Appendix C: Geochronology Study Data Validation Reports

Analyses were performed by EPA Method 160.3 for total solids and Plumb, 1981 for total organic carbon (TOC). The QAPP lists EPA Method ASTM D2216 for percent moisture, which was used to supplement Method 160.3 for total solids. The following data requirements were evaluated:

- Quality control analysis frequencies
- Holding times
- Laboratory blank contamination
- Laboratory Control Standard (LCS), Standard Reference Material (SRM), and Matrix Spike (MS) recoveries
- Laboratory triplicate relative standard deviations (RSDs)
- Field duplicate precision
- Reporting limits

Quality control analysis frequencies: For total solids, the QAPP requires the analysis of one matrix replicate per twenty samples. For TOC, the QAPP requires the analysis of one matrix replicate and one matrix spike per twenty samples, as well as one method blank in each batch or sample delivery group (SDG). The following quality control samples were analyzed in each sediment batch:

ANALYSIS	QC SAMPLES
Total solids	Method blank and laboratory triplicate
TOC	Method blank, SRM, MS and triplicate

Holding times: The holding times listed in the QAPP are 28 days for TOC and 7 days for moisture. The moisture analyses were performed past the 7-day QAPP holding time. The Puget Sound Estuary Program (PSEP) holding time for sediment is 14 days from collection. The moisture results were not qualified because they were analyzed within the 14-day PSEP holding time.

The samples were analyzed for TOC within the holding time.

Laboratory blank results: Criteria for method blanks are not discussed in the QAPP. However, the method blank analysis did not detect TOC.

LCS, SRM, and MS recoveries: The data quality indicator (DQI) for accuracy is 75-125% for TOC. All LCS, SRM, and MS recoveries were within these limits.

Laboratory triplicate RSDs: the DQI for precision for TOC is 30% and for moisture is 20%. Duplicate RPDs and triplicate RSDs were below these levels:

Sample ID	Total Solids (%)			TOC (%)		
	Sample	Replicate(s)	RPD/RSD	Sample	Replicate(s)	RPD/RSD
LDW-Sg1a-35-37	50.30	50.70, 51.20	0.9	2.02	2.42, 2.39	9.8
LDW-Sg2-60-62	54.60	54.10, 54.40	0.5	2.51	2.50, 2.46	1.1
LDW-Sg3-25-27	52.30	52.40, 52.50	0.2	2.19	2.16, 2.14	1.2
LDW-Sg4-35-37	46.10	45.80, 45.90	0.3	1.14	1.09, 1.07	3.3
LDW-Sg5a-40-42	54.40	54.40, 54.60	0.2	1.80	1.89, 2.01	5.5
LDW-Sg6-25-27	54.90	53.90, 53.50	1.3	2.22	2.24, 2.24	0.5
LDW-Sg7-55-57	67.00	67.10, 66.30	0.7	1.65	1.30, 1.37	12.9
LDW-Sg8-40-42	58.80	58.70, 58.10	0.6	1.77	1.90, 1.99	5.9
LDW-Sg9-60-62	64.20	64.30, 63.60	0.6	1.36	1.37, 1.25	5.0
LDW-Sg10-75-77	53.10	53.20, 53.20	0.1	1.84	1.79, 1.85	1.8
LDW-Sg11b-25-27	65.10	64.80, 64.60	0.4	1.70	1.64, 1.59	3.4
LDW-Sg11c-30-32	60.10	62.50, 57.20	4.4	1.87	1.68, 1.59	8.3
LDW-Sg12-60-62	43.00	43.30, 43.00	0.4	3.97	3.84, 3.60	4.9
LDW-Sg13-0-1	49.20	49.30, 49.20	0.1	3.03	3.02, 2.86	3.2

Field duplicate precision: The QAPP criterion for field duplicate RPDs is 30% for TOC and 20% for moisture. Sample and field duplicate results and their RPDs are as follows:

Sample ID	Duplicate ID	Total Solids (%)			TOC (%)		
		Sample Value	Duplicate Value	RPD	Sample Value	Duplicate Value	RPD
LDW-Sg13-15-17	LDW-Sg13-15-17-FD	47.30	44.50	6.1	2.86	2.71	5.4
LDW-Sg4-10-12	LDW-Sg4-10-12-FD	62.80	64.60	2.8	2.11	2.02	4.4
LDW-Sg7-35-37	LDW-Sg7-35-37-FD	64.20	64.80	0.9	1.73	1.67	3.5
LDW-Sg12-30-32	LDW-Sg12-30-32-FD	44.80	44.40	0.9	3.78	3.93	3.9
LDW-Sg10-10-12	LDW-Sg10-10-12-FD	52.50	52.00	1.0	1.67	1.44	14.8
LDW-Sg9-20-22	LDW-Sg9-20-22-FD	58.30	58.40	0.2	1.21	1.22	0.8
LDW-Sg8-15-17	LDW-Sg8-15-17-FD	60.30	60.70	0.7	1.95	2.04	4.5
LDW-Sg6-5-7	LDW-Sg6-5-7-FD	65.50	64.10	2.2	1.39	1.43	2.8
LDW-Sg3-15-17	LDW-Sg3-15-17-FD	55.20	54.90	0.5	2.11	2.24	6.0
LDW-Sg11b-0-2	LDW-Sg11b-0-2-FD	83.10	84.70	1.9	0.804	0.890	10.2
LDW-Sg11c-10-12	LDW-Sg11c-10-12-FD	68.40	67.10	1.9	1.45	1.43	1.4
LDW-Sg5a-30-32	LDW-Sg5a-30-32-FD	54.30	54.60	0.6	1.74	1.82	4.5
LDW-Sg2-50-52	LDW-Sg2-50-52-FD	50.60	50.50	0.2	2.09	2.25	7.4
LDW-Sg1a-5-7	LDW-Sg1a-5-7-FD	54.50	54.60	0.2	1.85	1.79	3.3

The RPD values met the QAPP criterion.

Reporting limits: The QAPP-specified method detection limits (MDLs) for sediment are 0.01% for TOC and 0.1% for moisture. TOC was detected and moisture was present in all samples and reporting limit evaluation does not apply.

Overall assessment: Documentation was found to be clear and complete. Quality control results demonstrated acceptable levels of accuracy. The precision of the data are acceptable.

Total solids and TOC data, as qualified, are acceptable for use.

ENVIRONMENTAL DATA SERVICES, LTD.

DATA VALIDATION • TECHNICAL WRITING • CONSULTING • DATA INTERPRETATION

DATA VALIDATION REPORT

LDW RI Sediment Transport

SDG #Sg1a

Prepared by

ENVIRONMENTAL DATA SERVICES, LTD.

For

WINDWARD ENVIRONMENTAL

February 15, 2005

2690 Oak Hill Drive, Allison Park, PA 15101
FAX/PHONE • 412-486-6989
E-MAIL • edatas@aol.com

Data Assessment Narrative

RADIOLOGICAL DATA ASSESSMENT NARRATIVE

SITE: LDW RI Sediment Transport

LABORATORY: Mass Spec Services

SAMPLE DELIVERY GROUP: Sg1a

This sample delivery group consists of the following soil samples:

LDW-Sg1a-0-1	LDW-Sg1a-5-7	LDW-Sg1a-5-7FD	LDW-Sg1a-10-11	LDW-Sg1a-15-16
LDW-Sg1a-20-21	LDW-Sg1a-25-26	LDW-Sg1a-30-31	LDW-Sg1a-35-37	LDW-Sg1a-40-41
LDW-Sg1a-45-46	LDW-Sg1a-50-51	LDW-Sg1a-55-56	LDW-Sg1a-60-61	LDW-Sg1a-65-66
LDW-Sg1a-70-71	LDW-Sg1a-75-76	LDW-Sg1a-80-81		

Samples described above were analyzed via Beta and Gamma Spectrometry to determine the concentrations of Lead 210 and Cesium 137 respectively in sediment.

Project specific QA objectives, as well as TPR80 (Idaho National Engineering and Environmental Laboratory Sample Management Office Technical Procedure for Radtioanalytical Data validation, TPR-80, Rc V.2, May, 1997.

All data are valid and acceptable except those analytes which have been qualified as described in the attached glossary. All data qualification related to this group of samples is detailed on the attached sheets.

Major Data Quality Issues

None.

Minor Data Quality Issues

None.

All data users should note two facts. First, the "R" flag means that the associated value is unusable due to significant QC problems, the data is invalid and provides no information as to whether the compound is present or not. "R" values should not appear on any data tables even as a last resort.

Lastly, no analyte concentration, even if it passed all QC tests, is guaranteed to be accurate. Strict QC serves to increase confidence in data but any value potentially contains error.

Date : 2-15-05

Diane Waldschmidt
Environmental Scientist/Director

HOLDING TIME

The amount of an analyte can change with time due to chemical instability, degradation, volatilization, etc. If the specified holding time is exceeded the data may not be valid.

The analyses performed on samples in this sample delivery group were all done within the holding time defined within the Sediment Transport Quality Assurance Project Plan and TPR-80 documents.

BLANK CONTAMINATION

Quality assurance blanks, method, trip, field, or rinse blanks are prepared to identify any contamination, which may have been introduced into the samples during preparation or field activity. Method blanks measure lab contamination. Trip blanks measure cross contamination during shipment. Field and rinse blanks measure cross contamination during field operations.

Trip, field, or rinsate blanks are not required for radiochemical analyses during the Sediment Transport Project, per QAPP.

Method Blank

No positive identifications of radiological target analytes were observed in corresponding method blanks for Pb-210 or Cs-137 above the laboratory-reporting limit in associated method blanks.

CALIBRATION

Satisfactory instrument calibration is established to ensure that the instrument is capable of producing acceptable quantitative results. The initial calibration efficiency demonstrates that the instrument is capable of giving acceptable performance. The continuing calibration verifies that the instrument is giving satisfactory weekly performance.

Calibration Gamma Spectrometry

- Efficiency of selected energies must be within three standard deviations of the mean. (Continuing Calibration)
- The resolution of each peak must not exceed 5Kev. (Continuing Calibration)

Calibration Beta Spectrometry

- Check source count - rates must be within three standard deviations of the mean. (Continuing Calibration)
- The calibration efficiency must be $\pm$10% of the previous calibration. (Initial Calibration)
- Calculated efficiency for each detector used must be greater than 15%. (Initial Calibration)

All Associated instrument calibrations for both beta and gamma spectrometry were well within acceptance limits at all times.

BETA SPECTROMETRY RECOVERY STANDARD

A recovery standard (Lead-210) is evaluated to check chemical recovery or yield. Recovery of this standard must be between 40 and 100 percent to demonstrate that the system was operating in a controlled manner. All associated data is rejected if the allowable recovery limit is not met.

All recovery standards observed for samples and method blanks were well within acceptance limits.

MATRIX SPIKE/MATRIX SPIKE DUPLICATE

The matrix spike and matrix spike duplicate (MS/MSD) are generated to determine the precision and accuracy of the analytical procedure in a given matrix. This information may be used to qualify data.

Sample LDW-Sg1a-35-37 was analyzed as a MS/MSD for Pb-210 and Cs-137. Precision and accuracy indicators were favorable and found to be within the guidelines established in the project QAPP in all cases.

LABORATORY CONTROL SAMPLE

A laboratory control sample (LCS) was processed at the frequency specified in the Project QAPP (one for each group of twenty samples processed). Observed recoveries of LCSs for both Pb-210 and Cs-137 were well within the acceptance range (85-115%) per the TPR-80.

FIELD DUPLICATE

Field duplicates are collected at a frequency of one per twenty field samples or a minimum of one per sample delivery group. Acceptable precision for results obtained for the field duplicate pair is +/- 30% relative percent difference.

Samples LDW-Sg1a-5-7 and LDW-Sg1a-5-7FD comprise the field duplicate pair associated with this SDG. All field duplicate precision values associated with the samples contained in this report were well within the specifications defined in the Sediment Transport Project QAPP and described above.

OTHER QC DATA OUT OF SPECIFICATION

None.

SYSTEM PERFORMANCE AND OVERALL ASSESSMENT

Overall the laboratory data generated met the project goals and QC criteria as defined in the Sediment Transport Project QAPP.

PROBLEMS WITH ANALYSIS NOTED IN CASE NARRATIVES

None.

DEFINITIONS OF DATA QUALIFIER (VALIDATION) FLAGS USED IN THIS REPORT

Flag	Definition
U	The analysis was performed, but no radioactivity was detected (i.e., the radioanalytical result was not statistically positive at the 95% confidence level and/or the result was below its MDA). The "U" qualifier flag is also applicable to any result reported as zero (0) (+/- an associated uncertainty). NOTE: *The radionuclide is not considered to be present in the sample*
UJ	The analysis was performed and a statistically positive result was reported at the 95% confidence interval. However, the result is highly questionable (false positive) due to analytical and/or laboratory quality control anomalies. The use of such a result is strongly discouraged. Analytical and quality control anomalies include such items as; significant blank contamination, known photopeak interferences and/or photopeak resolution problems, known matrix interferences, unacceptable laboratory control sample recoveries, serious instrument calibration problems, improper sample preservation, etc. NOTE: *The radionuclide may or may not be present in the sample and the result is considered highly questionable.*
J	The analysis was performed and radioactivity was detected (i.e., the radioanalytical result is statistically positive at the 95% confidence level and is above its MDA). However, the result is questionable due to analytical and/or laboratory quality control anomalies and should, therefore, be used only as an estimated (approximated) quantity. Analytical and/or quality control anomalies include such items such as; laboratory duplicate imprecision, unsatisfactory analytical yields, insufficient laboratory control sample recoveries, unacceptable PE sample results, instrument calibration problems, improper sample preservation, etc. NOTE: *The radionuclide is considered to be present in the sample, but the result may not be an accurate representation of the amount of activity actually present in the sample.*
R	The analysis result is unusable and was rejected due to severe analytical and/or quality control problems. NOTE: The radionuclide may or may not be present and the result is known to be inaccurate or imprecise.

Laboratory Data With Qualifiers Added

MASS SPEC SERVICES

P.O. Box 163, Orangeburg, NY 10962

Report of Analysis

Sediments

Windward Environmental LLC
200 West Mercer Street
Seattle, WA 98119

Attn: Tad Dashler

Core LDW-Sg1a **collected 12/29/04**

Report Date:	01/20/05
MSS No.:	Pb0070
Project:	04-08-06-23 LDW Group
Date Rec'd:	12/30/04
Task Supervisor:	H. Jeter

Radiometric Results in pCi / g dry

MSS No.	Identity	Comment	Collection Time	Pb-210	Cs-137	Beta Count	Gamma Count
Pb0070-1	LDW-Sg1a-0-1		8:26	0.98 ± 0.12	0.120 ± 0.063	01/08/05	01/05/05
Pb0070-2	LDW-Sg1a-0-1 MR	Matrix Replicate	8:26	0.90 ± 0.12	0.150 ± 0.079	01/08/05	01/06/05
Pb0070-3	LDW-Sg1a-5-7		8:35	0.60 ± 0.12	0.174 ± 0.056	01/08/05	01/04/05
Pb0070-4	LDW-Sg1a-5-7 FD	Field Duplicate	8:35	0.70 ± 0.12	0.161 ± 0.069	01/08/05	01/06/05
Pb0070-5	LDW-Sg1a-10-11		8:45	0.75 ± 0.14	0.272 ± 0.083	01/08/05	01/07/05
Pb0070-6	LDW-Sg1a-15-16		8:55	0.63 ± 0.13	0.201 ± 0.059	01/08/05	01/05/05
Pb0070-7	LDW-Sg1a-20-21		9:03	0.55 ± 0.14	0.191 ± 0.058	01/08/05	01/06/05
Pb0070-8	LDW-Sg1a-25-26		9:16	0.73 ± 0.13	0.300 ± 0.075	01/08/05	01/07/05
Pb0070-9	LDW-Sg1a-30-31		9:24	0.41 ± 0.10	0.262 ± 0.052	01/08/05	01/07/05
Pb0070-10	LDW-Sg1a-35-37		9:32	0.61 ± 0.12	0.209 ± 0.094	01/08/05	01/08/05
Pb0070-11	LDW-Sg1a-35-37 MS	Matrix Spike	9:32	6.55 ± 0.27	58.35 ± 0.67	01/08/05	01/05/05
Pb0070-12	LDW-Sg1a-35-37 MSD	Matrix Spike Duplicate	9:32	7.00 ± 0.26	53.48 ± 0.61	01/08/05	01/05/05
Pb0070-13	LDW-Sg1a-40-41		9:40	0.43 ± 0.10	0.431 ± 0.095	01/08/05	01/08/05
Pb0070-14	LDW-Sg1a-45-46		9:46	0.38 ± 0.09	0.265 ± 0.087	01/08/05	01/08/05
Pb0070-15	LDW-Sg1a-50-51		9:52	0.49 ± 0.11	0.093 ± 0.050	01/08/05	01/08/05
Pb0070-16	LDW-Sg1a-55-56		10:00	0.37 ± 0.12	0.098 ± 0.057	01/08/05	01/09/05
Pb0070-17	LDW-Sg1a-60-61		10:09	0.40 ± 0.08	0.098 ± 0.036	01/08/05	01/09/05
Pb0070-18	LDW-Sg1a-65-66		10:43	0.38 ± 0.09	< 0.078	01/08/05	01/09/05
Pb0070-19	LDW-Sg1a-70-71		10:50	0.27 ± 0.09	< 0.055	01/08/05	01/07/05
Pb0070-20	LDW-Sg1a-75-76		10:57	0.45 ± 0.11	< 0.093	01/08/05	01/09/05
Pb0070-21	LDW-Sg1a-80-81		11:04	0.39 ± 0.14	< 0.065	01/08/05	01/09/05

Matrix Spike Expected Values:

Pb-210 6.53 pCi/g spike + (0.61 ± 0.12) from matrix = 7.14 ± 0.12 pCi/g
Cs-137 49.9 pCi/g spike + (0.209 ± 0.094) from matrix = 50.1 ± 0.1 pCi/g

Target Detection Limits:

Pb-210 0.2 pCi/g dry
Cs-137 0.2 pCi/g dry

Bismuth Beta Counting Method
Gamma Spectral Analysis

Tolerances are 2 sigma counting uncertainties.
Detection limits are at the 4.66 sigma level.

Hewitt W. Jeter

ENVIRONMENTAL DATA SERVICES, LTD.

DATA VALIDATION • TECHNICAL WRITING • CONSULTING • DATA INTERPRETATION

DATA VALIDATION REPORT

LDW RI Sediment Transport

SDG #Sg2

Prepared by

ENVIRONMENTAL DATA SERVICES, LTD.

For

WINDWARD ENVIRONMENTAL

February 15, 2005

2690 Oak Hill Drive, Allison Park, PA 15101
FAX/PHONE • 412-486-6989
E-MAIL • edatas@aol.com

Data Assessment Narrative

RADIOLOGICAL DATA ASSESSMENT NARRATIVE

SITE: LDW RI Sediment Transport

LABORATORY: Mass Spec Services

SAMPLE DELIVERY GROUP: Sg2

This sample delivery group consists of the following soil samples:

LDW-Sg2-0-1	LDW-Sg2-5-6	LDW-Sg2-10-11	LDW-Sg2-15-16	LDW-Sg2-20-21
LDW-Sg2-25-26	LDW-Sg2-30-31	LDW-Sg2-35-36	LDW-Sg2-40-41	LDW-Sg2-45-46
LDW-Sg2-50-52	LDW-Sg2-50-52FD	LDW-Sg2-55-56	LDW-Sg2-60-62	LDW-Sg2-65-66
LDW-Sg2-70-71	LDW-Sg2-75-76	LDW-Sg2-80-81		

Samples described above were analyzed via Beta and Gamma Spectrometry to determine the concentrations of Lead 210 and Cesium 137 respectively in sediment.

Project specific QA objectives, as well as TPR80 (Idaho National Engineering and Environmental Laboratory Sample Management Office Technical Procedure for Radtioanalytical Data validation, TPR-80, Rc V.2, May, 1997.

All data are valid and acceptable except those analytes which have been qualified as described in the attached glossary. All data qualification related to this group of samples is detailed on the attached sheets.

Major Data Quality Issues

None.

Minor Data Quality Issues

None.

All data users should note two facts. First, the "R" flag means that the associated value is unusable due to significant QC problems, the data is invalid and provides no information as to whether the compound is present or not. "R" values should not appear on any data tables even as a last resort.

Lastly, no analyte concentration, even if it passed all QC tests, is guaranteed to be accurate. Strict QC serves to increase confidence in data but any value potentially contains error.

Date : 2-15-05

Diane Waldschmidt
Environmental Scientist/Director

HOLDING TIME

The amount of an analyte can change with time due to chemical instability, degradation, volatilization, etc. If the specified holding time is exceeded the data may not be valid.

The analyses performed on samples in this sample delivery group were all done within the holding time defined within the Sediment Transport Quality Assurance Project Plan and TPR-80 documents.

BLANK CONTAMINATION

Quality assurance blanks, method, trip, field, or rinse blanks are prepared to identify any contamination, which may have been introduced into the samples during preparation or field activity. Method blanks measure lab contamination. Trip blanks measure cross contamination during shipment. Field and rinse blanks measure cross contamination during field operations.

Trip, field, or rinsate blanks are not required for radiochemical analyses during the Sediment Transport Project, per QAPP.

Method Blank

No positive identifications of radiological target analytes were observed in corresponding method blanks for Pb-210 or Cs-137 above the laboratory-reporting limit in associated method blanks.

CALIBRATION

Satisfactory instrument calibration is established to ensure that the instrument is capable of producing acceptable quantitative results. The initial calibration efficiency demonstrates that the instrument is capable of giving acceptable performance. The continuing calibration verifies that the instrument is giving satisfactory weekly performance.

Calibration Gamma Spectrometry

- Efficiency of selected energies must be within three standard deviations of the mean. (Continuing Calibration)
- The resolution of each peak must not exceed 5Kev. (Continuing Calibration)

Calibration Beta Spectrometry

- Check source count - rates must be within three standard deviations of the mean. (Continuing Calibration)
- The calibration efficiency must be $\pm$10% of the previous calibration. (Initial Calibration)
- Calculated efficiency for each detector used must be greater than 15%. (Initial Calibration)

All Associated instrument calibrations for both beta and gamma spectrometry were well within acceptance limits at all times.

BETA SPECTROMETRY RECOVERY STANDARD

A recovery standard (Lead-210) is evaluated to check chemical recovery or yield. Recovery of this standard must be between 40 and 100 percent to demonstrate that the system was operating in a controlled manner. All associated data is rejected if the allowable recovery limit is not met.

All recovery standards observed for samples and method blanks were well within acceptance limits.

MATRIX SPIKE/MATRIX SPIKE DUPLICATE

The matrix spike and matrix spike duplicate (MS/MSD) are generated to determine the precision and accuracy of the analytical procedure in a given matrix. This information may be used to qualify data.

Sample LDW-Sg2-60-62 was analyzed as a MS/MSD for both Pb-210 and Cs-137. Precision and accuracy indicators were favorable and found to be within the guidelines established in the project QAPP in all cases.

LABORATORY CONTROL SAMPLE

A laboratory control sample (LCS) was processed at the frequency specified in the Project QAPP (one for each group of twenty samples processed). Observed recoveries of LCSs for both Pb-210 and Cs-137 were well within the acceptance range (85-115%) per the TPR-80.

FIELD DUPLICATE

Field duplicates are collected at a frequency of one per twenty field samples or a minimum of one per sample delivery group. Acceptable precision for results obtained for the field duplicate pair is +/- 30% relative percent difference.

Samples LDW-Sg2-50-52 and LDW-Sg2-50-52FD comprise the field duplicate pair associated with this SDG. All field duplicate precision values associated with the samples contained in this report were well within the specifications defined in the Sediment Transport Project QAPP and described above with one exception. The calculated relative percent difference value for Pb-210 is 41.1%. However, because the mean difference between Pb-210 results for the pair is less than 3, qualification of sample results is not necessary per TPR-80.

OTHER QC DATA OUT OF SPECIFICATION

None.

SYSTEM PERFORMANCE AND OVERALL ASSESSMENT

Overall the laboratory data generated met the project goals and QC criteria as defined in the Sediment Transport Project QAPP.

PROBLEMS WITH ANALYSIS NOTED IN CASE NARRATIVES

None.

DEFINITIONS OF DATA QUALIFIER (VALIDATION) FLAGS USED IN THIS REPORT

Flag	Definition
U	The analysis was performed, but no radioactivity was detected (i.e., the radioanalytical result was not statistically positive at the 95% confidence level and/or the result was below its MDA). The "U" qualifier flag is also applicable to any result reported as zero (0) (+/- an associated uncertainty). NOTE: *The radionuclide is not considered to be present in the sample*
UJ	The analysis was performed and a statistically positive result was reported at the 95% confidence interval. However, the result is highly questionable (false positive) due to analytical and/or laboratory quality control anomalies. The use of such a result is strongly discouraged. Analytical and quality control anomalies include such items as; significant blank contamination, known photopeak interferences and/or photopeak resolution problems, known matrix interferences, unacceptable laboratory control sample recoveries, serious instrument calibration problems, improper sample preservation, etc. NOTE: *The radionuclide may or may not be present in the sample and the result is considered highly questionable.*
J	The analysis was performed and radioactivity was detected (i.e., the radioanalytical result is statistically positive at the 95% confidence level and is above its MDA). However, the result is questionable due to analytical and/or laboratory quality control anomalies and should, therefore, be used only as an estimated (approximated) quantity. Analytical and/or quality control anomalies include such items such as; laboratory duplicate imprecision, unsatisfactory analytical yields, insufficient laboratory control sample recoveries, unacceptable PE sample results, instrument calibration problems, improper sample preservation, etc. NOTE: *The radionuclide is considered to be present in the sample, but the result may not be an accurate representation of the amount of activity actually present in the sample.*
R	The analysis result is unusable and was rejected due to severe analytical and/or quality control problems. NOTE: The radionuclide may or may not be present and the result is known to be inaccurate or imprecise.

Laboratory Data With Qualifiers Added

MASS SPEC SERVICES

P.O. Box 163, Orangeburg, NY 10962

Report of Analysis

Sediments

Windward Environmental LLC
200 West Mercer Street
Seattle, WA 98119

Attn: Tad Dashler

Core LDW-Sg2 **collected 12/28/04**

Report Date:	01/20/05
MSS No.:	Pb0071
Project:	04-08-06-23 LDW Group
Date Rec'd:	12/30/04
Task Supervisor:	H. Jeter

Radiometric Results in pCi / g dry

MSS No.	Identity	Comment	Collection Time	Pb-210 (2-15-05 DHW)	Cs-137 (2-15-05 DHW)	Beta Count	Gamma Count
Pb0071-1	LDW-Sg2-0-1		14:05	0.59 ± 0.12	0.071 ± 0.028	01/15/05	01/10/05
Pb0071-2	LDW-Sg2-5-6		14:11	0.48 ± 0.12	0.088 ± 0.046	01/15/05	01/14/05
Pb0071-3	LDW-Sg2-10-11		14:17	0.45 ± 0.15	0.153 ± 0.046	01/15/05	01/10/05
Pb0071-4	LDW-Sg2-15-16		14:24	0.40 ± 0.10	0.165 ± 0.052	01/15/05	01/12/05
Pb0071-5	LDW-Sg2-20-21		14:40	0.14 ± 0.11	0.169 ± 0.066	01/15/05	01/13/05
Pb0071-6	LDW-Sg2-25-26		14:49	0.14 ± 0.06	0.124 ± 0.054	01/15/05	01/11/05
Pb0071-7	LDW-Sg2-30-31		14:58	0.16 ± 0.08	< 0.083 U	01/15/05	01/11/05
Pb0071-8	LDW-Sg2-30-31 MR	Matrix Replicate	14:58	0.19 ± 0.09	< 0.068 U	01/15/05	01/12/05
Pb0071-9	LDW-Sg2-35-36		15:07	0.20 ± 0.08	< 0.055 U	01/15/05	01/13/05
Pb0071-10	LDW-Sg2-40-41		15:14	0.20 ± 0.08	< 0.045 U	01/15/05	01/11/05
Pb0071-11	LDW-Sg2-45-46		15:25	0.27 ± 0.11	< 0.069 U	01/15/05	01/11/05
Pb0071-12	LDW-Sg2-50-52		15:37	0.29 ± 0.09	< 0.075 U	01/15/05	01/19/05
Pb0071-13	LDW-Sg2-50-52 FD	Field Duplicate	15:37	0.44 ± 0.09	< 0.072 U	01/15/05	01/17/05
Pb0071-14	LDW-Sg2-55-56		15:45	0.15 ± 0.10	< 0.054 U	01/15/05	01/12/05
Pb0071-15	LDW-Sg2-60-62		15:53	0.38 ± 0.13	< 0.054 U	01/15/05	01/12/05
Pb0071-16	LDW-Sg2-60-62 MS	Matrix Spike	15:53	7.52 ± 0.32	49.10 ± 0.62	01/15/05	01/10/05
Pb0071-17	LDW-Sg2-60-62 MSD	Matrix Spike Duplicate	15:53	7.60 ± 0.30	54.79 ± 0.70	01/15/05	01/10/05
Pb0071-18	LDW-Sg2-65-66		16:03	0.32 ± 0.12	< 0.033 U	01/17/05	01/14/05
Pb0071-19	LDW-Sg2-70-71		16:13	0.18 ± 0.12	< 0.032 U	01/17/05	01/14/05
Pb0071-20	LDW-Sg2-75-76		16:25	0.31 ± 0.09	< 0.054 U	01/17/05	01/15/05
Pb0071-21	LDW-Sg2-80-81		16:38	0.19 ± 0.10	< 0.040 U	01/17/05	01/13/05

Matrix Spike Expected Values:

Pb-210 7.45 pCi/g spike + (0.38 ± 0.13) from matrix = 7.83 ± 0.13 pCi/g
Cs-137 44.7 pCi/g spike + (no contribution from matrix) = 44.7 pCi/g

Target Detection Limits:

Pb-210 0.2 pCi/g dry
Cs-137 0.2 pCi/g dry

Bismuth Beta Counting Method
Gamma Spectral Analysis

Tolerances are 2 sigma counting uncertainties.
Detection limits are at the 4.66 sigma level.

Hewitt W. Jeter

ENVIRONMENTAL DATA SERVICES, LTD.

DATA VALIDATION • TECHNICAL WRITING • CONSULTING • DATA INTERPRETATION

DATA VALIDATION REPORT

LDW RI Sediment Transport

SDG #Sg3

Prepared by

ENVIRONMENTAL DATA SERVICES, LTD.

For

WINDWARD ENVIRONMENTAL

March 7, 2005

2690 Oak Hill Drive, Allison Park, PA 15101
FAX/PHONE • 412-486-6989
E-MAIL • edatas@aol.com

Data Assessment Narrative

RADIOLOGICAL DATA ASSESSMENT NARRATIVE

SITE: LDW RI Sediment Transport

LABORATORY: Mass Spec Services

SAMPLE DELIVERY GROUP: Sg3

This sample delivery group consists of the following soil samples:

LDW-Sg3-0-1	LDW-Sg3-5-6	LDW-Sg3-10-11	LDW-Sg3-15-17	LDW-Sg3-15-17FD
LDW-Sg3-20-21	LDW-Sg3-25-27	LDW-Sg3-30-31	LDW-Sg3-35-36	LDW-Sg3-40-41
LDW-Sg3-45-46	LDW-Sg3-50-51	LDW-Sg3-55-56	LDW-Sg3-60-61	LDW-Sg3-65-66
LDW-Sg3-70-71	LDW-Sg3-75-76	LDW-Sg3-80-81		

Samples described above were analyzed via Beta and Gamma Spectrometry to determine the concentrations of Lead 210 and Cesium 137 respectively in sediment.

Project specific QA objectives, as well as TPR80 (Idaho National Engineering and Environmental Laboratory Sample Management Office Technical Procedure for Radtioanalytical Data validation, TPR-80, Rc V.2, May, 1997.

All data are valid and acceptable except those analytes which have been qualified as described in the attached glossary. All data qualification related to this group of samples is detailed on the attached sheets.

Major Data Quality Issues

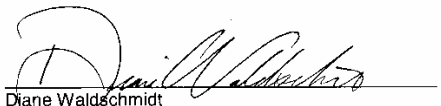
None.

Minor Data Quality Issues

None.

All data users should note two facts. First, the "R" flag means that the associated value is unusable due to significant QC problems, the data is invalid and provides no information as to whether the compound is present or not. "R" values should not appear on any data tables even as a last resort.

Lastly, no analyte concentration, even if it passed all QC tests, is guaranteed to be accurate. Strict QC serves to increase confidence in data but any value potentially contains error.



Date : 3-7-05

Diane Waldschmidt
Environmental Scientist/Director

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HOLDING TIME

The amount of an analyte can change with time due to chemical instability, degradation, volatilization, etc. If the specified holding time is exceeded the data may not be valid.

The analyses performed on samples in this sample delivery group were all done within the holding time defined within the Sediment Transport Quality Assurance Project Plan and TPR-80 documents.

BLANK CONTAMINATION

Quality assurance blanks, method, trip, field, or rinse blanks are prepared to identify any contamination, which may have been introduced into the samples during preparation or field activity. Method blanks measure lab contamination. Trip blanks measure cross contamination during shipment. Field and rinse blanks measure cross contamination during field operations.

Trip, field, or rinsate blanks are not required for radiochemical analyses during the Sediment Transport Project, per QAPP.

Method Blank

No positive identifications of radiological target analytes were observed in corresponding method blanks for Pb-210 or Cs-137 above the laboratory-reporting limit.

CALIBRATION

Satisfactory instrument calibration is established to ensure that the instrument is capable of producing acceptable quantitative results. The initial calibration efficiency demonstrates that the instrument is capable of giving acceptable performance. The continuing calibration verifies that the instrument is giving satisfactory weekly performance.

Calibration Gamma Spectrometry

- Efficiency of selected energies must be within three standard deviations of the mean. (Continuing Calibration)

- The resolution of each peak must not exceed 5Kev. (Continuing Calibration)

Calibration Beta Spectrometry

- Check source count - rates must be within three standard deviations of the mean. (Continuing Calibration)

- The calibration efficiency must be $\pm$10% of the previous calibration. (Initial Calibration)

- Calculated efficiency for each detector used must be greater than 15%. (Initial Calibration)

All Associated instrument calibrations for both beta and gamma spectrometry were well within acceptance limits at all times.

BETA SPECTROMETRY RECOVERY STANDARD

A recovery standard (Lead-210) is evaluated to check chemical recovery or yield. Recovery of this standard must be between 40 and 100 percent to demonstrate that the system was operating in a controlled manner. All associated data is rejected if the allowable recovery limit is not met.

All recovery standards observed for samples and method blanks were well within acceptance limits.

MATRIX SPIKE/MATRIX SPIKE DUPLICATE

The matrix spike and matrix spike duplicate (MS/MSD) are generated to determine the precision and accuracy of the analytical procedure in a given matrix. This information may be used to qualify data.

Sample LDW-Sg3-25-27 was analyzed as a MS/MSD for both Pb-210 and Cs-137. Precision and accuracy indicators were favorable and found to be within the guidelines established in the project QAPP in all cases.

LABORATORY CONTROL SAMPLE

A laboratory control sample (LCS) was processed at the frequency specified in the Project QAPP (one for each group of twenty samples processed). Observed recoveries of LCSs for both Pb-210 and Cs-137 were well within the acceptance range (85-115%) per the TPR-80.

FIELD DUPLICATE

Field duplicates are collected at a frequency of one per twenty field samples or a minimum of one per sample delivery group. Acceptable precision for results obtained for the field duplicate pair is +/- 30% relative percent difference.

Samples LDW-Sg3-15-17 and LDW-Sg3-15-17FD comprise the field duplicate pair associated with this SDG. All field duplicate precision values associated with the samples contained in this report were well within the specifications defined in the Sediment Transport Project QAPP and described above.

OTHER QC DATA OUT OF SPECIFICATION

None.

SYSTEM PERFORMANCE AND OVERALL ASSESSMENT

Overall the laboratory data generated met the project goals and QC criteria as defined in the Sediment Transport Project QAPP.

PROBLEMS WITH ANALYSIS NOTED IN CASE NARRATIVES

None.

DEFINITIONS OF DATA QUALIFIER (VALIDATION) FLAGS USED IN THIS REPORT

Flag	Definition
U	The analysis was performed, but no radioactivity was detected (i.e., the radioanalytical result was not statistically positive at the 95% confidence level and/or the result was below its MDA). The "U" qualifier flag is also applicable to any result reported as zero (0) (+/- an associated uncertainty). NOTE: *The radionuclide is not considered to be present in the sample*
UJ	The analysis was performed and a statistically positive result was reported at the 95% confidence interval. However, the result is highly questionable (false positive) due to analytical and/or laboratory quality control anomalies. The use of such a result is strongly discouraged. Analytical and quality control anomalies include such items as; significant blank contamination, known photopeak interferences and/or photopeak resolution problems, known matrix interferences, unacceptable laboratory control sample recoveries, serious instrument calibration problems, improper sample preservation, etc. NOTE: *The radionuclide may or may not be present in the sample and the result is considered highly questionable.*
J	The analysis was performed and radioactivity was detected (i.e., the radioanalytical result is statistically positive at the 95% confidence level and is above its MDA). However, the result is questionable due to analytical and/or laboratory quality control anomalies and should, therefore, be used only as an estimated (approximated) quantity. Analytical and/or quality control anomalies include such items such as; laboratory duplicate imprecision, unsatisfactory analytical yields, insufficient laboratory control sample recoveries, unacceptable PE sample results, instrument calibration problems, improper sample preservation, etc. NOTE: *The radionuclide is considered to be present in the sample, but the result may not be an accurate representation of the amount of activity actually present in the sample.*
R	The analysis result is unusable and was rejected due to severe analytical and/or quality control problems. NOTE: The radionuclide may or may not be present and the result is known to be inaccurate or imprecise.

Laboratory Data With Qualifiers Added

MASS SPEC SERVICES

P.O. Box 163, Orangeburg, NY 10962

Report of Analysis

Report Date:	02/07/05
MSS No.:	Pb0072
Project:	04-08-06-23 LDW Group
Date Rec'd:	12/30/04
Task Supervisor:	H. Jeter

Windward Environmental LLC
200 West Mercer Street
Seattle, WA 98119

Attn: Tad Dashler

Sediments

Core LDW-Sg3 collected 12/27/04

Radiometric Results in pCi / g dry

MSS No.	Identity	Comment	Collection Time	Pb-210	Cs-137	Beta Count	Gamma Count
Pb0072-1	LDW-Sg3-0-1	low weight 10.71 g dry	8:34	0.90 ± 0.24	0.170 ± 0.102	01/21/05	01/23/05
Pb0072-2	LDW-Sg3-5-6		8:49	1.00 ± 0.13	0.160 ± 0.060	01/21/05	01/29/05
Pb0072-3	LDW-Sg3-10-11		9:03	0.64 ± 0.12	0.198 ± 0.081	01/21/05	01/24/05
Pb0072-4	LDW-Sg3-15-17		9:12	0.69 ± 0.11	0.119 ± 0.053	01/21/05	01/22/05
Pb0072-5	LDW-Sg3-15-17 FD	Field Duplicate	9:12	0.85 ± 0.12	0.160 ± 0.042	01/21/05	01/23/05
Pb0072-6	LDW-Sg3-20-21		9:23	0.90 ± 0.15	0.147 ± 0.051	01/21/05	01/27/05
Pb0072-7	LDW-Sg3-25-27		9:31	0.78 ± 0.13	0.301 ± 0.105	01/22/05	01/22/05
Pb0072-8	LDW-Sg3-25-27 MS	Matrix Spike	9:31	8.19 ± 0.37	32.23 ± 0.40	01/22/05	01/21/05
Pb0072-9	LDW-Sg3-25-27 MSD	Matrix Spike Duplicate	9:31	8.15 ± 0.35	34.04 ± 0.41	01/22/05	01/21/05
Pb0072-10	LDW-Sg-30-31		9:44	0.80 ± 0.14	0.140 ± 0.069	01/22/05	01/23/05
Pb0072-11	LDW-Sg3-35-36		9:59	0.70 ± 0.13	0.149 ± 0.036	01/22/05	01/22/05
Pb0072-12	LDW-Sg3-40-41		10:11	0.50 ± 0.13	< 0.089 U	01/22/05	01/20/05
Pb0072-13	LDW-Sg3-45-46		10:26	0.69 ± 0.11	0.100 ± 0.059	01/22/05	01/29/05
Pb0072-14	LDW-Sg3-50-51		10:37	0.66 ± 0.14	< 0.094 U	01/22/05	01/22/05
Pb0072-15	LDW-Sg3-50-51 MR	Matrix Replicate	10:37	0.91 ± 0.17	0.212 ± 0.109	01/22/05	01/21/05
Pb0072-16	LDW-Sg3-55-56		10:48	0.80 ± 0.11	0.190 ± 0.057	01/22/05	01/23/05
Pb0072-17	LDW-Sg3-60-61		11:00	0.69 ± 0.14	0.167 ± 0.067	01/22/05	01/27/05
Pb0072-18	LDW-Sg3-65-66		11:18	0.77 ± 0.13	< 0.081 U	01/22/05	01/24/05
Pb0072-19	LDW-Sg3-70-71		11:34	0.75 ± 0.13	0.125 ± 0.042	01/22/05	01/23/05
Pb0072-20	LDW-Sg3-75-76		11:38	0.67 ± 0.14	0.331 ± 0.105	01/22/05	01/27/05
Pb0072-21	LDW-Sg3-80-81		11:45	0.67 ± 0.13	0.357 ± 0.108	01/22/05	01/23/05

Matrix Spike Expected Values:

Pb-210 7.89 pCi/g spike + (0.78 ± 0.13) from matrix = 8.67 ± 0.13 pCi/g
Cs-137 31.43 pCi/g spike + (0.30 ± 0.11) from matrix = 31.73 ± 0.11 pCi/g

Target Detection Limits:
Pb-210 0.2 pCi/g dry
Cs-137 0.2 pCi/g dry

Bismuth Beta Counting Method
Gamma Spectral Analysis

Hewitt W. Jeter

Tolerances are 2 sigma counting uncertainties.
Detection limits are at the 4.66 sigma level.

ENVIRONMENTAL DATA SERVICES, LTD.

DATA VALIDATION • TECHNICAL WRITING • CONSULTING • DATA INTERPRETATION

DATA VALIDATION REPORT

LDW RI Sediment Transport

SDG #Sg4

Prepared by

ENVIRONMENTAL DATA SERVICES, LTD.

For

WINDWARD ENVIRONMENTAL

March 7, 2005

2690 Oak Hill Drive, Allison Park, PA 15101
FAX/PHONE • 412-486-6989
E-MAIL • edatas@aol.com

Data Assessment Narrative

RADIOLOGICAL DATA ASSESSMENT NARRATIVE

SITE: LDW RI Sediment Transport

LABORATORY: Mass Spec Services

SAMPLE DELIVERY GROUP: Sg4

This sample delivery group consists of the following soil samples:

LDW-Sg4-0-1	LDW-Sg4-5-6	LDW-Sg4-10-12	LDW-Sg4-10-12FD	LDW-Sg4-15-16
LDW-Sg4-20-21	LDW-Sg4-25-26	LDW-Sg4-30-31	LDW-Sg4-35-37	LDW-Sg4-40-41
LDW-Sg4-45-46	LDW-Sg4-50-51	LDW-Sg4-55-56	LDW-Sg4-60-61	LDW-Sg4-65-66
LDW-Sg4-70-71	LDW-Sg4-75-76	LDW-Sg4-80-81		

Samples described above were analyzed via Beta and Gamma Spectrometry to determine the concentrations of Lead 210 and Cesium 137 respectively in sediment.

Project specific QA objectives, as well as TPR80 (Idaho National Engineering and Environmental Laboratory Sample Management Office Technical Procedure for Radtioanalytical Data validation, TPR-80, Rc V.2, May, 1997.

All data are valid and acceptable except those analytes which have been qualified as described in the attached glossary. All data qualification related to this group of samples is detailed on the attached sheets.

Major Data Quality Issues

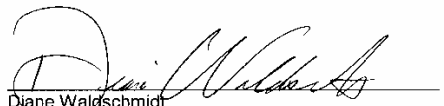
None.

Minor Data Quality Issues

None.

All data users should note two facts. First, the "R" flag means that the associated value is unusable due to significant QC problems, the data is invalid and provides no information as to whether the compound is present or not. "R" values should not appear on any data tables even as a last resort.

Lastly, no analyte concentration, even if it passed all QC tests, is guaranteed to be accurate. Strict QC serves to increase confidence in data but any value potentially contains error.



Date : 3-7-05

Diane Waldschmidt
Environmental Scientist/Director

1

HOLDING TIME

The amount of an analyte can change with time due to chemical instability, degradation, volatilization, etc. If the specified holding time is exceeded the data may not be valid.

The analyses performed on samples in this sample delivery group were all done within the holding time defined within the Sediment Transport Quality Assurance Project Plan and TPR-80 documents.

BLANK CONTAMINATION

Quality assurance blanks, method, trip, field, or rinse blanks are prepared to identify any contamination, which may have been introduced into the samples during preparation or field activity. Method blanks measure lab contamination. Trip blanks measure cross contamination during shipment. Field and rinse blanks measure cross contamination during field operations.

Trip, field, or rinsate blanks are not required for radiochemical analyses during the Sediment Transport Project, per QAPP.

Method Blank

No positive identifications of radiological target analytes were observed in corresponding method blanks for Pb-210 or Cs-137 above the laboratory-reporting limit.

CALIBRATION

Satisfactory instrument calibration is established to ensure that the instrument is capable of producing acceptable quantitative results. The initial calibration efficiency demonstrates that the instrument is capable of giving acceptable performance. The continuing calibration verifies that the instrument is giving satisfactory weekly performance.

Calibration Gamma Spectrometry

- Efficiency of selected energies must be within three standard deviations of the mean. (Continuing Calibration)

- The resolution of each peak must not exceed 5Kev. (Continuing Calibration)

Calibration Beta Spectrometry

- Check source count - rates must be within three standard deviations of the mean. (Continuing Calibration)

- The calibration efficiency must be $\pm$10% of the previous calibration. (Initial Calibration)

- Calculated efficiency for each detector used must be greater than 15%. (Initial Calibration)

All Associated instrument calibrations for both beta and gamma spectrometry were well within acceptance limits at all times.

BETA SPECTROMETRY RECOVERY STANDARD

A recovery standard (Lead-210) is evaluated to check chemical recovery or yield. Recovery of this standard must be between 40 and 100 percent to demonstrate that the system was operating in a controlled manner. All associated data is rejected if the allowable recovery limit is not met.

All recovery standards observed for samples and method blanks were well within acceptance limits.

MATRIX SPIKE/MATRIX SPIKE DUPLICATE

The matrix spike and matrix spike duplicate (MS/MSD) are generated to determine the precision and accuracy of the analytical procedure in a given matrix. This information may be used to qualify data.

Sample LDW-Sg4-35-37 was analyzed as a MS/MSD for both Pb-210 and Cs-137. Precision and accuracy indicators were favorable and found to be within the guidelines established in the project QAPP in all cases.

LABORATORY CONTROL SAMPLE

A laboratory control sample (LCS) was processed at the frequency specified in the Project QAPP (one for each group of twenty samples processed). Observed recoveries of LCSs for both Pb-210 and Cs-137 were well within the acceptance range (85-115%) per the TPR-80.

FIELD DUPLICATE

Field duplicates are collected at a frequency of one per twenty field samples or a minimum of one per sample delivery group. Acceptable precision for results obtained for the field duplicate pair is +/- 30% relative percent difference.

Samples LDW-Sg4-10-12 and LDW-Sg4-10-12FD comprise the field duplicate pair associated with this SDG. All field duplicate precision values associated with the samples contained in this report were well within the specifications defined in the Sediment Transport Project QAPP and described above with one exception. The calculated relative percent difference value for Cs-137 is 62.1%. However, because the mean difference between Cs-137 results for the pair is less than 3, qualification of sample results is not necessary per TPR-80.

OTHER QC DATA OUT OF SPECIFICATION

None.

SYSTEM PERFORMANCE AND OVERALL ASSESSMENT

Overall the laboratory data generated met the project goals and QC criteria as defined in the Sediment Transport Project QAPP.

PROBLEMS WITH ANALYSIS NOTED IN CASE NARRATIVES

None.

DEFINITIONS OF DATA QUALIFIER (VALIDATION) FLAGS USED IN THIS REPORT

Flag	Definition
U	The analysis was performed, but no radioactivity was detected (i.e., the radioanalytical result was not statistically positive at the 95% confidence level and/or the result was below its MDA). The "U" qualifier flag is also applicable to any result reported as zero (0) (+/- an associated uncertainty). NOTE: *The radionuclide is not considered to be present in the sample*
UJ	The analysis was performed and a statistically positive result was reported at the 95% confidence interval. However, the result is highly questionable (false positive) due to analytical and/or laboratory quality control anomalies. The use of such a result is strongly discouraged. Analytical and quality control anomalies include such items as; significant blank contamination, known photopeak interferences and/or photopeak resolution problems, known matrix interferences, unacceptable laboratory control sample recoveries, serious instrument calibration problems, improper sample preservation, etc. NOTE: *The radionuclide may or may not be present in the sample and the result is considered highly questionable.*
J	The analysis was performed and radioactivity was detected (i.e., the radioanalytical result is statistically positive at the 95% confidence level and is above its MDA). However, the result is questionable due to analytical and/or laboratory quality control anomalies and should, therefore, be used only as an estimated (approximated) quantity. Analytical and/or quality control anomalies include such items such as; laboratory duplicate imprecision, unsatisfactory analytical yields, insufficient laboratory control sample recoveries, unacceptable PE sample results, instrument calibration problems, improper sample preservation, etc. NOTE: *The radionuclide is considered to be present in the sample, but the result may not be an accurate representation of the amount of activity actually present in the sample.*
R	The analysis result is unusable and was rejected due to severe analytical and/or quality control problems. NOTE: The radionuclide may or may not be present and the result is known to be inaccurate or imprecise.

Laboratory Data With Qualifiers Added

MASS SPEC SERVICES

P.O. Box 163, Orangeburg, NY 10962

Report of Analysis

Sediments

Windward Environmental LLC
200 West Mercer Street
Seattle, WA 98119

Attn: Tad Dashler

Core LDW-Sg4 collected 12/22/04

Report Date:	02/10/05
MSS No.:	Pb0073
Project:	04-08-06-23 LDW Group
Date Rec'd:	12/30/04
Task Supervisor:	H. Jeter

Radiometric Results in pCi / g dry

MSS No.	Identity	Comment	Collection Time	Pb-210	Cs-137	Beta Count	Gamma Count
Pb0073-1	LDW-Sg4-0-1		12:00	0.42 ± 0.13	0.085 ± 0.034	01/28/05	02/02/05
Pb0073-2	LDW-Sg4-5-6		12:04	0.75 ± 0.14	0.171 ± 0.083	01/28/05	01/31/05
Pb0073-3	LDW-Sg4-10-12		12:11	0.49 ± 0.11	0.135 ± 0.057	01/28/05	02/03/05
Pb0073-4	LDW-Sg4-10-12 FD	Field Duplicate	12:11	0.46 ± 0.10	0.071 ± 0.047	01/28/05	02/03/05
Pb0073-5	LDW-Sg4-15-16		12:16	0.58 ± 0.12	0.122 ± 0.040	01/28/05	02/03/05
Pb0073-6	LDW-Sg4-20-21		12:25	0.54 ± 0.11	0.165 ± 0.059	01/28/05	02/01/05
Pb0073-7	LDW-Sg4-25-26		12:33	0.49 ± 0.11	0.158 ± 0.056	01/28/05	02/03/05
Pb0073-8	LDW-Sg4-30-31		13:15	0.53 ± 0.10	0.185 ± 0.045	01/28/05	02/02/05
Pb0073-9	LDW-Sg4-35-37		13:23	0.60 ± 0.12	0.231 ± 0.099	01/28/05	01/28/05
Pb0073-10	LDW-Sg4-35-37 MS	Matrix Spike	13:23	14.97 ± 0.61	68.05 ± 0.82	01/28/05	01/20/05
Pb0073-11	LDW-Sg4-35-37 MSD	Matrix Spike Duplicate	13:23	15.54 ± 0.69	67.31 ± 0.79	01/29/05	01/20/05
Pb0073-12	LDW-Sg4-40-41		13:32	0.58 ± 0.10	0.254 ± 0.059	01/29/05	02/01/05
Pb0073-13	LDW-Sg4-45-46		13:39	0.44 ± 0.12	0.162 ± 0.075	01/29/05	02/03/05
Pb0073-14	LDW-Sg4-50-51		13:43	0.40 ± 0.13	0.338 ± 0.086	01/29/05	02/02/05
Pb0073-15	LDW-Sg4-55-56		13:50	0.42 ± 0.12	0.219 ± 0.061	01/29/05	01/31/05
Pb0073-16	LDW-Sg4-60-61		13:55	0.53 ± 0.14	0.250 ± 0.106	01/29/05	02/02/05
Pb0073-17	LDW-Sg4-65-66		14:01	0.52 ± 0.11	0.203 ± 0.040	01/29/05	02/02/05
Pb0073-18	LDW-Sg4-70-71		14:05	0.43 ± 0.10	0.145 ± 0.044	01/29/05	01/29/05
Pb0073-19	LDW-Sg4-75-76		14:11	0.32 ± 0.12	0.481 ± 0.161	01/29/05	01/28/05
Pb0073-20	LDW-Sg4-75-76 MR	Matrix Replicate	14:11	0.43 ± 0.11	0.429 ± 0.138	01/29/05	02/01/05
Pb0073-21	LDW-Sg4-80-81		14:17	0.26 ± 0.11	0.265 ± 0.068	01/29/05	01/31/05

Matrix Spike Expected Values:

Pb-210	15.36 pCi/g spike + (0.60 ± 0.12)	from matrix =	15.96 ± 0.12	pCi/g
Cs-137	59.09 pCi/g spike + (0.23 ± 0.10)	from matrix =	59.32 ± 0.10	pCi/g

Target Detection Limits: Pb-210 0.2 pCi/g dry; Cs-137 0.2 pCi/g dry

Bismuth Beta Counting Method
Gamma Spectral Analysis

Tolerances are 2 sigma counting uncertainties.
Detection limits are at the 4.66 sigma level.

Hewitt W. Jeter

ENVIRONMENTAL DATA SERVICES, LTD.

DATA VALIDATION • TECHNICAL WRITING • CONSULTING • DATA INTERPRETATION

DATA VALIDATION REPORT

LDW RI Sediment Transport

SDG #Sg5a

Prepared by

ENVIRONMENTAL DATA SERVICES, LTD.

For

WINDWARD ENVIRONMENTAL

March 14, 2005

2690 Oak Hill Drive, Allison Park, PA 15101
FAX/PHONE • 412-486-6989
E-MAIL • edatas@aol.com

Data Assessment Narrative

RADIOLOGICAL DATA ASSESSMENT NARRATIVE

SITE: LDW RI Sediment Transport

LABORATORY: Mass Spec Services

SAMPLE DELIVERY GROUP: Sg5a

This sample delivery group consists of the following soil samples:

LDW-Sg5a-0-1	LDW-Sg5a-5-6	LDW-Sg5a-10-11	LDW-Sg5a-15-16	LDW-Sg5a-20-21
LDW-Sg5a-25-26	LDW-Sg5a-30-32	LDW-Sg5a-30-32FD	LDW-Sg5a-35-36	LDW-Sg5a-40-42
LDW-Sg5a-45-46	LDW-Sg5a-50-51	LDW-Sg5a-55-56	LDW-Sg5a-60-61	LDW-Sg5a-65-66
LDW-Sg5a-70-71	LDW-Sg5a-75-76	LDW-Sg5a-80-81		

Samples described above were analyzed via Beta and Gamma Spectrometry to determine the concentrations of Lead 210 and Cesium 137 respectively in sediment.

Project specific QA objectives, as well as TPR80 (Idaho National Engineering and Environmental Laboratory Sample Management Office Technical Procedure for Radtioanalytical Data validation, TPR-80, Rc V.2, May, 1997.

All data are valid and acceptable except those analytes which have been qualified as described in the attached glossary. All data qualification related to this group of samples is detailed on the attached sheets.

Major Data Quality Issues

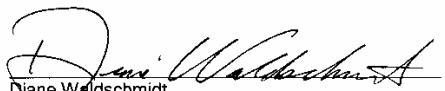
None.

Minor Data Quality Issues

None.

All data users should note two facts. First, the "R" flag means that the associated value is unusable due to significant QC problems, the data is invalid and provides no information as to whether the compound is present or not. "R" values should not appear on any data tables even as a last resort.

Lastly, no analyte concentration, even if it passed all QC tests, is guaranteed to be accurate. Strict QC serves to increase confidence in data but any value potentially contains error.



Date : 3-14-05

Diane Waldschmidt
Environmental Scientist/Director

HOLDING TIME

The amount of an analyte can change with time due to chemical instability, degradation, volatilization, etc. If the specified holding time is exceeded the data may not be valid.

The analyses performed on samples in this sample delivery group were all done within the holding time defined within the Sediment Transport Quality Assurance Project Plan and TPR-80 documents.

BLANK CONTAMINATION

Quality assurance blanks, method, trip, field, or rinse blanks are prepared to identify any contamination, which may have been introduced into the samples during preparation or field activity. Method blanks measure lab contamination. Trip blanks measure cross contamination during shipment. Field and rinse blanks measure cross contamination during field operations.

Trip, field, or rinsate blanks are not required for radiochemical analyses during the Sediment Transport Project, per QAPP.

Method Blank

No positive identifications of radiological target analytes were observed in corresponding method blanks for Pb-210 or Cs-137 above the laboratory reporting limit in associated method blanks.

CALIBRATION

Satisfactory instrument calibration is established to ensure that the instrument is capable of producing acceptable quantitative results. The initial calibration efficiency demonstrates that the instrument is capable of giving acceptable performance. The continuing calibration verifies that the instrument is giving satisfactory weekly performance.

Calibration Gamma Spectrometry

- Efficiency of selected energies must be within three standard deviations of the mean. (Continuing Calibration)
- The resolution of each peak must not exceed 5Kev. (Continuing Calibration)

Calibration Beta Spectrometry

- Check source count - rates must be within three standard deviations of the mean. (Continuing Calibration)
- The calibration efficiency must be $\pm$10% of the previous calibration. (Initial Calibration)
- Calculated efficiency for each detector used must be greater than 15%. (Initial Calibration)

All Associated instrument calibrations for both beta and gamma spectrometry were well within acceptance limits at all times.

BETA SPECTROMETRY RECOVERY STANDARD

A recovery standard (Lead-210) is evaluated to check chemical recovery or yield. Recovery of this standard must be between 40 and 100 percent to demonstrate that the system was operating in a controlled manner. All associated data is rejected if the allowable recovery limit is not met.

All recovery standards observed for samples and method blanks were well within acceptance limits.

MATRIX SPIKE/MATRIX SPIKE DUPLICATE

The matrix spike and matrix spike duplicate (MS/MSD) are generated to determine the precision and accuracy of the analytical procedure in a given matrix. This information may be used to qualify data.

Sample LDW-Sg5a-40-42 was analyzed as a MS/MSD for both Pb-210 and Cs-137. Precision and accuracy indicators were favorable and found to be within the guidelines established in the project QAPP in all cases.

LABORATORY CONTROL SAMPLE

A laboratory control sample (LCS) was processed at the frequency specified in the Project QAPP (one for each group of twenty samples processed). Observed recoveries of LCSs for both Pb-210 and Cs-137 were well within the acceptance range (85-115%) per the TPR-80.

FIELD DUPLICATE

Field duplicates are collected at a frequency of one per twenty field samples or a minimum of one per sample delivery group. Acceptable precision for results obtained for the field duplicate pair is +/- 30% relative percent difference.

Samples LDW-Sg5a-30-32 and LDW-Sg5a-30-32FD comprise the field duplicate pair associated with this SDG. All field duplicate precision values associated with the samples contained in this report were well within the specifications defined in the Sediment Transport Project QAPP and described above with one exception. The calculated relative percent difference value for Pb-210 is 33.6%. However, because the mean difference between Pb-210 results for the pair is less than 3, qualification of sample results is not necessary per TPR-80.

OTHER QC DATA OUT OF SPECIFICATION

None.

SYSTEM PERFORMANCE AND OVERALL ASSESSMENT

Overall the laboratory data generated met the project goals and QC criteria as defined in the Sediment Transport Project QAPP.

PROBLEMS WITH ANALYSIS NOTED IN CASE NARRATIVES

None.

DEFINITIONS OF DATA QUALIFIER (VALIDATION) FLAGS USED IN THIS REPORT

Flag	Definition
U	The analysis was performed, but no radioactivity was detected (i.e., the radioanalytical result was not statistically positive at the 95% confidence level and/or the result was below its MDA). The "U" qualifier flag is also applicable to any result reported as zero (0) (+/- an associated uncertainty). NOTE: *The radionuclide is not considered to be present in the sample*
UJ	The analysis was performed and a statistically positive result was reported at the 95% confidence interval. However, the result is highly questionable (false positive) due to analytical and/or laboratory quality control anomalies. The use of such a result is strongly discouraged. Analytical and quality control anomalies include such items as; significant blank contamination, known photopeak interferences and/or photopeak resolution problems, known matrix interferences, unacceptable laboratory control sample recoveries, serious instrument calibration problems, improper sample preservation, etc. NOTE: *The radionuclide may or may not be present in the sample and the result is considered highly questionable.*
J	The analysis was performed and radioactivity was detected (i.e., the radioanalytical result is statistically positive at the 95% confidence level and is above its MDA). However, the result is questionable due to analytical and/or laboratory quality control anomalies and should, therefore, be used only as an estimated (approximated) quantity. Analytical and/or quality control anomalies include such items such as; laboratory duplicate imprecision, unsatisfactory analytical yields, insufficient laboratory control sample recoveries, unacceptable PE sample results, instrument calibration problems, improper sample preservation, etc. NOTE: *The radionuclide is considered to be present in the sample, but the result may not be an accurate representation of the amount of activity actually present in the sample.*
R	The analysis result is unusable and was rejected due to severe analytical and/or quality control problems. NOTE: The radionuclide may or may not be present and the result is known to be inaccurate or imprecise.

Laboratory Data With Qualifiers Added

MASS SPEC SERVICES

P.O. Box 163, Orangeburg, NY 10962

Report of Analysis

Sediments

Report Date:	02/16/05
MSS No.:	Pb0074
Project:	04-08-06-23 LDW Group
Date Rec'd:	12/30/04
Task Supervisor:	H. Jeter

Windward Environmental LLC
200 West Mercer Street
Seattle, WA 98119

Attn: Tad Dashler

Core LDW-Sg5a collected 12/28/04

Radiometric Results in pCi / g dry

MSS No.	Identity	Comment	Collection Time	Pb-210	Cs-137	Beta Count	Gamma Count
Pb0074-1	LDW-Sg5a-0-1		8:45	1.04 ± 0.16	0.140 ± 0.078	02/04/05	02/10/05
Pb0074-2	LDW-Sg5a-0-1 MR	Matrix Replicate	8:45	0.96 ± 0.14	< 0.091 U	02/04/05	02/14/05
Pb0074-3	LDW-Sg5a-5-6		8:54	1.08 ± 0.16	0.125 ± 0.067	02/04/05	02/11/05
Pb0074-4	LDW-Sg5a-10-11		9:07	1.07 ± 0.18	0.132 ± 0.043	02/04/05	02/12/05
Pb0074-5	LDW-Sg5a-15-16		9:15	0.89 ± 0.14	0.203 ± 0.076	02/04/05	02/09/05
Pb0074-6	LDW-Sg5a-20-21		10:00	1.02 ± 0.15	0.160 ± 0.066	02/04/05	02/13/05
Pb0074-7	LDW-Sg5a-25-26		10:09	0.75 ± 0.13	0.140 ± 0.048	02/04/05	02/14/05
Pb0074-8	LDW-Sg5a-30-32		10:18	0.57 ± 0.13	0.108 ± 0.049	02/04/05	02/11/05
Pb0074-9	LDW-Sg5a-30-32 FD	Field Duplicate	10:18	0.80 ± 0.14	0.115 ± 0.047	02/05/05	02/10/05
Pb0074-10	LDW-Sg5a-35-36		10:32	0.96 ± 0.15	0.125 ± 0.058	02/05/05	02/11/05
Pb0074-11	LDW-Sg5a-40-42		10:37	0.75 ± 0.14	0.128 ± 0.064	02/05/05	02/09/05
Pb0074-12	LDW-Sg5a-40-42 MS	Matrix Spike	10:37	9.95 ± 0.39	32.05 ± 0.35	02/05/05	02/11/05
Pb0074-13	LDW-Sg5a-40-42 MSD	Matrix Spike Duplicate	10:37	9.20 ± 0.40	31.70 ± 0.34	02/05/05	02/13/05
Pb0074-14	LDW-Sg5a-45-46		10:46	0.62 ± 0.16	0.118 ± 0.049	02/05/05	02/13/05
Pb0074-15	LDW-Sg5a-50-51		10:57	0.56 ± 0.18	0.132 ± 0.048	02/05/05	02/10/05
Pb0074-16	LDW-Sg5a-55-56		11:06	0.38 ± 0.17	0.141 ± 0.054	02/05/05	02/13/05
Pb0074-17	LDW-Sg5a-60-61		11:13	0.87 ± 0.22	0.302 ± 0.099	02/05/05	02/10/05
Pb0074-18	LDW-Sg5a-65-66		11:23	0.58 ± 0.17	0.110 ± 0.046	02/05/05	02/12/05
Pb0074-19	LDW-Sg5a-70-71		11:31	0.58 ± 0.17	< 0.071 U	02/05/05	02/14/05
Pb0074-20	LDW-Sg5a-75-76		11:39	0.79 ± 0.17	0.115 ± 0.038	02/05/05	02/10/05
Pb0074-21	LDW-Sg5a-80-81		11:46	0.61 ± 0.16	0.158 ± 0.079	02/05/05	02/14/05

Matrix Spike Expected Values:	Pb-210	9.40 pCi/g spike + (0.75 ± 0.14) from matrix =	10.15 ± 0.14	pCi/g
	Cs-137	29.55 pCi/g spike + (0.13 ± 0.06) from matrix =	29.68 ± 0.06	pCi/g

Target Detection Limits: Pb-210 0.2 pCi/g dry; Cs-137 0.2 pCi/g dry

Bismuth Beta Counting Method
Gamma Spectral Analysis

Hewitt W. Jeter

Tolerances are 2 sigma counting uncertainties.
Detection limits are at the 4.66 sigma level.

ENVIRONMENTAL DATA SERVICES, LTD.

DATA VALIDATION • TECHNICAL WRITING • CONSULTING • DATA INTERPRETATION

DATA VALIDATION REPORT

LDW RI Sediment Transport

SDG #Sg6

Prepared by

ENVIRONMENTAL DATA SERVICES, LTD.

For

WINDWARD ENVIRONMENTAL

March 14, 2005

2690 Oak Hill Drive, Allison Park, PA 15101
FAX/PHONE • 412-486-6989
E-MAIL • edatas@aol.com

Data Assessment Narrative

RADIOLOGICAL DATA ASSESSMENT NARRATIVE

SITE: LDW RI Sediment Transport

LABORATORY: Mass Spec Services

SAMPLE DELIVERY GROUP: Sg6

This sample delivery group consists of the following soil samples:

LDW-Sg6-0-1	LDW-Sg6-5-7	LDW-Sg6-5-7FD	LDW-Sg6-10-11	LDW-Sg6-15-16
LDW-Sg6-20-21	LDW-Sg6-25-27	LDW-Sg6-30-31	LDW-Sg6-35-36	LDW-Sg6-40-41
LDW-Sg6-45-46	LDW-Sg6-50-51	LDW-Sg6-55-56	LDW-Sg6-60-61	LDW-Sg6-65-66
LDW-Sg6-70-71	LDW-Sg6-75-76	LDW-Sg6-80-81		

Samples described above were analyzed via Beta and Gamma Spectrometry to determine the concentrations of Lead 210 and Cesium 137 respectively in sediment.

Project specific QA objectives, as well as TPR80 (Idaho National Engineering and Environmental Laboratory Sample Management Office Technical Procedure for Radtioanalytical Data validation, TPR-80, Rc V.2, May, 1997.

All data are valid and acceptable except those analytes which have been qualified as described in the attached glossary. All data qualification related to this group of samples is detailed on the attached sheets.

Major Data Quality Issues

None.

Minor Data Quality Issues

None.

All data users should note two facts. First, the "R" flag means that the associated value is unusable due to significant QC problems, the data is invalid and provides no information as to whether the compound is present or not. "R" values should not appear on any data tables even as a last resort.

Lastly, no analyte concentration, even if it passed all QC tests, is guaranteed to be accurate. Strict QC serves to increase confidence in data but any value potentially contains error.

Date : 3-14-05

Diane Waldschmidt
Environmental Scientist/Director

HOLDING TIME

The amount of an analyte can change with time due to chemical instability, degradation, volatilization, etc. If the specified holding time is exceeded the data may not be valid.

The analyses performed on samples in this sample delivery group were all done within the holding time defined within the Sediment Transport Quality Assurance Project Plan and TPR-80 documents.

BLANK CONTAMINATION

Quality assurance blanks, method, trip, field, or rinse blanks are prepared to identify any contamination, which may have been introduced into the samples during preparation or field activity. Method blanks measure lab contamination. Trip blanks measure cross contamination during shipment. Field and rinse blanks measure cross contamination during field operations.

Trip, field, or rinsate blanks are not required for radiochemical analyses during the Sediment Transport Project, per QAPP.

Method Blank

No positive identifications of radiological target analytes were observed in corresponding method blanks for Pb-210 or Cs-137 above the laboratory reporting limit in associated method blanks.

CALIBRATION

Satisfactory instrument calibration is established to ensure that the instrument is capable of producing acceptable quantitative results. The initial calibration efficiency demonstrates that the instrument is capable of giving acceptable performance. The continuing calibration verifies that the instrument is giving satisfactory weekly performance.

Calibration Gamma Spectrometry

- Efficiency of selected energies must be within three standard deviations of the mean. (Continuing Calibration)
- The resolution of each peak must not exceed 5Kev. (Continuing Calibration)

Calibration Beta Spectrometry

- Check source count - rates must be within three standard deviations of the mean. (Continuing Calibration)
- The calibration efficiency must be $\pm$10% of the previous calibration. (Initial Calibration)
- Calculated efficiency for each detector used must be greater than 15%. (Initial Calibration)

All Associated instrument calibrations for both beta and gamma spectrometry were well within acceptance limits at all times.

BETA SPECTROMETRY RECOVERY STANDARD

A recovery standard (Lead-210) is evaluated to check chemical recovery or yield. Recovery of this standard must be between 40 and 100 percent to demonstrate that the system was operating in a controlled manner. All associated data is rejected if the allowable recovery limit is not met.

All recovery standards observed for samples and method blanks were well within acceptance limits.

MATRIX SPIKE/MATRIX SPIKE DUPLICATE

The matrix spike and matrix spike duplicate (MS/MSD) are generated to determine the precision and accuracy of the analytical procedure in a given matrix. This information may be used to qualify data.

Sample LDW-Sg6-25-27 was analyzed as a MS/MSD for both Pb-210 and Cs-137. Precision and accuracy indicators were favorable and found to be within the guidelines established in the project QAPP in all cases.

LABORATORY CONTROL SAMPLE

A laboratory control sample (LCS) was processed at the frequency specified in the Project QAPP (one for each group of twenty samples processed). Observed recoveries of LCSs for both Pb-210 and Cs-137 were well within the acceptance range (85-115%) per the TPR-80.

FIELD DUPLICATE

Field duplicates are collected at a frequency of one per twenty field samples or a minimum of one per sample delivery group. Acceptable precision for results obtained for the field duplicate pair is +/- 30% relative percent difference.

Samples LDW-Sg6-5-7 and LDW-Sg6-5-7FD comprise the field duplicate pair associated with this SDG. All field duplicate precision values associated with the samples contained in this report were well within the specifications defined in the Sediment Transport Project QAPP and described above with one exception. The calculated relative percent difference value for Cs-137 is 34.7%. However, because the mean difference between Cs-137 results for the pair is less than 3, qualification of sample results is not necessary per TPR-80.

OTHER QC DATA OUT OF SPECIFICATION

None.

SYSTEM PERFORMANCE AND OVERALL ASSESSMENT

Overall the laboratory data generated met the project goals and QC criteria as defined in the Sediment Transport Project QAPP.

PROBLEMS WITH ANALYSIS NOTED IN CASE NARRATIVES

None.

DEFINITIONS OF DATA QUALIFIER (VALIDATION) FLAGS USED IN THIS REPORT

Flag	Definition
U	The analysis was performed, but no radioactivity was detected (i.e., the radioanalytical result was not statistically positive at the 95% confidence level and/or the result was below its MDA). The "U" qualifier flag is also applicable to any result reported as zero (0) (+/- an associated uncertainty). NOTE: *The radionuclide is not considered to be present in the sample*
UJ	The analysis was performed and a statistically positive result was reported at the 95% confidence interval. However, the result is highly questionable (false positive) due to analytical and/or laboratory quality control anomalies. The use of such a result is strongly discouraged. Analytical and quality control anomalies include such items as; significant blank contamination, known photopeak interferences and/or photopeak resolution problems, known matrix interferences, unacceptable laboratory control sample recoveries, serious instrument calibration problems, improper sample preservation, etc. NOTE: *The radionuclide may or may not be present in the sample and the result is considered highly questionable.*
J	The analysis was performed and radioactivity was detected (i.e., the radioanalytical result is statistically positive at the 95% confidence level and is above its MDA). However, the result is questionable due to analytical and/or laboratory quality control anomalies and should, therefore, be used only as an estimated (approximated) quantity. Analytical and/or quality control anomalies include such items such as; laboratory duplicate imprecision, unsatisfactory analytical yields, insufficient laboratory control sample recoveries, unacceptable PE sample results, instrument calibration problems, improper sample preservation, etc. NOTE: *The radionuclide is considered to be present in the sample, but the result may not be an accurate representation of the amount of activity actually present in the sample.*
R	The analysis result is unusable and was rejected due to severe analytical and/or quality control problems. NOTE: The radionuclide may or may not be present and the result is known to be inaccurate or imprecise.

Laboratory Data With Qualifiers Added

MASS SPEC SERVICES

P.O. Box 163, Orangeburg, NY 10962

Report of Analysis

Report Date:	02/24/05
MSS No.:	Pb0075
Project:	04-08-06-23 LDW Group
Date Rec'd:	12/30/04
Task Supervisor:	H. Jeter

Windward Environmental LLC
200 West Mercer Street
Seattle, WA 98119

Attn: Tad Deshler

Sediments

Core LDW-Sg6 **collected 12/22/04**

DLW 3-11-05

Radiometric Results in pCi / g dry

DLW 3-14-05

MSS No.	Identity	Comment	Collection Time	Pb-210	Cs-137	Beta Count	Gamma Count
Pb0075-1	LDW-Sg6-0-1		8:40	1.02 ± 0.17	0.083 ± 0.041	02/12/05	02/17/05
Pb0075-2	LDW-Sg6-5-7		8:52	0.63 ± 0.16	0.069 ± 0.028	02/12/05	02/19/05
Pb0075-3	LDW-Sg6-5-7 FD	Field Duplicate	8:52	0.72 ± 0.17	0.098 ± 0.050	02/12/05	02/16/05
Pb0075-4	LDW-Sg6-10-11		8:59	0.79 ± 0.16	0.201 ± 0.060	02/12/05	02/19/05
Pb0075-5	LDW-Sg6-15-16		9:05	0.69 ± 0.20	0.072 ± 0.054	02/12/05	02/20/05
Pb0075-6	LDW-Sg6-20-21		9:12	0.33 ± 0.14	0.114 ± 0.059	02/12/05	02/17/05
Pb0075-7	LDW-Sg6-25-27		9:21	0.58 ± 0.23	0.196 ± 0.072	02/12/05	02/20/05
Pb0075-8	LDW-Sg6-25-27 MS	Matrix Spike	9:21	11.10 ± 0.51	28.17 ± 0.40	02/12/05	02/21/05
Pb0075-9	LDW-Sg6-25-27 MSD	Matrix Spike Duplicate	9:21	11.03 ± 0.49	28.90 ± 0.34	02/16/05	02/17/05
Pb0075-10	LDW-Sg6-30-31		9:28	0.78 ± 0.19	0.224 ± 0.080	02/16/05	02/21/05
Pb0075-11	LDW-Sg6-35-36		9:34	0.50 ± 0.19	0.133 ± 0.070	02/16/05	02/16/05
Pb0075-12	LDW-Sg6-40-41		9:40	0.66 ± 0.15	0.188 ± 0.071	02/12/05	02/18/05
Pb0075-13	LDW-Sg6-45-46		9:47	0.85 ± 0.13	0.160 ± 0.056	02/12/05	02/16/05
Pb0075-14	LDW-Sg6-50-51		10:01	0.62 ± 0.15	0.159 ± 0.056	02/12/05	02/15/05
Pb0075-15	LDW-Sg6-55-56		10:07	0.36 ± 0.15	0.160 ± 0.078	02/12/05	02/16/05
Pb0075-16	LDW-Sg6-60-61		10:11	0.22 ± 0.17	0.113 ± 0.053	02/16/05	02/19/05
Pb0075-17	LDW-Sg6-65-66		10:18	0.48 ± 0.17	0.119 ± 0.052	02/16/05	02/21/05
Pb0075-18	LDW-Sg6-70-71		10:25	0.30 ± 0.15	0.083 ± 0.046	02/16/05	02/15/05
Pb0075-19	LDW-Sg6-75-76		10:34	0.50 ± 0.14	0.174 ± 0.064	02/12/05	02/19/05
Pb0075-20	LDW-Sg6-80-81		10:45	0.48 ± 0.16	0.133 ± 0.074	02/12/05	02/15/05
Pb0075-21	LDW-Sg6-80-81 MR	Matrix Replicate	10:45	0.37 ± 0.14	0.156 ± 0.081	02/12/05	02/17/05

Matrix Spike Expected Values:

Pb-210	10.95 pCi/g spike	+ (0.58 ± 0.23)	from matrix =	11.52 ± 0.23	pCi/g
Cs-137	27.46 pCi/g spike	+ (0.20 ± 0.07)	from matrix =	27.66 ± 0.07	pCi/g

Target Detection Limits:
Pb-210 0.2 pCi/g dry
Cs-137 0.2 pCi/g dry

Bismuth Beta Counting Method
Gamma Spectral Analysis

Tolerances are 2 sigma counting uncertainties.
Detection limits are at the 4.66 sigma level.

Hewitt W. Jeter

ENVIRONMENTAL DATA SERVICES, LTD.

DATA VALIDATION • TECHNICAL WRITING • CONSULTING • DATA INTERPRETATION

DATA VALIDATION REPORT

LDW RI Sediment Transport

SDG #Sg7

Prepared by

ENVIRONMENTAL DATA SERVICES, LTD.

For

WINDWARD ENVIRONMENTAL

May 18, 2005

2690 Oak Hill Drive, Allison Park, PA 15101
FAX/PHONE • 412-486-6989
E-MAIL • edatas@aol.com

Data Assessment Narrative

RADIOLOGICAL DATA ASSESSMENT NARRATIVE

SITE: LDW RI Sediment Transport

LABORATORY: Mass Spec Services

SAMPLE DELIVERY GROUP: Sg7

This sample delivery group consists of the following soil samples:

LDW-Sg7-0-1	LDW-Sg7-5-6	LDW-Sg7-10-11	LDW-Sg7-15-16	LDW-Sg7-20-21
LDW-Sg7-25-26	LDW-Sg7-30-31	LDW-Sg7-35-37	LDW-Sg7-35-37FD	LDW-Sg7-40-41
LDW-Sg7-45-46	LDW-Sg7-50-51	LDW-Sg7-55-57	LDW-Sg7-60-61	LDW-Sg7-65-66
LDW-Sg7-70-71	LDW-Sg7-75-76	LDW-Sg7-80-81		

Samples described above were analyzed via Beta and Gamma Spectrometry to determine the concentrations of Lead 210 and Cesium 137 respectively in sediment.

Project specific QA objectives, as well as TPR80 (Idaho National Engineering and Environmental Laboratory Sample Management Office Technical Procedure for Radtioanalytical Data validation, TPR-80, Rc V.2, May, 1997.

All data are valid and acceptable except those analytes which have been qualified as described in the attached glossary. All data qualification related to this group of samples is detailed on the attached sheets.

Major Data Quality Issues

None.

Minor Data Quality Issues

None.

All data users should note two facts. First, the "R" flag means that the associated value is unusable due to significant QC problems, the data is invalid and provides no information as to whether the compound is present or not. "R" values should not appear on any data tables even as a last resort.

Lastly, no analyte concentration, even if it passed all QC tests, is guaranteed to be accurate. Strict QC serves to increase confidence in data but any value potentially contains error.

Date : 5-18-05

Diane Waldschmidt
Environmental Scientist/Director

HOLDING TIME

The amount of an analyte can change with time due to chemical instability, degradation, volatilization, etc. If the specified holding time is exceeded the data may not be valid.

The analyses performed on samples in this sample delivery group were all done within the holding time defined within the Sediment Transport Quality Assurance Project Plan and TPR-80 documents.

BLANK CONTAMINATION

Quality assurance blanks, method, trip, field, or rinse blanks are prepared to identify any contamination, which may have been introduced into the samples during preparation or field activity. Method blanks measure lab contamination. Trip blanks measure cross contamination during shipment. Field and rinse blanks measure cross contamination during field operations.

Trip, field, or rinsate blanks are not required for radiochemical analyses during the Sediment Transport Project, per QAPP.

Method Blank

No positive identifications of radiological target analytes were observed in corresponding method blanks for Pb-210 or Cs-137 above the laboratory-reporting limit.

CALIBRATION

Satisfactory instrument calibration is established to ensure that the instrument is capable of producing acceptable quantitative results. The initial calibration efficiency demonstrates that the instrument is capable of giving acceptable performance. The continuing calibration verifies that the instrument is giving satisfactory weekly performance.

Calibration Gamma Spectrometry

- Efficiency of selected energies must be within three standard deviations of the mean. (Continuing Calibration)
- The resolution of each peak must not exceed 5Kev. (Continuing Calibration)

Calibration Beta Spectrometry

- Check source count - rates must be within three standard deviations of the mean. (Continuing Calibration)
- The calibration efficiency must be $\pm$10% of the previous calibration. (Initial Calibration)
- Calculated efficiency for each detector used must be greater than 15%. (Initial Calibration)

All Associated instrument calibrations for both beta and gamma spectrometry were well within acceptance limits at all times.

BETA SPECTROMETRY RECOVERY STANDARD

A recovery standard (Lead-210) is evaluated to check chemical recovery or yield. Recovery of this standard must be between 40 and 100 percent to demonstrate that the system was operating in a controlled manner. All associated data is rejected if the allowable recovery limit is not met.

All recovery standards observed for samples and method blanks were well within acceptance limits.

MATRIX SPIKE/MATRIX SPIKE DUPLICATE

The matrix spike and matrix spike duplicate (MS/MSD) are generated to determine the precision and accuracy of the analytical procedure in a given matrix. This information may be used to qualify data.

Sample LDW-Sg7-55-57 was analyzed as a MS/MSD for both Pb-210 and Cs-137. Precision and accuracy indicators were favorable and found to be within the guidelines established in the project QAPP in all cases.

LABORATORY CONTROL SAMPLE

A laboratory control sample (LCS) was processed at the frequency specified in the Project QAPP (one for each group of twenty samples processed). Observed recoveries of LCSs for both Pb-210 and Cs-137 were well within the acceptance range (85-115%) per the TPR-80.

FIELD DUPLICATE

Field duplicates are collected at a frequency of one per twenty field samples or a minimum of one per sample delivery group. Acceptable precision for results obtained for the field duplicate pair is +/- 30% relative percent difference.

Samples LDW-Sg7-35-37 and LDW-Sg7-35-37FD comprise the field duplicate pair associated with this SDG. All field duplicate precision values associated with the samples contained in this report were well within the specifications defined in the Sediment Transport Project QAPP and described above.

OTHER QC DATA OUT OF SPECIFICATION

None.

SYSTEM PERFORMANCE AND OVERALL ASSESSMENT

Overall the laboratory data generated met the project goals and QC criteria as defined in the Sediment Transport Project QAPP.

PROBLEMS WITH ANALYSIS NOTED IN CASE NARRATIVES

None.

DEFINITIONS OF DATA QUALIFIER (VALIDATION) FLAGS USED IN THIS REPORT

Flag	Definition
U	The analysis was performed, but no radioactivity was detected (i.e., the radioanalytical result was not statistically positive at the 95% confidence level and/or the result was below its MDA). The "U" qualifier flag is also applicable to any result reported as zero (0) (+/- an associated uncertainty). NOTE: *The radionuclide is not considered to be present in the sample*
UJ	The analysis was performed and a statistically positive result was reported at the 95% confidence interval. However, the result is highly questionable (false positive) due to analytical and/or laboratory quality control anomalies. The use of such a result is strongly discouraged. Analytical and quality control anomalies include such items as; significant blank contamination, known photopeak interferences and/or photopeak resolution problems, known matrix interferences, unacceptable laboratory control sample recoveries, serious instrument calibration problems, improper sample preservation, etc. NOTE: *The radionuclide may or may not be present in the sample and the result is considered highly questionable.*
J	The analysis was performed and radioactivity was detected (i.e., the radioanalytical result is statistically positive at the 95% confidence level and is above its MDA). However, the result is questionable due to analytical and/or laboratory quality control anomalies and should, therefore, be used only as an estimated (approximated) quantity. Analytical and/or quality control anomalies include such items such as; laboratory duplicate imprecision, unsatisfactory analytical yields, insufficient laboratory control sample recoveries, unacceptable PE sample results, instrument calibration problems, improper sample preservation, etc. NOTE: *The radionuclide is considered to be present in the sample, but the result may not be an accurate representation of the amount of activity actually present in the sample.*
R	The analysis result is unusable and was rejected due to severe analytical and/or quality control problems. NOTE: The radionuclide may or may not be present and the result is known to be inaccurate or imprecise.

Laboratory Data With Qualifiers Added

MASS SPEC SERVICES

P.O. Box 163, Orangeburg, NY 10962

Report of Analysis

Report Date:	03/10/05
MSS No.:	Pb0076
Project:	04-08-06-23 LDW Group
Date Rec'd:	12/30/04
Task Supervisor:	H. Jeter

Windward Environmental LLC
200 West Mercer Street
Seattle, WA 98119

Attn: Tad Deshler

Sediments

Core LDW-Sg7 collected 12/16/04

DAW 5-17-05 DAW 5-17-05

Radiometric Results in pCi / g dry

MSS No.	Identity	Comment	Collection Time	Pb-210	Cs-137	Beta Count	Gamma Count
Pb0076-1	LDW-Sg7-0-1		13:00	0.80 ± 0.13	0.115 ± 0.049	02/18/05	03/05/05
Pb0076-2	LDW-Sg7-5-6		13:18	0.53 ± 0.12	0.134 ± 0.058	02/18/05	03/03/05
Pb0076-3	LDW-Sg7-10-11		13:35	0.56 ± 0.11	0.119 ± 0.041	02/18/05	03/05/05
Pb0076-4	LDW-Sg7-15-16		13:57	0.60 ± 0.11	0.198 ± 0.085	02/18/05	03/05/05
Pb0076-5	LDW-Sg7-20-21		14:25	0.45 ± 0.10	0.096 ± 0.038	02/18/05	03/05/05
Pb0076-6	LDW-Sg7-25-26		14:41	0.42 ± 0.09	0.085 ± 0.041	02/18/05	03/06/05
Pb0076-7	LDW-Sg7-30-31		14:55	0.39 ± 0.11	0.125 ± 0.041	02/18/05	02/27/05
Pb0076-8	LDW-Sg7-35-37		15:12	0.41 ± 0.09	0.118 ± 0.030	02/18/05	03/06/05
Pb0076-9	LDW-Sg7-35-37 FD	Field Duplicate	15:12	0.37 ± 0.08	0.120 ± 0.031	02/18/05	03/06/05
Pb0076-10	LDW-Sg7-40-41		15:32	0.40 ± 0.11	0.155 ± 0.042	02/19/05	03/08/05
Pb0076-11	LDW-Sg7-45-46		16:00	0.32 ± 0.09	0.110 ± 0.041	02/19/05	02/27/05
Pb0076-12	LDW-Sg7-50-51		16:12	0.26 ± 0.08	0.099 ± 0.041	02/19/05	03/07/05
Pb0076-13	LDW-Sg7-55-57		16:24	0.25 ± 0.11	0.080 ± 0.044	02/19/05	03/06/05
Pb0076-14	LDW-Sg7-55-57 MS	Matrix Spike	16:24	12.16 ± 0.48	25.72 ± 0.31	02/19/05	03/04/05
Pb0076-15	LDW-Sg7-55-57 MSD	Matrix Spike Duplicate	16:24	12.97 ± 0.57	23.26 ± 0.33	02/19/05	03/02/05
Pb0076-16	LDW-Sg7-60-61		16:43	0.28 ± 0.10	0.105 ± 0.032	02/19/05	03/07/05
Pb0076-17	LDW-Sg7-65-66		17:00	0.36 ± 0.13	0.218 ± 0.054	02/19/05	02/28/05
Pb0076-18	LDW-Sg7-65-66 MR	Matrix Replicate	17:00	0.41 ± 0.14	0.303 ± 0.073	02/19/05	03/06/05
Pb0076-19	LDW-Sg7-70-71		17:13	0.29 ± 0.13	0.326 ± 0.040	02/19/05	03/08/05
Pb0076-20	LDW-Sg7-75-76		17:25	0.24 ± 0.10	0.307 ± 0.055	02/19/05	03/07/05
Pb0076-21	LDW-Sg7-80-81		17:37	0.33 ± 0.11	0.382 ± 0.053	02/19/05	03/06/05

Matrix Spike Expected Values:

Pb-210	12.35 pCi/g spike	+ (0.25 ± 0.11)	from matrix =	12.60 ± 0.11	pCi/g
Cs-137	23.67 pCi/g spike	+ (0.08 ± 0.04)	from matrix =	23.75 ± 0.04	pCi/g

Target Detection Limits: Pb-210 0.2 pCi/g dry; Cs-137 0.2 pCi/g dry

Bismuth Beta Counting Method
Gamma Spectral Analysis

Hewitt W. Jeter

Tolerances are 2 sigma counting uncertainties.
Detection limits are at the 4.66 sigma level.

ENVIRONMENTAL DATA SERVICES, LTD.

DATA VALIDATION • TECHNICAL WRITING • CONSULTING • DATA INTERPRETATION

DATA VALIDATION REPORT

LDW RI Sediment Transport

SDG #Sg8

Prepared by

ENVIRONMENTAL DATA SERVICES, LTD.

For

WINDWARD ENVIRONMENTAL

May 18, 2005

2690 Oak Hill Drive, Allison Park, PA 15101
FAX/PHONE • 412-486-6989
E-MAIL • edatas@aol.com

Data Assessment Narrative

RADIOLOGICAL DATA ASSESSMENT NARRATIVE

SITE: LDW RI Sediment Transport

LABORATORY: Mass Spec Services

SAMPLE DELIVERY GROUP: Sg8

This sample delivery group consists of the following soil samples:

LDW-Sg8-0-1	LDW-Sg8-5-6	LDW-Sg8-10-11	LDW-Sg8-15-17	LDW-Sg8-15-17FD
LDW-Sg8-20-21	LDW-Sg8-25-26	LDW-Sg8-30-31	LDW-Sg8-35-36	LDW-Sg8-40-42
LDW-Sg8-45-46	LDW-Sg8-50-51	LDW-Sg8-55-56	LDW-Sg8-60-61	LDW-Sg8-65-66
LDW-Sg8-70-71	LDW-Sg8-75-76	LDW-Sg8-80-81		

Samples described above were analyzed via Beta and Gamma Spectrometry to determine the concentrations of Lead 210 and Cesium 137 respectively in sediment.

Project specific QA objectives, as well as TPR80 (Idaho National Engineering and Environmental Laboratory Sample Management Office Technical Procedure for Radtioanalytical Data validation, TPR-80, Rc V.2, May, 1997.

All data are valid and acceptable except those analytes which have been qualified as described in the attached glossary. All data qualification related to this group of samples is detailed on the attached sheets.

Major Data Quality Issues

None.

Minor Data Quality Issues

None.

All data users should note two facts. First, the "R" flag means that the associated value is unusable due to significant QC problems, the data is invalid and provides no information as to whether the compound is present or not. "R" values should not appear on any data tables even as a last resort.

Lastly, no analyte concentration, even if it passed all QC tests, is guaranteed to be accurate. Strict QC serves to increase confidence in data but any value potentially contains error.

Date : 5-18-05

Diane Waldschmidt
Environmental Scientist/Director

HOLDING TIME

The amount of an analyte can change with time due to chemical instability, degradation, volatilization, etc. If the specified holding time is exceeded the data may not be valid.

The analyses performed on samples in this sample delivery group were all done within the holding time defined within the Sediment Transport Quality Assurance Project Plan and TPR-80 documents.

BLANK CONTAMINATION

Quality assurance blanks, method, trip, field, or rinse blanks are prepared to identify any contamination, which may have been introduced into the samples during preparation or field activity. Method blanks measure lab contamination. Trip blanks measure cross contamination during shipment. Field and rinse blanks measure cross contamination during field operations.

Trip, field, or rinsate blanks are not required for radiochemical analyses during the Sediment Transport Project, per QAPP.

Method Blank

No positive identifications of radiological target analytes were observed in corresponding method blanks for Pb-210 or Cs-137 above the laboratory reporting limit in associated method blanks.

CALIBRATION

Satisfactory instrument calibration is established to ensure that the instrument is capable of producing acceptable quantitative results. The initial calibration efficiency demonstrates that the instrument is capable of giving acceptable performance. The continuing calibration verifies that the instrument is giving satisfactory weekly performance.

Calibration Gamma Spectrometry

- Efficiency of selected energies must be within three standard deviations of the mean. (Continuing Calibration)
- The resolution of each peak must not exceed 5Kev. (Continuing Calibration)

Calibration Beta Spectrometry

- Check source count - rates must be within three standard deviations of the mean. (Continuing Calibration)
- The calibration efficiency must be $\pm$10% of the previous calibration. (Initial Calibration)
- Calculated efficiency for each detector used must be greater than 15%. (Initial Calibration)

All Associated instrument calibrations for both beta and gamma spectrometry were well within acceptance limits at all times.

BETA SPECTROMETRY RECOVERY STANDARD

A recovery standard (Lead-210) is evaluated to check chemical recovery or yield. Recovery of this standard must be between 40 and 100 percent to demonstrate that the system was operating in a controlled manner. All associated data is rejected if the allowable recovery limit is not met.

All recovery standards observed for samples and method blanks were well within acceptance limits.

MATRIX SPIKE/MATRIX SPIKE DUPLICATE

The matrix spike and matrix spike duplicate (MS/MSD) are generated to determine the precision and accuracy of the analytical procedure in a given matrix. This information may be used to qualify data.

Sample LDW-Sg8-40-42 was analyzed as a MS/MSD for both Pb-210 and Cs-137. Precision and accuracy indicators were favorable and found to be within the guidelines established in the project QAPP in all cases.

LABORATORY CONTROL SAMPLE

A laboratory control sample (LCS) was processed at the frequency specified in the Project QAPP (one for each group of twenty samples processed). Observed recoveries of LCSs for both Pb-210 and Cs-137 were well within the acceptance range (85-115%) per the TPR-80.

FIELD DUPLICATE

Field duplicates are collected at a frequency of one per twenty field samples or a minimum of one per sample delivery group. Acceptable precision for results obtained for the field duplicate pair is +/- 30% relative percent difference.

Samples LDW-Sg8-15-17 and LDW-Sg8-15-17FD comprise the field duplicate pair associated with this SDG. All field duplicate precision values associated with the samples contained in this report were well within the specifications defined in the Sediment Transport Project QAPP and described above.

OTHER QC DATA OUT OF SPECIFICATION

None.

SYSTEM PERFORMANCE AND OVERALL ASSESSMENT

Overall the laboratory data generated met the project goals and QC criteria as defined in the Sediment Transport Project QAPP.

PROBLEMS WITH ANALYSIS NOTED IN CASE NARRATIVES

Sample LDW-Sg8-60-61 was analyzed as a laboratory duplicate. Generally speaking, precision demonstrated between each of the duplicate analyses is acceptable.

However, the Pb-210 result is a non-detection (<0.26 pCi/g) in the sample which is slightly higher than the target detection limit of 0.2 pCi/g, caused by relatively low sample weight and chemical yield. The matrix replicate at this depth exhibits a positive result of comparable magnitude. When counting near the detection limit, tolerances of the measurements become large and there is a 5% probability of false detection and a 5% probability of false non-detection.

DEFINITIONS OF DATA QUALIFIER (VALIDATION) FLAGS USED IN THIS REPORT

Flag	Definition
U	The analysis was performed, but no radioactivity was detected (i.e., the radioanalytical result was not statistically positive at the 95% confidence level and/or the result was below its MDA). The "U" qualifier flag is also applicable to any result reported as zero (0) (+/- an associated uncertainty). NOTE: *The radionuclide is not considered to be present in the sample*
UJ	The analysis was performed and a statistically positive result was reported at the 95% confidence interval. However, the result is highly questionable (false positive) due to analytical and/or laboratory quality control anomalies. The use of such a result is strongly discouraged. Analytical and quality control anomalies include such items as; significant blank contamination, known photopeak interferences and/or photopeak resolution problems, known matrix interferences, unacceptable laboratory control sample recoveries, serious instrument calibration problems, improper sample preservation, etc. NOTE: *The radionuclide may or may not be present in the sample and the result is considered highly questionable.*
J	The analysis was performed and radioactivity was detected (i.e., the radioanalytical result is statistically positive at the 95% confidence level and is above its MDA). However, the result is questionable due to analytical and/or laboratory quality control anomalies and should, therefore, be used only as an estimated (approximated) quantity. Analytical and/or quality control anomalies include such items such as; laboratory duplicate imprecision, unsatisfactory analytical yields, insufficient laboratory control sample recoveries, unacceptable PE sample results, instrument calibration problems, improper sample preservation, etc. NOTE: *The radionuclide is considered to be present in the sample, but the result may not be an accurate representation of the amount of activity actually present in the sample.*
R	The analysis result is unusable and was rejected due to severe analytical and/or quality control problems. NOTE: The radionuclide may or may not be present and the result is known to be inaccurate or imprecise.

Laboratory Data With Qualifiers Added

MASS SPEC SERVICES

P.O. Box 163, Orangeburg, NY 10962

Report of Analysis

Sediments

Report Date:	03/15/05
MSS No.:	Pb0077
Project:	04-08-06-23 LDW Group
Date Rec'd:	12/30/04
Task Supervisor:	H. Jeter

Windward Environmental LLC
200 West Mercer Street
Seattle, WA 98119

Attn: Tad Deshler

Core LDW-Sg8 collected 12/21/04

Radiometric Results in pCi / g dry

MSS No.	Identity	Comment	Collection Time	Pb-210	Cs-137	Beta Count	Gamma Count
Pb0077-1	LDW-Sg8-0-1		10:53	0.51 ± 0.14	< 0.050	02/26/05	03/09/05
Pb0077-2	LDW-Sg8-5-6		11:00	0.31 ± 0.10	< 0.044	02/26/05	03/10/05
Pb0077-3	LDW-Sg8-10-11		11:05	0.22 ± 0.08	< 0.048	02/26/05	03/11/05
Pb0077-4	LDW-Sg8-15-17		11:13	0.22 ± 0.09	< 0.058	02/26/05	03/11/05
Pb0077-5	LDW-Sg8-15-17 FD	Field Duplicate	11:13	0.29 ± 0.09	< 0.044	02/26/05	03/07/05
Pb0077-6	LDW-Sg8-20-21		11:19	0.30 ± 0.11	< 0.041	02/26/05	03/10/05
Pb0077-7	LDW-Sg8-25-26		11:27	0.31 ± 0.10	< 0.047	02/26/05	03/10/05
Pb0077-8	LDW-Sg8-30-31		11:34	0.23 ± 0.09	< 0.036	02/26/05	03/10/05
Pb0077-9	LDW-Sg8-35-36		11:40	0.50 ± 0.12	< 0.048	02/26/05	03/04/05
Pb0077-10	LDW-Sg8-40-42		11:46	0.35 ± 0.14	< 0.065	02/26/05	03/06/05
Pb0077-11	LDW-Sg8-40-42 MS	Matrix Spike	11:46	12.08 ± 0.50	24.03 ± 0.29	02/26/05	02/24/05
Pb0077-12	LDW-Sg8-40-42 MSD	Matrix Spike Duplicate	11:46	10.80 ± 0.45	23.40 ± 0.35	02/26/05	03/02/05
Pb0077-13	LDW-Sg8-45-46		11:53	0.32 ± 0.11	< 0.043	02/26/05	03/03/05
Pb0077-14	LDW-Sg8-50-51		12:50	0.25 ± 0.08	< 0.038	02/26/05	03/09/05
Pb0077-15	LDW-Sg8-55-56		12:56	0.36 ± 0.13	< 0.049	02/26/05	03/09/05
Pb0077-16	LDW-Sg8-60-61		13:02	< 0.26	< 0.045	02/26/05	02/24/05
Pb0077-17	LDW-Sg8-60-61 MR	Matrix Replicate	13:02	0.29 ± 0.14	< 0.064	02/26/05	03/09/05
Pb0077-18	LDW-Sg8-65-66		13:08	0.40 ± 0.14	< 0.042	02/26/05	03/11/05
Pb0077-19	LDW-Sg8-70-71		13:14	0.23 ± 0.11	< 0.044	02/26/05	03/08/05
Pb0077-20	LDW-Sg8-75-76		13:20	0.50 ± 0.14	< 0.028	02/26/05	03/12/05
Pb0077-21	LDW-Sg8-80-81		13:26	0.28 ± 0.11	< 0.036	02/26/05	03/03/05

Matrix Spike Expected Values:

Pb-210 11.20 pCi/g spike + (0.35 ± 0.14) from matrix = 11.55 ± 0.14 pCi/g
Cs-137 23.00 pCi/g spike + (no contribution from matrix) = 23.00 pCi/g

Target Detection Limits:

Pb-210 0.2 pCi/g dry
Cs-137 0.2 pCi/g dry

Bismuth Beta Counting Method
Gamma Spectral Analysis

Tolerances are 2 sigma counting uncertainties.
Detection limits are at the 4.66 sigma level.

Hewitt W. Jeter

ENVIRONMENTAL DATA SERVICES, LTD.

DATA VALIDATION • TECHNICAL WRITING • CONSULTING • DATA INTERPRETATION

DATA VALIDATION REPORT

LDW RI Sediment Transport

SDG #Sg9

Prepared by

ENVIRONMENTAL DATA SERVICES, LTD.

For

WINDWARD ENVIRONMENTAL

May 18, 2005

2690 Oak Hill Drive, Allison Park, PA 15101
FAX/PHONE • 412-486-6989
E-MAIL • edatas@aol.com

Data Assessment Narrative

RADIOLOGICAL DATA ASSESSMENT NARRATIVE

SITE: LDW RI Sediment Transport

LABORATORY: Mass Spec Services

SAMPLE DELIVERY GROUP: Sg9

This sample delivery group consists of the following soil samples:

LDW-Sg9-0-1	LDW-Sg9-5-6	LDW-Sg9-10-11	LDW-Sg9-15-16	LDW-Sg9-20-22
LDW-Sg9-20-22FD	LDW-Sg9-25-26	LDW-Sg9-30-31	LDW-Sg9-35-36	LDW-Sg9-40-41
LDW-Sg9-45-46	LDW-Sg9-50-51	LDW-Sg9-55-56	LDW-Sg9-60-62	LDW-Sg9-65-66
LDW-Sg9-70-71	LDW-Sg9-75-76	LDW-Sg9-80-81		

Samples described above were analyzed via Beta and Gamma Spectrometry to determine the concentrations of Lead 210 and Cesium 137 respectively in sediment.

Project specific QA objectives, as well as TPR80 (Idaho National Engineering and Environmental Laboratory Sample Management Office Technical Procedure for Radtioanalytical Data validation, TPR-80, Rc V.2, May, 1997.

All data are valid and acceptable except those analytes which have been qualified as described in the attached glossary. All data qualification related to this group of samples is detailed on the attached sheets.

Major Data Quality Issues

None.

Minor Data Quality Issues

None.

All data users should note two facts. First, the "R" flag means that the associated value is unusable due to significant QC problems, the data is invalid and provides no information as to whether the compound is present or not. "R" values should not appear on any data tables even as a last resort.

Lastly, no analyte concentration, even if it passed all QC tests, is guaranteed to be accurate. Strict QC serves to increase confidence in data but any value potentially contains error.

Date : 5-18-05

Diane Waldschmidt
Environmental Scientist/Director

HOLDING TIME

The amount of an analyte can change with time due to chemical instability, degradation, volatilization, etc. If the specified holding time is exceeded the data may not be valid.

The analyses performed on samples in this sample delivery group were all done within the holding time defined within the Sediment Transport Quality Assurance Project Plan and TPR-80 documents.

BLANK CONTAMINATION

Quality assurance blanks, method, trip, field, or rinse blanks are prepared to identify any contamination, which may have been introduced into the samples during preparation or field activity. Method blanks measure lab contamination. Trip blanks measure cross contamination during shipment. Field and rinse blanks measure cross contamination during field operations.

Trip, field, or rinsate blanks are not required for radiochemical analyses during the Sediment Transport Project, per QAPP.

Method Blank

No positive identifications of radiological target analytes were observed in corresponding method blanks for Pb-210 or Cs-137 above the laboratory-reporting limit.

CALIBRATION

Satisfactory instrument calibration is established to ensure that the instrument is capable of producing acceptable quantitative results. The initial calibration efficiency demonstrates that the instrument is capable of giving acceptable performance. The continuing calibration verifies that the instrument is giving satisfactory weekly performance.

Calibration Gamma Spectrometry

- Efficiency of selected energies must be within three standard deviations of the mean. (Continuing Calibration)
- The resolution of each peak must not exceed 5Kev. (Continuing Calibration)

Calibration Beta Spectrometry

- Check source count - rates must be within three standard deviations of the mean. (Continuing Calibration)
- The calibration efficiency must be $\pm$10% of the previous calibration. (Initial Calibration)
- Calculated efficiency for each detector used must be greater than 15%. (Initial Calibration)

All Associated instrument calibrations for both beta and gamma spectrometry were well within acceptance limits at all times.

BETA SPECTROMETRY RECOVERY STANDARD

A recovery standard (Lead-210) is evaluated to check chemical recovery or yield. Recovery of this standard must be between 40 and 100 percent to demonstrate that the system was operating in a controlled manner. All associated data is rejected if the allowable recovery limit is not met.

All recovery standards observed for samples and method blanks were well within acceptance limits.

MATRIX SPIKE/MATRIX SPIKE DUPLICATE

The matrix spike and matrix spike duplicate (MS/MSD) are generated to determine the precision and accuracy of the analytical procedure in a given matrix. This information may be used to qualify data.

Sample LDW-Sg9-60-62 was analyzed as a MS/MSD for both Pb-210 and Cs-137. Precision and accuracy indicators were favorable and found to be within the guidelines established in the project QAPP in all cases.

LABORATORY CONTROL SAMPLE

A laboratory control sample (LCS) was processed at the frequency specified in the Project QAPP (one for each group of twenty samples processed). Observed recoveries of LCSs for both Pb-210 and Cs-137 were well within the acceptance range (85-115%) per the TPR-80.

FIELD DUPLICATE

Field duplicates are collected at a frequency of one per twenty field samples or a minimum of one per sample delivery group. Acceptable precision for results obtained for the field duplicate pair is +/- 30% relative percent difference.

Samples LDW-Sg9-20-22 and LDW-Sg9-20-22FD comprise the field duplicate pair associated with this SDG. All field duplicate precision values associated with the samples contained in this report were well within the specifications defined in the Sediment Transport Project QAPP and described above with one exception. The calculated relative percent difference value for Pb-210 is 34.5%. However, because the mean difference between Pb-210 results for the pair is less than 3, qualification of sample results is not necessary per TPR-80.

OTHER QC DATA OUT OF SPECIFICATION

None.

SYSTEM PERFORMANCE AND OVERALL ASSESSMENT

Overall the laboratory data generated met the project goals and QC criteria as defined in the Sediment Transport Project QAPP.

PROBLEMS WITH ANALYSIS NOTED IN CASE NARRATIVES

None.

DEFINITIONS OF DATA QUALIFIER (VALIDATION) FLAGS USED IN THIS REPORT

Flag	Definition
U	The analysis was performed, but no radioactivity was detected (i.e., the radioanalytical result was not statistically positive at the 95% confidence level and/or the result was below its MDA). The "U" qualifier flag is also applicable to any result reported as zero (0) (+/- an associated uncertainty). NOTE: *The radionuclide is not considered to be present in the sample*
UJ	The analysis was performed and a statistically positive result was reported at the 95% confidence interval. However, the result is highly questionable (false positive) due to analytical and/or laboratory quality control anomalies. The use of such a result is strongly discouraged. Analytical and quality control anomalies include such items as; significant blank contamination, known photopeak interferences and/or photopeak resolution problems, known matrix interferences, unacceptable laboratory control sample recoveries, serious instrument calibration problems, improper sample preservation, etc. NOTE: *The radionuclide may or may not be present in the sample and the result is considered highly questionable.*
J	The analysis was performed and radioactivity was detected (i.e., the radioanalytical result is statistically positive at the 95% confidence level and is above its MDA). However, the result is questionable due to analytical and/or laboratory quality control anomalies and should, therefore, be used only as an estimated (approximated) quantity. Analytical and/or quality control anomalies include such items such as; laboratory duplicate imprecision, unsatisfactory analytical yields, insufficient laboratory control sample recoveries, unacceptable PE sample results, instrument calibration problems, improper sample preservation, etc. NOTE: *The radionuclide is considered to be present in the sample, but the result may not be an accurate representation of the amount of activity actually present in the sample.*
R	The analysis result is unusable and was rejected due to severe analytical and/or quality control problems. NOTE: The radionuclide may or may not be present and the result is known to be inaccurate or imprecise.

Laboratory Data With Qualifiers Added

MASS SPEC SERVICES

P.O. Box 163, Orangeburg, NY 10962

Report of Analysis

Sediments

Report Date:	03/25/05
MSS No.:	Pb0078
Project:	04-08-06-23 LDW Group
Date Rec'd:	12/30/04
Task Supervisor:	H. Jeter

Windward Environmental LLC
200 West Mercer Street
Seattle, WA 98119

Attn: Tad Deshler

Core LDW-Sg9 collected 12/21/04

Radiometric Results in pCi / g dry

MSS No.	Identity	Comment	Collection Time	Pb-210	Cs-137	Beta Count	Gamma Count
Pb0078-1	LDW-Sg9-0-1		8:15	0.65 ± 0.20	< 0.048	03/11/05	03/12/05
Pb0078-2	LDW-Sg9-5-6		8:29	0.29 ± 0.14	< 0.046	03/11/05	03/16/05
Pb0078-3	LDW-Sg9-10-11		8:42	0.39 ± 0.17	0.201 ± 0.046	03/11/05	03/13/05
Pb0078-4	LDW-Sg9-15-16		8:49	0.33 ± 0.17	0.355 ± 0.070	03/11/05	03/13/05
Pb0078-5	LDW-Sg9-20-22		8:55	0.34 ± 0.21	0.174 ± 0.094	03/11/05	03/14/05
Pb0078-6	LDW-Sg9-20-22 FD	Field Duplicate	8:55	0.24 ± 0.13	0.145 ± 0.057	03/11/05	03/18/05
Pb0078-7	LDW-Sg9-25-26		9:05	0.31 ± 0.11	0.091 ± 0.049	03/11/05	03/12/05
Pb0078-8	LDW-Sg9-30-31		9:11	0.37 ± 0.13	0.083 ± 0.051	03/11/05	03/15/05
Pb0078-9	LDW-Sg9-35-36		9:15	< 0.24	0.089 ± 0.043	03/11/05	03/17/05
Pb0078-10	LDW-Sg9-40-41		9:20	< 0.21	0.141 ± 0.046	03/11/05	03/15/05
Pb0078-11	LDW-Sg9-45-46		9:26	0.20 ± 0.10	< 0.048	03/11/05	03/16/05
Pb0078-12	LDW-Sg9-50-51		9:32	0.32 ± 0.10	< 0.064	03/11/05	03/15/05
Pb0078-13	LDW-Sg9-55-56		9:38	0.29 ± 0.13	< 0.111	03/11/05	03/13/05
Pb0078-14	LDW-Sg9-60-62		9:44	0.26 ± 0.09	< 0.066	03/11/05	03/11/05
Pb0078-15	LDW-Sg9-60-62 MS	Matrix Spike	9:44	10.83 ± 0.46	25.95 ± 0.31	03/11/05	03/13/05
Pb0078-16	LDW-Sg9-60-62 MSD	Matrix Spike Duplicate	9:44	11.57 ± 0.50	23.87 ± 0.31	03/11/05	03/15/05
Pb0078-17	LDW-Sg9-65-66		9:52	0.32 ± 0.14	< 0.061	03/11/05	03/10/05
Pb0078-18	LDW-Sg9-70-71		10:00	0.35 ± 0.13	< 0.041	03/11/05	03/14/05
Pb0078-19	LDW-Sg9-75-76		10:05	0.29 ± 0.12	< 0.040	03/11/05	03/13/05
Pb0078-20	LDW-Sg9-80-81		10:11	0.21 ± 0.10	< 0.036	03/11/05	03/16/05

Matrix Spike Expected Values:

Pb-210	11.39 pCi/g spike + (0.26 ± 0.09) from matrix =	11.65 ± 0.09	pCi/g
Cs-137	23.28 pCi/g spike + (no contribution from matrix) =	23.28	pCi/g

Target Detection Limits:
Pb-210 0.2 pCi/g dry
Cs-137 0.2 pCi/g dry

Bismuth Beta Counting Method
Gamma Spectral Analysis

Tolerances are 2 sigma counting uncertainties.
Detection limits are at the 4.66 sigma level.

Hewitt W. Jeter

ENVIRONMENTAL DATA SERVICES, LTD.

DATA VALIDATION • TECHNICAL WRITING • CONSULTING • DATA INTERPRETATION

DATA VALIDATION REPORT

LDW RI Sediment Transport

SDG #Sg10

Prepared by

ENVIRONMENTAL DATA SERVICES, LTD.

For

WINDWARD ENVIRONMENTAL

May 18, 2005

2690 Oak Hill Drive, Allison Park, PA 15101
FAX/PHONE • 412-486-6989
E-MAIL • edatas@aol.com

Data Assessment Narrative

RADIOLOGICAL DATA ASSESSMENT NARRATIVE

SITE: LDW RI Sediment Transport

LABORATORY: Mass Spec Services

SAMPLE DELIVERY GROUP: Sg10

This sample delivery group consists of the following soil samples:

LDW-Sg10-0-1	LDW-Sg10-5-6	LDW-Sg10-10-12	LDW-Sg10-10-12FD	LDW-Sg10-15-16
LDW-Sg10-20-21	LDW-Sg10-25-26	LDW-Sg10-30-31	LDW-Sg10-35-36	LDW-Sg10-40-41
LDW-Sg10-45-46	LDW-Sg10-50-51	LDW-Sg10-55-56	LDW-Sg10-60-61	LDW-Sg10-65-66
LDW-Sg10-70-71	LDW-Sg10-75-77	LDW-Sg10-80-81		

Samples described above were analyzed via Beta and Gamma Spectrometry to determine the concentrations of Lead 210 and Cesium 137 respectively in sediment.

Project specific QA objectives, as well as TPR80 (Idaho National Engineering and Environmental Laboratory Sample Management Office Technical Procedure for Radtioanalytical Data validation, TPR-80, Rc V.2, May, 1997.

All data are valid and acceptable except those analytes which have been qualified as described in the attached glossary. All data qualification related to this group of samples is detailed on the attached sheets.

Major Data Quality Issues

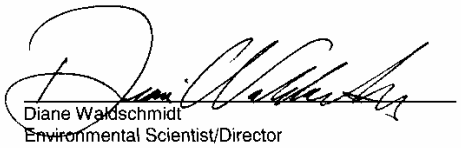
None.

Minor Data Quality Issues

None.

All data users should note two facts. First, the "R" flag means that the associated value is unusable due to significant QC problems, the data is invalid and provides no information as to whether the compound is present or not. "R" values should not appear on any data tables even as a last resort.

Lastly, no analyte concentration, even if it passed all QC tests, is guaranteed to be accurate. Strict QC serves to increase confidence in data but any value potentially contains error.



Date : 5-18-05

Diane Waldschmidt
Environmental Scientist/Director

HOLDING TIME

The amount of an analyte can change with time due to chemical instability, degradation, volatilization, etc. If the specified holding time is exceeded the data may not be valid.

The analyses performed on samples in this sample delivery group were all done within the holding time defined within the Sediment Transport Quality Assurance Project Plan and TPR-80 documents.

BLANK CONTAMINATION

Quality assurance blanks, method, trip, field, or rinse blanks are prepared to identify any contamination, which may have been introduced into the samples during preparation or field activity. Method blanks measure lab contamination. Trip blanks measure cross contamination during shipment. Field and rinse blanks measure cross contamination during field operations.

Trip, field, or rinsate blanks are not required for radiochemical analyses during the Sediment Transport Project, per QAPP.

Method Blank

No positive identifications of radiological target analytes were observed in corresponding method blanks for Pb-210 or Cs-137 above the laboratory-reporting limit.

CALIBRATION

Satisfactory instrument calibration is established to ensure that the instrument is capable of producing acceptable quantitative results. The initial calibration efficiency demonstrates that the instrument is capable of giving acceptable performance. The continuing calibration verifies that the instrument is giving satisfactory weekly performance.

Calibration Gamma Spectrometry

- Efficiency of selected energies must be within three standard deviations of the mean. (Continuing Calibration)

- The resolution of each peak must not exceed 5Kev. (Continuing Calibration)

Calibration Beta Spectrometry

- Check source count - rates must be within three standard deviations of the mean. (Continuing Calibration)

- The calibration efficiency must be $\pm$10% of the previous calibration. (Initial Calibration)

- Calculated efficiency for each detector used must be greater than 15%. (Initial Calibration)

All Associated instrument calibrations for both beta and gamma spectrometry were well within acceptance limits at all times.

BETA SPECTROMETRY RECOVERY STANDARD

A recovery standard (Lead-210) is evaluated to check chemical recovery or yield. Recovery of this standard must be between 40 and 100 percent to demonstrate that the system was operating in a controlled manner. All associated data is rejected if the allowable recovery limit is not met.

All recovery standards observed for samples and method blanks were well within acceptance limits.

MATRIX SPIKE/MATRIX SPIKE DUPLICATE

The matrix spike and matrix spike duplicate (MS/MSD) are generated to determine the precision and accuracy of the analytical procedure in a given matrix. This information may be used to qualify data.

Sample LDW-Sg10-75-77 was analyzed as a MS/MSD for both Pb-210 and Cs-137. Precision and accuracy indicators were favorable and found to be within the guidelines established in the project QAPP in all cases.

LABORATORY CONTROL SAMPLE

A laboratory control sample (LCS) was processed at the frequency specified in the Project QAPP (one for each group of twenty samples processed). Observed recoveries of LCSs for both Pb-210 and Cs-137 were well within the acceptance range (85-115%) per the TPR-80.

FIELD DUPLICATE

Field duplicates are collected at a frequency of one per twenty field samples or a minimum of one per sample delivery group. Acceptable precision for results obtained for the field duplicate pair is +/- 30% relative percent difference.

Samples LDW-Sg10-10-12 and LDW-Sg10-10-12FD comprise the field duplicate pair associated with this SDG. All field duplicate precision values associated with the samples contained in this report were well within the specifications defined in the Sediment Transport Project QAPP and described above.

OTHER QC DATA OUT OF SPECIFICATION

None.

SYSTEM PERFORMANCE AND OVERALL ASSESSMENT

Overall the laboratory data generated met the project goals and QC criteria as defined in the Sediment Transport Project QAPP.

PROBLEMS WITH ANALYSIS NOTED IN CASE NARRATIVES

None.

DEFINITIONS OF DATA QUALIFIER (VALIDATION) FLAGS USED IN THIS REPORT

Flag	Definition
U	The analysis was performed, but no radioactivity was detected (i.e., the radioanalytical result was not statistically positive at the 95% confidence level and/or the result was below its MDA). The "U" qualifier flag is also applicable to any result reported as zero (0) (+/- an associated uncertainty). NOTE: *The radionuclide is not considered to be present in the sample*
UJ	The analysis was performed and a statistically positive result was reported at the 95% confidence interval. However, the result is highly questionable (false positive) due to analytical and/or laboratory quality control anomalies. The use of such a result is strongly discouraged. Analytical and quality control anomalies include such items as; significant blank contamination, known photopeak interferences and/or photopeak resolution problems, known matrix interferences, unacceptable laboratory control sample recoveries, serious instrument calibration problems, improper sample preservation, etc. NOTE: *The radionuclide may or may not be present in the sample and the result is considered highly questionable.*
J	The analysis was performed and radioactivity was detected (i.e., the radioanalytical result is statistically positive at the 95% confidence level and is above its MDA). However, the result is questionable due to analytical and/or laboratory quality control anomalies and should, therefore, be used only as an estimated (approximated) quantity. Analytical and/or quality control anomalies include such items such as; laboratory duplicate imprecision, unsatisfactory analytical yields, insufficient laboratory control sample recoveries, unacceptable PE sample results, instrument calibration problems, improper sample preservation, etc. NOTE: *The radionuclide is considered to be present in the sample, but the result may not be an accurate representation of the amount of activity actually present in the sample.*
R	The analysis result is unusable and was rejected due to severe analytical and/or quality control problems. NOTE: The radionuclide may or may not be present and the result is known to be inaccurate or imprecise.

Laboratory Data With Qualifiers Added

MASS SPEC SERVICES

P.O. Box 163, Orangeburg, NY 10962

Report of Analysis

Report Date:	03/30/05
MSS No.:	Pb0079
Project:	04-08-06-23 LDW Group
Date Rec'd:	12/30/04
Task Supervisor:	H. Jeter

Windward Environmental LLC
200 West Mercer Street
Seattle, WA 98119

Attn: Tad Deshler

Sediments

Core LDW-Sg10 collected 12/20/04

Radiometric Results in pCi / g dry

MSS No.	Identity	Comment	Collection Time	Pb-210 5-18-05 DLW	Cs-137 5-18-05 DLW	Beta Count	Gamma Count
Pb0079-1	LDW-Sg10-0-1		12:55	1.04 ± 0.16	0.107 ± 0.048	03/19/05	03/23/05
Pb0079-2	LDW-Sg10-5-6		13:02	0.93 ± 0.20	0.125 ± 0.045	03/19/05	03/24/05
Pb0079-3	LDW-Sg10-10-12		13:08	0.71 ± 0.17	0.107 ± 0.043	03/19/05	03/19/05
Pb0079-4	LDW-Sg10-10-12 FD	Field Duplicate	13:08	0.64 ± 0.16	0.096 ± 0.057	03/19/05	03/23/05
Pb0079-5	LDW-Sg10-15-16		13:17	0.54 ± 0.13	0.116 ± 0.047	03/19/05	03/22/05
Pb0079-6	LDW-Sg10-20-21		13:23	0.38 ± 0.17	0.154 ± 0.034	03/19/05	03/20/05
Pb0079-7	LDW-Sg10-25-26		13:31	0.55 ± 0.11	0.168 ± 0.047	03/19/05	03/23/05
Pb0079-8	LDW-Sg10-30-31		13:38	0.47 ± 0.14	0.212 ± 0.099	03/19/05	03/23/05
Pb0079-9	LDW-Sg10-35-36		13:47	0.59 ± 0.15	0.194 ± 0.065	03/19/05	03/22/05
Pb0079-10	LDW-Sg10-40-41		13:54	0.35 ± 0.10	0.203 ± 0.039	03/19/05	03/21/05
Pb0079-11	LDW-Sg10-45-46		14:00	0.57 ± 0.14	0.223 ± 0.059	03/19/05	03/24/05
Pb0079-12	LDW-Sg10-50-51		14:10	0.21 ± 0.12	0.184 ± 0.054	03/19/05	03/19/05
Pb0079-13	LDW-Sg10-55-56		14:17	0.47 ± 0.16	0.145 ± 0.072	03/19/05	03/19/05
Pb0079-14	LDW-Sg10-60-61		14:27	0.51 ± 0.12	0.156 ± 0.068	03/19/05	03/20/05
Pb0079-15	LDW-Sg10-60-61 MR	Matrix replicate	14:27	0.46 ± 0.14	0.196 ± 0.106	03/19/05	03/18/05
Pb0079-16	LDW-Sg10-65-66		14:35	0.39 ± 0.13	0.167 ± 0.031	03/19/05	03/24/05
Pb0079-17	LDW-Sg10-70-71		14:43	0.61 ± 0.15	0.290 ± 0.123	03/19/05	03/24/05
Pb0079-18	LDW-Sg10-75-77		14:50	0.51 ± 0.16	0.213 ± 0.039	03/19/05	03/21/05
Pb0079-19	LDW-Sg10-75-77 MS	Matrix Spike	14:50	10.37 ± 0.46	26.43 ± 0.33	03/19/05	03/14/05
Pb0079-20	LDW-Sg10-75-77 MSD	Matrix Spike Duplicate	14:50	11.40 ± 0.51	26.53 ± 0.36	03/19/05	03/14/05
Pb0079-21	LDW-Sg10-80-81		14:58	0.51 ± 0.14	0.206 ± 0.040	03/19/05	03/20/05

Matrix Spike Expected Values:

Pb-210	10.56 pCi/g spike + (0.51 ± 0.16)	from matrix =	11.07 ± 0.16	pCi/g
Cs-137	24.96 pCi/g spike + (0.21 ± 0.04)	from matrix =	25.17 ± 0.04	pCi/g

Target Detection Limits:
Pb-210 0.2 pCi/g dry
Cs-137 0.2 pCi/g dry

Bismuth Beta Counting Method
Gamma Spectral Analysis

Hewitt W. Jeter

Tolerances are 2 sigma counting uncertainties.
Detection limits are at the 4.66 sigma level.

ENVIRONMENTAL DATA SERVICES, LTD.
DATA VALIDATION • TECHNICAL WRITING • CONSULTING • DATA INTERPRETATION

DATA VALIDATION REPORT

LDW RI Sediment Transport

SDG #Sg11b &11c

Prepared by

ENVIRONMENTAL DATA SERVICES, LTD.

For

WINDWARD ENVIRONMENTAL

May 24, 2005

2690 Oak Hill Drive, Allison Park, PA 15101
FAX/PHONE • 412-486-6989
E-MAIL • edatas@aol.com

Data Assessment Narrative

RADIOLOGICAL DATA ASSESSMENT NARRATIVE

SITE: LDW RI Sediment Transport

LABORATORY: Mass Spec Services

SAMPLE DELIVERY GROUP: Sg11b and c

This sample delivery group consists of the following soil samples:

LDW-Sg11b-0-2	LDW-Sg11b-0-2FD	LDW-Sg11b-5-6	LDW-Sg11b-10-11	LDW-Sg11b-15-16
LDW-Sg11b-20-21	LDW-Sg11b-25-27	LDW-Sg11b-30-31	LDW-Sg11b-35-36	LDW-Sg11b-40-41
LDW-Sg11c-0-1	LDW-Sg11c-5-6	LDW-Sg11c-10-12	LDW-Sg11c-10-12FD	LDW-Sg11c-15-16
LDW-Sg11c-20-21	LDW-Sg11c-25-26	LDW-Sg11c-30-32		

Samples described above were analyzed via Beta and Gamma Spectrometry to determine the concentrations of Lead 210 and Cesium 137 respectively in sediment.

Project specific QA objectives, as well as TPR80 (Idaho National Engineering and Environmental Laboratory Sample Management Office Technical Procedure for Radtioanalytical Data validation, TPR-80, Rc V.2, May, 1997.

All data are valid and acceptable except those analytes which have been qualified as described in the attached glossary. All data qualification related to this group of samples is detailed on the attached sheets.

Major Data Quality Issues

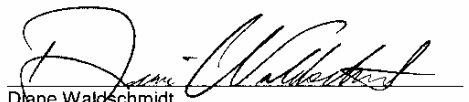
None.

Minor Data Quality Issues

None.

All data users should note two facts. First, the "R" flag means that the associated value is unusable due to significant QC problems, the data is invalid and provides no information as to whether the compound is present or not. "R" values should not appear on any data tables even as a last resort.

Lastly, no analyte concentration, even if it passed all QC tests, is guaranteed to be accurate. Strict QC serves to increase confidence in data but any value potentially contains error.



Date : 5-24-05

Diane Waldschmidt
Environmental Scientist/Director

HOLDING TIME

The amount of an analyte can change with time due to chemical instability, degradation, volatilization, etc. If the specified holding time is exceeded the data may not be valid.

The analyses performed on samples in this sample delivery group were all done within the holding time defined within the Sediment Transport Quality Assurance Project Plan and TPR-80 documents.

BLANK CONTAMINATION

Quality assurance blanks, method, trip, field, or rinse blanks are prepared to identify any contamination, which may have been introduced into the samples during preparation or field activity. Method blanks measure lab contamination. Trip blanks measure cross contamination during shipment. Field and rinse blanks measure cross contamination during field operations.

Trip, field, or rinsate blanks are not required for radiochemical analyses during the Sediment Transport Project, per QAPP.

Method Blank

No positive identifications of radiological target analytes were observed in corresponding method blanks for Pb-210 or Cs-137 above the laboratory-reporting limit.

CALIBRATION

Satisfactory instrument calibration is established to ensure that the instrument is capable of producing acceptable quantitative results. The initial calibration efficiency demonstrates that the instrument is capable of giving acceptable performance. The continuing calibration verifies that the instrument is giving satisfactory weekly performance.

Calibration Gamma Spectrometry

- Efficiency of selected energies must be within three standard deviations of the mean. (Continuing Calibration)

- The resolution of each peak must not exceed 5Kev. (Continuing Calibration)

Calibration Beta Spectrometry

- Check source count - rates must be within three standard deviations of the mean. (Continuing Calibration)

- The calibration efficiency must be $\pm$10% of the previous calibration. (Initial Calibration)

- Calculated efficiency for each detector used must be greater than 15%. (Initial Calibration)

All Associated instrument calibrations for both beta and gamma spectrometry were well within acceptance limits at all times.

BETA SPECTROMETRY RECOVERY STANDARD

A recovery standard (Lead-210) is evaluated to check chemical recovery or yield. Recovery of this standard must be between 40 and 100 percent to demonstrate that the system was operating in a controlled manner. All associated data is rejected if the allowable recovery limit is not met.

All recovery standards observed for samples and method blanks were well within acceptance limits.

MATRIX SPIKE/MATRIX SPIKE DUPLICATE

The matrix spike and matrix spike duplicate (MS/MSD) are generated to determine the precision and accuracy of the analytical procedure in a given matrix. This information may be used to qualify data.

Samples LDW-Sg11b-25-27 and LDW-11c-30-32 were analyzed as MS/MSD pairs for both Pb-210 and Cs-137. Precision and accuracy indicators were favorable and found to be within the guidelines established in the project QAPP in all cases.

LABORATORY CONTROL SAMPLE

A laboratory control sample (LCS) was processed at the frequency specified in the Project QAPP (one for each group of twenty samples processed). Observed recoveries of LCSs for both Pb-210 and Cs-137 were well within the acceptance range (85-115%) per the TPR-80.

FIELD DUPLICATE

Field duplicates are collected at a frequency of one per twenty field samples or a minimum of one per sample delivery group. Acceptable precision for results obtained for the field duplicate pair is +/- 30% relative percent difference.

Samples LDW-Sg11b-0-2 and LDW-Sg11b-0-2FD comprise one of the field duplicate pairs associated with this SDG. All field duplicate precision values associated with the samples described above were well within the specifications defined in the Sediment Transport Project QAPP and listed above.

Samples LDW-Sg11c-10-12 and LDW-Sg11c-10-12FD comprise one of the field duplicate pairs associated with this SDG. All field duplicate precision values associated with the samples described above were well within the specifications defined in the Sediment Transport Project QAPP and listed above with one exception. The calculated relative percent difference value for Pb-210 is 34%. However, because the mean difference between Pb-210 results for the pair is less than 3, qualification of sample results is not necessary per TPR-80.

OTHER QC DATA OUT OF SPECIFICATION

None.

SYSTEM PERFORMANCE AND OVERALL ASSESSMENT

Overall the laboratory data generated met the project goals and QC criteria as defined in the Sediment Transport Project QAPP.

PROBLEMS WITH ANALYSIS NOTED IN CASE NARRATIVES

None.

DEFINITIONS OF DATA QUALIFIER (VALIDATION) FLAGS USED IN THIS REPORT

Flag	Definition
U	The analysis was performed, but no radioactivity was detected (i.e., the radioanalytical result was not statistically positive at the 95% confidence level and/or the result was below its MDA). The "U" qualifier flag is also applicable to any result reported as zero (0) (+/- an associated uncertainty). NOTE: *The radionuclide is not considered to be present in the sample*
UJ	The analysis was performed and a statistically positive result was reported at the 95% confidence interval. However, the result is highly questionable (false positive) due to analytical and/or laboratory quality control anomalies. The use of such a result is strongly discouraged. Analytical and quality control anomalies include such items as; significant blank contamination, known photopeak interferences and/or photopeak resolution problems, known matrix interferences, unacceptable laboratory control sample recoveries, serious instrument calibration problems, improper sample preservation, etc. NOTE: *The radionuclide may or may not be present in the sample and the result is considered highly questionable.*
J	The analysis was performed and radioactivity was detected (i.e., the radioanalytical result is statistically positive at the 95% confidence level and is above its MDA). However, the result is questionable due to analytical and/or laboratory quality control anomalies and should, therefore, be used only as an estimated (approximated) quantity. Analytical and/or quality control anomalies include such items such as; laboratory duplicate imprecision, unsatisfactory analytical yields, insufficient laboratory control sample recoveries, unacceptable PE sample results, instrument calibration problems, improper sample preservation, etc. NOTE: *The radionuclide is considered to be present in the sample, but the result may not be an accurate representation of the amount of activity actually present in the sample.*
R	The analysis result is unusable and was rejected due to severe analytical and/or quality control problems. NOTE: The radionuclide may or may not be present and the result is known to be inaccurate or imprecise.

Laboratory Data With Qualifiers Added

MASS SPEC SERVICES

P.O. Box 163, Orangeburg, NY 10962

Report of Analysis

Sediments

Report Date:	04/04/05
MSS No.:	Pb0080
Project:	04-08-06-23 LDW Group
Date Rec'd:	12/30/04
Task Supervisor:	H. Jeter

Windward Environmental LLC
200 West Mercer Street
Seattle, WA 98119

Attn: Tad Deshler

Core LDW-Sg11b and c collected 12/27/04

Radiometric Results in pCi / g dry

MSS No.	Identity	Comment	Collection Time	Pb-210 5-23-05 DW	Cs-137 5-23-05 DW	Beta Count	Gamma Count
Pb0080-1	LDW-Sg11b-0-2		14:15	0.23 ± 0.08	< 0.043	03/25/05	03/29/05
Pb0080-2	LDW-Sg11b-0-2 FD	Field Duplicate	14:15	0.23 ± 0.09	< 0.032	03/25/05	03/31/05
Pb0080-3	LDW-Sg11b-5-6		14:22	0.26 ± 0.10	0.138 ± 0.057	03/25/05	03/30/05
Pb0080-4	LDW-Sg11b-10-11		14:28	0.29 ± 0.11	0.152 ± 0.037	03/25/05	03/29/05
Pb0080-5	LDW-Sg11b-15-16		14:35	0.28 ± 0.10	0.137 ± 0.061	03/25/05	03/31/05
Pb0080-6	LDW-Sg11b-20-21		14:42	0.43 ± 0.13	0.128 ± 0.037	03/25/05	03/31/05
Pb0080-7	LDW-Sg11b-25-27		14:50	0.26 ± 0.09	0.161 ± 0.045	03/25/05	03/26/05
Pb0080-8	LDW-Sg11b-25-27 MS	Matrix Spike	14:50	12.16 ± 0.47	33.56 ± 0.44	03/25/05	03/26/05
Pb0080-9	LDW-Sg11b-25-27 MSD	Matrix Spike Duplicate	14:50	13.89 ± 0.52	31.88 ± 0.44	03/25/05	03/27/05
Pb0080-10	LDW-Sg11b-30-31		14:58	0.36 ± 0.09	0.096 ± 0.038	03/25/05	04/01/05
Pb0080-11	LDW-Sg11b-35-36		15:06	0.37 ± 0.11	< 0.054	03/25/05	03/26/05
Pb0080-12	LDW-Sg11b-40-41		15:19	0.18 ± 0.08	< 0.057	03/25/05	04/02/05
Pb0080-13	LDW-Sg11c-0-1		15:45	0.32 ± 0.09	< 0.034	03/25/05	03/26/05
Pb0080-14	LDW-Sg11c-5-6		15:54	0.19 ± 0.08	< 0.050	03/25/05	03/29/05
Pb0080-15	LDW-Sg11c-10-12		16:00	0.22 ± 0.09	0.099 ± 0.020	03/25/05	03/26/05
Pb0080-16	LDW-Sg11c-10-12 FD	Field Duplicate	16:00	0.31 ± 0.11	0.113 ± 0.041	03/25/05	03/29/05
Pb0080-17	LDW-Sg11c-15-16		16:08	0.31 ± 0.09	0.206 ± 0.038	03/25/05	03/26/05
Pb0080-18	LDW-Sg11c-20-21		16:14	0.36 ± 0.10	0.188 ± 0.035	03/25/05	03/28/05
Pb0080-19	LDW-Sg11c-25-26		16:19	0.24 ± 0.07	0.097 ± 0.051	03/25/05	03/31/05
Pb0080-20	LDW-Sg11c-30-32		16:27	0.33 ± 0.11	0.241 ± 0.092	03/25/05	03/31/05
Pb0080-21	LDW-Sg11c-30-32 MS	Matrix Spike	16:27	12.75 ± 0.47	27.52 ± 0.24	03/25/05	03/26/05
Pb0080-22	LDW-Sg11c-30-32 MSD	Matrix Spike Duplicate	16:27	13.07 ± 0.48	27.02 ± 0.29	03/25/05	03/25/05

Matrix Spike Expected Values	25-27 cm:	Pb-210	12.68 pCi/g spike + (0.26 ± 0.09)	from matrix =	12.94 ± 0.09	pCi/g
		Cs-137	30.23 pCi/g spike + (0.16 ± 0.05)	from matrix =	30.39 ± 0.05	pCi/g
	30-32 cm:	Pb-210	12.53 pCi/g spike + (0.33 ± 0.11)	from matrix =	12.86 ± 0.11	pCi/g
		Cs-137	25.23 pCi/g spike + (0.24 ± 0.09)	from matrix =	25.47 ± 0.09	pCi/g

Target Detection Limits: Pb-210 0.2 pCi/g dry; Cs-137 0.2 pCi/g dry

Bismuth Beta Counting Method
Gamma Spectral Analysis

Tolerances are 2 sigma counting uncertainties.
Detection limits are at the 4.66 sigma level.

Hewitt W. Jeter

ENVIRONMENTAL DATA SERVICES, LTD.

DATA VALIDATION • TECHNICAL WRITING • CONSULTING • DATA INTERPRETATION

DATA VALIDATION REPORT

LDW RI Sediment Transport

SDG #Sg12

Prepared by

ENVIRONMENTAL DATA SERVICES, LTD.

For

WINDWARD ENVIRONMENTAL

May 24, 2005

2690 Oak Hill Drive, Allison Park, PA 15101
FAX/PHONE • 412-486-6989
E-MAIL • edatas@aol.com

Data Assessment Narrative

RADIOLOGICAL DATA ASSESSMENT NARRATIVE

SITE: LDW RI Sediment Transport

LABORATORY: Mass Spec Services

SAMPLE DELIVERY GROUP: Sg12

This sample delivery group consists of the following soil samples:

LDW-Sg12-0-1	LDW-Sg12-5-6	LDW-Sg12-10-11	LDW-Sg12-15-16	LDW-Sg12-20-21
LDW-Sg12-25-26	LDW-Sg12-30-32	LDW-Sg12-30-32FD	LDW-Sg12-35-36	LDW-Sg12-40-41
LDW-Sg12-45-46	LDW-Sg12-50-51	LDW-Sg12-55-56	LDW-Sg12-60-62	LDW-Sg12-65-66
LDW-Sg12-70-71	LDW-Sg12-75-76	LDW-Sg12-80-81		

Samples described above were analyzed via Beta and Gamma Spectrometry to determine the concentrations of Lead 210 and Cesium 137 respectively in sediment.

Project specific QA objectives, as well as TPR80 (Idaho National Engineering and Environmental Laboratory Sample Management Office Technical Procedure for Radtioanalytical Data validation, TPR-80, Rc V.2, May, 1997.

All data are valid and acceptable except those analytes which have been qualified as described in the attached glossary. All data qualification related to this group of samples is detailed on the attached sheets.

Major Data Quality Issues

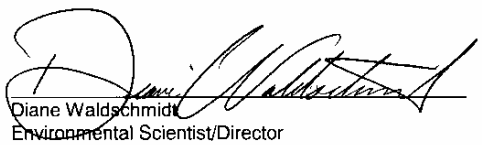
None.

Minor Data Quality Issues

None.

All data users should note two facts. First, the "R" flag means that the associated value is unusable due to significant QC problems, the data is invalid and provides no information as to whether the compound is present or not. "R" values should not appear on any data tables even as a last resort.

Lastly, no analyte concentration, even if it passed all QC tests, is guaranteed to be accurate. Strict QC serves to increase confidence in data but any value potentially contains error.



Date : 5-24-05

Diane Waldschmidt
Environmental Scientist/Director

HOLDING TIME

The amount of an analyte can change with time due to chemical instability, degradation, volatilization, etc. If the specified holding time is exceeded the data may not be valid.

The analyses performed on samples in this sample delivery group were all done within the holding time defined within the Sediment Transport Quality Assurance Project Plan and TPR-80 documents.

BLANK CONTAMINATION

Quality assurance blanks, method, trip, field, or rinse blanks are prepared to identify any contamination, which may have been introduced into the samples during preparation or field activity. Method blanks measure lab contamination. Trip blanks measure cross contamination during shipment. Field and rinse blanks measure cross contamination during field operations.

Trip, field, or rinsate blanks are not required for radiochemical analyses during the Sediment Transport Project, per QAPP.

Method Blank

No positive identifications of radiological target analytes were observed in corresponding method blanks for Pb-210 or Cs-137 above the laboratory-reporting limit.

CALIBRATION

Satisfactory instrument calibration is established to ensure that the instrument is capable of producing acceptable quantitative results. The initial calibration efficiency demonstrates that the instrument is capable of giving acceptable performance. The continuing calibration verifies that the instrument is giving satisfactory weekly performance.

Calibration Gamma Spectrometry

- Efficiency of selected energies must be within three standard deviations of the mean. (Continuing Calibration)
- The resolution of each peak must not exceed 5Kev. (Continuing Calibration)

Calibration Beta Spectrometry

- Check source count - rates must be within three standard deviations of the mean. (Continuing Calibration)
- The calibration efficiency must be $\pm$10% of the previous calibration. (Initial Calibration)
- Calculated efficiency for each detector used must be greater than 15%. (Initial Calibration)

All Associated instrument calibrations for both beta and gamma spectrometry were well within acceptance limits at all times.

BETA SPECTROMETRY RECOVERY STANDARD

A recovery standard (Lead-210) is evaluated to check chemical recovery or yield. Recovery of this standard must be between 40 and 100 percent to demonstrate that the system was operating in a controlled manner. All associated data is rejected if the allowable recovery limit is not met.

All recovery standards observed for samples and method blanks were well within acceptance limits.

MATRIX SPIKE/MATRIX SPIKE DUPLICATE

The matrix spike and matrix spike duplicate (MS/MSD) are generated to determine the precision and accuracy of the analytical procedure in a given matrix. This information may be used to qualify data.

Sample LDW-Sg12-30-32 was analyzed as a MS/MSD for both Pb-210 and Cs-137. Precision and accuracy indicators were favorable and found to be within the guidelines established in the project QAPP in all cases.

LABORATORY CONTROL SAMPLE

A laboratory control sample (LCS) was processed at the frequency specified in the Project QAPP (one for each group of twenty samples processed). Observed recoveries of LCSs for both Pb-210 and Cs-137 were well within the acceptance range (85-115%) per the TPR-80.

FIELD DUPLICATE

Field duplicates are collected at a frequency of one per twenty field samples or a minimum of one per sample delivery group. Acceptable precision for results obtained for the field duplicate pair is +/- 30% relative percent difference.

Samples LDW-Sg12-30-32 and LDW-Sg12-30-32FD comprise the field duplicate pair associated with this SDG. All field duplicate precision values associated with the samples contained in this report were well within the specifications defined in the Sediment Transport Project QAPP and described above with one exception. The calculated relative percent difference value for Cs-137 is 58.3%. However, because the mean difference between Cs-137 results for the pair is less than 3, qualification of sample results is not necessary per TPR-80.

OTHER QC DATA OUT OF SPECIFICATION

None.

SYSTEM PERFORMANCE AND OVERALL ASSESSMENT

Overall the laboratory data generated met the project goals and QC criteria as defined in the Sediment Transport Project QAPP.

PROBLEMS WITH ANALYSIS NOTED IN CASE NARRATIVES

None.

DEFINITIONS OF DATA QUALIFIER (VALIDATION) FLAGS USED IN THIS REPORT

Flag	Definition
U	The analysis was performed, but no radioactivity was detected (i.e., the radioanalytical result was not statistically positive at the 95% confidence level and/or the result was below its MDA). The "U" qualifier flag is also applicable to any result reported as zero (0) (+/- an associated uncertainty). NOTE: *The radionuclide is not considered to be present in the sample*
UJ	The analysis was performed and a statistically positive result was reported at the 95% confidence interval. However, the result is highly questionable (false positive) due to analytical and/or laboratory quality control anomalies. The use of such a result is strongly discouraged. Analytical and quality control anomalies include such items as; significant blank contamination, known photopeak interferences and/or photopeak resolution problems, known matrix interferences, unacceptable laboratory control sample recoveries, serious instrument calibration problems, improper sample preservation, etc. NOTE: *The radionuclide may or may not be present in the sample and the result is considered highly questionable.*
J	The analysis was performed and radioactivity was detected (i.e., the radioanalytical result is statistically positive at the 95% confidence level and is above its MDA). However, the result is questionable due to analytical and/or laboratory quality control anomalies and should, therefore, be used only as an estimated (approximated) quantity. Analytical and/or quality control anomalies include such items such as; laboratory duplicate imprecision, unsatisfactory analytical yields, insufficient laboratory control sample recoveries, unacceptable PE sample results, instrument calibration problems, improper sample preservation, etc. NOTE: *The radionuclide is considered to be present in the sample, but the result may not be an accurate representation of the amount of activity actually present in the sample.*
R	The analysis result is unusable and was rejected due to severe analytical and/or quality control problems. NOTE: The radionuclide may or may not be present and the result is known to be inaccurate or imprecise.

Laboratory Data With Qualifiers Added

MASS SPEC SERVICES

P.O. Box 163, Orangeburg, NY 10962

Report of Analysis

Report Date:	04/12/05
MSS No.:	Pb0081
Project:	04-08-06-23 LDW Group
Date Rec'd:	12/30/04
Task Supervisor:	H. Jeter

Windward Environmental LLC
200 West Mercer Street
Seattle, WA 98119

Attn: Tad Deshler

Sediments

Core LDW-Sg12 collected 12/20/04

Radiometric Results in pCi / g dry

MSS No.	Identity	Comment	Collection Time	Pb-210 5-23-05 DHW	Cs-137 5-23-05 DHW	Beta Count	Gamma Count
Pb0081-1	LDW-Sg12-0-1		7:47	1.07 ± 0.15	0.131 ± 0.039	04/01/05	04/06/05
Pb0081-2	LDW-Sg12-5-6		7:58	0.50 ± 0.11	0.074 ± 0.041	04/01/05	04/05/05
Pb0081-3	LDW-Sg12-10-11		8:09	0.77 ± 0.13	< 0.091	04/01/05	04/06/05
Pb0081-4	LDW-Sg12-15-16		8:20	0.76 ± 0.13	0.079 ± 0.044	04/01/05	04/05/05
Pb0081-5	LDW-Sg12-20-21		8:28	0.98 ± 0.14	< 0.072	04/01/05	04/05/05
Pb0081-6	LDW-Sg12-25-26		8:39	1.11 ± 0.12	< 0.094	04/01/05	04/05/05
Pb0081-7	LDW-Sg12-30-32		8:47	0.96 ± 0.13	0.135 ± 0.064	04/01/05	04/06/05
Pb0081-8	LDW-Sg12-30-32 FD	Field Duplicate	8:47	0.81 ± 0.12	0.246 ± 0.076	04/01/05	04/05/05
Pb0081-9	LDW-Sg12-35-36		8:55	0.43 ± 0.10	< 0.052	04/01/05	04/05/05
Pb0081-10	LDW-Sg12-40-41		9:07	0.87 ± 0.13	0.121 ± 0.071	04/01/05	04/05/05
Pb0081-11	LDW-Sg12-45-46		9:16	1.04 ± 0.14	< 0.106	04/01/05	04/07/05
Pb0081-12	LDW-Sg12-50-51		9:26	1.03 ± 0.14	< 0.102	04/01/05	04/09/05
Pb0081-13	LDW-Sg12-55-56		9:39	1.40 ± 0.16	< 0.096	04/01/05	04/10/05
Pb0081-14	LDW-Sg12-60-62		9:46	1.22 ± 0.15	0.120 ± 0.051	04/01/05	04/09/05
Pb0081-15	LDW-Sg12-60-62 MS	Matrix Spike	9:46	11.46 ± 0.47	48.09 ± 0.47	04/01/05	04/09/05
Pb0081-16	LDW-Sg12-60-62 MSD	Matrix Spike Duplicate	9:46	12.77 ± 0.49	49.68 ± 0.50	04/01/05	04/09/05
Pb0081-17	LDW-Sg12-65-66		10:04	1.13 ± 0.15	0.145 ± 0.067	04/01/05	04/09/05
Pb0081-18	LDW-Sg12-70-71		10:12	0.85 ± 0.14	0.113 ± 0.055	04/01/05	04/07/05
Pb0081-19	LDW-Sg12-75-76		10:19	0.96 ± 0.14	0.105 ± 0.062	04/01/05	04/10/05
Pb0081-20	LDW-Sg12-80-81		10:30	1.00 ± 0.13	0.156 ± 0.073	04/01/05	04/09/05

Matrix Spike Expected Values:

Pb-210	10.66 pCi/g spike	+ (1.22 ± 0.15)	from matrix =	11.88 ± 0.15	pCi/g
Cs-137	44.35 pCi/g spike	+ (0.12 ± 0.05)	from matrix =	44.47 ± 0.05	pCi/g

Target Detection Limits:
Pb-210 0.2 pCi/g dry
Cs-137 0.2 pCi/g dry

Bismuth Beta Counting Method
Gamma Spectral Analysis

Tolerances are 2 sigma counting uncertainties.
Detection limits are at the 4.66 sigma level.

Hewitt W. Jeter

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DATA VALIDATION REPORT

LDW RI Sediment Transport

SDG #Sg13

Prepared by

ENVIRONMENTAL DATA SERVICES, LTD.

For

WINDWARD ENVIRONMENTAL

May 24, 2005

2690 Oak Hill Drive, Allison Park, PA 15101
FAX/PHONE • 412-486-6989
E-MAIL • edatas@aol.com

Data Assessment Narrative

RADIOLOGICAL DATA ASSESSMENT NARRATIVE

SITE: LDW RI Sediment Transport

LABORATORY: Mass Spec Services

SAMPLE DELIVERY GROUP: Sg13

This sample delivery group consists of the following soil samples:

LDW-Sg13-0-1	LDW-Sg13-5-6	LDW-Sg13-10-11	LDW-Sg13-15-17	LDW-Sg13-15-17FD
LDW-Sg13-20-21	LDW-Sg13-25-26	LDW-Sg13-30-31	LDW-Sg13-35-36	LDW-Sg13-40-41
LDW-Sg13-45-46	LDW-Sg13-50-52	LDW-Sg13-55-56	LDW-Sg13-60-61	LDW-Sg13-65-66
LDW-Sg13-70-71	LDW-Sg13-75-76	LDW-Sg13-80-81		

Samples described above were analyzed via Beta and Gamma Spectrometry to determine the concentrations of Lead 210 and Cesium 137 respectively in sediment.

Project specific QA objectives, as well as TPR80 (Idaho National Engineering and Environmental Laboratory Sample Management Office Technical Procedure for Radtioanalytical Data validation, TPR-80, Rc V.2, May, 1997.

All data are valid and acceptable except those analytes which have been qualified as described in the attached glossary. All data qualification related to this group of samples is detailed on the attached sheets.

Major Data Quality Issues

None.

Minor Data Quality Issues

None.

All data users should note two facts. First, the "R" flag means that the associated value is unusable due to significant QC problems, the data is invalid and provides no information as to whether the compound is present or not. "R" values should not appear on any data tables even as a last resort.

Lastly, no analyte concentration, even if it passed all QC tests, is guaranteed to be accurate. Strict QC serves to increase confidence in data but any value potentially contains error.

Date : 5-24-05

Diane Waldschmidt
Environmental Scientist/Director

HOLDING TIME

The amount of an analyte can change with time due to chemical instability, degradation, volatilization, etc. If the specified holding time is exceeded the data may not be valid.

The analyses performed on samples in this sample delivery group were all done within the holding time defined within the Sediment Transport Quality Assurance Project Plan and TPR-80 documents.

BLANK CONTAMINATION

Quality assurance blanks, method, trip, field, or rinse blanks are prepared to identify any contamination, which may have been introduced into the samples during preparation or field activity. Method blanks measure lab contamination. Trip blanks measure cross contamination during shipment. Field and rinse blanks measure cross contamination during field operations.

Trip, field, or rinsate blanks are not required for radiochemical analyses during the Sediment Transport Project, per QAPP.

Method Blank

No positive identifications of radiological target analytes were observed in corresponding method blanks for Pb-210 or Cs-137 above the laboratory reporting limit in associated method blanks.

CALIBRATION

Satisfactory instrument calibration is established to ensure that the instrument is capable of producing acceptable quantitative results. The initial calibration efficiency demonstrates that the instrument is capable of giving acceptable performance. The continuing calibration verifies that the instrument is giving satisfactory weekly performance.

Calibration Gamma Spectrometry

- Efficiency of selected energies must be within three standard deviations of the mean. (Continuing Calibration)
- The resolution of each peak must not exceed 5Kev. (Continuing Calibration)

Calibration Beta Spectrometry

- Check source count - rates must be within three standard deviations of the mean. (Continuing Calibration)
- The calibration efficiency must be $\pm$10% of the previous calibration. (Initial Calibration)
- Calculated efficiency for each detector used must be greater than 15%. (Initial Calibration)

All Associated instrument calibrations for both beta and gamma spectrometry were well within acceptance limits at all times.

BETA SPECTROMETRY RECOVERY STANDARD

A recovery standard (Lead-210) is evaluated to check chemical recovery or yield. Recovery of this standard must be between 40 and 100 percent to demonstrate that the system was operating in a controlled manner. All associated data is rejected if the allowable recovery limit is not met.

All recovery standards observed for samples and method blanks were well within acceptance limits.

MATRIX SPIKE/MATRIX SPIKE DUPLICATE

The matrix spike and matrix spike duplicate (MS/MSD) are generated to determine the precision and accuracy of the analytical procedure in a given matrix. This information may be used to qualify data.

Sample LDW-Sg13-50-52 was analyzed as a MS/MSD for both Pb-210 and Cs-137. Precision and accuracy indicators were favorable and found to be within the guidelines established in the project QAPP in all cases.

MATRIX REPLICATE

Sample LDW-Sg13-60-61 was analyzed as a matrix replicate. Precision observed for each set of analyses (both Pb-210 and Cs-137) was found to meet all data quality objectives as defined in the Sediment Transport Project QAPP.

LABORATORY CONTROL SAMPLE

A laboratory control sample (LCS) was processed at the frequency specified in the Project QAPP (one for each group of twenty samples processed). Observed recoveries of LCSs for both Pb-210 and Cs-137 were well within the acceptance range (85-115%) per the TPR-80.

FIELD DUPLICATE

Field duplicates are collected at a frequency of one per twenty field samples or a minimum of one per sample delivery group. Acceptable precision for results obtained for the field duplicate pair is +/- 30% relative percent difference.

Samples LDW-Sg13-15-17 and LDW-Sg13-15-17FD comprise the field duplicate pair associated with this SDG. All field duplicate precision values associated with the samples contained in this report were well within the specifications defined in the Sediment Transport Project QAPP and described above.

OTHER QC DATA OUT OF SPECIFICATION

The field chain of custody documents contain numerous changes to sample identifications, however these changes have not been initialed or dated by the individual who made the changes. Therefore it is impossible to distinctly verify the identity of sample locations sent to the laboratory for analysis.

SYSTEM PERFORMANCE AND OVERALL ASSESSMENT

Overall the laboratory data generated met the project goals and QC criteria as defined in the Sediment Transport Project QAPP.

PROBLEMS WITH ANALYSIS NOTED IN CASE NARRATIVES

None.

DEFINITIONS OF DATA QUALIFIER (VALIDATION) FLAGS USED IN THIS REPORT

Flag	Definition
U	The analysis was performed, but no radioactivity was detected (i.e., the radioanalytical result was not statistically positive at the 95% confidence level and/or the result was below its MDA). The "U" qualifier flag is also applicable to any result reported as zero (0) (+/- an associated uncertainty). NOTE: *The radionuclide is not considered to be present in the sample*
UJ	The analysis was performed and a statistically positive result was reported at the 95% confidence interval. However, the result is highly questionable (false positive) due to analytical and/or laboratory quality control anomalies. The use of such a result is strongly discouraged. Analytical and quality control anomalies include such items as; significant blank contamination, known photopeak interferences and/or photopeak resolution problems, known matrix interferences, unacceptable laboratory control sample recoveries, serious instrument calibration problems, improper sample preservation, etc. NOTE: *The radionuclide may or may not be present in the sample and the result is considered highly questionable.*
J	The analysis was performed and radioactivity was detected (i.e., the radioanalytical result is statistically positive at the 95% confidence level and is above its MDA). However, the result is questionable due to analytical and/or laboratory quality control anomalies and should, therefore, be used only as an estimated (approximated) quantity. Analytical and/or quality control anomalies include such items such as; laboratory duplicate imprecision, unsatisfactory analytical yields, insufficient laboratory control sample recoveries, unacceptable PE sample results, instrument calibration problems, improper sample preservation, etc. NOTE: *The radionuclide is considered to be present in the sample, but the result may not be an accurate representation of the amount of activity actually present in the sample.*
R	The analysis result is unusable and was rejected due to severe analytical and/or quality control problems. NOTE: The radionuclide may or may not be present and the result is known to be inaccurate or imprecise.

Laboratory Data With Qualifiers Added

MASS SPEC SERVICES

P.O. Box 163, Orangeburg, NY 10962

Report of Analysis

Report Date:	04/16/05
MSS No.:	Pb0082
Project:	04-08-06-23 LDW Group
Date Rec'd:	12/30/04
Task Supervisor:	H. Jeter

Windward Environmental LLC
200 West Mercer Street
Seattle, WA 98119

Attn: Tad Deshler

Sediments

Core LDW-Sg13 collected 12/17/04

Radiometric Results in pCi / g dry

MSS No.	Identity	Comment	Collection Time	Pb-210 (5-24-05 DHW)	Cs-137 (5-24-05 DHW)	Beta Count	Gamma Count
Pb0082-1	LDW-Sg13-0-1		9:51	0.87 ± 0.14	0.111 ± 0.044	04/08/05	04/09/05
Pb0082-2	LDW-Sg13-5-6		10:05	0.94 ± 0.14	< 0.083	04/08/05	04/11/05
Pb0082-3	LDW-Sg13-10-11		10:22	0.69 ± 0.13	0.098 ± 0.056	04/08/05	04/11/05
Pb0082-4	LDW-Sg13-15-17		10:34	1.05 ± 0.14	< 0.083	04/08/05	04/10/05
Pb0082-5	LDW-Sg13-15-17 FD	Field Duplicate	10:34	1.03 ± 0.15	< 0.067	04/08/05	04/10/05
Pb0082-6	LDW-Sg13-20-21		10:46	0.82 ± 0.14	< 0.068	04/08/05	04/07/05
Pb0082-7	LDW-Sg13-25-26		11:00	0.55 ± 0.10	< 0.053	04/08/05	04/14/05
Pb0082-8	LDW-Sg13-30-31		11:14	0.64 ± 0.14	< 0.122	04/08/05	04/12/05
Pb0082-9	LDW-Sg13-35-36		11:26	0.78 ± 0.13	0.129 ± 0.068	04/08/05	04/13/05
Pb0082-10	LDW-Sg13-40-41		11:40	0.72 ± 0.12	0.093 ± 0.048	04/08/05	04/13/05
Pb0082-11	LDW-Sg13-45-46		11:51	0.46 ± 0.11	0.113 ± 0.053	04/08/05	04/12/05
Pb0082-12	LDW-Sg13-50-52		13:20	0.51 ± 0.10	0.082 ± 0.035	04/08/05	04/12/05
Pb0082-13	LDW-Sg13-50-52 MS	Matrix Spike	13:20	8.70 ± 0.30	25.55 ± 0.32	04/08/05	04/10/05
Pb0082-14	LDW-Sg13-50-52 MSD	Matrix Spike Duplicate	13:20	8.89 ± 0.34	19.94 ± 0.25	04/08/05	04/12/05
Pb0082-15	LDW-Sg13-55-56		13:28	0.37 ± 0.11	< 0.049	04/08/05	04/11/05
Pb0082-16	LDW-Sg13-60-61		13:43	0.54 ± 0.11	< 0.071	04/08/05	04/14/05
Pb0082-17	LDW-Sg13-60-61 MR	Matrix Replicate	13:43	0.50 ± 0.11	< 0.100	04/08/05	04/11/05
Pb0082-18	LDW-Sg13-65-66		13:51	0.54 ± 0.12	0.116 ± 0.037	04/08/05	04/13/05
Pb0082-19	LDW-Sg13-70-71		14:11	0.57 ± 0.12	0.070 ± 0.040	04/08/05	04/11/05
Pb0082-20	LDW-Sg13-75-76		14:19	0.56 ± 0.10	0.107 ± 0.059	04/08/05	04/14/05
Pb0082-21	LDW-Sg13-80-81		14:25	0.46 ± 0.09	0.119 ± 0.061	04/08/05	04/12/05

Matrix Spike Expected Values:

Pb-210	8.22 pCi/g spike + (0.51 ± 0.10)	from matrix =	8.73 ± 0.10	pCi/g
Cs-137	19.59 pCi/g spike + (0.08 ± 0.04)	from matrix =	19.67 ± 0.04	pCi/g

Target Detection Limits: Pb-210 0.2 pCi/g dry; Cs-137 0.2 pCi/g dry

Bismuth Beta Counting Method
Gamma Spectral Analysis

Hewitt W. Jeter

Tolerances are 2 sigma counting uncertainties.
Detection limits are at the 4.66 sigma level.