

January 28, 2004
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 – Third Quarter 2003
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 third quarter of 2003. 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, ExxonMobil Corporation is part of the PRP Group.

BACKGROUND

The Astoria Area-Wide site includes facilities and properties located at and near the Port of Astoria in Astoria, Oregon, as shown on Figure 1. The regional study area (RSA) includes the Astoria Area-Wide site and the surrounding areas. The RSA is located in Section 7, Township 8 North, Range 9 West, and Section 12, Township 8 North, Range 10 West, Willamette Base and Meridian. The Astoria Area-Wide site includes property bounded by Portway to the northeast, the Columbia River to the northwest, Hamburg Street (including the former McCall bulk plant) to the southwest, and Marine Drive to the southeast.

Ms. Anna Coates

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The topography of the area consists of a prominent hill overlooking the RSA from the southeast. West Marine Drive (US Highways 26, 30, and 101) is located on a topographic bench, at the base of the prominent hill, approximately 15 feet above the level of the Port facilities. The Columbia River flows to the west on the northwest side of the RSA. Youngs Bay lies to the southwest.

The area around the Port has been used for petroleum storage and distribution since the 1920s. Aboveground storage tanks (ASTs), underground storage tanks (USTs), and pipelines are present on several of the facilities subject to this investigation. Historically, the area was home to at least four bulk petroleum storage facilities and five vehicle fueling or service stations between West Marine Drive and the Columbia River in the RSA. Inactive pipelines associated with several of the former bulk fuel storage facilities extend onto Pier 2. A complete site history and a summary of remedial actions completed at the Astoria Area-Wide site are presented in the RI/FS Work Plan (*EnviroLogic Resources*, July 2002) and subsequent addenda.

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, one goal of which was to map the storm water piping system. This piping system is shown on Figure 2 in the Work Plan, Storm Water Monitoring (*EnviroLogic Resources*, 2003). *EnviroLogic Resources* has reviewed the results of the geophysical mapping along with additional information obtained during the Phase 1 field activities and compiled a storm water catchment map, presented on Figure 3 of the Work Plan, Storm Water Monitoring (*EnviroLogic Resources*, 2003).

Based on the areas drained, the areas of focus for the RI/FS, off-site contribution to drainage, and outfall accessibility, Outfall #2 in Catchment Area 2 and Outfall #6 in Catchment Area 4 have been selected for monitoring (Figure 2). 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 September 9, 2003, the first round of quarterly stormwater sampling was conducted. The sampling event was originally scheduled to occur during the 2nd Quarter of 2003, but was postponed because of the lack of rainfall events. A storm water sample was collected from the Outfall #2 sampling location. As shown on Figure 2, the sampling location for Outfall #2 is the first catch basin upstream of the Outfall. The actual outfall cannot be sampled due to the inability to locate the exact discharge point. A dye test performed in January 2003 indicated the approximate location of the discharge area within the riprap on the bank of Slip 2.

Ms. Anna Coates
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Water from the sampling point for Outfall #2 was collected by lowering a disposable plastic beaker into the catch basin and collecting the water directly from the inlet pipe. The water was transferred into the appropriate bottles and stored in a cooler with ice until the samples were delivered to the laboratory. At the time of sampling, Outfall #6 was beneath the river water since it was high tide. By low tide, it was no longer raining and water was no longer discharging from Outfall #6 for sampling.

The storm water sample was analyzed for RBDM volatile organic compounds (VOCs), RBDM polyaromatic hydrocarbons (PAHs/SVOCs), total copper, total lead, total zinc, pH, total suspended solids, and oil and grease. The absence of oil and grease or floating solids in the storm water was also noted during the sampling event 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. A validation of the data has been performed and the data are considered of an acceptable quality. The data validation report is included in Appendix A.

As shown on Tables 1 and 2, there were no VOCs or SVOCs detected in the storm water sample. Table 3 presents the metals in storm water. There were no metals detected above the laboratory reporting limits. However, the metals analyzed for (copper, lead, and zinc) were detected at values between the reporting limit and the method detection limits. 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 sample from Outfall #2. There were 2,000 µg/L of total suspended solids (TSS).

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CLOSING COMMENTS

There does not seem to have been an impact from the petroleum contamination at the Astoria Area-Wide site on the storm water discharging from Outfall #2. We plan to sample both Outfall #2 and Outfall #6 during the Fourth Quarter 2003. 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 Analytical Results of Inorganics in Storm Water
Table 2 Analytical Results of VOCs in Storm Water
Table 3 Analytical Results of SVOCs in Storm Water
Table 4 Analytical Results of Metals in Storm Water
Figure 1 Site Plan
Figure 2 Storm Water Sampling Locations
Appendix A Storm Water Monitoring Form
Appendix B Analytical Results and Data Validation Report

cc: Distribution list attached

Ms. Anna Coates
January 28, 2004
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**ASTORIA AREA-WIDE PETROLEUM SITE
Distribution List**

- 1 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
 - 1 Ted McCall, McCall Oil and Chemical Corporation
 - 1 John Edwards, Anchor Environmental, LLC, Consultant for McCall Oil and Chemical Corp
 - 1 Cary E. Bechtolt, Niemi Oil Company
 - 1 Allan B. Bakalian, Marten Law Group, PLLC, Attorney for Niemi Oil Company
 - 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
 - 1 Leon Lahiere, Hart Crowser, Consultant for Shell Oil Company
 - 1 Brian Harris, Harris Enterprises
 - 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
 - 1 Lon Yandell, Kleinfelder, Consultant for Harris Enterprises
 - 1 Richard Delphia, Delphia Oil Company
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 - 1 Cheryl Morrison, ChevronTexaco Products Company
 - 1 Charles Lambert, Attorney for ChevronTexaco Products Company
 - 1 Gerry Koschal, SAIC, Consultant for ChevronTexaco Products Company
 - 1 Brian Jacobson, Qwest Communications International, Inc.
 - 1 David Bledsoe, Perkins Coie LLP, Attorney for Qwest Communications International, Inc.
 - 1 Donna LaCombe, Tetra Tech EM, Inc., Consultant for Qwest Communications International
 - 1 Anita W. Lovely, for Exxon Mobil Corporation
-

TABLES

**TABLE 1
VOCs IN STORM WATER**

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

Locator ID	Sample ID	Sample Date	1,2,4- Trimethylbenzene	1,2- Dibromoethane	1,2- Dichloroethane	1,3,5-Trimethyl benzene	Benzene
			ug/L	ug/L	ug/L	ug/L	ug/L
Outfall#2	Outfall #2	9/9/2003	1 U	0.5 U	0.5 U	0.5 U	0.5 U

Locator ID	Sample ID	Sample Date	Ethylbenzene	Isopropyl benzene	Methyl-t-butyl ether	n-Propylbenzene	Toluene
			ug/L	ug/L	ug/L	ug/L	ug/L
Outfall#2	Outfall #2	9/9/2003	0.5 U	2 U	2 U	0.5 U	0.5 U

Locator ID	Sample ID	Sample Date	Xylenes
			ug/L
Outfall#2	Outfall #2	9/9/2003	1 U

Notes:

ug/L Micrograms per liter

na not analyzed

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.

TABLE 2
SVOCs IN STORM WATER

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

Locator ID	Sample ID	Sample Date	Acenaphthene	Acenaphthylene	Anthracene	Benzo(a)anthracene	Benzo(a)pyrene
			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	9/9/2003					
Locator ID	Sample ID	Sample Date	Benzo(b)fluoranthene	Benzo(g,h,i)perylene	Benzo(k)fluoranthene	Chrysene	Dibenzo(a,h)anthracene
			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	0.2 U
Outfall#2	Outfall #2	9/9/2003					
Locator ID	Sample ID	Sample Date	Fluoranthene	Fluorene	Indeno(1,2,3-cd)pyrene	Naphthalene	Phenanthrene
			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	2 U	0.1 U
Outfall#2	Outfall #2	9/9/2003				0.1 U	
Locator ID	Sample ID	Sample Date	Pyrene				
			ug/L				
Outfall#2	Outfall #2	9/9/2003	0.1 U				
Outfall#2	Outfall #2	9/9/2003					

Notes:

ug/L Micrograms per liter

na not analyzed

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.

**TABLE 3
METALS IN STORM WATER**

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

Locator ID	Sample ID	Sample Date	Arsenic, Total	Cadmium	Chromium	Copper	Lead	Mercury	Nickel	Zinc
			ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L
Outfall#2	Outfall #2	9/9/2003	na	na	na	3.2 J	5.1 J	na	na	16.6 J

Notes:

ug/L Micrograms per liter

na not analyzed

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.

TABLE 4
ADDITIONAL CHEMICAL ANALYSES IN STORM WATER

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

Locator ID	Sample ID	Sample Date	Chemical Oxygen Demand	pH	Phosphorus, Total (as P)	Total Organic Carbon (TOC)	Total Suspended Solids (TSS)	Oil & Grease (total)	Oil & Grease (polar)	Oil & Grease (nonpolar)
			ug/L	pH Units	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L
Outfall#2	Outfall #2	9/9/2003	na	6.11	na	na	2,000 J	950 U	950 U	950 U

Notes:

ug/L Micrograms per liter

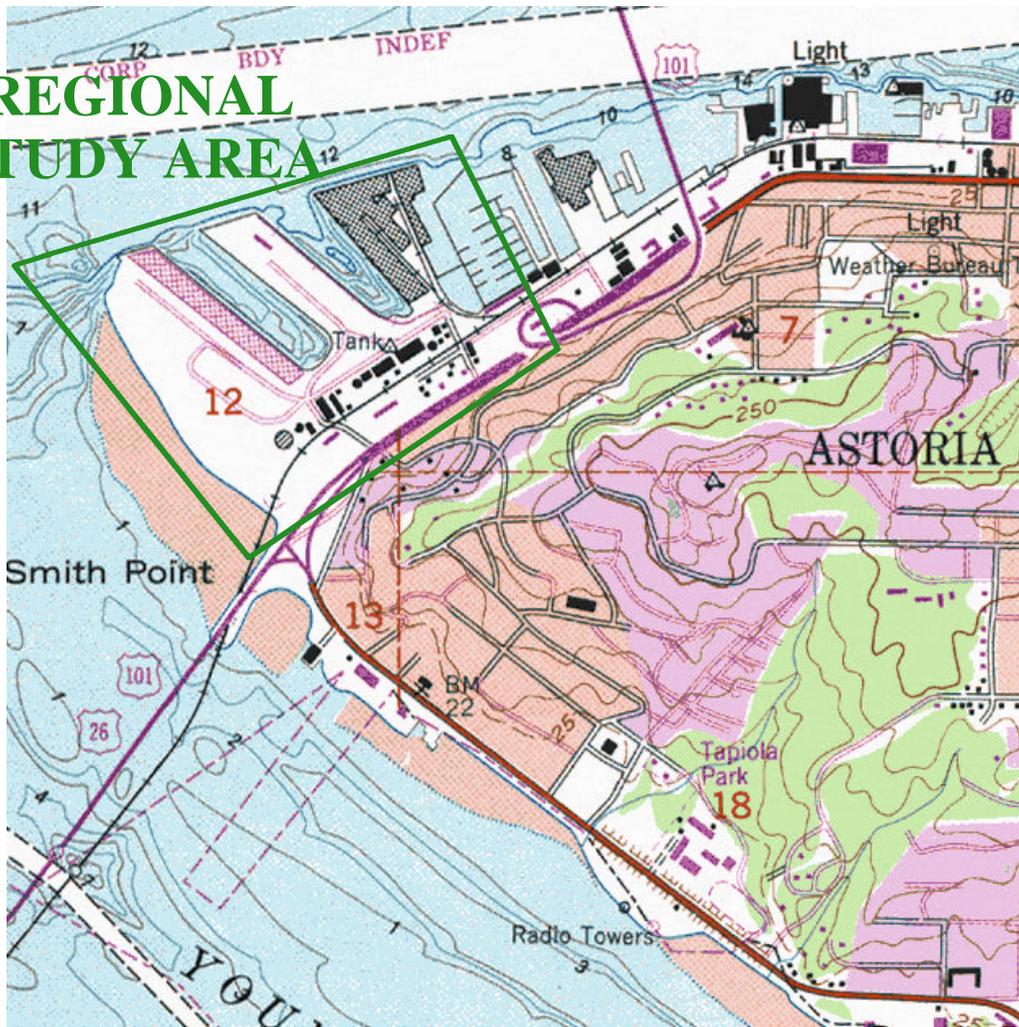
na not analyzed

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.

FIGURES

REGIONAL STUDY AREA



(from USGS, Astoria [1984], OR 7.5' Quadrangles)

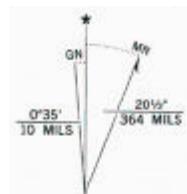
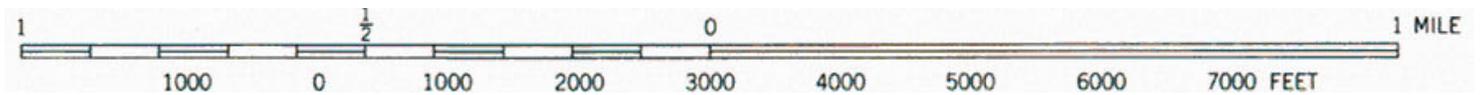


FIGURE 1

SITE LOCATION

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

EnviroLogic Resources, Inc.

Consulting Environmental & Water Resources Scientists

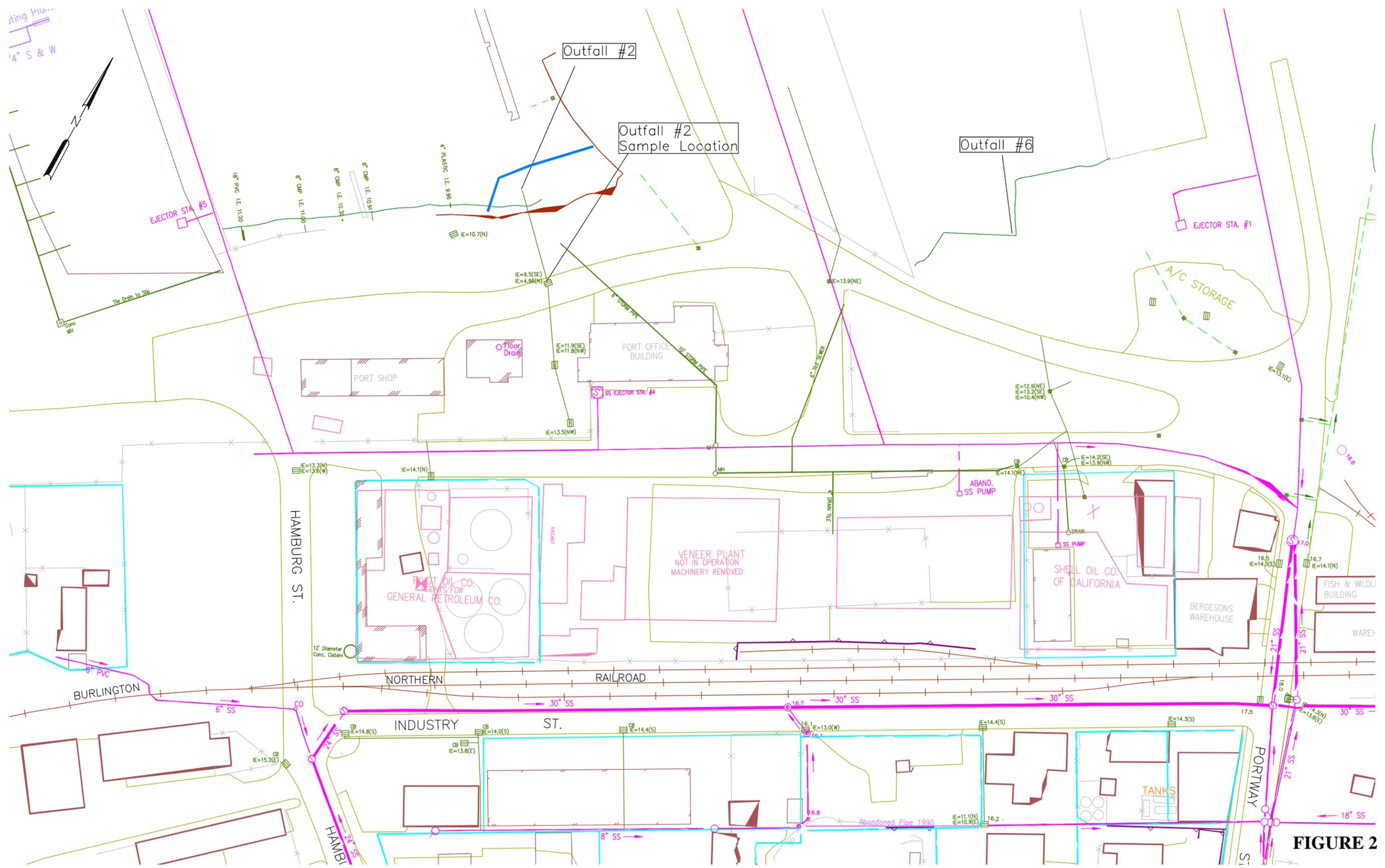


FIGURE 2

STORMWATER SAMPLING

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

APPENDIX A
STORM WATER MONITORING FORM

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: September 9, 2003	
Time Sample Collected: 1300	
Sample Collection Method: Disposable plastic beaker	
Weather: Overcast; Rained throughout early morning	Water Flow: Strong <u>Medium</u> Light
Color: Clear to mostly clear	Odor: None
Temperature: not available	Other:
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.

No flow was observed in Outfalls #13 and #14

APPENDIX B

ANALYTICAL RESULTS and DATA VALIDATION REPORT

**QUALITY ASSURANCE/QUALITY CONTROL REVIEW
STORM WATER – 3rd QUARTER 2003**

**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 sample collected was the third quarter 2003 storm water sample for the Astoria Area-Wide Petroleum Site. The sample was collected on September 9, 2003. 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 1 sample was 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
P3I0423	1	Water	9/09/03	Outfall #2

As stated in Appendix B, Sections 8.0, 9.0 and 10.0 of the Phase I 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. No data was qualified as a result of our review. Analyses performed are listed below.

Analysis	Reference
Total Suspended Solids	EPA Method 160.2
Fats, 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 COCs to indicate sample containers were broken or otherwise in any adverse condition upon arrival at the laboratory.
- The cooler temperature was recorded as 5.6°C for P3I0423 when it was received at the laboratory.
- 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:

- **J.** The analyte was positively identified; the associated numerical value is the approximate concentration of the analyte in the sample.

The laboratory in their laboratory report used this and other data qualifiers. 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. Based on this review pH was analyzed outside the EPA recommended holding time. The pH is qualified with a J flag

FIELD BLANKS

Equipment Blanks and Trip Blanks

No trip blank or equipment blank was utilized. The recommended frequency presented in the Phase 1 RI/FS work plan was one equipment blank for every 20 samples delivered to the laboratory and one trip blank for every cooler delivered to the laboratory.

LABORATORY METHOD BLANKS

Laboratory method blanks were analyzed at the required frequency for all analyses in the lab order. 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. No analytes were detected in the laboratory blanks.

SURROGATE RECOVERIES

Field Sample

One or more surrogates were utilized for each analysis except for total metals, total suspended solids, pH, and fats, 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 quality control information was acceptable. No data was qualified.

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. No field duplicate was 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. Overall the accuracy of the laboratory data is acceptable and no data is qualified due to a lack of precision.

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.

Trip and equipment blanks and field duplicates were not utilized with sample delivery group. No problems were noted in the laboratory blanks.

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. One analysis was qualified with a J flag due to an exceeded holding time.

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). 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.



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907.334.0200 fax 907.334.0210

12 November 2003

Tom Calabrese
EnviroLogic Resources, Inc.
P.O. Box 80762
Portland, OR 97280-0762
RE: Astoria Area-Wide Petroleum Site

Enclosed are the results of analyses for samples received by the laboratory on 09/11/03 13:00. If you have any questions concerning this report, please feel free to contact me.

Sincerely,

Joy D. Chang For Brian Cone
Industrial Services Manager



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

Project: Astoria Area-Wide Petroleum Site
 Project Number: 10077.005
 Project Manager: Tom Calabrese

Reported:
 11/12/03 15:36

ANALYTICAL REPORT FOR SAMPLES

Sample ID	Laboratory ID	Matrix	Date Sampled	Date Received
Outfall #2	P3I0423-01	Water	09/09/03 13:00	09/11/03 13:00

North Creek Analytical - Portland

The results in this report apply to the samples analyzed in accordance with the chain of custody document. This analytical report must be reproduced in its entirety.

Joy D. Chang For Brian Cone, Industrial Services Manager

North Creek Analytical, Inc.
Environmental Laboratory Network



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

Project: Astoria Area-Wide Petroleum Site
 Project Number: 10077.005
 Project Manager: Tom Calabrese

Reported:
 11/12/03 15:36

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

Analyte	Result	MDL	Reporting Limit	Units	Dilution	Batch	Prepared	Analyzed	Method	Notes
Outfall #2 (P3I0423-01) Water Sampled: 09/09/03 13:00 Received: 09/11/03 13:00										
Copper	0.00320	0.00259	0.0200	mg/l	1	3090977	09/23/03	09/25/03	EPA 200.8	J, D
Lead	0.00510	0.000870	0.0100	"	"	"	"	"	"	J, D
Zinc	0.0166	0.0102	0.0500	"	"	"	"	"	"	J, D

North Creek Analytical - Portland

Joy D. Chang For Brian Cone, Industrial Services 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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EnviroLogic Resources, Inc.
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Portland OR, 97280-0762

Project: Astoria Area-Wide Petroleum Site
Project Number: 10077.005
Project Manager: Tom Calabrese

Reported:
11/12/03 15:36

**Selected Volatile Organic Compounds per EPA Method 8260B
North Creek Analytical - Portland**

Analyte	Result	MDL	Reporting Limit	Units	Dilution	Batch	Prepared	Analyzed	Method	Notes
Outfall #2 (P3I0423-01) Water Sampled: 09/09/03 13:00 Received: 09/11/03 13:00										
1,2-Dibromoethane	ND	0.187	0.500	ug/l	1	3090576	09/15/03	09/15/03	EPA 8260B	U
1,2-Dichloroethane	ND	0.142	0.500	"	"	"	"	"	"	U
Benzene	ND	0.147	0.500	"	"	"	"	"	"	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: 4-BFB	89.5 %		80-120			"	"	"	"	
Surrogate: 1,2-DCA-d4	94.5 %		77-135			"	"	"	"	
Surrogate: Dibromofluoromethane	90.5 %		80-122			"	"	"	"	
Surrogate: Toluene-d8	107 %		80-120			"	"	"	"	

North Creek Analytical - Portland

Joy D. Chang For Brian Cone, Industrial Services Manager

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

Project: Astoria Area-Wide Petroleum Site
Project Number: 10077.005
Project Manager: Tom Calabrese

Reported:
11/12/03 15:36

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

Analyte	Result	MDL	Reporting Limit	Units	Dilution	Batch	Prepared	Analyzed	Method	Notes
Outfall #2 (P3I0423-01) Water Sampled: 09/09/03 13:00 Received: 09/11/03 13:00										
Acenaphthene	ND	0.0500	0.100	ug/l	1	3090533	09/12/03	09/22/03	EPA 8270m	U
Acenaphthylene	ND	0.0500	0.100	"	"	"	"	"	"	U
Anthracene	ND	0.0500	0.100	"	"	"	"	"	"	U
Benzo (a) anthracene	ND	0.0500	0.100	"	"	"	"	"	"	U
Benzo (a) pyrene	ND	0.0500	0.100	"	"	"	"	"	"	U
Benzo (b) fluoranthene	ND	0.0500	0.100	"	"	"	"	"	"	U
Benzo (ghi) perylene	ND	0.0500	0.100	"	"	"	"	"	"	U
Benzo (k) fluoranthene	ND	0.0500	0.100	"	"	"	"	"	"	U
Chrysene	ND	0.0500	0.100	"	"	"	"	"	"	U
Dibenzo (a,h) anthracene	ND	0.100	0.200	"	"	"	"	"	"	U
Fluoranthene	ND	0.0500	0.100	"	"	"	"	"	"	U
Fluorene	ND	0.0500	0.100	"	"	"	"	"	"	U
Indeno (1,2,3-cd) pyrene	ND	0.0500	0.100	"	"	"	"	"	"	U
Naphthalene	ND	0.0500	0.100	"	"	"	"	"	"	U
Phenanthrene	ND	0.0500	0.100	"	"	"	"	"	"	U
Pyrene	ND	0.0500	0.100	"	"	"	"	"	"	U
Surrogate: Fluorene-d10	45.3 %		25-125			"	"	"	"	
Surrogate: Pyrene-d10	55.5 %		23-150			"	"	"	"	
Surrogate: Benzo (a) pyrene-d12	31.3 %		10-125			"	"	"	"	

North Creek Analytical - Portland

Joy D. Chang For Brian Cone, Industrial Services Manager

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

Project: Astoria Area-Wide Petroleum Site
 Project Number: 10077.005
 Project Manager: Tom Calabrese

Reported:
 11/12/03 15:36

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

Analyte	Result	MDL	Reporting Limit	Units	Dilution	Batch	Prepared	Analyzed	Method	Notes
Outfall #2 (P3I0423-01) Water Sampled: 09/09/03 13:00 Received: 09/11/03 13:00										
pH	6.11			pH Units	1	3090541	09/12/03	09/12/03	150.1/9040	I-05
Total Suspended Solids	2.00	1.68	10.0	mg/l	"	3090652	09/16/03	09/16/03	EPA 160.2	J

North Creek Analytical - Portland

Joy D. Chang For Brian Cone, Industrial Services Manager

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

Project: Astoria Area-Wide Petroleum Site
 Project Number: 10077.005
 Project Manager: Tom Calabrese

Reported:
 11/12/03 15:36

**Conventional Chemistry Parameters by APHA/EPA Methods
 North Creek Analytical - Bothell**

Analyte	Result	MDL	Reporting Limit	Units	Dilution	Batch	Prepared	Analyzed	Method	Notes
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Outfall #2 (P3I0423-01) Water **Sampled: 09/09/03 13:00** **Received: 09/11/03 13:00**

Fats, Oil & Grease (total)	ND	0.950	4.72	mg/l	1	3I16005	09/16/03	09/17/03	EPA 1664	U
Fats, Oil & Grease (non-polar)	ND	0.950	4.72	"	"	"	"	"	"	U
Fats, Oil & Grease (polar)	ND	0.950	4.72	"	"	"	"	"	"	U

North Creek Analytical - Portland

Joy D. Chang For Brian Cone, Industrial Services Manager

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

Project: Astoria Area-Wide Petroleum Site
Project Number: 10077.005
Project Manager: Tom Calabrese

Reported:
11/12/03 15:36

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

Analyte	Result	MDL	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
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Batch 3090977: Prepared 09/23/03 Using EPA 200/3005

Blank (3090977-BLK1)

Copper	ND	0.000259	0.00200	mg/l							U
Lead	ND	0.0000870	0.00100	"							U
Zinc	ND	0.00102	0.00500	"							U

LCS (3090977-BS1)

Copper	0.104	0.000259	0.00200	mg/l	0.100		104	85-115			
Lead	0.108	0.0000870	0.00100	"	0.100		108	85-115			
Zinc	0.0994	0.00102	0.00500	"	0.100		99.4	85-115			

Duplicate (3090977-DUP1)

Source: P3I0635-01

Copper	0.0160	0.000259	0.00200	mg/l		0.0157			1.89	20	
Lead	0.00321	0.0000870	0.00100	"		0.00314			2.20	20	
Zinc	0.0221	0.00102	0.00500	"		0.0220			0.454	20	

Matrix Spike (3090977-MS1)

Source: P3I0635-01

Copper	0.127	0.000259	0.00200	mg/l	0.100	0.0157	111	70-130			
Lead	0.103	0.0000870	0.00100	"	0.100	0.00314	99.9	70-130			
Zinc	0.120	0.00102	0.00500	"	0.100	0.0220	98.0	70-130			

Matrix Spike (3090977-MS2)

Source: P3I0471-01

Copper	0.111	0.000259	0.00200	mg/l	0.100	0.00177	109	70-130			
Lead	0.0973	0.0000870	0.00100	"	0.100	ND	97.3	70-130			
Zinc	0.0933	0.00102	0.00500	"	0.100	0.00155	91.8	70-130			

North Creek Analytical - Portland

Joy D. Chang For Brian Cone, Industrial Services Manager

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North Creek Analytical, Inc.
Environmental Laboratory Network



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

Project: Astoria Area-Wide Petroleum Site
Project Number: 10077.005
Project Manager: Tom Calabrese

Reported:
11/12/03 15:36

**Selected Volatile Organic Compounds per EPA Method 8260B - Quality Control
North Creek Analytical - Portland**

Analyte	Result	MDL	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
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Batch 3090576: Prepared 09/15/03 Using EPA 5030B

Blank (3090576-BLK1)

1,2-Dibromoethane	ND	0.187	0.500	ug/l							U
1,2-Dichloroethane	ND	0.142	0.500	"							U
Benzene	ND	0.147	0.500	"							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: 4-BFB	19.8			"	20.0		99.0	80-120			
Surrogate: 1,2-DCA-d4	19.4			"	20.0		97.0	77-135			
Surrogate: Dibromofluoromethane	18.6			"	20.0		93.0	80-122			
Surrogate: Toluene-d8	22.4			"	20.0		112	80-120			

LCS (3090576-BS1)

Benzene	21.1	0.147	0.500	ug/l	20.0	ND	106	80-120			
Toluene	22.6	0.155	0.500	"	20.0	0.300	113	80-120			
Ethylbenzene	20.3	0.110	0.500	"	20.0	ND	102	80-120			
Xylenes (total)	62.8	0.262	1.00	"	60.0	ND	105	80-120			
Surrogate: 4-BFB	20.8			"	20.0		104	80-120			
Surrogate: 1,2-DCA-d4	19.4			"	20.0		97.0	77-135			
Surrogate: Dibromofluoromethane	18.3			"	20.0		91.5	80-122			
Surrogate: Toluene-d8	22.3			"	20.0		112	80-120			

Matrix Spike (3090576-MS1)

Source: P3I0479-03

Benzene	20.8	0.147	0.500	ug/l	20.0	ND	104	80-124			
Toluene	22.2	0.155	0.500	"	20.0	0.300	110	79.7-131			
Ethylbenzene	19.7	0.110	0.500	"	20.0	ND	98.5	80-124			
Xylenes (total)	58.8	0.262	1.00	"	60.0	ND	98.0	44.6-154			
Surrogate: 4-BFB	19.6			"	20.0		98.0	80-120			

North Creek Analytical - Portland

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Joy D. Chang For Brian Cone, Industrial Services Manager

North Creek Analytical, Inc.
Environmental Laboratory Network



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

Project: Astoria Area-Wide Petroleum Site
Project Number: 10077.005
Project Manager: Tom Calabrese

Reported:
11/12/03 15:36

Selected Volatile Organic Compounds per EPA Method 8260B - Quality Control
North Creek Analytical - Portland

Analyte	Result	MDL	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
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Batch 3090576: Prepared 09/15/03 Using EPA 5030B

Matrix Spike (3090576-MS1)

Source: P3I0479-03

Surrogate: 1,2-DCA-d4	18.6			ug/l	20.0		93.0	77-135			
Surrogate: Dibromofluoromethane	17.7			"	20.0		88.5	80-122			
Surrogate: Toluene-d8	21.8			"	20.0		109	80-120			

Matrix Spike (3090576-MS2)

Source: P3I0400-01RE1

Benzene	21.5	0.147	0.500	ug/l	20.0	0.500	105	80-124			
Toluene	22.8	0.155	0.500	"	20.0	0.690	111	79.7-131			
Ethylbenzene	19.1	0.110	0.500	"	20.0	0.440	93.3	80-124			
Xylenes (total)	55.0	0.262	1.00	"	60.0	0.620	90.6	44.6-154			
Surrogate: 4-BFB	18.5			"	20.0		92.5	80-120			
Surrogate: 1,2-DCA-d4	19.3			"	20.0		96.5	77-135			
Surrogate: Dibromofluoromethane	18.2			"	20.0		91.0	80-122			
Surrogate: Toluene-d8	22.4			"	20.0		112	80-120			

Matrix Spike Dup (3090576-MSD1)

Source: P3I0479-03

Benzene	21.0	0.147	0.500	ug/l	20.0	ND	105	80-124	0.957	25	
Toluene	22.4	0.155	0.500	"	20.0	0.300	110	79.7-131	0.897	25	
Ethylbenzene	19.5	0.110	0.500	"	20.0	ND	97.5	80-124	1.02	25	
Xylenes (total)	57.4	0.262	1.00	"	60.0	ND	95.7	44.6-154	2.41	25	
Surrogate: 4-BFB	19.2			"	20.0		96.0	80-120			
Surrogate: 1,2-DCA-d4	19.3			"	20.0		96.5	77-135			
Surrogate: Dibromofluoromethane	18.1			"	20.0		90.5	80-122			
Surrogate: Toluene-d8	21.8			"	20.0		109	80-120			

Matrix Spike Dup (3090576-MSD2)

Source: P3I0400-01RE1

Benzene	21.2	0.147	0.500	ug/l	20.0	0.500	104	80-124	1.41	25	
Toluene	22.7	0.155	0.500	"	20.0	0.690	110	79.7-131	0.440	25	
Ethylbenzene	18.8	0.110	0.500	"	20.0	0.440	91.8	80-124	1.58	25	
Xylenes (total)	55.2	0.262	1.00	"	60.0	0.620	91.0	44.6-154	0.363	25	
Surrogate: 4-BFB	19.1			"	20.0		95.5	80-120			
Surrogate: 1,2-DCA-d4	19.5			"	20.0		97.5	77-135			
Surrogate: Dibromofluoromethane	18.6			"	20.0		93.0	80-122			
Surrogate: Toluene-d8	23.1			"	20.0		116	80-120			

North Creek Analytical - Portland

Joy D. Chang For Brian Cone, Industrial Services Manager

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

Project: Astoria Area-Wide Petroleum Site
Project Number: 10077.005
Project Manager: Tom Calabrese

Reported:
11/12/03 15:36

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

Analyte	Result	MDL	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
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Batch 3090533: Prepared 09/12/03 Using EPA 3510/600 Series

Blank (3090533-BLK1)

Acenaphthene	ND	0.0500	0.100	ug/l							U
Acenaphthylene	ND	0.0500	0.100	"							U
Anthracene	ND	0.0500	0.100	"							U
Benzo (a) anthracene	ND	0.0500	0.100	"							U
Benzo (a) pyrene	ND	0.0500	0.100	"							U
Benzo (b) fluoranthene	ND	0.0500	0.100	"							U
Benzo (ghi) perylene	ND	0.0500	0.100	"							U
Benzo (k) fluoranthene	ND	0.0500	0.100	"							U
Chrysene	ND	0.0500	0.100	"							U
Dibenzo (a,h) anthracene	ND	0.100	0.200	"							U
Fluoranthene	ND	0.0500	0.100	"							U
Fluorene	ND	0.0500	0.100	"							U
Indeno (1,2,3-cd) pyrene	ND	0.0500	0.100	"							U
Naphthalene	ND	0.0500	0.100	"							U
Phenanthrene	ND	0.0500	0.100	"							U
Pyrene	ND	0.0500	0.100	"							U
Surrogate: Fluorene-d10	1.47			"	2.50		58.8	25-125			
Surrogate: Pyrene-d10	2.11			"	2.50		84.4	23-150			
Surrogate: Benzo (a) pyrene-d12	1.44			"	2.50		57.6	10-125			

LCS (3090533-BS1)

Acenaphthene	1.55	0.0500	0.100	ug/l	2.50		62.0	26-135			
Benzo (a) pyrene	1.45	0.0500	0.100	"	2.50		58.0	38-137			
Pyrene	1.68	0.0500	0.100	"	2.50		67.2	33-133			
Surrogate: Fluorene-d10	1.42			"	2.50		56.8	25-125			
Surrogate: Pyrene-d10	1.81			"	2.50		72.4	23-150			
Surrogate: Benzo (a) pyrene-d12	1.34			"	2.50		53.6	10-125			

North Creek Analytical - Portland

Joy D. Chang For Brian Cone, Industrial Services Manager

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Project: Astoria Area-Wide Petroleum Site
 Project Number: 10077.005
 Project Manager: Tom Calabrese

Reported:
 11/12/03 15:36

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

Analyte	Result	MDL	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
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Batch 3090533: Prepared 09/12/03 Using EPA 3510/600 Series

LCS Dup (3090533-BSD1)

Acenaphthene	1.65	0.0500	0.100	ug/l	2.50		66.0	26-135	6.25	60	
Benzo (a) pyrene	1.53	0.0500	0.100	"	2.50		61.2	38-137	5.37	60	
Pyrene	1.78	0.0500	0.100	"	2.50		71.2	33-133	5.78	60	
<i>Surrogate: Fluorene-d10</i>	<i>1.53</i>			<i>"</i>	<i>2.50</i>		<i>61.2</i>	<i>25-125</i>			
<i>Surrogate: Pyrene-d10</i>	<i>1.87</i>			<i>"</i>	<i>2.50</i>		<i>74.8</i>	<i>23-150</i>			
<i>Surrogate: Benzo (a) pyrene-d12</i>	<i>1.35</i>			<i>"</i>	<i>2.50</i>		<i>54.0</i>	<i>10-125</i>			

North Creek Analytical - Portland

Joy D. Chang For Brian Cone, Industrial Services Manager

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EnviroLogic Resources, Inc. P.O. Box 80762 Portland OR, 97280-0762	Project: Astoria Area-Wide Petroleum Site Project Number: 10077.005 Project Manager: Tom Calabrese	Reported: 11/12/03 15:36
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Conventional Chemistry Parameters per APHA/EPA Methods - Quality Control
North Creek Analytical - Portland

Analyte	Result	MDL	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
Batch 3090541: Prepared 09/12/03 Using Wet Chem											
Duplicate (3090541-DUP1)						Source: P3I0423-01					
pH	6.18			pH Units		6.11			1.14	25	
Batch 3090652: Prepared 09/16/03 Using Wet Chem											
Blank (3090652-BLK1)											
Total Suspended Solids	ND	1.68	10.0	mg/l							U
LCS (3090652-BS1)											
Total Suspended Solids	49.0	1.68	10.0	mg/l	50.0		98.0	80-120			
Duplicate (3090652-DUP1)						Source: P3I0423-01					
Total Suspended Solids	2.00	1.68	10.0	mg/l		2.00			0.00	20	J

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

Project: Astoria Area-Wide Petroleum Site
Project Number: 10077.005
Project Manager: Tom Calabrese

Reported:
11/12/03 15:36

**Conventional Chemistry Parameters by APHA/EPA Methods - Quality Control
North Creek Analytical - Bothell**

Analyte	Result	MDL	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
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Batch 3I16005: Prepared 09/16/03 Using Grav. Preparation

Blank (3I16005-BLK1)

Fats, Oil & Grease (total)	ND	1.00	5.00	mg/l							U
Fats, Oil & Grease (non-polar)	ND	1.24	5.00	"							U
Fats, Oil & Grease (polar)	ND	1.24	5.00	"							U

LCS (3I16005-BS1)

Fats, Oil & Grease (total)	39.1	1.00	5.00	mg/l	38.0		103	78-107			
Fats, Oil & Grease (non-polar)	19.9	1.24	5.00	"	18.5		108	65-132			

LCS Dup (3I16005-BSD1)

Fats, Oil & Grease (total)	36.0	1.00	5.00	mg/l	38.0		94.7	78-107	8.26	10	
Fats, Oil & Grease (non-polar)	17.6	1.24	5.00	"	18.5		95.1	65-132	12.3	20	

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 Project Number: 10077.005
 Project Manager: Tom Calabrese

Reported:
 11/12/03 15:36

Notes and Definitions

- D Data reported from a preparation or analytical dilution.
- I-05 This sample was received outside EPA recommended holding time.
- J Estimated value.
- U Analyte included in the analysis but not detected.
- 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
- RPD Relative Percent Difference

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