

Appendix A. Chain of Custody

Appendix B. Data Reports and Case Narratives

February 12, 1998

To: Art Johnson

From: Randy Knox, ^{RS/K}Metals Chemist

Subject: Gibbons Creek Project..... Sediment

QUALITY ASSURANCE SUMMARY

Data quality for this project was generally good with the following exceptions: recoveries of thallium and antimony from spiked samples were low, silver and antimony showed almost no recovery from the laboratory control (LCS) sample, and serial dilution results for one sample showed matrix suppression. Chromium recovery was high from the duplicate spiked sample but not the spiked sample. No other significant quality assurance issues were noted with the data.

SAMPLE INFORMATION

The samples from the Gibbons Creek Project were received by the Manchester Laboratory on 1/13/98 in good condition.

HOLDING TIMES

All analyses were performed within the USEPA Contract Laboratory Program (CLP) holding times for metals analysis (28 days for mercury, 180 days for all other metals).

INSTRUMENT CALIBRATION

Instrument calibration was performed before each analytical run and checked by initial calibration verification standards and blanks. Continuing calibration standards and blanks were analyzed at a frequency of 10% during the run and again at the end of the analytical run. All initial and continuing calibration verification standards were within the relevant USEPA (CLP) control limits. AA calibration gave a correlation coefficient (r) of 0.995 or greater, also meeting CLP calibration requirements. Silver in the interference check standard, ICSAB was higher, up to 130% of mixed level, than the allowed 120% . Since silver was not detected in the other interference check standard, ICASA, the result was judged to not be due to interference. Sample data should not be affected.

PROCEDURAL BLANKS

The procedural blanks associated with these samples showed no analytically significant levels of analyte.

SPIKED SAMPLES ANALYSIS

Spiked and duplicate spiked sample analyses were performed on this data set. All spike recoveries, except those for – antimony, thallium, and those for the duplicate chromium spike- were within the CLP acceptance limits of +/- 25%. Antimony and thallium data were qualified UJ, as undetected at estimated detection level, due to low spike recoveries. Chromium data is not qualified. Average chromium recovery was marginal, 127%.

PRECISION DATA

The results of duplicate samples or duplicate spiked samples were used to evaluate precision on this sample set. The relative percent difference (RPD) for all analytes was within the -20% CLP acceptance window for duplicate analysis. One exception is for mercury for sample, 98028148, which gave a RPD of 31%. Since mercury levels in this sample were less than three times the detection level, data was not qualified. Mercury precision for other duplicate samples was acceptable. Near the detection level the relative uncertainty of analysis increases.

SERIAL DILUTION

Five times serial dilutions - of six samples - were analyzed by ICP and the analytical results, corrected for dilution, compared to the original sample analysis. The RPD (relative % difference) for analytes at levels 50X greater than the detection level was acceptable, within $\pm 10\%$ for most samples. Sample, 98028148, had several elements with RPD's of 10 – 12 %. Data for higher level elements in this sample were reported from diluted sample. Results for elements reported from undiluted sample are qualified J, as estimated, or UJ, as undetected at estimated detection level.

LABORATORY CONTROL SAMPLE (LCS) ANALYSIS

LCS analyses were within the windows established for each parameter, except antimony and silver which gave almost no recovery from the LCS sample. Antimony data was qualified UJ, as undetected at estimated detection level, and silver as UJ or J – estimated – depending on whether silver was detected.

Please call Randy Knox at SCAN 360-871-8811 or Jim Ross at SCAN 360-871-8808 to further discuss this project.

RLK:rlk

Manchester Environmental Laboratory

Department of Ecology

Analysis Report for

Inductively Coupled Plasma

Project Name: Gibbons Creek

LIMS Project ID: 1028-98

Sample: **BLN80203**

Method: EPA200.7

Blank ID: M8021SB1

Date Prepared: 01/21/98

Matrix: Semi-Solid/Sludge

Project Officer: Art Johnson

Date Analyzed: 01/27/98

Units: mg/Kg Dry Wt.

Analyte	Result	Qualifier
Antimony	3	U
Beryllium	0.1	U
Cadmium	0.5	U
Chromium	0.5	U
Copper	1	U
Lead	3	U
Nickel	1.5	U
Silver	0.4	U
Zinc	1	U

Authorized By: Randy P. Knopf

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Analysis Report for

Inductively Coupled Plasma

Project Name: Gibbons Creek

LIMS Project ID: 1028-98

Sample: BLN80205

Method: EPA200.7

Blank ID: M8022SB2

Date Prepared: 01/21/98

Matrix: Semi-Solid/Sludge

Project Officer: Art Johnson

Date Analyzed: 01/27/98

Units: mg/Kg Dry Wt.

Analyte	Result	Qualifier
Antimony	3	U
Beryllium	0.1	U
Cadmium	0.5	U
Chromium	0.5	U
Copper	1	U
Lead	3	U
Nickel	1.5	U
Silver	0.4	U
Zinc	1	U

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Analysis Report for

Inductively Coupled Plasma

Project Name: Gibbons Creek

LIMS Project ID: 1028-98

Sample: **BLN80206**

Method: EPA200.7

Blank ID: M8022SB3

Date Prepared: 01/21/98

Matrix: Semi-Solid/Sludge

Project Officer: Art Johnson

Date Analyzed: 01/27/98

Units: mg/Kg Dry Wt.

Analyte	Result	Qualifier
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Antimony	3	U
Beryllium	0.1	U
Cadmium	0.5	U
Chromium	0.5	U
Copper	1	U
Lead	3	U
Nickel	1.5	U
Silver	0.4	U
Zinc	1	U

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Analysis Report for

Inductively Coupled Plasma

Project Name: Gibbons Creek

LIMS Project ID: 1028-98

Sample: LCS80204

Method: EPA200.7

Blank ID: M8021SL1

Date Prepared: 01/21/98

Matrix: Semi-Solid/Sludge

Project Officer: Art Johnson

Date Analyzed: 01/27/98

Units: mg/Kg Dry Wt.

Analyte	Result	Qualifier
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Antimony	0	%
Beryllium	105	%
Cadmium	104	%
Chromium	97	%
Copper	99	%
Lead	106	%
Nickel	103	%
Silver	4	%
Zinc	94	%

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Analysis Report for

Inductively Coupled Plasma

Project Name: Gibbons Creek

LIMS Project ID: 1028-98

Sample: LCS80207

Method: EPA200.7

Blank ID: M8022SL2

Date Prepared: 01/21/98

Matrix: Semi-Solid/Sludge

Project Officer: Art Johnson

Date Analyzed: 01/27/98

Units: mg/Kg Dry Wt.

Analyte	Result	Qualifier
Antimony	0	%
Beryllium	106	%
Cadmium	104	%
Chromium	96	%
Copper	99	%
Lead	109	%
Nickel	106	%
Silver	2	%
Zinc	91	%

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Analysis Report for

Inductively Coupled Plasma

Project Name: Gibbons Creek

LIMS Project ID: 1028-98

Sample: 98028130

Date Received: 01/13/98

Method: EPA200.7

Field ID: GIBBONS1

Date Prepared: 01/21/98

Matrix: Semi-Solid/Sludge

Project Officer: Art Johnson

Date Analyzed: 01/27/98

Units: mg/Kg Dry Wt.

Analyte	Result	Qualifier
Antimony	3	UJ
Beryllium	0.56	
Cadmium	0.5	U
Chromium	18.9	
Copper	17.2	
Lead	8.7	
Nickel	13	
Silver	0.4	UJ
Zinc	78.7	

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Analysis Report for

Inductively Coupled Plasma

Project Name: Gibbons Creek

LIMS Project ID: 1028-98

Sample: 98028133

Date Received: 01/13/98

Method: EPA200.7

Field ID: GIBBONS4

Date Prepared: 01/21/98

Matrix: Semi-Solid/Sludge

Project Officer: Art Johnson

Date Analyzed: 01/27/98

Units: mg/Kg Dry Wt.

Analyte	Result	Qualifier
Antimony	3	UJ
Beryllium	0.74	
Cadmium	0.68	
Chromium	57.7	
Copper	37.8	
Lead	14	
Nickel	14	
Silver	0.4	UJ
Zinc	144	

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Analysis Report for

Inductively Coupled Plasma

Project Name: Gibbons Creek

LIMS Project ID: 1028-98

Sample: 98028135

Date Received: 01/13/98

Method: EPA200.7

Field ID: GIBBONS6

Date Prepared: 01/21/98

Matrix: Semi-Solid/Sludge

Project Officer: Art Johnson

Date Analyzed: 01/27/98

Units: mg/Kg Dry Wt.

Analyte	Result	Qualifier
Antimony	3	UJ
Beryllium	0.39	
Cadmium	0.5	U
Chromium	47.3	
Copper	30.3	
Lead	6.7	
Nickel	12	
Silver	0.4	UJ
Zinc	113	

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Analysis Report for

Inductively Coupled Plasma

Project Name: Gibbons Creek

LIMS Project ID: 1028-98

Sample: 98028136

Date Received: 01/13/98

Method: EPA200.7

Field ID: GIBBONS7

Date Prepared: 01/21/98

Matrix: Semi-Solid/Sludge

Project Officer: Art Johnson

Date Analyzed: 01/27/98

Units: mg/Kg Dry Wt.

Analyte	Result	Qualifier
Antimony	3	UJ
Beryllium	0.77	
Cadmium	0.74	
Chromium	90.8	
Copper	54.1	
Lead	15	
Nickel	14	
Silver	0.4	UJ
Zinc	198	

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Inductively Coupled Plasma

Project Name: Gibbons Creek

LIMS Project ID: 1028-98

Sample: 98028137

Date Received: 01/13/98

Method: EPA200.7

Field ID: GIBBONS8

Date Prepared: 01/21/98

Matrix: Semi-Solid/Sludge

Project Officer: Art Johnson

Date Analyzed: 01/27/98

Units: mg/Kg Dry Wt.

Analyte	Result	Qualifier
Antimony	3	UJ
Beryllium	1.02	
Cadmium	1.0	
Chromium	78.6	
Copper	56.3	
Lead	18	
Nickel	18.5	
Silver	0.4	UJ
Zinc	226	

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Analysis Report for

Inductively Coupled Plasma

Project Name: Gibbons Creek

LIMS Project ID: 1028-98

Sample: 98028137 (Duplicate - LDP1)

Date Received: 01/13/98

Method: EPA200.7

Field ID: GIBBONS8

Date Prepared: 01/21/98

Matrix: Semi-Solid/Sludge

Project Officer: Art Johnson

Date Analyzed: 01/27/98

Units: mg/Kg Dry Wt.

Analyte	Result	Qualifier
Antimony	3	UJ
Beryllium	1.01	
Cadmium	0.5	U
Chromium	78.2	
Copper	55.2	
Lead	17	
Nickel	18.2	
Silver	0.54	J
Zinc	221	

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Analysis Report for

Inductively Coupled Plasma

Project Name: Gibbons Creek

LIMS Project ID: 1028-98

Sample: 98028138

Date Received: 01/13/98

Method: EPA200.7

Field ID: GIBBONS9

Date Prepared: 01/21/98

Matrix: Semi-Solid/Sludge

Project Officer: Art Johnson

Date Analyzed: 01/27/98

Units: mg/Kg Dry Wt.

Analyte	Result	Qualifier
Antimony	3	UJ
Beryllium	0.85	
Cadmium	0.64	
Chromium	69.8	
Copper	45.2	
Lead	16	
Nickel	17.9	
Silver	0.41	J
Zinc	173	

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Project Name: Gibbons Creek

LIMS Project ID: 1028-98

Sample: 98028139

Date Received: 01/13/98

Method: EPA200.7

Field ID: GIBBONS10

Date Prepared: 01/21/98

Matrix: Semi-Solid/Sludge

Project Officer: Art Johnson

Date Analyzed: 01/27/98

Units: mg/Kg Dry Wt.

Analyte	Result	Qualifier
Antimony	3	UJ
Beryllium	0.91	
Cadmium	0.5	U
Chromium	73.5	
Copper	49.5	
Lead	15	
Nickel	17.1	
Silver	0.54	J
Zinc	224	

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Analysis Report for

Inductively Coupled Plasma

Project Name: Gibbons Creek

LIMS Project ID: 1028-98

Sample: 98028140

Date Received: 01/13/98

Method: EPA200.7

Field ID: GIBBONSA

Date Prepared: 01/21/98

Matrix: Semi-Solid/Sludge

Project Officer: Art Johnson

Date Analyzed: 01/27/98

Units: mg/Kg Dry Wt.

Analyte	Result	Qualifier
Antimony	3	UJ
Beryllium	1.13	
Cadmium	0.5	U
Chromium	57.0	
Copper	42.5	
Lead	14	
Nickel	21.7	
Silver	0.4	UJ
Zinc	157	

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Inductively Coupled Plasma

Project Name: Gibbons Creek

LIMS Project ID: 1028-98

Sample: 98028141

Date Received: 01/13/98

Method: EPA200.7

Field ID: GIBBONSB

Date Prepared: 01/21/98

Matrix: Semi-Solid/Sludge

Project Officer: Art Johnson

Date Analyzed: 01/27/98

Units: mg/Kg Dry Wt.

Analyte	Result	Qualifier
Antimony	3	UJ
Beryllium	0.82	
Cadmium	0.5	U
Chromium	31.9	
Copper	26.5	
Lead	8.0	
Nickel	18.6	
Silver	0.4	UJ
Zinc	86.9	

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Analysis Report for

Inductively Coupled Plasma

Project Name: Gibbons Creek

LIMS Project ID: 1028-98

Sample: 98028142

Date Received: 01/13/98

Method: EPA200.7

Field ID: GIBBONSC

Date Prepared: 01/22/98

Matrix: Semi-Solid/Sludge

Project Officer: Art Johnson

Date Analyzed: 01/27/98

Units: mg/Kg Dry Wt.

Analyte	Result	Qualifier
Antimony	3	UJ
Beryllium	0.73	
Cadmium	0.5	U
Chromium	32.3	
Copper	27.5	
Lead	10	
Nickel	15	
Silver	0.4	UJ
Zinc	94.0	

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Analysis Report for

Inductively Coupled Plasma

Project Name: Gibbons Creek

LIMS Project ID: 1028-98

Sample: 98028142 (Duplicate - LDP1)

Date Received: 01/13/98

Method: EPA200.7

Field ID: GIBBONSC

Date Prepared: 01/22/98

Matrix: Semi-Solid/Sludge

Project Officer: Art Johnson

Date Analyzed: 01/27/98

Units: mg/Kg Dry Wt.

Analyte	Result	Qualifier
Antimony	3	UJ
Beryllium	0.62	
Cadmium	0.5	U
Chromium	31.5	
Copper	23.1	
Lead	7.2	
Nickel	13	
Silver	0.4	UJ
Zinc	78.0	

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Inductively Coupled Plasma

Project Name: Gibbons Creek

LIMS Project ID: 1028-98

Sample: 98028143

Date Received: 01/13/98

Method: EPA200.7

Field ID: GIBBONSD

Date Prepared: 01/22/98

Matrix: Semi-Solid/Sludge

Project Officer: Art Johnson

Date Analyzed: 01/27/98

Units: mg/Kg Dry Wt.

Analyte	Result	Qualifier
Antimony	3	UJ
Beryllium	0.77	
Cadmium	0.5	U
Chromium	54.5	
Copper	41.6	
Lead	16	
Nickel	15	
Silver	0.4	UJ
Zinc	154	

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Analysis Report for

Inductively Coupled Plasma

Project Name: Gibbons Creek

LIMS Project ID: 1028-98

Sample: 98028144

Date Received: 01/13/98

Method: EPA200.7

Field ID: GIBBONSE

Date Prepared: 01/22/98

Matrix: Semi-Solid/Sludge

Project Officer: Art Johnson

Date Analyzed: 01/27/98

Units: mg/Kg Dry Wt.

Analyte	Result	Qualifier
Antimony	3	UJ
Beryllium	0.72	
Cadmium	1.1	
Chromium	364	
Copper	69.7	
Lead	17	
Nickel	15.0	
Silver	0.53	J
Zinc	762	

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Analysis Report for

Inductively Coupled Plasma

Project Name: Gibbons Creek

LIMS Project ID: 1028-98

Sample: 98028145

Date Received: 01/13/98

Method: EPA200.7

Field ID: PWM 1

Date Prepared: 01/22/98

Matrix: Semi-Solid/Sludge

Project Officer: Art Johnson

Date Analyzed: 01/27/98

Units: mg/Kg Dry Wt.

Analyte	Result	Qualifier
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Antimony	3	UJ
Beryllium	0.18	
Cadmium	2.3	
Chromium	1740	
Copper	148	
Lead	18	
Nickel	12	
Silver	0.4	UJ
Zinc	2560	

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Analysis Report for

Inductively Coupled Plasma

Project Name: Gibbons Creek

LIMS Project ID: 1028-98

Sample: 98028146

Date Received: 01/13/98

Method: EPA200.7

Field ID: PWM 2

Date Prepared: 01/22/98

Matrix: Semi-Solid/Sludge

Project Officer: Art Johnson

Date Analyzed: 01/27/98

Units: mg/Kg Dry Wt.

Analyte	Result	Qualifier
Antimony	3	UJ
Beryllium	0.20	
Cadmium	1.8	
Chromium	1380	
Copper	104	
Lead	21	
Nickel	9.5	
Silver	0.4	UJ
Zinc	1210	

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Analysis Report for

Inductively Coupled Plasma

Project Name: Gibbons Creek

LIMS Project ID: 1028-98

Sample: 98028147

Date Received: 01/13/98

Method: EPA200.7

Field ID: PWM 3

Date Prepared: 01/22/98

Matrix: Semi-Solid/Sludge

Project Officer: Art Johnson

Date Analyzed: 01/27/98

Units: mg/Kg Dry Wt.

Analyte	Result	Qualifier
Antimony	3	UJ
Beryllium	0.24	J
Cadmium	1.3	J
Chromium	1410	
Copper	111	
Lead	19	J
Nickel	13.7	
Silver	0.4	UJ
Zinc	1260	

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Analysis Report for

Inductively Coupled Plasma

Project Name: Gibbons Creek

LIMS Project ID: 1028-98

Sample: 98028148

Date Received: 01/13/98

Method: EPA200.7

Field ID: PWMB1050L

Date Prepared: 01/22/98

Matrix: Semi-Solid/Sludge

Project Officer: Art Johnson

Date Analyzed: 01/27/98

Units: mg/Kg Dry Wt.

Analyte	Result	Qualifier
Antimony	6	UJ
Beryllium	0.2	U
Cadmium	2.1	
Chromium	1530	
Copper	165	
Lead	17	
Nickel	15	
Silver	0.8	UJ
Zinc	2660	

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Analysis Report for

Inductively Coupled Plasma

Project Name: Gibbons Creek

LIMS Project ID: 1028-98

Sample: 98028148 (Duplicate - LDPI)

Date Received: 01/13/98

Method: EPA200.7

Field ID: PWMB1050L

Date Prepared: 01/22/98

Matrix: Semi-Solid/Sludge

Project Officer: Art Johnson

Date Analyzed: 01/27/98

Units: mg/Kg Dry Wt.

Analyte	Result	Qualifier
Antimony	6	UJ
Beryllium	0.2	U
Cadmium	2.5	
Chromium	1530	
Copper	165	
Lead	14	
Nickel	15.3	
Silver	0.8	UJ
Zinc	2670	

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Analysis Report for

Inductively Coupled Plasma

Project Name: Gibbons Creek

LIMS Project ID: 1028-98

Sample: 98028142 (Matrix Spike - LMX1)

Date Received: 01/13/98

Method: EPA200.7

Field ID: GIBBONSC

Date Prepared: 01/22/98

Matrix: Semi-Solid/Sludge

Project Officer: Art Johnson

Date Analyzed: 01/27/98

Units: % Recovery

Analyte	Result	Qualifier
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Antimony	3	
Beryllium	104	
Cadmium	95	
Chromium	122	
Copper	110	
Lead	92	
Nickel	100	
Silver	104	
Zinc	112	

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Analysis Report for

Inductively Coupled Plasma

Project Name: Gibbons Creek

LIMS Project ID: 1028-98

Sample: 98028142 (Matrix Spike - LMX2)

Date Received: 01/13/98

Method: EPA200.7

Field ID: GIBBONSC

Date Prepared: 01/22/98

Matrix: Semi-Solid/Sludge

Project Officer: Art Johnson

Date Analyzed: 01/27/98

Units: % Recovery

Analyte	Result	Qualifier
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Antimony	4	
Beryllium	105	
Cadmium	97	
Chromium	131	
Copper	114	
Lead	92	
Nickel	101	
Silver	104	
Zinc	111	

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Manchester Environmental Laboratory

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Analysis Report for

Arsenic

Project Name: Gibbons Creek

LIMS Project ID: 1028-98

Project Officer: Art Johnson
Date Reported: 12-FEB-98

Method: EPA206.2
Matrix: Semi-Solid/Sludge
Analyte: Arsenic

Sample	QC	Field ID	Result	Qualifier	Units	Received	Analyzed
98028130		GIBBONS1	5.64		mg/Kg Dry Wt.	01/13/98	02/06/98
98028133		GIBBONS4	61.8		mg/Kg Dry Wt.	01/13/98	01/28/98
98028135		GIBBONS6	24.2		mg/Kg Dry Wt.	01/13/98	01/28/98
98028136		GIBBONS7	48.7		mg/Kg Dry Wt.	01/13/98	01/28/98
98028137		GIBBONS8	49.4		mg/Kg Dry Wt.	01/13/98	01/28/98
98028137	Duplicate		53.2		mg/Kg Dry Wt.	01/13/98	01/28/98
98028138		GIBBONS9	27.9		mg/Kg Dry Wt.	01/13/98	01/28/98
98028139		GIBBONS10	33.9		mg/Kg Dry Wt.	01/13/98	01/28/98
98028140		GIBBONSA	30.6		mg/Kg Dry Wt.	01/13/98	01/28/98
98028141		GIBBONSB	13.8		mg/Kg Dry Wt.	01/13/98	01/28/98
98028142		GIBBONSC	11.4		mg/Kg Dry Wt.	01/13/98	02/06/98
98028142	Matrix Spike		99 %			01/13/98	02/06/98
98028142	Matrix Spike		90 %			01/13/98	02/06/98
98028143		GIBBONSD	28.4		mg/Kg Dry Wt.	01/13/98	01/28/98
98028144		GIBBONSE	25.7		mg/Kg Dry Wt.	01/13/98	01/28/98
98028145		PWM 1	1.0		mg/Kg Dry Wt.	01/13/98	02/06/98
98028146		PWM 2	2.8		mg/Kg Dry Wt.	01/13/98	02/06/98
98028147		PWM 3	3.33		mg/Kg Dry Wt.	01/13/98	02/06/98
98028148		PWMB1050L	0.54		mg/Kg Dry Wt.	01/13/98	02/06/98
98028148	Duplicate		0.60		mg/Kg Dry Wt.	01/13/98	02/06/98
BLN80216		M8021SB1	0.3	U	mg/Kg Dry Wt.		01/28/98
BLN80362		M8022SB2	0.3	U	mg/Kg Dry Wt.		01/28/98
BLN80364		M8022SB3	0.3	U	mg/Kg Dry Wt.		02/06/98
LCS80217		M8021SL1	98 %				01/28/98
LCS80363		M8022SL2	104		mg/Kg Dry Wt.		01/28/98

Authorized By: Randy L. Knox

Release Date: 2/12/98

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Manchester Environmental Laboratory

Department of Ecology

Analysis Report for

Selenium

Project Name: Gibbons Creek

LIMS Project ID: 1028-98

Project Officer: Art Johnson
Date Reported: 12-FEB-98

Method: EPA270.2
Matrix: Semi-Solid/Sludge
Analyte: Selenium

Sample	QC	Field ID	Result	Qualifier	Units	Received	Analyzed
98028130		GIBBONS1	0.36		mg/Kg Dry Wt.	01/13/98	02/06/98
98028133		GIBBONS4	0.55		mg/Kg Dry Wt.	01/13/98	02/06/98
98028135		GIBBONS6	0.31		mg/Kg Dry Wt.	01/13/98	02/06/98
98028136		GIBBONS7	0.51		mg/Kg Dry Wt.	01/13/98	02/06/98
98028137		GIBBONS8	0.70		mg/Kg Dry Wt.	01/13/98	02/06/98
98028137	Duplicate		0.68		mg/Kg Dry Wt.	01/13/98	02/06/98
98028138		GIBBONS9	0.42		mg/Kg Dry Wt.	01/13/98	02/06/98
98028139		GIBBONS10	0.51		mg/Kg Dry Wt.	01/13/98	02/06/98
98028140		GIBBONSA	0.51		mg/Kg Dry Wt.	01/13/98	02/06/98
98028141		GIBBONSB	0.3	U	mg/Kg Dry Wt.	01/13/98	02/06/98
98028142		GIBBONSC	0.3	U	mg/Kg Dry Wt.	01/13/98	02/06/98
98028142	Matrix Spike		94 %			01/13/98	02/06/98
98028142	Matrix Spike		94 %			01/13/98	02/06/98
98028143		GIBBONSD	0.41		mg/Kg Dry Wt.	01/13/98	01/27/98
98028144		GIBBONSE	0.48		mg/Kg Dry Wt.	01/13/98	01/27/98
98028145		PWM 1	1.2		mg/Kg Dry Wt.	01/13/98	02/06/98
98028146		PWM 2	0.61		mg/Kg Dry Wt.	01/13/98	02/06/98
98028147		PWM 3	0.70		mg/Kg Dry Wt.	01/13/98	02/06/98
98028148		PWMB1050L	0.45		mg/Kg Dry Wt.	01/13/98	02/06/98
98028148	Duplicate		0.46		mg/Kg Dry Wt.	01/13/98	02/06/98
BLN80195		M8022SB2	0.3	U	mg/Kg Dry Wt.		01/27/98
BLN80196		M8021SB1	0.3	U	mg/Kg Dry Wt.		01/27/98
BLN80364		M8022SB3	0.3	U	mg/Kg Dry Wt.		01/27/98
ERA80197		M8022SL2	106 %				01/27/98
ERA80198		M8021SL1	95 %				01/27/98

Authorized By: Randy S. Knox

Release Date: 2/12/98

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Manchester Environmental Laboratory

Department of Ecology

Analysis Report for

Thallium

Project Name: Gibbons Creek

LIMS Project ID: 1028-98

Project Officer: Art Johnson
Date Reported: 12-FEB-98

Method: EPA279.2
Matrix: Semi-Solid/Sludge
Analyte: Thallium

Sample	QC	Field ID	Result	Qualifier	Units	Received	Analyzed
98028130		GIBBONS1	0.3	UJ	mg/Kg Dry Wt.	01/13/98	01/27/98
98028133		GIBBONS4	0.3	UJ	mg/Kg Dry Wt.	01/13/98	01/27/98
98028135		GIBBONS6	0.3	UJ	mg/Kg Dry Wt.	01/13/98	01/27/98
98028136		GIBBONS7	0.3	UJ	mg/Kg Dry Wt.	01/13/98	01/27/98
98028137		GIBBONS8	0.3	UJ	mg/Kg Dry Wt.	01/13/98	01/27/98
98028137	Duplicate		0.3	UJ	mg/Kg Dry Wt.	01/13/98	01/27/98
98028138		GIBBONS9	0.3	UJ	mg/Kg Dry Wt.	01/13/98	01/27/98
98028139		GIBBONS10	0.3	UJ	mg/Kg Dry Wt.	01/13/98	01/27/98
98028140		GIBBONSA	0.3	UJ	mg/Kg Dry Wt.	01/13/98	01/27/98
98028141		GIBBONSB	0.3	UJ	mg/Kg Dry Wt.	01/13/98	01/27/98
98028142		GIBBONSC	0.3	UJ	mg/Kg Dry Wt.	01/13/98	02/10/98
98028142	Matrix Spike		10 %			01/13/98	02/10/98
98028142	Matrix Spike		11 %			01/13/98	02/10/98
98028143		GIBBONSD	0.3	UJ	mg/Kg Dry Wt.	01/13/98	02/10/98
98028144		GIBBONSE	0.3	UJ	mg/Kg Dry Wt.	01/13/98	02/10/98
98028145		PWM 1	0.3	UJ	mg/Kg Dry Wt.	01/13/98	02/10/98
98028146		PWM 2	0.3	UJ	mg/Kg Dry Wt.	01/13/98	02/10/98
98028147		PWM 3	0.3	UJ	mg/Kg Dry Wt.	01/13/98	02/10/98
98028148		PWMB1050L	0.3	UJ	mg/Kg Dry Wt.	01/13/98	02/10/98
98028148	Duplicate		0.3	UJ	mg/Kg Dry Wt.	01/13/98	02/10/98
BLN80210		M8021SB1	0.3	U	mg/Kg Dry Wt.		01/27/98
BLN80212		M8022SB1	0.3	U	mg/Kg Dry Wt.		01/27/98
BLN80364		M8022SB3	0.3	U	mg/Kg Dry Wt.		02/10/98
LCS80211		M8021SL1	90 %				01/27/98
LCS80213		M8022SL1	98 %				01/27/98

Authorized By: Sally Bull

Release Date: 2/12/98

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Manchester Environmental Laboratory

Department of Ecology

Analysis Report for

Mercury

Project Name: Gibbons Creek

LIMS Project ID: 1028-98

Project Officer: Art Johnson

Method: EPA245.5

Date Reported: 03-FEB-98

Matrix: Semi-Solid/Sludge

Analyte: Mercury

Sample	QC	Field ID	Result	Qualifier	Units	Received	Analyzed
98028130		GIBBONS1	0.276		mg/Kg Dry Wt.	01/13/98	01/29/98
98028133		GIBBONS4	0.13		mg/Kg Dry Wt.	01/13/98	01/29/98
98028135		GIBBONS6	0.065		mg/Kg Dry Wt.	01/13/98	01/29/98
98028136		GIBBONS7	0.14		mg/Kg Dry Wt.	01/13/98	01/29/98
98028137		GIBBONS8	0.071		mg/Kg Dry Wt.	01/13/98	01/29/98
98028137	Duplicate		0.081		mg/Kg Dry Wt.	01/13/98	01/29/98
98028138		GIBBONS9	0.15		mg/Kg Dry Wt.	01/13/98	01/29/98
98028139		GIBBONS10	0.180		mg/Kg Dry Wt.	01/13/98	01/29/98
98028140		GIBBONSA	0.21		mg/Kg Dry Wt.	01/13/98	01/29/98
98028141		GIBBONSB	0.097		mg/Kg Dry Wt.	01/13/98	01/29/98
98028142		GIBBONSC	0.044		mg/Kg Dry Wt.	01/13/98	01/29/98
98028143		GIBBONSD	0.079		mg/Kg Dry Wt.	01/13/98	01/29/98
98028144		GIBBONSE	0.25		mg/Kg Dry Wt.	01/13/98	01/29/98
98028145		PWM 1	0.850		mg/Kg Dry Wt.	01/13/98	01/29/98
98028146		PWM 2	1.06		mg/Kg Dry Wt.	01/13/98	01/29/98
98028147		PWM 3	0.892		mg/Kg Dry Wt.	01/13/98	01/29/98
98028148		PWMB1050L	0.55		mg/Kg Dry Wt.	01/13/98	01/29/98
98028148	Duplicate		0.75		mg/Kg Dry Wt.	01/13/98	01/29/98
98028148	Matrix Spike		92 %			01/13/98	01/29/98
98028148	Matrix Spike		92 %			01/13/98	01/29/98
41C80236		M7028SG	95 %				01/29/98
BLN80235		M8028SH	0.005	U	mg/Kg Dry Wt.		01/29/98

Authorized By: Randy L. Knox

Release Date: 2/3/98

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State of Washington Department of Ecology
Manchester Environmental Laboratory
7411 Beach Dr. East Port Orchard WA. 98366

February 13, 1998

Project: Gibbons Creek
Samples: 02-8130, 8133, 8135-44
Laboratory: Rosa Environmental
By: Pam Covey *pc*

Case Summary

These samples required twelve (12) Grain Size analyses on sediment using Puget Sound Estuary Protocol (PSEP) method. There was one duplicate analysis requested.

The samples were received at the Manchester Environmental Laboratory on January 13, 1998 and transported to Rosa Environmental on January 21, 1998 for Grain Size analyses.

The analyses were reviewed for qualitative and quantitative accuracy, validity and usefulness.

The results are acceptable for use as reported.

Client: Washington State Department of Ecology Manchester Laboratory	REGL Project No.: 1004-006
Client Project No.: Gibbons Creek	Sample Batch No.: 1004-006-01

Case Narrative

1. The samples were received on January 22, 1998 in good condition.
2. Samples are prepared and tested in accordance with the Puget Sound Estuary Program, Apparent Grain Size Analysis, with modification to provide only the components of gravel, sand, silt and clay.
3. A moisture content is determined along with the preparation of the grain size test sample. The moisture content can be used to calculate the total mass of the test sample. This number is compared with the sum of the amount retained on the #230 sieve and the first (20 second) pipette reading. It is considered good if these two values are within 95 to 105%. Sample 028140 had a QA value of 115.03. This indicates an error occurred at some point in the process. Each pipette tare was re-weighed and the sieve sample was re-weighed. All were found to be recorded accurately. It was therefore assumed that the error occurred in writing down a wet weight, or in the homogenizing the sample prior to taking the test sample and the moisture content sample. The inclusion of a wood chunk in one but not the other would be enough to cause this magnitude of difference in the two numbers. The components of the grain size distribution were calculated based on the actual weights of the sieve sample and the 20 second pipette reading.
4. There were no other anomalies in either the samples or the testing.

Approved by:
Title:


Laboratory Manager

Date: 2/2/98

Washington State Department of Ecology
Manchester Laboratory

Table 1. Gibbons Creek Sediment Apparent Grain Size Distributions, By Component

Sample Number	% Gravel	% Sand	% Silt	% Clay
02-8130	0.1	61.0	33.4	5.6
02-8133	10.6	63.7	24.3	1.3
02-8135	1.3	82.1	13.1	3.5
02-8136	0.9	40.6	52.0	6.4
02-8137 A	0	19.8	71.8	8.3
02-8137 B	0	18.8	73.0	8.3
02-8138	0.4	33.2	57.3	9.1
02-8139	0.5	21.7	68.1	9.7
02-8140	1.0	24.2	57.7	17.1
02-8141	.04	27.2	64.4	8.0
02-8142	0.1	21.1	71.2	7.6
02-8143	0.2	25.9	63.3	10.6
02-8144	0	22.3	69.5	8.3

Refer to the narrative for a discussion of the samples and testing results.

QA SUMMARY

PROJECT:	WDOE - Manchester Laboratory	Project No.:	Gibbons Creek
REGL Triplicate Sample ID:	98035	Batch No.:	1004-006-01
Client Duplicate Sample ID:	02-8137	Page:	1 of 1

Duplicate Analysis, By Component

Sample ID	% Gravel	% Sand	% Silt	% Clay
02-8137A	0	19.8	71.8	8.3
02-8137B	0	18.8	73	8.3
AVE	0	19.3	72.4	8.3

The Duplicate Applies To The Following Samples

REGL ID	Client ID	Date Sampled	Date Extracted	Date Complete	QA*
98006	02-8130	1/9/98	1/27/98	1/30/98	104.5
98007	02-8133	1/9/98	1/27/98	1/30/98	101.4
98008	02-8135	1/9/98	1/27/98	1/30/98	99.1
98009	02-8136	1/9/98	1/27/98	1/30/98	101.1
98010	02-8137	1/9/98	1/27/98	1/30/98	101.7, 100.6
98011	02-8138	1/9/98	1/27/98	1/30/98	103.1
98012	02-8139	1/9/98	1/28/98	1/30/98	99.7
98013	02-8140	1/9/98	1/28/98	1/30/98	115
98014	02-8141	1/9/98	1/28/98	1/30/98	100.5
98015	02-8142	1/9/98	1/28/98	1/30/98	100.1
98016	02-8143	1/9/98	1/28/98	1/30/98	98.6
98017	02-8144	1/9/98	1/28/98	1/30/98	100.4

* QA limits = 95-105%

Washington State Department of Ecology
Manchester Laboratory

March 17, 1998

TO: Art Johnson

FROM: Debbie Lacroix, Chemist 

SUBJECT: General Chemistry Quality Assurance memo for the Gibbons Creek Project

SUMMARY

The data generated by the analysis of these samples can be used noting the qualifications discussed in this memo. Sample 98028148, its duplicate and triplicate for TOC analysis at 104°C have been qualified as estimates.

SAMPLE INFORMATION

Samples 98028130-48 from the Gibbons Creek project were received by the Manchester Laboratory on 1/13/98 in good condition. Analysis for percent solids was performed immediately after sample arrival. The samples were then stored in the freezer until TOC analysis could be performed.

HOLDING TIMES

All analyses were performed within applicable EPA holding times.

ANALYSIS PERFORMANCE

Instrument Calibration

Where applicable, instrument calibration was performed before each analysis and verified by initial and verification standards and blanks. All initial and continuing calibration verification standards were within the relevant EPA control limits. All balances are calibrated yearly with calibration verification occurring monthly.

Procedural Blanks

All procedural blanks were within acceptable limits.

Precision Data

The results of the duplicate and triplicate analysis of samples were used to evaluate the precision on this sample set. Relative percent differences (RPD) were within their acceptance windows of +/- 20 %. The relative standard deviations (RSD) were within their acceptance windows of +/- 20 % except for TOC (104°) sample 98028148. This prepped sample could not be re-analyzed due to insufficient sample. The sample was re-prepped using the sample for metal's analysis and re-analyzed. The RSD was still not within acceptance windows. The prepped sample was re-analyzed with similar results. The samples are therefore qualified as estimates.

Laboratory Control Sample (LCS) Analyses

LCS analyses were within their acceptance windows of +/- 20 %.

Other Quality Assurance Measures

The following sample containers broke while thawing for TOC analysis:

98028130
98028135
98028136
98028137
98028138
98028139
98028140
98028141
98028142
98028144

Metal's samples corresponding to the above sample numbers were used for the TOC analysis.

Percent solids at 70°C, used for the final TOC calculation at 104°C, for samples 98028145-47 were re-analyzed. Analysis for percent solids was difficult for these samples due to the large amount of grassy debris, roots and other matter. This mixed matrix made it difficult to take a homogenous portion of sample.

Please call Debbie Lacroix at 871-8812 with any questions or concerns about this project.

cc: Project File

Manchester Environmental Laboratory

Department of Ecology

Analysis Report for

Percent solids soil/tissue

Project Name: Gibbons Creek

LIMS Project ID: 1028-98

Project Officer: Art Johnson

Method: EPA160.3

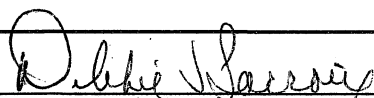
Date Reported: 15-JAN-98

Matrix: Semi-Solid/Sludge

Analyte: Solids

Sample	QC	Field ID	Result	Qualifier	Units	Received	Analyzed
98028130		GIBBONS1	49.3		%	01/13/98	01/13/98
98028133		GIBBONS4	15.7		%	01/13/98	01/13/98
98028135		GIBBONS6	47.5		%	01/13/98	01/13/98
98028136		GIBBONS7	25.3		%	01/13/98	01/13/98
98028137		GIBBONS8	21.2		%	01/13/98	01/13/98
98028137	Duplicate		21.3		%	01/13/98	01/13/98
98028137	Duplicate		21.4		%	01/13/98	01/13/98
98028138		GIBBONS9	31.1		%	01/13/98	01/13/98
98028139		GIBBONS10	25.1		%	01/13/98	01/13/98
98028140		GIBBONS A	19.7		%	01/13/98	01/13/98
98028141		GIBBONS B	37.3		%	01/13/98	01/13/98
98028142		GIBBONS C	37.2		%	01/13/98	01/13/98
98028143		GIBBONS D	21.8		%	01/13/98	01/13/98
98028144		GIBBONS E	10.6		%	01/13/98	01/13/98
98028145		PWM 1	13.9		%	01/13/98	01/13/98
98028146		PWM 2	20.1		%	01/13/98	01/13/98
98028147		PWM 3	29.2		%	01/13/98	01/13/98
98028148		PWMB1050L	1.6		%	01/13/98	01/13/98
98028148	Duplicate		1.5		%	01/13/98	01/13/98
98028148	Duplicate		1.5		%	01/13/98	01/13/98

Authorized By:



Release Date:

3-18-98

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Manchester Environmental Laboratory

Department of Ecology

Analysis Report for

Total Organic Carbon (104 C)

Project Name: Gibbons Creek

LIMS Project ID: 1028-98

Project Officer: Johnson, Art
Date Reported: 10-MAR-98

Method: PSEP-TOCM
Matrix: Frozen Sediment/soil
Analyte: Total Organic Carbon

Sample	QC	Field ID	Result	Qualifier	Units	Received	Analyzed
98028130		GIBBONS1	1.36		% Dry Wt.	01/13/98	03/02/98
98028133		GIBBONS4	7.60		% Dry Wt.	01/13/98	03/02/98
98028135		GIBBONS6	1.63		% Dry Wt.	01/13/98	03/02/98
98028136		GIBBONS7	4.56		% Dry Wt.	01/13/98	03/02/98
98028137		GIBBONS8	5.52		% Dry Wt.	01/13/98	03/02/98
98028137	Duplicate		5.12		% Dry Wt.	01/13/98	03/02/98
98028137	Replicate		5.07		% Dry Wt.	01/13/98	03/02/98
98028138		GIBBONS9	3.43		% Dry Wt.	01/13/98	03/02/98
98028139		GIBBONS10	3.81		% Dry Wt.	01/13/98	03/02/98
98028140		GIBBONS A	5.00		% Dry Wt.	01/13/98	03/02/98
98028141		GIBBONS B	1.84		% Dry Wt.	01/13/98	03/02/98
98028142		GIBBONS C	1.70		% Dry Wt.	01/13/98	03/03/98
98028143		GIBBONS D	3.39		% Dry Wt.	01/13/98	03/03/98
98028144		GIBBONS E	11.4		% Dry Wt.	01/13/98	03/03/98
98028145		PWM 1	39.7		% Dry Wt.	01/13/98	03/03/98
98028146		PWM 2	42.3		% Dry Wt.	01/13/98	03/03/98
98028147		PWM 3	33.4		% Dry Wt.	01/13/98	03/03/98
98028148		PWMB1050L	40.0	J	% Dry Wt.	01/13/98	03/09/98
98028148	Duplicate		42.6	J	% Dry Wt.	01/13/98	03/09/98
98028148	Replicate		43.3	J	% Dry Wt.	01/13/98	03/09/98

Authorized By: Debbie Haervey

Release Date: 3-18-98

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Manchester Environmental Laboratory

Department of Ecology

Analysis Report for

Total Organic Carbon (70 C)

Project Name: Gibbons Creek

LIMS Project ID: 1028-98

Project Officer: Johnson, Art
Date Reported: 09-MAR-98

Method: PSEP-TOC
Matrix: Frozen Sediment/soil
Analyte: Total Organic Carbon

Sample	QC	Field ID	Result	Qualifier	Units	Received	Analyzed
98028130		GIBBONS1	1.27		% Dry Wt.	01/13/98	03/02/98
98028133		GIBBONS4	7.40		% Dry Wt.	01/13/98	03/02/98
98028135		GIBBONS6	1.39		% Dry Wt.	01/13/98	03/02/98
98028136		GIBBONS7	3.93		% Dry Wt.	01/13/98	03/02/98
98028137		GIBBONS8	5.21		% Dry Wt.	01/13/98	03/02/98
98028137	Duplicate		4.87		% Dry Wt.	01/13/98	03/02/98
98028137	Replicate		4.82		% Dry Wt.	01/13/98	03/02/98
98028138		GIBBONS9	3.23		% Dry Wt.	01/13/98	03/02/98
98028139		GIBBONS10	3.76		% Dry Wt.	01/13/98	03/02/98
98028140		GIBBONSA	5.03		% Dry Wt.	01/13/98	03/02/98
98028141		GIBBONSB	1.60		% Dry Wt.	01/13/98	03/02/98
98028142		GIBBONSC	1.68		% Dry Wt.	01/13/98	03/03/98
98028143		GIBBONSD	3.54		% Dry Wt.	01/13/98	03/03/98
98028144		GIBBONSE	11.2		% Dry Wt.	01/13/98	03/03/98
98028145		PWM 1	39.7		% Dry Wt.	01/13/98	03/03/98
98028146		PWM 2	36.5		% Dry Wt.	01/13/98	03/03/98
98028147		PWM 3	30.4		% Dry Wt.	01/13/98	03/03/98
98028148		PWMB1050L	39.7		% Dry Wt.	01/13/98	03/09/98
98028148	Duplicate		39.3		% Dry Wt.	01/13/98	03/09/98
98028148	Replicate		39.9		% Dry Wt.	01/13/98	03/09/98

Authorized By: Dubhi Garroy


Release Date: 3-18-98

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Manchester Environmental Laboratory
7411 Beach DR E, Port Orchard Washington 98366

CASE NARRATIVE

February 27, 1998

Subject: Gibbons Creek
Samples: 98028130, 98028135, 98028137
Case No. 102898
Officer: Art Johnson
By: M. Mandjikov 

WTPH-Dx Analysis of the Gibbons Creek Sediment Samples

SUMMARY:

Samples 98028130, 98028135, and 98028137 were analyzed for diesel and extended diesel range hydrocarbons (lubricating oils).

Lubricating oil range hydrocarbons are present at low levels. The concentration of these hydrocarbons is so low that it is difficult to distinguish if they are from petroleum contamination or from naturally occurring organic material in the sediments. There is evidence of aliphatic hydrocarbons present in samples 98028135 and 98028137. This evidence suggests that petroleum contamination is likely present although it is difficult to confirm due to biogenic interference.

Because of the high moisture content of these samples, it was necessary to concentrate the samples to achieve a method detection limit below the MTCA soil clean up levels. Please use the REX1 results for the quantitation of the lubricating oil hydrocarbons. REX2 is the concentrated duplicate sample of 98028130.

All data are usable as reported. Please contact me at 360-871-8814 if you have any questions concerning the hydrocarbon analysis of this project.

METHODS:

These sediment samples were extracted into methylene chloride and analyzed by GC-FID. This method is a modification of EPA SW- 846 methods 8000, 8015, and 3540.

Manchester Environmental Laboratory

Department of Ecology

Analysis Report for

TPH as Heavy Fuel

Project Name: Gibbons Creek

LIMS Project ID: 1028-98

Sample: 98028130 (Re-extract/only - REX1) Date Received: 01/13/98

Method: WTPH-D

Field ID: GIBBONS1

Date Prepared: 02/09/98

Matrix: Sediment/Soil

Project Officer: Johnson, Art

Date Analyzed: 02/25/98

Units: mg/Kg Dry Wt.

Analyte	Result	Qualifier
---------	--------	-----------

Heavy Fuel Oil	69	U
----------------	----	---

Surrogate Recoveries

Pentacosane	90	%
-------------	----	---

Authorized By: *McLellan*

Release Date: 3/3/98

Page: 2

Manchester Environmental Laboratory

Department of Ecology

Analysis Report for

TPH as Heavy Fuel

Project Name: Gibbons Creek

LIMS Project ID: 1028-98

Sample: 98028130 (Re-extract/only - REX2) Date Received: 01/13/98

Method: WTPH-D

Field ID: GIBBONS1

Date Prepared: 02/09/98

Matrix: Sediment/Soil

Project Officer: Johnson, Art

Date Analyzed: 02/25/98

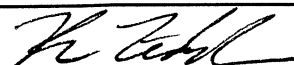
Units: mg/Kg Dry Wt.

Analyte	Result	Qualifier
---------	--------	-----------

Heavy Fuel Oil	100	
----------------	-----	--

Surrogate Recoveries

Pentacosane	87	%
-------------	----	---

Authorized By: 

Release Date: 3/3/98

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Manchester Environmental Laboratory

Department of Ecology

Analysis Report for

TPH as Heavy Fuel

Project Name: Gibbons Creek

LIMS Project ID: 1028-98

Sample: 98028135 (Re-extract/analy - REX1) Date Received: 01/13/98

Method: WTPH-D

Field ID: GIBBONS6

Date Prepared: 02/09/98

Matrix: Sediment/Soil

Project Officer: Johnson, Art

Date Analyzed: 02/25/98

Units: mg/Kg Dry Wt.

Analyte	Result	Qualifier
---------	--------	-----------

Heavy Fuel Oil	380	
----------------	-----	--

Surrogate Recoveries

Pentacosane	98	%
-------------	----	---

Authorized By: 

Release Date: 3/3/98

Page: 2

Manchester Environmental Laboratory

Department of Ecology

Analysis Report for

TPH as Heavy Fuel

Project Name: Gibbons Creek

LIMS Project ID: 1028-98

Sample: 98028137 (Re-extract/only - REX1) Date Received: 01/13/98

Method: WTPH-D

Field ID: GIBBONS8

Date Prepared: 02/09/98

Matrix: Sediment/Soil

Project Officer: Johnson, Art

Date Analyzed: 02/25/98

Units: mg/Kg Dry Wt.

Analyte	Result	Qualifier
---------	--------	-----------

Heavy Fuel Oil	410	
----------------	-----	--

Surrogate Recoveries

Pentacosane	91	%
-------------	----	---

Authorized By: 

Release Date: 3/3/98

Page: 2

Manchester Environmental Laboratory

Department of Ecology

Analysis Report for

TPH as Heavy Fuel

Project Name: Gibbons Creek

LIMS Project ID: 1028-98

Sample: BLN80345

Method: WTPH-D

Blank ID: OBS8040A1

Date Prepared: 02/09/98

Matrix: Sediment/Soil

Project Officer: Johnson, Art

Date Analyzed: 02/18/98

Units: mg/Kg Dry Wt.

Analyte	Result	Qualifier
---------	--------	-----------

Heavy Fuel Oil	410	U
#2 Diesel	200	U

Surrogate Recoveries

Pentacosane	104	%
-------------	-----	---

Authorized By: 

Release Date: 3/2/98

Page: 1

Manchester Environmental Laboratory

Department of Ecology

Analysis Report for

TPH as Heavy Fuel

Project Name: Gibbons Creek

LIMS Project ID: 1028-98

Sample: BLN80346

Method: WTPH-D

Blank ID: OBS8040A2

Date Prepared: 02/09/98

Matrix: Sediment/Soil

Project Officer: Johnson, Art

Date Analyzed: 02/18/98

Units: mg/Kg Dry Wt.

Analyte	Result	Qualifier
---------	--------	-----------

Heavy Fuel Oil	410	U
#2 Diesel	200	U

Surrogate Recoveries

Pentacosane	103	%
-------------	-----	---

Authorized By: 

Release Date: 3/2/98

Page: 1




STATE OF WASHINGTON
DEPARTMENT OF ECOLOGY
MANCHESTER ENVIRONMENTAL LABORATORY

7411 Beach Drive East • Port Orchard, Washington 98366-8204 • (360) 871-8860 • FAX (360) 871-8850

April 23, 1998

TO: Art Johnson
EILS

FROM: Bob Carrell 

SUBJECT: Gibbons Creek Sample 98028144 - Total Petroleum Hydrocarbon Screen

As I mentioned in an earlier e-mail to you, I performed a quick shake out extraction of a portion of the sediment with methylene chloride. For analysis by GC/FID, I used a single point calibration for lube oil. The results of the analysis showed the lube oil concentration to be approximately 40,000 mg/Kg on a dry weight basis.

cc: Bill Kammin



Manchester Environmental Laboratory

7411 Beach Dr E, Port Orchard Washington 98366


CASE NARRATIVE

March 6, 1998

Subject: Gibbons Creek - Dieldrin Analysis

Samples: 98028136, 37 and 44

Officer(s): Art Johnson

By: Bob Carrell 
Organics Analysis Unit

CHLORINATED PESTICIDE ANALYSIS

ANALYTICAL METHODS: The soil samples were extracted with acetone, solvent exchanged to hexane, florisiled (collecting the 15% diethyl ether/hexane fraction) and analyzed by capillary Gas Chromatography and Electron Capture Detection (GC/ECD) using the Manchester Laboratory standard operating procedures.

BLANKS: No target compounds were detected in the laboratory blanks hence it was demonstrated that the system was free of interfering contamination.

HOLDING TIMES: The samples were analyzed within the recommended holding time however, due to date that the request for dieldrin analysis was made, these samples had exceeded the recommended holding time for extractions (from the date of collection to the date of extraction) by at least three weeks. Because of this, the analyte was given a 'J' qualifier indicating an estimate and, since no dieldrin was found at or above the reporting value, the qualifier became "UJ".

SURROGATES: The recovery of the surrogate compounds were acceptable and ranged from 53 % to 86 %.

MATRIX SPIKES: Matrix spike recoveries of dieldrin for 98028136 LMX1 (86%) and 98028136 LMX2 (79%) were acceptable.

COMMENTS: At your request the analysis was limited to dieldrin. The data is acceptable for use as qualified.

DATA QUALIFIER CODES:

- U - The analyte was not detected at or above the reported value.
- J - The analyte was positively identified. The associated numerical value is an estimate.
- UJ - The analyte was not detected at or above the reported estimated result.

- REJ - The data are unusable for all purposes.
- NAF - Not analyzed for.
- N - For organic analytes there is evidence the analyte is present in this sample.
- NJ - There is evidence that the analyte is present. The associated numerical result is an estimate.
- E - This qualifier is used when the concentration of the associated value exceeds the known calibration range.

Manchester Environmental Laboratory

Department of Ecology

Analysis Report for

Organochlorine Pesticides

Project Name: Gibbons Creek

LIMS Project ID: 1028-98

Sample: BLN80582

Method: SW8080

Blank ID: OBS8042B1

Date Prepared: 02/17/98

Matrix: Sediment/Soil

Project Officer: Johnson, Art

Date Analyzed: 02/26/98

Units: ug/Kg Dry Wt.

Analyte	Result	Qualifier
---------	--------	-----------

Dieldrin	1.6	U
----------	-----	---

Surrogate Recoveries

Tetrachloro-m-xylene	75	%
4,4-Dibromooctafluorobiphenyl	79	%
Decachlorobiphenyl	86	%

Authorized By: *Paul*

Release Date: 3-13-98

Page: 1

Manchester Environmental Laboratory

Department of Ecology

Analysis Report for

Organochlorine Pesticides

Project Name: Gibbons Creek

LIMS Project ID: 1028-98

Sample: BLN80583

Method: SW8080

Blank ID: OBS8042B2

Date Prepared: 02/17/98

Matrix: Sediment/Soil

Project Officer: Johnson, Art

Date Analyzed: 02/26/98

Units: ug/Kg Dry Wt.

Analyte	Result	Qualifier
---------	--------	-----------

Dieldrin	1.6	U
----------	-----	---

Surrogate Recoveries

Tetrachloro-m-xylene	75	%
4,4-Dibromooctafluorobiphenyl	80	%
Decachlorobiphenyl	86	%

Authorized By: *B. Bull*

Release Date: 3-13-98

Page:

1

Manchester Environmental Laboratory

Department of Ecology

Analysis Report for

Organochlorine Pesticides

Project Name: Gibbons Creek

LIMS Project ID: 1028-98

Sample: 98028136

Date Received: 01/13/98

Method: SW8080

Field ID: GIBBONS7

Date Prepared: 02/17/98

Matrix: Sediment/Soil

Project Officer: Johnson, Art

Date Analyzed: 02/26/98

Units: ug/Kg Dry Wt.

Analyte	Result	Qualifier
---------	--------	-----------

Dieldrin	1.3	UJ
----------	-----	----

Surrogate Recoveries

Tetrachloro-m-xylene	69	%
4,4-Dibromooctafluorobiphenyl	67	%
Decachlorobiphenyl	65	%

Authorized By: *Camell*

Release Date: 3-13-98

Page:

1

Manchester Environmental Laboratory

Department of Ecology

Analysis Report for

Organochlorine Pesticides

Project Name: Gibbons Creek

LIMS Project ID: 1028-98

Sample: 98028136 (Matrix Spike - LMX1)

Date Received: 01/13/98

Method: SW8080

Field ID: GIBBONS7

Date Prepared: 02/17/98

Matrix: Sediment/Soil

Project Officer: Johnson, Art

Date Analyzed: 02/26/98

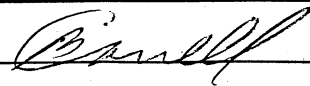
Units: % Recovery

Analyte	Result	Qualifier
---------	--------	-----------

Dieldrin	86	
----------	----	--

Surrogate Recoveries

Tetrachloro-m-xylene	67	%
4,4-Dibromooctafluorobiphenyl	77	%
Decachlorobiphenyl	65	%

Authorized By: 

Release Date: 3-13-98

Page:

2

Manchester Environmental Laboratory

Department of Ecology

Analysis Report for

Organochlorine Pesticides

Project Name: Gibbons Creek

LIMS Project ID: 1028-98

Sample: 98028136 (Matrix Spike - LMX2)

Date Received: 01/13/98

Method: SW8080

Field ID: GIBBONS7

Date Prepared: 02/17/98

Matrix: Sediment/Soil

Project Officer: Johnson, Art

Date Analyzed: 02/26/98

Units: % Recovery

Analyte	Result	Qualifier
---------	--------	-----------

Dieldrin	79	
----------	----	--

Surrogate Recoveries

Tetrachloro-m-xylene	62	%
4,4-Dibromooctafluorobiphenyl	67	%
Decachlorobiphenyl	53	%

Authorized By: 

Release Date: 3-13-98

Page: 3

Manchester Environmental Laboratory

Department of Ecology

Analysis Report for

Organochlorine Pesticides

Project Name: Gibbons Creek

LIMS Project ID: 1028-98

Sample: 98028137

Date Received: 01/13/98

Method: SW8080

Field ID: GIBBONS8

Date Prepared: 02/17/98

Matrix: Sediment/Soil

Project Officer: Johnson, Art

Date Analyzed: 02/26/98

Units: ug/Kg Dry Wt.

Analyte	Result	Qualifier
---------	--------	-----------

Dieldrin	1.6	UJ
----------	-----	----

Surrogate Recoveries

Tetrachloro-m-xylene	66	%
4,4-Dibromooctafluorobiphenyl	72	%
Decachlorobiphenyl	63	%

Authorized By: *Paully*

Release Date: 3-13-98

Page: 1

Manchester Environmental Laboratory

Department of Ecology

Analysis Report for

Organochlorine Pesticides

Project Name: Gibbons Creek

LIMS Project ID: 1028-98

Sample: 98028144

Date Received: 01/13/98

Method: SW8080

Field ID: GIBBONSE

Date Prepared: 02/17/98

Matrix: Sediment/Soil

Project Officer: Johnson, Art

Date Analyzed: 02/26/98

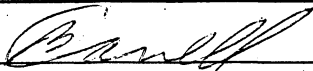
Units: ug/Kg Dry Wt.

Analyte	Result	Qualifier
---------	--------	-----------

Dieldrin	3.2	UJ
----------	-----	----

Surrogate Recoveries

Tetrachloro-m-xylene	73	%
4,4-Dibromooctafluorobiphenyl	80	%
Decachlorobiphenyl	58	%

Authorized By: 

Release Date: 3-13-98

Page:

1

Appendix C. Erickson and Tooley (1996) Sediment Sampling Sites

Appendix C. Sampling Sites of Erickson and Tooley (1996). (Site RC1 is misplaced in this figure and should be located further downstream just above the bifurcation of the lower channel.)

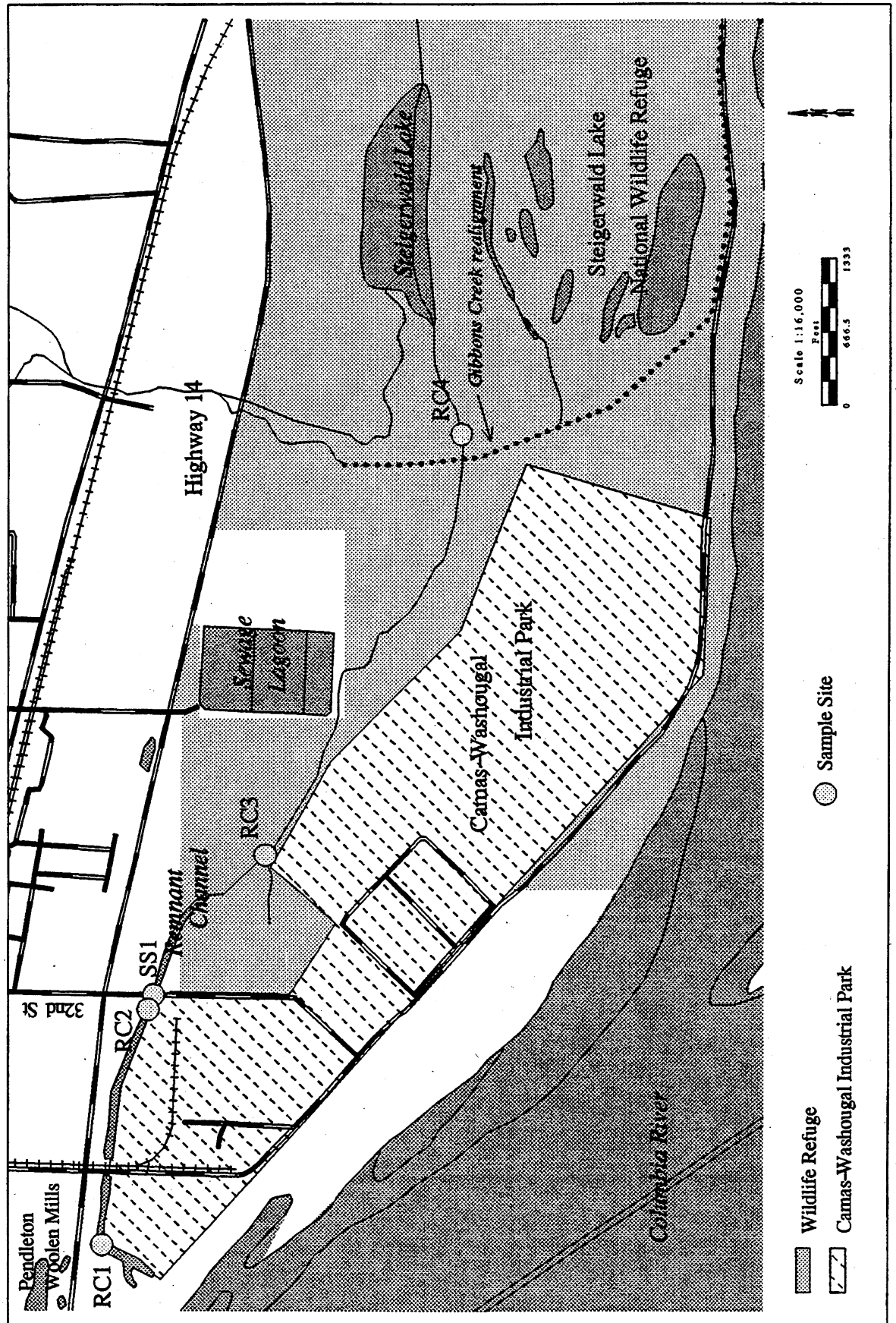


Figure 7. Water and Sediment Sampling Sites in Gibbons Creek Remnant Channel

Appendix D. Sediment Criteria and MTCA Cleanup Levels

Appendix D. Sediment Quality Criteria and MTCA Soil Cleanup Levels for Metals (mg/Kg, dry weight)

Metal	EILS LAET ¹	Ecology SQS ²	Ontario Ministry of Environment		Environment Canada		Ecology Model Toxics Control Act ⁵	
			LEL ³	SEL ³	TEL ⁴	PEL ⁴	Soil	Industrial Soil
Antimony	3	--	--	--	--	--	--	--
Arsenic	40	57	6	33	5.9	17	20	200
Cadmium	7.6	5.1	0.6	10	0.6	3.5	2	10
Chromium	280	260	26	110	37	90	100	500
Copper	840	390	50	110	36	200	--	--
Iron	--	--	20000	40000	--	--	--	--
Lead	260	450	31	250	35	91	250	1000
Manganese	1800	--	460	1100	--	--	--	--
Mercury	0.56	0.41	0.2	2	0.17	0.49	1	1
Nickel	46	--	16	75	18	36	--	--
Silver	4.5	6.1	0.5	--	--	--	--	--
Zinc	520	410	120	820	120	310	--	--

¹Freshwater Lowest Apparent Effects Threshold (Cubbage et al., 1997)

²Marine Sediment Quality Standard (WAC 173-204)

³Freshwater Lowest Effects Level and Severe Effects Level (Persaud et al., 1993)

⁴Freshwater Probable Effects Level and Threshold Effects Level (Environment Canada, 1994)

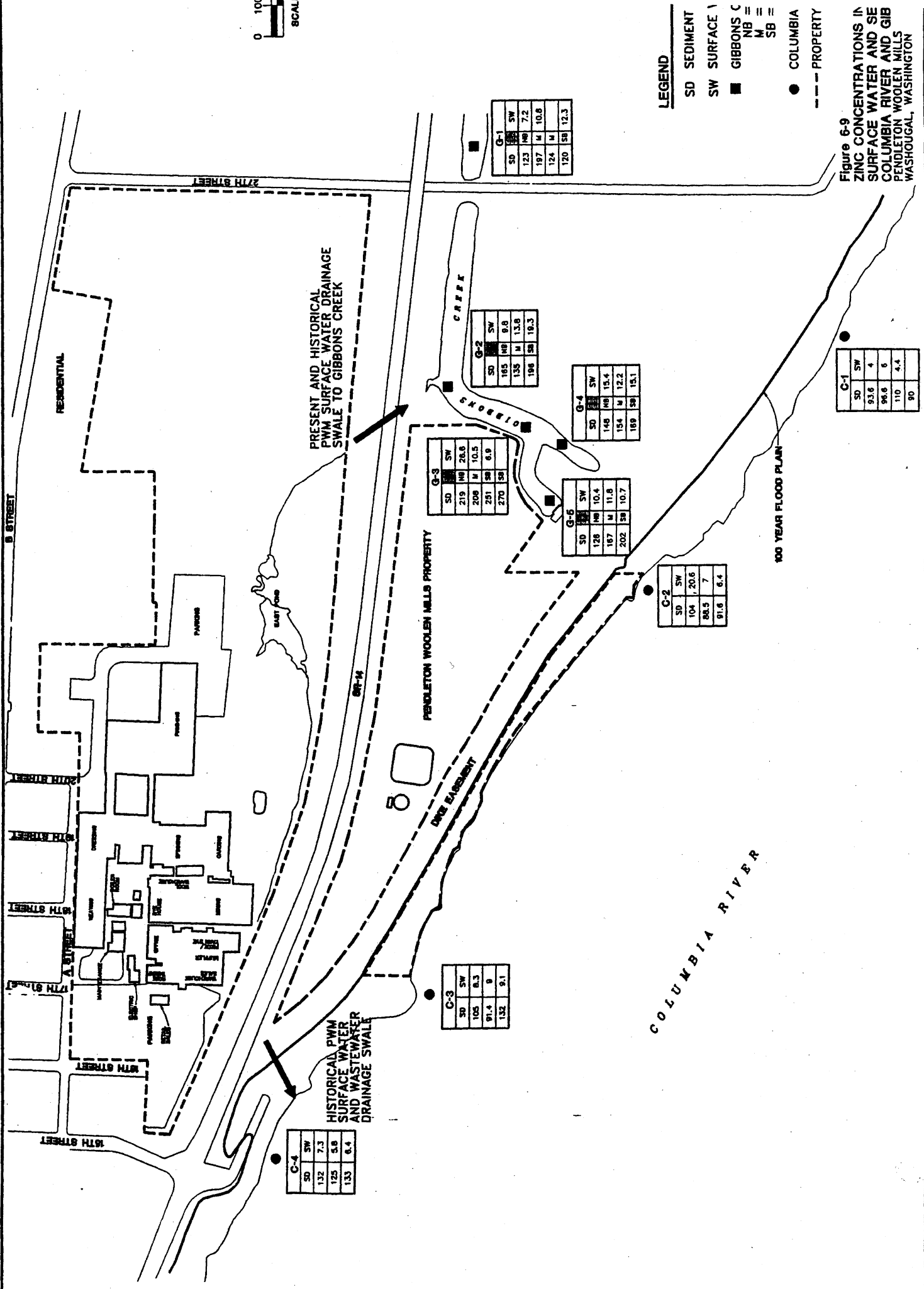
⁵Cleanup Levels (WAC 1173-240)

Appendix E. CH2M Hill (1992b) Data on Zinc and Chromium



- LEGEND**
- SD SEDIMENT
 - SW SURFACE 1
 - GIBBONS C
 - COLUMBIA
 - - - PROPERTY

Figure 6-9
ZINC CONCENTRATIONS IN
SURFACE WATER AND SE
COLUMBIA RIVER AND GIB
PENDLETON WOOLEN MILLS
WASHINGTON



G-1

SD	SW
123	7.2
197	10.6
124	M
120	58
	12.3

G-2

SD	SW
165	9.8
135	13.8
198	58
	10.3

G-4

SD	SW
146	15.4
154	M
189	58
	15.1

G-3

SD	SW
219	28.8
206	10.5
251	8.9
270	58

G-6

SD	SW
128	10.4
167	11.6
202	58
	10.7

G-2

SD	SW
104	20.6
88.5	7
91.6	6.4

C-1

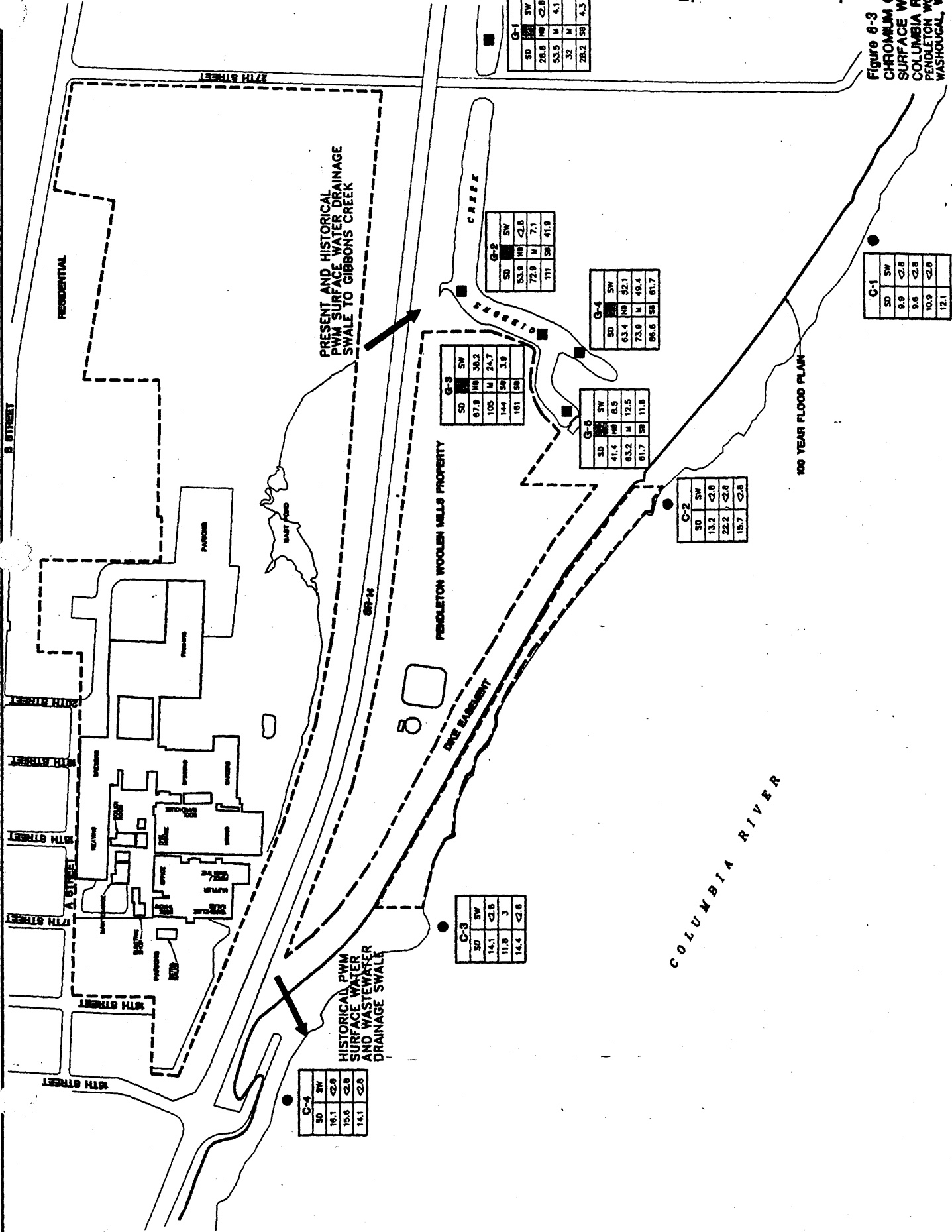
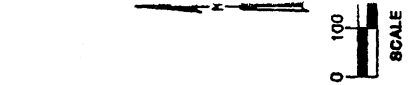
SD	SW
93.6	4
96.6	5
110	4.4
	90

C-4

SD	SW
132	7.3
125	5.8
133	8.4

C-3

SD	SW
105	6.3
91.4	9
132	9.1



- LEGEND**
- SD SEDIMENT (m)
 - SW SURFACE WATER
 - GIBBONS CREEK
 - COLUMBIA RIV.
 - - - PROPERTY BO.

Figure 6-3
CHROMIUM CONCENTRATIONS
SURFACE WATER AND SEDIMENT
COLUMBIA RIVER AND GIBBONS
PENDLETON WOOLEN MILLS
WASHINGTON, WASHINGTON

C-4

SD	SW
18.1	<2.8
19.6	<2.8
14.1	<2.8

C-3

SD	SW
14.1	<2.8
11.8	3
14.4	<2.8

C-2

SD	SW
13.2	<2.8
22.2	<2.8
15.7	<2.8

C-1

SD	SW
9.9	<2.8
9.6	<2.8
10.9	<2.8
12.1	

G-3

SD	SW
87.8	38.2
105	24.7
144	3.9
101	58

G-5

SD	SW
41.4	8.5
63.2	12.5
61.7	58
11.6	

G-4

SD	SW
63.4	52.1
73.9	48.4
66.6	81.7

G-2

SD	SW
53.8	<2.8
72.8	7.1
111	58
41.8	

G-1

SD	SW
28.8	<2.8
53.5	4.1
32	M
28.2	58
4.3	



Figure 1. 9828148 Biosolids Stereo 62X

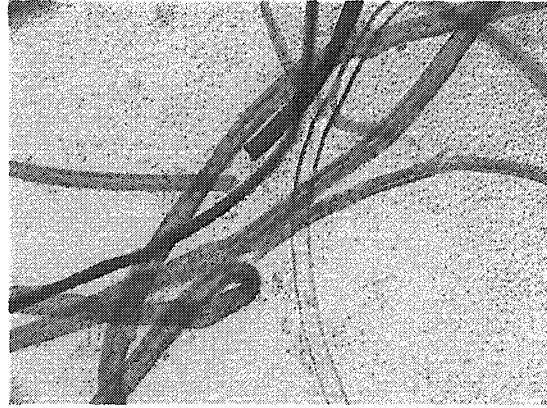
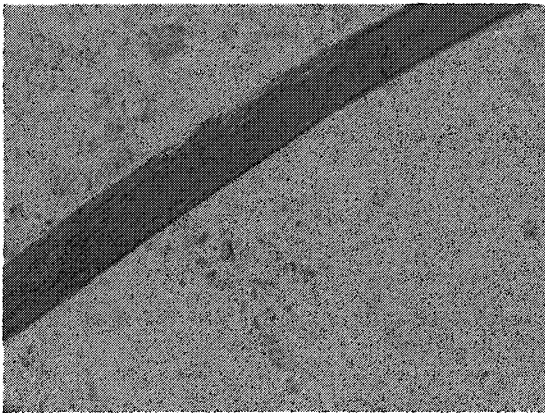
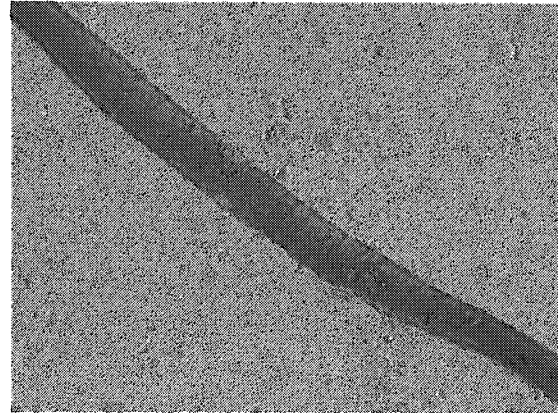


Figure 2. 98028148Q Fibers 200X



a



b

Figure 3. 98028148I Red and Purple Dyed Wool fibers 500X. F

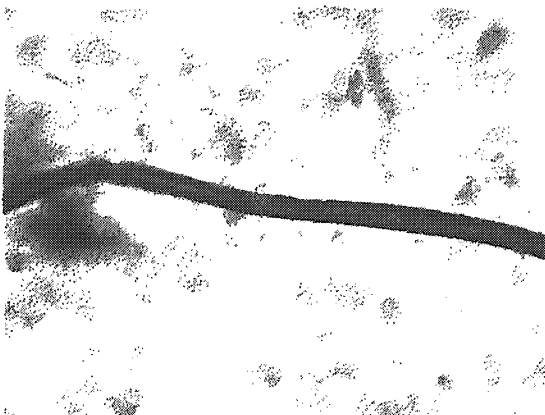


Figure 4. 98028145 PWM-1 200X Gray fiber



Figure 5. 98028146 PWM-3 200X Green fiber

Appendix F. Microscopic Examination of Samples in Vicinity of PWM Sprayfield

MANCHESTER ENVIRONMENTAL LABORATORY

7411 Beach Drive E , Port Orchard Washington 98366

CASE NARRATIVE

April 8, 1998

Subject: Gibbons Creek
Samples: 98028130 to -028148
Case No. 102898
Officer: Art Johnson
By: Dickey D. Huntamer
Microscopist - Chemist

FORENSIC MICROANALYSIS

Summary

Wool fibers similar to the wool fibers in found in the Pendleton Woolen Mill biosolids were found in soil samples from the Pendleton sprayfield. Examination of sediment samples collected near the edge of the sprayfield and Gibbons Creek failed to reveal any significant concentration of wool fibers consistent with the biosolids. The fibers although good indicators of where biosolids were sprayed were not transportable enough to be tracers of the biosolids.

Sample Description

Sixteen samples were received at Manchester Environmental Laboratory on January 13, 1998. One sample, 9802818 was a sample of the biosolids collected from the Pendleton Woolen Mill (PWM) treatment plant. The biosolids are the end product of the waste treatment and are disposed of by spraying on a field near Gibbons Creek. Three other samples, 98028145, 46, and 47 were soils collected from the spray field. Samples A through E(98028140 to -028144) were sediments collected from possible areas where biosolids could enter Gibbons creek. The remaining samples were creek sediments collected along the length of the creek.

Analysis

The samples were analyzed by examining representative portions under the stereo microscope looking for fibers. Examination of the biosolids sample, 98028048, showed around 100 to 150 wool fibers per milliliter. The fiber lengths were variable and a variety of colors were seen although blue, gray and black were most frequent, **Figure 1 and 2**. The fibers were manually separated from the biosolids using a tungsten needle and placed into a 50:50 glycerin -water mixture for storage. Although an occasional man-made fiber was observed along with numerous cellulose fibers the majority of the non-cellulose fibers found in the biosolids was "wool". While some fibers looked new the majority of the fibers showed significant degradation and biological deterioration, **Figure 3 a and b**.

An attempt was made to use a 45um sieve and a 30um nylon mesh for fiber separation. Although they were effective catching the longer fibers shorter fibers were lost through the mesh. Removing the fibers

caught in the mesh was also very time consuming. Consequently direct examination of small amounts of sample placed on a slide proved to be the most effective means of examining the samples while retaining the shorter fibers.

The field samples, PWM-1, 2, and 3, all had significant amounts of plant materials and plant fibers mixed with the soil. In some cases 30% to 50% was plant material. The only effective way to examine the samples was manually under the stereo microscope and pick out any "wool-like" fibers. Some of the fibers found in the field samples are shown in **Figures 4 and 5**. The numbers found were 10 to 20% of the number found in the biosolids and most showed significant structural deterioration.

Examination of the samples labeled A through E taken from the stream bank was also done manually. A few short fragments of wool fibers were observed in E along with a number of plant fibers. The plant fibers were opaque black but upon treatment with dilute HCl or exposure to air the fibers turned red-brown color

Since virtually no wool fibers were found in the samples A through D collected along the edge of the spray field the sediment samples from the creek were not analyzed.

Conclusions

A variety of wool fibers were observed in the biosolids. Some of the fibers were dyed and were easily recognized. Dyed wool fibers were also observed in the three spray field samples PWM 1 to 3. Only a few badly deteriorated fibers were detected in samples from Gibbons creek near the spray field. Based on these observations the fibers appear to remain where they are sprayed and don't appear to have any significant mobility. They provide a good indicator of where the biosolids have been sprayed but are probably poor indicators of biosolids mobility due to their entrapment in the soil. The fibers have a large size relative to the biosolids floc and liquid portion, which could still make it to the creek.

Results of the metals analysis on the same samples agree with the lack of transport of biosolids to the creek.

The wool fibers can be used to detect where PWM biosolids have been sprayed. They do not appear to function as indicators of biosolid transport since their morphology would tend to entangle them in the soil matrix. Stability over long time periods may also be a problem. Many of the fibers found in the biosolids and in the sprayfield showed biological deterioration which indicates the fibers have a finite lifetime in the environment.