc)	Pump Intake (ft btc)	Top Screen - Pump Intake (ft)	Convert Factor (L/ft)	Minimum Purge Volume (Liters)

3/4"=0.087 L/ft 2"=0.64 L/ft 4"=2.5 L/ft 6"=5.68 L/ft

Sample Containers

Number	Type	Preservative	Analytical Parameters	Filtered?
2	1 L Amber	None	PAHs	N
3	VOAs	HCl	BTEX	N
1	500 mL	NaOH	Total and Amenable CN	N
1	250 mL	HNO_3	Total Metals	N

Well Purge Data

Time	Volume Purged (Liters)	Purge Rate (Lpm)	DTW (ft btc)	Temp. (°C)	Conductivity (uS/cm)	D.O. (mg/L)	pH	ORP (mV)	Turbidity (NTUs)	Clarity/Color/ Remarks
12:15	Pump On		Initial 13.95	-	±3%	±10%	±0.1	±10mv	±10%	<= Stabilization Criteria
12:20	1.5		14.89	16.40	156	1.54	6.66	42.4	overrange	VC
12:25	2.5		14.89	16.09	156	1.06	6.60	39.6	overrange	VC
12:30	3.75		15.12	16.13	154	0.92	6.47	39.2	157	C1
12:35	5		15.12	16.09	154	0.94	6.49	39.0	96.2	C1
12:40	6		15.26	16.15	154	0.86	6.35	38.8	71.9	SC
12:45	7		15.28	16.09	154	1.02	6.36	38.6	44.5	SC
12:50	8		15.18	15.96	153	0.60	6.31	38.1	43.4	SC
12:55	9		15.19	15.90	152	0.71	6.06	37.1	38.7	SC
1:00	10		15.09	15.87	153	0.60	6.21	36.9	32.1	SC
1:05	11		15.29	16.9	155	0.51	6.21	37.1	29.2	SC
1:10	12		15.15	15.90	153	0.45	6.11	36.5	25.3	SC
1:15	13		15.23	15.92	153	0.37	5.92	36.3	28.2	SC
	Start Sampling									
	End Sampling			**Sample Number:**	2708-					
			Final 15.10							

Note: bgs= below ground surface btc=below top of casing DTW=depth to water Lpm=Liters per minute
Clarity: VC=very cloudy Cl=cloudy SC=slightly cloudy AC=almost clear C=clear CC=crystal clear

Low-Flow Well Sampling Field Log

Well Number: MW-9-29

Date: 3/12/04

HAI Project Number: 2708-30

Well Purge Data (continued from Page 1)

Time	Volume Purged (Liters)	Purge Rate (Lpm)	DTW (ft btc)	Temp. (°C)	Conductivity (uS/cm)	D.O. (mg/L)	pH	ORP (mV)	Turbidity (NTUs)	Clarity/Color/ Remarks
		Stabilization Criteria =>		-	±3%	±10%	±0.1	±10mv	±10%	
1:20	14.5		15.12	15.84	154	0.31	6.18	36.3	26.0	SC
1:25	16		15.14	16.22	155	2.36	6.03	35.7	24.3	SC
1:30	17.2		15.17	15.79	154	0.24	5.96	36.4	23.2	SC
1:35	18.7		15.20	15.80	154	0.03	6.14	35.5	21.5	AC
1:40	19.8		15.36	15.83	153	0.14	6.16	35.6	19.6	AC
1:45	20.5		15.17	15.71	154	0.13	6.09	35.4	19.4	AC
1:50	21.5		15.17	15.95	154	0.12	6.11	35.1	19.1	AC
1:55	23		15.18	15.37	157	0.23	6.40	34.9	16.2	AC
2:00	24		15.11	15.82	154	0.01	6.03	35.1	17.9	AC
2:05	24.5		15.14	15.89	154	0.00	5.98	35.3	17.1	AC
2:10	25.5		15.15	15.98	155	-0.03	6.03	34.6	15.0	AC
2:15	27		15.41	16.10	155	-0.03	6.06	35.1	17.8	AC
2:20	28		15.42	15.98	155	-0.04	5.98	35.1	16.0	AC
2:25	29.2		15.37	16.17	156	-0.05	6.19	35.1	14.6	AC
2:30	30.5		15.46	16.00	154	-0.05	6.17	35.0	13.5	AC
2:35	31.5		15.43	16.05	155	-0.05	6.09	34.9	13.0	AC
2:45	34.0		15.41	16.17	156	-0.07	6.18	34.6	11.8	AC
2:55	36.5		15.39	16.13	155	-0.07	6.25	34.9	10.66	C
3:05	39.5		15.39	15.99	155	-0.09	6.18	34.8	10.17	C
3:15	41.5		15.40	16.02	155	-0.08	6.25	34.5	9.90	C
3:16	Start Sampling									
3:30	End Sampling			Sample Number:		2708-	040312-MW9-29-001			
			Final 15.10							

Comments

Note: bgs= below ground surface btc=below top of casing DTW=depth to water Lpm=Liters per minute
Clarity: VC=very cloudy Cl=cloudy SC=slightly cloudy AC=almost clear C=clear CC=crystal clear

SCOEPA00013650

Low-Flow Well Sampling Field Log

Well Number: MW-10-61

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Date: 8/13/04

Project Information	
Project Name:	NW Natural - Gasco Facility
HAI Project Number:	2708-30

Sampling Information	
Field Team:	AER / MWG
Purge Method:	Low Flow
Pump Intake Depth (ft btc):	54'
Flow-Through Cell:	Yes
Sampling Method:	Bladder Pump
Decontamination Method:	Rinse, Alconox, Dilute Hexane, Rinse, Dilute Nitric, Rinse, Spray Isopropanol, Rinse, Spray De-Ionized
Purge Water Disposition:	AST
Field Conditions:	Sunny, 85°
Comments:	pump set @ 50psi 30 sec charge 30 sec exhaust

Well Information — Stick-up / or / Flush (circle one)

Well Diameter (in)	Drilled Well Depth (ft bgs)	Drilled Well Depth (ft btc)	Top of Screen (ft bgs)	Top of Screen (ft btc)	Screen Interval (ft bgs)
2"	61.00	63.80	50.00	52.80	50 - 60

Purge Volume (Only applicable if pump intake is above top of screen)

Top Screen (ft btc)	Pump Intake (ft btc)	Top Screen - Pump Intake (ft)	Convert Factor (L/ft)	Minimum Purge Volume (Liters)

3/4"=0.087 L/ft 2"=0.64 L/ft 4"=2.5 L/ft 6"=5.68 L/ft

Sample Containers

Number	Type	Preservative	Analytical Parameters	Filtered?
2	1 L Amber	None	PAHs	N
3	VOAs	HCl	BTEX	N
1	500 mL	NaOH	Total and Amenable CN	N
1	250 mL	HNO_3	Total Metals	N

Well Purge Data

Time	Volume Purged (Liters)	Purge Rate (Lpm)	DTW (ft btc)	Temp. (°C)	Conductivity (uS/cm)	D.O. (mg/L)	pH	ORP (mV)	Turbidity (NTUs)	Clarity/Color/ Remarks
11:30	Pump On		Initial 21.65	-	±3%	±10%	±0.1	±10mv	±10%	<= Stabilization Criteria
11:35	1		22.99	17.69	496	4.03	6.69	33.7	28.3	SC
11:40	2		23.12	16.55	529	1.22	6.58	25.2	28.1	SC
11:45	3.5		23.56	16.33	525	0.50	6.53	23.9	15.2	AC
11:50	4.5		23.51	16.33	529	0.27	6.53	23.2	13.7	AC
11:53	5.5		23.67	16.35	530	0.18	6.56	22.2	13.6	AC
11:56	6.5		23.53	16.21	530	0.18	6.54	22.3	10.61	AC
11:59	7		23.61	16.33	530	0.13	6.53	22.1	10.92	C
12:02	8		23.61	16.26	533	0.11	6.52	21.8	12.3	C
12:05	8.5		23.82	16.23	532	0.06	6.53	21.9	11.2	C
12:08	9.5		23.70	16.20	532	0.07	6.58	21.2	9.86	C
12:11	10		23.70	16.19	533	0.05	6.55	21.2	10.88	C
12:15	Start Sampling		23.70							
12:30	End Sampling			**Sample Number:**		2708- 040813-MW10-61-005				
			Final 24.03							

Note: bgs= below ground surface btc=below top of casing DTW=depth to water Lpm=Liters per minute
Clarity: VC=very cloudy Cl=cloudy SC=slightly cloudy AC=almost clear C=clear CC=crystal clear

SCOEPA00013651

Low-Flow Well Sampling Field Log

Well Number: MW-12-36

Page 1 of 1

Date: 8/25/04

Project Information	
Project Name:	NW Natural - Gasco Facility
HAI Project Number:	2708-30

Sampling Information	
Field Team:	APR / MWG
Purge Method:	Low Flow
Pump Intake Depth (ft btc):	~~30~~ 25'
Flow-Through Cell:	Yes
Sampling Method:	Bladder Pump
Decontamination Method:	Rinse, Alconox, Dilute Hexane, Rinse, Dilute Nitric, Rinse, Spray Isopropanol, Rinse, Spray De-Ionized
Purge Water Disposition:	AST
Field Conditions:	Overcast, 65°
Comments:	pump set @ 50 psi exhaust @ 30 sec charge @ 30 sec

Well Information — Stick-up or Flush (circle one)

Well Diameter (in)	Drilled Well Depth (ft bgs)	Drilled Well Depth (ft btc)	Top of Screen (ft bgs)	Top of Screen (ft btc)	Screen Interval (ft bgs)
2"	36.00	38.80	25.00	27.80	25 - 35

Purge Volume (Only applicable if pump intake is above top of screen)

Top Screen (ft btc)	Pump Intake (ft btc)	Top Screen - Pump Intake (ft)	Convert Factor (L/ft)	Minimum Purge Volume (Liters)

3/4"=0.087 L/ft 2"=0.64 L/ft 4"=2.5 L/ft 6"=5.68 L/ft

Sample Containers

Number	Type	Preservative	Analytical Parameters	Filtered?
2	1 L Amber	None	PAHs	N
3	VOAs	HCl	BTEX	N
1	500 mL	NaOH	Total and Amenable CN	N
1	250 mL	HNO_3	Total Metals	N

Well Purge Data

Time	Volume Purged (Liters)	Purge Rate (Lpm)	DTW (ft btc)	Temp. (°C)	Conductivity (uS/cm)	D.O. (mg/L)	pH	ORP (mV)	Turbidity (NTUs)	Clarity/Color/ Remarks
8:32	Pump On		Initial 16.90	-	±3%	±10%	±0.1	±10mv	±10%	<= Stabilization Criteria
8:35	~~X~~		17.63	15.94	447	6.03	6.94	-112.0	5.71	C
8:38	1		17.61	14.77	532	1.97	6.82	-114.8	4.59	C
8:41	1.75		17.65	14.29	572	0.75	6.72	-116.9	2.91	C
8:44	2.5		17.68	14.11	558	0.45	6.64	-117.4	1.89	C
8:47	3.5		18.08	13.86	491	0.44	6.58	-114.7	1.51	C
8:50	4.5		17.90	13.83	460	0.33	6.55	-113.3	1.34	C
8:53	5.5		17.81	13.86	442	0.22	6.54	-112.2	0.97	C
8:56	6		17.79	13.84	432	0.19	6.53	-111.7	1.17	C
8:59	6.5		17.81	13.82	425	0.17	6.54	-112.3	1.06	C
9:02	7.5		17.79	13.83	420	0.15	6.53	-112.6	1.30	C
9:02	Start Sampling		17.79							
9:20	End Sampling		17.94 Final	Sample Number:		2708-040825-MW12-36-017				

Note: bgs= below ground surface btc=below top of casing DTW=depth to water Lpm=Liters per minute
Clarity: VC=very cloudy Cl=cloudy SC=slightly cloudy AC=almost clear C=clear CC=crystal clear

SCOEPA00013652

Low-Flow Well Sampling Field Log

Well Number: MW-13-30

Page 1 of 1

Date: 8/25/04

Project Information	
Project Name:	NW Natural - Gasco Facility
HAI Project Number:	2708-30

Sampling Information	
Field Team:	APR/MWG
Purge Method:	Low Flow
Pump Intake Depth (ft btc):	20'
Flow-Through Cell:	Yes
Sampling Method:	Bladder Pump
Decontamination Method:	Rinse, Alconox, Dilute Hexane, Rinse, Dilute Nitric, Rinse, Spray Isopropanol, Rinse, Spray De-Ionized
Purge Water Disposition:	AST
Field Conditions:	Overcast, calm, 65
Comments:	pump set @ 50 psi; exhaust @ 30 sec; charge @ 30 sec

Well Information — Stick-up or Flush (circle one)

Well Diameter (in)	Drilled Well Depth (ft bgs)	Drilled Well Depth (ft btc)	Top of Screen (ft bgs)	Top of Screen (ft btc)	Screen Interval (ft bgs)
2"	30.00	29.60	19.00	18.60	19 - 29

Purge Volume (Only applicable if pump intake is above top of screen)

Top Screen (ft btc)	Pump Intake (ft btc)	Top Screen - Pump Intake (ft)	Convert Factor (L/ft)	Minimum Purge Volume (Liters)

3/4"=0.087 L/ft 2"=0.64 L/ft 4"=2.5 L/ft 6"=5.68 L/ft

Sample Containers

Number	Type	Preservative	Analytical Parameters	Filtered?
2	1 L Amber	None	PAHs	N
3	VOAs	HCl	BTEX	N
1	500 mL	NaOH	Total and Amenable CN	N
1	250 mL	HNO_3	Total Metals	N

Well Purge Data

Time	Volume Purged (Liters)	Purge Rate (Lpm)	DTW (ft btc)	Temp. (°C)	Conductivity (uS/cm)	D.O. (mg/L)	pH	ORP (mV)	Turbidity (NTUs)	Clarity/Color/ Remarks
9:49	Pump On		Initial 18.61	-	±3%	±10%	±0.1	±10mv	±10%	<= Stabilization Criteria
9:57			18.61	17.60	597	2.37	6.50	-115.2	6.35	C
10:00	0.75		18.61	17.07	648	1.07	6.44	-119.2	4.40	C
10:03	1.25		18.90	16.71	668	0.47	6.44	-126.6	4.95	C
10:06	2		18.61	16.77	674	0.35	6.43	-130.1	4.90	C
10:09	2.75		18.63	16.66	675	0.21	6.43	-132.6	5.35	C
10:12	3.5		18.62	16.55	676	0.18	6.43	-135.3	6.51	C
10:15	4		18.61	16.48	672	0.16	6.43	-137.5	5.04	C
10:18	4.75		18.71	16.53	672	0.14	6.43	-139.7	5.17	C
10:21	5		18.65	16.48	675	0.13	6.43	-141.4	5.77	C
10:21	Start Sampling		18.65							
10:41	End Sampling		18.61 Final	**Sample Number:**	2708- 040825-MW13-30-018					

Note: bgs= below ground surface btc=below top of casing DTW=depth to water Lpm=Liters per minute
Clarity: VC=very cloudy Cl=cloudy SC=slightly cloudy AC=almost clear C=clear CC=crystal clear

SCOEPA00013653

Low-Flow Well Sampling Field Log

Well Number: MW-13-61

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Date: 8/13/04

Project Information	
Project Name:	NW Natural - Gasco Facility
HAI Project Number:	2708-30

Sampling Information	
Field Team:	APR / MWG
Purge Method:	Low Flow
Pump Intake Depth (ft btc):	51'
Flow-Through Cell:	Yes
Sampling Method:	Bladder Pump
Decontamination Method:	Rinse, Alconox, Dilute Hexane, Rinse, Dilute Nitric, Rinse, Spray Isopropanol, Rinse, Spray De-Ionized
Purge Water Disposition:	AST
Field Conditions:	Sunny, 85°
Comments:	pump set @ 50 psi 30 sec charge 30 sec exhaust

Well Information — Stick-up or Flush (circle one)

Well Diameter (in)	Drilled Well Depth (ft bgs)	Drilled Well Depth (ft btc)	Top of Screen (ft bgs)	Top of Screen (ft btc)	Screen Interval (ft bgs)
2"	61.00	60.60	50.00	49.60	50 - 60

Purge Volume (Only applicable if pump intake is above top of screen)

Top Screen (ft btc)	Pump Intake (ft btc)	Top Screen - Pump Intake (ft)	Convert Factor (L/ft)	Minimum Purge Volume (Liters)

3/4"=0.087 L/ft 2"=0.64 L/ft 4"=2.5 L/ft 6"=5.68 L/ft

Sample Containers

Number	Type	Preservative	Analytical Parameters	Filtered?
2	1 L Amber	None	PAHs	N
3	VOAs	HCl	BTEX	N
1	500 mL	NaOH	Total and Amenable CN	N
1	250 mL	HNO_3	Total Metals	N

Well Purge Data

Time	Volume Purged (Liters)	Purge Rate (Lpm)	DTW (ft btc)	Temp. (°C)	Conductivity (uS/cm)	D.O. (mg/L)	pH	ORP (mV)	Turbidity (NTUs)	Clarity/Color/ Remarks
9:40	Pump On		Initial 28.15	-	±3%	±10%	±0.1	±10mv	±10%	<= Stabilization Criteria
9:45	1		29.04	17.44	613	2.39	6.23	2.2	33.9	AC
9:50	2		29.25	16.89	618	0.88	6.23	-10.2	26.8	AC
9:55	3		29.31	16.74	618	0.46	6.22	-13.4	18.3	AC
10:00	4		29.31	16.70	617	0.28	6.24	-14.9	14.8	AC
10:03	5		29.37	16.72	618	0.22	6.24	-15.1	14.6	AC
10:06	6		29.31	16.75	619	0.14	6.25	-15.3	13.4	AC
10:09	7		29.35	16.68	617	0.15	6.23	-15.0	13.7	AC
10:12	8		29.31	16.70	618	0.05	6.21	-14.9	11.5	AC
10:15	Start Sampling		29.31							
10:30	End Sampling		29.35 Final	Sample Number:	2708- 040813-MW13-61-D03					

Note: bgs= below ground surface btc=below top of casing DTW=depth to water Lpm=Liters per minute
Clarity: VC=very cloudy Cl=cloudy SC=slightly cloudy AC=almost clear C=clear CC=crystal clear

SCOEPA00013654

Monitoring Well Sampling Field Log

Well Number: MW-14-110

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Date: 8/24/04

Project Information	
Project Name:	NW Natural - Gasco Facility
HAI Project Number:	2708-30
Sampling Information	
Field Team:	APR/MWG
Purge Method:	Standard
Pump Intake Depth (ft btc):	100'
Flow-Through Cell:	Yes
Sampling Method:	Grundfos Pump
Decontamination Method:	Rinse, Alconox, Dilute Hexane, Rinse, Dilute Nitric, Rinse, Spray Isopropanol, Rinse, Spray De-Ionized
Purge Water Disposition:	AST
Field Conditions:	Rain, 65°
Comments:	153 Hz

Well Information — Stick-up or Flush (circle one)

Well Diameter (in)	Drilled Well Depth (ft bgs)	Drilled Well Depth (ft btc)	Top of Screen (ft bgs)	Top of Screen (ft btc)	Screen Interval (ft bgs)
2	110	112.1	98	100.1	98 - 108

Well Volume Calculation

Well Depth (ft btc)	DTW (ft btc)	Water Column (ft)	Convert Factor (gal/ft)	One Well Volume (gal)	Three Well Volumes (gal)
110	26.35	83.65	0.17	14.22	~42.5

3/4"=0.023 gal/ft 2"=0.17 gal/ft 4"=0.66 gal/ft 6"=1.5 gal/ft

Sample Containers

Number	Type	Preservative	Analytical Parameters	Filtered?
2	1 L Amber	None	PAHs	N
3	VOAs	HCl	BTEX	N
1	500 mL	NaOH	Total & Amenable CN	N
1	250 mL	HNO_3	Total Metals	N

Well Purge Data — **Total Volume to Purge (gal) =**

Time	Volume Purged (gallons)	Purge Rate (gpm)	DTW (ft btc)	Temp. (°C)	Conductivity (uS/cm)	D.O. (mg/L)	pH	ORP (mV)	Turbidity (NTUs)	Clarity/Color/ Remarks
	Pump On		Initial	-	±3%	±10%	±0.1	±10mv	±10%	<= Stabilization Criteria
12:50			26.35	#						
12:55	7		29.61	14.96	1633	0.22	6.58	-71.5	0.34	C
1:20	11		29.93	15.05	1631	0.10	6.60	-83.6	0.19	C
1:10	19		30.15	15.07	1572	0.07	6.62	-89.6	0.0	C
1:20	30		30.31	15.10	1546	0.03	6.65	-92.2	0.24	C
1:30	42.5		30.47	15.09	1544	0.02	6.65	-91.3	0.21	C
1:30	Start Sampling		30.47							
1:40	End Sampling		30.35	**Sample Number:**	2708-	040824-MW14-110				-014
			Final							

Note: bgs= below ground surface btc=below top of casing DTW=depth to water gpm=gallons per minute
Clarity: VC=very cloudy Cl=cloudy SC=slightly cloudy AC=almost clear C=clear CC=crystal clear

SCOEPA00013655

Low-Flow Well Sampling Field Log

Well Number: MW-15-50

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Date: 8/25/04

Project Information

Project Name: NW Natural - Gasco Facility

HAI Project Number: 2708-30

Sampling Information

Field Team: APR / MWG

Purge Method: Low Flow

Pump Intake Depth (ft btc): 42

Flow-Through Cell: Yes

Sampling Method: Grundfos Pump

Decontamination Method:
Rinse, Alconox, Dilute Hexane, Rinse, Dilute Nitric, Rinse, Spray Isopropanol, Rinse, Spray De-Ionized

Purge Water Disposition: AST

Field Conditions:

Comments: 103 Hz

Well Information — Stick-up or Flush (circle one)

Well Diameter (in)	Drilled Well Depth (ft bgs)	Drilled Well Depth (ft btc)	Top of Screen (ft bgs)	Top of Screen (ft btc)	Screen Interval (ft bgs)
2"	50.00	49.70	40.00	39.70	40 - 50

Purge Volume (Only applicable if pump intake is above top of screen)

Top Screen (ft btc)	Pump Intake (ft btc)	Top Screen - Pump Intake (ft)	Convert Factor (L/ft)	Minimum Purge Volume (Liters)

3/4"=0.087 L/ft 2"=0.64 L/ft 4"=2.5 L/ft 6"=5.68 L/ft

Sample Containers

Number	Type	Preservative	Analytical Parameters	Filtered?
2	1 L Amber	None	PAHs	N
3	VOAs	HCl	BTEX	N
1	500 mL	NaOH	Total and Amenable CN	N
1	250 mL	HNO_3	Total Metals	N

Well Purge Data

Time	Volume Purged (Liters)	Purge Rate (Lpm)	DTW (ft btc)	Temp. (°C)	Conductivity (uS/cm)	D.O. (mg/L)	pH	ORP (mV)	Turbidity (NTUs)	Clarity/Color/ Remarks
1:10	Pump On		Initial 20.25	-	±3%	±10%	±0.1	±10mv	±10%	<= Stabilization Criteria
1:13	3.5		21.31	22.19	1507	0.29	6.51	-160.4	2.83	C
1:16	5.5		21.41	23.55	1531	0.25	6.52	-161.0	2.31	C
1:19	8.5		23.05	23.51	1611	0.13	6.56	-175.2	3.85	C
1:22	11		23.43	23.15	1661	0.09	6.55	-176.5	2.93	C
1:25	12.5		23.60	23.06	1737	0.08	6.55	-175.1	2.71	C
1:28	16		23.71	23.08	1750	0.08	6.55	-175.4	2.46	C
1:31	18		23.75	23.16	1760	0.07	6.55	-175.1	2.67	C
1:31	Start Sampling		23.75							
1:30	End Sampling		23.17 Final	Sample Number:	2708-040825-MW15-50-020					

Note: bgs= below ground surface btc=below top of casing DTW=depth to water Lpm=Liters per minute
Clarity: VC=very cloudy Cl=cloudy SC=slightly cloudy AC=almost clear C=clear CC=crystal clear

SCOEPA00013656

Low-Flow Well Sampling Field Log

Well Number: MW-15-66

Page 1 of 1

Date: 8/17/04

Project Information	
Project Name:	NW Natural - Gasco Facility
HAI Project Number:	2708-30

Sampling Information	
Field Team:	MWG / APR
Purge Method:	Low Flow
Pump Intake Depth (ft btc):	61.5
Flow-Through Cell:	Yes
Sampling Method:	Bladder Pump
Decontamination Method:	Rinse, Alconox, Dilute Hexane, Rinse, Dilute Nitric, Rinse, Spray Isopropanol, Rinse, Spray De-Ionized
Purge Water Disposition:	AST
Field Conditions:	Sunny, 85°
Comments:	pump set @ 50psi 30 sec charge 30 sec exhaust

Well Information — Stick-up or Flush (circle one)

Well Diameter (in)	Drilled Well Depth (ft bgs)	Drilled Well Depth (ft btc)	Top of Screen (ft bgs)	Top of Screen (ft btc)	Screen Interval (ft bgs)
2"	66.00	65.80	60.50	60.30	60.5 - 65.5

Purge Volume (Only applicable if pump intake is above top of screen)

Top Screen (ft btc)	Pump Intake (ft btc)	Top Screen - Pump Intake (ft)	Convert Factor (L/ft)	Minimum Purge Volume (Liters)

3/4"=0.087 L/ft 2"=0.64 L/ft 4"=2.5 L/ft 6"=5.68 L/ft

Sample Containers

Number	Type	Preservative	Analytical Parameters	Filtered?
2	1 L Amber	None	PAHs	N
3	VOAs	HCl	BTEX	N
1	500 mL	NaOH	Total and Amenable CN	N
1	250 mL	HNO_3	Total Metals	N

Well Purge Data

Time	Volume Purged (Liters)	Purge Rate (Lpm)	DTW (ft btc)	Temp. (°C)	Conductivity (uS/cm)	D.O. (mg/L)	pH	ORP (mV)	Turbidity (NTUs)	Clarity/Color/ Remarks
1:14	Pump On		Initial 18.12	-	±3%	±10%	±0.1	±10mv	±10%	<= Stabilization Criteria
1:20	1		19.47	25.71	193	1.28	6.97	21.6	9.62	C
1:23	2		19.55	25.14	191	0.77	6.86	23.8	8.87	C
1:26	3		19.60	24.73	192	0.51	6.78	24.4	9.91	C
1:29	3.5		19.65	24.54	193	0.39	6.73	25.1	9.78	C
1:32	4.5		19.71	24.22	194	0.29	6.69	25.1	9.69	C
1:35	5.4		19.73	24.05	193	0.23	6.67	25.2	12.0	C
1:38	6		19.70	23.89	193	0.18	6.66	25.2	12.3	C
1:41	6.5		19.56	23.76	193	0.16	6.65	25.2	13.6	C
1:44	7		19.75	23.63	192	0.12	6.64	25.4	12.6	C
1:47	8		19.78	23.54	191	0.09	6.64	25.4	12.5	C
1:50	9		19.72	23.47	191	0.08	6.63	25.3	13.0	C
1:53	10		19.75	23.38	190	0.07	6.63	25.1	11.9	C
1:55	Start Sampling		19.75							
2:10	End Sampling		19.83 Final	Sample Number:	2708- 040813- MW15-66-006					

Note: bgs= below ground surface btc=below top of casing DTW=depth to water Lpm=Liters per minute
Clarity: VC=very cloudy Cl=cloudy SC=slightly cloudy AC=almost clear C=clear CC=crystal clear

SCOEPA00013657

Low-Flow Well Sampling Field Log

Well Number: MW-16-45

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Date: 8/26/04

Project Information	
Project Name:	NW Natural - Gasco Site
HAI Project Number:	2708-30
Sampling Information	
Field Team:	APR / MWG
Purge Method:	Low Flow
Pump Intake Depth (ft btc):	40'
Flow-Through Cell:	Yes
Sampling Method:	~~Bladder Pump~~ Grndfos
Decontamination Method:	Rinse, Alconox, Dilute Hexane, Rinse, Dilute Nitric, Rinse, Spray Isopropanol, Rinse, Spray De-Ionized
Purge Water Disposition:	AST
Field Conditions:	Rainy, 65°
Comments:	
	126 H_2

Well Information — (Stick-up) or Flush (circle one)

Well Diameter (in)	Drilled Well Depth (ft bgs)	Drilled Well Depth (ft btc)	Top of Screen (ft bgs)	Top of Screen (ft btc)	Screen Interval (ft bgs)
2.00	49.00		35.00		35 - 45

Purge Volume (Only applicable if pump intake is above top of screen)

Top Screen (ft btc)	Pump Intake (ft btc)	Top Screen - Pump Intake (ft)	Convert Factor (L/ft)	Minimum Purge Volume (Liters)

3/4"=0.087 L/ft 2"=0.64 L/ft 4"=2.5 L/ft 6"=5.68 L/ft

Sample Containers

Number	Type	Preservative	Analytical Parameters	Filtered?
3	1 L Amber	None	PAHs & SVOCs	N
1	250 mL	HNO_3	Total Metals	N
1	250 mL	NaOH	Total & Amenable CN	N
3	VOAs	HCl	VOCs	N

Well Purge Data

Time	Volume Purged (Liters)	Purge Rate (Lpm)	DTW (ft btc)	Temp. (°C)	Conductivity (uS/cm)	D.O. (mg/L)	pH	ORP (mV)	Turbidity (NTUs)	Clarity/Color/ Remarks
	Pump On		Initial 26.88	-	±3%	±10%	±0.1	±10mv	±10%	<= Stabilization Criteria
2:21	5		31.33	15.22	931	0.70	8.63	-99.6	over	VC
2:24	7		31.98	16.45	834	0.30	6.93	7.2	65	Cl
2:27	8.5		~~32.79~~	17.42	804	0.21	6.74	3.4	40	AC
2:30	10.5		32.19	18.07	762	0.17	6.70	-7.3	29	SC
2:33	12		32.09	18.32	742	0.15	6.70	-8.4	24	SC
2:36	13.5		32.09	18.53	739	0.12	6.69	-6.7	24	SC
			~~31.31~~							
2:30	Start Sampling		32.01							
2:47	End Sampling		31.34 Final	Sample Number: 2708-GW-8260-MW16-45-028						

Note: bgs= below ground surface btc=below top of casing DTW=depth to water Lpm=Liters per minute
Clarity: VC=very cloudy Cl=cloudy SC=slightly cloudy AC=almost clear C=clear CC=crystal clear

SCOEPA00013658

Low-Flow Well Sampling Field Log

Well Number: MW-16-65

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Date: 8/26/04

Project Information	
Project Name:	NW Natural - Gasco Site
HAI Project Number:	2708-30
Sampling Information	
Field Team:	APR / MWG
Purge Method:	Low Flow
Pump Intake Depth (ft btc):	60'
Flow-Through Cell:	Yes
Sampling Method:	~~Bladder Pump~~ GrndFos
Decontamination Method:	Rinse, Alconox, Dilute Hexane, Rinse, Dilute Nitric, Rinse, Spray Isopropanol, Rinse, Spray De-Ionized
Purge Water Disposition:	AST
Field Conditions:	Rainy, 65
Comments:	122 Hz

Well Information — Stick-up or Flush (circle one)

Well Diameter (in)	Drilled Well Depth (ft bgs)	Drilled Well Depth (ft btc)	Top of Screen (ft bgs)	Top of Screen (ft btc)	Screen Interval (ft bgs)
2.00	68.00		55.00		55 - 65

Purge Volume (Only applicable if pump intake is above top of screen)

Top Screen (ft btc)	Pump Intake (ft btc)	Top Screen - Pump Intake (ft)	Convert Factor (L/ft)	Minimum Purge Volume (Liters)

3/4"=0.087 L/ft 2"=0.64 L/ft 4"=2.5 L/ft 6"=5.68 L/ft

Sample Containers

Number	Type	Preservative	Analytical Parameters	Filtered?
3	1 L Amber	None	PAHs & SVOCs	N
1	250 mL	HNO_3	Total Metals	N
1	250 mL	NaOH	Total & Amenable CN	N
3	VOAs	HCl	VOCs	N

Well Purge Data

Time	Volume Purged (Liters)	Purge Rate (Lpm)	DTW (ft btc)	Temp. (°C)	Conductivity (uS/cm)	D.O. (mg/L)	pH	ORP (mV)	Turbidity (NTUs)	Clarity/Color/ Remarks
	Pump On		Initial 26.70	-	±3%	±10%	±0.1	±10mv	±10%	<= Stabilization Criteria
1:10	2.5		31.46	15.30	1048	0.27	6.60	-59.5	70	C1
1:13	3.5		31.95	15.64	1050	0.22	6.54	-57.8	70	C1
1:16	4		31.87	16.34	1052	0.35	6.55	-56.2	55	C1
1:19	4.5		31.87	17.15	1044	0.42	6.57	-55.6	65	C1
1:22	5		31.84	17.11	1034	0.25	6.57	-55.5	45	C1
1:25	5.5		33.81	18.32	987	0.37	6.53	-50.1	38	C1
1:28	9		35.11	19.13	976	0.20	6.54	-52.1	28	C1
1:31	10		35.47	18.37	959	0.13	6.55	-52.1	28	C1
1:34	11		35.57	18.37	943	0.17	6.54	-53.0	25	C1
1:37	13		37.63	18.57	910	0.16	6.55	-59.9	22	C1
1:37	Start Sampling		37.63							
1:53	End Sampling		37.99 Final	Sample Number: 2708-040826-MW-1665-026						
				2708-040826-MW-16-65-027						

Note: bgs= below ground surface btc=below top of casing DTW=depth to water Lpm=Liters per minute
Clarity: VC=very cloudy Cl=cloudy SC=slightly cloudy AC=almost clear C=clear CC=crystal clear

SCOEPA00013659

Low-Flow Well Sampling Field Log

Well Number: MW-16-125

Page 1 of 2

Date: 8/26/04

Project Information	
Project Name:	NW Natural - Gasco Site
HAI Project Number:	2708-30

Sampling Information	
Field Team:	AAR / MwG
Purge Method:	Low Flow
Pump Intake Depth (ft btc):	120'
Flow-Through Cell:	Yes
Sampling Method:	Bladder Pump
Decontamination Method:	Rinse, Alconox, Dilute Hexane, Rinse, Dilute Nitric, Rinse, Spray Isopropanol, Rinse, Spray De-Ionized
Purge Water Disposition:	AST
Field Conditions:	Rain, 65
Comments:	pump set @ 50psi 30 sec charge 30 sec exhaust

Well Information — Stick-up or Flush (circle one)

Well Diameter (in)	Drilled Well Depth (ft bgs)	Drilled Well Depth (ft btc)	Top of Screen (ft bgs)	Top of Screen (ft btc)	Screen Interval (ft bgs)
2.00	130.00		115.00		115 - 125

Purge Volume (Only applicable if pump intake is above top of screen)

Top Screen (ft btc)	Pump Intake (ft btc)	Top Screen - Pump Intake (ft)	Convert Factor (L/ft)	Minimum Purge Volume (Liters)

3/4"=0.087 L/ft 2"=0.64 L/ft 4"=2.5 L/ft 6"=5.68 L/ft

Sample Containers

Number	Type	Preservative	Analytical Parameters	Filtered?
~~6~~ 7	1 L Amber	None	PAHs & SVOCs	N
3	250 mL	HNO_3	Total Metals	N
3	250 mL	NaOH	Total & Amenable CN	N
~~8~~ 9	VOAs	HCl	VOCs	N

Well Purge Data

Time	Volume Purged (Liters)	Purge Rate (Lpm)	DTW (ft btc)	Temp. (°C)	Conductivity (uS/cm)	D.O. (mg/L)	pH	ORP (mV)	Turbidity (NTUs)	Clarity/Color/ Remarks
10:22	Pump On		Initial 27.10	-	±3%	±10%	±0.1	±10mv	±10%	<= Stabilization Criteria
10:28	1		27.31	15.18	1304	0.99	6.50	-114.3	340	C1
10:31	1.75		27.50	15.10	1421	0.68	6.55	-123.7	400	C1
10:34	3		27.48	15.07	1433	0.45	6.58	-127.4	290	C1
10:37	3.75		27.52	15.03	1427	0.34	6.59	-128.4	201	C1
10:40	4		27.52	15.03	1412	0.35	6.59	-129.2	160	C1
10:43	4.75		27.49	15.01	1406	0.33	6.59	-131.5	110	C1
10:46	5.5		27.46	14.97	1420	0.32	6.60	-129.1	75	C1
10:49	6		27.49	14.95	1440	0.31	6.60	-129.4	60	C1
10:52	6.5		27.51	14.94	1476	0.29	6.61	-131.1	45	C1
10:55	7.25		27.71	14.99	1506	0.29	6.61	-130.2	38	C1
10:58	8.5		27.62	14.98	1519	0.26	6.61	-130.5	32	C1
11:01	9		27.72	14.98	1526	0.27	6.62	-129.3	29	C1
	Start Sampling									
	End Sampling			Sample Number: 2708-040826-MW16-125-025						
			Final							

Note: bgs= below ground surface btc=below top of casing DTW=depth to water Lpm=Liters per minute
Clarity: VC=very cloudy Cl=cloudy SC=slightly cloudy AC=almost clear C=clear CC=crystal clear

SCOEPA00013660

Low-Flow Well Sampling Field Log

Well Number: MW-16-125

Date: 8/26/04

HAI Project Number: 2708-30

Well Purge Data (continued from Page 1)

Time	Volume Purged (Liters)	Purge Rate (Lpm)	DTW (ft btc)	Temp. (°C)	Conductivity (uS/cm)	D.O. (mg/L)	pH	ORP (mV)	Turbidity (NTUs)	Clarity/Color/ Remarks
		Stabilization Criteria =>		-	±3%	±10%	±0.1	±10mv	±10%	
11:04	10		27.57	14.93	1533	0.24	6.62	-124.7	25	SC
11:07	11		27.64	14.94	1532	0.24	6.62	-128.1	23	SC
11:10	11.5		27.76	15.06	1526	0.23	6.62	-127.1	21	SC
11:13	12.0		27.77	15.02	1525	0.23	6.62	-126.2	21	SC
	Start Sampling									
	End Sampling			Sample Number:		2708-				
			Final							

Comments

Note: bgs= below ground surface btc=below top of casing DTW=depth to water Lpm=Liters per minute
Clarity: VC=very cloudy Cl=cloudy SC=slightly cloudy AC=almost clear C=clear CC=crystal clear

SCOEPA00013661

APPENDIX E

Investigation-Derived Waste Management Documentation

SCOEPA00013662

NON-HAZARDOUS WASTE MANIFEST

Please print or type (Form designed for use on elite (12 pitch) typewriter)

NON-HAZARDOUS WASTE MANIFEST

1. Generator's US EPA ID No.

Manifest Document No. 0 8 2 2 4

2. Page 1 of 1

3. Generator's Name and Mailing Address
NW Natural
220 NW 2nd Avenue
Portland, OR 97209
ATTN: Bob Wyatt

4. Generator's Phone (503) 226-4211 ext. 5425

5. Transporter 1 Company Name: WasteWatch, Inc.
6. US EPA ID Number: O R Q 0 0 0 0 0 6 2 2 1
A. State Transporter's ID
B. Transporter 1 Phone (503) 455-8683

7. Transporter 2 Company Name: Savannah Transport, Inc.
8. US EPA ID Number: K S 0 0 0 0 3 3 6 8 9 1
C. State Transporter's ID
D. Transporter 2 Phone (877) 595-0100

9. Designated Facility Name and Site Address
Pollution Control Industries of
5485 Tay-For Drive
Millington, TN 38053
10. US EPA ID Number: T N D 0 0 0 7 7 2 1 8 6
E. State Facility's ID
F. Facility's Phone (901) 353-5291

11. WASTE DESCRIPTION	12. Containers No.	Type	13. Total Quantity	14. Unit Wt./Vol.
a. Non Hazardous, Non RCRA Regulated (IDW Soil)	22	D M	012,000	P
b.				
c.				
d.				

G. Additional Descriptions for Materials Listed Above
a) 280465

H. Handling Codes for Wastes Listed Above

15. Special Handling Instructions and Additional Information
Emergency Phone No: (503) 504-1733

Site Address:
7900 NW St. Helens Rd
Portland, OR 97210

16. GENERATOR'S CERTIFICATION: I hereby certify that the contents of this shipment are fully and accurately described and are in all respects in proper condition for transport. The materials described on this manifest are not subject to federal hazardous waste regulations.

X Printed/Typed Name: Robert J Wyatt — Signature: [signature] — Date: Month 8 Day 26 Year 04

17. Transporter 1 Acknowledgement of Receipt of Materials
Printed/Typed Name: Tim Ferrick — Signature: Tim Ferrick — Date: Month 8 Day 26 Year 04

18. Transporter 2 Acknowledgement of Receipt of Materials
Printed/Typed Name: Milton J. Vaughn — Signature: Milton J. Vaughn — Date: Month 09 Day 02 Year 04

19. Discrepancy Indication Space

20. Facility Owner or Operator; Certification of receipt of the waste materials covered by this manifest, except as noted in Item 19.
Printed/Typed Name — Signature — Date: Month Day Year

GENERATOR — TRANSPORTER — FACILITY — NON-HAZARDOUS WASTE

Received: 11/ 1/04 3:28PM; 5034651843 -> HAHN * ASSOCIATES; Page 2
11/01/2004 15:41 5034651843 WASTEWATCH PAGE 02

SCOEPA00013663

PCI

RECEIVED OCT 21 2004

Certificate

This certificate is to verify that the waste specified will be handled in accordance with all local, state, and federal regulations

Manifest: 08224
Generator: NORTHWEST NATURAL GAS

Page/Line	Waste Stream	PCI H CODE	Final H CODE
1 A	280465	na	na Energy Recovery by Thermal Destruction

Facility Name: Pollution Control Industries
Facility Address: 5485 Tay-For Dr.
Millington, TN 38053
Facility EPA ID: TND000772186

Signature:

Typed: Tita LaGrimas
Title: Executive Vice President of Regulatory Affairs
Date: 9/24/2004

Invoice #: TN0018292

Pollution Control Industries
4343 Kennedy Avenue, East Chicago, IN 46312
(219)397-3951 FAX: (219)397-6411
www.pollutioncontrol.com

RESPONSIBLE℠ RECYCLING
A commitment to our generators, our employees, and our community.

NON-HAZARDOUS WASTE MANIFEST

Please print or type (Form designed for use on elite (12 pitch) typewriter)

NON-HAZARDOUS WASTE MANIFEST

1. Generator's US EPA ID No.

Manifest Document No. U 8 2 2 4

2. Page 1 of 1

3. Generator's Name and Mailing Address
NW Natural
220 NW 2nd Avenue
Portland, OR 97209
ATTN: Bob Wyatt

4. Generator's Phone (503) 226-4211 ext. 5425

5. Transporter 1 Company Name: WasteWatch, Inc.
6. US EPA ID Number: O R Q 0 0 0 0 0 6 2 2 1
A. State Transporter's ID
B. Transporter 1 Phone: (503) 465-8683

7. Transporter 2 Company Name: Savannah Transport, Inc.
8. US EPA ID Number: K 3 0 0 0 0 3 3 6 8 9 1
C. State Transporter's ID
D. Transporter 2 Phone: (877) 595-0100

9. Designated Facility Name and Site Address
Pollution Control Industries of
5485 Tay-For Drive
Millington, TN 38053
10. US EPA ID Number: T N D 0 0 0 7 7 2 1 8 6
E. State Facility's ID
F. Facility's Phone: (901) 353-5291

11. WASTE DESCRIPTION	12. Containers No.	12. Containers Type	13. Total Quantity	14. Unit Wt./Vol.
a. Non Hazardous, Non RCRA Regulated (IDW Soil)	22	D M	012,000	P
b.				
c.				
d.				

G. Additional Descriptions for Materials Listed Above
a) 280465

H. Handling Codes for Wastes Listed Above

15. Special Handling Instructions and Additional Information
Emergency Phone No: (503) 504-1733

Site Address:
7900 NW St. Helens Rd
Portland, OR 97210

NON-HAZARDOUS WASTE

GENERATOR

16. **GENERATOR'S CERTIFICATION:** I hereby certify that the contents of this shipment are fully and accurately described and are in all respects in proper condition for transport. The materials described on this manifest are not subject to federal hazardous waste regulations.

X Printed/Typed Name: Robert J Wyatt — Signature — Date: Month 8 Day 26 Year 04

TRANSPORTER

17. Transporter 1 Acknowledgement of Receipt of Materials
Printed/Typed Name: Tim Ferrick — Signature: Tim Ferrick — Date: Month 8 Day 26 Year 04

18. Transporter 2 Acknowledgement of Receipt of Materials
Printed/Typed Name — Signature — Date: Month Day Year

FACILITY

19. Discrepancy Indication Space

20. Facility Owner or Operator; Certification of receipt of the waste materials covered by this manifest, except as noted in item 19.
Printed/Typed Name — Signature — Date: Month Day Year

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Rev. 3/95

POLLUTION CONTROL INDUSTRIES

Please indicate which PCI Facilty(s) are being utilized for this Profile

PROFILE NUMBER 280465 NE

☐ East Chicago, IN. 46310 1-800-388-7242 ☐ Millington, TN. 38053 1-888-724-8366 ☐ Rancho Cordova, CA. 95670 1-866-724-2272

GENERATORS WASTE PROFILE SHEET

PLEASE PRINT IN INK OR TYPE

PLEASE FAX COMPLETED FORM TO THE PCI APPROVALS DEPARTMENT AT 1-219-397-6411

A. GENERATOR INFORMATION:

Generator Name: Northwest Natural Gas
Facility Address 7900 NW St Helens Rd
City Portland State OR Zip 97210
Customer Name: Bob Wyatt
Customer Phone: (503) 226 - 4211 ext 5425
Customer Fax: (___) ___ - ___
Generator USEPA/Federal ID #: CESQG
Generator State ID # (If applicable): ___
Is the Generator a "Conditionally Exempt Small Quantity Generator"? X Yes ___ No
Generator's S.I.C. Code(4 Digit): ___

BILLING INFORMATION:

Billing Name: Waste Watch Inc
Billing Address P. O. Box 430
City Troutdale State OR Zip 97060
Billing Contact Name: Tim Ferrick
Billing Phone: (503) 465 - 8683
Billing Fax: (___) ___ - ___
P.C.I. Sales Rep.: Russ

B. WASTE STREAM INFORMATION:

Name of the Waste: Investigative derived Soil
Original Process Generating Waste: Soil investigation. Material is from gas manufacturing operations
Is a representative sample provided? ___ Yes X No
Is a MSDS attached? ___ Yes X No
Is there any Analytical attached? TCLP X Yes ___ No Other ___ Yes ___ No

C. GENERAL CHARACTERISTICS:

Color: Light-Brown

Odor: ___ None X Mild ___ Strong

Physical state @ 70 F: 1-10 % Liquid; ___ % Sludge; 90-100 % Solid; ___ % Powder; ___ % Gas(Aerosol); ___ % Gas(Other); ___ % Other

Phases: ___ Single Layer; X Multi Layer; How Many? 2

Btu/Lb: ___ <3000; ___ 3000-5000; X 5000-10,000; ___ >10,000

PH: ___ <2.0 ___ 2.0 to 4.0 X 4.0 to 10.0 ___ 10.0 to 12.5 ___ >12.5

Liquid Flash Point: ___ <73 F ___ 73 to 99 F ___ 100 to 139 F X 140 to 200 F ___ >200 F ___ None

Specific Gravity 1.15 - 1.2 % Total Halogens -

D. CHEMICAL COMPOSITION: Total of Maximum concentration must be > or = to 100%.

Constituents	Min%	Max%	Constituents	Min%	Max%
Soil	90	99.9			
water	0	10			
petroleum hydrocarbons	0	1.4			
benzene	0.001	0.01			

E. OTHER WASTE STREAM INFORMATION:

Is this waste a "USED OIL" per 40CFR PART 279? ___ Yes X No
If "Yes", does the total halogen content exceed 1,000 ppm? ___ Yes ___ No
If "Yes", can you identify the "Chlorinated Constituent" present in the oil? ___
If "Yes", can you rebut the presumption that this material is a "Hazardous Waste"? ___ Yes ___ No

Does the Waste have any of the following characteristics? (Please check all that apply)

___ Oxidizer ___ Organic Peroxide ___ Water Reactive ___ Air Reactive ___ Pyrophoric ___ Dioxin
___ Radioactive ___ Infectious ___ Pathogen ___ Carcinogen ___ Etiological
___ Explosive ___ Shock Sensitive ___ Undergo Hazardous Polymerization ___ Cylinder ___ Aerosols

Does the Waste contain any of the following?

None	or	LESS THAN	or	ACTUAL	None	or	LESS THAN	or	ACTUAL
X	PCB'S	___ <50ppm		___ ppm	X	Sulfides	___ <50ppm		___ ppm
___	Cyanides	X <50ppm		___ ppm	X	Phenolics	___ <50ppm		___ ppm

Does the waste represented by this profile contain benzene? X Yes ___ No
If "Yes", please list concentration in < 300 ppm.
Is the Waste subject to the benzene waste operations NESHAP? (40CFR Part 61, Subpart FF) ___ Yes X No
Answer "Yes" if your waste contains benzene **and** if the SIC code from your facility is one of the following:

2812 2813 2816 2819 2821 2822 2823 2824 2833 2834 2835 2836 2841 2842 2843 2844 2851
2861 2865 2869 2873 2874 2876 2879 2891 2892 2893 2896 2899 2911 3312 4953 4959 9511

E. OTHER WASTE STREAM INFORMATION CONTINUED:

Is the Waste subject to RCRA Subpart CC controls? (40 CFR 265 SUBPART CC) ___Yes _X_No
If "No", does the Waste meet the organic LDR exemption for UHC'S? (40 CFR 268.48, 268.7) _X_Yes ___No
If "No", does the Waste contain <500ppmw volatile organic(VO)? (40 CFR 265 SUBPART CC) ___Yes ___No
Does the Waste contain any Class I or Class II ozone-depleting substances? ___Yes _X_No
If PCB'S are present, is the waste regulated by TSCA per 40 CFR 761? ___Yes _X_No

F. SHIPPING INFORMATION:

Method of Shipment:
___Bulk Liquid(> 500 Gallons) ___Bulk Solids(roll-off box, vacuum box, etc) ___Lab Pack
___Cubic Yard Boxes ___Totes (Please specify size) ___
_X_Drums(Specify size) ___85 _X_55 ___30 ___16 ___5 Other (Please specify)___
Container Type: _X_Metal ___Plastic ___Fiberboard ___Combination(EX: Glass containers in metal drum)
___Other(Please describe)___
Shipping Frequency:
Number of Units 14-17 Per ___Month ___Quarter ___Year Other one Time

G. R.C.R.A. CHARACTERIZATION:

Is this a USEPA "Hazardous Waste" per 40CFR 261.3? ___Yes _X_No
If "No", Please skip to section H.
Is this a "Universal Waste" per 40CFR part 273? ___Yes _X_No
Is this a "Characteristic Waste"? (MGP Exclusion) ___Yes _X_No
If "Yes" Is it: ___D001 Ignitable ___D002 Corrosive ___D003 Reactive
Characteristic for Toxic Metals: ___D004 ___D005 ___D006 ___D007 ___D008 ___D009 ___D010 ___D011
Characteristic for Toxic Organics: D012 thru D043 (please list all that apply)___
Is this an "F" or "K" Listed waste or mixed with one? ___Yes _X_No
If "Yes", Please list all applicable code(s) from 40CFR261.31 and/or 261.32:___
Is this a commercial chemical product or spill cleanup that would carry a "U" or "P" waste code under 40CFR 261.33 (e) or (f)? ___Yes _X_No
If "Yes", Please list all applicable waste code(s).___
Is this a state regulated waste? ___Yes _X_No
If "Yes", Please list all codes.___

H. DOT SHIPPING INFORMATION:

Is this a U.S. Dept. of Transportation(USDOT) Hazardous Material? ___Yes _X_No
Proper Shipping Name per 49CFR 172.101 Hazardous Materials Table: Non Hazardous, Non RCRA regulated material
"Reportable Quantity"(if any) ___lbs
Hazard Class or Division No. ___ UN/NA # ___ Packing Group ___I ___II ___III
Is this a "Poison Inhalation Hazard"? ___Yes _X_No
If "Yes", Please indicate Hazard Zone ___Zone A ___Zone B ___Zone C ___Zone D ___Other
List two primary hazardous constituents:___

I. GENERATOR CERTIFICATION:

I hereby certify that the above and attached description is complete and accurate to the best of my knowledge and ability. No deliberate or willful omissions of composition or properties exist and that all known or suspected hazards have been disclosed.
I also certify that the obtained sample is representative of the waste material described above and give PCI permission and consent to make amendments and corrections.

Name(print) Robert J. Wyatt Title Environmental Compliance Specialist
Signature ___ Date 8-26-04

THIS SPACE FOR PCI APPROVALS DEPARTMENT ONLY

DATE RECEIVED ___/___/___ APPROVER'S INITIALS___ PROFILE NUMBER 280465
PROCESS CODE ___ ___ PRICE___ TRANS___
PROPER WASTE CODES ___
PROPER D.O.T. SHIPPING NAME:___
HAZARD CLASS___ UN___ NA___ PACKING GROUP ___I ___II ___III
N.O.S. DESCRIPTORS___
YARD INSTRUCTIONS:
___ NO LANDFILL CUSTOMER
___ NO SAMPLE APPROVAL
___ RUN SALES ANALYTICAL
___ N/H FOR METALS PER GEN.
___ RUN OX. SCREEN ON INCOMING
___ MSDS ATTACHED
___ SEE ATTACHED ANALYTICAL
___ RUN COMP. ON INCOMING
FORM CODE W___ SYSTEM CODE H___

WasteWatch, Inc.
Environmental Services

INVOICE

RECEIVED SEP 10 2004

		QTY	DESCRIPTION	EACH	TOTAL
Invoice No.	0904-105	22	Disposal: Non Haz Soil Borings, 55-gal drum	$205.00	$4,510.00
Invoice Date	9/8/04	1	Labor to consolidate 9 drums	$190.00	$190.00
WW Job No.	04-08224				
Date Shipped	8/26/04				
Terms	Net 30				
Work Order	**A276-2708-01**				
SOLD TO					
Company	Hahn and Associates				
Contact	Mark Whitson				
Address	434 NW 6th Avenue				
City, State	Portland, OR				
Zip Code	97209-3600				
Phone	(503) 796-0717				
NOTES					
Gasco site, manifest # 08224					
				PLEASE PAY THIS AMOUNT	**$4,700.00**

INVOICE APPROVAL
Job # 2708-70
Today's Date 9-13-04
Prj Mgr MWW / RSE
GL Number 2708-70

(TERMS: Net 30 Days)

Please Make Checks Payable To:
WASTEWATCH, INC.
P.O. Box 430
Troutdale, OR 97060

Thank You For Your Business

HAHN AND ASSOCIATES, INC.
ENVIRONMENTAL CONSULTANTS

PHONE MEMORANDUM

DATE: September 2, 2004

TO: File
NW Natural – Gasco Site
Portland, Oregon

FROM: Mark Whitson
Hahn and Associates, Inc.
Portland, Oregon

HAI Project No. 2708-70

SUBJECT: IDW Soil Cuttings – Non-Hazardous Waste Review
NW Natural Gasco Facility
Portland, Oregon

This memorandum documents the non-hazardous waste determination for the investigation derived waste (IDW) soil cuttings (22 full drums) that were removed from the Gasco site on August 26, 2004.

Listed wastes

The IDW did not meet any listed waste categories.

Characteristic wastes

Based on knowledge of historical waste activities at the Gasco site and previous soil chemical analyses, the soil cuttings are not a corrosive (40 CFR 261.22) or reactive (40 CFR 261.23) waste.

A representative composite sample of the IDW from the drums that contained liquid was collected on August 23, 2004, and analyzed for flashpoint. The flashpoint was non-detect at 150 degrees F (results attached). Therefore, the IDW is not a ignitable waste (40 CFR 261.21).

Based on knowledge of historical waste activities at the Gasco site and previous soil chemical analyses, the soil cuttings are not a Toxicity Characteristic waste (40 CFR 261.24). Benzene concentrations in the soil are elevated and leachate concentrations could be above Toxicity Characteristic regulatory levels; however, Oregon has adopted the Toxicity Characteristic exemption for manufactured gas plant waste (40 CFR 261.24(a)). The IDW contains manufactured gas plant waste. Therefore, the IDW is not a Toxicity Characteristic waste.

434 NW 6th AVENUE, SUITE 203 • PORTLAND, OREGON 97209-3651
503-796-0717 Telephone • 503-227-2209 Facsimile

HAHN AND ASSOCIATES, INC.
Environmental Consultants
434 NW Sixth Avenue, Suite 203 • Portland OR 97209
(503) 796-0717 • Fax (503) 227-2209

Laboratory: NORTH CREEK ANALYTICAL
Lab Project No.:

CHAIN OF CUSTODY

Chain of Custody No.: 1

Project Manager: MARK WHITSON
Project No.: 2708
Project Name:
Collected by: MATT GRAVES

Liquid with Sediment Sample
____ Test Filtrate ____ Test Sediment ____ Test Both
Multi-Phase Sample
____ Test One (which) ____ Test Separately ____ Shake

Samples Received at 4C (Y or N):
Appropriate Containers Used (Y or N): N
Provide Verbal Results (Y or N): No
Provide Preliminary Fax Results: Yes

Comments

Sample Number Prefix: 2708-040823-

Lab ID	Sample #	Date	Time	Sample Description	Matrix: Soil	Matrix: Water	Matrix: Other	Number of Containers	Analyses to be Performed: FLASH POINT	RUSH	Remarks
	100	8-23-04	10:00		X				X	X	24 HR.

Relinquished by	Company	Date	Time	Received by	Company
Matt Graves	HAI	8-23-04	1320		NCA

SCOEPA00013670

www.ncalabs.com

Seattle 11720 North Creek Pkwy N, Suite 400, Bothell, WA 98011-9223
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

25 August, 2004

Mark Whitson
Hahn and Associates, Inc.
434 NW Sixth Ave., Suite 203
Portland, OR 97209

RE: Northwest Natural

Enclosed are the results of analyses for samples received by the laboratory on 08/24/04 14:00. 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:
P4H0854

www.ncalabs.com

Seattle 11720 North Creek Pkwy N, Suite 400, Bothell, WA 98011-9223
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

Hahn and Associates, Inc.	Project: Northwest Natural	
434 NW Sixth Ave., Suite 203	Project Number: 2708	**Reported:**
Portland, OR 97209	Project Manager: Mark Whitson	08/25/04 12:23

ANALYTICAL REPORT FOR SAMPLES

Sample ID	Laboratory ID	Matrix	Date Sampled	Date Received
2708-040823-100	P4H0854-01	Soil	08/23/04 10:00	08/24/04 14:00

North Creek Analytical - Portland

Howard Holmes, Project Manager

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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Seattle 11720 North Creek Pkwy N, Suite 400, Bothell, WA 98011-9223
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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

Hahn and Associates, Inc.	Project: Northwest Natural	
434 NW Sixth Ave., Suite 203	Project Number: 2708	**Reported:**
Portland, OR 97209	Project Manager: Mark Whitson	08/25/04 12:23

Physical Parameters per APHA/ASTM/EPA Methods
North Creek Analytical - Portland

Analyte	Result	Reporting Limit	Units	Dilution	Method	Prepared	Analyzed	Batch	Notes
2708-040823-100 (P4H0854-01) Soil					Sampled: 08/23/04 Received: 08/24/04				
Flashpoint	ND	150	°F	1	EPA 1010	08/25/04	08/25/04	4081039	

North Creek Analytical - Portland

Howard Holmes, Project Manager

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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Seattle 11720 North Creek Pkwy N, Suite 400, Bothell, WA 98011-9223
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

Hahn and Associates, Inc.	Project: Northwest Natural	
434 NW Sixth Ave., Suite 203	Project Number: 2708	**Reported:**
Portland, OR 97209	Project Manager: Mark Whitson	08/25/04 12:23

Physical Parameters per APHA/ASTM/EPA Methods - Quality Control

North Creek Analytical - Portland

Analyte	Result	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
Batch 4081039 - Oil Qual. Extraction										
LCS (4081039-BS1)				Prepared & Analyzed: 08/25/04						
Flashpoint	130		°F				123-131			
Duplicate (4081039-DUP1)		**Source: P4H0456-18**		Prepared & Analyzed: 08/25/04						
Flashpoint	ND	150	°F		ND				50	

North Creek Analytical - Portland

Howard Holmes, Project Manager

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.

SCOEPA00013674

www.ncalabs.com

Seattle 11720 North Creek Pkwy N, Suite 400, Bothell, WA 98011-9223
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

Hahn and Associates, Inc.	Project: Northwest Natural	
434 NW Sixth Ave., Suite 203	Project Number: 2708	**Reported:**
Portland, OR 97209	Project Manager: Mark Whitson	08/25/04 12:23

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. MRLs are adjusted if %Solids are less than 50%.
wet	Sample results reported on a wet weight basis (as received)
RPD	Relative Percent Difference

North Creek Analytical - Portland

Howard Holmes, Project Manager

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.

SCOEPA00013675

T4HU057

HAHN AND ASSOCIATES, INC.
Environmental Consultants
434 NW Sixth Avenue, Suite 203 • Portland OR 97209
(503) 796-0717 • Fax (503) 227-2209

Laboratory: NORTH CREEK ANALYTICAL
Lab Project No.:

CHAIN OF CUSTODY

Chain of Custody No. 1

Project Manager: MARK WATSON
Project No.: 2708
Project Name:
Collected by: MATT GRAVES

Liquid with Sediment Sample
____ Test Filtrate ____ Test Sediment ____ Test Both
Multi-Phase Sample
____ Test One (which) ____ Test Separately ____ Shake

Samples Received at 4C (Y or N)
Appropriate Containers Used (Y or N)
Provide Verbal Results (Y or N): No
Provide Preliminary Fax Results: Yes

Comments
Sample Number Prefix: 2708-SY0823-

Lab ID	Sample #	Date	Time	Sample Description	Matrix: Soil	Matrix: Water	Matrix: Other	Number of Containers	Analyses to be Performed: FLASH PNT.	RUSH	Remarks
	100	8-23-04	10:00		X				X	X	24 HR.

Relinquished by	Company	Date	Time	Received by	Company
Matt Graves	HAI	8-23-04	1320		NCA
	NA	08-24-04	1400		NA

8/24/04
1400

SCOEPA00013676

NORTH CREEK ANALYTICAL COOLER RECEIPT FORM

(Army Corp. compliant)

Client: Hahn

1. **Please sign for receipt and opening of** 1 **cooler or** ____ **other** ____

   By (print) Carrie Fahsholz (sign) [signature]

2. Date samples received 8/24/04 Date opened: Same X or ___/___/___

3. Delivered by: X NCA courier ___ FedEx ___ UPS ___ Courier ___ Client ___ Other ____

   Airbill # if applicable ____ (Put copy of shipping papers in file)

4. There were 1 custody seals present, signed by [signature] date 8/24/04.

5. Were the custody seals unbroken and intact at the date and time of arrival? X Yes ___ No

6. Was ice used? X yes ___ no Type of ice: ___ blue ice ___ gel ice X real ice

   Temperature (degrees C) ____ Raytek thermometer 1.4 Digi-Therm (probe temperature blank)

7. Are custody papers sealed in a plastic bag and taped inside to lid? ___ Yes X No

8. Were custody papers filled out properly (ink, signed, etc.)? X Yes ___ No

   If "no" please specify: ____

9. Was project identifiable from custody papers? X Yes ___ No

   Name of project NW Natural (if applicable)

10. **Initial and date for unpacking:** CF **(initials)** **date** 8/24/04

11. Packing material: NA bubble wrap/bag ___ styrofoam ___ cardboard ____ other

12. Were samples in bags? ___ Yes X No

13. Did all containers indicated on the COC arrive? X Yes ___ No

    If "no" please indicate which containers were absent ____

14. Were all containers unbroken and labels in good condition? X Yes ___ No

    If "no" please indicate which containers ____

15. Were all bottle labels complete (ID, date, time, signature, etc.)? X Yes ___ No

    Do the IDs, times, etc. agree with the COC? X Yes ___ No

    If "no" please indicate which containers ____

16. Are containers properly preserved for indicated analysis? X Yes ___ No

17. Is there adequate volume for the test(s) requested? X Yes ___ No

18. If voa vials were submitted, are they free of bubbles? X N/A ___ Yes ___ No

19. **Log-in phase: Date samples were logged in:** 8/24/04 **Elm Project # P** 4H0854

20. Logged in by (print) Vanessa Evans (sign) Vanessa Evans

21. Was the project manager notified of status? (Use back of form as a record) ___ Yes X No

(iii) The potential of the constituent or any toxic degradation product of the constituent to migrate from the waste into the environment under the types of improper management considered in paragraph (a)(3)(vii) of this section.

(iv) The persistence of the constituent or any toxic degradation product of the constituent.

(v) The potential for the constituent or any toxic degradation product of the constituent to degrade into non-harmful constituents and the rate of degradation.

(vi) The degree to which the constituent or any degradation product of the constituent bioaccumulates in ecosystems.

(vii) The plausible types of improper management to which the waste could be subjected.

(viii) The quantities of the waste generated at individual generation sites or on a regional or national basis.

(ix) The nature and severity of the human health and environmental damage that has occurred as a result of the improper management of wastes containing the constituent.

(x) Action taken by other governmental agencies or regulatory programs based on the health or environmental hazard posed by the waste or waste constituent.

(xi) Such other factors as may be appropriate.

Substances will be listed on appendix VIII only if they have been shown in scientific studies to have toxic, carcinogenic, mutagenic or teratogenic effects on humans or other life forms.

(Wastes listed in accordance with these criteria will be designated Toxic wastes.)

(b) The Administrator may list classes or types of solid waste as hazardous waste if he has reason to believe that individual wastes, within the class or type of waste, typically or frequently are hazardous under the definition of hazardous waste found in section 1004(5) of the Act.

(c) The Administrator will use the criteria for listing specified in this section to establish the exclusion limits referred to in § 261.5(c).

[45 FR 33119, May 19, 1980, as amended at 55 FR 18726, May 4, 1990; 57 FR 14, Jan. 2, 1992]

Subpart C—Characteristics of Hazardous Waste

§ 261.20 General.

(a) A solid waste, as defined in § 261.2, which is not excluded from regulation as a hazardous waste under § 261.4(b), is a hazardous waste if it exhibits any of the characteristics identified in this subpart.

[*Comment:* § 262.11 of this chapter sets forth the generator's responsibility to determine whether his waste exhibits one or more of the characteristics identified in this subpart]

(b) A hazardous waste which is identified by a characteristic in this subpart is assigned every EPA Hazardous Waste Number that is applicable as set forth in this subpart. This number must be used in complying with the notification requirements of section 3010 of the Act and all applicable record-keeping and reporting requirements under parts 262 through 265, 268, and 270 of this chapter.

(c) For purposes of this subpart, the Administrator will consider a sample obtained using any of the applicable sampling methods specified in appendix I to be a representative sample within the meaning of part 260 of this chapter.

[*Comment:* Since the appendix I sampling methods are not being formally adopted by the Administrator, a person who desires to employ an alternative sampling method is not required to demonstrate the equivalency of his method under the procedures set forth in §§ 260.20 and 260.21.]

[45 FR 33119, May 19, 1980, as amended at 51 FR 40636, Nov. 7, 1986; 55 FR 22684, June 1, 1990; 56 FR 3876, Jan. 31, 1991]

§ 261.21 Characteristic of ignitability.

(a) A solid waste exhibits the characteristic of ignitability if a representative sample of the waste has any of the following properties:

(1) It is a liquid, other than an aqueous solution containing less than 24 percent alcohol by volume and has flash point less than 60 °C (140 °F), as determined by a Pensky-Martens Closed Cup Tester, using the test method specified in ASTM Standard D–93–79 or D–93–80 (incorporated by reference, see § 260.11), or a Setaflash Closed Cup Tester, using the test method specified

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in ASTM Standard D-3278-78 (incorporated by reference, see § 260.11), or as determined by an equivalent test method approved by the Administrator under procedures set forth in §§ 260.20 and 260.21.

(2) It is not a liquid and is capable, under standard temperature and pressure, of causing fire through friction, absorption of moisture or spontaneous chemical changes and, when ignited, burns so vigorously and persistently that it creates a hazard.

(3) It is an ignitable compressed gas as defined in 49 CFR 173.300 and as determined by the test methods described in that regulation or equivalent test methods approved by the Administrator under §§ 260.20 and 260.21.

(4) It is an oxidizer as defined in 49 CFR 173.151.

(b) A solid waste that exhibits the characteristic of ignitability has the EPA Hazardous Waste Number of D001.

[45 FR 33119, May 19, 1980, as amended at 46 FR 35247, July 7, 1981; 55 FR 22684, June 1, 1990]

§ 261.22 Characteristic of corrosivity.

(a) A solid waste exhibits the characteristic of corrosivity if a representative sample of the waste has either of the following properties:

(1) It is aqueous and has a pH less than or equal to 2 or greater than or equal to 12.5, as determined by a pH meter using Method 9040 in "Test Methods for Evaluating Solid Waste, Physical/Chemical Methods," EPA Publication SW-846, as incorporated by reference in § 260.11 of this chapter.

(2) It is a liquid and corrodes steel (SAE 1020) at a rate greater than 6.35 mm (0.250 inch) per year at a test temperature of 55 °C (130 °F) as determined by the test method specified in NACE (National Association of Corrosion Engineers) Standard TM-01-69 as standardized in "Test Methods for Evaluating Solid Waste, Physical/Chemical Methods," EPA Publication SW-846, as incorporated by reference in § 260.11 of this chapter.

(b) A solid waste that exhibits the characteristic of corrosivity has the EPA Hazardous Waste Number of D002.

[45 FR 33119, May 19, 1980, as amended at 46 FR 35247, July 7, 1981; 55 FR 22684, June 1, 1990; 58 FR 46049, Aug. 31, 1993]

§ 261.23 Characteristic of reactivity.

(a) A solid waste exhibits the characteristic of reactivity if a representative sample of the waste has *any* of the following properties:

(1) It is normally unstable and readily undergoes violent change without detonating.

(2) It reacts violently with water.

(3) It forms potentially explosive mixtures with water.

(4) When mixed with water, it generates toxic gases, vapors or fumes in a quantity sufficient to present a danger to human health or the environment.

(5) It is a cyanide or sulfide bearing waste which, when exposed to pH conditions between 2 and 12.5, can generate toxic gases, vapors or fumes in a quantity sufficient to present a danger to human health or the environment.

(6) It is capable of detonation or explosive reaction if it is subjected to a strong initiating source or if heated under confinement.

(7) It is readily capable of detonation or explosive decomposition or reaction at standard temperature and pressure.

(8) It is a forbidden explosive as defined in 49 CFR 173.51, or a Class A explosive as defined in 49 CFR 173.53 or a Class B explosive as defined in 49 CFR 173.88.

(b) A solid waste that exhibits the characteristic of reactivity has the EPA Hazardous Waste Number of D003.

[45 FR 33119, May 19, 1980, as amended at 55 FR 22684, June 1, 1990]

§ 261.24 Toxicity characteristic.

(a) A solid waste (except manufactured gas plant waste) exhibits the characteristic of toxicity if, using the Toxicity Characteristic Leaching Procedure, test Method 1311 in "Test Methods for Evaluating Solid Waste, Physical/Chemical Methods," EPA Publication SW-846, as incorporated by reference in § 260.11 of this chapter, the extract from a representative sample of the waste contains any of the contaminants listed in table 1 at the concentration equal to or greater than the respective value given in that table. Where the waste contains less than 0.5 percent filterable solids, the waste

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itself, after filtering using the methodology outlined in Method 1311, is considered to be the extract for the purpose of this section.

(b) A solid waste that exhibits the characteristic of toxicity has the EPA Hazardous Waste Number specified in Table I which corresponds to the toxic contaminant causing it to be hazardous.

TABLE 1—MAXIMUM CONCENTRATION OF CONTAMINANTS FOR THE TOXICITY CHARACTERISTIC

EPA HW No.[1]	Contaminant	CAS No.[2]	Regulatory Level (mg/L)
D004	Arsenic	7440–38–2	5.0
D005	Barium	7440–39–3	100.0
D018	Benzene	71–43–2	0.5
D006	Cadmium	7440–43–9	1.0
D019	Carbon tetrachloride	56–23–5	0.5
D020	Chlordane	57–74–9	0.03
D021	Chlorobenzene	108–90–7	100.0
D022	Chloroform	67–66–3	6.0
D007	Chromium	7440–47–3	5.0
D023	o-Cresol	95–48–7	[4]200.0
D024	m-Cresol	108–39–4	[4]200.0
D025	p-Cresol	106–44–5	[4]200.0
D026	Cresol		[4]200.0
D016	2,4-D	94–75–7	10.0
D027	1,4-Dichlorobenzene	106–46–7	7.5
D028	1,2-Dichloroethane	107–06–2	0.5
D029	1,1-Dichloroethylene	75–35–4	0.7
D030	2,4-Dinitrotoluene	121–14–2	[3]0.13
D012	Endrin	72–20–8	0.02
D031	Heptachlor (and its epoxide).	76–44–8	0.008
D032	Hexachlorobenzene	118–74–1	[3]0.13
D033	Hexachlorobutadiene	87–68–3	0.5
D034	Hexachloroethane	67–72–1	3.0
D008	Lead	7439–92–1	5.0
D013	Lindane	58–89–9	0.4
D009	Mercury	7439–97–6	0.2
D014	Methoxychlor	72–43–5	10.0
D035	Methyl ethyl ketone	78–93–3	200.0
D036	Nitrobenzene	98–95–3	2.0
D037	Pentrachlorophenol	87–86–5	100.0
D038	Pyridine	110–86–1	[3]5.0
D010	Selenium	7782–49–2	1.0
D011	Silver	7440–22–4	5.0
D039	Tetrachloroethylene	127–18–4	0.7
D015	Toxaphene	8001–35–2	0.5
D040	Trichloroethylene	79–01–6	0.5
D041	2,4,5-Trichlorophenol	95–95–4	400.0
D042	2,4,6-Trichlorophenol	88–06–2	2.0
D017	2,4,5-TP (Silvex)	93–72–1	1.0
D043	Vinyl chloride	75–01–4	0.2

[1] Hazardous waste number.
[2] Chemical abstracts service number.
[3] Quantitation limit is greater than the calculated regulatory level. The quantitation limit therefore becomes the regulatory level.
[4] If o-, m-, and p-Cresol concentrations cannot be differentiated, the total cresol (D026) concentration is used. The regulatory level of total cresol is 200 mg/l.

[55 FR 11862, Mar. 29, 1990, as amended at 55 FR 22684, June 1, 1990; 55 FR 26987, June 29, 1990; 58 FR 46049, Aug. 31, 1993; 67 FR 11254, Mar. 13, 2002]

Subpart D—Lists of Hazardous Wastes

§ 261.30 General.

(a) A solid waste is a hazardous waste if it is listed in this subpart, unless it has been excluded from this list under §§ 260.20 and 260.22.

(b) The Administrator will indicate his basis for listing the classes or types of wastes listed in this subpart by employing one or more of the following Hazard Codes:

Ignitable Waste	(I)
Corrosive Waste	(C)
Reactive Waste	(R)
Toxicity Characteristic Waste	(E)
Acute Hazardous Waste	(H)
Toxic Waste	(T)

Appendix VII identifies the constituent which caused the Administrator to list the waste as a Toxicity Characteristic Waste (E) or Toxic Waste (T) in §§ 261.31 and 261.32.

(c) Each hazardous waste listed in this subpart is assigned an EPA Hazardous Waste Number which precedes the name of the waste. This number must be used in complying with the notification requirements of Section 3010 of the Act and certain recordkeeping and reporting requirements under parts 262 through 265, 268, and part 270 of this chapter.

(d) The following hazardous wastes listed in § 261.31 or § 261.32 are subject to the exclusion limits for acutely hazardous wastes established in § 261.5: EPA Hazardous Wastes Nos. FO20, FO21, FO22, FO23, FO26, and FO27.

[45 FR 33119, May 19, 1980, as amended at 48 FR 14294, Apr. 1, 1983; 50 FR 2000, Jan. 14, 1985; 51 FR 40636, Nov. 7, 1986; 55 FR 11863, Mar. 29, 1990]

§ 261.31 Hazardous wastes from non-specific sources.

(a) The following solid wastes are listed hazardous wastes from non-specific sources unless they are excluded under §§ 260.20 and 260.22 and listed in appendix IX.

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Formal adoption of NOD exemption

Attachment A-1

Summary of Proposed Rule Revisions

This proposal adopts by reference 15 recent Environmental Protection Agency (EPA) amendments to federal hazardous waste rules and also amends numerous Oregon Administrative Rules (OARs) related to hazardous waste management.

The Department is proposing 12 amendments that correct or clarify Oregon's hazardous waste regulations. One proposed rule adopts all 15 of the federal rules in Attachment A-2 by reference. Most of the proposed changes are necessary to update administrative rules to reflect recent rule changes in the spills program that are referenced in the hazardous waste regulations. Some of the proposed rules were requested by EPA during our 2002 program reauthorization. Other changes make Oregon's rules consistent with the proposed federal rules. The following table and text in this attachment describe each proposed rule change, the reason for the change, the Oregon impact, and the Department's recommendation to the Environmental Quality Commission.

Rule # as found in this Attachment	OAR Citation	Why is Rule Change Proposed?
1	340-100-0002	Necessary to adopt federal rules by reference
2	340-101-0004	Deletion of state regulation that is less stringent than federal rule as a result of adopting federal rule
3	340-101-0050	Deletion of state rule as a result of adopting federal rule
4	340-102-0011	Requested by EPA for authorization
5	340-104-0340	Federal reference changed
6	340-105-0003	Requested by EPA for authorization
7	340-106-0002	Federal reference changed
8	340-109-0010	New spill response regulations
9	340-100-0020(1); 340-100-0004; 340-100-0010(3); 340-101-0001(1); 340-101-0040(1) & (2); 340-103-0031; 340-104-0001(5); 340-105-0010(2); 340-109-0010; 340-110-0061(2); 340-111-0020(1); 340-111-0050	New spill response regulations
10	340-109-0001; 340-113-0010	Requested by EPA during public comments
11	340-113-0020	Requested by EPA for authorization
12	340-113-0030	Requested by EPA for authorization

Administrative Rule Corrections and Amendments

1. Amendment: Amend OAR 340-100-0002, Adoption of EPA's Hazardous Waste and Used Oil Management Regulations.

a. Background: With each successive adoption of federal hazardous waste regulations, the Department amends OAR 340-100-0002 to record adopted federal rules and exclusions to the federal requirements. With this amendment, all of the proposed federal rules in **Attachment A-2** are adopted.

b. Oregon Impact: Amendment to OAR notes that federal rules are promulgated through July 24, 2002 with the exception of amendments to 40 CFR Parts 264, 265 and 270 as promulgated by 65 FR 30886-30913. Adoption of these rules will update Oregon's regulations making them equivalent to the federal regulations.

c. Recommendation: Amend OAR 340-100-0002 to reflect adoption of federal regulations through July 24, 2002 with the exception of FR 65, 30886-30913.

2. Amendment: Amend OAR 340-101-0004, Exclusions.

a. Background: 40 CFR 261.4(b) (7) exempts solid waste from the extraction, beneficiation and processing of ores and minerals from the definition of hazardous waste. The federal exemption is limited to certain types of processing activities and 20 types of processing ore and mineral wastes.

The current Oregon rule provision at OAR 340-101-0004(1) exempts all mineral processing wastes from being a hazardous waste, making the state provision less stringent than the federal management requirements. Federal law requires state environmental regulations to be at least as stringent as the federal requirements.

To clarify how mineral processing wastes are to be managed, the Department is proposing to delete the state rule, OAR 340-101-0004(1), which refers to mineral processing wastes.

In addition, the Department is proposing to adopt federal Hazardous Remediation Waste Management Requirements for dredged sediments (see item 15 of Federal Hazardous Waste Rule Amendments). Currently, Oregon Administrative Rules do not reflect the federal exclusion of these wastes, leaving Oregon rules more stringent than the federal rules. This exclusion is completed by removing the existing language thereby deleting 40 CFR 261.4(g) (sediment exclusion) from OAR 340-101-0004(3), and accepting the new federal exclusion for these wastes.

b. Oregon Impact: The 20 specific processing wastes exempted from management as hazardous waste include but are not limited to: slag from primary copper lead and zinc processing, gasified ash from coal gasification, iron blast furnace slag, and chloride process waste solids from titanium tetrachloride production. Mineral processing wastes not exempted under 40 CFR 261.7(b) (7) remain subject to management as potential hazardous waste. At this time, there are no known generators of these wastes in Oregon.

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Proposed removal of OAR 340-101-0004(3) will recognize adoption of the federal dredged sediment provisions.

c. Recommendation: Delete OAR 340-101-0004(1) and (3). (See Attachment A-3, Proposed Rule #5)

3. Correction: Delete OAR 340-101-0050, Standards for Materials Being Recycled.

a. Background: OAR 340-101-0050(1), regulates metal limits in zinc-containing fertilizers made from K061 hazardous waste (baghouse dust from secondary steel smelting). In 1999, the Department established metal limits for zinc-containing fertilizers made from K061 hazardous waste to be applied to land. Because the Department is recommending the adoption of EPA's new regulations setting metal limits for zinc-containing fertilizers made from any hazardous waste, including K061, the Commission must delete its state-only regulation for metal limits, because those limits are less stringent than new federal limits, including dioxin limits.

b. Oregon Impact: The Oregon Department of Agriculture (ODA) regulates contaminants in waste-derived fertilizers along with the Department. ODA has adopted the federal standard for zinc-micronutrient fertilizers made from hazardous wastes. The adoption of this regulation maintains equivalency with both state programs and the federal program and meets EPA's authorization expectations.

c: Recommendation: Delete and reserve OAR 340-101-0050(1). (See Attachment A-3, Proposed Rule #7)

4. Correction: Amend OAR 340-102-0011(2)(e), Hazardous Waste Determination.

a. Background: Reference to "40 CFR 273," Standards for Universal Waste Management, must be included in the state-only regulation in order to maintain equivalency with the federal program and program authorization. Universal Waste includes only specific post-consumer-use wastes. In Oregon these wastes are recalled and unused pesticides, batteries, mercury-containing thermostats and spent fluorescent lighting tubes.

b. Oregon Impact: Inserting "40 CFR Part 273" into the state-only language at OAR 340-102-0011(2)(e) refers generators to the federal standards for universal waste management rules for possible exclusions or restrictions of their universal wastes.

c: Recommendation: Insert the federal regulation citation 40 CFR Part 273 into the regulatory language at OAR 340-102-0011(2)(e). (See Attachment A-3, Proposed Rule #8)

5. Correction: Amend the federal citation 40 CFR 264.340(d) in the regulatory language at OAR 340-104-0340, Applicability to Incinerators.

a. Background: EPA redesignated "40 CFR 264.340(d)," to "40 CFR 264.340(e)," and the Department must correct the citation to read "40 CFR 264.340(e)" in order to maintain equivalency with the federal program and to meet EPA's authorization expectations.

b. Oregon Impact: Lists a correct citation in the Department's state-only hazardous waste rules.

c: Recommendation: Amend OAR 340-104-0340 to refer to the correct citation 40 CFR 264.340(e). (See Attachment A-3, Proposed Rule #11)

6. Correction: Delete the reference to the federal regulations 40 CFR 270.230(e)(1) in the regulatory language at OAR 340-105-0003, Consideration Under Federal Law.

a. Background: The federal regulation excludes off-site remediation waste management sites that are managed pursuant to Remedial Action Plans (RAPs), a form of a RCRA permit. Making this correction will meet EPA's authorization expectations.

b. Oregon Impact: There will be no impact on Oregon since the Department is already authorized for corrective action under RCRA.

c: Recommendation: Delete reference to 40 CFR 270.230(e)(1) from OAR 340-105-0003. (See Attachment A-3, Proposed Rule #12)

7. Correction: Correct the federal regulation "40 CFR 124.11(e)" to " 40 CFR 124.10(e)" in the regulatory language at OAR 340-106-0002, Requirements Not Applicable. 40 CFR 124.11(e) does not exist in the federal program.

a. Background: The correct citation is 40 CFR 124.10(e). The Department inadvertently listed 40 CFR 124.11(e) rather than 40 CFR 124.10(e).

b. Oregon Impact: This change completes the list of federal hazardous waste permitting rules.

c: Recommendation: Amend OAR 340-106-0002 to correct citation 124.10(e). (See Attachment A-3, Proposed Rule #14)

8. Correction: Delete OAR 340-109-0010(6)(a) and change 340-109-0010(6)(b) to (6)(a). Remove reference to deleted spill response rules, Division 108 and add reference to the new spill response Division 142.

a. Background: This change reflects spill response regulations in the new Division 142 (adopted by the Commission in January, 2003), deletes reference to now deleted Division 108 spill response regulations, and references new Division 142.

b. Oregon Impact: Provide rule consistency.

c. Recommendation: Delete references to Division 108 in OAR 340-109-0010; amend 340-109-0010 to refer to new Division 142. (See Attachment A-3, Proposed Rule #16)

9. Correction: Amend references from Division 108 to the new Division 142 that replaces it in Chapter 340 Divisions 100, 101, 103-105, 110, 111, and 113.

a. Background: Change reflects spill response regulations in new Division 142. Deletes reference to deleted Division 108 spill response regulations and references new Division 142.

b. Oregon Impact: Provide rule consistency.

c. Recommendation: Delete reference to Division 108 and add new reference to Division 142 in OAR 340-100-0020(1), 340-100-0004, 340-100-0010(3), 340-101-0001(1), 340-101-0040(1), 340-101-0040(2), 340-103-0031, 340-104-0001(5), 340-105-0010(2)(d)(B)(iii)(II), 340-109-0010, 340-110-0061(2), 340-111-0020(1), and 340-111-0050. (See Attachment A-3, Proposed Rule #1, 2, 3, 4, 6, 9, 10, 13, 16, 17, 18, and 19)

10. Correction: Correct and clarify OAR 340-100-0010, 340-109-0001, and 340-113-0010 to clarify that state-only pesticide residues are not federal hazardous waste or universal waste.

a. Background: The existing rule may be interpreted to imply that all "Pesticide Residue," which includes all pesticide waste not regulated as federal hazardous wastes is, by definition, federal "universal waste." That is incorrect and was never the intention of the Department when developing OAR 340-113-0010. Pesticide residue is not defined as a "universal waste" even though residues may be managed according to the same universal waste management requirements under State law.

b. Oregon Impact: Generators of pesticide residue will now know for certain that these materials may be managed according to universal waste management standards but are not by definition a "universal waste." Clarifying the Department's intent will meet EPA's authorization expectation.

c: Recommendation: Amend OAR 340-100-0010, 340-109-0001, and 340-113-0010 to clarify that state-only pesticide residues are not included in the definition of universal waste. (See Attachment A-3, Proposed Rule #3, 15, and 20)

11. Correction: Correct OAR 340-113-0020(1) Universal Waste Management, by removing reference to non-existent rule and correct reference from 40 CFR 273.6 to 40 CFR 273.9.

a. Background: This reference contains a non-existent rule, OAR 340-113-0030(5), which must be deleted to meet EPA's authorization expectations. OAR 340-113-0030(5) was deleted with adoption of the federal universal waste lamp provisions in 2000. In addition, 40 CFR 273.6 was changed to 40 CFR 273.9 by EPA.

b. Oregon Impact: Removal of the citation clarifies that no such regulation exists and references correct federal citation of 273.9.

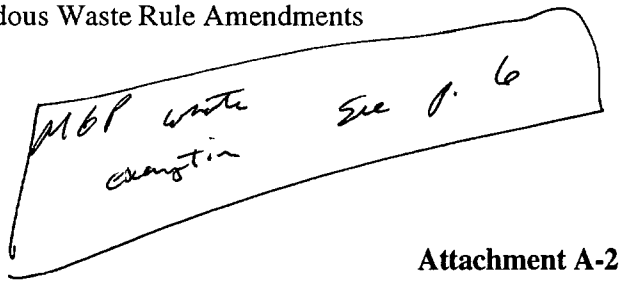
c: Recommendation: Delete OAR reference to OAR 340-113-0030(5) in 340-113-0020(1) and amend citation to 40 CFR 273.6 to 273.9. (See Attachment A-3, Proposed Rule #21)

12. Correction: Amend OAR 340-113-0030(1) & (2), Standards for Small and Large Quantity Handlers of Universal Waste, to reference correct federal universal waste rule provision.

a. Background: EPA changed citation in universal waste regulation, 40 CFR Part 273 from 273.6 to 273.9. State reference currently references a non-existent section 273.6, Definitions.

b. Oregon Impact: Correction to OAR 340-113-0030(1) & (2) will reference correct federal universal waste definition section of 273.9.

c. Recommendation: Correct reference in OAR 340-113-0030 from 40 CFR 273.6 to 273.9. (See Attachment A-3, Proposed Rule #22)



Attachment A-2

Federal Hazardous Waste Rule Amendments to be Adopted

This attachment describes the 15 federal amendments the Department is recommending be adopted by reference. All of the federal amendments described in this attachment are adopted by the first state amendment described in Attachment A-1.

1. Proposed Rule: Organobromines Production Wastes; Petroleum Refining Wastes; Identification and Listing of Hazardous Waste; Land Disposal Restrictions; Final Rule and Correcting Amendments. [65 FR 36365, June 8, 2000.]

a. Background: This rule corrects errors made in EPA's August 6, 1998 and March 17, 2000 rule amendments associated with four hazardous wastes that are generated by the petroleum refining industry. The 2000 rule language included a typographical error which made the rule unclear.

The intent of EPA's corrective rule amendment is to clarify that residuals generated from processing or recycling oil-bearing secondary materials that are not returned to a refinery operation are always designated as F037 listed hazardous wastes when disposed of or intended for disposal. The corrective rule creates no new regulatory requirements.

b. Oregon Impact: Adopting this rule will make Oregon administrative rules consistent with the EPA rule. The corrected rule does not create new regulatory requirements. At this time there are no known F037 wastes being generated in Oregon.

c. Recommendation: Adopt the rule correction.

2. Proposed Rule: National Emission Standards for Hazardous Pollutants (NESHAPS): Final Standards for Hazardous Air Pollutants for Hazardous Waste Combustors; Technical Corrections. [65 FR 42292, July 10, 2000; 66 FR 24270, May 14, 2001; 66 FR 35106, July 3, 2001.]

a. Background: On September 30, 1999, the EPA adopted standards to more rigorously control toxic emissions from burning hazardous waste in incinerators, cement kilns, and lightweight aggregate kilns. Several amendments to the original emission standards have subsequently been promulgated. Adopting these standards at this time ensures that Oregon's rules are consistent with federal rules and allows the Department to be the primary implementing agency.

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This rule adds gas turbines to the regulatory list of approved burners for hazardous waste comparable/synthetic gas fuel burners. This rule also corrects a typographical error in the 1998 NESHAPS rule and includes an amendment codifying a court vacatur of the Notice of Intent to Comply (NIC) provisions in the hazardous waste regulations relating to the standards for hazardous waste combustors.

b. Oregon Impact: The Commission has already updated the air quality portion of the NESHAPS, and now the hazardous waste program (HW) is proposing to update its portion. By adopting these corrections and clarifications of the NESHAPS standards for hazardous waste combustors, the Commission ensures that the air quality and hazardous waste rules are equivalent while maintaining consistent protectiveness. There is one hazardous waste combustor in Oregon subject to the combustor rules. That facility is the Umatilla Chemical Agent Disposal Facility outside of Hermiston, Oregon. The adoption of these rules will not have an impact on the existing permit for this facility since that permit includes the previously adopted AQ rules.

c. Recommendation: Adopt the rule correction.

3. Proposed Rule: Hazardous Waste Management System; Identification and Listing of Hazardous Waste; Chlorinated Aliphatic Production Wastes; Land Disposal Restrictions for Newly Identified Wastes; and CERCLA Hazardous Substance Designation and Reportable Quantities. [65 FR 67068, November 8, 2000.]

a. Background: In response to a lawsuit, EPA added two new waste streams (K174-wastewater treatment sludge containing dioxin and K175-wastewater treatment sludge containing mercury) generated by some in the chlorinated aliphatic manufacturing industry to the list of hazardous wastes. The listed wastes are those generated by industries manufacturing ethylene dichloride (EDC) and vinyl chloride monomer (VCM).

b. Oregon Impact: At this time, there are no facilities reporting the generation of such wastes in Oregon.

c. Recommendation: Adopt the rule.

4. Proposed Rule: Deferral of Phase IV Standards for Polychlorinated Biphenyls (PCBs) as a Constituent Subject to Treatment in Soil. [65 FR 81373, December 26, 2000.]

a. Background: This rule temporarily defers the requirement that PCBs be treated as a constituent subject to treatment when present in soils that exhibit the toxicity characteristic for metals. PCB's are a group of synthetic organic chemicals that, as wastes, show up as either oily liquids or solids. Once in the environment, PCB's do not readily break down and therefore remain for very long periods of time, increasing the availability of these materials to humans.

Federal PCB treatment standards were promulgated in 1998; however, EPA claims that the regulation discourages generators from cleaning up contaminated, PCB metal-bearing soils. This is the opposite of what EPA wanted to achieve when it promulgated alternative treatment standards for contaminated soils.

b. Oregon Impact: State cleanup rules require that soils contaminated with hazardous waste meet applicable land disposal restriction standards when excavated soils are placed on land. Generally, no cleanup sites were identified in Oregon that have high concentrations of both metals and PCBs. Deferral of the PCB treatment standards for these sites should not have an effect.

c. Recommendation: Adopt the deferral.

5. Proposed Rule: Storage, Treatment, Transportation and Disposal of Mixed Waste. [66 FR 27218, May 16, 2001.]

a. Background: This rule promulgates conditional exemptions for: (1) low-level mixed wastes (LLMW) from most RCRA Subtitle C (hazardous waste) storage and treatment regulations, and (2) LLMW and technologically enhanced naturally occurring and/or accelerator produced radioactive material (NARM) from most hazardous waste manifesting, transportation, and disposal regulations when specified conditions are met.

Mixed low-level radioactive wastes are mixtures that contain hazardous constituents regulated under RCRA. The rule provides that if a facility is licensed by the Nuclear Regulatory Commission (NRC) and the waste is managed according to specified conditions, the waste will be exempted from most hazardous waste management requirements.

b. Oregon Impact: The Commission previously adopted the federal "mixed waste" management regulations. Through these rules, the Department regulates the hazardous waste component of any mixture of a hazardous and a low-level radioactive waste. The NRC, through the Oregon Office of Energy and Oregon Department of Human Services (Oregon Public Health Services), regulates the low-level radioactive component. Adoption of this rule will clarify the proper management of these types of wastes and eliminate jurisdictional confusion. Low-level radioactive and ignitable liquid wastes produced at research laboratories or universities, facilities which are licensed by the NRC, are an example of a low-level mixed waste that could be conditionally exempted from most hazardous waste regulations if this amendment is adopted.

c. Recommendation: Adopt the rule.

6. Proposed Rule: Hazardous Waste Identification Rule (HWIR); Revisions to the Mixture and Derived-From Rules. [66 FR 27266, May 16, 2001.]

a. Background: In response to a federal court case, the revision expands the exclusion for mixtures or derivatives of listed wastes that are listed solely for the ignitability, corrosivity, or reactivity characteristics. Such mixtures and derivatives may be treated to remove the characteristic, and then disposed of as non-hazardous waste in a solid waste landfill, provided land disposal restrictions are met.

b. Oregon Impact: This allows generators of derived-from waste that is ***listed*** solely for ignitability, corrosivity or reactivity, to no longer manage those wastes as hazardous, provided the wastes do not exhibit any of the noted characteristics. The decharacterized wastes must meet land disposal restriction standards before the wastes may be disposed of in a solid waste landfill. Adoption of this rule will clarify management standards for these wastes and make Oregon's regulations equivalent to EPA's.

c. Recommendation: Adopt the rule.

7. Proposed Rule: Correction to the Hazardous Waste Identification Rule (HWIR): Revisions to the Mixture and Derived-From Rules. [66 FR 50332, October 3, 2001.]

a. Background: This rule clarifies 1) the federal exclusion from the definition of solid waste of certain mixtures of wastes, commonly referred to as Bevill wastes (20 "mineral processing" wastes excluded from the definition of hazardous wastes), and 2) the federal exclusion of listed hazardous wastes that are listed solely because they contain a characteristic of ignitability, corrosivity or reactivity (ICR), provided the waste has been decharacterized.

b. Oregon Impact: The Commission adopted the original federal mixture and derived-from rules. Adoption of this rule will clarify management standards for these wastes and make Oregon's regulations equivalent to EPA's.

c. Recommendation: Adopt the correction.

8. Proposed Rule: Change of Official EPA Mailing Address; Additional technical Amendments and Corrections. [66 FR 34374, June 28, 2001.]

a. Background: The rule updates the official mailing address for EPA, due to the relocation of the majority of its Headquarters offices to downtown Washington, D.C.

b. Oregon Impact: None

c. Recommendation: Adopt the rule.

9. Proposed Rule: Hazardous Waste Management System; Identification and Listing of Hazardous Waste: Inorganic Chemical Manufacturing Wastes; Land Disposal

Restrictions for Newly Identified Wastes; and CERCLA Hazardous Substance Designation and Reportable Quantities. [66 FR 58258, November 20, 2001, and 67 FR 17119, April 9, 2002 (Corrections)].

a. Background: As a result of a consent decree, EPA is listing three new inorganic hazardous wastes, (K176, K177, and K178) from chemical manufacturing, and establishing land disposal restrictions standards for these wastes. The listing of these wastes as hazardous will subject the wastes to comprehensive regulation, including the applicable land disposal treatment standards.

b. Oregon Impact: The rule is already in effect in Oregon, but is currently implemented by EPA. There are no known generators of these wastes in Oregon.

c. Recommendation: Adopt the rule.

10. Proposed Rule: Amendments to the Corrective Action Management Unit Rule. [67 FR 2962, January 22, 2002.]

a. Background: A Corrective Action Management Unit (CAMU) is a unit, established at a cleanup site, in which wastes can be treated, stored or disposed of without having to meet land disposal restrictions or trigger minimum technology requirements. The rule amends the 1993 CAMU rule to remove cleanup disincentives that RCRA can create and to facilitate treatment, storage and disposal of hazardous wastes generated during cleanups.

b. Oregon Impact: The Commission adopted the original "CAMU" rule and the Department became authorized to implement the CAMU standards in lieu of EPA in 1995. However, because of a legal challenge, EPA amended the base CAMU rule, and because the Department is authorized for the base CAMU rule, EPA granted the Department interim authorization to implement the CAMU amendments. Therefore, adoption of the amendments is necessary to provide continuity in the CAMU waste management program. In addition, adoption of the rule should facilitate the cleanup of contaminated sites by allowing more options for off-site treatment of wastes, perhaps resulting in lower costs.

c. Recommendation: Adopt the amendments.

11. Proposed Rule: NESHAPS: Interim Standards for Hazardous Air Pollutants for Hazardous Waste Combustors (Interim standards rule). [67 FR 6792, February 13, 2002.]

a. Background: As in # 2 above, the EPA has adopted standards to more rigorously control toxic emissions from burning hazardous waste in incinerators, cement kilns, and lightweight aggregate kilns. Several amendments to the original emission standards have

subsequently been promulgated. Portions of the rule were vacated by the Court, and EPA was granted an extension to develop these interim standards. These interim standards replace the vacated emission standards until final standards are promulgated by June 2005.

b. Oregon Impact: Air Quality (AQ) already adopted their portion of the NESHAP, and with this rule HW is updating its rule to be consistent. There is one hazardous waste combustor in Oregon subject to the combustor rules. That facility is the Umatilla Chemical Agent Disposal Facility outside of Hermiston, Oregon. The adoption of these rules will not have an impact on the existing permit for this facility since that permit includes the previously adopted AQ rules.

c. Recommendation: Adopt the rule.

12. Proposed Rule: NESHAPS: Standards for Hazardous Air Pollutants for Hazardous Waste Combustors. [67 FR 6968, February 14, 2002.]

a. Background: As in # 2 above, the EPA has adopted standards to more rigorously control toxic emissions from burning hazardous waste in incinerators, cement kilns, and lightweight aggregate kilns. Several amendments to the original emission standards have subsequently been promulgated. This rule corrects technical errors that were made in the September 30, 1999 EPA rulemaking establishing standards for hazardous waste burning cement kilns, lightweight aggregate kilns and incinerators (see 64 FR 52828, as amended 64 FR 63209).

b. Oregon Impact: AQ already adopted their portion of the NESHAP, and with this rule HW is updating its rule to be consistent. There is one hazardous waste combustor in Oregon subject to the combustor rules. That facility is the Umatilla Chemical Agent Disposal Facility outside of Hermiston, Oregon. The adoption of these rules will not have an impact on the existing permit for this facility since that permit includes the previously adopted AQ rules.

c. Recommendation: Adopt the rule.

13. Proposed Rule: Vacatur of Mineral Processing Spent Materials Being Reclaimed as Solid Wastes and TCLP Use with Manufacturing Gas Plant Wastes (MGP). 67 FR 11251, March 13, 2002.

a. Background: Because of a court challenge, EPA was required to vacate a previous rule that excluded certain mineral processing waste "secondary materials" from the definition of solid waste. EPA's original rule was promulgated to avoid the practice of placing mineral processing wastes on the ground, unprotected. However, the Court for the District of Columbia ruled that the additional processing of by-products and sludge generated from mineral processing is a continuation of the manufacturing process.

The court also determined that the Toxicity Characteristic Leaching Procedure (TCLP) was not appropriate for evaluating manufacturing gas plant (MGP) waste because the TCLP test was developed to evaluate only those wastes destined for disposal in solid waste disposal facilities, and there is no evidence that these wastes have been managed in such facilities.

b. Oregon Impact: The Commission previously adopted EPA's rule classifying mineral processing by-products and sludge as "solid wastes" when being reclaimed. However, these secondary materials were exempted from the definition of solid wastes if the materials were physically contained prior to and during reclamation (recycling). The effect of this rule vacatur is that certain mineral processing wastes that are by-products or sludge and destined for reclamation are not classified as "solid waste" and, therefore, have no requirement to be physically contained.

There are no known operations generating mineral processing characteristic by-products or sludge that are affected by the vacatur in Oregon.

There are seven MGP cleanup sites in Oregon. Two of these have already been cleaned up. The remaining five sites could be affected by this rule change. Adoption of the vacatur should increase flexibility and decrease costs for cleanups at these sites.

c. Recommendation: Adopt the rule deletions.

14. Proposed Rule: Zinc Fertilizers Made From Recycled Hazardous Secondary Materials. [67 FR 48393, July 24, 2002.]

a. Background: This rule establishes exclusions from the definition of solid waste and limits for metals and dioxin in zinc-containing fertilizers made from hazardous wastes.

b. Oregon Impact: In 1999, the Commission adopted metal limits for zinc-containing fertilizers made from K061 hazardous wastes. Prior to that, K061 (baghouse dust from steel manufacturing) could be processed and placed on the ground as fertilizer without having to meet dioxin and metal limits.

EPA's fertilizer rule establishes standards for all zinc-containing fertilizers made from hazardous waste, including K061. These new EPA standards supersede the Department's because they are more stringent than Oregon rules.

In addition, the Oregon Department of Agriculture (ODA) is also adopting by reference EPA's new rules, and the Department's adoption will be consistent with the ODA.

c. Recommendation: Adopt the rule.

15. Proposed Rule: Hazardous Remediation Waste Management Requirements (HWIR-Media); [63 FR 65874, November 30, 1998.]

a. Background: This proposed rule excludes from the definition of hazardous waste, dredged sediments managed pursuant to certain federal Clean Water Act requirements. This exclusion is limited to sediments destined for upland disposal areas with return flow discharge or otherwise regulated by the Clean Water Act. Sediments destined for upland disposal with no return flow will not be eligible for this exclusion.

b. Oregon Impact: On July 14, 2000, the Commission elected not to adopt the federal dredged materials exclusion in this rule from the definition of hazardous wastes. At that time, the Department was evaluating the best way to manage contaminated dredged sediments and stated that it was premature to eliminate the hazardous waste regulations as a management option.

Since then, the Department has evaluated best management methods for dredged materials throughout their life cycle, and believes that adoption of the exclusion will promote cleanup of contaminated sediments. Sediments meeting the exclusion will be managed according to Clean Water Act requirements. Sediments not meeting the conditions of the exclusion will be subject to applicable solid waste and hazardous waste management requirements. Hazardous waste regulations may be in effect after the dewatering of the dredged materials and before their final upland disposal if these materials are determined to be a solid waste.

c. Recommendation: Adopt the rule.

APPENDIX F

Chain-of-Custody Documentation and Laboratory Analytical Reports:
Groundwater Samples from June 2004 Temporary Well Points

SCOEPA00013695

HAHN AND ASSOCIATES, INC.
Environmental Consultants
434 NW Sixth Avenue, Suite 203 • Portland OR 97209
(503) 796-0717 • Fax (503) 227-2209

Laboratory: North Creek Analytical Portland OR
Lab Project No.:

CHAIN OF CUSTODY

Chain of Custody No. P4F0164

Project Manager: Rob Ede
Project No.: 2708
Project Name: GASCO
Collected by: APR

Liquid with Sediment Sample
____ Test Filtrate ____ Test Sediment ____ Test Both
Multi-Phase Sample
____ Test One (which) ____ Test Separately ____ Shake

Samples Received at 4C (Y or N):
Appropriate Containers Used (Y or N):
Provide Verbal Results (Y or N): No
Provide Preliminary Fax Results: Yes

Comments

Sample Number Prefix: 2708-040602-

metals = As, Cr, Cu, Ni, Pb, Zn
Pricing/reporting levels As per Nerenberg to Ede, 12/12/03.

Lab ID	Sample #	Date	Time	Sample Description	Matrix: Soil	Matrix: Water	Matrix: Other	Number of Containers	PAHs (EPA 8270 SIM)	SVOCs (EPA 8270)	VOCs (EPA 8260)	TOTAL CN (EPA 9010)	Amenb CN (EPA 9010)	Total metals (EPA 6010) #	Diss. metals (EPA 6010) #	RUSH	Remarks
	100	6/2/04	14:05	E.B./F.B.	X			4			X						~~HOLD~~ 1SK
	101	↓	14:45	356A 18-22'	X			10	X	X	X	X	X	X	X		
	99		1545	TRIP	X			1			~~X~~ 1SK						HOLD

Relinquished by	Company	Date	Time	Received by	Company
[signature]	HAI	6/3/04	13:20	[signature]	NCA
[signature]	NCA	6/3/04	16:45	[signature]	NCA

5.0°C

B-56 18-22' BGS GROUNDWATER

SCOEPA00013696

NORTH CREEK ANALYTICAL COOLER RECEIPT FORM

(Army Corp. compliant)

Client: HWA & Assoc.

1. **Please sign for receipt and opening of** 1 **cooler or** ____ **other** ____

   By (print) Erica Dahan (sign) Erica Dahan

2. Date samples received 6/3/04 Date opened: Same X or ___/___/___

3. Delivered by: X NCA courier ___ FedEx ___UPS ___Courier ___Client ___Other ____

   Airbill # if applicable ____ (Put copy of shipping papers in file)

4. There were 1 custody seals present, signed by BOB date 6/3/04

5. Were the custody seals unbroken and intact at the date and time of arrival? X Yes ___No

6. Was ice used? X yes ___no Type of ice: ___ blue ice X gel ice ___real ice

   Temperature (degrees C) 5.0°C Raytek thermometer ____ Digi-Therm (probe temperature blank)

7. Are custody papers sealed in a plastic bag and taped inside to lid? X Yes ___No

8. Were custody papers filled out properly (ink, signed, etc.)? X Yes ___No

   If "no" please specify: ____

9. Was project identifiable from custody papers? X Yes ___No

   Name of project PASCO (if applicable)

10. **Initial and date for unpacking:** VE **(initials)** **date** 6/4/04

11. Packing material: X bubble wrap/bag ___styrofoam ___cardboard ____other

12. Were samples in bags? ___Yes X No

13. Did all containers indicated on the COC arrive? X Yes ___No

    If "no" please indicate which containers were absent ____

14. Were all containers unbroken and labels in good condition? X Yes ___No

    If "no" please indicate which containers ____

15. Were all bottle labels complete (ID, date, time, signature, etc.)? X Yes ___No

    Do the IDs, times, etc. agree with the COC? X Yes ___No

    If "no" please indicate which containers ____

16. Are containers properly preserved for indicated analysis? X Yes ___No

17. Is there adequate volume for the test(s) requested? X Yes ___No

18. If voa vials were submitted, are they free of bubbles? X N/A ___Yes ___No

19. **Log-in phase: Date samples were logged in:** 6/4/04 **Elm Project # P** 4F0116

20. Logged in by (print) Vanessa Evans (sign) Vanessa Evans

21. Was the project manager notified of status? (Use back of form as a record) ___Yes X No

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541.383.9310 fax 541.382.7588

22 June, 2004

Rob Ede
Hahn and Associates, Inc.
434 NW Sixth Ave., Suite 203
Portland, OR 97209

RE: Gasco Upland

Enclosed are the results of analyses for samples received by the laboratory on 06/03/04 16:45. If you have any questions concerning this report, please feel free to contact me.

Sincerely,

Philip Nerenberg
Laboratory Manager

Work Orders included in this report:
P4F0166

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541.383.9310 fax 541.382.7588

Hahn and Associates, Inc.	Project: Gasco Upland	
434 NW Sixth Ave., Suite 203	Project Number: 2708	**Reported:**
Portland, OR 97209	Project Manager: Rob Ede	06/22/04 11:55

ANALYTICAL REPORT FOR SAMPLES

Sample ID	Laboratory ID	Matrix	Date Sampled	Date Received
2708-040602-100	P4F0166-01	Water	06/02/04 14:05	06/03/04 16:45
2708-040602-101	P4F0166-02	Water	06/02/04 14:45	06/03/04 16:45

North Creek Analytical - Portland

Philip Nerenberg

Philip Nerenberg, Laboratory Manager

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.

SCOEPA00013699

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541.383.9310 fax 541.382.7588

Hahn and Associates, Inc.	Project: Gasco Upland	
434 NW Sixth Ave., Suite 203	Project Number: 2708	**Reported:**
Portland, OR 97209	Project Manager: Rob Ede	06/22/04 11:55

Total Metals per EPA 6000/7000 Series Methods

B-56 18-22'

North Creek Analytical - Portland

Analyte	Result	Reporting Limit	Units	Dilution	Method	Prepared	Analyzed	Batch	Notes
2708-040602-101 (P4F0166-02) Water					Sampled: 06/02/04 Received: 06/03/04				
Arsenic	**0.00177**	0.00100	mg/l	1	EPA 6020	06/08/04	06/10/04	4060323	
Chromium	**0.00803**	0.00100	"	"	"	"	"	"	
Copper	**0.00856**	0.00200	"	"	"	"	"	"	
Lead	**0.00446**	0.00100	"	"	"	"	"	"	
Nickel	**0.0121**	0.00200	"	"	"	"	"	"	
Zinc	**0.0288**	0.00500	"	"	"	"	"	"	

North Creek Analytical - Portland

Philip Nerenberg

Philip Nerenberg, Laboratory Manager

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SCOEPA00013700

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Hahn and Associates, Inc.	Project: Gasco Upland	
434 NW Sixth Ave., Suite 203	Project Number: 2708	**Reported:**
Portland, OR 97209	Project Manager: Rob Ede	06/22/04 11:55

Dissolved Metals per EPA 6000/7000 Series Methods

B-56 18-22'

North Creek Analytical - Portland

Analyte	Result	Reporting Limit	Units	Dilution	Method	Prepared	Analyzed	Batch	Notes
2708-040602-101 (P4F0166-02) Water					Sampled: 06/02/04 Received: 06/03/04				
Arsenic	**0.00134**	0.00100	mg/l	1	EPA 6020	06/10/04	06/12/04	4060454	
Chromium	**0.00100**	0.00100	"	"	"	"	"	"	
Copper	ND	0.00200	"	"	"	"	"	"	
Lead	ND	0.00100	"	"	"	"	"	"	
Nickel	**0.0238**	0.00200	"	"	"	"	"	"	
Zinc	**0.0199**	0.00500	"	"	"	"	"	"	

North Creek Analytical - Portland

Philip Nerenberg

Philip Nerenberg, Laboratory Manager

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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Hahn and Associates, Inc.	Project: Gasco Upland	
434 NW Sixth Ave., Suite 203	Project Number: 2708	**Reported:**
Portland, OR 97209	Project Manager: Rob Ede	06/22/04 11:55

FIELD BLANK

Volatile Organic Compounds per EPA Method 8260B

North Creek Analytical - Portland

Analyte	Result	Reporting Limit	Units	Dilution	Method	Prepared	Analyzed	Batch	Notes
2708-040602-100 (P4F0166-01) Water					Sampled: 06/02/04 Received: 06/03/04				
Acetone	ND	25.0	ug/l	1	EPA 8260B	06/09/04	06/09/04	4060374	
Benzene	ND	1.00	"	"	"	"	"	"	
Bromobenzene	ND	1.00	"	"	"	"	"	"	
Bromochloromethane	ND	1.00	"	"	"	"	"	"	
Bromodichloromethane	ND	1.00	"	"	"	"	"	"	
Bromoform	ND	1.00	"	"	"	"	"	"	
Bromomethane	ND	5.00	"	"	"	"	"	"	
2-Butanone	ND	10.0	"	"	"	"	"	"	
n-Butylbenzene	ND	5.00	"	"	"	"	"	"	
sec-Butylbenzene	ND	1.00	"	"	"	"	"	"	
tert-Butylbenzene	ND	1.00	"	"	"	"	"	"	
Carbon disulfide	ND	10.0	"	"	"	"	"	"	
Carbon tetrachloride	ND	1.00	"	"	"	"	"	"	
Chlorobenzene	ND	1.00	"	"	"	"	"	"	
Chloroethane	ND	1.00	"	"	"	"	"	"	
Chloroform	ND	1.00	"	"	"	"	"	"	
Chloromethane	ND	5.00	"	"	"	"	"	"	
2-Chlorotoluene	ND	1.00	"	"	"	"	"	"	
4-Chlorotoluene	ND	1.00	"	"	"	"	"	"	
1,2-Dibromo-3-chloropropane	ND	5.00	"	"	"	"	"	"	
Dibromochloromethane	ND	1.00	"	"	"	"	"	"	
1,2-Dibromoethane	ND	1.00	"	"	"	"	"	"	
Dibromomethane	ND	1.00	"	"	"	"	"	"	
1,2-Dichlorobenzene	ND	1.00	"	"	"	"	"	"	
1,3-Dichlorobenzene	ND	1.00	"	"	"	"	"	"	
1,4-Dichlorobenzene	ND	1.00	"	"	"	"	"	"	
Dichlorodifluoromethane	ND	5.00	"	"	"	"	"	"	
1,1-Dichloroethane	ND	1.00	"	"	"	"	"	"	
1,2-Dichloroethane	ND	1.00	"	"	"	"	"	"	
1,1-Dichloroethene	ND	1.00	"	"	"	"	"	"	
cis-1,2-Dichloroethene	ND	1.00	"	"	"	"	"	"	
trans-1,2-Dichloroethene	ND	1.00	"	"	"	"	"	"	
1,2-Dichloropropane	ND	1.00	"	"	"	"	"	"	
1,3-Dichloropropane	ND	1.00	"	"	"	"	"	"	
2,2-Dichloropropane	ND	1.00	"	"	"	"	"	"	
1,1-Dichloropropene	ND	1.00	"	"	"	"	"	"	
cis-1,3-Dichloropropene	ND	1.00	"	"	"	"	"	"	

North Creek Analytical - Portland

Philip Nerenberg

Philip Nerenberg, Laboratory Manager

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.

SCOEPA00013702

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Hahn and Associates, Inc.	Project: Gasco Upland	
434 NW Sixth Ave., Suite 203	Project Number: 2708	**Reported:**
Portland, OR 97209	Project Manager: Rob Ede	06/22/04 11:55

Volatile Organic Compounds per EPA Method 8260B

North Creek Analytical - Portland

Analyte	Result	Reporting Limit	Units	Dilution	Method	Prepared	Analyzed	Batch	Notes
2708-040602-100 (P4F0166-01) Water					Sampled: 06/02/04 Received: 06/03/04				
trans-1,3-Dichloropropene	ND	1.00	ug/l	1	EPA 8260B	06/09/04	06/09/04	4060374	
Ethylbenzene	ND	1.00	"	"	"	"	"	"	
Hexachlorobutadiene	ND	2.00	"	"	"	"	"	"	
2-Hexanone	ND	10.0	"	"	"	"	"	"	
Isopropylbenzene	ND	2.00	"	"	"	"	"	"	
p-Isopropyltoluene	ND	2.00	"	"	"	"	"	"	
4-Methyl-2-pentanone	ND	5.00	"	"	"	"	"	"	
Methyl tert-butyl ether	ND	1.00	"	"	"	"	"	"	
Methylene chloride	ND	5.00	"	"	"	"	"	"	
Naphthalene	ND	2.00	"	"	"	"	"	"	
n-Propylbenzene	ND	1.00	"	"	"	"	"	"	
Styrene	ND	1.00	"	"	"	"	"	"	
1,1,1,2-Tetrachloroethane	ND	1.00	"	"	"	"	"	"	
1,1,2,2-Tetrachloroethane	ND	1.00	"	"	"	"	"	"	
Tetrachloroethene	ND	1.00	"	"	"	"	"	"	
Toluene	ND	1.00	"	"	"	"	"	"	
1,2,3-Trichlorobenzene	ND	1.00	"	"	"	"	"	"	
1,2,4-Trichlorobenzene	ND	1.00	"	"	"	"	"	"	
1,1,1-Trichloroethane	ND	1.00	"	"	"	"	"	"	
1,1,2-Trichloroethane	ND	1.00	"	"	"	"	"	"	
Trichloroethene	ND	1.00	"	"	"	"	"	"	
Trichlorofluoromethane	ND	1.00	"	"	"	"	"	"	
1,2,3-Trichloropropane	ND	1.00	"	"	"	"	"	"	
1,2,4-Trimethylbenzene	ND	1.00	"	"	"	"	"	"	
1,3,5-Trimethylbenzene	ND	1.00	"	"	"	"	"	"	
Vinyl chloride	ND	1.00	"	"	"	"	"	"	
o-Xylene	ND	1.00	"	"	"	"	"	"	
m,p-Xylene	ND	2.00	"	"	"	"	"	"	
Surr: 4-BFB	*92.0 %*	*75-120*							
Surr: 1,2-DCA-d4	*102 %*	*77-129*							
Surr: Dibromofluoromethane	*100 %*	*80-121*							
Surr: Toluene-d8	*98.0 %*	*80-120*							

North Creek Analytical - Portland

Philip Nerenberg

Philip Nerenberg, Laboratory Manager

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541.383.9310 fax 541.382.7588

Hahn and Associates, Inc.	Project: Gasco Upland	
434 NW Sixth Ave., Suite 203	Project Number: 2708	**Reported:**
Portland, OR 97209	Project Manager: Rob Ede	06/22/04 11:55

Volatile Organic Compounds per EPA Method 8260B

B-56 18-22'

North Creek Analytical - Portland

Analyte	Result	Reporting Limit	Units	Dilution	Method	Prepared	Analyzed	Batch	Notes
2708-040602-101 (P4F0166-02RE1) Water					Sampled: 06/02/04 Received: 06/03/04				
Acetone	ND	125	ug/l	5	EPA 8260B	06/10/04	06/10/04	4060429	
Benzene	**8.00**	5.00	"	"	"	"	"	"	
Bromobenzene	ND	5.00	"	"	"	"	"	"	
Bromochloromethane	ND	5.00	"	"	"	"	"	"	
Bromodichloromethane	ND	5.00	"	"	"	"	"	"	
Bromoform	ND	5.00	"	"	"	"	"	"	
Bromomethane	ND	25.0	"	"	"	"	"	"	
2-Butanone	ND	50.0	"	"	"	"	"	"	
n-Butylbenzene	ND	25.0	"	"	"	"	"	"	
sec-Butylbenzene	ND	5.00	"	"	"	"	"	"	
tert-Butylbenzene	ND	5.00	"	"	"	"	"	"	
Carbon disulfide	ND	50.0	"	"	"	"	"	"	
Carbon tetrachloride	ND	5.00	"	"	"	"	"	"	
Chlorobenzene	ND	5.00	"	"	"	"	"	"	
Chloroethane	ND	5.00	"	"	"	"	"	"	
Chloroform	ND	5.00	"	"	"	"	"	"	
Chloromethane	ND	25.0	"	"	"	"	"	"	
2-Chlorotoluene	ND	5.00	"	"	"	"	"	"	
4-Chlorotoluene	ND	5.00	"	"	"	"	"	"	
1,2-Dibromo-3-chloropropane	ND	25.0	"	"	"	"	"	"	
Dibromochloromethane	ND	5.00	"	"	"	"	"	"	
1,2-Dibromoethane	ND	5.00	"	"	"	"	"	"	
Dibromomethane	ND	5.00	"	"	"	"	"	"	
1,2-Dichlorobenzene	ND	5.00	"	"	"	"	"	"	
1,3-Dichlorobenzene	ND	5.00	"	"	"	"	"	"	
1,4-Dichlorobenzene	ND	5.00	"	"	"	"	"	"	
Dichlorodifluoromethane	ND	25.0	"	"	"	"	"	"	
1,1-Dichloroethane	ND	5.00	"	"	"	"	"	"	
1,2-Dichloroethane	ND	5.00	"	"	"	"	"	"	
1,1-Dichloroethene	ND	5.00	"	"	"	"	"	"	
cis-1,2-Dichloroethene	ND	5.00	"	"	"	"	"	"	
trans-1,2-Dichloroethene	ND	5.00	"	"	"	"	"	"	
1,2-Dichloropropane	ND	5.00	"	"	"	"	"	"	
1,3-Dichloropropane	ND	5.00	"	"	"	"	"	"	
2,2-Dichloropropane	ND	5.00	"	"	"	"	"	"	
1,1-Dichloropropene	ND	5.00	"	"	"	"	"	"	
cis-1,3-Dichloropropene	ND	5.00	"	"	"	"	"	"	

North Creek Analytical - Portland

Philip Nerenberg

Philip Nerenberg, Laboratory Manager

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Hahn and Associates, Inc.	Project: Gasco Upland	
434 NW Sixth Ave., Suite 203	Project Number: 2708	**Reported:**
Portland, OR 97209	Project Manager: Rob Ede	06/22/04 11:55

Volatile Organic Compounds per EPA Method 8260B

North Creek Analytical - Portland

Analyte	Result	Reporting Limit	Units	Dilution	Method	Prepared	Analyzed	Batch	Notes
2708-040602-101 (P4F0166-02RE1) Water						Sampled: 06/02/04	Received: 06/03/04		
trans-1,3-Dichloropropene	ND	5.00	ug/l	5	EPA 8260B	06/10/04	06/10/04	4060429	
Ethylbenzene	ND	5.00	"	"	"	"	"	"	
Hexachlorobutadiene	ND	10.0	"	"	"	"	"	"	
2-Hexanone	ND	50.0	"	"	"	"	"	"	
Isopropylbenzene	ND	10.0	"	"	"	"	"	"	
p-Isopropyltoluene	ND	10.0	"	"	"	"	"	"	
4-Methyl-2-pentanone	ND	25.0	"	"	"	"	"	"	
Methyl tert-butyl ether	ND	5.00	"	"	"	"	"	"	
Methylene chloride	ND	25.0	"	"	"	"	"	"	
Naphthalene	**328**	10.0	"	"	"	"	"	"	
n-Propylbenzene	ND	5.00	"	"	"	"	"	"	
Styrene	ND	5.00	"	"	"	"	"	"	
1,1,1,2-Tetrachloroethane	ND	5.00	"	"	"	"	"	"	
1,1,2,2-Tetrachloroethane	ND	5.00	"	"	"	"	"	"	
Tetrachloroethene	ND	5.00	"	"	"	"	"	"	
Toluene	ND	5.00	"	"	"	"	"	"	
1,2,3-Trichlorobenzene	ND	5.00	"	"	"	"	"	"	
1,2,4-Trichlorobenzene	ND	5.00	"	"	"	"	"	"	
1,1,1-Trichloroethane	ND	5.00	"	"	"	"	"	"	
1,1,2-Trichloroethane	ND	5.00	"	"	"	"	"	"	
Trichloroethene	ND	5.00	"	"	"	"	"	"	
Trichlorofluoromethane	ND	5.00	"	"	"	"	"	"	
1,2,3-Trichloropropane	ND	5.00	"	"	"	"	"	"	
1,2,4-Trimethylbenzene	ND	5.00	"	"	"	"	"	"	
1,3,5-Trimethylbenzene	ND	5.00	"	"	"	"	"	"	
Vinyl chloride	ND	5.00	"	"	"	"	"	"	
o-Xylene	ND	5.00	"	"	"	"	"	"	
m,p-Xylene	ND	10.0	"	"	"	"	"	"	
Surr: 4-BFB	*91.0 %*	*75-120*							
Surr: 1,2-DCA-d4	*94.5 %*	*77-129*							
Surr: Dibromofluoromethane	*96.5 %*	*80-121*							
Surr: Toluene-d8	*92.0 %*	*80-120*							

North Creek Analytical - Portland

Philip Nerenberg

Philip Nerenberg, Laboratory Manager

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Hahn and Associates, Inc.	Project: Gasco Upland	
434 NW Sixth Ave., Suite 203	Project Number: 2708	**Reported:**
Portland, OR 97209	Project Manager: Rob Ede	06/22/04 11:55

Semivolatile Organic Compounds per EPA Method 8270C

North Creek Analytical - Portland

Analyte B-56 18-22	Result	Reporting Limit	Units	Dilution	Method	Prepared	Analyzed	Batch	Notes
2708-040602-101 (P4F0166-02) Water					Sampled: 06/02/04 Received: 06/03/04				**R-05**
Carbazole	ND	25.0	ug/l	5	EPA 8270C	06/07/04	06/09/04	4060257	
Acenaphthene	**71.3**	25.0	"	"	"	"	"	"	
Acenaphthylene	ND	25.0	"	"	"	"	"	"	
Anthracene	**45.9**	25.0	"	"	"	"	"	"	
Benzo (a) anthracene	**50.4**	25.0	"	"	"	"	"	"	
Benzo (a) pyrene	**66.7**	25.0	"	"	"	"	"	"	
Benzo (b) fluoranthene	**39.4**	25.0	"	"	"	"	"	"	
Benzo (ghi) perylene	**50.9**	25.0	"	"	"	"	"	"	
Benzo (k) fluoranthene	**40.6**	25.0	"	"	"	"	"	"	
Benzoic Acid	ND	250	"	"	"	"	"	"	
Benzyl alcohol	ND	50.0	"	"	"	"	"	"	
4-Bromophenyl phenyl ether	ND	25.0	"	"	"	"	"	"	
Butyl benzyl phthalate	ND	25.0	"	"	"	"	"	"	
4-Chloro-3-methylphenol	ND	25.0	"	"	"	"	"	"	
4-Chloroaniline	ND	100	"	"	"	"	"	"	
Bis(2-chloroethoxy)methane	ND	50.0	"	"	"	"	"	"	
Bis(2-chloroethyl)ether	ND	25.0	"	"	"	"	"	"	
Bis(2-chloroisopropyl)ether	ND	50.0	"	"	"	"	"	"	
2-Chloronaphthalene	ND	25.0	"	"	"	"	"	"	
2-Chlorophenol	ND	25.0	"	"	"	"	"	"	
4-Chlorophenyl phenyl ether	ND	25.0	"	"	"	"	"	"	
Chrysene	**69.2**	25.0	"	"	"	"	"	"	
Di-n-butyl phthalate	ND	25.0	"	"	"	"	"	"	
Di-n-octyl phthalate	ND	25.0	"	"	"	"	"	"	
Dibenzo (a,h) anthracene	ND	25.0	"	"	"	"	"	"	
Dibenzofuran	ND	25.0	"	"	"	"	"	"	
1,2-Dichlorobenzene	ND	25.0	"	"	"	"	"	"	
1,3-Dichlorobenzene	ND	25.0	"	"	"	"	"	"	
1,4-Dichlorobenzene	ND	25.0	"	"	"	"	"	"	
3,3'-Dichlorobenzidine	ND	25.0	"	"	"	"	"	"	
2,4-Dichlorophenol	ND	25.0	"	"	"	"	"	"	
Diethyl phthalate	ND	25.0	"	"	"	"	"	"	
2,4-Dimethylphenol	ND	50.0	"	"	"	"	"	"	
Dimethyl phthalate	ND	25.0	"	"	"	"	"	"	
4,6-Dinitro-2-methylphenol	ND	50.0	"	"	"	"	"	"	
2,4-Dinitrophenol	ND	125	"	"	"	"	"	"	
2,4-Dinitrotoluene	ND	25.0	"	"	"	"	"	"	

North Creek Analytical - Portland

Philip Nerenberg

Philip Nerenberg, Laboratory Manager

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Hahn and Associates, Inc.	Project: Gasco Upland	
434 NW Sixth Ave., Suite 203	Project Number: 2708	**Reported:**
Portland, OR 97209	Project Manager: Rob Ede	06/22/04 11:55

Semivolatile Organic Compounds per EPA Method 8270C

North Creek Analytical - Portland

Analyte	Result	Reporting Limit	Units	Dilution	Method	Prepared	Analyzed	Batch	Notes
2708-040602-101 (P4F0166-02) Water					Sampled: 06/02/04	Received: 06/03/04			**R-05**
2,6-Dinitrotoluene	ND	25.0	ug/l	5	EPA 8270C	06/07/04	06/09/04	4060257	
Bis(2-ethylhexyl)phthalate	ND	50.0	"	"	"	"	"	"	
Fluoranthene	**161**	25.0	"	"	"	"	"	"	
Fluorene	**34.5**	25.0	"	"	"	"	"	"	
Hexachlorobenzene	ND	25.0	"	"	"	"	"	"	
Hexachlorobutadiene	ND	50.0	"	"	"	"	"	"	
Hexachlorocyclopentadiene	ND	50.0	"	"	"	"	"	"	
Hexachloroethane	ND	50.0	"	"	"	"	"	"	
Indeno (1,2,3-cd) pyrene	**36.9**	25.0	"	"	"	"	"	"	
Isophorone	ND	25.0	"	"	"	"	"	"	
2-Methylnaphthalene	ND	25.0	"	"	"	"	"	"	
2-Methylphenol	ND	50.0	"	"	"	"	"	"	
3-,4-Methylphenol	ND	25.0	"	"	"	"	"	"	
Naphthalene	ND	25.0	"	"	"	"	"	"	
2-Nitroaniline	ND	25.0	"	"	"	"	"	"	
3-Nitroaniline	ND	50.0	"	"	"	"	"	"	
4-Nitroaniline	ND	50.0	"	"	"	"	"	"	
Nitrobenzene	ND	25.0	"	"	"	"	"	"	
2-Nitrophenol	ND	25.0	"	"	"	"	"	"	
4-Nitrophenol	ND	125	"	"	"	"	"	"	
N-Nitrosodi-n-propylamine	ND	50.0	"	"	"	"	"	"	
N-Nitrosodiphenylamine	ND	25.0	"	"	"	"	"	"	
Pentachlorophenol	ND	50.0	"	"	"	"	"	"	
Phenanthrene	**136**	25.0	"	"	"	"	"	"	
Phenol	ND	25.0	"	"	"	"	"	"	
Pyrene	**199**	25.0	"	"	"	"	"	"	
1,2,4-Trichlorobenzene	ND	25.0	"	"	"	"	"	"	
2,4,5-Trichlorophenol	ND	25.0	"	"	"	"	"	"	
2,4,6-Trichlorophenol	ND	25.0	"	"	"	"	"	"	
Surr: 2-Fluorobiphenyl	*77.3 %*	*26-135*							
Surr: 2-Fluorophenol	*38.9 %*	*6-124*							
Surr: Nitrobenzene-d5	*77.5 %*	*23-147*							
Surr: Phenol-d6	*27.7 %*	*11-130*							
Surr: p-Terphenyl-d14	*116 %*	*38-149*							
Surr: 2,4,6-Tribromophenol	*97.2 %*	*19-126*							

North Creek Analytical - Portland

Philip Nerenberg

Philip Nerenberg, Laboratory Manager

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Hahn and Associates, Inc.	Project: Gasco Upland	
434 NW Sixth Ave., Suite 203	Project Number: 2708	**Reported:**
Portland, OR 97209	Project Manager: Rob Ede	06/22/04 11:55

Polynuclear Aromatic Compounds per EPA 8270M-SIM

North Creek Analytical - Portland

Analyte B-56 18-22	Result	Reporting Limit	Units	Dilution	Method	Prepared	Analyzed	Batch	Notes
2708-040602-101 (P4F0166-02) Water					Sampled: 06/02/04	Received: 06/03/04			**R-05**
Acenaphthene	**54.1**	2.00	ug/l	20	EPA 8270m	06/07/04	06/09/04	4060262	
Acenaphthylene	**4.08**	2.00	"	"	"	"	"	"	
Anthracene	**14.1**	2.00	"	"	"	"	"	"	
Benzo (a) anthracene	**7.99**	2.00	"	"	"	"	"	"	
Benzo (a) pyrene	**9.45**	2.00	"	"	"	"	"	"	
Benzo (b) fluoranthene	**7.03**	2.00	"	"	"	"	"	"	
Benzo (ghi) perylene	**6.89**	2.00	"	"	"	"	"	"	
Benzo (k) fluoranthene	**6.04**	2.00	"	"	"	"	"	"	
Chrysene	**10.2**	2.00	"	"	"	"	"	"	
Dibenzo (a,h) anthracene	ND	4.00	"	"	"	"	"	"	
Fluoranthene	**44.2**	2.00	"	"	"	"	"	"	
Fluorene	**23.3**	2.00	"	"	"	"	"	"	
Indeno (1,2,3-cd) pyrene	**4.81**	2.00	"	"	"	"	"	"	
Naphthalene	**21.0**	2.00	"	"	"	"	"	"	
Phenanthrene	**53.7**	2.00	"	"	"	"	"	"	
Pyrene	**50.7**	2.00	"	"	"	"	"	"	
Surr: Fluorene-d10	*85.6 %*	*25-125*							
Surr: Pyrene-d10	*73.7 %*	*23-150*							
Surr: Benzo (a) pyrene-d12	*39.3 %*	*10-125*							

North Creek Analytical - Portland

Philip Nerenberg

Philip Nerenberg, Laboratory Manager

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Hahn and Associates, Inc.	Project: Gasco Upland	
434 NW Sixth Ave., Suite 203	Project Number: 2708	**Reported:**
Portland, OR 97209	Project Manager: Rob Ede	06/22/04 11:55

Conventional Chemistry Parameters per APHA/EPA Methods

North Creek Analytical - Portland

Analyte B-56-18-22	Result	Reporting Limit	Units	Dilution	Method	Prepared	Analyzed	Batch	Notes
2708-040602-101 (P4F0166-02) Water					Sampled: 06/02/04 Received: 06/03/04				
Cyanide (amenable)	**0.0343**	0.00500	mg/l	1	EPA 9010A	06/14/04	06/15/04	4060555	
Cyanide (total)	**0.0800**	0.00500	"	"	EPA 9012A	06/11/04	06/11/04	4060476	

North Creek Analytical - Portland

Philip Nerenberg

Philip Nerenberg, Laboratory Manager

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Hahn and Associates, Inc.	Project: Gasco Upland	
434 NW Sixth Ave., Suite 203	Project Number: 2708	**Reported:**
Portland, OR 97209	Project Manager: Rob Ede	06/22/04 11:55

Total Metals per EPA 6000/7000 Series Methods - Quality Control

North Creek Analytical - Portland

Analyte	Result	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
Batch 4060323 - EPA 200/3005										
Blank (4060323-BLK1)				Prepared: 06/08/04 Analyzed: 06/09/04						
Arsenic	ND	0.00100	mg/l							
Chromium	ND	0.00100	"							
Copper	ND	0.00200	"							
Lead	ND	0.00100	"							
Nickel	ND	0.00200	"							
Zinc	ND	0.00500	"							
LCS (4060323-BS1)				Prepared: 06/08/04 Analyzed: 06/10/04						
Arsenic	0.0960	0.00100	mg/l	0.100		96.0	80-120			
Chromium	0.102	0.00100	"	0.100		102	80-120			
Copper	0.0979	0.00200	"	0.100		97.9	80-120			
Lead	0.101	0.00100	"	0.100		101	80-120			
Nickel	0.0974	0.00200	"	0.100		97.4	80-120			
Zinc	0.0940	0.00500	"	0.100		94.0	80-120			
LCS Dup (4060323-BSD1)				Prepared: 06/08/04 Analyzed: 06/10/04						
Arsenic	0.0973	0.00100	mg/l	0.100		97.3	80-120	1.35	20	
Chromium	0.105	0.00100	"	0.100		105	80-120	2.90	20	
Copper	0.0995	0.00200	"	0.100		99.5	80-120	1.62	20	
Lead	0.103	0.00100	"	0.100		103	80-120	1.96	20	
Nickel	0.100	0.00200	"	0.100		100	80-120	2.63	20	
Zinc	0.0954	0.00500	"	0.100		95.4	80-120	1.48	20	
Duplicate (4060323-DUP1)		**Source: P4F0072-01**		Prepared: 06/08/04 Analyzed: 06/10/04						
Arsenic	0.000830	0.00100	mg/l		0.000850			2.38	20	
Chromium	0.00348	0.00100	"		0.00391			11.6	20	
Copper	0.0598	0.00200	"		0.0574			4.10	20	
Lead	0.00572	0.00100	"		0.00546			4.65	20	
Nickel	0.00485	0.00200	"		0.00488			0.617	20	
Zinc	0.159	0.00500	"		0.154			3.19	20	

North Creek Analytical - Portland

Philip Nerenberg

Philip Nerenberg, Laboratory Manager

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Hahn and Associates, Inc.	Project: Gasco Upland	
434 NW Sixth Ave., Suite 203	Project Number: 2708	**Reported:**
Portland, OR 97209	Project Manager: Rob Ede	06/22/04 11:55

Total Metals per EPA 6000/7000 Series Methods - Quality Control

North Creek Analytical - Portland

Analyte	Result	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
Batch 4060323 - EPA 200/3005										
Matrix Spike (4060323-MS1)	**Source: P4F0072-01**			Prepared: 06/08/04		Analyzed: 06/10/04				
Arsenic	0.0974	0.00100	mg/l	0.100	0.000850	96.6	75-125			
Chromium	0.107	0.00100	"	0.100	0.00391	103	75-125			
Copper	0.158	0.00200	"	0.100	0.0574	101	75-125			
Lead	0.108	0.00100	"	0.100	0.00546	103	75-125			
Nickel	0.104	0.00200	"	0.100	0.00488	99.1	75-125			
Zinc	0.250	0.00500	"	0.100	0.154	96.0	75-125			
Matrix Spike (4060323-MS2)	**Source: P4F0072-02**			Prepared: 06/08/04		Analyzed: 06/10/04				
Arsenic	0.102	0.00100	mg/l	0.100	0.000420	102	75-125			
Chromium	0.107	0.00100	"	0.100	0.00106	106	75-125			
Copper	0.109	0.00200	"	0.100	0.00854	100	75-125			
Lead	0.102	0.00100	"	0.100	ND	102	75-125			
Nickel	0.104	0.00200	"	0.100	0.00213	102	75-125			
Zinc	0.126	0.00500	"	0.100	0.0291	96.9	75-125			

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Philip Nerenberg

Philip Nerenberg, Laboratory Manager

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Hahn and Associates, Inc.	Project: Gasco Upland	
434 NW Sixth Ave., Suite 203	Project Number: 2708	**Reported:**
Portland, OR 97209	Project Manager: Rob Ede	06/22/04 11:55

Dissolved Metals per EPA 6000/7000 Series Methods - Quality Control

North Creek Analytical - Portland

Analyte	Result	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
Batch 4060454 - EPA 200/3005 Diss										
Blank (4060454-BLK1)				Prepared: 06/10/04 Analyzed: 06/12/04						
Arsenic	ND	0.00100	mg/l							
Chromium	ND	0.00100	"							
Copper	ND	0.00200	"							
Lead	ND	0.00100	"							
Nickel	ND	0.00200	"							
Zinc	ND	0.00500	"							
LCS (4060454-BS1)				Prepared: 06/10/04 Analyzed: 06/12/04						
Arsenic	0.0961	0.00100	mg/l	0.100		96.1	80-120			
Chromium	0.101	0.00100	"	0.100		101	80-120			
Copper	0.101	0.00200	"	0.100		101	80-120			
Lead	0.100	0.00100	"	0.100		100	80-120			
Nickel	0.105	0.00200	"	0.100		105	80-120			
Zinc	0.0942	0.00500	"	0.100		94.2	80-120			
LCS Dup (4060454-BSD1)				Prepared: 06/10/04 Analyzed: 06/12/04						
Arsenic	0.100	0.00100	mg/l	0.100		100	80-120	3.98	20	
Chromium	0.103	0.00100	"	0.100		103	80-120	1.96	20	
Copper	0.105	0.00200	"	0.100		105	80-120	3.88	20	
Lead	0.0991	0.00100	"	0.100		99.1	80-120	0.904	20	
Nickel	0.106	0.00200	"	0.100		106	80-120	0.948	20	
Zinc	0.0977	0.00500	"	0.100		97.7	80-120	3.65	20	
Duplicate (4060454-DUP1)		**Source: P4F0212-01**		Prepared: 06/10/04 Analyzed: 06/12/04						
Arsenic	0.00151	0.00100	mg/l		0.00119			23.7	20	Q-06
Chromium	0.000840	0.00100	"		0.00498			142	20	Q-06
Copper	0.00231	0.00200	"		0.00218			5.79	20	
Lead	0.000760	0.00100	"		0.000640			17.1	20	
Nickel	0.0326	0.00200	"		0.0320			1.86	20	
Zinc	0.0687	0.00500	"		0.0647			6.00	20	

North Creek Analytical - Portland

Philip Nerenberg

Philip Nerenberg, Laboratory Manager

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Hahn and Associates, Inc.	Project: Gasco Upland	
434 NW Sixth Ave., Suite 203	Project Number: 2708	**Reported:**
Portland, OR 97209	Project Manager: Rob Ede	06/22/04 11:55

Dissolved Metals per EPA 6000/7000 Series Methods - Quality Control

North Creek Analytical - Portland

Analyte	Result	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
Batch 4060454 - EPA 200/3005 Diss										
Matrix Spike (4060454-MS1)	**Source: P4F0212-01**			Prepared: 06/10/04		Analyzed: 06/12/04				
Arsenic	0.109	0.00100	mg/l	0.100	0.00119	108	75-125			
Chromium	0.107	0.00100	"	0.100	0.00498	102	75-125			
Copper	0.101	0.00200	"	0.100	0.00218	98.8	75-125			
Lead	0.0913	0.00100	"	0.100	0.000640	90.7	75-125			
Nickel	0.134	0.00200	"	0.100	0.0320	102	75-125			
Zinc	0.169	0.00500	"	0.100	0.0647	104	75-125			
Matrix Spike (4060454-MS2)	**Source: P4F0212-02**			Prepared: 06/10/04		Analyzed: 06/12/04				
Arsenic	0.112	0.00100	mg/l	0.100	0.00796	104	75-125			
Chromium	0.103	0.00100	"	0.100	0.00538	97.6	75-125			
Copper	0.0958	0.00200	"	0.100	0.00177	94.0	75-125			
Lead	0.0913	0.00100	"	0.100	0.000600	90.7	75-125			
Nickel	0.138	0.00200	"	0.100	0.0338	104	75-125			
Zinc	0.106	0.00500	"	0.100	0.0103	95.7	75-125			

North Creek Analytical - Portland

Philip Nerenberg

Philip Nerenberg, Laboratory Manager

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Hahn and Associates, Inc.	Project: Gasco Upland	
434 NW Sixth Ave., Suite 203	Project Number: 2708	**Reported:**
Portland, OR 97209	Project Manager: Rob Ede	06/22/04 11:55

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 4060374 - EPA 5030B										
Blank (4060374-BLK1)				Prepared & Analyzed: 06/09/04						
Acetone	ND	25.0	ug/l							
Benzene	ND	1.00	"							
Bromobenzene	ND	1.00	"							
Bromochloromethane	ND	1.00	"							
Bromodichloromethane	ND	1.00	"							
Bromoform	ND	1.00	"							
Bromomethane	ND	5.00	"							
2-Butanone	ND	10.0	"							
n-Butylbenzene	ND	5.00	"							
sec-Butylbenzene	ND	1.00	"							
tert-Butylbenzene	ND	1.00	"							
Carbon disulfide	ND	10.0	"							
Carbon tetrachloride	ND	1.00	"							
Chlorobenzene	ND	1.00	"							
Chloroethane	ND	1.00	"							
Chloroform	ND	1.00	"							
Chloromethane	ND	5.00	"							
2-Chlorotoluene	ND	1.00	"							
4-Chlorotoluene	ND	1.00	"							
1,2-Dibromo-3-chloropropane	ND	5.00	"							
Dibromochloromethane	ND	1.00	"							
1,2-Dibromoethane	ND	1.00	"							
Dibromomethane	ND	1.00	"							
1,2-Dichlorobenzene	ND	1.00	"							
1,3-Dichlorobenzene	ND	1.00	"							
1,4-Dichlorobenzene	ND	1.00	"							
Dichlorodifluoromethane	ND	5.00	"							
1,1-Dichloroethane	ND	1.00	"							
1,2-Dichloroethane	ND	1.00	"							
1,1-Dichloroethene	ND	1.00	"							
cis-1,2-Dichloroethene	ND	1.00	"							
trans-1,2-Dichloroethene	ND	1.00	"							
1,2-Dichloropropane	ND	1.00	"							
1,3-Dichloropropane	ND	1.00	"							
2,2-Dichloropropane	ND	1.00	"							
1,1-Dichloropropene	ND	1.00	"							

North Creek Analytical - Portland

Philip Nerenberg

Philip Nerenberg, Laboratory Manager

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Hahn and Associates, Inc.	Project: Gasco Upland	
434 NW Sixth Ave., Suite 203	Project Number: 2708	**Reported:**
Portland, OR 97209	Project Manager: Rob Ede	06/22/04 11:55

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 4060374 - EPA 5030B										
Blank (4060374-BLK1)				Prepared & Analyzed: 06/09/04						
cis-1,3-Dichloropropene	ND	1.00	ug/l							
trans-1,3-Dichloropropene	ND	1.00	"							
Ethylbenzene	ND	1.00	"							
Hexachlorobutadiene	ND	2.00	"							
2-Hexanone	ND	10.0	"							
Isopropylbenzene	ND	2.00	"							
p-Isopropyltoluene	ND	2.00	"							
4-Methyl-2-pentanone	ND	5.00	"							
Methyl tert-butyl ether	ND	1.00	"							
Methylene chloride	ND	5.00	"							
Naphthalene	ND	2.00	"							
n-Propylbenzene	ND	1.00	"							
Styrene	ND	1.00	"							
1,1,1,2-Tetrachloroethane	ND	1.00	"							
1,1,2,2-Tetrachloroethane	ND	1.00	"							
Tetrachloroethene	ND	1.00	"							
Toluene	ND	1.00	"							
1,2,3-Trichlorobenzene	ND	1.00	"							
1,2,4-Trichlorobenzene	ND	1.00	"							
1,1,1-Trichloroethane	ND	1.00	"							
1,1,2-Trichloroethane	ND	1.00	"							
Trichloroethene	ND	1.00	"							
Trichlorofluoromethane	ND	1.00	"							
1,2,3-Trichloropropane	ND	1.00	"							
1,2,4-Trimethylbenzene	ND	1.00	"							
1,3,5-Trimethylbenzene	ND	1.00	"							
Vinyl chloride	ND	1.00	"							
o-Xylene	ND	1.00	"							
m,p-Xylene	ND	2.00	"							
Surr: 4-BFB	*19.3*		"	*20.0*		*96.5*	*75-120*			
Surr: 1,2-DCA-d4	*19.4*		"	*20.0*		*97.0*	*77-129*			
Surr: Dibromofluoromethane	*19.6*		"	*20.0*		*98.0*	*80-121*			
Surr: Toluene-d8	*19.4*		"	*20.0*		*97.0*	*80-120*			

North Creek Analytical - Portland

Philip Nerenberg

Philip Nerenberg, Laboratory Manager

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Hahn and Associates, Inc.	Project: Gasco Upland	
434 NW Sixth Ave., Suite 203	Project Number: 2708	**Reported:**
Portland, OR 97209	Project Manager: Rob Ede	06/22/04 11:55

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 4060374 - EPA 5030B										
LCS (4060374-BS1)				Prepared & Analyzed: 06/09/04						
Benzene	20.3	1.00	ug/l	20.0		102	80-120			
Chlorobenzene	20.1	1.00	"	20.0		100	80-124			
1,1-Dichloroethene	18.8	1.00	"	20.0		94.0	78-120			
Toluene	20.5	1.00	"	20.0		102	80-124			
Trichloroethene	19.2	1.00	"	20.0		96.0	80-132			
Surr: 4-BFB	*20.2*		"	*20.0*		*101*	*75-120*			
Surr: 1,2-DCA-d4	*19.4*		"	*20.0*		*97.0*	*77-129*			
Surr: Dibromofluoromethane	*20.7*		"	*20.0*		*104*	*80-121*			
Surr: Toluene-d8	*20.4*		"	*20.0*		*102*	*80-120*			
Matrix Spike (4060374-MS1)	**Source: P4F0166-01**			Prepared & Analyzed: 06/09/04						
Benzene	20.9	1.00	ug/l	20.0	ND	104	80-124			
Chlorobenzene	20.2	1.00	"	20.0	ND	101	72.9-134			
1,1-Dichloroethene	20.9	1.00	"	20.0	ND	104	79.3-127			
Toluene	21.0	1.00	"	20.0	0.390	103	79.7-131			
Trichloroethene	18.9	1.00	"	20.0	ND	94.5	68.4-130			
Surr: 4-BFB	*19.8*		"	*20.0*		*99.0*	*75-120*			
Surr: 1,2-DCA-d4	*20.3*		"	*20.0*		*102*	*77-129*			
Surr: Dibromofluoromethane	*21.2*		"	*20.0*		*106*	*80-121*			
Surr: Toluene-d8	*20.1*		"	*20.0*		*100*	*80-120*			
Matrix Spike Dup (4060374-MSD1)	**Source: P4F0166-01**			Prepared & Analyzed: 06/09/04						
Benzene	21.0	1.00	ug/l	20.0	ND	105	80-124	0.477	25	
Chlorobenzene	20.5	1.00	"	20.0	ND	102	72.9-134	1.47	25	
1,1-Dichloroethene	21.0	1.00	"	20.0	ND	105	79.3-127	0.477	25	
Toluene	21.2	1.00	"	20.0	0.390	104	79.7-131	0.948	25	
Trichloroethene	18.8	1.00	"	20.0	ND	94.0	68.4-130	0.531	25	
Surr: 4-BFB	*19.4*		"	*20.0*		*97.0*	*75-120*			
Surr: 1,2-DCA-d4	*19.2*		"	*20.0*		*96.0*	*77-129*			
Surr: Dibromofluoromethane	*19.8*		"	*20.0*		*99.0*	*80-121*			
Surr: Toluene-d8	*19.1*		"	*20.0*		*95.5*	*80-120*			

North Creek Analytical - Portland

Philip Nerenberg

Philip Nerenberg, Laboratory Manager

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Hahn and Associates, Inc.	Project: Gasco Upland	
434 NW Sixth Ave., Suite 203	Project Number: 2708	**Reported:**
Portland, OR 97209	Project Manager: Rob Ede	06/22/04 11:55

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 4060429 - EPA 5030B										
Blank (4060429-BLK1)				Prepared & Analyzed: 06/10/04						
Acetone	ND	25.0	ug/l							
Benzene	ND	1.00	"							
Bromobenzene	ND	1.00	"							
Bromochloromethane	ND	1.00	"							
Bromodichloromethane	ND	1.00	"							
Bromoform	ND	1.00	"							
Bromomethane	ND	5.00	"							
2-Butanone	ND	10.0	"							
n-Butylbenzene	ND	5.00	"							
sec-Butylbenzene	ND	1.00	"							
tert-Butylbenzene	ND	1.00	"							
Carbon disulfide	ND	10.0	"							
Carbon tetrachloride	ND	1.00	"							
Chlorobenzene	ND	1.00	"							
Chloroethane	ND	1.00	"							
Chloroform	ND	1.00	"							
Chloromethane	ND	5.00	"							
2-Chlorotoluene	ND	1.00	"							
4-Chlorotoluene	ND	1.00	"							
1,2-Dibromo-3-chloropropane	ND	5.00	"							
Dibromochloromethane	ND	1.00	"							
1,2-Dibromoethane	ND	1.00	"							
Dibromomethane	ND	1.00	"							
1,2-Dichlorobenzene	ND	1.00	"							
1,3-Dichlorobenzene	ND	1.00	"							
1,4-Dichlorobenzene	ND	1.00	"							
Dichlorodifluoromethane	ND	5.00	"							
1,1-Dichloroethane	ND	1.00	"							
1,2-Dichloroethane	ND	1.00	"							
1,1-Dichloroethene	ND	1.00	"							
cis-1,2-Dichloroethene	ND	1.00	"							
trans-1,2-Dichloroethene	ND	1.00	"							
1,2-Dichloropropane	ND	1.00	"							
1,3-Dichloropropane	ND	1.00	"							
2,2-Dichloropropane	ND	1.00	"							
1,1-Dichloropropene	ND	1.00	"							

North Creek Analytical - Portland

Philip Nerenberg

Philip Nerenberg, Laboratory Manager

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541.383.9310 fax 541.382.7588

Hahn and Associates, Inc.	Project: Gasco Upland	
434 NW Sixth Ave., Suite 203	Project Number: 2708	**Reported:**
Portland, OR 97209	Project Manager: Rob Ede	06/22/04 11:55

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 4060429 - EPA 5030B										
Blank (4060429-BLK1)				Prepared & Analyzed: 06/10/04						
cis-1,3-Dichloropropene	ND	1.00	ug/l							
trans-1,3-Dichloropropene	ND	1.00	"							
Ethylbenzene	ND	1.00	"							
Hexachlorobutadiene	ND	2.00	"							
2-Hexanone	ND	10.0	"							
Isopropylbenzene	ND	2.00	"							
p-Isopropyltoluene	ND	2.00	"							
4-Methyl-2-pentanone	ND	5.00	"							
Methyl tert-butyl ether	ND	1.00	"							
Methylene chloride	ND	5.00	"							
Naphthalene	ND	2.00	"							
n-Propylbenzene	ND	1.00	"							
Styrene	ND	1.00	"							
1,1,1,2-Tetrachloroethane	ND	1.00	"							
1,1,2,2-Tetrachloroethane	ND	1.00	"							
Tetrachloroethene	ND	1.00	"							
Toluene	ND	1.00	"							
1,2,3-Trichlorobenzene	ND	1.00	"							
1,2,4-Trichlorobenzene	ND	1.00	"							
1,1,1-Trichloroethane	ND	1.00	"							
1,1,2-Trichloroethane	ND	1.00	"							
Trichloroethene	ND	1.00	"							
Trichlorofluoromethane	ND	1.00	"							
1,2,3-Trichloropropane	ND	1.00	"							
1,2,4-Trimethylbenzene	ND	1.00	"							
1,3,5-Trimethylbenzene	ND	1.00	"							
Vinyl chloride	ND	1.00	"							
o-Xylene	ND	1.00	"							
m,p-Xylene	ND	2.00	"							
Surr: 4-BFB	*17.9*		"	*20.0*		*89.5*	*75-120*			
Surr: 1,2-DCA-d4	*18.2*		"	*20.0*		*91.0*	*77-129*			
Surr: Dibromofluoromethane	*18.7*		"	*20.0*		*93.5*	*80-121*			
Surr: Toluene-d8	*18.3*		"	*20.0*		*91.5*	*80-120*			

North Creek Analytical - Portland

Philip Nerenberg

Philip Nerenberg, Laboratory Manager

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Hahn and Associates, Inc.	Project: Gasco Upland	
434 NW Sixth Ave., Suite 203	Project Number: 2708	**Reported:**
Portland, OR 97209	Project Manager: Rob Ede	06/22/04 11:55

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 4060429 - EPA 5030B										
LCS (4060429-BS1)				Prepared & Analyzed: 06/10/04						
Benzene	20.5	1.00	ug/l	20.0		102	80-120			
Chlorobenzene	20.6	1.00	"	20.0		103	80-124			
1,1-Dichloroethene	19.1	1.00	"	20.0		95.5	78-120			
Toluene	20.7	1.00	"	20.0		104	80-124			
Trichloroethene	19.6	1.00	"	20.0		98.0	80-132			
Surr: 4-BFB	*19.0*		"	*20.0*		*95.0*	*75-120*			
Surr: 1,2-DCA-d4	*18.1*		"	*20.0*		*90.5*	*77-129*			
Surr: Dibromofluoromethane	*18.6*		"	*20.0*		*93.0*	*80-121*			
Surr: Toluene-d8	*18.6*		"	*20.0*		*93.0*	*80-120*			
Matrix Spike (4060429-MS1)	**Source: P4F0225-01**			Prepared & Analyzed: 06/10/04						
Benzene	20.8	1.00	ug/l	20.0	ND	104	80-124			
Chlorobenzene	20.6	1.00	"	20.0	ND	103	72.9-134			
1,1-Dichloroethene	20.4	1.00	"	20.0	ND	102	79.3-127			
Toluene	20.9	1.00	"	20.0	ND	104	79.7-131			
Trichloroethene	18.0	1.00	"	20.0	ND	90.0	68.4-130			
Surr: 4-BFB	*19.5*		"	*20.0*		*97.5*	*75-120*			
Surr: 1,2-DCA-d4	*18.6*		"	*20.0*		*93.0*	*77-129*			
Surr: Dibromofluoromethane	*20.5*		"	*20.0*		*102*	*80-121*			
Surr: Toluene-d8	*19.4*		"	*20.0*		*97.0*	*80-120*			
Matrix Spike Dup (4060429-MSD1)	**Source: P4F0225-01**			Prepared & Analyzed: 06/10/04						
Benzene	21.1	1.00	ug/l	20.0	ND	106	80-124	1.43	25	
Chlorobenzene	20.6	1.00	"	20.0	ND	103	72.9-134	0.00	25	
1,1-Dichloroethene	20.7	1.00	"	20.0	ND	104	79.3-127	1.46	25	
Toluene	21.0	1.00	"	20.0	ND	105	79.7-131	0.477	25	
Trichloroethene	18.0	1.00	"	20.0	ND	90.0	68.4-130	0.00	25	
Surr: 4-BFB	*19.0*		"	*20.0*		*95.0*	*75-120*			
Surr: 1,2-DCA-d4	*19.2*		"	*20.0*		*96.0*	*77-129*			
Surr: Dibromofluoromethane	*20.6*		"	*20.0*		*103*	*80-121*			
Surr: Toluene-d8	*19.0*		"	*20.0*		*95.0*	*80-120*			

North Creek Analytical - Portland

Philip Nerenberg

Philip Nerenberg, Laboratory Manager

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Hahn and Associates, Inc.	Project: Gasco Upland	
434 NW Sixth Ave., Suite 203	Project Number: 2708	**Reported:**
Portland, OR 97209	Project Manager: Rob Ede	06/22/04 11:55

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 4060257 - EPA 3510/600 Series										
Blank (4060257-BLK1)				Prepared: 06/07/04 Analyzed: 06/09/04						
Carbazole	ND	5.00	ug/l							
Acenaphthene	ND	5.00	"							
Acenaphthylene	ND	5.00	"							
Anthracene	ND	5.00	"							
Benzo (a) anthracene	ND	5.00	"							
Benzo (a) pyrene	ND	5.00	"							
Benzo (b) fluoranthene	ND	5.00	"							
Benzo (ghi) perylene	ND	5.00	"							
Benzo (k) fluoranthene	ND	5.00	"							
Benzoic Acid	ND	50.0	"							
Benzyl alcohol	ND	10.0	"							
4-Bromophenyl phenyl ether	ND	5.00	"							
Butyl benzyl phthalate	ND	5.00	"							
4-Chloro-3-methylphenol	ND	5.00	"							
4-Chloroaniline	ND	20.0	"							
Bis(2-chloroethoxy)methane	ND	10.0	"							
Bis(2-chloroethyl)ether	ND	5.00	"							
Bis(2-chloroisopropyl)ether	ND	10.0	"							
2-Chloronaphthalene	ND	5.00	"							
2-Chlorophenol	ND	5.00	"							
4-Chlorophenyl phenyl ether	ND	5.00	"							
Chrysene	ND	5.00	"							
Di-n-butyl phthalate	ND	5.00	"							
Di-n-octyl phthalate	ND	5.00	"							
Dibenzo (a,h) anthracene	ND	5.00	"							
Dibenzofuran	ND	5.00	"							
1,2-Dichlorobenzene	ND	5.00	"							
1,3-Dichlorobenzene	ND	5.00	"							
1,4-Dichlorobenzene	ND	5.00	"							
3,3'-Dichlorobenzidine	ND	5.00	"							
2,4-Dichlorophenol	ND	5.00	"							
Diethyl phthalate	ND	5.00	"							
2,4-Dimethylphenol	ND	10.0	"							
Dimethyl phthalate	ND	5.00	"							
4,6-Dinitro-2-methylphenol	ND	10.0	"							
2,4-Dinitrophenol	ND	25.0	"							

North Creek Analytical - Portland

Philip Nerenberg

Philip Nerenberg, Laboratory Manager

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Hahn and Associates, Inc.	Project: Gasco Upland	
434 NW Sixth Ave., Suite 203	Project Number: 2708	**Reported:**
Portland, OR 97209	Project Manager: Rob Ede	06/22/04 11:55

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 4060257 - EPA 3510/600 Series										
Blank (4060257-BLK1)				Prepared: 06/07/04 Analyzed: 06/09/04						
2,4-Dinitrotoluene	ND	5.00	ug/l							
2,6-Dinitrotoluene	ND	5.00	"							
Bis(2-ethylhexyl)phthalate	ND	10.0	"							
Fluoranthene	ND	5.00	"							
Fluorene	ND	5.00	"							
Hexachlorobenzene	ND	5.00	"							
Hexachlorobutadiene	ND	10.0	"							
Hexachlorocyclopentadiene	ND	10.0	"							
Hexachloroethane	ND	10.0	"							
Indeno (1,2,3-cd) pyrene	ND	5.00	"							
Isophorone	ND	5.00	"							
2-Methylnaphthalene	ND	5.00	"							
2-Methylphenol	ND	10.0	"							
3-,4-Methylphenol	ND	5.00	"							
Naphthalene	ND	5.00	"							
2-Nitroaniline	ND	5.00	"							
3-Nitroaniline	ND	10.0	"							
4-Nitroaniline	ND	10.0	"							
Nitrobenzene	ND	5.00	"							
2-Nitrophenol	ND	5.00	"							
4-Nitrophenol	ND	25.0	"							
N-Nitrosodi-n-propylamine	ND	10.0	"							
N-Nitrosodiphenylamine	ND	5.00	"							
Pentachlorophenol	ND	10.0	"							
Phenanthrene	ND	5.00	"							
Phenol	ND	5.00	"							
Pyrene	ND	5.00	"							
1,2,4-Trichlorobenzene	ND	5.00	"							
2,4,5-Trichlorophenol	ND	5.00	"							
2,4,6-Trichlorophenol	ND	5.00	"							
Surr: 2-Fluorobiphenyl	*53.6*		"	*75.0*		*71.5*	*26-135*			
Surr: 2-Fluorophenol	*71.6*		"	*150*		*47.7*	*6-124*			
Surr: Nitrobenzene-d5	*67.4*		"	*75.0*		*89.9*	*23-147*			
Surr: Phenol-d6	*48.8*		"	*150*		*32.5*	*11-130*			
Surr: p-Terphenyl-d14	*76.5*		"	*75.0*		*102*	*38-149*			
Surr: 2,4,6-Tribromophenol	*112*		"	*150*		*74.7*	*19-126*			

North Creek Analytical - Portland

Philip Nerenberg

Philip Nerenberg, Laboratory Manager

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Hahn and Associates, Inc.	Project: Gasco Upland	
434 NW Sixth Ave., Suite 203	Project Number: 2708	**Reported:**
Portland, OR 97209	Project Manager: Rob Ede	06/22/04 11:55

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 4060257 - EPA 3510/600 Series										
LCS (4060257-BS1)				Prepared: 06/07/04 Analyzed: 06/09/04						
Acenaphthene	65.3	5.00	ug/l	75.0		87.1	40-110			
4-Chloro-3-methylphenol	121	5.00	"	150		80.7	40-110			
2-Chlorophenol	109	5.00	"	150		72.7	40-110			
1,4-Dichlorobenzene	49.4	5.00	"	75.0		65.9	20-90			
2,4-Dinitrotoluene	69.7	5.00	"	75.0		92.9	50-110			
4-Nitrophenol	50.6	25.0	"	150		33.7	15-100			
N-Nitrosodi-n-propylamine	72.4	10.0	"	75.0		96.5	40-110			
Pentachlorophenol	99.4	10.0	"	150		66.3	30-120			
Phenol	49.3	5.00	"	150		32.9	15-110			
Pyrene	71.7	5.00	"	75.0		95.6	40-110			
1,2,4-Trichlorobenzene	50.0	5.00	"	75.0		66.7	25-100			
Surr: 2-Fluorobiphenyl	*58.9*		"	*75.0*		*78.5*	*26-135*			
Surr: 2-Fluorophenol	*79.8*		"	*150*		*53.2*	*6-124*			
Surr: Nitrobenzene-d5	*72.1*		"	*75.0*		*96.1*	*23-147*			
Surr: Phenol-d6	*55.2*		"	*150*		*36.8*	*11-130*			
Surr: p-Terphenyl-d14	*73.5*		"	*75.0*		*98.0*	*38-149*			
Surr: 2,4,6-Tribromophenol	*135*		"	*150*		*90.0*	*19-126*			
LCS Dup (4060257-BSD1)				Prepared: 06/07/04 Analyzed: 06/09/04						
Acenaphthene	65.8	5.00	ug/l	75.0		87.7	40-110	0.763	36	
4-Chloro-3-methylphenol	123	5.00	"	150		82.0	40-110	1.64	43	
2-Chlorophenol	108	5.00	"	150		72.0	40-110	0.922	38	
1,4-Dichlorobenzene	47.1	5.00	"	75.0		62.8	20-90	4.77	43	
2,4-Dinitrotoluene	71.1	5.00	"	75.0		94.8	50-110	1.99	31	
4-Nitrophenol	55.7	25.0	"	150		37.1	15-100	9.60	36	
N-Nitrosodi-n-propylamine	71.4	10.0	"	75.0		95.2	40-110	1.39	37	
Pentachlorophenol	100	10.0	"	150		66.7	30-120	0.602	40	
Phenol	52.5	5.00	"	150		35.0	15-110	6.29	36	
Pyrene	72.0	5.00	"	75.0		96.0	40-110	0.418	31	
1,2,4-Trichlorobenzene	49.9	5.00	"	75.0		66.5	25-100	0.200	42	
Surr: 2-Fluorobiphenyl	*62.3*		"	*75.0*		*83.1*	*26-135*			
Surr: 2-Fluorophenol	*83.4*		"	*150*		*55.6*	*6-124*			
Surr: Nitrobenzene-d5	*71.7*		"	*75.0*		*95.6*	*23-147*			
Surr: Phenol-d6	*57.2*		"	*150*		*38.1*	*11-130*			
Surr: p-Terphenyl-d14	*72.2*		"	*75.0*		*96.3*	*38-149*			
Surr: 2,4,6-Tribromophenol	*138*		"	*150*		*92.0*	*19-126*			

North Creek Analytical - Portland

Philip Nerenberg

Philip Nerenberg, Laboratory Manager

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Hahn and Associates, Inc.	Project: Gasco Upland	
434 NW Sixth Ave., Suite 203	Project Number: 2708	**Reported:**
Portland, OR 97209	Project Manager: Rob Ede	06/22/04 11:55

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 4060257 - EPA 3510/600 Series

North Creek Analytical - Portland

Philip Nerenberg

Philip Nerenberg, Laboratory Manager

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Hahn and Associates, Inc.	Project: Gasco Upland	
434 NW Sixth Ave., Suite 203	Project Number: 2708	**Reported:**
Portland, OR 97209	Project Manager: Rob Ede	06/22/04 11:55

Polynuclear Aromatic Compounds per EPA 8270M-SIM - Quality Control

North Creek Analytical - Portland

Analyte	Result	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
Batch 4060262 - EPA 3520/600 Series										
Blank (4060262-BLK1)				Prepared: 06/07/04 Analyzed: 06/09/04						
Acenaphthene	ND	0.100	ug/l							
Acenaphthylene	ND	0.100	"							
Anthracene	ND	0.100	"							
Benzo (a) anthracene	ND	0.100	"							
Benzo (a) pyrene	ND	0.100	"							
Benzo (b) fluoranthene	ND	0.100	"							
Benzo (ghi) perylene	ND	0.100	"							
Benzo (k) fluoranthene	ND	0.100	"							
Chrysene	ND	0.100	"							
Dibenzo (a,h) anthracene	ND	0.200	"							
Fluoranthene	ND	0.100	"							
Fluorene	ND	0.100	"							
Indeno (1,2,3-cd) pyrene	ND	0.100	"							
Naphthalene	ND	0.100	"							
Phenanthrene	ND	0.100	"							
Pyrene	ND	0.100	"							
Surr: Fluorene-d10	*2.12*		"	*2.50*		*84.8*	*25-125*			
Surr: Pyrene-d10	*2.32*		"	*2.50*		*92.8*	*23-150*			
Surr: Benzo (a) pyrene-d12	*2.20*		"	*2.50*		*88.0*	*10-125*			
LCS (4060262-BS1)				Prepared: 06/07/04 Analyzed: 06/09/04						
Acenaphthene	2.44	0.100	ug/l	2.50		97.6	26-135			
Benzo (a) pyrene	2.43	0.100	"	2.50		97.2	38-137			
Pyrene	2.56	0.100	"	2.50		102	33-133			
Surr: Fluorene-d10	*2.62*		"	*2.50*		*105*	*25-125*			
Surr: Pyrene-d10	*2.72*		"	*2.50*		*109*	*23-150*			
Surr: Benzo (a) pyrene-d12	*2.57*		"	*2.50*		*103*	*10-125*			

North Creek Analytical - Portland

Philip Nerenberg

Philip Nerenberg, Laboratory Manager

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Hahn and Associates, Inc.	Project: Gasco Upland	
434 NW Sixth Ave., Suite 203	Project Number: 2708	**Reported:**
Portland, OR 97209	Project Manager: Rob Ede	06/22/04 11:55

Polynuclear Aromatic Compounds per EPA 8270M-SIM - Quality Control

North Creek Analytical - Portland

Analyte	Result	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
Batch 4060262 - EPA 3520/600 Series										
LCS Dup (4060262-BSD1)				Prepared: 06/07/04 Analyzed: 06/09/04						
Acenaphthene	2.07	0.100	ug/l	2.50		82.8	26-135	16.4	60	
Benzo (a) pyrene	2.19	0.100	"	2.50		87.6	38-137	10.4	60	
Pyrene	2.33	0.100	"	2.50		93.2	33-133	9.41	60	
Surr: Fluorene-d10	*2.21*		"	*2.50*		*88.4*	*25-125*			
Surr: Pyrene-d10	*2.43*		"	*2.50*		*97.2*	*23-150*			
Surr: Benzo (a) pyrene-d12	*2.26*		"	*2.50*		*90.4*	*10-125*			

North Creek Analytical - Portland

Philip Nerenberg

Philip Nerenberg, Laboratory Manager

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Hahn and Associates, Inc.	Project: Gasco Upland	
434 NW Sixth Ave., Suite 203	Project Number: 2708	**Reported:**
Portland, OR 97209	Project Manager: Rob Ede	06/22/04 11:55

Conventional Chemistry Parameters per APHA/EPA Methods - Quality Control

North Creek Analytical - Portland

Analyte	Result	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
Batch 4060476 - General Preparation										
Blank (4060476-BLK1)				Prepared & Analyzed: 06/11/04						
Cyanide (total)	ND	0.00500	mg/l							
LCS (4060476-BS1)				Prepared & Analyzed: 06/11/04						
Cyanide (total)	0.0462	0.00500	mg/l	0.0500		92.4	75-125			
Duplicate (4060476-DUP1)		Source: P4F0258-01		Prepared & Analyzed: 06/11/04						
Cyanide (total)	0.00208	0.00500	mg/l		0.00198			4.93	20	
Matrix Spike (4060476-MS1)		Source: P4F0258-01		Prepared & Analyzed: 06/11/04						
Cyanide (total)	0.0456	0.00500	mg/l	0.0500	0.00198	87.2	75-125			

North Creek Analytical - Portland

Philip Nerenberg

Philip Nerenberg, Laboratory Manager

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Hahn and Associates, Inc.	Project: Gasco Upland	
434 NW Sixth Ave., Suite 203	Project Number: 2708	**Reported:**
Portland, OR 97209	Project Manager: Rob Ede	06/22/04 11:55

Notes and Definitions

Q-06	Analyses are not controlled on RPD values from sample concentrations less than 5 times the reporting limit.
R-05	Reporting limits raised due to dilution necessary for analysis. Sample contains high levels of reported analyte, non-target analyte, and/or matrix interference.
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. MRLs are adjusted if %Solids are less than 50%.
wet	Sample results reported on a wet weight basis (as received)
RPD	Relative Percent Difference

North Creek Analytical - Portland

Philip Nerenberg

Philip Nerenberg, Laboratory Manager

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4F0212

HAHN AND ASSOCIATES, INC.
Environmental Consultants
434 NW Sixth Avenue, Suite 203 • Portland OR 97209
(503) 796-0717 • Fax (503) 227-2209

Laboratory: North Creek Analytical Portland OR
Lab Project No.:

CHAIN OF CUSTODY
Chain of Custody No.:

Project Manager: Rob Edr
Project No.: 2708
Project Name: Grasso
Collected by: Andy Colinger

Liquid with Sediment Sample
Test Filtrate / Test Sediment / Test-Both
Multi-Phase Sample
Test One (which) / Test Separately / Shake

Samples Received at 4C (Y or N):
Appropriate Containers Used (Y or N):
Provide Verbal Results (Y or N): No
Provide Preliminary Fax Results: Yes

Comments

Sample Number Prefix: 2708-040603-

*metals = As, Cr, Cu, Ni, Pb, Zn
pricing / reporting levels as per Nerenberg to Edr, 12/2/03

Lab ID	Sample #	Date	Time	Sample Description	Matrix: Soil	Water	Other	Number of Containers	PAHs (EPA 8270 SIM)	SVOCs (EPA 8270)	VOCs (EPA 8260)	TPHDX (EPA 9071)	Amerlyse (EPA 9071)	TPH METHOD * (EPA 6010)	Dissolved Metals * (EPA 6010)	RUSH	Remarks
	-102	6/3/04	11:55	B-56A(40-44)		X		10	X	X	X	X	X	X	X		
	-103	6/3/04	2:00	B-56A(60-64)		X		10	X	X	X	X	X	X	X		
	-104	6/3/04	3:15	B-56A(80-84)		X		10	X	X	X	X	X	X	X		
	-105	6/3/04	3:30	B-56A		X		5	X		X			X			
	-TB57	6/3/04	4:00	TRIP		X		1			X						

Relinquished by	Company	Date	Time	Received by	Company
Andrea Colinger	HAI	6/3/04	@14:00		NC4
	NC4	6/4/04	14:20		NCA

5.1 @ 10.1

SCOEPA00013728

NORTH CREEK ANALYTICAL COOLER RECEIPT FORM

(Army Corp. compliant)

Client: Haley

1. **Please sign for receipt and opening of** 2 **cooler or** _____ **other** _____
   By (print) Vanessa Evans (sign) Vanessa Evans
2. Date samples received 6/4/04 Date opened: Same X or ___/___/___
3. Delivered by: X NCA courier ___ FedEx ___UPS ___Courier ___Client ___Other_____
   Airbill # if applicable _____ (Put copy of shipping papers in file)
4. There were 1 custody seals present, signed by BOB date 6/4/04
5. Were the custody seals unbroken and intact at the date and time of arrival? X Yes ___No
6. Was ice used? X yes ___no Type of ice: ___ blue ice X gel ice ___real ice
   Temperature (degrees C) 5.1 Raytek thermometer _____ Digi-Therm (probe temperature blank)
7. Are custody papers sealed in a plastic bag and taped inside to lid? ___ Yes X No
8. Were custody papers filled out properly (ink, signed, etc.)? X Yes ___ No
   If "no" please specify: _____
9. Was project identifiable from custody papers? X Yes ___ No
   Name of project Casco (if applicable)
10. **Initial and date for unpacking:** ED **(initials)** **date** 6/4/04
11. Packing material: NA bubble wrap/bag ___styrofoam X cardboard _____other
12. Were samples in bags? ___ Yes X No
13. Did all containers indicated on the COC arrive? X Yes ___ No
    If "no" please indicate which containers were absent _____
14. Were all containers unbroken and labels in good condition? X Yes ___ No
    If "no" please indicate which containers _____
15. Were all bottle labels complete (ID, date, time, signature, etc.)? X Yes ___ No
    Do the IDs, times, etc. agree with the COC? X Yes ___ No
    If "no" please indicate which containers _____
16. Are containers properly preserved for indicated analysis? X Yes ___ No
17. Is there adequate volume for the test(s) requested? X Yes ___ No
18. If voa vials were submitted, are they free of bubbles? ___N/A X Yes ___ No
19. **Log-in phase: Date samples were logged in:** 6/4/04 **Elm Project #** P4F0212
20. Logged in by (print) Erica Dolan (sign) Erica Dolan
21. Was the project manager notified of status? (Use back of form as a record) ___ Yes ___ No

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6 July, 2004

Rob Ede
Hahn and Associates, Inc.
434 NW Sixth Ave., Suite 203
Portland, OR 97209

RE: Gasco Upland

Enclosed are the results of analyses for samples received by the laboratory on 06/04/04 14:20. If you have any questions concerning this report, please feel free to contact me.

Sincerely,

Philip Nerenberg
Laboratory Manager

Work Orders included in this report:
P4F0212

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Hahn and Associates, Inc.	Project: Gasco Upland	
434 NW Sixth Ave., Suite 203	Project Number: 2708	**Reported:**
Portland, OR 97209	Project Manager: Rob Ede	07/06/04 13:01

ANALYTICAL REPORT FOR SAMPLES

Sample ID	Laboratory ID	Matrix	Date Sampled	Date Received
2708-040603-102	P4F0212-01	Water	06/03/04 11:55	06/04/04 14:20
2708-040603-103	P4F0212-02	Water	06/03/04 14:00	06/04/04 14:20
2708-040603-104	P4F0212-03	Water	06/03/04 15:15	06/04/04 14:20
2708-040603-105	P4F0212-04	Water	06/03/04 15:30	06/04/04 14:20
TB57	P4F0212-05	Water	06/03/04 16:40	06/04/04 14:20

North Creek Analytical - Portland

Philip Nerenberg

Philip Nerenberg, Laboratory Manager

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Hahn and Associates, Inc.	Project: Gasco Upland	
434 NW Sixth Ave., Suite 203	Project Number: 2708	**Reported:**
Portland, OR 97209	Project Manager: Rob Ede	07/06/04 13:01

Total Metals per EPA 6000/7000 Series Methods

North Creek Analytical - Portland

Analyte	Result	Reporting Limit	Units	Dilution	Method	Prepared	Analyzed	Batch	Notes
2708-040603-102 (P4F0212-01) Water					Sampled: 06/03/04 Received: 06/04/04				
Arsenic	**0.00401**	0.00100	mg/l	1	EPA 6020	06/09/04	06/11/04	4060378	
Chromium	**0.0595**	0.00100	"	"	"	"	"	"	
Copper	**0.0202**	0.00200	"	"	"	"	"	"	
Lead	**0.00232**	0.00100	"	"	"	"	"	"	
Nickel	**0.0256**	0.00200	"	"	"	"	"	"	
Zinc	**0.270**	0.00500	"	"	"	"	"	"	
2708-040603-103 (P4F0212-02) Water					Sampled: 06/03/04 Received: 06/04/04				
Arsenic	**0.0143**	0.00100	mg/l	1	EPA 6020	06/09/04	06/11/04	4060378	
Chromium	**0.0460**	0.00100	"	"	"	"	"	"	
Copper	**0.0336**	0.00200	"	"	"	"	"	"	
Lead	ND	0.00446	"	4.46	"	"	06/11/04	"	R-03
Nickel	**0.117**	0.00200	"	1	"	"	06/11/04	"	
Zinc	**0.224**	0.00500	"	"	"	"	"	"	
2708-040603-104 (P4F0212-03) Water					Sampled: 06/03/04 Received: 06/04/04				
Arsenic	**0.0179**	0.00200	mg/l	1	EPA 6020	06/09/04	06/11/04	4060378	
Chromium	**0.316**	0.00200	"	"	"	"	"	"	
Copper	**0.194**	0.00400	"	"	"	"	"	"	
Lead	**0.0256**	0.00200	"	"	"	"	"	"	
Nickel	**0.145**	0.00400	"	"	"	"	"	"	
Zinc	**0.702**	0.0100	"	"	"	"	"	"	

North Creek Analytical - Portland

Philip Nerenberg

Philip Nerenberg, Laboratory Manager

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Hahn and Associates, Inc.	Project: Gasco Upland	
434 NW Sixth Ave., Suite 203	Project Number: 2708	**Reported:**
Portland, OR 97209	Project Manager: Rob Ede	07/06/04 13:01

Dissolved Metals per EPA 6000/7000 Series Methods

North Creek Analytical - Portland

Analyte	Result	Reporting Limit	Units	Dilution	Method	Prepared	Analyzed	Batch	Notes
2708-040603-102 (P4F0212-01) Water					Sampled: 06/03/04 Received: 06/04/04				
Arsenic	**0.00119**	0.00100	mg/l	1	EPA 6020	06/10/04	06/12/04	4060454	
Chromium	**0.00498**	0.00100	"	"	"	"	"	"	
Copper	**0.00218**	0.00200	"	"	"	"	"	"	
Lead	ND	0.00100	"	"	"	"	"	"	
Nickel	**0.0320**	0.00200	"	"	"	"	"	"	
Zinc	**0.0647**	0.00500	"	"	"	"	"	"	
2708-040603-103 (P4F0212-02) Water					Sampled: 06/03/04 Received: 06/04/04				
Arsenic	**0.00796**	0.00100	mg/l	1	EPA 6020	06/10/04	06/12/04	4060454	
Chromium	**0.00538**	0.00100	"	"	"	"	"	"	
Copper	ND	0.00200	"	"	"	"	"	"	
Lead	ND	0.00100	"	"	"	"	"	"	
Nickel	**0.0338**	0.00200	"	"	"	"	"	"	
Zinc	**0.0103**	0.00500	"	"	"	"	"	"	
2708-040603-104 (P4F0212-03) Water					Sampled: 06/03/04 Received: 06/04/04				
Arsenic	**0.00724**	0.00100	mg/l	1	EPA 6020	06/10/04	06/12/04	4060454	
Chromium	**0.00653**	0.00100	"	"	"	"	"	"	
Copper	ND	0.00200	"	"	"	"	"	"	
Lead	ND	0.00100	"	"	"	"	"	"	
Nickel	**0.0325**	0.00200	"	"	"	"	"	"	
Zinc	**0.0755**	0.00500	"	"	"	"	"	"	

North Creek Analytical - Portland

Philip Nerenberg

Philip Nerenberg, Laboratory Manager

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Hahn and Associates, Inc.	Project: Gasco Upland	
434 NW Sixth Ave., Suite 203	Project Number: 2708	**Reported:**
Portland, OR 97209	Project Manager: Rob Ede	07/06/04 13:01

Volatile Organic Compounds per EPA Method 8260B

North Creek Analytical - Portland

Analyte	Result	Reporting Limit	Units	Dilution	Method	Prepared	Analyzed	Batch	Notes
2708-040603-102 (P4F0212-01) Water					Sampled: 06/03/04 Received: 06/04/04				
Acetone	ND	25.0	ug/l	1	EPA 8260B	06/09/04	06/10/04	4060374	
Benzene	ND	1.00	"	"	"	"	"	"	
Bromobenzene	ND	1.00	"	"	"	"	"	"	
Bromochloromethane	ND	1.00	"	"	"	"	"	"	
Bromodichloromethane	ND	1.00	"	"	"	"	"	"	
Bromoform	ND	1.00	"	"	"	"	"	"	
Bromomethane	ND	5.00	"	"	"	"	"	"	
2-Butanone	ND	10.0	"	"	"	"	"	"	
n-Butylbenzene	ND	5.00	"	"	"	"	"	"	
sec-Butylbenzene	ND	1.00	"	"	"	"	"	"	
tert-Butylbenzene	ND	1.00	"	"	"	"	"	"	
Carbon disulfide	ND	10.0	"	"	"	"	"	"	
Carbon tetrachloride	ND	1.00	"	"	"	"	"	"	
Chlorobenzene	ND	1.00	"	"	"	"	"	"	
Chloroethane	ND	1.00	"	"	"	"	"	"	
Chloroform	ND	1.00	"	"	"	"	"	"	
Chloromethane	ND	5.00	"	"	"	"	"	"	
2-Chlorotoluene	ND	1.00	"	"	"	"	"	"	
4-Chlorotoluene	ND	1.00	"	"	"	"	"	"	
1,2-Dibromo-3-chloropropane	ND	5.00	"	"	"	"	"	"	
Dibromochloromethane	ND	1.00	"	"	"	"	"	"	
1,2-Dibromoethane	ND	1.00	"	"	"	"	"	"	
Dibromomethane	ND	1.00	"	"	"	"	"	"	
1,2-Dichlorobenzene	ND	1.00	"	"	"	"	"	"	
1,3-Dichlorobenzene	ND	1.00	"	"	"	"	"	"	
1,4-Dichlorobenzene	ND	1.00	"	"	"	"	"	"	
Dichlorodifluoromethane	ND	5.00	"	"	"	"	"	"	
1,1-Dichloroethane	ND	1.00	"	"	"	"	"	"	
1,2-Dichloroethane	ND	1.00	"	"	"	"	"	"	
1,1-Dichloroethene	ND	1.00	"	"	"	"	"	"	
cis-1,2-Dichloroethene	ND	1.00	"	"	"	"	"	"	
trans-1,2-Dichloroethene	ND	1.00	"	"	"	"	"	"	
1,2-Dichloropropane	ND	1.00	"	"	"	"	"	"	
1,3-Dichloropropane	ND	1.00	"	"	"	"	"	"	
2,2-Dichloropropane	ND	1.00	"	"	"	"	"	"	
1,1-Dichloropropene	ND	1.00	"	"	"	"	"	"	
cis-1,3-Dichloropropene	ND	1.00	"	"	"	"	"	"	

North Creek Analytical - Portland

Philip Nerenberg

Philip Nerenberg, Laboratory Manager

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Hahn and Associates, Inc.	Project: Gasco Upland	
434 NW Sixth Ave., Suite 203	Project Number: 2708	**Reported:**
Portland, OR 97209	Project Manager: Rob Ede	07/06/04 13:01

Volatile Organic Compounds per EPA Method 8260B

North Creek Analytical - Portland

Analyte	Result	Reporting Limit	Units	Dilution	Method	Prepared	Analyzed	Batch	Notes
2708-040603-102 (P4F0212-01) Water					Sampled: 06/03/04 Received: 06/04/04				
trans-1,3-Dichloropropene	ND	1.00	ug/l	1	EPA 8260B	06/09/04	06/10/04	4060374	
Ethylbenzene	ND	1.00	"	"	"	"	"	"	
Hexachlorobutadiene	ND	2.00	"	"	"	"	"	"	
2-Hexanone	ND	10.0	"	"	"	"	"	"	
Isopropylbenzene	ND	2.00	"	"	"	"	"	"	
p-Isopropyltoluene	ND	2.00	"	"	"	"	"	"	
4-Methyl-2-pentanone	ND	5.00	"	"	"	"	"	"	
Methyl tert-butyl ether	ND	1.00	"	"	"	"	"	"	
Methylene chloride	ND	5.00	"	"	"	"	"	"	
Naphthalene	**2.57**	2.00	"	"	"	"	"	"	
n-Propylbenzene	ND	1.00	"	"	"	"	"	"	
Styrene	ND	1.00	"	"	"	"	"	"	
1,1,1,2-Tetrachloroethane	ND	1.00	"	"	"	"	"	"	
1,1,2,2-Tetrachloroethane	ND	1.00	"	"	"	"	"	"	
Tetrachloroethene	ND	1.00	"	"	"	"	"	"	
Toluene	ND	1.00	"	"	"	"	"	"	
1,2,3-Trichlorobenzene	ND	1.00	"	"	"	"	"	"	
1,2,4-Trichlorobenzene	ND	1.00	"	"	"	"	"	"	
1,1,1-Trichloroethane	ND	1.00	"	"	"	"	"	"	
1,1,2-Trichloroethane	ND	1.00	"	"	"	"	"	"	
Trichloroethene	ND	1.00	"	"	"	"	"	"	
Trichlorofluoromethane	ND	1.00	"	"	"	"	"	"	
1,2,3-Trichloropropane	ND	1.00	"	"	"	"	"	"	
1,2,4-Trimethylbenzene	ND	1.00	"	"	"	"	"	"	
1,3,5-Trimethylbenzene	ND	1.00	"	"	"	"	"	"	
Vinyl chloride	ND	1.00	"	"	"	"	"	"	
o-Xylene	ND	1.00	"	"	"	"	"	"	
m,p-Xylene	ND	2.00	"	"	"	"	"	"	
Surr: 4-BFB	*102 %*	*75-120*							
Surr: 1,2-DCA-d4	*108 %*	*77-129*							
Surr: Dibromofluoromethane	*110 %*	*80-121*							
Surr: Toluene-d8	*106 %*	*80-120*							

North Creek Analytical - Portland

Philip Nerenberg

Philip Nerenberg, Laboratory Manager

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541.383.9310 fax 541.382.7588

Hahn and Associates, Inc.	Project: Gasco Upland	
434 NW Sixth Ave., Suite 203	Project Number: 2708	**Reported:**
Portland, OR 97209	Project Manager: Rob Ede	07/06/04 13:01

Volatile Organic Compounds per EPA Method 8260B

North Creek Analytical - Portland

Analyte	Result	Reporting Limit	Units	Dilution	Method	Prepared	Analyzed	Batch	Notes
2708-040603-103 (P4F0212-02) Water					Sampled: 06/03/04 Received: 06/04/04				
Acetone	ND	25.0	ug/l	1	EPA 8260B	06/09/04	06/10/04	4060374	
Benzene	**3.62**	1.00	"	"	"	"	"	"	
Bromobenzene	ND	1.00	"	"	"	"	"	"	
Bromochloromethane	ND	1.00	"	"	"	"	"	"	
Bromodichloromethane	ND	1.00	"	"	"	"	"	"	
Bromoform	ND	1.00	"	"	"	"	"	"	
Bromomethane	ND	5.00	"	"	"	"	"	"	
2-Butanone	ND	10.0	"	"	"	"	"	"	
n-Butylbenzene	ND	5.00	"	"	"	"	"	"	
sec-Butylbenzene	ND	1.00	"	"	"	"	"	"	
tert-Butylbenzene	ND	1.00	"	"	"	"	"	"	
Carbon disulfide	ND	10.0	"	"	"	"	"	"	
Carbon tetrachloride	ND	1.00	"	"	"	"	"	"	
Chlorobenzene	ND	1.00	"	"	"	"	"	"	
Chloroethane	ND	1.00	"	"	"	"	"	"	
Chloroform	ND	1.00	"	"	"	"	"	"	
Chloromethane	ND	5.00	"	"	"	"	"	"	
2-Chlorotoluene	ND	1.00	"	"	"	"	"	"	
4-Chlorotoluene	ND	1.00	"	"	"	"	"	"	
1,2-Dibromo-3-chloropropane	ND	5.00	"	"	"	"	"	"	
Dibromochloromethane	ND	1.00	"	"	"	"	"	"	
1,2-Dibromoethane	ND	1.00	"	"	"	"	"	"	
Dibromomethane	ND	1.00	"	"	"	"	"	"	
1,2-Dichlorobenzene	ND	1.00	"	"	"	"	"	"	
1,3-Dichlorobenzene	ND	1.00	"	"	"	"	"	"	
1,4-Dichlorobenzene	ND	1.00	"	"	"	"	"	"	
Dichlorodifluoromethane	ND	5.00	"	"	"	"	"	"	
1,1-Dichloroethane	ND	1.00	"	"	"	"	"	"	
1,2-Dichloroethane	ND	1.00	"	"	"	"	"	"	
1,1-Dichloroethene	ND	1.00	"	"	"	"	"	"	
cis-1,2-Dichloroethene	ND	1.00	"	"	"	"	"	"	
trans-1,2-Dichloroethene	ND	1.00	"	"	"	"	"	"	
1,2-Dichloropropane	ND	1.00	"	"	"	"	"	"	
1,3-Dichloropropane	ND	1.00	"	"	"	"	"	"	
2,2-Dichloropropane	ND	1.00	"	"	"	"	"	"	
1,1-Dichloropropene	ND	1.00	"	"	"	"	"	"	
cis-1,3-Dichloropropene	ND	1.00	"	"	"	"	"	"	

North Creek Analytical - Portland

Philip Nerenberg

Philip Nerenberg, Laboratory Manager

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Hahn and Associates, Inc.	Project: Gasco Upland	
434 NW Sixth Ave., Suite 203	Project Number: 2708	**Reported:**
Portland, OR 97209	Project Manager: Rob Ede	07/06/04 13:01

Volatile Organic Compounds per EPA Method 8260B

North Creek Analytical - Portland

Analyte	Result	Reporting Limit	Units	Dilution	Method	Prepared	Analyzed	Batch	Notes
2708-040603-103 (P4F0212-02) Water					Sampled: 06/03/04 Received: 06/04/04				
trans-1,3-Dichloropropene	ND	1.00	ug/l	1	EPA 8260B	06/09/04	06/10/04	4060374	
Ethylbenzene	**70.0**	1.00	"	"	"	"	"	"	
Hexachlorobutadiene	ND	2.00	"	"	"	"	"	"	
2-Hexanone	ND	10.0	"	"	"	"	"	"	
Isopropylbenzene	ND	2.00	"	"	"	"	"	"	
p-Isopropyltoluene	ND	2.00	"	"	"	"	"	"	
4-Methyl-2-pentanone	ND	5.00	"	"	"	"	"	"	
Methyl tert-butyl ether	ND	1.00	"	"	"	"	"	"	
Methylene chloride	ND	5.00	"	"	"	"	"	"	
Naphthalene	**140**	2.00	"	"	"	"	"	"	
n-Propylbenzene	ND	1.00	"	"	"	"	"	"	
Styrene	ND	1.00	"	"	"	"	"	"	
1,1,1,2-Tetrachloroethane	ND	1.00	"	"	"	"	"	"	
1,1,2,2-Tetrachloroethane	ND	1.00	"	"	"	"	"	"	
Tetrachloroethene	ND	1.00	"	"	"	"	"	"	
Toluene	ND	1.00	"	"	"	"	"	"	
1,2,3-Trichlorobenzene	ND	1.00	"	"	"	"	"	"	
1,2,4-Trichlorobenzene	ND	1.00	"	"	"	"	"	"	
1,1,1-Trichloroethane	ND	1.00	"	"	"	"	"	"	
1,1,2-Trichloroethane	ND	1.00	"	"	"	"	"	"	
Trichloroethene	ND	1.00	"	"	"	"	"	"	
Trichlorofluoromethane	ND	1.00	"	"	"	"	"	"	
1,2,3-Trichloropropane	ND	1.00	"	"	"	"	"	"	
1,2,4-Trimethylbenzene	**2.06**	1.00	"	"	"	"	"	"	
1,3,5-Trimethylbenzene	ND	1.00	"	"	"	"	"	"	
Vinyl chloride	ND	1.00	"	"	"	"	"	"	
o-Xylene	**10.5**	1.00	"	"	"	"	"	"	
m,p-Xylene	**8.14**	2.00	"	"	"	"	"	"	
Surr: 4-BFB	*108 %*	*75-120*							
Surr: 1,2-DCA-d4	*106 %*	*77-129*							
Surr: Dibromofluoromethane	*113 %*	*80-121*							
Surr: Toluene-d8	*101 %*	*80-120*							

North Creek Analytical - Portland

Philip Nerenberg

Philip Nerenberg, Laboratory Manager

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Hahn and Associates, Inc.	Project: Gasco Upland	
434 NW Sixth Ave., Suite 203	Project Number: 2708	**Reported:**
Portland, OR 97209	Project Manager: Rob Ede	07/06/04 13:01

Volatile Organic Compounds per EPA Method 8260B

North Creek Analytical - Portland

Analyte	Result	Reporting Limit	Units	Dilution	Method	Prepared	Analyzed	Batch	Notes
2708-040603-104 (P4F0212-03) Water					Sampled: 06/03/04 Received: 06/04/04				
Acetone	ND	125	ug/l	5	EPA 8260B	06/09/04	06/10/04	4060374	
Benzene	ND	5.00	"	"	"	"	"	"	
Bromobenzene	ND	5.00	"	"	"	"	"	"	
Bromochloromethane	ND	5.00	"	"	"	"	"	"	
Bromodichloromethane	ND	5.00	"	"	"	"	"	"	
Bromoform	ND	5.00	"	"	"	"	"	"	
Bromomethane	ND	25.0	"	"	"	"	"	"	
2-Butanone	ND	50.0	"	"	"	"	"	"	
n-Butylbenzene	ND	25.0	"	"	"	"	"	"	
sec-Butylbenzene	ND	5.00	"	"	"	"	"	"	
tert-Butylbenzene	ND	5.00	"	"	"	"	"	"	
Carbon disulfide	ND	50.0	"	"	"	"	"	"	
Carbon tetrachloride	ND	5.00	"	"	"	"	"	"	
Chlorobenzene	ND	5.00	"	"	"	"	"	"	
Chloroethane	ND	5.00	"	"	"	"	"	"	
Chloroform	ND	5.00	"	"	"	"	"	"	
Chloromethane	ND	25.0	"	"	"	"	"	"	
2-Chlorotoluene	ND	5.00	"	"	"	"	"	"	
4-Chlorotoluene	ND	5.00	"	"	"	"	"	"	
1,2-Dibromo-3-chloropropane	ND	25.0	"	"	"	"	"	"	
Dibromochloromethane	ND	5.00	"	"	"	"	"	"	
1,2-Dibromoethane	ND	5.00	"	"	"	"	"	"	
Dibromomethane	ND	5.00	"	"	"	"	"	"	
1,2-Dichlorobenzene	ND	5.00	"	"	"	"	"	"	
1,3-Dichlorobenzene	ND	5.00	"	"	"	"	"	"	
1,4-Dichlorobenzene	ND	5.00	"	"	"	"	"	"	
Dichlorodifluoromethane	ND	25.0	"	"	"	"	"	"	
1,1-Dichloroethane	ND	5.00	"	"	"	"	"	"	
1,2-Dichloroethane	ND	5.00	"	"	"	"	"	"	
1,1-Dichloroethene	ND	5.00	"	"	"	"	"	"	
cis-1,2-Dichloroethene	ND	5.00	"	"	"	"	"	"	
trans-1,2-Dichloroethene	ND	5.00	"	"	"	"	"	"	
1,2-Dichloropropane	ND	5.00	"	"	"	"	"	"	
1,3-Dichloropropane	ND	5.00	"	"	"	"	"	"	
2,2-Dichloropropane	ND	5.00	"	"	"	"	"	"	
1,1-Dichloropropene	ND	5.00	"	"	"	"	"	"	
cis-1,3-Dichloropropene	ND	5.00	"	"	"	"	"	"	

North Creek Analytical - Portland

Philip Nerenberg

Philip Nerenberg, Laboratory Manager

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Hahn and Associates, Inc.	Project: Gasco Upland	
434 NW Sixth Ave., Suite 203	Project Number: 2708	**Reported:**
Portland, OR 97209	Project Manager: Rob Ede	07/06/04 13:01

Volatile Organic Compounds per EPA Method 8260B

North Creek Analytical - Portland

Analyte	Result	Reporting Limit	Units	Dilution	Method	Prepared	Analyzed	Batch	Notes
2708-040603-104 (P4F0212-03) Water					Sampled: 06/03/04 Received: 06/04/04				
trans-1,3-Dichloropropene	ND	5.00	ug/l	5	EPA 8260B	06/09/04	06/10/04	4060374	
Ethylbenzene	ND	5.00	"	"	"	"	"	"	
Hexachlorobutadiene	ND	10.0	"	"	"	"	"	"	
2-Hexanone	ND	50.0	"	"	"	"	"	"	
Isopropylbenzene	ND	10.0	"	"	"	"	"	"	
p-Isopropyltoluene	ND	10.0	"	"	"	"	"	"	
4-Methyl-2-pentanone	ND	25.0	"	"	"	"	"	"	
Methyl tert-butyl ether	ND	5.00	"	"	"	"	"	"	
Methylene chloride	ND	25.0	"	"	"	"	"	"	
Naphthalene	**441**	10.0	"	"	"	"	"	"	
n-Propylbenzene	ND	5.00	"	"	"	"	"	"	
Styrene	ND	5.00	"	"	"	"	"	"	
1,1,1,2-Tetrachloroethane	ND	5.00	"	"	"	"	"	"	
1,1,2,2-Tetrachloroethane	ND	5.00	"	"	"	"	"	"	
Tetrachloroethene	ND	5.00	"	"	"	"	"	"	
Toluene	ND	5.00	"	"	"	"	"	"	
1,2,3-Trichlorobenzene	ND	5.00	"	"	"	"	"	"	
1,2,4-Trichlorobenzene	ND	5.00	"	"	"	"	"	"	
1,1,1-Trichloroethane	ND	5.00	"	"	"	"	"	"	
1,1,2-Trichloroethane	ND	5.00	"	"	"	"	"	"	
Trichloroethene	ND	5.00	"	"	"	"	"	"	
Trichlorofluoromethane	ND	5.00	"	"	"	"	"	"	
1,2,3-Trichloropropane	ND	5.00	"	"	"	"	"	"	
1,2,4-Trimethylbenzene	ND	5.00	"	"	"	"	"	"	
1,3,5-Trimethylbenzene	ND	5.00	"	"	"	"	"	"	
Vinyl chloride	ND	5.00	"	"	"	"	"	"	
o-Xylene	**10.6**	5.00	"	"	"	"	"	"	
m,p-Xylene	ND	10.0	"	"	"	"	"	"	
Surr: 4-BFB	*96.0 %*	*75-120*							
Surr: 1,2-DCA-d4	*98.0 %*	*77-129*							
Surr: Dibromofluoromethane	*106 %*	*80-121*							
Surr: Toluene-d8	*94.0 %*	*80-120*							

North Creek Analytical - Portland

Philip Nerenberg

Philip Nerenberg, Laboratory Manager

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Hahn and Associates, Inc.	Project: Gasco Upland	
434 NW Sixth Ave., Suite 203	Project Number: 2708	**Reported:**
Portland, OR 97209	Project Manager: Rob Ede	07/06/04 13:01

Volatile Organic Compounds per EPA Method 8260B

North Creek Analytical - Portland

Analyte	Result	Reporting Limit	Units	Dilution	Method	Prepared	Analyzed	Batch	Notes
2708-040603-105 (P4F0212-04) Water					Sampled: 06/03/04 Received: 06/04/04				
Acetone	ND	50.0	ug/l	2	EPA 8260B	06/09/04	06/10/04	4060374	
Benzene	**3.10**	2.00	"	"	"	"	"	"	
Bromobenzene	ND	2.00	"	"	"	"	"	"	
Bromochloromethane	ND	2.00	"	"	"	"	"	"	
Bromodichloromethane	ND	2.00	"	"	"	"	"	"	
Bromoform	ND	2.00	"	"	"	"	"	"	
Bromomethane	ND	10.0	"	"	"	"	"	"	
2-Butanone	ND	20.0	"	"	"	"	"	"	
n-Butylbenzene	ND	10.0	"	"	"	"	"	"	
sec-Butylbenzene	ND	2.00	"	"	"	"	"	"	
tert-Butylbenzene	ND	2.00	"	"	"	"	"	"	
Carbon disulfide	ND	20.0	"	"	"	"	"	"	
Carbon tetrachloride	ND	2.00	"	"	"	"	"	"	
Chlorobenzene	ND	2.00	"	"	"	"	"	"	
Chloroethane	ND	2.00	"	"	"	"	"	"	
Chloroform	ND	2.00	"	"	"	"	"	"	
Chloromethane	ND	10.0	"	"	"	"	"	"	
2-Chlorotoluene	ND	2.00	"	"	"	"	"	"	
4-Chlorotoluene	ND	2.00	"	"	"	"	"	"	
1,2-Dibromo-3-chloropropane	ND	10.0	"	"	"	"	"	"	
Dibromochloromethane	ND	2.00	"	"	"	"	"	"	
1,2-Dibromoethane	ND	2.00	"	"	"	"	"	"	
Dibromomethane	ND	2.00	"	"	"	"	"	"	
1,2-Dichlorobenzene	ND	2.00	"	"	"	"	"	"	
1,3-Dichlorobenzene	ND	2.00	"	"	"	"	"	"	
1,4-Dichlorobenzene	ND	2.00	"	"	"	"	"	"	
Dichlorodifluoromethane	ND	10.0	"	"	"	"	"	"	
1,1-Dichloroethane	ND	2.00	"	"	"	"	"	"	
1,2-Dichloroethane	ND	2.00	"	"	"	"	"	"	
1,1-Dichloroethene	ND	2.00	"	"	"	"	"	"	
cis-1,2-Dichloroethene	ND	2.00	"	"	"	"	"	"	
trans-1,2-Dichloroethene	ND	2.00	"	"	"	"	"	"	
1,2-Dichloropropane	ND	2.00	"	"	"	"	"	"	
1,3-Dichloropropane	ND	2.00	"	"	"	"	"	"	
2,2-Dichloropropane	ND	2.00	"	"	"	"	"	"	
1,1-Dichloropropene	ND	2.00	"	"	"	"	"	"	
cis-1,3-Dichloropropene	ND	2.00	"	"	"	"	"	"	

North Creek Analytical - Portland

Philip Nerenberg

Philip Nerenberg, Laboratory Manager

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Hahn and Associates, Inc.	Project: Gasco Upland	
434 NW Sixth Ave., Suite 203	Project Number: 2708	**Reported:**
Portland, OR 97209	Project Manager: Rob Ede	07/06/04 13:01

Volatile Organic Compounds per EPA Method 8260B

North Creek Analytical - Portland

Analyte	Result	Reporting Limit	Units	Dilution	Method	Prepared	Analyzed	Batch	Notes
2708-040603-105 (P4F0212-04) Water					Sampled: 06/03/04 Received: 06/04/04				
trans-1,3-Dichloropropene	ND	2.00	ug/l	2	EPA 8260B	06/09/04	06/10/04	4060374	
Ethylbenzene	**2.02**	2.00	"	"	"	"	"	"	
Hexachlorobutadiene	ND	4.00	"	"	"	"	"	"	
2-Hexanone	ND	20.0	"	"	"	"	"	"	
Isopropylbenzene	ND	4.00	"	"	"	"	"	"	
p-Isopropyltoluene	ND	4.00	"	"	"	"	"	"	
4-Methyl-2-pentanone	ND	10.0	"	"	"	"	"	"	
Methyl tert-butyl ether	ND	2.00	"	"	"	"	"	"	
Methylene chloride	ND	10.0	"	"	"	"	"	"	
Naphthalene	**273**	4.00	"	"	"	"	"	"	
n-Propylbenzene	ND	2.00	"	"	"	"	"	"	
Styrene	ND	2.00	"	"	"	"	"	"	
1,1,1,2-Tetrachloroethane	ND	2.00	"	"	"	"	"	"	
1,1,2,2-Tetrachloroethane	ND	2.00	"	"	"	"	"	"	
Tetrachloroethene	ND	2.00	"	"	"	"	"	"	
Toluene	ND	2.00	"	"	"	"	"	"	
1,2,3-Trichlorobenzene	ND	2.00	"	"	"	"	"	"	
1,2,4-Trichlorobenzene	ND	2.00	"	"	"	"	"	"	
1,1,1-Trichloroethane	ND	2.00	"	"	"	"	"	"	
1,1,2-Trichloroethane	ND	2.00	"	"	"	"	"	"	
Trichloroethene	ND	2.00	"	"	"	"	"	"	
Trichlorofluoromethane	ND	2.00	"	"	"	"	"	"	
1,2,3-Trichloropropane	ND	2.00	"	"	"	"	"	"	
1,2,4-Trimethylbenzene	ND	2.00	"	"	"	"	"	"	
1,3,5-Trimethylbenzene	ND	2.00	"	"	"	"	"	"	
Vinyl chloride	ND	2.00	"	"	"	"	"	"	
o-Xylene	**6.96**	2.00	"	"	"	"	"	"	
m,p-Xylene	ND	4.00	"	"	"	"	"	"	
Surr: 4-BFB	*105 %*	*75-120*							
Surr: 1,2-DCA-d4	*106 %*	*77-129*							
Surr: Dibromofluoromethane	*112 %*	*80-121*							
Surr: Toluene-d8	*102 %*	*80-120*							

North Creek Analytical - Portland

Philip Nerenberg

Philip Nerenberg, Laboratory Manager

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541.383.9310 fax 541.382.7588

Hahn and Associates, Inc.	Project: Gasco Upland	
434 NW Sixth Ave., Suite 203	Project Number: 2708	**Reported:**
Portland, OR 97209	Project Manager: Rob Ede	07/06/04 13:01

Volatile Organic Compounds per EPA Method 8260B

North Creek Analytical - Portland

Analyte	Result	Reporting Limit	Units	Dilution	Method	Prepared	Analyzed	Batch	Notes
TB57 (P4F0212-05) Water					Sampled: 06/03/04 Received: 06/04/04				
Acetone	ND	25.0	ug/l	1	EPA 8260B	06/09/04	06/10/04	4060374	
Benzene	ND	1.00	"	"	"	"	"	"	
Bromobenzene	ND	1.00	"	"	"	"	"	"	
Bromochloromethane	ND	1.00	"	"	"	"	"	"	
Bromodichloromethane	ND	1.00	"	"	"	"	"	"	
Bromoform	ND	1.00	"	"	"	"	"	"	
Bromomethane	ND	5.00	"	"	"	"	"	"	
2-Butanone	ND	10.0	"	"	"	"	"	"	
n-Butylbenzene	ND	5.00	"	"	"	"	"	"	
sec-Butylbenzene	ND	1.00	"	"	"	"	"	"	
tert-Butylbenzene	ND	1.00	"	"	"	"	"	"	
Carbon disulfide	ND	10.0	"	"	"	"	"	"	
Carbon tetrachloride	ND	1.00	"	"	"	"	"	"	
Chlorobenzene	ND	1.00	"	"	"	"	"	"	
Chloroethane	ND	1.00	"	"	"	"	"	"	
Chloroform	ND	1.00	"	"	"	"	"	"	
Chloromethane	ND	5.00	"	"	"	"	"	"	
2-Chlorotoluene	ND	1.00	"	"	"	"	"	"	
4-Chlorotoluene	ND	1.00	"	"	"	"	"	"	
1,2-Dibromo-3-chloropropane	ND	5.00	"	"	"	"	"	"	
Dibromochloromethane	ND	1.00	"	"	"	"	"	"	
1,2-Dibromoethane	ND	1.00	"	"	"	"	"	"	
Dibromomethane	ND	1.00	"	"	"	"	"	"	
1,2-Dichlorobenzene	ND	1.00	"	"	"	"	"	"	
1,3-Dichlorobenzene	ND	1.00	"	"	"	"	"	"	
1,4-Dichlorobenzene	ND	1.00	"	"	"	"	"	"	
Dichlorodifluoromethane	ND	5.00	"	"	"	"	"	"	
1,1-Dichloroethane	ND	1.00	"	"	"	"	"	"	
1,2-Dichloroethane	ND	1.00	"	"	"	"	"	"	
1,1-Dichloroethene	ND	1.00	"	"	"	"	"	"	
cis-1,2-Dichloroethene	ND	1.00	"	"	"	"	"	"	
trans-1,2-Dichloroethene	ND	1.00	"	"	"	"	"	"	
1,2-Dichloropropane	ND	1.00	"	"	"	"	"	"	
1,3-Dichloropropane	ND	1.00	"	"	"	"	"	"	
2,2-Dichloropropane	ND	1.00	"	"	"	"	"	"	
1,1-Dichloropropene	ND	1.00	"	"	"	"	"	"	
cis-1,3-Dichloropropene	ND	1.00	"	"	"	"	"	"	

North Creek Analytical - Portland

Philip Nerenberg

Philip Nerenberg, Laboratory Manager

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541.383.9310 fax 541.382.7588

Hahn and Associates, Inc.	Project: Gasco Upland	
434 NW Sixth Ave., Suite 203	Project Number: 2708	**Reported:**
Portland, OR 97209	Project Manager: Rob Ede	07/06/04 13:01

Volatile Organic Compounds per EPA Method 8260B

North Creek Analytical - Portland

Analyte	Result	Reporting Limit	Units	Dilution	Method	Prepared	Analyzed	Batch	Notes
TB57 (P4F0212-05) Water					Sampled: 06/03/04 Received: 06/04/04				
trans-1,3-Dichloropropene	ND	1.00	ug/l	1	EPA 8260B	06/09/04	06/10/04	4060374	
Ethylbenzene	ND	1.00	"	"	"	"	"	"	
Hexachlorobutadiene	ND	2.00	"	"	"	"	"	"	
2-Hexanone	ND	10.0	"	"	"	"	"	"	
Isopropylbenzene	ND	2.00	"	"	"	"	"	"	
p-Isopropyltoluene	ND	2.00	"	"	"	"	"	"	
4-Methyl-2-pentanone	ND	5.00	"	"	"	"	"	"	
Methyl tert-butyl ether	ND	1.00	"	"	"	"	"	"	
Methylene chloride	ND	5.00	"	"	"	"	"	"	
Naphthalene	ND	2.00	"	"	"	"	"	"	
n-Propylbenzene	ND	1.00	"	"	"	"	"	"	
Styrene	ND	1.00	"	"	"	"	"	"	
1,1,1,2-Tetrachloroethane	ND	1.00	"	"	"	"	"	"	
1,1,2,2-Tetrachloroethane	ND	1.00	"	"	"	"	"	"	
Tetrachloroethene	ND	1.00	"	"	"	"	"	"	
Toluene	ND	1.00	"	"	"	"	"	"	
1,2,3-Trichlorobenzene	ND	1.00	"	"	"	"	"	"	
1,2,4-Trichlorobenzene	ND	1.00	"	"	"	"	"	"	
1,1,1-Trichloroethane	ND	1.00	"	"	"	"	"	"	
1,1,2-Trichloroethane	ND	1.00	"	"	"	"	"	"	
Trichloroethene	ND	1.00	"	"	"	"	"	"	
Trichlorofluoromethane	ND	1.00	"	"	"	"	"	"	
1,2,3-Trichloropropane	ND	1.00	"	"	"	"	"	"	
1,2,4-Trimethylbenzene	ND	1.00	"	"	"	"	"	"	
1,3,5-Trimethylbenzene	ND	1.00	"	"	"	"	"	"	
Vinyl chloride	ND	1.00	"	"	"	"	"	"	
o-Xylene	ND	1.00	"	"	"	"	"	"	
m,p-Xylene	ND	2.00	"	"	"	"	"	"	
Surr: 4-BFB	*94.0 %*	*75-120*							
Surr: 1,2-DCA-d4	*99.0 %*	*77-129*							
Surr: Dibromofluoromethane	*101 %*	*80-121*							
Surr: Toluene-d8	*98.0 %*	*80-120*							

North Creek Analytical - Portland

Philip Nerenberg

Philip Nerenberg, Laboratory Manager

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Hahn and Associates, Inc.	Project: Gasco Upland	
434 NW Sixth Ave., Suite 203	Project Number: 2708	**Reported:**
Portland, OR 97209	Project Manager: Rob Ede	07/06/04 13:01

Semivolatile Organic Compounds per EPA Method 8270C

North Creek Analytical - Portland

Analyte	Result	Reporting Limit	Units	Dilution	Method	Prepared	Analyzed	Batch	Notes
2708-040603-102 (P4F0212-01) Water					Sampled: 06/03/04 Received: 06/04/04				
Carbazole	ND	5.00	ug/l	1	EPA 8270C	06/07/04	06/09/04	4060257	
Acenaphthene	ND	5.00	"	"	"	"	"	"	
Acenaphthylene	ND	5.00	"	"	"	"	"	"	
Anthracene	ND	5.00	"	"	"	"	"	"	
Benzo (a) anthracene	ND	5.00	"	"	"	"	"	"	
Benzo (a) pyrene	ND	5.00	"	"	"	"	"	"	
Benzo (b) fluoranthene	ND	5.00	"	"	"	"	"	"	
Benzo (ghi) perylene	ND	5.00	"	"	"	"	"	"	
Benzo (k) fluoranthene	ND	5.00	"	"	"	"	"	"	
Benzoic Acid	ND	50.0	"	"	"	"	"	"	
Benzyl alcohol	ND	10.0	"	"	"	"	"	"	
4-Bromophenyl phenyl ether	ND	5.00	"	"	"	"	"	"	
Butyl benzyl phthalate	ND	5.00	"	"	"	"	"	"	
4-Chloro-3-methylphenol	ND	5.00	"	"	"	"	"	"	
4-Chloroaniline	ND	20.0	"	"	"	"	"	"	
Bis(2-chloroethoxy)methane	ND	10.0	"	"	"	"	"	"	
Bis(2-chloroethyl)ether	ND	5.00	"	"	"	"	"	"	
Bis(2-chloroisopropyl)ether	ND	10.0	"	"	"	"	"	"	
2-Chloronaphthalene	ND	5.00	"	"	"	"	"	"	
2-Chlorophenol	ND	5.00	"	"	"	"	"	"	
4-Chlorophenyl phenyl ether	ND	5.00	"	"	"	"	"	"	
Chrysene	ND	5.00	"	"	"	"	"	"	
Di-n-butyl phthalate	ND	5.00	"	"	"	"	"	"	
Di-n-octyl phthalate	ND	5.00	"	"	"	"	"	"	
Dibenzo (a,h) anthracene	ND	5.00	"	"	"	"	"	"	
Dibenzofuran	ND	5.00	"	"	"	"	"	"	
1,2-Dichlorobenzene	ND	5.00	"	"	"	"	"	"	
1,3-Dichlorobenzene	ND	5.00	"	"	"	"	"	"	
1,4-Dichlorobenzene	ND	5.00	"	"	"	"	"	"	
3,3'-Dichlorobenzidine	ND	5.00	"	"	"	"	"	"	
2,4-Dichlorophenol	ND	5.00	"	"	"	"	"	"	
Diethyl phthalate	ND	5.00	"	"	"	"	"	"	
2,4-Dimethylphenol	ND	10.0	"	"	"	"	"	"	
Dimethyl phthalate	ND	5.00	"	"	"	"	"	"	
4,6-Dinitro-2-methylphenol	ND	10.0	"	"	"	"	"	"	
2,4-Dinitrophenol	ND	25.0	"	"	"	"	"	"	
2,4-Dinitrotoluene	ND	5.00	"	"	"	"	"	"	

North Creek Analytical - Portland

Philip Nerenberg

Philip Nerenberg, Laboratory Manager

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Hahn and Associates, Inc.	Project: Gasco Upland	
434 NW Sixth Ave., Suite 203	Project Number: 2708	**Reported:**
Portland, OR 97209	Project Manager: Rob Ede	07/06/04 13:01

Semivolatile Organic Compounds per EPA Method 8270C

North Creek Analytical - Portland

Analyte	Result	Reporting Limit	Units	Dilution	Method	Prepared	Analyzed	Batch	Notes
2708-040603-102 (P4F0212-01) Water					Sampled: 06/03/04 Received: 06/04/04				
2,6-Dinitrotoluene	ND	5.00	ug/l	1	EPA 8270C	06/07/04	06/09/04	4060257	
Bis(2-ethylhexyl)phthalate	**17.4**	10.0	"	"	"	"	"	"	
Fluoranthene	ND	5.00	"	"	"	"	"	"	
Fluorene	ND	5.00	"	"	"	"	"	"	
Hexachlorobenzene	ND	5.00	"	"	"	"	"	"	
Hexachlorobutadiene	ND	10.0	"	"	"	"	"	"	
Hexachlorocyclopentadiene	ND	10.0	"	"	"	"	"	"	
Hexachloroethane	ND	10.0	"	"	"	"	"	"	
Indeno (1,2,3-cd) pyrene	ND	5.00	"	"	"	"	"	"	
Isophorone	ND	5.00	"	"	"	"	"	"	
2-Methylnaphthalene	ND	5.00	"	"	"	"	"	"	
2-Methylphenol	ND	10.0	"	"	"	"	"	"	
3-,4-Methylphenol	ND	5.00	"	"	"	"	"	"	
Naphthalene	**5.19**	5.00	"	"	"	"	"	"	
2-Nitroaniline	ND	5.00	"	"	"	"	"	"	
3-Nitroaniline	ND	10.0	"	"	"	"	"	"	
4-Nitroaniline	ND	10.0	"	"	"	"	"	"	
Nitrobenzene	ND	5.00	"	"	"	"	"	"	
2-Nitrophenol	ND	5.00	"	"	"	"	"	"	
4-Nitrophenol	ND	25.0	"	"	"	"	"	"	
N-Nitrosodi-n-propylamine	ND	10.0	"	"	"	"	"	"	
N-Nitrosodiphenylamine	ND	5.00	"	"	"	"	"	"	
Pentachlorophenol	ND	10.0	"	"	"	"	"	"	
Phenanthrene	ND	5.00	"	"	"	"	"	"	
Phenol	ND	5.00	"	"	"	"	"	"	
Pyrene	ND	5.00	"	"	"	"	"	"	
1,2,4-Trichlorobenzene	ND	5.00	"	"	"	"	"	"	
2,4,5-Trichlorophenol	ND	5.00	"	"	"	"	"	"	
2,4,6-Trichlorophenol	ND	5.00	"	"	"	"	"	"	
Surr: 2-Fluorobiphenyl	*71.8 %*	*26-135*							
Surr: 2-Fluorophenol	*44.5 %*	*6-124*							
Surr: Nitrobenzene-d5	*83.1 %*	*23-147*							
Surr: Phenol-d6	*30.4 %*	*11-130*							
Surr: p-Terphenyl-d14	*104 %*	*38-149*							
Surr: 2,4,6-Tribromophenol	*98.6 %*	*19-126*							

North Creek Analytical - Portland

Philip Nerenberg

Philip Nerenberg, Laboratory Manager

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541.383.9310 fax 541.382.7588

Hahn and Associates, Inc.	Project: Gasco Upland	
434 NW Sixth Ave., Suite 203	Project Number: 2708	**Reported:**
Portland, OR 97209	Project Manager: Rob Ede	07/06/04 13:01

Semivolatile Organic Compounds per EPA Method 8270C

North Creek Analytical - Portland

Analyte	Result	Reporting Limit	Units	Dilution	Method	Prepared	Analyzed	Batch	Notes
2708-040603-103 (P4F0212-02) Water					Sampled: 06/03/04 Received: 06/04/04				
Carbazole	ND	5.00	ug/l	1	EPA 8270C	06/07/04	06/09/04	4060257	
Acenaphthene	ND	5.00	"	"	"	"	"	"	
Acenaphthylene	ND	5.00	"	"	"	"	"	"	
Anthracene	ND	5.00	"	"	"	"	"	"	
Benzo (a) anthracene	ND	5.00	"	"	"	"	"	"	
Benzo (a) pyrene	ND	5.00	"	"	"	"	"	"	
Benzo (b) fluoranthene	ND	5.00	"	"	"	"	"	"	
Benzo (ghi) perylene	ND	5.00	"	"	"	"	"	"	
Benzo (k) fluoranthene	ND	5.00	"	"	"	"	"	"	
Benzoic Acid	ND	50.0	"	"	"	"	"	"	
Benzyl alcohol	ND	10.0	"	"	"	"	"	"	
4-Bromophenyl phenyl ether	ND	5.00	"	"	"	"	"	"	
Butyl benzyl phthalate	ND	5.00	"	"	"	"	"	"	
4-Chloro-3-methylphenol	ND	5.00	"	"	"	"	"	"	
4-Chloroaniline	ND	20.0	"	"	"	"	"	"	
Bis(2-chloroethoxy)methane	ND	10.0	"	"	"	"	"	"	
Bis(2-chloroethyl)ether	ND	5.00	"	"	"	"	"	"	
Bis(2-chloroisopropyl)ether	ND	10.0	"	"	"	"	"	"	
2-Chloronaphthalene	ND	5.00	"	"	"	"	"	"	
2-Chlorophenol	ND	5.00	"	"	"	"	"	"	
4-Chlorophenyl phenyl ether	ND	5.00	"	"	"	"	"	"	
Chrysene	ND	5.00	"	"	"	"	"	"	
Di-n-butyl phthalate	ND	5.00	"	"	"	"	"	"	
Di-n-octyl phthalate	ND	5.00	"	"	"	"	"	"	
Dibenzo (a,h) anthracene	ND	5.00	"	"	"	"	"	"	
Dibenzofuran	ND	5.00	"	"	"	"	"	"	
1,2-Dichlorobenzene	ND	5.00	"	"	"	"	"	"	
1,3-Dichlorobenzene	ND	5.00	"	"	"	"	"	"	
1,4-Dichlorobenzene	ND	5.00	"	"	"	"	"	"	
3,3'-Dichlorobenzidine	ND	5.00	"	"	"	"	"	"	
2,4-Dichlorophenol	ND	5.00	"	"	"	"	"	"	
Diethyl phthalate	ND	5.00	"	"	"	"	"	"	
2,4-Dimethylphenol	ND	10.0	"	"	"	"	"	"	
Dimethyl phthalate	ND	5.00	"	"	"	"	"	"	
4,6-Dinitro-2-methylphenol	ND	10.0	"	"	"	"	"	"	
2,4-Dinitrophenol	ND	25.0	"	"	"	"	"	"	
2,4-Dinitrotoluene	ND	5.00	"	"	"	"	"	"	

North Creek Analytical - Portland

Philip Nerenberg

Philip Nerenberg, Laboratory Manager

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Hahn and Associates, Inc.	Project: Gasco Upland	
434 NW Sixth Ave., Suite 203	Project Number: 2708	**Reported:**
Portland, OR 97209	Project Manager: Rob Ede	07/06/04 13:01

Semivolatile Organic Compounds per EPA Method 8270C

North Creek Analytical - Portland

Analyte	Result	Reporting Limit	Units	Dilution	Method	Prepared	Analyzed	Batch	Notes
2708-040603-103 (P4F0212-02) Water					Sampled: 06/03/04 Received: 06/04/04				
2,6-Dinitrotoluene	ND	5.00	ug/l	1	EPA 8270C	06/07/04	06/09/04	4060257	
Bis(2-ethylhexyl)phthalate	ND	10.0	"	"	"	"	"	"	
Fluoranthene	ND	5.00	"	"	"	"	"	"	
Fluorene	ND	5.00	"	"	"	"	"	"	
Hexachlorobenzene	ND	5.00	"	"	"	"	"	"	
Hexachlorobutadiene	ND	10.0	"	"	"	"	"	"	
Hexachlorocyclopentadiene	ND	10.0	"	"	"	"	"	"	
Hexachloroethane	ND	10.0	"	"	"	"	"	"	
Indeno (1,2,3-cd) pyrene	ND	5.00	"	"	"	"	"	"	
Isophorone	ND	5.00	"	"	"	"	"	"	
2-Methylnaphthalene	ND	5.00	"	"	"	"	"	"	
2-Methylphenol	ND	10.0	"	"	"	"	"	"	
3-,4-Methylphenol	ND	5.00	"	"	"	"	"	"	
Naphthalene	**41.5**	5.00	"	"	"	"	"	"	
2-Nitroaniline	ND	5.00	"	"	"	"	"	"	
3-Nitroaniline	ND	10.0	"	"	"	"	"	"	
4-Nitroaniline	ND	10.0	"	"	"	"	"	"	
Nitrobenzene	ND	5.00	"	"	"	"	"	"	
2-Nitrophenol	ND	5.00	"	"	"	"	"	"	
4-Nitrophenol	ND	25.0	"	"	"	"	"	"	
N-Nitrosodi-n-propylamine	ND	10.0	"	"	"	"	"	"	
N-Nitrosodiphenylamine	ND	5.00	"	"	"	"	"	"	
Pentachlorophenol	ND	10.0	"	"	"	"	"	"	
Phenanthrene	ND	5.00	"	"	"	"	"	"	
Phenol	ND	5.00	"	"	"	"	"	"	
Pyrene	ND	5.00	"	"	"	"	"	"	
1,2,4-Trichlorobenzene	ND	5.00	"	"	"	"	"	"	
2,4,5-Trichlorophenol	ND	5.00	"	"	"	"	"	"	
2,4,6-Trichlorophenol	ND	5.00	"	"	"	"	"	"	
Surr: 2-Fluorobiphenyl	*63.6 %*	*26-135*							
Surr: 2-Fluorophenol	*41.9 %*	*6-124*							
Surr: Nitrobenzene-d5	*73.9 %*	*23-147*							
Surr: Phenol-d6	*28.3 %*	*11-130*							
Surr: p-Terphenyl-d14	*101 %*	*38-149*							
Surr: 2,4,6-Tribromophenol	*94.2 %*	*19-126*							

North Creek Analytical - Portland

Philip Nerenberg

Philip Nerenberg, Laboratory Manager

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Hahn and Associates, Inc.	Project: Gasco Upland	
434 NW Sixth Ave., Suite 203	Project Number: 2708	**Reported:**
Portland, OR 97209	Project Manager: Rob Ede	07/06/04 13:01

Semivolatile Organic Compounds per EPA Method 8270C

North Creek Analytical - Portland

Analyte	Result	Reporting Limit	Units	Dilution	Method	Prepared	Analyzed	Batch	Notes
2708-040603-104 (P4F0212-03) Water					Sampled: 06/03/04 Received: 06/04/04				
Carbazole	ND	5.00	ug/l	1	EPA 8270C	06/07/04	06/09/04	4060257	
Acenaphthene	ND	5.00	"	"	"	"	"	"	
Acenaphthylene	ND	5.00	"	"	"	"	"	"	
Anthracene	ND	5.00	"	"	"	"	"	"	
Benzo (a) anthracene	ND	5.00	"	"	"	"	"	"	
Benzo (a) pyrene	ND	5.00	"	"	"	"	"	"	
Benzo (b) fluoranthene	ND	5.00	"	"	"	"	"	"	
Benzo (ghi) perylene	ND	5.00	"	"	"	"	"	"	
Benzo (k) fluoranthene	ND	5.00	"	"	"	"	"	"	
Benzoic Acid	ND	50.0	"	"	"	"	"	"	
Benzyl alcohol	ND	10.0	"	"	"	"	"	"	
4-Bromophenyl phenyl ether	ND	5.00	"	"	"	"	"	"	
Butyl benzyl phthalate	ND	5.00	"	"	"	"	"	"	
4-Chloro-3-methylphenol	ND	5.00	"	"	"	"	"	"	
4-Chloroaniline	ND	20.0	"	"	"	"	"	"	
Bis(2-chloroethoxy)methane	ND	10.0	"	"	"	"	"	"	
Bis(2-chloroethyl)ether	ND	5.00	"	"	"	"	"	"	
Bis(2-chloroisopropyl)ether	ND	10.0	"	"	"	"	"	"	
2-Chloronaphthalene	ND	5.00	"	"	"	"	"	"	
2-Chlorophenol	ND	5.00	"	"	"	"	"	"	
4-Chlorophenyl phenyl ether	ND	5.00	"	"	"	"	"	"	
Chrysene	ND	5.00	"	"	"	"	"	"	
Di-n-butyl phthalate	ND	5.00	"	"	"	"	"	"	
Di-n-octyl phthalate	ND	5.00	"	"	"	"	"	"	
Dibenzo (a,h) anthracene	ND	5.00	"	"	"	"	"	"	
Dibenzofuran	ND	5.00	"	"	"	"	"	"	
1,2-Dichlorobenzene	ND	5.00	"	"	"	"	"	"	
1,3-Dichlorobenzene	ND	5.00	"	"	"	"	"	"	
1,4-Dichlorobenzene	ND	5.00	"	"	"	"	"	"	
3,3'-Dichlorobenzidine	ND	5.00	"	"	"	"	"	"	
2,4-Dichlorophenol	ND	5.00	"	"	"	"	"	"	
Diethyl phthalate	ND	5.00	"	"	"	"	"	"	
2,4-Dimethylphenol	ND	10.0	"	"	"	"	"	"	
Dimethyl phthalate	ND	5.00	"	"	"	"	"	"	
4,6-Dinitro-2-methylphenol	ND	10.0	"	"	"	"	"	"	
2,4-Dinitrophenol	ND	25.0	"	"	"	"	"	"	
2,4-Dinitrotoluene	ND	5.00	"	"	"	"	"	"	

North Creek Analytical - Portland

Philip Nerenberg

Philip Nerenberg, Laboratory Manager

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Hahn and Associates, Inc.	Project: Gasco Upland	
434 NW Sixth Ave., Suite 203	Project Number: 2708	**Reported:**
Portland, OR 97209	Project Manager: Rob Ede	07/06/04 13:01

Semivolatile Organic Compounds per EPA Method 8270C

North Creek Analytical - Portland

Analyte	Result	Reporting Limit	Units	Dilution	Method	Prepared	Analyzed	Batch	Notes
2708-040603-104 (P4F0212-03) Water					Sampled: 06/03/04 Received: 06/04/04				
2,6-Dinitrotoluene	ND	5.00	ug/l	1	EPA 8270C	06/07/04	06/09/04	4060257	
Bis(2-ethylhexyl)phthalate	ND	10.0	"	"	"	"	"	"	
Fluoranthene	ND	5.00	"	"	"	"	"	"	
Fluorene	ND	5.00	"	"	"	"	"	"	
Hexachlorobenzene	ND	5.00	"	"	"	"	"	"	
Hexachlorobutadiene	ND	10.0	"	"	"	"	"	"	
Hexachlorocyclopentadiene	ND	10.0	"	"	"	"	"	"	
Hexachloroethane	ND	10.0	"	"	"	"	"	"	
Indeno (1,2,3-cd) pyrene	ND	5.00	"	"	"	"	"	"	
Isophorone	ND	5.00	"	"	"	"	"	"	
2-Methylnaphthalene	ND	5.00	"	"	"	"	"	"	
2-Methylphenol	ND	10.0	"	"	"	"	"	"	
3-,4-Methylphenol	ND	5.00	"	"	"	"	"	"	
Naphthalene	**317**	50.0	"	10	"	"	06/10/04	"	
2-Nitroaniline	ND	5.00	"	1	"	"	06/09/04	"	
3-Nitroaniline	ND	10.0	"	"	"	"	"	"	
4-Nitroaniline	ND	10.0	"	"	"	"	"	"	
Nitrobenzene	ND	5.00	"	"	"	"	"	"	
2-Nitrophenol	ND	5.00	"	"	"	"	"	"	
4-Nitrophenol	ND	25.0	"	"	"	"	"	"	
N-Nitrosodi-n-propylamine	ND	10.0	"	"	"	"	"	"	
N-Nitrosodiphenylamine	ND	5.00	"	"	"	"	"	"	
Pentachlorophenol	ND	10.0	"	"	"	"	"	"	
Phenanthrene	ND	5.00	"	"	"	"	"	"	
Phenol	ND	5.00	"	"	"	"	"	"	
Pyrene	ND	5.00	"	"	"	"	"	"	
1,2,4-Trichlorobenzene	ND	5.00	"	"	"	"	"	"	
2,4,5-Trichlorophenol	ND	5.00	"	"	"	"	"	"	
2,4,6-Trichlorophenol	ND	5.00	"	"	"	"	"	"	
Surr: 2-Fluorobiphenyl	*77.2 %*	*26-135*							
Surr: 2-Fluorophenol	*44.7 %*	*6-124*							
Surr: Nitrobenzene-d5	*87.3 %*	*23-147*							
Surr: Phenol-d6	*31.5 %*	*11-130*							
Surr: p-Terphenyl-d14	*95.9 %*	*38-149*							
Surr: 2,4,6-Tribromophenol	*97.2 %*	*19-126*							

North Creek Analytical - Portland

Philip Nerenberg

Philip Nerenberg, Laboratory Manager

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Hahn and Associates, Inc.	Project: Gasco Upland	
434 NW Sixth Ave., Suite 203	Project Number: 2708	**Reported:**
Portland, OR 97209	Project Manager: Rob Ede	07/06/04 13:01

Polynuclear Aromatic Compounds per EPA 8270M-SIM

North Creek Analytical - Portland

Analyte	Result	Reporting Limit	Units	Dilution	Method	Prepared	Analyzed	Batch	Notes
2708-040603-102 (P4F0212-01) Water					Sampled: 06/03/04 Received: 06/04/04				
Acenaphthene	**0.342**	0.100	ug/l	1	EPA 8270m	06/07/04	06/10/04	4060262	
Acenaphthylene	ND	0.100	"	"	"	"	"	"	
Anthracene	ND	0.100	"	"	"	"	"	"	
Benzo (a) anthracene	ND	0.100	"	"	"	"	"	"	
Benzo (a) pyrene	ND	0.100	"	"	"	"	"	"	
Benzo (b) fluoranthene	ND	0.100	"	"	"	"	"	"	
Benzo (ghi) perylene	ND	0.100	"	"	"	"	"	"	
Benzo (k) fluoranthene	ND	0.100	"	"	"	"	"	"	
Chrysene	ND	0.100	"	"	"	"	"	"	
Dibenzo (a,h) anthracene	ND	0.200	"	"	"	"	"	"	
Fluoranthene	**0.168**	0.100	"	"	"	"	"	"	
Fluorene	**0.132**	0.100	"	"	"	"	"	"	
Indeno (1,2,3-cd) pyrene	ND	0.100	"	"	"	"	"	"	
Naphthalene	**3.61**	0.100	"	"	"	"	"	"	
Phenanthrene	**0.330**	0.100	"	"	"	"	"	"	
Pyrene	**0.223**	0.100	"	"	"	"	"	"	
Surr: Fluorene-d10	*68.9 %*	*25-125*							
Surr: Pyrene-d10	*81.5 %*	*23-150*							
Surr: Benzo (a) pyrene-d12	*39.4 %*	*10-125*							
2708-040603-102 (P4F0212-01RE1) Water					Sampled: 06/03/04 Received: 06/04/04				
Benzo (a) anthracene	**0.0239**	0.0100	ug/l	1	EPA 8270m	06/07/04	06/25/04	4060262	
Benzo (a) pyrene	**0.0196**	0.0100	"	"	"	"	"	"	
Benzo (b) fluoranthene	**0.0234**	0.0100	"	"	"	"	"	"	
Benzo (k) fluoranthene	**0.0188**	0.0100	"	"	"	"	"	"	
Chrysene	**0.0345**	0.0100	"	"	"	"	"	"	
Dibenzo (a,h) anthracene	ND	0.0100	"	"	"	"	"	"	
Indeno (1,2,3-cd) pyrene	**0.0167**	0.0100	"	"	"	"	"	"	
Surr: Benzo (a) pyrene-d12	*31.0 %*	*10-125*							

North Creek Analytical - Portland

Philip Nerenberg

Philip Nerenberg, Laboratory Manager

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Hahn and Associates, Inc.	Project: Gasco Upland	
434 NW Sixth Ave., Suite 203	Project Number: 2708	**Reported:**
Portland, OR 97209	Project Manager: Rob Ede	07/06/04 13:01

Polynuclear Aromatic Compounds per EPA 8270M-SIM

North Creek Analytical - Portland

Analyte	Result	Reporting Limit	Units	Dilution	Method	Prepared	Analyzed	Batch	Notes
2708-040603-103 (P4F0212-02) Water					Sampled: 06/03/04 Received: 06/04/04				
Acenaphthene	**0.103**	0.100	ug/l	1	EPA 8270m	06/07/04	06/09/04	4060262	
Acenaphthylene	ND	0.100	"	"	"	"	"	"	
Anthracene	ND	0.100	"	"	"	"	"	"	
Benzo (a) anthracene	ND	0.100	"	"	"	"	"	"	
Benzo (a) pyrene	ND	0.100	"	"	"	"	"	"	
Benzo (b) fluoranthene	ND	0.100	"	"	"	"	"	"	
Benzo (ghi) perylene	ND	0.100	"	"	"	"	"	"	
Benzo (k) fluoranthene	ND	0.100	"	"	"	"	"	"	
Chrysene	ND	0.100	"	"	"	"	"	"	
Dibenzo (a,h) anthracene	ND	0.200	"	"	"	"	"	"	
Fluoranthene	ND	0.100	"	"	"	"	"	"	
Fluorene	ND	0.100	"	"	"	"	"	"	
Indeno (1,2,3-cd) pyrene	ND	0.100	"	"	"	"	"	"	
Naphthalene	**63.8**	2.50	"	25	"	"	06/10/04	"	
Phenanthrene	ND	0.100	"	1	"	"	06/09/04	"	
Pyrene	ND	0.100	"	"	"	"	"	"	
Surr: Fluorene-d10	*70.4 %*	*25-125*							
Surr: Pyrene-d10	*101 %*	*23-150*							
Surr: Benzo (a) pyrene-d12	*63.3 %*	*10-125*							
2708-040603-103 (P4F0212-02RE1) Water					Sampled: 06/03/04 Received: 06/04/04				
Benzo (a) anthracene	ND	0.0100	ug/l	1	EPA 8270m	06/07/04	06/25/04	4060262	
Benzo (a) pyrene	ND	0.0100	"	"	"	"	"	"	
Benzo (b) fluoranthene	ND	0.0100	"	"	"	"	"	"	
Benzo (k) fluoranthene	ND	0.0100	"	"	"	"	"	"	
Chrysene	ND	0.0100	"	"	"	"	"	"	
Dibenzo (a,h) anthracene	ND	0.0100	"	"	"	"	"	"	
Indeno (1,2,3-cd) pyrene	ND	0.0100	"	"	"	"	"	"	
Surr: Benzo (a) pyrene-d12	*49.2 %*	*10-125*							

North Creek Analytical - Portland

Philip Nerenberg

Philip Nerenberg, Laboratory Manager

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Hahn and Associates, Inc.	Project: Gasco Upland	
434 NW Sixth Ave., Suite 203	Project Number: 2708	**Reported:**
Portland, OR 97209	Project Manager: Rob Ede	07/06/04 13:01

Polynuclear Aromatic Compounds per EPA 8270M-SIM

North Creek Analytical - Portland

Analyte	Result	Reporting Limit	Units	Dilution	Method	Prepared	Analyzed	Batch	Notes
2708-040603-104 (P4F0212-03) Water					Sampled: 06/03/04 Received: 06/04/04				
Acenaphthene	**0.126**	0.100	ug/l	1	EPA 8270m	06/07/04	06/10/04	4060262	
Acenaphthylene	ND	0.150	"	"	"	"	"	"	R-03
Anthracene	ND	0.100	"	"	"	"	"	"	
Benzo (a) anthracene	ND	0.100	"	"	"	"	"	"	
Benzo (a) pyrene	ND	0.100	"	"	"	"	"	"	
Benzo (b) fluoranthene	ND	0.100	"	"	"	"	"	"	
Benzo (ghi) perylene	ND	0.100	"	"	"	"	"	"	
Benzo (k) fluoranthene	ND	0.100	"	"	"	"	"	"	
Chrysene	ND	0.100	"	"	"	"	"	"	
Dibenzo (a,h) anthracene	ND	0.200	"	"	"	"	"	"	
Fluoranthene	**0.165**	0.100	"	"	"	"	"	"	
Fluorene	ND	0.150	"	"	"	"	"	"	R-03
Indeno (1,2,3-cd) pyrene	ND	0.100	"	"	"	"	"	"	
Naphthalene	**358**	25.0	"	250	"	"	06/11/04	"	
Phenanthrene	**0.280**	0.100	"	1	"	"	06/10/04	"	
Pyrene	**0.230**	0.100	"	"	"	"	"	"	
Surr: Fluorene-d10	*74.8 %*	*25-125*							
Surr: Pyrene-d10	*107 %*	*23-150*							
Surr: Benzo (a) pyrene-d12	*60.1 %*	*10-125*							
2708-040603-104 (P4F0212-03RE1) Water					Sampled: 06/03/04 Received: 06/04/04				
Benzo (a) anthracene	**0.0315**	0.0100	ug/l	1	EPA 8270m	06/07/04	06/25/04	4060262	
Benzo (a) pyrene	**0.0313**	0.0100	"	"	"	"	"	"	
Benzo (b) fluoranthene	**0.0236**	0.0100	"	"	"	"	"	"	
Benzo (k) fluoranthene	**0.0166**	0.0100	"	"	"	"	"	"	
Chrysene	**0.0416**	0.0100	"	"	"	"	"	"	
Dibenzo (a,h) anthracene	ND	0.0100	"	"	"	"	"	"	
Indeno (1,2,3-cd) pyrene	**0.0154**	0.0100	"	"	"	"	"	"	
Surr: Benzo (a) pyrene-d12	*50.0 %*	*10-125*							

North Creek Analytical - Portland

Philip Nerenberg

Philip Nerenberg, Laboratory Manager

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Hahn and Associates, Inc.	Project: Gasco Upland	
434 NW Sixth Ave., Suite 203	Project Number: 2708	**Reported:**
Portland, OR 97209	Project Manager: Rob Ede	07/06/04 13:01

Polynuclear Aromatic Compounds per EPA 8270M-SIM

North Creek Analytical - Portland

Analyte	Result	Reporting Limit	Units	Dilution	Method	Prepared	Analyzed	Batch	Notes
2708-040603-105 (P4F0212-04) Water					Sampled: 06/03/04 Received: 06/04/04				
Acenaphthene	ND	0.150	ug/l	1	EPA 8270m	06/07/04	06/11/04	4060262	R-03
Acenaphthylene	ND	0.150	"	"	"	"	"	"	R-03
Anthracene	ND	0.100	"	"	"	"	"	"	
Benzo (a) anthracene	ND	0.100	"	"	"	"	"	"	
Benzo (a) pyrene	ND	0.100	"	"	"	"	"	"	
Benzo (b) fluoranthene	ND	0.100	"	"	"	"	"	"	
Benzo (ghi) perylene	ND	0.100	"	"	"	"	"	"	
Benzo (k) fluoranthene	ND	0.100	"	"	"	"	"	"	
Chrysene	ND	0.100	"	"	"	"	"	"	
Dibenzo (a,h) anthracene	ND	0.200	"	"	"	"	"	"	
Fluoranthene	**0.132**	0.100	"	"	"	"	"	"	
Fluorene	ND	0.150	"	"	"	"	"	"	R-03
Indeno (1,2,3-cd) pyrene	ND	0.100	"	"	"	"	"	"	
Naphthalene	**405**	25.0	"	250	"	"	06/11/04	"	
Phenanthrene	**0.214**	0.100	"	1	"	"	06/11/04	"	
Pyrene	**0.184**	0.100	"	"	"	"	"	"	
Surr: Fluorene-d10	*93.7 %*	*25-125*							
Surr: Pyrene-d10	*99.6 %*	*23-150*							
Surr: Benzo (a) pyrene-d12	*74.8 %*	*10-125*							
2708-040603-105 (P4F0212-04RE1) Water					Sampled: 06/03/04 Received: 06/04/04				J
Benzo (a) anthracene	ND	0.0300	ug/l	3	EPA 8270m	06/07/04	06/29/04	4060262	
Benzo (a) pyrene	ND	0.0300	"	"	"	"	"	"	
Benzo (b) fluoranthene	ND	0.0300	"	"	"	"	"	"	
Benzo (k) fluoranthene	ND	0.0300	"	"	"	"	"	"	
Chrysene	ND	0.0300	"	"	"	"	"	"	
Dibenzo (a,h) anthracene	ND	0.0300	"	"	"	"	"	"	
Indeno (1,2,3-cd) pyrene	ND	0.0300	"	"	"	"	"	"	
Surr: Benzo (a) pyrene-d12	*18.1 %*	*10-125*							

North Creek Analytical - Portland

Philip Nerenberg

Philip Nerenberg, Laboratory Manager

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Hahn and Associates, Inc.	Project: Gasco Upland	
434 NW Sixth Ave., Suite 203	Project Number: 2708	**Reported:**
Portland, OR 97209	Project Manager: Rob Ede	07/06/04 13:01

Conventional Chemistry Parameters per APHA/EPA Methods

North Creek Analytical - Portland

Analyte	Result	Reporting Limit	Units	Dilution	Method	Prepared	Analyzed	Batch	Notes
2708-040603-102 (P4F0212-01) Water					Sampled: 06/03/04 Received: 06/04/04				
Cyanide (amenable)	**0.105**	0.00500	mg/l	1	EPA 9010A	06/14/04	06/15/04	4060555	
Cyanide (total)	**0.517**	0.00500	"	"	EPA 9012A	06/11/04	06/11/04	4060476	
2708-040603-103 (P4F0212-02) Water					Sampled: 06/03/04 Received: 06/04/04				
Cyanide (amenable)	**0.0842**	0.00500	mg/l	1	EPA 9010A	06/14/04	06/15/04	4060555	
Cyanide (total)	**0.406**	0.00500	"	"	EPA 9012A	06/11/04	06/11/04	4060476	
2708-040603-104 (P4F0212-03) Water					Sampled: 06/03/04 Received: 06/04/04				
Cyanide (amenable)	**0.107**	0.00500	mg/l	1	EPA 9010A	06/14/04	06/15/04	4060555	
Cyanide (total)	**0.506**	0.00500	"	"	EPA 9012A	06/11/04	06/11/04	4060476	

North Creek Analytical - Portland

Philip Nerenberg

Philip Nerenberg, Laboratory Manager

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Hahn and Associates, Inc.	Project: Gasco Upland	
434 NW Sixth Ave., Suite 203	Project Number: 2708	**Reported:**
Portland, OR 97209	Project Manager: Rob Ede	07/06/04 13:01

Total Metals per EPA 6000/7000 Series Methods - Quality Control

North Creek Analytical - Portland

Analyte	Result	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
Batch 4060378 - EPA 200/3005										
Blank (4060378-BLK1)				Prepared: 06/09/04 Analyzed: 06/10/04						
Arsenic	ND	0.00100	mg/l							
Chromium	ND	0.00100	"							
Copper	ND	0.00200	"							
Lead	ND	0.00100	"							
Nickel	ND	0.00200	"							
Zinc	ND	0.00500	"							
LCS (4060378-BS1)				Prepared: 06/09/04 Analyzed: 06/10/04						
Arsenic	0.0926	0.00100	mg/l	0.100		92.6	80-120			
Chromium	0.100	0.00100	"	0.100		100	80-120			
Copper	0.0945	0.00200	"	0.100		94.5	80-120			
Lead	0.104	0.00100	"	0.100		104	80-120			
Nickel	0.0958	0.00200	"	0.100		95.8	80-120			
Zinc	0.0901	0.00500	"	0.100		90.1	80-120			
LCS Dup (4060378-BSD1)				Prepared: 06/09/04 Analyzed: 06/10/04						
Arsenic	0.0959	0.00100	mg/l	0.100		95.9	80-120	3.50	20	
Chromium	0.103	0.00100	"	0.100		103	80-120	2.96	20	
Copper	0.0964	0.00200	"	0.100		96.4	80-120	1.99	20	
Lead	0.103	0.00100	"	0.100		103	80-120	0.966	20	
Nickel	0.0966	0.00200	"	0.100		96.6	80-120	0.832	20	
Zinc	0.0932	0.00500	"	0.100		93.2	80-120	3.38	20	
Duplicate (4060378-DUP1)		**Source: P4F0201-02**		Prepared: 06/09/04 Analyzed: 06/10/04						
Arsenic	0.00178	0.00100	mg/l		0.00196			9.63	20	
Chromium	0.00266	0.00100	"		0.00270			1.49	20	
Copper	0.00386	0.00200	"		0.00390			1.03	20	
Lead	0.000610	0.00100	"		0.000610			0.00	20	
Nickel	0.00511	0.00200	"		0.00468			8.78	20	
Zinc	0.00493	0.00500	"		0.00518			4.95	20	

North Creek Analytical - Portland

Philip Nerenberg

Philip Nerenberg, Laboratory Manager

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Hahn and Associates, Inc.	Project: Gasco Upland	
434 NW Sixth Ave., Suite 203	Project Number: 2708	**Reported:**
Portland, OR 97209	Project Manager: Rob Ede	07/06/04 13:01

Total Metals per EPA 6000/7000 Series Methods - Quality Control

North Creek Analytical - Portland

Analyte	Result	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
Batch 4060378 - EPA 200/3005										
Matrix Spike (4060378-MS1)	**Source: P4F0201-02**			Prepared: 06/09/04 Analyzed: 06/11/04						
Arsenic	0.108	0.00100	mg/l	0.100	0.00196	106	75-125			
Chromium	0.112	0.00100	"	0.100	0.00270	109	75-125			
Copper	0.108	0.00200	"	0.100	0.00390	104	75-125			
Lead	0.102	0.00100	"	0.100	0.000610	101	75-125			
Nickel	0.111	0.00200	"	0.100	0.00468	106	75-125			
Zinc	0.106	0.00500	"	0.100	0.00518	101	75-125			
Matrix Spike (4060378-MS2)	**Source: P4F0201-03**			Prepared: 06/09/04 Analyzed: 06/11/04						
Arsenic	0.106	0.00100	mg/l	0.100	0.000630	105	75-125			
Chromium	0.111	0.00100	"	0.100	0.00970	101	75-125			
Copper	0.106	0.00200	"	0.100	0.00166	104	75-125			
Lead	0.104	0.00100	"	0.100	0.000350	104	75-125			
Nickel	0.108	0.00200	"	0.100	0.00863	99.4	75-125			
Zinc	0.102	0.00500	"	0.100	0.00151	100	75-125			

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Philip Nerenberg

Philip Nerenberg, Laboratory Manager

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Hahn and Associates, Inc.	Project: Gasco Upland	
434 NW Sixth Ave., Suite 203	Project Number: 2708	**Reported:**
Portland, OR 97209	Project Manager: Rob Ede	07/06/04 13:01

Dissolved Metals per EPA 6000/7000 Series Methods - Quality Control

North Creek Analytical - Portland

Analyte	Result	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
Batch 4060454 - EPA 200/3005 Diss										
Blank (4060454-BLK1)				Prepared: 06/10/04 Analyzed: 06/12/04						
Arsenic	ND	0.00100	mg/l							
Chromium	ND	0.00100	"							
Copper	ND	0.00200	"							
Lead	ND	0.00100	"							
Nickel	ND	0.00200	"							
Zinc	ND	0.00500	"							
LCS (4060454-BS1)				Prepared: 06/10/04 Analyzed: 06/12/04						
Arsenic	0.0961	0.00100	mg/l	0.100		96.1	80-120			
Chromium	0.101	0.00100	"	0.100		101	80-120			
Copper	0.101	0.00200	"	0.100		101	80-120			
Lead	0.100	0.00100	"	0.100		100	80-120			
Nickel	0.105	0.00200	"	0.100		105	80-120			
Zinc	0.0942	0.00500	"	0.100		94.2	80-120			
LCS Dup (4060454-BSD1)				Prepared: 06/10/04 Analyzed: 06/12/04						
Arsenic	0.100	0.00100	mg/l	0.100		100	80-120	3.98	20	
Chromium	0.103	0.00100	"	0.100		103	80-120	1.96	20	
Copper	0.105	0.00200	"	0.100		105	80-120	3.88	20	
Lead	0.0991	0.00100	"	0.100		99.1	80-120	0.904	20	
Nickel	0.106	0.00200	"	0.100		106	80-120	0.948	20	
Zinc	0.0977	0.00500	"	0.100		97.7	80-120	3.65	20	
Duplicate (4060454-DUP1)		**Source: P4F0212-01**		Prepared: 06/10/04 Analyzed: 06/12/04						
Arsenic	0.00151	0.00100	mg/l		0.00119			23.7	20	Q-06
Chromium	0.000840	0.00100	"		0.00498			142	20	Q-06
Copper	0.00231	0.00200	"		0.00218			5.79	20	
Lead	0.000760	0.00100	"		0.000640			17.1	20	
Nickel	0.0326	0.00200	"		0.0320			1.86	20	
Zinc	0.0687	0.00500	"		0.0647			6.00	20	

North Creek Analytical - Portland

Philip Nerenberg

Philip Nerenberg, Laboratory Manager

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Hahn and Associates, Inc.	Project: Gasco Upland	
434 NW Sixth Ave., Suite 203	Project Number: 2708	**Reported:**
Portland, OR 97209	Project Manager: Rob Ede	07/06/04 13:01

Dissolved Metals per EPA 6000/7000 Series Methods - Quality Control

North Creek Analytical - Portland

Analyte	Result	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
Batch 4060454 - EPA 200/3005 Diss										
Matrix Spike (4060454-MS1)	**Source: P4F0212-01**			Prepared: 06/10/04	Analyzed: 06/12/04					
Arsenic	0.109	0.00100	mg/l	0.100	0.00119	108	75-125			
Chromium	0.107	0.00100	"	0.100	0.00498	102	75-125			
Copper	0.101	0.00200	"	0.100	0.00218	98.8	75-125			
Lead	0.0913	0.00100	"	0.100	0.000640	90.7	75-125			
Nickel	0.134	0.00200	"	0.100	0.0320	102	75-125			
Zinc	0.169	0.00500	"	0.100	0.0647	104	75-125			
Matrix Spike (4060454-MS2)	**Source: P4F0212-02**			Prepared: 06/10/04	Analyzed: 06/12/04					
Arsenic	0.112	0.00100	mg/l	0.100	0.00796	104	75-125			
Chromium	0.103	0.00100	"	0.100	0.00538	97.6	75-125			
Copper	0.0958	0.00200	"	0.100	0.00177	94.0	75-125			
Lead	0.0913	0.00100	"	0.100	0.000600	90.7	75-125			
Nickel	0.138	0.00200	"	0.100	0.0338	104	75-125			
Zinc	0.106	0.00500	"	0.100	0.0103	95.7	75-125			

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Philip Nerenberg

Philip Nerenberg, Laboratory Manager

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Hahn and Associates, Inc.	Project: Gasco Upland	
434 NW Sixth Ave., Suite 203	Project Number: 2708	**Reported:**
Portland, OR 97209	Project Manager: Rob Ede	07/06/04 13:01

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 4060374 - EPA 5030B										
Blank (4060374-BLK1)				Prepared & Analyzed: 06/09/04						
Acetone	ND	25.0	ug/l							
Benzene	ND	1.00	"							
Bromobenzene	ND	1.00	"							
Bromochloromethane	ND	1.00	"							
Bromodichloromethane	ND	1.00	"							
Bromoform	ND	1.00	"							
Bromomethane	ND	5.00	"							
2-Butanone	ND	10.0	"							
n-Butylbenzene	ND	5.00	"							
sec-Butylbenzene	ND	1.00	"							
tert-Butylbenzene	ND	1.00	"							
Carbon disulfide	ND	10.0	"							
Carbon tetrachloride	ND	1.00	"							
Chlorobenzene	ND	1.00	"							
Chloroethane	ND	1.00	"							
Chloroform	ND	1.00	"							
Chloromethane	ND	5.00	"							
2-Chlorotoluene	ND	1.00	"							
4-Chlorotoluene	ND	1.00	"							
1,2-Dibromo-3-chloropropane	ND	5.00	"							
Dibromochloromethane	ND	1.00	"							
1,2-Dibromoethane	ND	1.00	"							
Dibromomethane	ND	1.00	"							
1,2-Dichlorobenzene	ND	1.00	"							
1,3-Dichlorobenzene	ND	1.00	"							
1,4-Dichlorobenzene	ND	1.00	"							
Dichlorodifluoromethane	ND	5.00	"							
1,1-Dichloroethane	ND	1.00	"							
1,2-Dichloroethane	ND	1.00	"							
1,1-Dichloroethene	ND	1.00	"							
cis-1,2-Dichloroethene	ND	1.00	"							
trans-1,2-Dichloroethene	ND	1.00	"							
1,2-Dichloropropane	ND	1.00	"							
1,3-Dichloropropane	ND	1.00	"							
2,2-Dichloropropane	ND	1.00	"							
1,1-Dichloropropene	ND	1.00	"							

North Creek Analytical - Portland

Philip Nerenberg

Philip Nerenberg, Laboratory Manager

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Hahn and Associates, Inc.	Project: Gasco Upland	
434 NW Sixth Ave., Suite 203	Project Number: 2708	**Reported:**
Portland, OR 97209	Project Manager: Rob Ede	07/06/04 13:01

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 4060374 - EPA 5030B										
Blank (4060374-BLK1)				Prepared & Analyzed: 06/09/04						
cis-1,3-Dichloropropene	ND	1.00	ug/l							
trans-1,3-Dichloropropene	ND	1.00	"							
Ethylbenzene	ND	1.00	"							
Hexachlorobutadiene	ND	2.00	"							
2-Hexanone	ND	10.0	"							
Isopropylbenzene	ND	2.00	"							
p-Isopropyltoluene	ND	2.00	"							
4-Methyl-2-pentanone	ND	5.00	"							
Methyl tert-butyl ether	ND	1.00	"							
Methylene chloride	ND	5.00	"							
Naphthalene	ND	2.00	"							
n-Propylbenzene	ND	1.00	"							
Styrene	ND	1.00	"							
1,1,1,2-Tetrachloroethane	ND	1.00	"							
1,1,2,2-Tetrachloroethane	ND	1.00	"							
Tetrachloroethene	ND	1.00	"							
Toluene	ND	1.00	"							
1,2,3-Trichlorobenzene	ND	1.00	"							
1,2,4-Trichlorobenzene	ND	1.00	"							
1,1,1-Trichloroethane	ND	1.00	"							
1,1,2-Trichloroethane	ND	1.00	"							
Trichloroethene	ND	1.00	"							
Trichlorofluoromethane	ND	1.00	"							
1,2,3-Trichloropropane	ND	1.00	"							
1,2,4-Trimethylbenzene	ND	1.00	"							
1,3,5-Trimethylbenzene	ND	1.00	"							
Vinyl chloride	ND	1.00	"							
o-Xylene	ND	1.00	"							
m,p-Xylene	ND	2.00	"							
Surr: 4-BFB	*19.3*		"	*20.0*		*96.5*	*75-120*			
Surr: 1,2-DCA-d4	*19.4*		"	*20.0*		*97.0*	*77-129*			
Surr: Dibromofluoromethane	*19.6*		"	*20.0*		*98.0*	*80-121*			
Surr: Toluene-d8	*19.4*		"	*20.0*		*97.0*	*80-120*			

North Creek Analytical - Portland

Philip Nerenberg

Philip Nerenberg, Laboratory Manager

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Hahn and Associates, Inc.	Project: Gasco Upland	
434 NW Sixth Ave., Suite 203	Project Number: 2708	**Reported:**
Portland, OR 97209	Project Manager: Rob Ede	07/06/04 13:01

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 4060374 - EPA 5030B										
LCS (4060374-BS1)				Prepared & Analyzed: 06/09/04						
Benzene	20.3	1.00	ug/l	20.0		102	80-120			
Chlorobenzene	20.1	1.00	"	20.0		100	80-124			
1,1-Dichloroethene	18.8	1.00	"	20.0		94.0	78-120			
Toluene	20.5	1.00	"	20.0		102	80-124			
Trichloroethene	19.2	1.00	"	20.0		96.0	80-132			
Surr: 4-BFB	*20.2*		"	*20.0*		*101*	*75-120*			
Surr: 1,2-DCA-d4	*19.4*		"	*20.0*		*97.0*	*77-129*			
Surr: Dibromofluoromethane	*20.7*		"	*20.0*		*104*	*80-121*			
Surr: Toluene-d8	*20.4*		"	*20.0*		*102*	*80-120*			
Matrix Spike (4060374-MS1)	**Source: P4F0166-01**			Prepared & Analyzed: 06/09/04						
Benzene	20.9	1.00	ug/l	20.0	ND	104	80-124			
Chlorobenzene	20.2	1.00	"	20.0	ND	101	72.9-134			
1,1-Dichloroethene	20.9	1.00	"	20.0	ND	104	79.3-127			
Toluene	21.0	1.00	"	20.0	0.390	103	79.7-131			
Trichloroethene	18.9	1.00	"	20.0	ND	94.5	68.4-130			
Surr: 4-BFB	*19.8*		"	*20.0*		*99.0*	*75-120*			
Surr: 1,2-DCA-d4	*20.3*		"	*20.0*		*102*	*77-129*			
Surr: Dibromofluoromethane	*21.2*		"	*20.0*		*106*	*80-121*			
Surr: Toluene-d8	*20.1*		"	*20.0*		*100*	*80-120*			
Matrix Spike Dup (4060374-MSD1)	**Source: P4F0166-01**			Prepared & Analyzed: 06/09/04						
Benzene	21.0	1.00	ug/l	20.0	ND	105	80-124	0.477	25	
Chlorobenzene	20.5	1.00	"	20.0	ND	102	72.9-134	1.47	25	
1,1-Dichloroethene	21.0	1.00	"	20.0	ND	105	79.3-127	0.477	25	
Toluene	21.2	1.00	"	20.0	0.390	104	79.7-131	0.948	25	
Trichloroethene	18.8	1.00	"	20.0	ND	94.0	68.4-130	0.531	25	
Surr: 4-BFB	*19.4*		"	*20.0*		*97.0*	*75-120*			
Surr: 1,2-DCA-d4	*19.2*		"	*20.0*		*96.0*	*77-129*			
Surr: Dibromofluoromethane	*19.8*		"	*20.0*		*99.0*	*80-121*			
Surr: Toluene-d8	*19.1*		"	*20.0*		*95.5*	*80-120*			

North Creek Analytical - Portland

Philip Nerenberg

Philip Nerenberg, Laboratory Manager

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541.383.9310 fax 541.382.7588

Hahn and Associates, Inc.	Project: Gasco Upland	
434 NW Sixth Ave., Suite 203	Project Number: 2708	**Reported:**
Portland, OR 97209	Project Manager: Rob Ede	07/06/04 13:01

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 4060257 - EPA 3510/600 Series										
Blank (4060257-BLK1)				Prepared: 06/07/04 Analyzed: 06/09/04						
Carbazole	ND	5.00	ug/l							
Acenaphthene	ND	5.00	"							
Acenaphthylene	ND	5.00	"							
Anthracene	ND	5.00	"							
Benzo (a) anthracene	ND	5.00	"							
Benzo (a) pyrene	ND	5.00	"							
Benzo (b) fluoranthene	ND	5.00	"							
Benzo (ghi) perylene	ND	5.00	"							
Benzo (k) fluoranthene	ND	5.00	"							
Benzoic Acid	ND	50.0	"							
Benzyl alcohol	ND	10.0	"							
4-Bromophenyl phenyl ether	ND	5.00	"							
Butyl benzyl phthalate	ND	5.00	"							
4-Chloro-3-methylphenol	ND	5.00	"							
4-Chloroaniline	ND	20.0	"							
Bis(2-chloroethoxy)methane	ND	10.0	"							
Bis(2-chloroethyl)ether	ND	5.00	"							
Bis(2-chloroisopropyl)ether	ND	10.0	"							
2-Chloronaphthalene	ND	5.00	"							
2-Chlorophenol	ND	5.00	"							
4-Chlorophenyl phenyl ether	ND	5.00	"							
Chrysene	ND	5.00	"							
Di-n-butyl phthalate	ND	5.00	"							
Di-n-octyl phthalate	ND	5.00	"							
Dibenzo (a,h) anthracene	ND	5.00	"							
Dibenzofuran	ND	5.00	"							
1,2-Dichlorobenzene	ND	5.00	"							
1,3-Dichlorobenzene	ND	5.00	"							
1,4-Dichlorobenzene	ND	5.00	"							
3,3'-Dichlorobenzidine	ND	5.00	"							
2,4-Dichlorophenol	ND	5.00	"							
Diethyl phthalate	ND	5.00	"							
2,4-Dimethylphenol	ND	10.0	"							
Dimethyl phthalate	ND	5.00	"							
4,6-Dinitro-2-methylphenol	ND	10.0	"							
2,4-Dinitrophenol	ND	25.0	"							

North Creek Analytical - Portland

Philip Nerenberg

Philip Nerenberg, Laboratory Manager

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Hahn and Associates, Inc.	Project: Gasco Upland	
434 NW Sixth Ave., Suite 203	Project Number: 2708	**Reported:**
Portland, OR 97209	Project Manager: Rob Ede	07/06/04 13:01

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 4060257 - EPA 3510/600 Series										
Blank (4060257-BLK1)				Prepared: 06/07/04 Analyzed: 06/09/04						
2,4-Dinitrotoluene	ND	5.00	ug/l							
2,6-Dinitrotoluene	ND	5.00	"							
Bis(2-ethylhexyl)phthalate	ND	10.0	"							
Fluoranthene	ND	5.00	"							
Fluorene	ND	5.00	"							
Hexachlorobenzene	ND	5.00	"							
Hexachlorobutadiene	ND	10.0	"							
Hexachlorocyclopentadiene	ND	10.0	"							
Hexachloroethane	ND	10.0	"							
Indeno (1,2,3-cd) pyrene	ND	5.00	"							
Isophorone	ND	5.00	"							
2-Methylnaphthalene	ND	5.00	"							
2-Methylphenol	ND	10.0	"							
3-,4-Methylphenol	ND	5.00	"							
Naphthalene	ND	5.00	"							
2-Nitroaniline	ND	5.00	"							
3-Nitroaniline	ND	10.0	"							
4-Nitroaniline	ND	10.0	"							
Nitrobenzene	ND	5.00	"							
2-Nitrophenol	ND	5.00	"							
4-Nitrophenol	ND	25.0	"							
N-Nitrosodi-n-propylamine	ND	10.0	"							
N-Nitrosodiphenylamine	ND	5.00	"							
Pentachlorophenol	ND	10.0	"							
Phenanthrene	ND	5.00	"							
Phenol	ND	5.00	"							
Pyrene	ND	5.00	"							
1,2,4-Trichlorobenzene	ND	5.00	"							
2,4,5-Trichlorophenol	ND	5.00	"							
2,4,6-Trichlorophenol	ND	5.00	"							
Surr: 2-Fluorobiphenyl	*53.6*		"	*75.0*		*71.5*	*26-135*			
Surr: 2-Fluorophenol	*71.6*		"	*150*		*47.7*	*6-124*			
Surr: Nitrobenzene-d5	*67.4*		"	*75.0*		*89.9*	*23-147*			
Surr: Phenol-d6	*48.8*		"	*150*		*32.5*	*11-130*			
Surr: p-Terphenyl-d14	*76.5*		"	*75.0*		*102*	*38-149*			
Surr: 2,4,6-Tribromophenol	*112*		"	*150*		*74.7*	*19-126*			

North Creek Analytical - Portland

Philip Nerenberg

Philip Nerenberg, Laboratory Manager

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Hahn and Associates, Inc.	Project: Gasco Upland	
434 NW Sixth Ave., Suite 203	Project Number: 2708	**Reported:**
Portland, OR 97209	Project Manager: Rob Ede	07/06/04 13:01

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 4060257 - EPA 3510/600 Series										
LCS (4060257-BS1)				Prepared: 06/07/04 Analyzed: 06/09/04						
Acenaphthene	65.3	5.00	ug/l	75.0		87.1	40-110			
4-Chloro-3-methylphenol	121	5.00	"	150		80.7	40-110			
2-Chlorophenol	109	5.00	"	150		72.7	40-110			
1,4-Dichlorobenzene	49.4	5.00	"	75.0		65.9	20-90			
2,4-Dinitrotoluene	69.7	5.00	"	75.0		92.9	50-110			
4-Nitrophenol	50.6	25.0	"	150		33.7	15-100			
N-Nitrosodi-n-propylamine	72.4	10.0	"	75.0		96.5	40-110			
Pentachlorophenol	99.4	10.0	"	150		66.3	30-120			
Phenol	49.3	5.00	"	150		32.9	15-110			
Pyrene	71.7	5.00	"	75.0		95.6	40-110			
1,2,4-Trichlorobenzene	50.0	5.00	"	75.0		66.7	25-100			
Surr: 2-Fluorobiphenyl	*58.9*		"	*75.0*		*78.5*	*26-135*			
Surr: 2-Fluorophenol	*79.8*		"	*150*		*53.2*	*6-124*			
Surr: Nitrobenzene-d5	*72.1*		"	*75.0*		*96.1*	*23-147*			
Surr: Phenol-d6	*55.2*		"	*150*		*36.8*	*11-130*			
Surr: p-Terphenyl-d14	*73.5*		"	*75.0*		*98.0*	*38-149*			
Surr: 2,4,6-Tribromophenol	*135*		"	*150*		*90.0*	*19-126*			
LCS Dup (4060257-BSD1)				Prepared: 06/07/04 Analyzed: 06/09/04						
Acenaphthene	65.8	5.00	ug/l	75.0		87.7	40-110	0.763	36	
4-Chloro-3-methylphenol	123	5.00	"	150		82.0	40-110	1.64	43	
2-Chlorophenol	108	5.00	"	150		72.0	40-110	0.922	38	
1,4-Dichlorobenzene	47.1	5.00	"	75.0		62.8	20-90	4.77	43	
2,4-Dinitrotoluene	71.1	5.00	"	75.0		94.8	50-110	1.99	31	
4-Nitrophenol	55.7	25.0	"	150		37.1	15-100	9.60	36	
N-Nitrosodi-n-propylamine	71.4	10.0	"	75.0		95.2	40-110	1.39	37	
Pentachlorophenol	100	10.0	"	150		66.7	30-120	0.602	40	
Phenol	52.5	5.00	"	150		35.0	15-110	6.29	36	
Pyrene	72.0	5.00	"	75.0		96.0	40-110	0.418	31	
1,2,4-Trichlorobenzene	49.9	5.00	"	75.0		66.5	25-100	0.200	42	
Surr: 2-Fluorobiphenyl	*62.3*		"	*75.0*		*83.1*	*26-135*			
Surr: 2-Fluorophenol	*83.4*		"	*150*		*55.6*	*6-124*			
Surr: Nitrobenzene-d5	*71.7*		"	*75.0*		*95.6*	*23-147*			
Surr: Phenol-d6	*57.2*		"	*150*		*38.1*	*11-130*			
Surr: p-Terphenyl-d14	*72.2*		"	*75.0*		*96.3*	*38-149*			
Surr: 2,4,6-Tribromophenol	*138*		"	*150*		*92.0*	*19-126*			

North Creek Analytical - Portland

Philip Nerenberg

Philip Nerenberg, Laboratory Manager

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Hahn and Associates. Inc.	Project: Gasco Upland	
434 NW Sixth Ave., Suite 203	Project Number: 2708	**Reported:**
Portland, OR 97209	Project Manager: Rob Ede	07/06/04 13:01

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 4060257 - EPA 3510/600 Series

North Creek Analytical - Portland

Philip Nerenberg

Philip Nerenberg, Laboratory Manager

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Hahn and Associates, Inc.	Project: Gasco Upland	
434 NW Sixth Ave., Suite 203	Project Number: 2708	**Reported:**
Portland, OR 97209	Project Manager: Rob Ede	07/06/04 13:01

Polynuclear Aromatic Compounds per EPA 8270M-SIM - Quality Control

North Creek Analytical - Portland

Analyte	Result	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
Batch 4060262 - EPA 3520/600 Series										
Blank (4060262-BLK1)				Prepared: 06/07/04 Analyzed: 06/09/04						
Acenaphthene	ND	0.100	ug/l							
Acenaphthylene	ND	0.100	"							
Anthracene	ND	0.100	"							
Benzo (a) anthracene	ND	0.100	"							
Benzo (a) pyrene	ND	0.100	"							
Benzo (b) fluoranthene	ND	0.100	"							
Benzo (ghi) perylene	ND	0.100	"							
Benzo (k) fluoranthene	ND	0.100	"							
Chrysene	ND	0.100	"							
Dibenzo (a,h) anthracene	ND	0.200	"							
Fluoranthene	ND	0.100	"							
Fluorene	ND	0.100	"							
Indeno (1,2,3-cd) pyrene	ND	0.100	"							
Naphthalene	ND	0.100	"							
Phenanthrene	ND	0.100	"							
Pyrene	ND	0.100	"							
Surr: Fluorene-d10	*2.12*		"	*2.50*		*84.8*	*25-125*			
Surr: Pyrene-d10	*2.32*		"	*2.50*		*92.8*	*23-150*			
Surr: Benzo (a) pyrene-d12	*2.20*		"	*2.50*		*88.0*	*10-125*			
Blank (4060262-BLK2)				Prepared: 06/07/04 Analyzed: 06/25/04						
Benzo (a) anthracene	ND	0.0100	ug/l							
Benzo (a) pyrene	ND	0.0100	"							
Benzo (b) fluoranthene	ND	0.0100	"							
Benzo (k) fluoranthene	ND	0.0100	"							
Chrysene	ND	0.0100	"							
Dibenzo (a,h) anthracene	ND	0.0100	"							
Indeno (1,2,3-cd) pyrene	ND	0.0100	"							
Surr: Benzo (a) pyrene-d12	*1.75*		"	*2.50*		*70.0*	*10-125*			

North Creek Analytical - Portland

Philip Nerenberg

Philip Nerenberg, Laboratory Manager

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Hahn and Associates, Inc.	Project: Gasco Upland	
434 NW Sixth Ave., Suite 203	Project Number: 2708	**Reported:**
Portland, OR 97209	Project Manager: Rob Ede	07/06/04 13:01

Polynuclear Aromatic Compounds per EPA 8270M-SIM - Quality Control

North Creek Analytical - Portland

Analyte	Result	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
Batch 4060262 - EPA 3520/600 Series										
LCS (4060262-BS1)				Prepared: 06/07/04 Analyzed: 06/09/04						
Acenaphthene	2.44	0.100	ug/l	2.50		97.6	26-135			
Benzo (a) pyrene	2.43	0.100	"	2.50		97.2	38-137			
Pyrene	2.56	0.100	"	2.50		102	33-133			
Surr: Fluorene-d10	*2.62*		"	*2.50*		*105*	*25-125*			
Surr: Pyrene-d10	*2.72*		"	*2.50*		*109*	*23-150*			
Surr: Benzo (a) pyrene-d12	*2.57*		"	*2.50*		*103*	*10-125*			
LCS Dup (4060262-BSD1)				Prepared: 06/07/04 Analyzed: 06/09/04						
Acenaphthene	2.07	0.100	ug/l	2.50		82.8	26-135	16.4	60	
Benzo (a) pyrene	2.19	0.100	"	2.50		87.6	38-137	10.4	60	
Pyrene	2.33	0.100	"	2.50		93.2	33-133	9.41	60	
Surr: Fluorene-d10	*2.21*		"	*2.50*		*88.4*	*25-125*			
Surr: Pyrene-d10	*2.43*		"	*2.50*		*97.2*	*23-150*			
Surr: Benzo (a) pyrene-d12	*2.26*		"	*2.50*		*90.4*	*10-125*			

North Creek Analytical - Portland

Philip Nerenberg

Philip Nerenberg, Laboratory Manager

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Hahn and Associates, Inc.	Project: Gasco Upland	
434 NW Sixth Ave., Suite 203	Project Number: 2708	**Reported:**
Portland, OR 97209	Project Manager: Rob Ede	07/06/04 13:01

Conventional Chemistry Parameters per APHA/EPA Methods - Quality Control

North Creek Analytical - Portland

Analyte	Result	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
Batch 4060476 - General Preparation										
Blank (4060476-BLK1)				Prepared & Analyzed: 06/11/04						
Cyanide (total)	ND	0.00500	mg/l							
LCS (4060476-BS1)				Prepared & Analyzed: 06/11/04						
Cyanide (total)	0.0462	0.00500	mg/l	0.0500		92.4	75-125			
Duplicate (4060476-DUP1)		Source: P4F0258-01		Prepared & Analyzed: 06/11/04						
Cyanide (total)	0.00208	0.00500	mg/l		0.00198			4.93	20	
Matrix Spike (4060476-MS1)		Source: P4F0258-01		Prepared & Analyzed: 06/11/04						
Cyanide (total)	0.0456	0.00500	mg/l	0.0500	0.00198	87.2	75-125			

North Creek Analytical - Portland

Philip Nerenberg

Philip Nerenberg, Laboratory Manager

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Hahn and Associates, Inc.	Project: Gasco Upland	
434 NW Sixth Ave., Suite 203	Project Number: 2708	**Reported:**
Portland, OR 97209	Project Manager: Rob Ede	07/06/04 13:01

Notes and Definitions

J	Estimated value.
Q-06	Analyses are not controlled on RPD values from sample concentrations less than 5 times the reporting limit.
R-03	The reporting limit for this analyte was raised due to matrix interference.
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. MRLs are adjusted if %Solids are less than 50%.
wet	Sample results reported on a wet weight basis (as received)
RPD	Relative Percent Difference

North Creek Analytical - Portland

Philip Nerenberg

Philip Nerenberg, Laboratory Manager

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SCOEPA00013769

HAHN AND ASSOCIATES, INC.

Environmental Consultants

434 NW Sixth Avenue, Suite 203 • Portland OR 97209

(503) 796-0717 • Fax (503) 227-2209

Laboratory NORTH CREEK ANALYTICAL PORTLAND OR

CHAIN OF CUSTODY

Lab Project No.

Chain of Custody No.

Project Manager	ROB EDE
Project No.	2708
Project Name	GASCO
Collected by	APR/RBE

Liquid with Sediment Sample

Test Filtrate ____ Test Sediment ____ Test Both ____

Multi-Phase Sample

Test One (which) ____ Test Separately ____ Shake ____

Samples Received at 4C (Y or N)	
Appropriate Containers Used (Y or N)	
Provide Verbal Results (Y or N)	No
Provide Preliminary Fax Results	Yes

Comments

Sample Number Prefix: 2708-040604

* Metals = As, Cr, Cu, Ni, Pb, Zn

pricing/reporting levels as per Nerenberg to Ede 12/12/03

Lab ID	Sample #	Date	Time	Sample Description	Matrix: Soil	Matrix: Water	Matrix: Other	Number of Containers	BAHs (EPA 8270 SIM)	SVOCs (EPA 8270)	VOCs (EPA 8260)	TOTAL CN (SPA 9010)	or AMENABLE CN (SPA 9010)	TOTAL METALS* (EPA 6010)	Dissolved Metals* Field Filtered (EPA 6010)			RUSH	Remarks
	098	6/4/04	800	TRIP B.		X		1			X								
	106		845	B-56A (60-104')		X		10	X	X	X	X	X	X	X				
	107	↓	900	E.B.		X		9	X		X				X				

Relinquished by	Company	Date	Time	Received by	Company
	HAI	6/7/04	12:22		NCA
Relinquished by	Company	Date	Time	Received by	Company

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541.383.9310 fax 541.382.7588

6 July, 2004

Rob Ede
Hahn and Associates, Inc.
434 NW Sixth Ave., Suite 203
Portland, OR 97209

RE: Gasco Upland

Enclosed are the results of analyses for samples received by the laboratory on 06/07/04 13:45. If you have any questions concerning this report, please feel free to contact me.

Sincerely,

Philip Nerenberg
Laboratory Manager

Work Orders included in this report:
P4F0245

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Hahn and Associates, Inc.	Project: Gasco Upland	
434 NW Sixth Ave., Suite 203	Project Number: 2708	**Reported:**
Portland, OR 97209	Project Manager: Rob Ede	07/06/04 12:50

ANALYTICAL REPORT FOR SAMPLES

Sample ID	Laboratory ID	Matrix	Date Sampled	Date Received
2708-040604-098	P4F0245-01	Water	06/04/04 08:00	06/07/04 13:45
2708-040604-106	P4F0245-02	Water	06/04/04 08:45	06/07/04 13:45
2708-040604-107	P4F0245-03	Water	06/04/04 09:00	06/07/04 13:45

North Creek Analytical - Portland

Philip Nerenberg

Philip Nerenberg, Laboratory Manager

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Hahn and Associates, Inc.	Project: Gasco Upland	
434 NW Sixth Ave., Suite 203	Project Number: 2708	**Reported:**
Portland, OR 97209	Project Manager: Rob Ede	07/06/04 12:50

Total Metals per EPA 6000/7000 Series Methods

North Creek Analytical - Portland

Analyte	Result	Reporting Limit	Units	Dilution	Method	Prepared	Analyzed	Batch	Notes
2708-040604-106 (P4F0245-02) Water					Sampled: 06/04/04 Received: 06/07/04				
Arsenic	**0.00869**	0.00100	mg/l	1	EPA 6020	06/09/04	06/12/04	4060379	
Chromium	**0.0375**	0.00100	"	"	"	"	"	"	
Copper	**0.0415**	0.00200	"	"	"	"	"	"	
Lead	**0.00457**	0.00100	"	"	"	"	"	"	
Nickel	**0.0505**	0.00200	"	"	"	"	"	"	
Zinc	**0.100**	0.00500	"	"	"	"	"	"	

North Creek Analytical - Portland

Philip Nerenberg

Philip Nerenberg, Laboratory Manager

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Hahn and Associates, Inc.	Project: Gasco Upland	
434 NW Sixth Ave., Suite 203	Project Number: 2708	**Reported:**
Portland, OR 97209	Project Manager: Rob Ede	07/06/04 12:50

Dissolved Metals per EPA 6000/7000 Series Methods

North Creek Analytical - Portland

Analyte	Result	Reporting Limit	Units	Dilution	Method	Prepared	Analyzed	Batch	Notes
2708-040604-106 (P4F0245-02) Water					Sampled: 06/04/04 Received: 06/07/04				
Arsenic	**0.00515**	0.00100	mg/l	1	EPA 6020	06/10/04	06/12/04	4060454	
Chromium	**0.00123**	0.00100	"	"	"	"	"	"	
Copper	ND	0.00200	"	"	"	"	"	"	
Lead	ND	0.00100	"	"	"	"	"	"	
Nickel	**0.0173**	0.00200	"	"	"	"	"	"	
Zinc	**0.0103**	0.00500	"	"	"	"	"	"	
2708-040604-107 (P4F0245-03) Water					Sampled: 06/04/04 Received: 06/07/04				
Arsenic	ND	0.00100	mg/l	1	EPA 6020	06/10/04	06/12/04	4060454	
Chromium	ND	0.00100	"	"	"	"	"	"	
Copper	ND	0.00200	"	"	"	"	"	"	
Lead	ND	0.00100	"	"	"	"	"	"	
Nickel	ND	0.00200	"	"	"	"	"	"	
Zinc	ND	0.00500	"	"	"	"	"	"	

North Creek Analytical - Portland

Philip Nerenberg

Philip Nerenberg, Laboratory Manager

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Hahn and Associates, Inc.	Project: Gasco Upland	
434 NW Sixth Ave., Suite 203	Project Number: 2708	**Reported:**
Portland, OR 97209	Project Manager: Rob Ede	07/06/04 12:50

Volatile Organic Compounds per EPA Method 8260B

North Creek Analytical - Portland

Analyte	Result	Reporting Limit	Units	Dilution	Method	Prepared	Analyzed	Batch	Notes
2708-040604-098 (P4F0245-01) Water					Sampled: 06/04/04 Received: 06/07/04				
Acetone	ND	25.0	ug/l	1	EPA 8260B	06/10/04	06/10/04	4060426	
Benzene	ND	1.00	"	"	"	"	"	"	
Bromobenzene	ND	1.00	"	"	"	"	"	"	
Bromochloromethane	ND	1.00	"	"	"	"	"	"	
Bromodichloromethane	ND	1.00	"	"	"	"	"	"	
Bromoform	ND	1.00	"	"	"	"	"	"	
Bromomethane	ND	5.00	"	"	"	"	"	"	
2-Butanone	ND	10.0	"	"	"	"	"	"	
n-Butylbenzene	ND	5.00	"	"	"	"	"	"	
sec-Butylbenzene	ND	1.00	"	"	"	"	"	"	
tert-Butylbenzene	ND	1.00	"	"	"	"	"	"	
Carbon disulfide	ND	10.0	"	"	"	"	"	"	
Carbon tetrachloride	ND	1.00	"	"	"	"	"	"	
Chlorobenzene	ND	1.00	"	"	"	"	"	"	
Chloroethane	ND	1.00	"	"	"	"	"	"	
Chloroform	ND	1.00	"	"	"	"	"	"	
Chloromethane	ND	5.00	"	"	"	"	"	"	
2-Chlorotoluene	ND	1.00	"	"	"	"	"	"	
4-Chlorotoluene	ND	1.00	"	"	"	"	"	"	
1,2-Dibromo-3-chloropropane	ND	5.00	"	"	"	"	"	"	
Dibromochloromethane	ND	1.00	"	"	"	"	"	"	
1,2-Dibromoethane	ND	1.00	"	"	"	"	"	"	
Dibromomethane	ND	1.00	"	"	"	"	"	"	
1,2-Dichlorobenzene	ND	1.00	"	"	"	"	"	"	
1,3-Dichlorobenzene	ND	1.00	"	"	"	"	"	"	
1,4-Dichlorobenzene	ND	1.00	"	"	"	"	"	"	
Dichlorodifluoromethane	ND	5.00	"	"	"	"	"	"	
1,1-Dichloroethane	ND	1.00	"	"	"	"	"	"	
1,2-Dichloroethane	ND	1.00	"	"	"	"	"	"	
1,1-Dichloroethene	ND	1.00	"	"	"	"	"	"	
cis-1,2-Dichloroethene	ND	1.00	"	"	"	"	"	"	
trans-1,2-Dichloroethene	ND	1.00	"	"	"	"	"	"	
1,2-Dichloropropane	ND	1.00	"	"	"	"	"	"	
1,3-Dichloropropane	ND	1.00	"	"	"	"	"	"	
2,2-Dichloropropane	ND	1.00	"	"	"	"	"	"	
1,1-Dichloropropene	ND	1.00	"	"	"	"	"	"	
cis-1,3-Dichloropropene	ND	1.00	"	"	"	"	"	"	

North Creek Analytical - Portland

Philip Nerenberg

Philip Nerenberg, Laboratory Manager

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Hahn and Associates, Inc.	Project: Gasco Upland	
434 NW Sixth Ave., Suite 203	Project Number: 2708	**Reported:**
Portland, OR 97209	Project Manager: Rob Ede	07/06/04 12:50

Volatile Organic Compounds per EPA Method 8260B

North Creek Analytical - Portland

Analyte	Result	Reporting Limit	Units	Dilution	Method	Prepared	Analyzed	Batch	Notes
2708-040604-098 (P4F0245-01) Water					Sampled: 06/04/04 Received: 06/07/04				
trans-1,3-Dichloropropene	ND	1.00	ug/l	1	EPA 8260B	06/10/04	06/10/04	4060426	
Ethylbenzene	ND	1.00	"	"	"	"	"	"	
Hexachlorobutadiene	ND	2.00	"	"	"	"	"	"	
2-Hexanone	ND	10.0	"	"	"	"	"	"	
Isopropylbenzene	ND	2.00	"	"	"	"	"	"	
p-Isopropyltoluene	ND	2.00	"	"	"	"	"	"	
4-Methyl-2-pentanone	ND	5.00	"	"	"	"	"	"	
Methyl tert-butyl ether	ND	1.00	"	"	"	"	"	"	
Methylene chloride	ND	5.00	"	"	"	"	"	"	
Naphthalene	ND	2.00	"	"	"	"	"	"	
n-Propylbenzene	ND	1.00	"	"	"	"	"	"	
Styrene	ND	1.00	"	"	"	"	"	"	
1,1,1,2-Tetrachloroethane	ND	1.00	"	"	"	"	"	"	
1,1,2,2-Tetrachloroethane	ND	1.00	"	"	"	"	"	"	
Tetrachloroethene	ND	1.00	"	"	"	"	"	"	
Toluene	ND	1.00	"	"	"	"	"	"	
1,2,3-Trichlorobenzene	ND	1.00	"	"	"	"	"	"	
1,2,4-Trichlorobenzene	ND	1.00	"	"	"	"	"	"	
1,1,1-Trichloroethane	ND	1.00	"	"	"	"	"	"	
1,1,2-Trichloroethane	ND	1.00	"	"	"	"	"	"	
Trichloroethene	ND	1.00	"	"	"	"	"	"	
Trichlorofluoromethane	ND	1.00	"	"	"	"	"	"	
1,2,3-Trichloropropane	ND	1.00	"	"	"	"	"	"	
1,2,4-Trimethylbenzene	ND	1.00	"	"	"	"	"	"	
1,3,5-Trimethylbenzene	ND	1.00	"	"	"	"	"	"	
Vinyl chloride	ND	1.00	"	"	"	"	"	"	
o-Xylene	ND	1.00	"	"	"	"	"	"	
m,p-Xylene	ND	2.00	"	"	"	"	"	"	
Surr: 4-BFB	*98.0 %*	*75-120*							
Surr: 1,2-DCA-d4	*109 %*	*77-129*							
Surr: Dibromofluoromethane	*104 %*	*80-121*							
Surr: Toluene-d8	*105 %*	*80-120*							

North Creek Analytical - Portland

Philip Nerenberg

Philip Nerenberg, Laboratory Manager

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Hahn and Associates, Inc.	Project: Gasco Upland	
434 NW Sixth Ave., Suite 203	Project Number: 2708	**Reported:**
Portland, OR 97209	Project Manager: Rob Ede	07/06/04 12:50

Volatile Organic Compounds per EPA Method 8260B

North Creek Analytical - Portland

Analyte	Result	Reporting Limit	Units	Dilution	Method	Prepared	Analyzed	Batch	Notes
2708-040604-106 (P4F0245-02) Water					Sampled: 06/04/04 Received: 06/07/04				
Acetone	ND	25.0	ug/l	1	EPA 8260B	06/10/04	06/10/04	4060426	
Benzene	ND	1.00	"	"	"	"	"	"	
Bromobenzene	ND	1.00	"	"	"	"	"	"	
Bromochloromethane	ND	1.00	"	"	"	"	"	"	
Bromodichloromethane	ND	1.00	"	"	"	"	"	"	
Bromoform	ND	1.00	"	"	"	"	"	"	
Bromomethane	ND	5.00	"	"	"	"	"	"	
2-Butanone	ND	10.0	"	"	"	"	"	"	
n-Butylbenzene	ND	5.00	"	"	"	"	"	"	
sec-Butylbenzene	ND	1.00	"	"	"	"	"	"	
tert-Butylbenzene	ND	1.00	"	"	"	"	"	"	
Carbon disulfide	ND	10.0	"	"	"	"	"	"	
Carbon tetrachloride	ND	1.00	"	"	"	"	"	"	
Chlorobenzene	ND	1.00	"	"	"	"	"	"	
Chloroethane	ND	1.00	"	"	"	"	"	"	
Chloroform	ND	1.00	"	"	"	"	"	"	
Chloromethane	ND	5.00	"	"	"	"	"	"	
2-Chlorotoluene	ND	1.00	"	"	"	"	"	"	
4-Chlorotoluene	ND	1.00	"	"	"	"	"	"	
1,2-Dibromo-3-chloropropane	ND	5.00	"	"	"	"	"	"	
Dibromochloromethane	ND	1.00	"	"	"	"	"	"	
1,2-Dibromoethane	ND	1.00	"	"	"	"	"	"	
Dibromomethane	ND	1.00	"	"	"	"	"	"	
1,2-Dichlorobenzene	ND	1.00	"	"	"	"	"	"	
1,3-Dichlorobenzene	ND	1.00	"	"	"	"	"	"	
1,4-Dichlorobenzene	ND	1.00	"	"	"	"	"	"	
Dichlorodifluoromethane	ND	5.00	"	"	"	"	"	"	
1,1-Dichloroethane	ND	1.00	"	"	"	"	"	"	
1,2-Dichloroethane	ND	1.00	"	"	"	"	"	"	
1,1-Dichloroethene	ND	1.00	"	"	"	"	"	"	
cis-1,2-Dichloroethene	ND	1.00	"	"	"	"	"	"	
trans-1,2-Dichloroethene	ND	1.00	"	"	"	"	"	"	
1,2-Dichloropropane	ND	1.00	"	"	"	"	"	"	
1,3-Dichloropropane	ND	1.00	"	"	"	"	"	"	
2,2-Dichloropropane	ND	1.00	"	"	"	"	"	"	
1,1-Dichloropropene	ND	1.00	"	"	"	"	"	"	
cis-1,3-Dichloropropene	ND	1.00	"	"	"	"	"	"	

North Creek Analytical - Portland

Philip Nerenberg

Philip Nerenberg, Laboratory Manager

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Hahn and Associates, Inc.	Project: Gasco Upland	
434 NW Sixth Ave., Suite 203	Project Number: 2708	**Reported:**
Portland, OR 97209	Project Manager: Rob Ede	07/06/04 12:50

Volatile Organic Compounds per EPA Method 8260B

North Creek Analytical - Portland

Analyte	Result	Reporting Limit	Units	Dilution	Method	Prepared	Analyzed	Batch	Notes
2708-040604-106 (P4F0245-02) Water					Sampled: 06/04/04 Received: 06/07/04				
trans-1,3-Dichloropropene	ND	1.00	ug/l	1	EPA 8260B	06/10/04	06/10/04	4060426	
Ethylbenzene	ND	1.00	"	"	"	"	"	"	
Hexachlorobutadiene	ND	2.00	"	"	"	"	"	"	
2-Hexanone	ND	10.0	"	"	"	"	"	"	
Isopropylbenzene	ND	2.00	"	"	"	"	"	"	
p-Isopropyltoluene	ND	2.00	"	"	"	"	"	"	
4-Methyl-2-pentanone	ND	5.00	"	"	"	"	"	"	
Methyl tert-butyl ether	ND	1.00	"	"	"	"	"	"	
Methylene chloride	ND	5.00	"	"	"	"	"	"	
Naphthalene	ND	2.00	"	"	"	"	"	"	
n-Propylbenzene	ND	1.00	"	"	"	"	"	"	
Styrene	ND	1.00	"	"	"	"	"	"	
1,1,1,2-Tetrachloroethane	ND	1.00	"	"	"	"	"	"	
1,1,2,2-Tetrachloroethane	ND	1.00	"	"	"	"	"	"	
Tetrachloroethene	ND	1.00	"	"	"	"	"	"	
Toluene	ND	1.00	"	"	"	"	"	"	
1,2,3-Trichlorobenzene	ND	1.00	"	"	"	"	"	"	
1,2,4-Trichlorobenzene	ND	1.00	"	"	"	"	"	"	
1,1,1-Trichloroethane	ND	1.00	"	"	"	"	"	"	
1,1,2-Trichloroethane	ND	1.00	"	"	"	"	"	"	
Trichloroethene	ND	1.00	"	"	"	"	"	"	
Trichlorofluoromethane	ND	1.00	"	"	"	"	"	"	
1,2,3-Trichloropropane	ND	1.00	"	"	"	"	"	"	
1,2,4-Trimethylbenzene	ND	1.00	"	"	"	"	"	"	
1,3,5-Trimethylbenzene	ND	1.00	"	"	"	"	"	"	
Vinyl chloride	ND	1.00	"	"	"	"	"	"	
o-Xylene	ND	1.00	"	"	"	"	"	"	
m,p-Xylene	ND	2.00	"	"	"	"	"	"	
Surr: 4-BFB	*97.5 %*	*75-120*							
Surr: 1,2-DCA-d4	*104 %*	*77-129*							
Surr: Dibromofluoromethane	*101 %*	*80-121*							
Surr: Toluene-d8	*100 %*	*80-120*							

North Creek Analytical - Portland

Philip Nerenberg

Philip Nerenberg, Laboratory Manager

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541.383.9310 fax 541.382.7588

Hahn and Associates, Inc.	Project: Gasco Upland	
434 NW Sixth Ave., Suite 203	Project Number: 2708	**Reported:**
Portland, OR 97209	Project Manager: Rob Ede	07/06/04 12:50

Volatile Organic Compounds per EPA Method 8260B

North Creek Analytical - Portland

Analyte	Result	Reporting Limit	Units	Dilution	Method	Prepared	Analyzed	Batch	Notes
2708-040604-107 (P4F0245-03) Water					Sampled: 06/04/04 Received: 06/07/04				
Acetone	ND	25.0	ug/l	1	EPA 8260B	06/10/04	06/10/04	4060426	
Benzene	ND	1.00	"	"	"	"	"	"	
Bromobenzene	ND	1.00	"	"	"	"	"	"	
Bromochloromethane	ND	1.00	"	"	"	"	"	"	
Bromodichloromethane	ND	1.00	"	"	"	"	"	"	
Bromoform	ND	1.00	"	"	"	"	"	"	
Bromomethane	ND	5.00	"	"	"	"	"	"	
2-Butanone	ND	10.0	"	"	"	"	"	"	
n-Butylbenzene	ND	5.00	"	"	"	"	"	"	
sec-Butylbenzene	ND	1.00	"	"	"	"	"	"	
tert-Butylbenzene	ND	1.00	"	"	"	"	"	"	
Carbon disulfide	ND	10.0	"	"	"	"	"	"	
Carbon tetrachloride	ND	1.00	"	"	"	"	"	"	
Chlorobenzene	ND	1.00	"	"	"	"	"	"	
Chloroethane	ND	1.00	"	"	"	"	"	"	
Chloroform	ND	1.00	"	"	"	"	"	"	
Chloromethane	ND	5.00	"	"	"	"	"	"	
2-Chlorotoluene	ND	1.00	"	"	"	"	"	"	
4-Chlorotoluene	ND	1.00	"	"	"	"	"	"	
1,2-Dibromo-3-chloropropane	ND	5.00	"	"	"	"	"	"	
Dibromochloromethane	ND	1.00	"	"	"	"	"	"	
1,2-Dibromoethane	ND	1.00	"	"	"	"	"	"	
Dibromomethane	ND	1.00	"	"	"	"	"	"	
1,2-Dichlorobenzene	ND	1.00	"	"	"	"	"	"	
1,3-Dichlorobenzene	ND	1.00	"	"	"	"	"	"	
1,4-Dichlorobenzene	ND	1.00	"	"	"	"	"	"	
Dichlorodifluoromethane	ND	5.00	"	"	"	"	"	"	
1,1-Dichloroethane	ND	1.00	"	"	"	"	"	"	
1,2-Dichloroethane	ND	1.00	"	"	"	"	"	"	
1,1-Dichloroethene	ND	1.00	"	"	"	"	"	"	
cis-1,2-Dichloroethene	ND	1.00	"	"	"	"	"	"	
trans-1,2-Dichloroethene	ND	1.00	"	"	"	"	"	"	
1,2-Dichloropropane	ND	1.00	"	"	"	"	"	"	
1,3-Dichloropropane	ND	1.00	"	"	"	"	"	"	
2,2-Dichloropropane	ND	1.00	"	"	"	"	"	"	
1,1-Dichloropropene	ND	1.00	"	"	"	"	"	"	
cis-1,3-Dichloropropene	ND	1.00	"	"	"	"	"	"	

North Creek Analytical - Portland

Philip Nerenberg

Philip Nerenberg, Laboratory Manager

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Hahn and Associates, Inc.	Project: Gasco Upland	
434 NW Sixth Ave., Suite 203	Project Number: 2708	**Reported:**
Portland, OR 97209	Project Manager: Rob Ede	07/06/04 12:50

Volatile Organic Compounds per EPA Method 8260B

North Creek Analytical - Portland

Analyte	Result	Reporting Limit	Units	Dilution	Method	Prepared	Analyzed	Batch	Notes
2708-040604-107 (P4F0245-03) Water					Sampled: 06/04/04 Received: 06/07/04				
trans-1,3-Dichloropropene	ND	1.00	ug/l	1	EPA 8260B	06/10/04	06/10/04	4060426	
Ethylbenzene	ND	1.00	"	"	"	"	"	"	
Hexachlorobutadiene	ND	2.00	"	"	"	"	"	"	
2-Hexanone	ND	10.0	"	"	"	"	"	"	
Isopropylbenzene	ND	2.00	"	"	"	"	"	"	
p-Isopropyltoluene	ND	2.00	"	"	"	"	"	"	
4-Methyl-2-pentanone	ND	5.00	"	"	"	"	"	"	
Methyl tert-butyl ether	ND	1.00	"	"	"	"	"	"	
Methylene chloride	ND	5.00	"	"	"	"	"	"	
Naphthalene	ND	2.00	"	"	"	"	"	"	
n-Propylbenzene	ND	1.00	"	"	"	"	"	"	
Styrene	ND	1.00	"	"	"	"	"	"	
1,1,1,2-Tetrachloroethane	ND	1.00	"	"	"	"	"	"	
1,1,2,2-Tetrachloroethane	ND	1.00	"	"	"	"	"	"	
Tetrachloroethene	ND	1.00	"	"	"	"	"	"	
Toluene	ND	1.00	"	"	"	"	"	"	
1,2,3-Trichlorobenzene	ND	1.00	"	"	"	"	"	"	
1,2,4-Trichlorobenzene	ND	1.00	"	"	"	"	"	"	
1,1,1-Trichloroethane	ND	1.00	"	"	"	"	"	"	
1,1,2-Trichloroethane	ND	1.00	"	"	"	"	"	"	
Trichloroethene	ND	1.00	"	"	"	"	"	"	
Trichlorofluoromethane	ND	1.00	"	"	"	"	"	"	
1,2,3-Trichloropropane	ND	1.00	"	"	"	"	"	"	
1,2,4-Trimethylbenzene	ND	1.00	"	"	"	"	"	"	
1,3,5-Trimethylbenzene	ND	1.00	"	"	"	"	"	"	
Vinyl chloride	ND	1.00	"	"	"	"	"	"	
o-Xylene	ND	1.00	"	"	"	"	"	"	
m,p-Xylene	ND	2.00	"	"	"	"	"	"	
Surr: 4-BFB	*103 %*	*75-120*							
Surr: 1,2-DCA-d4	*114 %*	*77-129*							
Surr: Dibromofluoromethane	*108 %*	*80-121*							
Surr: Toluene-d8	*108 %*	*80-120*							

North Creek Analytical - Portland

Philip Nerenberg

Philip Nerenberg, Laboratory Manager

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Hahn and Associates, Inc.	Project: Gasco Upland	
434 NW Sixth Ave., Suite 203	Project Number: 2708	**Reported:**
Portland, OR 97209	Project Manager: Rob Ede	07/06/04 12:50

Semivolatile Organic Compounds per EPA Method 8270C

North Creek Analytical - Portland

Analyte	Result	Reporting Limit	Units	Dilution	Method	Prepared	Analyzed	Batch	Notes
2708-040604-106 (P4F0245-02) Water					Sampled: 06/04/04 Received: 06/07/04				
Carbazole	ND	5.00	ug/l	1	EPA 8270C	06/10/04	06/15/04	4060423	
Acenaphthene	ND	5.00	"	"	"	"	"	"	
Acenaphthylene	ND	5.00	"	"	"	"	"	"	
Anthracene	ND	5.00	"	"	"	"	"	"	
Benzo (a) anthracene	ND	5.00	"	"	"	"	"	"	
Benzo (a) pyrene	ND	5.00	"	"	"	"	"	"	
Benzo (b) fluoranthene	ND	5.00	"	"	"	"	"	"	
Benzo (ghi) perylene	ND	5.00	"	"	"	"	"	"	
Benzo (k) fluoranthene	ND	5.00	"	"	"	"	"	"	
Benzoic Acid	ND	50.0	"	"	"	"	"	"	
Benzyl alcohol	ND	10.0	"	"	"	"	"	"	
4-Bromophenyl phenyl ether	ND	5.00	"	"	"	"	"	"	
Butyl benzyl phthalate	ND	5.00	"	"	"	"	"	"	
4-Chloro-3-methylphenol	ND	5.00	"	"	"	"	"	"	
4-Chloroaniline	ND	20.0	"	"	"	"	"	"	
Bis(2-chloroethoxy)methane	ND	10.0	"	"	"	"	"	"	
Bis(2-chloroethyl)ether	ND	5.00	"	"	"	"	"	"	
Bis(2-chloroisopropyl)ether	ND	10.0	"	"	"	"	"	"	
2-Chloronaphthalene	ND	5.00	"	"	"	"	"	"	
2-Chlorophenol	ND	5.00	"	"	"	"	"	"	
4-Chlorophenyl phenyl ether	ND	5.00	"	"	"	"	"	"	
Chrysene	ND	5.00	"	"	"	"	"	"	
Di-n-butyl phthalate	ND	5.00	"	"	"	"	"	"	
Di-n-octyl phthalate	ND	5.00	"	"	"	"	"	"	
Dibenzo (a,h) anthracene	ND	5.00	"	"	"	"	"	"	
Dibenzofuran	ND	5.00	"	"	"	"	"	"	
1,2-Dichlorobenzene	ND	5.00	"	"	"	"	"	"	
1,3-Dichlorobenzene	ND	5.00	"	"	"	"	"	"	
1,4-Dichlorobenzene	ND	5.00	"	"	"	"	"	"	
3,3´-Dichlorobenzidine	ND	5.00	"	"	"	"	"	"	
2,4-Dichlorophenol	ND	5.00	"	"	"	"	"	"	
Diethyl phthalate	ND	5.00	"	"	"	"	"	"	
2,4-Dimethylphenol	ND	10.0	"	"	"	"	"	"	
Dimethyl phthalate	ND	5.00	"	"	"	"	"	"	
4,6-Dinitro-2-methylphenol	ND	10.0	"	"	"	"	"	"	
2,4-Dinitrophenol	ND	25.0	"	"	"	"	"	"	
2,4-Dinitrotoluene	ND	5.00	"	"	"	"	"	"	

North Creek Analytical - Portland

Philip Nerenberg

Philip Nerenberg, Laboratory Manager

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Hahn and Associates, Inc.	Project: Gasco Upland	
434 NW Sixth Ave., Suite 203	Project Number: 2708	**Reported:**
Portland, OR 97209	Project Manager: Rob Ede	07/06/04 12:50

Semivolatile Organic Compounds per EPA Method 8270C

North Creek Analytical - Portland

Analyte	Result	Reporting Limit	Units	Dilution	Method	Prepared	Analyzed	Batch	Notes
2708-040604-106 (P4F0245-02) Water					Sampled: 06/04/04 Received: 06/07/04				
2,6-Dinitrotoluene	ND	5.00	ug/l	1	EPA 8270C	06/10/04	06/15/04	4060423	
Bis(2-ethylhexyl)phthalate	ND	10.0	"	"	"	"	"	"	
Fluoranthene	ND	5.00	"	"	"	"	"	"	
Fluorene	ND	5.00	"	"	"	"	"	"	
Hexachlorobenzene	ND	5.00	"	"	"	"	"	"	
Hexachlorobutadiene	ND	10.0	"	"	"	"	"	"	
Hexachlorocyclopentadiene	ND	10.0	"	"	"	"	"	"	
Hexachloroethane	ND	10.0	"	"	"	"	"	"	
Indeno (1,2,3-cd) pyrene	ND	5.00	"	"	"	"	"	"	
Isophorone	ND	5.00	"	"	"	"	"	"	
2-Methylnaphthalene	ND	5.00	"	"	"	"	"	"	
2-Methylphenol	ND	10.0	"	"	"	"	"	"	
3-,4-Methylphenol	ND	5.00	"	"	"	"	"	"	
Naphthalene	ND	5.00	"	"	"	"	"	"	
2-Nitroaniline	ND	5.00	"	"	"	"	"	"	
3-Nitroaniline	ND	10.0	"	"	"	"	"	"	
4-Nitroaniline	ND	10.0	"	"	"	"	"	"	
Nitrobenzene	ND	5.00	"	"	"	"	"	"	
2-Nitrophenol	ND	5.00	"	"	"	"	"	"	
4-Nitrophenol	ND	25.0	"	"	"	"	"	"	
N-Nitrosodi-n-propylamine	ND	10.0	"	"	"	"	"	"	
N-Nitrosodiphenylamine	ND	5.00	"	"	"	"	"	"	
Pentachlorophenol	ND	10.0	"	"	"	"	"	"	
Phenanthrene	ND	5.00	"	"	"	"	"	"	
Phenol	ND	5.00	"	"	"	"	"	"	
Pyrene	ND	5.00	"	"	"	"	"	"	
1,2,4-Trichlorobenzene	ND	5.00	"	"	"	"	"	"	
2,4,5-Trichlorophenol	ND	5.00	"	"	"	"	"	"	
2,4,6-Trichlorophenol	ND	5.00	"	"	"	"	"	"	
Surr: 2-Fluorobiphenyl	*80.9 %*	*26-135*							
Surr: 2-Fluorophenol	*51.2 %*	*6-124*							
Surr: Nitrobenzene-d5	*96.5 %*	*23-147*							
Surr: Phenol-d6	*36.5 %*	*11-130*							
Surr: p-Terphenyl-d14	*103 %*	*38-149*							
Surr: 2,4,6-Tribromophenol	*79.2 %*	*19-126*							

North Creek Analytical - Portland

Philip Nerenberg

Philip Nerenberg, Laboratory Manager

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Hahn and Associates, Inc.	Project: Gasco Upland	
434 NW Sixth Ave., Suite 203	Project Number: 2708	**Reported:**
Portland, OR 97209	Project Manager: Rob Ede	07/06/04 12:50

Polynuclear Aromatic Compounds per EPA 8270M-SIM

North Creek Analytical - Portland

Analyte	Result	Reporting Limit	Units	Dilution	Method	Prepared	Analyzed	Batch	Notes
2708-040604-106 (P4F0245-02) Water					Sampled: 06/04/04 Received: 06/07/04				
Acenaphthene	ND	0.100	ug/l	1	EPA 8270m	06/10/04	06/17/04	4060424	
Acenaphthylene	ND	0.100	"	"	"	"	"	"	
Anthracene	ND	0.100	"	"	"	"	"	"	
Benzo (a) anthracene	ND	0.100	"	"	"	"	"	"	
Benzo (a) pyrene	ND	0.100	"	"	"	"	"	"	
Benzo (b) fluoranthene	ND	0.100	"	"	"	"	"	"	
Benzo (ghi) perylene	ND	0.100	"	"	"	"	"	"	
Benzo (k) fluoranthene	ND	0.100	"	"	"	"	"	"	
Chrysene	ND	0.100	"	"	"	"	"	"	
Dibenzo (a,h) anthracene	ND	0.200	"	"	"	"	"	"	
Fluoranthene	ND	0.100	"	"	"	"	"	"	
Fluorene	ND	0.100	"	"	"	"	"	"	
Indeno (1,2,3-cd) pyrene	ND	0.100	"	"	"	"	"	"	
Naphthalene	**0.850**	0.100	"	"	"	"	"	"	
Phenanthrene	ND	0.100	"	"	"	"	"	"	
Pyrene	ND	0.100	"	"	"	"	"	"	
Surr: Fluorene-d10	*68.9 %*	*25-125*							
Surr: Pyrene-d10	*95.0 %*	*23-150*							
Surr: Benzo (a) pyrene-d12	*67.6 %*	*10-125*							
2708-040604-106 (P4F0245-02RE1) Water					Sampled: 06/04/04 Received: 06/07/04				J
Benzo (a) anthracene	**0.0167**	0.0100	ug/l	1	EPA 8270m	06/10/04	06/29/04	4060424	
Benzo (a) pyrene	**0.0170**	0.0100	"	"	"	"	"	"	
Benzo (b) fluoranthene	**0.0121**	0.0100	"	"	"	"	"	"	
Benzo (k) fluoranthene	**0.0113**	0.0100	"	"	"	"	"	"	
Chrysene	**0.0216**	0.0100	"	"	"	"	"	"	
Dibenzo (a,h) anthracene	ND	0.0100	"	"	"	"	"	"	
Indeno (1,2,3-cd) pyrene	**0.0108**	0.0100	"	"	"	"	"	"	
Surr: Benzo (a) pyrene-d12	*52.5 %*	*10-125*							

North Creek Analytical - Portland

Philip Nerenberg

Philip Nerenberg, Laboratory Manager

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Hahn and Associates, Inc.	Project: Gasco Upland	
434 NW Sixth Ave., Suite 203	Project Number: 2708	**Reported:**
Portland, OR 97209	Project Manager: Rob Ede	07/06/04 12:50

Polynuclear Aromatic Compounds per EPA 8270M-SIM

North Creek Analytical - Portland

Analyte	Result	Reporting Limit	Units	Dilution	Method	Prepared	Analyzed	Batch	Notes
2708-040604-107 (P4F0245-03) Water					Sampled: 06/04/04 Received: 06/07/04				
Acenaphthene	ND	0.100	ug/l	1	EPA 8270m	06/10/04	06/17/04	4060424	
Acenaphthylene	ND	0.100	"	"	"	"	"	"	
Anthracene	ND	0.100	"	"	"	"	"	"	
Benzo (a) anthracene	ND	0.100	"	"	"	"	"	"	
Benzo (a) pyrene	ND	0.100	"	"	"	"	"	"	
Benzo (b) fluoranthene	ND	0.100	"	"	"	"	"	"	
Benzo (ghi) perylene	ND	0.100	"	"	"	"	"	"	
Benzo (k) fluoranthene	ND	0.100	"	"	"	"	"	"	
Chrysene	ND	0.100	"	"	"	"	"	"	
Dibenzo (a,h) anthracene	ND	0.200	"	"	"	"	"	"	
Fluoranthene	ND	0.100	"	"	"	"	"	"	
Fluorene	ND	0.100	"	"	"	"	"	"	
Indeno (1,2,3-cd) pyrene	ND	0.100	"	"	"	"	"	"	
Naphthalene	ND	0.100	"	"	"	"	"	"	
Phenanthrene	ND	0.100	"	"	"	"	"	"	
Pyrene	ND	0.100	"	"	"	"	"	"	
Surr: Fluorene-d10	*96.6 %*	*25-125*							
Surr: Pyrene-d10	*112 %*	*23-150*							
Surr: Benzo (a) pyrene-d12	*93.7 %*	*10-125*							
2708-040604-107 (P4F0245-03RE1) Water					Sampled: 06/04/04 Received: 06/07/04				J
Benzo (a) anthracene	ND	0.0100	ug/l	1	EPA 8270m	06/10/04	06/29/04	4060424	
Benzo (a) pyrene	ND	0.0100	"	"	"	"	"	"	
Benzo (b) fluoranthene	ND	0.0100	"	"	"	"	"	"	
Benzo (k) fluoranthene	ND	0.0100	"	"	"	"	"	"	
Chrysene	ND	0.0100	"	"	"	"	"	"	
Dibenzo (a,h) anthracene	ND	0.0100	"	"	"	"	"	"	
Indeno (1,2,3-cd) pyrene	ND	0.0100	"	"	"	"	"	"	
Surr: Benzo (a) pyrene-d12	*71.0 %*	*10-125*							

North Creek Analytical - Portland

Philip Nerenberg

Philip Nerenberg, Laboratory Manager

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541.383.9310 fax 541.382.7588

Hahn and Associates, Inc.	Project: Gasco Upland	
434 NW Sixth Ave., Suite 203	Project Number: 2708	**Reported:**
Portland, OR 97209	Project Manager: Rob Ede	07/06/04 12:50

Conventional Chemistry Parameters per APHA/EPA Methods
North Creek Analytical - Portland

Analyte	Result	Reporting Limit	Units	Dilution	Method	Prepared	Analyzed	Batch	Notes
2708-040604-106 (P4F0245-02) Water					Sampled: 06/04/04 Received: 06/07/04				
Cyanide (amenable)	**0.156**	0.00500	mg/l	1	EPA 9010A	06/14/04	06/15/04	4060555	
Cyanide (total)	**0.533**	0.00500	"	"	EPA 9012A	"	"	"	

North Creek Analytical - Portland

Philip Nerenberg

Philip Nerenberg, Laboratory Manager

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Hahn and Associates, Inc.	Project: Gasco Upland	
434 NW Sixth Ave., Suite 203	Project Number: 2708	**Reported:**
Portland, OR 97209	Project Manager: Rob Ede	07/06/04 12:50

Total Metals per EPA 6000/7000 Series Methods - Quality Control

North Creek Analytical - Portland

Analyte	Result	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
Batch 4060379 - EPA 200/3005										
Blank (4060379-BLK1)				Prepared: 06/09/04 Analyzed: 06/11/04						
Arsenic	ND	0.00100	mg/l							
Chromium	ND	0.00100	"							
Copper	ND	0.00200	"							
Lead	ND	0.00100	"							
Nickel	ND	0.00200	"							
Zinc	ND	0.00500	"							
LCS (4060379-BS1)				Prepared: 06/09/04 Analyzed: 06/11/04						
Arsenic	0.0989	0.00100	mg/l	0.100		98.9	80-120			
Chromium	0.102	0.00100	"	0.100		102	80-120			
Copper	0.102	0.00200	"	0.100		102	80-120			
Lead	0.105	0.00100	"	0.100		105	80-120			
Nickel	0.106	0.00200	"	0.100		106	80-120			
Zinc	0.0970	0.00500	"	0.100		97.0	80-120			
LCS Dup (4060379-BSD1)				Prepared: 06/09/04 Analyzed: 06/11/04						
Arsenic	0.0978	0.00100	mg/l	0.100		97.8	80-120	1.12	20	
Chromium	0.100	0.00100	"	0.100		100	80-120	1.98	20	
Copper	0.0994	0.00200	"	0.100		99.4	80-120	2.58	20	
Lead	0.101	0.00100	"	0.100		101	80-120	3.88	20	
Nickel	0.105	0.00200	"	0.100		105	80-120	0.948	20	
Zinc	0.0979	0.00500	"	0.100		97.9	80-120	0.924	20	
Duplicate (4060379-DUP1)		**Source: P4F0261-02**		Prepared: 06/09/04 Analyzed: 06/12/04						
Arsenic	0.00357	0.00100	mg/l		0.00426			17.6	20	
Chromium	0.0171	0.00100	"		0.0176			2.88	20	
Copper	0.0408	0.00200	"		0.0416			1.94	20	
Lead	0.125	0.00100	"		0.134			6.95	20	
Nickel	0.0626	0.00200	"		0.0620			0.963	20	
Zinc	1.82	0.0248	"		1.73			5.07	20	

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Philip Nerenberg

Philip Nerenberg, Laboratory Manager

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Hahn and Associates, Inc.	Project: Gasco Upland	
434 NW Sixth Ave., Suite 203	Project Number: 2708	**Reported:**
Portland, OR 97209	Project Manager: Rob Ede	07/06/04 12:50

Total Metals per EPA 6000/7000 Series Methods - Quality Control

North Creek Analytical - Portland

Analyte	Result	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
Batch 4060379 - EPA 200/3005										
Matrix Spike (4060379-MS1)	**Source: P4F0261-02**			Prepared: 06/09/04 Analyzed: 06/12/04						
Arsenic	0.113	0.00100	mg/l	0.100	0.00426	109	75-125			
Chromium	0.122	0.00100	"	0.100	0.0176	104	75-125			
Copper	0.135	0.00200	"	0.100	0.0416	93.4	75-125			
Lead	0.220	0.00100	"	0.100	0.134	86.0	75-125			
Nickel	0.168	0.00200	"	0.100	0.0620	106	75-125			
Zinc	1.79	0.0224	"	0.100	1.73	60.0	75-125			Q-03
Matrix Spike (4060379-MS2)	**Source: P4F0261-04**			Prepared: 06/09/04 Analyzed: 06/12/04						
Arsenic	0.113	0.00100	mg/l	0.100	0.00103	112	75-125			
Chromium	0.111	0.00100	"	0.100	0.00973	101	75-125			
Copper	0.119	0.00200	"	0.100	0.0244	94.6	75-125			
Lead	0.164	0.00100	"	0.100	0.0726	91.4	75-125			
Nickel	0.166	0.00200	"	0.100	0.0620	104	75-125			
Zinc	1.29	0.0244	"	0.100	1.06	230	75-125			Q-03

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Hahn and Associates, Inc.	Project: Gasco Upland	
434 NW Sixth Ave., Suite 203	Project Number: 2708	**Reported:**
Portland, OR 97209	Project Manager: Rob Ede	07/06/04 12:50

Dissolved Metals per EPA 6000/7000 Series Methods - Quality Control

North Creek Analytical - Portland

Analyte	Result	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
Batch 4060454 - EPA 200/3005 Diss										
Blank (4060454-BLK1)				Prepared: 06/10/04 Analyzed: 06/12/04						
Arsenic	ND	0.00100	mg/l							
Chromium	ND	0.00100	"							
Copper	ND	0.00200	"							
Lead	ND	0.00100	"							
Nickel	ND	0.00200	"							
Zinc	ND	0.00500	"							
LCS (4060454-BS1)				Prepared: 06/10/04 Analyzed: 06/12/04						
Arsenic	0.0961	0.00100	mg/l	0.100		96.1	80-120			
Chromium	0.101	0.00100	"	0.100		101	80-120			
Copper	0.101	0.00200	"	0.100		101	80-120			
Lead	0.100	0.00100	"	0.100		100	80-120			
Nickel	0.105	0.00200	"	0.100		105	80-120			
Zinc	0.0942	0.00500	"	0.100		94.2	80-120			
LCS Dup (4060454-BSD1)				Prepared: 06/10/04 Analyzed: 06/12/04						
Arsenic	0.100	0.00100	mg/l	0.100		100	80-120	3.98	20	
Chromium	0.103	0.00100	"	0.100		103	80-120	1.96	20	
Copper	0.105	0.00200	"	0.100		105	80-120	3.88	20	
Lead	0.0991	0.00100	"	0.100		99.1	80-120	0.904	20	
Nickel	0.106	0.00200	"	0.100		106	80-120	0.948	20	
Zinc	0.0977	0.00500	"	0.100		97.7	80-120	3.65	20	
Duplicate (4060454-DUP1)		**Source: P4F0212-01**		Prepared: 06/10/04 Analyzed: 06/12/04						
Arsenic	0.00151	0.00100	mg/l		0.00119			23.7	20	Q-06
Chromium	0.000840	0.00100	"		0.00498			142	20	Q-06
Copper	0.00231	0.00200	"		0.00218			5.79	20	
Lead	0.000760	0.00100	"		0.000640			17.1	20	
Nickel	0.0326	0.00200	"		0.0320			1.86	20	
Zinc	0.0687	0.00500	"		0.0647			6.00	20	

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Philip Nerenberg

Philip Nerenberg, Laboratory Manager

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Hahn and Associates, Inc.	Project: Gasco Upland	
434 NW Sixth Ave., Suite 203	Project Number: 2708	**Reported:**
Portland, OR 97209	Project Manager: Rob Ede	07/06/04 12:50

Dissolved Metals per EPA 6000/7000 Series Methods - Quality Control

North Creek Analytical - Portland

Analyte	Result	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
Batch 4060454 - EPA 200/3005 Diss										
Matrix Spike (4060454-MS1)		**Source: P4F0212-01**		Prepared: 06/10/04		Analyzed: 06/12/04				
Arsenic	0.109	0.00100	mg/l	0.100	0.00119	108	75-125			
Chromium	0.107	0.00100	"	0.100	0.00498	102	75-125			
Copper	0.101	0.00200	"	0.100	0.00218	98.8	75-125			
Lead	0.0913	0.00100	"	0.100	0.000640	90.7	75-125			
Nickel	0.134	0.00200	"	0.100	0.0320	102	75-125			
Zinc	0.169	0.00500	"	0.100	0.0647	104	75-125			
Matrix Spike (4060454-MS2)		**Source: P4F0212-02**		Prepared: 06/10/04		Analyzed: 06/12/04				
Arsenic	0.112	0.00100	mg/l	0.100	0.00796	104	75-125			
Chromium	0.103	0.00100	"	0.100	0.00538	97.6	75-125			
Copper	0.0958	0.00200	"	0.100	0.00177	94.0	75-125			
Lead	0.0913	0.00100	"	0.100	0.000600	90.7	75-125			
Nickel	0.138	0.00200	"	0.100	0.0338	104	75-125			
Zinc	0.106	0.00500	"	0.100	0.0103	95.7	75-125			

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Hahn and Associates, Inc.	Project: Gasco Upland	
434 NW Sixth Ave., Suite 203	Project Number: 2708	**Reported:**
Portland, OR 97209	Project Manager: Rob Ede	07/06/04 12:50

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 4060426 - EPA 5030B										
Blank (4060426-BLK1)				Prepared & Analyzed: 06/10/04						
Acetone	ND	25.0	ug/l							
Benzene	ND	1.00	"							
Bromobenzene	ND	1.00	"							
Bromochloromethane	ND	1.00	"							
Bromodichloromethane	ND	1.00	"							
Bromoform	ND	1.00	"							
Bromomethane	ND	5.00	"							
2-Butanone	ND	10.0	"							
n-Butylbenzene	ND	5.00	"							
sec-Butylbenzene	ND	1.00	"							
tert-Butylbenzene	ND	1.00	"							
Carbon disulfide	ND	10.0	"							
Carbon tetrachloride	ND	1.00	"							
Chlorobenzene	ND	1.00	"							
Chloroethane	ND	1.00	"							
Chloroform	ND	1.00	"							
Chloromethane	ND	5.00	"							
2-Chlorotoluene	ND	1.00	"							
4-Chlorotoluene	ND	1.00	"							
1,2-Dibromo-3-chloropropane	ND	5.00	"							
Dibromochloromethane	ND	1.00	"							
1,2-Dibromoethane	ND	1.00	"							
Dibromomethane	ND	1.00	"							
1,2-Dichlorobenzene	ND	1.00	"							
1,3-Dichlorobenzene	ND	1.00	"							
1,4-Dichlorobenzene	ND	1.00	"							
Dichlorodifluoromethane	ND	5.00	"							
1,1-Dichloroethane	ND	1.00	"							
1,2-Dichloroethane	ND	1.00	"							
1,1-Dichloroethene	ND	1.00	"							
cis-1,2-Dichloroethene	ND	1.00	"							
trans-1,2-Dichloroethene	ND	1.00	"							
1,2-Dichloropropane	ND	1.00	"							
1,3-Dichloropropane	ND	1.00	"							
2,2-Dichloropropane	ND	1.00	"							
1,1-Dichloropropene	ND	1.00	"							

North Creek Analytical - Portland

Philip Nerenberg

Philip Nerenberg, Laboratory Manager

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Hahn and Associates, Inc.	Project: Gasco Upland	
434 NW Sixth Ave., Suite 203	Project Number: 2708	**Reported:**
Portland, OR 97209	Project Manager: Rob Ede	07/06/04 12:50

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 4060426 - EPA 5030B										
Blank (4060426-BLK1)				Prepared & Analyzed: 06/10/04						
cis-1,3-Dichloropropene	ND	1.00	ug/l							
trans-1,3-Dichloropropene	ND	1.00	"							
Ethylbenzene	ND	1.00	"							
Hexachlorobutadiene	ND	2.00	"							
2-Hexanone	ND	10.0	"							
Isopropylbenzene	ND	2.00	"							
p-Isopropyltoluene	ND	2.00	"							
4-Methyl-2-pentanone	ND	5.00	"							
Methyl tert-butyl ether	ND	1.00	"							
Methylene chloride	ND	5.00	"							
Naphthalene	ND	2.00	"							
n-Propylbenzene	ND	1.00	"							
Styrene	ND	1.00	"							
1,1,1,2-Tetrachloroethane	ND	1.00	"							
1,1,2,2-Tetrachloroethane	ND	1.00	"							
Tetrachloroethene	ND	1.00	"							
Toluene	ND	1.00	"							
1,2,3-Trichlorobenzene	ND	1.00	"							
1,2,4-Trichlorobenzene	ND	1.00	"							
1,1,1-Trichloroethane	ND	1.00	"							
1,1,2-Trichloroethane	ND	1.00	"							
Trichloroethene	ND	1.00	"							
Trichlorofluoromethane	ND	1.00	"							
1,2,3-Trichloropropane	ND	1.00	"							
1,2,4-Trimethylbenzene	ND	1.00	"							
1,3,5-Trimethylbenzene	ND	1.00	"							
Vinyl chloride	ND	1.00	"							
o-Xylene	ND	1.00	"							
m,p-Xylene	ND	2.00	"							
Surr: 4-BFB	*19.6*		"	*20.0*		*98.0*	*75-120*			
Surr: 1,2-DCA-d4	*20.7*		"	*20.0*		*104*	*77-129*			
Surr: Dibromofluoromethane	*19.8*		"	*20.0*		*99.0*	*80-121*			
Surr: Toluene-d8	*19.9*		"	*20.0*		*99.5*	*80-120*			

North Creek Analytical - Portland

Philip Nerenberg

Philip Nerenberg, Laboratory Manager

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Hahn and Associates, Inc.	Project: Gasco Upland	
434 NW Sixth Ave., Suite 203	Project Number: 2708	**Reported:**
Portland, OR 97209	Project Manager: Rob Ede	07/06/04 12:50

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 4060426 - EPA 5030B										
LCS (4060426-BS1)				Prepared & Analyzed: 06/10/04						
Benzene	19.4	1.00	ug/l	20.0		97.0	80-120			
Chlorobenzene	19.0	1.00	"	20.0		95.0	80-124			
1,1-Dichloroethene	18.4	1.00	"	20.0		92.0	78-120			
Toluene	19.1	1.00	"	20.0		95.5	80-124			
Trichloroethene	18.5	1.00	"	20.0		92.5	80-132			
Surr: 4-BFB	*19.2*		"	*20.0*		*96.0*	*75-120*			
Surr: 1,2-DCA-d4	*20.7*		"	*20.0*		*104*	*77-129*			
Surr: Dibromofluoromethane	*20.2*		"	*20.0*		*101*	*80-121*			
Surr: Toluene-d8	*20.3*		"	*20.0*		*102*	*80-120*			
Matrix Spike (4060426-MS1)	**Source: P4F0245-02**			Prepared & Analyzed: 06/10/04						
Benzene	20.3	1.00	ug/l	20.0	0.160	101	80-124			
Chlorobenzene	19.1	1.00	"	20.0	ND	95.5	72.9-134			
1,1-Dichloroethene	18.6	1.00	"	20.0	ND	93.0	79.3-127			
Toluene	18.0	1.00	"	20.0	0.280	88.6	79.7-131			
Trichloroethene	18.6	1.00	"	20.0	ND	93.0	68.4-130			
Surr: 4-BFB	*19.4*		"	*20.0*		*97.0*	*75-120*			
Surr: 1,2-DCA-d4	*20.8*		"	*20.0*		*104*	*77-129*			
Surr: Dibromofluoromethane	*21.0*		"	*20.0*		*105*	*80-121*			
Surr: Toluene-d8	*19.9*		"	*20.0*		*99.5*	*80-120*			
Matrix Spike Dup (4060426-MSD1)	**Source: P4F0245-02**			Prepared & Analyzed: 06/10/04						
Benzene	20.1	1.00	ug/l	20.0	0.160	99.7	80-124	0.990	25	
Chlorobenzene	19.3	1.00	"	20.0	ND	96.5	72.9-134	1.04	25	
1,1-Dichloroethene	18.1	1.00	"	20.0	ND	90.5	79.3-127	2.72	25	
Toluene	17.9	1.00	"	20.0	0.280	88.1	79.7-131	0.557	25	
Trichloroethene	19.1	1.00	"	20.0	ND	95.5	68.4-130	2.65	25	
Surr: 4-BFB	*19.8*		"	*20.0*		*99.0*	*75-120*			
Surr: 1,2-DCA-d4	*20.8*		"	*20.0*		*104*	*77-129*			
Surr: Dibromofluoromethane	*20.8*		"	*20.0*		*104*	*80-121*			
Surr: Toluene-d8	*19.4*		"	*20.0*		*97.0*	*80-120*			

North Creek Analytical - Portland

Philip Nerenberg

Philip Nerenberg, Laboratory Manager

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Hahn and Associates, Inc.	Project: Gasco Upland	
434 NW Sixth Ave., Suite 203	Project Number: 2708	**Reported:**
Portland, OR 97209	Project Manager: Rob Ede	07/06/04 12:50

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 4060423 - EPA 3510/600 Series										
Blank (4060423-BLK1)				Prepared: 06/10/04 Analyzed: 06/14/04						
Carbazole	ND	5.00	ug/l							
Acenaphthene	ND	5.00	"							
Acenaphthylene	ND	5.00	"							
Anthracene	ND	5.00	"							
Benzo (a) anthracene	ND	5.00	"							
Benzo (a) pyrene	ND	5.00	"							
Benzo (b) fluoranthene	ND	5.00	"							
Benzo (ghi) perylene	ND	5.00	"							
Benzo (k) fluoranthene	ND	5.00	"							
Benzoic Acid	ND	50.0	"							
Benzyl alcohol	ND	10.0	"							
4-Bromophenyl phenyl ether	ND	5.00	"							
Butyl benzyl phthalate	ND	5.00	"							
4-Chloro-3-methylphenol	ND	5.00	"							
4-Chloroaniline	ND	20.0	"							
Bis(2-chloroethoxy)methane	ND	10.0	"							
Bis(2-chloroethyl)ether	ND	5.00	"							
Bis(2-chloroisopropyl)ether	ND	10.0	"							
2-Chloronaphthalene	ND	5.00	"							
2-Chlorophenol	ND	5.00	"							
4-Chlorophenyl phenyl ether	ND	5.00	"							
Chrysene	ND	5.00	"							
Di-n-butyl phthalate	ND	5.00	"							
Di-n-octyl phthalate	ND	5.00	"							
Dibenzo (a,h) anthracene	ND	5.00	"							
Dibenzofuran	ND	5.00	"							
1,2-Dichlorobenzene	ND	5.00	"							
1,3-Dichlorobenzene	ND	5.00	"							
1,4-Dichlorobenzene	ND	5.00	"							
3,3'-Dichlorobenzidine	ND	5.00	"							
2,4-Dichlorophenol	ND	5.00	"							
Diethyl phthalate	ND	5.00	"							
2,4-Dimethylphenol	ND	10.0	"							
Dimethyl phthalate	ND	5.00	"							
4,6-Dinitro-2-methylphenol	ND	10.0	"							
2,4-Dinitrophenol	ND	25.0	"							

North Creek Analytical - Portland

Philip Nerenberg

Philip Nerenberg, Laboratory Manager

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Hahn and Associates, Inc.	Project: Gasco Upland	
434 NW Sixth Ave., Suite 203	Project Number: 2708	**Reported:**
Portland, OR 97209	Project Manager: Rob Ede	07/06/04 12:50

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 4060423 - EPA 3510/600 Series										
Blank (4060423-BLK1)				Prepared: 06/10/04 Analyzed: 06/14/04						
2,4-Dinitrotoluene	ND	5.00	ug/l							
2,6-Dinitrotoluene	ND	5.00	"							
Bis(2-ethylhexyl)phthalate	ND	10.0	"							
Fluoranthene	ND	5.00	"							
Fluorene	ND	5.00	"							
Hexachlorobenzene	ND	5.00	"							
Hexachlorobutadiene	ND	10.0	"							
Hexachlorocyclopentadiene	ND	10.0	"							
Hexachloroethane	ND	10.0	"							
Indeno (1,2,3-cd) pyrene	ND	5.00	"							
Isophorone	ND	5.00	"							
2-Methylnaphthalene	ND	5.00	"							
2-Methylphenol	ND	10.0	"							
3-,4-Methylphenol	ND	5.00	"							
Naphthalene	ND	5.00	"							
2-Nitroaniline	ND	5.00	"							
3-Nitroaniline	ND	10.0	"							
4-Nitroaniline	ND	10.0	"							
Nitrobenzene	ND	5.00	"							
2-Nitrophenol	ND	5.00	"							
4-Nitrophenol	ND	25.0	"							
N-Nitrosodi-n-propylamine	ND	10.0	"							
N-Nitrosodiphenylamine	ND	5.00	"							
Pentachlorophenol	ND	10.0	"							
Phenanthrene	ND	5.00	"							
Phenol	ND	5.00	"							
Pyrene	ND	5.00	"							
1,2,4-Trichlorobenzene	ND	5.00	"							
2,4,5-Trichlorophenol	ND	5.00	"							
2,4,6-Trichlorophenol	ND	5.00	"							
Surr: 2-Fluorobiphenyl	*60.0*		"	*75.0*		*80.0*	*26-135*			
Surr: 2-Fluorophenol	*74.6*		"	*150*		*49.7*	*6-124*			
Surr: Nitrobenzene-d5	*62.9*		"	*75.0*		*83.9*	*23-147*			
Surr: Phenol-d6	*51.9*		"	*150*		*34.6*	*11-130*			
Surr: p-Terphenyl-d14	*68.6*		"	*75.0*		*91.5*	*38-149*			
Surr: 2,4,6-Tribromophenol	*123*		"	*150*		*82.0*	*19-126*			

North Creek Analytical - Portland

Philip Nerenberg

Philip Nerenberg, Laboratory Manager

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Hahn and Associates, Inc.	Project: Gasco Upland	
434 NW Sixth Ave., Suite 203	Project Number: 2708	**Reported:**
Portland, OR 97209	Project Manager: Rob Ede	07/06/04 12:50

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 4060423 - EPA 3510/600 Series										
LCS (4060423-BS1)				Prepared: 06/10/04 Analyzed: 06/14/04						
Acenaphthene	60.6	5.00	ug/l	75.0		80.8	40-110			
4-Chloro-3-methylphenol	113	5.00	"	150		75.3	40-110			
2-Chlorophenol	95.7	5.00	"	150		63.8	40-110			
1,4-Dichlorobenzene	34.8	5.00	"	75.0		46.4	20-90			
2,4-Dinitrotoluene	68.4	5.00	"	75.0		91.2	50-110			
4-Nitrophenol	55.4	25.0	"	150		36.9	15-100			
N-Nitrosodi-n-propylamine	65.6	10.0	"	75.0		87.5	40-110			
Pentachlorophenol	99.6	10.0	"	150		66.4	30-120			
Phenol	47.5	5.00	"	150		31.7	15-110			
Pyrene	72.5	5.00	"	75.0		96.7	40-110			
1,2,4-Trichlorobenzene	37.6	5.00	"	75.0		50.1	25-100			
Surr: 2-Fluorobiphenyl	*56.1*		"	*75.0*		*74.8*	*26-135*			
Surr: 2-Fluorophenol	*77.0*		"	*150*		*51.3*	*6-124*			
Surr: Nitrobenzene-d5	*64.7*		"	*75.0*		*86.3*	*23-147*			
Surr: Phenol-d6	*53.2*		"	*150*		*35.5*	*11-130*			
Surr: p-Terphenyl-d14	*75.1*		"	*75.0*		*100*	*38-149*			
Surr: 2,4,6-Tribromophenol	*135*		"	*150*		*90.0*	*19-126*			
LCS Dup (4060423-BSD1)				Prepared: 06/10/04 Analyzed: 06/14/04						
Acenaphthene	71.0	5.00	ug/l	75.0		94.7	40-110	15.8	36	
4-Chloro-3-methylphenol	128	5.00	"	150		85.3	40-110	12.4	43	
2-Chlorophenol	109	5.00	"	150		72.7	40-110	13.0	38	
1,4-Dichlorobenzene	45.7	5.00	"	75.0		60.9	20-90	27.1	43	
2,4-Dinitrotoluene	75.8	5.00	"	75.0		101	50-110	10.3	31	
4-Nitrophenol	59.9	25.0	"	150		39.9	15-100	7.81	36	
N-Nitrosodi-n-propylamine	75.5	10.0	"	75.0		101	40-110	14.0	37	
Pentachlorophenol	109	10.0	"	150		72.7	30-120	9.01	40	
Phenol	52.2	5.00	"	150		34.8	15-110	9.43	36	
Pyrene	75.4	5.00	"	75.0		101	40-110	3.92	31	
1,2,4-Trichlorobenzene	50.8	5.00	"	75.0		67.7	25-100	29.9	42	
Surr: 2-Fluorobiphenyl	*65.4*		"	*75.0*		*87.2*	*26-135*			
Surr: 2-Fluorophenol	*82.6*		"	*150*		*55.1*	*6-124*			
Surr: Nitrobenzene-d5	*73.1*		"	*75.0*		*97.5*	*23-147*			
Surr: Phenol-d6	*57.7*		"	*150*		*38.5*	*11-130*			
Surr: p-Terphenyl-d14	*79.4*		"	*75.0*		*106*	*38-149*			
Surr: 2,4,6-Tribromophenol	*148*		"	*150*		*98.7*	*19-126*			

North Creek Analytical - Portland

Philip Nerenberg

Philip Nerenberg, Laboratory Manager

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541.383.9310 fax 541.382.7588

Hahn and Associates, Inc.	Project: Gasco Upland	
434 NW Sixth Ave., Suite 203	Project Number: 2708	**Reported:**
Portland, OR 97209	Project Manager: Rob Ede	07/06/04 12:50

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 4060423 - EPA 3510/600 Series

North Creek Analytical - Portland

Philip Nerenberg

Philip Nerenberg, Laboratory Manager

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Hahn and Associates, Inc.	Project: Gasco Upland	
434 NW Sixth Ave., Suite 203	Project Number: 2708	**Reported:**
Portland, OR 97209	Project Manager: Rob Ede	07/06/04 12:50

Polynuclear Aromatic Compounds per EPA 8270M-SIM - Quality Control

North Creek Analytical - Portland

Analyte	Result	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
Batch 4060424 - EPA 3510/600 Series										
Blank (4060424-BLK1)				Prepared: 06/10/04 Analyzed: 06/14/04						
Acenaphthene	ND	0.100	ug/l							
Acenaphthylene	ND	0.100	"							
Anthracene	ND	0.100	"							
Benzo (a) anthracene	ND	0.100	"							
Benzo (a) pyrene	ND	0.100	"							
Benzo (b) fluoranthene	ND	0.100	"							
Benzo (ghi) perylene	ND	0.100	"							
Benzo (k) fluoranthene	ND	0.100	"							
Chrysene	ND	0.100	"							
Dibenzo (a,h) anthracene	ND	0.200	"							
Fluoranthene	ND	0.100	"							
Fluorene	ND	0.100	"							
Indeno (1,2,3-cd) pyrene	ND	0.100	"							
Naphthalene	ND	0.100	"							
Phenanthrene	ND	0.100	"							
Pyrene	ND	0.100	"							
Surr: Fluorene-d10	*2.37*		"	*2.50*		*94.8*	*25-125*			
Surr: Pyrene-d10	*2.50*		"	*2.50*		*100*	*23-150*			
Surr: Benzo (a) pyrene-d12	*2.10*		"	*2.50*		*84.0*	*10-125*			
Blank (4060424-BLK2)				Prepared: 06/10/04 Analyzed: 06/29/04						J
Benzo (a) anthracene	ND	0.0100	ug/l							
Benzo (a) pyrene	ND	0.0100	"							
Benzo (b) fluoranthene	ND	0.0100	"							
Benzo (k) fluoranthene	ND	0.0100	"							
Chrysene	ND	0.0100	"							
Dibenzo (a,h) anthracene	ND	0.0100	"							
Indeno (1,2,3-cd) pyrene	ND	0.0100	"							
Surr: Benzo (a) pyrene-d12	*1.47*		"	*2.50*		*58.8*	*10-125*			

North Creek Analytical - Portland

Philip Nerenberg

Philip Nerenberg, Laboratory Manager

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Hahn and Associates, Inc.	Project: Gasco Upland	
434 NW Sixth Ave., Suite 203	Project Number: 2708	**Reported:**
Portland, OR 97209	Project Manager: Rob Ede	07/06/04 12:50

Polynuclear Aromatic Compounds per EPA 8270M-SIM - Quality Control

North Creek Analytical - Portland

Analyte	Result	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
Batch 4060424 - EPA 3510/600 Series										
LCS (4060424-BS1)				Prepared: 06/10/04 Analyzed: 06/14/04						
Acenaphthene	2.40	0.100	ug/l	2.50		96.0	26-135			
Benzo (a) pyrene	2.19	0.100	"	2.50		87.6	38-137			
Pyrene	2.46	0.100	"	2.50		98.4	33-133			
Surr: Fluorene-d10	*2.62*		"	*2.50*		*105*	*25-125*			
Surr: Pyrene-d10	*2.72*		"	*2.50*		*109*	*23-150*			
Surr: Benzo (a) pyrene-d12	*2.47*		"	*2.50*		*98.8*	*10-125*			
LCS Dup (4060424-BSD1)				Prepared: 06/10/04 Analyzed: 06/14/04						
Acenaphthene	2.30	0.100	ug/l	2.50		92.0	26-135	4.26	60	
Benzo (a) pyrene	2.12	0.100	"	2.50		84.8	38-137	3.25	60	
Pyrene	2.38	0.100	"	2.50		95.2	33-133	3.31	60	
Surr: Fluorene-d10	*2.49*		"	*2.50*		*99.6*	*25-125*			
Surr: Pyrene-d10	*2.55*		"	*2.50*		*102*	*23-150*			
Surr: Benzo (a) pyrene-d12	*2.29*		"	*2.50*		*91.6*	*10-125*			

North Creek Analytical - Portland

Philip Nerenberg

Philip Nerenberg, Laboratory Manager

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Hahn and Associates, Inc.	Project: Gasco Upland	
434 NW Sixth Ave., Suite 203	Project Number: 2708	**Reported:**
Portland, OR 97209	Project Manager: Rob Ede	07/06/04 12:50

Conventional Chemistry Parameters per APHA/EPA Methods - Quality Control

North Creek Analytical - Portland

Analyte	Result	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
Batch 4060555 - General Preparation										
Blank (4060555-BLK1)				Prepared: 06/14/04 Analyzed: 06/15/04						
Cyanide (total)	ND	0.00500	mg/l							
LCS (4060555-BS1)				Prepared: 06/14/04 Analyzed: 06/15/04						
Cyanide (total)	0.194	0.00500	mg/l	0.200		97.0	75-125			
Duplicate (4060555-DUP1)		**Source: P4F0245-02**		Prepared: 06/14/04 Analyzed: 06/15/04						
Cyanide (total)	0.529	0.00500	mg/l		0.533			0.753	20	
Matrix Spike (4060555-MS1)		**Source: P4F0245-02**		Prepared: 06/14/04 Analyzed: 06/15/04						
Cyanide (total)	0.716	0.0100	mg/l	0.200	0.533	91.5	75-125			

North Creek Analytical - Portland

Philip Nerenberg

Philip Nerenberg, Laboratory Manager

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Hahn and Associates, Inc.	Project: Gasco Upland	
434 NW Sixth Ave., Suite 203	Project Number: 2708	**Reported:**
Portland, OR 97209	Project Manager: Rob Ede	07/06/04 12:50

Notes and Definitions

J	Estimated value.
Q-03	The matrix spike recovery, and/or RPD, for this QC sample cannot be accurately calculated due to the high concentration of analyte already present in the source sample.
Q-06	Analyses are not controlled on RPD values from sample concentrations less than 5 times the reporting limit.
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. MRLs are adjusted if %Solids are less than 50%.
wet	Sample results reported on a wet weight basis (as received)
RPD	Relative Percent Difference

North Creek Analytical - Portland

Philip Nerenberg

Philip Nerenberg, Laboratory Manager

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SCOEPA00013800

P4FC037

HAHN AND ASSOCIATES, INC.
Environmental Consultants
434 NW Sixth Avenue, Suite 203 • Portland OR 97209
(503) 796-0717 • Fax (503) 227-2209

Laboratory: NORTH CREEK ANALYTICAL BOTHELL OR
Lab Project No.:

CHAIN OF CUSTODY

Chain of Custody No.:

Project Manager: ROB CDE
Project No.: 2708-10
Project Name: CASCO
Collected by: MWG

Liquid with Sediment Sample
____ Test Filtrate ____ Test Sediment ____ Test Both
Multi-Phase Sample
____ Test One (which) ____ Test Separately ____ Shake

Samples Received at 4C (Y or N):
Appropriate Containers Used (Y or N):
Provide Verbal Results (Y or N): No
Provide Preliminary Fax Results: Yes

Comments
Sample Number Prefix: 2708-040611-

Lab ID	Sample #	Date	Time	Sample Description	Matrix: Soil	Matrix: Water	Matrix: Other	Number of Containers	Analyses to be Performed: VOCs (EPA 8260)	RUSH	Remarks
	-097	6-13-04	1000	TB		X		1	X		
	-108		1045	B59A; 46-50'		X		4	X		
	-109		1145	B59A; 76-80'		X		4	X		
	-110		1245	B59A; 96-100'		X		4	X		
	-111		1335	B59A; EB		X		4	X		
	-112		1400	B59A; 116-120		X		4	X		
	-113		1540	B59A; 144-148'		X		4	X		

Relinquished by	Company	Date	Time	Received by	Company
[signature]	HAI	06-14-04	1620	[signature]	NCA
[signature]	NCA	06-14-04	1700	[signature]	NCA

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SCOEPA00013801

NORTH CREEK ANALYTICAL COOLER RECEIPT FORM

(Army Corp. compliant)

Client: Hahn & Associates

1. **Please sign for receipt and opening of** 1 **cooler or** _____ **other** _____

   By (print) Vanessa Evans (sign) Vanessa Evans

2. Date samples received 6/14/04 Date opened: Same X or ___/___/___

3. Delivered by: X NCA courier (Larry) ___ FedEx ___UPS ___Courier ___Client ___Other_____

   Airbill # if applicable _____ (Put copy of shipping papers in file)

4. There were 1 custody seals present, signed by Larry date 6/14/04

5. Were the custody seals unbroken and intact at the date and time of arrival? X Yes ___No

6. Was ice used? X yes ___no Type of ice: ___ blue ice ___gel ice ___real ice

   Temperature (degrees C) 2.3 Raytek thermometer _____ Digi-Therm (probe temperature blank)

7. Are custody papers sealed in a plastic bag and taped inside to lid? ___Yes X No

8. Were custody papers filled out properly (ink, signed, etc.)? X Yes ___No

   If "no" please specify: _____

9. Was project identifiable from custody papers? ___Yes X No

   Name of project Hasco (if applicable)

10. **Initial and date for unpacking:** _____ **(initials)** **date** ___/___/___

11. Packing material: NA bubble wrap/bag ___styrofoam ___cardboard _____other

12. Were samples in bags? ___Yes X No

13. Did all containers indicated on the COC arrive? X Yes ___No

    If "no" please indicate which containers were absent _____

14. Were all containers unbroken and labels in good condition? X Yes (X) No

    If "no" please indicate which containers one Voa of 109 was broken upon receipt

15. Were all bottle labels complete (ID, date, time, signature, etc.)? X Yes ___No

    Do the IDs, times, etc. agree with the COC? X Yes ___No

    If "no" please indicate which containers _____

16. Are containers properly preserved for indicated analysis? X Yes ___No

17. Is there adequate volume for the test(s) requested? X Yes ___No

18. If voa vials were submitted, are they free of bubbles? ___ N/A X Yes ___No

19. **Log-in phase: Date samples were logged in:** 6/15/04 **Elm Project #** P4F0537

20. Logged in by (print) Callie Fahsholz (sign) Callie Fahsholz

21. Was the project manager notified of status? (Use back of form as a record) ___Yes X No

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541.383.9310 fax 541.382.7588

29 June, 2004

Rob Ede
Hahn and Associates, Inc.
434 NW Sixth Ave., Suite 203
Portland, OR 97209

RE: Gasco Upland

Enclosed are the results of analyses for samples received by the laboratory on 06/14/04 17:00. If you have any questions concerning this report, please feel free to contact me.

Sincerely,

Philip Nerenberg
Laboratory Manager

Work Orders included in this report:
P4F0537

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Hahn and Associates, Inc.	Project: Gasco Upland	
434 NW Sixth Ave., Suite 203	Project Number: 2708-10	**Reported:**
Portland, OR 97209	Project Manager: Rob Ede	06/29/04 14:00

ANALYTICAL REPORT FOR SAMPLES

Sample ID	Laboratory ID	Matrix	Date Sampled	Date Received
2708-040611-097	P4F0537-01	Water	06/11/04 10:00	06/14/04 17:00
2708-040611-108	P4F0537-02	Water	06/11/04 10:45	06/14/04 17:00
2708-040611-109	P4F0537-03	Water	06/11/04 11:45	06/14/04 17:00
2708-040611-110	P4F0537-04	Water	06/11/04 12:45	06/14/04 17:00
2708-040611-111	P4F0537-05	Water	06/11/04 13:35	06/14/04 17:00
2708-040611-112	P4F0537-06	Water	06/11/04 14:00	06/14/04 17:00
2708-040611-113	P4F0537-07	Water	06/11/04 15:40	06/14/04 17:00

North Creek Analytical - Portland

Philip Nerenberg

Philip Nerenberg, Laboratory Manager

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Hahn and Associates, Inc.	Project: Gasco Upland	
434 NW Sixth Ave., Suite 203	Project Number: 2708-10	**Reported:**
Portland, OR 97209	Project Manager: Rob Ede	06/29/04 14:00

Volatile Organic Compounds per EPA Method 8260B

North Creek Analytical - Portland

Analyte	Result	Reporting Limit	Units	Dilution	Method	Prepared	Analyzed	Batch	Notes
2708-040611-097 (P4F0537-01RE1) Water					Sampled: 06/11/04 Received: 06/14/04				
Acetone	ND	25.0	ug/l	1	EPA 8260B	06/25/04	06/25/04	4061093	
Benzene	ND	1.00	"	"	"	"	"	"	
Bromobenzene	ND	1.00	"	"	"	"	"	"	
Bromochloromethane	ND	1.00	"	"	"	"	"	"	
Bromodichloromethane	ND	1.00	"	"	"	"	"	"	
Bromoform	ND	1.00	"	"	"	"	"	"	
Bromomethane	ND	5.00	"	"	"	"	"	"	
2-Butanone	ND	10.0	"	"	"	"	"	"	
n-Butylbenzene	ND	5.00	"	"	"	"	"	"	
sec-Butylbenzene	ND	1.00	"	"	"	"	"	"	
tert-Butylbenzene	ND	1.00	"	"	"	"	"	"	
Carbon disulfide	ND	10.0	"	"	"	"	"	"	
Carbon tetrachloride	ND	1.00	"	"	"	"	"	"	
Chlorobenzene	ND	1.00	"	"	"	"	"	"	
Chloroethane	ND	1.00	"	"	"	"	"	"	
Chloroform	ND	1.00	"	"	"	"	"	"	
Chloromethane	ND	5.00	"	"	"	"	"	"	
2-Chlorotoluene	ND	1.00	"	"	"	"	"	"	
4-Chlorotoluene	ND	1.00	"	"	"	"	"	"	
1,2-Dibromo-3-chloropropane	ND	5.00	"	"	"	"	"	"	
Dibromochloromethane	ND	1.00	"	"	"	"	"	"	
1,2-Dibromoethane	ND	1.00	"	"	"	"	"	"	
Dibromomethane	ND	1.00	"	"	"	"	"	"	
1,2-Dichlorobenzene	ND	1.00	"	"	"	"	"	"	
1,3-Dichlorobenzene	ND	1.00	"	"	"	"	"	"	
1,4-Dichlorobenzene	ND	1.00	"	"	"	"	"	"	
Dichlorodifluoromethane	ND	5.00	"	"	"	"	"	"	
1,1-Dichloroethane	ND	1.00	"	"	"	"	"	"	
1,2-Dichloroethane	ND	1.00	"	"	"	"	"	"	
1,1-Dichloroethene	ND	1.00	"	"	"	"	"	"	
cis-1,2-Dichloroethene	ND	1.00	"	"	"	"	"	"	
trans-1,2-Dichloroethene	ND	1.00	"	"	"	"	"	"	
1,2-Dichloropropane	ND	1.00	"	"	"	"	"	"	
1,3-Dichloropropane	ND	1.00	"	"	"	"	"	"	
2,2-Dichloropropane	ND	1.00	"	"	"	"	"	"	
1,1-Dichloropropene	ND	1.00	"	"	"	"	"	"	
cis-1,3-Dichloropropene	ND	1.00	"	"	"	"	"	"	

North Creek Analytical - Portland

Philip Nerenberg

Philip Nerenberg, Laboratory Manager

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Hahn and Associates, Inc.	Project: Gasco Upland	
434 NW Sixth Ave., Suite 203	Project Number: 2708-10	**Reported:**
Portland, OR 97209	Project Manager: Rob Ede	06/29/04 14:00

Volatile Organic Compounds per EPA Method 8260B

North Creek Analytical - Portland

Analyte	Result	Reporting Limit	Units	Dilution	Method	Prepared	Analyzed	Batch	Notes
2708-040611-097 (P4F0537-01RE1) Water					Sampled: 06/11/04 Received: 06/14/04				
trans-1,3-Dichloropropene	ND	1.00	ug/l	1	EPA 8260B	06/25/04	06/25/04	4061093	
Ethylbenzene	ND	1.00	"	"	"	"	"	"	
Hexachlorobutadiene	ND	2.00	"	"	"	"	"	"	
2-Hexanone	ND	10.0	"	"	"	"	"	"	
Isopropylbenzene	ND	2.00	"	"	"	"	"	"	
p-Isopropyltoluene	ND	2.00	"	"	"	"	"	"	
4-Methyl-2-pentanone	ND	5.00	"	"	"	"	"	"	
Methyl tert-butyl ether	ND	1.00	"	"	"	"	"	"	
Methylene chloride	ND	5.00	"	"	"	"	"	"	
Naphthalene	ND	2.00	"	"	"	"	"	"	
n-Propylbenzene	ND	1.00	"	"	"	"	"	"	
Styrene	ND	1.00	"	"	"	"	"	"	
1,1,1,2-Tetrachloroethane	ND	1.00	"	"	"	"	"	"	
1,1,2,2-Tetrachloroethane	ND	1.00	"	"	"	"	"	"	
Tetrachloroethene	ND	1.00	"	"	"	"	"	"	
Toluene	ND	1.00	"	"	"	"	"	"	
1,2,3-Trichlorobenzene	ND	1.00	"	"	"	"	"	"	
1,2,4-Trichlorobenzene	ND	1.00	"	"	"	"	"	"	
1,1,1-Trichloroethane	ND	1.00	"	"	"	"	"	"	
1,1,2-Trichloroethane	ND	1.00	"	"	"	"	"	"	
Trichloroethene	ND	1.00	"	"	"	"	"	"	
Trichlorofluoromethane	ND	1.00	"	"	"	"	"	"	
1,2,3-Trichloropropane	ND	1.00	"	"	"	"	"	"	
1,2,4-Trimethylbenzene	ND	1.00	"	"	"	"	"	"	
1,3,5-Trimethylbenzene	ND	1.00	"	"	"	"	"	"	
Vinyl chloride	ND	1.00	"	"	"	"	"	"	
o-Xylene	ND	1.00	"	"	"	"	"	"	
m,p-Xylene	ND	2.00	"	"	"	"	"	"	
Surr: 4-BFB	*89.5 %*	*75-120*							
Surr: 1,2-DCA-d4	*95.0 %*	*77-129*							
Surr: Dibromofluoromethane	*102 %*	*80-121*							
Surr: Toluene-d8	*98.0 %*	*80-120*							

North Creek Analytical - Portland

Philip Nerenberg

Philip Nerenberg, Laboratory Manager

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Hahn and Associates, Inc.	Project: Gasco Upland	
434 NW Sixth Ave., Suite 203	Project Number: 2708-10	**Reported:**
Portland, OR 97209	Project Manager: Rob Ede	06/29/04 14:00

Volatile Organic Compounds per EPA Method 8260B

North Creek Analytical - Portland

Analyte	Result	Reporting Limit	Units	Dilution	Method	Prepared	Analyzed	Batch	Notes
2708-040611-108 (P4F0537-02) Water					Sampled: 06/11/04 Received: 06/14/04				
Acetone	ND	1250	ug/l	50	EPA 8260B	06/24/04	06/24/04	4061040	
Benzene	**5570**	50.0	"	"	"	"	"	"	
Bromobenzene	ND	50.0	"	"	"	"	"	"	
Bromochloromethane	ND	50.0	"	"	"	"	"	"	
Bromodichloromethane	ND	50.0	"	"	"	"	"	"	
Bromoform	ND	50.0	"	"	"	"	"	"	
Bromomethane	ND	250	"	"	"	"	"	"	
2-Butanone	ND	500	"	"	"	"	"	"	
n-Butylbenzene	ND	250	"	"	"	"	"	"	
sec-Butylbenzene	ND	50.0	"	"	"	"	"	"	
tert-Butylbenzene	ND	50.0	"	"	"	"	"	"	
Carbon disulfide	ND	500	"	"	"	"	"	"	
Carbon tetrachloride	ND	50.0	"	"	"	"	"	"	
Chlorobenzene	ND	50.0	"	"	"	"	"	"	
Chloroethane	ND	50.0	"	"	"	"	"	"	
Chloroform	ND	50.0	"	"	"	"	"	"	
Chloromethane	ND	250	"	"	"	"	"	"	
2-Chlorotoluene	ND	50.0	"	"	"	"	"	"	
4-Chlorotoluene	ND	50.0	"	"	"	"	"	"	
1,2-Dibromo-3-chloropropane	ND	250	"	"	"	"	"	"	
Dibromochloromethane	ND	50.0	"	"	"	"	"	"	
1,2-Dibromoethane	ND	50.0	"	"	"	"	"	"	
Dibromomethane	ND	50.0	"	"	"	"	"	"	
1,2-Dichlorobenzene	ND	50.0	"	"	"	"	"	"	
1,3-Dichlorobenzene	ND	50.0	"	"	"	"	"	"	
1,4-Dichlorobenzene	ND	50.0	"	"	"	"	"	"	
Dichlorodifluoromethane	ND	250	"	"	"	"	"	"	
1,1-Dichloroethane	ND	50.0	"	"	"	"	"	"	
1,2-Dichloroethane	ND	50.0	"	"	"	"	"	"	
1,1-Dichloroethene	ND	50.0	"	"	"	"	"	"	
cis-1,2-Dichloroethene	ND	50.0	"	"	"	"	"	"	
trans-1,2-Dichloroethene	ND	50.0	"	"	"	"	"	"	
1,2-Dichloropropane	ND	50.0	"	"	"	"	"	"	
1,3-Dichloropropane	ND	50.0	"	"	"	"	"	"	
2,2-Dichloropropane	ND	50.0	"	"	"	"	"	"	
1,1-Dichloropropene	ND	50.0	"	"	"	"	"	"	
cis-1,3-Dichloropropene	ND	50.0	"	"	"	"	"	"	

North Creek Analytical - Portland

Philip Nerenberg

Philip Nerenberg, Laboratory Manager

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Hahn and Associates, Inc.	Project: Gasco Upland	
434 NW Sixth Ave., Suite 203	Project Number: 2708-10	**Reported:**
Portland, OR 97209	Project Manager: Rob Ede	06/29/04 14:00

Volatile Organic Compounds per EPA Method 8260B

North Creek Analytical - Portland

Analyte	Result	Reporting Limit	Units	Dilution	Method	Prepared	Analyzed	Batch	Notes
2708-040611-108 (P4F0537-02) Water					Sampled: 06/11/04 Received: 06/14/04				
trans-1,3-Dichloropropene	ND	50.0	ug/l	50	EPA 8260B	06/24/04	06/24/04	4061040	
Ethylbenzene	**317**	50.0	"	"	"	"	"	"	
Hexachlorobutadiene	ND	100	"	"	"	"	"	"	
2-Hexanone	ND	500	"	"	"	"	"	"	
Isopropylbenzene	ND	100	"	"	"	"	"	"	
p-Isopropyltoluene	ND	100	"	"	"	"	"	"	
4-Methyl-2-pentanone	ND	250	"	"	"	"	"	"	
Methyl tert-butyl ether	ND	50.0	"	"	"	"	"	"	
Methylene chloride	ND	250	"	"	"	"	"	"	
Naphthalene	**4460**	100	"	"	"	"	"	"	
n-Propylbenzene	ND	50.0	"	"	"	"	"	"	
Styrene	ND	50.0	"	"	"	"	"	"	
1,1,1,2-Tetrachloroethane	ND	50.0	"	"	"	"	"	"	
1,1,2,2-Tetrachloroethane	ND	50.0	"	"	"	"	"	"	
Tetrachloroethene	ND	50.0	"	"	"	"	"	"	
Toluene	ND	50.0	"	"	"	"	"	"	
1,2,3-Trichlorobenzene	ND	50.0	"	"	"	"	"	"	
1,2,4-Trichlorobenzene	ND	50.0	"	"	"	"	"	"	
1,1,1-Trichloroethane	ND	50.0	"	"	"	"	"	"	
1,1,2-Trichloroethane	ND	50.0	"	"	"	"	"	"	
Trichloroethene	ND	50.0	"	"	"	"	"	"	
Trichlorofluoromethane	ND	50.0	"	"	"	"	"	"	
1,2,3-Trichloropropane	ND	50.0	"	"	"	"	"	"	
1,2,4-Trimethylbenzene	**63.0**	50.0	"	"	"	"	"	"	
1,3,5-Trimethylbenzene	ND	50.0	"	"	"	"	"	"	
Vinyl chloride	ND	50.0	"	"	"	"	"	"	
o-Xylene	**85.5**	50.0	"	"	"	"	"	"	
m,p-Xylene	ND	100	"	"	"	"	"	"	
Surr: 4-BFB	*89.0 %*	*75-120*							
Surr: 1,2-DCA-d4	*93.5 %*	*77-129*							
Surr: Dibromofluoromethane	*102 %*	*80-121*							
Surr: Toluene-d8	*96.5 %*	*80-120*							

North Creek Analytical - Portland

Philip Nerenberg

Philip Nerenberg, Laboratory Manager

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541.383.9310 fax 541.382.7588

Hahn and Associates, Inc.	Project: Gasco Upland	
434 NW Sixth Ave., Suite 203	Project Number: 2708-10	**Reported:**
Portland, OR 97209	Project Manager: Rob Ede	06/29/04 14:00

Volatile Organic Compounds per EPA Method 8260B

North Creek Analytical - Portland

Analyte	Result	Reporting Limit	Units	Dilution	Method	Prepared	Analyzed	Batch	Notes
2708-040611-109 (P4F0537-03) Water					Sampled: 06/11/04 Received: 06/14/04				
Acetone	ND	125	ug/l	5	EPA 8260B	06/24/04	06/24/04	4061040	
Benzene	**230**	5.00	"	"	"	"	"	"	
Bromobenzene	ND	5.00	"	"	"	"	"	"	
Bromochloromethane	ND	5.00	"	"	"	"	"	"	
Bromodichloromethane	ND	5.00	"	"	"	"	"	"	
Bromoform	ND	5.00	"	"	"	"	"	"	
Bromomethane	ND	25.0	"	"	"	"	"	"	
2-Butanone	ND	50.0	"	"	"	"	"	"	
n-Butylbenzene	ND	25.0	"	"	"	"	"	"	
sec-Butylbenzene	ND	5.00	"	"	"	"	"	"	
tert-Butylbenzene	ND	5.00	"	"	"	"	"	"	
Carbon disulfide	ND	50.0	"	"	"	"	"	"	
Carbon tetrachloride	ND	5.00	"	"	"	"	"	"	
Chlorobenzene	ND	5.00	"	"	"	"	"	"	
Chloroethane	ND	5.00	"	"	"	"	"	"	
Chloroform	ND	5.00	"	"	"	"	"	"	
Chloromethane	ND	25.0	"	"	"	"	"	"	
2-Chlorotoluene	ND	5.00	"	"	"	"	"	"	
4-Chlorotoluene	ND	5.00	"	"	"	"	"	"	
1,2-Dibromo-3-chloropropane	ND	25.0	"	"	"	"	"	"	
Dibromochloromethane	ND	5.00	"	"	"	"	"	"	
1,2-Dibromoethane	ND	5.00	"	"	"	"	"	"	
Dibromomethane	ND	5.00	"	"	"	"	"	"	
1,2-Dichlorobenzene	ND	5.00	"	"	"	"	"	"	
1,3-Dichlorobenzene	ND	5.00	"	"	"	"	"	"	
1,4-Dichlorobenzene	ND	5.00	"	"	"	"	"	"	
Dichlorodifluoromethane	ND	25.0	"	"	"	"	"	"	
1,1-Dichloroethane	ND	5.00	"	"	"	"	"	"	
1,2-Dichloroethane	ND	5.00	"	"	"	"	"	"	
1,1-Dichloroethene	ND	5.00	"	"	"	"	"	"	
cis-1,2-Dichloroethene	ND	5.00	"	"	"	"	"	"	
trans-1,2-Dichloroethene	ND	5.00	"	"	"	"	"	"	
1,2-Dichloropropane	ND	5.00	"	"	"	"	"	"	
1,3-Dichloropropane	ND	5.00	"	"	"	"	"	"	
2,2-Dichloropropane	ND	5.00	"	"	"	"	"	"	
1,1-Dichloropropene	ND	5.00	"	"	"	"	"	"	
cis-1,3-Dichloropropene	ND	5.00	"	"	"	"	"	"	

North Creek Analytical - Portland

Philip Nerenberg

Philip Nerenberg, Laboratory Manager

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Hahn and Associates, Inc.	Project: Gasco Upland	
434 NW Sixth Ave., Suite 203	Project Number: 2708-10	**Reported:**
Portland, OR 97209	Project Manager: Rob Ede	06/29/04 14:00

Volatile Organic Compounds per EPA Method 8260B

North Creek Analytical - Portland

Analyte	Result	Reporting Limit	Units	Dilution	Method	Prepared	Analyzed	Batch	Notes
2708-040611-109 (P4F0537-03) Water					Sampled: 06/11/04 Received: 06/14/04				
trans-1,3-Dichloropropene	ND	5.00	ug/l	5	EPA 8260B	06/24/04	06/24/04	4061040	
Ethylbenzene	**25.8**	5.00	"	"	"	"	"	"	
Hexachlorobutadiene	ND	10.0	"	"	"	"	"	"	
2-Hexanone	ND	100	"	10	"	"	06/24/04	"	
Isopropylbenzene	ND	10.0	"	5	"	"	06/24/04	"	
p-Isopropyltoluene	ND	10.0	"	"	"	"	"	"	
4-Methyl-2-pentanone	ND	25.0	"	"	"	"	"	"	
Methyl tert-butyl ether	ND	5.00	"	"	"	"	"	"	
Methylene chloride	ND	25.0	"	"	"	"	"	"	
Naphthalene	**582**	10.0	"	"	"	"	"	"	
n-Propylbenzene	ND	5.00	"	"	"	"	"	"	
Styrene	ND	10.0	"	10	"	"	06/24/04	"	
1,1,1,2-Tetrachloroethane	ND	5.00	"	5	"	"	06/24/04	"	
1,1,2,2-Tetrachloroethane	ND	5.00	"	"	"	"	"	"	
Tetrachloroethene	ND	5.00	"	"	"	"	"	"	
Toluene	**12.4**	5.00	"	"	"	"	"	"	
1,2,3-Trichlorobenzene	ND	5.00	"	"	"	"	"	"	
1,2,4-Trichlorobenzene	ND	5.00	"	"	"	"	"	"	
1,1,1-Trichloroethane	ND	5.00	"	"	"	"	"	"	
1,1,2-Trichloroethane	ND	5.00	"	"	"	"	"	"	
Trichloroethene	ND	5.00	"	"	"	"	"	"	
Trichlorofluoromethane	ND	5.00	"	"	"	"	"	"	
1,2,3-Trichloropropane	ND	5.00	"	"	"	"	"	"	
1,2,4-Trimethylbenzene	**6.65**	5.00	"	"	"	"	"	"	
1,3,5-Trimethylbenzene	ND	5.00	"	"	"	"	"	"	
Vinyl chloride	ND	5.00	"	"	"	"	"	"	
o-Xylene	**12.2**	5.00	"	"	"	"	"	"	
m,p-Xylene	**13.8**	10.0	"	"	"	"	"	"	
Surr: 4-BFB	*95.0 %*	*75-120*							
Surr: 1,2-DCA-d4	*95.0 %*	*77-129*							
Surr: Dibromofluoromethane	*99.0 %*	*80-121*							
Surr: Toluene-d8	*96.0 %*	*80-120*							

North Creek Analytical - Portland

Philip Nerenberg

Philip Nerenberg, Laboratory Manager

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541.383.9310 fax 541.382.7588

Hahn and Associates, Inc.	Project: Gasco Upland	
434 NW Sixth Ave., Suite 203	Project Number: 2708-10	**Reported:**
Portland, OR 97209	Project Manager: Rob Ede	06/29/04 14:00

Volatile Organic Compounds per EPA Method 8260B

North Creek Analytical - Portland

Analyte	Result	Reporting Limit	Units	Dilution	Method	Prepared	Analyzed	Batch	Notes
2708-040611-110 (P4F0537-04) Water					Sampled: 06/11/04 Received: 06/14/04				
Acetone	ND	50.0	ug/l	2	EPA 8260B	06/24/04	06/24/04	4061040	
Benzene	**113**	2.00	"	"	"	"	"	"	
Bromobenzene	ND	2.00	"	"	"	"	"	"	
Bromochloromethane	ND	2.00	"	"	"	"	"	"	
Bromodichloromethane	ND	2.00	"	"	"	"	"	"	
Bromoform	ND	2.00	"	"	"	"	"	"	
Bromomethane	ND	10.0	"	"	"	"	"	"	
2-Butanone	ND	20.0	"	"	"	"	"	"	
n-Butylbenzene	ND	10.0	"	"	"	"	"	"	
sec-Butylbenzene	ND	2.00	"	"	"	"	"	"	
tert-Butylbenzene	ND	2.00	"	"	"	"	"	"	
Carbon disulfide	ND	20.0	"	"	"	"	"	"	
Carbon tetrachloride	ND	2.00	"	"	"	"	"	"	
Chlorobenzene	ND	2.00	"	"	"	"	"	"	
Chloroethane	ND	2.00	"	"	"	"	"	"	
Chloroform	ND	2.00	"	"	"	"	"	"	
Chloromethane	ND	10.0	"	"	"	"	"	"	
2-Chlorotoluene	ND	2.00	"	"	"	"	"	"	
4-Chlorotoluene	ND	2.00	"	"	"	"	"	"	
1,2-Dibromo-3-chloropropane	ND	10.0	"	"	"	"	"	"	
Dibromochloromethane	ND	2.00	"	"	"	"	"	"	
1,2-Dibromoethane	ND	2.00	"	"	"	"	"	"	
Dibromomethane	ND	2.00	"	"	"	"	"	"	
1,2-Dichlorobenzene	ND	2.00	"	"	"	"	"	"	
1,3-Dichlorobenzene	ND	2.00	"	"	"	"	"	"	
1,4-Dichlorobenzene	ND	2.00	"	"	"	"	"	"	
Dichlorodifluoromethane	ND	10.0	"	"	"	"	"	"	
1,1-Dichloroethane	ND	2.00	"	"	"	"	"	"	
1,2-Dichloroethane	ND	2.00	"	"	"	"	"	"	
1,1-Dichloroethene	ND	2.00	"	"	"	"	"	"	
cis-1,2-Dichloroethene	ND	2.00	"	"	"	"	"	"	
trans-1,2-Dichloroethene	ND	2.00	"	"	"	"	"	"	
1,2-Dichloropropane	ND	2.00	"	"	"	"	"	"	
1,3-Dichloropropane	ND	2.00	"	"	"	"	"	"	
2,2-Dichloropropane	ND	2.00	"	"	"	"	"	"	
1,1-Dichloropropene	ND	2.00	"	"	"	"	"	"	
cis-1,3-Dichloropropene	ND	2.00	"	"	"	"	"	"	

North Creek Analytical - Portland

Philip Nerenberg

Philip Nerenberg, Laboratory Manager

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Hahn and Associates, Inc.	Project: Gasco Upland	
434 NW Sixth Ave., Suite 203	Project Number: 2708-10	**Reported:**
Portland, OR 97209	Project Manager: Rob Ede	06/29/04 14:00

Volatile Organic Compounds per EPA Method 8260B

North Creek Analytical - Portland

Analyte	Result	Reporting Limit	Units	Dilution	Method	Prepared	Analyzed	Batch	Notes
2708-040611-110 (P4F0537-04) Water					Sampled: 06/11/04 Received: 06/14/04				
trans-1,3-Dichloropropene	ND	2.00	ug/l	2	EPA 8260B	06/24/04	06/24/04	4061040	
Ethylbenzene	**9.78**	2.00	"	"	"	"	"	"	
Hexachlorobutadiene	ND	4.00	"	"	"	"	"	"	
2-Hexanone	ND	20.0	"	"	"	"	"	"	
Isopropylbenzene	ND	4.00	"	"	"	"	"	"	
p-Isopropyltoluene	ND	4.00	"	"	"	"	"	"	
4-Methyl-2-pentanone	ND	10.0	"	"	"	"	"	"	
Methyl tert-butyl ether	ND	2.00	"	"	"	"	"	"	
Methylene chloride	ND	10.0	"	"	"	"	"	"	
Naphthalene	**272**	4.00	"	"	"	"	"	"	
n-Propylbenzene	ND	2.00	"	"	"	"	"	"	
Styrene	ND	2.00	"	"	"	"	"	"	
1,1,1,2-Tetrachloroethane	ND	2.00	"	"	"	"	"	"	
1,1,2,2-Tetrachloroethane	ND	2.00	"	"	"	"	"	"	
Tetrachloroethene	ND	2.00	"	"	"	"	"	"	
Toluene	**6.16**	2.00	"	"	"	"	"	"	
1,2,3-Trichlorobenzene	ND	2.00	"	"	"	"	"	"	
1,2,4-Trichlorobenzene	ND	2.00	"	"	"	"	"	"	
1,1,1-Trichloroethane	ND	2.00	"	"	"	"	"	"	
1,1,2-Trichloroethane	ND	2.00	"	"	"	"	"	"	
Trichloroethene	ND	2.00	"	"	"	"	"	"	
Trichlorofluoromethane	ND	2.00	"	"	"	"	"	"	
1,2,3-Trichloropropane	ND	2.00	"	"	"	"	"	"	
1,2,4-Trimethylbenzene	**2.58**	2.00	"	"	"	"	"	"	
1,3,5-Trimethylbenzene	ND	2.00	"	"	"	"	"	"	
Vinyl chloride	ND	2.00	"	"	"	"	"	"	
o-Xylene	**5.24**	2.00	"	"	"	"	"	"	
m,p-Xylene	**6.04**	4.00	"	"	"	"	"	"	
Surr: 4-BFB	*91.5 %*	*75-120*							
Surr: 1,2-DCA-d4	*95.0 %*	*77-129*							
Surr: Dibromofluoromethane	*102 %*	*80-121*							
Surr: Toluene-d8	*95.5 %*	*80-120*							

North Creek Analytical - Portland

Philip Nerenberg

Philip Nerenberg, Laboratory Manager

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Hahn and Associates, Inc.	Project: Gasco Upland	
434 NW Sixth Ave., Suite 203	Project Number: 2708-10	**Reported:**
Portland, OR 97209	Project Manager: Rob Ede	06/29/04 14:00

Volatile Organic Compounds per EPA Method 8260B

North Creek Analytical - Portland

Analyte	Result	Reporting Limit	Units	Dilution	Method	Prepared	Analyzed	Batch	Notes
2708-040611-111 (P4F0537-05) Water					Sampled: 06/11/04 Received: 06/14/04				
Acetone	ND	25.0	ug/l	1	EPA 8260B	06/24/04	06/24/04	4061040	
Benzene	ND	1.00	"	"	"	"	"	"	
Bromobenzene	ND	1.00	"	"	"	"	"	"	
Bromochloromethane	ND	1.00	"	"	"	"	"	"	
Bromodichloromethane	ND	1.00	"	"	"	"	"	"	
Bromoform	ND	1.00	"	"	"	"	"	"	
Bromomethane	ND	5.00	"	"	"	"	"	"	
2-Butanone	ND	10.0	"	"	"	"	"	"	
n-Butylbenzene	ND	5.00	"	"	"	"	"	"	
sec-Butylbenzene	ND	1.00	"	"	"	"	"	"	
tert-Butylbenzene	ND	1.00	"	"	"	"	"	"	
Carbon disulfide	ND	10.0	"	"	"	"	"	"	
Carbon tetrachloride	ND	1.00	"	"	"	"	"	"	
Chlorobenzene	ND	1.00	"	"	"	"	"	"	
Chloroethane	ND	1.00	"	"	"	"	"	"	
Chloroform	ND	1.00	"	"	"	"	"	"	
Chloromethane	ND	5.00	"	"	"	"	"	"	
2-Chlorotoluene	ND	1.00	"	"	"	"	"	"	
4-Chlorotoluene	ND	1.00	"	"	"	"	"	"	
1,2-Dibromo-3-chloropropane	ND	5.00	"	"	"	"	"	"	
Dibromochloromethane	ND	1.00	"	"	"	"	"	"	
1,2-Dibromoethane	ND	1.00	"	"	"	"	"	"	
Dibromomethane	ND	1.00	"	"	"	"	"	"	
1,2-Dichlorobenzene	ND	1.00	"	"	"	"	"	"	
1,3-Dichlorobenzene	ND	1.00	"	"	"	"	"	"	
1,4-Dichlorobenzene	ND	1.00	"	"	"	"	"	"	
Dichlorodifluoromethane	ND	5.00	"	"	"	"	"	"	
1,1-Dichloroethane	ND	1.00	"	"	"	"	"	"	
1,2-Dichloroethane	ND	1.00	"	"	"	"	"	"	
1,1-Dichloroethene	ND	1.00	"	"	"	"	"	"	
cis-1,2-Dichloroethene	ND	1.00	"	"	"	"	"	"	
trans-1,2-Dichloroethene	ND	1.00	"	"	"	"	"	"	
1,2-Dichloropropane	ND	1.00	"	"	"	"	"	"	
1,3-Dichloropropane	ND	1.00	"	"	"	"	"	"	
2,2-Dichloropropane	ND	1.00	"	"	"	"	"	"	
1,1-Dichloropropene	ND	1.00	"	"	"	"	"	"	
cis-1,3-Dichloropropene	ND	1.00	"	"	"	"	"	"	

North Creek Analytical - Portland

Philip Nerenberg

Philip Nerenberg, Laboratory Manager

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Hahn and Associates, Inc.	Project: Gasco Upland	
434 NW Sixth Ave., Suite 203	Project Number: 2708-10	**Reported:**
Portland, OR 97209	Project Manager: Rob Ede	06/29/04 14:00

Volatile Organic Compounds per EPA Method 8260B

North Creek Analytical - Portland

Analyte	Result	Reporting Limit	Units	Dilution	Method	Prepared	Analyzed	Batch	Notes
2708-040611-111 (P4F0537-05) Water					Sampled: 06/11/04 Received: 06/14/04				
trans-1,3-Dichloropropene	ND	1.00	ug/l	1	EPA 8260B	06/24/04	06/24/04	4061040	
Ethylbenzene	ND	1.00	"	"	"	"	"	"	
Hexachlorobutadiene	ND	2.00	"	"	"	"	"	"	
2-Hexanone	ND	10.0	"	"	"	"	"	"	
Isopropylbenzene	ND	2.00	"	"	"	"	"	"	
p-Isopropyltoluene	ND	2.00	"	"	"	"	"	"	
4-Methyl-2-pentanone	ND	5.00	"	"	"	"	"	"	
Methyl tert-butyl ether	ND	1.00	"	"	"	"	"	"	
Methylene chloride	ND	5.00	"	"	"	"	"	"	
Naphthalene	ND	2.00	"	"	"	"	"	"	
n-Propylbenzene	ND	1.00	"	"	"	"	"	"	
Styrene	ND	1.00	"	"	"	"	"	"	
1,1,1,2-Tetrachloroethane	ND	1.00	"	"	"	"	"	"	
1,1,2,2-Tetrachloroethane	ND	1.00	"	"	"	"	"	"	
Tetrachloroethene	ND	1.00	"	"	"	"	"	"	
Toluene	**1.13**	1.00	"	"	"	"	"	"	
1,2,3-Trichlorobenzene	ND	1.00	"	"	"	"	"	"	
1,2,4-Trichlorobenzene	ND	1.00	"	"	"	"	"	"	
1,1,1-Trichloroethane	ND	1.00	"	"	"	"	"	"	
1,1,2-Trichloroethane	ND	1.00	"	"	"	"	"	"	
Trichloroethene	ND	1.00	"	"	"	"	"	"	
Trichlorofluoromethane	ND	1.00	"	"	"	"	"	"	
1,2,3-Trichloropropane	ND	1.00	"	"	"	"	"	"	
1,2,4-Trimethylbenzene	ND	1.00	"	"	"	"	"	"	
1,3,5-Trimethylbenzene	ND	1.00	"	"	"	"	"	"	
Vinyl chloride	ND	1.00	"	"	"	"	"	"	
o-Xylene	ND	1.00	"	"	"	"	"	"	
m,p-Xylene	ND	2.00	"	"	"	"	"	"	
Surr: 4-BFB	*89.5 %*	*75-120*							
Surr: 1,2-DCA-d4	*97.5 %*	*77-129*							
Surr: Dibromofluoromethane	*102 %*	*80-121*							
Surr: Toluene-d8	*96.0 %*	*80-120*							

North Creek Analytical - Portland

Philip Nerenberg

Philip Nerenberg, Laboratory Manager

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Hahn and Associates, Inc.	Project: Gasco Upland	
434 NW Sixth Ave., Suite 203	Project Number: 2708-10	**Reported:**
Portland, OR 97209	Project Manager: Rob Ede	06/29/04 14:00

Volatile Organic Compounds per EPA Method 8260B

North Creek Analytical - Portland

Analyte	Result	Reporting Limit	Units	Dilution	Method	Prepared	Analyzed	Batch	Notes
2708-040611-112 (P4F0537-06) Water					Sampled: 06/11/04 Received: 06/14/04				
Acetone	ND	25.0	ug/l	1	EPA 8260B	06/24/04	06/24/04	4061040	
Benzene	**166**	1.00	"	"	"	"	"	"	
Bromobenzene	ND	1.00	"	"	"	"	"	"	
Bromochloromethane	ND	1.00	"	"	"	"	"	"	
Bromodichloromethane	ND	1.00	"	"	"	"	"	"	
Bromoform	ND	1.00	"	"	"	"	"	"	
Bromomethane	ND	5.00	"	"	"	"	"	"	
2-Butanone	ND	10.0	"	"	"	"	"	"	
n-Butylbenzene	ND	5.00	"	"	"	"	"	"	
sec-Butylbenzene	ND	1.00	"	"	"	"	"	"	
tert-Butylbenzene	ND	1.00	"	"	"	"	"	"	
Carbon disulfide	ND	10.0	"	"	"	"	"	"	
Carbon tetrachloride	ND	1.00	"	"	"	"	"	"	
Chlorobenzene	ND	1.00	"	"	"	"	"	"	
Chloroethane	ND	1.00	"	"	"	"	"	"	
Chloroform	ND	1.00	"	"	"	"	"	"	
Chloromethane	ND	5.00	"	"	"	"	"	"	
2-Chlorotoluene	ND	1.00	"	"	"	"	"	"	
4-Chlorotoluene	ND	1.00	"	"	"	"	"	"	
1,2-Dibromo-3-chloropropane	ND	5.00	"	"	"	"	"	"	
Dibromochloromethane	ND	1.00	"	"	"	"	"	"	
1,2-Dibromoethane	ND	1.00	"	"	"	"	"	"	
Dibromomethane	ND	1.00	"	"	"	"	"	"	
1,2-Dichlorobenzene	ND	1.00	"	"	"	"	"	"	
1,3-Dichlorobenzene	ND	1.00	"	"	"	"	"	"	
1,4-Dichlorobenzene	ND	1.00	"	"	"	"	"	"	
Dichlorodifluoromethane	ND	5.00	"	"	"	"	"	"	
1,1-Dichloroethane	ND	1.00	"	"	"	"	"	"	
1,2-Dichloroethane	ND	1.00	"	"	"	"	"	"	
1,1-Dichloroethene	ND	1.00	"	"	"	"	"	"	
cis-1,2-Dichloroethene	ND	1.00	"	"	"	"	"	"	
trans-1,2-Dichloroethene	ND	1.00	"	"	"	"	"	"	
1,2-Dichloropropane	ND	1.00	"	"	"	"	"	"	
1,3-Dichloropropane	ND	1.00	"	"	"	"	"	"	
2,2-Dichloropropane	ND	1.00	"	"	"	"	"	"	
1,1-Dichloropropene	ND	1.00	"	"	"	"	"	"	
cis-1,3-Dichloropropene	ND	1.00	"	"	"	"	"	"	

North Creek Analytical - Portland

Philip Nerenberg

Philip Nerenberg, Laboratory Manager

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Hahn and Associates, Inc.	Project: Gasco Upland	
434 NW Sixth Ave., Suite 203	Project Number: 2708-10	**Reported:**
Portland, OR 97209	Project Manager: Rob Ede	06/29/04 14:00

Volatile Organic Compounds per EPA Method 8260B

North Creek Analytical - Portland

Analyte	Result	Reporting Limit	Units	Dilution	Method	Prepared	Analyzed	Batch	Notes
2708-040611-112 (P4F0537-06) Water					Sampled: 06/11/04 Received: 06/14/04				
trans-1,3-Dichloropropene	ND	1.00	ug/l	1	EPA 8260B	06/24/04	06/24/04	4061040	
Ethylbenzene	**3.02**	1.00	"	"	"	"	"	"	
Hexachlorobutadiene	ND	2.00	"	"	"	"	"	"	
2-Hexanone	ND	10.0	"	"	"	"	"	"	
Isopropylbenzene	ND	2.00	"	"	"	"	"	"	
p-Isopropyltoluene	ND	2.00	"	"	"	"	"	"	
4-Methyl-2-pentanone	ND	5.00	"	"	"	"	"	"	
Methyl tert-butyl ether	ND	1.00	"	"	"	"	"	"	
Methylene chloride	ND	5.00	"	"	"	"	"	"	
Naphthalene	**116**	2.00	"	"	"	"	"	"	
n-Propylbenzene	ND	1.00	"	"	"	"	"	"	
Styrene	ND	1.00	"	"	"	"	"	"	
1,1,1,2-Tetrachloroethane	ND	1.00	"	"	"	"	"	"	
1,1,2,2-Tetrachloroethane	ND	1.00	"	"	"	"	"	"	
Tetrachloroethene	ND	1.00	"	"	"	"	"	"	
Toluene	**2.16**	1.00	"	"	"	"	"	"	
1,2,3-Trichlorobenzene	ND	1.00	"	"	"	"	"	"	
1,2,4-Trichlorobenzene	ND	1.00	"	"	"	"	"	"	
1,1,1-Trichloroethane	ND	1.00	"	"	"	"	"	"	
1,1,2-Trichloroethane	ND	1.00	"	"	"	"	"	"	
Trichloroethene	ND	1.00	"	"	"	"	"	"	
Trichlorofluoromethane	ND	1.00	"	"	"	"	"	"	
1,2,3-Trichloropropane	ND	1.00	"	"	"	"	"	"	
1,2,4-Trimethylbenzene	**1.51**	1.00	"	"	"	"	"	"	
1,3,5-Trimethylbenzene	ND	1.00	"	"	"	"	"	"	
Vinyl chloride	ND	1.00	"	"	"	"	"	"	
o-Xylene	**1.63**	1.00	"	"	"	"	"	"	
m,p-Xylene	**5.42**	2.00	"	"	"	"	"	"	
Surr: 4-BFB	*95.0 %*	*75-120*							
Surr: 1,2-DCA-d4	*97.5 %*	*77-129*							
Surr: Dibromofluoromethane	*104 %*	*80-121*							
Surr: Toluene-d8	*97.5 %*	*80-120*							

North Creek Analytical - Portland

Philip Nerenberg

Philip Nerenberg, Laboratory Manager

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541.383.9310 fax 541.382.7588

Hahn and Associates, Inc.	Project: Gasco Upland	
434 NW Sixth Ave., Suite 203	Project Number: 2708-10	**Reported:**
Portland, OR 97209	Project Manager: Rob Ede	06/29/04 14:00

Volatile Organic Compounds per EPA Method 8260B

North Creek Analytical - Portland

Analyte	Result	Reporting Limit	Units	Dilution	Method	Prepared	Analyzed	Batch	Notes
2708-040611-113 (P4F0537-07) Water					Sampled: 06/11/04 Received: 06/14/04				
Acetone	ND	25.0	ug/l	1	EPA 8260B	06/24/04	06/24/04	4061040	
Benzene	**19.3**	1.00	"	"	"	"	"	"	
Bromobenzene	ND	1.00	"	"	"	"	"	"	
Bromochloromethane	ND	1.00	"	"	"	"	"	"	
Bromodichloromethane	ND	1.00	"	"	"	"	"	"	
Bromoform	ND	1.00	"	"	"	"	"	"	
Bromomethane	ND	5.00	"	"	"	"	"	"	
2-Butanone	ND	10.0	"	"	"	"	"	"	
n-Butylbenzene	ND	5.00	"	"	"	"	"	"	
sec-Butylbenzene	ND	1.00	"	"	"	"	"	"	
tert-Butylbenzene	ND	1.00	"	"	"	"	"	"	
Carbon disulfide	ND	10.0	"	"	"	"	"	"	
Carbon tetrachloride	ND	1.00	"	"	"	"	"	"	
Chlorobenzene	ND	1.00	"	"	"	"	"	"	
Chloroethane	ND	1.00	"	"	"	"	"	"	
Chloroform	ND	1.00	"	"	"	"	"	"	
Chloromethane	ND	5.00	"	"	"	"	"	"	
2-Chlorotoluene	ND	1.00	"	"	"	"	"	"	
4-Chlorotoluene	ND	1.00	"	"	"	"	"	"	
1,2-Dibromo-3-chloropropane	ND	5.00	"	"	"	"	"	"	
Dibromochloromethane	ND	1.00	"	"	"	"	"	"	
1,2-Dibromoethane	ND	1.00	"	"	"	"	"	"	
Dibromomethane	ND	1.00	"	"	"	"	"	"	
1,2-Dichlorobenzene	ND	1.00	"	"	"	"	"	"	
1,3-Dichlorobenzene	ND	1.00	"	"	"	"	"	"	
1,4-Dichlorobenzene	ND	1.00	"	"	"	"	"	"	
Dichlorodifluoromethane	ND	5.00	"	"	"	"	"	"	
1,1-Dichloroethane	ND	1.00	"	"	"	"	"	"	
1,2-Dichloroethane	ND	1.00	"	"	"	"	"	"	
1,1-Dichloroethene	ND	1.00	"	"	"	"	"	"	
cis-1,2-Dichloroethene	ND	1.00	"	"	"	"	"	"	
trans-1,2-Dichloroethene	ND	1.00	"	"	"	"	"	"	
1,2-Dichloropropane	ND	1.00	"	"	"	"	"	"	
1,3-Dichloropropane	ND	1.00	"	"	"	"	"	"	
2,2-Dichloropropane	ND	1.00	"	"	"	"	"	"	
1,1-Dichloropropene	ND	1.00	"	"	"	"	"	"	
cis-1,3-Dichloropropene	ND	1.00	"	"	"	"	"	"	

North Creek Analytical - Portland

Philip Nerenberg

Philip Nerenberg, Laboratory Manager

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541.383.9310 fax 541.382.7588

Hahn and Associates, Inc.	Project: Gasco Upland	
434 NW Sixth Ave., Suite 203	Project Number: 2708-10	**Reported:**
Portland, OR 97209	Project Manager: Rob Ede	06/29/04 14:00

Volatile Organic Compounds per EPA Method 8260B

North Creek Analytical - Portland

Analyte	Result	Reporting Limit	Units	Dilution	Method	Prepared	Analyzed	Batch	Notes
2708-040611-113 (P4F0537-07) Water					Sampled: 06/11/04 Received: 06/14/04				
trans-1,3-Dichloropropene	ND	1.00	ug/l	1	EPA 8260B	06/24/04	06/24/04	4061040	
Ethylbenzene	**2.58**	1.00	"	"	"	"	"	"	
Hexachlorobutadiene	ND	2.00	"	"	"	"	"	"	
2-Hexanone	ND	10.0	"	"	"	"	"	"	
Isopropylbenzene	ND	2.00	"	"	"	"	"	"	
p-Isopropyltoluene	ND	2.00	"	"	"	"	"	"	
4-Methyl-2-pentanone	ND	5.00	"	"	"	"	"	"	
Methyl tert-butyl ether	ND	1.00	"	"	"	"	"	"	
Methylene chloride	ND	5.00	"	"	"	"	"	"	
Naphthalene	**119**	2.00	"	"	"	"	"	"	
n-Propylbenzene	ND	1.00	"	"	"	"	"	"	
Styrene	ND	1.00	"	"	"	"	"	"	
1,1,1,2-Tetrachloroethane	ND	1.00	"	"	"	"	"	"	
1,1,2,2-Tetrachloroethane	ND	1.00	"	"	"	"	"	"	
Tetrachloroethene	ND	1.00	"	"	"	"	"	"	
Toluene	**1.43**	1.00	"	"	"	"	"	"	
1,2,3-Trichlorobenzene	ND	1.00	"	"	"	"	"	"	
1,2,4-Trichlorobenzene	ND	1.00	"	"	"	"	"	"	
1,1,1-Trichloroethane	ND	1.00	"	"	"	"	"	"	
1,1,2-Trichloroethane	ND	1.00	"	"	"	"	"	"	
Trichloroethene	ND	1.00	"	"	"	"	"	"	
Trichlorofluoromethane	ND	1.00	"	"	"	"	"	"	
1,2,3-Trichloropropane	ND	1.00	"	"	"	"	"	"	
1,2,4-Trimethylbenzene	**1.17**	1.00	"	"	"	"	"	"	
1,3,5-Trimethylbenzene	ND	1.00	"	"	"	"	"	"	
Vinyl chloride	ND	1.00	"	"	"	"	"	"	
o-Xylene	**1.31**	1.00	"	"	"	"	"	"	
m,p-Xylene	**2.27**	2.00	"	"	"	"	"	"	
Surr: 4-BFB	*94.5 %*	*75-120*							
Surr: 1,2-DCA-d4	*96.5 %*	*77-129*							
Surr: Dibromofluoromethane	*107 %*	*80-121*							
Surr: Toluene-d8	*99.0 %*	*80-120*							

North Creek Analytical - Portland

Philip Nerenberg

Philip Nerenberg, Laboratory Manager

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Hahn and Associates, Inc.	Project: Gasco Upland	
434 NW Sixth Ave., Suite 203	Project Number: 2708-10	**Reported:**
Portland, OR 97209	Project Manager: Rob Ede	06/29/04 14:00

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 4061040 - EPA 5030B										
Blank (4061040-BLK1)				Prepared & Analyzed: 06/24/04						
Acetone	ND	25.0	ug/l							
Benzene	ND	1.00	"							
Bromobenzene	ND	1.00	"							
Bromochloromethane	ND	1.00	"							
Bromodichloromethane	ND	1.00	"							
Bromoform	ND	1.00	"							
Bromomethane	ND	5.00	"							
2-Butanone	ND	10.0	"							
n-Butylbenzene	ND	5.00	"							
sec-Butylbenzene	ND	1.00	"							
tert-Butylbenzene	ND	1.00	"							
Carbon disulfide	ND	10.0	"							
Carbon tetrachloride	ND	1.00	"							
Chlorobenzene	ND	1.00	"							
Chloroethane	ND	1.00	"							
Chloroform	ND	1.00	"							
Chloromethane	ND	5.00	"							
2-Chlorotoluene	ND	1.00	"							
4-Chlorotoluene	ND	1.00	"							
1,2-Dibromo-3-chloropropane	ND	5.00	"							
Dibromochloromethane	ND	1.00	"							
1,2-Dibromoethane	ND	1.00	"							
Dibromomethane	ND	1.00	"							
1,2-Dichlorobenzene	ND	1.00	"							
1,3-Dichlorobenzene	ND	1.00	"							
1,4-Dichlorobenzene	ND	1.00	"							
Dichlorodifluoromethane	ND	5.00	"							
1,1-Dichloroethane	ND	1.00	"							
1,2-Dichloroethane	ND	1.00	"							
1,1-Dichloroethene	ND	1.00	"							
cis-1,2-Dichloroethene	ND	1.00	"							
trans-1,2-Dichloroethene	ND	1.00	"							
1,2-Dichloropropane	ND	1.00	"							
1,3-Dichloropropane	ND	1.00	"							
2,2-Dichloropropane	ND	1.00	"							
1,1-Dichloropropene	ND	1.00	"							

North Creek Analytical - Portland

Philip Nerenberg

Philip Nerenberg, Laboratory Manager

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Hahn and Associates, Inc.	Project: Gasco Upland	
434 NW Sixth Ave., Suite 203	Project Number: 2708-10	**Reported:**
Portland, OR 97209	Project Manager: Rob Ede	06/29/04 14:00

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 4061040 - EPA 5030B										
Blank (4061040-BLK1)				Prepared & Analyzed: 06/24/04						
cis-1,3-Dichloropropene	ND	1.00	ug/l							
trans-1,3-Dichloropropene	ND	1.00	"							
Ethylbenzene	ND	1.00	"							
Hexachlorobutadiene	ND	2.00	"							
2-Hexanone	ND	10.0	"							
Isopropylbenzene	ND	2.00	"							
p-Isopropyltoluene	ND	2.00	"							
4-Methyl-2-pentanone	ND	5.00	"							
Methyl tert-butyl ether	ND	1.00	"							
Methylene chloride	ND	5.00	"							
Naphthalene	ND	2.00	"							
n-Propylbenzene	ND	1.00	"							
Styrene	ND	1.00	"							
1,1,1,2-Tetrachloroethane	ND	1.00	"							
1,1,2,2-Tetrachloroethane	ND	1.00	"							
Tetrachloroethene	ND	1.00	"							
Toluene	ND	1.00	"							
1,2,3-Trichlorobenzene	ND	1.00	"							
1,2,4-Trichlorobenzene	ND	1.00	"							
1,1,1-Trichloroethane	ND	1.00	"							
1,1,2-Trichloroethane	ND	1.00	"							
Trichloroethene	ND	1.00	"							
Trichlorofluoromethane	ND	1.00	"							
1,2,3-Trichloropropane	ND	1.00	"							
1,2,4-Trimethylbenzene	ND	1.00	"							
1,3,5-Trimethylbenzene	ND	1.00	"							
Vinyl chloride	ND	1.00	"							
o-Xylene	ND	1.00	"							
m,p-Xylene	ND	2.00	"							
Surr: 4-BFB	*18.7*		"	*20.0*		*93.5*	*75-120*			
Surr: 1,2-DCA-d4	*19.2*		"	*20.0*		*96.0*	*77-129*			
Surr: Dibromofluoromethane	*20.4*		"	*20.0*		*102*	*80-121*			
Surr: Toluene-d8	*19.8*		"	*20.0*		*99.0*	*80-120*			

North Creek Analytical - Portland

Philip Nerenberg

Philip Nerenberg, Laboratory Manager

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Hahn and Associates, Inc.	Project: Gasco Upland	
434 NW Sixth Ave., Suite 203	Project Number: 2708-10	**Reported:**
Portland, OR 97209	Project Manager: Rob Ede	06/29/04 14:00

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 4061040 - EPA 5030B										
LCS (4061040-BS1)				Prepared & Analyzed: 06/24/04						
Benzene	22.7	1.00	ug/l	20.0		114	80-120			
Chlorobenzene	24.1	1.00	"	20.0		120	80-124			
1,1-Dichloroethene	21.6	1.00	"	20.0		108	78-120			
Toluene	23.8	1.00	"	20.0		119	80-124			
Trichloroethene	20.3	1.00	"	20.0		102	80-132			
Surr: 4-BFB	*19.3*		"	*20.0*		*96.5*	*75-120*			
Surr: 1,2-DCA-d4	*19.5*		"	*20.0*		*97.5*	*77-129*			
Surr: Dibromofluoromethane	*22.1*		"	*20.0*		*110*	*80-121*			
Surr: Toluene-d8	*20.6*		"	*20.0*		*103*	*80-120*			
Matrix Spike (4061040-MS1)	**Source: P4F0878-01**			Prepared & Analyzed: 06/24/04						
Benzene	21.8	1.00	ug/l	20.0	ND	109	80-124			
Chlorobenzene	21.8	1.00	"	20.0	ND	109	72.9-134			
1,1-Dichloroethene	21.1	1.00	"	20.0	ND	106	79.3-127			
Toluene	21.6	1.00	"	20.0	ND	108	79.7-131			
Trichloroethene	18.0	1.00	"	20.0	ND	90.0	68.4-130			
Surr: 4-BFB	*19.1*		"	*20.0*		*95.5*	*75-120*			
Surr: 1,2-DCA-d4	*19.7*		"	*20.0*		*98.5*	*77-129*			
Surr: Dibromofluoromethane	*22.5*		"	*20.0*		*112*	*80-121*			
Surr: Toluene-d8	*20.2*		"	*20.0*		*101*	*80-120*			
Matrix Spike Dup (4061040-MSD1)	**Source: P4F0878-01**			Prepared & Analyzed: 06/24/04						
Benzene	21.8	1.00	ug/l	20.0	ND	109	80-124	0.00	25	
Chlorobenzene	21.8	1.00	"	20.0	ND	109	72.9-134	0.00	25	
1,1-Dichloroethene	21.0	1.00	"	20.0	ND	105	79.3-127	0.475	25	
Toluene	21.7	1.00	"	20.0	ND	108	79.7-131	0.462	25	
Trichloroethene	18.1	1.00	"	20.0	ND	90.5	68.4-130	0.554	25	
Surr: 4-BFB	*19.0*		"	*20.0*		*95.0*	*75-120*			
Surr: 1,2-DCA-d4	*19.3*		"	*20.0*		*96.5*	*77-129*			
Surr: Dibromofluoromethane	*22.1*		"	*20.0*		*110*	*80-121*			
Surr: Toluene-d8	*20.3*		"	*20.0*		*102*	*80-120*			

North Creek Analytical - Portland

Philip Nerenberg

Philip Nerenberg, Laboratory Manager

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Hahn and Associates, Inc.	Project: Gasco Upland	
434 NW Sixth Ave., Suite 203	Project Number: 2708-10	**Reported:**
Portland, OR 97209	Project Manager: Rob Ede	06/29/04 14:00

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 4061093 - EPA 5030B										
Blank (4061093-BLK1)				Prepared & Analyzed: 06/25/04						
Acetone	ND	25.0	ug/l							
Benzene	ND	1.00	"							
Bromobenzene	ND	1.00	"							
Bromochloromethane	ND	1.00	"							
Bromodichloromethane	ND	1.00	"							
Bromoform	ND	1.00	"							
Bromomethane	ND	5.00	"							
2-Butanone	ND	10.0	"							
n-Butylbenzene	ND	5.00	"							
sec-Butylbenzene	ND	1.00	"							
tert-Butylbenzene	ND	1.00	"							
Carbon disulfide	ND	10.0	"							
Carbon tetrachloride	ND	1.00	"							
Chlorobenzene	ND	1.00	"							
Chloroethane	ND	1.00	"							
Chloroform	ND	1.00	"							
Chloromethane	ND	5.00	"							
2-Chlorotoluene	ND	1.00	"							
4-Chlorotoluene	ND	1.00	"							
1,2-Dibromo-3-chloropropane	ND	5.00	"							
Dibromochloromethane	ND	1.00	"							
1,2-Dibromoethane	ND	1.00	"							
Dibromomethane	ND	1.00	"							
1,2-Dichlorobenzene	ND	1.00	"							
1,3-Dichlorobenzene	ND	1.00	"							
1,4-Dichlorobenzene	ND	1.00	"							
Dichlorodifluoromethane	ND	5.00	"							
1,1-Dichloroethane	ND	1.00	"							
1,2-Dichloroethane	ND	1.00	"							
1,1-Dichloroethene	ND	1.00	"							
cis-1,2-Dichloroethene	ND	1.00	"							
trans-1,2-Dichloroethene	ND	1.00	"							
1,2-Dichloropropane	ND	1.00	"							
1,3-Dichloropropane	ND	1.00	"							
2,2-Dichloropropane	ND	1.00	"							
1,1-Dichloropropene	ND	1.00	"							

North Creek Analytical - Portland

Philip Nerenberg

Philip Nerenberg, Laboratory Manager

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541.383.9310 fax 541.382.7588

Hahn and Associates, Inc.	Project: Gasco Upland	
434 NW Sixth Ave., Suite 203	Project Number: 2708-10	**Reported:**
Portland, OR 97209	Project Manager: Rob Ede	06/29/04 14:00

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 4061093 - EPA 5030B										
Blank (4061093-BLK1)				Prepared & Analyzed: 06/25/04						
cis-1,3-Dichloropropene	ND	1.00	ug/l							
trans-1,3-Dichloropropene	ND	1.00	"							
Ethylbenzene	ND	1.00	"							
Hexachlorobutadiene	ND	2.00	"							
2-Hexanone	ND	10.0	"							
Isopropylbenzene	ND	2.00	"							
p-Isopropyltoluene	ND	2.00	"							
4-Methyl-2-pentanone	ND	5.00	"							
Methyl tert-butyl ether	ND	1.00	"							
Methylene chloride	ND	5.00	"							
Naphthalene	ND	2.00	"							
n-Propylbenzene	ND	1.00	"							
Styrene	ND	1.00	"							
1,1,1,2-Tetrachloroethane	ND	1.00	"							
1,1,2,2-Tetrachloroethane	ND	1.00	"							
Tetrachloroethene	ND	1.00	"							
Toluene	ND	1.00	"							
1,2,3-Trichlorobenzene	ND	1.00	"							
1,2,4-Trichlorobenzene	ND	1.00	"							
1,1,1-Trichloroethane	ND	1.00	"							
1,1,2-Trichloroethane	ND	1.00	"							
Trichloroethene	ND	1.00	"							
Trichlorofluoromethane	ND	1.00	"							
1,2,3-Trichloropropane	ND	1.00	"							
1,2,4-Trimethylbenzene	ND	1.00	"							
1,3,5-Trimethylbenzene	ND	1.00	"							
Vinyl chloride	ND	1.00	"							
o-Xylene	ND	1.00	"							
m,p-Xylene	ND	2.00	"							
Surr: 4-BFB	*17.7*		"	*20.0*		*88.5*	*75-120*			
Surr: 1,2-DCA-d4	*18.1*		"	*20.0*		*90.5*	*77-129*			
Surr: Dibromofluoromethane	*19.9*		"	*20.0*		*99.5*	*80-121*			
Surr: Toluene-d8	*19.6*		"	*20.0*		*98.0*	*80-120*			

North Creek Analytical - Portland

Philip Nerenberg

Philip Nerenberg, Laboratory Manager

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Hahn and Associates, Inc.	Project: Gasco Upland	
434 NW Sixth Ave., Suite 203	Project Number: 2708-10	**Reported:**
Portland, OR 97209	Project Manager: Rob Ede	06/29/04 14:00

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 4061093 - EPA 5030B										
LCS (4061093-BS1)				Prepared & Analyzed: 06/25/04						
Benzene	22.0	1.00	ug/l	20.0		110	80-120			
Chlorobenzene	22.2	1.00	"	20.0		111	80-124			
1,1-Dichloroethene	20.6	1.00	"	20.0		103	78-120			
Toluene	22.4	1.00	"	20.0		112	80-124			
Trichloroethene	19.1	1.00	"	20.0		95.5	80-132			
Surr: 4-BFB	*19.2*		"	*20.0*		*96.0*	*75-120*			
Surr: 1,2-DCA-d4	*19.0*		"	*20.0*		*95.0*	*77-129*			
Surr: Dibromofluoromethane	*21.0*		"	*20.0*		*105*	*80-121*			
Surr: Toluene-d8	*20.2*		"	*20.0*		*101*	*80-120*			
Matrix Spike (4061093-MS1)	**Source: P4F0763-01**			Prepared & Analyzed: 06/25/04						
Benzene	26.9	1.00	ug/l	20.0	4.76	111	80-124			
Chlorobenzene	22.4	1.00	"	20.0	ND	112	72.9-134			
1,1-Dichloroethene	21.4	1.00	"	20.0	ND	107	79.3-127			
Toluene	22.0	1.00	"	20.0	0.210	109	79.7-131			
Trichloroethene	18.8	1.00	"	20.0	ND	94.0	68.4-130			
Surr: 4-BFB	*20.0*		"	*20.0*		*100*	*75-120*			
Surr: 1,2-DCA-d4	*19.8*		"	*20.0*		*99.0*	*77-129*			
Surr: Dibromofluoromethane	*21.3*		"	*20.0*		*106*	*80-121*			
Surr: Toluene-d8	*19.9*		"	*20.0*		*99.5*	*80-120*			
Matrix Spike Dup (4061093-MSD1)	**Source: P4F0763-01**			Prepared & Analyzed: 06/25/04						
Benzene	26.5	1.00	ug/l	20.0	4.76	109	80-124	1.50	25	
Chlorobenzene	21.7	1.00	"	20.0	ND	108	72.9-134	3.17	25	
1,1-Dichloroethene	20.3	1.00	"	20.0	ND	102	79.3-127	5.28	25	
Toluene	21.7	1.00	"	20.0	0.210	107	79.7-131	1.37	25	
Trichloroethene	17.8	1.00	"	20.0	ND	89.0	68.4-130	5.46	25	
Surr: 4-BFB	*19.8*		"	*20.0*		*99.0*	*75-120*			
Surr: 1,2-DCA-d4	*19.0*		"	*20.0*		*95.0*	*77-129*			
Surr: Dibromofluoromethane	*21.8*		"	*20.0*		*109*	*80-121*			
Surr: Toluene-d8	*20.2*		"	*20.0*		*101*	*80-120*			

North Creek Analytical - Portland

Philip Nerenberg

Philip Nerenberg, Laboratory Manager

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Hahn and Associates, Inc.	Project: Gasco Upland	
434 NW Sixth Ave., Suite 203	Project Number: 2708-10	**Reported:**
Portland, OR 97209	Project Manager: Rob Ede	06/29/04 14:00

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. MRLs are adjusted if %Solids are less than 50%.
wet	Sample results reported on a wet weight basis (as received)
RPD	Relative Percent Difference

North Creek Analytical - Portland

Philip Nerenberg

Philip Nerenberg, Laboratory Manager

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HAHN AND ASSOCIATES, INC.
Environmental Consultants
434 NW Sixth Avenue, Suite 203 • Portland OR 97209
(503) 796-0717 • Fax (503) 227-2209

Laboratory: NORTHWEST ANALYTICAL PORTLAND OR
Lab Project No.:

CHAIN OF CUSTODY

Chain of Custody No. 04F0616

Project Manager: Rob LDL
Project No.: 2708-10
Project Name: GASCO
Collected by: APR

Liquid with Sediment Sample
___ Test Filtrate ___ Test Sediment ___ Test Both
Multi-Phase Sample
___ Test One (which) ___ Test Separately ___ Shake

Samples Received at 4C (Y or N):
Appropriate Containers Used (Y or N):
Provide Verbal Results (Y or N): No
Provide Preliminary Fax Results: Yes

Comments

Sample Number Prefix: 2708-040614-

* Metals = As, Cr, Cu, Ni, Pb, Zn
Pricing/Reporting Levels as per Nuremberg to Ele 12/12/03

Lab ID	Sample #	Date	Time	Sample Description	Matrix: Soil	Matrix: Water	Matrix: Other	Number of Containers	PAHs (EPA 8270 SIM)	SVOCs (EPA 8270)	VOCs (EPA 8260)	TOTAL CN (EPA 9010)	Amenable CN (EPA 9010)	Total metals* (EPA 6020)	Diss. metals* - Filtered (EPA 6020)			RUSH	Remarks
	-096	6/14/04	800AM	TB		X		1			X								
	-114	↓	925AM	B59A (171-175)		X		4			X								
	-115	↓	145PM	B56B (136-140)		X		10	X	X	X	X	X	X	X				
	-116	↓	400PM	B56B (174-178)		X		10	X	X	X	X	X	X	X				

Relinquished by	Company	Date	Time	Received by	Company
[signature]	NCA	6-15-04	14:24	[signature]	NCA
[signature]	NCA	6/15/04	17:20	Vanessa Evans	NCA

2.5

SCOEPA00013826

NORTH CREEK ANALYTICAL COOLER RECEIPT FORM

(Army Corp. compliant)

Client: Hahn & Associates

1. **Please sign for receipt and opening of** 1 **cooler or** ____ **other** ____

   By (print) Vanessa Evans (sign) Vanessa Evans

2. Date samples received 6/15/04 Date opened: Same X or ___/___/___

3. Delivered by: X Bob NCA courier ___ FedEx ___ UPS ___ Courier ___ Client ___ Other ____

   Airbill # if applicable ____ (Put copy of shipping papers in file)

4. There were 1 custody seals present, signed by Bob date 6/15/04

5. Were the custody seals unbroken and intact at the date and time of arrival? X Yes ___ No

6. Was ice used? X yes ___ no Type of ice: ___ blue ice X gel ice ___ real ice

   Temperature (degrees C) 2.5 Raytek thermometer ____ Digi-Therm (probe temperature blank)

7. Are custody papers sealed in a plastic bag and taped inside to lid? ___ Yes X No

8. Were custody papers filled out properly (ink, signed, etc.)? X Yes ___ No

   If "no" please specify: ____

9. Was project identifiable from custody papers? X Yes ___ No

   Name of project Gasco (if applicable)

10. **Initial and date for unpacking:** ED **(initials)** **date** 6/16/04

11. Packing material: ___ bubble wrap/bag X styrofoam X cardboard ____ other

12. Were samples in bags? ___ Yes X No

13. Did all containers indicated on the COC arrive? X Yes ___ No

    If "no" please indicate which containers were absent ____

14. Were all containers unbroken and labels in good condition? X Yes ___ No

    If "no" please indicate which containers ____

15. Were all bottle labels complete (ID, date, time, signature, etc.)? X Yes ___ No

    Do the IDs, times, etc. agree with the COC? X Yes ___ No

    If "no" please indicate which containers ____

16. Are containers properly preserved for indicated analysis? X Yes ___ No

17. Is there adequate volume for the test(s) requested? X Yes ___ No

18. If voa vials were submitted, are they free of bubbles? ___ N/A X Yes ___ No

19. **Log-in phase: Date samples were logged in:** 6/16/04 **Elm Project # P** 4F0616

20. Logged in by (print) Vanessa Evans (sign) Vanessa Evans

21. Was the project manager notified of status? (Use back of form as a record) ___ Yes X No

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541.383.9310 fax 541.382.7588

2 July, 2004

Rob Ede
Hahn and Associates, Inc.
434 NW Sixth Ave., Suite 203
Portland, OR 97209

RE: Gasco Upland

Enclosed are the results of analyses for samples received by the laboratory on 06/15/04 17:20. If you have any questions concerning this report, please feel free to contact me.

Sincerely,

Philip Nerenberg
Laboratory Manager

Work Orders included in this report:
P4F0616

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Hahn and Associates, Inc.	Project: Gasco Upland	
434 NW Sixth Ave., Suite 203	Project Number: 2708-10	**Reported:**
Portland, OR 97209	Project Manager: Rob Ede	07/02/04 13:22

ANALYTICAL REPORT FOR SAMPLES

Sample ID	Laboratory ID	Matrix	Date Sampled	Date Received
2708-040614-096	P4F0616-01	Water	06/14/04 08:00	06/15/04 17:20
2708-040614-114	P4F0616-02	Water	06/14/04 09:25	06/15/04 17:20
2708-040614-115	P4F0616-03	Water	06/14/04 13:45	06/15/04 17:20
2708-040614-116	P4F0616-04	Water	06/14/04 16:00	06/15/04 17:20

North Creek Analytical - Portland

Philip Nerenberg

Philip Nerenberg, Laboratory Manager

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Hahn and Associates, Inc.	Project: Gasco Upland	
434 NW Sixth Ave., Suite 203	Project Number: 2708-10	**Reported:**
Portland, OR 97209	Project Manager: Rob Ede	07/02/04 13:22

Total Metals per EPA 6000/7000 Series Methods

North Creek Analytical - Portland

Analyte	Result	Reporting Limit	Units	Dilution	Method	Prepared	Analyzed	Batch	Notes
2708-040614-115 (P4F0616-03) Water					Sampled: 06/14/04 Received: 06/15/04				
Arsenic	**0.0290**	0.00200	mg/l	1	EPA 6020	06/17/04	06/19/04	4060762	
Chromium	**0.827**	0.00200	"	"	"	"	06/18/04	"	
Copper	**0.457**	0.00400	"	"	"	"	"	"	
Lead	**0.0306**	0.00200	"	"	"	"	"	"	
Nickel	**0.291**	0.00400	"	"	"	"	"	"	
Zinc	**6.51**	0.0566	"	5.66	"	"	06/18/04	"	
2708-040614-116 (P4F0616-04) Water					Sampled: 06/14/04 Received: 06/15/04				
Arsenic	**0.00369**	0.00100	mg/l	1	EPA 6020	06/17/04	06/19/04	4060762	
Chromium	**0.0351**	0.00100	"	"	"	"	06/18/04	"	
Copper	**0.0218**	0.00200	"	"	"	"	"	"	
Lead	**0.00204**	0.00100	"	"	"	"	"	"	
Nickel	**0.0246**	0.00200	"	"	"	"	"	"	
Zinc	**0.177**	0.00500	"	"	"	"	"	"	

North Creek Analytical - Portland

Philip Nerenberg

Philip Nerenberg, Laboratory Manager

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Hahn and Associates, Inc.	Project: Gasco Upland	
434 NW Sixth Ave., Suite 203	Project Number: 2708-10	**Reported:**
Portland, OR 97209	Project Manager: Rob Ede	07/02/04 13:22

Dissolved Metals per EPA 6000/7000 Series Methods

North Creek Analytical - Portland

Analyte	Result	Reporting Limit	Units	Dilution	Method	Prepared	Analyzed	Batch	Notes
2708-040614-115 (P4F0616-03) Water					Sampled: 06/14/04 Received: 06/15/04				
Arsenic	**0.00582**	0.00100	mg/l	1	EPA 6020	06/18/04	06/22/04	4060840	
Chromium	ND	0.00100	"	"	"	"	"	"	
Copper	ND	0.00200	"	"	"	"	"	"	
Lead	ND	0.00100	"	"	"	"	"	"	
Nickel	**0.0162**	0.00200	"	"	"	"	"	"	
Zinc	**0.191**	0.00500	"	"	"	"	"	"	
2708-040614-116 (P4F0616-04) Water					Sampled: 06/14/04 Received: 06/15/04				
Arsenic	ND	0.00100	mg/l	1	EPA 6020	06/18/04	06/22/04	4060840	
Chromium	ND	0.00100	"	"	"	"	"	"	
Copper	ND	0.00200	"	"	"	"	"	"	
Lead	ND	0.00100	"	"	"	"	"	"	
Nickel	**0.00445**	0.00200	"	"	"	"	"	"	
Zinc	**0.0383**	0.00500	"	"	"	"	"	"	

North Creek Analytical - Portland

Philip Nerenberg

Philip Nerenberg, Laboratory Manager

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541.383.9310 fax 541.382.7588

Hahn and Associates, Inc.	Project: Gasco Upland	
434 NW Sixth Ave., Suite 203	Project Number: 2708-10	**Reported:**
Portland, OR 97209	Project Manager: Rob Ede	07/02/04 13:22

Volatile Organic Compounds per EPA Method 8260B

North Creek Analytical - Portland

Analyte	Result	Reporting Limit	Units	Dilution	Method	Prepared	Analyzed	Batch	Notes
2708-040614-096 (P4F0616-01) Water					Sampled: 06/14/04 Received: 06/15/04				
Acetone	ND	25.0	ug/l	1	EPA 8260B	06/24/04	06/24/04	4061039	
Benzene	ND	1.00	"	"	"	"	"	"	
Bromobenzene	ND	1.00	"	"	"	"	"	"	
Bromochloromethane	ND	1.00	"	"	"	"	"	"	
Bromodichloromethane	ND	1.00	"	"	"	"	"	"	
Bromoform	ND	1.00	"	"	"	"	"	"	
Bromomethane	ND	5.00	"	"	"	"	"	"	
2-Butanone	ND	10.0	"	"	"	"	"	"	
n-Butylbenzene	ND	5.00	"	"	"	"	"	"	
sec-Butylbenzene	ND	1.00	"	"	"	"	"	"	
tert-Butylbenzene	ND	1.00	"	"	"	"	"	"	
Carbon disulfide	ND	10.0	"	"	"	"	"	"	
Carbon tetrachloride	ND	1.00	"	"	"	"	"	"	
Chlorobenzene	ND	1.00	"	"	"	"	"	"	
Chloroethane	ND	1.00	"	"	"	"	"	"	
Chloroform	ND	1.00	"	"	"	"	"	"	
Chloromethane	ND	5.00	"	"	"	"	"	"	
2-Chlorotoluene	ND	1.00	"	"	"	"	"	"	
4-Chlorotoluene	ND	1.00	"	"	"	"	"	"	
1,2-Dibromo-3-chloropropane	ND	5.00	"	"	"	"	"	"	
Dibromochloromethane	ND	1.00	"	"	"	"	"	"	
1,2-Dibromoethane	ND	1.00	"	"	"	"	"	"	
Dibromomethane	ND	1.00	"	"	"	"	"	"	
1,2-Dichlorobenzene	ND	1.00	"	"	"	"	"	"	
1,3-Dichlorobenzene	ND	1.00	"	"	"	"	"	"	
1,4-Dichlorobenzene	ND	1.00	"	"	"	"	"	"	
Dichlorodifluoromethane	ND	5.00	"	"	"	"	"	"	
1,1-Dichloroethane	ND	1.00	"	"	"	"	"	"	
1,2-Dichloroethane	ND	1.00	"	"	"	"	"	"	
1,1-Dichloroethene	ND	1.00	"	"	"	"	"	"	
cis-1,2-Dichloroethene	ND	1.00	"	"	"	"	"	"	
trans-1,2-Dichloroethene	ND	1.00	"	"	"	"	"	"	
1,2-Dichloropropane	ND	1.00	"	"	"	"	"	"	
1,3-Dichloropropane	ND	1.00	"	"	"	"	"	"	
2,2-Dichloropropane	ND	1.00	"	"	"	"	"	"	
1,1-Dichloropropene	ND	1.00	"	"	"	"	"	"	
cis-1,3-Dichloropropene	ND	1.00	"	"	"	"	"	"	

North Creek Analytical - Portland

Philip Nerenberg

Philip Nerenberg, Laboratory Manager

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541.383.9310 fax 541.382.7588

Hahn and Associates, Inc.	Project: Gasco Upland	
434 NW Sixth Ave., Suite 203	Project Number: 2708-10	**Reported:**
Portland, OR 97209	Project Manager: Rob Ede	07/02/04 13:22

Volatile Organic Compounds per EPA Method 8260B

North Creek Analytical - Portland

Analyte	Result	Reporting Limit	Units	Dilution	Method	Prepared	Analyzed	Batch	Notes
2708-040614-096 (P4F0616-01) Water					Sampled: 06/14/04 Received: 06/15/04				
trans-1,3-Dichloropropene	ND	1.00	ug/l	1	EPA 8260B	06/24/04	06/24/04	4061039	
Ethylbenzene	ND	1.00	"	"	"	"	"	"	
Hexachlorobutadiene	ND	2.00	"	"	"	"	"	"	
2-Hexanone	ND	10.0	"	"	"	"	"	"	
Isopropylbenzene	ND	2.00	"	"	"	"	"	"	
p-Isopropyltoluene	ND	2.00	"	"	"	"	"	"	
4-Methyl-2-pentanone	ND	5.00	"	"	"	"	"	"	
Methyl tert-butyl ether	ND	1.00	"	"	"	"	"	"	
Methylene chloride	ND	5.00	"	"	"	"	"	"	
Naphthalene	ND	2.00	"	"	"	"	"	"	
n-Propylbenzene	ND	1.00	"	"	"	"	"	"	
Styrene	ND	1.00	"	"	"	"	"	"	
1,1,1,2-Tetrachloroethane	ND	1.00	"	"	"	"	"	"	
1,1,2,2-Tetrachloroethane	ND	1.00	"	"	"	"	"	"	
Tetrachloroethene	ND	1.00	"	"	"	"	"	"	
Toluene	ND	1.00	"	"	"	"	"	"	
1,2,3-Trichlorobenzene	ND	1.00	"	"	"	"	"	"	
1,2,4-Trichlorobenzene	ND	1.00	"	"	"	"	"	"	
1,1,1-Trichloroethane	ND	1.00	"	"	"	"	"	"	
1,1,2-Trichloroethane	ND	1.00	"	"	"	"	"	"	
Trichloroethene	ND	1.00	"	"	"	"	"	"	
Trichlorofluoromethane	ND	1.00	"	"	"	"	"	"	
1,2,3-Trichloropropane	ND	1.00	"	"	"	"	"	"	
1,2,4-Trimethylbenzene	ND	1.00	"	"	"	"	"	"	
1,3,5-Trimethylbenzene	ND	1.00	"	"	"	"	"	"	
Vinyl chloride	ND	1.00	"	"	"	"	"	"	
o-Xylene	ND	1.00	"	"	"	"	"	"	
m,p-Xylene	ND	2.00	"	"	"	"	"	"	
Surr: 4-BFB	*77.5 %*	*75-120*							
Surr: 1,2-DCA-d4	*97.5 %*	*77-129*							
Surr: Dibromofluoromethane	*97.5 %*	*80-121*							
Surr: Toluene-d8	*94.0 %*	*80-120*							

North Creek Analytical - Portland

Philip Nerenberg

Philip Nerenberg, Laboratory Manager

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541.383.9310 fax 541.382.7588

Hahn and Associates, Inc.	Project: Gasco Upland	
434 NW Sixth Ave., Suite 203	Project Number: 2708-10	**Reported:**
Portland, OR 97209	Project Manager: Rob Ede	07/02/04 13:22

Volatile Organic Compounds per EPA Method 8260B

North Creek Analytical - Portland

Analyte	Result	Reporting Limit	Units	Dilution	Method	Prepared	Analyzed	Batch	Notes
2708-040614-114 (P4F0616-02) Water					Sampled: 06/14/04 Received: 06/15/04				
Acetone	ND	25.0	ug/l	1	EPA 8260B	06/24/04	06/24/04	4061039	
Benzene	**2.29**	1.00	"	"	"	"	"	"	
Bromobenzene	ND	1.00	"	"	"	"	"	"	
Bromochloromethane	ND	1.00	"	"	"	"	"	"	
Bromodichloromethane	ND	1.00	"	"	"	"	"	"	
Bromoform	ND	1.00	"	"	"	"	"	"	
Bromomethane	ND	5.00	"	"	"	"	"	"	
2-Butanone	ND	10.0	"	"	"	"	"	"	
n-Butylbenzene	ND	5.00	"	"	"	"	"	"	
sec-Butylbenzene	ND	1.00	"	"	"	"	"	"	
tert-Butylbenzene	ND	1.00	"	"	"	"	"	"	
Carbon disulfide	ND	10.0	"	"	"	"	"	"	
Carbon tetrachloride	ND	1.00	"	"	"	"	"	"	
Chlorobenzene	ND	1.00	"	"	"	"	"	"	
Chloroethane	ND	1.00	"	"	"	"	"	"	
Chloroform	ND	1.00	"	"	"	"	"	"	
Chloromethane	ND	5.00	"	"	"	"	"	"	
2-Chlorotoluene	ND	1.00	"	"	"	"	"	"	
4-Chlorotoluene	ND	1.00	"	"	"	"	"	"	
1,2-Dibromo-3-chloropropane	ND	5.00	"	"	"	"	"	"	
Dibromochloromethane	ND	1.00	"	"	"	"	"	"	
1,2-Dibromoethane	ND	1.00	"	"	"	"	"	"	
Dibromomethane	ND	1.00	"	"	"	"	"	"	
1,2-Dichlorobenzene	ND	1.00	"	"	"	"	"	"	
1,3-Dichlorobenzene	ND	1.00	"	"	"	"	"	"	
1,4-Dichlorobenzene	ND	1.00	"	"	"	"	"	"	
Dichlorodifluoromethane	ND	5.00	"	"	"	"	"	"	
1,1-Dichloroethane	ND	1.00	"	"	"	"	"	"	
1,2-Dichloroethane	ND	1.00	"	"	"	"	"	"	
1,1-Dichloroethene	ND	1.00	"	"	"	"	"	"	
cis-1,2-Dichloroethene	ND	1.00	"	"	"	"	"	"	
trans-1,2-Dichloroethene	ND	1.00	"	"	"	"	"	"	
1,2-Dichloropropane	ND	1.00	"	"	"	"	"	"	
1,3-Dichloropropane	ND	1.00	"	"	"	"	"	"	
2,2-Dichloropropane	ND	1.00	"	"	"	"	"	"	
1,1-Dichloropropene	ND	1.00	"	"	"	"	"	"	
cis-1,3-Dichloropropene	ND	1.00	"	"	"	"	"	"	

North Creek Analytical - Portland

Philip Nerenberg

Philip Nerenberg, Laboratory Manager

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541.383.9310 fax 541.382.7588

Hahn and Associates, Inc.	Project: Gasco Upland	
434 NW Sixth Ave., Suite 203	Project Number: 2708-10	**Reported:**
Portland, OR 97209	Project Manager: Rob Ede	07/02/04 13:22

Volatile Organic Compounds per EPA Method 8260B

North Creek Analytical - Portland

Analyte	Result	Reporting Limit	Units	Dilution	Method	Prepared	Analyzed	Batch	Notes
2708-040614-114 (P4F0616-02) Water					Sampled: 06/14/04 Received: 06/15/04				
trans-1,3-Dichloropropene	ND	1.00	ug/l	1	EPA 8260B	06/24/04	06/24/04	4061039	
Ethylbenzene	ND	1.00	"	"	"	"	"	"	
Hexachlorobutadiene	ND	2.00	"	"	"	"	"	"	
2-Hexanone	ND	10.0	"	"	"	"	"	"	
Isopropylbenzene	ND	2.00	"	"	"	"	"	"	
p-Isopropyltoluene	ND	2.00	"	"	"	"	"	"	
4-Methyl-2-pentanone	ND	5.00	"	"	"	"	"	"	
Methyl tert-butyl ether	ND	1.00	"	"	"	"	"	"	
Methylene chloride	ND	5.00	"	"	"	"	"	"	
Naphthalene	**3.46**	2.00	"	"	"	"	"	"	
n-Propylbenzene	ND	1.00	"	"	"	"	"	"	
Styrene	ND	1.00	"	"	"	"	"	"	
1,1,1,2-Tetrachloroethane	ND	1.00	"	"	"	"	"	"	
1,1,2,2-Tetrachloroethane	ND	1.00	"	"	"	"	"	"	
Tetrachloroethene	ND	1.00	"	"	"	"	"	"	
Toluene	ND	1.00	"	"	"	"	"	"	
1,2,3-Trichlorobenzene	ND	1.00	"	"	"	"	"	"	
1,2,4-Trichlorobenzene	ND	1.00	"	"	"	"	"	"	
1,1,1-Trichloroethane	ND	1.00	"	"	"	"	"	"	
1,1,2-Trichloroethane	ND	1.00	"	"	"	"	"	"	
Trichloroethene	ND	1.00	"	"	"	"	"	"	
Trichlorofluoromethane	ND	1.00	"	"	"	"	"	"	
1,2,3-Trichloropropane	ND	1.00	"	"	"	"	"	"	
1,2,4-Trimethylbenzene	ND	1.00	"	"	"	"	"	"	
1,3,5-Trimethylbenzene	ND	1.00	"	"	"	"	"	"	
Vinyl chloride	ND	1.00	"	"	"	"	"	"	
o-Xylene	ND	1.00	"	"	"	"	"	"	
m,p-Xylene	ND	2.00	"	"	"	"	"	"	
Surr: 4-BFB	*82.0 %*	*75-120*							
Surr: 1,2-DCA-d4	*102 %*	*77-129*							
Surr: Dibromofluoromethane	*101 %*	*80-121*							
Surr: Toluene-d8	*89.5 %*	*80-120*							

North Creek Analytical - Portland

Philip Nerenberg

Philip Nerenberg, Laboratory Manager

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541.383.9310 fax 541.382.7588

Hahn and Associates, Inc.	Project: Gasco Upland	
434 NW Sixth Ave., Suite 203	Project Number: 2708-10	**Reported:**
Portland, OR 97209	Project Manager: Rob Ede	07/02/04 13:22

Volatile Organic Compounds per EPA Method 8260B

North Creek Analytical - Portland

Analyte	Result	Reporting Limit	Units	Dilution	Method	Prepared	Analyzed	Batch	Notes
2708-040614-115 (P4F0616-03) Water					Sampled: 06/14/04 Received: 06/15/04				
Acetone	ND	25.0	ug/l	1	EPA 8260B	06/24/04	06/24/04	4061039	
Benzene	ND	1.00	"	"	"	"	"	"	
Bromobenzene	ND	1.00	"	"	"	"	"	"	
Bromochloromethane	ND	1.00	"	"	"	"	"	"	
Bromodichloromethane	ND	1.00	"	"	"	"	"	"	
Bromoform	ND	1.00	"	"	"	"	"	"	
Bromomethane	ND	5.00	"	"	"	"	"	"	
2-Butanone	ND	10.0	"	"	"	"	"	"	
n-Butylbenzene	ND	5.00	"	"	"	"	"	"	
sec-Butylbenzene	ND	1.00	"	"	"	"	"	"	
tert-Butylbenzene	ND	1.00	"	"	"	"	"	"	
Carbon disulfide	ND	10.0	"	"	"	"	"	"	
Carbon tetrachloride	ND	1.00	"	"	"	"	"	"	
Chlorobenzene	ND	1.00	"	"	"	"	"	"	
Chloroethane	ND	1.00	"	"	"	"	"	"	
Chloroform	ND	1.00	"	"	"	"	"	"	
Chloromethane	ND	5.00	"	"	"	"	"	"	
2-Chlorotoluene	ND	1.00	"	"	"	"	"	"	
4-Chlorotoluene	ND	1.00	"	"	"	"	"	"	
1,2-Dibromo-3-chloropropane	ND	5.00	"	"	"	"	"	"	
Dibromochloromethane	ND	1.00	"	"	"	"	"	"	
1,2-Dibromoethane	ND	1.00	"	"	"	"	"	"	
Dibromomethane	ND	1.00	"	"	"	"	"	"	
1,2-Dichlorobenzene	ND	1.00	"	"	"	"	"	"	
1,3-Dichlorobenzene	ND	1.00	"	"	"	"	"	"	
1,4-Dichlorobenzene	ND	1.00	"	"	"	"	"	"	
Dichlorodifluoromethane	ND	5.00	"	"	"	"	"	"	
1,1-Dichloroethane	ND	1.00	"	"	"	"	"	"	
1,2-Dichloroethane	ND	1.00	"	"	"	"	"	"	
1,1-Dichloroethene	ND	1.00	"	"	"	"	"	"	
cis-1,2-Dichloroethene	ND	1.00	"	"	"	"	"	"	
trans-1,2-Dichloroethene	ND	1.00	"	"	"	"	"	"	
1,2-Dichloropropane	ND	1.00	"	"	"	"	"	"	
1,3-Dichloropropane	ND	1.00	"	"	"	"	"	"	
2,2-Dichloropropane	ND	1.00	"	"	"	"	"	"	
1,1-Dichloropropene	ND	1.00	"	"	"	"	"	"	
cis-1,3-Dichloropropene	ND	1.00	"	"	"	"	"	"	

North Creek Analytical - Portland

Philip Nerenberg

Philip Nerenberg, Laboratory Manager

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Hahn and Associates, Inc.	Project: Gasco Upland	
434 NW Sixth Ave., Suite 203	Project Number: 2708-10	**Reported:**
Portland, OR 97209	Project Manager: Rob Ede	07/02/04 13:22

Volatile Organic Compounds per EPA Method 8260B

North Creek Analytical - Portland

Analyte	Result	Reporting Limit	Units	Dilution	Method	Prepared	Analyzed	Batch	Notes
2708-040614-115 (P4F0616-03) Water					Sampled: 06/14/04 Received: 06/15/04				
trans-1,3-Dichloropropene	ND	1.00	ug/l	1	EPA 8260B	06/24/04	06/24/04	4061039	
Ethylbenzene	ND	1.00	"	"	"	"	"	"	
Hexachlorobutadiene	ND	2.00	"	"	"	"	"	"	
2-Hexanone	ND	10.0	"	"	"	"	"	"	
Isopropylbenzene	ND	2.00	"	"	"	"	"	"	
p-Isopropyltoluene	ND	2.00	"	"	"	"	"	"	
4-Methyl-2-pentanone	ND	5.00	"	"	"	"	"	"	
Methyl tert-butyl ether	ND	1.00	"	"	"	"	"	"	
Methylene chloride	ND	5.00	"	"	"	"	"	"	
Naphthalene	**3.26**	2.00	"	"	"	"	"	"	
n-Propylbenzene	ND	1.00	"	"	"	"	"	"	
Styrene	ND	1.00	"	"	"	"	"	"	
1,1,1,2-Tetrachloroethane	ND	1.00	"	"	"	"	"	"	
1,1,2,2-Tetrachloroethane	ND	1.00	"	"	"	"	"	"	
Tetrachloroethene	ND	1.00	"	"	"	"	"	"	
Toluene	ND	1.00	"	"	"	"	"	"	
1,2,3-Trichlorobenzene	ND	1.00	"	"	"	"	"	"	
1,2,4-Trichlorobenzene	ND	1.00	"	"	"	"	"	"	
1,1,1-Trichloroethane	ND	1.00	"	"	"	"	"	"	
1,1,2-Trichloroethane	ND	1.00	"	"	"	"	"	"	
Trichloroethene	ND	1.00	"	"	"	"	"	"	
Trichlorofluoromethane	ND	1.00	"	"	"	"	"	"	
1,2,3-Trichloropropane	ND	1.00	"	"	"	"	"	"	
1,2,4-Trimethylbenzene	ND	1.00	"	"	"	"	"	"	
1,3,5-Trimethylbenzene	ND	1.00	"	"	"	"	"	"	
Vinyl chloride	ND	1.00	"	"	"	"	"	"	
o-Xylene	ND	1.00	"	"	"	"	"	"	
m,p-Xylene	ND	2.00	"	"	"	"	"	"	
Surr: 4-BFB	*77.0 %*	*75-120*							
Surr: 1,2-DCA-d4	*101 %*	*77-129*							
Surr: Dibromofluoromethane	*99.5 %*	*80-121*							
Surr: Toluene-d8	*95.5 %*	*80-120*							

North Creek Analytical - Portland

Philip Nerenberg

Philip Nerenberg, Laboratory Manager

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Hahn and Associates, Inc.	Project: Gasco Upland	
434 NW Sixth Ave., Suite 203	Project Number: 2708-10	**Reported:**
Portland, OR 97209	Project Manager: Rob Ede	07/02/04 13:22

Volatile Organic Compounds per EPA Method 8260B

North Creek Analytical - Portland

Analyte	Result	Reporting Limit	Units	Dilution	Method	Prepared	Analyzed	Batch	Notes
2708-040614-116 (P4F0616-04) Water					Sampled: 06/14/04 Received: 06/15/04				
Acetone	ND	25.0	ug/l	1	EPA 8260B	06/24/04	06/24/04	4061039	
Benzene	ND	1.00	"	"	"	"	"	"	
Bromobenzene	ND	1.00	"	"	"	"	"	"	
Bromochloromethane	ND	1.00	"	"	"	"	"	"	
Bromodichloromethane	ND	1.00	"	"	"	"	"	"	
Bromoform	ND	1.00	"	"	"	"	"	"	
Bromomethane	ND	5.00	"	"	"	"	"	"	
2-Butanone	ND	10.0	"	"	"	"	"	"	
n-Butylbenzene	ND	5.00	"	"	"	"	"	"	
sec-Butylbenzene	ND	1.00	"	"	"	"	"	"	
tert-Butylbenzene	ND	1.00	"	"	"	"	"	"	
Carbon disulfide	ND	10.0	"	"	"	"	"	"	
Carbon tetrachloride	ND	1.00	"	"	"	"	"	"	
Chlorobenzene	ND	1.00	"	"	"	"	"	"	
Chloroethane	ND	1.00	"	"	"	"	"	"	
Chloroform	ND	1.00	"	"	"	"	"	"	
Chloromethane	ND	5.00	"	"	"	"	"	"	
2-Chlorotoluene	ND	1.00	"	"	"	"	"	"	
4-Chlorotoluene	ND	1.00	"	"	"	"	"	"	
1,2-Dibromo-3-chloropropane	ND	5.00	"	"	"	"	"	"	
Dibromochloromethane	ND	1.00	"	"	"	"	"	"	
1,2-Dibromoethane	ND	1.00	"	"	"	"	"	"	
Dibromomethane	ND	1.00	"	"	"	"	"	"	
1,2-Dichlorobenzene	ND	1.00	"	"	"	"	"	"	
1,3-Dichlorobenzene	ND	1.00	"	"	"	"	"	"	
1,4-Dichlorobenzene	ND	1.00	"	"	"	"	"	"	
Dichlorodifluoromethane	ND	5.00	"	"	"	"	"	"	
1,1-Dichloroethane	ND	1.00	"	"	"	"	"	"	
1,2-Dichloroethane	ND	1.00	"	"	"	"	"	"	
1,1-Dichloroethene	ND	1.00	"	"	"	"	"	"	
cis-1,2-Dichloroethene	ND	1.00	"	"	"	"	"	"	
trans-1,2-Dichloroethene	ND	1.00	"	"	"	"	"	"	
1,2-Dichloropropane	ND	1.00	"	"	"	"	"	"	
1,3-Dichloropropane	ND	1.00	"	"	"	"	"	"	
2,2-Dichloropropane	ND	1.00	"	"	"	"	"	"	
1,1-Dichloropropene	ND	1.00	"	"	"	"	"	"	
cis-1,3-Dichloropropene	ND	1.00	"	"	"	"	"	"	

North Creek Analytical - Portland

Philip Nerenberg

Philip Nerenberg, Laboratory Manager

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541.383.9310 fax 541.382.7588

Hahn and Associates, Inc.	Project: Gasco Upland	
434 NW Sixth Ave., Suite 203	Project Number: 2708-10	**Reported:**
Portland, OR 97209	Project Manager: Rob Ede	07/02/04 13:22

Volatile Organic Compounds per EPA Method 8260B

North Creek Analytical - Portland

Analyte	Result	Reporting Limit	Units	Dilution	Method	Prepared	Analyzed	Batch	Notes
2708-040614-116 (P4F0616-04) Water					Sampled: 06/14/04 Received: 06/15/04				
trans-1,3-Dichloropropene	ND	1.00	ug/l	1	EPA 8260B	06/24/04	06/24/04	4061039	
Ethylbenzene	ND	1.00	"	"	"	"	"	"	
Hexachlorobutadiene	ND	2.00	"	"	"	"	"	"	
2-Hexanone	ND	10.0	"	"	"	"	"	"	
Isopropylbenzene	ND	2.00	"	"	"	"	"	"	
p-Isopropyltoluene	ND	2.00	"	"	"	"	"	"	
4-Methyl-2-pentanone	ND	5.00	"	"	"	"	"	"	
Methyl tert-butyl ether	ND	1.00	"	"	"	"	"	"	
Methylene chloride	ND	5.00	"	"	"	"	"	"	
Naphthalene	**4.20**	2.00	"	"	"	"	"	"	
n-Propylbenzene	ND	1.00	"	"	"	"	"	"	
Styrene	ND	1.00	"	"	"	"	"	"	
1,1,1,2-Tetrachloroethane	ND	1.00	"	"	"	"	"	"	
1,1,2,2-Tetrachloroethane	ND	1.00	"	"	"	"	"	"	
Tetrachloroethene	ND	1.00	"	"	"	"	"	"	
Toluene	ND	1.00	"	"	"	"	"	"	
1,2,3-Trichlorobenzene	ND	1.00	"	"	"	"	"	"	
1,2,4-Trichlorobenzene	ND	1.00	"	"	"	"	"	"	
1,1,1-Trichloroethane	ND	1.00	"	"	"	"	"	"	
1,1,2-Trichloroethane	ND	1.00	"	"	"	"	"	"	
Trichloroethene	ND	1.00	"	"	"	"	"	"	
Trichlorofluoromethane	ND	1.00	"	"	"	"	"	"	
1,2,3-Trichloropropane	ND	1.00	"	"	"	"	"	"	
1,2,4-Trimethylbenzene	ND	1.00	"	"	"	"	"	"	
1,3,5-Trimethylbenzene	ND	1.00	"	"	"	"	"	"	
Vinyl chloride	ND	1.00	"	"	"	"	"	"	
o-Xylene	ND	1.00	"	"	"	"	"	"	
m,p-Xylene	ND	2.00	"	"	"	"	"	"	
Surr: 4-BFB	*85.5 %*	*75-120*							
Surr: 1,2-DCA-d4	*106 %*	*77-129*							
Surr: Dibromofluoromethane	*102 %*	*80-121*							
Surr: Toluene-d8	*98.5 %*	*80-120*							

North Creek Analytical - Portland

Philip Nerenberg

Philip Nerenberg, Laboratory Manager

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Hahn and Associates, Inc.	Project: Gasco Upland	
434 NW Sixth Ave., Suite 203	Project Number: 2708-10	**Reported:**
Portland, OR 97209	Project Manager: Rob Ede	07/02/04 13:22

Semivolatile Organic Compounds per EPA Method 8270C

North Creek Analytical - Portland

Analyte	Result	Reporting Limit	Units	Dilution	Method	Prepared	Analyzed	Batch	Notes
2708-040614-115 (P4F0616-03) Water					Sampled: 06/14/04 Received: 06/15/04				
Carbazole	ND	5.00	ug/l	1	EPA 8270C	06/18/04	06/22/04	4060792	
Acenaphthene	ND	5.00	"	"	"	"	"	"	
Acenaphthylene	ND	5.00	"	"	"	"	"	"	
Anthracene	ND	5.00	"	"	"	"	"	"	
Benzo (a) anthracene	ND	5.00	"	"	"	"	"	"	
Benzo (a) pyrene	ND	5.00	"	"	"	"	"	"	
Benzo (b) fluoranthene	ND	5.00	"	"	"	"	"	"	
Benzo (ghi) perylene	ND	5.00	"	"	"	"	"	"	
Benzo (k) fluoranthene	ND	5.00	"	"	"	"	"	"	
Benzoic Acid	ND	50.0	"	"	"	"	"	"	
Benzyl alcohol	ND	10.0	"	"	"	"	"	"	
4-Bromophenyl phenyl ether	ND	5.00	"	"	"	"	"	"	
Butyl benzyl phthalate	ND	5.00	"	"	"	"	"	"	
4-Chloro-3-methylphenol	ND	5.00	"	"	"	"	"	"	
4-Chloroaniline	ND	20.0	"	"	"	"	"	"	
Bis(2-chloroethoxy)methane	ND	10.0	"	"	"	"	"	"	
Bis(2-chloroethyl)ether	ND	5.00	"	"	"	"	"	"	
Bis(2-chloroisopropyl)ether	ND	10.0	"	"	"	"	"	"	
2-Chloronaphthalene	ND	5.00	"	"	"	"	"	"	
2-Chlorophenol	ND	5.00	"	"	"	"	"	"	
4-Chlorophenyl phenyl ether	ND	5.00	"	"	"	"	"	"	
Chrysene	ND	5.00	"	"	"	"	"	"	
Di-n-butyl phthalate	ND	5.00	"	"	"	"	"	"	
Di-n-octyl phthalate	ND	5.00	"	"	"	"	"	"	
Dibenzo (a,h) anthracene	ND	5.00	"	"	"	"	"	"	
Dibenzofuran	ND	5.00	"	"	"	"	"	"	
1,2-Dichlorobenzene	ND	5.00	"	"	"	"	"	"	
1,3-Dichlorobenzene	ND	5.00	"	"	"	"	"	"	
1,4-Dichlorobenzene	ND	5.00	"	"	"	"	"	"	
3,3'-Dichlorobenzidine	ND	5.00	"	"	"	"	"	"	
2,4-Dichlorophenol	ND	5.00	"	"	"	"	"	"	
Diethyl phthalate	ND	5.00	"	"	"	"	"	"	
2,4-Dimethylphenol	ND	10.0	"	"	"	"	"	"	
Dimethyl phthalate	ND	5.00	"	"	"	"	"	"	
4,6-Dinitro-2-methylphenol	ND	10.0	"	"	"	"	"	"	
2,4-Dinitrophenol	ND	25.0	"	"	"	"	"	"	
2,4-Dinitrotoluene	ND	5.00	"	"	"	"	"	"	

North Creek Analytical - Portland

Philip Nerenberg

Philip Nerenberg, Laboratory Manager

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Hahn and Associates, Inc.	Project: Gasco Upland	
434 NW Sixth Ave., Suite 203	Project Number: 2708-10	**Reported:**
Portland, OR 97209	Project Manager: Rob Ede	07/02/04 13:22

Semivolatile Organic Compounds per EPA Method 8270C

North Creek Analytical - Portland

Analyte	Result	Reporting Limit	Units	Dilution	Method	Prepared	Analyzed	Batch	Notes
2708-040614-115 (P4F0616-03) Water					Sampled: 06/14/04 Received: 06/15/04				
2,6-Dinitrotoluene	ND	5.00	ug/l	1	EPA 8270C	06/18/04	06/22/04	4060792	
Bis(2-ethylhexyl)phthalate	ND	10.0	"	"	"	"	"	"	
Fluoranthene	ND	5.00	"	"	"	"	"	"	
Fluorene	ND	5.00	"	"	"	"	"	"	
Hexachlorobenzene	ND	5.00	"	"	"	"	"	"	
Hexachlorobutadiene	ND	10.0	"	"	"	"	"	"	
Hexachlorocyclopentadiene	ND	10.0	"	"	"	"	"	"	
Hexachloroethane	ND	10.0	"	"	"	"	"	"	
Indeno (1,2,3-cd) pyrene	ND	5.00	"	"	"	"	"	"	
Isophorone	ND	5.00	"	"	"	"	"	"	
2-Methylnaphthalene	ND	5.00	"	"	"	"	"	"	
2-Methylphenol	ND	10.0	"	"	"	"	"	"	
3-,4-Methylphenol	ND	5.00	"	"	"	"	"	"	
Naphthalene	ND	5.00	"	"	"	"	"	"	
2-Nitroaniline	ND	5.00	"	"	"	"	"	"	
3-Nitroaniline	ND	10.0	"	"	"	"	"	"	
4-Nitroaniline	ND	10.0	"	"	"	"	"	"	
Nitrobenzene	ND	5.00	"	"	"	"	"	"	
2-Nitrophenol	ND	5.00	"	"	"	"	"	"	
4-Nitrophenol	ND	25.0	"	"	"	"	"	"	
N-Nitrosodi-n-propylamine	ND	10.0	"	"	"	"	"	"	
N-Nitrosodiphenylamine	ND	5.00	"	"	"	"	"	"	
Pentachlorophenol	ND	10.0	"	"	"	"	"	"	
Phenanthrene	**5.16**	5.00	"	"	"	"	"	"	
Phenol	ND	5.00	"	"	"	"	"	"	
Pyrene	ND	5.00	"	"	"	"	"	"	
1,2,4-Trichlorobenzene	ND	5.00	"	"	"	"	"	"	
2,4,5-Trichlorophenol	ND	5.00	"	"	"	"	"	"	
2,4,6-Trichlorophenol	ND	5.00	"	"	"	"	"	"	
Surr: 2-Fluorobiphenyl	*84.6 %*	*26-135*							
Surr: 2-Fluorophenol	*47.6 %*	*6-124*							
Surr: Nitrobenzene-d5	*95.1 %*	*23-147*							
Surr: Phenol-d6	*32.7 %*	*11-130*							
Surr: p-Terphenyl-d14	*109 %*	*38-149*							
Surr: 2,4,6-Tribromophenol	*106 %*	*19-126*							

North Creek Analytical - Portland

Philip Nerenberg

Philip Nerenberg, Laboratory Manager

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Hahn and Associates, Inc.	Project: Gasco Upland	
434 NW Sixth Ave., Suite 203	Project Number: 2708-10	**Reported:**
Portland, OR 97209	Project Manager: Rob Ede	07/02/04 13:22

Semivolatile Organic Compounds per EPA Method 8270C

North Creek Analytical - Portland

Analyte	Result	Reporting Limit	Units	Dilution	Method	Prepared	Analyzed	Batch	Notes
2708-040614-116 (P4F0616-04) Water					Sampled: 06/14/04 Received: 06/15/04				
Carbazole	ND	5.00	ug/l	1	EPA 8270C	06/18/04	06/22/04	4060792	
Acenaphthene	ND	5.00	"	"	"	"	"	"	
Acenaphthylene	ND	5.00	"	"	"	"	"	"	
Anthracene	ND	5.00	"	"	"	"	"	"	
Benzo (a) anthracene	ND	5.00	"	"	"	"	"	"	
Benzo (a) pyrene	ND	5.00	"	"	"	"	"	"	
Benzo (b) fluoranthene	ND	5.00	"	"	"	"	"	"	
Benzo (ghi) perylene	ND	5.00	"	"	"	"	"	"	
Benzo (k) fluoranthene	ND	5.00	"	"	"	"	"	"	
Benzoic Acid	ND	50.0	"	"	"	"	"	"	
Benzyl alcohol	ND	10.0	"	"	"	"	"	"	
4-Bromophenyl phenyl ether	ND	5.00	"	"	"	"	"	"	
Butyl benzyl phthalate	ND	5.00	"	"	"	"	"	"	
4-Chloro-3-methylphenol	ND	5.00	"	"	"	"	"	"	
4-Chloroaniline	ND	20.0	"	"	"	"	"	"	
Bis(2-chloroethoxy)methane	ND	10.0	"	"	"	"	"	"	
Bis(2-chloroethyl)ether	ND	5.00	"	"	"	"	"	"	
Bis(2-chloroisopropyl)ether	ND	10.0	"	"	"	"	"	"	
2-Chloronaphthalene	ND	5.00	"	"	"	"	"	"	
2-Chlorophenol	ND	5.00	"	"	"	"	"	"	
4-Chlorophenyl phenyl ether	ND	5.00	"	"	"	"	"	"	
Chrysene	ND	5.00	"	"	"	"	"	"	
Di-n-butyl phthalate	ND	5.00	"	"	"	"	"	"	
Di-n-octyl phthalate	ND	5.00	"	"	"	"	"	"	
Dibenzo (a,h) anthracene	ND	5.00	"	"	"	"	"	"	
Dibenzofuran	ND	5.00	"	"	"	"	"	"	
1,2-Dichlorobenzene	ND	5.00	"	"	"	"	"	"	
1,3-Dichlorobenzene	ND	5.00	"	"	"	"	"	"	
1,4-Dichlorobenzene	ND	5.00	"	"	"	"	"	"	
3,3´-Dichlorobenzidine	ND	5.00	"	"	"	"	"	"	
2,4-Dichlorophenol	ND	5.00	"	"	"	"	"	"	
Diethyl phthalate	ND	5.00	"	"	"	"	"	"	
2,4-Dimethylphenol	ND	10.0	"	"	"	"	"	"	
Dimethyl phthalate	ND	5.00	"	"	"	"	"	"	
4,6-Dinitro-2-methylphenol	ND	10.0	"	"	"	"	"	"	
2,4-Dinitrophenol	ND	25.0	"	"	"	"	"	"	
2,4-Dinitrotoluene	ND	5.00	"	"	"	"	"	"	

North Creek Analytical - Portland

Philip Nerenberg

Philip Nerenberg, Laboratory Manager

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Hahn and Associates, Inc.	Project: Gasco Upland	
434 NW Sixth Ave., Suite 203	Project Number: 2708-10	**Reported:**
Portland, OR 97209	Project Manager: Rob Ede	07/02/04 13:22

Semivolatile Organic Compounds per EPA Method 8270C

North Creek Analytical - Portland

Analyte	Result	Reporting Limit	Units	Dilution	Method	Prepared	Analyzed	Batch	Notes
2708-040614-116 (P4F0616-04) Water					Sampled: 06/14/04 Received: 06/15/04				
2,6-Dinitrotoluene	ND	5.00	ug/l	1	EPA 8270C	06/18/04	06/22/04	4060792	
Bis(2-ethylhexyl)phthalate	ND	10.0	"	"	"	"	"	"	
Fluoranthene	ND	5.00	"	"	"	"	"	"	
Fluorene	ND	5.00	"	"	"	"	"	"	
Hexachlorobenzene	ND	5.00	"	"	"	"	"	"	
Hexachlorobutadiene	ND	10.0	"	"	"	"	"	"	
Hexachlorocyclopentadiene	ND	10.0	"	"	"	"	"	"	
Hexachloroethane	ND	10.0	"	"	"	"	"	"	
Indeno (1,2,3-cd) pyrene	ND	5.00	"	"	"	"	"	"	
Isophorone	ND	5.00	"	"	"	"	"	"	
2-Methylnaphthalene	ND	5.00	"	"	"	"	"	"	
2-Methylphenol	ND	10.0	"	"	"	"	"	"	
3-,4-Methylphenol	ND	5.00	"	"	"	"	"	"	
Naphthalene	ND	5.00	"	"	"	"	"	"	
2-Nitroaniline	ND	5.00	"	"	"	"	"	"	
3-Nitroaniline	ND	10.0	"	"	"	"	"	"	
4-Nitroaniline	ND	10.0	"	"	"	"	"	"	
Nitrobenzene	ND	5.00	"	"	"	"	"	"	
2-Nitrophenol	ND	5.00	"	"	"	"	"	"	
4-Nitrophenol	ND	25.0	"	"	"	"	"	"	
N-Nitrosodi-n-propylamine	ND	10.0	"	"	"	"	"	"	
N-Nitrosodiphenylamine	ND	5.00	"	"	"	"	"	"	
Pentachlorophenol	ND	10.0	"	"	"	"	"	"	
Phenanthrene	ND	5.00	"	"	"	"	"	"	
Phenol	ND	5.00	"	"	"	"	"	"	
Pyrene	ND	5.00	"	"	"	"	"	"	
1,2,4-Trichlorobenzene	ND	5.00	"	"	"	"	"	"	
2,4,5-Trichlorophenol	ND	5.00	"	"	"	"	"	"	
2,4,6-Trichlorophenol	ND	5.00	"	"	"	"	"	"	
Surr: 2-Fluorobiphenyl	*65.5 %*	*26-135*							
Surr: 2-Fluorophenol	*30.1 %*	*6-124*							
Surr: Nitrobenzene-d5	*67.9 %*	*23-147*							
Surr: Phenol-d6	*20.1 %*	*11-130*							
Surr: p-Terphenyl-d14	*104 %*	*38-149*							
Surr: 2,4,6-Tribromophenol	*64.5 %*	*19-126*							

North Creek Analytical - Portland

Philip Nerenberg

Philip Nerenberg, Laboratory Manager

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541.383.9310 fax 541.382.7588

Hahn and Associates, Inc.	Project: Gasco Upland	
434 NW Sixth Ave., Suite 203	Project Number: 2708-10	**Reported:**
Portland, OR 97209	Project Manager: Rob Ede	07/02/04 13:22

Polynuclear Aromatic Compounds per EPA 8270M-SIM

North Creek Analytical - Portland

Analyte	Result	Reporting Limit	Units	Dilution	Method	Prepared	Analyzed	Batch	Notes
2708-040614-115 (P4F0616-03) Water					Sampled: 06/14/04 Received: 06/15/04				
Acenaphthene	**0.646**	0.100	ug/l	1	EPA 8270m	06/18/04	06/21/04	4060793	
Acenaphthylene	ND	0.100	"	"	"	"	"	"	
Anthracene	**0.392**	0.100	"	"	"	"	"	"	
Benzo (a) anthracene	**0.170**	0.100	"	"	"	"	"	"	
Benzo (a) pyrene	**0.137**	0.100	"	"	"	"	"	"	
Benzo (b) fluoranthene	ND	0.100	"	"	"	"	"	"	
Benzo (ghi) perylene	ND	0.100	"	"	"	"	"	"	
Benzo (k) fluoranthene	ND	0.100	"	"	"	"	"	"	
Chrysene	**0.214**	0.100	"	"	"	"	"	"	
Dibenzo (a,h) anthracene	ND	0.200	"	"	"	"	"	"	
Fluoranthene	**1.10**	0.100	"	"	"	"	"	"	
Fluorene	**0.449**	0.100	"	"	"	"	"	"	
Indeno (1,2,3-cd) pyrene	ND	0.100	"	"	"	"	"	"	
Naphthalene	**2.58**	0.100	"	"	"	"	"	"	
Phenanthrene	**2.99**	0.100	"	"	"	"	"	"	
Pyrene	**1.31**	0.100	"	"	"	"	"	"	
Surr: Fluorene-d10	*110 %*	*25-125*							
Surr: Pyrene-d10	*114 %*	*23-150*							
Surr: Benzo (a) pyrene-d12	*64.6 %*	*10-125*							
2708-040614-116 (P4F0616-04) Water					Sampled: 06/14/04 Received: 06/15/04				
Acenaphthene	ND	0.100	ug/l	1	EPA 8270m	06/18/04	06/21/04	4060793	
Acenaphthylene	ND	0.100	"	"	"	"	"	"	
Anthracene	ND	0.100	"	"	"	"	"	"	
Benzo (a) anthracene	ND	0.100	"	"	"	"	"	"	
Benzo (a) pyrene	ND	0.100	"	"	"	"	"	"	
Benzo (b) fluoranthene	ND	0.100	"	"	"	"	"	"	
Benzo (ghi) perylene	ND	0.100	"	"	"	"	"	"	
Benzo (k) fluoranthene	ND	0.100	"	"	"	"	"	"	
Chrysene	ND	0.100	"	"	"	"	"	"	
Dibenzo (a,h) anthracene	ND	0.200	"	"	"	"	"	"	
Fluoranthene	ND	0.100	"	"	"	"	"	"	
Fluorene	ND	0.100	"	"	"	"	"	"	
Indeno (1,2,3-cd) pyrene	ND	0.100	"	"	"	"	"	"	
Naphthalene	**0.920**	0.100	"	"	"	"	"	"	
Phenanthrene	**0.144**	0.100	"	"	"	"	"	"	
Pyrene	**0.106**	0.100	"	"	"	"	"	"	

North Creek Analytical - Portland

Philip Nerenberg

Philip Nerenberg, Laboratory Manager

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541.383.9310 fax 541.382.7588

Hahn and Associates, Inc.	Project: Gasco Upland	
434 NW Sixth Ave., Suite 203	Project Number: 2708-10	**Reported:**
Portland, OR 97209	Project Manager: Rob Ede	07/02/04 13:22

Polynuclear Aromatic Compounds per EPA 8270M-SIM

North Creek Analytical - Portland

Analyte	Result	Reporting Limit	Units	Dilution	Method	Prepared	Analyzed	Batch	Notes
2708-040614-116 (P4F0616-04) Water					Sampled: 06/14/04 Received: 06/15/04				
Surr: Fluorene-d10	*91.7 %*	*25-125*							
Surr: Pyrene-d10	*117 %*	*23-150*							
Surr: Benzo (a) pyrene-d12	*97.1 %*	*10-125*							
2708-040614-116 (P4F0616-04RE1) Water					Sampled: 06/14/04 Received: 06/15/04				J
Benzo (a) anthracene	ND	0.100	ug/l	1	EPA 8270m	06/18/04	06/29/04	4060793	
Benzo (a) pyrene	ND	0.100	"	"	"	"	"	"	
Benzo (b) fluoranthene	ND	0.100	"	"	"	"	"	"	
Benzo (k) fluoranthene	ND	0.100	"	"	"	"	"	"	
Chrysene	ND	0.100	"	"	"	"	"	"	
Dibenzo (a,h) anthracene	ND	0.200	"	"	"	"	"	"	
Indeno (1,2,3-cd) pyrene	ND	0.100	"	"	"	"	"	"	
Surr: Benzo (a) pyrene-d12	*85.0 %*	*10-125*							

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Hahn and Associates, Inc.	Project: Gasco Upland	
434 NW Sixth Ave., Suite 203	Project Number: 2708-10	**Reported:**
Portland, OR 97209	Project Manager: Rob Ede	07/02/04 13:22

Conventional Chemistry Parameters per APHA/EPA Methods

North Creek Analytical - Portland

Analyte	Result	Reporting Limit	Units	Dilution	Method	Prepared	Analyzed	Batch	Notes
2708-040614-115 (P4F0616-03) Water					Sampled: 06/14/04 Received: 06/15/04				
Cyanide (amenable)	ND	0.00500	mg/l	1	EPA 9010A	06/24/04	06/24/04	4061043	
Cyanide (total)	**0.00600**	0.00500	"	"	EPA 9012A	06/23/04	06/24/04	4060978	
2708-040614-116 (P4F0616-04) Water					Sampled: 06/14/04 Received: 06/15/04				
Cyanide (amenable)	**0.0319**	0.00500	mg/l	1	EPA 9010A	06/24/04	06/24/04	4061043	
Cyanide (total)	**0.0557**	0.00500	"	"	EPA 9012A	06/23/04	06/24/04	4060978	

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Hahn and Associates, Inc.	Project: Gasco Upland	
434 NW Sixth Ave., Suite 203	Project Number: 2708-10	**Reported:**
Portland, OR 97209	Project Manager: Rob Ede	07/02/04 13:22

Total Metals per EPA 6000/7000 Series Methods - Quality Control

North Creek Analytical - Portland

Analyte	Result	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
Batch 4060762 - EPA 200/3005										
Blank (4060762-BLK1)				Prepared: 06/17/04 Analyzed: 06/19/04						
Arsenic	ND	0.00100	mg/l							
Chromium	ND	0.00100	"							
Copper	ND	0.00200	"							
Lead	ND	0.00100	"							
Nickel	ND	0.00200	"							
Zinc	ND	0.00500	"							
LCS (4060762-BS1)				Prepared: 06/17/04 Analyzed: 06/19/04						
Arsenic	0.0958	0.00100	mg/l	0.100		95.8	80-120			
Chromium	0.104	0.00100	"	0.100		104	80-120			
Copper	0.106	0.00200	"	0.100		106	80-120			
Lead	0.100	0.00100	"	0.100		100	80-120			
Nickel	0.106	0.00200	"	0.100		106	80-120			
Zinc	0.101	0.00500	"	0.100		101	80-120			
LCS Dup (4060762-BSD1)				Prepared: 06/17/04 Analyzed: 06/19/04						
Arsenic	0.0998	0.00100	mg/l	0.100		99.8	80-120	4.09	20	
Chromium	0.103	0.00100	"	0.100		103	80-120	0.966	20	
Copper	0.103	0.00200	"	0.100		103	80-120	2.87	20	
Lead	0.0996	0.00100	"	0.100		99.6	80-120	0.401	20	
Nickel	0.106	0.00200	"	0.100		106	80-120	0.00	20	
Zinc	0.100	0.00500	"	0.100		100	80-120	0.995	20	
Duplicate (4060762-DUP1)		**Source: P4F0610-01**		Prepared: 06/17/04 Analyzed: 06/19/04						
Arsenic	0.00521	0.00100	mg/l		0.00518			0.577	20	
Chromium	0.00267	0.00100	"		0.00318			17.4	20	
Copper	0.0796	0.00200	"		0.0831			4.30	20	
Lead	0.00592	0.00100	"		0.00608			2.67	20	
Nickel	0.0182	0.00200	"		0.0194			6.38	20	
Zinc	0.0182	0.00500	"		0.0194			6.38	20	

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Philip Nerenberg

Philip Nerenberg, Laboratory Manager

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Hahn and Associates, Inc.	Project: Gasco Upland	
434 NW Sixth Ave., Suite 203	Project Number: 2708-10	**Reported:**
Portland, OR 97209	Project Manager: Rob Ede	07/02/04 13:22

Total Metals per EPA 6000/7000 Series Methods - Quality Control

North Creek Analytical - Portland

Analyte	Result	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
Batch 4060762 - EPA 200/3005										
Matrix Spike (4060762-MS1)	**Source: P4F0610-01**			Prepared: 06/17/04 Analyzed: 06/19/04						
Arsenic	0.105	0.00100	mg/l	0.100	0.00518	99.8	75-125			
Chromium	0.104	0.00100	"	0.100	0.00318	101	75-125			
Copper	0.182	0.00200	"	0.100	0.0831	98.9	75-125			
Lead	0.102	0.00100	"	0.100	0.00608	95.9	75-125			
Nickel	0.121	0.00200	"	0.100	0.0194	102	75-125			
Zinc	0.118	0.00500	"	0.100	0.0194	98.6	75-125			
Matrix Spike (4060762-MS2)	**Source: P4F0632-01**			Prepared: 06/17/04 Analyzed: 06/20/04						
Arsenic	0.116	0.00100	mg/l	0.100	0.0151	101	75-125			
Chromium	0.199	0.00100	"	0.100	0.0980	101	75-125			
Copper	0.561	0.00200	"	0.100	0.468	93.0	75-125			
Lead	0.0940	0.00100	"	0.100	0.00395	90.0	75-125			
Nickel	0.234	0.00200	"	0.100	0.133	101	75-125			
Zinc	4.53	0.0286	"	0.100	4.39	140	75-125			Q-03

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Hahn and Associates, Inc.	Project: Gasco Upland	
434 NW Sixth Ave., Suite 203	Project Number: 2708-10	**Reported:**
Portland, OR 97209	Project Manager: Rob Ede	07/02/04 13:22

Dissolved Metals per EPA 6000/7000 Series Methods - Quality Control

North Creek Analytical - Portland

Analyte	Result	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
Batch 4060840 - EPA 200/3005 Diss										
Blank (4060840-BLK1)				Prepared: 06/18/04 Analyzed: 06/22/04						
Arsenic	ND	0.00100	mg/l							
Chromium	ND	0.00100	"							
Copper	ND	0.00200	"							
Lead	ND	0.00100	"							
Nickel	ND	0.00200	"							
Zinc	ND	0.00500	"							
LCS (4060840-BS1)				Prepared: 06/18/04 Analyzed: 06/22/04						
Arsenic	0.102	0.00100	mg/l	0.100		102	80-120			
Chromium	0.104	0.00100	"	0.100		104	80-120			
Copper	0.0991	0.00200	"	0.100		99.1	80-120			
Lead	0.102	0.00100	"	0.100		102	80-120			
Nickel	0.100	0.00200	"	0.100		100	80-120			
Zinc	0.0970	0.00500	"	0.100		97.0	80-120			
LCS Dup (4060840-BSD1)				Prepared: 06/18/04 Analyzed: 06/22/04						
Arsenic	0.101	0.00100	mg/l	0.100		101	80-120	0.985	20	
Chromium	0.102	0.00100	"	0.100		102	80-120	1.94	20	
Copper	0.0986	0.00200	"	0.100		98.6	80-120	0.506	20	
Lead	0.103	0.00100	"	0.100		103	80-120	0.976	20	
Nickel	0.0982	0.00200	"	0.100		98.2	80-120	1.82	20	
Zinc	0.0980	0.00500	"	0.100		98.0	80-120	1.03	20	
Duplicate (4060840-DUP1)		**Source: P4F0616-03**		Prepared: 06/18/04 Analyzed: 06/22/04						
Arsenic	0.00564	0.00100	mg/l		0.00582			3.14	20	
Chromium	0.000810	0.00100	"		ND				20	
Copper	ND	0.00200	"		ND			NA	20	
Lead	0.000260	0.00100	"		0.000240			8.00	20	
Nickel	0.0163	0.00200	"		0.0162			0.615	20	
Zinc	0.187	0.00500	"		0.191			2.12	20	

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Philip Nerenberg

Philip Nerenberg, Laboratory Manager

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Hahn and Associates, Inc.	Project: Gasco Upland	
434 NW Sixth Ave., Suite 203	Project Number: 2708-10	**Reported:**
Portland, OR 97209	Project Manager: Rob Ede	07/02/04 13:22

Dissolved Metals per EPA 6000/7000 Series Methods - Quality Control

North Creek Analytical - Portland

Analyte	Result	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
Batch 4060840 - EPA 200/3005 Diss										
Matrix Spike (4060840-MS1)	**Source: P4F0616-03**			Prepared: 06/18/04 Analyzed: 06/22/04						
Arsenic	0.112	0.00100	mg/l	0.100	0.00582	106	75-125			
Chromium	0.106	0.00100	"	0.100	ND	106	75-125			
Copper	0.102	0.00200	"	0.100	ND	102	75-125			
Lead	0.104	0.00100	"	0.100	0.000240	104	75-125			
Nickel	0.116	0.00200	"	0.100	0.0162	99.8	75-125			
Zinc	0.281	0.00500	"	0.100	0.191	90.0	75-125			
Matrix Spike (4060840-MS2)	**Source: P4F0616-04**			Prepared: 06/18/04 Analyzed: 06/22/04						
Arsenic	0.107	0.00100	mg/l	0.100	0.000660	106	75-125			
Chromium	0.106	0.00100	"	0.100	ND	106	75-125			
Copper	0.102	0.00200	"	0.100	ND	102	75-125			
Lead	0.104	0.00100	"	0.100	0.000310	104	75-125			
Nickel	0.104	0.00200	"	0.100	0.00445	99.6	75-125			
Zinc	0.139	0.00500	"	0.100	0.0383	101	75-125			

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Hahn and Associates, Inc.	Project: Gasco Upland	
434 NW Sixth Ave., Suite 203	Project Number: 2708-10	**Reported:**
Portland, OR 97209	Project Manager: Rob Ede	07/02/04 13:22

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 4061039 - EPA 5030B										
Blank (4061039-BLK1)				Prepared & Analyzed: 06/24/04						
Acetone	ND	25.0	ug/l							
Benzene	ND	1.00	"							
Bromobenzene	ND	1.00	"							
Bromochloromethane	ND	1.00	"							
Bromodichloromethane	ND	1.00	"							
Bromoform	ND	1.00	"							
Bromomethane	ND	5.00	"							
2-Butanone	ND	10.0	"							
n-Butylbenzene	ND	5.00	"							
sec-Butylbenzene	ND	1.00	"							
tert-Butylbenzene	ND	1.00	"							
Carbon disulfide	ND	10.0	"							
Carbon tetrachloride	ND	1.00	"							
Chlorobenzene	ND	1.00	"							
Chloroethane	ND	1.00	"							
Chloroform	ND	1.00	"							
Chloromethane	ND	5.00	"							
2-Chlorotoluene	ND	1.00	"							
4-Chlorotoluene	ND	1.00	"							
1,2-Dibromo-3-chloropropane	ND	5.00	"							
Dibromochloromethane	ND	1.00	"							
1,2-Dibromoethane	ND	1.00	"							
Dibromomethane	ND	1.00	"							
1,2-Dichlorobenzene	ND	1.00	"							
1,3-Dichlorobenzene	ND	1.00	"							
1,4-Dichlorobenzene	ND	1.00	"							
Dichlorodifluoromethane	ND	5.00	"							
1,1-Dichloroethane	ND	1.00	"							
1,2-Dichloroethane	ND	1.00	"							
1,1-Dichloroethene	ND	1.00	"							
cis-1,2-Dichloroethene	ND	1.00	"							
trans-1,2-Dichloroethene	ND	1.00	"							
1,2-Dichloropropane	ND	1.00	"							
1,3-Dichloropropane	ND	1.00	"							
2,2-Dichloropropane	ND	1.00	"							
1,1-Dichloropropene	ND	1.00	"							

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Philip Nerenberg, Laboratory Manager

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Hahn and Associates, Inc.	Project: Gasco Upland	
434 NW Sixth Ave., Suite 203	Project Number: 2708-10	**Reported:**
Portland, OR 97209	Project Manager: Rob Ede	07/02/04 13:22

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 4061039 - EPA 5030B										
Blank (4061039-BLK1)				Prepared & Analyzed: 06/24/04						
cis-1,3-Dichloropropene	ND	1.00	ug/l							
trans-1,3-Dichloropropene	ND	1.00	"							
Ethylbenzene	ND	1.00	"							
Hexachlorobutadiene	ND	2.00	"							
2-Hexanone	ND	10.0	"							
Isopropylbenzene	ND	2.00	"							
p-Isopropyltoluene	ND	2.00	"							
4-Methyl-2-pentanone	ND	5.00	"							
Methyl tert-butyl ether	ND	1.00	"							
Methylene chloride	ND	5.00	"							
Naphthalene	ND	2.00	"							
n-Propylbenzene	ND	1.00	"							
Styrene	ND	1.00	"							
1,1,1,2-Tetrachloroethane	ND	1.00	"							
1,1,2,2-Tetrachloroethane	ND	1.00	"							
Tetrachloroethene	ND	1.00	"							
Toluene	ND	1.00	"							
1,2,3-Trichlorobenzene	ND	1.00	"							
1,2,4-Trichlorobenzene	ND	1.00	"							
1,1,1-Trichloroethane	ND	1.00	"							
1,1,2-Trichloroethane	ND	1.00	"							
Trichloroethene	ND	1.00	"							
Trichlorofluoromethane	ND	1.00	"							
1,2,3-Trichloropropane	ND	1.00	"							
1,2,4-Trimethylbenzene	ND	1.00	"							
1,3,5-Trimethylbenzene	ND	1.00	"							
Vinyl chloride	ND	1.00	"							
o-Xylene	ND	1.00	"							
m,p-Xylene	ND	2.00	"							
Surr: 4-BFB	*17.5*		"	*20.0*		*87.5*	*75-120*			
Surr: 1,2-DCA-d4	*22.0*		"	*20.0*		*110*	*77-129*			
Surr: Dibromofluoromethane	*21.6*		"	*20.0*		*108*	*80-121*			
Surr: Toluene-d8	*20.9*		"	*20.0*		*104*	*80-120*			

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Philip Nerenberg

Philip Nerenberg, Laboratory Manager

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Hahn and Associates, Inc.	Project: Gasco Upland	
434 NW Sixth Ave., Suite 203	Project Number: 2708-10	**Reported:**
Portland, OR 97209	Project Manager: Rob Ede	07/02/04 13:22

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 4061039 - EPA 5030B										
LCS (4061039-BS1)				Prepared & Analyzed: 06/24/04						
Benzene	20.4	1.00	ug/l	20.0		102	80-120			
Chlorobenzene	21.3	1.00	"	20.0		106	80-124			
1,1-Dichloroethene	19.2	1.00	"	20.0		96.0	78-120			
Toluene	21.1	1.00	"	20.0		106	80-124			
Trichloroethene	22.6	1.00	"	20.0		113	80-132			
Surr: 4-BFB	*21.1*		"	*20.0*		*106*	*75-120*			
Surr: 1,2-DCA-d4	*20.6*		"	*20.0*		*103*	*77-129*			
Surr: Dibromofluoromethane	*20.6*		"	*20.0*		*103*	*80-121*			
Surr: Toluene-d8	*21.0*		"	*20.0*		*105*	*80-120*			
Matrix Spike (4061039-MS1)	**Source: P4F0616-02**			Prepared & Analyzed: 06/24/04						
Benzene	21.5	1.00	ug/l	20.0	2.29	96.0	80-124			
Chlorobenzene	20.8	1.00	"	20.0	ND	104	72.9-134			
1,1-Dichloroethene	17.9	1.00	"	20.0	ND	89.5	79.3-127			
Toluene	18.1	1.00	"	20.0	ND	90.5	79.7-131			
Trichloroethene	20.3	1.00	"	20.0	ND	102	68.4-130			
Surr: 4-BFB	*19.7*		"	*20.0*		*98.5*	*75-120*			
Surr: 1,2-DCA-d4	*20.0*		"	*20.0*		*100*	*77-129*			
Surr: Dibromofluoromethane	*19.9*		"	*20.0*		*99.5*	*80-121*			
Surr: Toluene-d8	*18.7*		"	*20.0*		*93.5*	*80-120*			
Matrix Spike Dup (4061039-MSD1)	**Source: P4F0616-02**			Prepared & Analyzed: 06/24/04						
Benzene	21.8	1.00	ug/l	20.0	2.29	97.6	80-124	1.39	25	
Chlorobenzene	19.9	1.00	"	20.0	ND	99.5	72.9-134	4.42	25	
1,1-Dichloroethene	18.3	1.00	"	20.0	ND	91.5	79.3-127	2.21	25	
Toluene	18.6	1.00	"	20.0	ND	93.0	79.7-131	2.72	25	
Trichloroethene	19.4	1.00	"	20.0	ND	97.0	68.4-130	4.53	25	
Surr: 4-BFB	*19.8*		"	*20.0*		*99.0*	*75-120*			
Surr: 1,2-DCA-d4	*19.3*		"	*20.0*		*96.5*	*77-129*			
Surr: Dibromofluoromethane	*19.7*		"	*20.0*		*98.5*	*80-121*			
Surr: Toluene-d8	*19.6*		"	*20.0*		*98.0*	*80-120*			

North Creek Analytical - Portland

Philip Nerenberg

Philip Nerenberg, Laboratory Manager

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Hahn and Associates, Inc.	Project: Gasco Upland	
434 NW Sixth Ave., Suite 203	Project Number: 2708-10	**Reported:**
Portland, OR 97209	Project Manager: Rob Ede	07/02/04 13:22

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 4060792 - EPA 3510/600 Series										
Blank (4060792-BLK1)				Prepared: 06/18/04 Analyzed: 06/22/04						
Carbazole	ND	5.00	ug/l							
Acenaphthene	ND	5.00	"							
Acenaphthylene	ND	5.00	"							
Anthracene	ND	5.00	"							
Benzo (a) anthracene	ND	5.00	"							
Benzo (a) pyrene	ND	5.00	"							
Benzo (b) fluoranthene	ND	5.00	"							
Benzo (ghi) perylene	ND	5.00	"							
Benzo (k) fluoranthene	ND	5.00	"							
Benzoic Acid	ND	50.0	"							
Benzyl alcohol	ND	10.0	"							
4-Bromophenyl phenyl ether	ND	5.00	"							
Butyl benzyl phthalate	ND	5.00	"							
4-Chloro-3-methylphenol	ND	5.00	"							
4-Chloroaniline	ND	20.0	"							
Bis(2-chloroethoxy)methane	ND	10.0	"							
Bis(2-chloroethyl)ether	ND	5.00	"							
Bis(2-chloroisopropyl)ether	ND	10.0	"							
2-Chloronaphthalene	ND	5.00	"							
2-Chlorophenol	ND	5.00	"							
4-Chlorophenyl phenyl ether	ND	5.00	"							
Chrysene	ND	5.00	"							
Di-n-butyl phthalate	ND	5.00	"							
Di-n-octyl phthalate	ND	5.00	"							
Dibenzo (a,h) anthracene	ND	5.00	"							
Dibenzofuran	ND	5.00	"							
1,2-Dichlorobenzene	ND	5.00	"							
1,3-Dichlorobenzene	ND	5.00	"							
1,4-Dichlorobenzene	ND	5.00	"							
3,3'-Dichlorobenzidine	ND	5.00	"							
2,4-Dichlorophenol	ND	5.00	"							
Diethyl phthalate	ND	5.00	"							
2,4-Dimethylphenol	ND	10.0	"							
Dimethyl phthalate	ND	5.00	"							
4,6-Dinitro-2-methylphenol	ND	10.0	"							
2,4-Dinitrophenol	ND	25.0	"							

North Creek Analytical - Portland

Philip Nerenberg

Philip Nerenberg, Laboratory Manager

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Hahn and Associates, Inc.	Project: Gasco Upland	
434 NW Sixth Ave., Suite 203	Project Number: 2708-10	**Reported:**
Portland, OR 97209	Project Manager: Rob Ede	07/02/04 13:22

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 4060792 - EPA 3510/600 Series										
Blank (4060792-BLK1)				Prepared: 06/18/04 Analyzed: 06/22/04						
2,4-Dinitrotoluene	ND	5.00	ug/l							
2,6-Dinitrotoluene	ND	5.00	"							
Bis(2-ethylhexyl)phthalate	ND	10.0	"							
Fluoranthene	ND	5.00	"							
Fluorene	ND	5.00	"							
Hexachlorobenzene	ND	5.00	"							
Hexachlorobutadiene	ND	10.0	"							
Hexachlorocyclopentadiene	ND	10.0	"							
Hexachloroethane	ND	10.0	"							
Indeno (1,2,3-cd) pyrene	ND	5.00	"							
Isophorone	ND	5.00	"							
2-Methylnaphthalene	ND	5.00	"							
2-Methylphenol	ND	10.0	"							
3-,4-Methylphenol	ND	5.00	"							
Naphthalene	ND	5.00	"							
2-Nitroaniline	ND	5.00	"							
3-Nitroaniline	ND	10.0	"							
4-Nitroaniline	ND	10.0	"							
Nitrobenzene	ND	5.00	"							
2-Nitrophenol	ND	5.00	"							
4-Nitrophenol	ND	25.0	"							
N-Nitrosodi-n-propylamine	ND	10.0	"							
N-Nitrosodiphenylamine	ND	5.00	"							
Pentachlorophenol	ND	10.0	"							
Phenanthrene	ND	5.00	"							
Phenol	ND	5.00	"							
Pyrene	ND	5.00	"							
1,2,4-Trichlorobenzene	ND	5.00	"							
2,4,5-Trichlorophenol	ND	5.00	"							
2,4,6-Trichlorophenol	ND	5.00	"							
Surr: 2-Fluorobiphenyl	*61.8*		"	*75.0*		*82.4*	*26-135*			
Surr: 2-Fluorophenol	*70.5*		"	*150*		*47.0*	*6-124*			
Surr: Nitrobenzene-d5	*71.8*		"	*75.0*		*95.7*	*23-147*			
Surr: Phenol-d6	*48.3*		"	*150*		*32.2*	*11-130*			
Surr: p-Terphenyl-d14	*87.4*		"	*75.0*		*117*	*38-149*			
Surr: 2,4,6-Tribromophenol	*155*		"	*150*		*103*	*19-126*			

North Creek Analytical - Portland

Philip Nerenberg

Philip Nerenberg, Laboratory Manager

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Hahn and Associates, Inc.	Project: Gasco Upland	
434 NW Sixth Ave., Suite 203	Project Number: 2708-10	**Reported:**
Portland, OR 97209	Project Manager: Rob Ede	07/02/04 13:22

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 4060792 - EPA 3510/600 Series										
LCS (4060792-BS1)				Prepared: 06/18/04 Analyzed: 06/22/04						
Acenaphthene	63.9	5.00	ug/l	75.0		85.2	40-110			
4-Chloro-3-methylphenol	134	5.00	"	150		89.3	40-110			
2-Chlorophenol	96.0	5.00	"	150		64.0	40-110			
1,4-Dichlorobenzene	35.8	5.00	"	75.0		47.7	20-90			
2,4-Dinitrotoluene	78.2	5.00	"	75.0		104	50-110			
4-Nitrophenol	69.0	25.0	"	150		46.0	15-100			
N-Nitrosodi-n-propylamine	65.4	10.0	"	75.0		87.2	40-110			
Pentachlorophenol	122	10.0	"	150		81.3	30-120			
Phenol	42.2	5.00	"	150		28.1	15-110			
Pyrene	84.0	5.00	"	75.0		112	40-110			Q-29
1,2,4-Trichlorobenzene	44.9	5.00	"	75.0		59.9	25-100			
Surr: 2-Fluorobiphenyl	*59.8*		"	*75.0*		*79.7*	*26-135*			
Surr: 2-Fluorophenol	*69.2*		"	*150*		*46.1*	*6-124*			
Surr: Nitrobenzene-d5	*68.8*		"	*75.0*		*91.7*	*23-147*			
Surr: Phenol-d6	*47.4*		"	*150*		*31.6*	*11-130*			
Surr: p-Terphenyl-d14	*92.4*		"	*75.0*		*123*	*38-149*			
Surr: 2,4,6-Tribromophenol	*165*		"	*150*		*110*	*19-126*			
LCS Dup (4060792-BSD1)				Prepared: 06/18/04 Analyzed: 06/22/04						
Acenaphthene	73.4	5.00	ug/l	75.0		97.9	40-110	13.8	36	
4-Chloro-3-methylphenol	146	5.00	"	150		97.3	40-110	8.57	43	
2-Chlorophenol	106	5.00	"	150		70.7	40-110	9.90	38	
1,4-Dichlorobenzene	43.1	5.00	"	75.0		57.5	20-90	18.5	43	
2,4-Dinitrotoluene	84.3	5.00	"	75.0		112	50-110	7.51	31	Q-29
4-Nitrophenol	76.0	25.0	"	150		50.7	15-100	9.66	36	
N-Nitrosodi-n-propylamine	73.2	10.0	"	75.0		97.6	40-110	11.3	37	
Pentachlorophenol	132	10.0	"	150		88.0	30-120	7.87	40	
Phenol	46.7	5.00	"	150		31.1	15-110	10.1	36	
Pyrene	82.4	5.00	"	75.0		110	40-110	1.92	31	
1,2,4-Trichlorobenzene	53.8	5.00	"	75.0		71.7	25-100	18.0	42	
Surr: 2-Fluorobiphenyl	*69.4*		"	*75.0*		*92.5*	*26-135*			
Surr: 2-Fluorophenol	*75.7*		"	*150*		*50.5*	*6-124*			
Surr: Nitrobenzene-d5	*77.4*		"	*75.0*		*103*	*23-147*			
Surr: Phenol-d6	*52.6*		"	*150*		*35.1*	*11-130*			
Surr: p-Terphenyl-d14	*90.3*		"	*75.0*		*120*	*38-149*			
Surr: 2,4,6-Tribromophenol	*180*		"	*150*		*120*	*19-126*			

North Creek Analytical - Portland

Philip Nerenberg

Philip Nerenberg, Laboratory Manager

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Hahn and Associates, Inc.	Project: Gasco Upland	
434 NW Sixth Ave., Suite 203	Project Number: 2708-10	**Reported:**
Portland, OR 97209	Project Manager: Rob Ede	07/02/04 13:22

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 4060792 - EPA 3510/600 Series

North Creek Analytical - Portland

Philip Nerenberg

Philip Nerenberg, Laboratory Manager

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Hahn and Associates, Inc.	Project: Gasco Upland	
434 NW Sixth Ave., Suite 203	Project Number: 2708-10	**Reported:**
Portland, OR 97209	Project Manager: Rob Ede	07/02/04 13:22

Polynuclear Aromatic Compounds per EPA 8270M-SIM - Quality Control

North Creek Analytical - Portland

Analyte	Result	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
Batch 4060793 - EPA 3510/600 Series										
Blank (4060793-BLK1)				Prepared & Analyzed: 06/18/04						
Acenaphthene	ND	0.100	ug/l							
Acenaphthylene	ND	0.100	"							
Anthracene	ND	0.100	"							
Benzo (a) anthracene	ND	0.100	"							
Benzo (a) pyrene	ND	0.100	"							
Benzo (b) fluoranthene	ND	0.100	"							
Benzo (ghi) perylene	ND	0.100	"							
Benzo (k) fluoranthene	ND	0.100	"							
Chrysene	ND	0.100	"							
Dibenzo (a,h) anthracene	ND	0.200	"							
Fluoranthene	ND	0.100	"							
Fluorene	ND	0.100	"							
Indeno (1,2,3-cd) pyrene	ND	0.100	"							
Naphthalene	ND	0.100	"							
Phenanthrene	ND	0.100	"							
Pyrene	ND	0.100	"							
Surr: Fluorene-d10	*2.59*		"	*2.50*		*104*	*25-125*			
Surr: Pyrene-d10	*3.02*		"	*2.50*		*121*	*23-150*			
Surr: Benzo (a) pyrene-d12	*2.75*		"	*2.50*		*110*	*10-125*			
Blank (4060793-BLK2)				Prepared: 06/18/04 Analyzed: 06/29/04						**J**
Benzo (a) anthracene	ND	0.0100	ug/l							
Benzo (a) pyrene	ND	0.0100	"							
Benzo (b) fluoranthene	ND	0.0100	"							
Benzo (k) fluoranthene	ND	0.0100	"							
Chrysene	ND	0.0100	"							
Dibenzo (a,h) anthracene	ND	0.0100	"							
Indeno (1,2,3-cd) pyrene	ND	0.0100	"							
Surr: Benzo (a) pyrene-d12	*2.26*		"	*2.50*		*90.4*	*10-125*			

North Creek Analytical - Portland

Philip Nerenberg

Philip Nerenberg, Laboratory Manager

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Hahn and Associates, Inc.	Project: Gasco Upland	
434 NW Sixth Ave., Suite 203	Project Number: 2708-10	**Reported:**
Portland, OR 97209	Project Manager: Rob Ede	07/02/04 13:22

Polynuclear Aromatic Compounds per EPA 8270M-SIM - Quality Control

North Creek Analytical - Portland

Analyte	Result	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
Batch 4060793 - EPA 3510/600 Series										
LCS (4060793-BS1)				Prepared & Analyzed: 06/18/04						
Acenaphthene	2.13	0.100	ug/l	2.50		85.2	26-135			
Benzo (a) pyrene	1.96	0.100	"	2.50		78.4	38-137			
Pyrene	2.49	0.100	"	2.50		99.6	33-133			
Surr: Fluorene-d10	*2.56*		"	*2.50*		*102*	*25-125*			
Surr: Pyrene-d10	*3.17*		"	*2.50*		*127*	*23-150*			
Surr: Benzo (a) pyrene-d12	*2.61*		"	*2.50*		*104*	*10-125*			
LCS Dup (4060793-BSD1)				Prepared & Analyzed: 06/18/04						
Acenaphthene	2.36	0.100	ug/l	2.50		94.4	26-135	10.2	60	
Benzo (a) pyrene	2.08	0.100	"	2.50		83.2	38-137	5.94	60	
Pyrene	2.58	0.100	"	2.50		103	33-133	3.55	60	
Surr: Fluorene-d10	*2.83*		"	*2.50*		*113*	*25-125*			
Surr: Pyrene-d10	*3.22*		"	*2.50*		*129*	*23-150*			
Surr: Benzo (a) pyrene-d12	*2.72*		"	*2.50*		*109*	*10-125*			

North Creek Analytical - Portland

Philip Nerenberg

Philip Nerenberg, Laboratory Manager

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Hahn and Associates, Inc.	Project: Gasco Upland	
434 NW Sixth Ave., Suite 203	Project Number: 2708-10	**Reported:**
Portland, OR 97209	Project Manager: Rob Ede	07/02/04 13:22

Conventional Chemistry Parameters per APHA/EPA Methods - Quality Control

North Creek Analytical - Portland

Analyte	Result	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
Batch 4060978 - General Preparation										
Blank (4060978-BLK1)				Prepared: 06/23/04 Analyzed: 06/24/04						
Cyanide (total)	ND	0.00500	mg/l							
LCS (4060978-BS1)				Prepared: 06/23/04 Analyzed: 06/24/04						
Cyanide (total)	0.185	0.00500	mg/l	0.200		92.5	75-125			
Duplicate (4060978-DUP1)		Source: P4F0569-03		Prepared: 06/23/04 Analyzed: 06/24/04						
Cyanide (total)	0.113	0.00500	mg/l		0.110			2.69	20	
Matrix Spike (4060978-MS1)		Source: P4F0569-03		Prepared: 06/23/04 Analyzed: 06/24/04						
Cyanide (total)	0.280	0.00500	mg/l	0.200	0.110	85.0	75-125			

North Creek Analytical - Portland

Philip Nerenberg

Philip Nerenberg, Laboratory Manager

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541.383.9310 fax 541.382.7588

Hahn and Associates, Inc.	Project: Gasco Upland	
434 NW Sixth Ave., Suite 203	Project Number: 2708-10	**Reported:**
Portland, OR 97209	Project Manager: Rob Ede	07/02/04 13:22

Notes and Definitions

J	Estimated value.
Q-03	The matrix spike recovery, and/or RPD, for this QC sample cannot be accurately calculated due to the high concentration of analyte already present in the source sample.
Q-29	The recovery for the Laboratory Control Sample, and/or LCS Duplicate, for this analyte was above method specified criteria. All samples were Non Detect for this analyte, therefore Data Quality is not 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. MRLs are adjusted if %Solids are less than 50%.
wet	Sample results reported on a wet weight basis (as received)
RPD	Relative Percent Difference

North Creek Analytical - Portland

Philip Nerenberg

Philip Nerenberg, Laboratory Manager

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APPENDIX G

Chain-of-Custody Documentation and Laboratory Analytical Reports:
August 2004 Groundwater Monitoring Event

SCOEPA00013862

nca

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11115 E Montgomery Suite B, Spokane, WA 99206-4776 509-924-9200 FAX 924-92
9405 SW Nimbus Ave, Beaverton, OR 97008-7132 503-906-9200 FAX 906-9210
20332 Empire Ave Suite F-1, Bend, OR 99701-5711 541-383-9310 FAX 382-7588
3209 Denali St, Anchorage, AK 99503-4030 907-334-9200 FAX 334-9210

CHAIN OF CUSTODY REPORT

Work Order #:

CLIENT: Hahn and Associates, Inc.

REPORT TO: Rob Ede
ADDRESS: HAI
PHONE: 503-796-0717 FAX:

INVOICE TO: HAI
- pricing & reporting as per Philip Nomburg.

P.O. NUMBER: 2708-30

PROJECT NAME: 2708-30
PROJECT NUMBER: 2708-30
SAMPLED BY: MWG/APR

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 Specify:

* *Turnaround Requests less than standard may incur Rush Charges.*

PRESERVATIVE: None | HCL | NaOH | NaOH | HNO_3

REQUESTED ANALYSES

CLIENT SAMPLE IDENTIFICATION	SAMPLING DATE/TIME	PAH's EPA 8270 SIM	BTEX EPA 8021	TOT. CYN. EPA 9010	AMEN. CYN. EPA 9010	TOT. METALS EPA 6010	MATRIX (W, S, O)	# OF CONT.	LOCATION / COMMENTS	NCA WO ID
1 2708-040812-MW9-29-001	8-12-04/1516	X	X	X	X	X	W	6	*As, Cr, Cu, Ni, Pb, Zn	
2										
3										
4										
5										
6										
7										
8										
9										
10										

RELEASED BY: Matt Graves DATE: 8-12-04
PRINT NAME: MATT GRAVES FIRM: HAI TIME:

RECEIVED BY: [signature] DATE: 8/13/04
PRINT NAME: Rafi F. FIRM: NCA TIME: 10:05 am

RELEASED BY: DATE:
PRINT NAME: FIRM: TIME:

RECEIVED BY: DATE:
PRINT NAME: FIRM: TIME:

ADDITIONAL REMARKS:

TEMP:

COC REV 1/03

PAGE OF

SCOEPA00013863

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Anchorage 2000 W International Airport Road, Suite A-10, Anchorage, AK 99502-1119
907.563.9200 fax 907.563.9210

November 03, 2004

Rob Ede
Hahn and Associates, Inc.
434 NW Sixth Ave., Suite 203
Portland, OR 97209

RE: NWNG Gasco Site

Enclosed are the results of analyses for samples received by the laboratory on 08/13/04 10:40.
The following list is a summary of the NCA Work Orders contained in this report.
If you have any questions concerning this report, please feel free to contact me.

Work	Project	ProjectNumber
P4H0513	NWNG Gasco Site	HAI 2708-30

Thank You,

Crystal Jones For Philip Nerenberg, Laboratory Manager

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North Creek Analytical, Inc.
Environmental Laboratory Network

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phone: (907) 563.9200 fax: (907) 563.9210

Hahn and Associates, Inc.	Project Name:	**NWNG Gasco Site**	
434 NW Sixth Ave., Suite 203	Project Number:	HAI 2708-30	Report Created:
Portland, OR 97209	Project Manager:	Rob Ede	08/27/04 12:12

ANALYTICAL REPORT FOR SAMPLES

Sample ID	Laboratory ID	Matrix	Date Sampled	Date Received
2708-040812-MW9-29-001	P4H0513-01	Water	08/12/04 15:16	08/13/04 10:40

North Creek Analytical - Portland

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Crystal Jones For Philip Nerenberg, Laboratory Manager

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Hahn and Associates, Inc.	Project Name: **NWNG Gasco Site**	
434 NW Sixth Ave., Suite 203	Project Number: HAI 2708-30	Report Created:
Portland, OR 97209	Project Manager: Rob Ede	08/27/04 12:12

Analyte	Method	Result	MDL*	MRL	Units	Dil	Batch	Prepared	Analyzed	Notes

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Crystal Jones For Philip Nerenberg, Laboratory Manager

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Hahn and Associates, Inc.	Project Name:	**NWNG Gasco Site**	
434 NW Sixth Ave., Suite 203	Project Number:	HAI 2708-30	Report Created:
Portland, OR 97209	Project Manager:	Rob Ede	08/27/04 12:12

BTEX per EPA Method 8021B - Laboratory Quality Control Results

North Creek Analytical - Portland

QC Batch: 4080647 **Water Preparation Method: EPA 5030B**

Analyte	Method	Result	MDL*	MRL	Units	Dil	Source Result	Spike Amt	% REC	(Limits)	% RPD	(Limits)	Analyzed	Notes
Blank (4080647-BLK1)							**Extracted: 08/17/04 08:59**							
Benzene	EPA 8021B	ND	---	0.500	ug/l	1x	--	--	--	--	--	--	08/17/04 09:53	
Toluene	"	ND	---	0.500	"	"	--	--	--	--	--	--	"	
Ethylbenzene	"	ND	---	0.500	"	"	--	--	--	--	--	--	"	
Xylenes (total)	"	ND	---	1.00	"	"	--	--	--	--	--	--	"	
Surrogate(s): 4-BFB (PID)		*Recovery: 104%*			*Limits: 70-130%*	"							*08/17/04 09:53*	
LCS (4080647-BS1)							**Extracted: 08/17/04 08:59**							
Benzene	EPA 8021B	20.0	---	0.500	ug/l	1x	--	20.0	100%	(70-130)	--	--	08/17/04 10:22	
Toluene	"	20.6	---	0.500	"	"	--	"	103%	(76-129)	--	--	"	
Ethylbenzene	"	21.0	---	0.500	"	"	--	"	105%	(82-130)	--	--	"	
Xylenes (total)	"	61.7	---	1.00	"	"	--	60.0	103%	(76-130)	--	--	"	
Surrogate(s): 4-BFB (PID)		*Recovery: 106%*			*Limits: 70-130%*	"							*08/17/04 10:22*	
Matrix Spike (4080647-MS1)					**QC Source: P4H0513-01**		**Extracted: 08/17/04 08:59**							
Benzene	EPA 8021B	18.8	---	0.500	ug/l	1x	ND	20.0	94.0%	(65-144)	--	--	08/17/04 11:59	
Toluene	"	19.1	---	0.500	"	"	ND	"	95.5%	(68-139)	--	--	"	
Ethylbenzene	"	19.4	---	0.500	"	"	ND	"	97.0%	(69-144)	--	--	"	
Xylenes (total)	"	56.6	---	1.00	"	"	ND	60.0	94.3%	(60-144)	--	--	"	
Surrogate(s): 4-BFB (PID)		*Recovery: 96.0%*			*Limits: 70-130%*	"							*08/17/04 11:59*	
Matrix Spike Dup (4080647-MSD1)					**QC Source: P4H0513-01**		**Extracted: 08/17/04 08:59**							
Benzene	EPA 8021B	19.0	---	0.500	ug/l	1x	ND	20.0	95.0%	(65-144)	1.06%	(20)	08/17/04 12:29	
Toluene	"	19.4	---	0.500	"	"	ND	"	97.0%	(68-139)	1.56%	"	"	
Ethylbenzene	"	19.7	---	0.500	"	"	ND	"	98.5%	(69-144)	1.53%	"	"	
Xylenes (total)	"	57.5	---	1.00	"	"	ND	60.0	95.8%	(60-144)	1.58%	"	"	
Surrogate(s): 4-BFB (PID)		*Recovery: 96.8%*			*Limits: 70-130%*	"							*08/17/04 12:29*	

North Creek Analytical - Portland

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Crystal Jones For Philip Nerenberg, Laboratory Manager

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Hahn and Associates, Inc.	Project Name:	**NWNG Gasco Site**	
434 NW Sixth Ave., Suite 203	Project Number:	HAI 2708-30	Report Created:
Portland, OR 97209	Project Manager:	Rob Ede	08/27/04 12:12

Total Metals per EPA 6000/7000 Series Methods - Laboratory Quality Control Results

North Creek Analytical - Portland

QC Batch: 4080802 **Water Preparation Method: EPA 200/3005**

Analyte	Method	Result	MDL*	MRL	Units	Dil	Source Result	Spike Amt	% REC	(Limits)	% RPD	(Limits)	Analyzed	Notes
Blank (4080802-BLK1)								Extracted: 08/19/04 13:11						
Arsenic	EPA 6020	ND	---	0.00100	mg/l	1x	--	--	--	--	--	--	08/21/04 19:41	
Chromium	"	ND	---	0.00100	"	"	--	--	--	--	--	--	08/22/04 18:47	
Copper	"	ND	---	0.00200	"	"	--	--	--	--	--	--	08/21/04 19:41	
Lead	"	ND	---	0.00100	"	"	--	--	--	--	--	--	"	
Nickel	"	ND	---	0.00200	"	"	--	--	--	--	--	--	"	
Zinc	"	ND	---	0.00500	"	"	--	--	--	--	--	--	"	
LCS (4080802-BS1)								Extracted: 08/19/04 13:11						
Arsenic	EPA 6020	0.0944	---	0.00100	mg/l	1x	--	0.100	94.4%	(80-120)	--	--	08/21/04 19:48	
Chromium	"	0.105	---	0.00100	"	"	--	"	105%	"	--	--	"	
Copper	"	0.0987	---	0.00200	"	"	--	"	98.7%	"	--	--	"	
Lead	"	0.0920	---	0.00100	"	"	--	"	92.0%	"	--	--	"	
Nickel	"	0.104	---	0.00200	"	"	--	"	104%	"	--	--	"	
Zinc	"	0.0936	---	0.00500	"	"	--	"	93.6%	"	--	--	"	
LCS Dup (4080802-BSD1)								Extracted: 08/19/04 13:11						
Arsenic	EPA 6020	0.0958	---	0.00100	mg/l	1x	--	0.100	95.8%	(80-120)	1.47%	(20)	08/21/04 19:54	
Chromium	"	0.102	---	0.00100	"	"	--	"	102%	"	2.90%	"	"	
Copper	"	0.0993	---	0.00200	"	"	--	"	99.3%	"	0.606%	"	"	
Lead	"	0.0914	---	0.00100	"	"	--	"	91.4%	"	0.654%	"	"	
Nickel	"	0.102	---	0.00200	"	"	--	"	102%	"	1.94%	"	"	
Zinc	"	0.0939	---	0.00500	"	"	--	"	93.9%	"	0.320%	"	"	
Duplicate (4080802-DUP1)				QC Source: P4H0552-01				Extracted: 08/19/04 13:11						
Arsenic	EPA 6020	0.00144	---	0.00100	mg/l	1x	0.00161	--	--	--	11.1%	(20)	08/21/04 21:04	
Chromium	"	0.00145	---	0.00100	"	"	0.00169	--	--	--	15.3%	"	"	
Copper	"	0.00165	---	0.00200	"	"	ND	--	--	--	NR	"	"	
Lead	"	ND	---	0.00100	"	"	ND	--	--	--	NR	"	"	
Nickel	"	0.0104	---	0.00200	"	"	0.0105	--	--	--	0.957%	"	"	
Zinc	"	0.00402	---	0.00500	"	"	ND	--	--	--	NR	"	"	
Matrix Spike (4080802-MS1)				QC Source: P4H0552-01				Extracted: 08/19/04 13:11						
Arsenic	EPA 6020	0.101	---	0.00100	mg/l	1x	0.00161	0.100	99.4%	(75-125)	--	--	08/21/04 20:01	
Chromium	"	0.104	---	0.00100	"	"	0.00169	"	102%	"	--	--	"	
Copper	"	0.0960	---	0.00200	"	"	ND	"	94.4%	"	--	--	"	
Lead	"	0.0865	---	0.00100	"	"	ND	"	86.5%	"	--	--	"	
Nickel	"	0.110	---	0.00200	"	"	0.0105	"	99.5%	"	--	--	"	
Zinc	"	0.0970	---	0.00500	"	"	ND	"	93.3%	"	--	--	"	

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Crystal Jones For Philip Nerenberg, Laboratory Manager

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Hahn and Associates, Inc.	Project Name: **NWNG Gasco Site**	
434 NW Sixth Ave., Suite 203	Project Number: HAI 2708-30	Report Created:
Portland, OR 97209	Project Manager: Rob Ede	08/27/04 12:12

Total Metals per EPA 6000/7000 Series Methods - Laboratory Quality Control Results

North Creek Analytical - Portland

QC Batch: 4080802 **Water Preparation Method: EPA 200/3005**

Analyte	Method	Result	MDL*	MRL	Units	Dil	Source Result	Spike Amt	% REC	(Limits)	% RPD	(Limits)	Analyzed	Notes
Matrix Spike (4080802-MS2)				**QC Source: P4H0552-02**					**Extracted: 08/19/04 13:11**					
Arsenic	EPA 6020	0.105	---	0.00100	mg/l	1x	0.00772	0.100	97.3%	(75-125)	--	--	08/21/04 20:13	
Chromium	"	0.104	---	0.00100	"	"	0.00180	"	102%	"	--	--	"	
Copper	"	0.0976	---	0.00200	"	"	0.00237	"	95.2%	"	--	--	"	
Lead	"	0.0867	---	0.00100	"	"	ND	"	86.7%	"	--	--	"	
Nickel	"	0.111	---	0.00200	"	"	0.0138	"	97.2%	"	--	--	"	
Zinc	"	0.100	---	0.00500	"	"	0.00613	"	93.9%	"	--	--	"	

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Crystal Jones For Philip Nerenberg, Laboratory Manager

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Hahn and Associates, Inc.	Project Name:	**NWNG Gasco Site**	
434 NW Sixth Ave., Suite 203	Project Number:	HAI 2708-30	Report Created:
Portland, OR 97209	Project Manager:	Rob Ede	08/27/04 12:12

Polynuclear Aromatic Compounds per EPA 8270M-SIM - Laboratory Quality Control Results

North Creek Analytical - Portland

QC Batch: 4080770 **Water Preparation Method: EPA 3520/600 Series**

Analyte	Method	Result	MDL*	MRL	Units	Dil	Source Result	Spike Amt	% REC	(Limits)	% RPD	(Limits)	Analyzed	Notes
Blank (4080770-BLK1)									**Extracted: 08/19/04 08:03**					
Acenaphthene	EPA 8270m	ND	---	0.100	ug/l	1x	--	--	--	--	--	--	08/23/04 19:42	
Acenaphthylene	"	ND	---	0.100	"	"	--	--	--	--	--	--	"	
Anthracene	"	ND	---	0.100	"	"	--	--	--	--	--	--	"	
Benzo (a) anthracene	"	ND	---	0.100	"	"	--	--	--	--	--	--	"	
Benzo (a) pyrene	"	ND	---	0.100	"	"	--	--	--	--	--	--	"	
Benzo (b) fluoranthene	"	ND	---	0.100	"	"	--	--	--	--	--	--	"	
Benzo (ghi) perylene	"	ND	---	0.100	"	"	--	--	--	--	--	--	"	
Benzo (k) fluoranthene	"	ND	---	0.100	"	"	--	--	--	--	--	--	"	
Chrysene	"	ND	---	0.100	"	"	--	--	--	--	--	--	"	
Dibenzo (a,h) anthracene	"	ND	---	0.200	"	"	--	--	--	--	--	--	"	
Fluoranthene	"	ND	---	0.100	"	"	--	--	--	--	--	--	"	
Fluorene	"	ND	---	0.100	"	"	--	--	--	--	--	--	"	
Indeno (1,2,3-cd) pyrene	"	ND	---	0.100	"	"	--	--	--	--	--	--	"	
Naphthalene	"	ND	---	0.100	"	"	--	--	--	--	--	--	"	
Phenanthrene	"	ND	---	0.100	"	"	--	--	--	--	--	--	"	
Pyrene	"	ND	---	0.100	"	"	--	--	--	--	--	--	"	
Surrogate(s): Fluorene-d10		*Recovery: 84.4%*			*Limits: 25-125%*	"							*08/23/04 19:42*	
Pyrene-d10		*63.6%*			*23-150%*	"							"	
Benzo (a) pyrene-d12		*62.0%*			*10-125%*	"							"	
LCS (4080770-BS1)									**Extracted: 08/19/04 08:03**					
Acenaphthene	EPA 8270m	1.64	---	0.100	ug/l	1x	--	2.50	65.6%	(26-135)	--	--	08/23/04 18:43	
Benzo (a) pyrene	"	1.32	---	0.100	"	"	--	"	52.8%	(38-137)	--	--	"	
Pyrene	"	1.33	---	0.100	"	"	--	"	53.2%	(33-133)	--	--	"	
Surrogate(s): Fluorene-d10		*Recovery: 79.6%*			*Limits: 25-125%*	"							*08/23/04 18:43*	
Pyrene-d10		*58.8%*			*23-150%*	"							"	
Benzo (a) pyrene-d12		*57.6%*			*10-125%*	"							"	
LCS Dup (4080770-BSD1)									**Extracted: 08/19/04 08:03**					
Acenaphthene	EPA 8270m	1.77	---	0.100	ug/l	1x	--	2.50	70.8%	(26-135)	7.62%	(60)	08/23/04 19:13	
Benzo (a) pyrene	"	1.35	---	0.100	"	"	--	"	54.0%	(38-137)	2.25%	"	"	
Pyrene	"	1.36	---	0.100	"	"	--	"	54.4%	(33-133)	2.23%	"	"	
Surrogate(s): Fluorene-d10		*Recovery: 83.2%*			*Limits: 25-125%*	"							*08/23/04 19:13*	
Pyrene-d10		*58.0%*			*23-150%*	"							"	
Benzo (a) pyrene-d12		*56.4%*			*10-125%*	"							"	

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Hahn and Associates, Inc.	Project Name: **NWNG Gasco Site**	
434 NW Sixth Ave., Suite 203	Project Number: HAI 2708-30	Report Created:
Portland, OR 97209	Project Manager: Rob Ede	08/27/04 12:12

Conventional Chemistry Parameters per APHA/EPA Methods - Laboratory Quality Control Results

North Creek Analytical - Portland

QC Batch: 4080967 **Water Preparation Method: General Preparation**

Analyte	Method	Result	MDL*	MRL	Units	Dil	Source Result	Spike Amt	% REC	(Limits)	% RPD	(Limits)	Analyzed	Notes
Blank (4080967-BLK1)								**Extracted: 08/24/04 09:59**						
Cyanide (total)	EPA 9012A	ND	---	0.00500	mg/l	1x	--	--	--	--	--	--	08/25/04 15:48	
LCS (4080967-BS1)								**Extracted: 08/24/04 09:59**						
Cyanide (total)	EPA 9012A	0.189	---	0.00500	mg/l	1x	--	0.200	94.5%	(75-125)	--	--	08/25/04 15:48	
Duplicate (4080967-DUP1)				**QC Source: P4H0513-01**					**Extracted: 08/24/04 09:59**					
Cyanide (total)	EPA 9012A	0.0146	---	0.00500	mg/l	1x	0.0125	--	--	--	15.5%	(20)	08/25/04 15:48	
Matrix Spike (4080967-MS1)				**QC Source: P4H0513-01**					**Extracted: 08/24/04 09:59**					
Cyanide (total)	EPA 9012A	0.194	---	0.00500	mg/l	1x	0.0125	0.200	90.8%	(75-125)	--	--	08/25/04 15:48	

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Crystal Jones For Philip Nerenberg, Laboratory Manager

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Hahn and Associates, Inc.	Project Name:	**NWNG Gasco Site**	
434 NW Sixth Ave., Suite 203	Project Number:	HAI 2708-30	Report Created:
Portland, OR 97209	Project Manager:	Rob Ede	08/27/04 12:12

Notes and Definitions

Report Specific Notes:

None

Laboratory Reporting Conventions:

DET - Analyte DETECTED at or above the Reporting Limit. Qualitative Analyses only.

ND - Analyte NOT DETECTED at or above the reporting limit (MDL or MRL, as appropriate).

NR / NA - Not Reported / Not Available

dry - Sample results reported on a dry weight basis. Reporting Limits are corrected for %Solids when %Solids are <50%.

wet - Sample results and reporting limits reported on a wet weight basis (as received).

RPD - Relative Percent Difference. (RPDs calculated using Results, not Percent Recoveries).

MRL - METHOD REPORTING LIMIT. Reporting Level at, or above, the lowest level standard of the Calibration Table.

MDL* - METHOD DETECTION LIMIT. Reporting Level at, or above, the statistically derived limit based on 40CFR, Part 136, Appendix B. *MDLs are listed on the report only if the data has been evaluated below the MRL. Results between the MDL and MRL are reported as Estimated results.

Dil - Dilutions are calculated based on deviations from the standard dilution performed for an analysis, and may not represent the dilution found on the analytical raw data.

Reporting limits - Reporting limits (MDLs and MRLs) are adjusted based on variations in sample preparation amounts, analytical dilutions and percent solids, where applicable.

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3209 Denali St, Anchorage, AK 99503-4030 907-334-9200 FAX 334-9210

CHAIN OF CUSTODY REPORT

Work Order #:

CLIENT: Hahnaw Associates, Inc.

REPORT TO: Rob Ede
ADDRESS: HAI

PHONE: 503-726-0917 FAX:

INVOICE TO:
HAI
pricing & reporting as per Philip Nordberg.

P.O. NUMBER: 2708-30

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 Specify:

* Turnaround Requests less than standard may incur Rush Charges.

PROJECT NAME:

PROJECT NUMBER: 2708-30

SAMPLED BY: MWG/APR

PRESERVATIVE: None | HCL | NaOH | NaOH | H_2SO_3

REQUESTED ANALYSES: PAH's EPA 8270 | BTEX EPA 8021 | Tot. CYN. EPA 9010 | AMEN. CYN. EPA 9012 | Tot. METALS (8) EPA 6010

#	CLIENT SAMPLE IDENTIFICATION	SAMPLING DATE/TIME	PAH's	BTEX	CYN	AMEN. CYN.	METALS	MATRIX (W, S, O)	# OF CONT.	LOCATION / COMMENTS	NCA WO ID
1	2708-040813-MW2-61-002	8-13-04 / 8:55	X	X	X	X	X	W	6	~~(8)~~ As, Cr, Cu, Ni, Pb, Zn	
2	2708-040813-MW13-61-003	8-13-04 / 10:20	X	X	X	X	X	W	6	"	
3	2708-040813-MW7-004	8-13-04 / 11:00	X	X				W	5	"	
4	2708-040813-MW10-61-005	8-13-04 / 12:15	X	X	X	X	X	W	6	"	
5	2708-040813-MW13-61-006	8-13-04 13:57	X	X	X	X	X	W	6	"	
6											
7											
8											
9											
10											

RELEASED BY: Matt Graves — DATE: 8-13-04
PRINT NAME: Matt Graves — FIRM: HAI — TIME:

RECEIVED BY: [signature] — DATE: 8/16/04
PRINT NAME: [illegible] — FIRM: NCA — TIME: 15:27

RELEASED BY: — DATE:
PRINT NAME: — FIRM: — TIME:

RECEIVED BY: — DATE:
PRINT NAME: — FIRM: — TIME:

ADDITIONAL REMARKS:

TEMP:

COC REV 1/03

PAGE OF

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November 03, 2004

Rob Ede
Hahn and Associates, Inc.
434 NW Sixth Ave., Suite 203
Portland, OR 97209

RE: NWNG Gasco Site

Enclosed are the results of analyses for samples received by the laboratory on 08/16/04 17:03.
The following list is a summary of the NCA Work Orders contained in this report.
If you have any questions concerning this report, please feel free to contact me.

Work	Project	ProjectNumber
P4H0552	NWNG Gasco Site	HAI 2708-30

Thank You,

Philip Nerenberg

Philip Nerenberg, Laboratory Manager

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Environmental Laboratory Network

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Hahn and Associates, Inc.	Project Name:	**NWNG Gasco Site**	
434 NW Sixth Ave., Suite 203	Project Number:	HAI 2708-30	Report Created:
Portland, OR 97209	Project Manager:	Rob Ede	11/03/04 13:02

ANALYTICAL REPORT FOR SAMPLES

Sample ID	Laboratory ID	Matrix	Date Sampled	Date Received
2708-040813-MW2-61-002	P4H0552-01	Water	08/13/04 08:55	08/16/04 17:03
2708-040813-MW13-61-003	P4H0552-02	Water	08/13/04 10:20	08/16/04 17:03
2708-040813-MW7-004	P4H0552-03	Water	08/13/04 11:00	08/16/04 17:03
2708-040813-MW10-61-005	P4H0552-04	Water	08/13/04 12:15	08/16/04 17:03
2708-040813-MW15-66-006	P4H0552-05	Water	08/13/04 13:57	08/16/04 17:03

North Creek Analytical - Portland

Philip Nerenberg

Philip Nerenberg, Laboratory Manager

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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Hahn and Associates, Inc.	Project Name:	**NWNG Gasco Site**	
434 NW Sixth Ave., Suite 203	Project Number:	HAI 2708-30	Report Created:
Portland, OR 97209	Project Manager:	Rob Ede	11/03/04 13:02

BTEX per EPA Method 8021B

North Creek Analytical - Portland

Analyte		Method	Result	MDL*	MRL	Units	Dil	Batch	Prepared	Analyzed	Notes
P4H0552-01	**Water**	**2708-040813-MW2-61-002**			**Sampled: 08/13/04 08:55**						
Benzene		EPA 8021B	ND	-----	0.500	ug/l	1x	4080834	08/20/04	08/20/04 11:39	
Toluene		"	ND	-----	0.500	"	"	"	"	"	
Ethylbenzene		"	ND	-----	0.500	"	"	"	"	"	
Xylenes (total)		"	ND	-----	1.00	"	"	"	"	"	
Surrogate(s): 4-BFB (PID)			*Recovery: 110%*		*Limits: 70 - 130 %*		"			"	
P4H0552-02	**Water**	**2708-040813-MW13-61-003**			**Sampled: 08/13/04 10:20**						
Benzene		EPA 8021B	**2.19**	-----	0.500	ug/l	1x	4080834	08/20/04	08/20/04 12:07	
Toluene		"	ND	-----	0.500	"	"	"	"	"	
Ethylbenzene		"	ND	-----	0.500	"	"	"	"	"	
Xylenes (total)		"	ND	-----	1.00	"	"	"	"	"	
Surrogate(s): 4-BFB (PID)			*Recovery: 108%*		*Limits: 70 - 130 %*		"			"	
P4H0552-03	**Water**	**2708-040813-MW7-004**			**Sampled: 08/13/04 11:00**						
Benzene		EPA 8021B	ND	-----	0.500	ug/l	1x	4080834	08/20/04	08/20/04 12:35	
Toluene		"	ND	-----	0.500	"	"	"	"	"	
Ethylbenzene		"	ND	-----	0.500	"	"	"	"	"	
Xylenes (total)		"	ND	-----	1.00	"	"	"	"	"	
Surrogate(s): 4-BFB (PID)			*Recovery: 111%*		*Limits: 70 - 130 %*		"			"	

North Creek Analytical - Portland

Philip Nerenberg

Philip Nerenberg, Laboratory Manager

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Hahn and Associates, Inc.	Project Name: **NWNG Gasco Site**	
434 NW Sixth Ave., Suite 203	Project Number: HAI 2708-30	Report Created:
Portland, OR 97209	Project Manager: Rob Ede	11/03/04 13:02

BTEX per EPA Method 8021B

North Creek Analytical - Portland

Analyte	Method	Result	MDL*	MRL	Units	Dil	Batch	Prepared	Analyzed	Notes
P4H0552-04 Water	**2708-040813-MW10-61-005**			**Sampled: 08/13/04 12:15**						
Benzene	EPA 8021B	ND	-----	0.500	ug/l	1x	4080834	08/20/04	08/20/04 13:03	
Toluene	"	ND	-----	0.500	"	"	"	"	"	
Ethylbenzene	"	ND	-----	0.500	"	"	"	"	"	
Xylenes (total)	"	ND	-----	1.00	"	"	"	"	"	
Surrogate(s): 4-BFB (PID)		*Recovery: 110%*		*Limits: 70 - 130 %*		"			"	
P4H0552-05 Water	**2708-040813-MW15-66-006**			**Sampled: 08/13/04 13:57**						
Benzene	EPA 8021B	ND	-----	0.500	ug/l	1x	4080834	08/20/04	08/20/04 13:32	
Toluene	"	ND	-----	0.500	"	"	"	"	"	
Ethylbenzene	"	ND	-----	0.500	"	"	"	"	"	
Xylenes (total)	"	ND	-----	1.00	"	"	"	"	"	
Surrogate(s): 4-BFB (PID)		*Recovery: 111%*		*Limits: 70 - 130 %*		"			"	

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434 NW Sixth Ave., Suite 203	Project Number: HAI 2708-30	Report Created:
Portland, OR 97209	Project Manager: Rob Ede	11/03/04 13:02

Total Metals per EPA 6000/7000 Series Methods

North Creek Analytical - Portland

Analyte		Method	Result	MDL*	MRL	Units	Dil	Batch	Prepared	Analyzed	Notes
P4H0552-01	**Water**	**2708-040813-MW2-61-002**			**Sampled: 08/13/04 08:55**						
Arsenic		EPA 6020	**0.00161**	-----	0.00100	mg/l	1x	4080802	08/19/04	08/21/04 20:52	
Chromium		"	**0.00169**	-----	0.00100	"	"	"	"	"	
Copper		"	ND	-----	0.00200	"	"	"	"	"	
Lead		"	ND	-----	0.00100	"	"	"	"	"	
Nickel		"	**0.0105**	-----	0.00200	"	"	"	"	"	
Zinc		"	ND	-----	0.00500	"	"	"	"	"	
P4H0552-02	**Water**	**2708-040813-MW13-61-003**			**Sampled: 08/13/04 10:20**						
Arsenic		EPA 6020	**0.00772**	-----	0.00100	mg/l	1x	4080802	08/19/04	08/21/04 21:11	
Chromium		"	**0.00180**	-----	0.00100	"	"	"	"	"	
Copper		"	**0.00237**	-----	0.00200	"	"	"	"	"	
Lead		"	ND	-----	0.00100	"	"	"	"	"	
Nickel		"	**0.0138**	-----	0.00200	"	"	"	"	"	
Zinc		"	**0.00613**	-----	0.00500	"	"	"	"	"	
P4H0552-04	**Water**	**2708-040813-MW10-61-005**			**Sampled: 08/13/04 12:15**						
Arsenic		EPA 6020	**0.00227**	-----	0.00100	mg/l	1x	4080802	08/19/04	08/21/04 21:24	
Chromium		"	**0.00355**	-----	0.00100	"	"	"	"	"	
Copper		"	**0.00414**	-----	0.00200	"	"	"	"	"	
Lead		"	ND	-----	0.00100	"	"	"	"	"	
Nickel		"	**0.0130**	-----	0.00200	"	"	"	"	"	
Zinc		"	**0.0183**	-----	0.00500	"	"	"	"	"	

North Creek Analytical - Portland

Philip Nerenberg

Philip Nerenberg, Laboratory Manager

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Hahn and Associates, Inc.	Project Name: **NWNG Gasco Site**	
434 NW Sixth Ave., Suite 203	Project Number: HAI 2708-30	Report Created:
Portland, OR 97209	Project Manager: Rob Ede	11/03/04 13:02

Total Metals per EPA 6000/7000 Series Methods

North Creek Analytical - Portland

Analyte		Method	Result	MDL*	MRL	Units	Dil	Batch	Prepared	Analyzed	Notes
P4H0552-05	**Water**	**2708-040813-MW15-66-006**			**Sampled: 08/13/04 13:57**						
Arsenic		EPA 6020	**0.00477**	-----	0.00100	mg/l	1x	4080802	08/19/04	08/21/04 21:36	
Chromium		"	**0.00270**	-----	0.00100	"	"	"	"	"	
Copper		"	**0.00295**	-----	0.00200	"	"	"	"	"	
Lead		"	ND	-----	0.00100	"	"	"	"	"	
Nickel		"	**0.00553**	-----	0.00200	"	"	"	"	"	
Zinc		"	**0.00895**	-----	0.00500	"	"	"	"	"	

North Creek Analytical - Portland

Philip Nerenberg

Philip Nerenberg, Laboratory Manager

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Hahn and Associates, Inc.	Project Name: **NWNG Gasco Site**	
434 NW Sixth Ave., Suite 203	Project Number: HAI 2708-30	Report Created:
Portland, OR 97209	Project Manager: Rob Ede	11/03/04 13:02

Polynuclear Aromatic Compounds per EPA 8270M-SIM

North Creek Analytical - Portland

Analyte	Method	Result	MDL*	MRL	Units	Dil	Batch	Prepared	Analyzed	Notes
P4H0552-01 Water	**2708-040813-MW2-61-002**			**Sampled: 08/13/04 08:55**						
Acenaphthene	EPA 8270m	ND	-----	0.100	ug/l	1x	4080770	08/19/04	08/24/04 16:58	
Acenaphthylene	"	ND	-----	0.100	"	"	"	"	"	
Anthracene	"	ND	-----	0.100	"	"	"	"	"	
Benzo (a) anthracene	"	ND	-----	0.100	"	"	"	"	"	
Benzo (a) pyrene	"	ND	-----	0.100	"	"	"	"	"	
Benzo (b) fluoranthene	"	ND	-----	0.100	"	"	"	"	"	
Benzo (ghi) perylene	"	ND	-----	0.100	"	"	"	"	"	
Benzo (k) fluoranthene	"	ND	-----	0.100	"	"	"	"	"	
Chrysene	"	ND	-----	0.100	"	"	"	"	"	
Dibenzo (a,h) anthracene	"	ND	-----	0.200	"	"	"	"	"	
Fluoranthene	"	ND	-----	0.100	"	"	"	"	"	
Fluorene	"	ND	-----	0.100	"	"	"	"	"	
Indeno (1,2,3-cd) pyrene	"	ND	-----	0.100	"	"	"	"	"	
Naphthalene	"	ND	-----	0.100	"	"	"	"	"	
Phenanthrene	"	ND	-----	0.100	"	"	"	"	"	
Pyrene	"	ND	-----	0.100	"	"	"	"	"	
Surrogate(s): Fluorene-d10		*Recovery: 71.4%*		*Limits: 25 - 125 %*	"				"	
Pyrene-d10		*62.6%*		*23 - 150 %*	"				"	
Benzo (a) pyrene-d12		*36.4%*		*10 - 125 %*	"				"	

North Creek Analytical - Portland

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Hahn and Associates, Inc.	Project Name: **NWNG Gasco Site**	
434 NW Sixth Ave., Suite 203	Project Number: HAI 2708-30	Report Created:
Portland, OR 97209	Project Manager: Rob Ede	11/03/04 13:02

Polynuclear Aromatic Compounds per EPA 8270M-SIM

North Creek Analytical - Portland

Analyte	Method	Result	MDL*	MRL	Units	Dil	Batch	Prepared	Analyzed	Notes
P4H0552-02 Water	**2708-040813-MW13-61-003**			**Sampled: 08/13/04 10:20**						
Acenaphthene	EPA 8270m	**0.115**	-----	0.100	ug/l	1x	4080770	08/19/04	08/24/04 17:24	
Acenaphthylene	"	ND	-----	0.100	"	"	"	"	"	
Anthracene	"	ND	-----	0.100	"	"	"	"	"	
Benzo (a) anthracene	"	ND	-----	0.100	"	"	"	"	"	
Benzo (a) pyrene	"	ND	-----	0.100	"	"	"	"	"	
Benzo (b) fluoranthene	"	ND	-----	0.100	"	"	"	"	"	
Benzo (ghi) perylene	"	ND	-----	0.100	"	"	"	"	"	
Benzo (k) fluoranthene	"	ND	-----	0.100	"	"	"	"	"	
Chrysene	"	ND	-----	0.100	"	"	"	"	"	
Dibenzo (a,h) anthracene	"	ND	-----	0.200	"	"	"	"	"	
Fluoranthene	"	ND	-----	0.100	"	"	"	"	"	
Fluorene	"	ND	-----	0.100	"	"	"	"	"	
Indeno (1,2,3-cd) pyrene	"	ND	-----	0.100	"	"	"	"	"	
Naphthalene	"	**0.168**	-----	0.100	"	"	"	"	"	
Phenanthrene	"	ND	-----	0.100	"	"	"	"	"	
Pyrene	"	ND	-----	0.100	"	"	"	"	"	
Surrogate(s): Fluorene-d10	*Recovery: 84.5%*			*Limits: 25 - 125 %*	"				"	
Pyrene-d10	*68.5%*			*23 - 150 %*	"				"	
Benzo (a) pyrene-d12	*47.1%*			*10 - 125 %*	"				"	

North Creek Analytical - Portland

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Hahn and Associates, Inc.	Project Name: **NWNG Gasco Site**	
434 NW Sixth Ave., Suite 203	Project Number: HAI 2708-30	Report Created:
Portland, OR 97209	Project Manager: Rob Ede	11/03/04 13:02

Polynuclear Aromatic Compounds per EPA 8270M-SIM

North Creek Analytical - Portland

Analyte	Method	Result	MDL*	MRL	Units	Dil	Batch	Prepared	Analyzed	Notes
P4H0552-03 Water	**2708-040813-MW7-004**			**Sampled: 08/13/04 11:00**						
Acenaphthene	EPA 8270m	ND	-----	0.100	ug/l	1x	4080770	08/19/04	08/24/04 17:50	
Acenaphthylene	"	ND	-----	0.100	"	"	"	"	"	
Anthracene	"	ND	-----	0.100	"	"	"	"	"	
Benzo (a) anthracene	"	ND	-----	0.100	"	"	"	"	"	
Benzo (a) pyrene	"	ND	-----	0.100	"	"	"	"	"	
Benzo (b) fluoranthene	"	ND	-----	0.100	"	"	"	"	"	
Benzo (ghi) perylene	"	ND	-----	0.100	"	"	"	"	"	
Benzo (k) fluoranthene	"	ND	-----	0.100	"	"	"	"	"	
Chrysene	"	ND	-----	0.100	"	"	"	"	"	
Dibenzo (a,h) anthracene	"	ND	-----	0.200	"	"	"	"	"	
Fluoranthene	"	ND	-----	0.100	"	"	"	"	"	
Fluorene	"	ND	-----	0.100	"	"	"	"	"	
Indeno (1,2,3-cd) pyrene	"	ND	-----	0.100	"	"	"	"	"	
Naphthalene	"	ND	-----	0.100	"	"	"	"	"	
Phenanthrene	"	ND	-----	0.100	"	"	"	"	"	
Pyrene	"	ND	-----	0.100	"	"	"	"	"	
Surrogate(s): Fluorene-d10		*Recovery: 60.9%*		*Limits: 25 - 125 %*		"			"	
Pyrene-d10		*68.9%*		*23 - 150 %*		"			"	
Benzo (a) pyrene-d12		*52.1%*		*10 - 125 %*		"			"	

North Creek Analytical - Portland

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Hahn and Associates, Inc.	Project Name: **NWNG Gasco Site**	
434 NW Sixth Ave., Suite 203	Project Number: HAI 2708-30	Report Created:
Portland, OR 97209	Project Manager: Rob Ede	11/03/04 13:02

Polynuclear Aromatic Compounds per EPA 8270M-SIM

North Creek Analytical - Portland

Analyte	Method	Result	MDL*	MRL	Units	Dil	Batch	Prepared	Analyzed	Notes
P4H0552-04 Water	**2708-040813-MW10-61-005**			**Sampled: 08/13/04 12:15**						
Acenaphthene	EPA 8270m	ND	-----	0.100	ug/l	1x	4080770	08/19/04	08/24/04 18:43	
Acenaphthylene	"	ND	-----	0.100	"	"	"	"	"	
Anthracene	"	ND	-----	0.100	"	"	"	"	"	
Benzo (a) anthracene	"	ND	-----	0.100	"	"	"	"	"	
Benzo (a) pyrene	"	**0.104**	-----	0.100	"	"	"	"	"	
Benzo (b) fluoranthene	"	ND	-----	0.100	"	"	"	"	"	
Benzo (ghi) perylene	"	**0.111**	-----	0.100	"	"	"	"	"	
Benzo (k) fluoranthene	"	ND	-----	0.100	"	"	"	"	"	
Chrysene	"	ND	-----	0.100	"	"	"	"	"	
Dibenzo (a,h) anthracene	"	ND	-----	0.200	"	"	"	"	"	
Fluoranthene	"	**0.135**	-----	0.100	"	"	"	"	"	
Fluorene	"	ND	-----	0.100	"	"	"	"	"	
Indeno (1,2,3-cd) pyrene	"	ND	-----	0.100	"	"	"	"	"	
Naphthalene	"	ND	-----	0.100	"	"	"	"	"	
Phenanthrene	"	ND	-----	0.100	"	"	"	"	"	
Pyrene	"	**0.177**	-----	0.100	"	"	"	"	"	
Surrogate(s): Fluorene-d10		*Recovery: 76.9%*		*Limits: 25 - 125 %*	"				"	
Pyrene-d10		*73.9%*		*23 - 150 %*	"				"	
Benzo (a) pyrene-d12		*62.6%*		*10 - 125 %*	"				"	

North Creek Analytical - Portland

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Hahn and Associates, Inc.	Project Name: **NWNG Gasco Site**	
434 NW Sixth Ave., Suite 203	Project Number: HAI 2708-30	Report Created:
Portland, OR 97209	Project Manager: Rob Ede	11/03/04 13:02

Polynuclear Aromatic Compounds per EPA 8270M-SIM

North Creek Analytical - Portland

Analyte	Method	Result	MDL*	MRL	Units	Dil	Batch	Prepared	Analyzed	Notes
P4H0552-05 Water	**2708-040813-MW15-66-006**			**Sampled: 08/13/04 13:57**						
Acenaphthene	EPA 8270m	ND	-----	0.100	ug/l	1x	4080770	08/19/04	08/24/04 18:17	
Acenaphthylene	"	ND	-----	0.100	"	"	"	"	"	
Anthracene	"	ND	-----	0.100	"	"	"	"	"	
Benzo (a) anthracene	"	ND	-----	0.100	"	"	"	"	"	
Benzo (a) pyrene	"	ND	-----	0.100	"	"	"	"	"	
Benzo (b) fluoranthene	"	ND	-----	0.100	"	"	"	"	"	
Benzo (ghi) perylene	"	ND	-----	0.100	"	"	"	"	"	
Benzo (k) fluoranthene	"	ND	-----	0.100	"	"	"	"	"	
Chrysene	"	ND	-----	0.100	"	"	"	"	"	
Dibenzo (a,h) anthracene	"	ND	-----	0.200	"	"	"	"	"	
Fluoranthene	"	ND	-----	0.100	"	"	"	"	"	
Fluorene	"	ND	-----	0.100	"	"	"	"	"	
Indeno (1,2,3-cd) pyrene	"	ND	-----	0.100	"	"	"	"	"	
Naphthalene	"	ND	-----	0.100	"	"	"	"	"	
Phenanthrene	"	ND	-----	0.100	"	"	"	"	"	
Pyrene	"	ND	-----	0.100	"	"	"	"	"	
Surrogate(s): Fluorene-d10	*Recovery: 69.3%*			*Limits: 25 - 125 %*	"				"	
Pyrene-d10	*76.1%*			*23 - 150 %*	"				"	
Benzo (a) pyrene-d12	*66.4%*			*10 - 125 %*	"				"	

North Creek Analytical - Portland

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Hahn and Associates, Inc.	Project Name: **NWNG Gasco Site**	
434 NW Sixth Ave., Suite 203	Project Number: HAI 2708-30	Report Created:
Portland, OR 97209	Project Manager: Rob Ede	11/03/04 13:02

Conventional Chemistry Parameters per APHA/EPA Methods

North Creek Analytical - Portland

Analyte		Method	Result	MDL*	MRL	Units	Dil	Batch	Prepared	Analyzed	Notes
P4H0552-01	**Water**	**2708-040813-MW2-61-002**			**Sampled: 08/13/04 08:55**						
Cyanide (amenable)		EPA 9010A	**0.0850**	-----	0.0500	mg/l	10x	4080967	08/24/04	08/25/04 15:48	
Cyanide (total)		EPA 9012A	**0.819**	-----	0.0500	"	"	"	"	"	
P4H0552-02	**Water**	**2708-040813-MW13-61-003**			**Sampled: 08/13/04 10:20**						
Cyanide (amenable)		EPA 9010A	**0.0423**	-----	0.00500	mg/l	1x	4080967	08/24/04	08/25/04 15:48	
Cyanide (total)		EPA 9012A	**0.125**	-----	0.00500	"	"	"	"	"	
P4H0552-04	**Water**	**2708-040813-MW10-61-005**			**Sampled: 08/13/04 12:15**						
Cyanide (amenable)		EPA 9010A	**0.0321**	-----	0.00500	mg/l	1x	4080967	08/24/04	08/25/04 15:48	
Cyanide (total)		EPA 9012A	**0.0614**	-----	0.00500	"	"	"	"	"	
P4H0552-05	**Water**	**2708-040813-MW15-66-006**			**Sampled: 08/13/04 13:57**						
Cyanide (amenable)		EPA 9010A	ND	-----	0.00500	mg/l	1x	4080967	08/24/04	08/25/04 15:48	
Cyanide (total)		EPA 9012A	ND	-----	0.00500	"	"	"	"	"	

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Hahn and Associates, Inc.	Project Name:	NWNG Gasco Site	
434 NW Sixth Ave., Suite 203	Project Number:	HAI 2708-30	Report Created:
Portland, OR 97209	Project Manager:	Rob Ede	11/03/04 13:02

BTEX per EPA Method 8021B - Laboratory Quality Control Results

North Creek Analytical - Portland

QC Batch: 4080834 **Water Preparation Method: EPA 5030B**

Analyte	Method	Result	MDL*	MRL	Units	Dil	Source Result	Spike Amt	% REC	(Limits)	% RPD	(Limits)	Analyzed	Notes
Blank (4080834-BLK1)								Extracted: 08/20/04 08:51						
Benzene	EPA 8021B	ND	---	0.500	ug/l	1x	--	--	--	--	--	--	08/20/04 09:43	
Toluene	"	ND	---	0.500	"	"	--	--	--	--	--	--	"	
Ethylbenzene	"	ND	---	0.500	"	"	--	--	--	--	--	--	"	
Xylenes (total)	"	ND	---	1.00	"	"	--	--	--	--	--	--	"	
Surrogate(s): 4-BFB (PID)		*Recovery: 117%*		*Limits: 70-130%*		"							*08/20/04 09:43*	
LCS (4080834-BS1)								Extracted: 08/20/04 08:51						
Benzene	EPA 8021B	22.8	---	0.500	ug/l	1x	--	20.0	114%	(70-130)	--	--	08/20/04 10:10	
Toluene	"	21.6	---	0.500	"	"	--	"	108%	(76-129)	--	--	"	
Ethylbenzene	"	21.9	---	0.500	"	"	--	"	110%	(82-130)	--	--	"	
Xylenes (total)	"	65.2	---	1.00	"	"	--	60.0	109%	(76-130)	--	--	"	
Surrogate(s): 4-BFB (PID)		*Recovery: 110%*		*Limits: 70-130%*		"							*08/20/04 10:10*	
Matrix Spike (4080834-MS1)							QC Source: P4H0552-01	Extracted: 08/20/04 08:51						
Benzene	EPA 8021B	21.7	---	0.500	ug/l	1x	ND	20.0	108%	(65-144)	--	--	08/20/04 10:39	
Toluene	"	20.6	---	0.500	"	"	ND	"	103%	(68-139)	--	--	"	
Ethylbenzene	"	20.7	---	0.500	"	"	ND	"	104%	(69-144)	--	--	"	
Xylenes (total)	"	61.8	---	1.00	"	"	ND	60.0	103%	(60-144)	--	--	"	
Surrogate(s): 4-BFB (PID)		*Recovery: 113%*		*Limits: 70-130%*		"							*08/20/04 10:39*	
Matrix Spike Dup (4080834-MSD1)							QC Source: P4H0552-01	Extracted: 08/20/04 08:51						
Benzene	EPA 8021B	19.2	---	0.500	ug/l	1x	ND	20.0	96.0%	(65-144)	12.2%	(20)	08/20/04 11:07	
Toluene	"	18.4	---	0.500	"	"	ND	"	92.0%	(68-139)	11.3%	"	"	
Ethylbenzene	"	18.5	---	0.500	"	"	ND	"	92.5%	(69-144)	11.2%	"	"	
Xylenes (total)	"	54.8	---	1.00	"	"	ND	60.0	91.3%	(60-144)	12.0%	"	"	
Surrogate(s): 4-BFB (PID)		*Recovery: 112%*		*Limits: 70-130%*		"							*08/20/04 11:07*	

North Creek Analytical - Portland

Philip Nerenberg

Philip Nerenberg, Laboratory Manager

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434 NW Sixth Ave., Suite 203	Project Number: HAI 2708-30	Report Created:
Portland, OR 97209	Project Manager: Rob Ede	11/03/04 13:02

Total Metals per EPA 6000/7000 Series Methods - Laboratory Quality Control Results

North Creek Analytical - Portland

QC Batch: 4080802 **Water Preparation Method: EPA 200/3005**

Analyte	Method	Result	MDL*	MRL	Units	Dil	Source Result	Spike Amt	% REC	(Limits)	% RPD	(Limits)	Analyzed	Notes
Blank (4080802-BLK1)								Extracted: 08/19/04 13:11						
Arsenic	EPA 6020	ND	---	0.00100	mg/l	1x	--	--	--	--	--	--	08/21/04 19:41	
Chromium	"	ND	---	0.00100	"	"	--	--	--	--	--	--	08/22/04 18:47	
Copper	"	ND	---	0.00200	"	"	--	--	--	--	--	--	08/21/04 19:41	
Lead	"	ND	---	0.00100	"	"	--	--	--	--	--	--	"	
Nickel	"	ND	---	0.00200	"	"	--	--	--	--	--	--	"	
Zinc	"	ND	---	0.00500	"	"	--	--	--	--	--	--	"	
LCS (4080802-BS1)								Extracted: 08/19/04 13:11						
Arsenic	EPA 6020	0.0944	---	0.00100	mg/l	1x	--	0.100	94.4%	(80-120)	--	--	08/21/04 19:48	
Chromium	"	0.105	---	0.00100	"	"	--	"	105%	"	--	--	"	
Copper	"	0.0987	---	0.00200	"	"	--	"	98.7%	"	--	--	"	
Lead	"	0.0920	---	0.00100	"	"	--	"	92.0%	"	--	--	"	
Nickel	"	0.104	---	0.00200	"	"	--	"	104%	"	--	--	"	
Zinc	"	0.0936	---	0.00500	"	"	--	"	93.6%	"	--	--	"	
LCS Dup (4080802-BSD1)								Extracted: 08/19/04 13:11						
Arsenic	EPA 6020	0.0958	---	0.00100	mg/l	1x	--	0.100	95.8%	(80-120)	1.47%	(20)	08/21/04 19:54	
Chromium	"	0.102	---	0.00100	"	"	--	"	102%	"	2.90%	"	"	
Copper	"	0.0993	---	0.00200	"	"	--	"	99.3%	"	0.606%	"	"	
Lead	"	0.0914	---	0.00100	"	"	--	"	91.4%	"	0.654%	"	"	
Nickel	"	0.102	---	0.00200	"	"	--	"	102%	"	1.94%	"	"	
Zinc	"	0.0939	---	0.00500	"	"	--	"	93.9%	"	0.320%	"	"	
Duplicate (4080802-DUP1)					QC Source: P4H0552-01				Extracted: 08/19/04 13:11					
Arsenic	EPA 6020	0.00144	---	0.00100	mg/l	1x	0.00161	--	--	--	11.1%	(20)	08/21/04 21:04	
Chromium	"	0.00145	---	0.00100	"	"	0.00169	--	--	--	15.3%	"	"	
Copper	"	0.00165	---	0.00200	"	"	ND	--	--	--	NR	"	"	
Lead	"	ND	---	0.00100	"	"	ND	--	--	--	NR	"	"	
Nickel	"	0.0104	---	0.00200	"	"	0.0105	--	--	--	0.957%	"	"	
Zinc	"	0.00402	---	0.00500	"	"	ND	--	--	--	NR	"	"	
Matrix Spike (4080802-MS1)					QC Source: P4H0552-01				Extracted: 08/19/04 13:11					
Arsenic	EPA 6020	0.101	---	0.00100	mg/l	1x	0.00161	0.100	99.4%	(75-125)	--	--	08/21/04 20:01	
Chromium	"	0.104	---	0.00100	"	"	0.00169	"	102%	"	--	--	"	
Copper	"	0.0960	---	0.00200	"	"	ND	"	94.4%	"	--	--	"	
Lead	"	0.0865	---	0.00100	"	"	ND	"	86.5%	"	--	--	"	
Nickel	"	0.110	---	0.00200	"	"	0.0105	"	99.5%	"	--	--	"	
Zinc	"	0.0970	---	0.00500	"	"	ND	"	93.3%	"	--	--	"	

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.

Philip Nerenberg

Philip Nerenberg, Laboratory Manager

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Hahn and Associates, Inc.	Project Name: **NWNG Gasco Site**	
434 NW Sixth Ave., Suite 203	Project Number: HAI 2708-30	Report Created:
Portland, OR 97209	Project Manager: Rob Ede	11/03/04 13:02

Total Metals per EPA 6000/7000 Series Methods - Laboratory Quality Control Results

North Creek Analytical - Portland

QC Batch: 4080802 **Water Preparation Method: EPA 200/3005**

Analyte	Method	Result	MDL*	MRL	Units	Dil	Source Result	Spike Amt	% REC	(Limits)	% RPD	(Limits)	Analyzed	Notes
Matrix Spike (4080802-MS2)				QC Source: P4H0552-02				Extracted: 08/19/04 13:11						
Arsenic	EPA 6020	0.105	---	0.00100	mg/l	1x	0.00772	0.100	97.3%	(75-125)	--	--	08/21/04 20:13	
Chromium	"	0.104	---	0.00100	"	"	0.00180	"	102%	"	--	--	"	
Copper	"	0.0976	---	0.00200	"	"	0.00237	"	95.2%	"	--	--	"	
Lead	"	0.0867	---	0.00100	"	"	ND	"	86.7%	"	--	--	"	
Nickel	"	0.111	---	0.00200	"	"	0.0138	"	97.2%	"	--	--	"	
Zinc	"	0.100	---	0.00500	"	"	0.00613	"	93.9%	"	--	--	"	

North Creek Analytical - Portland

Philip Nerenberg

Philip Nerenberg, Laboratory Manager

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Hahn and Associates, Inc.	Project Name: **NWNG Gasco Site**	
434 NW Sixth Ave., Suite 203	Project Number: HAI 2708-30	Report Created:
Portland, OR 97209	Project Manager: Rob Ede	11/03/04 13:02

Polynuclear Aromatic Compounds per EPA 8270M-SIM - Laboratory Quality Control Results

North Creek Analytical - Portland

QC Batch: 4080770 **Water Preparation Method: EPA 3520/600 Series**

Analyte	Method	Result	MDL*	MRL	Units	Dil	Source Result	Spike Amt	% REC	(Limits)	% RPD	(Limits)	Analyzed	Notes
Blank (4080770-BLK1)							**Extracted: 08/19/04 08:03**							
Total Aqueous Hydrocarbons (TAqH)	EPA 8270m	ND	---	1.00	ug/l	1x	--	--	--	--	--	--	08/23/04 19:42	
Total PAHs (TPAH)	"	ND	---	0.200	"	"	--	--	--	--	--	--	"	
Acenaphthene	"	ND	---	0.100	"	"	--	--	--	--	--	--	"	
Acenaphthylene	"	ND	---	0.100	"	"	--	--	--	--	--	--	"	
Anthracene	"	ND	---	0.100	"	"	--	--	--	--	--	--	"	
Benzo (a) anthracene	"	ND	---	0.100	"	"	--	--	--	--	--	--	"	
Benzo (a) pyrene	"	ND	---	0.100	"	"	--	--	--	--	--	--	"	
Benzo (b) fluoranthene	"	ND	---	0.100	"	"	--	--	--	--	--	--	"	
Benzo (ghi) perylene	"	ND	---	0.100	"	"	--	--	--	--	--	--	"	
Benzo (k) fluoranthene	"	ND	---	0.100	"	"	--	--	--	--	--	--	"	
Chrysene	"	ND	---	0.100	"	"	--	--	--	--	--	--	"	
Dibenzo (a,h) anthracene	"	ND	---	0.200	"	"	--	--	--	--	--	--	"	
Fluoranthene	"	ND	---	0.100	"	"	--	--	--	--	--	--	"	
Fluorene	"	ND	---	0.100	"	"	--	--	--	--	--	--	"	
Indeno (1,2,3-cd) pyrene	"	ND	---	0.100	"	"	--	--	--	--	--	--	"	
Naphthalene	"	ND	---	0.100	"	"	--	--	--	--	--	--	"	
Phenanthrene	"	ND	---	0.100	"	"	--	--	--	--	--	--	"	
Pyrene	"	ND	---	0.100	"	"	--	--	--	--	--	--	"	
Surrogate(s): Fluorene-d10		*Recovery: 84.4%*			*Limits: 25-125%*	"							*08/23/04 19:42*	
Pyrene-d10		*63.6%*			*23-150%*	"							"	
Benzo (a) pyrene-d12		*62.0%*			*10-125%*	"							"	
LCS (4080770-BS1)							**Extracted: 08/19/04 08:03**							
Acenaphthene	EPA 8270m	1.64	---	0.100	ug/l	1x	--	2.50	65.6%	(26-135)	--	--	08/23/04 18:43	
Benzo (a) pyrene	"	1.32	---	0.100	"	"	--	"	52.8%	(38-137)	--	--	"	
Pyrene	"	1.33	---	0.100	"	"	--	"	53.2%	(33-133)	--	--	"	
Surrogate(s): Fluorene-d10		*Recovery: 79.6%*			*Limits: 25-125%*	"							*08/23/04 18:43*	
Pyrene-d10		*58.8%*			*23-150%*	"							"	
Benzo (a) pyrene-d12		*57.6%*			*10-125%*	"							"	

North Creek Analytical - Portland

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Philip Nerenberg

Philip Nerenberg, Laboratory Manager

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Hahn and Associates, Inc.	Project Name: **NWNG Gasco Site**	
434 NW Sixth Ave., Suite 203	Project Number: HAI 2708-30	Report Created:
Portland, OR 97209	Project Manager: Rob Ede	11/03/04 13:02

Polynuclear Aromatic Compounds per EPA 8270M-SIM - Laboratory Quality Control Results

North Creek Analytical - Portland

QC Batch: 4080770 **Water Preparation Method: EPA 3520/600 Series**

Analyte	Method	Result	MDL*	MRL	Units	Dil	Source Result	Spike Amt	% REC	(Limits)	% RPD	(Limits)	Analyzed	Notes
LCS Dup (4080770-BSD1)							**Extracted: 08/19/04 08:03**							
Acenaphthene	EPA 8270m	1.77	---	0.100	ug/l	1x	--	2.50	70.8%	(26-135)	7.62%	(60)	08/23/04 19:13	
Benzo (a) pyrene	"	1.35	---	0.100	"	"	--	"	54.0%	(38-137)	2.25%	"	"	
Pyrene	"	1.36	---	0.100	"	"	--	"	54.4%	(33-133)	2.23%	"	"	
Surrogate(s): Fluorene-d10		*Recovery: 83.2%*			*Limits: 25-125%*	"							*08/23/04 19:13*	
Pyrene-d10		*58.0%*			*23-150%*	"							"	
Benzo (a) pyrene-d12		*56.4%*			*10-125%*	"							"	

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.

Philip Nerenberg

Philip Nerenberg, Laboratory Manager

North Creek Analytical, Inc.
Environmental Laboratory Network

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Hahn and Associates, Inc.	Project Name: **NWNG Gasco Site**	
434 NW Sixth Ave., Suite 203	Project Number: HAI 2708-30	Report Created:
Portland, OR 97209	Project Manager: Rob Ede	11/03/04 13:02

Conventional Chemistry Parameters per APHA/EPA Methods - Laboratory Quality Control Results

North Creek Analytical - Portland

QC Batch: 4080967 **Water Preparation Method: General Preparation**

Analyte	Method	Result	MDL*	MRL	Units	Dil	Source Result	Spike Amt	% REC	(Limits)	% RPD	(Limits)	Analyzed	Notes
Blank (4080967-BLK1)								Extracted: 08/24/04 09:59						
Cyanide (total)	EPA 9012A	ND	---	0.00500	mg/l	1x	--	--	--	--	--	--	08/25/04 15:48	
LCS (4080967-BS1)								Extracted: 08/24/04 09:59						
Cyanide (total)	EPA 9012A	0.189	---	0.00500	mg/l	1x	--	0.200	94.5%	(75-125)	--	--	08/25/04 15:48	
Duplicate (4080967-DUP1)				QC Source: P4H0513-01				Extracted: 08/24/04 09:59						
Cyanide (total)	EPA 9012A	0.0146	---	0.00500	mg/l	1x	0.0125	--	--	--	15.5%	(20)	08/25/04 15:48	
Matrix Spike (4080967-MS1)				QC Source: P4H0513-01				Extracted: 08/24/04 09:59						
Cyanide (total)	EPA 9012A	0.194	---	0.00500	mg/l	1x	0.0125	0.200	90.8%	(75-125)	--	--	08/25/04 15:48	

North Creek Analytical - Portland

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Philip Nerenberg

Philip Nerenberg, Laboratory Manager

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Hahn and Associates, Inc.	Project Name:	**NWNG Gasco Site**	
434 NW Sixth Ave., Suite 203	Project Number:	HAI 2708-30	Report Created:
Portland, OR 97209	Project Manager:	Rob Ede	11/03/04 13:02

Notes and Definitions

Report Specific Notes:

None

Laboratory Reporting Conventions:

DET - Analyte DETECTED at or above the Reporting Limit. Qualitative Analyses only.

ND - Analyte NOT DETECTED at or above the reporting limit (MDL or MRL, as appropriate).

NR / NA - Not Reported / Not Available

dry - Sample results reported on a dry weight basis. Reporting Limits are corrected for %Solids when %Solids are <50%.

wet - Sample results and reporting limits reported on a wet weight basis (as received).

RPD - Relative Percent Difference. (RPDs calculated using Results, not Percent Recoveries).

MRL - METHOD REPORTING LIMIT. Reporting Level at, or above, the lowest level standard of the Calibration Table.

MDL* - METHOD DETECTION LIMIT. Reporting Level at, or above, the statistically derived limit based on 40CFR, Part 136, Appendix B. *MDLs are listed on the report only if the data has been evaluated below the MRL. Results between the MDL and MRL are reported as Estimated results.

Dil - Dilutions are calculated based on deviations from the standard dilution performed for an analysis, and may not represent the dilution found on the analytical raw data.

Reporting limits - Reporting limits (MDLs and MRLs) are adjusted based on variations in sample preparation amounts, analytical dilutions and percent solids, where applicable.

SCOEPA00013892

nca

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3209 Denali St, Anchorage, AK 99503-4030 907-334-9200 FAX 334-92

CHAIN OF CUSTODY REPORT

Work Order #:

CLIENT: HAI

REPORT TO: Rob Eck
ADDRESS: HAI

PHONE: 5-3-76-0717 FAX:

INVOICE TO: HAI
pricing and reporting as per Philip N.
*AS, Cr, Cu, Ni, Pb, Zn

P.O. NUMBER: 2708-30

PROJECT NAME: NW NATURAL

PROJECT NUMBER: 2708-30

SAMPLED BY: MWG/APR

TURNAROUND REQUEST
in Business Days *

Organic & Inorganic Analyses: X10 (STD.) | 7 | 5 | 4 | 3 | 2 | 1 | <1

Petroleum Hydrocarbon Analyses: X5 (STD.) | 4 | 3 | 2 | 1 | <1

OTHER Specify:

* *Turnaround Requests less than standard may incur Rush Charges.*

PRESERVATIVE: NONE | HCL | NaOH | NaOH | HNO_3

REQUESTED ANALYSES

	CLIENT SAMPLE IDENTIFICATION	SAMPLING DATE/TIME	PAH EPA 8270	BTEX EPA 8021	TOT. CYN. EPA 9010	AMEN. CYN. EPA 9010	TOT. METALS EPA 601	MATRIX (W, S, O)	# OF CONT.	LOCATION / COMMENTS	NCA WO ID
1	2708-040816-MW4-104-007	8-16-04 9:50	X	X	X	X	X	W	6		
2	2708-040816-MW5-32-008	8-16-04 11:20	X	X	X	X	X	W	6		
3	2708-040816-MW2-32-009	8-16-04 13:05	X	X	X	X	X	W	6		
4											
5											
6											
7											
8											
9											
10											

RELEASED BY: MATT GRAVES DATE: 8-17-04
PRINT NAME: Matt Graves FIRM: HAI TIME:

RECEIVED BY: [signature] DATE: 8/17/04
PRINT NAME: Bob F FIRM: NCA TIME: 17:35

RELEASED BY: DATE:
PRINT NAME: FIRM: TIME:

RECEIVED BY: DATE:
PRINT NAME: FIRM: TIME:

ADDITIONAL REMARKS:

TEMP:

PAGE OF

COC REV 1/03

SCOEPA00013893

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1 September, 2004

Rob Ede
Hahn and Associates, Inc.
434 NW Sixth Ave., Suite 203
Portland, OR 97209

RE: Northwest Natural

Enclosed are the results of analyses for samples received by the laboratory on 08/17/04 18:06. 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:
P4H0592

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Hahn and Associates, Inc.	Project: Northwest Natural	
434 NW Sixth Ave., Suite 203	Project Number: 2708-30	**Reported:**
Portland, OR 97209	Project Manager: Rob Ede	09/01/04 20:54

ANALYTICAL REPORT FOR SAMPLES

Sample ID	Laboratory ID	Matrix	Date Sampled	Date Received
2708-040816-MW4-101-007	P4H0592-01	Water	08/16/04 09:50	08/17/04 18:06
2708-040816-MW5-32-008	P4H0592-02	Water	08/16/04 11:20	08/17/04 18:06
2708-040816-MW2-32-009	P4H0592-03	Water	08/16/04 13:05	08/17/04 18:06

North Creek Analytical - Portland

Howard Holmes, Project Manager

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Hahn and Associates, Inc.	Project: Northwest Natural	
434 NW Sixth Ave., Suite 203	Project Number: 2708-30	**Reported:**
Portland, OR 97209	Project Manager: Rob Ede	09/01/04 20:54

BTEX per EPA Method 8021B

North Creek Analytical - Portland

Analyte	Result	Reporting Limit	Units	Dilution	Method	Prepared	Analyzed	Batch	Notes
2708-040816-MW4-101-007 (P4H0592-01) Water					Sampled: 08/16/04 Received: 08/17/04				
Benzene	**513**	2.50	ug/l	5	EPA 8021B	08/20/04	08/20/04	4080834	
Toluene	ND	2.50	"	"	"	"	"	"	
Ethylbenzene	**3.14**	2.50	"	"	"	"	"	"	
Xylenes (total)	ND	5.00	"	"	"	"	"	"	
Surr: 4-BFB (PID)	*112 %*	*70-130*							
2708-040816-MW5-32-008 (P4H0592-02) Water					Sampled: 08/16/04 Received: 08/17/04				
Benzene	ND	0.500	ug/l	1	EPA 8021B	08/20/04	08/20/04	4080834	
Toluene	ND	0.500	"	"	"	"	"	"	
Ethylbenzene	ND	0.500	"	"	"	"	"	"	
Xylenes (total)	ND	1.00	"	"	"	"	"	"	
Surr: 4-BFB (PID)	*113 %*	*70-130*							
2708-040816-MW2-32-009 (P4H0592-03) Water					Sampled: 08/16/04 Received: 08/17/04				
Benzene	ND	0.500	ug/l	1	EPA 8021B	08/20/04	08/20/04	4080834	
Toluene	ND	0.500	"	"	"	"	"	"	
Ethylbenzene	ND	0.500	"	"	"	"	"	"	
Xylenes (total)	ND	1.00	"	"	"	"	"	"	
Surr: 4-BFB (PID)	*115 %*	*70-130*							

North Creek Analytical - Portland

Howard Holmes, Project Manager

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Hahn and Associates, Inc.	Project: Northwest Natural	
434 NW Sixth Ave., Suite 203	Project Number: 2708-30	**Reported:**
Portland, OR 97209	Project Manager: Rob Ede	09/01/04 20:54

Total Metals per EPA 6000/7000 Series Methods

North Creek Analytical - Portland

Analyte	Result	Reporting Limit	Units	Dilution	Method	Prepared	Analyzed	Batch	Notes
2708-040816-MW4-101-007 (P4H0592-01) Water					Sampled: 08/16/04 Received: 08/17/04				
Arsenic	**0.0142**	0.00100	mg/l	1	EPA 6010B	08/18/04	09/01/04	4080719	M-01
Chromium	ND	0.00100	"	"	"	"	"	"	M-01
Copper	ND	0.00200	"	"	"	"	"	"	M-01
Lead	ND	0.00100	"	"	"	"	"	"	M-01
Nickel	ND	0.00200	"	"	"	"	"	"	M-01
Zinc	ND	0.00500	"	"	"	"	"	"	M-01
2708-040816-MW5-32-008 (P4H0592-02) Water					Sampled: 08/16/04 Received: 08/17/04				
Arsenic	ND	0.00100	mg/l	1	EPA 6010B	08/18/04	09/01/04	4080719	M-01
Chromium	ND	0.00100	"	"	"	"	"	"	M-01
Copper	ND	0.00200	"	"	"	"	"	"	M-01
Lead	ND	0.00100	"	"	"	"	"	"	M-01
Nickel	**0.00359**	0.00200	"	"	"	"	"	"	M-01
Zinc	ND	0.00500	"	"	"	"	"	"	M-01
2708-040816-MW2-32-009 (P4H0592-03) Water					Sampled: 08/16/04 Received: 08/17/04				
Arsenic	**0.00108**	0.00100	mg/l	1	EPA 6010B	08/18/04	09/01/04	4080719	M-01
Chromium	ND	0.00100	"	"	"	"	"	"	M-01
Copper	ND	0.00200	"	"	"	"	"	"	M-01
Lead	ND	0.00100	"	"	"	"	"	"	M-01
Nickel	**0.00621**	0.00200	"	"	"	"	"	"	M-01
Zinc	ND	0.00500	"	"	"	"	"	"	M-01

North Creek Analytical - Portland

Howard Holmes, Project Manager

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Hahn and Associates, Inc.	Project: Northwest Natural	
434 NW Sixth Ave., Suite 203	Project Number: 2708-30	**Reported:**
Portland, OR 97209	Project Manager: Rob Ede	09/01/04 20:54

Polynuclear Aromatic Compounds per EPA 8270M-SIM

North Creek Analytical - Portland

Analyte	Result	Reporting Limit	Units	Dilution	Method	Prepared	Analyzed	Batch	Notes
2708-040816-MW4-101-007 (P4H0592-01) Water					Sampled: 08/16/04 Received: 08/17/04				
Acenaphthene	**0.541**	0.100	ug/l	1	EPA 8270m	08/19/04	08/24/04	4080770	
Acenaphthylene	ND	0.100	"	"	"	"	"	"	
Anthracene	ND	0.100	"	"	"	"	"	"	
Benzo (a) anthracene	ND	0.100	"	"	"	"	"	"	
Benzo (a) pyrene	ND	0.100	"	"	"	"	"	"	
Benzo (b) fluoranthene	ND	0.100	"	"	"	"	"	"	
Benzo (ghi) perylene	ND	0.100	"	"	"	"	"	"	
Benzo (k) fluoranthene	ND	0.100	"	"	"	"	"	"	
Chrysene	ND	0.100	"	"	"	"	"	"	
Dibenzo (a,h) anthracene	ND	0.200	"	"	"	"	"	"	
Fluoranthene	ND	0.100	"	"	"	"	"	"	
Fluorene	ND	0.100	"	"	"	"	"	"	
Indeno (1,2,3-cd) pyrene	ND	0.100	"	"	"	"	"	"	
Naphthalene	**26.2**	1.00	"	10	"	"	08/25/04	"	
Phenanthrene	ND	0.100	"	1	"	"	08/24/04	"	
Pyrene	ND	0.100	"	"	"	"	"	"	
Surr: Fluorene-d10	*76.9 %*	*25-125*							
Surr: Pyrene-d10	*70.6 %*	*23-150*							
Surr: Benzo (a) pyrene-d12	*45.0 %*	*10-125*							
2708-040816-MW5-32-008 (P4H0592-02) Water					Sampled: 08/16/04 Received: 08/17/04				
Acenaphthene	ND	0.100	ug/l	1	EPA 8270m	08/19/04	08/24/04	4080770	
Acenaphthylene	ND	0.100	"	"	"	"	"	"	
Anthracene	ND	0.100	"	"	"	"	"	"	
Benzo (a) anthracene	ND	0.100	"	"	"	"	"	"	
Benzo (a) pyrene	ND	0.100	"	"	"	"	"	"	
Benzo (b) fluoranthene	ND	0.100	"	"	"	"	"	"	
Benzo (ghi) perylene	ND	0.100	"	"	"	"	"	"	
Benzo (k) fluoranthene	ND	0.100	"	"	"	"	"	"	
Chrysene	ND	0.100	"	"	"	"	"	"	
Dibenzo (a,h) anthracene	ND	0.200	"	"	"	"	"	"	
Fluoranthene	ND	0.100	"	"	"	"	"	"	
Fluorene	ND	0.100	"	"	"	"	"	"	
Indeno (1,2,3-cd) pyrene	ND	0.100	"	"	"	"	"	"	
Naphthalene	ND	0.100	"	"	"	"	"	"	
Phenanthrene	ND	0.100	"	"	"	"	"	"	
Pyrene	**0.269**	0.100	"	"	"	"	"	"	

North Creek Analytical - Portland

Howard Holmes, Project Manager

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Hahn and Associates, Inc.	Project: Northwest Natural	
434 NW Sixth Ave., Suite 203	Project Number: 2708-30	**Reported:**
Portland, OR 97209	Project Manager: Rob Ede	09/01/04 20:54

Polynuclear Aromatic Compounds per EPA 8270M-SIM

North Creek Analytical - Portland

Analyte	Result	Reporting Limit	Units	Dilution	Method	Prepared	Analyzed	Batch	Notes
2708-040816-MW5-32-008 (P4H0592-02) Water						Sampled: 08/16/04	Received: 08/17/04		
Surr: Fluorene-d10	*85.0 %*	*25-125*							
Surr: Pyrene-d10	*64.6 %*	*23-150*							
Surr: Benzo (a) pyrene-d12	*60.4 %*	*10-125*							
2708-040816-MW2-32-009 (P4H0592-03) Water						Sampled: 08/16/04	Received: 08/17/04		
Acenaphthene	ND	0.100	ug/l	1	EPA 8270m	08/19/04	08/24/04	4080770	
Acenaphthylene	ND	0.100	"	"	"	"	"	"	
Anthracene	ND	0.100	"	"	"	"	"	"	
Benzo (a) anthracene	ND	0.100	"	"	"	"	"	"	
Benzo (a) pyrene	ND	0.100	"	"	"	"	"	"	
Benzo (b) fluoranthene	ND	0.100	"	"	"	"	"	"	
Benzo (ghi) perylene	ND	0.100	"	"	"	"	"	"	
Benzo (k) fluoranthene	ND	0.100	"	"	"	"	"	"	
Chrysene	ND	0.100	"	"	"	"	"	"	
Dibenzo (a,h) anthracene	ND	0.200	"	"	"	"	"	"	
Fluoranthene	ND	0.100	"	"	"	"	"	"	
Fluorene	ND	0.100	"	"	"	"	"	"	
Indeno (1,2,3-cd) pyrene	ND	0.100	"	"	"	"	"	"	
Naphthalene	ND	0.100	"	"	"	"	"	"	
Phenanthrene	ND	0.100	"	"	"	"	"	"	
Pyrene	ND	0.100	"	"	"	"	"	"	
Surr: Fluorene-d10	*79.7 %*	*25-125*							
Surr: Pyrene-d10	*62.7 %*	*23-150*							
Surr: Benzo (a) pyrene-d12	*58.9 %*	*10-125*							

North Creek Analytical - Portland

Howard Holmes, Project Manager

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Hahn and Associates, Inc.	Project: Northwest Natural	
434 NW Sixth Ave., Suite 203	Project Number: 2708-30	**Reported:**
Portland, OR 97209	Project Manager: Rob Ede	09/01/04 20:54

Conventional Chemistry Parameters per APHA/EPA Methods

North Creek Analytical - Portland

Analyte	Result	Reporting Limit	Units	Dilution	Method	Prepared	Analyzed	Batch	Notes
2708-040816-MW4-101-007 (P4H0592-01) Water					Sampled: 08/16/04 Received: 08/17/04				
Cyanide (amenable)	ND	0.00500	mg/l	1	EPA 9010A	08/24/04	08/25/04	4080967	
Cyanide (total)	ND	0.00500	"	"	EPA 9012A	"	"	"	
2708-040816-MW5-32-008 (P4H0592-02) Water					Sampled: 08/16/04 Received: 08/17/04				
Cyanide (amenable)	**0.175**	0.00500	mg/l	1	EPA 9010A	08/24/04	08/25/04	4080967	
Cyanide (total)	**0.521**	0.00500	"	"	EPA 9012A	"	"	"	
2708-040816-MW2-32-009 (P4H0592-03) Water					Sampled: 08/16/04 Received: 08/17/04				
Cyanide (amenable)	**0.0285**	0.00500	mg/l	1	EPA 9010A	08/24/04	08/25/04	4080967	
Cyanide (total)	**0.0835**	0.00500	"	"	EPA 9012A	"	"	"	

North Creek Analytical - Portland

Howard Holmes, Project Manager

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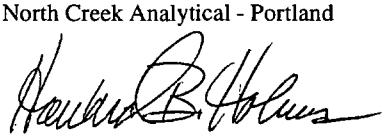
Hahn and Associates, Inc.	Project: Northwest Natural	
434 NW Sixth Ave., Suite 203	Project Number: 2708-30	**Reported:**
Portland, OR 97209	Project Manager: Rob Ede	09/01/04 20:54

BTEX per EPA Method 8021B - Quality Control

North Creek Analytical - Portland

Analyte	Result	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
Batch 4080834 - EPA 5030B										
Blank (4080834-BLK1)				Prepared & Analyzed: 08/20/04						
Benzene	ND	0.500	ug/l							
Toluene	ND	0.500	"							
Ethylbenzene	ND	0.500	"							
Xylenes (total)	ND	1.00	"							
Surr: 4-BFB (PID)	*58.5*		"	*50.0*		*117*	*70-130*			
LCS (4080834-BS1)				Prepared & Analyzed: 08/20/04						
Benzene	22.8	0.500	ug/l	20.0		114	70-130			
Toluene	21.6	0.500	"	20.0		108	76-129			
Ethylbenzene	21.9	0.500	"	20.0		110	82-130			
Xylenes (total)	65.2	1.00	"	60.0		109	76-130			
Surr: 4-BFB (PID)	*55.2*		"	*50.0*		*110*	*70-130*			
Matrix Spike (4080834-MS1)		**Source: P4H0552-01**		Prepared & Analyzed: 08/20/04						
Benzene	21.7	0.500	ug/l	20.0	ND	108	65-144			
Toluene	20.6	0.500	"	20.0	ND	103	68-139			
Ethylbenzene	20.7	0.500	"	20.0	ND	104	69-144			
Xylenes (total)	61.8	1.00	"	60.0	ND	103	60-144			
Surr: 4-BFB (PID)	*56.5*		"	*50.0*		*113*	*70-130*			
Matrix Spike Dup (4080834-MSD1)		**Source: P4H0552-01**		Prepared & Analyzed: 08/20/04						
Benzene	19.2	0.500	ug/l	20.0	ND	96.0	65-144	12.2	20	
Toluene	18.4	0.500	"	20.0	ND	92.0	68-139	11.3	20	
Ethylbenzene	18.5	0.500	"	20.0	ND	92.5	69-144	11.2	20	
Xylenes (total)	54.8	1.00	"	60.0	ND	91.3	60-144	12.0	20	
Surr: 4-BFB (PID)	*56.1*		"	*50.0*		*112*	*70-130*			

North Creek Analytical - Portland



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Hahn and Associates, Inc.	Project: Northwest Natural	
434 NW Sixth Ave., Suite 203	Project Number: 2708-30	**Reported:**
Portland, OR 97209	Project Manager: Rob Ede	09/01/04 20:54

Total Metals per EPA 6000/7000 Series Methods - Quality Control

North Creek Analytical - Portland

Analyte	Result	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
Batch 4080719 - EPA 200/3005										
Blank (4080719-BLK1)				Prepared: 08/18/04 Analyzed: 09/01/04						
Arsenic	ND	0.00100	mg/l							M-01
Chromium	ND	0.00100	"							M-01
Copper	ND	0.00200	"							M-01
Lead	ND	0.00100	"							M-01
Nickel	ND	0.00200	"							M-01
Zinc	ND	0.00500	"							M-01
LCS (4080719-BS1)				Prepared: 08/18/04 Analyzed: 08/19/04						
Arsenic	0.969	0.0100	mg/l	1.00		96.9	80-120			M-01
Chromium	0.478	0.0100	"	0.500		95.6	80-120			M-01
Copper	0.484	0.0200	"	0.500		96.8	80-120			M-01
Lead	0.962	0.0100	"	1.00		96.2	80-120			M-01
Nickel	0.477	0.0200	"	0.500		95.4	80-120			M-01
Zinc	0.494	0.0500	"	0.500		98.8	80-120			M-01
LCS Dup (4080719-BSD1)				Prepared: 08/18/04 Analyzed: 08/19/04						
Arsenic	0.940	0.0100	mg/l	1.00		94.0	80-120	3.04	20	M-01
Chromium	0.475	0.0100	"	0.500		95.0	80-120	0.630	20	M-01
Copper	0.462	0.0200	"	0.500		92.4	80-120	4.65	20	M-01
Lead	0.968	0.0100	"	1.00		96.8	80-120	0.622	20	M-01
Nickel	0.469	0.0200	"	0.500		93.8	80-120	1.69	20	M-01
Zinc	0.495	0.0500	"	0.500		99.0	80-120	0.202	20	M-01
Duplicate (4080719-DUP1)		**Source: P4H0586-01**		Prepared: 08/18/04 Analyzed: 08/19/04						
Arsenic	ND	0.0100	mg/l		0.00460				20	M-01
Chromium	ND	0.0100	"		ND			NA	20	M-01
Copper	ND	0.0200	"		ND			NA	20	M-01
Lead	ND	0.0100	"		ND			NA	20	M-01
Nickel	ND	0.0200	"		ND			NA	20	M-01
Zinc	ND	0.0500	"		ND			NA	20	M-01

North Creek Analytical - Portland

Howard Holmes, Project Manager

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Hahn and Associates, Inc.	Project: Northwest Natural	
434 NW Sixth Ave., Suite 203	Project Number: 2708-30	**Reported:**
Portland, OR 97209	Project Manager: Rob Ede	09/01/04 20:54

Total Metals per EPA 6000/7000 Series Methods - Quality Control

North Creek Analytical - Portland

Analyte	Result	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
Batch 4080719 - EPA 200/3005										
Matrix Spike (4080719-MS1)	**Source: P4H0586-01**			Prepared: 08/18/04		Analyzed: 08/19/04				
Arsenic	0.990	0.0100	mg/l	1.00	0.00460	98.5	75-125			M-01
Chromium	0.491	0.0100	"	0.500	ND	98.2	75-125			M-01
Copper	0.484	0.0200	"	0.500	ND	96.8	75-125			M-01
Lead	0.970	0.0100	"	1.00	ND	97.0	75-125			M-01
Nickel	0.484	0.0200	"	0.500	ND	96.8	75-125			M-01
Zinc	0.509	0.0500	"	0.500	ND	102	75-125			M-01
Matrix Spike (4080719-MS2)	**Source: P4H0586-04**			Prepared: 08/18/04		Analyzed: 08/19/04				
Arsenic	1.02	0.0100	mg/l	1.00	ND	102	75-125			M-01
Chromium	0.498	0.0100	"	0.500	ND	99.6	75-125			M-01
Copper	0.504	0.0200	"	0.500	ND	101	75-125			M-01
Lead	1.00	0.0100	"	1.00	ND	100	75-125			M-01
Nickel	0.500	0.0200	"	0.500	ND	100	75-125			M-01
Zinc	0.610	0.0500	"	0.500	0.103	101	75-125			M-01

North Creek Analytical - Portland

Howard Holmes, Project Manager

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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Hahn and Associates, Inc.	Project: Northwest Natural	
434 NW Sixth Ave., Suite 203	Project Number: 2708-30	**Reported:**
Portland, OR 97209	Project Manager: Rob Ede	09/01/04 20:54

Polynuclear Aromatic Compounds per EPA 8270M-SIM - Quality Control

North Creek Analytical - Portland

Analyte	Result	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
Batch 4080770 - EPA 3520/600 Series										
Blank (4080770-BLK1)				Prepared: 08/19/04 Analyzed: 08/23/04						
Acenaphthene	ND	0.100	ug/l							
Acenaphthylene	ND	0.100	"							
Anthracene	ND	0.100	"							
Benzo (a) anthracene	ND	0.100	"							
Benzo (a) pyrene	ND	0.100	"							
Benzo (b) fluoranthene	ND	0.100	"							
Benzo (ghi) perylene	ND	0.100	"							
Benzo (k) fluoranthene	ND	0.100	"							
Chrysene	ND	0.100	"							
Dibenzo (a,h) anthracene	ND	0.200	"							
Fluoranthene	ND	0.100	"							
Fluorene	ND	0.100	"							
Indeno (1,2,3-cd) pyrene	ND	0.100	"							
Naphthalene	ND	0.100	"							
Phenanthrene	ND	0.100	"							
Pyrene	ND	0.100	"							
Surr: Fluorene-d10	*2.11*		"	*2.50*		*84.4*	*25-125*			
Surr: Pyrene-d10	*1.59*		"	*2.50*		*63.6*	*23-150*			
Surr: Benzo (a) pyrene-d12	*1.55*		"	*2.50*		*62.0*	*10-125*			
LCS (4080770-BS1)				Prepared: 08/19/04 Analyzed: 08/23/04						
Acenaphthene	1.64	0.100	ug/l	2.50		65.6	26-135			
Benzo (a) pyrene	1.32	0.100	"	2.50		52.8	38-137			
Pyrene	1.33	0.100	"	2.50		53.2	33-133			
Surr: Fluorene-d10	*1.99*		"	*2.50*		*79.6*	*25-125*			
Surr: Pyrene-d10	*1.47*		"	*2.50*		*58.8*	*23-150*			
Surr: Benzo (a) pyrene-d12	*1.44*		"	*2.50*		*57.6*	*10-125*			

North Creek Analytical - Portland

Howard Holmes, Project Manager

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Hahn and Associates, Inc.	Project: Northwest Natural	
434 NW Sixth Ave., Suite 203	Project Number: 2708-30	**Reported:**
Portland, OR 97209	Project Manager: Rob Ede	09/01/04 20:54

Polynuclear Aromatic Compounds per EPA 8270M-SIM - Quality Control

North Creek Analytical - Portland

Analyte	Result	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
Batch 4080770 - EPA 3520/600 Series										
LCS Dup (4080770-BSD1)				Prepared: 08/19/04 Analyzed: 08/23/04						
Acenaphthene	1.77	0.100	ug/l	2.50		70.8	26-135	7.62	60	
Benzo (a) pyrene	1.35	0.100	"	2.50		54.0	38-137	2.25	60	
Pyrene	1.36	0.100	"	2.50		54.4	33-133	2.23	60	
Surr: Fluorene-d10	*2.08*		"	*2.50*		*83.2*	*25-125*			
Surr: Pyrene-d10	*1.45*		"	*2.50*		*58.0*	*23-150*			
Surr: Benzo (a) pyrene-d12	*1.41*		"	*2.50*		*56.4*	*10-125*			

North Creek Analytical - Portland

Howard Holmes, Project Manager

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Hahn and Associates, Inc.	Project: Northwest Natural	
434 NW Sixth Ave., Suite 203	Project Number: 2708-30	**Reported:**
Portland, OR 97209	Project Manager: Rob Ede	09/01/04 20:54

Conventional Chemistry Parameters per APHA/EPA Methods - Quality Control

North Creek Analytical - Portland

Analyte	Result	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
Batch 4080967 - General Preparation										
Blank (4080967-BLK1)				Prepared: 08/24/04 Analyzed: 08/25/04						
Cyanide (total)	ND	0.00500	mg/l							
LCS (4080967-BS1)				Prepared: 08/24/04 Analyzed: 08/25/04						
Cyanide (total)	0.189	0.00500	mg/l	0.200		94.5	75-125			
Duplicate (4080967-DUP1)		**Source: P4H0513-01**		Prepared: 08/24/04 Analyzed: 08/25/04						
Cyanide (total)	0.0146	0.00500	mg/l		0.0125			15.5	20	
Matrix Spike (4080967-MS1)		**Source: P4H0513-01**		Prepared: 08/24/04 Analyzed: 08/25/04						
Cyanide (total)	0.194	0.00500	mg/l	0.200	0.0125	90.8	75-125			

North Creek Analytical - Portland

Howard Holmes, Project Manager

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Hahn and Associates, Inc.	Project: Northwest Natural	
434 NW Sixth Ave., Suite 203	Project Number: 2708-30	**Reported:**
Portland, OR 97209	Project Manager: Rob Ede	09/01/04 20:54

Notes and Definitions

M-01	Analysis performed by EPA 200.8/6020 due to matrix interference or to meet lower reporting limit.
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. MRLs are adjusted if %Solids are less than 50%.
wet	Sample results reported on a wet weight basis (as received)
RPD	Relative Percent Difference

North Creek Analytical - Portland

Howard Holmes, Project Manager

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nca

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3209 Denali St, Anchorage, AK 99503-4030 907-334-9200 FAX 334-9210

CHAIN OF CUSTODY REPORT

Work Order #: P4H0913

CLIENT: HAI

REPORT TO: RoB ODE // HAI
ADDRESS:

PHONE: 503-796-0717 FAX:

INVOICE TO: HAI
*pricing & reporting as per Philip N.
metals = As, Cr, Cu, Ni, Pb, Zn

P.O. NUMBER: 2708-30

PROJECT NAME: NW NATURAL

PROJECT NUMBER: 2708-30

SAMPLED BY: MWG/APR

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 Specify:

* Turnaround Requests less than standard may incur Rush Charges.

PRESERVATIVE: NONE | HCL | NaOH | NaOH | HNO3 | HCL | NONE

REQUESTED ANALYSES

CLIENT SAMPLE IDENTIFICATION	SAMPLING DATE/TIME	PAH EPA 8270	BTEX EPA 8021	TOT. CYN. EPA 9010	AMEN. CYN. EPA 9010	TOT. METAL EPA 6020	VOC's EPA 8260	SVOC's EPA 8270							MATRIX (W, S, O)	# OF CONT.	LOCATION / COMMENTS	NCA WO ID
2708-040823-MW3 26-1010	8-23-04 11:50	X	X	X	X	X									W	7		
2708-040823-MW3-56-2 011	8-23-04 13:35	X	·	X	X	X	X	X							W	8		
2708-040823-MW4-35-3 012	8-23-04 15:00	X	X	X	X	X									W	7		
4																		
5																		
6																		
7																		
8																		
9																		
10																		

RELEASED BY: Matt Graves DATE: 08-24-04
PRINT NAME: MATT GRAVES FIRM: HAI TIME: 1320

RECEIVED BY: [signature] DATE: 08-24-04
PRINT NAME: Larry Spangler FIRM: NCA TIME: 1320

RELEASED BY: [signature] DATE: 08-24-04
PRINT NAME: Larry Spangler FIRM: NCA TIME: 1400

RECEIVED BY: [signature] DATE: 8/24/04
PRINT NAME: Cullie Fahrshotz FIRM: NCA TIME: 1400

ADDITIONAL REMARKS:

TEMP: 1.4

PAGE 1 OF 1

COC REV 1/03

SCOEPA00013908

NORTH CREEK ANALYTICAL COOLER RECEIPT FORM

(Army Corp. compliant)

Client: Hahn

1. **Please sign for receipt and opening of** 1 **cooler or** _____ **other**_____

   By (print) Carrie Fairshoir (sign) Carrie Fairshoir

2. Date samples received 8/24/04 Date opened: Same X or ___/___/___

3. Delivered by: X NCA courier ___ FedEx ___UPS ___Courier ___Client ___Other_____

   Airbill # if applicable _____ (Put copy of shipping papers in file)

4. There were 1 custody seals present, signed by [illegible] date 8/24/04.

5. Were the custody seals unbroken and intact at the date and time of arrival? X Yes ___No

6. Was ice used? X yes ___no Type of ice: ___ blue ice ___gel ice X real ice

   Temperature (degrees C) _____ Raytek thermometer 1.4 Digi-Therm (probe temperature blank)

7. Are custody papers sealed in a plastic bag and taped inside to lid? ___ Yes X No

8. Were custody papers filled out properly (ink, signed, etc.)? X Yes ___ No

   If "no" please specify: _____

9. Was project identifiable from custody papers? (X) Yes X No

   Name of project NW Natural (if applicable)

10. **Initial and date for unpacking:** CF **(initials)** **date** 8/25/04

11. Packing material: NA bubble wrap/bag ___styrofoam ___cardboard _____other

12. Were samples in bags? ___ Yes Y No

13. Did all containers indicated on the COC arrive? X Yes ___ No

    If "no" please indicate which containers were absent _____

14. Were all containers unbroken and labels in good condition? X Yes ___ No

    If "no" please indicate which containers _____

15. Were all bottle labels complete (ID, date, time, signature, etc.)? X Yes ___ No

    Do the IDs, times, etc. agree with the COC? X Yes ___ No

    If "no" please indicate which containers _____

16. Are containers properly preserved for indicated analysis? X Yes ___ No

17. Is there adequate volume for the test(s) requested? X Yes ___ No

18. If voa vials were submitted, are they free of bubbles? ___ N/A X Yes ___ No

19. **Log-in phase: Date samples were logged in:** 8/25/04 **Elm Project #** P4H0913

20. Logged in by (print) Carrie Fairshoir (sign) Carrie Fairshoir

21. Was the project manager notified of status? (Use back of form as a record) ✓ Yes ___ No

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October 22, 2004

Rob Ede
Hahn and Associates, Inc.
434 NW Sixth Ave., Suite 203
Portland, OR 97209

RE: Northwest Natural

Enclosed are the results of analyses for samples received by the laboratory on 08/24/04 14:00.
The following list is a summary of the NCA Work Orders contained in this report.
If you have any questions concerning this report, please feel free to contact me.

Work	Project	ProjectNumber
P4H0913	Northwest Natural	2708-30

Thank You,

Philip Nerenberg

Philip Nerenberg For Howard Holmes, Project Manager

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North Creek Analytical, Inc.
Environmental Laboratory Network

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Hahn and Associates, Inc.	Project Name:	**Northwest Natural**	
434 NW Sixth Ave., Suite 203	Project Number:	2708-30	Report Created:
Portland, OR 97209	Project Manager:	Rob Ede	10/22/04 16:05

ANALYTICAL REPORT FOR SAMPLES

Sample ID	Laboratory ID	Matrix	Date Sampled	Date Received
2708-040823-MW3-26-010	P4H0913-01	Water	08/23/04 11:50	08/24/04 14:00
2708-040823-MW3-56-011	P4H0913-02	Water	08/23/04 13:35	08/24/04 14:00
2708-040823-MW4-35-012	P4H0913-03	Water	08/23/04 13:05	08/24/04 14:00

North Creek Analytical - Portland

Philip Nerenberg

Philip Nerenberg For Howard Holmes, Project Manager

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Hahn and Associates, Inc.	Project Name: **Northwest Natural**	
434 NW Sixth Ave., Suite 203	Project Number: 2708-30	Report Created:
Portland, OR 97209	Project Manager: Rob Ede	10/22/04 16:05

BTEX per EPA Method 8021B

North Creek Analytical - Portland

Analyte	Method	Result	MDL*	MRL	Units	Dil	Batch	Prepared	Analyzed	Notes
P4H0913-01 Water	**2708-040823-MW3-26-010**			**Sampled: 08/23/04 11:50**						
Benzene	EPA 8021B	ND	-----	0.500	ug/l	1x	4081203	08/27/04	08/27/04 20:40	
Toluene	"	ND	-----	0.500	"	"	"	"	"	
Ethylbenzene	"	ND	-----	0.500	"	"	"	"	"	
Xylenes (total)	"	ND	-----	1.00	"	"	"	"	"	
Surrogate(s): 4-BFB (PID)		*Recovery: 110%*		*Limits: 70 - 130 %*		"			"	
P4H0913-03 Water	**2708-040823-MW4-35-012**			**Sampled: 08/23/04 13:05**						
Benzene	EPA 8021B	**1.61**	-----	0.500	ug/l	1x	4081203	08/27/04	08/27/04 21:12	
Toluene	"	ND	-----	0.500	"	"	"	"	"	
Ethylbenzene	"	ND	-----	0.500	"	"	"	"	"	
Xylenes (total)	"	**1.65**	-----	1.00	"	"	"	"	"	
Surrogate(s): 4-BFB (PID)		*Recovery: 109%*		*Limits: 70 - 130 %*		"			"	

North Creek Analytical - Portland

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Philip Nerenberg

Philip Nerenberg For Howard Holmes, Project Manager

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Hahn and Associates, Inc.	Project Name: **Northwest Natural**	
434 NW Sixth Ave., Suite 203	Project Number: 2708-30	Report Created:
Portland, OR 97209	Project Manager: Rob Ede	10/22/04 16:05

Total Metals per EPA 6000/7000 Series Methods

North Creek Analytical - Portland

Analyte		Method	Result	MDL*	MRL	Units	Dil	Batch	Prepared	Analyzed	Notes
P4H0913-01	**Water**	**2708-040823-MW3-26-010**			**Sampled: 08/23/04 11:50**						
Arsenic		EPA 6020	ND	-----	0.00100	mg/l	1x	4081098	08/26/04	09/06/04 22:35	
Chromium		"	ND	-----	0.00100	"	"	"	"	"	
Copper		"	ND	-----	0.00200	"	"	"	"	"	
Lead		"	ND	-----	0.00100	"	"	"	"	"	
Nickel		"	**0.0983**	-----	0.00200	"	"	"	"	"	
Zinc		"	**0.00692**	-----	0.00500	"	"	"	"	"	
P4H0913-02	**Water**	**2708-040823-MW3-56-011**			**Sampled: 08/23/04 13:35**						
Arsenic		EPA 6020	**0.00345**	-----	0.00100	mg/l	1x	4081098	08/26/04	09/06/04 23:01	
Chromium		"	**0.00177**	-----	0.00100	"	"	"	"	"	
Copper		"	ND	-----	0.00200	"	"	"	"	"	
Lead		"	ND	-----	0.00100	"	"	"	"	"	
Nickel		"	**0.00420**	-----	0.00200	"	"	"	"	"	
Zinc		"	ND	-----	0.00500	"	"	"	"	"	
P4H0913-03	**Water**	**2708-040823-MW4-35-012**			**Sampled: 08/23/04 13:05**						
Arsenic		EPA 6020	**0.00672**	-----	0.00100	mg/l	1x	4081098	08/26/04	09/06/04 23:14	
Chromium		"	ND	-----	0.00100	"	"	"	"	"	
Copper		"	ND	-----	0.00200	"	"	"	"	"	
Lead		"	ND	-----	0.00100	"	"	"	"	"	
Nickel		"	**0.00730**	-----	0.00200	"	"	"	"	"	
Zinc		"	ND	-----	0.00500	"	"	"	"	"	

North Creek Analytical - Portland

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Philip Nerenberg

Philip Nerenberg For Howard Holmes, Project Manager

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Hahn and Associates, Inc.	Project Name: **Northwest Natural**	
434 NW Sixth Ave., Suite 203	Project Number: 2708-30	Report Created:
Portland, OR 97209	Project Manager: Rob Ede	10/22/04 16:05

Volatile Organic Compounds per EPA Method 8260B

North Creek Analytical - Portland

Analyte	Method	Result	MDL*	MRL	Units	Dil	Batch	Prepared	Analyzed	Notes
P4H0913-02 Water	**2708-040823-MW3-56-011**			**Sampled: 08/23/04 13:35**						
Acetone	EPA 8260B	ND	-----	25.0	ug/l	1x	4090180	09/04/04	09/04/04 13:32	
Benzene	"	**10.6**	-----	1.00	"	"	"	"	"	
Bromobenzene	"	ND	-----	1.00	"	"	"	"	"	
Bromochloromethane	"	ND	-----	1.00	"	"	"	"	"	
Bromodichloromethane	"	ND	-----	1.00	"	"	"	"	"	
Bromoform	"	ND	-----	1.00	"	"	"	"	"	
Bromomethane	"	ND	-----	5.00	"	"	"	"	"	
2-Butanone	"	ND	-----	10.0	"	"	"	"	"	
n-Butylbenzene	"	ND	-----	5.00	"	"	"	"	"	
sec-Butylbenzene	"	ND	-----	1.00	"	"	"	"	"	
tert-Butylbenzene	"	ND	-----	1.00	"	"	"	"	"	
Carbon disulfide	"	ND	-----	10.0	"	"	"	"	"	
Carbon tetrachloride	"	ND	-----	1.00	"	"	"	"	"	
Chlorobenzene	"	ND	-----	1.00	"	"	"	"	"	
Chloroethane	"	ND	-----	1.00	"	"	"	"	"	
Chloroform	"	ND	-----	1.00	"	"	"	"	"	
Chloromethane	"	ND	-----	5.00	"	"	"	"	"	
2-Chlorotoluene	"	ND	-----	1.00	"	"	"	"	"	
4-Chlorotoluene	"	ND	-----	1.00	"	"	"	"	"	
1,2-Dibromo-3-chloropropane	"	ND	-----	5.00	"	"	"	"	"	
Dibromochloromethane	"	ND	-----	1.00	"	"	"	"	"	
1,2-Dibromoethane	"	ND	-----	1.00	"	"	"	"	"	
Dibromomethane	"	ND	-----	1.00	"	"	"	"	"	
1,2-Dichlorobenzene	"	ND	-----	1.00	"	"	"	"	"	
1,3-Dichlorobenzene	"	ND	-----	1.00	"	"	"	"	"	
1,4-Dichlorobenzene	"	ND	-----	1.00	"	"	"	"	"	
Dichlorodifluoromethane	"	ND	-----	5.00	"	"	"	"	"	
1,1-Dichloroethane	"	ND	-----	1.00	"	"	"	"	"	
1,2-Dichloroethane	"	ND	-----	1.00	"	"	"	"	"	
1,1-Dichloroethene	"	ND	-----	1.00	"	"	"	"	"	
cis-1,2-Dichloroethene	"	ND	-----	1.00	"	"	"	"	"	
trans-1,2-Dichloroethene	"	ND	-----	1.00	"	"	"	"	"	
1,2-Dichloropropane	"	ND	-----	1.00	"	"	"	"	"	
1,3-Dichloropropane	"	ND	-----	1.00	"	"	"	"	"	
2,2-Dichloropropane	"	ND	-----	1.00	"	"	"	"	"	
1,1-Dichloropropene	"	ND	-----	1.00	"	"	"	"	"	
cis-1,3-Dichloropropene	"	ND	-----	1.00	"	"	"	"	"	
trans-1,3-Dichloropropene	"	ND	-----	1.00	"	"	"	"	"	
Ethylbenzene	"	ND	-----	1.00	"	"	"	"	"	
Hexachlorobutadiene	"	ND	-----	2.00	"	"	"	"	"	
2-Hexanone	"	ND	-----	10.0	"	"	"	"	"	
Isopropylbenzene	"	ND	-----	2.00	"	"	"	"	"	

North Creek Analytical - Portland

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Philip Nerenberg

Philip Nerenberg For Howard Holmes, Project Manager

SCOEPA00013914

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Hahn and Associates, Inc.	Project Name:	**Northwest Natural**	
434 NW Sixth Ave., Suite 203	Project Number:	2708-30	Report Created:
Portland, OR 97209	Project Manager:	Rob Ede	10/22/04 16:05

Volatile Organic Compounds per EPA Method 8260B

North Creek Analytical - Portland

Analyte	Method	Result	MDL*	MRL	Units	Dil	Batch	Prepared	Analyzed	Notes
P4H0913-02 Water	**2708-040823-MW3-56-011**			**Sampled: 08/23/04 13:35**						
p-Isopropyltoluene	EPA 8260B	ND	-----	2.00	ug/l	1x	4090180	09/04/04	09/04/04 13:32	
4-Methyl-2-pentanone	"	ND	-----	5.00	"	"	"	"	"	
Methyl tert-butyl ether	"	ND	-----	1.00	"	"	"	"	"	
Methylene chloride	"	ND	-----	5.00	"	"	"	"	"	
Naphthalene	"	ND	-----	2.00	"	"	"	"	"	
n-Propylbenzene	"	ND	-----	1.00	"	"	"	"	"	
Styrene	"	ND	-----	1.00	"	"	"	"	"	
1,1,1,2-Tetrachloroethane	"	ND	-----	1.00	"	"	"	"	"	
1,1,2,2-Tetrachloroethane	"	ND	-----	1.00	"	"	"	"	"	
Tetrachloroethene	"	ND	-----	1.00	"	"	"	"	"	
Toluene	"	ND	-----	1.00	"	"	"	"	"	
1,2,3-Trichlorobenzene	"	ND	-----	1.00	"	"	"	"	"	
1,2,4-Trichlorobenzene	"	ND	-----	1.00	"	"	"	"	"	
1,1,1-Trichloroethane	"	ND	-----	1.00	"	"	"	"	"	
1,1,2-Trichloroethane	"	ND	-----	1.00	"	"	"	"	"	
Trichloroethene	"	ND	-----	1.00	"	"	"	"	"	
Trichlorofluoromethane	"	ND	-----	1.00	"	"	"	"	"	
1,2,3-Trichloropropane	"	ND	-----	1.00	"	"	"	"	"	
1,2,4-Trimethylbenzene	"	ND	-----	1.00	"	"	"	"	"	
1,3,5-Trimethylbenzene	"	ND	-----	1.00	"	"	"	"	"	
Vinyl chloride	"	ND	-----	1.00	"	"	"	"	"	
o-Xylene	"	ND	-----	1.00	"	"	"	"	"	
m,p-Xylene	"	ND	-----	2.00	"	"	"	"	"	
Surrogate(s): 4-BFB		*Recovery: 94.0%*		*Limits: 75 - 120 %*	"				"	
1,2-DCA-d4		*100%*		*77 - 129 %*	"				"	
Dibromofluoromethane		*95.5%*		*80 - 121 %*	"				"	
Toluene-d8		*93.5%*		*80 - 120 %*	"				"	

North Creek Analytical - Portland

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Philip Nerenberg

Philip Nerenberg For Howard Holmes, Project Manager

SCOEPA00013915

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Hahn and Associates, Inc.	Project Name: **Northwest Natural**	
434 NW Sixth Ave., Suite 203	Project Number: 2708-30	Report Created:
Portland, OR 97209	Project Manager: Rob Ede	10/22/04 16:05

Semivolatile Organic Compounds per EPA Method 8270C

North Creek Analytical - Portland

Analyte	Method	Result	MDL*	MRL	Units	Dil	Batch	Prepared	Analyzed	Notes
P4H0913-02 Water	**2708-040823-MW3-56-011**			**Sampled: 08/23/04 13:35**						
Carbazole	EPA 8270C	**18.6**	-----	5.00	ug/l	1x	4081091	08/26/04	08/30/04 21:33	
Acenaphthene	"	**34.2**	-----	5.00	"	"	"	"	"	
Acenaphthylene	"	ND	-----	5.00	"	"	"	"	"	
Anthracene	"	ND	-----	5.00	"	"	"	"	"	
Benzo (a) anthracene	"	ND	-----	5.00	"	"	"	"	"	
Benzo (a) pyrene	"	ND	-----	5.00	"	"	"	"	"	
Benzo (b) fluoranthene	"	ND	-----	5.00	"	"	"	"	"	
Benzo (ghi) perylene	"	ND	-----	5.00	"	"	"	"	"	
Benzo (k) fluoranthene	"	ND	-----	5.00	"	"	"	"	"	
Benzoic Acid	"	ND	-----	50.0	"	"	"	"	"	
Benzyl alcohol	"	ND	-----	10.0	"	"	"	"	"	
4-Bromophenyl phenyl ether	"	ND	-----	5.00	"	"	"	"	"	
Butyl benzyl phthalate	"	ND	-----	5.00	"	"	"	"	"	
4-Chloro-3-methylphenol	"	ND	-----	5.00	"	"	"	"	"	
4-Chloroaniline	"	ND	-----	20.0	"	"	"	"	"	
Bis(2-chloroethoxy)methane	"	ND	-----	10.0	"	"	"	"	"	
Bis(2-chloroethyl)ether	"	ND	-----	5.00	"	"	"	"	"	
Bis(2-chloroisopropyl)ether	"	ND	-----	10.0	"	"	"	"	"	
2-Chloronaphthalene	"	ND	-----	5.00	"	"	"	"	"	
2-Chlorophenol	"	ND	-----	5.00	"	"	"	"	"	
4-Chlorophenyl phenyl ether	"	ND	-----	5.00	"	"	"	"	"	
Chrysene	"	ND	-----	5.00	"	"	"	"	"	
Di-n-butyl phthalate	"	ND	-----	5.00	"	"	"	"	"	
Di-n-octyl phthalate	"	ND	-----	5.00	"	"	"	"	"	
Dibenzo (a,h) anthracene	"	ND	-----	5.00	"	"	"	"	"	
Dibenzofuran	"	**9.27**	-----	5.00	"	"	"	"	"	
1,2-Dichlorobenzene	"	ND	-----	5.00	"	"	"	"	"	
1,3-Dichlorobenzene	"	ND	-----	5.00	"	"	"	"	"	
1,4-Dichlorobenzene	"	ND	-----	5.00	"	"	"	"	"	
3,3'-Dichlorobenzidine	"	ND	-----	5.00	"	"	"	"	"	
2,4-Dichlorophenol	"	ND	-----	5.00	"	"	"	"	"	
Diethyl phthalate	"	ND	-----	5.00	"	"	"	"	"	
2,4-Dimethylphenol	"	ND	-----	10.0	"	"	"	"	"	
Dimethyl phthalate	"	ND	-----	5.00	"	"	"	"	"	
4,6-Dinitro-2-methylphenol	"	ND	-----	10.0	"	"	"	"	"	
2,4-Dinitrophenol	"	ND	-----	25.0	"	"	"	"	"	
2,4-Dinitrotoluene	"	ND	-----	5.00	"	"	"	"	"	
2,6-Dinitrotoluene	"	ND	-----	5.00	"	"	"	"	"	
Bis(2-ethylhexyl)phthalate	"	ND	-----	10.0	"	"	"	"	"	
Fluoranthene	"	**7.18**	-----	5.00	"	"	"	"	"	
Fluorene	"	**13.9**	-----	5.00	"	"	"	"	"	
Hexachlorobenzene	"	ND	-----	5.00	"	"	"	"	"	

North Creek Analytical - Portland

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Philip Nerenberg

Philip Nerenberg For Howard Holmes, Project Manager

SCOEPA00013916

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Hahn and Associates, Inc.	Project Name: **Northwest Natural**	
434 NW Sixth Ave., Suite 203	Project Number: 2708-30	Report Created:
Portland, OR 97209	Project Manager: Rob Ede	10/22/04 16:05

Semivolatile Organic Compounds per EPA Method 8270C

North Creek Analytical - Portland

Analyte	Method	Result	MDL*	MRL	Units	Dil	Batch	Prepared	Analyzed	Notes
P4H0913-02 Water	**2708-040823-MW3-56-011**			**Sampled: 08/23/04 13:35**						
Hexachlorobutadiene	EPA 8270C	ND	-----	10.0	ug/l	1x	4081091	08/26/04	08/30/04 21:33	
Hexachlorocyclopentadiene	"	ND	-----	10.0	"	"	"	"	"	
Hexachloroethane	"	ND	-----	10.0	"	"	"	"	"	
Indeno (1,2,3-cd) pyrene	"	ND	-----	5.00	"	"	"	"	"	
Isophorone	"	ND	-----	5.00	"	"	"	"	"	
2-Methylnaphthalene	"	ND	-----	5.00	"	"	"	"	"	
2-Methylphenol	"	ND	-----	10.0	"	"	"	"	"	
3-,4-Methylphenol	"	ND	-----	5.00	"	"	"	"	"	
Naphthalene	"	ND	-----	5.00	"	"	"	"	"	
2-Nitroaniline	"	ND	-----	5.00	"	"	"	"	"	
3-Nitroaniline	"	ND	-----	10.0	"	"	"	"	"	
4-Nitroaniline	"	ND	-----	10.0	"	"	"	"	"	
Nitrobenzene	"	ND	-----	5.00	"	"	"	"	"	
2-Nitrophenol	"	ND	-----	5.00	"	"	"	"	"	
4-Nitrophenol	"	ND	-----	25.0	"	"	"	"	"	
N-Nitrosodi-n-propylamine	"	ND	-----	10.0	"	"	"	"	"	
N-Nitrosodiphenylamine	"	ND	-----	5.00	"	"	"	"	"	
Pentachlorophenol	"	ND	-----	10.0	"	"	"	"	"	
Phenanthrene	"	**5.63**	-----	5.00	"	"	"	"	"	
Phenol	"	ND	-----	5.00	"	"	"	"	"	
Pyrene	"	**7.23**	-----	5.00	"	"	"	"	"	
1,2,4-Trichlorobenzene	"	ND	-----	5.00	"	"	"	"	"	
2,4,5-Trichlorophenol	"	ND	-----	5.00	"	"	"	"	"	
2,4,6-Trichlorophenol	"	ND	-----	5.00	"	"	"	"	"	
Surrogate(s): 2-Fluorobiphenyl		*Recovery: 71.8%*		*Limits: 26 - 135 %*	"				"	
2-Fluorophenol		*45.9%*		*6 - 124 %*	"				"	
Nitrobenzene-d5		*86.4%*		*23 - 147 %*	"				"	
Phenol-d6		*29.0%*		*11 - 130 %*	"				"	
p-Terphenyl-d14		*88.0%*		*38 - 149 %*	"				"	
2,4,6-Tribromophenol		*97.2%*		*19 - 126 %*	"				"	

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Hahn and Associates, Inc.	Project Name: **Northwest Natural**	
434 NW Sixth Ave., Suite 203	Project Number: 2708-30	Report Created:
Portland, OR 97209	Project Manager: Rob Ede	10/22/04 16:05

Polynuclear Aromatic Compounds per EPA 8270M-SIM

North Creek Analytical - Portland

Analyte	Method	Result	MDL*	MRL	Units	Dil	Batch	Prepared	Analyzed	Notes
P4H0913-01 Water	**2708-040823-MW3-26-010**			**Sampled: 08/23/04 11:50**						
Acenaphthene	EPA 8270m	ND	*0.0500*	0.100	ug/l	1x	4081163	08/27/04	09/02/04 12:37	
Acenaphthylene	"	ND	*0.0500*	0.100	"	"	"	"	"	
Anthracene	"	ND	*0.0500*	0.100	"	"	"	"	"	
Benzo (a) anthracene	"	ND	*0.0500*	0.100	"	"	"	"	"	
Benzo (a) pyrene	"	ND	*0.0500*	0.100	"	"	"	"	"	
Benzo (b) fluoranthene	"	ND	*0.0500*	0.100	"	"	"	"	"	
Benzo (ghi) perylene	"	ND	*0.0500*	0.100	"	"	"	"	"	
Benzo (k) fluoranthene	"	ND	*0.0500*	0.100	"	"	"	"	"	
Chrysene	"	ND	*0.0500*	0.100	"	"	"	"	"	
Dibenzo (a,h) anthracene	"	ND	*0.100*	0.200	"	"	"	"	"	
Fluoranthene	"	**0.0632**	*0.0500*	0.100	"	"	"	"	"	**J**
Fluorene	"	ND	*0.0500*	0.100	"	"	"	"	"	
Indeno (1,2,3-cd) pyrene	"	ND	*0.0500*	0.100	"	"	"	"	"	
Naphthalene	"	ND	*0.0500*	0.100	"	"	"	"	"	
Phenanthrene	"	**0.0681**	*0.0500*	0.100	"	"	"	"	"	**J**
Pyrene	"	**0.0808**	*0.0500*	0.100	"	"	"	"	"	**J**
Surrogate(s): Fluorene-d10	*Recovery: 95.3%*			*Limits: 25 - 125 %*	"				"	
Pyrene-d10	*93.6%*			*23 - 150 %*	"				"	
Benzo (a) pyrene-d12	*75.0%*			*10 - 125 %*	"				"	

North Creek Analytical - Portland

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Philip Nerenberg

Philip Nerenberg For Howard Holmes, Project Manager

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Hahn and Associates, Inc.	Project Name:	**Northwest Natural**	
434 NW Sixth Ave., Suite 203	Project Number:	2708-30	Report Created:
Portland, OR 97209	Project Manager:	Rob Ede	10/22/04 16:05

Polynuclear Aromatic Compounds per EPA 8270M-SIM

North Creek Analytical - Portland

Analyte	Method	Result	MDL*	MRL	Units	Dil	Batch	Prepared	Analyzed	Notes
P4H0913-02 Water	**2708-040823-MW3-56-011**			**Sampled: 08/23/04 13:35**						**R-05**
Acenaphthene	EPA 8270m	**25.8**	*0.500*	1.00	ug/l	10x	4081163	08/27/04	09/01/04 23:33	
Acenaphthylene	"	ND	*0.500*	1.00	"	"	"	"	"	
Anthracene	"	**2.29**	*0.500*	1.00	"	"	"	"	"	
Benzo (a) anthracene	"	ND	*0.500*	1.00	"	"	"	"	"	
Benzo (a) pyrene	"	ND	*0.500*	1.00	"	"	"	"	"	
Benzo (b) fluoranthene	"	ND	*0.500*	1.00	"	"	"	"	"	
Benzo (ghi) perylene	"	ND	*0.500*	1.00	"	"	"	"	"	
Benzo (k) fluoranthene	"	ND	*0.500*	1.00	"	"	"	"	"	
Chrysene	"	ND	*0.500*	1.00	"	"	"	"	"	
Dibenzo (a,h) anthracene	"	ND	*1.00*	2.00	"	"	"	"	"	
Fluoranthene	"	**6.76**	*0.500*	1.00	"	"	"	"	"	
Fluorene	"	**10.2**	*0.500*	1.00	"	"	"	"	"	
Indeno (1,2,3-cd) pyrene	"	ND	*0.500*	1.00	"	"	"	"	"	
Naphthalene	"	**0.554**	*0.500*	1.00	"	"	"	"	"	**J**
Phenanthrene	"	**3.94**	*0.500*	1.00	"	"	"	"	"	
Pyrene	"	**6.62**	*0.500*	1.00	"	"	"	"	"	
Surrogate(s): Fluorene-d10	*Recovery: 94.5%*			*Limits: 25 - 125 %*	"				"	
Pyrene-d10	*103%*			*23 - 150 %*	"				"	
Benzo (a) pyrene-d12	*76.1%*			*10 - 125 %*	"				"	

North Creek Analytical - Portland

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Philip Nerenberg

Philip Nerenberg For Howard Holmes, Project Manager

SCOEPA00013919

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Hahn and Associates, Inc.	Project Name: **Northwest Natural**	
434 NW Sixth Ave., Suite 203	Project Number: 2708-30	Report Created:
Portland, OR 97209	Project Manager: Rob Ede	10/22/04 16:05

Polynuclear Aromatic Compounds per EPA 8270M-SIM

North Creek Analytical - Portland

Analyte	Method	Result	MDL*	MRL	Units	Dil	Batch	Prepared	Analyzed	Notes
P4H0913-03 Water	**2708-040823-MW4-35-012**			**Sampled: 08/23/04 13:05**						**R-05**
Acenaphthene	EPA 8270m	**32.8**	*0.500*	1.00	ug/l	10x	4081163	08/27/04	09/01/04 23:58	
Acenaphthylene	"	**1.39**	*0.500*	1.00	"	"	"	"	"	
Anthracene	"	**1.02**	*0.500*	1.00	"	"	"	"	"	
Benzo (a) anthracene	"	ND	*0.500*	1.00	"	"	"	"	"	
Benzo (a) pyrene	"	ND	*0.500*	1.00	"	"	"	"	"	
Benzo (b) fluoranthene	"	ND	*0.500*	1.00	"	"	"	"	"	
Benzo (ghi) perylene	"	ND	*0.500*	1.00	"	"	"	"	"	
Benzo (k) fluoranthene	"	ND	*0.500*	1.00	"	"	"	"	"	
Chrysene	"	ND	*0.500*	1.00	"	"	"	"	"	
Dibenzo (a,h) anthracene	"	ND	*1.00*	2.00	"	"	"	"	"	
Fluoranthene	"	**7.46**	*0.500*	1.00	"	"	"	"	"	
Fluorene	"	**11.4**	*0.500*	1.00	"	"	"	"	"	
Indeno (1,2,3-cd) pyrene	"	ND	*0.500*	1.00	"	"	"	"	"	
Naphthalene	"	**1.44**	*0.500*	1.00	"	"	"	"	"	
Phenanthrene	"	**2.46**	*0.500*	1.00	"	"	"	"	"	
Pyrene	"	**7.36**	*0.500*	1.00	"	"	"	"	"	
Surrogate(s): Fluorene-d10	*Recovery: 104%*		*Limits: 25 - 125 %*		"				"	
Pyrene-d10	*115%*		*23 - 150 %*		"				"	
Benzo (a) pyrene-d12	*60.6%*		*10 - 125 %*		"				"	

North Creek Analytical - Portland

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Philip Nerenberg

Philip Nerenberg For Howard Holmes, Project Manager

SCOEPA00013920

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Hahn and Associates, Inc.	Project Name: Northwest Natural	
434 NW Sixth Ave., Suite 203	Project Number: 2708-30	Report Created:
Portland, OR 97209	Project Manager: Rob Ede	10/22/04 16:05

Conventional Chemistry Parameters per APHA/EPA Methods

North Creek Analytical - Portland

Analyte		Method	Result	MDL*	MRL	Units	Dil	Batch	Prepared	Analyzed	Notes
P4H0913-01	**Water**	**2708-040823-MW3-26-010**			**Sampled: 08/23/04 11:50**						
Cyanide (amenable)		EPA 9010A	**0.184**	-----	0.00500	mg/l	1x	4081272	08/31/04	09/03/04 12:53	
Cyanide (total)		EPA 9012A	**0.184**	-----	0.00500	"	"	"	"	"	
P4H0913-02	**Water**	**2708-040823-MW3-56-011**			**Sampled: 08/23/04 13:35**						
Cyanide (amenable)		EPA 9010A	**0.0324**	-----	0.00500	mg/l	1x	4081272	08/31/04	09/03/04 12:53	
Cyanide (total)		EPA 9012A	**0.0324**	-----	0.00500	"	"	"	"	"	
P4H0913-03	**Water**	**2708-040823-MW4-35-012**			**Sampled: 08/23/04 13:05**						
Cyanide (amenable)		EPA 9010A	**0.0980**	-----	0.00500	mg/l	1x	4081272	08/31/04	09/03/04 12:53	
Cyanide (total)		EPA 9012A	**0.178**	-----	0.00500	"	"	"	"	"	

North Creek Analytical - Portland

Philip Nerenberg

Philip Nerenberg For Howard Holmes, Project Manager

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Hahn and Associates, Inc.	Project Name: **Northwest Natural**	
434 NW Sixth Ave., Suite 203	Project Number: 2708-30	Report Created:
Portland, OR 97209	Project Manager: Rob Ede	10/22/04 16:05

BTEX per EPA Method 8021B - Laboratory Quality Control Results

North Creek Analytical - Portland

QC Batch: 4081203 **Water Preparation Method: EPA 5030B**

Analyte	Method	Result	MDL*	MRL	Units	Dil	Source Result	Spike Amt	% REC	(Limits)	% RPD	(Limits)	Analyzed	Notes
Blank (4081203-BLK1)								**Extracted: 08/27/04 16:24**						
Benzene	EPA 8021B	ND	---	0.500	ug/l	1x	--	--	--	--	--	--	08/27/04 17:02	
Toluene	"	ND	---	0.500	"	"	--	--	--	--	--	--	"	
Ethylbenzene	"	ND	---	0.500	"	"	--	--	--	--	--	--	"	
Xylenes (total)	"	ND	---	1.00	"	"	--	--	--	--	--	--	"	
Surrogate(s): 4-BFB (PID)		*Recovery: 107%*		*Limits: 70-130%*		"							*08/27/04 17:02*	
LCS (4081203-BS1)								**Extracted: 08/27/04 16:24**						
Benzene	EPA 8021B	18.6	---	0.500	ug/l	1x	--	20.0	93.0%	(70-130)	--	--	08/27/04 18:00	
Toluene	"	18.6	---	0.500	"	"	--	"	93.0%	(76-129)	--	--	"	
Ethylbenzene	"	17.7	---	0.500	"	"	--	"	88.5%	(82-130)	--	--	"	
Xylenes (total)	"	58.2	---	1.00	"	"	--	60.0	97.0%	(76-130)	--	--	"	
Surrogate(s): 4-BFB (PID)		*Recovery: 98.6%*		*Limits: 70-130%*		"							*08/27/04 18:00*	
Matrix Spike (4081203-MS1)						**QC Source: P4H0913-01**		**Extracted: 08/27/04 16:24**						
Benzene	EPA 8021B	18.8	---	0.500	ug/l	1x	ND	20.0	94.0%	(65-144)	--	--	08/27/04 18:32	
Toluene	"	18.7	---	0.500	"	"	ND	"	92.3%	(68-139)	--	--	"	
Ethylbenzene	"	17.8	---	0.500	"	"	ND	"	89.0%	(69-144)	--	--	"	
Xylenes (total)	"	58.7	---	1.00	"	"	ND	60.0	97.1%	(60-144)	--	--	"	
Surrogate(s): 4-BFB (PID)		*Recovery: 96.0%*		*Limits: 70-130%*		"							*08/27/04 18:32*	
Matrix Spike Dup (4081203-MSD1)						**QC Source: P4H0913-01**		**Extracted: 08/27/04 16:24**						
Benzene	EPA 8021B	18.8	---	0.500	ug/l	1x	ND	20.0	94.0%	(65-144)	0.00%	(20)	08/27/04 19:04	
Toluene	"	18.6	---	0.500	"	"	ND	"	91.8%	(68-139)	0.536%	"	"	
Ethylbenzene	"	17.7	---	0.500	"	"	ND	"	88.5%	(69-144)	0.563%	"	"	
Xylenes (total)	"	58.3	---	1.00	"	"	ND	60.0	96.4%	(60-144)	0.684%	"	"	
Surrogate(s): 4-BFB (PID)		*Recovery: 95.4%*		*Limits: 70-130%*		"							*08/27/04 19:04*	

North Creek Analytical - Portland

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Philip Nerenberg

Philip Nerenberg For Howard Holmes, Project Manager

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Hahn and Associates, Inc.	Project Name: **Northwest Natural**	
434 NW Sixth Ave., Suite 203	Project Number: 2708-30	Report Created:
Portland, OR 97209	Project Manager: Rob Ede	10/22/04 16:05

Total Metals per EPA 6000/7000 Series Methods - Laboratory Quality Control Results

North Creek Analytical - Portland

QC Batch: 4081098 **Water Preparation Method: EPA 200/3005**

Analyte	Method	Result	MDL*	MRL	Units	Dil	Source Result	Spike Amt	% REC	(Limits)	% RPD	(Limits)	Analyzed	Notes
Blank (4081098-BLK1)								Extracted: 08/26/04 08:53						
Arsenic	EPA 6020	ND	---	0.00100	mg/l	1x	--	--	--	--	--	--	09/08/04 21:34	
Chromium	"	ND	---	0.00100	"	"	--	--	--	--	--	--	"	
Copper	"	ND	---	0.00200	"	"	--	--	--	--	--	--	"	
Lead	"	ND	---	0.00100	"	"	--	--	--	--	--	--	"	
Nickel	"	ND	---	0.00200	"	"	--	--	--	--	--	--	"	
Zinc	"	ND	---	0.00500	"	"	--	--	--	--	--	--	"	
LCS (4081098-BS1)								Extracted: 08/26/04 08:53						
Arsenic	EPA 6020	0.0981	---	0.00100	mg/l	1x	--	0.100	98.1%	(80-120)	--	--	09/08/04 21:42	
Chromium	"	0.104	---	0.00100	"	"	--	"	104%	"	--	--	"	
Copper	"	0.106	---	0.00200	"	"	--	"	106%	"	--	--	"	
Lead	"	0.104	---	0.00100	"	"	--	"	104%	"	--	--	"	
Nickel	"	0.106	---	0.00200	"	"	--	"	106%	"	--	--	"	
Zinc	"	0.0973	---	0.00500	"	"	--	"	97.3%	"	--	--	"	
LCS Dup (4081098-BSD1)								Extracted: 08/26/04 08:53						
Arsenic	EPA 6020	0.0958	---	0.00100	mg/l	1x	--	0.100	95.8%	(80-120)	2.37%	(20)	09/08/04 21:50	
Chromium	"	0.102	---	0.00100	"	"	--	"	102%	"	1.94%	"	"	
Copper	"	0.104	---	0.00200	"	"	--	"	104%	"	1.90%	"	"	
Lead	"	0.104	---	0.00100	"	"	--	"	104%	"	0.00%	"	"	
Nickel	"	0.104	---	0.00200	"	"	--	"	104%	"	1.90%	"	"	
Zinc	"	0.0975	---	0.00500	"	"	--	"	97.5%	"	0.205%	"	"	
Duplicate (4081098-DUP1)					QC Source: P4H0913-01			Extracted: 08/26/04 08:53						
Arsenic	EPA 6020	ND	---	0.00100	mg/l	1x	ND	--	--	--	NR	(20)	09/06/04 22:48	
Chromium	"	ND	---	0.00100	"	"	ND	--	--	--	NR	"	"	
Copper	"	0.00117	---	0.00200	"	"	ND	--	--	--	NR	"	"	
Lead	"	ND	---	0.00100	"	"	ND	--	--	--	NR	"	"	
Nickel	"	0.0931	---	0.00200	"	"	0.0983	--	--	--	5.43%	"	"	
Zinc	"	0.00719	---	0.00500	"	"	0.00692	--	--	--	3.83%	"	"	
Matrix Spike (4081098-MS1)					QC Source: P4H0913-02			Extracted: 08/26/04 08:53						
Arsenic	EPA 6020	0.114	---	0.00100	mg/l	1x	0.00345	0.100	111%	(75-125)	--	--	09/06/04 23:08	
Chromium	"	0.116	---	0.00100	"	"	0.00177	"	114%	"	--	--	"	
Copper	"	0.108	---	0.00200	"	"	ND	"	107%	"	--	--	"	
Lead	"	0.103	---	0.00100	"	"	ND	"	103%	"	--	--	"	
Nickel	"	0.113	---	0.00200	"	"	0.00420	"	109%	"	--	--	"	
Zinc	"	0.106	---	0.00500	"	"	ND	"	103%	"	--	--	"	

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Philip Nerenberg For Howard Holmes, Project Manager

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Hahn and Associates, Inc.	Project Name: **Northwest Natural**	
434 NW Sixth Ave., Suite 203	Project Number: 2708-30	Report Created:
Portland, OR 97209	Project Manager: Rob Ede	10/22/04 16:05

Total Metals per EPA 6000/7000 Series Methods - Laboratory Quality Control Results

North Creek Analytical - Portland

QC Batch: 4081098 **Water Preparation Method: EPA 200/3005**

Analyte	Method	Result	MDL*	MRL	Units	Dil	Source Result	Spike Amt	% REC	(Limits)	% RPD	(Limits)	Analyzed	Notes
Matrix Spike (4081098-MS2)				QC Source: P4H0913-03				Extracted: 08/26/04 08:53						
Arsenic	EPA 6020	0.122	---	0.00100	mg/l	1x	0.00672	0.100	115%	(75-125)	--	--	09/06/04 23:27	
Chromium	"	0.117	---	0.00100	"	"	ND	"	117%	"	--	--	"	
Copper	"	0.104	---	0.00200	"	"	ND	"	103%	"	--	--	"	
Lead	"	0.100	---	0.00100	"	"	ND	"	100%	"	--	--	"	
Nickel	"	0.117	---	0.00200	"	"	0.00730	"	110%	"	--	--	"	
Zinc	"	0.0996	---	0.00500	"	"	ND	"	99.6%	"	--	--	"	

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Hahn and Associates, Inc.	Project Name: **Northwest Natural**	
434 NW Sixth Ave., Suite 203	Project Number: 2708-30	Report Created:
Portland, OR 97209	Project Manager: Rob Ede	10/22/04 16:05

Volatile Organic Compounds per EPA Method 8260B - Laboratory Quality Control Results

North Creek Analytical - Portland

QC Batch: 4090180 **Water Preparation Method: EPA 5030B**

Analyte	Method	Result	MDL*	MRL	Units	Dil	Source Result	Spike Amt	% REC	(Limits)	% RPD	(Limits)	Analyzed	Notes
Blank (4090180-BLK1)							**Extracted: 09/04/04 09:00**							
Acetone	EPA 8260B	ND	---	25.0	ug/l	1x	--	--	--	--	--	--	09/04/04 13:05	
Benzene	"	ND	---	1.00	"	"	--	--	--	--	--	--	"	
Bromobenzene	"	ND	---	1.00	"	"	--	--	--	--	--	--	"	
Bromochloromethane	"	ND	---	1.00	"	"	--	--	--	--	--	--	"	
Bromodichloromethane	"	ND	---	1.00	"	"	--	--	--	--	--	--	"	
Bromoform	"	ND	---	1.00	"	"	--	--	--	--	--	--	"	
Bromomethane	"	ND	---	5.00	"	"	--	--	--	--	--	--	"	
2-Butanone	"	ND	---	10.0	"	"	--	--	--	--	--	--	"	
n-Butylbenzene	"	ND	---	5.00	"	"	--	--	--	--	--	--	"	
sec-Butylbenzene	"	ND	---	1.00	"	"	--	--	--	--	--	--	"	
tert-Butylbenzene	"	ND	---	1.00	"	"	--	--	--	--	--	--	"	
Carbon disulfide	"	ND	---	10.0	"	"	--	--	--	--	--	--	"	
Carbon tetrachloride	"	ND	---	1.00	"	"	--	--	--	--	--	--	"	
Chlorobenzene	"	ND	---	1.00	"	"	--	--	--	--	--	--	"	
Chloroethane	"	ND	---	1.00	"	"	--	--	--	--	--	--	"	
Chloroform	"	ND	---	1.00	"	"	--	--	--	--	--	--	"	
Chloromethane	"	ND	---	5.00	"	"	--	--	--	--	--	--	"	
2-Chlorotoluene	"	ND	---	1.00	"	"	--	--	--	--	--	--	"	
4-Chlorotoluene	"	ND	---	1.00	"	"	--	--	--	--	--	--	"	
1,2-Dibromo-3-chloropropane	"	ND	---	5.00	"	"	--	--	--	--	--	--	"	
Dibromochloromethane	"	ND	---	1.00	"	"	--	--	--	--	--	--	"	
1,2-Dibromoethane	"	ND	---	1.00	"	"	--	--	--	--	--	--	"	
Dibromomethane	"	ND	---	1.00	"	"	--	--	--	--	--	--	"	
1,2-Dichlorobenzene	"	ND	---	1.00	"	"	--	--	--	--	--	--	"	
1,3-Dichlorobenzene	"	ND	---	1.00	"	"	--	--	--	--	--	--	"	
1,4-Dichlorobenzene	"	ND	---	1.00	"	"	--	--	--	--	--	--	"	
Dichlorodifluoromethane	"	ND	---	5.00	"	"	--	--	--	--	--	--	"	
1,1-Dichloroethane	"	ND	---	1.00	"	"	--	--	--	--	--	--	"	
1,2-Dichloroethane	"	ND	---	1.00	"	"	--	--	--	--	--	--	"	
1,1-Dichloroethene	"	ND	---	1.00	"	"	--	--	--	--	--	--	"	
cis-1,2-Dichloroethene	"	ND	---	1.00	"	"	--	--	--	--	--	--	"	
trans-1,2-Dichloroethene	"	ND	---	1.00	"	"	--	--	--	--	--	--	"	
1,2-Dichloropropane	"	ND	---	1.00	"	"	--	--	--	--	--	--	"	
1,3-Dichloropropane	"	ND	---	1.00	"	"	--	--	--	--	--	--	"	
2,2-Dichloropropane	"	ND	---	1.00	"	"	--	--	--	--	--	--	"	
1,1-Dichloropropene	"	ND	---	1.00	"	"	--	--	--	--	--	--	"	
cis-1,3-Dichloropropene	"	ND	---	1.00	"	"	--	--	--	--	--	--	"	
trans-1,3-Dichloropropene	"	ND	---	1.00	"	"	--	--	--	--	--	--	"	
Ethylbenzene	"	ND	---	1.00	"	"	--	--	--	--	--	--	"	
Hexachlorobutadiene	"	ND	---	2.00	"	"	--	--	--	--	--	--	"	
2-Hexanone	"	ND	---	10.0	"	"	--	--	--	--	--	--	"	

North Creek Analytical - Portland

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Hahn and Associates, Inc.	Project Name:	**Northwest Natural**	
434 NW Sixth Ave., Suite 203	Project Number:	2708-30	Report Created:
Portland, OR 97209	Project Manager:	Rob Ede	10/22/04 16:05

Volatile Organic Compounds per EPA Method 8260B - Laboratory Quality Control Results

North Creek Analytical - Portland

QC Batch: 4090180 **Water Preparation Method: EPA 5030B**

Analyte	Method	Result	MDL*	MRL	Units	Dil	Source Result	Spike Amt	% REC	(Limits)	% RPD	(Limits)	Analyzed	Notes
Blank (4090180-BLK1)							**Extracted: 09/04/04 09:00**							
Isopropylbenzene	EPA 8260B	ND	---	2.00	ug/l	1x	--	--	--	--	--	--	09/04/04 13:05	
p-Isopropyltoluene	"	ND	---	2.00	"	"	--	--	--	--	--	--	"	
4-Methyl-2-pentanone	"	ND	---	5.00	"	"	--	--	--	--	--	--	"	
Methyl tert-butyl ether	"	ND	---	1.00	"	"	--	--	--	--	--	--	"	
Methylene chloride	"	ND	---	5.00	"	"	--	--	--	--	--	--	"	
Naphthalene	"	ND	---	2.00	"	"	--	--	--	--	--	--	"	
n-Propylbenzene	"	ND	---	1.00	"	"	--	--	--	--	--	--	"	
Styrene	"	ND	---	1.00	"	"	--	--	--	--	--	--	"	
1,1,1,2-Tetrachloroethane	"	ND	---	1.00	"	"	--	--	--	--	--	--	"	
1,1,2,2-Tetrachloroethane	"	ND	---	1.00	"	"	--	--	--	--	--	--	"	
Tetrachloroethene	"	ND	---	1.00	"	"	--	--	--	--	--	--	"	
Toluene	"	ND	---	1.00	"	"	--	--	--	--	--	--	"	
1,2,3-Trichlorobenzene	"	ND	---	1.00	"	"	--	--	--	--	--	--	"	
1,2,4-Trichlorobenzene	"	ND	---	1.00	"	"	--	--	--	--	--	--	"	
1,1,1-Trichloroethane	"	ND	---	1.00	"	"	--	--	--	--	--	--	"	
1,1,2-Trichloroethane	"	ND	---	1.00	"	"	--	--	--	--	--	--	"	
Trichloroethene	"	ND	---	1.00	"	"	--	--	--	--	--	--	"	
Trichlorofluoromethane	"	ND	---	1.00	"	"	--	--	--	--	--	--	"	
1,2,3-Trichloropropane	"	ND	---	1.00	"	"	--	--	--	--	--	--	"	
1,2,4-Trimethylbenzene	"	ND	---	1.00	"	"	--	--	--	--	--	--	"	
1,3,5-Trimethylbenzene	"	ND	---	1.00	"	"	--	--	--	--	--	--	"	
Vinyl chloride	"	ND	---	1.00	"	"	--	--	--	--	--	--	"	
o-Xylene	"	ND	---	1.00	"	"	--	--	--	--	--	--	"	
m,p-Xylene	"	ND	---	2.00	"	"	--	--	--	--	--	--	"	
Surrogate(s): 4-BFB		*Recovery: 94.0%*			*Limits: 75-120%*	"							*09/04/04 13:05*	
1,2-DCA-d4		*102%*			*77-129%*	"							"	
Dibromofluoromethane		*95.5%*			*80-121%*	"							"	
Toluene-d8		*100%*			*80-120%*	"							"	

North Creek Analytical - Portland

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Philip Nerenberg

Philip Nerenberg For Howard Holmes, Project Manager

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Hahn and Associates, Inc.	Project Name: **Northwest Natural**	
434 NW Sixth Ave., Suite 203	Project Number: 2708-30	Report Created:
Portland, OR 97209	Project Manager: Rob Ede	10/22/04 16:05

Volatile Organic Compounds per EPA Method 8260B - Laboratory Quality Control Results

North Creek Analytical - Portland

QC Batch: 4090180 **Water Preparation Method: EPA 5030B**

Analyte	Method	Result	MDL*	MRL	Units	Dil	Source Result	Spike Amt	% REC	(Limits)	% RPD	(Limits)	Analyzed	Notes
LCS (4090180-BS1)													**Extracted: 09/04/04 09:00**	
Benzene	EPA 8260B	20.6	---	1.00	ug/l	1x	--	20.0	103%	(80-120)	--	--	09/04/04 11:15	
Chlorobenzene	"	20.2	---	1.00	"	"	--	"	101%	(80-124)	--	--	"	
1,1-Dichloroethene	"	17.0	---	1.00	"	"	--	"	85.0%	(78-120)	--	--	"	
Toluene	"	20.9	---	1.00	"	"	--	"	104%	(80-124)	--	--	"	
Trichloroethene	"	20.3	---	1.00	"	"	--	"	102%	(80-132)	--	--	"	
Surrogate(s): 4-BFB		*Recovery: 96.5%*			*Limits: 75-120%*	"							*09/04/04 11:15*	
1,2-DCA-d4		*100%*			*77-129%*	"							"	
Dibromofluoromethane		*100%*			*80-121%*	"							"	
Toluene-d8		*102%*			*80-120%*	"							"	
Matrix Spike (4090180-MS1)						**QC Source: P4H0913-02**							**Extracted: 09/04/04 09:00**	
Benzene	EPA 8260B	29.7	---	1.00	ug/l	1x	10.6	20.0	95.5%	(80-124)	--	--	09/04/04 11:42	
Chlorobenzene	"	20.1	---	1.00	"	"	ND	"	100%	(72.9-134)	--	--	"	
1,1-Dichloroethene	"	19.4	---	1.00	"	"	ND	"	97.0%	(79.3-127)	--	--	"	
Toluene	"	18.7	---	1.00	"	"	ND	"	93.5%	(79.7-131)	--	--	"	
Trichloroethene	"	20.1	---	1.00	"	"	ND	"	100%	(68.4-130)	--	--	"	
Surrogate(s): 4-BFB		*Recovery: 98.5%*			*Limits: 75-120%*	"							*09/04/04 11:42*	
1,2-DCA-d4		*104%*			*77-129%*	"							"	
Dibromofluoromethane		*102%*			*80-121%*	"							"	
Toluene-d8		*96.0%*			*80-120%*	"							"	
Matrix Spike Dup (4090180-MSD1)						**QC Source: P4H0913-02**							**Extracted: 09/04/04 09:00**	
Benzene	EPA 8260B	30.3	---	1.00	ug/l	1x	10.6	20.0	98.5%	(80-124)	2.00%	(25)	09/04/04 12:10	
Chlorobenzene	"	20.7	---	1.00	"	"	ND	"	104%	(72.9-134)	2.94%	"	"	
1,1-Dichloroethene	"	20.1	---	1.00	"	"	ND	"	100%	(79.3-127)	3.54%	"	"	
Toluene	"	19.6	---	1.00	"	"	ND	"	98.0%	(79.7-131)	4.70%	"	"	
Trichloroethene	"	20.4	---	1.00	"	"	ND	"	102%	(68.4-130)	1.48%	"	"	
Surrogate(s): 4-BFB		*Recovery: 103%*			*Limits: 75-120%*	"							*09/04/04 12:10*	
1,2-DCA-d4		*106%*			*77-129%*	"							"	
Dibromofluoromethane		*106%*			*80-121%*	"							"	
Toluene-d8		*102%*			*80-120%*	"							"	

North Creek Analytical - Portland

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Hahn and Associates, Inc.	Project Name:	**Northwest Natural**	
434 NW Sixth Ave., Suite 203	Project Number:	2708-30	Report Created:
Portland, OR 97209	Project Manager:	Rob Ede	10/22/04 16:05

Semivolatile Organic Compounds per EPA Method 8270C - Laboratory Quality Control Results

North Creek Analytical - Portland

QC Batch: 4081091 **Water Preparation Method: EPA 3510/600 Series**

Analyte	Method	Result	MDL*	MRL	Units	Dil	Source Result	Spike Amt	% REC	(Limits)	% RPD	(Limits)	Analyzed	Notes
Blank (4081091-BLK1)							Extracted: 08/26/04 08:13							
Carbazole	EPA 8270C	ND	---	5.00	ug/l	1x	--	--	--	--	--	--	08/30/04 20:04	
Acenaphthene	"	ND	---	5.00	"	"	--	--	--	--	--	--	"	
Acenaphthylene	"	ND	---	5.00	"	"	--	--	--	--	--	--	"	
Anthracene	"	ND	---	5.00	"	"	--	--	--	--	--	--	"	
Benzo (a) anthracene	"	ND	---	5.00	"	"	--	--	--	--	--	--	"	
Benzo (a) pyrene	"	ND	---	5.00	"	"	--	--	--	--	--	--	"	
Benzo (b) fluoranthene	"	ND	---	5.00	"	"	--	--	--	--	--	--	"	
Benzo (ghi) perylene	"	ND	---	5.00	"	"	--	--	--	--	--	--	"	
Benzo (k) fluoranthene	"	ND	---	5.00	"	"	--	--	--	--	--	--	"	
Benzoic Acid	"	ND	---	50.0	"	"	--	--	--	--	--	--	"	
Benzyl alcohol	"	ND	---	10.0	"	"	--	--	--	--	--	--	"	
4-Bromophenyl phenyl ether	"	ND	---	5.00	"	"	--	--	--	--	--	--	"	
Butyl benzyl phthalate	"	ND	---	5.00	"	"	--	--	--	--	--	--	"	
4-Chloro-3-methylphenol	"	ND	---	5.00	"	"	--	--	--	--	--	--	"	
4-Chloroaniline	"	ND	---	20.0	"	"	--	--	--	--	--	--	"	
Bis(2-chloroethoxy)methane	"	ND	---	10.0	"	"	--	--	--	--	--	--	"	
Bis(2-chloroethyl)ether	"	ND	---	5.00	"	"	--	--	--	--	--	--	"	
Bis(2-chloroisopropyl)ether	"	ND	---	10.0	"	"	--	--	--	--	--	--	"	
2-Chloronaphthalene	"	ND	---	5.00	"	"	--	--	--	--	--	--	"	
2-Chlorophenol	"	ND	---	5.00	"	"	--	--	--	--	--	--	"	
4-Chlorophenyl phenyl ether	"	ND	---	5.00	"	"	--	--	--	--	--	--	"	
Chrysene	"	ND	---	5.00	"	"	--	--	--	--	--	--	"	
Di-n-butyl phthalate	"	ND	---	5.00	"	"	--	--	--	--	--	--	"	
Di-n-octyl phthalate	"	ND	---	5.00	"	"	--	--	--	--	--	--	"	
Dibenzo (a,h) anthracene	"	ND	---	5.00	"	"	--	--	--	--	--	--	"	
Dibenzofuran	"	ND	---	5.00	"	"	--	--	--	--	--	--	"	
1,2-Dichlorobenzene	"	ND	---	5.00	"	"	--	--	--	--	--	--	"	
1,3-Dichlorobenzene	"	ND	---	5.00	"	"	--	--	--	--	--	--	"	
1,4-Dichlorobenzene	"	ND	---	5.00	"	"	--	--	--	--	--	--	"	
3,3'-Dichlorobenzidine	"	ND	---	5.00	"	"	--	--	--	--	--	--	"	
2,4-Dichlorophenol	"	ND	---	5.00	"	"	--	--	--	--	--	--	"	
Diethyl phthalate	"	ND	---	5.00	"	"	--	--	--	--	--	--	"	
2,4-Dimethylphenol	"	ND	---	10.0	"	"	--	--	--	--	--	--	"	
Dimethyl phthalate	"	ND	---	5.00	"	"	--	--	--	--	--	--	"	
4,6-Dinitro-2-methylphenol	"	ND	---	10.0	"	"	--	--	--	--	--	--	"	
2,4-Dinitrophenol	"	ND	---	25.0	"	"	--	--	--	--	--	--	"	
2,4-Dinitrotoluene	"	ND	---	5.00	"	"	--	--	--	--	--	--	"	
2,6-Dinitrotoluene	"	ND	---	5.00	"	"	--	--	--	--	--	--	"	
Bis(2-ethylhexyl)phthalate	"	ND	---	10.0	"	"	--	--	--	--	--	--	"	
Fluoranthene	"	ND	---	5.00	"	"	--	--	--	--	--	--	"	
Fluorene	"	ND	---	5.00	"	"	--	--	--	--	--	--	"	

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Hahn and Associates, Inc.	Project Name: Northwest Natural	
434 NW Sixth Ave., Suite 203	Project Number: 2708-30	Report Created:
Portland, OR 97209	Project Manager: Rob Ede	10/22/04 16:05

Semivolatile Organic Compounds per EPA Method 8270C - Laboratory Quality Control Results

North Creek Analytical - Portland

QC Batch: 4081091 **Water Preparation Method: EPA 3510/600 Series**

Analyte	Method	Result	MDL*	MRL	Units	Dil	Source Result	Spike Amt	% REC	(Limits)	% RPD	(Limits)	Analyzed	Notes
Blank (4081091-BLK1)							Extracted: 08/26/04 08:13							
Hexachlorobenzene	EPA 8270C	ND	---	5.00	ug/l	1x	--	--	--	--	--	--	08/30/04 20:04	
Hexachlorobutadiene	"	ND	---	10.0	"	"	--	--	--	--	--	--	"	
Hexachlorocyclopentadiene	"	ND	---	10.0	"	"	--	--	--	--	--	--	"	
Hexachloroethane	"	ND	---	10.0	"	"	--	--	--	--	--	--	"	
Indeno (1,2,3-cd) pyrene	"	ND	---	5.00	"	"	--	--	--	--	--	--	"	
Isophorone	"	ND	---	5.00	"	"	--	--	--	--	--	--	"	
2-Methylnaphthalene	"	ND	---	5.00	"	"	--	--	--	--	--	--	"	
2-Methylphenol	"	ND	---	10.0	"	"	--	--	--	--	--	--	"	
3-,4-Methylphenol	"	ND	---	5.00	"	"	--	--	--	--	--	--	"	
Naphthalene	"	ND	---	5.00	"	"	--	--	--	--	--	--	"	
2-Nitroaniline	"	ND	---	5.00	"	"	--	--	--	--	--	--	"	
3-Nitroaniline	"	ND	---	10.0	"	"	--	--	--	--	--	--	"	
4-Nitroaniline	"	ND	---	10.0	"	"	--	--	--	--	--	--	"	
Nitrobenzene	"	ND	---	5.00	"	"	--	--	--	--	--	--	"	
2-Nitrophenol	"	ND	---	5.00	"	"	--	--	--	--	--	--	"	
4-Nitrophenol	"	ND	---	25.0	"	"	--	--	--	--	--	--	"	
N-Nitrosodi-n-propylamine	"	ND	---	10.0	"	"	--	--	--	--	--	--	"	
N-Nitrosodiphenylamine	"	ND	---	5.00	"	"	--	--	--	--	--	--	"	
Pentachlorophenol	"	ND	---	10.0	"	"	--	--	--	--	--	--	"	
Phenanthrene	"	ND	---	5.00	"	"	--	--	--	--	--	--	"	
Phenol	"	ND	---	5.00	"	"	--	--	--	--	--	--	"	
Pyrene	"	ND	---	5.00	"	"	--	--	--	--	--	--	"	
1,2,4-Trichlorobenzene	"	ND	---	5.00	"	"	--	--	--	--	--	--	"	
2,4,5-Trichlorophenol	"	ND	---	5.00	"	"	--	--	--	--	--	--	"	
2,4,6-Trichlorophenol	"	ND	---	5.00	"	"	--	--	--	--	--	--	"	
Surrogate(s): 2-Fluorobiphenyl	*Recovery:*	*69.7%*		*Limits:*	*26-135%*	"							*08/30/04 20:04*	
2-Fluorophenol		*44.2%*			*6-124%*	"							"	
Nitrobenzene-d5		*80.0%*			*23-147%*	"							"	
Phenol-d6		*30.6%*			*11-130%*	"							"	
p-Terphenyl-d14		*80.5%*			*38-149%*	"							"	
2,4,6-Tribromophenol		*85.3%*			*19-126%*	"							"	

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Hahn and Associates, Inc.	Project Name:	**Northwest Natural**	
434 NW Sixth Ave., Suite 203	Project Number:	2708-30	Report Created:
Portland, OR 97209	Project Manager:	Rob Ede	10/22/04 16:05

Semivolatile Organic Compounds per EPA Method 8270C - Laboratory Quality Control Results

North Creek Analytical - Portland

QC Batch: 4081091 **Water Preparation Method: EPA 3510/600 Series**

Analyte	Method	Result	MDL*	MRL	Units	Dil	Source Result	Spike Amt	% REC	(Limits)	% RPD	(Limits)	Analyzed	Notes
LCS (4081091-BS1)								**Extracted: 08/26/04 08:13**						
Acenaphthene	EPA 8270C	54.5	---	5.00	ug/l	1x	--	75.0	72.7%	(40-110)	--	--	08/30/04 18:35	
4-Chloro-3-methylphenol	"	107	---	5.00	"	"	--	150	71.3%	"	--	--	"	
2-Chlorophenol	"	97.4	---	5.00	"	"	--	"	64.9%	"	--	--	"	
1,4-Dichlorobenzene	"	33.0	---	5.00	"	"	--	75.0	44.0%	(20-90)	--	--	"	
2,4-Dinitrotoluene	"	57.8	---	5.00	"	"	--	"	77.1%	(50-110)	--	--	"	
4-Nitrophenol	"	49.5	---	25.0	"	"	--	150	33.0%	(15-100)	--	--	"	
N-Nitrosodi-n-propylamine	"	55.3	---	10.0	"	"	--	75.0	73.7%	(40-110)	--	--	"	
Pentachlorophenol	"	108	---	10.0	"	"	--	150	72.0%	(30-120)	--	--	"	
Phenol	"	46.2	---	5.00	"	"	--	"	30.8%	(15-110)	--	--	"	
Pyrene	"	55.6	---	5.00	"	"	--	75.0	74.1%	(40-110)	--	--	"	
1,2,4-Trichlorobenzene	"	37.0	---	5.00	"	"	--	"	49.3%	(25-100)	--	--	"	
Surrogate(s): 2-Fluorobiphenyl		*Recovery: 63.2%*			*Limits: 26-135%*	"							*08/30/04 18:35*	
2-Fluorophenol		*44.8%*			*6-124%*	"							"	
Nitrobenzene-d5		*76.0%*			*23-147%*	"							"	
Phenol-d6		*30.4%*			*11-130%*	"							"	
p-Terphenyl-d14		*76.4%*			*38-149%*	"							"	
2,4,6-Tribromophenol		*84.7%*			*19-126%*	"							"	
LCS Dup (4081091-BSD1)								**Extracted: 08/26/04 08:13**						
Acenaphthene	EPA 8270C	62.1	---	5.00	ug/l	1x	--	75.0	82.8%	(40-110)	13.0%	(36)	08/30/04 19:20	
4-Chloro-3-methylphenol	"	118	---	5.00	"	"	--	150	78.7%	"	9.78%	(43)	"	
2-Chlorophenol	"	105	---	5.00	"	"	--	"	70.0%	"	7.51%	(38)	"	
1,4-Dichlorobenzene	"	39.9	---	5.00	"	"	--	75.0	53.2%	(20-90)	18.9%	(43)	"	
2,4-Dinitrotoluene	"	66.1	---	5.00	"	"	--	"	88.1%	(50-110)	13.4%	(31)	"	
4-Nitrophenol	"	56.4	---	25.0	"	"	--	150	37.6%	(15-100)	13.0%	(36)	"	
N-Nitrosodi-n-propylamine	"	59.9	---	10.0	"	"	--	75.0	79.9%	(40-110)	7.99%	(37)	"	
Pentachlorophenol	"	122	---	10.0	"	"	--	150	81.3%	(30-120)	12.2%	(40)	"	
Phenol	"	49.5	---	5.00	"	"	--	"	33.0%	(15-110)	6.90%	(36)	"	
Pyrene	"	61.5	---	5.00	"	"	--	75.0	82.0%	(40-110)	10.1%	(31)	"	
1,2,4-Trichlorobenzene	"	45.4	---	5.00	"	"	--	"	60.5%	(25-100)	20.4%	(42)	"	
Surrogate(s): 2-Fluorobiphenyl		*Recovery: 68.0%*			*Limits: 26-135%*	"							*08/30/04 19:20*	
2-Fluorophenol		*47.5%*			*6-124%*	"							"	
Nitrobenzene-d5		*87.5%*			*23-147%*	"							"	
Phenol-d6		*32.5%*			*11-130%*	"							"	
p-Terphenyl-d14		*84.5%*			*38-149%*	"							"	
2,4,6-Tribromophenol		*96.0%*			*19-126%*	"							"	

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Hahn and Associates, Inc.	Project Name: **Northwest Natural**	
434 NW Sixth Ave., Suite 203	Project Number: 2708-30	Report Created:
Portland, OR 97209	Project Manager: Rob Ede	10/22/04 16:05

Polynuclear Aromatic Compounds per EPA 8270M-SIM - Laboratory Quality Control Results

North Creek Analytical - Portland

QC Batch: 4081163 **Water Preparation Method: EPA 3520/600 Series**

Analyte	Method	Result	MDL*	MRL	Units	Dil	Source Result	Spike Amt	% REC	(Limits)	% RPD	(Limits)	Analyzed	Notes
Blank (4081163-BLK1)							**Extracted: 08/27/04 08:06**							
Acenaphthene	EPA 8270m	ND	0.0500	0.100	ug/l	1x	--	--	--	--	--	--	09/07/04 17:36	
Acenaphthylene	"	ND	0.0500	0.100	"	"	--	--	--	--	--	--	"	
Anthracene	"	ND	0.0500	0.100	"	"	--	--	--	--	--	--	"	
Benzo (a) anthracene	"	ND	0.0500	0.100	"	"	--	--	--	--	--	--	"	
Benzo (a) pyrene	"	ND	0.0500	0.100	"	"	--	--	--	--	--	--	"	
Benzo (b) fluoranthene	"	ND	0.0500	0.100	"	"	--	--	--	--	--	--	"	
Benzo (ghi) perylene	"	ND	0.0500	0.100	"	"	--	--	--	--	--	--	"	
Benzo (k) fluoranthene	"	ND	0.0500	0.100	"	"	--	--	--	--	--	--	"	
Chrysene	"	ND	0.0500	0.100	"	"	--	--	--	--	--	--	"	
Dibenzo (a,h) anthracene	"	ND	0.100	0.200	"	"	--	--	--	--	--	--	"	
Fluoranthene	"	ND	0.0500	0.100	"	"	--	--	--	--	--	--	"	
Fluorene	"	ND	0.0500	0.100	"	"	--	--	--	--	--	--	"	
Indeno (1,2,3-cd) pyrene	"	ND	0.0500	0.100	"	"	--	--	--	--	--	--	"	
Naphthalene	"	ND	0.0500	0.100	"	"	--	--	--	--	--	--	"	
Phenanthrene	"	ND	0.0500	0.100	"	"	--	--	--	--	--	--	"	
Pyrene	"	ND	0.0500	0.100	"	"	--	--	--	--	--	--	"	
Surrogate(s): Fluorene-d10		*Recovery:*	*71.6%*		*Limits:*	*25-125%*	"						*09/07/04 17:36*	
Pyrene-d10			*93.2%*			*23-150%*	"						"	
Benzo (a) pyrene-d12			*71.6%*			*10-125%*	"						"	
LCS (4081163-BS1)							**Extracted: 08/27/04 08:06**							
Acenaphthene	EPA 8270m	1.97	0.0500	0.100	ug/l	1x	--	2.50	78.8%	(26-135)	--	--	09/03/04 14:35	
Benzo (a) pyrene	"	2.16	0.0500	0.100	"	"	--	"	86.4%	(38-137)	--	--	"	
Pyrene	"	2.47	0.0500	0.100	"	"	--	"	98.8%	(33-133)	--	--	"	
Surrogate(s): Fluorene-d10		*Recovery:*	*85.6%*		*Limits:*	*25-125%*	"						*09/03/04 14:35*	
Pyrene-d10			*104%*			*23-150%*	"						"	
Benzo (a) pyrene-d12			*95.2%*			*10-125%*	"						"	
LCS Dup (4081163-BSD1)							**Extracted: 08/27/04 08:06**							
Acenaphthene	EPA 8270m	2.17	0.0500	0.100	ug/l	1x	--	2.50	86.8%	(26-135)	9.66%	(60)	09/03/04 15:01	
Benzo (a) pyrene	"	2.22	0.0500	0.100	"	"	--	"	88.8%	(38-137)	2.74%	"	"	
Pyrene	"	2.59	0.0500	0.100	"	"	--	"	104%	(33-133)	4.74%	"	"	
Surrogate(s): Fluorene-d10		*Recovery:*	*89.6%*		*Limits:*	*25-125%*	"						*09/03/04 15:01*	
Pyrene-d10			*105%*			*23-150%*	"						"	
Benzo (a) pyrene-d12			*92.4%*			*10-125%*	"						"	

North Creek Analytical - Portland

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Philip Nerenberg

Philip Nerenberg For Howard Holmes, Project Manager

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Hahn and Associates, Inc.	Project Name: Northwest Natural	
434 NW Sixth Ave., Suite 203	Project Number: 2708-30	Report Created:
Portland, OR 97209	Project Manager: Rob Ede	10/22/04 16:05

Conventional Chemistry Parameters per APHA/EPA Methods - Laboratory Quality Control Results

North Creek Analytical - Portland

QC Batch: 4081272 **Water Preparation Method: General Preparation**

Analyte	Method	Result	MDL*	MRL	Units	Dil	Source Result	Spike Amt	% REC	(Limits)	% RPD	(Limits)	Analyzed	Notes
Blank (4081272-BLK1)								**Extracted: 08/31/04 08:20**						
Cyanide (total)	EPA 9012A	ND	---	0.00500	mg/l	1x	--	--	--	--	--	--	09/03/04 12:53	
LCS (4081272-BS1)								**Extracted: 08/31/04 08:20**						
Cyanide (total)	EPA 9012A	0.190	---	0.00500	mg/l	1x	--	0.200	95.0%	(75-125)	--	--	09/03/04 12:53	
Matrix Spike (4081272-MS1)				**QC Source: P4H1069-03**				**Extracted: 08/31/04 08:20**						
Cyanide (total)	EPA 9012A	0.281	---	0.00500	mg/l	1x	0.0943	0.200	93.3%	(75-125)	--	--	09/03/04 12:53	
Matrix Spike Dup (4081272-MSD1)				**QC Source: P4H1069-03**				**Extracted: 08/31/04 08:20**						
Cyanide (total)	EPA 9012A	0.280	---	0.00500	mg/l	1x	0.0943	0.200	92.8%	(75-125)	0.357%	(20)	09/03/04 12:53	

North Creek Analytical - Portland

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Philip Nerenberg

Philip Nerenberg For Howard Holmes, Project Manager

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Hahn and Associates, Inc.	Project Name:	**Northwest Natural**	
434 NW Sixth Ave., Suite 203	Project Number:	2708-30	Report Created:
Portland, OR 97209	Project Manager:	Rob Ede	10/22/04 16:05

Notes and Definitions

Report Specific Notes:

J - Estimated value.

R-05 - Reporting limits raised due to dilution necessary for analysis. Sample contains high levels of reported analyte, non-target analyte, and/or matrix interference.

Laboratory Reporting Conventions:

DET - Analyte DETECTED at or above the Reporting Limit. Qualitative Analyses only.

ND - Analyte NOT DETECTED at or above the reporting limit (MDL or MRL, as appropriate).

NR / NA - Not Reported / Not Available

dry - Sample results reported on a dry weight basis. Reporting Limits are corrected for %Solids when %Solids are <50%.

wet - Sample results and reporting limits reported on a wet weight basis (as received).

RPD - Relative Percent Difference. (RPDs calculated using Results, not Percent Recoveries).

MRL - METHOD REPORTING LIMIT. Reporting Level at, or above, the lowest level standard of the Calibration Table.

MDL* - METHOD DETECTION LIMIT. Reporting Level at, or above, the statistically derived limit based on 40CFR, Part 136, Appendix B. *MDLs are listed on the report only if the data has been evaluated below the MRL. Results between the MDL and MRL are reported as Estimated results.

Dil - Dilutions are calculated based on deviations from the standard dilution performed for an analysis, and may not represent the dilution found on the analytical raw data.

Reporting limits - Reporting limits (MDLs and MRLs) are adjusted based on variations in sample preparation amounts, analytical dilutions and percent solids, where applicable.

SCOEPA00013933

nca

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3209 Denali St, Anchorage, AK 99503-4030 907-334-9200 FAX 334-9210

CHAIN OF CUSTODY REPORT

Work Order #: P4H0982

CLIENT: HAI

REPORT TO: Bob Ede HAI
ADDRESS:

PHONE: 503-796-0717 FAX:

INVOICE TO: HAI pricing as per Philip N.
*METALS: As, Cr, Cu, Ni, Pb, Zn

P.O. NUMBER: 2708-30

PROJECT NAME: NW NATURAL

PROJECT NUMBER: 2708-30

SAMPLED BY: MWG/APR

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 Specify:

* Turnaround Requests less than standard may incur Rush Charges.

PRESERVATIVE / REQUESTED ANALYSES

CLIENT SAMPLE IDENTIFICATION	SAMPLING DATE/TIME	NONE FAH EPA 8270	HCL BTEX EPA 8021	NaOH TOT. CYN. EPA 9010	NaOH AMEN CYN. EPA 9010	HNO_3 TOT. METALS EPA 8270	NONE SVOC's EPA 8270	HCL VOC's EPA 8260						MATRIX (W, S, O)	# OF CONT.	LOCATION / COMMENTS	NCA WO ID
1 2708-040824-MWS 175-013	8-24-04 11:30	X	X	X	X	X								W	7		
2 2708-040824-MW4-110-014	8-24-04 13:40	X	X	X	X	X								W	7		
3 2708-040824-MWX-100-015	8-24-04 14:45	X		X	X	X	X	X						W	8		
4 2708-040824-MW4-57-016	8-24-04 15:45	X		X	X	X	X	X						W	8		
5																	
6																	
7																	
8																	
9																	
10																	

RELEASED BY: Matt Graves DATE: 8-25-04
PRINT NAME: Matt Graves FIRM: HAI TIME:

RECEIVED BY: [signature] DATE: 8/25/04
PRINT NAME: Bob F FIRM: NCA TIME: 14:10

RELEASED BY: [signature] DATE: 8/25/04
PRINT NAME: Bob F FIRM: NCA TIME: 14:55

RECEIVED BY: [signature] DATE: 8/25/04
PRINT NAME: Callie Fairshore FIRM: NCA TIME: 1455

ADDITIONAL REMARKS:

TEMP: 3.5 4.6

PAGE OF

COC REV 1/03

SCOEPA00013934

NORTH CREEK ANALYTICAL COOLER RECEIPT FORM

(Army Corp. compliant)

Client: Haley

1. **Please sign for receipt and opening of** 2 **cooler or** _____ **other** _____

   By (print) Carrie Fairshild (sign) Carrie Fairshild

2. Date samples received 8/25/04 Date opened: Same X or ___/___/___

3. Delivered by: Bob NCA courier ___ FedEx ___UPS ___Courier ___Client ___Other_____

   Airbill # if applicable _____ (Put copy of shipping papers in file)

4. There were 1 custody seals present, signed by Bob date 8/25/04.

5. Were the custody seals unbroken and intact at the date and time of arrival? X Yes ___No

6. Was ice used? Y yes ___no Type of ice: ___ blue ice Y gel ice ___ real ice

   Temperature (degrees C) 4.6 3.9 Raytek thermometer _____ Digi-Therm (probe temperature blank)

7. Are custody papers sealed in a plastic bag and taped inside to lid? ___Yes X No

8. Were custody papers filled out properly (ink, signed, etc.)? Y Yes ___No

   If "no" please specify: _____

9. Was project identifiable from custody papers? Y Yes ___No

   Name of project _____ (if applicable)

10. **Initial and date for unpacking:** VE **(initials)** **date** 8/26/04

11. Packing material: NA bubble wrap/bag ___styrofoam ___cardboard _____other

12. Were samples in bags? / Yes X No

13. Did all containers indicated on the COC arrive? X Yes ___No

    If "no" please indicate which containers were absent _____

14. Were all containers unbroken and labels in good condition? X Yes ___No

    If "no" please indicate which containers _____

15. Were all bottle labels complete (ID, date, time, signature, etc.)? X Yes ___No

    Do the IDs, times, etc. agree with the COC? X Yes ___No

    If "no" please indicate which containers _____

16. Are containers properly preserved for indicated analysis? Y Yes ___No

17. Is there adequate volume for the test(s) requested? X Yes ___No

18. If voa vials were submitted, are they free of bubbles? X N/A ___Yes ___No

19. **Log-in phase: Date samples were logged in:** 8/26/04 **Elm Project # P** 410982

20. Logged in by (print) Vanessa Evans (sign) Vanessa Evans

21. Was the project manager notified of status? (Use back of form as a record) ___Yes X No

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October 22, 2004

Rob Ede
Hahn and Associates, Inc.
434 NW Sixth Ave., Suite 203
Portland, OR 97209

RE: Northwest Natural

Enclosed are the results of analyses for samples received by the laboratory on 08/25/04 14:55.
The following list is a summary of the NCA Work Orders contained in this report.
If you have any questions concerning this report, please feel free to contact me.

Work	Project	ProjectNumber
P4H0982	Northwest Natural	2708-30

Thank You,

Philip Nerenberg

Philip Nerenberg For Howard Holmes, Project Manager

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North Creek Analytical, Inc.
Environmental Laboratory Network

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Hahn and Associates, Inc.	Project Name:	**Northwest Natural**	
434 NW Sixth Ave., Suite 203	Project Number:	2708-30	Report Created:
Portland, OR 97209	Project Manager:	Rob Ede	10/22/04 12:27

ANALYTICAL REPORT FOR SAMPLES

Sample ID	Laboratory ID	Matrix	Date Sampled	Date Received
2708-040824-MW5-175-013	P4H0982-01	Water	08/24/04 11:30	08/25/04 14:55
2708-040824-MW14-110-014	P4H0982-02	Water	08/24/04 13:40	08/25/04 14:55
2708-040824-MW5-100-015	P4H0982-03	Water	08/24/04 14:45	08/25/04 14:55
2708-040824-MW4-57-016	P4H0982-04	Water	08/24/04 15:45	08/25/04 14:55

North Creek Analytical - Portland

Philip Nerenberg

Philip Nerenberg For Howard Holmes, Project Manager

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Hahn and Associates, Inc.	Project Name: **Northwest Natural**	
434 NW Sixth Ave., Suite 203	Project Number: 2708-30	Report Created:
Portland, OR 97209	Project Manager: Rob Ede	10/22/04 12:27

BTEX per EPA Method 8021B

North Creek Analytical - Portland

Analyte	Method	Result	MDL*	MRL	Units	Dil	Batch	Prepared	Analyzed	Notes
P4H0982-01 Water	**2708-040824-MW5-175-013**			**Sampled: 08/24/04 11:30**						
Benzene	EPA 8021B	ND	-----	0.500	ug/l	1x	4081203	08/27/04	08/27/04 21:43	
Toluene	"	ND	-----	0.500	"	"	"	"	"	
Ethylbenzene	"	ND	-----	0.500	"	"	"	"	"	
Xylenes (total)	"	ND	-----	1.00	"	"	"	"	"	
Surrogate(s): 4-BFB (PID)		*Recovery: 109%*		*Limits: 70 - 130 %*	"				"	
P4H0982-02 Water	**2708-040824-MW14-110-014**			**Sampled: 08/24/04 13:40**						
Benzene	EPA 8021B	ND	-----	0.500	ug/l	1x	4081203	08/27/04	08/27/04 22:15	
Toluene	"	ND	-----	0.500	"	"	"	"	"	
Ethylbenzene	"	ND	-----	0.500	"	"	"	"	"	
Xylenes (total)	"	ND	-----	1.00	"	"	"	"	"	
Surrogate(s): 4-BFB (PID)		*Recovery: 105%*		*Limits: 70 - 130 %*	"				"	

North Creek Analytical - Portland

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Philip Nerenberg

Philip Nerenberg For Howard Holmes, Project Manager

North Creek Analytical, Inc.
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Hahn and Associates, Inc.	Project Name: **Northwest Natural**	
434 NW Sixth Ave., Suite 203	Project Number: 2708-30	Report Created:
Portland, OR 97209	Project Manager: Rob Ede	10/22/04 12:27

Total Metals per EPA 6000/7000 Series Methods

North Creek Analytical - Portland

Analyte		Method	Result	MDL*	MRL	Units	Dil	Batch	Prepared	Analyzed	Notes
P4H0982-01	**Water**	**2708-040824-MW5-175-013**			**Sampled: 08/24/04 11:30**						
Arsenic		EPA 6020	**0.00620**	-----	0.00100	mg/l	1x	4081204	08/30/04	08/31/04 21:13	
Chromium		"	**0.00123**	-----	0.00100	"	"	"	"	"	
Copper		"	ND	-----	0.00200	"	"	"	"	"	
Lead		"	ND	-----	0.00100	"	"	"	"	"	
Nickel		"	**0.00307**	-----	0.00200	"	"	"	"	"	
Zinc		"	ND	-----	0.00500	"	"	"	"	"	
P4H0982-02	**Water**	**2708-040824-MW14-110-014**			**Sampled: 08/24/04 13:40**						
Arsenic		EPA 6020	**0.0114**	-----	0.00100	mg/l	1x	4081204	08/30/04	08/31/04 21:52	
Chromium		"	ND	-----	0.00100	"	"	"	"	"	
Copper		"	ND	-----	0.00200	"	"	"	"	"	
Lead		"	ND	-----	0.00100	"	"	"	"	"	
Nickel		"	**0.00279**	-----	0.00200	"	"	"	"	"	
Zinc		"	ND	-----	0.00500	"	"	"	"	"	
P4H0982-03	**Water**	**2708-040824-MW5-100-015**			**Sampled: 08/24/04 14:45**						
Arsenic		EPA 6020	**0.00865**	-----	0.00100	mg/l	1x	4081204	08/30/04	08/31/04 22:34	
Chromium		"	ND	-----	0.00100	"	"	"	"	"	
Copper		"	ND	-----	0.00200	"	"	"	"	"	
Lead		"	ND	-----	0.00100	"	"	"	"	"	
Nickel		"	**0.00200**	-----	0.00200	"	"	"	"	"	
Zinc		"	ND	-----	0.00500	"	"	"	"	"	

North Creek Analytical - Portland

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Philip Nerenberg

Philip Nerenberg For Howard Holmes, Project Manager

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Hahn and Associates, Inc.	Project Name: **Northwest Natural**	
434 NW Sixth Ave., Suite 203	Project Number: 2708-30	Report Created:
Portland, OR 97209	Project Manager: Rob Ede	10/22/04 12:27

Total Metals per EPA 6000/7000 Series Methods

North Creek Analytical - Portland

Analyte	Method	Result	MDL*	MRL	Units	Dil	Batch	Prepared	Analyzed	Notes
P4H0982-04 Water	**2708-040824-MW4-57-016**			**Sampled: 08/24/04 15:45**						
Arsenic	EPA 6020	**0.0126**	-----	0.00100	mg/l	1x	4081204	08/30/04	08/31/04 22:47	
Chromium	"	**0.00108**	-----	0.00100	"	"	"	"	"	
Copper	"	ND	-----	0.00200	"	"	"	"	"	
Lead	"	ND	-----	0.00100	"	"	"	"	"	
Nickel	"	**0.00788**	-----	0.00200	"	"	"	"	"	
Zinc	"	ND	-----	0.00500	"	"	"	"	"	

North Creek Analytical - Portland

Philip Nerenberg

Philip Nerenberg For Howard Holmes, Project Manager

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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phone: (907) 563.9200 fax: (907) 563.9210

Hahn and Associates, Inc.	Project Name: Northwest Natural	
434 NW Sixth Ave., Suite 203	Project Number: 2708-30	Report Created:
Portland, OR 97209	Project Manager: Rob Ede	10/22/04 12:27

Volatile Organic Compounds per EPA Method 8260B

North Creek Analytical - Portland

Analyte	Method	Result	MDL*	MRL	Units	Dil	Batch	Prepared	Analyzed	Notes
P4H0982-03 Water	**2708-040824-MW5-100-015**			**Sampled: 08/24/04 14:45**						
Acetone	EPA 8260B	ND	-----	2500	ug/l	100x	4081207	08/28/04	08/28/04 21:31	
Benzene	"	**11500**	-----	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	"	**683**	-----	100	"	"	"	"	"	
Hexachlorobutadiene	"	ND	-----	200	"	"	"	"	"	
2-Hexanone	"	ND	-----	1000	"	"	"	"	"	
Isopropylbenzene	"	ND	-----	200	"	"	"	"	"	

North Creek Analytical - Portland

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Philip Nerenberg

Philip Nerenberg For Howard Holmes, Project Manager

SCOEPA00013941

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Hahn and Associates, Inc.	Project Name: **Northwest Natural**	
434 NW Sixth Ave., Suite 203	Project Number: 2708-30	Report Created:
Portland, OR 97209	Project Manager: Rob Ede	10/22/04 12:27

Volatile Organic Compounds per EPA Method 8260B

North Creek Analytical - Portland

Analyte	Method	Result	MDL*	MRL	Units	Dil	Batch	Prepared	Analyzed	Notes
P4H0982-03 Water	**2708-040824-MW5-100-015**			**Sampled: 08/24/04 14:45**						
p-Isopropyltoluene	EPA 8260B	ND	-----	200	ug/l	100x	4081207	08/28/04	08/28/04 21:31	
4-Methyl-2-pentanone	"	ND	-----	500	"	"	"	"	"	
Methyl tert-butyl ether	"	ND	-----	100	"	"	"	"	"	
Methylene chloride	"	ND	-----	500	"	"	"	"	"	
Naphthalene	"	**12100**	-----	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	"	**253**	-----	100	"	"	"	"	"	
m,p-Xylene	"	ND	-----	200	"	"	"	"	"	

Surrogate(s):	*4-BFB*	*Recovery: 97.0%*	*Limits: 75 - 120 %*	*1X*	"
	1,2-DCA-d4	*102%*	*77 - 129 %*	"	"
	Dibromofluoromethane	*101%*	*80 - 121 %*	"	"
	Toluene-d8	*97.0%*	*80 - 120 %*	"	"

North Creek Analytical - Portland

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Philip Nerenberg

Philip Nerenberg For Howard Holmes, Project Manager

SCOEPA00013942

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Hahn and Associates, Inc.	Project Name: **Northwest Natural**	
434 NW Sixth Ave., Suite 203	Project Number: 2708-30	Report Created:
Portland, OR 97209	Project Manager: Rob Ede	10/22/04 12:27

Volatile Organic Compounds per EPA Method 8260B

North Creek Analytical - Portland

Analyte	Method	Result	MDL*	MRL	Units	Dil	Batch	Prepared	Analyzed	Notes
P4H0982-04RE1 Water	**2708-040824-MW4-57-016**			**Sampled: 08/24/04 15:45**						
Acetone	EPA 8260B	ND	-----	2500	ug/l	100x	4081244	08/30/04	08/30/04 14:31	
Benzene	"	**15000**	-----	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	"	**748**	-----	100	"	"	"	"	"	
Hexachlorobutadiene	"	ND	-----	200	"	"	"	"	"	
2-Hexanone	"	ND	-----	1000	"	"	"	"	"	
Isopropylbenzene	"	ND	-----	200	"	"	"	"	"	

North Creek Analytical - Portland

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Philip Nerenberg

Philip Nerenberg For Howard Holmes, Project Manager

SCOEPA00013943

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Hahn and Associates, Inc.	Project Name: **Northwest Natural**	
434 NW Sixth Ave., Suite 203	Project Number: 2708-30	Report Created:
Portland, OR 97209	Project Manager: Rob Ede	10/22/04 12:27

Volatile Organic Compounds per EPA Method 8260B

North Creek Analytical - Portland

Analyte	Method	Result	MDL*	MRL	Units	Dil	Batch	Prepared	Analyzed	Notes
P4H0982-04RE1 Water	**2708-040824-MW4-57-016**			**Sampled: 08/24/04 15:45**						
p-Isopropyltoluene	EPA 8260B	ND	-----	200	ug/l	100x	4081244	08/30/04	08/30/04 14:31	
4-Methyl-2-pentanone	"	ND	-----	500	"	"	"	"	"	
Methyl tert-butyl ether	"	ND	-----	100	"	"	"	"	"	
Methylene chloride	"	ND	-----	500	"	"	"	"	"	
Naphthalene	"	**3640**	-----	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	"	**122**	-----	100	"	"	"	"	"	
m,p-Xylene	"	ND	-----	200	"	"	"	"	"	

Surrogate(s):	*4-BFB*	*Recovery: 99.0%*	*Limits: 75 - 120 %*	*1X*	"
	1,2-DCA-d4	*100%*	*77 - 129 %*	"	"
	Dibromofluoromethane	*98.5%*	*80 - 121 %*	"	"
	Toluene-d8	*99.0%*	*80 - 120 %*	"	"

North Creek Analytical - Portland

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Philip Nerenberg

Philip Nerenberg For Howard Holmes, Project Manager

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Hahn and Associates, Inc.	Project Name: **Northwest Natural**	
434 NW Sixth Ave., Suite 203	Project Number: 2708-30	Report Created:
Portland, OR 97209	Project Manager: Rob Ede	10/22/04 12:27

Semivolatile Organic Compounds per EPA Method 8270C

North Creek Analytical - Portland

Analyte	Method	Result	MDL*	MRL	Units	Dil	Batch	Prepared	Analyzed	Notes
P4H0982-03 Water	**2708-040824-MW5-100-015**			**Sampled: 08/24/04 14:45**						**R-05**
Carbazole	EPA 8270C	ND	-----	500	ug/l	100x	4081273	08/31/04	09/02/04 23:47	
Acenaphthene	"	ND	-----	500	"	"	"	"	"	
Acenaphthylene	"	ND	-----	500	"	"	"	"	"	
Anthracene	"	ND	-----	500	"	"	"	"	"	
Benzo (a) anthracene	"	ND	-----	500	"	"	"	"	"	
Benzo (a) pyrene	"	ND	-----	500	"	"	"	"	"	
Benzo (b) fluoranthene	"	ND	-----	500	"	"	"	"	"	
Benzo (ghi) perylene	"	ND	-----	500	"	"	"	"	"	
Benzo (k) fluoranthene	"	ND	-----	500	"	"	"	"	"	
Benzoic Acid	"	ND	-----	5000	"	"	"	"	"	
Benzyl alcohol	"	ND	-----	1000	"	"	"	"	"	
4-Bromophenyl phenyl ether	"	ND	-----	500	"	"	"	"	"	
Butyl benzyl phthalate	"	ND	-----	500	"	"	"	"	"	
4-Chloro-3-methylphenol	"	ND	-----	500	"	"	"	"	"	
4-Chloroaniline	"	ND	-----	2000	"	"	"	"	"	
Bis(2-chloroethoxy)methane	"	ND	-----	1000	"	"	"	"	"	
Bis(2-chloroethyl)ether	"	ND	-----	500	"	"	"	"	"	
Bis(2-chloroisopropyl)ether	"	ND	-----	1000	"	"	"	"	"	
2-Chloronaphthalene	"	ND	-----	500	"	"	"	"	"	
2-Chlorophenol	"	ND	-----	500	"	"	"	"	"	
4-Chlorophenyl phenyl ether	"	ND	-----	500	"	"	"	"	"	
Chrysene	"	ND	-----	500	"	"	"	"	"	
Di-n-butyl phthalate	"	ND	-----	500	"	"	"	"	"	
Di-n-octyl phthalate	"	ND	-----	500	"	"	"	"	"	
Dibenzo (a,h) anthracene	"	ND	-----	500	"	"	"	"	"	
Dibenzofuran	"	ND	-----	500	"	"	"	"	"	
1,2-Dichlorobenzene	"	ND	-----	500	"	"	"	"	"	
1,3-Dichlorobenzene	"	ND	-----	500	"	"	"	"	"	
1,4-Dichlorobenzene	"	ND	-----	500	"	"	"	"	"	
3,3'-Dichlorobenzidine	"	ND	-----	500	"	"	"	"	"	
2,4-Dichlorophenol	"	ND	-----	500	"	"	"	"	"	
Diethyl phthalate	"	ND	-----	500	"	"	"	"	"	
2,4-Dimethylphenol	"	ND	-----	1000	"	"	"	"	"	
Dimethyl phthalate	"	ND	-----	500	"	"	"	"	"	
4,6-Dinitro-2-methylphenol	"	ND	-----	1000	"	"	"	"	"	
2,4-Dinitrophenol	"	ND	-----	2500	"	"	"	"	"	
2,4-Dinitrotoluene	"	ND	-----	500	"	"	"	"	"	
2,6-Dinitrotoluene	"	ND	-----	500	"	"	"	"	"	
Bis(2-ethylhexyl)phthalate	"	ND	-----	1000	"	"	"	"	"	
Fluoranthene	"	ND	-----	500	"	"	"	"	"	
Fluorene	"	ND	-----	500	"	"	"	"	"	
Hexachlorobenzene	"	ND	-----	500	"	"	"	"	"	

North Creek Analytical - Portland

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Philip Nerenberg

Philip Nerenberg For Howard Holmes, Project Manager

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Hahn and Associates, Inc.	Project Name: **Northwest Natural**	
434 NW Sixth Ave., Suite 203	Project Number: 2708-30	Report Created:
Portland, OR 97209	Project Manager: Rob Ede	10/22/04 12:27

Semivolatile Organic Compounds per EPA Method 8270C

North Creek Analytical - Portland

Analyte	Method	Result	MDL*	MRL	Units	Dil	Batch	Prepared	Analyzed	Notes
P4H0982-03 Water	**2708-040824-MW5-100-015**			**Sampled: 08/24/04 14:45**						**R-05**
Hexachlorobutadiene	EPA 8270C	ND	-----	1000	ug/l	100x	4081273	08/31/04	09/02/04 23:47	
Hexachlorocyclopentadiene	"	ND	-----	1000	"	"	"	"	"	
Hexachloroethane	"	ND	-----	1000	"	"	"	"	"	
Indeno (1,2,3-cd) pyrene	"	ND	-----	500	"	"	"	"	"	
Isophorone	"	ND	-----	500	"	"	"	"	"	
2-Methylnaphthalene	"	ND	-----	500	"	"	"	"	"	
2-Methylphenol	"	ND	-----	1000	"	"	"	"	"	
3-,4-Methylphenol	"	ND	-----	500	"	"	"	"	"	
Naphthalene	"	**9820**	-----	500	"	"	"	"	"	
2-Nitroaniline	"	ND	-----	500	"	"	"	"	"	
3-Nitroaniline	"	ND	-----	1000	"	"	"	"	"	
4-Nitroaniline	"	ND	-----	1000	"	"	"	"	"	
Nitrobenzene	"	ND	-----	500	"	"	"	"	"	
2-Nitrophenol	"	ND	-----	500	"	"	"	"	"	
4-Nitrophenol	"	ND	-----	2500	"	"	"	"	"	
N-Nitrosodi-n-propylamine	"	ND	-----	1000	"	"	"	"	"	
N-Nitrosodiphenylamine	"	ND	-----	500	"	"	"	"	"	
Pentachlorophenol	"	ND	-----	1000	"	"	"	"	"	
Phenanthrene	"	ND	-----	500	"	"	"	"	"	
Phenol	"	ND	-----	500	"	"	"	"	"	
Pyrene	"	ND	-----	500	"	"	"	"	"	
1,2,4-Trichlorobenzene	"	ND	-----	500	"	"	"	"	"	
2,4,5-Trichlorophenol	"	ND	-----	500	"	"	"	"	"	
2,4,6-Trichlorophenol	"	ND	-----	500	"	"	"	"	"	
Surrogate(s): *2-Fluorobiphenyl*		*Recovery:* *NR*		*Limits:* *26 - 135 %*	"				"	***S-01***
2-Fluorophenol		*NR*		*6 - 124 %*	"				"	***S-01***
Nitrobenzene-d5		*NR*		*23 - 147 %*	"				"	***S-01***
Phenol-d6		*NR*		*11 - 130 %*	"				"	***S-01***
p-Terphenyl-d14		*NR*		*38 - 149 %*	"				"	***S-01***
2,4,6-Tribromophenol		*NR*		*19 - 126 %*	"				"	***S-01***

North Creek Analytical - Portland

Philip Nerenberg

Philip Nerenberg For Howard Holmes, Project Manager

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Hahn and Associates, Inc.	Project Name: **Northwest Natural**	
434 NW Sixth Ave., Suite 203	Project Number: 2708-30	Report Created:
Portland, OR 97209	Project Manager: Rob Ede	10/22/04 12:27

Semivolatile Organic Compounds per EPA Method 8270C

North Creek Analytical - Portland

Analyte	Method	Result	MDL*	MRL	Units	Dil	Batch	Prepared	Analyzed	Notes
P4H0982-04 Water	**2708-040824-MW4-57-016**			**Sampled: 08/24/04 15:45**						**R-05**
Carbazole	EPA 8270C	ND	-----	500	ug/l	100x	4081273	08/31/04	09/03/04 00:29	
Acenaphthene	"	ND	-----	500	"	"	"	"	"	
Acenaphthylene	"	ND	-----	500	"	"	"	"	"	
Anthracene	"	ND	-----	500	"	"	"	"	"	
Benzo (a) anthracene	"	ND	-----	500	"	"	"	"	"	
Benzo (a) pyrene	"	ND	-----	500	"	"	"	"	"	
Benzo (b) fluoranthene	"	ND	-----	500	"	"	"	"	"	
Benzo (ghi) perylene	"	ND	-----	500	"	"	"	"	"	
Benzo (k) fluoranthene	"	ND	-----	500	"	"	"	"	"	
Benzoic Acid	"	ND	-----	5000	"	"	"	"	"	
Benzyl alcohol	"	ND	-----	1000	"	"	"	"	"	
4-Bromophenyl phenyl ether	"	ND	-----	500	"	"	"	"	"	
Butyl benzyl phthalate	"	ND	-----	500	"	"	"	"	"	
4-Chloro-3-methylphenol	"	ND	-----	500	"	"	"	"	"	
4-Chloroaniline	"	ND	-----	2000	"	"	"	"	"	
Bis(2-chloroethoxy)methane	"	ND	-----	1000	"	"	"	"	"	
Bis(2-chloroethyl)ether	"	ND	-----	500	"	"	"	"	"	
Bis(2-chloroisopropyl)ether	"	ND	-----	1000	"	"	"	"	"	
2-Chloronaphthalene	"	ND	-----	500	"	"	"	"	"	
2-Chlorophenol	"	ND	-----	500	"	"	"	"	"	
4-Chlorophenyl phenyl ether	"	ND	-----	500	"	"	"	"	"	
Chrysene	"	ND	-----	500	"	"	"	"	"	
Di-n-butyl phthalate	"	ND	-----	500	"	"	"	"	"	
Di-n-octyl phthalate	"	ND	-----	500	"	"	"	"	"	
Dibenzo (a,h) anthracene	"	ND	-----	500	"	"	"	"	"	
Dibenzofuran	"	ND	-----	500	"	"	"	"	"	
1,2-Dichlorobenzene	"	ND	-----	500	"	"	"	"	"	
1,3-Dichlorobenzene	"	ND	-----	500	"	"	"	"	"	
1,4-Dichlorobenzene	"	ND	-----	500	"	"	"	"	"	
3,3'-Dichlorobenzidine	"	ND	-----	500	"	"	"	"	"	
2,4-Dichlorophenol	"	ND	-----	500	"	"	"	"	"	
Diethyl phthalate	"	ND	-----	500	"	"	"	"	"	
2,4-Dimethylphenol	"	ND	-----	1000	"	"	"	"	"	
Dimethyl phthalate	"	ND	-----	500	"	"	"	"	"	
4,6-Dinitro-2-methylphenol	"	ND	-----	1000	"	"	"	"	"	
2,4-Dinitrophenol	"	ND	-----	2500	"	"	"	"	"	
2,4-Dinitrotoluene	"	ND	-----	500	"	"	"	"	"	
2,6-Dinitrotoluene	"	ND	-----	500	"	"	"	"	"	
Bis(2-ethylhexyl)phthalate	"	ND	-----	1000	"	"	"	"	"	
Fluoranthene	"	ND	-----	500	"	"	"	"	"	
Fluorene	"	ND	-----	500	"	"	"	"	"	
Hexachlorobenzene	"	ND	-----	500	"	"	"	"	"	

North Creek Analytical - Portland

Philip Nerenberg

Philip Nerenberg For Howard Holmes, Project Manager

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Hahn and Associates, Inc.	Project Name: **Northwest Natural**	
434 NW Sixth Ave., Suite 203	Project Number: 2708-30	Report Created:
Portland, OR 97209	Project Manager: Rob Ede	10/22/04 12:27

Semivolatile Organic Compounds per EPA Method 8270C

North Creek Analytical - Portland

Analyte	Method	Result	MDL*	MRL	Units	Dil	Batch	Prepared	Analyzed	Notes
P4H0982-04 Water	**2708-040824-MW4-57-016**			**Sampled: 08/24/04 15:45**						**R-05**
Hexachlorobutadiene	EPA 8270C	ND	-----	1000	ug/l	100x	4081273	08/31/04	09/03/04 00:29	
Hexachlorocyclopentadiene	"	ND	-----	1000	"	"	"	"	"	
Hexachloroethane	"	ND	-----	1000	"	"	"	"	"	
Indeno (1,2,3-cd) pyrene	"	ND	-----	500	"	"	"	"	"	
Isophorone	"	ND	-----	500	"	"	"	"	"	
2-Methylnaphthalene	"	ND	-----	500	"	"	"	"	"	
2-Methylphenol	"	ND	-----	1000	"	"	"	"	"	
3-,4-Methylphenol	"	ND	-----	500	"	"	"	"	"	
Naphthalene	"	**3640**	-----	500	"	"	"	"	"	
2-Nitroaniline	"	ND	-----	500	"	"	"	"	"	
3-Nitroaniline	"	ND	-----	1000	"	"	"	"	"	
4-Nitroaniline	"	ND	-----	1000	"	"	"	"	"	
Nitrobenzene	"	ND	-----	500	"	"	"	"	"	
2-Nitrophenol	"	ND	-----	500	"	"	"	"	"	
4-Nitrophenol	"	ND	-----	2500	"	"	"	"	"	
N-Nitrosodi-n-propylamine	"	ND	-----	1000	"	"	"	"	"	
N-Nitrosodiphenylamine	"	ND	-----	500	"	"	"	"	"	
Pentachlorophenol	"	ND	-----	1000	"	"	"	"	"	
Phenanthrene	"	ND	-----	500	"	"	"	"	"	
Phenol	"	ND	-----	500	"	"	"	"	"	
Pyrene	"	ND	-----	500	"	"	"	"	"	
1,2,4-Trichlorobenzene	"	ND	-----	500	"	"	"	"	"	
2,4,5-Trichlorophenol	"	ND	-----	500	"	"	"	"	"	
2,4,6-Trichlorophenol	"	ND	-----	500	"	"	"	"	"	

Surrogate(s):	*2-Fluorobiphenyl*	*Recovery: NR*	*Limits: 26 - 135 %*	"	"	***S-01***
	2-Fluorophenol	*NR*	*6 - 124 %*	"	"	***S-01***
	Nitrobenzene-d5	*NR*	*23 - 147 %*	"	"	***S-01***
	Phenol-d6	*NR*	*11 - 130 %*	"	"	***S-01***
	p-Terphenyl-d14	*NR*	*38 - 149 %*	"	"	***S-01***
	2,4,6-Tribromophenol	*NR*	*19 - 126 %*	"	"	***S-01***

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.

Philip Nerenberg

Philip Nerenberg For Howard Holmes, Project Manager

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Hahn and Associates, Inc.	Project Name: **Northwest Natural**	
434 NW Sixth Ave., Suite 203	Project Number: 2708-30	Report Created:
Portland, OR 97209	Project Manager: Rob Ede	10/22/04 12:27

Polynuclear Aromatic Compounds per EPA 8270M-SIM

North Creek Analytical - Portland

Analyte	Method	Result	MDL*	MRL	Units	Dil	Batch	Prepared	Analyzed	Notes
P4H0982-01 Water	**2708-040824-MW5-175-013**			**Sampled: 08/24/04 11:30**						
Acenaphthene	EPA 8270m	ND	*0.0500*	0.100	ug/l	1x	4081163	08/27/04	09/02/04 00:23	
Acenaphthylene	"	ND	*0.0500*	0.100	"	"	"	"	"	
Anthracene	"	ND	*0.0500*	0.100	"	"	"	"	"	
Benzo (a) anthracene	"	ND	*0.0500*	0.100	"	"	"	"	"	
Benzo (a) pyrene	"	ND	*0.0500*	0.100	"	"	"	"	"	
Benzo (b) fluoranthene	"	ND	*0.0500*	0.100	"	"	"	"	"	
Benzo (ghi) perylene	"	ND	*0.0500*	0.100	"	"	"	"	"	
Benzo (k) fluoranthene	"	ND	*0.0500*	0.100	"	"	"	"	"	
Chrysene	"	ND	*0.0500*	0.100	"	"	"	"	"	
Dibenzo (a,h) anthracene	"	ND	*0.100*	0.200	"	"	"	"	"	
Fluoranthene	"	ND	*0.0500*	0.100	"	"	"	"	"	
Fluorene	"	ND	*0.0500*	0.100	"	"	"	"	"	
Indeno (1,2,3-cd) pyrene	"	ND	*0.0500*	0.100	"	"	"	"	"	
Naphthalene	"	**0.0883**	*0.0500*	0.100	"	"	"	"	"	**J**
Phenanthrene	"	ND	*0.0500*	0.100	"	"	"	"	"	
Pyrene	"	ND	*0.0500*	0.100	"	"	"	"	"	
Surrogate(s): Fluorene-d10		*Recovery: 102%*		*Limits: 25 - 125 %*	"				"	
Pyrene-d10		*116%*		*23 - 150 %*	"				"	
Benzo (a) pyrene-d12		*68.5%*		*10 - 125 %*	"				"	

North Creek Analytical - Portland

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Philip Nerenberg

Philip Nerenberg For Howard Holmes, Project Manager

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Hahn and Associates, Inc.	Project Name: **Northwest Natural**	
434 NW Sixth Ave., Suite 203	Project Number: 2708-30	Report Created:
Portland, OR 97209	Project Manager: Rob Ede	10/22/04 12:27

Polynuclear Aromatic Compounds per EPA 8270M-SIM

North Creek Analytical - Portland

Analyte	Method	Result	MDL*	MRL	Units	Dil	Batch	Prepared	Analyzed	Notes
P4H0982-02 Water	**2708-040824-MW14-110-014**			**Sampled: 08/24/04 13:40**						
Acenaphthene	EPA 8270m	**0.0828**	*0.0500*	0.100	ug/l	1x	4081163	08/27/04	09/02/04 00:48	**J**
Acenaphthylene	"	ND	*0.0500*	0.100	"	"	"	"	"	
Anthracene	"	ND	*0.0500*	0.100	"	"	"	"	"	
Benzo (a) anthracene	"	ND	*0.0500*	0.100	"	"	"	"	"	
Benzo (a) pyrene	"	ND	*0.0500*	0.100	"	"	"	"	"	
Benzo (b) fluoranthene	"	ND	*0.0500*	0.100	"	"	"	"	"	
Benzo (ghi) perylene	"	ND	*0.0500*	0.100	"	"	"	"	"	
Benzo (k) fluoranthene	"	ND	*0.0500*	0.100	"	"	"	"	"	
Chrysene	"	ND	*0.0500*	0.100	"	"	"	"	"	
Dibenzo (a,h) anthracene	"	ND	*0.100*	0.200	"	"	"	"	"	
Fluoranthene	"	ND	*0.0500*	0.100	"	"	"	"	"	
Fluorene	"	ND	*0.0500*	0.100	"	"	"	"	"	
Indeno (1,2,3-cd) pyrene	"	ND	*0.0500*	0.100	"	"	"	"	"	
Naphthalene	"	ND	*0.0500*	0.100	"	"	"	"	"	
Phenanthrene	"	ND	*0.0500*	0.100	"	"	"	"	"	
Pyrene	"	ND	*0.0500*	0.100	"	"	"	"	"	
Surrogate(s): Fluorene-d10		*Recovery: 75.2%*		*Limits: 25 - 125 %*	"				"	
Pyrene-d10		*113%*		*23 - 150 %*	"				"	
Benzo (a) pyrene-d12		*95.8%*		*10 - 125 %*	"				"	

North Creek Analytical - Portland

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Philip Nerenberg

Philip Nerenberg For Howard Holmes, Project Manager

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Hahn and Associates, Inc.	Project Name: **Northwest Natural**	
434 NW Sixth Ave., Suite 203	Project Number: 2708-30	Report Created:
Portland, OR 97209	Project Manager: Rob Ede	10/22/04 12:27

Polynuclear Aromatic Compounds per EPA 8270M-SIM

North Creek Analytical - Portland

Analyte	Method	Result	MDL*	MRL	Units	Dil	Batch	Prepared	Analyzed	Notes
P4H0982-03 Water	**2708-040824-MW5-100-015**			**Sampled: 08/24/04 14:45**						**R-05**
Acenaphthene	EPA 8270m	**21.9**	*2.50*	5.00	ug/l	50x	4081163	08/27/04	09/02/04 14:32	
Acenaphthylene	"	ND	*2.50*	5.00	"	"	"	"	"	
Anthracene	"	ND	*2.50*	5.00	"	"	"	"	"	
Benzo (a) anthracene	"	ND	*2.50*	5.00	"	"	"	"	"	
Benzo (a) pyrene	"	ND	*2.50*	5.00	"	"	"	"	"	
Benzo (b) fluoranthene	"	ND	*2.50*	5.00	"	"	"	"	"	
Benzo (ghi) perylene	"	ND	*2.50*	5.00	"	"	"	"	"	
Benzo (k) fluoranthene	"	ND	*2.50*	5.00	"	"	"	"	"	
Chrysene	"	ND	*2.50*	5.00	"	"	"	"	"	
Dibenzo (a,h) anthracene	"	ND	*5.00*	10.0	"	"	"	"	"	
Fluoranthene	"	ND	*2.50*	5.00	"	"	"	"	"	
Fluorene	"	ND	*2.50*	5.00	"	"	"	"	"	
Indeno (1,2,3-cd) pyrene	"	ND	*2.50*	5.00	"	"	"	"	"	
Naphthalene	"	**11900**	*250*	500	"	5000x	"	"	09/02/04 16:29	
Phenanthrene	"	ND	*2.50*	5.00	"	50x	"	"	09/02/04 14:32	
Pyrene	"	ND	*2.50*	5.00	"	"	"	"	"	
Surrogate(s): Fluorene-d10	*Recovery: 87.4%*		*Limits: 25 - 125 %*		"				"	*J*
Pyrene-d10	*104%*		*23 - 150 %*		"				"	
Benzo (a) pyrene-d12	*71.8%*		*10 - 125 %*		"				"	*J*

North Creek Analytical - Portland

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Philip Nerenberg

Philip Nerenberg For Howard Holmes, Project Manager

SCOEPA00013951

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Hahn and Associates, Inc.	Project Name: **Northwest Natural**	
434 NW Sixth Ave., Suite 203	Project Number: 2708-30	Report Created:
Portland, OR 97209	Project Manager: Rob Ede	10/22/04 12:27

Polynuclear Aromatic Compounds per EPA 8270M-SIM

North Creek Analytical - Portland

Analyte	Method	Result	MDL*	MRL	Units	Dil	Batch	Prepared	Analyzed	Notes
P4H0982-03RE1 Water	**2708-040824-MW5-100-015**			**Sampled: 08/24/04 14:45**						**O-04, R-05**
Benzo (a) anthracene	EPA 8270m	ND	*0.100*	0.200	ug/l	2x	4081163	08/27/04	10/15/04 15:19	
Benzo (a) pyrene	"	ND	*0.100*	0.200	"	"	"	"	"	
Benzo (b) fluoranthene	"	ND	*0.100*	0.200	"	"	"	"	"	
Benzo (k) fluoranthene	"	ND	*0.100*	0.200	"	"	"	"	"	
Chrysene	"	ND	*0.100*	0.200	"	"	"	"	"	
Dibenzo (a,h) anthracene	"	ND	*0.200*	0.400	"	"	"	"	"	
Indeno (1,2,3-cd) pyrene	"	ND	*0.100*	0.200	"	"	"	"	"	
Surrogate(s): Pyrene-d10		*Recovery: 99.6%*		*Limits: 23 - 150 %*		"			"	
Benzo (a) pyrene-d12		*69.3%*		*10 - 125 %*		"			"	
P4H0982-04 Water	**2708-040824-MW4-57-016**			**Sampled: 08/24/04 15:45**						**R-05**
Acenaphthene	EPA 8270m	**42.1**	*5.00*	10.0	ug/l	100x	4081163	08/27/04	09/02/04 15:03	
Acenaphthylene	"	ND	*5.00*	10.0	"	"	"	"	"	
Anthracene	"	ND	*5.00*	10.0	"	"	"	"	"	
Benzo (a) anthracene	"	ND	*5.00*	10.0	"	"	"	"	"	
Benzo (a) pyrene	"	ND	*5.00*	10.0	"	"	"	"	"	
Benzo (b) fluoranthene	"	ND	*5.00*	10.0	"	"	"	"	"	
Benzo (ghi) perylene	"	ND	*5.00*	10.0	"	"	"	"	"	
Benzo (k) fluoranthene	"	ND	*5.00*	10.0	"	"	"	"	"	
Chrysene	"	ND	*5.00*	10.0	"	"	"	"	"	
Dibenzo (a,h) anthracene	"	ND	*10.0*	20.0	"	"	"	"	"	
Fluoranthene	"	ND	*5.00*	10.0	"	"	"	"	"	
Fluorene	"	ND	*5.00*	10.0	"	"	"	"	"	
Indeno (1,2,3-cd) pyrene	"	ND	*5.00*	10.0	"	"	"	"	"	
Naphthalene	"	**3780**	*50.0*	100	"	1000x	"	"	09/02/04 16:00	
Phenanthrene	"	ND	*5.00*	10.0	"	100x	"	"	09/02/04 15:03	
Pyrene	"	ND	*5.00*	10.0	"	"	"	"	"	
Surrogate(s): Fluorene-d10		*Recovery: NR*		*Limits: 25 - 125 %*		"			"	***S-01***
Pyrene-d10		*NR*		*23 - 150 %*		"			"	***S-01***
Benzo (a) pyrene-d12		*NR*		*10 - 125 %*		"			"	***S-01***

North Creek Analytical - Portland

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Hahn and Associates, Inc.	Project Name: **Northwest Natural**	
434 NW Sixth Ave., Suite 203	Project Number: 2708-30	Report Created:
Portland, OR 97209	Project Manager: Rob Ede	10/22/04 12:27

Polynuclear Aromatic Compounds per EPA 8270M-SIM

North Creek Analytical - Portland

Analyte	Method	Result	MDL*	MRL	Units	Dil	Batch	Prepared	Analyzed	Notes
P4H0982-04RE1 Water	**2708-040824-MW4-57-016**			**Sampled: 08/24/04 15:45**						**O-04, R-05**
Benzo (a) anthracene	EPA 8270m	**0.275**	*0.100*	0.200	ug/l	2x	4081163	08/27/04	10/15/04 15:19	
Benzo (a) pyrene	"	**0.207**	*0.100*	0.200	"	"	"	"	"	
Benzo (b) fluoranthene	"	**0.168**	*0.100*	0.200	"	"	"	"	"	**J**
Benzo (k) fluoranthene	"	**0.167**	*0.100*	0.200	"	"	"	"	"	**J**
Chrysene	"	**0.275**	*0.100*	0.200	"	"	"	"	"	
Dibenzo (a,h) anthracene	"	ND	*0.200*	0.400	"	"	"	"	"	
Indeno (1,2,3-cd) pyrene	"	**0.113**	*0.100*	0.200	"	"	"	"	"	**J**
Surrogate(s): Pyrene-d10		*Recovery: 92.8%*		*Limits: 23 - 150 %*		"			"	
Benzo (a) pyrene-d12		*67.4%*		*10 - 125 %*		"			"	

North Creek Analytical - Portland

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Hahn and Associates, Inc.	Project Name: **Northwest Natural**	
434 NW Sixth Ave., Suite 203	Project Number: 2708-30	Report Created:
Portland, OR 97209	Project Manager: Rob Ede	10/22/04 12:27

Conventional Chemistry Parameters per APHA/EPA Methods

North Creek Analytical - Portland

Analyte		Method	Result	MDL*	MRL	Units	Dil	Batch	Prepared	Analyzed	Notes
P4H0982-01	**Water**	**2708-040824-MW5-175-013**			**Sampled: 08/24/04 11:30**						
Cyanide (amenable)		EPA 9010A	**0.00690**	-----	0.00500	mg/l	1x	4081272	08/31/04	09/03/04 12:53	
Cyanide (total)		EPA 9012A	**0.00690**	-----	0.00500	"	"	"	"	"	
P4H0982-02	**Water**	**2708-040824-MW14-110-014**			**Sampled: 08/24/04 13:40**						
Cyanide (amenable)		EPA 9010A	**0.0154**	-----	0.00500	mg/l	1x	4081272	08/31/04	09/03/04 12:53	
Cyanide (total)		EPA 9012A	**0.0154**	-----	0.00500	"	"	"	"	"	
P4H0982-03	**Water**	**2708-040824-MW5-100-015**			**Sampled: 08/24/04 14:45**						
Cyanide (amenable)		EPA 9010A	**0.298**	-----	0.00500	mg/l	1x	4081272	08/31/04	09/03/04 12:53	
Cyanide (total)		EPA 9012A	**0.816**	-----	0.0100	"	2x	"	"	"	
P4H0982-04	**Water**	**2708-040824-MW4-57-016**			**Sampled: 08/24/04 15:45**						
Cyanide (amenable)		EPA 9010A	**0.261**	-----	0.0500	mg/l	10x	4081272	08/31/04	09/03/04 12:53	
Cyanide (total)		EPA 9012A	**1.76**	-----	0.0500	"	"	"	"	"	

North Creek Analytical - Portland

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Philip Nerenberg

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Hahn and Associates, Inc.	Project Name: **Northwest Natural**	
434 NW Sixth Ave., Suite 203	Project Number: 2708-30	Report Created:
Portland, OR 97209	Project Manager: Rob Ede	10/22/04 12:27

BTEX per EPA Method 8021B - Laboratory Quality Control Results

North Creek Analytical - Portland

QC Batch: 4081203 **Water Preparation Method: EPA 5030B**

Analyte	Method	Result	MDL*	MRL	Units	Dil	Source Result	Spike Amt	% REC	(Limits)	% RPD	(Limits)	Analyzed	Notes
Blank (4081203-BLK1)									Extracted: 08/27/04 16:24					
Benzene	EPA 8021B	ND	---	0.500	ug/l	1x	--	--	--	--	--	--	08/27/04 17:02	
Toluene	"	ND	---	0.500	"	"	--	--	--	--	--	--	"	
Ethylbenzene	"	ND	---	0.500	"	"	--	--	--	--	--	--	"	
Xylenes (total)	"	ND	---	1.00	"	"	--	--	--	--	--	--	"	
Surrogate(s): 4-BFB (PID)		*Recovery: 107%*			*Limits: 70-130%*	"							*08/27/04 17:02*	
LCS (4081203-BS1)									Extracted: 08/27/04 16:24					
Benzene	EPA 8021B	18.6	---	0.500	ug/l	1x	--	20.0	93.0%	(70-130)	--	--	08/27/04 18:00	
Toluene	"	18.6	---	0.500	"	"	--	"	93.0%	(76-129)	--	--	"	
Ethylbenzene	"	17.7	---	0.500	"	"	--	"	88.5%	(82-130)	--	--	"	
Xylenes (total)	"	58.2	---	1.00	"	"	--	60.0	97.0%	(76-130)	--	--	"	
Surrogate(s): 4-BFB (PID)		*Recovery: 98.6%*			*Limits: 70-130%*	"							*08/27/04 18:00*	
Matrix Spike (4081203-MS1)					QC Source: P4H0913-01				Extracted: 08/27/04 16:24					
Benzene	EPA 8021B	18.8	---	0.500	ug/l	1x	ND	20.0	94.0%	(65-144)	--	--	08/27/04 18:32	
Toluene	"	18.7	---	0.500	"	"	ND	"	92.3%	(68-139)	--	--	"	
Ethylbenzene	"	17.8	---	0.500	"	"	ND	"	89.0%	(69-144)	--	--	"	
Xylenes (total)	"	58.7	---	1.00	"	"	ND	60.0	97.1%	(60-144)	--	--	"	
Surrogate(s): 4-BFB (PID)		*Recovery: 96.0%*			*Limits: 70-130%*	"							*08/27/04 18:32*	
Matrix Spike Dup (4081203-MSD1)					QC Source: P4H0913-01				Extracted: 08/27/04 16:24					
Benzene	EPA 8021B	18.8	---	0.500	ug/l	1x	ND	20.0	94.0%	(65-144)	0.00%	(20)	08/27/04 19:04	
Toluene	"	18.6	---	0.500	"	"	ND	"	91.8%	(68-139)	0.536%	"	"	
Ethylbenzene	"	17.7	---	0.500	"	"	ND	"	88.5%	(69-144)	0.563%	"	"	
Xylenes (total)	"	58.3	---	1.00	"	"	ND	60.0	96.4%	(60-144)	0.684%	"	"	
Surrogate(s): 4-BFB (PID)		*Recovery: 95.4%*			*Limits: 70-130%*	"							*08/27/04 19:04*	

North Creek Analytical - Portland

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Philip Nerenberg

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Hahn and Associates, Inc.	Project Name: Northwest Natural	
434 NW Sixth Ave., Suite 203	Project Number: 2708-30	Report Created:
Portland, OR 97209	Project Manager: Rob Ede	10/22/04 12:27

Total Metals per EPA 6000/7000 Series Methods - Laboratory Quality Control Results

North Creek Analytical - Portland

QC Batch: 4081204 **Water Preparation Method: EPA 200/3005**

Analyte	Method	Result	MDL*	MRL	Units	Dil	Source Result	Spike Amt	% REC	(Limits)	% RPD	(Limits)	Analyzed	Notes
Blank (4081204-BLK1)								Extracted: 08/27/04 17:32						
Arsenic	EPA 6020	ND	---	0.00100	mg/l	1x	--	--	--	--	--	--	08/31/04 20:10	
Chromium	"	ND	---	0.00100	"	"	--	--	--	--	--	--	"	
Copper	"	ND	---	0.00200	"	"	--	--	--	--	--	--	"	
Lead	"	ND	---	0.00100	"	"	--	--	--	--	--	--	"	
Nickel	"	ND	---	0.00200	"	"	--	--	--	--	--	--	"	
Zinc	"	ND	---	0.00500	"	"	--	--	--	--	--	--	"	
LCS (4081204-BS1)								Extracted: 08/27/04 17:32						
Arsenic	EPA 6020	0.0984	---	0.00100	mg/l	1x	--	0.100	98.4%	(80-120)	--	--	08/31/04 20:16	
Chromium	"	0.0942	---	0.00100	"	"	--	"	94.2%	"	--	--	"	
Copper	"	0.0948	---	0.00200	"	"	--	"	94.8%	"	--	--	"	
Lead	"	0.101	---	0.00100	"	"	--	"	101%	"	--	--	"	
Nickel	"	0.0954	---	0.00200	"	"	--	"	95.4%	"	--	--	"	
Zinc	"	0.0910	---	0.00500	"	"	--	"	91.0%	"	--	--	"	
LCS Dup (4081204-BSD1)								Extracted: 08/27/04 17:32						
Arsenic	EPA 6020	0.0956	---	0.00100	mg/l	1x	--	0.100	95.6%	(80-120)	2.89%	(20)	08/31/04 20:23	
Chromium	"	0.0914	---	0.00100	"	"	--	"	91.4%	"	3.02%	"	"	
Copper	"	0.0925	---	0.00200	"	"	--	"	92.5%	"	2.46%	"	"	
Lead	"	0.0994	---	0.00100	"	"	--	"	99.4%	"	1.60%	"	"	
Nickel	"	0.0939	---	0.00200	"	"	--	"	93.9%	"	1.58%	"	"	
Zinc	"	0.0876	---	0.00500	"	"	--	"	87.6%	"	3.81%	"	"	
Duplicate (4081204-DUP1)					QC Source: P4H0982-01				Extracted: 08/27/04 17:32					
Arsenic	EPA 6020	0.00610	---	0.00100	mg/l	1x	0.00620	--	--	--	1.63%	(20)	08/31/04 21:26	
Chromium	"	0.00119	---	0.00100	"	"	0.00123	--	--	--	3.31%	"	"	
Copper	"	ND	---	0.00200	"	"	ND	--	--	--	NR	"	"	
Lead	"	ND	---	0.00100	"	"	ND	--	--	--	NR	"	"	
Nickel	"	0.00285	---	0.00200	"	"	0.00307	--	--	--	7.43%	"	"	
Zinc	"	ND	---	0.00500	"	"	ND	--	--	--	NR	"	"	
Matrix Spike (4081204-MS1)					QC Source: P4H0982-01				Extracted: 08/27/04 17:32					
Arsenic	EPA 6020	0.105	---	0.00100	mg/l	1x	0.00620	0.100	98.8%	(75-125)	--	--	08/31/04 21:39	
Chromium	"	0.0945	---	0.00100	"	"	0.00123	"	93.3%	"	--	--	"	
Copper	"	0.0930	---	0.00200	"	"	ND	"	93.0%	"	--	--	"	
Lead	"	0.101	---	0.00100	"	"	ND	"	101%	"	--	--	"	
Nickel	"	0.0963	---	0.00200	"	"	0.00307	"	93.2%	"	--	--	"	
Zinc	"	0.0903	---	0.00500	"	"	ND	"	90.3%	"	--	--	"	

North Creek Analytical - Portland

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Hahn and Associates, Inc.	Project Name:	**Northwest Natural**	
434 NW Sixth Ave., Suite 203	Project Number:	2708-30	Report Created:
Portland, OR 97209	Project Manager:	Rob Ede	10/22/04 12:27

Total Metals per EPA 6000/7000 Series Methods - Laboratory Quality Control Results

North Creek Analytical - Portland

QC Batch: 4081204 **Water Preparation Method: EPA 200/3005**

Analyte	Method	Result	MDL*	MRL	Units	Dil	Source Result	Spike Amt	% REC	(Limits)	% RPD	(Limits)	Analyzed	Notes
Matrix Spike (4081204-MS2)				**QC Source: P4H0982-02**				**Extracted: 08/27/04 17:32**						
Arsenic	EPA 6020	0.112	---	0.00100	mg/l	1x	0.0114	0.100	101%	(75-125)	--	--	08/31/04 22:20	
Chromium	"	0.0940	---	0.00100	"	"	ND	"	94.0%	"	--	--	"	
Copper	"	0.0925	---	0.00200	"	"	ND	"	91.3%	"	--	--	"	
Lead	"	0.0998	---	0.00100	"	"	ND	"	99.8%	"	--	--	"	
Nickel	"	0.0948	---	0.00200	"	"	0.00279	"	92.0%	"	--	--	"	
Zinc	"	0.0881	---	0.00500	"	"	ND	"	86.3%	"	--	--	"	

North Creek Analytical - Portland

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434 NW Sixth Ave., Suite 203	Project Number: 2708-30	Report Created:
Portland, OR 97209	Project Manager: Rob Ede	10/22/04 12:27

Volatile Organic Compounds per EPA Method 8260B - Laboratory Quality Control Results

North Creek Analytical - Portland

QC Batch: 4081207 **Water Preparation Method: EPA 5030B**

Analyte	Method	Result	MDL*	MRL	Units	Dil	Source Result	Spike Amt	% REC	(Limits)	% RPD	(Limits)	Analyzed	Notes
Blank (4081207-BLK1)								Extracted: 08/28/04 09:41						
Acetone	EPA 8260B	ND	---	25.0	ug/l	1x	--	--	--	--	--	--	08/28/04 12:48	
Benzene	"	ND	---	1.00	"	"	--	--	--	--	--	--	"	
Bromobenzene	"	ND	---	1.00	"	"	--	--	--	--	--	--	"	
Bromochloromethane	"	ND	---	1.00	"	"	--	--	--	--	--	--	"	
Bromodichloromethane	"	ND	---	1.00	"	"	--	--	--	--	--	--	"	
Bromoform	"	ND	---	1.00	"	"	--	--	--	--	--	--	"	
Bromomethane	"	ND	---	5.00	"	"	--	--	--	--	--	--	"	
2-Butanone	"	ND	---	10.0	"	"	--	--	--	--	--	--	"	
n-Butylbenzene	"	ND	---	5.00	"	"	--	--	--	--	--	--	"	
sec-Butylbenzene	"	ND	---	1.00	"	"	--	--	--	--	--	--	"	
tert-Butylbenzene	"	ND	---	1.00	"	"	--	--	--	--	--	--	"	
Carbon disulfide	"	ND	---	10.0	"	"	--	--	--	--	--	--	"	
Carbon tetrachloride	"	ND	---	1.00	"	"	--	--	--	--	--	--	"	
Chlorobenzene	"	ND	---	1.00	"	"	--	--	--	--	--	--	"	
Chloroethane	"	ND	---	1.00	"	"	--	--	--	--	--	--	"	
Chloroform	"	ND	---	1.00	"	"	--	--	--	--	--	--	"	
Chloromethane	"	ND	---	5.00	"	"	--	--	--	--	--	--	"	
2-Chlorotoluene	"	ND	---	1.00	"	"	--	--	--	--	--	--	"	
4-Chlorotoluene	"	ND	---	1.00	"	"	--	--	--	--	--	--	"	
1,2-Dibromo-3-chloropropane	"	ND	---	5.00	"	"	--	--	--	--	--	--	"	
Dibromochloromethane	"	ND	---	1.00	"	"	--	--	--	--	--	--	"	
1,2-Dibromoethane	"	ND	---	1.00	"	"	--	--	--	--	--	--	"	
Dibromomethane	"	ND	---	1.00	"	"	--	--	--	--	--	--	"	
1,2-Dichlorobenzene	"	ND	---	1.00	"	"	--	--	--	--	--	--	"	
1,3-Dichlorobenzene	"	ND	---	1.00	"	"	--	--	--	--	--	--	"	
1,4-Dichlorobenzene	"	ND	---	1.00	"	"	--	--	--	--	--	--	"	
Dichlorodifluoromethane	"	ND	---	5.00	"	"	--	--	--	--	--	--	"	
1,1-Dichloroethane	"	ND	---	1.00	"	"	--	--	--	--	--	--	"	
1,2-Dichloroethane	"	ND	---	1.00	"	"	--	--	--	--	--	--	"	
1,1-Dichloroethene	"	ND	---	1.00	"	"	--	--	--	--	--	--	"	
cis-1,2-Dichloroethene	"	ND	---	1.00	"	"	--	--	--	--	--	--	"	
trans-1,2-Dichloroethene	"	ND	---	1.00	"	"	--	--	--	--	--	--	"	
1,2-Dichloropropane	"	ND	---	1.00	"	"	--	--	--	--	--	--	"	
1,3-Dichloropropane	"	ND	---	1.00	"	"	--	--	--	--	--	--	"	
2,2-Dichloropropane	"	ND	---	1.00	"	"	--	--	--	--	--	--	"	
1,1-Dichloropropene	"	ND	---	1.00	"	"	--	--	--	--	--	--	"	
cis-1,3-Dichloropropene	"	ND	---	1.00	"	"	--	--	--	--	--	--	"	
trans-1,3-Dichloropropene	"	ND	---	1.00	"	"	--	--	--	--	--	--	"	
Ethylbenzene	"	ND	---	1.00	"	"	--	--	--	--	--	--	"	
Hexachlorobutadiene	"	ND	---	2.00	"	"	--	--	--	--	--	--	"	
2-Hexanone	"	ND	---	10.0	"	"	--	--	--	--	--	--	"	

North Creek Analytical - Portland

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Philip Nerenberg

Philip Nerenberg For Howard Holmes, Project Manager

SCOEPA00013958

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Hahn and Associates, Inc.	Project Name: Northwest Natural	
434 NW Sixth Ave., Suite 203	Project Number: 2708-30	Report Created:
Portland, OR 97209	Project Manager: Rob Ede	10/22/04 12:27

Volatile Organic Compounds per EPA Method 8260B - Laboratory Quality Control Results

North Creek Analytical - Portland

QC Batch: 4081207 **Water Preparation Method: EPA 5030B**

Analyte	Method	Result	MDL*	MRL	Units	Dil	Source Result	Spike Amt	% REC	(Limits)	% RPD	(Limits)	Analyzed	Notes
Blank (4081207-BLK1)							Extracted: 08/28/04 09:41							
Isopropylbenzene	EPA 8260B	ND	---	2.00	ug/l	1x	--	--	--	--	--	--	08/28/04 12:48	
p-Isopropyltoluene	"	ND	---	2.00	"	"	--	--	--	--	--	--	"	
4-Methyl-2-pentanone	"	ND	---	5.00	"	"	--	--	--	--	--	--	"	
Methyl tert-butyl ether	"	ND	---	1.00	"	"	--	--	--	--	--	--	"	
Methylene chloride	"	ND	---	5.00	"	"	--	--	--	--	--	--	"	
Naphthalene	"	ND	---	2.00	"	"	--	--	--	--	--	--	"	
n-Propylbenzene	"	ND	---	1.00	"	"	--	--	--	--	--	--	"	
Styrene	"	ND	---	1.00	"	"	--	--	--	--	--	--	"	
1,1,1,2-Tetrachloroethane	"	ND	---	1.00	"	"	--	--	--	--	--	--	"	
1,1,2,2-Tetrachloroethane	"	ND	---	1.00	"	"	--	--	--	--	--	--	"	
Tetrachloroethene	"	ND	---	1.00	"	"	--	--	--	--	--	--	"	
Toluene	"	ND	---	1.00	"	"	--	--	--	--	--	--	"	
1,2,3-Trichlorobenzene	"	ND	---	1.00	"	"	--	--	--	--	--	--	"	
1,2,4-Trichlorobenzene	"	ND	---	1.00	"	"	--	--	--	--	--	--	"	
1,1,1-Trichloroethane	"	ND	---	1.00	"	"	--	--	--	--	--	--	"	
1,1,2-Trichloroethane	"	ND	---	1.00	"	"	--	--	--	--	--	--	"	
Trichloroethene	"	ND	---	1.00	"	"	--	--	--	--	--	--	"	
Trichlorofluoromethane	"	ND	---	1.00	"	"	--	--	--	--	--	--	"	
1,2,3-Trichloropropane	"	ND	---	1.00	"	"	--	--	--	--	--	--	"	
1,2,4-Trimethylbenzene	"	ND	---	1.00	"	"	--	--	--	--	--	--	"	
1,3,5-Trimethylbenzene	"	ND	---	1.00	"	"	--	--	--	--	--	--	"	
Vinyl chloride	"	ND	---	1.00	"	"	--	--	--	--	--	--	"	
o-Xylene	"	ND	---	1.00	"	"	--	--	--	--	--	--	"	
m,p-Xylene	"	ND	---	2.00	"	"	--	--	--	--	--	--	"	
Surrogate(s): 4-BFB	*Recovery:*	*92.0%*		*Limits:*	*75-120%*	"							*08/28/04 12:48*	
1,2-DCA-d4		*100%*			*77-129%*	"							"	
Dibromofluoromethane		*99.0%*			*80-121%*	"							"	
Toluene-d8		*97.5%*			*80-120%*	"							"	

North Creek Analytical - Portland

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Philip Nerenberg

Philip Nerenberg For Howard Holmes, Project Manager

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Hahn and Associates, Inc.	Project Name: **Northwest Natural**	
434 NW Sixth Ave., Suite 203	Project Number: 2708-30	Report Created:
Portland, OR 97209	Project Manager: Rob Ede	10/22/04 12:27

Volatile Organic Compounds per EPA Method 8260B - Laboratory Quality Control Results

North Creek Analytical - Portland

QC Batch: 4081207 **Water Preparation Method: EPA 5030B**

Analyte	Method	Result	MDL*	MRL	Units	Dil	Source Result	Spike Amt	% REC	(Limits)	% RPD	(Limits)	Analyzed	Notes
LCS (4081207-BS1)													**Extracted: 08/28/04 09:41**	
Benzene	EPA 8260B	20.4	---	1.00	ug/l	1x	--	20.0	102%	(80-120)	--	--	08/28/04 10:56	
Chlorobenzene	"	20.0	---	1.00	"	"	--	"	100%	(80-124)	--	--	"	
1,1-Dichloroethene	"	17.3	---	1.00	"	"	--	"	86.5%	(78-120)	--	--	"	
Toluene	"	20.4	---	1.00	"	"	--	"	102%	(80-124)	--	--	"	
Trichloroethene	"	19.5	---	1.00	"	"	--	"	97.5%	(80-132)	--	--	"	
Surrogate(s): 4-BFB		*Recovery: 100%*			*Limits: 75-120%*	"							*08/28/04 10:56*	
1,2-DCA-d4		*96.5%*			*77-129%*	"							"	
Dibromofluoromethane		*99.0%*			*80-121%*	"							"	
Toluene-d8		*98.5%*			*80-120%*	"							"	
Matrix Spike (4081207-MS1)					**QC Source: P4H0929-01**								**Extracted: 08/28/04 09:41**	
Benzene	EPA 8260B	20.0	---	1.00	ug/l	1x	ND	20.0	100%	(80-124)	--	--	08/28/04 11:25	
Chlorobenzene	"	19.2	---	1.00	"	"	ND	"	96.0%	(72.9-134)	--	--	"	
1,1-Dichloroethene	"	17.6	---	1.00	"	"	ND	"	88.0%	(79.3-127)	--	--	"	
Toluene	"	15.4	---	1.00	"	"	ND	"	77.0%	(79.7-131)	--	--	"	Q-01
Trichloroethene	"	18.8	---	1.00	"	"	ND	"	94.0%	(68.4-130)	--	--	"	
Surrogate(s): 4-BFB		*Recovery: 96.5%*			*Limits: 75-120%*	"							*08/28/04 11:25*	
1,2-DCA-d4		*100%*			*77-129%*	"							"	
Dibromofluoromethane		*100%*			*80-121%*	"							"	
Toluene-d8		*86.0%*			*80-120%*	"							"	
Matrix Spike Dup (4081207-MSD1)					**QC Source: P4H0929-01**								**Extracted: 08/28/04 09:41**	
Benzene	EPA 8260B	20.6	---	1.00	ug/l	1x	ND	20.0	103%	(80-124)	2.96%	(25)	08/28/04 11:53	
Chlorobenzene	"	20.2	---	1.00	"	"	ND	"	101%	(72.9-134)	5.08%	"	"	
1,1-Dichloroethene	"	18.5	---	1.00	"	"	ND	"	92.5%	(79.3-127)	4.99%	"	"	
Toluene	"	15.6	---	1.00	"	"	ND	"	78.0%	(79.7-131)	1.29%	"	"	Q-01
Trichloroethene	"	19.1	---	1.00	"	"	ND	"	95.5%	(68.4-130)	1.58%	"	"	
Surrogate(s): 4-BFB		*Recovery: 94.0%*			*Limits: 75-120%*	"							*08/28/04 11:53*	
1,2-DCA-d4		*98.0%*			*77-129%*	"							"	
Dibromofluoromethane		*100%*			*80-121%*	"							"	
Toluene-d8		*85.0%*			*80-120%*	"							"	

North Creek Analytical - Portland

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Philip Nerenberg

Philip Nerenberg For Howard Holmes, Project Manager

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Hahn and Associates, Inc.	Project Name:	**Northwest Natural**	
434 NW Sixth Ave., Suite 203	Project Number:	2708-30	Report Created:
Portland, OR 97209	Project Manager:	Rob Ede	10/22/04 12:27

Volatile Organic Compounds per EPA Method 8260B - Laboratory Quality Control Results

North Creek Analytical - Portland

QC Batch: 4081244 **Water Preparation Method: EPA 5030B**

Analyte	Method	Result	MDL*	MRL	Units	Dil	Source Result	Spike Amt	% REC	(Limits)	% RPD	(Limits)	Analyzed	Notes
Blank (4081244-BLK1)							**Extracted: 08/30/04 09:26**							
Acetone	EPA 8260B	ND	---	25.0	ug/l	1x	--	--	--	--	--	--	08/30/04 11:18	
Benzene	"	ND	---	1.00	"	"	--	--	--	--	--	--	"	
Bromobenzene	"	ND	---	1.00	"	"	--	--	--	--	--	--	"	
Bromochloromethane	"	ND	---	1.00	"	"	--	--	--	--	--	--	"	
Bromodichloromethane	"	ND	---	1.00	"	"	--	--	--	--	--	--	"	
Bromoform	"	ND	---	1.00	"	"	--	--	--	--	--	--	"	
Bromomethane	"	ND	---	5.00	"	"	--	--	--	--	--	--	"	
2-Butanone	"	ND	---	10.0	"	"	--	--	--	--	--	--	"	
n-Butylbenzene	"	ND	---	5.00	"	"	--	--	--	--	--	--	"	
sec-Butylbenzene	"	ND	---	1.00	"	"	--	--	--	--	--	--	"	
tert-Butylbenzene	"	ND	---	1.00	"	"	--	--	--	--	--	--	"	
Carbon disulfide	"	ND	---	10.0	"	"	--	--	--	--	--	--	"	
Carbon tetrachloride	"	ND	---	1.00	"	"	--	--	--	--	--	--	"	
Chlorobenzene	"	ND	---	1.00	"	"	--	--	--	--	--	--	"	
Chloroethane	"	ND	---	1.00	"	"	--	--	--	--	--	--	"	
Chloroform	"	ND	---	1.00	"	"	--	--	--	--	--	--	"	
Chloromethane	"	ND	---	5.00	"	"	--	--	--	--	--	--	"	
2-Chlorotoluene	"	ND	---	1.00	"	"	--	--	--	--	--	--	"	
4-Chlorotoluene	"	ND	---	1.00	"	"	--	--	--	--	--	--	"	
1,2-Dibromo-3-chloropropane	"	ND	---	5.00	"	"	--	--	--	--	--	--	"	
Dibromochloromethane	"	ND	---	1.00	"	"	--	--	--	--	--	--	"	
1,2-Dibromoethane	"	ND	---	1.00	"	"	--	--	--	--	--	--	"	
Dibromomethane	"	ND	---	1.00	"	"	--	--	--	--	--	--	"	
1,2-Dichlorobenzene	"	ND	---	1.00	"	"	--	--	--	--	--	--	"	
1,3-Dichlorobenzene	"	ND	---	1.00	"	"	--	--	--	--	--	--	"	
1,4-Dichlorobenzene	"	ND	---	1.00	"	"	--	--	--	--	--	--	"	
Dichlorodifluoromethane	"	ND	---	5.00	"	"	--	--	--	--	--	--	"	
1,1-Dichloroethane	"	ND	---	1.00	"	"	--	--	--	--	--	--	"	
1,2-Dichloroethane	"	ND	---	1.00	"	"	--	--	--	--	--	--	"	
1,1-Dichloroethene	"	ND	---	1.00	"	"	--	--	--	--	--	--	"	
cis-1,2-Dichloroethene	"	ND	---	1.00	"	"	--	--	--	--	--	--	"	
trans-1,2-Dichloroethene	"	ND	---	1.00	"	"	--	--	--	--	--	--	"	
1,2-Dichloropropane	"	ND	---	1.00	"	"	--	--	--	--	--	--	"	
1,3-Dichloropropane	"	ND	---	1.00	"	"	--	--	--	--	--	--	"	
2,2-Dichloropropane	"	ND	---	1.00	"	"	--	--	--	--	--	--	"	
1,1-Dichloropropene	"	ND	---	1.00	"	"	--	--	--	--	--	--	"	
cis-1,3-Dichloropropene	"	ND	---	1.00	"	"	--	--	--	--	--	--	"	
trans-1,3-Dichloropropene	"	ND	---	1.00	"	"	--	--	--	--	--	--	"	
Ethylbenzene	"	ND	---	1.00	"	"	--	--	--	--	--	--	"	
Hexachlorobutadiene	"	ND	---	2.00	"	"	--	--	--	--	--	--	"	
2-Hexanone	"	ND	---	10.0	"	"	--	--	--	--	--	--	"	

North Creek Analytical - Portland

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Philip Nerenberg

Philip Nerenberg For Howard Holmes, Project Manager

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Hahn and Associates, Inc.
434 NW Sixth Ave., Suite 203
Portland, OR 97209

Project Name: **Northwest Natural**
Project Number: 2708-30
Project Manager: Rob Ede

Report Created:
10/22/04 12:27

Volatile Organic Compounds per EPA Method 8260B - Laboratory Quality Control Results
North Creek Analytical - Portland

QC Batch: 4081244 **Water Preparation Method: EPA 5030B**

Analyte	Method	Result	MDL*	MRL	Units	Dil	Source Result	Spike Amt	% REC	(Limits)	% RPD	(Limits)	Analyzed	Notes
Blank (4081244-BLK1)								Extracted: 08/30/04 09:26						
Isopropylbenzene	EPA 8260B	ND	---	2.00	ug/l	1x	--	--	--	--	--	--	08/30/04 11:18	
p-Isopropyltoluene	"	ND	---	2.00	"	"	--	--	--	--	--	--	"	
4-Methyl-2-pentanone	"	ND	---	5.00	"	"	--	--	--	--	--	--	"	
Methyl tert-butyl ether	"	ND	---	1.00	"	"	--	--	--	--	--	--	"	
Methylene chloride	"	ND	---	5.00	"	"	--	--	--	--	--	--	"	
Naphthalene	"	ND	---	2.00	"	"	--	--	--	--	--	--	"	
n-Propylbenzene	"	ND	---	1.00	"	"	--	--	--	--	--	--	"	
Styrene	"	ND	---	1.00	"	"	--	--	--	--	--	--	"	
1,1,1,2-Tetrachloroethane	"	ND	---	1.00	"	"	--	--	--	--	--	--	"	
1,1,2,2-Tetrachloroethane	"	ND	---	1.00	"	"	--	--	--	--	--	--	"	
Tetrachloroethene	"	ND	---	1.00	"	"	--	--	--	--	--	--	"	
Toluene	"	ND	---	1.00	"	"	--	--	--	--	--	--	"	
1,2,3-Trichlorobenzene	"	ND	---	1.00	"	"	--	--	--	--	--	--	"	
1,2,4-Trichlorobenzene	"	ND	---	1.00	"	"	--	--	--	--	--	--	"	
1,1,1-Trichloroethane	"	ND	---	1.00	"	"	--	--	--	--	--	--	"	
1,1,2-Trichloroethane	"	ND	---	1.00	"	"	--	--	--	--	--	--	"	
Trichloroethene	"	ND	---	1.00	"	"	--	--	--	--	--	--	"	
Trichlorofluoromethane	"	ND	---	1.00	"	"	--	--	--	--	--	--	"	
1,2,3-Trichloropropane	"	ND	---	1.00	"	"	--	--	--	--	--	--	"	
1,2,4-Trimethylbenzene	"	ND	---	1.00	"	"	--	--	--	--	--	--	"	
1,3,5-Trimethylbenzene	"	ND	---	1.00	"	"	--	--	--	--	--	--	"	
Vinyl chloride	"	ND	---	1.00	"	"	--	--	--	--	--	--	"	
o-Xylene	"	ND	---	1.00	"	"	--	--	--	--	--	--	"	
m,p-Xylene	"	ND	---	2.00	"	"	--	--	--	--	--	--	"	

Surrogate(s):		*Recovery:*	*Limits:*		
4-BFB	*96.5%*	*75-120%*	"		*08/30/04 11:18*
1,2-DCA-d4	*106%*	*77-129%*	"		"
Dibromofluoromethane	*106%*	*80-121%*	"		"
Toluene-d8	*103%*	*80-120%*	"		"

North Creek Analytical - Portland

Philip Nerenberg

Philip Nerenberg For Howard Holmes, Project Manager

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Environmental Laboratory Network

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Hahn and Associates, Inc.	Project Name: **Northwest Natural**	
434 NW Sixth Ave., Suite 203	Project Number: 2708-30	Report Created:
Portland, OR 97209	Project Manager: Rob Ede	10/22/04 12:27

Volatile Organic Compounds per EPA Method 8260B - Laboratory Quality Control Results

North Creek Analytical - Portland

QC Batch: 4081244 **Water Preparation Method: EPA 5030B**

Analyte	Method	Result	MDL*	MRL	Units	Dil	Source Result	Spike Amt	% REC	(Limits)	% RPD	(Limits)	Analyzed	Notes
LCS (4081244-BS1)													**Extracted: 08/30/04 09:26**	
Benzene	EPA 8260B	20.7	---	1.00	ug/l	1x	--	20.0	104%	(80-120)	--	--	08/30/04 09:27	
Chlorobenzene	"	20.6	---	1.00	"	"	--	"	103%	(80-124)	--	--	"	
1,1-Dichloroethene	"	17.0	---	1.00	"	"	--	"	85.0%	(78-120)	--	--	"	
Toluene	"	20.8	---	1.00	"	"	--	"	104%	(80-124)	--	--	"	
Trichloroethene	"	20.1	---	1.00	"	"	--	"	100%	(80-132)	--	--	"	
Surrogate(s): 4-BFB		*Recovery: 100%*			*Limits: 75-120%*	"							*08/30/04 09:27*	
1,2-DCA-d4		*96.0%*			*77-129%*	"							"	
Dibromofluoromethane		*99.0%*			*80-121%*	"							"	
Toluene-d8		*96.0%*			*80-120%*	"							"	
Matrix Spike (4081244-MS1)					**QC Source: P4H0856-01**								**Extracted: 08/30/04 09:26**	
Benzene	EPA 8260B	20.3	---	1.00	ug/l	1x	ND	20.0	102%	(80-124)	--	--	08/30/04 09:55	
Chlorobenzene	"	20.1	---	1.00	"	"	ND	"	100%	(72.9-134)	--	--	"	
1,1-Dichloroethene	"	21.3	---	1.00	"	"	ND	"	104%	(79.3-127)	--	--	"	
Toluene	"	20.4	---	1.00	"	"	ND	"	102%	(79.7-131)	--	--	"	
Trichloroethene	"	31.3	---	1.00	"	"	11.7	"	98.0%	(68.4-130)	--	--	"	
Surrogate(s): 4-BFB		*Recovery: 96.5%*			*Limits: 75-120%*	"							*08/30/04 09:55*	
1,2-DCA-d4		*97.5%*			*77-129%*	"							"	
Dibromofluoromethane		*100%*			*80-121%*	"							"	
Toluene-d8		*97.0%*			*80-120%*	"							"	
Matrix Spike Dup (4081244-MSD1)					**QC Source: P4H0856-01**								**Extracted: 08/30/04 09:26**	
Benzene	EPA 8260B	20.6	---	1.00	ug/l	1x	ND	20.0	103%	(80-124)	1.47%	(25)	08/30/04 10:23	
Chlorobenzene	"	19.9	---	1.00	"	"	ND	"	99.5%	(72.9-134)	1.00%	"	"	
1,1-Dichloroethene	"	21.2	---	1.00	"	"	ND	"	104%	(79.3-127)	0.471%	"	"	
Toluene	"	20.3	---	1.00	"	"	ND	"	102%	(79.7-131)	0.491%	"	"	
Trichloroethene	"	31.1	---	1.00	"	"	11.7	"	97.0%	(68.4-130)	0.641%	"	"	
Surrogate(s): 4-BFB		*Recovery: 93.5%*			*Limits: 75-120%*	"							*08/30/04 10:23*	
1,2-DCA-d4		*93.5%*			*77-129%*	"							"	
Dibromofluoromethane		*96.0%*			*80-121%*	"							"	
Toluene-d8		*94.0%*			*80-120%*	"							"	

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Philip Nerenberg

Philip Nerenberg For Howard Holmes, Project Manager

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Hahn and Associates, Inc.	Project Name: Northwest Natural	
434 NW Sixth Ave., Suite 203	Project Number: 2708-30	Report Created:
Portland, OR 97209	Project Manager: Rob Ede	10/22/04 12:27

Semivolatile Organic Compounds per EPA Method 8270C - Laboratory Quality Control Results

North Creek Analytical - Portland

QC Batch: 4081273 Water Preparation Method: EPA 3520/600 Series

Analyte	Method	Result	MDL*	MRL	Units	Dil	Source Result	Spike Amt	% REC	(Limits)	% RPD	(Limits)	Analyzed	Notes
Blank (4081273-BLK1)							Extracted: 08/31/04 08:22							
Carbazole	EPA 8270C	ND	---	5.00	ug/l	1x	--	--	--	--	--	--	09/03/04 15:41	
Acenaphthene	"	ND	---	5.00	"	"	--	--	--	--	--	--	"	
Acenaphthylene	"	ND	---	5.00	"	"	--	--	--	--	--	--	"	
Anthracene	"	ND	---	5.00	"	"	--	--	--	--	--	--	"	
Benzo (a) anthracene	"	ND	---	5.00	"	"	--	--	--	--	--	--	"	
Benzo (a) pyrene	"	ND	---	5.00	"	"	--	--	--	--	--	--	"	
Benzo (b) fluoranthene	"	ND	---	5.00	"	"	--	--	--	--	--	--	"	
Benzo (ghi) perylene	"	ND	---	5.00	"	"	--	--	--	--	--	--	"	
Benzo (k) fluoranthene	"	ND	---	5.00	"	"	--	--	--	--	--	--	"	
Benzoic Acid	"	ND	---	50.0	"	"	--	--	--	--	--	--	"	
Benzyl alcohol	"	ND	---	10.0	"	"	--	--	--	--	--	--	"	
4-Bromophenyl phenyl ether	"	ND	---	5.00	"	"	--	--	--	--	--	--	"	
Butyl benzyl phthalate	"	ND	---	5.00	"	"	--	--	--	--	--	--	"	
4-Chloro-3-methylphenol	"	ND	---	5.00	"	"	--	--	--	--	--	--	"	
4-Chloroaniline	"	ND	---	20.0	"	"	--	--	--	--	--	--	"	
Bis(2-chloroethoxy)methane	"	ND	---	10.0	"	"	--	--	--	--	--	--	"	
Bis(2-chloroethyl)ether	"	ND	---	5.00	"	"	--	--	--	--	--	--	"	
Bis(2-chloroisopropyl)ether	"	ND	---	10.0	"	"	--	--	--	--	--	--	"	
2-Chloronaphthalene	"	ND	---	5.00	"	"	--	--	--	--	--	--	"	
2-Chlorophenol	"	ND	---	5.00	"	"	--	--	--	--	--	--	"	
4-Chlorophenyl phenyl ether	"	ND	---	5.00	"	"	--	--	--	--	--	--	"	
Chrysene	"	ND	---	5.00	"	"	--	--	--	--	--	--	"	
Di-n-butyl phthalate	"	ND	---	5.00	"	"	--	--	--	--	--	--	"	
Di-n-octyl phthalate	"	ND	---	5.00	"	"	--	--	--	--	--	--	"	
Dibenzo (a,h) anthracene	"	ND	---	5.00	"	"	--	--	--	--	--	--	"	
Dibenzofuran	"	ND	---	5.00	"	"	--	--	--	--	--	--	"	
1,2-Dichlorobenzene	"	ND	---	5.00	"	"	--	--	--	--	--	--	"	
1,3-Dichlorobenzene	"	ND	---	5.00	"	"	--	--	--	--	--	--	"	
1,4-Dichlorobenzene	"	ND	---	5.00	"	"	--	--	--	--	--	--	"	
3,3'-Dichlorobenzidine	"	ND	---	5.00	"	"	--	--	--	--	--	--	"	
2,4-Dichlorophenol	"	ND	---	5.00	"	"	--	--	--	--	--	--	"	
Diethyl phthalate	"	ND	---	5.00	"	"	--	--	--	--	--	--	"	
2,4-Dimethylphenol	"	ND	---	10.0	"	"	--	--	--	--	--	--	"	
Dimethyl phthalate	"	ND	---	5.00	"	"	--	--	--	--	--	--	"	
4,6-Dinitro-2-methylphenol	"	ND	---	10.0	"	"	--	--	--	--	--	--	"	
2,4-Dinitrophenol	"	ND	---	25.0	"	"	--	--	--	--	--	--	"	
2,4-Dinitrotoluene	"	ND	---	5.00	"	"	--	--	--	--	--	--	"	
2,6-Dinitrotoluene	"	ND	---	5.00	"	"	--	--	--	--	--	--	"	
Bis(2-ethylhexyl)phthalate	"	ND	---	10.0	"	"	--	--	--	--	--	--	"	
Fluoranthene	"	ND	---	5.00	"	"	--	--	--	--	--	--	"	
Fluorene	"	ND	---	5.00	"	"	--	--	--	--	--	--	"	

North Creek Analytical - Portland

Philip Nerenberg

Philip Nerenberg For Howard Holmes, Project Manager

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Hahn and Associates, Inc.	Project Name: **Northwest Natural**	
434 NW Sixth Ave., Suite 203	Project Number: 2708-30	Report Created:
Portland, OR 97209	Project Manager: Rob Ede	10/22/04 12:27

Semivolatile Organic Compounds per EPA Method 8270C - Laboratory Quality Control Results

North Creek Analytical - Portland

QC Batch: 4081273 **Water Preparation Method: EPA 3520/600 Series**

Analyte	Method	Result	MDL*	MRL	Units	Dil	Source Result	Spike Amt	% REC	(Limits)	% RPD	(Limits)	Analyzed	Notes
Blank (4081273-BLK1)							**Extracted: 08/31/04 08:22**							
Hexachlorobenzene	EPA 8270C	ND	---	5.00	ug/l	1x	--	--	--	--	--	--	09/03/04 15:41	
Hexachlorobutadiene	"	ND	---	10.0	"	"	--	--	--	--	--	--	"	
Hexachlorocyclopentadiene	"	ND	---	10.0	"	"	--	--	--	--	--	--	"	
Hexachloroethane	"	ND	---	10.0	"	"	--	--	--	--	--	--	"	
Indeno (1,2,3-cd) pyrene	"	ND	---	5.00	"	"	--	--	--	--	--	--	"	
Isophorone	"	ND	---	5.00	"	"	--	--	--	--	--	--	"	
2-Methylnaphthalene	"	ND	---	5.00	"	"	--	--	--	--	--	--	"	
2-Methylphenol	"	ND	---	10.0	"	"	--	--	--	--	--	--	"	
3-,4-Methylphenol	"	ND	---	5.00	"	"	--	--	--	--	--	--	"	
Naphthalene	"	ND	---	5.00	"	"	--	--	--	--	--	--	"	
2-Nitroaniline	"	ND	---	5.00	"	"	--	--	--	--	--	--	"	
3-Nitroaniline	"	ND	---	10.0	"	"	--	--	--	--	--	--	"	
4-Nitroaniline	"	ND	---	10.0	"	"	--	--	--	--	--	--	"	
Nitrobenzene	"	ND	---	5.00	"	"	--	--	--	--	--	--	"	
2-Nitrophenol	"	ND	---	5.00	"	"	--	--	--	--	--	--	"	
4-Nitrophenol	"	ND	---	25.0	"	"	--	--	--	--	--	--	"	
N-Nitrosodi-n-propylamine	"	ND	---	10.0	"	"	--	--	--	--	--	--	"	
N-Nitrosodiphenylamine	"	ND	---	5.00	"	"	--	--	--	--	--	--	"	
Pentachlorophenol	"	ND	---	10.0	"	"	--	--	--	--	--	--	"	
Phenanthrene	"	ND	---	5.00	"	"	--	--	--	--	--	--	"	
Phenol	"	ND	---	5.00	"	"	--	--	--	--	--	--	"	
Pyrene	"	ND	---	5.00	"	"	--	--	--	--	--	--	"	
1,2,4-Trichlorobenzene	"	ND	---	5.00	"	"	--	--	--	--	--	--	"	
2,4,5-Trichlorophenol	"	ND	---	5.00	"	"	--	--	--	--	--	--	"	
2,4,6-Trichlorophenol	"	ND	---	5.00	"	"	--	--	--	--	--	--	"	
Surrogate(s): 2-Fluorobiphenyl	*Recovery:*	*70.0%*		*Limits:*	*26-135%*	"							*09/03/04 15:41*	
2-Fluorophenol		*71.3%*			*6-124%*	"							"	
Nitrobenzene-d5		*85.5%*			*23-147%*	"							"	
Phenol-d6		*75.3%*			*11-130%*	"							"	
p-Terphenyl-d14		*86.3%*			*38-149%*	"							"	
2,4,6-Tribromophenol		*99.3%*			*19-126%*	"							"	

North Creek Analytical - Portland

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Hahn and Associates, Inc.	Project Name: **Northwest Natural**	
434 NW Sixth Ave., Suite 203	Project Number: 2708-30	Report Created:
Portland, OR 97209	Project Manager: Rob Ede	10/22/04 12:27

Semivolatile Organic Compounds per EPA Method 8270C - Laboratory Quality Control Results

North Creek Analytical - Portland

QC Batch: 4081273 **Water Preparation Method: EPA 3520/600 Series**

Analyte	Method	Result	MDL*	MRL	Units	Dil	Source Result	Spike Amt	% REC	(Limits)	% RPD	(Limits)	Analyzed	Notes
LCS (4081273-BS1)									**Extracted: 08/31/04 08:22**					
Acenaphthene	EPA 8270C	58.5	---	5.00	ug/l	1x	--	75.0	78.0%	(40-110)	--	--	09/02/04 22:23	
4-Chloro-3-methylphenol	"	117	---	5.00	"	"	--	150	78.0%	"	--	--	"	
2-Chlorophenol	"	109	---	5.00	"	"	--	"	72.7%	"	--	--	"	
1,4-Dichlorobenzene	"	42.3	---	5.00	"	"	--	75.0	56.4%	(20-90)	--	--	"	
2,4-Dinitrotoluene	"	60.1	---	5.00	"	"	--	"	80.1%	(50-110)	--	--	"	
4-Nitrophenol	"	121	---	25.0	"	"	--	150	80.7%	(15-100)	--	--	"	
N-Nitrosodi-n-propylamine	"	57.9	---	10.0	"	"	--	75.0	77.2%	(40-110)	--	--	"	
Pentachlorophenol	"	117	---	10.0	"	"	--	150	78.0%	(30-120)	--	--	"	
Phenol	"	103	---	5.00	"	"	--	"	68.7%	(15-110)	--	--	"	
Pyrene	"	59.2	---	5.00	"	"	--	75.0	78.9%	(40-110)	--	--	"	
1,2,4-Trichlorobenzene	"	47.5	---	5.00	"	"	--	"	63.3%	(25-100)	--	--	"	
Surrogate(s): 2-Fluorobiphenyl		*Recovery: 70.0%*			*Limits: 26-135%*	"							*09/02/04 22:23*	
2-Fluorophenol		*70.0%*			*6-124%*	"							"	
Nitrobenzene-d5		*84.3%*			*23-147%*	"							"	
Phenol-d6		*72.0%*			*11-130%*	"							"	
p-Terphenyl-d14		*83.7%*			*38-149%*	"							"	
2,4,6-Tribromophenol		*90.7%*			*19-126%*	"							"	
LCS Dup (4081273-BSD1)									**Extracted: 08/31/04 08:22**					
Acenaphthene	EPA 8270C	60.6	---	5.00	ug/l	1x	--	75.0	80.8%	(40-110)	3.53%	(36)	09/02/04 23:05	
4-Chloro-3-methylphenol	"	122	---	5.00	"	"	--	150	81.3%	"	4.18%	(43)	"	
2-Chlorophenol	"	112	---	5.00	"	"	--	"	74.7%	"	2.71%	(38)	"	
1,4-Dichlorobenzene	"	44.6	---	5.00	"	"	--	75.0	59.5%	(20-90)	5.29%	(43)	"	
2,4-Dinitrotoluene	"	62.8	---	5.00	"	"	--	"	83.7%	(50-110)	4.39%	(31)	"	
4-Nitrophenol	"	128	---	25.0	"	"	--	150	85.3%	(15-100)	5.62%	(36)	"	
N-Nitrosodi-n-propylamine	"	59.9	---	10.0	"	"	--	75.0	79.9%	(40-110)	3.40%	(37)	"	
Pentachlorophenol	"	119	---	10.0	"	"	--	150	79.3%	(30-120)	1.69%	(40)	"	
Phenol	"	108	---	5.00	"	"	--	"	72.0%	(15-110)	4.74%	(36)	"	
Pyrene	"	61.9	---	5.00	"	"	--	75.0	82.5%	(40-110)	4.46%	(31)	"	
1,2,4-Trichlorobenzene	"	49.5	---	5.00	"	"	--	"	66.0%	(25-100)	4.12%	(42)	"	
Surrogate(s): 2-Fluorobiphenyl		*Recovery: 71.2%*			*Limits: 26-135%*	"							*09/02/04 23:05*	
2-Fluorophenol		*72.0%*			*6-124%*	"							"	
Nitrobenzene-d5		*86.7%*			*23-147%*	"							"	
Phenol-d6		*74.7%*			*11-130%*	"							"	
p-Terphenyl-d14		*86.5%*			*38-149%*	"							"	
2,4,6-Tribromophenol		*92.0%*			*19-126%*	"							"	

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Hahn and Associates, Inc.	Project Name: **Northwest Natural**	
434 NW Sixth Ave., Suite 203	Project Number: 2708-30	Report Created:
Portland, OR 97209	Project Manager: Rob Ede	10/22/04 12:27

Polynuclear Aromatic Compounds per EPA 8270M-SIM - Laboratory Quality Control Results

North Creek Analytical - Portland

QC Batch: 4081163 **Water Preparation Method: EPA 3520/600 Series**

Analyte	Method	Result	MDL*	MRL	Units	Dil	Source Result	Spike Amt	% REC	(Limits)	% RPD	(Limits)	Analyzed	Notes
Blank (4081163-BLK1)							**Extracted: 08/27/04 08:06**							
Acenaphthene	EPA 8270m	ND	0.0500	0.100	ug/l	1x	--	--	--	--	--	--	09/07/04 17:36	
Acenaphthylene	"	ND	0.0500	0.100	"	"	--	--	--	--	--	--	"	
Anthracene	"	ND	0.0500	0.100	"	"	--	--	--	--	--	--	"	
Benzo (a) anthracene	"	ND	0.0500	0.100	"	"	--	--	--	--	--	--	"	
Benzo (a) pyrene	"	ND	0.0500	0.100	"	"	--	--	--	--	--	--	"	
Benzo (b) fluoranthene	"	ND	0.0500	0.100	"	"	--	--	--	--	--	--	"	
Benzo (ghi) perylene	"	ND	0.0500	0.100	"	"	--	--	--	--	--	--	"	
Benzo (k) fluoranthene	"	ND	0.0500	0.100	"	"	--	--	--	--	--	--	"	
Chrysene	"	ND	0.0500	0.100	"	"	--	--	--	--	--	--	"	
Dibenzo (a,h) anthracene	"	ND	0.100	0.200	"	"	--	--	--	--	--	--	"	
Fluoranthene	"	ND	0.0500	0.100	"	"	--	--	--	--	--	--	"	
Fluorene	"	ND	0.0500	0.100	"	"	--	--	--	--	--	--	"	
Indeno (1,2,3-cd) pyrene	"	ND	0.0500	0.100	"	"	--	--	--	--	--	--	"	
Naphthalene	"	ND	0.0500	0.100	"	"	--	--	--	--	--	--	"	
Phenanthrene	"	ND	0.0500	0.100	"	"	--	--	--	--	--	--	"	
Pyrene	"	ND	0.0500	0.100	"	"	--	--	--	--	--	--	"	
Surrogate(s): Fluorene-d10		*Recovery:*	*71.6%*		*Limits:*	*25-125%*	"						*09/07/04 17:36*	
Pyrene-d10			*93.2%*			*23-150%*	"						"	
Benzo (a) pyrene-d12			*71.6%*			*10-125%*	"						"	
LCS (4081163-BS1)							**Extracted: 08/27/04 08:06**							
Acenaphthene	EPA 8270m	1.97	0.0500	0.100	ug/l	1x	--	2.50	78.8%	(26-135)	--	--	09/03/04 14:35	
Benzo (a) pyrene	"	2.16	0.0500	0.100	"	"	--	"	86.4%	(38-137)	--	--	"	
Pyrene	"	2.47	0.0500	0.100	"	"	--	"	98.8%	(33-133)	--	--	"	
Surrogate(s): Fluorene-d10		*Recovery:*	*85.6%*		*Limits:*	*25-125%*	"						*09/03/04 14:35*	
Pyrene-d10			*104%*			*23-150%*	"						"	
Benzo (a) pyrene-d12			*95.2%*			*10-125%*	"						"	
LCS Dup (4081163-BSD1)							**Extracted: 08/27/04 08:06**							
Acenaphthene	EPA 8270m	2.17	0.0500	0.100	ug/l	1x	--	2.50	86.8%	(26-135)	9.66%	(60)	09/03/04 15:01	
Benzo (a) pyrene	"	2.22	0.0500	0.100	"	"	--	"	88.8%	(38-137)	2.74%	"	"	
Pyrene	"	2.59	0.0500	0.100	"	"	--	"	104%	(33-133)	4.74%	"	"	
Surrogate(s): Fluorene-d10		*Recovery:*	*89.6%*		*Limits:*	*25-125%*	"						*09/03/04 15:01*	
Pyrene-d10			*105%*			*23-150%*	"						"	
Benzo (a) pyrene-d12			*92.4%*			*10-125%*	"						"	

North Creek Analytical - Portland

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Philip Nerenberg

Philip Nerenberg For Howard Holmes, Project Manager

North Creek Analytical, Inc.
Environmental Laboratory Network

SCOEPA00013967

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Hahn and Associates, Inc.	Project Name: **Northwest Natural**	
434 NW Sixth Ave., Suite 203	Project Number: 2708-30	Report Created:
Portland, OR 97209	Project Manager: Rob Ede	10/22/04 12:27

Conventional Chemistry Parameters per APHA/EPA Methods - Laboratory Quality Control Results

North Creek Analytical - Portland

QC Batch: 4081272 **Water Preparation Method: General Preparation**

Analyte	Method	Result	MDL*	MRL	Units	Dil	Source Result	Spike Amt	% REC	(Limits)	% RPD	(Limits)	Analyzed	Notes
Blank (4081272-BLK1)								**Extracted: 08/31/04 08:20**						
Cyanide (total)	EPA 9012A	ND	---	0.00500	mg/l	1x	--	--	--	--	--	--	09/03/04 12:53	
LCS (4081272-BS1)								**Extracted: 08/31/04 08:20**						
Cyanide (total)	EPA 9012A	0.190	---	0.00500	mg/l	1x	--	0.200	95.0%	(75-125)	--	--	09/03/04 12:53	
Matrix Spike (4081272-MS1)				**QC Source: P4H1069-03**				**Extracted: 08/31/04 08:20**						
Cyanide (total)	EPA 9012A	0.281	---	0.00500	mg/l	1x	0.0943	0.200	93.3%	(75-125)	--	--	09/03/04 12:53	
Matrix Spike Dup (4081272-MSD1)				**QC Source: P4H1069-03**				**Extracted: 08/31/04 08:20**						
Cyanide (total)	EPA 9012A	0.280	---	0.00500	mg/l	1x	0.0943	0.200	92.8%	(75-125)	0.357%	(20)	09/03/04 12:53	

North Creek Analytical - Portland

Philip Nerenberg

Philip Nerenberg For Howard Holmes, Project Manager

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Hahn and Associates, Inc.	Project Name:	**Northwest Natural**	
434 NW Sixth Ave., Suite 203	Project Number:	2708-30	Report Created:
Portland, OR 97209	Project Manager:	Rob Ede	10/22/04 12:27

Notes and Definitions

Report Specific Notes:

J - Estimated value.

O-04 - This sample was analyzed outside the EPA recommended holding time.

Q-01 - The matrix spike recovery, and/or RPD, for this QC sample is outside of established control limits. Failure of a matrix spike QC sample does not represent an out-of-control condition for the batch.

R-05 - Reporting limits raised due to dilution necessary for analysis. Sample contains high levels of reported analyte, non-target analyte, and/or matrix interference.

S-01 - The surrogate recovery for this sample is not available due to sample dilution required from high analyte concentration and/or matrix interferences.

Laboratory Reporting Conventions:

DET - Analyte DETECTED at or above the Reporting Limit. Qualitative Analyses only.

ND - Analyte NOT DETECTED at or above the reporting limit (MDL or MRL, as appropriate).

NR / NA - Not Reported / Not Available

dry - Sample results reported on a dry weight basis. Reporting Limits are corrected for %Solids when %Solids are <50%.

wet - Sample results and reporting limits reported on a wet weight basis (as received).

RPD - Relative Percent Difference. (RPDs calculated using Results, not Percent Recoveries).

MRL - METHOD REPORTING LIMIT. Reporting Level at, or above, the lowest level standard of the Calibration Table.

MDL* - METHOD DETECTION LIMIT. Reporting Level at, or above, the statistically derived limit based on 40CFR, Part 136, Appendix B. *MDLs are listed on the report only if the data has been evaluated below the MRL. Results between the MDL and MRL are reported as Estimated results.

Dil - Dilutions are calculated based on deviations from the standard dilution performed for an analysis, and may not represent the dilution found on the analytical raw data.

Reporting limits - Reporting limits (MDLs and MRLs) are adjusted based on variations in sample preparation amounts, analytical dilutions and percent solids, where applicable.

nca

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3209 Denali St, Anchorage, AK 99503-4030 907-334-9200 FAX 334-9210

CHAIN OF CUSTODY REPORT

Work Order #: 24H1019

CLIENT: HAI

REPORT TO: Bob Ede / HAI
ADDRESS:
PHONE: 503-746-0717 FAX:

INVOICE TO: HAI pricing as per Philip N.
Metals = As, Cr, Cu, Ni, Pb, Zn

P.O. NUMBER: 2708-30

PROJECT NAME: NW NATURAL
PROJECT NUMBER: 2708-30
SAMPLED BY: MWG/APR

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 Specify:

* Turnaround Requests less than standard may incur Rush Charges.

PRESERVATIVE: NONE, HCL, NaOH, NaOH, HNO3

REQUESTED ANALYSES

	CLIENT SAMPLE IDENTIFICATION	SAMPLING DATE/TIME	PAH EPA 8270	BTEX EPA 8021	TOT. CYN EPA 9010	AMEN, CPN, EPA 9010	TOT. METALS EPA 6020	MATRIX (W, S, O)	# OF CONT.	LOCATION / COMMENTS	NCA WO ID
1	2708-040825-MW12-36-017	8-25-04 9:10	X	X	X	X	X	W	7		
2	2708-040825-MW13-36-018	8-25-04 10:30	X	X	X	X	X	W	7		
3	2708-040825-MW1-22-019	8-25-04 11:45	X	X	X	X	X	W	7		
4	2708-040825-MW15-56-020	8-25-04 13:40	X	X	X	X	X	W	7		
5	2708-040825-MW8 56-021	8-25-04 14:45	X	X	X	X	X	W	7		
6	2708-040825-MW8-29-022	8-25-04	X	X	X	X	X	W	7		
7											
8											
9											
10											

RELEASED BY: Matt Graves DATE: 8-26-04
PRINT NAME: MATT GRAVES FIRM: HAI TIME:

RECEIVED BY: [signature] DATE: 8/26/04
PRINT NAME: Bob K FIRM: NCA TIME: 15:05

RELEASED BY: [signature] DATE: 8/26/04
PRINT NAME: Bob K FIRM: NCA TIME: 1617

RECEIVED BY: [signature] DATE: 8/26/04
PRINT NAME: Carrie Fairshore FIRM: NCA TIME: 1617

ADDITIONAL REMARKS:

TEMP: 1.2, 6.7

PAGE OF

COC REV 1/03

SCOEPA00013970

NORTH CREEK ANALYTICAL COOLER RECEIPT FORM

(Army Corp. compliant)

Client: Haley

1. **Please sign for receipt and opening of** 2 **cooler or** _____ **other** _____

   By (print) Callie Fahsholz (sign) Callie Fahsholz

2. Date samples received 8/26/04 Date opened: Same X or ___/___/___

3. Delivered by: BCP X NCA courier ___ FedEx ___UPS ___Courier ___Client ___Other_____

   Airbill # if applicable _____ (Put copy of shipping papers in file)

4. There were 1 custody seals present, signed by Bob date 8/26/04.

5. Were the custody seals unbroken and intact at the date and time of arrival? X Yes ___No

6. Was ice used? X yes ___no Type of ice: ___ blue ice X gel ice ___real ice

   Temperature (degrees C) 4.7 Raytek thermometer _____ Digi-Therm (probe temperature blank)

7. Are custody papers sealed in a plastic bag and taped inside to lid? ___ Yes X No

8. Were custody papers filled out properly (ink, signed, etc.)? X Yes ___ No

   If "no" please specify: _____

9. Was project identifiable from custody papers? X Yes ___ No

   Name of project Northwest Natural (if applicable)

10. **Initial and date for unpacking:** CF **(initials)** **date** 8/27/04

11. Packing material: NA bubble wrap/bag ___styrofoam ___cardboard _____other

12. Were samples in bags? ___ Yes Y No

13. Did all containers indicated on the COC arrive? X Yes ___ No

    If "no" please indicate which containers were absent _____

14. Were all containers unbroken and labels in good condition? Y Yes ___ No

    If "no" please indicate which containers _____

15. Were all bottle labels complete (ID, date, time, signature, etc.)? X Yes ___ No

    Do the IDs, times, etc. agree with the COC? Y Yes ___ No

    If "no" please indicate which containers _____

16. Are containers properly preserved for indicated analysis? X Yes ___ No

17. Is there adequate volume for the test(s) requested? X Yes ___ No

18. If voa vials were submitted, are they free of bubbles? ___ N/A X Yes ___ No

19. **Log-in phase: Date samples were logged in:** 8/27/04 **Elm Project # P** 4H1019

20. Logged in by (print) Callie Fahsholz (sign) Callie Fahsholz

21. Was the project manager notified of status? (Use back of form as a record) ___ Yes X No

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October 22, 2004

Rob Ede
Hahn and Associates, Inc.
434 NW Sixth Ave., Suite 203
Portland, OR 97209

RE: Northwest Natural

Enclosed are the results of analyses for samples received by the laboratory on 08/26/04 16:17.
The following list is a summary of the NCA Work Orders contained in this report.
If you have any questions concerning this report, please feel free to contact me.

Work	Project	ProjectNumber
P4H1019	Northwest Natural	2708-30

Thank You,

Philip Nerenberg

Philip Nerenberg For Howard Holmes, Project Manager

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Environmental Laboratory Network

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Hahn and Associates, Inc.	Project Name:	**Northwest Natural**	
434 NW Sixth Ave., Suite 203	Project Number:	2708-30	Report Created:
Portland, OR 97209	Project Manager:	Rob Ede	10/22/04 17:18

ANALYTICAL REPORT FOR SAMPLES

Sample ID	Laboratory ID	Matrix	Date Sampled	Date Received
2708-040825-MW12-36-017	P4H1019-01	Water	08/25/04 09:10	08/26/04 16:17
2708-040825-MW13-30-018	P4H1019-02	Water	08/25/04 10:30	08/26/04 16:17
2708-040825-MW1-22-019	P4H1019-03	Water	08/25/04 11:45	08/26/04 16:17
2708-040825-MW15-50-020	P4H1019-04	Water	08/25/04 13:40	08/26/04 16:17
2708-040825-MW8-56-021	P4H1019-05	Water	08/25/04 14:45	08/26/04 16:17
2708-040825-MW8-29-022	P4H1019-06	Water	08/25/04 12:00	08/26/04 16:17

North Creek Analytical - Portland

Philip Nerenberg

Philip Nerenberg For Howard Holmes, Project Manager

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Hahn and Associates, Inc.	Project Name: **Northwest Natural**	
434 NW Sixth Ave., Suite 203	Project Number: 2708-30	Report Created:
Portland, OR 97209	Project Manager: Rob Ede	10/22/04 17:18

BTEX per EPA Method 8021B

North Creek Analytical - Portland

Analyte	Method	Result	MDL*	MRL	Units	Dil	Batch	Prepared	Analyzed	Notes
P4H1019-01RE1 Water	**2708-040825-MW12-36-017**			**Sampled: 08/25/04 09:10**						
Benzene	EPA 8021B	**235**	-----	25.0	ug/l	50x	4081213	08/28/04	08/28/04 18:34	
Toluene	"	**584**	-----	25.0	"	"	"	"	"	
Ethylbenzene	"	**488**	-----	25.0	"	"	"	"	"	
Xylenes (total)	"	**991**	-----	50.0	"	"	"	"	"	
Surrogate(s): 4-BFB (PID)	*Recovery: 94.8%*			*Limits: 70 - 130 %*	*1X*				"	
P4H1019-02RE1 Water	**2708-040825-MW13-30-018**			**Sampled: 08/25/04 10:30**						
Benzene	EPA 8021B	**1150**	-----	5.00	ug/l	10x	4081213	08/28/04	08/28/04 21:13	
Toluene	"	**8.25**	-----	5.00	"	"	"	"	"	
Ethylbenzene	"	**120**	-----	5.00	"	"	"	"	"	
Xylenes (total)	"	**75.6**	-----	10.0	"	"	"	"	"	
Surrogate(s): 4-BFB (PID)	*Recovery: 89.4%*			*Limits: 70 - 130 %*	*1X*				"	
P4H1019-03 Water	**2708-040825-MW1-22-019**			**Sampled: 08/25/04 11:45**						
Benzene	EPA 8021B	**4.66**	-----	0.500	ug/l	1x	4081203	08/27/04	08/28/04 03:05	
Toluene	"	**5.87**	-----	0.500	"	"	"	"	"	
Ethylbenzene	"	**6.59**	-----	0.500	"	"	"	"	"	
Xylenes (total)	"	**46.3**	-----	1.00	"	"	"	"	"	
Surrogate(s): 4-BFB (PID)	*Recovery: 107%*			*Limits: 70 - 130 %*	"				"	

North Creek Analytical - Portland

Philip Nerenberg

Philip Nerenberg For Howard Holmes, Project Manager

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Hahn and Associates, Inc.	Project Name: **Northwest Natural**	
434 NW Sixth Ave., Suite 203	Project Number: 2708-30	Report Created:
Portland, OR 97209	Project Manager: Rob Ede	10/22/04 17:18

BTEX per EPA Method 8021B

North Creek Analytical - Portland

Analyte	Method	Result	MDL*	MRL	Units	Dil	Batch	Prepared	Analyzed	Notes
P4H1019-04RE3 Water	**2708-040825-MW15-50-020**			**Sampled: 08/25/04 13:40**						
Benzene	EPA 8021B	**40500**	-----	250	ug/l	500x	4081314	08/31/04	09/01/04 00:47	
Toluene	"	ND	-----	250	"	"	"	"	"	
Ethylbenzene	"	**288**	-----	250	"	"	"	"	"	
Xylenes (total)	"	**764**	-----	500	"	"	"	"	"	
Surrogate(s): 4-BFB (PID)		*Recovery: 113%*		*Limits: 70 - 130 %*		*1X*			"	
P4H1019-05RE2 Water	**2708-040825-MW8-56-021**			**Sampled: 08/25/04 14:45**						
Benzene	EPA 8021B	**20300**	-----	100	ug/l	200x	4081258	08/30/04	08/31/04 00:30	
Toluene	"	**248**	-----	100	"	"	"	"	"	
Ethylbenzene	"	**795**	-----	100	"	"	"	"	"	
Xylenes (total)	"	**831**	-----	200	"	"	"	"	"	
Surrogate(s): 4-BFB (PID)		*Recovery: 94.2%*		*Limits: 70 - 130 %*		*1X*			"	
P4H1019-06 Water	**2708-040825-MW8-29-022**			**Sampled: 08/25/04 12:00**						
Benzene	EPA 8021B	**85.9**	-----	0.500	ug/l	1x	4081203	08/27/04	08/28/04 04:42	
Toluene	"	**13.4**	-----	0.500	"	"	"	"	"	
Ethylbenzene	"	**14.3**	-----	0.500	"	"	"	"	"	
Xylenes (total)	"	**29.1**	-----	1.00	"	"	"	"	"	
Surrogate(s): 4-BFB (PID)		*Recovery: 110%*		*Limits: 70 - 130 %*		"			"	

North Creek Analytical - Portland

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Philip Nerenberg

Philip Nerenberg For Howard Holmes, Project Manager

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Hahn and Associates, Inc.	Project Name: **Northwest Natural**	
434 NW Sixth Ave., Suite 203	Project Number: 2708-30	Report Created:
Portland, OR 97209	Project Manager: Rob Ede	10/22/04 17:18

Total Metals per EPA 6000/7000 Series Methods

North Creek Analytical - Portland

Analyte		Method	Result	MDL*	MRL	Units	Dil	Batch	Prepared	Analyzed	Notes
P4H1019-01	**Water**	**2708-040825-MW12-36-017**			**Sampled: 08/25/04 09:10**						
Arsenic		EPA 6020	**0.00297**	-----	0.00100	mg/l	1x	4081235	08/30/04	09/09/04 21:48	
Chromium		"	ND	-----	0.00100	"	"	"	"	"	
Copper		"	ND	-----	0.00200	"	"	"	"	"	
Lead		"	ND	-----	0.00100	"	"	"	"	"	
Nickel		"	ND	-----	0.00200	"	"	"	"	"	
Zinc		"	ND	-----	0.00500	"	"	"	"	"	
P4H1019-02	**Water**	**2708-040825-MW13-30-018**			**Sampled: 08/25/04 10:30**						
Arsenic		EPA 6020	**0.0144**	-----	0.00100	mg/l	1x	4081235	08/30/04	09/09/04 22:39	
Chromium		"	ND	-----	0.00100	"	"	"	"	"	
Copper		"	ND	-----	0.00200	"	"	"	"	"	
Lead		"	ND	-----	0.00100	"	"	"	"	"	
Nickel		"	ND	-----	0.00200	"	"	"	"	"	
Zinc		"	ND	-----	0.00500	"	"	"	"	"	
P4H1019-03	**Water**	**2708-040825-MW1-22-019**			**Sampled: 08/25/04 11:45**						
Arsenic		EPA 6020	**0.00302**	-----	0.00100	mg/l	1x	4081235	08/30/04	09/09/04 22:52	
Chromium		"	**0.0315**	-----	0.00100	"	"	"	"	"	
Copper		"	ND	-----	0.00200	"	"	"	"	"	
Lead		"	**0.0182**	-----	0.00100	"	"	"	"	"	
Nickel		"	**0.168**	-----	0.00200	"	"	"	"	"	
Zinc		"	**0.230**	-----	0.00500	"	"	"	"	"	

North Creek Analytical - Portland

Philip Nerenberg

Philip Nerenberg For Howard Holmes, Project Manager

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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Hahn and Associates, Inc.	Project Name: **Northwest Natural**	
434 NW Sixth Ave., Suite 203	Project Number: 2708-30	Report Created:
Portland, OR 97209	Project Manager: Rob Ede	10/22/04 17:18

Total Metals per EPA 6000/7000 Series Methods

North Creek Analytical - Portland

Analyte		Method	Result	MDL*	MRL	Units	Dil	Batch	Prepared	Analyzed	Notes
P4H1019-04	**Water**	**2708-040825-MW15-50-020**			**Sampled: 08/25/04 13:40**						
Arsenic		EPA 6020	**0.0172**	-----	0.00100	mg/l	1x	4081235	08/30/04	09/09/04 23:05	
Chromium		"	**0.00141**	-----	0.00100	"	"	"	"	"	
Copper		"	**0.00265**	-----	0.00200	"	"	"	"	"	
Lead		"	ND	-----	0.00100	"	"	"	"	"	
Nickel		"	**0.00529**	-----	0.00200	"	"	"	"	"	
Zinc		"	ND	-----	0.00500	"	"	"	"	"	
P4H1019-05	**Water**	**2708-040825-MW8-56-021**			**Sampled: 08/25/04 14:45**						
Arsenic		EPA 6020	**0.00766**	-----	0.00100	mg/l	1x	4081235	08/30/04	09/09/04 23:18	
Chromium		"	**0.00720**	-----	0.00100	"	"	"	"	"	
Copper		"	ND	-----	0.00200	"	"	"	"	"	
Lead		"	ND	-----	0.00100	"	"	"	"	"	
Nickel		"	**0.00760**	-----	0.00200	"	"	"	"	"	
Zinc		"	**0.00535**	-----	0.00500	"	"	"	"	"	
P4H1019-06	**Water**	**2708-040825-MW8-29-022**			**Sampled: 08/25/04 12:00**						
Arsenic		EPA 6020	**0.00243**	-----	0.00100	mg/l	1x	4081235	08/30/04	09/09/04 23:43	
Chromium		"	**0.00660**	-----	0.00100	"	"	"	"	"	
Copper		"	ND	-----	0.00200	"	"	"	"	"	
Lead		"	ND	-----	0.00100	"	"	"	"	"	
Nickel		"	**0.0113**	-----	0.00200	"	"	"	"	"	
Zinc		"	ND	-----	0.00500	"	"	"	"	"	

North Creek Analytical - Portland

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Philip Nerenberg

Philip Nerenberg For Howard Holmes, Project Manager

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Hahn and Associates, Inc.	Project Name:	**Northwest Natural**	
434 NW Sixth Ave., Suite 203	Project Number:	2708-30	Report Created:
Portland, OR 97209	Project Manager:	Rob Ede	10/22/04 17:18

Polynuclear Aromatic Compounds per EPA 8270M-SIM

North Creek Analytical - Portland

Analyte	Method	Result	MDL*	MRL	Units	Dil	Batch	Prepared	Analyzed	Notes
P4H1019-01 Water	**2708-040825-MW12-36-017**			**Sampled: 08/25/04 09:10**						**R-05**
Acenaphthene	EPA 8270m	**62.0**	*0.500*	1.00	ug/l	10x	4081231	08/30/04	09/03/04 20:18	
Acenaphthylene	"	ND	*1.00*	1.00	"	"	"	"	"	
Anthracene	"	**2.66**	*0.500*	1.00	"	"	"	"	"	
Benzo (a) anthracene	"	ND	*0.500*	1.00	"	"	"	"	"	
Benzo (a) pyrene	"	ND	*0.500*	1.00	"	"	"	"	"	
Benzo (b) fluoranthene	"	ND	*0.500*	1.00	"	"	"	"	"	
Benzo (ghi) perylene	"	ND	*0.500*	1.00	"	"	"	"	"	
Benzo (k) fluoranthene	"	ND	*0.500*	1.00	"	"	"	"	"	
Chrysene	"	ND	*0.500*	1.00	"	"	"	"	"	
Dibenzo (a,h) anthracene	"	ND	*1.00*	2.00	"	"	"	"	"	
Fluoranthene	"	**6.34**	*0.500*	1.00	"	"	"	"	"	
Fluorene	"	**29.6**	*0.500*	1.00	"	"	"	"	"	
Indeno (1,2,3-cd) pyrene	"	ND	*0.500*	1.00	"	"	"	"	"	
Naphthalene	"	**554**	*5.00*	10.0	"	100x	"	"	09/07/04 16:31	
Phenanthrene	"	**36.2**	*0.500*	1.00	"	10x	"	"	09/03/04 20:18	
Pyrene	"	**5.51**	*0.500*	1.00	"	"	"	"	"	
Surrogate(s): Fluorene-d10	*Recovery: 97.9%*		*Limits: 25 - 125 %*		"				"	
Pyrene-d10	*126%*		*23 - 150 %*		"				"	
Benzo (a) pyrene-d12	*103%*		*10 - 125 %*		"				"	

North Creek Analytical - Portland

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Philip Nerenberg

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Hahn and Associates, Inc.	Project Name: **Northwest Natural**	
434 NW Sixth Ave., Suite 203	Project Number: 2708-30	Report Created:
Portland, OR 97209	Project Manager: Rob Ede	10/22/04 17:18

Polynuclear Aromatic Compounds per EPA 8270M-SIM

North Creek Analytical - Portland

Analyte	Method	Result	MDL*	MRL	Units	Dil	Batch	Prepared	Analyzed	Notes
P4H1019-02 Water	**2708-040825-MW13-30-018**			**Sampled: 08/25/04 10:30**						**R-05**
Acenaphthene	EPA 8270m	**171**	*5.00*	10.0	ug/l	100x	4081231	08/30/04	09/10/04 06:12	
Acenaphthylene	"	ND	*1.50*	1.50	"	10x	"	"	09/03/04 20:51	**R-03**
Anthracene	"	**6.46**	*0.500*	1.00	"	"	"	"	"	
Benzo (a) anthracene	"	ND	*0.500*	1.00	"	"	"	"	"	
Benzo (a) pyrene	"	ND	*0.500*	1.00	"	"	"	"	"	
Benzo (b) fluoranthene	"	ND	*0.500*	1.00	"	"	"	"	"	
Benzo (ghi) perylene	"	ND	*0.500*	1.00	"	"	"	"	"	
Benzo (k) fluoranthene	"	ND	*0.500*	1.00	"	"	"	"	"	
Chrysene	"	ND	*0.500*	1.00	"	"	"	"	"	
Dibenzo (a,h) anthracene	"	ND	*1.00*	2.00	"	"	"	"	"	
Fluoranthene	"	**2.94**	*0.500*	1.00	"	"	"	"	"	
Fluorene	"	**35.9**	*0.500*	1.00	"	"	"	"	"	
Indeno (1,2,3-cd) pyrene	"	ND	*0.500*	1.00	"	"	"	"	"	
Naphthalene	"	**78.6**	*0.500*	1.00	"	"	"	"	"	
Phenanthrene	"	**57.1**	*0.500*	1.00	"	"	"	"	"	
Pyrene	"	**2.41**	*0.500*	1.00	"	"	"	"	"	

Surrogate(s):	*Fluorene-d10*	*Recovery: 89.8%*	*Limits: 25 - 125 %*	"	"
	Pyrene-d10	*120%*	*23 - 150 %*	"	"
	Benzo (a) pyrene-d12	*93.1%*	*10 - 125 %*	"	"

North Creek Analytical - Portland

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Philip Nerenberg

Philip Nerenberg For Howard Holmes, Project Manager

North Creek Analytical, Inc.
Environmental Laboratory Network

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Hahn and Associates, Inc.	Project Name: **Northwest Natural**	
434 NW Sixth Ave., Suite 203	Project Number: 2708-30	Report Created:
Portland, OR 97209	Project Manager: Rob Ede	10/22/04 17:18

Polynuclear Aromatic Compounds per EPA 8270M-SIM

North Creek Analytical - Portland

Analyte	Method	Result	MDL*	MRL	Units	Dil	Batch	Prepared	Analyzed	Notes
P4H1019-03 Water	**2708-040825-MW1-22-019**			**Sampled: 08/25/04 11:45**						**R-05**
Acenaphthene	EPA 8270m	**50.0**	*0.500*	1.00	ug/l	10x	4081231	08/30/04	09/03/04 21:23	
Acenaphthylene	"	ND	*0.500*	1.00	"	"	"	"	"	
Anthracene	"	**7.00**	*0.500*	1.00	"	"	"	"	"	
Benzo (a) anthracene	"	ND	*0.500*	1.00	"	"	"	"	"	
Benzo (a) pyrene	"	ND	*0.500*	1.00	"	"	"	"	"	
Benzo (b) fluoranthene	"	ND	*0.500*	1.00	"	"	"	"	"	
Benzo (ghi) perylene	"	ND	*0.500*	1.00	"	"	"	"	"	
Benzo (k) fluoranthene	"	ND	*0.500*	1.00	"	"	"	"	"	
Chrysene	"	ND	*0.500*	1.00	"	"	"	"	"	
Dibenzo (a,h) anthracene	"	ND	*1.00*	2.00	"	"	"	"	"	
Fluoranthene	"	**2.61**	*0.500*	1.00	"	"	"	"	"	
Fluorene	"	**46.9**	*0.500*	1.00	"	"	"	"	"	
Indeno (1,2,3-cd) pyrene	"	ND	*0.500*	1.00	"	"	"	"	"	
Naphthalene	"	**403**	*5.00*	10.0	"	100x	"	"	09/07/04 17:05	
Phenanthrene	"	**77.4**	*0.500*	1.00	"	10x	"	"	09/03/04 21:23	
Pyrene	"	**2.34**	*0.500*	1.00	"	"	"	"	"	
Surrogate(s): Fluorene-d10	*Recovery: 90.3%*		*Limits: 25 - 125 %*		"				"	
Pyrene-d10	*124%*		*23 - 150 %*		"				"	
Benzo (a) pyrene-d12	*103%*		*10 - 125 %*		"				"	

North Creek Analytical - Portland

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Hahn and Associates, Inc.	Project Name: **Northwest Natural**	
434 NW Sixth Ave., Suite 203	Project Number: 2708-30	Report Created:
Portland, OR 97209	Project Manager: Rob Ede	10/22/04 17:18

Polynuclear Aromatic Compounds per EPA 8270M-SIM

North Creek Analytical - Portland

Analyte	Method	Result	MDL*	MRL	Units	Dil	Batch	Prepared	Analyzed	Notes
P4H1019-03RE1 Water	**2708-040825-MW1-22-019**			**Sampled: 08/25/04 11:45**						**O-04, R-05, X**
Benzo (a) anthracene	EPA 8270m	**0.130**	*0.100*	0.200	ug/l	2x	4081231	08/30/04	10/15/04 11:31	**J**
Benzo (a) pyrene	"	ND	*0.100*	0.200	"	"	"	"	"	
Benzo (b) fluoranthene	"	ND	*0.100*	0.200	"	"	"	"	"	
Benzo (k) fluoranthene	"	ND	*0.100*	0.200	"	"	"	"	"	
Chrysene	"	**0.131**	*0.100*	0.200	"	"	"	"	"	**J**
Dibenzo (a,h) anthracene	"	ND	*0.200*	0.400	"	"	"	"	"	
Indeno (1,2,3-cd) pyrene	"	ND	*0.100*	0.200	"	"	"	"	"	
Surrogate(s): Pyrene-d10		*Recovery: 98.3%*		*Limits: 23 - 150 %*		"			"	
Benzo (a) pyrene-d12		*85.2%*		*10 - 125 %*		"			"	
P4H1019-04 Water	**2708-040825-MW15-50-020**			**Sampled: 08/25/04 13:40**						**R-05**
Acenaphthene	EPA 8270m	**35.3**	*2.50*	5.00	ug/l	50x	4081231	08/30/04	09/03/04 21:55	
Acenaphthylene	"	**50.9**	*2.50*	5.00	"	"	"	"	"	
Anthracene	"	**4.23**	*2.50*	5.00	"	"	"	"	"	**J**
Benzo (a) anthracene	"	ND	*2.50*	5.00	"	"	"	"	"	
Benzo (a) pyrene	"	ND	*2.50*	5.00	"	"	"	"	"	
Benzo (b) fluoranthene	"	ND	*2.50*	5.00	"	"	"	"	"	
Benzo (ghi) perylene	"	ND	*2.50*	5.00	"	"	"	"	"	
Benzo (k) fluoranthene	"	ND	*2.50*	5.00	"	"	"	"	"	
Chrysene	"	ND	*2.50*	5.00	"	"	"	"	"	
Dibenzo (a,h) anthracene	"	ND	*5.00*	10.0	"	"	"	"	"	
Fluoranthene	"	**4.44**	*2.50*	5.00	"	"	"	"	"	**J**
Fluorene	"	**51.9**	*2.50*	5.00	"	"	"	"	"	
Indeno (1,2,3-cd) pyrene	"	ND	*2.50*	5.00	"	"	"	"	"	
Naphthalene	"	**6130**	*50.0*	100	"	1000x	"	"	09/07/04 17:39	
Phenanthrene	"	**78.8**	*2.50*	5.00	"	50x	"	"	09/03/04 21:55	
Pyrene	"	**3.93**	*2.50*	5.00	"	"	"	"	"	**J**
Surrogate(s): Fluorene-d10		*Recovery: 97.9%*		*Limits: 25 - 125 %*		"			"	*J*
Pyrene-d10		*114%*		*23 - 150 %*		"			"	
Benzo (a) pyrene-d12		*83.2%*		*10 - 125 %*		"			"	*J*

North Creek Analytical - Portland

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Philip Nerenberg

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Hahn and Associates, Inc.	Project Name: **Northwest Natural**	
434 NW Sixth Ave., Suite 203	Project Number: 2708-30	Report Created:
Portland, OR 97209	Project Manager: Rob Ede	10/22/04 17:18

Polynuclear Aromatic Compounds per EPA 8270M-SIM

North Creek Analytical - Portland

Analyte	Method	Result	MDL*	MRL	Units	Dil	Batch	Prepared	Analyzed	Notes
P4H1019-05 Water	**2708-040825-MW8-56-021**			**Sampled: 08/25/04 14:45**						**R-05**
Acenaphthene	EPA 8270m	**165**	*2.50*	5.00	ug/l	50x	4081231	08/30/04	09/03/04 22:28	
Acenaphthylene	"	**57.2**	*2.50*	5.00	"	"	"	"	"	
Anthracene	"	**11.7**	*2.50*	5.00	"	"	"	"	"	
Benzo (a) anthracene	"	ND	*2.50*	5.00	"	"	"	"	"	
Benzo (a) pyrene	"	ND	*2.50*	5.00	"	"	"	"	"	
Benzo (b) fluoranthene	"	ND	*2.50*	5.00	"	"	"	"	"	
Benzo (ghi) perylene	"	ND	*2.50*	5.00	"	"	"	"	"	
Benzo (k) fluoranthene	"	ND	*2.50*	5.00	"	"	"	"	"	
Chrysene	"	ND	*2.50*	5.00	"	"	"	"	"	
Dibenzo (a,h) anthracene	"	ND	*5.00*	10.0	"	"	"	"	"	
Fluoranthene	"	**14.7**	*2.50*	5.00	"	"	"	"	"	
Fluorene	"	**59.8**	*2.50*	5.00	"	"	"	"	"	
Indeno (1,2,3-cd) pyrene	"	ND	*2.50*	5.00	"	"	"	"	"	
Naphthalene	"	**10400**	*250*	500	"	5000x	"	"	09/08/04 17:14	
Phenanthrene	"	**108**	*2.50*	5.00	"	50x	"	"	09/03/04 22:28	
Pyrene	"	**16.3**	*2.50*	5.00	"	"	"	"	"	
Surrogate(s): Fluorene-d10	*Recovery: 127%*			*Limits: 25 - 125 %*		"			"	***S-09***
Pyrene-d10	*114%*			*23 - 150 %*		"			"	
Benzo (a) pyrene-d12	*77.1%*			*10 - 125 %*		"			"	***J***

North Creek Analytical - Portland

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Philip Nerenberg

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Hahn and Associates, Inc.	Project Name: **Northwest Natural**	
434 NW Sixth Ave., Suite 203	Project Number: 2708-30	Report Created:
Portland, OR 97209	Project Manager: Rob Ede	10/22/04 17:18

Polynuclear Aromatic Compounds per EPA 8270M-SIM

North Creek Analytical - Portland

Analyte	Method	Result	MDL*	MRL	Units	Dil	Batch	Prepared	Analyzed	Notes
P4H1019-06 Water	**2708-040825-MW8-29-022**			**Sampled: 08/25/04 12:00**						**R-05**
Acenaphthene	EPA 8270m	**234**	*5.00*	10.0	ug/l	100x	4081231	08/30/04	09/07/04 18:47	
Acenaphthylene	"	**2.82**	*0.500*	1.00	"	10x	"	"	09/03/04 23:00	
Anthracene	"	**16.1**	*0.500*	1.00	"	"	"	"	"	
Benzo (a) anthracene	"	**7.49**	*0.500*	1.00	"	"	"	"	"	
Benzo (a) pyrene	"	**8.19**	*0.500*	1.00	"	"	"	"	"	
Benzo (b) fluoranthene	"	**4.95**	*0.500*	1.00	"	"	"	"	"	
Benzo (ghi) perylene	"	**6.01**	*0.500*	1.00	"	"	"	"	"	
Benzo (k) fluoranthene	"	**4.24**	*0.500*	1.00	"	"	"	"	"	
Chrysene	"	**9.56**	*0.500*	1.00	"	"	"	"	"	
Dibenzo (a,h) anthracene	"	ND	*1.00*	2.00	"	"	"	"	"	
Fluoranthene	"	**27.8**	*0.500*	1.00	"	"	"	"	"	
Fluorene	"	**56.6**	*0.500*	1.00	"	"	"	"	"	
Indeno (1,2,3-cd) pyrene	"	**4.09**	*0.500*	1.00	"	"	"	"	"	
Naphthalene	"	**2520**	*50.0*	100	"	1000x	"	"	09/08/04 17:47	
Phenanthrene	"	**136**	*5.00*	10.0	"	100x	"	"	09/07/04 18:47	
Pyrene	"	**34.6**	*0.500*	1.00	"	10x	"	"	09/03/04 23:00	
Surrogate(s): Fluorene-d10	*Recovery: 115%*			*Limits: 25 - 125 %*	"				"	
Pyrene-d10	*115%*			*23 - 150 %*	"				"	
Benzo (a) pyrene-d12	*107%*			*10 - 125 %*	"				"	

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Hahn and Associates, Inc.	Project Name: **Northwest Natural**	
434 NW Sixth Ave., Suite 203	Project Number: 2708-30	Report Created:
Portland, OR 97209	Project Manager: Rob Ede	10/22/04 17:18

Conventional Chemistry Parameters per APHA/EPA Methods

North Creek Analytical - Portland

Analyte		Method	Result	MDL*	MRL	Units	Dil	Batch	Prepared	Analyzed	Notes
P4H1019-01	**Water**	**2708-040825-MW12-36-017**			**Sampled: 08/25/04 09:10**						
Cyanide (amenable)		EPA 9010A	ND	-----	0.00500	mg/l	1x	4090227	09/07/04	09/08/04 15:01	
Cyanide (total)		EPA 9012A	ND	-----	0.00500	"	"	"	"	"	
P4H1019-02	**Water**	**2708-040825-MW13-30-018**			**Sampled: 08/25/04 10:30**						
Cyanide (amenable)		EPA 9010A	**0.0552**	-----	0.00500	mg/l	1x	4090227	09/07/04	09/08/04 15:01	
Cyanide (total)		EPA 9012A	**0.100**	-----	0.00500	"	"	"	"	"	
P4H1019-03	**Water**	**2708-040825-MW1-22-019**			**Sampled: 08/25/04 11:45**						
Cyanide (amenable)		EPA 9010A	**1.89**	-----	0.0500	mg/l	10x	4090227	09/07/04	09/08/04 15:01	
Cyanide (total)		EPA 9012A	**4.31**	-----	0.0500	"	"	"	"	"	
P4H1019-04	**Water**	**2708-040825-MW15-50-020**			**Sampled: 08/25/04 13:40**						
Cyanide (amenable)		EPA 9010A	**0.418**	-----	0.00500	mg/l	1x	4090227	09/07/04	09/08/04 15:01	
Cyanide (total)		EPA 9012A	**0.460**	-----	0.00500	"	"	"	"	"	
P4H1019-05	**Water**	**2708-040825-MW8-56-021**			**Sampled: 08/25/04 14:45**						
Cyanide (amenable)		EPA 9010A	**0.153**	-----	0.00500	mg/l	1x	4090227	09/07/04	09/08/04 15:01	
Cyanide (total)		EPA 9012A	**0.474**	-----	0.00500	"	"	"	"	"	
P4H1019-06	**Water**	**2708-040825-MW8-29-022**			**Sampled: 08/25/04 12:00**						
Cyanide (amenable)		EPA 9010A	**0.138**	-----	0.0500	mg/l	10x	4090227	09/07/04	09/08/04 15:01	
Cyanide (total)		EPA 9012A	**2.69**	-----	0.0500	"	"	"	"	"	

North Creek Analytical - Portland

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Philip Nerenberg

Philip Nerenberg For Howard Holmes, Project Manager

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Hahn and Associates, Inc.	Project Name: **Northwest Natural**	
434 NW Sixth Ave., Suite 203	Project Number: 2708-30	Report Created:
Portland, OR 97209	Project Manager: Rob Ede	10/22/04 17:18

BTEX per EPA Method 8021B - Laboratory Quality Control Results

North Creek Analytical - Portland

QC Batch: 4081203 **Water Preparation Method: EPA 5030B**

Analyte	Method	Result	MDL*	MRL	Units	Dil	Source Result	Spike Amt	% REC	(Limits)	% RPD	(Limits)	Analyzed	Notes
Blank (4081203-BLK1)									**Extracted: 08/27/04 16:24**					
Benzene	EPA 8021B	ND	---	0.500	ug/l	1x	--	--	--	--	--	--	08/27/04 17:02	
Toluene	"	ND	---	0.500	"	"	--	--	--	--	--	--	"	
Ethylbenzene	"	ND	---	0.500	"	"	--	--	--	--	--	--	"	
Xylenes (total)	"	ND	---	1.00	"	"	--	--	--	--	--	--	"	
Surrogate(s): 4-BFB (PID)		*Recovery: 107%*			*Limits: 70-130%*	"							*08/27/04 17:02*	
LCS (4081203-BS1)									**Extracted: 08/27/04 16:24**					
Benzene	EPA 8021B	18.6	---	0.500	ug/l	1x	--	20.0	93.0%	(70-130)	--	--	08/27/04 18:00	
Toluene	"	18.6	---	0.500	"	"	--	"	93.0%	(76-129)	--	--	"	
Ethylbenzene	"	17.7	---	0.500	"	"	--	"	88.5%	(82-130)	--	--	"	
Xylenes (total)	"	58.2	---	1.00	"	"	--	60.0	97.0%	(76-130)	--	--	"	
Surrogate(s): 4-BFB (PID)		*Recovery: 98.6%*			*Limits: 70-130%*	"							*08/27/04 18:00*	
Matrix Spike (4081203-MS1)					**QC Source: P4H0913-01**				**Extracted: 08/27/04 16:24**					
Benzene	EPA 8021B	18.8	---	0.500	ug/l	1x	ND	20.0	94.0%	(65-144)	--	--	08/27/04 18:32	
Toluene	"	18.7	---	0.500	"	"	ND	"	92.3%	(68-139)	--	--	"	
Ethylbenzene	"	17.8	---	0.500	"	"	ND	"	89.0%	(69-144)	--	--	"	
Xylenes (total)	"	58.7	---	1.00	"	"	ND	60.0	97.1%	(60-144)	--	--	"	
Surrogate(s): 4-BFB (PID)		*Recovery: 96.0%*			*Limits: 70-130%*	"							*08/27/04 18:32*	
Matrix Spike Dup (4081203-MSD1)					**QC Source: P4H0913-01**				**Extracted: 08/27/04 16:24**					
Benzene	EPA 8021B	18.8	---	0.500	ug/l	1x	ND	20.0	94.0%	(65-144)	0.00%	(20)	08/27/04 19:04	
Toluene	"	18.6	---	0.500	"	"	ND	"	91.8%	(68-139)	0.536%	"	"	
Ethylbenzene	"	17.7	---	0.500	"	"	ND	"	88.5%	(69-144)	0.563%	"	"	
Xylenes (total)	"	58.3	---	1.00	"	"	ND	60.0	96.4%	(60-144)	0.684%	"	"	
Surrogate(s): 4-BFB (PID)		*Recovery: 95.4%*			*Limits: 70-130%*	"							*08/27/04 19:04*	

North Creek Analytical - Portland

Philip Nerenberg

Philip Nerenberg For Howard Holmes, Project Manager

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Hahn and Associates, Inc.	Project Name: **Northwest Natural**	
434 NW Sixth Ave., Suite 203	Project Number: 2708-30	Report Created:
Portland, OR 97209	Project Manager: Rob Ede	10/22/04 17:18

BTEX per EPA Method 8021B - Laboratory Quality Control Results

North Creek Analytical - Portland

QC Batch: 4081213 **Water Preparation Method: EPA 5030B**

Analyte	Method	Result	MDL*	MRL	Units	Dil	Source Result	Spike Amt	% REC	(Limits)	% RPD	(Limits)	Analyzed	Notes
Blank (4081213-BLK1)								**Extracted: 08/28/04 12:20**						
Benzene	EPA 8021B	ND	---	0.500	ug/l	1x	--	--	--	--	--	--	08/28/04 16:50	
Toluene	"	ND	---	0.500	"	"	--	--	--	--	--	--	"	
Ethylbenzene	"	ND	---	0.500	"	"	--	--	--	--	--	--	"	
Xylenes (total)	"	ND	---	1.00	"	"	--	--	--	--	--	--	"	
Surrogate(s): 4-BFB (PID)		*Recovery: 104%*		*Limits: 70-130%*		"							*08/28/04 16:50*	
LCS (4081213-BS1)								**Extracted: 08/28/04 12:20**						
Benzene	EPA 8021B	19.3	---	0.500	ug/l	1x	--	20.0	96.5%	(70-130)	--	--	08/28/04 14:02	
Toluene	"	18.9	---	0.500	"	"	--	"	94.5%	(76-129)	--	--	"	
Ethylbenzene	"	18.3	---	0.500	"	"	--	"	91.5%	(82-130)	--	--	"	
Xylenes (total)	"	59.8	---	1.00	"	"	--	60.0	99.7%	(76-130)	--	--	"	
Surrogate(s): 4-BFB (PID)		*Recovery: 108%*		*Limits: 70-130%*		"							*08/28/04 14:02*	
Duplicate (4081213-DUP1)						**QC Source: P4H1041-01**		**Extracted: 08/28/04 12:20**						
Benzene	EPA 8021B	9.38	---	0.500	ug/l	1x	10.1	--	--	--	7.39%	(20)	08/28/04 23:21	
Toluene	"	8.14	---	0.500	"	"	8.11	--	--	--	0.369%	"	"	
Ethylbenzene	"	2.03	---	0.500	"	"	2.07	--	--	--	1.95%	"	"	
Xylenes (total)	"	88.4	---	1.00	"	"	88.9	--	--	--	0.564%	"	"	
Surrogate(s): 4-BFB (PID)		*Recovery: 108%*		*Limits: 70-130%*		"							*08/28/04 23:21*	
Matrix Spike (4081213-MS1)						**QC Source: P4H1019-01RE1**		**Extracted: 08/28/04 12:20**						
Benzene	EPA 8021B	958	---	25.0	ug/l	50x	235	1000	72.3%	(65-144)	--	--	08/28/04 19:05	
Toluene	"	1330	---	25.0	"	"	584	"	74.6%	(68-139)	--	--	"	
Ethylbenzene	"	1200	---	25.0	"	"	488	"	71.2%	(69-144)	--	--	"	
Xylenes (total)	"	3390	---	50.0	"	"	991	3000	80.0%	(60-144)	--	--	"	
Surrogate(s): 4-BFB (PID)		*Recovery: 94.8%*		*Limits: 70-130%*		*1x*							*08/28/04 19:05*	
Matrix Spike Dup (4081213-MSD1)						**QC Source: P4H1019-01RE1**		**Extracted: 08/28/04 12:20**						
Benzene	EPA 8021B	1120	---	25.0	ug/l	50x	235	1000	88.5%	(65-144)	15.6%	(20)	08/28/04 20:42	
Toluene	"	1500	---	25.0	"	"	584	"	91.6%	(68-139)	12.0%	"	"	
Ethylbenzene	"	1350	---	25.0	"	"	488	"	86.2%	(69-144)	11.8%	"	"	
Xylenes (total)	"	3880	---	50.0	"	"	991	3000	96.3%	(60-144)	13.5%	"	"	
Surrogate(s): 4-BFB (PID)		*Recovery: 104%*		*Limits: 70-130%*		*1x*							*08/28/04 20:42*	

North Creek Analytical - Portland

Philip Nerenberg

Philip Nerenberg For Howard Holmes, Project Manager

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Hahn and Associates, Inc.	Project Name: **Northwest Natural**	
434 NW Sixth Ave., Suite 203	Project Number: 2708-30	Report Created:
Portland, OR 97209	Project Manager: Rob Ede	10/22/04 17:18

BTEX per EPA Method 8021B - Laboratory Quality Control Results

North Creek Analytical - Portland

QC Batch: 4081258 **Water Preparation Method: EPA 5030B**

Analyte	Method	Result	MDL*	MRL	Units	Dil	Source Result	Spike Amt	% REC	(Limits)	% RPD	(Limits)	Analyzed	Notes
Blank (4081258-BLK1)							**Extracted: 08/30/04 16:57**							
Benzene	EPA 8021B	ND	---	0.500	ug/l	1x	--	--	--	--	--	--	08/30/04 19:34	
Toluene	"	ND	---	0.500	"	"	--	--	--	--	--	--	"	
Ethylbenzene	"	ND	---	0.500	"	"	--	--	--	--	--	--	"	
Xylenes (total)	"	ND	---	1.00	"	"	--	--	--	--	--	--	"	
Surrogate(s): 4-BFB (PID)		*Recovery: 96.2%*			*Limits: 70-130%*	"							*08/30/04 19:34*	
LCS (4081258-BS1)							**Extracted: 08/30/04 16:57**							
Benzene	EPA 8021B	20.5	---	0.500	ug/l	1x	--	20.0	102%	(70-130)	--	--	08/30/04 21:16	
Toluene	"	19.6	---	0.500	"	"	--	"	98.0%	(76-129)	--	--	"	
Ethylbenzene	"	19.1	---	0.500	"	"	--	"	95.5%	(82-130)	--	--	"	
Xylenes (total)	"	57.4	---	1.00	"	"	--	60.0	95.7%	(76-130)	--	--	"	
Surrogate(s): 4-BFB (PID)		*Recovery: 99.0%*			*Limits: 70-130%*	"							*08/30/04 21:16*	
Matrix Spike (4081258-MS1)					**QC Source: P4H1069-06**		**Extracted: 08/30/04 16:57**							
Benzene	EPA 8021B	2210	---	25.0	ug/l	50x	1250	1000	96.0%	(65-144)	--	--	08/31/04 02:49	
Toluene	"	1220	---	25.0	"	"	339	"	88.1%	(68-139)	--	--	"	
Ethylbenzene	"	1130	---	25.0	"	"	223	"	90.7%	(69-144)	--	--	"	
Xylenes (total)	"	3120	---	50.0	"	"	486	3000	87.8%	(60-144)	--	--	"	
Surrogate(s): 4-BFB (PID)		*Recovery: 97.8%*			*Limits: 70-130%*	*1x*							*08/31/04 02:49*	
Matrix Spike Dup (4081258-MSD1)					**QC Source: P4H1069-06**		**Extracted: 08/30/04 16:57**							
Benzene	EPA 8021B	2270	---	25.0	ug/l	50x	1250	1000	102%	(65-144)	2.68%	(20)	08/31/04 03:17	
Toluene	"	1300	---	25.0	"	"	339	"	96.1%	(68-139)	6.35%	"	"	
Ethylbenzene	"	1190	---	25.0	"	"	223	"	96.7%	(69-144)	5.17%	"	"	
Xylenes (total)	"	3360	---	50.0	"	"	486	3000	95.8%	(60-144)	7.41%	"	"	
Surrogate(s): 4-BFB (PID)		*Recovery: 98.0%*			*Limits: 70-130%*	*1x*							*08/31/04 03:17*	

North Creek Analytical - Portland

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BTEX per EPA Method 8021B - Laboratory Quality Control Results

North Creek Analytical - Portland

QC Batch: 4081314 **Water Preparation Method: EPA 5030B**

Analyte	Method	Result	MDL*	MRL	Units	Dil	Source Result	Spike Amt	% REC	(Limits)	% RPD	(Limits)	Analyzed	Notes
Blank (4081314-BLK1)								**Extracted: 08/31/04 15:14**						
Benzene	EPA 8021B	ND	---	0.500	ug/l	1x	--	--	--	--	--	--	08/31/04 16:41	
Toluene	"	ND	---	0.500	"	"	--	--	--	--	--	--	"	
Ethylbenzene	"	ND	---	0.500	"	"	--	--	--	--	--	--	"	
Xylenes (total)	"	ND	---	1.00	"	"	--	--	--	--	--	--	"	
Surrogate(s): 4-BFB (PID)		*Recovery: 113%*		*Limits: 70-130%*		"							*08/31/04 16:41*	
LCS (4081314-BS1)								**Extracted: 08/31/04 15:14**						
Benzene	EPA 8021B	19.2	---	0.500	ug/l	1x	--	20.0	96.0%	(70-130)	--	--	08/31/04 17:10	
Toluene	"	19.9	---	0.500	"	"	--	"	99.5%	(76-129)	--	--	"	
Ethylbenzene	"	20.1	---	0.500	"	"	--	"	100%	(82-130)	--	--	"	
Xylenes (total)	"	58.4	---	1.00	"	"	--	60.0	97.3%	(76-130)	--	--	"	
Surrogate(s): 4-BFB (PID)		*Recovery: 111%*		*Limits: 70-130%*		"							*08/31/04 17:10*	
Matrix Spike (4081314-MS1)					**QC Source: P4H1116-01**			**Extracted: 08/31/04 15:14**						
Benzene	EPA 8021B	30.9	---	0.500	ug/l	1x	13.8	20.0	85.5%	(65-144)	--	--	08/31/04 20:57	
Toluene	"	18.8	---	0.500	"	"	ND	"	94.0%	(68-139)	--	--	"	
Ethylbenzene	"	18.9	---	0.500	"	"	ND	"	93.2%	(69-144)	--	--	"	
Xylenes (total)	"	48.1	---	1.00	"	"	ND	60.0	80.2%	(60-144)	--	--	"	
Surrogate(s): 4-BFB (PID)		*Recovery: 116%*		*Limits: 70-130%*		"							*08/31/04 20:57*	
Matrix Spike Dup (4081314-MSD1)					**QC Source: P4H1116-01**			**Extracted: 08/31/04 15:14**						
Benzene	EPA 8021B	30.8	---	0.500	ug/l	1x	13.8	20.0	85.0%	(65-144)	0.324%	(20)	08/31/04 21:26	
Toluene	"	18.7	---	0.500	"	"	ND	"	93.5%	(68-139)	0.533%	"	"	
Ethylbenzene	"	18.3	---	0.500	"	"	ND	"	90.2%	(69-144)	3.23%	"	"	
Xylenes (total)	"	47.1	---	1.00	"	"	ND	60.0	78.5%	(60-144)	2.10%	"	"	
Surrogate(s): 4-BFB (PID)		*Recovery: 121%*		*Limits: 70-130%*		"							*08/31/04 21:26*	

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Hahn and Associates, Inc.	Project Name: **Northwest Natural**	
434 NW Sixth Ave., Suite 203	Project Number: 2708-30	Report Created:
Portland, OR 97209	Project Manager: Rob Ede	10/22/04 17:18

Total Metals per EPA 6000/7000 Series Methods - Laboratory Quality Control Results

North Creek Analytical - Portland

QC Batch: 4081235 **Water Preparation Method: EPA 200/3005**

Analyte	Method	Result	MDL*	MRL	Units	Dil	Source Result	Spike Amt	% REC	(Limits)	% RPD	(Limits)	Analyzed	Notes
Blank (4081235-BLK1)								Extracted: 08/30/04 09:48						
Arsenic	EPA 6020	ND	---	0.00100	mg/l	1x	--	--	--	--	--	--	09/09/04 21:29	
Chromium	"	ND	---	0.00100	"	"	--	--	--	--	--	--	"	
Copper	"	ND	---	0.00200	"	"	--	--	--	--	--	--	"	
Lead	"	ND	---	0.00100	"	"	--	--	--	--	--	--	"	
Nickel	"	ND	---	0.00200	"	"	--	--	--	--	--	--	"	
Zinc	"	ND	---	0.00500	"	"	--	--	--	--	--	--	"	
LCS (4081235-BS1)								Extracted: 08/30/04 09:48						
Arsenic	EPA 6020	0.108	---	0.00100	mg/l	1x	--	0.100	108%	(80-120)	--	--	09/09/04 21:35	
Chromium	"	0.107	---	0.00100	"	"	--	"	107%	"	--	--	"	
Copper	"	0.107	---	0.00200	"	"	--	"	107%	"	--	--	"	
Lead	"	0.102	---	0.00100	"	"	--	"	102%	"	--	--	"	
Nickel	"	0.107	---	0.00200	"	"	--	"	107%	"	--	--	"	
Zinc	"	0.105	---	0.00500	"	"	--	"	105%	"	--	--	"	
LCS Dup (4081235-BSD1)								Extracted: 08/30/04 09:48						
Arsenic	EPA 6020	0.107	---	0.00100	mg/l	1x	--	0.100	107%	(80-120)	0.930%	(20)	09/09/04 21:42	
Chromium	"	0.106	---	0.00100	"	"	--	"	106%	"	0.939%	"	"	
Copper	"	0.106	---	0.00200	"	"	--	"	106%	"	0.939%	"	"	
Lead	"	0.102	---	0.00100	"	"	--	"	102%	"	0.00%	"	"	
Nickel	"	0.105	---	0.00200	"	"	--	"	105%	"	1.89%	"	"	
Zinc	"	0.106	---	0.00500	"	"	--	"	106%	"	0.948%	"	"	
Duplicate (4081235-DUP1)					QC Source: P4H1019-01				Extracted: 08/30/04 09:48					
Arsenic	EPA 6020	0.00307	---	0.00100	mg/l	1x	0.00297	--	--	--	3.31%	(20)	09/09/04 22:01	
Chromium	"	ND	---	0.00100	"	"	ND	--	--	--	NR	"	"	
Copper	"	ND	---	0.00200	"	"	ND	--	--	--	NR	"	"	
Lead	"	ND	---	0.00100	"	"	ND	--	--	--	NR	"	"	
Nickel	"	0.00159	---	0.00200	"	"	ND	--	--	--	NR	"	"	
Zinc	"	ND	---	0.00500	"	"	ND	--	--	--	NR	"	"	
Matrix Spike (4081235-MS1)					QC Source: P4H1069-03				Extracted: 08/30/04 09:48					
Arsenic	EPA 6020	0.118	---	0.00100	mg/l	1x	0.00461	0.100	113%	(75-125)	--	--	09/10/04 02:05	
Chromium	"	0.112	---	0.00100	"	"	0.00134	"	111%	"	--	--	"	
Copper	"	0.111	---	0.00200	"	"	ND	"	109%	"	--	--	"	
Lead	"	0.0980	---	0.00100	"	"	ND	"	98.0%	"	--	--	"	
Nickel	"	0.113	---	0.00200	"	"	0.00542	"	108%	"	--	--	"	
Zinc	"	0.108	---	0.00500	"	"	ND	"	105%	"	--	--	"	

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.

Philip Nerenberg

Philip Nerenberg For Howard Holmes, Project Manager

SCOEPA00013989

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Hahn and Associates, Inc.	Project Name: **Northwest Natural**	
434 NW Sixth Ave., Suite 203	Project Number: 2708-30	Report Created:
Portland, OR 97209	Project Manager: Rob Ede	10/22/04 17:18

Total Metals per EPA 6000/7000 Series Methods - Laboratory Quality Control Results

North Creek Analytical - Portland

QC Batch: 4081235 **Water Preparation Method: EPA 200/3005**

Analyte	Method	Result	MDL*	MRL	Units	Dil	Source Result	Spike Amt	% REC	(Limits)	% RPD	(Limits)	Analyzed	Notes
Matrix Spike (4081235-MS2)				**QC Source: P4H1019-01**				**Extracted: 08/30/04 09:48**						
Arsenic	EPA 6020	0.114	---	0.00100	mg/l	1x	0.00297	0.100	111%	(75-125)	--	--	09/09/04 22:26	
Chromium	"	0.109	---	0.00100	"	"	ND	"	109%	"	--	--	"	
Copper	"	0.108	---	0.00200	"	"	ND	"	108%	"	--	--	"	
Lead	"	0.0996	---	0.00100	"	"	ND	"	99.6%	"	--	--	"	
Nickel	"	0.109	---	0.00200	"	"	ND	"	107%	"	--	--	"	
Zinc	"	0.110	---	0.00500	"	"	ND	"	108%	"	--	--	"	
Matrix Spike Dup (4081235-MSD1)				**QC Source: P4H1069-03**				**Extracted: 08/30/04 09:48**						
Arsenic	EPA 6020	0.121	---	0.00100	mg/l	1x	0.00461	0.100	116%	(75-125)	2.51%	(20)	09/10/04 02:30	
Chromium	"	0.117	---	0.00100	"	"	0.00134	"	116%	"	4.37%	"	"	
Copper	"	0.114	---	0.00200	"	"	ND	"	112%	"	2.67%	"	"	
Lead	"	0.0967	---	0.00100	"	"	ND	"	96.7%	"	1.34%	"	"	
Nickel	"	0.118	---	0.00200	"	"	0.00542	"	113%	"	4.33%	"	"	
Zinc	"	0.114	---	0.00500	"	"	ND	"	111%	"	5.41%	"	"	

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Hahn and Associates, Inc.	Project Name: Northwest Natural	
434 NW Sixth Ave., Suite 203	Project Number: 2708-30	Report Created:
Portland, OR 97209	Project Manager: Rob Ede	10/22/04 17:18

Polynuclear Aromatic Compounds per EPA 8270M-SIM - Laboratory Quality Control Results

North Creek Analytical - Portland

QC Batch: 4081231 **Water Preparation Method: EPA 3520/600 Series**

Analyte	Method	Result	MDL*	MRL	Units	Dil	Source Result	Spike Amt	% REC	(Limits)	% RPD	(Limits)	Analyzed	Notes
Blank (4081231-BLK1)								Extracted: 08/30/04 08:20						
Acenaphthene	EPA 8270m	ND	0.0500	0.100	ug/l	1x	--	--	--	--	--	--	09/08/04 17:08	
Acenaphthylene	"	ND	0.0500	0.100	"	"	--	--	--	--	--	--	"	
Anthracene	"	ND	0.0500	0.100	"	"	--	--	--	--	--	--	"	
Benzo (a) anthracene	"	ND	0.0500	0.100	"	"	--	--	--	--	--	--	"	
Benzo (a) pyrene	"	ND	0.0500	0.100	"	"	--	--	--	--	--	--	"	
Benzo (b) fluoranthene	"	ND	0.0500	0.100	"	"	--	--	--	--	--	--	"	
Benzo (ghi) perylene	"	ND	0.0500	0.100	"	"	--	--	--	--	--	--	"	
Benzo (k) fluoranthene	"	ND	0.0500	0.100	"	"	--	--	--	--	--	--	"	
Chrysene	"	ND	0.0500	0.100	"	"	--	--	--	--	--	--	"	
Dibenzo (a,h) anthracene	"	ND	0.100	0.200	"	"	--	--	--	--	--	--	"	
Fluoranthene	"	ND	0.0500	0.100	"	"	--	--	--	--	--	--	"	
Fluorene	"	ND	0.0500	0.100	"	"	--	--	--	--	--	--	"	
Indeno (1,2,3-cd) pyrene	"	ND	0.0500	0.100	"	"	--	--	--	--	--	--	"	
Naphthalene	"	ND	0.0500	0.100	"	"	--	--	--	--	--	--	"	
Phenanthrene	"	ND	0.0500	0.100	"	"	--	--	--	--	--	--	"	
Pyrene	"	ND	0.0500	0.100	"	"	--	--	--	--	--	--	"	
Surrogate(s): Fluorene-d10		*Recovery:*	*115%*		*Limits:*	*25-125%*	"						*09/08/04 17:08*	
Pyrene-d10			*146%*			*23-150%*	"						"	
Benzo (a) pyrene-d12			*95.6%*			*10-125%*	"						"	
LCS (4081231-BS1)								Extracted: 08/30/04 08:20						
Acenaphthene	EPA 8270m	2.72	0.0500	0.100	ug/l	1x	--	2.50	109%	(26-135)	--	--	09/09/04 13:59	
Benzo (a) pyrene	"	2.79	0.0500	0.100	"	"	--	"	112%	(38-137)	--	--	"	
Pyrene	"	3.09	0.0500	0.100	"	"	--	"	124%	(33-133)	--	--	"	
Surrogate(s): Fluorene-d10		*Recovery:*	*120%*		*Limits:*	*25-125%*	"						*09/09/04 13:59*	
Pyrene-d10			*132%*			*23-150%*	"						"	
Benzo (a) pyrene-d12			*123%*			*10-125%*	"						"	
LCS Dup (4081231-BSD1)								Extracted: 08/30/04 08:20						
Acenaphthene	EPA 8270m	2.71	0.0500	0.100	ug/l	1x	--	2.50	108%	(26-135)	0.368%	(60)	09/09/04 14:25	
Benzo (a) pyrene	"	2.70	0.0500	0.100	"	"	--	"	108%	(38-137)	3.28%	"	"	
Pyrene	"	3.09	0.0500	0.100	"	"	--	"	124%	(33-133)	0.00%	"	"	
Surrogate(s): Fluorene-d10		*Recovery:*	*123%*		*Limits:*	*25-125%*	"						*09/09/04 14:25*	
Pyrene-d10			*135%*			*23-150%*	"						"	
Benzo (a) pyrene-d12			*121%*			*10-125%*	"						"	

North Creek Analytical - Portland

Philip Nerenberg

Philip Nerenberg For Howard Holmes, Project Manager

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Hahn and Associates, Inc.	Project Name: **Northwest Natural**	
434 NW Sixth Ave., Suite 203	Project Number: 2708-30	Report Created:
Portland, OR 97209	Project Manager: Rob Ede	10/22/04 17:18

Conventional Chemistry Parameters per APHA/EPA Methods - Laboratory Quality Control Results

North Creek Analytical - Portland

QC Batch: 4090227 **Water Preparation Method: Wet Chem**

Analyte	Method	Result	MDL*	MRL	Units	Dil	Source Result	Spike Amt	% REC	(Limits)	% RPD	(Limits)	Analyzed	Notes
Blank (4090227-BLK1)								**Extracted: 09/07/04 10:30**						
Cyanide (total)	EPA 9012A	ND	---	0.00500	mg/l	1x	--	--	--	--	--	--	09/08/04 15:01	
LCS (4090227-BS1)								**Extracted: 09/07/04 10:30**						
Cyanide (total)	EPA 9012A	0.185	---	0.00500	mg/l	1x	--	0.200	92.5%	(75-125)	--	--	09/08/04 15:01	
Duplicate (4090227-DUP1)				**QC Source: P4H1019-01**				**Extracted: 09/07/04 10:30**						
Cyanide (total)	EPA 9012A	0.00330	---	0.00500	mg/l	1x	ND	--	--	--	NR	(20)	09/08/04 15:01	Q-05
Matrix Spike (4090227-MS1)				**QC Source: P4H1019-01**				**Extracted: 09/07/04 10:30**						
Cyanide (total)	EPA 9012A	0.188	---	0.00500	mg/l	1x	ND	0.200	92.7%	(75-125)	--	--	09/08/04 15:01	

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.

Philip Nerenberg

Philip Nerenberg For Howard Holmes, Project Manager

SCOEPA00013992

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Hahn and Associates, Inc.	Project Name:	**Northwest Natural**	
434 NW Sixth Ave., Suite 203	Project Number:	2708-30	Report Created:
Portland, OR 97209	Project Manager:	Rob Ede	10/22/04 17:18

Notes and Definitions

Report Specific Notes:

J	-	Estimated value.
O-04	-	This sample was analyzed outside the EPA recommended holding time.
Q-05	-	Analyses are not controlled on RPD values from sample concentrations less than 10 times the reporting limit.
R-03	-	The reporting limit for this analyte was raised due to matrix interference.
R-05	-	Reporting limits raised due to dilution necessary for analysis. Sample contains high levels of reported analyte, non-target analyte, and/or matrix interference.
S-09	-	Surrogate recovery is outside control limits due to matrix interference.
X	-	See case narrative.

Laboratory Reporting Conventions:

DET	-	Analyte DETECTED at or above the Reporting Limit. Qualitative Analyses only.
ND	-	Analyte NOT DETECTED at or above the reporting limit (MDL or MRL, as appropriate).
NR / NA	-	Not Reported / Not Available
dry	-	Sample results reported on a dry weight basis. Reporting Limits are corrected for %Solids when %Solids are <50%.
wet	-	Sample results and reporting limits reported on a wet weight basis (as received).
RPD	-	Relative Percent Difference. (RPDs calculated using Results, not Percent Recoveries).
MRL	-	METHOD REPORTING LIMIT. Reporting Level at, or above, the lowest level standard of the Calibration Table.
MDL*	-	METHOD DETECTION LIMIT. Reporting Level at, or above, the statistically derived limit based on 40CFR, Part 136, Appendix B. *MDLs are listed on the report only if the data has been evaluated below the MRL. Results between the MDL and MRL are reported as Estimated results.
Dil	-	Dilutions are calculated based on deviations from the standard dilution performed for an analysis, and may not represent the dilution found on the analytical raw data.
Reporting limits	-	Reporting limits (MDLs and MRLs) are adjusted based on variations in sample preparation amounts, analytical dilutions and percent solids, where applicable.

SCOEPA00013993

nca

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CHAIN OF CUSTODY REPORT

Work Order #: P4H1069

CLIENT: HAI

REPORT TO: Rob Ede / HAI

ADDRESS:

PHONE: 503-796-7717 FAX:

INVOICE TO: HAI pricing as per Philip N. & metals = As, Cr, Cu, Ni, Pb, Zn

P.O. NUMBER: 2708-3[illegible]

PROJECT NAME: NW NATURAL

PROJECT NUMBER: 2708-3[illegible]

SAMPLED BY: MW[illegible]

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 Specify:

* Turnaround Requests less than standard may incur Rush Charges.

PRESERVATIVE: NONE | HCL | NONE | NaOH | NaOH | HNO3

REQUESTED ANALYSES

CLIENT SAMPLE IDENTIFICATION	SAMPLING DATE/TIME	PAH EPA 8270	VOCs EPA 8260	SVOCs 8270	TOTAL CYN EPA 9010	AMER. CYN EPA 9010	TOTAL METALS EPA 6020	BTEX 8021	MATRIX (W, S, O)	# OF CONT.	LOCATION / COMMENTS	NCA WO ID
1 2708-040826-MW7-023	8-26-04 9:10	X	X						W	5		
2 2708-040826-MW7-024	8-26-04 9:35	X	X						W	5		
3 2708-040826-MW[illegible]-025	8-26-04 11:30	X	X	X	X	X	X	~~X~~	W	~~[illegible]~~ 22	MS/MSD: PAH, BTEX, TOT. CYN, AMER. CYN.	
4 2708-040826-MW[illegible]-026	8-26-04 13:35	X	X	X	X	X	X		W	~~[illegible]~~ 8	~~[illegible]~~ PAHs, ~~[illegible]~~ VOCs	
5 2708-040826-MW[illegible]-028	8-26-04 15:10	X	X	X	X	X	X		W	8		
6 2708-040826-MW[illegible]-027	8-26-04 13:38	X						X	W	4	DUP.	
7												
8												
9												
10												

RELEASED BY: Matt Dr[illegible] DATE: TIME:
PRINT NAME: MATT DRAKE FIRM: HAI
RECEIVED BY: [signature] DATE: 8/27/04 TIME: 14:10
PRINT NAME: Bob F FIRM: NA

RELEASED BY: [signature] DATE: 8/27/04 TIME: 14:40
PRINT NAME: Bob F FIRM: NA
RECEIVED BY: Vanssaeros DATE: 8-27-04 TIME: 14:40
PRINT NAME: Vanssaeros FIRM: NCA

ADDITIONAL REMARKS:

TEMP: 5°F

PAGE OF

COC REV 1/03

52

SCOEPA00013994

NORTH CREEK ANALYTICAL COOLER RECEIPT FORM

(Army Corp. compliant)

Client: Haley

1. **Please sign for receipt and opening of** 2 **cooler or** _____ **other** _____

   By (print) Vanessa Evan (sign) Vanessa Evan

2. Date samples received 8/27/04 Date opened: Same X or ___/___/___

3. Delivered by: X NCA courier ___ FedEx ___UPS ___Courier ___Client ___Other _____

   Airbill # if applicable _____ (Put copy of shipping papers in file)

4. There were 1 custody seals present, signed by Bob date 8/27/04

5. Were the custody seals unbroken and intact at the date and time of arrival? X Yes ___No

6. Was ice used? X yes ___no Type of ice: X blue ice ___gel ice ___real ice

   Temperature (degrees C) _____ Raytek thermometer 5.9,5.2 Digi-Therm (probe temperature blank)

7. Are custody papers sealed in a plastic bag ~~and taped inside~~ to lid? X Yes (X) No

8. Were custody papers filled out properly (ink, signed, etc.)? X Yes ___No

   If "no" please specify: _____

9. Was project identifiable from custody papers? X Yes ___No

   Name of project NW Natural (if applicable)

10. **Initial and date for unpacking:** CF **(initials)** **date** 8/30/04

11. Packing material: NA bubble wrap/bag ___styrofoam ___cardboard _____other

12. Were samples in bags? ___Yes X No

13. Did all containers indicated on the COC arrive? Y Yes ___No

    If "no" please indicate which containers were absent _____

14. Were all containers unbroken and labels in good condition? Y Yes ___No

    If "no" please indicate which containers _____

15. Were all bottle labels complete (ID, date, time, signature, etc.)? Y Yes ___No

    Do the IDs, times, etc. agree with the COC? ___Yes ✓No

    If "no" please indicate which containers TB not on COC

16. Are containers properly preserved for indicated analysis? Y Yes ___No

17. Is there adequate volume for the test(s) requested? Y Yes ___No

18. If voa vials were submitted, are they free of bubbles? ___ N/A Y Yes ___No

19. **Log-in phase: Date samples were logged in:** 8/30/04 **Elm Project # P** 4H1069

20. Logged in by (print) Carrie Fanshold (sign) Carrie Fanshold

21. Was the project manager notified of status? (Use back of form as a record) ___Yes ✓No

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October 22, 2004

Rob Ede
Hahn and Associates, Inc.
434 NW Sixth Ave., Suite 203
Portland, OR 97209

RE: Northwest Natural

Enclosed are the results of analyses for samples received by the laboratory on 08/27/04 14:40.
The following list is a summary of the NCA Work Orders contained in this report.
If you have any questions concerning this report, please feel free to contact me.

Work	Project	ProjectNumber
P4H1069	Northwest Natural	2708-30

Thank You,

Philip Nerenberg

Philip Nerenberg For Howard Holmes, Project Manager

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North Creek Analytical, Inc.
Environmental Laboratory Network

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Hahn and Associates, Inc.	Project Name:	**Northwest Natural**	
434 NW Sixth Ave., Suite 203	Project Number:	2708-30	Report Created:
Portland, OR 97209	Project Manager:	Rob Ede	10/22/04 16:49

ANALYTICAL REPORT FOR SAMPLES

Sample ID	Laboratory ID	Matrix	Date Sampled	Date Received
2708-040826-MW7-023	P4H1069-01	Water	08/26/04 09:10	08/27/04 14:40
2708-040826-MW7-024	P4H1069-02	Water	08/26/04 09:35	08/27/04 14:40
2708-040826-MW16-125-025	P4H1069-03	Water	08/26/04 11:30	08/27/04 14:40
2708-040826-MW16-65-026	P4H1069-04	Water	08/26/04 13:35	08/27/04 14:40
2708-040826-MW16-45-028	P4H1069-05	Water	08/26/04 15:10	08/27/04 14:40
2708-040826-MW16-65-027	P4H1069-06	Water	08/26/04 13:38	08/27/04 14:40

North Creek Analytical - Portland

Philip Nerenberg

Philip Nerenberg For Howard Holmes, Project Manager

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Hahn and Associates, Inc.	Project Name:	**Northwest Natural**	
434 NW Sixth Ave., Suite 203	Project Number:	2708-30	Report Created:
Portland, OR 97209	Project Manager:	Rob Ede	10/22/04 16:49

Analytical Case Narrative

North Creek Analytical - Portland

P4H1069

Sample P4H1069-03 for 8270C Semi-volatiles may have low level contamination from the spike mix. This may have come from an improperly rinsed syringe. There was insufficient sample to re-extract. The data was reported and the affected analytes were flagged.

SCOEPA00013998

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Hahn and Associates, Inc.	Project Name: **Northwest Natural**	
434 NW Sixth Ave., Suite 203	Project Number: 2708-30	Report Created:
Portland, OR 97209	Project Manager: Rob Ede	10/22/04 16:49

BTEX per EPA Method 8021B

North Creek Analytical - Portland

Analyte		Method	Result	MDL*	MRL	Units	Dil	Batch	Prepared	Analyzed	Notes
P4H1069-06	**Water**	**2708-040826-MW16-65-027**			**Sampled: 08/26/04 13:38**						
Benzene		EPA 8021B	**1250**	-----	25.0	ug/l	50x	4081258	08/30/04	08/31/04 02:21	
Toluene		"	**339**	-----	25.0	"	"	"	"	"	
Ethylbenzene		"	**223**	-----	25.0	"	"	"	"	"	
Xylenes (total)		"	**486**	-----	50.0	"	"	"	"	"	
Surrogate(s): 4-BFB (PID)			*Recovery: 94.2%*		*Limits: 70 - 130 %*		*1X*			"	

North Creek Analytical - Portland

Philip Nerenberg

Philip Nerenberg For Howard Holmes, Project Manager

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Hahn and Associates, Inc.	Project Name: **Northwest Natural**	
434 NW Sixth Ave., Suite 203	Project Number: 2708-30	Report Created:
Portland, OR 97209	Project Manager: Rob Ede	10/22/04 16:49

Total Metals per EPA 6000/7000 Series Methods

North Creek Analytical - Portland

Analyte		Method	Result	MDL*	MRL	Units	Dil	Batch	Prepared	Analyzed	Notes
P4H1069-03	**Water**	**2708-040826-MW16-125-025**			**Sampled: 08/26/04 11:30**						
Arsenic		EPA 6020	**0.00461**	-----	0.00100	mg/l	1x	4081235	08/30/04	09/10/04 01:52	
Chromium		"	**0.00134**	-----	0.00100	"	"	"	"	"	
Copper		"	ND	-----	0.00200	"	"	"	"	"	
Lead		"	ND	-----	0.00100	"	"	"	"	"	
Nickel		"	**0.00542**	-----	0.00200	"	"	"	"	"	
Zinc		"	ND	-----	0.00500	"	"	"	"	"	
P4H1069-04	**Water**	**2708-040826-MW16-65-026**			**Sampled: 08/26/04 13:35**						
Arsenic		EPA 6020	**0.00173**	-----	0.00100	mg/l	1x	4081235	08/30/04	09/10/04 02:43	
Chromium		"	**0.00137**	-----	0.00100	"	"	"	"	"	
Copper		"	**0.00201**	-----	0.00200	"	"	"	"	"	
Lead		"	ND	-----	0.00100	"	"	"	"	"	
Nickel		"	**0.0197**	-----	0.00200	"	"	"	"	"	
Zinc		"	**0.00762**	-----	0.00500	"	"	"	"	"	
P4H1069-05	**Water**	**2708-040826-MW16-45-028**			**Sampled: 08/26/04 15:10**						
Arsenic		EPA 6020	**0.00917**	-----	0.00100	mg/l	1x	4081235	08/30/04	09/10/04 02:56	
Chromium		"	**0.0138**	-----	0.00100	"	"	"	"	"	
Copper		"	**0.00473**	-----	0.00200	"	"	"	"	"	
Lead		"	**0.00138**	-----	0.00100	"	"	"	"	"	
Nickel		"	**0.131**	-----	0.00200	"	"	"	"	"	
Zinc		"	**0.0110**	-----	0.00500	"	"	"	"	"	

North Creek Analytical - Portland

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Philip Nerenberg

Philip Nerenberg For Howard Holmes, Project Manager

SCOEPA00014000

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Hahn and Associates, Inc.	Project Name: **Northwest Natural**	
434 NW Sixth Ave., Suite 203	Project Number: 2708-30	Report Created:
Portland, OR 97209	Project Manager: Rob Ede	10/22/04 16:49

Volatile Organic Compounds per EPA Method 8260B

North Creek Analytical - Portland

Analyte	Method	Result	MDL*	MRL	Units	Dil	Batch	Prepared	Analyzed	Notes
P4H1069-01 Water	**2708-040826-MW7-023**			**Sampled: 08/26/04 09:10**						
Acetone	EPA 8260B	**140**	-----	25.0	ug/l	1x	4090189	09/06/04	09/06/04 21:16	
Benzene	"	ND	-----	1.00	"	"	"	"	"	
Bromobenzene	"	ND	-----	1.00	"	"	"	"	"	
Bromochloromethane	"	ND	-----	1.00	"	"	"	"	"	
Bromodichloromethane	"	ND	-----	1.00	"	"	"	"	"	
Bromoform	"	ND	-----	1.00	"	"	"	"	"	
Bromomethane	"	ND	-----	5.00	"	"	"	"	"	
2-Butanone	"	ND	-----	10.0	"	"	"	"	"	
n-Butylbenzene	"	ND	-----	5.00	"	"	"	"	"	
sec-Butylbenzene	"	ND	-----	1.00	"	"	"	"	"	
tert-Butylbenzene	"	ND	-----	1.00	"	"	"	"	"	
Carbon disulfide	"	ND	-----	10.0	"	"	"	"	"	
Carbon tetrachloride	"	ND	-----	1.00	"	"	"	"	"	
Chlorobenzene	"	ND	-----	1.00	"	"	"	"	"	
Chloroethane	"	ND	-----	1.00	"	"	"	"	"	
Chloroform	"	ND	-----	1.00	"	"	"	"	"	
Chloromethane	"	ND	-----	5.00	"	"	"	"	"	
2-Chlorotoluene	"	ND	-----	1.00	"	"	"	"	"	
4-Chlorotoluene	"	ND	-----	1.00	"	"	"	"	"	
1,2-Dibromo-3-chloropropane	"	ND	-----	5.00	"	"	"	"	"	
Dibromochloromethane	"	ND	-----	1.00	"	"	"	"	"	
1,2-Dibromoethane	"	ND	-----	1.00	"	"	"	"	"	
Dibromomethane	"	ND	-----	1.00	"	"	"	"	"	
1,2-Dichlorobenzene	"	ND	-----	1.00	"	"	"	"	"	
1,3-Dichlorobenzene	"	ND	-----	1.00	"	"	"	"	"	
1,4-Dichlorobenzene	"	ND	-----	1.00	"	"	"	"	"	
Dichlorodifluoromethane	"	ND	-----	5.00	"	"	"	"	"	
1,1-Dichloroethane	"	ND	-----	1.00	"	"	"	"	"	
1,2-Dichloroethane	"	ND	-----	1.00	"	"	"	"	"	
1,1-Dichloroethene	"	ND	-----	1.00	"	"	"	"	"	
cis-1,2-Dichloroethene	"	ND	-----	1.00	"	"	"	"	"	
trans-1,2-Dichloroethene	"	ND	-----	1.00	"	"	"	"	"	
1,2-Dichloropropane	"	ND	-----	1.00	"	"	"	"	"	
1,3-Dichloropropane	"	ND	-----	1.00	"	"	"	"	"	
2,2-Dichloropropane	"	ND	-----	1.00	"	"	"	"	"	
1,1-Dichloropropene	"	ND	-----	1.00	"	"	"	"	"	
cis-1,3-Dichloropropene	"	ND	-----	1.00	"	"	"	"	"	
trans-1,3-Dichloropropene	"	ND	-----	1.00	"	"	"	"	"	
Ethylbenzene	"	ND	-----	1.00	"	"	"	"	"	
Hexachlorobutadiene	"	ND	-----	2.00	"	"	"	"	"	
2-Hexanone	"	ND	-----	10.0	"	"	"	"	"	
Isopropylbenzene	"	ND	-----	2.00	"	"	"	"	"	

North Creek Analytical - Portland

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Philip Nerenberg

Philip Nerenberg For Howard Holmes, Project Manager

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Hahn and Associates, Inc.	Project Name: **Northwest Natural**	
434 NW Sixth Ave., Suite 203	Project Number: 2708-30	Report Created:
Portland, OR 97209	Project Manager: Rob Ede	10/22/04 16:49

Volatile Organic Compounds per EPA Method 8260B

North Creek Analytical - Portland

Analyte	Method	Result	MDL*	MRL	Units	Dil	Batch	Prepared	Analyzed	Notes
P4H1069-01 Water	**2708-040826-MW7-023**			**Sampled: 08/26/04 09:10**						
p-Isopropyltoluene	EPA 8260B	ND	-----	2.00	ug/l	1x	4090189	09/06/04	09/06/04 21:16	
4-Methyl-2-pentanone	"	ND	-----	5.00	"	"	"	"	"	
Methyl tert-butyl ether	"	ND	-----	1.00	"	"	"	"	"	
Methylene chloride	"	ND	-----	5.00	"	"	"	"	"	
Naphthalene	"	ND	-----	2.00	"	"	"	"	"	
n-Propylbenzene	"	ND	-----	1.00	"	"	"	"	"	
Styrene	"	ND	-----	1.00	"	"	"	"	"	
1,1,1,2-Tetrachloroethane	"	ND	-----	1.00	"	"	"	"	"	
1,1,2,2-Tetrachloroethane	"	ND	-----	1.00	"	"	"	"	"	
Tetrachloroethene	"	ND	-----	1.00	"	"	"	"	"	
Toluene	"	ND	-----	1.00	"	"	"	"	"	
1,2,3-Trichlorobenzene	"	ND	-----	1.00	"	"	"	"	"	
1,2,4-Trichlorobenzene	"	ND	-----	1.00	"	"	"	"	"	
1,1,1-Trichloroethane	"	ND	-----	1.00	"	"	"	"	"	
1,1,2-Trichloroethane	"	ND	-----	1.00	"	"	"	"	"	
Trichloroethene	"	ND	-----	1.00	"	"	"	"	"	
Trichlorofluoromethane	"	ND	-----	1.00	"	"	"	"	"	
1,2,3-Trichloropropane	"	ND	-----	1.00	"	"	"	"	"	
1,2,4-Trimethylbenzene	"	ND	-----	1.00	"	"	"	"	"	
1,3,5-Trimethylbenzene	"	ND	-----	1.00	"	"	"	"	"	
Vinyl chloride	"	ND	-----	1.00	"	"	"	"	"	
o-Xylene	"	**1.67**	-----	1.00	"	"	"	"	"	
m,p-Xylene	"	ND	-----	2.00	"	"	"	"	"	
Surrogate(s): 4-BFB		*Recovery: 87.0%*		*Limits: 75 - 120 %*	"				"	
1,2-DCA-d4		*101%*		*77 - 129 %*	"				"	
Dibromofluoromethane		*96.5%*		*80 - 121 %*	"				"	
Toluene-d8		*97.0%*		*80 - 120 %*	"				"	

North Creek Analytical - Portland

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Philip Nerenberg

Philip Nerenberg For Howard Holmes, Project Manager

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Hahn and Associates, Inc.	Project Name: **Northwest Natural**	
434 NW Sixth Ave., Suite 203	Project Number: 2708-30	Report Created:
Portland, OR 97209	Project Manager: Rob Ede	10/22/04 16:49

Volatile Organic Compounds per EPA Method 8260B

North Creek Analytical - Portland

Analyte	Method	Result	MDL*	MRL	Units	Dil	Batch	Prepared	Analyzed	Notes
P4H1069-02 Water	**2708-040826-MW7-024**			**Sampled: 08/26/04 09:35**						
Acetone	EPA 8260B	**153**	-----	25.0	ug/l	1x	4090189	09/06/04	09/06/04 21:43	
Benzene	"	ND	-----	1.00	"	"	"	"	"	
Bromobenzene	"	ND	-----	1.00	"	"	"	"	"	
Bromochloromethane	"	ND	-----	1.00	"	"	"	"	"	
Bromodichloromethane	"	ND	-----	1.00	"	"	"	"	"	
Bromoform	"	ND	-----	1.00	"	"	"	"	"	
Bromomethane	"	ND	-----	5.00	"	"	"	"	"	
2-Butanone	"	ND	-----	50.0	"	"	"	"	"	**R-03**
n-Butylbenzene	"	ND	-----	5.00	"	"	"	"	"	
sec-Butylbenzene	"	ND	-----	1.00	"	"	"	"	"	
tert-Butylbenzene	"	ND	-----	1.00	"	"	"	"	"	
Carbon disulfide	"	ND	-----	10.0	"	"	"	"	"	
Carbon tetrachloride	"	ND	-----	1.00	"	"	"	"	"	
Chlorobenzene	"	ND	-----	1.00	"	"	"	"	"	
Chloroethane	"	ND	-----	1.00	"	"	"	"	"	
Chloroform	"	ND	-----	1.00	"	"	"	"	"	
Chloromethane	"	ND	-----	5.00	"	"	"	"	"	
2-Chlorotoluene	"	ND	-----	1.00	"	"	"	"	"	
4-Chlorotoluene	"	ND	-----	1.00	"	"	"	"	"	
1,2-Dibromo-3-chloropropane	"	ND	-----	5.00	"	"	"	"	"	
Dibromochloromethane	"	ND	-----	1.00	"	"	"	"	"	
1,2-Dibromoethane	"	ND	-----	1.00	"	"	"	"	"	
Dibromomethane	"	ND	-----	1.00	"	"	"	"	"	
1,2-Dichlorobenzene	"	ND	-----	1.00	"	"	"	"	"	
1,3-Dichlorobenzene	"	ND	-----	1.00	"	"	"	"	"	
1,4-Dichlorobenzene	"	ND	-----	1.00	"	"	"	"	"	
Dichlorodifluoromethane	"	ND	-----	5.00	"	"	"	"	"	
1,1-Dichloroethane	"	ND	-----	1.00	"	"	"	"	"	
1,2-Dichloroethane	"	ND	-----	1.00	"	"	"	"	"	
1,1-Dichloroethene	"	ND	-----	1.00	"	"	"	"	"	
cis-1,2-Dichloroethene	"	ND	-----	1.00	"	"	"	"	"	
trans-1,2-Dichloroethene	"	ND	-----	1.00	"	"	"	"	"	
1,2-Dichloropropane	"	ND	-----	1.00	"	"	"	"	"	
1,3-Dichloropropane	"	ND	-----	1.00	"	"	"	"	"	
2,2-Dichloropropane	"	ND	-----	1.00	"	"	"	"	"	
1,1-Dichloropropene	"	ND	-----	1.00	"	"	"	"	"	
cis-1,3-Dichloropropene	"	ND	-----	1.00	"	"	"	"	"	
trans-1,3-Dichloropropene	"	ND	-----	1.00	"	"	"	"	"	
Ethylbenzene	"	ND	-----	1.00	"	"	"	"	"	
Hexachlorobutadiene	"	ND	-----	2.00	"	"	"	"	"	
2-Hexanone	"	ND	-----	10.0	"	"	"	"	"	
Isopropylbenzene	"	ND	-----	2.00	"	"	"	"	"	

North Creek Analytical - Portland

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Philip Nerenberg

Philip Nerenberg For Howard Holmes, Project Manager

SCOEPA00014003

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Hahn and Associates, Inc.	Project Name: **Northwest Natural**	
434 NW Sixth Ave., Suite 203	Project Number: 2708-30	Report Created:
Portland, OR 97209	Project Manager: Rob Ede	10/22/04 16:49

Volatile Organic Compounds per EPA Method 8260B

North Creek Analytical - Portland

Analyte	Method	Result	MDL*	MRL	Units	Dil	Batch	Prepared	Analyzed	Notes
P4H1069-02 Water	**2708-040826-MW7-024**			**Sampled: 08/26/04 09:35**						
p-Isopropyltoluene	EPA 8260B	ND	-----	2.00	ug/l	1x	4090189	09/06/04	09/06/04 21:43	
4-Methyl-2-pentanone	"	ND	-----	5.00	"	"	"	"	"	
Methyl tert-butyl ether	"	ND	-----	1.00	"	"	"	"	"	
Methylene chloride	"	ND	-----	5.00	"	"	"	"	"	
Naphthalene	"	ND	-----	2.00	"	"	"	"	"	
n-Propylbenzene	"	ND	-----	1.00	"	"	"	"	"	
Styrene	"	ND	-----	1.00	"	"	"	"	"	
1,1,1,2-Tetrachloroethane	"	ND	-----	1.00	"	"	"	"	"	
1,1,2,2-Tetrachloroethane	"	ND	-----	1.00	"	"	"	"	"	
Tetrachloroethene	"	ND	-----	1.00	"	"	"	"	"	
Toluene	"	ND	-----	1.00	"	"	"	"	"	
1,2,3-Trichlorobenzene	"	ND	-----	1.00	"	"	"	"	"	
1,2,4-Trichlorobenzene	"	ND	-----	1.00	"	"	"	"	"	
1,1,1-Trichloroethane	"	ND	-----	1.00	"	"	"	"	"	
1,1,2-Trichloroethane	"	ND	-----	1.00	"	"	"	"	"	
Trichloroethene	"	ND	-----	1.00	"	"	"	"	"	
Trichlorofluoromethane	"	ND	-----	1.00	"	"	"	"	"	
1,2,3-Trichloropropane	"	ND	-----	1.00	"	"	"	"	"	
1,2,4-Trimethylbenzene	"	ND	-----	1.00	"	"	"	"	"	
1,3,5-Trimethylbenzene	"	ND	-----	1.00	"	"	"	"	"	
Vinyl chloride	"	ND	-----	1.00	"	"	"	"	"	
o-Xylene	"	**1.71**	-----	1.00	"	"	"	"	"	
m,p-Xylene	"	ND	-----	2.00	"	"	"	"	"	
Surrogate(s): 4-BFB		*Recovery: 90.5%*		*Limits: 75 - 120 %*	"				"	
1,2-DCA-d4		*103%*		*77 - 129 %*	"				"	
Dibromofluoromethane		*98.0%*		*80 - 121 %*	"				"	
Toluene-d8		*100%*		*80 - 120 %*	"				"	

North Creek Analytical - Portland

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Philip Nerenberg

Philip Nerenberg For Howard Holmes, Project Manager

SCOEPA00014004

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Hahn and Associates, Inc.	Project Name: **Northwest Natural**	
434 NW Sixth Ave., Suite 203	Project Number: 2708-30	Report Created:
Portland, OR 97209	Project Manager: Rob Ede	10/22/04 16:49

Volatile Organic Compounds per EPA Method 8260B

North Creek Analytical - Portland

Analyte	Method	Result	MDL*	MRL	Units	Dil	Batch	Prepared	Analyzed	Notes
P4H1069-03 Water	**2708-040826-MW16-125-025**			**Sampled: 08/26/04 11:30**						
Acetone	EPA 8260B	ND	-----	25.0	ug/l	1x	4090189	09/06/04	09/06/04 15:45	
Benzene	"	ND	-----	1.00	"	"	"	"	"	
Bromobenzene	"	ND	-----	1.00	"	"	"	"	"	
Bromochloromethane	"	ND	-----	1.00	"	"	"	"	"	
Bromodichloromethane	"	ND	-----	1.00	"	"	"	"	"	
Bromoform	"	ND	-----	1.00	"	"	"	"	"	
Bromomethane	"	ND	-----	5.00	"	"	"	"	"	
2-Butanone	"	ND	-----	10.0	"	"	"	"	"	
n-Butylbenzene	"	ND	-----	5.00	"	"	"	"	"	
sec-Butylbenzene	"	ND	-----	1.00	"	"	"	"	"	
tert-Butylbenzene	"	ND	-----	1.00	"	"	"	"	"	
Carbon disulfide	"	ND	-----	10.0	"	"	"	"	"	
Carbon tetrachloride	"	ND	-----	1.00	"	"	"	"	"	
Chlorobenzene	"	ND	-----	1.00	"	"	"	"	"	
Chloroethane	"	**1.17**	-----	1.00	"	"	"	"	"	
Chloroform	"	ND	-----	1.00	"	"	"	"	"	
Chloromethane	"	ND	-----	5.00	"	"	"	"	"	
2-Chlorotoluene	"	ND	-----	1.00	"	"	"	"	"	
4-Chlorotoluene	"	ND	-----	1.00	"	"	"	"	"	
1,2-Dibromo-3-chloropropane	"	ND	-----	5.00	"	"	"	"	"	
Dibromochloromethane	"	ND	-----	1.00	"	"	"	"	"	
1,2-Dibromoethane	"	ND	-----	1.00	"	"	"	"	"	
Dibromomethane	"	ND	-----	1.00	"	"	"	"	"	
1,2-Dichlorobenzene	"	ND	-----	1.00	"	"	"	"	"	
1,3-Dichlorobenzene	"	ND	-----	1.00	"	"	"	"	"	
1,4-Dichlorobenzene	"	ND	-----	1.00	"	"	"	"	"	
Dichlorodifluoromethane	"	ND	-----	5.00	"	"	"	"	"	
1,1-Dichloroethane	"	ND	-----	1.00	"	"	"	"	"	
1,2-Dichloroethane	"	ND	-----	1.00	"	"	"	"	"	
1,1-Dichloroethene	"	ND	-----	1.00	"	"	"	"	"	
cis-1,2-Dichloroethene	"	ND	-----	1.00	"	"	"	"	"	
trans-1,2-Dichloroethene	"	ND	-----	1.00	"	"	"	"	"	
1,2-Dichloropropane	"	ND	-----	1.00	"	"	"	"	"	
1,3-Dichloropropane	"	ND	-----	1.00	"	"	"	"	"	
2,2-Dichloropropane	"	ND	-----	1.00	"	"	"	"	"	
1,1-Dichloropropene	"	ND	-----	1.00	"	"	"	"	"	
cis-1,3-Dichloropropene	"	ND	-----	1.00	"	"	"	"	"	
trans-1,3-Dichloropropene	"	ND	-----	1.00	"	"	"	"	"	
Ethylbenzene	"	ND	-----	1.00	"	"	"	"	"	
Hexachlorobutadiene	"	ND	-----	2.00	"	"	"	"	"	
2-Hexanone	"	ND	-----	10.0	"	"	"	"	"	
Isopropylbenzene	"	ND	-----	2.00	"	"	"	"	"	

North Creek Analytical - Portland

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Philip Nerenberg

Philip Nerenberg For Howard Holmes, Project Manager

SCOEPA00014005

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Hahn and Associates, Inc.	Project Name: **Northwest Natural**	
434 NW Sixth Ave., Suite 203	Project Number: 2708-30	Report Created:
Portland, OR 97209	Project Manager: Rob Ede	10/22/04 16:49

Volatile Organic Compounds per EPA Method 8260B

North Creek Analytical - Portland

Analyte	Method	Result	MDL*	MRL	Units	Dil	Batch	Prepared	Analyzed	Notes
P4H1069-03 Water	**2708-040826-MW16-125-025**			**Sampled: 08/26/04 11:30**						
p-Isopropyltoluene	EPA 8260B	ND	-----	2.00	ug/l	1x	4090189	09/06/04	09/06/04 15:45	
4-Methyl-2-pentanone	"	ND	-----	5.00	"	"	"	"	"	
Methyl tert-butyl ether	"	ND	-----	1.00	"	"	"	"	"	
Methylene chloride	"	ND	-----	5.00	"	"	"	"	"	
Naphthalene	"	**22.2**	-----	2.00	"	"	"	"	"	
n-Propylbenzene	"	ND	-----	1.00	"	"	"	"	"	
Styrene	"	ND	-----	1.00	"	"	"	"	"	
1,1,1,2-Tetrachloroethane	"	ND	-----	1.00	"	"	"	"	"	
1,1,2,2-Tetrachloroethane	"	ND	-----	1.00	"	"	"	"	"	
Tetrachloroethene	"	ND	-----	1.00	"	"	"	"	"	
Toluene	"	ND	-----	1.00	"	"	"	"	"	
1,2,3-Trichlorobenzene	"	ND	-----	1.00	"	"	"	"	"	
1,2,4-Trichlorobenzene	"	ND	-----	1.00	"	"	"	"	"	
1,1,1-Trichloroethane	"	ND	-----	1.00	"	"	"	"	"	
1,1,2-Trichloroethane	"	ND	-----	1.00	"	"	"	"	"	
Trichloroethene	"	ND	-----	1.00	"	"	"	"	"	
Trichlorofluoromethane	"	ND	-----	1.00	"	"	"	"	"	
1,2,3-Trichloropropane	"	ND	-----	1.00	"	"	"	"	"	
1,2,4-Trimethylbenzene	"	ND	-----	1.00	"	"	"	"	"	
1,3,5-Trimethylbenzene	"	ND	-----	1.00	"	"	"	"	"	
Vinyl chloride	"	ND	-----	1.00	"	"	"	"	"	
o-Xylene	"	ND	-----	1.00	"	"	"	"	"	
m,p-Xylene	"	ND	-----	2.00	"	"	"	"	"	
Surrogate(s): 4-BFB		*Recovery: 90.0%*		*Limits: 75 - 120 %*	"				"	
1,2-DCA-d4		*104%*		*77 - 129 %*	"				"	
Dibromofluoromethane		*97.0%*		*80 - 121 %*	"				"	
Toluene-d8		*98.0%*		*80 - 120 %*	"				"	

North Creek Analytical - Portland

Philip Nerenberg

Philip Nerenberg For Howard Holmes, Project Manager

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SCOEPA00014006

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Hahn and Associates, Inc.	Project Name: **Northwest Natural**	
434 NW Sixth Ave., Suite 203	Project Number: 2708-30	Report Created:
Portland, OR 97209	Project Manager: Rob Ede	10/22/04 16:49

Volatile Organic Compounds per EPA Method 8260B

North Creek Analytical - Portland

Analyte	Method	Result	MDL*	MRL	Units	Dil	Batch	Prepared	Analyzed	Notes
P4H1069-04 Water	**2708-040826-MW16-65-026**			**Sampled: 08/26/04 13:35**						
Acetone	EPA 8260B	ND	-----	1250	ug/l	50x	4090189	09/06/04	09/06/04 22:11	
Benzene	"	**1370**	-----	50.0	"	"	"	"	"	
Bromobenzene	"	ND	-----	50.0	"	"	"	"	"	
Bromochloromethane	"	ND	-----	50.0	"	"	"	"	"	
Bromodichloromethane	"	ND	-----	50.0	"	"	"	"	"	
Bromoform	"	ND	-----	50.0	"	"	"	"	"	
Bromomethane	"	ND	-----	250	"	"	"	"	"	
2-Butanone	"	ND	-----	500	"	"	"	"	"	
n-Butylbenzene	"	ND	-----	250	"	"	"	"	"	
sec-Butylbenzene	"	ND	-----	50.0	"	"	"	"	"	
tert-Butylbenzene	"	ND	-----	50.0	"	"	"	"	"	
Carbon disulfide	"	ND	-----	500	"	"	"	"	"	
Carbon tetrachloride	"	ND	-----	50.0	"	"	"	"	"	
Chlorobenzene	"	ND	-----	50.0	"	"	"	"	"	
Chloroethane	"	ND	-----	50.0	"	"	"	"	"	
Chloroform	"	ND	-----	50.0	"	"	"	"	"	
Chloromethane	"	ND	-----	250	"	"	"	"	"	
2-Chlorotoluene	"	ND	-----	50.0	"	"	"	"	"	
4-Chlorotoluene	"	ND	-----	50.0	"	"	"	"	"	
1,2-Dibromo-3-chloropropane	"	ND	-----	250	"	"	"	"	"	
Dibromochloromethane	"	ND	-----	50.0	"	"	"	"	"	
1,2-Dibromoethane	"	ND	-----	50.0	"	"	"	"	"	
Dibromomethane	"	ND	-----	50.0	"	"	"	"	"	
1,2-Dichlorobenzene	"	ND	-----	50.0	"	"	"	"	"	
1,3-Dichlorobenzene	"	ND	-----	50.0	"	"	"	"	"	
1,4-Dichlorobenzene	"	ND	-----	50.0	"	"	"	"	"	
Dichlorodifluoromethane	"	ND	-----	250	"	"	"	"	"	
1,1-Dichloroethane	"	ND	-----	50.0	"	"	"	"	"	
1,2-Dichloroethane	"	ND	-----	50.0	"	"	"	"	"	
1,1-Dichloroethene	"	ND	-----	50.0	"	"	"	"	"	
cis-1,2-Dichloroethene	"	ND	-----	50.0	"	"	"	"	"	
trans-1,2-Dichloroethene	"	ND	-----	50.0	"	"	"	"	"	
1,2-Dichloropropane	"	ND	-----	50.0	"	"	"	"	"	
1,3-Dichloropropane	"	ND	-----	50.0	"	"	"	"	"	
2,2-Dichloropropane	"	ND	-----	50.0	"	"	"	"	"	
1,1-Dichloropropene	"	ND	-----	50.0	"	"	"	"	"	
cis-1,3-Dichloropropene	"	ND	-----	50.0	"	"	"	"	"	
trans-1,3-Dichloropropene	"	ND	-----	50.0	"	"	"	"	"	
Ethylbenzene	"	**236**	-----	50.0	"	"	"	"	"	
Hexachlorobutadiene	"	ND	-----	100	"	"	"	"	"	
2-Hexanone	"	ND	-----	500	"	"	"	"	"	
Isopropylbenzene	"	ND	-----	100	"	"	"	"	"	

North Creek Analytical - Portland

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Philip Nerenberg

Philip Nerenberg For Howard Holmes, Project Manager

SCOEPA00014007

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Hahn and Associates, Inc.	Project Name: **Northwest Natural**	
434 NW Sixth Ave., Suite 203	Project Number: 2708-30	Report Created:
Portland, OR 97209	Project Manager: Rob Ede	10/22/04 16:49

Volatile Organic Compounds per EPA Method 8260B

North Creek Analytical - Portland

Analyte	Method	Result	MDL*	MRL	Units	Dil	Batch	Prepared	Analyzed	Notes
P4H1069-04 Water	**2708-040826-MW16-65-026**			**Sampled: 08/26/04 13:35**						
p-Isopropyltoluene	EPA 8260B	ND	-----	100	ug/l	50x	4090189	09/06/04	09/06/04 22:11	
4-Methyl-2-pentanone	"	ND	-----	250	"	"	"	"	"	
Methyl tert-butyl ether	"	ND	-----	50.0	"	"	"	"	"	
Methylene chloride	"	ND	-----	250	"	"	"	"	"	
Naphthalene	"	**4890**	-----	100	"	"	"	"	"	
n-Propylbenzene	"	ND	-----	50.0	"	"	"	"	"	
Styrene	"	ND	-----	50.0	"	"	"	"	"	
1,1,1,2-Tetrachloroethane	"	ND	-----	50.0	"	"	"	"	"	
1,1,2,2-Tetrachloroethane	"	ND	-----	50.0	"	"	"	"	"	
Tetrachloroethene	"	ND	-----	50.0	"	"	"	"	"	
Toluene	"	**388**	-----	50.0	"	"	"	"	"	
1,2,3-Trichlorobenzene	"	ND	-----	50.0	"	"	"	"	"	
1,2,4-Trichlorobenzene	"	ND	-----	50.0	"	"	"	"	"	
1,1,1-Trichloroethane	"	ND	-----	50.0	"	"	"	"	"	
1,1,2-Trichloroethane	"	ND	-----	50.0	"	"	"	"	"	
Trichloroethene	"	ND	-----	50.0	"	"	"	"	"	
Trichlorofluoromethane	"	ND	-----	50.0	"	"	"	"	"	
1,2,3-Trichloropropane	"	ND	-----	50.0	"	"	"	"	"	
1,2,4-Trimethylbenzene	"	ND	-----	50.0	"	"	"	"	"	
1,3,5-Trimethylbenzene	"	ND	-----	50.0	"	"	"	"	"	
Vinyl chloride	"	ND	-----	50.0	"	"	"	"	"	
o-Xylene	"	**181**	-----	50.0	"	"	"	"	"	
m,p-Xylene	"	**371**	-----	100	"	"	"	"	"	
Surrogate(s): 4-BFB		*Recovery: 96.5%*		*Limits: 75 - 120 %*		*1X*			"	
1,2-DCA-d4		*104%*		*77 - 129 %*		"			"	
Dibromofluoromethane		*101%*		*80 - 121 %*		"			"	
Toluene-d8		*101%*		*80 - 120 %*		"			"	

North Creek Analytical - Portland

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Philip Nerenberg

Philip Nerenberg For Howard Holmes, Project Manager

SCOEPA00014008

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Hahn and Associates, Inc.	Project Name: **Northwest Natural**	
434 NW Sixth Ave., Suite 203	Project Number: 2708-30	Report Created:
Portland, OR 97209	Project Manager: Rob Ede	10/22/04 16:49

Volatile Organic Compounds per EPA Method 8260B

North Creek Analytical - Portland

Analyte	Method	Result	MDL*	MRL	Units	Dil	Batch	Prepared	Analyzed	Notes
P4H1069-05 Water	**2708-040826-MW16-45-028**			**Sampled: 08/26/04 15:10**						
Acetone	EPA 8260B	ND	-----	1250	ug/l	50x	4090189	09/06/04	09/06/04 22:38	
Benzene	"	**2880**	-----	50.0	"	"	"	"	"	
Bromobenzene	"	ND	-----	50.0	"	"	"	"	"	
Bromochloromethane	"	ND	-----	50.0	"	"	"	"	"	
Bromodichloromethane	"	ND	-----	50.0	"	"	"	"	"	
Bromoform	"	ND	-----	50.0	"	"	"	"	"	
Bromomethane	"	ND	-----	250	"	"	"	"	"	
2-Butanone	"	ND	-----	500	"	"	"	"	"	
n-Butylbenzene	"	ND	-----	250	"	"	"	"	"	
sec-Butylbenzene	"	ND	-----	50.0	"	"	"	"	"	
tert-Butylbenzene	"	ND	-----	50.0	"	"	"	"	"	
Carbon disulfide	"	ND	-----	500	"	"	"	"	"	
Carbon tetrachloride	"	ND	-----	50.0	"	"	"	"	"	
Chlorobenzene	"	ND	-----	50.0	"	"	"	"	"	
Chloroethane	"	ND	-----	50.0	"	"	"	"	"	
Chloroform	"	ND	-----	50.0	"	"	"	"	"	
Chloromethane	"	ND	-----	250	"	"	"	"	"	
2-Chlorotoluene	"	ND	-----	50.0	"	"	"	"	"	
4-Chlorotoluene	"	ND	-----	50.0	"	"	"	"	"	
1,2-Dibromo-3-chloropropane	"	ND	-----	250	"	"	"	"	"	
Dibromochloromethane	"	ND	-----	50.0	"	"	"	"	"	
1,2-Dibromoethane	"	ND	-----	50.0	"	"	"	"	"	
Dibromomethane	"	ND	-----	50.0	"	"	"	"	"	
1,2-Dichlorobenzene	"	ND	-----	50.0	"	"	"	"	"	
1,3-Dichlorobenzene	"	ND	-----	50.0	"	"	"	"	"	
1,4-Dichlorobenzene	"	ND	-----	50.0	"	"	"	"	"	
Dichlorodifluoromethane	"	ND	-----	250	"	"	"	"	"	
1,1-Dichloroethane	"	ND	-----	50.0	"	"	"	"	"	
1,2-Dichloroethane	"	ND	-----	50.0	"	"	"	"	"	
1,1-Dichloroethene	"	ND	-----	50.0	"	"	"	"	"	
cis-1,2-Dichloroethene	"	ND	-----	50.0	"	"	"	"	"	
trans-1,2-Dichloroethene	"	ND	-----	50.0	"	"	"	"	"	
1,2-Dichloropropane	"	ND	-----	50.0	"	"	"	"	"	
1,3-Dichloropropane	"	ND	-----	50.0	"	"	"	"	"	
2,2-Dichloropropane	"	ND	-----	50.0	"	"	"	"	"	
1,1-Dichloropropene	"	ND	-----	50.0	"	"	"	"	"	
cis-1,3-Dichloropropene	"	ND	-----	50.0	"	"	"	"	"	
trans-1,3-Dichloropropene	"	ND	-----	50.0	"	"	"	"	"	
Ethylbenzene	"	**460**	-----	50.0	"	"	"	"	"	
Hexachlorobutadiene	"	ND	-----	100	"	"	"	"	"	
2-Hexanone	"	ND	-----	500	"	"	"	"	"	
Isopropylbenzene	"	ND	-----	100	"	"	"	"	"	

North Creek Analytical - Portland

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Philip Nerenberg

Philip Nerenberg For Howard Holmes, Project Manager

SCOEPA00014009

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Hahn and Associates, Inc.	Project Name: **Northwest Natural**	
434 NW Sixth Ave., Suite 203	Project Number: 2708-30	Report Created:
Portland, OR 97209	Project Manager: Rob Ede	10/22/04 16:49

Volatile Organic Compounds per EPA Method 8260B

North Creek Analytical - Portland

Analyte	Method	Result	MDL*	MRL	Units	Dil	Batch	Prepared	Analyzed	Notes
P4H1069-05 Water	**2708-040826-MW16-45-028**			**Sampled: 08/26/04 15:10**						
p-Isopropyltoluene	EPA 8260B	ND	-----	100	ug/l	50x	4090189	09/06/04	09/06/04 22:38	
4-Methyl-2-pentanone	"	ND	-----	250	"	"	"	"	"	
Methyl tert-butyl ether	"	ND	-----	50.0	"	"	"	"	"	
Methylene chloride	"	ND	-----	250	"	"	"	"	"	
Naphthalene	"	**7590**	-----	100	"	"	"	"	"	
n-Propylbenzene	"	ND	-----	50.0	"	"	"	"	"	
Styrene	"	ND	-----	50.0	"	"	"	"	"	
1,1,1,2-Tetrachloroethane	"	ND	-----	50.0	"	"	"	"	"	
1,1,2,2-Tetrachloroethane	"	ND	-----	50.0	"	"	"	"	"	
Tetrachloroethene	"	ND	-----	50.0	"	"	"	"	"	
Toluene	"	**959**	-----	50.0	"	"	"	"	"	
1,2,3-Trichlorobenzene	"	ND	-----	50.0	"	"	"	"	"	
1,2,4-Trichlorobenzene	"	ND	-----	50.0	"	"	"	"	"	
1,1,1-Trichloroethane	"	ND	-----	50.0	"	"	"	"	"	
1,1,2-Trichloroethane	"	ND	-----	50.0	"	"	"	"	"	
Trichloroethene	"	ND	-----	50.0	"	"	"	"	"	
Trichlorofluoromethane	"	ND	-----	50.0	"	"	"	"	"	
1,2,3-Trichloropropane	"	ND	-----	50.0	"	"	"	"	"	
1,2,4-Trimethylbenzene	"	**66.0**	-----	50.0	"	"	"	"	"	
1,3,5-Trimethylbenzene	"	ND	-----	50.0	"	"	"	"	"	
Vinyl chloride	"	ND	-----	50.0	"	"	"	"	"	
o-Xylene	"	**321**	-----	50.0	"	"	"	"	"	
m,p-Xylene	"	**546**	-----	100	"	"	"	"	"	
Surrogate(s): 4-BFB	*Recovery: 102%*			*Limits: 75 - 120 %*	*1X*				"	
1,2-DCA-d4	*108%*			*77 - 129 %*	"				"	
Dibromofluoromethane	*102%*			*80 - 121 %*	"				"	
Toluene-d8	*104%*			*80 - 120 %*	"				"	

North Creek Analytical - Portland

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Philip Nerenberg

Philip Nerenberg For Howard Holmes, Project Manager

SCOEPA00014010

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Hahn and Associates, Inc.	Project Name: **Northwest Natural**	
434 NW Sixth Ave., Suite 203	Project Number: 2708-30	Report Created:
Portland, OR 97209	Project Manager: Rob Ede	10/22/04 16:49

Semivolatile Organic Compounds per EPA Method 8270C

North Creek Analytical - Portland

Analyte	Method	Result	MDL*	MRL	Units	Dil	Batch	Prepared	Analyzed	Notes
P4H1069-03 Water	**2708-040826-MW16-125-025**			**Sampled: 08/26/04 11:30**						
Carbazole	EPA 8270C	ND	-----	5.00	ug/l	1x	4090065	09/02/04	09/07/04 18:10	
Acenaphthene	"	**7.23**	-----	5.00	"	"	"	"	"	X
Acenaphthylene	"	ND	-----	5.00	"	"	"	"	"	
Anthracene	"	ND	-----	5.00	"	"	"	"	"	
Benzo (a) anthracene	"	ND	-----	5.00	"	"	"	"	"	
Benzo (a) pyrene	"	ND	-----	5.00	"	"	"	"	"	
Benzo (b) fluoranthene	"	ND	-----	5.00	"	"	"	"	"	
Benzo (ghi) perylene	"	ND	-----	5.00	"	"	"	"	"	
Benzo (k) fluoranthene	"	ND	-----	5.00	"	"	"	"	"	
Benzoic Acid	"	ND	-----	50.0	"	"	"	"	"	
Benzyl alcohol	"	ND	-----	10.0	"	"	"	"	"	
4-Bromophenyl phenyl ether	"	ND	-----	5.00	"	"	"	"	"	
Butyl benzyl phthalate	"	ND	-----	5.00	"	"	"	"	"	
4-Chloro-3-methylphenol	"	**6.27**	-----	5.00	"	"	"	"	"	X
4-Chloroaniline	"	ND	-----	20.0	"	"	"	"	"	
Bis(2-chloroethoxy)methane	"	ND	-----	10.0	"	"	"	"	"	
Bis(2-chloroethyl)ether	"	ND	-----	5.00	"	"	"	"	"	
Bis(2-chloroisopropyl)ether	"	ND	-----	10.0	"	"	"	"	"	
2-Chloronaphthalene	"	ND	-----	5.00	"	"	"	"	"	
2-Chlorophenol	"	ND	-----	5.00	"	"	"	"	"	X
4-Chlorophenyl phenyl ether	"	ND	-----	5.00	"	"	"	"	"	
Chrysene	"	ND	-----	5.00	"	"	"	"	"	
Di-n-butyl phthalate	"	ND	-----	5.00	"	"	"	"	"	
Di-n-octyl phthalate	"	ND	-----	5.00	"	"	"	"	"	
Dibenzo (a,h) anthracene	"	ND	-----	5.00	"	"	"	"	"	
Dibenzofuran	"	ND	-----	5.00	"	"	"	"	"	
1,2-Dichlorobenzene	"	ND	-----	5.00	"	"	"	"	"	
1,3-Dichlorobenzene	"	ND	-----	5.00	"	"	"	"	"	
1,4-Dichlorobenzene	"	ND	-----	5.00	"	"	"	"	"	X
3,3'-Dichlorobenzidine	"	ND	-----	5.00	"	"	"	"	"	
2,4-Dichlorophenol	"	ND	-----	5.00	"	"	"	"	"	
Diethyl phthalate	"	ND	-----	5.00	"	"	"	"	"	
2,4-Dimethylphenol	"	ND	-----	10.0	"	"	"	"	"	
Dimethyl phthalate	"	ND	-----	5.00	"	"	"	"	"	
4,6-Dinitro-2-methylphenol	"	ND	-----	10.0	"	"	"	"	"	
2,4-Dinitrophenol	"	ND	-----	25.0	"	"	"	"	"	
2,4-Dinitrotoluene	"	ND	-----	5.00	"	"	"	"	"	
2,6-Dinitrotoluene	"	ND	-----	5.00	"	"	"	"	"	
Bis(2-ethylhexyl)phthalate	"	ND	-----	10.0	"	"	"	"	"	
Fluoranthene	"	ND	-----	5.00	"	"	"	"	"	
Fluorene	"	ND	-----	5.00	"	"	"	"	"	
Hexachlorobenzene	"	ND	-----	5.00	"	"	"	"	"	

North Creek Analytical - Portland

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Philip Nerenberg

Philip Nerenberg For Howard Holmes, Project Manager

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Hahn and Associates, Inc.	Project Name: **Northwest Natural**	
434 NW Sixth Ave., Suite 203	Project Number: 2708-30	Report Created:
Portland, OR 97209	Project Manager: Rob Ede	10/22/04 16:49

Semivolatile Organic Compounds per EPA Method 8270C

North Creek Analytical - Portland

Analyte	Method	Result	MDL*	MRL	Units	Dil	Batch	Prepared	Analyzed	Notes
P4H1069-03 Water	**2708-040826-MW16-125-025**			**Sampled: 08/26/04 11:30**						
Hexachlorobutadiene	EPA 8270C	ND	-----	10.0	ug/l	1x	4090065	09/02/04	09/07/04 18:10	
Hexachlorocyclopentadiene	"	ND	-----	10.0	"	"	"	"	"	
Hexachloroethane	"	ND	-----	10.0	"	"	"	"	"	
Indeno (1,2,3-cd) pyrene	"	ND	-----	5.00	"	"	"	"	"	
Isophorone	"	ND	-----	5.00	"	"	"	"	"	
2-Methylnaphthalene	"	**6.23**	-----	5.00	"	"	"	"	"	
2-Methylphenol	"	ND	-----	10.0	"	"	"	"	"	
3-,4-Methylphenol	"	ND	-----	5.00	"	"	"	"	"	
Naphthalene	"	**23.3**	-----	5.00	"	"	"	"	"	
2-Nitroaniline	"	ND	-----	5.00	"	"	"	"	"	
3-Nitroaniline	"	ND	-----	10.0	"	"	"	"	"	
4-Nitroaniline	"	ND	-----	10.0	"	"	"	"	"	
Nitrobenzene	"	ND	-----	5.00	"	"	"	"	"	
2-Nitrophenol	"	ND	-----	5.00	"	"	"	"	"	
4-Nitrophenol	"	ND	-----	25.0	"	"	"	"	"	
N-Nitrosodi-n-propylamine	"	ND	-----	10.0	"	"	"	"	"	X
N-Nitrosodiphenylamine	"	ND	-----	5.00	"	"	"	"	"	
Pentachlorophenol	"	ND	-----	10.0	"	"	"	"	"	
Phenanthrene	"	**5.94**	-----	5.00	"	"	"	"	"	
Phenol	"	ND	-----	5.00	"	"	"	"	"	X
Pyrene	"	ND	-----	5.00	"	"	"	"	"	X
1,2,4-Trichlorobenzene	"	ND	-----	5.00	"	"	"	"	"	X
2,4,5-Trichlorophenol	"	ND	-----	5.00	"	"	"	"	"	
2,4,6-Trichlorophenol	"	ND	-----	5.00	"	"	"	"	"	

Surrogate(s):	*2-Fluorobiphenyl*	*Recovery: 76.9%*	*Limits: 26 - 135 %*	"	"
	2-Fluorophenol	*74.1%*	*6 - 124 %*	"	"
	Nitrobenzene-d5	*89.6%*	*23 - 147 %*	"	"
	Phenol-d6	*78.3%*	*11 - 130 %*	"	"
	p-Terphenyl-d14	*91.3%*	*38 - 149 %*	"	"
	2,4,6-Tribromophenol	*101%*	*19 - 126 %*	"	"

North Creek Analytical - Portland

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Philip Nerenberg

Philip Nerenberg For Howard Holmes, Project Manager

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Hahn and Associates, Inc.	Project Name: **Northwest Natural**	
434 NW Sixth Ave., Suite 203	Project Number: 2708-30	Report Created:
Portland, OR 97209	Project Manager: Rob Ede	10/22/04 16:49

Semivolatile Organic Compounds per EPA Method 8270C

North Creek Analytical - Portland

Analyte	Method	Result	MDL*	MRL	Units	Dil	Batch	Prepared	Analyzed	Notes
P4H1069-04 Water	**2708-040826-MW16-65-026**			**Sampled: 08/26/04 13:35**						**R-05**
Carbazole	EPA 8270C	ND	-----	100	ug/l	20x	4090065	09/02/04	09/07/04 21:42	
Acenaphthene	"	ND	-----	100	"	"	"	"	"	
Acenaphthylene	"	ND	-----	100	"	"	"	"	"	
Anthracene	"	ND	-----	100	"	"	"	"	"	
Benzo (a) anthracene	"	ND	-----	100	"	"	"	"	"	
Benzo (a) pyrene	"	ND	-----	100	"	"	"	"	"	
Benzo (b) fluoranthene	"	ND	-----	100	"	"	"	"	"	
Benzo (ghi) perylene	"	ND	-----	100	"	"	"	"	"	
Benzo (k) fluoranthene	"	ND	-----	100	"	"	"	"	"	
Benzoic Acid	"	ND	-----	1000	"	"	"	"	"	
Benzyl alcohol	"	ND	-----	200	"	"	"	"	"	
4-Bromophenyl phenyl ether	"	ND	-----	100	"	"	"	"	"	
Butyl benzyl phthalate	"	ND	-----	100	"	"	"	"	"	
4-Chloro-3-methylphenol	"	ND	-----	100	"	"	"	"	"	
4-Chloroaniline	"	ND	-----	400	"	"	"	"	"	
Bis(2-chloroethoxy)methane	"	ND	-----	200	"	"	"	"	"	
Bis(2-chloroethyl)ether	"	ND	-----	100	"	"	"	"	"	
Bis(2-chloroisopropyl)ether	"	ND	-----	200	"	"	"	"	"	
2-Chloronaphthalene	"	ND	-----	100	"	"	"	"	"	
2-Chlorophenol	"	ND	-----	100	"	"	"	"	"	
4-Chlorophenyl phenyl ether	"	ND	-----	100	"	"	"	"	"	
Chrysene	"	ND	-----	100	"	"	"	"	"	
Di-n-butyl phthalate	"	ND	-----	100	"	"	"	"	"	
Di-n-octyl phthalate	"	ND	-----	100	"	"	"	"	"	
Dibenzo (a,h) anthracene	"	ND	-----	100	"	"	"	"	"	
Dibenzofuran	"	ND	-----	100	"	"	"	"	"	
1,2-Dichlorobenzene	"	ND	-----	100	"	"	"	"	"	
1,3-Dichlorobenzene	"	ND	-----	100	"	"	"	"	"	
1,4-Dichlorobenzene	"	ND	-----	100	"	"	"	"	"	
3,3'-Dichlorobenzidine	"	ND	-----	100	"	"	"	"	"	
2,4-Dichlorophenol	"	ND	-----	100	"	"	"	"	"	
Diethyl phthalate	"	ND	-----	100	"	"	"	"	"	
2,4-Dimethylphenol	"	ND	-----	200	"	"	"	"	"	
Dimethyl phthalate	"	ND	-----	100	"	"	"	"	"	
4,6-Dinitro-2-methylphenol	"	ND	-----	200	"	"	"	"	"	
2,4-Dinitrophenol	"	ND	-----	500	"	"	"	"	"	
2,4-Dinitrotoluene	"	ND	-----	100	"	"	"	"	"	
2,6-Dinitrotoluene	"	ND	-----	100	"	"	"	"	"	
Bis(2-ethylhexyl)phthalate	"	ND	-----	200	"	"	"	"	"	
Fluoranthene	"	ND	-----	100	"	"	"	"	"	
Fluorene	"	ND	-----	100	"	"	"	"	"	
Hexachlorobenzene	"	ND	-----	100	"	"	"	"	"	

North Creek Analytical - Portland

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Philip Nerenberg

Philip Nerenberg For Howard Holmes, Project Manager

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Hahn and Associates, Inc.	Project Name: **Northwest Natural**	
434 NW Sixth Ave., Suite 203	Project Number: 2708-30	Report Created:
Portland, OR 97209	Project Manager: Rob Ede	10/22/04 16:49

Semivolatile Organic Compounds per EPA Method 8270C

North Creek Analytical - Portland

Analyte	Method	Result	MDL*	MRL	Units	Dil	Batch	Prepared	Analyzed	Notes
P4H1069-04 Water	**2708-040826-MW16-65-026**			**Sampled: 08/26/04 13:35**						**R-05**
Hexachlorobutadiene	EPA 8270C	ND	-----	200	ug/l	20x	4090065	09/02/04	09/07/04 21:42	
Hexachlorocyclopentadiene	"	ND	-----	200	"	"	"	"	"	
Hexachloroethane	"	ND	-----	200	"	"	"	"	"	
Indeno (1,2,3-cd) pyrene	"	ND	-----	100	"	"	"	"	"	
Isophorone	"	ND	-----	100	"	"	"	"	"	
2-Methylnaphthalene	"	**460**	-----	100	"	"	"	"	"	
2-Methylphenol	"	ND	-----	200	"	"	"	"	"	
3-,4-Methylphenol	"	ND	-----	100	"	"	"	"	"	
Naphthalene	"	**3130**	-----	100	"	"	"	"	"	
2-Nitroaniline	"	ND	-----	100	"	"	"	"	"	
3-Nitroaniline	"	ND	-----	200	"	"	"	"	"	
4-Nitroaniline	"	ND	-----	200	"	"	"	"	"	
Nitrobenzene	"	ND	-----	100	"	"	"	"	"	
2-Nitrophenol	"	ND	-----	100	"	"	"	"	"	
4-Nitrophenol	"	ND	-----	500	"	"	"	"	"	
N-Nitrosodi-n-propylamine	"	ND	-----	200	"	"	"	"	"	
N-Nitrosodiphenylamine	"	ND	-----	100	"	"	"	"	"	
Pentachlorophenol	"	ND	-----	200	"	"	"	"	"	
Phenanthrene	"	ND	-----	100	"	"	"	"	"	
Phenol	"	ND	-----	100	"	"	"	"	"	
Pyrene	"	ND	-----	100	"	"	"	"	"	
1,2,4-Trichlorobenzene	"	ND	-----	100	"	"	"	"	"	
2,4,5-Trichlorophenol	"	ND	-----	100	"	"	"	"	"	
2,4,6-Trichlorophenol	"	ND	-----	100	"	"	"	"	"	
Surrogate(s): 2-Fluorobiphenyl	*Recovery: 76.9%*			*Limits: 26 - 135 %*	"				"	*J*
2-Fluorophenol	*76.9%*			*6 - 124 %*	"				"	
Nitrobenzene-d5	*87.0%*			*23 - 147 %*	"				"	*J*
Phenol-d6	*79.7%*			*11 - 130 %*	"				"	
p-Terphenyl-d14	*81.1%*			*38 - 149 %*	"				"	*J*
2,4,6-Tribromophenol	*87.4%*			*19 - 126 %*	"				"	

North Creek Analytical - Portland

Philip Nerenberg

Philip Nerenberg For Howard Holmes, Project Manager

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Hahn and Associates, Inc.	Project Name: **Northwest Natural**	
434 NW Sixth Ave., Suite 203	Project Number: 2708-30	Report Created:
Portland, OR 97209	Project Manager: Rob Ede	10/22/04 16:49

Semivolatile Organic Compounds per EPA Method 8270C

North Creek Analytical - Portland

Analyte	Method	Result	MDL*	MRL	Units	Dil	Batch	Prepared	Analyzed	Notes
P4H1069-05 Water	**2708-040826-MW16-45-028**			**Sampled: 08/26/04 15:10**						**R-05**
Carbazole	EPA 8270C	**137**	-----	100	ug/l	20x	4090065	09/02/04	09/07/04 22:25	
Acenaphthene	"	**130**	-----	100	"	"	"	"	"	
Acenaphthylene	"	ND	-----	100	"	"	"	"	"	
Anthracene	"	ND	-----	100	"	"	"	"	"	
Benzo (a) anthracene	"	ND	-----	100	"	"	"	"	"	
Benzo (a) pyrene	"	ND	-----	100	"	"	"	"	"	
Benzo (b) fluoranthene	"	ND	-----	100	"	"	"	"	"	
Benzo (ghi) perylene	"	ND	-----	100	"	"	"	"	"	
Benzo (k) fluoranthene	"	ND	-----	100	"	"	"	"	"	
Benzoic Acid	"	ND	-----	1000	"	"	"	"	"	
Benzyl alcohol	"	ND	-----	200	"	"	"	"	"	
4-Bromophenyl phenyl ether	"	ND	-----	100	"	"	"	"	"	
Butyl benzyl phthalate	"	ND	-----	100	"	"	"	"	"	
4-Chloro-3-methylphenol	"	ND	-----	100	"	"	"	"	"	
4-Chloroaniline	"	ND	-----	400	"	"	"	"	"	
Bis(2-chloroethoxy)methane	"	ND	-----	200	"	"	"	"	"	
Bis(2-chloroethyl)ether	"	ND	-----	100	"	"	"	"	"	
Bis(2-chloroisopropyl)ether	"	ND	-----	200	"	"	"	"	"	
2-Chloronaphthalene	"	ND	-----	100	"	"	"	"	"	
2-Chlorophenol	"	ND	-----	100	"	"	"	"	"	
4-Chlorophenyl phenyl ether	"	ND	-----	100	"	"	"	"	"	
Chrysene	"	ND	-----	100	"	"	"	"	"	
Di-n-butyl phthalate	"	ND	-----	100	"	"	"	"	"	
Di-n-octyl phthalate	"	ND	-----	100	"	"	"	"	"	
Dibenzo (a,h) anthracene	"	ND	-----	100	"	"	"	"	"	
Dibenzofuran	"	ND	-----	100	"	"	"	"	"	
1,2-Dichlorobenzene	"	ND	-----	100	"	"	"	"	"	
1,3-Dichlorobenzene	"	ND	-----	100	"	"	"	"	"	
1,4-Dichlorobenzene	"	ND	-----	100	"	"	"	"	"	
3,3'-Dichlorobenzidine	"	ND	-----	100	"	"	"	"	"	
2,4-Dichlorophenol	"	ND	-----	100	"	"	"	"	"	
Diethyl phthalate	"	ND	-----	100	"	"	"	"	"	
2,4-Dimethylphenol	"	ND	-----	200	"	"	"	"	"	
Dimethyl phthalate	"	ND	-----	100	"	"	"	"	"	
4,6-Dinitro-2-methylphenol	"	ND	-----	200	"	"	"	"	"	
2,4-Dinitrophenol	"	ND	-----	500	"	"	"	"	"	
2,4-Dinitrotoluene	"	ND	-----	100	"	"	"	"	"	
2,6-Dinitrotoluene	"	ND	-----	100	"	"	"	"	"	
Bis(2-ethylhexyl)phthalate	"	ND	-----	200	"	"	"	"	"	
Fluoranthene	"	ND	-----	100	"	"	"	"	"	
Fluorene	"	ND	-----	100	"	"	"	"	"	
Hexachlorobenzene	"	ND	-----	100	"	"	"	"	"	

North Creek Analytical - Portland

Philip Nerenberg

Philip Nerenberg For Howard Holmes, Project Manager

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Hahn and Associates, Inc.	Project Name: **Northwest Natural**	
434 NW Sixth Ave., Suite 203	Project Number: 2708-30	Report Created:
Portland, OR 97209	Project Manager: Rob Ede	10/22/04 16:49

Semivolatile Organic Compounds per EPA Method 8270C

North Creek Analytical - Portland

Analyte	Method	Result	MDL*	MRL	Units	Dil	Batch	Prepared	Analyzed	Notes
P4H1069-05 Water	**2708-040826-MW16-45-028**			**Sampled: 08/26/04 15:10**						**R-05**
Hexachlorobutadiene	EPA 8270C	ND	-----	200	ug/l	20x	4090065	09/02/04	09/07/04 22:25	
Hexachlorocyclopentadiene	"	ND	-----	200	"	"	"	"	"	
Hexachloroethane	"	ND	-----	200	"	"	"	"	"	
Indeno (1,2,3-cd) pyrene	"	ND	-----	100	"	"	"	"	"	
Isophorone	"	ND	-----	100	"	"	"	"	"	
2-Methylnaphthalene	"	**544**	-----	100	"	"	"	"	"	
2-Methylphenol	"	ND	-----	200	"	"	"	"	"	
3-,4-Methylphenol	"	ND	-----	100	"	"	"	"	"	
Naphthalene	"	**7200**	-----	1000	"	200x	"	"	09/08/04 19:12	
2-Nitroaniline	"	ND	-----	100	"	20x	"	"	09/07/04 22:25	
3-Nitroaniline	"	ND	-----	200	"	"	"	"	"	
4-Nitroaniline	"	ND	-----	200	"	"	"	"	"	
Nitrobenzene	"	ND	-----	100	"	"	"	"	"	
2-Nitrophenol	"	ND	-----	100	"	"	"	"	"	
4-Nitrophenol	"	ND	-----	500	"	"	"	"	"	
N-Nitrosodi-n-propylamine	"	ND	-----	200	"	"	"	"	"	
N-Nitrosodiphenylamine	"	ND	-----	100	"	"	"	"	"	
Pentachlorophenol	"	ND	-----	200	"	"	"	"	"	
Phenanthrene	"	**136**	-----	100	"	"	"	"	"	
Phenol	"	ND	-----	100	"	"	"	"	"	
Pyrene	"	ND	-----	100	"	"	"	"	"	
1,2,4-Trichlorobenzene	"	ND	-----	100	"	"	"	"	"	
2,4,5-Trichlorophenol	"	ND	-----	100	"	"	"	"	"	
2,4,6-Trichlorophenol	"	ND	-----	100	"	"	"	"	"	

Surrogate(s):	*2-Fluorobiphenyl*	*Recovery: 70.2%*	*Limits: 26 - 135 %*	"	"	***J***
	2-Fluorophenol	*69.3%*	*6 - 124 %*	"	"	
	Nitrobenzene-d5	*84.6%*	*23 - 147 %*	"	"	***J***
	Phenol-d6	*75.0%*	*11 - 130 %*	"	"	
	p-Terphenyl-d14	*74.9%*	*38 - 149 %*	"	"	***J***
	2,4,6-Tribromophenol	*86.8%*	*19 - 126 %*	"	"	

North Creek Analytical - Portland

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Philip Nerenberg

Philip Nerenberg For Howard Holmes, Project Manager

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Hahn and Associates, Inc.	Project Name: **Northwest Natural**	
434 NW Sixth Ave., Suite 203	Project Number: 2708-30	Report Created:
Portland, OR 97209	Project Manager: Rob Ede	10/22/04 16:49

Polynuclear Aromatic Compounds per EPA 8270M-SIM

North Creek Analytical - Portland

Analyte	Method	Result	MDL*	MRL	Units	Dil	Batch	Prepared	Analyzed	Notes
P4H1069-01 Water	**2708-040826-MW7-023**			**Sampled: 08/26/04 09:10**						
Acenaphthene	EPA 8270m	ND	*0.0500*	0.100	ug/l	1x	4081279	08/31/04	09/08/04 20:01	
Acenaphthylene	"	ND	*0.0500*	0.100	"	"	"	"	"	
Anthracene	"	ND	*0.0500*	0.100	"	"	"	"	"	
Benzo (a) anthracene	"	ND	*0.0500*	0.100	"	"	"	"	"	
Benzo (a) pyrene	"	ND	*0.0500*	0.100	"	"	"	"	"	
Benzo (b) fluoranthene	"	ND	*0.0500*	0.100	"	"	"	"	"	
Benzo (ghi) perylene	"	ND	*0.0500*	0.100	"	"	"	"	"	
Benzo (k) fluoranthene	"	ND	*0.0500*	0.100	"	"	"	"	"	
Chrysene	"	ND	*0.0500*	0.100	"	"	"	"	"	
Dibenzo (a,h) anthracene	"	ND	*0.100*	0.200	"	"	"	"	"	
Fluoranthene	"	ND	*0.0500*	0.100	"	"	"	"	"	
Fluorene	"	ND	*0.0500*	0.100	"	"	"	"	"	
Indeno (1,2,3-cd) pyrene	"	ND	*0.0500*	0.100	"	"	"	"	"	
Naphthalene	"	**0.322**	*0.0500*	0.100	"	"	"	"	"	
Phenanthrene	"	**0.140**	*0.0500*	0.100	"	"	"	"	"	
Pyrene	"	ND	*0.0500*	0.100	"	"	"	"	"	
Surrogate(s): Fluorene-d10		*Recovery: 94.5%*		*Limits: 25 - 125 %*	"				"	
Pyrene-d10		*122%*		*23 - 150 %*	"				"	
Benzo (a) pyrene-d12		*62.2%*		*10 - 125 %*	"				"	

North Creek Analytical - Portland

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Philip Nerenberg

Philip Nerenberg For Howard Holmes, Project Manager

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Hahn and Associates, Inc.	Project Name: **Northwest Natural**	
434 NW Sixth Ave., Suite 203	Project Number: 2708-30	Report Created:
Portland, OR 97209	Project Manager: Rob Ede	10/22/04 16:49

Polynuclear Aromatic Compounds per EPA 8270M-SIM

North Creek Analytical - Portland

Analyte	Method	Result	MDL*	MRL	Units	Dil	Batch	Prepared	Analyzed	Notes
P4H1069-02 Water	**2708-040826-MW7-024**			**Sampled: 08/26/04 09:35**						
Acenaphthene	EPA 8270m	ND	*0.0500*	0.100	ug/l	1x	4081279	08/31/04	09/08/04 20:34	
Acenaphthylene	"	ND	*0.0500*	0.100	"	"	"	"	"	
Anthracene	"	ND	*0.0500*	0.100	"	"	"	"	"	
Benzo (a) anthracene	"	ND	*0.0500*	0.100	"	"	"	"	"	
Benzo (a) pyrene	"	ND	*0.0500*	0.100	"	"	"	"	"	
Benzo (b) fluoranthene	"	ND	*0.0500*	0.100	"	"	"	"	"	
Benzo (ghi) perylene	"	ND	*0.0500*	0.100	"	"	"	"	"	
Benzo (k) fluoranthene	"	ND	*0.0500*	0.100	"	"	"	"	"	
Chrysene	"	ND	*0.0500*	0.100	"	"	"	"	"	
Dibenzo (a,h) anthracene	"	ND	*0.100*	0.200	"	"	"	"	"	
Fluoranthene	"	ND	*0.0500*	0.100	"	"	"	"	"	
Fluorene	"	ND	*0.0500*	0.100	"	"	"	"	"	
Indeno (1,2,3-cd) pyrene	"	ND	*0.0500*	0.100	"	"	"	"	"	
Naphthalene	"	**0.188**	*0.0500*	0.100	"	"	"	"	"	
Phenanthrene	"	ND	*0.0500*	0.100	"	"	"	"	"	
Pyrene	"	ND	*0.0500*	0.100	"	"	"	"	"	
Surrogate(s): Fluorene-d10	*Recovery: 96.2%*			*Limits: 25 - 125 %*	"				"	
Pyrene-d10	*122%*			*23 - 150 %*	"				"	
Benzo (a) pyrene-d12	*69.5%*			*10 - 125 %*	"				"	

North Creek Analytical - Portland

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Philip Nerenberg

Philip Nerenberg For Howard Holmes, Project Manager

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Hahn and Associates, Inc.	Project Name: Northwest Natural	
434 NW Sixth Ave., Suite 203	Project Number: 2708-30	Report Created:
Portland, OR 97209	Project Manager: Rob Ede	10/22/04 16:49

Polynuclear Aromatic Compounds per EPA 8270M-SIM

North Creek Analytical - Portland

Analyte	Method	Result	MDL*	MRL	Units	Dil	Batch	Prepared	Analyzed	Notes
P4H1069-03 Water	**2708-040826-MW16-125-025**			**Sampled: 08/26/04 11:30**						**R-05**
Acenaphthene	EPA 8270m	**1.74**	*0.500*	1.00	ug/l	10x	4090066	09/02/04	09/09/04 21:27	
Acenaphthylene	"	ND	*0.500*	1.00	"	"	"	"	"	
Anthracene	"	**0.676**	*0.500*	1.00	"	"	"	"	"	**J**
Benzo (a) anthracene	"	ND	*0.100*	0.200	"	2x	"	"	10/06/04 13:39	
Benzo (a) pyrene	"	ND	*0.100*	0.200	"	"	"	"	"	
Benzo (b) fluoranthene	"	ND	*0.100*	0.200	"	"	"	"	"	
Benzo (ghi) perylene	"	ND	*0.500*	1.00	"	10x	"	"	09/09/04 21:27	
Benzo (k) fluoranthene	"	ND	*0.100*	0.200	"	2x	"	"	10/06/04 13:39	
Chrysene	"	ND	*0.100*	0.200	"	"	"	"	"	
Dibenzo (a,h) anthracene	"	ND	*0.200*	0.400	"	"	"	"	"	
Fluoranthene	"	**0.621**	*0.500*	1.00	"	10x	"	"	09/09/04 21:27	**J**
Fluorene	"	**1.14**	*0.500*	1.00	"	"	"	"	"	
Indeno (1,2,3-cd) pyrene	"	ND	*0.100*	0.200	"	2x	"	"	10/06/04 13:39	
Naphthalene	"	**26.5**	*0.500*	1.00	"	10x	"	"	09/09/04 21:27	
Phenanthrene	"	**5.39**	*0.500*	1.00	"	"	"	"	"	
Pyrene	"	**0.816**	*0.500*	1.00	"	"	"	"	"	**J**
Surrogate(s): Fluorene-d10	*Recovery: 81.4%*		*Limits: 25 - 125 %*		"				"	
Pyrene-d10	*98.7%*		*23 - 150 %*		*2X*				*10/06/04 13:39*	
Benzo (a) pyrene-d12	*94.1%*		*10 - 125 %*		"				"	

North Creek Analytical - Portland

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Philip Nerenberg

Philip Nerenberg For Howard Holmes, Project Manager

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Hahn and Associates, Inc.	Project Name: **Northwest Natural**	
434 NW Sixth Ave., Suite 203	Project Number: 2708-30	Report Created:
Portland, OR 97209	Project Manager: Rob Ede	10/22/04 16:49

Polynuclear Aromatic Compounds per EPA 8270M-SIM

North Creek Analytical - Portland

Analyte	Method	Result	MDL*	MRL	Units	Dil	Batch	Prepared	Analyzed	Notes
P4H1069-04 Water	**2708-040826-MW16-65-026**			**Sampled: 08/26/04 13:35**						**R-05**
Acenaphthene	EPA 8270m	**91.0**	*5.00*	10.0	ug/l	100x	4090066	09/02/04	09/08/04 21:08	
Acenaphthylene	"	ND	*10.0*	10.0	"	"	"	"	"	
Anthracene	"	**10.3**	*5.00*	10.0	"	"	"	"	"	
Benzo (a) anthracene	"	ND	*5.00*	10.0	"	"	"	"	"	
Benzo (a) pyrene	"	ND	*5.00*	10.0	"	"	"	"	"	
Benzo (b) fluoranthene	"	ND	*5.00*	10.0	"	"	"	"	"	
Benzo (ghi) perylene	"	ND	*5.00*	10.0	"	"	"	"	"	
Benzo (k) fluoranthene	"	ND	*5.00*	10.0	"	"	"	"	"	
Chrysene	"	ND	*5.00*	10.0	"	"	"	"	"	
Dibenzo (a,h) anthracene	"	ND	*10.0*	20.0	"	"	"	"	"	
Fluoranthene	"	**5.54**	*5.00*	10.0	"	"	"	"	"	**J**
Fluorene	"	**42.8**	*5.00*	10.0	"	"	"	"	"	
Indeno (1,2,3-cd) pyrene	"	ND	*5.00*	10.0	"	"	"	"	"	
Naphthalene	"	**3600**	*50.0*	100	"	1000x	"	"	09/09/04 22:37	
Phenanthrene	"	**81.1**	*5.00*	10.0	"	100x	"	"	09/08/04 21:08	
Pyrene	"	**6.84**	*5.00*	10.0	"	"	"	"	"	**J**
Surrogate(s): Fluorene-d10	*Recovery:*	*NR*	*Limits:*	*25 - 125 %*	"				"	***S-01***
Pyrene-d10		*NR*		*23 - 150 %*	"				"	***S-01***
Benzo (a) pyrene-d12		*NR*		*10 - 125 %*	"				"	***S-01***

North Creek Analytical - Portland

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Philip Nerenberg

Philip Nerenberg For Howard Holmes, Project Manager

SCOEPA00014020

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Hahn and Associates, Inc.	Project Name: **Northwest Natural**	
434 NW Sixth Ave., Suite 203	Project Number: 2708-30	Report Created:
Portland, OR 97209	Project Manager: Rob Ede	10/22/04 16:49

Polynuclear Aromatic Compounds per EPA 8270M-SIM

North Creek Analytical - Portland

Analyte	Method	Result	MDL*	MRL	Units	Dil	Batch	Prepared	Analyzed	Notes
P4H1069-04RE1 Water	**2708-040826-MW16-65-026**			**Sampled: 08/26/04 13:35**						**O-04, R-05**
Benzo (a) anthracene	EPA 8270m	**0.241**	*0.200*	0.400	ug/l	4x	4090066	09/02/04	10/15/04 14:47	**J**
Benzo (a) pyrene	"	ND	*0.200*	0.400	"	"	"	"	"	
Benzo (b) fluoranthene	"	ND	*0.200*	0.400	"	"	"	"	"	
Benzo (k) fluoranthene	"	ND	*0.200*	0.400	"	"	"	"	"	
Chrysene	"	**0.300**	*0.200*	0.400	"	"	"	"	"	**J**
Dibenzo (a,h) anthracene	"	ND	*0.400*	0.800	"	"	"	"	"	
Indeno (1,2,3-cd) pyrene	"	ND	*0.200*	0.400	"	"	"	"	"	
Surrogate(s): Pyrene-d10		*Recovery: 99.2%*		*Limits: 23 - 150 %*	"				"	
Benzo (a) pyrene-d12		*89.9%*		*10 - 125 %*	"				"	
P4H1069-05 Water	**2708-040826-MW16-45-028**			**Sampled: 08/26/04 15:10**						**R-05**
Acenaphthene	EPA 8270m	**137**	*10.0*	20.0	ug/l	200x	4090066	09/02/04	09/09/04 23:10	
Acenaphthylene	"	**17.8**	*10.0*	20.0	"	"	"	"	"	**J**
Anthracene	"	**22.4**	*10.0*	20.0	"	"	"	"	"	
Benzo (a) anthracene	"	ND	*10.0*	20.0	"	"	"	"	"	
Benzo (a) pyrene	"	ND	*10.0*	20.0	"	"	"	"	"	
Benzo (b) fluoranthene	"	ND	*10.0*	20.0	"	"	"	"	"	
Benzo (ghi) perylene	"	ND	*10.0*	20.0	"	"	"	"	"	
Benzo (k) fluoranthene	"	ND	*10.0*	20.0	"	"	"	"	"	
Chrysene	"	ND	*10.0*	20.0	"	"	"	"	"	
Dibenzo (a,h) anthracene	"	ND	*20.0*	40.0	"	"	"	"	"	
Fluoranthene	"	**19.6**	*10.0*	20.0	"	"	"	"	"	**J**
Fluorene	"	**60.7**	*10.0*	20.0	"	"	"	"	"	
Indeno (1,2,3-cd) pyrene	"	ND	*10.0*	20.0	"	"	"	"	"	
Naphthalene	"	**7500**	*100*	200	"	2000x	"	"	09/09/04 23:42	
Phenanthrene	"	**154**	*10.0*	20.0	"	200x	"	"	09/09/04 23:10	
Pyrene	"	**23.9**	*10.0*	20.0	"	"	"	"	"	
Surrogate(s): Fluorene-d10		*Recovery: NR*		*Limits: 25 - 125 %*	"				"	***S-01***
Pyrene-d10		*NR*		*23 - 150 %*	"				"	***S-01***
Benzo (a) pyrene-d12		*NR*		*10 - 125 %*	"				"	***S-01***

North Creek Analytical - Portland

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Hahn and Associates, Inc.	Project Name: **Northwest Natural**	
434 NW Sixth Ave., Suite 203	Project Number: 2708-30	Report Created:
Portland, OR 97209	Project Manager: Rob Ede	10/22/04 16:49

Polynuclear Aromatic Compounds per EPA 8270M-SIM

North Creek Analytical - Portland

Analyte	Method	Result	MDL*	MRL	Units	Dil	Batch	Prepared	Analyzed	Notes
P4H1069-05RE1 Water	**2708-040826-MW16-45-028**			**Sampled: 08/26/04 15:10**						**O-04, R-05**
Benzo (a) anthracene	EPA 8270m	**2.64**	*1.25*	2.50	ug/l	25x	4090066	09/02/04	10/15/04 13:09	
Benzo (a) pyrene	"	**2.23**	*1.25*	2.50	"	"	"	"	"	**J**
Benzo (b) fluoranthene	"	**2.57**	*1.25*	2.50	"	"	"	"	"	**R-08**
Benzo (k) fluoranthene	"	ND	*1.25*	2.50	"	"	"	"	"	**R-08**
Chrysene	"	**3.33**	*1.25*	2.50	"	"	"	"	"	
Dibenzo (a,h) anthracene	"	ND	*2.50*	5.00	"	"	"	"	"	
Indeno (1,2,3-cd) pyrene	"	ND	*1.25*	2.50	"	"	"	"	"	
Surrogate(s): Pyrene-d10		*Recovery: 118%*		*Limits: 23 - 150 %*		"			"	
Benzo (a) pyrene-d12		*118%*		*10 - 125 %*		"			"	
P4H1069-06 Water	**2708-040826-MW16-65-027**			**Sampled: 08/26/04 13:38**						**R-05**
Acenaphthene	EPA 8270m	**85.6**	*5.00*	10.0	ug/l	100x	4090066	09/02/04	09/08/04 22:14	
Acenaphthylene	"	ND	*10.0*	10.0	"	"	"	"	"	
Anthracene	"	**10.3**	*5.00*	10.0	"	"	"	"	"	
Benzo (a) anthracene	"	ND	*5.00*	10.0	"	"	"	"	"	
Benzo (a) pyrene	"	ND	*5.00*	10.0	"	"	"	"	"	
Benzo (b) fluoranthene	"	ND	*5.00*	10.0	"	"	"	"	"	
Benzo (ghi) perylene	"	ND	*5.00*	10.0	"	"	"	"	"	
Benzo (k) fluoranthene	"	ND	*5.00*	10.0	"	"	"	"	"	
Chrysene	"	ND	*5.00*	10.0	"	"	"	"	"	
Dibenzo (a,h) anthracene	"	ND	*10.0*	20.0	"	"	"	"	"	
Fluoranthene	"	**5.62**	*5.00*	10.0	"	"	"	"	"	**J**
Fluorene	"	**39.5**	*5.00*	10.0	"	"	"	"	"	
Indeno (1,2,3-cd) pyrene	"	ND	*5.00*	10.0	"	"	"	"	"	
Naphthalene	"	**3870**	*50.0*	100	"	1000x	"	"	09/10/04 00:15	
Phenanthrene	"	**80.2**	*5.00*	10.0	"	100x	"	"	09/08/04 22:14	
Pyrene	"	**6.70**	*5.00*	10.0	"	"	"	"	"	**J**
Surrogate(s): Fluorene-d10		*Recovery: NR*		*Limits: 25 - 125 %*		"			"	***S-01***
Pyrene-d10		*NR*		*23 - 150 %*		"			"	***S-01***
Benzo (a) pyrene-d12		*NR*		*10 - 125 %*		"			"	***S-01***

North Creek Analytical - Portland

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434 NW Sixth Ave., Suite 203	Project Number: 2708-30	Report Created:
Portland, OR 97209	Project Manager: Rob Ede	10/22/04 16:49

Polynuclear Aromatic Compounds per EPA 8270M-SIM

North Creek Analytical - Portland

Analyte	Method	Result	MDL*	MRL	Units	Dil	Batch	Prepared	Analyzed	Notes
P4H1069-06RE1 Water	**2708-040826-MW16-65-027**			**Sampled: 08/26/04 13:38**						**O-04, R-05**
Benzo (a) anthracene	EPA 8270m	**0.343**	*0.250*	0.500	ug/l	5x	4090066	09/02/04	10/15/04 14:14	**J**
Benzo (a) pyrene	"	ND	*0.250*	0.500	"	"	"	"	"	
Benzo (b) fluoranthene	"	ND	*0.250*	0.500	"	"	"	"	"	
Benzo (k) fluoranthene	"	ND	*0.250*	0.500	"	"	"	"	"	
Chrysene	"	**0.413**	*0.250*	0.500	"	"	"	"	"	**J**
Dibenzo (a,h) anthracene	"	ND	*0.500*	1.00	"	"	"	"	"	
Indeno (1,2,3-cd) pyrene	"	ND	*0.250*	0.500	"	"	"	"	"	
Surrogate(s): Pyrene-d10		*Recovery: 114%*		*Limits: 23 - 150 %*	"				"	
Benzo (a) pyrene-d12		*100%*		*10 - 125 %*	"				"	

North Creek Analytical - Portland

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North Creek Analytical, Inc.
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Hahn and Associates, Inc.	Project Name: **Northwest Natural**	
434 NW Sixth Ave., Suite 203	Project Number: 2708-30	Report Created:
Portland, OR 97209	Project Manager: Rob Ede	10/22/04 16:49

Conventional Chemistry Parameters per APHA/EPA Methods

North Creek Analytical - Portland

Analyte		Method	Result	MDL*	MRL	Units	Dil	Batch	Prepared	Analyzed	Notes
P4H1069-03	**Water**	**2708-040826-MW16-125-025**			**Sampled: 08/26/04 11:30**						
Cyanide (amenable)		EPA 9010A	**0.0747**	-----	0.00500	mg/l	1x	4081272	08/31/04	09/03/04 12:53	
Cyanide (total)		EPA 9012A	**0.0943**	-----	0.00500	"	"	"	"	"	
P4H1069-04	**Water**	**2708-040826-MW16-65-026**			**Sampled: 08/26/04 13:35**						
Cyanide (amenable)		EPA 9010A	**0.186**	-----	0.00500	mg/l	1x	4081272	08/31/04	09/03/04 12:53	
Cyanide (total)		EPA 9012A	**0.402**	-----	0.00500	"	"	"	"	"	
P4H1069-05	**Water**	**2708-040826-MW16-45-028**			**Sampled: 08/26/04 15:10**						
Cyanide (amenable)		EPA 9010A	**0.0725**	-----	0.00500	mg/l	1x	4081272	08/31/04	09/03/04 12:53	
Cyanide (total)		EPA 9012A	**0.138**	-----	0.00500	"	"	"	"	"	

North Creek Analytical - Portland

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434 NW Sixth Ave., Suite 203	Project Number: 2708-30	Report Created:
Portland, OR 97209	Project Manager: Rob Ede	10/22/04 16:49

BTEX per EPA Method 8021B - Laboratory Quality Control Results

North Creek Analytical - Portland

QC Batch: 4081258 **Water Preparation Method: EPA 5030B**

Analyte	Method	Result	MDL*	MRL	Units	Dil	Source Result	Spike Amt	% REC	(Limits)	% RPD	(Limits)	Analyzed	Notes
Blank (4081258-BLK1)								**Extracted: 08/30/04 16:57**						
Benzene	EPA 8021B	ND	---	0.500	ug/l	1x	--	--	--	--	--	--	08/30/04 19:34	
Toluene	"	ND	---	0.500	"	"	--	--	--	--	--	--	"	
Ethylbenzene	"	ND	---	0.500	"	"	--	--	--	--	--	--	"	
Xylenes (total)	"	ND	---	1.00	"	"	--	--	--	--	--	--	"	
Surrogate(s): 4-BFB (PID)		*Recovery: 96.2%*			*Limits: 70-130%*	"							*08/30/04 19:34*	
LCS (4081258-BS1)								**Extracted: 08/30/04 16:57**						
Benzene	EPA 8021B	20.5	---	0.500	ug/l	1x	--	20.0	102%	(70-130)	--	--	08/30/04 21:16	
Toluene	"	19.6	---	0.500	"	"	--	"	98.0%	(76-129)	--	--	"	
Ethylbenzene	"	19.1	---	0.500	"	"	--	"	95.5%	(82-130)	--	--	"	
Xylenes (total)	"	57.4	---	1.00	"	"	--	60.0	95.7%	(76-130)	--	--	"	
Surrogate(s): 4-BFB (PID)		*Recovery: 99.0%*			*Limits: 70-130%*	"							*08/30/04 21:16*	
Matrix Spike (4081258-MS1)					**QC Source: P4H1069-06**			**Extracted: 08/30/04 16:57**						
Benzene	EPA 8021B	2210	---	25.0	ug/l	50x	1250	1000	96.0%	(65-144)	--	--	08/31/04 02:49	
Toluene	"	1220	---	25.0	"	"	339	"	88.1%	(68-139)	--	--	"	
Ethylbenzene	"	1130	---	25.0	"	"	223	"	90.7%	(69-144)	--	--	"	
Xylenes (total)	"	3120	---	50.0	"	"	486	3000	87.8%	(60-144)	--	--	"	
Surrogate(s): 4-BFB (PID)		*Recovery: 97.8%*			*Limits: 70-130%*	*1x*							*08/31/04 02:49*	
Matrix Spike Dup (4081258-MSD1)					**QC Source: P4H1069-06**			**Extracted: 08/30/04 16:57**						
Benzene	EPA 8021B	2270	---	25.0	ug/l	50x	1250	1000	102%	(65-144)	2.68%	(20)	08/31/04 03:17	
Toluene	"	1300	---	25.0	"	"	339	"	96.1%	(68-139)	6.35%	"	"	
Ethylbenzene	"	1190	---	25.0	"	"	223	"	96.7%	(69-144)	5.17%	"	"	
Xylenes (total)	"	3360	---	50.0	"	"	486	3000	95.8%	(60-144)	7.41%	"	"	
Surrogate(s): 4-BFB (PID)		*Recovery: 98.0%*			*Limits: 70-130%*	*1x*							*08/31/04 03:17*	

North Creek Analytical - Portland

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Hahn and Associates, Inc.	Project Name: **Northwest Natural**	
434 NW Sixth Ave., Suite 203	Project Number: 2708-30	Report Created:
Portland, OR 97209	Project Manager: Rob Ede	10/22/04 16:49

Total Metals per EPA 6000/7000 Series Methods - Laboratory Quality Control Results

North Creek Analytical - Portland

QC Batch: 4081235 **Water Preparation Method: EPA 200/3005**

Analyte	Method	Result	MDL*	MRL	Units	Dil	Source Result	Spike Amt	% REC	(Limits)	% RPD	(Limits)	Analyzed	Notes
Blank (4081235-BLK1)								**Extracted: 08/30/04 09:48**						
Arsenic	EPA 6020	ND	---	0.00100	mg/l	1x	--	--	--	--	--	--	09/09/04 21:29	
Chromium	"	ND	---	0.00100	"	"	--	--	--	--	--	--	"	
Copper	"	ND	---	0.00200	"	"	--	--	--	--	--	--	"	
Lead	"	ND	---	0.00100	"	"	--	--	--	--	--	--	"	
Nickel	"	ND	---	0.00200	"	"	--	--	--	--	--	--	"	
Zinc	"	ND	---	0.00500	"	"	--	--	--	--	--	--	"	
LCS (4081235-BS1)								**Extracted: 08/30/04 09:48**						
Arsenic	EPA 6020	0.108	---	0.00100	mg/l	1x	--	0.100	108%	(80-120)	--	--	09/09/04 21:35	
Chromium	"	0.107	---	0.00100	"	"	--	"	107%	"	--	--	"	
Copper	"	0.107	---	0.00200	"	"	--	"	107%	"	--	--	"	
Lead	"	0.102	---	0.00100	"	"	--	"	102%	"	--	--	"	
Nickel	"	0.107	---	0.00200	"	"	--	"	107%	"	--	--	"	
Zinc	"	0.105	---	0.00500	"	"	--	"	105%	"	--	--	"	
LCS Dup (4081235-BSD1)								**Extracted: 08/30/04 09:48**						
Arsenic	EPA 6020	0.107	---	0.00100	mg/l	1x	--	0.100	107%	(80-120)	0.930%	(20)	09/09/04 21:42	
Chromium	"	0.106	---	0.00100	"	"	--	"	106%	"	0.939%	"	"	
Copper	"	0.106	---	0.00200	"	"	--	"	106%	"	0.939%	"	"	
Lead	"	0.102	---	0.00100	"	"	--	"	102%	"	0.00%	"	"	
Nickel	"	0.105	---	0.00200	"	"	--	"	105%	"	1.89%	"	"	
Zinc	"	0.106	---	0.00500	"	"	--	"	106%	"	0.948%	"	"	
Duplicate (4081235-DUP1)					**QC Source: P4H1019-01**				**Extracted: 08/30/04 09:48**					
Arsenic	EPA 6020	0.00307	---	0.00100	mg/l	1x	0.00297	--	--	--	3.31%	(20)	09/09/04 22:01	
Chromium	"	ND	---	0.00100	"	"	ND	--	--	--	NR	"	"	
Copper	"	ND	---	0.00200	"	"	ND	--	--	--	NR	"	"	
Lead	"	ND	---	0.00100	"	"	ND	--	--	--	NR	"	"	
Nickel	"	0.00159	---	0.00200	"	"	ND	--	--	--	NR	"	"	
Zinc	"	ND	---	0.00500	"	"	ND	--	--	--	NR	"	"	
Matrix Spike (4081235-MS1)					**QC Source: P4H1069-03**				**Extracted: 08/30/04 09:48**					
Arsenic	EPA 6020	0.118	---	0.00100	mg/l	1x	0.00461	0.100	113%	(75-125)	--	--	09/10/04 02:05	
Chromium	"	0.112	---	0.00100	"	"	0.00134	"	111%	"	--	--	"	
Copper	"	0.111	---	0.00200	"	"	ND	"	109%	"	--	--	"	
Lead	"	0.0980	---	0.00100	"	"	ND	"	98.0%	"	--	--	"	
Nickel	"	0.113	---	0.00200	"	"	0.00542	"	108%	"	--	--	"	
Zinc	"	0.108	---	0.00500	"	"	ND	"	105%	"	--	--	"	

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434 NW Sixth Ave., Suite 203	Project Number: 2708-30	Report Created:
Portland, OR 97209	Project Manager: Rob Ede	10/22/04 16:49

Total Metals per EPA 6000/7000 Series Methods - Laboratory Quality Control Results

North Creek Analytical - Portland

QC Batch: 4081235 **Water Preparation Method: EPA 200/3005**

Analyte	Method	Result	MDL*	MRL	Units	Dil	Source Result	Spike Amt	% REC	(Limits)	% RPD	(Limits)	Analyzed	Notes
Matrix Spike (4081235-MS2)				QC Source: P4H1019-01				Extracted: 08/30/04 09:48						
Arsenic	EPA 6020	0.114	---	0.00100	mg/l	1x	0.00297	0.100	111%	(75-125)	--	--	09/09/04 22:26	
Chromium	"	0.109	---	0.00100	"	"	ND	"	109%	"	--	--	"	
Copper	"	0.108	---	0.00200	"	"	ND	"	108%	"	--	--	"	
Lead	"	0.0996	---	0.00100	"	"	ND	"	99.6%	"	--	--	"	
Nickel	"	0.109	---	0.00200	"	"	ND	"	107%	"	--	--	"	
Zinc	"	0.110	---	0.00500	"	"	ND	"	108%	"	--	--	"	
Matrix Spike Dup (4081235-MSD1)				QC Source: P4H1069-03				Extracted: 08/30/04 09:48						
Arsenic	EPA 6020	0.121	---	0.00100	mg/l	1x	0.00461	0.100	116%	(75-125)	2.51%	(20)	09/10/04 02:30	
Chromium	"	0.117	---	0.00100	"	"	0.00134	"	116%	"	4.37%	"	"	
Copper	"	0.114	---	0.00200	"	"	ND	"	112%	"	2.67%	"	"	
Lead	"	0.0967	---	0.00100	"	"	ND	"	96.7%	"	1.34%	"	"	
Nickel	"	0.118	---	0.00200	"	"	0.00542	"	113%	"	4.33%	"	"	
Zinc	"	0.114	---	0.00500	"	"	ND	"	111%	"	5.41%	"	"	

North Creek Analytical - Portland

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Philip Nerenberg

Philip Nerenberg For Howard Holmes, Project Manager

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Hahn and Associates, Inc.	Project Name: Northwest Natural	
434 NW Sixth Ave., Suite 203	Project Number: 2708-30	Report Created:
Portland, OR 97209	Project Manager: Rob Ede	10/22/04 16:49

Volatile Organic Compounds per EPA Method 8260B - Laboratory Quality Control Results

North Creek Analytical - Portland

QC Batch: 4090189 **Water Preparation Method: EPA 5030B**

Analyte	Method	Result	MDL*	MRL	Units	Dil	Source Result	Spike Amt	% REC	(Limits)	% RPD	(Limits)	Analyzed	Notes
Blank (4090189-BLK1)								Extracted: 09/06/04 09:31						
Acetone	EPA 8260B	ND	---	25.0	ug/l	1x	--	--	--	--	--	--	09/06/04 15:18	
Benzene	"	ND	---	1.00	"	"	--	--	--	--	--	--	"	
Bromobenzene	"	ND	---	1.00	"	"	--	--	--	--	--	--	"	
Bromochloromethane	"	ND	---	1.00	"	"	--	--	--	--	--	--	"	
Bromodichloromethane	"	ND	---	1.00	"	"	--	--	--	--	--	--	"	
Bromoform	"	ND	---	1.00	"	"	--	--	--	--	--	--	"	
Bromomethane	"	ND	---	5.00	"	"	--	--	--	--	--	--	"	
2-Butanone	"	ND	---	10.0	"	"	--	--	--	--	--	--	"	
n-Butylbenzene	"	ND	---	5.00	"	"	--	--	--	--	--	--	"	
sec-Butylbenzene	"	ND	---	1.00	"	"	--	--	--	--	--	--	"	
tert-Butylbenzene	"	ND	---	1.00	"	"	--	--	--	--	--	--	"	
Carbon disulfide	"	ND	---	10.0	"	"	--	--	--	--	--	--	"	
Carbon tetrachloride	"	ND	---	1.00	"	"	--	--	--	--	--	--	"	
Chlorobenzene	"	ND	---	1.00	"	"	--	--	--	--	--	--	"	
Chloroethane	"	ND	---	1.00	"	"	--	--	--	--	--	--	"	
Chloroform	"	ND	---	1.00	"	"	--	--	--	--	--	--	"	
Chloromethane	"	ND	---	5.00	"	"	--	--	--	--	--	--	"	
2-Chlorotoluene	"	ND	---	1.00	"	"	--	--	--	--	--	--	"	
4-Chlorotoluene	"	ND	---	1.00	"	"	--	--	--	--	--	--	"	
1,2-Dibromo-3-chloropropane	"	ND	---	5.00	"	"	--	--	--	--	--	--	"	
Dibromochloromethane	"	ND	---	1.00	"	"	--	--	--	--	--	--	"	
1,2-Dibromoethane	"	ND	---	1.00	"	"	--	--	--	--	--	--	"	
Dibromomethane	"	ND	---	1.00	"	"	--	--	--	--	--	--	"	
1,2-Dichlorobenzene	"	ND	---	1.00	"	"	--	--	--	--	--	--	"	
1,3-Dichlorobenzene	"	ND	---	1.00	"	"	--	--	--	--	--	--	"	
1,4-Dichlorobenzene	"	ND	---	1.00	"	"	--	--	--	--	--	--	"	
Dichlorodifluoromethane	"	ND	---	5.00	"	"	--	--	--	--	--	--	"	
1,1-Dichloroethane	"	ND	---	1.00	"	"	--	--	--	--	--	--	"	
1,2-Dichloroethane	"	ND	---	1.00	"	"	--	--	--	--	--	--	"	
1,1-Dichloroethene	"	ND	---	1.00	"	"	--	--	--	--	--	--	"	
cis-1,2-Dichloroethene	"	ND	---	1.00	"	"	--	--	--	--	--	--	"	
trans-1,2-Dichloroethene	"	ND	---	1.00	"	"	--	--	--	--	--	--	"	
1,2-Dichloropropane	"	ND	---	1.00	"	"	--	--	--	--	--	--	"	
1,3-Dichloropropane	"	ND	---	1.00	"	"	--	--	--	--	--	--	"	
2,2-Dichloropropane	"	ND	---	1.00	"	"	--	--	--	--	--	--	"	
1,1-Dichloropropene	"	ND	---	1.00	"	"	--	--	--	--	--	--	"	
cis-1,3-Dichloropropene	"	ND	---	1.00	"	"	--	--	--	--	--	--	"	
trans-1,3-Dichloropropene	"	ND	---	1.00	"	"	--	--	--	--	--	--	"	
Ethylbenzene	"	ND	---	1.00	"	"	--	--	--	--	--	--	"	
Hexachlorobutadiene	"	ND	---	2.00	"	"	--	--	--	--	--	--	"	
2-Hexanone	"	ND	---	10.0	"	"	--	--	--	--	--	--	"	

North Creek Analytical - Portland

Philip Nerenberg

Philip Nerenberg For Howard Holmes, Project Manager

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Hahn and Associates, Inc.	Project Name: **Northwest Natural**	
434 NW Sixth Ave., Suite 203	Project Number: 2708-30	Report Created:
Portland, OR 97209	Project Manager: Rob Ede	10/22/04 16:49

Volatile Organic Compounds per EPA Method 8260B - Laboratory Quality Control Results

North Creek Analytical - Portland

QC Batch: 4090189 **Water Preparation Method: EPA 5030B**

Analyte	Method	Result	MDL*	MRL	Units	Dil	Source Result	Spike Amt	% REC	(Limits)	% RPD	(Limits)	Analyzed	Notes
Blank (4090189-BLK1)							**Extracted: 09/06/04 09:31**							
Isopropylbenzene	EPA 8260B	ND	---	2.00	ug/l	1x	--	--	--	--	--	--	09/06/04 15:18	
p-Isopropyltoluene	"	ND	---	2.00	"	"	--	--	--	--	--	--	"	
4-Methyl-2-pentanone	"	ND	---	5.00	"	"	--	--	--	--	--	--	"	
Methyl tert-butyl ether	"	ND	---	1.00	"	"	--	--	--	--	--	--	"	
Methylene chloride	"	ND	---	5.00	"	"	--	--	--	--	--	--	"	
Naphthalene	"	ND	---	2.00	"	"	--	--	--	--	--	--	"	
n-Propylbenzene	"	ND	---	1.00	"	"	--	--	--	--	--	--	"	
Styrene	"	ND	---	1.00	"	"	--	--	--	--	--	--	"	
1,1,1,2-Tetrachloroethane	"	ND	---	1.00	"	"	--	--	--	--	--	--	"	
1,1,2,2-Tetrachloroethane	"	ND	---	1.00	"	"	--	--	--	--	--	--	"	
Tetrachlorocthene	"	ND	---	1.00	"	"	--	--	--	--	--	--	"	
Toluene	"	ND	---	1.00	"	"	--	--	--	--	--	--	"	
1,2,3-Trichlorobenzene	"	ND	---	1.00	"	"	--	--	--	--	--	--	"	
1,2,4-Trichlorobenzene	"	ND	---	1.00	"	"	--	--	--	--	--	--	"	
1,1,1-Trichloroethane	"	ND	---	1.00	"	"	--	--	--	--	--	--	"	
1,1,2-Trichloroethane	"	ND	---	1.00	"	"	--	--	--	--	--	--	"	
Trichloroethene	"	ND	---	1.00	"	"	--	--	--	--	--	--	"	
Trichlorofluoromethane	"	ND	---	1.00	"	"	--	--	--	--	--	--	"	
1,2,3-Trichloropropane	"	ND	---	1.00	"	"	--	--	--	--	--	--	"	
1,2,4-Trimethylbenzene	"	ND	---	1.00	"	"	--	--	--	--	--	--	"	
1,3,5-Trimethylbenzene	"	ND	---	1.00	"	"	--	--	--	--	--	--	"	
Vinyl chloride	"	ND	---	1.00	"	"	--	--	--	--	--	--	"	
o-Xylene	"	ND	---	1.00	"	"	--	--	--	--	--	--	"	
m,p-Xylene	"	ND	---	2.00	"	"	--	--	--	--	--	--	"	
Surrogate(s): 4-BFB	*Recovery: 96.0%*			*Limits: 75-120%*	"								*09/06/04 15:18*	
1,2-DCA-d4	*106%*			*77-129%*	"								"	
Dibromofluoromethane	*100%*			*80-121%*	"								"	
Toluene-d8	*104%*			*80-120%*	"								"	

North Creek Analytical - Portland

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Philip Nerenberg

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Hahn and Associates, Inc.	Project Name: **Northwest Natural**	
434 NW Sixth Ave., Suite 203	Project Number: 2708-30	Report Created:
Portland, OR 97209	Project Manager: Rob Ede	10/22/04 16:49

Volatile Organic Compounds per EPA Method 8260B - Laboratory Quality Control Results

North Creek Analytical - Portland

QC Batch: 4090189 **Water Preparation Method: EPA 5030B**

Analyte	Method	Result	MDL*	MRL	Units	Dil	Source Result	Spike Amt	% REC	(Limits)	% RPD	(Limits)	Analyzed	Notes
LCS (4090189-BS1)													**Extracted: 09/06/04 09:31**	
Benzene	EPA 8260B	21.4	---	1.00	ug/l	1x	--	20.0	107%	(80-120)	--	--	09/06/04 13:00	
Chlorobenzene	"	20.8	---	1.00	"	"	--	"	104%	(80-124)	--	--	"	
1,1-Dichloroethene	"	18.2	---	1.00	"	"	--	"	91.0%	(78-120)	--	--	"	
Toluene	"	21.4	---	1.00	"	"	--	"	107%	(80-124)	--	--	"	
Trichloroethene	"	20.2	---	1.00	"	"	--	"	101%	(80-132)	--	--	"	
Surrogate(s): 4-BFB		*Recovery: 95.0%*			*Limits: 75-120%*	"							*09/06/04 13:00*	
1,2-DCA-d4		*97.0%*			*77-129%*	"							"	
Dibromofluoromethane		*94.5%*			*80-121%*	"							"	
Toluene-d8		*97.5%*			*80-120%*	"							"	
LCS Dup (4090189-BSD1)													**Extracted: 09/06/04 09:31**	
Benzene	EPA 8260B	20.8	---	1.00	ug/l	1x	--	20.0	104%	(80-120)	2.84%	(25)	09/06/04 13:28	
Chlorobenzene	"	20.5	---	1.00	"	"	--	"	102%	(80-124)	1.45%	"	"	
1,1-Dichloroethene	"	17.5	---	1.00	"	"	--	"	87.5%	(78-120)	3.92%	"	"	
Toluene	"	21.3	---	1.00	"	"	--	"	106%	(80-124)	0.468%	"	"	
Trichloroethene	"	20.2	---	1.00	"	"	--	"	101%	(80-132)	0.00%	"	"	
Surrogate(s): 4-BFB		*Recovery: 98.5%*			*Limits: 75-120%*	"							*09/06/04 13:28*	
1,2-DCA-d4		*98.5%*			*77-129%*	"							"	
Dibromofluoromethane		*96.0%*			*80-121%*	"							"	
Toluene-d8		*100%*			*80-120%*	"							"	
Matrix Spike (4090189-MS1)						**QC Source: P4H1069-03**							**Extracted: 09/06/04 09:31**	
Benzene	EPA 8260B	22.1	---	1.00	ug/l	1x	ND	20.0	107%	(80-124)	--	--	09/06/04 13:55	
Chlorobenzene	"	20.6	---	1.00	"	"	ND	"	103%	(72.9-134)	--	--	"	
1,1-Dichloroethene	"	20.1	---	1.00	"	"	ND	"	100%	(79.3-127)	--	--	"	
Toluene	"	20.5	---	1.00	"	"	ND	"	100%	(79.7-131)	--	--	"	
Trichloroethene	"	20.4	---	1.00	"	"	ND	"	102%	(68.4-130)	--	--	"	
Surrogate(s): 4-BFB		*Recovery: 98.0%*			*Limits: 75-120%*	"							*09/06/04 13:55*	
1,2-DCA-d4		*102%*			*77-129%*	"							"	
Dibromofluoromethane		*99.0%*			*80-121%*	"							"	
Toluene-d8		*99.5%*			*80-120%*	"							"	

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Philip Nerenberg

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Hahn and Associates, Inc.	Project Name: **Northwest Natural**	
434 NW Sixth Ave., Suite 203	Project Number: 2708-30	Report Created:
Portland, OR 97209	Project Manager: Rob Ede	10/22/04 16:49

Volatile Organic Compounds per EPA Method 8260B - Laboratory Quality Control Results

North Creek Analytical - Portland

QC Batch: 4090189 **Water Preparation Method: EPA 5030B**

Analyte	Method	Result	MDL*	MRL	Units	Dil	Source Result	Spike Amt	% REC	(Limits)	% RPD	(Limits)	Analyzed	Notes
Matrix Spike Dup (4090189-MSD1)					**QC Source: P4H1069-03**				**Extracted: 09/06/04 09:31**					
Benzene	EPA 8260B	21.5	---	1.00	ug/l	1x	ND	20.0	104%	(80-124)	2.75%	(25)	09/06/04 14:23	
Chlorobenzene	"	20.5	---	1.00	"	"	ND	"	102%	(72.9-134)	0.487%	"	"	
1,1-Dichloroethene	"	19.5	---	1.00	"	"	ND	"	97.5%	(79.3-127)	3.03%	"	"	
Toluene	"	20.0	---	1.00	"	"	ND	"	97.6%	(79.7-131)	2.47%	"	"	
Trichloroethene	"	19.8	---	1.00	"	"	ND	"	99.0%	(68.4-130)	2.99%	"	"	
Surrogate(s): 4-BFB		*Recovery: 98.5%*			*Limits: 75-120%*	"							*09/06/04 14:23*	
1,2-DCA-d4		*101%*			*77-129%*	"							"	
Dibromofluoromethane		*98.0%*			*80-121%*	"							"	
Toluene-d8		*98.5%*			*80-120%*	"							"	

North Creek Analytical - Portland

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Philip Nerenberg

Philip Nerenberg For Howard Holmes, Project Manager

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Hahn and Associates, Inc.	Project Name: **Northwest Natural**	
434 NW Sixth Ave., Suite 203	Project Number: 2708-30	Report Created:
Portland, OR 97209	Project Manager: Rob Ede	10/22/04 16:49

Semivolatile Organic Compounds per EPA Method 8270C - Laboratory Quality Control Results

North Creek Analytical - Portland

QC Batch: 4090065 **Water Preparation Method: EPA 3520/600 Series**

Analyte	Method	Result	MDL*	MRL	Units	Dil	Source Result	Spike Amt	% REC	(Limits)	% RPD	(Limits)	Analyzed	Notes
Blank (4090065-BLK1)													Extracted: 09/02/04 07:08	
Carbazole	EPA 8270C	ND	---	5.00	ug/l	1x	--	--	--	--	--	--	09/07/04 19:35	
Acenaphthene	"	ND	---	5.00	"	"	--	--	--	--	--	--	"	
Acenaphthylene	"	ND	---	5.00	"	"	--	--	--	--	--	--	"	
Anthracene	"	ND	---	5.00	"	"	--	--	--	--	--	--	"	
Benzo (a) anthracene	"	ND	---	5.00	"	"	--	--	--	--	--	--	"	
Benzo (a) pyrene	"	ND	---	5.00	"	"	--	--	--	--	--	--	"	
Benzo (b) fluoranthene	"	ND	---	5.00	"	"	--	--	--	--	--	--	"	
Benzo (ghi) perylene	"	ND	---	5.00	"	"	--	--	--	--	--	--	"	
Benzo (k) fluoranthene	"	ND	---	5.00	"	"	--	--	--	--	--	--	"	
Benzoic Acid	"	ND	---	50.0	"	"	--	--	--	--	--	--	"	
Benzyl alcohol	"	ND	---	10.0	"	"	--	--	--	--	--	--	"	
4-Bromophenyl phenyl ether	"	ND	---	5.00	"	"	--	--	--	--	--	--	"	
Butyl benzyl phthalate	"	ND	---	5.00	"	"	--	--	--	--	--	--	"	
4-Chloro-3-methylphenol	"	ND	---	5.00	"	"	--	--	--	--	--	--	"	
4-Chloroaniline	"	ND	---	20.0	"	"	--	--	--	--	--	--	"	
Bis(2-chloroethoxy)methane	"	ND	---	10.0	"	"	--	--	--	--	--	--	"	
Bis(2-chloroethyl)ether	"	ND	---	5.00	"	"	--	--	--	--	--	--	"	
Bis(2-chloroisopropyl)ether	"	ND	---	10.0	"	"	--	--	--	--	--	--	"	
2-Chloronaphthalene	"	ND	---	5.00	"	"	--	--	--	--	--	--	"	
2-Chlorophenol	"	ND	---	5.00	"	"	--	--	--	--	--	--	"	
4-Chlorophenyl phenyl ether	"	ND	---	5.00	"	"	--	--	--	--	--	--	"	
Chrysene	"	ND	---	5.00	"	"	--	--	--	--	--	--	"	
Di-n-butyl phthalate	"	ND	---	5.00	"	"	--	--	--	--	--	--	"	
Di-n-octyl phthalate	"	ND	---	5.00	"	"	--	--	--	--	--	--	"	
Dibenzo (a,h) anthracene	"	ND	---	5.00	"	"	--	--	--	--	--	--	"	
Dibenzofuran	"	ND	---	5.00	"	"	--	--	--	--	--	--	"	
1,2-Dichlorobenzene	"	ND	---	5.00	"	"	--	--	--	--	--	--	"	
1,3-Dichlorobenzene	"	ND	---	5.00	"	"	--	--	--	--	--	--	"	
1,4-Dichlorobenzene	"	ND	---	5.00	"	"	--	--	--	--	--	--	"	
3,3'-Dichlorobenzidine	"	ND	---	5.00	"	"	--	--	--	--	--	--	"	
2,4-Dichlorophenol	"	ND	---	5.00	"	"	--	--	--	--	--	--	"	
Diethyl phthalate	"	ND	---	5.00	"	"	--	--	--	--	--	--	"	
2,4-Dimethylphenol	"	ND	---	10.0	"	"	--	--	--	--	--	--	"	
Dimethyl phthalate	"	ND	---	5.00	"	"	--	--	--	--	--	--	"	
4,6-Dinitro-2-methylphenol	"	ND	---	10.0	"	"	--	--	--	--	--	--	"	
2,4-Dinitrophenol	"	ND	---	25.0	"	"	--	--	--	--	--	--	"	
2,4-Dinitrotoluene	"	ND	---	5.00	"	"	--	--	--	--	--	--	"	
2,6-Dinitrotoluene	"	ND	---	5.00	"	"	--	--	--	--	--	--	"	
Bis(2-ethylhexyl)phthalate	"	ND	---	10.0	"	"	--	--	--	--	--	--	"	
Fluoranthene	"	ND	---	5.00	"	"	--	--	--	--	--	--	"	
Fluorene	"	ND	---	5.00	"	"	--	--	--	--	--	--	"	

North Creek Analytical - Portland

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Philip Nerenberg

Philip Nerenberg For Howard Holmes, Project Manager

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Hahn and Associates, Inc.	Project Name: **Northwest Natural**	
434 NW Sixth Ave., Suite 203	Project Number: 2708-30	Report Created:
Portland, OR 97209	Project Manager: Rob Ede	10/22/04 16:49

Semivolatile Organic Compounds per EPA Method 8270C - Laboratory Quality Control Results

North Creek Analytical - Portland

QC Batch: 4090065 **Water Preparation Method: EPA 3520/600 Series**

Analyte	Method	Result	MDL*	MRL	Units	Dil	Source Result	Spike Amt	% REC	(Limits)	% RPD	(Limits)	Analyzed	Notes
Blank (4090065-BLK1)							**Extracted: 09/02/04 07:08**							
Hexachlorobenzene	EPA 8270C	ND	---	5.00	ug/l	1x	--	--	--	--	--	--	09/07/04 19:35	
Hexachlorobutadiene	"	ND	---	10.0	"	"	--	--	--	--	--	--	"	
Hexachlorocyclopentadiene	"	ND	---	10.0	"	"	--	--	--	--	--	--	"	
Hexachloroethane	"	ND	---	10.0	"	"	--	--	--	--	--	--	"	
Indeno (1,2,3-cd) pyrene	"	ND	---	5.00	"	"	--	--	--	--	--	--	"	
Isophorone	"	ND	---	5.00	"	"	--	--	--	--	--	--	"	
2-Methylnaphthalene	"	ND	---	5.00	"	"	--	--	--	--	--	--	"	
2-Methylphenol	"	ND	---	10.0	"	"	--	--	--	--	--	--	"	
3-,4-Methylphenol	"	ND	---	5.00	"	"	--	--	--	--	--	--	"	
Naphthalene	"	ND	---	5.00	"	"	--	--	--	--	--	--	"	
2-Nitroaniline	"	ND	---	5.00	"	"	--	--	--	--	--	--	"	
3-Nitroaniline	"	ND	---	10.0	"	"	--	--	--	--	--	--	"	
4-Nitroaniline	"	ND	---	10.0	"	"	--	--	--	--	--	--	"	
Nitrobenzene	"	ND	---	5.00	"	"	--	--	--	--	--	--	"	
2-Nitrophenol	"	ND	---	5.00	"	"	--	--	--	--	--	--	"	
4-Nitrophenol	"	ND	---	25.0	"	"	--	--	--	--	--	--	"	
N-Nitrosodi-n-propylamine	"	ND	---	10.0	"	"	--	--	--	--	--	--	"	
N-Nitrosodiphenylamine	"	ND	---	5.00	"	"	--	--	--	--	--	--	"	
Pentachlorophenol	"	ND	---	10.0	"	"	--	--	--	--	--	--	"	
Phenanthrene	"	ND	---	5.00	"	"	--	--	--	--	--	--	"	
Phenol	"	ND	---	5.00	"	"	--	--	--	--	--	--	"	
Pyrene	"	ND	---	5.00	"	"	--	--	--	--	--	--	"	
1,2,4-Trichlorobenzene	"	ND	---	5.00	"	"	--	--	--	--	--	--	"	
2,4,5-Trichlorophenol	"	ND	---	5.00	"	"	--	--	--	--	--	--	"	
2,4,6-Trichlorophenol	"	ND	---	5.00	"	"	--	--	--	--	--	--	"	
Surrogate(s): 2-Fluorobiphenyl	*Recovery:*	*74.8%*		*Limits:*	*26-135%*	"							*09/07/04 19:35*	
2-Fluorophenol		*76.7%*			*6-124%*	"							"	
Nitrobenzene-d5		*88.3%*			*23-147%*	"							"	
Phenol-d6		*78.0%*			*11-130%*	"							"	
p-Terphenyl-d14		*88.3%*			*38-149%*	"							"	
2,4,6-Tribromophenol		*96.0%*			*19-126%*	"							"	

North Creek Analytical - Portland

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Philip Nerenberg

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Hahn and Associates, Inc.	Project Name: **Northwest Natural**	
434 NW Sixth Ave., Suite 203	Project Number: 2708-30	Report Created:
Portland, OR 97209	Project Manager: Rob Ede	10/22/04 16:49

Semivolatile Organic Compounds per EPA Method 8270C - Laboratory Quality Control Results

North Creek Analytical - Portland

QC Batch: 4090065 **Water Preparation Method: EPA 3520/600 Series**

Analyte	Method	Result	MDL*	MRL	Units	Dil	Source Result	Spike Amt	% REC	(Limits)	% RPD	(Limits)	Analyzed	Notes
LCS (4090065-BS1)								**Extracted: 09/02/04 07:08**						
Acenaphthene	EPA 8270C	61.6	---	5.00	ug/l	1x	--	75.0	82.1%	(40-110)	--	--	09/07/04 18:52	
4-Chloro-3-methylphenol	"	122	---	5.00	"	"	--	150	81.3%	"	--	--	"	
2-Chlorophenol	"	116	---	5.00	"	"	--	"	77.3%	"	--	--	"	
1,4-Dichlorobenzene	"	51.1	---	5.00	"	"	--	75.0	68.1%	(20-90)	--	--	"	
2,4-Dinitrotoluene	"	64.3	---	5.00	"	"	--	"	85.7%	(50-110)	--	--	"	
4-Nitrophenol	"	142	---	25.0	"	"	--	150	94.7%	(15-100)	--	--	"	
N-Nitrosodi-n-propylamine	"	60.6	---	10.0	"	"	--	75.0	80.8%	(40-110)	--	--	"	
Pentachlorophenol	"	121	---	10.0	"	"	--	150	80.7%	(30-120)	--	--	"	
Phenol	"	110	---	5.00	"	"	--	"	73.3%	(15-110)	--	--	"	
Pyrene	"	61.0	---	5.00	"	"	--	75.0	81.3%	(40-110)	--	--	"	
1,2,4-Trichlorobenzene	"	54.7	---	5.00	"	"	--	"	72.9%	(25-100)	--	--	"	
Surrogate(s): 2-Fluorobiphenyl		*Recovery: 68.1%*			*Limits: 26-135%*	"							*09/07/04 18:52*	
2-Fluorophenol		*74.7%*			*6-124%*	"							"	
Nitrobenzene-d5		*88.0%*			*23-147%*	"							"	
Phenol-d6		*76.7%*			*11-130%*	"							"	
p-Terphenyl-d14		*86.5%*			*38-149%*	"							"	
2,4,6-Tribromophenol		*99.3%*			*19-126%*	"							"	
Matrix Spike (4090065-MS1)						**QC Source: P4H1069-03**		**Extracted: 09/02/04 07:08**						
Acenaphthene	EPA 8270C	59.7	---	5.00	ug/l	1x	7.23	71.4	73.5%	(40-110)	--	--	09/07/04 20:18	
4-Chloro-3-methylphenol	"	125	---	5.00	"	"	6.27	143	83.0%	"	--	--	"	
2-Chlorophenol	"	99.6	---	5.00	"	"	ND	"	67.4%	"	--	--	"	
1,4-Dichlorobenzene	"	45.2	---	5.00	"	"	ND	71.4	57.1%	(20-90)	--	--	"	
2,4-Dinitrotoluene	"	61.2	---	5.00	"	"	ND	"	85.7%	(50-110)	--	--	"	
4-Nitrophenol	"	127	---	25.0	"	"	ND	143	88.8%	(15-100)	--	--	"	
N-Nitrosodi-n-propylamine	"	52.8	---	10.0	"	"	ND	71.4	63.9%	(40-110)	--	--	"	
Pentachlorophenol	"	119	---	10.0	"	"	ND	143	83.2%	(30-120)	--	--	"	
Phenol	"	96.4	---	5.00	"	"	ND	"	64.5%	(15-110)	--	--	"	
Pyrene	"	58.8	---	5.00	"	"	ND	71.4	78.1%	(40-110)	--	--	"	
1,2,4-Trichlorobenzene	"	48.1	---	5.00	"	"	ND	"	61.0%	(25-100)	--	--	"	
Surrogate(s): 2-Fluorobiphenyl		*Recovery: 66.7%*			*Limits: 26-135%*	"							*09/07/04 20:18*	
2-Fluorophenol		*66.7%*			*6-124%*	"							"	
Nitrobenzene-d5		*76.3%*			*23-147%*	"							"	
Phenol-d6		*69.7%*			*11-130%*	"							"	
p-Terphenyl-d14		*81.5%*			*38-149%*	"							"	
2,4,6-Tribromophenol		*97.2%*			*19-126%*	"							"	

North Creek Analytical - Portland

Philip Nerenberg

Philip Nerenberg For Howard Holmes, Project Manager

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Hahn and Associates, Inc.	Project Name:	**Northwest Natural**	
434 NW Sixth Ave., Suite 203	Project Number:	2708-30	Report Created:
Portland, OR 97209	Project Manager:	Rob Ede	10/22/04 16:49

Semivolatile Organic Compounds per EPA Method 8270C - Laboratory Quality Control Results

North Creek Analytical - Portland

QC Batch: 4090065 **Water Preparation Method: EPA 3520/600 Series**

Analyte	Method	Result	MDL*	MRL	Units	Dil	Source Result	Spike Amt	% REC	(Limits)	% RPD	(Limits)	Analyzed	Notes
Matrix Spike Dup (4090065-MSD1)					QC Source: P4H1069-03				Extracted: 09/02/04 07:08					
Acenaphthene	EPA 8270C	58.3	---	5.00	ug/l	1x	7.23	70.8	72.1%	(40-110)	2.37%	(36)	09/07/04 21:00	
4-Chloro-3-methylphenol	"	120	---	5.00	"	"	6.27	142	80.1%	"	4.08%	(43)	"	
2-Chlorophenol	"	102	---	5.00	"	"	ND	"	69.5%	"	2.38%	(38)	"	
1,4-Dichlorobenzene	"	42.0	---	5.00	"	"	ND	70.8	53.0%	(20-90)	7.34%	(43)	"	
2,4-Dinitrotoluene	"	60.8	---	5.00	"	"	ND	"	85.9%	(50-110)	0.656%	(31)	"	
4-Nitrophenol	"	131	---	25.0	"	"	ND	142	92.3%	(15-100)	3.10%	(36)	"	
N-Nitrosodi-n-propylamine	"	51.5	---	10.0	"	"	ND	70.8	62.6%	(40-110)	2.49%	(37)	"	
Pentachlorophenol	"	122	---	10.0	"	"	ND	142	85.9%	(30-120)	2.49%	(40)	"	
Phenol	"	94.5	---	5.00	"	"	ND	"	63.6%	(15-110)	1.99%	(36)	"	
Pyrene	"	57.0	---	5.00	"	"	ND	70.8	76.2%	(40-110)	3.11%	(31)	"	
1,2,4-Trichlorobenzene	"	45.9	---	5.00	"	"	ND	"	58.4%	(25-100)	4.68%	(42)	"	
Surrogate(s): 2-Fluorobiphenyl		*Recovery: 70.6%*			*Limits: 26-135%*	"							*09/07/04 21:00*	
2-Fluorophenol		*67.9%*			*6-124%*	"							"	
Nitrobenzene-d5		*80.4%*			*23-147%*	"							"	
Phenol-d6		*67.8%*			*11-130%*	"							"	
p-Terphenyl-d14		*83.2%*			*38-149%*	"							"	
2,4,6-Tribromophenol		*95.8%*			*19-126%*	"							"	

North Creek Analytical - Portland

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Philip Nerenberg

Philip Nerenberg For Howard Holmes, Project Manager

North Creek Analytical, Inc.
Environmental Laboratory Network

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Hahn and Associates, Inc.	Project Name: **Northwest Natural**	
434 NW Sixth Ave., Suite 203	Project Number: 2708-30	Report Created:
Portland, OR 97209	Project Manager: Rob Ede	10/22/04 16:49

Polynuclear Aromatic Compounds per EPA 8270M-SIM - Laboratory Quality Control Results

North Creek Analytical - Portland

QC Batch: 4081279 **Water Preparation Method: EPA 3520/600 Series**

Analyte	Method	Result	MDL*	MRL	Units	Dil	Source Result	Spike Amt	% REC	(Limits)	% RPD	(Limits)	Analyzed	Notes
Blank (4081279-BLK1)									Extracted: 08/31/04 09:15					
Acenaphthene	EPA 8270m	ND	0.0500	0.100	ug/l	1x	--	--	--	--	--	--	09/07/04 21:01	
Acenaphthylene	"	ND	0.0500	0.100	"	"	--	--	--	--	--	--	"	
Anthracene	"	ND	0.0500	0.100	"	"	--	--	--	--	--	--	"	
Benzo (a) anthracene	"	ND	0.0500	0.100	"	"	--	--	--	--	--	--	"	
Benzo (a) pyrene	"	ND	0.0500	0.100	"	"	--	--	--	--	--	--	"	
Benzo (b) fluoranthene	"	ND	0.0500	0.100	"	"	--	--	--	--	--	--	"	
Benzo (ghi) perylene	"	ND	0.0500	0.100	"	"	--	--	--	--	--	--	"	
Benzo (k) fluoranthene	"	ND	0.0500	0.100	"	"	--	--	--	--	--	--	"	
Chrysene	"	ND	0.0500	0.100	"	"	--	--	--	--	--	--	"	
Dibenzo (a,h) anthracene	"	ND	0.100	0.200	"	"	--	--	--	--	--	--	"	
Fluoranthene	"	ND	0.0500	0.100	"	"	--	--	--	--	--	--	"	
Fluorene	"	ND	0.0500	0.100	"	"	--	--	--	--	--	--	"	
Indeno (1,2,3-cd) pyrene	"	ND	0.0500	0.100	"	"	--	--	--	--	--	--	"	
Naphthalene	"	ND	0.0500	0.100	"	"	--	--	--	--	--	--	"	
Phenanthrene	"	ND	0.0500	0.100	"	"	--	--	--	--	--	--	"	
Pyrene	"	ND	0.0500	0.100	"	"	--	--	--	--	--	--	"	
Surrogate(s): Fluorene-d10		*Recovery:*	*92.0%*		*Limits:*	*25-125%*	"						*09/07/04 21:01*	
Pyrene-d10			*118%*			*23-150%*	"						"	
Benzo (a) pyrene-d12			*111%*			*10-125%*	"						"	
LCS (4081279-BS1)									Extracted: 08/31/04 09:15					
Acenaphthene	EPA 8270m	2.11	0.0500	0.100	ug/l	1x	--	2.50	84.4%	(26-135)	--	--	09/07/04 19:54	
Benzo (a) pyrene	"	2.50	0.0500	0.100	"	"	--	"	100%	(38-137)	--	--	"	
Pyrene	"	2.43	0.0500	0.100	"	"	--	"	97.2%	(33-133)	--	--	"	
Surrogate(s): Fluorene-d10		*Recovery:*	*97.2%*		*Limits:*	*25-125%*	"						*09/07/04 19:54*	
Pyrene-d10			*114%*			*23-150%*	"						"	
Benzo (a) pyrene-d12			*119%*			*10-125%*	"						"	
LCS Dup (4081279-BSD1)									Extracted: 08/31/04 09:15					
Acenaphthene	EPA 8270m	2.06	0.0500	0.100	ug/l	1x	--	2.50	82.4%	(26-135)	2.40%	(60)	09/07/04 20:27	
Benzo (a) pyrene	"	2.44	0.0500	0.100	"	"	--	"	97.6%	(38-137)	2.43%	"	"	
Pyrene	"	2.38	0.0500	0.100	"	"	--	"	95.2%	(33-133)	2.08%	"	"	
Surrogate(s): Fluorene-d10		*Recovery:*	*94.0%*		*Limits:*	*25-125%*	"						*09/07/04 20:27*	
Pyrene-d10			*110%*			*23-150%*	"						"	
Benzo (a) pyrene-d12			*114%*			*10-125%*	"						"	

North Creek Analytical - Portland

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Hahn and Associates, Inc.	Project Name: **Northwest Natural**	
434 NW Sixth Ave., Suite 203	Project Number: 2708-30	Report Created:
Portland, OR 97209	Project Manager: Rob Ede	10/22/04 16:49

Polynuclear Aromatic Compounds per EPA 8270M-SIM - Laboratory Quality Control Results

North Creek Analytical - Portland

QC Batch: 4090066 **Water Preparation Method: EPA 3520/600 Series**

Analyte	Method	Result	MDL*	MRL	Units	Dil	Source Result	Spike Amt	% REC	(Limits)	% RPD	(Limits)	Analyzed	Notes
Blank (4090066-BLK1)							**Extracted: 09/02/04 07:27**							
Acenaphthene	EPA 8270m	ND	0.0500	0.100	ug/l	1x	--	--	--	--	--	--	09/08/04 23:46	
Acenaphthylene	"	ND	0.0500	0.100	"	"	--	--	--	--	--	--	"	
Anthracene	"	ND	0.0500	0.100	"	"	--	--	--	--	--	--	"	
Benzo (a) anthracene	"	ND	0.0500	0.100	"	"	--	--	--	--	--	--	"	
Benzo (a) pyrene	"	ND	0.0500	0.100	"	"	--	--	--	--	--	--	"	
Benzo (b) fluoranthene	"	ND	0.0500	0.100	"	"	--	--	--	--	--	--	"	
Benzo (ghi) perylene	"	ND	0.0500	0.100	"	"	--	--	--	--	--	--	"	
Benzo (k) fluoranthene	"	ND	0.0500	0.100	"	"	--	--	--	--	--	--	"	
Chrysene	"	ND	0.0500	0.100	"	"	--	--	--	--	--	--	"	
Dibenzo (a,h) anthracene	"	ND	0.100	0.200	"	"	--	--	--	--	--	--	"	
Fluoranthene	"	ND	0.0500	0.100	"	"	--	--	--	--	--	--	"	
Fluorene	"	ND	0.0500	0.100	"	"	--	--	--	--	--	--	"	
Indeno (1,2,3-cd) pyrene	"	ND	0.0500	0.100	"	"	--	--	--	--	--	--	"	
Naphthalene	"	ND	0.0500	0.100	"	"	--	--	--	--	--	--	"	
Phenanthrene	"	ND	0.0500	0.100	"	"	--	--	--	--	--	--	"	
Pyrene	"	ND	0.0500	0.100	"	"	--	--	--	--	--	--	"	
Surrogate(s): Fluorene-d10		*Recovery:*	*80.4%*		*Limits:*	*25-125%*	"						*09/08/04 23:46*	
Pyrene-d10			*118%*			*23-150%*	"						"	
Benzo (a) pyrene-d12			*96.4%*			*10-125%*	"						"	
LCS (4090066-BS1)							**Extracted: 09/02/04 07:27**							
Acenaphthene	EPA 8270m	1.90	0.0500	0.100	ug/l	1x	--	2.50	76.0%	(26-135)	--	--	09/09/04 16:33	
Benzo (a) pyrene	"	2.07	0.0500	0.100	"	"	--	"	82.8%	(38-137)	--	--	"	
Pyrene	"	2.19	0.0500	0.100	"	"	--	"	87.6%	(33-133)	--	--	"	
Surrogate(s): Fluorene-d10		*Recovery:*	*85.2%*		*Limits:*	*25-125%*	"						*09/09/04 16:33*	
Pyrene-d10			*93.6%*			*23-150%*	"						"	
Benzo (a) pyrene-d12			*95.2%*			*10-125%*	"						"	
Matrix Spike (4090066-MS1)					**QC Source: P4H1069-03**		**Extracted: 09/02/04 07:27**							R-05
Acenaphthene	EPA 8270m	3.85	0.500	1.00	ug/l	10x	1.74	2.38	88.7%	(26-135)	--	--	09/09/04 21:54	
Benzo (a) pyrene	"	1.07	0.500	1.00	"	"	ND	"	45.0%	(38-137)	--	--	"	
Pyrene	"	3.43	0.500	1.00	"	"	0.816	"	110%	(33-133)	--	--	"	
Surrogate(s): Fluorene-d10		*Recovery:*	*83.6%*		*Limits:*	*25-125%*	"						*09/09/04 21:54*	
Pyrene-d10			*127%*			*23-150%*	"						"	
Benzo (a) pyrene-d12			*97.5%*			*10-125%*	"						"	

North Creek Analytical - Portland

Philip Nerenberg

Philip Nerenberg For Howard Holmes, Project Manager

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Hahn and Associates, Inc.	Project Name: **Northwest Natural**	
434 NW Sixth Ave., Suite 203	Project Number: 2708-30	Report Created:
Portland, OR 97209	Project Manager: Rob Ede	10/22/04 16:49

Polynuclear Aromatic Compounds per EPA 8270M-SIM - Laboratory Quality Control Results

North Creek Analytical - Portland

QC Batch: 4090066 **Water Preparation Method: EPA 3520/600 Series**

Analyte	Method	Result	MDL*	MRL	Units	Dil	Source Result	Spike Amt	% REC	(Limits)	% RPD	(Limits)	Analyzed	Notes
Matrix Spike Dup (4090066-MSD1)					QC Source: P4H1069-03				Extracted: 09/02/04 07:27					R-05
Acenaphthene	EPA 8270m	3.82	0.500	1.00	ug/l	10x	1.74	2.38	87.4%	(26-135)	0.782%	(60)	09/09/04 22:20	
Benzo (a) pyrene	"	0.838	0.500	1.00	"	"	ND	"	35.2%	(38-137)	24.3%	"	"	Q-01, J
Pyrene	"	3.50	0.500	1.00	"	"	0.816	"	113%	(33-133)	2.02%	"	"	
Surrogate(s): Fluorene-d10		*Recovery: 84.5%*			*Limits: 25-125%*	"							*09/09/04 22:20*	
Pyrene-d10		*129%*			*23-150%*	"							"	
Benzo (a) pyrene-d12		*103%*			*10-125%*	"							"	

North Creek Analytical - Portland

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Philip Nerenberg

Philip Nerenberg For Howard Holmes, Project Manager

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Hahn and Associates, Inc.	Project Name: **Northwest Natural**	
434 NW Sixth Ave., Suite 203	Project Number: 2708-30	Report Created:
Portland, OR 97209	Project Manager: Rob Ede	10/22/04 16:49

Conventional Chemistry Parameters per APHA/EPA Methods - Laboratory Quality Control Results

North Creek Analytical - Portland

QC Batch: 4081272 **Water Preparation Method: General Preparation**

Analyte	Method	Result	MDL*	MRL	Units	Dil	Source Result	Spike Amt	% REC	(Limits)	% RPD	(Limits)	Analyzed	Notes
Blank (4081272-BLK1)								**Extracted: 08/31/04 08:20**						
Cyanide (total)	EPA 9012A	ND	---	0.00500	mg/l	1x	--	--	--	--	--	--	09/03/04 12:53	
LCS (4081272-BS1)								**Extracted: 08/31/04 08:20**						
Cyanide (total)	EPA 9012A	0.190	---	0.00500	mg/l	1x	--	0.200	95.0%	(75-125)	--	--	09/03/04 12:53	
Matrix Spike (4081272-MS1)				**QC Source: P4H1069-03**				**Extracted: 08/31/04 08:20**						
Cyanide (total)	EPA 9012A	0.281	---	0.00500	mg/l	1x	0.0943	0.200	93.3%	(75-125)	--	--	09/03/04 12:53	
Matrix Spike Dup (4081272-MSD1)				**QC Source: P4H1069-03**				**Extracted: 08/31/04 08:20**						
Cyanide (total)	EPA 9012A	0.280	---	0.00500	mg/l	1x	0.0943	0.200	92.8%	(75-125)	0.357%	(20)	09/03/04 12:53	

North Creek Analytical - Portland

Philip Nerenberg

Philip Nerenberg For Howard Holmes, Project Manager

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Hahn and Associates, Inc.	Project Name:	**Northwest Natural**	
434 NW Sixth Ave., Suite 203	Project Number:	2708-30	Report Created:
Portland, OR 97209	Project Manager:	Rob Ede	10/22/04 16:49

Notes and Definitions

Report Specific Notes:

J - Estimated value.

O-04 - This sample was analyzed outside the EPA recommended holding time.

Q-01 - The matrix spike recovery, and/or RPD, for this QC sample is outside of established control limits. Failure of a matrix spike QC sample does not represent an out-of-control condition for the batch.

R-03 - The reporting limit for this analyte was raised due to matrix interference.

R-05 - Reporting limits raised due to dilution necessary for analysis. Sample contains high levels of reported analyte, non-target analyte, and/or matrix interference.

R-08 - Due to matrix unable to resolve Benzofluoranthene isomers. Value reported only in Benzo(b) category represents Total Benzo(b+k)fluoranthene.

S-01 - The surrogate recovery for this sample is not available due to sample dilution required from high analyte concentration and/or matrix interferences.

X - See case narrative.

Laboratory Reporting Conventions:

DET - Analyte DETECTED at or above the Reporting Limit. Qualitative Analyses only.

ND - Analyte NOT DETECTED at or above the reporting limit (MDL or MRL, as appropriate).

NR / NA - Not Reported / Not Available

dry - Sample results reported on a dry weight basis. Reporting Limits are corrected for %Solids when %Solids are <50%.

wet - Sample results and reporting limits reported on a wet weight basis (as received).

RPD - Relative Percent Difference. (RPDs calculated using Results, not Percent Recoveries).

MRL - METHOD REPORTING LIMIT. Reporting Level at, or above, the lowest level standard of the Calibration Table.

MDL* - METHOD DETECTION LIMIT. Reporting Level at, or above, the statistically derived limit based on 40CFR, Part 136, Appendix B. *MDLs are listed on the report only if the data has been evaluated below the MRL. Results between the MDL and MRL are reported as Estimated results.

Dil - Dilutions are calculated based on deviations from the standard dilution performed for an analysis, and may not represent the dilution found on the analytical raw data.

Reporting limits - Reporting limits (MDLs and MRLs) are adjusted based on variations in sample preparation amounts, analytical dilutions and percent solids, where applicable.

APPENDIX H

Chain-of-Custody Documentation and Laboratory Analytical Reports:
Soil Samples form June 2004 Push Probe Borings

SCOEPA00014041

Sent By: HAHN * ASSOCIATES; 5032272209; Jun-10-04 5:15PM; Page 3/3

HAHN AND ASSOCIATES, INC.
Environmental Consultants
434 NW Sixth Avenue, Suite 203 • Portland OR 97209
(503) 796-0717 • Fax (503) 227-2209

Laboratory NORTH CREEK ANALYTICAL PORTLAND OR

Lab Project No

CHAIN OF CUSTODY

Chain of Custody No F4F0426

Project Manager ROB EDE
Project No. 2708
Project Name GASCO UPLAND
Collected by RBE

Liquid with Sediment Sample
___ Test Filtrate ___ Test Sediment ___ Test Both
Multi-Phase Sample
Test One (which) ___ Test Separately ___ Shake

Samples Received at 4C (Y or N)
Appropriate Containers Used (Y or N)
Provide Verbal Results (Y or N) No
Provide Preliminary Fax Results Yes

Comments
Sample Number Prefix: 2708-040608-

Lab ID	Sample #	Date	Time	Sample Description	Matrix: Soil	Water	Other	Number of Containers	Analyses to be Performed: BTEX (EPA 8021)	PAHs (EPA 8270 SIM)	RUSH	Remarks
	13	6/8/04	930	BS4 2-2.5	X			2	X	X		
	14	6/8/04	938	BS4 7.5-8.0	X			2	X	X		

Relinquished by	Company	Date	Time	Received by	Company
RBE	HAI	6/11/04	9:30		NCA
	NCA	6/11/04	9:52		NCA

3.2°C

SCOEPA00014042

NORTH CREEK ANALYTICAL COOLER RECEIPT FORM

(Army Corp. compliant)

Client: Hahn

1. **Please sign for receipt and opening of** 1 **cooler or** _____ **other** _____

   By (print) Sarah Passarge (sign) [signature]

2. Date samples received 6/11/04 Date opened: Same X or ___/___/___

3. Delivered by: X NCA BAP courier ___ FedEx ___ UPS ___ Courier ___ Client ___ Other _____

   Airbill # if applicable _____ (Put copy of shipping papers in file)

4. There were 1 custody seals present, signed by BAP date 6/11/04.

5. Were the custody seals unbroken and intact at the date and time of arrival? X Yes ___ No

6. Was ice used? X yes ___ no Type of ice: ___ blue ice X gel ice ___ real ice

   Temperature (degrees C) 3.2 Raytek thermometer _____ Digi-Therm (probe temperature blank)

7. Are custody papers sealed in a plastic bag and taped inside to lid? ___ Yes X No

8. Were custody papers filled out properly (ink, signed, etc.)? X Yes ___ No

   If "no" please specify: _____

9. Was project identifiable from custody papers? X Yes ___ No

   Name of project Gasco Upland (if applicable)

10. **Initial and date for unpacking:** BF **(initials)** **date** 6/11/04

11. Packing material: NA bubble wrap/bag ___ styrofoam ___ cardboard _____ other

12. Were samples in bags? ___ Yes X No

13. Did all containers indicated on the COC arrive? X Yes ___ No

    If "no" please indicate which containers were absent _____

14. Were all containers unbroken and labels in good condition? X Yes ___ No

    If "no" please indicate which containers _____

15. Were all bottle labels complete (ID, date, time, signature, etc.)? X Yes ___ No

    Do the IDs, times, etc. agree with the COC? X Yes ___ No

    If "no" please indicate which containers _____

16. Are containers properly preserved for indicated analysis? X Yes ___ No

17. Is there adequate volume for the test(s) requested? X Yes ___ No

18. If voa vials were submitted, are they free of bubbles? X N/A ___ Yes ___ No

19. **Log-in phase: Date samples were logged in:** 6/11/04 **Elm Project #** P4F0426

20. Logged in by (print) Sarah Passarge (sign) [signature]

21. Was the project manager notified of status? (Use back of form as a record) ___ Yes X No

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29 June, 2004

Rob Ede
Hahn and Associates, Inc.
434 NW Sixth Ave., Suite 203
Portland, OR 97209

RE: Gasco Upland

Enclosed are the results of analyses for samples received by the laboratory on 06/11/04 09:52. If you have any questions concerning this report, please feel free to contact me.

Sincerely,

Philip Nerenberg
Laboratory Manager

Work Orders included in this report:
P4F0426

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Hahn and Associates, Inc.	Project:	Gasco Upland	
434 NW Sixth Ave., Suite 203	Project Number:	2708	**Reported:**
Portland, OR 97209	Project Manager:	Rob Ede	06/29/04 13:44

ANALYTICAL REPORT FOR SAMPLES

Sample ID	Laboratory ID	Matrix	Date Sampled	Date Received
2708-040608-13	P4F0426-01	Soil	06/08/04 09:30	06/11/04 09:52
2708-040608-14	P4F0426-02	Soil	06/08/04 09:38	06/11/04 09:52

North Creek Analytical - Portland

Philip Nerenberg

Philip Nerenberg, Laboratory Manager

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Hahn and Associates, Inc.	Project: Gasco Upland	
434 NW Sixth Ave., Suite 203	Project Number: 2708	**Reported:**
Portland, OR 97209	Project Manager: Rob Ede	06/29/04 13:44

BTEX per EPA Method 8021B

North Creek Analytical - Portland

Analyte	Result	Reporting Limit	Units	Dilution	Method	Prepared	Analyzed	Batch	Notes
2708-040608-13 (P4F0426-01) Soil					Sampled: 06/08/04 Received: 06/11/04				
Benzene	ND	0.0500	mg/kg dry	1	EPA 8021B	06/14/04	06/16/04	4060531	
Toluene	ND	0.0500	"	"	"	"	"	"	
Ethylbenzene	ND	0.0500	"	"	"	"	"	"	
Xylenes (total)	ND	0.0500	"	"	"	"	"	"	
Surr: a,a,a-TFT (PID)	*91.4 %*	*60-130*							
2708-040608-14 (P4F0426-02) Soil					Sampled: 06/08/04 Received: 06/11/04				
Benzene	ND	0.0500	mg/kg dry	1	EPA 8021B	06/14/04	06/16/04	4060531	
Toluene	ND	0.0500	"	"	"	"	"	"	
Ethylbenzene	ND	0.0500	"	"	"	"	"	"	
Xylenes (total)	ND	0.0500	"	"	"	"	"	"	
Surr: a,a,a-TFT (PID)	*89.6 %*	*60-130*							

North Creek Analytical - Portland

Philip Nerenberg

Philip Nerenberg, Laboratory Manager

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Hahn and Associates, Inc.	Project: Gasco Upland	
434 NW Sixth Ave., Suite 203	Project Number: 2708	**Reported:**
Portland, OR 97209	Project Manager: Rob Ede	06/29/04 13:44

Polynuclear Aromatic Compounds per EPA 8270M-SIM

North Creek Analytical - Portland

Analyte	Result	Reporting Limit	Units	Dilution	Method	Prepared	Analyzed	Batch	Notes
2708-040608-13 (P4F0426-01) Soil					Sampled: 06/08/04 Received: 06/11/04				**R-05**
Acenaphthene	ND	168	ug/kg dry	5	EPA 8270m	06/16/04	06/22/04	4060661	
Acenaphthylene	ND	168	"	"	"	"	"	"	
Anthracene	ND	168	"	"	"	"	"	"	
Benzo (a) anthracene	**240**	168	"	"	"	"	"	"	
Benzo (a) pyrene	**323**	168	"	"	"	"	"	"	
Benzo (b) fluoranthene	**303**	168	"	"	"	"	"	"	
Benzo (ghi) perylene	**306**	168	"	"	"	"	"	"	
Benzo (k) fluoranthene	**211**	168	"	"	"	"	"	"	
Chrysene	**330**	168	"	"	"	"	"	"	
Dibenzo (a,h) anthracene	ND	168	"	"	"	"	"	"	
Fluoranthene	**370**	168	"	"	"	"	"	"	
Fluorene	ND	168	"	"	"	"	"	"	
Indeno (1,2,3-cd) pyrene	**233**	168	"	"	"	"	"	"	
Naphthalene	ND	168	"	"	"	"	"	"	
Phenanthrene	**290**	168	"	"	"	"	"	"	
Pyrene	**454**	168	"	"	"	"	"	"	
Surr: Fluorene-d10	*120 %*	*40-150*							
Surr: Pyrene-d10	*121 %*	*40-150*							
Surr: Benzo (a) pyrene-d12	*115 %*	*40-150*							
2708-040608-14 (P4F0426-02) Soil					Sampled: 06/08/04 Received: 06/11/04				**R-05**
Acenaphthene	ND	3350	ug/kg dry	100	EPA 8270m	06/16/04	06/22/04	4060661	
Acenaphthylene	ND	3350	"	"	"	"	"	"	
Anthracene	ND	3350	"	"	"	"	"	"	
Benzo (a) anthracene	**15700**	3350	"	"	"	"	"	"	
Benzo (a) pyrene	**22100**	3350	"	"	"	"	"	"	
Benzo (b) fluoranthene	**20900**	3350	"	"	"	"	"	"	
Benzo (ghi) perylene	**24200**	3350	"	"	"	"	"	"	
Benzo (k) fluoranthene	**11800**	3350	"	"	"	"	"	"	
Chrysene	**20400**	3350	"	"	"	"	"	"	
Dibenzo (a,h) anthracene	ND	3350	"	"	"	"	"	"	
Fluoranthene	**56800**	3350	"	"	"	"	"	"	
Fluorene	ND	3350	"	"	"	"	"	"	
Indeno (1,2,3-cd) pyrene	**16400**	3350	"	"	"	"	"	"	
Naphthalene	ND	3350	"	"	"	"	"	"	
Phenanthrene	**18200**	3350	"	"	"	"	"	"	
Pyrene	**62100**	3350	"	"	"	"	"	"	

North Creek Analytical - Portland

Philip Nerenberg

Philip Nerenberg, Laboratory Manager

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Hahn and Associates, Inc.	Project:	Gasco Upland	
434 NW Sixth Ave., Suite 203	Project Number:	2708	**Reported:**
Portland, OR 97209	Project Manager:	Rob Ede	06/29/04 13:44

Polynuclear Aromatic Compounds per EPA 8270M-SIM

North Creek Analytical - Portland

Analyte	Result	Reporting Limit	Units	Dilution	Method	Prepared	Analyzed	Batch	Notes
2708-040608-14 (P4F0426-02) Soil						Sampled: 06/08/04	Received: 06/11/04		**R-05**
Surr: Fluorene-d10	*NR*	*40-150*							*S-01*
Surr: Pyrene-d10	*NR*	*40-150*							*S-01*
Surr: Benzo (a) pyrene-d12	*NR*	*40-150*							*S-01*

North Creek Analytical - Portland

Philip Nerenberg

Philip Nerenberg, Laboratory Manager

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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541.383.9310 fax 541.382.7588

Hahn and Associates, Inc.	Project: Gasco Upland	
434 NW Sixth Ave., Suite 203	Project Number: 2708	**Reported:**
Portland, OR 97209	Project Manager: Rob Ede	06/29/04 13:44

Percent Dry Weight (Solids) per Standard Methods

North Creek Analytical - Portland

Analyte	Result	Reporting Limit	Units	Dilution	Method	Prepared	Analyzed	Batch	Notes
2708-040608-13 (P4F0426-01) Soil					Sampled: 06/08/04 Received: 06/11/04				
% Solids	**89.5**	1.00	% by Weight	1	NCA SOP	06/17/04	06/18/04	4060748	
2708-040608-14 (P4F0426-02) Soil					Sampled: 06/08/04 Received: 06/11/04				
% Solids	**81.1**	1.00	% by Weight	1	NCA SOP	06/17/04	06/18/04	4060748	

North Creek Analytical - Portland

Philip Nerenberg

Philip Nerenberg, Laboratory Manager

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Hahn and Associates, Inc.	Project: Gasco Upland	
434 NW Sixth Ave., Suite 203	Project Number: 2708	**Reported:**
Portland, OR 97209	Project Manager: Rob Ede	06/29/04 13:44

BTEX per EPA Method 8021B - Quality Control

North Creek Analytical - Portland

Analyte	Result	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
Batch 4060531 - EPA 5035										
Blank (4060531-BLK1)				Prepared: 06/14/04 Analyzed: 06/16/04						
Benzene	ND	0.0500	mg/kg							
Toluene	ND	0.0500	"							
Ethylbenzene	ND	0.0500	"							
Xylenes (total)	ND	0.0500	"							
Surr: a,a,a-TFT (PID)	*1.41*		"	*1.25*		*113*	*60-130*			
LCS (4060531-BS1)				Prepared: 06/14/04 Analyzed: 06/16/04						
Benzene	1.43	0.0500	mg/kg	1.25		114	70-130			
Toluene	1.44	0.0500	"	1.25		115	70-130			
Ethylbenzene	1.36	0.0500	"	1.25		109	70-130			
Xylenes (total)	4.26	0.0500	"	3.75		114	70-130			
Surr: a,a,a-TFT (PID)	*1.39*		"	*1.25*		*111*	*60-130*			
Matrix Spike (4060531-MS1)	**Source: P4F0423-06**			Prepared: 06/14/04 Analyzed: 06/16/04						
Benzene	1.31	0.0500	mg/kg dry	1.52	0.0151	85.2	65-130			
Toluene	1.35	0.0500	"	1.52	0.0134	87.9	65-130			
Ethylbenzene	1.27	0.0500	"	1.52	ND	83.6	65-130			
Xylenes (total)	3.97	0.0500	"	4.55	ND	87.3	65-130			
Surr: a,a,a-TFT (PID)	*0.999*		"	*1.52*		*65.7*	*60-130*			
Matrix Spike Dup (4060531-MSD1)	**Source: P4F0423-06**			Prepared: 06/14/04 Analyzed: 06/16/04						
Benzene	1.32	0.0500	mg/kg dry	1.52	0.0151	85.8	65-130	0.760	20	
Toluene	1.38	0.0500	"	1.52	0.0134	89.9	65-130	2.20	20	
Ethylbenzene	1.29	0.0500	"	1.52	ND	84.9	65-130	1.56	20	
Xylenes (total)	3.99	0.0500	"	4.55	ND	87.7	65-130	0.503	20	
Surr: a,a,a-TFT (PID)	*1.03*		"	*1.52*		*67.8*	*60-130*			

North Creek Analytical - Portland

Philip Nerenberg

Philip Nerenberg, Laboratory Manager

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Hahn and Associates, Inc.	Project: Gasco Upland	
434 NW Sixth Ave., Suite 203	Project Number: 2708	**Reported:**
Portland, OR 97209	Project Manager: Rob Ede	06/29/04 13:44

Polynuclear Aromatic Compounds per EPA 8270M-SIM - Quality Control

North Creek Analytical - Portland

Analyte	Result	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
Batch 4060661 - EPA 3550										
Blank (4060661-BLK1)				Prepared & Analyzed: 06/16/04						
Acenaphthene	ND	13.4	ug/kg							
Acenaphthylene	ND	13.4	"							
Anthracene	ND	13.4	"							
Benzo (a) anthracene	ND	13.4	"							
Benzo (a) pyrene	ND	13.4	"							
Benzo (b) fluoranthene	ND	13.4	"							
Benzo (ghi) perylene	ND	13.4	"							
Benzo (k) fluoranthene	ND	13.4	"							
Chrysene	ND	13.4	"							
Dibenzo (a,h) anthracene	ND	13.4	"							
Fluoranthene	ND	13.4	"							
Fluorene	ND	13.4	"							
Indeno (1,2,3-cd) pyrene	ND	13.4	"							
Naphthalene	ND	13.4	"							
Phenanthrene	ND	13.4	"							
Pyrene	ND	13.4	"							
Surr: Fluorene-d10	*93.3*		"	*83.3*		*112*	*40-150*			
Surr: Pyrene-d10	*103*		"	*83.3*		*124*	*40-150*			
Surr: Benzo (a) pyrene-d12	*97.3*		"	*83.3*		*117*	*40-150*			
LCS (4060661-BS1)				Prepared: 06/16/04 Analyzed: 06/17/04						
Acenaphthene	172	13.4	ug/kg	167		103	33-139			
Benzo (a) pyrene	180	13.4	"	167		108	45-149			
Pyrene	197	13.4	"	167		118	39-138			
Surr: Fluorene-d10	*97.3*		"	*83.3*		*117*	*40-150*			
Surr: Pyrene-d10	*114*		"	*83.3*		*137*	*40-150*			
Surr: Benzo (a) pyrene-d12	*103*		"	*83.3*		*124*	*40-150*			

North Creek Analytical - Portland

Philip Nerenberg

Philip Nerenberg, Laboratory Manager

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Hahn and Associates, Inc.	Project: Gasco Upland	
434 NW Sixth Ave., Suite 203	Project Number: 2708	**Reported:**
Portland, OR 97209	Project Manager: Rob Ede	06/29/04 13:44

Polynuclear Aromatic Compounds per EPA 8270M-SIM - Quality Control

North Creek Analytical - Portland

Analyte	Result	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
Batch 4060661 - EPA 3550										
Matrix Spike (4060661-MS1)	**Source: P4F0275-01**			Prepared: 06/16/04	Analyzed: 06/21/04					**R-05**
Acenaphthene	7690	670	ug/kg dry	194	7950	-134	33-139			Q-01
Benzo (a) pyrene	654	670	"	194	417	122	45-149			
Pyrene	7910	670	"	194	6950	>300%	39-138			Q-01
Surr: Fluorene-d10	*ND*		"	*96.9*		*NR*	*40-150*			*S-01*
Surr: Pyrene-d10	*ND*		"	*96.9*		*NR*	*40-150*			*S-01*
Surr: Benzo (a) pyrene-d12	*ND*		"	*96.9*		*NR*	*40-150*			*S-01*
Matrix Spike Dup (4060661-MSD1)	**Source: P4F0275-01**			Prepared: 06/16/04	Analyzed: 06/21/04					**R-05**
Acenaphthene	8680	670	ug/kg dry	194	7950	>300%	33-139	12.1	60	Q-01
Benzo (a) pyrene	639	670	"	194	417	114	45-149	2.32	60	
Pyrene	7580	670	"	194	6950	>300%	39-138	4.26	60	Q-01
Surr: Fluorene-d10	*ND*		"	*96.9*		*NR*	*40-150*			*S-01*
Surr: Pyrene-d10	*ND*		"	*96.9*		*NR*	*40-150*			*S-01*
Surr: Benzo (a) pyrene-d12	*ND*		"	*96.9*		*NR*	*40-150*			*S-01*

North Creek Analytical - Portland

Philip Nerenberg

Philip Nerenberg, Laboratory Manager

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Hahn and Associates, Inc.	Project: Gasco Upland	
434 NW Sixth Ave., Suite 203	Project Number: 2708	**Reported:**
Portland, OR 97209	Project Manager: Rob Ede	06/29/04 13:44

Percent Dry Weight (Solids) per Standard Methods - Quality Control

North Creek Analytical - Portland

Analyte	Result	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
Batch 4060748 - Dry Weight										
Duplicate (4060748-DUP1)		**Source: P4F0470-02**		Prepared: 06/17/04 Analyzed: 06/18/04						
% Solids	94.0	1.00% by Weight			93.9			0.106	20	
Duplicate (4060748-DUP2)		**Source: P4F0470-03**		Prepared: 06/17/04 Analyzed: 06/18/04						
% Solids	95.1	1.00% by Weight			94.9			0.211	20	
Duplicate (4060748-DUP3)		**Source: P4F0619-01**		Prepared: 06/17/04 Analyzed: 06/18/04						
% Solids	73.9	1.00% by Weight			74.1			0.270	20	
Duplicate (4060748-DUP4)		**Source: P4F0619-02**		Prepared: 06/17/04 Analyzed: 06/18/04						
% Solids	71.8	1.00% by Weight			72.2			0.556	20	

North Creek Analytical - Portland

Philip Nerenberg

Philip Nerenberg, Laboratory Manager

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Hahn and Associates, Inc.	Project: Gasco Upland	
434 NW Sixth Ave., Suite 203	Project Number: 2708	**Reported:**
Portland, OR 97209	Project Manager: Rob Ede	06/29/04 13:44

Notes and Definitions

Q-01	The matrix spike recovery, and/or RPD, for this QC sample is outside of established control limits. Failure of a matrix spike QC sample does not represent an out-of-control condition for the batch.
R-05	Reporting limits raised due to dilution necessary for analysis. Sample contains high levels of reported analyte, non-target analyte, and/or matrix interference.
S-01	The surrogate recovery for this sample is not available due to sample dilution required from high analyte concentration and/or matrix interferences.
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. MRLs are adjusted if %Solids are less than 50%.
wet	Sample results reported on a wet weight basis (as received)
RPD	Relative Percent Difference

North Creek Analytical - Portland

Philip Nerenberg

Philip Nerenberg, Laboratory Manager

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Page 2 of 3
Jun-10-04 5:15PM;
5032272209;
Sent By: HAHN * ASSOCIATES;

HAHN AND ASSOCIATES, INC.
Environmental Consultants
434 NW Sixth Avenue, Suite 203 • Portland OR 97209
(503) 796-0717 • Fax (503) 227-2209

Laboratory NORTH CREEK ANALYTICAL PORTLAND OR
Lab Project No

CHAIN OF CUSTODY
Chain of Custody No P4F0425

Project Manager ROB LEE
Project No 2709
Project Name GASCO UPLAND
Collected by RBL

Liquid with Sediment Sample
Test Filtrate Test Sediment Test Both
Multi-Phase Sample
Test One (which) Test Separately Shake

Samples Received at 4C (Y or N)
Appropriate Containers Used (Y or N)
Provide Verbal Results (Y or N) No
Provide Preliminary Fax Results Yes

Comments
Sample Number Prefix: 2708-040607 -

Lab ID	Sample #	Date	Time	Sample Description	Matrix: Soil	Matrix: Water	Matrix: Other	Number of Containers	Analyses to be Performed: BTEX (EPA 8021)	PAHs (EPA 8270 SIM)	TCLP-Benzene	RUSH	Remarks
	06	6/7/04	920	B55 2-3	Y			2	X	X	X		
	07	6/7/04	930	B-55 8-8.5	Y			2					HOLD
	08	6/7/04	950	B-55 24-24.5	X			2					HOLD
	09	6/7/04	1135	B-55 32-32.5	X			2					HOLD
	10	6/7/04	1155	B-55 41.5-50	X			2					HOLD
	11	6/7/04	1440	B-53 2.5-3.0	X			2	X	X			—
	12	6/7/04	1495	B-53 26.5-27	X			2					

Relinquished by	Company	Date	Time	Received by	Company
	HAI	6/11/04	9:30		NCA
	NCA	6/11/04	9:52		NCA

3.2°C

SCOEPA00014055

NORTH CREEK ANALYTICAL COOLER RECEIPT FORM

(Army Corp. compliant)

Client: Hahn

1. **Please sign for receipt and opening of** 1 **cooler or** _____ **other** _____

   By (print) Sarah Passarge (sign) [signature]

2. Date samples received 6/11/04 Date opened: Same X or ___/___/___

3. Delivered by: X NCA courier ___ FedEx ___ UPS ___ Courier ___ Client ___ Other _____

   Airbill # if applicable _____ (Put copy of shipping papers in file)

4. There were 1 custody seals present, signed by BAD date 6/11/04.

5. Were the custody seals unbroken and intact at the date and time of arrival? X Yes ___ No

6. Was ice used? X yes ___ no Type of ice: ___ blue ice X gel ice ___ real ice

   Temperature (degrees C) 3.2 Raytek thermometer _____ Digi-Therm (probe temperature blank)

7. Are custody papers sealed in a plastic bag and taped inside to lid? ___ Yes X No

8. Were custody papers filled out properly (ink, signed, etc.)? X Yes ___ No

   If "no" please specify: _____

9. Was project identifiable from custody papers? X Yes ___ No

   Name of project Gasco Upland (if applicable)

10. **Initial and date for unpacking:** SP **(initials)** **date** 6/11/04

11. Packing material: NA bubble wrap/bag ___ styrofoam ___ cardboard _____ other

12. Were samples in bags? ___ Yes X No

13. Did all containers indicated on the COC arrive? X Yes ___ No

    If "no" please indicate which containers were absent _____

14. Were all containers unbroken and labels in good condition? X Yes ___ No

    If "no" please indicate which containers _____

15. Were all bottle labels complete (ID, date, time, signature, etc.)? X Yes ___ No

    Do the IDs, times, etc. agree with the COC? X Yes ___ No

    If "no" please indicate which containers _____

16. Are containers properly preserved for indicated analysis? X Yes ___ No

17. Is there adequate volume for the test(s) requested? X Yes ___ No

18. If voa vials were submitted, are they free of bubbles? X N/A ___ Yes ___ No

19. **Log-in phase: Date samples were logged in:** 6/11/04 **Elm Project # P** 4F0423

20. Logged in by (print) Sarah Passarge (sign) [signature]

21. Was the project manager notified of status? (Use back of form as a record) ___ Yes X No

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29 June, 2004

Rob Ede
Hahn and Associates, Inc.
434 NW Sixth Ave., Suite 203
Portland, OR 97209

RE: Gasco Upland

Enclosed are the results of analyses for samples received by the laboratory on 06/11/04 09:52. If you have any questions concerning this report, please feel free to contact me.

Sincerely,

Philip Nerenberg
Laboratory Manager

Work Orders included in this report:
P4F0423

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Hahn and Associates, Inc.	Project: Gasco Upland	
434 NW Sixth Ave., Suite 203	Project Number: 2708	**Reported:**
Portland, OR 97209	Project Manager: Rob Ede	06/29/04 13:52

ANALYTICAL REPORT FOR SAMPLES

Sample ID	Laboratory ID	Matrix	Date Sampled	Date Received
2108-040607-06	P4F0423-01	Soil	06/07/04 09:20	06/11/04 09:52
2108-040607-11	P4F0423-06	Soil	06/07/04 14:40	06/11/04 09:52

North Creek Analytical - Portland

Philip Nerenberg

Philip Nerenberg, Laboratory Manager

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Hahn and Associates, Inc.	Project: Gasco Upland	
434 NW Sixth Ave., Suite 203	Project Number: 2708	**Reported:**
Portland, OR 97209	Project Manager: Rob Ede	06/29/04 13:52

BTEX per EPA Method 8021B

North Creek Analytical - Portland

Analyte	Result	Reporting Limit	Units	Dilution	Method	Prepared	Analyzed	Batch	Notes
2108-040607-06 (P4F0423-01) Soil					Sampled: 06/07/04 Received: 06/11/04				
Benzene	**137**	2.00	mg/kg dry	40	EPA 8021B	06/14/04	06/16/04	4060531	
Toluene	**95.6**	2.00	"	"	"	"	"	"	
Ethylbenzene	**77.3**	2.00	"	"	"	"	"	"	
Xylenes (total)	**92.6**	2.00	"	"	"	"	"	"	
Surr: a,a,a-TFT (PID)	*NR*	*60-130*							*S-01*
2108-040607-11 (P4F0423-06) Soil					Sampled: 06/07/04 Received: 06/11/04				
Benzene	ND	0.0500	mg/kg dry	1	EPA 8021B	06/14/04	06/16/04	4060531	
Toluene	ND	0.0500	"	"	"	"	"	"	
Ethylbenzene	ND	0.0500	"	"	"	"	"	"	
Xylenes (total)	ND	0.0500	"	"	"	"	"	"	
Surr: a,a,a-TFT (PID)	*75.7 %*	*60-130*							

North Creek Analytical - Portland

Philip Nerenberg

Philip Nerenberg, Laboratory Manager

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Hahn and Associates, Inc.	Project: Gasco Upland	
434 NW Sixth Ave., Suite 203	Project Number: 2708	**Reported:**
Portland, OR 97209	Project Manager: Rob Ede	06/29/04 13:52

Polynuclear Aromatic Compounds per EPA 8270M-SIM

North Creek Analytical - Portland

Analyte	Result	Reporting Limit	Units	Dilution	Method	Prepared	Analyzed	Batch	Notes
2108-040607-06 (P4F0423-01) Soil					Sampled: 06/07/04 Received: 06/11/04				**R-05**
Acenaphthene	**977000**	335000	ug/kg dry	5000	EPA 8270m	06/16/04	06/22/04	4060661	
Acenaphthylene	**2400000**	335000	"	"	"	"	"	"	
Anthracene	**1760000**	335000	"	"	"	"	"	"	
Benzo (a) anthracene	**1240000**	335000	"	"	"	"	"	"	
Benzo (a) pyrene	**1170000**	335000	"	"	"	"	"	"	
Benzo (b) fluoranthene	**688000**	335000	"	"	"	"	"	"	
Benzo (ghi) perylene	**700000**	335000	"	"	"	"	"	"	
Benzo (k) fluoranthene	**731000**	335000	"	"	"	"	"	"	
Chrysene	**1480000**	335000	"	"	"	"	"	"	
Dibenzo (a,h) anthracene	ND	335000	"	"	"	"	"	"	
Fluoranthene	**4890000**	335000	"	"	"	"	"	"	
Fluorene	**1740000**	335000	"	"	"	"	"	"	
Indeno (1,2,3-cd) pyrene	**522000**	335000	"	"	"	"	"	"	
Naphthalene	**27600000**	3350000	"	50000	"	"	06/22/04	"	
Phenanthrene	**9750000**	335000	"	5000	"	"	06/22/04	"	
Pyrene	**5360000**	335000	"	"	"	"	"	"	
Surr: Fluorene-d10	*NR*	*40-150*							*S-01*
Surr: Pyrene-d10	*NR*	*40-150*							*S-01*
Surr: Benzo (a) pyrene-d12	*NR*	*40-150*							*S-01*
2108-040607-11 (P4F0423-06) Soil					Sampled: 06/07/04 Received: 06/11/04				**R-05**
Acenaphthene	ND	670	ug/kg dry	20	EPA 8270m	06/16/04	06/22/04	4060661	
Acenaphthylene	**745**	670	"	"	"	"	"	"	
Anthracene	**996**	670	"	"	"	"	"	"	
Benzo (a) anthracene	**4210**	670	"	"	"	"	"	"	
Benzo (a) pyrene	**6820**	670	"	"	"	"	"	"	
Benzo (b) fluoranthene	**4970**	670	"	"	"	"	"	"	
Benzo (ghi) perylene	**5480**	670	"	"	"	"	"	"	
Benzo (k) fluoranthene	**4210**	670	"	"	"	"	"	"	
Chrysene	**5320**	670	"	"	"	"	"	"	
Dibenzo (a,h) anthracene	**1040**	670	"	"	"	"	"	"	
Fluoranthene	**6430**	670	"	"	"	"	"	"	
Fluorene	ND	670	"	"	"	"	"	"	
Indeno (1,2,3-cd) pyrene	**4010**	670	"	"	"	"	"	"	
Naphthalene	ND	670	"	"	"	"	"	"	
Phenanthrene	**2690**	670	"	"	"	"	"	"	
Pyrene	**9700**	670	"	"	"	"	"	"	

North Creek Analytical - Portland

Philip Nerenberg

Philip Nerenberg, Laboratory Manager

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541.383.9310 fax 541.382.7588

Hahn and Associates, Inc.	Project: Gasco Upland	
434 NW Sixth Ave., Suite 203	Project Number: 2708	**Reported:**
Portland, OR 97209	Project Manager: Rob Ede	06/29/04 13:52

Polynuclear Aromatic Compounds per EPA 8270M-SIM

North Creek Analytical - Portland

Analyte	Result	Reporting Limit	Units	Dilution	Method	Prepared	Analyzed	Batch	Notes
2108-040607-11 (P4F0423-06) Soil						Sampled: 06/07/04	Received: 06/11/04		**R-05**
Surr: Fluorene-d10	*NR*	*40-150*							*S-01*
Surr: Pyrene-d10	*NR*	*40-150*							*S-01*
Surr: Benzo (a) pyrene-d12	*NR*	*40-150*							*S-01*

North Creek Analytical - Portland

Philip Nerenberg

Philip Nerenberg, Laboratory Manager

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Hahn and Associates, Inc.	Project: Gasco Upland	
434 NW Sixth Ave., Suite 203	Project Number: 2708	**Reported:**
Portland, OR 97209	Project Manager: Rob Ede	06/29/04 13:52

TCLP Volatile Organic Compounds per EPA Method 1311/8260B

North Creek Analytical - Portland

Analyte	Result	Reporting Limit	Units	Dilution	Method	Prepared	Analyzed	Batch	Notes
2108-040607-06 (P4F0423-01) Soil					Sampled: 06/07/04 Received: 06/11/04				
Benzene	**4.10**	0.0500	mg/l	5	1311/8260B	06/23/04	06/25/04	4061033	
Surr: 4-BFB	*96.0 %*	*75-130*							
Surr: Dibromofluoromethane	*110 %*	*75-130*							
Surr: Toluene-d8	*105 %*	*75-130*							

North Creek Analytical - Portland

Philip Nerenberg

Philip Nerenberg, Laboratory Manager

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Hahn and Associates, Inc.	Project: Gasco Upland	
434 NW Sixth Ave., Suite 203	Project Number: 2708	**Reported:**
Portland, OR 97209	Project Manager: Rob Ede	06/29/04 13:52

Percent Dry Weight (Solids) per Standard Methods

North Creek Analytical - Portland

Analyte	Result	Reporting Limit	Units	Dilution	Method	Prepared	Analyzed	Batch	Notes
2108-040607-06 (P4F0423-01) Soil					Sampled: 06/07/04 Received: 06/11/04				
% Solids	**78.0**	1.00	% by Weight	1	NCA SOP	06/17/04	06/18/04	4060748	
2108-040607-11 (P4F0423-06) Soil					Sampled: 06/07/04 Received: 06/11/04				
% Solids	**82.4**	1.00	% by Weight	1	NCA SOP	06/17/04	06/18/04	4060748	

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Philip Nerenberg

Philip Nerenberg, Laboratory Manager

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Hahn and Associates, Inc.	Project: Gasco Upland	
434 NW Sixth Ave., Suite 203	Project Number: 2708	**Reported:**
Portland, OR 97209	Project Manager: Rob Ede	06/29/04 13:52

BTEX per EPA Method 8021B - Quality Control

North Creek Analytical - Portland

Analyte	Result	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
Batch 4060531 - EPA 5035										
Blank (4060531-BLK1)				Prepared: 06/14/04 Analyzed: 06/16/04						
Benzene	ND	0.0500	mg/kg							
Toluene	ND	0.0500	"							
Ethylbenzene	ND	0.0500	"							
Xylenes (total)	ND	0.0500	"							
Surr: a,a,a-TFT (PID)	*1.41*		"	*1.25*		*113*	*60-130*			
LCS (4060531-BS1)				Prepared: 06/14/04 Analyzed: 06/16/04						
Benzene	1.43	0.0500	mg/kg	1.25		114	70-130			
Toluene	1.44	0.0500	"	1.25		115	70-130			
Ethylbenzene	1.36	0.0500	"	1.25		109	70-130			
Xylenes (total)	4.26	0.0500	"	3.75		114	70-130			
Surr: a,a,a-TFT (PID)	*1.39*		"	*1.25*		*111*	*60-130*			
Matrix Spike (4060531-MS1)	**Source: P4F0423-06**			Prepared: 06/14/04 Analyzed: 06/16/04						
Benzene	1.31	0.0500	mg/kg dry	1.52	0.0151	85.2	65-130			
Toluene	1.35	0.0500	"	1.52	0.0134	87.9	65-130			
Ethylbenzene	1.27	0.0500	"	1.52	ND	83.6	65-130			
Xylenes (total)	3.97	0.0500	"	4.55	ND	87.3	65-130			
Surr: a,a,a-TFT (PID)	*0.999*		"	*1.52*		*65.7*	*60-130*			
Matrix Spike Dup (4060531-MSD1)	**Source: P4F0423-06**			Prepared: 06/14/04 Analyzed: 06/16/04						
Benzene	1.32	0.0500	mg/kg dry	1.52	0.0151	85.8	65-130	0.760	20	
Toluene	1.38	0.0500	"	1.52	0.0134	89.9	65-130	2.20	20	
Ethylbenzene	1.29	0.0500	"	1.52	ND	84.9	65-130	1.56	20	
Xylenes (total)	3.99	0.0500	"	4.55	ND	87.7	65-130	0.503	20	
Surr: a,a,a-TFT (PID)	*1.03*		"	*1.52*		*67.8*	*60-130*			

North Creek Analytical - Portland

Philip Nerenberg

Philip Nerenberg, Laboratory Manager

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Hahn and Associates, Inc.	Project: Gasco Upland	
434 NW Sixth Ave., Suite 203	Project Number: 2708	**Reported:**
Portland, OR 97209	Project Manager: Rob Ede	06/29/04 13:52

Polynuclear Aromatic Compounds per EPA 8270M-SIM - Quality Control

North Creek Analytical - Portland

Analyte	Result	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
Batch 4060661 - EPA 3550										
Blank (4060661-BLK1)				Prepared & Analyzed: 06/16/04						
Acenaphthene	ND	13.4	ug/kg							
Acenaphthylene	ND	13.4	"							
Anthracene	ND	13.4	"							
Benzo (a) anthracene	ND	13.4	"							
Benzo (a) pyrene	ND	13.4	"							
Benzo (b) fluoranthene	ND	13.4	"							
Benzo (ghi) perylene	ND	13.4	"							
Benzo (k) fluoranthene	ND	13.4	"							
Chrysene	ND	13.4	"							
Dibenzo (a,h) anthracene	ND	13.4	"							
Fluoranthene	ND	13.4	"							
Fluorene	ND	13.4	"							
Indeno (1,2,3-cd) pyrene	ND	13.4	"							
Naphthalene	ND	13.4	"							
Phenanthrene	ND	13.4	"							
Pyrene	ND	13.4	"							
Surr: Fluorene-d10	*93.3*		"	*83.3*		*112*	*40-150*			
Surr: Pyrene-d10	*103*		"	*83.3*		*124*	*40-150*			
Surr: Benzo (a) pyrene-d12	*97.3*		"	*83.3*		*117*	*40-150*			
LCS (4060661-BS1)				Prepared: 06/16/04 Analyzed: 06/17/04						
Acenaphthene	172	13.4	ug/kg	167		103	33-139			
Benzo (a) pyrene	180	13.4	"	167		108	45-149			
Pyrene	197	13.4	"	167		118	39-138			
Surr: Fluorene-d10	*97.3*		"	*83.3*		*117*	*40-150*			
Surr: Pyrene-d10	*114*		"	*83.3*		*137*	*40-150*			
Surr: Benzo (a) pyrene-d12	*103*		"	*83.3*		*124*	*40-150*			

North Creek Analytical - Portland

Philip Nerenberg

Philip Nerenberg, Laboratory Manager

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Hahn and Associates, Inc.	Project: Gasco Upland	
434 NW Sixth Ave., Suite 203	Project Number: 2708	**Reported:**
Portland, OR 97209	Project Manager: Rob Ede	06/29/04 13:52

Polynuclear Aromatic Compounds per EPA 8270M-SIM - Quality Control

North Creek Analytical - Portland

Analyte	Result	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
Batch 4060661 - EPA 3550										
Matrix Spike (4060661-MS1)	**Source: P4F0275-01**			Prepared: 06/16/04		Analyzed: 06/21/04				**R-05**
Acenaphthene	7690	670	ug/kg dry	194	7950	-134	33-139			Q-01
Benzo (a) pyrene	654	670	"	194	417	122	45-149			
Pyrene	7910	670	"	194	6950	>300%	39-138			Q-01
Surr: Fluorene-d10	*ND*		"	*96.9*		*NR*	*40-150*			*S-01*
Surr: Pyrene-d10	*ND*		"	*96.9*		*NR*	*40-150*			*S-01*
Surr: Benzo (a) pyrene-d12	*ND*		"	*96.9*		*NR*	*40-150*			*S-01*
Matrix Spike Dup (4060661-MSD1)	**Source: P4F0275-01**			Prepared: 06/16/04		Analyzed: 06/21/04				**R-05**
Acenaphthene	8680	670	ug/kg dry	194	7950	>300%	33-139	12.1	60	Q-01
Benzo (a) pyrene	639	670	"	194	417	114	45-149	2.32	60	
Pyrene	7580	670	"	194	6950	>300%	39-138	4.26	60	Q-01
Surr: Fluorene-d10	*ND*		"	*96.9*		*NR*	*40-150*			*S-01*
Surr: Pyrene-d10	*ND*		"	*96.9*		*NR*	*40-150*			*S-01*
Surr: Benzo (a) pyrene-d12	*ND*		"	*96.9*		*NR*	*40-150*			*S-01*

North Creek Analytical - Portland

Philip Nerenberg

Philip Nerenberg, Laboratory Manager

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Hahn and Associates, Inc.	Project: Gasco Upland	
434 NW Sixth Ave., Suite 203	Project Number: 2708	**Reported:**
Portland, OR 97209	Project Manager: Rob Ede	06/29/04 13:52

TCLP Volatile Organic Compounds per EPA Method 1311/8260B - Quality Control

North Creek Analytical - Portland

Analyte	Result	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
Batch 4061033 - EPA 5030B										
Blank (4061033-BLK1)				Prepared: 06/23/04 Analyzed: 06/25/04						
Benzene	ND	0.0100	mg/l							
Surr: 4-BFB	*0.0182*		"	*0.0200*		*91.0*	*75-130*			
Surr: Dibromofluoromethane	*0.0212*		"	*0.0200*		*106*	*75-130*			
Surr: Toluene-d8	*0.0203*		"	*0.0200*		*102*	*75-130*			
LCS (4061033-BS1)				Prepared: 06/23/04 Analyzed: 06/24/04						
Benzene	0.224	0.0100	mg/l	0.200		112	66-142			
Surr: 4-BFB	*0.0185*		"	*0.0200*		*92.5*	*75-130*			
Surr: Dibromofluoromethane	*0.0204*		"	*0.0200*		*102*	*75-130*			
Surr: Toluene-d8	*0.0198*		"	*0.0200*		*99.0*	*75-130*			
LCS Dup (4061033-BSD1)				Prepared: 06/23/04 Analyzed: 06/24/04						
Benzene	0.233	0.0100	mg/l	0.200		116	66-142	3.94	21	
Surr: 4-BFB	*0.0195*		"	*0.0200*		*97.5*	*75-130*			
Surr: Dibromofluoromethane	*0.0213*		"	*0.0200*		*106*	*75-130*			
Surr: Toluene-d8	*0.0203*		"	*0.0200*		*102*	*75-130*			

North Creek Analytical - Portland

Philip Nerenberg

Philip Nerenberg, Laboratory Manager

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Hahn and Associates, Inc.	Project: Gasco Upland	
434 NW Sixth Ave., Suite 203	Project Number: 2708	**Reported:**
Portland, OR 97209	Project Manager: Rob Ede	06/29/04 13:52

Percent Dry Weight (Solids) per Standard Methods - Quality Control

North Creek Analytical - Portland

Analyte	Result	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
Batch 4060748 - Dry Weight										
Duplicate (4060748-DUP1)		**Source: P4F0470-02**		Prepared: 06/17/04 Analyzed: 06/18/04						
% Solids	94.0	1.00% by Weight			93.9			0.106	20	
Duplicate (4060748-DUP2)		**Source: P4F0470-03**		Prepared: 06/17/04 Analyzed: 06/18/04						
% Solids	95.1	1.00% by Weight			94.9			0.211	20	
Duplicate (4060748-DUP3)		**Source: P4F0619-01**		Prepared: 06/17/04 Analyzed: 06/18/04						
% Solids	73.9	1.00% by Weight			74.1			0.270	20	
Duplicate (4060748-DUP4)		**Source: P4F0619-02**		Prepared: 06/17/04 Analyzed: 06/18/04						
% Solids	71.8	1.00% by Weight			72.2			0.556	20	

North Creek Analytical - Portland

Philip Nerenberg

Philip Nerenberg, Laboratory Manager

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541.383.9310 fax 541.382.7588

Hahn and Associates, Inc.	Project: Gasco Upland	
434 NW Sixth Ave., Suite 203	Project Number: 2708	**Reported:**
Portland, OR 97209	Project Manager: Rob Ede	06/29/04 13:52

Notes and Definitions

Q-01	The matrix spike recovery, and/or RPD, for this QC sample is outside of established control limits. Failure of a matrix spike QC sample does not represent an out-of-control condition for the batch.
R-05	Reporting limits raised due to dilution necessary for analysis. Sample contains high levels of reported analyte, non-target analyte, and/or matrix interference.
S-01	The surrogate recovery for this sample is not available due to sample dilution required from high analyte concentration and/or matrix interferences.
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. MRLs are adjusted if %Solids are less than 50%.
wet	Sample results reported on a wet weight basis (as received)
RPD	Relative Percent Difference

North Creek Analytical - Portland

Philip Nerenberg

Philip Nerenberg, Laboratory Manager

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Environmental Consultants
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(503) 796-0717 • Fax (503) 227-2209

Laboratory North Creek Analytical Portland, OR
Lab Project No. _____

CHAIN OF CUSTODY

Chain of Custody No. _____

Project Manager	Rob EDE
Project No.	2708
Project Name	Gasco Upland
Collected by	RBE/APR

Liquid with Sediment Sample
_____ Test Filtrate _____ Test Sediment _____ Test Both
Multi-Phase Sample
_____ Test One (which) _____ Test Separately _____ Shake

Samples Received at 4C (Y or N)	
Appropriate Containers Used (Y or N)	
Provide Verbal Results (Y or N)	No
Provide Preliminary Fax Results	Yes

Comments
Sample Number Prefix: 2708-040601-

Lab ID	Sample #	Date	Time	Sample Description	Matrix: Soil	Matrix: Water	Matrix: Other	Number of Containers	Analyses to be Performed: PAHs (EPA 8270 SIM)	Analyses to be Performed: BTEX (EPA 8021)	Analyses to be Performed: TotL CN (EPA 9010)	RUSH	Remarks
	-01	6/1/04	900	B-56 2.5-3.5	X			2	X	X	X		
	-02		905	B-56 7.0-8.0	X			2					
	-03		920	B-56 11-12	X			2	X	X	X		
	-04	↓	955	B-56 26-27	X			2	X	X			

Relinquished by	RBE	Company	HAI	Date	6/2/04	Time	12:20
Received by		Company	NCA				
Relinquished by		Company	NCA	Date	6/2/04	Time	15:00
Received by		Company	NCA				

1.2

SCOEPA00014070

NORTH CREEK ANALYTICAL COOLER RECEIPT FORM

(Army Corp. compliant)

Client: Hahn & Associates

1. **Please sign for receipt and opening of** 1 **cooler or** _____ **other**_____

   By (print) Vanessa Evans (sign) Vanessa Evans

2. Date samples received 6/2/04 Date opened: Same X or ___/___/___

3. Delivered by: X NCA courier ___ FedEx ___UPS ___Courier ___Client ___Other_____

   Airbill # if applicable _____ (Put copy of shipping papers in file)

4. There were 1 custody seals present, signed by Bob date 6/2/04.

5. Were the custody seals unbroken and intact at the date and time of arrival? X Yes ___No

6. Was ice used? X yes ___no Type of ice: ___ blue ice ___gel ice X real ice

   Temperature (degrees C) X Raytek thermometer 1.2 Digi-Therm (probe temperature blank)

7. Are custody papers sealed in a plastic bag and taped inside to lid? ___Yes X No

8. Were custody papers filled out properly (ink, signed, etc.)? X Yes ___No

   If "no" please specify: _____

9. Was project identifiable from custody papers? X Yes ___No

   Name of project Haco upland (if applicable)

10. **Initial and date for unpacking:** VE **(initials)** **date** 6/2/04

11. Packing material: NA bubble wrap/bag ___styrofoam ___cardboard _____other

12. Were samples in bags? ___Yes X No

13. Did all containers indicated on the COC arrive? X Yes ___No

    If "no" please indicate which containers were absent _____

14. Were all containers unbroken and labels in good condition? X Yes ___No

    If "no" please indicate which containers _____

15. Were all bottle labels complete (ID, date, time, signature, etc.)? X Yes ___No

    Do the IDs, times, etc. agree with the COC? X Yes ___No

    If "no" please indicate which containers _____

16. Are containers properly preserved for indicated analysis? X Yes ___No

17. Is there adequate volume for the test(s) requested? X Yes ___No

18. If voa vials were submitted, are they free of bubbles? X N/A ___Yes ___No

19. **Log-in phase: Date samples were logged in:** 6/2/04 **Elm Project # P** 4F0013

20. Logged in by (print) Vanessa Evans (sign) Vanessa Evans

21. Was the project manager notified of status? (Use back of form as a record) ___Yes X No

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22 June, 2004

Rob Ede
Hahn and Associates, Inc.
434 NW Sixth Ave., Suite 203
Portland, OR 97209

RE: Gasco Upland

Enclosed are the results of analyses for samples received by the laboratory on 06/02/04 15:00. If you have any questions concerning this report, please feel free to contact me.

Sincerely,

Philip Nerenberg
Laboratory Manager

Work Orders included in this report:
P4F0113

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Hahn and Associates, Inc.	Project: Gasco Upland	
434 NW Sixth Ave., Suite 203	Project Number: 2708	**Reported:**
Portland, OR 97209	Project Manager: Rob Ede	06/22/04 11:43

ANALYTICAL REPORT FOR SAMPLES

Sample ID	Laboratory ID	Matrix	Date Sampled	Date Received
2708-040601-01	P4F0113-01	Soil	06/01/04 09:00	06/02/04 15:00
2708-040601-03	P4F0113-03	Soil	06/01/04 09:20	06/02/04 15:00
2708-040601-04	P4F0113-04	Soil	06/01/04 09:55	06/02/04 15:00

North Creek Analytical - Portland

Philip Nerenberg

Philip Nerenberg, Laboratory Manager

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Hahn and Associates, Inc.	Project: Gasco Upland	
434 NW Sixth Ave., Suite 203	Project Number: 2708	**Reported:**
Portland, OR 97209	Project Manager: Rob Ede	06/22/04 11:43

BTEX per EPA Method 8021B

North Creek Analytical - Portland

Analyte	Result	Reporting Limit	Units	Dilution	Method	Prepared	Analyzed	Batch	Notes
2708-040601-01 (P4F0113-01) Soil					Sampled: 06/01/04 Received: 06/02/04				
Benzene	ND	0.0500	mg/kg dry	1	EPA 8021B	06/07/04	06/09/04	4060277	
Toluene	ND	0.0500	"	"	"	"	"	"	
Ethylbenzene	ND	0.0500	"	"	"	"	"	"	
Xylenes (total)	ND	0.0500	"	"	"	"	"	"	
Surr: a,a,a-TFT (PID)	*91.4 %*	*60-130*							
2708-040601-03 (P4F0113-03) Soil					Sampled: 06/01/04 Received: 06/02/04				
Benzene	ND	0.0500	mg/kg dry	1	EPA 8021B	06/07/04	06/09/04	4060277	
Toluene	ND	0.0500	"	"	"	"	"	"	
Ethylbenzene	ND	0.0500	"	"	"	"	"	"	
Xylenes (total)	ND	0.0500	"	"	"	"	"	"	
Surr: a,a,a-TFT (PID)	*87.3 %*	*60-130*							
2708-040601-04 (P4F0113-04) Soil					Sampled: 06/01/04 Received: 06/02/04				
Benzene	ND	0.0500	mg/kg dry	1	EPA 8021B	06/07/04	06/09/04	4060277	
Toluene	ND	0.0500	"	"	"	"	"	"	
Ethylbenzene	ND	0.0500	"	"	"	"	"	"	
Xylenes (total)	ND	0.0500	"	"	"	"	"	"	
Surr: a,a,a-TFT (PID)	*63.8 %*	*60-130*							

North Creek Analytical - Portland

Philip Nerenberg

Philip Nerenberg, Laboratory Manager

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Hahn and Associates, Inc.	Project: Gasco Upland	
434 NW Sixth Ave., Suite 203	Project Number: 2708	**Reported:**
Portland, OR 97209	Project Manager: Rob Ede	06/22/04 11:43

Polynuclear Aromatic Compounds per EPA 8270M-SIM

North Creek Analytical - Portland

Analyte	Result	Reporting Limit	Units	Dilution	Method	Prepared	Analyzed	Batch	Notes
2708-040601-01 (P4F0113-01) Soil					Sampled: 06/01/04 Received: 06/02/04				
Acenaphthene	ND	13.4	ug/kg dry	1	EPA 8270m	06/03/04	06/09/04	4060142	
Acenaphthylene	ND	13.4	"	"	"	"	"	"	
Anthracene	ND	13.4	"	"	"	"	"	"	
Benzo (a) anthracene	ND	13.4	"	"	"	"	"	"	
Benzo (a) pyrene	ND	13.4	"	"	"	"	"	"	
Benzo (b) fluoranthene	ND	13.4	"	"	"	"	"	"	
Benzo (ghi) perylene	**14.0**	13.4	"	"	"	"	"	"	
Benzo (k) fluoranthene	ND	13.4	"	"	"	"	"	"	
Chrysene	ND	13.4	"	"	"	"	"	"	
Dibenzo (a,h) anthracene	ND	13.4	"	"	"	"	"	"	
Fluoranthene	ND	13.4	"	"	"	"	"	"	
Fluorene	ND	13.4	"	"	"	"	"	"	
Indeno (1,2,3-cd) pyrene	ND	13.4	"	"	"	"	"	"	
Naphthalene	ND	13.4	"	"	"	"	"	"	
Phenanthrene	ND	13.4	"	"	"	"	"	"	
Pyrene	ND	13.4	"	"	"	"	"	"	
Surr: Fluorene-d10	*93.6 %*	*40-150*							
Surr: Pyrene-d10	*110 %*	*40-150*							
Surr: Benzo (a) pyrene-d12	*90.5 %*	*40-150*							
2708-040601-03 (P4F0113-03) Soil					Sampled: 06/01/04 Received: 06/02/04				
Acenaphthene	ND	13.4	ug/kg dry	1	EPA 8270m	06/03/04	06/09/04	4060142	
Acenaphthylene	ND	13.4	"	"	"	"	"	"	
Anthracene	ND	13.4	"	"	"	"	"	"	
Benzo (a) anthracene	**23.1**	13.4	"	"	"	"	"	"	
Benzo (a) pyrene	**35.1**	13.4	"	"	"	"	"	"	
Benzo (b) fluoranthene	**31.4**	13.4	"	"	"	"	"	"	
Benzo (ghi) perylene	**37.0**	13.4	"	"	"	"	"	"	
Benzo (k) fluoranthene	**24.7**	13.4	"	"	"	"	"	"	
Chrysene	**30.7**	13.4	"	"	"	"	"	"	
Dibenzo (a,h) anthracene	ND	13.4	"	"	"	"	"	"	
Fluoranthene	**41.7**	13.4	"	"	"	"	"	"	
Fluorene	ND	13.4	"	"	"	"	"	"	
Indeno (1,2,3-cd) pyrene	**25.5**	13.4	"	"	"	"	"	"	
Naphthalene	ND	13.4	"	"	"	"	"	"	
Phenanthrene	**38.7**	13.4	"	"	"	"	"	"	
Pyrene	**69.0**	13.4	"	"	"	"	"	"	

North Creek Analytical - Portland

Philip Nerenberg

Philip Nerenberg, Laboratory Manager

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Hahn and Associates, Inc.	Project: Gasco Upland	
434 NW Sixth Ave., Suite 203	Project Number: 2708	**Reported:**
Portland, OR 97209	Project Manager: Rob Ede	06/22/04 11:43

Polynuclear Aromatic Compounds per EPA 8270M-SIM

North Creek Analytical - Portland

Analyte	Result	Reporting Limit	Units	Dilution	Method	Prepared	Analyzed	Batch	Notes
2708-040601-03 (P4F0113-03) Soil						Sampled: 06/01/04	Received: 06/02/04		
Surr: Fluorene-d10	*79.2 %*	*40-150*							
Surr: Pyrene-d10	*96.4 %*	*40-150*							
Surr: Benzo (a) pyrene-d12	*78.6 %*	*40-150*							
2708-040601-04 (P4F0113-04) Soil						Sampled: 06/01/04	Received: 06/02/04		
Acenaphthene	ND	13.4	ug/kg dry	1	EPA 8270m	06/03/04	06/09/04	4060142	
Acenaphthylene	ND	13.4	"	"	"	"	"	"	
Anthracene	**14.0**	13.4	"	"	"	"	"	"	
Benzo (a) anthracene	**32.7**	13.4	"	"	"	"	"	"	
Benzo (a) pyrene	**41.9**	13.4	"	"	"	"	"	"	
Benzo (b) fluoranthene	**33.6**	13.4	"	"	"	"	"	"	
Benzo (ghi) perylene	**32.2**	13.4	"	"	"	"	"	"	
Benzo (k) fluoranthene	**25.0**	13.4	"	"	"	"	"	"	
Chrysene	**37.7**	13.4	"	"	"	"	"	"	
Dibenzo (a,h) anthracene	ND	13.4	"	"	"	"	"	"	
Fluoranthene	**95.3**	13.4	"	"	"	"	"	"	
Fluorene	ND	13.4	"	"	"	"	"	"	
Indeno (1,2,3-cd) pyrene	**22.2**	13.4	"	"	"	"	"	"	
Naphthalene	ND	13.4	"	"	"	"	"	"	
Phenanthrene	**47.6**	13.4	"	"	"	"	"	"	
Pyrene	**143**	13.4	"	"	"	"	"	"	
Surr: Fluorene-d10	*100 %*	*40-150*							
Surr: Pyrene-d10	*119 %*	*40-150*							
Surr: Benzo (a) pyrene-d12	*94.1 %*	*40-150*							

North Creek Analytical - Portland

Philip Nerenberg

Philip Nerenberg, Laboratory Manager

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Hahn and Associates, Inc.	Project: Gasco Upland	
434 NW Sixth Ave., Suite 203	Project Number: 2708	**Reported:**
Portland, OR 97209	Project Manager: Rob Ede	06/22/04 11:43

Conventional Chemistry Parameters per APHA/EPA Methods
North Creek Analytical - Portland

Analyte	Result	Reporting Limit	Units	Dilution	Method	Prepared	Analyzed	Batch	Notes
2708-040601-01 (P4F0113-01) Soil					Sampled: 06/01/04 Received: 06/02/04				
Cyanide (total)	ND	0.435	mg/kg dry	1	EPA 9010B	06/11/04	06/11/04	4060488	
2708-040601-03 (P4F0113-03) Soil					Sampled: 06/01/04 Received: 06/02/04				
Cyanide (total)	ND	0.379	mg/kg dry	1	EPA 9010B	06/11/04	06/11/04	4060488	

North Creek Analytical - Portland

Philip Nerenberg

Philip Nerenberg, Laboratory Manager

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Hahn and Associates, Inc.	Project: Gasco Upland	
434 NW Sixth Ave., Suite 203	Project Number: 2708	**Reported:**
Portland, OR 97209	Project Manager: Rob Ede	06/22/04 11:43

Percent Dry Weight (Solids) per Standard Methods

North Creek Analytical - Portland

Analyte	Result	Reporting Limit	Units	Dilution	Method	Prepared	Analyzed	Batch	Notes
2708-040601-01 (P4F0113-01) Soil					Sampled: 06/01/04 Received: 06/02/04				
% Solids	**82.3**	1.00	% by Weight	1	NCA SOP	06/07/04	06/08/04	4060285	
2708-040601-03 (P4F0113-03) Soil					Sampled: 06/01/04 Received: 06/02/04				
% Solids	**75.6**	1.00	% by Weight	1	NCA SOP	06/07/04	06/08/04	4060285	
2708-040601-04 (P4F0113-04) Soil					Sampled: 06/01/04 Received: 06/02/04				
% Solids	**70.5**	1.00	% by Weight	1	NCA SOP	06/07/04	06/08/04	4060285	

North Creek Analytical - Portland

Philip Nerenberg

Philip Nerenberg, Laboratory Manager

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Hahn and Associates, Inc.	Project: Gasco Upland	
434 NW Sixth Ave., Suite 203	Project Number: 2708	**Reported:**
Portland, OR 97209	Project Manager: Rob Ede	06/22/04 11:43

BTEX per EPA Method 8021B - Quality Control

North Creek Analytical - Portland

Analyte	Result	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
Batch 4060277 - EPA 5035										
Blank (4060277-BLK1)				Prepared: 06/07/04 Analyzed: 06/08/04						
Benzene	ND	0.0500	mg/kg							
Toluene	ND	0.0500	"							
Ethylbenzene	ND	0.0500	"							
Xylenes (total)	ND	0.0500	"							
Surr: a,a,a-TFT (PID)	*1.35*		"	*1.25*		*108*	*60-130*			
LCS (4060277-BS1)				Prepared: 06/07/04 Analyzed: 06/08/04						
Benzene	1.36	0.0500	mg/kg	1.25		109	70-130			
Toluene	1.42	0.0500	"	1.25		114	70-130			
Ethylbenzene	1.32	0.0500	"	1.25		106	70-130			
Xylenes (total)	4.44	0.0500	"	3.75		118	70-130			
Surr: a,a,a-TFT (PID)	*1.42*		"	*1.25*		*114*	*60-130*			
Matrix Spike (4060277-MS1)	**Source: P4F0113-01**			Prepared: 06/07/04 Analyzed: 06/09/04						
Benzene	1.29	0.0500	mg/kg dry	1.52	ND	84.9	65-130			
Toluene	1.36	0.0500	"	1.52	ND	89.5	65-130			
Ethylbenzene	1.34	0.0500	"	1.52	ND	88.2	65-130			
Xylenes (total)	4.33	0.0500	"	4.55	ND	95.2	65-130			
Surr: a,a,a-TFT (PID)	*0.809*		"	*1.52*		*53.2*	*60-130*			*S-09*
Matrix Spike Dup (4060277-MSD1)	**Source: P4F0113-01**			Prepared: 06/07/04 Analyzed: 06/09/04						
Benzene	1.36	0.0500	mg/kg dry	1.52	ND	89.5	65-130	5.28	20	
Toluene	1.45	0.0500	"	1.52	ND	95.4	65-130	6.41	20	
Ethylbenzene	1.40	0.0500	"	1.52	ND	92.1	65-130	4.38	20	
Xylenes (total)	4.49	0.0500	"	4.55	ND	98.7	65-130	3.63	20	
Surr: a,a,a-TFT (PID)	*0.981*		"	*1.52*		*64.5*	*60-130*			

North Creek Analytical - Portland

Philip Nerenberg

Philip Nerenberg, Laboratory Manager

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Hahn and Associates, Inc.	Project: Gasco Upland	
434 NW Sixth Ave., Suite 203	Project Number: 2708	**Reported:**
Portland, OR 97209	Project Manager: Rob Ede	06/22/04 11:43

Polynuclear Aromatic Compounds per EPA 8270M-SIM - Quality Control

North Creek Analytical - Portland

Analyte	Result	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
Batch 4060142 - EPA 3550										
Blank (4060142-BLK1)				Prepared: 06/03/04 Analyzed: 06/09/04						
Benzo (e) pyrene	ND	13.4	ug/kg							
Acenaphthene	ND	13.4	"							
Acenaphthylene	ND	13.4	"							
Anthracene	ND	13.4	"							
Benzo (a) anthracene	ND	13.4	"							
Benzo (a) pyrene	ND	13.4	"							
Benzo (b) fluoranthene	ND	13.4	"							
Benzo (ghi) perylene	ND	13.4	"							
Benzo (k) fluoranthene	ND	13.4	"							
Chrysene	ND	13.4	"							
Dibenzo (a,h) anthracene	ND	13.4	"							
Fluoranthene	ND	13.4	"							
Fluorene	ND	13.4	"							
Indeno (1,2,3-cd) pyrene	ND	13.4	"							
Naphthalene	ND	13.4	"							
Phenanthrene	ND	13.4	"							
Pyrene	ND	13.4	"							
Surr: Fluorene-d10	*80.8*		"	*83.3*		*97.0*	*40-150*			
Surr: Pyrene-d10	*101*		"	*83.3*		*121*	*40-150*			
Surr: Benzo (a) pyrene-d12	*45.0*		"	*83.3*		*54.0*	*40-150*			
LCS (4060142-BS1)				Prepared: 06/03/04 Analyzed: 06/08/04						
Acenaphthene	160	13.4	ug/kg	167		95.8	33-139			
Benzo (a) pyrene	158	13.4	"	167		94.6	45-149			
Pyrene	165	13.4	"	167		98.8	39-138			
Surr: Fluorene-d10	*84.7*		"	*83.3*		*102*	*40-150*			
Surr: Pyrene-d10	*87.0*		"	*83.3*		*104*	*40-150*			
Surr: Benzo (a) pyrene-d12	*82.5*		"	*83.3*		*99.0*	*40-150*			

North Creek Analytical - Portland

Philip Nerenberg

Philip Nerenberg, Laboratory Manager

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Hahn and Associates, Inc.	Project: Gasco Upland	
434 NW Sixth Ave., Suite 203	Project Number: 2708	**Reported:**
Portland, OR 97209	Project Manager: Rob Ede	06/22/04 11:43

Polynuclear Aromatic Compounds per EPA 8270M-SIM - Quality Control

North Creek Analytical - Portland

Analyte	Result	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
Batch 4060142 - EPA 3550										
Matrix Spike (4060142-MS1)	**Source: P4F0077-01**			Prepared: 06/03/04		Analyzed: 06/09/04				
Acenaphthene	175	13.4	ug/kg dry	185	ND	94.6	33-139			
Benzo (a) pyrene	153	13.4	"	185	ND	82.7	45-149			
Pyrene	178	13.4	"	185	ND	96.2	39-138			
Surr: Fluorene-d10	*94.8*		"	*92.5*		*102*	*40-150*			
Surr: Pyrene-d10	*94.3*		"	*92.5*		*102*	*40-150*			
Surr: Benzo (a) pyrene-d12	*78.7*		"	*92.5*		*85.1*	*40-150*			
Matrix Spike Dup (4060142-MSD1)	**Source: P4F0077-01**			Prepared: 06/03/04		Analyzed: 06/08/04				
Acenaphthene	168	13.4	ug/kg dry	185	ND	90.8	33-139	4.08	60	
Benzo (a) pyrene	200	13.4	"	185	ND	108	45-149	26.6	60	
Pyrene	173	13.4	"	185	ND	93.5	39-138	2.85	60	
Surr: Fluorene-d10	*89.2*		"	*92.5*		*96.4*	*40-150*			
Surr: Pyrene-d10	*90.4*		"	*92.5*		*97.7*	*40-150*			
Surr: Benzo (a) pyrene-d12	*97.6*		"	*92.5*		*106*	*40-150*			

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Philip Nerenberg

Philip Nerenberg, Laboratory Manager

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Hahn and Associates, Inc.	Project: Gasco Upland	
434 NW Sixth Ave., Suite 203	Project Number: 2708	**Reported:**
Portland, OR 97209	Project Manager: Rob Ede	06/22/04 11:43

Conventional Chemistry Parameters per APHA/EPA Methods - Quality Control

North Creek Analytical - Portland

Analyte	Result	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
Batch 4060488 - General Preparation										
Blank (4060488-BLK1)				Prepared & Analyzed: 06/11/04						
Cyanide (total)	ND	0.500	mg/kg							
LCS (4060488-BS1)				Prepared & Analyzed: 06/11/04						
Cyanide (total)	9.38	0.500	mg/kg	10.0		93.8	75-125			
Duplicate (4060488-DUP1)		**Source: P4F0113-01**		Prepared & Analyzed: 06/11/04						
Cyanide (total)	0.318	0.336	mg/kg dry		0.259			20.5	40	
Matrix Spike (4060488-MS1)		**Source: P4F0113-01**		Prepared & Analyzed: 06/11/04						
Cyanide (total)	9.23	0.410	mg/kg dry	9.96	0.259	90.1	75-125			

North Creek Analytical - Portland

Philip Nerenberg

Philip Nerenberg, Laboratory Manager

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Hahn and Associates, Inc.	Project: Gasco Upland	
434 NW Sixth Ave., Suite 203	Project Number: 2708	**Reported:**
Portland, OR 97209	Project Manager: Rob Ede	06/22/04 11:43

Percent Dry Weight (Solids) per Standard Methods - Quality Control

North Creek Analytical - Portland

Analyte	Result	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
Batch 4060285 - Dry Weight										
Duplicate (4060285-DUP1)		**Source: P4F0169-05**		Prepared: 06/07/04 Analyzed: 06/08/04						
% Solids	80.0	1.00% by Weight			80.3			0.374	20	
Duplicate (4060285-DUP2)		**Source: P4F0169-06**		Prepared: 06/07/04 Analyzed: 06/08/04						
% Solids	77.4	1.00% by Weight			77.5			0.129	20	

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Philip Nerenberg

Philip Nerenberg, Laboratory Manager

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Hahn and Associates, Inc.	Project: Gasco Upland	
434 NW Sixth Ave., Suite 203	Project Number: 2708	**Reported:**
Portland, OR 97209	Project Manager: Rob Ede	06/22/04 11:43

Notes and Definitions

S-09	Surrogate recovery is outside control limits due to matrix interference.
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. MRLs are adjusted if %Solids are less than 50%.
wet	Sample results reported on a wet weight basis (as received)
RPD	Relative Percent Difference

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Philip Nerenberg

Philip Nerenberg, Laboratory Manager

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SCOEPA00014084

APPENDIX I

Core Photography and Physical Properties Data Report: Well MW-16

SCOEPA00014085

PTS Laboratories
ENVIRONMENTAL SERVICES

January 26, 2005

Mr. Rob Ede
Hahn and Associates, Inc.
434 NW 6th Avenue, Suite 203
Portland, OR 97209

Re: NW Natural-Gasco
PTS File 34452

Dear Mr. Ede:

Enclosed are final data and PhotoLog™ of samples submitted from your NW Natural-Gasco Project 2708-10. Electronic versions of the data have been previously sent to your attention and are on the enclosed CD along with digital images. All analyses were performed by applicable ASTM, EPA or API methodology. The samples are currently preserved in frozen storage pending further analyses. Core storage charges of $65.00/mo will start January 2005.

We appreciate the opportunity to be of service and trust these data will prove beneficial in the development of this project. Please call me at (562) 907-3607 with any questions or if you require additional information.

Sincerely,
PTS Laboratories, Inc.

Larry Kunkel
District Manager

LAK:re

Encl.

8100 Secura Way -- Santa Fe Springs, CA 90670
Phone 562.907.3607 Fax 562.907.3610
www.ptsgeolabs.com

PHYSICAL PROPERTIES DATA

(METHODOLOGY: ASTM D2216 / API RP40, API RP40)

PROJECT NAME: NW Natural Gasco
PROJECT NO: 2708-10

		METHODS:	API RP 40 / ASTM D2216	API RP 40		API RP 40		API RP 40	
SAMPLE ID.	DEPTH, ft.	SAMPLE ORIENTATION (1)	MOISTURE CONTENT (% wt)	DENSITY		POROSITY, %Vb (2)		PORE FLUID SATURATIONS, % Pv (3)	
				BULK (g/cc)	GRAIN (g/cc)	TOTAL	AIR FILLED	WATER	NAPL
MW-16-65	27.5	V	34.6	1.30	2.64	50.6	5.8	77.4	11.2
MW-16-65	29.2	V	39.3	1.24	2.65	53.0	4.9	67.6	23.1
MW-16-65	31.5	V	33.7	1.27	2.65	52.1	10.5	43.7	36.1
MW-16-65	33.5	V	32.1	1.34	2.71	50.6	8.2	63.1	20.7
MW-16-65	35.7	V	37.9	1.25	2.64	52.7	7.1	36.2	50.3
MW-16-65	38.5	V	35.8	1.31	2.67	51.0	5.3	55.8	33.8
MW-16-65	40.4	V	28.4	1.39	2.65	47.5	8.8	50.6	30.8
MW-16-65	42.5	V	27.4	1.45	2.68	45.9	6.1	85.4	1.4
MW-16-65	44.8	V	29.0	1.40	2.69	48.0	7.3	83.8	0.9
MW-16-65	45.3	V	29.8	1.39	2.69	48.1	6.6	83.2	3.2
MW-16-65	60.7	V	23.9	1.54	2.66	42.2	5.2	87.6	ND <0.1

(1) Sample Orientation: H = horizontal; V = vertical (2) Total Porosity = no pore fluids in place; all interconnected pore channels; Air Filled = pore channels not occupied by pore fluids (3) Water = 0.9989 g/cc, Hydrocarbon = 1.0700 g/cc; Vb = Bulk Volume, cc; Pv = Pore Volume, cc; ND = Not Detected

PTS Laboratories

Hahn and Associates, Inc.
PTS File No: 34452

FREE PRODUCT MOBILITY: INITIAL AND RESIDUAL SATURATIONS

PROJECT NAME: NW Natural Gasco
PROJECT NO: 2708-10

METHODS:			API RP40	API RP40	API RP40	ASTM D425M, DEAN-STARK			
						PORE FLUID SATURATIONS, % Pv			
						Initial Fluid Saturations		After Centrifuge at 1000xG (2)	
SAMPLE ID.	DEPTH, ft.	SAMPLE ORIENTATION (1)	BULK DENSITY, (g/cc)	GRAIN DENSITY, (g/cc)	TOTAL POROSITY, %Vb	WATER (Swi) SATURATION	NAPL (Soi) SATURATION	WATER (Srw) SATURATION	NAPL (Sor) SATURATION
MW-16-65	35.55	H	1.27	2.65	52.0	31.8	51.9	31.8	34.4
MW-16-65	40.10	H	1.53	2.66	42.4	64.0	23.0	42.3	17.3
MW-16-65	42.35	H	1.45	2.69	46.0	84.6	1.2	65.3	1.2

N/A = Not Analyzed. Vb = Bulk Volume, Pv = Pore Volume. (1) H = horizontal, V = vertical; (2) Samples centrifuged under water
Soi = Initial NAPL Saturation as received prior to centrifuging at 1000xG, Swi = Initial Water Saturation as received prior to centrifuging at 1000xG
Sor = Residual NAPL Saturation after centrifuging at 1000xG, Srw = Residual Water Saturation after centrifuging at 1000xG
Fluid Densities for pore fluid saturation calculations: Water =0.9989 g/cc, NAPL = 1.0700 g/cc.

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PTS Laboratories

Hahn + Associates
PTS File No: 34452

AMOTT WETTABILITY DATA

PROJECT NAME: NW Natural Gasco
PROJECT NO: 2708-10

Sample ID	Depth, feet	Porosity, Total % Pore Volume	NAPL Displacing Water, ml		NAPL Wetting Index (1)	Water Displacing NAPL, ml		Water Wetting Index (2)	Wettability Index (3)
			Spontaneous Water Production	Total Water Production		Spontaneous NAPL Production	Total NAPL Production		
MW-16-65	35.55	46.9	0.01	2.50	0.00	0.01	2.10	0.00	0.00

(1) Amott Oil-Wetting Index = Spontaneous Water Displaced, ml / Total Water Displaced, ml
(2) Amott Water-Wetting Index = Spontaneous Oil Displaced, ml / Total Oil Displaced, ml
(3) Wettability Index, WI = Oil-Wetting Index - Water-Wetting Index
WI = 1 = Strongly Water Wet
WI = 0 = Netural
WI = -1 = Strongly Oil Wet

SCOEPA00014089

VISCOSITY, SPECIFIC GRAVITY and DENSITY DATA

(METHODOLOGY: - ASTM D445, API RP40)

PROJECT NAME: NW Natural Gasco
PROJECT NO: 2708-10

SAMPLE ID	MATRIX	TEMP., (°F)	SPECIFIC GRAVITY	DENSITY (g/cc)	VISCOSITY (centistokes)	VISCOSITY (centipoise)
MW-16-45-OIL	Water	70	1.001	0.9987	1.015	1.013
		100	1.002	0.9953	0.704	0.701
		130	1.007	0.9924	0.530	0.526
MW-16-45-OIL	DNAPL	70	1.084	1.081	105	114
		100	1.079	1.072	40.1	43.0
		130	1.080	1.065	18.7	20.0

INTERFACIAL / SURFACE TENSION DATA

(METHODOLOGY: DuNuoy Method - ASTM D971)

PROJECT NAME: NW Natural Gasco
PROJECT NO: 2708-10

PHASE PAIR		TEMP.,	INTERFACIAL TENSION,
SAMPLE ID / PHASE	SAMPLE ID / PHASE	(°F)	(Dynes/centimeter)
MW-16-45-OIL (Water)	Air	70	66.7
MW-16-45-OIL (DNAPL)	Air	70	34.9
MW-16-45-OIL (DNAPL)	MW-16-45-OIL (Water)	70	14.2

QUALITY CONTROL DATA

PHASE PAIR:	DIWATER / AIR
TEMPERATURE, °F:	70
IFT, MEASURED:	73.2
IFT, PUBLISHED:	72.6
RPD:	0.89

PTS Laboratories, Inc.

Hahn and Associates, Inc.
PTS File No: 34452

PARTICLE SIZE SUMMARY

(METHODOLOGY: ASTM D422/D4464M)

PROJECT NAME: NW Natural-Gasco
PROJECT NO: 2708-10

Sample ID	Depth, ft.	Mean Grain Size Description (1)	Median Grain Size mm	Particle Size Distribution, wt. percent						Silt & Clay
				Gravel	Sand Size			Silt	Clay	
					Coarse	Medium	Fine			
MW-16-65	27.50	Silt	0.027	0.00	0.00	0.00	27.81	49.70	22.49	72.19
MW-16-65	29.20	Silt	0.040	0.00	0.00	0.00	34.98	48.63	16.39	65.02
MW-16-65	31.50	Fine sand	0.198	0.00	0.00	1.66	74.97	16.97	6.41	23.37
MW-16-65	33.50	Fine sand	0.134	0.00	0.00	0.60	60.77	27.97	10.66	38.63
MW-16-65	35.70	Fine sand	0.199	0.00	0.00	1.63	73.22	17.85	7.30	25.15
MW-16-65	38.50	Fine sand	0.187	0.00	0.00	0.85	72.40	17.73	9.02	26.75
MW-16-65	40.40	Fine sand	0.145	0.00	0.00	0.18	63.46	24.31	12.05	36.36
MW-16-65	42.50	Fine sand	0.235	0.00	0.00	8.04	71.96	13.68	6.33	20.00
MW-16-65	44.80	Fine sand	0.175	0.00	0.00	0.08	78.02	14.99	6.90	21.90
MW-16-65	45.30	Fine sand	0.257	0.00	0.00	11.95	62.41	17.77	7.87	25.64
MW-16-65	60.70	Fine sand	0.183	0.00	0.00	2.64	72.80	17.30	7.26	24.56

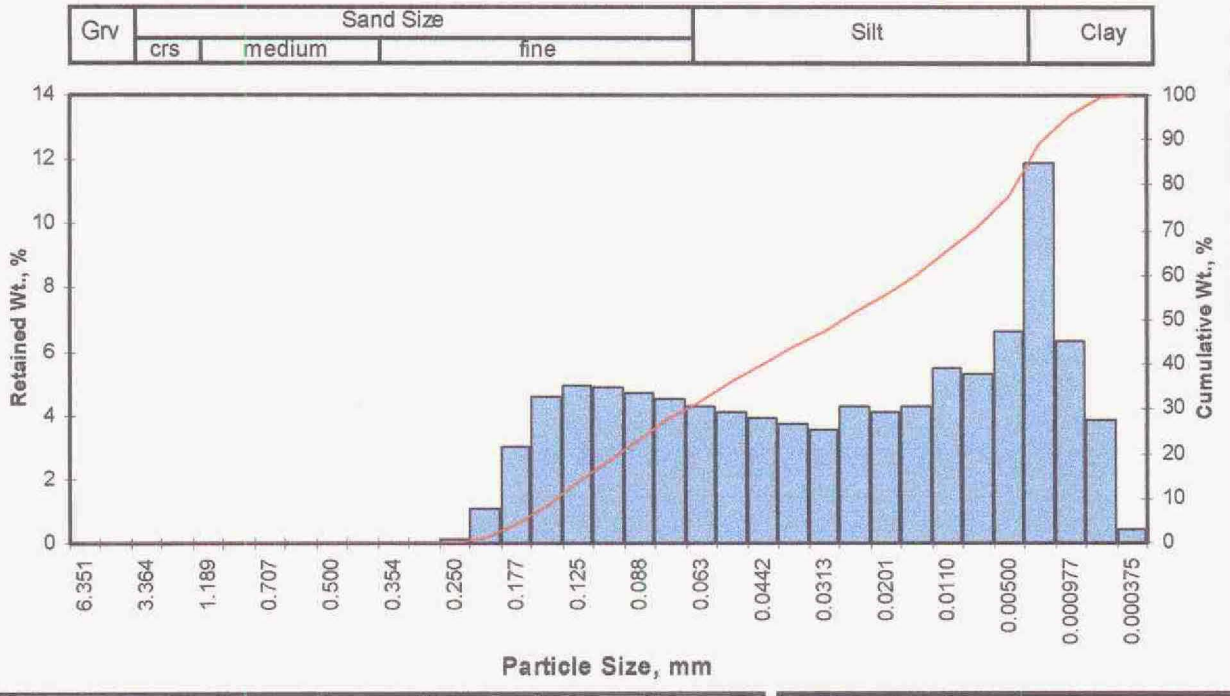
(1) Based on Mean from Trask

SCOEPA00014092

PTS Laboratories, Inc.

Particle Size Analysis - ASTM D4464M

Client:	Hahn and Associates, Inc.	**PTS File No:**	34452
Project:	NW Natural-Gasco	**Sample ID:**	MW-16-65
Project No:	2708-10	**Depth, ft:**	27.50



Particle Size, mm

Opening		Phi of	U.S.	Sample	Increment	Cumulative
Inches	Millimeters	Screen	No.	Weight, grams	Weight, percent	Weight, percent
0.2500	6.351	-2.67	1/4	0.00	0.00	0.00
0.1873	4.757	-2.25	4	0.00	0.00	0.00
0.1324	3.364	-1.75	6	0.00	0.00	0.00
0.0787	2.000	-1.00	10	0.00	0.00	0.00
0.0468	1.189	-0.25	16	0.00	0.00	0.00
0.0331	0.841	0.25	20	0.00	0.00	0.00
0.0278	0.707	0.50	25	0.00	0.00	0.00
0.0234	0.595	0.75	30	0.00	0.00	0.00
0.0197	0.500	1.00	35	0.00	0.00	0.00
0.0166	0.420	1.25	40	0.00	0.00	0.00
0.0139	0.354	1.50	45	0.00	0.00	0.00
0.0117	0.297	1.75	50	0.00	0.00	0.00
0.0098	0.250	2.00	60	0.13	0.13	0.13
0.0083	0.210	2.25	70	1.10	1.10	1.23
0.0070	0.177	2.50	80	3.00	3.00	4.23
0.0059	0.149	2.75	100	4.58	4.58	8.81
0.0049	0.125	3.00	120	4.95	4.95	13.75
0.0041	0.105	3.25	140	4.87	4.87	18.62
0.0035	0.088	3.50	170	4.69	4.69	23.31
0.0029	0.074	3.75	200	4.51	4.51	27.81
0.0025	0.063	4.00	230	4.29	4.29	32.10
0.0021	0.053	4.25	270	4.09	4.09	36.19
0.00174	0.0442	4.50	325	3.93	3.93	40.12
0.00146	0.0372	4.75	400	3.75	3.75	43.86
0.00123	0.0313	5.00	450	3.54	3.54	47.40
0.000986	0.0250	5.32	500	4.27	4.27	51.67
0.000790	0.0201	5.64	635	4.10	4.10	55.77
0.000615	0.0156	6.00		4.31	4.31	60.07
0.000435	0.0110	6.50		5.51	5.51	65.58
0.000308	0.00781	7.00		5.29	5.29	70.87
0.000197	0.00500	7.65		6.65	6.65	77.51
0.000077	0.00195	9.00		11.90	11.89	89.41
0.000038	0.000977	10.00		6.31	6.31	95.71
0.000019	0.000488	11.00		3.87	3.87	99.58
0.000015	0.000375	11.38		0.42	0.42	100.00
TOTALS				**100.10**	**100.00**	**100.00**

Cumulative Weight Percent greater than

Weight percent	Phi Value	Particle Size Inches	Particle Size Millimeters
5	2.54	0.0068	0.172
10	2.81	0.0056	0.143
16	3.12	0.0045	0.115
25	3.59	0.0033	0.083
40	4.49	0.0017	0.044
50	5.19	0.0011	0.027
60	5.99	0.0006	0.016
75	7.40	0.0002	0.006
84	8.38	0.0001	0.003
90	9.09	0.0001	0.002
95	9.89	0.0000	0.001

Measure	Trask	Inman	Folk-Ward
Median, phi	5.19	5.19	5.19
Median, in.	0.0011	0.0011	0.0011
Median, mm	0.027	0.027	0.027
Mean, phi	4.49	5.75	5.56
Mean, in.	0.0017	0.0007	0.0008
Mean, mm	0.044	0.019	0.021
Sorting	3.741	2.634	2.430
Skewness	0.811	0.211	0.244
Kurtosis	0.273	0.394	0.791

Grain Size Description (ASTM-USCS Scale)	Silt (based on Mean from Trask)

Description	Retained on Sieve #	Weight Percent
Gravel	4	0.00
Coarse Sand	10	0.00
Medium Sand	40	0.00
Fine Sand	200	27.81
Silt	>0.005 mm	49.70
Clay	<0.005 mm	22.49
	Total	**100**

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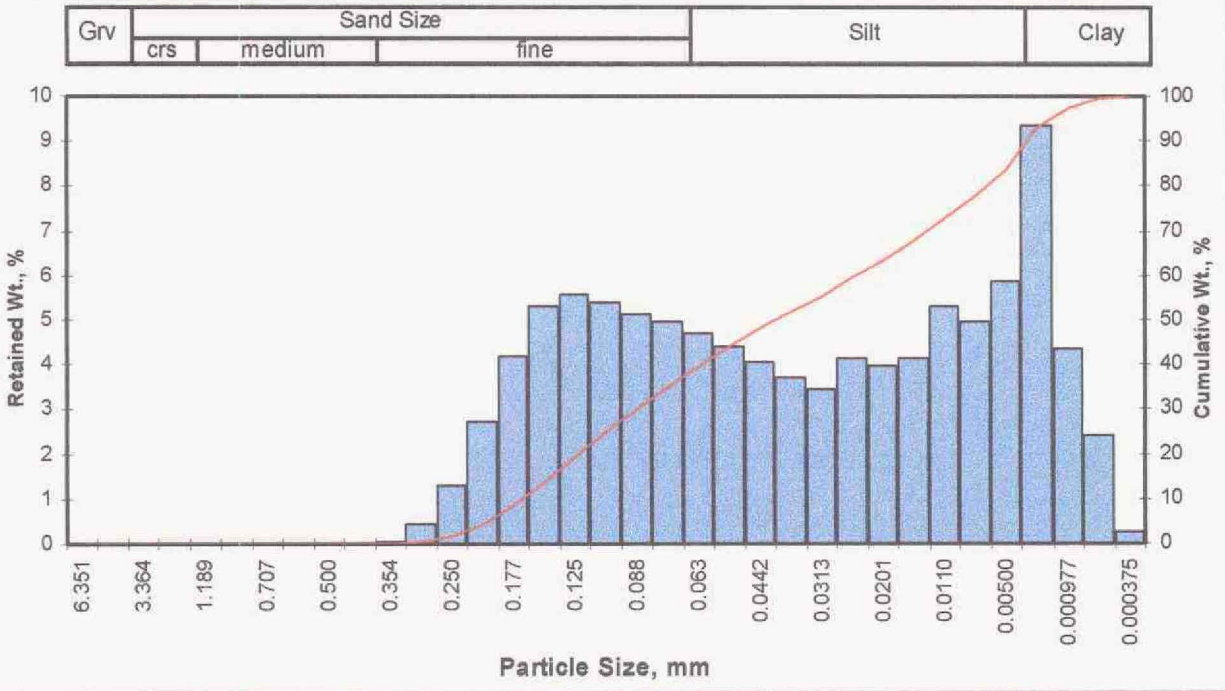
Fax: (562) 907-3610

PTS Laboratories, Inc.

Particle Size Analysis - ASTM D4464M

Client:	Hahn and Associates, Inc.	**PTS File No:**	34452
Project:	NW Natural-Gasco	**Sample ID:**	MW-16-65
Project No:	2708-10	**Depth, ft:**	29.20



Opening Inches	Opening Millimeters	Phi of Screen	U.S. No.	Sample Weight, grams	Increment Weight, percent	Cumulative Weight, percent
0.2500	6.351	-2.67	1/4	0.00	0.00	0.00
0.1873	4.757	-2.25	4	0.00	0.00	0.00
0.1324	3.364	-1.75	6	0.00	0.00	0.00
0.0787	2.000	-1.00	10	0.00	0.00	0.00
0.0468	1.189	-0.25	16	0.00	0.00	0.00
0.0331	0.841	0.25	20	0.00	0.00	0.00
0.0278	0.707	0.50	25	0.00	0.00	0.00
0.0234	0.595	0.75	30	0.00	0.00	0.00
0.0197	0.500	1.00	35	0.00	0.00	0.00
0.0166	0.420	1.25	40	0.00	0.00	0.00
0.0139	0.354	1.50	45	0.03	0.03	0.03
0.0117	0.297	1.75	50	0.42	0.42	0.45
0.0098	0.250	2.00	60	1.31	1.31	1.76
0.0083	0.210	2.25	70	2.72	2.72	4.48
0.0070	0.177	2.50	80	4.18	4.18	8.66
0.0059	0.149	2.75	100	5.28	5.28	13.94
0.0049	0.125	3.00	120	5.54	5.54	19.48
0.0041	0.105	3.25	140	5.40	5.40	24.88
0.0035	0.088	3.50	170	5.15	5.15	30.03
0.0029	0.074	3.75	200	4.95	4.95	34.98
0.0025	0.063	4.00	230	4.70	4.70	39.68
0.0021	0.053	4.25	270	4.38	4.38	44.06
0.00174	0.0442	4.50	325	4.03	4.03	48.09
0.00146	0.0372	4.75	400	3.71	3.71	51.80
0.00123	0.0313	5.00	450	3.43	3.43	55.24
0.000986	0.0250	5.32	500	4.13	4.13	59.37
0.000790	0.0201	5.64	635	3.96	3.96	63.33
0.000615	0.0156	6.00		4.15	4.15	67.48
0.000435	0.0110	6.50		5.32	5.32	72.80
0.000308	0.00781	7.00		4.96	4.96	77.76
0.000197	0.00500	7.65		5.85	5.85	83.61
0.000077	0.00195	9.00		9.37	9.37	92.98
0.000038	0.000977	10.00		4.35	4.35	97.33
0.000019	0.000488	11.00		2.42	2.42	99.75
0.000015	0.000375	11.38		0.25	0.25	100.00
TOTALS				**100.00**	**100.00**	**100.00**

Cumulative Weight Percent greater than

Weight percent	Phi Value	Particle Size Inches	Particle Size Millimeters
5	2.28	0.0081	0.206
10	2.56	0.0067	0.169
16	2.84	0.0055	0.139
25	3.26	0.0041	0.105
40	4.02	0.0024	0.062
50	4.63	0.0016	0.040
60	5.37	0.0010	0.024
75	6.72	0.0004	0.009
84	7.70	0.0002	0.005
90	8.57	0.0001	0.003
95	9.46	0.0001	0.001

Measure	Trask	Inman	Folk-Ward
Median, phi	4.63	4.63	4.63
Median, in.	0.0016	0.0016	0.0016
Median, mm	0.040	0.040	0.040
Mean, phi	4.13	5.27	5.06
Mean, in.	0.0022	0.0010	0.0012
Mean, mm	0.057	0.026	0.030
Sorting	3.325	2.429	2.303
Skewness	0.779	0.265	0.306
Kurtosis	0.286	0.478	0.849
Grain Size Description (ASTM-USCS Scale)		(based on Mean from Trask)	Silt

Description	Retained on Sieve #	Weight Percent
Gravel	4	0.00
Coarse Sand	10	0.00
Medium Sand	40	0.00
Fine Sand	200	34.98
Silt	>0.005 mm	48.63
Clay	<0.005 mm	16.39
	Total	**100**

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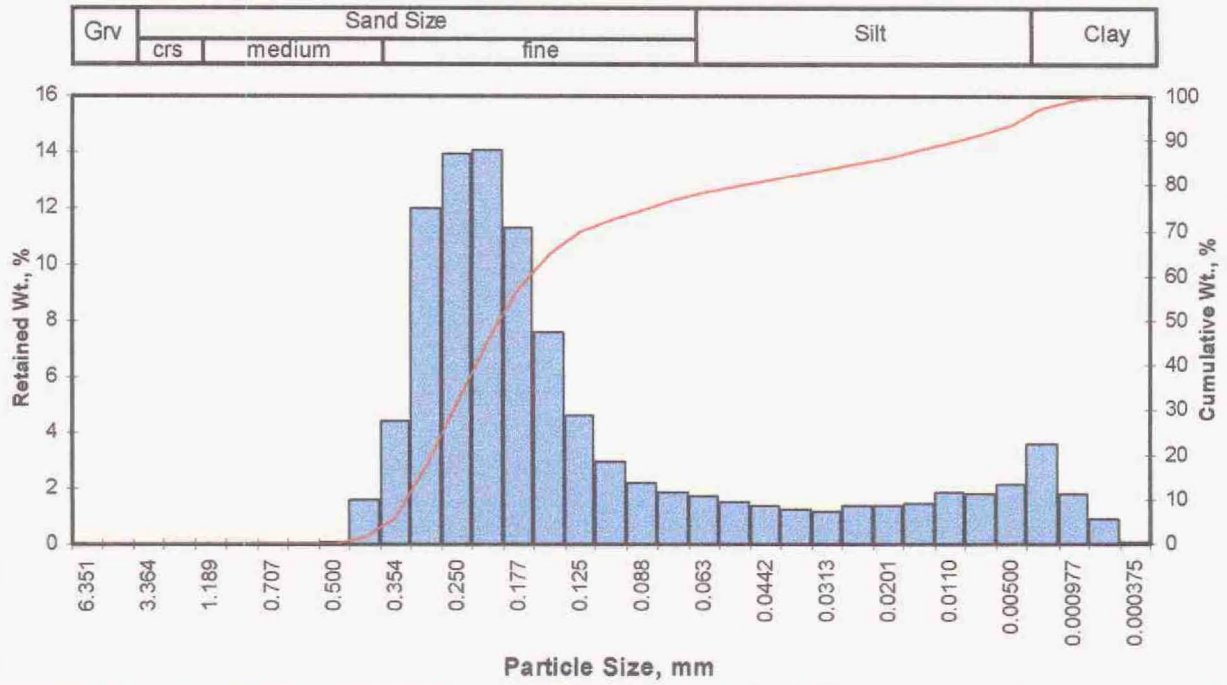
Particle Size Analysis - ASTM D4464M

Client:	Hahn and Associates, Inc.	**PTS File No:**	34452
Project:	NW Natural-Gasco	**Sample ID:**	MW-16-65
Project No:	2708-10	**Depth, ft:**	31.50



Opening Inches	Opening Millimeters	Phi of Screen	U.S. No.	Sample Weight, grams	Increment Weight, percent	Cumulative Weight, percent
0.2500	6.351	-2.67	1/4	0.00	0.00	0.00
0.1873	4.757	-2.25	4	0.00	0.00	0.00
0.1324	3.364	-1.75	6	0.00	0.00	0.00
0.0787	2.000	-1.00	10	0.00	0.00	0.00
0.0468	1.189	-0.25	16	0.00	0.00	0.00
0.0331	0.841	0.25	20	0.00	0.00	0.00
0.0278	0.707	0.50	25	0.00	0.00	0.00
0.0234	0.595	0.75	30	0.00	0.00	0.00
0.0197	0.500	1.00	35	0.09	0.09	0.09
0.0166	0.420	1.25	40	1.57	1.57	1.66
0.0139	0.354	1.50	45	4.43	4.43	6.09
0.0117	0.297	1.75	50	12.00	12.00	18.09
0.0098	0.250	2.00	60	13.90	13.90	31.98
0.0083	0.210	2.25	70	14.10	14.10	46.08
0.0070	0.177	2.50	80	11.30	11.30	57.38
0.0059	0.149	2.75	100	7.61	7.61	64.99
0.0049	0.125	3.00	120	4.63	4.63	69.62
0.0041	0.105	3.25	140	2.95	2.95	72.57
0.0035	0.088	3.50	170	2.18	2.18	74.75
0.0029	0.074	3.75	200	1.88	1.88	76.63
0.0025	0.063	4.00	230	1.70	1.70	78.33
0.0021	0.053	4.25	270	1.52	1.52	79.85
0.00174	0.0442	4.50	325	1.36	1.36	81.21
0.00146	0.0372	4.75	400	1.25	1.25	82.45
0.00123	0.0313	5.00	450	1.16	1.16	83.61
0.000986	0.0250	5.32	500	1.41	1.41	85.02
0.000790	0.0201	5.64	635	1.35	1.35	86.37
0.000615	0.0156	6.00		1.44	1.44	87.81
0.000435	0.0110	6.50		1.89	1.89	89.70
0.000308	0.00781	7.00		1.78	1.78	91.48
0.000197	0.00500	7.65		2.11	2.11	93.59
0.000077	0.00195	9.00		3.62	3.62	97.21
0.000038	0.000977	10.00		1.80	1.80	99.01
0.000019	0.000488	11.00		0.90	0.90	99.91
0.000015	0.000375	11.38		0.09	0.09	100.00
TOTALS				**100.00**	**100.00**	**100.00**

Cumulative Weight Percent greater than			
Weight percent	Phi Value	Particle Size Inches	Particle Size Millimeters
5	1.44	0.0145	0.369
10	1.58	0.0132	0.334
16	1.71	0.0121	0.306
25	1.87	0.0107	0.273
40	2.14	0.0089	0.227
50	2.34	0.0078	0.198
60	2.59	0.0066	0.167
75	3.53	0.0034	0.086
84	5.09	0.0012	0.029
90	6.58	0.0004	0.010
95	8.17	0.0001	0.003

Measure	Trask	Inman	Folk-Ward
Median, phi	2.34	2.34	2.34
Median, in.	0.0078	0.0078	0.0078
Median, mm	0.198	0.198	0.198
Mean, phi	2.48	3.40	3.04
Mean, in.	0.0071	0.0037	0.0048
Mean, mm	0.180	0.095	0.121
Sorting	1.777	1.690	1.865
Skewness	0.775	0.627	0.680
Kurtosis	0.288	0.991	1.663

Grain Size Description (ASTM-USCS Scale)	Fine sand (based on Mean from Trask)

Description	Retained on Sieve #	Weight Percent
Gravel	4	0.00
Coarse Sand	10	0.00
Medium Sand	40	1.66
Fine Sand	200	74.97
Silt	>0.005 mm	16.97
Clay	<0.005 mm	6.41
	Total	**100**

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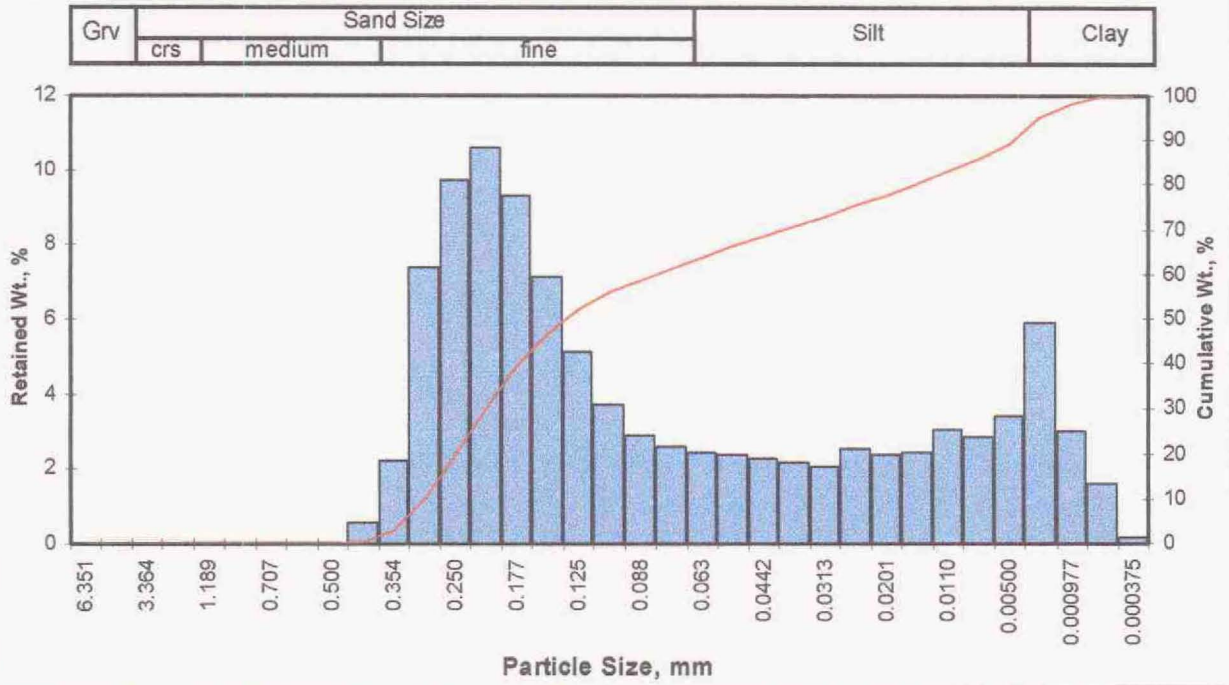
Particle Size Analysis - ASTM D4464M

Client: Hahn and Associates, Inc.
Project: NW Natural-Gasco
Project No: 2708-10

PTS File No: 34452
Sample ID: MW-16-65
Depth, ft: 33.50



Opening Inches	Opening Millimeters	Phi of Screen	U.S. No.	Sample Weight, grams	Increment Weight, percent	Cumulative Weight, percent
0.2500	6.351	-2.67	1/4	0.00	0.00	0.00
0.1873	4.757	-2.25	4	0.00	0.00	0.00
0.1324	3.364	-1.75	6	0.00	0.00	0.00
0.0787	2.000	-1.00	10	0.00	0.00	0.00
0.0468	1.189	-0.25	16	0.00	0.00	0.00
0.0331	0.841	0.25	20	0.00	0.00	0.00
0.0278	0.707	0.50	25	0.00	0.00	0.00
0.0234	0.595	0.75	30	0.00	0.00	0.00
0.0197	0.500	1.00	35	0.02	0.02	0.02
0.0166	0.420	1.25	40	0.58	0.58	0.60
0.0139	0.354	1.50	45	2.22	2.22	2.82
0.0117	0.297	1.75	50	7.42	7.42	10.24
0.0098	0.250	2.00	60	9.70	9.70	19.94
0.0083	0.210	2.25	70	10.60	10.60	30.54
0.0070	0.177	2.50	80	9.31	9.31	39.85
0.0059	0.149	2.75	100	7.16	7.16	47.01
0.0049	0.125	3.00	120	5.14	5.14	52.14
0.0041	0.105	3.25	140	3.74	3.74	55.88
0.0035	0.088	3.50	170	2.92	2.92	58.80
0.0029	0.074	3.75	200	2.57	2.57	61.37
0.0025	0.063	4.00	230	2.44	2.44	63.81
0.0021	0.053	4.25	270	2.37	2.37	66.18
0.00174	0.0442	4.50	325	2.28	2.28	68.46
0.00146	0.0372	4.75	400	2.17	2.17	70.63
0.00123	0.0313	5.00	450	2.07	2.07	72.70
0.000986	0.0250	5.32	500	2.52	2.52	75.22
0.000790	0.0201	5.64	635	2.38	2.38	77.60
0.000615	0.0156	6.00		2.43	2.43	80.03
0.000435	0.0110	6.50		3.07	3.07	83.10
0.000308	0.00781	7.00		2.84	2.84	85.94
0.000197	0.00500	7.65		3.40	3.40	89.34
0.000077	0.00195	9.00		5.88	5.88	95.22
0.000038	0.000977	10.00		3.02	3.02	98.24
0.000019	0.000488	11.00		1.60	1.60	99.84
0.000015	0.000375	11.38		0.16	0.16	100.00
TOTALS				**100.00**	**100.00**	**100.00**

Cumulative Weight Percent greater than			
Weight percent	Phi Value	Particle Size Inches	Particle Size Millimeters
5	1.57	0.0132	0.336
10	1.74	0.0118	0.299
16	1.90	0.0106	0.268
25	2.12	0.0091	0.230
40	2.51	0.0069	0.176
50	2.90	0.0053	0.134
60	3.62	0.0032	0.082
75	5.29	0.0010	0.026
84	6.66	0.0004	0.010
90	7.80	0.0002	0.004
95	8.95	0.0001	0.002

Measure	Trask	Inman	Folk-Ward
Median, phi	2.90	2.90	2.90
Median, in.	0.0053	0.0053	0.0053
Median, mm	0.134	0.134	0.134
Mean, phi	2.97	4.28	3.82
Mean, in.	0.0050	0.0020	0.0028
Mean, mm	0.128	0.052	0.071
Sorting	3.003	2.380	2.307
Skewness	0.570	0.581	0.611
Kurtosis	0.347	0.550	0.953

Grain Size Description (ASTM-USCS Scale)	Fine sand (based on Mean from Trask)

Description	Retained on Sieve #	Weight Percent
Gravel	4	0.00
Coarse Sand	10	0.00
Medium Sand	40	0.60
Fine Sand	200	60.77
Silt	>0.005 mm	27.97
Clay	<0.005 mm	10.66
	Total	**100**

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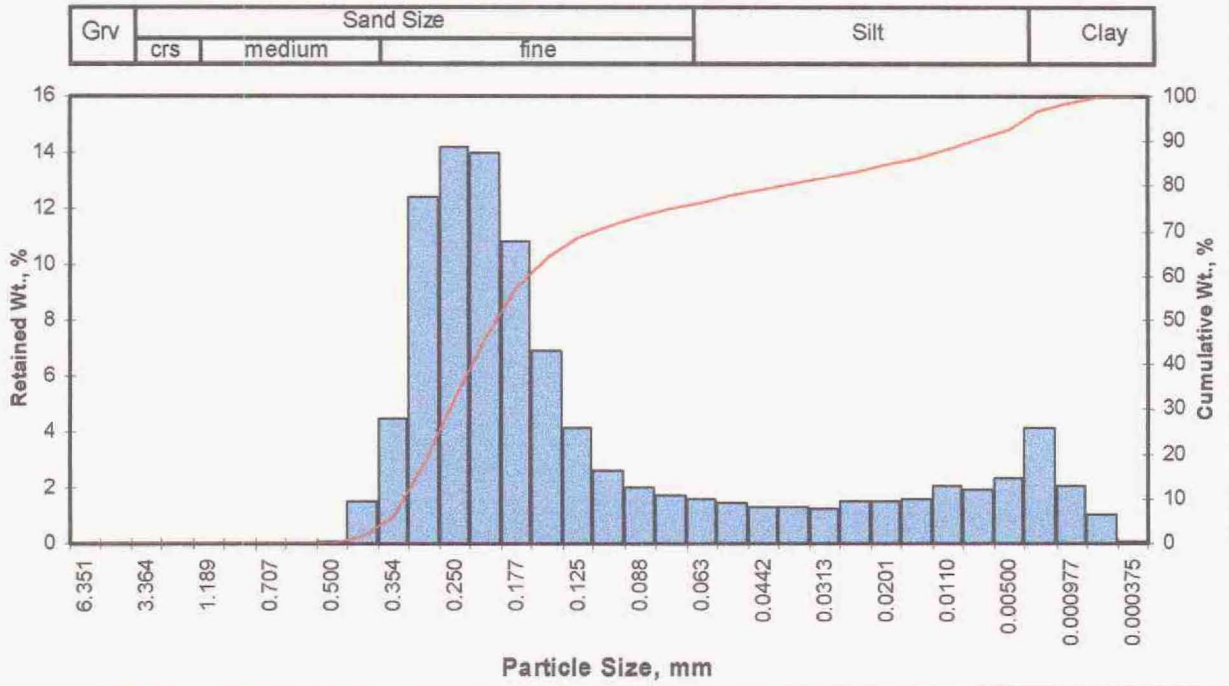
Particle Size Analysis - ASTM D4464M

Client:	Hahn and Associates, Inc.	**PTS File No:**	34452
Project:	NW Natural-Gasco	**Sample ID:**	MW-16-65
Project No:	2708-10	**Depth, ft:**	35.70



Opening Inches	Opening Millimeters	Phi of Screen	U.S. No.	Sample Weight, grams	Increment Weight, percent	Cumulative Weight, percent
0.2500	6.351	-2.67	1/4	0.00	0.00	0.00
0.1873	4.757	-2.25	4	0.00	0.00	0.00
0.1324	3.364	-1.75	6	0.00	0.00	0.00
0.0787	2.000	-1.00	10	0.00	0.00	0.00
0.0468	1.189	-0.25	16	0.00	0.00	0.00
0.0331	0.841	0.25	20	0.00	0.00	0.00
0.0278	0.707	0.50	25	0.00	0.00	0.00
0.0234	0.595	0.75	30	0.00	0.00	0.00
0.0197	0.500	1.00	35	0.08	0.08	0.08
0.0166	0.420	1.25	40	1.55	1.55	1.63
0.0139	0.354	1.50	45	4.50	4.50	6.13
0.0117	0.297	1.75	50	12.40	12.39	18.52
0.0098	0.250	2.00	60	14.20	14.19	32.72
0.0083	0.210	2.25	70	14.00	13.99	46.71
0.0070	0.177	2.50	80	10.80	10.79	57.50
0.0059	0.149	2.75	100	6.91	6.91	64.41
0.0049	0.125	3.00	120	4.11	4.11	68.52
0.0041	0.105	3.25	140	2.63	2.63	71.15
0.0035	0.088	3.50	170	1.98	1.98	73.12
0.0029	0.074	3.75	200	1.73	1.73	74.85
0.0025	0.063	4.00	230	1.58	1.58	76.43
0.0021	0.053	4.25	270	1.45	1.45	77.88
0.00174	0.0442	4.50	325	1.34	1.34	79.22
0.00146	0.0372	4.75	400	1.28	1.28	80.50
0.00123	0.0313	5.00	450	1.24	1.24	81.74
0.000986	0.0250	5.32	500	1.53	1.53	83.27
0.000790	0.0201	5.64	635	1.49	1.49	84.76
0.000615	0.0156	6.00		1.58	1.58	86.34
0.000435	0.0110	6.50		2.07	2.07	88.41
0.000308	0.00781	7.00		1.95	1.95	90.36
0.000197	0.00500	7.65		2.35	2.35	92.70
0.000077	0.00195	9.00		4.11	4.11	96.81
0.000038	0.000977	10.00		2.06	2.06	98.87
0.000019	0.000488	11.00		1.03	1.03	99.90
0.000015	0.000375	11.38		0.10	0.10	100.00
TOTALS				**100.10**	**100.00**	**100.00**

Cumulative Weight Percent greater than			
Weight percent	Phi Value	Particle Size Inches	Particle Size Millimeters
5	1.44	0.0145	0.369
10	1.58	0.0132	0.335
16	1.70	0.0121	0.308
25	1.86	0.0108	0.275
40	2.13	0.0090	0.228
50	2.33	0.0079	0.199
60	2.59	0.0065	0.166
75	3.77	0.0029	0.073
84	5.48	0.0009	0.022
90	6.91	0.0003	0.008
95	8.40	0.0001	0.003

Measure	Trask	Inman	Folk-Ward
Median, phi	2.33	2.33	2.33
Median, in.	0.0079	0.0079	0.0079
Median, mm	0.199	0.199	0.199
Mean, phi	2.52	3.59	3.17
Mean, in.	0.0068	0.0033	0.0044
Mean, mm	0.174	0.083	0.111
Sorting	1.938	1.889	2.000
Skewness	0.711	0.668	0.706
Kurtosis	0.309	0.844	1.495

Grain Size Description (ASTM-USCS Scale)	Fine sand (based on Mean from Trask)

Description	Retained on Sieve #	Weight Percent
Gravel	4	0.00
Coarse Sand	10	0.00
Medium Sand	40	1.63
Fine Sand	200	73.22
Silt	>0.005 mm	17.85
Clay	<0.005 mm	7.30
	Total	**100**

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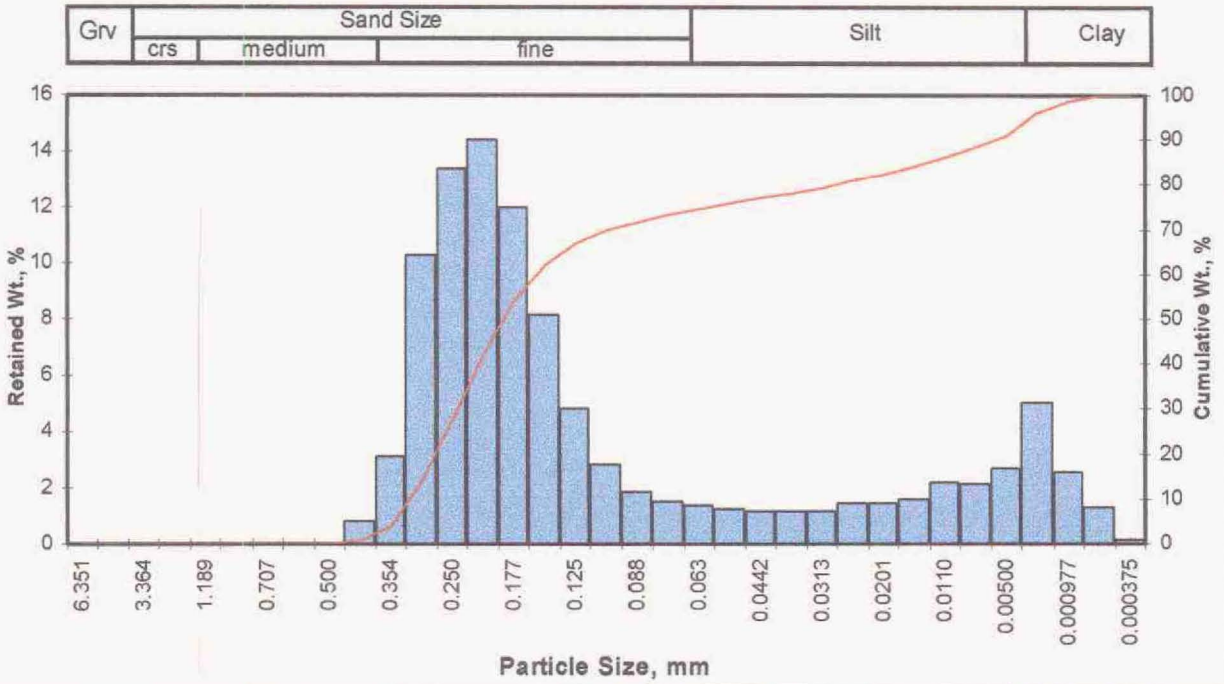
Particle Size Analysis - ASTM D4464M

Client:	Hahn and Associates, Inc.	**PTS File No:**	34452
Project:	NW Natural-Gasco	**Sample ID:**	MW-16-65
Project No:	2708-10	**Depth, ft:**	38.50



Opening (Inches)	Opening (Millimeters)	Phi of Screen	U.S. No.	Sample Weight, grams	Increment Weight, percent	Cumulative Weight, percent
0.2500	6.351	-2.67	1/4	0.00	0.00	0.00
0.1873	4.757	-2.25	4	0.00	0.00	0.00
0.1324	3.364	-1.75	6	0.00	0.00	0.00
0.0787	2.000	-1.00	10	0.00	0.00	0.00
0.0468	1.189	-0.25	16	0.00	0.00	0.00
0.0331	0.841	0.25	20	0.00	0.00	0.00
0.0278	0.707	0.50	25	0.00	0.00	0.00
0.0234	0.595	0.75	30	0.00	0.00	0.00
0.0197	0.500	1.00	35	0.03	0.03	0.03
0.0166	0.420	1.25	40	0.82	0.82	0.85
0.0139	0.354	1.50	45	3.10	3.10	3.95
0.0117	0.297	1.75	50	10.30	10.30	14.25
0.0098	0.250	2.00	60	13.40	13.40	27.66
0.0083	0.210	2.25	70	14.40	14.40	42.06
0.0070	0.177	2.50	80	12.00	12.00	54.07
0.0059	0.149	2.75	100	8.15	8.15	62.22
0.0049	0.125	3.00	120	4.80	4.80	67.02
0.0041	0.105	3.25	140	2.81	2.81	69.83
0.0035	0.088	3.50	170	1.88	1.88	71.71
0.0029	0.074	3.75	200	1.54	1.54	73.25
0.0025	0.063	4.00	230	1.37	1.37	74.62
0.0021	0.053	4.25	270	1.24	1.24	75.86
0.00174	0.0442	4.50	325	1.17	1.17	77.03
0.00146	0.0372	4.75	400	1.16	1.16	78.19
0.00123	0.0313	5.00	450	1.16	1.16	79.35
0.000986	0.0250	5.32	500	1.47	1.47	80.82
0.000790	0.0201	5.64	635	1.47	1.47	82.29
0.000615	0.0156	6.00		1.62	1.62	83.91
0.000435	0.0110	6.50		2.19	2.19	86.11
0.000308	0.00781	7.00		2.15	2.15	88.26
0.000197	0.00500	7.65		2.72	2.72	90.98
0.000077	0.00195	9.00		5.04	5.04	96.02
0.000038	0.000977	10.00		2.58	2.58	98.60
0.000019	0.000488	11.00		1.28	1.28	99.88
0.000015	0.000375	11.38		0.12	0.12	100.00
TOTALS				**100.00**	**100.00**	**100.00**

Cumulative Weight Percent greater than

Weight percent	Phi Value	Particle Size Inches	Particle Size Millimeters
5	1.53	0.0137	0.347
10	1.65	0.0126	0.319
16	1.78	0.0114	0.291
25	1.95	0.0102	0.259
40	2.21	0.0085	0.216
50	2.42	0.0074	0.187
60	2.68	0.0061	0.156
75	4.08	0.0023	0.059
84	6.02	0.0006	0.015
90	7.41	0.0002	0.006
95	8.73	0.0001	0.002

Measure	Trask	Inman	Folk-Ward
Median, phi	2.42	2.42	2.42
Median, in.	0.0074	0.0074	0.0074
Median, mm	0.187	0.187	0.187
Mean, phi	2.65	3.90	3.41
Mean, in.	0.0063	0.0026	0.0037
Mean, mm	0.159	0.067	0.094
Sorting	2.089	2.118	2.150
Skewness	0.661	0.701	0.727
Kurtosis	0.318	0.700	1.388

Grain Size Description (ASTM-USCS Scale)	Fine sand (based on Mean from Trask)

Description	Retained on Sieve #	Weight Percent
Gravel	4	0.00
Coarse Sand	10	0.00
Medium Sand	40	0.85
Fine Sand	200	72.40
Silt	>0.005 mm	17.73
Clay	<0.005 mm	9.02
	Total	**100**

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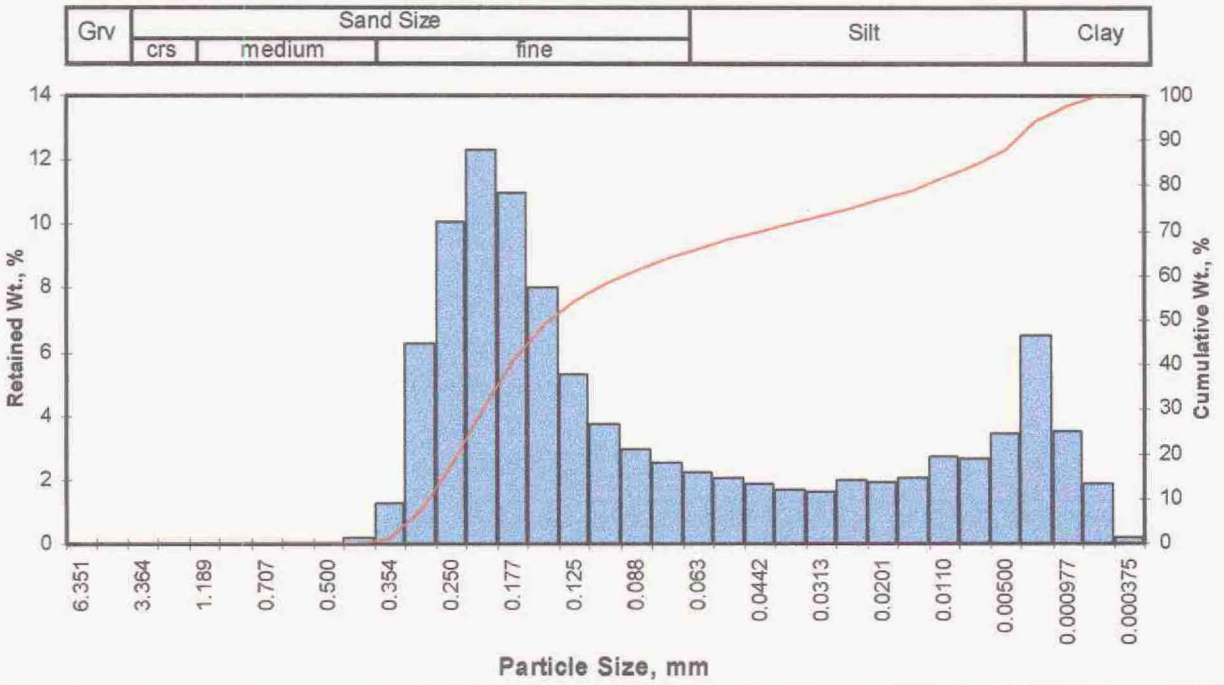
Particle Size Analysis - ASTM D4464M

Client:	Hahn and Associates, Inc.	**PTS File No:**	34452
Project:	NW Natural-Gasco	**Sample ID:**	MW-16-65
Project No:	2708-10	**Depth, ft:**	40.40



Opening		Phi of	U.S.	Sample	Increment	Cumulative
Inches	Millimeters	Screen	No.	Weight, grams	Weight, percent	Weight, percent
0.2500	6.351	-2.67	1/4	0.00	0.00	0.00
0.1873	4.757	-2.25	4	0.00	0.00	0.00
0.1324	3.364	-1.75	6	0.00	0.00	0.00
0.0787	2.000	-1.00	10	0.00	0.00	0.00
0.0468	1.189	-0.25	16	0.00	0.00	0.00
0.0331	0.841	0.25	20	0.00	0.00	0.00
0.0278	0.707	0.50	25	0.00	0.00	0.00
0.0234	0.595	0.75	30	0.00	0.00	0.00
0.0197	0.500	1.00	35	0.00	0.00	0.00
0.0166	0.420	1.25	40	0.18	0.18	0.18
0.0139	0.354	1.50	45	1.29	1.29	1.47
0.0117	0.297	1.75	50	6.26	6.26	7.73
0.0098	0.250	2.00	60	10.10	10.10	17.83
0.0083	0.210	2.25	70	12.30	12.30	30.13
0.0070	0.177	2.50	80	11.00	11.00	41.13
0.0059	0.149	2.75	100	8.01	8.01	49.14
0.0049	0.125	3.00	120	5.31	5.31	54.45
0.0041	0.105	3.25	140	3.73	3.73	58.17
0.0035	0.088	3.50	170	2.93	2.93	61.10
0.0029	0.074	3.75	200	2.54	2.54	63.64
0.0025	0.063	4.00	230	2.26	2.26	65.90
0.0021	0.053	4.25	270	2.03	2.03	67.93
0.00174	0.0442	4.50	325	1.85	1.85	69.78
0.00146	0.0372	4.75	400	1.72	1.72	71.50
0.00123	0.0313	5.00	450	1.61	1.61	73.11
0.000986	0.0250	5.32	500	1.97	1.97	75.08
0.000790	0.0201	5.64	635	1.94	1.94	77.02
0.000615	0.0156	6.00		2.07	2.07	79.09
0.000435	0.0110	6.50		2.71	2.71	81.80
0.000308	0.00781	7.00		2.68	2.68	84.48
0.000197	0.00500	7.65		3.47	3.47	87.95
0.000077	0.00195	9.00		6.54	6.54	94.49
0.000038	0.000977	10.00		3.48	3.48	97.97
0.000019	0.000488	11.00		1.85	1.85	99.82
0.000015	0.000375	11.38		0.18	0.18	100.00
TOTALS				**100.00**	**100.00**	**100.00**

Cumulative Weight Percent greater than			
Weight percent	Phi Value	Particle Size Inches	Particle Size Millimeters
5	1.64	0.0126	0.321
10	1.81	0.0113	0.286
16	1.95	0.0102	0.258
25	2.15	0.0089	0.226
40	2.47	0.0071	0.180
50	2.79	0.0057	0.145
60	3.41	0.0037	0.094
75	5.31	0.0010	0.025
84	6.91	0.0003	0.008
90	8.07	0.0001	0.004
95	9.15	0.0001	0.002

Measure	Trask	Inman	Folk-Ward
Median, phi	2.79	2.79	2.79
Median, in.	0.0057	0.0057	0.0057
Median, mm	0.145	0.145	0.145
Mean, phi	2.99	4.43	3.89
Mean, in.	0.0049	0.0018	0.0027
Mean, mm	0.126	0.046	0.068
Sorting	2.991	2.478	2.376
Skewness	0.523	0.663	0.678
Kurtosis	0.356	0.515	0.973

Grain Size Description (ASTM-USCS Scale)	Fine sand (based on Mean from Trask)

Description	Retained on Sieve #	Weight Percent
Gravel	4	0.00
Coarse Sand	10	0.00
Medium Sand	40	0.18
Fine Sand	200	63.46
Silt	>0.005 mm	24.31
Clay	<0.005 mm	12.05
	Total	**100**

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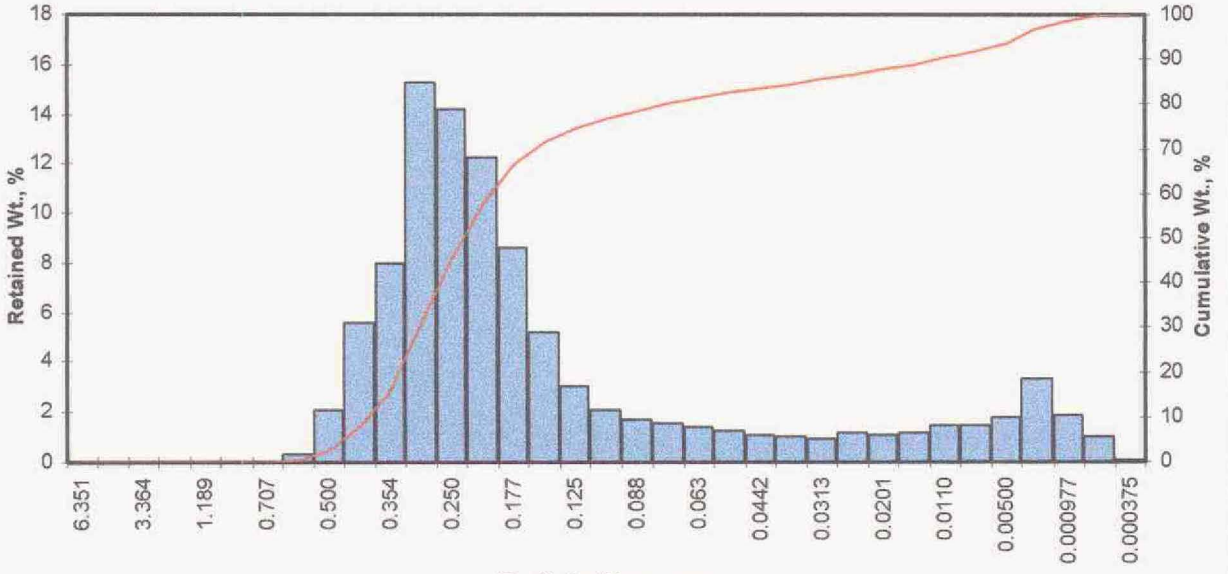
Particle Size Analysis - ASTM D4464M

Client:	Hahn and Associates, Inc.	**PTS File No:**	34452
Project:	NW Natural-Gasco	**Sample ID:**	MW-16-65
Project No:	2708-10	**Depth, ft:**	42.50

Grv	Sand Size			Silt	Clay
	crs	medium	fine		



Particle Size, mm

Opening		Phi of	U.S.	Sample Weight,	Increment Weight,	Cumulative Weight,
Inches	Millimeters	Screen	No.	grams	percent	percent
0.2500	6.351	-2.67	1/4	0.00	0.00	0.00
0.1873	4.757	-2.25	4	0.00	0.00	0.00
0.1324	3.364	-1.75	6	0.00	0.00	0.00
0.0787	2.000	-1.00	10	0.00	0.00	0.00
0.0468	1.189	-0.25	16	0.00	0.00	0.00
0.0331	0.841	0.25	20	0.00	0.00	0.00
0.0278	0.707	0.50	25	0.02	0.02	0.02
0.0234	0.595	0.75	30	0.34	0.34	0.36
0.0197	0.500	1.00	35	2.07	2.07	2.43
0.0166	0.420	1.25	40	5.61	5.61	8.04
0.0139	0.354	1.50	45	8.02	8.02	16.05
0.0117	0.297	1.75	50	15.30	15.30	31.35
0.0098	0.250	2.00	60	14.20	14.20	45.55
0.0083	0.210	2.25	70	12.30	12.30	57.84
0.0070	0.177	2.50	80	8.64	8.64	66.48
0.0059	0.149	2.75	100	5.20	5.20	71.68
0.0049	0.125	3.00	120	3.06	3.06	74.74
0.0041	0.105	3.25	140	2.06	2.06	76.80
0.0035	0.088	3.50	170	1.68	1.68	78.48
0.0029	0.074	3.75	200	1.52	1.52	80.00
0.0025	0.063	4.00	230	1.37	1.37	81.37
0.0021	0.053	4.25	270	1.21	1.21	82.58
0.00174	0.0442	4.50	325	1.07	1.07	83.65
0.00146	0.0372	4.75	400	0.99	0.99	84.64
0.00123	0.0313	5.00	450	0.93	0.93	85.57
0.000986	0.0250	5.32	500	1.13	1.13	86.70
0.000790	0.0201	5.64	635	1.08	1.08	87.78
0.000615	0.0156	6.00		1.14	1.14	88.92
0.000435	0.0110	6.50		1.51	1.51	90.43
0.000308	0.00781	7.00		1.45	1.45	91.88
0.000197	0.00500	7.65		1.80	1.80	93.67
0.000077	0.00195	9.00		3.37	3.37	97.04
0.000038	0.000977	10.00		1.87	1.87	98.91
0.000019	0.000488	11.00		0.99	0.99	99.90
0.000015	0.000375	11.38		0.10	0.10	100.00
TOTALS				**100.00**	**100.00**	**100.00**

Cumulative Weight Percent greater than

Weight percent	Phi Value	Particle Size Inches	Particle Size Millimeters
5	1.11	0.0182	0.462
10	1.31	0.0159	0.403
16	1.50	0.0139	0.354
25	1.65	0.0126	0.319
40	1.90	0.0105	0.268
50	2.09	0.0092	0.235
60	2.31	0.0079	0.201
75	3.03	0.0048	0.122
84	4.59	0.0016	0.042
90	6.36	0.0005	0.012
95	8.18	0.0001	0.003

Measure	Trask	Inman	Folk-Ward
Median, phi	2.09	2.09	2.09
Median, in.	0.0092	0.0092	0.0092
Median, mm	0.235	0.235	0.235
Mean, phi	2.18	3.04	2.73
Mean, in.	0.0087	0.0048	0.0060
Mean, mm	0.221	0.121	0.151
Sorting	1.616	1.545	1.843
Skewness	0.842	0.617	0.670
Kurtosis	0.252	1.285	2.089

Grain Size Description (ASTM-USCS Scale)	Fine sand (based on Mean from Trask)

Description	Retained on Sieve #	Weight Percent
Gravel	4	0.00
Coarse Sand	10	0.00
Medium Sand	40	8.04
Fine Sand	200	71.96
Silt	>0.005 mm	13.68
Clay	<0.005 mm	6.33
	Total	**100**

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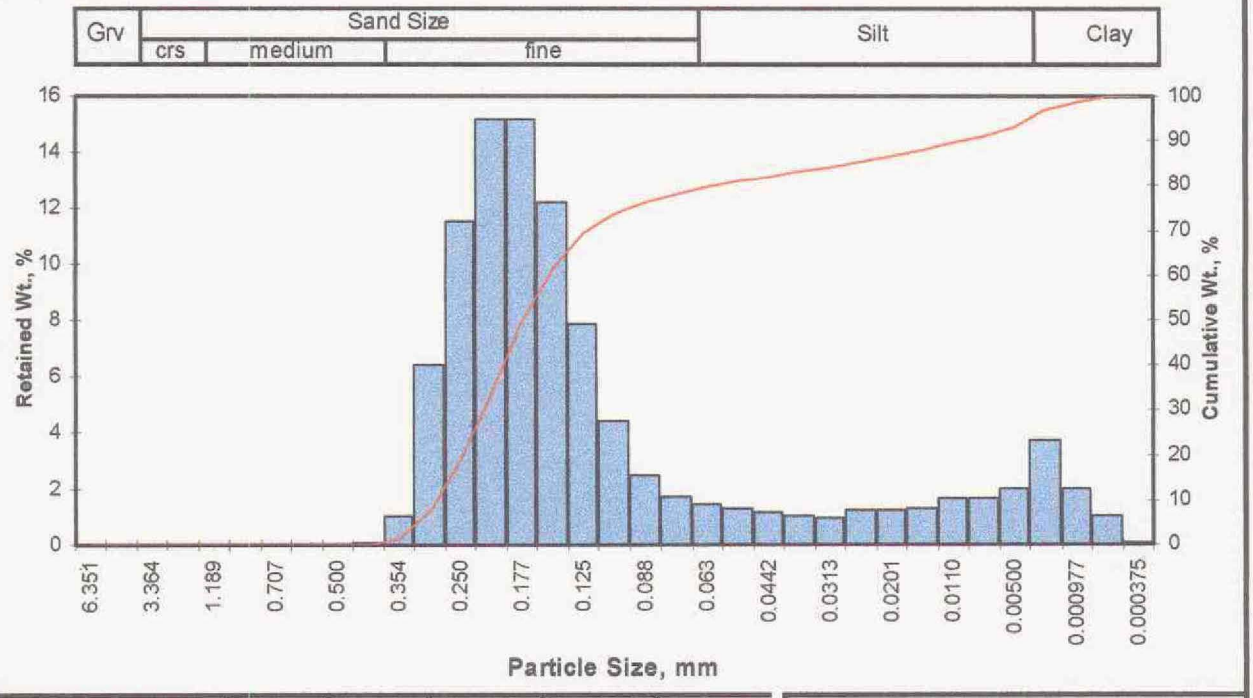
Particle Size Analysis - ASTM D4464M

Client:	Hahn and Associates, Inc.	**PTS File No:**	34452
Project:	NW Natural-Gasco	**Sample ID:**	MW-16-65
Project No:	2708-10	**Depth, ft:**	44.80



Opening		Phi of	U.S.	Sample	Increment	Cumulative
Inches	Millimeters	Screen	No.	Weight, grams	Weight, percent	Weight, percent
0.2500	6.351	-2.67	1/4	0.00	0.00	0.00
0.1873	4.757	-2.25	4	0.00	0.00	0.00
0.1324	3.364	-1.75	6	0.00	0.00	0.00
0.0787	2.000	-1.00	10	0.00	0.00	0.00
0.0468	1.189	-0.25	16	0.00	0.00	0.00
0.0331	0.841	0.25	20	0.00	0.00	0.00
0.0278	0.707	0.50	25	0.00	0.00	0.00
0.0234	0.595	0.75	30	0.00	0.00	0.00
0.0197	0.500	1.00	35	0.00	0.00	0.00
0.0166	0.420	1.25	40	0.08	0.08	0.08
0.0139	0.354	1.50	45	1.05	1.05	1.13
0.0117	0.297	1.75	50	6.45	6.44	7.57
0.0098	0.250	2.00	60	11.50	11.49	19.06
0.0083	0.210	2.25	70	15.20	15.18	34.24
0.0070	0.177	2.50	80	15.20	15.18	49.43
0.0059	0.149	2.75	100	12.20	12.19	61.61
0.0049	0.125	3.00	120	7.88	7.87	69.48
0.0041	0.105	3.25	140	4.43	4.43	73.91
0.0035	0.088	3.50	170	2.48	2.48	76.39
0.0029	0.074	3.75	200	1.72	1.72	78.10
0.0025	0.063	4.00	230	1.47	1.47	79.57
0.0021	0.053	4.25	270	1.31	1.31	80.88
0.00174	0.0442	4.50	325	1.14	1.14	82.02
0.00146	0.0372	4.75	400	1.03	1.03	83.05
0.00123	0.0313	5.00	450	0.99	0.99	84.04
0.000986	0.0250	5.32	500	1.24	1.24	85.28
0.000790	0.0201	5.64	635	1.21	1.21	86.49
0.000615	0.0156	6.00		1.28	1.28	87.76
0.000435	0.0110	6.50		1.69	1.69	89.45
0.000308	0.00781	7.00		1.63	1.63	91.08
0.000197	0.00500	7.65		2.02	2.02	93.10
0.000077	0.00195	9.00		3.74	3.74	96.83
0.000038	0.000977	10.00		2.02	2.02	98.85
0.000019	0.000488	11.00		1.05	1.05	99.90
0.000015	0.000375	11.38		0.10	0.10	100.00
TOTALS				**100.10**	**100.00**	**100.00**

Cumulative Weight Percent greater than			
Weight percent	Phi Value	Particle Size	
		Inches	Millimeters
5	1.65	0.0125	0.319
10	1.80	0.0113	0.287
16	1.93	0.0103	0.262
25	2.10	0.0092	0.234
40	2.34	0.0078	0.197
50	2.51	0.0069	0.175
60	2.72	0.0060	0.152
75	3.36	0.0038	0.097
84	4.99	0.0012	0.031
90	6.67	0.0004	0.010
95	8.33	0.0001	0.003

Measure	Trask	Inman	Folk-Ward
Median, phi	2.51	2.51	2.51
Median, in.	0.0069	0.0069	0.0069
Median, mm	0.175	0.175	0.175
Mean, phi	2.60	3.46	3.15
Mean, in.	0.0065	0.0036	0.0045
Mean, mm	0.166	0.091	0.113
Sorting	1.549	1.529	1.777
Skewness	0.860	0.622	0.682
Kurtosis	0.246	1.187	2.170

Grain Size Description (ASTM-USCS Scale)	Fine sand (based on Mean from Trask)

Description	Retained on Sieve #	Weight Percent
Gravel	4	0.00
Coarse Sand	10	0.00
Medium Sand	40	0.08
Fine Sand	200	78.02
Silt	>0.005 mm	14.99
Clay	<0.005 mm	6.90
	Total	**100**

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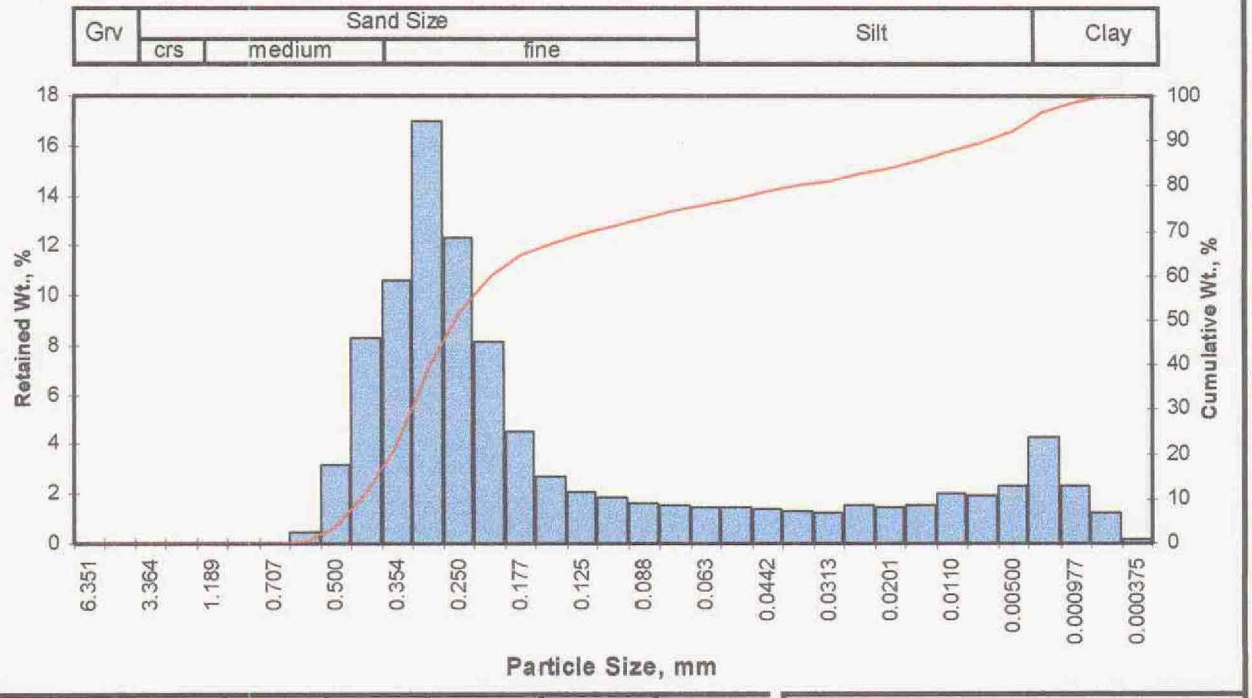
Particle Size Analysis - ASTM D4464M

Client:	Hahn and Associates, Inc.	**PTS File No:**	34452
Project:	NW Natural-Gasco	**Sample ID:**	MW-16-65
Project No:	2708-10	**Depth, ft:**	45.30



Opening		Phi of	U.S.	Sample Weight,	Increment Weight,	Cumulative Weight,
Inches	Millimeters	Screen	No.	grams	percent	percent
0.2500	6.351	-2.67	1/4	0.00	0.00	0.00
0.1873	4.757	-2.25	4	0.00	0.00	0.00
0.1324	3.364	-1.75	6	0.00	0.00	0.00
0.0787	2.000	-1.00	10	0.00	0.00	0.00
0.0468	1.189	-0.25	16	0.00	0.00	0.00
0.0331	0.841	0.25	20	0.00	0.00	0.00
0.0278	0.707	0.50	25	0.02	0.01	0.01
0.0234	0.595	0.75	30	0.45	0.45	0.46
0.0197	0.500	1.00	35	3.22	3.22	3.68
0.0166	0.420	1.25	40	8.27	8.27	11.95
0.0139	0.354	1.50	45	10.60	10.60	22.55
0.0117	0.297	1.75	50	17.00	17.00	39.55
0.0098	0.250	2.00	60	12.30	12.30	51.85
0.0083	0.210	2.25	70	8.13	8.13	59.98
0.0070	0.177	2.50	80	4.51	4.51	64.49
0.0059	0.149	2.75	100	2.72	2.72	67.20
0.0049	0.125	3.00	120	2.10	2.10	69.30
0.0041	0.105	3.25	140	1.84	1.84	71.14
0.0035	0.088	3.50	170	1.66	1.66	72.80
0.0029	0.074	3.75	200	1.56	1.56	74.36
0.0025	0.063	4.00	230	1.50	1.50	75.86
0.0021	0.053	4.25	270	1.45	1.45	77.31
0.00174	0.0442	4.50	325	1.37	1.37	78.68
0.00146	0.0372	4.75	400	1.29	1.29	79.97
0.00123	0.0313	5.00	450	1.24	1.24	81.21
0.000986	0.0250	5.32	500	1.54	1.54	82.75
0.000790	0.0201	5.64	635	1.49	1.49	84.24
0.000615	0.0156	6.00		1.57	1.57	85.81
0.000435	0.0110	6.50		2.04	2.04	87.85
0.000308	0.00781	7.00		1.93	1.93	89.78
0.000197	0.00500	7.65		2.35	2.35	92.13
0.000077	0.00195	9.00		4.23	4.23	96.36
0.000038	0.000977	10.00		2.30	2.30	98.66
0.000019	0.000488	11.00		1.22	1.22	99.88
0.000015	0.000375	11.38		0.12	0.12	100.00
TOTALS				**100.00**	**100.00**	**100.00**

Cumulative Weight Percent greater than			
Weight	Phi	Particle Size	
percent	Value	Inches	Millimeters
5	1.04	0.0191	0.486
10	1.19	0.0172	0.438
16	1.35	0.0155	0.394
25	1.54	0.0136	0.345
40	1.76	0.0116	0.295
50	1.96	0.0101	0.257
60	2.25	0.0083	0.210
75	3.86	0.0027	0.069
84	5.59	0.0008	0.021
90	7.06	0.0003	0.007
95	8.56	0.0001	0.003

Measure	Trask	Inman	Folk-Ward
Median, phi	1.96	1.96	1.96
Median, in.	0.0101	0.0101	0.0101
Median, mm	0.257	0.257	0.257
Mean, phi	2.27	3.47	2.97
Mean, in.	0.0081	0.0036	0.0050
Mean, mm	0.207	0.090	0.128
Sorting	2.235	2.121	2.201
Skewness	0.601	0.709	0.732
Kurtosis	0.320	0.774	1.329

Grain Size Description (ASTM-USCS Scale)	Fine sand (based on Mean from Trask)

Description	Retained on Sieve #	Weight Percent
Gravel	4	0.00
Coarse Sand	10	0.00
Medium Sand	40	11.95
Fine Sand	200	62.41
Silt	>0.005 mm	17.77
Clay	<0.005 mm	7.87
	Total	**100**

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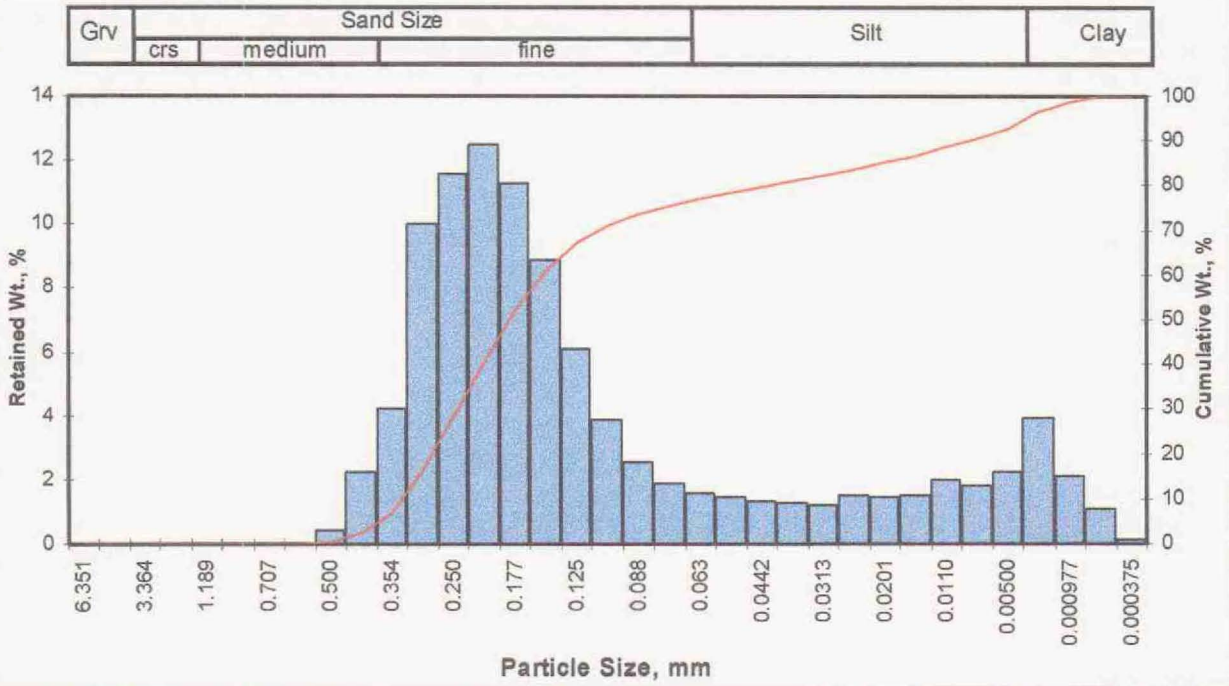
Particle Size Analysis - ASTM D4464M

Client:	Hahn and Associates, Inc.	**PTS File No:**	34452
Project:	NW Natural-Gasco	**Sample ID:**	MW-16-65
Project No:	2708-10	**Depth, ft:**	60.70



Opening Inches	Opening Millimeters	Phi of Screen	U.S. No.	Sample Weight, grams	Increment Weight, percent	Cumulative Weight, percent
0.2500	6.351	-2.67	1/4	0.00	0.00	0.00
0.1873	4.757	-2.25	4	0.00	0.00	0.00
0.1324	3.364	-1.75	6	0.00	0.00	0.00
0.0787	2.000	-1.00	10	0.00	0.00	0.00
0.0468	1.189	-0.25	16	0.00	0.00	0.00
0.0331	0.841	0.25	20	0.00	0.00	0.00
0.0278	0.707	0.50	25	0.00	0.00	0.00
0.0234	0.595	0.75	30	0.01	0.01	0.01
0.0197	0.500	1.00	35	0.42	0.42	0.43
0.0166	0.420	1.25	40	2.21	2.21	2.64
0.0139	0.354	1.50	45	4.21	4.21	6.85
0.0117	0.297	1.75	50	10.00	10.00	16.85
0.0098	0.250	2.00	60	11.60	11.60	28.45
0.0083	0.210	2.25	70	12.50	12.50	40.95
0.0070	0.177	2.50	80	11.30	11.30	52.25
0.0059	0.149	2.75	100	8.86	8.86	61.11
0.0049	0.125	3.00	120	6.07	6.07	67.17
0.0041	0.105	3.25	140	3.89	3.89	71.06
0.0035	0.088	3.50	170	2.52	2.52	73.58
0.0029	0.074	3.75	200	1.86	1.86	75.44
0.0025	0.063	4.00	230	1.58	1.58	77.02
0.0021	0.053	4.25	270	1.44	1.44	78.46
0.00174	0.0442	4.50	325	1.33	1.33	79.79
0.00146	0.0372	4.75	400	1.25	1.25	81.04
0.00123	0.0313	5.00	450	1.21	1.21	82.25
0.000986	0.0250	5.32	500	1.50	1.50	83.75
0.000790	0.0201	5.64	635	1.45	1.45	85.20
0.000615	0.0156	6.00		1.52	1.52	86.72
0.000435	0.0110	6.50		1.97	1.97	88.69
0.000308	0.00781	7.00		1.84	1.84	90.53
0.000197	0.00500	7.65		2.21	2.21	92.74
0.000077	0.00195	9.00		3.93	3.93	96.67
0.000038	0.000977	10.00		2.11	2.11	98.78
0.000019	0.000488	11.00		1.11	1.11	99.89
0.000015	0.000375	11.38		0.11	0.11	100.00
TOTALS				**100.00**	**100.00**	**100.00**

Cumulative Weight Percent greater than			
Weight percent	Phi Value	Particle Size Inches	Particle Size Millimeters
5	1.39	0.0150	0.382
10	1.58	0.0132	0.335
16	1.73	0.0119	0.302
25	1.93	0.0104	0.263
40	2.23	0.0084	0.213
50	2.45	0.0072	0.183
60	2.72	0.0060	0.152
75	3.69	0.0030	0.077
84	5.37	0.0009	0.024
90	6.86	0.0003	0.009
95	8.42	0.0001	0.003

Measure	Trask	Inman	Folk-Ward
Median, phi	2.45	2.45	2.45
Median, in.	0.0072	0.0072	0.0072
Median, mm	0.183	0.183	0.183
Mean, phi	2.55	3.55	3.18
Mean, in.	0.0067	0.0034	0.0043
Mean, mm	0.170	0.085	0.110
Sorting	1.843	1.823	1.977
Skewness	0.780	0.604	0.651
Kurtosis	0.285	0.929	1.634

Grain Size Description (ASTM-USCS Scale)	Fine sand (based on Mean from Trask)

Description	Retained on Sieve #	Weight Percent
Gravel	4	0.00
Coarse Sand	10	0.00
Medium Sand	40	2.64
Fine Sand	200	72.80
Silt	>0.005 mm	17.30
Clay	<0.005 mm	7.26
	Total	**100**

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DATE **PTS FILE# 34452** **CHAIN OF CUSTODY RECORD** PAGE 1 OF 3

COMPANY: GHAN AND ASSOCIATES, INC.
ADDRESS: 711 NW 6th Avenue #203 CITY: Portland ZIP CODE: 97209
PROJECT MANAGER: Rob Ede
PROJECT NAME: Natural - Gasco PHONE NUMBER: 503-796-0717
PROJECT NUMBER: 2708-10 FAX NUMBER:
SITE LOCATION: Gasco Facility 7900 NW St. Helens Rd
SAMPLER SIGNATURE: RLE

PO# 2708-10

SPECIAL HANDLING
24 HOURS 5 DAYS
72 HOURS NORMAL
OTHER

SAMPLE CONDITIONS
RECEIVED ON ICE YES/NO
SEALED YES/NO
OTHER YES/NO

COMMENTS
*6" DIAM. CORE IN LEXAN, CUT INTO 5'S.
*CONTINUOUSLY FROZEN WITH DRY ICE.

ANALYSIS REQUEST

SAMPLE ID NUMBER	DATE	TIME	DEPTH, FT
A/L-16-65	7/19/04	955	26-27
		955	27-28
		955	28-28.5
		955	28.5-29.5
		955	29.5-30.5
		955	30.5-31
		1020	31-32
		1020	32-32.3
		1020	32.3-33.3
		1020	33.3-33.5
		1020	33.5-34.5

PHYSICAL PROPERTIES PACKAGE, API RP40
MOISTURE CONTENT, ASTM D2216
POROSITY: TOTAL, API RP40
GRAIN DENSITY, API RP40
BULK DENSITY (DRY), API RP40
AIR PERMEABILITY, API RP40
SPECIFIC RETENTION/YIELD ASTM D425
CAPILLARY PRESSURE, ASTM D425M
SOIL pH, EPA 9045
POROSITY: EFFECTIVE, ASTM D425M
TCEQ/TNRCC PROPERTIES PACKAGE
GRAIN SIZE DISTRIBUTION, ASTM D422/4464M
HYDRAULIC CONDUCTIVITY, EPA 9100; API RP40
TOC: WALKLEY-BLACK
HYDRAULIC CONDUCTIVITY PACKAGE
ATTERBERG LIMITS, ASTM D4318
DIGITAL CORE PHOTO w/ & UV
NUMBER OF SAMPLES

1. RELINQUISHED BY	2. RECEIVED BY	3. RELINQUISHED BY	4. RECEIVED BY
RLE	T. Allison		
COMPANY	COMPANY	COMPANY	COMPANY
	PTS		
DATE TIME	DATE TIME	DATE TIME	DATE TIME
	7/23/04 1000		

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SCOEPA00014104

DATE **PTS FILE# 34452 CHAIN OF CUSTODY RECORD** PAGE 2 OF 3

COMPANY: [illegible] AND ASSOCIATES, INC

ADDRESS | CITY | ZIP CODE

PROJECT MANAGER

PROJECT NAME | PHONE NUMBER

PROJECT NUMBER | FAX NUMBER

SITE LOCATION

SAMPLER SIGNATURE

ANALYSIS REQUEST

PO# 2708-10

SPECIAL HANDLING

24 HOURS 5 DAYS
72 HOURS NORMAL
OTHER

SAMPLE CONDITIONS

RECEIVED ON ICE YES/NO
SEALED YES/NO
OTHER YES/NO

COMMENTS

SAMPLE ID NUMBER	DATE	TIME	DEPTH, FT
[illegible]-16-65	7/19/01	1020	34.5-35.5
		1020	35.5-36
		1055	36-37
		1055	37-38
		1055	38-39
		1055	39-40
		1055	40-41
		1125	41-42
		1125	42-43
		1125	43-44
		1125	44-45

PHYSICAL PROPERTIES PACKAGE, API RP40
MOISTURE CONTENT, ASTM D2216
POROSITY: TOTAL, API RP40
GRAIN DENSITY, API RP40
BULK DENSITY (DPY), API RP40
AIR PERMEABILITY, API RP40
SPECIFIC RETENTION/YIELD ASTM D425
CAPILLARY PRESSURE, ASTM D425M
SOIL pH, EPA 9045
POROSITY: EFFECTIVE, ASTM D425M
TCEQ/TNRCC PROPERTIES PACKAGE
GRAIN SIZE DISTRIBUTION, ASTM D422/4464M
HYDRAULIC CONDUCTIVITY, EPA 9100, API RP40
TOC: WALKLEY-BLACK
HYDRAULIC CONDUCTIVITY PACKAGE
ATTERBERG LIMITS, ASTM D4318
Digital Core Photo wet/UV
NUMBER OF SAMPLES

1. RELINQUISHED BY	2. RECEIVED BY	3. RELINQUISHED BY	4. RECEIVED BY
[illegible] B. [illegible]	[illegible]		
COMPANY	COMPANY [illegible]	COMPANY	COMPANY
DATE TIME	DATE 7/25/01 TIME 10 [illegible]	DATE TIME	DATE TIME

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SCOEPA00014105

DATE **PTS FILE# 34452 CHAIN OF CUSTODY RECORD** PAGE 3 OF 3

COMPANY: HAMAN AND ASSOCIATES, INC.
ADDRESS | CITY | ZIP CODE
PROJECT MANAGER
PROJECT NAME | PHONE NUMBER
PROJECT NUMBER | FAX NUMBER
SITE LOCATION
SAMPLER SIGNATURE

ANALYSIS REQUEST

PO# 2708-10

SPECIAL HANDLING
24 HOURS 5 DAYS
72 HOURS NORMAL
OTHER

SAMPLE CONDITIONS
RECEIVED ON ICE YES/NO
SEALED YES/NO
OTHER YES/NO

COMMENTS

SAMPLE ID NUMBER	DATE	TIME	DEPTH, FT
WW-16-65	7/19/04	1125	45-46
↓	↓	1500	60-61

PHYSICAL PROPERTIES PACKAGE, API RP40 | MOISTURE CONTENT, ASTM D2216 | POROSITY: TOTAL, API RP40 | GRAIN DENSITY, API RP40 | BULK DENSITY (DRY), API RP40 | AIR PERMEABILITY, API RP40 | SPECIFIC RETENTION/YIELD ASTM D425 | CAPILLARY PRESSURE, ASTM D425M | SOIL pH, EPA 9045 | POROSITY: EFFECTIVE, ASTM D425M | TCEQ/TNRCC PROPERTIES PACKAGE | GRAIN SIZE DISTRIBUTION, ASTM D422/4464M | HYDRAULIC CONDUCTIVITY, EPA 9100, API RP40 | TOC: WALKLEY-BLACK | HYDRAULIC CONDUCTIVITY PACKAGE | ATTERBERG LIMITS, ASTM D4318 | DIGITAL CAP PHOTO WHITE/CW | NUMBER OF SAMPLES

1. RELINQUISHED BY	2. RECEIVED BY	3. RELINQUISHED BY	4. RECEIVED BY
COMPANY	COMPANY	COMPANY	COMPANY
DATE TIME	DATE 7/28/04 TIME 1020AM	DATE TIME	DATE TIME

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SCOEPA00014106

APPENDIX J

Chain-of-Custody Documentation and Laboratory Analytical Reports:
NAPL Characterization, Well MW-16-45

SCOEPA00014107

HAHN AND ASSOCIATES, INC.
Environmental Consultants
434 NW Sixth Avenue, Suite 203 • Portland OR 97209
(503) 796-0717 • Fax (503) 227-2209

Laboratory: North Creek Analytical Beaverton Oregon
Lab Project No.:

CHAIN OF CUSTODY
Chain of Custody No.: P150524

Project Manager: ROB EDE
Project No.: 2708-10
Project Name: Casco RI
Collected by: Matt Graves

Liquid with Sediment Sample
___ Test Filtrate ___ Test Sediment ___ Test Both
Multi-Phase Sample
X Test One (which) OIL PHASE ___ Test Separately ___ Shake

Samples Received at 4C (Y or N):
Appropriate Containers Used (Y or N):
Provide Verbal Results (Y or N): No
Provide Preliminary Fax Results: Yes

Comments

Sample Number Prefix: 2708-04101 -

NCA PM: Philip Ni

PLEASE ANALYZE OIL PHASE ONLY.

* include cubazole on SVOC list

** May Need Follow-up for PAHs by 8270SIM depending on detections/reporting limits

Lab ID	Sample #	Date	Time	Sample Description	Matrix: Soil	Water	Other	Number of Containers	VOCs (EPA 8260B)	SVOCs (EPA 8270)*,**	Flashpoint	Hydrocarbon Fuel Fingerprint (EPA 8015M)	pH	RUSH	Remarks
	MW16-45-oil	10/4/04	1625	NAPL-MW16-45			X		X	X	X	X	X		

Relinquished by	Company	Date	Time	Received by	Company
Rob Ede	HA	10/13/04	15:55		NCA
Relinquished by	Company	Date	Time	Received by	Company
	NCA	10/13/04	16:42	Vanessa Turner	NCA

10.0

SCOEPA0014108

NORTH CREEK ANALYTICAL COOLER RECEIPT FORM

(Army Corp. compliant)

Client: Hahn & Associates

1. **Please sign for receipt and opening of** 1 **cooler or** _____ **other** _____

   By (print) Vanessa Eva (sign) Vanessa Eva

2. Date samples received 10/13/04 Date opened: Same X or ___/___/___

3. Delivered by: X NCA courier ___ FedEx ___UPS ___Courier ___Client ___Other _____

   Airbill # if applicable _____ (Put copy of shipping papers in file)

4. There were 1 custody seals present, signed by Bob date 10/13/04

5. Were the custody seals unbroken and intact at the date and time of arrival? X Yes ___No

6. Was ice used? X yes ___no Type of ice: ___ blue ice X gel ice ___real ice

   Temperature (degrees C) 10.0 Raytek thermometer _____ Digi-Therm (probe temperature blank)

7. Are custody papers sealed in a plastic bag and taped inside to lid? ___ Yes X No

8. Were custody papers filled out properly (ink, signed, etc.)? X Yes ___ No

   If "no" please specify: _____

9. Was project identifiable from custody papers? X Yes ___ No

   Name of project Chasco RI (if applicable)

10. **Initial and date for unpacking:** VE **(initials)** **date** 10/13/04

11. Packing material: X bubble wrap/bag ___styrofoam X cardboard _____other

12. Were samples in bags? ___ Yes X No

13. Did all containers indicated on the COC arrive? X Yes ___ No

    If "no" please indicate which containers were absent _____

14. Were all containers unbroken and labels in good condition? X Yes ___ No

    If "no" please indicate which containers _____

15. Were all bottle labels complete (ID, date, time, signature, etc.)? X Yes ___ No

    Do the IDs, times, etc. agree with the COC? X Yes ___ No

    If "no" please indicate which containers _____

16. Are containers properly preserved for indicated analysis? X Yes ___ No

17. Is there adequate volume for the test(s) requested? X Yes ___ No

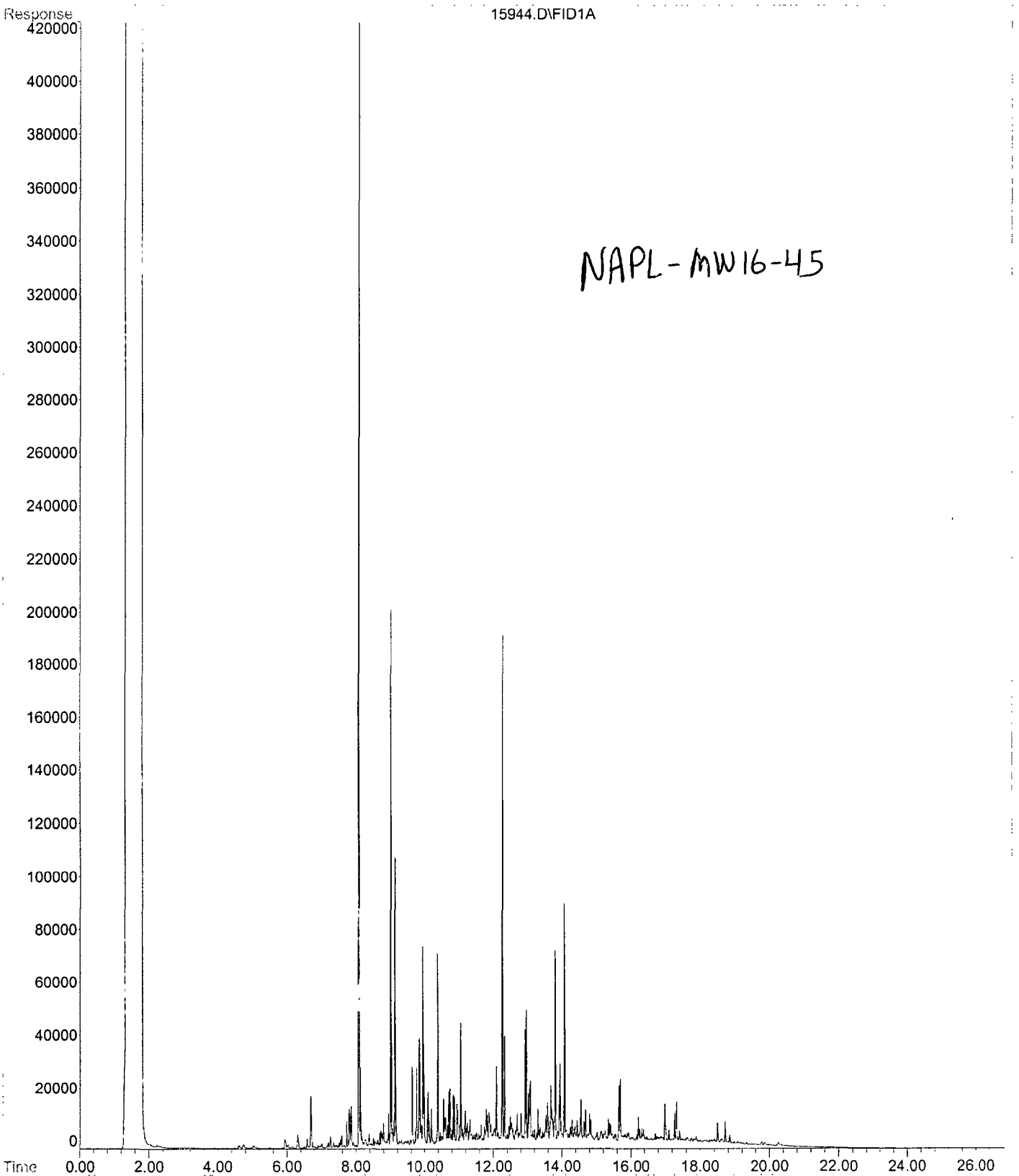
18. If voa vials were submitted, are they free of bubbles? X N/A ___ Yes ___ No

19. **Log-in phase: Date samples were logged in:** 10/13/04 **Elm Project # P** 4J0524

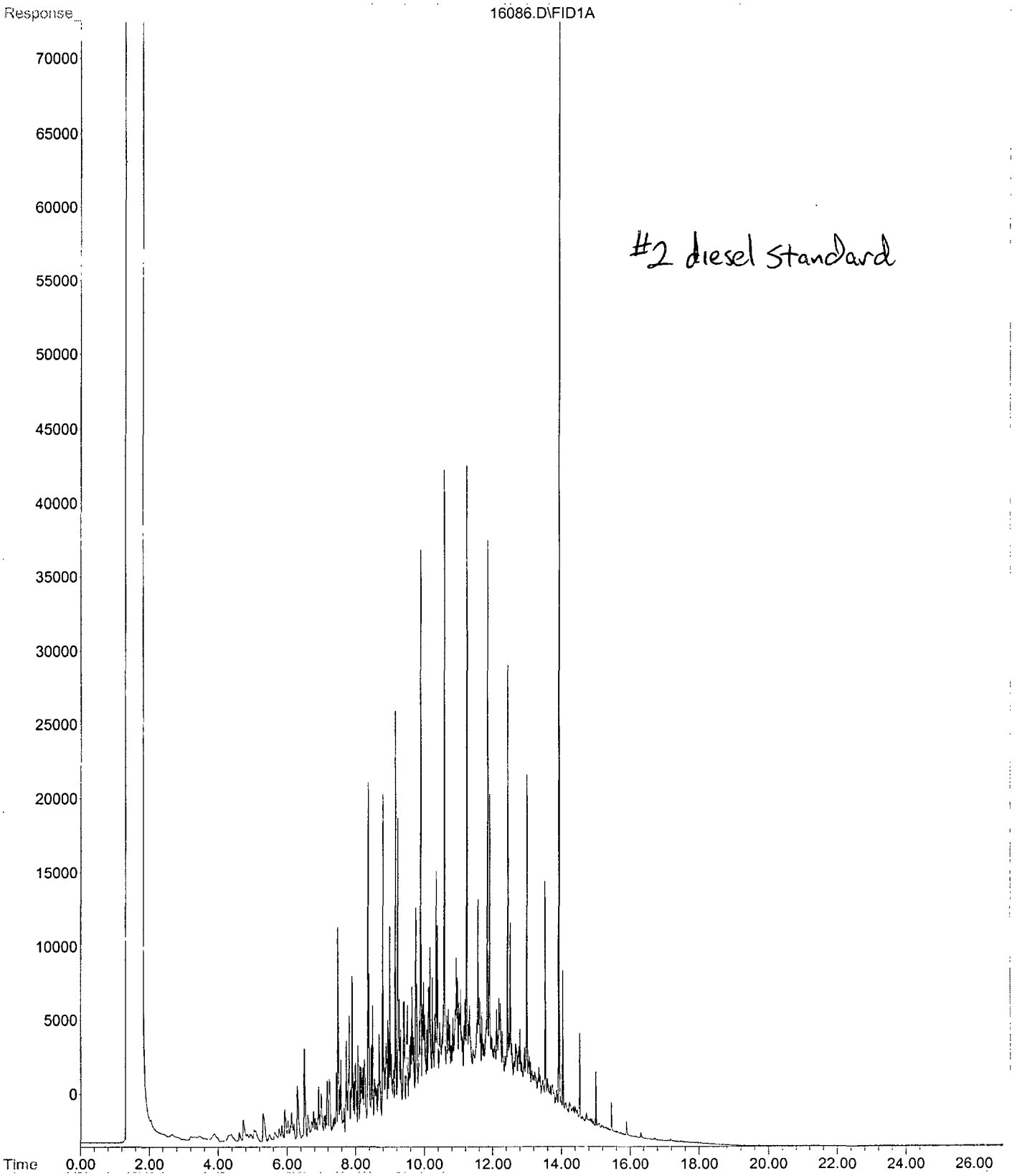
20. Logged in by (print) Vanessa Eva (sign) Vanessa Eva

21. Was the project manager notified of status? (Use back of form as a record) ___ Yes ___ No

File : D:\HPCHEM\041022\15944.D
Operator : BWJ
Acquired : 22 Oct 2004 15:00 using AcqMethod NW3HF.M
Instrument : DualFID3
Sample Name: P4J0524-01
Misc Info : 1X
Vial Number: 27

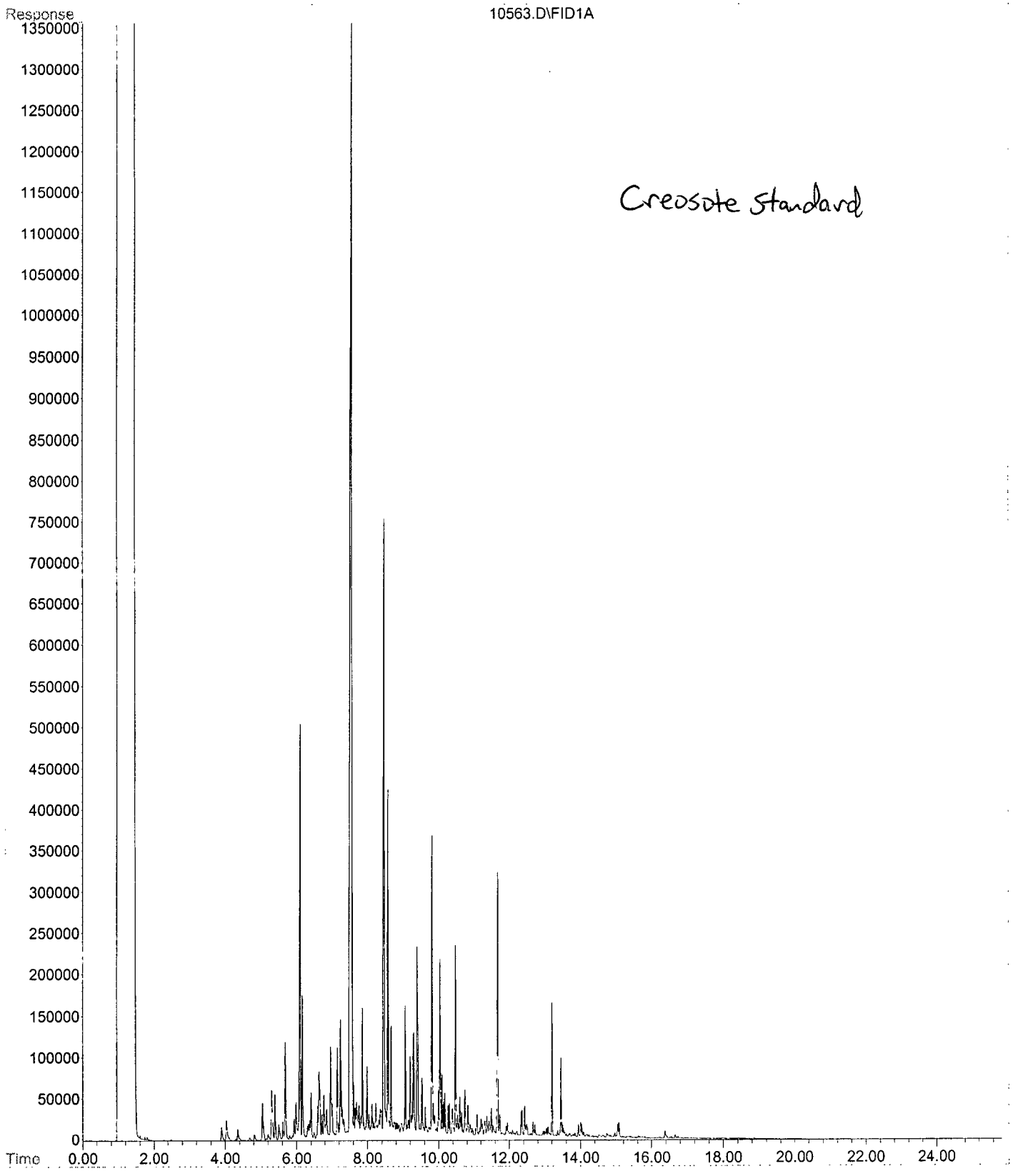


File : D:\HPCHEM\3\DATA\041028\16086.D
Operator : BWJ
Acquired : 29 Oct 2004 9:43 using AcqMethod AK3F704.M
Instrument : DualFID3
Sample Name: D 500/14.9 4050274
Misc Info : 1X
Vial Number: 50



#2 diesel standard

File : D:\HPCHEM\LIBRARY\DUALFID3F\10563.D
Operator : BWJ
Acquired : 29 Dec 2003 15:58 using AcqMethod ND3FO122.M
Instrument : DualFID3
Sample Name: creosote 2500 ppm
Misc Info : 1X
Vial Number: 40



Creosote Standard

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425.420.9200 fax 425.420.9210
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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
Anchorage 2000 W International Airport Road, Suite A-10, Anchorage, AK 99502-1119
907.563.9200 fax 907.563.9210

November 15, 2004

Rob Ede
Hahn and Associates, Inc.
434 NW Sixth Ave., Suite 203
Portland, OR 97209

RE: Gasco Upland

Enclosed are the results of analyses for samples received by the laboratory on 10/13/04 16:42.
The following list is a summary of the NCA Work Orders contained in this report.
If you have any questions concerning this report, please feel free to contact me.

Work	Project	ProjectNumber
P4J0524	Gasco Upland	2708-10

Thank You,

Philip Nerenberg

Philip Nerenberg, Laboratory Manager

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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Environmental Laboratory Network

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Anchorage 2000 W International Airport Road, Suite A-10, Anchorage, AK 99502-1119
phone: (907) 563.9200 fax: (907) 563.9210

Hahn and Associates, Inc.	Project Name:	**Gasco Upland**	
434 NW Sixth Ave., Suite 203	Project Number:	2708-10	Report Created:
Portland, OR 97209	Project Manager:	Rob Ede	11/15/04 16:25

ANALYTICAL REPORT FOR SAMPLES

Sample ID	Laboratory ID	Matrix	Date Sampled	Date Received
2708-041011MW-16-45-oil	P4J0524-01	Oil	10/11/04 16:25	10/13/04 16:42

North Creek Analytical - Portland

Philip Nerenberg

Philip Nerenberg, Laboratory Manager

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.

SCOEPA00014114

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phone: (907) 563.9200 fax: (907) 563.9210

Hahn and Associates, Inc.	Project Name:	**Gasco Upland**	
434 NW Sixth Ave., Suite 203	Project Number:	2708-10	Report Created:
Portland, OR 97209	Project Manager:	Rob Ede	11/15/04 16:25

Analytical Case Narrative

North Creek Analytical - Portland

P4J0524

Product Identification

The sample exhibited a pattern consistent with a medium distillate non-fuel gas-oil (e.g. Creosote or coal oil) by the HCID method. Further investigation by GC-MS confirmed the majority of the sample was made up of polycyclic aromatic hydrocarbons (PAHs) although the majority were naphthalene and its alky homologues. From this we conclude the sample may have been derived from only a few likely sources, those being: coal oil based creosote or the cracking and coking operations in many refineries (e.g. light cycle oil residue or coke oil).

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Hahn and Associates, Inc.	Project Name: **Gasco Upland**	
434 NW Sixth Ave., Suite 203	Project Number: 2708-10	Report Created:
Portland, OR 97209	Project Manager: Rob Ede	11/15/04 16:25

Hydrocarbon Identification per NW-TPH Methodology

North Creek Analytical - Portland

Analyte	Method	Result	MDL*	MRL	Units	Dil	Batch	Prepared	Analyzed	Notes
P4J0524-01 Oil	**2708-041011MW-16-45-oil**			**Sampled: 10/11/04 16:25**						
Gasoline Range Hydrocarbons	NWTPH HCID	ND	-----	1050	mg/kg wet	1x	4101021	10/21/04	10/22/04 15:00	
Diesel Range Hydrocarbons	"	**DET**	-----	2630	"	"	"	"	"	**X**
Heavy Oil Range Hydrocarbons	"	**DET**	-----	5260	"	"	"	"	"	**X**
Surrogate(s): 1-Chlorooctadecane		*Recovery: 32.5%*		*Limits: 50 - 150 %*	"				"	***S-09***

North Creek Analytical - Portland

Philip Nerenberg

Philip Nerenberg, Laboratory Manager

The results in this report apply to the samples analyzed in accordance with the chain of custody document. This analytical report must be reproduced in its entirety.

North Creek Analytical, Inc.
Environmental Laboratory Network

SCOEPA00014116

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phone: (907) 563.9200 fax: (907) 563.9210

Hahn and Associates, Inc.	Project Name: **Gasco Upland**	
434 NW Sixth Ave., Suite 203	Project Number: 2708-10	Report Created:
Portland, OR 97209	Project Manager: Rob Ede	11/15/04 16:25

Volatile Organic Compounds per EPA Method 8260B

North Creek Analytical - Portland

Analyte	Method	Result	MDL*	MRL	Units	Dil	Batch	Prepared	Analyzed	Notes
P4J0524-01 Oil	**2708-041011MW-16-45-oil**			**Sampled: 10/11/04 16:25**						
Acetone	EPA 8260B	ND	-----	250	mg/kg wet	10x	4100719	10/14/04	10/20/04 20:03	
Benzene	"	ND	-----	10.0	"	"	"	"	"	
Bromobenzene	"	ND	-----	10.0	"	"	"	"	"	
Bromochloromethane	"	ND	-----	10.0	"	"	"	"	"	
Bromodichloromethane	"	ND	-----	10.0	"	"	"	"	"	
Bromoform	"	ND	-----	10.0	"	"	"	"	"	
Bromomethane	"	ND	-----	50.0	"	"	"	"	"	
2-Butanone	"	ND	-----	100	"	"	"	"	"	
n-Butylbenzene	"	ND	-----	50.0	"	"	"	"	"	
sec-Butylbenzene	"	ND	-----	10.0	"	"	"	"	"	
tert-Butylbenzene	"	ND	-----	10.0	"	"	"	"	"	
Carbon disulfide	"	ND	-----	100	"	"	"	"	"	
Carbon tetrachloride	"	ND	-----	10.0	"	"	"	"	"	
Chlorobenzene	"	ND	-----	10.0	"	"	"	"	"	
Chloroethane	"	ND	-----	10.0	"	"	"	"	"	
Chloroform	"	ND	-----	10.0	"	"	"	"	"	
Chloromethane	"	ND	-----	50.0	"	"	"	"	"	
2-Chlorotoluene	"	ND	-----	10.0	"	"	"	"	"	
4-Chlorotoluene	"	ND	-----	10.0	"	"	"	"	"	
1,2-Dibromo-3-chloropropane	"	ND	-----	50.0	"	"	"	"	"	
Dibromochloromethane	"	ND	-----	10.0	"	"	"	"	"	
1,2-Dibromoethane	"	ND	-----	10.0	"	"	"	"	"	
Dibromomethane	"	ND	-----	10.0	"	"	"	"	"	
1,2-Dichlorobenzene	"	ND	-----	10.0	"	"	"	"	"	
1,3-Dichlorobenzene	"	ND	-----	10.0	"	"	"	"	"	
1,4-Dichlorobenzene	"	ND	-----	10.0	"	"	"	"	"	
Dichlorodifluoromethane	"	ND	-----	50.0	"	"	"	"	"	
1,1-Dichloroethane	"	ND	-----	10.0	"	"	"	"	"	
1,2-Dichloroethane	"	ND	-----	10.0	"	"	"	"	"	
1,1-Dichloroethene	"	ND	-----	10.0	"	"	"	"	"	
cis-1,2-Dichloroethene	"	ND	-----	10.0	"	"	"	"	"	
trans-1,2-Dichloroethene	"	ND	-----	10.0	"	"	"	"	"	
1,2-Dichloropropane	"	ND	-----	10.0	"	"	"	"	"	
1,3-Dichloropropane	"	ND	-----	10.0	"	"	"	"	"	
2,2-Dichloropropane	"	ND	-----	10.0	"	"	"	"	"	
1,1-Dichloropropene	"	ND	-----	10.0	"	"	"	"	"	
cis-1,3-Dichloropropene	"	ND	-----	10.0	"	"	"	"	"	
trans-1,3-Dichloropropene	"	ND	-----	10.0	"	"	"	"	"	
Ethylbenzene	"	**34.4**	-----	10.0	"	"	"	"	"	
Hexachlorobutadiene	"	ND	-----	40.0	"	"	"	"	"	
2-Hexanone	"	ND	-----	100	"	"	"	"	"	
Isopropylbenzene	"	ND	-----	20.0	"	"	"	"	"	

North Creek Analytical - Portland

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Philip Nerenberg

Philip Nerenberg, Laboratory Manager

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Hahn and Associates, Inc.	Project Name:	**Gasco Upland**	
434 NW Sixth Ave., Suite 203	Project Number:	2708-10	Report Created:
Portland, OR 97209	Project Manager:	Rob Ede	11/15/04 16:25

Volatile Organic Compounds per EPA Method 8260B

North Creek Analytical - Portland

Analyte	Method	Result	MDL*	MRL	Units	Dil	Batch	Prepared	Analyzed	Notes
P4J0524-01 Oil	**2708-041011MW-16-45-oil**			**Sampled: 10/11/04 16:25**						
p-Isopropyltoluene	EPA 8260B	ND	-----	20.0	mg/kg wet	10x	4100719	10/14/04	10/20/04 20:03	
4-Methyl-2-pentanone	"	ND	-----	50.0	"	"	"	"	"	
Methyl tert-butyl ether	"	ND	-----	10.0	"	"	"	"	"	
Methylene chloride	"	ND	-----	50.0	"	"	"	"	"	
Naphthalene	"	**1720**	-----	20.0	"	"	"	"	"	
n-Propylbenzene	"	ND	-----	10.0	"	"	"	"	"	
Styrene	"	ND	-----	10.0	"	"	"	"	"	
1,1,1,2-Tetrachloroethane	"	ND	-----	10.0	"	"	"	"	"	
1,1,2,2-Tetrachloroethane	"	ND	-----	10.0	"	"	"	"	"	
Tetrachloroethene	"	ND	-----	10.0	"	"	"	"	"	
Toluene	"	**17.8**	-----	10.0	"	"	"	"	"	
1,2,3-Trichlorobenzene	"	ND	-----	10.0	"	"	"	"	"	
1,2,4-Trichlorobenzene	"	ND	-----	10.0	"	"	"	"	"	
1,1,1-Trichloroethane	"	ND	-----	10.0	"	"	"	"	"	
1,1,2-Trichloroethane	"	ND	-----	10.0	"	"	"	"	"	
Trichloroethene	"	ND	-----	10.0	"	"	"	"	"	
Trichlorofluoromethane	"	ND	-----	10.0	"	"	"	"	"	
1,2,3-Trichloropropane	"	ND	-----	10.0	"	"	"	"	"	
1,2,4-Trimethylbenzene	"	**54.9**	-----	10.0	"	"	"	"	"	
1,3,5-Trimethylbenzene	"	**16.2**	-----	10.0	"	"	"	"	"	
Vinyl chloride	"	ND	-----	10.0	"	"	"	"	"	
o-Xylene	"	**22.3**	-----	10.0	"	"	"	"	"	
m,p-Xylene	"	**43.8**	-----	20.0	"	"	"	"	"	
Surrogate(s): 4-BFB	*Recovery: 94.5%*		*Limits: 42.6 - 130 %*		"				"	
1,2-DCA-d4	*112%*		*57.3 - 144 %*		"				"	
Dibromofluoromethane	*91.0%*		*45.5 - 130 %*		"				"	
Toluene-d8	*103%*		*42.1 - 144 %*		"				"	

North Creek Analytical - Portland

Philip Nerenberg

Philip Nerenberg, Laboratory Manager

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Hahn and Associates, Inc.	Project Name: **Gasco Upland**	
434 NW Sixth Ave., Suite 203	Project Number: 2708-10	Report Created:
Portland, OR 97209	Project Manager: Rob Ede	11/15/04 16:25

Semivolatile Organic Compounds per EPA Method 8270C

North Creek Analytical - Portland

Analyte	Method	Result	MDL*	MRL	Units	Dil	Batch	Prepared	Analyzed	Notes
P4J0524-01 Oil	**2708-041011MW-16-45-oil**			**Sampled: 10/11/04 16:25**						**R-05**
Carbazole	EPA 8270C	ND	-----	980	mg/kg	10x	4100753	10/15/04	10/22/04 09:01	
Acenaphthene	"	**1570**	-----	980	"	"	"	"	"	
Acenaphthylene	"	ND	-----	980	"	"	"	"	"	
Anthracene	"	**1020**	-----	980	"	"	"	"	"	
Benzo (a) anthracene	"	ND	-----	980	"	"	"	"	"	
Benzo (a) pyrene	"	ND	-----	980	"	"	"	"	"	
Benzo (b) fluoranthene	"	ND	-----	980	"	"	"	"	"	
Benzo (ghi) perylene	"	ND	-----	980	"	"	"	"	"	
Benzo (k) fluoranthene	"	ND	-----	980	"	"	"	"	"	
Benzoic Acid	"	ND	-----	2970	"	"	"	"	"	
Benzyl alcohol	"	ND	-----	980	"	"	"	"	"	
4-Bromophenyl phenyl ether	"	ND	-----	980	"	"	"	"	"	
Butyl benzyl phthalate	"	ND	-----	980	"	"	"	"	"	
4-Chloro-3-methylphenol	"	ND	-----	980	"	"	"	"	"	
4-Chloroaniline	"	ND	-----	5940	"	"	"	"	"	
Bis(2-chloroethoxy)methane	"	ND	-----	980	"	"	"	"	"	
Bis(2-chloroethyl)ether	"	ND	-----	980	"	"	"	"	"	
Bis(2-chloroisopropyl)ether	"	ND	-----	980	"	"	"	"	"	
2-Chloronaphthalene	"	ND	-----	980	"	"	"	"	"	
2-Chlorophenol	"	ND	-----	980	"	"	"	"	"	
4-Chlorophenyl phenyl ether	"	ND	-----	980	"	"	"	"	"	
Chrysene	"	ND	-----	980	"	"	"	"	"	
Di-n-butyl phthalate	"	ND	-----	2970	"	"	"	"	"	
Di-n-octyl phthalate	"	ND	-----	980	"	"	"	"	"	
Dibenzo (a,h) anthracene	"	ND	-----	980	"	"	"	"	"	
Dibenzofuran	"	ND	-----	980	"	"	"	"	"	
1,2-Dichlorobenzene	"	ND	-----	2970	"	"	"	"	"	
1,3-Dichlorobenzene	"	ND	-----	2970	"	"	"	"	"	
1,4-Dichlorobenzene	"	ND	-----	2970	"	"	"	"	"	
3,3'-Dichlorobenzidine	"	ND	-----	2970	"	"	"	"	"	
2,4-Dichlorophenol	"	ND	-----	980	"	"	"	"	"	
Diethyl phthalate	"	ND	-----	980	"	"	"	"	"	
2,4-Dimethylphenol	"	ND	-----	2970	"	"	"	"	"	
Dimethyl phthalate	"	ND	-----	980	"	"	"	"	"	
4,6-Dinitro-2-methylphenol	"	ND	-----	2970	"	"	"	"	"	
2,4-Dinitrophenol	"	ND	-----	5940	"	"	"	"	"	
2,4-Dinitrotoluene	"	ND	-----	1490	"	"	"	"	"	
2,6-Dinitrotoluene	"	ND	-----	1490	"	"	"	"	"	
Bis(2-ethylhexyl)phthalate	"	ND	-----	5940	"	"	"	"	"	
Fluoranthene	"	**1780**	-----	980	"	"	"	"	"	
Fluorene	"	**995**	-----	980	"	"	"	"	"	
Hexachlorobenzene	"	ND	-----	980	"	"	"	"	"	

North Creek Analytical - Portland

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Philip Nerenberg

Philip Nerenberg, Laboratory Manager

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Hahn and Associates, Inc.	Project Name:	**Gasco Upland**	
434 NW Sixth Ave., Suite 203	Project Number:	2708-10	Report Created:
Portland, OR 97209	Project Manager:	Rob Ede	11/15/04 16:25

Semivolatile Organic Compounds per EPA Method 8270C

North Creek Analytical - Portland

Analyte	Method	Result	MDL*	MRL	Units	Dil	Batch	Prepared	Analyzed	Notes
P4J0524-01 Oil	**2708-041011MW-16-45-oil**			**Sampled: 10/11/04 16:25**						**R-05**
Hexachlorobutadiene	EPA 8270C	ND	-----	2970	mg/kg	10x	4100753	10/15/04	10/22/04 09:01	
Hexachlorocyclopentadiene	"	ND	-----	2970	"	"	"	"	"	
Hexachloroethane	"	ND	-----	2970	"	"	"	"	"	
Indeno (1,2,3-cd) pyrene	"	ND	-----	980	"	"	"	"	"	
Isophorone	"	ND	-----	980	"	"	"	"	"	
2-Methylnaphthalene	"	**5500**	-----	980	"	"	"	"	"	
2-Methylphenol	"	ND	-----	980	"	"	"	"	"	
3-,4-Methylphenol	"	ND	-----	980	"	"	"	"	"	
Naphthalene	"	**15400**	-----	980	"	"	"	"	"	
2-Nitroaniline	"	ND	-----	980	"	"	"	"	"	
3-Nitroaniline	"	ND	-----	2970	"	"	"	"	"	
4-Nitroaniline	"	ND	-----	980	"	"	"	"	"	
Nitrobenzene	"	ND	-----	980	"	"	"	"	"	
2-Nitrophenol	"	ND	-----	980	"	"	"	"	"	
4-Nitrophenol	"	ND	-----	2970	"	"	"	"	"	
N-Nitrosodi-n-propylamine	"	ND	-----	980	"	"	"	"	"	
N-Nitrosodiphenylamine	"	ND	-----	980	"	"	"	"	"	
Pentachlorophenol	"	ND	-----	2970	"	"	"	"	"	
Phenanthrene	"	**6020**	-----	980	"	"	"	"	"	
Phenol	"	ND	-----	980	"	"	"	"	"	
Pyrene	"	**2210**	-----	980	"	"	"	"	"	
1,2,4-Trichlorobenzene	"	ND	-----	980	"	"	"	"	"	
2,4,5-Trichlorophenol	"	ND	-----	980	"	"	"	"	"	
2,4,6-Trichlorophenol	"	ND	-----	980	"	"	"	"	"	
Surrogate(s): 2-Fluorobiphenyl		*Recovery: 112%*		*Limits: 20 - 150 %*		"			"	
2-Fluorophenol		*106%*		*10 - 150 %*		"			"	
Nitrobenzene-d5		*104%*		*20 - 150 %*		"			"	
Phenol-d6		*98.6%*		*10 - 150 %*		"			"	
p-Terphenyl-d14		*109%*		*20 - 150 %*		"			"	
2,4,6-Tribromophenol		*85.1%*		*10 - 150 %*		"			"	

North Creek Analytical - Portland

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Philip Nerenberg

Philip Nerenberg, Laboratory Manager

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Hahn and Associates, Inc.	Project Name:	**Gasco Upland**	
434 NW Sixth Ave., Suite 203	Project Number:	2708-10	Report Created:
Portland, OR 97209	Project Manager:	Rob Ede	11/15/04 16:25

Polynuclear Aromatic Compounds per EPA 8270M-SIM

North Creek Analytical - Portland

Analyte	Method	Result	MDL*	MRL	Units	Dil	Batch	Prepared	Analyzed	Notes
P4J0524-01 Oil	**2708-041011MW-16-45-oil**			**Sampled: 10/11/04 16:25**						**A-02**
Acenaphthene	EPA 8270m	**1500**	-----	39.8	mg/kg	20x	4100753	10/15/04	11/03/04 00:41	
Acenaphthylene	"	**165**	-----	39.8	"	"	"	"	"	
Anthracene	"	**1110**	-----	39.8	"	"	"	"	"	
Benzo (a) anthracene	"	**565**	-----	39.8	"	"	"	"	"	
Benzo (a) pyrene	"	**508**	-----	39.8	"	"	"	"	"	
Benzo (b) fluoranthene	"	**289**	-----	39.8	"	"	"	"	"	
Benzo (ghi) perylene	"	**385**	-----	39.8	"	"	"	"	"	
Benzo (k) fluoranthene	"	**277**	-----	39.8	"	"	"	"	"	
Chrysene	"	**666**	-----	39.8	"	"	"	"	"	
Dibenzo (a,h) anthracene	"	**68.2**	-----	39.8	"	"	"	"	"	
Fluoranthene	"	**1800**	-----	39.8	"	"	"	"	"	
Fluorene	"	**1100**	-----	39.8	"	"	"	"	"	
Indeno (1,2,3-cd) pyrene	"	**274**	-----	39.8	"	"	"	"	"	
Naphthalene	"	**15600**	-----	398	"	200x	"	"	11/03/04 14:09	
Phenanthrene	"	**6200**	-----	398	"	"	"	"	"	
Pyrene	"	**2280**	-----	398	"	"	"	"	"	

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Philip Nerenberg

Philip Nerenberg, Laboratory Manager

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Hahn and Associates, Inc.	Project Name:	**Gasco Upland**	
434 NW Sixth Ave., Suite 203	Project Number:	2708-10	Report Created:
Portland, OR 97209	Project Manager:	Rob Ede	11/15/04 16:25

Conventional Chemistry Parameters per APHA/EPA Methods

North Creek Analytical - Portland

Analyte		Method	Result	MDL*	MRL	Units	Dil	Batch	Prepared	Analyzed	Notes
P4J0524-01	**Oil**	**2708-041011MW-16-45-oil**			**Sampled: 10/11/04 16:25**						
pH		150.1/9040A	**8.28**	-----		pH Units	1x	4100737	10/14/04	10/14/04 18:00	

North Creek Analytical - Portland

Philip Nerenberg

Philip Nerenberg, Laboratory Manager

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Hahn and Associates, Inc.	Project Name: **Gasco Upland**	
434 NW Sixth Ave., Suite 203	Project Number: 2708-10	Report Created:
Portland, OR 97209	Project Manager: Rob Ede	11/15/04 16:25

Physical Parameters per APHA/ASTM/EPA Methods

North Creek Analytical - Portland

Analyte		Method	Result	MDL*	MRL	Units	Dil	Batch	Prepared	Analyzed	Notes
P4J0524-01	**Oil**	**2708-041011MW-16-45-oil**			**Sampled: 10/11/04 16:25**						
Flashpoint		EPA 1010	ND	-----	150	°F	1x	4100866	10/18/04	10/18/04 12:46	

North Creek Analytical - Portland

Philip Nerenberg

Philip Nerenberg, Laboratory Manager

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Hahn and Associates, Inc.	Project Name: **Gasco Upland**	
434 NW Sixth Ave., Suite 203	Project Number: 2708-10	Report Created:
Portland, OR 97209	Project Manager: Rob Ede	11/15/04 16:25

Hydrocarbon Identification per NW-TPH Methodology - Laboratory Quality Control Results

North Creek Analytical - Portland

QC Batch: 4101021 **Soil Preparation Method: EPA 3550 Fuels**

Analyte	Method	Result	MDL*	MRL	Units	Dil	Source Result	Spike Amt	% REC	(Limits)	% RPD	(Limits)	Analyzed	Notes
Blank (4101021-BLK1)								Extracted: 10/21/04 06:41						
Gasoline Range Hydrocarbons	NWTPH HCID	ND	---	20.0	mg/kg	1x	--	--	--	--	--	--	10/22/04 11:58	
Diesel Range Hydrocarbons	"	ND	---	50.0	"	"	--	--	--	--	--	--	"	
Heavy Oil Range Hydrocarbons	"	ND	---	100	"	"	--	--	--	--	--	--	"	
Surrogate(s): 1-Chlorooctadecane		*Recovery: 131%*			*Limits: 50-150%*	"							*10/22/04 11:58*	
Duplicate (4101021-DUP1)					QC Source: P4J0524-01			Extracted: 10/21/04 06:41						
Gasoline Range Hydrocarbons	NWTPH HCID	DET	---	1000	mg/kg wet	1x	ND	--	--	--		(50)	10/22/04 14:19	Q-14
Diesel Range Hydrocarbons	"	DET	---	2500	"	"	53400	--	--	--	59.5%	"	"	Q-14
Heavy Oil Range Hydrocarbons	"	DET	---	5000	"	"	30700	--	--	--	64.7%	"	"	Q-14
Surrogate(s): 1-Chlorooctadecane		*Recovery: 34.8%*			*Limits: 50-150%*	"							*10/22/04 14:19*	*S-09*

North Creek Analytical - Portland

Philip Nerenberg

Philip Nerenberg, Laboratory Manager

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Hahn and Associates, Inc.	Project Name:	**Gasco Upland**	
434 NW Sixth Ave., Suite 203	Project Number:	2708-10	Report Created:
Portland, OR 97209	Project Manager:	Rob Ede	11/15/04 16:25

Volatile Organic Compounds per EPA Method 8260B - Laboratory Quality Control Results

North Creek Analytical - Portland

QC Batch: 4100719 **Soil Preparation Method: EPA 5035 Modified**

Analyte	Method	Result	MDL*	MRL	Units	Dil	Source Result	Spike Amt	% REC	(Limits)	% RPD	(Limits)	Analyzed	Notes
Blank (4100719-BLK1)								Extracted: 10/14/04 12:13						
Acetone	EPA 8260B	ND	---	2.50	mg/kg	1x	--	--	--	--	--	--	10/14/04 23:36	
Benzene	"	ND	---	0.100	"	"	--	--	--	--	--	--	"	
Bromobenzene	"	ND	---	0.100	"	"	--	--	--	--	--	--	"	
Bromochloromethane	"	ND	---	0.100	"	"	--	--	--	--	--	--	"	
Bromodichloromethane	"	ND	---	0.100	"	"	--	--	--	--	--	--	"	
Bromoform	"	ND	---	0.100	"	"	--	--	--	--	--	--	"	
Bromomethane	"	ND	---	0.500	"	"	--	--	--	--	--	--	"	
2-Butanone	"	ND	---	1.00	"	"	--	--	--	--	--	--	"	
n-Butylbenzene	"	ND	---	0.500	"	"	--	--	--	--	--	--	"	
sec-Butylbenzene	"	ND	---	0.100	"	"	--	--	--	--	--	--	"	
tert-Butylbenzene	"	ND	---	0.100	"	"	--	--	--	--	--	--	"	
Carbon disulfide	"	ND	---	1.00	"	"	--	--	--	--	--	--	"	
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	"	"	--	--	--	--	--	--	"	
1,2-Dibromo-3-chloropropane	"	ND	---	0.500	"	"	--	--	--	--	--	--	"	
Dibromochloromethane	"	ND	---	0.100	"	"	--	--	--	--	--	--	"	
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	---	0.500	"	"	--	--	--	--	--	--	"	
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	"	"	--	--	--	--	--	--	"	
Hexachlorobutadiene	"	ND	---	0.400	"	"	--	--	--	--	--	--	"	
2-Hexanone	"	ND	---	1.00	"	"	--	--	--	--	--	--	"	

North Creek Analytical - Portland

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Philip Nerenberg

Philip Nerenberg, Laboratory Manager

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Hahn and Associates, Inc.	Project Name: **Gasco Upland**	
434 NW Sixth Ave., Suite 203	Project Number: 2708-10	Report Created:
Portland, OR 97209	Project Manager: Rob Ede	11/15/04 16:25

Volatile Organic Compounds per EPA Method 8260B - Laboratory Quality Control Results

North Creek Analytical - Portland

QC Batch: 4100719 **Soil Preparation Method: EPA 5035 Modified**

Analyte	Method	Result	MDL*	MRL	Units	Dil	Source Result	Spike Amt	% REC	(Limits)	% RPD	(Limits)	Analyzed	Notes
Blank (4100719-BLK1)							**Extracted: 10/14/04 12:13**							
Isopropylbenzene	EPA 8260B	ND	---	0.200	mg/kg	1x	--	--	--	--	--	--	10/14/04 23:36	
p-Isopropyltoluene	"	ND	---	0.200	"	"	--	--	--	--	--	--	"	
4-Methyl-2-pentanone	"	ND	---	0.500	"	"	--	--	--	--	--	--	"	
Methyl tert-butyl ether	"	ND	---	0.100	"	"	--	--	--	--	--	--	"	
Methylene chloride	"	ND	---	0.500	"	"	--	--	--	--	--	--	"	
Naphthalene	"	ND	---	0.200	"	"	--	--	--	--	--	--	"	
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	"	"	--	--	--	--	--	--	"	
o-Xylene	"	ND	---	0.100	"	"	--	--	--	--	--	--	"	
m,p-Xylene	"	ND	---	0.200	"	"	--	--	--	--	--	--	"	
Surrogate(s): 4-BFB		*Recovery: 98.0%*			*Limits: 42.6-130%*	"							*10/14/04 23:36*	
1,2-DCA-d4		*116%*			*57.3-144%*	"							"	
Dibromofluoromethane		*102%*			*45.5-130%*	"							"	
Toluene-d8		*112%*			*42.1-144%*	"							"	

North Creek Analytical - Portland

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Philip Nerenberg

Philip Nerenberg, Laboratory Manager

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Hahn and Associates, Inc.	Project Name:	**Gasco Upland**	
434 NW Sixth Ave., Suite 203	Project Number:	2708-10	Report Created:
Portland, OR 97209	Project Manager:	Rob Ede	11/15/04 16:25

Volatile Organic Compounds per EPA Method 8260B - Laboratory Quality Control Results

North Creek Analytical - Portland

QC Batch: 4100719 **Soil Preparation Method: EPA 5035 Modified**

Analyte	Method	Result	MDL*	MRL	Units	Dil	Source Result	Spike Amt	% REC (Limits)	% RPD (Limits)	Analyzed	Notes
LCS (4100719-BS1)									**Extracted: 10/14/04 12:13**			
Benzene	EPA 8260B	1.98	---	0.100	mg/kg	1x	--	2.00	99.0% (81.9-125)	-- --	10/14/04 19:58	
Chlorobenzene	"	2.03	---	0.100	"	"	--	"	102% (79.2-125)	-- --	"	
1,1-Dichloroethene	"	1.62	---	0.100	"	"	--	"	81.0% (66.1-125)	-- --	"	
Toluene	"	2.04	---	0.100	"	"	--	"	102% (80-125)	-- --	"	
Trichloroethene	"	1.98	---	0.100	"	"	--	"	99.0% (76-125)	-- --	"	
Surrogate(s): 4-BFB		*Recovery: 104%*			*Limits: 42.6-130%*	"					*10/14/04 19:58*	
1,2-DCA-d4		*116%*			*57.3-144%*	"					"	
Dibromofluoromethane		*115%*			*45.5-130%*	"					"	
Toluene-d8		*113%*			*42.1-144%*	"					"	
Matrix Spike (4100719-MS1)					**QC Source: P4J0234-02**				**Extracted: 10/14/04 12:13**			
Benzene	EPA 8260B	2.86	---	0.100	mg/kg dry	1x	ND	2.89	99.0% (68.5-125)	-- --	10/14/04 21:20	
Chlorobenzene	"	2.95	---	0.100	"	"	ND	"	102% (65.9-125)	-- --	"	
1,1-Dichloroethene	"	2.35	---	0.100	"	"	ND	"	81.3% (55.8-125)	-- --	"	
Toluene	"	2.93	---	0.100	"	"	ND	"	101% (70.3-125)	-- --	"	
Trichloroethene	"	2.89	---	0.100	"	"	ND	"	100% (65.5-125)	-- --	"	
Surrogate(s): 4-BFB		*Recovery: 86.2%*			*Limits: 42.6-130%*	"					*10/14/04 21:20*	
1,2-DCA-d4		*96.5%*			*57.3-144%*	"					"	
Dibromofluoromethane		*98.6%*			*45.5-130%*	"					"	
Toluene-d8		*95.5%*			*42.1-144%*	"					"	
Matrix Spike Dup (4100719-MSD1)					**QC Source: P4J0234-02**				**Extracted: 10/14/04 12:13**			
Benzene	EPA 8260B	2.88	---	0.100	mg/kg dry	1x	ND	2.89	99.7% (68.5-125)	0.697% (25)	10/14/04 21:47	
Chlorobenzene	"	2.97	---	0.100	"	"	ND	"	103% (65.9-125)	0.676% "	"	
1,1-Dichloroethene	"	2.31	---	0.100	"	"	ND	"	79.9% (55.8-125)	1.72% "	"	
Toluene	"	3.00	---	0.100	"	"	ND	"	104% (70.3-125)	2.36% "	"	
Trichloroethene	"	2.89	---	0.100	"	"	ND	"	100% (65.5-125)	0.00% "	"	
Surrogate(s): 4-BFB		*Recovery: 85.8%*			*Limits: 42.6-130%*	"					*10/14/04 21:47*	
1,2-DCA-d4		*97.9%*			*57.3-144%*	"					"	
Dibromofluoromethane		*97.6%*			*45.5-130%*	"					"	
Toluene-d8		*96.9%*			*42.1-144%*	"					"	

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Hahn and Associates, Inc.	Project Name:	**Gasco Upland**	
434 NW Sixth Ave., Suite 203	Project Number:	2708-10	Report Created:
Portland, OR 97209	Project Manager:	Rob Ede	11/15/04 16:25

Semivolatile Organic Compounds per EPA Method 8270C - Laboratory Quality Control Results

North Creek Analytical - Portland

QC Batch: 4100753 **Other wet Preparation Method: EPA 3580**

Analyte	Method	Result	MDL*	MRL	Units	Dil	Source Result	Spike Amt	% REC	(Limits)	% RPD	(Limits)	Analyzed	Notes
Blank (4100753-BLK1)							**Extracted: 10/15/04 07:23**							
Carbazole	EPA 8270C	ND	---	99.0	mg/kg	1x	--	--	--	--	--	--	10/22/04 09:44	
Acenaphthene	"	ND	---	99.0	"	"	--	--	--	--	--	--	"	
Acenaphthylene	"	ND	---	99.0	"	"	--	--	--	--	--	--	"	
Anthracene	"	ND	---	99.0	"	"	--	--	--	--	--	--	"	
Benzo (a) anthracene	"	ND	---	99.0	"	"	--	--	--	--	--	--	"	
Benzo (a) pyrene	"	ND	---	99.0	"	"	--	--	--	--	--	--	"	
Benzo (b) fluoranthene	"	ND	---	99.0	"	"	--	--	--	--	--	--	"	
Benzo (ghi) perylene	"	ND	---	99.0	"	"	--	--	--	--	--	--	"	
Benzo (k) fluoranthene	"	ND	---	99.0	"	"	--	--	--	--	--	--	"	
Benzoic Acid	"	ND	---	300	"	"	--	--	--	--	--	--	"	
Benzyl alcohol	"	ND	---	99.0	"	"	--	--	--	--	--	--	"	
4-Bromophenyl phenyl ether	"	ND	---	99.0	"	"	--	--	--	--	--	--	"	
Butyl benzyl phthalate	"	ND	---	99.0	"	"	--	--	--	--	--	--	"	
4-Chloro-3-methylphenol	"	ND	---	99.0	"	"	--	--	--	--	--	--	"	
4-Chloroaniline	"	ND	---	600	"	"	--	--	--	--	--	--	"	
Bis(2-chloroethoxy)methane	"	ND	---	99.0	"	"	--	--	--	--	--	--	"	
Bis(2-chloroethyl)ether	"	ND	---	99.0	"	"	--	--	--	--	--	--	"	
Bis(2-chloroisopropyl)ether	"	ND	---	99.0	"	"	--	--	--	--	--	--	"	
2-Chloronaphthalene	"	ND	---	99.0	"	"	--	--	--	--	--	--	"	
2-Chlorophenol	"	ND	---	99.0	"	"	--	--	--	--	--	--	"	
4-Chlorophenyl phenyl ether	"	ND	---	99.0	"	"	--	--	--	--	--	--	"	
Chrysene	"	ND	---	99.0	"	"	--	--	--	--	--	--	"	
Di-n-butyl phthalate	"	ND	---	300	"	"	--	--	--	--	--	--	"	
Di-n-octyl phthalate	"	ND	---	99.0	"	"	--	--	--	--	--	--	"	
Dibenzo (a,h) anthracene	"	ND	---	99.0	"	"	--	--	--	--	--	--	"	
Dibenzofuran	"	ND	---	99.0	"	"	--	--	--	--	--	--	"	
1,2-Dichlorobenzene	"	ND	---	300	"	"	--	--	--	--	--	--	"	
1,3-Dichlorobenzene	"	ND	---	300	"	"	--	--	--	--	--	--	"	
1,4-Dichlorobenzene	"	ND	---	300	"	"	--	--	--	--	--	--	"	
3,3'-Dichlorobenzidine	"	ND	---	300	"	"	--	--	--	--	--	--	"	
2,4-Dichlorophenol	"	ND	---	99.0	"	"	--	--	--	--	--	--	"	
Diethyl phthalate	"	ND	---	99.0	"	"	--	--	--	--	--	--	"	
2,4-Dimethylphenol	"	ND	---	300	"	"	--	--	--	--	--	--	"	
Dimethyl phthalate	"	ND	---	99.0	"	"	--	--	--	--	--	--	"	
4,6-Dinitro-2-methylphenol	"	ND	---	300	"	"	--	--	--	--	--	--	"	
2,4-Dinitrophenol	"	ND	---	600	"	"	--	--	--	--	--	--	"	
2,4-Dinitrotoluene	"	ND	---	150	"	"	--	--	--	--	--	--	"	
2,6-Dinitrotoluene	"	ND	---	150	"	"	--	--	--	--	--	--	"	
Bis(2-ethylhexyl)phthalate	"	ND	---	600	"	"	--	--	--	--	--	--	"	
Fluoranthene	"	ND	---	99.0	"	"	--	--	--	--	--	--	"	
Fluorene	"	ND	---	99.0	"	"	--	--	--	--	--	--	"	

North Creek Analytical - Portland

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Philip Nerenberg

Philip Nerenberg, Laboratory Manager

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Hahn and Associates, Inc.	Project Name:	**Gasco Upland**	
434 NW Sixth Ave., Suite 203	Project Number:	2708-10	Report Created:
Portland, OR 97209	Project Manager:	Rob Ede	11/15/04 16:25

Semivolatile Organic Compounds per EPA Method 8270C - Laboratory Quality Control Results

North Creek Analytical - Portland

QC Batch: 4100753 **Other wet Preparation Method: EPA 3580**

Analyte	Method	Result	MDL*	MRL	Units	Dil	Source Result	Spike Amt	% REC	(Limits)	% RPD	(Limits)	Analyzed	Notes
Blank (4100753-BLK1)							**Extracted: 10/15/04 07:23**							
Hexachlorobenzene	EPA 8270C	ND	---	99.0	mg/kg	1x	--	--	--	--	--	--	10/22/04 09:44	
Hexachlorobutadiene	"	ND	---	300	"	"	--	--	--	--	--	--	"	
Hexachlorocyclopentadiene	"	ND	---	300	"	"	--	--	--	--	--	--	"	
Hexachloroethane	"	ND	---	300	"	"	--	--	--	--	--	--	"	
Indeno (1,2,3-cd) pyrene	"	ND	---	99.0	"	"	--	--	--	--	--	--	"	
Isophorone	"	ND	---	99.0	"	"	--	--	--	--	--	--	"	
2-Methylnaphthalene	"	ND	---	99.0	"	"	--	--	--	--	--	--	"	
2-Methylphenol	"	ND	---	99.0	"	"	--	--	--	--	--	--	"	
3-,4-Methylphenol	"	ND	---	99.0	"	"	--	--	--	--	--	--	"	
Naphthalene	"	ND	---	99.0	"	"	--	--	--	--	--	--	"	
2-Nitroaniline	"	ND	---	99.0	"	"	--	--	--	--	--	--	"	
3-Nitroaniline	"	ND	---	300	"	"	--	--	--	--	--	--	"	
4-Nitroaniline	"	ND	---	99.0	"	"	--	--	--	--	--	--	"	
Nitrobenzene	"	ND	---	99.0	"	"	--	--	--	--	--	--	"	
2-Nitrophenol	"	ND	---	99.0	"	"	--	--	--	--	--	--	"	
4-Nitrophenol	"	ND	---	300	"	"	--	--	--	--	--	--	"	
N-Nitrosodi-n-propylamine	"	ND	---	99.0	"	"	--	--	--	--	--	--	"	
N-Nitrosodiphenylamine	"	ND	---	99.0	"	"	--	--	--	--	--	--	"	
Pentachlorophenol	"	ND	---	300	"	"	--	--	--	--	--	--	"	
Phenanthrene	"	ND	---	99.0	"	"	--	--	--	--	--	--	"	
Phenol	"	ND	---	99.0	"	"	--	--	--	--	--	--	"	
Pyrene	"	ND	---	99.0	"	"	--	--	--	--	--	--	"	
1,2,4-Trichlorobenzene	"	ND	---	99.0	"	"	--	--	--	--	--	--	"	
2,4,5-Trichlorophenol	"	ND	---	99.0	"	"	--	--	--	--	--	--	"	
2,4,6-Trichlorophenol	"	ND	---	99.0	"	"	--	--	--	--	--	--	"	
Surrogate(s): 2-Fluorobiphenyl	*Recovery:*	*105%*		*Limits:*	*20-150%*	"							*10/22/04 09:44*	
2-Fluorophenol		*104%*			*10-150%*	"							"	
Nitrobenzene-d5		*106%*			*20-150%*	"							"	
Phenol-d6		*103%*			*10-150%*	"							"	
p-Terphenyl-d14		*107%*			*20-150%*	"							"	
2,4,6-Tribromophenol		*104%*			*10-150%*	"							"	

North Creek Analytical - Portland

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Philip Nerenberg

Philip Nerenberg, Laboratory Manager

SCOEPA00014129

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Hahn and Associates, Inc.	Project Name: **Gasco Upland**	
434 NW Sixth Ave., Suite 203	Project Number: 2708-10	Report Created:
Portland, OR 97209	Project Manager: Rob Ede	11/15/04 16:25

Semivolatile Organic Compounds per EPA Method 8270C - Laboratory Quality Control Results

North Creek Analytical - Portland

QC Batch: 4100753 **Other wet Preparation Method: EPA 3580**

Analyte	Method	Result	MDL*	MRL	Units	Dil	Source Result	Spike Amt	% REC	(Limits)	% RPD	(Limits)	Analyzed	Notes
LCS (4100753-BS1)								**Extracted: 10/15/04 07:23**						
Acenaphthene	EPA 8270C	492	---	99.0	mg/kg	1x	--	500	98.4%	(20-150)	--	--	10/22/04 03:16	
4-Chloro-3-methylphenol	"	898	---	99.0	"	"	--	1000	89.8%	"	--	--	"	
2-Chlorophenol	"	914	---	99.0	"	"	--	"	91.4%	"	--	--	"	
1,4-Dichlorobenzene	"	474	---	300	"	"	--	500	94.8%	"	--	--	"	
2,4-Dinitrotoluene	"	462	---	150	"	"	--	"	92.4%	"	--	--	"	
4-Nitrophenol	"	947	---	300	"	"	--	1000	94.7%	"	--	--	"	
N-Nitrosodi-n-propylamine	"	474	---	99.0	"	"	--	500	94.8%	"	--	--	"	
Pentachlorophenol	"	836	---	300	"	"	--	1000	83.6%	"	--	--	"	
Phenol	"	831	---	99.0	"	"	--	"	83.1%	"	--	--	"	
Pyrene	"	492	---	99.0	"	"	--	500	98.4%	"	--	--	"	
1,2,4-Trichlorobenzene	"	477	---	99.0	"	"	--	"	95.4%	"	--	--	"	
Surrogate(s): 2-Fluorobiphenyl		*Recovery: 108%*			*Limits: 20-150%*	"							*10/22/04 03:16*	
2-Fluorophenol		*102%*			*10-150%*	"							"	
Nitrobenzene-d5		*105%*			*20-150%*	"							"	
Phenol-d6		*101%*			*10-150%*	"							"	
p-Terphenyl-d14		*107%*			*20-150%*	"							"	
2,4,6-Tribromophenol		*110%*			*10-150%*	"							"	
Duplicate (4100753-DUP1)					**QC Source: P4J0475-01**					**Extracted: 10/15/04 07:23**				
Carbazole	EPA 8270C	ND	---	97.1	mg/kg	1x	ND	--	--	--	NR	(50)	10/22/04 04:42	
Acenaphthene	"	ND	---	97.1	"	"	ND	--	--	--	NR	"	"	
Acenaphthylene	"	ND	---	97.1	"	"	ND	--	--	--	NR	"	"	
Anthracene	"	ND	---	97.1	"	"	ND	--	--	--	NR	"	"	
Benzo (a) anthracene	"	ND	---	97.1	"	"	ND	--	--	--	NR	"	"	
Benzo (a) pyrene	"	ND	---	97.1	"	"	ND	--	--	--	NR	"	"	
Benzo (b) fluoranthene	"	ND	---	97.1	"	"	ND	--	--	--	NR	"	"	
Benzo (ghi) perylene	"	ND	---	97.1	"	"	ND	--	--	--	NR	"	"	
Benzo (k) fluoranthene	"	ND	---	97.1	"	"	ND	--	--	--	NR	"	"	
Benzoic Acid	"	ND	---	294	"	"	ND	--	--	--	NR	"	"	
Benzyl alcohol	"	ND	---	97.1	"	"	ND	--	--	--	NR	"	"	
4-Bromophenyl phenyl ether	"	ND	---	97.1	"	"	ND	--	--	--	NR	"	"	
Butyl benzyl phthalate	"	ND	---	97.1	"	"	ND	--	--	--	NR	"	"	
4-Chloro-3-methylphenol	"	ND	---	97.1	"	"	ND	--	--	--	NR	"	"	
4-Chloroaniline	"	ND	---	588	"	"	ND	--	--	--	NR	"	"	
Bis(2-chloroethoxy)methane	"	ND	---	97.1	"	"	ND	--	--	--	NR	"	"	
Bis(2-chloroethyl)ether	"	ND	---	97.1	"	"	ND	--	--	--	NR	"	"	
Bis(2-chloroisopropyl)ether	"	ND	---	97.1	"	"	ND	--	--	--	NR	"	"	
2-Chloronaphthalene	"	ND	---	97.1	"	"	ND	--	--	--	NR	"	"	
2-Chlorophenol	"	ND	---	97.1	"	"	ND	--	--	--	NR	"	"	
4-Chlorophenyl phenyl ether	"	ND	---	97.1	"	"	ND	--	--	--	NR	"	"	
Chrysene	"	ND	---	97.1	"	"	ND	--	--	--	NR	"	"	
Di-n-butyl phthalate	"	ND	---	294	"	"	ND	--	--	--	NR	"	"	

North Creek Analytical - Portland

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Philip Nerenberg

Philip Nerenberg, Laboratory Manager

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Hahn and Associates, Inc.	Project Name:	**Gasco Upland**	
434 NW Sixth Ave., Suite 203	Project Number:	2708-10	Report Created:
Portland, OR 97209	Project Manager:	Rob Ede	11/15/04 16:25

Semivolatile Organic Compounds per EPA Method 8270C - Laboratory Quality Control Results

North Creek Analytical - Portland

QC Batch: 4100753 **Other wet Preparation Method: EPA 3580**

Analyte	Method	Result	MDL*	MRL	Units	Dil	Source Result	Spike Amt	% REC	(Limits)	% RPD	(Limits)	Analyzed	Notes
Duplicate (4100753-DUP1)				QC Source: P4J0475-01				Extracted: 10/15/04 07:23						
Di-n-octyl phthalate	EPA 8270C	ND	---	97.1	mg/kg	1x	ND	--	--	--	NR	(50)	10/22/04 04:42	
Dibenzo (a,h) anthracene	"	ND	---	97.1	"	"	ND	--	--	--	NR	"	"	
Dibenzofuran	"	ND	---	97.1	"	"	ND	--	--	--	NR	"	"	
1,2-Dichlorobenzene	"	ND	---	294	"	"	ND	--	--	--	NR	"	"	
1,3-Dichlorobenzene	"	ND	---	294	"	"	ND	--	--	--	NR	"	"	
1,4-Dichlorobenzene	"	ND	---	294	"	"	ND	--	--	--	NR	"	"	
3,3'-Dichlorobenzidine	"	ND	---	294	"	"	ND	--	--	--	NR	"	"	
2,4-Dichlorophenol	"	ND	---	97.1	"	"	ND	--	--	--	NR	"	"	
Diethyl phthalate	"	ND	---	97.1	"	"	ND	--	--	--	NR	"	"	
2,4-Dimethylphenol	"	ND	---	294	"	"	ND	--	--	--	NR	"	"	
Dimethyl phthalate	"	ND	---	97.1	"	"	ND	--	--	--	NR	"	"	
4,6-Dinitro-2-methylphenol	"	ND	---	294	"	"	ND	--	--	--	NR	"	"	
2,4-Dinitrophenol	"	ND	---	588	"	"	ND	--	--	--	NR	"	"	
2,4-Dinitrotoluene	"	ND	---	147	"	"	ND	--	--	--	NR	"	"	
2,6-Dinitrotoluene	"	ND	---	147	"	"	ND	--	--	--	NR	"	"	
Bis(2-ethylhexyl)phthalate	"	ND	---	588	"	"	ND	--	--	--	NR	"	"	
Fluoranthene	"	ND	---	97.1	"	"	ND	--	--	--	NR	"	"	
Fluorene	"	ND	---	97.1	"	"	ND	--	--	--	NR	"	"	
Hexachlorobenzene	"	ND	---	97.1	"	"	ND	--	--	--	NR	"	"	
Hexachlorobutadiene	"	ND	---	294	"	"	ND	--	--	--	NR	"	"	
Hexachlorocyclopentadiene	"	ND	---	294	"	"	ND	--	--	--	NR	"	"	
Hexachloroethane	"	ND	---	294	"	"	ND	--	--	--	NR	"	"	
Indeno (1,2,3-cd) pyrene	"	ND	---	97.1	"	"	ND	--	--	--	NR	"	"	
Isophorone	"	ND	---	97.1	"	"	ND	--	--	--	NR	"	"	
2-Methylnaphthalene	"	ND	---	97.1	"	"	ND	--	--	--	NR	"	"	
2-Methylphenol	"	ND	---	97.1	"	"	ND	--	--	--	NR	"	"	
3-,4-Methylphenol	"	ND	---	97.1	"	"	ND	--	--	--	NR	"	"	
Naphthalene	"	ND	---	97.1	"	"	ND	--	--	--	NR	"	"	
2-Nitroaniline	"	ND	---	97.1	"	"	ND	--	--	--	NR	"	"	
3-Nitroaniline	"	ND	---	294	"	"	ND	--	--	--	NR	"	"	
4-Nitroaniline	"	ND	---	97.1	"	"	ND	--	--	--	NR	"	"	
Nitrobenzene	"	ND	---	97.1	"	"	ND	--	--	--	NR	"	"	
2-Nitrophenol	"	ND	---	97.1	"	"	ND	--	--	--	NR	"	"	
4-Nitrophenol	"	ND	---	294	"	"	ND	--	--	--	NR	"	"	
N-Nitrosodi-n-propylamine	"	ND	---	97.1	"	"	ND	--	--	--	NR	"	"	
N-Nitrosodiphenylamine	"	ND	---	97.1	"	"	ND	--	--	--	NR	"	"	
Pentachlorophenol	"	ND	---	294	"	"	ND	--	--	--	NR	"	"	
Phenanthrene	"	ND	---	97.1	"	"	ND	--	--	--	NR	"	"	
Phenol	"	ND	---	97.1	"	"	ND	--	--	--	NR	"	"	
Pyrene	"	ND	---	97.1	"	"	ND	--	--	--	NR	"	"	
1,2,4-Trichlorobenzene	"	ND	---	97.1	"	"	ND	--	--	--	NR	"	"	

North Creek Analytical - Portland

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Philip Nerenberg

Philip Nerenberg, Laboratory Manager

North Creek Analytical, Inc.
Environmental Laboratory Network

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Hahn and Associates, Inc.	Project Name: **Gasco Upland**	
434 NW Sixth Ave., Suite 203	Project Number: 2708-10	Report Created:
Portland, OR 97209	Project Manager: Rob Ede	11/15/04 16:25

Semivolatile Organic Compounds per EPA Method 8270C - Laboratory Quality Control Results

North Creek Analytical - Portland

QC Batch: 4100753 **Other wet Preparation Method: EPA 3580**

Analyte	Method	Result	MDL*	MRL	Units	Dil	Source Result	Spike Amt	% REC	(Limits)	% RPD	(Limits)	Analyzed	Notes
Duplicate (4100753-DUP1)					**QC Source: P4J0475-01**				**Extracted: 10/15/04 07:23**					
2,4,5-Trichlorophenol	EPA 8270C	ND	---	97.1	mg/kg	1x	ND	--	--	--	NR	(50)	10/22/04 04:42	
2,4,6-Trichlorophenol	"	ND	---	97.1	"	"	ND	--	--	--	NR	"	"	
Surrogate(s): 2-Fluorobiphenyl		*Recovery: 124%*			*Limits: 20-150%*	"							*10/22/04 04:42*	
2-Fluorophenol		*122%*			*10-150%*	"							"	
Nitrobenzene-d5		*123%*			*20-150%*	"							"	
Phenol-d6		*120%*			*10-150%*	"							"	
p-Terphenyl-d14		*125%*			*20-150%*	"							"	
2,4,6-Tribromophenol		*108%*			*10-150%*	"							"	
Matrix Spike (4100753-MS1)					**QC Source: P4J0475-01**				**Extracted: 10/15/04 07:23**					
Acenaphthene	EPA 8270C	619	---	98.0	mg/kg	1x	ND	495	125%	(20-150)	--	--	10/22/04 03:59	
4-Chloro-3-methylphenol	"	1120	---	98.0	"	"	ND	990	113%	(10-150)	--	--	"	
2-Chlorophenol	"	1120	---	98.0	"	"	ND	"	113%	"	--	--	"	
1,4-Dichlorobenzene	"	574	---	297	"	"	ND	495	116%	(20-150)	--	--	"	
2,4-Dinitrotoluene	"	568	---	149	"	"	ND	"	115%	"	--	--	"	
4-Nitrophenol	"	1070	---	297	"	"	ND	990	108%	(10-150)	--	--	"	
N-Nitrosodi-n-propylamine	"	589	---	98.0	"	"	ND	495	119%	(20-150)	--	--	"	
Pentachlorophenol	"	584	---	297	"	"	ND	990	59.0%	(10-150)	--	--	"	
Phenol	"	988	---	98.0	"	"	ND	"	99.8%	"	--	--	"	
Pyrene	"	602	---	98.0	"	"	ND	495	122%	(20-150)	--	--	"	
1,2,4-Trichlorobenzene	"	587	---	98.0	"	"	ND	"	119%	"	--	--	"	
Surrogate(s): 2-Fluorobiphenyl		*Recovery: 131%*			*Limits: 20-150%*	"							*10/22/04 03:59*	
2-Fluorophenol		*120%*			*10-150%*	"							"	
Nitrobenzene-d5		*130%*			*20-150%*	"							"	
Phenol-d6		*118%*			*10-150%*	"							"	
p-Terphenyl-d14		*131%*			*20-150%*	"							"	
2,4,6-Tribromophenol		*132%*			*10-150%*	"							"	

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Hahn and Associates, Inc.	Project Name: **Gasco Upland**	
434 NW Sixth Ave., Suite 203	Project Number: 2708-10	Report Created:
Portland, OR 97209	Project Manager: Rob Ede	11/15/04 16:25

Polynuclear Aromatic Compounds per EPA 8270M-SIM - Laboratory Quality Control Results

North Creek Analytical - Portland

QC Batch: 4100753 **Other wet Preparation Method: EPA 3580**

Analyte	Method	Result	MDL*	MRL	Units	Dil	Source Result	Spike Amt	% REC	(Limits)	% RPD	(Limits)	Analyzed	Notes
Blank (4100753-BLK1)							**Extracted: 10/15/04 07:23**							
Acenaphthene	EPA 8270m	ND	---	2.01	mg/kg	1x	--	--	--	--	--	--	11/03/04 00:10	
Acenaphthylene	"	ND	---	2.01	"	"	--	--	--	--	--	--	"	
Anthracene	"	ND	---	2.01	"	"	--	--	--	--	--	--	"	
Benzo (a) anthracene	"	ND	---	2.01	"	"	--	--	--	--	--	--	"	
Benzo (a) pyrene	"	ND	---	2.01	"	"	--	--	--	--	--	--	"	
Benzo (b) fluoranthene	"	ND	---	2.01	"	"	--	--	--	--	--	--	"	
Benzo (ghi) perylene	"	ND	---	2.01	"	"	--	--	--	--	--	--	"	
Benzo (k) fluoranthene	"	ND	---	2.01	"	"	--	--	--	--	--	--	"	
Chrysene	"	ND	---	2.01	"	"	--	--	--	--	--	--	"	
Dibenzo (a,h) anthracene	"	ND	---	2.01	"	"	--	--	--	--	--	--	"	
Fluoranthene	"	ND	---	2.01	"	"	--	--	--	--	--	--	"	
Fluorene	"	ND	---	2.01	"	"	--	--	--	--	--	--	"	
Indeno (1,2,3-cd) pyrene	"	ND	---	2.01	"	"	--	--	--	--	--	--	"	
Naphthalene	"	ND	---	2.01	"	"	--	--	--	--	--	--	"	
Phenanthrene	"	ND	---	2.01	"	"	--	--	--	--	--	--	"	
Pyrene	"	ND	---	2.01	"	"	--	--	--	--	--	--	"	

North Creek Analytical - Portland

Philip Nerenberg

Philip Nerenberg, Laboratory Manager

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Hahn and Associates, Inc.	Project Name:	**Gasco Upland**	
434 NW Sixth Ave., Suite 203	Project Number:	2708-10	Report Created:
Portland, OR 97209	Project Manager:	Rob Ede	11/15/04 16:25

Conventional Chemistry Parameters per APHA/EPA Methods - Laboratory Quality Control Results

North Creek Analytical - Portland

QC Batch: 4100737 **Other wet Preparation Method: General**

Analyte	Method	Result	MDL*	MRL	Units	Dil	Source Result	Spike Amt	% REC	(Limits)	% RPD	(Limits)	Analyzed	Notes
Duplicate (4100737-DUP1)					**QC Source: P4J0533-01**				**Extracted: 10/14/04 14:59**					
pH	150.1/9040A	6.54	---		pH Units	1x	6.58	--	--	--	0.610%	(25)	10/14/04 18:00	

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Hahn and Associates, Inc.	Project Name: **Gasco Upland**	
434 NW Sixth Ave., Suite 203	Project Number: 2708-10	Report Created:
Portland, OR 97209	Project Manager: Rob Ede	11/15/04 16:25

Physical Parameters per APHA/ASTM/EPA Methods - Laboratory Quality Control Results

North Creek Analytical - Portland

QC Batch: 4100866 **Other wet Preparation Method: Oil Qual.**

Analyte	Method	Result	MDL*	MRL	Units	Dil	Source Result	Spike Amt	% REC	(Limits)	% RPD	(Limits)	Analyzed	Notes
LCS (4100866-BS1)								**Extracted: 10/18/04 12:46**						
Flashpoint	EPA 1010	125	---		°F	1x	--	127	98.4%	(96.5-103)	--	--	10/18/04 12:46	
Duplicate (4100866-DUP1)							**QC Source: P4J0524-01**							
Flashpoint	EPA 1010	ND	---	150	°F	1x	ND	--	--	--	NR	(50)	10/18/04 12:46	

North Creek Analytical - Portland

Philip Nerenberg

Philip Nerenberg, Laboratory Manager

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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Hahn and Associates, Inc.	Project Name:	**Gasco Upland**	
434 NW Sixth Ave., Suite 203	Project Number:	2708-10	Report Created:
Portland, OR 97209	Project Manager:	Rob Ede	11/15/04 16:25

Notes and Definitions

Report Specific Notes:

A-02 - This analysis was performed on the 8270 SVOC extract, therefore no surrogate recoveries are available, and the blank is the only batch QC.

Q-14 - The matrix spike recovery, and/or RPD, for this QC sample is outside of control limits due to a non-homogeneous sample matrix.

R-05 - Reporting limits raised due to dilution necessary for analysis. Sample contains high levels of reported analyte, non-target analyte, and/or matrix interference.

S-09 - Surrogate recovery is outside control limits due to matrix interference.

X - See case narrative.

Laboratory Reporting Conventions:

DET - Analyte DETECTED at or above the Reporting Limit. Qualitative Analyses only.

ND - Analyte NOT DETECTED at or above the reporting limit (MDL or MRL, as appropriate).

NR / NA - Not Reported / Not Available

dry - Sample results reported on a dry weight basis. Reporting Limits are corrected for %Solids when %Solids are <50%.

wet - Sample results and reporting limits reported on a wet weight basis (as received).

RPD - Relative Percent Difference. (RPDs calculated using Results, not Percent Recoveries).

MRL - METHOD REPORTING LIMIT. Reporting Level at, or above, the lowest level standard of the Calibration Table.

MDL* - METHOD DETECTION LIMIT. Reporting Level at, or above, the statistically derived limit based on 40CFR, Part 136, Appendix B. *MDLs are listed on the report only if the data has been evaluated below the MRL. Results between the MDL and MRL are reported as Estimated results.

Dil - Dilutions are calculated based on deviations from the standard dilution performed for an analysis, and may not represent the dilution found on the analytical raw data.

Reporting limits - Reporting limits (MDLs and MRLs) are adjusted based on variations in sample preparation amounts, analytical dilutions and percent solids, where applicable.

REPORT ON SUPPLEMENTAL UPLAND REMEDIAL INVESTIGATION ACTIVITIES

VOLUME 1

NW Natural – Gasco Facility
7900 NW St. Helens Road
Portland, Oregon

March 11, 2005

Project No. 2708

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REPORT ON SUPPLEMENTAL UPLAND REMEDIAL INVESTIGATION ACTIVITIES

NW Natural – Gasco Facility
7900 NW St. Helens Road
Portland, Oregon

March 11, 2005

Prepared for:

NW Natural
Portland, Oregon

Prepared by:

Hahn and Associates, Inc.
Portland, Oregon

HAI Project No. 2708

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1.0 INTRODUCTION

The investigation activities described herein have been conducted to provide supplemental information related to the nature, extent, and potential migration pathways of chemical impacts present in groundwater along the uplands portion of the Willamette River shoreline at the NW Natural Gasco facility, 7900 NW St. Helens Road, in Portland, Oregon (Figure 1). The need and scope for these additional upland-area investigatory activities was initially discussed during a January 27, 2004 meeting with representatives of NW Natural, the Oregon Department of Environmental Quality (DEQ), and the U.S. Environmental Protection Agency (EPA), and were outlined in a DEQ Memorandum prepared by Mr. Matt McClincy and Mr. Rod Struck, dated January 26, 2004. The investigation activities described herein were completed in accordance with an HAI Work Plan dated April 28, 2004 (HAI 2004), as conditionally approved in DEQ correspondence dated May 11, 2004 (Mr. Matt McClincy to Mr. Bob Wyatt).

1.1 Purpose and Project Objectives

The purpose of this report is to summarize results of the supplemental soil and groundwater quality investigation activities that were conducted at the site during the timeframe June through August 2004, to satisfy the objectives identified below.

- Describe the presence and distribution of tar and/or oil in the Surficial Fill Unit and Alluvial Unit in the vicinity of the buried historical drainage near boring B-29.

- Evaluate the potential that oil identified in the subsurface in the vicinity of the historical drainage adjacent to the Willamette River is a present oil migration threat to Willamette River sediments.

- Collect representative groundwater quality data to supplement the current interpretation of contaminant nature and extent, with emphasis on identifying unique plume characteristics in the area

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of the historical discharge feature (e.g., boring B-29 area) that would be of significance to the upland source control evaluation.

- Collect representative groundwater quality data to supplement the current interpretation of contaminant nature and extent down-gradient of the former tar pond area, at a location mid-way between existing groundwater monitoring points MW-4 and MW-5.

1.2 Scope of Work

The overall scope of work for investigatory activities completed at the Gasco property during the timeframe June through December 2004 is summarized below, with sampling locations depicted on Figures 2 and 3.

- Installation of 10 push probe borings for identification of subsurface lithological and contaminant distribution conditions at a location between the former tar pond area and the Willamette River embankment, and in the area of the historic effluent discharge / filled area located upland of the surficial tar body previously identified in the Willamette River.

- Collection of depth discrete exploratory groundwater quality samples from push probe borings installed at two locations (borings B-56 and B-59) to further evaluate horizontal and vertical distribution of groundwater impacts adjacent to the Willamette River embankment.

- Collection of soil samples from select boring locations primarily across depths of interest with regard to potential human and/or ecological exposure (upper 3 to 12 feet below ground surface) for laboratory physical testing of polynuclear aromatic hydrocarbons (PAHs), benzene, toluene, ethylbenzene, and xylene (BTEX), and total cyanide.

- Collection, preservation, and shipment of undisturbed soil core across the oil-bearing zone identified in the area of historic

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effluent discharge for photographic evaluation and completion of analyses related to potential dense non-aqueous phase liquid (DNAPL) mobility.

- Installation of three new wells (MW-16-45, MW-16-65, and MW-16-125) in the area of historic effluent discharge to evaluate groundwater contaminant plume conditions in this area, as well as the potential to yield DNAPL from a well screened across the oily zone identified within soils at this location (e.g., MW-16-45).

- Sampling and analytical testing of groundwater samples from the MW-16 well cluster and all other wells at the site.

- Sampling of DNAPL from well MW-16-45, with physical and chemical testing of the oil.

1.3 Report Organization

This report is organized as follows:

- Section 1 provides a summary of the purpose, objectives, and scope of work for the investigation activities, as well as a description of the report's organization.

- Section 2 describes the supplemental RI activities completed at the site.

- Section 3 provides the results of the supplemental activities completed at the site.

- Section 4 provides a summary of the results and conclusions of the investigation

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2.0 SUPPLEMENTAL INVESTIGATION ACTIVITIES

2.1 Push Probe Boring Installation

Push probe borings were installed in the vicinity of the former effluent discharge feature / low area located east of the Fuel and Marine Marketing (FAMM) tank farm in the boring B-29 vicinity; as well as in the vicinity of boring B-31, located mid-way between the MW-4 and MW-5 monitoring well clusters, between the former tar pond area and the Willamette River (Figures 2 and 3).

As previously stated, the objective of the push probe work in the former effluent discharge / low area (boring B-29 vicinity) was to support evaluation of the extent and thickness of tarry and oily zones previously identified in the subsurface at this portion of the site, as well as to collect a vertical profile of groundwater quality to support the selection of screened intervals for a new monitoring well cluster to be installed in a subsequent phase of investigation.

The objective of the push probe work completed in the former B-31 vicinity, a location situated between the river and the former tar pond area, was to obtain a vertical profile of groundwater quality to supplement data currently available in this area at the adjacent MW-4 and MW-5 well cluster locations.

All push probe boring installation and abandonment activities were conducted in accordance with the April 28, 2004 Work Plan (HAI 2004), with drilling activities conducted by Geo-Tech Explorations, Inc. / Boart Longyear, Inc. of Tualatin, Oregon (Oregon Monitoring Well Constructor License No. 1011). A truck-mounted push probe unit using a 1.5-inch outside-diameter (OD) hydraulically-driven steel rod was used to advance all push probe soil borings.

Soil samples were collected from push probe borings using a 2-inch OD, 5-foot long, stainless-steel Macro-Core sampler, fitted with a PVC sleeve, that was advanced in 5 foot intervals into the undisturbed soils. All soil samples were screened in the field for the presence of contaminants by visual (color), olfactory, sheen, headspace vapor, and ultraviolet fluorescence methods.

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The results of the field screening observations are noted on the field boring logs. Soil sampling and screening activities were conducted in accordance with a DEQ-approved April 28, 2004 Work Plan (HAI 2004).

Where groundwater samples were collected for vertical contaminant profiling, a temporary 3.25-inch diameter steel casing was set through visually impacted zones in order to isolate upper zones of impact prior to advancing to the lower portions of each borehole. Further, all groundwater samples were collected from a new boring advanced directly to the targeted screen intervals without collection of soil samples, thereby reducing the potential for groundwater mixing within an open borehole prior to sample collection. Groundwater sampling activities were conducted in accordance with the approved April 28, 2004 Work Plan (HAI 2004).

2.1.1 Former Effluent Discharge / Low Area

Seven push probe borings (B-53, B-54, B-55, B-57, B-58, B-59, and B-59A) were installed in the area of the buried historical drainage / low area near boring B-29 (Figures 2 and 3) between the dates of June 7 and June 14, 2004. With the exception of borings B-53 and B-54, where sampler refusal was encountered on apparent concrete or rock within the fill at depths of 29 feet and 20 feet, respectively, all push probe borings were advanced and continuously cored to a minimum depth of 50 feet below ground surface (bgs). With the exception of those locations where sampling device refusal was encountered, all borings were advanced to a sufficient depth such that the base of oily zones within subsurface soils could be observed and documented.

Based on the depth and thickness of oily soil zones within borings B-55, B-57, and B-58, as well as within previous boring B-29, the location for a deep push probe boring was selected for soil description and vertical groundwater quality profiling purposes. As reviewed with Mr. Matt McClincy and Mr. Rod Struck of the DEQ during a site meeting conducted on June 8, 2004, and as approved during a June 9, 2004 telephone conversation (Mr. Rob Ede to Mr. Matt McClincy), it was agreed that a deep boring (i.e., boring B-59) would be installed at a location approximately midway between borings B-57 and B-58, and as close to the river embankment as possible. The preceding location was selected since it was deemed likely to adequately represent the

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oily zone identified in adjacent borings, and would suitably represent contaminant conditions immediately upland relative to the "surficial tar body" previously identified within the Willamette River (Figure 2). The surficial tar body was the subject of a separate and synchronous investigation conducted for NW Natural under oversight of the EPA by Anchor Environmental, LLC (Anchor), with results of that investigation included within a September 2004 Anchor report (Anchor 2004), and summarized in Section 2.9 herein.

Deep boring B-59 was advanced to a total depth of 175 feet bgs in an attempt to identify the top of gravels typical of the base of the Alluvial WBZ, or the top of the basalt bedrock. Boring B-59 was continuously logged to a depth of 50 feet bgs, below which soil cores were collected and logged at intervals ranging from 20 to 30 feet. The boring was terminated at a depth of 175 feet bgs prior to encountering the base of the Alluvial WBZ due to concerns of losing the tooling if the sampler should become stuck within hard substrate at this depth.

Lithological descriptions and field screening for potential soil contamination were obtained during the advancement of boring B-59. To prevent mixing of groundwater within the open borehole resulting from soil sample collection, groundwater samples were collected in a new boring installed adjacent to the first boring. Specifically, depth discrete groundwater samples were collected from adjacent boring B-59A from a temporary well point screened across depth intervals of 46 to 50 feet bgs; 76-80 feet bgs; 96-100 feet bgs; 116-120 feet bgs; 144-148 feet bgs; and 171-175 feet bgs.

The properties of each soil sample were noted in the field by the HAI scientist. Boring logs prepared by HAI for the push probe borings, including a description of field screening results and groundwater sample depth intervals, are included in Appendix A.

2.1.2 Former Tar Pond and River Embankment Area

Three deep push probe borings (B-56, B-56A, and B-56B) were advanced in the immediate vicinity of former boring B-31 (Figure 2), located between the former effluent tar pond and the Willamette River embankment, for screening

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of soils and collection of groundwater samples. Lithological descriptions and field screening for potential contamination were obtained during the advancement of boring B-56. Boring B-56 was continuously logged to a depth of 50 feet bgs, with subsequent soil cores collected every 10 feet through a depth of 110 feet bgs, and every 25 feet below 110 feet bgs. This boring was advanced to a total depth of 179 feet bgs, where sampling equipment refusal occurred in dense gravels / basalt bedrock.

To prevent mixing of groundwater within the open borehole, groundwater samples were collected in new borings installed adjacent to B-56. Specifically, after collection of a groundwater sample within the Surficial Fill WBZ, a 3.25-inch OD protective outer steel casing was advanced to a depth of 30 feet bgs, through which a temporary well point was advanced directly to targeted groundwater sampling depths. Depth discrete groundwater samples were collected from adjacent boring B-56A from a temporary well point screened across depth intervals of 18 to 22 feet bgs; 40-44 feet bgs; 60-64 feet bgs; 80-84 feet bgs; and 100-104 feet bgs. As depicted on the boring log for B-56A (Appendix A), the well point became stuck after being advanced to a depth of 140 feet bgs, at which time the probe rod became separated at a depth of 30 feet bgs. Attempts to retrieve the probe rod and well point (extending across a depth interval of 30 to 140 feet bgs) using a hollow-stem auger drill rig and a stinger were unsuccessful. Therefore, the well point and probe rod were pressure grouted and chipped in-place with bentonite from 40 feet bgs to ground surface. Below 40 feet bgs, the formation had heaved around the probe rod, preventing lowering of the grout tremie tube to a greater depth.

Push probe boring B-56B was subsequently installed adjacent to the sealed B-56A location, with depth discrete groundwater samples collected across depth intervals of 136-140 feet bgs and 174-178 feet bgs.

The properties of each soil sample were noted in the field by the HAI scientist. Boring logs prepared by HAI for the push probe borings, including a description of field screening results and groundwater sample depth intervals, are included in Appendix A.

2.2 Monitoring Well Installation

With the completion of groundwater and soil sampling activities associated with the push probe boring component of work (Section 2.1), and the receipt of analytical results from the groundwater investigation, NW Natural and DEQ met on July 7, 2004 and agreed upon the location and depth of monitoring wells. Approval of the proposed MW-16 series monitoring well cluster location was provided during this meeting in order to facilitate completion of well installation activities during the week of July 12, 2004. Proposed screen intervals for the MW-16 series wells were approved in an e-mail dated July 12, 2004 (Mr. Matt McClincy to Mr. Rob Ede). As agreed during the meeting, three monitoring wells were constructed near the shoreline riverward of boring B-59. Based on groundwater quality data obtained at the boring B-56 location, it was agreed that installation of permanent monitoring wells in the vicinity of this boring would not be necessary.

Of the wells proposed for installation as part of the MW-16 series cluster, the deepest well, designed to monitor chemical concentrations within the basal portion of the contaminant plume, was constructed with a screen interval of 115 to 125 feet bgs, with a stainless steel sump from 125 to 127.5 feet bgs. It was agreed that temporary well point data collected from below 144 feet bgs at boring B-59 was sufficient to provide vertical plume delineation in this area.

The intermediate-depth well, designed to target the dissolved phase contaminant plume within the upper Alluvial WBZ across an elevation similar to adjacent wells at the existing MW-3 and MW-4 well clusters, was constructed with a screened interval of 55 to 65 feet bgs, with a stainless steel sump from 65 to 67.5 feet bgs.

The shallow-depth well, designed to target the oil-bearing zone found within the upper Alluvial WBZ (across a depth interval of approximately 28 to 44 feet bgs), was constructed with a screened interval of 30 to 45 feet bgs, with a stainless steel sump from 45 to 47.5 feet bgs.

All well construction activities were conducted in accordance with the April 28, 2004 Work Plan (HAI 2004), with drilling activities conducted by Geo-Tech Explorations, Inc. / Boart Longyear, Inc. of Tualatin, Oregon (Oregon Monitoring Well Constructor License No. 1011). A sonic drill rig using 8-inch and/or 6-inch OD steel drive casing was used for all drilling activities, which occurred from July 14 through July 20, 2004.

During the drilling of monitoring well boreholes, continuous soil core was extruded from 4-inch to 6-inch diameter core barrels that were advanced 2 to 10 feet into undisturbed soils. With exception of select depth intervals at the MW-16-65 well location, soil cores were extruded into labeled plastic bags of approximately 2 to 3 foot lengths prior to being sliced open for field screening and description. At MW-16-65 , soil cores across a depth interval of 26 to 46 feet bgs and 60 to 63 feet bgs were collected with the use of 4-inch OD polycarbonate resin (Lexan®) tubes to facilitate recovery of relatively undisturbed soil. Upon being brought to the surface, the Lexan® tubes were immediately cut, capped, and labeled for placement within sample coolers containing dry ice. These core samples were maintained in a horizontal and frozen state prior to, and during, overnight shipment to the testing laboratory, where photographic logs, as well as physical and non-aqueous phase liquid (NAPL) mobility screening occurred (Section 2.8).

Details of the field methods employed to install the monitoring wells, and soil and groundwater sampling protocols, are included in the approved Work Plan (HAI 2004). Boring logs that describe the soils encountered and well construction details are included in Appendix B.

2.3 Monitoring Well Development

Wells MW-16-45, MW-16-65, and MW-16-125 underwent development with an electric submersible pump from July 28, 2004 through August 3, 2004 in an attempt to remove the fine sediment from around the well bore.

Development continued until indicator parameters (pH, temperature, specific conductivity, and dissolved oxygen) stabilized, and until turbidity levels within the purged water consistently dropped to acceptable levels, using a turbidity goal of 5 NTU.

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Well development field logs are included within Appendix C. As summarized on the field logs, development involved removal of 82 gallons of groundwater (25 well casing volumes) from well MW-16-45; 96 gallons of groundwater (13 well casing volumes) from well MW-16-65; and 382 gallons (22 well casing volumes) from well MW-16-125. All indicator parameters stabilized prior to completing development, while final turbidity measurements (2.24 to 9.21 NTU) were at or near the 5 NTU goal.

2.4 Monitoring Well Sampling

Site-wide groundwater monitoring activities, including sample collection from all non-product containing wells at the site (including the new MW-16 well cluster) were conducted by HAI between the dates of August 12 and August 26, 2004 in accordance with a DEQ-approved monitoring plan and schedule, dated July 22, 2004. Field sampling records documenting purging and sampling activities related to the August 2004 groundwater monitoring event are included within Appendix D.

2.5 Investigation-Derived Waste Management

Push probe and monitoring well installation activities, including Anchor's synchronous barge-based investigation activities related to the off-shore tar body (Section 2.9), generated 20 full and 9 partially filled 55-gallon drums of soil sample wastes, and 18 55-gallon drums filled with equipment decontamination and monitoring well development water. The 9 partially filled drums of soil were consolidated into 2 full drums prior to off-site shipment, resulting in 22 drums of soil sample wastes requiring management.

All equipment decontamination water was treated within the on-site wastewater treatment system, and discharged through NW Natural's National Discharge Elimination System (NPDES) permitted outfall in batches on June 23, 2004 and on August 4, 2004.

Soil sampling wastes were characterized as non-hazardous under the Resource Conservation and Recovery Act (RCRA), as summarized in a non-hazardous waste determination memorandum included within Appendix E.

Based on the waste determination referenced above, and approval of the waste profile from Pollution Control Industries, Inc. (PCI), of Millington, Tennessee, the target treatment/disposal facility, all soils were removed from the site under a non-hazardous waste manifest by WasteWatch, Inc., of Troutdale, Oregon on August 26, 2004. The soils were transported to PCI's Millington, Tennessee facility for incineration as non-hazardous waste. The non-hazardous waste manifest, documenting removal from the site and receipt by the treatment facility, is included within Appendix E, as is a certificate of thermal destruction documenting completion of treatment.

2.6 Elevation Survey

Monitoring wells and push probe boring locations were surveyed for location and elevation (mean seal level, City of Portland datum) by Mr. Robert Taylor, an Oregon Registered Professional Land Surveyor employed by NW Natural. For monitoring wells, both the ground surface and the top of the casing elevations were surveyed. All top of casing survey elevation data were collected within an accuracy of 0.01 feet vertically, while ground surface data was collected with an accuracy of 0.1 feet vertically. All elevation information has been included on the boring and well construction logs (Appendices A and B).

2.7 Non-Aqueous Phase Liquid Measurements

The evaluation for the presence of NAPL at wells MW-16-45, MW-16-65, and MW-16-125 has been conducted numerous times subsequent to completion of installation activities, as follows:

- Immediately after well installation activities were completed on July 21, 2004;
- Before and after conducting development activities on August 3 and 4, 2004;
- Prior to conducting a round of water levels at the site on August 12, 2004;

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- Prior to collecting groundwater samples from the wells within the MW-16 well cluster on August 26, 2004;

- During a NAPL check conducted on September 29, 2004 (in which NAPL was first identified in the sump of well MW-16-45);

- After identification of NAPL at the base of well MW-16-45, subsequent checks were conducted at this well location in tandem with NAPL removal activities occurring between October and December 2004.

All measurements were conducted by lowering an interface probe across the entire water column of the three MW-16 cluster wells and checking for identification of NAPL by a "sounding" of the probe alarm, and by conducting a visual evaluation of the probe tip and measuring tape upon removal from each well.

Prior to the September 29, 2004 NAPL check, measurements with an interface probe across the entire water column of the three MW-16 cluster wells did not result in the identification of NAPL, either by "sounding" the probe alarm, or as indicated by visual evaluation of the probe tip upon removal from the wells.

During the NAPL check conducted on September 29, 2004, although the NAPL sounding feature did not signal, approximately 1.5 feet of NAPL was observed adhering to the probe tip and base of the measuring tape upon withdrawal from well MW-16-45. Removal of the NAPL from the base of the well was subsequently conducted on numerous occasions with a clear bottom-filling weighted bailer between the dates of October 5 and December 2, 2004. NAPL removal was conducted primarily for the collection of sufficient sample volume for physical and chemical testing, as well as to support initial evaluation of the feasibility of possible longer term NAPL recovery at this location.

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2.8 Laboratory Analyses

With the exception of undisturbed soil core collected during the installation of well MW-16-45, all soil and groundwater samples collected as part of the supplemental RI or routine groundwater monitoring activities described herein were shipped in sealed coolers with chain-of-custody documentation to North Creek Analytical Laboratory in Beaverton, Oregon.

Soil core collected from the boring for well MW-16-65 as part of the supplemental RI activities were shipped to PTS Laboratories in Santa Fe Springs, California for physical testing and NAPL mobility-related screening analyses.

Additionally, samples of NAPL collected from well MW-16-45 were shipped to both North Creek Analytical, Inc. and to PTS Laboratories for both chemical and physical testing.

2.8.1 Groundwater

Groundwater samples collected for screening purposes from the deep push probe boring installed in the former effluent discharge/low area (boring B-59) were analyzed for those indicator constituents useful in ascertaining the overall presence and magnitude of site-related impacts. Specifically, samples from this push probe location were analyzed for volatile organic compounds (VOCs) by EPA Method 8260B.

Groundwater samples collected from the deep push probe boring installed between the former tar pond and the river (boring B-56), as well as from new monitoring wells within the MW-16 cluster and from immediately adjacent plume monitoring wells MW-3-56, MW-4-57, and MW-5-100, were analyzed for VOCs by EPA Method 8260B; semi-volatile organic compounds (SVOCs) by EPA Method 8270C; polynuclear aromatic hydrocarbons (PAHs) by EPA Method 8270 SIM; total and amenable cyanide by EPA Method 9010; and total and/or dissolved metals arsenic, chromium, copper, nickel, lead, and zinc by EPA Method 6010.

Groundwater samples collected from the on-site groundwater monitoring well network in August 2004 were analyzed for SVOCs, PAHs, VOCs, BTEX, total and amenable cyanide, and select metals, as per methodologies indicated above, in accordance with a DEQ-approved monitoring plan and schedule dated July 22, 2004.

Results of the June 2004 push probe / temporary well point groundwater sampling analyses are summarized on Tables 1 through 4, with chain-of-custody documentation and laboratory analytical reports included within Appendix F. Results of the August 2004 site-wide groundwater monitoring event are summarized on Tables 5 through 8, with chain-of-custody documentation and laboratory analytical reports included within Appendix G.

2.8.2 Soil

2.8.2.1 Chemical Testing

Seven select soil samples obtained during the June 2004 push probe investigation, primarily collected across depths of interest with regard to potential human and/or ecological exposure (upper 3 to 12 feet bgs), were selected to undergo laboratory analyses for PAHs by EPA Method 8270 SIM and BTEX by EPA Method 8021, two of the samples were selected for analysis of total cyanide content by EPA Method 9010, and one sample received follow-up analysis for leachable benzene by EPA Method 1311 (Toxicity Characteristic Leaching Procedure)/8021. Results of these soil analyses are set out in Tables 9 through 13 (see borings B-53 through B-56; Tar Pond Area), which also include a summary of all other available soil data for the site as a whole. Chain-of-custody documentation and laboratory analytical reports documenting analytical results of the June 2004 samples are included within Appendix H.

2.8.2.2 Physical Soil Core Testing

The soil core collected from the boring for well MW-16-65 within Lexan® liners, frozen, and shipped to PTS Laboratories, Inc. (PTS) in Santa Fe Springs, California has undergone various types of physical testing, as described below.

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Specifically, the soil core depth intervals from 26 to 46 feet bgs and from 60 to 61 feet bgs, were cut open and photographed under both white light and ultraviolet light. The photographs, which depict the soil type, structure, and presence and distribution of NAPL within the soils, are within the PTS Laboratory Report (PTS 2005), included as Appendix I.

Based on evaluation of the MW-16-65 core photo log, as well as boring logs for the MW-16 well cluster, 11 depth intervals for particle size testing using American Society of Testing and Materials (ASTM) Method D422/D4464M, and pore fluid saturation testing using ASTM D2216 / American Petroleum Institute (API) RP40 methodology (includes % water saturation and % NAPL saturation; total porosity, air filled porosity, grain density, dry bulk density, and initial moisture content) were selected. Specifically, these tests were conducted on undisturbed, frozen core submitted to PTS for the following depths: 27.5 feet, 29.2 feet, 31.5 feet, 33.5 feet, 35.7 feet, 38.5 feet, 40.4 feet, 42.5 feet, 44.8 feet, 45.3, and 60.7 feet bgs.

Results of the particle size and the physical properties testing of the above-referenced samples are summarized within the PTS Report included within Appendix I.

Based on results of the pore fluid saturation testing summarized in the PTS report, soil from three depth intervals (35.7, 40.4, and 42.5 feet bgs) were selected to undergo "Free Product Mobility/Residual Saturation" testing using centrifuge methodology as specified within ASTM Method D425M. These samples were selected since they contained a range of pore fluid saturations with regard to NAPL content (i.e., ranging from 1.4% at 42.5 feet bgs, to 50.3% at 35.7 feet bgs). This testing uses a large amount of force (1,000-times the force of gravity) such that minimum residual NAPL levels may be estimated. Results of these tests are included within the PTS Report included within Appendix I.

Finally a sample of core from a depth of approximately 35.6 feet bgs was selected for wettability index analysis by Amott Wettability methodology using site-specific NAPL and groundwater that was recovered from well MW-16-45 as part of the NAPL recovery evaluation described in Section 2.7. Wettability is a measure of a liquid's relative affinity for a solid. For example,

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a "wetting" fluid will preferentially spread over a solid surface (e.g., soil particle) at the expense of a "non-wetting" fluid. Thus, a strongly "water-wet" system would tend to result in lower residual NAPL saturation levels (e.g., greater mobility potential) than a strongly "NAPL-wet" system. Results of these tests are included within the PTS Report included within Appendix I.

2.8.3 NAPL

Samples of NAPL collected from the sump of well MW-16-45 were analyzed by North Creek Analytical (NCA) for chemistry and by PTS for physical parameters. Analyses conducted by NCA include the following:

- Flashpoint by EPA Method 1010
- pH by EPA Method 9040A
- SVOCs by EPA Method 8270C
- PAHs by EPA Method 8270 SIM
- VOCs by EPA Method 8260C
- Fuel Fingerprinting by NW-TPH Methodology

Laboratory reports documenting results of NCA's NAPL analyses are included within Appendix J, while these results, in addition to results from the previous testing of other wells at the site where NAPL has been identified (i.e., wells MW-6-36, MW-10-32, and MW-11-32), are summarized in Tables 14 through 16.

A second sample of NAPL and water collected from the sump of well MW-16-45 was analyzed by PTS as per their "Fluid Properties Package-NAPL and Water". This suite of analyses includes dynamic viscosity and fluid density at three temperatures, surface tension for each fluid, and interfacial tension for three phase pairs (oil/water; oil/air; and water/air) as per ASTM D445 and D1481.

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Laboratory reports documenting results of PTS's NAPL analyses are also included within Appendix I, and are summarized, in part, on Table 14.

2.9 Sediment Characterization

NW Natural entered into an Administrative Order on Consent (Order) with EPA on April 28, 2004 to perform a sediment removal action at the Gasco site. In accordance with the Statement of Work (SOW) attached to the Order, sediment characterization was performed by Anchor adjacent to the Gasco site in July 2004 to facilitate design of the removal action. The characterization protocols were discussed in detail in the Field Sampling Plan which was an Appendix to the Remedial Action Work Plan (Anchor 2004). The design characterization included the collection of subsurface cores within the removal action area in order to:

- Establish the lateral and vertical extents and the physical characteristics of the tar body
- Estimate elutriate concentrations in the nearby water column that may occur during the removal action
- Profile the contaminated materials to be removed to determine a suitable disposal location
- Determine the chemical/physical characteristics of the sediments residing within and beneath the visibly contaminated strata
- Provide observational data to support evaluation of the potential that NAPL identified in proximity of the historical drainage area upland of the off-shore tar body is a present oil migration threat to Willamette River sediments.

2.9.1 Sediment Collection and Processing

Twenty sediment samples (RAA-01 to RAA-20) were collected by Anchor in July 2004 from the locations depicted in Figure 3 and 11. The AN-X series of samples was collected during a previous sediment investigation in 2002. For all samples with sufficient water depths, the sampling was conducted from a shallow draft barge equipped with a hydraulic coring device (i.e.,

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Geoprobe). The Geoprobe was deployed through a "moonhole" in the middle of the barge deck space. Horizontal positioning at each sampling location was determined using a differential global positioning system (DGPS) in latitude and longitude to the nearest 0.01 second in the North American Datum (NAD) 1983. Where water depths precluded collection from the waterside, the cores were taken using a portable track-mounted Geoprobe rig from the landside. Coring began at the mudline/ground surface elevation using a 4-foot long, 2.5-inch inside diameter (ID) core sampler. Following penetration of the full length of the core tube (5 feet), the sampler was withdrawn to retrieve the liner containing the sediment sample. This process was repeated to a maximum depth of approximately 20 to 40 feet below mudline for all sampling stations.

Following retrieval, sediment cores were immediately opened and logged on the sampling vessel and the desired samples from the appropriate intervals were collected. Based on the heterogeneity of the strata encountered, a spatially representative subset of 17 samples from the total of 40 collected samples was selected for chemical and physical analyses.

2.9.2 Visual Characterization

To establish the lateral and vertical extents of the tar body and assess whether offshore migration of contamination from the uplands is potentially occurring, the cores were visually logged by Anchor personnel as to their color, structure, texture, mineral composition, moisture, and percent recovery, according to ASTM Method D 2487. In addition, particular emphasis was placed on identification of the tar body, visibly contaminated, and visibly uncontaminated zones. During evaluation of the cores, Anchor and EPA's oversight contractor, Parametrix, Inc., reached consensus on the depth(s) of the zones present at each station for the purposes of sampling. To maintain a consistent definition of each zone throughout the characterization, each zone was identified through the presence of particular physical characteristics. Observations of the tar body included:

- Thin tar laminations bounded by sediments
- Lenses of tar
- Somewhat soft, sticky masses of tar
- Dense brittle fragments of tar containing little or no sediments.

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Observations of the visibly contaminated zone included sediments:

- Saturated (i.e., visibly detectable) oil (but composed primarily of sediments)
- Saturated with tar and tarry like substances (but composed primarily of sediments)
- With a heavy sheen
- With blebs of oil and/or tar
- With a slight sheen.

Sediments with no sheen, oil, tar, or petroleum odor noted were identified as the visibly uncontaminated zone.

2.9.3 Chemical Testing

The 17 selected samples were subjected to the following suite of analyses: total organic carbon (TOC; PSEP protocols), BTEX (EPA method 8260), PAHs (EPA Method 8270), total cyanide (EPA Method 335.2), total solids (TS; EPA Method 160.3) and grain size (ASTM D 422). In addition, a representative subset of 9 samples with sufficient silt content was analyzed for Atterberg limits (ASTM D 4318). A TCLP (EPA Method 6010) and Dredge Elutriate Test (DRET) was also conducted on 2 representative tar body zone samples and visibly contaminated zone samples. These chemical analyses were conducted to facilitate a removal and disposal alternatives evaluation in accordance with the Order. The chemical laboratory analytical results will be included in the Remedial Action Project Plan (RAPP), to be prepared by Anchor, which is currently in draft form (Anchor 2004).

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3.0 RESULTS

3.1 Former Tar Pond / River Embankment Vicinity

Push probe boring B-56 was installed with the primary objective of obtaining depth discrete groundwater quality data near the former boring B-31 area, located between the former tar effluent pond and the Willamette River embankment (Figure 2 and 3). A hydrogeologic cross-section parallel to the river (Figure 4), including the B-56 boring location, is included as Figure 5. Results of these investigatory activities are summarized below:

3.1.1 Subsurface Conditions

- Soils encountered at the B-56 boring location (Appendix A and Figure 5) consisted of gravelly sands and silts, including patches or flecks of solid black carbon pitch (fill) to a depth of approximately 22.5 feet bgs, where an approximate 0.5-foot thick layer of solid, ductile tar was identified. Below the tar were interbedded sands, silty sands, and silts characteristic of the Alluvial WBZ extending to a depth of 174 feet bgs. Sandy gravel including angular basalt fragments were identified at this location from 174 to 179 feet bgs, where soil sampler refusal, potentially on basalt bedrock, was encountered.

- The silt layer that typically defines the top of the Alluvial WBZ in the more upland reaches of the site, and typically becomes thin to absent in the vicinity of the Willamette River shoreline, was not observed at the B-56 boring location (Figure 5).

- The thin layer of tar identified at the apparent base of the fill unit across a depth of 22 to 22.5 feet bgs at the B-56 location is consistent with the previous identification of this material at the immediately adjacent former B-31 boring location. Tar has not been identified within soils either immediately west (MW-4 well

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cluster) or immediately east (MW-5 well cluster) of the B-31/B-56 boring location (Figure 5). No evidence of oil was identified within either the fill or the underlying alluvial materials at these locations. The tar identified at this location was likely the result of historical discharge to the pre-fill ground surface.

3.1.2 Groundwater Analytical Results

Results of the testing of groundwater samples collected from the boring B-56 location are summarized in Tables 1 through 4. Hydrogeologic cross-sections through the B-56 boring location (oriented parallel to the river), are included as Figures 5A (depicting benzene concentrations) and 5B (depicting naphthalene concentrations). Additionally, plume iso-concentration maps depicting benzene and naphthalene concentrations within the Surficial Fill WBZ and the Alluvial WBZ across the site and the western portion of the adjacent Siltronic property, are provided as Figures 7 through 10.

Groundwater quality data from the adjacent Siltronic property that are posted on the referenced figures were obtained from results of investigatory activities conducted by HAI for NW Natural, as well as Limno-Tech, Inc. (LTI), Maul Foster Alongi, Inc. (MFA), and others for Siltronic. Primary sources for the Siltronic property data include a 2003 HAI report (HAI 2003), as well as 2003 and 2004 reports prepared by MFA (MFA 2003, 2004a through h), and a 1990 report prepared by CH2M HILL, Inc. (CH2M HILL 1990).

Key findings from evaluation of the preceding groundwater quality results are summarized below:

- The greatest benzene concentration in groundwater at the B-56 boring location was 8 parts per billion (ppb), as identified within the Surficial Fill WBZ across the 18-22 foot interval. Within the Alluvial WBZ, detectable concentrations of benzene were found to range from 3.1 ppb (80 to 84 feet bgs) to 3.62 ppb (60 to 64 feet bgs).

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- The greatest concentrations of PAHs in groundwater (with the exception of naphthalene) at the B-56 location were identified in the Surficial Fill WBZ, where individual PAHs were identified at concentrations ranging from 4 ppb to 54.1 ppb. In contrast, individual PAH concentrations (except naphthalene) from discrete zones within the Alluvial WBZ were typically identified at concentrations less than 0.2 ppb. With regard to naphthalene, the greatest concentration was identified across the 80 to 84 foot depth interval at this location, where a concentration of up to 405 ppb was identified.

  The concentrations of PAHs identified within the Surficial Fill WBZ at the B-56 boring location (317 ppb) were slightly elevated above PAH concentrations identified within the Surficial Fill WBZ at adjacent monitoring well locations to the west (MW-4-35 with 65 ppb) and east (MW-5-32 with 0.27 ppb). This occurrence, however, is likely a function of the presence of soil impacts across the temporary well point screen interval, in conjunction with the typically turbid nature of temporary well point samples. Specifically, because PAHs have a strong affinity to bind to soil particles, PAH results from turbid samples may be skewed high because results would be a function of both the dissolved phase (water) and the solid phase (soil) components. Such an effect is common and is exemplified at the MW-5-32 well location, where initial sampling in 1995 (when drilling-induced turbidity was greatest) identified 288 ppb total PAHs, while in 2004 only 0.27 ppb total PAHs were identified at this location.

- With regard to the Alluvial WBZ, as depicted on Figures 5, 8 and 10, concentrations of benzene (3.6 ppb maximum) and naphthalene (441 ppb maximum) as identified at the B-56 boring location were found to be significantly lower than concentrations of the same contaminants as identified at locations either immediately west (15,000 ppb benzene; 3,780 ppb naphthalene at MW-4-57) or immediately east (11,500 ppb benzene; 11,900 naphthalene at MW-5-100).

  Such a contaminant distribution as described above suggests the presence of two somewhat discrete contaminant plumes within

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the Alluvial WBZ at this portion of the site (Figures 8 and 10), with data from boring B-56 defining the eastern limit of the relatively shallow (approximately 45 to 120 feet bgs) plume identified at shoreline well cluster locations MW-4 and MW-16; while also providing definition of the western limit of the somewhat deeper (approximately 70 to 140 feet bgs) plume identified at shoreline well location MW-5-100 and extending east (to the adjacent Siltronic property) to wells WS-14 and WS-11. The eastern limit of this plume is defined by the WS-12 well location.

Based on the plume morphology (Figures 8 and 10), as well as observations of soil core, it appears that there are two different sources for the impacts observed within the Alluvial WBZ, with both sources appearing to correspond to locations where effluent, including NAPL, were formerly discharged directly onto the historic ground surface (i.e., the surface of the alluvial unit).

The western benzene and naphthalene plume appears to originate within the southern portion of the former tar ponds/former Koppers waste discharge area, generally between the MW-11 / MW-14 well locations and the MW-8 well cluster, with contaminant contribution to the Alluvial WBZ occurring to the north within the former tar pond area and adjacent low area/former discharge. NAPL source within the Alluvial WBZ has been observed within the former tar pond area (e.g., borings B-32, B-33, B-35 and MW-8), and within the upper portion of the Alluvial WBZ in the former effluent discharge area (e.g., borings B-55 through B-59, B-29 and MW-16).

The eastern benzene and naphthalene plume (e.g., MW-5, WS-11, and WS-14 down-gradient monitoring points), appears to be the result of deep NAPL migration near the eastern limit of the former tar ponds in vicinity of the Gasco/Siltronic property boundary (proximate to the former pond overflow point as depicted on Figure 3). Specifically, the deepest NAPL directly observed on either property has been identified in this area (B-33, B-35, B-1-8, and WS-16 boring locations), where NAPL has been logged at depths ranging from 67 feet bgs (B-33) to 74 feet bgs (WS-16). Further, the presence in DNAPL immediately north

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of these areas in wells WS-11-125 and WS-14-125, as identified by MFA (2004h), suggests the presence of NAPL in this area to depths as great as 125 feet bgs. The deeper NAPL penetration in this area has resulted in deeper dissolved phase contamination as compared to the western plume (Figures 5a and 5b).

3.1.3 Soil Analytical Results

Soil samples were collected at depths of 2.5, 11, and 26 feet bgs at boring B-56 to undergo laboratory analyses for BTEX, PAHs, and total cyanide analyses (Tables 9 through 12). Results of these tests indicated BTEX and cyanide to be non-detected at concentrations greater than laboratory reporting levels, while total PAH concentrations ranged from 14 parts per million (ppm) at 2 feet bgs to 525 ppm at 26 feet bgs, collected beneath the tarry zone described in Section 3.1.1.

3.2 Former Effluent Discharge and Low Area

Push probe borings B-53, B-54, B-55, B-57, B-58, B-59, and B-59A, in addition to monitoring wells MW-16-45, MW-16-65, and MW-16-125, were installed in the former low area that historically received MGP effluent that discharged directly to the Willamette River (Figures 2 and 3). Results of these investigatory activities are described below.

3.2.1 Subsurface Conditions

Observations regarding soil type and field screening information collected as part of the June 2004 push probe boring investigatory activities are summarized below. Further, Figure 11 identifies those depths at which tarry or oily soils were encountered across the northeastern portion of the site, as do cross-sections included as Figures 5 and 6.

- Soils consisted of gravelly sands, silts, brick and concrete fragments and large concrete and rock chunks (fill) to depths ranging from 25 feet bgs (B-55) to approximately 33.5 feet bgs (B-58). Beneath the fill were interbedded sands, silts, and silty

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sands characteristic of the Alluvial WBZ, extending to the maximum depth of exploration at 175 feet bgs (boring B-59).

- The silt layer that typically defines the top of the Alluvial WBZ but is often thin to absent in the vicinity of the Willamette River shoreline, was identified at the B-55 (25 feet bgs); B-57 (30.5 feet bgs); B-58 (33.5 feet bgs); B-59 (27 feet bgs); and MW-16 (26 feet bgs) locations.

- A soil matrix including tar (primarily black, patchy, solid to semi-solid) was identified within fill at depths ranging from 1 to 2 feet bgs and extending to depths ranging from approximately 22 to 30 feet bgs at all boring locations except P-53 and P-54 (near the river embankment), where only very minor patchy tar or tar flecks were identified within the fill.

- Several zones of patchy or massive hard carbon pitch were encountered within the fill at borings B-53 (patchy from 2.5 to 29 feet bgs); B-54 (patchy from 10 to 20 feet bgs); B-55 (massive from 22.5 to 25 feet bgs), B-57 (patchy from 20 to 23 feet bgs); B-58 (patchy from 17-22.5 feet bgs); and B-59 (patchy from 17.5-27 feet bgs).

- Visually-impacted zones containing oil were identified within and beneath the fill across depth intervals of 27.5 to 32 feet bgs at boring B-55; 26.5 to 37.5 feet bgs at boring B-57; 22.25 feet bgs (thin zone) and 30.5 to 37 feet bgs at boring B-58; and 30 to 38 feet bgs at boring B-59. Further, an impacted zone containing oil and extending from 27.5 to 40 feet bgs was previously identified at the former boring B-29 location (near B-59 and adjacent to the embankment) (Figures 5, 6, and 11).

- At certain locations (e.g., B-55 at 32 feet bgs; B-57 at 37.5 feet bgs; and B-59 at 38 feet bgs), a thin silt or sandy silt layer was identified that appeared to locally control vertical movement of the NAPL, with oily soils identified above the layer, while no oily soils were identified below the layer. At other boring locations (e.g., B-29 and B-58), no direct visual evidence of such a confining or

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partially confining silt layer was identified. However, the apparent base of the oil was visually identified at all boring locations.

- The presence of oil-bearing soils adjacent to the embankment appears limited to an approximate 200 foot length of shoreline within the former effluent discharge/low area (e.g., B-29, B-57, -58, -59, and MW-16-45 locations) with no oil identified to total depth at the B-9 or the MW-3 boring locations to the west, or within the boring for MW-4 to the east (Figures 5, 6, and 11).

- Boring logs indicate the presence of tars and carbon pitch (e.g., lampblack and/or pencil pitch) within materials used to fill the tar ponds and the adjacent low areas, with tarry soils identified immediately beneath the ground surface at many boring locations within these areas. However, based on borings installed closest to the river embankment (e.g., borings B-29, B-53, B-54, and MW-16), it appears that tarry soils were not used for construction of the river embankment (Figure 11).

Observations regarding soil type and field screening information collected as part of the boring investigatory activities related to the installation of the MW-16 well cluster (installed near the former B-29 boring location) are summarized below, while the boring logs are included within Appendix B.

- Soils consisted predominantly of gravelly sandy silt with brick fragments and concrete to a depth of 25 feet bgs. Likely native silt was encountered at a depth of 25 feet, underlain by interbedded silts, sands, and silty sands to the maximum depth of exploration at this location of 127.5 feet bgs.

- Likely carbon pitch flecks (black, hard fragments) were identified sporadically within fill across a depth interval of approximately 12 feet to 23 feet bgs.

- Semi-solid tar blebs were encountered in fill at a depth of 24.5 feet bgs, with black staining present between 24.5 feet through 27.5 feet bgs.

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- Brown oil was observed to be coating soil between a depth interval of 27.5 feet bgs to 37.5 feet bgs, with less oil (limited to more of a petroleum sheen) observed between a depth interval of 37.5 and 40 feet bgs (Figures 5, 6, and 11). Oil was observed coating soil between 40 and 44 feet bgs, with no oil identified at depth below 44 feet bgs. Evidence of a possible silt layer at 44 feet was identified, however, due to vibrations and extrusion related to sample collection, the soil core was highly disturbed and interpretation of the representativeness of the silt layer was difficult.

3.2.2 Photo Evaluation and Physical Testing of Soil Core

Relatively undisturbed soil core was collected, frozen and shipped to PTS in Santa Fe Springs, California for detailed evaluation including photography and physical testing. The core was obtained across a depth interval of 26 to 46 feet bgs, as well as 60 to 61 feet bgs during drilling of the boring for monitoring well MW-16-65. Photographs and results of physical testing (Appendix I) indicate the following:

- **26 to 29 feet bgs:** Patchy zones of apparent oily tar were identified from 26 to 29 feet bgs, with individual blebs all less than 0.1-inch diameter through 27 feet bgs, becoming larger from 27 to 29 feet bgs (black and moist where cut). Sieve testing of this zone (27.5 feet bgs) indicates the mean grain size description to be silt, with the median grain size being 0.027 millimeters (mm). Porosity was measured as 50.6%, with approximately 11.2% of the pore fluid being NAPL.

- **29 to 31 feet bgs:** An apparent increase in sand content occurs between 29 and 30 feet bgs, with a respective increase in black oily tar content. There is evidence of layering of tar/oil from 29 to 30 feet bgs, while only small blebs of tar exist from 30 to 31 feet bgs. Sieve testing of this zone (29.2 feet bgs) indicates the mean grain size description to be silt, with the median grain size being 0.044 mm. Porosity was measured as 53%, with approximately 23.1% of the pore fluid being NAPL.

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- **31 to 36 feet bgs:** The core appears sandier below 31 feet bgs, with oil (more brown than black in coloration) fairly uniformly present throughout core to a depth of approximately 36 feet bgs. Sieve testing of this zone (31.6, 33.5, and 35.7 feet bgs) indicates the mean grain size description to be fine sand, with the median grain size ranging from 0.134 mm to 0.199 mm. Porosity was measured as ranging from 50.6% to 52.37%, with approximately 20.7% (at 33.5 feet bgs) to 50.3% (at 35.7 feet bgs) of the pore fluid being NAPL.

  A sample of core from a depth of 35.55 feet bgs that underwent a free product mobility screening analysis found 51.9% initial NAPL saturation, with 34.4% residual saturation remaining after the core was centrifuged at 1,000-times the force of gravity, an approximate 34% decline in NAPL saturation after centrifuging. The preceding decline in NAPL saturation, in addition to the entry of NAPL through the coarse-grained sand pack of well MW-16-45, suggests the potential for NAPL mobility across this depth interval under certain conditions (e.g., in the presence of a coarse-grained sand matrix).

- **36 to 39 feet bgs:** Between 36 and 39 feet bgs, oily zones within the core are somewhat more patchy, although the ultraviolet photograph continues to indicate the presence of petroleum throughout these soils. Sieve testing of this zone (38.9 feet bgs) indicates the mean grain size description to be fine sand, with the median grain size being 0.187 mm. Porosity was measured as 51%, with approximately 33.8% of the pore fluid being NAPL.

- **39 to 42 feet bgs:** Below 39 feet there is a noticeable decline in oil content, with the greatest occurrences of oil found in blebs or layers up to 0.2 feet thick, although a thicker zone occurs between 41.5 and 42 feet bgs, with the potential petroleum presence in surrounding soils only indicated based on photography under ultraviolet light. Sieve testing of this zone (40.4 feet bgs) indicates the mean grain size description to be fine sand, with the median grain size being 0.145 mm. Porosity was measured as 47.5%, with approximately 30.8% of the pore fluid being NAPL.

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A sample of core from a depth of 40.10 feet bgs that underwent a free product mobility screening analysis found 23% initial NAPL saturation, with 17.3% residual saturation remaining after the core was centrifuged at 1,000-times the force of gravity, an approximate 25% decline in NAPL saturation after centrifuging. The preceding suggests the possibility of NAPL mobility across this depth interval under certain conditions.

- **42+ feet bgs:** Below 42 feet bgs, there is no oil indicated within soils based on white light photographs. However, there are indications of a potential light presence of petroleum between 42 and 43 feet bgs; 44.5 and 45 feet bgs; and a potential very light presence between 60.5 and 61 feet bgs, as observed under ultraviolet light. Although unknown, it is possible that the lower depth and lower level indications of petroleum (especially that only appearing in ultraviolet photographs), could be related to drag-down resulting from drilling or core tube insertion. Drag down is apparent in other segments of the core, as evidenced by indications of petroleum extending downward along the surface of the core. Sieve testing of this zone (42.5, 44.8, and 45.3 feet bgs) indicates the mean grain size description to be fine sand, with the median grain size ranging from 0.175 mm to 0.257 mm. Porosity was measured as ranging from 42.2% to 48.1%, with no NAPL detected (60.7 feet bgs) to 3.2% NAPL detected (45.3 feet bgs).

  A sample of core from a depth of 42.35 feet bgs that underwent a free product mobility screening analysis found 1.2% initial NAPL saturation, with 1.2% residual saturation remaining after the core was centrifuged at 1,000-times the force of gravity, a 0% decline in NAPL saturation after centrifuging, indicating that the NAPL in this zone is not potentially mobile.

3.2.3 Groundwater Analytical Results

Results of the testing of groundwater samples collected from the boring B-59 location are summarized in Tables 1 through 4, while results of the testing of samples collected from the MW-16 well cluster are included within Tables 5 through 8. Hydrogeologic cross-sections through the B-59/MW-16 area (oriented parallel to the river), are included as Figures 5A (depicting benzene concentrations) and 5B (depicting naphthalene concentrations), while cross-

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sections oriented normal to the river are included as Figures 6A (depicting benzene concentrations) and 6B (depicting naphthalene concentrations). Additionally, plume iso-concentration maps depicting benzene and naphthalene concentrations within the Surficial Fill WBZ and the Alluvial WBZ across the site and the western portion of the adjacent Siltronic property, are provided as Figures 7 through 10. Key groundwater data from the former effluent discharge/low area, are summarized below:

- Analytical results from the testing of groundwater samples collected across multiple depths (beneath the identified oily soils) at the boring B-59 location indicate that the greatest contaminant concentrations (5,570 ppb benzene and 4,460 ppb naphthalene) were present across the shallowest interval sampled - a depth interval of 46 to 50 feet bgs, while no contaminant concentrations greater than indicated screening levels were detected below a depth of 120 feet bgs (Table 1).

- Analytical results from the testing of groundwater samples collected from well MW-16-45, screened across the oily zone within the uppermost Alluvial WBZ, indicate the presence of 2,880 ppb benzene and 7,500 ppb naphthalene. Vertically, concentrations of these constituents were found to decline significantly with depth, with benzene not detected above laboratory method detection limits at a depth of 115 to 125 feet bgs, while naphthalene was identified at a concentration of only 26.5 ppb (below screening level) across the same depth interval (Tables 5 and 6; Figures 5 and 6).

- Laterally, benzene concentrations within the upper Alluvial WBZ as identified at the B-59 / MW-16 location depict attenuating concentrations relative to the "benzene high" previously identified to the east at the MW-4-56 well location. Specifically, benzene concentrations are found to decrease in a westerly direction from 15,000 ppb identified at well MW-4-56, to approximately 3,000 to 5,000 ppb identified at the B-59/MW-16 location, and finally to less than 100 ppb as identified at the MW-3 well location (Figure 8). As described in Section 3.2.5, analysis of a NAPL sample recovered from well MW-16-45 did not detect the presence of benzene at concentrations greater than laboratory method

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reporting levels (10,000 ppb), and therefore the decrease in benzene concentration at well MW-16-45 relative to MW-4-57, even with the presence of NAPL in the well casing, does not appear anomalous.

- The naphthalene concentration as identified across the oily zone at well MW-16-45 (7,500 ppb), represents an increase in concentration relative to adjacent well locations. Specifically, less than 1 ppb naphthalene was identified within the upper Alluvial WBZ along the shoreline to the west at the MW-3 well location, while 3,780 ppb naphthalene was identified across the most heavily impacted zone (upper Alluvial WBZ) to the east at the MW-4-57 well location (Figure 10). As described in Section 3.2.5, analysis of a NAPL sample recovered from well MW-16-45 identified the presence of naphthalene at a concentration of 15,600,000 ppb (48% of the total PAH content), thereby providing rationale for the elevated naphthalene concentration identified in groundwater at this location.

- As depicted in Figures 5 through 10, the NAPL and dissolved phase hydrocarbon presence on-site within the Alluvial WBZ is primarily limited to the former tar pond area as well as the former effluent discharge area to the immediate west, while impacts within the overlying Surficial Fill WBZ across much of the same area are much less pronounced. The preceding suggests the petroleum impacts identified within the Alluvial WBZ at this portion of the site are likely the result of historical discharge of NAPL and tar effluent directly to the pre-fill ground surface (e.g., typically the alluvial silt) in these areas.

3.2.4 Soil Analytical Results

Soil samples were collected from a depth of 2.5 feet bgs at borings B-53 and B-55; and from depths of 2 feet and 7.5 feet bgs at the B-54 boring location to undergo laboratory analyses for BTEX and PAHs (Tables 9 and 10). Results of these tests indicated BTEX to be non-detect for samples collected from borings B-53 and B-54 (where no shallow tar was identified), while the sample collected from boring B-55 (which contained solid tar in the sample matrix), identified the presence of 137 ppm benzene. Similarly, the sample

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from boring B-55 containing tar identified the presence of 61,008 ppm total PAHs, while samples from borings B-53 and B-54 identified from 3.06 ppm (2 feet bgs at B-53) to 268.6 ppm (7.5 feet bgs at B-54) total PAHs.

3.2.5 NAPL Characterization

Well MW-16-45 was screened immediately adjacent to the river embankment within a zone of oily soils (Section 3.2.1), with a screen set in the upper Alluvial WBZ from 30 to 45 feet bgs, and a primary sand-pack extending from 27 to 45 feet bgs. A sump was placed below the screen interval, extending from 45 to 47.5 feet bgs.

On September 29, 2004 approximately 1.5 feet of brown oil (NAPL) was identified in the sump of well MW-16-45. The NAPL was subsequently removed from the sump of the well over several days with the use of a disposable bailer to provide sufficient volume of sample for lab analysis, as well as to conduct an initial evaluation of the ability to remove NAPL from this location. No NAPL has been identified in intermediate-depth Alluvial WBZ well MW-16-65, or in deep Alluvial WBZ well MW-16-125.

Table 17 depicts the measured NAPL thickness at the MW-16-45 location during each measurement event, as well as the estimated volume of NAPL removed from the well. The volume of NAPL removed from this well is also depicted graphically on Figure 12. As depicted, approximately 1 liter of oil was initially removed from the well, with successive events yielding between 0.25 and 0.5 liters of NAPL. The NAPL recovered from the well has been observed (qualitative) to be highly viscous and tacky.

Results of the chemical and physical testing of the recovered NAPL are summarized on Tables 14 through 16, and as follows:

- The fuel fingerprint indicates the NAPL contains diesel- and heavy oil-range petroleum hydrocarbons. Evaluation of the chromatogram with various standards (Appendix J) resulted in the following description provided by the laboratory.

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"The sample exhibited a pattern consistent with a medium distillate non-fuel gas-oil (e.g., creosote or coal oil) by the HCID method. Further investigation by the GC-MS confirmed the majority of the sample was made up of polycyclic aromatic hydrocarbons (PAHs) although the majority were naphthalenes and its alkl homologues. From this we conclude the sample may have been derived from only a few likely sources, those being: coal oil based creosote or the cracking and coking operations in many refineries (e.g., light cycle oil residue or coke oil)." The preceding, in conjunction with knowledge of site history, strongly suggests the source of the oil to be cracking and coking processes related to the former oil gas MGP.

- The NAPL has a specific gravity of 1.084 at ambient temperature, and is therefore slightly denser than water (specific gravity of 1.0). At higher temperatures the NAPL was found to maintain a similar specific gravity.

- The NAPL has a viscosity of 105 centistokes (114 centipoise) at a temperature of 70 degrees F. For comparison, water has a viscosity of 1 centistoke or centipoise (by definition), while honey has a viscosity of approximately 10,000 centipoise. As summarized on Table 14, the NAPL at MW-16-45 has the greatest viscosity of any of the NAPL samples previously collected at the site, which ranged from 7.2 centistokes at well MW-6-32 (where active recovery is occurring) to 45.7 centistokes at well MW-11-32.

- Relatively low levels of aromatic hydrocarbons were identified within the NAPL as compared with NAPL from all other areas of the site, with ethylbenzene, toluene, xylene, and trimethlybenzenes all identified at concentrations less than 70 ppm (Table 14). Benzene was not detected within the NAPL at a concentration greater than laboratory method reporting levels (10 ppm).

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- The NAPL has no flashpoint below 150°F (Table 12). The low level of volatile aromatic hydrocarbons in the oil likely contributes to the oil's high flash point.

- PAHs were identified within the NAPL at a combined total concentration of 32,787 ppm, of which the carcinogenic PAH fraction consisted of 2,647 ppm. Further, naphthalene comprised almost 50% of total PAHs, with 15,600 ppm identified (Tables 14 and 15). In addition to PAHs, one additional SVOC (2-methylnaphthalene at a concentration of 5,500 ppm) was identified.

3.2.6 NAPL Distribution and Mobility Screening

As depicted on Figures 11 and in a schematic cross-section included as Figure 13, NAPL has been identified beneath a portion of the former discharge / low area, with the extent of NAPL in proximity of the embankment having been delineated to the east by well cluster MW-4 and to the west by well cluster MW-3, to the north by RAA-8, RAA-15, RAA-18, RAA-19, and RAA-20, and to the south by borings B-9 and B-30. As described in Section 3.2.3, the source of the NAPL is likely a function of historical discharge to the pre-fill ground surface in the former low area / discharge area immediately south of the MW-3 / above-ground storage tank farm area. The estimated locations of former effluent discharge features within this area (wastewater outfall and ditch), based on aerial photographs and/or facility diagrams, are included on Figure 11.

As depicted in Figures 11 and 13, the thickness and depth of the oil (NAPL) tends to become greater in a northerly direction, toward the river (although not extending to the river), with the NAPL present primarily across the upper portion of the alluvial unit. As observed at numerous push probe boring locations, the vertical migration of the NAPL appears to have been interrupted by the presence of numerous individual thin silt layers in the upper Alluvial WBZ. Although the continuity of individual silt layers is unknown, it appears sufficient silt is present within the upper Alluvial WBZ such that vertical NAPL migration has been restricted, as evidenced by lack of field screening evidence of impact at depth, as well as diminishing concentrations of dissolved contaminants in groundwater with increasing depth.

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As described in Section 3.2.2, results of physical testing of soil core collected from within the zone of NAPL occurrence at the MW-16-65 well location has provided physical data such as total porosity, particle size, pore fluid saturation (water and NAPL), specific gravity, density, viscosity, and interfacial / surface tension data for the core and/or NAPL (Appendix I).

Results of the preceding testing found the mean grain size of a majority of the soils within the NAPL zone to be classified as "fine sand", with total porosities ranging from 45.9% to 52%. NAPL saturations (as a percentage of total pore space) at select depth intervals between approximately 29 feet bgs and 40 feet bgs at the MW-16 location were found to range from 25.7% (at 33.5 feet bgs) to 62.6% (at 35.7 feet bgs). For comparison, residual (non-mobile) NAPL levels as cited in the literature (EPA 1992 and Jackson et.al. 2004), typically range from 5% to 50% of total porosity in soils present below the water table. Residual saturation of NAPL is the saturation at which the NAPL is immobilized by capillary forces as discontinuous ganglia under ambient groundwater flow conditions (Cohen and Mercer 1993).

With regard to NAPL mobility screening of site soils, minimum potential residual saturation levels were estimated by centrifuging soils at 1,000-times the force of gravity, an exertion of force much greater than would be exerted based on gravity, capillary effects, or hydraulic gradient. Based on the centrifuge testing results, minimum residual saturation levels (for soils in the primary zone of NAPL occurrence above 41 feet bgs) were identified as 17.3% (23% initial saturation), and 34.4% (51.9% initial saturation). Based on the preceding, it was possible to mobilize 25% to 34% of the NAPL with the application of sufficient force (1,000-times gravity), with an average minimum residual saturation after centrifuging of 26% (Appendix I).

The mobility screening evaluation is meant to indicate the magnitude of NAPL that may be present at levels greater than possible residual saturation levels, with the centrifuging meant to mimic an infinite amount of time under ambient gravity conditions (with a lack of adjacent barrier material). Due to the qualitative nature of the screening and the presence of apparent silt barrier material as observed in the shoreline borings, it is clear that the preceding estimation does not equate to a given percentage of NAPL that is presently mobile at the site. Rather, it suggests that NAPL is likely present at the site at levels greater than residual saturation, and as such, the NAPL

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has the potential for mobility given suitable conditions (i.e., as evidenced by flow into the course-grained sand pack of well MW-16-45).

In addition to the preceding, whether DNAPL or groundwater is the wetting fluid in the formation can have an effect on the distribution and fate of DNAPL in the saturated zone. Specifically, the size and distribution of NAPL ganglia or blebs in the saturated zone is affected by the wetting characteristic of the NAPL in the formation (Dwarakanath, et. al.). Water is typically the wetting fluid in the presence of NAPL, which results in smaller blebs of NAPL trapped within the soil pores, with minimal contact between the NAPL and soil (water preferentially coats the soil). Results of the site-specific wettability testing (Appendix I) found the NAPL/water system to be neutrally-wet, indicating that neither fluid (NAPL or water) has a preferred affinity over the other to spread over the soil particles. The preceding suggests that larger blebs of NAPL may become trapped within the soil pores (e.g., higher residual saturation) than would otherwise be encountered in a "typical" system where water is more strongly wetting.

Overall, the identified viscosity, specific gravity, and interfacial tension of the NAPL or NAPL/water system (Table 14) are within the typical range of an oil tar or creosote. With respect to mobility potential, the high viscosity, low specific gravity, and moderate interfacial tension all suggest limited mobility potential.

Section 3.3 of this report provides a description of tar/oil distribution in sediments immediately off-shore of the oil-bearing soils described herein, and is based on investigation and evaluation conducted by Anchor (Anchor 2004). The primary purpose of the evaluation provided in Section 3.3 is to assess the possibility that a complete migration pathway presently exists between NAPL in upland soils and NAPL observed in off-shore sediments.

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3.3 Visible Tar Distribution in Offshore Sediments

As described by Anchor (2004), the physical characteristics of the tar material in offshore sediments were spatially heterogeneous and varied in consistency from soft, sticky, plastic, stiff and firm, to brittle. The brittle material is generally gravel-size lumps of tarry sand that appears to have weathered. Much of the brittle tar is found on the sediment surface and was generally found at stations closer into the shoreline in areas that have been exposed to air during low flow conditions. Small pieces of this material were also found at depth in some cores. Most of the tar present below this weathered layer was a softer consistency. Although it smears on surfaces it touches, it is too viscous to flow noticeably and the intermixed sands and non-plastic silt/sands prohibited it from acting viscid when sheared in place. None of the tar layers identified exhibited a noticeable sheen.

The visually contaminated zone in sediments varied in consistency from sediments with a slight hydrocarbon odor, slight sheen, slight oil staining, and minor blebs of oil and/or tar to sediments with more extreme hydrocarbon odor, heavy sheen, and sediments more heavily saturated in tar. In some cases, this saturation had the consistency of somewhat more liquid material that was still very viscous and sticky that was termed "oil" in field logs. No free liquid hydrocarbon product beyond small scattered oily blebs was identified in any of the cores either in tar or in visually contaminated sediments. All "oily" sediments encountered felt viscous to the touch, were intermixed in a mostly sand/silt matrix and did not flow noticeably during the core cutting and sampling procedure.

Based on the physical definitions discussed in Section 2.9 the lateral and vertical extents of the tar body were delineated. The elevations and thicknesses of the surface tar body and visibly contaminated zones are depicted in Figure 6A. As shown, the primary geologic unit in the nearshore zone is silt with discontinuous lenses of sands at variable depths. Discontinuous "pockets" of tar and very viscous "oily" sediment in the nearshore stations are confined to the sediments consisting primarily of sand just below the mudline elevation. Both the tar and "oily" sediment layers were viscous to the touch and exhibited no free flowing properties during sampling, in contrast to the tar and oil zones identified in the upland shoreline area.

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The sediment layers where viscous "oily" saturated sands were observed are not laterally continuous with the tar and oil zones identified in the upland borings (see Figure 13). The upland areas with tar or oil product (B-59, B-29, MW-16) are intervened by offshore cores RAA-18, RAA-04, RAA-01, and RAA-02 with no (or very little) "oily" type products present (RAA- and AN-series boring logs are included in Appendix A). Similar observations were made at other intervening core locations (RAA-15, RAA-19, and RAA-20). One core, RAA-01, had very poor recovery in the top 10 feet of core, but the top material recovered was sandy tar and the material below this was firm sticky product in a silt matrix. The only oily type products in sediments were found further out in the AN-series cores in scattered relatively thin layers. In addition, the upland oils are present in alluvial soils with considerable sand content. Underneath these oils are silt layers that appear to extend towards a thicker sequence of surficial offshore silts. In the offshore sediments, this silt layer is typically quite thick and only occasionally interrupted by pockets of more sandy material. These silts appear to be acting as a barrier to the transport of the subsurface NAPL (Figure 13). Consequently, there appears to be no complete physical subsurface pathway between the upland oils in the alluvial sand material to the off-shore tar body or the scattered oily layers in the further offshore silts.

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4.0 CONCLUSIONS

Perhaps the most significant finding derived from results of the upland and in-water investigation activities described herein is the lack of connectivity between oil saturated soils within the Alluvial WBZ beneath the upland portion of the site and oily or tarry sediments within the Willamette River, thereby indicating that the NAPL has not in the past, nor is it currently, discharging to Willamette River sediments. As such, oil and tar noted in Willamette River sediments appear to be the result of previous overland discharge of these waste products that occurred at this portion of the site between 1913 and approximately 1941.

In addition to the preceding primary conclusion, the following general conclusions regarding the nature and extent of groundwater impacts and NAPL distribution adjacent to the Willamette River down-gradient of the former tar ponds and the former effluent discharge area, including the pathway between the upland and river areas, are as follows:

Visual Impacts Within Fill

1) Fill encountered adjacent to the embankment within both the former tar pond area and the former effluent discharge area consisted of gravelly sands and silts, including patches or flecks of solid black carbon pitch, with the fill extending to depths of approximately 22.5 feet bgs (B-56) to 26 feet bgs (MW-16).

2) Tar was mixed with other materials for use as fill within the former low area/effluent discharge area, with tar identified within fill ranging from 1 to 2 feet bgs and extending to depths ranging from approximately 22 to 30 feet bgs at borings near, but not immediately adjacent to, the embankment. Direct observation of fill in borings along the embankment indicates that tar was not a component of the fill used to construct the river embankment.

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3) An approximate 0.5-foot thick layer of solid, ductile tar identified on the inferred former ground surface riverward of the former tar ponds (B-56), and an approximate 0.5-foot zone containing oily/tar blebs identified near the inferred former ground surface riverward of the former effluent discharge area (MW-16) were likely the result of direct placement prior to filing.

Alluvial Unit Geology

4) Beneath the fill were interbedded sands, silts, and silty sands characteristic of the Alluvial WBZ, extending to a depth of approximately 179 feet bgs near the river embankment down-gradient of the former tar pond area, with similar depths anticipated below the former effluent area. A gravelly layer was observed at the base of the Alluvial unit, below which is inferred to be basaltic bedrock.

Alluvial Unit Groundwater Contaminant Nature and Extent

5) Groundwater data from boring B-56 suggest the presence of two apparently distinct petroleum-related contaminant plumes in the Alluvial WBZ down-gradient of the former tar pond area and the former effluent discharge area.

6) The western plume, located west of boring B-56 in the upper to mid-Alluvial WBZ, extends from approximately 45 feet bgs to 120 feet bgs near the river embankment (MW-4; B-59). The lateral extent of this plume is defined to the west by the MW-3 well cluster and to the east by the B-56 well point location. This plume appears to be the result of NAPL and groundwater penetration into the upper Alluvial WBZ within the southern portion of the former tar ponds/former Koppers waste discharge area.

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7) The eastern plume, located east of boring B-56 in the mid to lower portions of the Alluvial WBZ, extends from approximately 70 to 150 feet bgs (MW-5). The lateral extent of this plume is defined to the west by the B-56 well point location and to the east by the Siltronic WS-12 well cluster location. This plume appears to be the result of deeper NAPL migration near the eastern limit of the former tar pond/tar pond overflow area proximate to the former Siltronic property line.

NAPL-Bearing Soils-Former Effluent Discharge Area

8) The lateral limit of oil-bearing soils in proximity to the river embankment at the Gasco site has been found to be limited to an approximate 200 foot interval between the MW-3 and MW-4 well cluster locations (i.e., limited to the former effluent discharge/low area). NAPL-bearing Alluvial soils were similarly identified in push probe borings installed within the former effluent/low area further south of the embankment (e.g., borings B-55 and B-57 through B-59). Borings installed at the base of the embankment show that oil-bearing soils present within the Alluvial WBZ do not extend northward to the Willamette River.

9) The source of the observed NAPL is likely a function of historical discharge to the pre-fill ground surface in the former low area / discharge area southeast of the MW-3 / above-ground storage tank farm area.

10) Vertically, NAPL upland of the river embankment at MW-16 has been identified within visually-impacted soils across a depth interval of approximately 26 to 42 feet bgs, with thin silt layers within the upper Alluvial WBZ observed to be inhibiting vertical migration.

11) Fuel fingerprint analyses indicate that the NAPL contains diesel- and heavy oil-range petroleum hydrocarbons with the chromatograph suggesting it to be a creosote or oil derived from

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cracking/coking operations, both of which are consistent with operations historically conducted at the Gasco site.

12) Physical testing of soil core from the MW-16 NAPL zone indicates typical porosities ranging from 42% to 53%, with 11% to 25% of the pore fluids from 26 to 31 feet bgs consisting of NAPL; 20% to 50% of the pore fluids from 31 to 42 feet bgs consisting of NAPL; and 0 to 3% of the pore fluids below 42 feet bgs consisting of NAPL.

13) NAPL mobility screening results indicate that NAPL: is likely present at levels greater than residual saturation at depths between 29 feet bgs and 42 feet bgs at the MW-16 well location. Screening did not indicate potential NAPL mobility below 42 feet bgs. As such, and without consideration of underlying or adjacent low permeability silts, then migration of the NAPL across this depth interval would be deemed possible. However, observed NAPL distribution indicates the presence of underlying and adjacent silts have prevented NAPL migration from the MW-16 area to the adjacent river sediments. is not

14) Physical properties associated with the NAPL identify it as low density fluid (slightly more dense than water), with a high viscosity, moderate interfacial tension, and neutral wettability – all of which suggests poor mobility in the subsurface.

15) Limited NAPL removal activities at the MW-16-45 location suggests that removal of 15 to 30 liters (4 to 8 gallons) of NAPL per month from this location may be feasible, although the likely duration of such yields is not known.

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Pathway Evaluation-Upland and Offshore NAPL

16) Sediment borings installed near the toe of the river embankment did not identify the presence of NAPL as identified at adjacent upland locations B-29 and MW-16.

17) Sediment layers offshore of the former effluent discharge area containing viscous oil and tar are laterally discontinuous with the tar and oil zones identified at upland boring locations.

18) A laterally thickening zone of silt present between the upland portion of the site and the river appears to be acting as a barrier to the transport of NAPL, with no complete physical subsurface pathway between the zone of NAPL below the upland portion of the site and the tar body or scattered oily layers identified in offshore sediments.

19) Tar and oil within off-shore sediments appears to be the result of previous overland discharge of these waste products that occurred at this portion of the site between 1913 and approximately 1941.

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5.0 LIMITATIONS AND SIGNATURES

The information presented in this report was collected, analyzed, and interpreted following the standards of care, skill, and diligence ordinarily provided by a professional in the performance of similar services as of the time the services were performed. This report and the conclusions and/or recommendations contained in it are based solely upon research and/or observations, and physical sampling and analytical activities, if any, that were conducted at the Client's request.

The information presented in this report is based only upon activities witnessed by HAI or its contractors, and/or upon information provided to HAI by the Client and/or its contractors. The analytical data presented in this report, if any, document only the concentrations of the target analytes in the particular sample, and not the property as a whole.

Unless otherwise specified in writing, this report has been prepared solely for the use by the Client and for use only in connection with the evaluation of the subject property. Any other use by the Client or any use by any other person shall be at the user's sole risk, and HAI shall have neither liability nor responsibility with respect to such use.

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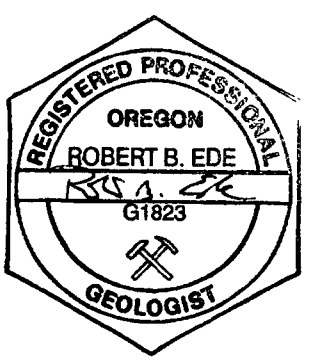

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7.0 GLOSSARY OF ABBREVIATIONS

Anchor	Anchor Environmental, LLC
API	American Petroleum Institute
ASTM	American Society of Testing Materials
bgs	below existing ground surface
BTEX	benzene, toluene, ethylbenzene, xylene
DEQ	Oregon Department of Environmental Quality
DNAPL	dense non-aqueous phase liquid
EPA	U.S. Environmental Protection Agency
FAMM	Fuel and Marine Marketing, Inc.
HAI	Hahn and Associates, Inc.
LTI	Limno-Tech, Inc.
MFA	Maul Foster Alongi, Inc.
mm	millimeter
msl	mean sea level
NAPL	non-aqueous phase liquid
NCA	North Creek Analytical
NPDES	National Pollution Discharge Elimination System
OAR	Oregon Administrative Rules
OD	outside diameter
OWRD	Oregon Water Resources Department
PAHs	polynuclear aromatic hydrocarbons
PCI	Pollution Control Industries, Inc.
PTS	PTS Laboratories, Inc.
ppb	parts per billion
ppm	parts per million
QA/QC	quality assurance / quality control
RCRA	Resource Conservation and Recovery Act
SVOCs	semi-volatile organic compounds
VOCs	volatile organic compounds

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TABLES

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TABLE 1 – Summary of Analytical Results for Groundwater Samples: Temporary Well Points
Volatile Organic Compounds by EPA Method 8260

Well Point Location	Sample Number	Sample Date	Screen Interval (feet bgs)	Analytical Results – ug/L (ppb) VOCs by EPA Method 8260											
				Aromatic VOCs (AVOCs)						Chlorinated VOCs					Other VOCs
				Benzene	Ethyl-benzene	Toluene	Total Xylenes	1,2,4-TMB	Naphthalene	1,1-DCE	cis-1,2-DCE	PCE	TCE	Vinyl Chloride	
Reference Level [1] ==>				51. [2]	7.3 [4]	9.8 [4]	13. [4]		620. [4]	3.2 [2]	590. [4]	590. [4]	30. [2]	530. [2]	
Push Probe Boring Samples															
B-56A	2708-040602-101	2-Jun-04	18-22	8.	5. U	5. U	10. U	5. U	328.	5. U	5. U	5. U	5. U	5. U	U
	2708-040603-102	3-Jun-04	40-44	1. U	1. U	1. U	2. U	1. U	2.57	1. U	1. U	1. U	1. U	1. U	U
	2708-040603-103	3-Jun-04	60-64	3.62	**70.**	1. U	**18.64**	2.06	140.	1. U	1. U	1. U	1. U	1. U	U
	2708-040603-104	3-Jun-04	80-84	5. U	5. U	5. U	10.6	5. U	441.	5. U	5. U	5. U	5. U	5. U	U
(duplicate)	2708-040603-105	3-Jun-04	80-84	3.1	2.02	2. U	6.96	2. U	273.	2. U	2. U	2. U	2. U	2. U	U
	2708-040604-106	4-Jun-04	100-104	1. U	1. U	1. U	2. U	1. U	2. U	1. U	1. U	1. U	1. U	1. U	U
B-56B	2708-040614-115	14-Jun-04	136-140	1. U	1. U	1. U	2. U	1. U	3.26	1. U	1. U	1. U	1. U	1. U	U
	2708-040614-116	14-Jun-04	174-178	1. U	1. U	1. U	2. U	1. U	4.2	1. U	1. U	1. U	1. U	1. U	U
B-59A	2708-040611-108	11-Jun-04	46-50	**5,570.**	**317.**	50. U	**85.5**	63.	**4,460.**	50. U	50. U	50. U	50. U	50. U	U
	2708-040611-109	11-Jun-04	76-80	**230.**	**25.8**	**12.4**	**26.**	6.65	582.	5. U	5. U	5. U	5. U	5. U	U
	2708-040611-110	11-Jun-04	96-100	**113.**	**9.78**	6.16	11.28	2.58	272.	2. U	2. U	2. U	2. U	2. U	U
	2708-040611-112	11-Jun-04	116-120	**166.**	3.02	2.16	7.05	1.51	116.	1. U	1. U	1. U	1. U	1. U	U
	2708-040611-113	11-Jun-04	144-148	19.3	2.58	1.43	3.58	1.17	119.	1. U	1. U	1. U	1. U	1. U	U
	2708-040614-114	14-Jun-04	171-175	2.29	1. U	1. U	2. U	1. U	3.46	1. U	1. U	1. U	1. U	1. U	U
Quality Control Samples															
Equipment Blank	2708-040602-100	2-Jun-04	-	1. U	1. U	1. U	2. U	1. U	2. U	1. U	1. U	1. U	1. U	1. U	U
Trip Blank	TB57	-	-	1. U	1. U	1. U	2. U	1. U	2. U	1. U	1. U	1. U	1. U	1. U	U
Trip Blank	2708-040604-098	4-Jun-04	-	1. U	1. U	1. U	2. U	1. U	2. U	1. U	1. U	1. U	1. U	1. U	U
Equipment Blank	2708-040604-107	4-Jun-04	-	1. U	1. U	1. U	2. U	1. U	2. U	1. U	1. U	1. U	1. U	1. U	U
Trip Blank	2708-040604-097	4-Jun-04	-	1. U	1. U	1. U	2. U	1. U	2. U	1. U	1. U	1. U	1. U	1. U	U
Equipment Blank	2708-040611-111	11-Jun-04	-	1. U	1. U	1.13	2. U	1. U	2. U	1. U	1. U	1. U	1. U	1. U	U
Trip Blank	2708-040614-096	6/14/04	-	1. U	1. U	1. U	2. U	1. U	2. U	1. U	1. U	1. U	1. U	1. U	U

Note: AVOCs = aromatic volatile organic compounds; DCE = dichloroethene; ppb = parts per billion; U = not detected above detection limit indicated
bgs = below ground surface; PCE = tetrachloroethene; TCE = trichloroethene; ug/L = micrograms per liter
AWQC = Ambient Water Quality Criteria; DEQ = Oregon Department of Environmental Quality; TMB = trimethylbenzene; VOCs = volatile organic compounds

1 = Reference Level is lowest of EPA AWQC for aquatic life protection, AWQC for human consumption of organisms only, or DEQ SLV for aquatic receptors
2 = Ambient Water Quality Criteria (EPA 822-R-02-047, November 2002) (AWQC) based on human consumption of organisms only
3 = AWQC based on Freshwater Aquatic Life Protection, CCC Values
4 = DEQ Level II Ecological Screening Level Values (SLVs) for aquatic receptors (December 2001)
Bold = Concentration exceeds Reference Level

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TABLE 2 - Summary of Analytical Results for Groundwater Samples: Temporary Well Points
Polynuclear Aromatic Hydrocarbons by EPA Method 8270 SIM or 8270C

PAHs by EPA Method 8270 (SIM)				Analytical Results in ug/L (ppb)																
				Carcinogenic PAHs								Non Carcinogenic PAHs								
Well Point Location	Sample Number	Sample Date	Screen Interval (feet bgs)	Benzo (a) anthracene	Benzo (a) pyrene	Benzo (b) fluoranthene	Benzo (g,h,i) perylene	Benzo (k) fluoranthene	Chrysene	Dibenzo (a,h) anthracene	Indeno (1,2,3 cd) pyrene	Acenaph thene	Acenaph thylene	Anthracene	Fluoranthene	Fluorene	Naphthalene	Phenanthrene	Pyrene	Total PAHs
Reference Level [1] ==>				0.02 [2]	0.01 [4]	0.02 [2]		0.02 [2]	0.02 [2]	0.02 [2]	0.02 [2]	520. [4]		13. [4]	6.16 [4]	3.9 [4]	620. [4]	6.3 [4]	4,000. [2]	
Push Probe Boring Samples																				
B-56A	2708-040602-101	2-Jun-04	18-22	**7.99**	**9.45**	**7.03**	6.89	**6.04**	**10.2**	4. U	**4.81**	54.1	4.08	**14.1**	**44.2**	**23.3**	21.	**53.7**	50.7	317.6
	2708-040603-102	3-Jun-04	40-44	**0.0239**	**0.0196**	**0.0234**	0.1000 U	**0.0188**	**0.0345**	0.0100 U	0.0167	0.3420	0.1000 U	0.1000 U	0.1680	0.1320	3.6100	0.3300	0.2230	4.9419
	2708-040603-103	3-Jun-04	60-64	0.0100 U	0.0100 U	0.0100 U	0.1000 U	0.0100 U	0.0100 U	0.0100 U	0.0100 U	0.1030	0.1000 U	0.1000 U	0.1000 U	0.1000 U	63.8000	0.1000 U	0.1000 U	63.9030
	2708-040603-104	3-Jun-04	80-84	**0.0315**	**0.0313**	**0.0236**	0.1000 U	0.0166	**0.0416**	0.0100 U	0.0154	0.1260	0.1500 U	0.1000 U	0.1650	0.1500 U	358.00	0.2800	0.2300	358.9610
(duplicate)	2708-040603-105	3-Jun-04	80-84	0.03 U	0.0300 U	0.0300 U	0.1000 U	0.0300 U	0.0300 U	0.0300 U	0.0300 U	0.1500 U	0.1500 U	0.1000 U	0.1320	0.1500 U	405.00	0.2140	0.1840	405.5300
	2708-040603-106	4-Jun-04	100-104	0.0167	**0.0170**	0.0121	0.1000 U	0.0113	**0.0216**	0.0100 U	0.0108	0.1000 U	0.1000 U	0.1000 U	0.1000 U	0.1000 U	0.8500	0.1000 U	0.1000 U	0.9395
B-56B	2708-040614-115	14-Jun-04	136-140	**0.1700**	**0.1370**	0.1000 U	0.1000 U	0.1000 U	**0.2140**	0.2000 U	0.1000 U	0.6460	0.1000 U	0.3920 U	1.1000	0.4490	2.5800	2.9900	1.3100	9.5960
	2708-040614-116	14-Jun-04	174-178	0.1000 U	0.1000 U	0.1000 U	0.1000 U	0.1000 U	0.1000 U	0.2000 U	0.1000 U	0.1000 U	0.1000 U	0.1000 U	0.1000 U	0.1000 U	0.9200	0.1440	0.1060	1.1700
Quality Control Samples																				
Equipment Blank	2708-040604-107	4-Jun-04	-	0.01 U	0.01 U	0.01 U	0.1 U	0.01 U	0.01 U	0.01 U	0.01 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U

Note:
AWQC = Ambient Water Quality
bgs = below ground surface
DEQ = Oregon Department of Environmental Quality
EB = equipment blank
EPA = U.S. Environmental Protection Agency
PAHs = polynuclear aromatic hydrocarbons
ppb = parts per billion
U = not detected above detection limit indicated
ug/L = micrograms per liter

1 = Reference Level is lowest of EPA AWQC for aquatic life protection, AWQC for human consumption of organisms only, or DEQ SLV for aquatic receptors
2 = Ambient Water Quality Criteria (EPA 822-R-02-047, November 2002) (AWQC) based on human consumption of organisms only
3 = AWQC based on Freshwater Aquatic Life Protection, CCC Values
4 = DEQ Level II Ecological Screening Level Values (SLVs) for aquatic receptors (December 2001)
Bold = Concentration exceeds Reference Level

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TABLE 3 - Summary of Analytical Results for Groundwater Samples: Temporary Well Points
Detected Semi-Volatile Organic Compounds by EPA Method 8270C

SVOCs by EPA Method 8270				Analytical Results in ug/L (ppb)																							
Well Point Location	Sample Number	Sample Date	Screen Interval (feet bgs)	Acenaphthene	Anthracene	Benzenemethanol (alpha,alpha,-dimethyl)[5]	Benzo (a) anthracene	Benzo (a) pyrene	Benzo (b) fluoranthene	Benzo (b) thiophene[5]	Benzo (ghi) perylene	Benzo (k) fluoranthene	Bis(2-ethylhexyl)phthalate	Carbazole	Chrysene	Fluoranthene	Fluorene	Indane[5]	Indeno (1,2,3-cd) pyrene	Naphthalene	Naphthalenecarboxylic acid[5] (Isomer)	1,8-Naphthalic anhydride[5]	Phenanthrene	Pyrene
Reference Level [1]				520. [4]	13. [4]	8.6 [4]	0.02 [2]	0.01 [4]	0.02 [2]	##	##	0.02 [2]	2.2 [2]	##	0.02 [2]	6.16 [4]	3.9 [4]	##	0.02 [2]	620. [4]	##	##	6.3 [4]	4,000. [2]
Push Probe Boring Samples																											
B-56A	02-101	2-Jun-04	18-22	71.3	**45.9**	50. U	**50.4**	**66.7**	**39.4**	50. U	50.9	**40.6**	50. U	25. U	**69.2**	**161.**	**34.5**	50. U	**36.9**	25. U	50. U	50. U	**136.**	199.
	03-102	3-Jun-04	40-44	5. U	5. U	-	5. U	5. U	5. U	-	5. U	5. U	**17.4**	5. U	5. U	5. U	5. U	-	5. U	5.19	-	-	5. U	5. U
	03-103	3-Jun-04	60-64	5. U	5. U	-	5. U	5. U	5. U	-	5. U	5. U	10. U	5. U	5. U	5. U	5. U	-	5. U	41.5	-	-	5. U	5. U
	03-104	3-Jun-04	80-84	5. U	5. U	**25.9** J	5. U	5. U	5. U	10.7 J	5. U	5. U	10. U	5. U	5. U	5. U	5. U	349. J	5. U	317.	15.5 J	90.7 J	5. U	5. U
	04-106	4-Jun-04	100-104	5. U	5. U	-	5. U	5. U	5. U	-	5. U	5. U	10. U	5. U	5. U	5. U	5. U	-	5. U	5. U	-	-	5. U	5. U
B-56B	14-115	14-Jun-04	136-140	5. U	5. U	-	5. U	5. U	5. U	-	5. U	5. U	10. U	5. U	5. U	5. U	5. U	-	5. U	5. U	-	-	5.16	5. U
	14-116	14-Jun-04	174-178	5. U	5. U	-	5. U	5. U	5. U	-	5. U	5. U	10. U	5. U	5. U	5. U	5. U	-	5. U	5. U	-	-	5. U	5. U

Note: Sample Prefix = 2708-0406
AWQC = Ambient Water Quality Criteria
bgs = below ground surface
DEQ = Oregon Department of Environmental Quality
EB = equipment blank
EPA = U.S. Environmental Protection Agency
PAHs = polynuclear aromatic hydrocarbons
ND = not detected
ppb = parts per billion
U = not detected above detection limit indicated
ug/l = micrograms per liter
J = estimated concentration

1 = Reference Level is lowest of EPA AWQC for aquatic life protection, AWQC for human consumption of organisms only, or DEQ SLV for aquatic receptors
2 = Ambient Water Quality Criteria (EPA 822-R-02-047, November 2002) (AWQC) based on human consumption of organisms only
3 = AWQC based on Freshwater Aquatic Life Protection, CCC Values
4 = DEQ Level II Ecological Screening Level Values (SLVs) for aquatic receptors (December 2001)
5 = Tentatively Identified Compound by GC/MS
Bold = Concentration exceeds Reference Level

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TABLE 4 - Summary of Analytical Results for Groundwater Samples: Temporary Well Points
Metals and Cyanide

Well Point Location	Sample Number	Sample Date	Screen Interval (feet bgs)	Analytical Results - mg/l (ppm)													
				Dissolved Metals by EPA 6000/7000 Series Methods						Total Metals by EPA 6000/7000 Series Methods						EPA Method 9010	
				Arsenic	Chromium	Copper	Lead	Nickel	Zinc	Arsenic	Chromium	Copper	Lead	Nickel	Zinc	Amenable Cyanide	Cyanide
		Reference Level [1] ==>		1.4E-04 [2]	0.011 [2]	2.7E-03	5.4E-04 [3,5]	0.016 [2]	0.037 [3,5]								0.005 [2]
Push Probe Boring Samples																	
B-56A	2708-040602-101	2-Jun-04	18-22	**0.00134**	0.00100	0.00200 U	0.00100 U	**0.0238**	0.0199	0.00177	0.00803	0.00856	0.00446	0.0121	0.0288	0.0343	**0.0800**
	2708-040603-102	3-Jun-04	40-44	**0.00119**	0.00498	0.00218	0.00100 U	**0.0320**	**0.0647**	0.00401	0.0595	0.0202	0.00232	0.0256	0.270	0.105	**0.517**
	2708-040603-103	3-Jun-04	60-64	**0.00796**	0.00538	0.00200 U	0.00100 U	**0.0338**	0.0103	0.0143	0.0460	0.0336	0.00446 U	0.117	0.224	0.0842	**0.406**
	2708-040603-104	3-Jun-04	80-84	**0.00724**	0.00653	0.00200 U	0.00100 U	**0.0325**	**0.0755**	0.0179	0.316	0.194	0.0256	0.145	0.702	0.107	**0.506**
	2708-040604-106	4-Jun-04	100-104	**0.00515**	0.00123	0.00200 U	0.00100 U	**0.0173**	0.0103	0.00869	0.0375	0.0415	0.00457	0.0505	0.100	0.156	**0.533**
B-56B	2708-040614-115	14-Jun-04	136-140	**0.00582**	0.001 U	0.002 U	0.001 U	0.0162	**0.191**	0.0290	0.827	0.457	0.0306	0.291	6.51	0.005 U	**0.006**
	2708-040614-116	14-Jun-04	174-178	0.001 U	0.001 U	0.002 U	0.001 U	0.00445	**0.0383**	0.00369	0.0351	0.0218	0.00204	0.0246	0.177	0.0319	**0.0557**
Quality Control Samples																	
Equipment Blank	2708-040604-107	4-Jun-04	-	0.001 U	0.001 U	0.002 U	0.001 U	0.002 U	0.005 U	-	-	-	-	-	-	-	**-**

AWQC = Ambient Water Quality Criteria
bgs = below ground surface
EPA = U.S. Environmental Protection Agency
J = estimated concentration

1 = Reference Level is lowest of EPA AWQC for aquatic life protection, AWQC for human consumption of organisms only, or DEQ SLV for aquatic receptors
2 = Ambient Water Quality Criteria (EPA 822-R-02-047, November 2002) (AWQC) based on human consumption of organisms only
3 = AWQC based on Freshwater Aquatic Life Protection, CCC Values
4 = DEQ Level II Ecological Screening Level Values (SLVs) for aquatic receptors (December 2001)
Bold = Concentration exceeds Reference Level

SCOEPA00014196

Table 5 - Summary of Analytical Results for Groundwater Samples
August 2004 Sampling Event

Well Number	HAI Sample Number[1]	Sample Date	Analytical Results																				
			EPA Method 8021 or 8260B ug/l (ppb)					EPA Method 8260B ug/l (ppb)							EPA Method 9010A	EPA Method 9012A	Total (Unfiltered) Metals by EPA Method 6010B or 6020B						EPA Method 8270-SIM
			Select Aromatic VOCs (AVOCs)					Select Halogenated VOCs (HVOCs)							mg/l (ppm)	mg/l (ppm)	mg/l (ppm)						ug/l (ppb)
			Benzene	Toluene	Ethyl benzene	Xylenes	Total BTEX	1,1-DCE	CIS-1,2-DCE	trans-1,2-DCE	TCE	PCE	chloroethane	Vinyl Chloride	Amenable Cyanide	Total Cyanide	Arsenic	Chromium	Copper	Lead	Nickel	Zinc	Carcinogenic PAHs	Total PAHs
Ambient Water Quality Criteria (AWQC) for Surface Water[2]			51.[4]	200,000.[4]	29,000.[4]	#	#	100.	100.	100.	100.	100.	100.	100.	#	620.[4]	0.00014[4]	0.011[3]	0.009[3]	0.0025[3]	0.052[4]	0.120[3]	#	#
MW-1-22	2708-040825-MW1-22-019	25-Aug-04	4.66	5.87	6.59	46.3	63.42	-	-	-	-	-	-	-	1.89	4.31	**0.00302**	**0.0315**	ND>0.00200	**0.0152**	**0.168**	**0.23**	0.26	589.25
MW-2-32	2708-040816-MW2-32-009	16-Aug-04	ND>0.500	ND>0.500	ND>0.500	ND>1.00	ND	-	-	-	-	-	-	-	0.0295	0.0835	**0.00108**	ND>0.0010	ND>0.0020	ND>0.0010	0.00621	ND>0.0050	ND	ND
MW-2-61	2708-040813-MW2-61-002	13-Aug-04	ND>0.500	ND>0.500	ND>0.500	ND>1.00	ND	-	-	-	-	-	-	-	0.09	0.82	**0.0016**	0.0017	ND>.00200	ND>.00100	0.0105	ND>.00500	ND	ND
MW-3-26	2708-040823-MW3-26-010	23-Aug-04	ND>0.500	ND>0.500	ND>0.500	ND>1.00	ND	-	-	-	-	-	-	-	0.18	0.18	ND>0.0010	ND>0.0010	ND>.00200	ND>.00100	**0.0953**	0.0069	ND	ND
MW-3-56	2708-040823-MW3-56-011	23-Aug-04	10.6	ND>1.00	ND>1.00	ND>1.00	10.6	ND>1.00	ND>1.00	ND>1.00	ND>1.00	ND>1.00	ND>1.00	ND>1.00	0.03	0.03	**0.0035**	0.0018	ND>.00200	ND>.00100	0.0042	ND>.00500	ND	55.64
MW-4-35	2708-040823-MW4-35-012	23-Aug-04	1.61	ND>0.500	ND>0.500	1.65	3.26	-	-	-	-	-	-	-	0.1	0.18	**0.0067**	ND>0.0010	ND>.00200	ND>0.0010	0.0073	ND>.00500	ND	65.33
MW-4-57	2708-040824-MW4-57-016	24-Aug-04	**15,000.**	ND>100	748.	122.	15,870.	ND>100	ND>100	ND>100	ND>100	ND>100	ND>100	ND>100	0.26	1.76	**0.0126**	0.0011	ND>.00200	ND>0.0010	0.0079	ND>.00500	1.21	3,822.86
MW-4-101	2708-040815-MW4-101-007	16-Aug-04	**513.**	ND>2.5	3.14	ND>5.00	516.14	-	-	-	-	-	-	-	0.005	0.005	**0.0142**	ND>0.0010	ND>0.0020	ND>0.0010	ND>0.0020	ND>0.0050	ND	26.74
MW-5-32	2708-040815-MW5-32-008	16-Aug-04	ND>0.500	ND>0.500	ND>0.500	ND>1.00	ND	-	-	-	-	-	-	-	0.175	0.521	ND>0.0010	ND>0.0010	ND>0.0020	ND>0.0010	0.00359	ND>0.0050	ND	0.27
MW-5-100	2708-040824-MW5-100-015	24-Aug-04	**11,500.**	ND>100	683.	253.	12,436.	ND>100	ND>100	ND>100	ND>100	ND>100	ND>100	ND>100	0.3	0.82	**0.0087**	ND>0.0010	ND>0.0020	ND>0.0010	0.002	ND>0.0050	ND	11,921.9
MW-5-175	2708-040824-MW5-175-013	24-Aug-04	ND>0.500	ND>0.500	ND>0.500	ND>1.00	ND	-	-	-	-	-	-	-	0.01	0.01	**0.0062**	0.0012	ND>0.0020	ND>0.0010	0.0031	ND>0.0050	ND	ND
MW-9-29	2708-040825-MW9-29-022	25-Aug-04	**85.9**	13.4	14.3	29.1	142.7	-	-	-	-	-	-	-	0.138	2.69	**0.00243**	0.0055	ND>0.00200	ND>0.00100	0.0113	ND>0.00500	38.52	3,072.45
MW-9-56	2708-040825-MW9-56-021	25-Aug-04	**20,300.**	248.	795.	831.	22,174.	-	-	-	-	-	-	-	0.153	0.474	**0.00766**	0.0072	ND>0.00200	ND>0.00100	0.0076	0.00535	ND	10,832.7
MW-9-29	2708-040812-MW9-29-001	12-Aug-04	ND>0.500	ND>0.500	ND>0.500	ND>1.00	ND	-	-	-	-	-	-	-	0.01	0.01	**0.002**	0.0014	ND>.00200	ND>.00100	0.0027	ND>.00500	ND	ND
MW-10-61	2708-040813-MW10-61-005	13-Aug-04	ND>0.500	ND>0.500	ND>0.500	ND>1.00	ND	-	-	-	-	-	-	-	0.03	0.06	**0.0023**	0.0036	0.0041	ND>.00100	0.013	0.0183	0.1	0.53
MW-12-36	2708-040825-MW12-36-017	25-Aug-04	**235.**	584.	488.	991.	2,298.	-	-	-	-	-	-	-	ND>.00500	ND>.00500	**0.0257**	ND>0.00100	ND>0.00200	ND>0.00100	ND>0.00200	ND>0.00500	ND	696.31
MW-13-30	2708-040825-MW13-30-018	25-Aug-04	**1,150.**	8.25	120.	75.6	1,353.85	-	-	-	-	-	-	-	0.055	0.1	**0.0144**	ND>0.00100	ND>0.00200	ND>0.00100	ND>0.00200	ND>0.00500	ND	364.41
MW-13-61	2708-040813-MW13-61-003	13-Aug-04	2.19	ND>0.500	ND>0.500	ND>1.00	2.19	-	-	-	-	-	-	-	0.04	0.13	**0.0077**	0.0018	0.0024	ND>.00100	0.0138	0.0061	ND	0.29
MW-14-110	2708-040824-MW14-110-014	24-Aug-04	ND>0.500	ND>0.500	ND>0.500	ND>1.00	ND	-	-	-	-	-	-	-	0.02	0.02	**0.0114**	ND>0.0010	ND>0.0020	ND>0.0010	0.0028	ND>.00500	ND	0.08
MW-15-50	2708-040825-MW15-50-020	25-Aug-04	**40,500.**	ND>250	288.	764.	41,552.	-	-	-	-	-	-	-	0.418	0.46	**0.0172**	0.00141	0.00265	ND>0.00100	0.00629	ND>0.00500	ND	6,268.1
MW-15-66	2708-040813-MW15-66-006	13-Aug-04	ND>0.500	ND>0.500	ND>0.500	ND>1.00	ND	-	-	-	-	-	-	-	ND>.00500	ND>.00500	**0.0048**	0.0027	0.003	ND>.00100	0.0055	0.00896	ND	ND
MW-15-45	2708-040826-MW15-45-028	26-Aug-04	**2,880.**	959.	460.	867.	5,166.	ND>50	ND>50	ND>50	ND>50	ND>50	ND>50.0	ND>50	0.0725	0.138	**0.0092**	**0.0138**	0.00473	0.00138	**0.131**	0.011	10.77	7,945.17
MW-15-66	2708-040826-MW15-66-026	26-Aug-04	**1,370.**	388.	236.	552.	2,546.	ND>50	ND>50	ND>50	ND>50	ND>50	ND>50.0	ND>50	0.186	0.402	**0.00173**	0.00137	0.00201	ND>0.00100	0.0197	0.00762	0.54	3,838.12
	2708-040826-MW15-66-027	26-Aug-04	**1,250.**	339.	223.	486.	2,298.	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	0.76	4,096.68
MW-16-125	2708-040825-MW16-125-025	26-Aug-04	ND>1.00	ND>1.00	ND>1.00	ND>2.00	ND	ND>1.00	ND>1.00	ND>1.00	ND>1.00	ND>1.00	1.17	ND>1.00	0.0747	0.0943	**0.00461**	0.00134	ND>0.00200	ND>0.00100	0.00642	ND>0.00500	ND	36.98

Note:
# = Reference Level not established
AWQC = Ambient Water Quality Criteria
Bold = Detected above Reference Level
BTEX = benzene, toluene, ethylbenzene, and xylenes

DEQ = Department of Environmental Quality
EPA = U.S. Environmental Protection Agency
mg/l = milligrams per liter
ND = not detected above detection limit indicated

PAHs = polynuclear aromatic hydrocarbons
ppb = parts per billion
ppm = parts per million
ug/l = micrograms per liter

1 = Sample Prefix: 2708-03
2 = Reference Level indicated is the lowest guidance value provided in the Ambient Water Quality Criteria (EPA-822-R-02-047, November 2002) based on Freshwater Chronic (Aquatic Life Protection) and Fish Consumption (Human Health Protection)
3 = Reference Level based on Aquatic Fresh Chronic Criteria of AWQC, November 2002 revision
4 = Reference Level based on Human Fish Consumption Criteria of AWQC, November 2002 revision

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Table 6 - Summary of Analytical Results for Groundwater Samples: PAHs
August 2004 Sampling Event

Well Number	HAI Sample Number [1]	Sample Date	PAHs by EPA Method 8270-SIM Analytical Results ug/l (ppb)																	
			Carcinogenic PAHs							Non-carcinogenic PAHs									Total Carcinogenic PAHs	Total PAHs
			Benzo (a) anthracene	Benzo (b) fluoranthene	Benzo (k) fluoranthene	Benzo (a) pyrene	Chrysene	Dibenzo (ah) anthracene	Indeno (1,2,3-cd) pyrene	Acenaphthene	Acenaphthylene	Anthracene	Benzo (ghi) perylene	Fluoranthene	Fluorene	Naphthalene	Phenanthrene	Pyrene		
Ambient Water Quality Criteria (AWQC) for Surface Water [2]			0.018 [4]	0.018 [4]	0.018 [4]	0.018 [4]	0.018 [4]	0.018 [4]	0.018 [4]	990. [3]	#	40,000 [4]	#	140. [4]	5,300 [4]	620. [3]	#	4,000 [4]	#	#
MW-1-22	2708-040825-MW1-22-019	25-Aug-04	**0.130 J**	ND>0.100	ND>0.100	ND>0.100	**0.131 J**	ND>0.200	ND>0.100	50.	ND>0.5	7.	ND>0.5	2.61	46.9	403.	77.4	2.34	0.26	589.25
MW-2-32	2708-040816-MW2-32-009	16-Aug-04	ND>0.100	ND>0.100	ND>0.100	ND>0.100	ND>0.100	ND>0.200	ND>0.100	ND>0.100	ND>0.100	ND>0.100	ND>0.100	ND>0.100	ND>0.100	ND>0.100	ND>0.100	ND>0.100	ND	ND
MW-2-61	2708-040813-MW2-61-002	13-Aug-04	ND>0.100	ND>0.100	ND>0.100	ND>0.100	ND>0.100	ND>0.200	ND>0.100	ND>0.100	ND>0.100	ND>0.100	ND>0.100	ND>0.100	ND>0.100	ND>0.100	ND>0.100	ND>0.100	ND	ND
MW-3-26	208+040823-MW3-26-010	23-Aug-04	ND>0.050	ND>0.100	ND>0.100	ND>0.100	ND>0.100	ND>0.100	ND>0.100	ND>0.100	ND>0.100	ND>0.100	ND>0.100	ND>0.100	ND>0.100	ND>0.100	ND>0.100	ND>0.100	ND	ND
MW-3-56	2708-040823-MW3-56-011	23-Aug-04	ND>0.50	ND>0.50	ND>0.50	ND>0.50	ND>0.50	ND>1.00	ND>0.50	25.8	0.500 J	2.29	ND>0.500	6.76	10.2	0.554 J	3.94	6.62	ND	56.64
MW-4-35	2708-040823-MW4-35-012	23-Aug-04	ND>0.500	ND>0.500	ND>0.500	ND>0.500	ND>0.500	ND>1.0	ND>0.500	32.8	1.39	1.02	ND>0.500	7.46	11.4	1.44	2.46	7.36	ND	65.33
MW-4-57	2708-040816-MW4-57-016	16-Aug-04	**0.275**	**0.168 J**	**0.167 J**	**0.207**	**0.275**	ND>0.2	**0.113 J**	42.1	ND>5.0	ND>5.0	ND>5.0	ND>5.0	ND>5.0	**3,780.**	ND>5.0	ND>5.0	1.21	3,822.86
MW-4-101	2708-040816-MW4-101-007	16-Aug-04	ND>0.100	ND>0.100	ND>0.100	ND>0.100	ND>0.100	ND>0.200	ND>0.100	0.541	ND>0.100	ND>0.100	ND>0.100	ND>0.100	ND>0.100	26.2	ND>0.100	ND>0.100	ND	26.74
MW-5-32	2708-040816-MW5-32-008	16-Aug-04	ND>0.100	ND>0.100	ND>0.100	ND>0.100	ND>0.100	ND>0.200	ND>0.100	ND>0.100	ND>0.100	ND>0.100	ND>0.100	ND>0.100	ND>0.100	ND>0.100	ND>0.100	0.269	ND	0.27
MW-5-100	2708-040824-MW5-100-015	24-Aug-04	ND>2.5	ND>2.5	ND>2.5	ND>2.5	ND>2.5	ND>2.5	ND>2.5	21.9	ND>2.5	ND>2.5	ND>2.5	ND>2.5	ND>2.5	**11,900.**	ND>2.5	ND>2.5	ND	11,921.9
MW-5-175	2708-040824-MW5-175-013	24-Aug-04	ND>0.100	ND>0.100	ND>0.100	ND>0.100	ND>0.100	ND>0.200	ND>0.100	ND>0.100	ND>0.100	ND>0.100	ND>0.100	ND>0.100	ND>0.100	ND>0.100	ND>0.100	ND>0.100	ND	ND
MW-9-29	2708-040825-MW9-29-022	25-Aug-04	**7.49**	**4.95**	**4.24**	**8.19**	**9.56**	ND>1.00	**4.09**	234.	2.82	16.1	6.01	27.8	56.5	**2,520.**	135.	34.6	38.52	3,072.45
MW-9-56	2708-040825-MW9-56-021	25-Aug-04	ND>2.5	ND>2.5	ND>2.5	ND>2.5	ND>2.5	ND>5.0	ND>2.5	186.	57.2	11.7	ND>2.5	14.7	59.8	**10,400.**	108.	16.3	ND	10,832.7
MW-9-29	2708-040812-MW9-29-001	12-Aug-04	ND>0.100	ND>0.100	ND>0.100	ND>0.100	ND>0.100	ND>0.200	ND>0.100	ND>0.100	ND>0.100	ND>0.100	ND>0.100	ND>0.100	ND>0.100	ND>0.100	ND>0.100	ND>0.100	ND	ND
MW-10-61	2708-040813-MW10-61-005	13-Aug-04	ND>0.100	ND>0.100	ND>0.100	**0.104**	ND>0.100	ND>0.200	ND>0.100	ND>0.100	ND>0.100	ND>0.100	0.11	0.14	ND>0.100	ND>0.100	ND>0.100	0.18	0.1	0.53
MW-12-36	2708-040825-MW12-36-017	25-Aug-04	ND>0.500	ND>0.500	ND>0.500	ND>0.500	ND>0.500	ND>1.00	ND>0.500	62.	ND>1.00	2.66	ND>0.500	6.34	29.6	554.	36.2	5.51	ND	696.31
MW-13-30	2708-040825-MW13-30-018	25-Aug-04	ND>0.500	ND>0.500	ND>0.500	ND>0.500	ND>0.500	ND>1.00	ND>0.500	171.	ND>1.50	6.46	ND>0.500	2.94	35.9	78.6	57.1	2.41	ND	354.41
MW-13-61	2708-040813-MW13-61-003	13-Aug-04	ND>0.100	ND>0.100	ND>0.100	ND>0.100	ND>0.100	ND>0.200	ND>0.100	0.115	ND>0.100	ND>0.100	ND>0.100	ND>0.100	ND>0.100	0.168	ND>0.100	ND>0.100	ND	0.28
MW-14-110	2708-040824-MW14-110-014	24-Aug-04	ND>0.050	ND>0.050	ND>0.050	ND>0.050	ND>0.050	ND>0.100	ND>0.050	0.0828 J	ND>0.050	ND>0.050	ND>0.050	ND>0.050	ND>0.050	ND>0.050	ND>0.050	ND>0.050	ND	0.08
MW-15-50	2708-040825-MW15-50-020	25-Aug-04	ND>2.5	ND>2.5	ND>2.5	ND>2.5	ND>2.5	ND>5.0	ND>2.5	36.3	50.9	4.23 J	ND>5.0	4.44 J	51.9	**6,130.**	3.93 J	ND>5.00	ND	6,268.1
MW-15-56	2708-040813-MW15-56-006	13-Aug-04	ND>0.100	ND>0.100	ND>0.100	ND>0.100	ND>0.100	ND>0.200	ND>0.100	ND>0.100	ND>0.100	ND>0.100	ND>0.100	ND>0.100	ND>0.100	ND>0.100	ND>0.100	ND>0.100	ND	ND
MW-15-45	2708-040826-MW16-45-028	25-Aug-04	**2.64**	**2.57**	ND>1.25	**2.23 J**	**3.33**	ND>2.5	ND>1.25	137.	17.8 J	22.4	ND>10.0	19.6 J	69.7	**7,500.**	154.	23.9	10.77	7,946.17
MW-16-55-026	2708-040826-MW16-55-026	26-Aug-04	**0.24**	ND>0.200	ND>0.200	ND>0.2	**0.3**	ND>0.400	ND>0.200	91.	ND>10.0	10.3	ND>5.0	5.54 J	42.8	**3,600.**	81.1	6.84 J	0.54	3,838.12
MW-16-55-027	2708-040826-MW16-55-027	26-Aug-04	**0.34**	ND>0.250	ND>0.250	ND>0.250	**0.41**	ND>0.500	ND>0.250	85.6	ND>10.0	10.3	ND>5.0	5.62 J	39.5	**3,870.**	80.2	6.70 J	0.75	4,099.68
MW-16-125	2708-040826-MW16-125-025	26-Aug-04	ND>0.100	ND>0.100	ND>0.100	ND>0.100	ND>0.100	ND>0.200	ND>0.100	1.74	ND>0.500	0.676 J	ND>0.500	0.82	1.14	26.5	5.39	0.816 J	ND	36.88

Note: **Bold** = detected above Reference Level
ND = not detected above detection limit indicated

PAHs = polynuclear aromatic hydrocarbons
ppb = parts per billion

ug/l = micrograms per liter

1 = Sample Prefix: 2708-03
2 = Reference Level indicated is the lowest guidance value provided in the Ambient Water Quality Criteria (EPA-822-R-02-047, November 2002) based on Freshwater Chronic (Aquatic Life Protection) and Fish Consumption (Human Health Protection)
3 = Reference Level based on Aquatic Fresh Chronic Criteria of AWQC, November 2002 revision
4 = Reference Level based on Human Fish Consumption Criteria of AWQC, November 2002 revision
J = Estimated concentration between method detection limit and method reporting level

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Table 7 - Summary of Analytical Results for Groundwater Samples: SVOCs
August 2004 Sampling Event

Well Number	HAI Sample Number [1]	Sample Date	SVOCs by EPA Method 8270C Analytical Results ug/l (ppb)				
			Carbazole	4-Chloro-3-methylphenol	Dibenzofuran	2-Methylnapthalene	PAHs
Ambient Water Quality Criteria (AWQC) for Surface Water [2]			-	-	-	-	See Table 6
MW-3-56	2708-040823-MW3-56-011	23-Aug-04	18.6	ND>5.0	9.27	ND>5.0	See Table 6
MW-4-57	2708-040824-MW4-57-016	24-Aug-04	ND>500	ND>500	ND>500	ND>500	See Table 6
MW-5-100	2708-040824-MW5-100-015	24-Aug-04	ND>500	ND>500	ND>500	ND>500	See Table 6
MW-16-45	2708-040826-MW16-45-028	26-Aug-04	137.	ND>100	ND>100	544.	See Table 6
MW-16-65	2708-040826-MW16-65-026	26-Aug-04	ND>100	ND>100	ND>100	460.	See Table 6
MW-16-125	2708-040826-MW16-125-025	26-Aug-04	ND>5.00	6.27	ND>5.00	6.23	See Table 6

Note: **Bold** = detected above Reference Level
ND = not detected above detection limit indicated
PAHs = polynuclear aromatic hydrocarbons
ppb = parts per billion
SVOCs = semi-volatile organic compound
ug/l = micrograms per liter

1 = Sample Prefix: 2708-03
2 = Reference Level indicated is the lowest guidance value provided in the Ambient Water Quality Criteria (EPA-822-R-02-047, November 2002) based on Freshwater Chronic (Aquatic Life Protection) and Fish Consumption (Human Health Protection)
3 = Reference Level based on Aquatic Fresh Chronic Criteria of AWQC, November 2002 revision
4 = Reference Level based on Human Fish Consumption Criteria of AWQC, November 2002 revision

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Table 8 - Summary of Analytical Results for Quality Assurance / Quality Control (QA/QC) Samples
August 2004 Sampling Event

QA/QC Sample Type	HAI Sample Number [1]	Sample Date	Comment	Analytical Results ug/l (ppb)								
				EPA Method 8260B					EPA Method 8270			
				Select Aromatic VOCs (AVOCs)					Polynuclear Aromatic Hydrocarbons (PAHs) [2]			
				Acetone	Benzene	Toluene	Ethyl benzene	Xylenes	Naphthalene	Phenanthrene	All Others	Total PAHs
Equipment Blank	2708-040813-MW7-004	13-Aug-04	DI Water sampled from decontaminated pump after sampling MW-13-61	-	ND>0.500	ND>0.500	ND>0.500	ND>1.00	ND>0.100	ND>0.100	ND	ND
Equipment Blank	2708-040826-MW7-023	26-Aug-04	DI Water sampled from decontaminated pump after sampling MW-8-29	140.	ND>1.00	ND>1.00	ND>1.00	1.67	0.322	0.140	ND	0.462
Equipment Blank	2708-040826-MW7-024	26-Aug-04	DI Water sampled from decontaminated pump after sampling MW1-22	153.	ND>1.00	ND>1.00	ND>1.00	1.71	0.188	ND>0.0500	ND	0.188

Note:
'-' = not analyzed
BTEX = benzene, toluene, ethylbenzene, and xylenes
EPA = U.S. Environmental Protection Agency
ND = not detected above detection limit indicated

ppb = parts per billion
ug/l = micrograms/liter

1 = Sample Prefix: 2708-03
2 = Only detected compounds shown

SCOEPA00014200

TABLE 9 – Summary of Analytical Results for Soil Samples
TPH, BTEX, Total PAHs, Total Phenols, and Cyanide

Study Area	Soil Boring Number	Sample Number[1]	Sample Date	Depth (feet bgs)	Field Observation				Analytical Results mg/kg (ppm)										
									DEQ Method		EPA Method 8270 SIM		EPA Method 8020					EPA Method 8270	EPA Method 9010
									TPH-G	418.1M									
					Sheen	Oil	Tar	Carbon Pitch (lampblack or pencil pitch)	Gasoline	Diesel/Oil	Carcinogenic PAHs	Total PAHs	Benzene	Toluene	Ethyl benzene	Xylenes	Total BTEX	Total Phenols	Total Cyanide
EPA PRGs for Industrial Soil [2] ==>					#	#	#	#	#	#	see Table 5	see Table 5	1.30	520	20	420	#	see Table 6	12,000
FAMM	B-07	950927-B7-05	27-Sep-95	17.0							ND	ND							
	B-08	950918-B8-04	18-Sep-95	10.0				X		54.	185.	338.49							
		950918-B8-05	18-Sep-95	12.5						15.									
		950918-B8-08	18-Sep-95	18.0							ND	0.243							
	B-10	950925-B10-04	25-Sep-95	17.5							ND	ND	ND>0.3	ND>0.3	ND>0.3	ND>0.3		ND	ND>0.5
	B-47	000829-039	29-Aug-00	0.2							2.39	3.93							
		000829-040	29-Aug-00	0.2 (dup)							0.055	0.055							
		000829-041	29-Aug-00	5.0				X			54.09	105.89	ND>0.0031	ND>0.0031	ND>0.0031	ND>0.00904	ND		
		000829-042	29-Aug-00	11.5				X			213.5	841.	ND>0.00298	ND>0.00298	ND>0.00298	ND>0.00893	ND		
		000829-043	29-Aug-00	11.5 (dup)							875.	2,277.	ND>0.00309	ND>0.00309	ND>0.00309	ND>0.00926	ND		
		000829-045	29-Aug-00	31.0							54.55	181.34	ND>0.00294	0.004	0.017	0.062	0.083		
	B-51	000828-023	28-Aug-00	0.2							9.12	19.055							
		000828-024	28-Aug-00	2.0															
		000828-025	28-Aug-00	8.5															
	B-52	000828-026	28-Aug-00	0.2							7.355	13.55							
		000828-027	28-Aug-00	3.5	X														
		000828-028	28-Aug-00	10.5	X														
		000828-029	28-Aug-00	10.5 (dup)	X														
		950918-B8-06	18-Sep-95	12.5 (dup)						18.									
	GT-1	971117-001	17-Nov-97	3.0							2.24	4.34	ND>0.025	ND>0.025	ND>0.025	ND>0.075	ND		ND>0.02
		971117-004	17-Nov-97	10.5	X	X			300 [6]	13,400 [6]	ND	6.17	ND>0.025	ND>0.025	0.034	0.13	0.164		ND>0.03 UJ
		971117-006	17-Nov-97	16.0							ND	ND	ND>0.025	ND>0.025	ND>0.075	ND>0.075	ND		ND>0.02
		971117-008	17-Nov-97	20.5							ND	ND	ND>0.025	ND>0.025	ND>0.075	ND>0.075	ND		ND>0.02
		971117-011	17-Nov-97	35.5							ND	ND	ND>0.025	ND>0.025	ND>0.075	ND>0.075	ND		ND>0.02
	GT-2	971117-012	17-Nov-97	3.5							ND	0.084	ND>0.025	ND>0.025	ND>0.075	ND>0.075	ND		ND>0.02
		971117-017	17-Nov-97	15.5							ND	ND	0.027	ND>0.025	ND>0.075	ND>0.075	0.027		ND>0.02
		971117-021	17-Nov-97	33.0							ND	ND	ND>0.025 UJ	ND>0.025 UJ	ND>0.075 UJ	ND>0.075 UJ	ND		ND>0.02
	GT-3	971118-023	18-Nov-97	3.0							21.9	43.09	ND>0.025	ND>0.025	ND>0.075	ND>0.075	ND		ND>0.02
		971118-026	18-Nov-97	12.5							ND	0.05	ND>0.025	ND>0.025	ND>0.075	ND>0.075	ND		ND>0.02
		971118-032	18-Nov-97	36.0							ND	ND	ND>0.025	ND>0.025	ND>0.075	ND>0.075	ND		ND>0.02
	GT-4	971118-034	18-Nov-97	13.5							ND	ND	ND>0.025	ND>0.025	ND>0.075	ND>0.075	ND		ND>0.02
		971118-038	18-Nov-97	40.5							ND	ND	ND>0.025	ND>0.025	ND>0.075	ND>0.075	ND		ND>0.02

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TABLE 9 – Summary of Analytical Results for Soil Samples
TPH, BTEX, Total PAHs, Total Phenols, and Cyanide

Study Area	Soil Boring Number	Sample Number[1]	Sample Date	Depth (feet bgs)	Field Observation				Analytical Results mg/kg (ppm)										
									DEQ Method		EPA Method 8270 SIM		EPA Method 8020					EPA Method 8270	EPA Method 9010
									TPH-G	418.1M									
					Sheen	Oil	Tar	Carbon Pitch (lampblack or pencil pitch)	Gasoline	Diesel/Oil	Carcinogenic PAHs	Total PAHs	Benzene	Toluene	Ethyl benzene	Xylenes	Total BTEX	Total Phenols	Total Cyanide
EPA PRGs for Industrial Soil [2] ==>					#	#	#	#	#	#	see Table 5	see Table 5	1.30	520	20	420	#	see Table 6	12,000
FAMM (cont.)	MW-13-61	971218-M13-02	18-Dec-97	6.0							ND	ND	ND>0.025	ND>0.025	ND>0.025	ND>0.075	ND		ND>0.02
		971218-M13-03	18-Dec-97	10.0							ND	ND	ND>0.025	ND>0.025	ND>0.025	ND>0.075	ND		ND>0.02
		971218-M13-04	18-Dec-97	13.5							ND	ND	ND>0.025	ND>0.025	ND>0.025	ND>0.075	ND		ND>0.02
		971218-M13-05	18-Dec-97	18.0							0.342	1.	ND>0.025	ND>0.025	ND>0.025	ND>0.075	ND		ND>0.02
		971218-M13-08	18-Dec-97	24.5							ND	ND	0.069	ND>0.025	ND>0.025	ND>0.075	0.069		0.04
		971218-M13-10	18-Dec-97	28.0							ND	0.058							
		971218-M13-11	18-Dec-97	31.0							ND	ND	ND>0.025	ND>0.025	ND>0.025	ND>0.075	ND		0.02
		971218-M13-17	18-Dec-97	57.0							ND	ND	ND>0.025	ND>0.025	ND>0.025	ND>0.075	ND		
	SS-5	981112-SS-05	12-Nov-98	0.2				X			255.3	398.5							1.3
	SS-6	981112-SS-06	12-Nov-98	0.2							1.532	2.568							0.58
	SS-10	981112-SS-10	12-Nov-98	0.2	Prussian Blue			X			16.52	35.28							41.
Office Area	B-38	000828-014	28-Aug-00	0.2							10.39	19.18							
		000828-015	28-Aug-00	2.0				X			4.9	10.4	ND>0.00284	ND>0.00284	ND>0.00284	ND>0.00852	ND		
		000828-016	28-Aug-00	8.5				X			0.395	0.72	ND>0.00305	ND>0.00305	ND>0.00305	ND>0.00915	ND		
	B-39	000828-004	28-Aug-00	0.2							6.49	11.57							
		000828-005	28-Aug-00	3.0							ND	ND	ND>0.00294	ND>0.00294	ND>0.00294	ND>0.00882	ND		
		000828-006	28-Aug-00	9.5							ND	ND	ND>0.00278	ND>0.00278	ND>0.00278	ND>0.00833	ND		
	B-40	000828-010	28-Aug-00	0.2							32.38	56.155							
		000828-011	28-Aug-00	2.5							ND	ND	ND>0.00269	ND>0.00269	ND>0.00269	ND>0.00806	ND		
		000828-012	28-Aug-00	9.5							ND	ND	ND>0.00329	ND>0.00329	ND>0.00329	ND>0.00987	ND		
	B-41	000828-007	28-Aug-00	0.2							14.885	27.285							
		000828-008	28-Aug-00	2.5							12.58	26.43	ND>0.00278	ND>0.00278	ND>0.00278	ND>0.00833	ND		
		000828-009	28-Aug-00	9.5							ND	ND	ND>0.00278	ND>0.00278	ND>0.00278	ND>0.00833	ND		
Retorts / Koppers	B-11	950928-B11-01	28-Sep-95	0.2						1,600. J									
		950928-B11-06	28-Sep-95	12.5	X					1,700. J	3.26	972.87	ND>0.3	ND>0.3	3.4 J	3. J	6.4		
		950928-B11-09	28-Sep-95	23.0							ND	1.051							
	B-13	951006-B13-03	6-Oct-95	10.5	X	X			1,000.	2,700.	3,915.9	29,386.9	**28.**	ND>20	**110.**	22.	160.	ND	ND>0.1
		951006-B13-07	6-Oct-95	18.5							ND	ND							
		951006-B13-10	6-Oct-95	24.0					ND>10	ND>5	ND	ND							
	B-14	950928-B14-01	28-Sep-95	0.2															
		950928-B14-02	28-Sep-95	2.5	X					280 J									
		950928-B14-03	28-Sep-95	5.0							ND	ND							
	B-15	951006-B15-05	6-Oct-95	21.0	X				70.	200.	45.9	637.6	**7.9**	ND>0.3	3.9	2.5	14.3		
		951006-B15-08	6-Oct-95	27.0							0.21	1.791							
	B-17	950929-B17-01	29-Sep-95	3.0							24.07	59.079							
		950929-B17-05	29-Sep-95	16.5	X	X			2400. J	4700. J	114.1	1,814.						ND	
		950929-B17-07	29-Sep-95	23.5							ND	0.888							

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TABLE 9 – Summary of Analytical Results for Soil Samples
TPH, BTEX, Total PAHs, Total Phenols, and Cyanide

Study Area	Soil Boring Number	Sample Number[1]	Sample Date	Depth (feet bgs)	Field Observation				Analytical Results mg/kg (ppm)										
									DEQ Method		EPA Method 8270 SIM		EPA Method 8020					EPA Method 8270	EPA Method 9010
									TPH-G	418.1M									
					Sheen	Oil	Tar	Carbon Pitch (lampblack or pencil pitch)	Gasoline	Diesel/Oil	Carcinogenic PAHs	Total PAHs	Benzene	Toluene	Ethyl benzene	Xylenes	Total BTEX	Total Phenols	Total Cyanide
EPA PRGs for Industrial Soil [2] ==>					#	#	#	#	#	#	see Table 5	see Table 5	1.30	520	20	420	#	see Table 6	12,000
Retorts / Koppers (cont.)	B-18	950919-B18-05	19-Sep-95	12.0	X				3,100.	99.	0.659	59.306	**360.**	**280.**	**31.**	220.	891.	0.36	ND>0.25
		950919-B18-08	19-Sep-95	19.5	X				850.	44.									
		950919-B18-09	19-Sep-95	22.0					24.	380.									
		950919-B18-10	19-Sep-95	24.5							ND	ND							
	B-19	950919-B19-01	19-Sep-95	0.2						68.	324.2	933.22	ND>0.3	ND>0.3	ND>0.3	ND>0.3	ND	ND	
		950919-B19-03	19-Sep-95	6.5	X	X			1,600.	1,500.	35.76	408.26	**41.**	**120.**	**39.**	160.	360.	ND	
		950919-B19-04	19-Sep-95	10.5	X				3,200. J	1,500. J									
		950919-B19-05	19-Sep-95	12.0					1,900.	6,800.									
		950920-B19-07	20-Sep-95	18.0					130. J	760. J	0.101	80.001							
		950920-B19-08	20-Sep-95	27.0							0.027	1.956							
	B-20	950929-B20-03	29-Sep-95	10.5	X	X			940 J	340. J	244.507	1,092.807	**120 J**	84.	16.	60.	260.	ND	
		950929-B20-07	29-Sep-95	23.5					220 J	**11.**	0.255	12.686							
	B-21	951003-B21-04	3-Oct-95	11.5							0.418	7.107							
	B-22	951003-B22-01	3-Oct-95	3.5	X	X				530.									
		951003-B22-05	3-Oct-95	13.5	X						1.727	40.268	ND>0.3	ND>0.3	ND>0.3	ND>0.3	ND	ND	
		951003-B22-09	3-Oct-95	24.0	X	X				600.	30.23	485.234	ND>0.3	ND>0.3	ND>0.3	ND>0.3	ND	ND	
		951003-B22-10	3-Oct-95	26.5						12.									
	B-23	951003-B23-02	3-Oct-95	10.5	X				1,300.	930.									0.17
		951003-B23-05	3-Oct-95	18.5	X					16.									
		951003-B23-08	3-Oct-95	26.5	X			X		110.	1.117	76.897	**13 J**	ND>0.3	ND>0.3	1.3	14.3	ND	
		951003-B23-10	3-Oct-95	31.5	X														
		951003-B23-12	3-Oct-95	34.5							ND	ND	ND>0.3 UJ	ND>0.3 UJ	ND>0.3 UJ	ND>0.3 UJ	ND		
	B-24	951002-B24-03	2-Oct-95	10.5	X		X		1,500.	640.	276.5	1,091.8							
		951002-B24-10	2-Oct-95	29.0							ND	0.14	**6.8 J**	2.3 J	ND>0.3 UJ	0.34 J	9.44		
	B-25	951002-B25-03	2-Oct-95	12.5	X				120. J	35.	3.328	12.458							
		951002-B25-05	2-Oct-95	20.0							ND	0.45							
	B-27	950920-B27-06	20-Sep-95	13.0	X					8.5									
		950920-B27-08	20-Sep-95	18.0															
		950920-B27-10	20-Sep-95	23.0	X	X			700.	570.	90.5	1,243.4	**110.**	46.	ND>30	ND>30	156.	ND	
		950920-B27-12	20-Sep-95	28.0					94.	ND>5	9.605	125.405	**22.**	3.6	ND>0.6	1.2	26.8		
		950920-B27-15	20-Sep-95	35.5							1.211	12.241							
	B-42	000828-020	28-Aug-00	0.2							0.825	1.52							
		000828-021	28-Aug-00	1.0							15.535	29.745	ND>0.00269	ND>0.00269	ND>0.00269	ND>0.00806	ND		
		000828-022	28-Aug-00	7.5							2.	6.315	ND>0.00272	ND>0.00272	ND>0.00272	ND>0.00815	ND		
	B-43	000829-050	29-Aug-00	0.2				pencil pitch			10,340.	16,920.							
		000829-046	29-Aug-00	2.0							6.16	10.835	ND>0.00266	ND>0.00266	ND>0.00266	ND>0.00798	ND		
		000829-047	29-Aug-00	2.0 (dup)							2.8	4.235	ND>0.00269	ND>0.00269	ND>0.00269	ND>0.00806	ND		
		000829-048	29-Aug-00	8.5							843.	1,410.75	ND>0.00275	ND>0.00275	ND>0.00275	ND>0.00824	ND		
		000829-049	29-Aug-00	8.5 (dup)							184.75	316.6	ND>0.00275	ND>0.00275	ND>0.00275	ND>0.00824	ND		

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TABLE 9 – Summary of Analytical Results for Soil Samples
TPH, BTEX, Total PAHs, Total Phenols, and Cyanide

Study Area	Soil Boring Number	Sample Number[1]	Sample Date	Depth (feet bgs)	Field Observation				Analytical Results mg/kg (ppm)										
									DEQ Method		EPA Method 8270 SIM		EPA Method 8020					EPA Method 8270	EPA Method 9010
									TPH-G	418.1M									
					Sheen	Oil	Tar	Carbon Pitch (lampblack or pencil pitch)	Gasoline	Diesel/Oil	Carcinogenic PAHs	Total PAHs	Benzene	Toluene	Ethyl benzene	Xylenes	Total BTEX	Total Phenols	Total Cyanide
EPA PRGs for Industrial Soil [2] ==>					#	#	#	#	#	#	see Table 5	see Table 5	1.30	520	20	420	#	see Table 6	12,000
Retorts / Koppers (cont.)	B-44	000829-052	29-Aug-00	0.2							32.28	99.95							
		000829-051	29-Aug-00	3.5							5.525	8.46	ND>0.00263	ND>0.00263	ND>0.00263	ND>0.00789	ND		
		000829-053	29-Aug-00	10.0	X		X	X			13,770.	62,405.	**56.7**	9.21	0.792	8.85	75,352.		
	B-45	000829-054	29-Aug-00	0.2							234.25	388.2							
		000829-055	29-Aug-00	2.0							0.06	0.06	ND>0.00333	ND>0.00333	ND>0.00333	ND>0.010	ND		
		000829-056	29-Aug-00	2.0 (dup)							0.085	0.16	ND>0.00333	ND>0.00333	ND>0.00333	ND>0.010	ND		
		000829-057	29-Aug-00	8.5							5.315	8.355	ND>0.00281	ND>0.00281	ND>0.00281	ND>0.00843	ND		
	B-46	000829-058	29-Aug-00	0.2							144.25	240.15							
		000829-059	29-Aug-00	5.0							2.065	3.135	ND>0.00272	ND>0.00272	ND>0.00272	ND>0.00815	ND		
		000829-060	29-Aug-00	10.5	X						0.14	0.36	ND>0.00312	ND>0.00312	ND>0.00312	ND>0.00938	ND		
	MW-06-61	951107-M6-01	7-Nov-95	2.5							ND	ND							
		951107-M6-08	7-Nov-95	30.0	X	X					1,389.	20,614.	**67.**	ND>30	**140.**	56.	263.		
		951107-M6-10	7-Nov-95	38.5							0.108	1.819	ND>0.3	ND>0.3	ND>0.3	ND>0.3	ND		
		951107-M6-11	7-Nov-95	43.0							ND	0.056							
	MW-09-29	951023-M9-01	23-Oct-95	0.2							**11.7**	21.502							
		951023-M9-04	23-Oct-95	5.0						19.	78.5	163.02	ND>0.3	ND>0.3	ND>0.3	ND>0.3	ND		518.
		951023-M9-05	23-Oct-95	**11.5**							0.163	0.521							
	MW-10-61	951108-M10-01	8-Nov-95	0.2							45.	78.741						ND	
		951108-M10-02	8-Nov-95	0.2 (dup)							64.1	106.99							
		951108-M10-09	8-Nov-95	28.0							ND	0.764	**43.**	3.	0.73	ND>0.3	46.73		
	MW-12-36	951023-M12-01	23-Oct-95	0.2						29. J	65.5	116.21							
		951023-M12-06	23-Oct-95	22.0	X	X			160.	30.	0.27	8.8	ND>3.	8.2	3.5	21.	32.7	ND	
		951023-M12-07	23-Oct-95	26.5							ND	ND							
	M-15	990628-02	28-Jun-99	6.0									ND>0.025	ND>0.025	ND>0.025	ND>0.075	ND		
	MW-15-66	990628-03	28-Jun-99	9.5									**4.8**	18.4	**111.**	289.	423.2		
		990629-12	29-Jun-99	51.0							ND	ND	ND>0.025	ND>0.025	ND>0.025	ND>0.075	ND		
		990629-16	29-Jun-99	64.0							ND	ND	ND>0.025	ND>0.025	ND>0.025	ND>0.075	ND		
	Dust-1	960212-D1-01	12-Feb-96	N/A							210.8	381.3							
	Dust-2	960227-D2-01	12-Feb-96	N/A				pencil pitch			15,554.	26,919.							
	SS-12	000829-061	29-Aug-00	0.2							1.795	2.925							
	SS-13	000829-062	29-Aug-00	0.2							1.46	3.72							
	SS-14	000829-063	29-Aug-00	0.2							9.795	16.5							
	SS-15	000829-064	29-Aug-00	0.2							197.25	662.							
	SS-15	000829-064	29-Aug-00	0.2 (dup)							314.5	527.6							

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TABLE 9 – Summary of Analytical Results for Soil Samples
TPH, BTEX, Total PAHs, Total Phenols, and Cyanide

Study Area	Soil Boring Number	Sample Number[1]	Sample Date	Depth (feet bgs)	Field Observation				Analytical Results mg/kg (ppm)										
									DEQ Method		EPA Method 8270 SIM		EPA Method 8020					EPA Method 8270	EPA Method 9010
									TPH-G	418.1M									
					Sheen	Oil	Tar	Carbon Pitch (lampblack or pencil pitch)	Gasoline	Diesel/Oil	Carcinogenic PAHs	Total PAHs	Benzene	Toluene	Ethyl benzene	Xylenes	Total BTEX	Total Phenols	Total Cyanide
EPA PRGs for Industrial Soil [2] ==>					#	#	#	#	#	#	see Table 5	see Table 5	1.30	520	20	420	#	see Table 6	12,000
Spent Oxide	B-01	950921-B1-01	21-Sep-95	0.2					ND>10 UJ	130.	7.17	13.358	ND>0.3	ND>0.3	ND>0.3	ND>0.3	ND		0.427
		950921-B1-02	21-Sep-95	0.2 (dup)						220.	26.14	55.96							0.382
		950921-B1-05	21-Sep-95	10.5	X			X		640.	336.7	1,279.7							50.7
		950921-B1-08	21-Sep-95	12.0						560.									
		950921-B1-09	21-Sep-95	21.0							0.926	5.026							4.07
	B-02	950927-B2-05	27-Sep-95	16.0				X											4.51
		950927-B2-07	27-Sep-95	20.5															
	B-03	950921-B3-05	21-Sep-95	10.5				X		120.	23.04	49.04	ND>0.3	ND>0.3	ND>0.3	ND>0.3	ND	ND	7.44
		950921-B3-07	21-Sep-95	15.0						5.9	ND	ND							
		950921-B3-10	21-Sep-95	22.5															3.07
	B-04	950921-B4-05	21-Sep-95	16.5															0.277
	B-05	950928-B5-05	28-Sep-95	15.5						780. J	0.94	3.64							2.67
	B-06	950927-B6-02	27-Sep-95	8.0	X		X			810. J	4,413.	12,486.8							
		950927-B6-03	27-Sep-95	15.5						54. J	40.2	86.45							
	B-36	000828-017	28-Aug-00	0.2							6.59	11.09							
		000828-018	28-Aug-00	3.5							0.515	1.16	ND>0.00294	ND>0.00294	ND>0.00294	ND>0.00882	ND		
		000828-019	28-Aug-00	10.0							0.315	0.635	ND>0.00305	ND>0.00305	ND>0.00305	ND>0.00915	ND		
	B-37	000828-001	28-Aug-00	0.2							36.04	63.855							
		000828-002	28-Aug-00	4.5							1.965	3.705	ND>0.00266	ND>0.00266	ND>0.00266	ND>0.00798	ND		
		000828-003	28-Aug-00	11.0							ND	ND	ND>0.00275	ND>0.00275	ND>0.00275	ND>0.00824	ND		
	MW-01-22	951024-M1-01	24-Oct-95	0.2							3.07	5.73							0.25
		951024-M1-02	24-Oct-95	3.5						460.	8.35	12.84							ND>.5
		951024-M1-06	24-Oct-95	23.5						ND>5	ND	0.461							0.88
	MW-02-32	951106-M2-01	6-Nov-95	0.2							5.2	10.293							0.47
		951106-M2-06	6-Nov-95	24.0						ND>5	0.152	0.432							
	MW-02-61	981007-M2-01	7-Oct-98	2.0							54.3	110.	ND>0.025	ND>0.025	ND>0.025	ND>0.075	ND		
		981007-M2-02	7-Oct-98	5.5							2,299.8	5,425.3	0.03 J	ND>0.025 UJ	ND>0.025 UJ	0.17 J	0.2		61.
		981007-M2-03	7-Oct-98	32.0							ND	0.424	ND>0.025	ND>0.025	ND>0.025	ND>0.075	ND		
	SS-7	981112-SS-07	12-Nov-98	0.2							108.3	183.55							13.
	SS-8	981112-SS-08	12-Nov-98	0.2							ND	ND							ND>0.50
	SS-9	981112-SS-09	12-Nov-98	0.2	Prussian Blue			X			22.4	55.51							56.

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TABLE 9 – Summary of Analytical Results for Soil Samples
TPH, BTEX, Total PAHs, Total Phenols, and Cyanide

Study Area	Soil Boring Number	Sample Number[1]	Sample Date	Depth (feet bgs)	Field Observation				Analytical Results mg/kg (ppm)										
									DEQ Method		EPA Method 8270 SIM		EPA Method 8020					EPA Method 8270	EPA Method 9010
									TPH-G	418.1M									
					Sheen	Oil	Tar	Carbon Pitch (lampblack or pencil pitch)	Gasoline	Diesel/Oil	Carcinogenic PAHs	Total PAHs	Benzene	Toluene	Ethyl benzene	Xylenes	Total BTEX	Total Phenols	Total Cyanide
EPA PRGs for Industrial Soil [2] ==>					#	#	#	#	#	#	see Table 5	see Table 5	1.30	520	20	420	#	see Table 6	12,000
Tar Pond	B-09	950918-B9-02	18-Sep-95	10.0	X		X		1,200.	25.	2,421.5	19,437.5	**104.**	44.2	**78.2**	102.6	329.		
		950918-B9-08	18-Sep-95	28.0	X				270.	1,600.									
		950918-B9-09	18-Sep-95	30.5	X						9.48	43.54							
		950918-B9-10	18-Sep-95	34.0							ND	0.484							
	B-26	951003-B26-01	4-Oct-95	0.2							5.13	9.319							
		951003-B26-06	4-Oct-95	20.5	X	X			1,300.	1,600.	861.7	15,529.7	**160.**	**110.**	16.	90.	376.	ND	
		951003-B26-13	4-Oct-95	39.5					ND>10	ND>5	ND	1.12							
	B-28	951002-B28-01	2-Oct-95	0.2					ND>10 UJ	35.	45.5	86.836	ND>0.3	ND>0.3	ND>0.3	ND>0.3	ND	ND	
		951002-B28-02	2-Oct-95	0.2 (dup)							65.5	135.19							
		951002-B28-07	2-Oct-95	15.0	X	X			24 J	200.	167.2	611.5	**5.5 J**	ND>2	ND>2	2.3	7.8	ND	
		951002-B28-11	2-Oct-95	24.0					ND>10 UJ	ND>5	ND	2.298	0.99 J	ND>0.3 UJ	ND>0.3 UJ	ND>0.3 UJ	0.99		
	B-29	950922-B29-01	22-Sep-95	0.2						190.	138.8	230.07							
		950922-B29-08	22-Sep-95	18.0			X												
		950922-B29-10	22-Sep-95	23.5					ND>10	9.3									
		950922-B29-12	22-Sep-95	28.0	X	X			53.	220.									
		950922-B29-15	22-Sep-95	35.5	X	X			1,800.	4,800.	5,214.1	58,821.7	**150.**	**140.**	**35.**	110.	435.	ND	
		950925-B29-17	25-Sep-95	44.0					ND>10	44.	2.614	16.454							
		950925-B29-18	25-Sep-95	47.0							ND	0.18							
	B-30	950922-B30-01	22-Sep-95	0.2						390.	500.	964.5							
		950922-B30-06	22-Sep-95	11.5	X			X	320.	3,200.	938.7	6,775.7	**18.**	1.9	12.	20.	51.9	ND	3.03
		950922-B30-08	22-Sep-95	17.0															
		950922-B30-12	22-Sep-95	28.5	X				150.	120.	94.3	853.	**17.**	ND>3.	2.8	ND>3.	19.8		
		950922-B30-13	22-Sep-95	33.5					12.	ND>5									
	B-31	950925-B31-01	25-Sep-95	0.2					-	240.	22.98	38.148	ND>0.3	ND>0.3	ND>0.3	ND>0.3	ND		0.59
		950925-B31-06	25-Sep-95	21.0	X		X	X	250.	2,200.	1,846.1	12,885.7	ND>3	ND>3	9.1	9.6	18.7	ND	
		950925-B31-08	25-Sep-95	24.5					ND>10	34.	2.089	5.494							
		950925-B31-10	25-Sep-95	28.0							ND	ND							
		950925-B31-11	25-Sep-95	28.0 (dup)							ND	ND							
	B-32	951003-B32-01	4-Oct-95	0.2						66 J	34.8	61.21							
		951003-B32-03	4-Oct-95	11.5				X	760.	6,800.	3,156.3	28,772.3							3.02
		951003-B32-15	4-Oct-95	46.5	X	X			1,400.	4,100.	1,728.	21,961.							
		951003-B32-18	4-Oct-95	58.5	X						ND	1.202	0.95 J	ND>0.3 UJ	ND>0.3 UJ	ND>0.3 UJ	0.95		
	B-33	951005-B33-01	5-Oct-95	0.2						170 J	575.3	955.4							
		951005-B33-02	5-Oct-95	3.0						140 J	151.77	37.51							
		951005-B33-03	5-Oct-95	5.5	X		X		430.	2,700.J	1,054.4	8,238.4	**47.**	22.	**29.**	28.	126.	ND	3.9
		951005-B33-11	5-Oct-95	38.5	X		X		1,700.	7,800. J									
		951005-B33-14	5-Oct-95	54.0	X		X		36.	230.	3.02	65.04	0.72	0.82	**1.**	**1.1**	3.64	ND	
		951006-B33-18	6-Oct-95	59.0							0.525	5.682							

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TABLE 9 – Summary of Analytical Results for Soil Samples
TPH, BTEX, Total PAHs, Total Phenols, and Cyanide

Study Area	Soil Boring Number	Sample Number[1]	Sample Date	Depth (feet bgs)	Field Observation				Analytical Results mg/kg (ppm)										
									DEQ Method		EPA Method 8270 SIM		EPA Method 8020					EPA Method 8270	EPA Method 9010
									TPH-G	418.1M									
					Sheen	Oil	Tar	Carbon Pitch (lampblack or pencil pitch)	Gasoline	Diesel/Oil	Carcinogenic PAHs	Total PAHs	Benzene	Toluene	Ethyl benzene	Xylenes	Total BTEX	Total Phenols	Total Cyanide
EPA PRGs for Industrial Soil [2] ==>					#	#	#	#	#	#	see Table 5	see Table 5	1.30	520	20	420	#	see Table 6	12,000
Tar Pond (cont.)	B-34	950928-B34-01	28-Sep-95	0.2						41 J	49.2	94.09							
		950928-B34-05	28-Sep-95	11.5	X		X		3,400.	4,200. J	1,639.	13,499.							6.48
		950928-B34-12	28-Sep-95	36.5	X	X			1,900.	69.									
	B-35	951005-B35-01	5-Oct-95	0.2						27. J	19.49	38.94	ND>0.3	ND>0.3	ND>0.3	ND>0.3	ND	ND	
		951005-B35-06	5-Oct-95	22.0	X	X			2,200.	7,700. J	4,013.5	41,601.5							0.67
		951005-B35-10	5-Oct-95	29.0							0.784	9.294							
	B-48	000828-031	28-Aug-00	5.0	X		X	X			2,270.	11,925.	**107.**	78.1	**103.**	141.	429.1		
		000828-032	28-Aug-00	9.5	X		X	X			424.5	2,387.	**6.8**	8.26	15.6	19.8	50.46		
	B-49	000828-036	28-Aug-00	0.2															
		000828-037	28-Aug-00	1.5				X			343.4	562.1	ND>0.00301	ND>0.00301	ND>0.00301	ND>0.00904	ND		
		000828-038	28-Aug-00	8.0	X		X	X			634.	3,992.	**1.78**	0.895	18.	24.5	45.175		
	B-50	000828-033	28-Aug-00	0.2															
		000828-034	28-Aug-00	1.0	X		X	X			369.5	1,740.5	**14.3**	5.68	**21.2**	43.9	85.08		
		000828-035	28-Aug-00	6.0	X		X	X			1,272.5	10,585.5	**11.6**	ND>3.330	**27.2**	31.5	70.3		
	B-53	040607-011	7-Jun-04	2.5 - 3.0				X			30.58	56.621	ND < 0.0500	ND < 0.0500	ND < 0.0500	ND < 0.0500	ND < 0.0500		
	B-54	040608-013	8-Jun-04	2.0 - 2.5							1.84	3.06	ND < 0.0500	ND < 0.0500	ND < 0.0500	ND < 0.0500	ND < 0.0500		
		040608-014	8-Jun-04	7.5 - 8.0							107.3	268.6	ND < 0.0500	ND < 0.0500	ND < 0.0500	ND < 0.0500	ND < 0.0500		
	B-55	040607-008	7-Jun-04	2.5 - 3.0			X				5,831.	61,008.	**137.**	95.6	**77.3**	92.6	402.5		
	B-56	040601-001	1-Jun-04	2.5 - 3.5							13.4 U	14.	ND < 0.0500	ND < 0.0500	ND < 0.0500	ND < 0.0500	ND < 0.0500		0.435 U
		040601-003	1-Jun-04	11 - 12							170.5	356.9	ND < 0.0500	ND < 0.0500	ND < 0.0500	ND < 0.0500	ND < 0.0500		0.379 U
		040601-004	1-Jun-04	26 - 27							193.1	525.2	ND < 0.0500	ND < 0.0500	ND < 0.0500	ND < 0.0500	ND < 0.0500		
	MW-03-56	951101-M3-10	1-Nov-95	31.0	X						3.718	10.128							
		951101-M3-13	1-Nov-95	38.0							ND	ND							
		951101-M3-17	1-Nov-95	53.5							ND	ND							
		951101-M3-18	1-Nov-95	53.5 (dup)							0.044	0.157							
	MW-04-57	951030-M4-01	30-Oct-95	0.2						57.	114.	195.1						ND	0.8
		951030-M4-06	30-Oct-95	25.5	X						872.	3,261.	ND>0.3	ND>0.3	ND>0.3	ND>0.3	ND	ND	1.3
		951030-M4-15	30-Oct-95	57.0							ND	0.263							
	MW-04-101	981014-M4-01	14-Oct-98	2.0							722.9	976.4	ND>0.025	ND>0.025	ND>0.025	ND>0.075	ND		
		981014-M4-02	14-Oct-98	6.0							0.257	0.367	ND>0.025	ND>0.025	ND>0.025	ND>0.075	ND		
		981014-M4-03	14-Oct-98	10.5							0.77	1.44	ND>0.025	ND>0.025	ND>0.025	ND>0.075	ND		ND>0.02
	MW-05-32	951027-M5-01	27-Oct-95	0.2							0.817	1.43							
		951027-M5-05	27-Oct-95	15.5					ND>10 UJ	350. J	810.	1,942.1							
		951027-M5-07	27-Oct-95	21.5							0.242	0.908							
		951027-M5-10	27-Oct-95	31.5							ND	ND							
	MW-05-175	981019-M5-01	19-Oct-98	5.0							63.2	112.35	ND>0.025	ND>0.025	ND>0.025	ND>0.075	ND		
		981019-M5-02	19-Oct-98	5.0 (dup)							19.53	67.21	ND>0.025	ND>0.025	ND>0.025	ND>0.075	ND		
		981019-M5-03	19-Oct-98	9.5							ND	ND	ND>0.025	ND>0.025	ND>0.025	ND>0.075	ND		ND>0.02
		981020-M5-09	20-Oct-98	71.0							ND	ND							

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TABLE 9 – Summary of Analytical Results for Soil Samples
TPH, BTEX, Total PAHs, Total Phenols, and Cyanide

Study Area	Soil Boring Number	Sample Number[1]	Sample Date	Depth (feet bgs)	Field Observation				Analytical Results mg/kg (ppm)										
									DEQ Method		EPA Method 8270 SIM		EPA Method 8020					EPA Method 8270	EPA Method 9010
									TPH-G	418.1M									
					Sheen	Oil	Tar	Carbon Pitch (lampblack or pencil pitch)	Gasoline	Diesel/Oil	Carcinogenic PAHs	Total PAHs	Benzene	Toluene	Ethyl benzene	Xylenes	Total BTEX	Total Phenols	Total Cyanide
EPA PRGs for Industrial Soil [3] ==>					#	#	#	#	#	#	see Table 5	see Table 5	1.30	520	20	420	#	see Table 6	12,000
Tar Pond (cont.)	MW-08-56	951025-M8-01	25-Oct-95	0.2							203.4	280.8							0.61
		951025-M8-11	25-Oct-95	44.0	X						0.783	8.063							
		951025-M8-15	25-Oct-95	55.0							ND	0.642							
	M-11	951102-M11-01	2-Nov-95	0.2						14.	67.4	105.83							
		951102-M11-09	2-Nov-95	39.0	X						9.723	7.876							
		951102-M11-10	2-Nov-95	43.5							0.968	10.915							
	MW-14-110	981014-M14-01	14-Oct-98	3.5				X			1,610.2	5,876.7	**7.6**	1.9	10.	19.	38.5		
		981014-M14-02	14-Oct-98	6.0				X			632.4	1,697.2	**2.3**	ND>1.25	5.2	7.7	15.2		
		981014-M14-03	14-Oct-98	10.0		X					389.8	1,410.1	0.3	0.6	5.	6.4	12.3		**1.1**
		981014-M14-07	14-Oct-98	43.5							1.55	10.83	ND>0.025 UJ	ND>0.025 UJ	ND>0.025 UJ	ND>0.025 UJ	ND		
		981016-M14-13	16-Oct-98	89.5							ND	ND	0.68	ND>0.025	ND>0.025	ND>0.025	0.68		
		981019-M14-20	19-Oct-98	106.0							ND	ND							
	SS-1	981112-SS-01	12-Nov-98	0.2							1.898	3.222							0.68
	SS-2	981112-SS-02	12-Nov-98	0.2							6.61	11.598							ND>0.50
	SS-3	981112-SS-03	12-Nov-98	0.2				X			54.5	84.8							0.58
	SS-4	981112-SS-04	12-Nov-98	0.2							12.77	21.202							ND>0.50
	SS-11	981112-SS-11	12-Nov-98	0.2							0.497	0.821							ND>0.50

NOTE:
1 = Sample number prefix: 2708-
2 = Reserved
3 = EPA Region 9 Preliminary Remediation Goals (PRGs) for Industrial Soil (Revised 10/1/2002)
4 = Reserved
5 = Reserved
6 = Analyzed via Northwest Methods NW-TPH-G and NW-TPH-Dx
7 = Leachable benzene by TCLP = 4.10 milligrams per liter
J indicates an estimated value (validation qualifier)

# = not established
BTEX = benzene, toluene, ethylbenzene, and xylenes
DEQ = Oregon Department of Environmental Quality
EPA = U.S. Environmental Protection Agency
mg/kg = milligrams/kilogram
U = not detected above concentration indicated

ND = not detected above detection limit indicated
PAHs = polynuclear aromatic hydrocarbons
ppm = parts per million
TPH = total petroleum hydrocarbons
BOLD = Detected above Reference Level

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Table 10 – Summary of Analytical Results for Soil Samples, PAHs by EPA Method 8270 (SIM)

PAHs by EPA Method 8270 (SIM)					Analytical Results mg/kg (ppm)																			
					Carcinogenic PAHs							Non-carcinogenic PAHs												
Study Area	Soil Boring	Sample Number[1]	Sample Date	Sample Depth (feet bgs)	Benzo (a) anthracene	Benzo (b) fluoranthene	Benzo (k) fluoranthene	Benzo (a) pyrene	Chrysene	Dibenz (ah) anthracene	Indeno (1,2,3-cd) pyrene	Acenaphthene	Acenaphthylene	Anthracene	Benzo (ghi) perylene	Fluoranthene	Fluorene	Naphthalene	Phenanthrene	Pyrene	Total Carcinogenic PAHs	Total Non-Carcinogenic PAHs
		EPA PRGs for Industrial Soil [3] ==>			2.1	2.1	21.	0.21	210.	0.21	2.1	29,000.	#	100,000.	#	22,000.	28,000.	190.	#	29,000.	#	#
FAMM	B-07	950927-B7-05	27-Sep-95	17.0	ND UJ	ND UJ	ND UJ	ND UJ	ND UJ	ND UJ	ND UJ	ND UJ	ND UJ	ND UJ	ND UJ	ND UJ	ND UJ	ND UJ	ND UJ	ND	ND
	B-08	950918-B8-04	18-Sep-95	10.0	**18.**	**40.**	12.	**47.**	24.	**6.**	**38.**	0.48	4.	2.8	58.	26.	0.71	2.3	7.2	52.	186.	153.49
		950918-B8-08	18-Sep-95	18.0	ND UJ	ND UJ	ND UJ	ND UJ	ND UJ	ND UJ	ND UJ	0.18 J	ND UJ	ND UJ	ND UJ	ND UJ	0.053 J	ND UJ	ND UJ	ND UJ	ND	0.243
	B-10	950925-B10-04	25-Sep-95	17.5	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
	B-47	000829-039	29-Aug-00	0.2	0.3	0.445	0.315 J	**0.445**	0.365	0.135	0.385	ND	ND	ND	0.48	0.455	ND	ND	0.18	0.425	2.39	1.64
		000829-040	29-Aug-00	0.2 (dup)	ND	ND	0.055 J	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	0.055	ND
		000829-041	29-Aug-00	5.0	**8.7**	**8.45**	7.85	**11.4**	9.45	**1.14**	**7.1**	1.65	ND	2.14	8.05	15.6	0.675	0.085	8.5	15.1	54.09	51.8
		000829-042	29-Aug-00	11.5	**42.** J	**27.5** J	**29.** J	**40.** J	45.5 J	**5.** J	**21.5** J	59.5	ND <5,000	76.5	23.5 J	135	42.	12. J	166	112.	213.5	627.5
		000829-043	29-Aug-00	11.5 (dup)	**146.** J	**132.** J	**127.** J	**176.** J	155 J	**30.** J	**105.** J	100	ND <5,000	108	120 J	306	69	87. J	332	280	875	1,402.
		000829-045	29-Aug-00	31.0	**8.2**	**7.85**	6.85	**12.**	10.1	**1.6**	**8.15**	9.95	1.75	6.25	10.8	25.8	4.94	14.2	24.7	28.4	54.55	126.79
	B-51	000828-023	28-Aug-00	0.2	1.24	1.6	1.02	**1.74**	1.6	**0.39**	1.53	0.06	0.175	ND	1.82	2.78	0.065	0.425	2.02	2.59	9.12	9.935
		000828-024	28-Aug-00	2.0	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
		000828-025	28-Aug-00	8.5	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	B-52	000828-026	28-Aug-00	0.2	0.85	1.35	0.97	**1.52**	1.5	**0.245**	0.92	ND	0.13	0.32	1.14	1.61	ND	0.23	0.825	1.94	7.355	6.195
		000828-027	28-Aug-00	3.5	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
		000828-028	28-Aug-00	10.5	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
		000828-029	28-Aug-00	10.5 (dup)	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	GT-1	971117-001	17-Nov-97	3.0	0.27	0.5	0.16	**0.58**	0.25	ND	0.48	ND	ND	ND	1.	0.38	ND UJ	ND	0.06 J	0.66 J	2.24	2.1
		971117-004	17-Nov-97	10.5	ND	ND	ND	ND	ND	ND	ND	1.4	ND	0.97	ND	ND	2.1	ND	ND	1.7	ND	6.17
		971117-006	17-Nov-97	15.0	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
		971117-008	17-Nov-97	20.5	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
		971117-011	17-Nov-97	35.5	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
	GT-2	971117-012	17-Nov-97	3.5	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	0.084	ND	ND	ND	ND	ND	ND	0.084
		971117-017	17-Nov-97	15.5	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
		971117-021	17-Nov-97	33.0	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
	GT-3	971118-023	18-Nov-97	3.0	**2.2**	**3.3**	8.4	**3.8**	1.8	ND	**2.4**	0.33	0.29	0.11	4.1	7.5	ND	0.14	0.12	8.6	21.9	21.19
		971118-026	18-Nov-97	12.5	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	0.05	ND	ND	ND	0.049	ND	0.099
		971118-032	18-Nov-97	38.0	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
	GT-4	971118-034	18-Nov-97	13.5	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
		971118-038	18-Nov-97	40.5	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
	MW-13	971218-M13-02	18-Dec-97	5.0	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
		971218-M13-03	18-Dec-97	10.0	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
		971218-M13-04	18-Dec-97	13.5	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
		971218-M13-05	18-Dec-97	18.0	0.09	0.071	ND	0.061	0.12	ND	ND	ND	ND	ND	ND	0.16	ND	0.23	0.093	0.17	0.342	0.653
		971218-M13-08	18-Dec-97	24.5	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
		971218-M13-10	18-Dec-97	28.0	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	0.058	ND	ND	0.058
		971218-M13-11	18-Dec-97	31.0	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
		971218-M13-17	18-Dec-97	57.0	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
	SS-05	981112-SS-05	12-Nov-98	0.2	**21.9**	**60.9**	17.	**69.1**	29.7	**9.4**	**47.3**	0.59	11.1	2.	69.9	16.1	0.61	5.	4.7	33.2	255.3	143.2
	SS-06	981112-SS-06	12-Nov-98	0.2	0.13	0.37	0.11	**0.36**	0.15	0.052	0.35	ND	0.078	ND	0.55	0.15	ND	ND	0.058	0.2	1.532	1.036
	SS-10	981112-SS-10	12-Nov-98	0.2	**2.6**	**5.8**	1.8	ND	3.5	**0.52**	**2.5**	0.14	0.31	0.36	3.1	5.	0.12	0.23	2.7	6.8	16.52	18.76

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Table 10 – Summary of Analytical Results for Soil Samples, PAHs by EPA Method 8270 (SIM)

PAHs by EPA Method 8270 (SIM)					Analytical Results mg/kg (ppm)																		
					Carcinogenic PAHs							Non-carcinogenic PAHs											
Study Area	Soil Boring	Sample Number[1]	Sample Date	Sample Depth (feet bgs)	Benzo (a) anthracene	Benzo (b) fluoranthene	Benzo (k) fluoranthene	Benzo (a) pyrene	Chrysene	Dibenz (ah) anthracene	Indeno (1,2,3-cd) pyrene	Acenaphthene	Acenaphthylene	Anthracene	Benzo (ghi) perylene	Fluoranthene	Fluorene	Naphthalene	Phenanthrene	Pyrene	Total Carcinogenic PAHs	Total Non-Carcinogenic PAHs
EPA PRGs for Industrial Soil [3] ==>					2.1	2.1	21.	0.21	210.	0.21	2.1	29,000.	#	100,000.	#	22,000.	26,000.	190.	#	29,000.	#	#
Office Area	B-38	000828-014	28-Aug-00	0.2	**1.58**	1.8	1.12	**2.08**	1.76	**0.43**	1.62	0.13	ND	ND	1.93	2.94	ND	ND	1.11	2.68	10.39	8.79
		000828-015	28-Aug-00	2.0	1.15	1.55	ND	**0.85**	0.8	ND	0.55	ND	ND	ND	0.65	1.15	ND	ND	1.85	1.85	4.9	5.5
		000828-016	28-Aug-00	8.5	0.095	0.135	ND	ND	0.09	0.075	ND	ND	ND	ND	ND	0.09	ND	ND	0.135	0.1	0.395	0.325
	B-39	000828-004	28-Aug-00	0.2	1.	1.15	0.705	**1.36**	1.13	**0.255**	0.88	0.085	0.055	ND	1.02	1.62	ND	0.06	0.52	1.72	6.49	5.08
		000828-005	28-Aug-00	3.0	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
		000828-006	28-Aug-00	9.5	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
	B-40	000828-010	28-Aug-00	0.2	**4.86**	**5.45**	4.14	**6.5**	5.2	**1.47**	**4.78**	0.36	0.065	0.55	5.8	7.05	0.14	ND	3.	6.8	32.38	23.775
		000828-011	28-Aug-00	2.5	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
		000828-012	28-Aug-00	9.5	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
	B-41	000828-007	28-Aug-00	0.2	**2.16**	**2.64**	1.74	**3.1**	2.43	**0.595**	**2.22**	0.165	0.17	ND	2.56	3.86	0.07	0.075	1.68	3.82	14.885	12.4
		000828-008	28-Aug-00	2.5	**1.87**	**2.13**	1.58	**2.86**	2.23	**0.42**	1.49	0.13	0.26	0.41	2.09	3.26	ND>0.1	0.24	2.26	5.2	12.58	13.86
		000828-009	28-Aug-00	9.5	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Retorts / Koppers	B-11	960928-B11-06	28-Sep-95	12.5	0.83	0.5	ND	**0.53**	1.4	ND	ND	7.8	0.61	2.7	ND	4.2	6.7	**915.**	25.2	7.4	3.26	969.61
		960928-B11-09	28-Sep-95	23.0	ND UJ	ND UJ	ND UJ	ND UJ	ND UJ	ND UJ	ND UJ	0.071 J	ND UJ	0.094 J	ND UJ	0.17 J	0.075 J	ND UJ	0.35 J	0.29 J	ND	1.051
	B-13	961006-B13-03	6-Oct-95	10.5	**564.**	**752.**	**238.**	**942.**	**811.**	**89.9**	**519.**	1,630.	155.	578.	747.	2,350.	481.	**13,000.**	2,950.	3,580.	3,915.9	25,471.
		961006-B13-07	6-Oct-95	18.5	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
		961006-B13-10	6-Oct-95	24.0	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND UJ	ND	ND	ND UJ	ND	ND	ND
	B-14	960928-B14-03	28-Sep-95	5.0	ND UJ	ND UJ	ND UJ	ND UJ	ND UJ	ND UJ	ND UJ	ND UJ	ND UJ	ND UJ	ND UJ	ND UJ	ND UJ	ND UJ	ND UJ	ND UJ	ND	ND
	B-15	961006-B15-06	6-Oct-95	21.0	**6.8**	**9.7**	3.2	**9.3**	9.7	**1.**	**6.2**	16.1	4.1	6.6	9.	27.7	6.9	**400.**	80.	41.3	46.9	591.7
		961006-B15-08	6-Oct-95	27.0	ND	0.05	0.15	ND	ND	ND	ND	ND	0.053	0.13	ND	0.24 J	0.038	0.13	0.59 J	0.4	0.21	1.581
	B-17	960929-B17-01	29-Sep-95	3.0	**3.5** J	**5.6** J	1.3 J	**5.7** J	3.6 J	**0.67** J	**3.7** J	0.026 J	0.22 J	0.92 J	5.3 J	10.5 J	0.15 J	0.093 J	4. J	13.8 J	24.07	35.909
		960929-B17-05	29-Sep-95	18.5	**28.**	**15.**	5.8	**16.**	44.	**1.1**	**4.2**	161.	10.	111.	5.9	114.	119.	**478.**	477.	224.	114.1	1,699.9
		960929-B17-07	29-Sep-95	23.5	ND UJ	ND UJ	ND UJ	ND UJ	ND UJ	ND UJ	ND UJ	0.078 J	ND UJ	0.086 J	ND UJ	0.072 J	0.062 J	0.16 J	0.32 J	0.11 J	ND	0.888
	B-18	960919-B18-05	19-Sep-95	12.0	0.17	0.09	0.032	0.074	0.26	ND	0.033	1.9	0.16	0.44	0.047	1.1	1.8	44.8	6.7	1.7	0.659	58.647
		960919-B18-10	19-Sep-95	24.5	ND UJ	ND UJ	ND UJ	ND UJ	ND UJ	ND UJ	ND UJ	ND UJ	ND UJ	ND UJ	ND UJ	ND UJ	ND UJ	ND UJ	ND UJ	ND UJ	ND	ND
	B-19	960919-B19-01	19-Sep-95	0.2	**53.1**	**57.8**	**29.6**	**61.**	71.4	**10.**	**41.5**	6.8	0.52	212.	46.	115.	20.1	2.9	91.7	114.	324.2	609.02
		960919-B19-03	19-Sep-95	6.5	**7.6**	**5.4**	2.4	**5.8**	9.7	**0.96**	**3.9**	13.4	4.6	14.4	5.1	25.4	13.	180.	83.3	33.3	35.76	372.5
		960920-B19-07	20-Sep-95	18.0	0.054 J	ND UJ	0.047 J	ND UJ	ND UJ	ND UJ	ND UJ	0.5 J	0.17 J	ND UJ	ND UJ	0.18 J	0.77 J	78.3 J	1.7 J	0.28 J	0.101	79.9
		960929-B19-08	20-Sep-95	27.0	0.027 J	ND UJ	ND UJ	ND UJ	ND UJ	ND UJ	ND UJ	0.081 J	ND UJ	0.081 J	ND UJ	0.13 J	0.097 J	1.1 J	0.3 J	0.14 J	0.027	1.929
	B-20	960929-B20-03	29-Sep-95	10.5	**40.4**	**44.5**	19.	**45.**	57.1	**4.707**	**23.8**	35.8	9.4	122.	29.3	113.	57.8	27.8	239.	214.	244.507	848.1
		960929-B20-07	29-Sep-95	23.5	0.048 J	0.06 J	ND UJ	0.053 J	0.054 J	ND UJ	0.04 J	0.068 J	0.095 J	0.063 J	0.055 J	0.18 J	0.11 J	11.2 J	0.36 J	0.3 J	0.255	12.431
	B-21	961003-B21-04	3-Oct-95	11.5	0.12 J	0.079 J	0.079 J	ND UJ	0.14 J	ND UJ	ND UJ	1.3 J	0.44 J	0.2 J	ND UJ	0.59 J	0.089 J	0.71 J	2.5 J	0.86 J	0.418	6.689
	B-22	961003-B22-05	3-Oct-95	13.5	0.63	0.19	0.12	0.15	0.58	ND	0.057	9.4	0.075	1.2	0.055	5.3	5.7	0.31	12.2	4.3	1.727	38.541
		961003-B22-09	3-Oct-95	24.0	**9.2**	**4.**	1.7	**2.6**	12.	0.15	0.58	78.8	0.504	17.5	0.49	65.4	59.9	0.41	160.2	71.7	30.23	455.004
	B-23	961003-B23-08	3-Oct-95	26.5	0.2	0.19	0.097	0.2	0.27	ND	0.16	0.87	1.2	0.52	0.19	1.4	3.	68.8	8.2	1.6	1.117	75.78
		961003-B23-12	3-Oct-95	34.5	ND UJ	ND UJ	ND UJ	ND UJ	ND UJ	ND UJ	ND UJ	ND UJ	ND UJ	ND UJ	ND UJ	ND UJ	ND UJ	ND UJ	ND UJ	ND UJ	ND	ND
	B-24	961002-B24-03	2-Oct-95	10.5	**41.9**	**53.2**	**21.3**	**59.5**	64.1	**5.5**	**31.**	52.4	7.5	34.9	42.	132.	28.5	115.	186.	217.	276.5	815.3
		961002-B24-10	2-Oct-95	29.0	ND UJ	ND UJ	ND UJ	ND UJ	ND UJ	ND UJ	ND UJ	ND UJ	ND UJ	ND UJ	ND UJ	ND UJ	ND UJ	0.14 J	ND UJ	ND UJ	ND	0.14

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PAHs by EPA Method 8270 (SIM)					Analytical Results mg/kg (ppm)																		
					Carcinogenic PAHs							Non-carcinogenic PAHs											
Study Area	Soil Boring	Sample Number[1]	Sample Date	Sample Depth (feet bgs)	Benzo (a) anthracene	Benzo (b) fluoranthene	Benzo (k) fluoranthene	Benzo (a) pyrene	Chrysene	Dibenz (ah) anthracene	Indeno (1,2,3-cd) pyrene	Acenaphthene	Acenaphthylene	Anthracene	Benzo (ghi) perylene	Fluoranthene	Fluorene	Naphthalene	Phenanthrene	Pyrene	Total Carcinogenic PAHs	Total Non-Carcinogenic PAHs
		EPA PRGs for Industrial Soil [3] ==>			2.1	2.1	21.	0.21	210.	0.21	2.1	29,000.	#	100,000.	#	22,000.	28,000.	190.	#	29,000.	#	#
Retorts / Koppers (cont.)	B-25	961002-B25-03	2-Oct-95	12.5	0.41	0.71	0.25	**0.78**	0.6	0.078	0.5	0.41	0.15	0.29	0.75	1.2	0.53	1.2	2.5	2.1	3.328	9.13
		961002-B25-05	2-Oct-95	20.0	ND UJ	ND UJ	ND UJ	ND UJ	ND UJ	ND UJ	ND UJ	ND UJ	ND UJ	ND UJ	ND UJ	ND UJ	ND UJ	0.45 J	ND UJ	ND UJ	ND	0.45
	B-27	960920-B27-10	20-Sep-96	23.0	**17.2**	**16.3**	8.2	**18.3**	21.	**1.9**	**9.6**	53.	32.6	21.9	13.6	79.1	45.7	**586.**	208.	113.	90.5	1,162.9
		960920-B27-12	20-Sep-96	28.0	1.9	1.6	0.78	**1.7**	2.6	0.11	0.915	8.6	2.	3.1	1.3	9.9	6.5	44.7	26.4	13.3	9.605	115.8
		960920-B27-15	20-Sep-96	35.5	0.31 J	0.26 J	0.091 J	0.16 J	0.28 J	ND UJ	0.11 J	1.1 J	0.14 J	0.36 J	0.15 J	1.3 J	0.88 J	1.8 J	3.5 J	1.8 J	1.211	11.03
	B-42	000828-020	28-Aug-00	0.2	0.12	0.135	0.17	0.185	0.16	ND	0.055	ND	ND	ND	0.18	0.205	ND	ND	0.115	0.195	0.825	0.695
		000828-021	28-Aug-00	1.0	**2.47**	**2.47**	1.83	**3.26**	2.68	**0.605**	**2.22**	0.22	ND	ND	2.77	4.86	0.08	0.18	1.98	4.12	15.535	14.21
		000828-022	28-Aug-00	7.5	0.255	0.275	0.21	**0.405**	0.37	0.09	0.395	ND	0.26	ND	0.675	0.64	0.085	0.58	1.36	0.715	2.	4.315
	B-43	000829-050	29-Aug-00	0.2	**1,490.**	**1,760.**	**1,460.**	**2,020.**	**1,650.**	**500.**	**1,460.**	110.	ND >5	139.	1,600.	1,980.	55.	11.	825.	1,860.	10,340.	6,589.
		000829-046	29-Aug-00	2.0	0.355	0.95	0.585	**1.26**	0.595	**0.345**	2.09	ND	0.165	ND	3.28 J	0.49 J	ND	0.1	0.105	0.535 J	6.16	4.879
		000829-047	29-Aug-00	2.0 (dup)	0.16	0.545	0.315	**0.595**	0.275	0.16	0.75	ND	0.11	ND	1.03 J	0.125 J	ND	ND	ND	0.17 J	2.8	1.435
		000829-048	29-Aug-00	8.5	**125.** J	**146.** J	**118.** J	**171.** J	138 J	**25.** J	**120.** J	19.2 J	ND	14.2 J	132. J	172. J	5.15 J	1.2	75. J	158. J	843.	567.75
		000829-049	29-Aug-00	8.5 (dup)	**27.4** J	**35.2** J	**28.** J	**40.4** J	29. J	**6.15** J	**18.6** J	2.5 J	ND	4. J	19.8 J	39.2 J	1.15 J	ND	18.8 J	48.4 J	184.75	131.85
	B-44	000829-052	29-Aug-00	0.2	**5.05**	**4.58**	3.55	**6.85**	6.25	**1.08**	**4.92**	0.17	4.1	3.17	6.1	14.5	2.92	1.21	18.3	17.2	32.28	67.67
		000829-051	29-Aug-00	3.5	0.5	1.	0.595	**1.32**	0.755	**0.245**	1.11	ND	0.14	ND	1.55	0.53	ND	ND	ND	0.715	5.525	2.935
		000829-053	29-Aug-00	10.0	**2,450.**	**1,720.**	**1,700.**	**2,780.**	**2,880.**	**440.**	**1,800.**	125.	3,480.	2,580.	2,000.	8,000.	1,900.	**8,300.**	14,000.	8,250.	13,770.	48,635.
	B-45	000829-054	29-Aug-00	0.2	**33.6**	**47.1**	**36.6**	**47.**	38.5	**7.75**	**23.7**	2.15	ND	4.3	23.3	52.5	1.4	ND	24.8	45.5	234.25	153.95
		000829-055	29-Aug-00	2.0	ND	0.05	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	0.05	ND
		000829-056	29-Aug-00	2.0 (dup)	ND	0.085	ND	ND	ND	ND	ND	ND	ND	ND	ND	0.075	ND	ND	ND	ND	0.085	0.075
		000829-057	29-Aug-00	8.5	0.355	0.98	0.535	**1.05**	0.665	**0.23**	1.4	ND	0.21	ND	1.98	0.36	ND	ND	ND	0.49	5.315	3.04
	B-46	000829-058	29-Aug-00	0.2	**19.5**	**29.7**	**21.9**	**30.8**	22.8	**4.95**	**14.6**	1.3	ND	2.45	15.1	29.6	0.75	ND	14.3	32.4	144.25	95.9
		000829-059	29-Aug-00	5.0	0.135	0.385	0.29	**0.48**	0.19	0.15	0.435	ND	0.075	ND	0.625	0.095	ND	ND	0.135	0.14	2.065	1.97
		000829-060	29-Aug-00	10.5	ND	0.09	ND	ND	ND	ND	0.05	ND	ND	ND	0.085	ND	ND	ND	0.135	ND	0.14	0.22
	MW-06-61	951107-M6-01	7-Nov-95	2.5	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
		951107-M6-08	7-Nov-95	30.0	**340.**	**170.**	**120.**	**190.**	**450.**	**25.**	**94.**	2,350.	25.	1,420.	130.	1,900.	990.	**3,650.**	5,780.	2,980.	1,389.	19,225.
		951107-M6-10	7-Nov-95	38.5	0.042	ND	ND	ND	0.065	ND	ND	0.22	ND	0.16	ND	0.22	0.095	0.075	0.6	0.34	0.108	1.711
		951107-M6-11	7-Nov-95	43.0	ND UJ	ND UJ	ND UJ	ND UJ	ND UJ	ND UJ	ND UJ	ND UJ	ND UJ	ND UJ	ND UJ	ND UJ	ND UJ	ND UJ	0.055 J	ND UJ	ND	0.055
	MW-09-29	951023-M9-01	23-Oct-95	0.2	1.4 J	**2.7**	0.88	**2.5**	1.9	**0.42**	1.9	0.12	0.17	0.31	2.6	2.2	0.055 J	0.087	0.96	3.3	11.7	9.802
		951023-M9-04	23-Oct-95	5.0	**7.4** J	**19.6**	5.	**14.4**	13.3	**2.7**	**18.1**	0.12	1.3	2.	22.6	17.9	0.4 J	1.2	8.6	30.4	78.5	84.52
		951023-M9-05	23-Oct-95	11.5	0.028 J	0.035	ND	0.032	0.041	ND	0.027	ND	ND	0.03	0.035	0.075	ND UJ	ND	0.095	0.12	0.163	0.358
	MW-10-61	951109-M10-01	9-Nov-95	0.2	**6.7**	**11.**	5.1	**9.5**	8.3	**1.4**	**5.**	0.83	ND	1.7	6.7	11.	0.23	0.081	3.3	9.9	45.	33.741
		951109-M10-02	9-Nov-95	0.2 (dup)	**10.**	**17.**	8.2	**14.**	7.5	**2.2**	**7.2**	1.1	ND	1.1	9.	14.	0.36	0.13	5.2	12.	64.1	42.89
		951109-M10-09	9-Nov-95	28.0	ND	ND	ND	ND	ND	ND	ND	0.038	ND	0.038	ND	0.078	ND	0.23	0.22	0.16	ND	0.764
	MW-12-36	951023-M12-01	23-Oct-95	0.2	**8.5** J	**15.3**	5.2	**13.3**	12.3	**2.2**	**8.7**	1.5	0.23	2.	10.8	12.4	0.54 J	0.34	5.8	17.1	65.5	59.71
		951023-M12-05	23-Oct-95	22.0	ND UJ	ND	ND	ND	0.27	ND	ND	0.34	ND	0.99	ND	0.97	0.4 J	0.23	4.	1.4	0.27	8.33
		951023-M12-07	23-Oct-95	26.5	ND UJ	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND UJ	ND	ND	ND	ND	ND
	MW-15-55	990629-12	29-Jun-99	51.0	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
		990629-15	29-Jun-99	54.0	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
	Dust -1	960212-D1-01	12-Feb-96	N/A	**33.**	**47.6**	17.9	**41.4**	36.1	**7.5**	**27.3**	4.4	1.7	5.6	36.5	53.7	1.9	1.1	23.7	41.9	210.8	170.5
	Dust -2	960227-D2-01	12-Feb-96	N/A	**2,600.**	**3,436.**	**1,292.**	**2,915.**	**2,856.**	**547.**	**1,908.**	375.	ND>20	444.	2,543.	3,483.	145.	68.	1,501.	2,806.	15,554.	11,365.
	SS-12	000829-061	29-Aug-00	0.2	0.255	0.35	0.29	**0.35**	0.265	0.09	0.195	ND	ND	ND	0.215	0.375	ND	ND	0.215	0.325	1.795	1.13
	SS-13	000829-062	29-Aug-00	0.2	0.205	0.275	0.22	**0.275**	0.235	0.085	0.165	ND	ND	ND	0.195	1.04	ND	ND	0.75	0.275	1.46	2.26
	SS-14	000829-063	29-Aug-00	0.2	1.34	1.74	1.52	**2.01**	1.6	**0.385**	1.2	0.125	ND	ND	1.34	2.22	0.05	ND	0.93	2.04	9.795	8.705
	SS-15	000829-064	29-Aug-00	0.2	**40.7**	**34.4**	**25.6**	**23.1**	58.5	**3.45** J	**11.5** J	2.35	2.5	37.2 J	12.	198.	3.2	ND	57.5	152.	197.25	484.75
		000829-064	29-Aug-00	0.2 (dup)	**42.6**	**60.5**	**47.4**	**68.5**	49.4	**11.4** J	**34.7** J	3.1	ND	5.55 J	33.8	71.5	1.75	ND	32.4	65.	314.5	213.1

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PAHs by EPA Method 8270 (SIM)					Analytical Results mg/kg (ppm)																			
					Carcinogenic PAHs							Non-carcinogenic PAHs												
Study Area	Soil Boring	Sample Number[1]	Sample Date	Sample Depth (feet bgs)	Benzo (a) anthracene	Benzo (b) fluoranthene	Benzo (k) fluoranthene	Benzo (a) pyrene	Chrysene	Dibenz (ah) anthracene	Indeno (1,2,3-cd) pyrene	Acenaphthene	Acenaphthylene	Anthracene	Benzo (ghi) perylene	Fluoranthene	Fluorene	Naphthalene	Phenanthrene	Pyrene	Total Carcinogenic PAHs	Total Non-Carcinogenic PAHs
		EPA PRGs for Industrial Soil [3] ==>			2.1	2.1	21.	0.21	210.	0.21	2.1	29,000.	#	100,000.	#	22,000.	26,000.	190.	#	29,000.	#	#
Spent Oxide	B-01	950921-B1-01	21-Sep-95	0.2	1. J	1.6 J	0.52 J	**1.5** J	1.4 J	**0.22** J	0.93 J	0.14 J	ND U	0.14 J	1.3 J	1.3 J	0.055 J	0.073 J	0.88 J	2.3 J	7.17	6.188
		950921-B1-02	21-Sep-95	0.2	**3.7** J	**5.6** J	1.7 J	**5.2** J	5.6 J	**0.84** J	**3.5** J	0.51 J	0.41 J	1.1 J	5.1 J	5.7 J	0.34 J	0.46 J	5.8 J	10.4 J	26.14	29.82
		950921-B1-05	21-Sep-95	10.5	**45.3**	**72.3**	**26.7**	**55.7**	82.8	7.7	**46.2**	6.1	5.8	21.7	66.8	140.	9.6	**313.**	142.	239.	336.7	943.
		950921-B1-09	21-Sep-95	21.0	0.19 J	0.21 J	0.066 J	0.17 J	0.19 J	ND U	0.11 J	0.13 J	ND U	0.24 J	0.17 J	0.36 J	0.14 J	0.21 J	2.2 J	0.65 J	0.926	4.1
	B-03	950921-B3-05	21-Sep-95	10.5	**3.2**	**5.2**	1.9	**4.8**	4.1	**0.64**	**3.2**	0.3	0.14	3.1	4.2	5.9	0.2	0.16	3.1	8.9	23.04	25.
		950921-B3-07	21-Sep-95	15.0	ND U	ND U	ND U	ND U	ND U	ND U	ND U	ND U	ND U	ND U	ND U	ND U	ND U	ND U	ND U	ND U	ND	ND
	B-05	950928-B5-05	28-Sep-95	15.5	ND U	0.2 J	ND U	0.18 J	ND U	ND U	0.56 J	0.14 J	0.44 J	0.19 J	1.1 J	0.34 J	ND U	ND U	ND U	0.49 J	0.94	2.7
	B-06	950927-B6-02	27-Sep-95	8.0	**574.**	**972.**	**370.**	**787.**	**833.**	**159.**	**738.**	21.	124.	191.	1,980.	1,680.	73.8	**884.**	1,180.	2,840.	4,413.	8,073.8
		950927-B6-03	27-Sep-95	15.5	**5.7** J	**8.8** J	3.5 J	**7.1** J	7.6 J	**1.1** J	**6.4** J	ND>1.0 UJ	0.55 J	2.1 J	9.6 J	10.2 J	ND>1.0 UJ	ND>1.0 UJ	5.5 J	18.3 J	40.2	46.25
	B-36	000828-017	28-Aug-00	0.2	0.98	1.23	1.05	**1.38**	1.16	**0.215**	0.575	0.105	ND U	ND U	0.6	1.52	ND U	0.105	0.7	1.47	6.59	4.5
		000828-018	28-Aug-00	3.5	0.07	0.11	0.065	0.1	0.08	ND U	0.09	ND U	ND U	ND U	0.13	0.155	ND U	0.12	0.07	0.17	0.515	0.645
		000828-019	28-Aug-00	10.0	0.09	0.12	ND U	0.05	0.055	ND U	ND U	ND U	ND U	ND U	ND U	0.08	ND U	ND U	0.135	0.105	0.315	0.32
	B-37	000828-001	28-Aug-00	0.2	**4.7**	**6.5**	4.92	**7.35**	5.85	**1.67**	**5.05**	0.455	0.06	0.735	6.3	8.55	0.2	0.055	3.96	7.5	38.04	27.815
		000828-002	28-Aug-00	4.5	0.25	0.33	0.25	**0.385**	0.3	0.095	0.375	ND U	ND U	ND U	0.475	0.54	ND U	ND U	0.21	0.515	1.965	1.74
		000828-003	28-Aug-00	11.0	ND U	ND U	ND U	ND U	ND U	ND U	ND U	ND U	ND U	ND U	ND U	ND U	ND U	ND U	ND U	ND U	ND	ND
	MW-01-22	951024-M1-01	24-Oct-95	0.2	0.41 J	0.66	ND U	**0.61**	0.64 J	ND U	0.75	ND U	ND U	ND U	1.	0.71	ND U	ND U	ND U	1.	3.07	2.71
		951024-M1-02	24-Oct-95	3.5	0.91 J	1.5	0.74	**1.7**	1.3 J	**0.4**	1.8	ND U	ND U	ND U	2.3	0.79	ND U	ND U	ND U	1.4	8.35	4.49
		951024-M1-05	24-Oct-95	23.5	ND U	ND U	ND U	ND U	ND U	ND U	ND U	ND U	ND U	0.19	ND U	0.032	ND U	ND U	0.15	0.089	ND	0.461
	MW-02-32	951106-M2-01	6-Nov-95	0.2	0.73	1.2	0.49	**1.1**	0.83	0.16	0.69	0.047	0.083	0.14	1.	1.4	ND>0.05	0.053	0.57	1.8	5.2	5.093
		951106-M2-05	6-Nov-95	24.0	0.039	0.036	ND U	0.04	0.037	ND U	ND U	0.2	ND U	ND U	ND U	ND U	ND U	0.008	ND U	ND U	0.152	0.28
	MW-02-61	981007-M2-01	7-Oct-98	2.0	**9.7**	**13.1**	ND U	**12.8**	8.8	**1.9**	**8.**	1.3	ND U	2.3	11.3	14.3	ND U	0.6	9.	16.9	54.3	55.7
		981007-M2-02	7-Oct-98	5.5	**315.**	**563.**	**179.**	**432.**	**334.**	**57.8**	**389.**	ND[2]	30.4	34.2	490.	591.	12.9	**923.**	309.	735.	2,299.8	3,125.5
		981007-M2-03	7-Oct-98	32.0	ND U	ND U	ND U	ND U	ND U	ND U	ND U	ND U	ND U	0.07	ND U	0.074	ND U	0.28 J	ND U	ND U	ND	0.424
	SS-07	981112-SS-07	12-Nov-98	0.2	**12.8**	**25.**	6.9	**23.7**	14.3	**1.9**	**23.7**	0.64	2.8	1.3	22.2	15.	0.41	1.8	6.9	24.2	108.3	75.25
	SS-08	981112-SS-08	12-Nov-98	0.2	ND U	ND U	ND U	ND U	ND U	ND U	ND U	ND U	ND U	ND U	ND U	ND U	ND U	ND U	ND U	ND U	ND	ND
	SS-09	981112-SS-09	12-Nov-98	0.2	**3.7**	**6.6**	1.7	**3.4**	4.3	**0.5**	**2.2**	0.38	0.19	1.3	2.5	10.	0.39	0.55	7.	10.8	22.4	33.11
Tar Pond	B-09	950918-B9-02	18-Sep-95	10.0	**472.**	**420.**	**139.**	**487.**	**601.**	**56.5**	**246.**	558.	457.	603.	344.	1,350.	464.	**7,560.**	3,410.	2,270.	2,421.5	17,016.
		950918-B9-09	18-Sep-95	30.5	1.6	1.8	0.66	**2.1**	1.9	**0.22**	1.2	1.9	0.17	1.3	1.8	4.4	0.99	8.3	7.8	7.4	9.48	34.06
		950918-B9-10	18-Sep-95	34.0	ND U	ND U	ND U	ND U	ND U	ND U	ND U	ND U	ND U	0.054 J	ND U	0.08 J	ND U	ND U	0.2 J	0.13 J	ND	0.464
	B-26	951003-B26-01	4-Oct-95	0.2	0.73	1.2	0.49	**0.99**	0.77	0.16	0.79	0.092	ND U	0.097	0.84	1.5	ND U	ND U	0.46	1.2	5.13	4.189
		951003-B26-06	4-Oct-95	20.5	**124.**	**134.**	**57.**	**138.**	**265.**	**20.7**	**123.**	608.	449.	1,220.	171.	949.	681.	**6,420.**	2,630.	1,640.	861.7	14,668.
		951003-B26-13	4-Oct-95	39.5	ND U	ND U	ND U	ND U	ND U	ND U	ND U	0.059	0.045	0.051	ND U	0.066	0.059	0.55	0.19 J	0.099	ND	1.12
	B-28	951002-B28-01	2-Oct-95	0.2	**6.1**	**10.1**	4.3	**8.6**	8.2	**1.6**	**6.6**	0.73	0.26 J	4.6	8.2	9.7	0.245	0.3	4.6	12.7	45.5	41.336
		951002-B28-02	2-Oct-95	0.2	**9.5**	**14.9**	6.3	**14.1**	9.5	**2.4**	**8.8**	1.1	0.86 J	1.8	12.3	17.3	0.55	0.88	9.2	25.7	65.5	59.69
		951002-B28-07	2-Oct-95	15.0	**19.1**	**33.4**	12.6	**42.7**	30.2	**3.6**	**25.6**	23.8	3.7	11.2	39.5	66.1	14.	102.	74.	110.	167.2	444.3
		951002-B28-11	2-Oct-95	24.0	ND U	ND U	ND U	ND U	ND U	ND U	ND U	0.057 J	ND U	ND U	ND U	ND U	ND U	2.2 J	0.041 J	ND U	ND	2.298
	B-29	950922-B29-01	22-Sep-95	0.2	**10.5**	**31.7**	11.6	**32.5**	19.3	**4.8**	**28.4**	0.4	7.3	3.3	41.8	9.4	0.47	2.4	3.4	22.8	138.8	91.27
		950922-B29-15	22-Sep-95	35.5	**1,540.**	**758.**	**308.**	**571.**	**1,810.**	**46.1**	**181.**	9,210.	77.6	1,650.	230.	8,480.	4,630.	**7,400.**	15,500.	6,530.	5,214.1	53,607.6
		950925-B29-17	25-Sep-95	44.0	0.56 J	0.45 J	0.12 J	**0.51** J	0.68 J	0.054 J	0.24 J	1.1 J	0.33 J	1. J	0.3 J	1.6 J	0.84 J	0.77 J	5.1 J	2.8 J	2.614	13.84
		950925-B29-18	25-Sep-95	47.0	ND U	ND U	ND U	ND U	ND U	ND U	ND U	ND U	ND U	ND U	ND U	ND U	ND U	0.18 J	ND U	ND U	ND	0.18
	B-30A	950922-B30-01	22-Sep-95	0.2	**49.8**	**110.**	**45.**	**99.6**	75.4	**20.2**	**100.**	9.2	13.4	16.	129.	110.5	5.9	9.4	37.3	133.8	590.	454.5
	B-30	950922-B30-06	22-Sep-95	11.5	**167.**	**167.**	**71.9**	**182.**	**245.**	**16.5**	**89.3**	220.	228.	417.	125.	739.	310.	**1,730.**	1,260.	808.	938.7	5,837.
		950922-B30-12	22-Sep-95	28.5	**14.3**	**17.4**	7.4	**22.**	19.8	**1.8**	**11.6**	15.2	68.8	28.7	17.7	53.3	31.	**327.**	126.	91.	94.3	759.7

SCOEPA00014212

Table 10 – Summary of Analytical Results for Soil Samples, PAHs by EPA Method 8270 (SIM)

PAHs by EPA Method 8270 (SIM)					Analytical Results mg/kg (ppm)																	
					Carcinogenic PAHs							Non-carcinogenic PAHs										
Study Area	Soil Boring	Sample Number[1]	Sample Date	Sample Depth (feet bgs)	Benzo (a) anthracene	Benzo (b) fluoranthene	Benzo (k) fluoranthene	Benzo (a) pyrene	Chrysene	Dibenz (ah) anthracene	Indeno (1,2,3-cd) pyrene	Acenaphthene	Acenaphthylene	Anthracene	Benzo (ghi) perylene	Fluoranthene	Fluorene	Naphthalene	Phenanthrene	Pyrene	Total Carcinogenic PAHs	Total Non-Carcinogenic PAHs
EPA PRGs for Industrial Soil [3] ==>					2.1	2.1	21.	0.21	210.	0.21	2.1	29,000.	#	100,000.	#	22,000.	26,000.	190.	#	29,000.	#	#
Tar Pond (cont.)	B-31	950925-B31-01	25-Sep-95	0.2	2.1	**5.4**	1.8	**4.8**	3.	**0.98**	**4.9**	0.11	1.3	0.59	6.8	1.6	0.058	0.3	0.71	3.7	22.98	15.168
		950925-B31-06	25-Sep-95	21.0	**319.**	**321.**	**119.**	**374.**	**394.**	**45.1**	**274.**	1,120.	50.6	473.	364.	1,290.	422.	**2,880.**	2,620.	1,600.	1,846.1	10,819.6
		950925-B31-08	25-Sep-95	24.5	0.28 J	0.35 J	0.11 J	**0.7** J	0.39 J	0.039 J	0.22 J	0.072 J	ND U J	0.18 J	0.27 J	0.88 J	0.063 J	ND>0.06 UJ	0.64 J	1.4 J	2.089	3.406
		950925-B31-10	25-Sep-95	29.0	ND U J	ND U J	ND U J	ND U J	ND U J	ND U J	ND U J	ND U J	ND U J	ND U J	ND U J	ND U J	ND U J	ND U J	ND U J	ND U J	ND	ND
		950925-B31-11	25-Sep-95	29.0	ND U J	ND U J	ND U J	ND U J	ND U J	ND U J	ND U J	ND U J	ND U J	ND U J	ND U J	ND U J	ND U J	ND U J	ND U J	ND U J	ND	ND
	B-32	951004-B32-01	4-Oct-95	0.2	**2.9**	**6.9**	2.5	**7.4**	5.6	**1.8**	**7.7**	0.09	1.7	0.53	12.4	2.7	0.11	0.82	0.66	7.4	34.8	26.41
		951004-B32-03	4-Oct-95	11.5	**495.**	**500.**	**292.**	**585.**	**824.**	**87.3**	**373.**	990.	807.	1,190.	529.	2,050.	810.	**11,100.**	4,560.	3,580.	3,156.3	25,615.
		951004-B32-15	4-Oct-95	38.5	**259.**	**285.**	**81.**	**386.**	**427.**	**52.**	**238.**	1,330.	39.	1,280.	354.	1,180.	526.	**11,100.**	2,440.	1,990.	1,728.	20,233.
		951004-B32-18	4-Oct-95	58.5	ND U	ND U	ND U	ND U	ND U	ND U	ND U	0.064	ND U	0.061	ND U	0.13	0.047	0.38	0.31	0.21	ND	1.202
	B-33	951006-B33-01	5-Oct-95	0.2	**34.6**	**124.**	**44.**	**129.**	70.	**32.7**	**141.**	1.3	29.1	9.9	202.	29.5	1.6	9.1	10.5	87.1	576.3	380.1
		951006-B33-02	5-Oct-95	3.9	1.9	**2.4**	0.88	**2.8**	2.5	**0.29**	1.5	1.7	0.23	0.96	2.1	6.4	0.85	1.5	4.1	7.4	12.27	25.24
		951006-B33-03	5-Oct-95	5.5	**181.**	**185.**	**72.1**	**225.**	**262.**	**21.3**	**108.**	369.	133.	263.	152.	527.	266.	**3,460.**	1,190.	824.	1,054.4	7,184.
		951006-B33-14	5-Oct-95	54.0	ND U	0.57	ND U	**0.7**	1.1	ND U	ND U	3.4	ND U	2.1	0.62	3.4	1.5	37.	8.6	5.4	2.37	62.02
		951006-B33-18	5-Oct-95	69.0	0.045 J	0.054 J	ND U UJ	**0.37** J	0.056 J	ND U UJ	ND U UJ	0.06 J	0.35 J	0.12 J	0.047 J	0.18 J	0.12 J	3.5 J	0.47 J	0.31 J	0.525	5.157
	B-34	960926-B34-01	26-Sep-95	0.2	**6.**	**10.**	4.5	**9.9**	9.6	**1.6**	**7.6**	0.99	0.45	1.5	9.5	11.7	0.44	1.1	5.6	13.6	49.2	44.89
		960926-B34-05	26-Sep-95	11.5	**227.**	**256.**	**153.**	**356.**	**383.**	**41.**	**223.**	253.	462.	1,289.	318.	849.	409.	**5,420.**	1,580.	1,290.	1,539.	11,869.
	B-35	951006-B35-01	5-Oct-95	0.2	**2.2**	**4.**	1.5	**4.1**	4.1	**0.59**	**3.**	ND U	0.54	0.88	4.5	4.	ND U	0.34	2.2	6.7	19.49	19.16
		951006-B35-06	5-Oct-95	22.0	**613.**	**780.**	**269.**	**954.**	**809.**	**91.5**	**497.**	532.	1,960.	889.	714.	2,600.	982.	**20,700.**	4,890.	4,330.	4,913.5	37,589.
		951006-B35-10	5-Oct-95	29.0	0.13	0.14	0.068	0.17	0.18	ND U	0.095	0.52	0.28	0.27	0.14	0.5	0.28	4.3	1.4	0.82	0.784	8.51
	B-48	000828-031	28-Aug-00	5.0	**425.**	**225.**	**285.**	**475.**	**535.**	**55.**	**270.**	725.	ND U	590.	365.	1,460.	545.	**835.**	3,020.	1,640.	2,270.	9,655.
		000828-032	28-Aug-00	9.5	**77.**	**54.5**	**51.**	**88.**	92.	**11.**	**51.**	114.	30.	77.5	65.	212.	65.	**755.**	386.	258.	424.5	1,962.5
	B-49	000828-036	28-Aug-00	0.2	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
		000828-037	28-Aug-00	1.5	**28.5**	**66.**	**40.**	**114.**	39.4	**9.4**	**46.1**	0.65	12.5	2.1	105.	22.8	ND U	6.2	8.95	60.5	343.4	218.7
		000828-038	28-Aug-00	8.0	**116.**	**77.**	**71.5**	**132.**	140.	**17.**	**80.5**	199.	43.	121.	106.	334.	121.	**1,300.**	750.	384.	634.	3,358.
	B-50	000828-033	28-Aug-00	0.2	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
		000828-034	28-Aug-00	1.0	**89.**	**41.5**	**44.**	**76.5**	86.	**9.**	**43.5**	145.	16.	86.	58.	220.	82.	76.	434.	294.	389.5	1,371.
		000828-035	28-Aug-00	6.0	**244.**	**150.**	**142.**	**259.**	**284.**	**33.5**	**160.**	344.	330.	342.	207.	875.	310.	**4,100.**	1,810.	996.	1,272.5	9,313.
	B-53	040607-011	7-Jun-04	2.5 - 3.0	**4.21**	**4.97**	4.21	**6.52**	5.32	**1.04**	**4.01**	0.67 U	0.745	0.996	5.48	6.43	0.67 U	0.67 U	2.69	9.7	30.58	26.041
	B-54	040608-013	11-Jun-04	2.0 - 2.5	0.24	0.303	0.211	**0.323**	0.33	0.168 U	0.233	0.168 U	0.168 U	0.168 U	0.306	0.37	0.168 U	0.168 U	0.29	0.454	1.64	1.42
		040608-014	11-Jun-04	7.5 - 8.0	**15.7**	**20.9**	11.8	**22.1**	29.4	3.35 U	**16.4**	3.35 U	3.35 U	3.35 U	24.2	56.8	3.35 U	3.35 U	18.2	62.1	197.3	161.3
	B-55	040607-006	7-Jun-04	2.5 - 3.0	**1,240.**	**688.**	**731.**	**1,170.**	**1,480.**	335. U	**522.**	977.	2,400.	1,750.	700.	4,890.	1,740.	**27,800.**	9,750.	5,360.	5,831.	55,177.
	B-56	040601-001	1-Jun-04	2.5-3.5	13.4 U	13.4 U	13.4 U	13.4 U	13.4 U	13.4 U	13.4 U	13.4 U	13.4 U	13.4 U	14.	13.4 U	13.4 U	13.4 U	13.4 U	13.4 U	13.4 U	14.
		040601-003	1-Jun-04	11-12	**23.1**	**31.4**	**24.7**	**35.1**	30.7	13.4 U	**25.5**	13.4 U	13.4 U	13.4 U	37.	41.7	13.4 U	13.4 U	38.7	69.	170.5	186.4
		040601-004	1-Jun-04	26-27	**32.7**	**33.6**	**25.**	**41.9**	37.7	13.4 U	**22.2**	13.4 U	13.4 U	14.	32.2	95.3	13.4 U	13.4 U	47.6	143.	193.1	332.1
	MW-03-56	951101-M3-10	1-Nov-95	31.0	0.53	0.83	0.3	**0.84**	0.51	0.098	0.61	0.19	0.14	0.14	0.96	1.4	0.16	0.65	0.77	2.	3.718	6.41
		951101-M3-13	1-Nov-95	38.0	ND U	ND U	ND U	ND U	ND U	ND U	ND U	ND U	ND U	ND U	ND U	ND U	ND U	ND U	ND U	ND U	ND	ND
		951101-M3-17	1-Nov-95	53.5	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
		951101-M3-18	1-Nov-95	53.5 (dup)	ND	0.044	ND	ND	ND	ND	ND	ND	ND	ND	0.04	0.031	ND	ND	ND	0.042	0.044	0.113
	MW-04-57	951030-M4-01	30-Oct-95	0.2	**10.**	**26.**	10.	**28.**	15.	**4.**	**21.**	ND>5.0	4.4	2.6	35.	12.	ND>5.0	1.7	3.4	22.	114.	81.1
		951030-M4-06	30-Oct-95	25.5	**190.**	**200.**	**68.**	**210.**	180.	**24.**	ND U	55.	ND U	110.	190.	540.	49.	25.	480.	830.	872.	2,389.
		951030-M4-15	30-Oct-95	57.0	ND U	ND U	ND U	ND U	ND U	ND U	ND U	0.03	ND U	ND U	ND U	0.053	ND U	0.08	0.033	0.067	ND	0.253
	MW-04-101	981014-M4-01	14-Oct-98	2.0	**67.5**	**209.**	**49.9**	**183.**	82.1	**21.1**	**110.**	1.1	25.1	7.9	ND U	53.2	1.5	6.1	13.6	146.	722.9	253.5
		981014-M4-02	14-Oct-98	5.0	ND U	0.1	ND U	0.1	0.057	ND U	ND U	ND U	ND U	ND U	ND U	ND U	ND U	ND U	ND U	0.11	0.257	0.11
		981014-M4-03	14-Oct-98	10.5	0.13	0.25	ND U	**0.23**	0.16	ND U	ND U	ND U	ND U	ND U	ND U	0.21	ND U	ND U	ND U	0.46	0.77	0.67
	MW-05-32	951027-M5-01	27-Oct-95	0.2	0.13	0.22	0.077	0.15	0.13	ND U	0.11	ND U	ND U	ND U	0.15	0.2	ND U	ND U	0.073	0.19	0.817	0.613
		951027-M5-05	27-Oct-95	15.5	**115.**	**170.**	**58.**	**208.**	130.	**25.**	**104.**	19.	15.	41.	153.	330.	16.	8.1	113.	437.	810.	1,132.1
		951027-M5-07	27-Oct-95	21.5	0.067 J	0.039 J	ND U UJ	0.051 J	0.085 J	ND U UJ	ND U UJ	ND U UJ	ND U UJ	0.072 J	0.044 J	0.17 J	ND U UJ	ND U UJ	0.15 J	0.23 J	0.242	0.666
		951027-M5-10	27-Oct-95	31.5	ND U UJ	ND U UJ	ND U UJ	ND U UJ	ND U UJ	ND U UJ	ND U UJ	ND U UJ	ND U UJ	ND U UJ	ND U UJ	ND U UJ	ND U UJ	ND U UJ	ND U UJ	ND U UJ	ND	ND

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Table 10 – Summary of Analytical Results for Soil Samples, PAHs by EPA Method 8270 (SIM)

PAHs by EPA Method 8270 (SIM)					Analytical Results mg/kg (ppm)																		
					Carcinogenic PAHs							Non-carcinogenic PAHs											
Study Area	Soil Boring	Sample Number[1]	Sample Date	Sample Depth (feet bgs)	Benzo (a) anthracene	Benzo (b) fluoranthene	Benzo (k) fluoranthene	Benzo (a) pyrene	Chrysene	Dibenz (ah) anthracene	Indeno (1,2,3-cd) pyrene	Acenaphthene	Acenaphthylene	Anthracene	Benzo (ghi) perylene	Fluoranthene	Fluorene	Naphthalene	Phenanthrene	Pyrene	Total Carcinogenic PAHs	Total Non-Carcinogenic PAHs
EPA PRGs for Industrial Soil [3] ==>					2.1	2.1	21.	0.21	210.	0.21	2.1	29,000.	#	100,000.	#	22,000.	26,000.	190.	#	29,000.	#	#	
Tar Pond	MW-95-17S	981019-M5-01	19-Oct-98	5.0	**7.1**	**14.4**	3.5	**16.3**	9.3	**2.1**	**10.5**	0.47	1.6	0.95	15.1	10.5	0.39	0.54	2.6	17.	63.2	49.15
(cont.)		981019-M5-02	19-Oct-98	5.0 (dup)	**3.2**	**3.9**	1.4	**4.3**	3.6	**0.53**	**2.6**	1.7	0.64	.2	3.6	11.	1.2	0.24	13.	14.3	19.53	47.68
		981019-M5-03	19-Oct-98	9.5	ND [d]	ND [d]	ND [d]	ND [d]	ND [d]	ND [d]	ND [d]	ND [d]	ND [d]	ND [d]	ND [d]	ND [d]	ND [d]	ND [d]	ND [d]	ND [d]	ND	ND
		981020-M5-09	20-Oct-98	71.0	ND [d]	ND [d]	ND [d]	ND [d]	ND [d]	ND [d]	ND [d]	ND [d]	ND [d]	ND [d]	ND [d]	ND [d]	ND [d]	ND [d]	ND [d]	ND [d]	ND	ND
	MW-99-5S	951025-M8-01	25-Oct-95	0.2	**12.** J	**39.6**	13.8	**41.7**	20.5 J	**9.1**	**48.2**	ND>0.50	3.2	1.8	56.5	6.7	ND [d]	2.2	1.4	26.1	203.4	97.9
		951025-M8-11	25-Oct-95	44.0	0.17 J	0.12 J	0.053 J	0.15 J	0.21 J	ND [d] UJ	0.08 J	0.74 J	0.3 J	0.22 J	0.13 J	0.6 J	0.48 J	2.6 J	1.5 J	0.71 J	0.783	7.28
		951025-M8-15	25-Oct-95	55.0	ND [d] UJ	ND [d]	ND [d]	ND [d]	ND [d]	ND [d]	ND [d]	ND [d]	ND [d]	0.057	ND [d]	0.065	ND [d]	0.31	0.11	0.1	ND	0.642
	M-11	951102-M11-01	2-Nov-95	0.2	**5.1**	**18.**	5.	**10.**	5.9	**2.3**	**9.2**	0.73	0.91	0.82	12.	12.	0.3	0.37	4.2	14.	67.4	45.33
		951102-M11-09	2-Nov-95	39.0	0.16	0.11	0.046	0.077	0.13	ND [d]	0.047	0.85	0.083	0.21	0.063	0.94	0.65	1.5	2.1	0.91	9.723	7.306
		951102-M11-10	2-Nov-95	43.5	0.26 J	0.14 J	0.07 J	0.16 J	0.26 J	ND [d] UJ	0.076 J	0.8 J	0.089 J	0.4 J	0.11 J	1.4 J	0.85 J	2. J	3.1 J	1.4 J	0.966	9.949
	MW-14-11S	981014-M14-01	14-Oct-98	3.5	**357.**	**411.**	**99.2**	**400.**	**343.**	ND [c]	ND [c]	42.3	138.	1.4	ND [c]	1,390.	57.	36.8	411.	2,190.	1,610.2	4,266.5
		981014-M14-02	14-Oct-98	6.0	**116.**	**133.**	**37.3**	**136.**	152.	ND [c]	**58.1**	19.6	21.9	23.	99.2	292.	14.2	12.9	118.	482.	632.4	1,064.8
		981014-M14-03	14-Oct-98	10.0	**71.3**	**74.6**	**24.**	**82.5**	94.8	ND [c]	**42.6**	39.3	6.6	37.1	57.	194.	33.	93.3	250.	310.	389.8	1,029.3
		981014-M14-07	14-Oct-98	43.5	0.31	0.33	ND [d]	**0.36**	0.35	ND [d]	0.2	0.39	0.36	0.36	0.32	1.2	0.45	2.1	2.3	1.8	1.55	9.28
		981016-M14-13	16-Oct-98	69.5	ND [d]	ND [d]	ND [d]	ND [d]	ND [d]	ND [d]	ND [d]	ND [d]	ND [d]	ND [d]	ND [d]	ND [d]	ND [d]	ND [d]	ND [d]	ND [d]	ND	ND
		981019-M14-20	19-Oct-98	106.0	ND [d] UJ	ND [d] UJ	ND [d] UJ	ND [d] UJ	ND [d] UJ	ND [d] UJ	ND [d] UJ	ND [d] UJ	ND [d] UJ	ND [d] UJ	ND [d] UJ	ND [d] UJ	ND [d] UJ	ND [d] UJ	ND [d] UJ	ND [d] UJ	ND	ND
	SS-01	981112-SS-01	12-Nov-98	0.2	0.21	0.45	0.14	**0.44**	0.23	0.068	0.35	ND [d]	0.054	ND [d]	0.5	0.29	ND [d]	ND [d]	0.1	0.37	1.898	1.324
	SS-02	981112-SS-02	12-Nov-98	0.2	0.79	1.5	0.47	**1.5**	0.93	**0.22**	1.2	ND [d]	0.2	0.08	1.6	1.2	ND [d]	0.088	0.22	1.6	5.61	4.988
	SS-03	981112-SS-03	12-Nov-98	0.2	**4.7**	**14.2**	3.5	**14.1**	6.2	**1.5**	**10.3**	0.1	1.9	ND [d]	14.4	3.4	0.13	0.9	0.97	8.5	54.5	30.3
	SS-04	981112-SS-04	12-Nov-98	0.2	1.3	**3.1**	0.88	**2.9**	1.7	**0.49**	**2.4**	0.083	0.5	0.25	3.1	1.4	0.059	0.23	0.61	2.2	12.77	8.432
	SS-11	981112-SS-11	12-Nov-98	0.2	0.061	0.14	ND [d]	0.13	0.066	ND [d]	0.1	ND [d]	ND [d]	ND [d]	0.15	0.075	ND [d]	ND [d]	ND [d]	0.099	0.497	0.324

Note:
DEQ = Oregon Department of Environmental Quality
EPA = U.S. Environmental Protection Agency
mg/kg = milligrams/kilogram
ND = Not detected above detection limit indicated
PAHs = polynuclear aromatic hydrocarbons
ppm = parts per million
J indicates an estimated value (validation qualifier)
UJ indicates an estimated reporting limit (validation qualifier)

# = Reference level not established
1 = Sample number prefix: 2708-
2 = Reserved
3 =EPA Region 9 Preliminary Remediation Goals (PRGs) for Industrial Soil (Revised 10/2/2002)
Bold = Detected above Reference Levels

a = detection limit is 0.95 mg/kg (ppm)
b = detection limit is 0.2 mg/kg (ppm)
c = detection limit is 1 mg/kg (ppm)
d = detection limit is 100 mg/kg (ppm)
e = detection limit is 0.5 mg/kg (ppm)
f = detection limit is 0.7 mg/kg (ppm)

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TABLE 11 – Summary of Analytical Results for Soil Samples
Phenols by EPA Method 8270

Phenols by EPA Method 8270						Analytical Results mg/kg (ppm)														
Study Area	Soil Boring	Sample Number[1]	Chain of Custody Number	Sample Date	Sample Depth (feet bgs)	4-Chloro-3-methylphenol	2-Chlorophenol	2,4-Dichlorophenol	2,4-Dimethylphenol	2,4-Dinitrophenol	2-Methyl-4,6-dinitrophenol	Cresols, Total	4-Methylphenol	2-Nitrophenol	4-Nitrophenol	2,3,4,6-Tetrachlorophenol	Pentachlorophenol	Phenol	2,4,5-Trichlorophenol	2,4,6-Trichlorophenol	Total Phenols
		EPA PRGs for Industrial Soil[3] ==>				#	240	1,800	12,000	1,200	#	#	3,100	#	#	18,000	9.00	100,000	62,000	62	#
FAMM	B-10	950925-B10-04	2708-SD13	25-Sep-95	17.5	ND>5.1	ND>5.1	ND>5.1	ND>5.1	ND>9.9	ND>5.1	ND>5.1	ND>5.1	ND>5.1	ND>5.1	ND>5.1	ND>5.1	ND>5.1	ND>5.1	ND>5.1	ND
Retort / Koppers	B-13	951006-B13-03	2708-SD35	6-Oct-95	10.5	ND>51	ND>51	ND>51	ND>51	ND>99	ND>51	ND>51	ND>51	ND>51	ND>51	ND>51	ND>51	ND>51	ND>51	ND>51	ND
	B-17	950929-B17-05	2708-SD22	29-Sep-95	16.5	ND>5.1	ND>5.1	ND>5.1	ND>5.1	ND>9.9	ND>5.1	ND>5.1	ND>5.1	ND>5.1	ND>5.1	ND>5.1	ND>5.1	ND>5.1	ND>5.1	ND>5.1	ND
	B-18	950919-B18-05	2708-SD03	19-Sep-95	12.0	ND>0.17	ND>0.17	ND>0.17	ND>0.17	ND>0.17	ND>0.17	ND>0.17	ND>0.17	ND>0.17	ND>0.17	ND>0.17	0.36	ND>0.17	ND>0.17	ND>0.17	0.36
	B-19	950919-B19-01	2708-SD03	19-Sep-95	0.2	ND>0.17	ND>0.17	ND>0.17	ND>0.17	ND>0.33	ND>0.17	ND>0.17	ND>0.17	ND>0.17	ND>0.17	ND>0.17	ND>0.17	ND>0.17	ND>0.17	ND>0.17	ND
		950919-B19-03	2708-SD04	19-Sep-95	6.5	ND>26	ND>26	ND>26	ND>26	ND>50	ND>26	ND>26	ND>26	ND>26	ND>26	ND>26	ND>26	ND>26	ND>26	ND>26	ND
	B-20	950929-B20-03	2708-SD22	29-Sep-95	10.5	ND>26	ND>26	ND>26	ND>26	ND>50	ND>26	ND>26	ND>26	ND>26	ND>26	ND>26	ND>26	ND>26	ND>26	ND>26	ND
	B-22	951003-B22-05	2708-SD27	3-Oct-95	13.5	ND>0.17	ND>0.17	ND>0.17	ND>0.17	ND>0.33	ND>0.17	ND>0.17	ND>0.17	ND>0.17	ND>0.17	ND>0.17	ND>0.17	ND>0.17	ND>0.17	ND>0.17	ND
		951003-B22-09	2708-SD28	3-Oct-95	24.0	ND>0.17	ND>0.17	ND>0.17	ND>0.17	ND>.33	ND>0.17	ND>0.17	ND>0.17	ND>0.17	ND>0.17	ND>0.17	ND>0.17	ND>0.17	ND>0.17	ND>0.17	ND
	B-23	951003-B23-09	2708-SD29	3-Oct-95	26.5	ND>0.8	ND>0.8	ND>0.8	ND>0.8	ND>2.0	ND>0.8	ND>0.8	ND>0.8	ND>0.8	ND>0.8	ND>0.8	ND>0.8	ND>0.8	ND>0.8	ND>0.8	ND
	B-27	950920-B27-10	2708-SD05	20-Sep-95	23.0	ND>26	ND>26	ND>26	ND>26	ND>50	ND>26	ND>26	ND>26	ND>26	ND>26	ND>26	ND>26	ND>26	ND>26	ND>26	ND
	MW-10-60	951108-M10-01	2708-SD52	8-Nov-95	0.2	ND>3.4	ND>3.4	ND>3.4	ND>3.4	ND>6.6	ND>3.4	ND>3.4	ND>3.4	ND>3.4	ND>3.4	ND>3.4	ND>3.4	ND>3.4	ND>3.4	ND>3.4	ND
	MW-12-34	951023-M12-06	2708-SD38	23-Oct-95	22.0	ND>1.7	ND>1.7	ND>1.7	ND>1.7	ND>3.3	ND>1.7	ND>1.7	ND>1.7	ND>1.7	ND>1.7	ND>1.7	ND>1.7	ND>1.7	ND>1.7	ND>1.7	ND
Spent Oxide	B-03	950921-B3-05	2708-SD07	21-Sep-95	10.5	ND>1.7	ND>1.7	ND>1.7	ND>1.7	ND>3.3	ND>1.7	ND>1.7	ND>1.7	ND>1.7	ND>1.7	ND>1.7	ND>1.7	ND>1.7	ND>1.7	ND>1.7	ND
Tar Pond	B-26	951003-B26-06	2708-SD30	4-Oct-95	20.5	ND>51	ND>51	ND>51	ND>51	ND>99	ND>51	ND>51	ND>51	ND>51	ND>51	ND>51	ND>51	ND>51	ND>51	ND>51	ND
	B-28	951002-B28-01	2708-SD25	2-Oct-95	0.2	ND>5.1	ND>5.1	ND>5.1	ND>5.1	ND>9.9	ND>5.1	ND>5.1	ND>5.1	ND>5.1	ND>5.1	ND>5.1	ND>5.1	ND>5.1	ND>5.1	ND>5.1	ND
		951002-B28-07	2708-SD25	2-Oct-95	15.0	ND>51	ND>51	ND>51	ND>51	ND>99	ND>51	ND>51	ND>51	ND>51	ND>51	ND>51	ND>51	ND>51	ND>51	ND>51	ND
	B-29	950922-B29-15	2708-SD12	22-Sep-95	35.5	ND>51	ND>51	ND>51	ND>51	ND>99	ND>51	ND>51	ND>51	ND>51	ND>51	ND>51	ND>51	ND>51	ND>51	ND>51	ND
	B-30	950922-B30-06	2708-SD10	22-Sep-95	11.5	ND>51	ND>51	ND>51	ND>51	ND>99	ND>51	ND>51	ND>51	ND>51	ND>51	ND>51	ND>51	ND>51	ND>51	ND>51	ND
	B-31	950925-B31-06	2708-SD14	25-Sep-95	21.0	ND>51	ND>51	ND>51	ND>51	ND>99	ND>51	ND>51	ND>51	ND>51	ND>51	ND>51	ND>51	ND>51	ND>51	ND>51	ND
	B-33	951005-B33-03	2708-SD34	5-Oct-95	5.5	ND>51	ND>51	ND>51	ND>51	ND>99	ND>51	ND>51	ND>51	ND>51	ND>51	ND>51	ND>51	ND>51	ND>51	ND>51	ND
		951005-B33-14	2708-SD34	5-Oct-95	54.0	ND>17	ND>17	ND>17	ND>17	ND>33	ND>17	ND>17	ND>17	ND>17	ND>17	ND>17	ND>17	ND>17	ND>17	ND>17	ND
	B-35	951005-B35-01	2708-SD33	5-Oct-95	0.2	ND>0.17	ND>0.17	ND>0.17	ND>0.17	ND>0.33	ND>0.17	ND>0.17	ND>0.17	ND>0.17	ND>0.17	ND>0.17	ND>0.17	ND>0.17	ND>0.17	ND>0.17	ND
	MW-04-57	951030-M4-01	2708-SD43	30-Oct-95	0.2	ND>51	ND>51	ND>51	ND>51	ND>99	ND>51	ND>51	ND>51	ND>51	ND>51	ND>51	ND>51	ND>51	ND>51	ND>51	ND
		951030-M4-06	2708-SD43	30-Oct-95	25.5	ND>51	ND>51	ND>51	ND>51	ND>99	ND>51	ND>51	ND>51	ND>51	ND>51	ND>51	ND>51	ND>51	ND>51	ND>51	ND

Note: DEQ = Oregon Department of Environmental Quality
EPA = U.S. Environmental Protection Agency
mg/kg = milligrams/kilogram

ND = Not detected above detection limit indicated
ppm = parts per million

[1] = Sample number prefix: 2708-
[2] = Reserved
[3] = Reference Levels are EPA Region 9 Preliminary Remediation Goals (PRGs) for Industrial Soil (Revised 10/2/2002)
# = Reference level not established

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TABLE 12 – Summary of Analytical Results for Soil Samples
Priority Pollutant Metals by EPA Methods 6010 and 7471

Total Metals by EPA Method 6010 and 7471						Analytical Results mg/kg (ppm)											
Area	Soil Boring	Sample Number (Prefix: 2708-)	Chain of Custody Number	Sample Date	Sample Depth (feet bgs)	Antimony	Arsenic	Beryllium	Cadmium	Chromium	Copper	Lead	Mercury	Nickel	Selenium	Silver	Thallium	Zinc
EPA PRGs for Industrial Soil [1] ==>						410.	1.6	1,900.	810.	450.	41,000.	750.	310.	2,000.	5,100.	5,100.	67.	100,000.
Background Levels[2]==>						4.	7.	#	1.	42.	36.	17.	0.07	28.	2.	1.	#	86.
FAMM	B-47	000829-039	2708-S075	29-Aug-00	0.2	1.57 J	ND[a]		ND[a]	1.8	5.87	ND[a]	ND[b]	1.1	ND[a]	ND[a]	ND[c]	33.4
		000829-040	2708-S075	29-Aug-00	0.2 (dup)	1.42 J	ND[a]		ND[a]	2.46	5.92	ND[a]	ND[b]	1.95	ND[a]	ND[a]	ND[c]	35.5
		000829-041	2708-S076	29-Aug-00	5.0	1.02 J	**5.25**		ND[a]	16.1	19.6	12.1	ND[b]	13.5	ND[a]	ND[a]	ND[c]	55.2
		000829-042	2708-S076	29-Aug-00	11.5	1.07 J	**2.67**		ND[a]	13.9	17.6	14.6	2.	14.7	ND[a]	ND[a]	ND[c]	53.
		000829-043	2708-S076	29-Aug-00	11.5 (dup)	ND[a] UJ	**3.33**		ND[a]	15.1	19.4	11.9	ND[b]	12.2	ND[a]	ND[a]	ND[c]	52.5
		000829-045	2708-S076	29-Aug-00	31.0	-	-		-	-	-	-	-	-	-	-	-	-
	B-51	000828-023	2708-S071	28-Aug-00	0.2	2.26 J	**3.14**		ND[a]	ND[a]	70.9	34.7	30.4	ND[b]	146.	ND[a]	ND[a]	ND[c]	114.
		000828-024	2708-S073	28-Aug-00	2.0	ND[a] UJ	**2.57**		ND[a]	ND[a]	12.9	11.	2.4	ND[b]	14.8	ND[a]	ND[a]	ND[a]	ND[a]
		000828-025	2708-S073	28-Aug-00	8.5	-	-		-	-	-	-	-	-	-	-	-	-	-
	B-52	000828-026	2708-S071	28-Aug-00	0.2	ND[a] UJ	ND[a]		ND[a]	ND[a]	ND[a]	3.83	4.01	ND[b]	3.78	ND[a]	ND[a]	ND[a]	28.4
		000828-027	2708-S073	28-Aug-00	3.5	ND[a] UJ	**2.54**		ND[a]	ND[a]	11.8	11.8	1.78	ND[b]	14.3	ND[a]	ND[a]	ND[a]	35.9
		000828-028	2708-S073	28-Aug-00	10.5	-	-		-	-	-	-	-	-	-	-	-	-	-
		000828-029	2708-S073	28-Aug-00	10.5 (dup)	-	-		-	-	-	-	-	-	-	-	-	-	-
	GT-1	971117-001	2708-S054	17-Nov-97	3.0	-	**1.8**		-	-	-	-	-	-	-	-	-	-	-
		971117-004	2708-S054	17-Nov-97	10.5	-	**1.8**		-	-	-	-	-	-	-	-	-	-	-
		971117-006	2708-S054	17-Nov-97	16.0	-	**2.4**		-	-	-	-	-	-	-	-	-	-	-
		971117-008	2708-S054	17-Nov-97	20.5	-	1.5		-	-	-	-	-	-	-	-	-	-	-
		971117-011	2708-S054	17-Nov-97	35.5	-	1.2		-	-	-	-	-	-	-	-	-	-	-
	GT-2	971117-012	2708-S054	17-Nov-97	3.5	-	1.1		-	-	-	-	-	-	-	-	-	-	-
		971117-017	2708-S055	17-Nov-97	15.5	-	**2.2**		-	-	-	-	-	-	-	-	-	-	-
		971117-021	2708-S055	17-Nov-97	33.0	-	ND[a]		-	-	-	-	-	-	-	-	-	-	-
	GT-3	971118-023	2708-S056	18-Nov-97	3.0	-	**2.7**		-	-	-	-	-	-	-	-	-	-	-
		971118-026	2708-S056	18-Nov-97	12.5	-	**1.9**		-	-	-	-	-	-	-	-	-	-	-
		971118-032	2708-S056	18-Nov-97	36.0	-	1.		-	-	-	-	-	-	-	-	-	-	-
	GT-4	971118-034	2708-S056	18-Nov-97	13.5	-	2.		-	-	-	-	-	-	-	-	-	-	-
		971118-038	2708-S057	18-Nov-97	40.5	-	1.3		-	-	-	-	-	-	-	-	-	-	-

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TABLE 12 – Summary of Analytical Results for Soil Samples
Priority Pollutant Metals by EPA Methods 6010 and 7471

Total Metals by EPA Method 6010 and 7471						Analytical Results mg/kg (ppm)												
Area	Soil Boring	Sample Number (Prefix: 2708-)	Chain of Custody Number	Sample Date	Sample Depth (feet bgs)	Antimony	Arsenic	Beryllium	Cadmium	Chromium	Copper	Lead	Mercury	Nickel	Selenium	Silver	Thallium	Zinc
EPA PRGs for Industrial Soil [1] ==>						410.	1.6	1,900.	810.	450.	41,000.	750.	310.	2,000.	5,100.	5,100.	67.	100,000.
Background Levels[2]==>						4.	7.	#	1.	42.	36.	17.	0.07	28.	2.	1.	#	86.
FAMM (cont.)	MW-13	971218-M13-02	2708-S058	18-Dec-97	6.0	-	**2.7**	-	-	-	-	-	-	-	-	-	-	-
		971218-M13-03	2708-S058	18-Dec-97	10.0	-	**2.8**	-	-	-	-	-	-	-	-	-	-	-
		971218-M13-04	2708-S058	18-Dec-97	13.5	-	**2.7**	-	-	-	-	-	-	-	-	-	-	-
		971218-M13-05	2708-S058	18-Dec-97	18.0	-	**2.5**	-	-	-	-	-	-	-	-	-	-	-
		971218-M13-08	2708-S058	18-Dec-97	24.5	-	**1.8**	-	-	-	-	-	-	-	-	-	-	-
		971218-M13-10	2708-S058	18-Dec-97	28.0	-	-	-	-	-	-	-	-	-	-	-	-	-
		971218-M13-11	2708-S058	18-Dec-97	31.0	-	**1.8**	-	-	-	-	-	-	-	-	-	-	-
		971218-M13-17	2708-S059	18-Dec-97	57.0	-	-	-	-	-	-	-	-	-	-	-	-	-
Office Area	B-38	000828-014	2708-S071	28-Aug-00	0.2	1.71 J	**5.26**	ND[a]	ND[a]	24.7	52.1	33.6	ND[b]	25.6	ND[a]	ND[a]	ND[a]	69.3
		000828-015	2708-S072	28-Aug-00	2.0	2.92 J	**6.37**	ND[a]	ND[a]	19.7	35.2	40.3	ND[b]	17.9	ND[a]	ND[a]	ND[a]	70.3
		000828-016	2708-S072	28-Aug-00	8.5	-	-	-	-	-	-	-	-	-	-	-	-	-
	B-39	000828-004	2708-S071	28-Aug-00	0.2	1.43 J	**5.05**	ND[a]	ND[a]	18.9	22.	36.6	ND[b]	84.	ND[a]	ND[a]	ND[a]	82.7
		000828-005	2708-S072	28-Aug-00	3.0	1.42 J	**4.86**	ND[a]	ND[a]	15.1	14.9	15.7	ND[b]	12.5	ND[a]	ND[a]	ND[a]	55.6
		000828-006	2708-S072	28-Aug-00	9.5	-	-	-	-	-	-	-	-	-	-	-	-	-
	B-40	000828-010	2708-S071	28-Aug-00	0.2	1.01 J	**3.39**	ND[a]	ND[a]	16.2	23.2	55.4	ND[b]	39.8	ND[a]	ND[a]	ND[a]	92.9
		000828-011	2708-S072	28-Aug-00	2.5	ND[a] UJ	**2.69**	ND[a]	ND[a]	13.1	12.2	2.27	ND[b]	15.6	ND[a]	ND[a]	ND[a]	36.9
		000828-012	2708-S072	28-Aug-00	9.5	-	-	-	-	-	-	-	-	-	-	-	-	-
	B-41	000828-007	2708-S071	28-Aug-00	0.2	1.96 J	**4.97**	ND[a]	ND[a]	14.7	19.7	21.4	ND[b]	20.9	ND[a]	ND[a]	ND[a]	74.4
		000828-008	2708-S072	28-Aug-00	2.5	1.24 J	**4.1**	ND[a]	ND[a]	13.7	19.	24.6	ND[b]	21.1	ND[a]	ND[a]	ND[a]	57.9
		000828-009	2708-S072	28-Aug-00	9.5	ND[a] UJ	**2.55**	ND[a]	ND[a]	12.9	12.5	1.94	ND[b]	15.3	ND[a]	ND[a]	ND[a]	36.2
Retorts/Koppers	B-42	000828-020	2708-S071	28-Aug-00	0.2	1.16 J	ND[a]	ND[a]	ND[a]	ND[a]	4.3	ND[a]	ND[b]	ND[a]	ND[a]	ND[a]	ND[a]	27.5
		000828-021	2708-S073	28-Aug-00	1.0	ND[a] UJ	**2.74**	ND[a]	ND[a]	13.7	12.4	3.19	ND[b]	16.5	ND[a]	ND[a]	ND[a]	64.2
		000828-022	2708-S073	28-Aug-00	7.5	-	-	-	-	-	-	-	-	-	-	-	-	-
	B-43	000829-050	2708-S075	29-Aug-00	0.2	3.76 J	**3.04**	ND[a]	ND[a]	22.3	40.9	94.6	3.23	19.8	ND[a]	ND[a]	ND[c]	226.
		000829-046	2708-S076	29-Aug-00	2.0	ND[a] UJ	**2.89**	ND[a]	ND[a]	11.4	11.8	2.44	0.105	17.3	ND[a]	ND[a]	ND[c]	35.9
		000829-047	2708-S076	29-Aug-00	2.0 (dup)	ND[a] UJ	**2.93**	ND[a]	ND[a]	12.3	11.8	1.97	ND[b]	15.5	ND[a]	ND[a]	ND[c]	36.8
		000829-048	2708-S076	29-Aug-00	8.5	-	-	-	-	-	-	-	-	-	-	-	-	-
		000829-049	2708-S076	29-Aug-00	8.5 (dup)	-	-	-	-	-	-	-	-	-	-	-	-	-
	B-44	000829-052	2708-S075	29-Aug-00	0.2	NDa UJ	**3.4**	ND[a]	ND[a]	12.6	12.5	1.76	ND[b]	14.6	ND[a]	ND[a]	ND[c]	37.9
		000829-051	2708-S076	29-Aug-00	3.5	ND[a] UJ	**2.46**	ND[a]	ND[a]	10.8	11.9	1.7	ND[b]	13.8	ND[a]	ND[a]	ND[c]	36.1
		000829-053	2708-S076	29-Aug-00	10.0	-	-	-	-	-	-	-	-	-	-	-	-	-

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TABLE 12 – Summary of Analytical Results for Soil Samples
Priority Pollutant Metals by EPA Methods 6010 and 7471

Total Metals by EPA Method 6010 and 7471						Analytical Results mg/kg (ppm)											
Area	Soil Boring	Sample Number (Prefix: 2708-)	Chain of Custody Number	Sample Date	Sample Depth (feet bgs)	Antimony	Arsenic	Beryllium	Cadmium	Chromium	Copper	Lead	Mercury	Nickel	Selenium	Silver	Thallium	Zinc
EPA PRGs for Industrial Soil [1] ==>						410.	1.6	1,900.	810.	450.	41,000.	750.	310.	2,000.	5,100.	5,100.	67.	100,000.
Background Levels[2]==>						4.	7.	#	1.	42.	36.	17.	0.07	28.	2.	1.	#	86.
Retorts/Koppers (cont.)	B-45	000829-054	2708-S075	29-Aug-00	0.2	1.44 J	ND[a]		ND[a]	4.96	10.1	2.77	ND[b]	3.16	ND[a]	ND[a]	ND[c]	42.3
		000829-055	2708-S076	29-Aug-00	2.0	1.11 J	**9.02**		ND[a]	15.8	21.3 J	10.2 J	ND[b]	14.4	ND[a]	ND[a]	ND[c]	58.8
		000829-056	2708-S076	29-Aug-00	2.0 (dup)	1.02 J	**5.52**		ND[a]	16.5	70.7 J	31.1 J	ND[b]	18.9	ND[a]	ND[a]	ND[c]	60.4
		000829-057	2708-S077	29-Aug-00	8.5	-	-	-	-	-	-	-	-	-	-	-	-	-
	B-46	000829-058	2708-S075	29-Aug-00	0.2	1.16 J	ND[a]		ND[a]	11.1	11.5	8.2	ND[b]	6.57	ND[a]	ND[a]	ND[c]	71.4
		000829-059	2708-S077	29-Aug-00	5.0	ND[a] UJ	**2.75**		ND[a]	12.5	11.5	1.65	ND[b]	13.3	ND[a]	ND[a]	ND[c]	35.7
		000829-060	2708-S077	29-Aug-00	10.5	ND[a] UJ	1.46		ND[a]	9.21	10.1	1.36	ND[b]	12.3	ND[a]	ND[a]	ND[a]	28.5
	SS-12	000829-061	2708-S075	29-Aug-00	0.2	ND[a] UJ	ND[a]		ND[a]	5.55	21.7	3.74	ND[b]	4.89	ND[a]	ND[a]	ND[c]	45.9
	SS-13	000829-062	2708-S075	29-Aug-00	0.2	ND[a] UJ	ND[a]		ND[a]	1.07	6.24	1.23	ND[b]	ND[a]	ND[a]	ND[a]	ND[c]	32.7
	SS-14	000829-063	2708-S075	29-Aug-00	0.2	1.34 J	ND[a]		ND[a]	3.21	5.41	4.17	ND[b]	2.08	ND[a]	ND[a]	ND[c]	55.1
	SS-15	000829-064	2708-S075	29-Aug-00	0.2	1.13 J	**3.34**		ND[a]	4.94	11.	132 J	0.578	5.78	ND[a]	ND[a]	ND[c]	58.5
		000829-065	2708-S075	29-Aug-00	0.2 (dup)	ND[a] UJ	ND[a]		ND[a]	5.47	6.73	4.33 J	ND[b]	3.02	ND[a]	ND[a]	ND[c]	37.9
Spent Oxide	B-1	950921-B1-01	2708-S009	21-Sep-95	0.2	ND[a]	**6.6 J**		ND[a]	26.	41.	60.	ND[b]	21.	ND[a]	ND[a]	4.1	140.
		950921-B1-02	2708-S009	21-Sep-95	0.2 (dup)	6.6	**21 J**		ND[a]	1.1	30.	60.	ND[b]	26.	ND[a]	ND[a]	7.6	160.
		950921-B1-05	2708-S009	21-Sep-95	10.5	ND[a]	**14.**		ND[a]	3.4	11.	80.	130.	ND[b]	36.	ND[a]	ND[a]	3.	670.
	B-2	950927-B2-05	2708-S016	27-Sep-95	16.0	ND[a]	**4.9**		ND[a]	4.3	12.	20.	15.	ND[b]	31.	ND[a]	ND[a]	3.8	3,000.
	B-3	950921-B3-05	2708-S007	21-Sep-95	10.5	ND[a] UJ	**7.**		ND[a]	ND[a]	30 J	35 J	22.	ND[b]	41 J	ND[a]	ND[a]	5.	120 J
	B-36	000828-017	2708-S071	28-Aug-00	0.2	1.27 J	**4.16**		ND[a]	ND[a]	18.	29.7	40.2	ND[b]	14.4	ND[a]	ND[a]	ND[c]	82.8
		000828-018	2708-S072	28-Aug-00	3.5	1.59 J	**4.89**		ND[a]	ND[a]	15.2	18.9	47.	ND[b]	12.3	ND[a]	ND[a]	ND[a]	67.3
		000828-019	2708-S073	28-Aug-00	10.0	1.26 J	**2.07**		ND[a]	ND[a]	6.58	13.1	8.56	ND[b]	6.91	ND[a]	ND[a]	ND[a]	45.2
	B-37	000828-001	2708-S071	28-Aug-00	0.2	1.73 J	ND[a]		ND[a]	ND[a]	5.43 J	10.2	7.69	ND[b]	3.98	ND[a] UJ	ND[a]	ND[a] UJ	49.8
		000828-002	2708-S072	28-Aug-00	4.5	ND[a] UJ	**3.2**		ND[a]	ND[a]	13.5	10.3	2.61	ND[b]	16.1	ND[a]	ND[a]	ND[a]	51.9
		000828-003	2708-S072	28-Aug-00	11.0	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	MW-02-61	981007-M2-01	2708-S060	7-Oct-98	2.0	-	**3.44**	-	-	-	-	-	-	-	-	-	-	-	-
		981007-M2-02	2709-S060	7-Oct-98	5.5	-	**4.**	-	-	-	-	-	-	-	-	-	-	-	-
		981007-M2-03	2709-S060	7-Oct-98	32.0	-	**3.**	-	-	-	-	-	-	-	-	-	-	-	-

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TABLE 12 – Summary of Analytical Results for Soil Samples
Priority Pollutant Metals by EPA Methods 6010 and 7471

Total Metals by EPA Method 6010 and 7471						Analytical Results mg/kg (ppm)												
Area	Soil Boring	Sample Number (Prefix: 2708-)	Chain of Custody Number	Sample Date	Sample Depth (feet bgs)	Antimony	Arsenic	Beryllium	Cadmium	Chromium	Copper	Lead	Mercury	Nickel	Selenium	Silver	Thallium	Zinc
EPA PRGs for Industrial Soil [1] ==>						410.	1.6	1,900.	810.	450.	41,000.	750.	310.	2,000.	5,100.	5,100.	67.	100,000.
Background Levels[2]==>						4.	7.	#	1.	42.	36.	17.	0.07	28.	2.	1.	#	86.
Tar Pond	B-48	000828-030	2708-S071	28-Aug-00	0.2	1.57 J	ND[a]	ND[a]	ND[a]	5.01	12.9	3.78	ND[b]	5.44	ND[a]	ND[a]	ND[c]	54.4
		000828-031	2708-S073	28-Aug-00	5.0	1.03 J	ND[a] UJ	ND[a]	ND[a]	8.86	9.23	18.3	ND[b]	11.1	ND[a] UJ	ND[a]	ND[c] R	43.4
		000828-032	2708-S073	28-Aug-00	9.5	-	-	-	-	-	-	-	-	-	-	-	-	-
	B-49	000828-036	2708-S071	28-Aug-00	0.2	1.62 J	ND[a]	ND[a]	ND[a]	9.26	9.62	6.93	ND[b]	4.7	ND[a]	ND[a]	ND>100	63.9
		000828-037	2708-S074	28-Aug-00	1.5	1.54 J	ND[a]	ND[a]	ND[a]	10.6	9.9	6.68	ND[b]	6.9	ND[a]	ND[a]	ND[c]	53.
		000828-038	2708-S074	28-Aug-00	8.0	-	-	-	-	-	-	-	-	-	-	-	-	-
	B-50	000828-033	2708-S071	28-Aug-00	0.2	1.87 J	1.11	ND[a]	ND[a]	11.9	16.7	10.8	ND[b]	5.92	ND[c]	ND[c]	ND>100	67.2
		000828-034	2708-S073	28-Aug-00	1.0	1.52 J	ND[a]	ND[a]	ND[a]	10.2	10.7	11.1	ND[b]	8.65	ND[a]	ND[a]	ND[c]	62.6
		000828-035	2708-S073	28-Aug-00	6.0	1.59 J	ND[a]	ND[a]	ND[a]	10.	10.4	12.6	ND[b]	10.1	ND[a]	ND[a]	ND>100	61.4
	MW-04-101	981014-M4-01	2708-S063	14-Oct-98	2.0	-	ND[a]	-	-	-	-	-	-	-	-	-	-	-
		981014-M4-02	2708-S063	14-Oct-98	6.0	-	ND[a]	-	-	-	-	-	-	-	-	-	-	-
		981014-M4-03	2708-S063	14-Oct-98	10.5	-	ND[a]	-	-	-	-	-	-	-	-	-	-	-
	MW-05-175	981019-M5-01	2708-S065	19-Oct-98	5.0	-	1.1	-	-	-	-	-	-	-	-	-	-	-
		981019-M5-02	2708-S065	19-Oct-98	5.0 (dup)	-	ND[a]	-	-	-	-	-	-	-	-	-	-	-
		981019-M5-03	2708-S065	19-Oct-98	9.5	-	ND[a]	-	-	-	-	-	-	-	-	-	-	-
		981020-M5-09	-	20-Oct-98	71.0	-	-	-	-	-	-	-	-	-	-	-	-	-
	MW-14-110	981014-M14-01	2708-S063	14-Oct-98	3.5	-	ND[a]	-	-	-	-	-	-	-	-	-	-	-
		981014-M14-02	2708-S063	14-Oct-98	6.0	-	ND[a]	-	-	-	-	-	-	-	-	-	-	-
		981014-M14-03	2708-S063	14-Oct-98	10.0	-	**1.8**	-	-	-	-	-	-	-	-	-	-	-
		981014-M14-07	2708-S063	14-Oct-98	43.5	-	**1.8**	-	-	-	-	-	-	-	-	-	-	-
		981016-M14-13	2708-S064	16-Oct-98	69.5	-	**5.2**	-	-	-	-	-	-	-	-	-	-	-
		981019-M14-20	2708-S065	19-Oct-98	106.0	-	-	-	-	-	-	-	-	-	-	-	-	-

NOTE:
bgs = below ground surface
dup = field duplicate sample
EPA = U.S. Environmental Protection Agency
mg/kg = milligrams per kilogram
J indicates an estimated value (validation qualifier)
UJ indicates an estimated reporting limit (validation qualifier)
R result is unusable due to serious deficiencies in meeting quality control criteria (validation qualifier)
Underline = Concentration exceeds default background level
Bold = Concentration exceedsEPA PRG for residential soil
Bold and Underline = Concentration exceeds default background level and EPA PRG for residential soil

ND = Not detected above detection limit indicated
ppm = parts per million
1 = Reference Levels are EPA Region 9 Preliminary Remediation Goals (PRGs) for Industrial Soil (Revised 10/2/2002)
2 = DEQ Default Background Concentrations for Metals (October 2002)
# = Reference level not established

a = detection limit is 1.00 mg/kg (ppm)
b = detection limit is 0.100 mg/kg
c = detection limit is 10 mg/kg

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TABLE 13 – Summary of Analytical Results for Soil Samples: Physical Properties

Study Area	Soil Boring Number	Sample Number[1]	Chain of Custody Number	Sample Date	Depth (feet bgs)	Soil Description	Analytical Results				
							EPA Method 160.3M	ASTM Method D4129-82M	ASTM Method E1109-86	ASTM Method D854-83	ASA Method 921-2.2
						(surficial fill unit unless otherwise noted)	Total Solids (%)	TOC (%)	Density (g/cm^3)	Specific Gravity	Porosity (% Pore Space)
FAMM	B-47	000829-042	2708-S076	29-Aug-00	11.5	Silty Sand	83.	0.35	1.04	1.8	42.
		000829-043	2708-S076	29-Aug-00	11.5 (dup)	Silty Sand	79.7	1.21	-	-	-
		000829-045	2708-S076	29-Aug-00	31.0	Sand (Alluvial)	84.6	2.47	-	-	-
	B-51	000828-025	2708-S073	28-Aug-00	8.5	Sand	92.6	0.85	1.05	2.	47.
	B-52	000828-028	2708-S073	28-Aug-00	10.5	Sand	82.6	0.44	-	-	-
		000828-029	2708-S073	28-Aug-00	10.5 (dup)	Sand	63.2	-	1.32	1.37	4.
Office	B-38	000828-016	2708-S072	28-Aug-00	8.5	Gravelly Silt	79.3	5.23	1.03	1.74	41.
	B-39	000828-006	2708-S072	28-Aug-00	9.5	Sand	90.	0.18	-	-	-
	B-40	000828-012	2708-S072	28-Aug-00	9.5	Silt (Alluvial)	75.3	0.8	-	-	-
	B-41	000828-009	2708-S072	28-Aug-00	9.5	Sand (Alluvial)	89.9	0.45	1.04	1.89	45.
Retort / Koppers	B-42	000828-022	2708-S073	28-Aug-00	7.5	Sand	90.	0.39	1.06	1.87	43.
	B-43	000829-048	2708-S076	29-Aug-00	8.5	Sand	93.1	1.49	-	-	-
	B-44	000829-053	2708-S076	29-Aug-00	10.0	Tarry Sand and Gravel	85.5	42.	-	-	-
	B-45	000829-057	2708-S077	29-Aug-00	8.5	Sand	93.4	3.85	-	-	-
	B-46	000829-059	2708-S077	29-Aug-00	5.0	Sand	93.7	0.26	1.17	2.04	43.
Spent Oxide	B-36	000828-019	2708-S073	28-Aug-00	10.0	Sandy Gravelly Silt	80.4	-	1.26	1.79	30.
	B-37	000828-003	2708-S072	28-Aug-00	11.0	Sand	94.6	0.22	1.13	2.22	49.
Tar Pond	B-48	000828-032	2708-S073	28-Aug-00	9.5	Tarry Sandy Gravel	81.7	17.9	-	-	-
	B-49	000828-037	2708-S074	28-Aug-00	1.5	Sandy Silty Gravel	87.7	4.56	-	-	-
	B-50	000828-035	2708-S073	28-Aug-00	6.0	Tarry Silty Sandy Gravel	76.2	27.9	1.01	1.56	35.
	MW-16-65	MW-16-65	-	19-Jul-04	multiple	See PTS Laboratories Physical Properties Data Tables and Charts included within Appendix I					

NOTE: ASA = American Standards Associaton
ASTM = American Society of Testing Materials
bgs = below ground surface

1 = Sample number prefix: 2708-

dup = field duplicate sample
EPA = U.S. Environmental Protection Agency
TOC = total organic carbon
g/cm^3 = gram per cubic centimeter

SCOEPA00014220

TABLE 14
Summary of DNAPL Testing Results: Physical and Chemical

Parameter	Unit of Measure	Analytical Result			
		Well MW-6-32	**Well MW-10-25**	**Well MW-11-32**	**Well MW-16-45**
		Sample No.2708-981214-MW6-32-01	Sample No. 2708-981214-MW10-25-02	Sample No. 2708-981214-MW11-32-03	Sample No. 2708-041011MW-16-45-0il
Total Metals [1]	mg/kg (ppm)				
Arsenic		2.75	3.85	-	-
Barium		ND>0.500	0.700	-	-
Cadmium		ND>0.500	ND>0.500	-	-
Chromium		0.700	0.850	-	-
Lead		ND>10	ND>10	-	-
Mercury		0.059	ND>0.0500	-	-
Selenium		0.550	ND>0.500	-	-
Silver		ND>0.500	ND>0.500	-	-
Aromatic Hydrocarbons [2]	mg/kg (ppm)				
Benzene		589	14,400	2,740	ND>10.0
Ethylbenzene		2,220	5,320	1,760	34.4
1,2,4-Trimethylbenzene		-	-	-	54.9
1,3,5-Trimethylbenzene		-	-	-	16.2
Naphthalene		-	-	-	1,720
Toluene		ND>5.00	21,900	2,950	17.8
Xylene		1,240	19,500	4,400	66.1
PAHs [3]	mg/kg (ppm)				
Total PAHs		214,900	189,700	164,470	32,787
Total Carcinogenic PAHs		9,300	19,490	16,210	2,647
Petroleum Hydrocarbon ID [4]	None				
Gasoline-Range		Detected [12]	Detected [12]	Detected [12]	Not Detected
Diesel-Range		Detected [12]	Detected [12]	Detected [12]	Detected [12]
Heavy Oil-Range		Detected [12]	Detected [12]	Detected [12]	Detected [12]
Reactive Cyanide [5]	mg/kg (ppm)	ND>0.200	ND>0.200	-	-
Reactive Sulfide [6]	mg/kg (ppm)	434	ND>50.0	-	-
Specific Gravity [7]	gm/cc	1.05	1.05	1.09	1.084 @ 70F; 1.079 @100F; 1.080 @130F
Viscosity [8]	cSt	7.2	14.7	45.7	105 @ 70F; 40.1@100F; 18.7@130F
Ignitability [9]	degrees F	No Flash to 150 degrees F	94.0 degrees F	-	No Flash to 150 degrees F
Heating Value [10]	BTU/lb	9,230	12,230	12,280	-
pH [11]	pH unit	6.26	4.30	-	8.28

NOTE:

1 = EPA Method 6010/6020/7471
2 = EPA Method 8020A or EPA 8260B
3 = EPA Method 8270 SIM
4 = EPA Method 8015M or NW-TPH Methodology
5 = EPA Method 9010A
6 = EPA Method 9030
7 = SM 2710F
8 = ASTM Method D-445
9 = EPA Method 1010
10 = ASTM Method D2015
11 = EPA Method 150.1/9040A
12 = Laboratory reports that detected hydrocarbons have pattern and range consistent with creosotes

cc=cubic centimeter
cSt = centistokes
BTU = british thermal unit
DNAPL = dense non-aqueous phase liquids
EPA = U. S. Environmental Protection Agency
gm = gram
lb = pound
mg/kg = milligrams/kilogram
ND = not detected above detection limit indicated
ppm = parts per million

TABLE 15
Summary of DNAPL Testing Results:
PAHs by EPA 8270 SIM

Analytical Parameters	**Laboratory Analytical Testing Results** in mg/kg (ppm)							
Sample Location ==>	MW-6-32		MW-10-25		MW-11-32		MW-16-45	
Sample Number ==>	MW-6-32-01		MW-10-25-02		MW-11-32-03		MW-16-45-oil	
Sample Date ==>	14-Dec-98		14-Dec-98		14-Dec-98		11-Oct-04	
Non-Carcinogenic PAHs								
Acenaphthene	25,800.		14,500.		9,140.		1,500.	
Acenaphthylene	2,010.	U	4,940.		7,480.		165.	
Anthracene	16,200.		10,300.		9,810.		1,110.	
Benzo (ghi) perylene	2,010.	U	2,370.		2,630.		385.	
Fluoranthene	25,700.		27,200.		25,000.		1,800.	
Fluorene	13,000.		12,100.		10,100.		1,100.	
Naphthalene	31,300.		13,300.		13,400.		15,600.	
Phenanthrene	67,100.		58,200.		45,900.		6,200.	
Pyrene	26,500.		27,300.		24,800.		2,280.	
Carcinogenic PAHs								
Benzo (a) anthracene	4,030.		4,890.		4,060.		565.	
Benzo (a) pyrene	2,010.	U	4,000.		3,920.		508.	
Benzo (b) fluoranthene	2,010.	U	2,040.		2,010.	U	289.	
Benzo (k) fluoranthene	2,010.	U	2,330.		2,790.		277.	
Chrysene	5,270.		6,230.		5,440.		666.	
Dibenz (a,h) anthracene	2,010.	U	2,010.	U	2,010.	U	68.2	
Indeno (1,2,3-cd) pyrene	2,010.	U	2,010.	U	2,010.	U	274.	
Total Carcinogenic PAHs	9,300.		19,490.		16,210.		2,647.2	
Total PAHs	214,900.		189,700.		164,470.		32,787.2	

Note:
EPA = U.S. Environmental Protection Agency
mg/kg = milligrams/kilogram
PAHs = polynuclear aromatic hydrocarbons
ppm = parts per million
U = not detected above concentration indicated

TABLE 16
Summary of DNAPL Testing Results:
SVOCs by EPA 8270C

Analytical Parameters	**Laboratory Analytical Testing Results** in mg/kg (ppm)
Sample Location ==>	MW-16-45
Sample Number ==>	MW-16-45-oil
Sample Date ==>	11-Oct-04
Acenaphthene	1,570.
Anthracene	1,020.
Fluoranthene	1,780.
Fluorene	995.
2-Methylnaphthalene	5,500.
Naphthalene	15,400.
Phenanthrene	6,020.
Pyrene	2,210.
All Others	Not Detected

Note:
EPA = U.S. Environmental Protection Agency
mg/kg = milligrams/kilogram
ppm = parts per million
SVOCs = semi-volatile organic compounds

Table 17 - Summary Of DNAPL Recovery Volume: Well MW-16-45

NW Natural
7900 NW St. Helens Road
Portland, Oregon

Project No. 2708

Date	DNAPL Recovered (per event)	Cumulative Volume Recovered	NAPL Thickness In Well (feet)
05-Oct-04	1.0	1	1.6
06-Oct-04	0.5	2	0.09
11-Oct-04	0.5	2	0.85
15-Oct-04	0.25	2	0.45
18-Oct-04	0.5	3	0.75
29-Oct-04	1.0	4	1.0
03-Nov-04	0.5	4	0.75
01-Dec-04	0.25	5	1.15

Notes: DNAPL = dense non-aqueous phase liquids

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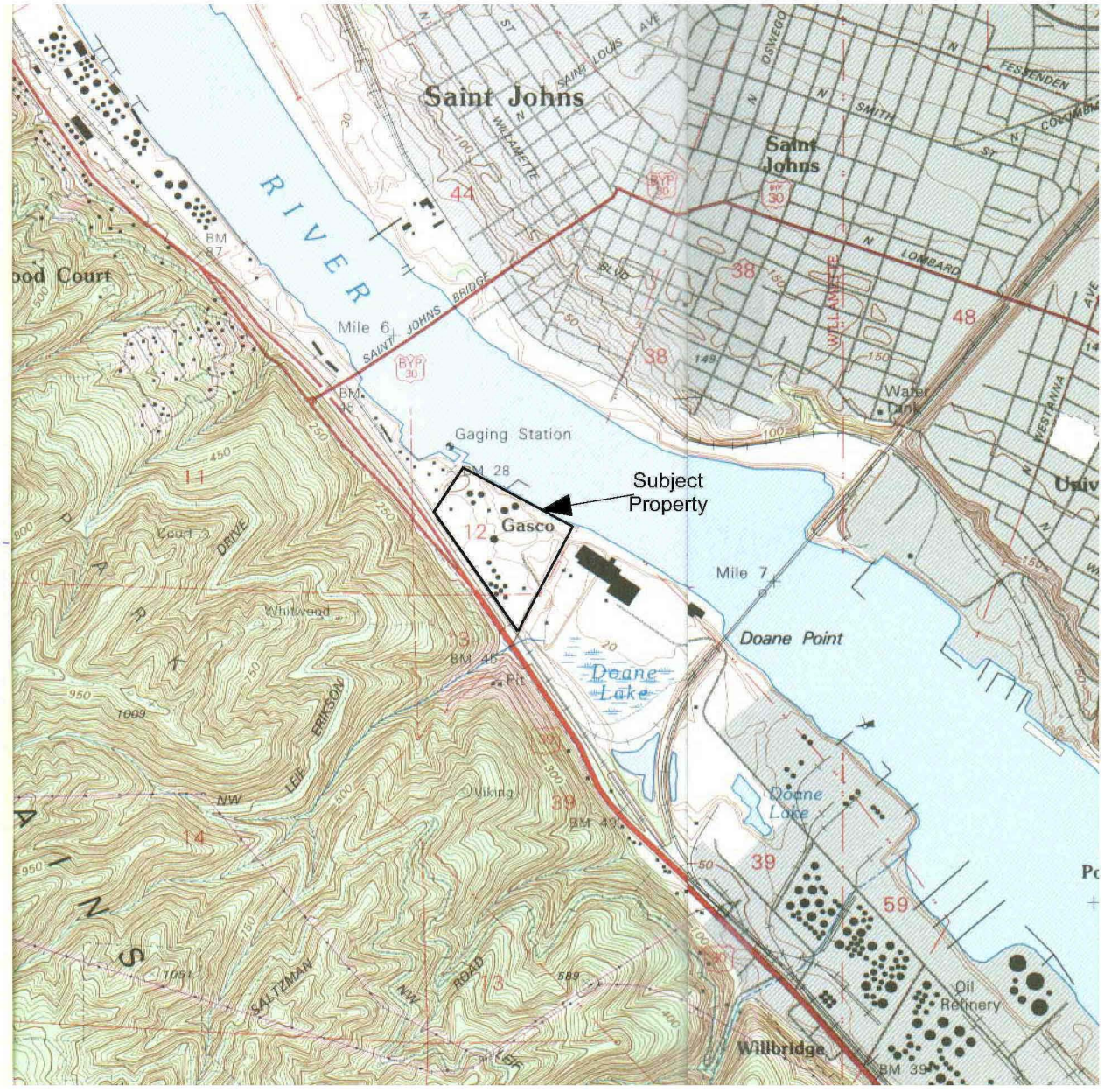
FIGURES

SCOEPA00014225



Note: Base Map from Linnton (1990) and Portland (1990), Oregon, USGS 7.5-Minute Quadrangles

N

0 2,000 4,000

Approximate Scale in Feet
Contour Interval = 10 feet

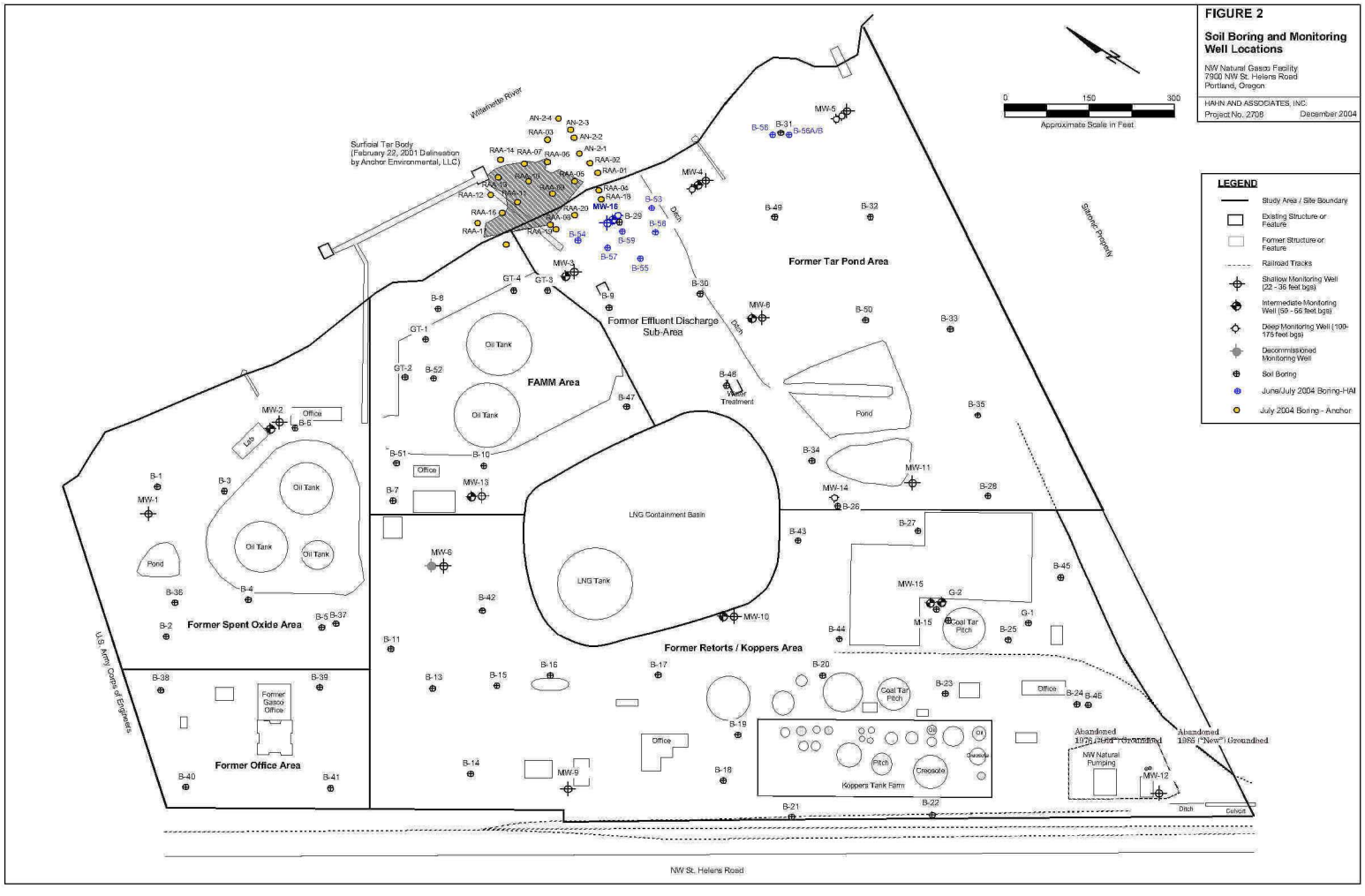
FIGURE 1

Location Map

NW Natural Gasco Facility
7900 NW St. Helens Road
Portland, Oregon

HAHN AND ASSOCIATES, INC.
Project No. 2708 December 2004

File: 2708-01 Location Map



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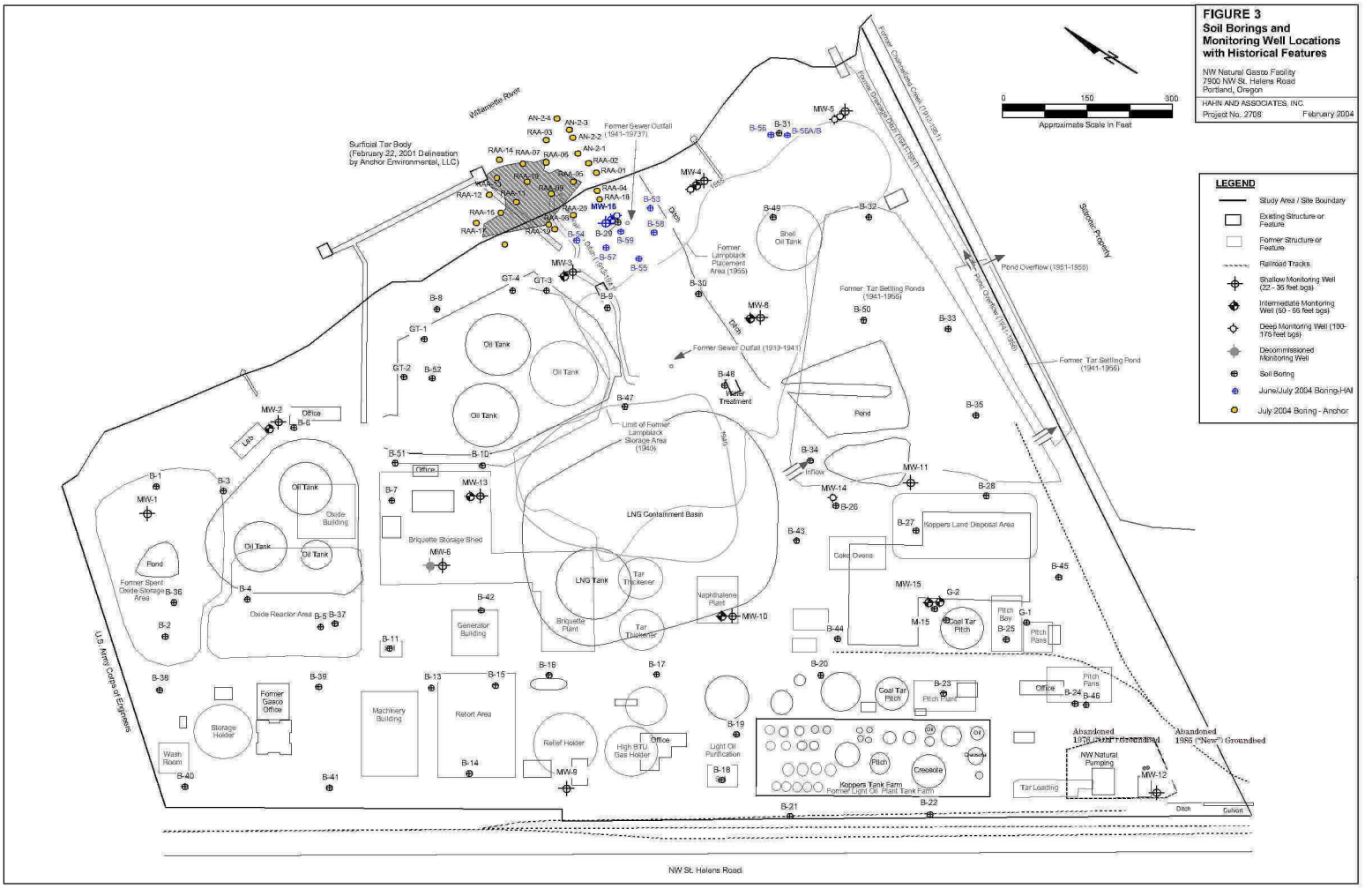

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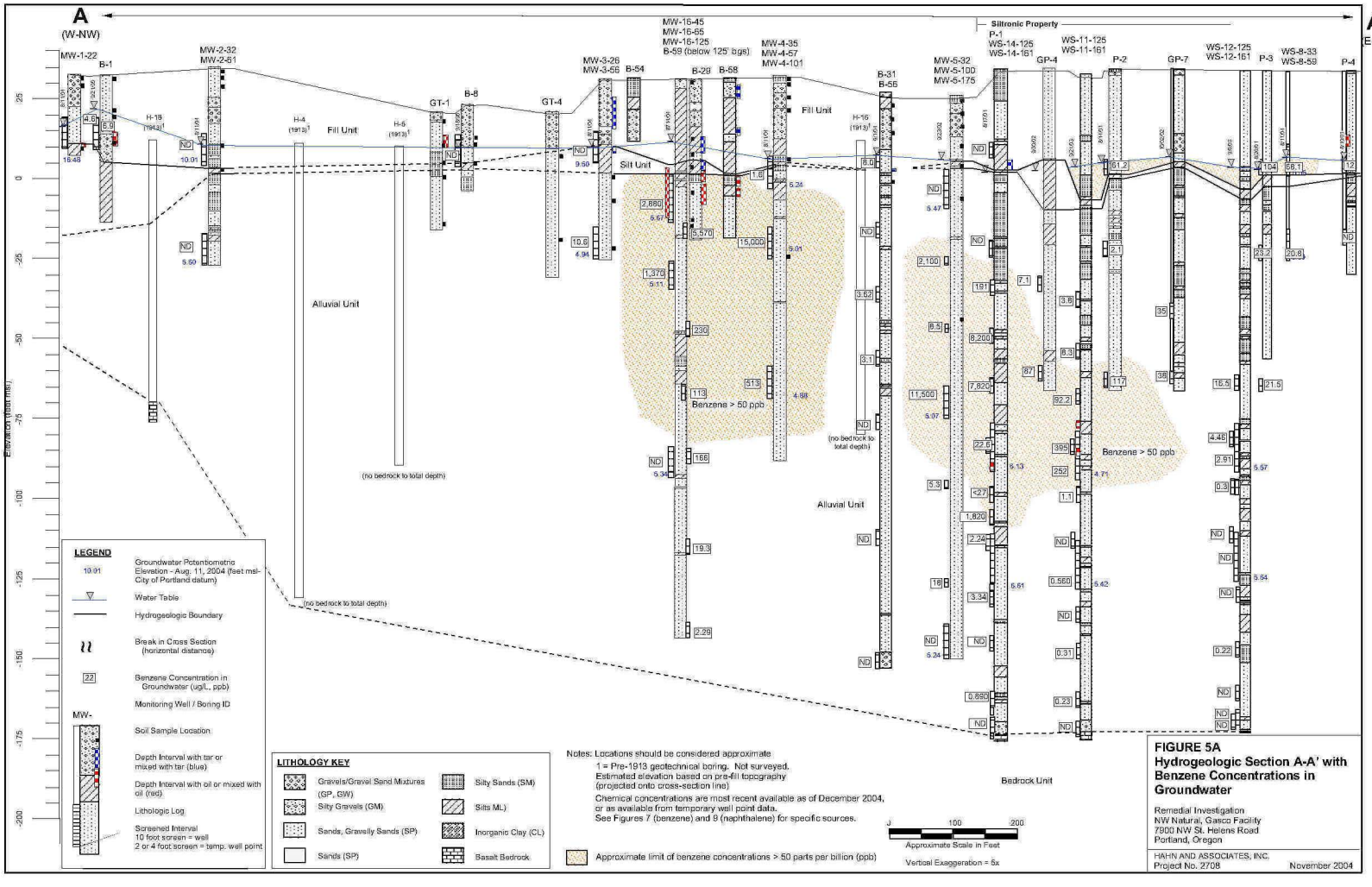

FIGURE 5A
Hydrogeologic Section A-A' with Benzene Concentrations in Groundwater

Remedial Investigation
NW Natural, Gasco Facility
7900 NW St. Helens Road
Portland, Oregon

HAHN AND ASSOCIATES, INC.
Project No. 2708

November 2004

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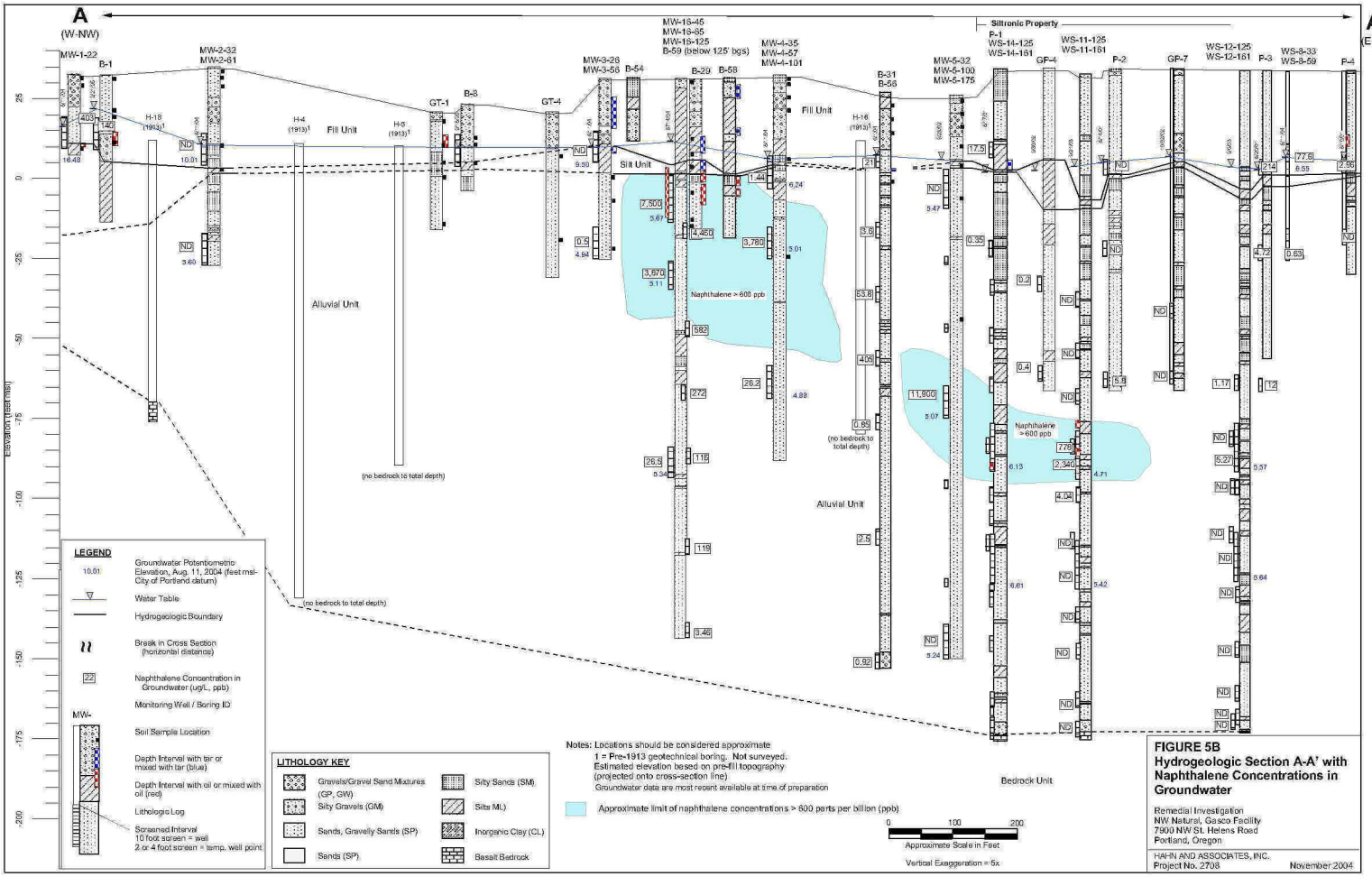


FIGURE 5B
Hydrogeologic Section A-A' with Naphthalene Concentrations in Groundwater

Remedial Investigation
NW Natural, Gasco Facility
7900 NW St. Helens Road
Portland, Oregon

HAHN AND ASSOCIATES, INC.
Project No. 2708 November 2004

SCOEPA00014231

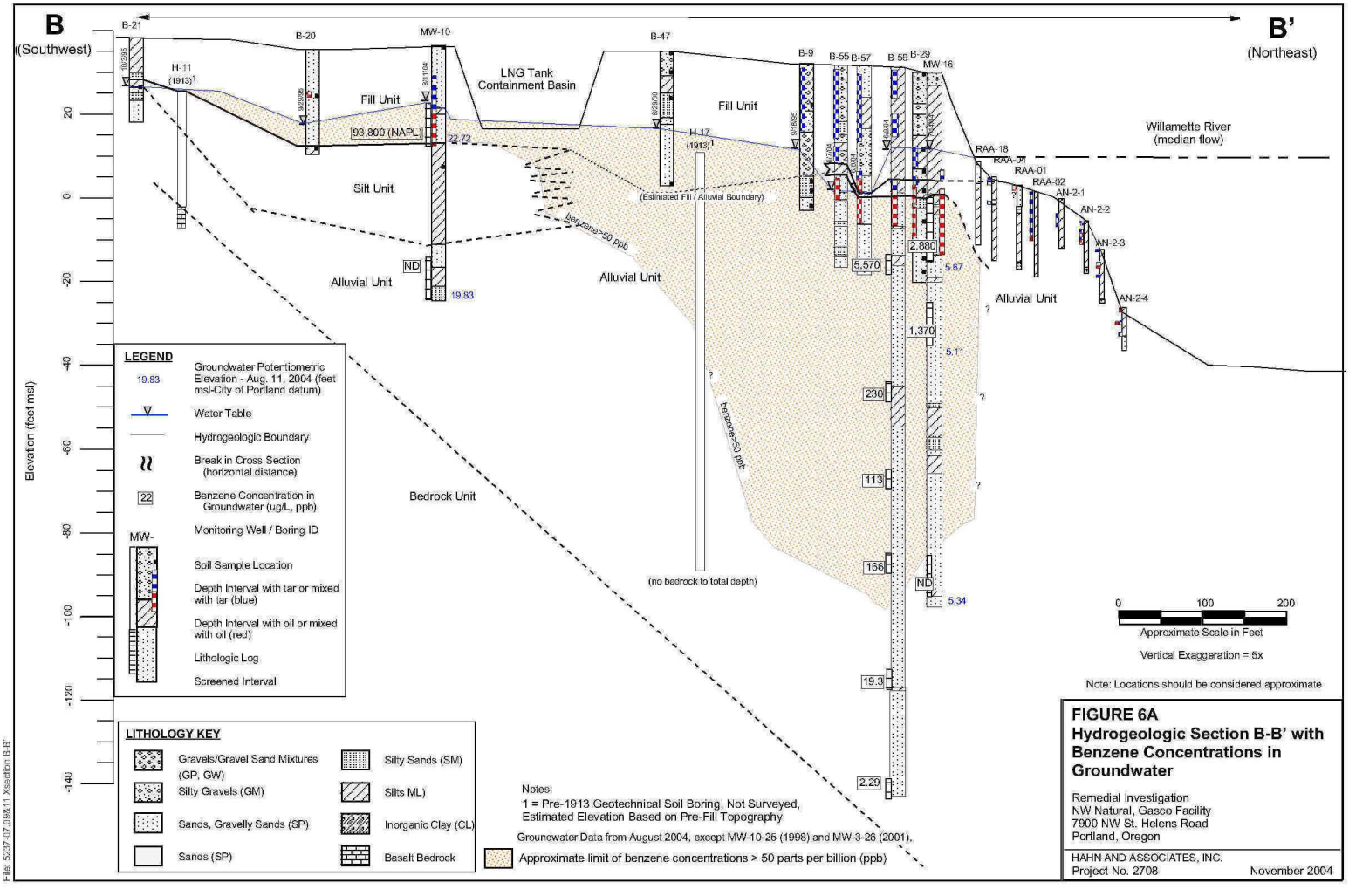


FIGURE 6A
Hydrogeologic Section B-B' with Benzene Concentrations in Groundwater

Remedial Investigation
NW Natural, Gasco Facility
7900 NW St. Helens Road
Portland, Oregon

HAHN AND ASSOCIATES, INC.
Project No. 2708 November 2004

SCOEPA00014232

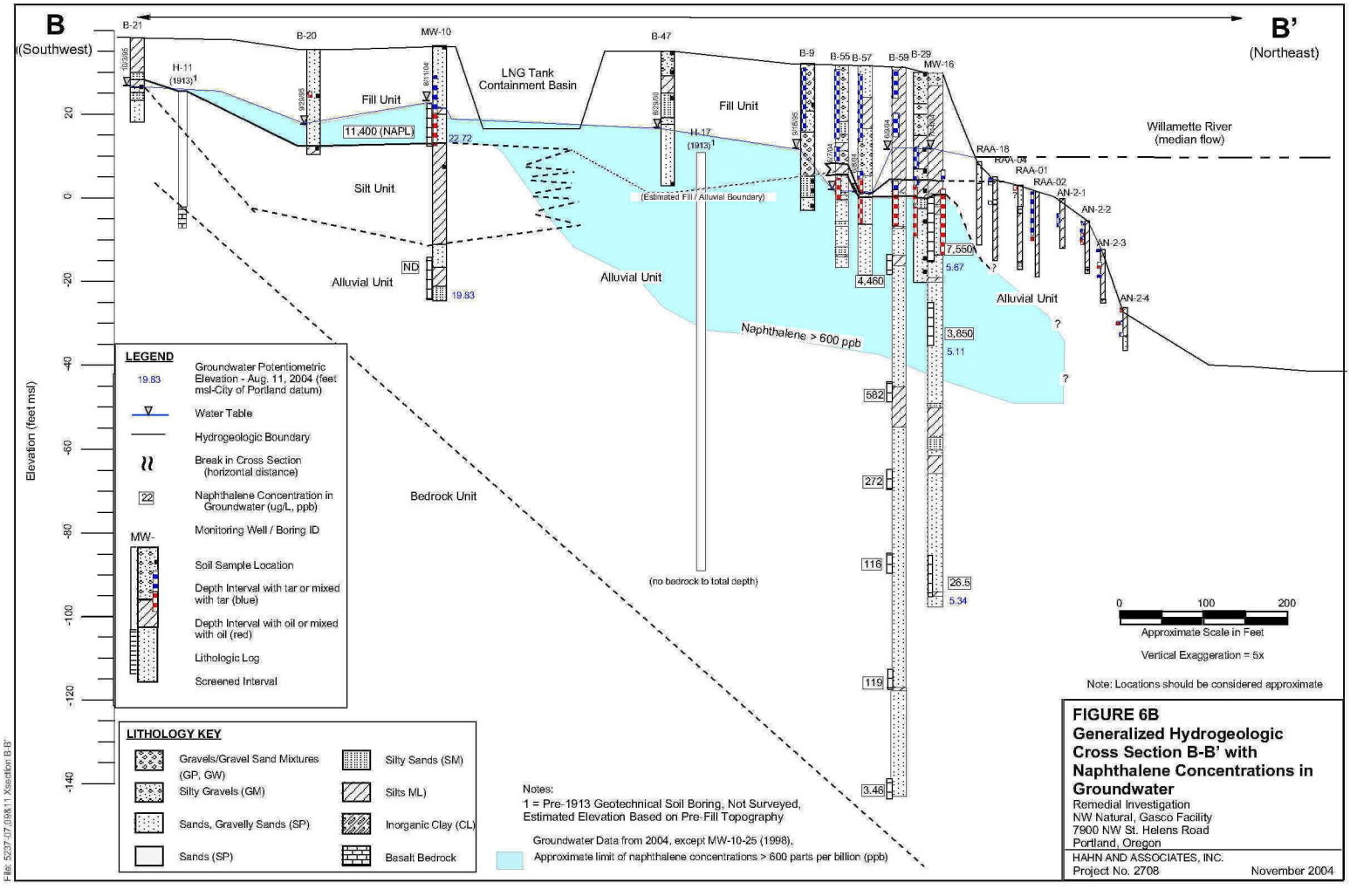
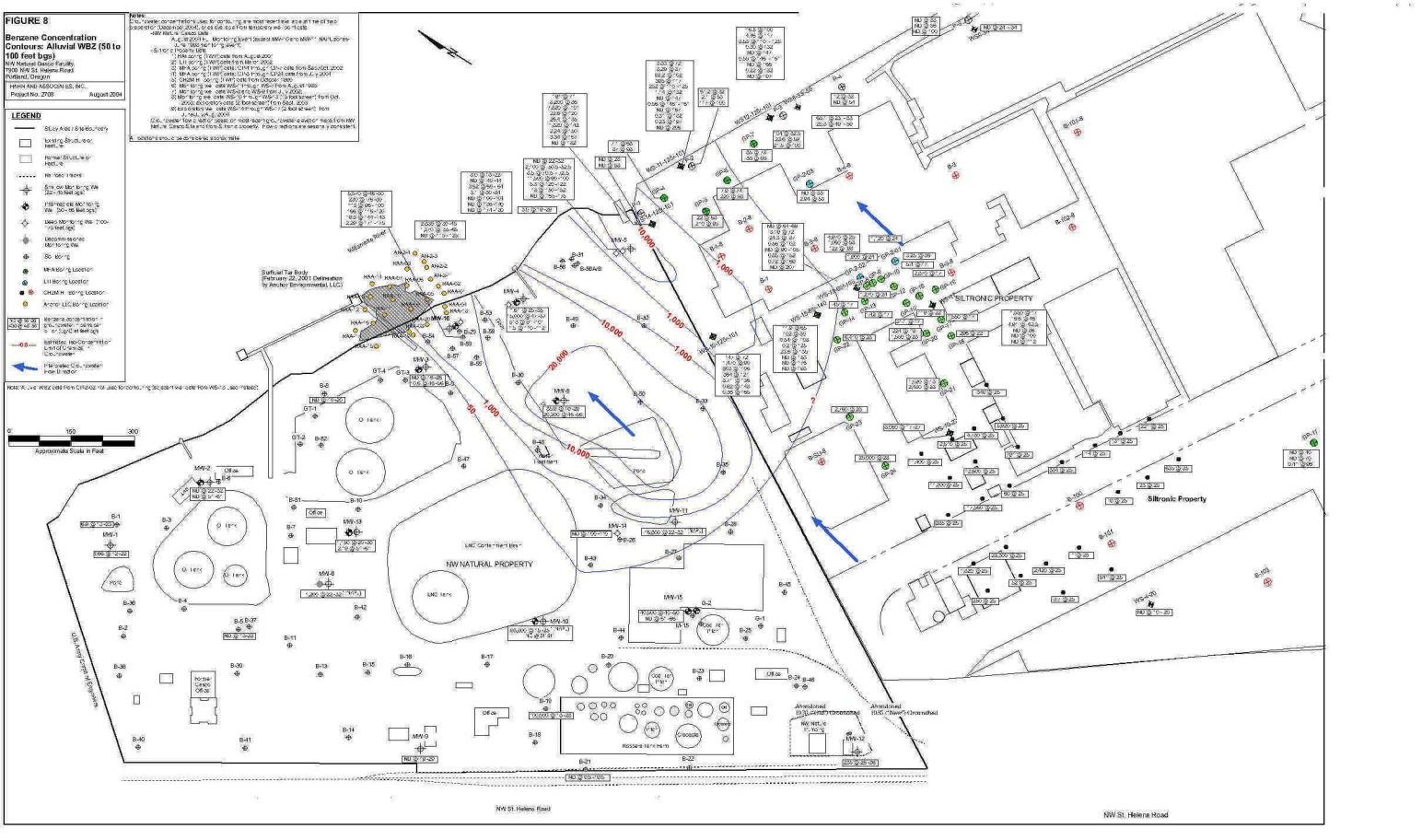


FIGURE 6B
Generalized Hydrogeologic Cross Section B-B' with Naphthalene Concentrations in Groundwater
Remedial Investigation
NW Natural, Gasco Facility
7900 NW St. Helens Road
Portland, Oregon

HAHN AND ASSOCIATES, INC.
Project No. 2708 November 2004

SCOEPA00014233

FIGURE 7
Benzene Concentration Contours: Surficial Fill WBZ (0 to 35 feet bgs)
NW Natural Gasco Facility
7900 NW St. Helens Road
Portland, Oregon
HAHN AND ASSOCIATES, INC.
Project No. 2708
December 2004
Notes:
LEGEND
Study Area / Site Boundary
Approximate Scale in Feet
0
150
300
Surficial Tar Body (February 22, 2001 Delineation by Anchor Environmental, LLC)
Willamette River
NW NATURAL PROPERTY
SILTRONIC PROPERTY
Siltronic Property
NW St. Helens Road
50
1,000
10,000
20,000
80,000



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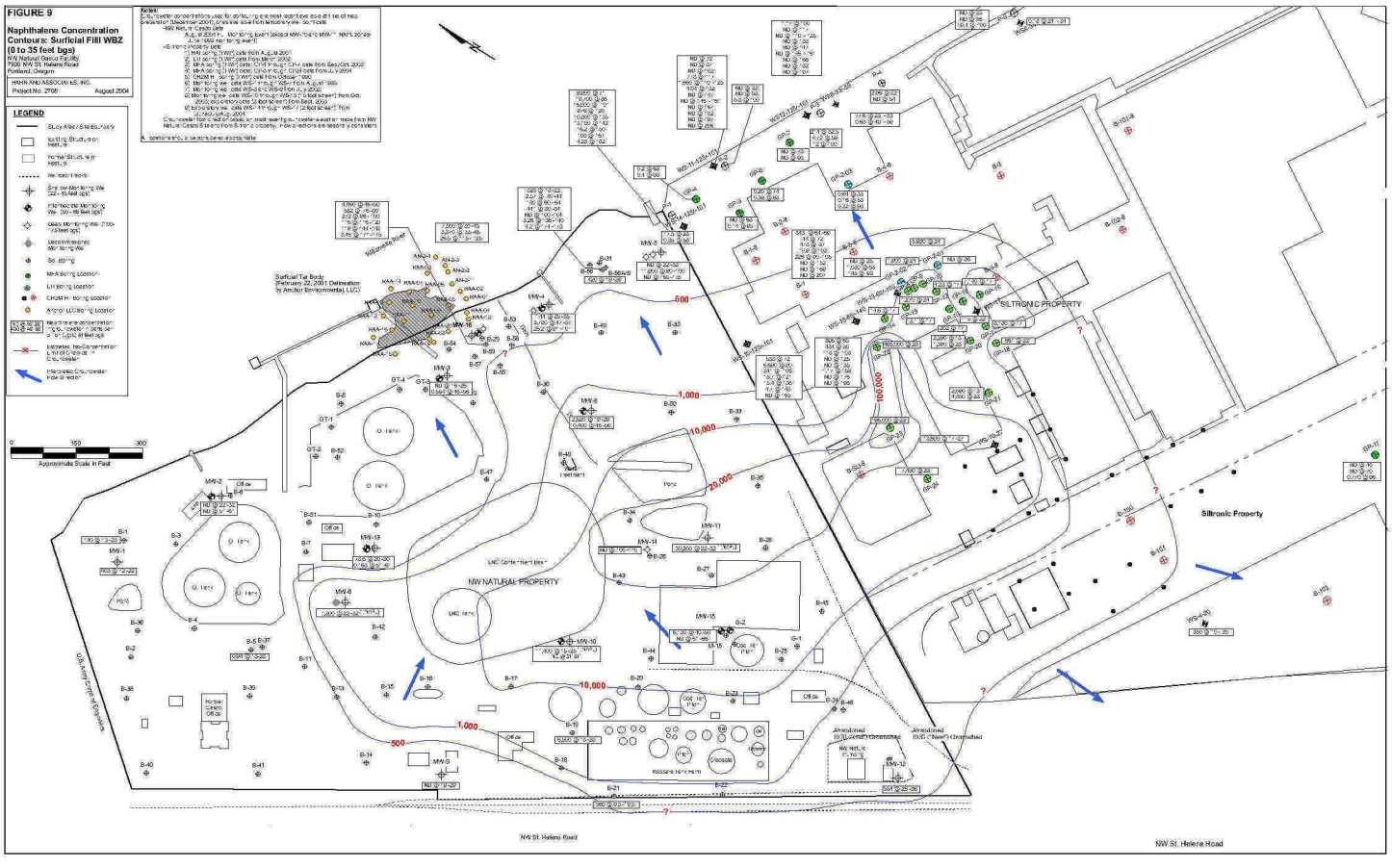

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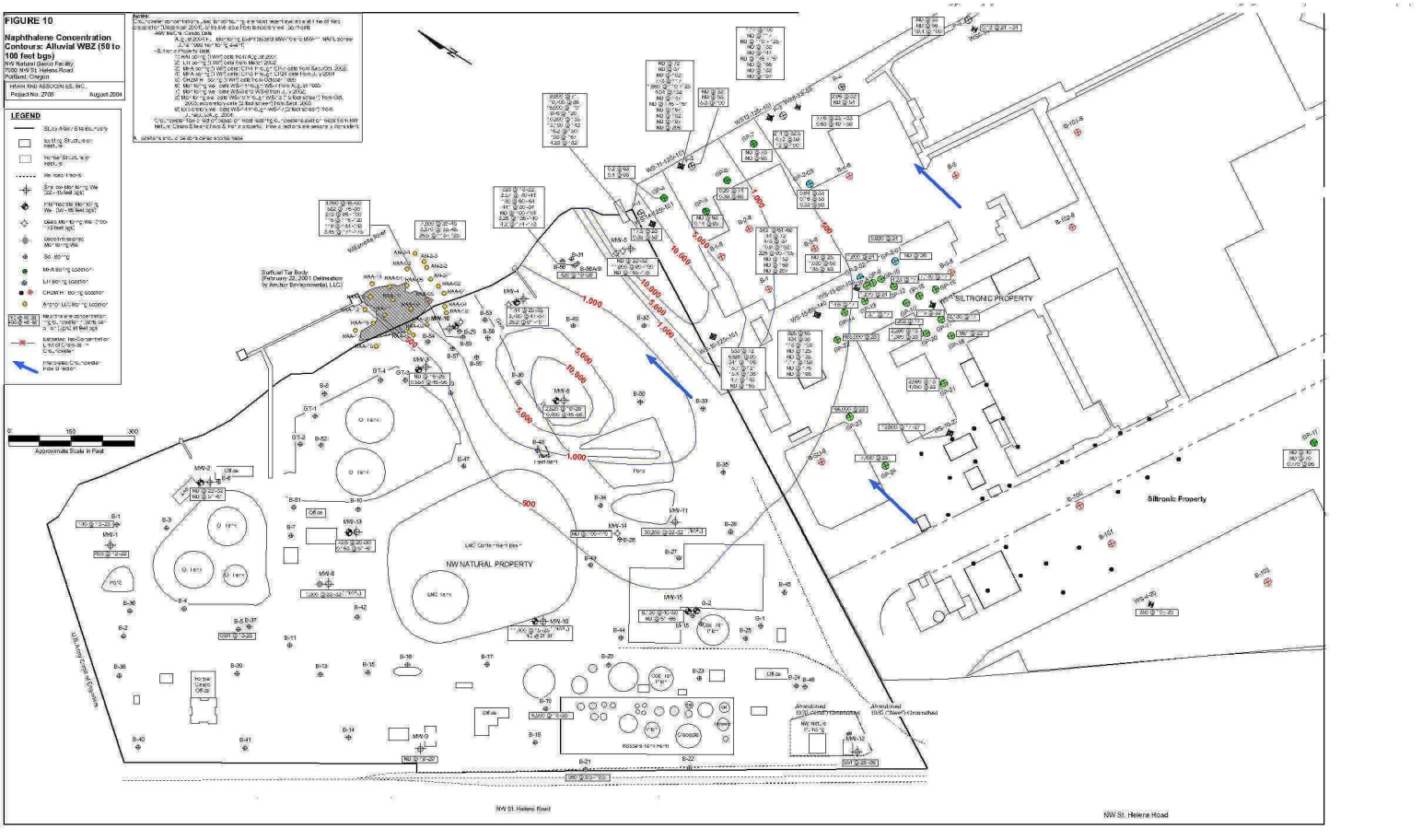

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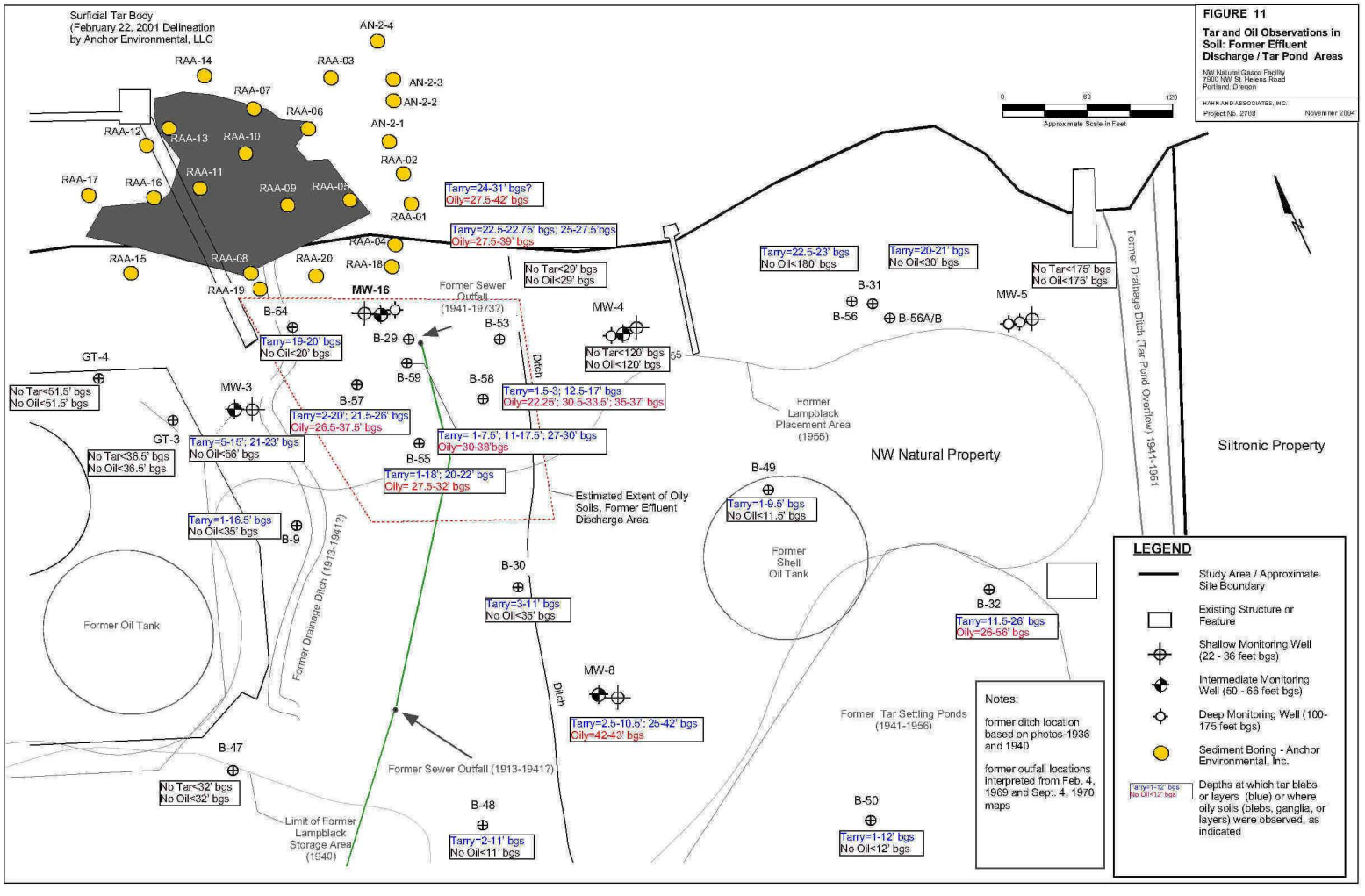

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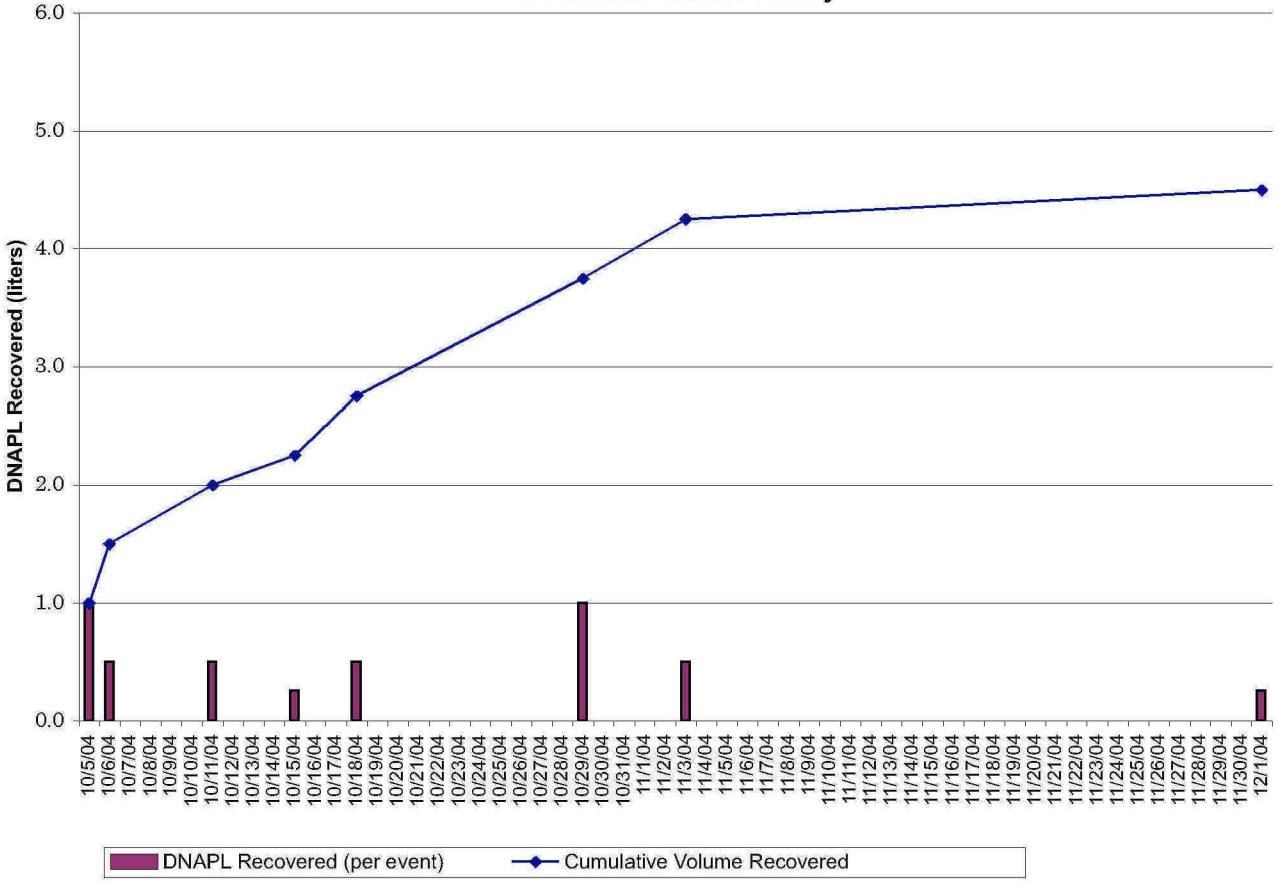
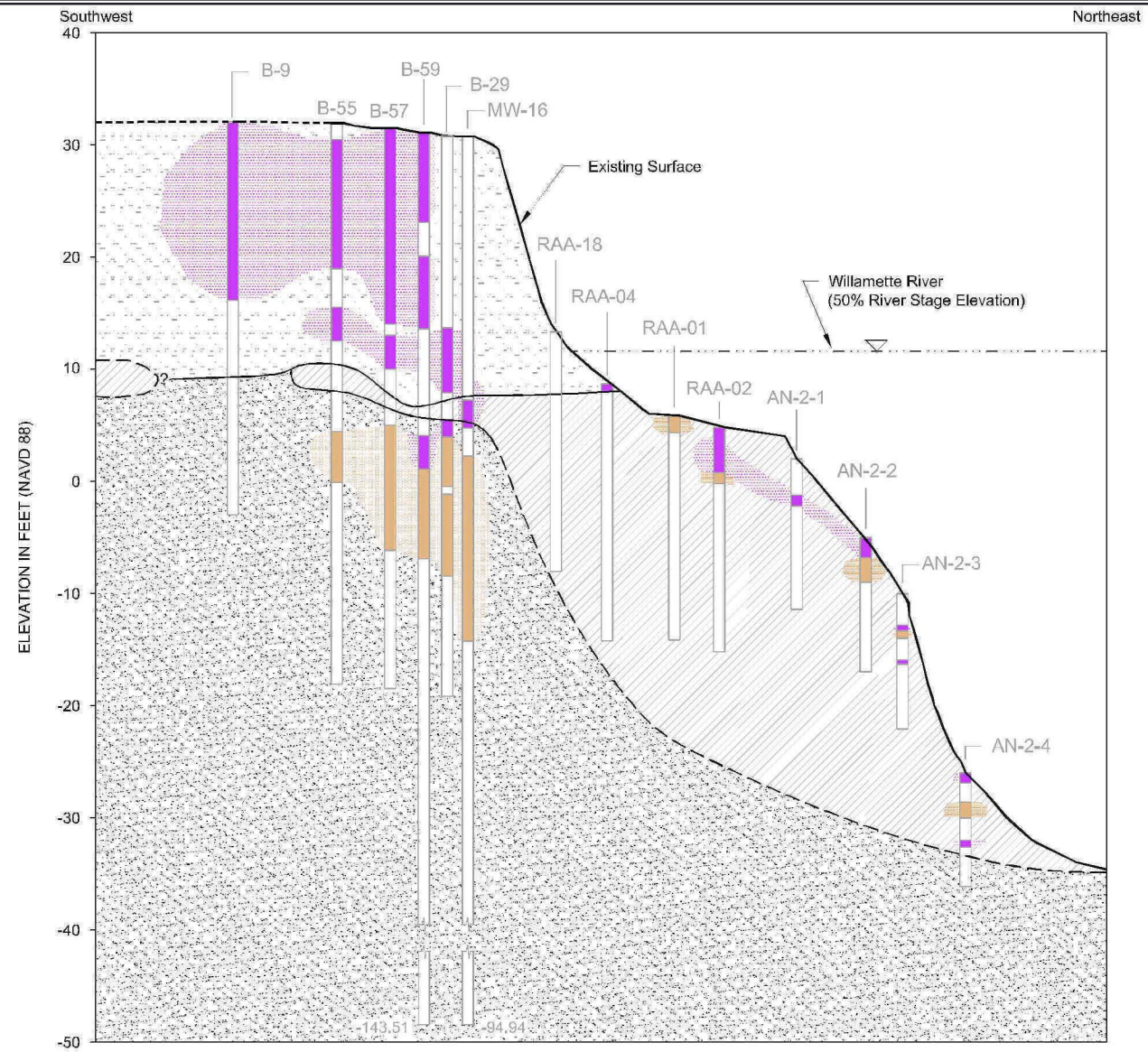
Figure 12
DNAPL Recovery Volume: Well MW-16-45
NW Natural - Gasco Facility



Updated: 3/11/05 RBE
File: 2708-12 DNAPL Recovery Chart-MW-16-45.xls/ Discharge Chart

HAHN AND ASSOCIATES, INC.
Project # 2976

SCOEPA00014240



Legend:

- Geologic Contact (Approximate)
- Tar Present
- Oil Present
- FILL Unit
- SILT Unit
- ALLUVIAL Unit

Note:
Locations and elevations should be considered approximate.

Figure:Anchor Environmental, 2005

0 50
Scale in Feet

Feb 08, 2005 10:31am dholmer K:\Jobs\000029-GASCO\000029020002902-57.dwg Presentation

ANCHOR ENVIRONMENTAL, L.L.C.

HAHN AND ASSOCIATES, INC.

ENVIRONMENTAL CONSULTANTS
434 NW 6th AVENUE, SUITE 203
PORTLAND, OREGON 97209

FIGURE 13
Schematic Cross-Section: Nearshore Area
NW Natural Gasco Site