

February 24, 2005
10077.005

Oregon Department of Environmental Quality
Northwest Region
2020 SW Fourth Avenue
Suite 400
Portland, Oregon 97201-4987

VIA Email/First Class

Attention: Anna Coates

**Subject: Technical Memorandum
Storm Water Sampling – Fourth Quarter 2004
Remedial Investigation/Feasibility Study/Interim Removal Action Measures
Astoria Area-Wide Petroleum Site
Astoria, Oregon
DEQ ECSI File #2277**

Dear Ms. Coates:

This Technical Memorandum presents the results of storm water sampling performed at the Astoria Area-Wide Petroleum Site in Astoria, Oregon, during the fourth quarter of 2004. A remedial investigation/feasibility study (RI/FS) is being performed pursuant to a Unilateral Order issued in December 2001 by the Oregon Department of Environmental Quality (DEQ) (No. ECSR-NWR-01-11) to eight entities. The Order requires these current and former facility owners, and operators involved in industrial and commercial activities to investigate and potentially cleanup properties within the Astoria Area-Wide site. ChevronTexaco Products Company (ChevronTexaco), Delphia Oil Company (Delphia), McCall Oil and Chemical Company (McCall), Ed Niemi Oil Company (Niemi Oil), Flying Dutchman and Harris Enterprises (Harris/Van West), Port of Astoria (the Port), Qwest Communications International (Qwest), and Shell Oil Company (Shell) are identified in the Order, collectively, as potentially responsible parties (PRPs), and have agreed to comply with its requirements. In addition, Exxon Mobil Corporation is part of the PRP Group.

In fall 2002, Phase 1 field activities were conducted at the site in accordance with the RI/FS Work Plan (*EnviroLogic Resources*, 2002b). As part of the Phase 1 field activities a geophysical survey was completed on portions of the site and the storm water piping system was located and mapped. This piping system is shown on Figure 2 in the Work Plan, Storm Water Monitoring (*EnviroLogic Resources*, 2003) (Storm Water Work Plan). *EnviroLogic Resources* has reviewed the results of the geophysical mapping along with additional information obtained during the Phase 1 field activities and has compiled a Storm Water Catchment Map, presented on Figure 3 of the Storm Water Work Plan. The analytical suite proposed in the Storm Water Work Plan includes constituents typical of storm water monitoring programs as well as constituents of interest presented in Risk-Based Decision Making (RBDM) for the Remediation of Petroleum-Contaminated Sites (Oregon Department of Environmental Quality, 2003).

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Storm water sampling was conducted at Outfall #2 in Catchment Area 2 and Outfall #6 in Catchment Area 4. These locations, depicted on Figure 2, were selected based on the areas of focus for the RI/FS, the storm water drainage area, off-site contribution to storm water drainage to the site, and outfall accessibility. Outfall #2 was selected because it drains the north-central portion of the Astoria Area-Wide site. Outfall #6 was selected because it drains the central portion of the Astoria Area-Wide site. The remaining catchments do not represent areas of investigative interest or are serviced by a combined sanitary and storm sewer system.

STORM WATER SAMPLING METHODS AND PROCEDURES

On October 19, 2004, the Fourth Quarter 2004 (4th and final Round) of quarterly storm water sampling was conducted. Storm water samples were collected from Outfall #2 and Outfall #6. Outfall #2 was relocated during the rerouting of the storm water pipeline as part of the Slip 2 hydrocarbon seep IRAM. Storm water samples for Outfall #2 were previously collected from the first catch basin upland of the former Outfall #2 because this outfall appeared to be buried beneath the riprap along the base of Slip 2.

Storm water from new Outfall #2 was collected at the discharge point directly into laboratory-prepared sample bottles. Given its location, a clean disposable plastic beaker was used to capture the storm water sample at the discharge of Outfall #6. From the beaker, the water was transferred into laboratory-prepared sample containers and stored in a cooler with ice until the samples were delivered to the laboratory.

In accordance with the Storm Water Work Plan, the storm water samples collected during the fourth quarter of 2004 were analyzed for RBDM volatile organic compounds (VOCs), RBDM polynuclear aromatic hydrocarbons (PAHs), total copper, total lead, total zinc, pH, total suspended solids, and oil and grease. Laboratory analytical work was performed by North Creek Analytical, Inc. (NCA), of Beaverton, Oregon. Field observations made during sampling are noted on the Storm Water Monitoring Form, which is attached as Appendix A.

SUMMARY OF STORM WATER ANALYTICAL RESULTS

The laboratory analytical reports are included in Appendix B attached to this technical memorandum. Tables 1, 2, 3, and 4 summarize the laboratory analytical results. The results of the previous sampling events are also included on the tables. A validation of the data has been performed and the data are considered of an acceptable quality. The data validation report for this sampling event is included in Appendix B.

As shown on Tables 1 and 2, no VOCs and no PAHs were detected in the storm water samples from Outfall #2 or #6. Table 3 presents the metals in storm water. Copper, lead and zinc were

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detected in samples from both outfalls. Outfall #6 contained the higher levels of metals with 8.97 µg/L of copper, 2.95 µg/L of lead, and 9.18 µg/L of zinc. Table 4 presents the results of additional chemical analyses performed on the storm water samples. Oil and grease was not detected by NCA in the storm water samples. There were 7.00 mg/L of total suspended solids (TSS) in Outfalls #2 and #6.

CLOSING COMMENTS

Analytical results indicate there is no impact from the petroleum contamination at the Astoria Area-Wide site to the storm water discharges from Outfall #2 or Outfall #6. Because there was no apparent impact on storm water from the petroleum contamination during any of the sampling rounds, this will be the final round of storm water sampling.

Please call me at (503)768-5121 if you have any questions or comments regarding this Technical Memorandum.

Sincerely,
EnviroLogic Resources, Inc.

Thomas J. Calabrese, RG, CWRE
Principal/Hydrogeologist
Project Manager

Attachments: Table 1 VOCs in Storm Water
 Table 2 SVOCs in Storm Water
 Table 3 Metals in Storm Water
 Table 4 Additional Analytes in Storm Water
 Figure 1 Site Plan
 Figure 2 Storm Water Sampling Locations
 Appendix A Storm Water Monitoring Forms
 Appendix B Analytical Results and Data Validation Report

cc: Distribution list attached

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**ASTORIA AREA-WIDE PETROLEUM SITE
Distribution List**

- 4 Anna Coates, DEQ Project Manager, Site Response
 - 1 Mike Lilly, Attorney for Port of Astoria
 - 1 Peter Gearin, Port of Astoria
 - 1 Tom Calabrese, *EnviroLogic Resources, Inc.*, Consultant for PoA and AAW PRP Group
 - 1 Max Miller, Tonkon Torp, Attorney for McCall Oil and Chemical Corporation
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 - 1 Kurt Harrington, AMEC, Inc., Consultant for Niemi Oil Company
 - 1 Ed Platt, Shell Oil Company
 - 1 Rick Glick, Davis Wright Tremaine, Attorney for Shell Oil Company
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 - 1 Larry Vandermay, Flying Dutchman
 - 1 David Bartz & Neal Hueske, Schwabe Williamson & Wyatt, Attorney for Flying Dutchman
 - 1 Jerry Hodson, Miller Nash, Attorney for Harris Enterprises
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 - 1 Donna LaCombe, Tetra Tech EM, Inc., Consultant for Qwest Communications International
 - 1 Anita W. Lovely, for Exxon Mobil Corporation
 - 2 Repository
-

TABLES

TABLE 1
VOCs IN STORM WATER

Remedial Investigation/Feasibility Study
Astoria Area-Wide Petroleum Site
Astoria, Oregon

Locator ID	Sample ID	Date	1,2,4-Trimethyl benzene ug/L	1,2-Dibromo ethane ug/L	1,2-Dichloro ethane ug/L	1,3,5-Trimethyl benzene ug/L	Benzene ug/L
Outfall #2	Outfall #2	9/9/2003	1 U	0.5 U	0.5 U	0.5 U	0.5 U
Outfall #2	Outfall #2	11/25/2003	1 U	0.5 U	0.5 U	0.5 U	0.5 U
Outfall #2	Outfall #2	2/17/2004	1 U	0.5 U	0.5 U	0.5 U	0.2 U
Outfall #2	Outfall #2	10/19/2004	1 U	0.5 U	0.5 U	0.5 U	0.2 U
Outfall #6	Outfall #6	11/25/2003	1 U	0.5 U	0.5 U	0.5 U	0.5 U
Outfall #6	Outfall #6	2/17/2004	1 U	0.5 U	0.5 U	0.5 U	0.2 U
Outfall #6	Outfall #6	10/19/2004	1 U	0.5 U	0.5 U	0.5 U	0.2 U
Locator ID	Sample ID	Date	Ethylbenzene ug/L	Isopropyl benzene ug/L	Methyl-t-butyl ether ug/L	n-Propyl benzene ug/L	Toluene ug/L
Outfall #2	Outfall #2	9/9/2003	0.5 U	2 U	2 U	0.5 U	0.5 U
Outfall #2	Outfall #2	11/25/2003	0.5 U	2 U	2 U	0.5 U	0.5 U
Outfall #2	Outfall #2	2/17/2004	0.5 U	2 U	2 U	0.5 U	0.5 U
Outfall #2	Outfall #2	10/19/2004	0.5 U	2 U	2 U	0.5 U	0.5 U
Outfall #6	Outfall #6	11/25/2003	0.5 U	2 U	2 U	0.5 U	0.5 U
Outfall #6	Outfall #6	2/17/2004	0.5 U	2 U	2 U	0.5 U	0.5 U
Outfall #6	Outfall #6	10/19/2004	0.5 U	2 U	2 U	0.5 U	0.5 U
Locator ID	Sample ID	Date	Xylenes ug/L				
Outfall #2	Outfall #2	9/9/2003	1 U				
Outfall #2	Outfall #2	11/25/2003	1 U				
Outfall #2	Outfall #2	2/17/2004	1 U				
Outfall #2	Outfall #2	10/19/2004	1 U				
Outfall #6	Outfall #6	11/25/2003	1 U				
Outfall #6	Outfall #6	2/17/2004	1 U				
Outfall #6	Outfall #6	10/19/2004	1 U				

TABLE 2
SVOCs IN STORM WATER

Remedial Investigation/Feasibility Study
Astoria Area-Wide Petroleum Site
Astoria, Oregon

Locator ID	Sample ID	Date	Acenaphthene	Acenaphthylene	Anthracene	Benzo(a) anthracene
			ug/L	ug/L	ug/L	ug/L
Outfall #2	Outfall #2	9/9/2003	0.1 U	0.1 U	0.1 U	0.1 U
Outfall #2	Outfall #2	11/25/2003	0.05 U	0.05 U	0.05 U	0.01 U
Outfall #2	Outfall #2	2/17/2004	0.05 U	0.05 U	0.05 U	0.01 U
Outfall #2	Outfall #2	10/19/2004	0.05 U	0.05 U	0.05 U	0.01 U
Outfall #6	Outfall #6	11/25/2003	0.05 U	0.05 U	0.05 U	0.01 U
Outfall #6	Outfall #6	2/17/2004	0.05 U	0.05 U	0.05 U	0.01 U
Outfall #6	Outfall #6	10/19/2004	0.05 U	0.05 U	0.05 U	0.01 U

Locator ID	Sample ID	Date	Benzo(a) pyrene	Benzo(b) fluoranthene	Benzo(g,h,i) perylene	Benzo(k) fluoranthene	Chrysene
			ug/L	ug/L	ug/L	ug/L	ug/L
Outfall #2	Outfall #2	9/9/2003	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U
Outfall #2	Outfall #2	11/25/2003	0.01 U	0.01 U	0.05 U	0.01 U	0.01 U
Outfall #2	Outfall #2	2/17/2004	0.01 U	0.01 U	0.05 U	0.01 U	0.01 U
Outfall #2	Outfall #2	10/19/2004	0.01 U	0.01 U	0.05 U	0.01 U	0.01 U
Outfall #6	Outfall #6	11/25/2003	0.01 U	0.01 U	0.05 U	0.01 U	0.01 U
Outfall #6	Outfall #6	2/17/2004	0.01 U	0.01 U	0.05 U	0.01 U	0.0134
Outfall #6	Outfall #6	10/19/2004	0.01 U	0.01 U	0.05 U	0.01 U	0.01 U

TABLE 2
SVOCs IN STORM WATER

Remedial Investigation/Feasibility Study
Astoria Area-Wide Petroleum Site
Astoria, Oregon

Locator ID	Sample ID	Date	Dibenzo(a,h) anthracene	Fluoranthene	Fluorene	Indeno(1,2,3- cd) pyrene	Naphthalene
			ug/L	ug/L	ug/L	ug/L	ug/L
Outfall #2	Outfall #2	9/9/2003	0.2 U	0.1 U	0.1 U	0.1 U	2 U
Outfall #2	Outfall #2	9/9/2003					0.1 U
Outfall #2	Outfall #2	11/25/2003	0.01 U	0.05 U	0.05 U	0.01 U	0.05 U
Outfall #2	Outfall #2	11/25/2003					2 U
Outfall #2	Outfall #2	2/17/2004	0.01 U	0.05 U	0.05 U	0.01 U	2 U
Outfall #2	Outfall #2	2/17/2004					0.05 U
Outfall #2	Outfall #2	10/19/2004	0.01 U	0.05 U	0.05 U	0.01 U	2 U
Outfall #2	Outfall #2	10/19/2004					0.05 U
Outfall #6	Outfall #6	11/25/2003	0.01 U	0.05 U	0.05 U	0.01 U	2 U
Outfall #6	Outfall #6	11/25/2003					0.05 U
Outfall #6	Outfall #6	2/17/2004	0.01 U	0.05 U	0.05 U	0.01 U	2 U
Outfall #6	Outfall #6	2/17/2004					0.05 U
Outfall #6	Outfall #6	10/19/2004	0.01 U	0.05 U	0.05 U	0.01 U	2 U
Outfall #6	Outfall #6	10/19/2004					0.05 U

Locator ID	Sample ID	Date	Phenanthrene	Pyrene
			ug/L	ug/L
Outfall #2	Outfall #2	9/9/2003	0.1 U	0.1 U
Outfall #2	Outfall #2	11/25/2003	0.05 U	0.05 U
Outfall #2	Outfall #2	2/17/2004	0.05 U	0.05 U
Outfall #2	Outfall #2	10/19/2004	0.05 U	0.05 U
Outfall #6	Outfall #6	11/25/2003	0.05 U	0.05 U
Outfall #6	Outfall #6	2/17/2004	0.05 U	0.05 U
Outfall #6	Outfall #6	10/19/2004	0.05 U	0.05 U

**TABLE 3
METALS IN STORM WATER**

Remedial Investigation/Feasibility Study
Astoria Area-Wide Petroleum Site
Astoria, Oregon

Locator ID	Sample ID	Date	Copper ug/L	Lead ug/L	Zinc ug/L
Outfall #2	Outfall #2	9/9/2003	3.2 J	5.1 J	16.6 J
Outfall #2	Outfall #2	11/25/2003	2 U B	0.72 J	19
Outfall #2	Outfall #2	2/17/2004	2.05	0.7 J	14 J+,B
Outfall #2	Outfall #2	10/19/2004	2.41	0.71 J	11.5 J, B
Outfall #6	Outfall #6	11/25/2003	6.87	3.4	139
Outfall #6	Outfall #6	2/17/2004	14.3	8.02	128
Outfall #6	Outfall #6	10/19/2004	8.97	2.95	91.8

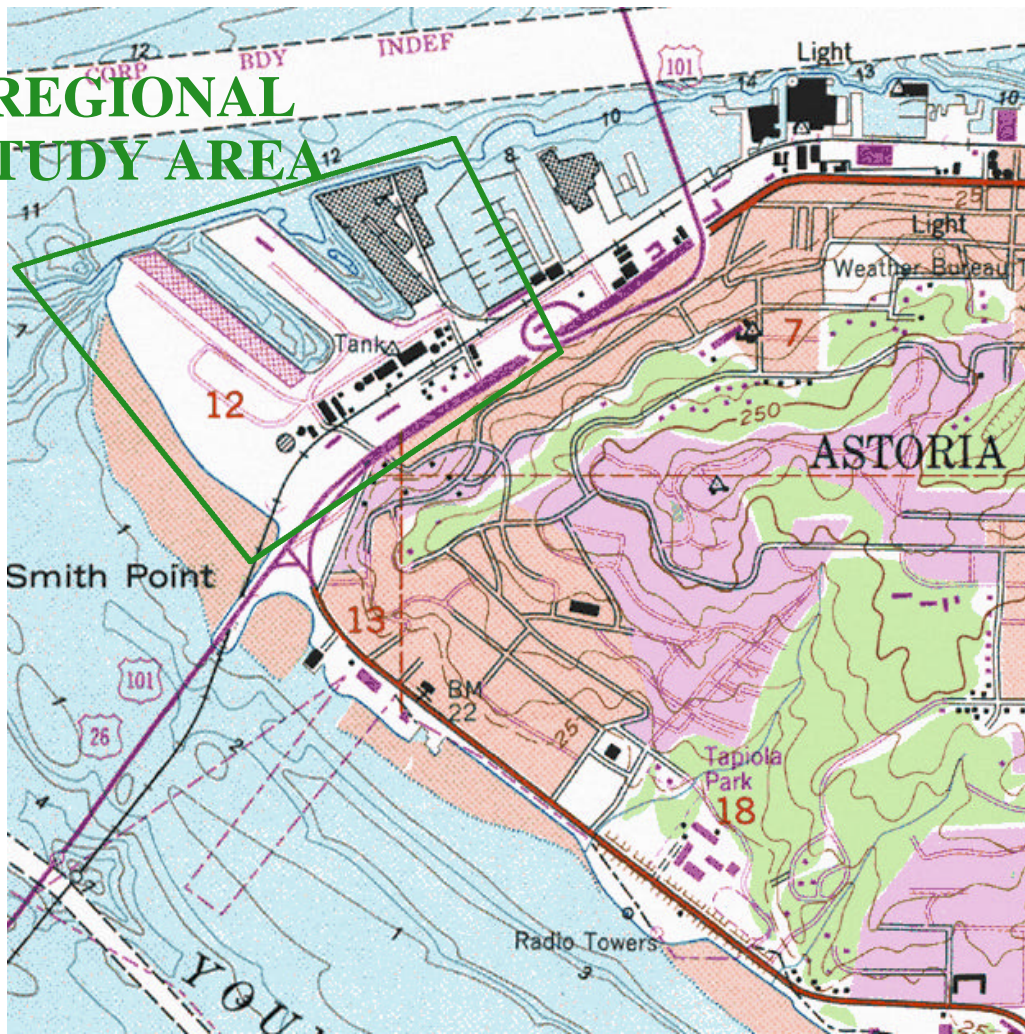
TABLE 4
ADDITIONAL ANALYTES IN STORM WATER

Remedial Investigation/Feasibility Study
 Astoria Area-Wide Petroleum Site
 Astoria, Oregon

Locator ID	Sample ID	Date	Oil & Grease	pH	Total Suspended Solids (TSS)
			mg/L	pH Units	mg/L
Outfall #2	Outfall #2	9/9/2003	950 U	6.11	2,000 J
Outfall #2	Outfall #2	11/25/2003	5 U	6.18 J	3 J
Outfall #2	Outfall #2	2/17/2004	5 U	6.37 J	23.0
Outfall #2	Outfall #2	10/19/2004	5 U	7.2	7.00 J
Outfall #6	Outfall #6	11/25/2003	5 U	6.74 J	51.0
Outfall #6	Outfall #6	2/17/2004	5 U	6.41 J	47.0
Outfall #6	Outfall #6	10/19/2004	5 U	6.98	7.00 J

FIGURES

REGIONAL STUDY AREA



(from USGS, Astoria {1984}, OR 7.5' Quadrangles)

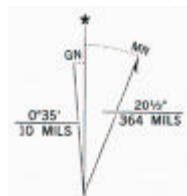
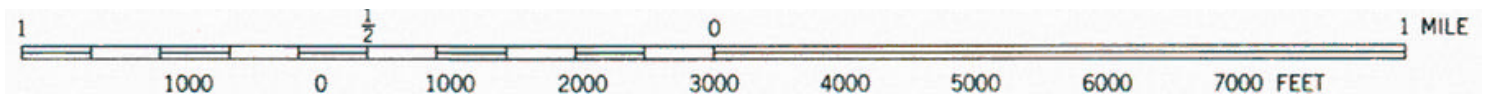


FIGURE 1

SITE LOCATION

**Remedial Investigation/Feasibility Study
Astoria Area-Wide Petroleum Site
Astoria, Oregon**

EnviroLogic Resources, Inc.

Consulting Environmental & Water Resources Scientists

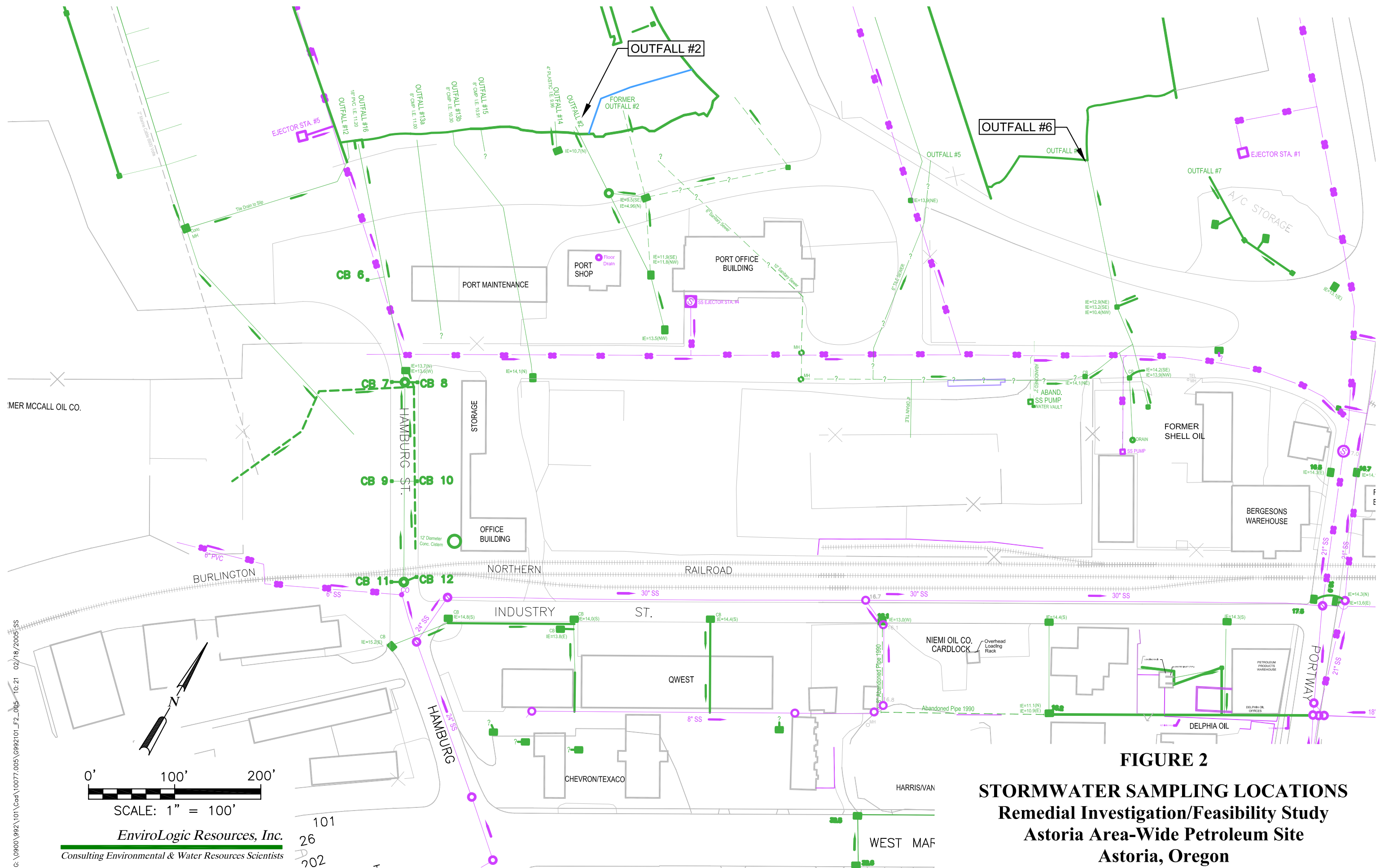


FIGURE 2
STORMWATER SAMPLING LOCATIONS
Remedial Investigation/Feasibility Study
Astoria Area-Wide Petroleum Site
Astoria, Oregon

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EnviroLogic Resources, Inc.
 Consulting Environmental & Water Resources Scientists

APPENDIX A

STORM WATER MONITORING FORMS

ASTORIA AREA-WIDE

STORM WATER SAMPLE FORM OUTFALL #2

Instructions: Make visual observations at outfalls. Monitor temperature and pH of storm water. Collect water samples into the appropriate bottles in the order specified. No headspace shall be left in the bottle. Be sure not to spill preservatives or create overflow in bottles with preservatives. Place bottles into cooler with blue ice for laboratory. Label all bottles. Fill out chain of custody form.

Date: 10/19/04	
Time Sample Collected: 11:00	
Sample Collection Method: Directly into bottles from outfall.	
Weather: Early morning strong showers, then partly sunny	Water Flow: Strong Medium <u>Light</u>
Color: Clear	Odor: None
Temperature: 15.8 Deg C	Other: pH=7.26, ORP=21 mV, Cond=287uS
Analyses Requested: RBDM VOCs 8260B RBDM PAHs Total Copper (500 mL plastic bottle) Total Lead (500 mL plastic bottle) Total Zinc (500 mL plastic bottle) PH (500 mL plastic bottle) Total Suspended Solids (TSS) (1,000 mL plastic bottle) Oil & Grease (1000 mL amber glass bottles)	

Label shall include: sample number, date, time, sampler, and preservatives.

ASTORIA AREA-WIDE

STORM WATER SAMPLE FORM OUTFALL #6

Instructions: Make visual observations at outfalls. Monitor temperature and pH of storm water. Collect water samples into the appropriate bottles in the order specified. No headspace shall be left in the bottle. Be sure not to spill preservatives or create overflow in bottles with preservatives. Place bottles into cooler with blue ice for laboratory. Label all bottles. Fill out chain of custody form.

Date: 10/19/04	
Time Sample Collected: 11:45	
Sample Collection Method: Disposable plastic beaker from outfall	
Weather: Early morning strong showers, then partly sunny	Water Flow: Strong Medium <u>Light</u>
Color: Clear	Odor: None
Temperature: 14.3 Deg C	Other: pH=6.81, ORP=54 mV, Cond=130 uS
Analyses Requested: RBDM VOCs 8260B RBDM PAHs Total Copper (500 mL plastic bottle) Total Lead (500 mL plastic bottle) Total Zinc (500 mL plastic bottle) PH (500 mL plastic bottle) Total Suspended Solids (TSS) (1,000 mL plastic bottle) Oil & Grease (1000 mL amber glass bottles)	

Label shall include: sample number, date, time, sampler, and preservatives.

APPENDIX B

***ANALYTICAL RESULTS AND
DATA VALIDATION REPORT***

**QUALITY ASSURANCE/QUALITY CONTROL REVIEW
STORM WATER – 4th QUARTER 2004**

**Remedial Investigation/Feasibility Study
Astoria Area-Wide Petroleum Site
Astoria, Oregon**

This report presents the results of our review of the laboratory analytical report and the data validation conducted based on the laboratory report referenced below. The samples were collected for the fourth quarter 2004 storm water event for the Astoria Area-Wide Petroleum Site. The samples were collected on October 19, 2004. Sample handling, analysis and quality control (QC) procedures were established in the July 15, 2002, Remedial Investigation /Feasibility Study, Astoria Area-Wide Petroleum Site, Astoria, Oregon, Phase 1 Work Plan (Phase 1 RI/FS) and in the March 26, 2003, Work Plan, Storm Water Monitoring, Remedial Investigation/Feasibility Study, Astoria Area-Wide Petroleum Site, Astoria. *EnviroLogic Resources, Inc.*, prepared both documents. The samples were submitted to North Creek Analytical (NCA) of Portland, Oregon, for analysis.

A total of 3 samples were submitted for analysis. Basic information about the lab order associated with this sample is presented below:

Lab Order	No. of Samples	Matrix	Date(s) Collected	Field Locations
P4J0792	2	Water	10/19/04	Outfall #2 & #6
	1	Water	10/19/04*	Trip Blank

*The trip blanks were provided by the laboratory and traveled with the cooler. The trip blanks are dated 10/19/04 because that is the date the samples were logged in at the laboratory.

As stated in Appendix B, Sections 8.0, 9.0 and 10.0 of the Phase 1 RI/FS our goal is to review the laboratory report and chain of custody for Quality Assurance/Quality Control (QA/QC) parameters and statistical parameters. The findings of our review are presented in the following pages. Qualified data is summarized in the attached table. Analyses performed are listed below.

Analysis	Reference
Total Suspended Solids	EPA Method 160.2
Oil & Grease	EPA Method 1664
Total Metals – (Copper, Lead, Zinc)	EPA Method 200 Series
Volatile Organic Compounds (VOCs)	EPA Method 8260B
Polynuclear Aromatic Compounds (PAHs)	EPA Method 8270M-SIM
PH	EPA Method 150.1/9040A

EPA = U.S. Environmental Protection Agency

CHAIN OF CUSTODY REVIEW

Chain of custodies (COC) were reviewed to determine sample condition upon arrival at the lab, that analysis requested was in accordance with the RI/FS Work Plan as updated by the Storm Water Work Plan, and that analyses requested were performed.

- No special conditions were noted on the North Creek Analytical Cooler Receipt Form or on the COC. No sample containers were broken or otherwise in any adverse condition upon arrival at the laboratory.
- Cooler (2) temperatures were recorded as 12.9°C and 5.1°C for P4J0792 when they were received at the laboratory.
- Two trip blanks were recorded on the COC for analysis of VOCs. Only one trip blank is recorded in the laboratory report as analyzed for VOCs.
- Analyses requested on the COC accurately reflect the analysis presented in the laboratory reports.

QUALITY CONTROL/QUALITY ASSURANCE REVIEW

DATA QUALIFIERS

The following data qualifier was used in this data validation report:

- **B.** The analyte was also identified in a field or laboratory blank associated with this sample or sample group.
- **U.** The analyte was analyzed for, but was not detected above the reported sample quantitation limit.
- **J.** The analyte was positively identified; the associated numerical value is the approximate concentration of the analyte in the sample.

The laboratory used these and other data qualifiers in its report. Those data qualifiers are defined in the laboratory report.

HOLDING TIMES

We reviewed the laboratory reports and compared sample dates, prepared dates and analyzed dates for all the analyses. The laboratory provided us with holding times for each analytical method for soil and water samples. Holding times were within limits for these analyses.

FIELD BLANKS

Equipment Blanks and Trip Blanks

No equipment blank was utilized. Two trip blanks traveled with the sample containers from the laboratory to the field. The recommended frequency presented in the Phase 1 RI/FS work plan is one equipment blank for every 20 samples delivered to the laboratory. One trip blank was analyzed for VOCs and no analytes were detected.

LABORATORY METHOD BLANKS

Laboratory method blanks were analyzed at the required frequency for all analyses in the lab order except for pH. Laboratory blanks were performed on sample batches so each blank is associated with a batch of field samples. The batch sample associated with each field sample is identified in the laboratory report. One analyte was detected in the laboratory blank for metals analyses and one analyte was detected in the laboratory blank for VOCs.

Zinc was detected in the metals laboratory blank at a concentration of 0.00183J mg/l (milligrams per liter). Field samples in the same batch that had zinc detected within 10 times the blank concentration are qualified. If the sample concentration was between the MDL (Method Detection Limit) and the RL (Reporting Limit) then the result was qualified by placing a UB flag next to the RL. If the sample concentration was above the RL then the detected concentration was qualified with a J and B flag. Data is not qualified where field samples had analytes detected at concentrations greater than 10 times the corresponding blank concentration. Laboratory dilution of field samples was considered.

Naphthalene was detected in the VOC laboratory blank at a concentration of 0.470J mg/l. Naphthalene was not detected in the field samples so no data was qualified.

SURROGATE RECOVERIES

One or more surrogates were utilized for each analysis except for total metals, total suspended solids, pH, and oil & grease analysis. We reviewed all of the surrogate recoveries relative to the specified control limits. No surrogate recoveries were outside control limits.

SPIKE AND SURROGATE RECOVERIES

Laboratory Control Samples

Laboratory Control Samples (LCS) were conducted at the required frequency. Based on our review all LCS recoveries met quality control limits.

Matrix Spike Samples

Matrix Spike (MS) were conducted at the required frequency. Based on our review all spike compounds and/or surrogates met quality control limits.

LABORATORY AND FIELD DUPLICATES/RELATIVE PERCENT DIFFERENCE

MSD, Laboratory Control Sample Duplicates (LCSDs), laboratory duplicates and field duplicate analytical information was reviewed. Based on our review all duplicate sample relative percent differences (RPDs) were within acceptable limits for laboratory duplicates except for one metals analyte. The RPD for the zinc was outside acceptable limits. The laboratory report noted matrix interference and the sample was also qualified due to zinc being detected in the laboratory blank. No field duplicates were obtained. No surrogate recovery exceptions for duplicate samples were noted.

STATISTICAL EVALUATION

Precision

Precision is a measure of the ability to reproduce data and is evaluated using duplicate samples. This includes field duplicates, laboratory duplicates, MSDs and LCSDs. Relative percent difference (RPD) is used to measure the reproducibility as described in section 10.1 of Appendix B of the RI/FS Work Plan. The RPD control limits are listed in the laboratory reports. These control limits may be slightly different than those presented in the Work Plan, but they are still acceptable. Overall precision for the analysis was acceptable

RPDs outside the control limits would represent statistical exceptions and indicate a lack of ability to reproduce the data. LCSD evaluate the affect laboratory conditions have on precision; no RPD exceptions were noted in LCSDs. Field duplicates, MSDs and lab duplicates evaluate the effect field and laboratory conditions have on precision. No RPD exceptions were noted in MSDs. No field duplicates were obtained so no evaluation of the reproducibility of the field data can be made. Overall the precision of the laboratory data is acceptable and no data is qualified due to lack of precision.

Accuracy

Accuracy measures the bias in a system and is evaluated using percent recovery of surrogate, spikes and LCS. LCS evaluates bias due to laboratory conditions. Bias due to field and laboratory conditions is evaluated using surrogates and matrix spikes. All surrogate and spike recoveries meet control limits except for naphthalene. No data was qualified due to the laboratory note that it did not represent an out-of-control condition for the batch and the fact that naphthalene was not detected in the samples. Overall the accuracy of the laboratory data is acceptable and no data is qualified due to a lack of accuracy

Representatives

Equipment blanks, laboratory blanks and field duplicate samples evaluate how representative analytical results are of actual site conditions. Blanks evaluate the introduction of “analytes” from outside sources such as field equipment, transportation equipment and the laboratory environment. Duplicate field samples attempt to evaluate how representative a sample is of site conditions by seeing if two samples are statistically representative of each other.

Equipment blanks and field duplicates were not utilized with sample delivery group. Trip blanks were utilized and no problems were noted with the trip blanks. One analyte was detected in the laboratory blank resulting in one data point being qualified. No data was rejected due to lack of representativeness.

Completeness

Completeness evaluates how successful the data set is at being valid. No data was rejected so the data group was 100 percent complete with respect to rejected analysis.

QUALIFIED DATA

The following data were qualified as a result of the data validation:

Laboratory Identification	Sample Name	Analyte	Original Result	Qualified Result	Method Detection Limit	Reporting Limit	Units
P3K0784-01	Outfall #2	Total Zinc	0.0115	0.0115 J B	0.00150	0.00500	mg/l

Notes:

NA= Not applicable

Data Qualifiers J+, B and J are defined in the text.

REFERENCES

USEPA (U.S. Environmental Protection Agency). 2002. USEPA Contract Laboratory Program, National Functional Guidelines For Inorganics Data Review. Office of Emergency and Remedial Response, U.S. Environmental Protection Agency. EPA 540/R-01/008.

USEPA (United States Environmental Protection Agency). 2003. Inorganic National Functional Guidelines Proposed Changes. <http://www.epa.gov/superfundprograms/clp/inorgfgchanges.htm>

USEPA (United States Environmental Protection Agency). 1999. USEPA Contract Laboratory Program, National Functional Guidelines for Organic Data Review. Office of Emergency and Remedial Response, U.S. Environmental Protection Agency. EPA 540/R-99/008.

EnviroLogic Resources, Inc. RI/FS and IRAM Development Work Plan, Phase I, Remedial Investigation/Feasibility Study, Astoria Area-Wide Petroleum Site, Astoria, Oregon, July 15, 2002.

EnviroLogic Resources, Inc. Work Plan, Storm Water Monitoring, Remedial Investigation/Feasibility Study, Astoria Area-Wide Petroleum Site, Astoria, Oregon, March 26, 2003



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November 01, 2004

Tom Calabrese
EnviroLogic Resources, Inc.
P.O. Box 80762
Portland, OR 97280-0762

RE: Astoria Area-Wide Petroleum Site RI-1

Enclosed are the results of analyses for samples received by the laboratory on 10/20/04 09:40.
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.

<u>Work</u>	<u>Project</u>	<u>ProjectNumber</u>
P4J0792	Astoria Area-Wide Petroleum Site	10077.005

Thank You,

Joy D. Chang, Project Manager

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Environmental Laboratory Network



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EnviroLogic Resources, Inc. P.O. Box 80762 Portland, OR 97280-0762	Project Name:	Astoria Area-Wide Petroleum Site RI-1	<u>Report Created:</u> 11/01/04 12:41
	Project Number:	10077.005	
	Project Manager:	Tom Calabrese	

ANALYTICAL REPORT FOR SAMPLES

Sample ID	Laboratory ID	Matrix	Date Sampled	Date Received
Outfall #2	P4J0792-01	Water	10/19/04 11:00	10/20/04 09:40
Trip Blank	P4J0792-02	Water	10/19/04 11:00	10/20/04 09:40
Outfall #6	P4J0792-03	Water	10/19/04 11:45	10/20/04 09:40

North Creek Analytical - Portland

Joy D. Chang, Project Manager

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EnviroLogic Resources, Inc. P.O. Box 80762 Portland, OR 97280-0762	Project Name:	Astoria Area-Wide Petroleum Site RI-1	<u>Report Created:</u> 11/01/04 12:41
	Project Number:	10077.005	
	Project Manager:	Tom Calabrese	

Oil and Grease Analysis per EPA Method 1664
 North Creek Analytical - Portland

Analyte	Method	Result	MDL*	MRL	Units	Dil	Batch	Prepared	Analyzed	Notes
P4J0792-01	Water	Outfall #2	Sampled: 10/19/04 11:00							
Oil & Grease	EPA 1664	ND	3.24	5.00	mg/l	1x	4101095	10/22/04	10/25/04 14:54	U
P4J0792-03	Water	Outfall #6	Sampled: 10/19/04 11:45							
Oil & Grease	EPA 1664	ND	3.24	5.00	mg/l	1x	4101095	10/22/04	10/25/04 14:54	U

North Creek Analytical - Portland

Joy D. Chang, Project Manager

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EnviroLogic Resources, Inc. P.O. Box 80762 Portland, OR 97280-0762	Project Name:	Astoria Area-Wide Petroleum Site RI-1	
	Project Number:	10077.005	<u>Report Created:</u>
	Project Manager:	Tom Calabrese	11/01/04 12:41

Total Metals per EPA 200 Series Methods
 North Creek Analytical - Portland

Analyte	Method	Result	MDL*	MRL	Units	Dil	Batch	Prepared	Analyzed	Notes
P4J0792-01	Water	Outfall #2	Sampled: 10/19/04 11:00							
Copper	EPA 200.8	0.00241	0.000788	0.00200	mg/l	1x	4101121	10/22/04	10/23/04 19:23	
Lead	"	0.000710	0.000224	0.00100	"	"	"	"	"	J
Zinc	"	0.0115	0.00150	0.00500	"	"	"	"	"	
P4J0792-03	Water	Outfall #6	Sampled: 10/19/04 11:45							
Copper	EPA 200.8	0.00897	0.000788	0.00200	mg/l	1x	4101121	10/22/04	10/23/04 19:40	
Lead	"	0.00295	0.000224	0.00100	"	"	"	"	"	
Zinc	"	0.0918	0.00150	0.00500	"	"	"	"	"	

North Creek Analytical - Portland

Joy D. Chang, Project Manager

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EnviroLogic Resources, Inc.

P.O. Box 80762
 Portland, OR 97280-0762

Project Name: **Astoria Area-Wide Petroleum Site RI-1**

Project Number: 10077.005
 Project Manager: Tom Calabrese

Report Created:
 11/01/04 12:41

Selected Volatile Organic Compounds (Including BTEX) per EPA Method 8260B

North Creek Analytical - Portland

Analyte	Method	Result	MDL*	MRL	Units	Dil	Batch	Prepared	Analyzed	Notes
---------	--------	--------	------	-----	-------	-----	-------	----------	----------	-------

P4J0792-01 Water Outfall #2 Sampled: 10/19/04 11:00

1,2-Dibromoethane	EPA 8260B	ND	0.187	0.500	ug/l	1x	4101391	10/28/04	10/28/04 11:39	U
1,2-Dichloroethane	"	ND	0.142	0.500	"	"	"	"	"	U
Benzene	"	ND	0.147	0.200	"	"	"	"	"	U
Toluene	"	ND	0.155	0.500	"	"	"	"	"	U
Ethylbenzene	"	ND	0.110	0.500	"	"	"	"	"	U
Xylenes (total)	"	ND	0.262	1.00	"	"	"	"	"	U
Methyl tert-butyl ether	"	ND	0.0865	2.00	"	"	"	"	"	U
Naphthalene	"	ND	0.0989	2.00	"	"	"	"	"	U
1,2,4-Trimethylbenzene	"	ND	0.0884	1.00	"	"	"	"	"	U
1,3,5-Trimethylbenzene	"	ND	0.157	0.500	"	"	"	"	"	U
Isopropylbenzene	"	ND	0.107	2.00	"	"	"	"	"	U
n-Propylbenzene	"	ND	0.138	0.500	"	"	"	"	"	U

Surrogate(s): 4-BFB Recovery: 91.0% Limits: 75 - 120 % "
 1,2-DCA-d4 116% 77 - 129 % "
 Dibromofluoromethane 116% 80 - 121 % "
 Toluene-d8 100% 80 - 120 % "

P4J0792-02 Water Trip Blank Sampled: 10/19/04 11:00

1,2-Dibromoethane	EPA 8260B	ND	0.187	0.500	ug/l	1x	4101391	10/28/04	10/28/04 11:13	U
1,2-Dichloroethane	"	ND	0.142	0.500	"	"	"	"	"	U
Benzene	"	ND	0.147	0.200	"	"	"	"	"	U
Toluene	"	ND	0.155	0.500	"	"	"	"	"	U
Ethylbenzene	"	ND	0.110	0.500	"	"	"	"	"	U
Xylenes (total)	"	ND	0.262	1.00	"	"	"	"	"	U
Methyl tert-butyl ether	"	ND	0.0865	2.00	"	"	"	"	"	U
Naphthalene	"	ND	0.0989	2.00	"	"	"	"	"	U
1,2,4-Trimethylbenzene	"	ND	0.0884	1.00	"	"	"	"	"	U
1,3,5-Trimethylbenzene	"	ND	0.157	0.500	"	"	"	"	"	U
Isopropylbenzene	"	ND	0.107	2.00	"	"	"	"	"	U
n-Propylbenzene	"	ND	0.138	0.500	"	"	"	"	"	U

Surrogate(s): 4-BFB Recovery: 88.5% Limits: 75 - 120 % "
 1,2-DCA-d4 119% 77 - 129 % "
 Dibromofluoromethane 117% 80 - 121 % "
 Toluene-d8 103% 80 - 120 % "

North Creek Analytical - Portland

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Joy D. Chang, Project Manager

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EnviroLogic Resources, Inc. P.O. Box 80762 Portland, OR 97280-0762	Project Name:	Astoria Area-Wide Petroleum Site RI-1	<u>Report Created:</u> 11/01/04 12:41
	Project Number:	10077.005	
	Project Manager:	Tom Calabrese	

Selected Volatile Organic Compounds (Including BTEX) per EPA Method 8260B
 North Creek Analytical - Portland

Analyte	Method	Result	MDL*	MRL	Units	Dil	Batch	Prepared	Analyzed	Notes
P4J0792-03	Water	Outfall #6	Sampled: 10/19/04 11:45							
1,2-Dibromoethane	EPA 8260B	ND	0.187	0.500	ug/l	1x	4101391	10/28/04	10/28/04 12:06	U
1,2-Dichloroethane	"	ND	0.142	0.500	"	"	"	"	"	U
Benzene	"	ND	0.147	0.200	"	"	"	"	"	U
Toluene	"	ND	0.155	0.500	"	"	"	"	"	U
Ethylbenzene	"	ND	0.110	0.500	"	"	"	"	"	U
Xylenes (total)	"	ND	0.262	1.00	"	"	"	"	"	U
Methyl tert-butyl ether	"	ND	0.0865	2.00	"	"	"	"	"	U
Naphthalene	"	ND	0.0989	2.00	"	"	"	"	"	U
1,2,4-Trimethylbenzene	"	ND	0.0884	1.00	"	"	"	"	"	U
1,3,5-Trimethylbenzene	"	ND	0.157	0.500	"	"	"	"	"	U
Isopropylbenzene	"	ND	0.107	2.00	"	"	"	"	"	U
n-Propylbenzene	"	ND	0.138	0.500	"	"	"	"	"	U

Surrogate(s):	4-BFB	Recovery:	90.5%	Limits:	75 - 120 %	"	"
	1,2-DCA-d4		120%		77 - 129 %	"	"
	Dibromofluoromethane		118%		80 - 121 %	"	"
	Toluene-d8		100%		80 - 120 %	"	"



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EnviroLogic Resources, Inc. P.O. Box 80762 Portland, OR 97280-0762	Project Name:	Astoria Area-Wide Petroleum Site RI-1	Report Created:
	Project Number:	10077.005	11/01/04 12:41
	Project Manager:	Tom Calabrese	

Polynuclear Aromatic Compounds per EPA 8270M-SIM
 North Creek Analytical - Portland

Analyte	Method	Result	MDL*	MRL	Units	Dil	Batch	Prepared	Analyzed	Notes
P4J0792-01	Water	Outfall #2	Sampled: 10/19/04 11:00							
Acenaphthene	EPA 8270m	ND	0.0500	0.0500	ug/l	1x	4101179	10/25/04	10/27/04 15:47	U
Acenaphthylene	"	ND	0.0500	0.0500	"	"	"	"	"	U
Anthracene	"	ND	0.0500	0.0500	"	"	"	"	"	U
Benzo (a) anthracene	"	ND	0.0100	0.0100	"	"	"	"	"	U
Benzo (a) pyrene	"	ND	0.0100	0.0100	"	"	"	"	"	U
Benzo (b) fluoranthene	"	ND	0.0100	0.0100	"	"	"	"	"	U
Benzo (ghi) perylene	"	ND	0.0500	0.0500	"	"	"	"	"	U
Benzo (k) fluoranthene	"	ND	0.0100	0.0100	"	"	"	"	"	U
Chrysene	"	ND	0.0100	0.0100	"	"	"	"	"	U
Dibenzo (a,h) anthracene	"	ND	0.0100	0.0100	"	"	"	"	"	U
Fluoranthene	"	ND	0.0500	0.0500	"	"	"	"	"	U
Fluorene	"	ND	0.0500	0.0500	"	"	"	"	"	U
Indeno (1,2,3-cd) pyrene	"	ND	0.0100	0.0100	"	"	"	"	"	U
Naphthalene	"	ND	0.0500	0.0500	"	"	"	"	"	U
Phenanthrene	"	ND	0.0500	0.0500	"	"	"	"	"	U
Pyrene	"	ND	0.0500	0.0500	"	"	"	"	"	U
<i>Surrogate(s): Fluorene-d10</i>		<i>Recovery: 115%</i>		<i>Limits: 25 - 150 %</i>						
<i>Pyrene-d10</i>		<i>92.4%</i>		<i>23 - 150 %</i>						
<i>Benzo (a) pyrene-d12</i>		<i>81.4%</i>		<i>10 - 150 %</i>						

North Creek Analytical - Portland

Joy D. Chang, Project Manager

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EnviroLogic Resources, Inc. P.O. Box 80762 Portland, OR 97280-0762	Project Name:	Astoria Area-Wide Petroleum Site RI-1	<u>Report Created:</u> 11/01/04 12:41
	Project Number:	10077.005	
	Project Manager:	Tom Calabrese	

Polynuclear Aromatic Compounds per EPA 8270M-SIM
 North Creek Analytical - Portland

Analyte	Method	Result	MDL*	MRL	Units	Dil	Batch	Prepared	Analyzed	Notes
P4J0792-03	Water	Outfall #6	Sampled: 10/19/04 11:45							
Acenaphthene	EPA 8270m	ND	0.0500	0.0500	ug/l	1x	4101179	10/25/04	10/27/04 15:13	U
Acenaphthylene	"	ND	0.0500	0.0500	"	"	"	"	"	U
Anthracene	"	ND	0.0500	0.0500	"	"	"	"	"	U
Benzo (a) anthracene	"	ND	0.0100	0.0100	"	"	"	"	"	U
Benzo (a) pyrene	"	ND	0.0100	0.0100	"	"	"	"	"	U
Benzo (b) fluoranthene	"	ND	0.0100	0.0100	"	"	"	"	"	U
Benzo (ghi) perylene	"	ND	0.0500	0.0500	"	"	"	"	"	U
Benzo (k) fluoranthene	"	ND	0.0100	0.0100	"	"	"	"	"	U
Chrysene	"	ND	0.0100	0.0100	"	"	"	"	"	U
Dibenzo (a,h) anthracene	"	ND	0.0100	0.0100	"	"	"	"	"	U
Fluoranthene	"	ND	0.0500	0.0500	"	"	"	"	"	U
Fluorene	"	ND	0.0500	0.0500	"	"	"	"	"	U
Indeno (1,2,3-cd) pyrene	"	ND	0.0100	0.0100	"	"	"	"	"	U
Naphthalene	"	ND	0.0500	0.0500	"	"	"	"	"	U
Phenanthrene	"	ND	0.0500	0.0500	"	"	"	"	"	U
Pyrene	"	ND	0.0500	0.0500	"	"	"	"	"	U
<i>Surrogate(s): Fluorene-d10</i>		<i>Recovery: 105%</i>		<i>Limits: 25 - 150 %</i>		<i>"</i>				
<i>Pyrene-d10</i>		<i>90.3%</i>		<i>23 - 150 %</i>		<i>"</i>				
<i>Benzo (a) pyrene-d12</i>		<i>76.3%</i>		<i>10 - 150 %</i>		<i>"</i>				



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EnviroLogic Resources, Inc. P.O. Box 80762 Portland, OR 97280-0762	Project Name:	Astoria Area-Wide Petroleum Site RI-1	<u>Report Created:</u> 11/01/04 12:41
	Project Number:	10077.005	
	Project Manager:	Tom Calabrese	

Conventional Chemistry Parameters per APHA/EPA Methods
North Creek Analytical - Portland

Analyte	Method	Result	MDL*	MRL	Units	Dil	Batch	Prepared	Analyzed	Notes
P4J0792-01	Water	Outfall #2	Sampled: 10/19/04 11:00							
Total Suspended Solids	EPA 160.2	7.00	<i>1.19</i>	10.0	mg/l	1x	4101271	10/26/04	10/26/04 16:35	J
pH	EPA 150.1	7.20			pH Units	"	4100963	10/20/04	10/20/04 10:50	
P4J0792-03	Water	Outfall #6	Sampled: 10/19/04 11:45							
Total Suspended Solids	EPA 160.2	7.00	<i>1.19</i>	10.0	mg/l	1x	4101271	10/26/04	10/26/04 16:35	J
pH	EPA 150.1	6.98			pH Units	"	4100963	10/20/04	10/20/04 10:50	

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EnviroLogic Resources, Inc. P.O. Box 80762 Portland, OR 97280-0762	Project Name: Astoria Area-Wide Petroleum Site RI-1 Project Number: 10077.005 Project Manager: Tom Calabrese	Report Created: 11/01/04 12:41
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Oil and Grease Analysis per EPA Method 1664 - Laboratory Quality Control Results
 North Creek Analytical - Portland

QC Batch: 4101095 Water Preparation Method: EPA 1664

Analyte	Method	Result	MDL*	MRL	Units	Dil	Source Result	Spike Amt	% REC	(Limits)	% RPD	(Limits)	Analyzed	Notes
Blank (4101095-BLK1)										Extracted: 10/22/04 06:52				
Oil & Grease	EPA 1664	ND	3.24	5.00	mg/l	1x	--	--	--	--	--	--	10/25/04 14:54	U
LCS (4101095-BS1)										Extracted: 10/22/04 06:52				
Oil & Grease	EPA 1664	69.0	3.24	5.00	mg/l	1x	--	80.0	86.2%	(79-114)	--	--	10/25/04 14:54	

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EnviroLogic Resources, Inc.	Project Name: Astoria Area-Wide Petroleum Site RI-1	
P.O. Box 80762	Project Number: 10077.005	Report Created: 11/01/04 12:41
Portland, OR 97280-0762	Project Manager: Tom Calabrese	

Total Metals per EPA 200 Series Methods - Laboratory Quality Control Results
North Creek Analytical - Portland

QC Batch: 4101121 Water Preparation Method: EPA 200/3005

Analyte	Method	Result	MDL*	MRL	Units	Dil	Source Result	Spike Amt	% REC (Limits)	% RPD (Limits)	Analyzed	Notes
---------	--------	--------	------	-----	-------	-----	---------------	-----------	----------------	----------------	----------	-------

Blank (4101121-BLK1) **Extracted: 10/22/04 11:17**

Copper	EPA 200.8	ND	0.000788	0.00200	mg/l	1x	--	--	--	--	10/23/04 18:59	U
Lead	"	ND	0.000224	0.00100	"	"	--	--	--	--	"	U
Zinc	"	0.00183	0.00150	0.00500	"	"	--	--	--	--	"	J

LCS (4101121-BS1) **Extracted: 10/22/04 11:17**

Copper	EPA 200.8	0.108	0.000788	0.00200	mg/l	1x	--	0.100	108%	(85-115)	--	10/23/04 19:07	
Lead	"	0.0977	0.000224	0.00100	"	"	--	"	97.7%	"	--	"	
Zinc	"	0.106	0.00150	0.00500	"	"	--	"	106%	"	--	"	

LCS Dup (4101121-BSD1) **Extracted: 10/22/04 11:17**

Copper	EPA 200.8	0.108	0.000788	0.00200	mg/l	1x	--	0.100	108%	(85-115)	0.00% (20)	10/23/04 19:15	
Lead	"	0.0967	0.000224	0.00100	"	"	--	"	96.7%	"	1.03%	"	
Zinc	"	0.109	0.00150	0.00500	"	"	--	"	109%	"	2.79%	"	

Duplicate (4101121-DUP1) **QC Source: P4J0792-01** **Extracted: 10/22/04 11:17**

Copper	EPA 200.8	0.00240	0.000788	0.00200	mg/l	1x	0.00241	--	--	--	0.416% (20)	10/23/04 19:31	
Lead	"	0.000690	0.000224	0.00100	"	"	0.000710	--	--	--	2.86%	"	J
Zinc	"	0.0162	0.00150	0.00500	"	"	0.0115	--	--	--	33.9%	"	Q-02

Matrix Spike (4101121-MS1) **QC Source: P4J0792-03** **Extracted: 10/22/04 11:17**

Copper	EPA 200.8	0.115	0.000788	0.00200	mg/l	1x	0.00897	0.100	106%	(70-130)	--	10/23/04 20:12	
Lead	"	0.0981	0.000224	0.00100	"	"	0.00295	"	95.2%	"	--	"	
Zinc	"	0.193	0.00150	0.00500	"	"	0.0918	"	101%	"	--	"	

Matrix Spike (4101121-MS2) **QC Source: P4J0799-01** **Extracted: 10/22/04 11:17**

Copper	EPA 200.8	0.269	0.000788	0.00200	mg/l	1x	0.171	0.100	98.0%	(70-130)	--	10/23/04 20:28	
Lead	"	0.105	0.000224	0.00100	"	"	0.00568	"	99.3%	"	--	"	
Zinc	"	0.119	0.00150	0.00500	"	"	0.0138	"	105%	"	--	"	

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EnviroLogic Resources, Inc.

P.O. Box 80762
Portland, OR 97280-0762

Project Name: **Astoria Area-Wide Petroleum Site RI-1**

Project Number: 10077.005
Project Manager: Tom Calabrese

Report Created:
11/01/04 12:41

Selected Volatile Organic Compounds (Including BTEX) per EPA Method 8260B - Laboratory Quality Control Results
North Creek Analytical - Portland

QC Batch: 4101391 Water Preparation Method: EPA 5030B

Analyte	Method	Result	MDL*	MRL	Units	Dil	Source Result	Spike Amt	% REC (Limits)	% RPD (Limits)	Analyzed	Notes		
Blank (4101391-BLK1)											Extracted: 10/28/04 08:45			
1,2-Dibromoethane	EPA 8260B	ND	0.187	0.500	ug/l	1x	--	--	--	--	10/28/04 10:46	U		
1,2-Dichloroethane	"	ND	0.142	0.500	"	"	--	--	--	--	"	U		
Benzene	"	ND	0.147	0.200	"	"	--	--	--	--	"	U		
Toluene	"	ND	0.155	0.500	"	"	--	--	--	--	"	U		
Ethylbenzene	"	ND	0.110	0.500	"	"	--	--	--	--	"	U		
Xylenes (total)	"	ND	0.262	1.00	"	"	--	--	--	--	"	U		
Methyl tert-butyl ether	"	ND	0.0865	2.00	"	"	--	--	--	--	"	U		
Naphthalene	"	0.470	0.0989	2.00	"	"	--	--	--	--	"	J		
1,2,4-Trimethylbenzene	"	ND	0.0884	1.00	"	"	--	--	--	--	"	U		
1,3,5-Trimethylbenzene	"	ND	0.157	0.500	"	"	--	--	--	--	"	U		
Isopropylbenzene	"	ND	0.107	2.00	"	"	--	--	--	--	"	U		
n-Propylbenzene	"	ND	0.138	0.500	"	"	--	--	--	--	"	U		
Surrogate(s): 4-BFB		Recovery:	93.5%	Limits:	75-120%	"					10/28/04 10:46			
1,2-DCA-d4			117%		77-129%	"					"			
Dibromofluoromethane			117%		80-121%	"					"			
Toluene-d8			102%		80-120%	"					"			
LCS (4101391-BS1)											Extracted: 10/28/04 08:45			
Benzene	EPA 8260B	20.9	0.147	0.200	ug/l	1x	--	20.0	104% (80-120)	--	10/28/04 08:59			
Toluene	"	21.0	0.155	0.500	"	"	--	"	105% (80-124)	--	"			
Ethylbenzene	"	20.4	0.110	0.500	"	"	--	"	102% (80-120)	--	"			
Xylenes (total)	"	62.9	0.262	1.00	"	"	--	60.0	105% (73-124)	--	"			
Methyl tert-butyl ether	"	22.3	0.0865	2.00	"	"	--	20.0	112% (80-129)	--	"			
Naphthalene	"	23.8	0.0989	2.00	"	"	--	"	119% (72-149)	--	"			
Surrogate(s): 4-BFB		Recovery:	102%	Limits:	75-120%	"					10/28/04 08:59			
1,2-DCA-d4			114%		77-129%	"					"			
Dibromofluoromethane			95.5%		80-121%	"					"			
Toluene-d8			104%		80-120%	"					"			
Matrix Spike (4101391-MS1)											QC Source: P4J0792-01		Extracted: 10/28/04 08:45	
Benzene	EPA 8260B	19.5	0.147	0.200	ug/l	1x	ND	20.0	97.5% (80-124)	--	10/28/04 09:26			
Toluene	"	19.3	0.155	0.500	"	"	ND	"	96.5% (79.7-131)	--	"			
Ethylbenzene	"	18.9	0.110	0.500	"	"	ND	"	94.5% (80-124)	--	"			
Xylenes (total)	"	55.0	0.262	1.00	"	"	ND	60.0	91.7% (44.6-154)	--	"			
Methyl tert-butyl ether	"	21.1	0.0865	2.00	"	"	ND	20.0	106% (80-130)	--	"			
Naphthalene	"	18.8	0.0989	2.00	"	"	ND	"	94.0% (69-163)	--	"			
Surrogate(s): 4-BFB		Recovery:	101%	Limits:	75-120%	"					10/28/04 09:26			
1,2-DCA-d4			110%		77-129%	"					"			
Dibromofluoromethane			102%		80-121%	"					"			
Toluene-d8			102%		80-120%	"					"			

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EnviroLogic Resources, Inc. P.O. Box 80762 Portland, OR 97280-0762	Project Name:	Astoria Area-Wide Petroleum Site RI-1	Report Created: 11/01/04 12:41
	Project Number:	10077.005	
	Project Manager:	Tom Calabrese	

Selected Volatile Organic Compounds (Including BTEX) per EPA Method 8260B - Laboratory Quality Control Results
 North Creek Analytical - Portland

QC Batch: 4101391 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 (4101391-MSD1)			QC Source: P4J0792-01				Extracted: 10/28/04 08:45					
Benzene	EPA 8260B	18.5	0.147	0.200	ug/l	1x	ND	20.0	92.5% (80-124)	5.26% (25)	10/28/04 09:53	
Toluene	"	18.0	0.155	0.500	"	"	ND	"	90.0% (79.7-131)	6.97% "	"	"
Ethylbenzene	"	17.7	0.110	0.500	"	"	ND	"	88.5% (80-124)	6.56% "	"	"
Xylenes (total)	"	52.8	0.262	1.00	"	"	ND	60.0	88.0% (44.6-154)	4.08% "	"	"
Methyl tert-butyl ether	"	21.1	0.0865	2.00	"	"	ND	20.0	106% (80-130)	0.00% "	"	"
Naphthalene	"	18.8	0.0989	2.00	"	"	ND	"	94.0% (69-163)	0.00% "	"	"
<i>Surrogate(s): 4-BFB</i>		<i>Recovery:</i>	<i>104%</i>	<i>Limits:</i>	<i>75-120%</i>	<i>"</i>					<i>10/28/04 09:53</i>	
<i>1,2-DCA-d4</i>			<i>113%</i>		<i>77-129%</i>	<i>"</i>						
<i>Dibromofluoromethane</i>			<i>106%</i>		<i>80-121%</i>	<i>"</i>						
<i>Toluene-d8</i>			<i>104%</i>		<i>80-120%</i>	<i>"</i>						

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EnviroLogic Resources, Inc.

P.O. Box 80762
Portland, OR 97280-0762

Project Name: **Astoria Area-Wide Petroleum Site RI-1**

Project Number: 10077.005
Project Manager: Tom Calabrese

Report Created:
11/01/04 12:41

Polynuclear Aromatic Compounds per EPA 8270M-SIM - Laboratory Quality Control Results
North Creek Analytical - Portland

QC Batch: 4101179 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 (4101179-BLK1)												Extracted: 10/25/04 06:55
Acenaphthene	EPA 8270m	ND	0.0500	0.0500	ug/l	1x	--	--	--	--	10/27/04 16:20	U
Acenaphthylene	"	ND	0.0500	0.0500	"	"	--	--	--	--	"	U
Anthracene	"	ND	0.0500	0.0500	"	"	--	--	--	--	"	U
Benzo (a) anthracene	"	ND	0.0100	0.0100	"	"	--	--	--	--	"	U
Benzo (a) pyrene	"	ND	0.0100	0.0100	"	"	--	--	--	--	"	U
Benzo (b) fluoranthene	"	ND	0.0100	0.0100	"	"	--	--	--	--	"	U
Benzo (ghi) perylene	"	ND	0.0500	0.0500	"	"	--	--	--	--	"	U
Benzo (k) fluoranthene	"	ND	0.0100	0.0100	"	"	--	--	--	--	"	U
Chrysene	"	ND	0.0100	0.0100	"	"	--	--	--	--	"	U
Dibenzo (a,h) anthracene	"	ND	0.0100	0.0100	"	"	--	--	--	--	"	U
Fluoranthene	"	ND	0.0500	0.0500	"	"	--	--	--	--	"	U
Fluorene	"	ND	0.0500	0.0500	"	"	--	--	--	--	"	U
Indeno (1,2,3-cd) pyrene	"	ND	0.0100	0.0100	"	"	--	--	--	--	"	U
Naphthalene	"	ND	0.0500	0.0500	"	"	--	--	--	--	"	U
Phenanthrene	"	ND	0.0500	0.0500	"	"	--	--	--	--	"	U
Pyrene	"	ND	0.0500	0.0500	"	"	--	--	--	--	"	U

Surrogate(s): Fluorene-d10 Recovery: 101% Limits: 25-150% " 10/27/04 16:20
 Pyrene-d10 64.0% 23-150% " "
 Benzo (a) pyrene-d12 40.8% 10-150% " "

LCS (4101179-BS1)

Extracted: 10/25/04 06:55

Acenaphthene	EPA 8270m	2.01	0.0500	0.0500	ug/l	1x	--	2.50	80.4% (26-150)	--	10/27/04 16:54	
Benzo (a) pyrene	"	1.94	0.0100	0.0100	"	"	--	"	77.6% (38-150)	--	"	
Pyrene	"	2.32	0.0500	0.0500	"	"	--	"	92.8% (33-150)	--	"	

Surrogate(s): Fluorene-d10 Recovery: 106% Limits: 25-150% " 10/27/04 16:54
 Pyrene-d10 87.2% 23-150% " "
 Benzo (a) pyrene-d12 86.8% 10-150% " "

LCS Dup (4101179-BSD1)

Extracted: 10/25/04 06:55

Acenaphthene	EPA 8270m	1.86	0.0500	0.0500	ug/l	1x	--	2.50	74.4% (26-150)	7.75% (60)	10/27/04 17:27	
Benzo (a) pyrene	"	2.11	0.0100	0.0100	"	"	--	"	84.4% (38-150)	8.40% "	"	
Pyrene	"	2.49	0.0500	0.0500	"	"	--	"	99.6% (33-150)	7.07% "	"	

Surrogate(s): Fluorene-d10 Recovery: 98.0% Limits: 25-150% " 10/27/04 17:27
 Pyrene-d10 90.8% 23-150% " "
 Benzo (a) pyrene-d12 92.8% 10-150% " "

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EnviroLogic Resources, Inc. P.O. Box 80762 Portland, OR 97280-0762	Project Name:	Astoria Area-Wide Petroleum Site RI-1	Report Created:
	Project Number:	10077.005	11/01/04 12:41
	Project Manager:	Tom Calabrese	

Conventional Chemistry Parameters per APHA/EPA Methods - Laboratory Quality Control Results
 North Creek Analytical - Portland

QC Batch: 4100963 **Water Preparation Method: General Preparation**

Analyte	Method	Result	MDL*	MRL	Units	Dil	Source Result	Spike Amt	% REC (Limits)	% RPD (Limits)	Analyzed	Notes	
Duplicate (4100963-DUP1)			QC Source: P4J0781-01				Extracted: 10/20/04 08:10						
pH	EPA 150.1	6.64			pH Units	1x	6.66	--	--	--	0.301% (25)	10/20/04 08:20	

QC Batch: 4101271 **Water Preparation Method: General Preparation**

Analyte	Method	Result	MDL*	MRL	Units	Dil	Source Result	Spike Amt	% REC (Limits)	% RPD (Limits)	Analyzed	Notes	
Blank (4101271-BLK1)							Extracted: 10/26/04 09:25						
Total Suspended Solids	EPA 160.2	ND	1.19	10.0	mg/l	1x	--	--	--	--	10/26/04 16:35	U	
LCS (4101271-BS1)							Extracted: 10/26/04 09:25						
Total Suspended Solids	EPA 160.2	52.0	2.38	20.0	mg/l	1x	--	50.0	104% (80-120)	--	10/26/04 16:35	D	
Duplicate (4101271-DUP1)			QC Source: P4J0934-01				Extracted: 10/26/04 09:25						
Total Suspended Solids	EPA 160.2	15.0	1.19	10.0	mg/l	1x	15.0	--	--	--	0.00% (20)	10/26/04 16:35	

North Creek Analytical - Portland

Joy D. Chang, Project Manager

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EnviroLogic Resources, Inc.

P.O. Box 80762
Portland, OR 97280-0762

Project Name: **Astoria Area-Wide Petroleum Site RI-1**

Project Number: 10077.005

Project Manager: Tom Calabrese

Report Created:
11/01/04 12:41

Notes and Definitions

Report Specific Notes:

- D - Data reported from a preparation or analytical dilution.
- J - Estimated value.
- Q-02 - The matrix spike recovery, and/or RPD, for this QC sample is outside of established control limits due to sample matrix interference.
- U - Analyte included in the analysis but not detected.

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.