SR
2/12/92
BNF

SW
item
#1650

SEATTLE STEAM
COMPANY

1325 Fourth Avenue, Suite 1440
Seattle, Washington 98101
Telephone 206/623-6366
Fax 467-6394

January 21, 1992

Mr. Joe Hicky
UST Program
Department of Ecology
Northwest Regional Office
3190 - 160th Ave. S.E.
Bellevue, WA 98008-5452

Dear Mr. Hicky:

The result of the last sampling train of our underground storage tanks monitoring wells for 1991 is enclosed.

Only one well showed a slight increase in TPH concentration and detectable levels of PAH compounds. However, there is no sign of these compounds in any of the down-gradient wells being sampled.

Semi-annual testing of these wells as recommended by our consultant would give us a definite indication of the effectiveness of the remedial actions already undertaken and continuously assess the condition of the areas surrounding these tanks.

Sincerely,

Ruel Harder

Ruel T. Harder
Chief Engineer

RTH/sh
cc: James G. Young

Dalton, Olmsted & Fuglevand, Inc. *Environmental Consultants*

19017 120th Avenue N.E., Suite 107 • Bothell, Washington 98011
Telephone (206) 486-7905 (FAX 486-7651)

January 6, 1992

Ruel Harder
Seattle Steam Company
1319 Western Avenue
Seattle, Washington 98101

Re: Results of Ground Water Monitoring for Selected Wells,
Post Street and Western Avenue Plants, November, 1991

Dear Mr. Harder:

Here are the results of chemical analyses of ground-water samples, obtained in November 1991, from selected monitoring wells at the subject plants. The wells were installed in December 1989 and January 1990 (DO&F report dated February 1990). The purpose of this work is to provide a basis for evaluating changes in ground-water quality as a result of the relining of the tanks on Western Avenue, and evaluating whether migration of dissolved oil constituents toward the west is occurring.

WORK PLAN

- Ground-water Sampling and Analyses - Ground-water samples were taken from the two wells (PS-1 and PS-2) installed at the Post Street Plant (Figure 1), and three of the wells (WA-7, WA-16, and WA-13) installed at the Western Avenue Plant (Figure 2). A duplicate sample (WA-7D) was also taken. The samples were submitted to the laboratory for analysis of total petroleum hydrocarbons (TPH) (EPA Method 418.1) and polynuclear aromatic hydrocarbons (PAH's) using EPA Method 8270. (For previous sampling rounds, method 8100 was used for PAH testing, however, because of indications of apparent "false positives," the laboratory elected to perform the 8270 analysis.)

- Data Analysis and Report - The results of the analyses and laboratory results are presented in this report. This report includes:

- Site plans showing the monitoring well locations;
- Results of the laboratory analyses;
- Description of our sampling procedures; and
- Evaluation of water-quality conditions

EVALUATION OF CHEMICAL ANALYSIS RESULTS

The results of the chemical analyses for this and previous rounds of sampling are shown on Table 1, attached.

Review of the analytical results show the following:

Post Street Plant

- The TPH concentration in water samples from well PS-1 has remained less than 1 mg/L. Carcinogenic PAH (CPAH) concentrations continue to be below detection limits of 0.0002 mg/L. Several non-carcinogenic PAH's were detected.

- The TPH concentration in water samples from well PS-2 has remained less than 1.0 mg/L. PAH's were not detected in well PS-2 above detection limits of 0.0002mg/L.

Western Avenue Plant

- TPH which initially ranged from about 1.1 to 1.5 mg/L in water samples from wells WA-7 and -16, continues to be less than 1 mg/L in the current round of sampling.

  TPH in water samples from well WA-13, located between the Western Avenue Plant and the tanks on the north side of Western Avenue, was 1.8 mg/L. It was noted at the time of water sampling from this well that the water was very turbid, and recovery was slow. This condition was not noted in previous sampling rounds. The slight increase in TPH concentrations from previous rounds may be due to movement of soil containing residual hydrocarbons into the well during the sampling process, rather than a change in water quality at this location

- PAH's were not detected in the current round of water samples from wells WA-7 and WA-16(detection limits of 0.0002 mg/L).

  Several previously undetected PAH compounds were detected in low concentrations (less that 0.001 mg/L) in well WA-13 in the current round of sampling. There is no indication of these compounds in the water quality results

from the down-gradient wells WA-7 and WA-16.

We recommend that water quality sampling continue to evaluate long-term water quality trends following the remedial actions accomplished by Seattle Steam. We suggest that the next round of sampling be accomplished in mid June, and semi-annually thereafter.

FIELD GROUND-WATER SAMPLING PROCEDURES

Wells that were expected to have the lowest level of contamination, were sampled first. A water level measurement was made initially. The samples were collected by first removing at least 3 casing volumes of water and/or measuring pH, specific conductivity, and temperature until a consistent reading was obtained. A clear PVC bottom-filling disposable bailer was used for each well. Laboratory-supplied containers were then carefully filled, taking care to remove air bubbles. After filling, the bottles were tapped to minimize air bubbles. Samples were then immediately placed in chilled ice chests for transport to the laboratory. One duplicate sample was obtained from one well (WA-7) for the current sampling round. (A field blank was not considered appropriate, considering the use of disposable bailers.) All ground-water sampling activities were documented on the Water Quality Sample Field Data Sheet, and an appropriate chain of custody form was filled out.

All samples for chemical analysis were placed in containers provided by North Creek Analytical of Bothell, Washington. All samples were labeled. A chain-of-custody form was completed for all samples to be transmitted to the laboratory. A copy of the form, signed by a representative of the laboratory who received the samples and by the person delivering the samples to the laboratory, was retained and kept in the project file.

We appreciate the opportunity of providing you with our services. If you have any questions, please call.

Sincerely,
DALTON, OLMSTED & FUGLEVAND, INC.

Terry L. Olmsted
Sr. Consulting Engineering Geologist

Enclosures: Table 1, Summary of Results of Chemical Analyses
Figure 1 & 2, Site Plan
Laboratory Results - November 1991 Round of Sampling

Dalton, Olmsted & Fuglevand, Inc.
Environmental Consultants
Seattle Steam Co. 01/06/92

Table 1. Summary of Results of Chemical Analyses on Monitoring Well Samples Post Street and Western Avenue Plants

POST STREET PLANT

Date/Concentration in mg/L (Units for other values are indicated

Well No. PS-1	12/19/89	02/19/91	05/24/91	11/26/91		
TPH(EPA 418.1)	2.1	1.1	<1.0	<1.0		
PAH - EPA Method	8100	8100	8100	8270		
Acenapthene	<0.006	<0.0005	<0.0001	0.0012		
Benzo(a)anthracene(CPAH)	0.007	<0.0005	<0.0001	<0.0002		
Chrysene(CPAH)	0.010	<0.0005	<0.0001	<0.0002		
Fluoranthene	<0.006	<0.0005	<0.0001	0.0002		
Pyrene	0.006	<0.0005	0.00029	0.00028		
Other PAH compounds	N.D.*	<0.0005	<0.0001	<0.0002		
Total Dissolved Solids	N.A.	1000	N.A.	160		
pH	N.A.	6.7	N.A.	7.6		
Conductivity(umohs/cm)	N.A.	458	N.A.	321		

Well No. PS-2						
TPH(EPA 418.1)	0.6	<1.0	<1.0	<1.0		
PAH - EPA Method	8100	8100	8100	8270		
PAH Compounds	N.A.	<0.0005	<0.0001	<0.0002		
Total Dissolved Solids	N.A.	410	N.A.	84		
pH	N.A.	6.7	N.A.	7.8		
Conductivity(umohs/cm)	N.A.	227	N.A.	169		

WESTERN AVENUE PLANT

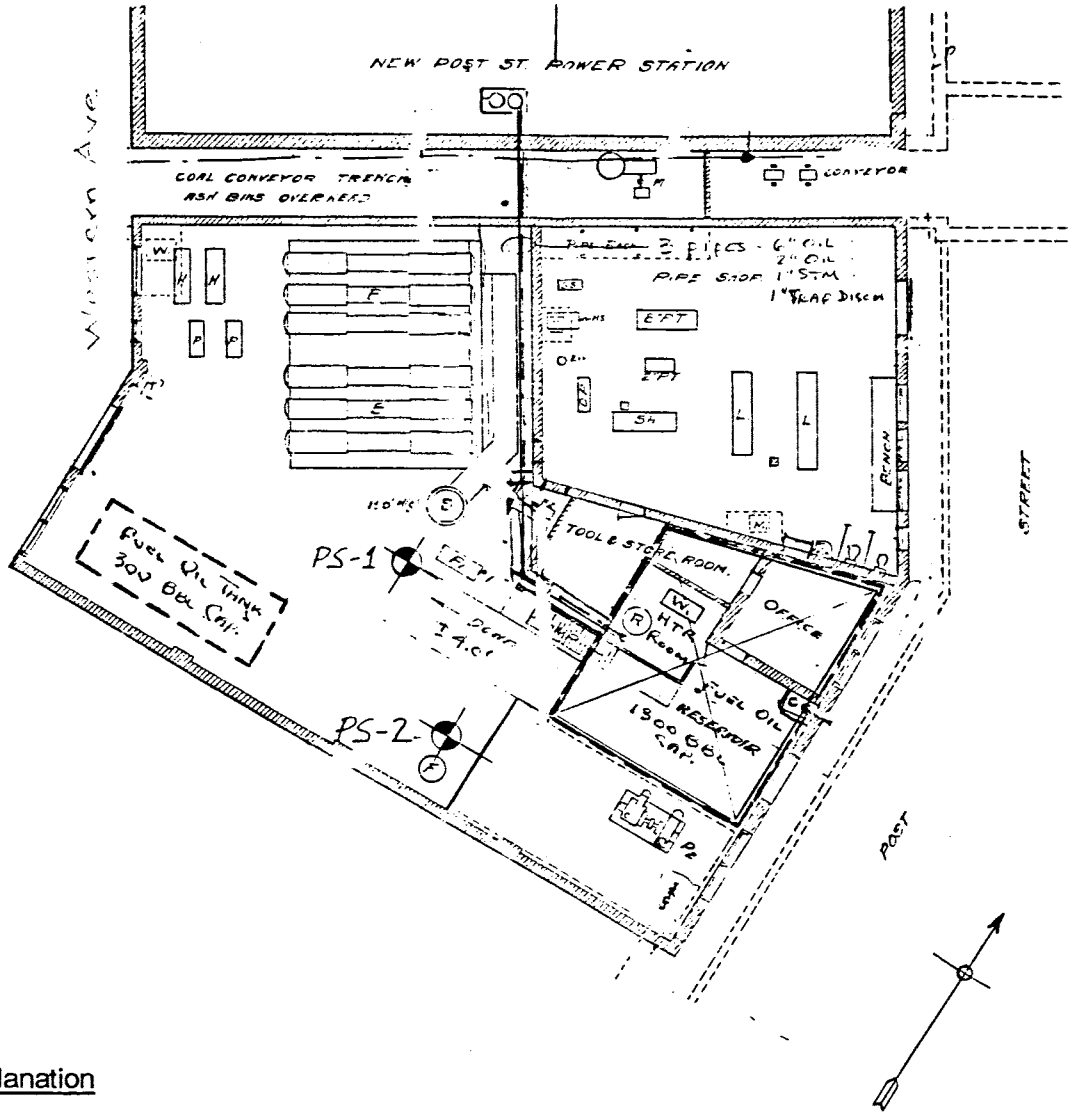
Date/Concentration in mg/L (Units for other values are indicated

Well No. WA-7	01/17/90	02/13/91	05/24/91	11/26/91		
TPH(EPA 418.1)	1.1	1.5	<1	<1		
PAH - EPA Method	8100	8100	8100	8270		
Acenaphthylene	<0.008	<0.001	0.00015	<0.0002		
Other PAH Compounds	N.D.*	<0.001	<0.0001	<0.0002		
Total Dissolved Solids	N.A.	2200	N.A.	1500		
pH	N.A.	6.7	N.A.	6.6		
Conductivity(umohs/cm)	N.A.	3900	N.A.	2800		

Well No. WA-16						
TPH(EPA 418.1)	0.5	1.6	<1	<1		
PAH - EPA Method	8100	8100	8100	8270		
PAH Compounds	<0.008	<0.001	<0.0001	<0.0002		
Total Dissolved Solids	N.A.	540	N.A.	435		
pH	N.A.	6.6	N.A.	7.1		
Conductivity(umohs/cm)	N.A.	910	N.A.	869		

Well No. WA-13						
TPH(EPA 418.1)	1.1	1.3	<1	1.8		
PAH - EPA Method	8100	8100	8100	8270		
Benzo (a) anthracene(CPAH)	<0.008	<0.001	<0.0001	0.00070		
Benzo (b&k) fluoranthene(CPAH	<0.008	<0.001	<0.0001	0.0012		
Benzo (ghi) perylene	<0.008	<0.001	<0.0001	0.00068		
Benzo (a) pyrene(CPAH)	N.A.	<0.001	0.0013	0.00073		
Crysene(CPAH)	<0.008	<0.001	<0.0001	0.00086		
Fluoranthene	<0.008	<0.001	<0.0001	0.00067		
Indeno (1,2,3-cd) pyrene(CPAH)	<0.008	<0.001	<0.0001	0.00059		
Phenanthrene	<0.008	<0.001	<0.0001	0.00024		
Pyrene	<0.008	<0.001	<0.0001	0.0011		
Other PAH Compounds	N.A.	<0.001	<0.0001	<0.0002		
Total Dissolved Solids	N.A.	460	N.A.	330		
pH	N.A.	7.2	N.A.	7.1		
Conductivity(umohs/cm)	N.A.	780	N.A.	655		

NOTES:Refer to attached laboratory reports for detailed results
*Refer to Dec.1989/Jan.1990 laboratory reports for detection limits
TPH = Total Recoverable Petroleum Hydrocarbons
PAH = Polynuclear Aromatic Hydrocarbons
N.D.= Not detected above detection limits as indicated on attached laboratory data sheets
N.A.= Not analyzed



Explanation

PS-1

Monitoring Well Location
and Designation

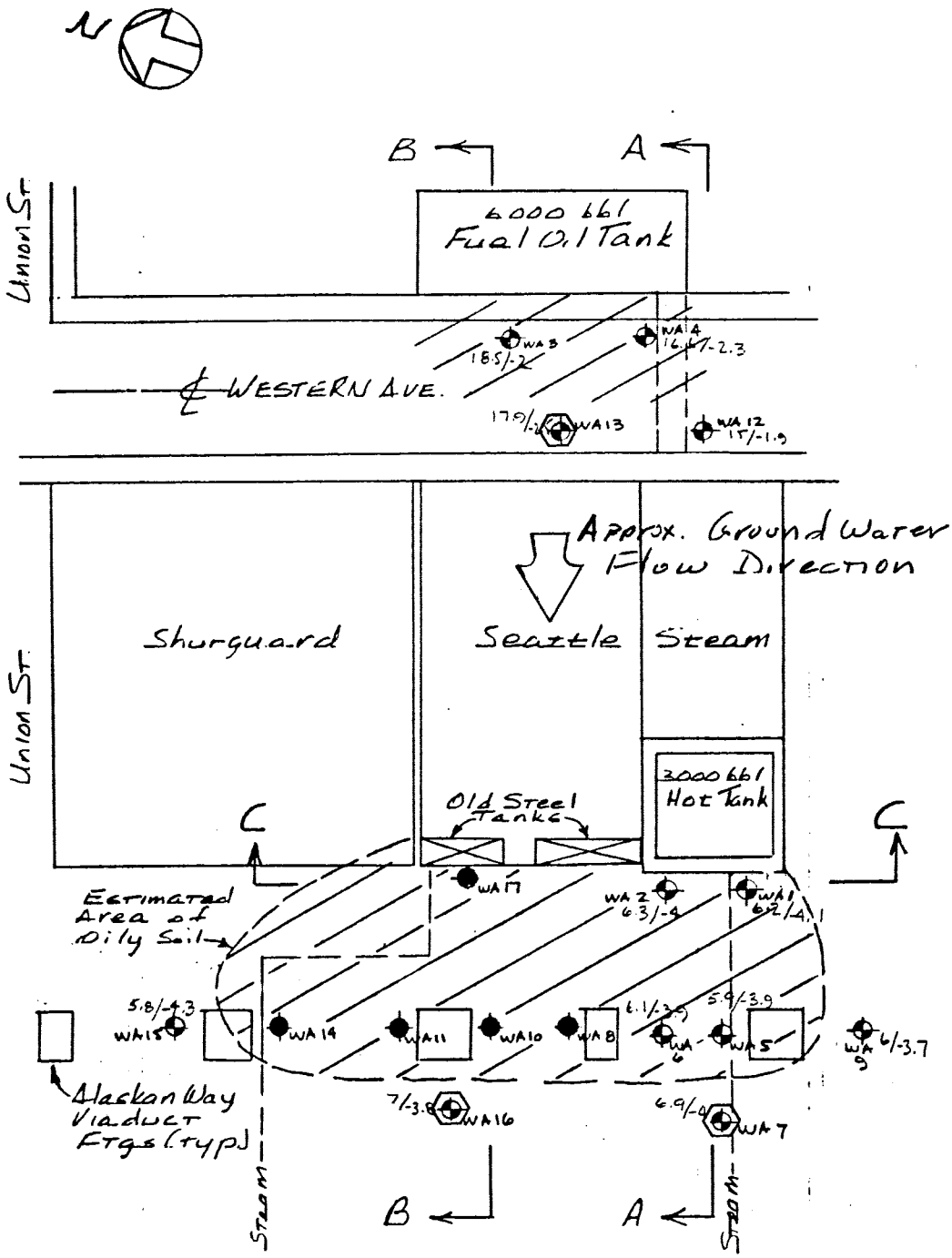
Approx. Scale: 1"=25'

Seattle Steam Company
POST STREET PLANT

SITE PLAN

SSC-001-01 **FIGURE 1**

DALTON, OLMSTED & FUGLEVAND, INC.



Explanation

Monitoring Well

7/-3.8 Surface/Groundwater Elev. 1-27-90 10 AM

Boring

Approx. Scale 1" = 35'

Seattle Steam Company
WESTERN AVENUE PLANT

SITE PLAN

SSC-001-01 **FIGURE 2**

DALTON, OLMSTED & FUGLEVAND, INC.

LABORATORY RESULTS - NOVEMBER 26, 1991 ROUND OF SAMPLING

NORTH CREEK ANALYTICAL

18939 120th Avenue N.E., Suite 101 • Bothell, WA 98011-2569
Phone (206) 481-9200 • FAX (206) 485-2992

Dalton, Olmsted & Fuglevand, Inc.	Client Project ID:	Seattle Steam, SSC-001-03	Sampled:	Nov 26, 1991
19017 120th Avenue NE, #107	Matrix Descript:	Water	Received:	Nov 26, 1991
Bothell, WA 98011	Analysis Method:	EPA 418.1 (I.R. with clean-up)	Extracted:	Nov 29, 1991
Attention: Terry Olmsted	First Sample #:	111-1180	Analyzed:	Dec 2, 1991
			Reported:	Dec 20, 1991

TOTAL RECOVERABLE PETROLEUM HYDROCARBONS

Sample Number	Sample Description	Petroleum Oil mg/L (ppm)
111-1180	WA7	N.D.
111-1181	WA7D	N.D.
111-1182	WA16	N.D.
111-1183	WA13	1.8
111-1184	PS-1	N.D.
111-1185	PS-2	N.D.
BLK112991	Method Blank	N.D.

Detection Limits:	**1.0**

Analytes reported as N.D. were not present above the stated limit of detection.

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For Scot Cocanour
Laboratory Director

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Dalton, Olmsted & Fuglevand, Inc.	Client Project ID:	Seattle Steam, SSC-001-03	Sampled:	Nov 26, 1991
19017 120th Avenue NE, #107	Sample Descript:	Water, WA7	Received:	Nov 26, 1991
Bothell, WA 98011	Analysis Method:	EPA 8270	Extracted:	Dec 2, 1991
Attention: Terry Olmsted	Lab Number:	111-1180	Analyzed:	Dec 13, 1991
			Reported:	Dec 20, 1991

POLYNUCLEAR AROMATIC HYDROCARBONS (EPA 8270)

Analyte	Detection Limit µg/L (ppb)	Sample Results µg/L (ppb)
Acenaphthene	0.20	N.D.
Acenaphthylene	0.20	N.D.
Anthracene	0.20	N.D.
Benzo (a) anthracene	0.20	N.D.
Benzo (b&k) fluoranthene	0.20	N.D.
Benzo (ghi) perylene	0.20	N.D.
Benzo (a) pyrene	0.20	N.D.
Chrysene	0.20	N.D.
Dibenzo (a,h) anthracene	0.20	N.D.
Dibenzofuran	0.20	N.D.
Fluoranthene	0.20	N.D.
Fluorene	0.20	N.D.
Indeno (1,2,3-cd) pyrene	0.20	N.D.
2-Methylnaphthalene	0.20	N.D.
Naphthalene	0.20	N.D.
Phenanthrene	0.20	N.D.
Pyrene	0.20	N.D.

Analytes reported as N.D. were not present above the stated limit of detection.

NORTH CREEK ANALYTICAL

for Scot Cocanour
Laboratory Director

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Dalton, Olmsted & Fuglevand, Inc.	Client Project ID:	Seattle Steam, SSC-001-03	Sampled:	Nov 26, 1991
19017 120th Avenue NE, #107	Sample Descript:	Water, WA7D	Received:	Nov 26, 1991
Bothell, WA 98011	Analysis Method:	EPA 8270	Extracted:	Dec 2, 1991
Attention: Terry Olmsted	Lab Number:	111-1181	Analyzed:	Dec 13, 1991
			Reported:	Dec 20, 1991

POLYNUCLEAR AROMATIC HYDROCARBONS (EPA 8270)

Analyte	Detection Limit µg/L (ppb)	Sample Results µg/L (ppb)
Acenaphthene	0.20	N.D.
Acenaphthylene	0.20	N.D.
Anthracene	0.20	N.D.
Benzo (a) anthracene	0.20	N.D.
Benzo (b&k) fluoranthene	0.20	N.D.
Benzo (ghi) perylene	0.20	N.D.
Benzo (a) pyrene	0.20	N.D.
Chrysene	0.20	N.D.
Dibenzo (a,h) anthracene	0.20	N.D.
Dibenzofuran	0.20	N.D.
Fluoranthene	0.20	N.D.
Fluorene	0.20	N.D.
Indeno (1,2,3-cd) pyrene	0.20	N.D.
2-Methylnaphthalene	0.20	N.D.
Naphthalene	0.20	N.D.
Phenanthrene	0.20	N.D.
Pyrene	0.20	N.D.

Analytes reported as N.D. were not present above the stated limit of detection.

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Scot Cocanour
Laboratory Director

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Dalton, Olmsted & Fuglevand, Inc.	Client Project ID:	Seattle Steam, SSC-001-03	Sampled:	Nov 26, 1991
19017 120th Avenue NE, #107	Sample Descript:	Water, WA16	Received:	Nov 26, 1991
Bothell, WA 98011	Analysis Method:	EPA 8270	Extracted:	Dec 2, 1991
Attention: Terry Olmsted	Lab Number:	111-1182	Analyzed:	Dec 13, 1991
			Reported:	Jan 2, 1992

POLYNUCLEAR AROMATIC HYDROCARBONS (EPA 8270)

Analyte	Detection Limit µg/L (ppb)	Sample Results µg/L (ppb)
Acenaphthene	0.20	N.D.
Acenaphthylene	0.20	N.D.
Anthracene	0.20	N.D.
Benzo (a) anthracene	0.20	N.D.
Benzo (b&k) fluoranthene	0.20	N.D.
Benzo (ghi) perylene	0.20	N.D.
Benzo (a) pyrene	0.20	N.D.
Chrysene	0.20	N.D.
Dibenzo (a,h) anthracene	0.20	N.D.
Dibenzofuran	0.20	N.D.
Fluoranthene	0.20	N.D.
Fluorene	0.20	N.D.
Indeno (1,2,3-cd) pyrene	0.20	N.D.
2-Methylnaphthalene	0.20	N.D.
Naphthalene	0.20	N.D.
Phenanthrene	0.20	N.D.
Pyrene	0.20	N.D.

Analytes reported as N.D. were not present above the stated limit of detection.

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Laboratory Director

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Dalton, Olmsted & Fuglevand, Inc.	Client Project ID:	Seattle Steam, SSC-001-03	Sampled:	Nov 26, 1991
19017 120th Avenue NE, #107	Sample Descript:	Water, WA13	Received:	Nov 26, 1991
Bothell, WA 98011	Analysis Method:	EPA 8270	Extracted:	Dec 2, 1991
Attention: Terry Olmsted	Lab Number:	111-1183	Analyzed:	Dec 18, 1991
			Reported:	Dec 20, 1991

POLYNUCLEAR AROMATIC HYDROCARBONS (EPA 8270)

Analyte	Detection Limit µg/L (ppb)	Sample Results µg/L (ppb)
Acenaphthene	0.20	N.D.
Acenaphthylene	0.20	N.D.
Anthracene	0.20	N.D.
Benzo (a) anthracene	0.20	0.70
Benzo (b&k) fluoranthene	0.20	1.2
Benzo (ghi) perylene	0.20	0.68
Benzo (a) pyrene	0.20	0.73
Chrysene	0.20	0.86
Dibenzo (a,h) anthracene	0.20	N.D.
Dibenzofuran	0.20	N.D.
Fluoranthene	0.20	0.67
Fluorene	0.20	N.D.
Indeno (1,2,3-cd) pyrene	0.20	0.59
2-Methylnaphthalene	0.20	N.D.
Naphthalene	0.20	N.D.
Phenanthrene	0.20	0.24
Pyrene	0.20	1.1

Analytes reported as N.D. were not present above the stated limit of detection.

NORTH CREEK ANALYTICAL

for Scot Cocanour
Laboratory Director

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Dalton, Olmsted & Fuglevand, Inc.	Client Project ID:	Seattle Steam, SSC-001-03	Sampled:	Nov 26, 1991
19017 120th Avenue NE, #107	Sample Descript:	Water, PS-1	Received:	Nov 26, 1991
Bothell, WA 98011	Analysis Method:	EPA 8270	Extracted:	Dec 2, 1991
Attention: Terry Olmsted	Lab Number:	111-1184	Analyzed:	Dec 13, 1991
			Reported:	Dec 20, 1991

POLYNUCLEAR AROMATIC HYDROCARBONS (EPA 8270)

Analyte	Detection Limit µg/L (ppb)	Sample Results µg/L (ppb)
Acenaphthene	0.20	1.2
Acenaphthylene	0.20	N.D.
Anthracene	0.20	N.D.
Benzo (a) anthracene	0.20	N.D.
Benzo (b&k) fluoranthene	0.20	N.D.
Benzo (ghi) perylene	0.20	N.D.
Benzo (a) pyrene	0.20	N.D.
Chrysene	0.20	N.D.
Dibenzo (a,h) anthracene	0.20	N.D.
Dibenzofuran	0.20	N.D.
Fluoranthene	0.20	0.20
Fluorene	0.20	N.D.
Indeno (1,2,3-cd) pyrene	0.20	N.D.
2-Methylnaphthalene	0.20	N.D.
Naphthalene	0.20	N.D.
Phenanthrene	0.20	N.D.
Pyrene	0.20	0.28

Analytes reported as N.D. were not present above the stated limit of detection.

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Scot Cocanour
Laboratory Director

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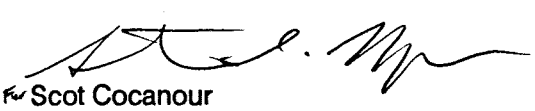
Dalton, Olmsted & Fuglevand, Inc.	Client Project ID:	Seattle Steam, SSC-001-03	Sampled:	Nov 26, 1991
19017 120th Avenue NE, #107	Sample Descript:	Water, PS2	Received:	Nov 26, 1991
Bothell, WA 98011	Analysis Method:	EPA 8270	Extracted:	Dec 2, 1991
Attention: Terry Olmsted	Lab Number:	111-1185	Analyzed:	Dec 13, 1991
			Reported:	Dec 20, 1991

POLYNUCLEAR AROMATIC HYDROCARBONS (EPA 8270)

Analyte	Detection Limit µg/L (ppb)	Sample Results µg/L (ppb)
Acenaphthene	0.20	N.D.
Acenaphthylene	0.20	N.D.
Anthracene	0.20	N.D.
Benzo (a) anthracene	0.20	N.D.
Benzo (b&k) fluoranthene	0.20	N.D.
Benzo (ghi) perylene	0.20	N.D.
Benzo (a) pyrene	0.20	N.D.
Chrysene	0.20	N.D.
Dibenzo (a,h) anthracene	0.20	N.D.
Dibenzofuran	0.20	N.D.
Fluoranthene	0.20	N.D.
Fluorene	0.20	N.D.
Indeno (1,2,3-cd) pyrene	0.20	N.D.
2-Methylnaphthalene	0.20	N.D.
Naphthalene	0.20	N.D.
Phenanthrene	0.20	N.D.
Pyrene	0.20	N.D.

Analytes reported as N.D. were not present above the stated limit of detection.

NORTH CREEK ANALYTICAL



For Scot Cocanour
Laboratory Director

NORTH CREEK ANALYTICAL

18939 120th Avenue N.E., Suite 101 • Bothell, WA 98011-2569
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Dalton, Olmsted & Fuglevand, Inc.	Client Project ID:	Seattle Steam, SSC-001-03		
19017 120th Avenue NE, #107	Sample Descript:	Method Blank		
Bothell, WA 98011	Analysis Method:	EPA 8270	Extracted:	Dec 2, 1991
Attention: Terry Olmsted	Lab Number:	BLK120291	Analyzed:	Dec 13, 1991
			Reported:	Dec 20, 1991

POLYNUCLEAR AROMATIC HYDROCARBONS (EPA 8270)

Analyte	Detection Limit µg/L (ppb)	Sample Results µg/L (ppb)
Acenaphthene	0.20	N.D.
Acenaphthylene	0.20	N.D.
Anthracene	0.20	N.D.
Benzo (a) anthracene	0.20	N.D.
Benzo (b&k) fluoranthene	0.20	N.D.
Benzo (ghi) perylene	0.20	N.D.
Benzo (a) pyrene	0.20	N.D.
Chrysene	0.20	N.D.
Dibenzo (a,h) anthracene	0.20	N.D.
Dibenzofuran	0.20	N.D.
Fluoranthene	0.20	N.D.
Fluorene	0.20	N.D.
Indeno (1,2,3-cd) pyrene	0.20	N.D.
2-Methylnaphthalene	0.20	N.D.
Naphthalene	0.20	N.D.
Phenanthrene	0.20	N.D.
Pyrene	0.20	N.D.

Analytes reported as N.D. were not present above the stated limit of detection.

NORTH CREEK ANALYTICAL

For Scot Cocanour
Laboratory Director

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Phone (206) 481-9200 • FAX (206) 485-2992

Dalton, Olmsted & Fuglevand, Inc.	Client Project ID:	Seattle Steam, SSC-001-03	Sampled:	Nov 26, 1991
19017 120th Avenue NE, #107	Sample Descript:	Water, WA7	Received:	Nov 26, 1991
Bothell, WA 98011			Analyzed:	Dec 3, 1991
Attention: Terry Olmsted	Sample Number:	111-1180	Reported:	Dec 20, 1991

LABORATORY ANALYSIS

Analyte	Detection Limit	Sample Results
Conductivity, µmhos/cm	1.0	2,800
pH	N.A.	6.6
Total Dissolved Solids, mg/L	4.0	1,500

Analytes reported as N.D. were not present above the stated limit of detection.

NORTH CREEK ANALYTICAL

for Scot Cocanour
Laboratory Director

NORTH CREEK ANALYTICAL

18939 120th Avenue N.E., Suite 101 • Bothell, WA 98011-2569
Phone (206) 481-9200 • FAX (206) 485-2992

Dalton, Olmsted & Fuglevand, Inc.	Client Project ID: Seattle Steam, SSC-001-03	Analyst : S. Kimball
19017 120th Avenue NE, #107	Method : EPA 418.1	
Bothell, WA 98011	Sample Matrix : Water	Extracted: Nov 29, 1991
Attention: Terry Olmsted	Units : mg/L	Analyzed: Dec 2, 1991
	QC Sample #: BLK112991	Reported: Dec 20, 1991

QUALITY CONTROL DATA REPORT

ANALYTE	Petroleum Oil
Sample Conc.:	N.D.
Spike Conc. Added:	15
Conc. Matrix Spike:	14.5
Matrix Spike % Recovery:	96
Conc. Matrix Spike Dup.:	14.5
Matrix Spike Duplicate % Recovery:	96
Relative % Difference:	0

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For Scot Cocanour
Laboratory Director

% Recovery:	Conc. of M.S. - Conc. of Sample / Spike Conc. Added	x 100
Relative % Difference:	Conc. of M.S. - Conc. of M.S.D. / (Conc. of M.S. + Conc. of M.S.D.) / 2	x 100

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Dalton, Olmsted & Fuglevand, Inc.	Client Project ID: Seattle Steam, SSC-001-03	Analyst : G. Emory
19017 120th Avenue NE, #107	Method : EPA 8270	
Bothell, WA 98011	Sample Matrix : Water	
Attention: Terry Olmsted	Units : Percent Recovery	Analyzed: Dec 13-18, 1991
	Sample Set #: 111-1180 to -1185	Reported: Dec 20, 1991

SURROGATE RECOVERY REPORT

Surrogate	Sample Number 111-1180	Sample Number 111-1181	Sample Number 111-1183	Sample Number 111-1184	Sample Number 111-1185
2-Fluorobiphenyl	104	63	123	120	55

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Dalton, Olmsted & Fuglevand, Inc.	Client Project ID: Seattle Steam, SSC-001-03	Analyst :	G. Emory
19017 120th Avenue NE, #107	Method : EPA 8270		
Bothell, WA 98011	Sample Matrix : Water	Extracted:	Dec 2, 1991
Attention: Terry Olmsted	Units : µg/L	Analyzed:	Dec 13, 1991
	QC Sample #: BLK120291	Reported:	Dec 20, 1991

QUALITY CONTROL DATA REPORT

Analyte	Sample Conc.	Spike Conc. Added	Conc. Matrix Spike	Matrix Spike % Recovery	Conc. Matrix Spike Duplicate	Matrix Spike Duplicate % Recovery	Relative % Difference
Naphthalene	N.D.	20	13	65%	13	65%	0.0%
Acenaphthene	N.D.	20	15	75%	15	75%	0.0%
Acenaphthylene	N.D.	20	14	70%	14	70%	0.0%
Fluorene	N.D.	20	15	75%	14	70%	6.9%
Phenanthrene	N.D.	20	16	80%	16	80%	0.0%
Anthracene	N.D.	20	12	60%	11	55%	8.7%
Fluoranthene	N.D.	20	17	85%	17	85%	0.0%
Pyrene	N.D.	20	22	110%	23	115%	4.4%
Benzo(a)-anthracene	N.D.	20	17	85%	17	85%	0.0%
Chrysene	N.D.	20	18	90%	17	85%	5.7%
Benzo(b+k)-fluoranthene	N.D.	40	36	90%	32	80%	11.8%

NORTH CREEK ANALYTICAL

for Scot Cocanour
Laboratory Director

$$\text{\% Recovery:} \quad \frac{\text{Conc. of M.S. - Conc. of Sample}}{\text{Spike Conc. Added}} \times 100$$

$$\text{Relative \% Difference:} \quad \frac{\text{Conc. of M.S. - Conc. of M.S.D.}}{\text{(Conc. of M.S. + Conc. of M.S.D.) / 2}} \times 100$$

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Dalton, Olmsted & Fuglevand, Inc.	Client Project ID: Seattle Steam, SSC-001-03	Analyst :	G. Emory
19017 120th Avenue NE, #107	Method : EPA 8270		
Bothell, WA 98011	Sample Matrix : Water	Extracted:	Dec 2, 1991
Attention: Terry Olmsted	Units : µg/L	Analyzed:	Dec 13, 1991
	QC Sample #: BLK120291	Reported:	Dec 20, 1991

QUALITY CONTROL DATA REPORT

Analyte	Sample Conc.	Spike Conc. Added	Conc. Matrix Spike	Matrix Spike % Recovery	Conc. Matrix Spike Duplicate	Matrix Spike Duplicate % Recovery	Relative % Difference
Benzo(a)pyrene	N.D.	20	16	80%	16	80%	0.0%
Indeno(a,2,3-cd)-pyrene	N.D.	20	21	105%	22	110%	4.7%
Dibenz(a,h)-anthracene	N.D.	20	20	100%	20	100%	0.0%
Benzo(g,h,i)-pyrene	N.D.	20	25	125%	25	125%	0.0%

NORTH CREEK ANALYTICAL

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% Recovery:	Conc. of M.S. - Conc. of Sample / Spike Conc. Added	x 100
Relative % Difference:	Conc. of M.S. - Conc. of M.S.D. / (Conc. of M.S. + Conc. of M.S.D.) / 2	x 100