

**Cesium-137
DATA VALIDATION REPORT**

**Lower Passaic River Study Area
Focused Sediment Investigation Work Plan (FSIWP)**

**ALS Environmental
(FSI002, FSI003, FSI004 and FSI005)**

**Prepared by
ENVIRONMENTAL DATA SERVICES, LTD.**

**For
TIERRA SOLUTIONS, INC.**

May 08, 2012

Data Assessment Narratives

DATA VALIDATION REPORT FOR CESIUM-137

SITE: Lower Passaic River Area, Focused Sediment Investigation Work Plan (FSIWP)

LABORATORY: ALS Environmental

SAMPLE DELIVERY GROUP: FSI002

This sample delivery group consists of the following samples:

B01-SD1-000-006	B02-SD1-000-006	B02-SD1-048-054	A01-SD1-012-018	A01-SD1-030-036
B01-SD1-012-018	B02-SD1-012-018	B02-SD1-060-066	SD-00-A01-018	A01-SD1-036-042
B01-SD1-024-030	B02-SD1-024-030	A01-SD1-000-006	A01-SD1-018-024	A01-SD1-042-048
B01-SD1-036-042	B02-SD1-036-042	A01-SD1-006-012	A01-SD1-024-030	

The samples described above were analyzed via gamma spectrometry. The standard operating procedure (SOP) L-3, titled; Preparation of Samples for Analysis by Gamma Spectroscopy, and Analysis of Gamma Emitting Radionuclides by Gamma Spectroscopy were used to determine the concentration of Cesium-137 in sediment. This SOP is located in Appendix B of the Focused Sediment Investigation Work Plan, Quality Assurance Project Plan, Lower Passaic River Study Area (FSIWP-QAPP).

The data validation SOP V-3 of the FSIWP-QAPP titled; RAD-1 Rev.4, July, 2007 was used to perform the Cesium-137 data validation.

All data qualification related to this group of samples is detailed on the attached sheets. Laboratory and data validation qualifiers and their related meanings are provided in the table located at the end of this report.

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 quality control (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.



Diane Waldschmidt
Environmental Scientist/Director

Date: 5/8/12

ANALYTE QUANTITATION

Project reporting limit goals for radiochemistry parameters are sample specific values expressed as minimum detectable concentration (MDC). The MDC values will be less than or equal to the PQLs defined in the FSIWP-QAPP, however, all radiochemistry sample readings are reported as measured. Additionally, sample-specific critical values (CV) (analogous to method detection limits [MDLs]) have also been calculated and reported. MDC and CV values have been derived based on the calculations provided in Worksheet #15-2 of the FSIWP-QAPP.

Per the FSIWP-QAPP, radiochemistry sample readings that are below the CV are not statistically positive and are qualified with a "U" flag. Sample activity readings that are above the CV but below the MDC are qualified "G," estimated.

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 completed within the holding time defined within the FSIWP-QAPP (three months from sample collection).

BLANK CONTAMINATION

Quality assurance method blanks identify any contamination which may have been introduced into the samples during preparation and analysis. Method blanks are used to measure lab contamination.

Trip, field, or rinsate blanks are not required for radiochemical analyses per the FSIWP-QAPP.

Method Blank

No positive identifications of radiological target analytes were observed in corresponding method blanks above the MDC.

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 daily and, in some cases, 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)

All associated instrument calibrations for gamma spectrometry were well within acceptance limits at all times.

LABORATORY DUPLICATE

The laboratory duplicate is generated to determine the precision of the analytical procedure in a given matrix. This information may be used to qualify data.

Sample B02-SD1-060-066 was analyzed in duplicate for Cs-137. Both sample results are reported as not detected at the minimum detectable concentration (MDC). Therefore, adequate precision is demonstrated.

Sample A01-SD1-036-042 was also analyzed in duplicate for Cs-137. Upon evaluation, the mean difference between positive results reported for the pair was less than one. Therefore, adequate precision is demonstrated.

LABORATORY CONTROL SAMPLE

A laboratory control sample (LCS) was processed at the frequency specified in the FSIWP-QAPP (one for each group of up to 20 samples analyzed). Observed recoveries of LCSs for Cs-137 were within the acceptance range (70-130%).

FIELD DUPLICATE

Field duplicates are required at a frequency of one per 20 field samples or a minimum of one per sample delivery group. Acceptable precision for results obtained for the field duplicate pair is +/- 50% relative percent difference when one or both duplicate values are greater than five times the MDC or results should have a mean difference of less than or equal to three when one or both are less than five times the MDC.

One blind field duplicate pair (A01-SD1-018-024 and SD-00-A01-018) was identified in association with this sample delivery group. Field precision was adequately demonstrated since the results reported for the pair have a mean difference of less than or equal to three, when results reported for one or both samples are less than five times the MDC.

ANALYTICAL ANOMALIES NOTED IN CASE NARRATIVES

The laboratory's narrative noted that there were cases where sample density was less than that of the associated calibration standard. In these instances, affected results may be biased high.

Validation guidance does not address this issue. Therefore, no data qualifier has been applied.

OTHER QC DATA OUT OF SPECIFICATION

None.

SYSTEM PERFORMANCE AND OVERALL ASSESSMENT

Overall the laboratory data generated met the project goals and quality control criteria.

Data Validation Qualifiers

Qualifier	Description
J	Estimated value (bias undetermined) – The analyte was positively identified; but the associated numerical value is the approximate concentration of the analyte in the sample.
JH	Estimated value (potential high bias) – The analyte was positively identified; but the associated numerical value is the approximate concentration, with a potential high bias, of the analyte in the sample.
JL	Estimated value (potential low bias) – The analyte was positively identified; but the associated numerical value is the approximate concentration, with a potential low bias, of the analyte in the sample.
U	Non-detected value - The result initially reported as positive by the laboratory was qualified as not detected per USEPA Region II validation guidance, due to an associated quality control failure.
UJ	Estimated non-detect - The analyte was not detected above the reported sample quantitation limit. However, the reported quantitation limit is approximate and may or may not represent the actual limit of quantitation necessary to accurately and precisely measure the analyte in the sample.
UJL	Estimated non-detect (potential low bias) – The analyte was not detected and the report sample quantitation limit is biased low.
UJH	Estimated non-detect (potential high bias) – The analyte was not detected and the reported sample quantitation limit is biased high.
NJ	The organic analysis indicates the presence of an analyte that has been “tentatively identified” and the associated numerical value represents its approximate concentration.
NJH	The organic analysis indicates the presence of an analyte that has been “tentatively identified” and the associated numerical value represents its approximate concentration with a potential high bias, of the analyte concentration.
R	The sample results are rejected. Due to a significant QA/QC problem, the analysis is invalid and provides no information as to whether the analyte is present or not.

Laboratory Qualifiers

Qualifier	Description
G	Measured sample activity is larger than the critical value but less than the minimum detectable concentration.
U	Measured sample activity is less than the critical value and therefore is not statistically positive.

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DATA VALIDATION REPORT FOR CESIUM-137

SITE: Lower Passaic River Area, Focused Sediment Investigation Work Plan (FSIWP)

LABORATORY: ALS Environmental

SAMPLE DELIVERY GROUP: FSI003

This sample delivery group consists of the following samples:

B01-SD1-006-012	B01-SD1-042-048	B02-SD1-030-036	SD-00-B02-054
B01-SD1-018-024	B02-SD1-006-012	B02-SD1-042-048	B02-SD1-066-072
B01-SD1-030-036	B02-SD1-018-024	B02-SD1-054-060	

The samples described above were analyzed via gamma spectrometry. The standard operating procedure (SOP) L-3, titled; Preparation of Samples for Analysis by Gamma Spectroscopy, and Analysis of Gamma Emitting Radionuclides by Gamma Spectroscopy were used to determine the concentration of Cesium-137 in sediment. This SOP is located in Appendix B of the Focused Sediment Investigation Work Plan, Quality Assurance Project Plan, Lower Passaic River Study Area (FSIWP-QAPP).

The data validation SOP V-3 of the FSIWP-QAPP titled; RAD-1 Rev.4, July, 2007 was used to perform the Cesium-137 data validation.

All data qualification related to this group of samples is detailed on the attached sheets. Laboratory and data validation qualifiers and their related meanings are provided in the table located at the end of this report.

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 quality control (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.



Diane Waldschmidt
Environmental Scientist/Director

Date: 5/8/12

ANALYTE QUANTITATION

Project reporting limit goals for radiochemistry parameters are sample specific values expressed as minimum detectable concentration (MDC). The MDC values will be less than or equal to the PQLs defined in the FSIWP-QAPP, however, all radiochemistry sample readings are reported as measured. Additionally, sample-specific critical values (CV) (analogous to method detection limits [MDLs]) have also been calculated and reported. MDC and CV values have been derived based on the calculations provided in Worksheet #15-2 of the FSIWP-QAPP.

Per the FSIWP-QAPP, radiochemistry sample readings that are below the CV are not statistically positive and are qualified with a "U" flag. Sample activity readings that are above the CV but below the MDC are qualified "G," estimated.

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 completed within the holding time defined within the FSIWP-QAPP (three months from sample collection).

BLANK CONTAMINATION

Quality assurance method blanks identify any contamination which may have been introduced into the samples during preparation and analysis. Method blanks are used to measure lab contamination.

Trip, field, or rinsate blanks are not required for radiochemical analyses per the FSIWP-QAPP.

Method Blank

No positive identifications of radiological target analytes were observed in corresponding method blanks above the MDC.

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 daily and, in some cases, 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)

All associated instrument calibrations for gamma spectrometry were well within acceptance limits at all times.

LABORATORY DUPLICATE

The laboratory duplicate is generated to determine the precision of the analytical procedure in a given matrix. This information may be used to qualify data.

Sample B02-SD1-042-048 was analyzed in duplicate for Cs-137. Both sample results are reported as not detected at the minimum detectable concentration (MDC). Therefore, adequate precision is demonstrated.

Sample B02-SD1-066-072 was also analyzed in duplicate for Cs-137. Both sample results are reported as not detected at the MDC. Therefore, adequate precision is demonstrated.

LABORATORY CONTROL SAMPLE

A laboratory control sample (LCS) was processed at the frequency specified in the Project QAPP (one for each group of up to 20 samples analyzed). Observed recoveries of LCSs for Cs-137 were within the acceptance range (70-130%).

FIELD DUPLICATE

Field duplicates are required at a frequency of one per 20 field samples or a minimum of one per sample delivery group. Acceptable precision for results obtained for the field duplicate pair is +/- 50% relative percent difference when one or both duplicate values are greater than five times the MDC or results should have a mean difference of less than or equal to three when one or both are less than five times the MDC.

One blind field duplicate pair (B02-SD1-054-060 and SD- SD-00-B02-054) was identified in association with this sample delivery group. Field precision was adequately demonstrated since the results reported for the pair have a mean difference of less than or equal to three, when results reported for one or both samples are less than five times the MDC.

ANALYTICAL ANOMALIES NOTED IN CASE NARRATIVES

The laboratory's narrative noted that there were cases where sample density was less than that of the associated calibration standard. In these instances, affected results may be biased high.

Validation guidance does not address this issue. Therefore, no data qualifier has been applied.

OTHER QC DATA OUT OF SPECIFICATION

None.

SYSTEM PERFORMANCE AND OVERALL ASSESSMENT

Overall the laboratory data generated met the project goals and quality control criteria.

Data Validation Qualifiers

Qualifier	Description
J	Estimated value (bias undetermined) – The analyte was positively identified; but the associated numerical value is the approximate concentration of the analyte in the sample.
JH	Estimated value (potential high bias) – The analyte was positively identified; but the associated numerical value is the approximate concentration, with a potential high bias, of the analyte in the sample.
JL	Estimated value (potential low bias) – The analyte was positively identified; but the associated numerical value is the approximate concentration, with a potential low bias, of the analyte in the sample.
U	Non-detected value - The result initially reported as positive by the laboratory was qualified as not detected per USEPA Region II validation guidance, due to an associated quality control failure.
UJ	Estimated non-detect - The analyte was not detected above the reported sample quantitation limit. However, the reported quantitation limit is approximate and may or may not represent the actual limit of quantitation necessary to accurately and precisely measure the analyte in the sample.
UJL	Estimated non-detect (potential low bias) – The analyte was not detected and the report sample quantitation limit is biased low.
UJH	Estimated non-detect (potential high bias) – The analyte was not detected and the reported sample quantitation limit is biased high.
NJ	The organic analysis indicates the presence of an analyte that has been “tentatively identified” and the associated numerical value represents its approximate concentration.
NJH	The organic analysis indicates the presence of an analyte that has been “tentatively identified” and the associated numerical value represents its approximate concentration with a potential high bias, of the analyte concentration.
R	The sample results are rejected. Due to a significant QA/QC problem, the analysis is invalid and provides no information as to whether the analyte is present or not.

Laboratory Qualifiers

Qualifier	Description
G	Measured sample activity is larger than the critical value but less than the minimum detectable concentration.
U	Measured sample activity is less than the critical value and therefore is not statistically positive.

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DATA VALIDATION REPORT FOR CESIUM-137

SITE: Lower Passaic River Area, Focused Sediment Investigation Work Plan (FSIWP)

LABORATORY: ALS Environmental

SAMPLE DELIVERY GROUP: FSI004

This sample delivery group consists of the following samples:

A01-SD1-048-054	A01-SD1-072-078	A02-SD1-012-018	A02-SD1-030-036	A02-SD1-054-060
A01-SD1-054-060	A01-SD1-078-084	A02-SD1-018-024	A02-SD1-036-042	A02-SD1-060-066
A01-SD1-060-066	A02-SD1-000-006	SD-00-A02-018	A02-SD1-042-048	A02-SD1-066-072
A01-SD1-066-072	A02-SD1-006-012	A02-SD1-024-030	A02-SD1-048-054	

The samples described above were analyzed via gamma spectrometry. The standard operating procedure (SOP) L-3, titled; Preparation of Samples for Analysis by Gamma Spectroscopy, and Analysis of Gamma Emitting Radionuclides by Gamma Spectroscopy were used to determine the concentration of Cesium-137 in sediment. This SOP is located in Appendix B of the Focused Sediment Investigation Work Plan, Quality Assurance Project Plan, Lower Passaic River Study Area (FSIWP-QAPP).

The data validation SOP V-3 of the FSIWP-QAPP titled; RAD-1 Rev.4, July, 2007 was used to perform the Cesium-137 data validation.

All data qualification related to this group of samples is detailed on the attached sheets. Laboratory and data validation qualifiers and their related meanings are provided in the table located at the end of this report.

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 quality control (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.



Diane Waldschmidt
Environmental Scientist/Director

Date: 5/8/12

ANALYTE QUANTITATION

Project reporting limit goals for radiochemistry parameters are sample specific values expressed as minimum detectable concentration (MDC). The MDC values will be less than or equal to the PQLs defined in the FSIWP-QAPP, however, all radiochemistry sample readings are reported as measured. Additionally, sample-specific critical values (CV) (analogous to method detection limits [MDLs]) have also been calculated and reported. MDC and CV values have been derived based on the calculations provided in Worksheet #15-2 of the FSIWP-QAPP.

Per the FSIWP-QAPP, radiochemistry sample readings that are below the CV are not statistically positive and are qualified with a "U" flag. Sample activity readings that are above the CV but below the MDC are qualified "G," estimated.

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 completed within the holding time defined within the FSIWP-QAPP (three months from sample collection).

BLANK CONTAMINATION

Quality assurance method blanks identify any contamination which may have been introduced into the samples during preparation and analysis. Method blanks are used to measure lab contamination.

Trip, field, or rinsate blanks are not required for radiochemical analyses per the FSIWP-QAPP.

Method Blank

No positive identifications of radiological target analytes were observed in corresponding method blanks above the MDC.

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 daily and, in some cases, 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)

All associated instrument calibrations for gamma spectrometry were well within acceptance limits at all times.

LABORATORY DUPLICATE

The laboratory duplicate is generated to determine the precision of the analytical procedure in a given matrix. This information may be used to qualify data.

Sample A01-SD1-078-084 was analyzed in duplicate for Cs-137. Both sample results are reported as not detected at the minimum detectable concentration (MDC). Therefore, adequate precision is demonstrated.

Sample A02-SD1-012-018 was also analyzed in duplicate for Cs-137. Both sample results are reported as not detected at the MDC. Therefore, adequate precision is demonstrated.

LABORATORY CONTROL SAMPLE

A laboratory control sample (LCS) was processed at the frequency specified in the Project QAPP (one for each group of up to 20 samples analyzed). Observed recoveries of LCSs for Cs-137 were within the acceptance range (70-130%).

FIELD DUPLICATE

Field duplicates are required at a frequency of one per 20 field samples or a minimum of one per sample delivery group. Acceptable precision for results obtained for the field duplicate pair is +/- 50% relative percent difference when one or both duplicate values are greater than five times the MDC or results should have a mean difference of less than or equal to three when one or both are less than five times the MDC.

One blind field duplicate pair (A02-SD1-018-024 and SD-00-A02-018) was identified in association with this sample delivery group. Field precision was adequately demonstrated since the results reported for the pair have a mean difference of less than or equal to three, when results reported for one or both samples are less than five times the MDC.

ANALYTICAL ANOMALIES NOTED IN CASE NARRATIVES

The laboratory's narrative noted that there were cases where sample density was less than that of the associated calibration standard. In these instances, affected results may be biased high.

Validation guidance does not address this issue. Therefore, no data qualifier has been applied.

OTHER QC DATA OUT OF SPECIFICATION

None.

SYSTEM PERFORMANCE AND OVERALL ASSESSMENT

Overall the laboratory data generated met the project goals and quality control criteria.

Data Validation Qualifiers

Qualifier	Description
J	Estimated value (bias undetermined) – The analyte was positively identified; but the associated numerical value is the approximate concentration of the analyte in the sample.
JH	Estimated value (potential high bias) – The analyte was positively identified; but the associated numerical value is the approximate concentration, with a potential high bias, of the analyte in the sample.
JL	Estimated value (potential low bias) – The analyte was positively identified; but the associated numerical value is the approximate concentration, with a potential low bias, of the analyte in the sample.
U	Non-detected value - The result initially reported as positive by the laboratory was qualified as not detected per USEPA Region II validation guidance, due to an associated quality control failure.
UJ	Estimated non-detect - The analyte was not detected above the reported sample quantitation limit. However, the reported quantitation limit is approximate and may or may not represent the actual limit of quantitation necessary to accurately and precisely measure the analyte in the sample.
UJL	Estimated non-detect (potential low bias) – The analyte was not detected and the report sample quantitation limit is biased low.
UJH	Estimated non-detect (potential high bias) – The analyte was not detected and the reported sample quantitation limit is biased high.
NJ	The organic analysis indicates the presence of an analyte that has been “tentatively identified” and the associated numerical value represents its approximate concentration.
NJH	The organic analysis indicates the presence of an analyte that has been “tentatively identified” and the associated numerical value represents its approximate concentration with a potential high bias, of the analyte concentration.
R	The sample results are rejected. Due to a significant QA/QC problem, the analysis is invalid and provides no information as to whether the analyte is present or not.

Laboratory Qualifiers

Qualifier	Description
G	Measured sample activity is larger than the critical value but less than the minimum detectable concentration.
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DATA VALIDATION REPORT FOR CESIUM-137

SITE: Lower Passaic River Area, Focused Sediment Investigation Work Plan (FSIWP)

LABORATORY: ALS Environmental

SAMPLE DELIVERY GROUP: FSI005

This sample delivery group consists of the following samples:

A03-SD1-000-006	A03-SD1-018-024	A03-SD1-036-042	A03-SD1-054-060	A03-SD1-066-072
A03-SD1-006-012	A03-SD1-024-030	A03-SD1-042-048	SD-00-A03-054	A03-SD1-072-078
A03-SD1-012-018	A03-SD1-030-036	A03-SD1-048-054	A03-SD1-060-066	A03-SD1-078-084

The samples described above were analyzed via gamma spectrometry. The standard operating procedure (SOP) L-3, titled; Preparation of Samples for Analysis by Gamma Spectroscopy, and Analysis of Gamma Emitting Radionuclides by Gamma Spectroscopy were used to determine the concentration of Cesium-137 in sediment. This SOP is located in Appendix B of the Focused Sediment Investigation Work Plan, Quality Assurance Project Plan, Lower Passaic River Study Area (FSIWP-QAPP).

The data validation SOP V-3 of the FSIWP-QAPP titled; RAD-1 Rev.4, July, 2007 was used to perform the Cesium-137 data validation.

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Major Data Quality Issues

None.

Minor Data Quality Issues

None.

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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.



Diane Waldschmidt
Environmental Scientist/Director

Date: 5/8/12

ANALYTE QUANTITATION

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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)

All associated instrument calibrations for gamma spectrometry were well within acceptance limits at all times.

LABORATORY DUPLICATE

The laboratory duplicate is generated to determine the precision of the analytical procedure in a given matrix. This information may be used to qualify data.

Sample A03-SD1-018-024 was analyzed in duplicate for Cs-137. Upon evaluation, the mean difference between positive results reported for the duplicate pair is less than three. Therefore, adequate precision is demonstrated.

Sample A03-SD1-066-072 was also analyzed in duplicate for Cs-137. Upon evaluation, the mean difference between positive results reported for the pair was less than three. Therefore, adequate precision is demonstrated.

LABORATORY CONTROL SAMPLE

A laboratory control sample (LCS) was processed at the frequency specified in the Project QAPP (one for each group of up to 20 samples analyzed). Observed recoveries of LCSs for Cs-137 were within the acceptance range (70-130%).

FIELD DUPLICATE

Field duplicates are required at a frequency of one per 20 field samples or a minimum of one per sample delivery group. Acceptable precision for results obtained for the field duplicate pair is +/- 50% relative percent difference when one or both duplicate values are greater than five times the MDC or results should have a mean difference of less than or equal to three when one or both are less than five times the MDC.

One blind field duplicate pair (A03-SD1-054-060 and SD-00-A03-054) was identified in association with this sample delivery group. Field precision was adequately demonstrated since the results reported for the pair have a mean difference of less than or equal to three, when results reported for one or both samples are less than five times the MDC.

ANALYTICAL ANOMALIES NOTED IN CASE NARRATIVES

The laboratory's narrative noted that there were cases where sample density was less than that of the associated calibration standard. In these instances, affected results may be biased high

Validation guidance does not address this issue. Therefore, no data qualifier has been applied.

OTHER QC DATA OUT OF SPECIFICATION

None.

SYSTEM PERFORMANCE AND OVERALL ASSESSMENT

Overall the laboratory data generated met the project goals and quality control criteria.

Data Validation Qualifiers

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UJ	Estimated non-detect - The analyte was not detected above the reported sample quantitation limit. However, the reported quantitation limit is approximate and may or may not represent the actual limit of quantitation necessary to accurately and precisely measure the analyte in the sample.
UJL	Estimated non-detect (potential low bias) – The analyte was not detected and the report sample quantitation limit is biased low.
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NJ	The organic analysis indicates the presence of an analyte that has been “tentatively identified” and the associated numerical value represents its approximate concentration.
NJH	The organic analysis indicates the presence of an analyte that has been “tentatively identified” and the associated numerical value represents its approximate concentration with a potential high bias, of the analyte concentration.
R	The sample results are rejected. Due to a significant QA/QC problem, the analysis is invalid and provides no information as to whether the analyte is present or not.

Laboratory Qualifiers

Qualifier	Description
G	Measured sample activity is larger than the critical value but less than the minimum detectable concentration.
U	Measured sample activity is less than the critical value and therefore is not statistically positive.

Validated Data Tables

Validated Data Tables
FSIWP
ALS Environmental
SDG FSI002 - Cs-137

ANALYTE	UNITS	B01-SD1-000-006	LQ	VQ	B01-SD1-012-018	LQ	VQ	B01-SD1-024-030	LQ	VQ	B01-SD1-036-042	LQ	VQ
Cs-137	pci/g	0.049	G		0.129			0.28			0.035	G	

Validated Data Tables
 FSIWP
 ALS Environmental
 SDG FSI002 - Cs-137

ANALYTE	UNITS	B02-SD1-000-006	LQ	VQ	B02-SD1-012-018	LQ	VQ	B02-SD1-024-030	LQ	VQ	B02-SD1-036-042	LQ	VQ
Cs-137	pci/g	0.023	G		0.03	G		0.07			-0.015	U	

Validated Data Tables
FSIWP
ALS Environmental
SDG FSI002 - Cs-137

ANALYTE	UNITS	B02-SD1-048-054	LQ VQ
Cs-137	pci/g	-0.001	U

Validated Data Tables
 FSIWP
 ALS Environmental
 SDG FSI002 - Cs-137

ANALYTE	UNITS	B02-SD1-060-066	LQ	VQ	A01-SD1-000-006	LQ	VQ	A01-SD1-006-012	LQ	VQ	A01-SD1-012-018	LQ	VQ	SD-00-A01-018
Cs-137	pci/g	-0.02	U		0.323			0.315			0.7			0.88

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Validated Data Tables
 FSIWP
 ALS Environmental
 SDG FSI003 - Cs-137

ANALYTE	UNITS	B01-SD1-006-012	LQ	VQ	B01-SD1-018-024	LQ	VQ	B01-SD1-030-036	LQ	VQ	B01-SD1-042-048	LQ	VQ
Cs-137	pci/g	0.012	U		0.003	U		0.294			-0.048	U	

Validated Data Tables
 FSIWP
 ALS Environmental
 SDG FSI003 - Cs-137

ANALYTE	UNITS	B02-SD1-006-012	LQ VQ	B02-SD1-018-024	LQ VQ	B02-SD1-030-036	LQ VQ	B02-SD1-042-048	LQ VQ
Cs-137	pci/g	0.036	U	0.054	G	0.056	G	0.014	U

Validated Data Tables
 FSIWP
 ALS Environmental
 SDG FSI003 - Cs-137

ANALYTE	UNITS	B02-SD1-054-060	LQ VQ	SD-00-B02-054	LQ VQ	B02-SD1-066-072	LQ VQ
Cs-137	pci/g	-0.009	U	0.009	U	-0.02	U

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Validated Data Tables
 FSIWP
 ALS Environmental
 SDG FSI004 - Cs-137

ANALYTE	UNITS	A01-SD1-048-054	LQ VQ	A01-SD1-054-060	LQ VQ	A01-SD1-060-066	LQ VQ	A01-SD1-066-072	LQ VQ
Cs-137	pci/g	1.46		1.37		0.257		-0.022	U

Validated Data Tables
 FSIWP
 ALS Environmental
 SDG FSI004 - Cs-137

ANALYTE	UNITS	A01-SD1-072-078	LQ	VQ	A01-SD1-078-084	LQ	VQ	A02-SD1-000-006	LQ	VQ	A02-SD1-006-012	LQ	VQ
Cs-137	pci/g	-0.019	U		0	U		1.76			0.54		

Validated Data Tables
FSIWP
ALS Environmental
SDG FSI004 - Cs-137

ANALYTE	UNITS	A02-SD1-012-018	LQ	VQ
Cs-137	pci/g	0.022	U	

Validated Data Tables
 FSIWP
 ALS Environmental
 SDG FSI004 - Cs-137

ANALYTE	UNITS	A02-SD1-018-024	LQ	VQ	SD-00-A02-018	LQ	VQ	A02-SD1-024-030	LQ	VQ	A02-SD1-030-036	LQ	VQ	A02-SD1-036-042
Cs-137	pci/g	-0.008	U		0.03	U		-0.014	U		-0.01	U		-0.032

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Validated Data Tables
 FSIWP
 ALS Environmental
 SDG FSI005 - Cs-137

ANALYTE	UNITS	A03-SD1-000-006	LQ VQ	A03-SD1-006-012	LQ VQ	A03-SD1-012-018	LQ VQ	A03-SD1-018-024	LQ VQ
Cs-137	pci/g	1.2		0.52		1.43		1.56	

Validated Data Tables
 FSIWP
 ALS Environmental
 SDG FSI005 - Cs-137

ANALYTE	UNITS	A03-SD1-024-030	LQ VQ	A03-SD1-030-036	LQ VQ	A03-SD1-036-042	LQ VQ	A03-SD1-042-048	LQ VQ
Cs-137	pci/g	1.67		2.02		1.91		3.48	

Validated Data Tables
 FSIWP
 ALS Environmental
 SDG FSI005 - Cs-137

ANALYTE	UNITS	A03-SD1-048-054	LQ VQ	A03-SD1-054-060	LQ VQ	SD-00-A03-054	LQ VQ	A03-SD1-060-066	LQ VQ
Cs-137	pci/g	2.61		0.59		0.59		0.92	

Validated Data Tables
 FSIWP
 ALS Environmental
 SDG FSI005 - Cs-137

ANALYTE	UNITS	A03-SD1-066-072	LQ	VQ	A03-SD1-072-078	LQ	VQ	A03-SD1-078-084	LQ	VQ
Cs-137	pci/g	1.08			0.4			0	U	

Laboratory Data With Qualifiers Added

RADIONUCLIDE ANALYSIS RESULTS

Date: 2/27/2012Lab Name: Paragon AnalyticsSDG No.: FSI002


Field Sample ID	Lab ID	Sample Matrix	Analyte	Sample Value	2-Sigma Counting Error	Sample Specific CV	MDC	Laboratory Qualifier	Units	Analysis Date	Sample Date	Sample Size	Yield	Detector ID
B01-SD1-000-006	1201098-1	SEDIMENT	Cs-137	0.049	0.055	0.04	0.09	G	pCi/g	2/13/2012 13:25	1/10/2012 09:40	189 g		7
B01-SD1-012-018	1201098-2	SEDIMENT	Cs-137	0.129	0.049	0.034	0.071		pCi/g	2/11/2012 17:37	1/10/2012 10:45	91.4 g		1
B01-SD1-024-030	1201098-3	SEDIMENT	Cs-137	0.28	0.038	0.022	0.045		pCi/g	2/11/2012 17:02	1/10/2012 11:23	129 g		2
B01-SD1-036-042	1201098-4	SEDIMENT	Cs-137	0.035	0.041	0.032	0.067	G	pCi/g	2/11/2012 17:02	1/10/2012 12:11	126 g		3
B02-SD1-000-006	1201098-5	SEDIMENT	Cs-137	0.023	0.023	0.018	0.038	G	pCi/g	2/11/2012 17:37	1/11/2012 06:31	214 g		4
B02-SD1-012-018	1201098-6	SEDIMENT	Cs-137	0.03	0.023	0.018	0.038	G	pCi/g	2/11/2012 17:02	1/11/2012 06:55	214 g		6
B02-SD1-024-030	1201098-7	SEDIMENT	Cs-137	0.07	0.042	0.032	0.066		pCi/g	2/11/2012 17:37	1/11/2012 07:05	102 g		7
B02-SD1-036-042	1201098-8	SEDIMENT	Cs-137	-0.015	0.025	0.021	0.045	U	pCi/g	2/12/2012 12:54	1/11/2012 07:22	193 g		4
B02-SD1-048-054	1201098-9	SEDIMENT	Cs-137	-0.001	0.039	0.032	0.066	U	pCi/g	2/12/2012 12:54	1/11/2012 09:00	141 g		6
B02-SD1-060-066	1201098-10	SEDIMENT	Cs-137	-0.02	0.019	0.016	0.034	U	pCi/g	2/12/2012 12:54	1/11/2012 09:15	208 g		7
A01-SD1-000-006	1201098-11	SEDIMENT	Cs-137	0.323	0.050	0.029	0.061		pCi/g	2/12/2012 13:38	1/11/2012 10:30	94.9 g		2
A01-SD1-006-012	1201098-12	SEDIMENT	Cs-137	0.315	0.063	0.041	0.085		pCi/g	2/12/2012 13:57	1/11/2012 10:40	102 g		1
A01-SD1-012-018	1201098-13	SEDIMENT	Cs-137	0.7	0.064	0.03	0.06		pCi/g	2/12/2012 13:57	1/11/2012 10:48	101 g		10
SD-00-A01-018	1201098-14	SEDIMENT	Cs-137	0.88	0.22	0.11	0.24		pCi/g	2/13/2012 11:14	1/11/2012	93.2 g		7
A01-SD1-018-024	1201098-15	SEDIMENT	Cs-137	0.79	0.22	0.11	0.24		pCi/g	2/13/2012 11:14	1/11/2012 10:57	109 g		9
A01-SD1-024-030	1201098-16	SEDIMENT	Cs-137	1.57	0.23	0.08	0.17		pCi/g	2/13/2012 11:14	1/11/2012 11:07	113 g		10
A01-SD1-030-036	1201098-17	SEDIMENT	Cs-137	4.16	0.41	0.11	0.24		pCi/g	2/13/2012 11:14	1/11/2012 11:20	93.7 g		8
A01-SD1-036-042	1201098-18	SEDIMENT	Cs-137	3.25	0.35	0.09	0.2		pCi/g	2/13/2012 13:25	1/11/2012 11:35	98.9 g		8
A01-SD1-042-048	1201098-19	SEDIMENT	Cs-137	2.16	0.32	0.12	0.26		pCi/g	2/13/2012 13:25	1/11/2012 11:48	104 g		9

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RADIONUCLIDE ANALYSIS RESULTS

dm
5/7/12

Date: 3/4/2012

Lab Name: Paragon Analytics

SDG No.: FSI003

Field Sample ID	Lab ID	Sample Matrix	Analyte	Sample Value	2-Sigma Counting Error	Sample Specific CV	MDC	Laboratory Qualifier	Units	Analysis Date	Sample Date	Sample Size	Yield	Detector ID
B01-SD1-006-012	1201179-1	SEDIMENT	Cs-137	0.012	0.052	0.041	0.093	U	pCi/g	2/13/2012 14:16	1/10/2012 10:30	209 g		10
B01-SD1-018-024	1201179-2	SEDIMENT	Cs-137	0.003	0.052	0.043	0.094	U	pCi/g	2/13/2012 14:34	1/10/2012 10:59	176 g		8
B01-SD1-030-036	1201179-3	SEDIMENT	Cs-137	0.294	0.087	0.05	0.109		pCi/g	2/13/2012 14:48	1/10/2012 11:36	127 g		7
B01-SD1-042-048	1201179-4	SEDIMENT	Cs-137	-0.048	0.050	0.043	0.09	U	pCi/g	2/14/2012 10:13	1/10/2012 12:27	116 g		4
B02-SD1-006-012	1201179-5	SEDIMENT	Cs-137	0.036	0.051	0.039	0.085	U	pCi/g	2/14/2012 10:13	1/11/2012 06:47	220 g		6
B02-SD1-018-024	1201179-6	SEDIMENT	Cs-137	0.054	0.060	0.042	0.096	G	pCi/g	2/14/2012 10:13	1/11/2012 06:58	191 g		8
B02-SD1-030-036	1201179-7	SEDIMENT	Cs-137	0.056	0.059	0.045	0.096	G	pCi/g	2/14/2012 10:13	1/11/2012 07:16	134 g		9
B02-SD1-042-048	1201179-8	SEDIMENT	Cs-137	0.014	0.049	0.039	0.086	U	pCi/g	2/14/2012 10:13	1/11/2012 07:54	151 g		10
B02-SD1-054-060	1201179-9	SEDIMENT	Cs-137	-0.009	0.041	0.034	0.075	U	pCi/g	2/14/2012 10:31	1/11/2012 09:07	213 g		1
SD-00-B02-054	1201179-10	SEDIMENT	Cs-137	0.009	0.048	0.038	0.081	U	pCi/g	2/14/2012 10:31	1/11/2012	206 g		2
B02-SD1-066-072	1201179-11	SEDIMENT	Cs-137	-0.02	0.054	0.046	0.1	U	pCi/g	2/14/2012 10:57	1/11/2012 09:21	212 g		3

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RADIONUCLIDE ANALYSIS RESULTS

JO
5/7/12

Date: 2/28/2012

Lab Name: Paragon Analytics

SDG No.: FSI004

Field Sample ID	Lab ID	Sample Matrix	Analyte	Sample Value	2-Sigma Counting Error	Sample Specific CV	MDC	Laboratory Qualifier	Units	Analysis Date	Sample Date	Sample Size	Yield	Detector ID
A01-SD1-048-054	1201180-1	SEDIMENT	Cs-137	1.46	0.094	0.04	0.08		pCi/g	2/14/2012 17:40	1/11/2012 14:35	102 g		6
A01-SD1-054-060	1201180-2	SEDIMENT	Cs-137	1.37	0.25	0.11	0.24		pCi/g	2/15/2012 07:50	1/11/2012 14:45	103 g		8
A01-SD1-060-066	1201180-3	SEDIMENT	Cs-137	0.257	0.073	0.046	0.097		pCi/g	2/15/2012 07:50	1/11/2012 14:55	120 g		6
A01-SD1-066-072	1201180-4	SEDIMENT	Cs-137	-0.022	0.054	0.046	0.097	U	pCi/g	2/15/2012 08:12	1/11/2012 15:08	124 g		7
A01-SD1-072-078	1201180-5	SEDIMENT	Cs-137	-0.019	0.044	0.037	0.08	U	pCi/g	2/15/2012 08:13	1/11/2012 15:22	145 g		10
A01-SD1-078-084	1201180-6	SEDIMENT	Cs-137	0	0.052	0.043	0.092	U	pCi/g	2/14/2012 13:15	1/11/2012 15:33	194 g		1
A02-SD1-000-006	1201180-7	SEDIMENT	Cs-137	1.76	0.27	0.1	0.23		pCi/g	2/15/2012 09:03	1/12/2012 07:05	105 g		8
A02-SD1-006-012	1201180-8	SEDIMENT	Cs-137	0.54	0.16	0.1	0.2		pCi/g	2/15/2012 09:03	1/12/2012 07:20	120 g		3
A02-SD1-012-018	1201180-9	SEDIMENT	Cs-137	0.022	0.053	0.042	0.09	U	pCi/g	2/14/2012 13:15	1/12/2012 07:34	167 g		2
A02-SD1-018-024	1201180-10	SEDIMENT	Cs-137	-0.008	0.050	0.042	0.09	U	pCi/g	2/14/2012 13:15	1/12/2012 07:44	167 g		8
A02-SD1-024-030	1201180-11	SEDIMENT	Cs-137	-0.014	0.048	0.041	0.092	U	pCi/g	2/14/2012 13:15	1/12/2012 07:57	154 g		10
A02-SD1-030-036	1201180-12	SEDIMENT	Cs-137	-0.01	0.050	0.042	0.092	U	pCi/g	2/14/2012 13:58	1/12/2012 08:38	216 g		3
A02-SD1-036-042	1201180-13	SEDIMENT	Cs-137	-0.032	0.054	0.046	0.099	U	pCi/g	2/14/2012 14:31	1/12/2012 09:04	171 g		9
SD-00-A02-018	1201180-14	SEDIMENT	Cs-137	0.03	0.054	0.042	0.092	U	pCi/g	2/15/2012 09:03	1/12/2012	166 g		1
A02-SD1-042-048	1201180-15	SEDIMENT	Cs-137	-0.005	0.049	0.041	0.089	U	pCi/g	2/15/2012 09:03	1/12/2012 09:20	141 g		2
A02-SD1-048-054	1201180-16	SEDIMENT	Cs-137	0.037	0.047	0.035	0.078	G	pCi/g	2/15/2012 11:19	1/12/2012 09:30	181 g		7
A02-SD1-054-060	1201180-17	SEDIMENT	Cs-137	-0.042	0.043	0.042	0.094	U	pCi/g	2/15/2012 11:19	1/12/2012 09:50	196 g		10
A02-SD1-060-066	1201180-18	SEDIMENT	Cs-137	-0.034	0.048	0.042	0.089	U	pCi/g	2/15/2012 11:41	1/12/2012 10:00	209 g		6
A02-SD1-066-072	1201180-19	SEDIMENT	Cs-137	-0.004	0.053	0.044	0.099	U	pCi/g	2/15/2012 12:23	1/12/2012 10:10	203 g		10


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RADIONUCLIDE ANALYSIS RESULTS

Date: 3/4/2012

Lab Name: Paragon Analytics

SDG No.: FSI005


 5/7/12

Field Sample ID	Lab ID	Sample Matrix	Analyte	Sample Value	2-Sigma Counting Error	Sample Specific CV	MDC	Laboratory Qualifier	Units	Analysis Date	Sample Date	Sample Size	Yield	Detector ID
A03-SD1-000-006	1201182-1	SEDIMENT	Cs-137	1.2	0.21	0.09	0.2		pCi/g	2/16/2012 08:34	1/12/2012 12:11	104 g		2
A03-SD1-006-012	1201182-2	SEDIMENT	Cs-137	0.52	0.13	0.07	0.16		pCi/g	2/16/2012 08:34	1/12/2012 12:22	138 g		1
A03-SD1-012-018	1201182-3	SEDIMENT	Cs-137	1.43	0.25	0.09	0.2		pCi/g	2/16/2012 08:35	1/12/2012 12:36	100 g		8
A03-SD1-018-024	1201182-4	SEDIMENT	Cs-137	1.56	0.30	0.11	0.26		pCi/g	2/16/2012 08:35	1/12/2012 12:40	89.1 g		9
A03-SD1-024-030	1201182-5	SEDIMENT	Cs-137	1.67	0.25	0.1	0.21		pCi/g	2/16/2012 10:00	1/12/2012 12:52	94.8 g		2
A03-SD1-030-036	1201182-6	SEDIMENT	Cs-137	2.02	0.32	0.11	0.24		pCi/g	2/16/2012 10:00	1/12/2012 13:05	91.5 g		3
A03-SD1-036-042	1201182-7	SEDIMENT	Cs-137	1.91	0.27	0.08	0.19		pCi/g	2/16/2012 10:00	1/12/2012 13:20	97.2 g		7
A03-SD1-042-048	1201182-8	SEDIMENT	Cs-137	3.48	0.40	0.19	0.4		pCi/g	2/16/2012 17:20	1/12/2012 13:39	26 g		9
A03-SD1-048-054	1201182-9	SEDIMENT	Cs-137	2.61	0.63	0.25	0.58		pCi/g	2/17/2012 11:18	1/12/2012 14:39	29.1 g		8
A03-SD1-054-060	1201182-10	SEDIMENT	Cs-137	0.59	0.16	0.08	0.18		pCi/g	2/16/2012 08:35	1/12/2012 14:57	128 g		3
SD-00-A03-054	1201182-11	SEDIMENT	Cs-137	0.59	0.16	0.08	0.18		pCi/g	2/16/2012 08:35	1/12/2012	128 g		7
A03-SD1-060-066	1201182-12	SEDIMENT	Cs-137	0.92	0.22	0.11	0.25		pCi/g	2/16/2012 10:00	1/12/2012 15:10	105 g		8
A03-SD1-066-072	1201182-13	SEDIMENT	Cs-137	1.08	0.22	0.09	0.2		pCi/g	2/16/2012 10:00	1/12/2012 15:20	118 g		9
A03-SD1-072-078	1201182-14	SEDIMENT	Cs-137	0.4	0.11	0.05	0.11		pCi/g	2/16/2012 10:00	1/12/2012 15:31	146 g		10
A03-SD1-078-084	1201182-15	SEDIMENT	Cs-137	0	0.049	0.04	0.091	U	pCi/g	2/16/2012 15:24	1/12/2012 15:43	214 g		10