0082167

SAF-RC-116
Columbia River Component of the RCBRA – Sediment
FINAL DATA PACKAGE

COMPLETE COPY OF DATA PACKAGE TO:

Kathy Wendt H4-21 KW 6/15/09
INITIAL/DATE

COMMENTS:

SDG SEQ041409 **SAF-RC-116**

Rad only ☑ Chem only Rad & Chem

☑ Complete Partial

Sampling Location:

300DC3-1SD	RKC1-1SD
RKC2-1SD	RDC-1SD
FIC1-1SD	FIC2-1SD
RBC-1SD	SI-8SD
300DC6-1SD	300DC5-1SD
YRC2-1SD	YRC1-1SD
300DC2-1SD	300DC4-1SD
RNC-1SD	

RECEIVED
JUN 24 2009
EDMC

Analytical Chemistry Data Package
Inorganics Analysis

RECEIVED
JUN 2009

Project: Washington Closures Hanford
AVS/SEM Analysis of Sediment

PNNL Project No. 56166
MSL CF No. 2981

Pacific Northwest
NATIONAL LABORATORY

Marine Sciences Laboratory
1529 West Sequim Bay Road
Sequim, WA 98382
PM: Jill Brandenberger
(360) 681-4564

SDG SEQ041409

INORGANIC CHEMISTRY ANALYSIS DATA PACKAGE CONTENTS

AVS/SEM Analysis in Sediment

Sample Summary Table 3
QA/QC Summary Table 5
Laboratory Qualifiers 7
Pertinent Dates Summary Table 8
QA/QC Narrative 9

Sample Custody Information

Laboratory Sample Log-In and Chain of Custody Forms for SDG041409 12

BATTELLE MARINE SCIENCES LABORATORY
1529 W. Sequim Bay Road
Sequim, WA 98382
(360) 681-4564

Project: Washington Closures Hanford AVS/SEM SDG 041409
File #: 2981

SAMPLE ID SPONSOR	SAMPLE ID BATTELLE	% Dry Weight	Batch ID	AVS µmole/g	SEM Ag µg/L	SEM Ag µg/g	SEM Ag µmole/g	SEM Cd µg/L	SEM Cd µg/g	SEM Cd µmole/g	SEM Cu µg/L	SEM Cu µg/g	SEM Cu µmole/g
J18ML8	2981-58 R1	73.0	AVS5	1.27	0.0477	0.0166	0.000154	0.612	0.213	0.00190	12.3	4.23	0.0665
J18ML8DUP	2981-58 R2	73.0	AVS5	1.21	0.0425	0.0141	0.000131	0.758	0.251	0.00224	15.1	4.97	0.0783
J18MJ7	2981-59	77.4	AVS5	2.95	0.03 U	0.008 U	0.00007 U	5.55	1.99	0.0177	22.7	8.09	0.127
J18M08	2981-60	71.1	AVS5	0.0410 U	0.230	0.0657	0.000609	0.533	0.152	0.00135	42.5	12.1	0.190
J18M31	2981-61	80.7	AVS5	0.212	0.0475	0.008 U	0.00007 U	18.5	2.32	0.0207	44.9	5.61	0.0883
J18KP6	2981-62	73.5	AVS5	4.27	0.03 U	0.008 U	0.00007 U	0.579	0.260	0.00232	13.5	6.02	0.0948
J18KX1	2981-63	56.4	AVS5	2.37	0.03 U	0.008 U	0.00007 U	1.01	0.732	0.00651	20.5	14.7	0.232
J18MN1	2981-64	67.2	AVS5	2.75	0.03 U	0.008 U	0.00007 U	0.596	0.288	0.00256	11.6	5.56	0.0875
J18MR8	2981-65	83.2	AVS5	0.432	0.03 U	0.008 U	0.00007 U	8.43	1.08	0.00964	30.4	3.89	0.0612
J18MH4	2981-66	85.5	AVS5	0.115	0.0979	0.0122	0.000113	6.93	0.866	0.00771	59.1	7.38	0.116
J18MV1	2981-67	82.8	AVS5	0.111	0.0957	0.0114	0.000106	13.7	1.64	0.0146	69.8	8.31	0.131
J18MP4	2981-68	81.3	AVS5	0.0410 U	0.0921	0.0105	0.0000976	1.47	0.168	0.00150	21.9	2.49	0.0392
J17XN2	2981-69	72.8	AVS5	2.34	0.03 U	0.008 U	0.00007 U	3.98	1.79	0.0159	31.8	14.2	0.224
J18KN2	2981-70	64.8	AVS5	9.78	0.03 U	0.008 U	0.00007 U	1.92	1.53	0.0136	12.0	9.41	0.148
J18KR9	2981-71	66.6	AVS5	0.224	0.03 U	0.008 U	0.00007 U	0.165	0.107	0.000951	29.8	19.3	0.303
J18KY5	2981-72 R1	72.6	AVS5	9.89	0.03 U	0.008 U	0.00007 U	2.18	1.97	0.0175	8.10	7.18	0.113
J18KY5DUP	2981-72 R2	72.6	AVS5	7.76	0.03 U	0.008 U	0.00007 U	2.87	1.83	0.0163	11.8	7.42	0.117
Detection Limit (mean used for AVS)				**0.0410**	**0.03**	**0.008**	**0.00007**	**0.02**	**0.005**	**0.00005**	**0.07**	**0.02**	**0.0003**

BATTELLE MARINE SCIENCES LABORATORY
1529 W. Sequim Bay Road
Sequim, WA 98382
(360) 681-4564

Project: Washington Closures Hanford AVS/SEM SDG 041409
File #: 2981

SAMPLE ID SPONSOR	SAMPLE ID BATTELLE	% Dry Weight	Batch ID	Ni µg/L	SEM Ni µg/g	SEM Ni µmole/g	SEM Pb µg/L	SEM Pb µg/g	SEM Pb µmole/g	SEM Zn µg/L	SEM Zn µg/g	SEM Zn µmole/g
J18ML8	2981-58 R1	73.0	AVS5	6.54	2.28	0.0388	16.3	5.67	0.0274	81.5	28.3	0.433
J18ML8DUP	2981-58 R2	73.0	AVS5	6.94	2.30	0.0392	16.1	5.34	0.0258	84.9	28.0	0.429
J18MJ7	2981-59	77.4	AVS5	9.89	3.55	0.0604	70.8	25.4	0.123	647	232	3.54
J18M08	2981-60	71.1	AVS5	14.7	4.19	0.0714	35.7	10.2	0.0491	71.2	20.2	0.309
J18M31	2981-61	80.7	AVS5	17.1	2.15	0.0366	130	16.3	0.0788	1337	168	2.56
J18KP6	2981-62	73.5	AVS5	8.21	3.70	0.0630	10.0	4.49	0.0217	88.2	39.5	0.605
J18KX1	2981-63	56.4	AVS5	14.4	10.4	0.177	9.56	6.88	0.0332	121	87.3	1.34
J18MN1	2981-64	67.2	AVS5	4.83	2.34	0.0398	12.5	6.04	0.0291	76.6	36.8	0.563
J18MR8	2981-65	83.2	AVS5	10.2	1.31	0.0223	53.0	6.80	0.0328	901	116	1.77
J18MH4	2981-66	85.5	AVS5	10.4	1.31	0.0222	143	17.9	0.0863	916	115	1.75
J18MV1	2981-67	82.8	AVS5	8.69	1.04	0.0177	145	17.3	0.0836	862	103	1.57
J18MP4	2981-68	81.3	AVS5	12.0	1.37	0.0233	27.2	3.10	0.0150	182	20.8	0.318
J17XN2	2981-69	72.8	AVS5	9.29	4.17	0.0711	84.9	38.1	0.184	457	205	3.14
J18KN2	2981-70	64.8	AVS5	3.74	2.97	0.0506	32.6	25.8	0.125	209	166	2.53
J18KR9	2981-71	66.6	AVS5	21.3	13.8	0.235	5.45	3.51	0.0170	48.8	31.4	0.480
J18KY5	2981-72 R1	72.6	AVS5	2.43	2.19	0.0373	17.2	15.4	0.0745	266	239	3.66
J18KY5DUP	2981-72 R2	72.6	AVS5	3.45	2.19	0.0374	25.3	16.1	0.0775	385	244	3.74
Detection Limit (mean used for AVS)				**0.08**	**0.01**	**0.0002**	**0.02**	**0.005**	**0.00003**	**0.1**	**0.04**	**0.0005**

BATTELLE MARINE SCIENCES LABORATORY
1529 W. Sequim Bay Road
Sequim, WA 98382
(360) 681-4564

Project: Washington Closures Hanford AVS/SEM SDG 041409
File #: 2981

SAMPLE ID SPONSOR	SAMPLE ID BATTELLE	% Dry Weight	Batch ID	AVS µmole/g	SEM Ag µg/L	SEM Ag µg/g	SEM Ag µmole/g	SEM Cd µg/L	SEM Cd µg/g	SEM Cd µmole/g	SEM Cu µg/L	SEM Cu µg/g	SEM Cu µmole/g
Detection Limit (mean used for AVS)				**0.0410**	**0.03**	**0.008**	**0.00007**	**0.02**	**0.005**	**0.00005**	**0.07**	**0.02**	**0.0003**
SEM Analytical Blanks													
ICB			--		0.03 U			0.02 U			0.07 U		
CCB1			--		0.03 U			0.02 U			0.07 U		
AVS/SEM Blanks													
BLANK 1	2981 Blank 041609	*73.8*	AVS5	0.0410 U	0.03 U	0.008 U	0.00004 U	0.02 U	0.005 U	0.00005 U	0.143	0.02 U	0.0003 U
Replicate Analysis Results													
J18ML8	2981-58 R1	73.0	AVS5	1.27	0.0477	0.0166	0.000154	0.612	0.213	0.00190	12.3	4.23	0.0665
J18ML8DUP	2981-58 R2	73.0	AVS5	1.21	0.0425	0.0141	0.000131	0.758	0.251	0.00224	15.1	4.97	0.0783
	RPD			**5%**			**16%**			**16%**			**16%**
J18KY5	2981-72 R1	72.6	AVS5	9.89	0.03 U	0.008 U	0.00007 U	2.18	1.97	0.0175	8.10	7.18	0.113
J18KY5DUP	2981-72 R2	72.6	AVS5	7.76	0.03 U	0.008 U	0.00007 U	2.87	1.83	0.0163	11.8	7.42	0.117
	RPD			**24%**			**NA**			**8%**			**3%**
Laboratory Control Sample Results													
LCS r1	LCS r3 041609	*73.8*	AVS5	0.468	9.59			9.30			10.8		
LCS r2	LCS r4 041709	*73.8*	AVS5	0.417	--			--			--		
BLANK 1		*73.8*	AVS5	0.0410 U	0.03 U	0.008 U	0.00007 U	0.02 U	0.005 U	0.00005 U	0.143	0.02 U	0.0003 U
	Spike Concentration			0.498	10			10			10		
	Percent Recovery			**94%**	**96%**			**93%**			**107%**		
				84%	--			--			--		
Standard Reference Material Data													
1640 Direct			--		7.18			23.3			89.7		
	Certified/Reference Value				7.62			22.79			85.2		
	Range				±0.25			±0.96			±1.2		
	Percent Recovery				**94%**			**102%**			**105%**		
SEM Matrix Spike Accuracy													
J18M08	2981-60	71.1	AVS5		0.230			0.533			42.5		
J18M08MS	2981-60MS	71.1	AVS5		9.89			10.8			242		
J18M08MSD	2981-60MSD	71.1	AVS5		9.94			10.8			247		
Amount Spiked					10			10			200		
% Recovery, MS					**97%**			**103%**			**100%**		
% Recovery, MSD					**97%**			**103%**			**102%**		
RPD					**1%**			**0%**			**2%**		

BATTELLE MARINE SCIENCES LABORATORY
1529 W. Sequim Bay Road
Sequim, WA 98382
(360) 681-4564

Project: Washington Closures Hanford AVS/SEM SDG 041409
File #: 2981

SAMPLE ID SPONSOR	SAMPLE ID BATTELLE	% Dry Weight	Batch ID	Ni µg/L	SEM Ni µg/g	SEM Ni µmole/g	SEM Pb µg/L	SEM Pb µg/g	SEM Pb µmole/g	SEM Zn µg/L	SEM Zn µg/g	SEM Zn µmole/g
Detection Limit (mean used for AVS)				**0.08**	**0.01**	**0.0002**	**0.02**	**0.005**	**0.00003**	**0.1**	**0.04**	**0.0005**
SEM Analytical Blanks												
ICB			--	0.08 U			0.02 U			0.1 U		
CCB1			--	0.08 U			0.02 U			0.1 U		
AVS/SEM Blanks												
BLANK 1	2981 Blank 041609	*73.8*	AVS5	0.08 U	0.01 U	0.0002 U	0.0372	0.005 U	0.00003 U	0.424	0.0508	0.000778
Replicate Analysis Results												
J18ML8	2981-58 R1	73.0	AVS5	6.54	2.281	0.0388	16.3	5.67	0.0274	81.5	28.3	0.433
J18ML8DUP	2981-58 R2	73.0	AVS5	6.94	2.303	0.0392	16.1	5.34	0.0258	84.9	28.0	0.429
	RPD					**1%**			**6%**			**1%**
J18KY5	2981-72 R1	72.6	AVS5	2.43	2.192	0.0373	17.2	15.4	0.0745	266	239	3.66
J18KY5DUP	2981-72 R2	72.6	AVS5	3.45	2.194	0.0374	25.3	16.1	0.0775	385	244	3.74
	RPD					**0%**			**4%**			**2%**
Laboratory Control Sample Results												
LCS r1	LCS r3 041609	*73.8*	AVS5	10.1			10.1			11.0		
LCS r2	LCS r4 041709	*73.8*	AVS5	--			--			--		
BLANK 1		*73.8*	AVS5	0.08 U	0.01 U	0.0002 U	0.0372	0.005 U	0.00003 U	0.424	0.0508	0.000778
	Spike Concentration			10			10			10		
	Percent Recovery			**101%**			**101%**			**106%**		
				--			--			--		
Standard Reference Material Data												
1640 Direct			--	28.7			29.4			56.5		
	Certified/Reference Value			27.4			27.89			53.2		
	Range			±0.8			±0.14			±1.1		
	Percent Recovery			**105%**			**105%**			**106%**		
SEM Matrix Spike Accuracy												
J18M08	2981-60	71.1	AVS5	14.7			35.7			71.2		
J18M08MS	2981-60MS	71.1	AVS5	25.1			238			273		
J18M08MSD	2981-60MSD	71.1	AVS5	25.1			238			272		
Amount Spiked				10			200			200		
% Recovery, MS				**104%**			**101%**			**101%**		
% Recovery, MSD				**104%**			**101%**			**100%**		
RPD				**0%**			**0%**			**0%**		

BATTELLE MARINE SCIENCES LABORATORY
1529 W. Sequim Bay Road
Sequim, WA 98382
(360) 681-4564

Project: Washington Closures Hanford AVS/SEM SDG 041409
File #: 2981

MSL SOP-C-001-04 Quality Control Criteria

Lab Qualifier	Description	Criterion
N	Spikes (Blank spikes AVS/matrix spikes SEM)	75-125%
*	Duplicates	<25% RPD
NA	Not Applicable/Available (note: precision on SEM data is only calculated after SEM ratio is applied)	
U	Not detected at or above MDL; MDL reported	

BATTELLE MARINE SCIENCES LABORATORY
1529 W. Sequim Bay Road
Sequim, WA 98382
(360) 681-4564

Project: Washington Closures Hanford AVS/SEM SDG 041409
File #: 2981

Molar Ratios of AVS to Total SEM Metals

SAMPLE ID SPONSOR	SAMPLE ID BATTELLE	% Dry Weight	Batch ID	AVS µmole/g	ΣSEM Metals µmole/g	Excess Metals Present (Y or N)
J18ML8	2981-58 R1	73.0	AVS5	1.2664	0.567	N
J18ML8DUP	2981-58 R2	73.0	AVS5	1.2077	0.574	N
J18MJ7	2981-59	77.4	AVS5	2.9542	3.872	Y
J18M08	2981-60	71.1	AVS5	0.0410	0.621	Y
J18M31	2981-61	80.7	AVS5	0.2116	2.788	Y
J18KP6	2981-62	73.5	AVS5	4.2677	0.786	N
J18KX1	2981-63	56.4	AVS5	2.3705	1.784	N
J18MN1	2981-64	67.2	AVS5	2.7526	0.722	N
J18MR8	2981-65	83.2	AVS5	0.4322	1.897	Y
J18MH4	2981-66	85.5	AVS5	0.1147	1.985	Y
J18MV1	2981-67	82.8	AVS5	0.1110	1.818	Y
J18MP4	2981-68	81.3	AVS5	0.0410	0.397	Y
J17XN2	2981-69	72.8	AVS5	2.3381	3.635	Y
J18KN2	2981-70	64.8	AVS5	9.7832	2.869	N
J18KR9	2981-71	66.6	AVS5	0.2240	1.037	Y
J18KY5	2981-72 R1	72.6	AVS5	9.8909	3.900	N
J18KY5DUP	2981-72 R2	72.6	AVS5	7.7639	3.987	N

Detection Limit (mean used for AVS)

QA/QC NARRATIVE

PROJECT:	Washington Closures Hanford AVS/SEM SDG041409
PARAMETER:	Acid Volatile Sulfide (AVS) and Simultaneously Extracted Metals (SEM)
LABORATORY:	Pacific Northwest National Laboratory (PNNL) operated by Battelle, Marine Sciences Laboratory (MSL), Sequim, Washington
MATRIX:	Sediment
SAMPLE CUSTODY AND PROCESSING:	A total of 15 sediment samples were received at MSL on 04/14/09. All samples were received in good condition (i.e., no sample containers were broken or leaking). Samples were assigned a Battelle Central File (CF) identification number (2981) and were entered into the MSL sample tracking and project management system.

SAMPLE PROCESSING INFORMATION:

MSL Code:	**2981* 58-72**
Description:	Sediment
Collection dates	03/05/09 through 04/02/09
Laboratory arrival date	04/14/09
Cooler temperature on arrival	5.5°C
AVS Extraction Dates:	04/16/09 and 04/17/09
AVS Analyses Dates:	04/20/09
SEM Analyses Dates:	04/20/09

METHODS:

Acid volatile sulfide (AVS) has been used to predict the sediment toxicity of copper (Cu), cadmium (Cd), nickel (Ni), lead (Pb) and zinc (Zn) (Ankley et al. 1996; Berry et al. 1996). This relationship results from the volatilization of AVS present in sediment and simultaneous release of previously sulfide bound metals (SEM). As a metal sulfide complex, early research indicates that metals are not available for uptake by benthic organisms. Under this assumption, the amount of AVS present in sediment limits the metal bioavailability and subsequent toxicity in sediments. Sulfide is an important binding component in modeling metal sorption in sediments (Morse et al. 1987). In the presence of excess sulfide, most of the reactive metal will form insoluble metal sulfides. The AVS becomes an indicator of the ratio of available sulfide to the SEM metals and allows the partitioning of free aqueous phase metal and solid phase metal in sediments. The five divalent metals (Cd, Ni, Cu, Pb and Zn) form metal sulfide complexes. If the molar ratios of the SEMs are greater than that of the AVS, the excess fraction of the metals may be considered to have a high potential for bioavailability. For divalent metals, one mole of SEM will react with one mole of AVS. Recently, silver (Ag) has been included as an SEM (Berry et al. 1999; US EPA 2000). However, for Ag the stoichiometric relationship differs slightly, such that one mole of SEM silver reacts with two moles of AVS.

Sediment samples were extracted and analyzed for AVS in accordance with Battelle SOP MSL-C-001. This procedure is based on a peer-reviewed, published procedure for the analysis of AVS in sediment and dissolved sulfide in aqueous samples, adopted from a draft EPA method (Allen et al. 1991.). In this method, sulfide in the sample is converted to hydrogen sulfide by the addition of hydrochloric acid at room temperature. The hydrogen sulfide (H_2S) is purged from the sample by an inert gas and trapped in a sodium hydroxide (NaOH) solution. With the addition of a mixed-diamine reagent (MDR), the sulfide is converted to methylene blue and measured on a spectrometer. AVS results were reported in units of μmole/g on a dry-weight basis.

The SEM extracts were analyzed for all other metals by Inductively Coupled Plasma-Mass Spectrometry (ICP-MS) in accordance with Battelle SOP MSL-I-022, Determination of Elements in Aqueous and Digestate Samples by ICP/MS. The analysis guidelines for this procedure are adapted from USEPA Method 1638 Determination of Trace Elements in Ambient Waters by Inductively Coupled Plasma-Mass Spectrometry. The SEM metal solution concentrations are determined in units of µg/L and then converted to µg SEM/g of sediment extracted for AVS. These data are further converted to µmole/g for each SEM metal.

HOLDING TIMES: The suggested holding time for AVS in sediment is 14 days per Battelle SOP MSL-C-001. The holding time may be extended if the samples are frozen and the oxidized layer is removed prior to analyses. The suggested holding time is calculated from day of collection to day of extraction (preservation of the sulfide). All samples were analyzed within 2x the suggested holding time except (2981*69). All samples were stored frozen from time of receipt to analysis. The data are not considered impacted by not achieving the suggested holding time.

DATA QUALITY CRITERIA (DQC):

Analyte	Analytical Method	Method Range of Spike Recovery	Replicate Precisions (RPD)	Achieved MDL[1]
AVS	Spectrometer	75-125%	≤25%	0.0410 µmole/g
SEM Ag	ICP-MS	75-125%	≤25%	0.03 µg/L
SEM Cd	ICP-MS	75-125%	≤25%	0.02 µg/L
SEM Cu	ICP-MS	75-125%	≤25%	0.07 µg/L
SEM Ni	ICP-MS	75-125%	≤25%	0.08 µg/L
SEM Pb	ICP-MS	75-125%	≤25%	0.02 µg/L
SEM Zn	ICP-MS	75-125%	≤25%	0.1 µg/L

[1] Batch average is reported for AVS

DETECTION LIMITS: Analytical results were reported to the laboratory achieved method detection limits (MDL) as determined from the Annual MDL study. The MDLs were determined according to EPA's "Definition and Procedure for the Determination of the Method Detection Limit - revision 1.11" 40 CFR Part 136, Appendix B. The achieved MDLs for ICP-MS are an order of magnitude lower, however, the matrix of the SEM requires a 10x dilution of the SEM solution and the achieved MDLs are adjusted for this dilution factor. Data were evaluated and flagged in accordance with the following criteria:

U Undetected at the MDL, MDL reported.

* Duplicates outside the QC sample criterion.

N Spikes outside the QC sample criterion.

METHOD BLANKS: One AVS Blank was prepared with this batch of samples and contained no detectable AVS. The AVS/SEM blank is created during the AVS analysis and the creation of the SEM sample. It consists of deionized water added to the bubblers along with hydrochloric acid used to oxidize the AVS from the sediment matrix. In most cases the SEM metals in this blank are greater than the ICP-MS MDL due to the presence of metals in the reagents used for the AVS. Therefore, the AVS/SEM blank was subtracted from the SEM concentrations reported in µg/L. The SEM Analytical blanks for the ICP-MS indicate there was no laboratory contamination.

QA/QC NARRATIVE

LABORATORY CONTROL SAMPLE (LCS) ACCURACY:

Duplicate laboratory control samples (LCS) samples are prepared and analyzed with the each batch of AVS samples. The percent recoveries for the AVS LCS were within the QC criterion of 75-125% recovery. Since only AVS is spiked in the AVS LCS samples, the SEM collected from the AVS blank was post spiked with the SEM metals to generate an LCS for the SEM quantification. The SEM blank spikes or LCSs were within the QC criterion of 75-125% recovery.

A riverine water standard reference material (SRM) identified as SRM 1640 was analyzed with the SEM extract by ICP-MS to provide a measure of instrument accuracy. The percent recoveries between the measured and certified or reference values were within the method QC criterion for all metals.

REPLICATE PRECISION:

Two laboratory duplicates were analyzed with this analytical batch. The duplicate analyses for AVS consist of the extraction of two different aliquots of sediment from the same sample container. The SEM precision is calculated once the SEM metal concentrations (µg/L) determined from the ICP-MS are converted to a mass basis (µg/g) to account for differences in sample mass extracted. Analytical precision was also assessed by the analyses of matrix spikes in duplicate. Precision of duplicate analyses was expressed as the relative percent difference (RPD) of replicate results. The RPD values were within the QC criterion of ≤25% for all parameters.

MATRIX SPIKE ACCURACY:

The analyses of the SEM extracts included the preparation of matrix spike samples in duplicate. An aliquot of the SEM extract was spiked with all SEM metals and analyzed with the batch. The matrix spike recoveries were within the QC acceptance criterion.

REFERENCES:

Allen, H.E., F. Gongmin, W. Boothman, D. DiToro, and J. Mahoney. 1991. Determination of Acid Volatile Sulfides (AVS) and Simultaneously Extracted Metals in Sediment. Draft Analytical Method for Determination of Acid Volatile Sulfide in Sediment. USEPA Office of Science and Technology, Washington, DC. April, 1991.

Ankley, G. T., Di Toro, D. M., Hansen, D. J., and Berry W. J. 1996. Technical basis and proposal for deriving sediment quality criteria for metals. Environmental Toxicology and Chemistry. 15:2056-2066.

Berry, W. J., Hansen, D. J., Mahony, J. D., Robson, D. L., Di Toro, D. M., Shipley, B. P., Corbin, J. M. and Boothman, W. S. 1996. Predicting the toxicity of metals-spiked laboratory sediments using acid-volatile sulfide and interstitial water normalization. Environmental Toxicology and Chemistry. 15:2067-2079.

Berry, W. J., Cantwell, M., Edwards, P., Serbst, J. R. and Hansen, D. J. 1999. Predicting the toxicity of sediments spiked with silver. Environmental Toxicology and Chemistry. 18:40-48.

Morse, J. W., Millero, F. J., Cornwell, J. C. and Rickard, D. 1987. The chemistry of the hydrogen sulfide and iron sulfide systems in natural waters. Earth Science Review. 24:1-42.

United States Environmental Protection Agency. 2000. Equilibrium partitioning sediment guidelines (ESGs) for the protection of benthic organisms: metal mixtures (cadmium, copper, lead, nickel, silver and zinc). EPA 822-R-00-005. Office of Science and Technology, Office of Research and Development. Washington, DC.

cc: Project Manager/Central File
Login File 2981

SAMPLE LOGIN
(SOP# MSL-A-001)

Project Manager: Brandenberger
Date Received: 04/14/09
Batch: 6

PROJECT: Washington Closure Hanford

SPONSOR CODE	Site Description	BATTELLE CODE	MATRIX	STORAGE LOCATION	PARAMETERS REQUESTED	COLLECTION DATE	INITIALS
J18ML8	na	2981-58	Other Solid	Refridgerator in lab 114	AVS-SEM-Sulfides; AVS-SEM-Metals (Cd,Cu,Pb,Ni,Zn)	03/30/09	MLFM
J18MJ7	na	2981-59	Other Solid	Refridgerator in lab 114	AVS-SEM-Sulfides; AVS-SEM-Metals (Cd,Cu,Pb,Ni,Zn)	03/27/09	MLFM
J18M08	na	2981-60	Other Solid	Refridgerator in lab 114	AVS-SEM-Sulfides; AVS-SEM-Metals (Cd,Cu,Pb,Ni,Zn)	03/26/09	MLFM
J18M31	na	2981-61	Other Solid	Refridgerator in lab 114	AVS-SEM-Sulfides; AVS-SEM-Metals (Cd,Cu,Pb,Ni,Zn)	03/26/09	MLFM
J18KP6	na	2981-62	Other Solid	Refridgerator in lab 114	AVS-SEM-Sulfides; AVS-SEM-Metals (Cd,Cu,Pb,Ni,Zn)	03/25/09	MLFM
J18KX1	na	2981-63	Other Solid	Refridgerator in lab 114	AVS-SEM-Sulfides; AVS-SEM-Metals (Cd,Cu,Pb,Ni,Zn)	03/25/09	MLFM
J18MN1	na	2981-64	Other Solid	Refridgerator in lab 114	AVS-SEM-Sulfides; AVS-SEM-Metals (Cd,Cu,Pb,Ni,Zn)	03/30/09	MLFM
J18MR8	na	2981-65	Other Solid	Refridgerator in lab 114	AVS-SEM-Sulfides; AVS-SEM-Metals (Cd,Cu,Pb,Ni,Zn)	04/02/09	MLFM
J18MH4	na	2981-66	Other Solid	Refridgerator in lab 114	AVS-SEM-Sulfides; AVS-SEM-Metals (Cd,Cu,Pb,Ni,Zn)	03/27/09	MLFM
J18MV1	na	2981-67	Other Solid	Refridgerator in lab 114	AVS-SEM-Sulfides; AVS-SEM-Metals (Cd,Cu,Pb,Ni,Zn)	04/02/09	MLFM
J18MP4	na	2981-68	Other Solid	Refridgerator in lab 114	AVS-SEM-Sulfides; AVS-SEM-Metals (Cd,Cu,Pb,Ni,Zn)	04/07/09	MLFM
J17XN2	na	2981-69	Other Solid	Refridgerator in lab 114	AVS-SEM-Sulfides; AVS-SEM-Metals (Cd,Cu,Pb,Ni,Zn)	03/05/09	MLFM
J18KN2	na	2981-70	Other Solid	Refridgerator in lab 114	AVS-SEM-Sulfides; AVS-SEM-Metals (Cd,Cu,Pb,Ni,Zn)	03/25/09	MLFM
J18KR9	na	2981-71	Other Solid	Refridgerator in lab 114	AVS-SEM-Sulfides; AVS-SEM-Metals (Cd,Cu,Pb,Ni,Zn)	03/26/09	MLFM
J18KY5	na	2981-72	Other Solid	Refridgerator in lab 114	AVS-SEM-Sulfides; AVS-SEM-Metals (Cd,Cu,Pb,Ni,Zn)	03/24/09	MLFM

LOG-IN CHECKLIST

Reference SOP# MSL-A-001

Central File #: 2981 Sample No(s): 58-72 Project Manager: Brandenberger

TO BE COMPLETED BY PROJECT MANAGER (prior to arrival when possible)

Matrix: _____ WP# _____

Yes	No	
		Navy-type Project (requires high-level sample tracking procedures)
		Filter Samples: *Amount:* Entire sample Half of sample
		Freeze dry sample(s) - samples will be weighed and placed in ultralow temp freezer (Login Lab)
		Special instructions:

Sample Preservation Instructions:

Date To Archive: _____ Date To Dispose: _____

TO BE COMPLETED UPON SAMPLE ARRIVAL/LOG-IN

Yes	No	N/A	Indicate in Appropriate Box
✓			Was a custody seal present?
✓			Was the custody seal intact?
✓			Was cooler(s) temperature(s) within acceptable range of 4±2°C or frozen? (if multiple coolers, note temp. of each) 5.5 °C ___ °C
		✓	Was Project Manager notified of any custody/login discrepancies (cooler temp, sponsor codes, etc)? Comment/Remedy:
✓			Were all chain of custody forms signed and dated?
	✓		Were samples filtered at MSL?

Sample condition(s): (Acceptable) Other (explain):

Container type: Teflon Poly (Glass) Cap. Vial Other:

Notes:

Completed By: [signature] Date/Time: 04/14/09 1335

SAMPLE PRESERVATION

- [x] Sample(s) were preserved at MSL
- [ ] Sample(s) were preserved prior to arrival at MSL (noted on CoC / Sample / per PM Instruction)
- [ ] Random pH checked for ~10% of samples (use dip paper) Sample IDs:
- [ ] Complete pH check required for project (use pH meter and record on pH Record form)

If preservation necessary, record Acid Lot#

Type:			Notes:
		0.2% HNO3	
		0.5% HCl (Hg samples)	
	✓	Refrigerate/Freeze	grids lab 114
		Other	

Completed By: [signature] Date/Time: 04/14/09 1400

Storage Shelf: grids, lab 114

Revsed 121608

Washington Closure Hanford	CHAIN OF CUSTODY/SAMPLE ANALYSIS REQUEST	RC-116-1821	Page 1 of 1

Collector: K. Royal	Company Contact: JOAN KESSNER	Telephone No.: 375-4688	Project Coordinator: KESSNER, JH
Price Code: 9K	Data Turnaround: 45 Days		
Project Designation: Columbia River Component of the RCBRA - Sediment	Sampling Location: 300DC3-1SD		SAF No.: RC-116
Ice Chest No.: WCH-08-001-2	Field Logbook No.: EL-1635/-1	COA: BESCRC6520	Method of Shipment: FED EX
Shipped To: Battelle Marine Sciences	Offsite Property No.: N/A		Bill of Lading/Air Bill No.: 7965133046 98

POSSIBLE SAMPLE HAZARDS/REMARKS

Special Handling and/or Storage

Preservation	Cool to 4C										
Type of Container	G										
No. of Container(s)	1										
Volume	125g										
SAMPLE ANALYSIS	See item (1) in Special Instructions.										

Sample No.	Matrix *	Sample Date	Sample Time										
J18ML8 2981.58	OTHER SOLID	3/30/09	1405	X									

CHAIN OF POSSESSION	Date/Time	Sign/Print Names: Received By/Stored In	Date/Time
Relinquished By/Removed From: Kim Royal	3/30/09 1425	Received By/Stored In: Ref. A	3/30/09 1425
Relinquished By/Removed From: Ref A	4/13/09 0800	Received By/Stored In: B Woodwind	4/13/09 0800
Relinquished By/Removed From: B Woodwind	4/13/09 1000	Received By/Stored In: Fed Ex	4/13/09 1000
Relinquished By/Removed From		Received By/Stored In	
Relinquished By/Removed From		Received By/Stored In	
Relinquished By/Removed From		Received By/Stored In	

SPECIAL INSTRUCTIONS

Contact Joan Kessner for Transfer of GEA to LVLI for particle size.

(1) AVS - SEM - SULFIDES; AVS - SEM - METALS {Cadmium, Copper, Lead, Nickel, Zinc}

Sampler unavailable to remove samples from controlled storage. Shipper removed samples from storage location taking custody

Matrix *

S=Soil
SE=Sediment
SO=Solid
SI=Sludge
W = Water
O=Oil
A=Air
DS=Drum Solids
DL=Drum Liquids
T=Tissue
WI=Wipe
L=Liquid
V=Vegetation
X=Other

LABORATORY SECTION	Received By: MSL	Title	Date/Time: 04/14/09 1330
FINAL SAMPLE DISPOSITION	Disposal Method	Disposed By	Date/Time

WCH-EE-011

Washington Closure Hanford	CHAIN OF CUSTODY/SAMPLE ANALYSIS REQUEST	RC-116-1818	Page 1 of 1

Collector: B Woodward	Company Contact: JOAN KESSNER	Telephone No.: 375-4688	Project Coordinator: KESSNER, JH
Price Code: 9K	Data Turnaround: 45 Days		
Project Designation: Columbia River Component of the RCBRA - Sediment	Sampling Location: RKC2-1SD		SAF No.: RC-116
Ice Chest No.: WCH-08-001-2	Field Logbook No.: EL-1635/-1	COA: BESCRC6520	Method of Shipment: FED EX
Shipped To: Battelle Marine Sciences	Offsite Property No.: N/A		Bill of Lading/Air Bill No.: 796513304698

POSSIBLE SAMPLE HAZARDS/REMARKS

Special Handling and/or Storage

Preservation	Cool to 4C										
Type of Container	G										
No. of Container(s)	1										
Volume	125g										
SAMPLE ANALYSIS	See item (1) in Special Instructions.										

Sample No.	Matrix *	Sample Date	Sample Time										
J18MJ7 2981.59	OTHER SOLID	3/27/09	0915	X									

CHAIN OF POSSESSION	Date/Time	Sign/Print Names: Received By/Stored In	Date/Time
Relinquished By/Removed From: B Woodward	3/27/09 0930	Ref C	3/27/09 0930
Relinquished By/Removed From: Ref. C	4/13/09 0800	Received By/Stored In: Kim Royal Kim Royal	4/13/09 0800
Relinquished By/Removed From: Kim Royal	4/13/09 1000	Received By/Stored In: Fed Ex	4/13/09 1000
Relinquished By/Removed From	Date/Time	Received By/Stored In	Date/Time
Relinquished By/Removed From	Date/Time	Received By/Stored In	Date/Time
Relinquished By/Removed From	Date/Time	Received By/Stored In	Date/Time

SPECIAL INSTRUCTIONS

(1) AVS - SEM - SULFIDES; AVS - SEM - METALS {Cadmium, Copper, Lead, Nickel, Zinc}

Sampler unavailable to remove samples from controlled storage. Shipper removed samples from storage location taking custody of samples for shipment to lab.

Matrix *

S=Soil
SE=Sediment
SO=Solid
Sl=Sludge
W = Water
O=Oil
A=Air
DS=Drum Solids
DL=Drum Liquids
T=Tissue
WI=Wipe
L=Liquid
V=Vegetation
X=Other

LABORATORY SECTION	Received By: [signature] 04/14/09 1330	Title: MSC	Date/Time
FINAL SAMPLE DISPOSITION	Disposal Method	Disposed By	Date/Time

WCH-EE-011

Washington Closure Hanford	CHAIN OF CUSTODY/SAMPLE ANALYSIS REQUEST	RC-116-1689	Page 1 of 1

Collector B. Woodward	Company Contact: JOAN KESSNER	Telephone No.: 375-4688	Project Coordinator: KESSNER, JH
Price Code: 9K	Data Turnaround: 45 Days		
Project Designation: Columbia River Component of the RCBRA - Sediment	Sampling Location: FIC1-1SD		SAF No.: RC-116
Ice Chest No. WCH-08-001-2	Field Logbook No.: EL-1635/-1	COA: BESCRC6520	Method of Shipment: FED EX
Shipped To: Battelle Marine Sciences	Offsite Property No.: N/A		Bill of Lading/Air Bill No. 796513304698

POSSIBLE SAMPLE HAZARDS/REMARKS

Special Handling and/or Storage

Preservation	Cool to 4C										
Type of Container	G										
No. of Container(s)	1										
Volume	125g										
SAMPLE ANALYSIS	See item (1) in Special Instructions.										

Sample No.	Matrix *	Sample Date	Sample Time										
J18M08 2981.62	OTHER SOLID	3/26/09	0940	X									

CHAIN OF POSSESSION	Date/Time	Sign/Print Names: Received By/Stored In	Date/Time
Relinquished By/Removed From: B. Woodward	3/26/09 1100	Received By/Stored In: Ref A	3/26/09 1100
Relinquished By/Removed From: Ref A	4/13/09 0800	Received By/Stored In: B. Woodward	4/13/09 0800
Relinquished By/Removed From: B. Woodward	4/13/09 1000	Received By/Stored In: FedEx	4/13/09 1000
Relinquished By/Removed From		Received By/Stored In	
Relinquished By/Removed From		Received By/Stored In	
Relinquished By/Removed From		Received By/Stored In	

SPECIAL INSTRUCTIONS

(1) AVS - SEM - SULFIDES; AVS - SEM - METALS (Cadmium, Copper, Lead, Nickel, Zinc)

Sampler unavailable to remove samples from controlled storage. Shipper removed samples from storage location taking custod of samples for shipment to lab

Matrix *

S=Soil
SE=Sediment
SO=Solid
Sl=Sludge
W = Water
O=Oil
A=Air
DS=Drum Solids
DL=Drum Liquids
T=Tissue
Wi=Wipe
L=Liquid
V=Vegetation
X=Other

LABORATORY SECTION	Received By	Title	Date/Time
	[signature]	MSL	04/14/09 1330

FINAL SAMPLE DISPOSITION	Disposal Method	Disposed By	Date/Time

WCH-EE-011

Washington Closure Hanford	CHAIN OF CUSTODY/SAMPLE ANALYSIS REQUEST	RC-116-1712	Page 1 of 1

Collector: B Woodward	Company Contact: JOAN KESSNER	Telephone No.: 375-4688	Project Coordinator: KESSNER, JH
Price Code: 9K	Data Turnaround: 45 Days		
Project Designation: Columbia River Component of the RCBRA - Sediment	Sampling Location: RBC-1SD		SAF No.: RC-116
Ice Chest No.: WCH-09-001-2	Field Logbook No.: EL-1635/-1	COA: BESCRC6520	Method of Shipment: FED EX
Shipped To: Battelle Marine Sciences	Offsite Property No.: N/A		Bill of Lading/Air Bill No.: 796513304698

POSSIBLE SAMPLE HAZARDS/REMARKS

Special Handling and/or Storage

Preservation	Cool to 4C										
Type of Container	G										
No. of Container(s)	1										
Volume	125g										
SAMPLE ANALYSIS	See item (1) in Special Instructions.										

Sample No.	Matrix *	Sample Date	Sample Time										
J18M31 2981.61	OTHER SOLID	3/26/09	1430	X									

CHAIN OF POSSESSION	Date/Time	Sign/Print Names: Received By/Stored In	Date/Time
Relinquished By/Removed From: B Woodward	3/26/09 1500	Received By/Stored In: Ref B	3/26/09 1500
Relinquished By/Removed From: Ref B	4/13/09 0800	Received By/Stored In: B Woodward	4/13/09 0800
Relinquished By/Removed From: B Woodward	4/13/09 1000	Received By/Stored In: FedEx	4/13/09 1000
Relinquished By/Removed From:		Received By/Stored In:	
Relinquished By/Removed From:		Received By/Stored In:	
Relinquished By/Removed From:		Received By/Stored In:	

SPECIAL INSTRUCTIONS

(1) AVS - SEM - SULFIDES; AVS - SEM - METALS {Cadmium, Copper, Lead, Nickel, Zinc}

of samples for shipment to lab.
Sampler unavailable to remove samples from controlled storage. Shipper removed samples from storage location taking custod

Matrix *
S=Soil
SB=Sediment
SO=Solid
Sl=Sludge
W = Water
O=Oil
A=Air
DS=Drum Solids
DL=Drum Liquids
T=Tissue
WI=Wipe
L=Liquid
V=Vegetation
X=Other

LABORATORY SECTION: Received By: [signature] Title: MSL Date/Time: 04/14/09 1330

FINAL SAMPLE DISPOSITION: Disposal Method | Disposed By | Date/Time

WCH-EE-011

Washington Closure Hanford	CHAIN OF CUSTODY/SAMPLE ANALYSIS REQUEST	RC-116-1512	Page 1 of 1

Collector: B Mayhew	Company Contact: JOAN KESSNER	Telephone No.: 375-4688	Project Coordinator: KESSNER, JH
Price Code: 9K	Data Turnaround: 45 Days		
Project Designation: Columbia River Component of the RCBRA - Sediment	Sampling Location: 300DC6-1SD		SAF No.: RC-116
Ice Chest No.: WCH-08-001-2	Field Logbook No.: EL-1635/-1	COA: BESCRC6520	Method of Shipment: FED EX
Shipped To: Battelle Marine Sciences	Offsite Property No.: N/A		Bill of Lading/Air Bill No.: 796513304698

POSSIBLE SAMPLE HAZARDS/REMARKS

Special Handling and/or Storage

Preservation	Cool to 4C										
Type of Container	G										
No. of Container(s)	1										
Volume	125g										
SAMPLE ANALYSIS	See item (1) in Special Instructions.										

Sample No.	Matrix *	Sample Date	Sample Time										
J18KP6 2981.62	OTHER SOLID	3/25/09	1000	X									

CHAIN OF POSSESSION	Sign/Print Names		
Relinquished By/Removed From	Date/Time	Received By/Stored In	Date/Time
B Mayhew	3/25/09 1030	Ref A	3/25/09 1030
Ref A	4/13/09 0800	B Woodward	4/13/09 0800
B Woodward	4/13/09 1000	Fed Ex	4/13/09 1000

SPECIAL INSTRUCTIONS

(1) AVS - SEM - SULFIDES; AVS - SEM - METALS {Cadmium, Copper, Lead, Nickel, Zinc}

Sampler unavailable to remove samples from controlled storage. Shipper removed samples from storage location taking custody of samples for shipment to lab.

Matrix *

S=Soil
SE=Sediment
SO=Solid
SI=Sludge
W = Water
O=Oil
A=Air
DS=Drum Solids
DL=Drum Liquids
T=Tissue
WI=Wipe
L=Liquid
V=Vegetation
X=Other

LABORATORY SECTION	Received By	Title	Date/Time
	MSL	04/14/09	1330

FINAL SAMPLE DISPOSITION	Disposal Method	Disposed By	Date/Time

WCH-EE-011

Washington Closure Hanford	CHAIN OF CUSTODY/SAMPLE ANALYSIS REQUEST	RC-116-1549	Page 1 of 1

Collector: B Mayhew	Company Contact: JOAN KESSNER	Telephone No.: 375-4688	Project Coordinator: KESSNER, JH
Price Code: 9K	Data Turnaround: 45 Days		
Project Designation: Columbia River Component of the RCBRA - Sediment	Sampling Location: YRC2-1SD		SAF No.: RC-116
Ice Chest No.: WLH-08-001-2	Field Logbook No.: EL-1635/-1	COA: BESCRC6520	Method of Shipment: FED EX
Shipped To: Battelle Marine Sciences	Offsite Property No.: N/A		Bill of Lading/Air Bill No.: 796513304698

POSSIBLE SAMPLE HAZARDS/REMARKS

Special Handling and/or Storage

Preservation	Cool to 4C											
Type of Container	G											
No. of Container(s)	1											
Volume	125g											
SAMPLE ANALYSIS	See item (1) in Special Instructions.											

Sample No.	Matrix *	Sample Date	Sample Time										
J18KX1 2981.63	OTHER SOLID	3/25/07	1345	X									

CHAIN OF POSSESSION — Sign/Print Names

Relinquished By/Removed From	Date/Time	Received By/Stored In	Date/Time
B Mayhew B Mayhew	3/25/09 1500	Ref B	3/25/09 1500
Ref B 4/13/09	0800	B Woodward	4/13/09 0800
B Woodward 4/13/09	1000	FedEx 4/13/09	1000
Relinquished By/Removed From	Date/Time	Received By/Stored In	Date/Time
Relinquished By/Removed From	Date/Time	Received By/Stored In	Date/Time
Relinquished By/Removed From	Date/Time	Received By/Stored In	Date/Time

SPECIAL INSTRUCTIONS

(1) AVS - SEM - SULFIDES; AVS - SEM - METALS {Cadmium, Copper, Lead, Nickel, Zinc}

Sampler unavailable to remove samples from controlled storage. Shipper removed samples from storage location taking custody of samples for shipment to lab.

Matrix *

S=Soil
SE=Sediment
SO=Solid
SI=Sludge
W = Water
O=Oil
A=Air
DS=Drum Solids
DL=Drum Liquids
T=Tissue
WI=Wipe
L=Liquid
V=Vegetation
X=Other

LABORATORY SECTION	Received By: [signature]	Title: MSL	Date/Time: 04/14/09 1330
FINAL SAMPLE DISPOSITION	Disposal Method	Disposed By	Date/Time

WCH-EE-011

Washington Closure Hanford	CHAIN OF CUSTODY/SAMPLE ANALYSIS REQUEST	RC-116-1844	Page 1 of 1

Collector: E.Seider	Company Contact: JOAN KESSNER	Telephone No.: 375-4688	Project Coordinator: KESSNER, JH
Price Code: 9K	Data Turnaround: 45 Days		
Project Designation: Columbia River Component of the RCBRA - Sediment	Sampling Location: 300DC2-1SD		SAF No.: RC-116
Ice Chest No.: WXH-08-001-2	Field Logbook No.: EL-1635/-1	COA: BESCRC6520	Method of Shipment: FED EX
Shipped To: Battelle Marine Sciences	Offsite Property No.: N/A		Bill of Lading/Air Bill No.: 7965133046 98

POSSIBLE SAMPLE HAZARDS/REMARKS		
Special Handling and/or Storage	Preservation	Cool to 4C
	Type of Container	G
	No. of Container(s)	1
	Volume	125g
SAMPLE ANALYSIS		See item (1) in Special Instructions.

Sample No.	Matrix *	Sample Date	Sample Time	
J18MN1 2891.64	OTHER SOLID	3/30/09	1450	X

CHAIN OF POSSESSION	Date/Time	Sign/Print Names: Received By/Stored In	Date/Time
Relinquished By/Removed From: Emily Seider	3/30/09 1530	Received By/Stored In: Ref. A	3/30/09 1530
Relinquished By/Removed From: Ref A	4/13/09 0800	Received By/Stored In: B Woodward	4/13/09 0800
Relinquished By/Removed From: B Woodward	4/13/09 1000	Received By/Stored In: Fed Ex	4/13/09 1000
Relinquished By/Removed From:		Received By/Stored In:	
Relinquished By/Removed From:		Received By/Stored In:	
Relinquished By/Removed From:		Received By/Stored In:	

SPECIAL INSTRUCTIONS

Contact Joan Kessner for Transfer of GEA to LVLI for particle size.

(1) AVS - SEM - SULFIDES; AVS - SEM - METALS {Cadmium, Copper, Lead, Nickel, Zinc}

Sampler unavailable to remove samples from controlled storage. Shipper removed samples from storage location taking custody of samples for shipment to lab

Matrix *
S=Soil
SE=Sediment
SO=Solid
SL=Sludge
W = Water
O=Oil
A=Air
DS=Drum Solids
DL=Drum Liquids
T=Tissue
WI=Wipe
L=Liquid
V=Vegetation
X=Other

LABORATORY SECTION	Received By	Title	Date/Time
	[signature]		04/14/09 1330

FINAL SAMPLE DISPOSITION	Disposal Method	Disposed By	Date/Time

WCH-EE-011

Washington Closure Hanford	CHAIN OF CUSTODY/SAMPLE ANALYSIS REQUEST	RC-116-1870	Page 1 of 1

Collector: Brett Mayhew	Company Contact: JOAN KESSNER	Telephone No.: 375-4688	Project Coordinator: KESSNER, JH
Price Code: 9K	Data Turnaround: 45 Days		
Project Designation: Columbia River Component of the RCBRA - Sediment	Sampling Location: RNC-1SD		SAF No.: RC-116
Ice Chest No.: WCH-08-001-2	Field Logbook No.: EL-1635/-1	COA: BESCRC6520	Method of Shipment: GROUND TRANSPORT
Shipped To: Battelle Marine Sciences	Offsite Property No.: N/A		Bill of Lading/Air Bill No.: N/A 7965 133 04698

POSSIBLE SAMPLE HAZARDS/REMARKS

Special Handling and/or Storage

Preservation	Cool to 4C										
Type of Container	G										
No. of Container(s)	1										
Volume	125g										
SAMPLE ANALYSIS	See item (1) in Special Instructions.										

Sample No.	Matrix *	Sample Date	Sample Time									
J18MR8 ~~289~~ 2981.65	OTHER SOLID	4/2/09	1548	X								

CHAIN OF POSSESSION	Date/Time	Sign/Print Names: Received By/Stored In	Date/Time
Relinquished By/Removed From: BMayhew BMayhew	4/2/09 1630	Ref A	4/2/09 1630
Relinquished By/Removed From: Ref. A	4/13/09 0800	Received By/Stored In: Kim Royal Kim Royal	4/13/09 0800
Relinquished By/Removed From: Kim Royal	4/13/09 1000	Received By/Stored In: Fed Ex	4/13/09 1000
Relinquished By/Removed From	Date/Time	Received By/Stored In	Date/Time
Relinquished By/Removed From	Date/Time	Received By/Stored In	Date/Time
Relinquished By/Removed From	Date/Time	Received By/Stored In	Date/Time

SPECIAL INSTRUCTIONS

(1) AVS - SEM - SULFIDES; AVS - SEM - METALS {Cadmium, Copper, Lead, Nickel, Zinc}

Sampler unavailable to remove samples from controlled storage. Shipper removed samples from storage location taking custody of samples for shipment to lab.

Matrix *
S=Soil
SE=Sediment
SO=Solid
SI=Sludge
W = Water
O=Oil
A=Air
DS=Drum Solids
DL=Drum Liquids
T=Tissue
WI=Wipe
L=Liquid
V=Vegetation
X=Other

LABORATORY SECTION	Received By	Title	Date/Time
	[illegible]	MSL	04/14/09 1330

FINAL SAMPLE DISPOSITION	Disposal Method	Disposed By	Date/Time

WCH-EE-011

Washington Closure Hanford	CHAIN OF CUSTODY/SAMPLE ANALYSIS REQUEST		RC-116-1805	Page 1 of 1
Collector: BWoodward	Company Contact: JOAN KESSNER	Telephone No.: 375-4688	Project Coordinator: KESSNER, JH	Price Code: 9K; Data Turnaround: 45 Days
Project Designation: Columbia River Component of the RCBRA - Sediment	Sampling Location: RKC1-1SD		SAF No.: RC-116	
Ice Chest No.: WCH-08-001-2	Field Logbook No.: EL-1635/-1	COA: BESCRC6520	Method of Shipment: FED EX	
Shipped To: Battelle Marine Sciences	Offsite Property No.: N/A		Bill of Lading/Air Bill No.: 796513304698	

POSSIBLE SAMPLE HAZARDS/REMARKS

Special Handling and/or Storage

Preservation	Cool to 4C
Type of Container	G
No. of Container(s)	1
Volume	125g

SAMPLE ANALYSIS

See item (1) in Special Instructions.

Sample No.	Matrix *	Sample Date	Sample Time	
J18MH4 2981.66	OTHER SOLID	3/27/09	0740	X

CHAIN OF POSSESSION — **Sign/Print Names**

Relinquished By/Removed From	Date/Time	Received By/Stored In	Date/Time
BWoodward	3/27/09 0900	Ret A	3/27/09 0900
~~Ret A~~	~~3/27/09 0901~~	~~D Heidelberg~~	~~3/27/09 0901~~ DH 3/27/09
~~D. Heidelberg~~	~~3/27/09 1000~~	~~Fedex~~	3/27/09 1000 PH 3/27/09
Ret A	4/13/09 0800	BWoodward	4/13/09 0800
BWoodward	4/13/09 1000	FedEx	4/13/09 1000

SPECIAL INSTRUCTIONS

(1) AVS - SEM - SULFIDES; AVS - SEM - METALS {Cadmium, Copper, Lead, Nickel, Zinc}

Sampler unavailable to remove samples from controlled storage. Shipper removed samples from storage location taking custody of samples for shipment to lab

Matrix *

S=Soil
SE=Sediment
SO=Solid
SI=Sludge
W = Water
O=Oil
A=Air
DS=Drum Solids
DL=Drum Liquids
T=Tissue
WI=Wipe
L=Liquid
V=Vegetation
X=Other

LABORATORY SECTION	Received By	Title	Date/Time
	[signature] MSL	04/14/09 1330	

FINAL SAMPLE DISPOSITION	Disposal Method	Disposed By	Date/Time

WCH-EE-011

Washington Closure Hanford	CHAIN OF CUSTODY/SAMPLE ANALYSIS REQUEST	RC-116-1883	Page 1 of 1

Collector: B Mayhew	Company Contact: JOAN KESSNER	Telephone No.: 375-4688	Project Coordinator: KESSNER, JH
Price Code: 9K	Data Turnaround: 45 Days		
Project Designation: Columbia River Component of the RCBRA - Sediment	Sampling Location: RDC-1SD		SAF No.: RC-116
Ice Chest No.: WCH-08-001-2	Field Logbook No.: EL-1635/-1	COA: BESCRC6520	Method of Shipment: FED EX
Shipped To: Battelle Marine Sciences	Offsite Property No.: N/A		Bill of Lading/Air Bill No.: 7965133046 98

POSSIBLE SAMPLE HAZARDS/REMARKS

Special Handling and/or Storage

Preservation	Cool to 4C										
Type of Container	G										
No. of Container(s)	1										
Volume	125g										
SAMPLE ANALYSIS	See item (1) in Special Instructions.										

Sample No.	Matrix *	Sample Date	Sample Time										
J18MV1 2981.67	OTHER SOLID	4/2/09	1723	X									

CHAIN OF POSSESSION	Date/Time	Sign/Print Names	Date/Time
Relinquished By/Removed From: B Mayhew B Mayhew	4/2/09 1740	Received By/Stored In: Ref A Ref A	4/2/09 1740
Relinquished By/Removed From: Ref A 4/13/09	0800	Received By/Stored In: B Woodward	4/13/09 0800
Relinquished By/Removed From: B Woodward	4/13/09 1000	Received By/Stored In: Fed Ex	4/13/09 1000
Relinquished By/Removed From		Received By/Stored In	
Relinquished By/Removed From		Received By/Stored In	
Relinquished By/Removed From		Received By/Stored In	

SPECIAL INSTRUCTIONS

Contact Joan Kessner for Transfer of GEA to LVLI for particle size.

(1) AVS - SEM - SULFIDES; AVS - SEM - METALS {Cadmium, Copper, Lead, Nickel, Zinc}

Sampler unavailable to remove samples from controlled storage. Shipper removed samples from storage location taking custody of samples for shipment to lab.

Matrix *

S=Soil
SE=Sediment
SO=Solid
Sl=Sludge
W = Water
O=Oil
A=Air
DS=Drum Solids
DL=Drum Liquids
T=Tissue
Wi=Wipe
L=Liquid
V=Vegetation
X=Other

LABORATORY SECTION	Received By: [signature]	Title: MSL	Date/Time: 04/14/09 1330
FINAL SAMPLE DISPOSITION	Disposal Method	Disposed By	Date/Time

WCH-EE-011

Washington Closure Hanford	CHAIN OF CUSTODY/SAMPLE ANALYSIS REQUEST	RC-116-1857	Page 1 of 1

Collector: E. JEIDER	Company Contact: JOAN KESSNER	Telephone No.: 375-4688	Project Coordinator: KESSNER, JH	Price Code: 9K	Data Turnaround: 45 Days
Project Designation: Columbia River Component of the RCBRA - Sediment	Sampling Location: ~~300DC1-1SD~~ DH 4/6/09 FIC2-1SD		SAF No.: RC-116		
Ice Chest No.: WCH-08-001-2	Field Logbook No.: EL-1635/-1	COA: BESCRC6520	Method of Shipment: FED EX		
Shipped To: Battelle Marine Sciences	Offsite Property No.: N/A		Bill of Lading/Air Bill No.: 796513304698		

POSSIBLE SAMPLE HAZARDS/REMARKS

Special Handling and/or Storage

Preservation	Cool to 4C										
Type of Container	G										
No. of Container(s)	1										
Volume	125g										
SAMPLE ANALYSIS	See item (1) in Special Instructions.										

Sample No.	Matrix *	Sample Date	Sample Time										
J18MP4 2981.68	OTHER SOLID	4/7/09	0820	X									

CHAIN OF POSSESSION	Sign/Print Names		
Relinquished By/Removed From	Date/Time	Received By/Stored In	Date/Time
E. SEIDER	4.7.09 0900	REF. A	4.7.09 0900
Ref A	4/13/09 0800	Bloodwend	4/13/09 0800
Bloodwend	4/13/09 1000	FedEx	4/13/09 1000

SPECIAL INSTRUCTIONS

Contact Joan Kessner for Transfer of GEA to LVLI for particle size.

(1) AVS - SEM - SULFIDES; AVS - SEM - METALS (Cadmium, Copper, Lead, Nickel, Zinc)

Sampler unavailable to remove samples from controlled storage. Shipper removed samples from storage location taking custod

Matrix *
S=Soil
SE=Sediment
SO=Solid
SI=Sludge
W = Water
O=Oil
A=Air
DS=Drum Solids
DL=Drum Liquids
T=Tissue
WI=Wipe
L=Liquid
V=Vegetation
X=Other

LABORATORY SECTION	Received By: [signature]	Title: MSL	Date/Time: 04/14/09 1330
FINAL SAMPLE DISPOSITION	Disposal Method	Disposed By	Date/Time

WCH-EE-011

Washington Closure Hanford	CHAIN OF CUSTODY/SAMPLE ANALYSIS REQUEST	RC-116-420	Page 1 of 1

Collector: L Stratton	Company Contact: JOAN KESSNER	Telephone No.: 375-4688	Project Coordinator: WEISS, RL
Project Designation: Columbia River Component of the RCBRA - Sediment	Sampling Location: SI-8 SD		SAF No.: RC-116
Ice Chest No.: WCH-08-001-2	Field Logbook No.: EL-1631/-1	COA: BESCRC6520	Method of Shipment: FED EX
Shipped To: Battelle Marine Sciences	Offsite Property No.: N/A		Bill of Lading/Air Bill No.: 796513304698

Price Code: 9K

Data Turnaround: 45 Days

POSSIBLE SAMPLE HAZARDS/REMARKS

Special Handling and/or Storage

Preservation	Cool to 4C
Type of Container	G
No. of Container(s)	1
Volume	125g

SAMPLE ANALYSIS

See item (1) in Special Instructions.

Sample No.	Matrix *	Sample Date	Sample Time	
J17XN2 2981.69	OTHER SOLID	3/5/09	1130	X

CHAIN OF POSSESSION — **Sign/Print Names**

Relinquished By/Removed From	Date/Time	Received By/Stored In	Date/Time
L. Stratton [signature]	3-5-09/1345	Ref B	3-5-09/1345
Ref B 4/13/09	0800	BWoodwind 4/13/09	0800
BWoodwind 4/13/09	1000	Fed Ex 4/13/09	1000

SPECIAL INSTRUCTIONS

(1) AVS - SEM - SULFIDES; AVS - SEM - METALS {Cadmium, Copper, Lead, Nickel, Zinc}

of samples for shipment to lab.
Sampler unavailable to remove samples from controlled storage. Shipper removed samples from storage location taking custod of samples for shipment to lab.

Matrix *
S=Soil
SE=Sediment
SO=Solid
SI=Sludge
W = Water
O=Oil
A=Air
DS=Drum Solids
DL=Drum Liquids
T=Tissue
WI=Wipe
L=Liquid
V=Vegetation
X=Other

LABORATORY SECTION	Received By: [signature] McGahan MSL 04/14/09 1330	Title	Date/Time
FINAL SAMPLE DISPOSITION	Disposal Method	Disposed By	Date/Time

WCH-EE-011

Washington Closure Hanford	CHAIN OF CUSTODY/SAMPLE ANALYSIS REQUEST	RC-116-1496	Page 1 of 1

Collector: B Mayhew	Company Contact: JOAN KESSNER	Telephone No.: 375-4688	Project Coordinator: KESSNER, JH
Price Code: 9K	Data Turnaround: 45 Days		
Project Designation: Columbia River Component of the RCBRA - Sediment	Sampling Location: 300DC5-1SD		SAF No.: RC-116
Ice Chest No.: WCH-08-001-2	Field Logbook No.: EL-1635/-1	COA: BESCRC6520	Method of Shipment: FED EX
Shipped To: Battelle Marine Sciences	Offsite Property No.: N/A		Bill of Lading/Air Bill No.: 7965133046 98

POSSIBLE SAMPLE HAZARDS/REMARKS

Special Handling and/or Storage

Preservation	Cool to 4C										
Type of Container	G										
No. of Container(s)	1										
Volume	125g										
SAMPLE ANALYSIS	See item (1) in Special Instructions.										

Sample No.	Matrix *	Sample Date	Sample Time										
J18KN2 2981.70	OTHER SOLID	3/25/09	815	X									

CHAIN OF POSSESSION	Date/Time	Sign/Print Names: Received By/Stored In	Date/Time
Relinquished By/Removed From: B Mayhew	3/25/09 830	Received By/Stored In: Ref A	3/25/09 830
Relinquished By/Removed From: Ref A 4/13/09	0800	Received By/Stored In: B Woodward 4/13/09	0800
Relinquished By/Removed From: B Woodward 4/13/09	1000	Received By/Stored In: FedEx 4/13/09	1000
Relinquished By/Removed From	Date/Time	Received By/Stored In	Date/Time
Relinquished By/Removed From	Date/Time	Received By/Stored In	Date/Time
Relinquished By/Removed From	Date/Time	Received By/Stored In	Date/Time

SPECIAL INSTRUCTIONS

(1) AVS - SEM - SULFIDES; AVS - SEM - METALS {Cadmium, Copper, Lead, Nickel, Zinc}

Sampler unavailable to remove samples from controlled storage. Shipper removed samples from storage location taking custod

Matrix *

S=Soil
SE=Sediment
SO=Solid
SI=Sludge
W = Water
O=Oil
A=Air
DS=Drum Solids
DL=Drum Liquids
T=Tissue
WI=Wipe
L=Liquid
V=Vegetation
X=Other

LABORATORY SECTION	Received By:	Title	Date/Time
	04/14/09 1330 MSL		

FINAL SAMPLE DISPOSITION	Disposal Method	Disposed By	Date/Time

WCH-EE-011

Washington Closure Hanford	CHAIN OF CUSTODY/SAMPLE ANALYSIS REQUEST	RC-116-1525	Page 1 of 1

Collector: B. Woodward	Company Contact: JOAN KESSNER	Telephone No.: 375-4688	Project Coordinator: KESSNER, JH
Price Code: 9K	Data Turnaround: 45 Days		
Project Designation: Columbia River Component of the RCBRA - Sediment	Sampling Location: YRC1-1SD		SAF No.: RC-116
Ice Chest No.: WCH-DR-001-2	Field Logbook No.: EL-1635/-1	COA: BESCRC6520	Method of Shipment: FED EX
Shipped To: Battelle Marine Sciences	Offsite Property No.: N/A		Bill of Lading/Air Bill No.: 7965133046 9P

POSSIBLE SAMPLE HAZARDS/REMARKS

Special Handling and/or Storage

Preservation	Cool to 4C										
Type of Container	G										
No. of Container(s)	1										
Volume	125g										
SAMPLE ANALYSIS	See item (1) in Special Instructions.										

Sample No.	Matrix *	Sample Date	Sample Time										
J18KR9 2981.71	OTHER SOLID	3/26/09	0800	X									

CHAIN OF POSSESSION	Date/Time	Sign/Print Names: Received By/Stored In	Date/Time
Relinquished By/Removed From: B. Woodward	3/26/09 1000	Received By/Stored In: RetA	3/26/09 1000
Relinquished By/Removed From: RetA	4/13/09 0800	Received By/Stored In: B. Woodward	4/13/09 0800
Relinquished By/Removed From: B. Woodward	4/13/09 1000	Received By/Stored In: FedEx	4/13/09 1000
Relinquished By/Removed From:		Received By/Stored In:	
Relinquished By/Removed From:		Received By/Stored In:	
Relinquished By/Removed From:		Received By/Stored In:	

SPECIAL INSTRUCTIONS

(1) AVS - SEM - SULFIDES; AVS - SEM - METALS {Cadmium, Copper, Lead, Nickel, Zinc}

of samples for shipment to lab.
Sampler unavailable to remove samples from controlled storage. Shipper removed samples from storage location taking custod

Matrix *
S=Soil
SE=Sediment
SO=Solid
Sl=Sludge
W = Water
O=Oil
A=Air
DS=Drum Solids
DL=Drum Liquids
T=Tissue
WI=Wipe
L=Liquid
V=Vegetation
X=Other

LABORATORY SECTION	Received By: MSL	Title	Date/Time: 04/14/09 1330
FINAL SAMPLE DISPOSITION	Disposal Method	Disposed By	Date/Time

WCH-EE-011

Washington Closure Hanford	CHAIN OF CUSTODY/SAMPLE ANALYSIS REQUEST	RC-116-1553	Page 1 of 1

Collector: L. Stratton	Company Contact: JOAN KESSNER; Telephone No.: 375-4688	Project Coordinator: KESSNER, JH	Price Code: 9K; Data Turnaround: 45 Days
Project Designation: Columbia River Component of the RCBRA - Sediment	Sampling Location: ~~FIC1-1SD~~ 300DC4-1SD JC 3/24/09	SAF No.: RC-116	
Ice Chest No.: WCH-08-001-2	Field Logbook No.: EL-1635/-1; COA: BESCRC6520	Method of Shipment: FED EX	
Shipped To: Battelle Marine Sciences	Offsite Property No.: N/A	Bill of Lading/Air Bill No.: 796513304698	

POSSIBLE SAMPLE HAZARDS/REMARKS

Special Handling and/or Storage

Preservation	Cool to 4C
Type of Container	G
No. of Container(s)	1
Volume	125g

SAMPLE ANALYSIS

See item (1) in Special Instructions.

Sample No.	Matrix *	Sample Date	Sample Time	
J18KY5 2981.72	OTHER SOLID	3/24/09	1435	X

CHAIN OF POSSESSION — **Sign/Print Names**

Relinquished By/Removed From	Date/Time	Received By/Stored In	Date/Time
[signature]	3-24-09/1600	[signature]	3-24-09/1600
Ret A	4/13/09 0800	B Woodward	4/13/09 0800
B Woodward	4/13/09 1000	Fed Ex	4/13/09 1000
		[signature]	

SPECIAL INSTRUCTIONS

(1) AVS - SEM - SULFIDES; AVS - SEM - METALS {Cadmium, Copper, Lead, Nickel, Zinc}

of samples for shipment to lab.
Sampler unavailable to remove samples from controlled storage. Shipper removed samples from storage location taking custod

Matrix *
S=Soil
SE=Sediment
SO=Solid
SI=Sludge
W = Water
O=Oil
A=Air
DS=Drum Solids
DL=Drum Liquids
T=Tissue
WI=Wipe
L=Liquid
V=Vegetation
X=Other

LABORATORY SECTION	Received By: [signature] c Hahn MSL 04/14/09 1330	Title	Date/Time
FINAL SAMPLE DISPOSITION	Disposal Method	Disposed By	Date/Time

WCH-EE-011

BATTELLE MARINE SCIENCES LABORATORY
1529 W. Sequim Bay Road
Sequim, WA 98382
(360) 681-4564

Project: Washington Closures Hanford AVS/SEM SDG 041409
File #: 2981

SAMPLE ID SPONSOR	SAMPLE ID BATTELLE	% Dry Weight	Batch ID	AVS µmole/g	SEM Ag µg/L	SEM Ag µg/g	SEM Ag µmole/g	SEM Cd µg/L	SEM Cd µg/g	SEM Cd µmole/g	SEM Cu µg/L	SEM Cu µg/g	SEM Cu µmole/g
Detection Limit (mean used for AVS)				**0.0410**	**0.03**	**0.008**	**0.00007**	**0.02**	**0.005**	**0.00005**	**0.07**	**0.02**	**0.0003**
SEM Analytical Blanks													
ICB			--		0.03 U			0.02 U			0.07 U		
CCB1			--		0.03 U			0.02 U			0.07 U		
AVS/SEM Blanks													
BLANK 1	2981 Blank 041609	*73.8*	AVS5	0.0410 U	0.03 U	0.008 U	0.00004 U	0.02 U	0.005 U	0.00005 U	0.143	0.02 U	0.0003 U
Replicate Analysis Results													
J18ML8	2981-58 R1	73.0	AVS5	1.27	0.0477	0.0166	0.000154	0.612	0.213	0.00190	12.3	4.23	0.0665
J18ML8DUP	2981-58 R2	73.0	AVS5	1.21	0.0425	0.0141	0.000131	0.758	0.251	0.00224	15.1	4.97	0.0783
	RPD			**5%**			**16%**			**16%**			**16%**
J18KY5	2981-72 R1	72.6	AVS5	9.89	0.03 U	0.008 U	0.00007 U	2.18	1.97	0.0175	8.10	7.18	0.113
J18KY5DUP	2981-72 R2	72.6	AVS5	7.76	0.03 U	0.008 U	0.00007 U	2.87	1.83	0.0163	11.8	7.42	0.117
	RPD			**24%**			**NA**			**8%**			**3%**
Laboratory Control Sample Results													
LCS r1	LCS r3 041609	*73.8*	AVS5	0.468	9.59			9.30			10.8		
LCS r2	LCS r4 041709	*73.8*	AVS5	0.417	--			--			--		
BLANK 1		*73.8*	AVS5	0.0410 U	0.03 U	0.008 U	0.00007 U	0.02 U	0.005 U	0.00005 U	0.143	0.02 U	0.0003 U
	Spike Concentration			0.498	10			10			10		
	Percent Recovery			**94%**	**96%**			**93%**			**107%**		
				84%	--			--			--		
Standard Reference Material Data													
1640 Direct			--		7.18			23.3			89.7		
	Certified/Reference Value				7.62			22.79			85.2		
	Range				±0.25			±0.96			±1.2		
	Percent Recovery				**94%**			**102%**			**105%**		
SEM Matrix Spike Accuracy													
J18M08	2981-60	71.1	AVS5		0.230			0.533			42.5		
J18M08MS	2981-60MS	71.1	AVS5		9.89			10.8			242		
J18M08MSD	2981-60MSD	71.1	AVS5		9.94			10.8			247		
Amount Spiked					10			10			200		
% Recovery, MS					**97%**			**103%**			**100%**		
% Recovery, MSD					**97%**			**103%**			**102%**		
RPD					**1%**			**0%**			**2%**		

BATTELLE MARINE SCIENCES LABORATORY
1529 W. Sequim Bay Road
Sequim, WA 98382
(360) 681-4564

Project: Washington Closures Hanford AVS/SEM SDG 041409
File #: 2981

SAMPLE ID SPONSOR	SAMPLE ID BATTELLE	% Dry Weight	Batch ID	Ni µg/L	SEM Ni µg/g	SEM Ni µmole/g	SEM Pb µg/L	SEM Pb µg/g	SEM Pb µmole/g	SEM Zn µg/L	SEM Zn µg/g	SEM Zn µmole/g
Detection Limit (mean used for AVS)				**0.08**	**0.01**	**0.0002**	**0.02**	**0.005**	**0.00003**	**0.1**	**0.04**	**0.0005**
SEM Analytical Blanks												
ICB			--	0.08 U			0.02 U			0.1 U		
CCB1			--	0.08 U			0.02 U			0.1 U		
AVS/SEM Blanks												
BLANK 1	2981 Blank 041609	*73.8*	AVS5	0.08 U	0.01 U	0.0002 U	0.0372	0.005 U	0.00003 U	0.424	0.0508	0.000778
Replicate Analysis Results												
J18ML8	2981-58 R1	73.0	AVS5	6.54	2.281	0.0388	16.3	5.67	0.0274	81.5	28.3	0.433
J18ML8DUP	2981-58 R2	73.0	AVS5	6.94	2.303	0.0392	16.1	5.34	0.0258	84.9	28.0	0.429
	RPD					**1%**			**6%**			**1%**
J18KY5	2981-72 R1	72.6	AVS5	2.43	2.192	0.0373	17.2	15.4	0.0745	266	239	3.66
J18KY5DUP	2981-72 R2	72.6	AVS5	3.45	2.194	0.0374	25.3	16.1	0.0775	385	244	3.74
	RPD					**0%**			**4%**			**2%**
Laboratory Control Sample Results												
LCS r1	LCS r3 041609	*73.8*	AVS5	10.1			10.1			11.0		
LCS r2	LCS r4 041709	*73.8*	AVS5	--			--			--		
BLANK 1		*73.8*	AVS5	0.08 U	0.01 U	0.0002 U	0.0372	0.005 U	0.00003 U	0.424	0.0508	0.000778
	Spike Concentration			10			10			10		
	Percent Recovery			**101%**			**101%**			**106%**		
				--			**--**			**--**		
Standard Reference Material Data												
1640 Direct			--	28.7			29.4			56.5		
	Certified/Reference Value			27.4			27.89			53.2		
	Range			±0.8			±0.14			±1.1		
	Percent Recovery			**105%**			**105%**			**106%**		
SEM Matrix Spike Accuracy												
J18M08	2981-60	71.1	AVS5	14.7			35.7			71.2		
J18M08MS	2981-60MS	71.1	AVS5	25.1			238			273		
J18M08MSD	2981-60MSD	71.1	AVS5	25.1			238			272		
Amount Spiked				10			200			200		
% Recovery, MS				**104%**			**101%**			**101%**		
% Recovery, MSD				**104%**			**101%**			**100%**		
RPD				**0%**			**0%**			**0%**		

Kessner, Joan H

From: Brandenberger, Jill M [Jill.Brandenberger@pnl.gov]
Sent: Friday, June 12, 2009 5:13 PM
To: Weiss, Richard L; Kessner, Joan H
Subject: WCH AVS_SEM 041409 data
Attachments: Data Pkg_SDG041409_WCH_AVSSEM.pdf; Table_SDG041409_WCH_AVSSEM.xls; EDD_2981_041409WCHAVSSEM.xls; SDG041409.txt

Hi Rich,

We have completed the analysis of the AVS/SEM sediment samples received at MSL on April 14, 2009. Please see below for the various files. Thank you Carolynn for finalizing the work products.

We are finishing up the total inorganic arsenic data packages. They will be ready next week. We quantified both the total inorganic arsenic (As3+ and As5+), but also the three organic species arsenobetaine, monomethyl arsenic, and dimethyl arsenic. These were acquired at no extra charge since we were working on our laboratory methods. Would you like me to include those additional parameters with your data deliverable? Or will that just be too confusing? I know how these things are sometimes.

Have a great weekend!
Jill

Jill M. Brandenberger
Senior Research Scientist
Marine and Environmental Chemistry

Pacific Northwest National Laboratory
Marine Science Laboratory
1529 West Sequim Bay Road
Sequim, WA 98382 USA
Tel: 360-681-4564
Fax: 360-681-3699
Jill.Brandenberger@pnl.gov
www.pnl.gov

http://marine.pnl.gov/research_areas.asp

From: Suslick, Carolynn R
Sent: Friday, June 12, 2009 4:57 PM
To: Brandenberger, Jill M
Subject: WCH AVS_SEM 041409 data

Jill,

Here is the EDD formatted data, the mini-data packet(table, narr, COCs), and the Excel/Word files for the last batch of WCH AVS_SEM data.

~C

<<Data Pkg_SDG041409_WCH_AVSSEM.pdf>> <<Table_SDG041409_WCH_AVSSEM.xls>>
<<EDD_2981_041409WCHAVSSEM.xls>> <<SDG041409.txt>>