APPENDIX E-1: SURFACE SEDIMENT CHEMISTRY DATA VALIDATION REPORT

A. Analytical chemistry: sample groups HU85, HV37, HV42, HV00, HV38, HV58, HV72, HV76, HW06, HW16, HR49, HS56

LABORATORY DATA CONSULTANTS, INC.
7750 El Camino Real, Suite 2L Carlsbad, CA 92009 Phone: 760/634-0437 Fax: 760/634-0439

LDC #13234/13315/13381/13384/13395/13398/13403/13412/13419/
13521/13846

Windward Environmental, LLC
200 West Mercer Street, Suite 401
Seattle, WA 98119
ATTN: Ms. Marina Mitchell

October 20, 2005

SUBJECT: Lower Duwamish Waterway Group Sediment Sample Data Validation

Dear Ms. Mitchell,

Enclosed is our revised EPA Level II and Level IV data validation of analytical chemistry results generated in support of the Lower Duwamish Waterway Group project. The primary analyses were performed by Analytical Resources, Inc. Samples were analyzed for GC/MS Volatiles by EPA SW 846 Methods 8260B, GC/MS Semivolatiles by EPA SW 846 Methods 8270C and 8270C-SIM, GC/MS Butyltins by the Krone Method and EPA SW 846 Method 8270C-SIM, GC Chlorinated Pesticides by EPA SW 846 Method 8081A, GC Polychlorinated Biphenyls by EPA SW 846 Method 8082, GC Pentachlorophenol by EPA SW 846 Method 8041, Metals by EPA SW 846 Methods 6010B/200.8/7471, Total Solids by EPA Method 160.3, Ammonia as Nitrogen by modified EPA Method 350.1, Sulfide by EPA Method 376.2, Grain Size by PSEP Method, and Total Organic Carbon by Plumb Method. Samples are referenced under the following Sample Delivery Groups: HU85, HV37, HV42, HV00, HV38, HV58, HV72, HV76, HW06, HW16, HR49, HZ55 and II22. See the Sample Analysis Table (Attachment 1) for the number of samples reviewed.

Please feel free to contact us if you have any questions.

Sincerely,

Stella S. Cuenco
Project Manager/Senior Chemist

Job #04-08-06-24 Attachment 1

Level II **LDC #13315 (Windward Environmental, LLC - Seattle WA / Lower Duwamish Waterway Group)**

LDC	SDG#	DATE REC'D	DATE DUE	PCBs (8082)		PCP (8041)		Total Solids (160.3)		TOC (Plumb)																							
Matrix: Tissue/Sediment				T	S	T	S	T	S	T	S	T	S	T	S	T	S	T	S	T	S	T	S	W	S	W	S	W	S	W	S	W	S
A	HS56	03/28/05	04/18/05	0	4	0	1	0	4	0	4																						
Total	B			0	4	0	1	0	4	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	10

Shaded cells indicate Level IV validation (all other cells are Level II validation). These sample counts do not include MS/MSD, and DUPs

Attachment 1

Level II

LDC #13234 (Windward Environmental, LLC - Seattle WA / Lower Duwamish Waterway Group)

LDC	SDG#	DATE REC'D	DATE DUE	PCBs (8082)		PCP (8041)		Total Solids (160.3)		TOC (Plumb)																									
Matrix: Tissue/Sediment				T	S	T	S	T	S	T	S	T	S	T	S	T	S	T	S	T	S	T	S	T	S	T	S	T	S	T	S	T	S	T	S
D	HR49	03/08/05	03/29/05	0	10	0	1	0	10	0	10																								
Total	B			0	10	0	1	0	10	0	10	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	31

Shaded cells indicate Level IV validation (all other cells are Level II validation). These sample counts do not include Rinsate Blanks,MS/MSD, and DUPs

Attachment 1

PDF Level II/IV **LDC #13381 (Windward Environmental, LLC - Seattle WA / Lower Duwamish Waterway Group)**

LDC	SDG#	DATE REC'D	(3) DATE DUE	SVOA (8270C)		SVOA (8270C -SIM)		Pest. (8081A)		PCBs (8082)		Metals & Hg (SW846)		BT (Krone)		NH_3 (350.1)		S= (376.2)		Total Solids (160.3)		TOC (Plumb)		Grain Size											
Matrix:	Water/Sediment			W	S	W	S	W	S	W	S	W	S	W	S	W	S	W	S	W	S	W	S	W	S	W	S	W	S	W	S	W	S
A	HU85	04/12/05	05/03/05	0	10	0	10	0	5	0	11	0	10	0	3	0	10	0	10	0	10	0	10	0	10								
B	HV37	04/13/05	05/03/05	0	19	0	16	0	2	0	17	0	16	0	3	0	16	0	16	0	16	0	16	0	16								
C	HV42	04/12/05	05/03/05	0	10	0	9	0	2	0	9	0	8	0	6	0	8	0	8	0	8	0	8	0	8								
Total	B/SC			0	39	0	35	0	9	0	37	0	34	0	12	0	34	0	34	0	34	0	34	0	34	0	0	0	0	0	0	0	336

Shaded cells indicate Level IV validation (all other cells are Level II validation). These sample counts do not include Rinsate Blanks, MS/MSD, and DUPs

Attachment 1

PDF Level II **LDC #13384 (Windward Environmental, LLC - Seattle WA / Lower Duwamish Waterway Group)**

LDC	SDG#	DATE REC'D	(3) DATE DUE	SVOA (8270C)		SVOA (8270C -SIM)		Pest. (8081A)		PCBs (8082)		Metals & Hg (SW846)		BT (Krone)		NH_3 (350.1)		S= (376.2)		Total Solids (160.3)		TOC (Plumb)		Grain Size											
Matrix:	Water/Sediment			W	S	W	S	W	S	W	S	W	S	W	S	W	S	W	S	W	S	W	S	W	S	W	S	W	S	W	S	W	S	W	S
A	HV00	04/15/05	05/06/05	0	15	0	15	0	5	0	15	0	15	0	4	0	15	0	15	0	15	0	15	0	15										
Total	B/SC			0	15	0	15	0	5	0	15	0	15	0	4	0	15	0	15	0	15	0	15	0	15	0	0	0	0	0	0	0	0	0	144

Shaded cells indicate Level IV validation (all other cells are Level II validation). These sample counts do not include MS/MSD, and DUPs

Attachment 1

PDF Level II **LDC #13395 (Windward Environmental, LLC - Seattle WA / Lower Duwamish Waterway Group)**

LDC	SDG#	DATE REC'D	(3) DATE DUE	SVOA (8270C)		SVOA (8270C -SIM)		Pest. (8081A)		PCBs (8082)		Metals & Hg (SW846)		NH_3 (350.1)		S= (376.2)		Total Solids (160.3)		TOC (Plumb)		Grain Size															
Matrix: Water/Sediment				W	S	W	S	W	S	W	S	W	S	W	S	W	S	W	S	W	S	W	S	W	S	W	S	W	S	W	S	W	S	W	S
A	HV38	04/19/05	05/10/05	0	3	0	3	0	1	0	4	0	3	0	3	0	3	0	3	0	3	0	3												
Total	B/SC			0	3	0	3	0	1	0	4	0	3	0	3	0	3	0	3	0	3	0	3	0	0	0	0	0	0	0	0	0	0	0	29

Shaded cells indicate Level IV validation (all other cells are Level II validation). These sample counts do not include MS/MSD, and DUPs

Attachment 1

PDF Level II **LDC #13398 (Windward Environmental, LLC - Seattle WA / Lower Duwamish Waterway Group)**

LDC	SDG#	DATE REC'D	(3) DATE DUE	SVOA (8270C)		SVOA (8270C -SIM)		Pest. (8081A)		PCBs (8082)		Metals & Hg (SW846)		BT (Krone)		NH_3 (350.1)		S= (376.2)		Total Solids (160.3)		TOC (Plumb)		Grain Size											
Matrix:	Water/Sediment			W	S	W	S	W	S	W	S	W	S	W	S	W	S	W	S	W	S	W	S	W	S	W	S	W	S	W	S	W	S
A	HV58	04/20/05	05/11/05	0	14	0	13	0	3	0	12	0	12	0	3	0	12	0	12	0	12	0	12	0	12								
Total	B/SC			0	14	0	13	0	3	0	12	0	12	0	3	0	12	0	12	0	12	0	12	0	12	0	0	0	0	0	0	0	117

Shaded cells indicate Level IV validation (all other cells are Level II validation). These sample counts do not include Rinsate Blanks, MS/MSD, and DUPs

Attachment 1

PDF Level II **LDC #13403 (Windward Environmental, LLC - Seattle WA / Lower Duwamish Waterway Group)**

LDC	SDG#	DATE REC'D	(3) DATE DUE	SVOA (8270C)		SVOA (8270C -SIM)		Pest. (8081A)		PCBs (8082)		Metals & Hg (SW846)		BT (Krone)		NH_3 (350.1)		S= (376.2)		Total Solids (160.3)		TOC (Plumb)		Grain Size											
Matrix:	Water/Sediment			W	S	W	S	W	S	W	S	W	S	W	S	W	S	W	S	W	S	W	S	W	S	W	S	W	S	W	S	W	S	W	S
A	HV72	04/21/05	05/12/05	0	6	0	6	0	2	0	6	0	6	0	1	0	6	0	9	0	6	0	6	0	9										
Total	B/SC			0	6	0	6	0	2	0	6	0	6	0	1	0	6	0	9	0	6	0	6	0	9	0	0	0	0	0	0	0	0	0	63

Shaded cells indicate Level IV validation (all other cells are Level II validation). These sample counts do not include MS/MSD, and DUPs

Attachment 1

PDF

LDC #13412 (Windward Environmental, LLC - Seattle WA / Lower Duwamish Waterway Group)

LDC	SDG#	DATE REC'D	(3) DATE DUE	SVOA (8270C)		SVOA (8270C -SIM)		Pest. (8081A)		PCBs (8082)		Metals & Hg (SW846)		NH_3 (350.1)		S= (376.2)		Total Solids (160.3)		TOC (Plumb)		Grain Size													
Matrix:	Water/Sediment			W	S	W	S	W	S	W	S	W	S	W	S	W	S	W	S	W	S	W	S	W	S	W	S	W	S	W	S	W	S
A	HV76	04/22/05	05/13/05	0	10	0	10	0	4	0	10	0	10	0	10	0	10	0	10	0	10	0	10										
Total	B/SC			0	10	0	10	0	4	0	10	0	10	0	10	0	10	0	10	0	10	0	10	0	0	0	0	0	0	0	0	0	94

Shaded cells indicate Level IV validation (all other cells are Level II validation). These sample counts do not include MS/MSD, anc DUPs

Attachment 1

Level II PDF

LDC #13419 (Windward Environmental, LLC - Seattle WA / Lower Duwamish Waterway Group)

LDC	SDG#	DATE REC'D	(3) DATE DUE	SVOA (8270C)		SVOA (8270C -SIM)		Pest. (8081A)		PCBs (8082)		Metals & Hg (SW846)		BT (Krone)		NH_3 (350.1)		S= (376.2)		Total Solids (160.3)		TOC (Plumb)		Grain Size											
Matrix:	Water/Sediment			W	S	W	S	W	S	W	S	W	S	W	S	W	S	W	S	W	S	W	S	W	S	W	S	W	S	W	S	W	S
A	HW06	04/25/05	05/16/05	0	8	0	9	0	2	0	9	0	7	0	1	0	7	0	7	0	7	0	7	0	7								
B	HW16	04/25/05	05/16/05	0	1	0	1	0	1	0	1	0	1	-	-	0	1	0	1	0	1	0	1	0	1								
Total	B/SC			0	9	0	10	0	3	0	10	0	8	0	1	0	8	0	8	0	8	0	8	0	8	0	0	0	0	0	0	0	81

Shaded cells indicate Level IV validation (all other cells are Level II validation). These sample counts do not include MS/MSD, and DUPs

Attachment 1

Level II PDF **LDC #13521 (Windward Environmental, LLC - Seattle WA / Lower Duwamish Waterway Group)**

LDC	SDG#	DATE REC'D	(3) DATE DUE	VOA (8260B)		Pest. (8031A)																													
Matrix:	Water/Sediment			W	S	W	S	W	S	W	S	W	S	W	S	W	S	W	S	W	S	W	S	W	S	W	S	W	S	W	S	W	S	W	S
A	HZ55	05/19/05	06/09/05	0	2	0	5																												
Total	B/SC			0	2	0	5	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	7

Shaded cells indcate Level IV validation (all other cells are Level II validation). These sample counts do not include MS/MSD, and DUPs

Attachment 1

Level II PDF

LDC #13846 (Windward Environmental, LLC - Seattle WA / Lower Duwamish Waterway Group)

LDC	SDG#	DATE REC'D	(3) DATE DUE	1,2,4-TCB (8260B)		Pest. (8081A)																													
Matrix: Water/Sediment				W	S	W	S	W	S	W	S	W	S	W	S	W	S	W	S	W	S	W	S	W	S	W	S	W	S	W	S	W	S	W	S
A	II22	08/09/05	08/30/05	2	0	1	0																												
Total	B/SC			2	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	3

Shaded cells indicate Level IV validation (all other cells are Level II validation). These sample counts do not include MS/MSD, and DUPs

CHEMICAL DATA QUALITY REVIEW FOR PHASE 2 SURFACE SEDIMENT SAMPLES

Lower Duwamish Waterway Group
LDC# 13234, 13315, 13381, 13384, 13395, 13398, 13403, 13412, 13419, 13521, 13846

This report details the findings of an EPA Level II and Level IV data validation of analytical chemistry results generated in support of the Lower Duwamish Waterway Group project. The primary analyses were performed by Analytical Resources, Inc. Samples were analyzed for GC/MS Volatiles by EPA SW 846 Methods 8260B, GC/MS Semivolatiles by EPA SW 846 Methods 8270C and 8270C-SIM, GC/MS Butyltins by the Krone Method and EPA SW 846 Method 8270C-SIM, GC Chlorinated Pesticides by EPA SW 846 Method 8081A, GC Polychlorinated Biphenyls by EPA SW 846 Method 8082, GC Pentachlorophenol by EPA SW 846 Method 8041, Metals by EPA SW 846 Methods 6010B/200.8/7471, Total Solids by EPA Method 160.3, Ammonia as Nitrogen by modified EPA Method 350.1, Sulfide by EPA Method 376.2, Grain Size by PSEP Method, and Total Organic Carbon by Plumb Method. Samples are referenced under the following Sample Delivery Groups: HU85, HV37, HV42, HV00, HV38, HV58, HV72, HV76, HW06, HW16, HR49, HZ55 and II22. See the Sample Analysis Table (Attachment 1) for the number of samples reviewed and the Sample Validation Table (Attachment 2) for the sample identifications and analyses. Sample IDs ending in "**" underwent Level IV review.

The QC guidelines used for data qualification are those specified in the National Functional Guidelines for Organic Data Review (October 1999) and the National Functional Guidelines for Inorganic Data Review (July 2002). Specific QC criteria used follows the Surface Sediment Sampling for Chemical Analyses and Toxicity Testing of the Lower Duwamish Waterway Quality Assurance Project Plan (January 14, 2005). Where specific guidance is not available, the data has been evaluated in a conservative manner using professional experience.

The following items were evaluated during the review:

- Holding Times
- Sample Preservation
- Cooler Temperatures
- Instrument Calibration
- Blanks
- Surrogates
- Matrix Spike/Matrix Spike Duplicates
- Internal Standards
- Laboratory Control Samples
- Target Compound Identifications (Not reviewed for Level II)
- Compound Quantitation and CRQLs (Not reviewed for Level II)
- System Performance
- Field Duplicates

Only issues which require comment or action are discussed in this report. Data deficiencies are arranged by method. Potential effects of data anomalies have been described where possible.

The following are definitions of the data qualifiers:

U Indicates the compound or analyte was analyzed for but not detected at or above the stated limit.

J Indicates an estimated value.

J+ The result is an estimated quantity, but the result may be biased high.

J- The result is an estimated quantity, but the result may be biased low.

R Quality control indicates the data is not usable.

N Presumptive evidence of presence of the constituent.

UJ Indicates the compound or analyte was analyzed for but not detected. The sample detection limit is an estimated value.

A Indicates the finding is based upon technical validation criteria.

P Indicates the finding is related to a protocol/contractual deviation.

Overall Data Assessment

I. Method Compliance

Antimony, arsenic and thallium were analyzed using EPA Method 200.8 instead of EPA SW 846 Method 6020 as required by the QAPP.

II. Usability

Technical holding time exceedance, instrument calibration, method blank contamination, compound identification, compound quantitation and various QC exceedance problems have warranted the qualification of a portion of the data set.

Low LCS and MS/MSD recoveries have warranted the qualification of detected results as estimated (J) and non-detected results as unusable (R) for butyltin trichloride in the butyltin analyses in SDGs HV42, HU85, HV00, HV37, HV58 and HW06.

Technical holding time problems have warranted the qualification of non-detected results as rejected (R) in the volatile analyses in SDGs HZ55 and II22. The detected results were qualified as estimated (J-) for sulfide and the total solids for one sample in SDG HW06 and for several samples in the total solids analyses in SDG HR49.

Instrument calibration problems have warranted the qualification of detected results as estimated (J) and non-detected results as estimated (UJ) for several compounds in the semivolatile and semivolatile-SIM analyses for SDGs HV42 and HV76.

Method blank contamination have warranted the qualification of bis(2-ethylhexyl)phthalate, di-n-butylphthalate and diethylphthalate as non-detected (U) for several samples in the semivolatile and semivolatile-SIM analyses for SDGs HV00, HV37, HV38 and HV58.

Compound identification problems have warranted the qualification of the detected result for hexachlorobenzene as presumptive and estimated (NJ) in the pesticide analysis for SDG II22.

Compound quantitation problems have warranted the qualification of detected results as estimated (J) for several compounds in the pesticide analysis for SDG HU85 and in the PCB analyses for SDGs HV00, HW06 and HS56.

Various QC accuracy and precision exceedances have warranted the qualification of detected results as estimated (J, J-) and non-detected results as estimated (UJ) in the semivolatile, semivolatile-SIM, pesticide, PCB, sulfide, metals and butyltin analyses for SDGs HU85, HV00, HV37, HV38, HV42, HV58, HV72, HV76, HW06, HW16 and HR49 and volatile analysis for SDG II22.

The required frequency of SRM was not met for the sulfide analyses.

No action was taken when the SRM results were outside the limit of Mean ± Standard Deviation for the organic analyses since the SRM standards were outdated and there were no certified QC limits established.

III. Additional Review

The calibration and internal standard summary forms and the ICP interference check sample analysis data that were associated to all the Level II samples were evaluated per client request. Instrument calibration and internal standard recovery problems did not warrant the qualification of the associated data as unusable (R).

The quality control criteria reviewed, other than those discussed above, were met and are considered acceptable. Sample results that were found to be estimated (J) are usable for limited purposes only. Sample results that were found to be rejected (R) are unusable for all purposes. Based upon the data validation all other results are considered valid and usable for all purposes.

GC/MS Volatiles by EPA SW 846 Method 8260B

I. Technical Holding Times

All technical holding time requirements were met with the following exceptions:

Associated SDG	Sample	Compound	Total Days From Sample Collection Until Analysis	Required Holding Time (in Days) From Sample Collection Until Analysis	Flag	A or P
HZ55	LDW-SS3-010 LDW-SS3-010RE	All TCL compounds	55	14	J (all detects) R (all non-detects)	P
II22	LDW-SSB4a-010 LDW-SSB4a-010RE	All TCL compounds	135	14	J (all detects) R (all non-detects)	P

Non-detected sample concentrations were qualified as unusable (R) due to a gross exceedance (>2X) of holding time.

The chain-of-custodies were reviewed for documentation of cooler temperatures. All cooler temperatures met validation criteria.

II. GC/MS Instrument Performance Check

Instrument performance check data were not reviewed for Level II.

III. Initial Calibration

Percent relative standard deviations (%RSD) were less than or equal to 15.0% for each individual compound and less than or equal to 30.0% for calibration check compounds (CCCs).

In the case where %RSD was greater than 15.0%, the laboratory used a calibration curve to evaluate the compound. All coefficients of determination (r^2) were greater than or equal to 0.990 .

For the purposes of technical evaluation, all compounds were evaluated against the 30.0% (%RSD) National Functional Guideline criteria. Unless noted above, all compounds were within the validation criteria.

IV. Continuing Calibration

Continuing calibration was performed at the required frequencies.

Percent differences (%D) between the initial calibration RRF and the continuing calibration RRF were within the method criteria of less than or equal to 20.0% for calibration check compounds (CCCs).

For the purposes of technical evaluation, all compounds were evaluated against the 25.0% (%D) National Functional Guideline criteria.

V. Blanks

Method blanks were reviewed for each matrix as applicable. No volatile contaminants were found in the method blanks.

VI. Surrogate Spikes

Surrogates were added to all samples and blanks as required by the method. All surrogate recoveries (%R) were within QC limits.

VII. Matrix Spike/Matrix Spike Duplicates

Matrix spike (MS) and matrix spike duplicate (MSD) samples were reviewed for each matrix as applicable. Percent recoveries (%R) and relative percent differences (RPD) were within QC limits with the following exceptions:

Associated SDG	Spike ID (Associated Samples)	Compound	MS (%R) (Limits)	MSD (%R) (Limits)	RPD (Limits)	Flag	A or P
II22	LDW-SSB4a-010MS/MSD (LDW-SSB4a-010 LDW-SSB4a-010RE)	1,2,4-Trichlorobenzene	40.6 (75-125)	46.7 (75-125)	-	J (all detects) UJ (all non-detects)	A

VIII. Laboratory Control Samples (LCS)

Laboratory control samples were reviewed for each matrix as applicable. Percent recoveries (%R) and relative percent differences (RPD) were within QC limits.

The required frequency of SRM analysis was not met for all the compounds. However, SRM analysis was performed for these compounds in the semivolatile analyses.

IX. Regional Quality Assurance and Quality Control

Not applicable.

X. Internal Standards

All internal standard areas and retention times were within QC limits.

XI. Target Compound Identifications

Target compound identifications data were not reviewed for Level II.

XII. Compound Quantitation and CRQLs

Compound quantitation and CRQLs data were not reviewed for Level II.

XIII. Tentatively Identified Compounds (TICs)

Tentatively identified compounds data were not reviewed for Level II.

XIV. System Performance

System performance data were not reviewed for Level II.

XV. Overall Assessment

Overall, the data cannot be used for their intended purpose.

XVI. Field Duplicates

No field duplicates were identified in this SDG.

GC/MS Semivolatiles by EPA SW 846 Method 8270C

I. Technical Holding Times

All technical holding time requirements were met.

The chain-of-custodies were reviewed for documentation of cooler temperatures. All cooler temperatures met validation criteria.

II. GC/MS Instrument Performance Check

Instrument performance was checked at 12 hour intervals with the following exceptions:

Associated SDG	Sample	Compound	Total Time From DFTPP Tuning Until Analysis	Required Analysis Time From DFTPP Tuning Until Analysis
HV42	LDW-SS47-010**	All TCL compounds	12 hours 8 minutes	12 hours

All ion abundance requirements were met.

Instrument performance check data were not reviewed for Level II.

III. Initial Calibration

Percent relative standard deviations (%RSD) were less than or equal to 30.0% for all compounds. with the following exceptions:

Associated SDG	Date	Compound	%RSD	Associated Samples	Flag	A or P
HV42 HV76	3/2/05	4,6-Dinitro-2-methylphenol	32.11128	LDW-SS45-010** LDW-SS46-010** LDW-SS6-010** LDW-SS6-010DL** LDW-SS47-010** LDW-SS47-010DL** LDW-SS108-010** LDW-SS61-010** LDW-SS25-010** LDW-SS86-010** LDW-SS98-010** LDW-SS141-010** LDW-SSB9a-010** LDW-SS156-010** LDW-SS155-010** LDW-SS154-010** LDW-SS153-010** LDW-SS152-010** LDW-SS151-010** LDW-SS144-010**	J (all detects) UJ (all non-detects)	A

A curve fit, based on the initial calibration, was established for quantitation. The coefficient of determination (r^2) was greater than or equal to 0.990 .

Average relative response factors (RRF) for all target compounds and system monitoring compounds were within validation criteria.

IV. Continuing Calibration

Continuing calibration was performed at the required frequencies.

All of the continuing calibration percent differences (%D) between the initial calibration RRF and the continuing calibration RRF were less than or equal to 25.0% with the following exceptions:

Associated SDG	Date	Compound	%D	Associated Samples	Flag	A or P
HV42	3/24/05	Hexachlorocyclopentadiene 2,4-Dinitrophenol	52.92375 27.16432	LDW-SS45-010** LDW-SS46-010** LDW-SS6-010** LDW-SS47-010**	J (all detects) UJ (all non-detects) J (all detects) UJ (all non-detects)	A
HV42	3/25/05	Hexachlorocyclopentadiene 2,4-Dinitrophenol	39.09301 40.86125	LDW-SS6-010DL** LDW-SS47-010DL** LDW-SS108-010**	J (all detects) UJ (all non-detects) J (all detects) UJ (all non-detects)	A
HV42	3/28/05	Nitrobenzene Hexachlorocyclopentadiene 2,4-Dinitrophenol 4-Nitrophenol	33.13655 53.69960 52.60003 36.32453	LDW-SS61-010** LDW-SS25-010** LDW-SS86-010**	J (all detects) UJ (all non-detects)	A
HV76	3/29/05	Hexachlorocyclopentadiene 2,4-Dinitrophenol	35.86451 31.91413	LDW-SS98-010** LDW-SS141-010** LDW-SSB9a-010** LDW-SS156-010** LDW-SS155-010** LDW-SS154-010** LDW-SS153-010** LDW-SS152-010** LDW-SS151-010** LDW-SS144-010**	J (all detects) UJ (all non-detects) J (all detects) UJ (all non-detects)	A

Initial calibration verification (ICV) percent recoveries (%R) were within the 75-125% QC limits with the following exceptions:

Associated SDG	Date	Standard	Compound	%R	Associated Samples	Flag	A or P
HV42	3/2/05	ICV0302	4,6-Dinitro-2-methylphenol	131.45	LDW-SS45-010** LDW-SS46-010** LDW-SS6-010** LDW-SS6-010DL** LDW-SS47-010** LDW-SS47-010DL** LDW-SS108-010** LDW-SS61-010** LDW-SS25-010** LDW-SS86-010**	J (all detects) UJ (all non-detects)	A

All of the continuing calibration RRF values were within validation criteria.

V. Blanks

Method blanks were reviewed for each matrix as applicable. No semivolatile contaminants were found in the method blanks with the following exceptions:

Associated SDG	Method Blank ID	Extraction Date	Compound TIC (RT in minutes)	Concentration	Associated Samples
HV00 HV38	MB-031705	3/17/05	Di-n-butylphthalate Bis(2-ethylhexyl)phthalate	29 ug/Kg 21 ug/Kg	LDW-SS81-010 LDW-SS65-010 LDW-SS41-010 LDW-SS30-010 LDW-SS19-010 LDW-SS11-010 LDW-SS105-010 LDW-SS106-010 LDW-SS122-010 LDW-SS131-010 LDW-SS206-010 LDW-SS140-010 LDW-SS39-010 LDW-SS100-010 LDW-SSB2b-010
HV37	MB-031805	3/18/05	Diethylphthalate Bis(2-ethylhexyl)phthalate	40 ug/Kg 58 ug/Kg	LDW-SS7-010 LDW-SS3-010 LDW-SS95-010 LDW-SS95-010DL LDW-SS133-010 LDW-SS138-010 LDW-SS139-010 LDW-SS137-010 LDW-SS132-010 LDW-SS66-010 LDW-SS62-010 LDW-SS207-010 LDW-SS146-010 LDW-SS147-010 LDW-SS148-010 LDW-SS149-010 LDW-SS150-010

Associated SDG	Method Blank ID	Extraction Date	Compound TIC (RT in minutes)	Concentration	Associated Samples
HV58	MB-032305	3/23/05	Phenol	40 ug/Kg	LDW-SS90-010 LDW-SS24-010 LDW-SS24-010DL LDW-SS9-010 LDW-SS9-010DL LDW-SS77-010 LDW-SS59-010 LDW-SSB5b-010 LDW-SS53-010 LDW-SS34-010 LDW-SSB4a-010 LDW-SS29-010 LDW-SS107-010 LDW-SS145-010

Sample concentrations were compared to concentrations detected in the method blanks. The sample concentrations were either not detected or were significantly greater (>10X for common contaminants, >5X for other contaminants) than the concentrations found in the associated method blanks with the following exceptions:

Associated SDG	Sample	Compound TIC (RT in minutes)	Reported Concentration	Modified Final Concentration
HV00	LDW-SS81-010	Bis(2-ethylhexyl)phthalate	190 ug/Kg	190U ug/Kg
HV00	LDW-SS65-010	Di-n-butylphthalate Bis(2-ethylhexyl)phthalate	21 ug/Kg 180 ug/Kg	21U ug/Kg 180U ug/Kg
HV00	LDW-SS41-010	Bis(2-ethylhexyl)phthalate	140 ug/Kg	140U ug/Kg
HV00	LDW-SS30-010	Bis(2-ethylhexyl)phthalate	170 ug/Kg	170U ug/Kg
HV00	LDW-SS19-010	Bis(2-ethylhexyl)phthalate	180 ug/Kg	180U ug/Kg
HV00	LDW-SS11-010	Bis(2-ethylhexyl)phthalate	130 ug/Kg	130U ug/Kg
HV00	LDW-SS105-010	Bis(2-ethylhexyl)phthalate	100 ug/Kg	100U ug/Kg
HV00	LDW-SS122-010	Bis(2-ethylhexyl)phthalate	50 ug/Kg	50U ug/Kg
HV00	LDW-SS131-010	Bis(2-ethylhexyl)phthalate	130 ug/Kg	130U ug/Kg
HV00	LDW-SS140-010	Bis(2-ethylhexyl)phthalate	57 ug/Kg	57U ug/Kg
HV38	LDW-SS39-010	Di-n-butylphthalate Bis(2-ethylhexyl)phthalate	120 ug/Kg 110 ug/Kg	120U ug/Kg 110U ug/Kg

*Indicates change as the result of report review.

Associated SDG	Sample	Compound TIC (RT in minutes)	Reported Concentration	Modified Final Concentration
HV38	LDW-SS100-010	Bis(2-ethylhexyl)phthalate	24 ug/Kg	24U ug/Kg
HV37	LDW-SS7-010	Diethylphthalate Bis(2-ethylhexyl)phthalate	100 ug/Kg 840 ug/Kg	100U ug/Kg 840U ug/Kg
HV37	LDW-SS3-010	Diethylphthalate Bis(2-ethylhexyl)phthalate	27 ug/Kg 37 ug/Kg	27U ug/Kg 37U ug/Kg
HV37	LDW-SS95-010	Diethylphthalate Bis(2-ethylhexyl)phthalate	26 ug/Kg 140 ug/Kg	26U ug/Kg 140U ug/Kg
HV37	LDW-SS133-010	Bis(2-ethylhexyl)phthalate	250 ug/Kg	250U ug/Kg
HV37	LDW-SS138-010	Bis(2-ethylhexyl)phthalate	120 ug/Kg	120U ug/Kg
HV37	LDW-SS139-010	Bis(2-ethylhexyl)phthalate	170 ug/Kg	170U ug/Kg
HV37	LDW-SS137-010	Bis(2-ethylhexyl)phthalate	320 ug/Kg	320U ug/Kg
HV37	LDW-SS132-010	Bis(2-ethylhexyl)phthalate	320 ug/Kg	320U ug/Kg
HV37	LDW-SS66-010	Bis(2-ethylhexyl)phthalate	360 ug/Kg	360U ug/Kg
HV37	LDW-SS62-010	Bis(2-ethylhexyl)phthalate	470 ug/Kg	470U ug/Kg
HV37	LDW-SS207-010	Bis(2-ethylhexyl)phthalate	550 ug/Kg	550U ug/Kg
HV37	LDW-SS146-010	Bis(2-ethylhexyl)phthalate	130 ug/Kg	130U ug/Kg
HV37	LDW-SS147-010	Bis(2-ethylhexyl)phthalate	82 ug/Kg	82U ug/Kg
HV37	LDW-SS148-010	Bis(2-ethylhexyl)phthalate	160 ug/Kg	160U ug/Kg
HV37	LDW-SS149-010	Bis(2-ethylhexyl)phthalate	59 ug/Kg	59U ug/Kg
HV37	LDW-SS150-010	Bis(2-ethylhexyl)phthalate	28 ug/Kg	28U ug/Kg
HV58	LDW-SS90-010	Phenol	84 ug/Kg	84U ug/Kg
HV58	LDW-SS24-010	Phenol	38 ug/Kg	38U ug/Kg

Associated SDG	Sample	Compound TIC (RT in minutes)	Reported Concentration	Modified Final Concentration
HV58	LDW-SS59-010	Phenol	49 ug/Kg	49U ug/Kg
HV58	LDW-SS53-010	Phenol	59 ug/Kg	59U ug/Kg
HV58	LDW-SSB4a-010	Phenol	51 ug/Kg	51U ug/Kg
HV58	LDW-SS29-010	Phenol	46 ug/Kg	46U ug/Kg
HV58	LDW-SS107-010	Phenol	34 ug/Kg	34U ug/Kg

VI. Surrogate Spikes

Surrogates were added to all samples and blanks as required by the method. All surrogate recoveries (%R) were within QC limits with the following exceptions:

Associated SDG	Sample	Surrogate	%R (Limits)	Compound	Flag	A or P
HV37	LDW-SS95-010	Nitrobenzene-d5 Terphenyl-d14 Phenol-d5 2,4,6-Tribromophenol 2-Fluorobiphenyl 1,2-Dichlorobenzene-d4 2-Fluorophenol 2-Chlorophenol-d4	21.3 (40-130) 22.0 (40-130) 20.7 (40-130) 22.9 (40-130) 20.4 (40-130) 15.8 (40-130) 19.8 (40-130) 19.7 (40-130)	All TCL compounds	J (all detects) UJ (all non-detects)	A

VII. Matrix Spike/Matrix Spike Duplicates

Matrix spike (MS) and matrix spike duplicate (MSD) samples were reviewed for each matrix as applicable. Percent recoveries (%R) and relative percent differences (RPD) were within QC limits with the following exceptions:

Associated SDG	Spike ID (Associated Samples)	Compound	MS (%R) (Limits)	MSD (%R) (Limits)	RPD (Limits)	Flag	A or P
HU85	LDW-SS74-010MS/MSD (LDW-SS74-010)	Phenol	-	35.2 (40-130)	-	J (all detects) UJ (all non-detects)	A
HV58	LDW-SS145-010MS/MSD (LDW-SS145-010)	Benzo(g,h,i)perylene	32.6 (40-130)	32.8 (40-130)	-	J (all detects) UJ (all non-detects)	A

VIII. Laboratory Control Samples (LCS)

Laboratory control samples were reviewed for each matrix as applicable. Percent recoveries (%R) and relative percent differences (RPD) were within QC limits.

Standard reference material was performed at the required frequencies.

IX. Regional Quality Assurance and Quality Control

Not applicable.

X. Internal Standards

All internal standard areas and retention times were within QC limits with the following exceptions:

Associated SDG	Sample	Internal Standards	Area (Limits)	Compound	Flag	A or P
HV42	LDW-SS6-010**	Perylene-d12	162046 (194084-776338)	Benzo(b)fluoranthene Benzo(k)fluoranthene Benzo(a)pyrene Indeno(1,2,3-cd)pyrene Dibenz(a,h)anthracene Benzo(g,h,i)perylene	J (all detects) UJ (all non-detects)	A
HV42	LDW-SS47-010**	Perylene-d12	169310 (194084-776338)	Benzo(b)fluoranthene Benzo(k)fluoranthene Benzo(a)pyrene Indeno(1,2,3-cd)pyrene Dibenz(a,h)anthracene Benzo(g,h,i)perylene	J (all detects) UJ (all non-detects)	A

XI. Target Compound Identifications

All target compound identifications were within validation criteria.

Target compound identifications data were not reviewed for Level II.

XII. Compound Quantitation and CRQLs

All compound quantitation and CRQLs were within validation criteria with the following exceptions:

Associated SDG	Sample	Compound	Finding	Criteria	Flag	A or P
HV37	LDW-SS95-010	Phenanthrene Anthracene Fluoranthene Pyrene Chrysene	Sample result exceeded calibration range.	Reported result should be within calibration range.	J (all detects) J (all detects) J (all detects) J (all detects) J (all detects)	A
HV37	LDW-SS95-010RE	Phenanthrene Fluoranthene	Sample result exceeded calibration range.	Reported result should be within calibration range.	J (all detects) J (all detects)	A
HV58	LDW-SS24-010	Fluoranthene Pyrene Chrysene Benzo(b)fluoranthene Benzo(k)fluoranthene Benzo(a)pyrene	Sample result exceeded calibration range.	Reported result should be within calibration range.	J (all detects) J (all detects) J (all detects) J (all detects) J (all detects) J (all detects)	A
HV58	LDW-SS9-010	Fluoranthene	Sample result exceeded calibration range.	Reported result should be within calibration range.	J (all detects)	A
HW06	LDW-SS35-010	Phenanthrene Fluoranthene Pyrene	Sample result exceeded calibration range.	Reported result should be within calibration range.	J (all detects) J (all detects) J (all detects)	A

Compound quantitation and CRQLs data were not reviewed for Level II.

XIII. Tentatively Identified Compounds (TICs)

Tentatively identified compounds were not reported by the laboratory for Level IV.

Tentatively identified compounds data were not reviewed for Level II.

XIV. System Performance

The system performance was acceptable.

System performance data were not reviewed for Level II.

XV. Overall Assessment

The overall assessment of data was acceptable. In the case where more than one result was reported for an individual sample, the least technically acceptable results were rejected as follows:

Associated SDG	Sample	Compound	Flag	A or P
HV37	LDW-SS95-010	Naphthalene 2-Methylnaphthalene Acenaphthylene Acenaphthene Dibenzofuran Fluorene Phenanthrene Carbazole Anthracene Fluoranthene Pyrene Benzo(a)anthracene Bis(2-ethylhexyl)phthalate Chrysene Benzo(b)fluoranthene Benzo(k)fluoranthene Benzo(a)pyrene Indeno(1,2,3-cd)pyrene Benzo(g,h,i)perylene	R R R R R R R R R R R R R R R R R R R	A
HV37	LDW-SS95-010RE	All TCL compounds except Naphthalene 2-Methylnaphthalene Acenaphthylene Dibenzofuran Carbazole Benzo(a)anthracene Bis(2-ethylhexyl)phthalate Benzo(b)fluoranthene Benzo(a)pyrene	R	A
HV37	LDW-SS95-010REDL	All TCL compounds except Acenaphthene Fluorene Phenanthrene Anthracene Fluoranthene Pyrene Chrysene Benzo(k)fluoranthene Indeno(1,2,3-cd)pyrene Benzo(g,h,i)perylene	R	A
HV37	LDW-SS95-010DL	All TCL compounds	R	A
HV58	LDW-SS24-010	Fluoranthene Pyrene Chrysene Benzo(b)fluoranthene Benzo(k)fluoranthene Benzo(a)pyrene Benzyl alcohol Acenaphthylene Phenanthrene Benzo(a)anthracene Indeno(1,2,3-cd)pyrene Dibenz(a,h)anthracene Benzo(g,h,i)perylene	R R R R R R R R R R R R R	A

*Indicates change as the result of report review.

Associated SDG	Sample	Compound	Flag	A or P
HV58	LDW-SS24-010DL	All TCL compounds except Fluoranthene Pyrene Chrysene Benzo(b)fluoranthene Benzo(k)fluoranthene Benzo(a)pyrene Benzyl alcohol Acenaphthylene Phenanthrene Benzo(a)anthracene Indeno(1,2,3-cd)pyrene Dibenz(a,h)anthracene Benzo(g,h,i)perylene	R	A
HV58	LDW-SS9-010	Fluoranthene Pyrene Chrysene Benzo(k)fluoranthene Indeno(1,2,3-cd)pyrene Benzo(g,h,i)perylene	R R R R R R	A
HV58	LDW-SS9-010DL	All TCL compounds except Fluoranthene Pyrene Chrysene Benzo(k)fluoranthene Indeno(1,2,3-cd)pyrene Benzo(g,h,i)perylene	R	A
HV42	LDW-SS6-010**	Phenanthrene Fluoranthene Pyrene Bis(2-ethylhexyl)phthalate Chrysene Benzo(b)fluoranthene Benzo(k)fluoranthene Benzo(a)pyrene Indeno(1,2,3-cd)pyrene Dibenz(a,h)anthracene Benzo(g,h,i)perylene	R R R R R R R R R R R	A
HV42	LDW-SS6-010DL**	All TCL compounds except Phenanthrene Fluoranthene Pyrene Bis(2-ethylhexyl)phthalate Chrysene Benzo(b)fluoranthene Benzo(k)fluoranthene Benzo(a)pyrene Indeno(1,2,3-cd)pyrene Dibenz(a,h)anthracene Benzo(g,h,i)perylene	R	A

Associated SDG	Sample	Compound	Flag	A or P
HV42	LDW-SS47-010**	Phenol	R	A
		Naphthalene	R	
		Dibenzofuran	R	
		Fluorene	R	
		Phenanthrene	R	
		Carbazole	R	
		Anthracene	R	
		Pyrene	R	
		Benzo(a)anthracene	R	
		Chrysene	R	
		Benzo(b)fluoranthene	R	
		Benzo(k)fluoranthene	R	
		Benzo(a)pyrene	R	
		Indeno(1,2,3-cd)pyrene	R	
		Dibenz(a,h)anthracene	R	
		Benzo(g,h,i)perylene	R	
HV42	LDW-SS47-010DL**	All TCL compounds except	R	A
		Phenol		
		Naphthalene		
		Dibenzofuran		
		Fluorene		
		Phenanthrene		
		Carbazole		
		Anthracene		
		Pyrene		
		Benzo(a)anthracene		
		Chrysene		
		Benzo(b)fluoranthene		
		Benzo(k)fluoranthene		
		Benzo(a)pyrene		
		Indeno(1,2,3-cd)pyrene		
		Dibenz(a,h)anthracene		
		Benzo(g,h,i)perylene		
HW06	LDW-SS35-010	Naphthalene	R	A
		2-Methylnaphthalene	R	
		Acenaphthene	R	
		Dibenzofuran	R	
		Fluorene	R	
		Phenanthrene	R	
		Carbazole	R	
		Anthracene	R	
		Fluoranthene	R	
		Pyrene	R	
		Benzo(a)anthracene	R	
		Bis(2-ethylhexyl)phthalate	R	
		Chrysene	R	
		Benzo(k)fluoranthene	R	
		Benzo(a)pyrene	R	
		Indeno(1,2,3-cd)pyrene	R	
		Benzo(g,h,i)perylene	R	
		Benzo(b)fluoranthene	R	
		Dibenz(a,h)anthracene	R	

Associated SDG	Sample	Compound	Flag	A or P
HW06	LDW-SS35-010DL	All TCL compounds except Naphthalene 2-Methylnaphthalene Acenaphthene Dibenzofuran Fluorene Phenanthrene Carbazole Anthracene Fluoranthene Pyrene Benzo(a)anthracene Bis(2-ethylhexyl)phthalate Chrysene Benzo(k)fluoranthene Benzo(a)pyrene Indeno(1,2,3-cd)pyrene Benzo(g,h,i)perylene Benzo(b)fluoranthene Dibenz(a,h)anthracene	R	A

For sample LDW-SS35-010DL, several compounds were considered most usable. The area count of the associated internal standard was outside the QC limits in sample LDW-SS35-010.

XVI. Field Duplicates

Samples LDW-SS19-010 and LDW-SS205-010 and samples LDW-SS131-010 and LDW-SS206-010 (SDG HV00), samples LDW-SS82-010 and LDW-SS204-010 (SDG HU85), samples LDW-SS62-010 and LDW-SS207-010 (SDG HV37) were identified as field duplicates. No semivolatiles were detected in any of the samples with the following exceptions:

Associated SDG	Compound	Concentration (ug/Kg)		RPD (Limits)
		LDW-SS19-010	LDW-SS205-010	
HV00	Phenol	20U	180	Not calculable
HV00	Acenaphthylene	20U	41	Not calculable
HV00	Acenaphthene	36	36	0 (≤50)
HV00	Dibenzofuran	20U	29	Not calculable
HV00	Fluorene	44	64	37 (≤50)
HV00	Phenanthrene	250	450	57 (≤50)

Associated SDG	Compound	Concentration (ug/Kg)		RPD (Limits)
		LDW-SS19-010	LDW-SS205-010	
HV00	Carbazole	22	68	102 (≤50)
HV00	Anthracene	77	190	85 (≤50)
HV00	Fluoranthene	460	910	66 (≤50)
HV00	Pyrene	350	960	93 (≤50)
HV00	Benzo(a)anthracene	180	350	64 (≤50)
HV00	Bis(2-ethylhexyl)phthalate	180	470	89 (≤50)
HV00	Chrysene	280	590	71 (≤50)
HV00	Benzo(b)fluoranthene	270	640	81 (≤50)
HV00	Benzo(k)fluoranthene	140	530	116 (≤50)
HV00	Benzo(a)pyrene	160	390	84 (≤50)
HV00	Indeno(1,2,3-cd)pyrene	64	140	75 (≤50)
HV00	Benzo(g,h,i)perylene	46	110	82 (≤50)

Associated SDG	Compound	Concentration (ug/Kg)		RPD (Limits)
		LDW-SS131-010	LDW-SS206-010	
HV00	Dimethylphthalate	34	66	64 (≤50)
HV00	Phenanthrene	49	130	91 (≤50)
HV00	Fluoranthene	210	690	107 (≤50)
HV00	Pyrene	130	400	102 (≤50)
HV00	Butylbenzylphthalate	23	44	63 (≤50)
HV00	Benzo(a)anthracene	79	170	73 (≤50)

Associated SDG	Compound	Concentration (ug/Kg)		RPD (Limits)
		LDW-SS131-010	LDW-SS206-010	
HV00	Bis(2-ethylhexyl)phthalate	130	270	70 (≤50)
HV00	Chrysene	100	270	92 (≤50)
HV00	Benzo(b)fluoranthene	120	240	67 (≤50)
HV00	Benzo(k)fluoranthene	65	170	89 (≤50)
HV00	Benzo(a)pyrene	70	120	53 (≤50)
HV00	Indeno(1,2,3-cd)pyrene	26	45	54 (≤50)
HV00	Benzo(g,h,i)perylene	20U	34	Not calculable
HV00	Anthracene	20U	36	Not calculable
HV00	Carbazole	20U	24	Not calculable

Associated SDG	Compound	Concentration (ug/Kg)		RPD (Limits)
		LDW-SS82-010	LDW-SS204-010	
HU85	Acenaphthene	50	20U	Not calculable
HU85	Phenanthrene	420	190	75 (≤50)
HU85	Carbazole	79	32	85 (≤50)
HU85	Anthracene	180	82	75 (≤50)
HU85	Fluoranthene	1000	630	45 (≤50)
HU85	Pyrene	790	440	57 (≤50)
HU85	Benzo(a)anthracene	570	220	89 (≤50)
HU85	Bis(2-ethylhexyl)phthalate	220	150	38 (≤50)
HU85	Chrysene	800	410	64 (≤50)

*Indicates change as the result of report review.

Associated SDG	Compound	Concentration (ug/Kg)		RPD (Limits)
		LDW-SS82-010	LDW-SS204-010	
HU85	Benzo(b)fluoranthene	650	360	57 (≤50)
HU85	Benzo(k)fluoranthene	460	180	88 (≤50)
HU85	Benzo(a)pyrene	470	190	85 (≤50)
HU85	Indeno(1,2,3-cd)pyrene	170	72	81 (≤50)
HU85	Benzo(g,h,i)perylene	120	49	84 (≤50)
HU85	Acenaphthylene	98U	22	Not calculable
HU85	Fluorene	98U	24	Not calculable

Associated SDG	Compound	Concentration (ug/Kg)		RPD (Limits)
		LDW-SS62-010	LDW-SS207-010	
HV37	Naphthalene	60U	120	Not calculable
HV37	Acenaphthylene	60U	34	Not calculable
HV37	Fluorene	38	36	5 (≤50)
HV37	Phenanthrene	210	240	13 (≤50)
HV37	Carbazole	39	45	14 (≤50)
HV37	Anthracene	120	140	15 (≤50)
HV37	Fluoranthene	700	730	4 (≤50)
HV37	Pyrene	450	490	9 (≤50)
HV37	Butylbenzylphthalate	46	48	4 (≤50)
HV37	Benzo(a)anthracene	270	320	17 (≤50)
HV37	Bis(2-ethylhexyl)phthalate	470	550	16 (≤50)

*Indicates change as the result of report review.

Associated SDG	Compound	Concentration (ug/Kg)		RPD (Limits)
		LDW-SS62-010	LDW-SS207-010	
HV37	Chrysene	440	530	19 (≤50)
HV37	Benzo(b)fluoranthene	390	390	0 (≤50)
HV37	Benzo(k)fluoranthene	380	500	27 (≤50)
HV37	Benzo(a)pyrene	290	330	13 (≤50)
HV37	Indeno(1,2,3-cd)pyrene	110	120	9 (≤50)
HV37	Benzo(g,h,i)perylene	82	97	17 (≤50)

XVII. Field Blanks

Samples LDW-SS103-RB (SDG HU85), LDW-SS7-RB (SDG HV37), and samples LDW-SSB7a-RB and LDW-SS71-RB (SDG HV58) were identified as rinsate blanks. No semivolatile contaminants were found in these blanks.

GC/MS Semivolatiles by EPA SW 846 Method 8270C using Selected Ion Monitoring (SIM).

I. Technical Holding Times

All technical holding time requirements were met.

The chain-of-custodies were reviewed for documentation of cooler temperatures. All cooler temperatures met validation criteria.

II. GC/MS Instrument Performance Check

Instrument performance was acceptable unless noted otherwise under initial calibration and continuing calibration sections.

Instrument performance check data were not reviewed for Level II.

III. Initial Calibration

Percent relative standard deviations (%RSD) were less than or equal to 30.0% for all compounds with the following exceptions:

Associated SDG	Date	Compound	%RSD	Associated Samples	Flag	A or P
HV42	1/29/05	Benzoic acid	39.2	LDW-SS45-010** LDW-SS46-010** LDW-SS6-010** LDW-SS47-010** LDW-SS108-010** LDW-SS61-010** LDW-SS25-010** LDW-SS86-010**	J (all detects) UJ (all non-detects)	A
HV76	1/29/05	Benzoic acid	39.231	LDW-SS98-010** LDW-SS141-010** LDW-SSB9a-010** LDW-SS156-010** LDW-SS155-010** LDW-SS154-010** LDW-SS153-010** LDW-SS152-010** LDW-SS151-010** LDW-SS144-010**	J (all detects) UJ (all non-detects)	A

Average relative response factors (RRF) for all target compounds and system monitoring compounds were within validation criteria.

IV. Continuing Calibration

Continuing calibration was performed at the required frequencies.

All of the continuing calibration percent differences (%D) between the initial calibration RRF and the continuing calibration RRF were less than or equal to 25.0% with the following exceptions:

Associated SDG	Date	Compound	%D	Associated Samples	Flag	A or P
HV42 HV76	3/28/05	Benzoic acid N-Nitrosodimethylamine	31.7 28.0	LDW-SS6-010** LDW-SSB9a-010** LDW-SS156-010** LDW-SS155-010** LDW-SS154-010** LDW-SS153-010**	J (all detects) UJ (all non-detects) J (all detects) UJ (all non-detects)	A
HV42 HV76	3/30/05	Benzoic acid N-Nitrosodimethylamine	42.1 34.0	LDW-SS61-010RE** LDW-SS152-010**	J (all detects) UJ (all non-detects) J (all detects) UJ (all non-detects)	A
HV76	3/29/05	N-Nitrosodimethylamine	30.8	LDW-SS151-010** LDW-SS144-010**	J (all detects) UJ (all non-detects)	A

All of the continuing calibration RRF values were within validation criteria.

V. Blanks

Method blanks were reviewed for each matrix as applicable. No polynuclear aromatic hydrocarbon contaminants were found in the method blanks with the following exceptions:

Associated SDG	Method Blank ID	Extraction Date	Compound TIC (RT in minutes)	Concentration	Associated Samples
HV42	MB-033005	3/30/05	Diethylphthalate	9.3 ug/Kg	LDW-SS6-010RE**

Associated SDG	Method Blank ID	Extraction Date	Compound TIC (RT in minutes)	Concentration	Associated Samples
HV76 HW06	MB-032205	3/22/05	Diethylphthalate	8.0 ug/Kg	LDW-SS98-010** LDW-SS141-010** LDW-SSB9a-010** LDW-SS156-010** LDW-SS155-010** LDW-SS154-010** LDW-SS153-010** LDW-SS152-010** LDW-SS151-010** LDW-SS144-010** LDW-SS71-010 LDW-SS2-010 LDW-SS2-010DL LDW-SS69b-010 LDW-SS158-010 LDW-SS159-010 LDW-SS157-010 LDW-SS35-010 LDW-SS35-010DL

Sample concentrations were compared to concentrations detected in the method blanks. The sample concentrations were either not detected or were significantly greater (>10X for common contaminants, >5X for other contaminants) than the concentrations found in the associated method blanks with the following exceptions:

Associated SDG	Sample	Compound TIC (RT in minutes)	Reported Concentration	Modified Final Concentration
HV42	LDW-SS6-010RE**	Diethylphthalate	7.2 ug/Kg	7.2U ug/Kg
HV76	LDW-SS98-010**	Diethylphthalate	14 ug/Kg	14U ug/Kg
HV76	LDW-SS141-010**	Diethylphthalate	9.7 ug/Kg	9.7U ug/Kg
HV76	LDW-SS156-010**	Diethylphthalate	11 ug/Kg	11U ug/Kg
HV76	LDW-SS152-010**	Diethylphthalate	8.4 ug/Kg	8.4U ug/Kg
HV76	LDW-SS151-010**	Diethylphthalate	11 ug/Kg	11U ug/Kg
HV76	LDW-SS144-010**	Diethylphthalate	7.3 ug/Kg	7.3U ug/Kg
HW06	LDW-SS71-010	Diethylphthalate	6.5 ug/Kg	6.5U ug/Kg
HW06	LDW-SS157-010	Diethylphthalate	7.7 ug/Kg	7.7U ug/Kg

VI. Surrogate Spikes

Surrogates were added to all samples and blanks as required by the method. All surrogate recoveries (%R) were within QC limits with the following exceptions:

Associated SDG	Sample	Surrogate	%R (Limits)	Compound	Flag	A or P
HV00	LDW-SS106-010	1,2-Dichlorobenzene-d4 Nitrobenzene-d5	34.8 (40-130) 36.4 (40-130)	Benzo(a)anthracene Benzo(b)fluoranthene Indeno(1,2,3-cd)pyrene 1,4-Dichlorobenzene 1,2,4-Trichlorobenzene Hexachlorobenzene Hexachlorobutadiene Dimethylphthalate Diethylphthalate Butylbenzylphthalate N-Nitrosodiphenylamine Benzyl alcohol 1,2-Dichlorobenzene N-Nitroso-di-propylamine N-Nitrosodimethylamine	J (all detects) UJ (all non-detects)	P
HV42	LDW-SS61-010**	2-Fluorobiphenyl 2-Fluorophenol 1,2-Dichlorobenzene-d4 2,4,6-Tribromophenol Phenol-d5 2-Chlorophenol-d4 Nitrobenzene-d5 Terphenyl-d14	31.6 (40-130) 28.5 (40-130) 22.4 (40-130) 35.2 (40-130) 28.8 (40-130) 28.5 (40-130) 26.8 (40-130) 35.2 (40-130)	All TCL compounds	J (all detects) UJ (all non-detects)	A
HV76	LDW-SS155-010**	Phenol-d5 2-Fluorophenol	34.7 (40-130) 37.9 (40-130)	Benzoic acid 2-Methylphenol 2,4-Dimethylphenol Pentachlorophenol	J (all detects) UJ (all non-detects)	P

VII. Matrix Spike/Matrix Spike Duplicates

Matrix spike (MS) and matrix spike duplicate (MSD) samples were reviewed for each matrix as applicable. Percent recoveries (%R) and relative percent differences (RPD) were within QC limits with the following exceptions:

Associated SDG	Spike ID (Associated Samples)	Compound	MS (%R) (Limits)	MSD (%R) (Limits)	RPD (Limits)	Flag	A or P
HV58	LDW-SS145-010MS/MSD (LDW-SS145-010)	Pentachlorophenol	-	39.2 (40-130)	-	J (all detects) UJ (all non-detects)	A
HV42	LDW-SS86-010MS/MSD (LDW-SS86-010**)	N-Nitroso-di-n-propylamine	34.7 (40-130)	-	-	J (all detects) UJ (all non-detects)	A

Associated SDG	Spike ID (Associated Samples)	Compound	MS (%R) (Limits)	MSD (%R) (Limits)	RPD (Limits)	Flag	A or P
HV76	LDW-SS151-010MS/MSD (LDW-SS151-010**)	N-Nitroso-di-n-propylamine	31.2 (40-130)	-	-	J (all detects) UJ (all non-detects)	A

VIII. Laboratory Control Samples (LCS)

Laboratory control samples were reviewed for each matrix as applicable. Percent recoveries (%R) were within QC limits.

Standard reference material was performed at the required frequencies.

IX. Regional Quality Assurance and Quality Control

Not applicable.

X. Internal Standards

All internal standard areas and retention times were within QC limits.

XI. Target Compound Identifications

All target compound identifications were within validation criteria.

Target compound identifications data were not reviewed for Level II.

XII. Compound Quantitation and CRQLs

All compound quantitation and CRQLs were within validation criteria with the following exceptions:

Associated SDG	Sample	Compound	Finding	Criteria	Flag	A or P
HW06	LDW-SS2-010	Benzo(b)fluoranthene	Sample result exceeded calibration range.	Reported result should be within calibration range.	J (all detects)	A
HW06	LDW-SS35-010	Benzo(a)anthracene Benzo(b)fluoranthene Benzo(a)pyrene Indeno(1.2.3-cd)pyrene	Sample result exceeded calibration range.	Reported result should be within calibration range.	J (all detects) J (all detects) J (all detects) J (all detects)	A

Compound quantitation and CRQLs data were not reviewed for Level II.

XIII. Tentatively Identified Compounds (TICs)

Tentatively identified compounds were not reported by the laboratory for Level IV.

Tentatively identified compounds data were not reviewed for Level II.

XIV. System Performance

The system performance was acceptable.

System performance data were not reviewed for Level II.

XV. Overall Assessment

The overall assessment of data was acceptable. In the case where more than one result was reported for an individual sample, the least technically acceptable results were rejected as follows:

Associated SDG	Sample	Compound	Flag	A or P
HV58	LDW-SS24-010	Benzo(b)fluoranthene	R	A
HV58	LDW-SS24-010DL	All TCL compounds except Benzo(b)fluoranthene	R	A
HV42	LDW-SS61-010**	All TCL compounds	R	A
HW06	LDW-SS2-010	Benzo(a)anthracene Benzo(b)fluoranthene	R R	A
HW06	LDW-SS2-010DL	All TCL compounds except Benzo(a)anthracene Benzo(b)fluoranthene	R	A
HW06	LDW-SS35-010	Benzo(a)anthracene Benzo(b)fluoranthene Benzo(a)pyrene Indeno(1,2,3-cd)pyrene	R R R R	A
HW06	LDW-SS35-010DL	All TCL compounds except Benzo(a)anthracene Benzo(b)fluoranthene Benzo(a)pyrene Indeno(1,2,3-cd)pyrene	R	A

*Indicates change as the result of report review.

XVI. Field Duplicates

Samples LDW-SS19-010 and LDW-SS205-010 and samples LDW-SS131-010 and LDW-SS206-010 (SDG HV00), samples LDW-SS82-010 and LDW-SS204-010 (SDG HU85), and samples LDW-SS62-010 and LDW-SS207-010 (SDG HV37) were identified as field duplicates. No semivolatiles were detected in any of the samples with the following exceptions:

Associated SDG	Compound	Concentration (ug/Kg)		RPD (Limits)
		LDW-SS19-010	LDW-SS205-010	
HV00	Benzo(a)anthracene	170	150	13 (≤50)
HV00	Benzo(b)fluoranthene	170	260	42 (≤50)
HV00	Benzo(a)pyrene	130	190	38 (≤50)
HV00	Indeno(1,2,3-cd)pyrene	78	110	34 (≤50)
HV00	Butylbenzylphthalate	9.9	32	105 (≤50)
HV00	1,2-Dichlorobenzene	6.6	6.6U	Not calculable

Associated SDG	Compound	Concentration (ug/Kg)		RPD (Limits)
		LDW-SS131-010	LDW-SS206-010	
HV00	Benzo(a)anthracene	56	42	29 (≤50)
HV00	Benzo(b)fluoranthene	71	47	41 (≤50)
HV00	Benzo(a)pyrene	62	37	51 (≤50)
HV00	Indeno(1,2,3-cd)pyrene	47	28	51 (≤50)
HV00	Benzoic acid	90	130	36 (≤50)
HV00	Dimethylphthalate	21	14	40 (≤50)
HV00	Butylbenzylphthalate	21	46	75 (≤50)

Associated SDG	Compound	Concentration (ug/Kg)		RPD (Limits)
		LDW-SS82-010	LDW-SS204-010	
HU85	Benzo(a)anthracene	56	29	22 (≤50)
HU85	Benzo(b)fluoranthene	54	32	51 (≤50)
HU85	Benzo(a)pyrene	34	21	47 (≤50)
HU85	Indeno(1,2,3-cd)pyrene	24	14	53 (≤50)

Associated SDG	Compound	Concentration (ug/Kg)		RPD (Limits)
		LDW-SS62-010	LDW-SS207-010	
HV37	Benzo(a)anthracene	22	32	37 (≤50)
HV37	Benzo(b)fluoranthene	25	43	53 (≤50)
HV37	Benzo(a)pyrene	20	29	37 (≤50)
HV37	Indeno(1,2,3-cd)pyrene	14	20	35 (≤50)

XVII. Field Blanks

No field blanks were identified in this SDG.

GC Chlorinated Pesticides by EPA SW 846 Method 8081A

I. Technical Holding Times

All technical holding time requirements were met.

The chain-of-custodies were reviewed for documentation of cooler temperatures. All cooler temperatures met validation criteria.

II. GC/ECD Instrument Performance Check

Instrument performance was acceptable unless noted otherwise under initial calibration and continuing calibration sections.

Instrument performance check data were not reviewed for Level II.

III. Initial Calibration

Initial calibration of multicomponent compounds was performed for the primary (quantitation) column as required by the method.

The percent relative standard deviations (%RSD) were less than or equal to 20.0% for all compounds.

Retention time windows were evaluated and considered technically acceptable.

IV. Continuing Calibration

Continuing calibration was performed at required frequencies.

The percent differences (%D) of calibration factors in continuing standard mixtures were within the 15.0% QC limits.

The percent difference (%D) of the second source calibration standard were less than or equal to 15.0% for all compounds.

Retention times (RT) of all compounds in the calibration standards were within QC limits.

V. Blanks

Method blanks were reviewed for each matrix as applicable. No chlorinated pesticide contaminants were found in the method blanks.

VI. Surrogate Spikes

Surrogates were added to all samples and blanks as required by the method. All surrogate recoveries (%R) were within QC limits.

VII. Matrix Spike/Matrix Spike Duplicates

Matrix spike (MS) and matrix spike duplicate (MSD) samples were reviewed for each matrix as applicable. Percent recoveries (%R) and relative percent differences (RPD) were within QC limits with the following exceptions:

Associated SDG	Spike ID (Associated Samples)	Compound	MS (%R) (Limits)	MSD (%R) (Limits)	RPD (Limits)	Flag	A or P
HW16	LDW-SSB7a-010MS/MSD (LDW-SSB7a-010)	Hexachlorobenzene	330 (50-150)	-	130 (≤50)	J (all detects) UJ (all non-detects)	A

VIII. Laboratory Control Samples (LCS)

Laboratory control samples were reviewed for each matrix as applicable. Percent recoveries (%R) were within QC limits with the following exceptions:

Associated SDG	LCS ID	Compound	%R (Limits)	Associated Samples	Flag	A or P
HU85	LCS-031405	Endrin aldehyde	33.8 (50-150)	LDW-SS85-010 LDW-SS73-010 LDW-SS82-010 LDW-SS74-010 LDW-SS204-010	J (all detects) UJ (all non-detects)	P
HV37 HV00	LCS-031605	Endrin aldehyde	36.8 (50-150)	LDW-SS133-010 LDW-SS150-010 LDW-SS81-010 LDW-SS41-010 LDW-SS131-010 LDW-SS206-010 LDW-SS140-010	J (all detects) UJ (all non-detects)	P
HV42 HV38	LCS-032105	Endrin aldehyde	27.8 (50-150)	LDW-SS108-010** LDW-SS25-010** LDW-SSB2b-010	J (all detects) UJ (all non-detects)	P
HV58 HW06 HW16	LCS-032205	Endrin aldehyde	19.5 (50-150)	LDW-SS9-010 LDW-SS59-010 LDW-SSB5b-010 LDW-SS2-010 LDW-SS69b-010 LDW-SSB7a-010	J (all detects) UJ (all non-detects)	P

Associated SDG	LCS ID	Compound	%R (Limits)	Associated Samples	Flag	A or P
HV72 HV76	LCS-032105	Endrin aldehyde	24.2 (50-150)	LDW-SS93-010 LDW-SSB6a-010 LDW-SSB9a-010** LDW-SS155-010** LDW-SS152-010** LDW-SS144-010**	J (all detects) UJ (all non-detects)	P

Standard reference material was performed at the required frequencies.

IX. Regional Quality Assurance and Quality Control

Not applicable.

X. Pesticide Cleanup Checks

a. Florisil Cartridge Check

Although florisil cleanup was not required by the method, it was performed by the laboratory for EPA Level IV.

Florisil cartridge check data were not reviewed for Level II.

b. GPC Calibration

Although GPC cleanup was not required by the method, GPC cleanup was performed.

XI. Target Compound Identification

All target compound identifications were within validation criteria for samples on which EPA Level IV review was performed.

Due to the presence of numerous interfering peaks in the sample and since GC/MS confirmation was not performed, the data was qualified as noted below due to potential false positives:

Associated SDG	Sample	Compound	Flag	A or P
II22	LDW-SSB4a-010	Hexachlorobenzene	NJ (all detects)	A

XII. Compound Quantitation and Reported CRQLs

All compound quantitation and CRQLs were within validation criteria for samples on which EPA Level IV review was performed.

The sample results for detected compounds from the two columns were within 40.0% relative percent differences (RPD) with the following exceptions:

Associated SDG	Sample	Compound	RPD	Flag	A or P
HU85	LDW-SS85-010	alpha-Chlordane	61	J (all detects)	A

Compound quantitation and CRQLs data were not reviewed for Level II.

XIII. Overall Assessment of Data

The overall assessment of data was acceptable.

XIV. Field Duplicates

Samples LDW-SS82-010 and LDW-SS204-010 (SDG HU85) and samples LDW-SS131-010 and LDW-SS206-010 (SDG HV00) were identified as field duplicates. No chlorinated pesticides were detected in any of the samples with the following exceptions:

Associated SDG	Compound	Concentration (ug/Kg)		RPD (Limits)
		LDW-SS131-010	LDW-SS206-010	
HV00	Hexachlorobenzene	0.98U	1.6	Not calculable

XV. Field Blanks

No field blanks were identified in this SDG.

Polychlorinated Biphenyls by EPA SW 846 Method 8082

I. Technical Holding Times

All technical holding time requirements were met.

The chain-of-custodies were reviewed for documentation of cooler temperatures. All cooler temperatures met validation criteria.

II. GC/ECD Instrument Performance Check

Instrument performance was acceptable unless noted otherwise under initial calibration and continuing calibration sections.

Instrument performance check data were not reviewed for Level II.

III. Initial Calibration

Initial calibration of multicomponent compounds was performed for the primary (quantitation) column as required by the method.

The percent relative standard deviations (%RSD) were less than or equal to 20.0% for all compounds.

Retention time windows were evaluated and considered technically acceptable.

IV. Continuing Calibration

Continuing calibration was performed at required frequencies.

The percent differences (%D) of calibration factors in continuing standard mixtures were within the 15.0% QC limits.

The percent difference (%D) of the second source calibration standard were less than or equal to 15.0% for all compounds.

Retention times (RT) of all compounds in the calibration standards were within QC limits.

V. Blanks

Method blanks were reviewed for each matrix as applicable. No polychlorinated biphenyl contaminants were found in the method blanks.

VI. Surrogate Spikes

Surrogates were added to all samples and blanks as required by the method. All surrogate recoveries (%R) were within QC limits with the following exceptions:

Associated SDG	Sample	Column	Surrogate	%R (Limits)	Compound	Flag	A or P
HR49	UB-SS8-010	Not specified	Tetrachloro-m-xylene	35.2 (50-150)	All TCL compounds	J (all detects) UJ (all non-detects)	P

VII. Matrix Spike/Matrix Spike Duplicates

Matrix spike (MS) and matrix spike duplicate (MSD) samples were reviewed for each matrix as applicable. Percent recoveries (%R) and relative percent differences (RPD) were within QC limits.

VIII. Laboratory Control Samples (LCS)

Laboratory control samples were reviewed for each matrix as applicable. Percent recoveries (%R) and relative percent differences (RPD) were within QC limits.

Standard reference material was performed at the required frequencies.

IX. Regional Quality Assurance and Quality Control

Not applicable.

X. Pesticide Cleanup Checks

a. Florisil Cartridge Check

Although florisil cleanup was not required by the method, it was performed by the laboratory for EPA Level IV.

Florisil cartridge check data were not reviewed for Level II.

b. GPC Calibration

Although GPC cleanup was not required by the method, GPC cleanup was performed by the laboratory for EPA Level IV.

Although sulfuric acid cleanup was not required by the method, sulfuric acid cleanup was performed by the laboratory for EPA Level IV.

GPC cleanup data were not reviewed for Level II.

XI. Target Compound Identification

All target compound identifications were within validation criteria.

Target compound identifications data were not reviewed for Level II.

XII. Compound Quantitation and Reported CRQLs

All compound quantitation and CRQLs were within validation criteria with the following exceptions:

Associated SDG	Sample	Compound	Finding	Criteria	Flag	A or P
HU85 HV37 HW06	LDW-SS85-010 LDW-SS148-010 LDW-SS35-010	Aroclor-1254	Sample result exceeded calibration range.	Reported result should be within calibration range.	J (all detects)	A
HV42	LDW-SS6-010**	Aroclor-1248 Aroclor-1254 Aroclor-1260	Sample result exceeded calibration range.	Reported result should be within calibration range.	J (all detects) J (all detects) J (all detects)	A
HV38	LDW-SSB2b-010	Aroclor-1242 Aroclor-1254	Sample result exceeded calibration range.	Reported result should be within calibration range.	J (all detects) J (all detects)	A
HW06	LDW-SS71-010	Aroclor-1242	Sample result exceeded calibration range.	Reported result should be within calibration range.	J (all detects)	A

The sample results for detected compounds from the two columns were within 40.0% relative percent differences (RPD) with the following exceptions:

Associated SDG	Sample	Compound	RPD	Flag	A or P
HV00	LDW-SS11-010	Aroclor-1260	43	J (all detects)	A
HW06	LDW-SS71-010 LDW-SS158-010	Aroclor-1242	42	J (all detects)	A
HS56	SC-SS1b-010	Aroclor-1248 Aroclor-1260	41 48	J (all detects) J (all detects)	A

Compound quantitation and CRQLs data were not reviewed for Level II.

XIII. Overall Assessment of Data

The overall assessment of data was acceptable. In the case where more than one result was reported for an individual sample, the least technically acceptable results were rejected as follows:

Associated SDG	Sample	Compound	Flag	A or P
HU85	LDW-SS85-010	Aroclor-1254 Aroclor-1260	R R	A
HU85	LDW-SS85-010DL	All TCL compounds except Aroclor-1254 Aroclor-1260	R	A
HV37	LDW-SS148-010	Aroclor-1254	R	A
HV37	LDW-SS148-010DL	All TCL compounds except Aroclor-1254	R	A
HV42	LDW-SS6-010**	Aroclor-1248 Aroclor-1254 Aroclor-1260	R R R	A
HV42	LDW-SS6-010DL**	All TCL compounds except Aroclor-1248 Aroclor-1254 Aroclor-1260	R	A
HV38 HW06	LDW-SSB2b-010 LDW-SS35-010	Aroclor-1242 Aroclor-1254	R R	A
HV38 HW06	LDW-SSB2b-010DL LDW-SS35-010DL	All TCL compounds Aroclor-1242 Aroclor-1254	R	A
HW06	LDW-SS71-010	Aroclor-1242 Aroclor-1254 Aroclor-1260	R R R	A
HW06	LDW-SS71-010DL	All TCL compounds except Aroclor-1242 Aroclor-1254 Aroclor-1260	R	A

*Indicates change as the result of report review.

XIV. Field Duplicates

Samples LDW-SS82-010 and LDW-SS204-010 (SDG HU85), samples LDW-SS62-010 and LDW-SS207-010 (SDG HV37), and samples LDW-SS131-010 and LDW-SS206-010 (SDG HV00) were identified as field duplicates. No polychlorinated biphenyls were detected in any of the samples with the following exceptions:

Associated SDG	Compound	Concentration (ug/Kg)		RPD (Limits)
		LDW-SS82-010	LDW-SS204-010	
HU85	Aroclor-1248	62	60	3 (≤50)
HU85	Aroclor-1254	72	84	15 (≤50)
HU85	Aroclor-1260	59	62	5 (≤50)

Associated SDG	Compound	Concentration (ug/Kg)		RPD (Limits)
		LDW-SS62-010	LDW-SS207-010	
HV37	Aroclor-1248	82	76	8 (≤50)
HV37	Aroclor-1254	140	130	7 (≤50)
HV37	Aroclor-1260	120	110	9 (≤50)

Associated SDG	Compound	Concentration (ug/Kg)		RPD (Limits)
		LDW-SS131-010	LDW-SS206-010	
HV00	Aroclor-1254	21	23	9 (≤50)

Associated SDG	Compound	Concentration (ug/Kg)		RPD (Limits)
		LDW-SS19-010	LDW-SS205-010	
HV00	Aroclor-1242	52	34	42 (≤50)
HV00	Aroclor-1254	110	86	24 (≤50)
HV00	Aroclor-1260	95	63	40 (≤50)

XV. Field Blanks

Samples LDW-SS103-RB (SDG HU85) and LDW-SS7-RB (SDG HV37), and samples LDW-SSB7a-RB and LDW-SS71-RB (SDG HV58) were identified as rinsate blanks. No polychlorinated biphenyl contaminants were found in these blanks.

Metals by EPA SW 846 Methods 6010B/200.8/7000

I. Technical Holding Times

All technical holding time requirements were met.

The chain-of-custodies were reviewed for documentation of cooler temperatures. All cooler temperatures met validation criteria.

II. Calibration

An initial calibration was performed.

The frequency and analysis criteria of the initial calibration verification (ICV) and continuing calibration verification (CCV) were met.

III. Blanks

Method blanks were reviewed for each matrix as applicable.

Data qualification by the initial, continuing and preparation blanks (ICB/CCB/PBs) was based on the maximum contaminant concentration in the ICB/CCB/PBs in the analysis of each analyte. No contaminant concentrations were found in the initial, continuing and preparation blanks with the following exceptions:

Associated SDG	Method Blank ID	Analyte	Maximum Concentration	Associated Samples
HV58	PB (prep blank)	Zinc	0.9 mg/Kg	LDW-SS24-010 LDW-SS9-010 LDW-SS77-010 LDW-SS59-010 LDW-SSB5b-010 LDW-SS53-010 LDW-SS34-010 LDW-SSB4a-010 LDW-SS29-010 LDW-SS107-010 LDW-SS145-010

Sample concentrations were compared to the maximum contaminant concentrations detected in the ICB/CCB/PBs. The sample concentrations were either not detected or were significantly greater (>5X blank contaminants) than the concentrations found in the associated method blanks.

IV. ICP Interference Check Sample (ICS) Analysis

The frequency of analysis was met.

The criteria for analysis were met with the following exceptions:

Associated SDG	ICS ID	Analyte	Concentration	Reporting Limit	Associated Samples	Flag	A or P
HV42	ICSA	Selenium	-52.8 ug/L	50 ug/L	LDW-SS6-010**	UJ (all non-detects)	P
HV76	ICSA	Molybdenum	5.7 ug/L	5.0 ug/L	LDW-SS152-010** LDW-SS151-010**	J (all detects)	P
HV76	ICSA	Selenium	-57.2 ug/L	50.0 ug/L	LDW-SS152-010** LDW-SS151-010**	UJ (all non-detects)	P

Samples were qualified as estimated (J) if the interferent concentrations in the samples were greater than ninety percent of the spiked interferent concentrations in the ICSA.

*V. Matrix Spike Analysis

Matrix spike (MS) analyses were reviewed for each matrix as applicable. Percent recoveries (%R) were within QC limits with the following exceptions:

Associated SDG	Spike ID (Associated Samples)	Analyte	%R (Limits)	Flag	A or P
HU85	LDW-SS85-010MS (LDW-SS85-010 LDW-SS73-010 LDW-SS78-010 LDW-SS82-010 LDW-SS74-010 LDW-SS204-010 LDW-SS91-010 LDW-SS103-010 LDW-SS68-010 LDW-SS8-010)	Antimony	6.1 (70-130)	J (all detects) UJ (all non-detects)	A
HV37	LDW-SS7-010MS (LDW-SS7-010 LDW-SS3-010 LDW-SS95-010 LDW-SS133-010 LDW-SS138-010 LDW-SS139-010 LDW-SS137-010 LDW-SS132-010 LDW-SS66-010 LDW-SS62-010 LDW-SS207-010 LDW-SS146-010 LDW-SS147-010 LDW-SS148-010 LDW-SS149-010 LDW-SS150-010)	Antimony	1.6 (70-130)	J (all detects) UJ (all non-detects)	A

Associated SDG	Spike ID (Associated Samples)	Analyte	%R (Limits)	Flag	A or P
HV00	LDW-SS81-010MS (LDW-SS81-010 LDW-SS65-010 LDW-SS41-010 LDW-SS30-010 LDW-SS21-010 LDW-SS19-010 LDW-SS205-010 LDW-SS11-010 LDW-SS16-010 LDW-SS105-010 LDW-SS106-010 LDW-SS122-010 LDW-SS131-010 LDW-SS206-010 LDW-SS140-010)	Antimony	1.6 (70-130)	J (all detects) UJ (all non-detects)	A
HV42 HV38	LDW-SS45-010MS (LDW-SS45-010** LDW-SS46-010** LDW-SS6-010** LDW-SS47-010** LDW-SS108-010** LDW-SS61-010** LDW-SS25-010** LDW-SS86-010** LDW-SS39-010 LDW-SS100-010 LDW-SSB2b-010)	Antimony	3.3 (70-130)	J (all detects) UJ (all non-detects)	A
HV58	LDW-SS90-010MSRE (LDW-SS90-010 LDW-SS24-010 LDW-SS9-010 LDW-SS77-010 LDW-SS59-010 LDW-SSB5b-010 LDW-SS53-010 LDW-SS34-010 LDW-SSB4a-010 LDW-SS29-010 LDW-SS107-010 LDW-SS145-010)	Antimony	5.3 (70-130)	J (all detects) UJ (all non-detects)	A
HV58	LDW-SS90-010MSRE (LDW-SS90-010)	Chromium	47.2 (70-130)	J (all detects) UJ (all non-detects)	A

Associated SDG	Spike ID (Associated Samples)	Analyte	%R (Limits)	Flag	A or P
HV58	LDW-SS90-010MS (LDW-SS24-010 LDW-SS9-010 LDW-SS77-010 LDW-SS59-010 LDW-SSB5b-010 LDW-SS53-010 LDW-SS34-010 LDW-SSB4a-010 LDW-SS29-010 LDW-SS107-010 LDW-SS145-010)	Copper Zinc	159 (70-130) 308 (70-130)	J (all detects) J (all detects)	A
HV72	LDW-SS93-010MS (LDW-SS93-010 LDW-SS124-010 LDW-SS135-010 LDW-SS136-010 LDW-SSB6a-010 LDW-SSC1-010)	Antimony	2.2 (70-130)	J (all detects) UJ (all non-detects)	A
HV76	LDW-SS98-010MS (LDW-SS98-010** LDW-SS141-010** LDW-SSB9a-010** LDW-SS156-010** LDW-SS155-010** LDW-SS154-010** LDW-SS153-010** LDW-SS152-010** LDW-SS151-010** LDW-SS144-010**)	Antimony	2.5 (70-130)	J (all detects) UJ (all non-detects)	A
HW06	LDW-SS71-010MS (LDW-SS71-010 LDW-SS2-010 LDW-SS69b-010 LDW-SS158-010 LDW-SS159-010 LDW-SS157-010 LDW-SS35-010)	Antimony	5.5 (70-130)	J (all detects) UJ (all non-detects)	A
HW06	LDW-SS71-010MS (LDW-SS71-010 LDW-SS2-010 LDW-SS69b-010 LDW-SS158-010 LDW-SS159-010 LDW-SS157-010 LDW-SS35-010)	Copper	159 (70-130)	J (all detects)	A

Associated SDG	Spike ID (Associated Samples)	Analyte	%R (Limits)	Flag	A or P
HW06	LDW-SS71-010MS (LDW-SS71-010 LDW-SS2-010 LDW-SS69b-010 LDW-SS158-010 LDW-SS159-010 LDW-SS157-010 LDW-SS35-010)	Mercury	37.5 (55-137)	J- (all detects) UJ (all non-detects)	A
HW16	LDW-SSB7a-010MS (LDW-SSB7a-010)	Antimony	4.6 (70-130)	J (all detects) UJ (all non-detects)	A

*Although antimony percent recoveries were severely low (<30%), all the results in the associated samples were qualified as estimated (J/UJ) since the post spike recoveries for antimony were greater than 75%.

*Added above text.

VI. Duplicate Sample Analysis

Duplicate (DUP) sample analyses were reviewed for each matrix as applicable. Results were within QC limits with the following exceptions:

Associated SDG	DUP ID (Associated Samples)	Analyte	RPD (Limits)	Difference (Limits)	Flag	A or P
HV58	LDW-SS90-010DUPRE (LDW-SS90-010)	Lead Zinc	65.7 (≤30) 34.1 (≤30)	- -	J (all detects) UJ (all non-detects) J (all detects) UJ (all non-detects)	A
HV58	LDW-SS90-010DUP (LDW-SS24-010 LDW-SS9-010 LDW-SS77-010 LDW-SS59-010 LDW-SS5b-010 LDW-SS53-010 LDW-SS34-010 LDW-SSB4a-010 LDW-SS29-010 LDW-SS107-010 LDW-SS145-010)	Arsenic Lead Nickel Zinc	74.4 (≤30) 52.6 (≤30) - 132 (≤30)	- - 9 mg/Kg (≤8 mg/Kg) -	J (all detects) UJ (all non-detects)	A

Associated SDG	DUP ID (Associated Samples)	Analyte	RPD (Limits)	Difference (Limits)	Flag	A or P
HW06	LDW-SS71-010DUP (LDW-SS71-010 LDW-SS2-010 LDW-SS69b-010 LDW-SS158-010 LDW-SS159-010 LDW-SS157-010 LDW-SS35-010)	Copper Mercury	44.8 (≤30) -	- 0.32 mg/Kg (≤0.12)	J (all detects) UJ (all non-detects) J (all detects) UJ (all non-detects)	A

VII. Laboratory Control Samples (LCS)

Laboratory control samples were reviewed for each matrix as applicable. Percent recoveries (%R) were within QC limits.

Standard reference material was performed at the required frequencies.

VIII. Internal Standards (ICP-MS)

All internal standard areas and retention times were within QC limits.

IX. Furnace Atomic Absorption QC

Graphite furnace atomic absorption was not utilized.

X. ICP Serial Dilution

ICP serial dilution was not performed by the laboratory.

XI. Sample Result Verification

All sample result verifications met validation criteria.

Sample result verification data were not reviewed for Level II.

Laboratory reported antimony, arsenic, and thallium by EPA SW 846 Method 200.8 instead of EPA SW 846 Method 6020 as required by the method.

XII. Overall Assessment of Data

The overall assessment of data was acceptable.

XIII. Field Duplicates

Samples LDW-SS82-010 and LDW-SS204-010 (SDG HU85), samples LDW-SS62-010 and LDW-SS207-010 (SDG HV37), samples LDW-SS19-010 and LDW-SS205-010, and samples LDW-SS131-010 and LDW-SS206-010 (SDG HV00) were identified as field duplicates. No metals were detected in any of the samples with the following exceptions:

Associated SDG	Analyte	Concentration (mg/Kg)		RPD (Limits)
		LDW-SS82-010	LDW-SS204-010	
HU85	Arsenic	9.4	8.6	9 (≤50)
HU85	Cadmium	0.4U	0.4	Not calculable
HU85	Chromium	27	27.7	3 (≤50)
HU85	Cobalt	8.4	8.7	4 (≤50)
HU85	Copper	51.7	59.6	14 (≤50)
HU85	Lead	32	328	164 (≤50)
HU85	Mercury	0.15	0.11	31 (≤50)
HU85	Nickel	19	20	5 (≤50)
HU85	Vanadium	60.3	63.9	6 (≤50)
HU85	Zinc	106	150	34 (≤50)
HU85	Molybdenum	1	1.6	46 (≤50)

Associated SDG	Analyte	Concentration (mg/Kg)		RPD (Limits)
		LDW-SS62-010	LDW-SS207-010	
HV37	Arsenic	16.8	16.5	2 (≤50)
HV37	Cadmium	0.8	0.8	0 (≤50)
HV37	Chromium	38	39	3 (≤50)
HV37	Cobalt	10.9	10.9	0 (≤50)
HV37	Copper	109	107	2 (≤50)

Associated SDG	Analyte	Concentration (mg/Kg)		RPD (Limits)
		LDW-SS62-010	LDW-SS207-010	
HV37	Lead	58	58	0 (≤50)
HV37	Mercury	0.5	0.28	56 (≤50)
HV37	Nickel	24	24	0 (≤50)
HV37	Vanadium	77.4	77.2	0 (≤50)
HV37	Zinc	159	160	1 (≤50)
HV37	Molybdenum	2	2	0 (≤50)

Associated SDG	Analyte	Concentration (mg/Kg)		RPD (Limits)
		LDW-SS19-010	LDW-SS205-010	
HV00	Arsenic	14.3	17.7	21 (≤50)
HV00	Cadmium	0.7	0.7	0 (≤50)
HV00	Chromium	41.2	69.9	3 (≤50)
HV00	Cobalt	11.2	11.6	4 (≤50)
HV00	Copper	127	134	5 (≤50)
HV00	Lead	80	72	11 (≤50)
HV00	Mercury	0.40	0.3	29 (≤50)
HV00	Nickel	29	29	0 (≤50)
HV00	Vanadium	74.2	74.8	1 (≤50)
HV00	Zinc	191	210	9 (≤50)
HV00	Molybdenum	2.7	2.4	12 (≤50)

Associated SDG	Analyte	Concentration (mg/Kg)		RPD (Limits)
		LDW-SS131-010	LDW-SS206-010	
HV00	Arsenic	10.4	9.6	8 (≤50)

*Indicates change as the result of report review.

Associated SDG	Analyte	Concentration (mg/Kg)		RPD (Limits)
		LDW-SS131-010	LDW-SS206-010	
HV00	Chromium	31	30	3 (≤50)
HV00	Cobalt	9.9	9.9	0 (≤50)
HV00	Copper	46.9	46.4	1 (≤50)
HV00	Lead	19	22	15 (≤50)
HV00	Mercury	0.1U	0.1	Not calculable
HV00	Nickel	23	22	4 (≤50)
HV00	Vanadium	68.2	68.5	0 (≤50)
HV00	Zinc	113	112	1 (≤50)
HV00	Molybdenum	2	2	0 (≤50)

XIV. Field Blanks

Samples LDW-SS103-RB (SDG HU85), LDW-SS7-RB (SDG HV37), and samples LDW-SSB7a-RB and LDW-SS71-RB (SDG HV58) were identified as rinsate blanks. No metal contaminants were found in these blanks.

Total Solids by EPA Method 160.3, Ammonia as Nitrogen by modified EPA Method 350.1, Sulfide by EPA Method 376.2, Grain Size by PSEP Method, & Total Organic Carbon by Plumb Method

I. Technical Holding Times

All technical holding time requirements were met with the following exceptions:

Associated SDG	Sample	Analyte	Total Days From Sample Collection Until Analysis	Required Holding Time (in Days) From Sample Collection Until Analysis	Flag	A or P
HW06	LDW-SS35-010	Total solids Sulfide	10	7	J- (all detects) R (all non-detects) J- (all detects) R (all non-detects)	P
HV72	LDW-SSMSMP43B-010	Sulfide	8	7	J- (all detects) UJ (all non-detects)	P
HR49	SC-SS1a-010 LW-SS3-010 LU-S9b-010 LW-SS6-010	Total solids	13	7	J- (all detects) R (all non-detects)	P
HR49	EB-SS2a-010 DRD-SS7-010 UB-SS8-010 EB-SS2b-010	Total solids	12	7	J- (all detects) R (all non-detects)	P
HR49	SB-SS6-010 LU-SS9a-010	Total solids	14	7	J- (all detects) R (all non-detects)	P

Since the results above were detected in the affected samples in SDGs HW06 and HR49, these findings did not warrant rejection (R) of the data.

Since the holding time was not grossly exceeded for sample LDW-SSMSMP43B-010 (SDG HV72), the results were qualified as estimated.

The chain-of-custodies were reviewed for documentation of cooler temperatures. All cooler temperatures met validation criteria.

II. Calibration

a. Initial Calibration

All criteria for the initial calibration of each method were met.

b. Calibration Verification

Calibration verification frequency and analysis criteria were met for each method when applicable.

III. Blanks

Method blanks were reviewed for each matrix as applicable. No contaminant concentrations were found in the method blanks with the following exceptions:

Associated SDG	Method Blank ID	Analyte	Concentration	Associated Samples
HU85	MB	Ammonia as N	0.16 mg/Kg	LDW-SS85-010 LDW-SS78-010 LDW-SS82-010 LDW-SS204-010 LDW-SS68-010
HV00	MB	Ammonia as N	0.24 mg/Kg	LDW-SS81-010 LDW-SS65-010 LDW-SS30-010 LDW-SS16-010 LDW-SS131-010 LDW-SS206-010

Sample concentrations were compared to concentrations detected in the method blanks. The sample concentrations were either not detected or were significantly greater (>5X blank contaminants) than the concentrations found in the associated method blanks.

IV. Matrix Spike/Matrix Spike Duplicates

Matrix spike (MS) and matrix spike duplicate (MSD) analyses were reviewed for each matrix as applicable. Percent recoveries (%R) and relative percent differences (RPD) were within QC limits with the following exceptions:

Associated SDG	Spike ID (Associated Samples)	Analyte	MS (%R) (Limits)	MSD (%R) (Limits)	RPD (Limits)	Flag	A or P
HV37	LDW-SS207-010MS/MSD (LDW-SS7-010 LDW-SS3-010 LDW-SS95-010 LDW-SS133-010 LDW-SS138-010 LDW-SS139-010 LDW-SS137-010 LDW-SS132-010 LDW-SS66-010 LDW-SS62-010 LDW-SS207-010 LDW-SS146-010 LDW-SS147-010 LDW-SS148-010 LDW-SS149-010 LDW-SS150-010)	Sulfide	61.9 (75-125)	63.1 (75-125)	-	J- (all detects) UJ (all non-detects)	A
HV42	LDW-SS86-010MS/MSD (LDW-SS45-010** LDW-SS46-010** LDW-SS6-010** LDW-SS47-010** LDW-SS108-010** LDW-SS61-010** LDW-SS25-010** LDW-SS86-010**)	Sulfide	-	73.5 (75-125)	-	J- (all detects) UJ (all non-detects)	A
HV00	LDW-SS122-010MS/MSD (LDW-SS81-010 LDW-SS65-010 LDW-SS41-010 LDW-SS30-010 LDW-SS21-010 LDW-SS19-010 LDW-SS205-010 LDW-SS11-010 LDW-SS16-010 LDW-SS105-010 LDW-SS106-010 LDW-SS122-010 LDW-SS131-010 LDW-SS206-010 LDW-SS140-010)	Sulfide	57.8 (75-125)	55.2 (75-125)	-	J- (all detects) UJ (all non-detects)	A
HV42 HV38	LDW-SS86-010MS/MSD (LDW-SS45-010** LDW-SS46-010** LDW-SS6-010** LDW-SS47-010** LDW-SS108-010** LDW-SS61-010** LDW-SS25-010** LDW-SS86-010** LDW-SS39-010 LDW-SS100-010 LDW-SSB2b-010)	Sulfide	-	73.5 (75-125)	-	J- (all detects) UJ (all non-detects)	A

Associated SDG	Spike ID (Associated Samples)	Analyte	MS (%R) (Limits)	MSD (%R) (Limits)	RPD (Limits)	Flag	A or P
HW06 HW16	LDW-SS157-010MS/MSD (LDW-SS2-010 LDW-SS69b-010 LDW-SS158-010 LDW-SS159-010 LDW-SS157-010 LDW-SSB7a-010)	Sulfide	50.6 (75-125)	63.5 (75-125)	-	J- (all detects) UJ (all non-detects)	A

V. Duplicates/Triplicates

Duplicate (DUP) and triplicate (TRP) sample analyses were reviewed for each matrix as applicable. Relative percent differences (RPD) and relative standard deviation (RSD) were within QC limits.

VI. Laboratory Control Samples

Laboratory control samples were reviewed for each matrix as applicable. Percent recoveries (%R) were within QC limits.

Standard reference material was performed for all analyses except sulfide.

VII. Sample Result Verification

All sample result verifications met validation criteria.

Sample result verification data were not reviewed for Level II.

VIII. Overall Assessment of Data

The overall assessment of data was acceptable.

IX. Field Duplicates

Samples LDW-SS82-010 and LDW-SS204-010 (SDG HU85), samples LDW-SS62-010 and LDW-SS207-010 (SDG HV37), samples LDW-SS19-010 and LDW-SS205-010, and samples LDW-SS131-010 and LDW-SS206-010 (SDG HV00) were identified as field duplicates. No contaminant concentrations were detected in any of the samples with the following exceptions:

Associated SDG	Analyte	Concentration		RPD (Limits)
		LDW-SS82-010	LDW-SS204-010	
HU85	Total solids	51.40 %	51.60 %	0 (≤50)

*Indicates change as the result of report review.

Associated SDG	Analyte	Concentration		RPD (Limits)
		LDW-SS82-010	LDW-SS204-010	
HU85	Ammonia as N	9.44 mg/Kg	9.27 mg/Kg	2 (≤50)
HU85	Total organic carbon	2.09 %	1.84 %	13 (≤50)
HU85	Sulfide	6.1U mg/Kg	11 mg/Kg	Not calculable
HU85	Phi size -2	99.1 % Finer	100 % Finer	1 (≤50)
HU85	Phi size -1	97.4 % Finer	98.5 % Finer	1 (≤50)
HU85	Phi size 0	96.6 % Finer	97.7 % Finer	1 (≤50)
HU85	Phi size 1	93.8 % Finer	94.6 % Finer	1 (≤50)
HU85	Phi size 2	87.3 % Finer	88.1 % Finer	1 (≤50)
HU85	Phi size 3	77.6 % Finer	78.1 % Finer	1 (≤50)
HU85	Phi size 4	54.1 % Finer	54.0 % Finer	0 (≤50)
HU85	Phi size 5	40.3 % Finer	39.4 % Finer	2 (≤50)
HU85	Phi size 6	26.9 % Finer	26.7 % Finer	1 (≤50)
HU85	Phi size 7	17.36 % Finer	17.5 % Finer	1 (≤50)
HU85	Phi size 8	11.0 % Finer	11.1 % Finer	1 (≤50)
HU85	Phi size 9	7.8 % Finer	7.8 % Finer	0 (≤50)
HU85	Phi size 10	5.7 % Finer	5.1 % Finer	11 (≤50)

Associated SDG	Analyte	Concentration		RPD (Limits)
		LDW-SS-89-010	LDW-SS-201-010	
HV37	Total Solids	42.4 %	42.7 %	1 (≤50)
HV37	Ammonia as N	22.1 mg/Kg	21.8 mg/Kg	1 (≤50)

*Indicates change as the result of report review.

Associated SDG	Analyte	Concentration		RPD (Limits)
		LDW-SS-89-010	LDW-SS-201-010	
HV37	Sulfide	35 mg/Kg	36 mg/Kg	3 (≤50)
HV37	Total organic carbon	2.91 %	2.84 %	3 (≤50)
HV37	Phi size 0	99.7 % Finer	99.6 % Finer	0 (≤50)
HV37	Phi size 1	98.8 % Finer	96.9 % Finer	2 (≤50)
HV37	Phi size 2	94.8 % Finer	93.0 % Finer	2 (≤50)
HV37	Phi size 3	92.8 % Finer	90.7 % Finer	2 (≤50)
HV37	Phi size 4	86.5 % Finer	84.8 % Finer	2 (≤50)
HV37	Phi size 5	73.1 % Finer	71.9 % Finer	2 (≤50)
HV37	Phi size 6	53.2 % Finer	50.9 % Finer	4 (≤50)
HV37	Phi size 7	35.2 % Finer	33.0 % Finer	6 (≤50)
HV37	Phi size 8	23.2 % Finer	21.5 % Finer	8 (≤50)
HV37	Phi size 9	17.0 % Finer	16.0 % Finer	6 (≤50)
HV37	Phi size 10	11.6 % Finer	11.2 % Finer	4 (≤50)

Associated SDG	Analyte	Concentration		RPD (Limits)
		LDW-SS19-010	LDW-SS205-010	
HV00	Total solids	51.70 %	51.70 %	0 (≤50)
HV00	Ammonia as N	5.71 mg/Kg	4.34 mg/Kg	27 (≤50)
HV00	Sulfide	6.6U mg/Kg	64 mg/Kg	Not calculable
HV00	Total organic carbon	2.03 %	2.33 %	14 (≤50)
HV00	Phi size -2	79.7 % Finer	100 % Finer	23 (≤50)

*Indicates change as the result of report review.

Associated SDG	Analyte	Concentration		RPD (Limits)
		LDW-SS19-010	LDW-SS205-010	
HV00	Phi size -1	78.4 % Finer	98.2 % Finer	22 (≤50)
HV00	Phi size 0	76.9 % Finer	95.6 % Finer	22 (≤50)
HV00	Phi size 1	73.9 % Finer	90.7 % Finer	20 (≤50)
HV00	Phi size 2	65.4 % Finer	81.8 % Finer	22 (≤50)
HV00	Phi size 3	58.9 % Finer	74.1 % Finer	23 (≤50)
HV00	Phi size 4	51.7 % Finer	64.7 % Finer	22 (≤50)
HV00	Phi size 5	47.4 % Finer	57.2 % Finer	19 (≤50)
HV00	Phi size 6	35.8 % Finer	43.9 % Finer	20 (≤50)
HV00	Phi size 7	24.1 % Finer	30.0 % Finer	22(≤50)
HV00	Phi size 8	16.0 % Finer	20.3 % Finer	24 (≤50)
HV00	Phi size 9	10.8 % Finer	13.0 % Finer	18 (≤50)
HV00	Phi size 10	7.1 % Finer	8.9 % Finer	23 (≤50)

Associated SDG	Analyte	Concentration		RPD (Limits)
		LDW-SS131-010	LDW-SS206-010	
HV00	Total solids	45.80 %	45.60 %	0 (≤50)
HV00	Ammonia as N	12.3 mg/Kg	11.6 mg/Kg	4 (≤50)
HV00	Sulfide	100 mg/Kg	28 mg/Kg	113 (≤50)
HV00	Total organic carbon	3.18 %	2.78 %	13 (≤50)
HV00	Phi size 0	99.7 % Finer	99.9 % Finer	0 (≤50)
HV00	Phi size 1	98.0 % Finer	98.1 % Finer	0 (≤50)

Associated SDG	Analyte	Concentration		RPD (Limits)
		LDW-SS131-010	LDW-SS206-010	
HV00	Phi size 2	94.6 % Finer	95.0 % Finer	0 (≤50)
HV00	Phi size 3	80.1 % Finer	80.9 % Finer	1 (≤50)
HV00	Phi size 4	60.2 % Finer	60.9 % Finer	1 (≤50)
HV00	Phi size 5	47.0 % Finer	45.1 % Finer	4 (≤50)
HV00	Phi size 6	30.7 % Finer	29.5 % Finer	4 (≤50)
HV00	Phi size 7	18.8 % Finer	18.0 % Finer	4 (≤50)
HV00	Phi size 8	11.9 % Finer	11.7 % Finer	2 (≤50)
HV00	Phi size 9	8.9 % Finer	8.8 % Finer	1 (≤50)
HV00	Phi size 10	6.9 % Finer	6.8 % Finer	1 (≤50)

X. Field Blanks

No field blanks were identified in this SDG.

GC/MS Butyltins By Krone Method & EPA SW 846 Method 8270C using Selected Ion Monitoring (SIM).

I. Technical Holding Times

All technical holding time requirements were met.

The chain-of-custodies were reviewed for documentation of cooler temperatures. All cooler temperatures met validation criteria.

II. GC/MS Instrument Performance Check

Instrument performance was checked at 12 hour intervals. All ion abundance requirements were met.

Instrument performance check data were not reviewed for Level II.

III. Initial Calibration

Initial calibration was performed using required standard concentrations.

Percent relative standard deviations (%RSD) were less than or equal to 30.0% for butyltin.

Average relative response factors (RRF) for butyltin were within validation criteria.

IV. Continuing Calibration

Continuing calibration was performed at the required frequencies.

The continuing calibration percent differences (%D) between the initial calibration RRF and the continuing calibration RRF were less than or equal to 25.0%.

The percent differences (%D) of the second source calibration standard were less than or equal to 25.0% for butyltin.

All of the continuing calibration RRF values were within validation criteria.

V. Blanks

Method blanks were reviewed for each matrix as applicable. No butyltin contaminants were found in the method blanks.

VI. Surrogate Spikes

Surrogates were added to all samples and blanks as required by the method. All surrogate recoveries (%R) were within QC limits.

VII. Matrix Spike/Matrix Spike Duplicates

Matrix spike (MS) and matrix spike duplicate (MSD) analyses were reviewed for each matrix as applicable. Percent recoveries (%R) and relative percent differences (RPD) were within QC limits with the following exceptions:

Associated SDG	Spike ID (Associated Samples)	Compound	MS (%R) (Limits)	MSD (%R) (Limits)	RPD (Limits)	Flag	A or P
HV00	LDW-SS41-010MS/MSD (LDW-SS41-010)	Tributyltin chloride	-	704 (20-130)	134 (≤50)	J (all detects) UJ (all non-detects)	A
HV42	LDW-SS47-010MS/MSD (LDW-SS47-010**)	Tributyltin chloride Dibutyltin dichloride	- -	- 285 (20-130)	107 (≤50) 58.2 (≤50)	J (all detects) UJ (all non-detects) J (all detects) UJ (all non-detects)	A
HV42	LDW-SS47-010MS/MSD (LDW-SS47-010**)	Butyltin trichloride	8.0 (20-130)	-	-	J (all detects) R (all non-detects)	A
HU85	LDW-SS74-010MS/MSD (LDW-SS74-010)	Butyltin trichloride	10.2 (20-130)	9.6 (20-130)	-	J (all detects) R (all non-detects)	A
HU85	LDW-SS74-010MS/MSD (LDW-SS74-010)	Dibutyltin dichloride	19.4 (20-130)	17.8 (20-130)	-	J (all detects) UJ (all non-detects)	A
HV58	LDW-SS34-010MS/MSD (LDW-SS34-010)	Butyltin trichloride	18.1 (20-130)	-	52.4 (≤50)	J (all detects) UJ (all non-detects)	A

Percent recoveries (%R) were not within QC limits for tributyltin chloride in the LDW-SS74-010MS/MSD in SDG HU85 and dibutyltin dichloride and tributyltin chloride in the LDW-SS47-010MS/MSD in SDG HV42. Since the sample concentrations were greater than the spiked concentrations or there were no associated samples, no data were qualified.

VIII. Laboratory Control Samples (LCS)

Laboratory control samples were reviewed for each matrix as applicable. Percent recoveries (%R) and relative percent differences (RPD) were within QC limits with the following exceptions:

Associated SDG	LCS ID	Compound	%R (Limits)	Associated Samples	Flag	A or P
HU85	LCS-031405	Butyltin trichloride	4.6 (20-130)	LDW-SS78-010 LDW-SS74-010 LDW-SS8-010	J (all detects) R (all non-detects)	P

Associated SDG	LCS ID	Compound	%R (Limits)	Associated Samples	Flag	A or P
HV00 HV37	LCS-031605	Butyltin trichloride	6.2 (20-130)	LDW-SS41-010 LDW-SS16-010 LDW-SS131-010 LDW-SS206-010 LDW-SS7-010 LDW-SS3-010 LDW-SS133-010	J (all detects) R (all non-detects)	P
HV42 HV72	LCS-031905	Butyltin trichloride	10.0 (20-130)	LDW-SS45-010** LDW-SS46-010** LDW-SS46-010DL** LDW-SS6-010** LDW-SS47-010** LDW-SS108-010** LDW-SS124-010	J (all detects) UJ (all non-detects)	P
HV58 HW06	LCS-032205	Butyltin trichloride	6.6 (20-130)	LDW-SS53-010 LDW-SS34-010 LDW-SS107-010 LDW-SS2-010	J (all detects) R (all non-detects)	P

Standard reference material was performed at the required frequencies.

IX. Regional Quality Assurance and Quality Control

Not applicable.

X. Internal Standards

All internal standard areas and retention times were within QC limits.

XI. Target Compound Identifications

All target compound identifications were within validation criteria.

Target compound identifications data were not reviewed for Level II.

XII. Compound Quantitation and CRQLs

All compound quantitation and CRQLs were within validation criteria with the following exceptions:

Associated SDG	Sample	Compound	Finding	Criteria	Flag	A or P
HV42	LDW-SS46-010**	Tributyltin chloride Dibutyltin dichloride	Sample result exceeded calibration range.	Reported result should be within calibration range.	J (all detects) J (all detects)	A

*Indicates change as the result of report review.

Compound quantitation and CRQLs data were not reviewed for Level II.

XIII. Tentatively Identified Compounds (TICs)

All tentatively identified compounds were within validation criteria.

Tentatively identified compounds data were not reviewed for Level II.

XIV. System Performance

The system performance was acceptable.

System performance data were not reviewed for Level II.

XV. Overall Assessment of Data

The overall assessment of data was acceptable. In the case where more than one result was reported for an individual sample, the least technically acceptable results were rejected as follows:

Associated SDG	Sample	Compound	Flag	A or P
HV42	LDW-SS46-010**	Tributyltin chloride Dibutyltin dichloride	R	A
HV42	LDW-SS46-010DL**	Butyltin trichloride	R	A

XVI. Field Duplicates

Samples LDW-SS131-010 and LDW-SS206-010 (SDG HV00) were identified as field duplicates. No butyltins were detected in any of the samples with the following exceptions:

Associated SDG	Compound	Concentration (ug/Kg)		RPD (Limits)
		LDW-SS131-010	LDW-SS206-010	
HV00	Tributyltin chloride	4.2U	59	Not calculable
HV00	Dibutyltin dichloride	5.8U	6.5	Not calculable

XVII. Field Blanks

No field blanks were identified in this SDG.

GC Pentachlorophenol By EPA SW 846 Method 8041

I. Technical Holding Times

All technical holding time requirements were met.

The chain-of-custodies were reviewed for documentation of cooler temperatures. All cooler temperatures met validation criteria.

II. Calibration

a. Initial Calibration

Initial calibration of compounds was performed for the primary (quantitation) column and confirmation column as required by this method.

The percent relative standard deviations (%RSD) were less than or equal to 20.0% for all compounds.

Retention time windows were evaluated and considered technically acceptable.

b. Calibration Verification

Calibration verification was performed at the required frequencies.

The percent differences (%D) of calibration factors in continuing standard mixtures were within the 15.0% QC limits.

Retention times (RT) of all compounds in the calibration standards were within QC limits.

III. Blanks

Method blanks were reviewed for each matrix as applicable. No pentachlorophenol contaminants were found in the method blanks.

IV. Accuracy and Precision Data

a. Surrogate Recovery

Surrogates were added to all samples and blanks as required by the method. All surrogate recoveries (%R) were within QC limits.

b. Matrix Spike/(Matrix Spike) Duplicate

Matrix spike (MS) and matrix spike duplicate (MSD) samples were reviewed for each matrix as applicable. Percent recoveries (%R) and relative percent differences (RPD) were within QC limits.

c. Laboratory Control Samples

Laboratory control samples were reviewed for each matrix as applicable. Percent recoveries (%R) were within QC limits.

The required frequency of SRM analysis was not met for pentachlorophenol. However, SRM analysis was performed for pentachlorophenol in the semivolatile analyses.

V. Target Compound Identification

All target compound identifications were within validation criteria.

VI. Compound Quantitation and CRQLs

All compound quantitation and CRQLs were within validation criteria.

VII. System Performance

The system performance was acceptable.

VIII. Overall Assessment of Data

The overall assessment of data was acceptable.

IX. Field Duplicates

No field duplicates were identified in this SDG.

X. Field Blanks

No field blanks were identified in this SDG.

Attachment 1

Job #04-08-06-24 Attachment 1

Level II **LDC #13315 (Windward Environmental, LLC - Seattle WA / Lower Duwamish Waterway Group)**

LDC	SDG#	DATE REC'D	DATE DUE	PCBs (8082)		PCP (8041)		Total Solids (160.3)		TOC (Plumb)																							
Matrix: Tissue/Sediment				T	S	T	S	T	S	T	S	T	S	T	S	T	S	T	S	T	S	T	S	W	S	W	S	W	S	W	S	W	S
A	HS56	03/28/05	04/18/05	0	4	0	1	0	4	0	4																						
Total	B			0	4	0	1	0	4	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	10

Shaded cells indicate Level IV validation (all other cells are Level II validation). These sample counts do not include MS/MSD, and DUPs

Attachment 1

Level II	LDC #13234 (Windward Environmental, LLC - Seattle WA / Lower Duwamish Waterway Group)																																		
LDC	SDG#	DATE REC'D	DATE DUE	PCBs (8082)		PCP (8041)		Total Solids (160.3)		TOC (Plumb)																									
Matrix: Tissue/Sediment				T	S	T	S	T	S	T	S																	T	S	T	S	T	S	T	S
D	HR49	03/08/05	03/29/05	0	10	0	1	0	10	0	10																								
Total	B			0	10	0	1	0	10	0	10	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	31

Shaded cells indicate Level IV validation (all other cells are Level II validation). These sample counts do not include Rinsate Banks,MS/MSD, and DUPs

Attachment 1

PDF Level II/IV **LDC #13381 (Windward Environmental, LLC - Seattle WA / Lower Duwamish Waterway Group)**

LDC	SDG#	DATE REC'D	(3) DATE DUE	SVOA (8270C)		SVOA (8270C -SIM)		Pest. (8081A)		PCBs (8082)		Metals & Hg (SW846)		BT (Krone)		NH_3 (350.1)		S= (376.2)		Total Solids (160.3)		TOC (Plumb)		Grain Size											
Matrix:	Water/Sediment			W	S	W	S	W	S	W	S	W	S	W	S	W	S	W	S	W	S	W	S	W	S	W	S	W	S	W	S	W	S
A	HU85	04/12/05	05/03/05	0	10	0	10	0	5	0	11	0	10	0	3	0	10	0	10	0	10	0	10	0	10								
B	HV37	04/13/05	05/03/05	0	19	0	16	0	2	0	17	0	16	0	3	0	16	0	16	0	16	0	16	0	16								
C	HV42	04/12/05	05/03/05	0	10	0	9	0	2	0	9	0	8	0	6	0	8	0	8	0	8	0	8	0	8								
Total	B/SC			0	39	0	35	0	9	0	37	0	34	0	12	0	34	0	34	0	34	0	34	0	34	0	0	0	0	0	0	0	0	0	336

Shaded cells indicate Level IV validation (all other cells are Level II validation). These sample counts do not include Rinsate Blarks, MS/MSD, and DUPs

Attachment 1

PDF Level II **LDC #13384 (Windward Environmental, LLC - Seattle WA / Lower Duwamish Waterway Group)**

LDC	SDG#	DATE REC'D	(3) DATE DUE	SVOA (8270C)		SVOA (8270C -SIM)		Pest. (8081A)		PCBs (8082)		Metals & Hg (SW846)		BT (Krone)		NH_3 (350.1)		S= (376.2)		Total Solids (160.3)		TOC (Plumb)		Grain Size										
Matrix:	Water/Sediment			W	S	W	S	W	S	W	S	W	S	W	S	W	S	W	S	W	S	W	S	W	S	W	S	W	S	W	S	W	S
A	HV00	04/15/05	05/06/05	0	15	0	15	0	5	0	15	0	15	0	4	0	15	0	15	0	15	0	15	0	15										
Total	B/SC			0	15	0	15	0	5	0	15	0	15	0	4	0	15	0	15	0	15	0	15	0	15	0	0	0	0	0	0	0	0	0	144

Shaded cells indicate Level IV validation (all other cells are Level II validation). These sample counts do not include MS/MSD, and DUPs

Attachment 1

PDF Level II

LDC #13395 (Windward Environmental, LLC - Seattle WA / Lower Duwamish Waterway Group)

LDC	SDG#	DATE REC'D	(3) DATE DUE	SVOA (8270C)		SVOA (8270C -SIM)		Pest. (8081A)		PCBs (8082)		Metals & Hg (SW846)		NH_3 (350.1)		S= (376.2)		Total Solids (160.3)		TOC (Plumb)		Grain Size															
Matrix: Water/Sediment				W	S	W	S	W	S	W	S	W	S	W	S	W	S	W	S	W	S	W	S	W	S	W	S	W	S	W	S	W	S	W	S
A	HV38	04/19/05	05/10/05	0	3	0	3	0	1	0	4	0	3	0	3	0	3	0	3	0	3	0	3												
Total	B/SC			0	3	0	3	0	1	0	4	0	3	0	3	0	3	0	3	0	3	0	3	0	0	0	0	0	0	0	0	0	0	0	29

Shaded cells indicate Level IV validation (all other cells are Level II validation). These sample counts do not include MS/MSD, and DUPs

Attachment 1

PDF Level II **LDC #13398 (Windward Environmental, LLC - Seattle WA / Lower Duwamish Waterway Group)**

LDC	SDG#	DATE REC'D	(3) DATE DUE	SVOA (8270C)		SVOA (8270C -SIM)		Pest. (8081A)		PCBs (8082)		Metals & Hg (SW846)		BT (Krone)		NH_3 (350.1)		S= (376.2)		Total Solids (160.3)		TOC (Plumb)		Grain Size									
Matrix: Water/Sediment				W	S	W	S	W	S	W	S	W	S	W	S	W	S	W	S	W	S	W	S	W	S	W	S	W	S	W	S	W	S
A	HV58	04/20/05	05/11/05	0	14	0	13	0	3	0	12	0	12	0	3	0	12	0	12	0	12	0	12	0	12								
Total	B/SC			0	14	0	13	0	3	0	12	0	12	0	3	0	12	0	12	0	12	0	12	0	12	0	0	0	0	0	0	0	0	0	117

Shaded cells indicate Level IV validation (all other cells are Level II validation). These sample counts do not include Rinsate Blarks, MS/MSD, and DUPs

Attachment 1

PDF Level II **LDC #13403 (Windward Environmental, LLC - Seattle WA / Lower Duwamish Waterway Group)**

LDC	SDG#	DATE REC'D	(3) DATE DUE	SVOA (8270C)		SVOA (8270C -SIM)		Pest. (8081A)		PCBs (8082)		Metals & Hg (SW846)		BT (Krone)		NH_3 (350.1)		S= (376.2)		Total Solids (160.3)		TOC (Plumb)		Grain Size									
Matrix:	Water/Sediment			W	S	W	S	W	S	W	S	W	S	W	S	W	S	W	S	W	S	W	S	W	S	W	S	W	S	W	S	W	S
A	HV72	04/21/05	05/12/05	0	6	0	6	0	2	0	6	0	6	0	1	0	6	0	9	0	6	0	6	0	9										
Total	B/SC			0	6	0	6	0	2	0	6	0	6	0	1	0	6	0	9	0	6	0	6	0	9	0	0	0	0	0	0	0	0	0	63

Shaded cells indicate Level IV validation (all other cells are Level II validation). These sample counts do not include MS/MSD, ard DUPs

Attachment 1

PDF	LDC #13412 (Windward Environmental, LLC - Seattle WA / Lower Duwamish Waterway Group)																																			
LDC	SDG#	DATE REC'D	(3) DATE DUE	SVOA (8270C)		SVOA (8270C -SIM)		Pest. (8081A)		PCBs (8082)		Metals & Hg (SW846)		NH_3 (350.1)		S= (376.2)		Total Solids (160.3)		TOC (Plumb)		Grain Size														
Matrix:	Water/Sediment			W	S	W	S	W	S	W	S	W	S	W	S	W	S	W	S	W	S	W	S	W	S	W	S	W	S	W	S	W	S	W	S	W	S
A	HV76	04/22/05	05/13/05	0	10	0	10	0	4	0	10	0	10	0	10	0	10	0	10	0	10	0	10													
Total	B/SC			0	10	0	10	0	4	0	10	0	10	0	10	0	10	0	10	0	10	0	10	0	0	0	0	0	0	0	0	0	0	0	94	

Shaded cells indicate Level IV validation (all other cells are Level II validation). These sample counts do not include MS/MSD, and DUPs

Attachment 1

Level II PDF **LDC #13419 (Windward Environmental, LLC - Seattle WA / Lower Duwamish Waterway Group)**

LDC	SDG#	DATE REC'D	(3) DATE DUE	SVOA (8270C)		SVOA (8270C -SIM)		Pest. (8081A)		PCBs (8082)		Metals & Hg (SW846)		BT (Krone)		NH_3 (350.1)		S= (376.2)		Total Solids (160.3)		TOC (Plumb)		Grain Size											
Matrix:	Water/Sediment			W	S	W	S	W	S	W	S	W	S	W	S	W	S	W	S	W	S	W	S	W	S	W	S	W	S	W	S	W	S	W	S
A	HW06	04/25/05	05/16/05	0	8	0	9	0	2	0	9	0	7	0	1	0	7	0	7	0	7	0	7	0	7										
B	HW16	04/25/05	05/16/05	0	1	0	1	0	1	0	1	0	1	-	-	0	1	0	1	0	1	0	1	0	1										
Total	B/SC			0	9	0	10	0	3	0	10	0	8	0	1	0	8	0	8	0	8	0	8	0	8	0	0	0	0	0	0	0	0	0	81

Shaded cells indicate Level IV validation (all other cells are Level II validation). These sample counts do not include MS/MSD, ard DUPs

Attachment 1

Level II PDF **LDC #13521 (Windward Environmental, LLC - Seattle WA / Lower Duwamish Waterway Group)**

LDC	SDG#	DATE REC'D	(3) DATE DUE	VOA (8260B)		Pest. (8031A)																													
Matrix:	Water/Sediment			W	S	W	S	W	S	W	S	W	S	W	S	W	S	W	S	W	S	W	S	W	S	W	S	W	S	W	S	W	S	W	S
A	HZ55	05/19/05	06/09/05	0	2	0	5																												
Total	B/SC			0	2	0	5	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	7

Shaded cells indcate Level IV validation (all other cells are Level II validation). These sample counts do not include MS/MSD, and DUPs

Attachment 1

Level II PDF

LDC #13846 (Windward Environmental, LLC - Seattle WA / Lower Duwamish Waterway Group)

LDC	SDG#	DATE REC'D	(3) DATE DUE	1,2,4-TCB (8260B)		Pest. (8081A)																													
Matrix: Water/Sediment				W	S	W	S	W	S	W	S	W	S	W	S	W	S	W	S	W	S	W	S	W	S	W	S	W	S	W	S	W	S	W	S
A	II22	08/09/05	08/30/05	2	0	1	0																												
Total	B/SC			2	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	3

Shaded cells indicate Level IV validation (all other cells are Level II validation). These sample counts do not include MS/MSD, and DUPs

Attachment 2

Attachment 2

SDG#: HR49 VALIDATION SAMPLE TABLE **LDC#:** 13234D

Project Name: Lower Duwamish Waterway Group Parameters/Analytical Method Project #04-08-06-21

Client ID #	Lab ID #	Matrix	Date Collected	SVOA (8270C)	SVOA (8270C -SIM)	Pest. (8081A)	PCBs (8082)	Metals (SW846)	PCP (8041)	Butyl-tin (Krone)	NH_3 (350.1)	S= (376.2)	Total Solids (160.3)	TOC (Plumb)	Grain Size
SC-SS1a-010	HR49C	sediment	02/01/05				X		X				X	X	
EB-SS2a-010	HR49D	sediment	02/02/05				X						X	X	
LW-SS3-010	HR49E	sediment	02/01/05				X						X	X	
SB-SS6-010	HR49F	sediment	01/31/05				X						X	X	
DRD-SS7-010	HR49G	sediment	02/02/05				X						X	X	
LU-SS9a-010	HR49H	sediment	01/31/05				X						X	X	
LU-SS9b-010	HR49I	sediment	02/01/05				X						X	X	
UB-SS8-010	HR49J	sediment	02/02/05				X						X	X	
LW-SS6-010	HR49K	sediment	02/01/05				X						X	X	
EB-SS2b-010	HR49L	sediment	02/02/05				X						X	X	
EB-SS2a-010MS	HR49DMS	sediment	02/02/05											X	
EB-SS2a-010DUP	HR49DDUP	sediment	02/02/05											X	
EB-SS2a-010TRP	HR49DTRP	sediment	02/02/05										X	X	
LW-SS3-010DUP	HR49EDUP	sediment	02/01/05										X		
LW-SS3-010TRP	HR49ETRP	sediment	02/01/05										X		
SC-SS1a-010MS	HR49CMS	sediment	02/01/05						X						
SC-SS1a-010MSD	HR49CMSD	sediment	02/01/05						X						
LU-SS9a-010MS	HR49HMS	sediment	01/31/05				X								
LU-SS9a-010MSD	HR49HMSD	sediment	01/31/05				X								

Note: X = Validation was performed.

Attachment 2

SDG#: HS56 VALIDATION SAMPLE TABLE **LDC#:** 13315A

Project Name: Lower Duwamish Working Group Parameters/Analytical Method Project #04-08-06-24

Client ID #	Lab ID #	Matrix	Date Collected	SVOA (8270C)	PAHs (8270C -SIM)	Pest. (8081A)	PCBs (8082)	Metals (SW846)	PCP (8041)	TBT (Krone)	NH_3 (350.1)	S= (376.2)	Total Solids (160.3)	TOC (Plumb)	Grain Size
LW-SS4-010	HS56B	sediment	02/08/05				X						X	X	
LW-SS5a-010	HS56C	sediment	02/08/05				X						X	X	
LW-SS5b-010	HS56D	sediment	02/08/05				X						X	X	
SC-SS1b-010	HS56E	sediment	02/10/05				X		X				X	X	
LW-SS4-010MS	HS56BMS	sediment	02/08/05											X	
LW-SS4-010DUP	HS56BDUP	sediment	02/08/05										X	X	
LW-SS4-010TRP	HS56BTRP	sediment	02/08/05										X	X	
LW-SS5a-010MS	HS56CMS	sediment	02/08/05				X								
LW-SS5a-010MSD	HS56CMSD	sediment	02/08/05				X								
SC-SS1b-010MS	HS56EMS	sediment	02/10/05						X						
SC-SS1b-010MSD	HS56EMSD	sediment	02/10/05						X						

Note: X = Validation was performed.

Attachment 2

SDG#: HU85 | VALIDATION SAMPLE TABLE | **LDC#:** 13381A

Project Name: Lower Duwamish Waterway Group | Parameters/Analytical Method | Project #04-08-06-24

Client ID #	Lab ID #	Matrix	Date Collected	SVOA (8270C)	SVOA (8270C -SIM)	Pest. (8081A)	PCBs (8082)	Metals (SW846)	PCP (8041)	BT (Krone/ 8270C -SIM)	NH_3 (350.1)	S= (376.2)	Total Solids (160.3)	TOC (Plumb)	Grain Size
LDW-SS85-010	HU85A	sediment	03/07/05	X	X	X	X	X			X	X	X	X	X
LDW-SS85-010DL	HU85ADL	sediment	03/07/05				X								
LDW-SS73-010	HU85B	sediment	03/07/05	X	X	X	X	X			X	X	X	X	X
LDW-SS78-010	HU85C	sediment	03/07/05	X	X		X	X		X	X	X	X	X	X
LDW-SS82-010	HU85D	sediment	03/07/05	X	X	X	X	X			X	X	X	X	X
LDW-SS74-010	HU85F	sediment	03/07/05	X	X	X	X	X		X	X	X	X	X	X
LDW-SS204-010	HU85G	sediment	03/07/05	X	X	X	X	X			X	X	X	X	X
LDW-SS91-010	HU85H	sediment	03/07/05	X	X		X	X			X	X	X	X	X
LDW-SS103-010	HU85I	sediment	03/07/05	X	X		X	X			X	X	X	X	X
LDW-SS68-010	HU85J	sediment	03/07/05	X	X		X	X			X	X	X	X	X
LDW-SS8-010	HU85K	sediment	03/07/05	X	X		X	X		X	X	X	X	X	X
LDW-SS103-RB	HU85L	water	03/07/05	X			X	X							
LDW-SS85-010MS	HU85AMS	sediment	03/07/05					X			X			X	
LDW-SS85-010DUP	HU85ADUP	sediment	03/07/05					X			X		X	X	
LDW-SS85-010TRP	HU85ATRP	sediment	03/07/05										X	X	
LDW-SS73-010MS	HU85BMS	sediment	03/07/05								X				
LDW-SS73-010DUP	HU85BDUP	sediment	03/07/05								X				
LDW-SS74-010MS	HU85FMS	sediment	03/07/05	X	X	X	X			X					
LDW-SS74-010MSD	HU85FMSD	sediment	03/07/05	X	X	X	X			X					
LDW-SS8-010MS	HU85KMS	sediment	03/07/05									X			
LDW-SS8-010MSD	HU85KMSD	sediment	03/07/05									X			
LDW-SS8-010DUP	HU85KDUP	sediment	03/07/05									X			
LDW-SS8-010TRP	HU85KTRP	sediment	03/07/05									X			

Note: X = Validation was performed.

Attachment 2

SDG#: HV37 — VALIDATION SAMPLE TABLE — **LDC#:** 13381B

Project Name: Lower Duwamish Waterway Group — Parameters/Analytical Method — Project #04-08-06-24

Client ID #	Lab ID #	Matrix	Date Collected	SVOA (8270C)	SVOA (8270C -SIM)	Pest. (8081A)	PCBs (8082)	Metals (SW846)	PCP (8041)	BT (Krone/ 8270C -SIM)	NH_3 (350.1)	S= (376.2)	Total Solids (160.3)	TOC (Plumb)	Grain Size
LDW-SS7-010	HV37A	sediment	03/09/05	X	X		X	X		X	X	X	X	X	X
LDW-SS3-010	HV37B	sediment	03/09/05	X	X		X	X		X	X	X	X	X	X
LDW-SS95-010	HV37C	sediment	03/09/05	X	X		X	X			X	X	X	X	X
LDW-SS95-010DL	HV37CDL	sediment	03/09/05	X											
LDW-SS95-010RE	HV37CRE	sediment	03/09/05	X											
LDW-SS95-010REDL	HV37CREDL	sediment	03/09/05	X											
LDW-SS133-010	HV37D	sediment	03/09/05	X	X	X	X	X		X	X	X	X	X	X
LDW-SS138-010	HV37E	sediment	03/09/05	X	X		X	X			X	X	X	X	X
LDW-SS139-010	HV37F	sediment	03/09/05	X	X		X	X			X	X	X	X	X
LDW-SS137-010	HV37G	sediment	03/09/05	X	X		X	X			X	X	X	X	X
LDW-SS132-010	HV37H	sediment	03/09/05	X	X		X	X			X	X	X	X	X
LDW-SS66-010	HV37I	sediment	03/09/05	X	X		X	X			X	X	X	X	X
LDW-SS62-010	HV37J	sediment	03/09/05	X	X		X	X			X	X	X	X	X
LDW-SS207-010	HV37K	sediment	03/09/05	X	X		X	X			X	X	X	X	X
LDW-SS146-010	HV37L	sediment	03/09/05	X	X		X	X			X	X	X	X	X
LDW-SS147-010	HV37M	sediment	03/09/05	X	X		X	X			X	X	X	X	X
LDW-SS148-010	HV37N	sediment	03/09/05	X	X		X	X			X	X	X	X	X
LDW-SS148-010DL	HV37NDL	sediment	03/09/05				X								
LDW-SS149-010	HV37O	sediment	03/09/05	X	X		X	X			X	X	X	X	X
LDW-SS150-010	HV37P	sediment	03/09/05	X	X	X	X	X			X	X	X	X	X
LDW-SS7-RB	HV37Q	water	03/09/05	X			X	X							
LDW-SS7-010MS	HV37AMS	sediment	03/09/05					X			X			X	
LDW-SS7-010DUP	HV37ADUP	sediment	03/09/05					X			X		X	X	X
LDW-SS7-010TRP	HV37ATRP	sediment	03/09/05												X
LDW-SS3-010MS	HV37BMS	sediment	03/09/05				X								

Note: X = Validation was performed.

Attachment 2

SDG#: HV42 — VALIDATION SAMPLE TABLE — **LDC#:** 13381C

Project Name: Lower Duwamish Waterway Group — Parameters/Analytical Method — Project #04-08-06-24

Client ID #	Lab ID #	Matrix	Date Collected	SVOA (8270C)	SVOA (8270C -SIM)	Pest. (8081A)	PCBs (8082)	Metals (SW846)	PCP (8041)	BT (Krone/ 8270C-SIM)	NH_3 (350.1)	S= (376.2)	Total Solids (160.3)	TOC (Plumb)	Grain Size
LDW-SS45-010	HV42A	sediment	03/10/05	X	X		X	X		X	X	X	X	X	X
LDW-SS46-010	HV42B	sediment	03/10/05	X	X		X	X		X	X	X	X	X	X
LDW-SS46-010DL	HV42BDL	sediment	03/10/05							X					
LDW-SS6-010	HV42C	sediment	03/10/05	X	X		X	X		X	X	X	X	X	X
LDW-SS6-010DL	HV42CDL	sediment	03/10/05	X			X								
LDW-SS47-010	HV42D	sediment	03/10/05	X	X		X	X		X	X	X	X	X	X
LDW-SS47-010DL	HV42DDL	sediment	03/10/05	X											
LDW-SS108-010	HV42E	sediment	03/10/05	X	X	X	X	X		X	X	X	X	X	X
LDW-SS61-010	HV42G	sediment	03/10/05	X	X		X	X			X	X	X	X	X
LDW-SS61-010RE	HV42GRE	sediment	03/10/05		X										
LDW-SS25-010	HV42H	sediment	03/10/05	X	X	X	X	X			X	X	X	X	X
LDW-SS86-010	HV42I	sediment	03/10/05	X	X		X	X			X	X	X	X	X
LDW-SS45-010MS	HV42AMS	sediment	03/10/05					X			X			X	
LDW-SS45-010DUP	HV42ADUP	sediment	03/10/05					X			X		X	X	X
LDW-SS45-010TRP	HV42ATRP	sediment	03/10/05												X
LDW-SS47-010MS	HV42DMS	sediment	03/10/05							X					
LDW-SS47-010MSD	HV42DMSD	sediment	03/10/05							X					
LDW-SS25-010MS	HV42HMS	sediment	03/10/05	X			X								
LDW-SS25-010MSD	HV42HMSD	sediment	03/10/05	X			X								
LDW-SS86-010MS	HV42IMS	sediment	03/10/05		X							X			
LDW-SS86-010MSD	HV42IMSD	sediment	03/10/05		X							X			
LDW-SS86-010DUP	HV42IDUP	sediment	03/10/05									X			
LDW-SS86-010TRP	HV42ITRP	sediment	03/10/05									X			

Note: X = Validation was performed.

Attachment 2

SDG#: HV00 — VALIDATION SAMPLE TABLE — **LDC#:** 13384A

Project Name: Lower Duwamish Waterway Group — Parameters/Analytical Method — Project #04-08-06-24

Client ID #	Lab ID #	Matrix	Date Collected	SVOA (8270C)	SVOA (8270C -SIM)	Pest. (8081A)	PCBs (8082)	Metals (SW846)	PCP (8041)	BT (Krone/ 8270C-SIM)	NH_3 (350.1)	S= (376.2)	Total Solids (160.3)	TOC (Plumb)	Grain Size
LDW-SS81-010	HVC0A	sediment	03/08/05	X	X	X	X	X			X	X	X	X	X
LDW-SS65-010	HVC0B	sediment	03/08/05	X	X		X	X			X	X	X	X	X
LDW-SS41-010	HVC0C	sediment	03/08/05	X	X	X	X	X		X	X	X	X	X	X
LDW-SS30-010	HVC0D	sediment	03/08/05	X	X		X	X			X	X	X	X	X
LDW-SS21-010	HVC0E	sediment	03/08/05	X	X		X	X			X	X	X	X	X
LDW-SS19-010	HVC0F	sediment	03/08/05	X	X		X	X			X	X	X	X	X
LDW-SS205-010	HVC0G	sediment	03/08/05	X	X		X	X			X	X	X	X	X
LDW-SS11-010	HVC0H	sediment	03/08/05	X	X		X	X			X	X	X	X	X
LDW-SS16-010	HVC0I	sediment	03/08/05	X	X		X	X		X	X	X	X	X	X
LDW-SS105-010	HVC0J	sediment	03/08/05	X	X		X	X			X	X	X	X	X
LDW-SS106-010	HVC0K	sediment	03/08/05	X	X		X	X			X	X	X	X	X
LDW-SS122-010	HVC0L	sediment	03/08/05	X	X		X	X			X	X	X	X	X
LDW-SS131-010	HVC0M	sediment	03/08/05	X	X	X	X	X		X	X	X	X	X	X
LDW-SS206-010	HVC0N	sediment	03/08/05	X	X	X	X	X		X	X	X	X	X	X
LDW-SS140-010	HVC0O	sediment	03/08/05	X	X	X	X	X			X	X	X	X	X
LDW-SS81-010MS	HVC0AMS	sediment	03/08/05					X			X				
LDW-SS81-010DUP	HVC0ADUP	sediment	03/08/05					X			X				
LDW-SS41-010MS	HVC0CMS	sediment	03/08/05							X	X				
LDW-SS41-010MSD	HVC0CMSD	sediment	03/08/05							X					
LDW-SS41-010DUP	HVC0CDUP	sediment	03/08/05								X				
LDW-SS19-010MS	HVC0FMS	sediment	03/08/05											X	
LDW-SS19-010DUP	HVC0FDUP	sediment	03/08/05										X	X	
LDW-SS19-010TRP	HVC0FTRP	sediment	03/08/05										X	X	
LDW-SS122-010MS	HVC0LMS	sediment	03/08/05									X			
LDW-SS122-010MSD	HVC0LMSD	sediment	03/08/05									X			

Note: X = Validation was performed.

Attachment 2

SDG#: HV38 | VALIDATION SAMPLE TABLE | **LDC#:** 13395A

Project Name: Lower Duwamish Waterway Group | Parameters/Analytical Method | Project #04-08-06-24

Client ID #	Lab ID #	Matrix	Date Collected	SVOA (8270C)	SVOA (8270C -SIM)	Pest. (8081A)	PCBs (8082)	Metals (SW846)	PCP (8041)	TBT (Krone)	NH_3 (350.1)	S= (376.2)	Total Solids (160.3)	TOC (Plumb)	Grain Size
LDW-SS39-010	HV38A	sediment	03/11/05	X	X		X	X			X	X	X	X	X
LDW-SS100-010	HV38B	sediment	03/11/05	X	X		X	X			X	X	X	X	X
LDW-SSB2b-010	HV38C	sediment	03/11/05	X	X	X	X	X			X	X	X	X	X
LDW-SSB2b-010DL	HV38CDL	sediment	03/11/05				X								
LDW-SSB2b-010MS	HV38CMS	sediment	03/11/05			X									
LDW-SSB2b-010MSD	HV38CMSD	sediment	03/11/05			X									

Note: X = Validation was performed.

Attachment 2

SDG#: HV58 — VALIDATION SAMPLE TABLE — **LDC#:** 13398A

Project Name: Lower Duwamish Waterway Group — Parameters/Analytical Method — Project #04-08-06-24

Client ID #	Lab ID #	Matrix	Date Collected	SVOA (8270C)	SVOA (8270C -SIM)	Pest. (8081A)	PCBs (8082)	Metals (SW846)	PCP (8041)	BT (Krone/ 8270C-SIM)	NH_3 (350.1)	S= (376.2)	Total Solids (160.3)	TOC (Plumb)	Grain Size
LDW-SS90-010	HV58A	sediment	03/14/05	X	X		X	X			X	X	X	X	X
LDW-SS24-010	HV58C	sediment	03/14/05	X	X		X	X			X	X	X	X	X
LDW-SS24-010DL	HV58CDL	sediment	03/14/05	X	X										
LDW-SS9-010	HV58D	sediment	03/14/05	X	X	X	X	X			X	X	X	X	X
LDW-SS9-010DL	HV58DDL	sediment	03/14/05	X											
LDW-SS77-010	HV58E	sediment	03/14/05	X	X		X	X			X	X	X	X	X
LDW-SS59-010	HV58F	sediment	03/14/05	X	X	X	X	X			X	X	X	X	X
LDW-SSB5b-010	HV58G	sediment	03/14/05	X	X	X	X	X			X	X	X	X	X
LDW-SS53-010	HV58H	sediment	03/14/05	X	X		X	X		X	X	X	X	X	X
LDW-SS34-010	HV58I	sediment	03/14/05	X	X		X	X		X	X	X	X	X	X
LDW-SSB4a-010	HV58J	sediment	03/14/05	X	X		X	X			X	X	X	X	X
LDW-SS29-010	HV58K	sediment	03/14/05	X	X		X	X			X	X	X	X	X
LDW-SS107-010	HV58L	sediment	03/14/05	X	X		X	X		X	X	X	X	X	X
LDW-SS145-010	HV58M	sediment	03/14/05	X	X		X	X			X	X	X	X	X
LDW-SSB7a-RB	HV58N	water	03/14/05	X			X	X							
LDW-SS71-RB	HV58O	water	03/14/05	X			X	X							
LDW-SS90-010MS	HV58AMS	sediment	03/14/05					X							
LDW-SS90-010MSRE	HV58AMSRE	sediment	03/14/05					X							
LDW-SS90-010DUP	HV58ADUP	sediment	03/14/05					X							
LDW-SS90-010DUPRE	HV58ADUPRE	sediment	03/14/05					X							
LDW-SS34-010MS	HV58IMS	sediment	03/14/05							X					
LDW-SS34-010MSD	HV58IMSD	sediment	03/14/05							X					
LDW-SS145-010MS	HV58MMS	sediment	03/14/05	X	X		X								
LDW-SS145-010MSD	HV58MMSD	sediment	03/14/05	X	X		X								
LDW-SS145-010DUP	HV58MDUP	sediment	03/14/05										X		

Note: X = Validation was performed.

SDG#: HV58 | VALIDATION SAMPLE TABLE | **LDC#:** 13398A

Project Name: Lower Duwamish Waterway Group | Parameters/Analytical Method | Project #04-08-06-24

Client ID #	Lab ID #	Matrix	Date Collected	SVOA (8270C)	SVOA (8270C -SIM)	Pest. (8081A)	PCBs (8082)	Metals (SW846)	PCP (8041)	BT (Krone/ 8270C-SIM)	NH_3 (350.1)	S= (376.2)	Total Solids (160.3)	TOC (Plumb)	Grain Size
LDW-SS145-010TRP	HV58MTRP	sediment	03/14/05										X		

Note: X = Validation was performed.

Attachment 2

SDG#: HV72 | VALIDATION SAMPLE TABLE | **LDC#:** 13403A

Project Name: Lower Duwamish Waterway Group | Parameters/Analytical Method | Project #04-08-06-24

Client ID #	Lab ID #	Matrix	Date Collected	SVOA (8270C)	SVOA (8270C -SIM)	Pest. (8081A)	PCBs (8082)	Metals (SW846)	PCP (8041)	BT (Krone/ 8270C-SIM)	NH_3 (350.1)	S= (376.2)	Total Solids (160.3)	TOC (Plumb)	Grain Size
LDW-SS93-010	HV72A	sediment	03/15/05	X	X	X	X	X			X	X	X	X	X
LDW-SS124-010	HV72B	sediment	03/15/05	X	X		X	X		X	X	X	X	X	X
LDW-SS135-010	HV72C	sediment	03/15/05	X	X		X	X			X	X	X	X	X
LDW-SS136-010	HV72D	sediment	03/15/05	X	X		X	X			X	X	X	X	X
LDW-SSB6a-010	HV72E	sediment	03/15/05	X	X	X	X	X			X	X	X	X	X
LDW-SSC1-010	HV72F	sediment	03/15/05	X	X		X	X			X	X	X	X	X
LDW-SSCR20B-010	HV72G	sediment	03/12/05									X			X
LDW-SSCR23B-010	HV72H	sediment	03/12/05									X			X
LDW-SSMSMP43B-010	HV72I	sediment	03/11/05									X			X
LDW-SS93-010MS	HV72AMS	sediment	03/15/05					X			X				
LDW-SS93-010DUP	HV72ADUP	sediment	03/15/05					X							X
LDW-SS93-010TRP	HV72ATRP	sediment	03/15/05												X
LDW-SSB6a-010MS	HV72EMS	sediment	03/15/05			X									
LDW-SSB6a-010MSD	HV72EMSD	sediment	03/15/05			X									
LDW-SSC1-010MS	HV72FMS	sediment	03/15/05	X								X			
LDW-SSC1-010MSD	HV72FMSD	sediment	03/15/05	X											
LDW-SSC1-010DUP	HV72FDUP	sediment	03/15/05									X			

Note: X = Validation was performed.

Attachment 2

SDG#: HV76 — VALIDATION SAMPLE TABLE — **LDC#:** 13412A

Project Name: Lower Duwamish Waterway Group — Parameters/Analytical Method — Project #04-08-06-24

Client ID #	Lab ID #	Matrix	Date Collected	SVOA (8270C)	PAHs (8270C -SIM)	Pest. (8081A)	PCBs (8082)	Metals (SW846)	PCP (8041)	BT (Krone)	NH_3 (350.1)	S= (376.2)	Total Solids (160.3)	TOC (Plumb)	Grain Size
LDW-SS98-010	HV76A	sediment	03/15/05	X	X		X	X			X	X	X	X	X
LDW-SS141-010	HV76B	sediment	03/15/05	X	X		X	X			X	X	X	X	X
LDW-SSB9a-010	HV76C	sediment	03/15/05	X	X	X	X	X			X	X	X	X	X
LDW-SS156-010	HV76D	sediment	03/15/05	X	X		X	X			X	X	X	X	X
LDW-SS155-010	HV76E	sediment	03/15/05	X	X	X	X	X			X	X	X	X	X
LDW-SS154-010	HV76F	sediment	03/15/05	X	X		X	X			X	X	X	X	X
LDW-SS153-010	HV76G	sediment	03/15/05	X	X		X	X			X	X	X	X	X
LDW-SS152-010	HV76H	sediment	03/15/05	X	X	X	X	X			X	X	X	X	X
LDW-SS151-010	HV76I	sediment	03/15/05	X	X		X	X			X	X	X	X	X
LDW-SS144-010	HV76J	sediment	03/15/05	X	X	X	X	X			X	X	X	X	X
LDW-SS98-010MS	HV76AMS	sediment	03/15/05					X						X	
LDW-SS98-010DUP	HV76ADUP	sediment	03/15/05					X					X	X	
LDW-SS98-010TRP	HV76ATRP	sediment	03/15/05										X	X	
LDW-SS151-010MS	HV76IMS	sediment	03/15/05	X	X		X					X			
LDW-SS151-010MSD	HV76IMSD	sediment	03/15/05	X	X		X								
LDW-SS151-010MS2	HV76IMS2	sediment	03/15/05									X			
LDW-SS151-010DUP	HV76IDUP	sediment	03/15/05									X			

Note: X = Validation was performed.

Attachment 2

SDG#: HW06 | VALIDATION SAMPLE TABLE | **LDC#:** 13419A

Project Name: Lower Duwamish Waterway Group | Parameters/Analytical Method | Project #04-08-06-24

Client ID #	Lab ID #	Matrix	Date Collected	SVOA (8270C)	SVOA (8270C -SIM)	Pest. (8081A)	PCBs (8082)	Metals (SW846)	PCP (8041)	BT (Krone/ 8270C-SIM)	NH_3 (350.1)	S= (376.2)	Total Solids (160.3)	TOC (Plumb)	Grain Size
LDW-SS71-010	HW06A	sediment	03/14/05	X	X		X	X			X	X	X	X	X
LDW-SS71-010DL	HW06ADL	sediment	03/16/05				X								
LDW-SS2-010	HW06B	sediment	03/16/05	X	X	X	X	X		X	X	X	X	X	X
LDW-SS2-010DL	HW06BDL	sediment	03/16/05		X										
LDW-SS69b-010	HW06C	sediment	03/16/05	X	X	X	X	X			X	X	X	X	X
LDW-SS158-010	HW06D	sediment	03/16/05	X	X		X	X			X	X	X	X	X
LDW-SS159-010	HW06E	sediment	03/16/05	X	X		X	X			X	X	X	X	X
LDW-SS157-010	HW06F	sediment	03/16/05	X	X		X	X			X	X	X	X	X
LDW-SS35-010	HW06G	sediment	03/08/05	X	X		X	X			X	X	X	X	X
LDW-SS35-010DL	HW06GDL	sediment	03/08/05	X	X		X								
LDW-SS71-010MS	HW06AMS	sediment	03/14/05					X			X			X	
LDW-SS71-010DUP	HW06ADUP	sediment	03/14/05					X			X		X	X	
LDW-SS71-010TRP	HW06ATRP	sediment	03/14/05										X	X	
LDW-SS69b-010MS	HW06CMS	sediment	03/16/05								X			X	
LDW-SS69b-010DUP	HW06CDUP	sediment	03/16/05								X		X	X	
LDW-SS69b-010TRP	HW06CTRP	sediment	03/16/05										X	X	
LDW-SS157-010MS	HW06FMS	sediment	03/16/05									X			
LDW-SS157-010MSD	HW06FMSD	sediment	03/16/05									X			
LDW-SS157-010DUP	HW06FDUP	sediment	03/16/05									X			
LDW-SS157-010TRP	HW06FTRP	sediment	03/16/05									X			

Note: X = Validation was performed.

Attachment 2

SDG#: HW16 — VALIDATION SAMPLE TABLE — **LDC#:** 13419B

Project Name: Lower Duwamish Waterway Group — Parameters/Analytical Method — Project #04-08-06-24

Client ID #	Lab ID #	Matrix	Date Collected	SVOA (8270C)	SVOA (8270C -SIM)	Pest. (8081A)	PCBs (8082)	Metals (SW846)	PCP (3041)	BT (Krone)	NH_3 (350.1)	S= (376.2)	Total Solids (160.3)	TOC (Plumb)	Grain Size
LDW-SSB7a-010	HW16A	sediment	03/18/05	X	X	X	X	X			X	X	X	X	X
LDW-SSB7a-010MS	HW16AMS	sediment	03/18/05			X		X			X			X	
LDW-SSB7a-010MSD	HW16AMSD	sediment	03/18/05			X									
LDW-SSB7a-010DUP	HW16ADUP	sediment	03/18/05					X			X		X	X	X
LDW-SSB7a-010TRP	HW16ATRP	sediment	03/18/05												X

Note: X = Validation was performed.

Attachment 2

SDG#: HZ55 VALIDATION SAMPLE TABLE **LDC#:** 13521A

Project Name: Lower Duwamish Waterway Group Parameters/Analytical Method Project #04-08-06-24

Client ID #	Lab ID #	Matrix	Date Collected	VOA (8260B)	Pest. (8081A)										
LDW-SS3-010	HZ55A	sediment	03/09/05	X	X										
LDW-SS3-010RE	HZ55ARE	sediment	03/09/05	X											
LDW-SS100-010	HZ55B	sediment	03/11/05		X										
LDW-SS151-010	HZ55C	sediment	03/15/05		X										
LDW-SS53-010	HZ55D	sediment	02/02/05		X										
LDW-SSC1-010	HZ55E	sediment	03/15/05		X										
LDW-SS3-010MS	HZ55AMS	sediment	03/09/05	X	X										
LDW-SS3-010MSD	HZ55AMSD	sediment	03/09/05	X	X										

Note: X = Validation was performed.

Attachment 2

SDG#: II22 — VALIDATION SAMPLE TABLE — **LDC#:** 13846A

Project Name: Lower Duwamish Waterway Group — Parameters/Analytical Method — Project #04-08-06-24

Client ID #	Lab ID #	Matrix	Date Collected	1,2,4-TCB (8260B)	Pest. (8081A)											
LDW-SSB4a-010	II22A	sediment	03/14/05	X	X											
LDW-SSB4a-010RE	II22ARE	sediment	03/14/05	X												
LDW-SSB4a-010MS	II22AMS	sediment	03/14/05	X	X											
LDW-SSB4a-010MSD	II22AMSD	sediment	03/14/05	X	X											

Note: X = Validation was performed.

LDC #: 13381A2a **VALIDATION COMPLETENESS WORKSHEET** Date: 4/20/05
SDG #: HU85 Level II Page: 1 of 1
Laboratory: Analytical Resources, Inc. Reviewer: CF
2nd Reviewer: A

METHOD: GC/MS Semivolatiles (EPA SW 846 Method 8270C)

The samples listed below were reviewed for each of the following validation areas. Validation findings are noted in attached validation findings worksheets.

	Validation Area		Comments
I.	Technical holding times	A	Sampling dates: 3/7/05
II.	GC/MS Instrument performance check	N	
III.	Initial calibration	N	
IV.	Continuing calibration	N	
V.	Blanks	A	
VI.	Surrogate spikes	A	
VII.	Matrix spike/Matrix spike duplicates	SW	
VIII.	Laboratory control samples	A	LCS
IX.	Regional Quality Assurance and Quality Control	N	
X.	Internal standards	N	
XI.	Target compound identification	N	
XII.	Compound quantitation/CRQLs	N	
XIII.	Tentitatively identified compounds (TICs)	N	
XIV.	System performance	N	
XV.	Overall assessment of data	A	
XVI.	Field duplicates	SW	D = 4 + 6
XVII.	Field blanks	ND	RB = 11

Note: A = Acceptable
N = Not provided/applicable
SW = See worksheet
ND = No compounds detected
R = Rinsate
FB = Field blank
D = Duplicate
TB = Trip blank
EB = Equipment blank

Validated Samples
All seds except #11

1	LDW-SS85-010	11	LDW-SS103-RB	21	MB-031405 W	31	
2	LDW-SS73-010	12	LDW-SS74-010MS	22	MB-031405 S	32	
3	LDW-SS76-010	13	LDW-SS74-010MSD	23		33	
4	LDW-SS82-010	14		24		34	
5	LDW-SS74-010	15		25		35	
6	LDW-SS204-010	16		26		36	
7	LDW-SS91-010	17		27		37	
8	LDW-SS103-010	18		28		38	
9	LDW-SS68-010	19		29		39	
10	LDW-SS8-010	20		30		40	

VALIDATION FINDINGS WORKSHEET

METHOD: GC/MS BNA (EPA SW 846 Method 8270)

A. Phenol**	P. Bis(2-chloroethoxy)methane	EE. 2,6-Dinitrotoluene	TT. Pentachlorophenol**	III. Benzo(a)pyrene**
B. Bis (2-chloroethyl) ether	Q. 2,4-Dichlorophenol**	FF. 3-Nitroaniline	UU. Phenanthrene	JJJ. Indeno(1,2,3-cd)pyrene
C. 2-Chlorophenol	R. 1,2,4-Trichlorobenzene	GG. Acenaphthene**	VV. Anthracene	KKK. Dibenz(a,h)anthracene
D. 1,3-Dichlorobenzene	S. Naphthalene	HH. 2,4-Dinitrophenol*	WW. Carbazole	LLL. Benzo(g,h,i)perylene
E. 1,4-Dichlorobenzene**	T. 4-Chloroaniline	II. 4-Nitrophenol*	XX. Di-n-butylphthalate	MMM. Bis(2-Chloroisopropyl)ether
F. 1,2-Dichlorobenzene	U. Hexachlorobutadiene**	JJ. Dibenzofuran	YY. Fluoranthene**	NNN. Aniline
G. 2-Methylphenol	V. 4-Chloro-3-methylphenol**	KK. 2,4-Dinitrotoluene	ZZ. Pyrene	OOO. N-Nitrosodimethylamine
H. 2,2'-Oxybis(1-chloropropane)	W. 2-Methylnaphthalene	LL. Diethylphthalate	AAA. Butylbenzylphthalate	PPP. Benzoic Acid
I. 4-Methylphenol	X. Hexachlorocyclopentadiene*	MM. 4-Chlorophenyl-phenyl ether	BBB. 3,3'-Dichlorobenzidine	QQQ. Benzyl alcohol
J. N-Nitroso-di-n-propylamine*	Y. 2,4,6-Trichlorophenol**	NN. Fluorene	CCC. Benzo(a)anthracene	RRR. Pyridine
K. Hexachloroethane	Z. 2,4,5-Trichlorophenol	OO. 4-Nitroaniline	DDD. Chrysene	SSS. Benzidine
L. Nitrobenzene	AA. 2-Chloronaphthalene	PP. 4,6-Dinitro-2-methylphenol	EEE. Bis(2-ethylhexyl)phthalate	TTT.
M. Isophorone	BB. 2-Nitroaniline	QQ. N-Nitrosodiphenylamine (1)**	FFF. Di-n-octylphthalate**	UUU.
N. 2-Nitrophenol**	CC. Dimethylphthalate	RR. 4-Bromophenyl-phenylether	GGG. Benzo(b)fluoranthene	VVV.
O. 2,4-Dimethylphenol	DD. Acenaphthylene	SS. Hexachlorobenzene	HHH. Benzo(k)fluoranthene	WWW.

LDC #: 13381A29
SDG #: H485

VALIDATION FINDINGS WORKSHEET
Matrix Spike/Matrix Spike Duplicates

Page: 1 of 1
Reviewer: q
2nd Reviewer: K

METHOD: GC/MS BNA (EPA SW 846 Method 8270)

Please see qualifications below for all questions answered "N". Not applicable questions are identified as "N/A".

(Y) N N/A Were a matrix spike (MS) and matrix spike duplicate (MSD) analyzed for each matrix in this SDG? If no, indicate which matrix does not have an associated MS/MSD. Soil / Water.

(Y) N N/A Was a MS/MSD analyzed every 20 samples of each matrix?

Y (N) N/A Were the MS/MSD percent recoveries (%R) and the relative percent differences (RPD) within the QC limits?

#	Date	MS/MSD ID	Compound	MS %R (Limits)	MSD %R (Limits)	RPD (Limits)	Associated Samples	Qualifications
		12/13	A	( )	35.2 (40-130)	( )	5	J/UJ/A
				( )	( )	( )		
				( )	( )	( )		
		QC flw ADs		( )	( )	( )		
				( )	( )	( )		
				( )	( )	( )		
				( )	( )	( )		
				( )	( )	( )		
				( )	( )	( )		
				( )	( )	( )		
				( )	( )	( )		
				( )	( )	( )		
				( )	( )	( )		
				( )	( )	( )		
				( )	( )	( )		
				( )	( )	( )		
				( )	( )	( )		
				( )	( )	( )		

	Compound	QC Limits (Soil)	RPD (Soil)	QC Limits (Water)	RPD (Water)		Compound	QC Limits (Soil)	RPD (Soil)	QC Limits (Water)	RPD (Water)
A.	Phenol	26-90%	≤ 35%	12-110%	≤ 42%	GG.	Acenaphthene	31-137%	≤ 19%	46-118%	≤ 31%
C.	2-Chlorophenol	25-102%	≤ 50%	27-123%	≤ 40%	II.	4-Nitrophenol	11-114%	≤ 50%	10-80%	≤ 50%
E.	1,4-Dichlorobenzene	28-104%	≤ 27%	36-97%	≤ 28%	KK.	2,4-Dinitrotoluene	28-89%	≤ 47%	24-96%	≤ 38%
J.	N-Nitroso-di-n-propylamine	41-126%	≤ 38%	41-116%	≤ 38%	TT.	Pentachlorophenol	17-109%	≤ 47%	9-103%	≤ 50%
R.	1,2,4-Trichlorobenzene	38-107%	≤ 23%	39-98%	≤ 28%	ZZ.	Pyrene	35-142%	≤ 36%	26-127%	≤ 31%
V.	4-Chloro-3-methylphenol	26-103%	≤ 33%	23-97%	≤ 42%						

LDC#: 13381A2a
SDG#: HU85

VALIDATION FINDINGS WORKSHEET
Field Duplicates

Reviewer: 9
2nd Reviewer: JA

METHOD: GC/MS Semivolatiles (EPA SW 846 Method 8270)

Y N NA Were field duplicate pairs identified in this SDG?
Y N NA Were target analytes detected in the field duplicate pairs?

Compound	Concentration (ug/Kg)		RPD	(≤ 50)
	4	6		
GG	50	20U	~~200~~ NC	
UU	420	190	75	
WW	79	32	85	
VV	180	82	75	
YY	1000	630	45	
ZZ	790	440	57	
CCC	570	220	89	
EEE	220	150	38	
DDD	800	410	64	
GGG	650	360	57	
HHH	460	180	88	
III	470	190	85	
JJJ	170	72	81	
LLL	120	49	84	
DD	98U	22	~~200~~ NC	
NN	98U	24	~~200~~	

LDC #: 13381B2a

SDG #: HV37

Laboratory: Analytical Resources, Inc.

VALIDATION COMPLETENESS WORKSHEET

Level II

Date: 4/21/05

Page: 1 of 1

Reviewer: Q

2nd Reviewer: K

METHOD: GC/MS Semivolatiles (EPA SW 846 Method 8270C)

The samples listed below were reviewed for each of the following validation areas. Validation findings are noted in attached validation findings worksheets.

	Validation Area		Comments
I.	Technical holding times	A	Sampling dates: 3/9/05
II.	GC/MS Instrument performance check	N	
III.	Initial calibration	N	
IV.	Continuing calibration	N	
V.	Blanks	SW	
VI.	Surrogate spikes	SW	
VII.	Matrix spike/Matrix spike duplicates	A	
VIII.	Laboratory control samples	A SW	LCS
IX.	Regional Quality Assurance and Quality Control	N	
X.	Internal standards	N	
XI.	Target compound identification	N	
XII.	Compound quantitation/CRQLs	SW N	
XIII.	Tentitatively identified compounds (TICs)	N	
XIV.	System performance	N	
XV.	Overall assessment of data	SW	
XVI.	Field duplicates	SW	D=13+14
XVII.	Field blanks	ND	FB = 20

Note: A = Acceptable
N = Not provided/applicable
SW = See worksheet

ND = No compounds detected
R = Rinsate
FB = Field blank

D = Duplicate
TB = Trip blank
EB = Equipment blank

Validated Samples

All soils except #20

1	LDW-SS7-10	11	LDW-SS132-10	21	LDW-SS150-10MS	31	MB-031505 W
2	LDW-SS3-10	12	LDW-SS66-10	22	LDW-SS150-10MSD	32	MB-031805 S
3	LDW-SS95-10	13	LDW-SS62-10	23		33	MB-040105 S
4	LDW-SS95-10DL	14	LDW-SS207-10	24		34	
5	LDW-SS95-10RF	15	LDW-SS146-10	25		35	
6	LDW-SS95-10REDL	16	LDW-SS147-10	26		36	
7	LDW-SS133-10	17	LDW-SS148-10	27		37	
8	LDW-SS138-10	18	LDW-SS149-10	28		38	
9	LDW-SS139-10	19	LDW-SS150-10	29		39	
10	LDW-SS137-10	20	LDW-SS7-RB	30		40	

LDC #: 13381B29
SDG #: HV3T

VALIDATION FINDINGS WORKSHEET
Blanks

Page: 1 of 1
Reviewer: 9
2nd Reviewer: AC

METHOD: GC/MS BNA (EPA SW 846 Method 8270)

Please see qualifications below for all questions answered "N". Not applicable questions are identified as "N/A".

(Y) N N/A Was a method blank analyzed for each matrix?
(Y) N N/A Was a method blank analyzed for each concentration preparation level?
(Y) N N/A Was a method blank associated with every sample?
(Y) N N/A Was the blank contaminated? If yes, please see qualification below.

Blank extraction date: 3/18/05 **Blank analysis date:** 3/29/05
Conc. units: ug/kg Associated Samples: 1-4, T-19

Compound	Blank ID	Sample Identification								
MB-	031805	1	2	3	T	8	9	10	11	12
LL	40	100/U	2T/U	26/~~BU~~						
EEE	58	840/U	3T/U	140/~~BU~~	250/U	120/U	170/U	320/U	320/U	360/U

Blank extraction date: _____ **Blank analysis date:** _____
Conc. units: _____ Associated Samples: 1-4, T-19

Compound	Blank ID	Sample Identification								
MB-	031805	13	14	15	16	17	18	19		
LL	40									
EEE	58	~~350~~ 410/U	550/U	130/U	82/U	160/U	59/U	28/U		

CIRCLED RESULTS WERE NOT QUALIFIED. ALL RESULTS NOT CIRCLED WERE QUALIFIED BY THE FOLLOWING STATEMENT:
Common contaminants such as the phthalates and TICs noted above that were detected in samples within ten times the associated method blank concentration were qualified as not detected, "U". Other contaminants within five times the method blank concentration were also qualified as not detected, "U".

LDC #: [illegible]
SDG #: HV3T

VALIDATION FINDINGS WORKSHEET
Surrogate Recovery

Page: 1 of 1
Reviewer: Q
2nd Reviewer: [illegible]

METHOD: GC/MS BNA (EPA SW 846 Method 8270)

Please see qualification below for all questions answered "N". Not applicable questions are identified as "N/A".

Y (N) N/A Were percent recoveries (%R) for surrogates within QC limits?
(Y) N N/A If 2 or more base neutral or acid surrogates were outside QC limits, was a reanalysis performed to confirm %R?
Y N (N/A) If any %R was less than 10 percent, was a reanalysis performed to confirm %R?

#	Date	Sample ID	Surrogate	%R (Limits)	Qualifications
		3	NBZ	21.3 (40-130)	J/UJ/A
			TPH	22.0 ( )	
			PHL	20.7 ( )	
			TBP	22.9 ( )	
			FBP	20.4 ( )	
			DCB	15.8 ( )	
			2FP	19.8 ( )	
			2CP	19.7 ( )	
				( )	
		4	All	DIL ( )	No Qual (DF=10x)
				( )	
				( )	
				( )	
				( )	
				( )	
				( )	
				( )	
				( )	
				( )	
				( )	
				( )	
				( )	
				( )	
				( )	
				( )	

* QC limits are advisory	QC Limits (Soil)	QC Limits (Water)
S1 (NBZ) = Nitrobenzene-d5	23-120	35-114
S2 (FBP) = 2-Fluorobiphenyl	30-115	43-116
S3 (TPH) = Terphenyl-d14	18-137	33-141
S4 (PHL) = Phenol-d5	24-113	10-94

	QC Limits (Soil)	QC Limits (Water)
S5 (2FP)= 2-Fluorophenol	25-121	21-100
S6 (TBP) = 2,4,6-Tribromophenol	19-122	10-123
S7 (2CP) = 2-Chlorophenol-d4	20-130*	33-110*
S8 (DCB) = 1,2-Dichlorobenzene-d4	20-130*	16-110*

LDC #: 13381B29
SDG #: HV3T

VALIDATION FINDINGS WORKSHEET
Compound Quantitation and Reported CRQLs

Page: 1 of 1
Reviewer: SK
2nd Reviewer: AC

METHOD: GC/MS BNA (EPA SW 846 Method 8270)

Please see qualifications below for all questions answered "N". Not applicable questions are identified as "N/A".

Y N N/A Were the correct internal standard (IS), quantitation ion and relative response factor (RRF) used to quantitate the compound?

Y N N/A Were compound quantitation and CRQLs adjusted to reflect all sample dilutions and dry weight factors applicable to level IV validation?

#	Date	Sample ID	Finding	Associated Samples	Qualifications
		3	uu. VV. YY. ZZ. DDD	3	Vdets/A
			>calib range		
		5	uu. YY >calib range	5	

Comments: See sample calculation verification worksheet for recalculations

LDC #: 13381B29
SDG #: HV37

VALIDATION FINDINGS WORKSHEET
Overall Assessment of Data

Page: 1 of 1
Reviewer: 9
2nd Reviewer: AC

METHOD: GC/MS BNA (EPA SW 846 Method 8270)

Please see qualifications below for all questions answered "N". Not applicable questions are identified as "N/A".

All available information pertaining to the data were reviewed using professional judgement to compliment the determination of the overall quality of the data.

Y N N/A Was the overall quality and usability of the data acceptable?

#	Date	Sample ID	Finding	Associated Samples	Qualifications
		3	S. W. DD. ~~GG~~. VV.	3	R/A
			NN. UU. WW. VV. YY.		
			ZZ. CCC. EEE. DDD		
			~~FFF~~. HHH. III. JJJ		
			KKK		
		5	All except S. W. ~~GG~~.	5	R/A
			DD. JJJ. WW. CCC.		
			EEE. ~~FFF~~. III.		
		6	All except:	6	~~R~~ R/A
		~~6~~	~~GG~~. NN. UU. VV. YY	~~6~~	
			ZZ. DDD. HHH. JJJ		
			KKK		
		4	All	4	R/A

Comments: _____

OVR.2S

LDC#: 13381B2a
SDG#: HV37

VALIDATION FINDINGS WORKSHEET
Field Duplicates

Reviewer: Q
2nd Reviewer: M

METHOD: GC/MS Semivolatiles (EPA SW 846 Method 8270)

Y N NA Were field duplicate pairs identified in this SDG?
Y N NA Were target analytes detected in the field duplicate pairs?

Compound	Concentration (ug/Kg)		RPD	(≤50)
	13	14		
S	60U	120	NC ~~200~~	
DD	60U	34	↓ ~~200~~	
NN	38	36	5	
UU	210	240	13	
WW	39	45	14	
VV	120	140	15	
YY	700	730	4	
ZZ	450	490	9	
AAA	46	48	4	
CCC	270	320	17	
EEE	470	550	16	
DDD	440	530	19	
GGG	390	390	0	
HHH	380	500	27	
III	290	330	13	
JJJ	110	120	9	
LLL	82	97	17	

LDC #: 13381C2a **VALIDATION COMPLETENESS WORKSHEET** Date: 4/20/05
SDG #: HV42 Level ~~III~~ IV Page: 1 of 1
Laboratory: Analytical Resources, Inc. Reviewer: 9
2nd Reviewer: 2

METHOD: GC/MS Semivolatiles (EPA SW 846 Method 8270C)

The samples listed below were reviewed for each of the following validation areas. Validation findings are noted in attached validation findings worksheets.

	Validation Area		Comments
I.	Technical holding times	A	Sampling dates: 3/10/05
II.	GC/MS Instrument performance check	~~A~~N	
III.	Initial calibration	~~A~~N	%RSD . r^2
IV.	Continuing calibration	~~A~~N	
V.	Blanks	A	
VI.	Surrogate spikes	A	
VII.	Matrix spike/Matrix spike duplicates	A	
VIII.	Laboratory control samples	A	LCS
IX.	Regional Quality Assurance and Quality Control	N	
X.	Internal standards	~~A~~N	
XI.	Target compound identification	A	
XII.	Compound quantitation/CRQLs	A	
XIII.	Tentitatively identified compounds (TICs)	N	
XIV.	System performance	A	
XV.	Overall assessment of data	A	
XVI.	Field duplicates	N	
XVII.	Field blanks	N	

Note: A = Acceptable
N = Not provided/applicable
SW = See worksheet
ND = No compounds detected
R = Rinsate
FB = Field blank
D = Duplicate
TB = Trip blank
EB = Equipment blank

Validated Samples
All soils

1 1	LDW-SS45-010	11 3	LDW-SS25-010MS	21	MB-032105	31	
2 1	LDW-SS46-010	12 3	LDW-SS25-010MSD	22		32	
3 1	LDW-SS6-010	13		23		33	
4 2	LDW-SS6-010DL	14		24		34	
5 1	LDW-SS47-010	15		25		35	
6 2	LDW-SS47-010DL	16		26		36	
7 2	LDW-SS108-010	17		27		37	
8 3	LDW-SS61-010	18		28		38	
9 3	LDW-SS25-010	19		29		39	
10 3	LDW-SS86-010	20		30		40	

LDC #: 13381C29
SDG #: HV42

VALIDATION FINDINGS CHECKLIST

Reviewer: Q
2nd Reviewer: VC

Method: Semivolatiles (EPA SW 846 Method 8270C)

Validation Area	Yes	No	NA	Findings/Comments
I. Technical holding times				
All technical holding times were met.	✓			
Cooler temperature criteria was met.	✓			
II. GC/MS Instrument performance check				
Were the DFTPP performance results reviewed and found to be within the specified criteria?	✓			
Were all samples analyzed within the 12 hour clock criteria?	✓			
III. Initial calibration				
Did the laboratory perform a 5 point calibration prior to sample analysis?	✓			
Were all percent relative standard deviations (%RSD) and relative response factors (RRF) within method criteria for all CCCs and SPCCs?	✓			
Was a curve fit used for evaluation? If Yes, what was the acceptance criteria used?	✓			
Did the initial calibration meet the curve fit acceptance criteria?	✓			
Were all percent relative standard deviations (%RSD) $\leq$ 30% and relative response factors (RRF) $\geq$ 0.05?	✓	✓		
IV. Continuing calibration				
Was a continuing calibration standard analyzed at least once every 12 hours for each instrument?	✓			
Were all percent differences (%D) and relative response factors (RRF) within method criteria for all CCCs and SPCCs?	✓			
Were all percent differences (%D) $\leq$ 25% and relative response factors (RRF) $\geq$ 0.05?	✓	✓		
V. Blanks				
Was a method blank associated with every sample in this SDG?	✓			
Was a method blank analyzed for each matrix and concentration?	✓			
Was there contamination in the method blanks? If yes, please see the Blanks validation completeness worksheet.		✓		
VI. Surrogate spikes				
Were all surrogate %R within QC limits?	✓			
If 2 or more base neutral or acid surrogates were outside QC limits, was a reanalysis performed to confirm %R?			✓	
If any %R was less than 10 percent, was a reanalysis performed to confirm %R?			✓	
VII. Matrix spike/Matrix spike duplicates				
Were a matrix spike (MS) and matrix spike duplicate (MSD) analyzed for each matrix in this SDG? If no, indicate which matrix does not have an associated MS/MSD. Soil / Water.	✓			
Was a MS/MSD analyzed every 20 samples of each matrix?	✓			

LDC #: 13381C29
SDG #: HV42

VALIDATION FINDINGS CHECKLIST

Reviewer: 9
2nd Reviewer: K

Validation Area	Yes	No	NA	Findings/Comments
Were the MS/MSD percent recoveries (%R) and the relative percent differences (RPD) within the QC limits?	✓			
VIII. Laboratory control samples				
Was an LCS analyzed for this SDG?	✓			
Was an LCS analyzed per extraction batch?	✓			
Were the LCS percent recoveries (%R) and relative percent difference (RPD) within the QC limits?	✓			
IX. Regional Quality Assurance and Quality Control				
Were performance evaluation (PE) samples performed?		✓		
Were the performance evaluation (PE) samples within the acceptance limits?			✓	
X. Internal standards				
Were internal standard area counts within -50% or +100% of the associated calibration standard?	✓	✓		
Were retention times within ± 30 seconds from the associated calibration standard?	✓			
XI. Target compound identification				
Were relative retention times (RRT's) within ± 0.06 RRT units of the standard?	✓			
Did compound spectra meet specified EPA "Functional Guidelines" criteria?	✓			
Were chromatogram peaks verified and accounted for?	✓			
XII. Compound quantitation/CRQLs				
Were the correct internal standard (IS), quantitation ion and relative response factor (RRF) used to quantitate the compound?	✓			
Were compound quantitation and CRQLs adjusted to reflect all sample dilutions and dry weight factors applicable to level IV validation?	✓			
XIII. Tentatively identified compounds (TICs)				
Were the major ions (> 10 percent relative intensity) in the reference spectrum evaluated in sample spectrum?			✓	
Were relative intensities of the major ions within ± 20% between the sample and the reference spectra?			✓	
Did the raw data indicate that the laboratory performed a library search for all required peaks in the chromatograms (samples and blanks)?		✓		
XIV. System performance				
System performance was found to be acceptable.	✓			
XV. Overall assessment of data				
Overall assessment of data was found to be acceptable.	✓			

Validation Area	Yes	No	NA	Findings/Comments
XVI. Field duplicates				
Field duplicate pairs were identified in this SDG.		✓		
Target compounds were detected in the field duplicates.			✓	
XVII. Field blanks				
Field blanks were identified in this SDG.		✓		
Target compounds were detected in the field blanks.			✓	

LDC #: 13381C29
SDG #: HV42

VALIDATION FINDINGS WORKSHEET
GC/MS Performance Check

Page: 1 of 1
Reviewer: 9
2nd Reviewer: DL

METHOD: GC/MS BNA (EPA SW 846 Method 8270)

Please see qualifications below for all questions answered "N". Not applicable questions are identified as "N/A".

(Y) N N/A Were the DFTPP performance results reviewed and found to be within the EPA Functional Guideline criteria?

Y (N) N/A Were all samples analyzed within the 12 hour clock criteria?

#	Laboratory ID	12 Hour Clock (Time/date)	Finding	Associated Samples Client ID	Qualifications
	5	3/24/05 @ 22:00	8 min out of 12 hr	5	U Non-detect text

m/z	ION ABUNDANCE CRITERIA	m/z	ION ABUNDANCE CRITERIA
51	30.0 - 60.0% of m/z 198	199	5.0 - 9.0% of m/z 198
68	Less than 2.0% of m/z 69	275	10.0 - 30.0% of m/z 198
69	Present	365	Greater than 1.0% of m/z 198
70	Less than 2.0% of 69	441	Present, but less than m/z 443
127	40.0 - 60.0% of m/z 198	442	Greater than 40.0% of m/z 198
197	Less than 1.0% of m/z 198	443	17.0 - 23.0% of m/z 442
198	Base peak, 100% relative abundance		

LDC #: 13381C29
SDG #: HV42

VALIDATION FINDINGS WORKSHEET
Initial Calibration

Reviewer: [illegible]
2nd Reviewer: [illegible]

METHOD: GC/MS BNA (EPA SW 846 Method 8270)

Please see qualifications below for all questions answered "N". Not applicable questions are identified as "N/A".

(Y) N N/A Did the laboratory conduct an acceptable 5 point calibration prior to sample analysis?
(Y) N N/A Were percent relative standard deviations (%RSD) and relative response factors (RRF) within method criteria for all CCC's and SPCC's?
(Y) N N/A Was a curve fit used for evaluation? If yes, what was the acceptance criteria used for evaluation?
(Y) N N/A Did the initial calibration meet the acceptance criteria?
Y (N) N/A Were all %RSDs and RRFs within the validation criteria of ≤30 %RSD and ≥0.05 RRF ?

#	Date	Standard ID	Compound	Finding %RSD (Limit: ≤30.0%)	Finding RRF (Limit: ≥0.05)	Associated Samples	Qualifications
	3/2/05	ICAL	PP	32.11128		All + Blk	J/UJ/A

LDC #: 13381C29
SDG #: HV42

VALIDATION FINDINGS WORKSHEET
Continuing Calibration

Page: 1 of 1
Reviewer: Q
2nd Reviewer: A

METHOD: GC/MS BNA (EPA SW 846 Method 8270)

Please see qualifications below for all questions answered "N". Not applicable questions are identified as "N/A".

(Y) N N/A Was a continuing calibration standard analyzed at least once every 12 hours of sample analysis for each instrument?

(Y) N N/A Were percent differences (%D) and relative response factors (RRF) within method criteria for all CCC's and SPCC's ?

Y (N) N/A Were all %D and RRFs within the validation criteria of ≤25 %D and ≥0.05 RRF ?

#	Date	Standard ID	Compound	Finding %D (Limit: ≤25.0%)	Finding RRF (Limit: ≥0.05)	Associated Samples	Qualifications
	3/2/05	ICV0302	PP	131.45 (75-125)		All+Blk	J/UJ/A
	3/24/05	CC0324	X	52.92375		1-3, 5, Blk	J/UJ/A
			HH	27.16432			
	3/25/05	CC0325	X	39.09301		4, 6-7,	J/UJ/A
			HH	40.86125			
	3/28/05	CC0328	L	33.13655		8-12	J/UJ/A
			X	53.69960			
			HH	52.80003			
			II	36.3253			

CONCAL.2S

LDC #: 13801 e29
SDG #: HV42

VALIDATION FINDINGS WORKSHEET
Internal Standards

Page: 1 of 1
Reviewer: 9
2nd Reviewer: AK

METHOD: GC/MS BNA (EPA SW 846 Method 8270)

Please see qualifications below for all questions answered "N". Not applicable questions are identified as "N/A".

Y (N) N/A Were all internal standard area counts within -50 to +100 of the associated calibration standard?

(Y) N N/A Were the retention times of the internal standards within +/- 30 seconds of the retention times of the associated calibration standard?

#	Date	Sample ID	Internal Standard	Area (Limits)	RT (Limits)	Qualifications
		3	PRY	162046 (194084 - 776338)		J/UJ/A
				↓		↓
		5	PRY	169310 (↓	)	(EEE → LLL)

* QC limits are advisory

IS1 (DCB) = 1,4-Dichlorobenzene-d4
IS2 (NPT) = Naphthalene-d8
IS3 (ANT) = Acenaphthene-d10
IS4 (PHN) = Phenanthrene-d10
IS5 (CRY) = Chrysene-d12
IS6 (PRY) = Perylene-d12

LDC #: 13381c29
SDG #: HV42

VALIDATION FINDINGS WORKSHEET
Overall Assessment of Data

Page: 1 of 1
Reviewer: a
2nd Reviewer: a

METHOD: GC/MS BNA (EPA SW 846 Method 8270)

Please see qualifications below for all questions answered "N". Not applicable questions are identified as "N/A".

All available information pertaining to the data were reviewed using professional judgement to compliment the determination of the overall quality of the data.

(Y) N N/A Was the overall quality and usability of the data acceptable?

#	Date	Sample ID	Finding	Associated Samples	Qualifications
		3	UU, YY, ZZ, ZZZ, DDD.	3	R/D
			~~GGG~~. HHH. III. JJJ.		
			KKK. LLL		
		~~1~~ 4	M except above	4	R/D
		5	A, S. JJJ, NN, UU. WW	5	R/D
			VV, ZZ. CCC. DDD.		
			~~GGG~~. HHH. III. JJJ		
			KKK. LLL		
		6	M except above	6	R/D

Comments:

LDC #: 13381C29
SDG #: HV42

VALIDATION FINDINGS WORKSHEET
Initial Calibration Calculation Verification

Page: 1 of 1
Reviewer: Q
2nd Reviewer: K

METHOD: GC/MS BNA (EPA SW 846 Method 8270)

The Relative Response Factor (RRF), average RRF, and percent relative standard deviation (%RSD) were recalculated for the compounds identified below using the following calculations:

RRF = $(A_x)(C_{is})/(A_{is})(C_x)$
average RRF = sum of the RRFs/number of standards
%RSD = 100 * (S/X)

A_x = Area of compound, A_{is} = Area of associated internal standard
C_x = Concentration of compound, C_{is} = Concentration of internal standard
S = Standard deviation of the RRFs, X = Mean of the RRFs

#	Standard ID	Calibration Date	Compound (Reference Internal Standard)	Reported RRF (25 std)	Recalculated RRF (25 std)	Reported Average RRF (initial)	Recalculated Average RRF (initial)	Reported %RSD	Recalculated %RSD
1	1CAL	3/2/05	Phenol (1st internal standard)	2.24544	2.24544	2.2105	2.2105	5.17514	5.17515
			Naphthalene (2nd internal standard)	1.13613	1.13613	1.1037	1.1037	8.71448	8.71446
			Fluorene (3rd internal standard)	1.32360	1.32360	1.35311	1.35311	9.20486	9.20479
			Pentachlorophenol (4th internal standard)	0.15258	0.15258	0.14996	0.14996	3.15825	3.1599
			~~Bis(2-ethylhexyl)phthalate~~ DDD (5th internal standard)	1.27580	1.27580	1.36698	1.36698	11.53316	11.53321
			Berzo(a)pyrene (6th internal standard)	1.25152	1.25152	1.26417	1.26417	5.64386	5.6440
2			~~Phenol~~ EEE (1st internal standard)	0.57751	0.5775	0.58798	0.58798	6.18268	6.18252
			Naphthalene (2nd internal standard)						
			Fluorene (3rd internal standard)						
			Pentachlorophenol (4th internal standard)						
			Bis(2-ethylhexyl)phthalate (5th internal standard)						
			Benzo(a)pyrene (6th internal standard)						
3			Phenol (1st internal standard)						
			Naphthalene (2nd internal standard)						
			Fluorene (3rd internal standard)						
			Pentachlorophenol (4th internal standard)						
			Bis(2-ethylhexyl)phthalate (5th internal standard)						
			Benzo(a)pyrene (6th internal standard)						

Comments: Refer to Initial Calibration findings worksheet for list of qualifications and associated samples when reported results do not agree within 10.0% of the recalculated results.

LDC #: 13381C29
SDG #: HV42

VALIDATION FINDINGS WORKSHEET
Continuing Calibration Results Verification

Page: 1 of 1
Reviewer: 9
2nd Reviewer: ∝

METHOD: GC/MS BNA (EPA SW 846 Method 8270)

The percent difference (%D) of the initial calibration average Relative Response Factors (RRFs) and the continuing calibration RRFs were recalculated for the compounds identified below using the following calculation:

% Difference = 100 * (ave. RRF - RRF)/ave. RRF
RRF = $(A_x)(C_{is})/(A_{is})(C_x)$

Where: ave. RRF = initial calibration average RRF
RRF = continuing calibration RRF
A_x = Area of compound, A_{is} = Area of associated internal standard
C_x = Concentration of compound, C_{is} = Concentration of internal standard

#	Standard ID	Calibration Date	Compound (Reference Internal Standard)	Average RRF (Initial)	Reported RRF (CC)	Recalculated RRF (CC)	Reported %D	Recalculated %D
1	CC0324	3/24/05	Pherol (1st interral standard)	2.21T05	2.15860	2.15860	2.63633	2.63651
			Naphthalene (2nd internal standard)	1.1T03T	1.09512	1.09512	6.42928	6.42921
			Fluorene (3rd internal standard)	1.35311	1.2T104	1.2T104	6.06561	6.06541
			Pentachlorophenol (4th internal standard)	0.14996	0.13644	0.13644	9.011T8	9.01327
			~~Bis(2-ethylhexyl)phthalate~~ DDD (5th internal standard)	1.36698	1.20907	1.2090T	11.55209	11.55198
			Benzo(a)pyrene (6th internal standard)	1.264IT	1.24T03	1.24T03	1.35599	1.35599
2			~~Phenol~~ ESTD (1st internal standard)	0.58T98	0.5888 1	0.5888 1	0.14020	0.1409
			Naphthalene (2nd internal standard)					
			Fluorene (3rd internal standard)					
			Pentachlorophenol (4th internal standard)					
			Bis(2-ethylhexyl)phthalate (5th internal standard)					
			~~Benzo(a)pyrene~~ ESTD (6th internal standard)	0.58T98	0.6018T	0.6018T	2.36092	2.36164
3	CC0325	3/25/05	Phenol (1st internal standard)	2.21T05	2.15495	2.15495	2.80107	2.80124
			Naphthalene (2nd internal standard)	1.1T03T	1.08T62	1.08T62	T.0T020	T.0T014
			Fluorene (3rd internal standard)	1.35311	1.28982	1.28982	4.6TT32	4.6TT06
			Pentachlorophenol (4th internal standard)	0.14996	0.12491	0.12491	16.T0179	16.T0312
			~~Bis(2-ethylhexyl)phthalate~~ DDD (5th internal standard)	1.36698	1.20TT6	1.20TT6	11.64T52	11.64141
			Benzo(a)pyrene (6th internal standard)	1.264IT	1.30822	1.30822	3.48477	3.48476

Comments: Refer to Continuing Calibration findings worksheet for list of qualifications and associated samples when reported results do not agree within 10.0% of the recalculated results.

LDC #: 1338|C2A
SDG #: HV42

VALIDATION FINDINGS WORKSHEET
Continuing Calibration Results Verification

Reviewer: A
2nd Reviewer: K

METHOD: GC/MS BNA (EPA SW 846 Method 8270)

The percent difference (%D) of the initial calibration average Relative Response Factors (RRFs) and the continuing calibration RRFs were recalculated for the compounds identified below using the following calculation:

% Difference = 100 * (ave. RRF - RRF)/ave. RRF
$RRF = (A_x)(C_{is})/(A_{is})(C_x)$

Where: ave. RRF = initial calibration average RRF
RRF = continuing calibration RRF
A_x = Area of compound, A_{is} = Area of associated internal standard
C_x = Concentration of compound, C_{is} = Concentration of internal standard

#	Standard ID	Calibration Date	Compound (Reference Internal Standard)	Average RRF (Initial)	Reported RRF (CC)	Recalculated RRF (CC)	Reported %D	Recalculated %D
1	CC0328	3/28/05	Phenol (1st internal standard)	2.21705	2.08584	2.08584	5.91816	5.91833
			Naphthalene (2nd internal standard)	1.17037	1.08062	1.08062	7.66900	7.66894
			Fluorene (3rd internal standard)	1.35311	1.27981	1.27981	5.41757	5.41732
			Pentachlorophenol (4th internal standard)	0.14996	0.13340	0.13340	11.03915	11.04054
			Bis(2-ethylhexyl)phthalate (5th internal standard)	1.36698	1.20674	1.20674	11.72246	11.72235
			Benzo(a)pyrene (6th internal standard)	1.36417	1.21017	1.21017	4.27158	4.27159
2			~~Phenol (1st internal standard)~~	0.58798	0.58403	0.58403	0.67232	0.67162
			Naphthalene (2nd internal standard)					
			Fluorene (3rd internal standard)					
			Pentachlorophenol (4th internal standard)					
			Bis(2-ethylhexyl)phthalate (5th internal standard)					
			Benzo(a)pyrene (6th internal standard)					
3			Phenol (1st internal standard)					
			Naphthalene (2nd internal standard)					
			Fluorene (3rd internal standard)					
			Pentachlorophenol (4th internal standard)					
			Bis(2-ethylhexyl)phthalate (5th internal standard)					
			Benzo(a)pyrene (6th internal standard)					

Comments: Refer to Continuing Calibration findings worksheet for list of qualifications and associated samples when reported results do not agree within 10.0% of the recalculated results.

LDC #: 13381C29
SDG #: HV42

VALIDATION FINDINGS WORKSHEET
Surrogate Results Verification

Page: 1 of 1
Reviewer: 9
2nd reviewer: E

METHOD: GC/MS Semivolatiles (EPA SW 846 Method 8270)

The percent recoveries (%R) of surrogates were recalculated for the compounds identified below using the following calculation:

% Recovery: SF/SS * 100

Where: SF = Surrogate Found
SS = Surrogate Spiked

Sample ID: 1

	Surrogate Spiked	Surrogate Found	Percent Recovery Reported	Percent Recovery Recalculated	Percent Difference
Nitrobenzene-d5	8.333	4.97138	59.6	59.6	0
2-Fluorobiphenyl	↓	5.30425	63.6	63.6	↓
Terphenyl-d14	↓	5.84616	70.2	70.2	↓
Phenol-d5	12.5	7.42560	59.4	59.4	↓
2-Fluorophenol	↓	6.92077	55.4	55.4	↓
2,4,6-Tribromophenol	↓	9.31255	74.5	74.5	↓
2-Chlorophenol-d4	↓	7.74023	61.9	61.9	↓
1,2-Dichlorobenzene-d4	8.333	4.57398	54.1	54.1	↓

Sample ID:

	Surrogate Spiked	Surrogate Found	Percent Recovery Reported	Percent Recovery Recalculated	Percent Difference
Nitrobenzene-d5					
2-Fluorobiphenyl					
Terphenyl-d14					
Phenol-d5					
2-Fluorophenol					
2,4,6-Tribromophenol					
2-Chlorophenol-d4					
1,2-Dichlorobenzene-d4					

Sample ID:

	Surrogate Spiked	Surrogate Found	Percent Recovery Reported	Percent Recovery Recalculated	Percent Difference
Nitrobenzene-d5					
2-Fluorobiphenyl					
Terphenyl-d14					
Phenol-d5					
2 Fluorophenol					
2,4,6-Tribromophenol					
2-Chlorophenol-d4					
1,2-Dichlorobenzene-d4					

LDC #: 13381C29
SDG #: HV42

VALIDATION FINDINGS WORKSHEET
Matrix Spike/Matrix Spike Duplicates Results Verification

Page: 1 of 1
Reviewer: 9
2nd Reviewer: K

METHOD: GC/MS BNA (EPA SW 846 Method 8270)

The percent recoveries (%R) and Relative Percent Difference (RPD) of the matrix spike and matrix spike duplicate were recalculated for the compounds identified below using the following calculation:

% Recovery = 100 * (SSC - SC)/SA Where: SSC = Spiked sample concentration; SA = Spike added; SC = Sample concentation

RPD = | MS - MSD | * 2/(MS + MSD) MS = Matrix spike percent recovery; MSD = Matrix spike duplicate percent recovery

MS/MSD samples: 11/12

Compound	Spike Added (µg/L)		Sample Concentration (µg/L)	Spiked Sample Concentration (µg/L)		Matrix Spike Percent Recovery		Matrix Spike Duplicate Percent Recovery		MS/MSD RPD	
	MS	MSD	------	MS	MSD	Reported	Recalc.	Reported	Recalc.	Reported	Recalculated
Phenol	118	122	ND	361	434	50.3	50.3	60.1	60.1	18.4	18.4
2-Chlorophenol	↓	↓		349	408	48.6	48.6	56.5	56.5	15.6	15.6
1,4-Dichlorobenzene	479	481		217	242	45.3	45.3	50.3	50.3	10.9	10.9
N-Nitroso-di-n-propylamine	↓	↓		231	257	48.2	48.2	53.4	53.4	10.7	10.7
1,2,4-Trichlorobenzene	↓	↓		229	263	47.8	47.8	54.7	54.7	13.8	13.8
4-Chloro-3-methylphenol	118	122		457	552	59.5	59.5	76.5	76.5	25.5	25.5
Acenaphthene	479	481		244	304	50.9	50.9	63.2	63.2	21.9	21.9
4-Nitrophenol	118	122		541	624	75.3	75.3	86.4	86.4	14.2	14.2
2,4-Dinitrotoluene	479	481		240	315	50.1	50.1	65.5	65.5	27.0	27.0
Pentachlorophenol	118	122		350	532	48.7	48.7	73.7	73.7	41.3	41.3
Pyrene	479	481	↓	249	342	52.0	52.0	71.1	71.1	31.5	31.5

Comments: Refer to Matrix Spike/Matrix Spike Duplicates findings worksheet for list of qualifications and associated samples when reported results do not agree within 10.0% of the recalculated results.

LDC #: 13381C29
SDG #: HV42

VALIDATION FINDINGS WORKSHEET
Laboratory Control Sample/Laboratory Control Sample Duplicates Results Verification

Page: 1 of 1
Reviewer: 9
2nd Reviewer: [illegible]

METHOD: GC/MS BNA (EPA SW 846 Method 8270)

The percent recoveries (%R) and Relative Percent Difference (RPD) of the laboratory control sample and laboratory control sample duplicate were recalculated for the compounds identified below using the following calculation:

% Recovery = 100 * (SC/SA Where: SSC = Spike concertration
SA = Spike added

RPD = | LCS - LCSD | * 2/(LCS + LCSD) LCS = Laboratory control sample percent recovery LCSD = Laboratory control sample duplicate percent recovery

LCS/LCSD samples: LCS-03105

Compound	Spike Added (ug/kg)		Spike Concentration (ug/kg)		LCS Percent Recovery		LCSD Percent Recovery		LCS/LCSD RPD	
	LCS	LCSD	LCS	LCSD	Reported	Recalc.	Reported	Recalc.	Reported	Recalculated
Phenol	750	NA	463	NA	61.7	61.7				
2-Chlorophenol	↓		460		61.3	61.3				
1,4-Dichlorobenzene	500		300		60.0	60.0				
N-Nitroso-di-n-propylamine			297		59.4	59.4				
1,2,4-Trichlorobenzene			302		60.4	60.4				
4-Chloro-3-methylphenol	750		494		65.9	65.9				
Acenaphthene	500		314		62.8	62.8				
4-Nitrophenol	750		550		73.3	73.3				
2,4-Dinitrotoluene	500		338		67.6	67.6				
Pentachlorophenol	750		491		65.5	65.5				
Pyrene	500	↓	353	↓	70.6	70.6				

Comments: Refer to Laboratory Control Sample/Laboratory Control Sample Duplicates findings worksheet for list of qualifications and associated samples when reported results do not agree within 10.0% of the recalculated results.

LDC #: 13381C29
SDG #: HV42

VALIDATION FINDINGS WORKSHEET
Sample Calculation Verification

Page: 1 of 1
Reviewer: 9
2nd reviewer: [illegible]

METHOD: GC/MS BNA (EPA SW 846 Method 8270)

Y N N/A Were all reported results recalculated and verified for all level IV samples?
Y N N/A Were all recalculated results for detected target compounds agree within 10.0% of the reported results?

$$\text{Concentration} = \frac{(A_x)(I_s)(V_t)(DF)(2.0)}{(A_{is})(RRF)(V_o)(V_i)(\%S)}$$

A_x = Area of the characteristic ion (EICP) for the compound to be measured

A_{is} = Area of the characteristic ion (EICP) for the specific internal standard

I_s = Amount of internal standard added in nanograms (ng)

V_o = Volume or weight of sample extract in milliliters (ml) or grams (g).

V_i = Volume of extract injected in microliters (ul)

V_t = Volume of the concentrated extract in microliters (ul)

Df = Dilution Factor.

%S = Percent solids, applicable to soil and solid matrices only.

2.0 = Factor of 2 to account for GPC cleanup

Example:

Sample I.D. 2, S:

$$\text{Conc.} = \frac{(56910)(20)(500)(3)(\quad)}{(627107)(1.17037)(41.8)(1)(0.614)}$$

$= 90.64\ \mu g/g$

#	Sample ID	Compound	Reported Concentration ( )	Calculated Concentration ( )	Qualification

LDC #: 13384A2a **VALIDATION COMPLETENESS WORKSHEET** Date: 4/20/05
SDG #: HV00 Level II Page: 1 of 1
Laboratory: Analytical Resources, Inc. Reviewer: Q
2nd Reviewer: K

METHOD: GC/MS Semivolatiles (EPA SW 846 Method 8270C)

The samples listed below were reviewed for each of the following validation areas. Validation findings are noted in attached validation findings worksheets.

	Validation Area		Comments
I.	Technical holding times	A	Sampling dates: 3/8/05
II.	GC/MS Instrument performance check	N	
III.	Initial calibration	N	
IV.	Continuing calibration	N	
V.	Blanks	SW	
VI.	Surrogate spikes	A	
VII.	Matrix spike/Matrix spike duplicates	A	LDW-SS25-010 (HV42H)
VIII.	Laboratory control samples	A	LCS
IX.	Regional Quality Assurance and Quality Control	N	
X.	Internal standards	N	
XI.	Target compound identification	N	
XII.	Compound quantitation/CRQLs	N	
XIII.	Tentitatively identified compounds (TICs)	N	
XIV.	System performance	N	
XV.	Overall assessment of data	A	
XVI.	Field duplicates	SW	D=6+7. 13+14
XVII.	Field blanks	~~SW~~ N	

Note: A = Acceptable
N = Not provided/applicable
SW = See worksheet
ND = No compounds detected
R = Rinsate
FB = Field blank
D = Duplicate
TB = Trip blank
EB = Equipment blank

Validated Samples
All soils

1 1	LDW-SS81-010	11 1	LDW-SS106-010	21	MB-031705	31	
2 1	LDW-SS65-010	12 1	LDW-SS122-010	22	MB-032105	32	
3 1	LDW-SS41-010	13 1	LDW-SS131-010	23		33	
4 1	LDW-SS30-010	14 1	LDW-SS206-010	24		34	
5 2	LDW-SS21-010	15 1	LDW-SS140-010	25		35	
6 1	LDW-SS19-010	16 1	LDW-SS140-010MS	26		36	
7 2	LDW-SS205-010	17 1	LDW-SS140-010MSD	27		37	
8 1	LDW-SS11-010	18		28		38	
9 2	LDW-SS16-010	19		29		39	
10 1	LDW-SS105-010	20		30		40	

LDC #: 13384A29
SDG #: HV00

VALIDATION FINDINGS WORKSHEET
Blanks

Page: 1 of 1
Reviewer: 9
2nd Reviewer: K

METHOD: GC/MS BNA (EPA SW 846 Method 8270)

Please see qualifications below for all questions answered "N". Not applicable questions are identified as "N/A".

(Y) N N/A Was a method blank analyzed for each matrix?
(Y) N N/A Was a method blank analyzed for each concentration preparation level?
(Y) N N/A Was a method blank associated with every sample?
(Y) N N/A Was the blank contaminated? If yes, please see qualification below.

Blank extraction date: 3/17/05 **Blank analysis date:** 3/22/05
Conc. units: ug/Kg Associated Samples: 1-4. 6. 8. 10-15

Compound	Blank ID	Sample Identification								
MB	-031705	1	2	3	4	6	8	10	12	13
XX	29		21/U							
ZZZ	21	190/U	180/U	140/U	170/U	180/U	130/U	100/U	50/U	130/U

Blank extraction date: Same **Blank analysis date:**
Conc. units: Associated Samples: 1-4. 6. 8. 10-15

Compound	Blank ID	Sample Identification								
MB	-031705	14	15							
XX	29									
ZZZ	21	(270)	57/U							

CIRCLED RESULTS WERE NOT QUALIFIED. ALL RESULTS NOT CIRCLED WERE QUALIFIED BY THE FOLLOWING STATEMENT:
Common contaminants such as the phthalates and TICs noted above that were detected in samples within ten times the associated method blank concentration were qualified as not detected, "U". Other contaminants within five times the method blank concentration were also qualified as not detected, "U".

LDC#: 13384A2a
SDG#: HV00

VALIDATION FINDINGS WORKSHEET
Field Duplicates

Reviewer: 9
2nd Reviewer: A

METHOD: GC/MS Semivolatiles (EPA SW 846 Method 8270)

Y N NA Were field duplicate pairs identified in this SDG?
Y N NA Were target analytes detected in the field duplicate pairs?

Compound	Concentration (ug/Kg)		RPD	(≤50)
	6	7		
A	20U	180	C ~~200~~	
DD	20U	41	! ~~200~~	
GG	36	36	0	
JJ	20U	29	~~200~~	
NN	44	64	37	
UU	250	450	57	
WW	22	68	102	
VV	77	190	85	
YY	460	910	66	
ZZ	350	960	93	
CCC	180	350	64	
EEE	180	470	89	
DDD	280	590	71	
GGG	270	640	81	
HHH	140	530	116	
III	160	390	84	
JJJ	64	140	75	
LLL	46	110	82	

Compound	Concentration (ug/Kg)		RPD	(≤50)
	13	14		
CC	34	66	64	
UU	49	130	91	
YY	210	690	107	
ZZ	130	400	102	

LDC#: 13384A2a
SDG#: HV00

VALIDATION FINDINGS WORKSHEET
Field Duplicates

Reviewer: CK
2nd Reviewer: DC

METHOD: GC/MS Semivolatiles (EPA SW 846 Method 8270)

Y N NA Were field duplicate pairs identified in this SDG?
Y N NA Were target analytes detected in the field duplicate pairs?

Compound	Concentration (ug/Kg)		RPD	(≤50)
	13	14		
AAA	23	44	63	
CCC	79	170	73	
EEE	130	270	70	
DDD	100	270	92	
GGG	120	240	67	
HHH	65	170	89	
III	70	120	53	
JJJ	26	45	54	
LLL	20U	34	NC ~~200~~	
VV	20U	36	NC ~~200~~	
WW	20U	24	↓ ~~200~~	

LDC #: 13395A2a **VALIDATION COMPLETENESS WORKSHEET** Date: 4/20/05
SDG #: HV38 Level II Page: 1 of 1
Laboratory: Analytical Resources, Inc. Reviewer: 9
2nd Reviewer: 0

METHOD: GC/MS Semivolatiles (EPA SW 846 Method 8270C)

The samples listed below were reviewed for each of the following validation areas. Validation findings are noted in attached validation findings worksheets.

	Validation Area		Comments
I.	Technical holding times	A	Sampling dates: 3/11/05
II.	GC/MS Instrument performance check	N	
III.	Initial calibration	N	
IV.	Continuing calibration	N	
V.	Blanks	SW	
VI.	Surrogate spikes	A	
VII.	Matrix spike/Matrix spike duplicates	A	LDW-SS40-010 (HV00)
VIII.	Laboratory control samples	A	LCS
IX.	Regional Quality Assurance and Quality Control	N	
X.	Internal standards	N	
XI.	Target compound identification	N	
XII.	Compound quantitation/CRQLs	N	
XIII.	Tentitatively identified compounds (TICs)	N	
XIV.	System performance	N	
XV.	Overall assessment of data	A	
XVI.	Field duplicates	N	
XVII.	Field blanks	N	

Note: A = Acceptable
N = Not provided/applicable
SW = See worksheet
ND = No compounds detected
R = Rinsate
FB = Field blank
D = Duplicate
TB = Trip blank
EB = Equipment blank

Validated Samples

1	LDW-SS39-010 Sed	11	MB-031705	21		31	
2	LDW-SS100-010	12		22		32	
3	LDW-SS~~2~~b-010 B2b	13		23		33	
4		14		24		34	
5		15		25		35	
6		16		26		36	
7		17		27		37	
8		18		28		38	
9		19		29		39	
10		20		30		40	

LDC #: 13395A29
SDG #: HV38

VALIDATION FINDINGS WORKSHEET
Blanks

Page: 1 of 1
Reviewer: [illegible]
2nd Reviewer: [illegible]

METHOD: GC/MS BNA (EPA SW 846 Method 8270)

Please see qualifications below for all questions answered "N". Not applicable questions are identified as "N/A".

Y N N/A Was a method blank analyzed for each matrix?
Y N N/A Was a method blank analyzed for each concentration preparation level?
Y N N/A Was a method blank associated with every sample?
Y N N/A Was the blank contaminated? If yes, please see qualification below.

Blank extraction date: 3/17/05 **Blank analysis date:** 3/22/05
Conc. units: ug/kg Associated Samples: 1 2 3

Compound	Blank ID	Sample Identification								
MB	031705	1	2	3						
XX	29	120/U								
ZZZ	21	110/U	24/U	(350)						

Blank extraction date: _____ **Blank analysis date:** _____
Conc. units: _____ Associated Samples: _____

Compound	Blank ID	Sample Identification								

CIRCLED RESULTS WERE NOT QUALIFIED. ALL RESULTS NOT CIRCLED WERE QUALIFIED BY THE FOLLOWING STATEMENT:
Common contaminants such as the phthalates and TICs noted above that were detected in samples within ten times the associated method blank concentration were qualified as not detected, "U". Other contaminants within five times the method blank concentration were also qualified as not detected, "U".

LDC #: 13398A2a **VALIDATION COMPLETENESS WORKSHEET** Date: 4/21/05
SDG #: HV58 Level II Page: 1 of 1
Laboratory: Analytical Resources, Inc. Reviewer: Q
2nd Reviewer: M

METHOD: GC/MS Semivolatiles (EPA SW 846 Method 8270C)

The samples listed below were reviewed for each of the following validation areas. Validation findings are noted in attached validation findings worksheets.

	Validation Area		Comments
I.	Technical holding times	A	Sampling dates: 3/14/05
II.	GC/MS Instrument performance check	N	
III.	Initial calibration	N	
IV.	Continuing calibration	N	
V.	Blanks	SW	
VI.	Surrogate spikes	A	
VII.	Matrix spike/Matrix spike duplicates	SW	QC only for AR>
VIII.	Laboratory control samples	A	LCS
IX.	Regional Quality Assurance and Quality Control	N	
X.	Internal standards	N	
XI.	Target compound identification	N	
XII.	Compound quantitation/CRQLs	SW N	
XIII.	Tentitatively identified compounds (TICs)	N	
XIV.	System performance	N	
XV.	Overall assessment of data	SW	
XVI.	Field duplicates	N	
XVII.	Field blanks	ND	RB=15. 16

Note: A = Acceptable
N = Not provided/applicable
SW = See worksheet
ND = No compounds detected
R = Rinsate
FB = Field blank
D = Duplicate
TB = Trip blank
EB = Equipment blank

Validated Samples

1	LDW-SS90-010 Soil	11	LDW-SSB4a-010 Soil	21	MB-031905 W	31	
2	LDW-SS24-010	12	LDW-SS29-010	22	MB-032305 S	32	
3	LDW-SS24-010DL	13	LDW-SS107-010	23		33	
4	LDW-SS9-010	14	LDW-SS145-010	24		34	
5	LDW-SS9-010DL	15	LDW-SSB7a-RB W	25		35	
6	LDW-SS77-010	16	LDW-SS71-RB	26		36	
7	LDW-SS59-010	17	LDW-SS145-010MS Soil	27		37	
8	LDW-SSB5b-010	18	LDW-SS145-010MSD	28		38	
9	LDW-SS53-010	19		29		39	
10	LDW-SS34-010	20		30		40	

LDC #: 13398A2a
SDG #: #1158

VALIDATION FINDINGS WORK SHEET
Blanks

Page: 1 of 1
Reviewer: 9
2nd Reviewer: M

METHOD: GC/MS BNA (EPA SW 846 Method 8270)

Please see qualifications below for all questions answered "N". Not applicable questions are identified as "N/A".

Y N N/A Was a method blank analyzed for each matrix?
Y N N/A Was a method blank analyzed for each concentration preparation level?
Y N N/A Was a method blank associated with every sample?
Y N N/A Was the blank contaminated? If yes, please see qualification below.

Blank extraction date: 3/23/05 **Blank analysis date:** 3/31/05
Conc. units: ug/kg Associated Samples: all soils

Compound	Blank ID	Sample Identification								
LIB	32305	1	2	7	9	11	12	13		
A	40	84/U	38/U	49/U	59/U	51/U	46/U	34/U		

Blank extraction date: _____ **Blank analysis date:** _____
Conc. units: _____ Associated Samples: _____

Compound	Blank ID	Sample Identification								

CIRCLED RESULTS WERE NOT QUALIFIED. ALL RESULTS NOT CIRCLED WERE QUALIFIED BY THE FOLLOWING STATEMENT:
Common contaminants such as the phthalates and TICs noted above that were detected in samples within ten times the associated method blank concentration were qualified as not detected, "U". Other contaminants within five times the method blank concentration were also qualified as not detected, "U".

LDC #: 13398A29
SDG #: HV58

VALIDATION FINDINGS WORKSHEET
Matrix Spike/Matrix Spike Duplicates

Page: 1 of 1
Reviewer: 9
2nd Reviewer: M

METHOD: GC/MS BNA (EPA SW 846 Method 8270)

Please see qualifications below for all questions answered "N". Not applicable questions are identified as "N/A".

(Y) N N/A Were a matrix spike (MS) and matrix spike duplicate (MSD) analyzed for each matrix in this SDG? If no, indicate which matrix does not have an associated MS/MSD. Soil / Water.

(Y) N N/A Was a MS/MSD analyzed every 20 samples of each matrix?

Y (N) N/A Were the MS/MSD percent recoveries (%R) and the relative percent differences (RPD) within the QC limits?

#	Date	MS/MSD ID	Compound	MS %R (Limits)	MSD %R (Limits)	RPD (Limits)	Associated Samples	Qualifications
		17/18	44	32.6 (40-130)	32.8 (40-130)	( )	4	Y/N/A
				( )	( )	( )		
				( )	( )	( )		
				( )	( )	( )		
				( )	( )	( )		
				( )	( )	( )		
				( )	( )	( )		
				( )	( )	( )		
				( )	( )	( )		
				( )	( )	( )		
				( )	( )	( )		
				( )	( )	( )		
				( )	( )	( )		
				( )	( )	( )		
				( )	( )	( )		
				( )	( )	( )		
				( )	( )	( )		
				( )	( )	( )		
				( )	( )	( )		

	Compound	QC Limits (Soil)	RPD (Soil)	QC Limits (Water)	RPD (Water)		Compound	QC Limits (Soil)	RPD (Soil)	QC Limits (Water)	RPD (Water)
A.	Phenol	26-90%	≤ 35%	12-110%	≤ 42%	GG.	Acenaphthene	31-137%	≤ 19%	46-118%	≤ 31%
C.	2-Chlorophenol	25-102%	≤ 50%	27-123%	≤ 40%	II.	4-Nitrophenol	11-114%	≤ 50%	10-80%	≤ 50%
E.	1,4-Dichlorobenzene	28-104%	≤ 27%	36-97%	≤ 28%	KK.	2,4-Dinitrotoluene	28-89%	≤ 47%	24-96%	≤ 38%
J.	N-Nitroso-di-n-propylamine	41-126%	≤ 38%	41-116%	≤ 38%	TT.	Pentachlorophenol	17-109%	≤ 47%	9-103%	≤ 50%
R.	1,2,4-Trichlorobenzene	38-107%	≤ 23%	39-98%	≤ 28%	ZZ.	Pyrene	35-142%	≤ 36%	26-127%	≤ 31%
V.	4-Chloro-3-methylphenol	26-103%	≤ 33%	23-97%	≤ 42%						

LDC #: 13398A2a
SDG #: HV58

VALIDATION FINDINGS WORKSHEET
Compound Quantitation and Reported CRQLs

Page: 1 of 1
Reviewer: [illegible]
2nd Reviewer: [illegible]

METHOD: GC/MS BNA (EPA SW 846 Method 8270)

Please see qualifications below for all questions answered "N". Not applicable questions are identified as "N/A".

Y N N/A Were the correct internal standard (IS), quantitation ion and relative response factor (RRF) used to quantitate the compound?

Y N N/A Were compound quantitation and CRQLs adjusted to reflect all sample dilutions and dry weight factors applicable to level IV validation?

#	Date	Sample ID	Finding	Asscciated Samples	Qualifications
		2	YY, ZZ, DDD, ~~EEE~~.	2	Jdets/A
			HHH, III > calib range		
		4	YY > calib range	4	

Comments: See sample calculation verification worksheet for recalculations

LDC #: 13398A29
SDG #: HY58

VALIDATION FINDINGS WORKSHEET
Overall Assessment of Data

Page: 1 of 1
Reviewer: 9
2nd Reviewer: AC

METHOD: GC/MS BNA (EPA SW 846 Method 8270)

Please see qualifications below for all questions answered "N". Not applicable questions are identified as "N/A".

All available information pertaining to the data were reviewed using professional judgement to compliment the determination of the overall quality of the data.

Y N N/A Was the overall quality and usability of the data acceptable?

#	Date	Sample ID	Finding	Associated Samples	Qualifications
		2	YY. ZZ. DDD. GGG.	2	R/A
			HHH. III. QQQ. DD		
			MM. CCC. VVV, KKK,		
			LLL		
		3	All except above	3	R/A
		4	YY. ZZ, DDD. HHH	4	R/A
			VVV. LLL		
		☆			
		5	All except above	5	R/A

Comments: _____

OVR.2S

LDC #: 13403A2a **VALIDATION COMPLETENESS WORKSHEET** Date: 4/21/05

SDG #: HV72 Level IV

Laboratory: Analytical Resources, Inc.

Page: 1 of 1

Reviewer: 9

2nd Reviewer: IX

METHOD: GC/MS Semivolatiles (EPA SW 846 Method 8270C)

The samples listed below were reviewed for each of the following validation areas. Validation findings are noted in attached validation findings worksheets.

	Validation Area		Comments
I.	Technical holding times	A	Sampling dates: 3/15/05
II.	GC/MS Instrument performance check	N	
III.	Initial calibration	N	
IV.	Continuing calibration	N	
V.	Blanks	A	
VI.	Surrogate spikes	A	
VII.	Matrix spike/Matrix spike duplicates	A	
VIII.	Laboratory control samples	A	LCS
IX.	Regional Quality Assurance and Quality Control	N	
X.	Internal standards	N	
XI.	Target compound identification	N	
XII.	Compound quantitation/CRQLs	N	
XIII.	Tentitatively identified compounds (TICs)	N	
XIV.	System performance	N	
XV.	Overall assessment of data	A	
XVI.	Field duplicates	N	
XVII.	Field blanks	N	

Note: A = Acceptable
N = Not provided/applicable
SW = See worksheet
ND = No compounds detected
R = Rinsate
FB = Field blank
D = Duplicate
TB = Trip blank
EB = Equipment blank

Validated Samples

MS: Soils

1	LDW-SS93-010	11	MB-032205	21		31	
2	LDW-SS124-010	12		22		32	
3	LDW-SS135-010	13		23		33	
4	LDW-SS136-010	14		24		34	
5	LDW-SSB6a-010	15		25		35	
6	LDW-SSC1-010	16		26		36	
7	LDW-SSC1-010MS	17		27		37	
8	LDW-SSC1-010MSD	18		28		38	
9		19		29		39	
10		20		30		40	

LDC #: 13412A2a **VALIDATION COMPLETENESS WORKSHEET** Date: 4/27/05
SDG #: HV76 Level IV Page: 1 of 1
Laboratory: Analytical Resources, Inc. Reviewer: 9
2nd Reviewer: K

METHOD: GC/MS Semivolatiles (EPA SW 846 Method 8270C)

The samples listed below were reviewed for each of the following validation areas. Validation findings are noted in attached validation findings worksheets.

	Validation Area		Comments
I.	Technical holding times	A	Sampling dates: 3/15/05
II.	GC/MS Instrument performance check	A	
III.	Initial calibration	SW	%RSD, r^2
IV.	Continuing calibration	SW	
V.	Blanks	A	
VI.	Surrogate spikes	A	
VII.	Matrix spike/Matrix spike duplicates	A	
VIII.	Laboratory control samples	A	LCS
IX.	Regional Quality Assurance and Quality Control	N	
X.	Internal standards	A	
XI.	Target compound identification	A	
XII.	Compound quantitation/CRQLs	A	
XIII.	Tentitatively identified compounds (TICs)	N	
XIV.	System performance	A	
XV.	Overall assessment of data	A	
XVI.	Field duplicates	N	
XVII.	Field blanks	N	

Note: A = Acceptable
N = Not provided/applicable
SW = See worksheet
ND = No compounds detected
R = Rinsate
FB = Field blank
D = Duplicate
TB = Trip blank
EB = Equipment blank

Validated Samples
All soils

1	LDW-SS98-010	11	LDW-SS151-010MS	21	MB-032405	31	
2	LDW-SS141-010	12	LDW-SS151-010MSD	22		32	
3	LDW-SSB9a-010	13		23		33	
4	LDW-SS156-010	14		24		34	
5	LDW-SS155-010	15		25		35	
6	LDW-SS154-010	16		26		36	
7	LDW-SS153-010	17		27		37	
8	LDW-SS152-010	18		28		38	
9	LDW-SS151-010	19		29		39	
10	LDW-SS144-010	20		30		40	

LDC #: 13412A2a
SDG #: HV76

VALIDATION FINDINGS CHECKLIST

Reviewer: 9
2nd Reviewer: K

Method: Semivolatiles (EPA SW 846 Method 8270C)

Validation Area	Yes	No	NA	Findings/Comments
I. Technical holding times				
All technical holding times were met.	✓			
Cooler temperature criteria was met.	✓			
II. GC/MS Instrument performance check				
Were the DFTPP performance results reviewed and found to be within the specified criteria?	✓			
Were all samples analyzed within the 12 hour clock criteria?	✓			
III. Initial calibration				
Did the laboratory perform a 5 point calibration prior to sample analysis?	✓			
Were all percent relative standard deviations (%RSD) and relative response factors (RRF) within method criteria for all CCCs and SPCCs?	✓			
Was a curve fit used for evaluation? If Yes, what was the acceptance criteria used?	✓			
Did the initial calibration meet the curve fit acceptance criteria?	✓			
Were all percent relative standard deviations (%RSD) $\leq$ 30% and relative response factors (RRF) $\geq$ 0.05?	✓	✓		
IV. Continuing calibration				
Was a continuing calibration standard analyzed at least once every 12 hours for each instrument?	✓			
Were all percent differences (%D) and relative response factors (RRF) within method criteria for all CCCs and SPCCs?	✓			
Were all percent differences (%D) $\leq$ 25% and relative response factors (RRF) $\geq$ 0.05?		✓		
V. Blanks				
Was a method blank associated with every sample in this SDG?	✓			
Was a method blank analyzed for each matrix and concentration?	✓			
Was there contamination in the method blanks? If yes, please see the Blanks validation completeness worksheet.		✓		
VI. Surrogate spikes				
Were all surrogate %R within QC limits?	✓			
If 2 or more base neutral or acid surrogates were outside QC limits, was a reanalysis performed to confirm %R?			✓	
If any %R was less than 10 percent, was a reanalysis performed to confirm %R?			✓	
VII. Matrix spike/Matrix spike duplicates				
Were a matrix spike (MS) and matrix spike duplicate (MSD) analyzed for each matrix in this SDG? If no, indicate which matrix does not have an associated MS/MSD. Soil / Water.	✓			
Was a MS/MSD analyzed every 20 samples of each matrix?	✓			

LDC #: 13413A2a
SDG #: HVT6

VALIDATION FINDINGS CHECKLIST

Reviewer: 9
2nd Reviewer: M

Validation Area	Yes	No	NA	Findings/Comments
Were the MS/MSD percent recoveries (%R) and the relative percent differences (RPD) within the QC limits?	✓			
VIII. Laboratory control samples				
Was an LCS analyzed for this SDG?	✓			
Was an LCS analyzed per extraction batch?	✓			
Were the LCS percent recoveries (%R) and relative percent difference (RPD) within the QC limits?	✓			
IX. Regional Quality Assurance and Quality Control				
Were performance evaluation (PE) samples performed?		✓		
Were the performance evaluation (PE) samples within the acceptance limits?			✓	
X. Internal standards				
Were internal standard area counts within -50% or +100% of the associated calibration standard?	✓			
Were retention times within ± 30 seconds from the associated calibration standard?	✓			
XI. Target compound identification				
Were relative retention times (RRT's) within ± 0.06 RRT units of the standard?	✓			
Did compound spectra meet specified EPA "Functional Guidelines" criteria?	✓			
Were chromatogram peaks verified and accounted for?	✓			
XII. Compound quantitation/CRQLs				
Were the correct internal standard (IS), quantitation ion and relative response factor (RRF) used to quantitate the compound?	✓			
Were compound quantitation and CRQLs adjusted to reflect all sample dilutions and dry weight factors applicable to level IV validation?	✓			
XIII. Tentatively identified compounds (TICs)				
Were the major ions (> 10 percent relative intensity) in the reference spectrum evaluated in sample spectrum?			✓	
Were relative intensities of the major ions within ± 20% between the sample and the reference spectra?			✓	
Did the raw data indicate that the laboratory performed a library search for all required peaks in the chromatograms (samples and blanks)?		✓		
XIV. System performance				
System performance was found to be acceptable.	✓			
XV. Overall assessment of data				
Overall assessment of data was found to be acceptable.	✓			

LDC #: 13412A2a
SDG #: HVT6

VALIDATION FINDINGS CHECKLIST

Reviewer: a
2nd Reviewer: x

Validation Area	Yes	No	NA	Findings/Comments
XVI. Field duplicates				
Field duplicate pairs were identified in this SDG.		✓		
Target compounds were detected in the field duplicates.			✓	
XVII. Field blanks				
Field blanks were identified in this SDG.		✓		
Target compounds were detected in the field blanks.			✓	

LDC #: 13413A29
SDG #: HV76

VALIDATION FINDINGS WORKSHEET
Initial Calibration

Reviewer: 9
2nd Reviewer: 2

METHOD: GC/MS BNA (EPA SW 846 Method 8270)

Please see qualifications below for all questions answered "N". Not applicable questions are identified as "N/A".

Y N N/A Did the laboratory conduct an acceptable 5 point calibration prior to sample analysis?
Y N N/A Were percent relative standard deviations (%RSD) and relative response factors (RRF) within method criteria for all CCC's and SPCC's?
Y N N/A Was a curve fit used for evaluation? If yes, what was the acceptance criteria used for evaluation?_____
Y N N/A Did the initial calibration meet the acceptance criteria?
Y N N/A Were all %RSDs and RRFs within the validation criteria of ≤30 %RSD and ≥0.05 RRF ?

#	Date	Standard ID	Compound	Finding %RSD (Limit: ≤30.0%)	Finding RRF (Limit: ≥0.05)	Associated Samples	Qualifications
	3/2/05	ICAL	PP	32.11128		M+Bdc	J/UN/A

LDC #: 13412A29
SDG #: HV76

VALIDATION FINDINGS WORKSHEET
Continuing Calibration

Page: 1 of 1
Reviewer: [illegible]
2nd Reviewer: [illegible]

METHOD: GC/MS BNA (EPA SW 846 Method 8270)

Please see qualifications below for all questions answered "N". Not applicable questions are identified as "N/A".

(Y) N N/A Was a continuing calibration standard analyzed at least once every 12 hours of sample analysis for each instrument?
(Y) N N/A Were percent differences (%D) and relative response factors (RRF) within method criteria for all CCC's and SPCC's ?
Y (N) N/A Were all %D and RRFs within the validation criteria of ≤25 %D and ≥0.05 RRF ?

#	Date	Standard ID	Compound	Finding %D (Limit: ≤25.0%)	Finding RRF (Limit: ≥0.05)	Associated Samples	Qualifications
	3/29/05	CC0329	X	35.86451		MT + Blk	J/UJ/A
			HH	31.91413			↓

LDC #: 34128c9
SDG #: HV76

VALIDATION FINDINGS WORKSHEET
Initial Calibration Calculation Verification

Page: 1 of 1
Reviewer: Q
2nd Reviewer: K

METHOD: GC/MS BNA (EPA SW 846 Method 8270)

The Relative Response Factor (RRF), average RRF, and percent relative standard deviation (%RSD) were recalculated for the compounds identified below using the following calculations:

RRF = $(A_x)(C_{is})/(A_{is})(C_x)$
average RRF = sum of the RRFs/number of standards
%RSD = 100 * (S/X)

A_x = Area of compound, A_{is} = Area of associated internal standard
C_x = Concentration of compound, C_{is} = Concentration of internal standard
S = Standard deviation of the RRFs, X = Mean of the RRFs

#	Standard ID	Calibration Date	Compound (Reference Internal Standard)	Reported RRF (25 std)	Recalculated RRF (25 std)	Reported Average RRF (initial)	Recalculated Average RRF (initial)	Reported %RSD	Recalculated %RSD
1	1645	3/2/05	Phenol (1st internal standard)	2.24544	2.24544	2.21705	2.21705	5.17514	5.17575
			Naphthalene (2nd internal standard)	1.13613	1.13613	1.17037	1.17037	8.71448	8.71446
			Fluorene (3rd internal standard)	1.32360	1.32360	1.35311	1.35311	9.20486	9.20479
			Pentachlorophenol (4th internal standard)	0.15258	0.15258	0.14996	0.14996	3.15825	3.15899
			~~Bis(2-ethylhexyl)phthalate~~ DDD (5th internal standard)	1.27580	1.27580	1.36698	1.36698	11.53316	11.53321
			Benzo(a)pyrene (6th internal standard)	1.25152	1.25152	1.26417	1.26417	5.64386	5.64440
2			~~Phenol~~ EEC (1st internal standard)	0.57751	0.57751	0.58798	0.58798	6.18268	6.18252
			Naphthalene (2nd internal standard)						
			Fluorene (3rd internal standard)						
			Pentachlorophenol (4th internal standard)						
			Bis(2-ethylhexyl)phthalate (5th internal standard)						
			Benzo(a)pyrene (6th internal standard)						
3			Phenol (1st internal standard)						
			Naphthalene (2nd internal standard)						
			Fluorene (3rd internal standard)						
			Pentachlorophenol (4th internal standard)						
			Bis(2-ethylhexyl)phthalate (5th internal standard)						
			Benzo(a)pyrene (6th internal standard)						

Comments: Refer to Initial Calibration findings worksheet for list of qualifications and associated samples when reported results do not agree within 10.0% of the recalculated results.

LDC #: 13412A29
SDG #: HVT6

VALIDATION FINDINGS WORKSHEET
Continuing Calibration Results Verification

Page: 1 of 1
Reviewer: [illegible]
2nd Reviewer: [illegible]

METHOD: GC/MS BNA (EPA SW 846 Method 8270)

The percent difference (%D) of the initial calibration average Relative Response Factors (RRFs) and the continuing calibration RRFs were recalculated for the compounds identified below using the following calculation:

% Difference = 100 * (ave. RRF - RRF)/ave. RRF
RRF = $(A_x)(C_{is})/(A_{is})(C_x)$

Where: ave. RRF = initial calibration average RRF
RRF = continuing calibration RRF
A_x = Area of compound, A_{is} = Area of associated internal standard
C_x = Concentration of compound, C_{is} = Concentration of internal standard

#	Standard ID	Calibration Date	Compound (Reference Internal Standard)	Average RRF (Initial)	Reported RRF (CC)	Recalculated RRF (CC)	Reported %D	Recalculated %D
1	CC0329	3/29/05	Phenol (1st internal standard)	2.2105	2.18049	2.18049	1.64887	1.64905
			Naphthalene (2nd internal standard)	1.1703	1.08330	1.08330	7.43940	7.43933
			Fluorene (3rd internal standard)	1.3531	1.2731	1.2731	5.91222	5.91198
			Pentachlorophenol (4th internal standard)	0.1496	0.12973	0.12973	13.49076	13.49213
			~~Bis(2-ethylhexyl)phthalate~~ DIDP (5th internal standard)	1.36698	1.2441	1.2441	8.98886	8.98874
			Benzo(a)pyrene (6th internal standard)	1.2617	1.2261	1.2261	2.96356	2.96357
2			~~Phenol~~ BEHP (1st internal standard)	0.58798	0.59722	0.59722	1.57150	1.57223
			Naphthalene (2nd internal standard)					
			Fluorene (3rd internal standard)					
			Pentachlorophenol (4th internal standard)					
			Bis(2-ethylhexyl)phthalate (5th internal standard)					
			Benzo(a)pyrene (6th internal standard)					
3			Phenol (1st internal standard)					
			Naphthalene (2nd internal standard)					
			Fluorene (3rd internal standard)					
			Pentachlorophenol (4th internal standard)					
			Bis(2-ethylhexyl)phthalate (5th internal standard)					
			Benzo(a)pyrene (6th internal standard)					

Comments: Refer to Continuing Calibration findings worksheet for list of qualifications and associated samples when reported results do not agree within 10.0% of the recalculated results.

LDC #: 13412A29
SDG #: HVT6

VALIDATION FINDINGS WORKSHEET
Surrogate Results Verification

Page: 1 of 1
Reviewer: 9
2nd reviewer: V

METHOD: GC/MS Semivolatiles (EPA SW 846 Method 8270)

The percent recoveries (%R) of surrogates were recalculated for the compounds identified below using the following calculation:

% Recovery: SF/SS * 100

Where: SF = Surrogate Found
SS = Surrogate Spiked

Sample ID: 1

	Surrogate Spiked	Surrogate Found	Percent Recovery Reported	Percent Recovery Recalculated	Percent Difference
Nitrobenzene-d5	25	15.12369	60.5	60.5	0
2-Fluorobiphenyl	↓	16.08765	64.3	64.3	↓
Terphenyl-d14	↓	17.46015	69.8	69.8	↓
Phenol-d5	37.5	23.41569	62.5	62.4	0.1
2-Fluorophenol	↓	21.05631	56.2	56.2	0
2,4,6-Tribromophenol	↓	26.67654	71.1	71.1	↓
2-Chlorophenol-d4	↓	23.22648	69.9	61.9	↓
1,2-Dichlorobenzene-d4	25	13.37094	53.5	53.5	↓

Sample ID: _____

	Surrogate Spiked	Surrogate Found	Percent Recovery Reported	Percent Recovery Recalculated	Percent Difference
Nitrobenzene-d5					
2-Fluorobiphenyl					
Terphenyl-d14					
Phenol-d5					
2-Fluorophenol					
2,4,6-Tribromophenol					
2-Chlorophenol-d4					
1,2-Dichlorobenzene-d4					

Sample ID: _____

	Surrogate Spiked	Surrogate Found	Percent Recovery Reported	Percent Recovery Recalculated	Percent Difference
Nitrobenzene-d5					
2-Fluorobiphenyl					
Terphenyl-d14					
Phenol-d5					
2-Fluorophenol					
2,4,6-Tribromophenol					
2-Chlorophenol-d4					
1,2-Dichlorobenzene-d4					

LDC #: 13413A29
SDG #: HV76

VALIDATION FINDINGS WORKSHEET
Matrix Spike/Matrix Spike Duplicates Results Verification

Page: 1 of 1
Reviewer: 9
2nd Reviewer: 4

METHOD: GC/MS BNA (EPA SW 846 Method 8270)

The percent recoveries (%R) and Relative Percent Difference (RPD) of the matrix spike and matrix spike duplicate were recalculated for the compounds identified below using the following calculation:

% Recovery = 100 * (SSC - SC)/SA Where: SSC = Spiked sample concentration; SA = Spike added; SC = Sample concentation

RPD = | MS - MSD | * 2/(MS + MSD) MS = Matrix spike percent recovery MSD = Matrix spike duplicate percent recovery

MS/MSD samples: 11/12

Compound	Spike Added (µg/kg)		Sample Concentration (µg/kg)	Spiked Sample Concentration (µg/kg)		Matrix Spike Percent Recovery		Matrix Spike Duplicate Percent Recovery		MS/MSD RPD	
	MS	MSD	------	MS	MSD	Reported	Recalc.	Reported	Recalc.	Reported	Recalculated
Phenol	731	736	ND	451	459	61.7	61.7	62.4	62.4	1.8	1.8
2-Chlorophenol	↓	↓		440	452	60.2	60.2	61.4	61.4	2.7	2.7
1,4-Dichlorobenzene	487	490		487 281	292	57.7	57.7	59.6	59.6	3.8	3.8
N-Nitroso-di-n-propylamine	↓	↓		312	325	64.1	64.1	66.3	66.3	4.1	4.1
1,2,4-Trichlorobenzene	↓	↓		283	297	58.1	58.1	60.6	60.6	4.8	4.8
4-Chloro-3-methylphenol	731	736		531	460	72.6	72.6	62.5	62.5	14.3	14.3
Acenaphthene	487	490		314	327	64.5	64.5	66.7	66.7	4.1	4.1
4-Nitrophenol	731	736		596	548	81.5	81.5	74.5	74.5	8.4	8.4
2,4-Dinitrotoluene	487	490		293	332	60.2	60.2	67.8	67.8	12.5	12.5
Pentachlorophenol	731	736		464	417	63.5	63.5	56.7	56.7	10.7	10.7
Pyrene	487	490	↓	329	353	67.6	67.5	72.0	72.0	7.0	7.0

Comments: Refer to Matrix Spike/Matrix Spike Duplicates findings worksheet for list of qualifications and associated samples when reported results do not agree within 10.0% of the recalculated results.

LDC #: 13412B29
SDG #: HVT6

VALIDATION FINDINGS WORKSHEET
Laboratory Control Sample/Laboratory Control Sample Duplicates Results Verification

Page: 1 of 1
Reviewer: 9
2nd Reviewer: M

METHOD: GC/MS BNA (EPA SW 846 Method 8270)

The percent recoveries (%R) and Relative Percent Difference (RPD) of the laboratory control sample and laboratory control sample duplicate were recalculated for the compounds identified below using the following calculation:

% Recovery = 100 * (SC/SA Where: SSC = Spike concentration; SA = Spike added

RPD = | LCS - LCSD | * 2/(LCS + LCSD) LCS = Laboratory control sample percent recovery LCSD = Laboratory control sample duplicate percent recovery

LCS/LCSD samples: LCS-03405

Compound	Spike Added (µg/kg)		Spike Concentration (µg/kg)		LCS Percent Recovery		LCSD Percent Recovery		LCS/LCSD RPD	
	LCS	LCSD	LCS	LCSD	Reported	Recalc.	Reported	Recalc.	Reported	Recalculated
Phenol	750	NA	500	NA	66.7	66.7				
2-Chlorophenol	↓		470		62.7	62.7				
1,4-Dichlorobenzene	500		312		62.4	62.4				
N-Nitroso-di-n-propylamine			333		66.6	66.6				
1,2,4-Trichlorobenzene			310		62.0	62.0				
4-Chloro-3-methylphenol	750		552		73.6	73.6				
Acenaphthene	500		334		66.8	66.8				
4-Nitrophenol	750		626		83.5	83.5				
2,4-Dinitrotoluene	500		348		69.6	69.6				
Pentachlorophenol	750		496		66.1	66.1				
Pyrene	500	↓	378	↓	75.6	75.6				

Comments: Refer to Laboratory Control Sample/Laboratory Control Sample Duplicates findings worksheet for list of qualifications and associated samples when reported results do not agree within 10.0% of the recalculated results.

LDC #: 13412A29
SDG #: HV76

VALIDATION FINDINGS WORKSHEET
Sample Calculation Verification

Page: 6 of 1
Reviewer: 9
2nd reviewer: 4

METHOD: GC/MS BNA (EPA SW 846 Method 8270)

Y N N/A Were all reported results recalculated and verified for all level IV samples?
Y N N/A Were all recalculated results for detected target compounds agree within 10.0% of the reported results?

$$\text{Concentration} = \frac{(A_x)(I_s)(V_t)(DF)(2.0)}{(A_{is})(RRF)(V_o)(V_i)(\%S)}$$

A_x = Area of the characteristic ion (EICP) for the compound to be measured

A_{is} = Area of the characteristic ion (EICP) for the specific internal standard

I_s = Amount of internal standard added in nanograms (ng)

V_o = Volume or weight of sample extract in milliliters (ml) or grams (g).

V_i = Volume of extract injected in microliters (ul)

V_t = Volume of the concentrated extract in microliters (ul)

Df = Dilution Factor.

%S = Percent solids, applicable to soil and solid matrices only.

2.0 = Factor of 2 to account for GPC cleanup

Example:

Sample I.D. 2, 11:

$$\text{Conc.} = \frac{(16756)(20)(500)(3)(\quad)}{(341537)(1.2617)(52.5)(1)(0.483)}$$

$$= 45.91 \text{ ug/g}$$

#	Sample ID	Compound	Reported Concentration ( )	Calculated Concentration ( )	Qualification

LDC #: 13419A2a **VALIDATION COMPLETENESS WORKSHEET** Date: 4/07/05
SDG #: HW06 Level II Page: 1 of 1
Laboratory: Analytical Resources, Inc. Reviewer: a
2nd Reviewer: JL

METHOD: GC/MS Semivolatiles (EPA SW 846 Method 8270C)

The samples listed below were reviewed for each of the following validation areas. Validation findings are noted in attached validation findings worksheets.

	Validation Area		Comments
I.	Technical holding times	A	Sampling dates: 3/14 8 - 16/05
II.	GC/MS Instrument performance check	N	
III.	Initial calibration	N	
IV.	Continuing calibration	N	
V.	Blanks	A	
VI.	Surrogate spikes	A	
VII.	Matrix spike/Matrix spike duplicates	A	LDW-SSC1-010 (HVT2)
VIII.	Laboratory control samples	A	LCS
IX.	Regional Quality Assurance and Quality Control	N	
X.	Internal standards	N	
XI.	Target compound identification	N	
XII.	Compound quantitation/CRQLs	~~A~~ N	
XIII.	Tentitatively identified compounds (TICs)	N	
XIV.	System performance	N	
XV.	Overall assessment of data	A	
XVI.	Field duplicates	N	
XVII.	Field blanks	N	

Note: A = Acceptable
N = Not provided/applicable
SW = See worksheet
ND = No compounds detected
R = Rinsate
FB = Field blank
D = Duplicate
TB = Trip blank
EB = Equipment blank

Validated Samples
MI soils

1	LDW-SS71-010	11	MB-032205	21		31	
2	LDW-SS2-010	12		22		32	
3	LDW-SS69b-010	13		23		33	
4	LDW-SS158-010	14		24		34	
5	LDW-SS159-010	15		25		35	
6	LDW-SS157-010	16		26		36	
7	LDW-SS35-010	17		27		37	
8	LDW-SS35-010DL	18		28		38	
9		19		29		39	
10		20		30		40	

LDC #: 13419A29
SDG #: HW06

VALIDATION FINDINGS WORKSHEET
Compound Quantitation and Reported CRQLs

Page: 1 of 1
Reviewer: 2
2nd Reviewer: 2

METHOD: GC/MS BNA (EPA SW 846 Method 8270)

Please see qualifications below for all questions answered "N". Not applicable questions are identified as "N/A".

Y N N/A Were the correct internal standard (IS), quantitation ion and relative response factor (RRF) used to quantitate the compound?

Y N N/A Were compound quantitation and CRQLs adjusted to reflect all sample dilutions and dry weight factors applicable to level IV validation?

#	Date	Sample ID	Finding	Associated Samples	Qualifications
		T	44, 77, 22 >calib	T	J detects/A
			wipe.		

Comments: See sample calculation verification worksheet for recalculations

LDC #: 13419A29
SDG #: HW06

VALIDATION FINDINGS WORKSHEET
Overall Assessment of Data

Page: 1 of 1
Reviewer: [illegible]
2nd Reviewer: [illegible]

METHOD: GC/MS BNA (EPA SW 846 Method 8270)

Please see qualifications below for all questions answered "N". Not applicable questions are identified as "N/A".

All available information pertaining to the data were reviewed using professional judgement to compliment the determination of the overall quality of the data.

(Y) N N/A Was the overall quality and usability of the data acceptable?

#	Date	Sample ID	Finding	Associated Samples	Qualifications
		7	S. W. GG. JJ. NN. UU	7	R/A
			WW. VV. YY. ZZ. CCC		
			~~EEE~~. DDD. HHH. III.		
			JJJ, ~~LLL~~, ~~GGG~~ KKK		
			(6th out)		
		8	All except above	8	R/A

Comments: _____

OVR.2S

LDC #: 13419B2a **VALIDATION COMPLETENESS WORKSHEET** Date: 4/27/05
SDG #: HW16 Level II Page: 1 of 1
Laboratory: Analytical Resources, Inc. Reviewer: [illegible]
2nd Reviewer: [illegible]

METHOD: GC/MS Semivolatiles (EPA SW 846 Method 8270C)

The samples listed below were reviewed for each of the following validation areas. Validation findings are noted in attached validation findings worksheets.

	Validation Area		Comments
I.	Technical holding times	A	Sampling dates: 3/18/05
II.	GC/MS Instrument performance check	N	
III.	Initial calibration	N	
IV.	Continuing calibration	N	
V.	Blanks	A	
VI.	Surrogate spikes	A	
VII.	Matrix spike/Matrix spike duplicates	A	LDW-SS151-010 (HV76)
VIII.	Laboratory control samples	A	LCS
IX.	Regional Quality Assurance and Quality Control	N	
X.	Internal standards	N	
XI.	Target compound identification	N	
XII.	Compound quantitation/CRQLs	N	
XIII.	Tentitatively identified compounds (TICs)	N	
XIV.	System performance	N	
XV.	Overall assessment of data	A	
XVI.	Field duplicates	N	
XVII.	Field blanks	N	

Note: A = Acceptable
N = Not provided/applicable
SW = See worksheet
ND = No compounds detected
R = Rinsate
FB = Field blank
D = Duplicate
TB = Trip blank
EB = Equipment blank

Validated Samples

1	LDW-SSB7a-010 sed	11	MB-032405	21		31	
2		12		22		32	
3		13		23		33	
4		14		24		34	
5		15		25		35	
6		16		26		36	
7		17		27		37	
8		18		28		38	
9		19		29		39	
10		20		30		40	

LDC #: 13381A2b **VALIDATION COMPLETENESS WORKSHEET** Date: 4/21/05

SDG #: HU85 Level II Page: 1 of 1

Laboratory: Analytical Resources, Inc. Reviewer: [illegible]

SVOAs 2nd Reviewer: [illegible]

METHOD: GC/MS ~~Polynuclear Aromatic Hydrocarbons~~ (EPA SW 846 Method 8270C)

The samples listed below were reviewed for each of the following validation areas. Validation findings are noted in attached validation findings worksheets.

	Validation Area		Comments
I.	Technical holding times	A	Sampling dates: 3/7/05
II.	GC/MS Instrument performance check	N	
III.	Initial calibration	N	
IV.	Continuing calibration	N	
V.	Blanks	A	
VI.	Surrogate spikes	A	
VII.	Matrix spike/Matrix spike duplicates	A	
VIII.	Laboratory control samples	A	LCS
IX.	Regional Quality Assurance and Quality Control	N	
X.	Internal standards	N	
XI.	Target compound identification	N	
XII.	Compound quantitation/CRQLs	N	
XIII.	Tentitatively identified compounds (TICs)	N	
XIV.	System performance	N	
XV.	Overall assessment of data	A	
XVI.	Field duplicates	SW	D = 4 + 6
XVII.	Field blanks	N	

Note: A = Acceptable; N = Not provided/applicable; SW = See worksheet; ND = No compounds detected; R = Rinsate; FB = Field blank; D = Duplicate; TB = Trip blank; EB = Equipment blank

Validated Samples

All sed's

1	LDW-SS85-010	11	LDW-SS74-010MS	21		31	
2	LDW-SS73-010	12	LDW-SS74-010MSD	22		32	
3	LDW-SS78-010	13	MB-031405	23		33	
4	LDW-SS82-010	14		24		34	
5	LDW-SS74-010	15		25		35	
6	LDW-SS204-010	16		26		36	
7	LDW-SS91-010	17		27		37	
8	LDW-SS103-010	18		28		38	
9	LDW-SS68-010	19		29		39	
10	LDW-SS8-010	20		30		40	

LDC#: 13381A2b
SDG#: HU85

VALIDATION FINDINGS WORKSHEET
Field Duplicates

Reviewer: 9
2nd Reviewer: N

METHOD: GC/MS Semivolatiles (EPA SW 846 Method 8270-SIM)

Y N NA Were field duplicate pairs identified in this SDG?
Y N NA Were target analytes detected in the field duplicate pairs?

Compound	Concentration (ug/Kg)		RPD	(≤ 50)
	4	6		
CCC	36	29	22	
GGG	54	32	51	
III	34	21	47	
JJJ	24	14	53	

LDC #: 13381B2b **VALIDATION COMPLETENESS WORKSHEET** Date: 4/20/05
SDG #: HV37 Level II Page: 1 of 1
Laboratory: Analytical Resources, Inc. Reviewer: [illegible]
SVOAs 2nd Reviewer: [illegible]

METHOD: GC/MS ~~Polynuclear Aromatic Hydrocarbons~~ (EPA SW 846 Method 8270C) ~~SIM~~

The samples listed below were reviewed for each of the following validation areas. Validation findings are noted in attached validation findings worksheets.

	Validation Area		Comments
I.	Technical holding times	A	Sampling dates: 3/9/05
II.	GC/MS Instrument performance check	N	
III.	Initial calibration	N	
IV.	Continuing calibration	N	
V.	Blanks	A	
VI.	Surrogate spikes	A	
VII.	Matrix spike/Matrix spike duplicates	A	
VIII.	Laboratory control samples	A	LCS
IX.	Regional Quality Assurance and Quality Control	N	
X.	Internal standards	N	
XI.	Target compound identification	N	
XII.	Compound quantitation/CRQLs	N	
XIII.	Tentitatively identified compounds (TICs)	N	
XIV.	System performance	N	
XV.	Overall assessment of data	A	
XVI.	Field duplicates	SW	D = 10 + 11
XVII.	Field blanks	N	

Note: A = Acceptable
N = Not provided/applicable
SW = See worksheet
ND = No compounds detected
R = Rinsate
FB = Field blank
D = Duplicate
TB = Trip blank
EB = Equipment blank

Validated Samples
MS01S

1	LDW-SS7-10	11	LDW-SS207-10	21	MB-031805	31	
2	LDW-SS3-10	12	LDW-SS146-10	22		32	
3	LDW-SS95-10	13	LDW-SS147-10	23		33	
4	LDW-SS133-10	14	LDW-SS148-10	24		34	
5	LDW-SS138-10	15	LDW-SS149-10	25		35	
6	LDW-SS139-10	16	LDW-SS150-10	26		36	
7	LDW-SS137-10	17	LDW-SS150-10MS	27		37	
8	LDW-SS132-10	18	LDW-SS150-10MSD	28		38	
9	LDW-SS66-10	19		29		39	
10	LDW-SS62-10	20		30		40	

LDC#: 13381B2b
SDG#: HV37

VALIDATION FINDINGS WORKSHEET
Field Duplicates

Reviewer: [illegible]
2nd Reviewer: [illegible]

METHOD: GC/MS Semivolatiles (EPA SW 846 Method 8270-SIM)

Y N NA Were field duplicate pairs identified in this SDG?
Y N NA Were target analytes detected in the field duplicate pairs?

Compound	Concentration (ug/Kg)		RPD	(≤50)
	10	11		
CCC	22	32	37	
GGG	25	43	53	
III	20	29	37	
JJJ	14	20	35	

LDC #: 13381C2b **VALIDATION COMPLETENESS WORKSHEET** Date: 4/27/05
SDG #: HV42 Level II Page: 1 of 1
Laboratory: Analytical Resources, Inc. Reviewer: [illegible]
2nd Reviewer: [illegible]

METHOD: GC/MS ~~Polynuclear Aromatic Hydrocarbons~~ SVOA (EPA SW 846 Method 8270C) ~~-~~ SIM)

The samples listed below were reviewed for each of the following validation areas. Validation findings are noted in attached validation findings worksheets.

	Validation Area		Comments
I.	Technical holding times	A	Sampling dates: 3/10/05
II.	GC/MS Instrument performance check	A	
III.	Initial calibration	A	
IV.	Continuing calibration	A	
V.	Blanks	A	
VI.	Surrogate spikes	A	
VII.	Matrix spike/Matrix spike duplicates	A	
VIII.	Laboratory control samples	A	LCS
IX.	Regional Quality Assurance and Quality Control	N	
X.	Internal standards	A	
XI.	Target compound identification	A	
XII.	Compound quantitation/CRQLs	A	
XIII.	Tentitatively identified compounds (TICs)	N	
XIV.	System performance	A	
XV.	Overall assessment of data	A	
XVI.	Field duplicates	N	
XVII.	Field blanks	N	

Note: A = Acceptable
N = Not provided/applicable
SW = See worksheet
ND = No compounds detected
R = Rinsate
FB = Field blank
D = Duplicate
TB = Trip blank
EB = Equipment blank

Validated Samples
All Soils

1	LDW-SS45-010	11	LDW-SS61-010RE	21	MB-033005	31	
2	LDW-SS46-010	12		22	MB-032105	32	
3	LDW-SS6-010	13		23		33	
4	LDW-SS47-010	14		24		34	
5	LDW-SS108-010	15		25		35	
6	LDW-SS61-010	16		26		36	
7	LDW-SS25-010	17		27		37	
8	LDW-SS86-010	18		28		38	
9	LDW-SS86-010MS	19		29		39	
10	LDW-SS86-010MSD	20		30		40	

LDC #: 13381C26
SDG #: HV42

VALIDATION FINDINGS CHECKLIST

Page: 1 of 3
Reviewer: 9
2nd Reviewer: K

Method: Semivolatiles (EPA SW 846 Method 8270C)

Validation Area	Yes	No	NA	Findings/Comments
I. Technical holding times				
All technical holding times were met.	✓			
Cooler temperature criteria was met.	✓			
II. GC/MS Instrument performance check				
Were the DFTPP performance results reviewed and found to be within the specified criteria?	✓			
Were all samples analyzed within the 12 hour clock criteria?	✓			
III. Initial calibration				
Did the laboratory perform a 5 point calibration prior to sample analysis?	✓			
Were all percent relative standard deviations (%RSD) and relative response factors (RRF) within method criteria for all CCCs and SPCCs?	✓			
Was a curve fit used for evaluation? If Yes, what was the acceptance criteria used?		✓		
Did the initial calibration meet the curve fit acceptance criteria?			✓	
Were all percent relative standard deviations (%RSD) $\leq$ 30% and relative response factors (RRF) $\geq$ 0.05?		✓		
IV. Continuing calibration				
Was a continuing calibration standard analyzed at least once every 12 hours for each instrument?	✓			
Were all percent differences (%D) and relative response factors (RRF) within method criteria for all CCCs and SPCCs?	✓			
Were all percent differences (%D) $\leq$ 25% and relative response factors (RRF) $\geq$ 0.05?		✓		
V. Blanks				
Was a method blank associated with every sample in this SDG?	✓			
Was a method blank analyzed for each matrix and concentration?	✓			
Was there contamination in the method blanks? If yes, please see the Blanks validation completeness worksheet.	✓			
VI. Surrogate spikes				
Were all surrogate %R within QC limits?		✓		
If 2 or more base neutral or acid surrogates were outside QC limits, was a reanalysis performed to confirm %R?	✓			
If any %R was less than 10 percent, was a reanalysis performed to confirm %R?			✓	
VII. Matrix spike/Matrix spike duplicates				
Were a matrix spike (MS) and matrix spike duplicate (MSD) analyzed for each matrix in this SDG? If no, indicate which matrix does not have an associated MS/MSD. Soil / Water.	✓			
Was a MS/MSD analyzed every 20 samples of each matrix?	✓			

LDC #: 13301C26
SDG #: HV42

VALIDATION FINDINGS CHECKLIST

Reviewer: 9
2nd Reviewer: K

Validation Area	Yes	No	NA	Findings/Comments
Were the MS/MSD percent recoveries (%R) and the relative percent differences (RPD) within the QC limits?		✓		
VIII. Laboratory control samples				
Was an LCS analyzed for this SDG?	✓			
Was an LCS analyzed per extraction batch?	✓			
Were the LCS percent recoveries (%R) and relative percent difference (RPD) within the QC limits?	✓			
IX. Regional Quality Assurance and Quality Control				
Were performance evaluation (PE) samples performed?		✓		
Were the performance evaluation (PE) samples within the acceptance limits?			✓	
X. Internal standards				
Were internal standard area counts within -50% or +100% of the associated calibration standard?	✓			
Were retention times within ± 30 seconds from the associated calibration standard?	✓			
XI. Target compound identification				
Were relative retention times (RRT's) within ± 0.06 RRT units of the standard?	✓			
Did compound spectra meet specified EPA "Functional Guidelines" criteria?	✓			
Were chromatogram peaks verified and accounted for?	✓			
XII. Compound quantitation/CRQLs				
Were the correct internal standard (IS), quantitation ion and relative response factor (RRF) used to quantitate the compound?	✓			
Were compound quantitation and CRQLs adjusted to reflect all sample dilutions and dry weight factors applicable to level IV validation?	✓			
XIII. Tentatively identified compounds (TICs)				
Were the major ions (> 10 percent relative intensity) in the reference spectrum evaluated in sample spectrum?			✓	
Were relative intensities of the major ions within ± 20% between the sample and the reference spectra?			✓	
Did the raw data indicate that the laboratory performed a library search for all required peaks in the chromatograms (samples and blanks)?		✓		
XIV. System performance				
System performance was found to be acceptable.	✓			
XV. Overall assessment of data				
Overall assessment of data was found to be acceptable.	✓			

LDC #: 13381C26
SDG #: HV42

VALIDATION FINDINGS CHECKLIST

Reviewer: 9
2nd Reviewer: 4

Validation Area	Yes	No	NA	Findings/Comments
XVI. Field duplicates				
Field duplicate pairs were identified in this SDG.		✓		
Target compounds were detected in the field duplicates.			✓	
XVII. Field blanks				
Field blanks were identified in this SDG.		✓		
Target compounds were detected in the field blanks.			✓	

LDC #: 1338C2b

SDG #: HV42

Reviewer: [illegible]

2nd Reviewer: [illegible]

VALIDATION FINDINGS WORKSHEET

Initial Calibration

METHOD: GC/MS BNA (EPA SW 846 Method 8270)

Please see qualifications below for all questions answered "N". Not applicable questions are identified as "N/A".

- (Y) N N/A — Did the laboratory conduct an acceptable 5 point calibration prior to sample analysis?
- (Y) N N/A — Were percent relative standard deviations (%RSD) and relative response factors (RRF) within method criteria for all CCC's and SPCC's?
- Y (N) N/A — Was a curve fit used for evaluation? If yes, what was the acceptance criteria used for evaluation?________
- Y N (N/A) — Did the initial calibration meet the acceptance criteria?
- Y (N) N/A — Were all %RSDs and RRFs within the validation criteria of ≤30 %RSD and ≥0.05 RRF ?

#	Date	Standard ID	Compound	Finding %RSD (Limit: ≤30.0%)	Finding RRF (Limit: ≥0.05)	Associated Samples	Qualifications
	1/29/05	ICAL	DPP	39.2		MI + BK	J/UJ/A

INICAL.2S

LDC #: 13381C2b
SDG #: HV42

VALIDATION FINDINGS WORKSHEET
Continuing Calibration

Page: 1 of 1
Reviewer: 9
2nd Reviewer: K

METHOD: GC/MS BNA (EPA SW 846 Method 8270)

Please see qualifications below for all questions answered "N". Not applicable questions are identified as "N/A".

Y N N/A Was a continuing calibration standard analyzed at least once every 12 hours of sample analysis for each instrument?
Y N N/A Were percent differences (%D) and relative response factors (RRF) within method criteria for all CCC's and SPCC's ?
Y N N/A Were all %D and RRFs within the validation criteria of ≤25 %D and ≥0.05 RRF ?

#	Date	Standard ID	Compound	Finding %D (Limit: ≤25.0%)	Finding RRF (Limit: ≥0.05)	Associated Samples	Qualifications
	3/28/05	CC0328	PPP	31.1		3	J/UJ/A
			000	28.0			
	3/30/05	CC0330	PPP	42.1		11. ~~B42~~	J/UJ/A
			000	34.0		MB-033005	

CONCAL.2S

LDC #: 13381C2b
SDG #: HV42

VALIDATION FINDINGS WORKSHEET
Blanks

Page: 1 of 1
Reviewer: A
2nd Reviewer: K

METHOD: GC/MS BNA (EPA SW 846 Method 8270)

Please see qualifications below for all questions answered "N". Not applicable questions are identified as "N/A".

Y N N/A Was a method blank analyzed for each matrix?
Y N N/A Was a method blank analyzed for each concentration preparation level?
Y N N/A Was a method blank associated with every sample?
Y N N/A Was the blank contaminated? If yes, please see qualification below.

Blank extraction date: 3/30/05 **Blank analysis date:** 3/30/05
Conc. units: ug/L Associated Samples: 11

Compound	Blank ID	Sample Identification								
MB	033005	11								
cc	9.3	7.2/U								

Blank extraction date: _____ **Blank analysis date:** _____
Conc. units: _____ Associated Samples: _____

Compound	Blank ID	Sample Identification								

CIRCLED RESULTS WERE NOT QUALIFIED. ALL RESULTS NOT CIRCLED WERE QUALIFIED BY THE FOLLOWING STATEMENT:
Common contaminants such as the phthalates and TICs noted above that were detected in samples within ten times the associated method blank concentration were qualified as not detected, "U". Other contamirants within five times the method blank concentration were also qualified as not detected, "U".

LDC #: 15301C V

SDG #: HV42

VALIDATION FINDINGS WORKSHEET
Surrogate Recovery

Page: 1 of 1
Reviewer: JC
2nd Reviewer: JC

METHOD: GC/MS BNA (EPA SW 846 Method 8270)

Please see qualification below for all questions answered "N". Not applicable questions are identified as "N/A".

Y (N) N/A Were percent recoveries (%R) for surrogates within QC limits?

Y N (N/A) If 2 or more base neutral or acid surrogates were outside QC limits, was a reanalysis performed to confirm %R?

Y N (N/A) If any %R was less than 10 percent, was a reanalysis performed to confirm %R?

#	Date	Sample ID	Surrogate	%R (Limits)	Qualifications
		3	PHL	38.4 (40-130)	No qual
				( )	
		6	FBP	31.6 ( )	J/UJ/P
			2FP	28.5 ( )	
			DCB	22.4 ( )	
			TBP	35.2 ( )	
			PHL	28.8 ( )	
			2CP	28.5 ( )	
			NBZ	26.8 ( )	
			TPH	35.2 ( )	
				( )	
		7	PHL	39.2 ( )	No qual
			NBZ	37.6 ( )	✓
				( )	
				( )	
				( )	
				( )	
				( )	
				( )	
				( )	
				( )	
				( )	
				( )	
				( )	

* QC limits are advisory	QC Limits (Soil)	QC Limits (Water)
S1 (NBZ) = Nitrobenzene-d5	23-120	35-114
S2 (FBP) = 2-Fluorobiphenyl	30-115	43-116
S3 (TPH) = Terphenyl-d14	18-137	33-141
S4 (PHL) = Phenol-d5	24-113	10-94

	QC Limits (Soil)	QC Limits (Water)
S5 (2FP)= 2-Fluorophenol	25-121	21-100
S6 (TBP) = 2,4,6-Tribromophenol	19-122	10-123
S7 (2CP) = 2-Chlorophenol-d4	20-130*	33-110*
S8 (DCB) = 1,2-Dichlorobenzene-d4	20-130*	16-110*

LDC #: 13381cab
SDG #: HV42

VALIDATION FINDINGS WORKSHEET
Matrix Spike/Matrix Spike Duplicates

Page: 1 of 1
Reviewer: 9
2nd Reviewer: ✓

METHOD: GC/MS BNA (EPA SW 846 Method 8270)

Please see qualifications below for all questions answered "N". Not applicable questions are identified as "N/A".

(Y) N N/A Were a matrix spike (MS) and matrix spike duplicate (MSD) analyzed for each matrix in this SDG? If no, indicate which matrix does not have an associated MS/MSD. Soil / Water.

(Y) N N/A Was a MS/MSD analyzed every 20 samples of each matrix?

Y (N) N/A Were the MS/MSD percent recoveries (%R) and the relative percent differences (RPD) within the QC limits?

#	Date	MS/MSD ID	Compound	MS %R (Limits)	MSD %R (Limits)	RPD (Limits)	Associated Samples	Qualifications
		9/10	✓	34.T (40-130)	( )	( )	8	✓/M/A
				( )	( )	( )		
				( )	( )	( )		
		No MS/MSD	W	( )	( )	( )	11	None/A
				( )	( )	( )		
				( )	( )	( )		
				( )	( )	( )		
				( )	( )	( )		
				( )	( )	( )		
				( )	( )	( )		
				( )	( )	( )		
				( )	( )	( )		
				( )	( )	( )		
				( )	( )	( )		
				( )	( )	( )		
				( )	( )	( )		
				( )	( )	( )		
				( )	( )	( )		

	Compound	QC Limits (Soil)	RPD (Soil)	QC Limits (Water)	RPD (Water)		Compound	QC Limits (Soil)	RPD (Soil)	QC Limits (Water)	RPD (Water)
A.	Phenol	26-90%	≤ 35%	12-110%	≤ 42%	GG.	Acenaphthene	31-137%	≤ 19%	46-118%	≤ 31%
C.	2-Chlorophenol	25-102%	≤ 50%	27-123%	≤ 40%	II.	4-Nitrophenol	11-114%	≤ 50%	10-80%	≤ 50%
E.	1,4-Dichlorobenzene	28-104%	≤ 27%	36-97%	≤ 28%	KK.	2,4-Dinitrotoluene	28-89%	≤ 47%	24-96%	≤ 38%
J.	N-Nitroso-di-n-propylamine	41-126%	≤ 38%	41-116%	≤ 38%	TT.	Pentachlorophenol	17-109%	≤ 47%	9-103%	≤ 50%
R.	1,2,4-Trichlorobenzene	38-107%	≤ 23%	39-98%	≤ 28%	ZZ.	Pyrene	35-142%	≤ 36%	26-127%	≤ 31%
V.	4-Chloro-3-methylphenol	26-103%	≤ 33%	23-97%	≤ 42%						

LDC #: 13381C2D
SDG #: HV42

VALIDATION FINDINGS WORKSHEET
Overall Assessment of Data

Page: 1 of 1
Reviewer: Q
2nd Reviewer: A

METHOD: GC/MS BNA (EPA SW 846 Method 8270)

Please see qualifications below for all questions answered "N". Not applicable questions are identified as "N/A".

All available information pertaining to the data were reviewed using professional judgement to compliment the determination of the overall quality of the data.

(Y) N N/A Was the overall quality and usability of the data acceptable?

#	Date	Sample ID	Finding	Associated Samples	Qualifications
		6	All	6	R/A

Comments:

LDC #: 13381C2b
SDG #: HV42

VALIDATION FINDINGS WORKSHEET
Initial Calibration Calculation Verification

Page: 1 of 1
Reviewer: 9
2nd Reviewer: DC

METHOD: GC/MS BNA (EPA SW 846 Method 8270)

The Relative Response Factor (RRF), average RRF, and percent relative standard deviation (%RSD) were recalculated for the compounds identified below using the following calculations:

RRF = $(A_x)(C_{is})/(A_{is})(C_x)$
average RRF = sum of the RRFs/number of standards
%RSD = 100 * (S/X)

A_x = Area of compound, A_{is} = Area of associated internal standard
C_x = Concentration of compound, C_{is} = Concentration of internal standard
S = Standard deviation of the RRFs, X = Mean of the RRFs

#	Standard ID	Calibration Date	Compound (Reference Internal Standard)	Reported RRF (1 std)	Recalculated RRF (1 std)	Reported Average RRF (initial)	Recalculated Average RRF (initial)	Reported %RSD	Recalculated %RSD
1	ICAL	1/29/05	~~Phenol~~ E (1st internal standard)	1.370	1.370	1.397	1.397	2.5	2.5
			~~Naphthalene~~ A (2nd internal standard)	0.310	0.310	0.303	0.303	2.0	2.0
			~~Fluorene~~ EE (3rd internal standard)	1.186	1.186	1.162	1.162	5.9	5.9
			Pentachlorophenol (4th internal standard)	0.138	0.138	0.129	0.129	18.5	18.5
			~~Bis(2-ethylhexyl)phthalate~~ CCC (5th internal standard)	1.236	1.236	1.225	1.225	2.0	2.0
			Benzo(a)pyrene (6th internal standard)	1.035	1.035	1.061	1.061	3.7	3.7
2			Phenol (1st internal standard)						
			Naphthalene (2nd internal standard)						
			Fluorene (3rd internal standard)						
			Pentachlorophenol (4th internal standard)						
			Bis(2-ethylhexyl)phthalate (5th internal standard)						
			Benzo(a)pyrene (6th internal standard)						
3			Phenol (1st internal standard)						
			Naphthalene (2nd internal standard)						
			Fluorene (3rd internal standard)						
			Pentachlorophenol (4th internal standard)						
			Bis(2-ethylhexyl)phthalate (5th internal standard)						
			Benzo(a)pyrene (6th internal standard)						

Comments: Refer to Initial Calibration findings worksheet for list of qualifications and associated samples when reported results do not agree within 10.0% of the recalculated results.

LDC #: 13381c2b
SDG #: HV42

VALIDATION FINDINGS WORKSHEET
Continuing Calibration Results Verification

Page: 1 of 1
Reviewer: 9
2nd Reviewer: JC

METHOD: GC/MS BNA (EPA SW 846 Method 8270)

The percent difference (%D) of the initial calibration average Relative Response Factors (RRFs) and the continuing calibration RRFs were recalculated for the compounds identified below using the following calculation:

% Difference = 100 * (ave. RRF - RRF)/ave. RRF
$RRF = (A_x)(C_{is})/(A_{is})(C_x)$

Where: ave. RRF = initial calibration average RRF
RRF = continuing calibration RRF
A_x = Area of compound, A_{is} = Area of associated internal standard
C_x = Concentration of compound, C_{is} = Concentration of internal standard

#	Standard ID	Calibration Date	Compound (Reference Internal Standard)	Average RRF (Initial)	Reported RRF (CC)	Recalculated RRF (CC)	Reported %D	Recalculated %D
1	cc0324	3/24/05	~~Phenol~~ (1st internal standard) E	1.397	1.365	1.365	2.3	2.3
			~~Naphthalene~~ (2nd internal standard) R	0.303	0.303	0.303	0.0	0.0
			~~Fluorene~~ (3rd internal standard) LL	1.162	1.162	1.162	0.0	0.0
			Pentachlorophenol (4th internal standard)	0.129	0.132	0.132	2.3	2.5
			~~Bis(2-ethylhexyl)phthalate~~ (5th internal standard)	1.225	1.252	1.252	2.2	2.2
			Benzo(a)pyrene (6th internal standard)	1.061	1.034	1.034	2.5	2.5
2	cc0328	3/28/05	~~Phenol~~ (1st internal standard) E	1.397	1.457	1.457	4.3	4.3
			~~Naphthalene~~ (2nd internal standard) R	0.303	0.310	0.310	2.3	2.5
			~~Fluorene~~ (3rd internal standard) LL	1.162	1.246	1.246	7.2	7.2
			Pentachlorophenol (4th internal standard)	0.129	0.138	0.138	7.0	6.8
			~~Bis(2-ethylhexyl)phthalate~~ (5th internal standard)	1.225	1.235	1.235	0.8	0.8
			Benzo(a)pyrene (6th internal standard)	1.061	1.028	1.028	3.1	3.1
3	cc0330	3/30/05	~~Phenol~~ (1st internal standard) E	1.397	1.269	1.269	9.2	9.2
			~~Naphthalene~~ (2nd internal standard) R	0.303	0.309	0.309	2.0	2.1
			~~Fluorene~~ (3rd internal standard) LL	1.162	1.240	1.240	6.7	6.7
			Pentachlorophenol (4th internal standard)	0.129	0.126	0.126	2.3	2.5
			~~Bis(2-ethylhexyl)phthalate~~ (5th internal standard)	1.225	1.270	1.270	3.7	3.7
			Benzo(a)pyrene (6th internal standard)	1.061	1.051	1.051	0.9	0.9

Comments: Refer to Continuing Calibration findings worksheet for list of qualifications and associated samples when reported results do not agree within 10.0% of the recalculated results.

LDC #: 13381c6
SDG #: HV42

VALIDATION FINDINGS WORKSHEET
Surrogate Results Verification

Page: 1 of 1
Reviewer: 9
2nd reviewer: K

METHOD: GC/MS Semivolatiles (EPA SW 846 Method 8270)

The percent recoveries (%R) of surrogates were recalculated for the compounds identified below using the following calculation:

% Recovery: SF/SS * 100

Where: SF = Surrogate Found
SS = Surrogate Spiked

Sample ID: 1

	Surrogate Spiked	Surrogate Found	Percent Recovery Reported	Percent Recovery Recalculated	Percent Difference
Nitrobenzene-d5	2.5	1.61600	64.8	64.6	0.2
2-Fluorobiphenyl	↓	1.58508	63.6	63.4	↓
Terphenyl-d14	↓	1.79119	71.6	71.6	0
Phenol-d5	3.75	2.24858	60.0	60.0	↓
2-Fluorophenol	↓	1.93124	51.5	51.5	↓
2,4,6-Tribromophenol	↓	2.71512	72.5	72.4	0.1
2-Chlorophenol-d4	↓	2.23387	59.5	59.8	↓
1,2-Dichlorobenzene-d4	2.5	1.49565	60.0	59.8	0.2

Sample ID: _____

	Surrogate Spiked	Surrogate Found	Percent Recovery Reported	Percent Recovery Recalculated	Percent Difference
Nitrobenzene-d5					
2-Fluorobiphenyl					
Terphenyl-d14					
Phenol-d5					
2-Fluorophenol					
2,4,6-Tribromophenol					
2-Chlorophenol-d4					
1,2-Dichlorobenzene-d4					

Sample ID: _____

	Surrogate Spiked	Surrogate Found	Percent Recovery Reported	Percent Recovery Recalculated	Percent Difference
Nitrobenzene-d5					
2-Fluorobiphenyl					
Terphenyl-d14					
Phenol-d5					
2-Fluorophenol					
2,4,6-Tribromophenol					
2-Chlorophenol-d4					
1,2-Dichlorobenzene-d4					

LDC #: 13381cb
SDG #: HV42

VALIDATION FINDINGS WORKSHEET
Matrix Spike/Matrix Spike Duplicates Results Verification

Page: 6 of 7
Reviewer: 9
2nd Reviewer: AC

METHOD: GC/MS BNA (EPA SW 846 Method 8270)

The percent recoveries (%R) and Relative Percent Difference (RPD) of the matrix spike and matrix spike duplicate were recalculated for the compounds identified below using the following calculation:

% Recovery = 100 * (SSC - SC)/SA Where: SSC = Spiked sample concentration; SA = Spike added; SC = Sample concentation

RPD = | MS - MSD | * 2/(MS + MSD) MS = Matrix spike percent recovery; MSD = Matrix spike duplicate percent recovery

MS/MSD samples: 9/10

Compound	Spike Added (MS)		Sample Concentration (MS)	Spiked Sample Concentration (MS)		Matrix Spike Percent Recovery		Matrix Spike Duplicate Percent Recovery		MS/MSD RPD	
	MS	MSD	------	MS	MSD	Reported	Recalc.	Reported	Recalc.	Reported	Recalculated
Phenol											
2-Chlorophenol											
1,4-Dichlorobenzene											
N-Nitroso-di-n-propylamine	164	163	ND	56.9	71.7	34.7	34.7	44.0	44.0	23.0	23.0
1,2,4-Trichlorobenzene	164	V	V	69.4	93.9	42.3	42.3	57.6	57.6	30.0	30.0
4-Chloro-3-methylphenol											
Acenaphthene											
4-Nitrophenol											
2,4-Dinitrotoluene											
Pentachlorophenol	245	244	ND	124	173	50.6	50.6	70.9	70.9	33.0	33.0
Pyrene											

Comments: Refer to Matrix Spike/Matrix Spike Duplicates findings worksheet for list of qualifications and associated samples when reported results do not agree within 10.0% of the recalculated results.

LDC #: 13381Cb
SDG #: HV42

VALIDATION FINDINGS WORKSHEET
Laboratory Control Sample/Laboratory Control Sample Duplicates Results Verification

Page: 1 of 1
Reviewer: 9
2nd Reviewer: AC

METHOD: GC/MS BNA (EPA SW 846 Method 8270)

The percent recoveries (%R) and Relative Percent Difference (RPD) of the laboratory control sample and laboratory control sample duplicate were recalculated for the compounds identified below using the following calculation:

% Recovery = 100 * (SC/SA Where: SSC = Spike concentration
SA = Spike added

RPD = | LCS - LCSD | * 2/(LCS + LCSD) LCS = Laboratory cortrol sample percent recovery LCSD = Laboratcry control sample duplicate percent recovery

LCS/LCSD samples: LCS-032105

Compound	Spike Added (ug/kg)		Spike Concentration (ug/kg)		LCS Percent Recovery		LCSD Percent Recovery		LCS/LCSD RPD	
	LCS	LCSD	LCS	LCSD	Reported	Recalc.	Reported	Recalc.	Reported	Recalculated
Phenol										
2-Chlorophenol										
1,4-Dichlorobenzene										
N-Nitroso-di-n-propylamine	167	NA	74.0	NA	44.3	44.3				
1,2,4-Trichlorobenzene	V	V	97.3	V	58.3	58.3				
4-Chloro-3-methylphenol										
Acenaphthene										
4-Nitrophenol										
2,4-Dinitrotoluene										
Pentachlorophenol	1250	NA	188	NA	75.2	75.2				
Pyrene										

Comments: Refer to Laboratory Control Sample/Laboratory Control Sample Duplicates findings worksheet for list of qualifications and associated samples when reported results do not agree within 10.0% of the recalculated results.

LDC #: 13381C6b
SDG #: HV42

VALIDATION FINDINGS WORKSHEET
Sample Calculation Verification

Page: 1 of 1
Reviewer: 9
2nd reviewer: MC

METHOD: GC/MS BNA (EPA SW 846 Method 8270)

Y N N/A Were all reported results recalculated and verified for all level IV samples?
Y N N/A Were all recalculated results for detected target compounds agree within 10.0% of the reported results?

$$\text{Concentration} = \frac{(A_x)(I_s)(V_t)(DF)(2.0)}{(A_{is})(RRF)(V_o)(V_i)(\%S)}$$

A_x = Area of the characteristic ion (EICP) for the compound to be measured

A_{is} = Area of the characteristic ion (EICP) for the specific internal standard

I_s = Amount of internal standard added in nanograms (ng)

V_o = Volume or weight of sample extract in milliliters (ml) or grams (g).

V_i = Volume of extract injected in microliters (ul)

V_t = Volume of the concentrated extract in microliters (ul)

Df = Dilution Factor.

%S = Percent solids, applicable to soil and solid matrices only.

2.0 = Factor of 2 to account for GPC cleanup

Example:

Sample I.D. 1, 111:

$$\text{Conc.} = \frac{(186238)(2)(500)(1)(\quad)}{(54719)(1.06)(16)(1)(0.474)}$$

$$= 42.26 \text{ ug/Kg}$$

#	Sample ID	Compound	Reported Concentration ( )	Calculated Concentration ( )	Qualification

LDC #: 13384A2b **VALIDATION COMPLETENESS WORKSHEET** Date: 4/20/05
SDG #: HV00 Level II Page: 1 of 1
Laboratory: Analytical Resources, Inc. Reviewer: [illegible]
2nd Reviewer: [illegible]

METHOD: GC/MS ~~Polynuclear Aromatic Hydrocarbons~~ SVOA (EPA SW 846 Method 8270C) ~~SIM~~

The samples listed below were reviewed for each of the following validation areas. Validation findings are noted in attached validation findings worksheets.

	Validation Area		Comments
I.	Technical holding times	A	Sampling dates: 3/8/05
II.	GC/MS Instrument performance check	N	
III.	Initial calibration	N	
IV.	Continuing calibration	N	
V.	Blanks	A	
VI.	Surrogate spikes	SW	
VII.	Matrix spike/Matrix spike duplicates	A	
VIII.	Laboratory control samples	A	LCS.
IX.	Regional Quality Assurance and Quality Control	N	
X.	Internal standards	N	
XI.	Target compound identification	N	
XII.	Compound quantitation/CRQLs	N	
XIII.	Tentitatively identified compounds (TICs)	N	
XIV.	System performance	N	
XV.	Overall assessment of data	A	
XVI.	Field duplicates	SW	D = 6+7. 13+14
XVII.	Field blanks	N	

Note: A = Acceptable; N = Not provided/applicable; SW = See worksheet; ND = No compounds detected; R = Rinsate; FB = Field blank; D = Duplicate; TB = Trip blank; EB = Equipment blank

Validated Samples
All Soils

1	LDW-SS81-010	11	LDW-SS106-010	21	MB-031605	31	
2	LDW-SS65-010	12	LDW-SS122-010	22		32	
3	LDW-SS41-010	13	LDW-SS131-010	23		33	
4	LDW-SS30-010	14	LDW-SS206-010	24		34	
5	LDW-SS21-010	15	LDW-SS140-010	25		35	
6	LDW-SS19-010	16	LDW-SS140-010MS	26		36	
7	LDW-SS205-010	17	LDW-SS140-010MSD	27		37	
8	LDW-SS11-010	18		28		38	
9	LDW-SS16-010	19		29		39	
10	LDW-SS105-010	20		30		40	

LDC #: [illegible]
SDG #: HV00

VALIDATION FINDINGS WORKSHEET
Surrogate Recovery

Page: 1 of 1
Reviewer: 9
2nd Reviewer: AC

METHOD: GC/MS BNA (EPA SW 846 Method 8270)

Please see qualification below for all questions answered "N". Not applicable questions are identified as "N/A".

Y (N) N/A Were percent recoveries (%R) for surrogates within QC limits?
Y N (N/A) If 2 or more base neutral or acid surrogates were outside QC limits, was a reanalysis performed to confirm %R?
Y N (N/A) If any %R was less than 10 percent, was a reanalysis performed to confirm %R?

#	Date	Sample ID	Surrogate	%R (Limits)	Qualifications
		1	DCB	39.2 (40-130)	No qual.
				( )	
		11	DCB	34.8 ( )	J/UJ/P (see table)
			NBZ	36.4 ( )	
				( )	
				( )	
				( )	
				( )	
				( )	
				( )	
				( )	
				( )	
				( )	
				( )	
				( )	
				( )	
				( )	
				( )	
				( )	
				( )	
				( )	
				( )	
				( )	
				( )	
				( )	
				( )	

* QC limits are advisory	QC Limits (Soil)	QC Limits (Water)
S1 (NBZ) = Nitrobenzene-d5	23-120	35-114
S2 (FBP) = 2-Fluorobiphenyl	30-115	43-116
S3 (TPH) = Terphenyl-d14	18-137	33-141
S4 (PHL) = Phenol-d5	24-113	10-94
S5 (2FP)= 2-Fluorophenol	25-121	21-100
S6 (TBP) = 2,4,6-Tribromophenol	19-122	10-123
S7 (2CP) = 2-Chlorophenol-d4	20-130*	33-110*
S8 (DCB) = 1,2-Dichlorobenzene-d4	20-130*	16-110*

ANALYTICAL RESOURCES INCORPORATED

ORGANICS ANALYSIS DATA SHEET
Semivolatiles by Selected Ion Monitoring GC/MS
Page 1 of 1

Sample ID: MB-031605
METHOD BLANK

Lab Sample ID: MB-031605
LIMS ID: 05-4644
Matrix: Sediment
Data Release Authorized:
Reported: 03/25/05

QC Report No: HV00-Windward Environmental
Project: LDW RI-Surface Sediment Chemistry
04-08-06-24
Date Sampled: NA
Date Received: NA

Date Extracted: 03/16/05
Date Analyzed: 03/23/05 14:17
Instrument/Analyst: NT2/Van
GPC Cleanup: No

Sample Amount: 7.50 g
Final Extract Volume: 0.50 mL
Dilution Factor: 1.00
Percent Moisture: NA
pH: NA

CAS Number	Analyte	RL	Result
56-55-3	Benzo(a)anthracene	6.7	< 6.7 U
205-99-2	Benzo(b)fluoranthene	6.7	< 6.7 U
50-32-8	Benzo(a)pyrene	6.7	< 6.7 U
193-39-5	Indeno(1,2,3-cd)pyrene	6.7	< 6.7 U
106-46-7	1,4-Dichlorobenzene	6.7	< 6.7 U
120-82-1	1,2,4-Trichlorobenzene	6.7	< 6.7 U
118-74-1	Hexachlorobenzene	6.7	< 6.7 U
87-68-3	Hexachlorobutadiene	6.7	< 6.7 U
65-85-0	Benzoic Acid	67	< 67 U
131-11-3	Dimethylphthalate	6.7	< 6.7 U
84-66-2	Diethylphthalate	6.7	< 6.7 U
85-68-7	Butylbenzylphthalate	6.7	< 6.7 U
95-48-7	2-Methylphenol	6.7	< 6.7 U
105-67-9	2,4-Dimethylphenol	6.7	< 6.7 U
86-30-6	N-Nitrosodiphenylamine	6.7	< 6.7 U
100-51-6	Benzyl Alcohol	33	< 33 U
87-86-5	Pentachlorophenol	33	< 33 U
95-50-1	1,2-Dichlorobenzene	6.7	< 6.7 U
621-64-7	N-Nitroso-Di-N-Propylamine	33	< 33 U
62-75-9	N-Nitrosodimethylamine	33	< 33 U

Reported in µg/kg (ppb)

SIM Semivolatile Surrogate Recovery

2-Fluorobiphenyl	60.4%	d5-Phenol	55.5%
2-Fluorophenol	52.8%	d4-2-Chlorophenol	60.0%
d4-1,2-Dichlorobenzene	56.4%	d5-Nitrobenzene	59.2%
2,4,6-Tribromophenol	67.7%	d14-p-Terphenyl	72.8%

BNs

LDC#: 13384A2b
SDG#: HV00

VALIDATION FINDINGS WORKSHEET
Field Duplicates

Page: 1 of 1
Reviewer: 9
2nd Reviewer: M

METHOD: GC/MS Semivolatiles (EPA SW 846 Method 8270-SIM)

Y N NA Were field duplicate pairs identified in this SDG?
Y N NA Were target analytes detected in the field duplicate pairs?

Compound	Concentration (ug/Kg)		RPD	(≤50)
	6	7		
CCC	170	150	13	
GGG	170	260	42	
III	130	190	38	
JJJ	78	110	34	
AAA	9.9	32	105	
F	6.6	6.6U	~~200~~ NC	

Compound	Concentration (ug/Kg)		RPD	(≤50)
	13	14		
CCC	56	42	29	
GGG	71	47	41	
III	62	37	51	
JJJ	47	28	51	
PPP	90	130	36	
CC	21	14	40	
AAA	21	46	75	

LDC #: 13395A2b **VALIDATION COMPLETENESS WORKSHEET** Date: 4/20/05

SDG #: HV38 Level II Page: 1 of 1

Laboratory: Analytical Resources, Inc. Reviewer: 2

2nd Reviewer: 2

METHOD: GC/MS ~~Polynuclear Aromatic Hydrocarbons~~ SVOA (EPA SW 846 Method 8270C)

The samples listed below were reviewed for each of the following validation areas. Validation findings are noted in attached validation findings worksheets.

	Validation Area		Comments
I.	Technical holding times	A	Sampling dates: 3/11/05
II.	GC/MS Instrument performance check	N	
III.	Initial calibration	N	
IV.	Continuing calibration	N	
V.	Blanks	A	
VI.	Surrogate spikes	A	
VII.	Matrix spike/Matrix spike duplicates	A	LDW-SS140-010 (HV00)
VIII.	Laboratory control samples	A	LCS
IX.	Regional Quality Assurance and Quality Control	N	
X.	Internal standards	N	
XI.	Target compound identification	N	
XII.	Compound quantitation/CRQLs	N	
XIII.	Tentitatively identified compounds (TICs)	N	
XIV.	System performance	N	
XV.	Overall assessment of data	A	
XVI.	Field duplicates	N	
XVII.	Field blanks	N	

Note: A = Acceptable
N = Not provided/applicable
SW = See worksheet
ND = No compounds detected
R = Rinsate
FB = Field blank
D = Duplicate
TB = Trip blank
EB = Equipment blank

Validated Samples

1	LDW-SS39-010	11	MB-031605	21		31	
2	LDW-SS100-010	12		22		32	
3	LDW-SS2U-010 R2b	13		23		33	
4		14		24		34	
5		15		25		35	
6		16		26		36	
7		17		27		37	
8		18		28		38	
9		19		29		39	
10		20		30		40	

LDC #: [illegible]
SDG #: #V38
METHOD: GC/MS BNA (EPA SW 846 Method 8270)

VALIDATION FINDINGS WORKSHEET
Surrogate Recovery

Page: 1 of 1
Reviewer:
2nd Reviewer:

Please see qualification below for all questions answered "N". Not applicable questions are identified as "N/A".

[✓ Y] N N/A Were percent recoveries (%R) for surrogates within QC limits?
Y N [✓ N/A] If 2 or more base neutral or acid surrogates were outside QC limits, was a reanalysis performed to confirm %R?
Y N [✓ N/A] If any %R was less than 10 percent, was a reanalysis performed to confirm %R?

#	Date	Sample ID	Surrogate	%R (Limits)	Qualifications
		2	DCB	36.4 (40-130)	No Qual
				( )	
				( )	
				( )	
				( )	
				( )	
				( )	
				( )	
				( )	
				( )	
				( )	
				( )	
				( )	
				( )	
				( )	
				( )	
				( )	
				( )	
				( )	
				( )	
				( )	
				( )	
				( )	
				( )	

* QC limits are advisory

	QC Limits (Soil)	QC Limits (Water)
S1 (NBZ) = Nitrobenzene-d5	23-120	35-114
S2 (FBP) = 2-Fluorobiphenyl	30-115	43-116
S3 (TPH) = Terphenyl-d14	18-137	33-141
S4 (PHL) = Phenol-d5	24-113	10-94
S5 (2FP)= 2-Fluorophenol	25-121	21-100
S6 (TBP) = 2,4,6-Tribromophenol	19-122	10-123
S7 (2CP) = 2-Chlorophenol-d4	20-130*	33-110*
S8 (DCB) = 1,2-Dichlorobenzene-d4	20-130*	16-110*

LDC #: 13398A2b **VALIDATION COMPLETENESS WORKSHEET** Date: 4/21/05
SDG #: HV58 Level II Page: 1 of 1
Laboratory: Analytical Resources, Inc. Reviewer: 9
2nd Reviewer: AC

METHOD: GC/MS ~~Polynuclear Aromatic Hydrocarbons~~ (EPA SW 846 Method 8270C~~)~~ SIM) SVOAs

The samples listed below were reviewed for each of the following validation areas. Validation findings are noted in attached validation findings worksheets.

	Validation Area		Comments
I.	Technical holding times	A	Sampling dates: 3/14/05
II.	GC/MS Instrument performance check	N	
III.	Initial calibration	N	
IV.	Continuing calibration	N	
V.	Blanks	A	
VI.	Surrogate spikes	A	
VII.	Matrix spike/Matrix spike duplicates	SW	
VIII.	Laboratory control samples	A	LCS
IX.	Regional Quality Assurance and Quality Control	N	
X.	Internal standards	N	
XI.	Target compound identification	N	
XII.	Compound quantitation/CRQLs	N	
XIII.	Tentitatively identified compounds (TICs)	N	
XIV.	System performance	N	
XV.	Overall assessment of data	SW	
XVI.	Field duplicates	N	
XVII.	Field blanks	N	~~FB~~

Note: A = Acceptable
N = Not provided/applicable
SW = See worksheet
ND = No compounds detected
R = Rinsate
FB = Field blank
D = Duplicate
TB = Trip blank
EB = Equipment blank

Validated Samples
All soils

1	LDW-SS90-010	11	LDW-SS29-010	21	MB-032205	31	
2	LDW-SS24-010	12	LDW-SS107-010	22		32	
3	LDW-SS24-010DL	13	LDW-SS145-010	23		33	
4	LDW-SS9-010	14	LDW-SS145-010MS	24		34	
5	LDW-SS77-010	15	LDW-SS145-010MSD	25		35	
6	LDW-SS59-010	16		26		36	
7	LDW-SSB5b-010	17		27		37	
8	LDW-SS53-010	18		28		38	
9	LDW-SS34-010	19		29		39	
10	LDW-SSB4a-010	20		30		40	

LDC #: 13398A26
SDG #: HV58

VALIDATION FINDINGS WORKSHEET
Matrix Spike/Matrix Spike Duplicates

Page: 1 of 1
Reviewer: Q
2nd Reviewer: DE

METHOD: GC/MS BNA (EPA SW 846 Method 8270)

Please see qualifications below for all questions answered "N". Not applicable questions are identified as "N/A".

(Y) N N/A Were a matrix spike (MS) and matrix spike duplicate (MSD) analyzed for each matrix in this SDG? If no, indicate which matrix does not have an associated MS/MSD. Soil / Water.

(Y) N N/A Was a MS/MSD analyzed every 20 samples of each matrix?

Y (N) N/A Were the MS/MSD percent recoveries (%R) and the relative percent differences (RPD) within the QC limits?

#	Date	MS/MSD ID	Compound	MS %R (Limits)	MSD %R (Limits)	RPD (Limits)	Associated Samples	Qualifications
		14/15	TT	( )	39.2 (40-130)	( )	13	J/UJ/A
				( )	( )	( )		
				( )	( )	( )		
				( )	( )	( )		
				( )	( )	( )		
				( )	( )	( )		
				( )	( )	( )		
				( )	( )	( )		
				( )	( )	( )		
				( )	( )	( )		
				( )	( )	( )		
				( )	( )	( )		
				( )	( )	( )		
				( )	( )	( )		
				( )	( )	( )		
				( )	( )	( )		
				( )	( )	( )		
				( )	( )	( )		
				( )	( )	( )		
				( )	( )	( )		

	Compound	QC Limits (Soil)	RPD (Soil)	QC Limits (Water)	RPD (Water)		Compound	QC Limits (Soil)	RPD (Soil)	QC Limits (Water)	RPD (Water)
A.	Phenol	26-90%	≤ 35%	12-110%	≤ 42%	GG.	Acenaphthene	31-137%	≤ 19%	46-118%	≤ 31%
C.	2-Chlorophenol	25-102%	≤ 50%	27-123%	≤ 40%	II.	4-Nitrophenol	11-114%	≤ 50%	10-80%	≤ 50%
E.	1,4-Dichlorobenzene	28-104%	≤ 27%	36-97%	≤ 28%	KK.	2,4-Dinitrotoluene	28-89%	≤ 47%	24-96%	≤ 38%
J.	N-Nitroso-di-n-propylamine	41-126%	≤ 38%	41-116%	≤ 38%	TT.	Pentachlorophenol	17-109%	≤ 47%	9-103%	≤ 50%
R.	1,2,4-Trichlorobenzene	38-107%	≤ 23%	39-98%	≤ 28%	ZZ.	Pyrene	35-142%	≤ 36%	26-127%	≤ 31%
V.	4-Chloro-3-methylphenol	26-103%	≤ 33%	23-97%	≤ 42%						

LDC #: 13398A2b
SDG #: HV58

VALIDATION FINDINGS WORKSHEET
Overall Assessment of Data

Page: 1 of 1
Reviewer: Q
2nd Reviewer: AC

METHOD: GC/MS BNA (EPA SW 846 Method 8270)

Please see qualifications below for all questions answered "N". Not applicable questions are identified as "N/A".

All available information pertaining to the data were reviewed using professional judgement to compliment the determination of the overall quality of the data.

(Y) N N/A Was the overall quality and usability of the data acceptable?

#	Date	Sample ID	Finding	Associated Samples	Qualifications
		2	GGG.	2	R/A
		3	M except GGG	3	

Comments: _____

OVR.2S

LDC #: 13403A2b **VALIDATION COMPLETENESS WORKSHEET** Date: 4/21/05
SDG #: HV72 Level ~~IV~~ II Page: 1 of 1
Laboratory: Analytical Resources, Inc. Reviewer: [illegible]
2nd Reviewer: [illegible]

METHOD: GC/MS ~~Polynuclear Aromatic Hydrocarbons~~ SVOAS (EPA SW 846 Method 8270C)

The samples listed below were reviewed for each of the following validation areas. Validation findings are noted in attached validation findings worksheets.

	Validation Area		Comments
I.	Technical holding times	A	Sampling dates: 3/15/05
II.	GC/MS Instrument performance check	N	
III.	Initial calibration	N	
IV.	Continuing calibration	N	
V.	Blanks	A	
VI.	Surrogate spikes	A	
VII.	Matrix spike/Matrix spike duplicates	SW	
VIII.	Laboratory control samples	A	LCS
IX.	Regional Quality Assurance and Quality Control	N	
X.	Internal standards	N	
XI.	Target compound identification	N	
XII.	Compound quantitation/CRQLs	N	
XIII.	Tentitatively identified compounds (TICs)	N	
XIV.	System performance	N	
XV.	Overall assessment of data	A	
XVI.	Field duplicates	N	
XVII.	Field blanks	N	

Note: A = Acceptable
N = Not provided/applicable
SW = See worksheet
ND = No compounds detected
R = Rinsate
FB = Field blank
D = Duplicate
TB = Trip blank
EB = Equipment blank

Validated Samples

1	LDW-SS93-010 sed	11	MB-032205	21		31	
2	LDW-SS124-010	12		22		32	
3	LDW-SS135-010	13		23		33	
4	LDW-SS136-010	14		24		34	
5	LDW-SSB6a-010	15		25		35	
6	LDW-SSC1-010	16		26		36	
7		17		27		37	
8		18		28		38	
9		19		29		39	
10		20		30		40	

LDC #: 13703A2b
SDG #: HVT2

VALIDATION FINDINGS WORKSHEET
Matrix Spike/Matrix Spike Duplicates

Page: 1 of 1
Reviewer: 9
2nd Reviewer: M

METHOD: GC/MS BNA (EPA SW 846 Method 8270)

Please see qualifications below for all questions answered "N". Not applicable questions are identified as "N/A".

(Y) N N/A Were a matrix spike (MS) and matrix spike duplicate (MSD) analyzed for each matrix in this SDG? If no, indicate which matrix does not have an associated MS/MSD. Soil / Water.

(Y) N N/A Was a MS/MSD analyzed every 20 samples of each matrix?

Y (N) N/A Were the MS/MSD percent recoveries (%R) and the relative percent differences (RPD) within the QC limits?

#	Date	MS/MSD ID	Compound	MS %R (Limits)	MSD %R (Limits)	RPD (Limits)	Associated Samples	Qualifications
		LDW-55145-010	ZZTT	( )	39.2 (40-130)	( )	None	No Qual
				( )	( )	( )		
				( )	( )	( )		
				( )	( )	( )		
				( )	( )	( )		
				( )	( )	( )		
				( )	( )	( )		
				( )	( )	( )		
				( )	( )	( )		
				( )	( )	( )		
				( )	( )	( )		
				( )	( )	( )		
				( )	( )	( )		
				( )	( )	( )		
				( )	( )	( )		
				( )	( )	( )		
				( )	( )	( )		
				( )	( )	( )		

	Compound	QC Limits (Soil)	RPD (Soil)	QC Limits (Water)	RPD (Water)		Compound	QC Limits (Soil)	RPD (Soil)	QC Limits (Water)	RPD (Water)
A.	Phenol	26-90%	≤ 35%	12-110%	≤ 42%	GG.	Acenaphthene	31-137%	≤ 19%	46-118%	≤ 31%
C.	2-Chlorophenol	25-102%	≤ 50%	27-123%	≤ 40%	II.	4-Nitrophenol	11-114%	≤ 50%	10-80%	≤ 50%
E.	1,4-Dichlorobenzene	28-104%	≤ 27%	36-97%	≤ 28%	KK.	2,4-Dinitrotoluene	28-89%	≤ 47%	24-96%	≤ 38%
J.	N-Nitroso-di-n-propylamine	41-126%	≤ 38%	41-116%	≤ 36%	TT.	Pentachlorophenol	17-109%	≤ 47%	9-103%	≤ 50%
R.	1,2,4-Trichlorobenzene	38-107%	≤ 23%	39-98%	≤ 28%	ZZ.	Pyrene	35-142%	≤ 36%	26-127%	≤ 31%
V.	4-Chloro-3-methylphenol	26-103%	≤ 33%	23-97%	≤ 42%						

LDC #: 13412A2b **VALIDATION COMPLETENESS WORKSHEET** Date: 4/27/05
SDG #: HV76 Level IV Page: 1 of 1
Laboratory: Analytical Resources, Inc. Reviewer: [illegible]
SVOA 2nd Reviewer: [illegible]

METHOD: GC/MS Polynuclear Aromatic Hydrocarbons (EPA SW 846 Method 8270C) – SIM

The samples listed below were reviewed for each of the following validation areas. Validation findings are noted in attached validation findings worksheets.

	Validation Area		Comments
I.	Technical holding times	A	Sampling dates: 3/15/05
II.	GC/MS Instrument performance check	A	
III.	Initial calibration	SW	
IV.	Continuing calibration	SW	
V.	Blanks	SW	
VI.	Surrogate spikes	SW	
VII.	Matrix spike/Matrix spike duplicates	SW	
VIII.	Laboratory control samples	A	LCS
IX.	Regional Quality Assurance and Quality Control	N	
X.	Internal standards	A	
XI.	Target compound identification	A	
XII.	Compound quantitation/CRQLs	A	
XIII.	Tentitatively identified compounds (TICs)	N	
XIV.	System performance	A	
XV.	Overall assessment of data	A	
XVI.	Field duplicates	N	
XVII.	Field blanks	N	

Note: A = Acceptable
N = Not provided/applicable
SW = See worksheet
ND = No compounds detected
R = Rinsate
FB = Field blank
D = Duplicate
TB = Trip blank
EB = Equipment blank

Validated Samples
All soils

1 1	LDW-SS98-010	11 4	LDW-SS151-010MS	21		31	
2 1	LDW-SS141-010	12 4	LDW-SS151-010MSD	22		32	
3 2	LDW-SSB9a-010	13 1	MB-030205	23		33	
4 2	LDW-SS156-010	14		24		34	
5 2	LDW-SS155-010	15		25		35	
6 2	LDW-SS154-010	16		26		36	
7 2	LDW-SS153-010	17		27		37	
8 4	LDW-SS152-010	18		28		38	
9 3	LDW-SS151-010	19		29		39	
10 3	LDW-SS144-010	20		30		40	

LDC #: 13912A26
SDG #: HV76

VALIDATION FINDINGS CHECKLIST

Page: 1 of 3
Reviewer: 9
2nd Reviewer: M

Method: Semivolatiles (EPA SW 846 Method 8270C)

Validation Area	Yes	No	NA	Findings/Comments
I. Technical holding times				
All technical holding times were met.	✓			
Cooler temperature criteria was met.	✓			
II. GC/MS instrument performance check				
Were the DFTPP performance results reviewed and found to be within the specified criteria?	✓			
Were all samples analyzed within the 12 hour clock criteria?	✓			
III. Initial calibration				
Did the laboratory perform a 5 point calibration prior to sample analysis?	✓			
Were all percent relative standard deviations (%RSD) and relative response factors (RRF) within method criteria for all CCCs and SPCCs?	✓			
Was a curve fit used for evaluation? If Yes, what was the acceptance criteria used?		✓		
Did the initial calibration meet the curve fit acceptance criteria?			✓	
Were all percent relative standard deviations (%RSD) $\leq$ 30% and relative response factors (RRF) $\geq$ 0.05?		✓		
IV. Continuing calibration				
Was a continuing calibration standard analyzed at least once every 12 hours for each instrument?	✓			
Were all percent differences (%D) and relative response factors (RRF) within method criteria for all CCCs and SPCCs?	✓			
Were all percent differences (%D) $\leq$ 25% and relative response factors (RRF) $\geq$ 0.05?		✓		
V. Blanks				
Was a method blank associated with every sample in this SDG?	✓			
Was a method blank analyzed for each matrix and concentration?	✓			
Was there contamination in the method blanks? If yes, please see the Blanks validation completeness worksheet.	✓			
VI. Surrogate spikes				
Were all surrogate %R within QC limits?		✓		
If 2 or more base neutral or acid surrogates were outside QC limits, was a reanalysis performed to confirm %R?			✓	
If any %R was less than 10 percent, was a reanalysis performed to confirm %R?			✓	
VII. Matrix spike/Matrix spike duplicates				
Were a matrix spike (MS) and matrix spike duplicate (MSD) analyzed for each matrix in this SDG? If no, indicate which matrix does not have an associated MS/MSD. Soil / Water.	✓			
Was a MS/MSD analyzed every 20 samples of each matrix?	✓			

LDC #: 13462A26
SDG #: HV76

VALIDATION FINDINGS CHECKLIST

Reviewer: 9
2nd Reviewer: K

Validation Area	Yes	No	NA	Findings/Comments
Were the MS/MSD percent recoveries (%R) and the relative percent differences (RPD) within the QC limits?		✓		
VIII. Laboratory control samples				
Was an LCS analyzed for this SDG?	✓			
Was an LCS analyzed per extraction batch?	✓			
Were the LCS percent recoveries (%R) and relative percent difference (RPD) within the QC limits?	✓			
IX. Regional Quality Assurance and Quality Control				
Were performance evaluation (PE) samples performed?		✓		
Were the performance evaluation (PE) samples within the acceptance limits?			✓	
X. Internal standards				
Were internal standard area counts within -50% or +100% of the associated calibration standard?	✓			
Were retention times within ± 30 seconds from the associated calibration standard?	✓			
XI. Target compound identification				
Were relative retention times (RRT's) within ± 0.06 RRT units of the standard?	✓			
Did compound spectra meet specified EPA "Functional Guidelines" criteria?	✓			
Were chromatogram peaks verified and accounted for?	✓			
XII. Compound quantitation/CRQLs				
Were the correct internal standard (IS), quantitation ion and relative response factor (RRF) used to quantitate the compound?	✓			
Were compound quantitation and CRQLs adjusted to reflect all sample dilutions and dry weight factors applicable to level IV validation?	✓			
XIII. Tentatively identified compounds (TICs)				
Were the major ions (> 10 percent relative intensity) in the reference spectrum evaluated in sample spectrum?			✓	
Were relative intensities of the major ions within ± 20% between the sample and the reference spectra?			✓	
Did the raw data indicate that the laboratory performed a library search for all required peaks in the chromatograms (samples and blanks)?		✓		
XIV. System performance				
System performance was found to be acceptable.	✓			
XV. Overall assessment of data				
Overall assessment of data was found to be acceptable.	✓			

Validation Area	Yes	No	NA	Findings/Comments
XVI. Field duplicates				
Field duplicate pairs were identified in this SDG.		✓		
Target compounds were detected in the field duplicates.			✓	
XVII. Field blanks				
Field blanks were identified in this SDG.		✓		
Target compounds were detected in the field blanks.			✓	

LDC #: 13412A2b
SDG #: HV76

VALIDATION FINDINGS WORKSHEET
Initial Calibration

Reviewer: [illegible]
2nd Reviewer: [illegible]

METHOD: GC/MS BNA (EPA SW 846 Method 8270)

Please see qualifications below for all questions answered "N". Not applicable questions are identified as "N/A".

(Y) N N/A Did the laboratory conduct an acceptable 5 point calibration prior to sample analysis?
(Y) N N/A Were percent relative standard deviations (%RSD) and relative response factors (RRF) within method criteria for all CCC's and SPCC's?
Y (N) N/A Was a curve fit used for evaluation? If yes, what was the acceptance criteria used for evaluation?__________
~~Y N~~ (N/A) Did the initial calibration meet the acceptance criteria?
Y (N) N/A Were all %RSDs and RRFs within the validation criteria of ≤30 %RSD and ≥0.05 RRF ?

#	Date	Standard ID	Compound	Finding %RSD (Limit: ≤30.0%)	Finding RRF (Limit: ≥0.05)	Associated Samples	Qualifications
	1/29/05	ICAL	PPP	39.231		M+ Blk	J/UJ/A

LDC #: 13412B26
SDG #: HVT6

VALIDATION FINDINGS WORKSHEET
Continuing Calibration

METHOD: GC/MS BNA (EPA SW 846 Method 8270)

Please see qualifications below for all questions answered "N". Not applicable questions are identified as "N/A".

Y N N/A Was a continuing calibration standard analyzed at least once every 12 hours of sample analysis for each instrument?

Y N N/A Were percent differences (%D) and relative response factors (RRF) within method criteria for all CCC's and SPCC's ?

Y N N/A Were all %D and RRFs within the validation criteria of ≤25 %D and ≥0.05 RRF ?

#	Date	Standard ID	Compound	Finding %D (Limit: ≤25.0%)	Finding RRF (Limit: ≥0.05)	Associated Samples	Qualifications
	3/28/05	CC0328	PPP	31.7		3-7.	J/UJ/A
			DDD	28.0			
	3/29/05	CC0329	DDD	30.8		9-10	J/UJ/A
	3/30/05	CC0330	PPP	42.1		8. 11-12	J/UJ/A
			DDD	34.0			

LDC #: B412A2b
SDG #: HV76

VALIDATION FINDINGS WORKSHEET
Blanks

Page: 1 of 1
Reviewer: 9
2nd Reviewer: 2

METHOD: GC/MS BNA (EPA SW 846 Method 8270)

Please see qualifications below for all questions answered "N". Not applicable questions are identified as "N/A".

(Y) N N/A Was a method blank analyzed for each matrix?
(Y) N N/A Was a method blank analyzed for each concentration preparation level?
(Y) N N/A Was a method blank associated with every sample?
(Y) N N/A Was the blank contaminated? If yes, please see qualification below.

Blank extraction date: 3/22/05 **Blank analysis date:** 3/24/05
Conc. units: ug/kg Associated Samples: all MS

Compound	Blank ID	Sample Identification								
MS	032205	1	2	4	8	9	10			
LC	8.0	14/U	9.7/U	11/U	8.4/U	11/U	7.3/U			

Blank extraction date: _____ **Blank analysis date:** _____
Conc. units: _____ Associated Samples: _____

Compound	Blank ID	Sample Identification								

CIRCLED RESULTS WERE NOT QUALIFIED. ALL RESULTS NOT CIRCLED WERE QUALIFIED BY THE FOLLOWING STATEMENT:
Common contaminants such as the phthalates and TICs noted above that were detected in samples within ten times the associated method blank concentration were qualified as not detected, "U". Other contaminants within five times the method blank concentration were also qualified as not detected, "U".

LDC #: 134F4J2D

SDG #: HV76

VALIDATION FINDINGS WORKSHEET
Surrogate Recovery

Page: 1 of 1
Reviewer: 9
2nd Reviewer: MC

METHOD: GC/MS BNA (EPA SW 846 Method 8270)

Please see qualification below for all questions answered "N". Not applicable questions are identified as "N/A".

Y N N/A Were percent recoveries (%R) for surrogates within QC limits?

Y N N/A If 2 or more base neutral or acid surrogates were outside QC limits, was a reanalysis performed to confirm %R?

Y N N/A If any %R was less than 10 percent, was a reanalysis performed to confirm %R?

#	Date	Sample ID	Surrogate	%R (Limits)	Qualifications
		4	PHL	37.6 (41-130)	No qual.
				( )	
		5	PHL	34.7 ( )	J/UJ/P (PPP.4.0.TT)
			2FP	37.9 ( )	
				( )	
		8	2FP	39.2 ( )	No qual
				( )	
		10	PHL	35.7 ( )	
			NBZ	39.2 ( )	
				( )	
				( )	
				( )	
				( )	
				( )	
				( )	
				( )	
				( )	
				( )	
				( )	
				( )	
				( )	
				( )	
				( )	

* QC limits are advisory	QC Limits (Soil)	QC Limits (Water)
S1 (NBZ) = Nitrobenzene-d5	23-120	35-114
S2 (FBP) = 2-Fluorobiphenyl	30-115	43-116
S3 (TPH) = Terphenyl-d14	18-137	33-141
S4 (PHL) = Phenol-d5	24-113	10-94

	QC Limits (Soil)	QC Limits (Water)
S5 (2FP) = 2-Fluorophenol	25-121	21-100
S6 (TBP) = 2,4,6-Tribromophenol	19-122	10-123
S7 (2CP) = 2-Chlorophenol-d4	20-130*	33-110*
S8 (DCB) = 1,2-Dichlorobenzene-d4	20-130*	16-110*

LDC #: 13412A2b
SDG #: HV76

VALIDATION FINDINGS WORKSHEET
Matrix Spike/Matrix Spike Duplicates

Page: 1 of 1
Reviewer: [illegible]
2nd Reviewer: [illegible]

METHOD: GC/MS BNA (EPA SW 846 Method 8270)

Please see qualifications below for all questions answered "N". Not applicable questions are identified as "N/A'.

(Y) N N/A Were a matrix spike (MS) and matrix spike duplicate (MSD) analyzed for each matrix in this SDG? If no, indicate which matrix does not have an associated MS/MSD. Soil / Water.

(Y) N N/A Was a MS/MSD analyzed every 20 samples of each matrix?

Y (N) N/A Were the MS/MSD percent recoveries (%R) and the relative percent differences (RPD) within the QC limits?

#	Date	MS/MSD ID	Compound	MS %R (Limits)	MSD %R (Limits)	RPD (Limits)	Associated Samples	Qualifications
		11/12	2,4-DNT	31.2 (40-130)	( )	( )	9	J/UJ/A
				( )	( )	( )		
				( )	( )	( )		
				( )	( )	( )		
				( )	( )	( )		
				( )	( )	( )		
				( )	( )	( )		
				( )	( )	( )		
				( )	( )	( )		
				( )	( )	( )		
				( )	( )	( )		
				( )	( )	( )		
				( )	( )	( )		
				( )	( )	( )		
				( )	( )	( )		
				( )	( )	( )		
				( )	( )	( )		

	Compound	QC Limits (Soil)	RPD (Soil)	QC Limits (Water)	RPD (Water)		Compound	QC Limits (Soil)	RPD (Soil)	QC Limits (Water)	RPD (Water)
A.	Phenol	26-90%	≤ 35%	12-110%	≤ 42%	GG.	Acenaphthene	31-137%	≤ 19%	46-118%	≤ 31%
C.	2-Chlorophenol	25-102%	≤ 50%	27-123%	≤ 40%	II.	4-Nitrophenol	11-114%	≤ 50%	10-80%	≤ 50%
E.	1,4-Dichlorobenzene	28-104%	≤ 27%	36-97%	≤ 28%	KK.	2,4-Dinitrotoluene	28-89%	≤ 47%	24-96%	≤ 38%
J.	N-Nitroso-di-n-propylamine	41-126%	≤ 38%	41-116%	≤ 38%	TT.	Pentachlorophenol	17-109%	≤ 47%	9-103%	≤ 50%
R.	1,2,4-Trichlorobenzene	38-107%	≤ 23%	39-98%	≤ 28%	ZZ.	Pyrene	35-142%	≤ 36%	26-127%	≤ 31%
V.	4-Chloro-3-methylphenol	26-103%	≤ 33%	23-97%	≤ 42%						

LDC #: 13412B-b1
SDG #: HJV76

VALIDATION FINDINGS WORKSHEET
Initial Calibration Calculation Verification

Page: 1 of 1
Reviewer: 9
2nd Reviewer: AC

METHOD: GC/MS BNA (EPA SW 846 Method 8270)

The Relative Response Factor (RRF), average RRF, and percent relative standard deviation (%RSD) were recalculated for the compounds identified below using the following calculations:

$RRF = (A_x)(C_{is})/(A_{is})(C_x)$
average RRF = sum of the RRFs/number of standards
%RSD = 100 * (S/X)

A_x = Area of compound, A_{is} = Area of associated internal standard
C_x = Concentration of compound, C_{is} = Concentration of internal standard
S = Standard deviation of the RRFs, X = Mean of the RRFs

#	Standard ID	Calibration Date	Compound (Reference Internal Standard)	Reported RRF (1 std)	Recalculated RRF (1 std)	Reported Average RRF (Initial)	Recalculated Average RRF (Initial)	Reported %RSD	Recalculated %RSD
1	ICAL	1/29/05	~~Phenol~~ (1st internal standard)	1.370	1.370	1.397	1.397	2.5	2.5
			~~Naphthalene~~ (2nd internal standard)	0.310	0.310	0.303	0.303	2.0	2.0
			~~Fluorene~~ (3rd internal standard)	1.186	1.186	1.162	1.162	5.9	5.9
			Pentachlorophenol (4th internal standard)	0.138	0.138	0.129	0.129	18.5	18.5
			~~Bis(2-ethylhexyl)phthalate~~ (5th internal standard)	1.236	1.236	1.225	1.225	2.0	2.0
			Benzo(a)pyrene (6th internal standard)	1.035	1.035	1.061	1.061	3.7	3.7
2			Phenol (1st internal standard)						
			Naphthalene (2nd internal standard)						
			Fluorene (3rd internal standard)						
			Pentachlorophenol (4th internal standard)						
			Bis(2-ethylhexyl)phthalate (5th internal standard)						
			Benzo(a)pyrene (6th internal standard)						
3			Phenol (1st internal standard)						
			Naphthalene (2nd internal standard)						
			Fluorene (3rd internal standard)						
			Pentachlorophenol (4th internal standard)						
			Bis(2-ethylhexyl)phthalate (5th internal standard)						
			Benzo(a)pyrene (6th internal standard)						

Comments: Refer to Initial Calibration findings worksheet for list of qualifications and associated samples when reported results do not agree within 10.0% of the recalculated results.

LDC #: 13412B2b
SDG #: HV76

VALIDATION FINDINGS WORKSHEET
Continuing Calibration Results Verification

Page: 1 of 1
Reviewer: 9
2nd Reviewer: JL

METHOD: GC/MS BNA (EPA SW 846 Method 8270)

The percent difference (%D) of the initial calibration average Relative Response Factors (RRFs) and the continuing calibration RRFs were recalculated for the compounds identified below using the following calculation:

% Difference = 100 * (ave. RRF - RRF)/ave. RRF
$RRF = (A_x)(C_{is})/(A_{is})(C_x)$

Where: ave. RRF = initial calibration average RRF
RRF = continuing calibration RRF
A_x = Area of compound, A_{is} = Area of associated internal standard
C_x = Concentration of compound, C_{is} = Concentration of internal standard

#	Standard ID	Calibration Date	Compound (Reference Internal Standard)	Average RRF (Initial)	Reported RRF (CC)	Recalculated RRF (CC)	Reported %D	Recalculated %D
1	cc0324	3/24/05	~~Phenol~~ (1st internal standard) E	1.397	1.365	1.365	2.3	2.3
			~~Naphthalene~~ (2rd internal standard) R	0.303	0.303	0.303	0.0	0.0
			~~Fluorene~~ (3rd internal standard) LL	1.162	1.162	1.162	0.0	0.0
			Pentachlorophenol (4th internal standard)	0.129	0.132	0.132	2.3	2.5
			~~Bis(2-ethylhexyl)phthalate~~ (5th internal standard)	1.225	1.252	1.252	2.2	2.2
			Benzo(a)pyrene (6th internal standard)	1.061	1.034	1.034	2.5	2.5
2	cc0328	3/28/05	~~Phenol~~ (1st internal standard) E	1.397	1.457	1.457	4.3	4.3
			~~Naphthalene~~ (2nd internal standard) R	0.303	0.310	0.310	2.3	2.5
			~~Fluorene~~ (3rd internal standard) LL	1.162	1.246	1.246	7.2	7.2
			Pentachlorophenol (4th internal standard)	0.129	0.138	0.138	7.0	6.8
			~~Bis(2-ethylhexyl)phthalate~~ (5th internal standard)	1.225	1.235	1.235	0.8	0.8
			Benzo(a)pyrene (6th internal standard)	1.061	1.028	1.028	3.1	3.1
3	cc0330	3/30/05	~~Phenol~~ (1st internal standard) E	1.397	1.269	1.269	9.2	9.2
			~~Naphthalene~~ (2nd internal standard) R	0.303	0.309	0.309	2.0	2.1
			~~Fluorene~~ (3rd internal standard) LL	1.162	1.240	1.240	6.7	6.7
			Pentachlorophenol (4th internal standard)	0.129	0.126	0.126	2.3	2.5
			~~Bis(2-ethylhexyl)phthalate~~ (5th internal standard)	1.225	1.270	1.270	3.7	3.7
			Benzo(a)pyrene (6th internal standard)	1.061	1.051	1.051	0.9	0.9

Comments: Refer to Continuing Calibration findings worksheet for list of qualifications and associated samples when reported results do not agree within 10.0% of the recalculated results.

LDC #: 13412A2b
SDG #: HV76

VALIDATION FINDINGS WORKSHEET
Continuing Calibration Results Verification

Page: 1 of 1
Reviewer: a
2nd Reviewer: a

METHOD: GC/MS BNA (EPA SW 846 Method 8270)

The percent difference (%D) of the initial calibration average Relative Response Factors (RRFs) and the continuing calibration RRFs were recalculated for the compounds identified below using the following calculation:

% Difference = 100 * (ave RRF - RRF)/ave. RRF
RRF = $(A_x)(C_{is})/(A_{is})(C_x)$

Where: ave. RRF = initial calibration average RRF
RRF = continuing calibration RRF
A_x = Area of compound, A_{is} = Area of associated internal standard
C_x = Concentration of compound, C_{is} = Concentration of internal standard

#	Standard ID	Calibration Date	Compound (Reference Internal Standard)	Average RRF (Initial)	Reported RRF (CC)	Recalculated RRF (CC)	Reported %D	Recalculated %D
1	CC0329	3/29/05	~~Phenol~~ (1st internal standard) C	1.397	1.431	1.431	2.4	2.4
			~~Naphthalene~~ (2rd internal standard) R	0.303	0.309	0.309	2.0	2.1
			~~Fluorene~~ (3rd internal standard) C C	1.162	1.178	1.178	1.4	1.3
			Pentachlorophenol (4th internal standard)	0.129	0.146	0.146	13.2	12.9
			~~Bis(2-ethylhexyl)phthalate~~ (5th internal standard) CCC	1.225	1.234	1.234	0.7	0.7
			Benzo(a)pyrene (6th internal standard)	1.061	1.059	1.059	0.2	0.2
2			Phenol (1st internal standard)					
			Naphthalene (2nd internal standard)					
			Fluorene (3rd internal standard)					
			Pentachlorophenol (4th internal standard)					
			Bis(2-ethylhexyl)phthalate (5th internal standard)					
			Benzo(a)pyrene (6th internal standard)					
3			Phenol (1st internal standard)					
			Naphthalene (2nd internal standard)					
			Fluorene (3rd internal standard)					
			Pentachlorophenol (4th internal standard)					
			Bis(2-ethylhexyl)phthalate (5th internal standard)					
			Benzo(a)pyrene (6th internal standard)					

Comments: Refer to Continuing Calibration findings worksheet for list of qualifications and associated samples when reported results do not agree within 10.0% of the recalculated results.

LDC #: 13412B26
SDG #: HV76

VALIDATION FINDINGS WORKSHEET
Surrogate Results Verification

Page: 1 of 1
Reviewer: 9
2nd reviewer: ✓

METHOD: GC/MS Semivolatiles (EPA SW 846 Method 8270)

The percent recoveries (%R) of surrogates were recalculated for the compounds identified below using the following calculation:

% Recovery: SF/SS * 100

Where: SF = Surrogate Found
SS = Surrogate Spiked

Sample ID: 1

	Surrogate Spiked	Surrogate Found	Percent Recovery Reported	Percent Recovery Recalculated	Percent Difference
Nitrobenzene-d5	2.5	1.28578	51.6	51.4	0.2
2-Fluorobiphenyl	↓	1.47249	58.8	58.9	0.1
Terphenyl-d14	↓	1.71444	68.4	68.6	0.2
Phenol-d5	3.75	2.00939	53.6	53.6	0
2-Fluorophenol	↓	1.99018	53.1	53.1	0
2,4,6-Tribromophenol	↓	2.53964	67.7	67.7	0
2-Chlorophenol-d4	↓	1.99125	53.1	53.1	0
1,2-Dichlorobenzene-d4	2.5	1.12530	45.2	45.0	0.2

Sample ID:

	Surrogate Spiked	Surrogate Found	Percent Recovery Reported	Percent Recovery Recalculated	Percent Difference
Nitrobenzene-d5					
2-Fluorobiphenyl					
Terphenyl-d14					
Phenol-d5					
2-Fluorophenol					
2,4,6-Tribromophenol					
2-Chlorophenol-d4					
1,2-Dichlorobenzene-d4					

Sample ID:

	Surrogate Spiked	Surrogate Found	Percent Recovery Reported	Percent Recovery Recalculated	Percent Difference
Nitrobenzene-d5					
2-Fluorobiphenyl					
Terphenyl-d14					
Phenol-d5					
2-Fluorophenol					
2,4,6-Tribromophenol					
2-Chlorophenol-d4					
1,2-Dichlorobenzene-d4					

LDC #: 13412b6
SDG #: HVT6

VALIDATION FINDINGS WORKSHEET
Matrix Spike/Matrix Spike Duplicates Results Verification

Page: 1 of 1
Reviewer: 4
2nd Reviewer: K

METHOD: GC/MS BNA (EPA SW 846 Method 8270)

The percent recoveries (%R) and Relative Percent Difference (RPD) of the matrix spike and matrix spike duplicate were recalculated for the compounds identified below using the following calculation:

% Recovery = 100 * (SSC - SC)/SA Where: SSC = Spiked sample concentration; SA = Spike added; SC = Sample concentation

RPD = I MS - MSD I * 2/(MS + MSD) MS = Matrix spike percent recovery; MSD = Matrix spike duplicate percent recovery

MS/MSD samples: 11/12

Compound	Spike Added (MS/MSD)		Sample Concentration (MS/MSD)	Spiked Sample Concentration (MS/MSD)		Matrix Spike Percent Recovery		Matrix Spike Duplicate Percent Recovery		MS/MSD RPD	
	MS	MSD	------	MS	MSD	Reported	Recalc.	Reported	Recalc.	Reported	Recalculated
Phenol											
2-Chlorophenol											
1,4-Dichlorobenzene	163	163	ND	85.4	94.0	52.4	52.4	57.7	57.7	9.6	9.6
N-Nitroso-di-n-propylamine	↓	↓	↓	50.8	68.5	31.2	31.2	42.0	42.0	29.7	29.7
1,2,4-Trichlorobenzene				91.3	99.9	56.0	56.0	61.3	61.3	9.0	9.0
4-Chloro-3-methylphenol											
Acenaphthene											
4-Nitrophenol											
2,4-Dinitrotoluene											
Pentachlorophenol	244	245	ND	186	200	76.2	76.2	81.6	81.6	7.3	7.3
Pyrene											

Comments: Refer to Matrix Spike/Matrix Spike Duplicates findings worksheet for list of qualifications and asscciated samples when reported results do not agree within 10.0% of the recalculated results.

LDC #: 13412A-b
SDG #: HV76

VALIDATION FINDINGS WORKSHEET
Laboratory Control Sample/Laboratory Control Sample Duplicates Results Verification

Reviewer: 9
2nd Reviewer: A

METHOD: GC/MS BNA (EPA SW 846 Method 8270)

The percent recoveries (%R) and Relative Percent Difference (RPD) of the laboratory control sample and laboratory control sample duplicate were recalculated for the compounds identified below using the following calculation:

% Recovery = 100 * (SC/SA Where: SSC = Spike concentration
SA = Spike added

RPD = | LCS - LCSD | * 2/(LCS + LCSD) LCS = Laboratory control sample percent recovery LCSD = Laboratory control sample duplicate percent recovery

LCS/LCSD samples: LCS-033205

Compound	Spike Added (µg/kg)		Spike Concentration (µg/kg)		LCS Percent Recovery		LCSD Percent Recovery		LCS/LCSD RPD	
	LCS	LCSD	LCS	LCSD	Reported	Recalc.	Reported	Recalc.	Reported	Recalculated
Phenol										
2-Chlorophenol										
1,4-Dichlorobenzene	167	NA	109	NA	65.3	65.3				
N-Nitroso-di-n-propylamine	↓	↓	~~167~~ 101	↓	60.5	60.5				
1,2,4-Trichlorobenzene	↓	↓	118	↓	70.7	70.7				
4-Chloro-3-methylphenol										
Acenaphthene										
4-Nitrophenol										
2,4-Dinitrotoluene										
Pentachlorophenol	250	NA	167	NA	66.8	66.8				
Pyrene										

Comments: Refer to Laboratory Control Sample/Laboratory Control Sample Duplicates findings worksheet for list of qualifications and associated samples when reported results do not agree within 10.0% of the recalculated results.

LDC #: 13412A6
SDG #: HV76

VALIDATION FINDINGS WORKSHEET
Sample Calculation Verification

Page: 1 of 1
Reviewer: Q
2nd reviewer: VE

METHOD: GC/MS BNA (EPA SW 846 Method 8270)

Y N N/A Were all reported results recalculated and verified for all level IV samples?
Y N N/A Were all recalculated results for detected target compounds agree within 10.0% of the reported results?

$$\text{Concentration} = \frac{(A_x)(I_s)(V_t)(DF)(2.0)}{(A_{is})(RRF)(V_o)(V_i)(\%S)}$$

A_x = Area of the characteristic ion (EICP) for the compound to be measured

A_{is} = Area of the characteristic ion (EICP) for the specific internal standard

I_s = Amount of internal standard added in nanograms (ng)

V_o = Volume or weight of sample extract in milliliters (ml) or grams (g).

V_i = Volume of extract injected in microliters (ul)

V_t = Volume of the concentrated extract in microliters (ul)

Df = Dilution Factor.

%S = Percent solids, applicable to soil and solid matrices only.

2.0 = Factor of 2 to account for GPC cleanup

Example:

Sample I.D. 1, 11:

Conc. = $\frac{(13034)(2)(500)(1)(\quad)}{(56349)(1.061)(13.1)(1)(0.592)}$

= 28.11 MS/KG

#	Sample ID	Compound	Reported Concentration ( )	Calculated Concentration ( )	Qualification

LDC #: 13419A2b **VALIDATION COMPLETENESS WORKSHEET** Date: 4/27/05
SDG #: HW06 Level II Page: 1 of 1
Laboratory: Analytical Resources, Inc. Reviewer: [illegible]
2nd Reviewer: [illegible]

METHOD: GC/MS ~~Polynuclear Aromatic Hydrocarbons~~ SVOAs (EPA SW 846 Method 8270C) - SIM)

The samples listed below were reviewed for each of the following validation areas. Validation findings are noted in attached validation findings worksheets.

	Validation Area		Comments
I.	Technical holding times	A	Sampling dates: 3/8-16/05
II.	GC/MS Instrument performance check	N	
III.	Initial calibration	N	
IV.	Continuing calibration	N	
V.	Blanks	SW	
VI.	Surrogate spikes	SW	
VII.	Matrix spike/Matrix spike duplicates	SW	
VIII.	Laboratory control samples	A	LCS
IX.	Regional Quality Assurance and Quality Control	N	
X.	Internal standards	N	
XI.	Target compound identification	N	
XII.	Compound quantitation/CRQLs	SW N	
XIII.	Tentatively identified compounds (TICs)	N	
XIV.	System performance	N	
XV.	Overall assessment of data	SW	
XVI.	Field duplicates	N	
XVII.	Field blanks	N	

Note: A = Acceptable
N = Not provided/applicable
SW = See worksheet
ND = No compounds detected
R = Rinsate
FB = Field blank
D = Duplicate
TB = Trip blank
EB = Equipment blank

Validated Samples
MS only

1	LDW-SS71-010	11	MB-032205	21		31	
2	LDW-SS2-010	12		22		32	
3	LDW-SS2-010DL	13		23		33	
4	LDW-SS69b-010	14		24		34	
5	LDW-SS158-010	15		25		35	
6	LDW-SS159-010	16		26		36	
7	LDW-SS157-010	17		27		37	
8	LDW-SS35-010	18		28		38	
9	LDW-SS35-010DL	19		29		39	
10		20		30		40	

LDC #: 13419B26
SDG #: HW06

VALIDATION FINDINGS WORKSHEET
Blanks

Page: 1 of 1
Reviewer: [illegible]
2nd Reviewer: [illegible]

METHOD: GC/MS BNA (EPA SW 846 Method 8270)

Please see qualifications below for all questions answered "N". Not applicable questions are identified as "N/A".

Y N N/A Was a method blank analyzed for each matrix?
Y N N/A Was a method blank analyzed for each concentration preparation level?
Y N N/A Was a method blank associated with every sample?
Y N N/A Was the blank contaminated? If yes, please see qualification below.

Blank extraction date: 3/22/05 **Blank analysis date:** 3/24/05
Conc. units: ug/kg Associated Samples: all

Compound	Blank ID	Sample Identification								
MB	032205	1	7							
22	8.0	6.5/U	7.7/U							

Blank extraction date: _____ **Blank analysis date:** _____
Conc. units: _____ Associated Samples: _____

Compound	Blank ID	Sample Identification								

CIRCLED RESULTS WERE NOT QUALIFIED. ALL RESULTS NOT CIRCLED WERE QUALIFIED BY THE FOLLOWING STATEMENT:
Common contaminants such as the phthalates and TICs noted above that were detected in samples within ten times the associated method blank concentration were qualified as not detected, "U". Other contaminants within five times the methoc blank concentration were also qualified as not detected, "U".

LDC #: 14179A4 (4)
SDG #: HW06

VALIDATION FINDINGS WORKSHEET
Surrogate Recovery

METHOD: GC/MS BNA (EPA SW 846 Method 8270)

Please see qualification below for all questions answered "N". Not applicable questions are identified as "N/A".

Y (N) N/A Were percent recoveries (%R) for surrogates within QC limits?

Y N (N/A) If 2 or more base neutral or acid surrogates were outside QC limits, was a reanalysis performed to confirm %R?

Y N (N/A) If any %R was less than 10 percent, was a reanalysis performed to confirm %R?

#	Date	Sample ID	Surrogate	%R (Limits)	Qualifications
		9	DCB	38.0 (40-130)	No final
				( )	
				( )	
				( )	
				( )	
				( )	
				( )	
				( )	
				( )	
				( )	
				( )	
				( )	
				( )	
				( )	
				( )	
				( )	
				( )	
				( )	
				( )	
				( )	
				( )	
				( )	
				( )	
				( )	

* QC limits are advisory	QC Limits (Soil)	QC Limits (Water)
S1 (NBZ) = Nitrobenzene-d5	23-120	35-114
S2 (FBP) = 2-Fluorobiphenyl	30-115	43-116
S3 (TPH) = Terphenyl-d14	18-137	33-141
S4 (PHL) = Phenol-d5	24-113	10-94

	QC Limits (Soil)	QC Limits (Water)
S5 (2FP)= 2-Fluorophenol	25-121	21-100
S6 (TBP) = 2,4,6-Tribromophenol	19-122	10-123
S7 (2CP) = 2-Chlorophenol-d4	20-130*	33-110*
S8 (DCB) = 1,2-Dichlorobenzene-d4	20-130*	16-110*

LDC #: 13419A2b
SDG #: HW06

VALIDATION FINDINGS WORKSHEET
Matrix Spike/Matrix Spike Duplicates

Page: 1 of 1
Reviewer: 9
2nd Reviewer: K

METHOD: GC/MS BNA (EPA SW 846 Method 8270)

Please see qualifications below for all questions answered "N". Not applicable questions are identified as "N/A".

Y N N/A Were a matrix spike (MS) and matrix spike duplicate (MSD) analyzed for each matrix in this SDG? If no, indicate which matrix does not have an associated MS/MSD. Soil / Water.

Y N N/A Was a MS/MSD analyzed every 20 samples of each matrix?

Y N N/A Were the MS/MSD percent recoveries (%R) and the relative percent differences (RPD) within the QC limits?

#	Date	MS/MSD ID	Compound	MS %R (Limits)	MSD %R (Limits)	RPD (Limits)	Associated Samples	Qualifications
		LDW-SS15-010	J	31.2 (40-130)	( )	( )	None	No qual
		CHV76		( )	( )	( )		
				( )	( )	( )		
				( )	( )	( )		
				( )	( )	( )		
				( )	( )	( )		
				( )	( )	( )		
				( )	( )	( )		
				( )	( )	( )		
				( )	( )	( )		
				( )	( )	( )		
				( )	( )	( )		
				( )	( )	( )		
				( )	( )	( )		
				( )	( )	( )		
				( )	( )	( )		

	Compound	QC Limits (Soil)	RPD (Soil)	QC Limits (Water)	RPD (Water)		Compound	QC Limits (Soil)	RPD (Soil)	QC Limits (Water)	RPD (Water)
A.	Phenol	26-90%	≤ 35%	12-110%	≤ 42%	GG.	Acenaphthene	31-137%	≤ 19%	46-118%	≤ 31%
C.	2-Chlorophenol	25-102%	≤ 50%	27-123%	≤ 40%	II.	4-Nitrophenol	11-114%	≤ 50%	10-80%	≤ 50%
E.	1,4-Dichlorobenzene	28-104%	≤ 27%	36-97%	≤ 28%	KK.	2,4-Dinitrotoluene	28-89%	≤ 47%	24-96%	≤ 38%
J.	N-Nitroso-di-n-propylamine	41-126%	≤ 38%	41-116%	≤ 38%	TT.	Pentachlorophenol	17-109%	≤ 47%	9-103%	≤ 50%
R.	1,2,4-Trichlorobenzene	38-107%	≤ 23%	39-98%	≤ 28%	ZZ.	Pyrene	35-142%	≤ 36%	26-127%	≤ 31%
V.	4-Chloro-3-methylphenol	26-103%	≤ 33%	23-97%	≤ 42%						

LDC #: 13417A26
SDG #: HW06

VALIDATION FINDINGS WORKSHEET
Compound Quantitation and Reported CRQLs

Page: 1 of 1
Reviewer: 9
2nd Reviewer: 9

METHOD: GC/MS BNA (EPA SW 846 Method 8270)

Please see qualifications below for all questions answered "N". Not applicable questions are identified as "N/A".

Y N N/A Were the correct internal standard (IS), quantitation ion and relative response factor (RRF) used to quantitate the compound?
Y N N/A Were compound quantitation and CRQLs adjusted to reflect all sample dilutions and dry weight factors applicable to level IV validation?

#	Date	Sample ID	Finding	Associated Samples	Qualifications
		2	~~CCC~~ > calib rege	2	~~RF/RR~~ dets/ND
		8	ccc. ~~CCC~~. III. VH	8	↓

Comments: See sample calculation verification worksheet for recalculations

LDC #: 13419B26
SDG #: HW06

VALIDATION FINDINGS WORKSHEET
Overall Assessment of Data

Page: 1 of 1
Reviewer: [illegible]
2nd Reviewer: AC

METHOD: GC/MS BNA (EPA SW 846 Method 8270)

Please see qualifications below for all questions answered "N". Not applicable questions are identified as "N/A".

All available information pertaining to the data were reviewed using professional judgement to compliment the determination of the overall quality of the data.

(Y) N N/A Was the overall quality and usability of the data acceptable?

#	Date	Sample ID	Finding	Associated Samples	Qualifications
		2	ccc. GGG.	2	R/D
					↓
		3	M1 except above	3	
		8	ccc. ~~GGG~~. III. VV	8	R/D
		9	M1 except above	9	R/D

Comments: _____

OVR.2S

LDC #: 13419B2b **VALIDATION COMPLETENESS WORKSHEET** Date: 4/27/05
SDG #: HW16 Level II Page: 1 of 1
Laboratory: Analytical Resources, Inc. Reviewer: T
SVOAs 2nd Reviewer: V

METHOD: GC/MS ~~Polynuclear Aromatic Hydrocarbons~~ (EPA SW 846 Method 8270C) ~~-~~ SIM)

The samples listed below were reviewed for each of the following validation areas. Validation findings are noted in attached validation findings worksheets.

	Validation Area		Comments
I.	Technical holding times	A	Sampling dates: 3/18/05
II.	GC/MS Instrument performance check	N	
III.	Initial calibration	N	
IV.	Continuing calibration	N	
V.	Blanks	A	
VI.	Surrogate spikes	A	
VII.	Matrix spike/Matrix spike duplicates	SW	
VIII.	Laboratory control samples	A	LCS
IX.	Regional Quality Assurance and Quality Control	N	
X.	Internal standards	N	
XI.	Target compound identification	N	
XII.	Compound quantitation/CRQLs	N	
XIII.	Tentitatively identified compounds (TICs)	N	
XIV.	System performance	N	
XV.	Overall assessment of data	A	
XVI.	Field duplicates	N	
XVII.	Field blanks	N	

Note: A = Acceptable
N = Not provided/applicable
SW = See worksheet
ND = No compounds detected
R = Rinsate
FB = Field blank
D = Duplicate
TB = Trip blank
EB = Equipment blank

Validated Samples

1	LDW-SSB7a-010 Sed	11		21		31	
2		12		22		32	
3		13		23		33	
4		14		24		34	
5		15		25		35	
6		16		26		36	
7		17		27		37	
8		18		28		38	
9		19		29		39	
10		20		30		40	

LDC #: 13419B2b
SDG #: HW16

VALIDATION FINDINGS WORKSHEET
Matrix Spike/Matrix Spike Duplicates

Page: 1 of 1
Reviewer: Q
2nd Reviewer: AC

METHOD: GC/MS BNA (EPA SW 846 Method 8270)

Please see qualifications below for all questions answered "N". Not applicable questions are identified as "N/A".

(Y) N N/A Were a matrix spike (MS) and matrix spike duplicate (MSD) analyzed for each matrix in this SDG? If no, indicate which matrix does not have an associated MS/MSD. Soil / Water.

(Y) N N/A Was a MS/MSD analyzed every 20 samples of each matrix?

(Y) N N/A Were the MS/MSD percent recoveries (%R) and the relative percent differences (RPD) within the QC limits?

#	Date	MS/MSD ID	Compound	MS %R (Limits)	MSD %R (Limits)	RPD (Limits)	Associated Samples	Qualifications
		LDW-55145-010 (HV58)	TT	( )	39.2 (40-130)	( )	None	No Qual
				( )	( )	( )		
				( )	( )	( )		
				( )	( )	( )		
				( )	( )	( )		
				( )	( )	( )		
				( )	( )	( )		
				( )	( )	( )		
				( )	( )	( )		
				( )	( )	( )		
				( )	( )	( )		
				( )	( )	( )		
				( )	( )	( )		
				( )	( )	( )		
				( )	( )	( )		
				( )	( )	( )		

	Compound	QC Limits (Soil)	RPD (Soil)	QC Limits (Water)	RPD (Water)		Compound	QC Limits (Soil)	RPD (Soil)	QC Limits (Water)	RPD (Water)
A.	Phenol	26-90%	≤ 35%	12-110%	≤ 42%	GG.	Acenaphthene	31-137%	≤ 19%	46-118%	≤ 31%
C.	2-Chlorophenol	25-102%	≤ 50%	27-123%	≤ 40%	II.	4-Nitrophenol	11-114%	≤ 50%	10-80%	≤ 50%
E.	1,4-Dichlorobenzene	28-104%	≤ 27%	36-97%	≤ 28%	KK.	2,4-Dinitrotoluene	28-89%	≤ 47%	24-96%	≤ 38%
J.	N-Nitroso-di-n-propylamine	41-126%	≤ 38%	41-116%	≤ 38%	TT.	Pentachlorophenol	17-109%	≤ 47%	9-103%	≤ 50%
R.	1,2,4-Trichlorobenzene	38-107%	≤ 23%	39-98%	≤ 28%	ZZ.	Pyrene	35-142%	≤ 36%	26-127%	≤ 31%
V.	4-Chloro-3-methylphenol	26-103%	≤ 33%	23-97%	≤ 42%						

LDC #: 13381A3a

SDG #: HU85

Laboratory: Analytical Resources, Inc.

VALIDATION COMPLETENESS WORKSHEET

Level II

Date: 4/20/05

Page: 1 of 1

Reviewer: EJ

2nd Reviewer: EJ

METHOD: GC Chlorinated Pesticides (EPA SW 846 Method 8081A)

The samples listed below were reviewed for each of the following validation areas. Validation findings are noted in attached validation findings worksheets.

	Validation Area		Comments
I.	Technical holding times	A	Sampling dates: 3/7/05
II.	GC/ECD Instrument Performance Check	N	
III.	Initial calibration	N	
IV.	Continuing calibration	N	
V.	Blanks	A	
VI.	Surrogate spikes	A	
VII.	Matrix spike/Matrix spike duplicates	A	
VIII.	Laboratory control samples ~~SRM~~	SW	LCS
IX.	Regional quality assurance and quality control	N	
Xa.	Florisil cartridge check	N	
Xb.	GPC Calibration	N	Silica gel clean-up + sulfur
XI.	Target compound identification	N	
XII.	Compound quantitation and reported CRQLs	SW	
XIII.	Overall assessment of data	A	
XIV.	Field duplicates	ND	D = 3 + 5
XV.	Field blanks	N	

Note: A = Acceptable; N = Not provided/applicable; SW = See worksheet; ND = No compounds detected; R = Rinsate; FB = Field blank; D = Duplicate; TB = Trip blank; EB = Equipment blank

Validated Samples:

Sediment

1	LDW-SS85-010	11	HU85MBS1	21		31	
2	LDW-SS73-010	12		22		32	
3	LDW-SS82-010 D	13		23		33	
4	LDW-SS74-010	14		24		34	
5	LDW-SS204-010 D	15		25		35	
6	LDW-SS74-010MS	16		26		36	
7	LDW-SS74-010MSD	17		27		37	
8		18		28		38	
9		19		29		39	
10		20		30		40	

VALIDATION FINDINGS WORKSHEET

METHOD: Pesticide/PCBs (EPASW 846 Method 8081/8082)

A. alpha-BHC	I. Dieldrin	Q. Endrin ketone	Y. Aroclor-1242	GG.
B. beta-BHC	J. 4,4'-DDE	R. Endrin aldehyde	Z. Aroclor-1248	HH.
C. delta-BHC	K. Endrin	S. alpha-Chlordane	AA. Aroclor-1254	II.
D. gamma-BHC	L. Endosulfan II	T. gamma-Chlordane	BB. Aroclor-1260	JJ.
E. Heptachlor	M. 4,4'-DDD	U. Toxaphene	CC. DB 608	KK.
F. Aldrin	N. Endosulfan sulfate	V. Aroclor-1016	DD. DB 1701	LL.
G. Heptachlor epoxide	O. 4,4'-DDT	W. Aroclor-1221	EE.	MM.
H. Endosulfan I	P. Methoxychlor	X. Aroclor-1232	FF.	NN.

Notes:_____

LDC #: 13381A3a
SDG #: H485

VALIDATION FINDINGS WORKSHEET
Laboratory Control Samples

Page: 1 of 1
Reviewer: [illegible]
2nd Reviewer: [illegible]

METHOD: GC Pesticides/PCBs (EPA SW 846 Method 8081/8082)

Please see qualifications below for all questions answered "N". Not applicable questions are identified as "N/A".

Y N N/A Were a laboratory control samples (LCS) and laboratory control sample duplicate (LCSD) analyzed for each matrix in this SDG? (Y circled)

Y N N/A Were the LCS percent recoveries (%R) and relative percent differences (RPD) within the QC limits? (N circled)

Level IV/D Only

Y N N/A Was a LCS analyzed every 20 samples for each matrix or whenever a sample extraction was performed? (N/A circled)

#	Date	LCS/LCSD ID	Compound	LCS %R (Limits)	LCSD %R (Limits)	RPD (Limits)	Associated Samples	Qualifications
				( )	( )	( )		
		LCS-031405	R	33.8 (50-150)	( )	( )	All + Blk	J/UJ/P
				( )	( )	( )		
				( )	( )	( )		
				( )	( )	( )		
				( )	( )	( )		
				( )	( )	( )		
				( )	( )	( )		
				( )	( )	( )		
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LDC #: 13381A3a
SDG #: HU85

VALIDATION FINDINGS WORKSHEET
Compound Quantitation and Reported CRQLs

Reviewer:
2nd Reviewer:

METHOD: ✓ GC __ HPLC

Please see qualifications below for all questions answered "N". Not applicable questions are identified as "N/A".

Level IV/D Only

Y N N/A Were CRQLs adjusted for sample dilutions, dry weight factors, etc.?

Y N N/A Did the reported results for detected target compounds agree within 10.0% of the recalculated results?

#	Compound Name	~~Finding~~ sample ID	Associated Samples %RPD Bet. Columns	Qualifications
	S	1	61%	J/A det

Comments: See sample calculation verification worksheet for recalculations

LDC #: 13381B3a

SDG #: HV37

Laboratory: Analytical Resources, Inc.

VALIDATION COMPLETENESS WORKSHEET

Level II

Date: 4/20/05

Page: 1 of 1

Reviewer: [illegible]

2nd Reviewer: [illegible]

METHOD: GC Chlorinated Pesticides (EPA SW 846 Method 8081A)

The samples listed below were reviewed for each of the following validation areas. Validation findings are noted in attached validation findings worksheets.

	Validation Area		Comments
I.	Technical holding times	A	Sampling dates: 3/9/05
II.	GC/ECD Instrument Performance Check	N	
III.	Initial calibration	N	
IV.	Continuing calibration	N	
V.	Blanks	A	
VI.	Surrogate spikes	A	
VII.	Matrix spike/Matrix spike duplicates	A	LDW-SS140-010 MS/MSD
VIII.	Laboratory control samples / SRM	SW	LCS
IX.	Regional quality assurance and quality control	N	
Xa.	Florisil cartridge check	N	
Xb.	GPC Calibration	N	Silica gel + sulfur clean up performed
XI.	Target compound identification	N	
XII.	Compound quantitation and reported CRQLs	N	
XIII.	Overall assessment of data	A	
XIV.	Field duplicates	N	
XV.	Field blanks	N	

Note: A = Acceptable
N = Not provided/applicable
SW = See worksheet

ND = No compounds detected
R = Rinsate
FB = Field blank

D = Duplicate
TB = Trip blank
EB = Equipment blank

Validated Samples: Sediment

1	LDW-SS133-1010	11	HV00MB51	21		31	
2	LDW-SS150-1010	12		22		32	
3		13		23		33	
4		14		24		34	
5		15		25		35	
6		16		26		36	
7		17		27		37	
8		18		28		38	
9		19		29		39	
10		20		30		40	

LDC #: 13381B3a

SDG #: HV37

VALIDATION FINDINGS WORKSHEET

Laboratory Control Samples

Page: 1 of 1

Reviewer:

2nd Reviewer:

METHOD: GC Pesticides/PCBs (EPA SW 846 Method 8081/8082)

Please see qualifications below for all questions answered "N". Not applicable questions are identified as "N/A".

[✓ Y] N N/A Were a laboratory control samples (LCS) and laboratory control sample duplicate (LCSD) analyzed for each matrix in this SDG? ______

Y [✓ N] N/A Were the LCS percent recoveries (%R) and relative percent differences (RPD) within the QC limits?

Level IV/D Only

Y N [✓ N/A] Was a LCS analyzed every 20 samples for each matrix or whenever a sample extraction was performed?

#	Date	LCS/LCSD ID	Compound	LCS %R (Limits)	LCSD %R (Limits)	RPD (Limits)	Associated Samples	Qualifications
		LCS-031605	R	36.8 (50-150)	( )	( )	All + Blk	J/UJ/P
				( )	( )	( )		
				( )	( )	( )		
				( )	( )	( )		
				( )	( )	( )		
				( )	( )	( )		
				( )	( )	( )		
				( )	( )	( )		
				( )	( )	( )		
				( )	( )	( )		
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				( )	( )	( )		
				( )	( )	( )		

LDC #: 13381C3a

SDG #: HV42

Laboratory: Analytical Resources, Inc.

VALIDATION COMPLETENESS WORKSHEET

Level IV

Date: 4/20/05

Page: 1 of 1

Reviewer: [illegible]

2nd Reviewer: [illegible]

METHOD: GC Chlorinated Pesticides (EPA SW 846 Method 8081A)

The samples listed below were reviewed for each of the following validation areas. Validation findings are noted in attached validation findings worksheets.

	Validation Area		Comments
I.	Technical holding times	A	Sampling dates: 3/10/05
II.	GC/ECD Instrument Performance Check	A	
III.	Initial calibration	A	
IV.	Continuing calibration	A	
V.	Blanks	A	
VI.	Surrogate spikes	A	
VII.	Matrix spike/Matrix spike duplicates	A	LDW-SSB26-010MS/MSD
VIII.	Laboratory control samples / SRM	SW/A	LCS
IX.	Regional quality assurance and quality control	N	
Xa.	Florisil cartridge check	N	
Xb.	GPC Calibration	N	Silica Gel + sulfur clean up
XI.	Target compound identification	A	
XII.	Compound quantitation and reported CRQLs	A	
XIII.	Overall assessment of data	A	
XIV.	Field duplicates	N	
XV.	Field blanks	N	

Note: A = Acceptable
N = Not provided/applicable
SW = See worksheet

ND = No compounds detected
R = Rinsate
FB = Field blank

D = Duplicate
TB = Trip blank
EB = Equipment blank

Validated Samples:

Sediment

1	LDW-SS108-010	11	HV38MS1	21		31	
2	LDW-SS25-010	12		22		32	
3		13		23		33	
4		14		24		34	
5		15		25		35	
6		16		26		36	
7		17		27		37	
8		18		28		38	
9		19		29		39	
10		20		30		40	

LDC #: 13381C39
SDG #: HV42

VALIDATION FINDINGS CHECKLIST

Reviewer: [illegible]
2nd Reviewer: [illegible]

Method: Pesticides/PCBs (EPA SW 846 Method 8081/8082)

Validation Area	Yes	No	NA	Findings/Comments
I. Technical holding times				
All technical holding times were met.	✓			
Cooler temperature criteria was met.	✓			
II. GC/ECD Instrument performance check				
Was the instrument performance found to be acceptable?	✓			
III. Initial calibration				
Did the laboratory perform a 5 point calibration prior to sample analysis?	✓			
Was a linear fit used for evaluation? If yes, were all percent relative standard deviations (%RSD) ≤ 20%?	✓			
Was a curve fit used for evaluation? If Yes, what was the acceptance criteria used?		✓		
Did the initial calibration meet the curve fit acceptance criteria?			✓	
Were the RT windows properly established?	✓			
Were the required standard concentrations analyzed in the initial calibration?	✓			
IV. Continuing calibration				
What type of continuing calibration calculation was performed? ____%D or ____%R	✓			
Were Evaluation mix standards analyzed prior to the initial calibration and sample analysis?	✓			
Were endrin and 4,4'-DDT breakdowns ≤ 15%.0 for individual breakdown in the Evaluation mix standards?	✓			
Was a continuing calibration analyzed daily?	✓			
Were all percent differences (%D) ≤ 15%.0 or percent recovieries 85-115%?	✓			
Were all the retention times within the acceptance windows?	✓			
V. Blanks				
Was a method blank associated with every sample in this SDG?	✓			
Was a method blank analyzed for each matrix and concentration?	✓			
Were extract cleanup blanks analyzed with every batch requiring clean-up?	✓			
Was there contamination in the method blanks or clean-up blanks? If yes, please see the Blanks validation completeness worksheet.		✓		
VI. Surrogate spikes				
Were all surrogate %R within the QC limits?	✓			
If the percent recovery (%R) of one or more surrogates was outside QC limits, was a reanalysis performed to confirm %R?			✓	
If any %R was less than 10 percent, was a reanalysis performed to confirm %R?			✓	

LDC #: 13381C39
SDG #: #V42

VALIDATION FINDINGS CHECKLIST

Reviewer: EJ
2nd Reviewer: JC

Validation Area	Yes	No	NA	Findings/Comments
VII. Matrix spike/Matrix spike duplicates				
Were a matrix spike (MS) and matrix spike duplicate (MSD) analyzed for each matrix in this SDG? If no, indicate which matrix does not have an associated MS/MSD. Soil / Water.	✓			
Was a MS/MSD analyzed every 20 samples of each matrix?	✓			
Were the MS/MSD percent recoveries (%R) and the relative percent differences (RPD) within the QC limits?	✓			
VIII. Laboratory control samples				
Was an LCS analyzed for this SDG?	✓			
Was an LCS analyzed per extraction batch?	✓			
Were the LCS percent recoveries (%R) and relative percent difference (RPD) within the QC limits?		✓		
IX. Regional Quality Assurance and Quality Control				
Were performance evaluation (PE) samples performed?			✓	
Were the performance evaluation (PE) samples within the acceptance limits?			✓	
X. Target compound identification				
Were the retention times of reported detects within the RT windows?	✓			
XI. Compound quantitation/CRQLs				
Were compound quantitation and CRQLs adjusted to reflect all sample dilutions, dry weight factors, and clean-up activities applicable to level IV validation?	✓			
XII. System performance				
System performance was found to be acceptable.	✓			
XIII. Overall assessment of data				
Overall assessment of data was found to be acceptable.	✓			
XIV. Field duplicates				
Field duplicate pairs were identified in this SDG.		✓		
Target compounds were detected in the field duplicates.			✓	
XV. Field blanks				
Field blanks were identified in this SDG.		✓		
Target compounds were detected in the field blanks.			✓	

LDC #: 13381C39
SDG #: HY42
METHOD: GC Pesticides/PCBs (EPA SW 846 Method 8081/8082)

VALIDATION FINDINGS WORKSHEET
Laboratory Control Samples

Page: 1 of 1
Reviewer:
2nd Reviewer:

Please see qualifications below for all questions answered "N". Not applicable questions are identified as "N/A".

[✓ Y] N N/A Were a laboratory control samples (LCS) and laboratory control sample duplicate (LCSD) analyzed for each matrix in this SDG? ______

Y [✓ N] N/A Were the LCS percent recoveries (%R) and relative percent differences (RPD) within the QC limits?

Level IV/D Only

[✓ Y] N N/A Was a LCS analyzed every 20 samples for each matrix or whenever a sample extraction was performed?

#	Date	LCS/LCSD ID	Compound	LCS %R (Limits)	LCSD %R (Limits)	RPD (Limits)	Associated Samples	Qualifications
		LCS-032105	R	27.8 (50-150)	( )	( )	All + Blk	J/UJ/P
				( )	( )	( )		
				( )	( )	( )		
				( )	( )	( )		
				( )	( )	( )		
				( )	( )	( )		
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				( )	( )	( )		

LDC #: 13381c3a
SDG #: HV42

VALIDATION FINDINGS WORKSHEET
Initial Calibration Calculation Verification

Page: 1 of 1
Reviewer: [illegible]
2nd Reviewer: [illegible]

METHOD: GC ✓ HPLC ____

The calibration Factor (CF), average CF, and percent relative standard deviation (%RSD) were recalculated for the compounds identified below using the following calculations:

CF = A/C
average CF = sum of the CF/number of standards
%RSD = 100 * (S/X)

A = Area of compound,
C = Concentration of compound,
S = Standard deviation of the CF
X = Mean of the CFs

#	Standard ID	Calibration Date	Compound	Reported CF (0.02std)	Recalculated CF (0.02std)	Reported Average CF (initial)	Recalculated Average CF (initial)	Reported %RSD	Recalculated %RSD
1	PEST0224 STX-CLP1	2/24/05	endosulfan I	1.46297	1.46297	1.34357	1.34357	6.029	6.029
			methoxychlor	0.46416	0.46416	0.42316	0.42316	13.320	13.320
2	STX-CLP2	↓	↓	1.10076	1.10076	1.01447	1.01447	7.408	7.408
				0.53981	0.53981	0.48227	0.48227	8.706	8.706
3									
4									

Comments: Refer to Initial Calibration findings worksheet for list of qualifications and associated samples when reported results do not agree within 10.0% of the recalculated results.

LDC #: 13381c3a
SDG #: HV42

VALIDATION FINDINGS WORKSHEET
Continuing Calibration Results Verification

Reviewer: [illegible]
2nd Reviewer: [illegible]

METHOD: GC / HPLC

The percent difference (%D) of the initial calibration average Calibration Factors (CF) and the continuing calibration CF were recalculated for the compounds identified below using the following calculation:

% Difference = 100 * (ave. CF - CF)/ave. CF
CF = A/C

Where: ave. CF = initial calibration average CF
CF = continuing calibration CF
A = Area of compound
C = Concentration of compound

#	Standard ID	Calibration Date	Compound	Average CF(Ical)/ CCV Conc.	Reported CF/Conc. CCV	Recalculated CF/Conc. CCV	Reported %D	Recalculated %D
1	INDAC14	3/22/05	endosulfan I	0.020	0.021	0.021	5.0	5.0
	1404		methoxychlor	0.20	0.20	0.20	0	0
	STX-CVP1							
2		↓	↓	0.020	0.020	0.020	0	0
	STX-CVP2			0.20	0.20	0.20	0	0
3								
4								

Comments: Refer to Continuing Calibration findings worksheet for list of qualifications and associated samples when reported results do not agree within 10.0% of the recalculated results.

LDC #: 13381C3a
SDG #: HV42

VALIDATION FINDINGS WORKSHEET

Surrogate Results Verification

Page: 1 of 1
Reviewer: B
2nd reviewer: M

METHOD: GC Pesticides/PCBs (EPA SW 846 Method 8081/8082)

The percent recoveries (%R) of surrogates were recalculated for the compounds identified below using the following calculation:

% Recovery: SF/SS * 100

Where: SF = Surrogate Found
SS = Surrogate Spiked

Sample ID: #1

Surrogate	Column	Surrogate Spiked	Surrogate Found	Percent Recovery	Percent Recovery	Percent Difference
				Reported	Recalculated	
Tetrachloro-m-xylene						
Tetrachloro-m-xylene	STX-CLP1	0.04	0.03	75.0	75	0
Decachlorobiphenyl	STX-CLP2	↓	0.0404	101	101	↓
Decachlorobiphenyl						

Sample ID:

Surrogate	Column	Surrogate Spiked	Surrogate Found	Percent Recovery	Percent Recovery	Percent Difference
				Reported	Recalculated	
Tetrachloro-m-xylene						
Tetrachloro-m-xylene						
Decachlorobiphenyl						
Decachlorobiphenyl						

Sample ID:

Surrogate	Column	Surrogate Spiked	Surrogate Found	Percent Recovery	Percent Recovery	Percent Difference
				Reported	Recalculated	
Tetrachloro-m-xylene						
Tetrachloro-m-xylene						
Decachlorobiphenyl						
Decachlorobiphenyl						

Sample ID:

Surrogate	Column	Surrogate Spiked	Surrogate Found	Percent Recovery	Percent Recovery	Percent Difference
				Reported	Recalculated	
Tetrachloro-m-xylene						
Tetrachloro-m-xylene						
Decachlorobiphenyl						
Decachlorobiphenyl						

Notes:

LDC #: 13381c3a
SDG #: HV42

VALIDATION FINDINGS WORKSHEET
Matrix Spike/Matrix Spike Duplicates Results Verification

Page: 1 of 1
Reviewer: [illegible]
2nd Reviewer: [illegible]

METHOD: GC Pesticides/PCBs (EPA SW 846 Method 8081/8082)

The percent recoveries (%R) and Relative Percent difference (RPD) of the matrix spike and matrix spike duplicate were recalculated for the compounds identified below using the following calculation:

% Recovery = 100* (SSC-SC)/SA

Where: SSC = Spiked sample concentration
SA = Spike added
SC = Concentration

RPD = | MS - MSD | * 2/(MS + MSD)

MS = Matrix spike percent recovery

MSD = Matrix spike duplicate percent recovery

MS/MSD samples: LDW-SSB26-010 MS/MSD

Compound	Spike Added (ug/kg)		Sample Concentration (ug/kg)	Spiked Sample Concentration (ug/kg)		Matrix Spike Percent Recovery		Matrix Spike Duplicate Percent Recovery		MS/MSD RPD	
	MS	MSD	-	MS	MSD	Reported	Recalc.	Reported	Recalc.	Reported	Recalculated
gamma-BHC	9.77	9.72	ND	~~9.21~~ 7.96	9.21	79.4	79.4	94.8	94.8	17.1	17.1
Heptachlor	↓	↓	↓	7.09	8.38	72.6	72.6	86.2	86.2	16.7	16.7
Aldrin	↓	↓	↓	6.62	7.70	67.8	67.8	79.2	79.2	15.1	15.1
Dieldrin	19.5	19.4	↓	25.0	27.8	128	128	143	143	10.6	10.6
Endrin	19.5	↓	↓	19.5	23.1	100	100	119	119	16.9	16.9
4,4'-DDT	↓	↓	↓	20.7	24.5	106	106	126	126	16.8	16.8

Comments: Refer ot Matrix Spike/Matrix Spike Duplicates findings worksheet for list of qualifications and associated samples when reported results do not agree within 10.0% of the recalculated results.

LDC #: 13381C3a
SDG #: HV42

VALIDATION FINDINGS WORKSHEET
Laboratory Control Sample/Laboratory Control Sample Duplicate Results Verification

Reviewer: [illegible]
2nd Reviewer: [illegible]

METHOD: GC Pesticides/PCBs (EPA SW 846 Method 8081/8082)

The percent recoveries (%R) and Relative Percent difference (RPD) of the laboratory control sample and laboratory control sample duplicate were recalculated for the compounds identified below using the following calculation:

% Recovery = 100* (SSC-SC)/SA

Where: SSC = Spiked sample concentration
SA = Spike added
SC = Concentration

RPD = | LCS - LCSD | * 2/(LCS + LCSD)

LCS = Laboratory control sample percent recovery
LCSD = Laboratory control sample duplicate percent recovery

LCS/LCSD samples: LCS-032105

Compound	Spike Added (ug/kg)		Sample Concentration (ug/kg)	Spiked Sample Concentration (ug/kg)		LCS Percent Recovery		LCSD Percent Recovery		LCS/LCSD RPD	
	LCS	LCSD	-	LCS	LCSD	Reported	Recalc.	Reported	Recalc.	Reported	Recalculated
Gamma-BHC	4.0	NA		3.50	NA	87.5	87.5				
Heptachlor				3.48		87.0	87.0				
Aldrin				3.26		81.5	81.5				
Dieldrin				7.06		88.2	88.2				
Endrin				7.38		92.2	92.2				
4,4'-DDT				7.92		99.0	99.0	NA			

Comments: Refer to Laboratory Control Sample/Laboratory Control Sample Duplicate findings worksheet for list of qualifications and associated samples when reported results do not agree within 10.0% of the recalculated results.

LDC #: 13381c3a
SDG #: HV42

VALIDATION FINDINGS WORKSHEET
Sample Calculation Verification

Reviewer: JB
2nd reviewer: a

METHOD: GC Pesticides/PCBs (EPA SW 846 Method 8081/8082)

Y N N/A Were all reported results recalculated and verified for all level IV samples?
Y N N/A Were all recalculated results for detected target compounds agree within 10.0% of the reported results?

Example:

Sample I.D. _____ _____:

Conc. = (_____) / (_____)

=

all ND

#	Sample ID	Compound	Reported Concentration ( )	Calculated Concentration ( )	Qualification

Note: _____

LDC #: 13384A3a
SDG #: HV00
Laboratory: Analytical Resources, Inc.

VALIDATION COMPLETENESS WORKSHEET
Level II

Date: 4/20/05
Page: 1 of 1
Reviewer: F
2nd Reviewer: K

METHOD: GC Chlorinated Pesticides (EPA SW 846 Method 8081A)

The samples listed below were reviewed for each of the following validation areas. Validation findings are noted in attached validation findings worksheets.

	Validation Area		Comments
I.	Technical holding times	A	Sampling dates: 3/8/05
II.	GC/ECD Instrument Performance Check	N	
III.	Initial calibration	N	
IV.	Continuing calibration	N	
V.	Blanks	A	
VI.	Surrogate spikes	A	
VII.	Matrix spike/Matrix spike duplicates	A	
VIII.	Laboratory control samples / SRM	SW	LCS
IX.	Regional quality assurance and quality control	N	
Xa.	Florisil cartridge check	N	
Xb.	GPC Calibration	N	Sulfur + Silical gel clean-up
XI.	Target compound identification	N	
XII.	Compound quantitation and reported CRQLs	N	
XIII.	Overall assessment of data	A	
XIV.	Field duplicates	SW	D = 4+5
XV.	Field blanks	N	

Note: A = Acceptable
N = Not provided/applicable
SW = See worksheet
ND = No compounds detected
R = Rinsate
FB = Field blank
D = Duplicate
TB = Trip blank
EB = Equipment blank

Validated Samples:

Sediments

1	LDW-SS81-010	11	HV00MBS1	21		31	
2	LDW-SS41-010	12		22		32	
3	~~LDW-SS30-010~~	13		23		33	
4	LDW-SS131-010 D	14		24		34	
5	LDW-SS206-010 D	15		25		35	
6	LDW-SS140-010	16		26		36	
7	~~LDW-SS150-010~~	17		27		37	
8	LDW-SS140-010MS	18		28		38	
9	LDW-SS140-010MSD	19		29		39	
10		20		30		40	

LDC #: 13384A3a
SDG #: #V00
METHOD: GC Pesticides/PCBs (EPA SW 846 Method 8081/8082)

VALIDATION FINDINGS WORKSHEET

Laboratory Control Samples

Page: 1 of 1
Reviewer:
2nd Reviewer:

Please see qualifications below for all questions answered "N". Not applicable questions are identified as "N/A".

[✓ Y] N N/A Were a laboratory control samples (LCS) and laboratory control sample duplicate (LCSD) analyzed for each matrix in this SDG?

Y [✓ N] N/A Were the LCS percent recoveries (%R) and relative percent differences (RPD) within the QC limits?

Level IV/D Only

[✓ Y] N N/A Was a LCS analyzed every 20 samples for each matrix or whenever a sample extraction was performed?

#	Date	LCS/LCSD ID	Compound	LCS %R (Limits)	LCSD %R (Limits)	RPD (Limits)	Associated Samples	Qualifications
		LCS-031605	R	36.8 (50-150)	( )	( )	All + Blk	J/UJ/P
				( )	( )	( )		
				( )	( )	( )		
				( )	( )	( )		
				( )	( )	( )		
				( )	( )	( )		
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				( )	( )	( )		
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				( )	( )	( )		
				( )	( )	( )		

LDC #: 13384 A39
SDG #: HV0C

VALIDATION FINDINGS WORKSHEET
Field Duplicates

Reviewer: [illegible]
2nd reviewer: [illegible]

METHOD: GC Pesticides/PCBs (EPA SW846 Method 8081/8082)

(Y) N N/A Were field duplicate pairs identified in this SDG?
Y (N) N/A Were target compounds detected in thie field duplicate pairs?

Compound	Concentration (ug/kg)		≤ 50 RPD
	4	5	
Hexachlorobenzene	0.98 U	1.6	200 NC

Compound	Concentration ( )		RPD

Compound	Concentration ( )		RPD

Compound	Concentration ( )		RPD

LDC #: 13395A3a
SDG #: HV38
Laboratory: Analytical Resources, Inc.

VALIDATION COMPLETENESS WORKSHEET
Level II

Date: 4/20/05
Page: 1 of 1
Reviewer: [illegible]
2nd Reviewer: [illegible]

METHOD: GC Chlorinated Pesticides (EPA SW 846 Method 8081A)

The samples listed below were reviewed for each of the following validation areas. Validation findings are noted in attached validation findings worksheets.

	Validation Area		Comments
I.	Technical holding times	A	Sampling dates: 3/11/05
II.	GC/ECD Instrument Performance Check	N	
III.	Initial calibration	N	
IV.	Continuing calibration	N	
V.	Blanks	A	
VI.	Surrogate spikes	A	
VII.	Matrix spike/Matrix spike duplicates	~~SW~~ A	
VIII.	Laboratory control samples / SRM	SW	LCS
IX.	Regional quality assurance and quality control	N	
Xa.	Florisil cartridge check	N	
Xb.	GPC Calibration	N	Sulfur + Silica gel clean-up
XI.	Target compound identification	N	
XII.	Compound quantitation and reported CRQLs	N	
XIII.	Overall assessment of data	A	
XIV.	Field duplicates	N	
XV.	Field blanks	N	

Note: A = Acceptable
N = Not provided/applicable
SW = See worksheet
ND = No compounds detected
R = Rinsate
FB = Field blank
D = Duplicate
TB = Trip blank
EB = Equipment blank

Validated Samples: sediment

1	LDW-SS2b-010	11	MB-03 2105	21		31	
2	LDW-SS2b-010MS	12		22		32	
3	LDW-SS2b-010MSD	13		23		33	
4	SSB2b	14		24		34	
5		15		25		35	
6		16		26		36	
7		17		27		37	
8		18		28		38	
9		19		29		39	
10		20		30		40	

LDC #: 13395A39
SDG #: HV38

VALIDATION FINDINGS WORKSHEET
Laboratory Control Samples

Page: 1 of 1
Reviewer:
2nd Reviewer:

METHOD: GC Pesticides/PCBs (EPA SW 846 Method 8081/8082)

Please see qualifications below for all questions answered "N". Not applicable questions are identified as "N/A".

[✓ Y] N N/A Were a laboratory control samples (LCS) and laboratory control sample duplicate (LCSD) analyzed for each matrix in this SDG? ______

Y [✓ N] N/A Were the LCS percent recoveries (%R) and relative percent differences (RPD) within the QC limits?

Level IV/D Only

Y N [✓ N/A] Was a LCS analyzed every 20 samples for each matrix or whenever a sample extraction was performed?

#	Date	LCS/LCSD ID	Compound	LCS %R (Limits)	LCSD %R (Limits)	RPD (Limits)	Associated Samples	Qualifications
		LCS - 032105	R	27.8 (50-150)	( )	( )	All + Blk	J/UJ/P
				( )	( )	( )		
				( )	( )	( )		
				( )	( )	( )		
				( )	( )	( )		
				( )	( )	( )		
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				( )	( )	( )		

LDC #: 13398A3a

SDG #: HV58

Laboratory: Analytical Resources, Inc.

VALIDATION COMPLETENESS WORKSHEET

Level II

Date: 4/28/05

Page: 1 of 1

Reviewer:

2nd Reviewer:

METHOD: GC Chlorinated Pesticides (EPA SW 846 Method 8081A)

The samples listed below were reviewed for each of the following validation areas. Validation findings are noted in attached validation findings worksheets.

	Validation Area		Comments
I.	Technical holding times	A	Sampling dates: 3/14/05
II.	GC/ECD Instrument Performance Check	NA	
III.	Initial calibration	N	
IV.	Continuing calibration	N	
V.	Blanks	A	
VI.	Surrogate spikes	A	
VII.	Matrix spike/Matrix spike duplicates	SW	LDW-SSB7a-010
VIII.	Laboratory control samples /SRM	SW	LCS
IX.	Regional quality assurance and quality control	N	
Xa.	Florisil cartridge check	N	
Xb.	GPC Calibration	N	Sulfur + silica gel clean up
XI.	Target compound identification	N	
XII.	Compound quantitation and reported CRQLs	N	
XIII.	Overall assessment of data	A	
XIV.	Field duplicates	N	
XV.	Field blanks	N	

Note: A = Acceptable
N = Not provided/applicable
SW = See worksheet
ND = No compounds detected
R = Rinsate
FB = Field blank
D = Duplicate
TB = Trip blank
EB = Equipment blank

Validated Samples:

Sediment

1	LDW-SS9-010	11		21		31	
2	LDW-SS59-010	12		22		32	
3	LDW-SSB5b-010	13		23		33	
4		14		24		34	
5		15		25		35	
6		16		26		36	
7		17		27		37	
8		18		28		38	
9		19		29		39	
10		20		30		40	

LDC #: 13398A39
SDG #: HV58

VALIDATION FINDINGS WORKSHEET
Matrix Spike/Matrix Spike Duplicates

Page: 1 of 1
Reviewer:
2nd Reviewer:

METHOD: [✓ GC] __ HPLC

Please see qualifications below for all questions answered "N". Not applicable questions are identified as "N/A".

[✓ Y] N N/A Were a matrix spike (MS) and matrix spike duplicate (MSD) analyzed for each matrix in this SDG?

[✓ Y] N N/A Was an MS/MSD analyzed every 20 samples for each matrix or whenever a sample extraction was performed?

Y [✓ N] N/A Were the MS/MSD percent recoveries (%R) and relative percent differences (RPD) within QC limits?

#	MS/MSD ID	Compound	MS %R (Limits)	MSD %R (Limits)	RPD (Limits)	Associated Samples	Qualifications
	LDW-SSB7a-	Hexachlorobenzene	330 (50-150)	( )	130 (50)	no Ass. Sample	no QUAL
	010MS/D		( )	( )	( )		
			( )	( )	( )		
			( )	( )	( )		
			( )	( )	( )		
			( )	( )	( )		
			( )	( )	( )		
			( )	( )	( )		
			( )	( )	( )		
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LDC #: 13398A39
SDG #: HY58

VALIDATION FINDINGS WORKSHEET

Laboratory Control Samples

Page: 1 of 1
Reviewer:
2nd Reviewer:

METHOD: GC Pesticides/PCBs (EPA SW 846 Method 8081/8082)

Please see qualifications below for all questions answered "N". Not applicable questions are identified as "N/A".

[✓ Y] N N/A Were a laboratory control samples (LCS) and laboratory control sample duplicate (LCSD) analyzed for each matrix in this SDG? ______

Y [✓ N] N/A Were the LCS percent recoveries (%R) and relative percent differences (RPD) within the QC limits?

Level IV/D Only

Y N [✓ N/A] Was a LCS analyzed every 20 samples for each matrix or whenever a sample extraction was performed?

#	Date	LCS/LCSD ID	Compound	LCS %R (Limits)	LCSD %R (Limits)	RPD (Limits)	Associated Samples	Qualifications
		LCS-032205	R	19.5 (50-150)	( )	( )	All + Blk	J/UJ/P
				( )	( )	( )		
				( )	( )	( )		
				( )	( )	( )		
				( )	( )	( )		
				( )	( )	( )		
				( )	( )	( )		
				( )	( )	( )		
				( )	( )	( )		
				( )	( )	( )		
				( )	( )	( )		
				( )	( )	( )		
				( )	( )	( )		
				( )	( )	( )		
				( )	( )	( )		
				( )	( )	( )		
				( )	( )	( )		
				( )	( )	( )		
				( )	( )	( )		
				( )	( )	( )		
				( )	( )	( )		
				( )	( )	( )		
				( )	( )	( )		
				( )	( )	( )		
				( )	( )	( )		
				( )	( )	( )		

LDC #: 13403A3a

SDG #: HV72

Laboratory: Analytical Resources, Inc.

VALIDATION COMPLETENESS WORKSHEET

Level ☒ II

Date: 4/28/05

Page: 1 of 1

Reviewer: FT

2nd Reviewer: [illegible]

METHOD: GC Chlorinated Pesticides (EPA SW 846 Method 8081A)

The samples listed below were reviewed for each of the following validation areas. Validation findings are noted in attached validation findings worksheets.

	Validation Area		Comments
I.	Technical holding times	A	Sampling dates: 3/15/05
II.	GC/ECD Instrument Performance Check	NA	
III.	Initial calibration	N	
IV.	Continuing calibration	N	
V.	Blanks	A	
VI.	Surrogate spikes	A	
VII.	Matrix spike/Matrix spike duplicates	A	
VIII.	Laboratory control samples / SRM	SW	LCS
IX.	Regional quality assurance and quality control	N	
Xa.	Florisil cartridge check	N	
Xb.	GPC Calibration	N	Sulfur & Silica Gel clean up
XI.	Target compound identification	N	
XII.	Compound quantitation and reported CRQLs	N	
XIII.	Overall assessment of data	A	
XIV.	Field duplicates	N	
XV.	Field blanks	N	

Note: A = Acceptable
N = Not provided/applicable
SW = See worksheet
ND = No compounds detected
R = Rinsate
FB = Field blank
D = Duplicate
TB = Trip blank
EB = Equipment blank

Validated Samples: Sediment

1	LDW-SS93-010	11	MB-032105	21		31	
2	LDW-SSB6a-010	12		22		32	
3	LDW-SSB6a-010MS	13		23		33	
4	LDW-SSB6a-010MSD	14		24		34	
5		15		25		35	
6		16		26		36	
7		17		27		37	
8		18		28		38	
9		19		29		39	
10		20		30		40	

LDC #: 13403A3a
SDG #: HV72

VALIDATION FINDINGS WORKSHEET
Laboratory Control Samples

Page: 1 of 1
Reviewer: FT
2nd Reviewer: R

METHOD: GC Pesticides/PCBs (EPA SW 846 Method 8081/8082)

Please see qualifications below for all questions answered "N". Not applicable questions are identified as "N/A".

[✓ Y] N N/A Were a laboratory control samples (LCS) and laboratory control sample duplicate (LCSD) analyzed for each matrix in this SDG? ______

Y [✓ N] N/A Were the LCS percent recoveries (%R) and relative percent differences (RPD) within the QC limits?

Level IV/D Only

Y N [✓ N/A] Was a LCS analyzed every 20 samples for each matrix or whenever a sample extraction was performed?

#	Date	LCS/LCSD ID	Compound	LCS %R (Limits)	LCSD %R (Limits)	RPD (Limits)	Associated Samples	Qualifications
		LCS-032105	R	24.2 (50-150)	( )	( )	All + BLK	J/UJ/P
				( )	( )	( )		
				( )	( )	( )		
				( )	( )	( )		
				( )	( )	( )		
				( )	( )	( )		
				( )	( )	( )		
				( )	( )	( )		
				( )	( )	( )		
				( )	( )	( )		
				( )	( )	( )		
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				( )	( )	( )		
				( )	( )	( )		
				( )	( )	( )		
				( )	( )	( )		

LDC #: 13412A3a

SDG #: HV76

Laboratory: Analytical Resources, Inc.

VALIDATION COMPLETENESS WORKSHEET

Level IV

Date: 4/28/09

Page: 1 of 1

Reviewer: [illegible]

2nd Reviewer: [illegible]

METHOD: GC Chlorinated Pesticides (EPA SW 846 Method 8081A)

The samples listed below were reviewed for each of the following validation areas. Validation findings are noted in attached validation findings worksheets.

	Validation Area		Comments
I.	Technical holding times	A	Sampling dates: 3/15/09
II.	GC/ECD Instrument Performance Check	A	
III.	Initial calibration	A	
IV.	Continuing calibration	A	
V.	Blanks	A	
VI.	Surrogate spikes	A	
VII.	Matrix spike/Matrix spike duplicates	A	LDW-SSB6a-010
VIII.	Laboratory control samples /SRM	SW	
IX.	Regional quality assurance and quality control	N	
Xa.	Florisil cartridge check	N	
Xb.	GPC Calibration	N	Sulfur + Silica gel clean-up
XI.	Target compound identification	A	
XII.	Compound quantitation and reported CRQLs	A	
XIII.	Overall assessment of data	A	
XIV.	Field duplicates	N	
XV.	Field blanks	N	

Note: A = Acceptable
N = Not provided/applicable
SW = See worksheet
ND = No compounds detected
R = Rinsate
FB = Field blank
D = Duplicate
TB = Trip blank
EB = Equipment blank

Validated Samples: sediment

1	LDW-SSB9a-010	11	MB-032109	21		31	
2	LDW-SS155-010	12		22		32	
3	LDW-SS152-010	13		23		33	
4	LDW-SS144-010	14		24		34	
5	~~LDW-SS155-010MS~~	15		25		35	
6	~~LDW-SS155-010MS~~D	16		26		36	
7		17		27		37	
8		18		28		38	
9		19		29		39	
10		20		30		40	

LDC #: 13412A39
SDG #: HV76

VALIDATION FINDINGS CHECKLIST

Page: 1 of 2
Reviewer: [illegible]
2nd Reviewer: [illegible]

Method: Pesticides/PCBs (EPA SW 846 Method 8081/8082)

Validation Area	Yes	No	NA	Findings/Comments
I. Technical holding times				
All technical holding times were met.	✓			
Cooler temperature criteria was met.	✓			
II. GC/ECD Instrument performance check				
Was the instrument performance found to be acceptable?	✓			
III. Initial calibration				
Did the laboratory perform a 5 point calibration prior to sample analysis?	✓			
Was a linear fit used for evaluation? If yes, were all percent relative standard deviations (%RSD) ≤ 20%?	✓			
Was a curve fit used for evaluation? If Yes, what was the acceptance criteria used?		✓		
Did the initial calibration meet the curve fit acceptance criteria?			✓	
Were the RT windows properly established?	✓			
Were the required standard concentrations analyzed in the initial calibration?	✓			
IV. Continuing calibration				
What type of continuing calibration calculation was performed? ____%D or ____%R	✓			
Were Evaluation mix standards analyzed prior to the initial calibration and sample analysis?	✓			
Were endrin and 4,4'-DDT breakdowns ≤ 15%.0 for individual breakdown in the Evaluation mix standards?	✓			
Was a continuing calibration analyzed daily?	✓			
Were all percent differences (%D) ≤ 15%.0 or percent recovieries 85-115%?	✓			
Were all the retention times within the acceptance windows?	✓			
V. Blanks				
Was a method blank associated with every sample in this SDG?	✓			
Was a method blank analyzed for each matrix and concentration?	✓			
Were extract cleanup blanks analyzed with every batch requiring clean-up?	✓			
Was there contamination in the method blanks or clean-up blanks? If yes, please see the Blanks validation completeness worksheet.		✓		
VI. Surrogate spikes				
Were all surrogate %R within the QC limits?	✓			
If the percent recovery (%R) of one or more surrogates was outside QC limits, was a reanalysis performed to confirm %R?			✓	
If any %R was less than 10 percent, was a reanalysis performed to confirm %R?			✓	

LDC #: 13412A3a
SDG #: HV76

VALIDATION FINDINGS CHECKLIST

Reviewer: BJ
2nd Reviewer: DL

Validation Area	Yes	No	NA	Findings/Comments
VII. Matrix spike/Matrix spike duplicates				
Were a matrix spike (MS) and matrix spike duplicate (MSD) analyzed for each matrix in this SDG? If no, indicate which matrix does not have an associated MS/MSD. Soil / Water.	✓			
Was a MS/MSD analyzed every 20 samples of each matrix?	✓			
Were the MS/MSD percent recoveries (%R) and the relative percent differences (RPD) within the QC limits?	✓			
VIII. Laboratory control samples				
Was an LCS analyzed for this SDG?	✓			
Was an LCS analyzed per extraction batch?	✓			
Were the LCS percent recoveries (%R) and relative percent difference (RPD) within the QC limits?		✓		
IX. Regional Quality Assurance and Quality Control				
Were performance evaluation (PE) samples performed?			✓	
Were the performance evaluation (PE) samples within the acceptance limits?			✓	
X. Target compound identification				
Were the retention times of reported detects within the RT windows?			✓	
XI. Compound quantitation/CRQLs				
Were compound quantitation and CRQLs adjusted to reflect all sample dilutions, dry weight factors, and clean-up activities applicable to level IV validation?	✓			
XII. System performance				
System performance was found to be acceptable.				
XIII. Overall assessment of data				
Overall assessment of data was found to be acceptable.	✓			
XIV. Field duplicates				
Field duplicate pairs were identified in this SDG.		✓		
Target compounds were detected in the field duplicates.			✓	
XV. Field blanks				
Field blanks were identified in this SDG.		✓		
Target compounds were detected in the field blanks.			✓	

LDC #: 13412A3a
SDG #: HV76

VALIDATION FINDINGS WORKSHEET

Laboratory Control Samples

Page: 1 of 1
Reviewer: [illegible]
2nd Reviewer: [illegible]

METHOD: GC Pesticides/PCBs (EPA SW 846 Method 8081/8082)

Please see qualifications below for all questions answered "N". Not applicable questions are identified as "N/A".

[✓ Y] N N/A Were a laboratory control samples (LCS) and laboratory control sample duplicate (LCSD) analyzed for each matrix in this SDG? ______

Y [✓ N] N/A Were the LCS percent recoveries (%R) and relative percent differences (RPD) within the QC limits?

Level IV/D Only

[✓ Y] N N/A Was a LCS analyzed every 20 samples for each matrix or whenever a sample extraction was performed?

#	Date	LCS/LCSD ID	Compound	LCS %R (Limits)	LCSD %R (Limits)	RPD (Limits)	Associated Samples	Qualifications
		LCS - 032105	R	24.2 (50-150)	( )	( )	All + Blank	J/UJ/P
				( )	( )	( )		
				( )	( )	( )		
				( )	( )	( )		
				( )	( )	( )		
				( )	( )	( )		
				( )	( )	( )		
				( )	( )	( )		
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				( )	( )	( )		
				( )	( )	( )		

LDC # 13412A39
SDG #: HV76

VALIDATION FINDINGS WORKSHEET
Initial Calibration Calculation Verification

Page: 1 of 1
Reviewer: [illegible]
2nd Reviewer: [illegible]

METHOD: GC / HPLC

The calibration Factor (CF), average CF, and percent relative standard deviation (%RSD) were recalculated for the compounds identified below using the following calculations:

CF = A/C
average CF = sum of the CF/number of standards
%RSD = 100 * (S/X)

A = Area of compound,
C = Concentration of compound,
S = Standard deviation of the CF
X = Mean of the CFs

#	Standard ID	Calibration Date	Compound	Reported CF (0.0^2std)	Recalculated CF (0.0^2std)	Reported Average CF (initial)	Recalculated Average CF (initial)	Reported %RSD	Recalculated %RSD
1	PEST0224 RTXCLP1	2/24/05	endosulfan 1	1.46297	1.46297	1.34357	1.34357	6.029	6.029
			Methoxychlor	0.46416	0.46416	0.42316	0.42316	13.320	13.320
2	PEST0224B RTXCLP2	2/24/05	↓	1.10076	1.10076	1.01447	1.0144	7.408	7.408
				0.53981	0.53981	0.48227	0.48227	8.706	8.706
3									
4									

Comments: Refer to Initial Calibration findings worksheet for list of qualifications and associated samples when reported results do not agree within 10.0% of the recalculated results.

DC #: 13412A39
SDG #: HV76

VALIDATION FINDINGS WORKSHEET
Continuing Calibration Results Verification

Page: 1 of 1
Reviewer: 19
2nd Reviewer: &

METHOD: GC_____ HPLC_____

The percent difference (%D) of the initial calibration average Calibration Factors (CF) and the continuing calibration CF were recalculated for the compounds identified below using the following calculation:

% Difference = 100 * (ave. CF - CF)/ave. CF
CF = A/C

Where: ave. CF = initial calibration average CF
CF = continuing calibration CF
A = Area of compound
C = Concentration of compound

#	Standard ID	Calibration Date	Compound	Average CF(Ical)/ CCV Conc.	Reported CF/Conc. CCV	Recalculated CF/Conc. CCV	Reported %D	Recalculated %D
1	INDC16	3/24/05	endosulfan I	0.020	0.020	0.020	0	0
	STX CVP1	14:38	methoxychlor	0.20	0.18	0.18	10.0	10.0
2	STX CVP2	↓	↓	↓	0.019	0.019	5.0	5.0
					0.18	0.18	10.0	10.0
3								
4								

Comments: Refer to Continuing Calibration findings worksheet for list of qualifications and associated samples when reported results do not agree within 10.0% of the recalculated results.

LDC #: 13412A39
SDG #: #176

Page: 1 of 1
Reviewer:
2nd reviewer:

VALIDATION FINDINGS WORKSHEET

Surrogate Results Verification

METHOD: GC Pesticides/PCBs (EPA SW 846 Method 8081/8082)

The percent recoveries (%R) of surrogates were recalculated for the compounds identified below using the following calculation:

% Recovery: SF/SS * 100

Where: SF = Surrogate Found
SS = Surrogate Spiked

Sample ID: #1

Surrogate	Column	Surrogate Spiked	Surrogate Found	Percent Recovery	Percent Recovery	Percent Difference
				Reported	Recalculated	
Tetrachloro-m-xylene						
Tetrachloro-m-xylene	RTX-CLP1	0.04	~~76.5~~ 0.0306	76.5	76.5	0
Decachlorobiphenyl	RTX-CLP2	↓	~~70.0~~ 0.0280	70.0	70.0	0
Decachlorobiphenyl						

Sample ID:

Surrogate	Column	Surrogate Spiked	Surrogate Found	Percent Recovery	Percent Recovery	Percent Difference
				Reported	Recalculated	
Tetrachloro-m-xylene						
Tetrachloro-m-xylene						
Decachlorobiphenyl						
Decachlorobiphenyl						

Sample ID:

Surrogate	Column	Surrogate Spiked	Surrogate Found	Percent Recovery	Percent Recovery	Percent Difference
				Reported	Recalculated	
Tetrachloro-m-xylene						
Tetrachloro-m-xylene						
Decachlorobiphenyl						
Decachlorobiphenyl						

Sample ID:

Surrogate	Column	Surrogate Spiked	Surrogate Found	Percent Recovery	Percent Recovery	Percent Difference
				Reported	Recalculated	
Tetrachloro-m-xylene						
Tetrachloro-m-xylene						
Decachlorobiphenyl						
Decachlorobiphenyl						

Notes:

LDC #: 13412A39
SDG #: HV76

VALIDATION FINDINGS WORKSHEET
Matrix Spike/Matrix Spike Duplicates Results Verification

Reviewer: F
2nd Reviewer: R

METHOD: GC Pesticides/PCBs (EPA SW 846 Method 8081/8082)

The percent recoveries (%R) and Relative Percent difference (RPD) of the matrix spike and matrix spike duplicate were recalculated for the compounds identified below using the following calculation:

% Recovery = 100* (SSC-SC)/SA

Where: SSC = Spiked sample concentration; SA = Spike added; SC = Concentration

RPD = | MS - MSD | * 2/(MS + MSD)

MS = Matrix spike percent recovery; MSD = Matrix spike duplicate percent recovery

MS/MSD samples: 5 + 6

Compound	Spike Added (ug/kg)		Sample Concentration (ug/kg)	Spiked Sample Concentration (ug/kg)		Matrix Spike Percent Recovery		Matrix Spike Duplicate Percent Recovery		MS/MSD RPD	
	MS	MSD	-	MS	MSD	Reported	Recalc.	Reported	Recalc.	Reported	Recalculated
gamma-BHC	9.89	9.55	ND	6.79	6.74	63.6	63.6	68.4	68.4	6.9	6.9
Heptachlor				7.57	10.4	76.5	76.5	106	106	31.5	31.5
Aldrin				8.13	8.37	82.2	82.2	85.0	85.0	2.9	2.9
Dieldrin	19.8	19.7		17.1	17.2	86.4	86.4	87.3	87.3	0.6	0.6
Endrin				15.0	15.2	75.8	75.8	77.2	77.2	1.3	1.3
4,4'-DDT				21.9	21.9	111	111	111	111	0	0

Comments: Refer ot Matrix Spike/Matrix Spike Duplicates findings worksheet for list of qualifications and associated samples when reported results do not agree within 10.0% of the recalculated results.

LDC #: 13412A39
SDG #: HV76

VALIDATION FINDINGS WORKSHEET
Laboratory Control Sample/Laboratory Control Sample Duplicate Results Verification

Reviewer: [illegible]
2nd Reviewer: [illegible]

METHOD: GC Pesticides/PCBs (EPA SW 846 Method 8081/8082)

The percent recoveries (%R) and Relative Percent difference (RPD) of the laboratory control sample and laboratory control sample duplicate were recalculated for the compounds identified below using the following calculation:

% Recovery = 100* (SSC-SC)/SA

Where: SSC = Spiked sample concentration; SA = Spike added; SC = Concentration

RPD = | LCS - LCSD | * 2/(LCS + LCSD)

LCS = Laboratory control sample percent recovery; LCSD = Laboratory control sample duplicate percent recovery

LCS/LCSD samples: LCS-032105

Compound	Spike Added (ug/kg)		Sample Concentration (ng/kg)	Spiked Sample Concentration (ug/kg)		LCS Percent Recovery		LCSD Percent Recovery		LCS/LCSD RPD	
	LCS	LCSD	-	LCS	LCSD	Reported	Recalc.	Reported	Recalc.	Reported	Recalculated
Gamma-BHC	4.0	NA	0	3.18	NA	79.5	79.5				
Heptachlor	↓			3.14	↓	78.5	78.5				
Aldrin	↓	↓	↓	3.06	↓	76.5	76.5				
Dieldrin	8.0	↓	↓	6.54	↓	81.8	81.8				
Endrin	8.0	↓	↓	6.70	↓	83.8	83.8				
4,4'-DDT	↓	↓	↓	6.78	↓	84.8	84.8	NA			

Comments: Refer to Laboratory Control Sample/Laboratory Control Sample Duplicate findings worksheet for list of qualifications and associated samples when reported results do not agree within 10.0% of the recalculated results.

LDC #: 13412 A3a
SDG #: HV76

VALIDATION FINDINGS WORKSHEET
Sample Calculation Verification

Page: 1 of 1
Reviewer: [illegible]
2nd reviewer: [illegible]

METHOD: GC Pesticides/PCBs (EPA SW 846 Method 8081/8082)

Y N N/A Were all reported results recalculated and verified for all level IV samples?
Y N N/A Were all recalculated results for detected target compounds agree within 10.0% of the reported results?

Example:

Sample I.D. _____ _____:

Conc. = $\frac{(\quad)}{(\quad)}$

= all NP

#	Sample ID	Compound	Reported Concentration ( )	Calculated Concentration ( )	Qualification

Note: _____

LDC #: 13419A3a
SDG #: HW06
Laboratory: Analytical Resources, Inc.

VALIDATION COMPLETENESS WORKSHEET
Level II

Date: 4/28/05
Page: 1 of 1
Reviewer:
2nd Reviewer:

METHOD: GC Chlorinated Pesticides (EPA SW 846 Method 8081A)

The samples listed below were reviewed for each of the following validation areas. Validation findings are noted in attached validation findings worksheets.

	Validation Area		Comments
I.	Technical holding times	A	Sampling dates: 3/16/05
II.	GC/ECD Instrument Performance Check	N	
III.	Initial calibration	N	
IV.	Continuing calibration	N	
V.	Blanks	A	
VI.	Surrogate spikes	A	
VII.	Matrix spike/Matrix spike duplicates	SW	LDW-SS.B7a-010
VIII.	Laboratory control samples /SRM	SW	LCS
IX.	Regional quality assurance and quality control	N	
Xa.	Florisil cartridge check	N	
Xb.	GPC Calibration	N	Sulfur + Silica gel clean up
XI.	Target compound identification	N	
XII.	Compound quantitation and reported CRQLs	N	
XIII.	Overall assessment of data	A	
XIV.	Field duplicates	N	
XV.	Field blanks	N	

Note: A = Acceptable
N = Not provided/applicable
SW = See worksheet
ND = No compounds detected
R = Rinsate
FB = Field blank
D = Duplicate
TB = Trip blank
EB = Equipment blank

Validated Samples:

sediment

1	LDW-SS2-010	11	MB-032205	21		31	
2	LDW-SS69b-010	12		22		32	
3		13		23		33	
4		14		24		34	
5		15		25		35	
6		16		26		36	
7		17		27		37	
8		18		28		38	
9		19		29		39	
10		20		30		40	

LDC #: 13419A39
SDG #: HW06

VALIDATION FINDINGS WORKSHEET
Matrix Spike/Matrix Spike Duplicates

Page: 1 of 1
Reviewer:
2nd Reviewer:

METHOD: ✓ GC ___ HPLC

Please see qualifications below for all questions answered "N". Not applicable questions are identified as "N/A".

[✓ Y] N N/A Were a matrix spike (MS) and matrix spike duplicate (MSD) analyzed for each matrix in this SDG?

[✓ Y] N N/A Was an MS/MSD analyzed every 20 samples for each matrix or whenever a sample extraction was performed?

Y [✓ N] N/A Were the MS/MSD percent recoveries (%R) and relative percent differences (RPD) within QC limits?

#	MS/MSD ID	Compound	MS %R (Limits)	MSD %R (Limits)	RPD (Limits)	Associated Samples	Qualifications
	LDW-SSB79a-	Hexachloro-	330 (50-150)	( )	130 (50)	no associated sample	no QUAL
	010	benzene	( )	( )	( )		
			( )	( )	( )		
			( )	( )	( )		
			( )	( )	( )		
			( )	( )	( )		
			( )	( )	( )		
			( )	( )	( )		
			( )	( )	( )		
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			( )	( )	( )		
			( )	( )	( )		

LDC #: 13419A3a
SDG #: HW06

Page: 1 of 1
Reviewer:
2nd Reviewer:

VALIDATION FINDINGS WORKSHEET
Laboratory Control Samples (LCS)

METHOD: GC/MS VOA (EPA SW 846 Method 8260B)

Please see qualifications below for all questions answered "N". Not applicable questions are identified as "N/A".

[✓ Y] N N/A Was a LCS required?
Y [✓ N] N/A Were the LCS percent recoveries (%R) and relative percent difference (RPD) within the QC limits?

#	Date	LCS/LCSD ID	Compound	LCS %R (Limits)	LCSD %R (Limits)	RPD (Limits)	Associated Samples	Qualifications
		LCS-032205	R	19.5 (50-150)	( )	( )	All +Blk	J/UJ/P
				( )	( )	( )		
				( )	( )	( )		
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LDC #: 13419B3a
SDG #: HW16
Laboratory: Analytical Resources, Inc.

VALIDATION COMPLETENESS WORKSHEET
Level II

Date: 4/28/05
Page: 1 of 1
Reviewer: [illegible]
2nd Reviewer: [illegible]

METHOD: GC Chlorinated Pesticides (EPA SW 846 Method 8081A)

The samples listed below were reviewed for each of the following validation areas. Validation findings are noted in attached validation findings worksheets.

	Validation Area		Comments
I.	Technical holding times	A	Sampling dates: 3/18/05
II.	GC/ECD Instrument Performance Check	N	
III.	Initial calibration	N	
IV.	Continuing calibration	N	
V.	Blanks	A	
VI.	Surrogate spikes	A	
VII.	Matrix spike/Matrix spike duplicates	SW	
VIII.	Laboratory control samples / SRM	SW	LCS
IX.	Regional quality assurance and quality control	N	
Xa.	Florisil cartridge check	N	
Xb.	GPC Calibration	N	Sulfur + Silica gel clean up
XI.	Target compound identification	N	
XII.	Compound quantitation and reported CRQLs	N	
XIII.	Overall assessment of data	A	
XIV.	Field duplicates	N	
XV.	Field blanks	N	

Note: A = Acceptable
N = Not provided/applicable
SW = See worksheet
ND = No compounds detected
R = Rinsate
FB = Field blank
D = Duplicate
TB = Trip blank
EB = Equipment blank

Validated Samples: Sediment

1	LDW-SSB7a-010	11	MB-032205	21		31	
2	LDW-SSB7a-010MS	12		22		32	
3	LDW-SSB7a-010MSD	13		23		33	
4		14		24		34	
5		15		25		35	
6		16		26		36	
7		17		27		37	
8		18		28		38	
9		19		29		39	
10		20		30		40	

LDC #: 13419B3a
SDG #: HW16

VALIDATION FINDINGS WORKSHEET
Matrix Spike/Matrix Spike Duplicates

Page: 1 of 1
Reviewer: B
2nd Reviewer: K

METHOD: ✓ GC ___ HPLC

Please see qualifications below for all questions answered "N". Not applicable questions are identified as "N/A".

[✓ Y] N N/A Were a matrix spike (MS) and matrix spike duplicate (MSD) analyzed for each matrix in this SDG?
[✓ Y] N N/A Was an MS/MSD analyzed every 20 samples for each matrix or whenever a sample extraction was performed?
Y [✓ N] N/A Were the MS/MSD percent recoveries (%R) and relative percent differences (RPD) within QC limits?

#	MS/MSD ID	Compound	MS %R (Limits)	MSD %R (Limits)	RPD (Limits)	Associated Samples	Qualifications
	2 & 3	Hexachlorobenzene	330 (50-150)	( )	130 (50)	#1	J/UJ/A
			( )	( )	( )		
			( )	( )	( )		
			( )	( )	( )		
			( )	( )	( )		
			( )	( )	( )		
			( )	( )	( )		
			( )	( )	( )		
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LDC #: 13419B3a
SDG #: HW16

VALIDATION FINDINGS WORKSHEET

Laboratory Control Samples

Page: 1 of 1
Reviewer:
2nd Reviewer:

METHOD: GC Pesticides/PCBs (EPA SW 846 Method 8081/8082)

Please see qualifications below for all questions answered "N". Not applicable questions are identified as "N/A".

[✓ Y] N N/A Were a laboratory control samples (LCS) and laboratory control sample duplicate (LCSD) analyzed for each matrix in this SDG? ________

Y [✓ N] N/A Were the LCS percent recoveries (%R) and relative percent differences (RPD) within the QC limits?

Level IV/D Only

Y N [✓ N/A] Was a LCS analyzed every 20 samples for each matrix or whenever a sample extraction was performed?

#	Date	LCS/LCSD ID	Compound	LCS %R (Limits)	LCSD %R (Limits)	RPD (Limits)	Associated Samples	Qualifications
		LCS-032205	R	19.5 (50-150)	( )	( )	All + Blk	J/UJ/P
				( )	( )	( )		
				( )	( )	( )		
				( )	( )	( )		
				( )	( )	( )		
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LDC #: 13381A3b

SDG #: HU85

Laboratory: Analytical Resources, Inc.

VALIDATION COMPLETENESS WORKSHEET

Level II

Date: 4/20/05

Page: 1 of 1

Reviewer:

2nd Reviewer:

METHOD: GC Polychlorinated Biphenyls (EPA SW 846 Method 8082)

The samples listed below were reviewed for each of the following validation areas. Validation findings are noted in attached validation findings worksheets.

	Validation Area		Comments
I.	Technical holding times	A	Sampling dates: 3/7/05
II.	GC/ECD Instrument Performance Check	N	
III.	Initial calibration	N	
IV.	Continuing calibration	N	
V.	Blanks	A	
VI.	Surrogate spikes	A	
VII.	Matrix spike/Matrix spike duplicates	A	AQ = QC sample
VIII.	Laboratory control samples / SRM	A	LCS/D
IX.	Regional quality assurance and quality control	N	
Xa.	Florisil cartridge check	N	
Xb.	GPC Calibration	N	Acid + Sulfur clean up
XI.	Target compound identification	A	
XII.	Compound quantitation and reported CRQLs	SW	
XIII.	Overall assessment of data	SW	
XIV.	Field duplicates	SW	D = 5 + 7
XV.	Field blanks	ND	RB = 12

Note: A = Acceptable
N = Not provided/applicable
SW = See worksheet
ND = No compounds detected
R = Rinsate
FB = Field blank
D = Duplicate
TB = Trip blank
EB = Equipment blank
RB = Rinse Blank

Validated Samples: Sediment + water

1	LDW-SS85-010 D	11	LDW-SS8-010	21	MB-031505	~~31~~	HU8 MB S1
2	LDW-SS85-010DL	12	LDW-SS103-RB W	22	MB-031405	~~32~~	HU85MBW1
3	LDW-SS73-010	13	LDW-SS74-010MS	23		33	
4	LDW-SS78-010	14	LDW-SS74-010MSD	24		34	
5	LDW-SS82-010 D	15		25		35	
6	LDW-SS74-010	16		26		36	
7	LDW-SS204-010 D	17		27		37	
8	LDW-SS91-010	18		28		38	
9	LDW-SS103-010	19		29		39	
10	LDW-SS68-010	20		30		40	

VALIDATION FINDINGS WORKSHEET

METHOD: Pesticide/PCBs (EPASW 846 Method 8081/8082)

A. alpha-BHC	I. Dieldrin	Q. Endrin ketone	Y. Aroclor-1242	GG.
B. beta-BHC	J. 4,4'-DDE	R. Endrin aldehyde	Z. Aroclor-1248	HH.
C. delta-BHC	K. Endrin	S. alpha-Chlordane	AA. Aroclor-1254	II.
D. gamma-BHC	L. Endosulfan II	T. gamma-Chlordane	BB. Aroclor-1260	JJ.
E. Heptachlor	M. 4,4'-DDD	U. Toxaphene	CC. DB 608	KK.
F. Aldrin	N. Endosulfan sulfate	V. Aroclor-1016	DD. DB 1701	LL.
G. Heptachlor epoxide	O. 4,4'-DDT	W. Aroclor-1221	EE.	MM.
H. Endosulfan I	P. Methoxychlor	X. Aroclor-1232	FF.	NN.

Notes: _____

LDC #: 13381A3b
SDG #: HU85

VALIDATION FINDINGS WORKSHEET
Compound Quantitation and Reported CRQLs

Reviewer: FT
2nd Reviewer: [illegible]

METHOD: ✓ GC __ HPLC

Please see qualifications below for all questions answered "N". Not applicable questions are identified as "N/A".
Level IV/D Only
Y N N/A Were CRQLs adjusted for sample dilutions, dry weight factors, etc.?
Y N N/A Did the reported results for detected target compounds agree within 10.0% of the recalculated results?

#	Compound Name	Finding	Associated Samples	Qualifications
	AA	exceeded cal range	1	J/A det

Comments: See sample calculation verification worksheet for recalculations

LDC #: 13381A36
SDG #: HUB5

VALIDATION FINDINGS WORKSHEET
Overall Assessment of Data

Reviewer:
2nd Reviewer:

METHOD: GC/MS BNA (EPA SW 846 Method 8270)

Please see qualifications below for all questions answered "N". Not applicable questions are identified as "N/A".

All available information pertaining to the data were reviewed using professional judgement to compliment the determination of the overall quality of the data.

Y N N/A Was the overall quality and usability of the data acceptable?

#	Date	Sample ID	Finding	Associated Samples	Qualifications
		1	AA & BB-		R/A
			AA exceeded cal range		
			BB lower than diluted result		
		2	All except Above diluted		R/A

Comments:

LDC #: 13381A36
SDG #: HU85

VALIDATION FINDINGS WORKSHEET
Field Duplicates

Page: 1 of 1
Reviewer: [illegible]
2nd reviewer: [illegible]

METHOD: ___ GC ___ HPLC

Y N N/A Were field duplicate pairs identified in this SDG?

Y N N/A Were target compounds detected in the field duplicate pairs?

Compound	Concentration (ug/kg)		%RPD Limit 50	Qualification Parent only / All Samples
	5	7		
Z	62	60	3	
AA	72	84	15	
BB	59	62	5	

Compound	Concentration ( )		%RPD Limit _____	Qualification Parent only / All Samples

LDC #: 13381B3b
SDG #: HV37
Laboratory: Analytical Resources, Inc.

VALIDATION COMPLETENESS WORKSHEET
Level II

Date: 4/20/05
Page: 1 of 2
Reviewer: RJ
2nd Reviewer: [illegible]

METHOD: GC Polychlorinated Biphenyls (EPA SW 846 Method 8082)

The samples listed below were reviewed for each of the following validation areas. Validation findings are noted in attached validation findings worksheets.

	Validation Area		Comments
I.	Technical holding times	A	Sampling dates: 3/9/05
II.	GC/ECD Instrument Performance Check	A	
III.	Initial calibration	N	
IV.	Continuing calibration	N	
V.	Blanks	A	
VI.	Surrogate spikes	A	
VII.	Matrix spike/Matrix spike duplicates	A	AQ QC sample
VIII.	Laboratory control samples / SRM	A	LCS
IX.	Regional quality assurance and quality control	N	
Xa.	Florisil cartridge check	N	
Xb.	GPC Calibration	N	Acid + Sulfur clean up
XI.	Target compound identification	A	
XII.	Compound quantitation and reported CRQLs	SW	
XIII.	Overall assessment of data	SW	
XIV.	Field duplicates	SW	D = 10 & 11
XV.	Field blanks	ND	RB = 17

Note: A = Acceptable
N = Not provided/applicable
SW = See worksheet
ND = No compounds detected
R = Rinsate
FB = Field blank
D = Duplicate
TB = Trip blank
EB = Equipment blank
RB = Rinse Blk

Validated Samples: all sediment except 17 (water)

1	LDW-SS7-10 10	11	LDW-SS207-10 10 D	21	HV37MW1	31	
2	LDW-SS3-10 10	12	LDW-SS146-10 10	22	HV37MBS1	32	
3	LDW-SS95-10 10	13	LDW-SS147-10 10	23	LDW-SS148-010 DL	33	
4	LDW-SS133-10 10	14	LDW-SS148-10 10	24		34	
5	LDW-SS138-10 10	15	LDW-SS149-10 10	25		35	
6	LDW-SS139-10 10	16	LDW-SS150-10 10	26		36	
7	LDW-SS137-10 10	17	LDW-SS7-RB W	27		37	
8	LDW-SS132-10 10	18	LDW-SS3-010MS	28		38	
9	LDW-SS66-10 10	19	LDW-SS3-010MSD	29		39	
10	LDW-SS62-10 10 D	20		30		40	

LDC #: 13381B3b
SDG #: HV37

VALIDATION FINDINGS WORKSHEET
Compound Quantitation and Reported CRQLs

Page: 1 of 1
Reviewer: [illegible]
2nd Reviewer: [illegible]

METHOD: GC Pesticides/PCBs (EPA SW 846, 8081)

Please see qualifications below for all questions answered "N". Not applicable questions are identified as "N/A".
Level IV/D Only

Y N N/A Were CRQLs adjusted for sample dilutions, dry weight factors, cleanup, activities, etc.?
Y N N/A Did the recalculated results for detected target compounds agree within 10.0% of the reported results?

#	Date	Lab ID/Reference	Finding	Associated Samples	Qualifications
		14	AA exceeded cal range		J/A dd

Comments: See sample calculation verification worksheet for recalculations

LDC #: 13381B3b
SDG #: HY37

VALIDATION FINDINGS WORKSHEET
Overall Assessment of Data

Page: 1 of 1
Reviewer: [illegible]
2nd Reviewer: [illegible]

METHOD: GC Pesticides/PCBs (EPA SW846 Method 8081/8082)

Please see qualifications below for all questions answered "N". Not applicable questions are identified as "N/A".

All available information pertaining to the data were reviewed using professional judgement to compliment the determination of the overall quality of the data.

Y N N/A Was the overall quality and usability of the data acceptable?

#	Date	Sample ID	Finding	Associated Samples	Qualifications
		14	AA exceeded cal range.		R/A
		23	all except Above diluted		R/A

Comments: _____

LDC #: 13381B36
SDG #: #V37

VALIDATION FINDINGS WORKSHEET
Field Duplicates

Page: 1 of 1
Reviewer: [illegible]
2nd reviewer: [illegible]

METHOD: GC Pesticides/PCBs (EPA SW846 Method 8081/8082)

(Y) N N/A Were field duplicate pairs identified in this SDG?
Y (N) N/A Were target compounds detected in thie field duplicate pairs?

Compound	Concentration (ng/kg)		RPD
Z	82	76	8
AA	140	130	7
BB	120	110	9

Compound	Concentration ( )		RPD

Compound	Concentration ( )		RPD

Compound	Concentration ( )		RPD

LDC #: 13381C3b
SDG #: HV42
Laboratory: Analytical Resources, Inc.

VALIDATION COMPLETENESS WORKSHEET
Level II

Date: 4/20/05
Page: 1 of 1
Reviewer:
2nd Reviewer:

METHOD: GC Polychlorinated Biphenyls (EPA SW 846 Method 8082)

The samples listed below were reviewed for each of the following validation areas. Validation findings are noted in attached validation findings worksheets.

	Validation Area		Comments
I.	Technical holding times	A	Sampling dates: 3/10/05
II.	GC/ECD Instrument Performance Check	A	
III.	Initial calibration	A/N	
IV.	Continuing calibration	A/N	
V.	Blanks	A	
VI.	Surrogate spikes	A	
VII.	Matrix spike/Matrix spike duplicates	A	
VIII.	Laboratory control samples	A	
IX.	Regional quality assurance and quality control	N	
Xa.	Florisil cartridge check	N	
Xb.	GPC Calibration	N	Acid + Sulfur clean up
XI.	Target compound identification	A	
XII.	Compound quantitation and reported CRQLs	SW	
XIII.	Overall assessment of data	SW	
XIV.	Field duplicates	N	
XV.	Field blanks	N	

Note: A = Acceptable
N = Not provided/applicable
SW = See worksheet
ND = No compounds detected
R = Rinsate
FB = Field blank
D = Duplicate
TB = Trip blank
EB = Equipment blank

Validated Samples: Sediment

1	LDW-SS45-010	11	LDW-SS6-010D1	21		31	
2	LDW-SS46-010	12	HV42MS1	22		32	
3	LDW-SS6-010	13		23		33	
4	LDW-SS47-010	14		24		34	
5	LDW-SS108-010	15		25		35	
6	LDW-SS61-010	16		26		36	
7	LDW-SS25-010	17		27		37	
8	LDW-SS86-010	18		28		38	
9	LDW-SS25-010MS	19		29		39	
10	LDW-SS25-010MSD	20		30		40	

LDC #: 13381C36
SDG #: HV42

VALIDATION FINDINGS CHECKLIST

Reviewer: B
2nd Reviewer: M

Method: ✓ GC _____ HPLC

Validation Area	Yes	No	NA	Findings/Comments
I. Technical holding times				
All technical holding times were met.	✓			
Cooler temperature criteria was met.	✓			
II. Initial calibration				
Did the laboratory perform a 5 point calibration prior to sample analysis?	✓			
Was a linear fit used for evaluation? If yes, were all percent relative standard deviations (%RSD) ≤ 20%?	✓			
Was a curve fit used for evaluation? If Yes, what was the acceptance criteria used?		✓		
Did the initial calibration meet the curve fit acceptance criteria?			✓	
Were the RT windows properly established?	✓			
IV. Continuing calibration				
What type of continuing calibration calculation was performed? ____%D or ____%R	✓			
Was a continuing calibration analyzed daily?	✓			
Were all percent differences (%D) ≤ 15%.0 or percent recoveries 85-115%?	✓			
Were all the retention times within the acceptance windows?	✓			
V. Blanks				
Was a method blank associated with every sample in this SDG?	✓			
Was a method blank analyzed for each matrix and concentration?	✓			
Was there contamination in the method blanks? If yes, please see the Blanks validation completeness worksheet.		✓		
VI. Surrogate spikes				
Were all surrogate %R within the QC limits?	✓			
If the percent recovery (%R) of one or more surrogates was outside QC limits, was a reanalysis performed to confirm %R?			✓	
If any %R was less than 10 percent, was a reanalysis performed to confirm %R?			✓	
VII. Matrix spike/Matrix spike duplicates				
Were a matrix spike (MS) and matrix spike duplicate (MSD) analyzed for each matrix in this SDG? If no, indicate which matrix does not have an associated MS/MSD. Soil / Water.	✓			
Was a MS/MSD analyzed every 20 samples of each matrix?	✓			
Were the MS/MSD percent recoveries (%R) and the relative percent differences (RPD) within the QC limits?	✓			
VIII. Laboratory control samples				
Was an LCS analyzed for this SDG?	✓			
Was an LCS analyzed per extraction batch?	✓			

LDC #: 13381C36
SDG #: HV42

VALIDATION FINDINGS CHECKLIST

Reviewer: B
2nd Reviewer: K

Validation Area	Yes	No	NA	Findings/Comments
Were the LCS percent recoveries (%R) and relative percent difference (RPD) within the QC limits?	✓			
IX. Regional Quality Assurance and Quality Control				
Were performance evaluation (PE) samples performed?			✓	
Were the performance evaluation (PE) samples within the acceptance limits?			✓	
X. Target compound identification				
Were the retention times of reported detects within the RT windows?	✓			
XI. Compound quantitation/CRQLs				
Were compound quantitation and CRQLs adjusted to reflect all sample dilutions and dry weight factors applicable to level IV validation?	✓			
XII. System performance				
System performance was found to be acceptable.	✓			
XIII. Overall assessment of data				
Overall assessment of data was found to be acceptable.	✓			
XIV. Field duplicates				
Were field duplicate pairs identified in this SDG?		✓		
Were target compounds idetected in the field duplicates?			✓	
XV. Field blanks				
Were field blanks identified in this SDG?		✓		
Were target compounds detected in the field blanks?			✓	

LDC #: 13381C36
SDG #: HV42

VALIDATION FINDINGS WORKSHEET
Compound Quantitation and Reported CRQLs

Page: 1 of 1
Reviewer:
2nd Reviewer:

METHOD: GC Pesticides/PCBs (EPA SW 846, 8081)

Please see qualifications below for all questions answered "N". Not applicable questions are identified as "N/A".
Level IV/D Only

Y N N/A Were CRQLs adjusted for sample dilutions, dry weight factors, cleanup, activities, etc.?
Y N N/A Did the recalculated results for detected target compounds agree within 10.0% of the reported results?

#	Date	Lab ID/Reference	Finding	Associated Samples	Qualifications
		# 3	Z, AA, BB exceeded cal range		J/A det

Comments: See sample calculation verification worksheet for recalculations

LDC #: 13381c3b
SDG #: HV42

VALIDATION FINDINGS WORKSHEET
Overall Assessment of Data

Reviewer: D
2nd Reviewer: ac

METHOD: GC Pesticides/PCBs (EPA SW846 Method 8081/8082)

Please see qualifications below for all questions answered "N". Not applicable questions are identified as "N/A".

All available information pertaining to the data were reviewed using professional judgement to compliment the determination of the overall quality of the data.

Y N N/A Was the overall quality and usability of the data acceptable?

#	Date	Sample ID	Finding	Associated Samples	Qualifications
		3	Z, AA, BB exceeded cal range		R/A
		11	all except above diluted		R/A

Comments: _____

LDC #: 13381c3b
SDG #: HV42

VALIDATION FINDINGS WORKSHEET
Initial Calibration Calculation Verification

Page: 1 of 1
Reviewer: [illegible]
2nd Reviewer: [illegible]

METHOD: GC / HPLC

The calibration Factor (CF), average CF, and percent relative standard deviation (%RSD) were recalculated for the compounds identified below using the following calculations:

CF = A/C
average CF = sum of the CF/number of standards
%RSD = 100 * (S/X)

A = Area of compound,
C = Concentration of compound,
S = Standard deviation of the CF
X = Mean of the CFs

#	Standard ID	Calibration Date	Compound	Reported CF (0.25 std)	Recalculated CF (0.25 std)	Reported Average CF (initial)	Recalculated Average CF (initial)	Reported %RSD	Recalculated %RSD
1	RCB1 CLPPest	3/1/05	Aroclor 1260-1	0.10024	0.10024	0.09383	0.09383	14.279	14.279
2	ZB-35	↓	↓	0.07447	0.07447	0.07049	0.07049	5.564	5.564
3									
4									

Comments: Refer to Initial Calibration findings worksheet for list of qualifications and associated samples when reported results do not agree within 10.0% of the recalculated results.

LDC #: 13358le3b
SDG #: HV42

VALIDATION FINDINGS WORKSHEET
Continuing Calibration Results Verification

Page: 1 of 1
Reviewer: B
2nd Reviewer: A

METHOD: GC ✓ HPLC ____

The percent difference (%D) of the initial calibration average Calibration Factors (CF) and the continuing calibration CF were recalculated for the compounds identified below using the following calculation:

% Difference = 100 * (ave. CF - CF)/ave. CF
CF = A/C

Where: ave. CF = initial calibration average CF
CF = continuing calibration CF
A = Area of compound
C = Concentration of compound

#	Standard ID	Calibration Date	Compound	Average CF(ical)/ CCV Conc.	Reported CF/Conc. CCV	Recalculated CF/Conc. CCV	Reported %D	Recalculated %D
1	AR166018	3/23/05	Aroclor 1260-1	0.50	0.45	0.45	9.9	9.9
	17:26							
	~~CLPBest~~	ZB35						
2		CLPEST	↓	0.50	0.41	0.41	18.5	18.5
3	17:27	3/28/05	↓	0.50	0.57	0.57	13.8	13.8
		CLPEST						
4		ZB35	↓	0.50	0.47	0.47	5.2	5.2

Comments: Refer to Continuing Calibration findings worksheet for list of qualifications and associated samples when reported results do not agree within 10.0% of the recalculated results.

LDC #: 13381C36
SDG #: HV42

VALIDATION FINDINGS WORKSHEET
Surrogate Results Verification

Reviewer: B
2nd reviewer: K

METHOD: GC ___ HPLC

The percent recoveries (%R) of surrogates were recalculated for the compounds identified below using the following calculation:

% Recovery: SF/SS * 100

Where: SF = Surrogate Found
SS = Surrogate Spiked

Sample ID: #1

Surrogate	Column/Detector	Surrogate Spiked	Surrogate Found	Percent Recovery	Percent Recovery	Percent Difference
				Reported	Recalculated	
DCB	CLPPEST	0.04	0.0307	132	132	0
TCMX	↓	↓	0.0527	76.8	76.8	↓

Sample ID:

Surrogate	Column/Detector	Surrogate Spiked	Surrogate Found	Percent Recovery	Percent Recovery	Percent Difference
				Reported	Recalculated	

Sample ID:

Surrogate	Column/Detector	Surrogate Spiked	Surrogate Found	Percent Recovery	Percent Recovery	Percent Difference
				Reported	Recalculated	

LDC #: 13381c36
SDG #: HV42

VALIDATION FINDINGS WORKSHEET
Matrix Spike/Matrix Spike Duplicates Results Verification

Reviewer: 5
2nd Reviewer: R

METHOD: __GC __HPLC

The percent recoveries (%R) and relative percent differences (RPD) of the matrix spike and matrix spike duplicate were recalculated for the compounds identified below using the following calculation:

%Recovery = 100 * (SSC - SC)/SA Where SSC = Spiked concentration SC = Sample concentration
SA = Spike added

RPD =({SSCMS - SSCMSD} * 2) / (SSCMS + SSCMSD))*100 MS = Matrix spike percent recovery MSD = Matrix spike duplicate percent recovery

MS/MSD samples: 9 & 10

Compound	Spike Added (ug/kg)		Sample Conc. (ug/kg)	Spike Sample Concentration (ug/kg)		Matrix spike Percent Recovery		Matrix Spike Duplicate Percent Recovery		MS/MSD RPD	
	MS	MSD	---	MS	MSD	Reported	Recalc.	Reported	Recalc.	Reported	Recalc.
Gasoline (8015)											
Diesel (8015)											
Benzene (8021B)											
Methane (RSK-175)											
2,4-D (8151)											
Dinoseb (8151)											
Naphthalene (8310)											
Anthracene (8310)											
HMX (8330)											
2,4,6-Trinitrotoluene (8330)											
Aroclor 1260	98.5	98.5	ND	105	127	107	107	129	129	19.0	19

Comments: Refer to Matrix Spike/Matrix Spike Duplicates findings worksheet for list of qualifications and associated samples when reported results do not agree within 10.0% of the recalculated results.

LDC #: 13381c3b
SDG #: HV42

VALIDATION FINDINGS WORKSHEET
Laboratory Control Sample/Laboratory Control Sample Duplicates Results Verification

Reviewer: 1
2nd Reviewer: R

METHOD: GC HPLC

The percent recoveries (%R) and relative percent differences (RPD) of the laboratory control sample and laboratory control sample duplicate were recalculated for the compounds identified below using the following calculation:

%Recovery = 100 * (SSC - SC)/SA Where SSC = Spiked concentration, SA = Spike added, SC = Sample concentration

RPD =(({SSCLCS - SSCLCSD} * 2) / (SSCLCS + SSCLCSD))*100 LCS = Laboratory Control Sample percent recovery LCSD = Laboratory Control Sample duplicate percent recovery

LCS/LCSD samples: LCS-031905

Compound	Spike Added (ug/kg)		Sample Conc. (ug/kg)	Spike Sample Concentration (ug/kg)		LCS Percent Recovery		LCSD Percent Recovery		LCS/LCSD RPD	
	LCS	LCSD	---	LCS	LCSD	Reported	Recalc.	Reported	Recalc.	Reported	Recalc.
Gasoline (8015)											
Diesel (8015)											
Benzene (8021B)											
Methane (RSK-175)											
2,4-D (8151)											
Dinoseb (8151)											
Naphthalene (8310)											
Anthracene (8310)											
HMX (8330)											
2,4,6-Trinitrotoluene (8330)											
Aroclor 1260	102	NA	ND	107	NA	105	105	NA			

Comments: Refer to Laboratory Control Sample/Laboratory Control Sample Duplicate findings worksheet for list of qualifications and associated samples when reported results do not agree within 10.0% of the recalculated results.

LDC #: 13381C36
SDG #: HV42

VALIDATION FINDINGS WORKSHEET
Sample Calculation Verification

Page: 1 of 1
Reviewer: [illegible]
2nd Reviewer: [illegible]

METHOD: ✓ GC ___ HPLC

Y N N/A Were all reported results recalculated and verified for all level IV samples?
Y N N/A Were all recalculated results for detected target compounds within 10% of the reported results?

Concentration= $\frac{(A)(Fv)(Df)}{(RF)(Vs \text{ or } Ws)(\%S/100)}$

A= Area or height of the compound to be measured
Fv= Final Volume of extract
Df= Dilution Factor
RF= Average response factor of the compound in the initial calibration
Vs= Initial volume of the sample
Ws= Initial weight of the sample
%S= Percent Solid

Example:

Sample ID. #1 Compound Name PCB-1260

Concentration = $\frac{0.477 \times 5 \times 1000}{25.4}$

= 94 ug/kg

#	Sample ID	Compound	Reported Concentrations ( )	Recalculated Results Concentrations ( )	Qualifications
	1260-2 =	$\frac{5}{9241233} \times 0.05 = 0.0523$	= 0.577		
	PCB 1260 - $\frac{(2+3+4+5)}{4}$	= 0.577+0.352+0.556+0.423 / 4		= 0.477	

Comments: ___

SAMPCALew.wpd

LDC #: 13384A3b

SDG #: HV00

Laboratory: Analytical Resources, Inc.

VALIDATION COMPLETENESS WORKSHEET

Level II

Date: 4/20/05

Page: 1 of 1

Reviewer:

2nd Reviewer:

METHOD: GC Polychlorinated Biphenyls (EPA SW 846 Method 8082)

The samples listed below were reviewed for each of the following validation areas. Validation findings are noted in attached validation findings worksheets.

	Validation Area		Comments
I.	Technical holding times	A	Sampling dates: 3/8/05
II.	GC/ECD Instrument Performance Check	A	
III.	Initial calibration	N	
IV.	Continuing calibration	N	
V.	Blanks	A	
VI.	Surrogate spikes	A	
VII.	Matrix spike/Matrix spike duplicates	A	
VIII.	Laboratory control samples / SRM	A	LCS
IX.	Regional quality assurance and quality control	N	
Xa.	Florisil cartridge check	N	
Xb.	GPC Calibration	N	Acid clean up + Sulfur clean up
XI.	Target compound identification	A	
XII.	Compound quantitation and reported CRQLs	SW	
XIII.	Overall assessment of data	N	
XIV.	Field duplicates	SW	P = 13 + 14, 6+7
XV.	Field blanks	N	

Note: A – Acceptable
N = Not provided/applicable
SW = See worksheet

ND – No compounds detected
R = Rinsate
FB = Field blank

D = Duplicate
TB = Trip blank
EB = Equipment blank

Validated Samples: sediment

1 +	LDW-SS81-010	11	LDW-SS106-010	21	MB-032405	31	
2 +	LDW-SS65-010	12	LDW-SS122-010	22		32	
3 +	LDW-SS41-010	13	LDW-SS131-010 D	23		33	
4 +	LDW-SS30-010	14	LDW-SS206-010 D	24		34	
5 +	LDW-SS21-010	15	LDW-SS140-010	25		35	
6	LDW-SS19-010	16	LDW-SS140-010MS	26		36	
7	LDW-SS205-010	17	LDW-SS140-010MSD	27		37	
8	LDW-SS11-010	18		28		38	
9	LDW-SS16-010	19		29		39	
10	LDW-SS105-010	20		30		40	

LDC #: 13384A36
SDG #: HV00

VALIDATION FINDINGS WORKSHEET
Compound Quantitation and Reported CRQLs

Reviewer: [illegible]
2nd Reviewer: [illegible]

METHOD: GC Pesticides/PCBs (EPA SW 846, 8081)

Please see qualifications below for all questions answered "N". Not applicable questions are identified as "N/A".
Level IV/D Only

Y N N/A Were CRQLs adjusted for sample dilutions, dry weight factors, cleanup, activities, etc.?
Y N N/A Did the recalculated results for detected target compounds agree within 10.0% of the reported results?

#	Date	compound ~~Lab ID/Reference~~	%RPD BT column ≤40 Finding	Associated Samples	Qualifications
		BB	43	8	J/Adet

Comments: See sample calculation verification worksheet for recalculations

LDC #: 13384A36
SDG #: HV00

VALIDATION FINDINGS WORKSHEET
Field Duplicates

Page: 1 of 1
Reviewer: JB
2nd reviewer: JC

METHOD: ✓ GC ___ HPLC

Y N N/A Were field duplicate pairs identified in this SDG?

Y N N/A Were target compounds detected in the field duplicate pairs?

Compound	Concentration (ug/kg)		%RPD Limit 30	Qualification Parent only / All Samples
	13	14		
AA	21	23	9	

Compound	Concentration (ug/kg)		%RPD Limit 50	Qualification Parent only / All Samples
	6	7		
Aroclor 1242	52	34	42	
1254	110	86	24	
1260	95	63	40	

LDC #: 13395A3b
SDG #: HV38
Laboratory: Analytical Resources, Inc.

VALIDATION COMPLETENESS WORKSHEET
Level II

Date: 4/20/05
Page: 1 of 1
Reviewer: [illegible]
2nd Reviewer: [illegible]

METHOD: GC Polychlorinated Biphenyls (EPA SW 846 Method 8082)

The samples listed below were reviewed for each of the following validation areas. Validation findings are noted in attached validation findings worksheets.

	Validation Area		Comments
I.	Technical holding times	A	Sampling dates: 3/11/05
II.	GC/ECD Instrument Performance Check	A	
III.	Initial calibration	N	
IV.	Continuing calibration	N	
V.	Blanks	A	
VI.	Surrogate spikes	A	
VII.	Matrix spike/Matrix spike duplicates	A	LDW-SS140-010
VIII.	Laboratory control samples SR/M	A	LCS
IX.	Regional quality assurance and quality control	N	
Xa.	Florisil cartridge check	N	
Xb.	GPC Calibration	N	Sulfur + Acid clean up
XI.	Target compound identification	A	
XII.	Compound quantitation and reported CRQLs	SW	
XIII.	Overall assessment of data	SW	
XIV.	Field duplicates	N	
XV.	Field blanks	N	

Note: A = Acceptable
N = Not provided/applicable
SW = See worksheet
ND = No compounds detected
R = Rinsate
FB = Field blank
D = Duplicate
TB = Trip blank
EB = Equipment blank

Validated Samples: Sediment

1	LDW-SS39-010	11	MB-03 2405	21		31	
2	LDW-SS100-010	12		22		32	
3	LDW-~~SS2b~~ SSB2b-010	13		23		33	
4	LDW-SSB2b-010 ~~MS~~	14	DL	24		34	
5	~~LDW-SS~~	15		25		35	
6		16		26		36	
7		17		27		37	
8		18		28		38	
9		19		29		39	
10		20		30		40	

SRM in SDG HV00

LDC #: 13395A36
SDG #: HV38

VALIDATION FINDINGS WORKSHEET
Compound Quantitation and Reported CRQLs

Reviewer: [redacted]
2nd Reviewer: M

METHOD: GC Pesticides/PCBs (EPA SW 846, 8081)

Please see qualifications below for all questions answered "N". Not applicable questions are identified as "N/A".
Level IV/D Only
Y N N/A Were CRQLs adjusted for sample dilutions, dry weight factors, cleanup, activities, etc.?
Y N N/A Did the recalculated results for detected target compounds agree within 10.0% of the reported results?

#	Date	Lab ID/Reference	Finding	Associated Samples	Qualifications
		3	Y, AA exceeded cal range		J/A dot

Comments: See sample calculation verification worksheet for recalculations

LDC #: 13395A36
SDG #: HV38

VALIDATION FINDINGS WORKSHEET
Overall Assessment of Data

Page: 1 of 7
Reviewer: [illegible]
2nd Reviewer: [illegible]

METHOD: GC Pesticides/PCBs (EPA SW846 Method 8081/8082)

Please see qualifications below for all questions answered "N". Not applicable questions are identified as "N/A".

All available information pertaining to the data were reviewed using professional judgement to compliment the determination of the overall quality of the data.

Y N N/A Was the overall quality and usability of the data acceptable?

#	Date	Sample ID	Finding	Associated Samples	Qualifications
		3	Y, AA exceeded cal range		R/A
		4	All except Above		R/A

Comments: _____

C:\WPDOCS\WRK\PEST\OVR.3S

LDC #: 13398A3b

SDG #: HV58

Laboratory: Analytical Resources, Inc.

VALIDATION COMPLETENESS WORKSHEET

Level II

Date: 4/28/05

Page: 1 of 1

Reviewer: FT

2nd Reviewer: [illegible]

METHOD: GC Polychlorinated Biphenyls (EPA SW 846 Method 8082)

The samples listed below were reviewed for each of the following validation areas. Validation findings are noted in attached validation findings worksheets.

	Validation Area		Comments
I.	Technical holding times	A	Sampling dates: 3/14/05
II.	GC/ECD Instrument Performance Check	NA	
III.	Initial calibration	N	
IV.	Continuing calibration	N	
V.	Blanks	A	
VI.	Surrogate spikes	A	
VII.	Matrix spike/Matrix spike duplicates	A	
VIII.	Laboratory control samples /SRM	A	LCS
IX.	Regional quality assurance and quality control	N	
Xa.	Florisil cartridge check	N	
Xb.	GPC Calibration	N	
XI.	Target compound identification	N	
XII.	Compound quantitation and reported CRQLs	N	
XIII.	Overall assessment of data	A	
XIV.	Field duplicates	N	
XV.	Field blanks	ND	RB = 13 & 14

Note: A = Acceptable; N = Not provided/applicable; SW = See worksheet; ND = No compounds detected; R = Rinsate; FB = Field blank; D = Duplicate; TB = Trip blank; EB = Equipment blank

Validated Samples: sediment + water

1	LDW-SS90-010	11	LDW-SS107-010	21	~~RA1~~	31	
2	LDW-SS24-010	12	LDW-SS145-010	22	MB-032405	32	
3	LDW-SS9-010	13	LDW-SSB7a-RB W	23		33	
4	LDW-SS77-010	14	LDW-SS71-RB W	24		34	
5	LDW-SS59-010	15	LDW-SS145-010MS	25		35	
6	LDW-SSB5b-010	16	LDW-SS145-010MSD	26		36	
7	LDW-SS53-010	17		27		37	
8	LDW-SS34-010	18		28		38	
9	LDW-SSB4a-010	19		29		39	
10	LDW-SS29-010	20		30		40	

LDC #: 13403A3b

SDG #: HV72

Laboratory: Analytical Resources, Inc.

VALIDATION COMPLETENESS WORKSHEET

Level ☒ II

Date: 4/20/05

Page: 1 of 1

Reviewer: EJ

2nd Reviewer: [illegible]

METHOD: GC Polychlorinated Biphenyls (EPA SW 846 Method 8082)

The samples listed below were reviewed for each of the following validation areas. Validation findings are noted in attached validation findings worksheets.

	Validation Area		Comments
I.	Technical holding times	A	Sampling dates: 3/15/05
II.	GC/ECD Instrument Performance Check	NA	
III.	Initial calibration	N	
IV.	Continuing calibration	N	
V.	Blanks	A	
VI.	Surrogate spikes	A	
VII.	Matrix spike/Matrix spike duplicates	A	LDW - SS145-010
VIII.	Laboratory control samples /SRM	A	LCS
IX.	Regional quality assurance and quality control	N	
Xa.	Florisil cartridge check	N	
Xb.	GPC Calibration	N	Acid + Sulfur clean up
XI.	Target compound identification	N	
XII.	Compound quantitation and reported CRQLs	N	
XIII.	Overall assessment of data	A	
XIV.	Field duplicates	N	
XV.	Field blanks	N	

Note: A = Acceptable
N = Not provided/applicable
SW = See worksheet

ND = No compounds detected
R = Rinsate
FB = Field blank

D = Duplicate
TB = Trip blank
EB = Equipment blank

Validated Samples: Sediment

1	LDW-SS93-010	11	MB-032405	21		31	
2	LDW-SS124-010	12		22		32	
3	LDW-SS135-010	13		23		33	
4	LDW-SS136-010	14		24		34	
5	LDW-SSB6a-010	15		25		35	
6	LDW-SSC1-010	16		26		36	
7		17		27		37	
8		18		28		38	
9		19		29		39	
10		20		30		40	

LDC #: 13412A3b
SDG #: HV76
Laboratory: Analytical Resources, Inc.

VALIDATION COMPLETENESS WORKSHEET
Level IV

Date: 4/28/05
Page: 1 of 1
Reviewer: [illegible]
2nd Reviewer: [illegible]

METHOD: GC Polychlorinated Biphenyls (EPA SW 846 Method 8082)

The samples listed below were reviewed for each of the following validation areas. Validation findings are noted in attached validation findings worksheets.

	Validation Area		Comments
I.	Technical holding times	A	Sampling dates: 3/15/04
II.	GC/ECD Instrument Performance Check	NA	
III.	Initial calibration	A	
IV.	Continuing calibration	A	
V.	Blanks	A	
VI.	Surrogate spikes	A	
VII.	Matrix spike/Matrix spike duplicates	A	
VIII.	Laboratory control samples /SRM	A	
IX.	Regional quality assurance and quality control	N	
Xa.	Florisil cartridge check	N	
Xb.	GPC Calibration	N	Sulfur + Acid clean up
XI.	Target compound identification	N	
XII.	Compound quantitation and reported CRQLs	A	
XIII.	Overall assessment of data	A	
XIV.	Field duplicates	N	
XV.	Field blanks	N	

Note: A = Acceptable
N = Not provided/applicable
SW = See worksheet
ND = No compounds detected
R = Rinsate
FB = Field blank
D = Duplicate
TB = Trip blank
EB = Equipment blank

Validated Samples: Sediment

1	LDW-SS98-010	11	LDW-SS151-010MS	21	MB-032205	31	
2	LDW-SS141-010	12	LDW-SS151-010MSD	22		32	
3	LDW-SSB9a-010	13		23		33	
4	LDW-SS156-010	14		24		34	
5	LDW-SS155-010	15		25		35	
6	LDW-SS154-010	16		26		36	
7	LDW-SS153-010	17		27		37	
8	LDW-SS152-010	18		28		38	
9	LDW-SS151-010	19		29		39	
10	LDW-SS144-010	20		30		40	

LDC #: 13412A3b
SDG #: HV76

VALIDATION FINDINGS CHECKLIST

Reviewer: [illegible]
2nd Reviewer: [illegible]

Method: ✓ GC _____ HPLC

Validation Area	Yes	No	NA	Findings/Comments
I. Technical holding times				
All technical holding times were met.	✓			
Cooler temperature criteria was met.	✓			
II. Initial calibration				
Did the laboratory perform a 5 point calibration prior to sample analysis?	✓			
Was a linear fit used for evaluation? If yes, were all percent relative standard deviations (%RSD) ≤ 20%?	✓			
Was a curve fit used for evaluation? If Yes, what was the acceptance criteria used?		✓		
Did the initial calibration meet the curve fit acceptance criteria?			✓	
Were the RT windows properly established?	✓			
IV. Continuing calibration				
What type of continuing calibration calculation was performed? ____%D or %R	✓			
Was a continuing calibration analyzed daily?	✓			
Were all percent differences (%D) ≤ 15%.0 or percent recoveries 85-115%?	✓			
Were all the retention times within the acceptance windows?	✓			
V. Blanks				
Was a method blank associated with every sample in this SDG?	✓			
Was a method blank analyzed for each matrix and concentration?	✓			
Was there contamination in the method blanks? If yes, please see the Blanks validation completeness worksheet.		✓		
VI. Surrogate spikes				
Were all surrogate %R within the QC limits?	✓			
If the percent recovery (%R) of one or more surrogates was outside QC limits, was a reanalysis performed to confirm %R?			✓	
If any %R was less than 10 percent, was a reanalysis performed to confirm %R?			✓	
VII. Matrix spike/Matrix spike duplicates				
Were a matrix spike (MS) and matrix spike duplicate (MSD) analyzed for each matrix in this SDG? If no, indicate which matrix does not have an associated MS/MSD. Soil / Water.	✓			
Was a MS/MSD analyzed every 20 samples of each matrix?	✓			
Were the MS/MSD percent recoveries (%R) and the relative percent differences (RPD) within the QC limits?	✓			
VIII. Laboratory control samples				
Was an LCS analyzed for this SDG?	✓			
Was an LCS analyzed per extraction batch?	✓			

LDC #: 13412A36
SDG #: HV76

VALIDATION FINDINGS CHECKLIST

Reviewer: [illegible]
2nd Reviewer: [illegible]

Validation Area	Yes	No	NA	Findings/Comments
Were the LCS percent recoveries (%R) and relative percent difference (RPD) within the QC limits?	✓			
IX. Regional Quality Assurance and Quality Control				
Were performance evaluation (PE) samples performed?			✓	
Were the performance evaluation (PE) samples within the acceptance limits?			✓	
X. Target compound identification				
Were the retention times of reported detects within the RT windows?	✓			
XI. Compound quantitation/CRQLs				
Were compound quantitation and CRQLs adjusted to reflect all sample dilutions and dry weight factors applicable to level IV validation?	✓			
XII. System performance				
System performance was found to be acceptable.	✓			
XIII. Overall assessment of data				
Overall assessment of data was found to be acceptable.	✓			
XIV. Field duplicates				
Were field duplicate pairs identified in this SDG?		✓		
Were target compounds idetected in the field duplicates?			✓	
XV. Field blanks				
Were field blanks identified in this SDG?		✓		
Were target compounds detected in the field blanks?			✓	

LDC #: 13412A36
SDG #: HV76

VALIDATION FINDINGS WORKSHEET
Initial Calibration Calculation Verification

Reviewer: [illegible]
2nd Reviewer: [illegible]

METHOD: GC ✓ HPLC ____

The calibration Factor (CF), average CF, and percent relative standard deviation (%RSD) were recalculated for the compounds identified below using the following calculations:

CF = A/C
average CF = sum of the CF/number of standards
%RSD = 100 * (S/X)

A = Area of compound,
C = Concentration of compound,
S = Standard deviation of the CF
X = Mean of the CFs

#	Standard ID	Calibration Date	Compound	Reported CF (0.25 std)	Recalculated CF (0.25 std)	Reported Average CF (initial)	Recalculated Average CF (initial)	Reported %RSD	Recalculated %RSD
1	CLPEST 8082A ICAL	3/15/05	Aroclor 1260-1	0.1002	0.1002	0.0938	0.0938	14.3	14.3
2	ZB35 ICAL	3/15/05	Aroclor 1260-1	0.0745	0.0745	0.0705	0.0705	5.6	5.6
3									
4									

Comments: Refer to Initial Calibration findings worksheet for list of qualifications and associated samples when reported results do not agree within 10.0% of the recalculated results.

LDC #: 13412A36
SDG #: HV76

VALIDATION FINDINGS WORKSHEET
Continuing Calibration Results Verification

Reviewer: [illegible]
2nd Reviewer: [illegible]

METHOD: GC / HPLC

The percent difference (%D) of the initial calibration average Calibration Factors (CF) and the continuing calibration CF were recalculated for the compounds identified below using the following calculation:

% Difference = 100 * (ave. CF - CF)/ave. CF
CF = A/C

Where: ave. CF = initial calibration average CF
CF = continuing calibration CF
A = Area of compound
C = Concentration of compound

#	Standard ID	Calibration Date	Compound	Average CF(ical)/ CCV Conc.	Reported CF/Conc. CCV	Recalculated CF/Conc. CCV	Reported %D	Recalculated %D
1	EXPEST	3/30/05 1926	Aroclor 1260-1	0.50	0.52	0.52	3.7	3.7
	CCV							
2	ZB35	↓	↓	0.50	0.50	0.50	0.2	0.2
	CCV							
3								
4								

Comments: Refer to Continuing Calibration findings worksheet for list of qualifications and associated samples when reported results do not agree within 10.0% of the recalculated results.

LDC #: 13412A36
SDG #: HV76

VALIDATION FINDINGS WORKSHEET
Surrogate Results Verification

Reviewer: [illegible]
2nd reviewer: [illegible]

METHOD: __ GC __ HPLC

The percent recoveries (%R) of surrogates were recalculated for the compounds identified below using the following calculation:

% Recovery: SF/SS * 100

Where: SF = Surrogate Found
SS = Surrogate Spiked

Sample ID: #

Surrogate	Column/Detector	Surrogate Spiked	Surrogate Found	Percent Recovery	Percent Recovery	Percent Difference
				Reported	Recalculated	
DCB	CLPEST	0.04	0.0530	132	132	0
TCMX	↓	↓	0.0402	100	100	0

Sample ID:

Surrogate	Column/Detector	Surrogate Spiked	Surrogate Found	Percent Recovery	Percent Recovery	Percent Difference
				Reported	Recalculated	

Sample ID:

Surrogate	Column/Detector	Surrogate Spiked	Surrogate Found	Percent Recovery	Percent Recovery	Percent Difference
				Reported	Recalculated	

LDC #: 13412A36
SDG #: HV76

VALIDATION FINDINGS WORKSHEET
Matrix Spike/Matrix Spike Duplicates Results Verification

Reviewer: [illegible]
2nd Reviewer: [illegible]

METHOD: ~~GC~~ HPLC

The percent recoveries (%R) and relative percent differences (RPD) of the matrix spike and matrix spike duplicate were recalculated for the compounds identified below using the following calculation:

%Recovery = 100 * (SSC - SC)/SA Where SSC = Spiked concentration SA = Spike added SC = Sample concentration

RPD =({SSCMS - SSCMSD} * 2) / (SSCMS + SSCMSD))*100 MS = Matrix spike percent recovery MSD = Matrix spike duplicate percent recovery

MS/MSD samples: 11 & 12

Compound	Spike Added (ug/kg)		Sample Conc. (ug/kg)	Spike Sample Concentration (ug/kg)		Matrix spike Percent Recovery		Matrix Spike Duplicate Percent Recovery		MS/MSD RPD	
	MS	MSD	---	MS	MSD	Reported	Recalc.	Reported	Recalc.	Reported	Recalc.
Gasoline (8015)											
Diesel (8015)											
Benzene (8021B)											
Methane (RSK-175)											
2,4-D (8151)											
Dinoseb (8151)											
Naphthalene (8310)											
Anthracene (8310)											
HMX (8330)											
2,4,6-Trinitrotoluene (8330)											
Aroclor 1260	98.8	99.3	ND	95.5	97.9	~~97.9~~ 96.7	96.7	~~98.3~~ 98.6	98.6	2.5	2.5

Comments: Refer to Matrix Spike/Matrix Spike Duplicates findings worksheet for list of qualifications and associated samples when reported results do not agree within 10.0% of the recalculated results.

LDC #: 13412A36
SDG #: HV76

VALIDATION FINDINGS WORKSHEET
Laboratory Control Sample/Laboratory Control Sample Duplicates Results Verification

Reviewer: 5
2nd Reviewer:

METHOD: GC HPLC

The percent recoveries (%R) and relative percent differences (RPD) of the laboratory control sample and laboratory control sample duplicate were recalculated for the compounds identified below using the following calculation:

%Recovery = 100 * (SSC - SC)/SA Where SSC = Spiked concentration, SA = Spike added, SC = Sample concentration

RPD =(({SSCLCS - SSCLCSD} * 2) / (SSCLCS + SSCLCSD))*100 LCS = Laboratory Control Sample percent recovery LCSD = Laboratory Control Sample duplicate percent recovery

LCS/LCSD samples: LCS-032205

Compound	Spike Added (ug/kg)		Sample Conc. (ug/kg)	Spike Sample Concentration (ug/kg)		LCS Percent Recovery		LCSD Percent Recovery		LCS/LCSD RPD	
	LCS	LCSD	---	LCS	LCSD	Reported	Recalc.	Reported	Recalc.	Reported	Recalc.
Gasoline (8015)											
Diesel (8015)											
Benzene (8021B)											
Methane (RSK-175)											
2,4-D (8151)											
Dinoseb (8151)											
Naphthalene (8310)											
Anthracene (8310)											
HMX (8330)											
2,4,6-Trinitrotoluene (8330)											
Aroclor 1260	102	NA	0	88.4	NA	86.7	87	NA			

Comments: Refer to Laboratory Control Sample/Laboratory Control Sample Duplicate findings worksheet for list of qualifications and associated samples when reported results do not agree within 10.0% of the recalculated results.

LDC #: 13412A3b
SDG #: #V76

VALIDATION FINDINGS WORKSHEET
Sample Calculation Verification

Page: 1 of 1
Reviewer: [illegible]
2nd Reviewer: [illegible]

METHOD: ✓ GC ___ HPLC

Y N N/A Were all reported results recalculated and verified for all level IV samples?
Y N N/A Were all recalculated results for detected target compounds within 10% of the reported results?

Concentration= $\frac{(A)(Fv)(Df)}{(RF)(Vs \text{ or } Ws)(\%S/100)}$

A= Area or height of the compound to be measured
Fv= Final Volume of extract
Df= Dilution Factor
RF= Average response factor of the compound in the initial calibration
Vs= Initial volume of the sample
Ws= Initial weight of the sample
%S= Percent Solid

Example:

Sample ID. #10 Compound Name Aroclor 1260

Concentration = $\frac{0.520 \times 5 \times 1000}{25.6}$

= 100 ug/kg

#	Sample ID	Compound	Reported Concentrations ( )	Recalculated Results Concentrations ( )	Qualifications
	1260-3 = $\frac{8477378\ (0.05)\ (24.6)\ (1000)}{(10.1058)(7884807)\ (5.1)}$		= 0.508		
	$\frac{1260-3+4+5}{3}$	= $\frac{0.508+0.517+0.535}{3}$ =		0.520	

Comments: _____

SAMPCALew.wpd

LDC #: 13419A3b

SDG #: HW06

Laboratory: Analytical Resources, Inc.

VALIDATION COMPLETENESS WORKSHEET

Level II

Date: 4/27/05

Page: 1 of 1

Reviewer: [illegible]

2nd Reviewer: [illegible]

METHOD: GC Polychlorinated Biphenyls (EPA SW 846 Method 8082)

The samples listed below were reviewed for each of the following validation areas. Validation findings are noted in attached validation findings worksheets.

	Validation Area		Comments
I.	Technical holding times	A	Sampling dates: 3/8 → 3/16/05
II.	GC/ECD Instrument Performance Check	NA	
III.	Initial calibration	N	
IV.	Continuing calibration	N	
V.	Blanks	A	
VI.	Surrogate spikes	A	
VII.	Matrix spike/Matrix spike duplicates	A	LDW-SS151-010 MS/MSD
VIII.	Laboratory control samples	A	LCS
IX.	Regional quality assurance and quality control	N	
Xa.	Florisil cartridge check	N	
Xb.	GPC Calibration	N	Sulfur + Acid clean up
XI.	Target compound identification	N	
XII.	Compound quantitation and reported CRQLs	SW	
XIII.	Overall assessment of data	N	
XIV.	Field duplicates	N	
XV.	Field blanks	N	

Note: A = Acceptable
N = Not provided/applicable
SW = See worksheet

ND = No compounds detected
R = Rinsate
FB = Field blank

D = Duplicate
TB = Trip blank
EB = Equipment blank

Validated Samples: Sediment

1	LDW-SS71-010	11	MB-032205	21		31	
2	LDW-SS71-010DL	12		22		32	
3	LDW-SS2-010	13		23		33	
4	LDW-SS69b-010	14		24		34	
5	LDW-SS158-010	15		25		35	
6	LDW-SS159-010	16		26		36	
7	LDW-SS157-010	17		27		37	
8	LDW-SS35-010	18		28		38	
9	LDW-SS35-010DL	19		29		39	
10		20		30		40	

LDC #: 13419A36
SDG #: HW06

VALIDATION FINDINGS WORKSHEET
Compound Quantitation and Reported CRQLs

Page: 1 of 1
Reviewer: [illegible]
2nd Reviewer: [illegible]

METHOD: ✓GC __ HPLC

Please see qualifications below for all questions answered "N". Not applicable questions are identified as "N/A".

Level IV/D Only

Y N N/A Were CRQLs adjusted for sample dilutions, dry weight factors, etc.?

Y N N/A Did the reported results for detected target compounds agree within 10.0% of the recalculated results?

#	Compound Name	Finding	Associated Samples	Qualifications
	Y	exceeded cal range	1	J/A
	AA	↓	7	J/A
		% RPD Bet. column ≤40		
	Y	42%	1	J/A
	Y	42%	5	J/A

Comments: See sample calculation verification worksheet for recalculations

LDC #: 13419A36
SDG #: HW06

VALIDATION FINDINGS WORKSHEET
Overall Assessment of Data

Page: 1 of 1
Reviewer: EP
2nd Reviewer: E

METHOD: GC Pesticides/PCBs (EPA SW846 Method 8081/8082)

Please see qualifications below for all questions answered "N". Not applicable questions are identified as "N/A".

All available information pertaining to the data were reviewed using professional judgement to compliment the determination of the overall quality of the data.

Y N N/A Was the overall quality and usability of the data acceptable?

#	Date	Sample ID	Finding	Associated Samples	Qualifications
		Y, AA, BB	Y exceed cal range AA, BB, lower results	1	R/A
		All except Above	diluted	2	R/A
		Y, AA	AA exceeded cal range Y lower result	8	R/A
		All except Above	diluted	9	R/A

Comments: _____

LDC #: 13419B3b
SDG #: HW16
Laboratory: Analytical Resources, Inc.

VALIDATION COMPLETENESS WORKSHEET
Level II

Date: 4/28/05
Page: 1 of 1
Reviewer:
2nd Reviewer:

METHOD: GC Polychlorinated Biphenyls (EPA SW 846 Method 8082)

The samples listed below were reviewed for each of the following validation areas. Validation findings are noted in attached validation findings worksheets.

	Validation Area		Comments
I.	Technical holding times	A	Sampling dates: 3/18/05
II.	GC/ECD Instrument Performance Check	NA	
III.	Initial calibration	N	
IV.	Continuing calibration	N	
V.	Blanks	A	
VI.	Surrogate spikes	A	
VII.	Matrix spike/Matrix spike duplicates	N	NO MS/D Text
VIII.	Laboratory control samples	A	LCS
IX.	Regional quality assurance and quality control	N	
Xa.	Florisil cartridge check	N	
Xb.	GPC Calibration	N	Sulfur + Acid clean up
XI.	Target compound identification	N	
XII.	Compound quantitation and reported CRQLs	N	
XIII.	Overall assessment of data	A	
XIV.	Field duplicates	N	
XV.	Field blanks	N	

Note: A = Acceptable
N = Not provided/applicable
SW = See worksheet

ND = No compounds detected
R = Rinsate
FB = Field blank

D = Duplicate
TB = Trip blank
EB = Equipment blank

Validated Samples: Sediment

1	LDW-SSB7a-010	11	MB-032405	21		31	
2		12		22		32	
3		13		23		33	
4		14		24		34	
5		15		25		35	
6		16		26		36	
7		17		27		37	
8		18		28		38	
9		19		29		39	
10		20		30		40	

LDC #: 13381A4 **VALIDATION COMPLETENESS WORKSHEET** Date: 4/15/05
SDG #: HU85 Level II Page: 1 of 1
Laboratory: Analytical Resources, Inc. Reviewer: MM
200.8 2nd Reviewer: VL

METHOD: Metals (EPA SW 846 Method 6010B/~~6020~~/7000)

The samples listed below were reviewed for each of the following validation areas. Validation findings are noted in attached validation findings worksheets.

	Validation Area		Comments
I.	Technical holding times	A	Sampling dates: 3/7/05
II.	Calibration	N	
III.	Blanks	A	
IV.	ICP Interference Check Sample (ICS) Analysis	N	
V.	Matrix Spike Analysis	SW	
VI.	Duplicate Sample Analysis	A	
VII.	Laboratory Control Samples (LCS)	A	LCS / SRM
VIII.	Internal Standard (ICP-MS)	N	Not reviewed
IX.	Furnace Atomic Absorption QC	N	Not utilized
X.	ICP Serial Dilution	N	Not performed
XI.	Sample Result Verification	SW	1
XII.	Overall Assessment of Data	A	
XIII.	Field Duplicates	SW	(4,6)
XIV.	Field Blanks	ND	RB = 11

Note: A = Acceptable
N = Not provided/applicable
SW = See worksheet
ND = No compounds detected
R = Rinsate
FB = Field blank
D = Duplicate
TB = Trip blank
EB = Equipment blank

Validated Samples: All sediment except #11 A2

1	LDW-SS85-010	11	LDW-SS103-RB A2	21		31	
2	LDW-SS73-010	12	LDW-SS85-010MS	22		32	
3	LDW-SS78-010	13	LDW-SS85-010DUP	23		33	
4	LDW-SS82-010	14	PBW	24		34	
5	LDW-SS74-010	15	PBS	25		35	
6	LDW-SS204-010	16		26		36	
7	LDW-SS91-010	17		27		37	
8	LDW-SS103-010	18		28		38	
9	LDW-SS68-010	19		29		39	
10	LDW-SS8-010	20		30		40	

Notes: _____

LDC #: 1338/B4
SDG #: ____

VALIDATION FINDINGS WORKSHEET
Sample Specific Element Reference

Page: 1 of 1
Reviewer: MH
2nd reviewer: K

All circled elements are applicable to each sample.

Sample ID	Matrix	Target Analyte List (TAL)
1-11	sediment	Al, [✓ Sb], [✓ As], Ba, Be, [✓ Cd], Ca, [✓ Cr], [✓ Co], [✓ Cu], Fe, [✓ Pb], Mg, Mn, [✓ Hg], [✓ Ni], K, [✓ Se], [✓ Ag], Na, [✓ Tl], [✓ V], [✓ Zn], [✓ Mo], B, Si, CN⁻, ___ ___
or 12,13	sediment	Al, [✓ Sb], [✓ As], Ba, Be, [✓ Cd], Ca, [✓ Cr], [✓ Co], [✓ Cu], Fe, [✓ Pb], Mg, Mn, [✓ Hg], [✓ Ni], K, [✓ Se], [✓ Ag], Na, [✓ Tl], [✓ V], [✓ Zn], [✓ Mo], B, Si, CN⁻, ___ ___
		Al, Sb, As, Ba, Be, Cd, Ca, Cr, Co, Cu, Fe, Pb, Mg, Mn, Hg, Ni, K, Se, Ag, Na, Tl, V, Zn, Mo, B, Si, CN⁻, ___ ___
		Al, Sb, As, Ba, Be, Cd, Ca, Cr, Co, Cu, Fe, Pb, Mg, Mn, Hg, Ni, K, Se, Ag, Na, Tl, V, Zn, Mo, B, Si, CN⁻, ___ ___
		Al, Sb, As, Ba, Be, Cd, Ca, Cr, Co, Cu, Fe, Pb, Mg, Mn, Hg, Ni, K, Se, Ag, Na, Tl, V, Zn, Mo, B, Si, CN⁻, ___ ___
		Al, Sb, As, Ba, Be, Cd, Ca, Cr, Co, Cu, Fe, Pb, Mg, Mn, Hg, Ni, K, Se, Ag, Na, Tl, V, Zn, Mo, B, Si, CN⁻, ___ ___
		Al, Sb, As, Ba, Be, Cd, Ca, Cr, Co, Cu, Fe, Pb, Mg, Mn, Hg, Ni, K, Se, Ag, Na, Tl, V, Zn, Mo, B, Si, CN⁻, ___ ___
		Al, Sb, As, Ba, Be, Cd, Ca, Cr, Co, Cu, Fe, Pb, Mg, Mn, Hg, Ni, K, Se, Ag, Na, Tl, V, Zn, Mo, B, Si, CN⁻, ___ ___
		Al, Sb, As, Ba, Be, Cd, Ca, Cr, Co, Cu, Fe, Pb, Mg, Mn, Hg, Ni, K, Se, Ag, Na, Tl, V, Zn, Mo, B, Si, CN⁻, ___ ___
		Al, Sb, As, Ba, Be, Cd, Ca, Cr, Co, Cu, Fe, Pb, Mg, Mn, Hg, Ni, K, Se, Ag, Na, Tl, V, Zn, Mo, B, Si, CN⁻, ___ ___
		Al, Sb, As, Ba, Be, Cd, Ca, Cr, Co, Cu, Fe, Pb, Mg, Mn, Hg, Ni, K, Se, Ag, Na, Tl, V, Zn, Mo, B, Si, CN⁻, ___ ___
		Al, Sb, As, Ba, Be, Cd, Ca, Cr, Co, Cu, Fe, Pb, Mg, Mn, Hg, Ni, K, Se, Ag, Na, Tl, V, Zn, Mo, B, Si, CN⁻, ___ ___
		Al, Sb, As, Ba, Be, Cd, Ca, Cr, Co, Cu, Fe, Pb, Mg, Mn, Hg, Ni, K, Se, Ag, Na, Tl, V, Zn, Mo, B, Si, CN⁻, ___ ___
		Al, Sb, As, Ba, Be, Cd, Ca, Cr, Co, Cu, Fe, Pb, Mg, Mn, Hg, Ni, K, Se, Ag, Na, Tl, V, Zn, Mo, B, Si, CN⁻, ___ ___
		Al, Sb, As, Ba, Be, Cd, Ca, Cr, Co, Cu, Fe, Pb, Mg, Mn, Hg, Ni, K, Se, Ag, Na, Tl, V, Zn, Mo, B, Si, CN⁻, ___ ___
		Al, Sb, As, Ba, Be, Cd, Ca, Cr, Co, Cu, Fe, Pb, Mg, Mn, Hg, Ni, K, Se, Ag, Na, Tl, V, Zn, Mo, B, Si, CN⁻, ___ ___
		Al, Sb, As, Ba, Be, Cd, Ca, Cr, Co, Cu, Fe, Pb, Mg, Mn, Hg, Ni, K, Se, Ag, Na, Tl, V, Zn, Mo, B, Si, CN⁻, ___ ___
		Al, Sb, As, Ba, Be, Cd, Ca, Cr, Co, Cu, Fe, Pb, Mg, Mn, Hg, Ni, K, Se, Ag, Na, Tl, V, Zn, Mo, B, Si, CN⁻, ___ ___
		Al, Sb, As, Ba, Be, Cd, Ca, Cr, Co, Cu, Fe, Pb, Mg, Mn, Hg, Ni, K, Se, Ag, Na, Tl, V, Zn, Mo, B, Si, CN⁻, ___ ___
		Al, Sb, As, Ba, Be, Cd, Ca, Cr, Co, Cu, Fe, Pb, Mg, Mn, Hg, Ni, K, Se, Ag, Na, Tl, V, Zn, Mo, B, Si, CN⁻, ___ ___
		Al, Sb, As, Ba, Be, Cd, Ca, Cr, Co, Cu, Fe, Pb, Mg, Mn, Hg, Ni, K, Se, Ag, Na, Tl, V, Zn, Mo, B, Si, CN⁻, ___ ___
		Al, Sb, As, Ba, Be, Cd, Ca, Cr, Co, Cu, Fe, Pb, Mg, Mn, Hg, Ni, K, Se, Ag, Na, Tl, V, Zn, Mo, B, Si, CN⁻, ___ ___
		Al, Sb, As, Ba, Be, Cd, Ca, Cr, Co, Cu, Fe, Pb, Mg, Mn, Hg, Ni, K, Se, Ag, Na, Tl, V, Zn, Mo, B, Si, CN⁻, ___ ___
		Al, Sb, As, Ba, Be, Cd, Ca, Cr, Co, Cu, Fe, Pb, Mg, Mn, Hg, Ni, K, Se, Ag, Na, Tl, V, Zn, Mo, B, Si, CN⁻, ___ ___
		Al, Sb, As, Ba, Be, Cd, Ca, Cr, Co, Cu, Fe, Pb, Mg, Mn, Hg, Ni, K, Se, Ag, Na, Tl, V, Zn, Mo, B, Si, CN⁻, ___ ___
Analysis Method		
ICP Trace		Al, Sb, As, Ba, Be, [✓ Cd], Ca, [✓ Cr, Co, Cu], Fe, [✓ Pb], Mg, Mn, Hg, [✓ Ni], K, [✓ Se, Ag], Na, ~~Tl~~, [✓ V, Zn, Mo], B, Si, CN⁻, ___ ___
ICP ~~Trace~~		Al, Sb, As, Ba, Be, Cd, Ca, Cr, Co, Cu, Fe, Pb, Mg, Mn, Hg, Ni, K, Se, Ag, Na, Tl, V, Zn, Mo, B, Si, CN⁻, ___
ICP-MS		Al, [✓ Sb], [✓ As], Ba, Be, Cd, Ca, Cr, Co, Cu, Fe, Pb, Mg, Mn, Hg, Ni, K, Se, Ag, Na, [✓ Tl], V, Zn, Mo, B, Si, CN⁻, ___ ___
GFAA		Al, Sb, As, Ba, Be, Cd, Ca, Cr, Co, Cu, Fe, Pb, Mg, Mn, Hg, Ni, K, Se, Ag, Na, Tl, V, Zn, Mo, B, Si, CN⁻,

Comments: Mercury by CVAA if performed

LDC #: 13381A4
SDG #: H1185

VALIDATION FINDINGS WORKSHEET
Matrix Spike Analysis

Page: 1 of 1
Reviewer: MY
2nd Reviewer: DC

METHOD: Trace Metals (EPA SW 846 Method 6010/7000)

Please see qualifications below for all questions answered "N". Not applicable questions are identified as "N/A".

(Y) N N/A Was a matrix spike analyzed for each matrix in this SDG?

Y (N) N/A Were matrix spike percent recoveries (%R) within the control limits of ~~75-125~~ 70-130? If the sample concentration exceeded the spike concentration by a factor of 4 or more, no action was taken.

(Y) N N/A Was a post digestion spike analyzed for ICP elements that did not meet the required criteria for matrix spike recovery?

LEVEL IV ONLY:

Y N (N/A) Were recalculated results acceptable? See Level IV Recalculation Worksheet for recalculations.

#	Matrix Spike ID	Matrix	Analyte	%R	Associated Samples	Qualifications
1	12	sediment	Sb	8.1 (70-130)	All sediment	J (all sediment (post spike 98.7%))

Comments:

MS.4S2

LDC #: 1338|A4

SDG #: HH85

VALIDATION FINDINGS WORKSHEET
Sample Result Verification

Reviewer: MH

2nd Reviewer AC

METHOD: Trace metals (EPA SW-846 6010/7000)

#	Sample ID	Analyte	Result (units)	RL (units)	Finding	Qualifications
1	All	Sb, As, Tl			Lab reported by 200.8. Instead of 6020 in the Appx	Treat.

Comments:

LDC#: 13381 A4
SDG#: 4U85

VALIDATION FINDINGS WORKSHEET
Field Duplicates

Page: 1 of 1
Reviewer: WH
2nd Reviewer: [illegible]

METHOD: Metals (EPA Method 6010B/200.8/7000)

(Y) N NA Were field duplicate pairs identified in this SDG?
(Y) N NA Were target analytes detected in the field duplicate pairs?

Compound	Concentration (mg/Kg) 4	6	(≤50) RPD	
Arsenic	9.4	8.6	9	
Cadmium	0.4U	0.4	NC	
Chromium	27	27.7	3	
Cobalt	8.4	8.7	4	
Copper	51.7	59.6	14	
Lead	32	328	164	
Mercury	0.15	0.11	31	
Nickel	19	20	5	
Vanadium	60.3	63.9	6	
Zinc	106	150	34	
Molybdenum	1	1.6	46	

V:\FIELD DUPLICATES\FD_inorganic\13381A4.wpd

LDC #: 13381B4 **VALIDATION COMPLETENESS WORKSHEET** Date: 4/15/05
SDG #: HV37 Level II Page: 1 of 1
Laboratory: Analytical Resources, Inc. Reviewer: HH
2nd Reviewer: M

METHOD: Metals (EPA SW 846 Method 6010B/~~6020~~/7000) 200.8

The samples listed below were reviewed for each of the following validation areas. Validation findings are noted in attached validation findings worksheets.

	Validation Area		Comments
I.	Technical holding times	A	Sampling dates: 3/9/05
II.	Calibration	N	
III.	Blanks	A	
IV.	ICP Interference Check Sample (ICS) Analysis	N	
V.	Matrix Spike Analysis	SW	
VI.	Duplicate Sample Analysis	A	
VII.	Laboratory Control Samples (LCS)	A	LCS + SRM
VIII.	Internal Standard (ICP-MS)	N	Not reviewed
IX.	Furnace Atomic Absorption QC	N	Not utilized
X.	ICP Serial Dilution	N	Not performed
XI.	Sample Result Verification	SW	
XII.	Overall Assessment of Data	A	
XIII	Field Duplicates	SW	(10, 11)
XIV.	Field Blanks	ND	RB = 17

Note: A = Acceptable
N = Not provided/applicable
SW = See worksheet
ND = No compounds detected
R = Rinsate
FB = Field blank
D = Duplicate
TB = Trip blank
EB = Equipment blank

Validated Samples: All sediment except #17 A2

1	LDW-SS7-0-10	11	LDW-SS207-0-10	21	PBS	31	
2	LDW-SS3-0-10	12	LDW-SS146-0-10	22		32	
3	LDW-SS95-0-10	13	LDW-SS147-0-10	23		33	
4	LDW-SS133-0-10	14	LDW-SS148-0-10	24		34	
5	LDW-SS138-0-10	15	LDW-SS149-0-10	25		35	
6	LDW-SS139-0-10	16	LDW-SS150-0-10	26		36	
7	LDW-SS137-0-10	17	LDW-SS7-RB A2	27		37	
8	LDW-SS132-0-10	18	LDW-SS7-0-10MS	28		38	
9	LDW-SS66-0-10	19	LDW-SS7-0-10DUP	29		39	
10	LDW-SS62-0-10	20	PBW	30		40	

Notes:

LDC #: 13381B4
SDG #: H-V37

VALIDATION FINDINGS WORKSHEET
Sample Specific Element Reference

Page: 1 of 1
Reviewer: MH
2nd reviewer: x

All circled elements are applicable to each sample.

Sample ID	Matrix	Target Analyte List (TAL)
1-17	Sediment/bz	Al, [✓ Sb], [✓ As], Ba, Be, [✓ Cd], Ca, [✓ Cr], [✓ Co], [✓ Cu], Fe, [✓ Pb], Mg, Mn, [✓ Hg], [✓ Ni], K, [✓ Se], [✓ Ag], Na, [✓ Tl], [✓ V], [✓ Zn], [✓ Mo], B, Si, CN^-, ___ ___
pz18,19	Sediment	Al, [✓ Sb], [✓ As], Ba, Be, [✓ Cd], Ca, [✓ Cr], [✓ Co], [✓ Cu], Fe, [✓ Pb], Mg, Mn, [✓ Hg], [✓ Ni], [✓ K], [✓ Se], [✓ Ag], Na, [✓ Tl], [✓ V], [✓ Zn], [✓ Mo], B, Si, CN^-, ___ ___
		Al, Sb, As, Ba, Be, Cd, Ca, Cr, Co, Cu, Fe, Pb, Mg, Mn, Hg, Ni, K, Se, Ag, Na, Tl, V, Zn, Mo, B, Si, CN^-, ___ ___
		Al, Sb, As, Ba, Be, Cd, Ca, Cr, Co, Cu, Fe, Pb, Mg, Mn, Hg, Ni, K, Se, Ag, Na, Tl, V, Zn, Mo, B, Si, CN^-, ___ ___
		Al, Sb, As, Ba, Be, Cd, Ca, Cr, Co, Cu, Fe, Pb, Mg, Mn, Hg, Ni, K, Se, Ag, Na, Tl, V, Zn, Mo, B, Si, CN^-, ___ ___
		Al, Sb, As, Ba, Be, Cd, Ca, Cr, Co, Cu, Fe, Pb, Mg, Mn, Hg, Ni, K, Se, Ag, Na, Tl, V, Zn, Mo, B, Si, CN^-, ___ ___
		Al, Sb, As, Ba, Be, Cd, Ca, Cr, Co, Cu, Fe, Pb, Mg, Mn, Hg, Ni, K, Se, Ag, Na, Tl, V, Zn, Mo, B, Si, CN^-, ___ ___
		Al, Sb, As, Ba, Be, Cd, Ca, Cr, Co, Cu, Fe, Pb, Mg, Mn, Hg, Ni, K, Se, Ag, Na, Tl, V, Zn, Mo, B, Si, CN^-, ___ ___
		Al, Sb, As, Ba, Be, Cd, Ca, Cr, Co, Cu, Fe, Pb, Mg, Mn, Hg, Ni, K, Se, Ag, Na, Tl, V, Zn, Mo, B, Si, CN^-, ___ ___
		Al, Sb, As, Ba, Be, Cd, Ca, Cr, Co, Cu, Fe, Pb, Mg, Mn, Hg, Ni, K, Se, Ag, Na, Tl, V, Zn, Mo, B, Si, CN^-, ___ ___
		Al, Sb, As, Ba, Be, Cd, Ca, Cr, Co, Cu, Fe, Pb, Mg, Mn, Hg, Ni, K, Se, Ag, Na, Tl, V, Zn, Mo, B, Si, CN^-, ___ ___
		Al, Sb, As, Ba, Be, Cd, Ca, Cr, Co, Cu, Fe, Pb, Mg, Mn, Hg, Ni, K, Se, Ag, Na, Tl, V, Zn, Mo, B, Si, CN^-, ___ ___
		Al, Sb, As, Ba, Be, Cd, Ca, Cr, Co, Cu, Fe, Pb, Mg, Mn, Hg, Ni, K, Se, Ag, Na, Tl, V, Zn, Mo, B, Si, CN^-, ___ ___
		Al, Sb, As, Ba, Be, Cd, Ca, Cr, Co, Cu, Fe, Pb, Mg, Mn, Hg, Ni, K, Se, Ag, Na, Tl, V, Zn, Mo, B, Si, CN^-, ___ ___
		Al, Sb, As, Ba, Be, Cd, Ca, Cr, Co, Cu, Fe, Pb, Mg, Mn, Hg, Ni, K, Se, Ag, Na, Tl, V, Zn, Mo, B, Si, CN^-, ___ ___
		Al, Sb, As, Ba, Be, Cd, Ca, Cr, Co, Cu, Fe, Pb, Mg, Mn, Hg, Ni, K, Se, Ag, Na, Tl, V, Zn, Mo, B, Si, CN^-, ___ ___
		Al, Sb, As, Ba, Be, Cd, Ca, Cr, Co, Cu, Fe, Pb, Mg, Mn, Hg, Ni, K, Se, Ag, Na, Tl, V, Zn, Mo, B, Si, CN^-, ___ ___
		Al, Sb, As, Ba, Be, Cd, Ca, Cr, Co, Cu, Fe, Pb, Mg, Mn, Hg, Ni, K, Se, Ag, Na, Tl, V, Zn, Mo, B, Si, CN^-, ___ ___
		Al, Sb, As, Ba, Be, Cd, Ca, Cr, Co, Cu, Fe, Pb, Mg, Mn, Hg, Ni, K, Se, Ag, Na, Tl, V, Zn, Mo, B, Si, CN^-, ___ ___
		Al, Sb, As, Ba, Be, Cd, Ca, Cr, Co, Cu, Fe, Pb, Mg, Mn, Hg, Ni, K, Se, Ag, Na, Tl, V, Zn, Mo, B, Si, CN^-, ___ ___
		Al, Sb, As, Ba, Be, Cd, Ca, Cr, Co, Cu, Fe, Pb, Mg, Mn, Hg, Ni, K, Se, Ag, Na, Tl, V, Zn, Mo, B, Si, CN^-, ___ ___
		Al, Sb, As, Ba, Be, Cd, Ca, Cr, Co, Cu, Fe, Pb, Mg, Mn, Hg, Ni, K, Se, Ag, Na, Tl, V, Zn, Mo, B, Si, CN^-, ___ ___
		Al, Sb, As, Ba, Be, Cd, Ca, Cr, Co, Cu, Fe, Pb, Mg, Mn, Hg, Ni, K, Se, Ag, Na, Tl, V, Zn, Mo, B, Si, CN^-, ___ ___
		Al, Sb, As, Ba, Be, Cd, Ca, Cr, Co, Cu, Fe, Pb, Mg, Mn, Hg, Ni, K, Se, Ag, Na, Tl, V, Zn, Mo, B, Si, CN^-, ___ ___
		Al, Sb, As, Ba, Be, Cd, Ca, Cr, Co, Cu, Fe, Pb, Mg, Mn, Hg, Ni, K, Se, Ag, Na, Tl, V, Zn, Mo, B, Si, CN^-, ___ ___
		Analysis Method
ICP Trace		Al, Sb, As, Ba, Be, [✓ Cd], Ca, [✓ Cr, Co, Cu], Fe, [✓ Pb], Mg, Mn, Hg, [✓ Ni], K, [✓ Se, Ag], Na, ~~Tl~~, [✓ V, Zn, Mo], B, Si, CN^-, ___ ___
ICP ~~Trace~~		Al, Sb, As, Ba, Be, Cd, Ca, Cr, Co, Cu, Fe, Pb, Mg, Mn, Hg, Ni, K, Se, Ag, Na, Tl, V, Zn, Mo, B, Si, CN^-, ___ ___
ICP-MS		Al, [✓ Sb], [✓ As], Ba, Be, Cd, Ca, Cr, Co, Cu, Fe, Pb, Mg, Mn, Hg, Ni, K, Se, Ag, Na, [✓ Tl], V, Zn, Mo, B, Si, CN^-, ___ ___
GFAA		Al, Sb, As, Ba, Be, Cd, Ca, Cr, Co, Cu, Fe, Pb, Mg, Mn, Hg, Ni, K, Se, Ag, Na, Tl, V, Zn, Mo, B, Si, CN^-,

Comments: Mercury by CVAA if performed

LDC #: 1338|B4
SDG #: HV37

VALIDATION FINDINGS WORKSHEET
Matrix Spike Analysis

Page: 1 of 1
Reviewer: MW
2nd Reviewer: [illegible]

METHOD: Trace Metals (EPA SW 846 Method 6010/7000)

Please see qualifications below for all questions answered "N". Not applicable questions are identified as "N/A".

(Y) N N/A Was a matrix spike analyzed for each matrix in this SDG?

Y (N) N/A Were matrix spike percent recoveries (%R) within the control limits of ~~75-125?~~ 70-130 If the sample concentration exceeded the spike concentration by a factor of 4 or more, no action was taken.

Y N N/A Was a post digestion spike analyzed for ICP elements that did not meet the required criteria for matrix spike recovery?

LEVEL IV ONLY:

Y N N/A Were recalculated results acceptable? See Level IV Recalculation Worksheet for recalculations.

#	Matrix Spike ID	Matrix	Analyte	%R	Associated Samples	Qualifications
1	18	Sediment	Sb	1.6	All Sediment	J/UJ/A (post spike = 97.7%)

Comments:

LDC #: 13381B4
SDG #: 14V37

VALIDATION FINDINGS WORKSHEET
Sample Result Verification

Reviewer: MH
2nd Reviewer: AL

METHOD: Trace metals (EPA SW-846 6010/7000)

#	Sample ID	Analyte	Result (units)	RL (units)	Finding	Qualifications
1	All	Sb, As, Tl			Lab reported by 200.8 instead of 6020 in the Dups.	Treat.

Comments:

LDC#: 13381B4
SDG#: HV37

VALIDATION FINDINGS WORKSHEET
Field Duplicates

Page: 1 of 1
Reviewer: MM
2nd Reviewer: AC

METHOD: Metals (EPA Method 6010B/7000/200.8)

(Y) N NA Were field duplicate pairs identified in this SDG?
(Y) N NA Were target analytes detected in the field duplicate pairs?

Compound	Concentration (mg/kg)		(≤50) RPD	
	10	11		
Arsenic	16.8	16.5	2	
Cadmium	0.8	0.8	0	
Chromium	38	39	3	
Cobalt	10.9	10.9	0	
Copper	109	107	2	
Lead	58	58	0	
Mercury	0.5	0.28	56	
Nickel	24	24	0	
Vanadium	77.4	77.2	0	
Zinc	159	160	1	
Molybdenum	2	2	0	

LDC #: 13381C4 **VALIDATION COMPLETENESS WORKSHEET** Date: 4/15/05
SDG #: HV42 Level III Page: 1 of 1
Laboratory: Analytical Resources, Inc. Reviewer: MH
2nd Reviewer: DC

METHOD: Metals (EPA SW 846 Method 6010B/~~6020~~7000) 2008

The samples listed below were reviewed for each of the following validation areas. Validation findings are noted in attached validation findings worksheets.

	Validation Area		Comments
I.	Technical holding times	A	Sampling dates: 3/10/05
II.	Calibration	SW ~~N~~	
III.	Blanks	A	
IV.	ICP Interference Check Sample (ICS) Analysis	SW	
V.	Matrix Spike Analysis	SW	
VI.	Duplicate Sample Analysis	A	
VII.	Laboratory Control Samples (LCS)	~~SW~~ A	LCS + SRM
VIII.	Internal Standard (ICP-MS)	A ~~N~~	~~Not reviewed~~
IX.	Furnace Atomic Absorption QC	N	Not utilized
X.	ICP Serial Dilution	N	Not performed
XI.	Sample Result Verification	SW	
XII.	Overall Assessment of Data	A	
XIII.	Field Duplicates	N	
XIV.	Field Blanks	N	

Note: A = Acceptable
N = Not provided/applicable
SW = See worksheet
ND = No compounds detected
R = Rinsate
FB = Field blank
D = Duplicate
TB = Trip blank
EB = Equipment blank

Validated Samples: Estimate

1	LDW-SS45-010	11	PB	21		31	
2	LDW-SS46-010	12		22		32	
3	LDW-SS6-010	13		23		33	
4	LDW-SS47-010	14		24		34	
5	LDW-SS108-010	15		25		35	
6	LDW-SS61-010	16		26		36	
7	LDW-SS25-010	17		27		37	
8	LDW-SS86-010	18		28		38	
9	LDW-SS45-010MS	19		29		39	
10	LDW-SS45-010DUP	20		30		40	

Notes: _____

LDC #: 1338/c4
SDG #: 14V4V

VALIDATION FINDINGS CHECKLIST

Page: 1 of 1
Reviewer: MB
2nd Reviewer: x

Method: Metals (EPA SW 846 Method 6010/7000/6020) 4

Validation Area	Yes	No	NA	Findings/Comments
I. Technical holding times				
All technical holding times were met.	✓			
Cooler temperature criteria was met.	✓			
II. Calibration				
Were all instruments calibrated daily, each set-up time?	✓			
Were the proper number of standards used?	✓			
Were all initial and continuing calibration verification %Rs within the 90-110% (80-120% for mercury and 85-115% for cyanide) QC limits?	✓			
Were all initial calibration correlation coefficients ≥ 0.995?	✓			
Was a midrange cyanide standard distilled?			✓	
III. Blanks				
Was a method blank associated with every sample in this SDG?	✓			
Was there contamination in the method blanks? If yes, please see the Blanks validation completeness worksheet.				
IV. ICP Interference Check Sample				
Were ICP interference check samples performed daily?	✓			
Were the AB solution percent recoveries (%R) with the 80-120% QC limits?				
IV. Matrix spike/Matrix spike duplicates				
Were a matrix spike (MS) and duplicate (DUP) analyzed for each matrix in this SDG? If no, indicate which matrix does not have an associated MS/MSD or MS/DUP. Soil / Water.	✓			
Were the MS/MSD percent recoveries (%R) and the relative percent differences (RPD) within the 75-125 QC limits? If the sample concentration exceeded the spike concentration by a factor of 4 or more, no action was taken.		✓		
Were the MS/MSD or duplicate relative percent differences (RPD) ≤ 20% for waters and ≤ 35% for soil samples? A control limit of +/- RL(+/-2X RL for soil) was used for samples that were ≤ 5X the RL, including when only one of the duplicate sample values were ≤ 5X the RL.	✓			
V. Laboratory control samples				
Was an LCS anaylzed for this SDG?	✓			
Was an LCS analyzed per extraction batch?	✓			
Were the LCS percent recoveries (%R) and relative percent difference (RPD) within the 80-120% QC limits for water samples and laboratory established QC limits for soils?	✓			
VI. Furnace Atomic Absorption QC				
If MSA was performed, was the correlation coefficients ≥ 0.995?			✓	
Do all applicable analysies have duplicate injections?			✓	

LDC #: 13381c4
SDG #: 14V4

VALIDATION FINDINGS CHECKLIST

Page: 1 of 1
Reviewer: MR
2nd Reviewer: M

Validation Area	Yes	No	NA	Findings/Comments
For sample concentrations > RL, are applicable duplicate injection RSD values < 20%?			✓	
Were analytical spike recoveries within the 85-115% QC limits?			✓	
VII. ICP Serial Dilution				
Was an ICP serial dilution analyzed if analyte concentrations were > 50X the IDL?		✓		
Were all percent differences (%Ds) ≤ 10%?			✓	
Was there evidence of negative interference? If yes, professional judgement will be used to qualify the data.			✓	
VIII. Internal Standards (EPA SW 846 Method ~~6020~~) 200.8				
Were all the percent recoveries (%R) within the ~~30-120~~% of the intensity of the internal standard in the associated initial calibration? %s 60-125				
If the %Rs were outside the criteria, was a reanalysis performed?				
IX. Regional Quality Assurance and Quality Control				
Were performance evaluation (PE) samples performed?			✓	
Were the performance evaluation (PE) samples within the acceptance limits?			✓	
X. Sample Result Verification				
Were RLs adjusted to reflect all sample dilutions and dry weight factors applicable to level IV validation?	✓			
XI. Overall assessment of data				
Overall assessment of data was found to be acceptable.	✓			
XII. Field duplicates				
Field duplicate pairs were identified in this SDG.		✓		
Target analytes were detected in the field duplicates.			✓	
XIII. Field blanks				
Field blanks were identified in this SDG.		✓		
Target analytes were detected in the field blanks.			✓	

LDC #: 13381C4
SDG #: HV42

VALIDATION FINDINGS WORKSHEET
Sample Specific Element Reference

Page: 1 of 1
Reviewer: MH
2nd reviewer:

All circled elements are applicable to each sample.

Sample ID	Matrix	Target Analyte List (TAL)
1-8	Sediment	Al, [✓ Sb], [✓ As], Ba, Be, [✓ Cd], Ca, [✓ Cr], [✓ Co], [✓ Cu], Fe, [✓ Pb], Mg, Mn, [✓ Hg], [✓ Ni], K, [✓ Se], [✓ Ag], Na, [✓ Tl], [✓ V], [✓ Zn], [✓ Mo], B, Si, CN^-, ___ ___
QC 9,10	↓	Al, [✓ Sb], [✓ As], Ba, Be, [✓ Cd], Ca, [✓ Cr], [✓ Co], [✓ Cu], Fe, [✓ Pb], Mg, Mn, [✓ Hg], [✓ Ni], K, [✓ Se], [✓ Ag], Na, [✓ Tl], [✓ V], [✓ Zn], [✓ Mo], B, Si, CN^-, ___ ___
		Al, Sb, As, Ba, Be, Cd, Ca, Cr, Co, Cu, Fe, Pb, Mg, Mn, Hg, Ni, K, Se, Ag, Na, Tl, V, Zn, Mo, B, Si, CN^-, ___ ___
		Al, Sb, As, Ba, Be, Cd, Ca, Cr, Co, Cu, Fe, Pb, Mg, Mn, Hg, Ni, K, Se, Ag, Na, Tl, V, Zn, Mo, B, Si, CN^-, ___ ___
		Al, Sb, As, Ba, Be, Cd, Ca, Cr, Co, Cu, Fe, Pb, Mg, Mn, Hg, Ni, K, Se, Ag, Na, Tl, V, Zn, Mo, B, Si, CN^-, ___ ___
		Al, Sb, As, Ba, Be, Cd, Ca, Cr, Co, Cu, Fe, Pb, Mg, Mn, Hg, Ni, K, Se, Ag, Na, Tl, V, Zn, Mo, B, Si, CN^-, ___ ___
		Al, Sb, As, Ba, Be, Cd, Ca, Cr, Co, Cu, Fe, Pb, Mg, Mn, Hg, Ni, K, Se, Ag, Na, Tl, V, Zn, Mo, B, Si, CN^-, ___ ___
		Al, Sb, As, Ba, Be, Cd, Ca, Cr, Co, Cu, Fe, Pb, Mg, Mn, Hg, Ni, K, Se, Ag, Na, Tl, V, Zn, Mo, B, Si, CN^-, ___ ___
		Al, Sb, As, Ba, Be, Cd, Ca, Cr, Co, Cu, Fe, Pb, Mg, Mn, Hg, Ni, K, Se, Ag, Na, Tl, V, Zn, Mo, B, Si, CN^-, ___ ___
		Al, Sb, As, Ba, Be, Cd, Ca, Cr, Co, Cu, Fe, Pb, Mg, Mn, Hg, Ni, K, Se, Ag, Na, Tl, V, Zn, Mo, B, Si, CN^-, ___ ___
		Al, Sb, As, Ba, Be, Cd, Ca, Cr, Co, Cu, Fe, Pb, Mg, Mn, Hg, Ni, K, Se, Ag, Na, Tl, V, Zn, Mo, B, Si, CN^-, ___ ___
		Al, Sb, As, Ba, Be, Cd, Ca, Cr, Co, Cu, Fe, Pb, Mg, Mn, Hg, Ni, K, Se, Ag, Na, Tl, V, Zn, Mo, B, Si, CN^-, ___ ___
		Al, Sb, As, Ba, Be, Cd, Ca, Cr, Co, Cu, Fe, Pb, Mg, Mn, Hg, Ni, K, Se, Ag, Na, Tl, V, Zn, Mo, B, Si, CN^-, ___ ___
		Al, Sb, As, Ba, Be, Cd, Ca, Cr, Co, Cu, Fe, Pb, Mg, Mn, Hg, Ni, K, Se, Ag, Na, Tl, V, Zn, Mo, B, Si, CN^-, ___ ___
		Al, Sb, As, Ba, Be, Cd, Ca, Cr, Co, Cu, Fe, Pb, Mg, Mn, Hg, Ni, K, Se, Ag, Na, Tl, V, Zn, Mo, B, Si, CN^-, ___ ___
		Al, Sb, As, Ba, Be, Cd, Ca, Cr, Co, Cu, Fe, Pb, Mg, Mn, Hg, Ni, K, Se, Ag, Na, Tl, V, Zn, Mo, B, Si, CN^-, ___ ___
		Al, Sb, As, Ba, Be, Cd, Ca, Cr, Co, Cu, Fe, Pb, Mg, Mn, Hg, Ni, K, Se, Ag, Na, Tl, V, Zn, Mo, B, Si, CN^-, ___ ___
		Al, Sb, As, Ba, Be, Cd, Ca, Cr, Co, Cu, Fe, Pb, Mg, Mn, Hg, Ni, K, Se, Ag, Na, Tl, V, Zn, Mo, B, Si, CN^-, ___ ___
		Al, Sb, As, Ba, Be, Cd, Ca, Cr, Co, Cu, Fe, Pb, Mg, Mn, Hg, Ni, K, Se, Ag, Na, Tl, V, Zn, Mo, B, Si, CN^-, ___ ___
		Al, Sb, As, Ba, Be, Cd, Ca, Cr, Co, Cu, Fe, Pb, Mg, Mn, Hg, Ni, K, Se, Ag, Na, Tl, V, Zn, Mo, B, Si, CN^-, ___ ___
		Al, Sb, As, Ba, Be, Cd, Ca, Cr, Co, Cu, Fe, Pb, Mg, Mn, Hg, Ni, K, Se, Ag, Na, Tl, V, Zn, Mo, B, Si, CN^-, ___ ___
		Al, Sb, As, Ba, Be, Cd, Ca, Cr, Co, Cu, Fe, Pb, Mg, Mn, Hg, Ni, K, Se, Ag, Na, Tl, V, Zn, Mo, B, Si, CN^-, ___ ___
		Al, Sb, As, Ba, Be, Cd, Ca, Cr, Co, Cu, Fe, Pb, Mg, Mn, Hg, Ni, K, Se, Ag, Na, Tl, V, Zn, Mo, B, Si, CN^-, ___ ___
		Al, Sb, As, Ba, Be, Cd, Ca, Cr, Co, Cu, Fe, Pb, Mg, Mn, Hg, Ni, K, Se, Ag, Na, Tl, V, Zn, Mo, B, Si, CN^-, ___ ___
		Al, Sb, As, Ba, Be, Cd, Ca, Cr, Co, Cu, Fe, Pb, Mg, Mn, Hg, Ni, K, Se, Ag, Na, Tl, V, Zn, Mo, B, Si, CN^-, ___ ___
Analysis Method		
ICP Trace		Al, Sb, As, Ba, Be, [✓ Cd], Ca, [✓ Cr, Co, Cu], Fe, [✓ Pb], Mg, Mn, Hg, [✓ Ni], K, [✓ Se, Ag], Na, [✓ ~~Tl~~, V, Zn, Mo], B, Si, CN^-, ___ ___
ICP ~~Trace~~		Al, Sb, As, Ba, Be, Cd, Ca, Cr, Co, Cu, Fe, Pb, Mg, Mn, Hg, Ni, K, Se, Ag, Na, Tl, V, Zn, Mo, B, Si, CN^-, ___ ___
ICP-MS		Al, [✓ Sb], [✓ As], Ba, Be, Cd, Ca, Cr, Co, Cu, Fe, Pb, Mg, Mn, Hg, Ni, K, Se, Ag, Na, [✓ Tl], V, Zn, Mo, B, Si, CN^-, ___ ___
GFAA		Al, Sb, As, Ba, Be, Cd, Ca, Cr, Co, Cu, Fe, Pb, Mg, Mn, Hg, Ni, K, Se, Ag, Na, Tl, V, Zn, Mo, B, Si, CN^-, ___

Comments: Mercury by CVAA if performed

ELEMENTS.4

LDC #: 1338/C4
SDG #: 4V42

VALIDATION FINDINGS WORKSHEET
Calibration

Page: 1 of 1
Reviewer: MH
2nd Reviewer: [illegible]

METHOD: Trace Metals (EPA SW 846 Method 6010/7000)

Please see qualifications below for all questions answered "N". Not applicable questions are identified as "N/A".

(Y) N N/A Were all instruments calibrated daily, each set-up time, and were the proper number of standards used?

(Y) N N/A Were all initial and continuing calibration verification percent recoveries (%R) within the control limits of 90-110% for all analytes except mercury (80-120%) and cyanide (85-115%)?

LEVEL IV ONLY:

Y N (N/A) Was a midrange cyanide standard distilled?

(Y) N N/A Are all correlation coefficients ≥0.995?

(Y) N N/A Were recalculated results acceptable? See Level IV Initial and Continuing Calibration Recalculation Worksheet for recalculations.

#	Date	Calibration ID	Analyte	%R	Associated Samples	Qualification of Data
1	3/25/05	CRDL	Cu	151.3 ~~(90-115)~~ (70-130)	All	No qual (All >>XRL)

Comments: _____

CAL.4SW

LDC #: 1338|c4
SDG #: HV42

VALIDATION FINDINGS WORKSHEET
ICP Interference Check Sample

Reviewer: HH
2nd Reviewer: M

METHOD: Trace Metals (EPA SW 846 Method 6010/7000)

Please see qualifications below for all questions answered "N". Not applicable questions are identified as "N/A".

(Y) N N/A Were ICP interference check samples performed as required?
(Y) N N/A Were the AB solution percent recoveries (%R) within the control limits of 80-120% ?

LEVEL IV ONLY:

(Y) N N/A Were recalculated results acceptable? See Level IV Recalculation Worksheet for recalculations.

#	Date	ICS Identification	Analyte	Finding	Associated Samples	Qualifications
1	3/28/05	ICSA	Se	-5.8 ug/L (RL: 50 ug/L)	3	UJ/P (< Ca > 90% in ICSA)

Comments:

LDC #: 13381C4
SDG #: HY42

VALIDATION FINDINGS WORKSHEET
Matrix Spike Analysis

Page: 1 of 1
Reviewer: MY
2nd Reviewer: JL

METHOD: Trace Metals (EPA SW 846 Method 6010/7000)

Please see qualifications below for all questions answered "N". Not applicable questions are identified as "N/A".

(Y) N N/A Was a matrix spike analyzed for each matrix in this SDG?

Y (N) N/A Were matrix spike percent recoveries (%R) within the control limits of ~~75-125~~? If the sample concentration exceeded the spike concentration by a factor of 4 or more, no action was taken. 70-130

(Y) N N/A Was a post digestion spike analyzed for ICP elements that did not meet the required criteria for matrix spike recovery?

LEVEL IV ONLY:

Y N (N/A) Were recalculated results acceptable? See Level IV Recalculation Worksheet for recalculations.

#	Matrix Spike ID	Matrix	Analyte	%R	Associated Samples	Qualifications
1	9	Sediment	Sb	3.3 (70-130)	All	J/UJ/A (post spike = 92.8%)

Comments:

LDC #: 1332|C4
SDG #: H142

VALIDATION FINDINGS WORKSHEET
Sample Result Verification

Reviewer: MH
2nd Reviewer: AC

METHOD: Trace metals (EPA SW-846 6010/7000)

#	Sample ID	Analyte	Result (units)	RL (units)	Finding	Qualifications
1	All	Sb, As, Tl			Lab reported by 200.8 instead of 6020 in the App	Test.

Comments:

LDC #: 13381C4
SDG #: 4W42

VALIDATION FINDINGS WORKSHEET
Initial and Continuing Calibration Calculation Verification

Reviewer: MW
2nd Reviewer: K

METHOD: Trace Metals (EPA SW 846 Method 6010/7000)

An initial and continuing calibration verification percent recovery (%R) was recalculated for each type of analysis using the following formula:

$\%R = \frac{Found}{True} \times 100$ Where, Found = concentration (in ug/L) of each analyte measured in the analysis of the ICV or CCV solution
True = concentration (in ug/L) of each analyte in the ICV or CCV source

Standard ID	Type of Analysis	Element	Found (ug/L)	True (ug/L)	Recalculated %R	Reported %R	Acceptable (Y/N)
ICV	ICP (Initial calibration)	Cd	1014	1000	101.4	101.4	Y
↓	~~GFAA~~ (Initial calibration) ICP/MS	Tl	49.05	50	98.1	98.1	↓
↓	CVAA (Initial calibration)	Hg	8.36	8.0	104.5	104.5	↓
CCV	ICP (Continuing calibration)	Zn	961.6	1000	96.2	96.2	↓
↓	GFAA (Continuing calibration)	Sb	50.865	50	101.7	101.7	↓
↓	CVAA (Continuing calibration)	Hg	3.56	4.0	89	89.0	↓
	Cyanide (Initial calibration)						
	Cyanide (Continuing calibation)						

Comments: Refer to Calibration Verification findings worksheet for list of qualifications and associated samples when reported results do not agree within 10.0% of the recalculated results.

LDC #: 13381C4
SDG #: 14442

VALIDATION FINDINGS WORKSHEET
Level IV Recalculation Worksheet

Reviewer: MM
2nd Reviewer: DR

METHOD: Trace Metals (EPA SW 846 Method 6010/7000)

Percent recoveries (%R) for an ICP interference check sample, a laboratory control sample and a matrix spike sample were recaluculated using the following formula:

$$\%R = \frac{Found}{True} \times 100$$

Where, Fcund = Concentration of each analyte measured in the analysis of the sample. For the matrix spike calculation, Found = SSR (spiked sample result) - SR (sample result).
True = Concentration of each analyte in the source.

A sample and duplicate relative percent difference (RPD) was recalculated using the following formula:

$$RPD = \frac{|S-D|}{(S+D)/2} \times 100$$

Where, S = Original sample concentration
D = Duplicate sample concentration

An ICP serial dilution percent difference (%D) was recalculated using the following formula:

$$\%D = \frac{|I-SDR|}{I} \times 100$$

Where, I = Initial Sample Result (mg/L)
SDR = Serial Dilution Result (mg/L) (Instrument Reading x 5)

Sample ID	Type of Analysis	Element	Found / S / I (units)	True / D / SDR (units)	Recalculated %R / RPD / %D	Reported %R / RPD / %D	Acceptable (Y/N)
ICSAB	ICP interference check	V	976.4	1000	97.6	97.6	Y
LCS	Laboratory control sample	Mo	49.8	50	99.6	99.6	
9	Matrix spike	Ag	(SSR-SR) 110	110	1.00	1.00	
10	Duplicate	As	26.3	26.1	0.8	0.8	
MA	ICP serial diluton						

Comments: Refer to appropriate worksheet for list of qualifications and associated samples when reported results do not agree within 10.0% of the recalculated results.

LDC #: 13381c4
SDG #: 4V42

VALIDATION FINDINGS WORKSHEET
Sample Calculation Verification

Page: 1 of 1
Reviewer: MV
2nd reviewer: [illegible]

METHOD: Trace Metals (EPA SW 846 Method 6010/7000)

Please see qualifications below for all questions answered "N". Not applicable questions are identified as "N/A".

(Y) N N/A Have results been reported and calculated correctly?
(Y) N N/A Are results within the calibrated range of the instruments and within the linear range of the ICP?
(Y) N N/A Are all detection limits below the CRDL?

Detected analyte results for 1 were recalculated and verified using the following equation:

Concentration = $\frac{(RD)(FV)(Dil)}{(In.\ Vol.)(\%S)}$

RD = Raw data concentration
FV = Final volume (ml)
In. Vol. = Initial volume (ml) or weight (G)
Dil = Dilution factor
%S = Decimal percent solids

Recalculation:

$Co = \frac{0.05011\ mg/L \times 0.05L \times 2 \times 1000\ g/kg}{1.002g \times 0.453} = 11.4\ mg/kg$

Sample ID	Analyte	Reported Concentration (mg/kg)	Calculated Concentration (mg/kg)	Acceptable (Y/N)
1	As	26.1	26.1	Y
	Cd	1.0	1.0	
	Cr	41	41	
	Co	11.0	11.0	
	Cu	156	156	
	Pb	95	95	
	Hg	0.3	0.3	
	Mo	2	2	
	Ni	25	25	
	V	75.6	75.5	
	Zn	216	216	

LDC #: 13384A4

SDG #: HV00

Laboratory: Analytical Resources, Inc.

VALIDATION COMPLETENESS WORKSHEET

Level II

Date: 4/18/05

Page: 1 of 1

Reviewer: MM

2nd Reviewer: [illegible]

METHOD: Metals (EPA SW 846 Method 6010B/~~6020~~ 200.8/7000)

The samples listed below were reviewed for each of the following validation areas. Validation findings are noted in attached validation findings worksheets.

	Validation Area		Comments
I.	Technical holding times	A	Sampling dates: 3/8/05
II.	Calibration	N	
III.	Blanks	A	
IV.	ICP Interference Check Sample (ICS) Analysis	N	
V.	Matrix Spike Analysis	SW	
VI.	Duplicate Sample Analysis	A	
VII.	Laboratory Control Samples (LCS)	A	LCS + SRM
VIII.	Internal Standard (ICP-MS)	N	Not reviewed
IX.	Furnace Atomic Absorption QC	N	Not utilized
X.	ICP Serial Dilution	N	Not performed
XI.	Sample Result Verification	N	
XII.	Overall Assessment of Data	A	
XIII	Field Duplicates	SW	(6, 7), (13, 14)
XIV.	Field Blanks	N	

Note: A = Acceptable; N = Not provided/applicable; SW = See worksheet; ND = No compounds detected; R = Rinsate; FB = Field blank; D = Duplicate; TB = Trip blank; EB = Equipment blank

Validated Samples: Sediment

1	LDW-SS81-010	11	LDW-SS106-010	21		31	
2	LDW-SS65-010	12	LDW-SS122-010	22		32	
3	LDW-SS41-010	13	LDW-SS131-010	23		33	
4	LDW-SS30-010	14	LDW-SS206-010	24		34	
5	LDW-SS21-010	15	LDW-SS140-010	25		35	
6	LDW-SS19-010	16	LDW-SS81-010MS	26		36	
7	LDW-SS205-010	17	LDW-SS81-010DUP	27		37	
8	LDW-SS11-010	18	PB	28		38	
9	LDW-SS16-010	19		29		39	
10	LDW-SS105-010	20		30		40	

Notes: _____

LDC #: 13384A4
SDG #: 14V00

VALIDATION FINDINGS WORKSHEET
Sample Specific Element Reference

Page: 1 of 1
Reviewer: MH
2nd reviewer:

All circled elements are applicable to each sample.

Sample ID	Matrix	Target Analyte List (TAL)
1-15	Sediment	Al, [✓ Sb], [✓ As], Ba, Be, [✓ Cd], Ca, [✓ Cr], [✓ Co], [✓ Cu], Fe, [✓ Pb], Mg, Mn, [✓ Hg], [✓ Ni], K, [✓ Se], [✓ Ag], Na, [✓ Tl], [✓ V], [✓ Zn], [✓ Mo], B, Si, CN⁻, ___ ___
a16, 17	b	Al, [✓ Sb, As], Ba, Be, [✓ Cd], Ca, [✓ Cr, Co, Cu], Fe, [✓ Pb], Mg, Mn, [✓ Hg, Ni], K, [✓ Se, Ag], Na, [✓ Tl, V, Zn, Mo], B, Si, CN⁻, ___ ___
		Al, Sb, As, Ba, Be, Cd, Ca, Cr, Co, Cu, Fe, Pb, Mg, Mn, Hg, Ni, K, Se, Ag, Na, Tl, V, Zn, Mo, B, Si, CN⁻, ___ ___
		Al, Sb, As, Ba, Be, Cd, Ca, Cr, Co, Cu, Fe, Pb, Mg, Mn, Hg, Ni, K, Se, Ag, Na, Tl, V, Zn, Mo, B, Si, CN⁻, ___ ___
		Al, Sb, As, Ba, Be, Cd, Ca, Cr, Co, Cu, Fe, Pb, Mg, Mn, Hg, Ni, K, Se, Ag, Na, Tl, V, Zn, Mo, B, Si, CN⁻, ___ ___
		Al, Sb, As, Ba, Be, Cd, Ca, Cr, Co, Cu, Fe, Pb, Mg, Mn, Hg, Ni, K, Se, Ag, Na, Tl, V, Zn, Mo, B, Si, CN⁻, ___ ___
		Al, Sb, As, Ba, Be, Cd, Ca, Cr, Co, Cu, Fe, Pb, Mg, Mn, Hg, Ni, K, Se, Ag, Na, Tl, V, Zn, Mo, B, Si, CN⁻, ___ ___
		Al, Sb, As, Ba, Be, Cd, Ca, Cr, Co, Cu, Fe, Pb, Mg, Mn, Hg, Ni, K, Se, Ag, Na, Tl, V, Zn, Mo, B, Si, CN⁻, ___ ___
		Al, Sb, As, Ba, Be, Cd, Ca, Cr, Co, Cu, Fe, Pb, Mg, Mn, Hg, Ni, K, Se, Ag, Na, Tl, V, Zn, Mo, B, Si, CN⁻, ___ ___
		Al, Sb, As, Ba, Be, Cd, Ca, Cr, Co, Cu, Fe, Pb, Mg, Mn, Hg, Ni, K, Se, Ag, Na, Tl, V, Zn, Mo, B, Si, CN⁻, ___ ___
		Al, Sb, As, Ba, Be, Cd, Ca, Cr, Co, Cu, Fe, Pb, Mg, Mn, Hg, Ni, K, Se, Ag, Na, Tl, V, Zn, Mo, B, Si, CN⁻, ___ ___
		Al, Sb, As, Ba, Be, Cd, Ca, Cr, Co, Cu, Fe, Pb, Mg, Mn, Hg, Ni, K, Se, Ag, Na, Tl, V, Zn, Mo, B, Si, CN⁻, ___ ___
		Al, Sb, As, Ba, Be, Cd, Ca, Cr, Co, Cu, Fe, Pb, Mg, Mn, Hg, Ni, K, Se, Ag, Na, Tl, V, Zn, Mo, B, Si, CN⁻, ___ ___
		Al, Sb, As, Ba, Be, Cd, Ca, Cr, Co, Cu, Fe, Pb, Mg, Mn, Hg, Ni, K, Se, Ag, Na, Tl, V, Zn, Mo, B, Si, CN⁻, ___ ___
		Al, Sb, As, Ba, Be, Cd, Ca, Cr, Co, Cu, Fe, Pb, Mg, Mn, Hg, Ni, K, Se, Ag, Na, Tl, V, Zn, Mo, B, Si, CN⁻, ___ ___
		Al, Sb, As, Ba, Be, Cd, Ca, Cr, Co, Cu, Fe, Pb, Mg, Mn, Hg, Ni, K, Se, Ag, Na, Tl, V, Zn, Mo, B, Si, CN⁻, ___ ___
		Al, Sb, As, Ba, Be, Cd, Ca, Cr, Co, Cu, Fe, Pb, Mg, Mn, Hg, Ni, K, Se, Ag, Na, Tl, V, Zn, Mo, B, Si, CN⁻, ___ ___
		Al, Sb, As, Ba, Be, Cd, Ca, Cr, Co, Cu, Fe, Pb, Mg, Mn, Hg, Ni, K, Se, Ag, Na, Tl, V, Zn, Mo, B, Si, CN⁻, ___ ___
		Al, Sb, As, Ba, Be, Cd, Ca, Cr, Co, Cu, Fe, Pb, Mg, Mn, Hg, Ni, K, Se, Ag, Na, Tl, V, Zn, Mo, B, Si, CN⁻, ___ ___
		Al, Sb, As, Ba, Be, Cd, Ca, Cr, Co, Cu, Fe, Pb, Mg, Mn, Hg, Ni, K, Se, Ag, Na, Tl, V, Zn, Mo, B, Si, CN⁻, ___ ___
		Al, Sb, As, Ba, Be, Cd, Ca, Cr, Co, Cu, Fe, Pb, Mg, Mn, Hg, Ni, K, Se, Ag, Na, Tl, V, Zn, Mo, B, Si, CN⁻, ___ ___
		Al, Sb, As, Ba, Be, Cd, Ca, Cr, Co, Cu, Fe, Pb, Mg, Mn, Hg, Ni, K, Se, Ag, Na, Tl, V, Zn, Mo, B, Si, CN⁻, ___ ___
		Al, Sb, As, Ba, Be, Cd, Ca, Cr, Co, Cu, Fe, Pb, Mg, Mn, Hg, Ni, K, Se, Ag, Na, Tl, V, Zn, Mo, B, Si, CN⁻, ___ ___
		Al, Sb, As, Ba, Be, Cd, Ca, Cr, Co, Cu, Fe, Pb, Mg, Mn, Hg, Ni, K, Se, Ag, Na, Tl, V, Zn, Mo, B, Si, CN⁻, ___ ___
		Al, Sb, As, Ba, Be, Cd, Ca, Cr, Co, Cu, Fe, Pb, Mg, Mn, Hg, Ni, K, Se, Ag, Na, Tl, V, Zn, Mo, B, Si, CN⁻, ___ ___
Analysis Method		
ICP		Al, Sb, As, Ba, Be, [✓ Cd], Ca, Cr, Co, Cu, Fe, Pb, Mg, Mn, Hg, Ni, K, Se, Ag, Na, Tl, V, Zn, Mo, B, Si, CN⁻, ___ ___
ICP Trace		Al, Sb, As, Ba, Be, [✓ Cd], Ca, [✓ Cr], [✓ Co], [✓ Cu], Fe, [✓ Pb], Mg, Mn, Hg, [✓ Ni], K, [✓ Se], [✓ Ag], Na, Tl, [✓ V], [✓ Zn], [✓ Mo], B, Si, CN⁻, ___ ___
ICP-MS		Al, [✓ Sb], [✓ As], Ba, Be, Cd, Ca, Cr, Co, Cu, Fe, Pb, Mg, Mn, Hg, Ni, K, Se, Ag, Na, [✓ Tl], V, Zn, Mo, B, Si, CN⁻, ___ ___
GFAA		Al, Sb, As, Ba, Be, Cd, Ca, Cr, Co, Cu, Fe, Pb, Mg, Mn, Hg, Ni, K, Se, Ag, Na, Tl, V, Zn, Mo, B, Si, CN⁻,

Comments: Mercury by CVAA if performed

LDC #: 13384A4
SDG #: 14400

VALIDATION FINDINGS WORKSHEET
Matrix Spike Analysis

Reviewer: MY
2nd Reviewer: [illegible]

METHOD: Trace Metals (EPA SW 846 Method 6010/7000)

Please see qualifications below for all questions answered "N". Not applicable questions are identified as "N/A".

(Y) N N/A Was a matrix spike analyzed for each matrix in this SDG?

Y N N/A Were matrix spike percent recoveries (%R) within the control limits of 75-125? If the sample concentration exceeded the spike concentration by a factor of 4 or more, no action was taken.

(Y) N N/A Was a post digestion spike analyzed for ICP elements that did not meet the required criteria for matrix spike recovery?

LEVEL IV ONLY:

Y N (N/A) Were recalculated results acceptable? See Level IV Recalculation Worksheet for recalculations.

#	Matrix Spike ID	Matrix	Analyte	%R	Associated Samples	Qualifications
1	16	Sediment	Sb	1.6 (70-130)	A1	J/UJ/A (post spike = 99.0)

Comments:

LDC #: 13384B4
SDG #: HV00

VALIDATION FINDINGS WORKSHEET
Sample Result Verification

Reviewer: MH
2nd Reviewer: N

METHOD: Trace metals (EPA SW-846 6010/7000)

#	Sample ID	Analyte	Result (units)	RL (units)	Finding	Qualifications
1	All	Sb, As, Tl	Lab reported by 6020	1/200.8 instead of in the SAPP.		Test.

Comments:

LDC#: 13384/84
SDG#: 14400

VALIDATION FINDINGS WORKSHEET
Field Duplicates

Reviewer: WH
2nd Reviewer: DC

METHOD: Metals (EPA Method 6010B/7000/200.8)

(Y) N NA Were field duplicate pairs identified in this SDG?
(Y) N NA Were target analytes detected in the field duplicate pairs?

Compound	Concentration (mg/kg)		RPD (50 (5 35))	
	6	7		
Arsenic	14.3	17.7	21	
Cadmium	0.7	0.7	0	
Chromium	41.2	39.9	3	
Cobalt	11.2	11.6	4	
Copper	127	134	5	
Lead	80	72	11	
Mercury	0.40	0.3	29	
Nickel	29	29	0	
Vanadium	74.2	74.8	1	
Zinc	191	210	9	
Molybdenum	2.7	2.4	12	

LDC#: 13384 A4
SDG#: HV00

VALIDATION FINDINGS WORKSHEET
Field Duplicates

Page: 2 of 2
Reviewer: MH
2nd Reviewer: [illegible]

METHOD: Metals (EPA Method 6010B/7000/200.8)

(Y) N NA Were field duplicate pairs identified in this SDG?
(Y) N NA Were target analytes detected in the field duplicate pairs?

Compound	Concentration (mg/kg)		RPD (50 (±~~25~~))	
	13	14		
Arsenic	10.4	9.6	8	
Chromium	31	30	3	
Cobalt	9.9	9.9	0	
Copper	46.9	46.4	1	
Lead	19	22	15	
Mercury	0.1U	0.1	~~200~~ NC	
Nickel	23	22	4	
Vanadium	68.2	68.5	0	
Zinc	113	112	1	
Molybdenum	2	2	0	

LDC #: 13395A4

VALIDATION COMPLETENESS WORKSHEET

Level II

Date: 4/21/05

SDG #: HV38

Page: 1 of 1

Laboratory: Analytical Resources, Inc.

Reviewer: MH

2nd Reviewer: [illegible]

METHOD: Metals (EPA SW 846 Method 6010B/~~6020~~2008/7000)

The samples listed below were reviewed for each of the following validation areas. Validation findings are noted in attached validation findings worksheets.

	Validation Area		Comments
I.	Technical holding times	A	Sampling dates: 3/11/05
II.	Calibration	N	
III.	Blanks	A	
IV.	ICP Interference Check Sample (ICS) Analysis	N	
V.	Matrix Spike Analysis	SW	
VI.	Duplicate Sample Analysis	A	
VII.	Laboratory Control Samples (LCS)	A	LCS + SRM
VIII.	Internal Standard (ICP-MS)	N	Not reviewed
IX.	Furnace Atomic Absorption QC	N	Not utilized
X.	ICP Serial Dilution	N	Not performed
XI.	Sample Result Verification	SW	
XII.	Overall Assessment of Data	A	
XIII.	Field Duplicates	N	
XIV.	Field Blanks	N	

Note: A = Acceptable; N = Not provided/applicable; SW = See worksheet; ND = No compounds detected; R = Rinsate; FB = Field blank; D = Duplicate; TB = Trip blank; EB = Equipment blank

Validated Samples: Sediment

1	LDW-SS39-010	11		21		31	
2	LDW-SS100-010	12		22		32	
3	LDW-SS2b-010	13		23		33	
4	FB	14		24		34	
5		15		25		35	
6		16		26		36	
7		17		27		37	
8		18		28		38	
9		19		29		39	
10		20		30		40	

Notes: _____

LDC #: 13398A4
SDG #: 4V38

VALIDATION FINDINGS WORKSHEET
Sample Specific Element Reference

Page: 1 of 1
Reviewer: MH
2nd reviewer:

All circled elements are applicable to each sample.

Sample ID	Matrix	Target Analyte List (TAL)
1-3	Sediment	Al, [✓ Sb, As], Ba, Be, [✓ Cd], Ca, [✓ Cr, Co, Cu], Fe, [✓ Pb], Mg, Mn, [✓ Hg, Ni], K, [✓ Se, Ag], Na, [✓ Tl, V, Zn, Mo], B, Si, CN⁻, ___ ___
		Al, Sb, As, Ba, Be, Cd, Ca, Cr, Co, Cu, Fe, Pb, Mg, Mn, Hg, Ni, K, Se, Ag, Na, Tl, V, Zn, Mo, B, Si, CN⁻, ___ ___
		Al, Sb, As, Ba, Be, Cd, Ca, Cr, Co, Cu, Fe, Pb, Mg, Mn, Hg, Ni, K, Se, Ag, Na, Tl, V, Zn, Mo, B, Si, CN⁻, ___ ___
		Al, Sb, As, Ba, Be, Cd, Ca, Cr, Co, Cu, Fe, Pb, Mg, Mn, Hg, Ni, K, Se, Ag, Na, Tl, V, Zn, Mo, B, Si, CN⁻, ___ ___
		Al, Sb, As, Ba, Be, Cd, Ca, Cr, Co, Cu, Fe, Pb, Mg, Mn, Hg, Ni, K, Se, Ag, Na, Tl, V, Zn, Mo, B, Si, CN⁻, ___ ___
		Al, Sb, As, Ba, Be, Cd, Ca, Cr, Co, Cu, Fe, Pb, Mg, Mn, Hg, Ni, K, Se, Ag, Na, Tl, V, Zn, Mo, B, Si, CN⁻, ___ ___
		Al, Sb, As, Ba, Be, Cd, Ca, Cr, Co, Cu, Fe, Pb, Mg, Mn, Hg, Ni, K, Se, Ag, Na, Tl, V, Zn, Mo, B, Si, CN⁻, ___ ___
		Al, Sb, As, Ba, Be, Cd, Ca, Cr, Co, Cu, Fe, Pb, Mg, Mn, Hg, Ni, K, Se, Ag, Na, Tl, V, Zn, Mo, B, Si, CN⁻, ___ ___
		Al, Sb, As, Ba, Be, Cd, Ca, Cr, Co, Cu, Fe, Pb, Mg, Mn, Hg, Ni, K, Se, Ag, Na, Tl, V, Zn, Mo, B, Si, CN⁻, ___ ___
		Al, Sb, As, Ba, Be, Cd, Ca, Cr, Co, Cu, Fe, Pb, Mg, Mn, Hg, Ni, K, Se, Ag, Na, Tl, V, Zn, Mo, B, Si, CN⁻, ___ ___
		Al, Sb, As, Ba, Be, Cd, Ca, Cr, Co, Cu, Fe, Pb, Mg, Mn, Hg, Ni, K, Se, Ag, Na, Tl, V, Zn, Mo, B, Si, CN⁻, ___ ___
		Al, Sb, As, Ba, Be, Cd, Ca, Cr, Co, Cu, Fe, Pb, Mg, Mn, Hg, Ni, K, Se, Ag, Na, Tl, V, Zn, Mo, B, Si, CN⁻, ___ ___
		Al, Sb, As, Ba, Be, Cd, Ca, Cr, Co, Cu, Fe, Pb, Mg, Mn, Hg, Ni, K, Se, Ag, Na, Tl, V, Zn, Mo, B, Si, CN⁻, ___ ___
		Al, Sb, As, Ba, Be, Cd, Ca, Cr, Co, Cu, Fe, Pb, Mg, Mn, Hg, Ni, K, Se, Ag, Na, Tl, V, Zn, Mo, B, Si, CN⁻, ___ ___
		Al, Sb, As, Ba, Be, Cd, Ca, Cr, Co, Cu, Fe, Pb, Mg, Mn, Hg, Ni, K, Se, Ag, Na, Tl, V, Zn, Mo, B, Si, CN⁻, ___ ___
		Al, Sb, As, Ba, Be, Cd, Ca, Cr, Co, Cu, Fe, Pb, Mg, Mn, Hg, Ni, K, Se, Ag, Na, Tl, V, Zn, Mo, B, Si, CN⁻, ___ ___
		Al, Sb, As, Ba, Be, Cd, Ca, Cr, Co, Cu, Fe, Pb, Mg, Mn, Hg, Ni, K, Se, Ag, Na, Tl, V, Zn, Mo, B, Si, CN⁻, ___ ___
		Al, Sb, As, Ba, Be, Cd, Ca, Cr, Co, Cu, Fe, Pb, Mg, Mn, Hg, Ni, K, Se, Ag, Na, Tl, V, Zn, Mo, B, Si, CN⁻, ___ ___
		Al, Sb, As, Ba, Be, Cd, Ca, Cr, Co, Cu, Fe, Pb, Mg, Mn, Hg, Ni, K, Se, Ag, Na, Tl, V, Zn, Mo, B, Si, CN⁻, ___ ___
		Al, Sb, As, Ba, Be, Cd, Ca, Cr, Co, Cu, Fe, Pb, Mg, Mn, Hg, Ni, K, Se, Ag, Na, Tl, V, Zn, Mo, B, Si, CN⁻, ___ ___
		Al, Sb, As, Ba, Be, Cd, Ca, Cr, Co, Cu, Fe, Pb, Mg, Mn, Hg, Ni, K, Se, Ag, Na, Tl, V, Zn, Mo, B, Si, CN⁻, ___ ___
		Al, Sb, As, Ba, Be, Cd, Ca, Cr, Co, Cu, Fe, Pb, Mg, Mn, Hg, Ni, K, Se, Ag, Na, Tl, V, Zn, Mo, B, Si, CN⁻, ___ ___
		Al, Sb, As, Ba, Be, Cd, Ca, Cr, Co, Cu, Fe, Pb, Mg, Mn, Hg, Ni, K, Se, Ag, Na, Tl, V, Zn, Mo, B, Si, CN⁻, ___ ___
		Al, Sb, As, Ba, Be, Cd, Ca, Cr, Co, Cu, Fe, Pb, Mg, Mn, Hg, Ni, K, Se, Ag, Na, Tl, V, Zn, Mo, B, Si, CN⁻, ___ ___
		Al, Sb, As, Ba, Be, Cd, Ca, Cr, Co, Cu, Fe, Pb, Mg, Mn, Hg, Ni, K, Se, Ag, Na, Tl, V, Zn, Mo, B, Si, CN⁻, ___ ___
Analysis Method		
ICP		Al, Sb, As, Ba, Be, Cd, Ca, Cr, Co, Cu, Fe, Pb, Mg, Mn, Hg, Ni, K, Se, Ag, Na, Tl, V, Zn, Mo, B, Si, CN⁻, ___ ___
ICP Trace		Al, Sb, As, Ba, Be, [✓ Cd], Ca, [✓ Cr, Co, Cu], Fe, [✓ Pb], Mg, Mn, Hg, [✓ Ni], K, [✓ Se, Ag], Na, Tl, [✓ V, Zn, Mo], B, Si, CN⁻, ___ ___
ICP-MS		Al, [✓ Sb], [✓ As], Ba, Be, Cd, Ca, Cr, Co, Cu, Fe, Pb, Mg, Mn, Hg, Ni, K, Se, Ag, Na, [✓ Tl], V, Zn, Mo, B, Si, CN⁻, ___ ___
GFAA		Al, Sb, As, Ba, Be, Cd, Ca, Cr, Co, Cu, Fe, Pb, Mg, Mn, Hg, Ni, K, Se, Ag, Na, Tl, V, Zn, Mo, B, Si, CN⁻, ___ ___

Comments: Mercury by CVAA if performed

LDC #: 13395A4
SDG #: HV38

VALIDATION FINDINGS WORKSHEET
Matrix Spike Analysis

Page: 1 of 1
Reviewer: MH
2nd Reviewer: [illegible]

METHOD: Trace Metals (EPA SW 846 Method 6010/7000)

Please see qualifications below for all questions answered "N". Not applicable questions are identified as "N/A".

(Y) N N/A Was a matrix spike analyzed for each matrix in this SDG?

Y (N) N/A Were matrix spike percent recoveries (%R) within the control limits of 75-125? If the sample concentration exceeded the spike concentration by a factor of 4 or more, no action was taken.

(Y) N N/A Was a post digestion spike analyzed for ICP elements that did not meet the required criteria for matrix spike recovery?

LEVEL IV ONLY:

Y N (N/A) Were recalculated results acceptable? See Level IV Recalculation Worksheet for recalculations.

#	Matrix Spike ID	Matrix	Analyte	%R	Associated Samples	Qualifications
1	LDW-SS45-010 (SDG HV42)	Sediment	Sb	3.3 (70-130)	All	J/UJ/A (post spike : 97.8%)

Comments:

LDC #: 13395A4
SDG #: HV38

VALIDATION FINDINGS WORKSHEET
Sample Result Verification

Reviewer: MH
2nd Reviewer: DC

METHOD: Trace metals (EPA SW-846 6010/7000)

#	Sample ID	Analyte	Result (units)	RL (units)	Finding	Qualifications
1	All	Sb, As, Tl	Lab reported	by 200.8.	D App. by 6020	Text.

Comments:

LDC #: 13398A4 **VALIDATION COMPLETENESS WORKSHEET** Date: 3/14/05

SDG #: HV58 Level II Page: 1 of 1

Laboratory: Analytical Resources, Inc. Reviewer: MH

2nd Reviewer: [illegible]

METHOD: Metals (EPA SW 846 Method 6010B/~~6020~~ 200.8 /7000)

The samples listed below were reviewed for each of the following validation areas. Validation findings are noted in attached validation findings worksheets.

	Validation Area		Comments
I.	Technical holding times	A	Sampling dates: 3/14/05
II.	Calibration	N	
III.	Blanks	SW	
IV.	ICP Interference Check Sample (ICS) Analysis	N	
V.	Matrix Spike Analysis	SW	
VI.	Duplicate Sample Analysis	SW	
VII.	Laboratory Control Samples (LCS)	A	LCS + SRM
VIII.	Internal Standard (ICP-MS)	N	Not reviewed
IX.	Furnace Atomic Absorption QC	N	Not utilized
X.	ICP Serial Dilution	N	Not performed
XI.	Sample Result Verification	SW	
XII.	Overall Assessment of Data	A	
XIII.	Field Duplicates	N	
XIV.	Field Blanks	ND	RB = 13, 14

Note: A = Acceptable; N = Not provided/applicable; SW = See worksheet; ND = No compounds detected; R = Rinsate; FB = Field blank; D = Duplicate; TB = Trip blank; EB = Equipment blank

Validated Samples: All sediment, except #13, 14. Aq.

1	LDW-SS90-010	11	LDW-SS107-010	21		31	
2	LDW-SS24-010	12	LDW-SS145-010	22		32	
3	LDW-SS9-010	13	LDW-SSB7a-RB	23		33	
4	LDW-SS77-010	14	LDW-SS71-RB	24		34	
5	LDW-SS59-010	15	LDW-SS90-010MS RE	25		35	
6	LDW-SSB5b-010	16	LDW-SS90-010DUP RE	26		36	
7	LDW-SS53-010	17	PBW	27		37	
8	LDW-SS34-010	18	PBS	28		38	
9	LDW-SSB4a-010	19	LDW-SS90-010MS	29		39	
10	LDW-SS29-010	20	↓ dup	30		40	

Notes: _____

LDC #: 133984 4
SDG #: IAV 58

VALIDATION FINDINGS WORKSHEET
Sample Specific Element Reference

Page: 1 of 1
Reviewer: MH
2nd reviewer: X

All circled elements are applicable to each sample.

Sample ID	Matrix	Target Analyte List (TAL)
1-14	Soil / k2	Al, [✓ Sb, As], Ba, Be, [✓ Cd], Ca, [✓ Cr, Co, Cu], Fe, [✓ Pb], Mg, Mn, [✓ Hg, Ni], K, [✓ Se, Ag], Na, [✓ Tl, V, Zn, Mo], B, Si, CN^-, ___ ___
w 15,16		Al, Sb, As, Ba, Be, Cd, Ca, Cr, Co, Cu, Fe, Pb, Mg, Mn, Hg, Ni, K, Se, Ag, Na, Tl, V, Zn, Mo, B, Si, CN^-, ___ ___
		Al, Sb, As, Ba, Be, Cd, Ca, Cr, Co, Cu, Fe, Pb, Mg, Mn, Hg, Ni, K, Se, Ag, Na, Tl, V, Zn, Mo, B, Si, CN^-, ___ ___
		Al, Sb, As, Ba, Be, Cd, Ca, Cr, Co, Cu, Fe, Pb, Mg, Mn, Hg, Ni, K, Se, Ag, Na, Tl, V, Zn, Mo, B, Si, CN^-, ___ ___
		Al, Sb, As, Ba, Be, Cd, Ca, Cr, Co, Cu, Fe, Pb, Mg, Mn, Hg, Ni, K, Se, Ag, Na, Tl, V, Zn, Mo, B, Si, CN^-, ___ ___
		Al, Sb, As, Ba, Be, Cd, Ca, Cr, Co, Cu, Fe, Pb, Mg, Mn, Hg, Ni, K, Se, Ag, Na, Tl, V, Zn, Mo, B, Si, CN^-, ___ ___
		Al, Sb, As, Ba, Be, Cd, Ca, Cr, Co, Cu, Fe, Pb, Mg, Mn, Hg, Ni, K, Se, Ag, Na, Tl, V, Zn, Mo, B, Si, CN^-, ___ ___
		Al, Sb, As, Ba, Be, Cd, Ca, Cr, Co, Cu, Fe, Pb, Mg, Mn, Hg, Ni, K, Se, Ag, Na, Tl, V, Zn, Mo, B, Si, CN^-, ___ ___
		Al, Sb, As, Ba, Be, Cd, Ca, Cr, Co, Cu, Fe, Pb, Mg, Mn, Hg, Ni, K, Se, Ag, Na, Tl, V, Zn, Mo, B, Si, CN^-, ___ ___
		Al, Sb, As, Ba, Be, Cd, Ca, Cr, Co, Cu, Fe, Pb, Mg, Mn, Hg, Ni, K, Se, Ag, Na, Tl, V, Zn, Mo, B, Si, CN^-, ___ ___
		Al, Sb, As, Ba, Be, Cd, Ca, Cr, Co, Cu, Fe, Pb, Mg, Mn, Hg, Ni, K, Se, Ag, Na, Tl, V, Zn, Mo, B, Si, CN^-, ___ ___
		Al, Sb, As, Ba, Be, Cd, Ca, Cr, Co, Cu, Fe, Pb, Mg, Mn, Hg, Ni, K, Se, Ag, Na, Tl, V, Zn, Mo, B, Si, CN^-, ___ ___
		Al, Sb, As, Ba, Be, Cd, Ca, Cr, Co, Cu, Fe, Pb, Mg, Mn, Hg, Ni, K, Se, Ag, Na, Tl, V, Zn, Mo, B, Si, CN^-, ___ ___
		Al, Sb, As, Ba, Be, Cd, Ca, Cr, Co, Cu, Fe, Pb, Mg, Mn, Hg, Ni, K, Se, Ag, Na, Tl, V, Zn, Mo, B, Si, CN^-, ___ ___
		Al, Sb, As, Ba, Be, Cd, Ca, Cr, Co, Cu, Fe, Pb, Mg, Mn, Hg, Ni, K, Se, Ag, Na, Tl, V, Zn, Mo, B, Si, CN^-, ___ ___
		Al, Sb, As, Ba, Be, Cd, Ca, Cr, Co, Cu, Fe, Pb, Mg, Mn, Hg, Ni, K, Se, Ag, Na, Tl, V, Zn, Mo, B, Si, CN^-, ___ ___
		Al, Sb, As, Ba, Be, Cd, Ca, Cr, Co, Cu, Fe, Pb, Mg, Mn, Hg, Ni, K, Se, Ag, Na, Tl, V, Zn, Mo, B, Si, CN^-, ___ ___
		Al, Sb, As, Ba, Be, Cd, Ca, Cr, Co, Cu, Fe, Pb, Mg, Mn, Hg, Ni, K, Se, Ag, Na, Tl, V, Zn, Mo, B, Si, CN^-, ___ ___
		Al, Sb, As, Ba, Be, Cd, Ca, Cr, Co, Cu, Fe, Pb, Mg, Mn, Hg, Ni, K, Se, Ag, Na, Tl, V, Zn, Mo, B, Si, CN^-, ___ ___
		Al, Sb, As, Ba, Be, Cd, Ca, Cr, Co, Cu, Fe, Pb, Mg, Mn, Hg, Ni, K, Se, Ag, Na, Tl, V, Zn, Mo, B, Si, CN^-, ___ ___
		Al, Sb, As, Ba, Be, Cd, Ca, Cr, Co, Cu, Fe, Pb, Mg, Mn, Hg, Ni, K, Se, Ag, Na, Tl, V, Zn, Mo, B, Si, CN^-, ___ ___
		Al, Sb, As, Ba, Be, Cd, Ca, Cr, Co, Cu, Fe, Pb, Mg, Mn, Hg, Ni, K, Se, Ag, Na, Tl, V, Zn, Mo, B, Si, CN^-, ___ ___
		Al, Sb, As, Ba, Be, Cd, Ca, Cr, Co, Cu, Fe, Pb, Mg, Mn, Hg, Ni, K, Se, Ag, Na, Tl, V, Zn, Mo, B, Si, CN^-, ___ ___
		Al, Sb, As, Ba, Be, Cd, Ca, Cr, Co, Cu, Fe, Pb, Mg, Mn, Hg, Ni, K, Se, Ag, Na, Tl, V, Zn, Mo, B, Si, CN^-, ___ ___
		Al, Sb, As, Ba, Be, Cd, Ca, Cr, Co, Cu, Fe, Pb, Mg, Mn, Hg, Ni, K, Se, Ag, Na, Tl, V, Zn, Mo, B, Si, CN^-, ___ ___
		Analysis Method
ICP		Al, Sb, As, Ba, Be, Cd, Ca, Cr, Co, Cu, Fe, Pb, Mg, Mn, Hg, Ni, K, Se, Ag, Na, Tl, V, Zn, Mo, B, Si, CN^-, ___ ___
ICP Trace		Al, Sb, As, Ba, Be, [✓ Cd], Ca, [✓ Cr, Co, Cu], Fe, [✓ Pb], Mg, Mn, Hg, [✓ Ni], K, [✓ Se, Ag], Na, Tl, [✓ V, Zn, Mo], B, Si, CN^-, ___ ___
ICP-MS		Al, [✓ Sb], [✓ As], Ba, Be, Cd, Ca, Cr, Co, Cu, Fe, Pb, Mg, Mn, Hg, Ni, K, Se, Ag, Na, [✓ Tl], V, Zn, Mo, B, Si, CN^-, ___ ___
GFAA		Al, Sb, As, Ba, Be, Cd, Ca, Cr, Co, Cu, Fe, Pb, Mg, Mn, Hg, Ni, K, Se, Ag, Na, Tl, V, Zn, Mo, B, Si, CN^-,

Comments: Mercury by CVAA if performed

LDC #: 13398A4
SDG #: HV58

VALIDATION FINDINGS WORKSHEET
PB/ICB/CCB QUALIFIED SAMPLES

Page: 1 of 1
Reviewer: MH
2nd Reviewer: [illegible]

METHOD: Trace Metals (EPA SW 846 Method 6010/7000) Soil preparation factor applied: _____
Sample Concentration units, unless otherwise noted: mg/kg Associated Samples: 2-12

					Sample Identification										
Analyte	Maximum PB[a] (mg/Kg)	Maximum PB[a] (ug/L)	Maximum ICB/CCB[a] (ug/L)	Blank Action Limit											
Al															Al
Sb						ND	Samples	less	quantitation	limit					Sb
As															As
Ba															Ba
Be															Be
Cd															Cd
Ca															Ca
Cr															Cr
Co															Co
Cu															Cu
Fe															Fe
Pb															Pb
Mg															Mg
Mn															Mn
Hg															Hg
Ni															Ni
K															K
Se															Se
Ag															Ag
Na															Na
Tl															Tl
V															V
Zn	0.9			9											Zn
B															B
Mo															Mo
Sr															Sr

Samples with analyte concentrations within five times the associated ICB, CCB or PB concentration are listed above with the centifications from the Validation Completeness Worksheet. These sample results were qualified as not detected, "U".
Note : a - The listed analyte concentration is the highest ICB, CCB, or PB detected in the analysis of each element.

LDC #: 13398A4
SDG #: I-V68

VALIDATION FINDINGS WORKSHEET
Matrix Spike Analysis

Page: 1 of 1
Reviewer: MH
2nd Reviewer: M

METHOD: Trace Metals (EPA SW 846 Method 6010/7000)

Please see qualifications below for all questions answered "N". Not applicable questions are identified as "N/A".

(Y) N N/A Was a matrix spike analyzed for each matrix in this SDG?

Y (N) N/A Were matrix spike percent recoveries (%R) within the control limits of ~~75-125~~ 70-130? If the sample concentration exceeded the spike concentration by a factor of 4 or more, no action was taken.

(Y) N N/A Was a post digestion spike analyzed for ICP elements that did not meet the required criteria for matrix spike recovery?

LEVEL IV ONLY:

Y N (N/A) Were recalculated results acceptable? See Level IV Recalculation Worksheet for recalculations.

#	Matrix Spike ID	Matrix	Analyte	%R	Associated Samples	Qualifications
1	15	Sediment	Sb	5.3	All Sediments	J/UJ/A (post spike 99.9 / 87.7)
			Cr	47.2	↓	↓
2	19	Sediment	Cu	159	2-12	J/UJ/A (post spike 99.5 / 88-11)
			Zn	308	↓	↓

Comments:

LDC #: 13398A4
SDG #: 4V58

VALIDATION FINDINGS WORKSHEET
Duplicate Analysis

Page: 1 of 1
Reviewer: MU
2nd Reviewer: AL

METHOD: Trace Metals (EPA SW 846 Method 6010/7000)

Please see qualifications below for all questions answered "N". Not applicable questions are identified as "N/A".

Y N N/A Was a duplicate sample analyzed for each matrix in this SDG?

Y N N/A Were all duplicate sample relative percent differences (RPD) ≤ 20% for water samples and ≤ 35% for soil samples? If no, see qualifications below. A control limit of ±R.L. (±2X R.L for soil) was used for sample values that were <5X the R.L., including the case when only one of the duplicate sample values was <5X R.L.. If field blanks were used for laboratory duplicates, note in the Overall Assessment.

LEVEL IV ONLY:

Y N N/A Were recalculated results acceptable? See Level IV Recalculation Worksheet for recalculations.

#	Duplicate ID	Matrix	Analyte	RPD (Limits)	Difference (Limits) ug/mg	Associated Samples	Qualifications
1	16	Sediment	Pb	65.7 (≤30)		1	J/UJ/A
			Zn	34.1		↓	↓
2	20	Sediment	Ag	94.4 (≤30)		2-12	J/UJ/A
			Pb	52.6			
			Ni		9 (≤8)		
			Zn	132			

Comments:

LDC #:_____
SDG #:_____

VALIDATION FINDINGS WORKSHEET
Sample Result Verification

Reviewer: MH
2nd Reviewer: 2

METHOD: Trace metals (EPA SW-846 6010/7000)

#	Sample ID	Analyte	Result (units)	RL (units)	Finding	Qualifications
1	All	Sb, Ag, Tl	Lab reported by 200.8.		Q APP. by 6020	Text.

Comments:_____

LDC #: 13403A4

SDG #: HV72

Laboratory: Analytical Resources, Inc.

VALIDATION COMPLETENESS WORKSHEET

Level ~~IV~~ II

Date: 4/22/05

Page: 1 of 1

Reviewer: MH

2nd Reviewer: [illegible]

METHOD: Metals (EPA SW 846 Method 6010B/~~6020~~7000) 2008

The samples listed below were reviewed for each of the following validation areas. Validation findings are noted in attached validation findings worksheets.

	Validation Area		Comments
I.	Technical holding times	A	Sampling dates: 3/15/05
II.	Calibration	N	
III.	Blanks	A	
IV.	ICP Interference Check Sample (ICS) Analysis	N	
V.	Matrix Spike Analysis	SW	
VI.	Duplicate Sample Analysis	A	
VII.	Laboratory Control Samples (LCS)	A	LCS + SRM
VIII.	Internal Standard (ICP-MS)	N	Not reviewed
IX.	Furnace Atomic Absorption QC	N	Not utilized
X.	ICP Serial Dilution	N	Not performed
XI.	Sample Result Verification	SW	
XII.	Overall Assessment of Data	A	
XIII.	Field Duplicates	N	
XIV.	Field Blanks	N	

Note: A = Acceptable
N = Not provided/applicable
SW = See worksheet
ND = No compounds detected
R = Rinsate
FB = Field blank
D = Duplicate
TB = Trip blank
EB = Equipment blank

Validated Samples: Sediment

1	LDW-SS93-010	11		21		31	
2	LDW-SS124-010	12		22		32	
3	LDW-SS135-010	13		23		33	
4	LDW-SS136-010	14		24		34	
5	LDW-SSB6a-010	15		25		35	
6	LDW-SSC1-010	16		26		36	
7	LDW-SS93-010MS	17		27		37	
8	LDW-SS93-010DUP	18		28		38	
9	FB	19		29		39	
10		20		30		40	

Notes: _____

LDC #: 13403A4
SDG #: HV72

VALIDATION FINDINGS WORKSHEET
Sample Specific Element Reference

Page: 1 of 1
Reviewer: MB
2nd reviewer:

All circled elements are applicable to each sample.

Sample ID	Matrix	Target Analyte List (TAL)
1-6	sediment	Al, [✓ Sb], [✓ As], Ba, Be, [✓ Cd], Ca, [✓ Cr], [✓ Co], [✓ Cu], Fe, [✓ Pb], Mg, Mn, [✓ Hg], [✓ Ni], K, [✓ Se], [✓ Ag], Na, [✓ Tl], [✓ V], [✓ Zn], [✓ Mo], B, Si, CN⁻, ___ ___
or 7, 8	〃	Al, [✓ Sb], [✓ As], Ba, Be, [✓ Cd], Ca, [✓ Cr], [✓ Co], [✓ Cu], Fe, [✓ Pb], Mg, Mn, [✓ Hg], [✓ Ni], K, [✓ Se], [✓ Ag], Na, [✓ Tl], [✓ V], [✓ Zn], [✓ Mo], B, Si, CN⁻, ___ ___
		Al, Sb, As, Ba, Be, Cd, Ca, Cr, Co, Cu, Fe, Pb, Mg, Mn, Hg, Ni, K, Se, Ag, Na, Tl, V, Zn, Mo, B, Si, CN⁻, ___ ___
		Al, Sb, As, Ba, Be, Cd, Ca, Cr, Co, Cu, Fe, Pb, Mg, Mn, Hg, Ni, K, Se, Ag, Na, Tl, V, Zn, Mo, B, Si, CN⁻, ___ ___
		Al, Sb, As, Ba, Be, Cd, Ca, Cr, Co, Cu, Fe, Pb, Mg, Mn, Hg, Ni, K, Se, Ag, Na, Tl, V, Zn, Mo, B, Si, CN⁻, ___ ___
		Al, Sb, As, Ba, Be, Cd, Ca, Cr, Co, Cu, Fe, Pb, Mg, Mn, Hg, Ni, K, Se, Ag, Na, Tl, V, Zn, Mo, B, Si, CN⁻, ___ ___
		Al, Sb, As, Ba, Be, Cd, Ca, Cr, Co, Cu, Fe, Pb, Mg, Mn, Hg, Ni, K, Se, Ag, Na, Tl, V, Zn, Mo, B, Si, CN⁻, ___ ___
		Al, Sb, As, Ba, Be, Cd, Ca, Cr, Co, Cu, Fe, Pb, Mg, Mn, Hg, Ni, K, Se, Ag, Na, Tl, V, Zn, Mo, B, Si, CN⁻, ___ ___
		Al, Sb, As, Ba, Be, Cd, Ca, Cr, Co, Cu, Fe, Pb, Mg, Mn, Hg, Ni, K, Se, Ag, Na, Tl, V, Zn, Mo, B, Si, CN⁻, ___ ___
		Al, Sb, As, Ba, Be, Cd, Ca, Cr, Co, Cu, Fe, Pb, Mg, Mn, Hg, Ni, K, Se, Ag, Na, Tl, V, Zn, Mo, B, Si, CN⁻, ___ ___
		Al, Sb, As, Ba, Be, Cd, Ca, Cr, Co, Cu, Fe, Pb, Mg, Mn, Hg, Ni, K, Se, Ag, Na, Tl, V, Zn, Mo, B, Si, CN⁻, ___ ___
		Al, Sb, As, Ba, Be, Cd, Ca, Cr, Co, Cu, Fe, Pb, Mg, Mn, Hg, Ni, K, Se, Ag, Na, Tl, V, Zn, Mo, B, Si, CN⁻, ___ ___
		Al, Sb, As, Ba, Be, Cd, Ca, Cr, Co, Cu, Fe, Pb, Mg, Mn, Hg, Ni, K, Se, Ag, Na, Tl, V, Zn, Mo, B, Si, CN⁻, ___ ___
		Al, Sb, As, Ba, Be, Cd, Ca, Cr, Co, Cu, Fe, Pb, Mg, Mn, Hg, Ni, K, Se, Ag, Na, Tl, V, Zn, Mo, B, Si, CN⁻, ___ ___
		Al, Sb, As, Ba, Be, Cd, Ca, Cr, Co, Cu, Fe, Pb, Mg, Mn, Hg, Ni, K, Se, Ag, Na, Tl, V, Zn, Mo, B, Si, CN⁻, ___ ___
		Al, Sb, As, Ba, Be, Cd, Ca, Cr, Co, Cu, Fe, Pb, Mg, Mn, Hg, Ni, K, Se, Ag, Na, Tl, V, Zn, Mo, B, Si, CN⁻, ___ ___
		Al, Sb, As, Ba, Be, Cd, Ca, Cr, Co, Cu, Fe, Pb, Mg, Mn, Hg, Ni, K, Se, Ag, Na, Tl, V, Zn, Mo, B, Si, CN⁻, ___ ___
		Al, Sb, As, Ba, Be, Cd, Ca, Cr, Co, Cu, Fe, Pb, Mg, Mn, Hg, Ni, K, Se, Ag, Na, Tl, V, Zn, Mo, B, Si, CN⁻, ___ ___
		Al, Sb, As, Ba, Be, Cd, Ca, Cr, Co, Cu, Fe, Pb, Mg, Mn, Hg, Ni, K, Se, Ag, Na, Tl, V, Zn, Mo, B, Si, CN⁻, ___ ___
		Al, Sb, As, Ba, Be, Cd, Ca, Cr, Co, Cu, Fe, Pb, Mg, Mn, Hg, Ni, K, Se, Ag, Na, Tl, V, Zn, Mo, B, Si, CN⁻, ___ ___
		Al, Sb, As, Ba, Be, Cd, Ca, Cr, Co, Cu, Fe, Pb, Mg, Mn, Hg, Ni, K, Se, Ag, Na, Tl, V, Zn, Mo, B, Si, CN⁻, ___ ___
		Al, Sb, As, Ba, Be, Cd, Ca, Cr, Co, Cu, Fe, Pb, Mg, Mn, Hg, Ni, K, Se, Ag, Na, Tl, V, Zn, Mo, B, Si, CN⁻, ___ ___
		Al, Sb, As, Ba, Be, Cd, Ca, Cr, Co, Cu, Fe, Pb, Mg, Mn, Hg, Ni, K, Se, Ag, Na, Tl, V, Zn, Mo, B, Si, CN⁻, ___ ___
		Al, Sb, As, Ba, Be, Cd, Ca, Cr, Co, Cu, Fe, Pb, Mg, Mn, Hg, Ni, K, Se, Ag, Na, Tl, V, Zn, Mo, B, Si, CN⁻, ___ ___
		Al, Sb, As, Ba, Be, Cd, Ca, Cr, Co, Cu, Fe, Pb, Mg, Mn, Hg, Ni, K, Se, Ag, Na, Tl, V, Zn, Mo, B, Si, CN⁻, ___ ___
		Analysis Method
ICP		Al, Sb, As, Ba, Be, Cd, Ca, Cr, Co, Cu, Fe, Pb, Mg, Mn, Hg, Ni, K, Se, Ag, Na, Tl, V, Zn, Mo, B, Si, CN⁻, ___ ___
ICP Trace		Al, Sb, As, Ba, Be, [✓ Cd], Ca, [✓ Cr], [✓ Co], [✓ Cu], Fe, [✓ Pb], Mg, Mn, Hg, [✓ Ni], K, [✓ Se], [✓ Ag], Na, Tl, [✓ V], [✓ Zn], [✓ Mo], B, Si, CN⁻, ___ ___
ICP-MS		Al, [✓ Sb], [✓ As], Ba, Be, Cd, Ca, Cr, Co, Cu, Fe, Pb, Mg, Mn, Hg, Ni, K, Se, Ag, Na, [✓ Tl], V, Zn, Mo, B, Si, CN⁻, ___ ___
GFAA		Al, Sb, As, Ba, Be, Cd, Ca, Cr, Co, Cu, Fe, Pb, Mg, Mn, Hg, Ni, K, Se, Ag, Na, Tl, V, Zn, Mo, B, Si, CN⁻,

Comments: [✓ Mercury by CVAA if performed]

LDC #: 13403A4
SDG #: HV72

VALIDATION FINDINGS WORKSHEET
Matrix Spike Analysis

Reviewer: MH
2nd Reviewer: K

METHOD: Trace Metals (EPA SW 846 Method 6010/7000)

Please see qualifications below for all questions answered "N". Not applicable questions are identified as "N/A".

(Y) N N/A Was a matrix spike analyzed for each matrix in this SDG?

Y (N) N/A Were matrix spike percent recoveries (%R) within the control limits of ~~75-125~~ 70-130? If the sample concentration exceeded the spike concentration by a factor of 4 or more, no action was taken.

(Y) N N/A Was a post digestion spike analyzed for ICP elements that did not meet the required criteria for matrix spike recovery?

LEVEL IV ONLY:

Y N (N/A) Were recalculated results acceptable? See Level IV Recalculation Worksheet for recalculations.

#	Matrix Spike ID	Matrix	Analyte	%R	Associated Samples	Qualifications
1	7	sediment	Sb	2.2	All	J/UJ/A (post spike = 99.6)

Comments:

LDC #: 13403A4
SDG #: 1HV72

VALIDATION FINDINGS WORKSHEET
Sample Result Verification

Reviewer: MP
2nd Reviewer: [illegible]

METHOD: Trace metals (EPA SW-846 6010/7000)

#	Sample ID	Analyte	Result (units)	RL (units)	Finding	Qualifications
1	All	Sb, As, Tl	Lab reported by 200.8.		Appp by ~~200~~ 6020	Test.

Comments:

LDC #: 13412A4 **VALIDATION COMPLETENESS WORKSHEET** Date: 4/26/08

SDG #: HV76 Level IV Page: 1 of 1

Laboratory: Analytical Resources, Inc. Reviewer: MM

2nd Reviewer: R

METHOD: Metals (EPA SW 846 Method 6010B/~~6020~~/7000)

The samples listed below were reviewed for each of the following validation areas. Validation findings are noted in attached validation findings worksheets.

	Validation Area		Comments
I.	Technical holding times	A	Sampling dates: 3/15/05
II.	Calibration	A	
III.	Blanks	A	
IV.	ICP Interference Check Sample (ICS) Analysis	SW	
V.	Matrix Spike Analysis	SW	
VI.	Duplicate Sample Analysis	A	
VII.	Laboratory Control Samples (LCS)	A	Lcs + SRM
VIII.	Internal Standard (ICP-MS)	A	
IX.	Furnace Atomic Absorption QC	N	Not performed
X.	ICP Serial Dilution	A/N	~~Not performed~~ MM
XI.	Sample Result Verification	SW	
XII.	Overall Assessment of Data	A	
XIII.	Field Duplicates	N	
XIV.	Field Blanks	N	

Note: A = Acceptable; N = Not provided/applicable; SW = See worksheet; ND = No compounds detected; R = Rinsate; FB = Field blank; D = Duplicate; TB = Trip blank; EB = Equipment blank

Validated Samples: Solvent

1	LDW-SS98-010	11	LDW-SS98-010MS	21		31	
2	LDW-SS141-010	12	LDW-SS98-010DUP	22		32	
3	LDW-SSB9a-010	13	FB	23		33	
4	LDW-SS156-010	14		24		34	
5	LDW-SS155-010	15		25		35	
6	LDW-SS154-010	16		26		36	
7	LDW-SS153-010	17		27		37	
8	LDW-SS152-010	18		28		38	
9	LDW-SS151-010	19		29		39	
10	LDW-SS144-010	20		30		40	

Notes: _____

LDC #: 13412B4
SDG #: HV76

VALIDATION FINDINGS CHECKLIST

Page: 1 of 1
Reviewer: LM
2nd Reviewer: KC

Method: Metals (EPA SW 826 Method 6010/7000/6020)

Validation Area	Yes	No	NA	Findings/Comments
I. Technical holding times				
All technical holding times were met.	✓			
Cooler temperature criteria was met.	✓			
II. Calibration				
Were all instruments calibrated daily, each set-up time?	✓			
Were the proper number of standards used?	✓			
Were all initial and continuing calibration verification %Rs within the 90-110% (80-120% for mercury and 85-115% for cyanide) QC limits?	✓			
Were all initial calibration correlation coefficients ≥ 0.995?	✓			
Was a midrange cyanide standard distilled?			✓	
III. Blanks				
Was a method blank associated with every sample in this SDG?	✓			
Was there contamination in the method blanks? If yes, please see the Blanks validation completeness worksheet.		✓		
IV. ICP Interference Check Sample				
Were ICP interference check samples performed daily?	✓			
Were the AB solution percent recoveries (%R) with the 80-120% QC limits?	✓			
IV. Matrix spike/Matrix spike duplicates				
Were a matrix spike (MS) and duplicate (DUP) analyzed for each matrix in this SDG? If no, indicate which matrix does not have an associated MS/MSD or MS/DUP. Soil / Water.	✓			
Were the MS/MSD percent recoveries (%R) and the relative percent differences (RPD) within the 75-125 QC limits? If the sample concentration exceeded the spike concentration by a factor of 4 or more, no action was taken.		✓		
Were the MS/MSD or duplicate relative percent differences (RPD) ≤ 20% for waters and ≤ 35% for soil samples? A control limit of +/- RL(+/-2X RL for soil) was used for samples that were ≤ 5X the RL, including when only one of the duplicate sample values were ≤ 5X the RL.	✓			
V. Laboratory control samples				
Was an LCS anaylzed for this SDG?	✓			
Was an LCS analyzed per extraction batch?	✓			
Were the LCS percent recoveries (%R) and relative percent difference (RPD) within the 80-120% QC limits for water samples and laboratory established QC limits for soils?	✓			
VI. Furnace Atomic Absorption QC				
If MSA was performed, was the correlation coefficients ≥ 0.995?			✓	
Do all applicable analysies have duplicate injections?			✓	

LDC #: 13412A4
SDG #: HV96

VALIDATION FINDINGS CHECKLIST

Reviewer: MM
2nd Reviewer: M

Validation Area	Yes	No	NA	Findings/Comments
For sample concentrations > RL, are applicable duplicate injection RSD values < 20%?			✓	
Were analytical spike recoveries within the 85-115% QC limits?			✓	
VII. ICP Serial Dilution				
Was an ICP serial dilution analyzed if analyte concentrations were > 50X the IDL?	✓			
Were all percent differences (%Ds) ≤ 10%?	✓			
Was there evidence of negative interference? If yes, professional judgement will be used to qualify the data.			✓	
VIII. Internal Standards (EPA SW 846 Method ~~6020~~ 6020A)				
Were all the percent recoveries (%R) within the ~~30-120%~~ 60-140% of the intensity of the internal standard in the associated initial calibration?	✓			
If the %Rs were outside the criteria, was a reanalysis performed?			✓	
IX. Regional Quality Assurance and Quality Control				
Were performance evaluation (PE) samples performed?			✓	
Were the performance evaluation (PE) samples within the acceptance limits?			✓	
X. Sample Result Verification				
Were RLs adjusted to reflect all sample dilutions and dry weight factors applicable to level IV validation?	✓			
XI. Overall assessment of data				
Overall assessment of data was found to be acceptable.	✓			
XII. Field duplicates				
Field duplicate pairs were identified in this SDG.		✓		
Target analytes were detected in the field duplicates.			✓	
XIII. Field blanks				
Field blanks were identified in this SDG.		✓		
Target analytes were detected in the field blanks.			✓	

LDC #: 13412A4
SDG #: 17V76

VALIDATION FINDINGS WORKSHEET
Sample Specific Element Reference

Page: 1 of 1
Reviewer: MH
2nd reviewer:

All circled elements are applicable to each sample.

Sample ID	Matrix	Target Analyte List (TAL)
1-10	Sediment	Al, [✓ Sb, As] Ba, Be, [✓ Cd] Ca, [✓ Cr, Co, Cu], Fe, [✓ Pb], Mg, Mn, [✓ Hg], [✓ Ni], K, [✓ Se], [✓ Ag] Na, [✓ Tl], [✓ V], [✓ Zn], [✓ Mo], B, Si, CN^-, ___ ___
m11, 12	↓	Al, [✓ Sb, As,] Ba, Be, [✓ Cd] Ca, [✓ Cr, Co, Cu], Fe, [✓ Pb], Mg, Mn, [✓ Hg, Ni], K, [✓ Se, Ag] Na, [✓ Tl, V, Zn, Mo], B, Si, CN^-, ___ ___
		Al, Sb, As, Ba, Be, Cd, Ca, Cr, Co, Cu, Fe, Pb, Mg, Mn, Hg, Ni, K, Se, Ag, Na, Tl, V, Zn, Mo, B, Si, CN^-, ___ ___
		Al, Sb, As, Ba, Be, Cd, Ca, Cr, Co, Cu, Fe, Pb, Mg, Mn, Hg, Ni, K, Se, Ag, Na, Tl, V, Zn, Mo, B, Si, CN^-, ___ ___
		Al, Sb, As, Ba, Be, Cd, Ca, Cr, Co, Cu, Fe, Pb, Mg, Mn, Hg, Ni, K, Se, Ag, Na, Tl, V, Zn, Mo, B, Si, CN^-, ___ ___
		Al, Sb, As, Ba, Be, Cd, Ca, Cr, Co, Cu, Fe, Pb, Mg, Mn, Hg, Ni, K, Se, Ag, Na, Tl, V, Zn, Mo, B, Si, CN^-, ___ ___
		Al, Sb, As, Ba, Be, Cd, Ca, Cr, Co, Cu, Fe, Pb, Mg, Mn, Hg, Ni, K, Se, Ag, Na, Tl, V, Zn, Mo, B, Si, CN^-, ___ ___
		Al, Sb, As, Ba, Be, Cd, Ca, Cr, Co, Cu, Fe, Pb, Mg, Mn, Hg, Ni, K, Se, Ag, Na, Tl, V, Zn, Mo, B, Si, CN^-, ___ ___
		Al, Sb, As, Ba, Be, Cd, Ca, Cr, Co, Cu, Fe, Pb, Mg, Mn, Hg, Ni, K, Se, Ag, Na, Tl, V, Zn, Mo, B, Si, CN^-, ___ ___
		Al, Sb, As, Ba, Be, Cd, Ca, Cr, Co, Cu, Fe, Pb, Mg, Mn, Hg, Ni, K, Se, Ag, Na, Tl, V, Zn, Mo, B, Si, CN^-, ___ ___
		Al, Sb, As, Ba, Be, Cd, Ca, Cr, Co, Cu, Fe, Pb, Mg, Mn, Hg, Ni, K, Se, Ag, Na, Tl, V, Zn, Mo, B, Si, CN^-, ___ ___
		Al, Sb, As, Ba, Be, Cd, Ca, Cr, Co, Cu, Fe, Pb, Mg, Mn, Hg, Ni, K, Se, Ag, Na, Tl, V, Zn, Mo, B, Si, CN^-, ___ ___
		Al, Sb, As, Ba, Be, Cd, Ca, Cr, Co, Cu, Fe, Pb, Mg, Mn, Hg, Ni, K, Se, Ag, Na, Tl, V, Zn, Mo, B, Si, CN^-, ___ ___
		Al, Sb, As, Ba, Be, Cd, Ca, Cr, Co, Cu, Fe, Pb, Mg, Mn, Hg, Ni, K, Se, Ag, Na, Tl, V, Zn, Mo, B, Si, CN^-, ___ ___
		Al, Sb, As, Ba, Be, Cd, Ca, Cr, Co, Cu, Fe, Pb, Mg, Mn, Hg, Ni, K, Se, Ag, Na, Tl, V, Zn, Mo, B, Si, CN^-, ___ ___
		Al, Sb, As, Ba, Be, Cd, Ca, Cr, Co, Cu, Fe, Pb, Mg, Mn, Hg, Ni, K, Se, Ag, Na, Tl, V, Zn, Mo, B, Si, CN^-, ___ ___
		Al, Sb, As, Ba, Be, Cd, Ca, Cr, Co, Cu, Fe, Pb, Mg, Mn, Hg, Ni, K, Se, Ag, Na, Tl, V, Zn, Mo, B, Si, CN^-, ___ ___
		Al, Sb, As, Ba, Be, Cd, Ca, Cr, Co, Cu, Fe, Pb, Mg, Mn, Hg, Ni, K, Se, Ag, Na, Tl, V, Zn, Mo, B, Si, CN^-, ___ ___
		Al, Sb, As, Ba, Be, Cd, Ca, Cr, Co, Cu, Fe, Pb, Mg, Mn, Hg, Ni, K, Se, Ag, Na, Tl, V, Zn, Mo, B, Si, CN^-, ___ ___
		Al, Sb, As, Ba, Be, Cd, Ca, Cr, Co, Cu, Fe, Pb, Mg, Mn, Hg, Ni, K, Se, Ag, Na, Tl, V, Zn, Mo, B, Si, CN^-, ___ ___
		Al, Sb, As, Ba, Be, Cd, Ca, Cr, Co, Cu, Fe, Pb, Mg, Mn, Hg, Ni, K, Se, Ag, Na, Tl, V, Zn, Mo, B, Si, CN^-, ___ ___
		Al, Sb, As, Ba, Be, Cd, Ca, Cr, Co, Cu, Fe, Pb, Mg, Mn, Hg, Ni, K, Se, Ag, Na, Tl, V, Zn, Mo, B, Si, CN^-, ___ ___
		Al, Sb, As, Ba, Be, Cd, Ca, Cr, Co, Cu, Fe, Pb, Mg, Mn, Hg, Ni, K, Se, Ag, Na, Tl, V, Zn, Mo, B, Si, CN^-, ___ ___
		Al, Sb, As, Ba, Be, Cd, Ca, Cr, Co, Cu, Fe, Pb, Mg, Mn, Hg, Ni, K, Se, Ag, Na, Tl, V, Zn, Mo, B, Si, CN^-, ___ ___
		Al, Sb, As, Ba, Be, Cd, Ca, Cr, Co, Cu, Fe, Pb, Mg, Mn, Hg, Ni, K, Se, Ag, Na, Tl, V, Zn, Mo, B, Si, CN^-, ___ ___

Analysis Method

ICP		Al, Sb, As, Ba, Be, Cd, Ca, Cr, Co, Cu, Fe, Pb, Mg, Mn, Hg, Ni, K, Se, Ag, Na, Tl, V, Zn, Mo, B, Si, CN^-, ___ ___
ICP Trace		Al, Sb, As, Ba, Be, [✓ Cd], Ca, [✓ Cr, Co, Cu], Fe, [✓ Pb], Mg, Mn, Hg, [✓ Ni], K, [✓ Se], [✓ Ag], Na, Tl, [✓ V], [✓ Zn], [✓ Mo], B, Si, CN^-, ___ ___
ICP-MS		Al, [✓ Sb], [✓ As] Ba, Be, Cd, Ca, Cr, Co, Cu, Fe, Pb, Mg, Mn, Hg, Ni, K, Se, Ag, Na, [✓ Tl], V, Zn, Mo, B, Si, CN^-, ___ ___
GFAA		Al, Sb, As, Ba, Be, Cd, Ca, Cr, Co, Cu, Fe, Pb, Mg, Mn, Hg, Ni, K, Se, Ag, Na, Tl, V, Zn, Mo, B, Si, CN^-,

Comments: [✓ Mercury by CVAA if performed]

LDC #: 13412B4
SDG #: HV76

VALIDATION FINDINGS WORKSHEET
ICP Interference Check Sample

Reviewer: MH
2nd Reviewer:

METHOD: Trace Metals (EPA SW 846 Method 6010/7000)

Please see qualifications below for all questions answered "N". Not applicable questions are identified as "N/A".

(Y) N N/A Were ICP interference check samples performed as required?

(Y) N N/A Were the AB solution percent recoveries (%R) within the control limits of 80-120% ?

LEVEL IV ONLY:

(Y) N N/A Were recalculated results acceptable? See Level IV Recalculation Worksheet for recalculations.

#	Date	ICS Identification	Analyte	Finding ug/L	Associated Samples	Qualifications
1	3/31/05	ICSA	Mo	5.7 (RL=5.0)	8.9	J (all / p
			Se	-5.2 (RL=50.0)	↓ (Fe > 90% in ICSA) (~200)	UJ (all / p
2	↓	↓	Mo	5.7 (RL=5.0)	1.7, 10	N, qvm
			Se	-5.2 (RL=50.0)	↓ (Al, Ca, Mg, Fe < 90% in ICSA)	↓

Comments:

LDC #: 34128A
SDG #: 14176

VALIDATION FINDINGS WORKSHEET
Matrix Spike Analysis

Page: 1 of 1
Reviewer: MY
2nd Reviewer:

METHOD: Trace Metals (EPA SW 846 Method 6010/7000)

Please see qualifications below for all questions answered "N". Not applicable questions are identified as "N/A".

(Y) N N/A Was a matrix spike analyzed for each matrix in this SDG?

Y (N) N/A Were matrix spike percent recoveries (%R) within the control limits of ~~75-125~~? If the sample concentration exceeded the spike concentration by a factor of 4 or more, no action was taken. 70-130

(Y) N N/A Was a post digestion spike analyzed for ICP elements that did not meet the required criteria for matrix spike recovery?

LEVEL IV ONLY:

(Y) N N/A Were recalculated results acceptable? See Level IV Recalculation Worksheet for recalculations.

#	Matrix Spike ID	Matrix	Analyte	%R	Associated Samples	Qualifications
1	11	Sediment	Sb	2.5	All	J/nJ/A (post spike = 104 %)

Comments:

LDC #: 13412A4
SDG #: HV96

VALIDATION FINDINGS WORKSHEET
Sample Result Verification

Reviewer: MH
2nd Reviewer

METHOD: Trace metals (EPA SW-846 6010/7000)

#	Sample ID	Analyte	Result (units)	RL (units)	Finding	Qualifications
1	All	Sb, As, Tl	200.8 by Lab	Below the RDL.		Test

Comments:

LDC #: 13412A4
SDG #: HV76

VALIDATION FINDINGS WORKSHEET
Initial and Continuing Calibration Calculation Verification

Page: 1 of 1
Reviewer: MJ
2nd Reviewer: ok

METHOD: Trace Metals (EPA SW 846 Method 6010/7000)

An initial and continuing calibration verification percent recovery (%R) was recalculated for each type of analysis using the following formula:

%R = Found x 100 / True

Where, Found = concentration (in ug/L) of each analyte measured in the analysis of the ICV or CCV solution
True = concentration (in ug/L) of each analyte in the ICV or CCV source

Standard ID	Type of Analysis	Element	Found (ug/L)	True (ug/L)	Recalculated %R	Reported %R	Acceptable (Y/N)
ICV	ICP (Intial calibration)	Cr	940.5	1000	94.0	94.0	Y
↓	~~GFAA~~ (Initial calibration) ICP/MS	Sb	50.98	50.0	101.9	101.9	
	CVAA (Initial calibration)	Hg	8.07	8.0	100.9	100.9	
CCV	ICP (Continuing calibration)	Mo	1008	1000	100.1	100.1	
	~~GFAA~~ (Continuing calibration) ICP/MS	Tl	53.5	50	107.0	107.0	
↓	CVAA (Continuing calibration)	Hg	4.02	4.0	100.5	100.5	↓
	Cyanide (Initial calibration)						
	Cyanide (Continuing calibation)						

Comments: Refer to Calibration Verification findings worksheet for list of qualifications and associated samples when reported results do not agree within 10.0% of the recalculated results.

LDC #: 13412A4
SDG #: HV76

VALIDATION FINDINGS WORKSHEET
Level IV Recalculation Worksheet

Reviewer: MM
2nd Reviewer: DC

METHOD: Trace Metals (EPA SW 846 Method 6010/7000)

Percent recoveries (%R) for an ICP interference check sample, a laboratory control sample and a matrix spike sample were recaluculated using the following formula:

$\%R = \frac{Found}{True} \times 100$

Where, Found = Concentration of each analyte measured in the analysis of the sample. For the matrix spike calculation, Found = SSR (spiked sample result) - SR (sample result).
True = Concentration of each analyte in the source.

A sample and duplicate relative percent difference (RPD) was recalculated using the following formula:

$RPD = \frac{|S-D|}{(S+D)/2} \times 100$

Where, S = Original sample concentration
D = Duplicate sample concentration

An ICP serial dilution percent difference (%D) was recalculated using the following formula:

$\%D = \frac{|I-SDR|}{I} \times 100$

Where, I = Initial Sample Result (mg/L)
SDR = Serial Dilution Result (mg/L) (Instrument Reading x 5)

Sample ID	Type of Analysis	Element	Found / S / I (units)	True / D / SDR (units)	Recalculated %R / RPD / %D	Reported %R / RPD / %D	Acceptable (Y/N)
ICSAB	ICP interferance check	Be	989.4	1000	98.9	98.9	Y
LCS	Laboratory control sample	Cu	47.4	50	94.8	94.8	
1	Matrix spike	Ag	(SSR-SR) 88.96	92.1	96.6	96.5	
12	Duplicate	V	53.5	52.6	1.7	1.7	
1 MS	ICP serial dilution	Zn	351.1	353.9	0.8	0.8	

Comments: Refer to appropriate worksheet for list of qualifications and associated samples when reported results do not agree within 10.0% of the recalculated results.

LDC #: 13412A24
SDG #: HV76

VALIDATION FINDINGS WORKSHEET
Sample Calculation Verification

Reviewer: MV
2nd reviewer: R

METHOD: Trace Metals (EPA SW 846 Method 6010/7000)

Please see qualifications below for all questions answered "N". Not applicable questions are identified as "N/A".

Y N N/A Have results been reported and calculated correctly?
Y N N/A Are results within the calibrated range of the instruments and within the linear range of the ICP?
Y N N/A Are all detection limits below the CRDL?

Detected analyte results for 1 were recalculated and verified using the following equation:

Concentration = $\frac{(RD)(FV)(Dil)}{(In.\ Vol.)(\%S)}$

RD = Raw data concentration
FV = Final volume (ml)
In. Vol. = Initial volume (ml) or weight (G)
Dil = Dilution factor
%S = Decimal percent solids

Recalculation:

$As = \frac{5.457\ ug/L \times 0.05\ L \times 20}{0.541 \times 1.042\ g} = 9.68\ ug/g$

$= 9.68\ mg/kg$

Sample ID	Analyte	Reported Concentration (~~mg/kg~~)	Calculated Concentration (~~mg/kg~~)	Acceptable (Y/N)
1	As	9.7	9.7	Y
	Cr	19.4	19.4	
	Co	6.1	6.1	
	Cu	33.6	33.6	
	Pb	15	15	
	Mo	1.2	1.2	
	Ni	13	13	
	V	52.6	52.6	
	Zn	65	65	↓

LDC #: 13419A4 **VALIDATION COMPLETENESS WORKSHEET** Date: 4/26/05
SDG #: HW06 Level II Page: 1 of 1
Laboratory: Analytical Resources, Inc. Reviewer: MN
2nd Reviewer: DL

METHOD: Metals (EPA SW 846 Method 6010B/~~6020~~ 200.8 /7000)

The samples listed below were reviewed for each of the following validation areas. Validation findings are noted in attached validation findings worksheets.

	Validation Area		Comments
I.	Technical holding times	A	Sampling dates: 3/8 - 3/16/05
II.	Calibration	N	
III.	Blanks	A	
IV.	ICP Interference Check Sample (ICS) Analysis	N	
V.	Matrix Spike Analysis	SW	
VI.	Duplicate Sample Analysis	SW	
VII.	Laboratory Control Samples (LCS)	A	Lcs + SRM
VIII.	Internal Standard (ICP-MS)	N	not reviewed
IX.	Furnace Atomic Absorption QC	N	not utilized
X.	ICP Serial Dilution	N	not performed.
XI.	Sample Result Verification	SW	
XII.	Overall Assessment of Data	A	
XIII.	Field Duplicates	N	
XIV.	Field Blanks	N	

Note: A = Acceptable
N = Not provided/applicable
SW = See worksheet
ND = No compounds detected
R = Rinsate
FB = Field blank
D = Duplicate
TB = Trip blank
EB = Equipment blank

Validated Samples: Se Limit.

1	LDW-SS71-010	11		21		31	
2	LDW-SS2-010	12		22		32	
3	LDW-SS69b-010	13		23		33	
4	LDW-SS158-010	14		24		34	
5	LDW-SS159-010	15		25		35	
6	LDW-SS157-010	16		26		36	
7	LDW-SS35-010	17		27		37	
8	LDW-SS71-010MS	18		28		38	
9	LDW-SS71-010DUP	19		29		39	
10	PB	20		30		40	

Notes: _____

LDC #: 13419A4
SDG #: 1twoб

VALIDATION FINDINGS WORKSHEET
Sample Specific Element Reference

Page: 1 of 1
Reviewer: MH
2nd reviewer: ɗ

All circled elements are applicable to each sample.

Sample ID	Matrix	Target Analyte List (TAL)
1-7	Sediment	Al, [✓ Sb, As], Ba, Be, [✓ Cd], Ca, [✓ Cr, Co, Cu], Fe, [✓ Pb], Mg, Mn, [✓ Hg], [✓ Ni], K, [✓ Se], [✓ Ag], Na, [✓ Tl], [✓ V], [✓ Zn], [✓ Mo], B, Si, CN^-, ___ ___
8,9	〃	Al, [✓ Sb, As], Ba, Be, [✓ Cd], Ca, [✓ Cr, Co, Cu], Fe, [✓ Pb], Mg, Mn, [✓ Hg, Ni], K, [✓ Se, Ag], Na, [✓ Tl, V, Zn, Mo], B, Si, CN^-, ___ ___
		Al, Sb, As, Ba, Be, Cd, Ca, Cr, Co, Cu, Fe, Pb, Mg, Mn, Hg, Ni, K, Se, Ag, Na, Tl, V, Zn, Mo, B, Si, CN^-, ___ ___
		Al, Sb, As, Ba, Be, Cd, Ca, Cr, Co, Cu, Fe, Pb, Mg, Mn, Hg, Ni, K, Se, Ag, Na, Tl, V, Zn, Mo, B, Si, CN^-, ___ ___
		Al, Sb, As, Ba, Be, Cd, Ca, Cr, Co, Cu, Fe, Pb, Mg, Mn, Hg, Ni, K, Se, Ag, Na, Tl, V, Zn, Mo, B, Si, CN^-, ___ ___
		Al, Sb, As, Ba, Be, Cd, Ca, Cr, Co, Cu, Fe, Pb, Mg, Mn, Hg, Ni, K, Se, Ag, Na, Tl, V, Zn, Mo, B, Si, CN^-, ___ ___
		Al, Sb, As, Ba, Be, Cd, Ca, Cr, Co, Cu, Fe, Pb, Mg, Mn, Hg, Ni, K, Se, Ag, Na, Tl, V, Zn, Mo, B, Si, CN^-, ___ ___
		Al, Sb, As, Ba, Be, Cd, Ca, Cr, Co, Cu, Fe, Pb, Mg, Mn, Hg, Ni, K, Se, Ag, Na, Tl, V, Zn, Mo, B, Si, CN^-, ___ ___
		Al, Sb, As, Ba, Be, Cd, Ca, Cr, Co, Cu, Fe, Pb, Mg, Mn, Hg, Ni, K, Se, Ag, Na, Tl, V, Zn, Mo, B, Si, CN^-, ___ ___
		Al, Sb, As, Ba, Be, Cd, Ca, Cr, Co, Cu, Fe, Pb, Mg, Mn, Hg, Ni, K, Se, Ag, Na, Tl, V, Zn, Mo, B, Si, CN^-, ___ ___
		Al, Sb, As, Ba, Be, Cd, Ca, Cr, Co, Cu, Fe, Pb, Mg, Mn, Hg, Ni, K, Se, Ag, Na, Tl, V, Zn, Mo, B, Si, CN^-, ___ ___
		Al, Sb, As, Ba, Be, Cd, Ca, Cr, Co, Cu, Fe, Pb, Mg, Mn, Hg, Ni, K, Se, Ag, Na, Tl, V, Zn, Mo, B, Si, CN^-, ___ ___
		Al, Sb, As, Ba, Be, Cd, Ca, Cr, Co, Cu, Fe, Pb, Mg, Mn, Hg, Ni, K, Se, Ag, Na, Tl, V, Zn, Mo, B, Si, CN^-, ___ ___
		Al, Sb, As, Ba, Be, Cd, Ca, Cr, Co, Cu, Fe, Pb, Mg, Mn, Hg, Ni, K, Se, Ag, Na, Tl, V, Zn, Mo, B, Si, CN^-, ___ ___
		Al, Sb, As, Ba, Be, Cd, Ca, Cr, Co, Cu, Fe, Pb, Mg, Mn, Hg, Ni, K, Se, Ag, Na, Tl, V, Zn, Mo, B, Si, CN^-, ___ ___
		Al, Sb, As, Ba, Be, Cd, Ca, Cr, Co, Cu, Fe, Pb, Mg, Mn, Hg, Ni, K, Se, Ag, Na, Tl, V, Zn, Mo, B, Si, CN^-, ___ ___
		Al, Sb, As, Ba, Be, Cd, Ca, Cr, Co, Cu, Fe, Pb, Mg, Mn, Hg, Ni, K, Se, Ag, Na, Tl, V, Zn, Mo, B, Si, CN^-, ___ ___
		Al, Sb, As, Ba, Be, Cd, Ca, Cr, Co, Cu, Fe, Pb, Mg, Mn, Hg, Ni, K, Se, Ag, Na, Tl, V, Zn, Mo, B, Si, CN^-, ___ ___
		Al, Sb, As, Ba, Be, Cd, Ca, Cr, Co, Cu, Fe, Pb, Mg, Mn, Hg, Ni, K, Se, Ag, Na, Tl, V, Zn, Mo, B, Si, CN^-, ___ ___
		Al, Sb, As, Ba, Be, Cd, Ca, Cr, Co, Cu, Fe, Pb, Mg, Mn, Hg, Ni, K, Se, Ag, Na, Tl, V, Zn, Mo, B, Si, CN^-, ___ ___
		Al, Sb, As, Ba, Be, Cd, Ca, Cr, Co, Cu, Fe, Pb, Mg, Mn, Hg, Ni, K, Se, Ag, Na, Tl, V, Zn, Mo, B, Si, CN^-, ___ ___
		Al, Sb, As, Ba, Be, Cd, Ca, Cr, Co, Cu, Fe, Pb, Mg, Mn, Hg, Ni, K, Se, Ag, Na, Tl, V, Zn, Mo, B, Si, CN^-, ___ ___
		Al, Sb, As, Ba, Be, Cd, Ca, Cr, Co, Cu, Fe, Pb, Mg, Mn, Hg, Ni, K, Se, Ag, Na, Tl, V, Zn, Mo, B, Si, CN^-, ___ ___
		Al, Sb, As, Ba, Be, Cd, Ca, Cr, Co, Cu, Fe, Pb, Mg, Mn, Hg, Ni, K, Se, Ag, Na, Tl, V, Zn, Mo, B, Si, CN^-, ___ ___
		Al, Sb, As, Ba, Be, Cd, Ca, Cr, Co, Cu, Fe, Pb, Mg, Mn, Hg, Ni, K, Se, Ag, Na, Tl, V, Zn, Mo, B, Si, CN^-, ___ ___

Analysis Method

ICP		Al, Sb, As, Ba, Be, Cd, Ca, Cr, Co, Cu, Fe, Pb, Mg, Mn, Hg, Ni, K, Se, Ag, Na, Tl, V, Zn, Mo, B, Si, CN^-, ___ ___
ICP Trace		Al, Sb, As, Ba, Be, [✓ Cd], Ca, [✓ Cr, Co, Cu], Fe, [✓ Pb], Mg, Mn, Hg, [✓ Ni], K, [✓ Se], [✓ Ag], Na, Tl, [✓ V], [✓ Zn], [✓ Mo], B, Si, CN^-, ___ ___
ICP-MS		Al, [✓ Sb], [✓ As], Ba, Be, Cd, Ca, Cr, Co, Cu, Fe, Pb, Mg, Mn, Hg, Ni, K, Se, Ag, Na, [✓ Tl], V, Zn, Mo, B, Si, CN^-, ___ ___
GFAA		Al, Sb, As, Ba, Be, Cd, Ca, Cr, Co, Cu, Fe, Pb, Mg, Mn, Hg, Ni, K, Se, Ag, Na, Tl, V, Zn, Mo, B, Si, CN^-,

Comments: [✓ Mercury by CVAA if performed]

LDC #: 13419A4
SDG #: HW06

VALIDATION FINDINGS WORKSHEET
Matrix Spike Analysis

Reviewer: MH
2nd Reviewer: [illegible]

METHOD: Trace Metals (EPA SW 846 Method 6010/7000)

Please see qualifications below for all questions answered "N". Not applicable questions are identified as "N/A".

Y (N) N/A Was a matrix spike analyzed for each matrix in this SDG?

Y (N) N/A Were matrix spike percent recoveries (%R) within the control limits of ~~75-125~~ If the sample concentration exceeded the spike concentration by a factor of 4 or more, no action was taken. (APP limits)

Y (N) N/A Was a post digestion spike analyzed for ICP elements that did not meet the required criteria for matrix spike recovery?

LEVEL IV ONLY:

Y N (N/A) Were recalculated results acceptable? See Level IV Recalculation Worksheet for recalculations.

#	Matrix Spike ID	Matrix	Analyte	%R	Associated Samples	Qualifications
1	8	Solid	Sb	5.5 (70-130)	A1	J/UJ/A (post spike 100.0%)
	↓	↓	Cu	159 ↓	↓	J/J+/A (↓ 99.7%)
	↓	↓	Hg	32.5 (55-137)	↓	J-/UJ/A (post spike was not performed)

Comments: _____

LDC #: 13419A4
SDG #: HW06

VALIDATION FINDINGS WORKSHEET
Duplicate Analysis

Page: 1 of 1
Reviewer: MH
2nd Reviewer:

METHOD: Trace Metals (EPA SW 846 Method 6010/7000)

Please see qualifications below for all questions answered "N'. Not applicable questions are identified as "N/A".

Y N N/A Was a duplicate sample analyzed for each matrix in this SDG?

Y N N/A Were all duplicate sample relative percent differences (RPD) ≤ 20% for water samples and ≤ 35% for soil samples? If no, see qualifications below. A control limit of ±R.L. (±2X R.L. for soil) was used for sample values that were <5X the R.L., including the case when only one of the duplicate sample values was <5X R.L.. If field blanks were used for laboratory duplicates, note in the Overall Assessment.

LEVEL IV ONLY:

Y N N/A Were recalculated results acceptable? See Level IV Recalculation Worksheet for recalculations.

#	Duplicate ID	Matrix	Analyte	RPD (Limits)	Difference (Limits) mg/kg	Associated Samples	Qualifications
1	a	Sediment	Cu	44.8 (≤30)		All	J/UJ/A
			Hg		0.32 (≤0.12)	↓	↓

Comments:

LDC #: 13419A4
SDG #: 1HW06

VALIDATION FINDINGS WORKSHEET
Sample Result Verification

Reviewer: MP
2nd Reviewer: K

METHOD: Trace metals (EPA SW-346 6010/7000)

#	Sample ID	Analyte	Result (units)	RL (units)	Finding	Qualifications
1	All	Sb, As, Tl	200.8 by Lab	Below in the	Appr.	Test

Comments:

LDC #: 13419B4
SDG #: HW16
Laboratory: Analytical Resources, Inc.

VALIDATION COMPLETENESS WORKSHEET
Level II

Date: 4/26/07
Page: 1 of 1
Reviewer: MM
2nd Reviewer: [illegible]

METHOD: Metals (EPA SW 846 Method 6010B/~~6020~~2008/7000)

The samples listed below were reviewed for each of the following validation areas. Validation findings are noted in attached validation findings worksheets.

	Validation Area		Comments
I.	Technical holding times	A	Sampling dates: 3/18/07
II.	Calibration	N	
III.	Blanks	A	
IV.	ICP Interference Check Sample (ICS) Analysis	N	
V.	Matrix Spike Analysis	SW	
VI.	Duplicate Sample Analysis	A	
VII.	Laboratory Control Samples (LCS)	A	LCS + SRM
VIII.	Internal Standard (ICP-MS)	N	Not reviewed
IX.	Furnace Atomic Absorption QC	N	Not utilized
X.	ICP Serial Dilution	N	Not performed
XI.	Sample Result Verification	SW	
XII.	Overall Assessment of Data	A	
XIII.	Field Duplicates	N	
XIV.	Field Blanks	N	

Note: A = Acceptable
N = Not provided/applicable
SW = See worksheet
ND = No compounds detected
R = Rinsate
FB = Field blank
D = Duplicate
TB = Trip blank
EB = Equipment blank

Validated Samples: Sediment

1	LDW-SSB7a-010	11		21		31	
2	LDW-SSB7a-010MS	12		22		32	
3	LDW-SSB7a-010DUP	13		23		33	
4	PB	14		24		34	
5		15		25		35	
6		16		26		36	
7		17		27		37	
8		18		28		38	
9		19		29		39	
10		20		30		40	

Notes: _____

LDC #: 13419B4
SDG #: HW16

VALIDATION FINDINGS WORKSHEET
Sample Specific Element Reference

Page: 1 of 1
Reviewer: MH
2nd reviewer:

All circled elements are applicable to each sample.

Sample ID	Matrix	Target Analyte List (TAL)
1	Solid	Al, [✓ Sb, As] Ba, Be, [✓ Cd] Ca, [✓ Cr, Co, Cu], Fe, [✓ Pb], Mg, Mn, [✓ Hg], [✓ Ni], K, [✓ Se], [✓ Ag] Na, [✓ Tl], [✓ V], [✓ Zn], [✓ Mo], B, Si, CN⁻, ___ ___
2, 3	↓	Al, [✓ Sb, As,] Ba, Be, [✓ Cd], Ca, [✓ Cr, Co, Cu], Fe, [✓ Pb], Mg, Mn, [✓ Hg, Ni], K, [✓ Se, Ag, Na], [✓ Tl, V, Zn, Mo], B, Si, CN⁻, ___ ___
		Al, Sb, As, Ba, Be, Cd, Ca, Cr, Co, Cu, Fe, Pb, Mg, Mn, Hg, Ni, K, Se, Ag, Na, Tl, V, Zn, Mo, B, Si, CN⁻, ___ ___
		Al, Sb, As, Ba, Be, Cd, Ca, Cr, Co, Cu, Fe, Pb, Mg, Mn, Hg, Ni, K, Se, Ag, Na, Tl, V, Zn, Mo, B, Si, CN⁻, ___ ___
		Al, Sb, As, Ba, Be, Cd, Ca, Cr, Co, Cu, Fe, Pb, Mg, Mn, Hg, Ni, K, Se, Ag, Na, Tl, V, Zn, Mo, B, Si, CN⁻, ___ ___
		Al, Sb, As, Ba, Be, Cd, Ca, Cr, Co, Cu, Fe, Pb, Mg, Mn, Hg, Ni, K, Se, Ag, Na, Tl, V, Zn, Mo, B, Si, CN⁻, ___ ___
		Al, Sb, As, Ba, Be, Cd, Ca, Cr, Co, Cu, Fe, Pb, Mg, Mn, Hg, Ni, K, Se, Ag, Na, Tl, V, Zn, Mo, B, Si, CN⁻, ___ ___
		Al, Sb, As, Ba, Be, Cd, Ca, Cr, Co, Cu, Fe, Pb, Mg, Mn, Hg, Ni, K, Se, Ag, Na, Tl, V, Zn, Mo, B, Si, CN⁻, ___ ___
		Al, Sb, As, Ba, Be, Cd, Ca, Cr, Co, Cu, Fe, Pb, Mg, Mn, Hg, Ni, K, Se, Ag, Na, Tl, V, Zn, Mo, B, Si, CN⁻, ___ ___
		Al, Sb, As, Ba, Be, Cd, Ca, Cr, Co, Cu, Fe, Pb, Mg, Mn, Hg, Ni, K, Se, Ag, Na, Tl, V, Zn, Mo, B, Si, CN⁻, ___ ___
		Al, Sb, As, Ba, Be, Cd, Ca, Cr, Co, Cu, Fe, Pb, Mg, Mn, Hg, Ni, K, Se, Ag, Na, Tl, V, Zn, Mo, B, Si, CN⁻, ___ ___
		Al, Sb, As, Ba, Be, Cd, Ca, Cr, Co, Cu, Fe, Pb, Mg, Mn, Hg, Ni, K, Se, Ag, Na, Tl, V, Zn, Mo, B, Si, CN⁻, ___ ___
		Al, Sb, As, Ba, Be, Cd, Ca, Cr, Co, Cu, Fe, Pb, Mg, Mn, Hg, Ni, K, Se, Ag, Na, Tl, V, Zn, Mo, B, Si, CN⁻, ___ ___
		Al, Sb, As, Ba, Be, Cd, Ca, Cr, Co, Cu, Fe, Pb, Mg, Mn, Hg, Ni, K, Se, Ag, Na, Tl, V, Zn, Mo, B, Si, CN⁻, ___ ___
		Al, Sb, As, Ba, Be, Cd, Ca, Cr, Co, Cu, Fe, Pb, Mg, Mn, Hg, Ni, K, Se, Ag, Na, Tl, V, Zn, Mo, B, Si, CN⁻, ___ ___
		Al, Sb, As, Ba, Be, Cd, Ca, Cr, Co, Cu, Fe, Pb, Mg, Mn, Hg, Ni, K, Se, Ag, Na, Tl, V, Zn, Mo, B, Si, CN⁻, ___ ___
		Al, Sb, As, Ba, Be, Cd, Ca, Cr, Co, Cu, Fe, Pb, Mg, Mn, Hg, Ni, K, Se, Ag, Na, Tl, V, Zn, Mo, B, Si, CN⁻, ___ ___
		Al, Sb, As, Ba, Be, Cd, Ca, Cr, Co, Cu, Fe, Pb, Mg, Mn, Hg, Ni, K, Se, Ag, Na, Tl, V, Zn, Mo, B, Si, CN⁻, ___ ___
		Al, Sb, As, Ba, Be, Cd, Ca, Cr, Co, Cu, Fe, Pb, Mg, Mn, Hg, Ni, K, Se, Ag, Na, Tl, V, Zn, Mo, B, Si, CN⁻, ___ ___
		Al, Sb, As, Ba, Be, Cd, Ca, Cr, Co, Cu, Fe, Pb, Mg, Mn, Hg, Ni, K, Se, Ag, Na, Tl, V, Zn, Mo, B, Si, CN⁻, ___ ___
		Al, Sb, As, Ba, Be, Cd, Ca, Cr, Co, Cu, Fe, Pb, Mg, Mn, Hg, Ni, K, Se, Ag, Na, Tl, V, Zn, Mo, B, Si, CN⁻, ___ ___
		Al, Sb, As, Ba, Be, Cd, Ca, Cr, Co, Cu, Fe, Pb, Mg, Mn, Hg, Ni, K, Se, Ag, Na, Tl, V, Zn, Mo, B, Si, CN⁻, ___ ___
		Al, Sb, As, Ba, Be, Cd, Ca, Cr, Co, Cu, Fe, Pb, Mg, Mn, Hg, Ni, K, Se, Ag, Na, Tl, V, Zn, Mo, B, Si, CN⁻, ___ ___
		Al, Sb, As, Ba, Be, Cd, Ca, Cr, Co, Cu, Fe, Pb, Mg, Mn, Hg, Ni, K, Se, Ag, Na, Tl, V, Zn, Mo, B, Si, CN⁻, ___ ___
		Al, Sb, As, Ba, Be, Cd, Ca, Cr, Co, Cu, Fe, Pb, Mg, Mn, Hg, Ni, K, Se, Ag, Na, Tl, V, Zn, Mo, B, Si, CN⁻, ___ ___
Analysis Method		
ICP		Al, Sb, As, Ba, Be, Cd, Ca, Cr, Co, Cu, Fe, Pb, Mg, Mn, Hg, Ni, K, Se, Ag, Na, Tl, V, Zn, Mo, B, Si, CN⁻, ___ ___
ICP Trace		Al, Sb, As, Ba, Be, [✓ Cd], Ca, [✓ Cr, Co, Cu], Fe, [✓ Pb], Mg, Mn, Hg, [✓ Ni], K, [✓ Se], [✓ Ag], Na, Tl, [✓ V], [✓ Zn], [✓ Mo], B, Si, CN⁻, ___ ___
ICP-MS		Al, [✓ Sb], [✓ As] Ba, Be, Cd, Ca, Cr, Co, Cu, Fe, Pb, Mg, Mn, Hg, Ni, K, Se, Ag, Na, [✓ Tl], V, Zn, Mo, B, Si, CN⁻, ___ ___
GFAA		Al, Sb, As, Ba, Be, Cd, Ca, Cr, Co, Cu, Fe, Pb, Mg, Mn, Hg, Ni, K, Se, Ag, Na, Tl, V, Zn, Mo, B, Si, CN⁻,

Comments: [✓ Mercury by CVAA if performed]

LDC #: 13419B4
SDG #: HW16

VALIDATION FINDINGS WORKSHEET
Matrix Spike Analysis

Reviewer: MH
2nd Reviewer: [illegible]

METHOD: Trace Metals (EPA SW 846 Method 6010/7000)

Please see qualifications below for all questions answered "N". Not applicable questions are identified as "N/A".

(Y) N N/A Was a matrix spike analyzed for each matrix in this SDG?

Y (N) N/A Were matrix spike percent recoveries (%R) within the control limits of 75-125? If the sample concentration exceeded the spike concentration by a factor of 4 or more, no action was taken.

(Y) N N/A Was a post digestion spike analyzed for ICP elements that did not meet the required criteria for matrix spike recovery?

LEVEL IV ONLY:

Y N (N/A) Were recalculated results acceptable? See Level IV Recalculation Worksheet for recalculations.

#	Matrix Spike ID	Matrix	Analyte	%R	Associated Samples	Qualifications
1	2	Solid	Sb	4.6 (70-130)	All	J/UJ/A (post spike 99.5%)

Comments:

LDC #: 13419B4
SDG #: HW16

VALIDATION FINDINGS WORKSHEET
Sample Result Verification

Reviewer: MH
2nd Reviewer: AC

METHOD: Trace metals (EPA SW-846 6010/7000)

#	Sample ID	Analyte	Result (units)	RL (units)	Finding	Qualifications
1	All	Sb, As, Tl	200.8 by Lab	6020. in the	appr.	Test

Comments:

LDC #: 13381A6 **VALIDATION COMPLETENESS WORKSHEET** Date: 4/14/05
SDG #: HU85 Level II Page: 1 of 1
Laboratory: Analytical Resources, Inc. Reviewer: MM
2nd Reviewer: [illegible]

METHOD: Ammonia-N (EPA Method 350.1), Grain Size (PSEP), Sulfide (EPA Method 376.2), Total Solids (EPA Method 160.3), TOC (Plumb),

The samples listed below were reviewed for each of the following validation areas. Validation findings are noted in attached validation findings worksheets.

	Validation Area		Comments
I.	Technical holding times	A	Sampling dates: 3/7/05
IIa.	Initial calibration	N	
IIb.	Calibration verification	N	
III.	Blanks	SW	
IV	Matrix Spike/Matrix Spike Duplicates	A	
V	Duplicates	A	Triplicate
VI.	Laboratory control samples	A	LCS/SRM. No SRM for S Test.
VII.	Sample result verification	N	
VIII.	Overall assessment of data	A	
IX.	Field duplicates	SW	(4, 6)
X	Field blanks	N	

Note: A = Acceptable; N = Not provided/applicable; SW = See worksheet; ND = No compounds detected; R = Rinsate; FB = Field blank; D = Duplicate; TB = Trip blank; EB = Equipment blank

Validated Samples: All Sediment

1	LDW-SS85-010	11	LDW-SS85-010MS	21		31	
2	LDW-SS73-010	12	LDW-SS85-010DUP	22		32	
3	LDW-SS78-010	13	LDW-SS73-010MS	23		33	
4	LDW-SS82-010	14	LDW-SS73-010DUP	24		34	
5	LDW-SS74-010	15	LDW-SS8-010MS	25		35	
6	LDW-SS204-010	16	LDW-SS8-010MSD	26		36	
7	LDW-SS91-010	17	LDW-SS8-010DUP	27		37	
8	LDW-SS103-010	18	LDW-SS85-010TRP	28		38	
9	LDW-SS68-010	19	LDW-SS8-010TRP	29		39	
10	LDW-SS8-010	20	MB	30		40	

Notes: _____

LDC #: 1338/A6
SDG #: Hu85

VALIDATION FINDINGS WORKSHEET
Sample Specific Analysis Reference

Page: 1 of 1
Reviewer: MH
2nd reviewer: DL

All circled methods are applicable to each sample.

Sample ID	Parameter
1-10	pH TDS Cl F NO_3 NO_2 SO_4 PO_4 ALK CN^- [✓ NH_3] TKN [✓ TOC] CR^{6+} [✓ S] [✓ TS] [✓ Grain Size] ____
11	pH TDS Cl F NO_3 NO_2 SO_4 PO_4 ALK CN^- [✓ NH_3] TKN [✓ TOC] CR^{6+} ____ ____ ____ ____
12	pH TDS Cl F NO_3 NO_2 SO_4 PO_4 ALK CN^- [✓ NH_3] TKN [✓ TOC] CR^{6+} ____ [✓ TS] ____ ____
13	pH TDS Cl F NO_3 NO_2 SO_4 PO_4 ALK CN^- [✓ NH_3] TKN TOC CR^{6+} ____ ____ ____ ____
14	pH TDS Cl F NO_3 NO_2 SO_4 PO_4 ALK CN^- [✓ NH_3] TKN TOC CR^{6+} ____ ____ ____ ____
15	pH TDS Cl F NO_3 NO_2 SO_4 PO_4 ALK CN^- NH_3 TKN TOC CR^{6+} [✓ S] ____ ____ ____
16	pH TDS Cl F NO_3 NO_2 SO_4 PO_4 ALK CN^- NH_3 TKN TOC CR^{6+} [✓ S] ____ ____ ____
17	pH TDS Cl F NO_3 NO_2 SO_4 PO_4 ALK CN^- NH_3 TKN TOC CR^{6+} [✓ S] ____ ____ ____
18	pH TDS Cl F NO_3 NO_2 SO_4 PO_4 ALK CN^- NH_3 TKN [✓ TOC] CR^{6+} ____ [✓ TS] ____ ____
19	pH TDS Cl F NO_3 NO_2 SO_4 PO_4 ALK CN^- NH_3 TKN TOC CR^{6+} [✓ S] ____ ____ ____
	pH TDS Cl F NO_3 NO_2 SO_4 PO_4 ALK CN^- NH_3 TKN TOC CR^{6+} ____ ____ ____ ____
	pH TDS Cl F NO_3 NO_2 SO_4 PO_4 ALK CN^- NH_3 TKN TOC CR^{6+} ____ ____ ____ ____
	pH TDS Cl F NO_3 NO_2 SO_4 PO_4 ALK CN^- NH_3 TKN TOC CR^{6+} ____ ____ ____ ____
	pH TDS Cl F NO_3 NO_2 SO_4 PO_4 ALK CN^- NH_3 TKN TOC CR^{6+} ____ ____ ____ ____
	pH TDS Cl F NO_3 NO_2 SO_4 PO_4 ALK CN^- NH_3 TKN TOC CR^{6+} ____ ____ ____ ____
	pH TDS Cl F NO_3 NO_2 SO_4 PO_4 ALK CN^- NH_3 TKN TOC CR^{6+} ____ ____ ____ ____
	pH TDS Cl F NO_3 NO_2 SO_4 PO_4 ALK CN^- NH_3 TKN TOC CR^{6+} ____ ____ ____ ____
	pH TDS Cl F NO_3 NO_2 SO_4 PO_4 ALK CN^- NH_3 TKN TOC CR^{6+} ____ ____ ____ ____
	pH TDS Cl F NO_3 NO_2 SO_4 PO_4 ALK CN^- NH_3 TKN TOC CR^{6+} ____ ____ ____ ____
	pH TDS Cl F NO_3 NO_2 SO_4 PO_4 ALK CN^- NH_3 TKN TOC CR^{6+} ____ ____ ____ ____
	pH TDS Cl F NO_3 NO_2 SO_4 PO_4 ALK CN^- NH_3 TKN TOC CR^{6+} ____ ____ ____ ____
	pH TDS Cl F NO_3 NO_2 SO_4 PO_4 ALK CN^- NH_3 TKN TOC CR^{6+} ____ ____ ____ ____
	pH TDS Cl F NO_3 NO_2 SO_4 PO_4 ALK CN^- NH_3 TKN TOC CR^{6+} ____ ____ ____ ____
	pH TDS Cl F NO_3 NO_2 SO_4 PO_4 ALK CN^- NH_3 TKN TOC CR^{6+} ____ ____ ____ ____
	pH TDS Cl F NO_3 NO_2 SO_4 PO_4 ALK CN^- NH_3 TKN TOC CR^{6+}

Comments:

LDC #: 1338/A6
SDG #: H485

VALIDATION FINDINGS WORKSHEET
Blanks

Reviewer: MH
2nd Reviewer: [illegible]

METHOD: Inorganics, Method See comm

Please see qualifications below for all questions answered "N". Not applicable questions are identified as "N/A".
(Y) N N/A Were all samples associated with a given method blank?
(Y) N N/A Were any inorganic contaminants detected above the reporting limit in the method blanks? If yes, please see qualifications below.

Conc. units: mg/kg

Associated Samples: 1, 3, 4, 6, 9

Analyte	Blank ID	Maximum ICB/CCB	Blank Action Limit	Sample Identification								
	MB											
NH3-N	0.16		0.80		No	Samples qualified						

CIRCLED RESULTS WERE NOT QUALIFIED. ALL RESULTS NOT CIRCLED WERE QUALIFIED BY THE FOLLOWING STATEMENT:
All contaminants within five times the methoc blank concentration were qualified as not detected, "U".

LDC #: 12381A6
SDG #: 14485

VALIDATION FINDINGS WORKSHEET
Field Duplicates

METHOD: Inorganics, Method See comm

(Y) N N/A Were field duplicate pairs identified in this SDG?
(Y) N N/A Were target analytes detected in the field duplicate pairs?

Analyte	Concentration ( ) 4	6	RPD (~~Limits~~) ≤50	Qualifier
TS (%)	51.40	51.60	0	
NH_3-N (mg/kg)	9.44	9.27	2	
TOC (%)	2.09	1.84	13	
S (mg/kg)	8.14	11 ~~8.35~~ MH	NC	

Analyte	Concentration ( )		RPD (Limits)	Qualifier

Analyte	Concentration ( )		RPD (Limits)	Qualifier

Analyte	Concentration ( )		RPD (Limits)	Qualifier

LDC#: 13381A6
SDG#: HH85

VALIDATION FINDINGS WORKSHEET
Field Duplicates

Reviewer: MM
2nd Reviewer: A

Grain Size, Method PSEP

(Y) N NA Were field duplicate pairs identified in this SDG?
(Y) N NA Were target analytes detected in the field duplicate pairs?

Phi Size	% Finer (%)		(<50) RPD	
	4	6		
-2	99.1	100	1	
-1	97.4	98.5	1	
0	96.6	97.7	1	
1	93.8	94.6	1	
2	87.3	88.1	1	
3	77.6	78.1	1	
4	54.1	54.0	0	
5	40.3	39.4	2	
6	26.9	26.7	1	
7	17.3	17.5	1	
8	11.0	11.1	1	
9	7.8	7.8	0	
10	5.7	5.1	11	

LDC #: 13381B6 **VALIDATION COMPLETENESS WORKSHEET** Date: 4/15/05

SDG #: HV37 Level II Page: 1 of 1

Laboratory: Analytical Resources, Inc. Reviewer: MH

2nd Reviewer: M

METHOD: Ammonia-N (EPA Method 350.1), Grain Size (PSEP), Sulfide (EPA Method 376.2), Total Solids (EPA Method 160.3), TOC (Plumb),

The samples listed below were reviewed for each of the following validation areas. Validation findings are noted in attached validation findings worksheets.

	Validation Area		Comments
I.	Technical holding times	A	Sampling dates: 3/9/05
IIa.	Initial calibration	N	
IIb.	Calibration verification	N	
III.	Blanks	A	
IV	Matrix Spike/Matrix Spike Duplicates	SW	
V	Duplicates	A	FB Triplicate
VI.	Laboratory control samples	A	LCS + SRM. No SRM for S. Test.
VII.	Sample result verification	N	
VIII.	Overall assessment of data	A	
IX.	Field duplicates	SW	(10, 11)
X	Field blanks	N	

Note: A = Acceptable
N = Not provided/applicable
SW = See worksheet
ND = No compounds detected
R = Rinsate
FB = Field blank
D = Duplicate
TB = Trip blank
EB = Equipment blank

Validated Samples: Sediment

1	LDW-SS7-10	11	LDW-SS207-10	21	LDW-SS207-10MSD	31	
2	LDW-SS3-10	12	LDW-SS146-10	22	LDW-SS207-10DUP	32	
3	LDW-SS95-10	13	LDW-SS147-10	23	↓ TRP	33	
4	LDW-SS133-10	14	LDW-SS148-10	24	MB	34	
5	LDW-SS138-10	15	LDW-SS149-10	25		35	
6	LDW-SS139-10	16	LDW-SS150-10	26		36	
7	LDW-SS137-10	17	LDW-SS7-10MS	27		37	
8	LDW-SS132-10	18	LDW-SS7-10DUP	28		38	
9	LDW-SS66-10	19	LDW-SS7-10TRP	29		39	
10	LDW-SS62-10	20	LDW-SS207-10MS	30		40	

Notes: _____

LDC #: 1338IB6
SDG #: HV37

VALIDATION FINDINGS WORKSHEET
Sample Specific Analysis Reference

Page: 1 of 1
Reviewer: MH
2nd reviewer:

All circled methods are applicable to each sample.

Sample ID	Parameter				
1-16	pH TDS Cl F NO_3 NO_2 SO_4 PO_4 ALK CN^- [✓ NH_3] TKN [✓ TOC] CR^{6+}	[✓ S]	[✓ TS]	[✓ Grain size]	
ol-17	pH TDS Cl F NO_3 NO_2 SO_4 PO_4 ALK CN^- [✓ NH_3] TKN [✓ TOC] CR^{6+}				
18	pH TDS Cl F NO_3 NO_2 SO_4 PO_4 ALK CN^- [✓ NH_3] TKN [✓ TOC] CR^{6+}		[✓ TS]	[✓ Grain size]	
19	pH TDS Cl F NO_3 NO_2 SO_4 PO_4 ALK CN^- NH_3 TKN [✓ TOC] CR^{6+}		[✓ TS]	↓	
20	pH TDS Cl F NO_3 NO_2 SO_4 PO_4 ALK CN^- NH_3 TKN TOC CR^{6+}	[✓ S]			
21	pH TDS Cl F NO_3 NO_2 SO_4 PO_4 ALK CN^- NH_3 TKN TOC CR^{6+}	[✓ S]			
✓ 22	pH TDS Cl F NO_3 NO_2 SO_4 PO_4 ALK CN^- NH_3 TKN ~~TOC~~ CR^{6+}	[✓ S]			
✓ 23	pH TDS Cl F NO_3 NO_2 SO_4 PO_4 ALK CN^- NH_3 TKN ~~TOC~~ CR^{6+}	[✓ S]			
	pH TDS Cl F NO_3 NO_2 SO_4 PO_4 ALK CN^- NH_3 TKN TOC CR^{6+}				
	pH TDS Cl F NO_3 NO_2 SO_4 PO_4 ALK CN^- NH_3 TKN TOC CR^{6+}				
	pH TDS Cl F NO_3 NO_2 SO_4 PO_4 ALK CN^- NH_3 TKN TOC CR^{6+}				
	pH TDS Cl F NO_3 NO_2 SO_4 PO_4 ALK CN^- NH_3 TKN TOC CR^{6+}				
	pH TDS Cl F NO_3 NO_2 SO_4 PO_4 ALK CN^- NH_3 TKN TOC CR^{6+}				
	pH TDS Cl F NO_3 NO_2 SO_4 PO_4 ALK CN^- NH_3 TKN TOC CR^{6+}				
	pH TDS Cl F NO_3 NO_2 SO_4 PO_4 ALK CN^- NH_3 TKN TOC CR^{6+}				
	pH TDS Cl F NO_3 NO_2 SO_4 PO_4 ALK CN^- NH_3 TKN TOC CR^{6+}				
	pH TDS Cl F NO_3 NO_2 SO_4 PO_4 ALK CN^- NH_3 TKN TOC CR^{6+}				
	pH TDS Cl F NO_3 NO_2 SO_4 PO_4 ALK CN^- NH_3 TKN TOC CR^{6+}				
	pH TDS Cl F NO_3 NO_2 SO_4 PO_4 ALK CN^- NH_3 TKN TOC CR^{6+}				
	pH TDS Cl F NO_3 NO_2 SO_4 PO_4 ALK CN^- NH_3 TKN TOC CR^{6+}				
	pH TDS Cl F NO_3 NO_2 SO_4 PO_4 ALK CN^- NH_3 TKN TOC CR^{6+}				
	pH TDS Cl F NO_3 NO_2 SO_4 PO_4 ALK CN^- NH_3 TKN TOC CR^{6+}				
	pH TDS Cl F NO_3 NO_2 SO_4 PO_4 ALK CN^- NH_3 TKN TOC CR^{6+}				
	pH TDS Cl F NO_3 NO_2 SO_4 PO_4 ALK CN^- NH_3 TKN TOC CR^{6+}				
	pH TDS Cl F NO_3 NO_2 SO_4 PO_4 ALK CN^- NH_3 TKN TOC CR^{6+}				

Comments:

LDC #: 13381B6
SDG #: HV37

VALIDATION FINDINGS WORKSHEET
Matrix Spike/Matrix Spike Duplicates

Reviewer: MH
2nd Reviewer: AR

METHOD: Inorganics, EPA Method See cover

Please see qualifications below for all questions answered "N". Not applicable questions are identified as "N/A".

(Y) N N/A Was a matrix spike analyzed for each matrix in this SDG?

Y (N) N/A Were matrix spike percent recoveries (%R) within the control limits of 75-125? If the sample concentration exceeded the spike concentration by a factor of 4 or more, no action was taken.

(Y) N N/A Were all duplicate sample relative percent differences (RPD) ≤ 20% for water samples and ≤35% for soil samples?

LEVEL IV ONLY:

Y N (N/A) Were recalculated results acceptable? See Level IV Recalculation Worksheet for recalculations.

#	MS/MSD ID	Matrix	Analyte	MS %Recovery	MSD %Recovery	RPD (Limits)	Associated Samples	Qualifications
1	20/21	Sediment	S	61.9	63.1		All	J- (all detects) / UJ (all non-detects) / A

Comments:

LDC #: 13381B6
SDG #: HV37

VALIDATION FINDINGS WORKSHEET
Field Duplicates

Page: 1 of 2
Reviewer: MM
2nd reviewer: M

METHOD: Inorganics, Method See cover

(Y) N N/A Were field duplicate pairs identified in this SDG?
(Y) N N/A Were target analytes detected in the field duplicate pairs?

Analyte	Concentration ( )		RPD (Limit) ≤50	Difference (Limit)	Qualifier
	10	11			
TS (%)	42.4	42.70	1		
NH_3-N (mg/kg)	22.1	21.8	1		
S ⌀	35	36	3		
TOC (%)	2.92	2.84	3		

Analyte	Concentration ( )		RPD (Limit)	Difference (Limit)	Qualifier

Analyte	Concentration ( )		RPD (Limit)	Difference (Limit)	Qualifier

Analyte	Concentration ( )		RPD (Limit)	Difference (Limit)	Qualifier

LDC#: 13381 B6
SDG#: HV37

VALIDATION FINDINGS WORKSHEET
Field Duplicates

Reviewer: MM
2nd Reviewer: [signature]

Grain Size, Method PSEP

Y N NA Were field duplicate pairs identified in this SDG?
Y N NA Were target analytes detected in the field duplicate pairs?

Phi Size	% Finer (%)		RPD	
	10	11		
0	99.7	99.8	0	
1	98.8	96.9	2	
2	94.8	93.0	2	
3	92.8	90.7	2	
4	86.5	84.8	2	
5	73.1	71.9	2	
6	53.2	50.9	4	
7	35.2	33.0	6	
8	23.2	21.5	8	
9	17.0	16.0	6	
10	11.6	11.2	4	

LDC #: 13381C6

SDG #: HV42

Laboratory: Analytical Resources, Inc.

VALIDATION COMPLETENESS WORKSHEET

Level IV

Date: 4/15/05

Page: 1 of 1

Reviewer: MH

2nd Reviewer: YL

METHOD: Ammonia-N (EPA Method 350.1), Grain Size (PSEP),Sulfide (EPA Method 376.2), Total Solids (EPA Method 160.3), TOC (Plumb),

The samples listed below were reviewed for each of the following validation areas. Validation findings are noted in attached validation findings worksheets.

	Validation Area		Comments
I.	Technical holding times	A	Sampling dates: 3/10/05
IIa.	Initial calibration	N	
IIb.	Calibration verification	N	
III.	Blanks	A	
IV	Matrix Spike/Matrix Spike Duplicates	SW	
V	Duplicates	A	Triplicates.
VI.	Laboratory control samples	A	LCS + SRM. No SRM for S. Test.
VII.	Sample result verification	N	
VIII.	Overall assessment of data	A	
IX.	Field duplicates	N	
X	Field blanks	N	

Note: A = Acceptable; N = Not provided/applicable; SW = See worksheet; ND = No compounds detected; R = Rinsate; FB = Field blank; D = Duplicate; TB = Trip blank; EB = Equipment blank

Validated Samples: Sediment

1	LDW-SS45-010	11	LDW-SS45-010TRP	21		31	
2	LDW-SS46-010	~~12~~	~~LDW-SS47-010MS~~	22		32	
3	LDW-SS6-010	~~13~~	~~LDW-SS47-010MSD~~	23		33	
4	LDW-SS47-010	14	LDW-SS86-010MS	24		34	
5	LDW-SS108-010	15	LDW-SS86-010MSD	25		35	
6	LDW-SS61-010	16	LDW-SS86-010DUP	26		36	
7	LDW-SS25-010	17	↓ TRP	27		37	
8	LDW-SS86-010	18	MB	28		38	
9	LDW-SS45-010MS	19		29		39	
10	LDW-SS45-010DUP	20		30		40	

Notes: _____

LDC #: 1338 C6
SDG #: HV42

VALIDATION FINDINGS WORKSHEET
Sample Specific Analysis Reference

Page: 1 of 1
Reviewer: MH
2nd reviewer: ✓

All circled methods are applicable to each sample.

Sample ID	Parameter
1-8	pH TDS Cl F NO_3 NO_2 SO_4 PO_4 ALK CN^- [✓ NH_3] TKN [✓ TOC] CR^{6+} [✓ S] [✓ TS] [✓ Grain Size] ____
or 9	pH TDS Cl F NO_3 NO_2 SO_4 PO_4 ALK CN^- [✓ NH_3] TKN [✓ TOC] CR^{6+} ____ ____ ____ ____
10	pH TDS Cl F NO_3 NO_2 SO_4 PO_4 ALK CN^- [✓ NH_3] TKN [✓ TOC] CR^{6+} ____ [✓ TS] [✓ Grain Size] ____
11	pH TDS Cl F NO_3 NO_2 SO_4 PO_4 ALK CN^- NH_3 TKN [✓ TOC] CR^{6+} ____ [✓ TS] ↓ ____
~~12~~	pH TDS Cl F NO_3 NO_2 SO_4 PO_4 ALK CN^- NH_3 TKN TOC CR^{6+} ____ ____ ____ ____
~~13~~	pH TDS Cl F NO_3 NO_2 SO_4 PO_4 ALK CN^- NH_3 TKN TOC CR^{6+} ____ ____ ____ ____
14	pH TDS Cl F NO_3 NO_2 SO_4 PO_4 ALK CN^- NH_3 TKN TOC CR^{6+} [✓ S] ____ ____ ____
15	pH TDS Cl F NO_3 NO_2 SO_4 PO_4 ALK CN^- NH_3 TKN TOC CR^{6+} [✓ S] ____ ____ ____
16	pH TDS Cl F NO_3 NO_2 SO_4 PO_4 ALK CN^- NH_3 TKN TOC CR^{6+} [✓ S] ____ ____ ____
17	pH TDS Cl F NO_3 NO_2 SO_4 PO_4 ALK CN^- NH_3 TKN TOC CR^{6+} [✓ S] ____ ____ ____
	pH TDS Cl F NO_3 NO_2 SO_4 PO_4 ALK CN^- NH_3 TKN TOC CR^{6+} ____ ____ ____ ____
	pH TDS Cl F NO_3 NO_2 SO_4 PO_4 ALK CN^- NH_3 TKN TOC CR^{6+} ____ ____ ____ ____
	pH TDS Cl F NO_3 NO_2 SO_4 PO_4 ALK CN^- NH_3 TKN TOC CR^{6+} ____ ____ ____ ____
	pH TDS Cl F NO_3 NO_2 SO_4 PO_4 ALK CN^- NH_3 TKN TOC CR^{6+} ____ ____ ____ ____
	pH TDS Cl F NO_3 NO_2 SO_4 PO_4 ALK CN^- NH_3 TKN TOC CR^{6+} ____ ____ ____ ____
	pH TDS Cl F NO_3 NO_2 SO_4 PO_4 ALK CN^- NH_3 TKN TOC CR^{6+} ____ ____ ____ ____
	pH TDS Cl F NO_3 NO_2 SO_4 PO_4 ALK CN^- NH_3 TKN TOC CR^{6+} ____ ____ ____ ____
	pH TDS Cl F NO_3 NO_2 SO_4 PO_4 ALK CN^- NH_3 TKN TOC CR^{6+} ____ ____ ____ ____
	pH TDS Cl F NO_3 NO_2 SO_4 PO_4 ALK CN^- NH_3 TKN TOC CR^{6+} ____ ____ ____ ____
	pH TDS Cl F NO_3 NO_2 SO_4 PO_4 ALK CN^- NH_3 TKN TOC CR^{6+} ____ ____ ____ ____
	pH TDS Cl F NO_3 NO_2 SO_4 PO_4 ALK CN^- NH_3 TKN TOC CR^{6+} ____ ____ ____ ____
	pH TDS Cl F NO_3 NO_2 SO_4 PO_4 ALK CN^- NH_3 TKN TOC CR^{6+} ____ ____ ____ ____
	pH TDS Cl F NO_3 NO_2 SO_4 PO_4 ALK CN^- NH_3 TKN TOC CR^{6+} ____ ____ ____ ____
	pH TDS Cl F NO_3 NO_2 SO_4 PO_4 ALK CN^- NH_3 TKN TOC CR^{6+} ____ ____ ____ ____
	pH TDS Cl F NO_3 NO_2 SO_4 PO_4 ALK CN^- NH_3 TKN TOC CR^{6+} ____ ____ ____ ____

Comments:

LDC #: 13381c4
SDG #: 14142

VALIDATION FINDINGS CHECKLIST

Reviewer: MH
2nd Reviewer: [illegible]

Method: Inorganics (EPA Method See Cover

Validation Area	Yes	No	NA	Findings/Comments
I. Technical holding times				
All technical holding times were met.	✓			
Cooler temperature criteria was met.	✓			
II. Calibration				
Were all instruments calibrated daily, each set-up time?	✓			
Were the proper number of standards used?	✓			
Were all initial calibration correlation coefficients ≥ 0.995?	✓			
Were all initial and continuing calibration verification %Rs within the 90-110% QC limits?	✓			
Were titrant checks performed as required?			✓	
Were balance checks performed as required?	✓			
Were all initial and continuing calibration verification %Rs within the 90-110% QC limits?	✓			
III. Blanks				
Was a method blank associated with every sample in this SDG?	✓			
Was there contamination in the method blanks? If yes, please see the Blanks validation completeness worksheet.		✓		
IV. Matrix spike/Matrix spike duplicates and Duplicates				
Were a matrix spike (MS) and duplicate (DUP) analyzed for each matrix in this SDG? If no, indicate which matrix does not have an associated MS/MSD or MS/DUP. Soil / Water.	✓			
Were the MS/MSD percent recoveries (%R) and the relative percent differences (RPD) within the 75-125 QC limits? If the sample concentration exceeded the spike concentration by a factor of 4 or more, no action was taken.		✓		
Were the MS/MSD or duplicate relative percent differences (RPD) ≤ 20% for waters and ≤ 35% for soil samples? A control limit of ≤ CRDL(≤ 2X CRDL for soil) was used for samples that were ≤ 5X the CRDL, including when only one of the duplicate sample values were ≤ 5X the CRDL.	✓			
V. Laboratory control samples				
Was an LCS anaylzed for this SDG?	✓			
Was an LCS analyzed per extraction batch?	✓			
Were the LCS percent recoveries (%R) and relative percent difference (RPD) within the 80-120% (85-115% for Method 300.0) QC limits?	✓			
VI. Regional Quality Assurance and Quality Control				
Were performance evaluation (PE) samples performed?			✓	
Were the performance evaluation (PE) samples within the acceptance limits?			✓	

LDC #: 1338|C6
SDG #: 1V42

VALIDATION FINDINGS CHECKLIST

Reviewer: MH
2nd Reviewer: [illegible]

Validation Area	Yes	No	NA	Findings/Comments
VII. Sample Result Verification				
Were RLs adjusted to reflect all sample dilutions and dry weight factors applicable to level IV validation?	✓			
Were detection limits < RL?	✓			
VIII. Overall assessment of data				
Overall assessment of data was found to be acceptable.	✓			
IX. Field duplicates				
Field duplicate pairs were identified in this SDG.		✓		
Target analytes were detected in the field duplicates.			✓	
X. Field blanks				
Field blanks were identified in this SDG.		✓		
Target analytes were detected in the field blanks.			✓	

LDC #: 1338/C6
SDG #: 4442

VALIDATION FINDINGS WORKSHEET
Matrix Spike/Matrix Spike Duplicates

Reviewer: MH
2nd Reviewer: [illegible]

METHOD: Inorganics, EPA Method See Cover

Please see qualifications below for all questions answered "N". Not applicable questions are identified as "N/A".

(Y) N N/A Was a matrix spike analyzed for each matrix in this SDG?

Y (N) N/A Were matrix spike percent recoveries (%R) within the control limits of 75-125? If the sample concentration exceeded the spike concentration by a factor of 4 or more, no action was taken.

(Y) N N/A Were all duplicate sample relative percent differences (RPD) ≤ 20% for water samples and ≤35% for soil samples?

LEVEL IV ONLY:

Y N (N/A) Were recalculated results acceptable? See Level IV Recalculation Worksheet for recalculations.

#	MS/MSD ID	Matrix	Analyte	MS %Recovery	MSD %Recovery	RPD (Limits)	Associated Samples	Qualifications
1	14/15	Sediment	S		73.5		A1	J- / UJ / A

Comments:

LDC #: 13391c6
SDG #: HV42

VALIDATION FINDINGS WORKSHEET
Level IV Recalculation Worksheet

Reviewer: MH
2nd Reviewer: AC

METHOD: Inorganics, Method see cover

Percent recoveries (%R) for a laboratory control sample and a matrix spike sample were recalculated using the following formula:

%R = Found / True x 100 Where, Found = concentration of each analyte measured in the analysis of the sample. For the matrix spike calculation, Found = SSR (spiked sample result) - SR (sample result).
True = concentration of each analyte in the source.

A sample and duplicate relative percent difference (RPD) was recalculated using the following formula:

RPD = |S-D| / (S+D)/2 x 100 Where, S = Original sample concentration
D = Duplicate sample concentration

Sample ID	Type of Analysis	Element	Found / S (units)	True / D (units)	Recalculated %R / RPD	Reported %R / RPD	Acceptable (Y/N)
LCS	Laboratory control sample	S	0.774	0.82	94.4	94.4	Y
9	Matrix spike sample	TOC	(SSR-SR) 3.24	~~6.05~~ 3.36 MH	96.4	96.5	↓
10	Duplicate sample	NH_3-N	12.9	13.1	1.5	2.3	↓

Comments: Refer to appropriate worksheet for list of qualifications and associated samples when reported results do not agree within 10.0% of the recalculated results.

LDC #: 13381C6
SDG #: HH42

VALIDATION FINDINGS WORKSHEET
Initial and Continuing Calibration Calculation Verification

Page: 1 of 1
Reviewer: MM
2nd Reviewer: K

METHOD: Inorganics, Method See cover

The correlation coefficient (r) for the calibration of NH_3-N was recalculated. Calibration date: 3/15/05

An initial or continuing calibration verification percent recovery (%R) was recalculated for each type of analysis using the following formula:

$$\%R = \frac{\text{Found}}{\text{True}} \times 100$$

Where, Found = concentration of each analyte measured in the analysis of the ICV or CCV solution
True = concentration of each analyte in the ICV or CCV source

Type of Analysis	Analyte		conc. (mg/L) (units)	Abs (units)	Recalculated r or %R	Reported r or %R	Acceptable (Y/N)
Initial calibration	NH_3-N	Blank	0	0.1572	r=0.999985	r=0.99999	Y
Calibration verification		Standard 1	0.01	0.8004			
		Standard 2	0.02	1.1632			
		Standard 3	0.05	2.3854			
		Standard 4	0.2	8.4864			
		Standard 5	0.5	21.0341			
		Standard 6	0.8	33.2346			
		Standard 7	1	41.4473			
Calibration verification CCV	NH_3-N	0.5	0.533		107	106	Y
Calibration verification CCV	S	0.82	0.778		95	95	Y
Calibration verification CCV	TOC	5000	5226		104.5	104.5	Y

Comments: Refer to Calibration Verification findings worksheet for list of qualifications and associated samples when reported results do not agree within 10.0% of the recalculated results.

LDC #: 1338|C6
SDG #: 1+V42

VALIDATION FINDINGS WORKSHEET
Sample Calculation Verification

Page: 1 of 1
Reviewer: MH
2nd reviewer: [illegible]

METHOD: Inorganics, Method See cover

Please see qualifications below for all questions answered "N". Not applicable questions are identified as "N/A".

Y N N/A Have results been reported and calculated correctly?
Y N N/A Are results within the calibrated range of the instruments?
Y N N/A Are all detection limits below the CRQL?

Compound (analyte) results for 1 reported with a positive detect were recalculated and verified using the following equation:

Concentration = Recalculation:

$$TOC = \frac{(25710 - 31) \times 49.55}{45.4} = 2809 \text{ mg/kg}$$

$$= 2.81\ \%$$

#	Sample ID	Analyte	Reported Concentration (mg/kg)	Calculated Concentration (mg/kg)	Acceptable (Y/N)
1	1	TS (%)	45.4	45.4	Y
		NH3-N	13.2	13.1		
		TOC (%)	2.81	2.81		
		Grain size.	% Finer	% Finer	
	4	~~% Finer~~			
		phi size 0	99.7	99.7	Y
		1	98.3	98.3		
		2	85.7	85.6		
		3	80.4	80.4		
		4	74.0	74.0		
		5	65.1	65.3		
		6	46.3	46.3		
		7	30.2	30.2		
		8	19.4	19.4		
		9	12.4	12.4		
		10	8.6	8.6		

Note:

LDC #: 13384A6 **VALIDATION COMPLETENESS WORKSHEET** Date: 4/18/05

SDG #: HV00 Level II Page: 1 of 1

Laboratory: Analytical Resources, Inc. Reviewer: MH

2nd Reviewer:

METHOD: Ammonia-N (EPA Method 350.1), Grain Size (PSEP), Sulfide (EPA Method 376.2), Total Solids (EPA Method 160.3), TOC (Plumb),

The samples listed below were reviewed for each of the following validation areas. Validation findings are noted in attached validation findings worksheets.

	Validation Area		Comments
I.	Technical holding times	A	Sampling dates: 3/8/05
IIa.	Initial calibration	N	
IIb.	Calibration verification	N	
III.	Blanks	SW	
IV	Matrix Spike/Matrix Spike Duplicates	SW	
V	Duplicates	A	Triplicates.
VI.	Laboratory control samples	A	LCS+SRM, No SRM for S. Text.
VII.	Sample result verification	N	
VIII.	Overall assessment of data	A	
IX.	Field duplicates	SW	(6,7), (13,14)
X	Field blanks	N	

Note: A = Acceptable
N = Not provided/applicable
SW = See worksheet
ND = No compounds detected
R = Rinsate
FB = Field blank
D = Duplicate
TB = Trip blank
EB = Equipment blank

Validated Samples: Sediment

1	LDW-SS81-010	11	LDW-SS106-010	21	LDW-SS19-010MS	31	MS
2	LDW-SS65-010	12	LDW-SS122-010	22	LDW-SS19-010DUP	32	
3	LDW-SS41-010	13	LDW-SS131-010	23	LDW-SS122-010MS	33	
4	LDW-SS30-010	14	LDW-SS206-010	24	LDW-SS122-010MSD	34	
5	LDW-SS21-010	15	LDW-SS140-010	25	LDW-SS122-010DUP	35	
6	LDW-SS19-010	16	LDW-SS81-010MS	26	LDW-SS19-010TRP	36	
7	LDW-SS205-010	17	LDW-SS81-010DUP	27	LDW-SS122-010TRP	37	
8	LDW-SS11-010	18	LDW-SS41-010MS	28	LDW-SS11-010Dup	38	
9	LDW-SS16-010	19	~~LDW-SS41-010MSD~~	29	↓ TRP	39	
10	LDW-SS105-010	20	LDW-SS41-010DUP	30		40	

Notes:

LDC #: 13384A6
SDG #: 14V00

VALIDATION FINDINGS WORKSHEET
Sample Specific Analysis Reference

Page: 1 of 1
Reviewer: MH
2nd reviewer:

All circled methods are applicable to each sample.

Sample ID	Parameter				
1-15	pH TDS Cl F NO_3 NO_2 SO_4 PO_4 ALK CN^- [✓ NH_3] TKN [✓ TOC] CR^{6+}	[✓ TS]	[✓ S]	[✓ Grain size]	
16	pH TDS Cl F NO_3 NO_2 SO_4 PO_4 ALK CN^- [✓ NH_3] TKN TOC CR^{6+}				
17	pH TDS Cl F NO_3 NO_2 SO_4 PO_4 ALK CN^- [✓ NH_3] TKN TOC CR^{6+}				
18	pH TDS Cl F NO_3 NO_2 SO_4 PO_4 ALK CN^- [✓ NH_3] TKN TOC CR^{6+}				
19	~~pH TDS Cl F NO_3 NO_2 SO_4 PO_4 ALK CN^- NH_3 TKN TOC CR^{6+}~~				
20	pH TDS Cl F NO_3 NO_2 SO_4 PO_4 ALK CN^- [✓ NH_3] TKN TOC CR^{6+}				
21	pH TDS Cl F NO_3 NO_2 SO_4 PO_4 ALK CN^- NH_3 TKN [✓ TOC] CR^{6+}				
22	pH TDS Cl F NO_3 NO_2 SO_4 PO_4 ALK CN^- NH_3 TKN [✓ TOC] CR^{6+}	[✓ TS]			
23	pH TDS Cl F NO_3 NO_2 SO_4 PO_4 ALK CN^- NH_3 TKN TOC CR^{6+}		[✓ S]		
24	pH TDS Cl F NO_3 NO_2 SO_4 PO_4 ALK CN^- NH_3 TKN TOC CR^{6+}		[✓ S]		
25	pH TDS Cl F NO_3 NO_2 SO_4 PO_4 ALK CN^- NH_3 TKN TOC CR^{6+}		[✓ S]		
26	pH TDS Cl F NO_3 NO_2 SO_4 PO_4 ALK CN^- NH_3 TKN [✓ TOC] CR^{6+}	[✓ TS]			
27	pH TDS Cl F NO_3 NO_2 SO_4 PO_4 ALK CN^- NH_3 TKN TOC CR^{6+}		[✓ S]		
28, 29	pH TDS Cl F NO_3 NO_2 SO_4 PO_4 ALK CN^- NH_3 TKN TOC CR^{6+}			[✓ Grain size]	
	pH TDS Cl F NO_3 NO_2 SO_4 PO_4 ALK CN^- NH_3 TKN TOC CR^{6+}				
	pH TDS Cl F NO_3 NO_2 SO_4 PO_4 ALK CN^- NH_3 TKN TOC CR^{6+}				
	pH TDS Cl F NO_3 NO_2 SO_4 PO_4 ALK CN^- NH_3 TKN TOC CR^{6+}				
	pH TDS Cl F NO_3 NO_2 SO_4 PO_4 ALK CN^- NH_3 TKN TOC CR^{6+}				
	pH TDS Cl F NO_3 NO_2 SO_4 PO_4 ALK CN^- NH_3 TKN TOC CR^{6+}				
	pH TDS Cl F NO_3 NO_2 SO_4 PO_4 ALK CN^- NH_3 TKN TOC CR^{6+}				
	pH TDS Cl F NO_3 NO_2 SO_4 PO_4 ALK CN^- NH_3 TKN TOC CR^{6+}				
	pH TDS Cl F NO_3 NO_2 SO_4 PO_4 ALK CN^- NH_3 TKN TOC CR^{6+}				
	pH TDS Cl F NO_3 NO_2 SO_4 PO_4 ALK CN^- NH_3 TKN TOC CR^{6+}				
	pH TDS Cl F NO_3 NO_2 SO_4 PO_4 ALK CN^- NH_3 TKN TOC CR^{6+}				
	pH TDS Cl F NO_3 NO_2 SO_4 PO_4 ALK CN^- NH_3 TKN TOC CR^{6+}				

Comments:

LDC #: 133846
SDG #: 4V00

VALIDATION FINDINGS WORKSHEET
Blanks

Reviewer: MH
2nd Reviewer: K

METHOD: Inorganics, Method See cover

Please see qualifications below for all questions answered "N". Not applicable questions are identified as "N/A".
Y N N/A Were all samples associated with a given method blank?
Y N N/A Were any inorganic contaminants detected above the reporting limit in the method blanks? If yes, please see qualifications below.

Conc. units: mg/kg **Associated Samples:** 1, 2, 4, 9, 13, 14,

Analyte	Blank ID	Maximum ICB/CCB	Blank Action Limit	Sample Identification								
	MB											
NH_3-N	0.24		1.20			No samples qualified						

CIRCLED RESULTS WERE NOT QUALIFIED. ALL RESULTS NOT CIRCLED WERE QUALIFIED BY THE FOLLOWING STATEMENT:
All contamnants within five times the methoc blank concentration were qualified as not detected, "U".

LDC #: 13384A6
SDG #: HV00

VALIDATION FINDINGS WORKSHEET
Matrix Spike/Matrix Spike Duplicates

Reviewer: MH
2nd Reviewer: [illegible]

METHOD: Inorganics, EPA Method See cover

Please see qualifications below for all questions answered "N". Not applicable questions are identified as "N/A".

(Y) N N/A Was a matrix spike analyzed for each matrix in this SDG?

Y (N) N/A Were matrix spike percent recoveries (%R) within the control limits of 75-125? If the sample concentration exceeded the spike concentration by a factor of 4 or more, no action was taken.

(Y) N N/A Were all duplicate sample relative percent differences (RPD) ≤ 20% for water samples and ≤35% for soil samples?

LEVEL IV ONLY:

Y N (N/A) Were recalculated results acceptable? See Level IV Recalculation Worksheet for recalculations.

#	MS/MSD ID	Matrix	Analyte	MS %Recovery	MSD %Recovery	RPD (Limits)	Associated Samples	Qualifications
1	23/24	Sediment	S	57.8	55.2		All	J-/UJ/A

Comments:

LDC #: 13384A6
SDG #: HV00

VALIDATION FINDINGS WORKSHEET
Field Duplicates

Reviewer: MM
2nd reviewer: M

METHOD: Inorganics, Method See cover

(Y) N N/A Were field duplicate pairs identified in this SDG?
(Y) N N/A Were target analytes detected in the field duplicate pairs?

Analyte	Concentration ( ) 6	7	RPD (Limit) (≤50)	Difference (Limit)	Qualifier
TS (%)	51.70	51.70	0		
NH_3-N (mg/kg)	5.71	4.34	27		
S ↓	6.64	64	~~200~~ NC		
TOC (%)	2.03	2.33	14		

Analyte	Concentration ( ) 13	14	RPD (Limit) (≤50)	Difference (Limit)	Qualifier
TS (%)	45.80	45.60	0		
NH_3-N (mg/kg)	12.3	11.8	4		
S ↓	100	28	113		
TOC (%)	3.18	2.78	13		

Analyte	Concentration ( )		RPD (Limit)	Difference (Limit)	Qualifier

Analyte	Concentration ( )		RPD (Limit)	Difference (Limit)	Qualifier

LDC#: 13384 A6
SDG#: 4400

VALIDATION FINDINGS WORKSHEET
Field Duplicates

Reviewer: MM
2nd Reviewer: M

Grain Size, Method PSEP

(Y) N NA Were field duplicate pairs identified in this SDG?
(Y) N NA Were target analytes detected in the field duplicate pairs?

Phi Size	% Finer (%)		(≤50) RPD	
	6	7		
-2	79.7	100	23	
-1	78.4	98.2	22	
0	76.9	95.6	22	
1	73.9	90.7	20	
2	65.4	81.8	22	
3	58.9	74.1	23	
4	51.7	64.7	22	
5	47.4	57.2	19	
6	35.8	43.9	20	
7	24.1	30.0	22	
8	16.0	20.3	24	
9	10.8	13.0	18	
10	7.1	8.9	23	

LDC#: 13384 A6
SDG#: HV00

VALIDATION FINDINGS WORKSHEET
Field Duplicates

Reviewer: MY
2nd Reviewer: M

Grain Size, Method PSEP

(Y) N NA Were field duplicate pairs identified in this SDG?
(X) N NA Were target analytes detected in the field duplicate pairs?

Phi Size	% Finer (%)		(≤50) RPD	
	13	14		
0	99.7	99.9	0	
1	98.0	98.1	0	
2	94.6	95.0	0	
3	80.1	80.9	1	
4	60.2	60.9	1	
5	47.0	45.1	4	
6	30.7	29.5	4	
7	18.8	18.0	4	
8	11.9	11.7	2	
9	8.9	8.8	1	
10	6.9	6.8	1	

LDC #: 13395A6 **VALIDATION COMPLETENESS WORKSHEET** Date: 4/21/05

SDG #: HV38 Level II Page: 1 of 1

Laboratory: Analytical Resources, Inc. Reviewer: VM

2nd Reviewer: K

METHOD: Ammonia-N (EPA Method 350.1), Grain Size (PSEP), Sulfide (EPA Method 376.2), Total Solids (EPA Method 160.3), TOC (Plumb),

The samples listed below were reviewed for each of the following validation areas. Validation findings are noted in attached validation findings worksheets.

	Validation Area		Comments
I.	Technical holding times	A	Sampling dates: 3/11/05
IIa.	Initial calibration	N	
IIb.	Calibration verification	N	
III.	Blanks	A	
IV	Matrix Spike/Matrix Spike Duplicates	SW	
V	Duplicates	A	Triplicates
VI.	Laboratory control samples	A	LCS + SRM, No SRM for S. Tetra.
VII.	Sample result verification	N	
VIII.	Overall assessment of data	A	
IX.	Field duplicates	N	
X	Field blanks	N	

Note: A = Acceptable; N = Not provided/applicable; SW = See worksheet; ND = No compounds detected; R = Rinsate; FB = Field blank; D = Duplicate; TB = Trip blank; EB = Equipment blank

Validated Samples: Sediment

1	LDW-SS39-010	11		21		31	
2	LDW-SS100-010	12		22		32	
3	LDW-SS2b-010	13		23		33	
4	MS.	14		24		34	
5		15		25		35	
6		16		26		36	
7		17		27		37	
8		18		28		38	
9		19		29		39	
10		20		30		40	

Notes: _____

LDC #: 13395A6
SDG #: 14V38

VALIDATION FINDINGS WORKSHEET
Sample Specific Analysis Reference

Page: 1 of 1
Reviewer:
2nd reviewer:

All circled methods are applicable to each sample.

Sample ID	Parameter
1-3	pH TDS Cl F NO_3 NO_2 SO_4 PO_4 ALK CN^- [✓ NH_3] TKN [✓ TOC] CR^{6+} [✓ TS] [✓ S] [✓ Grain Size] ____
	pH TDS Cl F NO_3 NO_2 SO_4 PO_4 ALK CN^- NH_3 TKN TOC CR^{6+} ____ ____ ____ ____
	pH TDS Cl F NO_3 NO_2 SO_4 PO_4 ALK CN^- NH_3 TKN TOC CR^{6+} ____ ____ ____ ____
	pH TDS Cl F NO_3 NO_2 SO_4 PO_4 ALK CN^- NH_3 TKN TOC CR^{6+} ____ ____ ____ ____
	pH TDS Cl F NO_3 NO_2 SO_4 PO_4 ALK CN^- NH_3 TKN TOC CR^{6+} ____ ____ ____ ____
	pH TDS Cl F NO_3 NO_2 SO_4 PO_4 ALK CN^- NH_3 TKN TOC CR^{6+} ____ ____ ____ ____
	pH TDS Cl F NO_3 NO_2 SO_4 PO_4 ALK CN^- NH_3 TKN TOC CR^{6+} ____ ____ ____ ____
	pH TDS Cl F NO_3 NO_2 SO_4 PO_4 ALK CN^- NH_3 TKN TOC CR^{6+} ____ ____ ____ ____
	pH TDS Cl F NO_3 NO_2 SO_4 PO_4 ALK CN^- NH_3 TKN TOC CR^{6+} ____ ____ ____ ____
	pH TDS Cl F NO_3 NO_2 SO_4 PO_4 ALK CN^- NH_3 TKN TOC CR^{6+} ____ ____ ____ ____
	pH TDS Cl F NO_3 NO_2 SO_4 PO_4 ALK CN^- NH_3 TKN TOC CR^{6+} ____ ____ ____ ____
	pH TDS Cl F NO_3 NO_2 SO_4 PO_4 ALK CN^- NH_3 TKN TOC CR^{6+} ____ ____ ____ ____
	pH TDS Cl F NO_3 NO_2 SO_4 PO_4 ALK CN^- NH_3 TKN TOC CR^{6+} ____ ____ ____ ____
	pH TDS Cl F NO_3 NO_2 SO_4 PO_4 ALK CN^- NH_3 TKN TOC CR^{6+} ____ ____ ____ ____
	pH TDS Cl F NO_3 NO_2 SO_4 PO_4 ALK CN^- NH_3 TKN TOC CR^{6+} ____ ____ ____ ____
	pH TDS Cl F NO_3 NO_2 SO_4 PO_4 ALK CN^- NH_3 TKN TOC CR^{6+} ____ ____ ____ ____
	pH TDS Cl F NO_3 NO_2 SO_4 PO_4 ALK CN^- NH_3 TKN TOC CR^{6+} ____ ____ ____ ____
	pH TDS Cl F NO_3 NO_2 SO_4 PO_4 ALK CN^- NH_3 TKN TOC CR^{6+} ____ ____ ____ ____
	pH TDS Cl F NO_3 NO_2 SO_4 PO_4 ALK CN^- NH_3 TKN TOC CR^{6+} ____ ____ ____ ____
	pH TDS Cl F NO_3 NO_2 SO_4 PO_4 ALK CN^- NH_3 TKN TOC CR^{6+} ____ ____ ____ ____
	pH TDS Cl F NO_3 NO_2 SO_4 PO_4 ALK CN^- NH_3 TKN TOC CR^{6+} ____ ____ ____ ____
	pH TDS Cl F NO_3 NO_2 SO_4 PO_4 ALK CN^- NH_3 TKN TOC CR^{6+} ____ ____ ____ ____
	pH TDS Cl F NO_3 NO_2 SO_4 PO_4 ALK CN^- NH_3 TKN TOC CR^{6+} ____ ____ ____ ____
	pH TDS Cl F NO_3 NO_2 SO_4 PO_4 ALK CN^- NH_3 TKN TOC CR^{6+} ____ ____ ____ ____
	pH TDS Cl F NO_3 NO_2 SO_4 PO_4 ALK CN^- NH_3 TKN TOC CR^{6+}

Comments:

LDC #: 13395A6
SDG #: HV38

VALIDATION FINDINGS WORKSHEET
Matrix Spike/Matrix Spike Duplicates

Reviewer: MH
2nd Reviewer:

METHOD: Inorganics, EPA Method See cover

Please see qualifications below for all questions answered "N". Not applicable questions are identified as "N/A".

(Y) N N/A Was a matrix spike analyzed for each matrix in this SDG?

Y (N) N/A Were matrix spike percent recoveries (%R) within the control limits of (75-125)? If the sample concentration exceeded the spike concentration by a factor of 4 or more, no action was taken.

(Y) N N/A Were all duplicate sample relative percent differences (RPD) ≤ 20% for water samples and ≤35% for soil samples?

LEVEL IV ONLY:

Y N (N/A) Were recalculated results acceptable? See Level IV Recalculation Worksheet for recalculations.

#	MS/MSD ID	Matrix	Analyte	MS %Recovery	MSD %Recovery	RPD (Limits)	Associated Samples	Qualifications
1	LDW-SS86-010 MS/MSD (SDG HV42)	Sediment	S		73.5		All	J-/UJ/A

Comments:

LDC #: 13398A6 **VALIDATION COMPLETENESS WORKSHEET** Date: 4/21/05
SDG #: HV58 Level II Page: 1 of 1
Laboratory: Analytical Resources, Inc. Reviewer: MM
2nd Reviewer: M

METHOD: Ammonia-N (EPA Method 350.1), Grain Size (PSEP), Sulfide (EPA Method 376.2), Total Solids (EPA Method 160.3), TOC (Plumb),

The samples listed below were reviewed for each of the following validation areas. Validation findings are noted in attached validation findings worksheets.

	Validation Area		Comments
I.	Technical holding times	A	Sampling dates: 3/14/05
IIa.	Initial calibration	N	
IIb.	Calibration verification	N	
III.	Blanks	A	
IV	Matrix Spike/Matrix Spike Duplicates	A	MS/MSD MS
V	Duplicates	A	Triplicates
VI.	Laboratory control samples	A	LCS + SRM, No SRM for S. Text.
VII.	Sample result verification	N	
VIII.	Overall assessment of data	A	
IX.	Field duplicates	N	
X	Field blanks	N	

Note: A = Acceptable
N = Not provided/applicable
SW = See worksheet
ND = No compounds detected
R = Rinsate
FB = Field blank
D = Duplicate
TB = Trip blank
EB = Equipment blank

Validated Samples: Sediment

1	LDW-SS90-010	11	LDW-SS107-010	21		31	
2	LDW-SS24-010	12	LDW-SS145-010	22		32	
3	LDW-SS9-010	13	LDW-SS145-010DUP	23		33	
4	LDW-SS77-010	14	↓ TRP	24		34	
5	LDW-SS59-010	15	MB	25		35	
6	LDW-SSB5b-010	16		26		36	
7	LDW-SS53-010	17		27		37	
8	LDW-SS34-010	18		28		38	
9	LDW-SSB4a-010	19		29		39	
10	LDW-SS29-010	20		30		40	

Notes: _____

LDC #: 13396A6
SDG #: HV58

VALIDATION FINDINGS WORKSHEET
Sample Specific Analysis Reference

Page: 1 of 1
Reviewer: MH
2nd reviewer:

All circled methods are applicable to each sample.

Sample ID	Parameter
1-12	pH TDS Cl F NO_3 NO_2 SO_4 PO_4 ALK CN^- [✓ NH_3] TKN [✓ TOC] CR^{6+} [✓ TS] [✓ S] [✓ Grain Size] ____
[illegible] 13,14	pH TDS Cl F NO_3 NO_2 SO_4 PO_4 ALK CN^- NH_3 TKN TOC CR^{6+} [✓ TS] ____ ____ ____
	pH TDS Cl F NO_3 NO_2 SO_4 PO_4 ALK CN^- NH_3 TKN TOC CR^{6+} ____ ____ ____ ____
	pH TDS Cl F NO_3 NO_2 SO_4 PO_4 ALK CN^- NH_3 TKN TOC CR^{6+} ____ ____ ____ ____
	pH TDS Cl F NO_3 NO_2 SO_4 PO_4 ALK CN^- NH_3 TKN TOC CR^{6+} ____ ____ ____ ____
	pH TDS Cl F NO_3 NO_2 SO_4 PO_4 ALK CN^- NH_3 TKN TOC CR^{6+} ____ ____ ____ ____
	pH TDS Cl F NO_3 NO_2 SO_4 PO_4 ALK CN^- NH_3 TKN TOC CR^{6+} ____ ____ ____ ____
	pH TDS Cl F NO_3 NO_2 SO_4 PO_4 ALK CN^- NH_3 TKN TOC CR^{6+} ____ ____ ____ ____
	pH TDS Cl F NO_3 NO_2 SO_4 PO_4 ALK CN^- NH_3 TKN TOC CR^{6+} ____ ____ ____ ____
	pH TDS Cl F NO_3 NO_2 SO_4 PO_4 ALK CN^- NH_3 TKN TOC CR^{6+} ____ ____ ____ ____
	pH TDS Cl F NO_3 NO_2 SO_4 PO_4 ALK CN^- NH_3 TKN TOC CR^{6+} ____ ____ ____ ____
	pH TDS Cl F NO_3 NO_2 SO_4 PO_4 ALK CN^- NH_3 TKN TOC CR^{6+} ____ ____ ____ ____
	pH TDS Cl F NO_3 NO_2 SO_4 PO_4 ALK CN^- NH_3 TKN TOC CR^{6+} ____ ____ ____ ____
	pH TDS Cl F NO_3 NO_2 SO_4 PO_4 ALK CN^- NH_3 TKN TOC CR^{6+} ____ ____ ____ ____
	pH TDS Cl F NO_3 NO_2 SO_4 PO_4 ALK CN^- NH_3 TKN TOC CR^{6+} ____ ____ ____ ____
	pH TDS Cl F NO_3 NO_2 SO_4 PO_4 ALK CN^- NH_3 TKN TOC CR^{6+} ____ ____ ____ ____
	pH TDS Cl F NO_3 NO_2 SO_4 PO_4 ALK CN^- NH_3 TKN TOC CR^{6+} ____ ____ ____ ____
	pH TDS Cl F NO_3 NO_2 SO_4 PO_4 ALK CN^- NH_3 TKN TOC CR^{6+} ____ ____ ____ ____
	pH TDS Cl F NO_3 NO_2 SO_4 PO_4 ALK CN^- NH_3 TKN TOC CR^{6+} ____ ____ ____ ____
	pH TDS Cl F NO_3 NO_2 SO_4 PO_4 ALK CN^- NH_3 TKN TOC CR^{6+} ____ ____ ____ ____
	pH TDS Cl F NO_3 NO_2 SO_4 PO_4 ALK CN^- NH_3 TKN TOC CR^{6+} ____ ____ ____ ____
	pH TDS Cl F NO_3 NO_2 SO_4 PO_4 ALK CN^- NH_3 TKN TOC CR^{6+} ____ ____ ____ ____
	pH TDS Cl F NO_3 NO_2 SO_4 PO_4 ALK CN^- NH_3 TKN TOC CR^{6+} ____ ____ ____ ____
	pH TDS Cl F NO_3 NO_2 SO_4 PO_4 ALK CN^- NH_3 TKN TOC CR^{6+} ____ ____ ____ ____
	pH TDS Cl F NO_3 NO_2 SO_4 PO_4 ALK CN^- NH_3 TKN TOC CR^{6+}

Comments:

LDC #: 13403A6 **VALIDATION COMPLETENESS WORKSHEET** Date: 4/22/05
SDG #: HV72 Level IV Page: 1 of 1
Laboratory: Analytical Resources, Inc. Reviewer: MM
2nd Reviewer: M

METHOD: Ammonia-N (EPA Method 350.1 IM), Grain Size (PSEP),Sulfide (EPA Method 376.2), Total Solids (EPA Method 160.3), TOC (Plumb),

The samples listed below were reviewed for each of the following validation areas. Validation findings are noted in attached validation findings worksheets.

	Validation Area		Comments
I.	Technical holding times	SW	Sampling dates: 3/11-15/05
IIa.	Initial calibration	N	
IIb.	Calibration verification	N	
III.	Blanks	A	
IV	Matrix Spike/Matrix Spike Duplicates	A	
V	Duplicates	A	Triplicates.
VI.	Laboratory control samples	A	LCS + SRM, No SRM for S Test.
VII.	Sample result verification	N	
VIII.	Overall assessment of data	A	
IX.	Field duplicates	N	
X	Field blanks	N	

Note: A = Acceptable
N = Not provided/applicable
SW = See worksheet
ND = No compounds detected
R = Rinsate
FB = Field blank
D = Duplicate
TB = Trip blank
EB = Equipment blank

Validated Samples: Sediment

1	LDW-SS93-010	11	LDW-SS93-010DUP	21		31	
2	LDW-SS124-010	12	LDW-SS93-010TRP	22		32	
3	LDW-SS135-010	13	LDW-SSC1-010MS	23		33	
4	LDW-SS136-010	14	LDW-SSC1-010DUP	24		34	
5	LDW-SSB6a-010	15	MB	25		35	
6	LDW-SSC1-010	16		26		36	
7	LDW-SSCR20B-010	17		27		37	
8	LDW-SSCR23B-010	18		28		38	
9	LDW-SSMSMP43B-010	19		29		39	
10	LDW-SS93-010MS	20		30		40	

Notes: _____

LDC #: 13403A6
SDG #: HV72

VALIDATION FINDINGS WORKSHEET
Sample Specific Analysis Reference

Page: 1 of 1
Reviewer: MH
2nd reviewer: d

All circled methods are applicable to each sample.

Sample ID	Parameter				
1-6	pH TDS Cl F NO$_3$ NO$_2$ SO$_4$ PO$_4$ ALK CN$^-$ [✓ NH$_3$] TKN [✓ TOC] CR^{6+}	[✓ TS]	[✓ S]	[✓ Grain size]	
7-9	pH TDS Cl F NO$_3$ NO$_2$ SO$_4$ PO$_4$ ALK CN$^-$ NH$_3$ TKN TOC CR^{6+}		[✓ S]	↓	
m 10	pH TDS Cl F NO$_3$ NO$_2$ SO$_4$ PO$_4$ ALK CN$^-$ [✓ NH$_3$] TKN TOC CR^{6+}			↓	
11	pH TDS Cl F NO$_3$ NO$_2$ SO$_4$ PO$_4$ ALK CN$^-$ [✓ NH$_3$] TKN TOC CR^{6+}			↓	
12	pH TDS Cl F NO$_3$ NO$_2$ SO$_4$ PO$_4$ ALK CN$^-$ NH$_3$ TKN TOC CR^{6+}			↓	
13	pH TDS Cl F NO$_3$ NO$_2$ SO$_4$ PO$_4$ ALK CN$^-$ NH$_3$ TKN TOC CR^{6+}		[✓ S]		
14	pH TDS Cl F NO$_3$ NO$_2$ SO$_4$ PO$_4$ ALK CN$^-$ NH$_3$ TKN TOC CR^{6+}		[✓ S]		
	pH TDS Cl F NO$_3$ NO$_2$ SO$_4$ PO$_4$ ALK CN$^-$ NH$_3$ TKN TOC CR^{6+}				
	pH TDS Cl F NO$_3$ NO$_2$ SO$_4$ PO$_4$ ALK CN$^-$ NH$_3$ TKN TOC CR^{6+}				
	pH TDS Cl F NO$_3$ NO$_2$ SO$_4$ PO$_4$ ALK CN$^-$ NH$_3$ TKN TOC CR^{6+}				
	pH TDS Cl F NO$_3$ NO$_2$ SO$_4$ PO$_4$ ALK CN$^-$ NH$_3$ TKN TOC CR^{6+}				
	pH TDS Cl F NO$_3$ NO$_2$ SO$_4$ PO$_4$ ALK CN$^-$ NH$_3$ TKN TOC CR^{6+}				
	pH TDS Cl F NO$_3$ NO$_2$ SO$_4$ PO$_4$ ALK CN$^-$ NH$_3$ TKN TOC CR^{6+}				
	pH TDS Cl F NO$_3$ NO$_2$ SO$_4$ PO$_4$ ALK CN$^-$ NH$_3$ TKN TOC CR^{6+}				
	pH TDS Cl F NO$_3$ NO$_2$ SO$_4$ PO$_4$ ALK CN$^-$ NH$_3$ TKN TOC CR^{6+}				
	pH TDS Cl F NO$_3$ NO$_2$ SO$_4$ PO$_4$ ALK CN$^-$ NH$_3$ TKN TOC CR^{6+}				
	pH TDS Cl F NO$_3$ NO$_2$ SO$_4$ PO$_4$ ALK CN$^-$ NH$_3$ TKN TOC CR^{6+}				
	pH TDS Cl F NO$_3$ NO$_2$ SO$_4$ PO$_4$ ALK CN$^-$ NH$_3$ TKN TOC CR^{6+}				
	pH TDS Cl F NO$_3$ NO$_2$ SO$_4$ PO$_4$ ALK CN$^-$ NH$_3$ TKN TOC CR^{6+}				
	pH TDS Cl F NO$_3$ NO$_2$ SO$_4$ PO$_4$ ALK CN$^-$ NH$_3$ TKN TOC CR^{6+}				
	pH TDS Cl F NO$_3$ NO$_2$ SO$_4$ PO$_4$ ALK CN$^-$ NH$_3$ TKN TOC CR^{6+}				
	pH TDS Cl F NO$_3$ NO$_2$ SO$_4$ PO$_4$ ALK CN$^-$ NH$_3$ TKN TOC CR^{6+}				
	pH TDS Cl F NO$_3$ NO$_2$ SO$_4$ PO$_4$ ALK CN$^-$ NH$_3$ TKN TOC CR^{6+}				
	pH TDS Cl F NO$_3$ NO$_2$ SO$_4$ PO$_4$ ALK CN$^-$ NH$_3$ TKN TOC CR^{6+}				
	pH TDS Cl F NO$_3$ NO$_2$ SO$_4$ PO$_4$ ALK CN$^-$ NH$_3$ TKN TOC CR^{6+}				

Comments:

LDC #: 13403A6
SDG #: HV72

VALIDATION FINDINGS WORKSHEET
Technical Holding Times

Reviewer: WM
2nd reviewer: AC

All circled dates have exceeded the technical holding time.
Y N (N/A) Were all samples preserved as applicable to each method ?
(Y) N N/A Were all cooler temperatures within validation criteria?

Method:	376.2					
Parameters:	S					
Technical holding time:	7 days					

Sample ID	Sampling date	Analysis date	Analysis date	Analysis date	Analysis date	Analysis date	Qualifier
9	3/11/05	3/19/05	(8 days)				J-/UJ/R

LDC #: 13412A6
SDG #: HV76
Laboratory: Analytical Resources, Inc.

VALIDATION COMPLETENESS WORKSHEET
Level IV

Date: 4/25/05
Page: 1 of 1
Reviewer: MH
2nd Reviewer: [illegible]

METHOD: Ammonia-N (EPA Method 350.1), Grain Size (PSEP),Sulfide (EPA Method 376.2), Total Solids (EPA Method 160.3), TOC (Plumb),

The samples listed below were reviewed for each of the following validation areas. Validation findings are noted in attached validation findings worksheets.

	Validation Area		Comments
I.	Technical holding times	A	Sampling dates: 3/15/05
IIa.	Initial calibration	A	
IIb.	Calibration verification	A	
III.	Blanks	A	
IV	Matrix Spike/Matrix Spike Duplicates	A	MS
V	Duplicates	A	Triplicates
VI.	Laboratory control samples	A	LCS+SRM, No SRM for S Test
VII.	Sample result verification	A	
VIII.	Overall assessment of data	A	
IX.	Field duplicates	N	
X	Field blanks	N	

Note: A = Acceptable
N = Not provided/applicable
SW = See worksheet
ND = No compounds detected
R = Rinsate
FB = Field blank
D = Duplicate
TB = Trip blank
EB = Equipment blank

Validated Samples: Sediment

1	LDW-SS98-010	11	LDW-SS98-010MS	21		31	
2	LDW-SS141-010	12	LDW-SS98-010DUP	22		32	
3	LDW-SSB9a-010	13	LDW-SS151-010MS	23		33	
4	LDW-SS156-010	14	LDW-SS151-010MSD 2	24		34	
5	LDW-SS155-010	15	LDW-SS151-010DUP	25		35	
6	LDW-SS154-010	16	LDW-SS98-010TRP	26		36	
7	LDW-SS153-010	17	RB	27		37	
8	LDW-SS152-010	18		28		38	
9	LDW-SS151-010	19		29		39	
10	LDW-SS144-010	20		30		40	

Notes: _____

LDC #: 13412A6
SDG #: 14V76

VALIDATION FINDINGS CHECKLIST

Reviewer: MH
2nd Reviewer: [illegible]

Method: Inorganics (EPA Method See cover)

Validation Area	Yes	No	NA	Findings/Comments
I. Technical holding times				
All technical holding times were met.	✓			
Cooler temperature criteria was met.	✓			
II. Calibration				
Were all instruments calibrated daily, each set-up time?	✓			
Were the proper number of standards used?	✓			
Were all initial calibration correlation coefficients ≥ 0.995?	✓			
Were all initial and continuing calibration verification %Rs within the 90-110% QC limits?	✓			
Were titrant checks performed as required?			✓	
Were balance checks performed as required?			✓	
Were all initial and continuing calibration verification %Rs within the 90-110% QC limits?	✓			
III. Blanks				
Was a method blank associated with every sample in this SDG?	✓			
Was there contamination in the method blanks? If yes, please see the Blanks validation completeness worksheet.		✓		
IV. Matrix spike/Matrix spike duplicates and Duplicates				
Were a matrix spike (MS) and duplicate (DUP) analyzed for each matrix in this SDG? If no, indicate which matrix does not have an associated MS/MSD or MS/DUP. Soil / Water.	✓			
Were the MS/MSD percent recoveries (%R) and the relative percent differences (RPD) within the 75-125 QC limits? If the sample concentration exceeded the spike concentration by a factor of 4 or more, no action was taken.	✓			
Were the MS/MSD or duplicate relative percent differences (RPD) ≤ 20% for waters and ≤ 35% for soil samples? A control limit of ≤ CRDL(≤ 2X CRDL for soil) was used for samples that were ≤ 5X the CRDL, including when only one of the duplicate sample values were ≤ 5X the CRDL.	✓			
V. Laboratory control samples				
Was an LCS analyzed for this SDG?	✓			
Was an LCS analyzed per extraction batch?	✓			
Were the LCS percent recoveries (%R) and relative percent difference (RPD) within the 80-120% (85-115% for Method 300.0) QC limits?	✓			
VI. Regional Quality Assurance and Quality Control				
Were performance evaluation (PE) samples performed?			✓	
Were the performance evaluation (PE) samples within the acceptance limits?			✓	

LDC #: 13412A6
SDG #: HV76

VALIDATION FINDINGS CHECKLIST

Reviewer: MH
2nd Reviewer: [illegible]

Validation Area	Yes	No	NA	Findings/Comments
VII. Sample Result Verification				
Were RLs adjusted to reflect all sample dilutions and dry weight factors applicable to level IV validation?	✓			
Were detection limits < RL?	✓			
VIII. Overall assessment of data				
Overall assessment of data was found to be acceptable.	✓			
IX. Field duplicates				
Field duplicate pairs were identified in this SDG.		✓		
Target analytes were detected in the field duplicates.			✓	
X. Field blanks				
Field blanks were identified in this SDG.		✓		
Target analytes were detected in the field blanks.			✓	

LDC #: 13412-A6
SDG #: HV76

VALIDATION FINDINGS WORKSHEET
Sample Specific Analysis Reference

Page: 1 of 1
Reviewer: MH
2nd reviewer:

All circled methods are applicable to each sample.

Sample ID	Parameter
1-10	pH TDS Cl F NO_3 NO_2 SO_4 PO_4 ALK CN^- [✓ NH_3] TKN [✓ TOC] CR^{6+} [✓ S] [✓ TS] [✓ Grain size]
DL 11	pH TDS Cl F NO_3 NO_2 SO_4 PO_4 ALK CN^- NH_3 TKN [✓ TOC] CR^{6+}
12	pH TDS Cl F NO_3 NO_2 SO_4 PO_4 ALK CN^- NH_3 TKN [✓ TOC] CR^{6+} [✓ TS]
13	pH TDS Cl F NO_3 NO_2 SO_4 PO_4 ALK CN^- NH_3 TKN TOC CR^{6+} [✓ S]
14	pH TDS Cl F NO_3 NO_2 SO_4 PO_4 ALK CN^- NH_3 TKN TOC CR^{6+} [✓ S]
15	pH TDS Cl F NO_3 NO_2 SO_4 PO_4 ALK CN^- NH_3 TKN TOC CR^{6+} [✓ S]
16	pH TDS Cl F NO_3 NO_2 SO_4 PO_4 ALK CN^- NH_3 TKN [✓ TOC] CR^{6+} [✓ TS]
	pH TDS Cl F NO_3 NO_2 SO_4 PO_4 ALK CN^- NH_3 TKN TOC CR^{6+}
	pH TDS Cl F NO_3 NO_2 SO_4 PO_4 ALK CN^- NH_3 TKN TOC CR^{6+}
	pH TDS Cl F NO_3 NO_2 SO_4 PO_4 ALK CN^- NH_3 TKN TOC CR^{6+}
	pH TDS Cl F NO_3 NO_2 SO_4 PO_4 ALK CN^- NH_3 TKN TOC CR^{6+}
	pH TDS Cl F NO_3 NO_2 SO_4 PO_4 ALK CN^- NH_3 TKN TOC CR^{6+}
	pH TDS Cl F NO_3 NO_2 SO_4 PO_4 ALK CN^- NH_3 TKN TOC CR^{6+}
	pH TDS Cl F NO_3 NO_2 SO_4 PO_4 ALK CN^- NH_3 TKN TOC CR^{6+}
	pH TDS Cl F NO_3 NO_2 SO_4 PO_4 ALK CN^- NH_3 TKN TOC CR^{6+}
	pH TDS Cl F NO_3 NO_2 SO_4 PO_4 ALK CN^- NH_3 TKN TOC CR^{6+}
	pH TDS Cl F NO_3 NO_2 SO_4 PO_4 ALK CN^- NH_3 TKN TOC CR^{6+}
	pH TDS Cl F NO_3 NO_2 SO_4 PO_4 ALK CN^- NH_3 TKN TOC CR^{6+}
	pH TDS Cl F NO_3 NO_2 SO_4 PO_4 ALK CN^- NH_3 TKN TOC CR^{6+}
	pH TDS Cl F NO_3 NO_2 SO_4 PO_4 ALK CN^- NH_3 TKN TOC CR^{6+}
	pH TDS Cl F NO_3 NO_2 SO_4 PO_4 ALK CN^- NH_3 TKN TOC CR^{6+}
	pH TDS Cl F NO_3 NO_2 SO_4 PO_4 ALK CN^- NH_3 TKN TOC CR^{6+}
	pH TDS Cl F NO_3 NO_2 SO_4 PO_4 ALK CN^- NH_3 TKN TOC CR^{6+}
	pH TDS Cl F NO_3 NO_2 SO_4 PO_4 ALK CN^- NH_3 TKN TOC CR^{6+}
	pH TDS Cl F NO_3 NO_2 SO_4 PO_4 ALK CN^- NH_3 TKN TOC CR^{6+}

Comments:

LDC #: 13412 A6
SDG #: 12V76

VALIDATION FINDINGS WORKSHEET
Initial and Continuing Calibration Calculation Verification

Page: 1 of 1
Reviewer: MH
2nd Reviewer: [illegible]

METHOD: Inorganics, Method See cover

The correlation coefficient (r) for the calibration of S was recalculated. Calibration date: 3/22/05

An initial or continuing calibration verification percent recovery (%R) was recalculated for each type of analysis using the following formula:

%R = Found x 100 / True

Where, Found = concentration of each analyte measured in the analysis of the ICV or CCV solution
True = concentration of each analyte in the ICV or CCV source

Type of Analysis	Analyte		conc. (mg/L) (units)	Area (units)	Recalculated r or %R	Reported r or %R	Acceptable (Y/N)
Initial calibration	S	Blank	0	0	r^2 = 0.9999	r = 0.9999	Y
Calibration verification		Standard 1	0.05	0.032			
		Standard 2	0.124	0.079			
		Standard 3	0.249	0.150			
		Standard 4	0.498	0.298			
		Standard 5	0.995	0.594			
		Standard 6					
		Standard 7					
Calibration verification CCV	0.5	0.5 ~~0.5112~~ MH	0.5112		102.2	102.2	Y
Calibration verification CCV	TOC	0.5	0.5415		108.3	108.3	J
Calibration verification CCV	S	0.958	0.800		106	105	J

Comments: Refer to Calibration Verification findings worksheet for list of qualifications and associated samples when reported results do not agree within 10.0% of the recalculated results.

LDC #: 13412A6
SDG #: HV76

VALIDATION FINDINGS WORKSHEET
Level IV Recalculation Worksheet

Page: 1 of 1
Reviewer: MM
2nd Reviewer: AC

METHOD: Inorganics, Method See cover

Percent recoveries (%R) for a laboratory control sample and a matrix spike sample were recalculated using the following formula:

$\%R = \frac{Found}{True} \times 100$ Where, Found = concentration of each analyte measured in the analysis of the sample. For the matrix spike calculation, Found = SSR (spiked sample result) - SR (sample result).
True = concentration of each analyte in the source.

A sample and duplicate relative percent difference (RPD) was recalculated using the following formula:

$RPD = \frac{|S-D|}{(S+D)/2} \times 100$ Where, S = Original sample concentration
D = Duplicate sample concentration

Sample ID	Type of Analysis	Element	Found / S (units)	True / D (units)	Recalculated %R / RPD	Reported %R / RPD	Acceptable (Y/N)
LCS	Laboratory control sample	Tl	0.499	0.500	99.8	99.8	Y
13	Matrix spike sample	S	(SSR-SR) 393	335	117.3 ~~119.5~~ 117	116.4	
1, 16	Duplicate sample	TS	53.7 53.6	536	RSD 0.1	RSD 0.1	

Comments: Refer to appropriate worksheet for list of qualifications and associated samples when reported results do not agree within 10.0% of the recalculated results.

LDC #: 12412A6
SDG #: H576

VALIDATION FINDINGS WORKSHEET
Sample Calculation Verification

Page: 1 of 1
Reviewer: MH
2nd reviewer: [illegible]

METHOD: Inorganics, Method See cover

Please see qualifications below for all questions answered "N". Not applicable questions are identified as "N/A".

(Y) N N/A Have results been reported and calculated correctly?
(Y) N N/A Are results within the calibrated range of the instruments?
(Y) N N/A Are all detection limits below the CRQL?

Compound (analyte) results for [illegible] reported with a positive detect were recalculated and verified using the following equation:

Concentration = Recalculation:

$$\text{Toc} = \frac{\%\ \text{Moisture at } 70^{\circ}\text{C}}{\%\ \text{Moisture}} \times \text{Reading}$$

$$\text{Toc} = \frac{11136\ \text{mg/kg} \times 56.53}{53.6} = 11745\ \text{mg/kg} = 1.17\ \%$$

#	Sample ID	Analyte	Reported Concentration ( )	Calculated Concentration ( )	Acceptable (Y/N)
1	1	TS (%)	53.6	53.6	Y
		NH3 (mg/kg)	7.26	7.27	
		S	60	60	
		TOC (%)	1.18	1.17	
			% Finer		
		Grain size -1	99.9	99.9	Y
		.0	99.7	99.7	
		1	99.3	99.3	
		2	99.4	99.4	
		3	84.6	84.6	
		4	60.4	60.4	
		5	38.9	38.9	
		6	25.3	~~25.3~~ 25.0	
		7	16.1	15.7	
		8	11.3	10.8	
		9	8.2	7.6	
		10	6.1	5.5	

Note:

LDC #: 13419A6 **VALIDATION COMPLETENESS WORKSHEET** Date: 4/26/05
SDG #: HW06 Level II Page: 1 of 1
Laboratory: Analytical Resources, Inc. Reviewer: MM
2nd Reviewer: AC

METHOD: Ammonia-N (EPA Method 350.1), Grain Size (PSEP),Sulfide (EPA Method 376.2), Total Solids (EPA Method 160.3), TOC (Plumb),

The samples listed below were reviewed for each of the following validation areas. Validation findings are noted in attached validation findings worksheets.

	Validation Area		Comments
I.	Technical holding times	SW	Sampling dates: 3/8/05 - 3/16/05
IIa.	Initial calibration	N	
IIb.	Calibration verification	N	
III.	Blanks	A	
IV	Matrix Spike/Matrix Spike Duplicates	SW	
V	Duplicates	A	Triplicates
VI.	Laboratory control samples	A	LCS + SRM. No SRM for S. Text.
VII.	Sample result verification	N	
VIII.	Overall assessment of data	A	
IX.	Field duplicates	N	
X	Field blanks	N	

Note: A = Acceptable
N = Not provided/applicable
SW = See worksheet
ND = No compounds detected
R = Rinsate
FB = Field blank
D = Duplicate
TB = Trip blank
EB = Equipment blank

Validated Samples: Sediments

1	LDW-SS71-010	11	LDW-SS69b-010DUP	21	MB	31	
2	LDW-SS2-010	12	LDW-SS157-010MS	22		32	
3	LDW-SS69b-010	13	LDW-SS157-010DUP	23		33	
4	LDW-SS158-010	14	↓ MSD	24		34	
5	LDW-SS159-010	15	↓ TRP	25		35	
6	LDW-SS157-010	16	LDW-SS71-010 TRP	26		36	
7 ✓	LDW-SS35-010	17	LDW-SS69b-010 TRP	27		37	
8	LDW-SS71-010MS	18		28		38	
9	LDW-SS71-010DUP	19		29		39	
10	LDW-SS69b-010MS	20		30		40	

Notes:

LDC #: 13419A6
SDG #: HW06

VALIDATION FINDINGS WORKSHEET

Sample Specific Analysis Reference

Page: 1 of 1
Reviewer: WH
2nd reviewer:

All circled methods are applicable to each sample.

Sample ID	Parameter
1-7	pH TDS Cl F NO$_3$ NO$_2$ SO$_4$ PO$_4$ ALK CN$^-$ [✓ NH$_3$] TKN [✓ TOC] CR^{6+} [✓ TS] [✓ S] [✓ Grain size] ____
oc 8	pH TDS Cl F NO$_3$ NO$_2$ SO$_4$ PO$_4$ ALK CN$^-$ [✓ NH$_3$] TKN [✓ TOC] CR^{6+} ____ ____ ____ ____
9	pH TDS Cl F NO$_3$ NO$_2$ SO$_4$ PO$_4$ ALK CN$^-$ [✓ NH$_3$] TKN [✓ TOC] CR^{6+} [✓ TS] ____ ____ ____
10	pH TDS Cl F NO$_3$ NO$_2$ SO$_4$ PO$_4$ ALK CN$^-$ [✓ NH$_3$] TKN [✓ TOC] CR^{6+} ____ ____ ____ ____
11	pH TDS Cl F NO$_3$ NO$_2$ SO$_4$ PO$_4$ ALK CN$^-$ [✓ NH$_3$] TKN [✓ TOC] CR^{6+} [✓ TS] ____ ____ ____
12	pH TDS Cl F NO$_3$ NO$_2$ SO$_4$ PO$_4$ ALK CN$^-$ NH$_3$ TKN TOC CR^{6+} ____ [✓ S] ____ ____
13	pH TDS Cl F NO$_3$ NO$_2$ SO$_4$ PO$_4$ ALK CN$^-$ NH$_3$ TKN TOC CR^{6+} ____ [✓ S] ____ ____
14	pH TDS Cl F NO$_3$ NO$_2$ SO$_4$ PO$_4$ ALK CN$^-$ NH$_3$ TKN TOC CR^{6+} ____ [✓ S] ____ ____
15	pH TDS Cl F NO$_3$ NO$_2$ SO$_4$ PO$_4$ ALK CN$^-$ NH$_3$ TKN TOC CR^{6+} ____ [✓ S] ____ ____
16	pH TDS Cl F NO$_3$ NO$_2$ SO$_4$ PO$_4$ ALK CN$^-$ NH$_3$ TKN [✓ TOC] CR^{6+} [✓ TS] ____ ____ ____
17	pH TDS Cl F NO$_3$ NO$_2$ SO$_4$ PO$_4$ ALK CN$^-$ NH$_3$ TKN [✓ TOC] CR^{6+} [✓ TS] ____ ____ ____
	pH TDS Cl F NO$_3$ NO$_2$ SO$_4$ PO$_4$ ALK CN$^-$ NH$_3$ TKN TOC CR^{6+} ____ ____ ____ ____
	pH TDS Cl F NO$_3$ NO$_2$ SO$_4$ PO$_4$ ALK CN$^-$ NH$_3$ TKN TOC CR^{6+} ____ ____ ____ ____
	pH TDS Cl F NO$_3$ NO$_2$ SO$_4$ PO$_4$ ALK CN$^-$ NH$_3$ TKN TOC CR^{6+} ____ ____ ____ ____
	pH TDS Cl F NO$_3$ NO$_2$ SO$_4$ PO$_4$ ALK CN$^-$ NH$_3$ TKN TOC CR^{6+} ____ ____ ____ ____
	pH TDS Cl F NO$_3$ NO$_2$ SO$_4$ PO$_4$ ALK CN$^-$ NH$_3$ TKN TOC CR^{6+} ____ ____ ____ ____
	pH TDS Cl F NO$_3$ NO$_2$ SO$_4$ PO$_4$ ALK CN$^-$ NH$_3$ TKN TOC CR^{6+} ____ ____ ____ ____
	pH TDS Cl F NO$_3$ NO$_2$ SO$_4$ PO$_4$ ALK CN$^-$ NH$_3$ TKN TOC CR^{6+} ____ ____ ____ ____
	pH TDS Cl F NO$_3$ NO$_2$ SO$_4$ PO$_4$ ALK CN$^-$ NH$_3$ TKN TOC CR^{6+} ____ ____ ____ ____
	pH TDS Cl F NO$_3$ NO$_2$ SO$_4$ PO$_4$ ALK CN$^-$ NH$_3$ TKN TOC CR^{6+} ____ ____ ____ ____
	pH TDS Cl F NO$_3$ NO$_2$ SO$_4$ PO$_4$ ALK CN$^-$ NH$_3$ TKN TOC CR^{6+} ____ ____ ____ ____
	pH TDS Cl F NO$_3$ NO$_2$ SO$_4$ PO$_4$ ALK CN$^-$ NH$_3$ TKN TOC CR^{6+} ____ ____ ____ ____
	pH TDS Cl F NO$_3$ NO$_2$ SO$_4$ PO$_4$ ALK CN$^-$ NH$_3$ TKN TOC CR^{6+} ____ ____ ____ ____
	pH TDS Cl F NO$_3$ NO$_2$ SO$_4$ PO$_4$ ALK CN$^-$ NH$_3$ TKN TOC CR^{6+} ____ ____ ____ ____
	pH TDS Cl F NO$_3$ NO$_2$ SO$_4$ PO$_4$ ALK CN$^-$ NH$_3$ TKN TOC CR^{6+} ____ ____ ____ ____

Comments:

LDC #: 13719B6
SDG #: HW06

VALIDATION FINDINGS WORKSHEET
Technical Holding Times

Page: 1 of 1
Reviewer: MM
2nd reviewer: JA

All circled dates have exceeded the technical holding time.
Y N (N/A) Were all samples preserved as applicable to each method ?
(Y) N N/A Were all cooler temperatures within validation criteria?

Method:		160.3	376.2				
Parameters:		TS	S				
Technical holding time:		7 days	7 days				
Sample ID	Sampling date	Analysis date	Analysis date	Analysis date	Analysis date	Analysis date	Qualifier
7 (1 day)	3/8/05	3/18/05	(10 days)				J-/R/P
7	↓		3/18/05	(10 days)			J-/R/P

HT.6

LDC #: 13419A6
SDG #: HW06

VALIDATION FINDINGS WORKSHEET
Matrix Spike/Matrix Spike Duplicates

Reviewer: MH
2nd Reviewer: [illegible]

METHOD: Inorganics, EPA Method See cover

Please see qualifications below for all questions answered "N". Not applicable questions are identified as "N/A".

Y N N/A Was a matrix spike analyzed for each matrix in this SDG?

Y (N) N/A Were matrix spike percent recoveries (%R) within the control limits of 75-125? If the sample concentration exceeded the spike concentration by a factor of 4 or more, no action was taken.

(Y) N N/A Were all duplicate sample relative percent differences (RPD) ≤ 20% for water samples and ≤35% for soil samples?

LEVEL IV ONLY:

Y N (N/A) Were recalculated results acceptable? See Level IV Recalculation Worksheet for recalculations.

#	MS/MSD ID	Matrix	Analyte	MS %Recovery	MSD %Recovery	RPD (Limits)	Associated Samples	Qualifications
1	12/14	Solvent	S	50.6	63.5		2-6	J-/4J/A

Comments:

LDC #: 13419B6 **VALIDATION COMPLETENESS WORKSHEET** Date: 4/26/05
SDG #: HW16 Level II Page: 1 of 1
Laboratory: Analytical Resources, Inc. Reviewer: MM
2nd Reviewer: a

METHOD: Ammonia-N (EPA Method 350.1), Grain Size (PSEP), Sulfide (EPA Method 376.2), Total Solids (EPA Method 160.3), TOC (Plumb),

The samples listed below were reviewed for each of the following validation areas. Validation findings are noted in attached validation findings worksheets.

	Validation Area		Comments
I.	Technical holding times	A	Sampling dates: 3/18/05
IIa.	Initial calibration	N	
IIb.	Calibration verification	N	
III.	Blanks	A	
IV	Matrix Spike/Matrix Spike Duplicates	SW	
V	Duplicates	A	
VI.	Laboratory control samples	A	LCS+SRM. No SRM for S, Teot
VII.	Sample result verification	N	
VIII.	Overall assessment of data	A	
IX.	Field duplicates	N	
X.	Field blanks	N	

Note: A = Acceptable
N = Not provided/applicable
SW = See worksheet
ND = No compounds detected
R = Rinsate
FB = Field blank
D = Duplicate
TB = Trip blank
EB = Equipment blank

Validated Samples: Sediment

1	LDW-SSB7a-010	11		21		31	
2	LDW-SSB7a-010MS	12		22		32	
3	LDW-SSB7a-010DUP	13		23		33	
4	LDW-SSB7a-010TRP	14		24		34	
5	MB	15		25		35	
6		16		26		36	
7		17		27		37	
8		18		28		38	
9		19		29		39	
10		20		30		40	

Notes:

LDC #: 13419B6
SDG #: 1AW16

VALIDATION FINDINGS WORKSHEET

Sample Specific Analysis Reference

Page: 1 of 1
Reviewer: MH
2nd reviewer:

All circled methods are applicable to each sample.

Sample ID	Parameter				
1	pH TDS Cl F NO_3 NO_2 SO_4 PO_4 ALK CN^- [✓ NH_3] TKN [✓ TOC] CR^{6+}	[✓ TS]	[✓ S]	[✓ Grain Size]	
2	pH TDS Cl F NO_3 NO_2 SO_4 PO_4 ALK CN^- [✓ NH_3] TKN [✓ TOC] CR^{6+}				
3	pH TDS Cl F NO_3 NO_2 SO_4 PO_4 ALK CN^- [✓ NH_3] TKN [✓ TOC] CR^{6+}	[✓ TS]		[✓ Grain Size]	
4	pH TDS Cl F NO_3 NO_2 SO_4 PO_4 ALK CN^- NH_3 TKN [✓ TOC] CR^{6+}	[✓ TS]		〃	
	pH TDS Cl F NO_3 NO_2 SO_4 PO_4 ALK CN^- NH_3 TKN TOC CR^{6+}				
	pH TDS Cl F NO_3 NO_2 SO_4 PO_4 ALK CN^- NH_3 TKN TOC CR^{6+}				
	pH TDS Cl F NO_3 NO_2 SO_4 PO_4 ALK CN^- NH_3 TKN TOC CR^{6+}				
	pH TDS Cl F NO_3 NO_2 SO_4 PO_4 ALK CN^- NH_3 TKN TOC CR^{6+}				
	pH TDS Cl F NO_3 NO_2 SO_4 PO_4 ALK CN^- NH_3 TKN TOC CR^{6+}				
	pH TDS Cl F NO_3 NO_2 SO_4 PO_4 ALK CN^- NH_3 TKN TOC CR^{6+}				
	pH TDS Cl F NO_3 NO_2 SO_4 PO_4 ALK CN^- NH_3 TKN TOC CR^{6+}				
	pH TDS Cl F NO_3 NO_2 SO_4 PO_4 ALK CN^- NH_3 TKN TOC CR^{6+}				
	pH TDS Cl F NO_3 NO_2 SO_4 PO_4 ALK CN^- NH_3 TKN TOC CR^{6+}				
	pH TDS Cl F NO_3 NO_2 SO_4 PO_4 ALK CN^- NH_3 TKN TOC CR^{6+}				
	pH TDS Cl F NO_3 NO_2 SO_4 PO_4 ALK CN^- NH_3 TKN TOC CR^{6+}				
	pH TDS Cl F NO_3 NO_2 SO_4 PO_4 ALK CN^- NH_3 TKN TOC CR^{6+}				
	pH TDS Cl F NO_3 NO_2 SO_4 PO_4 ALK CN^- NH_3 TKN TOC CR^{6+}				
	pH TDS Cl F NO_3 NO_2 SO_4 PO_4 ALK CN^- NH_3 TKN TOC CR^{6+}				
	pH TDS Cl F NO_3 NO_2 SO_4 PO_4 ALK CN^- NH_3 TKN TOC CR^{6+}				
	pH TDS Cl F NO_3 NO_2 SO_4 PO_4 ALK CN^- NH_3 TKN TOC CR^{6+}				
	pH TDS Cl F NO_3 NO_2 SO_4 PO_4 ALK CN^- NH_3 TKN TOC CR^{6+}				
	pH TDS Cl F NO_3 NO_2 SO_4 PO_4 ALK CN^- NH_3 TKN TOC CR^{6+}				
	pH TDS Cl F NO_3 NO_2 SO_4 PO_4 ALK CN^- NH_3 TKN TOC CR^{6+}				
	pH TDS Cl F NO_3 NO_2 SO_4 PO_4 ALK CN^- NH_3 TKN TOC CR^{6+}				
	pH TDS Cl F NO_3 NO_2 SO_4 PO_4 ALK CN^- NH_3 TKN TOC CR^{6+}				

Comments:

LDC #: 13419B6
SDG #: 1HW16

VALIDATION FINDINGS WORKSHEET
Matrix Spike/Matrix Spike Duplicates

Reviewer: MH
2nd Reviewer:

METHOD: Inorganics, EPA Method See com

Please see qualifications below for all questions answered "N". Not applicable questions are identified as "N/A".

(Y) N N/A Was a matrix spike analyzed for each matrix in this SDG?

Y (N) N/A Were matrix spike percent recoveries (%R) within the control limits of (75-125)? If the sample concentration exceeded the spike concentration by a factor of 4 or more, no action was taken.

(Y) N N/A Were all duplicate sample relative percent differences (RPD) ≤ 20% for water samples and ≤35% for soil samples?

LEVEL IV ONLY:

Y N (N/A) Were recalculated results acceptable? See Level IV Recalculation Worksheet for recalculations.

#	MS/MSD ID	Matrix	Analyte	MS %Recovery	MSD %Recovery	RPD (Limits)	Associated Samples	Qualifications
1	LDW-35157-010 MS/MSD	Sediment	S	50.6	63.5		All	J/UR/A

Comments:

LDC #: 13381A19 **VALIDATION COMPLETENESS WORKSHEET** Date: 4/21/05
SDG #: HU85 Level II Page: 1 of 1
Laboratory: Analytical Resources, Inc. Reviewer: [illegible]
2nd Reviewer: [illegible]

METHOD: GC/MS TBT(EPA SW 846 Method 8270C-SIM/Krone)

The samples listed below were reviewed for each of the following validation areas. Validation findings are noted in attached validation findings worksheets.

	Validation Area		Comments
I.	Technical holding times	A	Sampling dates: 3/7/05
II.	GC/MS Instrument performance check	N	
III.	Initial calibration	N	
IV.	Continuing calibration	N	
V.	Blanks	A	
VI.	Surrogate spikes	A	
VII.	Matrix spike/Matrix spike duplicates	SW	
VIII.	Laboratory control samples	SW A	LCS
IX.	Regional Quality Assurance and Quality Control	N	
X.	Internal standards	N	
XI.	Target compound identification	N	
XII.	Compound quantitation/CRQLs	N	
XIII.	Tentitatively identified compounds (TICs)	N	
XIV.	System performance	N	
XV.	Overall assessment of data	A	
XVI.	Field duplicates	N	
XVII.	Field blanks	N	

Note: A = Acceptable; N = Not provided/applicable; SW = See worksheet; ND = No compounds detected; R = Rinsate; FB = Field blank; D = Duplicate; TB = Trip blank; EB = Equipment blank

Validated Samples

1	LDW-SS78-010 sed	11	MB-031405	21		31	
2	LDW-SS74-010	12		22		32	
3	LDW-SS8-010	13		23		33	
4	LDW-SS74-010MS	14		24		34	
5	LDW-SS74-010MSD	15		25		35	
6		16		26		36	
7		17		27		37	
8		18		28		38	
9		19		29		39	
10		20		30		40	

LDC #: 13381A19
SDG #: HU85

VALIDATION FINDINGS WORKSHEET
Matrix Spike/Matrix Spike Duplicates

Page: 1 of 1
Reviewer: 9
2nd Reviewer:

METHOD: GC/MS BNA (EPA SW 846 Method 8270)

Please see qualifications below for all questions answered "N". Not applicable questions are identified as "N/A".

(Y) N N/A Were a matrix spike (MS) and matrix spike duplicate (MSD) analyzed for each matrix in this SDG? If no, indicate which matrix does not have an associated MS/MSD. Soil / Water.

(Y) N N/A Was a MS/MSD analyzed every 20 samples of each matrix?

Y (N) N/A Were the MS/MSD percent recoveries (%R) and the relative percent differences (RPD) within the QC limits?

#	Date	MS/MSD ID	Compound	MS %R (Limits)	MSD %R (Limits)	RPD (Limits)	Associated Samples	Qualifications
		4/5	TBT	NA (20-130)	( )	( )	2	No qual
			B	19.4 ( )	~~17.8 (20-130)~~	( )		(cmc ≥ 2x EA)
			C	10.2 (20-130)	9.6 (20-130)	( )		↓ E / A
			B	19.4 (20-130)	17.8 (20-130)	( )		↓ u / A
		TBT = Tributyl		Tin chloride	( )	( )		
				( )	( )	( )		
				( )	( )	( )		
				( )	( )	( )		
		C = Butyl		Tin Trichloride	( )	( )		
		B = Dibutyl		Tin Dichloride	( )	( )		
				( )	( )	( )		
				( )	( )	( )		
				( )	( )	( )		
				( )	( )	( )		
				( )	( )	( )		
				( )	( )	( )		
				( )	( )	( )		

	Compound	QC Limits (Soil)	RPD (Soil)	QC Limits (Water)	RPD (Water)		Compound	QC Limits (Soil)	RPD (Soil)	QC Limits (Water)	RPD (Water)
A.	Phenol	26-90%	≤ 35%	12-110%	≤ 42%	GG.	Acenaphthene	31-137%	≤ 19%	46-118%	≤ 31%
C.	2-Chlorophenol	25-102%	≤ 50%	27-123%	≤ 40%	II.	4-Nitrophenol	11-114%	≤ 50%	10-80%	≤ 50%
E.	1,4-Dichlorobenzene	28-104%	≤ 27%	36-97%	≤ 28%	KK.	2,4-Dintrotoluene	28-89%	≤ 47%	24-96%	≤ 38%
J.	N-Nitroso-di-n-propylamine	41-126%	≤ 38%	41-116%	≤ 38%	TT.	Pentachlorophenol	17-109%	≤ 47%	9-103%	≤ 50%
R.	1,2,4-Trichlorobenzene	38-107%	≤ 23%	39-98%	≤ 28%	ZZ.	Pyrene	35-142%	≤ 36%	26-127%	≤ 31%
V.	4-Chloro-3-methylphenol	26-103%	≤ 33%	23-97%	≤ 42%						

LDC #: 13381A19
SDG #: HU85

VALIDATION FINDINGS WORKSHEET
Laboratory Control Samples (LCS)

Page: 1 of 1
Reviewer:
2nd Reviewer:

METHOD: GC/MS BNA (EPA SW 846 Method 8270)

Please see qualifications below for all questions answered "N". Not applicable questions are identified as "N/A".

[✓ Y] N N/A Was a LCS required?

Y [✓ N] N/A Were the LCS/LCSD percent recoveries (%R) and the relative percent differences (RPD) within the QC limits?

#	Date	LCS/LCSD ID	Compound	LCS %R (Limits)	LCSD %R (Limits)	RPD (Limits)	Associated Samples	Qualifications
		LCS-031405	A	4.6 (20-130)	( )	( )	All+BK	J/R/P
				( )	( )	( )		
				( )	( )	( )		
		A =	Butyl	Tin Trichloride	)	( )		
				( )	( )	( )		
				( )	( )	( )		
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				( )	( )	( )		
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LDC #: 13384A19 **VALIDATION COMPLETENESS WORKSHEET** Date: 4/20/05
SDG #: HV00 Level II Page: 1 of 1
Laboratory: Analytical Resources, Inc. Reviewer: 9
2nd Reviewer: K

METHOD: GC/MS TBT(EPA SW 846 Method 8270C-SIM/Krone)

The samples listed below were reviewed for each of the following validation areas. Validation findings are noted in attached validation findings worksheets.

	Validation Area		Comments
I.	Technical holding times	A	Sampling dates: 3/8/05
II.	GC/MS Instrument performance check	N	
III.	Initial calibration	N	
IV.	Continuing calibration	N	
V.	Blanks	A	
VI.	Surrogate spikes	A	
VII.	Matrix spike/Matrix spike duplicates	SW	
VIII.	Laboratory control samples	A SW	LCS
IX.	Regional Quality Assurance and Quality Control	N	
X.	Internal standards	N	
XI.	Target compound identification	N	
XII.	Compound quantitation/CRQLs	N	
XIII.	Tentitatively identified compounds (TICs)	N	
XIV.	System performance	N	
XV.	Overall assessment of data	A	
XVI.	Field duplicates	SW	D = 3+4
XVII.	Field blanks	N	

Note: A = Acceptable; N = Not provided/applicable; SW = See worksheet; ND = No compounds detected; R = Rinsate; FB = Field blank; D = Duplicate; TB = Trip blank; EB = Equipment blank

Validated Samples

1	LDW-SS41-010 sed	11	MB-031605	21		31	
2	LDW-SS16-010	12		22		32	
3	LDW-SS131-010	13		23		33	
4	LDW-SS206-010	14		24		34	
5	LDW-SS41-010MS	15		25		35	
6	LDW-SS41-010MSD	16		26		36	
7		17		27		37	
8		18		28		38	
9		19		29		39	
10		20		30		40	

LDC #: 13384819
SDG #: HV00

VALIDATION FINDINGS WORKSHEET
Matrix Spike/Matrix Spike Duplicates

Page: 1 of 1
Reviewer: 9
2nd Reviewer: AC

METHOD: GC/MS BNA (EPA SW 846 Method 8270)

Please see qualifications below for all questions answered "N". Not applicable questions are identified as "N/A".

(Y) N N/A Were a matrix spike (MS) and matrix spike duplicate (MSD) analyzed for each matrix in this SDG? If no, incicate which matrix does not have an associated MS/MSD. Scil / Water.

(Y) N N/A Was a MS/MSD analyzed every 20 samples of each matrix?

Y (N) N/A Were the MS/MSD percent recoveries (%R) and the relative percent differences (RPD) within the QC limits?

#	Date	MS/MSD ID	Compound	MS %R (Limits)	MSD %R (Limits)	RPD (Limits)	Associated Samples	Qualifications
		5/6	TBT	( )	704 (20-130)	134 (≤ 50)	1	J/UJ/A
				( )	( )	( )		
				( )	( )	( )		
				( )	( )	( )		
				( )	( )	( )		
				( )	( )	( )		
		TBT = Tributyl Tin chloride		( )	( )	( )		
				( )	( )	( )		
				( )	( )	( )		
				( )	( )	( )		
				( )	( )	( )		
				( )	( )	( )		
				( )	( )	( )		
				( )	( )	( )		
				( )	( )	( )		
				( )	( )	( )		
				( )	( )	( )		

	Compound	QC Limits (Soil)	RPD (Soil)	QC Limits (Water)	RPD (Water)		Compound	QC Limits (Soil)	RPD (Soil)	QC Limits (Water)	RPD (Water)
A.	Phenol	26-90%	≤ 35%	12-110%	≤ 42%	GG.	Acenaphthene	31-137%	≤ 19%	46-118%	≤ 31%
C.	2-Chlorophenol	25-102%	≤ 50%	27-123%	≤ 40%	II.	4-Nitrophenol	11-114%	≤ 50%	10-80%	≤ 50%
E.	1,4-Dichlorobenzene	28-104%	≤ 27%	36-97%	≤ 28%	KK.	2,4-Dinitrotoluene	28-89%	≤ 47%	24-96%	≤ 38%
J.	N-Nitroso-di-n-propylamine	41-126%	≤ 38%	41-116%	≤ 38%	TT.	Pentachlorophenol	17-109%	≤ 47%	9-103%	≤ 50%
R.	1,2,4-Trichlorobenzene	38-107%	≤ 23%	39-98%	≤ 28%	ZZ.	Pyrene	35-142%	≤ 36%	26-127%	≤ 31%
V.	4-Chloro-3-methylphenol	26-103%	≤ 33%	23-97%	≤ 42%						

LDC #: 13384A19
SDG #: HV00

Page: 1 of 1
Reviewer:
2nd Reviewer:

VALIDATION FINDINGS WORKSHEET
Laboratory Control Samples (LCS)

METHOD: GC/MS BNA (EPA SW 846 Method 8270)

Please see qualifications below for all questions answered "N". Not applicable questions are identified as "N/A".

[✓ Y] N N/A Was a LCS required?

Y [✓ N] N/A Were the LCS/LCSD percent recoveries (%R) and the relative percent differences (RPD) within the QC limits?

#	Date	LCS/LCSD ID	Compound	LCS %R (Limits)	LCSD %R (Limits)	RPD (Limits)	Associated Samples	Qualifications
		LCS-031605	A	6.2 (20-130)	( )	( )	All + Bk	J/R/P
				( )	( )	( )		
				( )	( )	( )		
				( )	( )	( )		
		A = Butyl Tin Trichloride			( )	( )		
				( )	( )	( )		
				( )	( )	( )		
				( )	( )	( )		
				( )	( )	( )		
				( )	( )	( )		
				( )	( )	( )		
				( )	( )	( )		
				( )	( )	( )		
				( )	( )	( )		
				( )	( )	( )		
				( )	( )	( )		
				( )	( )	( )		
				( )	( )	( )		
				( )	( )	( )		
				( )	( )	( )		
				( )	( )	( )		
				( )	( )	( )		
				( )	( )	( )		
				( )	( )	( )		
				( )	( )	( )		

LDC #: 13384A19
SDG #: HV00

VALIDATION FINDINGS WORKSHEET
Field Duplicates

Page: 1 of 1
Reviewer: 9
2nd reviewer: JK

METHOD: GC/MS BNA (EPA SW 846 Method 8270)

(Y) N N/A Were field duplicate pairs identified in this SDG?
Y/N N/A Were target compounds identified in the field duplicate pairs?

Compound	Concentration (µg/kg)		RPD (≤ 50)
	3	4	
Tributyl Tin chloride	4.2 U	59	~~200~~ NC
TBT as TBT ion	3.8 U	53	NC
Dibutyl Tin Dichloride	5.8 U	6.5	NC

Compound	Concentration ( )		RPD

Compound	Concentration ( )		RPD

Compound	Concentration ( )		RPD

LDC #: 13381B19 **VALIDATION COMPLETENESS WORKSHEET** Date: 4/21/05
SDG #: HV37 Level II Page: 1 of 1
Laboratory: Analytical Resources, Inc. Reviewer: Q
2nd Reviewer: [illegible]

METHOD: GC/MS TBT(EPA SW 846 Method 8270C-SIM/Krone)

The samples listed below were reviewed for each of the following validation areas. Validation findings are noted in attached validation findings worksheets.

	Validation Area		Comments
I.	Technical holding times	A	Sampling dates: 3/9/05
II	GC/MS Instrument performance check	N	
III.	Initial calibration	N	
IV.	Continuing calibration	N	
V.	Blanks	A	
VI.	Surrogate spikes	A	
VII.	Matrix spike/Matrix spike duplicates	SW	
VIII.	Laboratory control samples	ASW	LCS
IX.	Regional Quality Assurance and Quality Control	N	
X.	Internal standards	N	
XI.	Target compound identification	N	
XII.	Compound quantitation/CRQLs	N	
XIII.	Tentitatively identified compounds (TICs)	N	
XIV.	System performance	N	
XV.	Overall assessment of data	A	
XVI.	Field duplicates	N	
XVII.	Field blanks	N	

Note: A = Acceptable
N = Not provided/applicable
SW = See worksheet
ND = No compounds detected
R = Rinsate
FB = Field blank
D = Duplicate
TB = Trip blank
EB = Equipment blank

Validated Samples

1	LDW-SS7-10 sed	11	MB-031605	21		31	
2	LDW-SS3-10	12		22		32	
3	LDW-SS133-10	13		23		33	
4		14		24		34	
5		15		25		35	
6		16		26		36	
7		17		27		37	
8		18		28		38	
9		19		29		39	
10		20		30		40	

LDC #: 13381B19
SDG #: HV3T

VALIDATION FINDINGS WORKSHEET
Matrix Spike/Matrix Spike Duplicates

Page: 1 of 1
Reviewer: [illegible]
2nd Reviewer: [illegible]

METHOD: GC/MS BNA (EPA SW 846 Method 8270)

Please see qualifications below for all questions answered "N". Not applicable questions are identified as "N/A".

Y N N/A Were a matrix spike (MS) and matrix spike duplicate (MSD) analyzed for each matrix in this SDG? If no, indicate which matrix does not have an associated MS/MSD. Soil / Water.

Y N N/A Was a MS/MSD analyzed every 20 samples of each matrix?

Y N N/A Were the MS/MSD percent recoveries (%R) and the relative percent differences (RPD) within the QC limits?

#	Date	MS/MSD ID	Compound	MS %R (Limits)	MSD %R (Limits)	RPD (Limits)	Associated Samples	Qualifications
		LOW-5541-010	TBT	( )	704 (20-130)	134 (≤ 50)	None	No Qual
				( )	( )	( )		
				( )	( )	( )		
				( )	( )	( )		
				( )	( )	( )		
				( )	( )	( )		
				( )	( )	( )		
				( )	( )	( )		
				( )	( )	( )		
				( )	( )	( )		
				( )	( )	( )		
				( )	( )	( )		
				( )	( )	( )		
				( )	( )	( )		
				( )	( )	( )		
				( )	( )	( )		

	Compound	QC Limits (Soil)	RPD (Soil)	QC Limits (Water)	RPD (Water)		Compound	QC Limits (Soil)	RPD (Soil)	QC Limits (Water)	RPD (Water)
A.	Phenol	26-90%	≤ 35%	12-110%	≤ 42%	GG.	Acenaphthene	31-137%	≤ 19%	46-118%	≤ 31%
C.	2-Chlorophenol	25-102%	≤ 50%	27-123%	≤ 40%	II.	4-Nitrophenol	11-114%	≤ 50%	10-80%	≤ 50%
E.	1,4-Dichlorobenzene	28-104%	≤ 27%	36-97%	≤ 28%	KK.	2,4-Dintrotoluene	28-89%	≤ 47%	24-96%	≤ 38%
J.	N-Nitroso-di-n-propylamine	41-126%	≤ 38%	41-116%	≤ 38%	TT.	Pentachlorophenol	17-109%	≤ 47%	9-103%	≤ 50%
R.	1,2,4-Trichlorobenzene	38-107%	≤ 23%	39-98%	≤ 28%	ZZ.	Pyrene	35-142%	≤ 36%	26-127%	≤ 31%
V.	4-Chloro-3-methylphenol	26-103%	≤ 33%	23-97%	≤ 42%						

LDC #: 13381B19
SDG #: HV37

VALIDATION FINDINGS WORKSHEET
Laboratory Control Samples (LCS)

Page: 1 of 1
Reviewer: 9
2nd Reviewer: 8

METHOD: GC/MS BNA (EPA SW 846 Method 8270)

Please see qualifications below for all questions answered "N". Not applicable questions are identified as "N/A".

[✓ Y] N N/A Was a LCS required?

Y [✓ N] N/A Were the LCS/LCSD percent recoveries (%R) and the relative percent differences (RPD) within the QC limits?

#	Date	LCS/LCSD ID	Compound	LCS %R (Limits)	LCSD %R (Limits)	RPD (Limits)	Associated Samples	Qualifications
		LCS-031605	A	6.2 (20-130)	( )	( )	All + Bk	J/R/P
				( )	( )	( )		
				( )	( )	( )		
				( )	( )	( )		
		A = Butyl Tin Trichloride			( )	( )		
				( )	( )	( )		
				( )	( )	( )		
				( )	( )	( )		
				( )	( )	( )		
				( )	( )	( )		
				( )	( )	( )		
				( )	( )	( )		
				( )	( )	( )		
				( )	( )	( )		
				( )	( )	( )		
				( )	( )	( )		
				( )	( )	( )		
				( )	( )	( )		
				( )	( )	( )		
				( )	( )	( )		
				( )	( )	( )		
				( )	( )	( )		
				( )	( )	( )		
				( )	( )	( )		
				( )	( )	( )		

LDC #: 13381C19 **VALIDATION COMPLETENESS WORKSHEET** Date: 4/21/05
SDG #: HV42 Level IV Page: 1 of 1
Laboratory: Analytical Resources, Inc. Reviewer: 9
2nd Reviewer: K

METHOD: GC/MS TBT(EPA SW 846 Method 8270C-SIM/Krone)

The samples listed below were reviewed for each of the following validation areas. Validation findings are noted in attached validation findings worksheets.

	Validation Area		Comments
I.	Technical holding times	A	Sampling dates: 3/10/05
II.	GC/MS Instrument performance check	A	
III.	Initial calibration	A	no CCCs & SPCCs
IV.	Continuing calibration	A	↓
V.	Blanks	A	
VI.	Surrogate spikes	A	
VII.	Matrix spike/Matrix spike duplicates	SW	
VIII.	Laboratory control samples	A SW	LCS
IX.	Regional Quality Assurance and Quality Control	N	
X.	Internal standards	A	
XI.	Target compound identification	A	
XII.	Compound quantitation/CRQLs	A SW	
XIII.	Tentitatively identified compounds (TICs)	N	
XIV.	System performance	A A	
XV.	Overall assessment of data	A	
XVI.	Field duplicates	N	
XVII.	Field blanks	N	

Note: A = Acceptable
N = Not provided/applicable
SW = See worksheet
ND = No compounds detected
R = Rinsate
FB = Field blank
D = Duplicate
TB = Trip blank
EB = Equipment blank

Validated Samples
All soils

1	LDW-SS45-010	11	LDW-SS47-010MSD	21		31	
2	LDW-SS46-010	12	MB-031905	22		32	
3 2	LDW-SS46-010DL	13		23		33	
4	LDW-SS6-010	14		24		34	
5	LDW-SS47-010	15		25		35	
6	LDW-SS108-010	16		26		36	
~~7~~	~~LDW-SS61-010~~	17		27		37	
~~8~~	~~LDW-SS25-010~~	18		28		38	
~~9~~	~~LDW-SS86-010~~	19		29		39	
10	LDW-SS47-010MS	20		30		40	

LDC #: 13381019
SDG #: HV42

VALIDATION FINDINGS CHECKLIST

Page: 1 of 3
Reviewer: 9
2nd Reviewer: K

Method: Semivolatiles (EPA SW 846 Method 8270C)

Validation Area	Yes	No	NA	Findings/Comments
I. Technical holding times				
All technical holding times were met.	✓			
Cooler temperature criteria was met.	✓			
II. GC/MS instrument performance check				
Were the DFTPP performance results reviewed and found to be within the specified criteria?	✓			
Were all samples analyzed within the 12 hour clock criteria?	✓			
III. Initial calibration				
Did the laboratory perform a 5 point calibration prior to sample analysis?	✓			
Were all percent relative standard deviations (%RSD) and relative response factors (RRF) within method criteria for all CCCs and SPCCs?			✓	
Was a curve fit used for evaluation? If Yes, what was the acceptance criteria used?		✓		
Did the initial calibration meet the curve fit acceptance criteria?			✓	
Were all percent relative standard deviations (%RSD) $\leq$ 30% and relative response factors (RRF) $\geq$ 0.05?	✓			
IV. Continuing calibration				
Was a continuing calibration standard analyzed at least once every 12 hours for each instrument?	✓			
Were all percent differences (%D) and relative response factors (RRF) within method criteria for all CCCs and SPCCs?			✓	
Were all percent differences (%D) $\leq$ 25% and relative response factors (RRF) $\geq$ 0.05?	✓			
V. Blanks				
Was a method blank associated with every sample in this SDG?	✓			
Was a method blank analyzed for each matrix and concentration?	✓			
Was there contamination in the method blanks? If yes, please see the Blanks validation completeness worksheet.		✓		
VI. Surrogate spikes				
Were all surrogate %R within QC limits?	✓			
If 2 or more base neutral or acid surrogates were outside QC limits, was a reanalysis performed to confirm %R?			✓	
If any %R was less than 10 percent, was a reanalysis performed to confirm %R?			✓	
VII. Matrix spike/Matrix spike duplicates				
Were a matrix spike (MS) and matrix spike duplicate (MSD) analyzed for each matrix in this SDG? If no, indicate which matrix does not have an associated MS/MSD. Soil / Water.	✓			
Was a MS/MSD analyzed every 20 samples of each matrix?	✓			

LDC #: 13381C19
SDG #: HV42

VALIDATION FINDINGS CHECKLIST

Reviewer: 9
2nd Reviewer: AC

Validation Area	Yes	No	NA	Findings/Comments
Were the MS/MSD percent recoveries (%R) and the relative percent differences (RPD) within the QC limits?		✓		
VIII. Laboratory control samples				
Was an LCS analyzed for this SDG?	✓			
Was an LCS analyzed per extraction batch?	✓			
Were the LCS percent recoveries (%R) and relative percent difference (RPD) within the QC limits?	✓			
IX. Regional Quality Assurance and Quality Control				
Were performance evaluation (PE) samples performed?		✓		
Were the performance evaluation (PE) samples within the acceptance limits?			✓	
X. Internal standards				
Were internal standard area counts within -50% or +100% of the associated calibration standard?	✓			
Were retention times within ± 30 seconds from the associated calibration standard?	✓			
XI. Target compound identification				
Were relative retention times (RRT's) within ± 0.06 RRT units of the standard?	✓			
Did compound spectra meet specified EPA "Functional Guidelines" criteria?	✓			
Were chromatogram peaks verified and accounted for?	✓			
XII. Compound quantitation/CRQLs				
Were the correct internal standard (IS), quantitation ion and relative response factor (RRF) used to quantitate the compound?	✓			
Were compound quantitation and CRQLs adjusted to reflect all sample dilutions and dry weight factors applicable to level IV validation?	✓			
XIII. Tentatively identified compounds (TICs)				
Were the major ions (> 10 percent relative intensity) in the reference spectrum evaluated in sample spectrum?			✓	
Were relative intensities of the major ions within ± 20% between the sample and the reference spectra?			✓	
Did the raw data indicate that the laboratory performed a library search for all required peaks in the chromatograms (samples and blanks)?		✓		
XIV. System performance				
System performance was found to be acceptable.	✓			
XV. Overall assessment of data				
Overall assessment of data was found to be acceptable.	✓			

LDC #: 13385C19
SDG #: HV42

VALIDATION FINDINGS CHECKLIST

Reviewer: 9
2nd Reviewer: K

Validation Area	Yes	No	NA	Findings/Comments
XVI. Field duplicates				
Field duplicate pairs were identified in this SDG.		✓		
Target compounds were detected in the field duplicates.			✓	
XVII. Field blanks				
Field blanks were identified in this SDG.		✓		
Target compounds were detected in the field blanks.			✓	

LDC #: 13381c19
SDG #: HV42

VALIDATION FINDINGS WORKSHEET
Matrix Spike/Matrix Spike Duplicates

Page: 1 of 1
Reviewer: Q
2nd Reviewer: M

METHOD: GC/MS BNA (EPA SW 846 Method 8270)

Please see qualifications below for all questions answered "N". Not applicable questions are identified as "N/A".

(Y) N N/A Were a matrix spike (MS) and matrix spike duplicate (MSD) analyzed for each matrix in this SDG? If no, indicate which matrix does not have an associated MS/MSD. Soil / Water.

(Y) N N/A Was a MS/MSD analyzed every 20 samples of each matrix?

Y (N) N/A Were the MS/MSD percent recoveries (%R) and the relative percent differences (RPD) within the QC limits?

#	Date	MS/MSD ID	Compound	MS %R (Limits)	MSD %R (Limits)	RPD (Limits)	Associated Samples	Qualifications
		10/11	TBT	NA (20-130)	NA (20-130)	107 (≤ 50)	5	J/UJ/A *
			B	NA (↓)	285 (↓)	58.2 (↓)		
				( )	( )	( )	*	No final ylr
		TBT = Tributyl Tin chloride		( )	( )	( )		%R due to
				( )	( )	( )		conc > 2xSA
				( )	( )	( )		
		B = Dibutyl Tin Dichloride		( )	( )	( )		
				( )	( )	( )		
				( )	( )	( )		
		10/11	A	8.0 (20-130)	( )	( )	5	J/R/A
				( )	( )	( )		
				( )	( )	( )		
		A = Butyl Tin	Tin	Trichloride	( )	( )		
				( )	( )	( )		
				( )	( )	( )		
				( )	( )	( )		
				( )	( )	( )		

	Compound	QC Limits (Soil)	RPD (Soil)	QC Limits (Water)	RPD (Water)		Compound	QC Limits (Soil)	RPD (Soil)	QC Limits (Water)	RPD (Water)
A.	Phenol	26-90%	≤ 35%	12-110%	≤ 42%	GG.	Acenaphthene	31-137%	≤ 19%	46-118%	≤ 31%
C.	2-Chlorophenol	25-102%	≤ 50%	27-123%	≤ 40%	II.	4-Nitrophenol	11-114%	≤ 50%	10-80%	≤ 50%
E.	1,4-Dichlorobenzene	28-104%	≤ 27%	36-97%	≤ 28%	KK.	2,4-Dinitrotoluene	28-89%	≤ 47%	24-96%	≤ 38%
J.	N-Nitroso-di-n-propylamine	41-126%	≤ 38%	41-116%	≤ 38%	TT.	Pentachlorophenol	17-109%	≤ 47%	9-103%	≤ 50%
R.	1,2,4-Trichlorobenzene	38-107%	≤ 23%	39-98%	≤ 28%	ZZ.	Pyrene	35-142%	≤ 36%	26-127%	≤ 31%
V.	4-Chloro-3-methylphenol	26-103%	≤ 33%	23-97%	≤ 42%						

LDC #: 1338/C19
SDG #: HV42

VALIDATION FINDINGS WORKSHEET
Laboratory Control Samples (LCS)

Page: 1 of 1
Reviewer:
2nd Reviewer:

METHOD: GC/MS BNA (EPA SW 846 Method 8270)

Please see qualifications below for all questions answered "N". Not applicable questions are identified as "N/A".
[✓ Y] N N/A Was a LCS required?
Y [✓ N] N/A Were the LCS/LCSD percent recoveries (%R) and the relative percent differences (RPD) within the QC limits?

#	Date	LCS/LCSD ID	Compound	LCS %R (Limits)	LCSD %R (Limits)	RPD (Limits)	Associated Samples	Qualifications
		LCS-031905	A	10.0 (20-130)	( )	( )	All + Bk	J/UJ/P
				( )	( )	( )		
				( )	( )	( )		
				( )	( )	( )		
				( )	( )	( )		
		A = Butyl Tin Trichloride			( )	( )		
				( )	( )	( )		
				( )	( )	( )		
				( )	( )	( )		
				( )	( )	( )		
				( )	( )	( )		
				( )	( )	( )		
				( )	( )	( )		
				( )	( )	( )		
				( )	( )	( )		
				( )	( )	( )		
				( )	( )	( )		
				( )	( )	( )		
				( )	( )	( )		
				( )	( )	( )		
				( )	( )	( )		
				( )	( )	( )		
				( )	( )	( )		
				( )	( )	( )		
				( )	( )	( )		

LDC #: 13381C19
SDG #: HV42

VALIDATION FINDINGS WORKSHEET
Compound Quantitation and Reported CRQLs

Page: 1 of 1
Reviewer: [illegible]
2nd Reviewer: [illegible]

METHOD: GC/MS BNA (EPA SW 846 Method 8270)

Please see qualifications below for all questions answered "N". Not applicable questions are identified as "N/A".

(Y) N N/A Were the correct internal standard (IS), quantitation ion and relative response factor (RRF) used to quantitate the compound?

(Y) N N/A Were compound quantitation and CRQLs adjusted to reflect all sample dilutions and dry weight factors applicable to level IV validation?

#	Date	Sample ID	Finding	Associated Samples	Qualifications
		2	Tributyl Tin chloride, TBT as Ion > calib range	2	J detects / A
		2	Dibutyl Tin Dichloride > calib range	2	↓

Comments: See sample calculation verification worksheet for recalculations

LDC #: 13381e19
SDG #: HV42

VALIDATION FINDINGS WORKSHEET
Overall Assessment of Data

Page: 1 of 1
Reviewer: Q
2nd Reviewer: AC

METHOD: GC/MS BNA (EPA SW 846 Method 8270)

Please see qualifications below for all questions answered "N". Not applicable questions are identified as "N/A".

All available information pertaining to the data were reviewed using professional judgement to compliment the determination of the overall quality of the data.

(Y) N N/A Was the overall quality and usability of the data acceptable?

#	Date	Sample ID	Finding	Associated Samples	Qualifications
		2	ML	2	R/D

Comments:

LDC #: 33819
SDG #: HV42

VALIDATION FINDINGS WORKSHEET
Initial Calibration Calculation Verification

Reviewer: 9
2nd Reviewer: ac

METHOD: GC/MS BNA (EPA SW 846 Method 8270)

The Relative Response Factor (RRF), average RRF, and percent relative standard deviation (%RSD) were recalculated for the compounds identified below using the following calculations:

$RRF = (A_x)(C_{is})/(A_{is})(C_x)$
average RRF = sum of the RRFs/number of standards
$\%RSD = 100 * (S/X)$

A_x = Area of compound, A_{is} = Area of associated internal standard
C_x = Concentration of compound, C_{is} = Concentration of internal standard
S = Standard deviation of the RRFs, X = Mean of the RRFs

#	Standard ID	Calibration Date	Compound (Reference Internal Standard)	Reported RRF (| std)	Recalculated RRF (| std)	Reported Average RRF (initial)	Recalculated Average RRF (initial)	Reported %RSD	Recalculated %RSD
1	ICAL	1/18/05	~~Phenol~~ (1st internal standard) TBT	0.561	0.561	0.558	0.558	6.1	6.1
			Naphthalene (2nd internal standard)						
			Fluorene (3rd internal standard)						
			Pentachlorophenol (4th internal standard)						
			Bis(2-ethylhexyl)phthalate (5th internal standard)						
			Benzo(a)pyrene (6th internal standard)						
2			Phenol (1st internal standard)						
			Naphthalene (2nd internal standard)						
			Fluorene (3rd internal standard)						
			Pentachlorophenol (4th internal standard)						
			Bis(2-ethylhexyl)phthalate (5th internal standard)						
			Benzo(a)pyrene (6th internal standard)						
3			Phenol (1st internal standard)						
			Naphthalene (2nd internal standard)						
			Fluorene (3rd internal standard)						
			Pentachlorophenol (4th internal standard)						
			Bis(2-ethylhexyl)phthalate (5th internal standard)						
			Benzo(a)pyrene (6th internal standard)						

Comments: Refer to Initial Calibration findings worksheet for list of qualifications and associated samples when reported results do not agree within 10.0% of the recalculated results.

LDC #: 13381C19
SDG #: HV42

VALIDATION FINDINGS WORKSHEET
Continuing Calibration Results Verification

Page: 1 of 1
Reviewer: 9
2nd Reviewer: K

METHOD: GC/MS BNA (EPA SW 846 Method 8270)

The percent difference (%D) of the initial calibration average Relative Response Factors (RRFs) and the continuing calibration RRFs were recalculated for the compounds identified below using the following calculation:

% Difference = 100 * (ave. RRF - RRF)/ave. RRF
RRF = $(A_x)(C_{is})/(A_{is})(C_x)$

Where: ave. RRF = initial calibration average RRF
RRF = continuing calibration RRF
A_x = Area of compound, A_{is} = Area of associated internal standard
C_x = Concentration of compound, C_{is} = Concentration of internal standard

#	Standard ID	Calibration Date	Compound (Reference Internal Standard)	Average RRF (Initial)	Reported RRF (CC)	Recalculated RRF (CC)	Reported %D	Recalculated %D
1	cc0322	3/22/05	Phenol (1st internal standard) TBT	0.558	0.612	0.612	9.7	9.7
			Naphthalene (2nd internal standard)					
			Fluorene (3rd internal standard)					
			Pentachlorophenol (4th internal standard)					
			Bis(2-ethylhexyl)phthalate (5th internal standard)					
			Benzo(a)pyrene (6th internal standard)					
2	cc0325	3/25/05	Phenol (1st internal standard) TBT	0.558	0.616	0.616	10.4	10.4
			Naphthalene (2nd internal standard)					
			Fluorene (3rd internal standard)					
			Pentachlorophenol (4th internal standard)					
			Bis(2-ethylhexyl)phthalate (5th internal standard)					
			Benzo(a)pyrene (6th internal standard)					
3			Phenol (1st internal standard)					
			Naphthalene (2nd internal standard)					
			Fluorene (3rd internal standard)					
			Pentachlorophenol (4th internal standard)					
			Bis(2-ethylhexyl)phthalate (5th internal standard)					
			Benzo(a)pyrene (6th internal standard)					

Comments: Refer to Continuing Calibration findings worksheet for list of qualifications and associated samples when reported results do not agree within 10.0% of the recalculated results.

LDC #: 13381C19
SDG #: HV42

VALIDATION FINDINGS WORKSHEET
Surrogate Results Verification

Page: 1 of 1
Reviewer: 9
2nd reviewer: K

METHOD: GC/MS Semivolatiles (EPA SW 846 Method 8270)

The percent recoveries (%R) of surrogates were recalculated for the compounds identified below using the following calculation:

% Recovery: SF/SS * 100

Where: SF = Surrogate Found
SS = Surrogate Spiked

Sample ID: 1

	Surrogate Spiked	Surrogate Found	Percent Recovery Reported	Percent Recovery Recalculated	Percent Difference
~~Nitrobenzene-d5~~ Tripropyl Tin ch	0.588	0.41076	69.8	69.8	0
2-Fluorobiphenyl Tripentyl Tin ch	0.56763	0.41474	72.2	73.1	0.9
Terphenyl-d14					
Phenol-d5					
2-Fluorophenol					
2,4,6-Tribromophenol					
2-Chlorophenol-d4					
~~1,2-Dichlorobenzene-d4~~					

Sample ID: _____

	Surrogate Spiked	Surrogate Found	Percent Recovery Reported	Percent Recovery Recalculated	Percent Difference
Nitrobenzene-d5					
2-Fluorobiphenyl					
Terphenyl-d14					
Phenol-d5					
2-Fluorophenol					
2,4,6-Tribromophenol					
2-Chlorophenol-d4					
1,2-Dichlorobenzene-d4					

Sample ID: _____

	Surrogate Spiked	Surrogate Found	Percent Recovery Reported	Percent Recovery Recalculated	Percent Difference
Nitrobenzene-d5					
2-Fluorobiphenyl					
Terphenyl-d14					
Phenol-d5					
2-Fluorophenol					
2,4,6-Tribromophenol					
2-Chlorophenol-d4					
1,2-Dichlorobenzene-d4					

LDC #: 33819C9
SDG #: HV42

VALIDATION FINDINGS WORKSHEET
Matrix Spike/Matrix Spike Duplicates Results Verification

Page: 1 of 1
Reviewer:
2nd Reviewer:

METHOD: GC/MS BNA (EPA SW 846 Method 8270)

The percent recoveries (%R) and Relative Percent Difference (RPD) of the matrix spike and matrix spike duplicate were recalculated for the compounds identified below using the following calculation:

% Recovery = 100 * (SSC - SC)/SA

Where: SSC = Spiked sample concentration; SA = Spike added; SC = Sample concentation

RPD = | MS - MSD | * 2/(MS + MSD)

MS = Matrix spike percent recovery; MSD = Matrix spike duplicate percent recovery

MS/MSD samples: 10/11

Compound	Spike Added (MS)		Sample Concentration (MS)	Spiked Sample Concentration (MS)		Matrix Spike Percent Recovery		Matrix Spike Duplicate Percent Recovery		MS/MSD RPD	
	MS	MSD	------	MS	MSD	Reported	Recalc.	Reported	Recalc.	Reported	Recalculated
~~Phenol~~ TBT	49.7	49.4	260	364	1210	NA	209	NA	1923	107	107
2-Chlorophenol											
1,4-Dichloroberzene											
N-Nitroso-di-n-propylamine											
1,2,4-Trichlorobenzene											
4-Chloro-3-methylphenol											
Acenaphthene											
4-Nitrophenol											
2,4-Dinitrotoluene											
Pentachlorophenol											
~~Pyrene~~											

Comments: Refer to Matrix Spike/Matrix Spike Duplicates findings worksheet for list of qualifications and associated samples when reported results do not agree within 10.0% of the recalculated results.

LDC #: 13381C19
SDG #: HV42

VALIDATION FINDINGS WORKSHEET
Laboratory Control Sample/Laboratory Control Sample Duplicates Results Verification

Page: 1 of 1
Reviewer: [illegible]
2nd Reviewer: [illegible]

METHOD: GC/MS BNA (EPA SW 846 Method 8270)

The percent recoveries (%R) and Relative Percent Difference (RPD) of the laboratory control sample and laboratory control sample duplicate were recalculated for the compounds identified below using the following calculation:

% Recovery = 100 * (SC/SA Where: SSC = Spike concentration; SA = Spike added

RPD = | LCS - LCSD | * 2/(LCS + LCSD) LCS = Laboratory control sample percent recovery LCSD = Laboratory control sample duplicate percent recovery

LCS/LCSD samples: LCS-031905

Compound	Spike Added (ug/L)		Spike Concentration (ug/L)		LCS Percent Recovery		LCSD Percent Recovery		LCS/LCSD RPD	
	LCS	LCSD	LCS	LCSD	Reported	Recalc.	Reported	Recalc.	Reported	Recalculated
~~Phenol~~ TBT	50	NA	54.9	NA	110	110				
2-Chlorophenol										
1,4-Dichlorobenzene										
N-Nitroso-di-n-propylamine										
1,2,4-Trichlorobenzene										
4-Chloro-3-methylphenol										
Acenaphthene										
4-Nitrophenol										
2,4-Dinitrotoluene										
Pentachlorophenol										
Pyrene										

Comments: Refer to Laboratory Control Sample/Laboratory Control Sample Duplicates findings worksheet for list of qualifications and associated samples when reported results do not agree within 10.0% of the recalculated results.

LDC #: 13381C19
SDG #: HV42

VALIDATION FINDINGS WORKSHEET
Sample Calculation Verification

Page: 1 of 1
Reviewer: Q
2nd reviewer: K

METHOD: GC/MS BNA (EPA SW 846 Method 8270)

Y N N/A Were all reported results recalculated and verified for all level IV samples?
Y N N/A Were all recalculated results for detected target compounds agree within 10.0% of the reported results?

Concentration = $\frac{(A_x)(I_s)(V_t)(DF)(2.0)}{(A_{is})(RRF)(V_o)(V_i)(\%S)}$

A_x	=	Area of the characteristic ion (EICP) for the compound to be measured
A_{is}	=	Area of the characteristic ion (EICP) for the specific internal standard
I_s	=	Amount of internal standard added in nanograms (ng)
V_o	=	Volume or weight of sample extract in milliliters (ml) or grams (g).
V_i	=	Volume of extract injected in microliters (ul)
V_t	=	Volume of the concentrated extract in microliters (ul)
Df	=	Dilution Factor.
%S	=	Percent solids, applicable to soil and solid matrices only.
2.0	=	Factor of 2 to account for GPC cleanup

Example:

Sample I.D. 4, TBT:

Conc. = $\frac{(8396)(2)(500)(1)(\quad)}{(118091)(0.558)(8.01)(\text{@}1)(0.629)}$

= 25.29 µg/kg

TBT as chloride = 21.9 µg/kg
TBT as ion = 19.5 µg/kg

#	Sample ID	Compound	Reported Concentration ( )	Calculated Concentration ( )	Qualification

LDC #: 13403A19

VALIDATION COMPLETENESS WORKSHEET

Level ~~IV~~ II

Date: 4/21/05
Page: 1 of 1
Reviewer: [illegible]
2nd Reviewer: [illegible]

SDG #: HV72
Laboratory: Analytical Resources, Inc.

METHOD: GC/MS Butyltins (Krone/8270C-SIM)

The samples listed below were reviewed for each of the following validation areas. Validation findings are noted in attached validation findings worksheets.

	Validation Area		Comments
I.	Technical holding times	A	Sampling dates: 3/15/05
II.	GC/MS Instrument performance check	N	
III.	Initial calibration	N	
IV.	Continuing calibration	N	
V.	Blanks	A	
VI.	Surrogate spikes	A	
VII.	Matrix spike/Matrix spike duplicates	SW	
VIII.	Laboratory control samples	A SW [illegible]	
IX.	Regional Quality Assurance and Quality Control	N	
X.	Internal standards	N	
XI.	Target compound identification	N	
XII.	Compound quantitation/CRQLs	N	
XIII.	Tentatively identified compounds (TICs)	N	
XIV.	System performance	N	
XV.	Overall assessment of data	A	
XVI.	Field duplicates	N	
XVII.	Field blanks	N	

Note: A = Acceptable
N = Not provided/applicable
SW = See worksheet

ND = No compounds detected
R = Rinsate
FB = Field blank

D = Duplicate
TB = Trip blank
EB = Equipment blank

Validated Samples:

1	LDW-SS124-010 sed	11	MB-031905	21		31	
2		12		22		32	
3		13		23		33	
4		14		24		34	
5		15		25		35	
6		16		26		36	
7		17		27		37	
8		18		28		38	
9		19		29		39	
10		20		30		40	

LDC #: 13403A19
SDG #: #VT2

VALIDATION FINDINGS WORKSHEET
Matrix Spike/Matrix Spike Duplicates

Page: 1 of 1
Feviewer: 9
2nd Feviewer: K

METHOD: GC/MS BNA (EPA SW 846 Method 8270)

Please see qualifications below for all questions answered "N". Not applicable questions are identified as "N/A".

(Y) N N/A Were a matrix spike (MS) and matrix spike duplicate (MSD) analyzed for each matrix in this SDG? If no, indicate which matrix does not have an associated MS/MSD. Soil / Water.

(Y) N N/A Was a MS/MSD analyzed every 20 samples of each matrix?

Y (N) N/A Were the MS/MSD percent recoveries (%R) and the relative percent differences (RPD) within the QC limits?

#	Date	MS/MSD ID	Compound	MS %R (Limits)	MSD %R (Limits)	RPD (Limits)	Associated Samples	Qualifications
		400-5547-010	TBT	NA (20-130)	NA (20-130)	10T (≤ 50)	None	No qual
			B	NA (↓)	=85 (↓)	58.2 (↓)		↓
			A	8.0 (↓)	( )	( )		
		TBT = Tributyl Tin chloride		( )	( )	( )		
				( )	( )	( )		
				( )	( )	( )		
		B = Dibutyl Tin Dichloride		( )	( )	( )		
		A = Butyl Tin Trichloride		( )	( )	( )		
				( )	( )	( )		
				( )	( )	( )		
				( )	( )	( )		
				( )	( )	( )		
				( )	( )	( )		
				( )	( )	( )		
				( )	( )	( )		
				( )	( )	( )		
				( )	( )	( )		

	Compound	QC Limits (Soil)	RPD (Soil)	QC Limits (Water)	RPD (Water)		Compound	QC Limits (Soil)	RPD (Soil)	QC Limits (Water)	RPD (Water)
A.	Phenol	26-90%	≤ 35%	12-110%	≤ 42%	GG.	Acenaphthene	31-137%	≤ 19%	46-118%	≤ 31%
C.	2-Chlorophenol	25-102%	≤ 50%	27-123%	≤ 40%	II.	4-Nitrophenol	11-114%	≤ 50%	10-80%	≤ 50%
E.	1,4-Dichlorobenzene	28-104%	≤ 27%	36-97%	≤ 28%	KK.	2,4-Dinitrotoluene	28-89%	≤ 47%	24-96%	≤ 38%
I.	N-Nitroso-di-n-propylamine	41-126%	≤ 38%	41-116%	≤ 38%	TT.	Pentachlorophenol	17-109%	≤ 47%	9-103%	≤ 50%
R.	1,2,4-Trichlorobenzene	38-107%	≤ 23%	39-98%	≤ 28%	ZZ.	Pyrene	35-142%	≤ 36%	26-127%	≤ 31%
V.	4-Chloro-3-methylphenol	26-103%	≤ 33%	23-97%	≤ 42%						

LDC #: 13703A19
SDG #: HVT

VALIDATION FINDINGS WORKSHEET
Laboratory Control Samples (LCS)

Page: 1 of 1
Reviewer: 9
2nd Reviewer: ae

METHOD: GC/MS BNA (EPA SW 846 Method 8270)

Please see qualifications below for all questions answered "N". Not applicable questions are identified as "N/A".

[✓ Y] N N/A Was a LCS required?

Y [✓ N] N/A Were the LCS/LCSD percent recoveries (%R) and the relative percent differences (RPD) within the QC limits?

#	Date	LCS/LCSD ID	Compound	LCS %R (Limits)	LCSD %R (Limits)	RPD (Limits)	Associated Samples	Qualifications
		LCS-031905	Δ	10.0 (20-130)	( )	( )	All + Bk	J/UJ/P
				( )	( )	( )		
				( )	( )	( )		
				( )	( )	( )		
		Δ =	Butyl	Tin (Trichloride	)	( )		
				( )	( )	( )		
				( )	( )	( )		
				( )	( )	( )		
				( )	( )	( )		
				( )	( )	( )		
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LDC #: 13398A19 **VALIDATION COMPLETENESS WORKSHEET** Date: 4/21/05
SDG #: HV58 Level II Page: 1 of 1
Laboratory: Analytical Resources, Inc. Reviewer: 9
2nd Reviewer: [illegible]

METHOD: GC/MS TBT (EPA SW 846 Method 8270C-SIM/Krone)

The samples listed below were reviewed for each of the following validation areas. Validation findings are noted in attached validation findings worksheets.

	Validation Area		Comments
I.	Technical holding times	A	Sampling dates: 3/14/05
II.	GC/MS Instrument performance check	N	
III.	Initial calibration	N	
IV.	Continuing calibration	N	
V.	Blanks	A	
VI.	Surrogate spikes	A	
VII.	Matrix spike/Matrix spike duplicates	A SW	
VIII.	Laboratory control samples	A SW LCS	
IX.	Regional Quality Assurance and Quality Control	N	
X.	Internal standards	N	
XI.	Target compound identification	N	
XII.	Compound quantitation/CRQLs	N	
XIII.	Tentatively identified compounds (TICs)	N	
XIV.	System performance	N	
XV.	Overall assessment of data	A	
XVI.	Field duplicates	N	
XVII.	Field blanks	N	

Note: A = Acceptable
N = Not provided/applicable
SW = See worksheet
ND = No compounds detected
R = Rinsate
FB = Field blank
D = Duplicate
TB = Trip blank
EB = Equipment blank

Validated Samples

1	LDW-SS53-010 ed	11	MB-032205	21		31	
2	LDW-SS34-010	12		22		32	
3	LDW-SS107-010	13		23		33	
4	LDW-SS34-010MS	14		24		34	
5	LDW-SS34-010MSD	15		25		35	
6		16		26		36	
7		17		27		37	
8		18		28		38	
9		19		29		39	
10		20		30		40	

LDC #: 13384A19 (70)
SDG #: HU8558

VALIDATION FINDINGS WORKSHEET
Matrix Spike/Matrix Spike Duplicates

Page: 1 of 1
Reviewer: a
2nd Reviewer: a

METHOD: GC/MS BNA (EPA SW 846 Method 8270)

Please see qualifications below for all questions answered "N". Not applicable questions are identified as "N/A".

(Y) N N/A Were a matrix spike (MS) and matrix spike duplicate (MSD) analyzed for each matrix in this SDG? If no, indicate which matrix does not have an associated MS/MSD. Soil / Water.

(Y) N N/A Was a MS/MSD analyzed every 20 samples of each matrix?

Y (N) N/A Were the MS/MSD percent recoveries (%R) and the relative percent differences (RPD) within the QC limits?

#	Date	MS/MSD ID	Compound	MS %R (Limits)	MSD %R (Limits)	RPD (Limits)	Associated Samples	Qualifications
		4/5	A	14 (20-130	( )	( )		
				( )	( )	( )		
				( )	( )	( )		
		4/5	D	18.1 (20-130	( )	52.4 (≤ 50	2	Y/N Y/A
				( )	( )	( )		
				( )	( )	( )		
		A = Butyl Tin Trichloride		( )	( )	( )		
				( )	( )	( )		
				( )	( )	( )		
				( )	( )	( )		
				( )	( )	( )		
				( )	( )	( )		
				( )	( )	( )		
				( )	( )	( )		
				( )	( )	( )		
				( )	( )	( )		
				( )	( )	( )		
				( )	( )	( )		

	Compound	QC Limits (Soil)	RPD (Soil)	QC Limits (Water)	RPD (Water)		Compound	QC Limits (Soil)	RPD (Soil)	QC Limits (Water)	RPD (Water)
A.	Phenol	26-90%	≤ 35%	12-110%	≤ 42%	GG.	Acenaphthene	31-137%	≤ 19%	46-118%	≤ 31%
C.	2-Chlorophenol	25-102%	≤ 50%	27-123%	≤ 40%	II.	4-Nitrophenol	11-114%	≤ 50%	10-80%	≤ 50%
E.	1,4-Dichlorobenzene	28-104%	≤ 27%	36-97%	≤ 28%	KK.	2,4-Diritrotoluene	28-89%	≤ 47%	24-96%	≤ 38%
J.	N-Nitroso-di-n-propylamine	41-126%	≤ 38%	41-116%	≤ 38%	TT.	Pentachlorophenol	17-109%	≤ 47%	9-103%	≤ 50%
R.	1,2,4-Trichlorobenzene	38-107%	≤ 23%	39-98%	≤ 28%	ZZ.	Pyrene	35-142%	≤ 36%	26-127%	≤ 31%
V.	4-Chloro-3-methylphenol	26-103%	≤ 33%	23-97%	≤ 42%						

LDC #: 13398B19
SDG #: HV58

VALIDATION FINDINGS WORKSHEET
Laboratory Control Samples (LCS)

Page: 1 of 1
Reviewer: q
2nd Reviewer:

METHOD: GC/MS BNA (EPA SW 846 Method 8270)

Please see qualifications below for all questions answered "N". Not applicable questions are identified as "N/A".

[✓ Y] N N/A Was a LCS required?

Y [✓ N] N/A Were the LCS/LCSD percent recoveries (%R) and the relative percent differences (RPD) within the QC limits?

#	Date	LCS/LCSD ID	Compound	LCS %R (Limits)	LCSD %R (Limits)	RPD (Limits)	Associated Samples	Qualifications
		LCS-022205	A	6.6 (20-130)	( )	( )	All + Blk	J/R/A
				( )	( )	( )		
				( )	( )	( )		
			A = Butyl Tin chloride	( )	( )	( )		
				( )	( )	( )		
				( )	( )	( )		
				( )	( )	( )		
				( )	( )	( )		
				( )	( )	( )		
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				( )	( )	( )		

LDC #: 13419A19
SDG #: HW06
Laboratory: Analytical Resources, Inc.

VALIDATION COMPLETENESS WORKSHEET
Level II

Date: 4/27/05
Page: 1 of 1
Reviewer: [illegible]
2nd Reviewer: [illegible]

METHOD: GC/MS TBT(EPA SW 846 Method 8270C-SIM/Krone)

The samples listed below were reviewed for each of the following validation areas. Validation findings are noted in attached validation findings worksheets.

	Validation Area		Comments
I.	Technical holding times	A	Sampling dates: 3/16/05
II.	GC/MS Instrument performance check	N	
III.	Initial calibration	N	
IV.	Continuing calibration	N	
V.	Blanks	A	
VI.	Surrogate spikes	A	
VII.	Matrix spike/Matrix spike duplicates	A/M	LDW-SS34-010 (HV=8)
VIII.	Laboratory control samples	A	LCS
IX.	Regional Quality Assurance and Quality Control	N	
X.	Internal standards	N	
XI.	Target compound identification	N	
XII.	Compound quantitation/CRQLs	N	
XIII.	Tentitatively identified compounds (TICs)	N	
XIV.	System performance	N	
XV.	Overall assessment of data	A	
XVI.	Field duplicates	N	
XVII.	Field blanks	N	

Note: A = Acceptable
N = Not provided/applicable
SW = See worksheet
ND = No compounds detected
R = Rinsate
FB = Field blank
D = Duplicate
TB = Trip blank
EB = Equipment blank

Validated Samples

1	LDW-SS2-010 sed	11		21		31	
2	MB-032205	12		22		32	
3		13		23		33	
4		14		24		34	
5		15		25		35	
6		16		26		36	
7		17		27		37	
8		18		28		38	
9		19		29		39	
10		20		30		40	

LDC #: 13719A19
SDG #: HW06

VALIDATION FINDINGS WORKSHEET
Matrix Spike/Matrix Spike Duplicates

Page: 1 of 1
Reviewer: 9
2nd Reviewer: M

METHOD: GC/MS BNA (EPA SW 846 Method 8270)

Please see qualifications below for all questions answered "N". Not applicable questions are identified as "N/A".

(Y) N N/A Were a matrix spike (MS) and matrix spike duplicate (MSD) analyzed for each matrix in this SDG? If no, indicate which matrix does not have an associated MS/MSD. Soil / Water.

(Y) N N/A Was a MS/MSD analyzed every 20 samples of each matrix?

(Y) N N/A Were the MS/MSD percent recoveries (%R) and the relative percent differences (RPD) within the QC limits?

#	Date	MS/MSD ID	Compound	MS %R (Limits)	MSD %R (Limits)	RPD (Limits)	Associated Samples	Qualifications
		LDW-5534-010	A	18.1 (20-130)	( )	52.4 (≤ 50)	None	No qual
				( )	( )	( )		
				( )	( )	( )		
				( )	( )	( )		
				( )	( )	( )		
				( )	( )	( )		
				( )	( )	( )		
				( )	( )	( )		
				( )	( )	( )		
				( )	( )	( )		
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				( )	( )	( )		
				( )	( )	( )		
				( )	( )	( )		
				( )	( )	( )		
				( )	( )	( )		

	Compound	QC Limits (Soil)	RPD (Soil)	QC Limits (Water)	RPD (Water)		Compound	QC Limits (Soil)	RPD (Soil)	QC Limits (Water)	RPD (Water)
A.	Phenol	26-90%	≤ 35%	12-110%	≤ 42%	GG.	Acenaphthene	31-137%	≤ 19%	46-118%	≤ 31%
C.	2-Chlorophenol	25-102%	≤ 50%	27-123%	≤ 40%	II.	4-Nitrophenol	11-114%	≤ 50%	10-80%	≤ 50%
E.	1,4-Dichlorobenzene	28-104%	≤ 27%	36-97%	≤ 28%	KK.	2,4-Dinitrotoluene	28-89%	≤ 47%	24-96%	≤ 38%
J.	N-Nitroso-di-n-propylamine	41-126%	≤ 38%	41-116%	≤ 38%	TT.	Pentachlorophenol	17-109%	≤ 47%	9-103%	≤ 50%
R.	1,2,4-Trichlorobenzene	38-107%	≤ 23%	39-98%	≤ 28%	ZZ.	Pyrene	35-142%	≤ 36%	26-127%	≤ 31%
V.	4-Chloro-3-methylphenol	26-103%	≤ 33%	23-97%	≤ 42%						

LDC #: 13419A19
SDG #: HV06

VALIDATION FINDINGS WORKSHEET
Laboratory Control Samples (LCS)

Page: 1 of 1
Reviewer: q
2nd Reviewer: R

METHOD: GC/MS BNA (EPA SW 846 Method 8270)

Please see qualifications below for all questions answered "N". Not applicable questions are identified as "N/A".

[✓ Y] N N/A Was a LCS required?

Y [✓ N] N/A Were the LCS/LCSD percent recoveries (%R) and the relative percent differences (RPD) within the QC limits?

#	Date	LCS/LCSD ID	Compound	LCS %R (Limits)	LCSD %R (Limits)	RPD (Limits)	Associated Samples	Qualifications
		LCS-032205	Δ	6.6 (20-130)	( )	( )	M + Bk	J/R/P
				( )	( )	( )		
				( )	( )	( )		
				( )	( )	( )		
		Δ = Butyl	Tin	Trichloride	( )	( )		
				( )	( )	( )		
				( )	( )	( )		
				( )	( )	( )		
				( )	( )	( )		
				( )	( )	( )		
				( )	( )	( )		
				( )	( )	( )		
				( )	( )	( )		
				( )	( )	( )		
				( )	( )	( )		
				( )	( )	( )		
				( )	( )	( )		
				( )	( )	( )		
				( )	( )	( )		
				( )	( )	( )		
				( )	( )	( )		
				( )	( )	( )		
				( )	( )	( )		
				( )	( )	( )		
				( )	( )	( )		

LDC #: 13234D3b

SDG #: HR49

Laboratory: Analytical Resources, Inc.

VALIDATION COMPLETENESS WORKSHEET

Level II

Date: 3/10/05

Page: 1 of 1

Reviewer: F7

2nd Reviewer: CV

METHOD: GC Polychlorinated Biphenyls (EPA SW 846 Method 8082)

The samples listed below were reviewed for each of the following validation areas. Validation findings are noted in attached validation findings worksheets.

	Validation Area		Comments
I.	Technical holding times	A	Sampling dates: 1/31 – 2/2/05
II.	GC/ECD Instrument Performance Check	N	
III.	Initial calibration	N	
IV.	Continuing calibration	N	
V.	Blanks	A	
VI.	Surrogate spikes	SW	
VII.	Matrix spike/Matrix spike duplicates	A	
VIII.	Laboratory control samples / SRM	SW	LCS
IX.	Regional quality assurance and quality control	N	
Xa.	Florisil cartridge check	N	
Xb.	GPC Calibration	N	
XI.	Target compound identification	A	
XII.	Compound quantitation and reported CRQLs	N	
XIII.	Overall assessment of data	N	
XIV.	Field duplicates	N	
XV.	Field blanks N	~~ND~~	~~EB = 2~~ , 0 F7

Note: A = Acceptable; N = Not provided/applicable; SW = See worksheet; ND = No compounds detected; R = Rinsate; FB = Field blank; D = Duplicate; TB = Trip blank; EB = Equipment blank

Validated Samples: sediment

1	SC-SS1a-010	11	LU-SS9a-010MS	21	MB-020905	31	
2	~~EB-SS2a-010~~ OK don't dilute	12	LU-SS9a-010MSD	22		32	
3	LW-SS3-010	13		23		33	
4	SB-SS6-010	14		24		34	
5	DRD-SS7-010	15		25		35	
6	LU-SS9a-010	16		26		36	
7	LU-SS9b-010	17		27		37	
8	UB-SS8-010	18		28		38	
9	LW-SS6-010	19		29		39	
10	~~EB-SS2b-010~~ O/K don't dilute	20		30		40	

note: No SRM was analyzed due to analyst oversight

LDC #: 13234D36
SDG #: HR49

VALIDATION FINDINDS WORKSHEET
Surrogate Recovery

Page: 1 of 1
Reviewer: EF
2nd Reviewer: K

METHOD: ✓ GC __ HPLC

Are surrogates required by the method? Yes___ or No____.

Please see qualifications below for all questions answered "N". Not applicable questions are identified as "N/A".

Y N N/A Were surrogates spiked into all samples and blanks?

Y N N/A Did all surrogate recoveries (%R) meet the QC limits?

#	Sample ID	Detector/ Column	Surrogate Compound	%R (Limits)	Qualifications
	8	not specified	TCMX	35.2 (50-150)	J/UJ/P
				( )	
				( )	
				( )	
				( )	
				( )	
				( )	
				( )	
				( )	
				( )	
				( )	
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				( )	
				( )	
				( )	
				( )	
				( )	
				( )	
				( )	
				( )	
				( )	
				( )	
				( )	

	Surrogate Compound		Surrogate Compound		Surrogate Compound		Surrogate Compound
A	Chlorobenzene (CBZ)	G	Octacosane	M	Benzo(e)Pyrene	S	1-Chloro-3-Nitrobenzene
B	4-Bromofluorobenzene (BFB)	H	Ortho-Terphenyl	N	Terphenyl-D14	T	3,4-Dinitrotoluene
C	a,a,a-Trifluorotoluene	I	Fluorobenzene (FBZ)	O	Decafluorobiphenyl (DCB)	U	Tripentyltin
D	Bromcchlorobenene	J	n-Triacontane	P	1-methylnaphthalene	V	Tri-n-propyltin
E	1,4-Dichlorobutane	K	Hexacosane	Q	Dichlorophenyl Acetic Acid (DCAA)	W	Tributyl Phosphate
F	1,4-Difluorobenzene (DFB)	L	Bromobenzene	R	4-Nitrophenol	X	Triphenyl Phosphate

LDC #: 13234D
SDG #: HR49
METHOD: ✓ GC __ HPLC

VALIDATION FINDINGS WORKSHEET
Laboratory Control Samples (LCS) /SRM

Page: 1 of 1
Reviewer: [illegible]
2nd Reviewer: [illegible]

Please see qualifications below for all questions answered "N". Not applicable questions are identified as "N/A".

Y N [✓ N/A] Were a laboratory control samples (LCS) and laboratory control sample duplicate (LCSD) analyzed for each matrix in this SDG?
Y N [✓ N/A] Were the LCS percent recoveries (%R) and relative percent differences (RPD) within the QC limits?

Level IV/D Only
Y N [✓ N/A] Was an LCS analyzed every 20 samples for each matrix or whenever a sample extraction was performed?

#	LCS/LCSD ID	Compound	LCS %R (Limits)	LCSD %R (Limits)	RPD (Limits)	Associated Samples	Qualifications
			( )	( )	( )		
	No SRM was analyzed		( )	( )	( )	All	~~none/p~~ txt
			( )	( )	( )		
			( )	( )	( )		
			( )	( )	( )		
			( )	( )	( )		
			( )	( )	( )		
			( )	( )	( )		
			( )	( )	( )		
			( )	( )	( )		
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			( )	( )	( )		
			( )	( )	( )		
			( )	( )	( )		
			( )	( )	( )		
			( )	( )	( )		
			( )	( )	( )		

LDC #: 13315A3b **VALIDATION COMPLETENESS WORKSHEET** Date: 3/29/05
SDG #: HS56 Level II Page: 1 of 1
Laboratory: Analytical Resources, Inc. Reviewer: [illegible]
2nd Reviewer: [illegible]

METHOD: GC Polychlorinated Biphenyls (EPA SW 846 Method 8082)

The samples listed below were reviewed for each of the following validation areas. Validation findings are noted in attached validation findings worksheets.

	Validation Area		Comments
I.	Technical holding times	A	Sampling dates: 2/8 - 2/10/05
II.	GC/ECD Instrument Performance Check	N	
III.	Initial calibration	N	
IV.	Continuing calibration	N	
V.	Blanks	A	
VI.	Surrogate spikes	A	
VII.	Matrix spike/Matrix spike duplicates	A	
VIII.	Laboratory control samples /SRM	A	LCS
IX.	Regional quality assurance and quality control	N	
Xa.	Florisil cartridge check	N	
Xb.	GPC Calibration	N	
XI.	Target compound identification	N	
XII.	Compound quantitation and reported CRQLs	SW	
XIII.	Overall assessment of data	N	
XIV.	Field duplicates	N	
XV.	Field blanks	N	

Note: A = Acceptable; N = Not provided/applicable; SW = See worksheet; ND = No compounds detected; R = Rinsate; FB = Field blank; D = Duplicate; TB = Trip blank; EB = Equipment blank

Validated Samples: Sediment

1	LDW-SS4-010	11	MB-021805	21		31	
2	LDW-SS5a-010	12		22		32	
3	LDW-SS5b-010	13		23		33	
4	SC-SS1b-010	14		24		34	
5	LDW-SS5a-010MS	15		25		35	
6	LDW-SS5a-010MSD	16		26		36	
7		17		27		37	
8		18		28		38	
9		19		29		39	
10		20		30		40	

VALIDATION FINDINGS WORKSHEET

METHOD: Pesticide/PCBs (EPASW 846 Method 8081/8082)

A. alpha-BHC	I. Dieldrin	Q. Endrin ketone	Y. Aroclor-1242	GG.
B. beta-BHC	J. 4,4'-DDE	R. Endrin aldehyde	Z. Aroclor-1248	HH.
C. delta-BHC	K. Endrin	S. alpha-Chlordane	AA. Aroclor-1254	II.
D. gamma-BHC	L. Endosulfan II	T. gamma-Chlordane	BB. Aroclor-1260	JJ.
E. Heptachlor	M. 4,4'-DDD	U. Toxaphene	CC. DB 608	KK.
F. Aldrin	N. Endosulfan sulfate	V. Aroclor-1016	DD. DB 1701	LL.
G. Heptachlor epoxide	O. 4,4'-DDT	W. Aroclor-1221	EE.	MM.
H. Endosulfan I	P. Methoxychlor	X. Aroclor-1232	FF.	NN.

Notes:_____

LDC #: 13315A36
SDG #: #556

VALIDATION FINDINGS WORKSHEET
Compound Quantitation and Reported CRQLs

Reviewer: EJ
2nd Reviewer: AC

METHOD: V GC __ HPLC

Please see qualifications below for all questions answered "N". Not applicable questions are identified as "N/A".

Level IV/D Only

Y N N/A Were CRQLs adjusted for sample dilutions, dry weight factors, etc.?

Y N N/A Did the reported results for detected target compounds agree within 10.0% of the recalculated results?

#	Compound Name	Finding (% RPD Bet column ± 40)	Associated Samples	Qualifications
	Z	41%	4	J/A det
	BB	48%	↓	↓

Comments: See sample calculation verification worksheet for recalculations

LDC #: 13234D33
SDG #: HR49
Laboratory: Analytical Resources, Inc.

VALIDATION COMPLETENESS WORKSHEET
Level IV

Date: 3/15/05
Page: 1 of 1
Reviewer: EJ
2nd Reviewer: KC

METHOD: GC Pentachlorophenol (EPA SW846 Method 8041)

The samples listed below were reviewed for each of the following validation areas. Validation findings are noted in attached validation findings worksheets.

	Validation Area		Comments
I.	Technical holding times	A	Sampling dates: 2/1/05
IIa.	Initial calibration	A N	
IIb.	Calibration verification	A N	
III.	Blanks	A	
IVa.	Surrogate recovery	A	
IVb.	Matrix spike/Matrix spike duplicates	A	
IVc.	Laboratory control samples / SRM	SW	LCS ~~MS~~ SRM ~~SWA~~ DC (SWA)
V.	Target compound identification	A N	
VI.	Compound Quantitation and CRQLs	A N	
VII.	System Performance	A N	
VIII.	Overall assessment of data	A	
IX.	Field duplicates	N	
X.	Field blanks	N	

Note: A = Acceptable
N = Not provided/applicable
SW = See worksheet

ND = No compounds detected
R = Rinsate
FB = Field blank

D = Duplicate
TB = Trip blank
EB = Equipment blank

Validated Samples:
Sediment

1	SC-SS1a-010	11	MB-020905	21		31	
2	SC-SS1a-010MS	12		22		32	
3	SC-SS1a-010MSD	13		23		33	
4		14		24		34	
5		15		25		35	
6		16		26		36	
7		17		27		37	
8		18		28		38	
9		19		29		39	
10		20		30		40	

LDC #: 13234D33
SDG #: H1249

VALIDATION FINDINGS CHECKLIST

Reviewer: B
2nd Reviewer: [illegible]

Method: ✓ GC _____ HPLC

Validation Area	Yes	No	NA	Findings/Comments
I. Technical holding times				
All technical holding times were met.	✓			
Cooler temperature criteria was met.	✓			
II. Initial calibration				
Did the laboratory perform a 5 point calibration prior to sample analysis?	✓			
Was a linear fit used for evaluation? If yes, were all percent relative standard deviations (%RSD) ≤ 20%?	✓			
Was a curve fit used for evaluation? If Yes, what was the acceptance criteria used?		✓	✓	
Did the initial calibration meet the curve fit acceptance criteria?				
Were the RT windows properly established?	✓			
IV. Continuing calibration				
What type of continuing calibration calculation was performed? ____%D or %R	✓			
Was a continuing calibration analyzed daily?	✓			
Were all percent differences (%D) ≤ 15%.0 or percent recoveries 85-115%?	✓			
Were all the retention times within the acceptance windows?	✓			
V. Blanks				
Was a method blank associated with every sample in this SDG?	✓			
Was a method blank analyzed for each matrix and concentration?	✓			
Was there contamination in the method blanks? If yes, please see the Blanks validation completeness worksheet.		✓		
VI. Surrogate spikes				
Were all surrogate %R within the QC limits?	✓			
If the percent recovery (%R) of one or more surrogates was outside QC limits, was a reanalysis performed to confirm %R?			✓	
If any %R was less than 10 percent, was a reanalysis performed to confirm %R?			✓	
VII. Matrix spike/Matrix spike duplicates				
Were a matrix spike (MS) and matrix spike duplicate (MSD) analyzed for each matrix in this SDG? If no, indicate which matrix does not have an associated MS/MSD. Soil / Water.	✓			
Was a MS/MSD analyzed every 20 samples of each matrix?	✓			
Were the MS/MSD percent recoveries (%R) and the relative percent differences (RPD) within the QC limits?	✓			
VIII. Laboratory control samples				
Was an LCS analyzed for this SDG?	✓			
Was an LCS analyzed per extraction batch?	✓			

LDC #: 13234D33
SDG #: HP49

VALIDATION FINDINGS CHECKLIST

Reviewer: [illegible]
2nd Reviewer: [illegible]

Validation Area	Yes	No	NA	Findings/Comments
Were the LCS percent recoveries (%R) and relative percent difference (RPD) within the QC limits?	✓			
IX. Regional Quality Assurance and Quality Control				
Were performance evaluation (PE) samples performed?			✓	
Were the performance evaluation (PE) samples within the acceptance limits?			✓	
X. Target compound identification				
Were the retention times of reported detects within the RT windows?			✓	
XI. Compound quantitation/CRQLs				
Were compound quantitation and CRQLs adjusted to reflect all sample dilutions and dry weight factors applicable to level IV validation?	✓			
XII. System performance				
System performance was found to be acceptable.	✓			
XIII. Overall assessment of data				
Overall assessment of data was found to be acceptable.	✓			
XIV. Field duplicates				
Were field duplicate pairs identified in this SDG?		✓		
Were target compounds idetected in the field duplicates?			✓	
XV. Field blanks				
Were field blanks identified in this SDG?		✓		
Were target compounds detected in the field blanks?			✓	

LDC #: 13234D33
SDG #: HR49

VALIDATION FINDINGS WORKSHEET
Initial Calibration Calculation Verification

Page: 1 of 1
Reviewer: [illegible]
2nd Reviewer: [illegible]

METHOD: GC ✓ HPLC ____

The calibration Factor (CF), average CF, and percent relative standard deviation (%RSD) were recalculated for the compounds identified below using the following calculations:

CF = A/C
average CF = sum of the CF/number of standards
%RSD = 100 * (S/X)

A = Area of compound,
C = Concentration of compound,
S = Standard deviation of the CF
X = Mean of the CFs

#	Standard ID	Calibration Date	Compound	Reported CF (0.0125 std)	Recalculated CF (0.0125 std)	Reported Average CF (initial)	Recalculated Average CF (initial)	Reported %RSD	Recalculated %RSD
1	Pentachlorophenol DB5	11/9/04	Pentachlorophenol	4.4×10^7	4.4×10^7	4.37×10^7	4.37×10^7	2.8	2.8
2	DB608		↓	2.7×10^7	2.7×10^7	2.72×10^7	2.72×10^7	1.6	1.6
3									
4									

Comments: Refer to Initial Calibration findings worksheet for list of qualifications and associated samples when reported results do not agree within 10.0% of the recalculated results.

INICIAL ISB

LDC #: 13234D33
SDG #: HR49

VALIDATION FINDINGS WORKSHEET
Continuing Calibration Results Verification

Reviewer: [illegible]
2nd Reviewer: [illegible]

METHOD: GC ✓ HPLC ____

The percent difference (%D) of the initial calibration average Calibration Factors (CF) and the continuing calibration CF were recalculated for the compounds identified below using the following calculation:

% Difference = 100 * (ave. CF - CF)/ave. CF
CF = A/C

Where: ave. CF = initial calibration average CF
CF = continuing calibration CF
A = Area of compound
C = Concentration of compound

#	Standard ID	Calibration Date	Compound	Average CF(ical)/ CCV Conc.	Reported CF/Conc. CCV	Recalculated CF/Conc. CCV	Reported %D	Recalculated %D
1	CCV	2/14/05	Pentachlorophenol	~~0.0246~~ 0.0250	~~0.0250~~ 0.0246	0.0246	1.6	1.6
	DB5							
2	DB608		↓	0.0250	0.0251	0.0251	0.4	0.4
3								
4								

Comments: Refer to Continuing Calibration findings worksheet for list of qualifications and associated samples when reported results do not agree within 10.0% of the recalculated results.

LDC #: 13234D33
SDG #: HR49

METHOD: ___ GC ___ HPLC

VALIDATION FINDINGS WORKSHEET
Surrogate Results Verification

Reviewer: 5
2nd reviewer: SK

The percent recoveries (%R) of surrogates were recalculated for the compounds identified below using the following calculation:

% Recovery: SF/SS * 100

Where: SF = Surrogate Found
SS = Surrogate Spiked

Sample ID: 1

Surrogate	Column/Detector	Surrogate Spiked	Surrogate Found	Percent Recovery	Percent Recovery	Percent Difference
				Reported	Recalculated	
2,4,6-Tribromophenol	DB-5	100	83.6	83.6	83.6	0

Sample ID:

Surrogate	Column/Detector	Surrogate Spiked	Surrogate Found	Percent Recovery	Percent Recovery	Percent Difference
				Reported	Recalculated	

Sample ID:

Surrogate	Column/Detector	Surrogate Spiked	Surrogate Found	Percent Recovery	Percent Recovery	Percent Difference
				Reported	Recalculated	

LDC #: 13234D33
SDG #: HR49

VALIDATION FINDINGS WORKSHEET
Matrix Spike/Matrix Spike Duplicates Results Verification

Reviewer: [illegible]
2nd Reviewer: [illegible]

METHOD: ___GC ___HPLC

The percent recoveries (%R) and relative percent differences (RPD) of the matrix spike and matrix spike duplicate were recalculated for the compounds identified below using the following calculation:

%Recovery = 100 * (SSC - SC)/SA Where SSC = Spiked sample concentration SC = Sample concentration
SA = Spike added
RPD =(((SSCMS - SSCMSD) * 2) / (SSCMS + SSCMSD))*100 MS = Matrix spike MSD = Matrix spike duplicate

MS/MSD samples: 2 & 3

Compound	Spike Added (ug/kg)		Sample Conc. (ug/kg)	Spike Sample Concentration (ug/kg)		Matrix spike Percent Recovery		Matrix Spike Duplicate Percent Recovery		MS/MSD RPD	
	MS	MSD	---	MS	MSD	Reported	Recalc.	Reported	Recalc.	Reported	Recalc.
Gasoline (8015)											
Diesel (8015)											
Benzene (8021B)											
Methane (RSK-175)											
2,4-D (8151)											
Dinoseb (8151)											
Naphthalene (8310)											
Anthracene (8310)											
HMX (8330)											
2,4,6-Trinitrotoluene (8330)											
Pentachlorophenol	78.3	78.3	ND	66.1	76.8	84.4	84.4	~~78.3~~ 98.1	98.1	15	15

Comments: Refer to Matrix Spike/Matrix Spike Duplicates findings worksheet for list of qualifications and associated samples when reported results do not agree within 10.0% of the recalculated results.

LDC #: 13234D33
SDG #: HR49

VALIDATION FINDINGS WORKSHEET
Laboratory Control Sample/Laboratory Control Sample Duplicates Results Verification

Reviewer: 5
2nd Reviewer:

METHOD: GC HPLC

The percent recoveries (%R) and relative percent differences (RPD) of the laboratory control sample and laboratory control sample duplicate were recalculated for the compounds identified below using the following calculation:

%Recovery = 100 * (SSC - SC)/SA

Where SSC = Spiked sample concentration; SA = Spike added; SC = Sample concentration; LCS = Laboratory Control Sample; LCSD = Laboratory Control Sample duplicate

RPD =(({SSCLCS - SSCLCSD} * 2) / (SSCLCS + SSCLCSD))*100

LCS/LCSD samples: LCS-020905

Compound	Spike Added (ug/kg)		Sample Conc. (ug/kg)	Spike Sample Concentration (ug/kg)		LCS Percent Recovery		LCSD Percent Recovery		LCS/LCSD RPD	
	LCS	LCSD	---	LCS	LCSD	Reported	Recalc.	Reported	Recalc.	Reported	Recalc.
Gasoline (8015)											
Diesel (8015)											
Benzene (8021B)											
Methane (RSK-175)											
2,4-D (8151)											
Dinoseb (8151)											
Naphthalene (8310)											
Anthracene (8310)											
HMX (8330)											
2,4,6-Trinitrotoluene (8330)											
Pentachlorophenol	61.5	NA	0	62.5	NA	98.4	98.4	NA			

Comments: Refer to Laboratory Control Sample/Laboratory Control Sample Duplicate findings worksheet for list of qualifications and associated samples when reported results do not agree within 10.0% of the recalculated results.

LDC #: 13234D33
SDG #: HR49

VALIDATION FINDINGS WORKSHEET
Sample Calculation Verification

Reviewer: JS
2nd Reviewer: MC

METHOD: X **GC** ___ **HPLC**

Y N N/A Were all reported results recalculated and verified for all level IV samples?
Y N N/A Were all recalculated results for detected target compounds within 10% of the reported results?

Concentration= $\frac{(A)(Fv)(Df)}{(RF)(Vs \text{ or } Ws)(\%S/100)}$

A= Area or height of the compound to be measured
Fv= Final Volume of extract
Df= Dilution Factor
RF= Average response factor of the compound in the initial calibration
Vs= Initial volume of the sample
Ws= Initial weight of the sample
%S= Percent Solid

Example:

Sample ID._____ Compound Name _____

Concentration =_____

#	Sample ID	Compound	Reported Concentrations ( )	Recalculated Results Concentrations ( )	Qualifications

Comments: _____

SAMPCALew.wpd

LDC #: 13234D6
SDG #: HR49
Laboratory: Analytical Resources, Inc.

VALIDATION COMPLETENESS WORKSHEET
Level II

Date: 3/11/05
Page: 1 of 1
Reviewer: MM
2nd Reviewer: [illegible]

METHOD: Total Solids (EPA Method 160.3), TOC (Plumb),

The samples listed below were reviewed for each of the following validation areas. Validation findings are noted in attached validation findings worksheets.

	Validation Area		Comments
I.	Technical holding times	SW	Sampling dates: 1/31/05 - 2/2/05
IIa.	Initial calibration	N	
IIb.	Calibration verification	N	
III.	Blanks	A	
IV	Matrix Spike/Matrix Spike Duplicates	A	
V	Duplicates	A	Triplicates
VI.	Laboratory control samples	A	Lcs + SRM
VII.	Sample result verification	N	
VIII.	Overall assessment of data	A	
IX.	Field duplicates	N	
X	Field blanks	N	

Note: A = Acceptable
N = Not provided/applicable
SW = See worksheet
ND = No compounds detected
R = Rinsate
FB = Field blank
D – Duplicate
TB = Trip blank
EB = Equipment blank

Validated Samples:

1	SC-SS1a-010	11	EB-SS2a-010MS	21		31	
2	EB-SS2a-010	12	EB-SS2a-010DUP	22		32	
3	LW-SS3-010	13	LW-SS3-010DUP	23		33	
4	SB-SS6-010	14	↓ TRP	24		34	
5	DRD-SS7-010	15	EB-SS2a-010 TRP	25		35	
6	LU-SS9a-010	16	MB	26		36	
7	LU-SS9b-010	17		27		37	
8	UB-SS8-010	18		28		38	
9	LW-SS6-010	19		29		39	
10	EB-SS2b-010	20		30		40	

Notes: _____

LDC #: 13>3406
SDG #: 14R49

VALIDATION FINDINGS WORKSHEET
Sample Specific Analysis Reference

Page: 1 of 1
Reviewer: MH
2nd reviewer:

All circled methods are applicable to each sample.

Sample ID	Parameter
1-10	pH TDS Cl F NO_3 NO_2 SO_4 PO_4 ALK CN^- NH_3 TKN [✓ TOC] CR^{6+} [✓ TS] ____ ____ ____
gw 11	pH TDS Cl F NO_3 NO_2 SO_4 PO_4 ALK CN^- NH_3 TKN [✓ TOC] CR^{6+} ____ ____ ____ ____
12	pH TDS Cl F NO_3 NO_2 SO_4 PO_4 ALK CN^- NH_3 TKN [✓ TOC] CR^{6+} ____ ____ ____ ____
13,14	pH TDS Cl F NO_3 NO_2 SO_4 PO_4 ALK CN^- NH_3 TKN TOC CR^{6+} [✓ TS] ____ ____ ____
15	pH TDS Cl F NO_3 NO_2 SO_4 PO_4 ALK CN^- NH_3 TKN [✓ TOC] CR^{6+} ____ ____ ____ ____
	pH TDS Cl F NO_3 NO_2 SO_4 PO_4 ALK CN^- NH_3 TKN TOC CR^{6+} ____ ____ ____ ____
	pH TDS Cl F NO_3 NO_2 SO_4 PO_4 ALK CN^- NH_3 TKN TOC CR^{6+} ____ ____ ____ ____
	pH TDS Cl F NO_3 NO_2 SO_4 PO_4 ALK CN^- NH_3 TKN TOC CR^{6+} ____ ____ ____ ____
	pH TDS Cl F NO_3 NO_2 SO_4 PO_4 ALK CN^- NH_3 TKN TOC CR^{6+} ____ ____ ____ ____
	pH TDS Cl F NO_3 NO_2 SO_4 PO_4 ALK CN^- NH_3 TKN TOC CR^{6+} ____ ____ ____ ____
	pH TDS Cl F NO_3 NO_2 SO_4 PO_4 ALK CN^- NH_3 TKN TOC CR^{6+} ____ ____ ____ ____
	pH TDS Cl F NO_3 NO_2 SO_4 PO_4 ALK CN^- NH_3 TKN TOC CR^{6+} ____ ____ ____ ____
	pH TDS Cl F NO_3 NO_2 SO_4 PO_4 ALK CN^- NH_3 TKN TOC CR^{6+} ____ ____ ____ ____
	pH TDS Cl F NO_3 NO_2 SO_4 PO_4 ALK CN^- NH_3 TKN TOC CR^{6+} ____ ____ ____ ____
	pH TDS Cl F NO_3 NO_2 SO_4 PO_4 ALK CN^- NH_3 TKN TOC CR^{6+} ____ ____ ____ ____
	pH TDS Cl F NO_3 NO_2 SO_4 PO_4 ALK CN^- NH_3 TKN TOC CR^{6+} ____ ____ ____ ____
	pH TDS Cl F NO_3 NO_2 SO_4 PO_4 ALK CN^- NH_3 TKN TOC CR^{6+} ____ ____ ____ ____
	pH TDS Cl F NO_3 NO_2 SO_4 PO_4 ALK CN^- NH_3 TKN TOC CR^{6+} ____ ____ ____ ____
	pH TDS Cl F NO_3 NO_2 SO_4 PO_4 ALK CN^- NH_3 TKN TOC CR^{6+} ____ ____ ____ ____
	pH TDS Cl F NO_3 NO_2 SO_4 PO_4 ALK CN^- NH_3 TKN TOC CR^{6+} ____ ____ ____ ____
	pH TDS Cl F NO_3 NO_2 SO_4 PO_4 ALK CN^- NH_3 TKN TOC CR^{6+} ____ ____ ____ ____
	pH TDS Cl F NO_3 NO_2 SO_4 PO_4 ALK CN^- NH_3 TKN TOC CR^{6+} ____ ____ ____ ____
	pH TDS Cl F NO_3 NO_2 SO_4 PO_4 ALK CN^- NH_3 TKN TOC CR^{6+} ____ ____ ____ ____
	pH TDS Cl F NO_3 NO_2 SO_4 PO_4 ALK CN^- NH_3 TKN TOC CR^{6+} ____ ____ ____ ____
	pH TDS Cl F NO_3 NO_2 SO_4 PO_4 ALK CN^- NH_3 TKN TOC CR^{6+} ____ ____ ____ ____

Comments:____

LDC #: 13234D6
SDG #: HR49

VALIDATION FINDINGS WORKSHEET
Technical Holding Times

Page: 1 of 1
Reviewer: WM
2nd reviewer: [illegible]

All circled dates have exceeded the technical holding time.
Y N (N/A) Were all samples preserved as applicable to each method ?
(Y) N N/A Were all cooler temperatures within validation criteria?

Method:		160.3					
Parameters:		TS					
Technical holding time:		7 days					
Sample ID	Sampling date	Analysis date	Analysis date	Analysis date	Analysis date	Analysis date	Qualifier
1,3,7,9,13,14	2/1/05	2/14/05	(13 days)				J-/B/P
2,5,8,10	2/2/05	↓	(12 days)				↓
4,6,	1/31/05	↓	(14 days)				↓

LDC #: 13315A6 **VALIDATION COMPLETENESS WORKSHEET** Date: 3/28/05
SDG #: HS56 Level II Page: 1 of 1
Laboratory: Analytical Resources, Inc. Reviewer: MM
2nd Reviewer: SC

METHOD: Total Solids (EPA Method 160.3), TOC (Plumb),

The samples listed below were reviewed for each of the following validation areas. Validation findings are noted in attached validation findings worksheets.

	Validation Area		Comments
I.	Technical holding times	A	Sampling dates: 2/8, 10/05
IIa.	Initial calibration	N	
IIb.	Calibration verification	N	
III.	Blanks	A	
IV	Matrix Spike/Matrix Spike Duplicates	A	
V	Duplicates	A	Triplicates.
VI.	Laboratory control samples	A	LCS + SRM
VII.	Sample result verification	N	
VIII.	Overall assessment of data	A	
IX.	Field duplicates	N	
X	Field blanks	N	

Note: A = Acceptable
N = Not provided/applicable
SW = See worksheet
ND = No compounds detected
R = Rinsate
FB = Field blank
D = Duplicate
TB = Trip blank
EB = Equipment blank

Validated Samples: Sediment.

1	LDW-SS4-010	11		21		31	
2	LDW-SS5a-010	12		22		32	
3	LDW-SS5b-010	13		23		33	
4	SC-SS1b-010	14		24		34	
5	LDW-SS4-010MS	15		25		35	
6	LDW-SS4-010DUP	16		26		36	
7	LDW-SS4-010TRP	17		27		37	
8	HD	18		28		38	
9		19		29		39	
10		20		30		40	

Notes:

LDC #: 13315B6
SDG #: H556

VALIDATION FINDINGS WORKSHEET
Sample Specific Analysis Reference

Page: 1 of 1
Reviewer: MH
2nd reviewer:

All circled methods are applicable to each sample.

Sample ID	Parameter
1-4	pH TDS Cl F NO_3 NO_2 SO_4 PO_4 ALK CN^- NH_3 TKN [✓ TOC] CR^{6+} [✓ TS] ____ ____ ____
QC 5	pH TDS Cl F NO_3 NO_2 SO_4 PO_4 ALK CN^- NH_3 TKN [✓ TOC] CR^{6+} ____ ____ ____ ____
↓ 6, 7	pH TDS Cl F NO_3 NO_2 SO_4 PO_4 ALK CN^- NH_3 TKN [✓ TOC] CR^{6+} [✓ TS] ____ ____ ____
	pH TDS Cl F NO_3 NO_2 SO_4 PO_4 ALK CN^- NH_3 TKN TOC CR^{6+} ____ ____ ____ ____
	pH TDS Cl F NO_3 NO_2 SO_4 PO_4 ALK CN^- NH_3 TKN TOC CR^{6+} ____ ____ ____ ____
	pH TDS Cl F NO_3 NO_2 SO_4 PO_4 ALK CN^- NH_3 TKN TOC CR^{6+} ____ ____ ____ ____
	pH TDS Cl F NO_3 NO_2 SO_4 PO_4 ALK CN^- NH_3 TKN TOC CR^{6+} ____ ____ ____ ____
	pH TDS Cl F NO_3 NO_2 SO_4 PO_4 ALK CN^- NH_3 TKN TOC CR^{6+} ____ ____ ____ ____
	pH TDS Cl F NO_3 NO_2 SO_4 PO_4 ALK CN^- NH_3 TKN TOC CR^{6+} ____ ____ ____ ____
	pH TDS Cl F NO_3 NO_2 SO_4 PO_4 ALK CN^- NH_3 TKN TOC CR^{6+} ____ ____ ____ ____
	pH TDS Cl F NO_3 NO_2 SO_4 PO_4 ALK CN^- NH_3 TKN TOC CR^{6+} ____ ____ ____ ____
	pH TDS Cl F NO_3 NO_2 SO_4 PO_4 ALK CN^- NH_3 TKN TOC CR^{6+} ____ ____ ____ ____
	pH TDS Cl F NO_3 NO_2 SO_4 PO_4 ALK CN^- NH_3 TKN TOC CR^{6+} ____ ____ ____ ____
	pH TDS Cl F NO_3 NO_2 SO_4 PO_4 ALK CN^- NH_3 TKN TOC CR^{6+} ____ ____ ____ ____
	pH TDS Cl F NO_3 NO_2 SO_4 PO_4 ALK CN^- NH_3 TKN TOC CR^{6+} ____ ____ ____ ____
	pH TDS Cl F NO_3 NO_2 SO_4 PO_4 ALK CN^- NH_3 TKN TOC CR^{6+} ____ ____ ____ ____
	pH TDS Cl F NO_3 NO_2 SO_4 PO_4 ALK CN^- NH_3 TKN TOC CR^{6+} ____ ____ ____ ____
	pH TDS Cl F NO_3 NO_2 SO_4 PO_4 ALK CN^- NH_3 TKN TOC CR^{6+} ____ ____ ____ ____
	pH TDS Cl F NO_3 NO_2 SO_4 PO_4 ALK CN^- NH_3 TKN TOC CR^{6+} ____ ____ ____ ____
	pH TDS Cl F NO_3 NO_2 SO_4 PO_4 ALK CN^- NH_3 TKN TOC CR^{6+} ____ ____ ____ ____
	pH TDS Cl F NO_3 NO_2 SO_4 PO_4 ALK CN^- NH_3 TKN TOC CR^{6+} ____ ____ ____ ____
	pH TDS Cl F NO_3 NO_2 SO_4 PO_4 ALK CN^- NH_3 TKN TOC CR^{6+} ____ ____ ____ ____
	pH TDS Cl F NO_3 NO_2 SO_4 PO_4 ALK CN^- NH_3 TKN TOC CR^{6+} ____ ____ ____ ____
	pH TDS Cl F NO_3 NO_2 SO_4 PO_4 ALK CN^- NH_3 TKN TOC CR^{6+} ____ ____ ____ ____
	pH TDS Cl F NO_3 NO_2 SO_4 PO_4 ALK CN^- NH_3 TKN TOC CR^{6+}

Comments:____

LDC #: 13315A33
SDG #: HS56
Laboratory: Analytical Resources, Inc.

VALIDATION COMPLETENESS WORKSHEET
Level II

Date: 3/29/05
Page: 1 of 1
Reviewer: [illegible]
2nd Reviewer: [illegible]

METHOD: GC Pentachlorophenol (EPA SW846 Method 8041)

The samples listed below were reviewed for each of the following validation areas. Validation findings are noted in attached validation findings worksheets.

	Validation Area		Comments
I.	Technical holding times	A	Sampling dates: 2/10/05
IIa.	Initial calibration	N	
IIb.	Calibration verification	N	
III.	Blanks	N	
IVa.	Surrogate recovery	A	
IVb	Matrix spike/Matrix spike duplicates	A	
IVc.	Laboratory control samples / SRM	A	LCS ~~ND~~ SRM (SVOA was analyzed)
V.	Target compound identification	N	
VI.	Compound Quantitation and CRQLs	N	
VII.	System Performance	N	
VIII.	Overall assessment of data	A	
IX.	Field duplicates	N	
X.	Field blanks	N	

Note: A = Acceptable
N = Not provided/applicable
SW = See worksheet

ND = No compounds detected
R = Rinsate
FB = Field blank

D = Duplicate
TB = Trip blank
EB = Equipment blank

Validated Samples: sediment

1	SC-SS1b-010	11	MB-021805	21		31	
2	SC-SS1b-010MS	12		22		32	
3	SC-SS1b-010MSD	13		23		33	
4		14		24		34	
5		15		25		35	
6		16		26		36	
7		17		27		37	
8		18		28		38	
9		19		29		39	
10		20		30		40	

LDC #: 13521A1 **VALIDATION COMPLETENESS WORKSHEET** Date: 5/27/05
SDG #: HZ55 Level II Page: 1 of 1
Laboratory: Analytical Resources, Inc. Reviewer: [illegible]
2nd Reviewer: [illegible]

METHOD: GC/MS Volatiles (EPA SW 846 Method 8260B)

The samples listed below were reviewed for each of the following validation areas. Validation findings are noted in attached validation findings worksheets.

	Validation Area		Comments
I.	Technical holding times	SW	Sampling dates: 3/9/05
II.	GC/MS Instrument performance check	N	
III.	Initial calibration	N	
IV.	Continuing calibration	N	
V.	Blanks	A	
VI.	Surrogate spikes	A	
VII.	Matrix spike/Matrix spike duplicates	A	
VIII.	Laboratory control samples	A	LCS/D no SRM was analyzed
IX.	Regional Quality Assurance and Quality Control	N	
X.	Internal standards	N	
XI.	Target compound identification	N	
XII.	Compound quantitation/CRQLs	N	
XIII.	Tentitatively identified compounds (TICs)	N	
XIV.	System performance	N	
XV.	Overall assessment of data	SW	
XVI.	Field duplicates	N	
XVII.	Field blanks	N	

Note: A = Acceptable
N = Not provided/applicable
SW = See worksheet
ND = No compounds detected
R = Rinsate
FB = Field blank
D = Duplicate
TB = Trip blank
EB = Equipment blank

Validated Samples Sediment

1	LDW-SS3-010	11	MB-050305	21		31	
2	LDW-SS3-010RE	12		22		32	
3	LDW-SS3-010MS	13		23		33	
4	LDW-SS3-010MSD	14		24		34	
5		15		25		35	
6		16		26		36	
7		17		27		37	
8		18		28		38	
9		19		29		39	
10		20		30		40	

LDC #: 1352A1
SDG #: HZ55

VALIDATION FINDINGS WORKSHEET
Technical Holding Times

Page: 1 of 1
Reviewer: [illegible]
2nd Reviewer: [illegible]

All circled dates have exceeded the technical holding times.
Y N N/A Were all cooler temperatures within validation criteria?

METHOD : GC/MS VOA (EPA SW 846 Method 8260B)

Sample ID	Matrix	Preserved	Sampling Date	Extraction date	Analysis date	Total # of Days	Qualifier
All	sediment	Frozen	3/9/05		5/3/05	55	J/R/P

TECHNICAL HOLDING TIME CRITERIA

Water unpreserved:	Aromatic within 7 days, non-aromatic within 14 days of sample collection.
Water preserved:	Both within 14 days of sample collection.
Soil:	Both within 14 days of sample collection.

LDC #: 1352/A1
SDG #: H255

VALIDATION FINDINGS WORKSHEET
Compound Quantitation and CRQLs

Page: 1 of 1
Reviewer: RJ
2nd Reviewer: [illegible]

METHOD: GC/MS VOA (EPA SW 846 Method 8260B)

Please see qualifications below for all questions answered "N". Not applicable questions are identified as "N/A".

Y N N/A Were the correct internal standard (IS), quantitation ion and relative response factor (RRF) used to quantitate the compound?
Y N N/A Were compound quantitation and CRQLs adjusted to reflect all sample dilutions and dry weight factors applicable to level IV validation?

#	Date	Sample ID	Finding	Associated Samples	Qualifications
		2	Re-analysis confirmed 1ST Run		R/A

Comments: See sample calculation verification worksheet for recalculations

LDC #: 13521A3
SDG #: HZ55
Laboratory: Analytical Resources, Inc.

VALIDATION COMPLETENESS WORKSHEET
Level II

Date: 5/27/05
Page: 1 of 1
Reviewer: [illegible]
2nd Reviewer: [illegible]

METHOD: GC Chlorinated Pesticides (EPA SW 846 Method 8081A)

The samples listed below were reviewed for each of the following validation areas. Validation findings are noted in attached validation findings worksheets.

	Validation Area		Comments
I.	Technical holding times	A	Sampling dates: ~~3/9/05~~ 2/2/05 → 3/15/05
II.	GC/ECD Instrument Performance Check	N	
III.	Initial calibration	N	
IV.	Continuing calibration	N	
V.	Blanks	A	
VI.	Surrogate spikes	A	
VII.	Matrix spike/Matrix spike duplicates	A	
VIII.	Laboratory control samples	A	LCS No SRM was analyzed
IX.	Regional quality assurance and quality control	N	
Xa.	Florisil cartridge check	N	
Xb.	GPC Calibration	N	
XI.	Target compound identification	N	
XII.	Compound quantitation and reported CRQLs	N	
XIII.	Overall assessment of data	A	
XIV.	Field duplicates	N	
XV.	Field blanks	N	

Note: A = Acceptable
N = Not provided/applicable
SW = See worksheet
ND = No compounds detected
R = Rinsate
FB = Field blank
D = Duplicate
TB = Trip blank
EB = Equipment blank

Validated Samples:

Sediment

1	LDW-SS3-010	11	MB-042805	21		31	
2	LDW-SS100-010	12		22		32	
3	LDW-SS151-010	13		23		33	
4	LDW-SS53-010 2/2/05	14		24		34	
5	LDW-SSC1-010	15		25		35	
6	LDW-SS3-010MS	16		26		36	
7	LDW-SS3-010MSD	17		27		37	
8		18		28		38	
9		19		29		39	
10		20		30		40	

samples were analyzed for Hexachlorobenzene + Hexachlorobutadiene

LDC #: 13846A1 **VALIDATION COMPLETENESS WORKSHEET** Date: 8/17/05
SDG #: II22 Level II Page: 1 of 1
Laboratory: Analytical Resources, Inc. Reviewer: [illegible]
2nd Reviewer: [illegible]

METHOD: GC/MS Volatiles (EPA SW 846 Method 8260B)

The samples listed below were reviewed for each of the following validation areas. Validation findings are noted in attached validation findings worksheets.

	Validation Area		Comments
I.	Technical holding times	SW	Sampling dates: 3/14/05
II.	GC/MS Instrument performance check	N	
III.	Initial calibration	N	
IV.	Continuing calibration	N	
V.	Blanks	A	
VI.	Surrogate spikes	A	
VII.	Matrix spike/Matrix spike duplicates	SW	
VIII.	Laboratory control samples	A	LCS/P NO SRM was analyzed Text
IX.	Regional Quality Assurance and Quality Control	N	
X.	Internal standards	N	check IS areas
XI.	Target compound identification	A	
XII.	Compound quantitation/CRQLs	N	
XIII.	Tentitatively identified compounds (TICs)	N	
XIV.	System performance	N	
XV.	Overall assessment of data	SW	
XVI.	Field duplicates	N	
XVII.	Field blanks	N	

Note: A = Acceptable; N = Not provided/applicable; SW = See worksheet; ND = No compounds detected; R = Rinsate; FB = Field blank; D = Duplicate; TB = Trip blank; EB = Equipment blank

Validated Samples

Sediment / IS out of QC

1	LDW-SSB4a-010	11	MB-072705	21		31	
2	LDW-SSB4a-010RE	12		22		32	
3	LDW-SSB4a-010MS	13		23		33	
4	LDW-SSB4a-010MSD	14		24		34	
5		15		25		35	
6		16		26		36	
7		17		27		37	
8		18		28		38	
9		19		29		39	
10		20		30		40	

TARGET COMPOUND WORKSHEET

METHOD: VOA (EPA SW 846 Method 8260B)

A. Chloromethane*	S. Trichloroethene	KK. Trichlorofluoromethane	CCC. tert-Butylbenzene	UUU. 1,2-Dichlorotetrafluoroethane
B. Bromomethane	T. Dibromochloromethane	LL. Methyl-tert-butyl ether	DDD. 1,2,4-Trimethylbenzene	VVV. 4-Ethyltoluene
C. Vinyl choride**	U. 1,1,2-Trichloroethane	MM. 1,2-Dibromo-3-chloropropane	EEE. sec-Butylbenzene	WWW. Ethanol
D. Chloroethane	V. Benzene	NN. Methyl ethyl ketone	FFF. 1,3-Dichlorobenzene	XXX. Di-isopropyl ether
E. Methylene chloride	W. trans-1,3-Dichloropropene	OO. 2,2-Dichloropropane	GGG. p-Isopropyltoluene	YYY. tert-Butanol
F. Acetone	X. Bromoform*	PP. Bromochloromethane	HHH. 1,4-Dichlorobenzene	ZZZ. tert-Butyl alcohol
G. Carbon disulfide	Y. 4-Methyl-2-pentanone	QQ. 1,1-Dichloropropene	III. n-Butylbenzene	AAAA. Ethyl tert-butyl ether
H. 1,1-Dichloroethene**	Z. 2-Hexanone	RR. Dibromomethane	JJJ. 1,2-Dichlorobenzene	BBBB. tert-Amyl methyl ether
I. 1,1-Dichloroethane*	AA. Tetrachloroethene	SS. 1,3-Dichloropropane	KKK. 1,2,4-Trichlorobenzene	CCCC.1-Chlorohexane
J. 1,2-Dichloroethene, total	BB. 1,1,2,2-Tetrachloroethane*	TT. 1,2-Dibromoethane	LLL. Hexachlorobutadiene	DDDD. Isopropyl alcohol
K. Chloroform**	CC. Toluene**	UU. 1,1,1,2-Tetrachloroethane	MMM. Naphthalene	EEEE. Acetonitrile
L. 1,2-Dichloroethane	DD. Chlorobenzene*	VV. Isopropylbenzene	NNN. 1,2,3-Trichlorobenzene	FFFF. Acrolein
M. 2-Butanone	EE. Ethylbenzene**	WW. Bromobenzene	OOO. 1,3,5-Trichlorobenzene	GGGG. Acrylonitrile
N. 1,1,1-Trichloroethane	FF. Styrene	XX. 1,2,3-Trichloropropane	PPP. trans-1,2-Dichloroethene	HHHH. 1,4-Dioxane
O. Carbon tetrachloride	GG. Xylenes, total	YY. n-Propylbenzene	QQQ. cis-1,2-Dichloroethene	IIII. Isobutyl alcohol
P. Bromodichloromethane	HH. Vinyl acetate	ZZ. 2-Chlorotoluene	RRR. m,p-Xylenes	JJJJ. Methacrylonitrile
Q. 1,2-Dichloropropane**	II. 2-Chloroethylvinyl ether	AAA. 1,3,5-Trimethylbenzene	SSS. o-Xylene	KKKK. Propionitrile
R. cis-1,3-Dichloropropene	JJ. Dichlorodifluoromethane	BBB. 4-Chlorotoluene	TTT. 1,1,2-Trichloro-1,2,2-trifluoroethane	LLLL.

* = System performance check compounds (SPCC) for RRF ; ** = Calibration check compounds (CCC) for %RSD.

LDC #: 13846A1
SDG #: I122

VALIDATION FINDINGS WORKSHEET
Technical Holding Times

Reviewer: [illegible]
2nd Reviewer:

All circled dates have exceeded the technical holding times.
(Y) N N/A Were all cooler temperatures within validation criteria?

METHOD : GC/MS VOA (EPA SW 846 Method 8260B)

Sample ID	Matrix	Preserved	Sampling Date	Extraction date	Analysis date	Total # of Days	Qualifier
1, 2	sediment	frozen	3/14/05		7/27/05	135	J/R/P

TECHNICAL HOLDING TIME CRITERIA

Water unpreserved:	Aromatic within 7 days, non-aromatic within 14 days of sample collection.
Water preserved:	Both within 14 days of sample collection.
Soil:	Both within 14 days of sample collection.

LDC #: 13846A1
SDG #: II22

VALIDATION FINDINGS WORKSHEET
Matrix Spike/Matrix Spike Duplicates

Page: 1 of 1
Reviewer: EJ
2nd Reviewer:

METHOD : GC/MS VOA (EPA SW 846 Method 8260B)

Please see qualifications below for all questions answered "N". Not applicable questions are identified as "N/A".

Y N N/A Were a matrix spike (MS) and matrix spike duplicate (MSD) analyzed for each matrix in this SDG? If no, indicate which matrix does not have an associated MS/MSD. Soil / Water.

Y N N/A Was a MS/MSD analyzed every 20 samples of each matrix?

Y N N/A Were the MS/MSD percent recoveries (%R) and the relative percent differences (RPD) within the QC limits?

#	Date	MS/MSD ID	Compound	MS %R (Limits)	MSD %R (Limits)	RPD (Limits)	Associated Samples	Qualifications
		3+4	KKK	40.6 (75-125)	46.7 (75-125)	( )	All	J/UJ/A
				( )	( )	( )		
				( )	( )	( )		
				( )	( )	( )		
				( )	( )	( )		
				( )	( )	( )		
				( )	( )	( )		
				( )	( )	( )		
				( )	( )	( )		
				( )	( )	( )		
				( )	( )	( )		
				( )	( )	( )		
				( )	( )	( )		
				( )	( )	( )		
				( )	( )	( )		
				( )	( )	( )		
				( )	( )	( )		
				( )	( )	( )		
				( )	( )	( )		

	Compound	QC Limits (Soil)	RPD (Soil)	QC Limits (Water)	RPD (Water)
H.	1,1-Dichloroethene	59-172%	≤ 22%	61-145%	≤ 14%
S.	Trichloroethene	62-137%	≤ 24%	71-120%	≤ 14%
V.	Benzene	66-142%	≤ 21%	76-127%	≤ 11%
CC.	Toluene	59-139%	≤ 21%	76-125%	≤ 13%
DD.	Chlorobenzene	60-133%	≤ 21%	75-130%	≤ 13%

LDC #: 13846A1
SDG #: II22

VALIDATION FINDINGS WORKSHEET
Overall Assessment of Data

Page: 1 of 1
Reviewer: AT
2nd Reviewer:

METHOD: GC/MS VOA (EPA SW 846 Method 8260B)

Please see qualifications below for all questions answered "N". Not applicable questions are identified as "N/A".

All available information pertaining to the data were reviewed using professional judgement to compliment the determination of the overall quality of the data.

Y N N/A Was the overall quality and usability of the data acceptable?

#	Date	~~Sample ID~~ compound	Finding	Associated Samples	Qualifications
		All	IS failed	1	R/A

Comments: _____

LDC #: 13846A3a

SDG #: II22

Laboratory: Analytical Resources, Inc.

VALIDATION COMPLETENESS WORKSHEET

Level II

Date: 8/17/05

Page: 1 of 1

Reviewer: [illegible]

2nd Reviewer: _____

METHOD: GC Chlorinated Pesticides (EPA SW 846 Method 8081A)

The samples listed below were reviewed for each of the following validation areas. Validation findings are noted in attached validation findings worksheets.

	Validation Area		Comments
I.	Technical holding times	A	Sampling dates: 3/14/05
II.	GC/ECD Instrument Performance Check	N	
III.	Initial calibration	N	
IV.	Continuing calibration	N	
V.	Blanks	A	
VI.	Surrogate spikes	A	
VII.	Matrix spike/Matrix spike duplicates	A	
VIII.	Laboratory control samples	A	LCS; NO SRM (stand. Ref. Material) was analyzed. Text
IX.	Regional quality assurance and quality control	N	
Xa.	Florisil cartridge check	N	
Xb.	GPC Calibration	N	
XI.	Target compound identification	SW	
XII.	Compound quantitation and reported CRQLs	N	
XIII.	Overall assessment of data	A	
XIV.	Field duplicates	N	
XV.	Field blanks	N	

Note: A = Acceptable; N = Not provided/applicable; SW = See worksheet; ND = No compounds detected; R = Rinsate; FB = Field blank; D = Duplicate; TB = Trip blank; EB = Equipment blank

Validated Samples: Sediment

1	LDW-SSB4a-010	11	MB-072805	21		31	
2	LDW-SSB4a-010MS	12		22		32	
3	LDW-SSB4a-010MSD	13		23		33	
4		14		24		34	
5		15		25		35	
6		16		26		36	
7		17		27		37	
8		18		28		38	
9		19		29		39	
10		20		30		40	

LDC #: 13846A3a
SDG #: TI22

VALIDATION FINDINGS WORKSHEET
Target Compound Identification

Page: 1 of 1
Reviewer: FT
2nd Reviewer:

METHOD: ✓ GC __ HPLC

Please see qualifications below for all questions answered "N". Not applicable questions are identified as "N/A".
Y N N/A Were the retention times for detected target compounds within their retention time windows?

#	Sample ID	Column / Detector	Compound	RT (Limits)	Qualifications
	1	-	Hexachlorobenzene	( )	NJ
				( )	(No interference check
				( )	- PCB Aroclor - was
				( )	analyzed)
				( )	
				( )	
				( )	
				( )	
				( )	
				( )	
				( )	
				( )	
				( )	
				( )	
				( )	
				( )	
				( )	
				( )	
				( )	
				( )	
				( )	
				( )	
				( )	
				( )	
				( )	
				( )	

Comments:

B. Analytical chemistry: sample group HZ55

LABORATORY DATA CONSULTANTS, INC.
7750 El Camino Real, Suite 2L Carlsbad, CA 92009 Phone: 760/634-0437 Fax: 760/634-0439

LDC #13521
June 7, 2005

Windward Environmental, LLC
200 West Mercer Street, Suite 401
Seattle, WA 98119
ATTN: Ms. Susie McGroddy

SUBJECT: Lower Duwamish Waterway Group Sediment Sample Data Validation

Dear Ms. McGroddy,

Enclosed is our EPA Level II data validation of analytical chemistry results generated in support of the Lower Duwamish Waterway Group project. The analyses were performed by Analytical Resources, Inc. GC/MS Volatiles by EPA SW 846 Method 8260B and GC Chlorinated Pesticides by EPA SW 846 Method 8081A. Samples are referenced under the following Sample Delivery Group: HZ55. See the Sample Analysis Table (Attachment 1) for the number of samples reviewed.

Please feel free to contact us if you have any questions.

Sincerely,

Stella S. Cuenco
Project Manager/Senior Chemist

Attachment 1

Level II PDF LDC #13521 (Windward Environmental, LLC - Seattle WA / Lower Duwamish Waterway Group)

LDC	SDG#	DATE REC'D	(3) DATE DUE	VOA (8260B)		Pest. (8081A)																													
Matrix:	Water/Sediment			W	S	W	S	W	S	W	S	W	S	W	S	W	S	W	S	W	S	W	S	W	S	W	S	W	S	W	S	W	S	W	S
A	HZ55	05/19/05	06/09/05	0	2	0	5																												
Total	B/SC			0	2	0	5	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	7

Shaded cells indicate Level IV validation (all other cells are Level II validation). These sample counts do rot include MS/MSD, and DUPs

ADDENDUM TO THE
CHEMICAL DATA QUALITY REVIEW FOR PHASE 2 SEDIMENT SAMPLES

Lower Duwamish Waterway Group
LDC# 13521

This report details the findings of an EPA Level II data validation of analytical chemistry results generated in support of the Lower Duwamish Waterway Group project. The analyses were performed by Analytical Resources, Inc. GC/MS Volatiles by EPA SW 846 Method 8260B and GC Chlorinated Pesticides by EPA SW 846 Method 8081A. Samples are referenced under the following Sample Delivery Group: HZ55. See the Sample Analysis Table (Attachment 1) for the number of samples reviewed and the Sample Validation Table (Attachment 2) for the sample identifications and analyses.

The QC guidelines used for data qualification are those specified in the National Functional Guidelines for Organic Data Review (October 1999). Specific QC criteria used follows the Surface Sediment Sampling for Chemical Analyses and Toxicity Testing of the Lower Duwamish Waterway Quality Assurance Project Plan (January 14, 2005). Where specific guidance is not available, the data has been evaluated in a conservative manner consistent with industry standards using professional experience.

The following items were evaluated during the review:

- Holding Times
- Sample Preservation
- Cooler Temperatures
- Blanks
- Surrogates
- Matrix Spike/Matrix Spike Duplicates
- Laboratory Control Samples
- System Performance
- Field Duplicates

Attachment 1

Level II PDF **LDC #13521 (Windward Environmental, LLC - Seattle WA / Lower Duwamish Waterway Group)**

LDC	SDG#	DATE REC'D	(3) DATE DUE	VOA (8260B)		Pest. (8031A)																													
Matrix:	Water/Sediment			W	S	W	S	W	S	W	S	W	S	W	S	W	S	W	S	W	S	W	S	W	S	W	S	W	S	W	S	W	S	W	S
A	HZ55	05/19/05	06/09/05	0	2	0	5																												
Total	B/SC			0	2	0	5	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	7

Shaded cells indcate Level IV validation (all other cells are Level II validation). These sample counts do not include MS/MSD, and DUPs

Attachment 2

SDG#: HZ55 VALIDATION SAMPLE TABLE **LDC#:** 13521A

Project Name: Lower Duwamish Waterway Group Parameters/Analytical Method Project #04-08-06-24

Client ID #	Lab ID #	Matrix	Date Collected	VOA (8260B)	Pest. (8081A)										
LDW-SS3-010	HZ55A	sediment	03/09/05	X	X										
LDW-SS3-010RE	HZ55ARE	sediment	03/09/05	X											
LDW-SS100-010	HZ55B	sediment	03/11/05		X										
LDW-SS151-010	HZ55C	sediment	03/15/05		X										
LDW-SS53-010	HZ55D	sediment	02/02/05		X										
LDW-SSC1-010	HZ55E	sediment	03/15/05		X										
LDW-SS3-010MS	HZ55AMS	sediment	03/09/05	X	X										
LDW-SS3-010MSD	HZ55AMSD	sediment	03/09/05	X	X										

Note: X = Validation was performed.

Only issues which require comment or action are discussed in this report. Data deficiencies are arranged by method. Potential effects of data anomalies have been described where possible.

The following are definitions of the data qualifiers:

U Indicates the compound or analyte was analyzed for but not detected at or above the stated limit.

J Indicates an estimated value.

R Quality control indicates the data is not usable.

N Presumptive evidence of presence of the constituent.

UJ Indicates the compound or analyte was analyzed for but not detected. The sample detection limit is an estimated value.

A Indicates the finding is based upon technical validation criteria.

P Indicates the finding is related to a protocol/contractual deviation.

Overall Data Assessment

Holding time exceedances have warranted warranted the qualification of non-detected results as rejected (R) in the volatile analysis.

The quality control criteria reviewed, other than those discussed above, were met and are considered acceptable. Sample results that were found to be rejected (R) are unusable for all purposes. Based upon the data validation all other results are considered valid and usable for all purposes.

GC/MS Volatiles by EPA SW 846 Method 8260B

I. Technical Holding Times

All technical holding time requirements were met with the following exceptions:

Associated SDG	Sample	Compound	Total Days From Sample Collection Until Analysis	Required Holding Time (in Days) From Sample Collection Until Analysis	Flag	A or P
HA55	LDW-SS3-010 LDW-SS3-010RE LDW-SS3-010MS LDW-SS3-010MSD	All TCL compounds	55	14	J (all detects) R (all non-detects)	P

Non-detected sample concentrations were qualified as unusable (R) due to a gross exceedance (>2X) of holding time.

The chain-of-custodies were reviewed for documentation of cooler temperatures. All cooler temperatures met validation criteria.

II. GC/MS Instrument Performance Check

Instrument performance check data were not reviewed for Level II.

III. Initial Calibration

Initial calibration data were not reviewed for Level II.

IV. Continuing Calibration

Continuing calibration data were not reviewed for Level II.

V. Blanks

Method blanks were reviewed for each matrix as applicable. No volatile contaminants were found in the method blanks.

VI. Surrogate Spikes

Surrogates were added to all samples and blanks as required by the method. All surrogate recoveries (%R) were within QC limits.

VII. Matrix Spike/Matrix Spike Duplicates

Matrix spike (MS) and matrix spike duplicate (MSD) samples were reviewed for each matrix as applicable. Percent recoveries (%R) and relative percent differences (RPD) were within QC limits.

VIII. Laboratory Control Samples (LCS)

Laboratory control samples were reviewed for each matrix as applicable. Percent recoveries (%R) and relative percent differences (RPD) were within QC limits.

Standard reference material was not performed in this SDG.

IX. Regional Quality Assurance and Quality Control

Not applicable.

X. Internal Standards

Internal standards data were not reviewed for Level II.

XI. Target Compound Identifications

Target compound identifications data were not reviewed for Level II.

XII. Compound Quantitation and CRQLs

Compound quantitation and CRQLs data were not reviewed for Level II.

XIII. Tentatively Identified Compounds (TICs)

Tentatively identified compounds data were not reviewed for Level II.

XIV. System Performance

System performance data were not reviewed for Level II.

XV. Overall Assessment

Overall, the data cannot be used for their intended purpose.

XVI. Field Duplicates

No field duplicates were identified in this SDG.

XVII. Field Blanks

No field blanks were identified in this SDG.

GC Chlorinated Pesticides by EPA SW 846 Method 8081A

I. Technical Holding Times

All technical holding time requirements were met.

The chain-of-custodies were reviewed for documentation of cooler temperatures. All cooler temperatures met validation criteria.

II. GC/ECD Instrument Performance Check

Instrument performance check data were not reviewed for Level II.

III. Initial Calibration

Initial calibration data were not reviewed for Level II.

IV. Continuing Calibration

Continuing calibration data were not reviewed for Level II.

V. Blanks

Method blanks were reviewed for each matrix as applicable. No chlorinated pesticide contaminants were found in the method blanks.

VI. Surrogate Spikes

Surrogates were added to all samples and blanks as required by the method. All surrogate recoveries (%R) were within QC limits.

VII. Matrix Spike/Matrix Spike Duplicates

Matrix spike (MS) and matrix spike duplicate (MSD) samples were reviewed for each matrix as applicable. Percent recoveries (%R) and relative percent differences (RPD) were within QC limits.

VIII. Laboratory Control Samples (LCS)

Laboratory control samples were reviewed for each matrix as applicable. Percent recoveries (%R) were within QC limits.

Standard reference material was not performed in this SDG.

IX. Regional Quality Assurance and Quality Control

Not applicable.

X. Pesticide Cleanup Checks

a. Florisil Cartridge Check

Florisil cartridge check data were not reviewed for Level II.

b. GPC Calibration

GPC cleanup data were not reviewed for Level II.

XI. Target Compound Identification

Target compound identification data were not reviewed for Level II.

XII. Compound Quantitation and Reported CRQLs

Compound quantitation and CRQLs data were not reviewed for Level II.

XIII. Overall Assessment of Data

The overall assessment of data was acceptable.

XIV. Field Duplicates

No field duplicates were identified in this SDG.

XV. Field Blanks

No field blanks were identified in this SDG.

LDC #: 13521A1 **VALIDATION COMPLETENESS WORKSHEET** Date: 5/27/05
SDG #: HZ55 Level II Page: 1 of 1
Laboratory: Analytical Resources, Inc. Reviewer: [illegible]
2nd Reviewer: [illegible]

METHOD: GC/MS Volatiles (EPA SW 846 Method 8260B)

The samples listed below were reviewed for each of the following validation areas. Validation findings are noted in attached validation findings worksheets.

	Validation Area		Comments
I.	Technical holding times	SW	Sampling dates: 3/9/05
II.	GC/MS Instrument performance check	N	
III.	Initial calibration	N	
IV.	Continuing calibration	N	
V.	Blanks	A	
VI.	Surrogate spikes	A	
VII.	Matrix spike/Matrix spike duplicates	A	
VIII.	Laboratory control samples	A	LCS/D no SRM was analyzed
IX.	Regional Quality Assurance and Quality Control	N	
X.	Internal standards	N	
XI.	Target compound identification	N	
XII.	Compound quantitation/CRQLs	N	
XIII.	Tentitatively identified compounds (TICs)	N	
XIV.	System performance	N	
XV.	Overall assessment of data	SW	
XVI.	Field duplicates	N	
XVII.	Field blanks	N	

Note: A = Acceptable
N = Not provided/applicable
SW = See worksheet
ND = No compounds detected
R = Rinsate
FB = Field blank
D = Duplicate
TB = Trip blank
EB = Equipment blank

Validated Samples Sediment

1	LDW-SS3-010	11	MB-050305	21		31	
2	LDW-SS3-010RE	12		22		32	
3	LDW-SS3-010MS	13		23		33	
4	LDW-SS3-010MSD	14		24		34	
5		15		25		35	
6		16		26		36	
7		17		27		37	
8		18		28		38	
9		19		29		39	
10		20		30		40	

LDC #: 1352A1
SDG #: HZ55

VALIDATION FINDINGS WORKSHEET
Technical Holding Times

Page: 1 of 1
Reviewer: [illegible]
2nd Reviewer: [illegible]

All circled dates have exceeded the technical holding times.
Y N N/A Were all cooler temperatures within validation criteria?

METHOD : GC/MS VOA (EPA SW 846 Method 8260B)

Sample ID	Matrix	Preserved	Sampling Date	Extraction date	Analysis date	Total # of Days	Qualifier
All	sediment	Frozen	3/9/05		5/3/05	55	J/R/P

TECHNICAL HOLDING TIME CRITERIA

Water unpreserved:	Aromatic within 7 days, non-aromatic within 14 days of sample collection.
Water preserved:	Both within 14 days of sample collection.
Soil:	Both within 14 days of sample collection.

LDC #: 1352/A1
SDG #: H255

VALIDATION FINDINGS WORKSHEET
Compound Quantitation and CRQLs

Page: 1 of 1
Reviewer: RJ
2nd Reviewer: [illegible]

METHOD: GC/MS VOA (EPA SW 846 Method 8260B)

Please see qualifications below for all questions answered "N". Not applicable questions are identified as "N/A".

Y N N/A Were the correct internal standard (IS), quantitation ion and relative response factor (RRF) used to quantitate the compound?
Y N N/A Were compound quantitation and CRQLs adjusted to reflect all sample dilutions and dry weight factors applicable to level IV validation?

#	Date	Sample ID	Finding	Associated Samples	Qualifications
		2	Re-analysis confirmed 1ST Run		R/A

Comments: See sample calculation verification worksheet for recalculations

LDC #: 13521A3
SDG #: HZ55
Laboratory: Analytical Resources, Inc.

VALIDATION COMPLETENESS WORKSHEET
Level II

Date: 5/27/05
Page: 1 of 1
Reviewer: [illegible]
2nd Reviewer: [illegible]

METHOD: GC Chlorinated Pesticides (EPA SW 846 Method 8081A)

The samples listed below were reviewed for each of the following validation areas. Validation findings are noted in attached validation findings worksheets.

	Validation Area		Comments
I.	Technical holding times	A	Sampling dates: ~~3/9/05~~ 2/2/05 → 3/15/05
II.	GC/ECD Instrument Performance Check	N	
III.	Initial calibration	N	
IV.	Continuing calibration	N	
V.	Blanks	A	
VI.	Surrogate spikes	A	
VII.	Matrix spike/Matrix spike duplicates	A	
VIII.	Laboratory control samples	A	LCS No SRM was analyzed
IX.	Regional quality assurance and quality control	N	
Xa.	Florisil cartridge check	N	
Xb.	GPC Calibration	N	
XI.	Target compound identification	N	
XII.	Compound quantitation and reported CRQLs	N	
XIII.	Overall assessment of data	A	
XIV.	Field duplicates	N	
XV.	Field blanks	N	

Note: A = Acceptable
N = Not provided/applicable
SW = See worksheet
ND = No compounds detected
R = Rinsate
FB = Field blank
D = Duplicate
TB = Trip blank
EB = Equipment blank

Validated Samples:

Sediment

1	LDW-SS3-010	11	MB-042805	21		31	
2	LDW-SS100-010	12		22		32	
3	LDW-SS151-010	13		23		33	
4	LDW-SS53-010 2/2/05	14		24		34	
5	LDW-SSC1-010	15		25		35	
6	LDW-SS3-010MS	16		26		36	
7	LDW-SS3-010MSD	17		27		37	
8		18		28		38	
9		19		29		39	
10		20		30		40	

samples were analyzed for Hexachlorobenzene + Hexachlorobutadiene

C. PCB congeners: sample groups 16148, 16165

LABORATORY DATA CONSULTANTS, INC.
7750 El Camino Real, Suite 2L Carlsbad, CA 92009 Phone: 760/634-0437 Fax: 760/634-0439

LDC #13668
July 8, 2005

Windward Environmental, LLC
200 West Mercer Street, Suite 401
Seattle, WA 98119
ATTN: Ms. Susie McGroddy

SUBJECT: Lower Duwamish Waterway Group Sediment Sample Data Validation

Dear Ms. McGroddy,

Enclosed is our EPA Level IV data validation review of Analytical chemistry results generated in support of the Lower Duwamish Waterway Group project. The analyses were performed by Axys Analytical Services, Ltd. Samples were analyzed for HRGC/HRMS Polychlorinated Biphenyl Congeners by modified EPA Method 1668A. Samples are referenced under the following Sample Delivery Groups: DPWG16148 and DPGW16165. See the Sample Analysis Table (Attachment 1) for the number of samples reviewed.

Please feel free to contact us if you have any questions.

Sincerely,

Stella Cuenco

Stella S. Cuenco
Project Manager/Senior Chemist

Attachment 1

PDF

LDC #13668 (Windward Environmental, LLC - Seattle WA / Lower Duwamish Waterway Group)

LDC	SDG#	DATE REC'D	(3) DATE DUE	PCBs Cong. (1668)																															
Matrix:	Tissue/Sediment			T	S	T	S	T	S	T	S	T	S	T	S	T	S	T	S	W	S	W	S	W	S	W	S	W	S	W	S	W	S	W	S
A	DPWG16148	03/27/05	07/19/05	0	14																														
B	DPWG16165	03/27/05	07/19/05	0	13																														
Total	B/SC			0	27	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	27

Shaded cells indicate Level IV validation (al other cells are Level II validation). These sample counts do not include MS/MSD, and DUPs

CHEMICAL DATA QUALITY REVIEW FOR PHASE 1 AND PHASE 2 SURFACE SEDIMENT SAMPLES

Lower Duwamish Waterway Group
LDC# 13668

This report details the findings of an EPA Level IV data validation review of Analytical chemistry results generated in support of the Lower Duwamish Waterway Group project. The analyses were performed by Axys Analytical Services, Ltd. Samples were analyzed for HRGC/HRMS Polychlorinated Biphenyl Congeners by modified EPA Method 1668A. Samples are referenced under the following Sample Delivery Groups: DPWG16148 and DPGW16165. See the Sample Analysis Table (Attachment 1) for the number of samples reviewed and the Sample Validation Table (Attachment 2) for the sample identifications and analyses.

The QC guidelines used for data qualification are those specified in the EPA Region 10 SOP for the Validation of 1668 Toxic, Dioxin-like PCB Data (Revision 1.0, December 8, 1995). Specific QC criteria used follows the Surface Sediment Sampling for Chemical Analyses and Toxicity Testing of the Lower Duwamish Waterway Quality Assurance Project Plan (January 14, 2005). Where specific guidance is not available, the data has been evaluated in a conservative manner consistent with industry standards using professional experience.

The following items were evaluated during the review:

- Holding Times
- Sample Preservation
- Cooler Temperatures
- Blanks
- Matrix Spike/Matrix Spike Duplicates
- Internal Standards
- Laboratory Control Samples
- System Performance
- Field Duplicates

Attachment 1

LDC #13668 (Windward Environmental, LLC - Seattle WA / Lower Duwamish Waterway Group)

LDC	SDG#	DATE REC'D	(3) DATE DUE	PCBs Cong. (1668)																																			
Matrix:	Tissue/Sediment			T	S	T	S	T	S	T	S	T	S	T	S	T	S	T	S	W	S	W	S	W	S	W	S	W	S	W	S	W	S	W	S	W	S	W	S
A	DPWG16148	06/27/05	07/19/05	0	14																																		
B	DPWG16165	06/27/05	07/19/05	0	13																																		
Total	B/SC			0	27	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	27

Shaded cells indicate Level IV validation (all other cells are Level II validation). These sample counts do not include MS/MSD, and DUPs

Attachment 2

SDG#: DPWG16148 VALIDATION SAMPLE TABLE **LDC#:** 13668A

Project Name: Lower Duwamish Waterway Group Parameters/Analytical Method Project #04-08-06-24

Client ID #	Lab ID #	Matrix	Date Collected	PCB Cong. (1668A)											
LDW-SS-83-010	L7787-18	sediment	01/24/05	X											
LDW-SS-86-010	L7787-19	sediment	03/10/05	X											
LDW-SS-92-010	L7787-20	sediment	01/25/05	X											
LDW-SS-101-010	L7787-21	sediment	01/20/05	X											
LDW-SS-106-010	L7787-22	sediment	03/08/05	X											
LDW-SS-108-010	L7787-23	sediment	03/10/05	X											
LDW-SS-120-010	L7787-25	sediment	01/19/05	X											
LDW-SS-130-010	L7787-26	sediment	01/20/05	X											
LDW-SS-136-010	L7787-27	sediment	03/15/05	X											
LDW-SS-141-010	L7787-28	sediment	03/15/05	X											
LDW-SS-142-010	L7787-29	sediment	01/21/05	X											
LDW-SS-149-010	L7787-30	sediment	03/09/05	X											
LDW-SS-B2b-010	L7787-31	sediment	03/11/05	X											
LDW-SS-B9a-010	L7787-32	sediment	03/15/05	X											
LDW-SS-149-010DUP	L7787-30DUP	sediment	03/09/05	X											

Note: X = Validation was performed.

Attachment 2

SDG#: DPWG16165 VALIDATION SAMPLE TABLE **LDC#:** 13668B

Project Name: Lower Duwamish Waterway Group Parameters/Analytical Method Project #04-08-06-24

Client ID #	Lab ID #	Matrix	Date Collected	PCB Cong. (1668A)											
LDW-SS-14-010	L7787-5	sediment	01/17/05	X											
LDW-SS-17-010	L7787-6	sediment	01/17/05	X											
LDW-SS-19-010	L7787-7	sediment	03/08/05	X											
LDW-SS-24-010	L7787-8	sediment	03/14/05	X											
LDW-SS-25-010	L7787-9	sediment	03/11/05	X											
LDW-SS-28-010	L7787-10	sediment	01/24/05	X											
LDW-SS-46-010	L7787-11	sediment	03/10/05	X											
LDW-SS-56-010	L7787-12	sediment	01/24/05	X											
LDW-SS-64-010	L7787-13	sediment	01/24/05	X											
LDW-SS-67-010	L7787-14	sediment	01/21/05	X											
LDW-SS-71-010	L7787-15	sediment	03/14/05	X											
LDW-SS-72-010	L7787-16	sediment	01/24/05	X											
LDW-SS-74-010	L7787-17	sediment	03/07/05	X											
LDW-SS-67-010DUP	L7787-14DUP	sediment	01/21/05	X											

Note: X = Validation was performed.

Only issues which require comment or action are discussed in this report. Data deficiencies are arranged by method. Potential effects of data anomalies have been described where possible.

The following are definitions of the data qualifiers:

U Indicates the compound or analyte was analyzed for but not detected at or above the stated limit.

J Indicates an estimated value.

- J1 Blank Contamination: Indicates possible high bias and/or false positives.
- J2 Calibration Range exceeded: Indicates possible low bias.
- J3 Holding times not met: Indicates low bias for most analytes.
- J4 Other QC parameters outside control limits: bias not readily determined.
- J5 Other QC parameters outside control limits. The reported results appear to be biased high. The actual value of target compound in the sample may be lower than the value reported by the laboratory.
- J6 Other QC parameters outside control limits. The reported results appear to be biased low. The actual value of target compound in the sample may be higher than the value reported by the laboratory.

R Quality control indicates the data is not usable.

N Presumptive evidence of presence of the constituent.

UJ Indicates the compound or analyte was analyzed for but not detected. The sample detection limit is an estimated value.

A Indicates the finding is based upon technical validation criteria.

P Indicates the finding is related to a protocol/contractual deviation.

Overall Data Assessment

Compound quantification problems have warranted the qualification of several results in two samples as estimated (J).

The frequency of matrix spike (MS) and matrix spike duplicate (MSD) was not met as required by the QAPP. MS/MSD analyses are not required for EPA Method 1668A. The laboratory consulted with the client on this discrepancy and was instructed to proceed with the extraction and analysis despite the absence of MS/MSDs.

The frequency of SRM was not met as required by the QAPP.

The quality control criteria reviewed, other than those discussed above, were met and are considered acceptable. Sample results that were found to be estimated (J) are usable for limited purposes only. Based upon the data validation all other results are considered valid and usable for all purposes.

HRGC/HRMS Polychlorinated Biphenyl Congeners by modified EPA Method 1668A

I. Technical Holding Times

All technical holding time requirements were met.

The chain-of-custodies were reviewed for documentation of cooler temperatures. All cooler temperatures met validation criteria.

II. GC/MS Instrument Performance Check

Instrument performance was checked at the required daily frequency.

Retention time windows were established for all congeners. The chromatographic resolution was less than or equal to 40% for congeners PCB-23 and PCB-34 and congeners PCB-182 and PCB-187.

The static resolving power was at least 10,000 (10% valley definition).

III. Initial Calibration

A five point initial calibration was performed as required by the method.

The percent relative standard deviations (%RSD) were less than or equal to 20.0% for compounds.

The minimum S/N ratio for each target compound was greater than or equal to 2.5 and greater than or equal to 10 for each recovery and internal standard compound.

IV. Routine Calibration (Continuing)

Routine calibration was performed at the required frequencies.

All of the routine calibration percent differences (%D) between the initial calibration RRF and the routine calibration RRF were less than or equal to 25.0% for unlabeled compounds and less than or equal to 35.0% for labeled compounds.

V. Blanks

Method blanks were reviewed for each matrix as applicable. No polychlorinated biphenyl contaminants were found in the method blanks with the following exceptions:

Associated SDG	Method Blank ID	Extraction Date	Compound	Concentration	Associated Samples
DPWG16148	WG15674-101	5/9/05	PCB-66 PCB-77 PCB-90 PCB-105 PCB-110 PCB-114 PCB-118 PCB-129 PCB-153 PCB-156 PCB-167	6.98 ng/Kg 0.618 ng/Kg 1.51 ng/Kg 1.64 ng/Kg 1.19 ng/Kg 0.237 ng/Kg 4.67 ng/Kg 1.35 ng/Kg 1.26 ng/Kg 0.336 ng/Kg 0.178 ng/Kg	LDW-SS-83-010 LDW-SS-86-010 LDW-SS-92-010 LDW-SS-101-010 LDW-SS-106-010 LDW-SS-108-010 LDW-SS-120-010 LDW-SS-130-010 LDW-SS-136-010 LDW-SS-141-010 LDW-SS-142-010 LDW-SS-149-010 LDW-SS-B2b-010 LDW-SS-B9a-010
DPWG16165	WG15734-101	5/15/05	PCB-66 PCB-77 PCB-90 PCB-105 PCB-110 PCB-114 PCB-118 PCB-126 PCB-129 PCB-153 PCB-156 PCB-167 PCB-169 PCB-180 PCB-189	0.190 ng/Kg 0.245 ng/Kg 0.274 ng/Kg 0.118 ng/Kg 0.221 ng/Kg 0.044 ng/Kg 0.197 ng/Kg 0.060 ng/Kg 0.165 ng/Kg 0.086 ng/Kg 0.080 ng/Kg 0.021 ng/Kg 0.023 ng/Kg 0.050 ng/Kg 0.028 ng/Kg	LDW-SS-14-010 LDW-SS-17-010 LDW-SS-19-010 LDW-SS-24-010 LDW-SS-25-010 LDW-SS-28-010 LDW-SS-46-010 LDW-SS-56-010 LDW-SS-64-010 LDW-SS-67-010 LDW-SS-71-010 LDW-SS-72-010 LDW-SS-74-010

Sample concentrations were compared to concentrations detected in the method blanks. The sample concentrations were either not detected or were significantly greater (>5X blank contaminants) than the concentrations found in the associated method blanks.

No field blanks were identified in this SDG.

VI. Matrix Spike/Matrix Spike Duplicates

A matrix spike (MS) and matrix spike duplicate (MSD) was not performed for this SDG.

Duplicate (DUP) sample analyses were reviewed for each matrix as applicable. Results were within QC limits.

VII. Laboratory Control Samples (LCS)

Laboratory control samples were reviewed for each matrix as applicable. The percent recoveries (%R) were within the QC limits.

Standard reference material was performed at the required frequencies for SDG DPWG16148.

No standard reference material was performed for SDG DPWG16165.

VIII. Regional Quality Assurance and Quality Control

Not applicable.

IX. Internal Standards

All internal standard recoveries were within QC limits.

X. Target Compound Identifications

All target compound identifications were within validation criteria.

XI. Compound Quantitation and CRQLs

All compound quantitation and CRQLs were within validation criteria with the following exceptions:

Associated SDG	Sample	Compound	Finding	Flag	A or P
DPWG16148	LDW-SS-120-010 (150X)	PCB-90 PCB-105 PCB-110 PCB-118 PCB-129 PCB-153 PCB-189	The internal standards in this sample were not reported, however the values from both the original undiluted and diluted analyses were used to quantitate the results.	J4 (all detects)	A
DPWG16148	LDW-SS-B2b-010 (150X)	PCB-66 PCB-90 PCB-105 PCB-110 PCB-118 PCB-129 PCB-153 PCB-180 PCB-189	The internal standards in this sample were not reported, however the values from both the original undiluted and diluted analyses were used to quantitate the results.	J4 (all detects)	A

XII. System Performance

The system performance was acceptable.

XIII. Overall Assessment of Data

Data flags are summarized at the end of this report if data has been qualified.

XIV. Field Duplicates

No field duplicates were identified in this SDG.

LDC #: 13668A3 **VALIDATION COMPLETENESS WORKSHEET** Date: 6/07/05

SDG #: DPWG16148 Level IV Page: 1 of 1

Laboratory: AXYS Analytical Services, Ltd. Reviewer: 9

2nd Reviewer: W

METHOD: HRGC/HRMS Polychlorinated Biphenyl Congeners (EPA Method 1668A)

The samples listed below were reviewed for each of the following validation areas. Validation findings are noted in attached validation findings worksheets.

	Validation Area		Comments
I.	Technical holding times	A	Sampling dates: 1/19 - 3/15/05
II.	GC/MS Instrument performance check	A	
III.	Initial calibration	A	%RSD ≤ 20
IV.	Routine calibration	A	%D ≤ 25/35
V.	Blanks	SW	
VI.	Matrix spike/Matrix spike duplicates /DUP	N/A	
VII.	Laboratory control samples	A	LCS / SRM
VIII.	Regional quality assurance and quality control	N	
IX.	Internal standards	A	
X.	Target compound identifications	A	
XI.	Compound quantitation and CRQLs	SW	
XII.	System performance	A	
XIII.	Overall assessment of data	A	
XIV.	Field duplicates	N	
XV.	Field blanks	N	

Note: A = Acceptable
N = Not provided/applicable
SW = See worksheet
ND = No compounds detected
R = Rinsate
FB = Field blank
D = Duplicate
TB = Trip blank
EB = Equipment blank

Validated Samples:

All Soils

1	LDW-SS-83-010	11	LDW-SS-142-010	21	NIST 1944-101	31	
2	LDW-SS-86-010	12	LDW-SS-149-010	22		32	
3	LDW-SS-92-010	13	LDW-SS-B2b-010	23		33	
4	LDW-SS-101-010	14	LDW-SS-B9a-010	24		34	
5	LDW-SS-106-010	15	LDW-SS-149-010DUP	25		35	
6	LDW-SS-108-010	16		26		36	
7	LDW-SS-120-010	17		27		37	
8	LDW-SS-130-010	18		28		38	
9	LDW-SS-136-010	19		29		39	
10	LDW-SS-141-010	20		30		40	

LDC #: 136883
SDG #: DPW616148

VALIDATION FINDINGS CHECKLIST

Reviewer: 9
2nd Reviewer: M

Method: HRGC/HRMS Polychlorinated Biphenyls (EPA Method 1668)

Validation Area	Yes	No	NA	Findings/Comments
I. Technical holding times				
All technical holding times were met.	✓			
Cooler temperature criteria was met.	✓			
II. GC/MS instrument performance check				
Was PFK exact mass 380.9760 verified?	✓			
Were the retention time windows established for all homologues?	✓			
Is the static resolving power at least 10,000 (10% valley definition)?	✓			
Was the mass resolution adequately check with PFK?	✓			
III. Initial calibration				
Was the initial calibration performed at 5 concentration levels?	✓			
Were all percent relative standard deviations (%RSD) ≤ ~~25% for unlabeled standards and ≤ 30% for labeled standards~~ 20%?	✓			
Did all calibration standards meet the Ion Abundance Ratio criteria?	✓			
Was the signal to noise ratio for each target compound ≥ 2.5 and for each recovery and internal standard > 10?	✓			
IV. Continuing calibration				
Was a routine calibration performed at the beginning of each 12 hour period?	✓			
Were all percent differences (%D) < ~~40%~~ 25/35 for unlabeled and labeled standards?	✓			
Did all routine calibration standards meet the Ion Abundance Ratio criteria?	✓			
V. Blanks				
Was a method blank associated with every sample in this SDG?	✓			
Was a method blank performed for each matrix and concentration?	✓			
Was there contamination in the method blanks? If yes, please see the Blanks validation completeness worksheet.	✓			
VI. Matrix spike/Matrix spike duplicates				
Were a matrix spike (MS) and matrix spike duplicate (MSD) analyzed for each matrix in this SDG? If no, indicate which matrix does not have an associated MS/MSD. Soil / Water.		✓		DUP
Were the MS/MSD percent recoveries (%R) and the relative percent differences (RPD) within the QC limits?			✓	
VII. Laboratory control samples				
Was an LCS analyzed for this SDG?	✓			
Was an LCS analyzed per extraction batch?	✓			
Were the LCS percent recoveries (%R) and relative percent difference (RPD) within the QC limits?	✓			

LDC #: 13668A3
SDG #: OPNG16148

VALIDATION FINDINGS CHECKLIST

Reviewer: CA
2nd Reviewer: M

Validation Area	Yes	No	NA	Findings/Comments
VIII. Regional Quality Assurance and Quality Control				
Were performance evaluation (PE) samples performed?		✓		
Were the performance evaluation (PE) samples within the acceptance limits?			✓	
IX. Internal standards				
Were internal standard recoveries within the 25-150% criteria?	✓			
Was the minimum S/N ratio of all internal standard peaks > 10?	✓			
X. Target compound identification				
For polychlorinated biphenyl congeners with associated labeled standards, were the retention times of the two quantitation peaks within -1 to 3 sec. of the RT of the labeled standard?	✓			
For polychlorinated biphenyl congeners without associated labeled standards, were the relative retention times of the two quantitation peaks within 0.005 time units of the RRT measured in the routine calibration?	✓			
For other polychlorinated biphenyl congeners, were the retention times of the two quantitation peaks within RT established in the performance check solution?	✓			
Did compound spectra contain all characteristic ions listed in the table attached?	✓			
Was the Ion Abundance Ratio for the two quantitation ions within criteria?	✓			
Was the signal to noise ratio for each target compound and labeled standard > 2.5?	✓			
Does the maximum intensity of each specified characteristic ion coincide within ± 2 seconds (includes labeled standards)?	✓			
Was an acceptable lock mass recorded and monitored?	✓			
XI. Compound quantitation/CRQLs				
Were the correct internal standard (IS), quantitation ion and relative response factor (RRF) used to quantitate the compound?	✓			
Were compound quantitation and CRQLs adjusted to reflect all sample dilutions and dry weight factors applicable to level IV validation?	✓			
XII. System performance				
System performance was found to be acceptable.	✓			
XIII. Overall assessment of data				
Overall assessment of data was found to be acceptable.	✓			
XIV. Field duplicates				
Field duplicate pairs were identified in this SDG.		✓		
Target compounds were detected in the field duplicates.			✓	
XV. Field blanks				
Field blanks were identified in this SDG.		✓		
Target compounds were detected in the field blanks.			✓	

LDC #: 13668A3
SDG #: DPWG16448

VALIDATION FINDINGS WORKSHEET
Blanks

Page: ___ of ___
Reviewer: 9
2nd Reviewer: a

METHOD: HRGC/HRMS Polychlorinated Biphenyls (EPA Method 1668)

Please see qualifications below for all questions answered "N". Not applicable questions are identified as "N/A".

Y N N/A Were all samples associated with a method blank?
Y N N/A Was a method blank performed for each matrix and whenever a sample extraction was performed?
Y N N/A Was method blank contamination less < CRQL for all target compounds?

Blank extraction date: 5/9/05 **Blank analysis date:** 5/13/05 **Associated samples:** All

Conc. units: pg/kg

Compound	Blank ID	Sample Identification								
NG	05674-101	(5x)		#11						
PCB 66	6.98	(34.9)								
TT	0.618	(3.09)								
90/101/113	1.51	(7.55)								
105	1.64	(8.2)								
110/115	1.19	(5.95)		>5X						
114	0.236	(1.185)								
118	4.67	(23.35)								
129/138/160/163	1.35	(6.75)								
153/168	1.26	(6.3)								
156/157	0.334 0.327	(1.68 1.605)								
167	0.178	(0.89)								

CIRCLED RESULTS WERE NOT QUALIFIED. ALL RESULTS NOT CIRCLED WERE QUALIFIED BY THE FOLLOWING STATEMENT:
All contaminants within five times the method blank concentration were qualified as not detected, "U".

LDC #: 13668A3
SDG #: DPWG16148

VALIDATION FINDINGS WORKSHEET
Compound Quantitation and Reported CRQLs

Page: 1 of 1
Reviewer: 9
2nd Reviewer: K

METHOD: HRGC/HRMS Polychlorinated Biphenyls (EPA Method 1668)

Please see qualifications below for all questions answered "N". Not applicable questions are identified as "N/A".

Y N N/A Were the correct internal standard (IS), quantitation ions and relative response factors (RRF) used to quantitate the compound?
Y N N/A Compound quantitation and CRQLs were adjusted to reflect all sample dilutions and dry weight factors (if necessary).

#	Date	Sample ID	Finding	Associated Samples	Qualifications
		7, 13	~~The results from diluted (150x)~~		
		7, 13	The results reported from diluted analysis (150x) and recovery corrected for possible losses through the extraction and cleanup steps using the recovery values observed in the original run.		J+ (all detects) J (all non-detects)
		7, 13	msc'd cpds	PCB- 90, 105, 110, 118, 129, 153, 189	
		13		PCB- 66, 90, 105, 110, 118, 129, 153, 180, 189	

Comments: See sample calculation verification worksheet for recalculations

LDC #: 13668A3
SDG #: DPWF16148

VALIDATION FINDINGS WORKSHEET
Initial Calibration Calculation Verification

Page: 1 of 1
Reviewer: 9
2nd Reviewer: M

METHOD: HRGC/HRMS Polychlorinated Biphenyls (EPA Method 1668)

The Relative Response Factor (RRF), average RRF, and percent relative standard deviation (%RSD) were recalculated for the compounds identified below using the follcwing calculations:

RRF = $(A_x)(C_{is})/(A_{is})(C_x)$
average RRF = sum of the RRFs/number of standards
%RSD = 100 * (S/X)

A_x = Area of compound,
C_x = Concentration of compound,
S = Standard deviation of the RRFs,

A_{is} = Area of associated internal standard
C_{is} = Concentration of internal standard
X = Mean of the RRFs

#	Standard ID	Calibration Date	Compound (Reference Internal Standard)	Reported Average RRF (initial)	Recalculated Average RRF (initial)	Reported RRF (CS3 std)	Recalculated RRF (CS3 std)	Reported %RSD	Recalculated %RSD
1	1CAL2	4/20/05	PCB-77 (^{13}C-PCB-77)	0.91	0.91	0.92	0.92	1.64	1.67
			PCB-105 (^{13}C-PCB-105)	0.88	0.88	0.90	0.90	2.85	3.06
			PCB-156 (^{13}C-PCB-156)	0.94	0.96	0.97	0.98	2.68	2.73
			PCB-180 (^{13}C-PCB-180)	0.86	0.86	0.88	0.89	3.02	2.89
2			PCB-77 (^{13}C-PCB-77)						
			PCB-105 (^{13}C-PCB-105)						
			PCB-156 (^{13}C-PCB-156)						
			PCB-180 (^{13}C-PCB-180)						
3			PCB-77 (^{13}C-PCB-77)						
			PCB-105 (^{13}C-PCB-105)						
			PCB-156 (^{13}C-PCB-156)						
			PCB-180 (^{13}C-PCB-180)						

Comments: Refer to Initial Calibration findings worksheet for list of qualifications and associated samples when reported results do not agree within 10.0% of the recalculated results.

LDC #: 13668A3
SDG #: DPWF16148

VALIDATION FINDINGS WORKSHEET
Routine Calibration Results Verification

Reviewer:
2nd Reviewer:

METHOD: HRGC/HRMS Polychlorinated Biphenyls (EPA Method 1668)

The percent difference (%D) of the initial calibration average Relative Response Factors (RRFs) and the continuing calibration RRFs were recalculated for the compounds identified below using the following calculation:

% Difference = 100 * (ave. RRF - RRF)/ave. RRF
$RRF = (A_x)(C_{is})/(A_{is})(C_x)$

Where: ave. RRF = initial calibration average RRF
RRF = continuing calibration RRF
A_x = Area of compound, A_{is} = Area of associated internal standard
C_x = Concentration of compound, C_{is} = Concentration of internal standard

#	Standard ID	Calibration Date	Compound (Reference Internal Standard)	Average RRF (initial)	Reported RRF ~~Amt~~ (CC)	Recalculated ~~RRF~~ ~~Amt~~ (CC)	Reported %D	Recalculated %D
1	PBSC-246 S1	5/14/05	PCB-77 (^{13}C-PCB-77)	0.91	52.0	51.9		
			PCB-105 (^{13}C-PCB-105)	0.88	51.4	51.5		
			PCB-156 (^{13}C-PCB-156)	0.96	102	102		
			PCB-180 (^{13}C-PCB-180)	0.86	50.8	50.9		
2	PBSC-269AS1	5/27/05	PCB-77 (^{13}C-PCB-77)	0.91	53.9	53.7		
			PCB-105 (^{13}C-PCB-105)	0.88	51.4	51.5		
			PCB-156 (^{13}C-PCB-156)	0.96	102	101		
			PCB-180 (^{13}C-PCB-180)	0.86	51.3	51.3		
3	PBSC-247S1	5/14/05	PCB-77 (^{13}C-PCB-77)	0.91	51.5	57.2		
			PCB-105 (^{13}C-PCB-105)	0.88	51.3	57.2		
			PCB-156 (^{13}C-PCB-156)	0.96	101	101		
			PCB-180 (^{13}C-PCB-180)	0.86	48.9	48.9		

Comments: Refer to Routine Calibration findings worksheet for list of qualifications and associated samples when reported results do not agree within 10.0% of the recalculated results.

LDC #: 36683
SDG #: DPIN6148

VALIDATION FINDINGS WORKSHEET
Routine Calibration Results Verification

Reviewer: 9
2nd Reviewer: AL

METHOD: HRGC/HRMS Polychlorinated Biphenyls (EPA Method 1668)

The percent difference (%D) of the initial calibration average Relative Response Factors (RRFs) and the continuing calibration RRFs were recalculated for the compounds identified below using the following calculation:

% Difference = 100 * (ave. RRF - RRF)/ave. RRF
$RRF = (A_x)(C_{is})/(A_{is})(C_x)$

Where: ave. RRF = initial calibration average RRF
RRF = continuing calibration RRF
A_x = Area of compound, A_{is} = Area of associated internal standard
C_x = Concentration of compound, C_{is} = Concentration of internal standard

#	Standard ID	Calibration Date	Compound (Reference Internal Standard)	Average RRF (initial)	Reported RRF (CC)	Recalculated RRF (CC)	Reported %D	Recalculated %D
1	PBSC-705	5/28/05	PCB-77 (^{13}C-PCB-77)	0.91	52.1	51.9		
			PCB-105 (^{13}C-PCB-105)	0.88	50.3	50.1		
			PCB-156 (^{13}C-PCB-156)	0.96	106	106		
			PCB-180 (^{13}C-PCB-180)	0.86	50.6	50.7		
2	PBSC-2715	5/28/05	PCB-77 (^{13}C-PCB-77)	0.91	51.8	51.5		
			PCB-105 (^{13}C-PCB-105)	0.88	49.8	49.6		
			PCB-156 (^{13}C-PCB-156)	0.96	104	104		
			PCB-180 (^{13}C-PCB-180)	0.86	51.5	51.8		
3	PBSC-2485	5/15/05	PCB-77 (^{13}C-PCB-77)	0.91	51.5	51.5		
			PCB-105 (^{13}C-PCB-105)	0.88	50.4	50.3		
			PCB-156 (^{13}C-PCB-156)	0.96	101	101		
			PCB-180 (^{13}C-PCB-180)	0.86	49.9	50.2		

Comments: Refer to Routine Calibration findings worksheet for list of qualifications and associated samples when reported results do not agree within 10.0% of the recalculated results.

LDC #: 13668A3
SDG #: DPWG1614 8

VALIDATION FINDINGS WORKSHEET
Laboratory Control Sample Results Verification

METHOD: HRGC/HRMS Polychlorinated Biphenyls (EPA Method 1668)

The percent recoveries (%R) and Relative Percent Difference (RPD) of the laboratoy control sample and laboratory control sample duplicate (if applicable) were recalculated for the compounds identified below using the following calculation:

% Recovery = 100 * SSC/SA Where: SSC = Spiked sample concentration; SA = Spike added

RPD = I LCS - LCSD I * 2/(LCS + LCSD) LCS = Laboraotry control sample percent recovery LCSD = Laboratory control sample duplicate percent recovery

LCS ID: NG156T4-102

Compound	Spike Added (ng/mL)		Spiked Sample Concentration (ng/mL)		LCS Percent Recovery		LCSD Percent Recovery		LCS/LCSD RPD	
	LCS	LCSD	LCS	LCSD	Reported	Recalc.	Reported	Recalc.	Reported	Recalculated
PC3-77	50	NA	52.9	NA	106	106				
PC3-81			52.0		104	104				
PCB-105			53.2		106	106				
PCB-114			52.6		105	105				
PCB-118			53.6		107	107				
PCB-123			52.7		105	105				
PCB-126			52.5		105	105				
PCB-156/157	100		105		105	105				
PCB-157										
PCB-167	50		52.9		106	106				
PCB-169			52.4		105	105				
~~PCB-170~~										
~~PCB-180~~										
PCB-189	50		51.3		103	103				

Comments: Refer to Laboratory Control Sample findings worksheet for list of qualifications and associated samples when reported results do not agree within 10.0% of the recalculated results.

Ions Monitored for HRGC/HRMS Analysis of Polychlorinated Biphenyls

Descriptor	Accurate mass[a]	Ion ID	Analyte	Substance
1	289.9224	M	C12 H6 35Cl4	TCB
	291.9194	M+2	C12 H6 35Cl3 37Cl4	TCB
	301.9626	M	13C12 H6 35Cl4	PeCB
	303.9597	M+2	13C12 H6 35Cl3 37Cl	PeCB
	325.8804	M+2	C12 H5 35Cl4 37Cl	PeCB
	327.8775	M+4	C12 H5 35Cl3 37Cl2	PeCB
	[292.9825]	Lock	C7 F11	PFK
2	325.8804	M+2	C12 H5 35Cl4 37Cl	PeCB
	327.8775	M+4	C12 H5 35Cl3 37Cl2	PeCB
	337.9207	M+2	13C12 H5 35Cl4 37Cl	PeCB
	339.9178	M+4	13C12 H5 35Cl3 37Cl2	PeCB
	359.8415	M+2	C12 H4 35Cl5 37Cl	HxCB
	361.8385	M+4	C12 H4 35Cl4 37Cl2	HxCB
	371.8817	M+2	13C12 H4 35Cl5 37Cl	HxCB
	373.8788	M+4	13C12 H4 35Cl4 37Cl2	HxCB
	393.8025	M+2	C12 H3 35Cl6 37Cl	HpCB
	395.7996	M+4	C12 H3 35Cl5 37Cl2	HpCB
	405.8428	M+2	13C12 H3 35Cl6 37Cl	HpCB
	407.8398	M+4	13C12 H3 35Cl5 37Cl2	HpCB
	[354.9892[	Lock	C9F13	PFK
3	509.7229	M+4	13C12 35Cl10 37Cl2	DCB
	511.7199	M+6	13C12 35Cl9 37Cl3	
	513.7170	M+8	13C12 35Cl8 37Cl4	
	[442.9728]	Lock	C10 F17	PFK

S = internal/recovery standard

H = 1.007825
C = 12.000000
^{13}C = 13.003355
F = 18.9984

^{35}Cl = 34.968853
^{37}Cl = 36.965903

LDC #: 13668A3
SDG #: DPW616H8

VALIDATION FINDINGS WORKSHEET
Sample Calculation Verification

Page: 1 of 1
Reviewer: 9
2nd reviewer: W

METHOD: HRGC/HRMS Polychlorinated Biphenyls (EPA Method 1668)

Y N N/A Were all reported results recalculated and verified for all level IV samples?

Y N N/A Were all recalculated results for detected target compounds agree within 10.0% of the reported results?

Concentration = $\frac{(A_x)(I_s)(DF)}{(A_{is})(RRF)(V_o)(\%S)}$

A_x = Area of the characteristic ion (EICP) for the compound to be measured

A_{is} = Area of the characteristic ion (EICP) for the specific internal standard

I_s = Amount of internal standard added in nanograms (ng)

RRF = Relative response factor of the calibration standard.

V_o = Volume or weight of sample pruged in milliliters (ml) or grams (g).

Df = Dilution factor.

%S = Percent solids, applicable to soils and solid matrices only.

Example:

Sample I.D. 7, PCB77:

Conc. = (1.79e+07)(2000)( ) / (1.72e+08)(0.91)(10.42)( )

= 21.95 ng/kg

#	Sample ID	Compound	Reported Concentration ( )	Calculated Concentration ( )	Qualification

LDC #: 13668B3 **VALIDATION COMPLETENESS WORKSHEET** Date: 6/28/05
SDG #: DPWG16165 Level IV Page: 1 of 1
Laboratory: AXYS Analytical Services, Ltd. Reviewer: 9
2nd Reviewer: M

METHOD: HRGC/HRMS Polychlorinated Biphenyl Congeners (EPA Method 1668A)

The samples listed below were reviewed for each of the following validation areas. Validation findings are noted in attached validation findings worksheets.

	Validation Area		Comments
I.	Technical holding times	A	Sampling dates: 1/17 - 3/14/05
II.	GC/MS Instrument performance check	A	
III.	Initial calibration	A	%RSD ≤ 20.
IV.	Routine calibration	A	%D ≤ 25/35.
V.	Blanks	SW	
VI.	Matrix spike/Matrix spike duplicates/DUP	N/A	
VII.	Laboratory control samples	A	LCS. NO SRM
VIII.	Regional quality assurance and quality control	N	
IX.	Internal standards	A	
X.	Target compound identifications	A	
XI.	Compound quantitation and CRQLs	A	
XII.	System performance	A	
XIII.	Overall assessment of data	A	
XIV.	Field duplicates	N	
XV.	Field blanks	N	

Note: A = Acceptable; N = Not provided/applicable; SW = See worksheet; ND = No compounds detected; R = Rinsate; FB = Field blank; D = Duplicate; TB = Trip blank; EB = Equipment blank

Validated Samples:
11 sed's

1	LDW-SS-14-010	11	LDW-SS-71-010	21	WG15T34-101	31	
2	LDW-SS-17-010	12	LDW-SS-72-010	22		32	
3	LDW-SS-19-010	13	LDW-SS-74-010	23		33	
4	LDW-SS-24-010	14	LDW-SS-67-010DUP	24		34	
5	LDW-SS-25-010	15		25		35	
6	LDW-SS-28-010	16		26		36	
7	LDW-SS-46-010	17		27		37	
8	LDW-SS-56-010	18		28		38	
9	LDW-SS-64-010	19		29		39	
10	LDW-SS-67-010	20		30		40	

LDC #: 13668B3
SDG #: JPW61165

VALIDATION FINDINGS CHECKLIST

Reviewer: 9
2nd Reviewer: DL

Method: HRGC/HRMS Polychlorinated Biphenyls (EPA Method 1668)

Validation Area	Yes	No	NA	Findings/Comments
I. Technical holding times				
All technical holding times were met.	✓			
Cooler temperature criteria was met.	✓			
II. GC/MS instrument performance check				
Was PFK exact mass 380.9760 verified?	✓			
Were the retention time windows established for all homologues?	✓			
Is the static resolving power at least 10,000 (10% valley definition)?	✓			
Was the mass resolution adequately check with PFK?	✓			
III. Initial calibration				
Was the initial calibration performed at 5 concentration levels?	✓			
Were all percent relative standard deviations (%RSD) ≤ ~~25% for unlabeled standards and ≤ 30% for labeled standards~~ 20.2?	✓			
Did all calibration standards meet the Ion Abundance Ratio criteria?	✓			
Was the signal to noise ratio for each target compound ≥ 2.5 and for each recovery and internal standard ≥ 10?	✓			
IV. Continuing calibration				
Was a routine calibration performed at the beginning of each 12 hour period?	✓			
Were all percent differences (%D) ≤ ~~40%~~ 25/35 for unlabeled and labeled standards?	✓			
Did all routine calibration standards meet the Ion Abundance Ratio criteria?	✓			
V. Blanks				
Was a method blank associated with every sample in this SDG?	✓			
Was a method blank performed for each matrix and concentration?	✓			
Was there contamination in the method blanks? If yes, please see the Blanks validation completeness worksheet.	✓			
VI. Matrix spike/Matrix spike duplicates				
Were a matrix spike (MS) and matrix spike duplicate (MSD) analyzed for each matrix in this SDG? If no, indicate which matrix does not have an associated MS/MSD. Soil / Water.		✓		DUP
Were the MS/MSD percent recoveries (%R) and the relative percent differences (RPD) within the QC limits?			✓	
VII. Laboratory control samples				
Was an LCS analyzed for this SDG?	✓			
Was an LCS analyzed per extraction batch?	✓			
Were the LCS percent recoveries (%R) and relative percent difference (RPD) within the QC limits?	✓			

LDC #: 13668B3
SDG #: JPW61165

VALIDATION FINDINGS CHECKLIST

Reviewer: 1
2nd Reviewer: 1

Validation Area	Yes	No	NA	Findings/Comments
VIII. Regional Quality Assurance and Quality Control				
Were performance evaluation (PE) samples performed?		✓		
Were the performance evaluation (PE) samples within the acceptance limits?			✓	
IX. Internal standards				
Were internal standard recoveries within the 25-150% criteria?	✓			
Was the minimum S/N ratio of all internal standard peaks > 10?	✓			
X. Target compound identification				
For polychlorinated biphenyl congeners with associated labeled standards, were the retention times of the two quantitation peaks within -1 to 3 sec. of the RT of the labeled standard?	✓			
For polychlorinated biphenyl congeners without associated labeled standards, were the relative retention times of the two quantitation peaks within 0.005 time units of the RRT measured in the routine calibration?	✓			
For other polychlorinated biphenyl congeners, were the retention times of the two quantitation peaks within RT established in the performance check solution?	✓			
Did compound spectra contain all characteristic ions listed in the table attached?	✓			
Was the Ion Abundance Ratio for the two quantitation ions within criteria?	✓			
Was the signal to noise ratio for each target compound and labeled standard ≥ 2.5?	✓			
Does the maximum intensity of each specified characteristic ion coincide within ± 2 seconds (includes labeled standards)?	✓			
Was an acceptable lock mass recorded and monitored?	✓			
XI. Compound quantitation/CRQLs				
Were the correct internal standard (IS), quantitation ion and relative response factor (RRF) used to quantitate the compound?	✓			
Were compound quantitation and CRQLs adjusted to reflect all sample dilutions and dry weight factors applicable to level IV validation?	✓			
XII. System performance				
System performance was found to be acceptable.	✓			
XIII. Overall assessment of data				
Overall assessment of data was found to be acceptable.	✓			
XIV. Field duplicates				
Field duplicate pairs were identified in this SDG.		✓		
Target compounds were detected in the field duplicates.			✓	
XV. Field blanks				
Field blanks were identified in this SDG.		✓		
Target compounds were detected in the field blanks.			✓	

LDC #: 13668B3
SDG #: JPW616165

VALIDATION FINDINGS WORKSHEET
Blanks

Page: 1 of 1
Reviewer: 9
2nd Reviewer: M

METHOD: HRGC/HRMS Polychlorinated Biphenyls (EPA Method 1668)

Please see qualifications below for all questions answered "N". Not applicable questions are identified as "N/A".

Y N N/A Were all samples associated with a method blank?
Y N N/A Was a method blank performed for each matrix and whenever a sample extraction was performed?
Y N N/A Was method blank contamination less < CRQL for all target compounds?

Blank extraction date: 5/15/05 **Blank analysis date:** 5/26/05 **Associated samples:** All

Conc. units: pg/kg

Compound	Blank ID	Sample Identification								
NG	153410	(5x)		All						
PCB 66	0.190	(0.95)								
TT	0.245	(1.225)								
90/101/113	0.274	(1.37)								
105	0.118	(0.59)								
110/115	0.221	(1.105)		>5X						
114	0.044	(0.22)								
118	0.197	(0.985)								
126	0.060	(0.30)								
129/138/160/163	0.165	(0.825)								
153/168	0.086	(0.43)								
156/157	0.080	(0.40)								
167	0.021	(0.105)								
169	0.023	(0.115)								
180/193	0.050	(0.25)								
189	0.028	(0.14)								

CIRCLED RESULTS WERE NOT QUALIFIED. ALL RESULTS NOT CIRCLED WERE QUALIFIED BY THE FOLLOWING STATEMENT:
All contaminants within five times the method blank concentration were qualified as not detected, "U".

LDC #: 13668B3
SDG #: JDPW616165

VALIDATION FINDINGS WORKSHEET
Initial Calibration Calculation Verification

Page: 1 of 1
Reviewer: 9
2nd Reviewer: AC

METHOD: HRGC/HRMS Polychlorinated Biphenyls (EPA Method 1668)

The Relative Response Factor (RRF), average RRF, and percent relative standard deviation (%RSD) were recalculated for the compounds identified below using the following calculations:

RRF = $(A_x)(C_{is})/(A_{is})(C_x)$
average RRF = sum of the RRFs/number of standards
%RSD = 100 * (S/X)

A_x = Area of compound, A_{is} = Area of associated internal standard
C_x = Concentration of compound, C_{is} = Concentration of internal standard
S = Standard deviation of the RRFs, X = Mean of the RRFs

#	Standard ID	Calibration Date	Compound (Reference Internal Standard)	Reported Average RRF (initial)	Recalculated Average RRF (initial)	Reported RRF (CS3 std)	Recalculated RRF (CS3 std)	Reported %RSD	Recalculated %RSD
1	ICAL	5/25/05	PCB-77 (^{13}C-PCE-77)	1.21	1.21	1.17	1.16	6.96	6.90
			PCB-105 (^{13}C-PCE-105)	1.00	1.00	1.00	0.99	1.52	1.49
			PCB-156 (^{13}C-PCE-156)	1.14	1.14	1.13	1.13	1.61	1.47
			PCB-189 (^{13}C-PCE-189)	0.96	0.96	0.97	0.98	2.06	1.95
2	ICAL	6/1/05	PCB-77 (^{13}C-PCB-77)	1.12	1.12	1.07	1.07	4.12	3.97
			PCB-105 (^{13}C-PCB-105)	0.98	0.98	0.97	0.97	1.30	1.17
			PCB-156 (^{13}C-PCB-156)	1.09	1.09	1.11	1.11	3.07	2.93
			PCB-189 (^{13}C-PCB-189)	0.89	0.89	0.88	0.88	4.08	3.97
3			PCB-77 (^{13}C-PCB-77)						
			PCB-105 (^{13}C-PCB-105)						
			PCB-156 (^{13}C-PCB-156)						
			PCB-180 (^{13}C-PCB-180)						

Comments: Refer to Initial Calibration findings worksheet for list of qualifications and associated samples when reported results do not agree within 10.0% of the recalculated results.

LDC #: 13668B3
SDG #: DPW616165

VALIDATION FINDINGS WORKSHEET
Routine Calibration Results Verification

Page: 1 of 2
Reviewer: 9
2nd Reviewer: VC

METHOD: HRGC/HRMS Polychlorinated Biphenyls (EPA Method 1668)

The percent difference (%D) of the initial calibration average Relative Response Factors (RRFs) and the continuing calibration RRFs were recalculated for the compounds identified below using the following calculation:

% Difference = 100 * (ave. RRF - RRF)/ave. RRF
RRF = $(A_x)(C_{is})/(A_{is})(C_x)$

Where: ave. RRF = initial calibration average RRF
RRF = continuing calibration RRF
A_x = Area of compound, A_{is} = Area of associated internal standard
C_x = Concentration of compound, C_{is} = Concentration of internal standard

#	Standard ID	Calibration Date	Compound (Reference Internal Standard)	Average RRF (Initial)	Reported RRF~~Amt~~ (CC)	Recalculated RRF~~Amt~~ (CC)	Reported %D	Recalculated %D
1	PB5B_190S1	5/25/05	PCB-77 (^{13}C-PCB-77)	1.21	46.2	46.3		
			PCB-105 (^{13}C-PCB-105)	1.00	48.3	48.1		
			PCB-156 (^{13}C-PCB-156)	1.14	102	102		
			PCB-180 (^{13}C-PCB-180)	0.96	47.9	47.9		
2	PB5B_201S1	6/2/05	PCB-77 (^{13}C-PCB-77)	1.12	48.0	48.0		
			PCB-105 (^{13}C-PCB-105)	0.98	50.8	50.8		
			PCB-156 (^{13}C-PCB-156)	1.09	97.3	97.5		
			PCB-180 (^{13}C-PCB-180)	0.89	49.8	49.7		
3	PB5B_191AS1	5/26/05	PCB-77 (^{13}C-PCB-77)	1.21	48.5	48.6		
			PCB-105 (^{13}C-PCB-105)	1.00	52.2	52.0		
			PCB-156 (^{13}C-PCB-156)	1.14	95.7	95.5		
			PCB-180 (^{13}C-PCB-180)	0.96	48.5	48.5		

Comments: Refer to Routine Calibration findings worksheet for list of qualifications and associated samples when reported results do not agree within 10.0% of the recalculated results.

LDC #: 13668B3
SDG #: DPNF1615

VALIDATION FINDINGS WORKSHEET
Routine Calibration Results Verification

Reviewer: 9
2nd Reviewer: M

METHOD: HRGC/HRMS Polychlorinated Biphenyls (EPA Method 1668)

The percent difference (%D) of the initial calibration average Relative Response Factors (RRFs) and the continuing calibration RRFs were recalculated for the compounds identified below using the following calculation:

% Difference = 100 * (ave. RRF - RRF)/ave. RRF
RRF = $(A_x)(C_{is})/(A_{is})(C_x)$

Where: ave. RRF = initial calibration average RRF
RRF = continuing calibration RRF
A_x = Area of compound, A_{is} = Area of associated internal standard
C_x = Concentration of compound C_{is} = Concentration of internal standard

#	Standard ID	Calibration Date	Compound (Reference Internal Standard)	Average RRF (initial)	Reported RRF~~Act~~ (CC)	Recalculated RRF~~Act~~ (CC)	Reported %D	Recalculated %D
1	DBSB-192A	5/27/05	PCB-77 (^{13}C-PCB-77)	1.21	48.5	48.7		Corrected
	S=1		PCB-105 (^{13}C-PCB-105)	1.00	52.2	52.0		
			PCB-156 (^{13}C-PCB-156)	1.14	95.1	94.9		
			PCB-180 (^{13}C-PCB-180)	0.96	46.5	46.5		
2			PCB-77 (^{13}C-PCB-77)					
			PCB-105 (^{13}C-PCB-105)					
			PCB-156 (^{13}C-PCB-156)					
			PCB-180 (^{13}C-PCB-180)					
3			PCB-77 (^{13}C-PCB-77)					
			PCB-105 (^{13}C-PCB-105)					
			PCB-156 (^{13}C-PCB-156)					
			PCB-180 (^{13}C-PCB-180)					

Comments: Refer to Routine Calibration findings worksheet for list of qualifications and associated samples when reported results do not agree within 10.0% of the recalculated results.

LDC #: 136883
SDG #: DPWF1616S

VALIDATION FINDINGS WORKSHEET
Laboratory Control Sample Results Verification

Reviewer: 9
2nd Reviewer: R

METHOD: HRGC/HRMS Polychlorinated Bipheryls (EPA Method 1668)

The percent recoveries (%R) and Relative Percent Difference (RPD) of the laboratoy control sample and laboratory control sample duplicate (if applicable) were recalculated for the compounds identified below using the following calculation:

% Recovery = 100 * SSC/SA

Where: SSC = Spiked sample concentration
SA = Spike added

RPD = | LCS - LCSD | * 2/(LCS + LCSD)

LCS = Laboraotry control sample percent recovery

LCSD = Laboratory control sample duplicate percent recovery

LCS ID: WF15734-102

Compound	Spike Added (ng/mL)		Spiked Sample Concentration (ng/mL)		LCS Percent Recovery		LCSD Percent Recovery		LCS/LCSD RPD	
	LCS	LCSD	LCS	LCSD	Reported	Recalc.	Reported	Recalc.	Reported	Recalculated
PCB-77	50	NA	45.6	NA	91.3	91.2				
PCB-81	↓		47.5		95.0	95.0				
PCB-105			48.5		97.1	97.0				
PCB-114			47.8		95.6	95.6				
PCB-118			48.4		96.9	96.8				
PCB-123			48.1		96.2	96.2				
PCB-126	↓		48.0		95.9	96.0				
PCB-156/157	100		94.7		94.7	94.7				
~~PCB-157~~										
PCB-167	50		47.3		94.6	94.6				
PCB-169	↓		46.7		93.4	93.4				
~~PCB-170~~										
~~PCB-180~~										
PCB-189	50		46.7		93.5	93.4				

Comments: Refer to Laboratory Control Sample findings worksheet for list of qualifications and associated samples when reported results do not agree within 10.0% of the recalculated results.

Ions Monitored for HRGC/HRMS Analysis of Polychlorinated Biphenyls

Descriptor	Accurate mass[a]	Ion ID	Analyte	Substance
1	289.9224	M	C12 H6 35Cl4	TCB
	291.9194	M+2	C12 H6 35Cl3 37Cl4	TCB
	301.9626	M	13C12 H6 35Cl4	PeCB
	303.9597	M+2	13C12 H6 35Cl3 37Cl	PeCB
	325.8804	M+2	C12 H5 35Cl4 37Cl	PeCB
	327.8775	M+4	C12 H5 35Cl3 37Cl2	PeCB
	[292.9825]	Lock	C7 F11	PFK
2	325.8804	M+2	C12 H5 35Cl4 37Cl	PeCB
	327.8775	M+4	C12 H5 35Cl3 37Cl2	PeCB
	337.9207	M+2	13C12 H5 35Cl4 37Cl	PeCB
	339.9178	M+4	13C12 H5 35Cl3 37Cl2	PeCB
	359.8415	M+2	C12 H4 35Cl5 37Cl	HxCB
	361.8385	M+4	C12 H4 35Cl4 37Cl2	HxCB
	371.8817	M+2	13C12 H4 35Cl5 37Cl	HxCB
	373.8788	M+4	13C12 H4 35Cl4 37Cl2	HxCB
	393.8025	M+2	C12 H3 35Cl6 37Cl	HpCB
	395.7996	M+4	C12 H3 35Cl5 37Cl2	HpCB
	405.8428	M+2	13C12 H3 35Cl6 37Cl	HpCB
	407.8398	M+4	13C12 H3 35Cl5 37Cl2	HpCB
	[354.9892[	Lock	C9F13	PFK
3	509.7229	M+4	13C12 35Cl10 37Cl2	DCB
	511.7199	M+6	13C12 35Cl9 37Cl3	
	513.7170	M+8	13C12 35Cl8 37Cl4	
	[442.9728]	Lock	C10 F17	PFK

S = internal/recovery standard

H = 1.007825
C = 12.000000
^{13}C = 13.003355
F = 18.9984

^{35}Cl = 34.968853
^{37}Cl = 36.965903

LDC #: 13668B3
SDG #: DPW616165

VALIDATION FINDINGS WORKSHEET
Sample Calculation Verification

Page: 1 of 1
Reviewer: 4
2nd reviewer: VV

METHOD: HRGC/HRMS Polychlorinated Biphenyls (EPA Method 1668)

Y N N/A Were all reported results recalculated and verified for all level IV samples?

Y N N/A Were all recalculated results for detected target compounds agree within 10.0% of the reported results?

Concentration = $\frac{(A_x)(I_s)(DF)}{(A_{is})(RRF)(V_o)(\%S)}$

A_x = Area of the characteristic ion (EICP) for the compound to be measured

A_{is} = Area of the characteristic ion (EICP) for the specific internal standard

I_s = Amount of internal standard added in nanograms (ng)

RRF = Relative response factor of the calibration standard.

V_o = Volume or weight of sample pruged in milliliters (ml) or grams (g).

Df = Dilution factor.

%S = Percent solids, applicable to soils and solid matrices only.

Example:

Sample I.D. 1 , PCB77:

Conc. = $\frac{(1.22e+08)(2000)(\quad)}{(9.46e+07)(1.21)(10.82)(\quad)}$

= 197.0 ng/kg

#	Sample ID	Compound	Reported Concentration ( )	Calculated Concentration ( )	Qualification

D. PCB congeners: sample group 16336

LABORATORY DATA CONSULTANTS, INC.
7750 El Camino Real, Suite 2L Carlsbad, CA 92009 Phone: 760/634-0437 Fax: 760/634-0439

LDC #13738
July 19, 2005

Windward Environmental, LLC
200 West Mercer Street, Suite 401
Seattle, WA 98119
ATTN: Ms. Susie McGroddy

SUBJECT: Lower Duwamish Waterway Group Sediment Sample Data Validation

Dear Ms. McGroddy,

Enclosed is our EPA Level IV data validation review of Analytical chemistry results generated in support of the Lower Duwamish Waterway Group project. The analyses were performed by Axys Analytical Services, Ltd. Samples were analyzed for HRGC/HRMS Polychlorinated Biphenyl Congeners by modified EPA Method 1668A. Samples are referenced under the following Sample Delivery Group: DPW16336. See the Sample Analysis Table (Attachment 1) for the number of samples reviewed.

Please feel free to contact us if you have any questions.

Sincerely,

Stella S. Cuenco
Project Manager/Senior Chemist

Attachment 1

LDC #13738 (Windward Environmental, LLC - Seattle WA / Lower Duwamish Waterway Group)

LDC	SDG#	DATE REC'D	(3) DATE DUE	PCBs Cong. (1668)																													
Matrix:	Tissue/Sediment			T	S	T	S	T	S	T	S	T	S	T	S	T	S	T	S	W	S	W	S	W	S	W	S	W	S	W	S	W	S
A	DPWG16336	07/14/05	08/04/05	0	6																												
Total	B/SC			0	6	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	6

Shaded cells indicate Level IV validation (all other cells are Level II validation). These sample counts do not include MS/MSD, and DUPs

ADDENDUM TO THE CHEMICAL DATA QUALITY REVIEW FOR PHASE 1 AND PHASE 2 SURFACE SEDIMENT SAMPLES

Lower Duwamish Waterway Group
LDC# 13738

This report details the findings of an EPA Level IV data validation review of Analytical chemistry results generated in support of the Lower Duwamish Waterway Group project. The analyses were performed by Axys Analytical Services, Ltd. Samples were analyzed for HRGC/HRMS Polychlorinated Biphenyl Congeners by modified EPA Method 1668A. Samples are referenced under the following Sample Delivery Group: DPW16336. See the Sample Analysis Table (Attachment 1) for the number of samples reviewed and the Sample Validation Table (Attachment 2) for the sample identifications and analyses.

The QC guidelines used for data qualification are those specified in the EPA Region 10 SOP for the Validation of 1668 Toxic, Dioxin-like PCB Data (Revision 1.0, December 8, 1995). Specific QC criteria used follows the Surface Sediment Sampling for Chemical Analyses and Toxicity Testing of the Lower Duwamish Waterway Quality Assurance Project Plan (January 14, 2005). Where specific guidance is not available, the data has been evaluated in a conservative manner consistent with industry standards using professional experience.

The following items were evaluated during the review:

- Holding Times
- Sample Preservation
- Cooler Temperatures
- Blanks
- Matrix Spike/Matrix Spike Duplicates
- Internal Standards
- Laboratory Control Samples
- System Performance
- Field Duplicates

Attachment 1

LDC #13738 (Windward Environmental, LLC - Seattle WA / Lower Duwamish Waterway Group)

LDC	SDG#	DATE REC'D	(3) DATE DUE	PCBs Cong. (1668)																															
Matrix:	Tissue/Sediment			T	S	T	S	T	S	T	S	T	S	T	S	T	S	T	S	W	S	W	S	W	S	W	S	W	S	W	S	W	S	W	S
A	DPWG16336	07/14/05	08/04/05	0	6																														
Total	B/SC			0	6	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	6

Shaded cells indcate Level IV validation (all other cells are Level II validation). These sample counts dc not include MS/MSD, and DUPs

Attachment 2

SDG#: DPWG16336 VALIDATION SAMPLE TABLE **LDC#:** 13738A

Project Name: Lower Duwamish Waterway Group Parameters/Analytical Method Project #04-08-06-24

Client ID #	Lab ID #	Matrix	Date Collected	PCB Cong. (1668)											
LDW-SS-84-010	L7601-14	sediment	01/19/05	X											
LDW-SS-109-010	L7787-1	sediment	01/25/05	X											
LDW-SS-143-010	L7787-2	sediment	01/26/05	X											
LDW-SS-37-010	L7787-3	sediment	01/18/05	X											
LDW-SS-6-010	L7787-4	sediment	03/10/05	X											
LDW-SS-110-010	L7787-24	sediment	01/25/05	X											
LDW-SS-110-010DUP	L7787-24DUP	sediment	01/25/05	X											

Note: X = Validation was performed.

Only issues which require comment or action are discussed in this report. Data deficiencies are arranged by method. Potential effects of data anomalies have been described where possible.

The following are definitions of the data qualifiers:

U Indicates the compound or analyte was analyzed for but not detected at or above the stated limit.

J Indicates an estimated value.

- J1 Blank Contamination: Indicates possible high bias and/or false positives.
- J2 Calibration Range exceeded: Indicates possible low bias.
- J3 Holding times not met: Indicates low bias for most analytes.
- J4 Other QC parameters outside control limits: bias not readily determined.
- J5 Other QC parameters outside control limits. The reported results appear to be biased high. The actual value of target compound in the sample may be lower than the value reported by the laboratory.
- J6 Other QC parameters outside control limits. The reported results appear to be biased low. The actual value of target compound in the sample may be higher than the value reported by the laboratory.

R Quality control indicates the data is not usable.

N Presumptive evidence of presence of the constituent.

UJ Indicates the compound or analyte was analyzed for but not detected. The sample detection limit is an estimated value.

A Indicates the finding is based upon technical validation criteria.

P Indicates the finding is related to a protocol/contractual deviation.

Overall Data Assessment

The frequency of matrix spike (MS) and matrix spike duplicate (MSD) was not met as required by the QAPP. MS/MSD analyses are not required for EPA Method 1668A. The laboratory consulted with the client on this discrepancy and was instructed to proceed with the extraction and analysis despite the absence of MS/MSDs.

The frequency of SRM was not met as required by the QAPP.

The quality control criteria reviewed were met and are considered acceptable. Based upon the data validation all results are considered valid and usable for all purposes.

HRGC/HRMS Polychlorinated Biphenyl Congeners by modified EPA Method 1668A

I. Technical Holding Times

All technical holding time requirements were met.

The chain-of-custodies were reviewed for documentation of cooler temperatures. All cooler temperatures met validation criteria.

II. HRGC/HRMS Instrument Performance Check

Instrument performance was checked at the required daily frequency.

Retention time windows were established for all congeners. The chromatographic resolution was less than or equal to 40% for congeners PCB-23 and PCB-34 and congeners PCB-182 and PCB-187.

The static resolving power was at least 10,000 (10% valley definition).

III. Initial Calibration

A five point initial calibration was performed as required by the method.

The percent relative standard deviations (%RSD) were less than or equal to 20.0% for compounds.

The minimum S/N ratio for each target compound was greater than or equal to 2.5 and greater than or equal to 10 for each recovery and internal standard compound.

IV. Routine Calibration (Continuing)

Routine calibration was performed at the required frequencies.

All of the routine calibration percent differences (%D) between the initial calibration RRF and the routine calibration RRF were less than or equal to 25.0% for unlabeled compounds and less than or equal to 35.0% for labeled compounds.

V. Blanks

Method blanks were reviewed for each matrix as applicable. No polychlorinated biphenyl contaminants were found in the method blanks with the following exceptions:

Associated SDG	Method Blank ID	Extraction Date	Compound	Concentration	Associated Samples
DPWG16336	WG16186-101	6/23/05	PCB-66 PCB-77 PCB-90 PCB-105 PCB-110 PCB-118 PCB-129 PCB-153 PCB-156	5.13 ng/Kg 1.52 ng/Kg 20.9 ng/Kg 4.90 ng/Kg 29.4 ng/Kg 17.4 ng/Kg 22.3 ng/Kg 17.0 ng/Kg 2.67 ng/Kg	LDW-SS-84-010 LDW-SS-109-010 LDW-SS-143-010 LDW-SS-37-010 LDW-SS-6-010 LDW-SS-110-010

Sample concentrations were compared to concentrations detected in the method blanks. The sample concentrations were either not detected or were significantly greater (>5X blank contaminants) than the concentrations found in the associated method blanks.

No field blanks were identified in this SDG.

VI. Matrix Spike/Matrix Spike Duplicates

A matrix spike (MS) and matrix spike duplicate (MSD) was not performed for this SDG.

Duplicate (DUP) sample analyses were reviewed for each matrix as applicable. Results were within QC limits.

VII. Laboratory Control Samples (LCS)

Laboratory control samples were reviewed for each matrix as applicable. The percent recoveries (%R) were within the QC limits.

Standard reference material was performed at the required frequencies for this SDG.

VIII. Regional Quality Assurance and Quality Control

Not applicable.

IX. Internal Standards

All internal standard areas and retention times were within QC limits with the following exceptions:

Associated SDG	Sample	Internal Standards	Area (Limits)	Compound
DPWG16336	WG16186-101	^{13}C-PCB 155 ^{13}C-PCB 188	19.8 (25-150) 22.1 (25-150)	PCB 129 PCB 138 PCB 153 PCB 160 PCB 163 PCB 168 PCB 180 PCB 193

X. Target Compound Identifications

All target compound identifications were within validation criteria.

XI. Compound Quantitation and CRQLs

All compound quantitation and CRQLs were within validation criteria.

XII. System Performance

The system performance was acceptable.

XIII. Overall Assessment of Data

Overall assessment of data was acceptable.

XIV. Field Duplicates

No field duplicates were identified in this SDG.

LDC #: 13738A3 **VALIDATION COMPLETENESS WORKSHEET** Date: 7/15/05
SDG #: DPWG16336 Level IV Page: 1 of 1
Laboratory: AXYS Analytical Services, Ltd. Reviewer: T
2nd Reviewer: M

METHOD: HRGC/HRMS Polychlorinated Biphenyl Congeners (EPA Method 1668A)

The samples listed below were reviewed for each of the following validation areas. Validation findings are noted in attached validation findings worksheets.

	Validation Area		Comments
I.	Technical holding times	A	Sampling dates: 1/18 - 3/10/05
II.	~~GC/MS~~ HRGC/HRMS Instrument performance check	A	
III.	Initial calibration	A	%RSD ≤ 20.
IV.	Routine calibration	A	%D ≤ 25/35.
V.	Blanks	SW	
VI.	Matrix spike/Matrix spike duplicates/DUP	N/A	No MS/MSD.
VII.	Laboratory control samples	A	LCS. ~~No MS/MSD~~ No SRM
VIII.	Regional quality assurance and quality control	N	
IX.	Internal standards	SW	
X.	Target compound identifications	A	
XI.	Compound quantitation and CRQLs	A	
XII.	System performance	A	
XIII.	Overall assessment of data	A	
XIV.	Field duplicates	N	
XV.	Field blanks	N	

Note: A = Acceptable
N = Not provided/applicable
SW = See worksheet
ND = No compounds detected
R = Rinsate
FB = Field blank
D = Duplicate
TB = Trip blank
EB = Equipment blank

Validated Samples:

1	LDW-SS-84-010 sed	11	WG16186-101	21		31	
2	LDW-SS-109-010	12		22		32	
3	LDW-SS-143-010	13		23		33	
4	LDW-SS-37-010	14		24		34	
5	LDW-SS-6-010	15		25		35	
6	LDW-SS-110-010	16		26		36	
7	LDW-SS-110-010DUP	17		27		37	
8		18		28		38	
9		19		29		39	
10		20		30		40	

LDC #: 13738A3
SDG #: DDNG16336

VALIDATION FINDINGS CHECKLIST

Page: 1 of 32
Reviewer: 9
2nd Reviewer: K

Method: HRGC/HRMS Polychlorinated Biphenyls (EPA Method 1668)

Validation Area	Yes	No	NA	Findings/Comments
I. Technical holding times				
All technical holding times were met.	✓			
Cooler temperature criteria was met.	✓			
II. GC/MS Instrument performance check				
Was PFK exact mass 380.9760 verified?	✓			
Were the retention time windows established for all homologues?	✓			
Is the static resolving power at least 10,000 (10% valley definition)?	✓			
Was the mass resolution adequately check with PFK?	✓			
III. Initial calibration				
Was the initial calibration performed at 5 concentration levels?	✓			
Were all percent relative standard deviations (%RSD) ≤ ~~25% for unlabeled standards and ≤ 30% for labeled standards~~ 20% ?	✓			
Did all calibration standards meet the Ion Abundance Ratio criteria?	✓			
Was the signal to noise ratio for each target compound ≥ 2.5 and for each recovery and internal standard > 10?	✓			
IV. Continuing calibration				
Was a routine calibration performed at the beginning of each 12 hour period?	✓			
Were all percent differences (%D) < ~~40%~~ 25/35 % for unlabeled and labeled standards?	✓			
Did all routine calibration standards meet the Ion Abundance Ratio criteria?	✓			
V. Blanks				
Was a method blank associated with every sample in this SDG?	✓			
Was a method blank performed for each matrix and concentration?	✓			
Was there contamination in the method blanks? If yes, please see the Blanks validation completeness worksheet.	✓			
VI. Matrix spike/Matrix spike duplicates				
Were a matrix spike (MS) and matrix spike duplicate (MSD) analyzed for each matrix in this SDG? If no, indicate which matrix does not have an associated MS/MSD. Soil / Water.		✓		DUP
Were the MS/MSD percent recoveries (%R) and the relative percent differences (RPD) within the QC limits?			✓	
VII. Laboratory control samples				
Was an LCS analyzed for this SDG?	✓			
Was an LCS analyzed per extraction batch?	✓			
Were the LCS percent recoveries (%R) and relative percent difference (RPD) within the QC limits?	✓			

LDC #: 13738A3
SDG #: DPW616336

VALIDATION FINDINGS CHECKLIST

Reviewer: 9
2nd Reviewer: W

Validation Area	Yes	No	NA	Findings/Comments
VIII. Regional Quality Assurance and Quality Control				
Were performance evaluation (PE) samples performed?		✓		
Were the performance evaluation (PE) samples within the acceptance limits?			✓	
IX. Internal standards				
Were internal standard recoveries within the 25-150% criteria?		✓		
Was the minimum S/N ratio of all internal standard peaks ≥ 10?	✓			
X. Target compound identification				
For polychlorinated biphenyl congeners with associated labeled standards, were the retention times of the two quantitation peaks within -1 to 3 sec. of the RT of the labeled standard?	✓			
For polychlorinated biphenyl congeners without associated labeled standards, were the relative retention times of the two quantitation peaks within 0.005 time units of the RRT measured in the routine calibration?	✓			
For other polychlorinated biphenyl congeners, were the retention times of the two quantitation peaks within RT established in the performance check solution?	✓			
Did compound spectra contain all characteristic ions listed in the table attached?	✓			
Was the Ion Abundance Ratio for the two quantitation ions within criteria?	✓			
Was the signal to noise ratio for each target compound and labeled standard > 2.5?	✓			
Does the maximum intensity of each specified characteristic ion coincide within ± 2 seconds (includes labeled standards)?	✓			
Was an acceptable lock mass recorded and monitored?	✓			
XI. Compound quantitation/CRQLs				
Were the correct internal standard (IS), quantitation ion and relative response factor (RRF) used to quantitate the compound?	✓			
Were compound quantitation and CRQLs adjusted to reflect all sample dilutions and dry weight factors applicable to level IV validation?	✓			
XII. System performance				
System performance was found to be acceptable.	✓			
XIII. Overall assessment of data				
Overall assessment of data was found to be acceptable.	✓			
XIV. Field duplicates				
Field duplicate pairs were identified in this SDG.		✓		
Target compounds were detected in the field duplicates.			✓	
XV. Field blanks				
Field blanks were identified in this SDG.		✓		
Target compounds were detected in the field blanks.			✓	

LDC #: 13738A3
SDG #: DPW616336

VALIDATION FINDINGS WORKSHEET
Blanks

Page: 1 of 1
Reviewer: 9
2nd Reviewer: 9

METHOD: HRGC/HRMS Polychlorinated Biphenyls (EPA Method 1668)

Please see qualifications below for all questions answered "N". Not applicable questions are identified as "N/A".

Y N N/A Were all samples associated with a method blank?
Y N N/A Was a method blank performed for each matrix and whenever a sample extraction was performed?
Y N N/A Was method blank contamination less < CRQL for all target compounds?

Blank extraction date: 6/23/05 **Blank analysis date:** 7/8/05 **Associated samples:** All

Conc. units: pg/g

Compound	Blank ID	Sample Identification									
~~NA~~	6186-101		~~1 (100X)~~	All							
PCB 66	5.13	(25.65)									
TT	1.52	(7.6)									
90/101/113	20.9	(104.5)		>5X							
105	4.90	(24.5)									
110/115	29.4	(147)									
118	17.4	(87)									
129/138/160/163	22.3	(111.5)									
153/168	17.0	(85)									
156/157	2.67	(13.35)									

CIRCLED RESULTS WERE NOT QUALIFIED. ALL RESULTS NOT CIRCLED WERE QUALIFIED BY THE FOLLOWING STATEMENT:
All contaminants within five times the method blank concentration were qualified as not detected, "U".

LDC #: 13738A3
SDG #: DPWG16336

VALIDATION FINDINGS WORKSHEET
Internal Standards

Page: 1 of 1
Reviewer: 9
2nd Reviewer: AC

METHOD: HRGC/HRMS Polychlorinated Biphenyls (EPA Method 1668)

Please see qualifications below for all questions answered "N". Not applicable questions are identified as "N/A'.

(Y) N N/A Are all internal standard recoveries were within the 25-150% criteria?

(Y) N N/A Was the S/N ratio all internal standard peaks ≥ 10?

#	Date	Lab ID/Reference	Compound	% Recovery (Limit: 25-150%)	Qualifications
		WG16186-101	13C-Labeled PCB155	19.8 (25-150)	J/UJ/P
			13C-Labeled PCB188	22.1 (↓)	↓
				( )	(PCB 9, 138, 153, 160, 163
				( )	168, 180, 193)
				( )	
				( )	
				( )	
				( )	
				( )	
				( )	
				( )	
				( )	
				( )	
				( )	
				( )	
				( )	
				( )	
				( )	
				( )	

	Internal Standards		Recovery Standards
A.	^{13}C-PCB-77	K.	
B.	^{13}C-PCB-105	L.	
C.	^{13}C-PCB-118	M.	
D.	^{13}C-PCB-126	N.	
E.	^{13}C-PCB-156	O.	
F.	^{13}C-PCB-157	P.	
G.	^{13}C-PCB-169	Q.	
H.	^{13}C-PCB-180	R.	
I.		T.	

LDC #: 13738A3
SDG #: DPWF16336

VALIDATION FINDINGS WORKSHEET
Initial Calibration Calculation Verification

Page: 1 of 1
Reviewer: 9
2nd Reviewer: AL

METHOD: HRGC/HRMS Polychlorinated Biphenyls (EPA Method 1668)

The Relative Response Factor (RRF), average RRF, and percent relative standard deviation (%RSD) were recalculated for the compounds identified below using the following calculations:

$RRF = (A_x)(C_{is})/(A_{is})(C_x)$
average RRF = sum of the RRFs/number of standards
%RSD = 100 * (S/X)

A_x = Area of compound, A_{is} = Area of associated internal standard
C_x = Concentration of compound, C_{is} = Concentration of internal standard
S = Standard deviation of the RRFs, X = Mean of the RRFs

#	Standard ID	Calibration Date	Compound (Reference Internal Standard)	Reported Average RRF (initial)	Recalculated Average RRF (initial)	Reported RRF (CS3 std)	Recalculated RRF (CS3 std)	Reported %RSD	Recalculated %RSD
1	ICAL	6/16/05	PCB-77 (^{13}C-PCB-77)	0.96	0.96	0.91	0.91	16.4	16.3
			PCB-105 (^{13}C-PCB-105)	0.88	0.88	0.86	0.86	8.52	8.44
			PCB-156 (^{13}C-PCB-156)	0.98	0.98	0.97	0.97	8.11	8.26
			PCB-180 (^{13}C-PCB-180)	0.85	0.85	0.86	0.86	3.60	3.72
2			PCB-77 (^{13}C-PCB-77)						
			PCB-105 (^{13}C-PCB-105)						
			PCB-156 (^{13}C-PCB-156)						
			PCB-180 (^{13}C-PCB-180)						
3			PCB-77 (^{13}C-PCB-77)						
			PCB-105 (^{13}C-PCB-105)						
			PCB-156 (^{13}C-PCB-156)						
			PCB-180 (^{13}C-PCB-180)						

Comments: Refer to Initial Calibration findings worksheet for list of qualifications and associated samples when reported results do not agree within 10.0% of the recalculated results.

LDC #: 13738A3
SDG #: DPNF16336

VALIDATION FINDINGS WORKSHEET
Routine Calibration Results Verification

Page: 1 of 1
Reviewer: 9
2nd Reviewer: 9

METHOD: HRGC/HRMS Polychlorinated Biphenyls (EPA Method 1668)

The percent difference (%D) of the initial calibration average Relative Response Factors (RRFs) and the continuing calibration RRFs were recalculated for the compounds identified below using the following calculation:

% Difference = 100 * (ave. RRF - RRF)/ave. RRF
$RRF = (A_x)(C_{is})/(A_{is})(C_x)$

Where: ave. RRF = initial calibration average RRF
RRF = continuing calibration RRF
A_x = Area of compound, A_{is} = Area of associated internal standard
C_x = Concentration of compound, C_{is} = Concentration of internal standard

#	Standard ID	Calibration Date	Compound (Reference Internal Standard)	Average RRF (initial)	Reported RRF ~~Amt~~ (CC)	Recalculated RRF ~~Amt~~ (CC)	Reported %D	Recalculated %D
1	PBSC-328	6/29/05	PCB-77 (^{13}C-PCB-77)	0.96	50.7	50.8		
	S=1		PCB-105 (^{13}C-PCB-105)	0.88	55.6	55.6		
			PCB-156 (^{13}C-PCB-156)	0.98	103	103		
			PCB-180 (^{13}C-PCB-180)	0.85	54.0	53.9		
2	PBSC-327	6/28/05	PCB-77 (^{13}C-PCB-77)	0.96	47.2	47.2		
	S=1		PCB-105 (^{13}C-PCB-105)	0.88	49.2	49.1		
			PCB-156 (^{13}C-PCB-156)	0.98	102	102		
			PCB-180 (^{13}C-PCB-180)	0.85	53.8	53.6		
3	PBSC-339D	7/6/05	PCB-77 (^{13}C-PCB-77)	0.96	50.5	50.6		
	S=1		PCB-105 (^{13}C-PCB-105)	0.88	55.2	55.0		
			PCB-156 (^{13}C-PCB-156)	0.98	102	102		
			PCB-180 (^{13}C-PCB-180)	0.85	54.1	53.9		

Comments: Refer to Routine Calibration findings worksheet for list of qualifications and associated samples when reported results do not agree within 10.0% of the recalculated results.

LDC #: 13738A3
SDG #: DPNF16336

VALIDATION FINDINGS WORKSHEET
Routine Calibration Results Verification

Page: 1 of 1
Reviewer: 2
2nd Reviewer: 2

METHOD: HRGC/HRMS Polychlorinated Biphenyls (EPA Method 1668)

The percent difference (%D) of the initial calibration average Relative Response Factors (RRFs) and the continuing calibration RRFs were recalculated for the compounds identified below using the following calculation:

% Difference = 100 * (ave. RRF - RRF)/ave. RRF
RRF = $(A_x)(C_{is})/(A_{is})(C_x)$

Where: ave. RRF = initial calibration average RRF
RRF = continuing calibration RRF
A_x = Area of compound, A_{is} = Area of associated internal standard
C_x = Concentration of compound, C_{is} = Concentration of internal standard

#	Standard ID	Calibration Date	Compound (Reference Internal Standard)	Average RRF (initial)	Reported RRF ~~Amt~~ (CC)	Recalculated RRF ~~Amt~~ (CC)	Reported %D	Recalculated %D
1	PBSC343A S=1	7/7/05	PCB-77 (^{13}C-PCB-77)	0.96	51.3	51.4		
			PCB-105 (^{13}C-PCB-105)	0.88	55.4	55.4		
			PCB-156 (^{13}C-PCB-156)	0.98	102	102		
			PCB-180 (^{13}C-PCB-180)	0.85	54.3	54.1		
2			PCB-77 (^{13}C-PCB-77)					
			PCB-105 (^{13}C-PCB-105)					
			PCB-156 (^{13}C-PCB-156)					
			PCB-180 (^{13}C-PCB-180)					
3			PCB-77 (^{13}C-PCB-77)					
			PCB-105 (^{13}C-PCB-105)					
			PCB-156 (^{13}C-PCB-156)					
			PCB-180 (^{13}C-FCB-180)					

Comments: Refer to Routine Calibration findings worksheet for list of qualificatcns and associated samples when reported results do not agree within 10.0% of the recalculated results.

LDC #: 13388J

SDG #: DPWF16336

VALIDATION FINDINGS WORKSHEET
Laboratory Control Sample Results Verification

Page: 1 of 1

Reviewer: 9

2nd Reviewer: AC

METHOD: HRGC/HRMS Polychlorinated Biphenyls (EPA Method 1668)

The percent recoveries (%R) and Relative Percent Difference (RPD) of the laboratoy control sample and laboratory control sample duplicate (if applicable) were recalculated for the compounds identified below using the following calculation:

% Recovery = 100 * SSC/SA Where: SSC = Spiked sample concentration; SA = Spike added

RPD = | LCS - LCSD | * 2/(LCS + LCSD) LCS = Laboraotry control sample percent recovery LCSD = Laboratory control sample duplicate percent recovery

LCS ID: WF16186-102

Compound	Spike Added (ng/mL)		Spiked Sample Concentration (ng/mL)		LCS Percent Recovery		LCSD Percent Recovery		LCS/LCSD RPD	
	LCS	LCSD	LCS	LCSD	Reported	Recalc.	Reported	Recalc.	Reported	Recalculated
PCB-77	100	NA	101	NA	101	101				
PCB-81	↓		102		102	102				
PCB-105			104		104	104				
PCB-114			98.6		98.6	98.6				
PCB-118			115		115	115				
FCB-123			104		104	104				
FCB-126	↓		104		104	104				
PCB-156/157	200		194		96.9	97				
~~PCB-157~~										
PCB-167	100		98.1		98.1	98.1				
PCB-169	↓		102		102	102				
~~PCB-170~~										
~~PCB-180~~										
PCB-189	100		107		107	107				

Comments: Refer to Laboratory Control Sample findings worksheet for list of qualifications and associated samples when reported results do not agree within 10.0% of the recalculated results.

Ions Monitored for HRGC/HRMS Analysis of Polychlorinated Biphenyls

Descriptor	Accurate mass[a]	Ion ID	Analyte	Substance
1	289.9224	M	C12 H6 35Cl4	TCB
	291.9194	M+2	C12 H6 35Cl3 37Cl4	TCB
	301.9626	M	13C12 H6 35Cl4	PeCB
	303.9597	M+2	13C12 H6 35Cl3 37Cl	PeCB
	325.8804	M+2	C12 H5 35Cl4 37Cl	PeCB
	327.8775	M+4	C12 H5 35Cl3 37Cl2	PeCB
	[292.9825]	Lock	C7 F11	PFK
2	325.8804	M+2	C12 H5 35Cl4 37Cl	PeCB
	327.8775	M+4	C12 H5 35Cl3 37Cl2	PeCB
	337.9207	M+2	13C12 H5 35Cl4 37Cl	PeCB
	339.9178	M+4	13C12 H5 35Cl3 37Cl2	PeCB
	359.8415	M+2	C12 H4 35Cl5 37Cl	HxCB
	361.8385	M+4	C12 H4 35Cl4 37Cl2	HxCB
	371.8817	M+2	13C12 H4 35Cl5 37Cl	HxCB
	373.8788	M+4	13C12 H4 35Cl4 37Cl2	HxCB
	393.8025	M+2	C12 H3 35Cl6 37Cl	HpCB
	395.7996	M+4	C12 H3 35Cl5 37Cl2	HpCB
	405.8428	M+2	13C12 H3 35Cl6 37Cl	HpCB
	407.8398	M+4	13C12 H3 35Cl5 37Cl2	HpCB
	[354.9892[	Lock	C9F13	PFK
3	509.7229	M+4	13C12 35Cl10 37Cl2	DCB
	511.7199	M+6	13C12 35Cl9 37Cl3	
	513.7170	M+8	13C12 35Cl8 37Cl4	
	[442.9728]	Lock	C10 F17	PFK

S = internal/recovery standard

H = 1.007825
C = 12.000000
^{13}C = 13.003355
F = 18.9984

^{35}Cl = 34.968853
^{37}Cl = 36.965903

LDC #: 13388A3
SDG #: DPNF16336

VALIDATION FINDINGS WORKSHEET
Sample Calculation Verification

Page: 1 of 1
Reviewer: a
2nd reviewer: DL

METHOD: HRGC/HRMS Polychlorinated Biphenyls (EPA Method 1668)

Y N N/A Were all reported results recalculated and verified for all level IV samples?

Y N N/A Were all recalculated results for detected target compounds agree within 10.0% of the reported results?

Concentration = $\frac{(A_x)(I_s)(DF)}{(A_{is})(RRF)(V_o)(\%S)}$

A_x = Area of the characteristic ion (EICP) for the compound to be measured

A_{is} = Area of the characteristic ion (EICP) for the specific internal standard

I_s = Amount of internal standard added in nanograms (ng)

RRF = Relative response factor of the calibration standard.

V_o = Volume or weight of sample pruged in milliliters (ml) or grams (g).

Df = Dilution factor.

%S = Percent solids, applicable to soils and solid matrices only.

Example:

Sample I.D. 1, PCB77:

Conc. = $\frac{(3.93e+07)(8000)(\quad)}{(1.38e+06)(0.96)(5.26)(\quad)}$

= 45117.6 ng/Kg.

#	Sample ID	Compound	Reported Concentration ( )	Calculated Concentration ( )	Qualification

E. Dioxins/furans: sample groups 16036, 16057

LABORATORY DATA CONSULTANTS, INC.
7750 El Camino Real, Suite 2L Carlsbad, CA 92009 Phone: 760/634-0437 Fax: 760/634-0439

LDC #13655
July 8, 2005

Windward Environmental, LLC
200 West Mercer Street, Suite 401
Seattle, WA 98119
ATTN: Ms. Susie McGroddy

SUBJECT: Lower Duwamish Waterway Group Sediment Sample Data Validation

Dear Ms. McGroddy,

Enclosed is our EPA Level IV data validation of analytical chemistry results generated in support of the Lower Duwamish Waterway Group project. The primary analyses were performed by Axys Analytical Services. Samples were analyzed for HRGC/MS Dioxin/Dibenzofurans by EPA Method 1613B. Samples are referenced under the following Sample Delivery Groups: DPWG16036 and DPWG16057. See the Sample Analysis Table (Attachment 1) for the number of samples reviewed.

Please feel free to contact us if you have any questions.

Sincerely,

Stella S. Cuenco
Project Manager/Senior Chemist

Attachment 1

PDF

LDC #13655 (Windward Environmental, LLC - Seattle WA / Lower Duwamish Waterway Group)

LDC	SDG#	DATE REC'D	(3) DATE DUE	Dioxins (1613B)																															
Matrix: Water/Sediment				W	S	W	S	W	S	W	S	W	S	W	S	W	S	W	S	W	S	W	S	W	S	W	S	W	S	W	S	W	S	W	S
A	DPWG16036	03/23/05	07/15/05	0	5																														
B	DPWG16057	03/23/05	07/15/05	0	5																														
Total	B/SC			0	10	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	10

Shaded cells indicate Level IV validation (al other cells are Level II validation). These sample counts do not include MS/MSD, and DUPs

CHEMICAL DATA QUALITY REVIEW FOR PHASE I AND PHASE 2 SURFACE SEDIMENT SAMPLES

Lower Duwamish Waterway Group
LDC# 13655

This report details the findings of an EPA Level IV data validation of analytical chemistry results generated in support of the Lower Duwamish Waterway Group project. The primary analyses were performed by Axys Analytical Services. Samples were analyzed for HRGC/MS Dioxin/Dibenzofurans by EPA Method 1613B. Samples are referenced under the following Sample Delivery Groups: DPWG16036 and DPWG16057. See the Sample Analysis Table (Attachment 1) for the number of samples reviewed and the Sample Validation Table (Attachment 2) for the sample identifications and analyses.

The QC guidelines used for data qualification are those specified in the EPA Region 10 SOP for the Validation of Polychlorinated Dibenzodioxin (PCDD) and Polychlorinated Dibenzofuran (PCDF) Data (Revision 2.0 January 31, 1996). Specific QC criteria used follows the Surface Sediment Sampling for Chemical Analyses and Toxicity Testing of the Lower Duwamish Waterway Quality Assurance Project Plan (January 14, 2005). Where specific guidance is not available, the data has been evaluated in a conservative manner consistent with industry standards using professional experience.

The following items were evaluated during the review:

- Holding Times
- Sample Preservation
- Cooler Temperatures
- Instrument Calibration
- Blanks
- Matrix Spike/Matrix Spike Duplicates
- Internal Standards
- Laboratory Control Samples
- Target Compound Identifications
- Compound Quantitation and CRQLs
- System Performance
- Field Duplicates

Attachment 1

PDF	LDC #13655 (Windward Environmental, LLC - Seattle WA / Lower Duwamish Waterway Group)																																			
LDC	SDG#	DATE REC'D	(3) DATE DUE	Dioxins (1613B)																																
Matrix: Water/Sediment				W	S	W	S	W	S	W	S	W	S	W	S	W	S	W	S	W	S	W	S	W	S	W	S	W	S	W	S	W	S	W	S	W	S
A	DPWG16036	06/23/05	07/15/05	0	5																															
B	DPWG16057	06/23/05	07/15/05	0	5																															
Total	B/SC			0	10	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	10

Shaded cells indicate Level IV validation (all other cells are Level II validation). These sample counts do not include MS/MSD, and DUPs

Attachment 2

SDG#: DPWG16036 | VALIDATION SAMPLE TABLE | **LDC#:** 13655A

Project Name: Lower Duwamish Waterway Group | Parameters/Analytical Method | Project #04-08-06-24

Client ID #	Lab ID #	Matrix	Date Collected	Dioxins (1613B)											
EB-SS2b-010	L7611-3	sediment	02/02/05	X											
LDW-SS131-010	L7707-1	sediment	03/08/05	X											
LDW-SS206-010	L7707-2	sediment	03/08/05	X											
LDW-SS71-010	L7707-3	sediment	03/14/05	X											
LDW-SS59R2-010	L7707-4	sediment	03/14/05	X											
EB-SS2b-010DUP	L7611-3DUP	sediment	02/02/05	X											

Note: X = Validation was performed.

Attachment 2

SDG#: DPWG16057 | VALIDATION SAMPLE TABLE | **LDC#:** 13655B

Project Name: Lower Duwamish Waterway Group | Parameters/Analytical Method | Project #04-08-06-24

Client ID #	Lab ID #	Matrix	Date Collected	Dioxins (1613B)											
LDW-SS-84-010	L7601-14	sediment	01/19/05	X											
LDW-SS59-010	L7630-5	sediment	02/02/05	X											
LDW-SS-109-010	L7787-1	sediment	01/25/05	X											
LDW-SS-143-010	L7787-2	sediment	01/26/05	X											
LDW-SS-37-010	L7787-3	sediment	01/18/05	X											
LDW-SS59-010DUP	L7630-5DUP	sediment	02/02/05	X											

Note: X = Validation was performed.

Only issues which require comment or action are discussed in this report. Data deficiencies are arranged by method. Potential effects of data anomalies have been described where possible.

The following are definitions of the data qualifiers:

U Indicates the compound or analyte was analyzed for but not detected at or above the stated limit.

J Indicates an estimated value.

- J1 Blank Contamination: Indicates possible high bias and/or false positives.
- J2 Calibration Range exceeded: Indicates possible low bias.
- J3 Holding times not met: Indicates low bias for most analytes.
- J4 Other QC parameters outside control limits: bias not readily determined.
- J5 Other QC parameters outside control limits. The reported results appear to be biased high. The actual value of target compound in the sample may be lower than the value reported by the laboratory.
- J6 Other QC parameters outside control limits. The reported results appear to be biased low. The actual value of target compound in the sample may be higher than the value reported by the laboratory.

R Quality control indicates the data is not usable.

N Presumptive evidence of presence of the constituent.

UJ Indicates the compound or analyte was analyzed for but not detected. The sample detection limit is an estimated value.

A Indicates the finding is based upon technical validation criteria.

P Indicates the finding is related to a protocol/contractual deviation.

Overall Data Assessment

Method blank contamination have warranted the qualification of several compounds as non-detected (U).

Laboratory duplicate precision and SRM accuracy exceedances have warranted the qualification of results as estimated (J).

The frequency of matrix spike (MS) and matrix spike duplicate (MSD) was not met as required by the QAPP. MS/MSD analyses are not required for EPA Method 1613B. The laboratory consulted with the client on this discrepancy and was instructed to proceed with the extraction and analysis despite the absence of MS/MSDs.

The quality control criteria reviewed, other than those discussed above, were met and are considered acceptable. Sample results that were found to be estimated (J) are usable for limited purposes only. Based upon the data validation all other results are considered valid and usable for all purposes.

HRGC/HRMS Dioxins/Dibenzofurans By EPA Method 1613B

I. Technical Holding Times

All technical holding time requirements were met.

The chain-of-custodies were reviewed for documentation of cooler temperatures. All cooler temperatures met validation criteria.

II. GC/MS Instrument Performance Check

Instrument performance was checked at the required daily frequency.

Retention time windows were established for all homologues. The chromatographic resolution between ^{13}C-2,3,7,8-TCDD and ^{13}C-1,2,3,4-TCDD was less than or equal to 25%.

The ion abundance ratios for all PCDDs and PCDFs were within validation criteria.

III. Initial Calibration

A five point initial calibration was performed as required by the method.

Percent relative standard deviations (%RSD) were less than or equal to 20.0% for all calibration check compounds and less than or equal to 35.0% for all other compounds.

The ion abundance ratios for all PCDDs and PCDFs were within validation criteria.

The minimum S/N ratio was technically acceptable.

IV. Routine Calibration (Continuing)

Routine calibration was performed at the required frequencies.

All of the routine calibration concentrations were within the QC limits.

The ion abundance ratios for all PCDDs and PCDFs were within method criteria.

V. Blanks

Method blanks were reviewed for each matrix as applicable. No polychlorinated dioxin/dibenzofuran contaminants were found in the method blanks with the following exceptions:

Associated SDG	Method Blank ID	Extraction Date	Compound	Concentration	Associated Samples
DPWG16036	WG15383-101	4/29/05	2,3,7,8-TCDD 1,2,3,7,8-PeCDD 1,2,3,4,7,8-HxCDD 1,2,3,6,7,8-HxCDD 1,2,3,7,8,9-HxCDD 1,2,3,4,6,7,8-HpCDD OCDD Total PeCDD Total HpCDD	0.134 ng/Kg 0.100 ng/Kg 0.070 ng/Kg 0.054 ng/Kg 0.100 ng/Kg 0.113 ng/Kg 0.158 ng/Kg 0.100 ng/Kg 0.113 ng/Kg	EB-SS2b-010 LDW-SS131-010 LDW-SS206-010 LDW-SS71-010 LDW-SS59R2-010
DPWG16057	WG15727-101	5/12/05	1,2,3,4,6,7,8-HpCDD OCDD 1,2,3,4,7,8,9-HpCDF OCDF Total HpCDD	0.111 ng/Kg 0.275 ng/Kg 0.058 ng/Kg 0.094 ng/Kg 0.111 ng/Kg	LDW-SS-84-010 LDW-SS59-010 LDW-SS-109-010 LDW-SS-143-010 LDW-SS-37-010

Sample concentrations were compared to concentrations detected in the method blanks. The sample concentrations were either not detected or were significantly greater (>5X blank contaminants) than the concentrations found in the associated method blanks with the following exceptions:

Associated SDG	Sample	Compound	Reported Concentration	Modified Final Concentration
DPWG16036	EB-SS2b-010 (5x)	2,3,7,8-TCDD	0.757 ng/Kg	0.757U ng/Kg
DPWG16036	LDW-SS71-010	2,3,7,8-TCDD	0.560 ng/Kg	0.560U ng/Kg
DPWG16036	LDW-SS59R2-010 (5x)	2,3,7,8-TCDD	1.04 ng/Kg	1.04U ng/Kg

VI. Matrix Spike/Matrix Spike Duplicates

Matrix spike (MS) and matrix spike duplicate (MSD) analyses were not required by the method.

Duplicate (DUP) sample analyses were reviewed for each matrix as applicable. Relative percent differences (RPD) were within QC limits with the following exceptions:

Associated SDG	DUP ID (Associated Samples)	Compound	RPD (Limits)	Flag	A or P
DPWG16057	LDW-SS59-010DUP (LDW-SS59-010)	1,2,3,6,7,8-HxCDD	63.0 (≤50)	J4 (all detects)	A

VII. Laboratory Control Samples (LCS)

Laboratory control samples were reviewed for each matrix as applicable. The percent recoveries (%R) were within QC limits.

Standard reference material were within QC limits with the following exceptions:

Associated SDG	SRM ID	Compound	Concentration (Limits)	Associated Samples	Flag	A or P
DPWG16036	SRM	1,2,3,7,8,9-HxCDF	4.43 ng/Kg (48-60)	EB-SS2b-010 LDW-SS131-010 LDW-SS206-010 LDW-SS71-010 LDW-SS59R2-010	J6 (all detects) UJ6 (all non-detects)	A
DPWG16057	SRM	1,2,3,7,8,9-HxCDF	2.65 ng/Kg (48-60)	LDW-SS-84-010 LDW-SS59-010 LDW-SS-109-010 LDW-SS-143-010 LDW-SS-37-010	J6 (all detects) UJ6 (all non-detects)	A

Although the concentrations of 1,2,3,7,8,9-HxCDF were less than 10% of the certified value, the associated results were qualified as estimated (J/UJ) since the LCS recoveries were within QC limts.

VIII. Regional Quality Assurance and Quality Control

Not applicable.

IX. Internal Standards

All internal standard recoveries were within QC limits.

X. Target Compound Identifications

All target compound identifications were within validation criteria.

XI. Compound Quantitation and CRQLs

All compound quantitation and CRQLs were within validation criteria.

XII. System Performance

The system performance was acceptable.

XIII. Overall Assessment of Data

The overall assessment of data was acceptable. In the case where more than one result was reported for an individual sample, the least technically acceptable results were rejected as follows:

Associated SDG	Sample	Compound	Flag	A or P
DPWG16036	EB-SS2b-010 LDW-SS131-010 LDW-SS206-010 LDW-SS71-010 LDW-SS59R2-010	2,3,7,8-TCDF (DB-5)	R	A
DPWG16057	LDW-SS-84-010 LDW-SS59-010 LDW-SS-109-010 LDW-SS-143-010 LDW-SS-37-010	2,3,7,8-TCDF (DB-5)	R	A

Data flags are summarized at the end of this report if data has been qualified.

XIV. Field Duplicates

Samples LDW-SS131-010 and LDW-SS206-010 were identified as field duplicates. No polychlorinated dioxins/dibenzofurans were detected in any of the samples with the following exceptions:

Associated SDG	Compound	Concentration (ng/Kg)		RPD (Limits)
		LDW-SS131-010	LDW-SS206-010	
DPWG16036	2,3,7,8-TCDD	1.07	2.41	77 (≤50)
DPWG16036	1,2,3,7,8-PeCDD	2.38	7.98	108 (≤50)
DPWG16036	1,2,3,4,7,8-HxCDD	1.86	5.40	98 (≤50)
DPWG16036	1,2,3,6,7,8-HxCDD	7.25	24.8	110 (≤50)
DPWG16036	1,2,3,7,8,9-HxCDD	7.40	21.9	99 (≤50)
DPWG16036	1,2,3,4,6,7,8-HpCDD	171	395	79 (≤50)
DPWG16036	OCDD	1160	2060	56 (≤50)
DPWG16036	2,3,7,8-TCDF	1.39	1.55	11 (≤50)
DPWG16036	1,2,3,7,8-PeCDF	0.463	0.474	2 (≤50)

Associated SDG	Compound	Concentration (ng/Kg)		RPD (Limits)
		LDW-SS131-010	LDW-SS206-010	
DPWG16036	2,3,4,7,8-PeCDF	0.876	1.94	76 (≤50)
DPWG16036	1,2,3,4,7,8-HxCDF	3.10	7.20	80 (≤50)
DPWG16036	1,2,3,6,7,8-HxCDF	1.25	3.00	82 (≤50)
DPWG16036	1,2,3,7,8,9-HxCDF	0.172	0.526	101 (≤50)
DPWG16036	2,3,4,6,7,8-HxCDF	0.843	1.93	78 (≤50)
DPWG16036	1,2,3,4,6,7,8-HpCDF	21.9	51.7	81 (≤50)
DPWG16036	1,2,3,4,7,8,9-HpCDF	1.76	3.32	61 (≤50)
DPWG16036	OCDF	53.3	73.9	32 (≤50)
DPWG16036	Total TCDD	5.37	10.1	61 (≤50)
DPWG16036	Total PeCDD	13.2	28.4	73 (≤50)
DPWG16036	Total HxCDD	59.2	190	105 (≤50)
DPWG16036	Total HpCDD	357	766	73 (≤50)
DPWG16036	Total TCDF	9.95	10.9	9 (≤50)
DPWG16036	Total PeCDF	16.0	34.9	74 (≤50)
DPWG16036	Total HxCDF	38.1	142	115 (≤50)
DPWG16036	Total HpCDF	69.2	174	86 (≤50)
DPWG16036	2,3,7,8-TCDF (DB-225)	0.614	0.728	17 (≤50)

XV. Field Blanks

No field blanks were identified in this SDG.

LDC #: 13655A21 **VALIDATION COMPLETENESS WORKSHEET** Date: 6/27/05
SDG #: DPWG16036 Level IV Page: 1 of 1
Laboratory: AXYS Analytical Services Ltd. Reviewer: [illegible]
2nd Reviewer: [illegible]

METHOD: HRGC/HRMS Dioxins/Dibenzofurans (EPA Method 1613B)

The samples listed below were reviewed for each of the following validation areas. Validation findings are noted in attached validation findings worksheets.

	Validation Area		Comments
I.	Technical holding times	A	Sampling dates: 2/2-14/05
II.	HRGC/HRMS Instrument performance check	A	
III.	Initial calibration	A	%RSD ≤ 20/35
IV.	Routine calibration	A	RC limits
V.	Blanks	SW	
VI.	Matrix spike/Matrix spike duplicates/DUP	N/A	Not required
VII.	Laboratory control samples	SW	LCS / SRM
VIII.	Regional quality assurance and quality control	N	
IX.	Internal standards	A	
X.	Target compound identifications	A	
XI.	Compound quantitation and CRQLs	A	
XII.	System performance	A	
XIII	Overall assessment of data	SW	
XIV.	Field duplicates	SW	D = 2+3
XV.	Field blanks	N	~~EB=1~~

Note: A = Acceptable
N = Not provided/applicable
SW = See worksheet
ND = No compounds detected
R = Rinsate
FB = Field blank
D = Duplicate
TB = Trip blank
EB = Equipment blank

Validated Samples:

1	EB-SS2b-010 Soil	11	WG15383-101	21		31	
2	LDW-SS131-010	12		22		32	
3	LDW-SS206-010	13		23		33	
4	LDW-SS71-010	14		24		34	
5	LDW-SS59-010 R2	15		25		35	
6	EB-SS2b-010DUP	16		26		36	
7		17		27		37	
8		18		28		38	
9		19		29		39	
10		20		30		40	

Notes: _____

LDC #: 13655A21
SDG #: DPW616036

VALIDATION FINDINGS CHECKLIST

Page: 1 of 3
Reviewer: 9
2nd Reviewer: A

Method: Dioxins/Dibenzofurans (EPA SW 846 Method 1613)

Validation Area	Yes	No	NA	Findings/Comments
I. Technical holding times				
All technical holding times were met.	✓			
Cooler temperature criteria was met.	✓			
II. GC/MS Instrument performance check				
Was PFK exact mass 380.9760 verified?	✓			
Were the retention time windows established for all homologues?	✓			
Was the chromatographic resolution between 2,3,7,8-TCDD and peaks representing any other unlabeled TCDD isomers ≤ 25% ?	✓			
Is the static resolving power at least 10,000 (10% valley definition)?	✓			
Was the mass resolution adequately check with PFK?	✓			
Was the presence of 1,2,8,9-TCDD and 1,3,4,6,8-PeCDF verified?	✓			
III. Initial calibration				
Was the initial calibration performed at 5 concentration levels?	✓			
Were all percent relative standard deviations (%RSD) ≤ 20% for unlabeled standards and ≤ ~~30~~ 35% for labeled standards?	✓			
Did all calibration standards meet the Ion Abundance Ratio criteria?	✓			
Was the signal to noise ratio for each target compound ≥ 2.5 and for each recovery and internal standard ≥ 10?	✓			
IV. Continuing calibration				
Was a routine calibration performed at the beginning and end of each 12 hour period?	✓			
Were all ~~percent differences (%D) ≤ 20% for unlabeled standards and ≤ 30% for labeled standards~~? conc meet QC limits ?	✓			
Did all routine calibration standards meet the Ion Abundance Ratio criteria?	✓			
V. Blanks				
Was a method blank associated with every sample in this SDG?	✓			
Was a method blank performed for each matrix and concentration?	✓			
Was there contamination in the method blanks? If yes, please see the Blanks validation completeness worksheet?		✓		
VI. Matrix spike/Matrix spike duplicates				
Were a matrix spike (MS) and matrix spike duplicate (MSD) analyzed for each matrix in this SDG? If no, indicate which matrix does not have an associated MS/MSD. Soil / Water.		✓		DUP
Were the MS/MSD percent recoveries (%R) and the relative percent differences (RPD) within the QC limits?			✓	
VII. Laboratory control samples				
Was an LCS analyzed for this SDG?	✓			
Was an LCS analyzed per extraction batch?	✓			

Validation Area	Yes	No	NA	Findings/Comments
Were the LCS percent recoveries (%R) and relative percent difference (RPD) within the QC limits?	✓			
VIII. Regional Quality Assurance and Quality Control				
Were performance evaluation (PE) samples performed?		✓		
Were the performance evaluation (PE) samples within the acceptance limits?			✓	
IX. Internal standards				
Were internal standard recoveries within the 25-125% criteria?	✓			
Was the minimum S/N ratio of all internal standard peaks ≥ 10?	✓			
X. Target compound identification				
For 2,3,7,8 substituted congeners with associated labeled standards, were the retention times of the two quantitation peaks within -1 to 3 sec. of the RT of the labeled standard?	✓			
For 2,3,7,8 substituted congeners without associated labeled standards, were the relative retention times of the two quantitation peaks within 0.005 time units of the RRT measured in the routine calibration?	✓			
For non-2,3,7,8 substituted congeners, were the retention times of the two quantitation peaks within RT established in the performance check solution?	✓			
Did compound spectra contain all characteristic ions listed in the table attached?	✓			
Was the Ion Abundance Ratio for the two quantitation ions within criteria?	✓			
Was the signal to noise ratio for each target compound and labeled standard ≥ 2.5?	✓			
Does the maximum intensity of each specified characteristic ion coincide within ± 2 seconds (includes labeled standards)?	✓			
For PCDF identification, was any signal (S/N ≥ 2.5, at ± seconds RT) detected in the corresponding PCDPE channel?	✓			
Was an acceptable lock mass recorded and monitored?	✓			
XI. Compound quantitation/CRQLs				
Were the correct internal standard (IS), quantitation ion and relative response factor (RRF) used to quantitate the compound?	✓			
Were compound quantitation and CRQLs adjusted to reflect all sample dilutions and dry weight factors applicable to level IV validation?	✓			
XII. System performance				
System performance was found to be acceptable.	✓			
XIII. Overall assessment of data				
Overall assessment of data was found to be acceptable.	✓			
XIV. Field duplicates				
Field duplicate pairs were identified in this SDG.	✓			
Target compounds were detected in the field duplicates.	✓			
XV. Field blanks				

LDC #: 13655A21
SDG #: DPWG16036

VALIDATION FINDINGS CHECKLIST

Reviewer: 9
2nd Reviewer: JC

Validation Area	Yes	No	NA	Findings/Comments
Field blanks were identified in this SDG.		/		
Target compounds were detected in the field blanks.			/	

VALIDATION FINDINGS WORKSHEET

METHOD: HRGC/HRMS Dioxins/Dibenzofurans (EPA Method 1613A)

A. 2,3,7,8-TCDD	F. 1,2,3,4,6,7,8-HpCDD	K. 1,2,3,4,7,8-HxCDF	P. 1,2,3,4,7,8,9-HpCDF	U. Total HpCDD
B. 1,2,3,7,8-PeCDD	G. OCDD	L. 1,2,3,6,7,8-HxCDF	Q. OCDF	V. Total TCDF
C. 1,2,3,4,7,8-HxCDD	H. 2,3,7,8-TCDF	M. 2,3,4,6,7,8-HxCDF	R. Total TCDD	W. Total PeCDF
D. 1,2,3,6,7,8-HxCDD	I. 1,2,3,7,8-PeCDF	N. 1,2,3,7,8,9-HxCDF	S. Total PeCDD	X. Total HxCDF
E. 1,2,3,7,8,9-HxCDD	J. 2,3,4,7,8-PeCDF	O. 1,2,3,4,6,7,8-HpCDF	T. Total HxCDD	Y. Total HpCDF

Notes:

LDC #: 13655A21
SDG #: DPWF16036

VALIDATION FINDINGS WORKSHEET
Blanks

Page: 1 of 1
Reviewer: Q
2nd Reviewer: M

METHOD: GC/MS Dioxins/Dibenzofurans (Method 1613~~A~~B)

Please see qualifications below for all questions answered "N". Not applicable questions are identified as "N/A".

Y N N/A Were all samples associated with a method blank?
Y N N/A Was a method blank performed for each matrix and whenever a sample extraction was performed?
Y N N/A Was method blank contamination less < CRQL for all target compounds?

Blank extraction date: 4/29/05 **Blank analysis date:** 5/12/05
Conc. units: ng/kg Associated Samples: all

Compound	Blank ID	Sample Identification								
WF	15383-10	1 (5x)	4	5 (S)	others					
A	0.134 *	0.757/U	0.560/U	1.04/U	> S	X				
B	0.10 D	4.07								
C	0.070 *	7.45								
D	0.054 *	21.9								
E	0.100 *	19.6								
F	0.113	539			> 5x					
G	0.158	4.90								
S	0.100	28.0								
U	0.113	1.90								

CIRCLED RESULTS WERE NOT QUALIFIED. ALL RESULTS NOT CIRCLED WERE QUALIFIED BY THE FOLLOWING STATEMENT:
All contaminants within five times the method blank concentration were qualified as not detected, "U".

* sample.

LDC #: 13655A21
SDG #: DPWG16036

VALIDATION FINDINGS WORKSHEET
Laboratory Control Samples (LCS)

Page: 1 of 1
Reviewer: [illegible]
2nd Reviewer: [illegible]

METHOD: HRGC/HRMS Dioxins/Dibenzofurans (EPA Method 1613B)
Please see qualifications below for all questions answered "N". Not applicable questions are identified as "N/A".

(Y) N N/A Was a LCS required?
(Y) N N/A Was a LCS analyzed every 20 samples for each matrix or whenever a sample extraction was performed?
(Y) N N/A Were the LCS percent recoveries (%R) and relative percent difference (RPD) within the QC limits?

#	Date	Lab ID/Reference	Compound	~~SRM~~ LCS %R (Limits)	~~NS/KS~~ LCSD %R (Limits)	RPD (Limits)	Associated Samples	Qualifications
		SRM	A	122 ng/kg ( )	(124-142)	( )	M+B4C	~~J6/UJ6/A~~
			I	30.9 ( )	(38-52)	( )		
			J	39.9 ( )	(41-49)	( )		
			K	185 ( )	(190-250)	( )		
			N*	443 ( )	(48-60)	J6/UJ6		
			M	443 ( )	(1-37)	( )		1E dets/A
				( )	( )	( )		
				( )	( )	( )		
				( )	( )	( )		
				( )	( )	( )		
				( )	( )	( )		
				( )	( )	( )		
				( )	( )	( )		
			* except N all cpds w/in 50-150% of certified values					
				( )	( )	( )		
				( )	( )	( )		
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				( )	( )	( )		

LDC #: 13655A21
SDG #: DPW616036

VALIDATION FINDINGS WORKSHEET
Overall Assessment of Data

Reviewer: Q
2nd Reviewer: A

METHOD: HRGC/HRMS Dioxins/Dibenzofurans (EPA Method 1613B)

Please see qualifications below for all questions answered "N". Not applicable questions are identified as "N/A".

All available information pertaining to the data were reviewed using professional judgement to compliment the determination of the overall quality of the data.

Y N N/A Was the overall quality and usability of the data acceptable?

#	Date	Sample ID	Finding	Associated Samples	Qualifications
		All	2,3,7,8-TCDF on DB-5	All	R / A

Comments:

LDC#:13655A21
SDG#:DPWG16036

VALIDATION FINDINGS WORKSHEET
Field Duplicates

Reviewer: Q
2nd Reviewer: AV

METHOD: HRGC/HRMS Dioxins/Dibenzofurans (EPA Method 1613B)

Y N NA Were field duplicate pairs identified in this SDG?
Y N NA Were target analytes detected in the field duplicate pairs?

Compound	Concentration (ng/Kg)		RPD	(≤ 50)
	2	3		
A	1.07	2.41	77	
B	2.38	7.98	108	
C	1.86	5.40	98	
D	7.25	24.8	110	
E	7.40	21.9	99	
F	171	395	79	
G	1160	2060	56	
H	1.39	1.55	11	
I	0.463	0.474	2	
J	0.876	1.94	76	
K	3.10	7.20	80	
L	1.25	3.00	82	
N	0.172	0.526	101	
M	0.843	1.93	78	
O	21.9	51.7	81	
P	1.76	3.32	61	
Q	53.3	73.9	32	
R	5.37	10.1	61	
S	13.2	28.4	73	
T	50.2	100	105	
U	357	766	73	
V	9.95	10.9	9	
W	16.0	34.9	74	
X	38.1	142	115	
Y	69.2	174	86	
H (DB-225)	0.614	0.728	17	

LDC #: 13655A21
SDG #: DPWF16036

VALIDATION FINDINGS WORKSHEET
Initial Calibration Calculation Verification

Reviewer: 1
2nd Reviewer: 1

METHOD: HRGC/HRMS Dioxins/Dibenzofurans (EPA Method 1613B)

The Relative Response Factor (RRF), average RRF, and percent relative standard deviation (%RSD) were recalculated for the compounds identified below using the following calculations:

RRF = $(A_x)(C_{is})/(A_{is})(C_x)$ — A_x = Area of compound, A_{is} = Area of associated internal standard
average RRF = sum of the RRFs/number of standards — C_x = Concentration of compound, C_{is} = Concentration of internal standard
%RSD = 100 * (S/X) — S = Standard deviation of the RRFs, X = Mean of the RRFs

#	Standard ID	Calibration Date	Compound (Reference Internal Standard)	Reported Average RRF (initial)	Recalculated Average RRF (initial)	Reported RRF (CS3 std)	Recalculated RRF (CS3 std)	Reported %RSD	Recalculated %RSD
1	ICAL	4/26/05	2,3,7,8-TCDF (^{13}C-2,3,7,8-TCDF)	1.21	1.21	1.23	1.23	1.20	1.31
			2,3,7,8-TCDD (^{13}C-2,3,7,8-TCDD)	1.01	1.01	1.03	1.03	1.59	1.57
			1,2,3,6,7,8-HxCDD (^{13}C-1,2,3,6,7,8-HxCDD)	0.90	0.90	0.89	0.89	1.67	1.48
			1,2,3,4,6,7,8-HpCDD (^{13}C-1,2,4,6,7,8,-HpCDD)	1.00	1.00	1.00	1.00	0.63	0.55
			OCDF (^{13}C-OCDD)	1.42	1.42	1.39	1.39	4.49	4.43
2	ICAL	4/20/05	2,3,7,8-TCDF (^{13}C-2,3,7,8-TCDF)	1.10	1.10	1.13	1.13	3.43	3.31
			2,3,7,8-TCDD (^{13}C-2,3,7,8-TCDD)						
			1,2,3,6,7,8-HxCDD (^{13}C-1,2,3,6,7,8-HxCDD)						
			1,2,3,4,6,7,8-HpCDD (^{13}C-1,2,4,6,7,8,-HpCDD)						
			OCDF (^{13}C-OCDD)						
3			2,3,7,8-TCDF (^{13}C-2,3,7,8-TCDF)						
			2,3,7,8-TCDD (^{13}C-2,3,7,8-TCDD)						
			1,2,3,6,7,8-HxCDD (^{13}C-1,2,3,6,7,8-HxCDD)						
			1,2,3,4,6,7,8-HpCDD (^{13}C-1,2,4,6,7,8,-HpCDD)						
			OCDF (^{13}C-OCDD)						

Comments: Refer to Initial Calibration findings worksheet for list of qualifications and associated samples when reported results do not agree within 10.0% of the recalculated results.

LDC #: 13655A21
SDG #: DPWG16030

VALIDATION FINDINGS WORKSHEET
Routine Calibration Results Verification

Page: 1 of 1
Reviewer: CA
2nd Reviewer: K

METHOD: HRGC/HRMS Dioxins/Dibenzofurans (EPA Method 1613B)

The percent difference (%D) of the initial calibration average Relative Response Factors (RRFs) and the continuing calibration RRFs were recalculated for the compounds identified below using the following calculation:

% Difference = 100 * (ave. RRF - RRF)/ave. RRF
$RRF = (A_x)(C_{is})/(A_{is})(C_x)$

Where: ave. RRF = initial calibration average RRF
RRF = continuing calibration RRF
A_x = Area of compound, A_{is} = Area of associated internal standard
C_x = Concentration of compound, C_{is} = Concentration of internal standard

#	Standard ID	Calibration Date	Compound (Reference Internal Standard)	Average RRF (initial)	Reported RRF ~~Amt~~ (CC)	Recalculated RRF ~~Amt~~ (CC)	Reported %D	Recalculated %D
1	DX52_2035:1	5/2/05	2,3,7,8-TCDF (^{13}C-2,3,7,8-TCDF)	1.21	~~9.92~~	9.92		
			2,3,7,8-TCDD (^{13}C-2,3,7,8-TCDD)	1.01	10.2	10.2		
			1,2,3,6,7,8-HxCDD (^{13}C-1,2,3,6,7,8-HxCDD)	0.90	47.9	48.2		
			1,2,3,4,6,7,8-HpCDD (^{13}C-1,2,4,6,7,8,-HpCDD)	1.00	49.7	49.6		
			OCDF (^{13}C-OCDD)	1.42	95.1	94.9		
2	DX52_2105:1	5/18/05	2,3,7,8-TCDF (^{13}C-2,3,7,8-TCDF)	1.21	9.86	9.87		
			2,3,7,8-TCDD (^{13}C-2,3,7,8-TCDD)	1.01	10.2	10.2		
			1,2,3,6,7,8-HxCDD (^{13}C-1,2,3,6,7,8-HxCDD)	0.90	48.1	48.5		
			1,2,3,4,6,7,8-HpCDD (^{13}C-1,2,4,6,7,8,-HpCDD)	1.00	49.1	48.8		
			OCDF (^{13}C-OCDD)	1.42	93.6	93.5		
3	DB53_1398S:2	5/10/05	2,3,7,8-TCDF (^{13}C-2,3,7,8-TCDF)	1.10	11.0	11.0		
			2,3,7,8-TCDD (^{13}C-2,3,7,8-TCDD)					
			1,2,3,6,7,8-HxCDD (^{13}C-1,2,3,6,7,8-HxCDD)					
			1,2,3,4,6,7,8-HpCDD (^{13}C-1,2,4,6,7,8,-HpCDD)					
			OCDF (^{13}C-OCDD)					

Comments: Refer to Routine Calibration findings worksheet for list of qualifications and associated samples when reported results do not agree within 10.0% of the recalculated results.

LDC #: 13655A2
SDG #: JDPNF1603

VALIDATION FINDINGS WORKSHEET
Routine Calibration Results Verification

METHOD: HRGC/HRMS Dioxins/Dibenzofurans (EPA Method 1613B)

The percent difference (%D) of the initial calibration average Relative Response Factors (RRFs) and the continuing calibration RRFs were recalculated for the compounds identified below using the following calculation:

% Difference = 100 * (ave. RRF - RRF)/ave. RRF
$RRF = (A_x)(C_{is})/(A_{is})(C_x)$

Where: ave. RRF = initial calibration average RRF
RRF = continuing calibration RRF
A_x = Area of compound, A_{is} = Area of associated internal standard
C_x = Concentration of compound, C_{is} = Concentration of internal standard

#	Standard ID	Calibration Date	Compound (Reference Internal Standard)	Average RRF (initial)	Reported ~~RRF~~ (CC)	Recalculated ~~RRF~~ (CC)	Reported %D	Recalculated %D
1	DB053_140513	5/1/05	2,3,7,8-TCDF (^{13}C-2,3,7,8-TCDF)	1.10	11.0	11.0	Not reported.	
			2,3,7,8-TCDD (^{13}C-2,3,7,8-TCDD)					
			1,2,3,6,7,8-HxCDD (^{13}C-1,2,3,6,7,8-HxCDD)					
			1,2,3,4,6,7,8-HpCDD (^{13}C-1,2,4,6,7,8,-HpCDD)					
			OCDF (^{13}C-OCDD)					
2			2,3,7,8-TCDF (^{13}C-2,3,7,8-TCDF)					
			2,3,7,8-TCDD (^{13}C-2,3,7,8-TCDD)					
			1,2,3,6,7,8-HxCDD (^{13}C-1,2,3,6,7,8-HxCDD)					
			1,2,3,4,6,7,8-HpCDD (^{13}C-1,2,4,6,7,8,-HpCDD)					
			OCDF (^{13}C-OCDD)					
3			2,3,7,8-TCDF (^{13}C-2,3,7,8-TCDF)					
			2,3,7,8-TCDD (^{13}C-2,3,7,8-TCDD)					
			1,2,3,6,7,8-HxCDD (^{13}C-1,2,3,6,7,8-HxCDD)					
			1,2,3,4,6,7,8-HpCDD (^{13}C-1,2,4,6,7,8,-HpCDD)					
			OCDF (^{13}C-OCDD)					

Comments: Refer to Routine Calibration findings worksheet for list of qualifications and associated samples when reported results do not agree within 10.0% of the recalculated results.

LDC #: 13695A21
SDG #: DPNF16036

VALIDATION FINDINGS WORKSHEET
Laboratory Control Sample Results Verification

Page: 1 of 1
Reviewer: 1
2nd Reviewer:

METHOD: GC/MS Dioxins/Dibenzofurans (EPA SW 846 Method 1613~~A~~)

The percent recoveries (%R) and Relative Percent Difference (RPD) of the laboratoy control sample and laboratory control sample cuplicate (if applicable) were recalculated for the compounds identified below using the follcwing calculation:

% Recovery = 100 * SSC/SA Where: SSC = Spiked sample concentration
SA = Spike added

RPD = I LCS - LCSD I * 2/(LCS + LCSD) LCS = Laboraotry control sample percent recovery LCSD = Laboratory control sample duplicate percent recovery

LCS ID: WF15383-102

Compound	Spike Added (ng/mL)		Spiked Sample Concentration (ng/mL)		LCS Percent Recovery		LCSD Percent Recovery		LCS/LCSD RPD	
	LCS	LCSD	LCS	LCSD	Reported	Recalc.	Reported	Recalc.	Reported	Recalculated
A	10	NA	10.1	NA	101	101				
B	50	↓	51.1	↓	102	102				
C	↓		48.4		96.8	96.8				
P	50.0		49.3		98.7	98.6				
Q	100		96.1		96.1	96.1				

Comments: Refer to Laboratory Control Sample findings worksheet for list of qualifications and associated samples when reported results do not agree within 10.0% of the recalculated results.

LDC #: 13655A21
SDG #: DPW61036

VALIDATION FINDINGS WORKSHEET
Sample Calculation Verification

Page: 1 of 1
Reviewer: 1
2nd reviewer: 1

METHOD: HRGC/HRMS Dioxins/Dibenzofurans (EPA Method 1613~~A~~)

Y N N/A Were all reported results recalculated and verified for all level IV samples?
Y N N/A Were all recalculated results for detected target compounds agree within 10.0% of the reported results?

Concentration = $\frac{(A_x)(I_s)(DF)}{(A_{is})(RRF)(V_o)(\%S)}$

A_x = Area of the characteristic ion (EICP) for the compound to be measured

A_{is} = Area of the characteristic ion (EICP) for the specific internal standard

I_s = Amount of internal standard added in nanograms (ng)

V_o = Volume or weight of sample extract in milliliters (ml) or grams (g).

RRF = Relative Response Factor (average) from the initial calibration

Df = Dilution Factor.

%S = Percent solids, applicable to soil and solid matrices only.

Example:

Sample I.D. 1 , A :

Conc. = $\frac{(1.3\text{E+}05)(2000)(1)}{(3.62\text{E+}07)(1.01)(9.89)(\ )}$

= 0.7577 ng/g

#	Sample ID	Compound	Reported Concentration ( )	Calculated Concentration ( )	Qualification

LDC #: 13655B21 **VALIDATION COMPLETENESS WORKSHEET** Date: 6/27/05
SDG #: DPWG16057 Level IV Page: 1 of 1
Laboratory: AXYS Analytical Services Ltd. Reviewer: 9
2nd Reviewer: K

METHOD: HRGC/HRMS Dioxins/Dibenzofurans (EPA Method 1613B)

The samples listed below were reviewed for each of the following validation areas. Validation findings are noted in attached validation findings worksheets.

	Validation Area		Comments
I.	Technical holding times	A	Sampling dates: 1/19 - 2/2/05
II.	HRGC/HRMS Instrument performance check	A	
III.	Initial calibration	A	%RSD ≤ 20/35.
IV.	Routine calibration	A	RC Limits
V.	Blanks	A	
VI.	Matrix spike/Matrix spike duplicates/DUP	SW	Not reqd for MS/MSD
VII.	Laboratory control samples	SW	LCS/SRM
VIII.	Regional quality assurance and quality control	N	
IX.	Internal standards	A	
X.	Target compound identifications	A	
XI.	Compound quantitation and CRQLs	A	
XII.	System performance	A	
XIII.	Overall assessment of data	A SW	All 2,3,7,8-TCDF (DB-5) R/A
XIV.	Field duplicates	N	
XV.	Field blanks	N	

Note: A = Acceptable
N = Not provided/applicable
SW = See worksheet
ND = No compounds detected
R = Rinsate
FB = Field blank
D = Duplicate
TB = Trip blank
EB = Equipment blank

Validated Samples:

1	LDW-SS-84-010 Sed	11	WG15T2T-101	21		31	
2	LDW-SS59-010	12		22		32	
3	LDW-SS-109-010	13		23		33	
4	LDW-SS-143-010	14		24		34	
5	LDW-SS-37-010	15		25		35	
6	LDW-SS59-010DUP	16		26		36	
7		17		27		37	
8		18		28		38	
9		19		29		39	
10		20		30		40	

Notes: _____

LDC #: 13655B21
SDG #: DPWG16057

VALIDATION FINDINGS CHECKLIST

Page: 1 of 3
Reviewer: 9
2nd Reviewer: ✓

Method: Dioxins/Dibenzofurans (EPA SW 846 Method 1613)

Validation Area	Yes	No	NA	Findings/Comments
I. Technical holding times				
All technical holding times were met.	✓			
Cooler temperature criteria was met.	✓			
II. GC/MS Instrument performance check				
Was PFK exact mass 380.9760 verified?	✓			
Were the retention time windows established for all homologues?	✓			
Was the chromatographic resolution between 2,3,7,8-TCDD and peaks representing any other unlabeled TCDD isomers ≤ 25% ?	✓			
Is the static resolving power at least 10,000 (10% valley definition)?	✓			
Was the mass resolution adequately check with PFK?	✓			
Was the presence of 1,2,8,9-TCDD and 1,3,4,6,8-PeCDF verified?	✓			
III. Initial calibration				
Was the initial calibration performed at 5 concentration levels?	✓			
Were all percent relative standard deviations (%RSD) ≤ 20% for unlabeled standards and ≤ 30% for labeled standards?	✓			
Did all calibration standards meet the Ion Abundance Ratio criteria?	✓			
Was the signal to noise ratio for each target compound ≥ 2.5 and for each recovery and internal standard ≥ 10?	✓			
IV. Continuing calibration				
Was a routine calibration performed at the beginning and end of each 12 hour period?	✓			
Were all ~~percent differences (%D) ≤ 20% for unlabeled standards and ≤ 30% for labeled standards?~~ conc meet QC limits?	✓			
Did all routine calibration standards meet the Ion Abundance Ratio criteria?	✓			
V. Blanks				
Was a method blank associated with every sample in this SDG?	✓			
Was a method blank performed for each matrix and concentration?	✓			
Was there contamination in the method blanks? If yes, please see the Blanks validation completeness worksheet?	✓			
VI. Matrix spike/Matrix spike duplicates				
Were a matrix spike (MS) and matrix spike duplicate (MSD) analyzed for each matrix in this SDG? If no, indicate which matrix does not have an associated MS/MSD. Soil / Water.		✓		DUP
Were the MS/MSD percent recoveries (%R) and the relative percent differences (RPD) within the QC limits?			✓	
VII. Laboratory control samples				
Was an LCS analyzed for this SDG?	✓			
Was an LCS analyzed per extraction batch?	✓			

Validation Area	Yes	No	NA	Findings/Comments
Were the LCS percent recoveries (%R) and relative percent difference (RPD) within the QC limits?	✓			
VIII. Regional Quality Assurance and Quality Control				
Were performance evaluation (PE) samples performed?		✓		
Were the performance evaluation (PE) samples within the acceptance limits?			✓	
IX. Internal standards				
Were internal standard recoveries within the 25-125% criteria?	✓			
Was the minimum S/N ratio of all internal standard peaks ≥ 10?	✓			
X. Target compound identification				
For 2,3,7,8 substituted congeners with associated labeled standards, were the retention times of the two quantitation peaks within -1 to 3 sec. of the RT of the labeled standard?	✓			
For 2,3,7,8 substituted congeners without associated labeled standards, were the relative retention times of the two quantitation peaks within 0.005 time units of the RRT measured in the routine calibration?	✓			
For non-2,3,7,8 substituted congeners, were the retention times of the two quantitation peaks within RT established in the performance check solution?	✓			
Did compound spectra contain all characteristic ions listed in the table attached?	✓			
Was the Ion Abundance Ratio for the two quantitation ions within criteria?	✓			
Was the signal to noise ratio for each target compound and labeled standard ≥ 2.5?	✓			
Does the maximum intensity of each specified characteristic ion coincide within ± 2 seconds (includes labeled standards)?	✓			
For PCDF identification, was any signal (S/N ≥ 2.5, at ± seconds RT) detected in the corresponding PCDPE channel?	✓			
Was an acceptable lock mass recorded and monitored?	✓			
XI. Compound quantitation/CRQLs				
Were the correct internal standard (IS), quantitation ion and relative response factor (RRF) used to quantitate the compound?	✓			
Were compound quantitation and CRQLs adjusted to reflect all sample dilutions and dry weight factors applicable to level IV validation?	✓			
XII. System performance				
System performance was found to be acceptable.	✓			
XIII. Overall assessment of data				
Overall assessment of data was found to be acceptable.	✓			
XIV. Field duplicates				
Field duplicate pairs were identified in this SDG.		✓		
Target compounds were detected in the field duplicates.			✓	
XV. Field blanks				

Validation Area	Yes	No	NA	Findings/Comments
Field blanks were identified in this SDG.		✓		
Target compounds were detected in the field blanks.			✓	

VALIDATION FINDINGS WORKSHEET

METHOD: HRGC/HRMS Dioxins/Dibenzofurans (EPA Method 1613A)

A. 2,3,7,8-TCDD	F. 1,2,3,4,6,7,8-HpCDD	K. 1,2,3,4,7,8-HxCDF	P. 1,2,3,4,7,8,9-HpCDF	U. Total HpCDD
B. 1,2,3,7,8-PeCDD	G. OCDD	L. 1,2,3,6,7,8-HxCDF	Q. OCDF	V. Total TCDF
C. 1,2,3,4,7,8-HxCDD	H. 2,3,7,8-TCDF	M. 2,3,4,6,7,8-HxCDF	R. Total TCDD	W. Total PeCDF
D. 1,2,3,6,7,8-HxCDD	I. 1,2,3,7,8-PeCDF	N. 1,2,3,7,8,9-HxCDF	S. Total PeCDD	X. Total HxCDF
E. 1,2,3,7,8,9-HxCDD	J. 2,3,4,7,8-PeCDF	O. 1,2,3,4,6,7,8-HpCDF	T. Total HxCDD	Y. Total HpCDF

Notes:

LDC #: 13655B21
SDG #: DPN F160ST

VALIDATION FINDINGS WORKSHEET
Blanks

Reviewer: [illegible]
2nd Reviewer: [illegible]

METHOD: GC/MS Dioxins/Dibenzofurans (Method 1613~~A~~)

Please see qualifications below for all questions answered "N". Not applicable questions are identified as "N/A".

(Y) N N/A Were all samples associated with a method blank?
(Y) N N/A Was a method blank performed for each matrix and whenever a sample extraction was performed?
(Y) N N/A Was method blank contamination less < CRQL for all target compounds?

Blank extraction date: 5/12/05 **Blank analysis date:** 6/2/05
Conc. units: ng/kg Associated Samples: MM

Compound	Blank ID	Sample Identification								
WG45727-101		All								
F	0.111									
G	0.275									
P	0.058*									
R	0.094*									
U	0.111									

>5x

CIRCLED RESULTS WERE NOT QUALIFIED. ALL RESULTS NOT CIRCLED WERE QUALIFIED BY THE FOLLOWING STATEMENT:
All contaminants within five times the method blank concentration were qualified as not detected, "U".

* 2MPC

LDC #: 13655B21
SDG #: OPW616057

VALIDATION FINDINGS WORKSHEET
Matrix Spike/Matrix Spike Duplicates

Page: 1 of 1
Reviewer: 4
2nd Reviewer: K

METHOD: GC/MS Dioxins/Dibenzofurans (Method 1613B)

Please see qualifications below for all questions answered "N". Not applicable questions are identified as "N/A".

(Y) N N/A Were a matrix spike (MS) and matrix spike duplicate (MSD) analyzed for each matrix in this SDG? If no, indicate which matrix does not have an associated MS/MSD. Soil / Water.

Y (N) N/A Was a MS/MSD analyzed every 20 samples of each matrix?

Y N (N/A) Were the MS/MSD percent recoveries (%R) and the relative percent differences (RPD) within the QC limits stated below?

#	Date	MS/MSD ID	Compound	MS %R (Limits)	MSD %R (Limits)	RPD (Limits)	Associated Samples	Qualifications
		2/6	D	( )	( )	63.0 (≤50)	2	J+ all dets / A
			All	( )	( )	( )		
				( )	( )	( )		
				( )	( )	( )		
				( )	( )	( )		
				( )	( )	( )		
				( )	( )	( )		
				( )	( )	( )		
				( )	( )	( )		
				( )	( )	( )		
				( )	( )	( )		
				( )	( )	( )		
				( )	( )	( )		
				( )	( )	( )		
				( )	( )	( )		
				( )	( )	( )		
				( )	( )	( )		
				( )	( )	( )		

	PCDDs	% Recovery (Soil)	RPD (Soil)	% Recovery (Water)	RPD (Water)		PCDFs	% Recovery (Soil)	RPD (Soil)	% Recovery (Water)	RPD (Water)
A.	Tetra-	60-140	50	60-140	50	F.	Tetra-	60-140	50	60-140	50
B.	Penta-	60-140	50	60-140	50	G.	Penta-	60-140	50	60-140	50
C.	Hexa-	60-140	50	60-140	50	H.	Hexa-	60-140	50	60-140	50
D.	Hepta-	60-140	50	60-140	50	I.	Hepta-	60-140	50	60-140	50
E.	Octa-	60-140	50	60-140	50	J.	Octa-	60-140	50	60-140	50

LDC #: 36553B1
SDG #: DPW6160ST

VALIDATION FINDINGS WORKSHEET
Laboratory Control Samples (LCS)

Page: 1 of 1
Reviewer: AL
2nd Reviewer: AC

METHOD: HRGC/HRMS Dioxins/Dibenzofurans (EPA Method 1613B)

Please see qualifications below for all questions answered "N". Not applicable questions are identified as "N/A".

(Y) N N/A Was a LCS required?

(Y) N N/A Was a LCS analyzed every 20 samples for each matrix or whenever a sample extraction was performed?

(Y) N N/A Were the LCS percent recoveries (%R) and relative percent difference (RPD) within the QC limits?

#	Date	Lab ID/Reference	Compound	LCS %R (Limits)	LCSD %R (Limits)	RPD (Limits)	Associated Samples	Qualifications
		LRM	A	116 (124-142)	( )	( )	All + Blks	~~J6/UJ6/A~~ Text
			B	14.1 (17-21)	( )	( )		
			C	18.8 (23-29)	( )	( )		
			D	45.2 (50-62)	( )	( )		
			F	T24 (T30-T80)	( )	( )		
			G	50 TO (5100-6500)	( )	( )		
			J	39.1 (41-49)	( )	( )		
			K	1TO (190-250)	( )	( )		
			L	T9.9 (80-100)	( )	( )		
			N	2.65 (48-60)	( )	J6/UJ6		
			M	41.0 (21-37)	( )	( )		J6 dets/A
			Q	861 (900-1100)	( )	( )		~~J6/UJ6/A~~
				( )	( )	( )		
				( )	( )	( )		
				( )	( )	( )		
				( )	( )	( )		
			* except N(NA	cpds(w/in	50-150%	)		
			of certified	values		)		
				( )	( )	( )		
				( )	( )	( )		
				( )	( )	( )		
				( )	( )	( )		
				( )	( )	( )		
				( )	( )	( )		
				( )	( )	( )		
				( )	( )	( )		
				( )	( )	( )		

LDC #: 13655B21
SDG #: DPWG16057

VALIDATION FINDINGS WORKSHEET
Initial Calibration Calculation Verification

Reviewer: 1
2nd Reviewer: K

METHOD: HRGC/HRMS Dioxins/Dibenzofurans (EPA Method 1613B)

The Relative Response Factor (RRF), average RRF, and percent relative standard deviation (%RSD) were recalculated for the compounds identified below using the following calculations:

$RRF = (A_x)(C_{is})/(A_{is})(C_x)$
average RRF = sum of the RRFs/number of standards
%RSD = 100 * (S/X)

A_x = Area of compound, A_{is} = Area of asscciated internal standard
C_x = Concentration of compound, C_{is} = Concentration of internal standard
S = Standard deviation of the RRFs, X = Mean of the RRFs

#	Standard ID	Calibration Date	Compound (Reference Internal Standard)	Reported Average RRF (initial)	Recalculated Average RRF (initial)	Reported RRF (CS3 std)	Recalculated RRF (CS3 std)	Reported %RSD	Recalculated %RSD
1	ICAL	4/26/05	2,3,7,8-TCDF (^{13}C-2,3,7,8-TCDF)	1.21	1.21	1.23	1.23	1.20	1.31
			2,3,7,8-TCDD (^{13}C-2,3,7,8-TCDD)	1.01	1.01	1.03	1.03	1.59	1.57
			1,2,3,6,7,8-HxCDD (^{13}C-1,2,3,6,7,8-HxCDD)	0.90	0.90	0.89	0.89	1.67	1.48
			1,2,3,4,6,7,8-HpCDD (^{13}C-1,2,4,6,7,8,-HpCDD)	1.00	1.00	1.00	1.00	0.63	0.55
			OCDF (^{13}C-OCDD)	1.42	1.42	1.39	1.39	4.49	4.43
2	ICAL	4/30/05	2,3,7,8-TCDF (^{13}C-2,3,7,8-TCDF)	1.10	1.10	1.13	1.13	3.43	3.31
			2,3,7,8-TCDD (^{13}C-2,3,7,8-TCDD)						
			1,2,3,6,7,8-HxCDD (^{13}C-1,2,3,6,7,8-HxCDD)						
			1,2,3,4,6,7,8-HpCDD (^{13}C-1,2,4,6,7,8,-HpCDD)						
			OCDF (^{13}C-OCDD)						
3	ICAL	5/13/05	2,3,7,8-TCDF (^{13}C-2,3,7,8-TCDF)	1.26	1.26	1.23	1.23	3.98	3.92
			2,3,7,8-TCDD (^{13}C-2,3,7,8-TCDD)	1.17	1.17	1.15	1.15	3.08	3.05
			1,2,3,6,7,8-HxCDD (^{13}C-1,2,3,6,7,8-HxCDD)	0.92	0.92	0.92	0.92	1.79	2.09
			1,2,3,4,6,7,8-HpCDD (^{13}C-1,2,4,6,7,8,-HpCDD)	1.04	1.04	1.02	1.02	1.55	1.52
			OCDF (^{13}C-OCDD)	1.51	1.51	1.43	1.43	4.36	4.31

Comments: Refer to Initial Calibration findings worksheet for list of qualifications and associated samples when reported results do not agree within 10.0% of the recalculated results.

LDC #: 13656B21
SDG #: DPWG16057

VALIDATION FINDINGS WORKSHEET
Routine Calibration Results Verification

Page: 1 of 1
Reviewer: SK
2nd Reviewer: [illegible]

METHOD: HRGC/HRMS Dioxins/Dibenzofurans (EPA Method 1613B)

The percent difference (%D) of the initial calibration average Relative Response Factors (RRFs) and the continuing calibration RRFs were recalculated for the compounds identified below using the following calculation:

% Difference = 100 * (ave. RRF - RRF)/ave. RRF
RRF = $(A_x)(C_{is})/(A_{is})(C_x)$

Where: ave. RRF = initial calibration average RRF
RRF = continuing calibration RRF
A_x = Area of compound, A_{is} = Area of associated internal standard
C_x = Concentration of compound, C_{is} = Concentration of internal standard

#	Standard ID	Calibration Date	Compound (Reference Internal Standard)	Average RRF (initial)	Reported RRF (CC)	Recalculated RRF (CC)	Reported %D	Recalculated %D
1	DX52.234S1	6/2/05	2,3,7,8-TCDF (^{13}C-2,3,7,8-TCDF)	1.21	9.55	9.55		
			2,3,7,8-TCDD (^{13}C-2,3,7,8-TCDD)	1.01	10.3	10.3		
			1,2,3,6,7,8-HxCDD (^{13}C-1,2,3,6,7,8-HxCDD)	0.90	47.7	47.8		
			1,2,3,4,6,7,8-HpCDD (^{13}C-1,2,4,6,7,8,-HpCDD)	1.00	49.7	49.6		
			OCDF (^{13}C-OCDD)	1.42	93.9	93.9		
2	DB53.156S2	6/18/05	2,3,7,8-TCDF (^{13}C-2,3,7,8-TCDF)	1.10	9.30	9.27		
			2,3,7,8-TCDD (^{13}C-2,3,7,8-TCDD)					
			1,2,3,6,7,8-HxCDD (^{13}C-1,2,3,6,7,8-HxCDD)					
			1,2,3,4,6,7,8-HpCDD (^{13}C-1,2,4,6,7,8,-HpCDD)					
			OCDF (^{13}C-OCDD)					
3	DX52.235AS1	6/23/05	2,3,7,8-TCDF (^{13}C-2,3,7,8-TCDF)	1.21	9.61	9.61		
			2,3,7,8-TCDD (^{13}C-2,3,7,8-TCDD)	1.01	10.0	10.0		
			1,2,3,6,7,8-HxCDD (^{13}C-1,2,3,6,7,8-HxCDD)	0.90	46.4	46.7		
			1,2,3,4,6,7,8-HpCDD (^{13}C-1,2,4,6,7,8,-HpCDD)	1.00	49.8	49.6		
			OCDF (^{13}C-OCDD)	1.42	94.7	94.5		

Comments: Refer to Routine Calibration findings worksheet for list of qualifications and associated samples when reported results do not agree within 10.0% of the recalculated results.

LDC #: 13655B4
SDG #: DPW91605 7

VALIDATION FINDINGS WORKSHEET
Routine Calibration Results Verification

METHOD: HRGC/HRMS Dioxins/Dibenzofurans (EPA Method 1613B)

The percent difference (%D) of the initial calibration average Relative Response Factors (RRFs) and the continuing calibration RRFs were recalculated for the compounds identified below using the following calculation:

% Difference = 100 * (ave. RRF - RRF)/ave. RRF
$RRF = (A_x)(C_{is})/(A_{is})(C_x)$

Where: ave. RRF = initial calibration average RRF
RRF = continuing calibration RRF
A_x = Area of compound, A_{is} = Area of associated internal standard
C_x = Concentration of compound, C_{is} = Concentration of internal standard

#	Standard ID	Calibration Date	Compound (Reference Internal Standard)	Average RRF (initial)	Reported ~~Amt~~ RRF (CC)	Recalculated ~~Amt~~ RRF (CC)	Reported %D	Recalculated %D
1	DX52.244CS:1	6/8/05	2,3,7,8-TCDF (^{13}C-2,3,7,8-TCDF)	1.21	9.53	9.53		
			2,3,7,8-TCDD (^{13}C-2,3,7,8-TCDD)	1.01	10.1	10.1		
			1,2,3,6,7,8-HxCDD (^{13}C-1,2,3,6,7,8-HxCDD)	0.90	48.6	48.7		
			1,2,3,4,6,7,8-HpCDD (^{13}C-1,2,4,6,7,8,-HpCDD)	1.00	48.4	48.2		
			OCDF (^{13}C-OCDD)	1.42	94.0	93.8		
2	DB53.184AS:2	6/7/05	2,3,7,8-TCDF (^{13}C-2,3,7,8-TCDF)	1.40	9.38	9.36		
			2,3,7,8-TCDD (^{13}C-2,3,7,8-TCDD)					
			1,2,3,6,7,8-HxCDD (^{13}C-1,2,3,6,7,8-HxCDD)					
			1,2,3,4,6,7,8-HpCDD (^{13}C-1,2,4,6,7,8,-HpCDD)					
			OCDF (^{13}C-OCDD)					
3	DX58.186AS:1	5/23/05	2,3,7,8-TCDF (^{13}C-2,3,7,8-TCDF)	1.26	10.8	10.7		
			2,3,7,8-TCDD (^{13}C-2,3,7,8-TCDD)	1.17	10.3	10.3		
			1,2,3,6,7,8-HxCDD (^{13}C-1,2,3,6,7,8-HxCDD)	0.92	50.3	50.3		
			1,2,3,4,6,7,8-HpCDD (^{13}C-1,2,4,6,7,8,-HpCDD)	1.04	51.3	51.2		
			OCDF (^{13}C-OCDD)	1.51	106	106		

Comments: Refer to Routine Calibration findings worksheet for list of qualifications and associated samples when reported results do not agree within 10.0% of the recalculated results.

LDC #: 13655B2
SDG #: DDPNF160ST

VALIDATION FINDINGS WORKSHEET
Routine Calibration Results Verification

Reviewer: 4
2nd Reviewer: M

METHOD: HRGC/HRMS Dioxins/Dibenzofurans (EPA Method 1613B)

The percent difference (%D) of the initial calibration average Relative Response Factors (RRFs) and the continuing calibration RRFs were recalculated for the compounds identified below using the following calculation:

% Difference = 100 * (ave. RRF - RRF)/ave. RRF
RRF = $(A_x)(C_{is})/(A_{is})(C_x)$

Where: ave. RRF = initial calibration average RRF
RRF = continuing calibration RRF
A_x = Area of compound, A_{is} = Area of associated internal standard
C_x = Concentration of compound, C_{is} = Concentration of internal standard

#	Standard ID	Calibration Date	Compound (Reference Internal Standard)	Average RRF (initial)	Reported ~~Amt~~ RRF (CC)	Recalculated ~~Amt~~ RRF (CC)	Reported %D	Recalculated %D
1	DX3B_1845:1	5/22/05	2,3,7,8-TCDF (^{13}C-2,3,7,8-TCDF)	1.26	10.9	10.9		
			2,3,7,8-TCDD (^{13}C-2,3,7,8-TCDD)	1.17	9.97	9.96		
			1,2,3,6,7,8-HxCDD (^{13}C-1,2,3,6,7,8-HxCDD)	0.92	50.4	50.3		
			1,2,3,4,6,7,8-HpCDD (^{13}C-1,2,4,6,7,8,-HpCDD)	1.04	51.8	52.0		
			OCDF (^{13}C-OCDD)	1.51	106	106	Not reported	
2			2,3,7,8-TCDF (^{13}C-2,3,7,8-TCDF)					
			2,3,7,8-TCDD (^{13}C-2,3,7,8-TCDD)					
			1,2,3,6,7,8-HxCDD (^{13}C-1,2,3,6,7,8-HxCDD)					
			1,2,3,4,6,7,8-HpCDD (^{13}C-1,2,4,6,7,8,-HpCDD)					
			OCDF (^{13}C-OCDD)					
3			2,3,7,8-TCDF (^{13}C-2,3,7,8-TCDF)					
			2,3,7,8-TCDD (^{13}C-2,3,7,8-TCDD)					
			1,2,3,6,7,8-HxCDD (^{13}C-1,2,3,6,7,8-HxCDD)					
			1,2,3,4,6,7,8-HpCDD (^{13}C-1,2,4,6,7,8,-HpCDD)					
			OCDF (^{13}C-OCDD)					

Comments: Refer to Routine Calibration findings worksheet for list of qualifications and associated samples when reported results do not agree within 10.0% of the recalculated results.

LDC #: 13655B2
SDG #: DDWF160T7

VALIDATION FINDINGS WORKSHEET
Laboratory Control Sample Results Verification

Reviewer: Q
2nd Reviewer: K

METHOD: GC/MS Dioxins/Dibenzofurans (EPA SW 846 Method 1613~~A~~)

The percent recoveries (%R) and Relative Percent Difference (RPD) of the laboratoy control sample and laboratory control sample duplicate (if applicable) were recalculated for the compounds identified below using the following calculation:

% Recovery = 100 * SSC/SA Where: SSC = Spiked sample concentration
SA = Spike added

RPD = | LCS - LCSD | * 2/(LCS + LCSD) LCS = Laboraotry control sample percent recovery LCSD = Laboratory control sample duplicate percent recovery

LCS ID: WF1ST2T-102

Compound	Spike Added (ng/mL)		Spiked Sample Concentration (ng/mL)		LCS Percent Recovery		LCSD Percent Recovery		LCS/LCSD RPD	
	LCS	LCSD	LCS	LCSD	Reported	Recalc.	Reported	Recalc.	Reported	Recalculated
A	10	NA	9.89	NA	98.9	98.9				
B	50		53.8		108	108				
C	↓		49.7		99.3	99.4				
P	↓		50.3		101	101				
Q	10		10T		10T	107				

Comments: Refer to Laboratory Control Sample findings worksheet for list of qualifications and associated samples when reported results do not agree within 10.0% of the recalculated results.

LDC #: 13655B21
SDG #: DDWG160ST

VALIDATION FINDINGS WORKSHEET
Sample Calculation Verification

Page: 1 of 1
Reviewer: 9
2nd reviewer: A

METHOD: HRGC/HRMS Dioxins/Dibenzofurans (EPA Method 1613A)

Y N N/A Were all reported results recalculated and verified for all level IV samples?
Y N N/A Were all recalculated results for detected target compounds agree within 10.0% of the reported results?

Concentration = $\frac{(A_x)(I_s)(DF)}{(A_{is})(RRF)(V_o)(\%S)}$

A_x = Area of the characteristic ion (EICP) for the compound to be measured

A_{is} = Area of the characteristic ion (EICP) for the specific internal standard

I_s = Amount of internal standard added in nanograms (ng)

V_o = Volume or weight of sample extract in milliliters (ml) or grams (g).

RRF = Relative Response Factor (average) from the initial calibration

Df = Dilution Factor.

%S = Percent solids, applicable to soil and solid matrices only.

Example:

Sample I.D. 1 , F :

Conc. = $\frac{(7.81e+08)(2000)(\quad R \quad)}{(1.25e+07)(1.00)(11.0)(\quad)}$

= 11360 ng/kg

#	Sample ID	Compound	Reported Concentration ( )	Calculated Concentration ( )	Qualification

F. Dioxins/furans: sample groups 15547, 15584

LABORATORY DATA CONSULTANTS, INC.
7750 El Camino Real, Suite 2L Carlsbad, CA 92009 Phone: 760/634-0437 Fax: 760/634-0439

LDC #13425/13439
May 20, 2005

Windward Environmental, LLC
200 West Mercer Street, Suite 401
Seattle, WA 98119
ATTN: Ms. Susie McGroddy

SUBJECT: Lower Duwamish Waterway Group Sediment Sample Data Validation

Dear Ms. McGroddy,

Enclosed is our EPA Level II and Level IV data validation of analytical chemistry results generated in support of the Lower Duwamish Waterway Group project. The primary analyses were performed by Axys Analytical Services. Samples were analyzed for HRGC/MS Dioxin/Dibenzofurans by EPA Method 1613B. Samples are referenced under the following Sample Delivery Groups: DPWG15547 and DPWG15584. See the Sample Analysis Table (Attachment 1) for the number of samples reviewed.

Please feel free to contact us if you have any questions.

Sincerely,

Stella S. Cuenco
Project Manager/Senior Chemist

Attachment 1

PDF	LDC #13425 (Windward Environmental, LLC - Seattle WA / Lower Duwamish Waterway Group)																																
LDC	SDG#	DATE REC'D	(3) DATE DUE	Dioxins (1613B)																													
Matrix:	Water/Sediment			W	S	W	S	W	S	W	S	W	S	W	S	W	S	W	S	W	S	W	S	W	S	W	S	W	S	W	S	W	S
A	DPWG15547	04/26/05	05/17/05	0	13																												
Total	B/SC			0	13	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	13

Shaded cells indicate Level IV validation (all other cells are Level II validation). These sample counts do not include MS/MSD, and DUPs

Attachment 1

PDF

LDC #13439 (Windward Environmental, LLC - Seattle WA / Lower Duwamish Waterway Group)

LDC	SDG#	DATE REC'D	(3) DATE DUE	Dioxins (1613B)																													
Matrix:	Water/Sediment			W	S	W	S	W	S	W	S	W	S	W	S	W	S	W	S	W	S	W	S	W	S	W	S	W	S	W	S	W	S
A	DPWG15584	05/02/05	05/23/05	0	15																												
Total	B/SC			0	15	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	15

Shaded cells indicate Level IV validation (all other cells are Level II validation). These sample counts do not include MS/MSD, and DUPs

ADDENDUM
CHEMICAL DATA QUALITY REVIEW FOR PHASE I SURFACE SEDIMENT SAMPLES

Lower Duwamish Waterway Group
LDC# 13425, 13439

This report details the findings of an EPA Level IV data validation of analytical chemistry results generated in support of the Lower Duwamish Waterway Group project. The primary analyses were performed by Axys Analytical Services. Samples were analyzed for HRGC/MS Dioxin/Dibenzofurans by EPA Method 1613B. Samples are referenced under the following Sample Delivery Groups: DPWG15547 and DPWG15584. See the Sample Analysis Table (Attachment 1) for the number of samples reviewed and the Sample Validation Table (Attachment 2) for the sample identifications and analyses.

The QC guidelines used for data qualification are those specified in the EPA Region 10 SOP for the Validation of Polychlorinated Dibenzodioxin (PCDD) and Polychlorinated Dibenzofuran (PCDF) Data (Revision 2.0 January 31, 1996). Specific QC criteria used follows the Surface Sediment Sampling for Chemical Analyses and Toxicity Testing of the Lower Duwamish Waterway Quality Assurance Project Plan (January 14, 2005). Where specific guidance is not available, the data has been evaluated in a conservative manner consistent with industry standards using professional experience.

The following items were evaluated during the review:

- Holding Times
- Sample Preservation
- Cooler Temperatures
- Instrument Calibration
- Blanks
- Matrix Spike/Matrix Spike Duplicates
- Internal Standards
- Laboratory Control Samples
- Target Compound Identifications
- Compound Quantitation and CRQLs
- System Performance
- Field Duplicates

Attachment 1

PDF	LDC #13425 (Windward Environmental, LLC - Seattle WA / Lower Duwamish Waterway Group)																																			
LDC	SDG#	DATE REC'D	(3) DATE DUE	Dioxins (1613B)																																
Matrix:	Water/Sediment			W	S	W	S	W	S	W	S	W	S	W	S	W	S	W	S	W	S	W	S	W	S	W	S	W	S	W	S	W	S	W	S	W	S
A	DPWG15547	04/26/05	05/17/05	0	13																															
Total	B/SC			0	13	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	13

Shaded cells indicate Level IV validation (all other cells are Level II validation). These sample counts do not include MS/MSD, and DUPs

Attachment 1

PDF	LDC #13439 (Windward Environmental, LLC - Seattle WA / Lower Duwamish Waterway Group)																																		
LDC	SDG#	DATE REC'D	(3) DATE DUE	Dioxins (1613B)																															
Matrix:	Water/Sediment			W	S	W	S	W	S	W	S	W	S	W	S	W	S	W	S	W	S	W	S	W	S	W	S	W	S	W	S	W	S	W	S
A	DPWG15584	05/02/05	05/23/05	0	15																														
Total	B/SC			0	15	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	15

Shaded cells indcate Level IV validation (all other cells are Level II validation). These sample counts dc not include MS/MSD, and DUPs

Attachment 2

SDG#: DPWG15547 | VALIDATION SAMPLE TABLE | **LDC#:** 13425A

Project Name: Lower Duwamish Waterway Group | Parameters/Analytical Method | Project #04-08-06-24

Client ID #	Lab ID #	Matrix	Date Collected	Dioxins (1613B)											
LDW-SS-14-010	L7601-1	sediment	01/17/05	X											
LDW-SS-22-010	L7601-2	sediment	01/17/05	X											
LDW-SS-127-010	L7601-3	sediment	01/20/05	X											
LDW-SS-43-010	L7601-4	sediment	01/21/05	X											
LDW-SS-57-010	L7601-5	sediment	01/24/05	X											
LDW-SS-28-010	L7601-6	sediment	01/24/05	X											
LDW-SS-36-010	L7601-7	sediment	01/24/05	X											
LDW-SS-83-010	L7601-8	sediment	01/24/05	X											
LDW-SS-56-010	L7601-9	sediment	01/24/05	X											
LDW-SS-64-010	L7601-10	sediment	01/24/05	X											
LDW-SS-58-010	L7601-11	sediment	01/24/05	X											
LDW-SS-203-010	L7601-12	sediment	01/24/05	X											
LDW-SS-123-010	L7601-13	sediment	01/24/05	X											
LDW-SS-14-010DUP	L7601-1DUP	sediment	01/17/05	X											

Note: X = Validation was performed.

Attachment 2

SDG#: DPWG15584 | VALIDATION SAMPLE TABLE | **LDC#:** 13439A

Project Name: Lower Duwamish Waterway Group | Parameters/Analytical Method | Project #04-08-06-24

Client ID #	Lab ID #	Matrix	Date Collected	Dioxins (1613B)										
SC-SS1a-010	L7611-1	sediment	02/01/05	X										
EB-SS2a-010	L7611-2	sediment	02/02/05	X										
LW-SS3-010	L7611-4	sediment	02/01/05	X										
LW-SS6-010	L7611-5	sediment	02/01/05	X										
SB-SS6-010	L7611-6	sediment	01/31/05	X										
DRD-SS7-010	L7611-7	sediment	02/02/05	X										
UB-SS8-010	L7611-8	sediment	02/02/05	X										
LU-SS9a-010	L7611-9	sediment	01/31/05	X										
LU-SS9b-010	L7611-10	sediment	02/01/05	X										
LDW-SS20-010	L7611-11	sediment	02/02/05	X										
LDW-SS18-010	L7611-12	sediment	02/01/05	X										
LW-SS4-010	L7630-1	sediment	02/05/05	X										
LW-SS5a-010	L7630-2	sediment	02/08/05	X										
LW-SS5b-010	L7630-3	sediment	02/08/05	X										
SC-SS1b-010	L7630-4	sediment	02/10/05	X										
SB-SS6-010DUP	L7611-6DUP	sediment	01/31/05	X										

Note: X = Validation was performed.

Only issues which require comment or action are discussed in this report. Data deficiencies are arranged by method. Potential effects of data anomalies have been described where possible.

The following are definitions of the data qualifiers:

U Indicates the compound or analyte was analyzed for but not detected at or above the stated limit.

J Indicates an estimated value.

- J1 Blank Contamination: Indicates possible high bias and/or false positives.
- J2 Calibration Range exceeded: Indicates possible low bias.
- J3 Holding times not met: Indicates low bias for most analytes.
- J4 Other QC parameters outside control limits: bias not readily determined.
- J5 Other QC parameters outside control limits. The reported results appear to be biased high. The actual value of target compound in the sample may be lower than the value reported by the laboratory.
- J6 Other QC parameters outside control limits. The reported results appear to be biased low. The actual value of target compound in the sample may be higher than the value reported by the laboratory.

R Quality control indicates the data is not usable.

N Presumptive evidence of presence of the constituent.

UJ Indicates the compound or analyte was analyzed for but not detected. The sample detection limit is an estimated value.

A Indicates the finding is based upon technical validation criteria.

P Indicates the finding is related to a protocol/contractual deviation.

Overall Data Assessment

Laboratory duplicate precision and SRM accuracy exceedances have warranted the qualification of results as estimated (J).

The frequency of matrix spike (MS) and matrix spike duplicate (MSD) was not met as required by the QAPP. MS/MSD analyses are not required for EPA Method 1613B. The laboratory consulted with the client on this discrepancy and was instructed to proceed with the extraction and analysis despite the absence of MS/MSDs.

The quality control criteria reviewed, other than those discussed above, were met and are considered acceptable. Sample results that were found to be estimated (J) are usable for limited purposes only. Based upon the data validation all other results are considered valid and usable for all purposes.

HRGC/HRMS Dioxins/Dibenzofurans By EPA Method 1613B

I. Technical Holding Times

All technical holding time requirements were met.

The chain-of-custodies were reviewed for documentation of cooler temperatures. All cooler temperatures met validation criteria.

II. GC/MS Instrument Performance Check

Instrument performance was checked at the required daily frequency.

Retention time windows were established for all homologues. The chromatographic resolution between ^{13}C-2,3,7,8-TCDD and ^{13}C-1,2,3,4-TCDD was less than or equal to 25%.

The ion abundance ratios for all PCDDs and PCDFs were within validation criteria.

III. Initial Calibration

A five point initial calibration was performed as required by the method.

Percent relative standard deviations (%RSD) were less than or equal to 20.0% for all calibration check compounds and less than or equal to 35.0% for all other compounds.

The ion abundance ratios for all PCDDs and PCDFs were within validation criteria.

The minimum S/N ratio was technically acceptable.

IV. Routine Calibration (Continuing)

Routine calibration was performed at the required frequencies.

All of the routine calibration concentrations were within the QC limits.

The ion abundance ratios for all PCDDs and PCDFs were within method criteria.

V. Blanks

Method blanks were reviewed for each matrix as applicable. No polychlorinated dioxin/dibenzofuran contaminants were found in the method blanks with the following exceptions:

Associated SDG	Method Blank ID	Extraction Date	Compound	Concentration	Associated Samples
DPWG15547	WG15017-101	2/10/05	1,2,3,4,6,7,8-HpCDD OCDD 2,3,4,7,8-PeCDF OCDF Total HpCDD	0.087 ng/Kg 0.282 ng/Kg 0.058 ng/Kg 0.097 ng/Kg 0.139 ng/Kg	LDW-SS-14-010 LDW-SS-22-010 LDW-SS-127-010 LDW-SS-43-010 LDW-SS-57-010 LDW-SS-28-010 LDW-SS-36-010 LDW-SS-83-010 LDW-SS-56-010 LDW-SS-64-010 LDW-SS-58-010 LDW-SS-203-010 LDW-SS-123-010
DPWG15584	WG15060-101	2/21/05	1,2,3,4,6,7,8-HpCDD OCDD OCDF Total HpCDD	0.084 ng/Kg 0.224 ng/Kg 0.058 ng/Kg 0.084 ng/Kg	SC-SS1a-010 EB-SS2a-010 LW-SS3-010 LW-SS6-010 SB-SS6-010 DRD-SS7-010 UB-SS8-010 LU-SS9a-010 LU-SS9b-010 LDW-SS20-010 LDW-SS18-010 LW-SS4-010 LW-SS5a-010 LW-SS5b-010 SC-SS1b-010

Sample concentrations were compared to concentrations detected in the method blanks. The sample concentrations were either not detected or were significantly greater (>5X blank contaminants) than the concentrations found in the associated method blanks.

VI. Matrix Spike/Matrix Spike Duplicates

Matrix spike (MS) and matrix spike duplicate (MSD) analyses were not required by the method.

Duplicate (DUP) sample analyses were reviewed for each matrix as applicable. Relative percent differences (RPD) were within QC limits with the following exceptions:

Associated SDG	DUP ID (Associated Samples)	Compound	RPD (Limits)	Flag	A or P
DPWG15547	LDW-SS-14-010DUP (LDW-SS-14-010)	1,2,3,4,6,7,8-HpCDD OCDD	65.2 (≤50) 52.2 (≤50)	J4 (all detects) J4 (all detects)	A

VII. Laboratory Control Samples (LCS)

Laboratory control samples were reviewed for each matrix as applicable. The percent recoveries (%R) were within QC limits.

Standard reference material were within QC limits with the following exceptions:

Associated SDG	SRM ID	Compound	Concentration (Limits)	Associated Samples	Flag	A or P
DPWG15547	SRM	1,2,3,7,8,9-HxCDF	2.41 mg/Kg (66.5-199.5)	LDW-SS-14-010 LDW-SS-22-010 LDW-SS-127-010 LDW-SS-43-010 LDW-SS-57-010 LDW-SS-28-010 LDW-SS-36-010 LDW-SS-83-010 LDW-SS-56-010 LDW-SS-64-010 LDW-SS-58-010 LDW-SS-203-010 LDW-SS-123-010	J6 (all detects) UJ6 (all non-detects)	A
DPWG15547	SRM	2,3,4,6,7,8-HxCDF	44.8 mg/Kg (9.5-28.5)	LDW-SS-14-010 LDW-SS-22-010 LDW-SS-127-010 LDW-SS-43-010 LDW-SS-57-010 LDW-SS-28-010 LDW-SS-36-010 LDW-SS-83-010 LDW-SS-56-010 LDW-SS-64-010 LDW-SS-58-010 LDW-SS-203-010 LDW-SS-123-010	J5 (all detects)	A

Associated SDG	SRM ID	Compound	Concentration (Limits)	Associated Samples	Flag	A or P
DPWG15584	SRM	1,2,3,7,8,9-HxCDF	2.37 mg/Kg (66.5-199.5)	SC-SS1a-010 EB-SS2a-010 LW-SS3-010 LW-SS6-010 SB-SS6-010 DRD-SS7-010 UB-SS8-010 LU-SS9a-010 LU-SS9b-010 LDW-SS20-010 LDW-SS18-010 LW-SS4-010 LW-SS5a-010 LW-SS5b-010 SC-SS1b-010	J6 (all detects) UJ6 (all non-detects)	A
DPWG15584	SRM	2,3,4,6,7,8-HxCDF	39.5 mg/Kg (9.5-28.5)	SC-SS1a-010 EB-SS2a-010 LW-SS3-010 LW-SS6-010 SB-SS6-010 DRD-SS7-010 UB-SS8-010 LU-SS9a-010 LU-SS9b-010 LDW-SS20-010 LDW-SS18-010 LW-SS4-010 LW-SS5a-010 LW-SS5b-010 SC-SS1b-010	J5 (all detects)	A

Although the concentrations of 1,2,3,7,8,9-HxCDF were less than 10% of the certified value, the associated results were qualified as estimated (J/UJ) since the LCS recoveries were within QC limts.

VIII. Regional Quality Assurance and Quality Control

Not applicable.

IX. Internal Standards

All internal standard recoveries were within QC limits.

X. Target Compound Identifications

All target compound identifications were within validation criteria.

XI. Compound Quantitation and CRQLs

All compound quantitation and CRQLs were within validation criteria.

XII. System Performance

The system performance was acceptable.

XIII. Overall Assessment of Data

The overall assessment of data was acceptable. In the case where more than one result was reported for an individual sample, the least technically acceptable results were rejected as follows:

Associated SDG	Sample	Compound	Flag	A or P
DPWG15547 DPWG15584	LDW-SS-14-010 LDW-SS-22-010 LDW-SS-127-010 LDW-SS-43-010 LDW-SS-57-010 LDW-SS-28-010 LDW-SS-36-010 LDW-SS-83-010 LDW-SS-56-010 LDW-SS-64-010 LDW-SS-58-010 LDW-SS-203-010 LDW-SS-123-010 SC-SS1a-010 EB-SS2a-010 LW-SS3-010 LW-SS6-010 SB-SS6-010 DRD-SS7-010 UB-SS8-010 LU-SS9a-010 LU-SS9b-010 LDW-SS20-010 LDW-SS18-010 LW-SS4-010 LW-SS5a-010 LW-SS5b-010 SC-SS1b-010	2,3,7,8-TCDF (DB-5)	R	A

Data flags have been summarized at the end of the report.

XIV. Field Duplicates

Samples LDW-SS-203-010 and LDW-SS-123-010 (SDG DPWG15547) were identified as field duplicates. No polychlorinated dioxins/dibenzofurans were detected in any of the samples with the following exceptions:

Associated SDG	Compound	Concentration (ng/Kg)		RPD (Limits)
		LDW-SS-203-010	LDW-SS-123-010	
DPWG15547	2,3,7,8-TCDD	0.273	0.247	10 (≤50)
DPWG15547	1,2,3,7,8-PeCDD	0.661	0.661	0 (≤50)
DPWG15547	1,2,3,4,7,8-HxCDD	0.786	0.694	12 (≤50)
DPWG15547	1,2,3,6,7,8-HxCDD	4.88	4.57	7 (≤50)
DPWG15547	1,2,3,7,8,9-HxCDD	2.80	2.50	11 (≤50)
DPWG15547	1,2,3,4,6,7,8-HpCDD	112	107	5 (≤50)
DPWG15547	OCDD	894	830	7 (≤50)
DPWG15547	2,3,78-TCDF (DB-225)	0.539	0.526	2 (≤50)
DPWG15547	1,2,3,7,8-PeCDF	0.634	0.566	11 (≤50)
DPWG15547	2,3,4,7,8-PeCDF	1.34	1.19	12 (≤50)
DPWG15547	1,2,3,4,7,8-HxCDF	8.08	7.33	10 (≤50)
DPWG15547	1,2,3,6,7,8-HxCDF	2.05	2.0	2 (≤50)
DPWG15547	1,2,3,7,8,9-HxCDF	0.219	0.186	16 (≤50)
DPWG15547	2,3,4,6,7,8-HxCDF	1.12	1.09	3 (≤50)
DPWG15547	1,2,3,4,6,7,8-HpCDF	35.8	35.8	0 (≤50)
DPWG15547	1,2,3,4,7,8,9-HpCDF	4.34	4.32	0 (≤50)

Associated SDG	Compound	Concentration (ng/Kg)		RPD (Limits)
		LDW-SS-203-010	LDW-SS-123-010	
DPWG15547	OCDF	79.3	104	27 (≤50)
DPWG15547	Total TCDD	3.23	3.27	1 (≤50)
DPWG15547	Total PeCDD	5.71	4.82	17 (≤50)
DPWG15547	Total HxCDD	33.3	31.8	5 (≤50)
DPWG15547	Total HpCDD	242	224	8 (≤50)
DPWG15547	Total TCDF	13.1	12.5	5 (≤50)
DPWG15547	Total PeCDF	23.2	22.0	5 (≤50)
DPWG15547	Total HxCDF	65.5	61.6	6 (≤50)
DPWG15547	Total HpCDF	130	135	4 (≤50)

XV. Field Blanks

No field blanks were identified in this SDG.

LDC #: 13425A21 **VALIDATION COMPLETENESS WORKSHEET** Date: 4/29/05
SDG #: DPWG15547 Level IV Page: 1 of 1
Laboratory: AXYS Analytical Services Ltd. Reviewer: [illegible]
2nd Reviewer: [illegible]

METHOD: HRGC/HRMS Dioxins/Dibenzofurans (EPA Method 1613B)

The samples listed below were reviewed for each of the following validation areas. Validation findings are noted in attached validation findings worksheets.

	Validation Area		Comments
I.	Technical holding times	A	Sampling dates: 1/17 - 24/05
II.	HRGC/HRMS Instrument performance check	A	
III.	Initial calibration	A	%RSD ≤ 20/35
IV.	Routine calibration	A	~~%D ≤ 20/30~~ Meet QC limits
V.	Blanks	SW	
VI.	Matrix spike/Matrix spike duplicates / DUP	N/SW	~~None~~ not Req'd
VII.	Laboratory control samples	A/SW	LCS/CRM
VIII.	Regional quality assurance and quality control	N	
IX.	Internal standards	A	
X.	Target compound identifications	A	
XI.	Compound quantitation and CRQLs	A	
XII.	System performance	A	
XIII.	Overall assessment of data	SW	
XIV.	Field duplicates	SW	D = 12+13
XV.	Field blanks	N	

Note: A = Acceptable
N = Not provided/applicable
SW = See worksheet
ND = No compounds detected
R = Rinsate
FB = Field blank
D = Duplicate
TB = Trip blank
EB = Equipment blank

Validated Samples:
MSeds

1	LDW-SS-14-010	11	LDW-SS-58-010	21	W4150IT-101	31	
2	LDW-SS-22-010	12	LDW-SS-203-010	22		32	
3	LDW-SS-127-010	13	LDW-SS-123-010	23		33	
4	LDW-SS-43-010	14	LDW-SS-14-010DUP	24		34	
5	LDW-SS-57-010	15		25		35	
6	LDW-SS-28-010	16		26		36	
7	LDW-SS-36-010	17		27		37	
8	LDW-SS-83-010	18		28		38	
9	LDW-SS-56-010	19		29		39	
10	LDW-SS-64-010	20		30		40	

Notes: _____

LDC #: 13425A21
SDG #: DPWG15547

VALIDATION FINDINGS CHECKLIST

Reviewer: [illegible]
2nd Reviewer: [illegible]

Method: Dioxins/Dibenzofurans (EPA SW 846 Method 1613)

Validation Area	Yes	No	NA	Findings/Comments
I. Technical holding times				
All technical holding times were met.	✓			
Cooler temperature criteria was met.	✓			
II. GC/MS Instrument performance check				
Was PFK exact mass ~~380.9760~~ verified?	✓			
Were the retention time windows established for all homologues?	✓			
Was the chromatographic resolution between 2,3,7,8-TCDD and peaks representing any other unlabeled TCDD isomers ≤ 25% ?	✓			
Is the static resolving power at least 10,000 (10% valley definition)?	✓			
Was the mass resolution adequately check with PFK?	✓			
Was the presence of 1,2,8,9-TCDD and 1,3,4,6,8-PeCDF verified?	✓			
III. Initial calibration				
Was the initial calibration performed at 5 concentration levels?	✓			
Were all percent relative standard deviations (%RSD) ≤ 20% for unlabeled standards and ≤ ~~30~~ 35% for labeled standards?	✓			
Did all calibration standards meet the Ion Abundance Ratio criteria?	✓			
Was the signal to noise ratio for each target compound ≥ 2.5 and for each recovery and internal standard ≥ 10?	✓			
IV. Continuing calibration				
Was a routine calibration performed at the beginning and end of each 12 hour period?	✓			
Were all percent differences (%D) ≤ 20% for unlabeled standards and ≤ 30% for labeled standards?	✓			
Did all routine calibration standards meet the Ion Abundance Ratio criteria?	✓			
V. Blanks				
Was a method blank associated with every sample in this SDG?	✓			
Was a method blank performed for each matrix and concentration?	✓			
Was there contamination in the method blanks? If yes, please see the Blanks validation completeness worksheet?	✓			
VI. Matrix spike/Matrix spike duplicates				
Were a matrix spike (MS) and matrix spike duplicate (MSD) analyzed for each matrix in this SDG? If no, indicate which matrix does not have an associated MS/MSD. Soil / Water.		✓		
Were the MS/MSD percent recoveries (%R) and the relative percent differences (RPD) within the QC limits?			✓	
VII. Laboratory control samples				
Was an LCS analyzed for this SDG?	✓			
Was an LCS analyzed per extraction batch?	✓			

LDC #: 13425A21
SDG #: MDW61552

VALIDATION FINDINGS CHECKLIST

Reviewer: CK
2nd Reviewer: KC

Validation Area	Yes	No	NA	Findings/Comments
Were the LCS percent recoveries (%R) and relative percent difference (RPD) within the QC limits?	✓			
VIII. Regional Quality Assurance and Quality Control				
Were performance evaluation (PE) samples performed?		✓		
Were the performance evaluation (PE) samples within the acceptance limits?			✓	
IX. Internal standards				
Were internal standard recoveries within the 25-125% criteria?	✓			
Was the minimum S/N ratio of all internal standard peaks ≥ 10?	✓			
X. Target compound identification				
For 2,3,7,8 substituted congeners with associated labeled standards, were the retention times of the two quantitation peaks within -1 to 3 sec. of the RT of the labeled standard?			✓	
For 2,3,7,8 substituted congeners without associated labeled standards, were the relative retention times of the two quantitation peaks within 0.005 time units of the RRT measured in the routine calibration?			✓	
For non-2,3,7,8 substituted congeners, were the retention times of the two quantitation peaks within RT established in the performance check solution?			✓	
Did compound spectra contain all characteristic ions listed in the table attached?			✓	
Was the Ion Abundance Ratio for the two quantitation ions within criteria?			✓	
Was the signal to noise ratio for each target compound and labeled standard ≥ 2.5?			✓	
Does the maximum intensity of each specified characteristic ion coincide within ± 2 seconds (includes labeled standards)?			✓	
For PCDF identification, was any signal (S/N ≥ 2.5, at ± seconds RT) detected in the corresponding PCDPE channel?			✓	
Was an acceptable lock mass recorded and monitored?	✓			
XI. Compound quantitation/CRQLs				
Were the correct internal standard (IS), quantitation ion and relative response factor (RRF) used to quantitate the compound?	✓			
Were compound quantitation and CRQLs adjusted to reflect all sample dilutions and dry weight factors applicable to level IV validation?	✓			
XII. System performance				
System performance was found to be acceptable.	✓			
XIII. Overall assessment of data				
Overall assessment of data was found to be acceptable.	✓			
XIV. Field duplicates				
Field duplicate pairs were identified in this SDG.	✓			
Target compounds were detected in the field duplicates.	✓			
XV. Field blanks				

LDC #: 13425A21
SDG #: DPNG1557

VALIDATION FINDINGS CHECKLIST

Reviewer: 4
2nd Reviewer: 4

Validation Area	Yes	No	NA	Findings/Comments
Field blanks were identified in this SDG.		✓		
Target compounds were detected in the field blanks.			✓	

VALIDATION FINDINGS WORKSHEET

METHOD: HRGC/HRMS Dioxins/Dibenzofurans (EPA SW 846 Method ~~8290~~) 1613)

A. 2,3,7,8-TCDD	F. 1,2,3,4,6,7,8-HpCDD	K. 1,2,3,4,7,8-HxCDF	P. 1,2,3,4,7,8,9-HpCDF	U. Total HpCDD
B. 1,2,3,7,8-PeCDD	G. OCDD	L. 1,2,3,6,7,8-HxCDF	Q. OCDF	V. Total TCDF
C. 1,2,3,4,7,8-HxCDD	H. 2,3,7,8-TCDF	M. 2,3,4,6,7,8-HxCDF	R. Total TCDD	W. Total PeCDF
D. 1,2,3,6,7,8-HxCDD	I. 1,2,3,7,8-PeCDF	N. 1,2,3,7,8,9-HxCDF	S. Total PeCDD	X. Total HxCDF
E. 1,2,3,7,8,9-HxCDD	J. 2,3,4,7,8-PeCDF	O. 1,2,3,4,6,7,8-HpCDF	T. Total HxCDD	Y. Total HpCDF

Notes: _____

LDC #: 13425A21
SDG #: DPWG155-4T

VALIDATION FINDINGS WORKSHEET
Blanks

Page: 1 of 1
Reviewer: Q
2nd Reviewer: M

METHOD: GC/MS Dioxins/Dibenzofurans (Method 1613A)

Please see qualifications below for all questions answered "N". Not applicable questions are identified as "N/A".

Y N N/A Were all samples associated with a method blank?
Y N N/A Was a method blank performed for each matrix and whenever a sample extraction was performed?
Y N N/A Was method blank contamination less < CRQL for all target compounds?

Blank extraction date: 2/10/05 **Blank analysis date:** 2/23/05
Conc. units: ng/kg

Associated samples: A11

Compound	Blank ID	Sample Identification								
WG	1501-10	A11								
F (0.435)	0.087	>5X								
G (1.41)	0.282									
J (0.29)	0.058									
Q (0.485)	0.097									
U (0.695)	0.139									

CIRCLED RESULTS WERE NOT QUALIFIED. ALL RESULTS NOT CIRCLED WERE QUALIFIED BY THE FOLLOWING STATEMENT:
All contaminants within five times the method blank concentration were qualified as not detected, "U".

LDC #: 13425A21
SDG #: DPWE1554T

VALIDATION FINDINGS WORKSHEET
Matrix Spike/Matrix Spike Duplicates

Page: 1 of 1
Reviewer: 9
2nd Reviewer: ac

METHOD: GC/MS Dioxins/Dibenzofurans (Method 1613A)

Please see qualifications below for all questions answered "N". Not applicable questions are identified as "N/A".

Y (N) N/A Were a matrix spike (MS) and matrix spike duplicate (MSD) analyzed for each matrix in this SDG? If no, indicate which matrix does not have an associated MS/MSD. Soil / Water.

Y (N) N/A Was a MS/MSD analyzed every 20 samples of each matrix?

Y N N/A Were the MS/MSD percent recoveries (%R) and the relative percent differences (RPD) within the QC limits stated below?

#	Date	MS/MSD ID	Compound	MS %R (Limits)	MSD %R (Limits)	RPD (Limits)	Associated Samples	Qualifications
		1F	DF	( )	( )	65.2 (≤ 50)	1	J/bl/A
			E	( )	( )	52.2 (↓)		↓
			others	≤ 10 x D	( )	( )		
				( )	( )	( )		
				( )	( )	( )		
				( )	( )	( )		
				( )	( )	( )		
				( )	( )	( )		
				( )	( )	( )		
				( )	( )	( )		
				( )	( )	( )		
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				( )	( )	( )		
				( )	( )	( )		
				( )	( )	( )		
				( )	( )	( )		

	PCDDs	% Recovery (Soil)	RPD (Soil)	% Recovery (Water)	RPD (Water)		PCDFs	% Recovery (Soil)	RPD (Soil)	% Recovery (Water)	RPD (Water)
A.	Tetra-	60-140	50	60-140	50	F.	Tetra-	60-140	50	60-140	50
B.	Penta-	60-140	50	60-140	50	G.	Penta-	60-140	50	60-140	50
C.	Hexa-	60-140	50	60-140	50	H.	Hexa-	60-140	50	60-140	50
D.	Hepta-	60-140	50	60-140	50	I.	Hepta-	60-140	50	60-140	50
E.	Octa-	60-140	50	60-140	50	J.	Octa-	60-140	50	60-140	50

LDC #: 13425A21
SDG #: DPWG15547

VALIDATION FINDINGS WORKSHEET
Laboratory Control Samples (LCS)

Page: 1 of 1
Reviewer: R
2nd Reviewer:

METHOD: HRGC/HRMS Dioxins/Dibenzofurans (EPA ~~SW 846~~ Method ~~8290~~) 1613B

Please see qualifications below for all questions answered "N". Not applicable questions are identified as "N/A".

[✓ Y] N N/A Was a LCS required?
[✓ Y] N N/A Was a LCS analyzed every 20 samples for each matrix or whenever a sample extraction was performed?
[✓ Y] N N/A Were the LCS percent recoveries (%R) and relative percent difference (RPD) within the QC limits?

#	Date	Lab ID/Reference	Compound	conc ~~LCS~~ SRM ~~%R~~ (~~Limits~~)	~~LCSD~~ ~~%R~~ (Limits)	RPD (Limits)	Associated Samples	Qualifications
		SRM	N	2.41 ng/kg)	(66.5-199.5)	( )	All, blk	J6/UJ6/A
			M	44.8 (↓)	(9.5-28.5)	( )		J5 date/A
				( )	( )	( )		
				( )	( )	( )		
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				( )	( )	( )		

LDC #: 34254A21
SDG #: OPWE1554T

VALIDATION FINDINGS WORKSHEET
Overall Assessment of Data

Reviewer: 9
2nd Reviewer: JK

METHOD: GC/MS Dioxins/Dibenzofurans (Method 1613A)

Please see qualifications below for all questions answered "N". Not applicable questions are identified as "N/A".

All available information pertaining to the data were reviewed using professional judgement to compliment the determination of the overall quality of the data.

(Y) N N/A Was the overall quality and usability of the data acceptable?

#	Date	Sample ID	Finding	Associated Samples	Qualifications
		All	2,3,7,8-TCDF on DB-5	All	R/A

Comments: _____

LDC#:13425A21
SDG#:DPWG15547

VALIDATION FINDINGS WORKSHEET
Field Duplicates

Reviewer: CA
2nd Reviewer: D

METHOD: HRGC/HRMS Dioxins/Dibenzofurans (EPA SW 846 Method 1613)

Y N NA Were field duplicate pairs identified in this SDG?
Y N NA Were target analytes detected in the field duplicate pairs?

Compound	Concentration (ng/Kg)		RPD	(≤50)
	12	13		
2,3,7,8-TCDD	0.273	0.247	10	
1,2,3,7,8-PeCDD	0.661	0.661	0	
1,2,3,4,7,8-HxCDD	0.786	0.694	12	
1,2,3,6,7,8-HxCDD	4.88	4.57	7	
1,2,3,7,8,9-HxCDD	2.80	2.50	11	
1,2,3,4,6,7,8-HpCDD	112	107	5	
OCDD	894	830	7	
2,3,78-TCDF (DB-225)	0.539	0.526	2	
1,2,3,7,8-PeCDF	0.634	0.566	11	
2,3,4,7,8 PeCDF	1.34	1.19	12	
1,2,3,4,7,8-HxCDF	8.08	7.33	10	
1,2,3,6,7,8-HxCDF	2.05	2.0	2	
1,2,3,7,8,9-HxCDF	0.219	0.186	16	
2,3,4,6,7,8-HxCDF	1.12	1.09	3	
1,2,3,4,6,7,8-HpCDF	35.8	35.8	0	
1,2,3,4,7,8,9-HpCDF	4.34	4.32	0	
OCDF	79.3	104	27	
Total TCDD	3.23	3.27	1	

LDC#:13425A21
SDG#:DPWG15547

VALIDATION FINDINGS WORKSHEET
Field Duplicates

Reviewer: [illegible]
2nd Reviewer: [illegible]

METHOD: HRGC/HRMS Dioxins/Dibenzofurans (EPA SW 846 Method 1613)

Y N NA Were field duplicate pairs identified in this SDG?
Y N NA Were target analytes detected in the field duplicate pairs?

Compound	Concentration (ng/Kg)		RPD	(≤50)
	12	13		
Total PeCDD	5.71	4.82	17	
Total HxCDD	33.3	31.8	5	
Total HpCDD	242	224	8	
Total TCDF	13.1	12.5	5	
Total PeCDF	23.2	22.0	5	
Total HxCDF	65.5	61.6	6	
Total HpCDF	130	135	4	

LDC #: 13425A21
SDG #: DRW65547

VALIDATION FINDINGS WORKSHEET
Initial Calibration Calculation Verification

Reviewer: 9
2nd Reviewer: AC

METHOD: HRGC/HRMS Dioxins/Dibenzofurans (EPA SW 846 Method ~~8290~~ 1613)

The Relative Response Factor (RRF), average RRF, and percent relative standard deviation (%RSD) were recalculated for the compounds identified below using the following calculations:

$RRF = (A_x)(C_{is})/(A_{is})(C_x)$
average RRF = sum of the RRFs/number of standards
%RSD = 100 * (S/X)

A_x = Area of compound, A_{is} = Area of associated internal standard
C_x = Concentration of compound, C_{is} = Concentration of internal standard
S = Standard deviation of the RRFs, X = Mean of the RRFs

#	Standard ID	Calibration Date	Compound (Reference Internal Standard)	Reported Average RRF (initial)	Recalculated Average RRF (initial)	Reported RRF (C3 std)	Recalculated RRF (C3 std)	Reported %RSD	Recalculated %RSD
1	ICAL	2/20/05	2,3,7,8-TCDF (^{13}C-2,3,7,8-TCDF)	0.98	0.98	1.04	1.04	3.13	3.26
			2,3,7,8-TCDD (^{13}C-2,3,7,8-TCDD)	1.15	1.15	1.15	1.15	0.65	0.47
			1,2,3,6,7,8-HxCDD (^{13}C-1,2,3,6,7,8-HxCDD)	0.88	0.88	0.87	0.87	2.07	2.19
			1,2,3,4,6,7,8-HpCDD (^{13}C-1,2,4,6,7,8,-HpCDD)	0.99	0.99	0.98	0.98	1.49	1.52
			OCDF (^{13}C-OCDD)	1.44	1.44	1.43	1.43	5.39	5.43
2	ICAL	2/15/05	2,3,7,8-TCDF (^{13}C-2,3,7,8-TCDF)	1.18	1.18	1.22	1.22	2.60	2.70
			2,3,7,8-TCDD (^{13}C-2,3,7,8-TCDD)						
			1,2,3,6,7,8-HxCDD (^{13}C-1,2,3,6,7,8-HxCDD)						
			1,2,3,4,6,7,8-HpCDD (^{13}C-1,2,4,6,7,8,-HpCDD)						
			OCDF (^{13}C-OCDD)						
3			2,3,7,8-TCDF (^{13}C-2,3,7,8-TCDF)						
			2,3,7,8-TCDD (^{13}C-2,3,7,8-TCDD)						
			1,2,3,6,7,8-HxCDD (^{13}C-1,2,3,6,7,8-HxCDD)						
			1,2,3,4,6,7,8-HpCDD (^{13}C-1,2,4,6,7,8,-HpCDD)						
			OCDF (^{13}C-OCDD)						

Comments: Refer to Initial Calibration findings worksheet for list of qualifications and associated samples when reported results do not agree within 10.0% of the recalculated results.

LDC #: 13423A21
SDG #: DPWG15547

VALIDATION FINDINGS WORKSHEET
Routine Calibration Results Verification

Page: 1 of 1
Reviewer:
2nd Reviewer:

METHOD: HRGC/HRMS Dioxins/Dibenzofurans (EPA SW 846 Method ~~8290~~ 1613)

The percent difference (%D) of the initial calibration average Relative Response Factors (RRFs) and the continuing calibration RRFs were recalculated for the compounds identified below using the following calculation:

% Difference = 100 * (ave. RRF - RRF)/ave. RRF
$RRF = (A_x)(C_{is})/(A_{is})(C_x)$

Where: ave. RRF = initial calibration average RRF
RRF = continuing calibration RRF
A_x = Area of compound, A_{is} = Area of associated internal standard
C_x = Concentration of compound, C_{is} = Concentration of internal standard

#	Standard ID	Calibration Date	Compound (Reference Internal Standard)	Average RRF (initial)	Reported RRF ~~Awt~~ (CC)	Recalculated RRF ~~Awt~~ (CC)	Reported %D	Recalculated %D
1	DX52092 S:1	2/23/05	2,3,7,8-TCDF (^{13}C-2,3,7,8-TCDF)	0.98	11.0	11.0		
			2,3,7,8-TCDD (^{13}C-2,3,7,8-TCDD)	1.15	10.3	10.4		
			1,2,3,6,7,8-HxCDD (^{13}C-1,2,3,6,7,8-HxCDD)	0.88	50.4	50.4		
			1,2,3,4,6,7,8-HpCDD (^{13}C-1,2,4,6,7,8,-HpCDD)	0.99	49.9	50.0		
			OCDF (^{13}C-OCDD)	1.44	102	102		
2	DB53050 S:2	2/23/05	2,3,7,8-TCDF (^{13}C-2,3,7,8-TCDF)	1.18	9.47	9.48		
			2,3,7,8-TCDD (^{13}C-2,3,7,8-TCDD)					
			1,2,3,6,7,8-HxCDD (^{13}C-1,2,3,6,7,8-HxCDD)					
	~~DB~~		1,2,3,4,6,7,8-HpCDD (^{13}C-1,2,4,6,7,8,-HpCDD)					
			OCDF (^{13}C-OCDD)					
3	DX52093 S:1	2/24/05	2,3,7,8-TCDF (^{13}C-2,3,7,8-TCDF)	0.98	10.8	10.9		
			2,3,7,8-TCDD (^{13}C-2,3,7,8-TCDD)	1.15	10.4	10.4		
			1,2,3,6,7,8-HxCDD (^{13}C-1,2,3,6,7,8-HxCDD)	0.88	51.1	50.8		
			1,2,3,4,6,7,8-HpCDD (^{13}C-1,2,4,6,7,8,-HpCDD)	0.99	49.2	49.4		
			OCDF (^{13}C-OCDD)	1.44	102	102		

Comments: Refer to Routine Calibration findings worksheet for list of qualifications and associated samples when reported results do not agree within 10.0% of the recalculated results.

LDC #: 13425A2
SDG #: DPW61554T

VALIDATION FINDINGS WORKSHEET
Routine Calibration Results Verification

Reviewer: [illegible]
2nd Reviewer: [illegible]

METHOD: GC/MS Dioxins/Dibenzofurans (EPA SW 846 Method ~~8280A~~ (613)

The percent difference (%D) of the initial calibration average Relative Response Factors (RRFs) and the continuing calibration RRFs were recalculated for the compounds identified below using the following calculation:

% Difference = 100 * (ave. RRF - RRF)/ave. RRF
$RRF = (A_x)(C_{is})/(A_{is})(C_x)$

Where: ave. RRF = initial calibration average RRF
RRF = continuing calibration RRF
A_x = Area of compound, A_{is} = Area of associated internal standard
C_x = Concentration of compound, C_{is} = Concentration of internal standard

#	Standard ID	Calibration Date	Compound (Reference Internal Standard)	Average RRF (initial)	Reported RRF (CC)	Recalculated RRF (CC)	Reported %D	Recalculated %D
1	DX52_100S	2/28/05	2,3,7,8-TCDF (^{13}C-2,3,7,8-TCDF)	0.98	11.0	11.0		
			2,3,7,8-TCDD (^{13}C-2,3,7,8-TCDD)	1.15	10.3	10.3		
			1,2,3,6,7,8-HxCDD (^{13}C-1,2,3,6,7,8-HxCDD)	0.88	51.6	51.4		
			1,2,3,4,6,7,8-HpCDD (^{13}C-1,2,3,7,8,9-HxCDD)	0.99	50.5	50.6		
			OCDF (^{13}C-OCDD)	1.44	100	99.9		
2	DX52_101S	2/28/05	2,3,7,8-TCDF (^{13}C-2,3,7,8-TCDF)	0.98	10.8	10.9		
			2,3,7,8-TCDD (^{13}C-2,3,7,8-TCDD)	1.15	10.4	10.4		
			1,2,3,6,7,8-HxCDD (^{13}C-1,2,3,6,7,8-HxCDD)	0.88	51.4	51.4		
			1,2,3,4,6,7,8-HpCDD (^{13}C-1,2,3,7,8,9-HxCDD)	0.99	49.9	50.0		
			OCDF (^{13}C-OCDD)	1.44	101	101		
3	DX52_118S	3/11/05	2,3,7,8-TCDF (^{13}C-2,3,7,8-TCDF)	0.98	11.0	11.0		
			2,3,7,8-TCDD (^{13}C-2,3,7,8-TCDD)	1.15	10.3	10.3		
			1,2,3,6,7,8-HxCDD (^{13}C-1,2,3,6,7,8-HxCDD)	0.88	51.4	51.3		
			1,2,3,4,6,7,8-HpCDD (^{13}C-1,2,3,7,8,9-HxCDD)	0.99	50.7	50.9		
			OCDF (^{13}C-OCDD)	1.44	107	102		

Comments: Refer to Routine Calibration findings worksheet for list of qualifications and associated samples when reported results do not agree within 10.0% of the recalculated results.

LDC #: 13425A2l
SDG #: DPW615547

VALIDATION FINDINGS WORKSHEET
Laboratory Control Sample Results Verification

Reviewer: QL
2nd Reviewer: QC

METHOD: GC/MS Dioxins/Dibenzofurans (EPA SW 846 Method 1613A)

The percent recoveries (%R) and Relative Percent Difference (RPD) of the laboratoy control sample and laboratory control sample duplicate (if applicable) were recalculated for the compounds identified below using the following calculation:

% Recovery = 100 * SSC/SA Where: SSC = Spiked sample concentration
SA = Spike added

RPD = | LCS - LCSD | * 2/(LCS + LCSD) LCS = Laboraotry control sample percent recovery LCSD = Laboratory control sample duplicate percent recovery

LCS ID:

Compound	Spike Added (ng/mL)		Spiked Sample Concentration (ng/mL)		LCS Percent Recovery		LCSD Percent Recovery		LCS/LCSD RPD	
	LCS	LCSD	LCS	LCSD	Reported	Recalc.	Reported	Recalc.	Reported	Recalculated
A	10.0	NA	9.96	NA	99.6	99.6				
B	50.0	↓	51.5	↓	103	103				
C	50.0		50.6		101	101				
P	↓		50.3		101	101				
Q	100	↓	101	↓	101	101				

Comments: Refer to Laboratory Control Sample findings worksheet for list of qualifications and associated samples when reported results do not agree within 10.0% of the recalculated results.

Ions Monitored for HRGC/HRMS Analytis of PCDDs/PCDFs

Descriptor	Accurate mass[a]	Ion ID	Elemental Composition	Analyte	Descriptor	Accurate Mass[a]	Ion ID	Elemental Composition	Analyte
1	303.9016	M	$C_{12}H_4{}^{35}Cl_4O$	TCDF	4	407.7818	M+2	$C_{12}H^{35}Cl_6{}^{37}ClO$	HpCDF
	305.8987	M+2	$C_{12}H_4{}^{35}Cl_3{}^{37}C10$	TCDF		409.7788	M+4	$C_{12}H^{35}Cl_5{}^{37}Cl_2O$	HpCDF
	315.9419	M	$^{13}C_{12}H_4{}^{35}Cl_4O$	TCDF (S)		417.8250	M	$^{13}C_{12}H^{35}Cl_7O$	HpCDF (S)
	317.9389	M+2	$^{13}C_{12}H_4{}^{35}Cl_3{}^{37}ClO$	TCDF (S)		419.8220	M+2	$^{13}C_{12}H^{35}Cl_6{}^{37}ClO$	HpCDF
	319.8965	M	$C_{12}H_4{}^{35}Cl_4O_2$	TCDD		423.7767	M+2	$C_{12}H^{35}Cl_6{}^{37}ClO_2$	HpCDD
	321.8936	M+2	$C_{12}H_4{}^{35}Cl_3{}^{37}C10_2$	TCDD		425.7737	M+4	$C_{12}H^{35}Cl_5{}^{37}Cl_2O_2$	HpCDD
	331.9368	M	$^{13}C_{12}H_4{}^{35}Cl_4O_2$	TCDD (S)		435.8169	M+2	$^{13}C_{12}H^{35}Cl_6{}^{37}ClO_2$	HpCDD (S)
	333.9338	M+2	$^{13}C_{12}H_4{}^{35}Cl_3{}^{37}ClO_2$	TCDD (S)		437.8140	M+4	$^{13}C_{12}H^{35}Cl_5{}^{37}Cl_2O_2$	HpCDD (S)
	375.8364	M+2	$C_{12}H_4{}^{35}Cl_5{}^{37}ClO$	HxCDPE		479.7165	M+4	$C_{12}H^{35}Cl_7{}^{37}Cl_2O$	NCDPE
	[354.9792]	LOCK	C_9F_{13}	PFK		[430.9728]	LOCK	C_9F_{17}	PFK
2	339.8597	M+2	$C_{12}H_3{}^{35}Cl_4{}^{37}ClO$	PeCDF	5	441.7428	M+2	$C_{12}{}^{35}Cl_7{}^{37}ClO$	OCDF
	341.8567	M+4	$C_{12}H_3{}^{35}Cl_3{}^{37}Cl_2O$	PeCDF		443.7399	M+4	$C_{12}{}^{35}Cl_6{}^{37}Cl_2O$	OCDF
	351.9000	M+2	$^{13}C_{12}H_3{}^{35}Cl_4{}^{37}C10$	PeCDF (S)		457.7377	M+2	$C_{12}{}^{35}Cl_7{}^{37}ClO_2$	OCDD
	353.8970	M+4	$^{13}C_{12}H_3{}^{35}Cl_3{}^{37}Cl_2O$	PeCDF (S)		459.7348	M+4	$C_{12}{}^{35}Cl_6{}^{37}Cl_2O_2$	OCDD
	355.8546	M+2	$C_{12}H_3{}^{35}Cl_4{}^{37}ClO_2$	PeCDD		469.7780	M+2	$^{13}C_{12}{}^{35}Cl_7{}^{37}ClO_2$	OCDD (S)
	357.8516	M+4	$C_{12}H_3{}^{35}Cl_3{}^{37}Cl_2O_2$	PeCDD		471.7750	M+4	$^{13}C_{12}{}^{35}Cl_6{}^{37}Cl_2O_2$	OCDD (S)
	367.8949	M+2	$^{13}C_{12}H_3{}^{35}Cl_4{}^{37}ClO_2$	PeCDD (S)		513.6775	M+4	$C_{12}{}^{35}Cl_8{}^{37}Cl_2O$	DCDPE
	369.8919	M+4	$^{13}C_{12}H_3{}^{35}Cl_3{}^{37}Cl_2O_2$	PeCDD (S)		[422.9278]	LOCK	$C_{10}F_{17}$	PFK
	409.7974	M+2	$C_{12}H_3{}^{35}Cl_6{}^{37}ClO$	HpCDPE					
	[354.9792]	LOCK	C_9F_{13}	PFK					
3	373.8208	M+2	$C_{12}H_2{}^{35}Cl_5{}^{37}ClO$	HxCDF					
	375.8178	M+4	$C_{12}H_2{}^{35}Cl_4{}^{37}Cl_2O$	HxCDF					
	383.8639	M	$^{13}C_{12}H_2{}^{35}Cl_6O$	HxCDF (S)					
	385.8610	M+2	$^{13}C_{12}H_2{}^{35}Cl_5{}^{37}ClO$	HxCDF (S)					
	389.8156	M+2	$C_{12}H_2{}^{35}Cl_5{}^{37}ClO_2$	HxCDD					
	391.8127	M+4	$C_{12}H_2{}^{35}Cl_4{}^{37}Cl_2O_2$	HxCDD					
	401.8559	M+2	$^{13}C_{12}H_2{}^{35}Cl_5{}^{37}ClO_2$	HxCDD (S)					
	403.8529	M+4	$^{13}C_{12}H_2{}^{35}Cl_4{}^{37}Cl_2O_2$	HxCDD (S)					
	445.7555	M+4	$C_{12}H_2{}^{35}Cl_6{}^{37}Cl_2O$	OCDPE					
	[430.9728]	LOCK	C_9F_{17}	PFK					

(a) The following nuclidic masses were used:

H = 1.007825	O = 15.994915
C = 12.000000	^{35}Cl = 34.968853
^{13}C = 13.003355	^{37}Cl = 36.965903
F = 18.9984	

S = internal/recovery standard

LDC #: 13425A21
SDG #: DPWG1554T

VALIDATION FINDINGS WORKSHEET
Sample Calculation Verification

Page: 1 of 1
Reviewer: 9
2nd reviewer: 2

METHOD: HRGC/HRMS Dioxins/Dibenzofurans (EPA SW 846 Method 1613A)

Y N N/A Were all reported results recalculated and verified for all level IV samples?
Y N N/A Were all recalculated results for detected target compounds agree within 10.0% of the reported results?

Concentration = $\frac{(A_x)(I_s)(DF)}{(A_{is})(RRF)(V_o)(\%S)}$

A_x = Area of the characteristic ion (EICP) for the compound to be measured

A_{is} = Area of the characteristic ion (EICP) for the specific internal standard

I_s = Amount of internal standard added in nanograms (ng)

V_o = Volume or weight of sample extract in milliliters (ml) or grams (g).

RRF = Relative Response Factor (average) from the initial calibration

Df = Dilution Factor.

%S = Percent solids, applicable to soil and solid matrices only.

Example:

Sample I.D. 1 , F :

Conc. = $\frac{(5.74e+07)(2000)(1)}{(3.69e+08)(0.99)(11.2)(\ )}$

= 28.0 ng/kg

#	Sample ID	Compound	Reported Concentration ( )	Calculated Concentration ( )	Qualification

LDC #: 13439A21 **VALIDATION COMPLETENESS WORKSHEET** Date: 5/9/05
SDG #: DPWG15584 Level IV Page: 1 of 1
Laboratory: AXYS Analytical Services Ltd. Reviewer: [illegible]
2nd Reviewer: [illegible]

METHOD: HRGC/HRMS Dioxins/Dibenzofurans (EPA Method 1613)

The samples listed below were reviewed for each of the following validation areas. Validation findings are noted in attached validation findings worksheets.

	Validation Area		Comments
I.	Technical holding times	A	Sampling dates: 1/31 - 2/10/05
II.	HRGC/HRMS Instrument performance check	A	
III.	Initial calibration	A	%RSD ≤ 20/35
IV.	Routine calibration	A	RC limits
V.	Blanks	SW	
VI.	Matrix spike/Matrix spike duplicates /Dup	N/A	
VII.	Laboratory control samples	A/SW	LCS OPR/SLV
VIII.	Regional quality assurance and quality control	N	
IX.	Internal standards	A	
X.	Target compound identifications	A	
XI.	Compound quantitation and CRQLs	A	
XII.	System performance	A	
XIII.	Overall assessment of data	A SW	
XIV.	Field duplicates	N	
XV.	Field blanks	N	

Note: A = Acceptable
N = Not provided/applicable
SW = See worksheet
ND = No compounds detected
R = Rinsate
FB = Field blank
D = Duplicate
TB = Trip blank
EB = Equipment blank

Validated Samples:
All soils

1	SC-SS1a-010	11	LDW-SS18-010	21	WG15060-101	31	
2	EB-SS2a-010	12	LW-SS4-010	22		32	
3	LW-SS3-010	13	LW-SS5a-010	23		33	
4	LW-SS6-010	14	LW-SS5b-010	24		34	
5	SB-SS6-010	15	SC-SS16-010	25		35	
6	DRD-SS7-010	16	SB-SS6-010DUP	26		36	
7	UB-SS8-010	17		27		37	
8	LU-SS9a-010	18		28		38	
9	LU-SS9b-010	19		29		39	
10	LDW-SS20-010	20		30		40	

Notes: _____

LDC #: 13439A21
SDG #: DPWG15584

VALIDATION FINDINGS CHECKLIST

Reviewer: 9
2nd Reviewer: R

Method: Dioxins/Dibenzofurans (EPA SW 846 Method 1613)

Validation Area	Yes	No	NA	Findings/Comments
I. Technical holding times				
All technical holding times were met.	✓			
Cooler temperature criteria was met.	✓			
II. GC/MS Instrument performance check				
Was PFK exact mass 380.9760 verified?	✓			
Were the retention time windows established for all homologues?	✓			
Was the chromatographic resolution between 2,3,7,8-TCDD and peaks representing any other unlabeled TCDD isomers ≤ 25% ?	✓			
Is the static resolving power at least 10,000 (10% valley definition)?	✓			
Was the mass resolution adequately check with PFK?	✓			
Was the presence of 1,2,8,9-TCDD and 1,3,4,6,8-PeCDF verified?	✓			
III. Initial calibration				
Was the initial calibration performed at 5 concentration levels?	✓			
Were all percent relative standard deviations (%RSD) ≤ 20% for unlabeled standards and ≤ 30% for labeled standards?	✓			
Did all calibration standards meet the Ion Abundance Ratio criteria?	✓			
Was the signal to noise ratio for each target compound ≥ 2.5 and for each recovery and internal standard ≥ 10?	✓			
IV. Continuing calibration				
Was a routine calibration performed at the beginning and end of each 12 hour period?	✓			
~~Were all percent differences (%D) ≤ 20% for unlabeled standards and ≤ 30% for labeled standards?~~ conc meet RC limits ?	✓			
Did all routine calibration standards meet the Ion Abundance Ratio criteria?	✓			
V. Blanks				
Was a method blank associated with every sample in this SDG?	✓			
Was a method blank performed for each matrix and concentration?	✓			
Was there contamination in the method blanks? If yes, please see the Blanks validation completeness worksheet?	✓			
VI. Matrix spike/Matrix spike duplicates				
Were a matrix spike (MS) and matrix spike duplicate (MSD) analyzed for each matrix in this SDG? If no, indicate which matrix does not have an associated MS/MSD. Soil / Water.		✓		
Were the MS/MSD percent recoveries (%R) and the relative percent differences (RPD) within the QC limits?			✓	
VII. Laboratory control samples				
Was an LCS analyzed for this SDG?	✓			
Was an LCS analyzed per extraction batch?	✓			

LDC #: 13439A21
SDG #: DPW615584

VALIDATION FINDINGS CHECKLIST

Reviewer: 9
2nd Reviewer: DK

Validation Area	Yes	No	NA	Findings/Comments
Were the LCS percent recoveries (%R) and relative percent difference (RPD) within the QC limits?	✓			
VIII. Regional Quality Assurance and Quality Control				
Were performance evaluation (PE) samples performed?		✓		
Were the performance evaluation (PE) samples within the acceptance limits?			✓	
IX. Internal standards				
Were internal standard recoveries within the 25-125% criteria?	✓			
Was the minimum S/N ratio of all internal standard peaks ≥ 10?	✓			
X. Target compound identification				
For 2,3,7,8 substituted congeners with associated labeled standards, were the retention times of the two quantitation peaks within -1 to 3 sec. of the RT of the labeled standard?	✓		✓	
For 2,3,7,8 substituted congeners without associated labeled standards, were the relative retention times of the two quantitation peaks within 0.005 time units of the RRT measured in the routine calibration?	✓		✓	
For non-2,3,7,8 substituted congeners, were the retention times of the two quantitation peaks within RT established in the performance check solution?	✓		✓	
Did compound spectra contain all characteristic ions listed in the table attached?	✓		✓	
Was the Ion Abundance Ratio for the two quantitation ions within criteria?	✓		✓	
Was the signal to noise ratio for each target compound and labeled standard ≥ 2.5?	✓		✓	
Does the maximum intensity of each specified characteristic ion coincide within ± 2 seconds (includes labeled standards)?	✓		✓	
For PCDF identification, was any signal (S/N ≥ 2.5, at ± seconds RT) detected in the corresponding PCDPE channel?	✓		✓	
Was an acceptable lock mass recorded and monitored?	✓			
XI. Compound quantitation/CRQLs				
Were the correct internal standard (IS), quantitation ion and relative response factor (RRF) used to quantitate the compound?	✓			
Were compound quantitation and CRQLs adjusted to reflect all sample dilutions and dry weight factors applicable to level IV validation?	✓			
XII. System performance				
System performance was found to be acceptable.	✓			
XIII. Overall assessment of data				
Overall assessment of data was found to be acceptable.	✓			
XIV. Field duplicates				
Field duplicate pairs were identified in this SDG.		✓		
Target compounds were detected in the field duplicates.			✓	
XV. Field blanks				

LDC #: 13439A21
SDG #: DPWF1558

VALIDATION FINDINGS CHECKLIST

Reviewer: 9
2nd Reviewer: JV

Validation Area	Yes	No	NA	Findings/Comments
Field blanks were identified in this SDG.		✓		
Target compounds were detected in the field blanks.			✓	

VALIDATION FINDINGS WORKSHEET

METHOD: HRGC/HRMS Dioxins/Dibenzofurans (EPA SW 846 Method ~~8290~~ 1613)

A. 2,3,7,8-TCDD	F. 1,2,3,4,6,7,8-HpCDD	K. 1,2,3,4,7,8-HxCDF	P. 1,2,3,4,7,8,9-HpCDF	U. Total HpCDD
B. 1,2,3,7,8-PeCDD	G. OCDD	L. 1,2,3,6,7,8-HxCDF	Q. OCDF	V. Total TCDF
C. 1,2,3,4,7,8-HxCDD	H. 2,3,7,8-TCDF	M. 2,3,4,6,7,8-HxCDF	R. Total TCDD	W. Total PeCDF
D. 1,2,3,6,7,8-HxCDD	I. 1,2,3,7,8-PeCDF	N. 1,2,3,7,8,9-HxCDF	S. Total PeCDD	X. Total HxCDF
E. 1,2,3,7,8,9-HxCDD	J. 2,3,4,7,8-PeCDF	O. 1,2,3,4,6,7,8-HpCDF	T. Total HxCDD	Y. Total HpCDF

Notes: _____

LDC #: 13139A2
SDG #: OPW61558

VALIDATION FINDINGS WORKSHEET
Blanks

Reviewer: 9
2nd Reviewer: AC

METHOD: HRGC/HRMS Dioxins/Dibenzofurans (EPA Method ~~8290~~ 1613)

Please see qualifications below for all questions answered "N". Not applicable questions are identified as "N/A".

Y N N/A Were all samples associated with a method blank?
Y N N/A Was a method blank analyzed for each matrix?
Y N N/A Was the blank contaminated? If yes, please see qualification below.

Blank extraction date: 2/21/05 **Blank analysis date:** 3/17/05
Conc. units: ng/kg Associated Samples: All

Compound	Blank ID	Sample Identification								
	WG15060-10)	All								
F (0.42)	0.084	>5X								
G (1.12)	0.224									
Q (0.29)	0.058									
U (0.42)	0.084									
(5x)										

Blank extraction date:_____ **Blank analysis date:**_____
Conc. units:_____ Associated Samples:_____

Compound	Blank ID	Sample Identification								

CIRCLED RESULTS WERE NOT QUALIFIED. ALL RESULTS NOT CIRCLED WERE QUALIFIED BY THE FOLLOWING STATEMENT:
All contaminants within five times the method blank concentration were qualified as not detected, "U".

LDC #: B439A21

SDG #: DWG1558

VALIDATION FINDINGS WORKSHEET
Laboratory Control Samples (LCS)

Page: 1 of 1

Reviewer: x

2nd Reviewer:

METHOD: HRGC/HRMS Dioxins/Dibenzofurans (EPA SW 846 Method 8290)

Please see qualifications below for all questions answered "N". Not applicable questions are identified as "N/A".

[✓ Y] N N/A Was a LCS required?

[✓ Y] N N/A Was a LCS analyzed every 20 samples for each matrix or whenever a sample extraction was performed?

[✓ Y] N N/A Were the LCS percent recoveries (%R) and relative percent difference (RPD) within the QC limits?

#	Date	Lab ID/Reference	Compound	WC ~~LCS~~ SRM ~~%R (Limits)~~	LC~~S~~D ~~%~~R (Limits)	RPD (Limits)	Associated Samples	Qualifications
		SRM	N	2.37 (ng/kg)	(66.5–199.5)	( )	All	J6/UJ6/A
			M	39.5 (↓)	(9.5–28.5)	( )		J5 dets/A
				( )	( )	( )		
				( )	( )	( )		
				( )	( )	( )		
				( )	( )	( )		
				( )	( )	( )		
				( )	( )	( )		
				( )	( )	( )		
				( )	( )	( )		
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				( )	( )	( )		
				( )	( )	( )		
				( )	( )	( )		

LDC #: 13439A1
SDG #: JPW615584

VALIDATION FINDINGS WORKSHEET
Overall Assessment of Data

Page: 1 of 1
Reviewer: 9
2nd Reviewer: M

METHOD: HRGC/HRMS Dioxins/Dibenzofurans (EPA SW 846 Method 8290)

Please see qualifications below for all questions answered "N". Not applicable questions are identified as "N/A".

All available information pertaining to the data were reviewed using professional judgement to compliment the determination of the overall quality of the data.

(Y) N N/A Was the overall quality and usability of the data acceptable?

#	Date	Sample ID	Finding	Associated Samples	Qualifications
		All	2,3,7,8-TCDF on DB-5	All	R/J

Comments: _____

LDC #: 13439A21
SDG #: ~~D7H5~~ 15584

VALIDATION FINDINGS WORKSHEET
Initial Calibration Calculation Verification

Page: 1 of 1
Reviewer: 9
2nd Reviewer: K

METHOD: HRGC/HRMS Dioxins/Dibenzofurans (EPA SW 846 Method ~~8290~~ 1613)

The Relative Response Factor (RRF), average RRF, and percent relative standard deviation (%RSD) were recalculated for the compounds identifed below using the following calculations:

RRF = $(A_x)(C_{is})/(A_{is})(C_x)$
average RRF = sum of the RRFs/number of standards
%RSD = 100 * (S/X)

A_x = Area of compound,
C_x = Concentration of compound,
S = Standard deviation of the RRFs,

A_{is} = Area of associated internal standard
C_{is} = Concentration of internal standard
X = Mean of the RRFs

#	Standard ID	Calibration Date	Compound (Reference Internal Standard)	Reported Average RRF (initial)	Recalculated Average RRF (initial)	Reported RRF (<3 std)	Recalculated RRF (<3 std)	Reported %RSD	Recalculated %RSD
1	ICAL2	3/30/05	2,3,7,8-TCDF (^{13}C-2,3,7,8-TCDF)	1.15	1.15	1.15	1.15	0.65	0.47
			2,3,7,8-TCDD (^{13}C-2,3,7,8-TCDD)	0.98	0.98	1.04	1.04	3.13	3.26
			1,2,3,6,7,8-HxCDD (^{13}C-1,2,3,6,7,8-HxCDD)	0.88	0.88	0.87	0.87	2.07	2.19
			1,2,3,4,6,7,8-HpCDD (^{13}C-1,2,4,6,7,8,-HpCDD)	0.99	0.99	0.98	0.98	1.49	1.52
			OCDF (^{13}C-OCDD)	1.44	1.44	1.43	1.43	5.39	5.43
2	ICAL	2/15/05	2,3,7,8-TCDF (^{13}C-2,3,7,8-TCDF)	1.18	1.18	1.22	1.22	2.60	2.70
			2,3,7,8-TCDD (^{13}C-2,3,7,8-TCDD)						
			1,2,3,6,7,8-HxCDD (^{13}C-1,2,3,6,7,8-HxCDD)						
			1,2,3,4,6,7,8-HpCDD (^{13}C-1,2,4,6,7,8,-HpCDD)						
			OCDF (^{13}C-OCDD)						
3	ICAL	4/3/05	2,3,7,8-TCDF (^{13}C-2,3,7,8-TCDF)	1.08	1.08	1.09	1.09	2.05	2.00
			2,3,7,8-TCDD (^{13}C-2,3,7,8-TCDD)	1.02	1.02	1.07	1.07	3.45	3.21
			1,2,3,6,7,8-HxCDD (^{13}C-1,2,3,6,7,8-HxCDD)	0.86	0.86	0.89	0.89	2.37	2.47
			1,2,3,4,6,7,8-HpCDD (^{13}C-1,2,4,6,7,8,-HpCDD)	0.97	0.97	0.96	0.96	2.29	2.19
			OCDF (^{13}C-OCDD)	1.25	1.25	1.24	1.24	3.75	3.57

Comments: Refer to Initial Calibration findings worksheet for list of qualifications and associated samples when reported results do not agree within 10.0% of the recalculated results.

LDC #: 13439A21
SDG #: DPWG155 82

VALIDATION FINDINGS WORKSHEET
Initial Calibration Calculation Verification

Reviewer: 1
2nd Reviewer: C

METHOD: HRGC/HRMS Dioxins/Dibenzofurans (EPA SW 846 Method ~~8290~~ 1613)

The Relative Response Factor (RRF), average RRF, and percent relative standard deviation (%RSD) were recalculated for the compounds identified below using the following calculations:

RRF = $(A_x)(C_{is})/(A_{is})(C_x)$ — A_x = Area of compound, A_{is} = Area of associated internal standard
average RRF = sum of the RRFs/number of standards — C_x = Concentration of compound, C_{is} = Concentration of internal standard
%RSD = 100 * (S/X) — S = Standard deviation of the RRFs, X = Mean of the RRFs

#	Standard ID	Calibration Date	Compound (Reference Internal Standard)	Reported Average RRF (initial)	Recalculated Average RRF (initial)	Reported RRF (C3 std)	Recalculated RRF (C3 std)	Reported %RSD	Recalculated %RSD
1	1CAC	4/9/05	2,3,7,8-TCDF (^{13}C-2,3,7,8-TCDF)						
			2,3,7,8-TCDD (^{13}C-2,3,7,8-TCDD)						
			1,2,3,6,7,8-HxCDD (^{13}C-1,2,3,6,7,8-HxCDD)						
			1,2,3,4,6,7,8-HpCDD (^{13}C-1,2,4,6,7,8,-HpCDD)						
			OCDF (^{13}C-OCDD)	1.51	1.51	1.46	1.47	3.88	3.82
2			2,3,7,8-TCDF (^{13}C-2,3,7,8-TCDF)						
			2,3,7,8-TCDD (^{13}C-2,3,7,8-TCDD)						
			1,2,3,6,7,8-HxCDD (^{13}C-1,2,3,6,7,8-HxCDD)						
			1,2,3,4,6,7,8-HpCDD (^{13}C-1,2,4,6,7,8,-HpCDD)						
			OCDF (^{13}C-OCDD)						
3			2,3,7,8-TCDF (^{13}C-2,3,7,8-TCDF)						
			2,3,7,8-TCDD (^{13}C-2,3,7,8-TCDD)						
			1,2,3,6,7,8-HxCDD (^{13}C-1,2,3,6,7,8-HxCDD)						
			1,2,3,4,6,7,8-HpCDD (^{13}C-1,2,4,6,7,8,-HpCDD)						
			OCDF (^{13}C-OCDD)						

Comments: Refer to Initial Calibration findings worksheet for list of qualifications and associated samples when reported results do not agree within 10.0% of the recalculated results.

LDC #: 13439A2
SDG #: DPNG1558d

VALIDATION FINDINGS WORKSHEET
Routine Calibration Results Verification

Page: 1 of 1
Reviewer: 9
2nd Reviewer: M

METHOD: HRGC/HRMS Dioxins/Dibenzofurans (EPA SW 846 Method ~~8290~~ 1613)

The percent difference (%D) of the initial calibration average Relative Response Factors (RRFs) and the continuing calibration RRFs were recalculated for the compounds identified below using the following calculation:

% Difference = 100 * (ave RRF - RRF)/ave. RRF
$RRF = (A_x)(C_{is})/(A_{is})(C_x)$

Where: ave. RRF = initial calibration average RRF
RRF = continuing calibration RRF
A_x = Area of compound, A_{is} = Area of associated internal standard
C_x = Concentration of compound, C_{is} = Concentration of internal standard

#	Standard ID	Calibration Date	Compound (Reference Internal Standard)	Average RRF (Initial)	Reported RRF (CC)	Recalculated RRF (CC)	Reported %D	Recalculated %D
1	DX52_12T S1	3/7/05	2,3,7,8-TCDF (^{13}C-2,3,7,8-TCDF)	1.15	10.2	10.2		
			2,3,7,8-TCDD (^{13}C-2,3,7,8-TCDD)	0.98	10.3	10.3		
			1,2,3,6,7,8-HxCDD (^{13}C-1,2,3,6,7,8-HxCDD)	0.88	51.6	51.6		
			1,2,3,4,6,7,8-HpCDD (^{13}C-1,2,4,6,7,8,-HpCDD)	0.99	49.5	49.5		
			OCDF (^{13}C-OCDD)	1.44	97.6	97.5		
2	DB53.058 S2	3/3/05	2,3,7,8-TCDF (^{13}C-2,3,7,8-TCDF)	1.18	10.1	10.1		
			2,3,7,8-TCDD (^{13}C-2,3,7,8-TCDD)					
			1,2,3,6,7,8-HxCDD (^{13}C-1,2,3,6,7,8-HxCDD)					
			1,2,3,4,6,7,8-HpCDD (^{13}C-1,2,4,6,7,8,-HpCDD)					
	DB53_059 S2	3/4/05	~~OCDF (^{13}C-OCDD)~~ 2,3,7,8-TCDF (^{13}C-H)	1.18	10.7	10.7		
3	DY5C_1T5 S1	4/5/05	2,3,7,8-TCDF (^{13}C-2,3,7,8-TCDF)	1.08	9.91	9.93		
			2,3,7,8-TCDD (^{13}C-2,3,7,8-TCDD)	1.02	10.8	10.8		
			1,2,3,6,7,8-HxCDD (^{13}C-1,2,3,6,7,8-HxCDD)	0.86	51.3	51.3		
			1,2,3,4,6,7,8-HpCDD (^{13}C-1,2,4,6,7,8,-HpCDD)	0.97	49.5	49.5		
			OCDF (^{13}C-OCDD)	1.25	97.2	97.0		

Comments: Refer to Routine Calibration findings worksheet for list of qualifications and associated samples when reported results do not agree within 10.0% of the recalculated results.

LDC #: 13439A2
SDG #: DPW615584

VALIDATION FINDINGS WORKSHEET
Routine Calibration Results Verification

Reviewer: 1
2nd Reviewer: 1

METHOD: HRGC/HRMS Dioxins/Dibenzofurans (EPA SW 846 Method ~~8290~~) 1613

The percent difference (%D) of the initial calibration average Relative Response Factors (RRFs) and the continuing calibration RRFs were recalculated for the compounds identified below using the following calculation:

% Difference = 100 * (ave. RRF - RRF)/ave. RRF
$RRF = (A_x)(C_{is})/(A_{is})(C_x)$

Where: ave. RRF = initial calibration average RRF
RRF = continuing calibration RRF
A_x = Area of compound, A_{is} = Area of associated internal standard
C_x = Concentration of compound, C_{is} = Concentration of internal standard

#	Standard ID	Calibration Date	Compound (Reference Internal Standard)	Average RRF (initial)	Reported RRF (CC)	Recalculated RRF (CC)	Reported %D	Recalculated %D
1	DX5B_B55	4/11/05	2,3,7,8-TCDF (^{13}C-2,3,7,8-TCDF)					
			2,3,7,8-TCDD (^{13}C-2,3,7,8-TCDD)					
			1,2,3,6,7,8-HxCDD (^{13}C-1,2,3,6,7,8-HxCDD)					
			1,2,3,4,6,7,8-HpCDD (^{13}C-1,2,4,6,7,8,-HpCDD)					
			OCDF (^{13}C-OCDD)	~~1.51~~	~~94~~	94		
2	DX52_B485	3/29/05	2,3,7,8-TCDF (^{13}C-2,3,7,8-TCDF)	1.15	9.93	9.97		
			2,3,7,8-TCDD (^{13}C-2,3,7,8-TCDD)	0.98	10.4	10.5		
			1,2,3,6,7,8-HxCDD (^{13}C-1,2,3,6,7,8-HxCDD)	0.88	48.8	48.6		
			1,2,3,4,6,7,8-HpCDD (^{13}C-1,2,4,6,7,8,-HpCDD)	0.99	48.9	49.2		
			OCDF (^{13}C-OCDD)	1.44	95.4	95.1		
3	DX5C_B745	4/1/05	2,3,7,8-TCDF (^{13}C-2,3,7,8-TCDF)	1.08	10.5	10.5		
			2,3,7,8-TCDD (^{13}C-2,3,7,8-TCDD)	1.02	10.5	10.4		
			1,2,3,6,7,8-HxCDD (^{13}C-1,2,3,6,7,8-HxCDD)	0.86	49.6	49.7		
			1,2,3,4,6,7,8-HpCDD (^{13}C-1,2,4,6,7,8,-HpCDD)	0.97	49.8	49.6		
			OCDF (^{13}C-OCDD)	1.25	97.1	96.6		

Comments: Refer to Routine Calibration findings worksheet for list of qualifications and associated samples when reported results do not agree within 10.0% of the recalculated results.

LDC #: 13439A21
SDG #: DPWF15584

VALIDATION FINDINGS WORKSHEET
Laboratory Control Sample Results Verification

Page: 1 of 1
Reviewer: 9
2nd Reviewer: 8

METHOD: HRGC/HRMS Dioxins/Dibenzofurans (EPA SW 846 Method ~~8290~~) (613)

The percent recoveries (%R) and Relative Percent Difference (RPD) of the laboratoy control sample and laboratory control sample duplicate (if applicable) were recalculated for the compounds identified below using the following calculation:

% Recovery = 100 * SSC/SA Where: SSC = Spiked sample concentration; SA = Spike added

RPD = | LCS - LCSD | * 2/(LCS + LCSD) LCS = Laboraotry control sample percent recovery LCSD = Laboratory control sample duplicate percent recovery

LCS ID: & WG15060-102

Compound	Spike Added (ng/mL)		Spiked Sample Concentration (ng/mL)		LCS Percent Recovery		LCSD Percent Recovery		LCS/LCSD RPD	
	LCS	LCSD	LCS	LCSD	Reported	Recalc.	Reported	Recalc.	Reported	Recalculated
2,3,7,8-TCDD	10	NA	9.57	NA	95.7	95.7				
1,2,3,7,8-PeCDD	50	↓	47.6	↓	95.2	95.2				
1,2,3,4,7,8-HxCDD	50	↓	50.0	↓	100	100				
1,2,3,6,7,8-HxCDD										
1,2,3,7,8,9-HxCDD										
1,2,3,4,6,7,8-HpCDD										
OCDD										
2,3,7,8-TCDF										
1,2,3,7,8-PeCDF										
2,3,4,7,8-PeCDF										
1,2,3,4,7,8-HxCDF										
1,2,3,6,7,8-HxCDF										
2,3,4,6,7,8-HxCDF										
1,2,3,7,8,9-HxCDF										
1,2,3,4,6,7,8-HpCDF										
1,2,3,4,7,8,9-HpCDF	50.0	NA	48.5	NA	96.9	97				
OCDF	100	↓	93.3	↓	93.3	93.3				

Comments: Refer to Laboratory Control Sample findings worksheet for list of qualifications and associated samples when reported results do not agree within 10.0% of the recalculated results.

Ions Monitored for HRGC/HRMS Analysis of PCDDs/PCDFs

Descriptor	Accurate mass[a]	Ion ID	Elemental Composition	Analyte	Descriptor	Accurate Mass[a]	Ion ID	Elemental Composition	Analyte
1	303.9016	M	$C_{12}H_4{}^{35}Cl_4O$	TCDF	4	407.7818	M+2	$C_{12}H^{35}Cl_6{}^{37}ClO$	HpCDF
	305.8987	M+2	$C_{12}H_4{}^{35}Cl_3{}^{37}C10$	TCDF		409.7788	M+4	$C_{12}H^{35}Cl_5{}^{37}Cl_2O$	HpCDF
	315.9419	M	$^{13}C_{12}H_4{}^{35}Cl_4O$	TCDF (S)		417.8250	M	$^{13}C_{12}H^{35}Cl_7O$	HpCDF (S)
	317.9389	M+2	$^{13}C_{12}H_4{}^{35}Cl_3{}^{37}ClO$	TCDF (S)		419.8220	M+2	$^{13}C_{12}H^{35}Cl_6{}^{37}ClO$	HpCDF
	319.8965	M	$C_{12}H_4{}^{35}Cl_4O_2$	TCDD		423.7767	M+2	$C_{12}H^{35}Cl_6{}^{37}ClO_2$	HpCDD
	321.8936	M+2	$C_{12}H_4{}^{35}Cl_3{}^{37}C10_2$	TCDD		425.7737	M+4	$C_{12}H^{35}Cl_5{}^{37}Cl_2O_2$	HpCDD
	331.9368	M	$^{13}C_{12}H_4{}^{35}Cl_4O_2$	TCDD (S)		435.8169	M+2	$^{13}C_{12}H^{35}Cl_6{}^{37}ClO_2$	HpCDD (S)
	333.9338	M+2	$^{13}C_{12}H_4{}^{35}Cl_3{}^{37}ClO_2$	TCDD (S)		437.8140	M+4	$^{13}C_{12}H^{35}Cl_5{}^{37}Cl_2O_2$	HpCDD (S)
	375.8364	M+2	$C_{12}H_4{}^{35}Cl_5{}^{37}ClO$	HxCDPE		479.7165	M+4	$C_{12}H^{35}Cl_7{}^{37}Cl_2O$	NCDPE
	[354.9792]	LOCK	C_9F_{13}	PFK		[430.9728]	LOCK	C_9F_{17}	PFK
2	339.8597	M+2	$C_{12}H_3{}^{35}Cl_4{}^{37}ClO$	PeCDF	5	441.7428	M+2	$C_{12}{}^{35}Cl_7{}^{37}ClO$	OCDF
	341.8567	M+4	$C_{12}H_3{}^{35}Cl_3{}^{37}Cl_2O$	PeCDF		443.7399	M+4	$C_{12}{}^{35}Cl_6{}^{37}Cl_2O$	OCDF
	351.9000	M+2	$^{13}C_{12}H_3{}^{35}Cl_4{}^{37}C10$	PeCDF (S)		457.7377	M+2	$C_{12}{}^{35}Cl_7{}^{37}ClO_2$	OCDD
	353.8970	M+4	$^{13}C_{12}H_3{}^{35}Cl_3{}^{37}Cl_2O$	PeCDF (S)		459.7348	M+4	$C_{12}{}^{35}Cl_6{}^{37}Cl_2O_2$	OCDD
	355.8546	M+2	$C_{12}H_3{}^{35}Cl_4{}^{37}ClO_2$	PeCDD		469.7780	M+2	$^{13}C_{12}{}^{35}Cl_7{}^{37}ClO_2$	OCDD (S)
	357.8516	M+4	$C_{12}H_3{}^{35}Cl_3{}^{37}Cl_2O_2$	PeCDD		471.7750	M+4	$^{13}C_{12}{}^{35}Cl_6{}^{37}Cl_2O_2$	OCDD (S)
	367.8949	M+2	$^{13}C_{12}H_3{}^{35}Cl_4{}^{37}ClO_2$	PeCDD (S)		513.6775	M+4	$C_{12}{}^{35}Cl_8{}^{37}Cl_2O$	DCDPE
	369.8919	M+4	$^{13}C_{12}H_3{}^{35}Cl_3{}^{37}Cl_2O_2$	PeCDD (S)		[422.9278]	LOCK	$C_{10}F_{17}$	PFK
	409.7974	M+2	$C_{12}H_3{}^{35}Cl_6{}^{37}ClO$	HpCDPE					
	[354.9792]	LOCK	C_9F_{13}	PFK					
3	373.8208	M+2	$C_{12}H_2{}^{35}Cl_5{}^{37}ClO$	HxCDF					
	375.8178	M+4	$C_{12}H_2{}^{35}Cl_4{}^{37}Cl_2O$	HxCDF					
	383.8639	M	$^{13}C_{12}H_2{}^{35}Cl_6O$	HxCDF (S)					
	385.8610	M+2	$^{13}C_{12}H_2{}^{35}Cl_5{}^{37}ClO$	HxCDF (S)					
	389.8156	M+2	$C_{12}H_2{}^{35}Cl_5{}^{37}ClO_2$	HxCDD					
	391.8127	M+4	$C_{12}H_2{}^{35}Cl_4{}^{37}Cl_2O_2$	HxCDD					
	401.8559	M+2	$^{13}C_{12}H_2{}^{35}Cl_5{}^{37}ClO_2$	HxCDD (S)					
	403.8529	M+4	$^{13}C_{12}H_2{}^{35}Cl_4{}^{37}Cl_2O_2$	HxCDD (S)					
	445.7555	M+4	$C_{12}H_2{}^{35}Cl_6{}^{37}Cl_2O$	OCDPE					
	[430.9728]	LOCK	C_9F_{17}	PFK					

(a) The following nuclidic masses were used:

H = 1.007825	O = 15.994915
C = 12.000000	^{35}Cl = 34.968853
^{13}C = 13.003355	^{37}Cl = 36.965903
F = 18.9984	

S = internal/recovery standard

LDC #: 13439A21
SDG #: DPW615584

VALIDATION FINDINGS WORKSHEET
Sample Calculation Verification

Page: 1 of 1
Reviewer: 9
2nd reviewer: M

METHOD: HRGC/HRMS Dioxins/Dibenzofurans (EPA SW 846 Method ~~8290~~ 1613)

Y N N/A Were all reported results recalculated and verified for all level IV samples?
Y N N/A Were all recalculated results for detected target compounds agree within 10.0% of the reported results?

Concentration = $\frac{(A_x)(I_s)(DF)}{(A_{is})(RRF)(V_o)(\%S)}$

A_x = Area of the characteristic ion (EICP) for the compound to be measured

A_{is} = Area of the characteristic ion (EICP) for the specific internal standard

I_s = Amount of internal standard added in nanograms (ng)

V_o = Volume or weight of sample extract in milliliters (ml) or grams (g).

RRF = Relative Response Factor (average) from the initial calibration

Df = Dilution Factor.

%S = Percent solids, applicable to soil and solid matrices only.

Example:

Sample I.D. 1, #A:

Conc. = $\frac{(8.28e+04)(2000)(1)}{(1.24e+07)(1.02)(10.4)(\ )}$

= 1.259 ng/g

#	Sample ID	Compound	Reported Concentration ( )	Calculated Concentration ( )	Qualification

APPENDIX E-2: SEDIMENT TOXICITY TESTING DATA VALIDATION REPORTS

DMR-0506

DMR

Dinnel Marine Resources

QUALITY ASSURANCE EVALUATIONS OF AMPHIPOD AND POLYCHAETE BIOASSAYS OF LOWER DUWAMISH RIVER SEDIMENTS

Round 2

Draft Final Report

29 June 2005

For

Windward Environmental LLC
Seattle, Washington

Prepared By

Dinnel Marine Resources
Anacortes, WA

Table of Contents

Page

1.0 Introduction 1

2.0 Quality Assurance Audit Results 1
2.1 Laboratory Protocols and SOPs 1
2.2 Test-in-Progress Audits 2
2.3 Initial Data Evaluations 2
2.4 Final QA Evaluation of Overall Data Quality and Usability 2
2.4.1 Chain of Custody and Sample Holding 2
2.4.2 *Eohaustorius* Test 725-7 3
2.4.3 *Neanthes* Test 725-8 5

3.0 References 8

List of Tables

Table 1. PSEP (1995) and PSDDA (1994) water quality assurance parameters for the *Eohaustorius* and *Neanthes* tests 3

Table 2. Summary of *Eohaustorius* Test 725-7 4

Table 3. Summary of *Neanthes* Test 725-8 7

Appendices

1. Northwestern Aquatic Sciences' State of Washington Accreditation Certificate and Scope of Accreditation

2. Dinnel Marine Resources' Letter to Northwestern Aquatic Sciences Detailing Project-Specific Testing Requirements

3. Results of the Test-in-Progress Audits of Northwestern Aquatic Sciences' Round 2 Tests

4. Comments to Northwestern Aquatic Sciences by Dinnel Marine Resources following DMR's QA Review of NAS' Two Round 2 Data Reports and NAS' Response

1.0 INTRODUCTION

Northwestern Aquatic Sciences (NAS), Newport, Oregon was contracted by Windward Environmental LLC to conduct amphipod and polychaete bioassays of sediments collected from the Lower Duwamish Waterway in March 2005. NAS is a State of Washington accredited laboratory (Lab accreditation number C042, expiration: 30 September 2005) and is certified to perform amphipod and polychaete tests using the Puget Sound Estuary Program (PSEP 1995) protocols. A copy of NAS' accreditation certificate and Scope of Accreditation appears in Appendix 1.

This report summarizes the Quality Assurance/Quality Control (QA/QC) evaluations of the second of two rounds of amphipod (*Eohaustorius estuarius*) and polychaete (*Neanthes arenaceodentata*) bioassays of sediments collected from the Lower Duwamish Waterway in March 2005. Testing for Round 2 was initiated on 29 April 2005. Results of QA/QC evaluations of the Round 1 testing can be found in DMR (2005).

The QA steps taken to ensure high quality data and maximum data completeness before, during and after this round of testing are described in this report. Major QA tasks by Dinnel Marine Resources (DMR) included the following:

I. A pre-test review of NAS' Standard Operating Procedures (SOPs)
- Pre-test coordination with NAS and Windward Environmental
- An initial evaluation of all data for completeness, correct data entries, and accurate transcription to electronic formats
- A final QA evaluation of overall data quality and usability (this report)

2.0 QUALITY ASSURANCE AUDIT RESULTS

2.1 LABORATORY PROTOCOLS AND SOPs

The PSEP protocols (PSEP 1995) for conducting amphipod and polychaete bioassays and NAS' laboratory SOPs (NAS-XXX-EE4, Rev. 3 and NAS-XXX-NA4, Rev. 4) for the *Eohaustorius* and *Neanthes* tests were reviewed in detail prior to the initiation of testing. NAS' SOPs were in excellent condition, and no changes were needed other than the addition of some project-specific provisions requested by Windward Environmental. A letter detailing the project-specific test provisions was sent to NAS on 23 February 2005 (Appendix 2).

2.2 TEST-IN-PROGRESS AUDITS

An unannounced test-in-progress audit of both Round 2 tests was conducted by Dr. Paul Dinnel on 3 May 2005. All PSEP and project-specific protocol provisions were being followed without any apparent deviations. The only water quality deviation noted was that a few test chamber temperatures were slightly elevated in the *Neanthes* test on Day 3. Completed test-in-progress audit checklists for the amphipod and polychaete bioassays appear in Appendix 3.

2.3 INITIAL DATA EVALUATIONS

All raw data forms and electronic database files were reviewed for completeness and fidelity of transcription to electronic formats. A 100% check was made of all data entered into NAS' internal electronic database. All errors, omissions, clarifications, or changes needed to NAS' draft report were documented and communicated to NAS. A copy of the initial data evaluation report to NAS appears in Appendix 4. All needed corrections to the data report were made by NAS and subsequently verified by DMR (see NAS response letter in Appendix 4).

PSEP (1995) water quality assurance parameters were primarily used for QA assessments of the sediment tests. Where specific values were lacking in PSEP, PSDDA (1994) values were used. These values are summarized in Table 1 for the *Eohaustorius* and *Neanthes* tests. Note that these protocol provisions have occasionally been modified via clarification and issue papers prepared by the U.S. Army Corps of Engineers (USACOE) and the other relevant sediment management agencies (USACOE 1991-2005).

2.4 FINAL QA EVALUATION OF OVERALL DATA QUALITY AND USABILITY

Following corrections to the data reports by NAS personnel, a 100% check was made to verify each correction. Following this, an overall evaluation of data completeness and quality was accomplished (this report). Conclusions regarding data completeness and quality follow below.

2.4.1 Chain of Custody and Sample Holding

All chain of custody protocols were properly observed in transfers of sediment samples from Windward Environmental to NAS. The test and reference sediments were stored at 4° C in a locked cold room until testing was initiated. If samples contained significant headspaces, these head spaces were purged of air with nitrogen gas prior to storage.

Table 1. PSEP (1995) and PSDDA (1994) water quality assurance parameters for the *Eohaustorius* and *Neanthes* tests, as occasionally modified by USACOE clarification and issue papers.

Parameter	*Eohaustorius*	*Neanthes*
Temperature, °C	14 – 16	19 - 21
Salinity, ppt	Ambient Interstitial*	28 – 35 (PSDDA) 26 – 30 (PSEP)
Dissolved oxygen, mg/liter	>4.0	>4.5
pH	7 – 9	7 - 9
Total Ammonia, mg/liter	60**	≤10*** 10-20***
Total Sulfide, mg/liter	**3.4*** **	**0.5**[#]

* A project-specific salinity of 28 ± 1 ppt was chosen for the *Eohaustorius* tests
** U.S. EPA No Effect Concentration (EPA 1994) (Discussed in Barton 2002)
*** DMMP No effects (≤10) and possible minor effects (10-20) thresholds (Kendall and Barton 2004)
[#] Based on values for *Rhepoxynius* and *Ampelisca*

2.4.2 *Eohaustorius* Test 725-7

1. A *Eohaustorius estuarius* bioassay was conducted on 21 Lower Duwamish River sediment samples, plus 3 reference sediments. A negative control, and two positive (toxic) controls with cadmium and ammonia were run concurrently with the Lower Duwamish test sediments.

2. Testing was initiated within 53 days following sediment collection, which was within the 8 week limit specified in Windward Environmental's Quality Assurance Project Plan (QAPP) (Windward 2005).

3. This test was completed with no protocol deviations and two water quality deviations. The two water quality deviations were: 1) overlying salinities in some test chambers were outside the project-specified salinity of 28 ± 1 ppt by up to 2 ppt. Some of the chamber salinities were up to 0.5 ppt low due to low initial interstitial salinities and some up to 2.0 ppt high due to evaporation during the latter half of the test. These

salinity deviations should not have significantly affected the results of this test. 2) Temperature and pH measurements were inadvertently omitted in one test chamber on Day 8, resulting a a few missing water quality data points.

4. The reference toxicant 50% Lethal Concentration (LC50) for the cadmium test was 2.09 mg/liter. This result was within NAS' control chart warning limits of 0.54 – 5.86 mg Cd/liter. The ammonia LC50 was 163 mg/liter total ammonia. This result was within NAS' control chart warning limits of 64.7 – 224 mg/liter total ammonia. The ammonia test control survival was 85 % (100 % survival in one replicate, 70 % in the other), which is slightly below the protocol-specified 90 %. Since the LC50 in the ammonia test was essentially in the middle of the control chart warning limits, the slightly low control survival does not appear to be a significant issue.

5. Negative control mean mortality (0 %) was <10% for this test and thus acceptable by present PSEP and PSDDA criteria. The mean mortality responses for the reference sediments ranged from 2.0 to 24.0 %, which were within the PSDDA limit of ≤ 25 %.

6. The maximum ammonia concentration measured in the overlying water during this test in any one sample was 19.3 mg/liter total ammonia. This is well below the EPA NOEC threshold concentration of 60 mg/liter and well below NAS' reference toxicant test LC50 of 163 mg/liter. Thus, ammonia concentrations were not high enough to cause significant stresses in this test.

7. No sulfides were detected in any of the test sample overlying waters (detection limit 0.02 mg/liter). Thus, sulfide levels in this test were not high enough to interfere.

8. Replication was five-fold for all samples as specified by PSDDA.

9. Data completeness for the 21 (plus 3 control) samples tested with *Eohaustorius* was >99 %.

10. **Final QA determination:** All data are of excellent quality and fully usable for any purpose.

Table 2. Summary of *Eohaustorius* Test 725-7.

<u>*Eohaustorius estuarius*, 29 April to 9 May 2005:</u>
Number of test samples, including reference sediments: 24
Sediment holding time <8 weeks?: Yes
Protocol deviations?: No
Average negative control mortality: 0 %
Average reference sediment mortality ≤ 25 % ?: Yes
Reference toxicant LC50: 2.09 mg/liter cadmium and 163 mg/liter total ammonia. These values are within NAS' control chart warning limits.
Water quality parameter deviations: Yes. Salinities in some test chambers were up to 0.5 ppt low or 2.0 ppt high during some portion of the test and a temperature and

pH measurement was missed in one chamber on one day. These water quality deviations are considered minor and should not have significantly affected the test results.

Ammonia and sulfide concentrations < critical limits?: Yes, for both ammonia and sulfide.

QA reviewer conclusion: All data are of excellent quality and fully usable for any purpose.

2.4.3 *Neanthes* Test 725-8

1. A *Neanthes arenaceodentata* bioassay was conducted on 21 Lower Duwamish River sediment samples, plus 3 reference sediments. A negative control, and two positive (toxic) controls with cadmium and ammonia were run concurrently with the Lower Duwamish test sediments.

2. Testing was initiated within 53 days following sediment collection, which was within the 8 week limit specified in Windward Environmental's Quality Assurance Project Plan (QAPP) (Windward 2005).

3. This test was completed with two protocol deviations and three water quality deviations. The two protocol deviations were:

   I. On two test days (Day 9 and Day16), airflow was off to some beakers. Minimum measured dissolved oxygen (DO) on Day 9 was 5.2 mg/liter, which exceeded the required minimum of 4.5 mg/liter (= 60 % saturation at 20 °C and 28 ppt salinity). Day 16 DO concentrations dropped below the required minimum in 11 test beakers by as much a 1.0 mg/liter. Two of these beakers were water quality beakers, leaving 9 test beakers. Mean survival at test termination in these 9 test beakers with the transient low DO (97.8 % -- 8 beakers had complete survival and 1 beaker had 1 mortality) was similar to the average survival for all test and reference samples combined (99.0 %). Likewise, the average individual growth rate for the 9 low DO beakers (0.88 mg/day/worm) was similar to the average for all test and reference sediments combined (0.87 mg/day/worm). Thus, it is unlikely that the transient low DOs on Day 16 significantly affected the results of this test.

   II. Six polychaetes were inadvertently added to beaker #18 (replicate 1, sample LDW-SS122-010). This means that 6 worms had to compete for the available food instead of the usual 5. This could have adversely affected the growth rate in that one replicate. The growth rate in that one replicate was the lowest of the 5 sample replicates (0.70 vs. a range of 0.76 to 1.06 mg/day/worm for the other 4 replicates). Thus, it is probably reasonable to exclude that one replicate and use the remaining 4 replicates to calculate the sample averages for the growth

endpoint (inclusion of this sample for the survival endpoint should be no problem – survival was 100 %).

The three water quality deviations were:

I. DO concentrations were up to 1.0 mg/liter low on Day 16 in 11 beakers. This issue is discussed under protocol deviations (A) above.

II. Three overlying water salinity measurements on Day 18, and one on Day 20 exceeded the PSEP protocol-specified limit of 28 ± 2 ppt by 0.5 ppt. These minor salinity deviations should not have affected the test results (indeed, PSDDA allows a salinity range of 28-35 ppt).

III. Temperature on Day 3 exceeded the protocol-specified 20.0 ± 1.0 °C by 0.8 °C. This transient temperature deviation should not have significantly affected the test results.

4. The reference toxicant 50% Lethal Concentration (LC50) for the cadmium test was 8.84 mg/liter. This result was within NAS' control chart warning limits of 4.45 – 11.2 mg Cd/liter. The ammonia LC50 was 226 mg/liter total ammonia. This result was below NAS' control chart warning limits of 287 - 456 mg/liter total ammonia. However, NAS' ammonia control chart for *Neanthes* only had 7 data points; thus, variability may be somewhat greater than presently indicated. In addition, the mean control survival in the ammonia reference toxicant test was only 85 % (100 % and 70 % for the two replicates), which was less than the protocol-specified 90%. Neither the low ammonia test LC50 or the slightly low survival in the ammonia test controls are deemed significant since the test negative control performance was excellent (100 % survival and an individual growth rate of 1.11 mg/day/worm).

5. Negative control mean mortality (0 %) was <10% for this test and thus acceptable by present PSEP and PSDDA criteria. The control mean individual growth rate was 1.11 mg/day/worm, which is substantially greater than the 0.72 mg/day/worm recommended by PSDDA/PSEP. The mean mortality responses for the 3 reference sediments ranged from 0 to 4.0 %, which was within the PSDDA limit of ≤ 25 %. The mean individual growth rates for the 3 reference sediments were 98.2, 97.3 and 108 % of the negative control growth rate, which were all ≥ 80 % of the negative control growth.

6. The maximum ammonia concentration measured in the overlying water during the test in any one sample was 8.6 mg/liter total ammonia. This is below the DMMP no effects threshold concentration of 10 mg/liter and well below NAS' reference toxicant test LC50 of 183 mg/liter. Thus, ammonia concentrations were not high enough to cause significant stresses in this test.

7. No sulfides were detected in any of the test sample overlying waters (detection limit 0.02 mg/liter). Thus, sulfide levels in this test were not high enough to interfere.

8. Replication was five-fold for all samples as specified by PSDDA, except for sample LDW-SS122-010. Replicate 1 for this sample should be excluded for the growth endpoint since 6 worms were inadvertently added to this replicate.

9. Data completeness for the 21 (plus 3 control) samples tested with *Neanthes* was >99 %.

10. **Final QA determination:** All data are of good quality and fully usable for any purpose, except that replicate 1 of sample LDW-SS122-010 should be excluded for the growth endpoint (but can be used for the survival endpoint).

Table 3. Summary of *Neanthes* Test 725-8.

<u>*Neanthes arenaceodentata*, 29 April – 19 May 2005:</u>

Number of test samples, including reference sediments: 24

Sediment holding time <8 weeks?: Yes

Protocol deviations?: Yes. Some aeration was not working on Days 9 and 16, resulting in transient (but probably insignificant) low DOs in 9 test beakers (and 2 water quality beakers) on Day 16. Also, 6 worms were inadvertently added to one beaker at test initiation.

Average negative control mortality: 0 %

Average control individual growth rate ≥ 0.72 mg/day/worm?: Yes

Average reference sediment mortality ≤ 10 %?: Yes

Average reference sediment individual growth rates ≥ 80 % compared to the negative control?: Yes

Reference toxicant LC50: 8.84 mg/liter cadmium and 226 mg/liter total ammonia. The cadmium LC50 is within control chart warning limits but the ammonia response is lower than the control chart lower limit; however, the ammonia control chart only had seven data points at the time.

Water quality parameter deviations: Salinity in four beakers was 0.5 ppt above the protocol-specified range on Days 18 or 20. These minor salinity deviations should not have significantly affected the results of the test. Also, temperature exceeded the specified limit of 21 °C by 0.8 °C on Day 3. This transient temperature deviation should not have adversely affected the test results.

Ammonia and sulfide concentrations < critical limits?: Yes, for both ammonia and sulfide.

QA reviewer conclusion: All data are of good quality and fully usable for any purpose, except that replicate 1 of sample LDW-SS122-010 should be excluded for the growth endpoint (but can be used for the survival endpoint).

3.0 REFERENCES

Barton, J. 2002. Ammonia and amphipod toxicity testing. Dredged Material Management Program (DMMP) clarification Paper dated 6/15/02. U.S. Army Corps of Engineers, Seattle District, Seattle, WA. 6 pp.

DMR (Dinnel Marine Resources). 2005. Quality assurance evaluations of amphipod and polychaete bioassays of Lower Duwamish River sediments. Final Report for Windward Environmental LLC. DMR-0504:14 pp. + appendices.

EPA (U.S. Environmental Protection Agency). 1994. Methods for assessing the toxicity of sediment-associated contaminants with estuarine amphipods. EPA/600/R-94/025. Pp 80-82.

Kendall, D. and J. Barton. 2004. Ammonia and sulfide guidance relative to *Neanthes* growth bioassay. Dredged Material Management Program (DMMP) clarification paper dated 6/15/04. U.S. Army Corps of Engineers, Seattle District, Seattle, WA. 9 pp.

PSDDA (Puget Sound Dredged Disposal Analysis). 1994. Dredged Analysis Information System (DAIS), Version 4.4. Electronic database from Seattle District, U. S. Army Corps of Engineers.

PSEP (Puget Sound Estuary Program). 1995. Recommended guidelines for conducting laboratory bioassays on Puget Sound Sediments. Final Report by PTI Environmental Services for U. S. Environmental Protection Agency, Region 10, Office of Puget Sound, Seattle, WA.

USACOE (U.S. Army Corps of Engineers). 1991-2005. Periodic Clarification and Issue papers issued by the U.S. Army Corps of Engineers, Seattle District, Dredged Materials Management Office (DMMO) from 1991 through 2005 (See DMMO website).

Windward (Windward Environmental LLC). 2005. Quality assurance project plan: Surface sediment sampling for chemical analyses and toxicity testing of the Lower Duwamish Waterway. Final Report for the U.S. Environmental Protection Agency, Region 10, Seattle, WA and the Washington Department of Ecology, Northwest Office, Bellevue, WA. 89 pp. + maps.

Appendix 1

Northwestern Aquatic Sciences' State of Washington Accreditation Certificate and Scope of Accreditation

The State of Washington Department of Ecology

This is to certify that

Northwestern Aquatic Sciences
Newport, OR

has complied with provisions set forth in Chapter 173-50 WAC and is hereby recognized by the Department of Ecology as an ACCREDITED LABORATORY for the analytical parameters listed on the accompanying Scope of Accreditation. This certificate is effective October 1, 2004, and shall expire September 30, 2005.

Witnessed under my hand on October 7, 2004.

Perry F. Brake, Chemist
Lab Accreditation Section Manager

Lab Accreditation Number
C042

Scope of Accreditation

Northwestern Aquatic Sciences

Newport, OR

is accredited by the State of Washington Department of Ecology to perform analyses for the parameters listed below using the analytical methods indicated. This Scope of Accreditation may apply to any of the following matrix types: non-potable water, drinking water, solid and chemical materials, and air and emissions. Accreditation for all parameters is final unless indicated otherwise in a note. Accreditation is for the latest version of a method unless otherwise specified in a note. EPA refers to the U.S. Environmental Protection Agency. SM refers to American Public Health Association's publication, Standard Methods for the Examination of Water and Wastewater, 18th, 19th or 20th Edition, unless otherwise noted. ASTM stands for the American Society for Testing and Materials. PSEP stands for Puget Sound Estuary Program. Other references are detailed in the notes section.

Matrix Type/Parameter Name	Reference	Method Number	Notes
Non-potable Water			
Ampelisca abdita	ASTM	E 1367	1
Ampelisca abdita	EPA	100.4	13
Ampelisca abdita	PSEP	1995	2
Atherinops affinis (West Coast)	EPA	1006.0	3,4
Bioaccumulation, Benthic Invert	ASTM	E 1688	5
Bioconcentration, Fish, Mollusks	ASTM	E 1022	6
Ceriodaphnia dubia	EPA	1002.0	4,7
Ceriodaphnia dubia	EPA	2002.0	4,8
Chironomus tentans	EPA	100.5	14
Chironomus tentans	ASTM	E 1706	9
Chironomus tentans	EPA	100.2	14
Crassostrea gigas	PSEP	1995	2
Crassostrea gigas (West Coast)	EPA	1005.0	3,4
Cyprinodon variegatus	EPA	1004.0	4,10
Cyprinodon variegatus	EPA	2004.0	4,8
Dangerous Waste Static Salmonid	WDOE	80-12 Part A	11
Daphnia magna	EPA	2021.0	4,8
Daphnia pulex	EPA	2021.0	4,8

Matrix Type/Parameter Name	Reference	Method Number	Notes
Dendraster excentricus	ASTM	E 1563	12
Dendraster excentricus	PSEP	1995	2
Dendraster excentricus (West Coast)	EPA	1008.0	3,4
Eohaustorius estuarius	ASTM	E 1367	1
Eohaustorius estuarius	PSEP	1995	2
Eohaustorius estuarius	EPA	100.4	13
Holmesimysis costata	EPA	821-R-02-012	4,8
Holmesimysis costata (West Coast)	EPA	1007.0	3,4
Hyalella azteca	EPA	100.1	14
Hyalella azteca	ASTM	E 1706	9
Hyalella azteca	EPA	100.4	14
Leptocheirus plumulosus	ASTM	E 1367	1
Leptocheirus plumulosus	EPA	100.4	13
Menidia beryllina	EPA	1006.0	4,10
Menidia spp.	EPA	2006.0	4,8
Mysidopsis bahia	EPA	1007.0	4,10
Mysidopsis bahia	EPA	2007.0	8
Mytilus spp.	PSEP	1995	2
Mytilus spp. (West Coast)	EPA	1005.0	3,4
Neanthes arenaceodentata	PSEP	1995	2
Salvelinus fontinalis	EPA	2019.0	4,8
Oncorhynchus mykiss	EPA	2019.0	4,8
Pimephales promelas, Chronic	EPA	1000.0	4,7
Pimephales promelas	EPA	2000.0	4,8
Rhepoxynius abronius	ASTM	E 1367	1
Rhepoxynius abronius	PSEP	1995	2
Rhepoxynius abronius	EPA	100.4	13
Strongylocentrotus purpuratus	ASTM	E 1563	12
Strongylocentrotus purpuratus (WC)	EPA	1008.0	3,4
Strongylocentrotus purpuratus (WC)	EPA	600/R-95/136	3,4

Matrix Type/Parameter Name	Reference	Method Number	Notes
Strongylocentrotus spp.	PSEP	1995	2

Accredited Parameter Note Detail

(1) ASTM. "Standard Guide for Conducting 10-day Static Sediment Toxicity Tests with Marine and Estuarine Amphipods," E 1367-99. (2) Puget Sound Estuary Program, "Recommended Guidelines for Conducting Laboratory Bioassays on Puget Sound Sediments," July 1995. (3) USEPA. "Short-term Methods for Estimating the Chronic Toxicity of Effluents and Receiving Waters to West Coast Marine and Estuarine Organisms," EPA 600/R-95/136 (Third edition) August 1995. (4) Meets requirements of "Laboratory Guidance and Whole Effluent Toxicity Test Review Criteria," Washington Department of Ecology, Publication Number WQ-R-80, Revised December 2001. (5) ASTM. "Standard Guide for Determination of the Bioaccumulation of Sediment Associated Contaminants by Benthic Invertebrates," E 1688-00a. (6) ASTM. "Practice for Conducting Bioconcentration Tests with Fishes and Saltwater Bivalve Mollusks," E 1022-94. (7) USEPA. "Short-term Methods for Estimating the Chronic Toxicity of Effluents and Receiving Waters to Freshwater Organisms," EPA-821-R-02-013 (Fourth Edition) October 2002. (8) USEPA. "Methods for Measuring the Acute Toxicity of Effluents and Receiving Waters to Freshwater and Marine Organisms," EPA-821-R-02-012 (Fifth Edition) October 2002. (9) ASTM. "Test Method for Measuring the Toxicity of Sediment-associated Contaminants with Freshwater Invertebrates," E 1706-00. (10) USEPA. "Short-term Methods for Measuring the Chronic Toxicity of Effluents and Receiving Waters to Marine and Estuarine Organisms," EPA-821-R-02-014 (Fourth Edition) October 2002. (11) Washington Department of Ecology. "Biological Testing Methods," WDOE 80-12 Revised April 1997. (12) ASTM. "Guide for Conducting Static Acute Toxicity Tests with Echinoid Embryos," E 1563-98. (13) USEPA. "Methods for Assessing the Toxicity of Sediment-associated Contaminants with Estuarine and Marine Amphipods." EPA 600/R-94/025 June 1994. (14) USEPA. "Methods for Measuring the Toxicity and Bioaccumulation of Sediment-associated Contaminants with Freshwater Invertebrates." EPA 600/R-99/064 (Second Edition) March 2000.

Authentication Signature

Perry Brake -- Section Manager, Washington State Department of Ecology -- Lab Accreditation Section

Appendix 2

Dinnel Marine Resources' Letter to Northwestern Aquatic Sciences Detailing Project-Specific Testing Requirements

DMR

Dinnel Marine Resources
1519 13th St.
Anacortes, WA 98221
360-299-8468

23 February 2005

Ms. Michelle Redmond
Northwestern Aquatic Sciences
PO Box 1437
Newport, OR 97365

Dear Michelle:

Thank you for providing copies of NAS' protocols for the *Eohaustorius estuarius* and *Neanthes arenaceodentata* bioassay tests to be used to assay Lower Duwamish Waterway Group sediment samples. I found the protocols to be very well written and in conformance with PSEP/SMS guidelines developed for these tests (PSEP 1995, with periodic modifications by the Dredged Material Management Program). I see no need to modify anything in your current protocols for these two test species.

As noted in both of your protocols, there are a number of variables that can change from client to client depending on their testing needs. I take this opportunity to highlight these project-specific items and encourage you to append this letter to your working protocols being used for the Duwamish Waterway testing. Project-specific testing requirements noted here are specified by the client, Windward Environmnetal LLC (Windward 2005).

For the *Eohaustorius estuarius* testing:

1. The salinity of the dilution water is specified as "...at ambient interstitial salinity for the sediment collection site for the *E. estuarius* test." Windward (2005) does not specify a salinity for this test. Thus, the question is still open as to what salinity will be used for testing. Since most amphipod bioassays use 28 ppt, I suggest that the dilution salinity for the *E. estuarius* be 28 ppt, unless the ambient salinity at the amphipod collection site is markedly different from this (see NAS protocol sections 4 and 7.5).

2. For the Duwamish testing, please note that interstitial sediment sulfide will be measured in all sediment samples at test initiation (see table in protocol section 7.7).

3. Windward has requested that the reference toxicant be cadmium chloride (see protocol section 7.10).

4. The reference sediment performance criterion for this project is "mean percent mortality in the reference sediment must be ≤25 % over the negative control (see protocol section 7.9).

5. The 8-week sediment holding time is in effect for this project. Sediment samples must be stored in the dark at 4 ± 2 °C with no headspace or headspace filled with nitrogen gas (see protocol section 2.6).

6. Any ammonia purging must be authorized by Windward (see protocol section 7.2).

For the *Neanthes arenaceodentata* testing:

1. The 8-week sediment holding time is in effect for this project. Sediment samples must be stored in the dark at 4 ± 2 °C with no headspace or headspace filled with nitrogen gas (see protocol section 2.6 and 3).

2. Any ammonia purging must be authorized by Windward (see section 7.2).

3. For the Duwamish testing, please note that interstitial sediment sulfides will be measured at test initiation (see protocol table in section 7.7).

4. Windward has requested that the reference toxicant be cadmium chloride (see section 7.10).

Please advise me if you have any concerns about these testing provisions.

I look forward to working with you and NAS on this project. As usual, I will conduct several unannounced test-in-progress audits during this project.

Sincerely,

Paul Dinnel, Project QA Monitor

CC: Helle Andersen, Windward Environmental LLC

Appendix 3

Results of the Test-in-Progress Audits of Northwestern Aquatic Sciences' Round 2 Tests

Dinnel Marine Research

CHECKLIST FOR 10-DAY AMPHIPOD BIOASSAY

Project Name: Lower Duwamish River Round 2

Auditor: Paul Dinnel

Laboratory: Northwestern Aquatic Sciences, Newport, OR

Test Type: 10-Day Acute

Test Personnel: Michele Redmond

Test SOP: NAS-xxx-EE4

Test Date: Begin 29 April '05

Number of Samples: 21 Test, 3 Ref, 1 Control

SOP Deviations: None

Other Notes:

Shipping and Holding Conditions

Samples Received: 21 Test Samples

Samples Tested: 21 Test, 3 Ref. 1 Control

Holding Time at Test Initiation: 53 Days

Holding Conditions: 4°C in Dark

Problems Noted in Shipping and Holding: No

Testing Conditions

Protocol Used: NAS-xxx-EE4

Protocol Available?: Yes

Deviations?: No

Test Initiation Date: 29 April '05

Number of Samples: 21 Test Sediments

Multiple Batches?: No

Test Species: Eohaustorius estuarius

Animal Source: Yaquina Bay

Holding Conditions: 15°C, Constant Light

Holding Time: 2 Days

Feeding During Holding?: No

Size Selection Criteria: Those Retained on a 1 mm Screen

Other Notes:

CHECKLIST FOR 10-DAY AMPHIPOD BIOASSAY

Quality Assurance Audit

Audit date: 3 May '05

Days/Hours After Initiation: 4 DAYS

Source of Neg. Control Sediment: YAQUINA BAY

# of Reference Sediments: 3

Amount of Sediment Used: 175 ml

Final Water Volume: 950 ml

Seawater Source YAQUINA BAY

Seawater Treatment: 0.4 µm, AERATED, SAL. ADJUSTED w/ MILLI Q

Seawater Holding Time: 2 DAYS

Number of Replicates: 5 + W.Q.

Sediment Equilibration Period?: OVERNIGHT

Beakers/Amphipods Randomized?: YES

No. Amphipods/Beaker: 20

Feeding During Test?: NO

Interstitial Salinities Checked?: YES

Interstitial Salinities Adjusted?: 7 SAMPLES ADJUSTED

All Beakers Aerated?: YES

Water Temperature: 14.2 - 15.9 °C.

Water Salinity: 26.5 - 29.5 ‰

Water DO: 6.5 - 8.2 mg/l

Water pH: 7.7 - 8.2

Photoperiod: CONSTANT LIGHT

Positive Controls Used?: YES

Positive Control Toxicant: Cd & AMMONIA

Daily Test Records Maintained?: YES

Emergence Data Collected?: YES

QA Officer: LINDA NENETH

Internal QA Checks?: NOT YET

Will Reburial Test Be Conducted at End of Test?: YES

Sulfides and Ammonia Measured at Initiation and End?: YES

SOP Deviations or Problems Noted:

QA Officer: PAUL A. DINNEL Audit Date: 3 May '05

CHECKLIST FOR 20-DAY JUVENILE POLYCHAETE BIOASSAY

Project Name: Lower Duwamish River Round 2

Auditor: Paul Dinnel

Laboratory: Northwestern Aquatic Sciences, Newport, OR

Test Type: 20-Day Survival and Growth

Test Personnel: Michele Redmond, Gerald Irissarri, Bill Montgomery

Test SOP: NAS-xxx-NA4

Test Date: Begin 29 April 05

Number of Samples: 21 Test, 3 Ref + 1 Control

SOP Deviations: None

Other Notes:

Shipping and Holding Conditions

Samples Received: 21 Test Sediments

Samples Tested: 21 + 3 Ref + 1 Control

Holding Time at Test Initiation: 53 Days

Holding Conditions: 4 °C in Dark

Problems Noted in Shipping and Holding: No

Testing Conditions

Protocol Used: NAS-xxx-NA4

Protocol Available?: Yes

Deviations?: No

Test Initiation Date: 29 April 05

Number of Samples: 21 Test.

Multiple Batches?: No

Test Species: Neanthes arenaceodentata

Animal Source: Long Beach State Univ.

Holding Conditions: 20°, Full Light, Reduced Salinity to 28‰

Holding Time: 3 Days

Feeding During Holding?: Yes

Average Weight at T_0: Not Yet

Other Notes:

CHECKLIST FOR 20-DAY JUVENILE POLYCHAETE BIOASSAY

Quality Assurance Audit

Audit date: 3 MAY '05

Days/Hours After Initiation: 4 Days

Source of Neg. Control Sediment: YAQUINA BAY

# of Reference Sediments: 3

Amount of Sediment Used: 175 ml

Final Water Volume: 950 ml.

Seawater Source YAQUINA BAY

Seawater Treatment: 0.4 µm, AERATED ADJUST SALINITY W/ MILLI Q.

Seawater Holding Time: 3 Days

Number of Replicates: 5 + 1 W.Q

Sediment Equilibration Period?: OVERNIGHT

Beakers Randomized?: YES

No. Worms/Beaker: 5

Feeding During Test: TETRAMARIN, EVERY 2 DAYS

Interstitial Salinities Checked?: YES

Interstitial Salinities Adjusted?: 7 ADJUSTED

All Beakers Aerated?: YES

Water Temperature: 19.5 - 21.8 °C

Water Salinity: 26.0 - 28.5 ‰

Water DO: 5.9 - 7.3 mg/l

Water pH: ~~5.9 - 7.3~~ PAS 7.5 - 8.2

Seawater Renewal Schedule: EVERY 3 Days

Positive Controls Used?: YES

Photoperiod: CONSTANT LIGHT

Positive Control Toxicant: Cd AND AMMONIA

Daily Test Records Maintained?: YES

Internal QA Checks?: NOT SO FAR

QA Officer: LINDA NEMETH

Sulfides and Ammonia Measured at Initiation and End?: YES

SOP Deviations or Problems Noted:

A FEW TEMPERATURE READINGS WERE HIGH ON Day 3 (MAX = 21.8°C)

QA Officer: Paul A. Dinnel Audit Date: 3 MAY '05

Appendix 4

Comments to Northwestern Aquatic Sciences by Dinnel Marine Resources following DMR's QA Review of NAS' Two Round 2 Data Reports and NAS' Response

DMR

Dinnel Marine Resources
1519 13th St.
Anacortes, WA 98221
360-299-8468

7 June 2005

Ms. Michele Redmond
Lower Duwamish River Bioassay Project Manager
Northwestern Aquatic Sciences
PO Box 1437
Newport, OR 97365

Dear Michele:

I have finished my audits of your two Round 2 draft reports of sediment testing of Lower Duwamish River test sediments. Once again, your data reports were in excellent condition and reflect your usual high degree of attention to detail. There are only two very minor corrections needed to the reports, one in each report. My audit findings are noted below. Please provide me with copies of any corrections made to your draft data reports.

***Eohustorius estuarius* Report No. 725-7:**

Table 2, Sample LDW-SS39-010 (NAS #9901F): The standard deviation for emergence should apparently be 8.5 instead of 8.3.

***Neanthes arenaceodentata* Report No. 725-8:**

CETIS QC Chart for the ammonia reference toxicant test: The survival value for concentration 110 mg/L, replicate #1 should be 0.90000 instead of 1.00000 and the mean for that sample should be 0.95000 instead of 1.00000. This correction may result in a very slight change to the calculated LC50.

OK AS IS - NO CORRECTION REQUIRED PAD

Once again, thank you and your staff for all of your excellent work.

Sincerely,

Paul A. Dinnel
Quality Assurance Manager

CC: Helle Andersen, Windward Environmental

NORTHWESTERN AQUATIC SCIENCES
A Division of NAS Associates, Inc.
P.O. Box 1437, Newport, Oregon 97365 • (541) 265-7225 • Fax: (541) 265-2799 • contact@nwaquatic.com

June 10, 2005

Dr. Paul Dinnel
Dinnel Marine Resources
1519 13th St.
Anacortes, WA 98221

Dear Paul:

Enclosed are copies of both final reports for the second round of the Lower Duwamish testing. No raw data pages were changed. Changes were as follows:

1. For report 725-7, with *Eohaustorius*, your comment was:

   > Table 2, Sample LDW-SS39-010 (NAS #9901F): The standard deviation for emergence should apparently be 8.5 instead of 8.3.

   This value, in Table 3, was changed to 8.5.

2. For report 725-8, with *Neanthes*, your comment was:

   > CETIS QC Chart for the ammonia reference toxicant test: The survival value for concentration 110 mg/L, replicate #1 should be 0.90000 instead of 1.00000 and the mean for that sample should be 0.95000 instead of 1.00000. This correction may result in a very slight change to the calculated LC50.

   No change was needed. On day 1, replicate A (#1) in 110 mg/L had one worm missing (total of 9), and replicate A in 441 mg/L had an extra worm (total of 11). We take our water quality measurements in replicate A, and drew the conclusion that one worm was probably transferred on a water quality instrument probe. Therefore we adjusted the start counts according, and the survival value for replicate #1 in 110 mg/L was 1.0.

Thank you for your thorough and thoughtful reviews of our work. I hope we will work with you on another project soon.

Sincerely,

Michele S. Redmond

Michele S. Redmond
Cc: Helle Andersen, Windward Environmental

DMR-0505

DMR

Dinnel Marine Resources

QUALITY ASSURANCE EVALUATIONS OF LARVAL MUSSEL BIOASSAYS OF LOWER DUWAMISH RIVER SEDIMENTS

Round 2

Draft Final Report

22 June 2005

For

Windward Environmental LLC
Seattle, Washington

Prepared By

Dinnel Marine Resources
Anacortes, WA

Table of Contents

Page

1.0 Introduction 1

2.0 Quality Assurance Audit Results 1
2.1 Pre-Test Laboratory Inspection 1
2.2 Laboratory Protocols and SOPs 2
2.3 Test-in-Progress Audits 2
2.4 Initial Data Evaluations 2
2.5 Final QA Evaluation of Overall Data Quality and Usability 2
2.5.1 Chain of Custody and Sample Holding 3
2.5.2 Round 2 Larval Mussel Bioassay 3

3.0 References 5

Table 1. PSEP (1995) and PSDDA (1994) water quality assurance parameters For the *Mytilus* larval bioassay 3

Table 2. Summary of the Round 2 mussel larval bioassay 4

Appendices:

1. MEC-Weston's State of Washington Accreditation Certificate and Scope of Accreditation

2. Pre-test Laboratory Inspection Checklist and Communications Related to Pre-Test Refinements of MEC-Weston's Standard Operating Procedures

3. Comments by Dinnel Marine Resources to MEC-Weston Following DMR's QA Review of the Round 2 Final Data

1.0 INTRODUCTION

MEC Analytical Systems-Weston Solutions (MEC-Weston), Tiburon, California was contracted by Windward Environmental LLC to conduct larval mussel bioassays of sediments collected from the Lower Duwamish Waterway in March 2005. MEC-Weston is a State of Washington accredited laboratory (Lab accreditation number C284, expiration: 3 September 2005) and is certified to perform larval tests using the Puget Sound Estuary Program (PSEP 1995) protocols. A copy of MEC-Weston's accreditation certificate and Scope of Accreditation appears in Appendix 1.

This report summarizes the Quality Assurance/Quality Control (QA/QC) evaluations of the second of two rounds of mussel (*Mytilus galloprovincialis*) larval development bioassays of sediments collected from the Lower Duwamish Waterway in March 2005. Testing during Round 2 was completed in one test batch, initiated on 29 April 2005. QA/QC evaluations of Round 1 tests are recorded in DMR 2005.

The QA steps taken to ensure high quality data and maximum data completeness before, during and after this round of testing are described in this report. Major QA tasks by Dinnel Marine Resources (DMR) included the following:

I. A pre-test inspection of MEC-Weston's laboratory capabilities, equipment and personnel
II. A pre-test review of MEC-Weston's Standard Operating Procedures (SOPs)
- Pre-test coordination with the MEC-Weston and Windward Environmental
- An initial evaluation of all data for completeness, correct data entries, and accurate transcription to electronic formats
- A final QA evaluation of overall data quality and usability (this report)

2.0 QUALITY ASSURANCE AUDIT RESULTS

2.1 PRE-TEST LABORATORY INSPECTION

A pre-test inspection of MEC-Weston's Tiburon bioassay laboratory, equipment, and personnel qualifications was conducted by Dr. Paul Dinnel on 28 February 2005. A summary of the inspection was recorded in checklist form (Appendix 2). MEC-Weston's bioassay laboratory, equipment, and credentials of the testing personnel all appeared to be in excellent order. No modifications to the laboratory or equipment were required.

2.2 LABORATORY PROTOCOLS AND SOPs

The PSEP protocol (PSEP 1995) for conducting larval mussel bioassays and MEC-Weston's laboratory SOP (MEC-Weston SOP BIO073.00) for this test were reviewed in detail prior to the initiation of testing. MEC-Weston's SOP was in excellent condition, and my suggestions for revisions/clarifications were minor. My comments to MEC-Weston were contained in a letter to Mr. Bill Gardiner dated 26 February 2005 (Appendix 2). Comments received from Bill Gardiner in an e-mail message dated 27 February 2005 (Appendix 2) clarified several questions about their SOP regarding randomization and use of a perforated plunger for sampling larvae. Subsequent discussion with Windward Environmental staff clarified the issue related to aeration during testing.

2.3 TEST-IN-PROGRESS AUDITS

No test-in-progress audits of the larval mussel tests were conducted due to the travel distance involved and the very short duration of the larval tests (48 hours).

2.4 INITIAL DATA EVALUATIONS

All raw data forms and electronic database files were reviewed for completeness and fidelity of transcription to electronic formats. A 100% check was made of all data entered into MEC-Weston's internal electronic database. All errors, omissions, clarifications, or changes needed to MEC-Weston's draft report were documented and communicated to MEC-Weston. A copy of the initial data evaluation report to MEC-Weston appears in Appendix 3. All needed corrections to the data report were made by MEC-Weston and subsequently verified by DMR.

PSEP (1995) water quality assurance parameters were primarily used for QA assessments of the sediment tests. Where specific values were lacking in PSEP, PSDDA (1994) values were used. These values are summarized in Table 1 for the *Mytilus* test.

2.5 FINAL QA EVALUATION OF OVERALL DATA QUALITY AND USABILITY

Following corrections to the data report by MEC-Weston personnel, a 100% check was made to verify each correction. Following this, an overall evaluation of data completeness and quality was accomplished (this report). Conclusions regarding data completeness and quality follow below (summary details for the *Mytilus* larval test are given in Table 2).

2.5.1 Chain of Custody and Sample Holding

All chain of custody protocols were properly observed in transfers of sediment samples from Windward Environmental to MEC-Weston. The test and reference sediments were stored at 4° C in a locked cold room until testing was initiated. If samples contained significant headspaces, these headspaces were purged of air with nitrogen gas prior to storage.

Table 1. PSEP (1995) and PSDDA (1994) water quality assurance parameters for the *Mytilus* larval bioassay.

Parameter	*Mytilus Test*
Temperature, °C	15-17
Salinity, ppt	27-29
Dissolved oxygen, mg/liter	60% saturation
pH	7-9
Total Ammonia, mg/liter	None
Total Sulfide, mg/liter	**None**

2.5.2 Round 2 Larval Mussel Bioassay

1. A mussel larval bioassay was conducted on 21 Lower Duwamish River sediment samples, plus 3 reference sediments. A negative (seawater only) control, and two positive (toxic) controls with copper and ammonia were run concurrently with the Lower Duwamish test sediments.

2. Testing was initiated within 53 days following sediment collection, which was within the 8 week limit specified in Windward Environmental's Quality Assurance Project Plan (QAPP) (Windward 2005).

3. This test was completed with no protocol or water quality deviations.

4. The reference toxicant 50% Effective Concentration (EC50) for the copper test was 7.0 µg/liter. This result was within MEC-Weston's control chart warning limits of 5.7 to 15.4 µg Cu/liter. The ammonia EC50 for the mussel larval test was 6.4 mg/liter total ammonia. MEC-Weston does not have enough data points as yet to establish control chart limits for ammonia for the mussel larval test.

5. Negative (seawater only) control combined mortality/abnormality (11.4 %) was <30% for this test and thus acceptable by present PSEP and PSDDA criteria. The mean combined

mortality/abnormality responses (normalized to the seawater control) for the reference sediments ranged from 24.1 to 30.3 %, which were within the PSDDA limit of ≤35 %.

6. The maximum total ammonia concentration measured in the overlying water during the test in any one sample was 0.50 mg/liter total ammonia. This is well below the EC50 of 6.4 mg/liter and below the NOEC of 2.5 mg/liter measured in the parallel ammonia positive control test. Thus, ammonia concentrations were probably not high enough to cause significant stresses in this test.

7. The maximum total sulfides concentration measured in the overlying water during the test in any one sample was 0.190 mg/liter. There currently are no PSEP or PSDDA protocol guidelines for sulfides, but an equivalent guideline for the echinoderm larval bioassay is a maximum of 0.5 mg/liter sulfides. In addition, the three sediment test samples with the highest initial overlying water sulfides (0.175 to 0.190 mg/liter) did not have unusually high mortality or abnormality responses. Thus, sulfide levels in this test probably were not high enough to interfere.

8. Replication was five-fold for all samples as specified by PSDDA.

9. Data completeness for the 24 (plus control) samples tested with mussel larvae was 100 %.

10. **Final QA determination:** All data are of excellent quality and fully usable for any purpose.

Table 2. Summary of the Round 2 mussel larval bioassay.

Mytilus galloprovincialis, 29 April – 1 May 2005:

Number of test samples, including reference sediments: 24
Sediment holding time <8 weeks?: Yes
Protocol deviations? No
Average negative control combined mortality/abnormality: 11.4 %
Average reference sediment combined mortality/abnormality ≤35% normalized to the seawater negative control?: Yes
Reference toxicant EC50: 7.0 µg/liter copper and 6.4 mg/liter total ammonia. The copper EC50 is within MEC-Weston's control chart warning limits. There are no established control chart warning limits for ammonia yet.
Water quality parameter deviations: None
Ammonia and sulfide concentrations < critical limits?: Yes for ammonia and probably for sulfides.

QA reviewer conclusion: All data are of excellent quality and fully usable for any purpose.

3.0 REFERENCES

DMR (Dinnel Marine Resources). 2005. Quality Assurance evaluations of larval mussel bioassays of Lower Duwamish River sediments: Round 1. Final Report submitted to Windward Environmental LLC. Report No. DMR-0503, 7 pp. + appendices.

Ecology (Washington State Department of Ecology). 1996. Sediment management standards: Marine bioassays. Task II: Recommended quality assurance and quality control deliverables. Ecology publication No. 96-314:18 pp.

PSDDA (Puget Sound Dredged Disposal Analysis). 1994. Dredged Analysis Information System (DAIS), Version 4.4. Electronic database from Seattle District, U. S. Army Corps of Engineers.

PSEP (Puget Sound Estuary Program). 1995. Recommended guidelines for conducting laboratory bioassays on Puget Sound Sediments. Final Report by PTI Environmental Services for U. S. Environmental Protection Agency, Region 10, Office of Puget Sound, Seattle, WA.

Windward (Windward Environmental LLC). 2005. Quality assurance project plan: Surface sediment sampling for chemical analyses and toxicity testing of the Lower Duwamish Waterway. Final Report for the U.S. Environmental Protection Agency, Region 10, Seattle, WA and the Washington Department of Ecology, Northwest Office, Bellevue, WA. 89 pp. + maps.

Appendix 1

MEC-Weston's State of Washington Accreditation Certificate and Scope of Accreditation

The State of Washington Department of Ecology

This is to certify that

MEC - Weston Solutions Inc. N CA Bioassay Lab
Tiburon, CA

has complied with provisions set forth in Chapter 173-50 WAC and is hereby recognized by the Department of Ecology as an ACCREDITED LABORATORY for the analytical parameters listed on the accompanying Scope of Accreditation. This certificate is effective September 4, 2004, and shall expire September 3, 2005.

Witnessed under my hand on September 1, 2004.

Perry F. Brake, Chemist
Lab Accreditation Section Manager

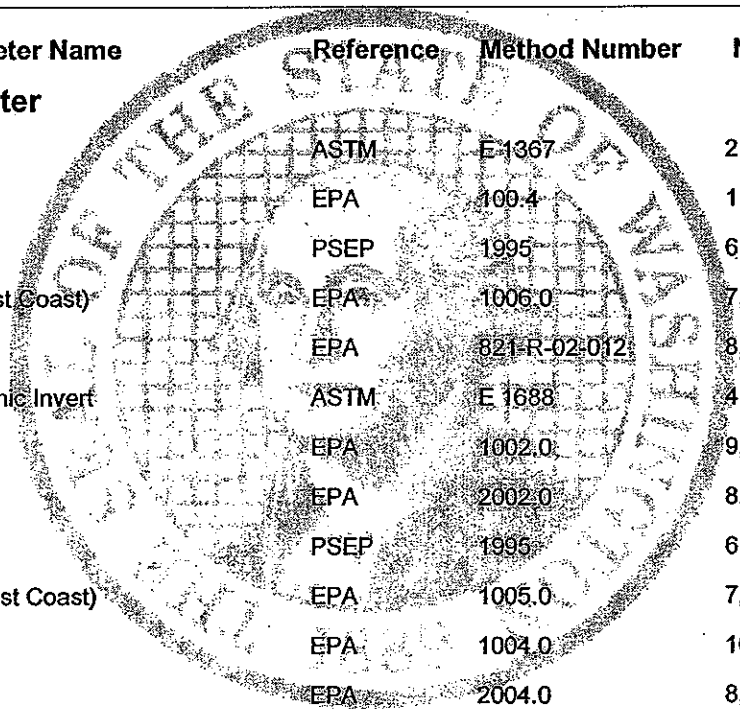
Lab Accreditation Number
C284

Scope of Accreditation

MEC - Weston Solutions Inc. N CA Bioassay Lab

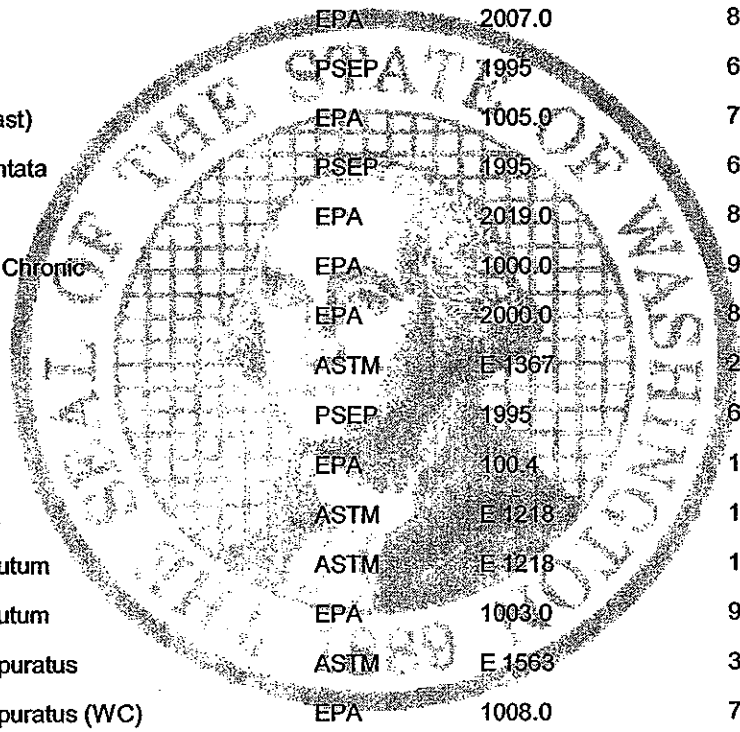
Tiburon, CA

is accredited by the State of Washington Department of Ecology to perform analyses for the parameters listed below using the analytical methods indicated. This Scope of Accreditation may apply to any of the following matrix types: non-potable water, drinking water, solid and chemical materials, and air and emissions. Accreditation for all parameters is final unless indicated otherwise in a note. Accreditation is for the latest version of a method unless otherwise specified in a note. EPA refers to the U.S. Environmental Protection Agency. SM refers to American Public Health Association's publication, Standard Methods for the Examination of Water and Wastewater, 18th, 19th or 20th Edition, unless otherwise noted. ASTM stands for the American Society for Testing and Materials. PSEP stands for Puget Sound Estuary Program. Other references are detailed in the notes section.



Matrix Type/Parameter Name	Reference	Method Number	Notes
Non-potable Water			
Ampelisca abdita	ASTM	E 1367	2
Ampelisca abdita	EPA	100.4	11
Ampelisca abdita	PSEP	1995	6
Atherinops affinis (West Coast)	EPA	1006.0	7,14
Atherinops affinis	EPA	821-R-02-012	8,14
Bioaccumulation, Benthic Invert	ASTM	E 1688	4
Ceriodaphnia dubia	EPA	1002.0	9,14
Ceriodaphnia dubia	EPA	2002.0	8,14
Crassostrea gigas	PSEP	1995	6
Crassostrea gigas (West Coast)	EPA	1005.0	7,14
Cyprinodon variegatus	EPA	1004.0	10,14
Cyprinodon variegatus	EPA	2004.0	8,14
Dangerous Waste Static Salmonid	WDOE	80-12 Part A	13
Daphnia magna	EPA	2021.0	8,14
Dendraster excentricus	ASTM	E 1563	3
Dendraster excentricus	PSEP	1995	6
Dendraster excentricus (West Coast)	EPA	1008.0	7,14
Eohaustorius estuarius	ASTM	E 1367	2

Matrix Type/Parameter Name	Reference	Method Number	Notes
Eohaustorius estuarius	PSEP	1995	6
Eohaustorius estuarius	EPA	100.4	2
Haliotus rufescens (West Coast)	EPA	600-R-95/136	7,14
Holmesimysis costata	EPA	821-R-02-012	8,14
Holmesimysis costata (West Coast)	EPA	1007.0	7,14
Macrocystis pyrifera (WC)	EPA	1009.0	7,14
Menidia beryllina	EPA	1006.0	10,14
Menidia spp.	EPA	2006.0	8,14
Mysidopsis bahia	EPA	1007.0	10,14
Mysidopsis bahia	EPA	2007.0	8,14
Mytilus spp.	PSEP	1995	6
Mytilus spp. (West Coast)	EPA	1005.0	7,14
Neanthes arenaceodentata	PSEP	1995	6
Oncorhynchus mykiss	EPA	2019.0	8,14
Pimephales promelas, Chronic	EPA	1000.0	9,14
Pimephales promelas	EPA	2000.0	8,14
Rhepoxynius abronius	ASTM	E 1367	2
Rhepoxynius abronius	PSEP	1995	6
Rhepoxynius abronius	EPA	100.4	11
Skeletonema costatum	ASTM	E 1218	1
Selanastrum capricornutum	ASTM	E 1218	1
Selenastrum capricornutum	EPA	1003.0	9,14
Strongylocentrotus purpuratus	ASTM	E 1563	3
Strongylocentrotus purpuratus (WC)	EPA	1008.0	7,14
Strongylocentrotus purpuratus (WC)	EPA	600/R-95/136	7,14
Strongylocentrotus spp.	PSEP	1995	6
Thalassiosira pseudonana	ASTM	E 1218	1



Matrix Type/Parameter Name	Reference	Method Number	Notes

Accredited Parameter Note Detail

(1) ASTM. "Standard Guide for Conducting Static 96-h Toxicity Tests with Microalgae." E 1218-00. (2) ASTM. "Standard Guide for Conducting 10-day Static Sediment Toxicity Tests with Marine and Estuarine Amphipods." E 1367-03. (3) Standard Guide for Conducting Static Acute Toxicity Tests with Echinoid Embryos." E 1563-98(2004). (4) ASTM. "Standard Guide for Determination of the Bioaccumulation of Sediment Associated Contaminants by Benthic Invertebrates." E 1688-00a. (5) ASTM. "Test Method for Measuring the Toxicity of Sediment-associated Contaminants with Freshwater Invertebrates." E 1706-00. (6) PSEP. "Recommended Guidelines for Conducting Laboratory Bioassays on Puget Sound Sediments." July 1995. (7) USEPA. "Short-term Methods for Estimating the Chronic Toxicity of Effluents and Receiving Waters to West Coast Marine and Estuarine Organisms." EPA 600/R-95/136. (8) USEPA. "Methods for Measuring the Acute Toxicity of Effluents and Receiving Waters to Freshwater and Marine Organisms." EPA-821-R-02-012. Fifth Edition. October 2002. (9) USEPA. "Short-term Methods for Estimating the Chronic Toxicity of Effluents and Receiving Waters to Freshwater Organisms." EPA-821-R-02-013. Fourth Edition. October 2002. (10) USEPA. "Short-term Methods for Estimating the Chronic Toxicity of Effluents and Receiving Waters to Marine and Estuarine Organisms." EPA-821-R-02-014. Third Edition. October 2002. (11) USEPA. "Methods for Assessing the Toxicity of Sediment-associated Contaminants with Estuarine and Marine Amphipods." EPA 600/R-94/025. June 1994. (12) USEPA. "Methods for Measuring the Toxicity and Bioaccumulation of Sediment-associated Contaminants with Freshwater Invertebrates." EPA 600/R-99/064. March 2000. (13) WDOE. "Biological Testing Methods." WDOE 80-12. Revised April 1997. (14) Meets requirements of "Laboratory Guidance and Whole Effluent Toxicity Test Review Criteria." WDOE WQ-R-95-80, Revised December 2001.

9/1/04

Authentication Signature

Perry Brake – Section Manager, Washington State Department of Ecology – Lab Accreditation Section

Appendix 2

Pre-Test Laboratory Inspection Checklist and Communications Related to Pre-Test Refinements of MEC-Weston's Standard Operating Procedures

ON-SITE LABORATORY EVALUATION FORMS AND CHECKLISTS

The laboratory must have an informal meeting to introduce the technical staff and other personnel of the toxicity test program to the evaluator. The laboratory must present and discuss aspects of the laboratory QA and toxicity test program. The evaluator must explain the audit or evaluation process if it is not clear to the laboratory.

The completed pre-survey forms (Appendix E) should be used by the evaluator as supplemental on-site checklists with Appendix F.

The following items are covered in this appendix:

I. On-Site informal Laboratory Presentation

II. Organization History

III. Laboratory Staff

IV. Facilities and General Equipment

V. Test Equipment, Instruments, and Supplies

VI. Test Organisms

VII. Documentation

VIII. Toxicity Test Methodology

IX. Quality Assurance and Quality Control

X. Data Handling

XI. Summary

APPENDIX F

INFORMAL LABORATORY MEETING AND INTRODUCTION
OF THE TECHNICAL STAFF

I. Organizational Information

Facility Description: MEC - Weston Solutions Tiburon Laboratory

Name/Affiliation:

Address: 3150 Paradise Dr., Bldg 36

Tiburon, CA 94920

Phone Number: 415-435-1847

Laboratory Director/Manager: Scott Bodensteiner

Type of Evaluation: Larval Bioassay Pre-test Audit

Informal meeting and introduction of laboratory staff: Y X N ___

Laboratory Personnel Contacted

Name	Title
William Gardiner	Senior Scientist
Matt Zinkl	Lab Manager

ON-SITE LABORATORY FORMS AND CHECKLISTS

Note: The completed pre-survey forms (Appendix E) should be used by the audit or evaluator to supplement the on-site forms and checklists.

II. Organization History

Item	Yes	No	Comments
Laboratory On-Site Introduction/ Meeting with staff	X		
Laboratory demonstrates active toxicity test program	X		
Performance reference toxicant data available and checked	X		
Organization chart provided	X	X	PAS

III. Laboratory Staff

Item	Yes	No	Comments
Pre-survey forms verification	X		
Appropriate educational background experience/toxicity testing	X		
Laboratory adequately staffed	X		
All technical staff available during evaluation	X		FOR LARVAL TEST
QA officer report to senior management	X		LIN CRAFT, CARLSBAD OFFICE
Director/Supervisor/ Manager available during evaluation		X	
QA officer available during evaluation		X	

IV. Facilities and General Equipment

Item	Yes	No	Comments
Pre-survey forms verification			
Tour lab	X		

IV. Facilities and General Equipment (Continued)

Item	Yes	No	Comments
Tour mobile lab, if available		X	NONE USED
Lab work space adequate	X		
Culture space adequate	X		
Toxicity Test space adequate	X		
Lab has distilled/ demineralized water.	X		
Lab has distilled demineralized water checked/recorded.	X		
Analytical balance/ calibrated yearly	X		
Balance routinely checked/ class S weights/recorded logbook	X		
Exhaust hoods provided	X		
Refrigerator/freezer adequate, etc.	X		
Lab maintained in clean/ organized manner	X		
Contamination-free work areas available for handling test materials	X		
Culture and test areas separated	X		PARTIALLY
Adequate storage areas available	X		
Temperature of lab adequate	X		
Lighting adequate	X		
Air condition/ventilation adequate	X		
Chemical waste disposal policies/ SOPs available	X		
Lab secure	X		

V. Test Equipment, Instruments, and Supplies

Item	Yes	No	Comments
Pre-survey forms verification	X		

V. Test Equipment, Instruments, and Supplies (Continued)

Item	Yes	No	Comments
SOP(s) verification	X		
Calibration checks/log books pre-survey forms	X		
Manual available to operator	X		

VI. Test Organisms

Item	Yes	No	Comments
Pre-survey forms verification	X		
Culture Maintenance SOP(s) available		X	NOT NEEDED, MUSSELS ORDERED AS NEEDED
Disease control/treatment protocols documented		X	NA
Holding/acclimation facilities adequate	X		
Source of test organisms documented	X		
Food and feeding program documented		X	NA
Freshwater supply/source/quantity used/quality documented			NA
Estuarine/marine water supply/ source/quantity used/quality/ documented	X		AVAIL. ON REQUEST

VII. Documentation

Item	Yes	No	Comments
Pre-survey forms verification	X		

VII. Documentation (Continued)

Item	Yes	No	Comments
Sample custodian designated	X		
Sample procedures/ responsibilities documented	X		
Written SOPs available for receipt of samples			
QA procedures documented/ available to staff	X		
Written SOPs developed for compiling/maintaining sample document files	X		
Written SOPs for samples preservation, storage/ are maintained.	X		
Written SOPs for culture/ test methods	X		
Daily activities/toxicity test documented	X		
Bound logbooks available/ general chemistry (pH,DO,etc.)	X		
Bound logbooks used, pages numbered consecutively		X	
Type of work clearly displayed on logbooks	X		
Logbooks maintained in legible manner	X		
Are anomalies recorded routinely			
Are inserts permanently affixed and signed.			
Supervisor inspects notebooks/ for appropriate documentation	X		

VIII. Toxicity Test Methodology (Recommended Toxicity Test Conditions and Test Acceptability Criteria: On-Site Checklists, see Appendix G.)

Item	Yes	No	Comments
Pre-survey forms verification	X		
Required methods used	X		
Any unauthorized deviations	X		
Are written SOPs provided	X		

VIII. Toxicity Test Methodology (Recommended Toxicity Test Conditions and Test Acceptability Criteria: On-Site Checklists, see Appendix G.) (Continued)

Item	Yes	No	Comments
Biologist/technician record bench data in neat accurate manner	X		
Appropriate instrumentation used with each toxicity test	X		

IX. Quality Assurance/Quality Control (QA/QC)

Item	Yes	No	Comments
Pre-survey forms verification	X		
Lab maintains QA/QC manual	X		
Manual addresses elements of QA program, including the following:			
a. Personnel	X		
b. Facilities and equipment	X		
c. Operation of instruments	X		
d. Documentation of SOPs	X		
e. Procurement and inventory practices			NA
f. Project plans/ Data quality objectives	X		PROJECT SPECIFIC PLANS
g. Reliability of data	X		
h. Data validation	X		
i. Feedback and corrective action	X		
j. Instrument calibration	X		

IX. Quality Assurance and Quality Control (Continued)

Item	Yes	No	Comments
k. Recordkeeping	X		
l. Internal QA/QC audits	X		
m. QC responsibilities/ reporting clearly defined	X		
n. QC charts maintained for routine analysis	X		
o. QC records show corrective action to meet QC criteria	X		
p. Supervisory personnel review data and QC results	X		
Chain-of-custody maintained	X		
Record keeping adequate	X		
Instrument Calibration/ logbooks maintained	X		
Reference toxicant evaluations used	X		
Analytical support/ inorganic analyses	X		
Analytical support/ organic analyses	X		

X. Data Handling

Item	Yes	No	Comments
Recommended statistical programs used	X		
Data calculations check/ second person	X		
Data calculations documented	X		
Data analyses capabilities available	X		
Data and records retained	X		
PC computer(s) available	X		

DMR

Dinnel Marine Resources
1519 13th St.
Anacortes, WA 98221
360-299-8468

26 February 2005

Mr. Bill Gardiner
MEC-Weston Solutions
3150 Paradise Drive, Bldg. 36
Tiburon, CA 94920

Dear Bill:

Thank you for providing copies of MEC-Weston Solutions' protocol for the Mussel embryo bioassay tests to be used to assay Lower Duwamish Waterway Group sediment samples. I found your protocol to be well written and generally in conformance with PSEP/SMS guidelines developed for these tests (PSEP [or PSWQA] 1995, with periodic modifications by the Dredged Material Management Program). There are a few potential minor protocol refinements that I will discuss with you and your staff on my site visit on the morning of 28 February, 2005. Several of these items are noted here:

1. No provision is given in MEC's protocol for randomization. The PSEP (1995) guidelines state that "A random numbering method should be used to distribute the chambers in the water bath (or incubator or cold room)."

2. No mention is made in your protocol about use of a perforated plunger to mix embryos/larvae at test initiation or termination. Use of a perforated plunger is required by the PSEP guidelines to ensure proper mixing during subsampling.

As noted in your protocol, there are a number of variables that can change from client to client depending on their testing needs. I take this opportunity to highlight these project-specific items and encourage you to append this letter to your working mussel embryo protocol being used for the Duwamish Waterway testing. Project-specific testing requirements noted here are specified by the client, Windward Environmnetal LLC (Windward 2005).

1. "The mean effective mortality (combined mortality and abnormal development) in the negative control should be ≤ 30 % (Windward 2005, pg. 71). In other words, normal development in the negative control must be ≥ 70 % relative to the average embryo density of the Time zero counts.

2. At this time, Windward Environmental requests that "all beakers will be aerated to maintain correct levels of (DO) saturation throughout the tests" (Windward 2005, pg. 69). Normally, the PSEP (1995) mussel embryo development test protocol calls for aeration only if DO levels in one or more test/control beakers falls below 60% saturation. This aeration requirement needs to be verified with Windward prior to test initiation.

3. For the Duwamish testing, please note the following Windward requirements for water quality monitoring: "Temperature, salinity, DO and pH will be measured daily for the amphipod mortality and larval development tests." Additionally, "Ammonia and total sulfides will be measured in overlying water in all three tests at test initiation." (Windward 2005, pg. 73).

4. Windward Environmental (2005, pg. 72) indicates that "For the bivalve test, the negative control seawater will be either ambient seawater from San Francisco Bay flowing into the MEC laboratory or seawater collected from Bodega Bay." At the moment, your protocol specifies collection from Scripps Institution of Oceanography (La Jolla).

5. Windward has requested that the reference toxicant be copper sulfate, which, per your protocol, is your normal reference toxicant for this test.

6. The reference sediment performance criterion for this project is "Mean number of normal developed larvae in the reference sediments divided by the mean number of normal developed larvae in the negative control should be ≥ 65 %." (Windward 2005, pg. 71).

7. The 8-week sediment holding time is in effect for this project. Sediment samples must be stored in the dark at 4 ± 2 °C with no headspace or headspace filled with nitrogen gas (Windward 2005, pg. 68).

8. "The EC50 for a positive control test (copper sulfate) should be within the mean EC50 ± 2 standard deviations of the control chart" mean for the mussel embryo development test (Windward 2005, pg. 71).

9. Also, please note that Windward requires that "Toxicity test samples will be retested within the (8-week) holding time if the negative control fails to meet the performance criteria." (Windward 2005, pg. 71).

Please advise me if you have any concerns about these testing provisions.

I look forward to working with you and MEC-Weston Solutions on this project. Please be sure to provide me with periodic updates as may be necessary and advise me of any protocol deviations or negative control, positive control or reference sediment QA failures.

Sincerely,

Paul Dinnel, Project QA Monitor

CC: Helle Andersen, Windward Environmental LLC
Matt Zinkl, MEC-Weston Solutions

References

PSEP (Puget Sound Estuary Program). 1995. Recommended guidelines for conducting laboratory bioassays on Puget Sound sediments. Final Report. Prepared for the Puget Sound Estuary Program, U.S. Environmental Protection Agency, Region 10, Office of Puget Sound, and U.S. Army Corps of Engineers, Seattle District, Seattle, WA. Prepared by PTI Environmnetal Services, Inc., Bellevue, WA.

Windward (Windward Environmental LLC). 2005. Quality assurance project plan: surface sediment sampling for chemical analyses and toxicity testing of the Lower Duwamish Waterway. Final Report submitted to the U.S. Environmental Protection Agency, Region 10, Seattle, WA and the Washington State Department of Ecology, Northwest Regional Office, Bellevue, WA. 89 pp + maps.

Subj: **RE: Comments on Mussel Embryo protocol**
Date: 02/27/2005 1:01:03 PM Pacific Standard Time
From: Bill.Gardiner@WestonSolutions.com
To: PADinnel@aol.com

Paul,

thanks for your comments. Yes we do use a perforated plunger for mixing the larval stock and yes we randomize jar positions. You will be able to see the randomization sheets tomorrow.

I agree we should check with Windward about aeration. We normally do not aerate unless DO drops to unacceptable levels, as PSEP requires. My guess is that Windward does not intend to have this deviation in the protocol.

See you tomorrow - have a safe flight.

Bill

-----Original Message-----
From: PADinnel@aol.com [mailto:PADinnel@aol.com]
Sent: Sat 2/26/2005 8:18 PM
To: Gardiner, William
Cc: hellea@windwardenv.com; Zinkl, Matt
Subject: Comments on Mussel Embryo protocol
Dear Bill:

Please see attached.

Paul

Appendix 3

Comments by Dinnel Marine Resources to MEC-Weston Following DMR's QA Review of the Round 2 Final Data

DMR

Dinnel Marine Resources
1519 13th St.
Anacortes, WA 98221
360-299-8468

30 May 2005

Mr. Bill Gardiner
MEC-Weston Solutions
3150 Paradise Drive, Bldg. 36
Tiburon, CA 94920

Dear Bill:

Thank you for sending a copy of your Round 2 draft report and raw data for the Lower Duwamish River sediment tests using mussel embryos. I have finished my QA audit of your Round 2 data report and found it to be in excellent shape, with the exception of a few items that need to be corrected in the final draft. Many of these items are simply "housekeeping" but a few will require recalculation of some of the test endpoint statistics.

The apparent corrections needed to the final draft report are:

1. Title on cover: Change "Phase II" to "Round II".

2. Last three sentences of the **Introduction** should read: This represents the second round of sediments evaluated from the Lower Duwamish River. Sediment evaluations for the first round of samples included two batches of larval tests, Batch 1 and Batch 2. This report provides an overview of the methods followed during this evaluation and presents the results for Round 2 larval tests.

3. PSEP 1995 and Windward 2004 are cited in the first paragraph of the Methods. References to these citations should be added to the report.

4. The second and third sentences under "***48-hour Larval Bioassay***" should read: The 48-h larval test was conducted in one batch initiated on April 29 2005. Both negative controls and reference treatments were evaluated with this toxicity test batch.

5. Last line of the first full paragraph on page 3 should read: 23.8 embryos/mL, ...

6. Line just above "***Data Analysis and QA/QC***": Change "round" to "batch".

7. Under "***Data Analysis and QA/QC***" (Page 4): Change T to T_t in two of your formulas.

8. Under "**3.0 Results**", in the first sentence, change "Round 3" to "Round 2" and "Tables 1" to "Table 1". At the beginning of the second paragraph, change "Round 1" to "Round 2" in two places.

9. Table 1: Change "Round 3" to "Round 2" in the table header. Note that some of the table values for samples LDW 68, LDW 158, LDW B2b and LDW B6a will likely need to be changed (see item #12 below).

10. Table 2: Change "Round 3" to "Round 2" in the table header.

11. Table 3. Ditto.

12. Appendix A1: Ditto. Also, there appear to the following errors in Appendix A1:

    Sample LDW 68, Rep. 1: The normal value should be 218 instead of 195. The sample mean values will need to be recalculated and also changed in Table 1.

    There are apparent errors in the Excel spreadsheet formulas for calculating the mean statistics for samples LDW 158, -B2b and –B6a (the last three samples). The mean percentage mortality and mean percentage abnormal (and SDs) for sample LDW 158 appear to be ok, but all other calculations appear to be wrong. If found to be wrong, the samples will need to be recalculated and the values in Table 1 corrected.

13. Appendix B1: Change "Round 3" to "Round 2" in the table header.

14: All raw data sheets: Change "Round 3" to "Round 2" where needed. Ditto on Ref Tox. Test sheets.

Thank you for addressing these comments. Please forward any corrections to the Round 2 data report so that I may verify the changes (or comments as to why they should not be changed).

Sincerely,

Paul Dinnel, Project QA Monitor

CC: Helle Andersen, Windward Environmental LLC

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Paul Dinnel, Project QA Monitor

CC: Helle Andersen, Windward Environmental LLC