ENVIRONMENTAL STANDARDS

Setting the Standards for Innovative Environmental Solutions

QUALITY ASSURANCE REVIEW

OF THE OU-4B AND OU-5 SOIL SAMPLES

COLLECTED ON NOVEMBER 21 AND 22, 2019

AT THE ANACONDA COPPER MINE SITE

IN YERINGTON, NEVADA

February 25, 2020

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1.0 Introduction

This quality assurance (QA) review is based upon a rigorous examination of all data generated from the analyses of the OU-4b and OU-5 soil samples that were collected by Wood Environment & Infrastructure Solutions, Inc., on November 21 and 22, 2019, at the Anaconda Copper Mine Site in Yerington, Nevada. These samples were analyzed by Eurofins TestAmerica, St Louis in Missouri. The samples and analyses included in this QA review are specified on Table 1.

This review has been performed with guidance from the "National Functional Guidelines for Inorganic Data Review" (US EPA, 2/94). This document is not entirely applicable to the type of analyses and analytical protocols performed on the samples evaluated in this QA review, but it has been used with professional judgment to aid the data reviewer in the interpretation of the quality control (QC) analysis results and in the overall evaluation of the sample data deliverables. It should also be noted that results affected by blank contamination will be designated with a "UJ" qualifier (not the "U" qualifier typically used when following the National Functional Guidelines) in order to be consistent with historical project validation protocols.

The reported analytical results are presented as a summary of the data in Section 2. Data were examined to determine the usability of the analytical results and the compliance relative to the requirements specified in the published analytical methods and the Site-Wide Quality Assurance Project Plan Anaconda Copper Mine Site Yerington, Nevada, Update Version 5.1 (September 5, 2018). Qualifier codes have been placed next to results to enable the data user to quickly assess the qualitative and/or quantitative reliability of any result. This critical QA review identifies data quality issues for specific samples and specific evaluation criteria. The data qualifications allow the data's end-user to best understand the usability of the analytical results. Data not qualified in this report should be considered valid based on the QC criteria that have been reviewed. Details of this QA review are presented in Section 1 of this report. This report was prepared to provide a critical review of the laboratory analyses and reported analytical results. Rigorous QA reviews of laboratory-generated data routinely identify various problems associated with analytical measurements, even from the most experienced and capable laboratories.

TABLE 1

SAMPLES INCLUDED IN THIS QUALITY ASSURANCE REVIEW

Field Sample Identification	Laboratory Sample Identification	SDG	Matrix	Date Sample Collected	Parameter(s) Examined
STSB27_0-0.5	160-36526-1	160-36526-1	Soil	11/21/19	^{226}Ra, ^{228}Ra, Th, U
STSB27_0.5-3	160-36526-2	160-36526-1	Soil	11/21/19	^{226}Ra, ^{228}Ra, Th, U
STSB27_3-6	160-36526-3	160-36526-1	Soil	11/21/19	^{226}Ra, ^{228}Ra, Th, U
STSB27_6-15	160-36526-4	160-36526-1	Soil	11/21/19	^{226}Ra, ^{228}Ra, Th, U
STSB28_0-0.5	160-36526-5	160-36526-1	Soil	11/21/19	^{226}Ra, ^{228}Ra, Th, U
STSB28-FD_0-0.5 (Field Duplicate of STSB28_0-0.5)	160-36526-6	160-36526-1	Soil	11/21/19	^{226}Ra, ^{228}Ra, Th, U
STSB28_0.5-3	160-36526-7	160-36526-1	Soil	11/21/19	^{226}Ra, ^{228}Ra, Th, U
STSB28_3-6	160-36526-8	160-36526-1	Soil	11/21/19	^{226}Ra, ^{228}Ra, Th, U
STSB28_6-15	160-36526-9	160-36526-1	Soil	11/21/19	^{226}Ra, ^{228}Ra, Th, U
STSB29_0-0.5	160-36526-10	160-36526-1	Soil	11/21/19	^{226}Ra, ^{228}Ra, Th, U
STSB29_0.5-3	160-36526-11	160-36526-1	Soil	11/21/19	^{226}Ra, ^{228}Ra, Th, U
STSB29_0.5-3MS (Matrix Spike)	160-36526-11MS	160-36526-1	Soil	11/21/19	Th, U
STSB29_0.5-3MSD (Matrix Spike Duplicate)	160-36526-11MSD	160-36526-1	Soil	11/21/19	Th, U
STSB29_0.5-3DUP (Laboratory Duplicate)	160-36526-11DUP	160-36526-1	Soil	11/21/19	^{226}Ra, ^{228}Ra, Th, U
STSB29_3-6	160-36526-12	160-36526-1	Soil	11/21/19	^{226}Ra, ^{228}Ra, Th, U
STSB29_6-15	160-36526-13	160-36526-1	Soil	11/21/19	^{226}Ra, ^{228}Ra, Th, U
STSB29-FD_6-15 (Field Duplicate of STSB29_6-15)	160-36526-14	160-36526-1	Soil	11/21/19	^{226}Ra, ^{228}Ra, Th, U
STSB30_0-0.5	160-36526-15	160-36526-1	Soil	11/22/19	^{226}Ra, ^{228}Ra, Th, U
STSB30_0.5-3	160-36526-16	160-36526-1	Soil	11/22/19	^{226}Ra, ^{228}Ra, Th, U
STSB30_3-6	160-36526-17	160-36526-1	Soil	11/22/19	^{226}Ra, ^{228}Ra, Th, U
STSB30_6-15	160-36526-18	160-36526-1	Soil	11/22/19	^{226}Ra, ^{228}Ra, Th, U
STSB31_0-0.5	160-36526-19	160-36526-1	Soil	11/22/19	^{226}Ra, ^{228}Ra, Th, U
STSB31_0.5-3	160-36526-20	160-36526-1	Soil	11/22/19	^{226}Ra, ^{228}Ra, Th, U

TABLE 1 (Cont.)

Field Sample Identification	Laboratory Sample Identification	SDG	Matrix	Date Sample Collected	Parameter(s) Examined
STSB31_0.5-3MS (Matrix Spike)	160-36526-20MS	160-36526-1	Soil	11/22/19	Th, U
STSB31_0.5-3MSD (Matrix Spike Duplicate)	160-36526-20MSD	160-36526-1	Soil	11/22/19	Th, U
STSB31_3-6	160-36526-21	160-36526-1	Soil	11/22/19	^{226}Ra, ^{228}Ra, Th, U
STSB31_3-6DUP (Laboratory Duplicate)	160-36526-21DUP	160-36526-1	Soil	11/22/19	^{226}Ra, ^{228}Ra
STSB31_6-15	160-36526-22	160-36526-1	Soil	11/22/19	^{226}Ra, ^{228}Ra, Th, U

NOTES:

^{226}Ra - Radium-226 by US EPA Method 901.1.
^{228}Ra - Radium-228 by US EPA Method 901.1.
Th - Total Thorium by SW-846 Method 6020A.
U - Total Uranium by SW-846 Method 6020A.

2.0 Findings

Complete support documentation for this inorganic and radiological QA review is presented in Section 8.0 of this report.

A. Inorganic Analyses

Twenty-seven samples (including QC samples) were analyzed for total thorium and total uranium by SW-846 Method 6020A. The findings offered in this report for this fraction are based on the items on the following table:

Item Reviewed	Acceptable	Acceptable with Qualification	Not Acceptable
Holding Times	√		
Blank Analysis Results	√		
LCS Results	√		
MS/MSD Results	√		
Laboratory Duplicate Precision	√		
Serial Dilution Analysis		√	
Detection Limits/Sensitivity	√		
Calibrations	√		
RL Standard Recoveries	√		
Internal Standard Recoveries	√		
Field Duplicate Precision		√	
Analytical Sequence	√		
Sample Preparation	√		
Quantitation of Positive Results	√		
Evaluation of Raw Data	√		

Serial Dilution Analysis: Poor precision (the percent difference [%D] was > 10% when the original sample result was > 50× the method detection limit [MDL]) was observed for total thorium in an associated serial dilution analysis. The positive results for total thorium in samples STSB31_0.5-3, STSB31_3-6, and STSB31_6-15 should be considered estimated and have been flagged “J” on the data tables.

Field Duplicate Precision: Acceptable precision and sample representativeness were not observed (relative percent difference [RPD] > 40% when both results were > 5× the reporting limit [RL], or the difference between the results was > 2× the RL when at least one result was < 5× the RL) between the results for total uranium in sample STSB28_0-0.5 and its field duplicate, sample STSB28-FD_0-0.5. The positive results for total uranium in these samples should be considered estimated and have been flagged “J” on the data tables.

B. Radiological Analyses

Twenty-four samples (including QC samples) were analyzed for radium-226 and radium-228 by US EPA Method 901.1. The findings offered in this report for this fraction are based on the items on the following table:

Item Reviewed	Acceptable	Acceptable with Qualification	Not Acceptable
Holding Times	√		
Blank Results	√		
LCS Recoveries	√		
Laboratory Duplicate Precision	√		
Efficiency Checks	√		
Background Checks	√		
FWHM Resolution Checks	√		
Centroid Checks	√		
Field Duplicate Precision	√		
Quantitation of Results		√	
Evaluation of Raw Data	√		

Quantitation of Results: All positive results reported at concentrations greater than the MDL, but less than the RL, were qualified as estimated and have been flagged "J" on the data tables.

3.0 Qualifier Summary

A. Inorganic Analyses

Analyte(s)	SDG(s)	Sample(s)	Validation Qualifier(s)	Reason for Qualification(s)
total thorium	160-36526-1	STSB31_0.5-3, STSB31_3-6, and STSB31_6-15	J	G – Serial dilution imprecision
total uranium	160-36526-1	STSB28_0-0.5 and STSB28-FD_0-0.5	J	8 – Field duplicate imprecision

B. Radiological Analyses

All positive results reported between the MDL and RL have been flagged "J." (Valid Reason Code: T)

4.0 Overall Assessment

Based on this QA review, the results for total thorium in a few samples were qualified as estimated due to serial dilution imprecision. The results for total uranium in two samples were qualified as estimated due to field duplicate imprecision. In addition, several radium-228 results were qualified as estimated because positive results were reported between the MDL and the RL.

5.0 Inorganic and Radiological Data Qualifiers and Valid Reason Codes

Inorganic and Radiological Data Qualifiers

U Analyte not detected at the detection limit concentration.

J Reported value is an estimated concentration.

UJ Analyte not detected at an estimated detection limit concentration.

R These data were rejected and were not used for any purposes.

UR The analyte was not detected. The detection limit is unreliable and may be representative of a false negative. These data were rejected and are not usable for any purpose.

Valid Reason Codes

1 Holding time violation
2 Method blank contamination
3 Surrogate recovery
4 Matrix spike/matrix spike duplicate recovery
5 Matrix spike/matrix spike duplicate precision outside limits
6 Laboratory control sample recovery
7 Field blank contamination
8 Field duplicate precision outside of limits
9 Other deficiencies (including cooler temperature)
A Absence of supporting QC
S ICV, CCV, or column performance check problem
Y Initial and continuing calibration blank problem
M Interference check samples problem
O Post-digestion spike outside of QC criteria
F MSA correlation coefficient < 0.995, or MSA not done
G Serial dilution problem
K DFTPP or BFB tuning problem
Q Initial calibration problem
X Internal standard recovery problem
V Second-source standard calibration verification problem
L Low bias
Z Retention time problem
N Counting time error (radionuclide chemistry)
W Detector instability (radionuclide chemistry)
C Co-elution of compounds
E Value exceeds linear calibration range

I	Interferences present during analysis
T	Trace-level compound, poor quantitation
P	Dual-column precision outside of limits
B	LCS/LCSD precision outside limits
D	Lab Dup/Rep precision outside limits
H	High bias

6.0 Signatures

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7.0 ANALYTICAL RESULTS

Yerington
SDG: 160-36526-1

					Lab Sample	160-36526-1						160-36526-10					
					Field Sample	STSB27_0-0.5						STSB29_0-0.5					
					Collect Date	11/21/2019 9:15:00 AM						11/21/2019 3:00:00 PM					
					Type	N						N					
					Parent												
Method	**CAS Number**	**Chemical Name**	**TD**	**Test Type**	**Units**	**Result**	**Qual/ Reason**	**MDL**	**RDL**	**Uncert**	**Detect Flag**	**Result**	**Qual/ Reason**	**MDL**	**RDL**	**Uncert**	**Detect Flag**
901.1_RA	13982-63-3	Radium-226	T	INITIAL	PCI/G	1.68		0.145	1.00	0.277	Y	1.22		0.175	1.00	0.263	Y
	15262-20-1	Radium-228	T	INITIAL	PCI/G	0.731	J/T	0.244	1.00	0.269	Y	0.740	J/T	0.245	1.00	0.181	Y
SW-846 6020A	7440-29-1	Thorium	T	INITIAL	MG/KG	3.1		0.084	0.19		Y	4.7		0.087	0.19		Y
	7440-61-1	Uranium	T	INITIAL	MG/KG	1.6		0.037	0.093		Y	0.74		0.038	0.096		Y

					Lab Sample	160-36526-11						160-36526-12					
					Field Sample	STSB29_0.5-3						STSB29_3-6					
					Collect Date	11/21/2019 3:10:00 PM						11/21/2019 3:30:00 PM					
					Type	N						N					
					Parent												
Method	**CAS Number**	**Chemical Name**	**TD**	**Test Type**	**Units**	**Result**	**Qual/ Reason**	**MDL**	**RDL**	**Uncert**	**Detect Flag**	**Result**	**Qual/ Reason**	**MDL**	**RDL**	**Uncert**	**Detect Flag**
901.1_RA	13982-63-3	Radium-226	T	INITIAL	PCI/G	1.34		0.137	1.00	0.251	Y	1.14		0.242	1.00	0.280	Y
	15262-20-1	Radium-228	T	INITIAL	PCI/G	0.962	J/T	0.0877	1.00	0.202	Y	1.16		0.331	1.00	0.314	Y
SW-846 6020A	7440-29-1	Thorium	T	INITIAL	MG/KG	2.9		0.081	0.18		Y	7.1		0.085	0.19		Y
	7440-61-1	Uranium	T	INITIAL	MG/KG	0.85		0.036	0.090		Y	1.4		0.038	0.094		Y

					Lab Sample	160-36526-13						160-36526-14					
					Field Sample	STSB29_6-15						STSB29-FD_6-15					
					Collect Date	11/21/2019 3:45:00 PM						11/21/2019 3:50:00 PM					
					Type	N						N					
					Parent												
Method	**CAS Number**	**Chemical Name**	**TD**	**Test Type**	**Units**	**Result**	**Qual/ Reason**	**MDL**	**RDL**	**Uncert**	**Detect Flag**	**Result**	**Qual/ Reason**	**MDL**	**RDL**	**Uncert**	**Detect Flag**
901.1_RA	13982-63-3	Radium-226	T	INITIAL	PCI/G	1.79		0.291	1.00	0.404	Y	1.66		0.207	1.00	0.328	Y
	15262-20-1	Radium-228	T	INITIAL	PCI/G	1.33		0.206	1.00	0.371	Y	1.42		0.212	1.00	0.271	Y
SW-846 6020A	7440-29-1	Thorium	T	INITIAL	MG/KG	7.4		0.094	0.21		Y	7.8		0.089	0.20		Y
	7440-61-1	Uranium	T	INITIAL	MG/KG	1.9		0.042	0.10		Y	2.1		0.039	0.099		Y

					Lab Sample	160-36526-15						160-36526-16					
					Field Sample	STSB30_0-0.5						STSB30_0.5-3					
					Collect Date	11/22/2019 8:55:00 AM						11/22/2019 9:02:00 AM					
					Type	N						N					
					Parent												
Method	**CAS Number**	**Chemical Name**	**TD**	**Test Type**	**Units**	**Result**	**Qual/ Reason**	**MDL**	**RDL**	**Uncert**	**Detect Flag**	**Result**	**Qual/ Reason**	**MDL**	**RDL**	**Uncert**	**Detect Flag**
901.1_RA	13982-63-3	Radium-226	T	INITIAL	PCI/G	2.82		0.167	1.00	0.401	Y	2.35		0.120	1.00	0.343	Y
	15262-20-1	Radium-228	T	INITIAL	PCI/G	0.735	J/T	0.279	1.00	0.296	Y	0.832	J/T	0.173	1.00	0.250	Y
SW-846 6020A	7440-29-1	Thorium	T	INITIAL	MG/KG	1.9		0.091	0.20		Y	2.7		0.082	0.18		Y
	7440-61-1	Uranium	T	INITIAL	MG/KG	1.4		0.040	0.10		Y	0.82		0.036	0.091		Y

					Lab Sample	160-36526-17						160-36526-18					
					Field Sample	STSB30_3-6						STSB30_6-15					
					Collect Date	11/22/2019 9:10:00 AM						11/22/2019 9:25:00 AM					
					Type	N						N					
					Parent												
Method	**CAS Number**	**Chemical Name**	**TD**	**Test Type**	**Units**	**Result**	**Qual/ Reason**	**MDL**	**RDL**	**Uncert**	**Detect Flag**	**Result**	**Qual/ Reason**	**MDL**	**RDL**	**Uncert**	**Detect Flag**
901.1_RA	13982-63-3	Radium-226	T	INITIAL	PCI/G	2.15		0.181	1.00	0.364	Y	2.17		0.200	1.00	0.377	Y
	15262-20-1	Radium-228	T	INITIAL	PCI/G	0.972	J/T	0.230	1.00	0.317	Y	1.43		0.203	1.00	0.310	Y
SW-846 6020A	7440-29-1	Thorium	T	INITIAL	MG/KG	2.8		0.084	0.19		Y	12		0.10	0.22		Y
	7440-61-1	Uranium	T	INITIAL	MG/KG	0.72		0.037	0.093		Y	2.6		0.045	0.11		Y

					Lab Sample	160-36526-19						160-36526-2					
					Field Sample	STSB31_0-0.5						STSB27_0.5-3					
					Collect Date	11/22/2019 11:56:00 AM						11/21/2019 9:25:00 AM					
					Type	N						N					
					Parent												
Method	**CAS Number**	**Chemical Name**	**TD**	**Test Type**	**Units**	**Result**	**Qual/ Reason**	**MDL**	**RDL**	**Uncert**	**Detect Flag**	**Result**	**Qual/ Reason**	**MDL**	**RDL**	**Uncert**	**Detect Flag**
901.1_RA	13982-63-3	Radium-226	T	INITIAL	PCI/G	4.73		0.245	1.00	0.643	Y	2.01		0.146	1.00	0.311	Y
	15262-20-1	Radium-228	T	INITIAL	PCI/G	0.866	J/T	0.530	1.00	0.349	Y	0.787	J/T	0.197	1.00	0.204	Y
SW-846 6020A	7440-29-1	Thorium	T	INITIAL	MG/KG	5.0		0.084	0.19		Y	3.3		0.089	0.20		Y
	7440-61-1	Uranium	T	INITIAL	MG/KG	3.1		0.037	0.093		Y	1.2		0.039	0.099		Y

					Lab Sample	160-36526-20						160-36526-21					
					Field Sample	STSB31_0.5-3						STSB31_3-6					
					Collect Date	11/22/2019 12:03:00 PM						11/22/2019 12:10:00 PM					
					Type	N						N					
					Parent												
Method	**CAS Number**	**Chemical Name**	**TD**	**Test Type**	**Units**	**Result**	**Qual/ Reason**	**MDL**	**RDL**	**Uncert**	**Detect Flag**	**Result**	**Qual/ Reason**	**MDL**	**RDL**	**Uncert**	**Detect Flag**
901.1_RA	13982-63-3	Radium-226	T	INITIAL	PCI/G	3.60		0.144	1.00	0.485	Y	4.63		0.247	1.00	0.648	Y
	15262-20-1	Radium-228	T	INITIAL	PCI/G	0.970	J/T	0.216	1.00	0.246	Y	0.947	J/T	0.302	1.00	0.326	Y
SW-846 6020A	7440-29-1	Thorium	T	INITIAL	MG/KG	5.0	J/G	0.085	0.19		Y	4.8	J/G	0.089	0.20		Y
	7440-61-1	Uranium	T	INITIAL	MG/KG	1.4		0.038	0.095		Y	1.7		0.040	0.099		Y

					Lab Sample	160-36526-22						160-36526-3					
					Field Sample	STSB31_6-15						STSB27_3-6					
					Collect Date	11/22/2019 12:20:00 PM						11/21/2019 9:31:00 AM					
					Type	N						N					
					Parent												
Method	**CAS Number**	**Chemical Name**	**TD**	**Test Type**	**Units**	**Result**	**Qual/ Reason**	**MDL**	**RDL**	**Uncert**	**Detect Flag**	**Result**	**Qual/ Reason**	**MDL**	**RDL**	**Uncert**	**Detect Flag**
901.1_RA	13982-63-3	Radium-226	T	INITIAL	PCI/G	2.45		0.271	1.00	0.458	Y	1.96		0.146	1.00	0.326	Y
	15262-20-1	Radium-228	T	INITIAL	PCI/G	1.55		0.569	1.00	0.632	Y	0.702	J/T	0.279	1.00	0.229	Y
SW-846 6020A	7440-29-1	Thorium	T	INITIAL	MG/KG	6.4	J/G	0.081	0.18		Y	2.8		0.088	0.19		Y
	7440-61-1	Uranium	T	INITIAL	MG/KG	4.0		0.036	0.090		Y	1.0		0.039	0.097		Y

					Lab Sample	160-36526-4						160-36526-5					
					Field Sample	STSB27_6-15						STSB28_0-0.5					
					Collect Date	11/21/2019 9:55:00 AM						11/21/2019 11:45:00 AM					
					Type	N						N					
					Parent												
Method	**CAS Number**	**Chemical Name**	**TD**	**Test Type**	**Units**	**Result**	**Qual/ Reason**	**MDL**	**RDL**	**Uncert**	**Detect Flag**	**Result**	**Qual/ Reason**	**MDL**	**RDL**	**Uncert**	**Detect Flag**
901.1_RA	13982-63-3	Radium-226	T	INITIAL	PCI/G	1.69		0.168	1.00	0.303	Y	1.93		0.113	1.00	0.295	Y
	15262-20-1	Radium-228	T	INITIAL	PCI/G	1.11		0.310	1.00	0.332	Y	0.863	J/T	0.258	1.00	0.242	Y
SW-846 6020A	7440-29-1	Thorium	T	INITIAL	MG/KG	7.4		0.090	0.20		Y	3.5		0.081	0.18		Y
	7440-61-1	Uranium	T	INITIAL	MG/KG	1.9		0.040	0.10		Y	4.2	J/8	0.036	0.090		Y

					Lab Sample	160-36526-6						160-36526-7					
					Field Sample	STSB28-FD_0-0.5						STSB28_0.5-3					
					Collect Date	11/21/2019 11:50:00 AM						11/21/2019 11:55:00 AM					
					Type	N						N					
					Parent												
Method	**CAS Number**	**Chemical Name**	**TD**	**Test Type**	**Units**	**Result**	**Qual/ Reason**	**MDL**	**RDL**	**Uncert**	**Detect Flag**	**Result**	**Qual/ Reason**	**MDL**	**RDL**	**Uncert**	**Detect Flag**
901.1_RA	13982-63-3	Radium-226	T	INITIAL	PCI/G	1.77		0.175	1.00	0.315	Y	2.72		0.120	1.00	0.370	Y
	15262-20-1	Radium-228	T	INITIAL	PCI/G	0.807	J/T	0.213	1.00	0.262	Y	0.684	J/T	0.354	1.00	0.216	Y
SW-846 6020A	7440-29-1	Thorium	T	INITIAL	MG/KG	4.0		0.090	0.20		Y	3.8		0.087	0.19		Y
	7440-61-1	Uranium	T	INITIAL	MG/KG	2.6	J/8	0.040	0.10		Y	1.3		0.039	0.097		Y

					Lab Sample	160-36526-8						160-36526-9					
					Field Sample	STSB28_3-6						STSB28_6-15					
					Collect Date	11/21/2019 12:15:00 PM						11/21/2019 12:25:00 PM					
					Type	N						N					
					Parent												
Method	**CAS Number**	**Chemical Name**	**TD**	**Test Type**	**Units**	**Result**	**Qual/ Reason**	**MDL**	**RDL**	**Uncert**	**Detect Flag**	**Result**	**Qual/ Reason**	**MDL**	**RDL**	**Uncert**	**Detect Flag**
901.1_RA	13982-63-3	Radium-226	T	INITIAL	PCI/G	3.11		0.181	1.00	0.448	Y	2.28		0.205	1.00	0.413	Y
	15262-20-1	Radium-228	T	INITIAL	PCI/G	1.13		0.0977	1.00	0.256	Y	1.98		0.174	1.00	0.393	Y
SW-846 6020A	7440-29-1	Thorium	T	INITIAL	MG/KG	4.2		0.085	0.19		Y	8.1		0.10	0.23		Y
	7440-61-1	Uranium	T	INITIAL	MG/KG	1.3		0.038	0.095		Y	2.3		0.046	0.11		Y

8.0 SUPPORTING DOCUMENTATION

eurofins

Environment Testing
TestAmerica

ANALYTICAL REPORT

Job Number: 160-36526-1

Job Description: ACMS - Yerington OU-4B_OU-5_SOIL

Contract Number: EPSCM 2017-009//BP01498843

For:
Wood E&I Solutions Inc
10940 White Rock Road Suite 190
Rancho Cordova, CA 95670

Attention: Kent Parrish

Approved for release.
Jayna K Awalt
Project Manager II
12/31/2019 9:41 AM

Jayna K Awalt, Project Manager II
13715 Rider Trail North, Earth City, MO, 63045
(314)298-8566
jayna.awalt@testamericainc.com
12/31/2019

The test results in this report meet NELAP requirements for parameters for which accreditation is required or available. Any exceptions to the NELAP requirements are noted. Results pertain only to samples listed in this report. Pursuant to NELAP, this report shall not be reproduced, except in full, without the written approval of the laboratory. This report is confidential and is intended for the sole use of TestAmerica and its client. All questions regarding this report should be directed to the TestAmerica Project Manager.

Louisiana Lab Certification ID (Non-Potable, Solid/Haz. Material): 106151
Florida Lab Certification ID (Drinking Water): E87689.

The test results in this report relate only to the samples as received by the laboratory and will meet all requirements of the methodology, with any exceptions noted. This report shall not be reproduced except in full, without the express written approval of the laboratory. All questions should be directed to the Eurofins TestAmerica Project Manager.

This report has been electronically signed and authorized by the signatory. Electronic signature is intended to be the legally binding equivalent of a traditionally handwritten signature.

Sample Summary

Client: Wood E&I Solutions Inc
Project/Site: ACMS - Yerington OU-4B_OU-5_SOIL

Job ID: 160-36526-1

Lab Sample ID	Client Sample ID	Matrix	Collected	Received	Asset ID
160-36526-1	STSB27_0-0.5	Solid	11/21/19 09:15	11/26/19 09:15	
160-36526-2	STSB27_0.5-3	Solid	11/21/19 09:25	11/26/19 09:15	
160-36526-3	STSB27_3-6	Solid	11/21/19 09:31	11/26/19 09:15	
160-36526-4	STSB27_6-15	Solid	11/21/19 09:55	11/26/19 09:15	
160-36526-5	STSB28_0-0.5	Solid	11/21/19 11:45	11/26/19 09:15	
160-36526-6	STSB28-FD_0-0.5	Solid	11/21/19 11:50	11/26/19 09:15	
160-36526-7	STSB28_0.5-3	Solid	11/21/19 11:55	11/26/19 09:15	
160-36526-8	STSB28_3-6	Solid	11/21/19 12:15	11/26/19 09:15	
160-36526-9	STSB28_6-15	Solid	11/21/19 12:25	11/26/19 09:15	
160-36526-10	STSB29_0-0.5	Solid	11/21/19 15:00	11/26/19 09:15	
160-36526-11	STSB29_0.5-3	Solid	11/21/19 15:10	11/26/19 09:15	
160-36526-12	STSB29_3-6	Solid	11/21/19 15:30	11/26/19 09:15	
160-36526-13	STSB29_6-15	Solid	11/21/19 15:45	11/26/19 09:15	
160-36526-14	STSB29-FD_6-15	Solid	11/21/19 15:50	11/26/19 09:15	
160-36526-15	STSB30_0-0.5	Solid	11/22/19 08:55	11/26/19 09:15	
160-36526-16	STSB30_0.5-3	Solid	11/22/19 09:02	11/26/19 09:15	
160-36526-17	STSB30_3-6	Solid	11/22/19 09:10	11/26/19 09:15	
160-36526-18	STSB30_6-15	Solid	11/22/19 09:25	11/26/19 09:15	
160-36526-19	STSB31_0-0.5	Solid	11/22/19 11:56	11/26/19 09:15	
160-36526-20	STSB31_0.5-3	Solid	11/22/19 12:03	11/26/19 09:15	
160-36526-21	STSB31_3-6	Solid	11/22/19 12:10	11/26/19 09:15	
160-36526-22	STSB31_6-15	Solid	11/22/19 12:20	11/26/19 09:15	

Job ID: 160-36526-1

Laboratory: Eurofins TestAmerica, St. Louis

Narrative

CASE NARRATIVE

Client: Wood E&I Solutions Inc

Project: ACMS - Yerington OU-4B_OU-5_SOIL

Report Number: 160-36526-1

With the exceptions noted as flags or footnotes, standard analytical protocols were followed in the analysis of the samples and no problems were encountered or anomalies observed. In addition all laboratory quality control samples were within established control limits, with any exceptions noted below. Each sample was analyzed to achieve the lowest possible reporting limit within the constraints of the method. In some cases, due to interference or analytes present at high concentrations, samples were diluted. For diluted samples, the reporting limits are adjusted relative to the dilution required.

Eurofins TestAmerica, St. Louis attests to the validity of the laboratory data generated by Eurofins TestAmerica facilities reported herein. All analyses performed by Eurofins TestAmerica facilities were done using established laboratory SOPs that incorporate QA/QC procedures described in the application methods. Eurofins TestAmerica's operations groups have reviewed the data for compliance with the laboratory QA/QC plan, and data have been found to be compliant with laboratory protocols unless otherwise noted below.

The test results in this report meet all NELAP requirements for parameters for which accreditation is required or available. Any exceptions to NELAP requirements are noted in this report. Pursuant to NELAP, this report may not be reproduced, except in full, without the written approval of the laboratory.

Calculations are performed before rounding to avoid round-off errors in calculated results.

All holding times were met and proper preservation noted for the methods performed on these samples, unless otherwise detailed in the individual sections below.

All solid sample results for Chemistry analyses are reported on an ""as received"" basis unless otherwise indicated by the presence of a % solids value in the method header. All soil/sediment sample results for radiochemistry analyses are based upon sample as dried and disaggregated with the exception of tritium, carbon-14, and iodine-129 by gamma spectroscopy unless requested as wet weight by the client."

Any minimum detectable concentration (MDC), critical value (DLC), or Safe Drinking Water Act detection limit (SDWA DL) is sample-specific unless otherwise stated elsewhere in this narrative.

Radiochemistry sample results are reported with the count date/time applied as the Activity Reference Date.

Reference the chain of custody and condition upon receipt report for any variations on receipt conditions and temperature of samples on receipt.

Manual Integrations and ROIs were performed only when necessary and are in compliance with the laboratory's standard operating procedure. Detailed information can be found in the raw data section of the level IV report.

This laboratory report is confidential and is intended for the sole use of Eurofins TestAmerica and its client.

RECEIPT

The samples were received on 11/26/2019 9:15 AM; the samples arrived in good condition, properly preserved and, where required, on ice. The temperatures of the 2 coolers at receipt time were -0.1° C and 0.0° C.

METALS (ICPMS)

Job ID: 160-36526-1 (Continued)

Laboratory: Eurofins TestAmerica, St. Louis (Continued)

Samples STSB27_0-0.5 (160-36526-1), STSB27_0.5-3 (160-36526-2), STSB27_3-6 (160-36526-3), STSB27_6-15 (160-36526-4), STSB28_0-0.5 (160-36526-5), STSB28-FD_0-0.5 (160-36526-6), STSB28_0.5-3 (160-36526-7), STSB28_3-6 (160-36526-8), STSB28_6-15 (160-36526-9), STSB29_0-0.5 (160-36526-10), STSB29_0.5-3 (160-36526-11), STSB29_3-6 (160-36526-12), STSB29_6-15 (160-36526-13), STSB29-FD_6-15 (160-36526-14), STSB30_0-0.5 (160-36526-15), STSB30_0.5-3 (160-36526-16), STSB30_3-6 (160-36526-17), STSB30_6-15 (160-36526-18), STSB31_0-0.5 (160-36526-19), STSB31_0.5-3 (160-36526-20), STSB31_3-6 (160-36526-21) and STSB31_6-15 (160-36526-22) were analyzed for metals (ICPMS) in accordance with EPA SW-846 Methods 6020A. The samples were prepared on 12/02/2019 and analyzed on 12/10/2019 and 12/11/2019.

For ICPMS Metals, a 2X dilution was performed. This is a standard dilution that is performed by TestAmerica St. Louis on all samples analyzed by method SW-846 6020A. The dilution is performed in order to have the matrix of the samples (i.e. the concentration of acids) match the matrix of the standards used for calibration and instrument quality control purposes. The MDL studies analyzed by this method undergo the same 2X dilution, and all detection limits are based on this. As such, MDL's and RL's are not affected by the dilution.

The serial dilution performed for the following samples associated with batch preparation batch 160-452612 and analytical batch 160-453935 was outside control limits for Thorium indicating potential matrix interference: (160-36526-B-20-A SD).

No additional analytical or quality issues were noted, other than those described above or in the Definitions/Glossary page.

PERCENT SOLIDS

Samples STSB27_0-0.5 (160-36526-1), STSB27_0.5-3 (160-36526-2), STSB27_3-6 (160-36526-3), STSB27_6-15 (160-36526-4), STSB28_0-0.5 (160-36526-5), STSB28-FD_0-0.5 (160-36526-6), STSB28_0.5-3 (160-36526-7), STSB28_3-6 (160-36526-8), STSB28_6-15 (160-36526-9), STSB29_0-0.5 (160-36526-10), STSB29_0.5-3 (160-36526-11), STSB29_3-6 (160-36526-12), STSB29_6-15 (160-36526-13), STSB29-FD_6-15 (160-36526-14), STSB30_0-0.5 (160-36526-15), STSB30_0.5-3 (160-36526-16), STSB30_3-6 (160-36526-17), STSB30_6-15 (160-36526-18), STSB31_0-0.5 (160-36526-19), STSB31_0.5-3 (160-36526-20), STSB31_3-6 (160-36526-21) and STSB31_6-15 (160-36526-22) were analyzed for percent solids in accordance with EPA Method 160.3 MOD. The samples were analyzed on 11/28/2019.

No analytical or quality issues were noted, other than those described above or in the Definitions/Glossary page.

RADIUM-226 BY GAMMA SPEC (21 DAY INGROWTH)

Samples STSB27_0-0.5 (160-36526-1), STSB27_0.5-3 (160-36526-2), STSB27_3-6 (160-36526-3), STSB27_6-15 (160-36526-4), STSB28_0-0.5 (160-36526-5), STSB28-FD_0-0.5 (160-36526-6), STSB28_0.5-3 (160-36526-7), STSB28_3-6 (160-36526-8), STSB28_6-15 (160-36526-9), STSB29_0-0.5 (160-36526-10), STSB29_0.5-3 (160-36526-11), STSB29_3-6 (160-36526-12), STSB29_6-15 (160-36526-13), STSB29-FD_6-15 (160-36526-14), STSB30_0-0.5 (160-36526-15), STSB30_0.5-3 (160-36526-16), STSB30_3-6 (160-36526-17), STSB30_6-15 (160-36526-18), STSB31_0-0.5 (160-36526-19), STSB31_0.5-3 (160-36526-20), STSB31_3-6 (160-36526-21) and STSB31_6-15 (160-36526-22) were analyzed for Radium-226 by gamma spec (21 day ingrowth) in accordance with EPA 901.1. The samples were dried on 11/29/2019, prepared on 12/01/2019 and analyzed on 12/25/2019.

Many isotopes requested for analysis do not have any gamma emissions, or the gamma emissions they do have are very poor. Often, such analytes are reported by gamma spectrometry assuming secular equilibrium with a longer-lived parent. The client should ensure that such inference is acceptable for their sample based upon process knowledge. The following assumptions were made for this report:

Inferred from	Reported to Analyte
Th-234	Pa-234
Th-234	U-238
Pb-210	Po-210
Pb-210	Bi-210
Cs-137	Ba-137m
Pb-212	Po-216
Xe-131m	Xe-131
Sb-125	Te-125m
Ag-108m	Ag-108
Rh-106	Ru-106
Pb-212	Th-228
Pb-212	Ra-224
U-235	Th-231

Job ID: 160-36526-1 (Continued)

Laboratory: Eurofins TestAmerica, St. Louis (Continued)

Ac-228	Th-232
Ac-228	Ra-228
Th-227	Ra-223
Th-227	Ac-227
Th-227	Bi-211
Th-227	Pb-211
Bi-214	Ra-226

No analytical or quality issues were noted, other than those described above or in the Definitions/Glossary page.

The results listed within this Laboratory Report pertain only to the samples tested in the laboratory. The analyses contained in this report were performed in accordance with the BPLAMP Technical Specifications, applicable federal, state, local regulations and certification requirements as well as the methodologies as described in laboratory SOPs reviewed by the BPLAMP. This Laboratory Report is confidential and is intended for the sole use of Eurofins TestAmerica and its client. This report shall not be reproduced, except in full, without written permission from TestAmerica. The signature on the cover page extends to the case narrative and all the data and forms in the package. The Chain of Custody is included and is an integral part of this report.

Jayna Awalt
Project Manager II
12/31/2019 9:39:03 AM

Atlantic Richfield Company
A BP affiliated company

Laboratory Management Program LaMP Chain of Custody Record

BP/ARC Site Node Path: NV_YERINGTON **Req Due Date (mm/dd/yy):** STD TAT **Rush TAT:** Yes ___ No X

BP/ARC Facility Name: Anaconda Copper Mine Site **Lab Work Order Number:**

Lab Name:	TestAmerica, Inc.	BP/ARC Facility Address:	1 Austin Circle	Consultant/Contractor	Wood - E&I Solutions, Inc.
Lab Address:	13715 Rider Trail N., Earth City, MO 63045	City, State, ZIP Code:	Yerington, Nevada 89447	Consultant/Contractor Project No.	SA18170340.005.055B
Lab PM:	Jayna Awalt	Lead Regulatory Agency:	NDEP Abandoned Mine Lands Program	Address:	10940 White Rock Rd, Ste 190 Rancho Cordova, CA 95670
Lab Phone:	314-298-8566	California Global ID No.:		Consultant/Contractor PM:	Kent Parrish
Lab Shipping Accnt:	1955-3772-0 (TAL Acct #)	Enfos Proposal No: D019Q-0047	Work Release No: WR331232	Phone: 916-636-3200	Email: Kent.Parrish@woodplc.com
Lab Bottle Order No:	NA	Accounting Mode:	Provision X OOC-BU ___ OOC-RM ___	Email Report/EDD To:	lynda.lombardi@woodplc.com
Other Info:	OU-4b_OU-5_Soil	Stage: Appraise	Activity: Field Work/Remedial Investigation	Invoice To:	BP/ARC X Contractor ___

BP/ARC EBM: Chuck Stilwell
EBM Phone: 713-998-2443
EBM Email: Chuck.Stilwell@bp.com

Report Type & QC Level: Standard ___ Full Data Package X

Lab No.	Sample Description	Date	Time	Matrix: Soil / Solid	Water / Liquid	Air / Vapor		No. Containers / Preservative: Total Number of Containers	Unpreserved	H_2SO_4	HNO_3				Requested Analyses: Thorium, Uranium (SW6020A)	Radium-226 (HASL 300)	Radium-228 (HASL 300)						MS/MSD or LD	Comments
	STSB27_0-0.5	11/21/19	0915	X				2	2						X	X	X							Report soil on dry weight basis.
	STSB27_0.5-3	11/21/19	0925	X				2	2						X	X	X							
	STSB27_3-6	11/21/19	0931	X				2	2						X	X	X							
	STSB27_6-15	11/21/19	0955	X				2	2						X	X	X							
	STSB28X_0-0.5	11/21/19	1145	X				2	2						X	X	X							STSB28_0-0.5 Sample ID
	STSB28-FD_0-0.5	11/21/19	1150	X				2	2						X	X	X							
	STSB28_0.5-3	11/21/19	1155	X				2	2						X	X	X							
	STSB28_3-6	11/21/19	1215	X				2	2						X	X	X							
	STSB28_6-15	11/21/19	1225	X				2	2						X	X	X							
	STSB29_0-0.5	11/21/19	1500	X				2	2						X	X	X							

180-36526 Chain of Custody

	Relinquished By / Affiliation	Date	Time	Accepted By / Affiliation	Date	Time
Sampler's Name: Bryce Johnson						
Sampler's Company: Wood	/ Wood	11/25/19	1030	/ BTAS TL	11/26/19	08:15
Shipment Method: Fed EX Ship Date: 11/25/19						
Shipment Tracking No: 8137 9414 1730, 1740						

Special Instructions:

THIS LINE - LAB USE ONLY: Custody Seals In Place: Yes / No | Temp Blank: Yes / No | Cooler Temp on Receipt: _____ °F/C | Trip Blank: Yes / No | MS/MSD Sample Submitted: Yes / No

Atlantic Richfield Company
A BP affiliated company

Laboratory Management Program LaMP Chain of Custody Record

BP/ARC Site Node Path: NV_YERINGTON
Req Due Date (mm/dd/yy): STD TAT
Rush TAT: Yes ___ No X
BP/ARC Facility Name: Anaconda Copper Mine Site
Lab Work Order Number:

Lab Name:	TestAmerica, Inc.	BP/ARC Facility Address:	1 Austin Circle	Consultant/Contractor	Wood - E&I Solutions, Inc.
Lab Address:	13715 Rider Trail N., Earth City, MO 63045	City, State, ZIP Code:	Yerington, Nevada 89447	Consultant/Contractor Project No:	SA18170340.005.055B
Lab PM:	Jayna Awalt	Lead Regulatory Agency	NDEP Abandoned Mine Lands Program	Address	10940 White Rock Rd, Ste 190 Rancho Cordova, CA 95670
Lab Phone:	314-298-8566	California Global ID No.		Consultant/Contractor PM:	Kent Parrish
Lab Shipping Accnt:	1955-3772-0 (TAL Acct #)	Enfos Proposal No: D019Q-0047	Work Release No: WR331232	Phone: 916-636-3200	Email: Kent.Parrish@woodplc.com
Lab Bottle Order No:	NA	Accounting Mode	Provision X OOC-BU ___ OOC-RM ___	Email Report/EDD To:	lynda.lombardi@woodplc.com
Other Info:	OU-4b_OU-5_Soil	Stage Appraise	Activity: Field Work/Remedial Investigation	Invoice To:	BP/ARC X Contractor ___

BP/ARC EBM: Chuck Stilwell
EBM Phone: 713-998-2443
EBM Email: Chuck.Stilwell@bp.com

Report Type & QC Level: Standard ___ Full Data Package X

Lab No.	Sample Description	Date	Time	Matrix: Soil / Solid	Water / Liquid	Air / Vapor	No. Containers / Preservative: Total Number of Containers	Unpreserved	H_2SO_4	HNO_3	Requested Analyses: Thorium, Uranium (SW6020A)	Radium-226 (HASL 300)	Radium-228 (HASL 300)	MS/MSD or LD	Comments (Note: If sample not collected, indicate "No Sample" in comments and single-strike out and initial any preprinted sample description)
	STSB29_0.5-3	11/21/19	1510	X			4	4			X	X	X	X	Report soil on dry weight basis. 4 containers BJ 11/21/19
	STSB29_3-6	11/21/19	1530	X			2	2			X	X	X		
	STSB29_6-15	11/21/19	1545	X			2	2			X	X	X		
	STSB29-FD_6-15	11/21/19	1550	X			2	2			X	X	X		
	STSB30_0-0.5	11/22/19	0855	X			2	2			X	X	X		
	STSB30_0.5-3	11/22/19	0902	X			2	2			X	X	X		
	STSB30_3-6	11/22/19	0910	X			2	2			X	X	X		
	STSB30_6-15	11/22/19	0925	X			2	2			X	X	X		
								BJ 11/25/19							

	Relinquished By / Affiliation	Date	Time	Accepted By / Affiliation	Date	Time
Sampler's Name: Bryce Johnson						
Sampler's Company: Wood	[signature] / Wood	11/25/19	1030	[signature] / ETAS TL	11/26/19	0915
Shipment Method: Fed Ex Ship Date: 11/25/19						
Shipment Tracking No:						

Special Instructions: 8137 9414 1730, 1740

THIS LINE - LAB USE ONLY: Custody Seals In Place: Yes / No | Temp Blank: Yes / No | Cooler Temp on Receipt: _____ °F/C | Trip Blank: Yes / No | MS/MSD Sample Submitted: Yes / No

BP/ARC LaMP COC Rev. 7, Jul 29, 2010

Atlantic Richfield Company
A BP affiliated company

Laboratory Management Program LaMP Chain of Custody Record

BP/ARC Site Node Path: NV_YERINGTON
Req Due Date (mm/dd/yy): STD TAT
Rush TAT: Yes ___ No X
BP/ARC Facility Name: Anaconda Copper Mine Site
Lab Work Order Number:

Lab Name:	TestAmerica, Inc.	BP/ARC Facility Address:	1 Austin Circle	Consultant/Contractor:	Wood - E&I Solutions, Inc.
Lab Address:	13715 Rider Trail N., Earth City, MO 63045	City, State, ZIP Code:	Yerington, Nevada 89447	Consultant/Contractor Project No:	SA18170340.005.055B
Lab PM:	Jayna Awalt	Lead Regulatory Agency:	NDEP Abandoned Mine Lands Program	Address:	10940 White Rock Rd, Ste 190 Rancho Cordova, CA 95670
Lab Phone:	314-298-8566	California Global ID No.:		Consultant/Contractor PM:	Kent Parrish
Lab Shipping Accnt:	1955-3772-0 (TAL Acct #)	Enfos Proposal No: D019Q-0047	Work Release No: WR331232	Phone: 916-636-3200	Email: Kent.Parrish@woodplc.com
Lab Bottle Order No:	NA	Accounting Mode:	Provision X OOC-BU ___ OOC-RM ___	Email Report/EDD To:	lynda.lombardi@woodplc.com
Other Info:	OU-4b_OU-5_Soil	Stage: Appraise	Activity: Field Work/Remedial Investigation	Invoice To:	BP/ARC X Contractor ___
BP/ARC EBM:	Chuck Stilwell				
EBM Phone:	713-998-2443				
EBM Email:	Chuck.Stilwell@bp.com				

Report Type & QC Level: Standard ___ Full Data Package X

Lab No.	Sample Description	Date	Time	Matrix: Soil / Solid	Water / Liquid	Air / Vapor	No. Containers / Preservative: Total Number of Containers	Unpreserved	H_2SO_4	HNO_3	Requested Analyses: Thorium, Uranium (SW6020A)	Radium-226 (HASL 300)	Radium-228 (HASL 300)	MS/MSD or LD	Comments (Note: If sample not collected, indicate "No Sample" in comments and single-strike out and initial any preprinted sample description)
	STSB31_0-0.5	11/22/19	1156	X			2	2			X	X	X		Report soil on dry weight basis.
	STSB31_0.5-3	11/22/19	1203	X			2	2			X	X	X		
	STSB31_3-6	11/22/19	1210	X			2	2			X	X	X		
	STSB31_6-15	11/22/19	1220	X			2	2			X	X	X		

BJ 11/25/19

	Relinquished By / Affiliation	Date	Time	Accepted By / Affiliation	Date	Time
Sampler's Name: Bryce Johnson						
Sampler's Company: Wood	/ Wood	11/25/19	1030	/ ETASTL	11/26/19	0515
Shipment Method: Fed Ex Ship Date: 11/25/19						
Shipment Tracking No: 8137 9414 1730, 1740						

Special Instructions:

THIS LINE - LAB USE ONLY: Custody Seals In Place: Yes / No | Temp Blank: Yes / No | Cooler Temp on Receipt: _____ °F/C | Trip Blank: Yes / No | MS/MSD Sample Submitted: Yes / No

Login Sample Receipt Checklist

Client: Wood E&I Solutions Inc

Job Number: 160-36526-1

Login Number: 36526
List Number: 1
Creator: Press, Nicholas B

List Source: Eurofins TestAmerica, St. Louis

Question	Answer	Comment
Radioactivity wasn't checked or is </= background as measured by a survey meter.	True	
The cooler's custody seal, if present, is intact.	True	
Sample custody seals, if present, are intact.	True	
The cooler or samples do not appear to have been compromised or tampered with.	True	
Samples were received on ice.	True	
Cooler Temperature is acceptable.	True	
Cooler Temperature is recorded.	True	
COC is present.	True	
COC is filled out in ink and legible.	True	
COC is filled out with all pertinent information.	True	
Is the Field Sampler's name present on COC?	True	
There are no discrepancies between the containers received and the COC.	True	
Samples are received within Holding Time (excluding tests with immediate HTs)	True	
Sample containers have legible labels.	True	
Containers are not broken or leaking.	True	
Sample collection date/times are provided.	True	
Appropriate sample containers are used.	True	
Sample bottles are completely filled.	True	
Sample Preservation Verified.	N/A	
There is sufficient vol. for all requested analyses, incl. any requested MS/MSDs	True	
Containers requiring zero headspace have no headspace or bubble is <6mm (1/4").	N/A	
Multiphasic samples are not present.	True	
Samples do not require splitting or compositing.	True	
Residual Chlorine Checked.	N/A	

Internal Chain of Custody Tracking

Login	Smp	Customer Sample ID	Matrix	Container ID	Lab Sample ID	Container Type	Location	Custody User	I/O	ICOC ID	ICOC Date
160-36526	1	STSB27_0-0.5	Solid	160-1842871	160-36526-A-1	Plastic Bag - 500g	Rad Soil Storage 4	Moore, Octavia R	I	160-187105	12/03/19 16:13
160-36526	1	STSB27_0-0.5	Solid	160-1842871	160-36526-A-1	Plastic Bag - 500g	Rad Cart	Quinn, Erin J	I	160-186876	11/29/19 12:32
160-36526	1	STSB27_0-0.5	Solid	160-1842871	160-36526-A-1	Plastic Bag - 500g	DRY AND GRIND	Quinn, Erin J	I	160-186874	11/29/19 12:31
160-36526	1	STSB27_0-0.5	Solid	160-1842871	160-36526-A-1	Plastic Bag - 500g	Rad Cart	Patel, Kaushal P	I	160-186823	11/28/19 11:34
160-36526	1	STSB27_0-0.5	Solid	160-1842871	160-36526-A-1	Plastic Bag - 500g	Pre-Prep	Patel, Kaushal P	I	160-186822	11/28/19 11:12
160-36526	1	STSB27_0-0.5	Solid	160-1842872	160-36526-B-1	Clear Glass 4oz Wide -	1-40	Mazariegos, Leonel	I	160-187462	12/05/19 18:29
160-36526	1	STSB27_0-0.5	Solid	160-1842872	160-36526-B-1	Clear Glass 4oz Wide -	METALS	Mazariegos, Leonel	I	160-186946	12/02/19 10:07
160-36526	1	STSB27_0-0.5	Solid	160-1842872	160-36526-B-1	Clear Glass 4oz Wide -	1-40	Patel, Kaushal P	I	160-186838	11/28/19 12:46
160-36526	1	STSB27_0-0.5	Solid	160-1842872	160-36526-B-1	Clear Glass 4oz Wide -	Pre-Prep	Patel, Kaushal P	I	160-186824	11/28/19 11:35
160-36526	2	STSB27_0.5-3	Solid	160-1842873	160-36526-A-2	Plastic Bag - 500g	Rad Soil Storage 4	Moore, Octavia R	I	160-187105	12/03/19 16:13
160-36526	2	STSB27_0.5-3	Solid	160-1842873	160-36526-A-2	Plastic Bag - 500g	Rad Cart	Quinn, Erin J	I	160-186876	11/29/19 12:32
160-36526	2	STSB27_0.5-3	Solid	160-1842873	160-36526-A-2	Plastic Bag - 500g	DRY AND GRIND	Quinn, Erin J	I	160-186874	11/29/19 12:31
160-36526	2	STSB27_0.5-3	Solid	160-1842873	160-36526-A-2	Plastic Bag - 500g	Rad Cart	Patel, Kaushal P	I	160-186823	11/28/19 11:34
160-36526	2	STSB27_0.5-3	Solid	160-1842873	160-36526-A-2	Plastic Bag - 500g	Pre-Prep	Patel, Kaushal P	I	160-186822	11/28/19 11:12
160-36526	2	STSB27_0.5-3	Solid	160-1842874	160-36526-B-2	Clear Glass 4oz Wide -	1-40	Mazariegos, Leonel	I	160-187462	12/05/19 18:29
160-36526	2	STSB27_0.5-3	Solid	160-1842874	160-36526-B-2	Clear Glass 4oz Wide -	METALS	Mazariegos, Leonel	I	160-186946	12/02/19 10:07
160-36526	2	STSB27_0.5-3	Solid	160-1842874	160-36526-B-2	Clear Glass 4oz Wide -	1-40	Patel, Kaushal P	I	160-186838	11/28/19 12:46
160-36526	2	STSB27_0.5-3	Solid	160-1842874	160-36526-B-2	Clear Glass 4oz Wide -	Pre-Prep	Patel, Kaushal P	I	160-186824	11/28/19 11:35
160-36526	3	STSB27_3-6	Solid	160-1842875	160-36526-A-3	Plastic Bag - 500g	Rad Soil Storage 4	Moore, Octavia R	I	160-187105	12/03/19 16:13
160-36526	3	STSB27_3-6	Solid	160-1842875	160-36526-A-3	Plastic Bag - 500g	Rad Cart	Quinn, Erin J	I	160-186876	11/29/19 12:32
160-36526	3	STSB27_3-6	Solid	160-1842875	160-36526-A-3	Plastic Bag - 500g	DRY AND GRIND	Quinn, Erin J	I	160-186874	11/29/19 12:31
160-36526	3	STSB27_3-6	Solid	160-1842875	160-36526-A-3	Plastic Bag - 500g	Rad Cart	Patel, Kaushal P	I	160-186823	11/28/19 11:34
160-36526	3	STSB27_3-6	Solid	160-1842875	160-36526-A-3	Plastic Bag - 500g	Pre-Prep	Patel, Kaushal P	I	160-186822	11/28/19 11:12
160-36526	3	STSB27_3-6	Solid	160-1842876	160-36526-B-3	Clear Glass 4oz Wide -	1-40	Mazariegos, Leonel	I	160-187462	12/05/19 18:29
160-36526	3	STSB27_3-6	Solid	160-1842876	160-36526-B-3	Clear Glass 4oz Wide -	METALS	Mazariegos, Leonel	I	160-186946	12/02/19 10:07
160-36526	3	STSB27_3-6	Solid	160-1842876	160-36526-B-3	Clear Glass 4oz Wide -	1-40	Patel, Kaushal P	I	160-186838	11/28/19 12:46
160-36526	3	STSB27_3-6	Solid	160-1842876	160-36526-B-3	Clear Glass 4oz Wide -	Pre-Prep	Patel, Kaushal P	I	160-186824	11/28/19 11:35
160-36526	4	STSB27_6-15	Solid	160-1842877	160-36526-A-4	Plastic Bag - 500g	Rad Soil Storage 4	Moore, Octavia R	I	160-187105	12/03/19 16:13
160-36526	4	STSB27_6-15	Solid	160-1842877	160-36526-A-4	Plastic Bag - 500g	Rad Cart	Quinn, Erin J	I	160-186876	11/29/19 12:32
160-36526	4	STSB27_6-15	Solid	160-1842877	160-36526-A-4	Plastic Bag - 500g	DRY AND GRIND	Quinn, Erin J	I	160-186874	11/29/19 12:31
160-36526	4	STSB27_6-15	Solid	160-1842877	160-36526-A-4	Plastic Bag - 500g	Rad Cart	Patel, Kaushal P	I	160-186823	11/28/19 11:34
160-36526	4	STSB27_6-15	Solid	160-1842877	160-36526-A-4	Plastic Bag - 500g	Pre-Prep	Patel, Kaushal P	I	160-186822	11/28/19 11:12
160-36526	4	STSB27_6-15	Solid	160-1842878	160-36526-B-4	Clear Glass 4oz Wide -	1-40	Mazariegos, Leonel	I	160-187462	12/05/19 18:29
160-36526	4	STSB27_6-15	Solid	160-1842878	160-36526-B-4	Clear Glass 4oz Wide -	METALS	Mazariegos, Leonel	I	160-186946	12/02/19 10:07
160-36526	4	STSB27_6-15	Solid	160-1842878	160-36526-B-4	Clear Glass 4oz Wide -	1-40	Patel, Kaushal P	I	160-186838	11/28/19 12:46
160-36526	4	STSB27_6-15	Solid	160-1842878	160-36526-B-4	Clear Glass 4oz Wide -	Pre-Prep	Patel, Kaushal P	I	160-186824	11/28/19 11:35
160-36526	5	STSB28_0-0.5	Solid	160-1842879	160-36526-A-5	Plastic Bag - 500g	Rad Soil Storage 4	Moore, Octavia R	I	160-187105	12/03/19 16:13
160-36526	5	STSB28_0-0.5	Solid	160-1842879	160-36526-A-5	Plastic Bag - 500g	Rad Cart	Quinn, Erin J	I	160-186876	11/29/19 12:32
160-36526	5	STSB28_0-0.5	Solid	160-1842879	160-36526-A-5	Plastic Bag - 500g	DRY AND GRIND	Quinn, Erin J	I	160-186874	11/29/19 12:31
160-36526	5	STSB28_0-0.5	Solid	160-1842879	160-36526-A-5	Plastic Bag - 500g	Rad Cart	Patel, Kaushal P	I	160-186823	11/28/19 11:34

Internal Chain of Custody Tracking

Login	Smp	Customer Sample ID	Matrix	Container ID	Lab Sample ID	Container Type	Location	Custody User	I/O	ICOC ID	ICOC Date
160-36526	5	STSB28_0-0.5	Solid	160-1842879	160-36526-A-5	Plastic Bag - 500g	Pre-Prep	Patel, Kaushal P	I	160-186822	11/28/19 11:12
160-36526	5	STSB28_0-0.5	Solid	160-1842880	160-36526-B-5	Clear Glass 4oz Wide -	1-40	Mazariegos, Leonel	I	160-187462	12/05/19 18:29
160-36526	5	STSB28_0-0.5	Solid	160-1842880	160-36526-B-5	Clear Glass 4oz Wide -	METALS	Mazariegos, Leonel	I	160-186946	12/02/19 10:07
160-36526	5	STSB28_0-0.5	Solid	160-1842880	160-36526-B-5	Clear Glass 4oz Wide -	1-40	Patel, Kaushal P	I	160-186838	11/28/19 12:46
160-36526	5	STSB28_0-0.5	Solid	160-1842880	160-36526-B-5	Clear Glass 4oz Wide -	Pre-Prep	Patel, Kaushal P	I	160-186824	11/28/19 11:35
160-36526	6	STSB28-FD_0-0.5	Solid	160-1842881	160-36526-A-6	Plastic Bag - 500g	Rad Soil Storage 4	Moore, Octavia R	I	160-187105	12/03/19 16:13
160-36526	6	STSB28-FD_0-0.5	Solid	160-1842881	160-36526-A-6	Plastic Bag - 500g	Rad Cart	Quinn, Erin J	I	160-186876	11/29/19 12:32
160-36526	6	STSB28-FD_0-0.5	Solid	160-1842881	160-36526-A-6	Plastic Bag - 500g	DRY AND GRIND	Quinn, Erin J	I	160-186874	11/29/19 12:31
160-36526	6	STSB28-FD_0-0.5	Solid	160-1842881	160-36526-A-6	Plastic Bag - 500g	Rad Cart	Patel, Kaushal P	I	160-186823	11/28/19 11:34
160-36526	6	STSB28-FD_0-0.5	Solid	160-1842881	160-36526-A-6	Plastic Bag - 500g	Pre-Prep	Patel, Kaushal P	I	160-186822	11/28/19 11:12
160-36526	6	STSB28-FD_0-0.5	Solid	160-1842882	160-36526-B-6	Clear Glass 4oz Wide -	1-40	Mazariegos, Leonel	I	160-187462	12/05/19 18:29
160-36526	6	STSB28-FD_0-0.5	Solid	160-1842882	160-36526-B-6	Clear Glass 4oz Wide -	METALS	Mazariegos, Leonel	I	160-186946	12/02/19 10:07
160-36526	6	STSB28-FD_0-0.5	Solid	160-1842882	160-36526-B-6	Clear Glass 4oz Wide -	1-40	Patel, Kaushal P	I	160-186838	11/28/19 12:46
160-36526	6	STSB28-FD_0-0.5	Solid	160-1842882	160-36526-B-6	Clear Glass 4oz Wide -	Pre-Prep	Patel, Kaushal P	I	160-186824	11/28/19 11:35
160-36526	7	STSB28_0.5-3	Solid	160-1842883	160-36526-A-7	Plastic Bag - 500g	Rad Soil Storage 4	Moore, Octavia R	I	160-187105	12/03/19 16:13
160-36526	7	STSB28_0.5-3	Solid	160-1842883	160-36526-A-7	Plastic Bag - 500g	Rad Cart	Quinn, Erin J	I	160-186876	11/29/19 12:32
160-36526	7	STSB28_0.5-3	Solid	160-1842883	160-36526-A-7	Plastic Bag - 500g	DRY AND GRIND	Quinn, Erin J	I	160-186874	11/29/19 12:31
160-36526	7	STSB28_0.5-3	Solid	160-1842883	160-36526-A-7	Plastic Bag - 500g	Rad Cart	Patel, Kaushal P	I	160-186823	11/28/19 11:34
160-36526	7	STSB28_0.5-3	Solid	160-1842883	160-36526-A-7	Plastic Bag - 500g	Pre-Prep	Patel, Kaushal P	I	160-186822	11/28/19 11:12
160-36526	7	STSB28_0.5-3	Solid	160-1842884	160-36526-B-7	Clear Glass 4oz Wide -	1-40	Mazariegos, Leonel	I	160-187462	12/05/19 18:29
160-36526	7	STSB28_0.5-3	Solid	160-1842884	160-36526-B-7	Clear Glass 4oz Wide -	METALS	Mazariegos, Leonel	I	160-186946	12/02/19 10:07
160-36526	7	STSB28_0.5-3	Solid	160-1842884	160-36526-B-7	Clear Glass 4oz Wide -	1-40	Patel, Kaushal P	I	160-186838	11/28/19 12:46
160-36526	7	STSB28_0.5-3	Solid	160-1842884	160-36526-B-7	Clear Glass 4oz Wide -	Pre-Prep	Patel, Kaushal P	I	160-186824	11/28/19 11:35
160-36526	8	STSB28_3-6	Solid	160-1842885	160-36526-A-8	Plastic Bag - 500g	Rad Soil Storage 4	Moore, Octavia R	I	160-187105	12/03/19 16:13
160-36526	8	STSB28_3-6	Solid	160-1842885	160-36526-A-8	Plastic Bag - 500g	Rad Cart	Quinn, Erin J	I	160-186876	11/29/19 12:32
160-36526	8	STSB28_3-6	Solid	160-1842885	160-36526-A-8	Plastic Bag - 500g	DRY AND GRIND	Quinn, Erin J	I	160-186874	11/29/19 12:31
160-36526	8	STSB28_3-6	Solid	160-1842885	160-36526-A-8	Plastic Bag - 500g	Rad Cart	Patel, Kaushal P	I	160-186823	11/28/19 11:34
160-36526	8	STSB28_3-6	Solid	160-1842885	160-36526-A-8	Plastic Bag - 500g	Pre-Prep	Patel, Kaushal P	I	160-186822	11/28/19 11:12
160-36526	8	STSB28_3-6	Solid	160-1842886	160-36526-B-8	Clear Glass 4oz Wide -	1-40	Mazariegos, Leonel	I	160-187462	12/05/19 18:29
160-36526	8	STSB28_3-6	Solid	160-1842886	160-36526-B-8	Clear Glass 4oz Wide -	METALS	Mazariegos, Leonel	I	160-186946	12/02/19 10:07
160-36526	8	STSB28_3-6	Solid	160-1842886	160-36526-B-8	Clear Glass 4oz Wide -	1-40	Patel, Kaushal P	I	160-186838	11/28/19 12:46
160-36526	8	STSB28_3-6	Solid	160-1842886	160-36526-B-8	Clear Glass 4oz Wide -	Pre-Prep	Patel, Kaushal P	I	160-186824	11/28/19 11:35
160-36526	9	STSB28_6-15	Solid	160-1842887	160-36526-A-9	Plastic Bag - 500g	Rad Soil Storage 4	Moore, Octavia R	I	160-187105	12/03/19 16:13
160-36526	9	STSB28_6-15	Solid	160-1842887	160-36526-A-9	Plastic Bag - 500g	Rad Cart	Quinn, Erin J	I	160-186876	11/29/19 12:32
160-36526	9	STSB28_6-15	Solid	160-1842887	160-36526-A-9	Plastic Bag - 500g	DRY AND GRIND	Quinn, Erin J	I	160-186874	11/29/19 12:31
160-36526	9	STSB28_6-15	Solid	160-1842887	160-36526-A-9	Plastic Bag - 500g	Rad Cart	Patel, Kaushal P	I	160-186823	11/28/19 11:34
160-36526	9	STSB28_6-15	Solid	160-1842887	160-36526-A-9	Plastic Bag - 500g	Pre-Prep	Patel, Kaushal P	I	160-186822	11/28/19 11:12
160-36526	9	STSB28_6-15	Solid	160-1842888	160-36526-B-9	Clear Glass 4oz Wide -	1-40	Mazariegos, Leonel	I	160-187462	12/05/19 18:29
160-36526	9	STSB28_6-15	Solid	160-1842888	160-36526-B-9	Clear Glass 4oz Wide -	METALS	Mazariegos, Leonel	I	160-186946	12/02/19 10:07
160-36526	9	STSB28_6-15	Solid	160-1842888	160-36526-B-9	Clear Glass 4oz Wide -	1-40	Patel, Kaushal P	I	160-186838	11/28/19 12:46

Internal Chain of Custody Tracking

Login	Smp	Customer Sample ID	Matrix	Container ID	Lab Sample ID	Container Type	Location	Custody User	I/O	ICOC ID	ICOC Date
160-36526	9	STSB28_6-15	Solid	160-1842888	160-36526-B-9	Clear Glass 4oz Wide -	Pre-Prep	Patel, Kaushal P	I	160-186824	11/28/19 11:35
160-36526	10	STSB29_0-0.5	Solid	160-1842889	160-36526-A-10	Plastic Bag - 500g	Rad Soil Storage 4	Moore, Octavia R	I	160-187105	12/03/19 16:13
160-36526	10	STSB29_0-0.5	Solid	160-1842889	160-36526-A-10	Plastic Bag - 500g	Rad Cart	Quinn, Erin J	I	160-186876	11/29/19 12:32
160-36526	10	STSB29_0-0.5	Solid	160-1842889	160-36526-A-10	Plastic Bag - 500g	DRY AND GRIND	Quinn, Erin J	I	160-186874	11/29/19 12:31
160-36526	10	STSB29_0-0.5	Solid	160-1842889	160-36526-A-10	Plastic Bag - 500g	Rad Cart	Patel, Kaushal P	I	160-186823	11/28/19 11:34
160-36526	10	STSB29_0-0.5	Solid	160-1842889	160-36526-A-10	Plastic Bag - 500g	Pre-Prep	Patel, Kaushal P	I	160-186822	11/28/19 11:12
160-36526	10	STSB29_0-0.5	Solid	160-1842890	160-36526-B-10	Clear Glass 4oz Wide -	1-40	Mazariegos, Leonel	I	160-187462	12/05/19 18:29
160-36526	10	STSB29_0-0.5	Solid	160-1842890	160-36526-B-10	Clear Glass 4oz Wide -	METALS	Mazariegos, Leonel	I	160-186946	12/02/19 10:07
160-36526	10	STSB29_0-0.5	Solid	160-1842890	160-36526-B-10	Clear Glass 4oz Wide -	1-40	Patel, Kaushal P	I	160-186838	11/28/19 12:46
160-36526	10	STSB29_0-0.5	Solid	160-1842890	160-36526-B-10	Clear Glass 4oz Wide -	Pre-Prep	Patel, Kaushal P	I	160-186824	11/28/19 11:35
160-36526	11	STSB29_0.5-3	Solid	160-1842891	160-36526-A-11	Plastic Bag - 500g	Rad Soil Storage 4	Moore, Octavia R	I	160-187105	12/03/19 16:13
160-36526	11	STSB29_0.5-3	Solid	160-1842891	160-36526-A-11	Plastic Bag - 500g	Rad Cart	Quinn, Erin J	I	160-186876	11/29/19 12:32
160-36526	11	STSB29_0.5-3	Solid	160-1842891	160-36526-A-11	Plastic Bag - 500g	DRY AND GRIND	Quinn, Erin J	I	160-186874	11/29/19 12:31
160-36526	11	STSB29_0.5-3	Solid	160-1842891	160-36526-A-11	Plastic Bag - 500g	Rad Cart	Patel, Kaushal P	I	160-186823	11/28/19 11:34
160-36526	11	STSB29_0.5-3	Solid	160-1842891	160-36526-A-11	Plastic Bag - 500g	Pre-Prep	Patel, Kaushal P	I	160-186822	11/28/19 11:12
160-36526	11	STSB29_0.5-3	Solid	160-1842925	160-36526-A-11	Plastic Bag - 500g	Rad Soil Storage 4	Moore, Octavia R	I	160-187105	12/03/19 16:13
160-36526	11	STSB29_0.5-3	Solid	160-1842925	160-36526-A-11	Plastic Bag - 500g	Rad Cart	Quinn, Erin J	I	160-186876	11/29/19 12:32
160-36526	11	STSB29_0.5-3	Solid	160-1842925	160-36526-A-11	Plastic Bag - 500g	DRY AND GRIND	Quinn, Erin J	I	160-186874	11/29/19 12:31
160-36526	11	STSB29_0.5-3	Solid	160-1842925	160-36526-A-11	Plastic Bag - 500g	Rad Cart	Patel, Kaushal P	I	160-186823	11/28/19 11:34
160-36526	11	STSB29_0.5-3	Solid	160-1842925	160-36526-A-11	Plastic Bag - 500g	Pre-Prep	Patel, Kaushal P	I	160-186822	11/28/19 11:12
160-36526	11	STSB29_0.5-3	Solid	160-1842892	160-36526-B-11	Clear Glass 4oz Wide -	1-40	Mazariegos, Leonel	I	160-187462	12/05/19 18:29
160-36526	11	STSB29_0.5-3	Solid	160-1842892	160-36526-B-11	Clear Glass 4oz Wide -	METALS	Mazariegos, Leonel	I	160-186946	12/02/19 10:07
160-36526	11	STSB29_0.5-3	Solid	160-1842892	160-36526-B-11	Clear Glass 4oz Wide -	1-40	Patel, Kaushal P	I	160-186838	11/28/19 12:46
160-36526	11	STSB29_0.5-3	Solid	160-1842892	160-36526-B-11	Clear Glass 4oz Wide -	Pre-Prep	Patel, Kaushal P	I	160-186824	11/28/19 11:35
160-36526	11	STSB29_0.5-3	Solid	160-1842922	160-36526-B-11	Clear Glass 4oz Wide -	1-40	Mazariegos, Leonel	I	160-187462	12/05/19 18:29
160-36526	11	STSB29_0.5-3	Solid	160-1842922	160-36526-B-11	Clear Glass 4oz Wide -	METALS	Mazariegos, Leonel	I	160-186946	12/02/19 10:07
160-36526	11	STSB29_0.5-3	Solid	160-1842922	160-36526-B-11	Clear Glass 4oz Wide -	1-40	Patel, Kaushal P	I	160-186838	11/28/19 12:46
160-36526	11	STSB29_0.5-3	Solid	160-1842922	160-36526-B-11	Clear Glass 4oz Wide -	Pre-Prep	Patel, Kaushal P	I	160-186824	11/28/19 11:35
160-36526	11	STSB29_0.5-3	Solid	160-1842924	160-36526-B-11	No Container	1-40	Mazariegos, Leonel	I	160-187462	12/05/19 18:29
160-36526	11	STSB29_0.5-3	Solid	160-1842924	160-36526-B-11	No Container	METALS	Mazariegos, Leonel	I	160-186946	12/02/19 10:07
160-36526	12	STSB29_3-6	Solid	160-1842893	160-36526-A-12	Plastic Bag - 500g	Rad Soil Storage 4	Moore, Octavia R	I	160-187105	12/03/19 16:13
160-36526	12	STSB29_3-6	Solid	160-1842893	160-36526-A-12	Plastic Bag - 500g	Rad Cart	Quinn, Erin J	I	160-186876	11/29/19 12:32
160-36526	12	STSB29_3-6	Solid	160-1842893	160-36526-A-12	Plastic Bag - 500g	DRY AND GRIND	Quinn, Erin J	I	160-186874	11/29/19 12:31
160-36526	12	STSB29_3-6	Solid	160-1842893	160-36526-A-12	Plastic Bag - 500g	Rad Cart	Patel, Kaushal P	I	160-186823	11/28/19 11:34
160-36526	12	STSB29_3-6	Solid	160-1842893	160-36526-A-12	Plastic Bag - 500g	Pre-Prep	Patel, Kaushal P	I	160-186822	11/28/19 11:12
160-36526	12	STSB29_3-6	Solid	160-1842894	160-36526-B-12	Clear Glass 4oz Wide -	1-40	Mazariegos, Leonel	I	160-187462	12/05/19 18:29
160-36526	12	STSB29_3-6	Solid	160-1842894	160-36526-B-12	Clear Glass 4oz Wide -	METALS	Mazariegos, Leonel	I	160-186946	12/02/19 10:07
160-36526	12	STSB29_3-6	Solid	160-1842894	160-36526-B-12	Clear Glass 4oz Wide -	1-40	Patel, Kaushal P	I	160-186838	11/28/19 12:46
160-36526	12	STSB29_3-6	Solid	160-1842894	160-36526-B-12	Clear Glass 4oz Wide -	Pre-Prep	Patel, Kaushal P	I	160-186824	11/28/19 11:35
160-36526	13	STSB29_6-15	Solid	160-1842895	160-36526-A-13	Plastic Bag - 500g	Rad Soil Storage 4	Moore, Octavia R	I	160-187105	12/03/19 16:13

Internal Chain of Custody Tracking

Login	Smp	Customer Sample ID	Matrix	Container ID	Lab Sample ID	Container Type	Location	Custody User	I/O	ICOC ID	ICOC Date
160-36526	13	STSB29_6-15	Solid	160-1842895	160-36526-A-13	Plastic Bag - 500g	Rad Cart	Quinn, Erin J	I	160-186876	11/29/19 12:32
160-36526	13	STSB29_6-15	Solid	160-1842895	160-36526-A-13	Plastic Bag - 500g	DRY AND GRIND	Quinn, Erin J	I	160-186874	11/29/19 12:31
160-36526	13	STSB29_6-15	Solid	160-1842895	160-36526-A-13	Plastic Bag - 500g	Rad Cart	Patel, Kaushal P	I	160-186823	11/28/19 11:34
160-36526	13	STSB29_6-15	Solid	160-1842895	160-36526-A-13	Plastic Bag - 500g	Pre-Prep	Patel, Kaushal P	I	160-186822	11/28/19 11:12
160-36526	13	STSB29_6-15	Solid	160-1842896	160-36526-B-13	Clear Glass 4oz Wide -	1-40	Mazariegos, Leonel	I	160-187462	12/05/19 18:29
160-36526	13	STSB29_6-15	Solid	160-1842896	160-36526-B-13	Clear Glass 4oz Wide -	METALS	Mazariegos, Leonel	I	160-186946	12/02/19 10:07
160-36526	13	STSB29_6-15	Solid	160-1842896	160-36526-B-13	Clear Glass 4oz Wide -	1-40	Patel, Kaushal P	I	160-186838	11/28/19 12:46
160-36526	13	STSB29_6-15	Solid	160-1842896	160-36526-B-13	Clear Glass 4oz Wide -	Pre-Prep	Patel, Kaushal P	I	160-186824	11/28/19 11:35
160-36526	14	STSB29-FD_6-15	Solid	160-1842897	160-36526-A-14	Plastic Bag - 500g	Rad Soil Storage 4	Moore, Octavia R	I	160-187105	12/03/19 16:13
160-36526	14	STSB29-FD_6-15	Solid	160-1842897	160-36526-A-14	Plastic Bag - 500g	Rad Cart	Quinn, Erin J	I	160-186876	11/29/19 12:32
160-36526	14	STSB29-FD_6-15	Solid	160-1842897	160-36526-A-14	Plastic Bag - 500g	DRY AND GRIND	Quinn, Erin J	I	160-186874	11/29/19 12:31
160-36526	14	STSB29-FD_6-15	Solid	160-1842897	160-36526-A-14	Plastic Bag - 500g	Rad Cart	Patel, Kaushal P	I	160-186823	11/28/19 11:34
160-36526	14	STSB29-FD_6-15	Solid	160-1842897	160-36526-A-14	Plastic Bag - 500g	Pre-Prep	Patel, Kaushal P	I	160-186822	11/28/19 11:12
160-36526	14	STSB29-FD_6-15	Solid	160-1842898	160-36526-B-14	Clear Glass 4oz Wide -	1-40	Mazariegos, Leonel	I	160-187462	12/05/19 18:29
160-36526	14	STSB29-FD_6-15	Solid	160-1842898	160-36526-B-14	Clear Glass 4oz Wide -	METALS	Mazariegos, Leonel	I	160-186946	12/02/19 10:07
160-36526	14	STSB29-FD_6-15	Solid	160-1842898	160-36526-B-14	Clear Glass 4oz Wide -	1-40	Patel, Kaushal P	I	160-186838	11/28/19 12:46
160-36526	14	STSB29-FD_6-15	Solid	160-1842898	160-36526-B-14	Clear Glass 4oz Wide -	Pre-Prep	Patel, Kaushal P	I	160-186824	11/28/19 11:35
160-36526	15	STSB30_0-0.5	Solid	160-1842899	160-36526-A-15	Plastic Bag - 500g	Rad Soil Storage 4	Moore, Octavia R	I	160-187105	12/03/19 16:13
160-36526	15	STSB30_0-0.5	Solid	160-1842899	160-36526-A-15	Plastic Bag - 500g	Rad Cart	Quinn, Erin J	I	160-186876	11/29/19 12:32
160-36526	15	STSB30_0-0.5	Solid	160-1842899	160-36526-A-15	Plastic Bag - 500g	DRY AND GRIND	Quinn, Erin J	I	160-186874	11/29/19 12:31
160-36526	15	STSB30_0-0.5	Solid	160-1842899	160-36526-A-15	Plastic Bag - 500g	Rad Cart	Patel, Kaushal P	I	160-186823	11/28/19 11:34
160-36526	15	STSB30_0-0.5	Solid	160-1842899	160-36526-A-15	Plastic Bag - 500g	Pre-Prep	Patel, Kaushal P	I	160-186822	11/28/19 11:12
160-36526	15	STSB30_0-0.5	Solid	160-1842900	160-36526-B-15	Clear Glass 4oz Wide -	1-40	Mazariegos, Leonel	I	160-187462	12/05/19 18:29
160-36526	15	STSB30_0-0.5	Solid	160-1842900	160-36526-B-15	Clear Glass 4oz Wide -	METALS	Mazariegos, Leonel	I	160-186946	12/02/19 10:07
160-36526	15	STSB30_0-0.5	Solid	160-1842900	160-36526-B-15	Clear Glass 4oz Wide -	1-40	Patel, Kaushal P	I	160-186838	11/28/19 12:46
160-36526	15	STSB30_0-0.5	Solid	160-1842900	160-36526-B-15	Clear Glass 4oz Wide -	Pre-Prep	Patel, Kaushal P	I	160-186824	11/28/19 11:35
160-36526	16	STSB30_0.5-3	Solid	160-1842901	160-36526-A-16	Plastic Bag - 500g	Rad Soil Storage 4	Moore, Octavia R	I	160-187105	12/03/19 16:13
160-36526	16	STSB30_0.5-3	Solid	160-1842901	160-36526-A-16	Plastic Bag - 500g	Rad Cart	Quinn, Erin J	I	160-186876	11/29/19 12:32
160-36526	16	STSB30_0.5-3	Solid	160-1842901	160-36526-A-16	Plastic Bag - 500g	DRY AND GRIND	Quinn, Erin J	I	160-186874	11/29/19 12:31
160-36526	16	STSB30_0.5-3	Solid	160-1842901	160-36526-A-16	Plastic Bag - 500g	Rad Cart	Patel, Kaushal P	I	160-186823	11/28/19 11:34
160-36526	16	STSB30_0.5-3	Solid	160-1842901	160-36526-A-16	Plastic Bag - 500g	Pre-Prep	Patel, Kaushal P	I	160-186822	11/28/19 11:12
160-36526	16	STSB30_0.5-3	Solid	160-1842902	160-36526-B-16	Clear Glass 4oz Wide -	1-40	Mazariegos, Leonel	I	160-187462	12/05/19 18:29
160-36526	16	STSB30_0.5-3	Solid	160-1842902	160-36526-B-16	Clear Glass 4oz Wide -	METALS	Mazariegos, Leonel	I	160-186946	12/02/19 10:07
160-36526	16	STSB30_0.5-3	Solid	160-1842902	160-36526-B-16	Clear Glass 4oz Wide -	1-40	Patel, Kaushal P	I	160-186838	11/28/19 12:46
160-36526	16	STSB30_0.5-3	Solid	160-1842902	160-36526-B-16	Clear Glass 4oz Wide -	Pre-Prep	Patel, Kaushal P	I	160-186824	11/28/19 11:35
160-36526	17	STSB30_3-6	Solid	160-1842903	160-36526-A-17	Plastic Bag - 500g	Rad Soil Storage 4	Moore, Octavia R	I	160-187105	12/03/19 16:13
160-36526	17	STSB30_3-6	Solid	160-1842903	160-36526-A-17	Plastic Bag - 500g	Rad Cart	Quinn, Erin J	I	160-186876	11/29/19 12:32
160-36526	17	STSB30_3-6	Solid	160-1842903	160-36526-A-17	Plastic Bag - 500g	DRY AND GRIND	Quinn, Erin J	I	160-186874	11/29/19 12:31
160-36526	17	STSB30_3-6	Solid	160-1842903	160-36526-A-17	Plastic Bag - 500g	Rad Cart	Patel, Kaushal P	I	160-186823	11/28/19 11:34
160-36526	17	STSB30_3-6	Solid	160-1842903	160-36526-A-17	Plastic Bag - 500g	Pre-Prep	Patel, Kaushal P	I	160-186822	11/28/19 11:12

Internal Chain of Custody Tracking

Login	Smp	Customer Sample ID	Matrix	Container ID	Lab Sample ID	Container Type	Location	Custody User	I/O	ICOC ID	ICOC Date
160-36526	17	STSB30_3-6	Solid	160-1842904	160-36526-B-17	Clear Glass 4oz Wide -	1-40	Mazariegos, Leonel	I	160-187462	12/05/19 18:29
160-36526	17	STSB30_3-6	Solid	160-1842904	160-36526-B-17	Clear Glass 4oz Wide -	METALS	Mazariegos, Leonel	I	160-186946	12/02/19 10:07
160-36526	17	STSB30_3-6	Solid	160-1842904	160-36526-B-17	Clear Glass 4oz Wide -	1-40	Patel, Kaushal P	I	160-186838	11/28/19 12:46
160-36526	17	STSB30_3-6	Solid	160-1842904	160-36526-B-17	Clear Glass 4oz Wide -	Pre-Prep	Patel, Kaushal P	I	160-186824	11/28/19 11:35
160-36526	18	STSB30_6-15	Solid	160-1842905	160-36526-A-18	Plastic Bag - 500g	Rad Soil Storage 4	Moore, Octavia R	I	160-187105	12/03/19 16:13
160-36526	18	STSB30_6-15	Solid	160-1842905	160-36526-A-18	Plastic Bag - 500g	Rad Cart	Quinn, Erin J	I	160-186876	11/29/19 12:32
160-36526	18	STSB30_6-15	Solid	160-1842905	160-36526-A-18	Plastic Bag - 500g	DRY AND GRIND	Quinn, Erin J	I	160-186874	11/29/19 12:31
160-36526	18	STSB30_6-15	Solid	160-1842905	160-36526-A-18	Plastic Bag - 500g	Rad Cart	Patel, Kaushal P	I	160-186823	11/28/19 11:34
160-36526	18	STSB30_6-15	Solid	160-1842905	160-36526-A-18	Plastic Bag - 500g	Pre-Prep	Patel, Kaushal P	I	160-186822	11/28/19 11:12
160-36526	18	STSB30_6-15	Solid	160-1842906	160-36526-B-18	Clear Glass 4oz Wide -	1-40	Mazariegos, Leonel	I	160-187462	12/05/19 18:29
160-36526	18	STSB30_6-15	Solid	160-1842906	160-36526-B-18	Clear Glass 4oz Wide -	METALS	Mazariegos, Leonel	I	160-186946	12/02/19 10:07
160-36526	18	STSB30_6-15	Solid	160-1842906	160-36526-B-18	Clear Glass 4oz Wide -	1-40	Patel, Kaushal P	I	160-186838	11/28/19 12:46
160-36526	18	STSB30_6-15	Solid	160-1842906	160-36526-B-18	Clear Glass 4oz Wide -	Pre-Prep	Patel, Kaushal P	I	160-186824	11/28/19 11:35
160-36526	19	STSB31_0-0.5	Solid	160-1842907	160-36526-A-19	Plastic Bag - 500g	Rad Soil Storage 4	Moore, Octavia R	I	160-187105	12/03/19 16:13
160-36526	19	STSB31_0-0.5	Solid	160-1842907	160-36526-A-19	Plastic Bag - 500g	Rad Cart	Quinn, Erin J	I	160-186876	11/29/19 12:32
160-36526	19	STSB31_0-0.5	Solid	160-1842907	160-36526-A-19	Plastic Bag - 500g	DRY AND GRIND	Quinn, Erin J	I	160-186874	11/29/19 12:31
160-36526	19	STSB31_0-0.5	Solid	160-1842907	160-36526-A-19	Plastic Bag - 500g	Rad Cart	Patel, Kaushal P	I	160-186823	11/28/19 11:34
160-36526	19	STSB31_0-0.5	Solid	160-1842907	160-36526-A-19	Plastic Bag - 500g	Pre-Prep	Patel, Kaushal P	I	160-186822	11/28/19 11:12
160-36526	19	STSB31_0-0.5	Solid	160-1842908	160-36526-B-19	Clear Glass 4oz Wide -	1-40	Mazariegos, Leonel	I	160-187462	12/05/19 18:29
160-36526	19	STSB31_0-0.5	Solid	160-1842908	160-36526-B-19	Clear Glass 4oz Wide -	METALS	Mazariegos, Leonel	I	160-186946	12/02/19 10:07
160-36526	19	STSB31_0-0.5	Solid	160-1842908	160-36526-B-19	Clear Glass 4oz Wide -	1-40	Patel, Kaushal P	I	160-186838	11/28/19 12:46
160-36526	19	STSB31_0-0.5	Solid	160-1842908	160-36526-B-19	Clear Glass 4oz Wide -	Pre-Prep	Patel, Kaushal P	I	160-186824	11/28/19 11:35
160-36526	20	STSB31_0.5-3	Solid	160-1842909	160-36526-A-20	Plastic Bag - 500g	Rad Soil Storage 4	Moore, Octavia R	I	160-187105	12/03/19 16:13
160-36526	20	STSB31_0.5-3	Solid	160-1842909	160-36526-A-20	Plastic Bag - 500g	Rad Cart	Quinn, Erin J	I	160-186876	11/29/19 12:32
160-36526	20	STSB31_0.5-3	Solid	160-1842909	160-36526-A-20	Plastic Bag - 500g	DRY AND GRIND	Quinn, Erin J	I	160-186874	11/29/19 12:31
160-36526	20	STSB31_0.5-3	Solid	160-1842909	160-36526-A-20	Plastic Bag - 500g	Rad Cart	Patel, Kaushal P	I	160-186823	11/28/19 11:34
160-36526	20	STSB31_0.5-3	Solid	160-1842909	160-36526-A-20	Plastic Bag - 500g	Pre-Prep	Patel, Kaushal P	I	160-186822	11/28/19 11:12
160-36526	20	STSB31_0.5-3	Solid	160-1842910	160-36526-B-20	Clear Glass 4oz Wide -	1-40	Mazariegos, Leonel	I	160-187462	12/05/19 18:29
160-36526	20	STSB31_0.5-3	Solid	160-1842910	160-36526-B-20	Clear Glass 4oz Wide -	METALS	Mazariegos, Leonel	I	160-186946	12/02/19 10:07
160-36526	20	STSB31_0.5-3	Solid	160-1842910	160-36526-B-20	Clear Glass 4oz Wide -	1-40	Patel, Kaushal P	I	160-186838	11/28/19 12:46
160-36526	20	STSB31_0.5-3	Solid	160-1842910	160-36526-B-20	Clear Glass 4oz Wide -	Pre-Prep	Patel, Kaushal P	I	160-186824	11/28/19 11:35
160-36526	21	STSB31_3-6	Solid	160-1842911	160-36526-A-21	Plastic Bag - 500g	Rad Soil Storage 4	Moore, Octavia R	I	160-187105	12/03/19 16:13
160-36526	21	STSB31_3-6	Solid	160-1842911	160-36526-A-21	Plastic Bag - 500g	Rad Cart	Quinn, Erin J	I	160-186876	11/29/19 12:32
160-36526	21	STSB31_3-6	Solid	160-1842911	160-36526-A-21	Plastic Bag - 500g	DRY AND GRIND	Quinn, Erin J	I	160-186874	11/29/19 12:31
160-36526	21	STSB31_3-6	Solid	160-1842911	160-36526-A-21	Plastic Bag - 500g	Rad Cart	Patel, Kaushal P	I	160-186823	11/28/19 11:34
160-36526	21	STSB31_3-6	Solid	160-1842911	160-36526-A-21	Plastic Bag - 500g	Pre-Prep	Patel, Kaushal P	I	160-186822	11/28/19 11:12
160-36526	21	STSB31_3-6	Solid	160-1842912	160-36526-B-21	Clear Glass 4oz Wide -	1-40	Mazariegos, Leonel	I	160-187462	12/05/19 18:29
160-36526	21	STSB31_3-6	Solid	160-1842912	160-36526-B-21	Clear Glass 4oz Wide -	METALS	Mazariegos, Leonel	I	160-186946	12/02/19 10:07
160-36526	21	STSB31_3-6	Solid	160-1842912	160-36526-B-21	Clear Glass 4oz Wide -	1-40	Patel, Kaushal P	I	160-186838	11/28/19 12:46
160-36526	21	STSB31_3-6	Solid	160-1842912	160-36526-B-21	Clear Glass 4oz Wide -	Pre-Prep	Patel, Kaushal P	I	160-186824	11/28/19 11:35

Internal Chain of Custody Tracking

Login	Smp	Customer Sample ID	Matrix	Container ID	Lab Sample ID	Container Type	Location	Custody User	I/O	ICOC ID	ICOC Date
160-36526	22	STSB31_6-15	Solid	160-1842913	160-36526-A-22	Plastic Bag - 500g	Rad Soil Storage 4	Moore, Octavia R	I	160-187105	12/03/19 16:13
160-36526	22	STSB31_6-15	Solid	160-1842913	160-36526-A-22	Plastic Bag - 500g	Rad Cart	Quinn, Erin J	I	160-186876	11/29/19 12:32
160-36526	22	STSB31_6-15	Solid	160-1842913	160-36526-A-22	Plastic Bag - 500g	DRY AND GRIND	Quinn, Erin J	I	160-186874	11/29/19 12:31
160-36526	22	STSB31_6-15	Solid	160-1842913	160-36526-A-22	Plastic Bag - 500g	Rad Cart	Patel, Kaushal P	I	160-186823	11/28/19 11:34
160-36526	22	STSB31_6-15	Solid	160-1842913	160-36526-A-22	Plastic Bag - 500g	Pre-Prep	Patel, Kaushal P	I	160-186822	11/28/19 11:12
160-36526	22	STSB31_6-15	Solid	160-1842914	160-36526-B-22	Clear Glass 4oz Wide -	1-40	Mazariegos, Leonel	I	160-187462	12/05/19 18:29
160-36526	22	STSB31_6-15	Solid	160-1842914	160-36526-B-22	Clear Glass 4oz Wide -	METALS	Mazariegos, Leonel	I	160-186946	12/02/19 10:07
160-36526	22	STSB31_6-15	Solid	160-1842914	160-36526-B-22	Clear Glass 4oz Wide -	1-40	Patel, Kaushal P	I	160-186838	11/28/19 12:46
160-36526	22	STSB31_6-15	Solid	160-1842914	160-36526-B-22	Clear Glass 4oz Wide -	Pre-Prep	Patel, Kaushal P	I	160-186824	11/28/19 11:35

Accreditation/Certification Summary

Client: Wood E&I Solutions Inc
Project/Site: ACMS - Yerington OU-4B_OU-5_SOIL

Job ID: 160-36526-1

Laboratory: Eurofins TestAmerica, St. Louis

Unless otherwise noted, all analytes for this laboratory were covered under each accreditation/certification below.

Authority	Program	Identification Number	Expiration Date
Louisiana	NELAP	04080	06-30-20

The following analytes are included in this report, but the laboratory is not certified by the governing authority. This list may include analytes for which the agency does not offer certification.

Analysis Method	Prep Method	Matrix	Analyte
901.1	Fill_Geo-21	Solid	Radium-226
901.1	Fill_Geo-21	Solid	Radium-228
Moisture		Solid	Percent Moisture
Moisture		Solid	Percent Solids

Nevada	State Program	MO000542018-1	07-31-20

The following analytes are included in this report, but the laboratory is not certified by the governing authority. This list may include analytes for which the agency does not offer certification.

Analysis Method	Prep Method	Matrix	Analyte
6020A	3050B	Solid	Thorium
901.1	Fill_Geo-21	Solid	Radium-226
901.1	Fill_Geo-21	Solid	Radium-228
Moisture		Solid	Percent Moisture
Moisture		Solid	Percent Solids

Method Summary

Client: Wood E&I Solutions Inc
Project/Site: ACMS - Yerington OU-4B_OU-5_SOIL

Job ID: 160-36526-1

Method	Method Description	Protocol	Laboratory
6020A	Metals (ICP/MS)	SW846	TAL SL
Moisture	Percent Moisture	EPA	TAL SL
901.1	Radium-226 & Other Gamma Emitters (GS)	EPA	TAL SL
3050B	Preparation, Metals	SW846	TAL SL
Dry and Grind	Preparation, Dry and Grind	None	TAL SL
Fill_Geo-21	Fill Geometry, 21-Day In-Growth	None	TAL SL

Protocol References:

EPA = US Environmental Protection Agency

None = None

SW846 = "Test Methods For Evaluating Solid Waste, Physical/Chemical Methods", Third Edition, November 1986 And Its Updates.

Laboratory References:

TAL SL = Eurofins TestAmerica, St. Louis, 13715 Rider Trail North, Earth City, MO 63045, TEL (314)298-8566

Definitions/Glossary

Client: Wood E&I Solutions Inc
Project/Site: ACMS - Yerington OU-4B_OU-5_SOIL

Job ID: 160-36526-1

Qualifiers

Rad

Qualifier	Qualifier Description
U	Result is less than the sample detection limit.

Glossary

Abbreviation	These commonly used abbreviations may or may not be present in this report.
¤	Listed under the "D" column to designate that the result is reported on a dry weight basis
%R	Percent Recovery
CFL	Contains Free Liquid
CNF	Contains No Free Liquid
DER	Duplicate Error Ratio (normalized absolute difference)
Dil Fac	Dilution Factor
DL	Detection Limit (DoD/DOE)
DL, RA, RE, IN	Indicates a Dilution, Re-analysis, Re-extraction, or additional Initial metals/anion analysis of the sample
DLC	Decision Level Concentration (Radiochemistry)
EDL	Estimated Detection Limit (Dioxin)
LOD	Limit of Detection (DoD/DOE)
LOQ	Limit of Quantitation (DoD/DOE)
MDA	Minimum Detectable Activity (Radiochemistry)
MDC	Minimum Detectable Concentration (Radiochemistry)
MDL	Method Detection Limit
ML	Minimum Level (Dioxin)
NC	Not Calculated
ND	Not Detected at the reporting limit (or MDL or EDL if shown)
PQL	Practical Quantitation Limit
QC	Quality Control
RER	Relative Error Ratio (Radiochemistry)
RL	Reporting Limit or Requested Limit (Radiochemistry)
RPD	Relative Percent Difference, a measure of the relative difference between two points
TEF	Toxicity Equivalent Factor (Dioxin)
TEQ	Toxicity Equivalent Quotient (Dioxin)

ENVIRONMENTAL STANDARDS

INORGANIC ANALYSIS SUPPORT DOCUMENTATION

ESI project name:	ARCO Yerington	Reviewed by:	BE
Sample Collection Dates:	11/21-22/19	Approved by:	Dina V
Job Number:	20115675.GW20	Completion Date:	2/13/2020
Project Manager:	Dina		
Laboratory:	TA St. Louis		

Applicable Sample No's ( ) Refer to Table 1 in the Quality Assurance Review

Deliverable:			Sample No.	Lab Control No.
	CLP (Full)	( )	160-36526-1	
	Level IV (Full)	(x)		
	Limited	( )		
	Other:			

The following table indicates criteria that were examined, the identified problems, and support documentation attachments

	Criteria Examined in Detail Check (√) if Yes or Footnote Letter for Comments Below					Problems Identified Check (√) if Yes or Footnote Letter for Comments Below					Support Documentation Attachments Check (√) if Yes or Footnote Letter for Comments Below				
	Metals					Metals					Metals				
Holding Times	x										x				
Blank Analysis Results	x										x				
Matrix Spike (Predigestion) Results	x										x				
Duplicate Analysis: (x) Field (x) Lab	x					X					x				
Quantitation of Results	x										x				
Detection Limit/Sensitivity															
Initial Calibrations	x										x				
Continuing Calibrations	x										x				
Laboratory Control Standard (LCS)	x										x				
ICP Linear Range Analysis	x										x				
ICP Interference Checks	x										x				
ICP Serial Dilutions	x					x					x				
ICP Post-Digestion Spike															
GFAA Post Digestion Spikes															
GFAA Duplicate Injections															
ICP Multiple Exposures															
GFAA Standard Additions															
CRDL Standards	x										x				
Condition on Receipt	x										x				
Percent Solids	x										x				
Others: Total vs. Dissolved Metals															

Comments:

ENVIRONMENTAL STANDARDS

RADIOLOGICAL ANALYSIS SUPPORT DOCUMENTATION

ESI project name:	Yerington	Reviewed by:	BJE
Sample Collection Dates:	11/21-22/19	Approved by:	Dina V
Job Number:	20115675.GW20	Completion Date:	2/13/2020
Project Manager:	KV		
Laboratory:	TA St. Louis		

Applicable Sample No's (X) — Refer to Table 1 in the Quality Assurance Review

			Sample No.	Lab Control No.
Deliverable:	Level IV (Full)	(X)	160-36526-1	
	Limited	( )		
	Other:			

The following table indicates criteria that were examined, the identified problems, and support documentation attachments

	Criteria Examined in Detail Check (√) if Yes or Footnote Letter for Comments Below					Problems Identified Check (√) if Yes or Footnote Letter for Comments Below					Support Documentation Attachments Check (√) if Yes or Footnote Letter for Comments Below				
			Ra-226	Ra-228				Ra-226	Ra-228				Ra-226	Ra-228	
Holding Times			X	X									X	X	
Blank Analysis Results			X	X									X	X	
Laboratory Control Standard (LCS)			X	X									X	X	
Tracer/Chemical Yield			X	X									X	X	
Duplicate Analysis: (X) Field (X) Lab			X	X									X	X	
Matrix Spike Results															
Quantitation of Results			X	X									X	X	
Detection Limit			X	X									X	X	
Efficiency/Energy Calibrations															
Initial Calibration Verifications			X	X									X	X	
Annual Calibration Verifications															
Continuing Calibration Checks			X	X									X	X	
Continuing Calibration Backgrounds			X	X									X	X	
Sample Preservation			X	X									X	X	
Condition on Receipt			X	X									X	X	
Others:															

Comments:

EVALUATION OF INORGANIC FIELD DUPLICATE SAMPLE ANALYSIS PRECISION

Units see below	PRECISION OBJECTIVES*	
	Analyte > or = 5 X RL	RPD < or = 40
	Analyte < 5 X RL	Difference ≤ RL × 2

* Enter the project-specific or default acceptance criteria

ANALYTE	Units	STSB28_0-0.5 Analyte Concentration	Qual	RL	STSB28-FD_0-0.5 Analyte Concentration	Qual	RL	Difference	RPD	Notes
Thorium	MG/KG	3.5		0.18	4.0		0.20	NA	13.3%	IN
Uranium	MG/KG	4.2		0.09	2.6		0.10	NA	47.1%	1
								NA	#DIV/0!	#DIV/0!
								NA	#DIV/0!	#DIV/0!
								NA	#DIV/0!	#DIV/0!
								NA	#DIV/0!	#DIV/0!
								NA	#DIV/0!	#DIV/0!
								NA	#DIV/0!	#DIV/0!
								NA	#DIV/0!	#DIV/0!
								NA	#DIV/0!	#DIV/0!
								NA	#DIV/0!	#DIV/0!
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								NA	#DIV/0!	#DIV/0!
								NA	#DIV/0!	#DIV/0!
								NA	#DIV/0!	#DIV/0!
								NA	#DIV/0!	#DIV/0!

NOTES:

Qual) Column to enter J, U, U*, or B

RPD) Relative Percent Difference

RL) Reporting Limit

J) The analyte concentration should be considered estimated.

U) The analyte was not-detected in the sample. The numerical value of the EDL will be used for comparison purposes.

U* or B) The result was blank qualified. The numerical value will be used for comparison purposes.

NA) The RPD or Difference is not applicable.

1) Both results are > or = 5 X RL and RPD over acceptance limit, flag positive results "J".

2) At least one of the results is < 5 X RL and difference is over acceptance limit, flag positive results "J" and "not-detected" r

Comments:

EVALUATION OF INORGANIC FIELD DUPLICATE SAMPLE ANALYSIS PRECISION

Units see below	PRECISION OBJECTIVES*	
	Analyte > or = 5 X RL	RPD < or = 40
	Analyte < 5 X RL	Difference ≤ RL × 2

* Enter the project-specific or default acceptance criteria

ANALYTE	Units	STSB29_6-15 Analyte Concentration	Qual	RL	STSB29-FD_6-15 Analyte Concentration	Qual	RL	Difference	RPD	Notes
Thorium	MG/KG	7.4		0.21	7.8		0.20	NA	5.3%	IN
Uranium	MG/KG	1.9		0.10	2.1		0.10	NA	10.0%	IN
								NA	#DIV/0!	#DIV/0!
								NA	#DIV/0!	#DIV/0!
								NA	#DIV/0!	#DIV/0!
								NA	#DIV/0!	#DIV/0!
								NA	#DIV/0!	#DIV/0!
								NA	#DIV/0!	#DIV/0!
								NA	#DIV/0!	#DIV/0!
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								NA	#DIV/0!	#DIV/0!
								NA	#DIV/0!	#DIV/0!

NOTES:

Qual) Column to enter J, U, U*, or B

RPD) Relative Percent Difference

RL) Reporting Limit

J) The analyte concentration should be considered estimated.

U) The analyte was not-detected in the sample. The numerical value of the EDL will be used for comparison purposes.

U* or B) The result was blank qualified. The numerical value will be used for comparison purposes.

NA) The RPD or Difference is not applicable.

1) Both results are > or = 5 X RL and RPD over acceptance limit, flag positive results "J".

2) At least one of the results is < 5 X RL and difference is over acceptance limit, flag positive results "J" and "not-detected" re

Comments:

RADIOLOGICAL FIELD DUPLICATE EVALUATION

DUPLICATE ERROR RATIO (DER 2-s) LIMIT < 2

DER = ABS (SAMPLE ACT - DUPLICATE ACT) / SQRT [(TPU 2-s SAMPLE)2 + (TPU 2-s DUPLICATE)2]

160-36526-1

Samples: STSB28_0-0.5 & STSB28-FD_0-0.5

Analyte	Sample Act	Sample TPU	Duplicate Act	Duplicate TPU	DER 2-s
Ra-226	1.93	0.295	1.77	0.315	0.74
Ra-228	0.863	0.242	0.807	0.262	0.31

Samples: STSB29_6-15 & STSB29-FD_6-15

Analyte	Sample Act	Sample TPU	Duplicate Act	Duplicate TPU	DER 2-s
Ra-226	1.79	0.404	1.66	0.328	0.50
Ra-228	1.33	0.371	1.42	0.271	0.39

Client Sample Results

Client: Wood E&I Solutions Inc
Project/Site: ACMS - Yerington OU-4B_OU-5_SOIL

Job ID: 160-36526-1

Client Sample ID: STSB27_0-0.5

Lab Sample ID: 160-36526-1
Date Collected: 11/21/19 09:15
Matrix: Solid
Date Received: 11/26/19 09:15
Percent Solids: 98.5

Method: 6020A - Metals (ICP/MS)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Thorium	3.1		0.19	0.084	mg/Kg	☼	12/02/19 10:13	12/10/19 22:15	2
Uranium	1.6		0.093	0.037	mg/Kg	☼	12/02/19 10:13	12/10/19 22:15	2

Method: 901.1 - Radium-226 & Other Gamma Emitters (GS)

Analyte	Result	Qualifier	Count Uncert. (2σ+/-)	Total Uncert. (2σ+/-)	RL	MDC	Unit	Prepared	Analyzed	Dil Fac
Radium-226	1.68		0.215	0.277	1.00	0.145	pCi/g	12/01/19 08:08	12/25/19 08:19	1
Radium-228	0.731		0.258	0.269	1.00	0.244	pCi/g	12/01/19 08:08	12/25/19 08:19	1

Client Sample ID: STSB27_0.5-3

Lab Sample ID: 160-36526-2
Date Collected: 11/21/19 09:25
Matrix: Solid
Date Received: 11/26/19 09:15
Percent Solids: 96.7

Method: 6020A - Metals (ICP/MS)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Thorium	3.3		0.20	0.089	mg/Kg	☼	12/02/19 10:13	12/10/19 22:22	2
Uranium	1.2		0.099	0.039	mg/Kg	☼	12/02/19 10:13	12/10/19 22:22	2

Method: 901.1 - Radium-226 & Other Gamma Emitters (GS)

Analyte	Result	Qualifier	Count Uncert. (2σ+/-)	Total Uncert. (2σ+/-)	RL	MDC	Unit	Prepared	Analyzed	Dil Fac
Radium-226	2.01		0.230	0.311	1.00	0.146	pCi/g	12/01/19 08:08	12/25/19 08:19	1
Radium-228	0.787		0.188	0.204	1.00	0.197	pCi/g	12/01/19 08:08	12/25/19 08:19	1

Client Sample ID: STSB27_3-6

Lab Sample ID: 160-36526-3
Date Collected: 11/21/19 09:31
Matrix: Solid
Date Received: 11/26/19 09:15
Percent Solids: 95.5

Method: 6020A - Metals (ICP/MS)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Thorium	2.8		0.19	0.088	mg/Kg	☼	12/02/19 10:13	12/10/19 22:28	2
Uranium	1.0		0.097	0.039	mg/Kg	☼	12/02/19 10:13	12/10/19 22:28	2

Method: 901.1 - Radium-226 & Other Gamma Emitters (GS)

Analyte	Result	Qualifier	Count Uncert. (2σ+/-)	Total Uncert. (2σ+/-)	RL	MDC	Unit	Prepared	Analyzed	Dil Fac
Radium-226	1.96		0.254	0.326	1.00	0.146	pCi/g	12/01/19 08:08	12/25/19 08:20	1
Radium-228	0.702		0.218	0.229	1.00	0.279	pCi/g	12/01/19 08:08	12/25/19 08:20	1

Client Sample ID: STSB27_6-15

Lab Sample ID: 160-36526-4
Date Collected: 11/21/19 09:55
Matrix: Solid
Date Received: 11/26/19 09:15
Percent Solids: 91.5

Method: 6020A - Metals (ICP/MS)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Thorium	7.4		0.20	0.090	mg/Kg	☼	12/02/19 10:13	12/10/19 22:35	2
Uranium	1.9		0.10	0.040	mg/Kg	☼	12/02/19 10:13	12/10/19 22:35	2

Client Sample Results

Client: Wood E&I Solutions Inc
Project/Site: ACMS - Yerington OU-4B_OU-5_SOIL

Job ID: 160-36526-1

Client Sample ID: STSB27_6-15

Lab Sample ID: 160-36526-4
Date Collected: 11/21/19 09:55
Matrix: Solid
Date Received: 11/26/19 09:15
Percent Solids: 91.5

Method: 901.1 - Radium-226 & Other Gamma Emitters (GS)

Analyte	Result	Qualifier	Count Uncert. (2σ+/-)	Total Uncert. (2σ+/-)	RL	MDC	Unit	Prepared	Analyzed	Dil Fac
Radium-226	1.69		0.247	0.303	1.00	0.168	pCi/g	12/01/19 08:08	12/25/19 09:01	1
Radium-228	1.11		0.312	0.332	1.00	0.310	pCi/g	12/01/19 08:08	12/25/19 09:01	1

Client Sample ID: STSB28_0-0.5

Lab Sample ID: 160-36526-5
Date Collected: 11/21/19 11:45
Matrix: Solid
Date Received: 11/26/19 09:15
Percent Solids: 94.9

Method: 6020A - Metals (ICP/MS)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Thorium	3.5		0.18	0.081	mg/Kg	☼	12/02/19 10:13	12/10/19 22:42	2
Uranium	4.2		0.090	0.036	mg/Kg	☼	12/02/19 10:13	12/10/19 22:42	2

Method: 901.1 - Radium-226 & Other Gamma Emitters (GS)

Analyte	Result	Qualifier	Count Uncert. (2σ+/-)	Total Uncert. (2σ+/-)	RL	MDC	Unit	Prepared	Analyzed	Dil Fac
Radium-226	1.93		0.216	0.295	1.00	0.113	pCi/g	12/01/19 08:08	12/25/19 09:02	1
Radium-228	0.863		0.225	0.242	1.00	0.258	pCi/g	12/01/19 08:08	12/25/19 09:02	1

Client Sample ID: STSB28-FD_0-0.5

Lab Sample ID: 160-36526-6
Date Collected: 11/21/19 11:50
Matrix: Solid
Date Received: 11/26/19 09:15
Percent Solids: 94.8

Method: 6020A - Metals (ICP/MS)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Thorium	4.0		0.20	0.090	mg/Kg	☼	12/02/19 10:13	12/10/19 22:48	2
Uranium	2.6		0.10	0.040	mg/Kg	☼	12/02/19 10:13	12/10/19 22:48	2

Method: 901.1 - Radium-226 & Other Gamma Emitters (GS)

Analyte	Result	Qualifier	Count Uncert. (2σ+/-)	Total Uncert. (2σ+/-)	RL	MDC	Unit	Prepared	Analyzed	Dil Fac
Radium-226	1.77		0.255	0.315	1.00	0.175	pCi/g	12/01/19 08:08	12/25/19 09:03	1
Radium-228	0.807		0.249	0.262	1.00	0.213	pCi/g	12/01/19 08:08	12/25/19 09:03	1

Client Sample ID: STSB28_0.5-3

Lab Sample ID: 160-36526-7
Date Collected: 11/21/19 11:55
Matrix: Solid
Date Received: 11/26/19 09:15
Percent Solids: 95.5

Method: 6020A - Metals (ICP/MS)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Thorium	3.8		0.19	0.087	mg/Kg	☼	12/02/19 10:13	12/10/19 23:15	2
Uranium	1.3		0.097	0.039	mg/Kg	☼	12/02/19 10:13	12/10/19 23:15	2

Method: 901.1 - Radium-226 & Other Gamma Emitters (GS)

Analyte	Result	Qualifier	Count Uncert. (2σ+/-)	Total Uncert. (2σ+/-)	RL	MDC	Unit	Prepared	Analyzed	Dil Fac
Radium-226	2.72		0.238	0.370	1.00	0.120	pCi/g	12/01/19 08:08	12/25/19 09:34	1
Radium-228	0.684		0.205	0.216	1.00	0.354	pCi/g	12/01/19 08:08	12/25/19 09:34	1

Client Sample Results

Client: Wood E&I Solutions Inc
Project/Site: ACMS - Yerington OU-4B_OU-5_SOIL

Job ID: 160-36526-1

Client Sample ID: STSB28_3-6

Lab Sample ID: 160-36526-8
Date Collected: 11/21/19 12:15
Matrix: Solid
Date Received: 11/26/19 09:15
Percent Solids: 95.3

Method: 6020A - Metals (ICP/MS)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Thorium	4.2		0.19	0.085	mg/Kg	☼	12/02/19 10:13	12/10/19 23:22	2
Uranium	1.3		0.095	0.038	mg/Kg	☼	12/02/19 10:13	12/10/19 23:22	2

Method: 901.1 - Radium-226 & Other Gamma Emitters (GS)

Analyte	Result	Qualifier	Count Uncert. (2σ+/-)	Total Uncert. (2σ+/-)	RL	MDC	Unit	Prepared	Analyzed	Dil Fac
Radium-226	3.11		0.317	0.448	1.00	0.181	pCi/g	12/01/19 08:08	12/25/19 09:35	1
Radium-228	1.13		0.229	0.256	1.00	0.0977	pCi/g	12/01/19 08:08	12/25/19 09:35	1

Client Sample ID: STSB28_6-15

Lab Sample ID: 160-36526-9
Date Collected: 11/21/19 12:25
Matrix: Solid
Date Received: 11/26/19 09:15
Percent Solids: 83.1

Method: 6020A - Metals (ICP/MS)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Thorium	8.1		0.23	0.10	mg/Kg	☼	12/02/19 10:13	12/10/19 23:29	2
Uranium	2.3		0.11	0.046	mg/Kg	☼	12/02/19 10:13	12/10/19 23:29	2

Method: 901.1 - Radium-226 & Other Gamma Emitters (GS)

Analyte	Result	Qualifier	Count Uncert. (2σ+/-)	Total Uncert. (2σ+/-)	RL	MDC	Unit	Prepared	Analyzed	Dil Fac
Radium-226	2.28		0.339	0.413	1.00	0.205	pCi/g	12/01/19 08:08	12/25/19 09:35	1
Radium-228	1.98		0.337	0.393	1.00	0.174	pCi/g	12/01/19 08:08	12/25/19 09:35	1

Client Sample ID: STSB29_0-0.5

Lab Sample ID: 160-36526-10
Date Collected: 11/21/19 15:00
Matrix: Solid
Date Received: 11/26/19 09:15
Percent Solids: 95.5

Method: 6020A - Metals (ICP/MS)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Thorium	4.7		0.19	0.087	mg/Kg	☼	12/02/19 10:13	12/10/19 23:36	2
Uranium	0.74		0.096	0.038	mg/Kg	☼	12/02/19 10:13	12/10/19 23:36	2

Method: 901.1 - Radium-226 & Other Gamma Emitters (GS)

Analyte	Result	Qualifier	Count Uncert. (2σ+/-)	Total Uncert. (2σ+/-)	RL	MDC	Unit	Prepared	Analyzed	Dil Fac
Radium-226	1.22		0.230	0.263	1.00	0.175	pCi/g	12/01/19 08:08	12/25/19 09:36	1
Radium-228	0.740		0.165	0.181	1.00	0.245	pCi/g	12/01/19 08:08	12/25/19 09:36	1

Client Sample ID: STSB29_0.5-3

Lab Sample ID: 160-36526-11
Date Collected: 11/21/19 15:10
Matrix: Solid
Date Received: 11/26/19 09:15
Percent Solids: 95.4

Method: 6020A - Metals (ICP/MS)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Thorium	2.9		0.18	0.081	mg/Kg	☼	12/02/19 10:13	12/10/19 23:42	2
Uranium	0.85		0.090	0.036	mg/Kg	☼	12/02/19 10:13	12/10/19 23:42	2

Client Sample Results

Client: Wood E&I Solutions Inc
Project/Site: ACMS - Yerington OU-4B_OU-5_SOIL

Job ID: 160-36526-1

Client Sample ID: STSB29_0.5-3

Lab Sample ID: 160-36526-11
Date Collected: 11/21/19 15:10
Matrix: Solid
Date Received: 11/26/19 09:15
Percent Solids: 95.4

Method: 901.1 - Radium-226 & Other Gamma Emitters (GS)

Analyte	Result	Qualifier	Count Uncert. (2σ+/-)	Total Uncert. (2σ+/-)	RL	MDC	Unit	Prepared	Analyzed	Dil Fac
Radium-226	1.34		0.209	0.251	1.00	0.137	pCi/g	12/01/19 08:08	12/25/19 09:36	1
Radium-228	0.962		0.177	0.202	1.00	0.0877	pCi/g	12/01/19 08:08	12/25/19 09:36	1

Client Sample ID: STSB29_3-6

Lab Sample ID: 160-36526-12
Date Collected: 11/21/19 15:30
Matrix: Solid
Date Received: 11/26/19 09:15
Percent Solids: 95.7

Method: 6020A - Metals (ICP/MS)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Thorium	7.1		0.19	0.085	mg/Kg	☼	12/02/19 10:13	12/11/19 00:16	2
Uranium	1.4		0.094	0.038	mg/Kg	☼	12/02/19 10:13	12/11/19 00:16	2

Method: 901.1 - Radium-226 & Other Gamma Emitters (GS)

Analyte	Result	Qualifier	Count Uncert. (2σ+/-)	Total Uncert. (2σ+/-)	RL	MDC	Unit	Prepared	Analyzed	Dil Fac
Radium-226	1.14		0.253	0.280	1.00	0.242	pCi/g	12/01/19 08:08	12/25/19 09:37	1
Radium-228	1.16		0.290	0.314	1.00	0.331	pCi/g	12/01/19 08:08	12/25/19 09:37	1

Client Sample ID: STSB29_6-15

Lab Sample ID: 160-36526-13
Date Collected: 11/21/19 15:45
Matrix: Solid
Date Received: 11/26/19 09:15
Percent Solids: 92.2

Method: 6020A - Metals (ICP/MS)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Thorium	7.4		0.21	0.094	mg/Kg	☼	12/02/19 10:13	12/11/19 00:43	2
Uranium	1.9		0.10	0.042	mg/Kg	☼	12/02/19 10:13	12/11/19 00:43	2

Method: 901.1 - Radium-226 & Other Gamma Emitters (GS)

Analyte	Result	Qualifier	Count Uncert. (2σ+/-)	Total Uncert. (2σ+/-)	RL	MDC	Unit	Prepared	Analyzed	Dil Fac
Radium-226	1.79		0.360	0.404	1.00	0.291	pCi/g	12/01/19 08:08	12/25/19 10:11	1
Radium-228	1.33		0.345	0.371	1.00	0.206	pCi/g	12/01/19 08:08	12/25/19 10:11	1

Client Sample ID: STSB29-FD_6-15

Lab Sample ID: 160-36526-14
Date Collected: 11/21/19 15:50
Matrix: Solid
Date Received: 11/26/19 09:15
Percent Solids: 90.1

Method: 6020A - Metals (ICP/MS)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Thorium	7.8		0.20	0.089	mg/Kg	☼	12/02/19 10:13	12/11/19 00:50	2
Uranium	2.1		0.099	0.039	mg/Kg	☼	12/02/19 10:13	12/11/19 00:50	2

Method: 901.1 - Radium-226 & Other Gamma Emitters (GS)

Analyte	Result	Qualifier	Count Uncert. (2σ+/-)	Total Uncert. (2σ+/-)	RL	MDC	Unit	Prepared	Analyzed	Dil Fac
Radium-226	1.66		0.279	0.328	1.00	0.207	pCi/g	12/01/19 08:08	12/25/19 10:11	1
Radium-228	1.42		0.229	0.271	1.00	0.212	pCi/g	12/01/19 08:08	12/25/19 10:11	1

Client Sample Results

Client: Wood E&I Solutions Inc
Project/Site: ACMS - Yerington OU-4B_OU-5_SOIL

Job ID: 160-36526-1

Client Sample ID: STSB30_0-0.5

Lab Sample ID: 160-36526-15
Date Collected: 11/22/19 08:55
Matrix: Solid
Date Received: 11/26/19 09:15
Percent Solids: 94.8

Method: 6020A - Metals (ICP/MS)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Thorium	1.9		0.20	0.091	mg/Kg	☼	12/02/19 10:13	12/11/19 00:57	2
Uranium	1.4		0.10	0.040	mg/Kg	☼	12/02/19 10:13	12/11/19 00:57	2

Method: 901.1 - Radium-226 & Other Gamma Emitters (GS)

Analyte	Result	Qualifier	Count Uncert. (2σ+/-)	Total Uncert. (2σ+/-)	RL	MDC	Unit	Prepared	Analyzed	Dil Fac
Radium-226	2.82		0.274	0.401	1.00	0.167	pCi/g	12/01/19 08:08	12/25/19 10:12	1
Radium-228	0.735		0.286	0.296	1.00	0.279	pCi/g	12/01/19 08:08	12/25/19 10:12	1

Client Sample ID: STSB30_0.5-3

Lab Sample ID: 160-36526-16
Date Collected: 11/22/19 09:02
Matrix: Solid
Date Received: 11/26/19 09:15
Percent Solids: 94.8

Method: 6020A - Metals (ICP/MS)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Thorium	2.7		0.18	0.082	mg/Kg	☼	12/02/19 10:13	12/11/19 01:03	2
Uranium	0.82		0.091	0.036	mg/Kg	☼	12/02/19 10:13	12/11/19 01:03	2

Method: 901.1 - Radium-226 & Other Gamma Emitters (GS)

Analyte	Result	Qualifier	Count Uncert. (2σ+/-)	Total Uncert. (2σ+/-)	RL	MDC	Unit	Prepared	Analyzed	Dil Fac
Radium-226	2.35		0.240	0.343	1.00	0.120	pCi/g	12/01/19 08:08	12/25/19 10:13	1
Radium-228	0.832		0.235	0.250	1.00	0.173	pCi/g	12/01/19 08:08	12/25/19 10:13	1

Client Sample ID: STSB30_3-6

Lab Sample ID: 160-36526-17
Date Collected: 11/22/19 09:10
Matrix: Solid
Date Received: 11/26/19 09:15
Percent Solids: 95.5

Method: 6020A - Metals (ICP/MS)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Thorium	2.8		0.19	0.084	mg/Kg	☼	12/02/19 10:13	12/11/19 01:10	2
Uranium	0.72		0.093	0.037	mg/Kg	☼	12/02/19 10:13	12/11/19 01:10	2

Method: 901.1 - Radium-226 & Other Gamma Emitters (GS)

Analyte	Result	Qualifier	Count Uncert. (2σ+/-)	Total Uncert. (2σ+/-)	RL	MDC	Unit	Prepared	Analyzed	Dil Fac
Radium-226	2.15		0.288	0.364	1.00	0.181	pCi/g	12/01/19 08:08	12/25/19 10:14	1
Radium-228	0.972		0.302	0.317	1.00	0.230	pCi/g	12/01/19 08:08	12/25/19 10:14	1

Client Sample ID: STSB30_6-15

Lab Sample ID: 160-36526-18
Date Collected: 11/22/19 09:25
Matrix: Solid
Date Received: 11/26/19 09:15
Percent Solids: 83.8

Method: 6020A - Metals (ICP/MS)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Thorium	12		0.22	0.10	mg/Kg	☼	12/02/19 10:13	12/11/19 01:17	2
Uranium	2.6		0.11	0.045	mg/Kg	☼	12/02/19 10:13	12/11/19 01:17	2

Eurofins TestAmerica, St. Louis

Client Sample Results

Client: Wood E&I Solutions Inc
Project/Site: ACMS - Yerington OU-4B_OU-5_SOIL

Job ID: 160-36526-1

Client Sample ID: STSB30_6-15

Lab Sample ID: 160-36526-18
Date Collected: 11/22/19 09:25
Matrix: Solid
Date Received: 11/26/19 09:15
Percent Solids: 83.8

Method: 901.1 - Radium-226 & Other Gamma Emitters (GS)

Analyte	Result	Qualifier	Count Uncert. (2σ+/-)	Total Uncert. (2σ+/-)	RL	MDC	Unit	Prepared	Analyzed	Dil Fac
Radium-226	2.17		0.303	0.377	1.00	0.200	pCi/g	12/01/19 08:08	12/25/19 10:42	1
Radium-228	1.43		0.274	0.310	1.00	0.203	pCi/g	12/01/19 08:08	12/25/19 10:42	1

Client Sample ID: STSB31_0-0.5

Lab Sample ID: 160-36526-19
Date Collected: 11/22/19 11:56
Matrix: Solid
Date Received: 11/26/19 09:15
Percent Solids: 92.2

Method: 6020A - Metals (ICP/MS)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Thorium	5.0		0.19	0.084	mg/Kg	☼	12/02/19 10:13	12/11/19 01:23	2
Uranium	3.1		0.093	0.037	mg/Kg	☼	12/02/19 10:13	12/11/19 01:23	2

Method: 901.1 - Radium-226 & Other Gamma Emitters (GS)

Analyte	Result	Qualifier	Count Uncert. (2σ+/-)	Total Uncert. (2σ+/-)	RL	MDC	Unit	Prepared	Analyzed	Dil Fac
Radium-226	4.73		0.425	0.643	1.00	0.245	pCi/g	12/01/19 08:08	12/25/19 10:43	1
Radium-228	0.866		0.338	0.349	1.00	0.530	pCi/g	12/01/19 08:08	12/25/19 10:43	1

Client Sample ID: STSB31_0.5-3

Lab Sample ID: 160-36526-20
Date Collected: 11/22/19 12:03
Matrix: Solid
Date Received: 11/26/19 09:15
Percent Solids: 94.4

Method: 6020A - Metals (ICP/MS)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Thorium	5.0		0.19	0.085	mg/Kg	☼	12/02/19 10:16	12/11/19 04:12	2
Uranium	1.4		0.095	0.038	mg/Kg	☼	12/02/19 10:16	12/11/19 04:12	2

Method: 901.1 - Radium-226 & Other Gamma Emitters (GS)

Analyte	Result	Qualifier	Count Uncert. (2σ+/-)	Total Uncert. (2σ+/-)	RL	MDC	Unit	Prepared	Analyzed	Dil Fac
Radium-226	3.60		0.308	0.485	1.00	0.144	pCi/g	12/01/19 08:08	12/25/19 10:43	1
Radium-228	0.970		0.225	0.246	1.00	0.216	pCi/g	12/01/19 08:08	12/25/19 10:43	1

Client Sample ID: STSB31_3-6

Lab Sample ID: 160-36526-21
Date Collected: 11/22/19 12:10
Matrix: Solid
Date Received: 11/26/19 09:15
Percent Solids: 94.1

Method: 6020A - Metals (ICP/MS)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Thorium	4.8		0.20	0.089	mg/Kg	☼	12/02/19 10:16	12/11/19 04:59	2
Uranium	1.7		0.099	0.040	mg/Kg	☼	12/02/19 10:16	12/11/19 04:59	2

Method: 901.1 - Radium-226 & Other Gamma Emitters (GS)

Analyte	Result	Qualifier	Count Uncert. (2σ+/-)	Total Uncert. (2σ+/-)	RL	MDC	Unit	Prepared	Analyzed	Dil Fac
Radium-226	4.63		0.433	0.648	1.00	0.247	pCi/g	12/01/19 10:17	12/25/19 10:46	1
Radium-228	0.947		0.312	0.326	1.00	0.302	pCi/g	12/01/19 10:17	12/25/19 10:46	1

Client Sample Results

Client: Wood E&I Solutions Inc
Project/Site: ACMS - Yerington OU-4B_OU-5_SOIL

Job ID: 160-36526-1

Client Sample ID: STSB31_6-15

Date Collected: 11/22/19 12:20
Date Received: 11/26/19 09:15

Lab Sample ID: 160-36526-22

Matrix: Solid
Percent Solids: 94.7

Method: 6020A - Metals (ICP/MS)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Thorium	6.4		0.18	0.081	mg/Kg	☼	12/02/19 10:16	12/11/19 05:06	2
Uranium	4.0		0.090	0.036	mg/Kg	☼	12/02/19 10:16	12/11/19 05:06	2

Method: 901.1 - Radium-226 & Other Gamma Emitters (GS)

Analyte	Result	Qualifier	Count Uncert. (2σ+/-)	Total Uncert. (2σ+/-)	RL	MDC	Unit	Prepared	Analyzed	Dil Fac
Radium-226	2.45		0.384	0.458	1.00	0.271	pCi/g	12/01/19 10:17	12/25/19 11:23	1
Radium-228	1.55		0.612	0.632	1.00	0.569	pCi/g	12/01/19 10:17	12/25/19 11:23	1

QC Sample Results

Client: Wood E&I Solutions Inc
Project/Site: ACMS - Yerington OU-4B_OU-5_SOIL

Job ID: 160-36526-1

Method: 6020A - Metals (ICP/MS)

Lab Sample ID: MB 160-452611/1-A
Matrix: Solid
Analysis Batch: 453933

Client Sample ID: Method Blank
Prep Type: Total/NA
Prep Batch: 452611

Analyte	MB Result	MB Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Thorium	ND		0.18	0.082	mg/Kg		12/02/19 10:13	12/10/19 21:55	2
Uranium	ND		0.091	0.036	mg/Kg		12/02/19 10:13	12/10/19 21:55	2

Lab Sample ID: LCS 160-452611/2-A
Matrix: Solid
Analysis Batch: 453933

Client Sample ID: Lab Control Sample
Prep Type: Total/NA
Prep Batch: 452611

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec. Limits
Thorium	94.7	91.6		mg/Kg		97	80 - 120

Lab Sample ID: LCSSRM 160-452611/3-A
Matrix: Solid
Analysis Batch: 453933

Client Sample ID: Lab Control Sample
Prep Type: Total/NA
Prep Batch: 452611

Analyte	Spike Added	LCSSRM Result	LCSSRM Qualifier	Unit	D	%Rec	%Rec. Limits
Uranium	98.1	97.5		mg/Kg		99.4	74.0 - 126.4

Lab Sample ID: 160-36526-11 MS
Matrix: Solid
Analysis Batch: 453933

Client Sample ID: STSB29_0.5-3
Prep Type: Total/NA
Prep Batch: 452611

Analyte	Sample Result	Sample Qualifier	Spike Added	MS Result	MS Qualifier	Unit	D	%Rec	%Rec. Limits
Thorium	2.9		91.4	93.2		mg/Kg	☼	99	75 - 125
Uranium	0.85		91.4	90.3		mg/Kg	☼	98	75 - 125

Lab Sample ID: 160-36526-11 MSD
Matrix: Solid
Analysis Batch: 453933

Client Sample ID: STSB29_0.5-3
Prep Type: Total/NA
Prep Batch: 452611

Analyte	Sample Result	Sample Qualifier	Spike Added	MSD Result	MSD Qualifier	Unit	D	%Rec	%Rec. Limits	RPD	RPD Limit
Thorium	2.9		96.4	102		mg/Kg	☼	103	75 - 125	9	30
Uranium	0.85		96.4	95.5		mg/Kg	☼	98	75 - 125	6	30

Lab Sample ID: 160-36526-11 DU
Matrix: Solid
Analysis Batch: 453933

Client Sample ID: STSB29_0.5-3
Prep Type: Total/NA
Prep Batch: 452611

Analyte	Sample Result	Sample Qualifier	DU Result	DU Qualifier	Unit	D	RPD	RPD Limit
Thorium	2.9		3.66		mg/Kg	☼	23	30
Uranium	0.85		1.02		mg/Kg	☼	18	30

Lab Sample ID: MB 160-452612/1-A
Matrix: Solid
Analysis Batch: 453935

Client Sample ID: Method Blank
Prep Type: Total/NA
Prep Batch: 452612

Analyte	MB Result	MB Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Thorium	ND		0.19	0.087	mg/Kg		12/02/19 10:16	12/11/19 03:52	2
Uranium	ND		0.097	0.039	mg/Kg		12/02/19 10:16	12/11/19 03:52	2

Method: 6020A - Metals (ICP/MS) (Continued)

Lab Sample ID: LCS 160-452612/2-A — **Client Sample ID: Lab Control Sample**
Matrix: Solid — **Prep Type: Total/NA**
Analysis Batch: 453935 — **Prep Batch: 452612**

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec. Limits
Thorium	89.9	90.8		mg/Kg		101	80 - 120

Lab Sample ID: LCSSRM 160-452612/3-A — **Client Sample ID: Lab Control Sample**
Matrix: Solid — **Prep Type: Total/NA**
Analysis Batch: 453935 — **Prep Batch: 452612**

Analyte	Spike Added	LCSSRM Result	LCSSRM Qualifier	Unit	D	%Rec	%Rec. Limits
Uranium	98.1	101		mg/Kg		103.2	74.0 - 126.4

Lab Sample ID: 160-36526-20 MS — **Client Sample ID: STSB31_0.5-3**
Matrix: Solid — **Prep Type: Total/NA**
Analysis Batch: 453935 — **Prep Batch: 452612**

Analyte	Sample Result	Sample Qualifier	Spike Added	MS Result	MS Qualifier	Unit	D	%Rec	%Rec. Limits
Thorium	5.0		104	108		mg/Kg	☼	99	75 - 125
Uranium	1.4		104	105		mg/Kg	☼	100	75 - 125

Lab Sample ID: 160-36526-20 MSD — **Client Sample ID: STSB31_0.5-3**
Matrix: Solid — **Prep Type: Total/NA**
Analysis Batch: 453935 — **Prep Batch: 452612**

Analyte	Sample Result	Sample Qualifier	Spike Added	MSD Result	MSD Qualifier	Unit	D	%Rec	%Rec. Limits	RPD	RPD Limit
Thorium	5.0		89.2	96.8		mg/Kg	☼	103	75 - 125	11	30
Uranium	1.4		89.2	93.2		mg/Kg	☼	103	75 - 125	12	30

Method: 901.1 - Radium-226 & Other Gamma Emitters (GS)

Lab Sample ID: MB 160-452567/1-A — **Client Sample ID: Method Blank**
Matrix: Solid — **Prep Type: Total/NA**
Analysis Batch: 455099 — **Prep Batch: 452567**

Analyte	MB Result	MB Qualifier	Count Uncert. (2σ+/-)	Total Uncert. (2σ+/-)	RL	MDC	Unit	Prepared	Analyzed	Dil Fac
Radium-226	-0.05823	U	0.152	0.152	1.00	0.355	pCi/g	12/01/19 08:08	12/25/19 10:44	1
Radium-228	-0.01981	U	0.167	0.167	1.00	0.249	pCi/g	12/01/19 08:08	12/25/19 10:44	1

Lab Sample ID: LCS 160-452567/2-A — **Client Sample ID: Lab Control Sample**
Matrix: Solid — **Prep Type: Total/NA**
Analysis Batch: 455100 — **Prep Batch: 452567**

Analyte	Spike Added	LCS Result	LCS Qual	Total Uncert. (2σ+/-)	RL	MDC	Unit	%Rec	%Rec. Limits
Americium-241	96.6	94.90		9.97		1.11	pCi/g	98	75 - 125
Cesium-137	27.3	27.06		2.89		0.218	pCi/g	99	75 - 125
Cobalt-60	10.8	10.48		1.10		0.0972	pCi/g	97	75 - 125

Method: 901.1 - Radium-226 & Other Gamma Emitters (GS) (Continued)

Lab Sample ID: 160-36526-11 DU
Matrix: Solid
Analysis Batch: 455101

Client Sample ID: STSB29_0.5-3
Prep Type: Total/NA
Prep Batch: 452567

Analyte	Sample Result	Sample Qual	DU Result	DU Qual	Total Uncert. (2σ+/-)	RL	MDC	Unit	DER	DER Limit
Radium-226	1.34		1.419		0.274	1.00	0.162	pCi/g	0.41	2
Radium-228	0.962		0.6580		0.240	1.00	0.209	pCi/g	1.94	2

Lab Sample ID: MB 160-452568/1-A
Matrix: Solid
Analysis Batch: 455099

Client Sample ID: Method Blank
Prep Type: Total/NA
Prep Batch: 452568

Analyte	MB Result	MB Qualifier	Count Uncert. (2σ+/-)	Total Uncert. (2σ+/-)	RL	MDC	Unit	Prepared	Analyzed	Dil Fac
Radium-226	-0.008814	U	0.159	0.159	1.00	0.281	pCi/g	12/01/19 10:17	12/25/19 11:24	1
Radium-228	0.02422	U	0.174	0.174	1.00	0.249	pCi/g	12/01/19 10:17	12/25/19 11:24	1

Lab Sample ID: LCS 160-452568/2-A
Matrix: Solid
Analysis Batch: 455100

Client Sample ID: Lab Control Sample
Prep Type: Total/NA
Prep Batch: 452568

Analyte	Spike Added	LCS Result	LCS Qual	Total Uncert. (2σ+/-)	RL	MDC	Unit	%Rec	%Rec. Limits
Americium-241	96.6	93.75		9.86		1.18	pCi/g	97	75 - 125
Cesium-137	27.3	27.44		2.93		0.196	pCi/g	100	75 - 125
Cobalt-60	10.8	10.71		1.13		0.0911	pCi/g	100	75 - 125

Lab Sample ID: 160-36526-21 DU
Matrix: Solid
Analysis Batch: 455101

Client Sample ID: STSB31_3-6
Prep Type: Total/NA
Prep Batch: 452568

Analyte	Sample Result	Sample Qual	DU Result	DU Qual	Total Uncert. (2σ+/-)	RL	MDC	Unit	DER	DER Limit
Radium-226	4.63		4.568		0.570	1.00	0.146	pCi/g	0.14	2
Radium-228	0.947		0.9845		0.324	1.00	0.234	pCi/g	0.16	2

QC Association Summary

Client: Wood E&I Solutions Inc
Project/Site: ACMS - Yerington OU-4B_OU-5_SOIL

Job ID: 160-36526-1

Metals

Prep Batch: 452611

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
160-36526-1	STSB27_0-0.5	Total/NA	Solid	3050B	
160-36526-2	STSB27_0.5-3	Total/NA	Solid	3050B	
160-36526-3	STSB27_3-6	Total/NA	Solid	3050B	
160-36526-4	STSB27_6-15	Total/NA	Solid	3050B	
160-36526-5	STSB28_0-0.5	Total/NA	Solid	3050B	
160-36526-6	STSB28-FD_0-0.5	Total/NA	Solid	3050B	
160-36526-7	STSB28_0.5-3	Total/NA	Solid	3050B	
160-36526-8	STSB28_3-6	Total/NA	Solid	3050B	
160-36526-9	STSB28_6-15	Total/NA	Solid	3050B	
160-36526-10	STSB29_0-0.5	Total/NA	Solid	3050B	
160-36526-11	STSB29_0.5-3	Total/NA	Solid	3050B	
160-36526-12	STSB29_3-6	Total/NA	Solid	3050B	
160-36526-13	STSB29_6-15	Total/NA	Solid	3050B	
160-36526-14	STSB29-FD_6-15	Total/NA	Solid	3050B	
160-36526-15	STSB30_0-0.5	Total/NA	Solid	3050B	
160-36526-16	STSB30_0.5-3	Total/NA	Solid	3050B	
160-36526-17	STSB30_3-6	Total/NA	Solid	3050B	
160-36526-18	STSB30_6-15	Total/NA	Solid	3050B	
160-36526-19	STSB31_0-0.5	Total/NA	Solid	3050B	
MB 160-452611/1-A	Method Blank	Total/NA	Solid	3050B	
LCS 160-452611/2-A	Lab Control Sample	Total/NA	Solid	3050B	
LCSSRM 160-452611/3-A	Lab Control Sample	Total/NA	Solid	3050B	
160-36526-11 MS	STSB29_0.5-3	Total/NA	Solid	3050B	
160-36526-11 MSD	STSB29_0.5-3	Total/NA	Solid	3050B	
160-36526-11 DU	STSB29_0.5-3	Total/NA	Solid	3050B	

Prep Batch: 452612

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
160-36526-20	STSB31_0.5-3	Total/NA	Solid	3050B	
160-36526-21	STSB31_3-6	Total/NA	Solid	3050B	
160-36526-22	STSB31_6-15	Total/NA	Solid	3050B	
MB 160-452612/1-A	Method Blank	Total/NA	Solid	3050B	
LCS 160-452612/2-A	Lab Control Sample	Total/NA	Solid	3050B	
LCSSRM 160-452612/3-A	Lab Control Sample	Total/NA	Solid	3050B	
160-36526-20 MS	STSB31_0.5-3	Total/NA	Solid	3050B	
160-36526-20 MSD	STSB31_0.5-3	Total/NA	Solid	3050B	

Analysis Batch: 453933

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
160-36526-1	STSB27_0-0.5	Total/NA	Solid	6020A	452611
160-36526-2	STSB27_0.5-3	Total/NA	Solid	6020A	452611
160-36526-3	STSB27_3-6	Total/NA	Solid	6020A	452611
160-36526-4	STSB27_6-15	Total/NA	Solid	6020A	452611
160-36526-5	STSB28_0-0.5	Total/NA	Solid	6020A	452611
160-36526-6	STSB28-FD_0-0.5	Total/NA	Solid	6020A	452611
160-36526-7	STSB28_0.5-3	Total/NA	Solid	6020A	452611
160-36526-8	STSB28_3-6	Total/NA	Solid	6020A	452611
160-36526-9	STSB28_6-15	Total/NA	Solid	6020A	452611
160-36526-10	STSB29_0-0.5	Total/NA	Solid	6020A	452611
160-36526-11	STSB29_0.5-3	Total/NA	Solid	6020A	452611
160-36526-12	STSB29_3-6	Total/NA	Solid	6020A	452611

Metals (Continued)

Analysis Batch: 453933 (Continued)

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
160-36526-13	STSB29_6-15	Total/NA	Solid	6020A	452611
160-36526-14	STSB29-FD_6-15	Total/NA	Solid	6020A	452611
160-36526-15	STSB30_0-0.5	Total/NA	Solid	6020A	452611
160-36526-16	STSB30_0.5-3	Total/NA	Solid	6020A	452611
160-36526-17	STSB30_3-6	Total/NA	Solid	6020A	452611
160-36526-18	STSB30_6-15	Total/NA	Solid	6020A	452611
160-36526-19	STSB31_0-0.5	Total/NA	Solid	6020A	452611
MB 160-452611/1-A	Method Blank	Total/NA	Solid	6020A	452611
LCS 160-452611/2-A	Lab Control Sample	Total/NA	Solid	6020A	452611
LCSSRM 160-452611/3-A	Lab Control Sample	Total/NA	Solid	6020A	452611
160-36526-11 MS	STSB29_0.5-3	Total/NA	Solid	6020A	452611
160-36526-11 MSD	STSB29_0.5-3	Total/NA	Solid	6020A	452611
160-36526-11 DU	STSB29_0.5-3	Total/NA	Solid	6020A	452611

Analysis Batch: 453935

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
160-36526-20	STSB31_0.5-3	Total/NA	Solid	6020A	452612
160-36526-21	STSB31_3-6	Total/NA	Solid	6020A	452612
160-36526-22	STSB31_6-15	Total/NA	Solid	6020A	452612
MB 160-452612/1-A	Method Blank	Total/NA	Solid	6020A	452612
LCS 160-452612/2-A	Lab Control Sample	Total/NA	Solid	6020A	452612
LCSSRM 160-452612/3-A	Lab Control Sample	Total/NA	Solid	6020A	452612
160-36526-20 MS	STSB31_0.5-3	Total/NA	Solid	6020A	452612
160-36526-20 MSD	STSB31_0.5-3	Total/NA	Solid	6020A	452612

General Chemistry

Analysis Batch: 452332

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
160-36526-1	STSB27_0-0.5	Total/NA	Solid	Moisture	
160-36526-2	STSB27_0.5-3	Total/NA	Solid	Moisture	
160-36526-3	STSB27_3-6	Total/NA	Solid	Moisture	
160-36526-4	STSB27_6-15	Total/NA	Solid	Moisture	
160-36526-5	STSB28_0-0.5	Total/NA	Solid	Moisture	
160-36526-6	STSB28-FD_0-0.5	Total/NA	Solid	Moisture	
160-36526-7	STSB28_0.5-3	Total/NA	Solid	Moisture	
160-36526-8	STSB28_3-6	Total/NA	Solid	Moisture	
160-36526-9	STSB28_6-15	Total/NA	Solid	Moisture	
160-36526-10	STSB29_0-0.5	Total/NA	Solid	Moisture	
160-36526-11	STSB29_0.5-3	Total/NA	Solid	Moisture	
160-36526-12	STSB29_3-6	Total/NA	Solid	Moisture	
160-36526-13	STSB29_6-15	Total/NA	Solid	Moisture	
160-36526-14	STSB29-FD_6-15	Total/NA	Solid	Moisture	
160-36526-15	STSB30_0-0.5	Total/NA	Solid	Moisture	
160-36526-16	STSB30_0.5-3	Total/NA	Solid	Moisture	
160-36526-17	STSB30_3-6	Total/NA	Solid	Moisture	
160-36526-18	STSB30_6-15	Total/NA	Solid	Moisture	
160-36526-19	STSB31_0-0.5	Total/NA	Solid	Moisture	
160-36526-20	STSB31_0.5-3	Total/NA	Solid	Moisture	
160-36526-20 DU	STSB31_0.5-3	Total/NA	Solid	Moisture	

QC Association Summary

Client: Wood E&I Solutions Inc
Project/Site: ACMS - Yerington OU-4B_OU-5_SOIL

Job ID: 160-36526-1

General Chemistry

Analysis Batch: 452334

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
160-36526-21	STSB31_3-6	Total/NA	Solid	Moisture	
160-36526-22	STSB31_6-15	Total/NA	Solid	Moisture	
160-36453-A-23 DU	Duplicate	Total/NA	Solid	Moisture	

Rad

Leach Batch: 452495

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
160-36526-1	STSB27_0-0.5	Total/NA	Solid	Dry and Grind	
160-36526-2	STSB27_0.5-3	Total/NA	Solid	Dry and Grind	
160-36526-3	STSB27_3-6	Total/NA	Solid	Dry and Grind	
160-36526-4	STSB27_6-15	Total/NA	Solid	Dry and Grind	
160-36526-5	STSB28_0-0.5	Total/NA	Solid	Dry and Grind	
160-36526-6	STSB28-FD_0-0.5	Total/NA	Solid	Dry and Grind	
160-36526-7	STSB28_0.5-3	Total/NA	Solid	Dry and Grind	
160-36526-8	STSB28_3-6	Total/NA	Solid	Dry and Grind	
160-36526-9	STSB28_6-15	Total/NA	Solid	Dry and Grind	
160-36526-10	STSB29_0-0.5	Total/NA	Solid	Dry and Grind	
160-36526-11	STSB29_0.5-3	Total/NA	Solid	Dry and Grind	
160-36526-12	STSB29_3-6	Total/NA	Solid	Dry and Grind	
160-36526-13	STSB29_6-15	Total/NA	Solid	Dry and Grind	
160-36526-14	STSB29-FD_6-15	Total/NA	Solid	Dry and Grind	
160-36526-15	STSB30_0-0.5	Total/NA	Solid	Dry and Grind	
160-36526-16	STSB30_0.5-3	Total/NA	Solid	Dry and Grind	
160-36526-17	STSB30_3-6	Total/NA	Solid	Dry and Grind	
160-36526-18	STSB30_6-15	Total/NA	Solid	Dry and Grind	
160-36526-19	STSB31_0-0.5	Total/NA	Solid	Dry and Grind	
160-36526-20	STSB31_0.5-3	Total/NA	Solid	Dry and Grind	
160-36526-21	STSB31_3-6	Total/NA	Solid	Dry and Grind	
160-36526-22	STSB31_6-15	Total/NA	Solid	Dry and Grind	
160-36526-11 DU	STSB29_0.5-3	Total/NA	Solid	Dry and Grind	
160-36526-21 DU	STSB31_3-6	Total/NA	Solid	Dry and Grind	

Prep Batch: 452567

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
160-36526-1	STSB27_0-0.5	Total/NA	Solid	Fill_Geo-21	452495
160-36526-2	STSB27_0.5-3	Total/NA	Solid	Fill_Geo-21	452495
160-36526-3	STSB27_3-6	Total/NA	Solid	Fill_Geo-21	452495
160-36526-4	STSB27_6-15	Total/NA	Solid	Fill_Geo-21	452495
160-36526-5	STSB28_0-0.5	Total/NA	Solid	Fill_Geo-21	452495
160-36526-6	STSB28-FD_0-0.5	Total/NA	Solid	Fill_Geo-21	452495
160-36526-7	STSB28_0.5-3	Total/NA	Solid	Fill_Geo-21	452495
160-36526-8	STSB28_3-6	Total/NA	Solid	Fill_Geo-21	452495
160-36526-9	STSB28_6-15	Total/NA	Solid	Fill_Geo-21	452495
160-36526-10	STSB29_0-0.5	Total/NA	Solid	Fill_Geo-21	452495
160-36526-11	STSB29_0.5-3	Total/NA	Solid	Fill_Geo-21	452495
160-36526-12	STSB29_3-6	Total/NA	Solid	Fill_Geo-21	452495
160-36526-13	STSB29_6-15	Total/NA	Solid	Fill_Geo-21	452495
160-36526-14	STSB29-FD_6-15	Total/NA	Solid	Fill_Geo-21	452495
160-36526-15	STSB30_0-0.5	Total/NA	Solid	Fill_Geo-21	452495
160-36526-16	STSB30_0.5-3	Total/NA	Solid	Fill_Geo-21	452495

QC Association Summary

Client: Wood E&I Solutions Inc
Project/Site: ACMS - Yerington OU-4B_OU-5_SOIL

Job ID: 160-36526-1

Rad (Continued)

Prep Batch: 452567 (Continued)

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
160-36526-17	STSB30_3-6	Total/NA	Solid	Fill_Geo-21	452495
160-36526-18	STSB30_6-15	Total/NA	Solid	Fill_Geo-21	452495
160-36526-19	STSB31_0-0.5	Total/NA	Solid	Fill_Geo-21	452495
160-36526-20	STSB31_0.5-3	Total/NA	Solid	Fill_Geo-21	452495
MB 160-452567/1-A	Method Blank	Total/NA	Solid	Fill_Geo-21	
LCS 160-452567/2-A	Lab Control Sample	Total/NA	Solid	Fill_Geo-21	
160-36526-11 DU	STSB29_0.5-3	Total/NA	Solid	Fill_Geo-21	452495

Prep Batch: 452568

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
160-36526-21	STSB31_3-6	Total/NA	Solid	Fill_Geo-21	452495
160-36526-22	STSB31_6-15	Total/NA	Solid	Fill_Geo-21	452495
MB 160-452568/1-A	Method Blank	Total/NA	Solid	Fill_Geo-21	
LCS 160-452568/2-A	Lab Control Sample	Total/NA	Solid	Fill_Geo-21	
160-36526-21 DU	STSB31_3-6	Total/NA	Solid	Fill_Geo-21	452495

Lab Chronicle

Client: Wood E&I Solutions Inc
Project/Site: ACMS - Yerington OU-4B_OU-5_SOIL

Job ID: 160-36526-1

Client Sample ID: STSB27_0-0.5 — Lab Sample ID: 160-36526-1

Date Collected: 11/21/19 09:15
Date Received: 11/26/19 09:15
Matrix: Solid

Prep Type	Batch Type	Batch Method	Run	Dilution Factor	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Analysis	Moisture		1	452332	11/28/19 11:12	KPP	TAL SL
Total/NA	Leach	Dry and Grind			452495	11/29/19 11:49	EJQ	TAL SL
Total/NA	Prep	Fill_Geo-21			452567	12/01/19 08:08	SJS	TAL SL
Total/NA	Analysis	901.1		1	455099	12/25/19 08:19	KLS	TAL SL

Client Sample ID: STSB27_0-0.5 — Lab Sample ID: 160-36526-1

Date Collected: 11/21/19 09:15
Date Received: 11/26/19 09:15
Matrix: Solid
Percent Solids: 98.5

Prep Type	Batch Type	Batch Method	Run	Dilution Factor	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Prep	3050B			452611	12/02/19 10:13	LAM	TAL SL
Total/NA	Analysis	6020A		2	453933	12/10/19 22:15	LKP	TAL SL

Client Sample ID: STSB27_0.5-3 — Lab Sample ID: 160-36526-2

Date Collected: 11/21/19 09:25
Date Received: 11/26/19 09:15
Matrix: Solid

Prep Type	Batch Type	Batch Method	Run	Dilution Factor	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Analysis	Moisture		1	452332	11/28/19 11:12	KPP	TAL SL
Total/NA	Leach	Dry and Grind			452495	11/29/19 11:49	EJQ	TAL SL
Total/NA	Prep	Fill_Geo-21			452567	12/01/19 08:08	SJS	TAL SL
Total/NA	Analysis	901.1		1	455100	12/25/19 08:19	KLS	TAL SL

Client Sample ID: STSB27_0.5-3 — Lab Sample ID: 160-36526-2

Date Collected: 11/21/19 09:25
Date Received: 11/26/19 09:15
Matrix: Solid
Percent Solids: 96.7

Prep Type	Batch Type	Batch Method	Run	Dilution Factor	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Prep	3050B			452611	12/02/19 10:13	LAM	TAL SL
Total/NA	Analysis	6020A		2	453933	12/10/19 22:22	LKP	TAL SL

Client Sample ID: STSB27_3-6 — Lab Sample ID: 160-36526-3

Date Collected: 11/21/19 09:31
Date Received: 11/26/19 09:15
Matrix: Solid

Prep Type	Batch Type	Batch Method	Run	Dilution Factor	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Analysis	Moisture		1	452332	11/28/19 11:12	KPP	TAL SL
Total/NA	Leach	Dry and Grind			452495	11/29/19 11:49	EJQ	TAL SL
Total/NA	Prep	Fill_Geo-21			452567	12/01/19 08:08	SJS	TAL SL
Total/NA	Analysis	901.1		1	455104	12/25/19 08:20	KLS	TAL SL

Lab Chronicle

Client: Wood E&I Solutions Inc
Project/Site: ACMS - Yerington OU-4B_OU-5_SOIL

Job ID: 160-36526-1

Client Sample ID: STSB27_3-6 — Lab Sample ID: 160-36526-3

Date Collected: 11/21/19 09:31 — **Matrix: Solid**
Date Received: 11/26/19 09:15 — **Percent Solids: 95.5**

Prep Type	Batch Type	Batch Method	Run	Dilution Factor	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Prep	3050B			452611	12/02/19 10:13	LAM	TAL SL
Total/NA	Analysis	6020A		2	453933	12/10/19 22:28	LKP	TAL SL

Client Sample ID: STSB27_6-15 — Lab Sample ID: 160-36526-4

Date Collected: 11/21/19 09:55 — **Matrix: Solid**
Date Received: 11/26/19 09:15

Prep Type	Batch Type	Batch Method	Run	Dilution Factor	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Analysis	Moisture		1	452332	11/28/19 11:12	KPP	TAL SL
Total/NA	Leach	Dry and Grind			452495	11/29/19 11:49	EJQ	TAL SL
Total/NA	Prep	Fill_Geo-21			452567	12/01/19 08:08	SJS	TAL SL
Total/NA	Analysis	901.1		1	455099	12/25/19 09:01	KLS	TAL SL

Client Sample ID: STSB27_6-15 — Lab Sample ID: 160-36526-4

Date Collected: 11/21/19 09:55 — **Matrix: Solid**
Date Received: 11/26/19 09:15 — **Percent Solids: 91.5**

Prep Type	Batch Type	Batch Method	Run	Dilution Factor	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Prep	3050B			452611	12/02/19 10:13	LAM	TAL SL
Total/NA	Analysis	6020A		2	453933	12/10/19 22:35	LKP	TAL SL

Client Sample ID: STSB28_0-0.5 — Lab Sample ID: 160-36526-5

Date Collected: 11/21/19 11:45 — **Matrix: Solid**
Date Received: 11/26/19 09:15

Prep Type	Batch Type	Batch Method	Run	Dilution Factor	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Analysis	Moisture		1	452332	11/28/19 11:12	KPP	TAL SL
Total/NA	Leach	Dry and Grind			452495	11/29/19 11:49	EJQ	TAL SL
Total/NA	Prep	Fill_Geo-21			452567	12/01/19 08:08	SJS	TAL SL
Total/NA	Analysis	901.1		1	455100	12/25/19 09:02	KLS	TAL SL

Client Sample ID: STSB28_0-0.5 — Lab Sample ID: 160-36526-5

Date Collected: 11/21/19 11:45 — **Matrix: Solid**
Date Received: 11/26/19 09:15 — **Percent Solids: 94.9**

Prep Type	Batch Type	Batch Method	Run	Dilution Factor	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Prep	3050B			452611	12/02/19 10:13	LAM	TAL SL
Total/NA	Analysis	6020A		2	453933	12/10/19 22:42	LKP	TAL SL

Client Sample ID: STSB28-FD_0-0.5 — Lab Sample ID: 160-36526-6

Date Collected: 11/21/19 11:50 — **Matrix: Solid**
Date Received: 11/26/19 09:15

Prep Type	Batch Type	Batch Method	Run	Dilution Factor	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Analysis	Moisture		1	452332	11/28/19 11:12	KPP	TAL SL

Lab Chronicle

Client: Wood E&I Solutions Inc
Project/Site: ACMS - Yerington OU-4B_OU-5_SOIL

Job ID: 160-36526-1

Client Sample ID: STSB28-FD_0-0.5
Lab Sample ID: 160-36526-6
Date Collected: 11/21/19 11:50
Matrix: Solid
Date Received: 11/26/19 09:15

Prep Type	Batch Type	Batch Method	Run	Dilution Factor	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Leach	Dry and Grind			452495	11/29/19 11:49	EJQ	TAL SL
Total/NA	Prep	Fill_Geo-21			452567	12/01/19 08:08	SJS	TAL SL
Total/NA	Analysis	901.1		1	455104	12/25/19 09:03	KLS	TAL SL

Client Sample ID: STSB28-FD_0-0.5
Lab Sample ID: 160-36526-6
Date Collected: 11/21/19 11:50
Matrix: Solid
Date Received: 11/26/19 09:15
Percent Solids: 94.8

Prep Type	Batch Type	Batch Method	Run	Dilution Factor	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Prep	3050B			452611	12/02/19 10:13	LAM	TAL SL
Total/NA	Analysis	6020A		2	453933	12/10/19 22:48	LKP	TAL SL

Client Sample ID: STSB28_0.5-3
Lab Sample ID: 160-36526-7
Date Collected: 11/21/19 11:55
Matrix: Solid
Date Received: 11/26/19 09:15

Prep Type	Batch Type	Batch Method	Run	Dilution Factor	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Analysis	Moisture		1	452332	11/28/19 11:12	KPP	TAL SL
Total/NA	Leach	Dry and Grind			452495	11/29/19 11:49	EJQ	TAL SL
Total/NA	Prep	Fill_Geo-21			452567	12/01/19 08:08	SJS	TAL SL
Total/NA	Analysis	901.1		1	455101	12/25/19 09:34	KLS	TAL SL

Client Sample ID: STSB28_0.5-3
Lab Sample ID: 160-36526-7
Date Collected: 11/21/19 11:55
Matrix: Solid
Date Received: 11/26/19 09:15
Percent Solids: 95.5

Prep Type	Batch Type	Batch Method	Run	Dilution Factor	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Prep	3050B			452611	12/02/19 10:13	LAM	TAL SL
Total/NA	Analysis	6020A		2	453933	12/10/19 23:15	LKP	TAL SL

Client Sample ID: STSB28_3-6
Lab Sample ID: 160-36526-8
Date Collected: 11/21/19 12:15
Matrix: Solid
Date Received: 11/26/19 09:15

Prep Type	Batch Type	Batch Method	Run	Dilution Factor	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Analysis	Moisture		1	452332	11/28/19 11:12	KPP	TAL SL
Total/NA	Leach	Dry and Grind			452495	11/29/19 11:49	EJQ	TAL SL
Total/NA	Prep	Fill_Geo-21			452567	12/01/19 08:08	SJS	TAL SL
Total/NA	Analysis	901.1		1	455102	12/25/19 09:35	KLS	TAL SL

Lab Chronicle

Client: Wood E&I Solutions Inc
Project/Site: ACMS - Yerington OU-4B_OU-5_SOIL

Job ID: 160-36526-1

Client Sample ID: STSB28_3-6

Lab Sample ID: 160-36526-8
Date Collected: 11/21/19 12:15
Matrix: Solid
Date Received: 11/26/19 09:15
Percent Solids: 95.3

Prep Type	Batch Type	Batch Method	Run	Dilution Factor	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Prep	3050B			452611	12/02/19 10:13	LAM	TAL SL
Total/NA	Analysis	6020A		2	453933	12/10/19 23:22	LKP	TAL SL

Client Sample ID: STSB28_6-15

Lab Sample ID: 160-36526-9
Date Collected: 11/21/19 12:25
Matrix: Solid
Date Received: 11/26/19 09:15

Prep Type	Batch Type	Batch Method	Run	Dilution Factor	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Analysis	Moisture		1	452332	11/28/19 11:12	KPP	TAL SL
Total/NA	Leach	Dry and Grind			452495	11/29/19 11:49	EJQ	TAL SL
Total/NA	Prep	Fill_Geo-21			452567	12/01/19 08:08	SJS	TAL SL
Total/NA	Analysis	901.1		1	455098	12/25/19 09:35	KLS	TAL SL

Client Sample ID: STSB28_6-15

Lab Sample ID: 160-36526-9
Date Collected: 11/21/19 12:25
Matrix: Solid
Date Received: 11/26/19 09:15
Percent Solids: 83.1

Prep Type	Batch Type	Batch Method	Run	Dilution Factor	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Prep	3050B			452611	12/02/19 10:13	LAM	TAL SL
Total/NA	Analysis	6020A		2	453933	12/10/19 23:29	LKP	TAL SL

Client Sample ID: STSB29_0-0.5

Lab Sample ID: 160-36526-10
Date Collected: 11/21/19 15:00
Matrix: Solid
Date Received: 11/26/19 09:15

Prep Type	Batch Type	Batch Method	Run	Dilution Factor	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Analysis	Moisture		1	452332	11/28/19 11:12	KPP	TAL SL
Total/NA	Leach	Dry and Grind			452495	11/29/19 11:49	EJQ	TAL SL
Total/NA	Prep	Fill_Geo-21			452567	12/01/19 08:08	SJS	TAL SL
Total/NA	Analysis	901.1		1	455099	12/25/19 09:36	KLS	TAL SL

Client Sample ID: STSB29_0-0.5

Lab Sample ID: 160-36526-10
Date Collected: 11/21/19 15:00
Matrix: Solid
Date Received: 11/26/19 09:15
Percent Solids: 95.5

Prep Type	Batch Type	Batch Method	Run	Dilution Factor	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Prep	3050B			452611	12/02/19 10:13	LAM	TAL SL
Total/NA	Analysis	6020A		2	453933	12/10/19 23:36	LKP	TAL SL

Client Sample ID: STSB29_0.5-3

Lab Sample ID: 160-36526-11
Date Collected: 11/21/19 15:10
Matrix: Solid
Date Received: 11/26/19 09:15

Prep Type	Batch Type	Batch Method	Run	Dilution Factor	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Analysis	Moisture		1	452332	11/28/19 11:12	KPP	TAL SL

Lab Chronicle

Client: Wood E&I Solutions Inc
Project/Site: ACMS - Yerington OU-4B_OU-5_SOIL

Job ID: 160-36526-1

Client Sample ID: STSB29_0.5-3
Lab Sample ID: 160-36526-11
Date Collected: 11/21/19 15:10
Matrix: Solid
Date Received: 11/26/19 09:15

Prep Type	Batch Type	Batch Method	Run	Dilution Factor	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Leach	Dry and Grind			452495	11/29/19 11:49	EJQ	TAL SL
Total/NA	Prep	Fill_Geo-21			452567	12/01/19 08:08	SJS	TAL SL
Total/NA	Analysis	901.1		1	455100	12/25/19 09:36	KLS	TAL SL

Client Sample ID: STSB29_0.5-3
Lab Sample ID: 160-36526-11
Date Collected: 11/21/19 15:10
Matrix: Solid
Date Received: 11/26/19 09:15
Percent Solids: 95.4

Prep Type	Batch Type	Batch Method	Run	Dilution Factor	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Prep	3050B			452611	12/02/19 10:13	LAM	TAL SL
Total/NA	Analysis	6020A		2	453933	12/10/19 23:42	LKP	TAL SL

Client Sample ID: STSB29_3-6
Lab Sample ID: 160-36526-12
Date Collected: 11/21/19 15:30
Matrix: Solid
Date Received: 11/26/19 09:15

Prep Type	Batch Type	Batch Method	Run	Dilution Factor	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Analysis	Moisture		1	452332	11/28/19 11:12	KPP	TAL SL
Total/NA	Leach	Dry and Grind			452495	11/29/19 11:49	EJQ	TAL SL
Total/NA	Prep	Fill_Geo-21			452567	12/01/19 08:08	SJS	TAL SL
Total/NA	Analysis	901.1		1	455104	12/25/19 09:37	KLS	TAL SL

Client Sample ID: STSB29_3-6
Lab Sample ID: 160-36526-12
Date Collected: 11/21/19 15:30
Matrix: Solid
Date Received: 11/26/19 09:15
Percent Solids: 95.7

Prep Type	Batch Type	Batch Method	Run	Dilution Factor	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Prep	3050B			452611	12/02/19 10:13	LAM	TAL SL
Total/NA	Analysis	6020A		2	453933	12/11/19 00:16	LKP	TAL SL

Client Sample ID: STSB29_6-15
Lab Sample ID: 160-36526-13
Date Collected: 11/21/19 15:45
Matrix: Solid
Date Received: 11/26/19 09:15

Prep Type	Batch Type	Batch Method	Run	Dilution Factor	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Analysis	Moisture		1	452332	11/28/19 11:12	KPP	TAL SL
Total/NA	Leach	Dry and Grind			452495	11/29/19 11:49	EJQ	TAL SL
Total/NA	Prep	Fill_Geo-21			452567	12/01/19 08:08	SJS	TAL SL
Total/NA	Analysis	901.1		1	455102	12/25/19 10:11	KLS	TAL SL

Lab Chronicle

Client: Wood E&I Solutions Inc
Project/Site: ACMS - Yerington OU-4B_OU-5_SOIL

Job ID: 160-36526-1

Client Sample ID: STSB29_6-15
Lab Sample ID: 160-36526-13
Date Collected: 11/21/19 15:45
Matrix: Solid
Date Received: 11/26/19 09:15
Percent Solids: 92.2

Prep Type	Batch Type	Batch Method	Run	Dilution Factor	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Prep	3050B			452611	12/02/19 10:13	LAM	TAL SL
Total/NA	Analysis	6020A		2	453933	12/11/19 00:43	LKP	TAL SL

Client Sample ID: STSB29-FD_6-15
Lab Sample ID: 160-36526-14
Date Collected: 11/21/19 15:50
Matrix: Solid
Date Received: 11/26/19 09:15

Prep Type	Batch Type	Batch Method	Run	Dilution Factor	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Analysis	Moisture		1	452332	11/28/19 11:12	KPP	TAL SL
Total/NA	Leach	Dry and Grind			452495	11/29/19 11:49	EJQ	TAL SL
Total/NA	Prep	Fill_Geo-21			452567	12/01/19 08:08	SJS	TAL SL
Total/NA	Analysis	901.1		1	455098	12/25/19 10:11	KLS	TAL SL

Client Sample ID: STSB29-FD_6-15
Lab Sample ID: 160-36526-14
Date Collected: 11/21/19 15:50
Matrix: Solid
Date Received: 11/26/19 09:15
Percent Solids: 90.1

Prep Type	Batch Type	Batch Method	Run	Dilution Factor	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Prep	3050B			452611	12/02/19 10:13	LAM	TAL SL
Total/NA	Analysis	6020A		2	453933	12/11/19 00:50	LKP	TAL SL

Client Sample ID: STSB30_0-0.5
Lab Sample ID: 160-36526-15
Date Collected: 11/22/19 08:55
Matrix: Solid
Date Received: 11/26/19 09:15

Prep Type	Batch Type	Batch Method	Run	Dilution Factor	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Analysis	Moisture		1	452332	11/28/19 11:12	KPP	TAL SL
Total/NA	Leach	Dry and Grind			452495	11/29/19 11:49	EJQ	TAL SL
Total/NA	Prep	Fill_Geo-21			452567	12/01/19 08:08	SJS	TAL SL
Total/NA	Analysis	901.1		1	455099	12/25/19 10:12	KLS	TAL SL

Client Sample ID: STSB30_0-0.5
Lab Sample ID: 160-36526-15
Date Collected: 11/22/19 08:55
Matrix: Solid
Date Received: 11/26/19 09:15
Percent Solids: 94.8

Prep Type	Batch Type	Batch Method	Run	Dilution Factor	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Prep	3050B			452611	12/02/19 10:13	LAM	TAL SL
Total/NA	Analysis	6020A		2	453933	12/11/19 00:57	LKP	TAL SL

Client Sample ID: STSB30_0.5-3
Lab Sample ID: 160-36526-16
Date Collected: 11/22/19 09:02
Matrix: Solid
Date Received: 11/26/19 09:15

Prep Type	Batch Type	Batch Method	Run	Dilution Factor	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Analysis	Moisture		1	452332	11/28/19 11:12	KPP	TAL SL

Lab Chronicle

Client: Wood E&I Solutions Inc
Project/Site: ACMS - Yerington OU-4B_OU-5_SOIL

Job ID: 160-36526-1

Client Sample ID: STSB30_0.5-3
Lab Sample ID: 160-36526-16
Date Collected: 11/22/19 09:02
Matrix: Solid
Date Received: 11/26/19 09:15

Prep Type	Batch Type	Batch Method	Run	Dilution Factor	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Leach	Dry and Grind			452495	11/29/19 11:49	EJQ	TAL SL
Total/NA	Prep	Fill_Geo-21			452567	12/01/19 08:08	SJS	TAL SL
Total/NA	Analysis	901.1		1	455100	12/25/19 10:13	KLS	TAL SL

Client Sample ID: STSB30_0.5-3
Lab Sample ID: 160-36526-16
Date Collected: 11/22/19 09:02
Matrix: Solid
Date Received: 11/26/19 09:15
Percent Solids: 94.8

Prep Type	Batch Type	Batch Method	Run	Dilution Factor	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Prep	3050B			452611	12/02/19 10:13	LAM	TAL SL
Total/NA	Analysis	6020A		2	453933	12/11/19 01:03	LKP	TAL SL

Client Sample ID: STSB30_3-6
Lab Sample ID: 160-36526-17
Date Collected: 11/22/19 09:10
Matrix: Solid
Date Received: 11/26/19 09:15

Prep Type	Batch Type	Batch Method	Run	Dilution Factor	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Analysis	Moisture		1	452332	11/28/19 11:12	KPP	TAL SL
Total/NA	Leach	Dry and Grind			452495	11/29/19 11:49	EJQ	TAL SL
Total/NA	Prep	Fill_Geo-21			452567	12/01/19 08:08	SJS	TAL SL
Total/NA	Analysis	901.1		1	455104	12/25/19 10:14	KLS	TAL SL

Client Sample ID: STSB30_3-6
Lab Sample ID: 160-36526-17
Date Collected: 11/22/19 09:10
Matrix: Solid
Date Received: 11/26/19 09:15
Percent Solids: 95.5

Prep Type	Batch Type	Batch Method	Run	Dilution Factor	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Prep	3050B			452611	12/02/19 10:13	LAM	TAL SL
Total/NA	Analysis	6020A		2	453933	12/11/19 01:10	LKP	TAL SL

Client Sample ID: STSB30_6-15
Lab Sample ID: 160-36526-18
Date Collected: 11/22/19 09:25
Matrix: Solid
Date Received: 11/26/19 09:15

Prep Type	Batch Type	Batch Method	Run	Dilution Factor	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Analysis	Moisture		1	452332	11/28/19 11:12	KPP	TAL SL
Total/NA	Leach	Dry and Grind			452495	11/29/19 11:49	EJQ	TAL SL
Total/NA	Prep	Fill_Geo-21			452567	12/01/19 08:08	SJS	TAL SL
Total/NA	Analysis	901.1		1	455101	12/25/19 10:42	KLS	TAL SL

Lab Chronicle

Client: Wood E&I Solutions Inc
Project/Site: ACMS - Yerington OU-4B_OU-5_SOIL

Job ID: 160-36526-1

Client Sample ID: STSB30_6-15
Lab Sample ID: 160-36526-18
Date Collected: 11/22/19 09:25
Matrix: Solid
Date Received: 11/26/19 09:15
Percent Solids: 83.8

Prep Type	Batch Type	Batch Method	Run	Dilution Factor	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Prep	3050B			452611	12/02/19 10:13	LAM	TAL SL
Total/NA	Analysis	6020A		2	453933	12/11/19 01:17	LKP	TAL SL

Client Sample ID: STSB31_0-0.5
Lab Sample ID: 160-36526-19
Date Collected: 11/22/19 11:56
Matrix: Solid
Date Received: 11/26/19 09:15

Prep Type	Batch Type	Batch Method	Run	Dilution Factor	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Analysis	Moisture		1	452332	11/28/19 11:12	KPP	TAL SL
Total/NA	Leach	Dry and Grind			452495	11/29/19 11:49	EJQ	TAL SL
Total/NA	Prep	Fill_Geo-21			452567	12/01/19 08:08	SJS	TAL SL
Total/NA	Analysis	901.1		1	455102	12/25/19 10:43	KLS	TAL SL

Client Sample ID: STSB31_0-0.5
Lab Sample ID: 160-36526-19
Date Collected: 11/22/19 11:56
Matrix: Solid
Date Received: 11/26/19 09:15
Percent Solids: 92.2

Prep Type	Batch Type	Batch Method	Run	Dilution Factor	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Prep	3050B			452611	12/02/19 10:13	LAM	TAL SL
Total/NA	Analysis	6020A		2	453933	12/11/19 01:23	LKP	TAL SL

Client Sample ID: STSB31_0.5-3
Lab Sample ID: 160-36526-20
Date Collected: 11/22/19 12:03
Matrix: Solid
Date Received: 11/26/19 09:15

Prep Type	Batch Type	Batch Method	Run	Dilution Factor	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Analysis	Moisture		1	452332	11/28/19 11:12	KPP	TAL SL
Total/NA	Leach	Dry and Grind			452495	11/29/19 11:49	EJQ	TAL SL
Total/NA	Prep	Fill_Geo-21			452567	12/01/19 08:08	SJS	TAL SL
Total/NA	Analysis	901.1		1	455098	12/25/19 10:43	KLS	TAL SL

Client Sample ID: STSB31_0.5-3
Lab Sample ID: 160-36526-20
Date Collected: 11/22/19 12:03
Matrix: Solid
Date Received: 11/26/19 09:15
Percent Solids: 94.4

Prep Type	Batch Type	Batch Method	Run	Dilution Factor	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Prep	3050B			452612	12/02/19 10:16	LAM	TAL SL
Total/NA	Analysis	6020A		2	453935	12/11/19 04:12	LKP	TAL SL

Client Sample ID: STSB31_3-6
Lab Sample ID: 160-36526-21
Date Collected: 11/22/19 12:10
Matrix: Solid
Date Received: 11/26/19 09:15

Prep Type	Batch Type	Batch Method	Run	Dilution Factor	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Analysis	Moisture		1	452334	11/28/19 12:00	KPP	TAL SL

Lab Chronicle

Client: Wood E&I Solutions Inc
Project/Site: ACMS - Yerington OU-4B_OU-5_SOIL

Job ID: 160-36526-1

Client Sample ID: STSB31_3-6
Lab Sample ID: 160-36526-21
Date Collected: 11/22/19 12:10
Matrix: Solid
Date Received: 11/26/19 09:15

Prep Type	Batch Type	Batch Method	Run	Dilution Factor	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Leach	Dry and Grind			452495	11/29/19 11:49	EJQ	TAL SL
Total/NA	Prep	Fill_Geo-21			452568	12/01/19 10:17	SJS	TAL SL
Total/NA	Analysis	901.1		1	455104	12/25/19 10:46	KLS	TAL SL

Client Sample ID: STSB31_3-6
Lab Sample ID: 160-36526-21
Date Collected: 11/22/19 12:10
Matrix: Solid
Date Received: 11/26/19 09:15
Percent Solids: 94.1

Prep Type	Batch Type	Batch Method	Run	Dilution Factor	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Prep	3050B			452612	12/02/19 10:16	LAM	TAL SL
Total/NA	Analysis	6020A		2	453935	12/11/19 04:59	LKP	TAL SL

Client Sample ID: STSB31_6-15
Lab Sample ID: 160-36526-22
Date Collected: 11/22/19 12:20
Matrix: Solid
Date Received: 11/26/19 09:15

Prep Type	Batch Type	Batch Method	Run	Dilution Factor	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Analysis	Moisture		1	452334	11/28/19 12:00	KPP	TAL SL
Total/NA	Leach	Dry and Grind			452495	11/29/19 11:49	EJQ	TAL SL
Total/NA	Prep	Fill_Geo-21			452568	12/01/19 10:17	SJS	TAL SL
Total/NA	Analysis	901.1		1	455102	12/25/19 11:23	KLS	TAL SL

Client Sample ID: STSB31_6-15
Lab Sample ID: 160-36526-22
Date Collected: 11/22/19 12:20
Matrix: Solid
Date Received: 11/26/19 09:15
Percent Solids: 94.7

Prep Type	Batch Type	Batch Method	Run	Dilution Factor	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Prep	3050B			452612	12/02/19 10:16	LAM	TAL SL
Total/NA	Analysis	6020A		2	453935	12/11/19 05:06	LKP	TAL SL

Laboratory References:
TAL SL = Eurofins TestAmerica, St. Louis, 13715 Rider Trail North, Earth City, MO 63045, TEL (314)298-8566

COVER PAGE
METALS

Lab Name: Eurofins TestAmerica, St. Louis Job Number: 160-36526-1

SDG No.:

Project: ACMS - Yerington OU-4B_OU-5_SOIL

Client Sample ID	Lab Sample ID
STSB27_0-0.5	160-36526-1
STSB27_0.5-3	160-36526-2
STSB27_3-6	160-36526-3
STSB27_6-15	160-36526-4
STSB28_0-0.5	160-36526-5
STSB28-FD_0-0.5	160-36526-6
STSB28_0.5-3	160-36526-7
STSB28_3-6	160-36526-8
STSB28_6-15	160-36526-9
STSB29_0-0.5	160-36526-10
STSB29_0.5-3	160-36526-11
STSB29_3-6	160-36526-12
STSB29_6-15	160-36526-13
STSB29-FD_6-15	160-36526-14
STSB30_0-0.5	160-36526-15
STSB30_0.5-3	160-36526-16
STSB30_3-6	160-36526-17
STSB30_6-15	160-36526-18
STSB31_0-0.5	160-36526-19
STSB31_0.5-3	160-36526-20
STSB31_3-6	160-36526-21
STSB31_6-15	160-36526-22

Comments:

1A-IN
INORGANIC ANALYSIS DATA SHEET
METALS

Client Sample ID: STSB27_0-0.5

Lab Sample ID: 160-36526-1

Lab Name: Eurofins TestAmerica, St. Louis

Job No.: 160-36526-1

SDG ID.:

Matrix: Solid

Date Sampled: 11/21/2019 09:15

Reporting Basis: DRY

Date Received: 11/26/2019 09:15

% Solids: 98.5

CAS No.	Analyte	Result	RL	MDL	Units	C	Q	DIL	Method
7440-29-1	Thorium	3.1	0.19	0.084	mg/Kg			2	6020A
7440-61-1	Uranium	1.6	0.093	0.037	mg/Kg			2	6020A

1A-IN
INORGANIC ANALYSIS DATA SHEET
METALS

Client Sample ID: STSB27_0.5-3

Lab Sample ID: 160-36526-2

Lab Name: Eurofins TestAmerica, St. Louis

Job No.: 160-36526-1

SDG ID.:

Matrix: Solid

Date Sampled: 11/21/2019 09:25

Reporting Basis: DRY

Date Received: 11/26/2019 09:15

% Solids: 96.7

CAS No.	Analyte	Result	RL	MDL	Units	C	Q	DIL	Method
7440-29-1	Thorium	3.3	0.20	0.089	mg/Kg			2	6020A
7440-61-1	Uranium	1.2	0.099	0.039	mg/Kg			2	6020A

1A-IN
INORGANIC ANALYSIS DATA SHEET
METALS

Client Sample ID: STSB27_3-6

Lab Sample ID: 160-36526-3

Lab Name: Eurofins TestAmerica, St. Louis

Job No.: 160-36526-1

SDG ID.:

Matrix: Solid

Date Sampled: 11/21/2019 09:31

Reporting Basis: DRY

Date Received: 11/26/2019 09:15

% Solids: 95.5

CAS No.	Analyte	Result	RL	MDL	Units	C	Q	DIL	Method
7440-29-1	Thorium	2.8	0.19	0.088	mg/Kg			2	6020A
7440-61-1	Uranium	1.0	0.097	0.039	mg/Kg			2	6020A

1A-IN
INORGANIC ANALYSIS DATA SHEET
METALS

Client Sample ID: STSB27_6-15

Lab Sample ID: 160-36526-4

Lab Name: Eurofins TestAmerica, St. Louis

Job No.: 160-36526-1

SDG ID.:

Matrix: Solid

Date Sampled: 11/21/2019 09:55

Reporting Basis: DRY

Date Received: 11/26/2019 09:15

% Solids: 91.5

CAS No.	Analyte	Result	RL	MDL	Units	C	Q	DIL	Method
7440-29-1	Thorium	7.4	0.20	0.090	mg/Kg			2	6020A
7440-61-1	Uranium	1.9	0.10	0.040	mg/Kg			2	6020A

1A-IN
INORGANIC ANALYSIS DATA SHEET
METALS

Client Sample ID: STSB28_0-0.5

Lab Sample ID: 160-36526-5

Lab Name: Eurofins TestAmerica, St. Louis

Job No.: 160-36526-1

SDG ID.:

Matrix: Solid

Date Sampled: 11/21/2019 11:45

Reporting Basis: DRY

Date Received: 11/26/2019 09:15

% Solids: 94.9

CAS No.	Analyte	Result	RL	MDL	Units	C	Q	DIL	Method
7440-29-1	Thorium	3.5	0.18	0.081	mg/Kg			2	6020A
7440-61-1	Uranium	4.2	0.090	0.036	mg/Kg			2	6020A

1A-IN
INORGANIC ANALYSIS DATA SHEET
METALS

Client Sample ID: STSB28-FD_0-0.5

Lab Sample ID: 160-36526-6

Lab Name: Eurofins TestAmerica, St. Louis

Job No.: 160-36526-1

SDG ID.:

Matrix: Solid

Date Sampled: 11/21/2019 11:50

Reporting Basis: DRY

Date Received: 11/26/2019 09:15

% Solids: 94.8

CAS No.	Analyte	Result	RL	MDL	Units	C	Q	DIL	Method
7440-29-1	Thorium	4.0	0.20	0.090	mg/Kg			2	6020A
7440-61-1	Uranium	2.6	0.10	0.040	mg/Kg			2	6020A

1A-IN
INORGANIC ANALYSIS DATA SHEET
METALS

Client Sample ID: STSB28_0.5-3

Lab Sample ID: 160-36526-7

Lab Name: Eurofins TestAmerica, St. Louis

Job No.: 160-36526-1

SDG ID.:

Matrix: Solid

Date Sampled: 11/21/2019 11:55

Reporting Basis: DRY

Date Received: 11/26/2019 09:15

% Solids: 95.5

CAS No.	Analyte	Result	RL	MDL	Units	C	Q	DIL	Method
7440-29-1	Thorium	3.8	0.19	0.087	mg/Kg			2	6020A
7440-61-1	Uranium	1.3	0.097	0.039	mg/Kg			2	6020A

1A-IN
INORGANIC ANALYSIS DATA SHEET
METALS

Client Sample ID: STSB28_3-6

Lab Sample ID: 160-36526-8

Lab Name: Eurofins TestAmerica, St. Louis

Job No.: 160-36526-1

SDG ID.:

Matrix: Solid

Date Sampled: 11/21/2019 12:15

Reporting Basis: DRY

Date Received: 11/26/2019 09:15

% Solids: 95.3

CAS No.	Analyte	Result	RL	MDL	Units	C	Q	DIL	Method
7440-29-1	Thorium	4.2	0.19	0.085	mg/Kg			2	6020A
7440-61-1	Uranium	1.3	0.095	0.038	mg/Kg			2	6020A

1A-IN
INORGANIC ANALYSIS DATA SHEET
METALS

Client Sample ID: STSB28_6-15

Lab Sample ID: 160-36526-9

Lab Name: Eurofins TestAmerica, St. Louis

Job No.: 160-36526-1

SDG ID.:

Matrix: Solid

Date Sampled: 11/21/2019 12:25

Reporting Basis: DRY

Date Received: 11/26/2019 09:15

% Solids: 83.1

CAS No.	Analyte	Result	RL	MDL	Units	C	Q	DIL	Method
7440-29-1	Thorium	8.1	0.23	0.10	mg/Kg			2	6020A
7440-61-1	Uranium	2.3	0.11	0.046	mg/Kg			2	6020A

1A-IN
INORGANIC ANALYSIS DATA SHEET
METALS

Client Sample ID: STSB29_0-0.5

Lab Sample ID: 160-36526-10

Lab Name: Eurofins TestAmerica, St. Louis

Job No.: 160-36526-1

SDG ID.:

Matrix: Solid

Date Sampled: 11/21/2019 15:00

Reporting Basis: DRY

Date Received: 11/26/2019 09:15

% Solids: 95.5

CAS No.	Analyte	Result	RL	MDL	Units	C	Q	DIL	Method
7440-29-1	Thorium	4.7	0.19	0.087	mg/Kg			2	6020A
7440-61-1	Uranium	0.74	0.096	0.038	mg/Kg			2	6020A

1A-IN
INORGANIC ANALYSIS DATA SHEET
METALS

Client Sample ID: STSB29_0.5-3

Lab Sample ID: 160-36526-11

Lab Name: Eurofins TestAmerica, St. Louis

Job No.: 160-36526-1

SDG ID.:

Matrix: Solid

Date Sampled: 11/21/2019 15:10

Reporting Basis: DRY

Date Received: 11/26/2019 09:15

% Solids: 95.4

CAS No.	Analyte	Result	RL	MDL	Units	C	Q	DIL	Method
7440-29-1	Thorium	2.9	0.18	0.081	mg/Kg			2	6020A
7440-61-1	Uranium	0.85	0.090	0.036	mg/Kg			2	6020A

1A-IN
INORGANIC ANALYSIS DATA SHEET
METALS

Client Sample ID: STSB29_3-6

Lab Sample ID: 160-36526-12

Lab Name: Eurofins TestAmerica, St. Louis

Job No.: 160-36526-1

SDG ID.:

Matrix: Solid

Date Sampled: 11/21/2019 15:30

Reporting Basis: DRY

Date Received: 11/26/2019 09:15

% Solids: 95.7

CAS No.	Analyte	Result	RL	MDL	Units	C	Q	DIL	Method
7440-29-1	Thorium	7.1	0.19	0.085	mg/Kg			2	6020A
7440-61-1	Uranium	1.4	0.094	0.038	mg/Kg			2	6020A

1A-IN
INORGANIC ANALYSIS DATA SHEET
METALS

Client Sample ID: STSB29_6-15

Lab Sample ID: 160-36526-13

Lab Name: Eurofins TestAmerica, St. Louis

Job No.: 160-36526-1

SDG ID.:

Matrix: Solid

Date Sampled: 11/21/2019 15:45

Reporting Basis: DRY

Date Received: 11/26/2019 09:15

% Solids: 92.2

CAS No.	Analyte	Result	RL	MDL	Units	C	Q	DIL	Method
7440-29-1	Thorium	7.4	0.21	0.094	mg/Kg			2	6020A
7440-61-1	Uranium	1.9	0.10	0.042	mg/Kg			2	6020A

1A-IN
INORGANIC ANALYSIS DATA SHEET
METALS

Client Sample ID: STSB29-FD_6-15

Lab Sample ID: 160-36526-14

Lab Name: Eurofins TestAmerica, St. Louis

Job No.: 160-36526-1

SDG ID.:

Matrix: Solid

Date Sampled: 11/21/2019 15:50

Reporting Basis: DRY

Date Received: 11/26/2019 09:15

% Solids: 90.1

CAS No.	Analyte	Result	RL	MDL	Units	C	Q	DIL	Method
7440-29-1	Thorium	7.8	0.20	0.089	mg/Kg			2	6020A
7440-61-1	Uranium	2.1	0.099	0.039	mg/Kg			2	6020A

1A-IN
INORGANIC ANALYSIS DATA SHEET
METALS

Client Sample ID: STSB30_0-0.5

Lab Sample ID: 160-36526-15

Lab Name: Eurofins TestAmerica, St. Louis

Job No.: 160-36526-1

SDG ID.:

Matrix: Solid

Date Sampled: 11/22/2019 08:55

Reporting Basis: DRY

Date Received: 11/26/2019 09:15

% Solids: 94.8

CAS No.	Analyte	Result	RL	MDL	Units	C	Q	DIL	Method
7440-29-1	Thorium	1.9	0.20	0.091	mg/Kg			2	6020A
7440-61-1	Uranium	1.4	0.10	0.040	mg/Kg			2	6020A

1A-IN
INORGANIC ANALYSIS DATA SHEET
METALS

Client Sample ID: STSB30_0.5-3

Lab Sample ID: 160-36526-16

Lab Name: Eurofins TestAmerica, St. Louis

Job No.: 160-36526-1

SDG ID.:

Matrix: Solid

Date Sampled: 11/22/2019 09:02

Reporting Basis: DRY

Date Received: 11/26/2019 09:15

% Solids: 94.8

CAS No.	Analyte	Result	RL	MDL	Units	C	Q	DIL	Method
7440-29-1	Thorium	2.7	0.18	0.082	mg/Kg			2	6020A
7440-61-1	Uranium	0.82	0.091	0.036	mg/Kg			2	6020A

1A-IN
INORGANIC ANALYSIS DATA SHEET
METALS

Client Sample ID: STSB30_3-6

Lab Sample ID: 160-36526-17

Lab Name: Eurofins TestAmerica, St. Louis

Job No.: 160-36526-1

SDG ID.:

Matrix: Solid

Date Sampled: 11/22/2019 09:10

Reporting Basis: DRY

Date Received: 11/26/2019 09:15

% Solids: 95.5

CAS No.	Analyte	Result	RL	MDL	Units	C	Q	DIL	Method
7440-29-1	Thorium	2.8	0.19	0.084	mg/Kg			2	6020A
7440-61-1	Uranium	0.72	0.093	0.037	mg/Kg			2	6020A

1A-IN
INORGANIC ANALYSIS DATA SHEET
METALS

Client Sample ID: STSB30_6-15

Lab Sample ID: 160-36526-18

Lab Name: Eurofins TestAmerica, St. Louis

Job No.: 160-36526-1

SDG ID.:

Matrix: Solid

Date Sampled: 11/22/2019 09:25

Reporting Basis: DRY

Date Received: 11/26/2019 09:15

% Solids: 83.8

CAS No.	Analyte	Result	RL	MDL	Units	C	Q	DIL	Method
7440-29-1	Thorium	12	0.22	0.10	mg/Kg			2	6020A
7440-61-1	Uranium	2.6	0.11	0.045	mg/Kg			2	6020A

1A-IN
INORGANIC ANALYSIS DATA SHEET
METALS

Client Sample ID: STSB31_0-0.5

Lab Sample ID: 160-36526-19

Lab Name: Eurofins TestAmerica, St. Louis

Job No.: 160-36526-1

SDG ID.:

Matrix: Solid

Date Sampled: 11/22/2019 11:56

Reporting Basis: DRY

Date Received: 11/26/2019 09:15

% Solids: 92.2

CAS No.	Analyte	Result	RL	MDL	Units	C	Q	DIL	Method
7440-29-1	Thorium	5.0	0.19	0.084	mg/Kg			2	6020A
7440-61-1	Uranium	3.1	0.093	0.037	mg/Kg			2	6020A

1A-IN
INORGANIC ANALYSIS DATA SHEET
METALS

Client Sample ID: STSB31_0.5-3

Lab Sample ID: 160-36526-20

Lab Name: Eurofins TestAmerica, St. Louis

Job No.: 160-36526-1

SDG ID.:

Matrix: Solid

Date Sampled: 11/22/2019 12:03

Reporting Basis: DRY

Date Received: 11/26/2019 09:15

% Solids: 94.4

CAS No.	Analyte	Result	RL	MDL	Units	C	Q	DIL	Method
7440-29-1	Thorium	5.0	0.19	0.085	mg/Kg			2	6020A
7440-61-1	Uranium	1.4	0.095	0.038	mg/Kg			2	6020A

1A-IN
INORGANIC ANALYSIS DATA SHEET
METALS

Client Sample ID: STSB31_3-6

Lab Sample ID: 160-36526-21

Lab Name: Eurofins TestAmerica, St. Louis

Job No.: 160-36526-1

SDG ID.:

Matrix: Solid

Date Sampled: 11/22/2019 12:10

Reporting Basis: DRY

Date Received: 11/26/2019 09:15

% Solids: 94.1

CAS No.	Analyte	Result	RL	MDL	Units	C	Q	DIL	Method
7440-29-1	Thorium	4.8	0.20	0.089	mg/Kg			2	6020A
7440-61-1	Uranium	1.7	0.099	0.040	mg/Kg			2	6020A

1A-IN
INORGANIC ANALYSIS DATA SHEET
METALS

Client Sample ID: STSB31_6-15

Lab Sample ID: 160-36526-22

Lab Name: Eurofins TestAmerica, St. Louis

Job No.: 160-36526-1

SDG ID.:

Matrix: Solid

Date Sampled: 11/22/2019 12:20

Reporting Basis: DRY

Date Received: 11/26/2019 09:15

% Solids: 94.7

CAS No.	Analyte	Result	RL	MDL	Units	C	Q	DIL	Method
7440-29-1	Thorium	6.4	0.18	0.081	mg/Kg			2	6020A
7440-61-1	Uranium	4.0	0.090	0.036	mg/Kg			2	6020A

2A-IN
CALIBRATION VERIFICATIONS
METALS

Lab Name: Eurofins TestAmerica, St. Louis Job No.: 160-36526-1

SDG No.:

ICV Source: MS A ICV_01071 Concentration Units: ug/L

CCV Source: MS A CAL1 LLC_00418

Analyte	ICV 160-453933/5 12/10/2019 16:24				CCVL 160-453933/50 12/10/2019 21:28				CCVL 160-453933/63 12/10/2019 22:55			
	Found	C	True	%R	Found	C	True	%R	Found	C	True	%R
Thorium	99.7		100	100	1.68	J	2.00	84	1.77	J	2.00	89
Uranium	101		100	101	0.871	J	1.00	87	0.896	J	1.00	90

Note! Calculations are performed before rounding to avoid round-off errors in calculated results.
Italicized analytes were not requested for this sequence.

2A-IN
CALIBRATION VERIFICATIONS
METALS

Lab Name: Eurofins TestAmerica, St. Louis Job No.: 160-36526-1

SDG No.:

ICV Source: MS A ICV_01071 Concentration Units: ug/L

CCV Source: MS A CAL1 LLC_00418

Analyte	CCVL 160-453933/76 12/11/2019 00:23				CCVL 160-453933/86 12/11/2019 01:30							
	Found	C	True	%R	Found	C	True	%R	Found	C	True	%R
Thorium	1.83	J	2.00	91	1.76	J	2.00	88				
Uranium	0.903	J	1.00	90	0.883	J	1.00	88				

Note! Calculations are performed before rounding to avoid round-off errors in calculated results.
Italicized analytes were not requested for this sequence.

2A-IN
CALIBRATION VERIFICATIONS
METALS

Lab Name: Eurofins TestAmerica, St. Louis Job No.: 160-36526-1

SDG No.:

ICV Source: MS A ICV_01071 Concentration Units: ug/L

CCV Source: MS A CAL2 CCV_00375

Analyte	ICV 160-453933/5 12/10/2019 16:24				CCV 160-453933/51 12/10/2019 21:34				CCV 160-453933/64 12/10/2019 23:02			
	Found	C	True	%R	Found	C	True	%R	Found	C	True	%R
Thorium	99.7		100	100	97.6		100	98	96.4		100	96
Uranium	101		100	101	97.3		100	97	96.3		100	96

Note! Calculations are performed before rounding to avoid round-off errors in calculated results.
Italicized analytes were not requested for this sequence.

2A-IN
CALIBRATION VERIFICATIONS
METALS

Lab Name: Eurofins TestAmerica, St. Louis Job No.: 160-36526-1

SDG No.:

ICV Source: MS A ICV_01071 Concentration Units: ug/L

CCV Source: MS A CAL2 CCV_00375

Analyte	CCV 160-453933/77 12/11/2019 00:30				CCV 160-453933/87 12/11/2019 01:37							
	Found	C	True	%R	Found	C	True	%R	Found	C	True	%R
Thorium	97.3		100	97	96.4		100	96				
Uranium	97.2		100	97	95.7		100	96				

Note! Calculations are performed before rounding to avoid round-off errors in calculated results.
Italicized analytes were not requested for this sequence.

2A-IN
CALIBRATION VERIFICATIONS
METALS

Lab Name: Eurofins TestAmerica, St. Louis Job No.: 160-36526-1

SDG No.:

ICV Source: MS A ICV_01071 Concentration Units: ug/L

CCV Source: MS A CAL1 LLC_00418

Analyte	ICV 160-453935/7 12/11/2019 02:24				CCVL 160-453935/24 12/11/2019 04:19				CCVL 160-453935/37 12/11/2019 05:46			
	Found	C	True	%R	Found	C	True	%R	Found	C	True	%R
Thorium	99.5		100	100	1.88	J	2.00	94	1.86	J	2.00	93
Uranium	101		100	101	0.944	J	1.00	94	0.961	J	1.00	96

Note! Calculations are performed before rounding to avoid round-off errors in calculated results.
Italicized analytes were not requested for this sequence.

2A-IN
CALIBRATION VERIFICATIONS
METALS

Lab Name: Eurofins TestAmerica, St. Louis Job No.: 160-36526-1

SDG No.:

ICV Source: MS A ICV_01071 Concentration Units: ug/L

CCV Source: MS A CAL2 CCV_00375

Analyte	ICV 160-453935/7 12/11/2019 02:24				CCV 160-453935/12 12/11/2019 02:58				CCV 160-453935/25 12/11/2019 04:25			
	Found	C	True	%R	Found	C	True	%R	Found	C	True	%R
Thorium	99.5		100	100	97.4		100	97	98.7		100	99
Uranium	101		100	101	98.5		100	99	99.5		100	100

Note! Calculations are performed before rounding to avoid round-off errors in calculated results.
Italicized analytes were not requested for this sequence.

2A-IN
CALIBRATION VERIFICATIONS
METALS

Lab Name: Eurofins TestAmerica, St. Louis Job No.: 160-36526-1

SDG No.:

ICV Source: MS A ICV_01071 Concentration Units: ug/L

CCV Source: MS A CAL2 CCV_00375

Analyte	CCV 160-453935/38 12/11/2019 05:53											
	Found	C	True	%R	Found	C	True	%R	Found	C	True	%R
Thorium	99.2		100	99								
Uranium	99.4		100	99								

Note! Calculations are performed before rounding to avoid round-off errors in calculated results.
Italicized analytes were not requested for this sequence.

2B-IN
CRQL CHECK STANDARD
METALS

Lab Name: Eurofins TestAmerica, St. Louis Job No.: 160-36526-1

SDG No.:

Method: 6020A Instrument ID: ICPMS7700

Lab Sample ID: CRI 160-453933/7 Concentration Units: ug/L

CRQL Check Standard Source: MS A CAL1 LLC_00418

Analyte	CRQL Check Standard				
	True	Found	Qualifiers	%R(1)	Limits
Thorium	2.00	1.79	J	90	70-130
Uranium	1.00	0.881	J	88	70-130

Lab Sample ID: CRI 160-453935/9 Concentration Units: ug/L

CRQL Check Standard Source: MS A CAL1 LLC_00418

Analyte	CRQL Check Standard				
	True	Found	Qualifiers	%R(1)	Limits
Thorium	2.00	1.84	J	92	70-130
Uranium	1.00	0.930	J	93	70-130

Note! Calculations are performed before rounding to avoid round-off errors in calculated results.

FORM IIB-IN

3-IN
INSTRUMENT BLANKS
METALS

Lab Name: Eurofins TestAmerica, St. Louis Job No.: 160-36526-1

SDG No.:

Concentration Units: ug/L

Analyte	RL	ICB 160-453933/6 12/10/2019 16:31		CCB 160-453933/52 12/10/2019 21:41		CCB 160-453933/65 12/10/2019 23:09		CCB 160-453933/78 12/11/2019 00:36	
		Found	C	Found	C	Found	C	Found	C
Thorium	2.0	ND		ND		ND		ND	
Uranium	1.0	ND		ND		ND		ND	

Italicized analytes were not requested for this sequence.

3-IN
INSTRUMENT BLANKS
METALS

Lab Name: Eurofins TestAmerica, St. Louis Job No.: 160-36526-1

SDG No.:

Concentration Units: ug/L

Analyte	RL	CCB 160-453933/88 12/11/2019 01:44							
		Found	C	Found	C	Found	C	Found	C
Thorium	2.0	ND							
Uranium	1.0	ND							

Italicized analytes were not requested for this sequence.

3-IN
INSTRUMENT BLANKS
METALS

Lab Name: Eurofins TestAmerica, St. Louis Job No.: 160-36526-1

SDG No.:

Concentration Units: ug/L

Analyte	RL	ICB 160-453935/8 12/11/2019 02:31		CCB 160-453935/13 12/11/2019 03:05		CCB 160-453935/26 12/11/2019 04:32		CCB 160-453935/39 12/11/2019 06:00	
		Found	C	Found	C	Found	C	Found	C
Thorium	2.0	ND		ND		ND		ND	
Uranium	1.0	ND		ND		ND		ND	

Italicized analytes were not requested for this sequence.

3-IN
METHOD BLANK
METALS

Lab Name: Eurofins TestAmerica, St. Louis Job No.: 160-36526-1

SDG No.:

Concentration Units: mg/Kg Lab Sample ID: MB 160-452611/1-A

Instrument Code: ICPMS7700 Batch No.: 453933

CAS No.	Analyte	Concentration	C	Q	Method
7440-29-1	Thorium	ND			6020A
7440-61-1	Uranium	ND			6020A

FORM III-IN

3-IN
METHOD BLANK
METALS

Lab Name: Eurofins TestAmerica, St. Louis Job No.: 160-36526-1

SDG No.:

Concentration Units: mg/Kg Lab Sample ID: MB 160-452612/1-A

Instrument Code: ICPMS7700 Batch No.: 453935

CAS No.	Analyte	Concentration	C	Q	Method
7440-29-1	Thorium	ND			6020A
7440-61-1	Uranium	ND			6020A

FORM III-IN

4A-IN
INTERFERENCE CHECK STANDARD
METALS

Lab Name: Eurofins TestAmerica, St. Louis Job No.: 160-36526-1

SDG No.:

Lab Sample ID: ICSA 160-453933/8 Instrument ID: ICPMS7700

Lab File ID: 010ICSA.D ICS Source: MS A ICSA_00326

Concentration Units: ug/L

Analyte	True Solution A	Found Solution A	Percent Recovery
Thorium		**0.0710**	
Uranium		**0.0130**	
Aluminum	*100000*	*105486*	*105*

Calculations are performed before rounding to avoid round-off errors in calculated results.

FORM IVA-IN

4A-IN
INTERFERENCE CHECK STANDARD
METALS

Lab Name: Eurofins TestAmerica, St. Louis Job No.: 160-36526-1

SDG No.:

Lab Sample ID: ICSAB 160-453933/9 Instrument ID: ICPMS7700

Lab File ID: 011ICSB.D ICS Source: MS A ICSAB_00338

Concentration Units: ug/L

Analyte	True Solution AB	Found Solution AB	Percent Recovery
Thorium	**50.0**	**52.9**	**106**
Uranium	**50.0**	**53.4**	**107**

Calculations are performed before rounding to avoid round-off errors in calculated results.

FORM IVA-IN

4A-IN
INTERFERENCE CHECK STANDARD
METALS

Lab Name: Eurofins TestAmerica, St. Louis Job No.: 160-36526-1

SDG No.:

Lab Sample ID: ICSA 160-453935/10 Instrument ID: ICPMS7700

Lab File ID: 099ICSA.D ICS Source: MS A ICSA_00326

Concentration Units: ug/L

Analyte	True Solution A	Found Solution A	Percent Recovery
Thorium		**0.0670**	
Uranium		**0.0120**	
Aluminum	*100000*	*104487*	*104*

Calculations are performed before rounding to avoid round-off errors in calculated results.

FORM IVA-IN

4A-IN
INTERFERENCE CHECK STANDARD
METALS

Lab Name: Eurofins TestAmerica, St. Louis Job No.: 160-36526-1

SDG No.:

Lab Sample ID: ICSAB 160-453935/11 Instrument ID: ICPMS7700

Lab File ID: 100ICSB.D ICS Source: MS A ICSAB_00338

Concentration Units: ug/L

Analyte	True Solution AB	Found Solution AB	Percent Recovery
Thorium	50.0	54.2	108
Uranium	50.0	54.4	109

Calculations are performed before rounding to avoid round-off errors in calculated results.

FORM IVA-IN

5A-IN
MATRIX SPIKE SAMPLE RECOVERY
METALS

Client ID: STSB29_0.5-3 MS

Lab ID: 160-36526-11 MS

Lab Name: Eurofins TestAmerica, St. Louis

Job No.: 160-36526-1

SDG No.:

Matrix: Solid

Concentration Units: mg/Kg

% Solids: 95.4

Analyte	SSR	C	Sample Result (SR)	C	Spike Added (SA)	%R	Control Limit %R	Q	Method
Thorium	93.2		2.9		91.4	99	75-125		6020A
Uranium	90.3		0.85		91.4	98	75-125		6020A

SSR = Spiked Sample Result

Calculations are performed before rounding to avoid round-off errors in calculated results.
Note - Results and Reporting Limits have been adjusted for dry weight.

FORM VA - IN

5A-IN
MATRIX SPIKE SAMPLE RECOVERY
METALS

Client ID: STSB31_0.5-3 MS

Lab ID: 160-36526-20 MS

Lab Name: Eurofins TestAmerica, St. Louis

Job No.: 160-36526-1

SDG No.:

Matrix: Solid

Concentration Units: mg/Kg

% Solids: 94.4

Analyte	SSR	C	Sample Result (SR)	C	Spike Added (SA)	%R	Control Limit %R	Q	Method
Thorium	108		5.0		104	99	75-125		6020A
Uranium	105		1.4		104	100	75-125		6020A

SSR = Spiked Sample Result

Calculations are performed before rounding to avoid round-off errors in calculated results.
Note - Results and Reporting Limits have been adjusted for dry weight.

FORM VA - IN

5A-IN
MATRIX SPIKE DUPLICATE SAMPLE RECOVERY
METALS

Client ID: STSB29_0.5-3 MSD

Lab ID: 160-36526-11 MSD

Lab Name: Eurofins TestAmerica, St. Louis

Job No.: 160-36526-1

SDG No.:

Matrix: Solid

Concentration Units: mg/Kg

% Solids: 95.4

Analyte	(SDR)	C	Spike Added (SA)	%R	Control Limit %R	RPD	RPD Limit	Q	Method
Thorium	102		96.4	103	75-125	9	30		6020A
Uranium	95.5		96.4	98	75-125	6	30		6020A

SDR = Sample Duplicate Result

Calculations are performed before rounding to avoid round-off errors in calculated results.
Note - Results and Reporting Limits have been adjusted for dry weight.

FORM VD - IN

5A-IN
MATRIX SPIKE DUPLICATE SAMPLE RECOVERY
METALS

Client ID: STSB31_0.5-3 MSD

Lab ID: 160-36526-20 MSD

Lab Name: Eurofins TestAmerica, St. Louis

Job No.: 160-36526-1

SDG No.:

Matrix: Solid

Concentration Units: mg/Kg

% Solids: 94.4

Analyte	(SDR)	C	Spike Added (SA)	%R	Control Limit %R	RPD	RPD Limit	Q	Method
Thorium	96.8		89.2	103	75-125	11	30		6020A
Uranium	93.2		89.2	103	75-125	12	30		6020A

SDR = Sample Duplicate Result

Calculations are performed before rounding to avoid round-off errors in calculated results.
Note - Results and Reporting Limits have been adjusted for dry weight.

FORM VD - IN

6-IN
DUPLICATES
METALS

Client ID: STSB29_0.5-3 DU

Lab ID: 160-36526-11 DU

Lab Name: Eurofins TestAmerica, St. Louis

Job No.: 160-36526-1

SDG No.:

% Solids for Sample: 95.4

% Solids for Duplicate: 95.4

Matrix: Solid

Concentration Units: mg/Kg

Analyte	Control Limit	Sample (S)	C	Duplicate (D)	C	RPD	Q	Method
Thorium	0.21	2.9		3.66		23		6020A
Uranium	0.10	0.85		1.02		18		6020A

Calculations are performed before rounding to avoid round-off errors in calculated results.

FORM VI-IN

LINEAR RANGE CHECK STANDARD
METALS -

Lab ID: LRC 160-453933/11

Lab Name: Eurofins TestAmerica, St. Louis Job No.: 160-36526-1

Sample Matrix: Solid LCS Source: MS LDR 2_00186

Analyte	Solid(ug/L)							
	True	Found	C	%R	Limits		Q	Method
Thorium	2000	2100		105	90	110		6020A
Uranium	2000	2040		102	90	110		6020A

Calculations are performed before rounding to avoid round-off errors in calculated results.

7A-IN
LAB CONTROL SAMPLE
METALS

Lab ID: LCS 160-452611/2-A

Lab Name: Eurofins TestAmerica, St. Louis Job No.: 160-36526-1

Sample Matrix: Solid LCS Source: MPREP1-A_00004

Analyte	Solid(mg/Kg)							
	True	Found	C	%R	Limits		Q	Method
Thorium	94.7	91.6		97	80	120		6020A

Calculations are performed before rounding to avoid round-off errors in calculated results.

FORM VIIA - IN

7A-IN
LCS-CERTIFIED REFERENCE MATERIAL
METALS

Lab ID: LCSSRM 160-452611/3-A

Lab Name: Eurofins TestAmerica, St. Louis Job No.: 160-36526-1

Sample Matrix: Solid LCS Source: PR_LCSSRM U_00001

Analyte	Solid(mg/Kg)							
	True	Found	C	%R	Limits		Q	Method
Uranium	98.1	97.5		99.4	74.0	126.4		6020A

Calculations are performed before rounding to avoid round-off errors in calculated results.

FORM VIIA - IN

LINEAR RANGE CHECK STANDARD
METALS -

Lab ID: LRC 160-453935/2

Lab Name: Eurofins TestAmerica, St. Louis Job No.: 160-36526-1

Sample Matrix: Solid LCS Source: MS LDR 2_00186

Analyte	Solid(ug/L)							
	True	Found	C	%R	Limits		Q	Method
Thorium	2000	2100		105	90	110		6020A
Uranium	2000	2040		102	90	110		6020A

Calculations are performed before rounding to avoid round-off errors in calculated results.

7A-IN
LAB CONTROL SAMPLE
METALS

Lab ID: LCS 160-452612/2-A

Lab Name: Eurofins TestAmerica, St. Louis Job No.: 160-36526-1

Sample Matrix: Solid LCS Source: MPREP1-A_00004

Analyte	Solid(mg/Kg)							
	True	Found	C	%R	Limits		Q	Method
Thorium	89.9	90.8		101	80	120		6020A

Calculations are performed before rounding to avoid round-off errors in calculated results.

FORM VIIA - IN

7A-IN
LCS-CERTIFIED REFERENCE MATERIAL
METALS

Lab ID: LCSSRM 160-452612/3-A

Lab Name: Eurofins TestAmerica, St. Louis Job No.: 160-36526-1

Sample Matrix: Solid LCS Source: PR_LCSSRM U_00001

Analyte	Solid(mg/Kg)							
	True	Found	C	%R	Limits		Q	Method
Uranium	98.1	101		103.2	74.0	126.4		6020A

Calculations are performed before rounding to avoid round-off errors in calculated results.

FORM VIIA - IN

8-IN
ICP-AES AND ICP-MS SERIAL DILUTIONS
METALS

Lab ID: 160-36526-11

SDG No:

Lab Name: Eurofins TestAmerica, St. Louis Job No: 160-36526-1

Matrix: Solid Concentration Units: mg/Kg

Analyte	Initial Sample Result (I)	C	Serial Dilution Result (S)	C	% Difference	Q	Method
Thorium	2.9		2.47		NC		6020A
Uranium	0.85		0.838		NC		6020A

Calculations are performed before rounding to avoid round-off errors in calculated results.

FORM VIII-IN

8-IN
ICP-AES AND ICP-MS SERIAL DILUTIONS
METALS

Lab ID: 160-36526-20

SDG No:

Lab Name: Eurofins TestAmerica, St. Louis Job No: 160-36526-1

Matrix: Solid Concentration Units: mg/Kg

Analyte	Initial Sample Result (I)	C	Serial Dilution Result (S)	C	% Difference	Q	Method
Thorium	5.0		4.22		16	V	6020A
Uranium	1.4		1.30		NC		6020A

Calculations are performed before rounding to avoid round-off errors in calculated results.

FORM VIII-IN

9-IN
DETECTION LIMITS
METALS

Lab Name: Eurofins TestAmerica, St. Louis Job Number: 160-36526-1

SDG Number:

Matrix: Solid Instrument ID: ICPMS7700

Method: 6020A MDL Date: 05/14/2018 10:39

Prep Method: 3050B

Analyte	Wavelength/ Mass	RL (mg/Kg)	MDL (mg/Kg)
Thorium	232	0.2	0.09
Uranium	238	0.1	0.04

9-IN
CALIBRATION BLANK DETECTION LIMITS
METALS

Lab Name: Eurofins TestAmerica, St. Louis Job Number: 160-36526-1

SDG Number:

Matrix: Solid Instrument ID: ICPMS7700

Method: 6020A XMDL Date: 06/27/2019 14:00

Analyte	Wavelength/ Mass	XRL (ug/L)	XMDL (ug/L)
Thorium	232	2	0.9
Uranium	238	1	0.4

11-IN
LINEAR RANGES
METALS

Lab Name: Eurofins TestAmerica, St. Loui Job No: 160-36526-1

SDG No.:

Instrument ID: ICPMS7700 Date: 08/05/2019 16:42

Analyte	Integ. Time (Sec.)	Concentration (ug/L)	Method
Thorium		2000	6020A
Uranium		2000	6020A

FORM XI - IN

12-IN
PREPARATION LOG
METALS

Lab Name: Eurofins TestAmerica, St. Louis Job No.: 160-36526-1

SDG No.:

Prep Method: 3050B

Lab Sample ID	Preparation Date	Prep Batch	Initial Weight (g)	Initial Volume	Final Volume (mL)
MB 160-452611/1-A	12/02/2019 10:13	452611	0.5496		50
LCS 160-452611/2-A	12/02/2019 10:13	452611	0.5279		50
LCSSRM 160-452611/3-A	12/02/2019 10:13	452611	0.5580		50
160-36526-1	12/02/2019 10:13	452611	0.5443		50
160-36526-2	12/02/2019 10:13	452611	0.5242		50
160-36526-3	12/02/2019 10:13	452611	0.5374		50
160-36526-4	12/02/2019 10:13	452611	0.5449		50
160-36526-5	12/02/2019 10:13	452611	0.5854		50
160-36526-6	12/02/2019 10:13	452611	0.5289		50
160-36526-7	12/02/2019 10:13	452611	0.5414		50
160-36526-8	12/02/2019 10:13	452611	0.5532		50
160-36526-9	12/02/2019 10:13	452611	0.5255		50
160-36526-10	12/02/2019 10:13	452611	0.5444		50
160-36526-11	12/02/2019 10:13	452611	0.5808		50
160-36526-11 DU	12/02/2019 10:13	452611	0.5103		50
160-36526-11 MS	12/02/2019 10:13	452611	0.5730		50
160-36526-11 MSD	12/02/2019 10:13	452611	0.5433		50
160-36526-12	12/02/2019 10:13	452611	0.5553		50
160-36526-13	12/02/2019 10:13	452611	0.5193		50
160-36526-14	12/02/2019 10:13	452611	0.5623		50
160-36526-15	12/02/2019 10:13	452611	0.5238		50
160-36526-16	12/02/2019 10:13	452611	0.5815		50
160-36526-17	12/02/2019 10:13	452611	0.5642		50
160-36526-18	12/02/2019 10:13	452611	0.5346		50
160-36526-19	12/02/2019 10:13	452611	0.5845		50

FORM XII-IN

12-IN
PREPARATION LOG
METALS

Lab Name: Eurofins TestAmerica, St. Louis Job No.: 160-36526-1

SDG No.:

Prep Method: 3050B

Lab Sample ID	Preparation Date	Prep Batch	Initial Weight (g)	Initial Volume	Final Volume (mL)
MB 160-452612/1-A	12/02/2019 10:16	452612	0.5161		50
LCS 160-452612/2-A	12/02/2019 10:16	452612	0.5559		50
LCSSRM 160-452612/3-A	12/02/2019 10:16	452612	0.5371		50
160-36526-20	12/02/2019 10:16	452612	0.5586		50
160-36526-20 MS	12/02/2019 10:16	452612	0.5114		50
160-36526-20 MSD	12/02/2019 10:16	452612	0.5934		50
160-36526-21	12/02/2019 10:16	452612	0.5363		50
160-36526-22	12/02/2019 10:16	452612	0.5838		50

FORM XII-IN

13-IN
ANALYSIS RUN LOG
METALS

Lab Name: Eurofins TestAmerica, St. Louis Job No.: 160-36526-1

SDG No.:

Instrument ID: ICPMS7700 Analysis Method: 6020A

Start Date: 12/10/2019 15:57 End Date: 12/11/2019 01:44

Lab Sample Id	D/F	Type	Time	Analytes																							
				Th	U																						
ICIS 160-453933/1			15:57	X	X																						
IC 160-453933/2	1		16:04	X	X																						
IC 160-453933/3	1		16:11	X	X																						
IC 160-453933/4	1		16:17	X	X																						
ICV 160-453933/5	1		16:24	X	X																						
ICB 160-453933/6	1		16:31	X	X																						
CRI 160-453933/7	1		16:38	X	X																						
ICSA 160-453933/8	1		16:44	X	X																						
ICSAB 160-453933/9	1		16:51	X	X																						
LRC 160-453933/10			16:58																								
LRC 160-453933/11	1		17:05	X	X																						
CCV 160-453933/12			17:12																								
CCB 160-453933/13			17:18																								
ZZZZZZ			17:25																								
ZZZZZZ			17:32																								
ZZZZZZ			17:39																								
ZZZZZZ			17:45																								
ZZZZZZ			17:52																								
ZZZZZZ			17:59																								
ZZZZZZ			18:06																								
ZZZZZZ			18:12																								
ZZZZZZ			18:19																								
ZZZZZZ			18:26																								
CCVL 160-453933/24			18:33																								
CCV 160-453933/25			18:39																								
CCB 160-453933/26			18:46																								
ZZZZZZ			18:53																								
ZZZZZZ			18:59																								
ZZZZZZ			19:06																								
ZZZZZZ			19:13																								
ZZZZZZ			19:20																								
ZZZZZZ			19:26																								
ZZZZZZ			19:33																								
ZZZZZZ			19:40																								
ZZZZZZ			19:47																								
ZZZZZZ			19:53																								
CCVL 160-453933/37			20:00																								
CCV 160-453933/38			20:07																								
CCB 160-453933/39			20:14																								
ZZZZZZ			20:20																								
ZZZZZZ			20:27																								
ZZZZZZ			20:34																								

FORM XIII-IN

13-IN
ANALYSIS RUN LOG
METALS

Lab Name: Eurofins TestAmerica, St. Louis Job No.: 160-36526-1

SDG No.:

Instrument ID: ICPMS7700 Analysis Method: 6020A

Start Date: 12/10/2019 15:57 End Date: 12/11/2019 01:44

Lab Sample Id	D/F	Type	Time	Analytes																							
				Th	U																						
ZZZZZZ			20:41																								
ZZZZZZ			20:47																								
ZZZZZZ			20:54																								
ZZZZZZ			21:01																								
ZZZZZZ			21:07																								
ZZZZZZ			21:14																								
ZZZZZZ			21:21																								
CCVL 160-453933/50	1		21:28	X	X																						
CCV 160-453933/51	1		21:34	X	X																						
CCB 160-453933/52	1		21:41	X	X																						
ZZZZZZ			21:48																								
MB 160-452611/1-A	2	T	21:55	X	X																						
LCS 160-452611/2-A	2	T	22:01	X																							
LCSSRM 160-452611/3-A	10	T	22:08		X																						
160-36526-1	2	T	22:15	X	X																						
160-36526-2	2	T	22:22	X	X																						
160-36526-3	2	T	22:28	X	X																						
160-36526-4	2	T	22:35	X	X																						
160-36526-5	2	T	22:42	X	X																						
160-36526-6	2	T	22:48	X	X																						
CCVL 160-453933/63	1		22:55	X	X																						
CCV 160-453933/64	1		23:02	X	X																						
CCB 160-453933/65	1		23:09	X	X																						
160-36526-7	2	T	23:15	X	X																						
160-36526-8	2	T	23:22	X	X																						
160-36526-9	2	T	23:29	X	X																						
160-36526-10	2	T	23:36	X	X																						
160-36526-11	2	T	23:42	X	X																						
160-36526-11 SD	10	T	23:49	X	X																						
160-36526-11 DU	2	T	23:56	X	X																						
160-36526-11 MS	2	T	00:02	X	X																						
160-36526-11 MSD	2	T	00:09	X	X																						
160-36526-12	2	T	00:16	X	X																						
CCVL 160-453933/76	1		00:23	X	X																						
CCV 160-453933/77	1		00:30	X	X																						
CCB 160-453933/78	1		00:36	X	X																						
160-36526-13	2	T	00:43	X	X																						
160-36526-14	2	T	00:50	X	X																						
160-36526-15	2	T	00:57	X	X																						
160-36526-16	2	T	01:03	X	X																						
160-36526-17	2	T	01:10	X	X																						
160-36526-18	2	T	01:17	X	X																						

FORM XIII-IN

13-IN
ANALYSIS RUN LOG
METALS

Lab Name: Eurofins TestAmerica, St. Louis Job No.: 160-36526-1

SDG No.:

Instrument ID: ICPMS7700 Analysis Method: 6020A

Start Date: 12/10/2019 15:57 End Date: 12/11/2019 01:44

Lab Sample Id	D/F	Type	Time	Analytes																							
				Th	U																						
160-36526-19	2	T	01:23	X	X																						
CCVL 160-453933/86	1		01:30	X	X																						
CCV 160-453933/87	1		01:37	X	X																						
CCB 160-453933/88	1		01:44	X	X																						

Prep Types:
T = Total/NA

FORM XIII-IN

13-IN
ANALYSIS RUN LOG
METALS

Lab Name: Eurofins TestAmerica, St. Louis Job No.: 160-36526-1

SDG No.:

Instrument ID: ICPMS7700 Analysis Method: 6020A

Start Date: 12/10/2019 16:58 End Date: 12/11/2019 08:15

Lab Sample Id	D/F	Type	Time	Analytes																							
				Th	U																						
LRC 160-453935/1			16:58																								
LRC 160-453935/2	1		17:05	X	X																						
ICIS 160-453935/3			01:57	X	X																						
IC 160-453935/4	1		02:04	X	X																						
IC 160-453935/5	1		02:11	X	X																						
IC 160-453935/6	1		02:17	X	X																						
ICV 160-453935/7	1		02:24	X	X																						
ICB 160-453935/8	1		02:31	X	X																						
CRI 160-453935/9	1		02:38	X	X																						
ICSA 160-453935/10	1		02:44	X	X																						
ICSAB 160-453935/11	1		02:51	X	X																						
CCV 160-453935/12	1		02:58	X	X																						
CCB 160-453935/13	1		03:05	X	X																						
ZZZZZZ			03:11																								
ZZZZZZ			03:18																								
ZZZZZZ			03:25																								
ZZZZZZ			03:32																								
ZZZZZZ			03:38																								
ZZZZZZ			03:45																								
MB 160-452612/1-A	2	T	03:52	X	X																						
LCS 160-452612/2-A	2	T	03:58	X																							
LCSSRM 160-452612/3-A	10	T	04:05		X																						
160-36526-20	2	T	04:12	X	X																						
CCVL 160-453935/24	1		04:19	X	X																						
CCV 160-453935/25	1		04:25	X	X																						
CCB 160-453935/26	1		04:32	X	X																						
160-36526-20 SD	10	T	04:39	X	X																						
160-36526-20 MS	2	T	04:46	X	X																						
160-36526-20 MSD	2	T	04:52	X	X																						
160-36526-21	2	T	04:59	X	X																						
160-36526-22	2	T	05:06	X	X																						
ZZZZZZ			05:13																								
ZZZZZZ			05:19																								
ZZZZZZ			05:26																								
ZZZZZZ			05:33																								
ZZZZZZ			05:40																								
CCVL 160-453935/37	1		05:46	X	X																						
CCV 160-453935/38	1		05:53	X	X																						
CCB 160-453935/39	1		06:00	X	X																						
ZZZZZZ			06:07																								
ZZZZZZ			06:13																								
ZZZZZZ			06:20																								

FORM XIII-IN

13-IN
ANALYSIS RUN LOG
METALS

Lab Name: Eurofins TestAmerica, St. Louis Job No.: 160-36526-1

SDG No.:

Instrument ID: ICPMS7700 Analysis Method: 6020A

Start Date: 12/10/2019 16:58 End Date: 12/11/2019 08:15

Lab Sample Id	D/F	Type	Time	Analytes																								
				Th	U																							
ZZZZZZ			06:27																									
ZZZZZZ			06:34																									
ZZZZZZ			06:41																									
ZZZZZZ			06:47																									
ZZZZZZ			06:54																									
ZZZZZZ			07:01																									
ZZZZZZ			07:07																									
CCVL 160-453935/50			07:14																									
CCV 160-453935/51			07:21																									
CCB 160-453935/52			07:28																									
ZZZZZZ			07:34																									
ZZZZZZ			07:41																									
ZZZZZZ			07:48																									
ZZZZZZ			07:55																									
CCVL 160-453935/57			08:01																									
CCV 160-453935/58			08:08																									
CCB 160-453935/59			08:15																									

Prep Types:
T = Total/NA

FORM XIII-IN

15-IN
ICP-MS INTERNAL STANDARDS RELATIVE INTENSITY SUMMARY
METALS

Lab Name: Eurofins TestAmerica, St. Louis Job No.: 160-36526-1

SDG No.:

ICP-MS Instrument ID: ICPMS7700 Start Date: 12/10/2019 End Date: 12/11/2019

Lab Sample ID	Time	Internal Standards %RI For:									
		Element Li-6	Q	Element Sc/2	Q	Element Sc/3	Q	Element Ge/2	Q	Element Ge/3	Q
IC 160-453933/2	16:04	100		95		100		97		100	
IC 160-453933/3	16:11	100		104		103		107		104	
IC 160-453933/4	16:17	99		106		104		112		106	
ICV 160-453933/5	16:24	100		107		103		111		106	
ICB 160-453933/6	16:31	103		106		105		105		105	
CRI 160-453933/7	16:38	103		111		106		109		106	
ICSA 160-453933/8	16:44	93		102		100		98		97	
ICSAB 160-453933/9	16:51	93		110		105		109		103	
LRC 160-453933/11	17:05	87		137		116		117		112	
CCVL 160-453933/50	21:28	85		109		117		114		125	
CCV 160-453933/51	21:34	79		103		114		114		122	
CCB 160-453933/52	21:41	82		106		114		110		120	
MB 160-452611/1-A	21:55	80		105		116		111		123	
LCS 160-452611/2-A	22:01	78		104		113		108		121	
LCSSRM 160-452611/3-A	22:08	79		108		121		110		121	
160-36526-1	22:15	74		123		135		111		120	
160-36526-2	22:22	74		121		135		113		124	
160-36526-3	22:28	75		119		132		115		125	
160-36526-4	22:35	75		121		135		116		127	
160-36526-5	22:42	74		111		133		109		127	
160-36526-6	22:48	71		116		127		114		122	
CCVL 160-453933/63	22:55	76		107		118		113		126	
CCV 160-453933/64	23:02	76		109		119		119		127	
CCB 160-453933/65	23:09	77		110		120		115		126	
160-36526-7	23:15	74		119		130		114		125	
160-36526-8	23:22	73		118		133		116		127	
160-36526-9	23:29	73		119		132		116		125	
160-36526-10	23:36	72		124		134		117		129	
160-36526-11	23:42	71		121		133		119		129	
160-36526-11 SD	23:49	75		114		127		119		131	
160-36526-11 DU	23:56	72		120		136		117		128	
160-36526-11 MS	00:02	72		130				116		126	
160-36526-11 MSD	00:09	71		122		134		115		125	
160-36526-12	00:16	75		115		130		115		127	
CCVL 160-453933/76	00:23	78		112		122		119		130	
CCV 160-453933/77	00:30	75		111		121		122		130	
CCB 160-453933/78	00:36	77		111		121		117		128	
160-36526-13	00:43	73		117		132		116		129	
160-36526-14	00:50	73		121		135		120		130	
160-36526-15	00:57	73		123		138		118		130	
160-36526-16	01:03	72		120		135		118		130	

FORM XV - IN

15-IN
ICP-MS INTERNAL STANDARDS RELATIVE INTENSITY SUMMARY
METALS

Lab Name: Eurofins TestAmerica, St. Louis Job No.: 160-36526-1

SDG No.:

ICP-MS Instrument ID: ICPMS7700 Start Date: 12/10/2019 End Date: 12/11/2019

Lab Sample ID	Time	Internal Standards %RI For:									
		Element Li-6	Q	Element Sc/2	Q	Element Sc/3	Q	Element Ge/2	Q	Element Ge/3	Q
160-36526-17	01:10	70		121		134		118		129	
160-36526-18	01:17	72		127		140		123		132	
160-36526-19	01:23	72		124		138		120		130	
CCVL 160-453933/86	01:30	75		115		126		122		131	
CCV 160-453933/87	01:37	75		114		125		126		133	
CCB 160-453933/88	01:44	76		114		123		119		129	

FORM XV - IN

15-IN
ICP-MS INTERNAL STANDARDS RELATIVE INTENSITY SUMMARY
METALS

Lab Name: Eurofins TestAmerica, St. Louis Job No.: 160-36526-1

SDG No.:

ICP-MS Instrument ID: ICPMS7700 Start Date: 12/10/2019 End Date: 12/11/2019

Lab Sample ID	Time	Internal Standards %RI For:									
		Element In	Q	Element Ho/2	Q	Element Ho/3	Q	Element Ir/2	Q	Element Ir/3	Q
IC 160-453933/2	16:04	99		94		99		94		99	
IC 160-453933/3	16:11	100		99		100		98		99	
IC 160-453933/4	16:17	100		101		103		98		100	
ICV 160-453933/5	16:24	102		103		103		101		101	
ICB 160-453933/6	16:31	105		102		104		103		103	
CRI 160-453933/7	16:38	105		105		104		104		103	
ICSA 160-453933/8	16:44	91		97		95		88		88	
ICSAB 160-453933/9	16:51	95		100		97		89		90	
LRC 160-453933/11	17:05	102		106		106		95		95	
CCVL 160-453933/50	21:28	122		109		121		115		122	
CCV 160-453933/51	21:34	116		108		119		110		116	
CCB 160-453933/52	21:41	119		108		120		113		119	
MB 160-452611/1-A	21:55	119		109		120		113		118	
LCS 160-452611/2-A	22:01	115		106		119		107		115	
LCSSRM 160-452611/3-A	22:08	117		108		119		112		118	
160-36526-1	22:15	112		107		116		106		110	
160-36526-2	22:22	116		108		120		106		113	
160-36526-3	22:28	117		109		121		109		114	
160-36526-4	22:35	119		109		123		108		115	
160-36526-5	22:42	119		102		121		101		115	
160-36526-6	22:48	113		105		115		103		108	
CCVL 160-453933/63	22:55	121		103		118		106		116	
CCV 160-453933/64	23:02	121		107		120		109		116	
CCB 160-453933/65	23:09	123		109		120		112		120	
160-36526-7	23:15	117		108		119		106		113	
160-36526-8	23:22	117		108		120		106		112	
160-36526-9	23:29	117		106		118		103		111	
160-36526-10	23:36	119		107		121		106		114	
160-36526-11	23:42	118		107		120		106		113	
160-36526-11 SD	23:49	123		108		121		106		116	
160-36526-11 DU	23:56	118		105		120		104		113	
160-36526-11 MS	00:02	116		107		121		103		112	
160-36526-11 MSD	00:09	117		107		120		105		113	
160-36526-12	00:16	121		107		121		106		114	
CCVL 160-453933/76	00:23	126		110		123		111		119	
CCV 160-453933/77	00:30	123		108		123		110		117	
CCB 160-453933/78	00:36	125		109		122		112		119	
160-36526-13	00:43	119		107		121		106		113	
160-36526-14	00:50	122		108		123		106		116	
160-36526-15	00:57	122		108		123		107		115	
160-36526-16	01:03	122		108		124		106		116	

FORM XV - IN

15-IN
ICP-MS INTERNAL STANDARDS RELATIVE INTENSITY SUMMARY
METALS

Lab Name: Eurofins TestAmerica, St. Louis Job No.: 160-36526-1

SDG No.:

ICP-MS Instrument ID: ICPMS7700 Start Date: 12/10/2019 End Date: 12/11/2019

Lab Sample ID	Time	Internal Standards %RI For:									
		Element In	Q	Element Ho/2	Q	Element Ho/3	Q	Element Ir/2	Q	Element Ir/3	Q
160-36526-17	01:10	119		105		120		103		112	
160-36526-18	01:17	122		112		123		109		115	
160-36526-19	01:23	121		108		121		105		113	
CCVL 160-453933/86	01:30	127		111		124		113		119	
CCV 160-453933/87	01:37	124		110		123		112		118	
CCB 160-453933/88	01:44	125		109		122		113		119	

15-IN
ICP-MS INTERNAL STANDARDS RELATIVE INTENSITY SUMMARY
METALS

Lab Name: Eurofins TestAmerica, St. Louis Job No.: 160-36526-1

SDG No.:

ICP-MS Instrument ID: ICPMS7700 Start Date: 12/10/2019 End Date: 12/11/2019

Lab Sample ID	Time	Internal Standards %RI For:									
		Element Li-6	Q	Element Sc/2	Q	Element Sc/3	Q	Element Ge/2	Q	Element Ge/3	Q
LRC 160-453935/2	17:05	87		137		116		117		112	
IC 160-453935/4	02:04	102		110		100		107		101	
IC 160-453935/5	02:11	99		102		100		107		101	
IC 160-453935/6	02:17	98		102		98		107		101	
ICV 160-453935/7	02:24	99		100		97		105		99	
ICB 160-453935/8	02:31	100		100		96		99		98	
CRI 160-453935/9	02:38	103		101		99		101		100	
ICSA 160-453935/10	02:44	100		99		96		94		92	
ICSAB 160-453935/11	02:51	100		103		97		100		93	
CCV 160-453935/12	02:58	102		101		99		105		101	
CCB 160-453935/13	03:05	100		100		98		99		99	
MB 160-452612/1-A	03:52	100		95		93		97		97	
LCS 160-452612/2-A	03:58	98		93		92		93		95	
LCSSRM 160-452612/3-A	04:05	98		95		97		93		93	
160-36526-20	04:12	96		107		109		97		96	
CCVL 160-453935/24	04:19	101		99		96		99		98	
CCV 160-453935/25	04:25	100		97		96		102		98	
CCB 160-453935/26	04:32	102		98		96		96		96	
160-36526-20 SD	04:39	100		100		98		98		97	
160-36526-20 MS	04:46	97		110		109		95		95	
160-36526-20 MSD	04:52	95		116		113		96		94	
160-36526-21	04:59	98		106		103		99		96	
160-36526-22	05:06	94		105		104		98		96	
CCVL 160-453935/37	05:46	103		96		95		97		96	
CCV 160-453935/38	05:53	97		93		92		96		94	
CCB 160-453935/39	06:00	99		93		93		93		93	

15-IN
ICP-MS INTERNAL STANDARDS RELATIVE INTENSITY SUMMARY
METALS

Lab Name: Eurofins TestAmerica, St. Louis Job No.: 160-36526-1

SDG No.:

ICP-MS Instrument ID: ICPMS7700 Start Date: 12/10/2019 End Date: 12/11/2019

Lab Sample ID	Time	Internal Standards %RI For:									
		Element In	Q	Element Ho/2	Q	Element Ho/3	Q	Element Ir/2	Q	Element Ir/3	Q
LRC 160-453935/2	17:05	102		106		106		95		95	
IC 160-453935/4	02:04	100		107		100		106		100	
IC 160-453935/5	02:11	98		100		101		99		98	
IC 160-453935/6	02:17	96		101		101		98		98	
ICV 160-453935/7	02:24	98		100		100		100		99	
ICB 160-453935/8	02:31	98		100		100		101		99	
CRI 160-453935/9	02:38	99		100		100		100		100	
ICSA 160-453935/10	02:44	88		96		94		87		87	
ICSAB 160-453935/11	02:51	88		95		93		87		86	
CCV 160-453935/12	02:58	99		102		102		101		101	
CCB 160-453935/13	03:05	100		102		101		101		102	
MB 160-452612/1-A	03:52	96		100		100		99		100	
LCS 160-452612/2-A	03:58	95		98		100		94		98	
LCSSRM 160-452612/3-A	04:05	94		98		100		97		99	
160-36526-20	04:12	93		98		100		94		95	
CCVL 160-453935/24	04:19	97		100		100		100		99	
CCV 160-453935/25	04:25	96		100		99		99		99	
CCB 160-453935/26	04:32	98		100		99		100		100	
160-36526-20 SD	04:39	96		100		100		97		98	
160-36526-20 MS	04:46	93		97		99		92		95	
160-36526-20 MSD	04:52	91		97		97		92		93	
160-36526-21	04:59	93		101		98		96		95	
160-36526-22	05:06	94		100		100		95		96	
CCVL 160-453935/37	05:46	98		100		100		99		99	
CCV 160-453935/38	05:53	96		99		99		100		100	
CCB 160-453935/39	06:00	97		99		100		100		100	

FORM XV - IN

METALS BATCH WORKSHEET

Lab Name: Eurofins TestAmerica, St. Loui Job No.: 160-36526-1

SDG No.:

Batch Number: 452611 Batch Start Date: 12/02/19 10:13 Batch Analyst: Mazariegos, Leonel A

Batch Method: 3050B Batch End Date: 12/02/19 15:26

Lab Sample ID	Client Sample ID	Method Chain	Basis	InitialAmount	FinalAmount	MPREP1-A 00004	MPREP1-B 00004	MPREP2 00022	PR_LCSSRM U 00001
MB 160-452611/1		3050B, 6020A		0.5496 g	50 mL				
LCS 160-452611/2		3050B, 6020A		0.5279 g	50 mL	0.25 mL	0.25 mL	0.25 mL	
LCSSRM 160-452611/3		3050B, 6020A		0.5580 g	50 mL				0.558 g
160-36526-B-1	STSB27_0-0.5	3050B, 6020A	T	0.5443 g	50 mL				
160-36526-B-2	STSB27_0.5-3	3050B, 6020A	T	0.5242 g	50 mL				
160-36526-B-3	STSB27_3-6	3050B, 6020A	T	0.5374 g	50 mL				
160-36526-B-4	STSB27_6-15	3050B, 6020A	T	0.5449 g	50 mL				
160-36526-B-5	STSB28_0-0.5	3050B, 6020A	T	0.5854 g	50 mL				
160-36526-B-6	STSB28-FD_0-0.5	3050B, 6020A	T	0.5289 g	50 mL				
160-36526-B-7	STSB28_0.5-3	3050B, 6020A	T	0.5414 g	50 mL				
160-36526-B-8	STSB28_3-6	3050B, 6020A	T	0.5532 g	50 mL				
160-36526-B-9	STSB28_6-15	3050B, 6020A	T	0.5255 g	50 mL				
160-36526-B-10	STSB29_0-0.5	3050B, 6020A	T	0.5444 g	50 mL				
160-36526-B-11	STSB29_0.5-3	3050B, 6020A	T	0.5808 g	50 mL				
160-36526-B-11 DU	STSB29_0.5-3	3050B, 6020A	T	0.5103 g	50 mL				
160-36526-B-11 MS	STSB29_0.5-3	3050B, 6020A	T	0.5730 g	50 mL	0.25 mL	0.25 mL	0.25 mL	
160-36526-B-11 MSD	STSB29_0.5-3	3050B, 6020A	T	0.5433 g	50 mL	0.25 mL	0.25 mL	0.25 mL	
160-36526-B-12	STSB29_3-6	3050B, 6020A	T	0.5553 g	50 mL				
160-36526-B-13	STSB29_6-15	3050B, 6020A	T	0.5193 g	50 mL				
160-36526-B-14	STSB29-FD_6-15	3050B, 6020A	T	0.5623 g	50 mL				
160-36526-B-15	STSB30_0-0.5	3050B, 6020A	T	0.5238 g	50 mL				
160-36526-B-16	STSB30_0.5-3	3050B, 6020A	T	0.5815 g	50 mL				
160-36526-B-17	STSB30_3-6	3050B, 6020A	T	0.5642 g	50 mL				
160-36526-B-18	STSB30_6-15	3050B, 6020A	T	0.5346 g	50 mL				
160-36526-B-19	STSB31_0-0.5	3050B, 6020A	T	0.5845 g	50 mL				

The pound sign (#) in the amount added field denotes that the reagent was used undiluted. All calculations are performed using the stated concentration for this reagent.

METALS BATCH WORKSHEET

Lab Name: Eurofins TestAmerica, St. Loui Job No.: 160-36526-1

SDG No.:

Batch Number: 452611 Batch Start Date: 12/02/19 10:13 Batch Analyst: Mazariegos, Leonel A

Batch Method: 3050B Batch End Date: 12/02/19 15:26

Batch Notes	
Balance ID	27150420
Blank Soil Lot Number	25438819
Temperature - Corrected - End	C2: 93.5 Degrees C
Temperature - Corrected - Start	B2: 93.8 Degrees C
Digestion End Time	12/02/2019 14:58
Digestion Start Time	12/02/2019 12:34
Digestion Unit ID	HOTBLOCK 1
Digestion Tube/Cup ID	348541-4653
Hydrogen Peroxide ID	1819373
Hydrochloric Acid ID	1824059
Nitric Acid ID	1841775, 1836217
Pipette/Syringe/Dispenser ID	MET-12
Analyst ID - Spike Analyst	LAM
Sufficient Volume for Batch QC	YES
Thermometer ID	160322347

Basis	Basis Description
T	Total/NA

The pound sign (#) in the amount added field denotes that the reagent was used undiluted. All calculations are performed using the stated concentration for this reagent.

METALS BATCH WORKSHEET

Lab Name: Eurofins TestAmerica, St. Loui Job No.: 160-36526-1

SDG No.:

Batch Number: 452612 Batch Start Date: 12/02/19 10:16 Batch Analyst: Mazariegos, Leonel A

Batch Method: 3050B Batch End Date: 12/02/19 15:26

Lab Sample ID	Client Sample ID	Method Chain	Basis	InitialAmount	FinalAmount	MPREP1-A 00004	MPREP1-B 00004	MPREP2 00022	PR_LCSSRM U 00001
MB 160-452612/1		3050B, 6020A		0.5161 g	50 mL				
LCS 160-452612/2		3050B, 6020A		0.5559 g	50 mL	0.25 mL	0.25 mL	0.25 mL	
LCSSRM 160-452612/3		3050B, 6020A		0.5371 g	50 mL				0.5371 g
160-36526-B-20	STSB31_0.5-3	3050B, 6020A	T	0.5586 g	50 mL				
160-36526-B-20 MS	STSB31_0.5-3	3050B, 6020A	T	0.5114 g	50 mL	0.25 mL	0.25 mL	0.25 mL	
160-36526-B-20 MSD	STSB31_0.5-3	3050B, 6020A	T	0.5934 g	50 mL	0.25 mL	0.25 mL	0.25 mL	
160-36526-B-21	STSB31_3-6	3050B, 6020A	T	0.5363 g	50 mL				
160-36526-B-22	STSB31_6-15	3050B, 6020A	T	0.5838 g	50 mL				

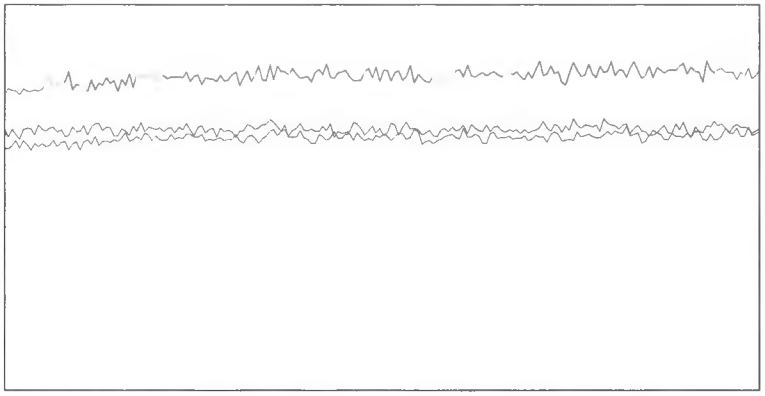
Batch Notes	
Balance ID	27150420
Blank Soil Lot Number	25438819
Temperature - Corrected - End	C2: 93.5 Degrees C
Temperature - Corrected - Start	B2: 93.8 Degrees C
Digestion End Time	12/02/2019 14:58
Digestion Start Time	12/02/2019 12:34
Digestion Unit ID	HOTBLOCK 1
Digestion Tube/Cup ID	348541-4653
Hydrogen Peroxide ID	1819373
Hydrochloric Acid ID	1824059
Nitric Acid ID	1841775, 1836217
Pipette/Syringe/Dispenser ID	MET-12
Analyst ID - Spike Analyst	LAM
Sufficient Volume for Batch QC	YES
Thermometer ID	160322347

Basis	Basis Description
T	Total/NA

The pound sign (#) in the amount added field denotes that the reagent was used undiluted. All calculations are performed using the stated concentration for this reagent.

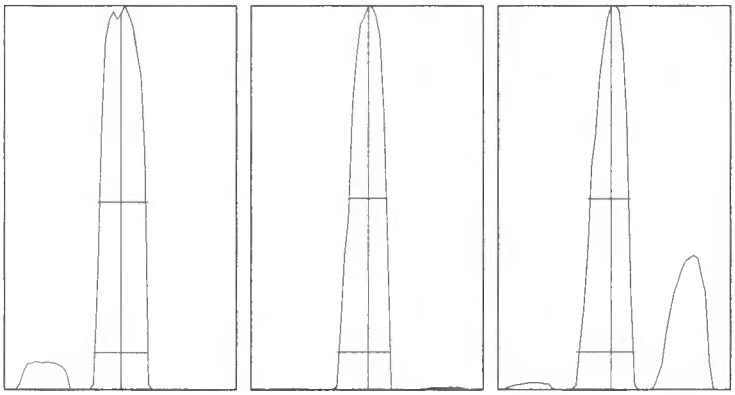
Tune Report

Tune File : autotune.u
Comment :



Integration Time:	0.1000 sec	
Sampling Period:	0.3100 sec	
n:	200	
Oxide:	156/140	0.535%
Doubly Charged:	70/140	1.171%

m/z	Range	Count	Mean	RSD%	Background
7	50,000	33942.0	33830.2	1.53	1.20
89	100,000	67141.0	65460.4	1.82	1.90
205	50,000	41673.0	40699.1	2.26	4.00



m/z:	7	89	205
Height:	33,807	66,519	40,303
Axis:	7.05	89.05	205.00
W-50%:	0.65	0.50	0.55
W-10%:	0.700	0.700	0.7500

Integration Time: 0.1000 sec
Acquisition Time: 22.7600 sec

Y axis : Linear

Tune Report

Tune File : autotune.u
Comment :

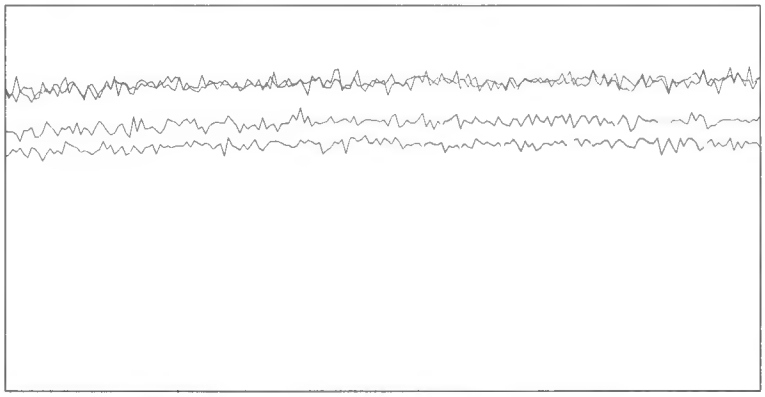
Tuning Parameters

===Plasma Condition===			===Ion Lenses===			===Q-Pole Parameters===		
RF Power	:	1550 W	Extract 1	:	0 V	AMU Gain	:	118
RF Matching	:	1.5 V	Extract 2	:	-120 V	AMU Offset	:	128
Smpl Depth	:	8 mm	Omega Bias	:	-90 V	Axis Gain	:	0.998
Torch-H	:	0.1 mm	Omega Lens	:	8 V	Axis Offset	:	0.11
Torch-V	:	0.1 mm	Cell Entrance	:	-30 V	QP Bias	:	-3 V
Carrier Gas	:	0.55 L/min	Cell Exit	:	-50 V			
Dilution Mode	:	ON	Deflect	:	12.2 V	===Detector Parameters===		
Dilution Gas	:	0.5 L/min	Plate Bias	:	-40 V	Discriminator	:	4.5 mV
Optional Gas	:	0 %	===Octopole Parameters===			Analog HV	:	1919 V
Nebulizer Pump	:	0.1 rps	OctP RF	:	190 V	Pulse HV	:	1104 V
Sample Pump	:	--- rps	OctP Bias	:	-8 V			
S/C Temp	:	2 degC						

===Reaction Cell===								
Reaction Mode	:	OFF						
H2 Gas	:	0 mL/min	He Gas	:	0 mL/min	Optional Gas	:	--- %

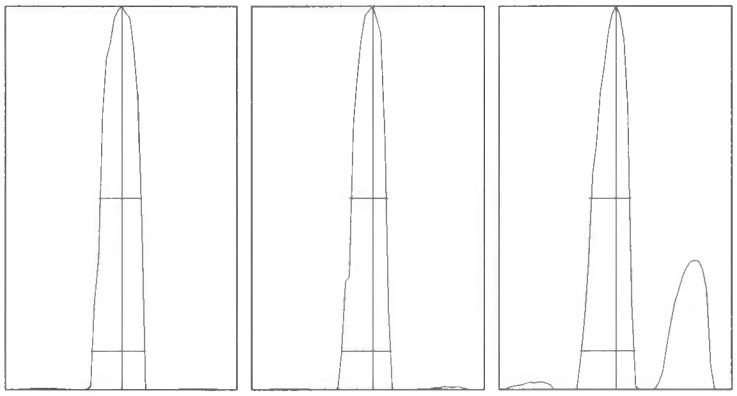
Tune Report

Tune File : he.u
Comment :



Integration Time:	0.1000 sec	
Sampling Period:	0.6200 sec	
n:	200	
Oxide:	156/140	0.247%
Doubly Charged:	70/140	1.286%

m/z	Range	Count	Mean	RSD%	Background
59	20,000	12555.0	12734.6	1.93	0.00
89	20,000	16212.0	15941.2	1.97	0.20
140	50,000	40899.0	39843.3	1.94	0.20
205	50,000	35802.0	34693.3	2.14	0.50
156/140	1	0.196%	0.233%	12.67	
70/140	2	1.374%	1.263%	6.41	



m/z:	59	89	205
Height:	13,037	16,439	35,819
Axis:	59.05	89.10	205.05
W-50%:	0.55	0.50	0.55
W-10%:	0.700	0.6500	0.700

Integration Time: 0.1000 sec
Acquisition Time: 22.5600 sec

Y axis : Linear

Tune Report

Tune File : he.u
Comment :

Tuning Parameters

===Plasma Condition===			===Ion Lenses===			===Q-Pole Parameters===		
RF Power	:	1550 W	Extract 1	:	0 V	AMU Gain	:	118
RF Matching	:	1.5 V	Extract 2	:	-120 V	AMU Offset	:	128
Smpl Depth	:	8 mm	Omega Bias	:	-80 V	Axis Gain	:	0.998
Torch-H	:	0.1 mm	Omega Lens	:	8.5 V	Axis Offset	:	0.11
Torch-V	:	0.1 mm	Cell Entrance	:	-40 V	QP Bias	:	-15 V
Carrier Gas	:	0.55 L/min	Cell Exit	:	-60 V			
Dilution Mode	:	ON	Deflect	:	-0.4 V	===Detector Parameters===		
Dilution Gas	:	0.5 L/min	Plate Bias	:	-60 V	Discriminator	:	4.5 mV
Optional Gas	:	0 %	===Octopole Parameters===			Analog HV	:	1919 V
Nebulizer Pump	:	0.1 rps	OctP RF	:	190 V	Pulse HV	:	1104 V
Sample Pump	:	--- rps	OctP Bias	:	-18 V			
S/C Temp	:	2 degC						

===Reaction Cell===								
Reaction Mode	:	ON						
H2 Gas	:	0 mL/min	He Gas	:	4.3 mL/min	Optional Gas	:	--- %

QC Tune Report

Data File: C:\ICPMH\1\7500\QCTUNE.D
Date Acquired: 10 Dec 2019 03:42:44 pm
Operator: LP 7700
Misc Info:
Vial Number: 1307
Current Method: C:\ICPMH\1\METHODS\TN_6020.m

Minimum Response(CPS)

Element	Actual	Required	Flag

RSD (%)

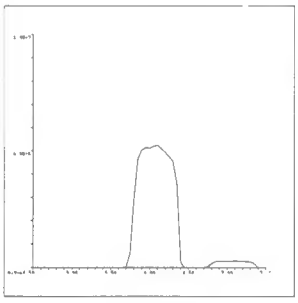
Element	Actual	Required	Flag
6 Li	0.17	5.00	
59 Co	1.06	5.00	
115 In	0.63	5.00	
205 Tl	0.57	5.00	

Ion Ratio

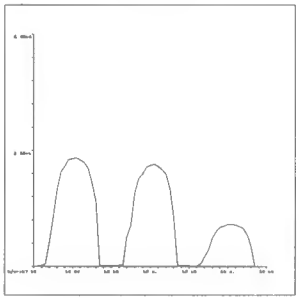
Element	Actual	Required	Flag

Maximum Bkg. Count(CPS)

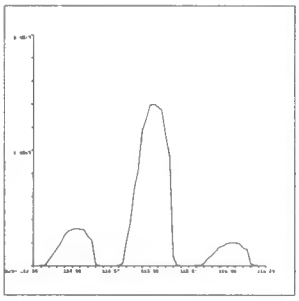
Element	Actual	Required	Flag



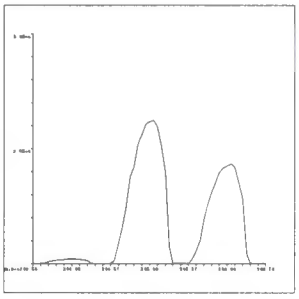
6 Li
Mass Calib.
Actual: 6.05
Required: 5.90-6.10
Flag:
Peak Width
Actual: 0.60
Required: 0.90
Flag:



59 Co
Mass Calib.
Actual: 59.05
Required: 58.90-59.10
Flag:
Peak Width
Actual: 0.60
Required: 0.90
Flag:



115 In
Mass Calib.
Actual: 115.05
Required: 114.90-115.10
Flag:
Peak Width
Actual: 0.60
Required: 0.90
Flag:



205 Tl
Mass Calib.
Actual: 205.00
Required: 204.90-205.10
Flag:
Peak Width
Actual: 0.65
Required: 0.90
Flag:

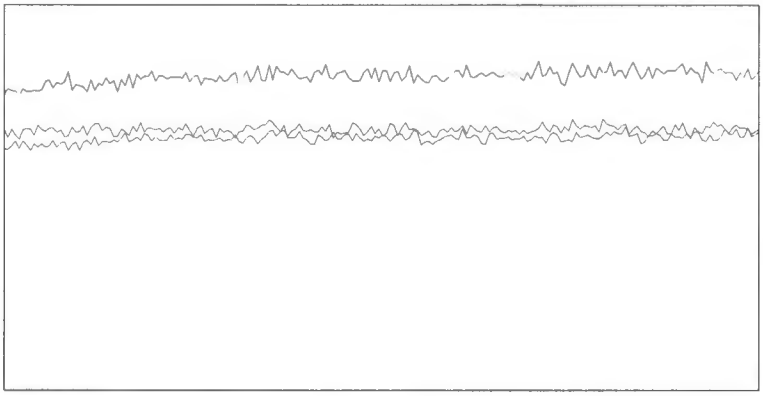
QC Tune Result:Pass

Replicated Data: Tune #1

Mass	Count(CPS)				
6	2877351.00	2862537.00	2853527.00	2829811.00	2840811.00
7	158721.09	156592.50	154929.91	155404.70	154440.41
8	36.00	31.50	35.00	41.50	28.00
58	1225560.00	1223748.00	1209847.00	1207828.00	1200629.00
59	1137512.00	1123184.00	1127595.00	1119311.00	1112796.00
60	457138.00	456799.41	458767.41	455067.59	454458.69
95	582518.19	581706.63	578256.50	574551.81	577642.19
111	605780.00	606448.19	606370.19	604968.88	608564.19
114	1422587.00	1415358.00	1418130.00	1412034.00	1406409.00
115	6134521.00	6097464.00	6103727.00	6128907.00	6099688.00
116	889908.81	884251.00	882771.31	885372.00	886322.88
118	834597.50	834124.81	834758.00	832982.31	829008.00
204	50164.42	50722.34	51239.73	52245.21	52375.13
205	1449399.00	1444889.00	1463075.00	1467627.00	1475043.00
206	1013061.00	1021512.00	1026749.00	1022823.00	1028747.00
207	911532.81	907450.31	912652.00	916670.63	914989.13
208	2188323.00	2179130.00	2193981.00	2195687.00	2166986.00

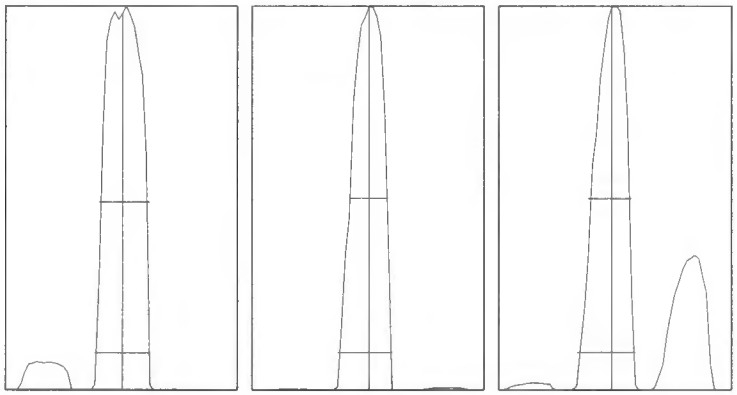
Tune Report

Tune File : autotune.u
Comment :



Integration Time:	0.1000 sec	
Sampling Period:	0.3100 sec	
n:	200	
Oxide:	156/140	0.535%
Doubly Charged:	70/140	1.171%

m/z	Range	Count	Mean	RSD%	Background
7	50,000	33942.0	33830.2	1.53	1.20
89	100,000	67141.0	65460.4	1.82	1.90
205	50,000	41673.0	40699.1	2.26	4.00



m/z:	7	89	205
Height:	33,807	66,519	40,303
Axis:	7.05	89.05	205.00
W-50%:	0.65	0.50	0.55
W-10%:	0.700	0.700	0.7500

Integration Time: 0.1000 sec
Acquisition Time: 22.7600 sec

Y axis : Linear

Tune Report

Tune File : autotune.u
Comment :

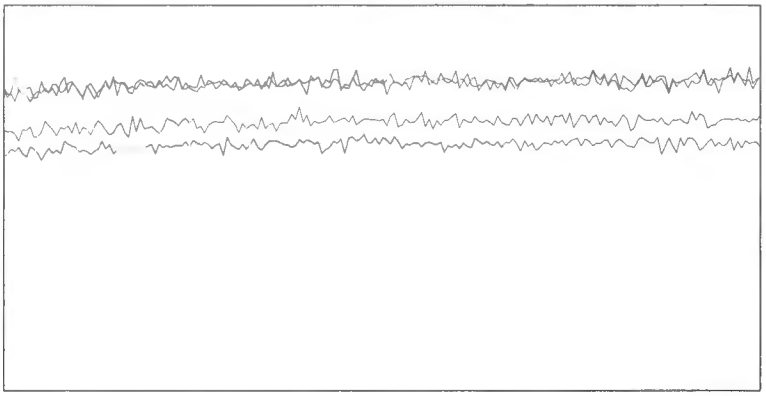
Tuning Parameters

===Plasma Condition===			===Ion Lenses===			===Q-Pole Parameters===		
RF Power	:	1550 W	Extract 1	:	0 V	AMU Gain	:	118
RF Matching	:	1.5 V	Extract 2	:	-120 V	AMU Offset	:	128
Smpl Depth	:	8 mm	Omega Bias	:	-90 V	Axis Gain	:	0.998
Torch-H	:	0.1 mm	Omega Lens	:	8 V	Axis Offset	:	0.11
Torch-V	:	0.1 mm	Cell Entrance	:	-30 V	QP Bias	:	-3 V
Carrier Gas	:	0.55 L/min	Cell Exit	:	-50 V			
Dilution Mode	:	ON	Deflect	:	12.2 V	===Detector Parameters===		
Dilution Gas	:	0.5 L/min	Plate Bias	:	-40 V	Discriminator	:	4.5 mV
Optional Gas	:	0 %	===Octopole Parameters===			Analog HV	:	1919 V
Nebulizer Pump	:	0.1 rps	OctP RF	:	190 V	Pulse HV	:	1104 V
Sample Pump	:	--- rps	OctP Bias	:	-8 V			
S/C Temp	:	2 degC						

===Reaction Cell===								
Reaction Mode	:	OFF						
H2 Gas	:	0 mL/min	He Gas	:	0 mL/min	Optional Gas	:	--- %

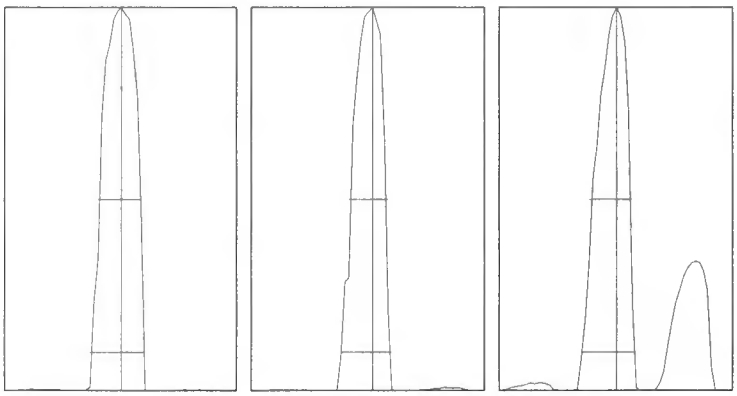
Tune Report

Tune File : he.u
Comment :



Integration Time:	0.1000 sec	
Sampling Period:	0.6200 sec	
n:	200	
Oxide:	156/140	0.247%
Doubly Charged:	70/140	1.286%

m/z	Range	Count	Mean	RSD%	Background
59	20,000	12555.0	12734.6	1.93	0.00
89	20,000	16212.0	15941.2	1.97	0.20
140	50,000	40899.0	39843.3	1.94	0.20
205	50,000	35802.0	34693.3	2.14	0.50
156/140	1	0.196%	0.233%	12.67	
70/140	2	1.374%	1.263%	6.41	



m/z:	59	89	205
Height:	13,037	16,439	35,819
Axis:	59.05	89.10	205.05
W-50%:	0.55	0.50	0.55
W-10%:	0.700	0.6500	0.700

Integration Time: 0.1000 sec
Acquisition Time: 22.5600 sec

Y axis : Linear

Tune Report

Tune File : he.u
Comment :

Tuning Parameters

===Plasma Condition===			===Ion Lenses===			===Q-Pole Parameters===		
RF Power	:	1550 W	Extract 1	:	0 V	AMU Gain	:	118
RF Matching	:	1.5 V	Extract 2	:	-120 V	AMU Offset	:	128
Smpl Depth	:	8 mm	Omega Bias	:	-80 V	Axis Gain	:	0.998
Torch-H	:	0.1 mm	Omega Lens	:	8.5 V	Axis Offset	:	0.11
Torch-V	:	0.1 mm	Cell Entrance	:	-40 V	QP Bias	:	-15 V
Carrier Gas	:	0.55 L/min	Cell Exit	:	-60 V			
Dilution Mode	:	ON	Deflect	:	-0.4 V	===Detector Parameters===		
Dilution Gas	:	0.5 L/min	Plate Bias	:	-60 V	Discriminator	:	4.5 mV
Optional Gas	:	0 %	===Octopole Parameters===			Analog HV	:	1919 V
Nebulizer Pump	:	0.1 rps	OctP RF	:	190 V	Pulse HV	:	1104 V
Sample Pump	:	--- rps	OctP Bias	:	-18 V			
S/C Temp	:	2 degC						

===Reaction Cell===								
Reaction Mode	:	ON						
H2 Gas	:	0 mL/min	He Gas	:	4.3 mL/min	Optional Gas	:	--- %

QC Tune Report

Data File: C:\ICPMH\1\7500\QCTUNE.D
Date Acquired: 10 Dec 2019 03:42:44 pm
Operator: LP 7700
Misc Info:
Vial Number: 1307
Current Method: C:\ICPMH\1\METHODS\TN_6020.m

Minimum Response(CPS)

Element	Actual	Required	Flag

RSD (%)

Element	Actual	Required	Flag
6 Li	0.17	5.00	
59 Co	1.06	5.00	
115 In	0.63	5.00	
205 Tl	0.57	5.00	

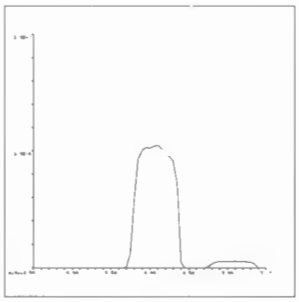
Ion Ratio

Element	Actual	Required	Flag

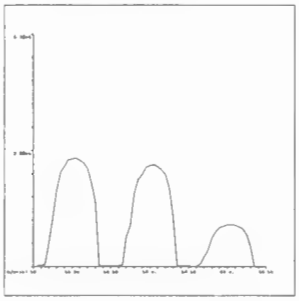
Maximum Bkg. Count(CPS)

Element	Actual	Required	Flag

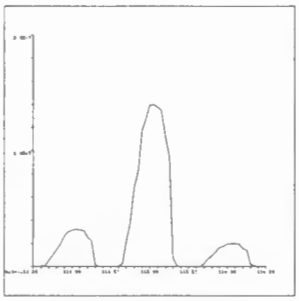
C:\ICPMH\1\DATA\121019B2.B\QCTUNE00.D



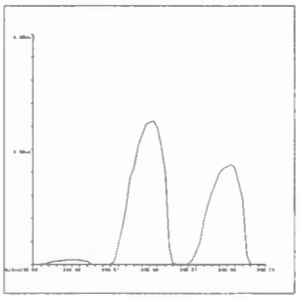
6 Li
Mass Calib.
Actual: 6.05
Required: 5.90-6.10
Flag:
Peak Width
Actual: 0.60
Required: 0.90
Flag:



59 Co
Mass Calib.
Actual: 59.05
Required: 58.90-59.10
Flag:
Peak Width
Actual: 0.60
Required: 0.90
Flag:



115 In
Mass Calib.
Actual: 115.05
Required: 114.90-115.10
Flag:
Peak Width
Actual: 0.60
Required: 0.90
Flag:



205 Tl
Mass Calib.
Actual: 205.00
Required: 204.90-205.10
Flag:
Peak Width
Actual: 0.65
Required: 0.90
Flag:

QC Tune Result:Pass

C:\ICPMH\1\DATA\121019B2.B\QCTUNE00.D

Replicated Data: Tune #1

Mass	Count(CPS)				
6	2877351.00	2862537.00	2853527.00	2829811.00	2840811.00
7	158721.09	156592.50	154929.91	155404.70	154440.41
8	36.00	31.50	35.00	41.50	28.00
58	1225560.00	1223748.00	1209847.00	1207828.00	1200629.00
59	1137512.00	1123184.00	1127595.00	1119311.00	1112796.00
60	457138.00	456799.41	458767.41	455067.59	454458.69
95	582518.19	581706.63	578256.50	574551.81	577642.19
111	605780.00	606448.19	606370.19	604968.88	608564.19
114	1422587.00	1415358.00	1418130.00	1412034.00	1406409.00
115	6134521.00	6097464.00	6103727.00	6128907.00	6099688.00
116	889908.81	884251.00	882771.31	885372.00	886322.88
118	834597.50	834124.81	834758.00	832982.31	829008.00
204	50164.42	50722.34	51239.73	52245.21	52375.13
205	1449399.00	1444889.00	1463075.00	1467627.00	1475043.00
206	1013061.00	1021512.00	1026749.00	1022823.00	1028747.00
207	911532.81	907450.31	912652.00	916670.63	914989.13
208	2188323.00	2179130.00	2193981.00	2195687.00	2166986.00

COVER PAGE
GENERAL CHEMISTRY

Lab Name: Eurofins TestAmerica, St. Louis Job Number: 160-36526-1

SDG No.:

Project: ACMS - Yerington OU-4B_OU-5_SOIL

Client Sample ID	Lab Sample ID
STSB27_0-0.5	160-36526-1
STSB27_0.5-3	160-36526-2
STSB27_3-6	160-36526-3
STSB27_6-15	160-36526-4
STSB28_0-0.5	160-36526-5
STSB28-FD_0-0.5	160-36526-6
STSB28_0.5-3	160-36526-7
STSB28_3-6	160-36526-8
STSB28_6-15	160-36526-9
STSB29_0-0.5	160-36526-10
STSB29_0.5-3	160-36526-11
STSB29_3-6	160-36526-12
STSB29_6-15	160-36526-13
STSB29-FD_6-15	160-36526-14
STSB30_0-0.5	160-36526-15
STSB30_0.5-3	160-36526-16
STSB30_3-6	160-36526-17
STSB30_6-15	160-36526-18
STSB31_0-0.5	160-36526-19
STSB31_0.5-3	160-36526-20
STSB31_3-6	160-36526-21
STSB31_6-15	160-36526-22

Comments:

9-IN
DETECTION LIMITS
GENERAL CHEMISTRY

Lab Name: Eurofins TestAmerica, St. Louis Job Number: 160-36526-1

SDG Number:

Matrix: Solid Instrument ID: NOEQUIP

Method: Moisture RL Date: 01/28/2011 14:43

Analyte	Wavelength/ Mass	RL (%)	
Percent Moisture		0.1	
Percent Solids		0.1	

9-IN
CALIBRATION BLANK DETECTION LIMITS
GENERAL CHEMISTRY

Lab Name: Eurofins TestAmerica, St. Louis Job Number: 160-36526-1

SDG Number:

Matrix: Solid Instrument ID: NOEQUIP

Method: Moisture XRL Date: 01/28/2011 14:42

Analyte	Wavelength/ Mass	XRL (%)	
Percent Moisture		0.1	
Percent Solids		0.1	

13-IN
ANALYSIS RUN LOG
GENERAL CHEMISTRY

Lab Name: Eurofins TestAmerica, St. Louis Job No.: 160-36526-1

SDG No.:

Instrument ID: NOEQUIP Analysis Method: Moisture

Start Date: 11/28/2019 11:12 End Date: 11/28/2019 11:12

Lab Sample Id	D/F	Type	Time	Analytes	
				% Sol	Moist
160-36526-1	1	T	11:12	X	X
160-36526-2	1	T	11:12	X	X
160-36526-3	1	T	11:12	X	X
160-36526-4	1	T	11:12	X	X
160-36526-5	1	T	11:12	X	X
160-36526-6	1	T	11:12	X	X
160-36526-7	1	T	11:12	X	X
160-36526-8	1	T	11:12	X	X
160-36526-9	1	T	11:12	X	X
160-36526-10	1	T	11:12	X	X
160-36526-11	1	T	11:12	X	X
160-36526-12	1	T	11:12	X	X
160-36526-13	1	T	11:12	X	X
160-36526-14	1	T	11:12	X	X
160-36526-15	1	T	11:12	X	X
160-36526-16	1	T	11:12	X	X
160-36526-17	1	T	11:12	X	X
160-36526-18	1	T	11:12	X	X
160-36526-19	1	T	11:12	X	X
160-36526-20	1	T	11:12	X	X
160-36526-20 DU	1	T	11:12	X	X

Prep Types:
T = Total/NA

FORM XIII-IN

13-IN
ANALYSIS RUN LOG
GENERAL CHEMISTRY

Lab Name: Eurofins TestAmerica, St. Louis Job No.: 160-36526-1

SDG No.:

Instrument ID: NOEQUIP Analysis Method: Moisture

Start Date: 11/28/2019 12:00 End Date: 11/28/2019 12:00

Lab Sample Id	D/F	Type	Time	Analytes																							
				% Sol	Moist																						
ZZZZZZ			12:00																								
ZZZZZZ			12:00																								
ZZZZZZ			12:00																								
ZZZZZZ			12:00																								
160-36526-21	1	T	12:00	X	X																						
160-36526-22	1	T	12:00	X	X																						
ZZZZZZ			12:00																								
ZZZZZZ			12:00																								
ZZZZZZ			12:00																								
160-36453-A-23 DU	1	T	12:00	X	X																						
ZZZZZZ			12:00																								
ZZZZZZ			12:00																								
ZZZZZZ			12:00																								
ZZZZZZ			12:00																								
ZZZZZZ			12:00																								

Prep Types:
T = Total/NA

FORM XIII-IN

GENERAL CHEMISTRY BATCH WORKSHEET

Lab Name: Eurofins TestAmerica, St. Loui Job No.: 160-36526-1

SDG No.:

Batch Number: 452332 Batch Start Date: 11/28/19 11:12 Batch Analyst: Patel, Kaushal P

Batch Method: Moisture Batch End Date: 12/02/19 13:54

Lab Sample ID	Client Sample ID	Method Chain	Basis	DISH#	DishWeight	SampleMassWet	SampleMassDry		
160-36526-B-1	STSB27_0-0.5	Moisture	T	1	0.9982 g	16.3344 g	16.0973 g		
160-36526-B-2	STSB27_0.5-3	Moisture	T	2	1.0128 g	15.1648 g	14.7001 g		
160-36526-B-3	STSB27_3-6	Moisture	T	3	1.0008 g	16.4696 g	15.7777 g		
160-36526-B-4	STSB27_6-15	Moisture	T	4	1.0094 g	15.4721 g	14.2399 g		
160-36526-B-5	STSB28_0-0.5	Moisture	T	5	0.9999 g	15.6181 g	14.8774 g		
160-36526-B-6	STSB28-FD_0-0.5	Moisture	T	6	1.0071 g	14.9891 g	14.2653 g		
160-36526-B-7	STSB28_0.5-3	Moisture	T	7	0.9949 g	15.5437 g	14.8895 g		
160-36526-B-8	STSB28_3-6	Moisture	T	8	1.0209 g	14.6054 g	13.9711 g		
160-36526-B-9	STSB28_6-15	Moisture	T	9	1.0041 g	13.2865 g	11.2075 g		
160-36526-B-10	STSB29_0-0.5	Moisture	T	10	1.0060 g	16.7711 g	16.0587 g		
160-36526-B-11	STSB29_0.5-3	Moisture	T	11	1.0092 g	16.8122 g	16.0929 g		
160-36526-B-12	STSB29_3-6	Moisture	T	12	1.0055 g	14.1441 g	13.5790 g		
160-36526-B-13	STSB29_6-15	Moisture	T	13	1.0049 g	14.2046 g	13.1757 g		
160-36526-B-14	STSB29-FD_6-15	Moisture	T	14	1.0112 g	16.9566 g	15.3739 g		
160-36526-B-15	STSB30_0-0.5	Moisture	T	15	1.0040 g	17.4058 g	16.5536 g		
160-36526-B-16	STSB30_0.5-3	Moisture	T	16	1.0019 g	16.8312 g	16.0108 g		
160-36526-B-17	STSB30_3-6	Moisture	T	17	1.0099 g	16.2672 g	15.5816 g		
160-36526-B-18	STSB30_6-15	Moisture	T	18	1.0064 g	14.8811 g	12.6347 g		
160-36526-B-19	STSB31_0-0.5	Moisture	T	19	1.0145 g	15.4397 g	14.3128 g		
160-36526-B-20	STSB31_0.5-3	Moisture	T	20	0.9967 g	16.2963 g	15.4468 g		
160-36526-B-20 DU	STSB31_0.5-3	Moisture	T	21	1.0053 g	18.5479 g	17.6455 g		

The pound sign (#) in the amount added field denotes that the reagent was used undiluted. All calculations are performed using the stated concentration for this reagent.

GENERAL CHEMISTRY BATCH WORKSHEET

Lab Name: Eurofins TestAmerica, St. Loui Job No.: 160-36526-1

SDG No.:

Batch Number: 452332 Batch Start Date: 11/28/19 11:12 Batch Analyst: Patel, Kaushal P

Batch Method: Moisture Batch End Date: 12/02/19 13:54

Batch Notes	
Balance ID	0034150065
Batch Comment	TRAY -E1
Date samples were placed in the oven	11/28/2019
Oven Temp In	103.8 Degrees C
Time samples were place in the oven	11:54
Date samples were removed from oven	12/02/2019
Oven Temp Out	104.0 Degrees C
Time Samples were removed from oven	13:54
Oven ID	OC
Thermometer ID	A142186

Basis	Basis Description
T	Total/NA

The pound sign (#) in the amount added field denotes that the reagent was used undiluted. All calculations are performed using the stated concentration for this reagent.

GENERAL CHEMISTRY BATCH WORKSHEET

Lab Name: Eurofins TestAmerica, St. Loui Job No.: 160-36526-1

SDG No.:

Batch Number: 452334 Batch Start Date: 11/28/19 12:00 Batch Analyst: Patel, Kaushal P

Batch Method: Moisture Batch End Date: 12/02/19 13:54

Lab Sample ID	Client Sample ID	Method Chain	Basis	DISH#	DishWeight	SampleMassWet	SampleMassDry		
160-36526-B-21	STSB31_3-6	Moisture	T	5	1.0094 g	19.1137 g	18.0496 g		
160-36526-B-22	STSB31_6-15	Moisture	T	6	1.0106 g	10.9784 g	10.4492 g		
160-36453-A-23 DU		Moisture	T	10	1.0103 g	11.7326 g	11.5456 g		

Batch Notes	
Balance ID	0034150065
Batch Comment	TRAY G-2
Date samples were placed in the oven	11/28/2019
Oven Temp In	104 Degrees C
Time samples were place in the oven	12:26
Date samples were removed from oven	12/02/2019
Oven Temp Out	104.0 Degrees C
Time Samples were removed from oven	13:54
Oven ID	OC
Thermometer ID	A142186

Basis	Basis Description
T	Total/NA

The pound sign (#) in the amount added field denotes that the reagent was used undiluted. All calculations are performed using the stated concentration for this reagent.

Prep Batch: 452567

Fill Geometry, 21-Day In-Growth

Gamma Spectroscopy Analysis Detail Report
Prep Batch: 452567

Lab Id: MB 160-452567/1-A | Analyzed: 12/25/19 10:44 | Ts: 30 | Sigma: 2
Client ID: | Detector: GV16 | Decay Corrected: No | Ingrowth:

Analyte	MB Result	Count Unc	Total Unc	Qualifier	Unit	RL	MDC	Anly Batch
Radium-226	-0.05823	0.152	0.152	U	pCi/g	1.00	0.355	455099
Radium-228	-0.01981	0.167	0.167	U	pCi/g	1.00	0.249	455099

Lab Id: LCS 160-452567/2-A | Analyzed: 12/25/19 10:46 | Ts: 30 | Sigma: 2
Client ID: | Detector: GV17 | Decay Corrected: No | Ingrowth:

Analyte	LCS Result	Count Unc	Total Unc	Qualifier	Unit	RL	MDC	Anly Batch
Americium-241	94.90	1.54	9.97		pCi/g		1.11	455100
Cesium-137	27.06	0.655	2.89		pCi/g		0.218	455100
Cobalt-60	10.48	0.335	1.10		pCi/g		0.0972	455100

Lab Id: 160-36526-1 | Analyzed: 12/25/19 08:19 | Ts: 30 | Sigma: 2
Client ID: STSB27_0-0.5 | Detector: GV16 | Decay Corrected: No | Ingrowth:

Analyte	Result	Count Unc	Total Unc	Qualifier	Unit	RL	MDC	Anly Batch
Radium-226	1.68	0.215	0.277		pCi/g	1.00	0.145	455099
Radium-228	0.731	0.258	0.269		pCi/g	1.00	0.244	455099

Lab Id: 160-36526-2 | Analyzed: 12/25/19 08:19 | Ts: 30 | Sigma: 2
Client ID: STSB27_0.5-3 | Detector: GV17 | Decay Corrected: No | Ingrowth:

Analyte	Result	Count Unc	Total Unc	Qualifier	Unit	RL	MDC	Anly Batch
Radium-226	2.01	0.230	0.311		pCi/g	1.00	0.146	455100
Radium-228	0.787	0.188	0.204		pCi/g	1.00	0.197	455100

Lab Id: 160-36526-3 | Analyzed: 12/25/19 08:20 | Ts: 30 | Sigma: 2
Client ID: STSB27_3-6 | Detector: GV5 | Decay Corrected: No | Ingrowth:

Analyte	Result	Count Unc	Total Unc	Qualifier	Unit	RL	MDC	Anly Batch
Radium-226	1.96	0.254	0.326		pCi/g	1.00	0.146	455104
Radium-228	0.702	0.218	0.229		pCi/g	1.00	0.279	455104

Lab Id: 160-36526-4 | Analyzed: 12/25/19 09:01 | Ts: 30 | Sigma: 2
Client ID: STSB27_6-15 | Detector: GV16 | Decay Corrected: No | Ingrowth:

Analyte	Result	Count Unc	Total Unc	Qualifier	Unit	RL	MDC	Anly Batch
Radium-226	1.69	0.247	0.303		pCi/g	1.00	0.168	455099
Radium-228	1.11	0.312	0.332		pCi/g	1.00	0.310	455099

Gamma Spectroscopy Analysis Detail Report
Prep Batch: 452567

Lab Id: 160-36526-5 | Analyzed: 12/25/19 09:02 | Ts: 30 | Sigma: 2
Client ID: STSB28_0-0.5 | Detector: GV17 | Decay Corrected: No | Ingrowth:

Analyte	Result	Count Unc	Total Unc	Qualifier	Unit	RL	MDC	Anly Batch
Radium-226	1.93	0.216	0.295		pCi/g	1.00	0.113	455100
Radium-228	0.863	0.225	0.242		pCi/g	1.00	0.258	455100

Lab Id: 160-36526-6 | Analyzed: 12/25/19 09:03 | Ts: 30 | Sigma: 2
Client ID: STSB28-FD_0-0.5 | Detector: GV5 | Decay Corrected: No | Ingrowth:

Analyte	Result	Count Unc	Total Unc	Qualifier	Unit	RL	MDC	Anly Batch
Radium-226	1.77	0.255	0.315		pCi/g	1.00	0.175	455104
Radium-228	0.807	0.249	0.262		pCi/g	1.00	0.213	455104

Lab Id: 160-36526-7 | Analyzed: 12/25/19 09:34 | Ts: 30 | Sigma: 2
Client ID: STSB28_0.5-3 | Detector: GV9 | Decay Corrected: No | Ingrowth:

Analyte	Result	Count Unc	Total Unc	Qualifier	Unit	RL	MDC	Anly Batch
Radium-226	2.72	0.238	0.370		pCi/g	1.00	0.120	455101
Radium-228	0.684	0.205	0.216		pCi/g	1.00	0.354	455101

Lab Id: 160-36526-8 | Analyzed: 12/25/19 09:35 | Ts: 30 | Sigma: 2
Client ID: STSB28_3-6 | Detector: GV12 | Decay Corrected: No | Ingrowth:

Analyte	Result	Count Unc	Total Unc	Qualifier	Unit	RL	MDC	Anly Batch
Radium-226	3.11	0.317	0.448		pCi/g	1.00	0.181	455102
Radium-228	1.13	0.229	0.256		pCi/g	1.00	0.0977	455102

Lab Id: 160-36526-9 | Analyzed: 12/25/19 09:35 | Ts: 30 | Sigma: 2
Client ID: STSB28_6-15 | Detector: GV14 | Decay Corrected: No | Ingrowth:

Analyte	Result	Count Unc	Total Unc	Qualifier	Unit	RL	MDC	Anly Batch
Radium-226	2.28	0.339	0.413		pCi/g	1.00	0.205	455098
Radium-228	1.98	0.337	0.393		pCi/g	1.00	0.174	455098

Lab Id: 160-36526-10 | Analyzed: 12/25/19 09:36 | Ts: 30 | Sigma: 2
Client ID: STSB29_0-0.5 | Detector: GV16 | Decay Corrected: No | Ingrowth:

Analyte	Result	Count Unc	Total Unc	Qualifier	Unit	RL	MDC	Anly Batch
Radium-226	1.22	0.230	0.263		pCi/g	1.00	0.175	455099
Radium-228	0.740	0.165	0.181		pCi/g	1.00	0.245	455099

Gamma Spectroscopy Analysis Detail Report
Prep Batch: 452567

Lab Id: 160-36526-11 | Analyzed: 12/25/19 09:36 | Ts: 30 | Sigma: 2
Client ID: STSB29_0.5-3 | Detector: GV17 | Decay Corrected: No | Ingrowth:

Analyte	Result	Count Unc	Total Unc	Qualifier	Unit	RL	MDC	Anly Batch
Radium-226	1.34	0.209	0.251		pCi/g	1.00	0.137	455100
Radium-228	0.962	0.177	0.202		pCi/g	1.00	0.0877	455100

Lab Id: 160-36526-11 DU | Analyzed: 12/25/19 10:10 | Ts: 30 | Sigma: 2
Client ID: STSB29_0.5-3 | Detector: GV9 | Decay Corrected: No | Ingrowth:

Analyte	DU Result	Count Unc	Total Unc	Qualifier	Unit	RL	MDC	Anly Batch
Radium-226	1.419	0.231	0.274		pCi/g	1.00	0.162	455101
Radium-228	0.6580	0.230	0.240		pCi/g	1.00	0.209	455101

Lab Id: 160-36526-12 | Analyzed: 12/25/19 09:37 | Ts: 30 | Sigma: 2
Client ID: STSB29_3-6 | Detector: GV5 | Decay Corrected: No | Ingrowth:

Analyte	Result	Count Unc	Total Unc	Qualifier	Unit	RL	MDC	Anly Batch
Radium-226	1.14	0.253	0.280		pCi/g	1.00	0.242	455104
Radium-228	1.16	0.290	0.314		pCi/g	1.00	0.331	455104

Lab Id: 160-36526-13 | Analyzed: 12/25/19 10:11 | Ts: 30 | Sigma: 2
Client ID: STSB29_6-15 | Detector: GV12 | Decay Corrected: No | Ingrowth:

Analyte	Result	Count Unc	Total Unc	Qualifier	Unit	RL	MDC	Anly Batch
Radium-226	1.79	0.360	0.404		pCi/g	1.00	0.291	455102
Radium-228	1.33	0.345	0.371		pCi/g	1.00	0.206	455102

Lab Id: 160-36526-14 | Analyzed: 12/25/19 10:11 | Ts: 30 | Sigma: 2
Client ID: STSB29-FD_6-15 | Detector: GV14 | Decay Corrected: No | Ingrowth:

Analyte	Result	Count Unc	Total Unc	Qualifier	Unit	RL	MDC	Anly Batch
Radium-226	1.66	0.279	0.328		pCi/g	1.00	0.207	455098
Radium-228	1.42	0.229	0.271		pCi/g	1.00	0.212	455098

Lab Id: 160-36526-15 | Analyzed: 12/25/19 10:12 | Ts: 30 | Sigma: 2
Client ID: STSB30_0-0.5 | Detector: GV16 | Decay Corrected: No | Ingrowth:

Analyte	Result	Count Unc	Total Unc	Qualifier	Unit	RL	MDC	Anly Batch
Radium-226	2.82	0.274	0.401		pCi/g	1.00	0.167	455099
Radium-228	0.735	0.286	0.296		pCi/g	1.00	0.279	455099

Gamma Spectroscopy Analysis Detail Report
Prep Batch: 452567

Lab Id: 160-36526-16 | Analyzed: 12/25/19 10:13 | Ts: 30 | Sigma: 2
Client ID: STSB30_0.5-3 | Detector: GV17 | Decay Corrected: No | Ingrowth:

Analyte	Result	Count Unc	Total Unc	Qualifier	Unit	RL	MDC	Anly Batch
Radium-226	2.35	0.240	0.343		pCi/g	1.00	0.120	455100
Radium-228	0.832	0.235	0.250		pCi/g	1.00	0.173	455100

Lab Id: 160-36526-17 | Analyzed: 12/25/19 10:14 | Ts: 30 | Sigma: 2
Client ID: STSB30_3-6 | Detector: GV5 | Decay Corrected: No | Ingrowth:

Analyte	Result	Count Unc	Total Unc	Qualifier	Unit	RL	MDC	Anly Batch
Radium-226	2.15	0.288	0.364		pCi/g	1.00	0.181	455104
Radium-228	0.972	0.302	0.317		pCi/g	1.00	0.230	455104

Lab Id: 160-36526-18 | Analyzed: 12/25/19 10:42 | Ts: 30 | Sigma: 2
Client ID: STSB30_6-15 | Detector: GV9 | Decay Corrected: No | Ingrowth:

Analyte	Result	Count Unc	Total Unc	Qualifier	Unit	RL	MDC	Anly Batch
Radium-226	2.17	0.303	0.377		pCi/g	1.00	0.200	455101
Radium-228	1.43	0.274	0.310		pCi/g	1.00	0.203	455101

Lab Id: 160-36526-19 | Analyzed: 12/25/19 10:43 | Ts: 30 | Sigma: 2
Client ID: STSB31_0-0.5 | Detector: GV12 | Decay Corrected: No | Ingrowth:

Analyte	Result	Count Unc	Total Unc	Qualifier	Unit	RL	MDC	Anly Batch
Radium-226	4.73	0.425	0.643		pCi/g	1.00	0.245	455102
Radium-228	0.866	0.338	0.349		pCi/g	1.00	0.530	455102

Lab Id: 160-36526-20 | Analyzed: 12/25/19 10:43 | Ts: 30 | Sigma: 2
Client ID: STSB31_0.5-3 | Detector: GV14 | Decay Corrected: No | Ingrowth:

Analyte	Result	Count Unc	Total Unc	Qualifier	Unit	RL	MDC	Anly Batch
Radium-226	3.60	0.308	0.485		pCi/g	1.00	0.144	455098
Radium-228	0.970	0.225	0.246		pCi/g	1.00	0.216	455098

Gamma Spectroscopy Analysis Detail Report
Prep Batch: 452567

Quality Control Summary

Method Blank ID:	Analyte	Parent Result	Spike Added	MB Result	Qualifier	Unit	% Rec	% Rec Limits	RPD	RER	DER	DER Limit	Z Factor
MB 160-452567/1-A	Radium-226			-0.05823	U	pCi/g							-.7679
MB 160-452567/1-A	Radium-228			-0.01981	U	pCi/g							-.2378
Lab Control Sample ID:	**Analyte**	**Parent Result**	**Spike Added**	**LCS Result**	**Qualifier**	**Unit**	**% Rec**	**% Rec Limits**	**RPD**	**RER**	**DER**	**DER Limit**	**Z Factor**
LCS 160-452567/2-A	Americium-241		96.6	94.90		pCi/g	98	75 - 125					-.3184
LCS 160-452567/2-A	Cesium-137		27.3	27.06		pCi/g	99	75 - 125					-.1774
LCS 160-452567/2-A	Cobalt-60		10.8	10.48		pCi/g	97	75 - 125					-.4623
Duplicate ID:	**Analyte**	**Parent Result**	**Spike Added**	**DU Result**	**Qualifier**	**Unit**	**% Rec**	**% Rec Limits**	**RPD**	**RER**	**DER**	**DER Limit**	**Z Factor**
160-36526-11	Radium-226	1.34		1.419		pCi/g			6	0.15	0.41	2	.4125
160-36526-11	Radium-228	0.962		0.6580		pCi/g			38	0.69	1.94	2	1.9401

Glossary:

Ts = Count Duration, Sample

GAMMA SPECTROSCOPY BATCH WORKSHEET

Lab Name: Eurofins TestAmerica, St. Loui Job No.: 160-36526-1

SDG No.:

Batch Number: 452567 Batch Start Date: 12/01/19 08:08 Batch Analyst: Small, Sean J

Batch Method: Fill_Geo-21 Batch End Date: 12/01/19 10:11

Lab Sample ID	Client Sample ID	Method Chain	Basis	TareWeight	GrossWeight	InitialAmount	IngDecDate1	IngDecDate3	Geometry
MB 160-452567/1		Fill_Geo-21, 901.1				291.18 g	12/1/19 09:25	12/22/19 09:25	Tuna Can
LCS 160-452567/2		Fill_Geo-21, 901.1				341.9 g	12/1/19 09:25	12/22/19 09:25	Tuna Can
160-36526-A-1-A	STSB27_0-0.5	Fill_Geo-21, 901.1	T	46.5 g	453.8 g	407.3 g	12/1/19 09:25	12/22/19 09:25	Tuna Can
160-36526-A-2-A	STSB27_0.5-3	Fill_Geo-21, 901.1	T	46.4 g	462.3 g	415.9 g	12/1/19 09:25	12/22/19 09:25	Tuna Can
160-36526-A-3-A	STSB27_3-6	Fill_Geo-21, 901.1	T	46.4 g	475.4 g	429 g	12/1/19 09:25	12/22/19 09:25	Tuna Can
160-36526-A-4-A	STSB27_6-15	Fill_Geo-21, 901.1	T	46.6 g	370.5 g	323.9 g	12/1/19 09:25	12/22/19 09:25	Tuna Can
160-36526-A-5-A	STSB28_0-0.5	Fill_Geo-21, 901.1	T	46.7 g	450.3 g	403.6 g	12/1/19 09:25	12/22/19 09:25	Tuna Can
160-36526-A-6-A	STSB28-FD_0-0.5	Fill_Geo-21, 901.1	T	46.6 g	459.4 g	412.8 g	12/1/19 09:25	12/22/19 09:25	Tuna Can
160-36526-A-7-A	STSB28_0.5-3	Fill_Geo-21, 901.1	T	46.5 g	452.9 g	406.4 g	12/1/19 09:25	12/22/19 09:25	Tuna Can
160-36526-A-8-A	STSB28_3-6	Fill_Geo-21, 901.1	T	46.9 g	431.9 g	385 g	12/1/19 09:25	12/22/19 09:25	Tuna Can
160-36526-A-9-A	STSB28_6-15	Fill_Geo-21, 901.1	T	46.6 g	271.1 g	224.5 g	12/1/19 09:25	12/22/19 09:25	Tuna Can
160-36526-A-10-A	STSB29_0-0.5	Fill_Geo-21, 901.1	T	46.7 g	451.2 g	404.5 g	12/1/19 09:25	12/22/19 09:25	Tuna Can
160-36526-A-11-A	STSB29_0.5-3	Fill_Geo-21, 901.1	T	46.5 g	429.7 g	383.2 g	12/1/19 09:25	12/22/19 09:25	Tuna Can
160-36526-A-11-B DU	STSB29_0.5-3	Fill_Geo-21, 901.1	T	46.5 g	429.7 g	383.2 g	12/1/19 09:25	12/22/19 09:25	Tuna Can
160-36526-A-12-A	STSB29_3-6	Fill_Geo-21, 901.1	T	46.4 g	378.5 g	332.1 g	12/1/19 09:25	12/22/19 09:25	Tuna Can
160-36526-A-13-A	STSB29_6-15	Fill_Geo-21, 901.1	T	46.0 g	313.7 g	267.7 g	12/1/19 09:25	12/22/19 09:25	Tuna Can
160-36526-A-14-A	STSB29-FD_6-15	Fill_Geo-21, 901.1	T	46.3 g	330.0 g	283.7 g	12/1/19 09:25	12/22/19 09:25	Tuna Can
160-36526-A-15-A	STSB30_0-0.5	Fill_Geo-21, 901.1	T	46.6 g	439.9 g	393.3 g	12/1/19 09:25	12/22/19 09:25	Tuna Can
160-36526-A-16-A	STSB30_0.5-3	Fill_Geo-21, 901.1	T	46.2 g	449.9 g	403.7 g	12/1/19 09:25	12/22/19 09:25	Tuna Can
160-36526-A-17-A	STSB30_3-6	Fill_Geo-21, 901.1	T	46.4 g	454.1 g	407.7 g	12/1/19 09:25	12/22/19 09:25	Tuna Can
160-36526-A-18-A	STSB30_6-15	Fill_Geo-21, 901.1	T	46.1 g	290.2 g	244.1 g	12/1/19 09:25	12/22/19 09:25	Tuna Can

The pound sign (#) in the amount added field denotes that the reagent was used undiluted. All calculations are performed using the stated concentration for this reagent.

GAMMA SPECTROSCOPY BATCH WORKSHEET

Lab Name: Eurofins TestAmerica, St. Loui Job No.: 160-36526-1

SDG No.:

Batch Number: 452567 Batch Start Date: 12/01/19 08:08 Batch Analyst: Small, Sean J

Batch Method: Fill_Geo-21 Batch End Date: 12/01/19 10:11

Lab Sample ID	Client Sample ID	Method Chain	Basis	TareWeight	GrossWeight	InitialAmount	IngDecDate1	IngDecDate3	Geometry
160-36526-A-19-A	STSB31_0-0.5	Fill_Geo-21, 901.1	T	46.2 g	404.9 g	358.7 g	12/1/19 09:25	12/22/19 09:25	Tuna Can
160-36526-A-20-A	STSB31_0.5-3	Fill_Geo-21, 901.1	T	46.5 g	455.2 g	408.7 g	12/1/19 09:25	12/22/19 09:25	Tuna Can

Lab Sample ID	Client Sample ID	Method Chain	Basis	Tuna Can LCS 00009					
MB 160-452567/1		Fill_Geo-21, 901.1							
LCS 160-452567/2		Fill_Geo-21, 901.1		# g					
160-36526-A-1-A	STSB27_0-0.5	Fill_Geo-21, 901.1	T						
160-36526-A-2-A	STSB27_0.5-3	Fill_Geo-21, 901.1	T						
160-36526-A-3-A	STSB27_3-6	Fill_Geo-21, 901.1	T						
160-36526-A-4-A	STSB27_6-15	Fill_Geo-21, 901.1	T						
160-36526-A-5-A	STSB28_0-0.5	Fill_Geo-21, 901.1	T						
160-36526-A-6-A	STSB28-FD_0-0.5	Fill_Geo-21, 901.1	T						
160-36526-A-7-A	STSB28_0.5-3	Fill_Geo-21, 901.1	T						
160-36526-A-8-A	STSB28_3-6	Fill_Geo-21, 901.1	T						
160-36526-A-9-A	STSB28_6-15	Fill_Geo-21, 901.1	T						
160-36526-A-10-A	STSB29_0-0.5	Fill_Geo-21, 901.1	T						
160-36526-A-11-A	STSB29_0.5-3	Fill_Geo-21, 901.1	T						
160-36526-A-11-B DU	STSB29_0.5-3	Fill_Geo-21, 901.1	T						
160-36526-A-12-A	STSB29_3-6	Fill_Geo-21, 901.1	T						
160-36526-A-13-A	STSB29_6-15	Fill_Geo-21, 901.1	T						
160-36526-A-14-A	STSB29-FD_6-15	Fill_Geo-21, 901.1	T						

The pound sign (#) in the amount added field denotes that the reagent was used undiluted. All calculations are performed using the stated concentration for this reagent.

GAMMA SPECTROSCOPY BATCH WORKSHEET

Lab Name: Eurofins TestAmerica, St. Loui Job No.: 160-36526-1

SDG No.:

Batch Number: 452567 Batch Start Date: 12/01/19 08:08 Batch Analyst: Small, Sean J

Batch Method: Fill_Geo-21 Batch End Date: 12/01/19 10:11

Lab Sample ID	Client Sample ID	Method Chain	Basis	Tuna Can LCS 00009					
160-36526-A-15-A	STSB30_0-0.5	Fill_Geo-21, 901.1	T						
160-36526-A-16-A	STSB30_0.5-3	Fill_Geo-21, 901.1	T						
160-36526-A-17-A	STSB30_3-6	Fill_Geo-21, 901.1	T						
160-36526-A-18-A	STSB30_6-15	Fill_Geo-21, 901.1	T						
160-36526-A-19-A	STSB31_0-0.5	Fill_Geo-21, 901.1	T						
160-36526-A-20-A	STSB31_0.5-3	Fill_Geo-21, 901.1	T						

Batch Notes	
Balance ID	1121432711
SOP Number	ST-RC-0003, ST-RC-0025

Basis	Basis Description
T	Total/NA

The pound sign (#) in the amount added field denotes that the reagent was used undiluted. All calculations are performed using the stated concentration for this reagent.

Prep Batch: 452568

Fill Geometry, 21-Day In-Growth

Gamma Spectroscopy Analysis Detail Report
Prep Batch: 452568

Lab Id: MB 160-452568/1-A | Analyzed: 12/25/19 11:24 | Ts: 30 | Sigma: 2
Client ID: | Detector: GV16 | Decay Corrected: No | Ingrowth:

Analyte	MB Result	Count Unc	Total Unc	Qualifier	Unit	RL	MDC	Anly Batch
Radium-226	-0.008814	0.159	0.159	U	pCi/g	1.00	0.281	455099
Radium-228	0.02422	0.174	0.174	U	pCi/g	1.00	0.249	455099

Lab Id: LCS 160-452568/2-A | Analyzed: 12/25/19 11:26 | Ts: 30 | Sigma: 2
Client ID: | Detector: GV17 | Decay Corrected: No | Ingrowth:

Analyte	LCS Result	Count Unc	Total Unc	Qualifier	Unit	RL	MDC	Anly Batch
Americium-241	93.75	1.60	9.86		pCi/g		1.18	455100
Cesium-137	27.44	0.652	2.93		pCi/g		0.196	455100
Cobalt-60	10.71	0.339	1.13		pCi/g		0.0911	455100

Lab Id: 160-36526-21 | Analyzed: 12/25/19 10:46 | Ts: 30 | Sigma: 2
Client ID: STSB31_3-6 | Detector: GV5 | Decay Corrected: No | Ingrowth:

Analyte	Result	Count Unc	Total Unc	Qualifier	Unit	RL	MDC	Anly Batch
Radium-226	4.63	0.433	0.648		pCi/g	1.00	0.247	455104
Radium-228	0.947	0.312	0.326		pCi/g	1.00	0.302	455104

Lab Id: 160-36526-21 DU | Analyzed: 12/25/19 11:22 | Ts: 30 | Sigma: 2
Client ID: STSB31_3-6 | Detector: GV9 | Decay Corrected: No | Ingrowth:

Analyte	DU Result	Count Unc	Total Unc	Qualifier	Unit	RL	MDC	Anly Batch
Radium-226	4.568	0.315	0.570		pCi/g	1.00	0.146	455101
Radium-228	0.9845	0.308	0.324		pCi/g	1.00	0.234	455101

Lab Id: 160-36526-22 | Analyzed: 12/25/19 11:23 | Ts: 30 | Sigma: 2
Client ID: STSB31_6-15 | Detector: GV12 | Decay Corrected: No | Ingrowth:

Analyte	Result	Count Unc	Total Unc	Qualifier	Unit	RL	MDC	Anly Batch
Radium-226	2.45	0.384	0.458		pCi/g	1.00	0.271	455102
Radium-228	1.55	0.612	0.632		pCi/g	1.00	0.569	455102

Gamma Spectroscopy Analysis Detail Report
Prep Batch: 452568

Quality Control Summary

Method Blank ID:	Analyte	Parent Result	Spike Added	MB Result	Qualifier	Unit	% Rec	% Rec Limits	RPD	RER	DER	DER Limit	Z Factor
MB 160-452568/1-A	Radium-226			-0.008814	U	pCi/g							-.1108
MB 160-452568/1-A	Radium-228			0.02422	U	pCi/g							.278
Lab Control Sample ID:	**Analyte**	**Parent Result**	**Spike Added**	**LCS Result**	**Qualifier**	**Unit**	**% Rec**	**% Rec Limits**	**RPD**	**RER**	**DER**	**DER Limit**	**Z Factor**
LCS 160-452568/2-A	Americium-241		96.6	93.75		pCi/g	97	75 - 125					-.5405
LCS 160-452568/2-A	Cesium-137		27.3	27.44		pCi/g	100	75 - 125					.071
LCS 160-452568/2-A	Cobalt-60		10.8	10.71		pCi/g	100	75 - 125					-.0799
Duplicate ID:	**Analyte**	**Parent Result**	**Spike Added**	**DU Result**	**Qualifier**	**Unit**	**% Rec**	**% Rec Limits**	**RPD**	**RER**	**DER**	**DER Limit**	**Z Factor**
160-36526-21	Radium-226	4.63		4.568		pCi/g			1	0.05	0.14	2	.1437
160-36526-21	Radium-228	0.947		0.9845		pCi/g			4	0.06	0.16	2	.1618

Glossary:

Ts = Count Duration, Sample

GAMMA SPECTROSCOPY BATCH WORKSHEET

Lab Name: Eurofins TestAmerica, St. Loui Job No.: 160-36526-1

SDG No.:

Batch Number: 452568 Batch Start Date: 12/01/19 10:17 Batch Analyst: Small, Sean J

Batch Method: Fill_Geo-21 Batch End Date: 12/01/19 10:23

Lab Sample ID	Client Sample ID	Method Chain	Basis	TareWeight	GrossWeight	InitialAmount	IngDecDate1	IngDecDate3	Geometry
MB 160-452568/1		Fill_Geo-21, 901.1				291.18 g	12/1/19 10:21	12/22/19 10:21	Tuna Can
LCS 160-452568/2		Fill_Geo-21, 901.1				341.9 g	12/1/19 10:21	12/22/19 10:21	Tuna Can
160-36526-A-21-A	STSB31_3-6	Fill_Geo-21, 901.1	T	46.2 g	428.4 g	382.2 g	12/1/19 10:21	12/22/19 10:21	Tuna Can
160-36526-A-21-A DU	STSB31_3-6	Fill_Geo-21, 901.1	T	46.2 g	428.4 g	382.2 g	12/1/19 10:21	12/22/19 10:21	Tuna Can
160-36526-A-22-A	STSB31_6-15	Fill_Geo-21, 901.1	T	46.1 g	257.3 g	211.2 g	12/1/19 10:21	12/22/19 10:21	Tuna Can

Lab Sample ID	Client Sample ID	Method Chain	Basis	Tuna Can LCS 00009				
MB 160-452568/1		Fill_Geo-21, 901.1						
LCS 160-452568/2		Fill_Geo-21, 901.1		# g				
160-36526-A-21-A	STSB31_3-6	Fill_Geo-21, 901.1	T					
160-36526-A-21-A DU	STSB31_3-6	Fill_Geo-21, 901.1	T					
160-36526-A-22-A	STSB31_6-15	Fill_Geo-21, 901.1	T					

Batch Notes	
Balance ID	1121432711
SOP Number	ST-RC-0003, ST-RC-0025

Basis	Basis Description
T	Total/NA

The pound sign (#) in the amount added field denotes that the reagent was used undiluted. All calculations are performed using the stated concentration for this reagent.

Initial Calibrations

Gamma Verification per Geometry

Detector: Ge5

Geometry: Tunacan

Reference date 1/1/2012

Calibration Standard: 90099

Standard volume g / vial 1550

Standard volume transferred in g / geometry 317.8

lab ID# of cal standard Rad12-0007

Isotope	Certified Activity gammas/sec	Geometry Activity gammas/sec	γ abundance	Bq/sample	Count Results	%recovery
Pb-210	3094	634	0.0425	14926	14353	96.2
Am-241	2037	418	0.3590	1163	1230.2	105.7
Cd-109	2881	591	0.0361	16363	16101	98.4
Co-57	1511	310	0.8560	362	347.72	96.1
Ce-139	2139	439	0.7990	549	538.4	98.1
Hg-203	4651	954	0.8146	1171	1208.4	103.2
Sn-113	3015	618	0.6400	966	972.07	100.6
Cs-137	1938	397	0.8510	467	462.35	99.0
Y-88	7264	1489	0.9370	1589	1559.3	98.1
Co-60	3580	734	0.9997	734	722.51	98.4
Co-60	3581	734	0.9999	734	739.67	100.7
Y-88	7690	1577	0.9920	1589	1613.8	101.5

Reviewed By: Jody Watson

Date: 3/27/2012

Gamma Verification per Geometry

Detector: Ge9

Geometry: Tunacan

Reference date 1/1/2012

Calibration Standard: 90099

Standard volume g / vial 1550

Standard volume transferred in g / geometry 317.8

lab ID# of cal standard 6699

Isotope	Certified Activity gammas/sec	Geometry Activity gammas/sec	γ abundance	Bq/sample	Count Results	%recovery
Pb-210	3094	634	0.0425	14926	14240	95.4
Am-241	2037	418	0.3590	1163	1244.5	107.0
Cd-109	2881	591	0.0361	16363	15902	97.2
Co-57	1511	310	0.8560	362	347.48	96.0
Ce-139	2139	439	0.7990	549	535.87	97.6
Hg-203	4651	954	0.8146	1171	1216.7	103.9
Sn-113	3015	618	0.6400	966	970.65	100.5
Cs-137	1938	397	0.8510	467	466.58	99.9
Y-88	7264	1489	0.9370	1589	1552.5	97.7
Co-60	3580	734	0.9997	734	727.12	99.0
Co-60	3581	734	0.9999	734	719.75	98.0
Y-88	7690	1577	0.9920	1589	1638.8	103.1

Reviewed By: Jody Watson

Date: 6/14/2012

Gamma Verification per Geometry

Detector: **Ge12**
Geometry: **Tuna Can**
Reference date: **1/1/2018**
Calibration Standard: **108513**
Standard volume g / vial: **1550**
Standard volume transferred in g / geometry: **342.2**
lab ID# of cal standard: #1402359 / Tuna Can_2018_00001

Isotope	Certified Activity - Bq	Geometry Activity - Bq	Count Results	%recovery
Pb-210	72410	15986	16000	100.1
Am-241	5770	1274	1261	99.0
Cd-109	79700	17596	18250	103.7
Co-57	1809	399	393.1	98.4
Ce-139	2723	601	585.9	97.5
Hg-203	5868	1296	1312	101.3
Sn-113	4658	1028	1059	103.0
Cs-137	2283	504	509.8	101.1
Y-88	7810	1724	1705	98.9
Co-60	3574	789	776.5	98.4
Co-60	3574	789	765.4	97.0
Y-88	7810	1724	1769	102.6

Reviewed By: Jody Watson

Date: 4/23/2018

Gamma Verification per Geometry

Detector: Ge14

Geometry: Tunacan

Reference date 1/1/2012

Calibration Standard: 90099

Standard volume g / vial 1550

Standard volume transferred in g / geometry 317.8

lab ID# of cal standard 6699

Isotope	Certified Activity gammas/sec	Geometry Activity gammas/sec	γ abundance	Bq/sample	Count Results	%recovery
Pb-210	3094	634	0.0425	14926	14422	96.6
Am-241	2037	418	0.3590	1163	1222.5	105.1
Cd-109	2881	591	0.0361	16363	16145	98.7
Co-57	1511	310	0.8560	362	349.28	96.5
Ce-139	2139	439	0.7990	549	538.52	98.1
Hg-203	4651	954	0.8146	1171	1205.9	103.0
Sn-113	3015	618	0.6400	966	971.36	100.6
Cs-137	1938	397	0.8510	467	465.65	99.7
Y-88	7264	1489	0.9370	1589	1570	98.8
Co-60	3580	734	0.9997	734	724.16	98.6
Co-60	3581	734	0.9999	734	720.6	98.1
Y-88	7690	1577	0.9920	1589	1634	102.8

Reviewed By: Jody Watson

Date: 4/23/2012

Gamma Verification per Geometry

Detector:	Ge16
Geometry:	Tunacan
Reference date	1/1/2012
Calibration Standard:	90099
Standard volume g / vial	1550
Standard volume transferred in g / geometry	317.8
lab ID# of cal standard	6699

Isotope	Certified Activity gammas/sec	Geometry Activity gammas/sec	γ abundance	Bq/sample	Count Results	%recovery
Pb-210	3094	634	0.0425	14926	14377	96.3
Am-241	2037	418	0.3590	1163	1228.5	105.6
Cd-109	2881	591	0.0361	16363	16032	98.0
Co-57	1511	310	0.8560	362	349.8	96.7
Ce-139	2139	439	0.7990	549	538.18	98.0
Sn-113	3015	618	0.6400	966	969.68	100.4
Cs-137	1938	397	0.8510	467	468.24	100.3
Y-88	7264	1489	0.9370	1589	1552.4	97.7
Co-60	3580	734	0.9997	734	725.6	98.8
Co-60	3581	734	0.9999	734	726.23	98.9
Y-88	7690	1577	0.9920	1589	1629.1	102.5

Reviewed By: Jody Watson

Date: 7/13/2012

Gamma Verification per Geometry

Detector: Ge17

Geometry: Tunacan

Reference date 1/1/2012

Calibration Standard: 90099

Standard volume g / vial 1550

Standard volume transferred in g / geometry 317.8

lab ID# of cal standard 6699

Isotope	Certified Activity gammas/sec	Geometry Activity gammas/sec	γ abundance	Bq/sample	Count Results	%recovery
Pb-210	3094	634	0.0425	14926	14476	97.0
Am-241	2037	418	0.3590	1163	1217.3	104.6
Cd-109	2881	591	0.0361	16363	16121	98.5
Co-57	1511	310	0.8560	362	351.58	97.1
Ce-139	2139	439	0.7990	549	540.43	98.5
Hg-203	4651	954	0.8146	1171	1200.7	102.6
Sn-113	3015	618	0.6400	966	969.38	100.4
Cs-137	1938	397	0.8510	467	466.08	99.8
Y-88	7264	1489	0.9370	1589	1562.4	98.3
Co-60	3580	734	0.9997	734	724.88	98.7
Co-60	3581	734	0.9999	734	733.12	99.8
Y-88	7690	1577	0.9920	1589	1616.3	✓ 101.7

Reviewed By: Megan McAfee

Date: 4/13/2012

2nd Source Verification

Detector:	Ge5
Geometry:	Tunacan
Reference date	1/1/2010
Source:	81427-334
Standard volume g / vial	1550
Standard volume transferred in g / geometry	318.5
lab ID# of cal standard	6665

Isotope	Certified Activity gammas/sec	Geometry Activity	γ abundance	Bq/sample	Count Results	%recovery
Am-241	2034	418	0.359	1164	1160.9	✓ 99.7
Cs-137	1926	396	0.851	465	442.36	95.1
Co-60	3611	742	0.99974	742	700.21	94.3
Co-60	3612	742	0.999856	742	701.86	94.6

Reviewed By: Jody Watson

Date: 3/27/2012

2nd Source Verification

Detector:	Ge9
Geometry:	Tunacan
Reference date	1/1/2010
Source:	81427-334
Standard volume g / vial	1550
Standard volume transferred in g / geometry	318.5
lab ID# of cal standard	6665

Isotope	Certified Activity gammas/sec	Geometry Activity	γ abundance	Bq/sample	Count Results	%recovery
Am-241	2034	418	0.359	1164	1169.4	100.4
Cs-137	1926	396	0.851	465	444.52	95.6
Co-60	3611	742	0.99974	742	687.72	92.7
Co-60	3612	742	0.999856	742	692.56	93.3

Reviewed By: Jody Watson

Date: 6/14/2012

2nd Source Verification

Detector: **Ge12**
Geometry: **Tunacan**
Reference date: **10/1/2006**
Calibration Standard: **74139-334**
Standard volume g / vial: **1550**
Standard volume transferred in g / geometry: **341.9**
lab ID# of cal standard: **1282974**

Isotope	Certified Activity gammas/sec	Geometry Activity	γ abundance	Bq/sample	Count Results	%recovery
Am-241	2034	449	0.359	1250	1288	103.1
Cs-137	1926	425	0.851	499	509.9	102.1
Co-60	3612	797	0.999856	797	833.8	104.6

Reviewed By: Jody Watson

Date: 4/24/2018

2nd Source Verification

Detector: Ge14

Geometry: Tunacan

Reference date 1/1/2010

Source: 81427-334

Standard volume g / vial 1550

Standard volume transferred in g / geometry 318.5

lab ID# of cal standard 6665

Isotope	Certified Activity gammas/sec	Geometry Activity	γ abundance	Bq/sample	Count Results	%recovery
Am-241	2034	418	0.359	1164	1140.8	98.0
Cs-137	1926	396	0.851	465	447.55	96.2
Co-60	3611	742	0.99974	742	690.01	93.0
Co-60	3612	742	0.999856	742	699.61	94.2

Reviewed By: Jody Watson

Date: 4/24/2012

2nd Source Verification

Detector: Ge16

Geometry: Tunacan

Reference date 1/1/2010

Source: 81427-334

Standard volume g / vial 1550

Standard volume transferred in g / geometry 318.5

lab ID# of cal standard 6665

Isotope	Certified Activity gammas/sec	Geometry Activity	γ abundance	Bq/sample	Count Results	%recovery
Am-241	2034	418	0.359	1164	1175.5	101.0
Cs-137	1926	396	0.851	465	456.26	✓ 98.1
Co-60	3611	742	0.99974	742	696.55	93.8
Co-60	3612	742	0.999856	742	694.91	93.6

Reviewed By: Jody Watson

Date: 7/17/2012

2nd Source Verification

Detector:	Ge17
Geometry:	Tunacan
Reference date	1/1/2010
Source:	81427-334
Standard volume g / vial	1550
Standard volume transferred in g / geometry	318.5
lab ID# of cal standard	6665

Isotope	Certified Activity gammas/sec	Geometry Activity	γ abundance	Bq/sample	Count Results	%recovery
Am-241	2034	418	0.359	1164	1140.2	97.9
Cs-137	1926	396	0.851	465	440.98	94.8
Co-60	3611	742	0.99974	742	682.05	91.9
Co-60	3612	742	0.999856	742	689.63	92.9

Reviewed By: Megan McAfee

Date: 4/13/2012

Test America
St. Louis
Background Check

Spectrum: 5_20191206006_BGLong
Description: Background Long PBC Count
Acquired: 12/6/2019 6:41:26 PM
Detector: Detector # 5
Background Evaluation Criteria:
1) Place instrument out of service if Countrate exceeds Control Limits.
2) Investigate high countrate and take corrective action as necessary if Countrate exceeds Tolerance Limits.

	Target	L_Ctrl	L_Tol	Measured	H_Tol	H_Ctrl	Results
Bkgd Countrate	1.45	1.30	1.35	1.48	1.55	1.60	PASS

Analyst: Shiloh Smith Reviewer: Shiloh Smith

(Page 1 of 8)

Test America
St. Louis
Background Check

Spectrum: 9_20191206007_BGLong
Description: Background Long PBC Count
Acquired: 12/6/2019 6:43:28 PM
Detector: Detector # 9
Background Evaluation Criteria:
1) Place instrument out of service if Countrate exceeds Control Limits.
2) Investigate high countrate and take corrective action as necessary if Countrate exceeds Tolerance Limits.

	Target	L_Ctrl	L_Tol	Measured	H_Tol	H_Ctrl	Results
Bkgd Countrate	1.89	1.53	1.65	1.77	2.14	2.26	PASS

Analyst: Shiloh Smith Reviewer: Shiloh Smith

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Test America
St. Louis
Background Check

Spectrum: 12_20191206008_BGLong
Description: Background Long PBC Count
Acquired: 12/6/2019 6:42:59 PM
Detector: Detector #12
Background Evaluation Criteria:
1) Place instrument out of service if Countrate exceeds Control Limits.
2) Investigate high countrate and take corrective action as necessary if Countrate exceeds Tolerance Limits.

	Target	L_Ctrl	L_Tol	Measured	H_Tol	H_Ctrl	Results
Bkgd Countrate	2.00	1.89	1.93	1.94	2.07	2.10	PASS

Analyst: Shiloh Smith Reviewer: Shiloh Smith

(Page 1 of 5)

Test America
St. Louis
Background Check

Spectrum: 14_20191206007_BGLong
Description: Background Long PBC Count
Acquired: 12/6/2019 6:44:03 PM
Detector: Detector #14
Background Evaluation Criteria:
1) Place instrument out of service if Countrate exceeds Control Limits.
2) Investigate high countrate and take corrective action as necessary if Countrate exceeds Tolerance Limits.

	Target	L_Ctrl	L_Tol	Measured	H_Tol	H_Ctrl	Results
Bkgd Countrate	1.80	1.66	1.71	1.74	1.90	1.94	PASS

Analyst: Shiloh Smith Reviewer: kody Saulters

(Page 1 of 8)

Test America
St. Louis
Background Check

Spectrum: 16_20191206007_BGLong
Description: Background Long PBC Count
Acquired: 12/6/2019 6:45:28 PM
Detector: Detector #16
Background Evaluation Criteria:
1) Place instrument out of service if Countrate exceeds Control Limits.
2) Investigate high countrate and take corrective action as necessary if Countrate exceeds Tolerance Limits.

	Target	L_Ctrl	L_Tol	Measured	H_Tol	H_Ctrl	Results
Bkgd Countrate	2.68	2.51	2.56	2.63	2.80	2.86	PASS

Analyst: Shiloh Smith Reviewer: kody Saulters

(Page 1 of 8)

Test America
St. Louis
Background Check

Spectrum: 17_20191206005_BGLong
Description: Background Long PBC Count
Acquired: 12/6/2019 6:46:43 PM
Detector: Detector #17
Background Evaluation Criteria:
1) Place instrument out of service if Countrate exceeds Control Limits.
2) Investigate high countrate and take corrective action as necessary if Countrate exceeds Tolerance Limits.

	Target	L_Ctrl	L_Tol	Measured	H_Tol	H_Ctrl	Results
Bkgd Countrate	2.32	2.18	2.23	2.27	2.42	2.46	PASS

Analyst: Shiloh Smith Reviewer: kody Saulters

(Page 1 of 8)

Test America
St. Louis
Quality Control Check

Spectrum: 5_20191225001_QCAsLeft
Description: Quality control Check (QC Source 'A') Post Stabilization
Acquired: 12/25/2019 5:07:21 AM
Detector: Detector # 5
Quality Control Evaluation Criteria:
1) Notify Supervisor if 'AS FOUND' parameters exceed Tolerance or Control Limits.
2) Place out of service if 'AS LEFT' parameters exceed Tolerance or Control Limits.

	Target	L_Ctrl	L_Tol	Measured	H_Tol	H_Ctrl	Results
QA-60							
Channel	238.00	236.00	237.00	237.80	239.00	240.00	PASS
Energy	59.54	59.04	59.29	59.58	59.79	60.04	PASS
FWHM	0.74	0.00	0.00	0.73	1.84	1.94	PASS
ActivityDiff	636.60	-5.00	-4.00	1.25	4.00	5.00	PASS
QA-662							
FWHM	1.36	0.00	0.00	1.31	3.06	3.16	PASS
ActivityDiff	596.80	-5.00	-4.00	1.81	4.00	5.00	PASS
QA-1332							
Channel	5330.00	5327.00	5328.00	5328.80	5332.00	5333.00	PASS
Energy	1332.51	1331.76	1332.01	1332.26	1333.01	1333.26	PASS
FWHM	1.90	0.00	0.00	1.90	4.10	4.20	PASS
ActivityDiff	1164.20	-5.00	-4.00	-1.37	4.00	5.00	PASS

Analyst: Caleb Quinn Reviewer: kody Saulters

Test America
St. Louis
Background Check

Spectrum: 5_20191225002_BG
Description: Background Contamination Check
Acquired: 12/25/2019 5:29:36 AM
Detector: Detector # 5
Background Evaluation Criteria:
1) Place instrument out of service if Countrate exceeds Control Limits.
2) Investigate high countrate and take corrective action as necessary if Countrate exceeds Tolerance Limits.

	Target	L_Ctrl	L_Tol	Measured	H_Tol	H_Ctrl	Results
Bkgd Countrate	1.45	1.30	1.35	1.45	1.55	1.60	PASS

Analyst: Caleb Quinn Reviewer: kody Saulters

Test America
St. Louis
Quality Control Check

Spectrum: 9_20191225002_QCAsLeft
Description: Quality control Check (QC Source 'E') Post Stabilization
Acquired: 12/25/2019 5:45:19 AM
Detector: Detector # 9
Quality Control Evaluation Criteria:
1) Notify Supervisor if 'AS FOUND' parameters exceed Tolerance or Control Limits.
2) Place out of service if 'AS LEFT' parameters exceed Tolerance or Control Limits.

	Target	L_Ctrl	L_Tol	Measured	H_Tol	H_Ctrl	Results
QA-60							
Channel	238.00	236.00	237.00	238.00	239.00	240.00	PASS
Energy	59.54	59.04	59.29	59.61	59.79	60.04	PASS
FWHM	1.08	0.00	0.00	0.94	2.18	2.28	PASS
ActivityDiff	649.44	-5.00	-4.00	-0.33	4.00	5.00	PASS
QA-662							
FWHM	1.62	0.00	0.00	1.51	3.32	3.42	PASS
ActivityDiff	607.56	-5.00	-4.00	0.71	4.00	5.00	PASS
QA-1332							
Channel	5330.00	5327.00	5328.00	5329.70	5332.00	5333.00	PASS
Energy	1332.51	1331.76	1332.01	1332.34	1333.01	1333.26	PASS
FWHM	2.12	0.00	0.00	1.95	4.32	4.42	PASS
ActivityDiff	1191.31	-5.00	-4.00	0.02	4.00	5.00	PASS

Analyst: Caleb Quinn Reviewer: kody Saulters

Test America
St. Louis
Background Check

Spectrum: 9_20191225001_BG
Description: Background Contamination Check
Acquired: 12/25/2019 4:44:53 AM
Detector: Detector # 9
Background Evaluation Criteria:
1) Place instrument out of service if Countrate exceeds Control Limits.
2) Investigate high countrate and take corrective action as necessary if Countrate exceeds Tolerance Limits.

	Target	L_Ctrl	L_Tol	Measured	H_Tol	H_Ctrl	Results
Bkgd Countrate	1.89	1.53	1.65	1.81	2.14	2.26	PASS

Analyst: Caleb Quinn Reviewer: kody Saulters

Test America
St. Louis
Quality Control Check

Spectrum: 12_20191225002_QCAsLeft
Description: Quality control Check (QC Source 'H') Post Stabilization
Acquired: 12/25/2019 5:45:50 AM
Detector: Detector #12
Quality Control Evaluation Criteria:
1) Notify Supervisor if 'AS FOUND' parameters exceed Tolerance or Control Limits.
2) Place out of service if 'AS LEFT' parameters exceed Tolerance or Control Limits.

	Target	L_Ctrl	L_Tol	Measured	H_Tol	H_Ctrl	Results
QA-60							
Channel	238.00	236.00	237.00	237.90	239.00	240.00	PASS
Energy	59.54	59.04	59.29	59.60	59.79	60.04	PASS
FWHM	0.90	0.00	0.00	0.85	2.00	2.10	PASS
ActivityDiff	691.00	-5.00	-4.00	-0.34	4.00	5.00	PASS
QA-662							
FWHM	1.48	0.00	0.00	1.48	3.18	3.28	PASS
ActivityDiff	659.00	-5.00	-4.00	0.20	4.00	5.00	PASS
QA-1332							
Channel	5330.00	5327.00	5328.00	5330.10	5332.00	5333.00	PASS
Energy	1332.51	1331.76	1332.01	1332.51	1333.01	1333.26	PASS
FWHM	2.00	0.00	0.00	1.96	4.20	4.30	PASS
ActivityDiff	1274.00	-5.00	-4.00	1.01	4.00	5.00	PASS

Analyst: Caleb Quinn Reviewer: kody Saulters

Test America
St. Louis
Background Check

Spectrum: 12_20191225001_BG
Description: Background Contamination Check
Acquired: 12/25/2019 4:45:26 AM
Detector: Detector #12
Background Evaluation Criteria:
1) Place instrument out of service if Countrate exceeds Control Limits.
2) Investigate high countrate and take corrective action as necessary if Countrate exceeds Tolerance Limits.

	Target	L_Ctrl	L_Tol	Measured	H_Tol	H_Ctrl	Results
Bkgd Countrate	2.00	1.89	1.93	1.99	2.07	2.10	PASS

Analyst: Caleb Quinn Reviewer: kody Saulters

Test America
St. Louis
Quality Control Check

Spectrum: 14_20191225001_QCAsLeft
Description: Quality control Check (QC Source 'E') Post Stabilization
Acquired: 12/25/2019 5:05:49 AM
Detector: Detector #14
Quality Control Evaluation Criteria:
1) Notify Supervisor if 'AS FOUND' parameters exceed Tolerance or Control Limits.
2) Place out of service if 'AS LEFT' parameters exceed Tolerance or Control Limits.

	Target	L_Ctrl	L_Tol	Measured	H_Tol	H_Ctrl	Results
QA-60							
Channel	238.00	236.00	237.00	237.90	239.00	240.00	PASS
Energy	59.54	59.04	59.29	59.64	59.79	60.04	PASS
FWHM	0.76	0.00	0.00	0.90	1.86	1.96	PASS
ActivityDiff	671.90	-5.00	-4.00	-3.38	4.00	5.00	PASS
QA-662							
FWHM	1.35	0.00	0.00	1.39	3.05	3.15	PASS
ActivityDiff	628.85	-5.00	-4.00	-2.62	4.00	5.00	PASS
QA-1332							
Channel	5330.00	5327.00	5328.00	5329.80	5332.00	5333.00	PASS
Energy	1332.51	1331.76	1332.01	1332.46	1333.01	1333.26	PASS
FWHM	1.91	0.00	0.00	1.91	4.11	4.21	PASS
ActivityDiff	1224.59	-5.00	-4.00	-2.45	4.00	5.00	PASS

Analyst: Caleb Quinn Reviewer: kody Saulters

Test America
St. Louis
Background Check

Spectrum: 14_20191225002_BG
Description: Background Contamination Check
Acquired: 12/25/2019 5:26:35 AM
Detector: Detector #14
Background Evaluation Criteria:
1) Place instrument out of service if Countrate exceeds Control Limits.
2) Investigate high countrate and take corrective action as necessary if Countrate exceeds Tolerance Limits.

	Target	L_Ctrl	L_Tol	Measured	H_Tol	H_Ctrl	Results
Bkgd Countrate	1.80	1.66	1.71	1.77	1.90	1.94	PASS

Analyst: Caleb Quinn Reviewer: kody Saulters

Test America
St. Louis
Quality Control Check

Spectrum: 16_20191225001_QCAsLeft
Description: Quality control Check (QC Source 'G') Post Stabilization
Acquired: 12/25/2019 5:07:08 AM
Detector: Detector #16
Quality Control Evaluation Criteria:
1) Notify Supervisor if 'AS FOUND' parameters exceed Tolerance or Control Limits.
2) Place out of service if 'AS LEFT' parameters exceed Tolerance or Control Limits.

	Target	L_Ctrl	L_Tol	Measured	H_Tol	H_Ctrl	Results
QA-60							
Channel	238.00	236.00	237.00	237.80	239.00	240.00	PASS
Energy	59.54	59.04	59.29	59.54	59.79	60.04	PASS
FWHM	0.96	0.00	0.00	1.01	2.06	2.16	PASS
ActivityDiff	602.10	-5.00	-4.00	3.74	4.00	5.00	PASS
QA-662							
FWHM	1.53	0.00	0.00	1.73	3.23	3.33	PASS
ActivityDiff	571.13	-5.00	-4.00	1.24	4.00	5.00	PASS
QA-1332							
Channel	5330.00	5327.00	5328.00	5331.00	5332.00	5333.00	PASS
Energy	1332.51	1331.76	1332.01	1332.86	1333.01	1333.26	PASS
FWHM	2.09	0.00	0.00	2.67	4.29	4.39	PASS
ActivityDiff	1139.05	-5.00	-4.00	3.20	4.00	5.00	PASS

Analyst: Caleb Quinn Reviewer: kody Saulters

Test America
St. Louis
Background Check

Spectrum: 16_20191225002_BG
Description: Background Contamination Check
Acquired: 12/25/2019 5:26:04 AM
Detector: Detector #16
Background Evaluation Criteria:
1) Place instrument out of service if Countrate exceeds Control Limits.
2) Investigate high countrate and take corrective action as necessary if Countrate exceeds Tolerance Limits.

	Target	L_Ctrl	L_Tol	Measured	H_Tol	H_Ctrl	Results
Bkgd Countrate	2.68	2.51	2.56	2.76	2.80	2.86	PASS

Analyst: Caleb Quinn Reviewer: kody Saulters

Test America
St. Louis
Quality Control Check

Spectrum: 17_20191225001_QCAsLeft
Description: Quality control Check (QC Source 'H') Post Stabilization
Acquired: 12/25/2019 5:06:25 AM
Detector: Detector #17
Quality Control Evaluation Criteria:
1) Notify Supervisor if 'AS FOUND' parameters exceed Tolerance or Control Limits.
2) Place out of service if 'AS LEFT' parameters exceed Tolerance or Control Limits.

	Target	L_Ctrl	L_Tol	Measured	H_Tol	H_Ctrl	Results
QA-60							
Channel	238.00	236.00	237.00	237.90	239.00	240.00	PASS
Energy	59.54	59.04	59.29	59.64	59.79	60.04	PASS
FWHM	0.77	0.00	0.00	0.76	1.87	1.97	PASS
ActivityDiff	691.00	-5.00	-4.00	2.33	4.00	5.00	PASS
QA-662							
FWHM	1.37	0.00	0.00	1.37	3.07	3.17	PASS
ActivityDiff	659.00	-5.00	-4.00	-0.03	4.00	5.00	PASS
QA-1332							
Channel	5330.00	5327.00	5328.00	5329.50	5332.00	5333.00	PASS
Energy	1332.51	1331.76	1332.01	1332.47	1333.01	1333.26	PASS
FWHM	1.88	0.00	0.00	1.83	4.08	4.18	PASS
ActivityDiff	1274.00	-5.00	-4.00	-1.23	4.00	5.00	PASS

Analyst: Caleb Quinn Reviewer: kody Saulters

Test America
St. Louis
Background Check

Spectrum: 17_20191225002_BG
Description: Background Contamination Check
Acquired: 12/25/2019 5:27:29 AM
Detector: Detector #17
Background Evaluation Criteria:
1) Place instrument out of service if Countrate exceeds Control Limits.
2) Investigate high countrate and take corrective action as necessary if Countrate exceeds Tolerance Limits.

	Target	L_Ctrl	L_Tol	Measured	H_Tol	H_Ctrl	Results
Bkgd Countrate	2.32	2.18	2.23	2.32	2.42	2.46	PASS

Analyst: Caleb Quinn Reviewer: kody Saulters

Gamma Spectroscopy Run Log

Detector: GV5

Analysis Date	Count Minutes	Lab Sample ID	Client Sample ID	Analysis Batch	Prep Batch	Method	Analyst Initials
03/26/12 15:05		IC 160-12297/1		12297			JLW
03/27/12 10:12		ICV 160-12297/2		12297			JLW
12/06/19 18:41		ICB 160-453835/1		453835			JLW
12/25/19 04:46		CCV 160-455104/1		455104			
12/25/19 05:07		CCV 160-455104/2		455104			KLS
12/25/19 05:29		CCB 160-455104/3		455104			KLS
12/25/19 06:03	30	ZZZZZ		455104			
12/25/19 06:37	30	ZZZZZ		455104			
12/25/19 07:09	30	ZZZZZ		455104			
12/25/19 07:47	30	ZZZZZ		455104			
12/25/19 08:20	30	160-36526-3	STSB27_3-6	455104	452567	901.1	KLS
12/25/19 09:03	30	160-36526-6	STSB28-FD_0-0.5	455104	452567	901.1	KLS
12/25/19 09:37	30	160-36526-12	STSB29_3-6	455104	452567	901.1	KLS
12/25/19 10:14	30	160-36526-17	STSB30_3-6	455104	452567	901.1	KLS
12/25/19 10:46	30	160-36526-21	STSB31_3-6	455104	452568	901.1	KLS
12/25/19 11:26	30	ZZZZZ		455104			
12/25/19 12:00	30	ZZZZZ		455104			
12/25/19 12:33	30	ZZZZZ		455104			
12/25/19 13:07	30	ZZZZZ		455104			
12/25/19 13:41	30	ZZZZZ		455104			
12/25/19 14:42	30	ZZZZZ		455104			
12/25/19 15:16	30	ZZZZZ		455104			
12/25/19 16:19	30	ZZZZZ		455104			
12/25/19 16:56	30	ZZZZZ		455104			
12/25/19 17:32	30	ZZZZZ		455104			
12/25/19 18:08	30	ZZZZZ		455104			

Detector: GV9

Analysis Date	Count Minutes	Lab Sample ID	Client Sample ID	Analysis Batch	Prep Batch	Method	Analyst Initials
05/03/12 13:37		IC 160-12326/1		12326			JLW
06/14/12 10:54		ICV 160-12326/2		12326			JLW
12/06/19 18:43		ICB 160-453837/1		453837			JLW
12/25/19 04:44		CCB 160-455101/1		455101			KLS
12/25/19 05:24		CCV 160-455101/2		455101			
12/25/19 05:45		CCV 160-455101/3		455101			KLS
12/25/19 06:07	30	ZZZZZ		455101			
12/25/19 06:43	30	ZZZZZ		455101			
12/25/19 07:14	30	ZZZZZ		455101			
12/25/19 07:48	30	ZZZZZ		455101			
12/25/19 08:21	30	ZZZZZ		455101			
12/25/19 08:59	30	ZZZZZ		455101			
12/25/19 09:34	30	160-36526-7	STSB28_0.5-3	455101	452567	901.1	KLS
12/25/19 10:10	30	160-36526-11 DU	STSB29_0.5-3 DU	455101	452567	901.1	KLS
12/25/19 10:42	30	160-36526-18	STSB30_6-15	455101	452567	901.1	KLS
12/25/19 11:22	30	160-36526-21 DU	STSB31_3-6 DU	455101	452568	901.1	KLS
12/25/19 11:57	30	ZZZZZ		455101			
12/25/19 12:28	30	ZZZZZ		455101			
12/25/19 13:02	30	ZZZZZ		455101			
12/25/19 13:34	30	ZZZZZ		455101			
12/25/19 14:15	30	ZZZZZ		455101			
12/25/19 14:57	30	ZZZZZ		455101			
12/25/19 15:33	30	ZZZZZ		455101			

Gamma Spectroscopy Run Log

Detector: GV9 (Continued)

Analysis Date	Count Minutes	Lab Sample ID	Client Sample ID	Analysis Batch	Prep Batch	Method	Analyst Initials
12/25/19 16:13	30	ZZZZZ		455101			
12/25/19 16:50	30	ZZZZZ		455101			
12/25/19 17:26	30	ZZZZZ		455101			
12/25/19 18:03	30	ZZZZZ		455101			
12/25/19 18:41	30	ZZZZZ		455101			

Detector: GV12

Analysis Date	Count Minutes	Lab Sample ID	Client Sample ID	Analysis Batch	Prep Batch	Method	Analyst Initials
04/18/18 13:54		IC 160-364854/1		364854			JLW
04/24/18 09:26		ICV 160-364854/2		364854			JLW
12/06/19 18:42		ICB 160-453836/1		453836			JLW
12/25/19 04:45		CCB 160-455102/1		455102			KLS
12/25/19 05:25		CCV 160-455102/2		455102			
12/25/19 05:45		CCV 160-455102/3		455102			KLS
12/25/19 06:08	30	ZZZZZ		455102			
12/25/19 06:43	30	ZZZZZ		455102			
12/25/19 07:15	30	ZZZZZ		455102			
12/25/19 07:48	30	ZZZZZ		455102			
12/25/19 08:22	30	ZZZZZ		455102			
12/25/19 09:00	30	ZZZZZ		455102			
12/25/19 09:35	30	160-36526-8	STSB28_3-6	455102	452567	901.1	KLS
12/25/19 10:11	30	160-36526-13	STSB29_6-15	455102	452567	901.1	KLS
12/25/19 10:43	30	160-36526-19	STSB31_0-0.5	455102	452567	901.1	KLS
12/25/19 11:23	30	160-36526-22	STSB31_6-15	455102	452568	901.1	KLS
12/25/19 11:58	30	ZZZZZ		455102			
12/25/19 12:30	30	ZZZZZ		455102			
12/25/19 13:02	30	ZZZZZ		455102			
12/25/19 13:41	30	ZZZZZ		455102			
12/25/19 14:15	30	ZZZZZ		455102			
12/25/19 14:58	30	ZZZZZ		455102			
12/25/19 15:34	30	ZZZZZ		455102			
12/25/19 16:13	30	ZZZZZ		455102			
12/25/19 16:51	30	ZZZZZ		455102			
12/25/19 17:27	30	ZZZZZ		455102			
12/25/19 18:04	30	ZZZZZ		455102			

Detector: GV14

Analysis Date	Count Minutes	Lab Sample ID	Client Sample ID	Analysis Batch	Prep Batch	Method	Analyst Initials
04/23/12 09:56		IC 160-12359/1		12359			JLW
04/24/12 08:12		ICV 160-12359/2		12359			JLW
12/06/19 18:44		ICB 160-453839/1		453839			JLW
12/25/19 04:43		CCV 160-455098/1		455098			
12/25/19 05:05		CCV 160-455098/2		455098			KLS
12/25/19 05:26		CCB 160-455098/3		455098			KLS
12/25/19 06:00	30	ZZZZZ		455098			
12/25/19 06:34	30	ZZZZZ		455098			
12/25/19 07:07	30	ZZZZZ		455098			
12/25/19 07:43	30	ZZZZZ		455098			
12/25/19 08:18	30	ZZZZZ		455098			
12/25/19 09:00	30	ZZZZZ		455098			

Gamma Spectroscopy Run Log

Detector: GV14 (Continued)

Analysis Date	Count Minutes	Lab Sample ID	Client Sample ID	Analysis Batch	Prep Batch	Method	Analyst Initials
12/25/19 09:35	30	160-36526-9	STSB28_6-15	455098	452567	901.1	KLS
12/25/19 10:11	30	160-36526-14	STSB29-FD_6-15	455098	452567	901.1	KLS
12/25/19 10:43	30	160-36526-20	STSB31_0.5-3	455098	452567	901.1	KLS
12/25/19 11:23	30	ZZZZZ		455098			
12/25/19 11:59	30	ZZZZZ		455098			
12/25/19 12:30	30	ZZZZZ		455098			
12/25/19 13:05	30	ZZZZZ		455098			
12/25/19 13:38	30	ZZZZZ		455098			
12/25/19 14:17	30	ZZZZZ		455098			
12/25/19 14:59	30	ZZZZZ		455098			
12/25/19 15:35	30	ZZZZZ		455098			
12/25/19 16:14	30	ZZZZZ		455098			
12/25/19 16:52	30	ZZZZZ		455098			
12/25/19 17:29	30	ZZZZZ		455098			
12/25/19 18:05	30	ZZZZZ		455098			
12/25/19 18:46	30	ZZZZZ		455098			

Detector: GV16

Analysis Date	Count Minutes	Lab Sample ID	Client Sample ID	Analysis Batch	Prep Batch	Method	Analyst Initials
07/10/12 10:35		IC 160-12382/1		12382			JLW
07/17/12 11:27		ICV 160-12382/2		12382			JLW
12/06/19 18:45		ICB 160-453840/1		453840			JLW
12/25/19 04:45		CCV 160-455099/1		455099			
12/25/19 05:07		CCV 160-455099/2		455099			KLS
12/25/19 05:26		CCB 160-455099/3		455099			KLS
12/25/19 06:01	30	ZZZZZ		455099			
12/25/19 06:35	30	ZZZZZ		455099			
12/25/19 07:08	30	ZZZZZ		455099			
12/25/19 07:44	30	ZZZZZ		455099			
12/25/19 08:19	30	160-36526-1	STSB27_0-0.5	455099	452567	901.1	KLS
12/25/19 09:01	30	160-36526-4	STSB27_6-15	455099	452567	901.1	KLS
12/25/19 09:36	30	160-36526-10	STSB29_0-0.5	455099	452567	901.1	KLS
12/25/19 10:12	30	160-36526-15	STSB30_0-0.5	455099	452567	901.1	KLS
12/25/19 10:44	30	MB 160-452567/1-A		455099	452567	901.1	KLS
12/25/19 11:24	30	MB 160-452568/1-A		455099	452568	901.1	KLS
12/25/19 11:59	30	ZZZZZ		455099			
12/25/19 12:31	30	ZZZZZ		455099			
12/25/19 13:05	30	ZZZZZ		455099			
12/25/19 13:39	30	ZZZZZ		455099			
12/25/19 14:18	30	ZZZZZ		455099			
12/25/19 15:00	30	ZZZZZ		455099			
12/25/19 15:36	30	ZZZZZ		455099			
12/25/19 16:15	30	ZZZZZ		455099			
12/25/19 16:53	30	ZZZZZ		455099			
12/25/19 17:29	30	ZZZZZ		455099			
12/25/19 18:05	30	ZZZZZ		455099			

Detector: GV17

Analysis Date	Count Minutes	Lab Sample ID	Client Sample ID	Analysis Batch	Prep Batch	Method	Analyst Initials
03/26/12 06:29		IC 160-12390/1		12390			JLW

Gamma Spectroscopy Run Log

Detector: GV17 (Continued)

Analysis Date	Count Minutes	Lab Sample ID	Client Sample ID	Analysis Batch	Prep Batch	Method	Analyst Initials
03/26/12 09:29		ICV 160-12390/2		12390			JLW
12/06/19 18:46		ICB 160-453841/1		453841			AJD
12/25/19 04:44		CCV 160-455100/1		455100			
12/25/19 05:06		CCV 160-455100/2		455100			KLS
12/25/19 05:27		CCB 160-455100/3		455100			KLS
12/25/19 06:02	30	ZZZZZ		455100			
12/25/19 06:36	30	ZZZZZ		455100			
12/25/19 07:09	30	ZZZZZ		455100			
12/25/19 07:45	30	ZZZZZ		455100			
12/25/19 08:19	30	160-36526-2	STSB27_0.5-3	455100	452567	901.1	KLS
12/25/19 09:02	30	160-36526-5	STSB28_0-0.5	455100	452567	901.1	KLS
12/25/19 09:36	30	160-36526-11	STSB29_0.5-3	455100	452567	901.1	KLS
12/25/19 10:13	30	160-36526-16	STSB30_0.5-3	455100	452567	901.1	KLS
12/25/19 10:46	30	LCS 160-452567/2-A		455100	452567	901.1	KLS
12/25/19 11:26	30	LCS 160-452568/2-A		455100	452568	901.1	KLS
12/25/19 12:00	30	ZZZZZ		455100			
12/25/19 12:32	30	ZZZZZ		455100			
12/25/19 13:07	30	ZZZZZ		455100			
12/25/19 13:40	30	ZZZZZ		455100			
12/25/19 14:19	30	ZZZZZ		455100			
12/25/19 15:01	30	ZZZZZ		455100			
12/25/19 15:36	30	ZZZZZ		455100			
12/25/19 16:16	30	ZZZZZ		455100			
12/25/19 16:54	30	ZZZZZ		455100			
12/25/19 17:31	30	ZZZZZ		455100			
12/25/19 18:07	30	ZZZZZ		455100			

REAGENT TRACEABILITY SUMMARY

Lab Name: Eurofins TestAmerica, St. Louis Job No.: 160-36526-1

SDG No.:

Reagent ID	Exp Date	Prep Date	Dilutant Used	Reagent Final Volume	Parent Reagent		Analyte	Concentration
					Reagent ID	Volume Added		
MPREP1-A_00004	11/26/20	CPI International, Lot 10094019-9			(Purchased Reagent)		Ag	40 mg/L
							Al	2000 mg/L
							As	200 mg/L
							B	40 mg/L
							Ba	200 mg/L
							Be	20 mg/L
							Bi	200 mg/L
							Ca	2000 mg/L
							Cd	200 mg/L
							Co	200 mg/L
							Cr	200 mg/L
							Cu	200 mg/L
							Fe	2000 mg/L
							K	2000 mg/L
							Li	20 mg/L
							Mg	2000 mg/L
							Mn	200 mg/L
							Na	2000 mg/L
							Ni	200 mg/L
							P	200 mg/L
							Pb	200 mg/L
							Se	100 mg/L
							Sm	200 mg/L
							Sr	200 mg/L
							Thorium	200 mg/L
							Tl	40 mg/L
							Uranium	200 mg/L
							V	200 mg/L
							Zn	200 mg/L
MPREP1-B_00004	11/26/20	CPI International, Lot 10094019-8			(Purchased Reagent)		Sulfur	2000 mg/L
MPREP2_00022	11/26/20	CPI International, Lot 10094019-7			(Purchased Reagent)		Mo	100 mg/L
							Sb	99.99 mg/L
							Si	1000 mg/L
							Sn	200 mg/L
							Ti	200 mg/L
							W	200 mg/L
							Zr	200 mg/L
MS A CAL1 LLC_00418	01/05/20	12/05/19	2% HCL 2% HN03, Lot 1843378	500 mL	MS CAL 1 A_00006	0.5 mL	Thorium	2 ug/L
							Uranium	1 ug/L
.MS CAL 1 A_00006	09/18/20	CPI, Lot 10103046-1			(Purchased Reagent)		Thorium	2 ug/mL
							Uranium	1 ug/mL
MS A CAL2 CCV_00375	01/05/20	12/05/19	2% HCL 2% HN03, Lot 1843378	500 mL	MS CAL3 A_00011	0.5 mL	Thorium	100 ug/L
							Uranium	100 ug/L
.MS CAL3 A_00011	05/31/20	CPI, Lot 10097743-1			(Purchased Reagent)		Thorium	100 ug/mL

REAGENT TRACEABILITY SUMMARY

Lab Name: Eurofins TestAmerica, St. Louis Job No.: 160-36526-1

SDG No.:

Reagent ID	Exp Date	Prep Date	Dilutant Used	Reagent Final Volume	Parent Reagent		Analyte	Concentration
					Reagent ID	Volume Added		
							Uranium	100 ug/mL
MS A CAL3_00334	01/05/20	12/05/19	2% HCL 2% HN03, Lot 1843378	200 mL	MS CAL3 A_00011	0.4 mL	Thorium	200 ug/L
							Uranium	200 ug/L
.MS CAL3 A_00011	05/31/20	CPI, Lot 10097743-1			(Purchased Reagent)		Thorium	100 ug/mL
							Uranium	100 ug/mL
MS A ICSA_00326	12/11/19	12/04/19	2% HCL 2% HN03, Lot 1843378	100 mL	STD AL_00019	1 mL	Al	100 mg/L
.STD AL_00019	07/30/20	Inorganic Ventures, Lot 169484-37			(Purchased Reagent)		Al	10000 ug/mL
MS A ICSAB_00338	12/11/19	12/04/19	2% HCL 2% HN03, Lot 1843378	100 mL	MS CAL3 A_00012	0.05 mL	Thorium	50 ug/L
							Uranium	50 ug/L
.MS CAL3 A_00012	11/20/20	CPI, Lot 10097743-1			(Purchased Reagent)		Thorium	100 ug/mL
							Uranium	100 ug/mL
MS A ICV_01071	12/11/19	12/10/19	2% Nitric Acid, Lot 1843378	100 mL	MS ICV 2_00009	0.05 mL	Thorium	100 ug/L
							Uranium	100 ug/L
.MS ICV 2_00009	05/31/20	CPI, Lot 10097743-4			(Purchased Reagent)		Thorium	200 ug/mL
							Uranium	200 ug/mL
MS LDR 2_00186	12/25/19	11/25/19	2% HCL 2% HNO3, Lot 1831732	100 mL	MS CAL3 A_00011	2 mL	Thorium	2 ug/mL
							Uranium	2 ug/mL
.MS CAL3 A_00011	05/31/20	CPI, Lot 10097743-1			(Purchased Reagent)		Thorium	100 ug/mL
							Uranium	100 ug/mL
PR_LCSSRM U_00001	03/31/20	ERA, Lot D099-540			(Purchased Reagent)		Ag	43.3 mg/Kg
							Al	8360 mg/Kg
							As	161 mg/Kg
							B	81.6 mg/Kg
							Ba	260 mg/Kg
							Be	97.6 mg/Kg
							Ca	4760 mg/Kg
							Cd	211 mg/Kg
							Co	48.2 mg/Kg
							Cr	136 mg/Kg
							Cu	166 mg/Kg
							Fe	14100 mg/Kg
							Hg	11.5 mg/Kg
							K	2020 mg/Kg
							Mg	2340 mg/Kg
							Mn	228 mg/Kg
							Mo	110 mg/Kg
							Na	218 mg/Kg
							Ni	91.9 mg/Kg
							Pb	111 mg/Kg
							Sb	75.5 mg/Kg
							Se	191 mg/Kg

REAGENT TRACEABILITY SUMMARY

Lab Name: Eurofins TestAmerica, St. Louis Job No.: 160-36526-1

SDG No.:

Reagent ID	Exp Date	Prep Date	Dilutant Used	Reagent Final Volume	Parent Reagent		Analyte	Concentration
					Reagent ID	Volume Added		
							Sn	99.9 mg/Kg
							Sr	107 mg/Kg
							Ti	376 mg/Kg
							Tl	156 mg/Kg
							Uranium	98.1 mg/Kg
							V	56.7 mg/Kg
							Zn	199 mg/Kg
Source A_00001	04/01/59	02/23/11	water, Lot 79670-334	0.9986 Source	Gamma Ampuole_00001	0.9986 g	Americium-241	9.4429 Bq
							Cd-109	132.909 Bq
							Ce-139	4.4538 Bq
							Cesium-137	3.7296 Bq
							Co-57	2.9513 Bq
							Cobalt-60	6.2002 Bq
							Hg-203	9.6996 Bq
							Sn-113	7.6266 Bq
							Y-88	12.712 Bq
.Gamma Ampuole_00001	04/07/59		Analytics, Lot 79670-334		(Purchased Reagent)		Americium-241	9442.9 Bq
							Cd-109	132909 Bq
							Ce-139	4453.8 Bq
							Cesium-137	3729.6 Bq
							Co-57	2951.3 Bq
							Cobalt-60	6200.2 Bq
							Hg-203	9699.6 Bq
							Sn-113	7626.6 Bq
							Y-88	12712 Bq
Source E_00001	04/01/59	02/23/11	water, Lot 79670-334	1.0205 g	Gamma Ampuole_00001	1.0205 g	Americium-241	9442.9 Bq
							Cd-109	132909 Bq
							Ce-139	4453.8 Bq
							Cesium-137	3729.6 Bq
							Co-57	2951.3 Bq
							Cobalt-60	6200.2 Bq
							Hg-203	9699.6 Bq
							Sn-113	7626.6 Bq
							Y-88	12712 Bq
.Gamma Ampuole_00001	04/07/59		Analytics, Lot 79670-334		(Purchased Reagent)		Americium-241	9442.9 Bq
							Cd-109	132909 Bq
							Ce-139	4453.8 Bq
							Cesium-137	3729.6 Bq
							Co-57	2951.3 Bq
							Cobalt-60	6200.2 Bq
							Hg-203	9699.6 Bq
							Sn-113	7626.6 Bq
							Y-88	12712 Bq
Source G_00001	01/01/61	01/01/11	water, Lot 83725-334	10 mL	Gamma Ampuole_00003	1.8639 g	Americium-241	1693.09 Bq
							Cd-109	24592.1 Bq
							Ce-139	816.481 Bq

REAGENT TRACEABILITY SUMMARY

Lab Name: Eurofins TestAmerica, St. Louis Job No.: 160-36526-1

SDG No.:

Reagent ID	Exp Date	Prep Date	Dilutant Used	Reagent Final Volume	Parent Reagent		Analyte	Concentration
					Reagent ID	Volume Added		
							Cesium-137	681.815 Bq
							Co-57	532.386 Bq
							Cobalt-60	1120.87 Bq
							Hg-203	1766.08 Bq
							Sn-113	1445.98 Bq
							Y-88	2359.21 Bq
.Gamma Ampuole_00003	01/19/61		Analytics, Lot 83725-334		(Purchased Reagent)		Americium-241	9083.6 Bq
							Cd-109	131939 Bq
							Ce-139	4380.5 Bq
							Cesium-137	3658 Bq
							Co-57	2856.3 Bq
							Cobalt-60	6013.6 Bq
							Hg-203	9475.2 Bq
							Sn-113	7757.8 Bq
							Y-88	12657.4 Bq
Source H_00002	01/01/51	01/01/12	wataer, Lot 83725-334	10 mL	Gamma Ampuole_00003	2.1184 g	Americium-241	1924.27 Bq
							Cd-109	27950 Bq
							Ce-139	927.965 Bq
							Cesium-137	774.911 Bq
							Co-57	605.079 Bq
							Cobalt-60	1273.92 Bq
							Hg-203	2007.23 Bq
							Sn-113	1643.41 Bq
							Y-88	2681.34 Bq
.Gamma Ampuole_00003	01/19/61		Analytics, Lot 83725-334		(Purchased Reagent)		Americium-241	9083.6 Bq
							Cd-109	131939 Bq
							Ce-139	4380.5 Bq
							Cesium-137	3658 Bq
							Co-57	2856.3 Bq
							Cobalt-60	6013.6 Bq
							Hg-203	9475.2 Bq
							Sn-113	7757.8 Bq
							Y-88	12657.4 Bq
Tuna Can LCS_00009	09/13/20		Analytics, Lot 74139-334		(Purchased Reagent)		Americium-241	219 dpm/g
							Cesium-137	82.3 dpm/g
							Cobalt-60	136 dpm/g
Tuna Can_00002	02/03/15		Eckert & Ziegler, Lot 81427-334		(Purchased Reagent)		Americium-241	1164 Bq
							Cd-109	16063 Bq
							Ce-139	546 Bq
							Cesium-137	465 Bq
							Co-57	357 Bq
							Cobalt-60	742 Bq
							Hg-203	1208 Bq
							Pb-210	15186 Bq
							Sn-113	943 Bq
							Y-88	1571 Bq

REAGENT TRACEABILITY SUMMARY

Lab Name: Eurofins TestAmerica, St. Louis Job No.: 160-36526-1

SDG No.:

Reagent ID	Exp Date	Prep Date	Dilutant Used	Reagent Final Volume	Parent Reagent		Analyte	Concentration
					Reagent ID	Volume Added		
Tuna Can_00003	02/09/17	Eckert & Ziegler, Lot 90099			(Purchased Reagent)		Americium-241	1164 Bq
							Cd-109	16373 Bq
							Ce-139	549 Bq
							Cesium-137	467 Bq
							Co-57	362 Bq
							Cobalt-60	735 Bq
							Hg-203	1171 Bq
							Pb-210	14936 Bq
							Sn-113	967 Bq
							Y-88	1590 Bq
Tuna Can_00006	03/01/16	Eckert & Ziegler, Lot 83814-334			(Purchased Reagent)		Americium-241	1195 Bq
							Cd-109	16353 Bq
							Ce-139	543 Bq
							Cesium-137	453 Bq
							Co-57	354 Bq
							Cobalt-60	745 Bq
							Hg-203	1175 Bq
							Pb-210	14606 Bq
							Sn-113	961 Bq
							Y-88	1568 Bq

Reagent

Gamma Ampuole_00001

Eckert & Ziegler
Analytics

1380 Seaboard Industrial Blvd.
Atlanta, Georgia 30318
Tel 404•352•8677
Fax 404•352•2837
www.analyticsinc.com

CERTIFICATE OF CALIBRATION

Standard Radionuclide Source

79670-334

5 mL Liquid in Flame Sealed Vial

Customer: TestAmerica St. Louis
P.O. No.: 2303925, Item 1
Calibration Date: 01-Apr-2009 12:00 EST **Grams of Master Source:** 0.028371

This standard radionuclide source was prepared using aliquots measured gravimetrically from master radionuclide solutions. Calibration and purity were checked using a germanium gamma spectrometer system. At the time of calibration no interfering gamma-ray emitting impurities were detected. The gamma-ray emission rates for the most intense gamma-ray lines are given. Analytics maintains traceability to the National Institute of Standards and Technology through a Measurements Assurance Program as described in USNRC Regulatory Guide 4.15, Revision 1, February, 1979, and compliance with ANSI N42.22-1995, "Traceability of Radioactive Sources to NIST."

Nuclide	Gamma-Ray Energy (keV)	Half-Life, Days	Master Source* γps/gram	This Source γps	Uncertainty, % Type u_A	u_B	U	Calibration Method
Am-241	59.5	157860	———	3.390E+03	0.1	0.9	1.8	4π LS
Cd-109	88.0	462.60	1.691E+05	4.798E+03	0.4	1.7	3.5	HPGe
Co-57	122.1	271.79	8.904E+04	2.526E+03	0.5	1.3	2.8	HPGe
Ce-139	165.9	137.6	1.256E+05	3.563E+03	0.4	1.1	2.3	HPGe
Hg-203	279.2	46.61	2.788E+05	7.910E+03	0.3	1.1	2.3	HPGe
Sn-113	391.7	115.1	1.725E+05	4.894E+03	0.5	1.1	2.4	HPGe
Cs-137	661.7	10983	1.120E+05	3.178E+03	0.7	1.2	2.8	HPGe
Y-88	898.0	106.6	4.205E+05	1.193E+04	0.8	1.1	2.7	HPGe
Co-60	1173.2	1925.4	2.184E+05	6.196E+03	0.7	1.1	2.6	HPGe
Co-60	1332.5	1925.4	2.185E+05	6.199E+03	0.7	1.1	2.6	HPGe
Y-88	1836.1	106.6	4.444E+05	1.261E+04	0.7	1.1	2.6	HPGe

* Master Source refers to Analytics' 8-isotope mixture which is calibrated quarterly.

Calibration Methods: 4π LS - 4 pi Liquid Scintillation Counting, HPGe - High Purity Germanium Gamma-Ray Spectrometer, IC - Ionization Chamber. **Uncertainty:** U - Relative expanded uncertainty, k = 2. See NIST Technical Note 1297, "Guidelines for Evaluating and Expressing the Uncertainty of NIST Measurement Results."

Comments:
5.31740 grams 4M HCl solution with approximately 30 microg/g each of Cd, Co, Ce, Hg, Sn, Cs, and Y carriers.

This standard will expire one year after the calibration date.

Source Prepared by: [signature] for
W. Mao, Radiochemist

QA Approved: [signature] Date: 5-13-09
D. M. Montgomery, QA Manager

End of Certificate

Corporate Office
24937 Avenue Tibbitts Valencia, California 91355

Laboratory
1380 Seaboard Industrial Blvd. Atlanta, Georgia, 30318

Reagent

Gamma Ampuole_00003

Eckert & Ziegler
Analytics

1380 Seaboard Industrial Blvd.
Atlanta, Georgia 30318
Tel 404•352•8677
Fax 404•352•2837
www.analyticsinc.com

CERTIFICATE OF CALIBRATION

Standard Radionuclide Source

83725-334

5 mL Liquid in Flame Sealed Vial

Customer: Test America St. Louis/Earth City, MO
P.O. No.: 2397508, Item 1
Reference Date: 01-Jan-2011 12:00 PM EST **Grams of Master Source:** 0.028066

This standard radionuclide source was prepared using aliquots measured gravimetrically from master radionuclide solutions. Calibration and purity were checked using a germanium gamma spectrometer system. At the time of calibration no interfering gamma-ray emitting impurities were detected. The gamma-ray emission rates for the most intense gamma-ray lines are given. Eckert & Ziegler Analytics (EZA) maintains traceability to the National Institute of Standards and Technology through a Measurements Assurance Program as described in USNRC Regulatory Guide 4.15, Revision 1, February, 1979, and compliance with ANSI N42.22-1995, "Traceability of Radioactive Sources to NIST." EZA is accredited by the Health Physics Society (HPS) for the production of NIST-traceable sources, and this source was produced in accordance with the HPS accreditation requirements. Customers may report any concerns with the accreditation program to the HPS Secretariat, 1313 Dolley Madison Blvd., Ste. 402, McLean, VA 22101.

Nuclide	Gamma-Ray Energy (keV)	Half-Life, Days	Master Source* γps/gram	This Source γps	Uncertainty, % Type u_A	u_B	U	Calibration Method
Am-241	59.5	1.580E+05	———	3.261E+03	0.1	0.9	1.8	4π LS
Cd-109	88.0	4.626E+02	1.697E+05	4.763E+03	0.8	1.7	3.8	HPGe
Co-57	122.1	2.718E+02	8.711E+04	2.445E+03	0.5	1.3	2.8	HPGe
Ce-139	165.9	1.376E+02	1.247E+05	3.500E+03	0.5	1.1	2.4	HPGe
Hg-203	279.2	4.661E+01	2.753E+05	7.727E+03	0.4	1.1	2.3	HPGe
Sn-113	391.7	1.151E+02	1.769E+05	4.965E+03	0.5	1.1	2.4	HPGe
Cs-137	661.7	1.098E+04	1.109E+05	3.113E+03	0.7	1.2	2.8	HPGe
Y-88	898.0	1.066E+02	4.224E+05	1.186E+04	0.5	1.1	2.4	HPGe
Co-60	1173.2	1.925E+03	2.142E+05	6.012E+03	0.6	1.1	2.5	HPGe
Co-60	1332.5	1.925E+03	2.143E+05	6.015E+03	0.6	1.1	2.5	HPGe
Y-88	1836.1	1.066E+02	4.472E+05	1.255E+04	0.5	1.1	2.4	HPGe

* Master Source refers to Analytics' 8-isotope mixture which is calibrated quarterly.

Calibration Methods: 4π LS - 4 pi Liquid Scintillation Counting, HPGe - High Purity Germanium Gamma-Ray Spectrometer, IC - Ionization Chamber. **Uncertainty:** U - Relative expanded uncertainty, k = 2. See NIST Technical Note 1297, "Guidelines for Evaluating and Expressing the Uncertainty of NIST Measurement Results."

(Certificate continued on reverse side)

ANA Form005 Rev. —

Corporate Office
24937 Avenue Tibbitts Valencia, California 91355

Laboratory
1380 Seaboard Industrial Blvd. Atlanta, Georgia, 30318

Comments:
5.30203 grams 4M HCl solution with approximately 30 μg/g each of Cd, Co, Ce, Hg, Sn, Cs, and Y carriers.

This standard will expire one year after the reference date.

Source Prepared by: MITaskaeva
M. I. Taskaeva, Radiochemist

QA Approved: _____ Date: 13/JAN/11
J. D. McCorvey, QA Manager Alternate

Reagent

MPREP1-A_00004

1642488
ID MPREP1-A 00004
Exp 11/26/20 Prpd AM Opn 11/26/19
Metals Prep 1 Spike A

CERTIFICATE OF ANALYSIS

Multi-Element Aqueous CRM

Product #: TA-CM-FEB19-STL1-A

Custom ISO G34 Metals Prep 1 Spike A

Lot #: 10094019-9

Matrix: 5% HNO_3

Element	Certified Concentration & Uncertainty	Element	Certified Concentration & Uncertainty	Element	Certified Concentration & Uncertainty
Ag	40.00 ± 0.40 µg/mL	Cr	200.0 ± 2.0 µg/mL	Pb	200.0 ± 2.0 µg/mL
Al	2000 ± 10 µg/mL	Cu	200.0 ± 2.0 µg/mL	Se	100.0 ± 1.0 µg/mL
As	200.0 ± 2.0 µg/mL	Fe	2000 ± 10 µg/mL	Sm	200.0 ± 2.0 µg/mL
B	40.00 ± 0.20 µg/mL	K	2000 ± 10 µg/mL	Sr	200.0 ± 2.0 µg/mL
Ba	200.0 ± 2.0 µg/mL	Li	20.00 ± 0.20 µg/mL	Th	200.0 ± 2.0 µg/mL
Be	20.00 ± 0.20 µg/mL	Mg	2000 ± 10 µg/mL	Tl	40.00 ± 0.40 µg/mL
Bi	200.0 ± 2.0 µg/mL	Mn	200.0 ± 2.0 µg/mL	U	200.0 ± 2.0 µg/mL
Ca	2000 ± 10 µg/mL	Na	2000 ± 10 µg/mL	V	200.0 ± 2.0 µg/mL
Cd	200.0 ± 2.0 µg/mL	Ni	200.0 ± 2.0 µg/mL	Zn	200.0 ± 2.0 µg/mL
Co	200.0 ± 2.0 µg/mL	P	200.0 ± 2.0 µg/mL		

Source Material Lot# Chart

Element	Source Material Lot#	Element	Source Material Lot#	Element	Source Material Lot#
Ag	975475	Cr	880115	Pb	168223
Al	992545	Cu	148793	Se	929078
As	166531	Fe	1004971	Sm	120677R
B	982524	K	983959	Sr	976606
Ba	150283R	Li	156949	Th	122067
Be	998969	Mg	738337	Tl	991734
Bi	753003	Mn	985851	U	AM17-111UX
Ca	150704	Na	994710	V	983037
Cd	173171	Ni	752769	Zn	979871
Co	979870	P	122196R		

Intended Use: This solution is intended for use as a certified reference material (CRM) or calibration standard for inductively coupled plasma optical emission spectroscopy (ICP-OES), inductively coupled plasma mass spectrometry (ICP-MS), flame or furnace atomic absorption spectroscopy (AA or GFAA), and other techniques for elemental analysis.

Certification & Traceability: This CRM was manufactured, processed, and certified under a quality management system that is registered/accredited to **ISO 9001**, **ISO 17034**, and **ISO/IEC 17025**. This CRM was prepared to the certified concentrations shown above by gravimetric methods, using single-element concentrates that were certified using the "High Performance ICP-OES" protocol developed by NIST and are directly traceable to **NIST SRMs (see reverse side)**. The solution was stabilized using high purity nitric acid (HNO_3) and diluted with filtered (0.22 µm), 18 M-ohm deionized water. The balances used in the preparation of this CRM are calibrated regularly with traceability to NIST, using a calibration provider that is accredited to ISO/IEC 17025 by a mutually recognized accreditation body. All volumetric dilutions are performed in Class A calibrated glassware. The certified concentrations were determined based upon gravimetric procedures. Secondary verification of the certified concentrations was performed using ICP-OES that was calibrated and/or referenced against **NIST SRMs (see reverse side)**. The uncertainty associated with each certified concentration represents the expanded uncertainty at the 95% confidence level using a coverage factor of k=2.

USA
5580 Skylane Boulevard P: 707.525.5788
Santa Rosa, CA 95403 P: 800.878.7654
F: 707.545.7901

Europe
Nieuwe Hemweg 7P P: +31 20 638 05 97
1013BG Amsterdam F: +31 20 420 28 36
The Netherlands

www.cpiinternational.com

12/31/2019

Instructions for Use: We recommend that the solution be thoroughly mixed by repeated shaking or swirling of the bottle immediately prior to use. To achieve the highest accuracy, the analyst should: (1) use only pre-cleaned containers and transferware, (2) not pipette directly from the CRM's original container, (3) never pour used product back into the original container, (4) make dilutions using calibrated balances or certified class A volumetric flasks and pipettes, (5) use a minimum sub-sample size of 500 µL, and (6) dilute with the same matrix as the original CRM or other chemically suitable matrix. The solution should be kept tightly capped and stored under normal laboratory conditions. Do not freeze, heat, or immerse the bottle or its contents, and avoid exposure to direct sunlight or moisture.

Period of Validity: CPI International ensures the accuracy of this solution for **18 months** from the certification date shown below, provided the instructions for use are followed. During the period of validity, the purchaser will be notified if this product is recalled due to any significant changes in the stability of the solution.

Chuck Goudreau

Chuck Goudreau, Certifying Officer

November 8, 2019

Certification Date

CPI International waives all responsibility for any damages resulting from the usage and/or implementation of the products/data described herein.

Health and Safety Information: Refer to the Safety Data Sheet (SDS).

Homogeneity: This solution was determined to be homogeneous by procedures consistent with the requirements of ISO Guide 34 and ISO Guide 35. Replicate samples of the finished solution were analyzed to confirm its homogeneity, in accordance with QSP 6-13 Assessment of Homogeneity and Stability. To ensure homogeneity, users should not take a smaller sub-sample than specified in the Instructions for Use, as doing so will invalidate the certified values and uncertainties.

Quality Manual Rev: No. 5, 03/01/2013

Further Information: Please contact CPI International for further information about this CRM.

Quality Certifications: This CRM was prepared under a quality management system that is registered/accredited to the following:

- ISO 9001 – Quality Management Systems – Requirements (TUV NORD Cert. No. 44 100 16560231)
- ISO/IEC 17025 – General Requirements for the Competence of Testing and Calibration Laboratories (A2LA Cert. No. 2848.01)
- ISO Guide 34 – General Requirements for the Competence of Reference Material Producers (A2LA Cert. No. 2848.02)
    - ISO Guide 34 references additional requirements specified in ISO Guide 31 and ISO Guide 35.

This CRM is traceable to the following NIST SRMs:

Analyte	Aq. SRM	MO SRM		Analyte	Aq. SRM	MO SRM		Analyte	Aq. SRM	MO SRM
Ag	3151	1077a		Hf	3122	—		S	3154	2770
Al	3101a	1075a		Hg	3133	3133		Sb	3102a	3102a
As	3103a	3103a		Ho	3123a	—		Sc	3148a	3148a
Au	3121	—		In	3124a	3124a		Se	3149	3149
B	3107	3107		K	3141a	3141a		Si	3150	1066a
Ba	3104a	1051b		La	3127a	3127a		Sm	3147a	—
Be	3105a	3105a		Li	3129a	3129a		Sn	3161a	1057b
Bi	3106	3106		Lu	3130a	—		SO_4^{-2}	3181	—
Br^-	3184	—		Mg	3131a	3131a		Sr	3153a	3153a
Ca	3109a	3109a		Mn	3132	3132		Ta	3155	—
Cd	3108	1053a		Mo	3134	3134		Tb	3157a	—
Ce	3110	3110		Na	3152a	3152a		Te	3156	—
Cl^-	3182	1818a		Nb	3137	—		Th	3159	—
Co	3113	3113		Nd	3135a	—		Ti	3162a	3162a
Cr	3112a	1078b		Ni	3136	1065b		Tl	3158	3158
Cs	3111a	—		NO_3^-	3185	—		Tm	3160a	—
Cu	3114	1080a		P	3139a	3139a		U	3164	—
Dy	3115a	—		Pb	3128	3128		V	3165	1052b
Er	3116a	—		Pd	3138	—		W	3163	3163
Eu	3117a	—		PO_4^{-3}	3186	—		Y	3167a	3167a
F^-	3183	—		Pr	3142a	—		Yb	3166a	—
Fe	3126a	1079b		Pt	3140	3140		Zn	3168a	3168a
Ga	3119a	—		Rb	3145a	—		Zr	3169	3169
Gd	3118a	—		Re	3143	—				
Ge	3120a	—		Rh	3144	3144				

Reagent

MPREP1-B_00004

1842490
ID MPREP1 B_00004
Exp 11/26/20 Prpd LAM Opn 11/26/19
Metals Prep 1 Spike B

CERTIFICATE OF ANALYSIS

Single-Element Aqueous CRM

Product #: TA-CM-FEB19-STL1-B

Custom ISO G34 Metals Prep 1 Spike Std. Solution B

Product Lot #: 10094019-8

Matrix: H_2O

Source Material Lot #: 983063

Element	Certified Concentration & Uncertainty
S	**2000 ± 10 µg/mL**

Intended Use: This solution is intended for use as a certified reference material (CRM) or calibration standard for inductively coupled plasma optical emission spectroscopy (ICP-OES), inductively coupled plasma mass spectrometry (ICP-MS), flame or furnace atomic absorption spectroscopy (AA or GFAA), and other techniques for elemental analysis.

Certification & Traceability: This CRM was manufactured, processed, and certified under a quality management system that is registered/accredited to **ISO 9001**, **ISO 17034**, and **ISO/IEC 17025**. This CRM was prepared to a nominal concentration of 2000 µg/mL by gravimetric methods using a single-element concentrate dissolved in high purity nitric acid (HNO_3) and diluted with filtered (0.22 µm), 18 M-ohm deionized water. The balances used in the preparation of this CRM are calibrated regularly with traceability to NIST, using a calibration provider that is accredited to ISO/IEC 17025 by a mutually recognized accreditation body. All volumetric dilutions are performed in Class A calibrated glassware. The certified concentration and uncertainty were determined using the "High Performance ICP-OES" protocol developed by NIST, and both the certified concentration and uncertainty values are traceable to **NIST SRM 3154**. The uncertainty associated with the certified concentration represents the expanded uncertainty at the 95% confidence level using a coverage factor of k=2.

Instructions for Use: We recommend that the solution be thoroughly mixed by repeated shaking or swirling of the bottle immediately prior to use. To achieve the highest accuracy, the analyst should: (1) use only pre-cleaned containers and transferware, (2) not pipette directly from the CRM's original container, (3) never pour used product back into the original container, (4) make dilutions using calibrated balances or certified class A volumetric flasks and pipettes, (5) use a minimum sub-sample size of 500 µL, and (6) dilute with the same matrix as the original CRM or other chemically suitable matrix. The solution should be kept tightly capped and stored under normal laboratory conditions. Do not freeze, heat, or immerse the bottle or its contents, and avoid exposure to direct sunlight or moisture.

Period of Validity: CPI International ensures the accuracy of this solution for **18 months** from the certification date shown below, provided the instructions for use are followed. During the period of validity, the purchaser will be notified if this product is recalled due to any significant changes in the stability of the solution.

Chuck Goudreau

Chuck Goudreau, Certifying Officer

November 8, 2019
Certification Date

CPI International waives all responsibility for any damages resulting from the usage and/or implementation of the products/data described herein.

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www.cpiinternational.com

Health and Safety Information: Refer to the Safety Data Sheet (SDS).

Homogeneity: This solution was determined to be homogeneous by procedures consistent with the requirements of ISO Guide 34 and ISO Guide 35. Replicate samples of the finished solution were analyzed to confirm its homogeneity, in accordance with QSP 6-13 Assessment of Homogeneity and Stability. To ensure homogeneity, users should not take a smaller sub-sample than specified in the Instructions for Use, as doing so will invalidate the certified values and uncertainties.

Quality Manual Rev: No. 5, 03/01/2013

Further Information: Please contact CPI International for further information about this CRM.

Quality Certifications: This CRM was prepared under a quality management system that is registered/accredited to the following:

- ISO 9001 – Quality Management Systems – Requirements (TUV NORD Cert. No. 44 100 16560231)
- ISO/IEC 17025 – General Requirements for the Competence of Testing and Calibration Laboratories (A2LA Cert. No. 2848.01)
- ISO Guide 34 – General Requirements for the Competence of Reference Material Producers (A2LA Cert. No. 2848.02)
    - ISO Guide 34 references additional requirements specified in ISO Guide 31 and ISO Guide 35.

Reagent

MPREP2_00022

1842492
ID MPREP2_00022
Exp 11/26/20 Prpd LAM Opn 11/26/19
Metals Prep 2 Spike

CERTIFICATE OF ANALYSIS

Multi-Element Aqueous CRM

Product #: TA-CM-FEB19-STL2-500

Custom ISO G34 Metals Prep 2 Spike Standard

Lot #: 10094019-7

Matrix: 5% HNO_3/tr. HF

Element	Certified Concentration & Uncertainty	Element	Certified Concentration & Uncertainty	Element	Certified Concentration & Uncertainty
Mo	100.0 ± 1.0 µg/mL	Sn	200.0 ± 2.0 µg/mL	Zr	200.0 ± 2.0 µg/mL
Sb	99.99 ± 0.50 µg/mL	Ti	200.0 ± 2.0 µg/mL		
Si	1000 ± 10 µg/mL	W	200.0 ± 2.0 µg/mL		

Source Material Lot# Chart

Element	Source Material Lot#	Element	Source Material Lot#	Element	Source Material Lot#
Mo	175215	Sn	171360	Zr	172925
Sb	978317	Ti	161694		
Si	977647	W	997482		

Intended Use: This solution is intended for use as a certified reference material (CRM) or calibration standard for inductively coupled plasma optical emission spectroscopy (ICP-OES), inductively coupled plasma mass spectrometry (ICP-MS), flame or furnace atomic absorption spectroscopy (AA or GFAA), and other techniques for elemental analysis.

Certification & Traceability: This CRM was manufactured, processed, and certified under a quality management system that is registered/accredited to **ISO 9001**, **ISO 17034**, and **ISO/IEC 17025**. This CRM was prepared to the certified concentrations shown above by gravimetric methods, using single-element concentrates that were certified using the "High Performance ICP-OES" protocol developed by NIST and are directly traceable to **NIST SRMs (see reverse side)**. The solution was stabilized using high purity nitric acid (HNO_3), trace hydrofluoric acid (HF) and diluted with filtered (0.22 µm), 18 M-ohm deionized water. The balances used in the preparation of this CRM are calibrated regularly with traceability to NIST, using a calibration provider that is accredited to ISO/IEC 17025 by a mutually recognized accreditation body. All volumetric dilutions are performed in Class A calibrated glassware. The certified concentrations were determined based upon gravimetric procedures. Secondary verification of the certified concentrations was performed using ICP-OES that was calibrated and/or referenced against **NIST SRMs (see reverse side)**. The uncertainty associated with each certified concentration represents the expanded uncertainty at the 95% confidence level using a coverage factor of k=2.

Instructions for Use: We recommend that the solution be thoroughly mixed by repeated shaking or swirling of the bottle immediately prior to use. To achieve the highest accuracy, the analyst should: (1) use only pre-cleaned containers and transferware, (2) not pipette directly from the CRM's original container, (3) never pour used product back into the original container, (4) make dilutions using calibrated balances or certified class A volumetric flasks and pipettes, (5) use a minimum sub-sample size of 500 µL, and (6) dilute with the same matrix as the original CRM or other chemically suitable matrix. The solution should be kept tightly capped and stored under normal laboratory conditions. Do not freeze, heat, or immerse the bottle or its contents, and avoid exposure to direct sunlight or moisture.

Period of Validity: CPI International ensures the accuracy of this solution for **18 months** from the certification date shown below, provided the instructions for use are followed. During the period of validity, the purchaser will be notified if this product is recalled due to any significant changes in the stability of the solution.

Chuck Goudreau

Chuck Goudreau, Certifying Officer

November 8, 2019
Certification Date

CPI International waives all responsibility for any damages resulting from the usage and/or implementation of the products/data described herein.

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12/31/2019

Health and Safety Information: Refer to the Safety Data Sheet (SDS).

Homogeneity: This solution was determined to be homogeneous by procedures consistent with the requirements of ISO Guide 34 and ISO Guide 35. Replicate samples of the finished solution were analyzed to confirm its homogeneity, in accordance with QSP 6-13 Assessment of Homogeneity and Stability. To ensure homogeneity, users should not take a smaller sub-sample than specified in the Instructions for Use, as doing so will invalidate the certified values and uncertainties.

Quality Manual Rev: No. 5, 03/01/2013

Further Information: Please contact CPI International for further information about this CRM.

Quality Certifications: This CRM was prepared under a quality management system that is registered/accredited to the following:

- ISO 9001 – Quality Management Systems – Requirements (TUV NORD Cert. No. 44 100 16560231)
- ISO/IEC 17025 – General Requirements for the Competence of Testing and Calibration Laboratories (A2LA Cert No. 2848.01)
- ISO Guide 34 – General Requirements for the Competence of Reference Material Producers (A2LA Cert. No. 2848.02)
    - ISO Guide 34 references additional requirements specified in ISO Guide 31 and ISO Guide 35.

This CRM is traceable to the following NIST SRMs:

Analyte	Aq. SRM	MO SRM		Analyte	Aq. SRM	MO SRM		Analyte	Aq. SRM	MO SRM
Ag	3151	1077a		Hf	3122	—		S	3154	2770
Al	3101a	1075a		Hg	3133	3133		Sb	3102a	3102a
As	3103a	3103a		Ho	3123a	—		Sc	3148a	3148a
Au	3121	—		In	3124a	3124a		Se	3149	3149
B	3107	3107		K	3141a	3141a		Si	3150	1066a
Ba	3104a	1051b		La	3127a	3127a		Sm	3147a	—
Be	3105a	3105a		Li	3129a	3129a		Sn	3161a	1057b
Bi	3106	3106		Lu	3130a	—		SO_4^{2-}	3181	—
Br^-	3184	—		Mg	3131a	3131a		Sr	3153a	3153a
Ca	3109a	3109a		Mn	3132	3132		Ta	3155	—
Cd	3108	1053a		Mo	3134	3134		Tb	3157a	—
Ce	3110	3110		Na	3152a	3152a		Te	3156	—
Cl^-	3182	1818a		Nb	3137	—		Th	3159	—
Co	3113	3113		Nd	3135a	—		Ti	3162a	3162a
Cr	3112a	1078b		Ni	3136	1065b		Tl	3158	3158
Cs	3111a	—		NO_3^-	3185	—		Tm	3160a	—
Cu	3114	1080a		P	3139a	3139a		U	3164	—
Dy	3115a	—		Pb	3128	3128		V	3165	1052b
Er	3116a	—		Pd	3138	—		W	3163	3163
Eu	3117a	—		PO_4^{3-}	3186	—		Y	3167a	3167a
F^-	3183	—		Pr	3142a	—		Yb	3166a	—
Fe	3126a	1079b		Pt	3140	3140		Zn	3168a	3168a
Ga	3119a	—		Rb	3145a	—		Zr	3169	3169
Gd	3118a	—		Re	3143	—				
Ge	3120a	—		Rh	3144	3144				

Reagent

MS CAL 1 A_00006

1799532
ID MS CAL 1 A_00006
Exp 09/18/20 Prpd cb Opn 09/18/19
MS CAL 1 A

CPI INTERNATIONAL

CERTIFICATE OF ANALYSIS

Multi-Element Aqueous CRM — Product #: TA-CM-AUG19-STL4

Custom Standard — Lot #: 10103046-1

Matrix: 5% HNO_3

Element	Certified Concentration	Element	Certified Concentration	Element	Certified Concentration
Ag	2.0 µg/mL	Cr	10.0 µg/mL	Sm	10.0 µg/mL
As	10.0 µg/mL	Cu	3.0 µg/mL	Sr	5.0 µg/mL
B	100 µg/mL	Li	5.0 µg/mL	Th	2.0 µg/mL
Ba	2.0 µg/mL	Mn	4.0 µg/mL	Tl	2.0 µg/mL
Be	0.5 µg/mL	Ni	5.0 µg/mL	U	1.0 µg/mL
Cd	0.5 µg/mL	Pb	3.0 µg/mL	V	10.0 µg/mL
Co	2.0 µg/mL	Se	5.0 µg/mL	Zn	20.0 µg/mL

Source Material Lot # Chart

Element	Source Material Lot#	Element	Source Material Lot#	Element	Source Material Lot#
Ag	975475	Cr	975466	Sm	148251
As	175385	Cu	982446	Sr	998106
B	982186	Li	751942	Th	987024
Ba	994634	Mn	997487	Tl	991734
Be	998969	Ni	984273	U	992180
Cd	996631	Pb	981329	V	990117
Co	979906	Se	982461	Zn	984272

Intended Use: This solution is intended for use as a reference material (RM) or calibration standard for inductively coupled plasma optical emission spectroscopy (ICP-OES), inductively coupled plasma mass spectrometry (ICP-MS), flame or furnace atomic absorption spectroscopy (AA or GFAA), and other techniques for elemental analysis.

Certification & Traceability: This RM was manufactured, processed, and/or certified under a quality management system that is registered/accredited to **ISO 9001**, **ISO 17034**, and **ISO/IEC 17025**. This RM was prepared to the certified concentrations shown above by gravimetric methods using single-element concentrates, and was stabilized using high purity nitric acid (HNO_3), and diluted with filtered (0.22 µm), 18 M-ohm deionized water. The balances used in the preparation of this RM are calibrated regularly with traceability to NIST, using a calibration provider that is accredited to ISO/IEC 17025 by a mutually recognized accreditation body. All volumetric dilutions are performed in Class A calibrated glassware. The certified concentrations were determined based upon gravimetric procedures. Secondary verification of the certified concentrations was performed using ICP-OES that was calibrated and/or referenced against **NIST SRMs (see reverse side)**. The uncertainty associated with the certified concentration is ±0.5% relative, which is the sum of the estimated errors due to the purity of the raw materials, the gravimetric preparation of the solution, and transpiration through the container. This represents the expanded uncertainty at the 95% confidence level using a coverage factor of k=2.

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12/31/2019

Instructions for Use: We recommend that the solution be thoroughly mixed by repeated shaking or swirling of the bottle immediately prior to use. To achieve the highest accuracy, the analyst should: (1) use only pre-cleaned containers and transferware, (2) not pipette directly from the RM's original container, (3) never pour used product back into the original container, (4) make dilutions using calibrated balances or certified class A volumetric flasks and pipettes, (5) use a minimum sub-sample size of 500 µL, and (6) dilute with the same matrix as the original RM or other chemically suitable matrix. The solution should be kept tightly capped and stored under normal laboratory conditions. Do not freeze, heat, or immerse the bottle or its contents, and avoid exposure to direct sunlight or moisture.

Period of Validity: CPI International ensures the accuracy of this solution for **18 months** from the certification date shown below, provided the instructions for use are followed. During the period of validity, the purchaser will be notified if this product is recalled due to any significant changes in the stability of the solution.

Chuck Goudreau

Chuck Goudreau, Certifying Officer

September 12, 2019

Certification Date

CPI International waives all responsibility for any damages resulting from the usage and/or implementation of the products/data described herein.

This RM is traceable to the following NIST SRMs:

Analyte	Aq. SRM	MO SRM		Analyte	Aq. SRM	MO SRM		Analyte	Aq. SRM	MO SRM
Ag	3151	1077a		[illegible]	[illegible]	—		S	3154	2770
Al	3101a	1075a		[illegible]	[illegible]	[illegible]		Sb	3102a	3102a
As	3103a	3103a		[illegible]	[illegible]	—		Sc	3148a	3148a
Au	3121	—		[illegible]	[illegible]	3124a		Se	3149	3149
B	3107	3107		[illegible]	[illegible]	[illegible]		Si	3150	1066a
Ba	3104a	1051b		[illegible]	[illegible]	[illegible]		Sm	3147a	—
Be	3105a	3105a		[illegible]	[illegible]	3129a		Sn	3161a	1057b
Bi	3106	3106		[illegible]	[illegible]	—		SO_4^{2-}	3181	—
Br	3184	—		[illegible]	[illegible]	3131a		Sr	3153a	3153a
Ca	3109a	3109a		[illegible]	[illegible]	[illegible]		Ta	3155	—
Cd	3108	1053a		[illegible]	[illegible]	[illegible]		Tb	3157a	—
Ce	3110	3110		[illegible]	[illegible]	3152a		Te	3156	—
Cl	3182	1818a		[illegible]	[illegible]			Th	3159	—
Co	3113	3113		[illegible]	[illegible]	—		Ti	3162a	3162a
Cr	3112a	1078b		[illegible]	[illegible]	[illegible]		Tl	3158	3158
Cs	3111a	—		[illegible]	[illegible]	—		Tm	3160a	—
Cu	3114	1080a		[illegible]	[illegible]	3139a		U	3164	—
Dy	3115a	—		[illegible]	[illegible]	[illegible]		V	3165	1052b
Er	3116a	—		[illegible]	[illegible]	[illegible]		W	3163	3163
Eu	3117a	—		[illegible]	[illegible]	—		Y	3167a	3167a
F	3183	—		[illegible]	[illegible]	—		Yb	3166a	—
Fe	3126a	1079b		[illegible]	[illegible]	[illegible]		Zn	3168a	3168a
Ga	3119a	—		[illegible]	[illegible]	—		Zr	3169	3169
Gd	3118a	—		[illegible]	[illegible]	—				
Ge	3120a	—		[illegible]	[illegible]	[illegible]				

Reagent

MS CAL3 A_00011

1738191
D MS CAL3 A_00011
Exp 05/31/20 Prpd cb Opn 05/21/19
MS CAL 3 A

CERTIFICATE OF ANALYSIS

Multi-Element Aqueous CRM

Product #: TA-CM-APR19-STL5

Mix Name: TA-CAL-3

Lot #: 10097743-1

Matrix: 2% HNO_3

Element	Certified Concentration & Uncertainty	Element	Certified Concentration & Uncertainty	Element	Certified Concentration & Uncertainty
Ag	20.02 ± 0.10 µg/mL	Cr	100.1 ± 0.5 µg/mL	Sm	100.1 ± 0.5 µg/mL
As	100.0 ± 0.5 µg/mL	Cu	100.0 ± 0.5 µg/mL	Sr	100.1 ± 0.5 µg/mL
B	200.0 ± 1.0 µg/mL	Li	100.1 ± 0.5 µg/mL	Th	100.1 ± 0.5 µg/mL
Ba	100.1 ± 0.5 µg/mL	Mn	100.1 ± 0.5 µg/mL	Tl	20.02 ± 0.10 µg/mL
Be	100.0 ± 0.5 µg/mL	Ni	100.0 ± 0.5 µg/mL	U	100.1 ± 0.5 µg/mL
Cd	100.0 ± 0.5 µg/mL	Pb	100.1 ± 0.5 µg/mL	V	100.0 ± 0.5 µg/mL
Co	100.0 ± 0.5 µg/mL	Se	50.01 ± 0.25 µg/mL	Zn	100.0 ± 0.5 µg/mL

Intended Use: This solution is intended for use as a certified reference material (CRM) or calibration standard for inductively coupled plasma optical emission spectroscopy (ICP-OES), inductively coupled plasma mass spectrometry (ICP-MS), flame or furnace atomic absorption spectroscopy (AA or GFAA), and other techniques for elemental analysis.

Certification & Traceability: This CRM was manufactured, processed, and certified under a quality management system that is registered/accredited to **ISO 9001**, **ISO 17034**, and **ISO/IEC 17025**. This CRM was prepared to the certified concentrations shown above by gravimetric methods, using single-element concentrates that were certified using the "High Performance ICP-OES" protocol developed by NIST and are directly traceable to **NIST SRMs (see reverse side)**. The solution was stabilized using high purity nitric acid (HNO_3) and diluted with filtered (0.22 µm), 18 M-ohm deionized water. The balances used in the preparation of this CRM are calibrated regularly with traceability to NIST, using a calibration provider that is accredited to ISO/IEC 17025 by a mutually recognized accreditation body. All volumetric dilutions are performed in Class A calibrated glassware. The certified concentrations were determined based upon gravimetric procedures. Secondary verification of the certified concentrations was performed using ICP-OES that was calibrated and/or referenced against **NIST SRMs (see reverse side)**. The uncertainty associated with each certified concentration represents the expanded uncertainty at the 95% confidence level using a coverage factor of k=2.

Instructions for Use: We recommend that the solution be thoroughly mixed by repeated shaking or swirling of the bottle immediately prior to use. To achieve the highest accuracy, the analyst should: (1) use only pre-cleaned containers and transferware, (2) not pipette directly from the CRM's original container, (3) never pour used product back into the original container, (4) make dilutions using calibrated balances or certified class A volumetric flasks and pipettes, (5) use a minimum sub-sample size of 500 µL, and (6) dilute with the same matrix as the original CRM or other chemically suitable matrix. The solution should be kept tightly capped and stored under normal laboratory conditions. Do not freeze, heat, or immerse the bottle or its contents, and avoid exposure to direct sunlight or moisture.

Period of Validity: CPI International ensures the accuracy of this solution for **18 months** from the certification date shown below, provided the instructions for use are followed. During the period of validity, the purchaser will be notified if this product is recalled due to any significant changes in the stability of the solution.

Chuck Goudreau

Chuck Goudreau, Certifying Officer

May 23, 2019
Certification Date

CPI International waives all responsibility for any damages resulting from the usage and/or implementation of the products/data described herein.

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Health and Safety Information: Refer to the Safety Data Sheet (SDS).

Homogeneity: This solution was determined to be homogeneous by procedures consistent with the requirements of ISO Guide 34 and ISO Guide 35. Replicate samples of the finished solution were analyzed to confirm its homogeneity, in accordance with QSP 6-13 Assessment of Homogeneity and Stability. To ensure homogeneity, users should not take a smaller sub-sample than specified in the Instructions for Use, as doing so will invalidate the certified values and uncertainties.

Quality Manual Rev: No. 5, 03/01/2013

Further Information: Please contact CPI International for further information about this CRM.

Quality Certifications: This CRM was prepared under a quality management system that is registered/accredited to the following:

- ISO 9001 – Quality Management Systems – Requirements (TUV NORD Cert. No. 44 100 16560231)
- ISO/IEC 17025 – General Requirements for the Competence of Testing and Calibration Laboratories (A2LA Cert. No. 2848.01)
- ISO Guide 34 – General Requirements for the Competence of Reference Material Producers (A2LA Cert. No. 2848.02)
    - ISO Guide 34 references additional requirements specified in ISO Guide 31 and ISO Guide 35.

This CRM is traceable to the following NIST SRMs:

Analyte	Aq. SRM	MO SRM		Analyte	Aq. SRM	MO SRM		Analyte	Aq. SRM	MO SRM
Ag	3151	1077a		Hf	3122	—		S	3154	2770
Al	3101a	1075a		Hg	3133	3133		Sb	3102a	3102a
As	3103a	3103a		Ho	3123a	—		Sc	3148a	3148a
Au	3121	—		In	3124a	3124a		Se	3149	3149
B	3107	3107		K	3141a	3141a		Si	3150	1066a
Ba	3104a	1051b		La	3127a	3127a		Sm	3147a	—
Be	3105a	3105a		Li	3129a	3129a		Sn	3161a	1057b
Bi	3106	3106		Lu	3130a	—		SO_4^{-2}	3181	—
Br^-	3184	—		Mg	3131a	3131a		Sr	3153a	3153a
Ca	3109a	3109a		Mn	3132	3132		Ta	3155	—
Cd	3108	1053a		Mo	3134	3134		Tb	3157a	—
Ce	3110	3110		Na	3152a	3152a		Te	3156	—
Cl^-	3182	1818a		Nb	3137	—		Th	3159	—
Co	3113	3113		Nd	3135a	—		Ti	3162a	3162a
Cr	3112a	1078b		Ni	3136	1065b		Tl	3158	3158
Cs	3111a	—		NO_3	3185	—		Tm	3160a	—
Cu	3114	1080a		P	3139a	3139a		U	3164	—
Dy	3115a	—		Pb	3128	3128		V	3165	1052b
Er	3116a	—		Pd	3138	—		W	3163	3163
Eu	3117a	—		PO_4^{-3}	3186	—		Y	3167a	3167a
F^-	3183	—		Pr	3142a	—		Yb	3166a	—
Fe	3126a	1079b		Pt	3140	3140		Zn	3168a	3168a
Ga	3119a	—		Rb	3145a	—		Zr	3169	3169
Gd	3118a	—		Re	3143	—				
Ge	3120a	—		Rh	3144	3144				

Reagent

MS CAL3 A_00012

CPI INTERNATIONAL

183/637
ID MS CAL 3 A 00012
Exp 11/20/20 Prpd LKP Opn 11/20/19
MS CAL 3 A

CERTIFICATE OF ANALYSIS

Multi-Element Aqueous CRM

Product #: TA-CM-APR19-STL5

Mix Name: TA-CAL-3

Lot #: 10097743-1

Matrix: 2% HNO_3

Element	Certified Concentration & Uncertainty	Element	Certified Concentration & Uncertainty	Element	Certified Concentration & Uncertainty
Ag	20.02 ± 0.10 µg/mL	Cr	100.1 ± 0.5 µg/mL	Sm	100.1 ± 0.5 µg/mL
As	100.0 ± 0.5 µg/mL	Cu	100.0 ± 0.5 µg/mL	Sr	100.1 ± 0.5 µg/mL
B	200.0 ± 1.0 µg/mL	Li	100.1 ± 0.5 µg/mL	Th	100.1 ± 0.5 µg/mL
Ba	100.1 ± 0.5 µg/mL	Mn	100.1 ± 0.5 µg/mL	Tl	20.02 ± 0.10 µg/mL
Be	100.0 ± 0.5 µg/mL	Ni	100.0 ± 0.5 µg/mL	U	100.1 ± 0.5 µg/mL
Cd	100.0 ± 0.5 µg/mL	Pb	100.1 ± 0.5 µg/mL	V	100.0 ± 0.5 µg/mL
Co	100.0 ± 0.5 µg/mL	Se	50.01 ± 0.25 µg/mL	Zn	100.0 ± 0.5 µg/mL

Intended Use: This solution is intended for use as a certified reference material (CRM) or calibration standard for inductively coupled plasma optical emission spectroscopy (ICP-OES), inductively coupled plasma mass spectrometry (ICP-MS), flame or furnace atomic absorption spectroscopy (AA or GFAA), and other techniques for elemental analysis.

Certification & Traceability: This CRM was manufactured, processed, and certified under a quality management system that is registered/accredited to **ISO 9001**, **ISO 17034**, and **ISO/IEC 17025**. This CRM was prepared to the certified concentrations shown above by gravimetric methods, using single-element concentrates that were certified using the "High Performance ICP-OES" protocol developed by NIST and are directly traceable to **NIST SRMs (see reverse side)**. The solution was stabilized using high purity nitric acid (HNO_3) and diluted with filtered (0.22 µm), 18 M-ohm deionized water. The balances used in the preparation of this CRM are calibrated regularly with traceability to NIST, using a calibration provider that is accredited to ISO/IEC 17025 by a mutually recognized accreditation body. All volumetric dilutions are performed in Class A calibrated glassware. The certified concentrations were determined based upon gravimetric procedures. Secondary verification of the certified concentrations was performed using ICP-OES that was calibrated and/or referenced against **NIST SRMs (see reverse side)**. The uncertainty associated with each certified concentration represents the expanded uncertainty at the 95% confidence level using a coverage factor of k=2.

Instructions for Use: We recommend that the solution be thoroughly mixed by repeated shaking or swirling of the bottle immediately prior to use. To achieve the highest accuracy, the analyst should: (1) use only pre-cleaned containers and transferware, (2) not pipette directly from the CRM's original container, (3) never pour used product back into the original container, (4) make dilutions using calibrated balances or certified class A volumetric flasks and pipettes, (5) use a minimum sub-sample size of 500 µL, and (6) dilute with the same matrix as the original CRM or other chemically suitable matrix. The solution should be kept tightly capped and stored under normal laboratory conditions. Do not freeze, heat, or immerse the bottle or its contents, and avoid exposure to direct sunlight or moisture.

Period of Validity: CPI International ensures the accuracy of this solution for **18 months** from the certification date shown below, provided the instructions for use are followed. During the period of validity, the purchaser will be notified if this product is recalled due to any significant changes in the stability of the solution.

Chuck Goudreau

Chuck Goudreau, Certifying Officer

November 12, 2019
Certification Date

CPI International waives all responsibility for any damages resulting from the usage and/or implementation of the products/data described herein.

USA
5580 Skylane Boulevard P: 707.525.5788
Santa Rosa, CA 95403 P: 800.878.7654
F: 707.545.7901

Europe
Nieuwe Hemweg 7P P: +31 20 638 05 97
1013BG Amsterdam F: +31 20 420 28 36
The Netherlands

www.cpiinternational.com

Health and Safety Information: Refer to the Safety Data Sheet (SDS).

Homogeneity: This solution was determined to be homogeneous by procedures consistent with the requirements of ISO Guide 34 and ISO Guide 35. Replicate samples of the finished solution were analyzed to confirm its homogeneity, in accordance with QSP 6-13 Assessment of Homogeneity and Stability. To ensure homogeneity, users should not take a smaller sub-sample than specified in the Instructions for Use, as doing so will invalidate the certified values and uncertainties.

Quality Manual Rev: No. 5, 03/01/2013

Further Information: Please contact CPI International for further information about this CRM.

Quality Certifications: This CRM was prepared under a quality management system that is registered/accredited to the following:

- ISO 9001 – Quality Management Systems – Requirements (TUV NORD Cert. No. 44 100 16560231)
- ISO/IEC 17025 – General Requirements for the Competence of Testing and Calibration Laboratories (A2LA Cert. No. 2848.01)
- ISO Guide 34 – General Requirements for the Competence of Reference Material Producers (A2LA Cert. No. 2848.02)
    - ISO Guide 34 references additional requirements specified in ISO Guide 31 and ISO Guide 35.

This CRM is traceable to the following NIST SRMs:

Analyte	Aq. SRM	MO SRM	Analyte	Aq. SRM	MO SRM	Analyte	Aq. SRM	MO SRM
Ag	3151	1077a	Hf	3122	—	S	3154	2770
Al	3101a	1075a	Hg	3133	3133	Sb	3102a	3102a
As	3103a	3103a	Ho	3123a	—	Sc	3148a	3148a
Au	3121	—	In	3124a	3124a	Se	3149	3149
B	3107	3107	K	3141a	3141a	Si	3150	1066a
Ba	3104a	1051b	La	3127a	3127a	Sm	3147a	—
Be	3105a	3105a	Li	3129a	3129a	Sn	3161a	1057b
Bi	3106	3106	Lu	3130a	—	SO_4^{2-}	3181	—
Br^-	3184	—	Mg	3131a	3131a	Sr	3153a	3153a
Ca	3109a	3109a	Mn	3132	3132	Ta	3155	—
Cd	3108	1053a	Mo	3134	3134	Tb	3157a	—
Ce	3110	3110	Na	3152a	3152a	Te	3156	—
Cl^-	3182	1818a	Nb	3137	—	Th	3159	—
Co	3113	3113	Nd	3135a	—	Ti	3162a	3162a
Cr	3112a	1078b	Ni	3136	1065b	Tl	3158	3158
Cs	3111a	—	NO_3^-	3185	—	Tm	3160a	—
Cu	3114	1080a	P	3139a	3139a	U	3164	—
Dy	3115a	—	Pb	3128	3128	V	3165	1052b
Er	3116a	—	Pd	3138	—	W	3163	3163
Eu	3117a	—	PO_4^{3-}	3186	—	Y	3167a	3167a
F^-	3183	—	Pr	3142a	—	Yb	3166a	—
Fe	3126a	1079b	Pt	3140	3140	Zn	3168a	3168a
Ga	3119a	—	Rb	3145a	—	Zr	3169	3169
Gd	3118a	—	Re	3143	—			
Ge	3120a	—	Rh	3144	3144			

Reagent

MS ICV 2_00009

1738164
D MS ICV 2_00009
Exp 05/31/20 Prpd cb Opn 05/31/19
ICV 2 - new

CPI INTERNATIONAL

CERTIFICATE OF ANALYSIS

Multi-Element Aqueous CRM

Product #: G34-TA-CM-APR19-STL8

Mix Name: G34 MC ICV 2

Lot #: 10097743-4

Matrix: 2% HNO_3

Element	Certified Concentration & Uncertainty	Element	Certified Concentration & Uncertainty	Element	Certified Concentration & Uncertainty
Ag	39.98 ± 0.20 µg/mL	Li	200.1 ± 1.0 µg/mL	Tl	40.17 ± 0.20 µg/mL
Ba	200.0 ± 1.0 µg/mL	Mn	200.4 ± 1.0 µg/mL	U	200.4 ± 1.0 µg/mL
Be	200.4 ± 1.0 µg/mL	Ni	200.1 ± 1.0 µg/mL	V	200.1 ± 1.0 µg/mL
Cd	200.3 ± 1.0 µg/mL	Pb	200.1 ± 1.0 µg/mL	Zn	200.1 ± 1.0 µg/mL
Co	200.1 ± 1.0 µg/mL	Sm	200.2 ± 1.0 µg/mL	Zr	200.5 ± 1.0 µg/mL
Cr	200.2 ± 1.0 µg/mL	Sr	200.5 ± 1.0 µg/mL		
Cu	200.2 ± 1.0 µg/mL	Th	200.0 ± 1.0 µg/mL		

Intended Use: This solution is intended for use as a second source certified reference material (CRM) or calibration standard for inductively coupled plasma optical emission spectroscopy (ICP-OES), inductively coupled plasma mass spectrometry (ICP-MS), flame or furnace atomic absorption spectroscopy (AA or GFAA), and other techniques for elemental analysis.

Certification & Traceability: This CRM was manufactured, processed, and certified under a quality management system that is registered/accredited to **ISO 9001**, **ISO 17034**, and **ISO/IEC 17025**. This CRM was prepared to the certified concentrations shown above by gravimetric methods, using single-element concentrates that were certified using the "High Performance ICP-OES" protocol developed by NIST and are directly traceable to **NIST SRMs (see reverse side)**. The solution was stabilized using high purity nitric acid (HNO_3) and diluted with filtered (0.22 µm), 18 M-ohm deionized water. The balances used in the preparation of this CRM are calibrated regularly with traceability to NIST, using a calibration provider that is accredited to ISO/IEC 17025 by a mutually recognized accreditation body. All volumetric dilutions are performed in Class A calibrated glassware. The certified concentrations were determined based upon gravimetric procedures. Secondary verification of the certified concentrations was performed using ICP-OES that was calibrated and/or referenced against **NIST SRMs (see reverse side)**. The uncertainty associated with each certified concentration represents the expanded uncertainty at the 95% confidence level using a coverage factor of k=2.

Instructions for Use: We recommend that the solution be thoroughly mixed by repeated shaking or swirling of the bottle immediately prior to use. To achieve the highest accuracy, the analyst should: (1) use only pre-cleaned containers and transferware, (2) not pipette directly from the CRM's original container, (3) never pour used product back into the original container, (4) make dilutions using calibrated balances or certified class A volumetric flasks and pipettes, (5) use a minimum sub-sample size of 500 µL, and (6) dilute with the same matrix as the original CRM or other chemically suitable matrix. The solution should be kept tightly capped and stored under normal laboratory conditions. Do not freeze, heat, or immerse the bottle or its contents, and avoid exposure to direct sunlight or moisture.

Period of Validity: CPI International ensures the accuracy of this solution for **18 months** from the certification date shown below, provided the instructions for use are followed. During the period of validity, the purchaser will be notified if this product is recalled due to any significant changes in the stability of the solution.

Chuck Goudreau

Chuck Goudreau, Certifying Officer

May 23, 2019
Certification Date

CPI International waives all responsibility for any damages resulting from the usage and/or implementation of the products/data described herein.

USA
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1013BG Amsterdam F: +31 20 420 28 36
The Netherlands

12/31/2019

Health and Safety Information: Refer to the Safety Data Sheet (SDS).

Homogeneity: This solution was determined to be homogeneous by procedures consistent with the requirements of ISO Guide 34 and ISO Guide 35. Replicate samples of the finished solution were analyzed to confirm its homogeneity, in accordance with QSP 6-13 Assessment of Homogeneity and Stability. To ensure homogeneity, users should not take a smaller sub-sample than specified in the Instructions for Use, as doing so will invalidate the certified values and uncertainties.

Quality Manual Rev: No. 5, 03/01/2013

Further Information: Please contact CPI International for further information about this CRM.

Quality Certifications: This CRM was prepared under a quality management system that is registered/accredited to the following:

- ISO 9001 – Quality Management Systems – Requirements (TUV NORD Cert. No. 44 100 16560231)
- ISO/IEC 17025 – General Requirements for the Competence of Testing and Calibration Laboratories (A2LA Cert. No. 2848.01)
- ISO Guide 34 – General Requirements for the Competence of Reference Material Producers (A2LA Cert. No. 2848.02)
  - ISO Guide 34 references additional requirements specified in ISO Guide 31 and ISO Guide 35.

This CRM is traceable to the following NIST SRMs:

Analyte	Aq. SRM	MO SRM		Analyte	Aq. SRM	MO SRM		Analyte	Aq. SRM	MO SRM
Ag	3151	1077a		Hf	3122	—		S	3154	2770
Al	3101a	1075a		Hg	3133	3133		Sb	3102a	3102a
As	3103a	3103a		Ho	3123a	—		Sc	3148a	3148a
Au	3121	—		In	3124a	3124a		Se	3149	3149
B	3107	3107		K	3141a	3141a		Si	3150	1066a
Ba	3104a	1051b		La	3127a	3127a		Sm	3147a	—
Be	3105a	3105a		Li	3129a	3129a		Sn	3161a	1057b
Bi	3106	3106		Lu	3130a	—		SO_4^{-2}	3181	—
Br^-	3184	—		Mg	3131a	3131a		Sr	3153a	3153a
Ca	3109a	3109a		Mn	3132	3132		Ta	3155	—
Cd	3108	1053a		Mo	3134	3134		Tb	3157a	—
Ce	3110	3110		Na	3152a	3152a		Te	3156	—
Cl^-	3182	1818a		Nb	3137	—		Th	3159	—
Co	3113	3113		Nd	3135a	—		Ti	3162a	3162a
Cr	3112a	1078b		Ni	3136	1065b		Tl	3158	3158
Cs	3111a	—		NO_3^-	3185	—		Tm	3160a	—
Cu	3114	1080a		P	3139a	3139a		U	3164	—
Dy	3115a	—		Pb	3128	3128		V	3165	1052b
Er	3116a	—		Pd	3138	—		W	3163	3163
Eu	3117a	—		PO_4^{-3}	3186	—		Y	3167a	3167a
F^-	3183	—		Pr	3142a	—		Yb	3166a	—
Fe	3126a	1079b		Pt	3140	3140		Zn	3168a	3168a
Ga	3119a	—		Rb	3145a	—		Zr	3169	3169
Gd	3118a	—		Re	3143	—				
Ge	3120a	—		Rh	3144	3144				

Reagent

PR_LCSSRM U_00001

Reference Materials

▪ Certificate of Analysis ▪

Product:	Metals in Soil
Catalog Number:	540
Lot No.	D099-540
Certificate Issue Date:	September 25, 2017
Expiration Date:	May 31, 2020
Revision Number:	Original

1598419
ID: PR_LCSSRM_00023
Exp 6/31/20 Prep LKP Opn 06/01/19
Soil ERA

Product use instructions are included as part of the certification packet and are paginated separately from this Certificate of Analysis. Please reference the product use instructions for catalog #540 revision 030512.

CERTIFICATION

Parameter	Certified Value[1]	Reference Value	Uncertainty[2]	QC Performance Acceptance Limits[3]	PT Performance Acceptance Limits[4]
	mg/kg	mg/kg	%	mg/kg	mg/kg
Aluminum	10100	8360	6.40	4150 - 12600	4200 - 12500
Antimony	145	75.5	4.11	2.85 - 148	14.5 - 199
Arsenic	171	161	5.55	134 - 188	113 - 209
Barium	272	260	1.63	215 - 305	195 - 325
Beryllium	102	97.6	6.04	81.4 - 114	73.2 - 122
Boron	102	81.6	5.55	59.2 - 104	49.0 - 114
Cadmium	225	211	4.08	176 - 246	158 - 264
Calcium	5190	4760	5.49	3890 - 5640	3460 - 6070
Chromium	144	136	5.99	112 - 160	95.2 - 177
Cobalt	48.8	48.2	5.95	40.6 - 55.7	36.1 - 60.2
Copper	174	166	6.60	139 - 192	124 - 207
Iron	15000	14100	7.12	8470 - 19700	4930 - 23200
Lead	111	111	5.58	92.1 - 130	78.8 - 143
Magnesium	2570	2340	5.51	1780 - 2900	1450 - 3220
Manganese	232	228	3.96	188 - 268	165 - 291
Mercury	12.0	11.5	1.02	8.23 - 14.7	6.87 - 16.0
Molybdenum	123	110	2.96	88.2 - 132	77.5 - 142
Nickel	98.3	91.9	5.89	76.2 - 108	64.3 - 119
Potassium	2420	2020	6.79	1410 - 2630	1190 - 2850
Selenium	206	191	6.44	152 - 231	131 - 252
Silver	45.5	43.3	6.26	34.6 - 51.9	30.1 - 56.5
Sodium	252	218	6.53	159 - 278	105 - 332
Strontium	111	107	5.08	87.0 - 127	77.2 - 137
Thallium	167	156	6.28	127 - 186	110 - 202

16341 Table Mountain Pkwy ▪ Golden, CO 80403 ▪ T: 800.372.0122 ▪ 303.431.8454 ▪ www.eraqc.com

▪ Certificate of Analysis ▪

Parameter	Certified Value[1]	Reference Value	Uncertainty[2]	QC Performance Acceptance Limits[3]	PT Performance Acceptance Limits[4]
	mg/kg	mg/kg	%	mg/kg	mg/kg
Tin	111	99.9	6.00	78.1 - 122	56.7 - 143
Titanium	512	376	5.98	68.8 - 683	51.2 - 803
Uranium	97.6	98.1	6.22	74.9 - 121	72.6 - 124
Vanadium	61.8	56.7	9.53	44.8 - 68.7	32.2 - 81.3
Zinc	207	199	7.09	162 - 237	139 - 259

ANALYTICAL VERIFICATION

Parameter	Certified Value[1]	Proficiency Testing Study			NIST Traceability	
		Mean	Recovery[5]	n	SRM Number	Recovery
	mg/kg	mg/kg	%			%
Aluminum	10100	8360	82.8	157	-	-
Antimony	145	75.5	52.0	160	-	-
Arsenic	171	161	94.2	200	-	-
Barium	272	260	95.6	182	-	-
Beryllium	102	97.6	95.6	167	-	-
Boron	102	81.6	80.0	115	-	-
Cadmium	225	211	93.7	200	-	-
Calcium	5190	4760	91.8	140	-	-
Chromium	144	136	94.5	191	-	-
Cobalt	48.8	48.2	98.7	168	-	-
Copper	174	166	95.2	202	-	-
Iron	15000	14100	93.6	153	-	-
Lead	111	111	99.9	208	-	-
Magnesium	2570	2340	90.9	143	-	-
Manganese	232	228	98.4	170	-	-
Mercury	12.0	11.5	95.5	133	-	-
Molybdenum	123	110	89.4	168	-	-
Nickel	98.3	91.9	93.5	197	-	-
Potassium	2420	2020	83.6	142	-	-
Selenium	206	191	92.9	184	-	-

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▪ Certificate of Analysis ▪

Parameter	Certified Value[1]	Proficiency Testing Study			NIST Traceability	
		Mean	Recovery[5]	n	SRM Number	Recovery
	mg/kg	mg/kg	%			%
Silver	45.5	43.3	95.1	165	-	-
Sodium	252	218	86.6	138	-	-
Strontium	111	107	96.5	118	-	-
Thallium	167	156	93.6	163	-	-
Tin	111	99.9	90.0	126	-	-
Titanium	512	376	73.4	122	-	-
Uranium	97.6	98.1	100	36	-	-
Vanadium	61.8	56.7	91.8	163	-	-
Zinc	207	199	96.2	200	-	-

1. The **Certified Values** are the actual "made-to" concentrations confirmed by ERA analytical verification. The certified values are monitored and purchasers will be notified of any significant changes resulting in recertification or withdrawal of this certified reference material during the period of validity of this certificate.

2. The **Uncertainty** is the total propagated uncertainty at the 95% confidence interval. The uncertainty is based on the preparation and internal analytical verification of the product by ERA, multiplied by a coverage factor. The uncertainty applies to the product as supplied and does not take into account any required or optional dilution and/or preparations the laboratory may perform while using this product.

3. The **QC Performance Acceptance Limits (QC PALs™)** are based on actual historical data collected in ERA's Proficiency Testing program. The QC PALs™ reflect any inherent biases in the methods used to establish the limits and closely approximate a 95% confidence interval of the performance that experienced laboratories should achieve using accepted environmental methods. Use the QC PALs™ to realistically evaluate your performance against your peers.

4. The **PT Performance Acceptance Limits (PT PALs™)** are calculated using the regression equations and fixed acceptance criteria specified in the NELAC proficiency testing requirements. Use the PT PALs™ when analyzing this QC standard alongside USEPA and NELAC compliant PT standards. Please note that many PT study acceptance limits are concentration dependent (some non-linearly) and, therefore, the acceptance limits of this QC standard and any PT standard may differ relative to their difference in concentrations.

5. The **PT Data/Traceability** data include the mean value, percent recovery and number of data points reported by the laboratories in our Proficiency Testing study compared to the Certified Values. In addition, where NIST Standard Reference Materials (SRMs) are available, each analyte has been analytically traced to the NIST SRM listed. This product is traceable to the lot numbers of its starting materials. All gravimetric and volumetric measurements related to its manufacture are traceable to NIST through an unbroken chain of comparisons.
Traceability Recovery (%) = [(% recovery certified standard)/(% recovery NIST SRM)]*100
The traceability data shown were compiled by analyzing the ERA standards or their associated stock solutions against the applicable NIST SRMs.

6. For additional information on this product such as intended use, instructions for use, level of homogeneity, and safety information, please refer to the provided Instruction Sheet

If you have any questions or need technical assistance, please call ERA technical assistance at 1-800-372-0122 or send an email to info@eraqc.com.

Certifying Officer
Brian Miller

Quality Officer
Patrick Larson

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Reagent

Source A_00001

Eckert & Ziegler
Analytics

1380 Seaboard Industrial Blvd.
Atlanta, Georgia 30318
Tel 404·352·8677
Fax 404·352·2837
www.analyticsinc.com

CERTIFICATE OF CALIBRATION

Standard Radionuclide Source

79670-334

5 mL Liquid in Flame Sealed Vial

Customer: TestAmerica St. Louis
P.O. No.: 2303925, Item 1
Calibration Date: 01-Apr-2009 12:00 EST **Grams of Master Source:** 0.028371

This standard radionuclide source was prepared using aliquots measured gravimetrically from master radionuclide solutions. Calibration and purity were checked using a germanium gamma spectrometer system. At the time of calibration no interfering gamma-ray emitting impurities were detected. The gamma-ray emission rates for the most intense gamma-ray lines are given. Analytics maintains traceability to the National Institute of Standards and Technology through a Measurements Assurance Program as described in USNRC Regulatory Guide 4.15, Revision 1, February, 1979, and compliance with ANSI N42.22-1995, "Traceability of Radioactive Sources to NIST."

Nuclide	Gamma-Ray Energy (keV)	Half-Life, Days	Master Source* γps/gram	This Source γps	Uncertainty, % Type u_A	u_B	U	Calibration Method
Am-241	59.5	157860	———	3.390E+03	0.1	0.9	1.8	4π LS
Cd-109	88.0	462.60	1.691E+05	4.798E+03	0.4	1.7	3.5	HPGe
Co-57	122.1	271.79	8.904E+04	2.526E+03	0.5	1.3	2.8	HPGe
Ce-139	165.9	137.6	1.256E+05	3.563E+03	0.4	1.1	2.3	HPGe
Hg-203	279.2	46.61	2.788E+05	7.910E+03	0.3	1.1	2.3	HPGe
Sn-113	391.7	115.1	1.725E+05	4.894E+03	0.5	1.1	2.4	HPGe
Cs-137	661.7	10983	1.120E+05	3.178E+03	0.7	1.2	2.8	HPGe
Y-88	898.0	106.6	4.205E+05	1.193E+04	0.8	1.1	2.7	HPGe
Co-60	1173.2	1925.4	2.184E+05	6.196E+03	0.7	1.1	2.6	HPGe
Co-60	1332.5	1925.4	2.185E+05	6.199E+03	0.7	1.1	2.6	HPGe
Y-88	1836.1	106.6	4.444E+05	1.261E+04	0.7	1.1	2.6	HPGe

* Master Source refers to Analytics' 8-isotope mixture which is calibrated quarterly.

Calibration Methods: 4π LS - 4 pi Liquid Scintillation Counting, HPGe - High Purity Germanium Gamma-Ray Spectrometer, IC - Ionization Chamber. **Uncertainty:** U - Relative expanded uncertainty, k = 2. See NIST Technical Note 1297, "Guidelines for Evaluating and Expressing the Uncertainty of NIST Measurement Results."

Comments:
5.31740 grams 4M HCl solution with approximately 30 microg/g each of Cd, Co, Ce, Hg, Sn, Cs, and Y carriers.

This standard will expire one year after the calibration date.

Source Prepared by: [signature] for
W. Mao, Radiochemist

QA Approved: [signature] Date: 5-13-09
D. M. Montgomery, QA Manager

End of Certificate

Corporate Office
24937 Avenue Tibbitts Valencia, California 91355

Laboratory
1380 Seaboard Industrial Blvd. Atlanta, Georgia, 30318

Reagent

Source E_00001

Eckert & Ziegler
Analytics

1380 Seaboard Industrial Blvd.
Atlanta, Georgia 30318
Tel 404•352•8677
Fax 404•352•2837
www.analyticsinc.com

CERTIFICATE OF CALIBRATION

Standard Radionuclide Source

79670-334

5 mL Liquid in Flame Sealed Vial

Customer: TestAmerica St. Louis
P.O. No.: 2303925, Item 1
Calibration Date: 01-Apr-2009 12:00 EST **Grams of Master Source:** 0.028371

This standard radionuclide source was prepared using aliquots measured gravimetrically from master radionuclide solutions. Calibration and purity were checked using a germanium gamma spectrometer system. At the time of calibration no interfering gamma-ray emitting impurities were detected. The gamma-ray emission rates for the most intense gamma-ray lines are given. Analytics maintains traceability to the National Institute of Standards and Technology through a Measurements Assurance Program as described in USNRC Regulatory Guide 4.15, Revision 1, February, 1979, and compliance with ANSI N42.22-1995, "Traceability of Radioactive Sources to NIST."

Nuclide	Gamma-Ray Energy (keV)	Half-Life, Days	Master Source* γps/gram	This Source γps	Uncertainty, % Type u_A	u_B	U	Calibration Method
Am-241	59.5	157860	———	3.390E+03	0.1	0.9	1.8	4π LS
Cd-109	88.0	462.60	1.691E+05	4.798E+03	0.4	1.7	3.5	HPGe
Co-57	122.1	271.79	8.904E+04	2.526E+03	0.5	1.3	2.8	HPGe
Ce-139	165.9	137.6	1.256E+05	3.563E+03	0.4	1.1	2.3	HPGe
Hg-203	279.2	46.61	2.788E+05	7.910E+03	0.3	1.1	2.3	HPGe
Sn-113	391.7	115.1	1.725E+05	4.894E+03	0.5	1.1	2.4	HPGe
Cs-137	661.7	10983	1.120E+05	3.178E+03	0.7	1.2	2.8	HPGe
Y-88	898.0	106.6	4.205E+05	1.193E+04	0.8	1.1	2.7	HPGe
Co-60	1173.2	1925.4	2.184E+05	6.196E+03	0.7	1.1	2.6	HPGe
Co-60	1332.5	1925.4	2.185E+05	6.199E+03	0.7	1.1	2.6	HPGe
Y-88	1836.1	106.6	4.444E+05	1.261E+04	0.7	1.1	2.6	HPGe

* Master Source refers to Analytics' 8-isotope mixture which is calibrated quarterly.

Calibration Methods: 4π LS - 4 pi Liquid Scintillation Counting, HPGe - High Purity Germanium Gamma-Ray Spectrometer, IC - Ionization Chamber. **Uncertainty:** U - Relative expanded uncertainty, k = 2. See NIST Technical Note 1297, "Guidelines for Evaluating and Expressing the Uncertainty of NIST Measurement Results."

Comments:
5.31740 grams 4M HCl solution with approximately 30 microg/g each of Cd, Co, Ce, Hg, Sn, Cs, and Y carriers.

This standard will expire one year after the calibration date.

Source Prepared by: [signature] for
W. Mao, Radiochemist

QA Approved: [signature] Date: 5-13-09
D. M. Montgomery, QA Manager

End of Certificate

Corporate Office
24937 Avenue Tibbitts Valencia, California 91355

Laboratory
1380 Seaboard Industrial Blvd. Atlanta, Georgia, 30318

Reagent

Source G_00001

Eckert & Ziegler
Analytics

1380 Seaboard Industrial Blvd.
Atlanta, Georgia 30318
Tel 404·352·8677
Fax 404·352·2837
www.analyticsinc.com

CERTIFICATE OF CALIBRATION

Standard Radionuclide Source

79670-334

5 mL Liquid in Flame Sealed Vial

Customer: TestAmerica St. Louis
P.O. No.: 2303925, Item 1
Calibration Date: 01-Apr-2009 12:00 EST **Grams of Master Source:** 0.028371

This standard radionuclide source was prepared using aliquots measured gravimetrically from master radionuclide solutions. Calibration and purity were checked using a germanium gamma spectrometer system. At the time of calibration no interfering gamma-ray emitting impurities were detected. The gamma-ray emission rates for the most intense gamma-ray lines are given. Analytics maintains traceability to the National Institute of Standards and Technology through a Measurements Assurance Program as described in USNRC Regulatory Guide 4.15, Revision 1, February, 1979, and compliance with ANSI N42.22-1995, "Traceability of Radioactive Sources to NIST."

Nuclide	Gamma-Ray Energy (keV)	Half-Life, Days	Master Source* γps/gram	This Source γps	Uncertainty, % Type u_A	u_B	U	Calibration Method
Am-241	59.5	157860	———	3.390E+03	0.1	0.9	1.8	4π LS
Cd-109	88.0	462.60	1.691E+05	4.798E+03	0.4	1.7	3.5	HPGe
Co-57	122.1	271.79	8.904E+04	2.526E+03	0.5	1.3	2.8	HPGe
Ce-139	165.9	137.6	1.256E+05	3.563E+03	0.4	1.1	2.3	HPGe
Hg-203	279.2	46.61	2.788E+05	7.910E+03	0.3	1.1	2.3	HPGe
Sn-113	391.7	115.1	1.725E+05	4.894E+03	0.5	1.1	2.4	HPGe
Cs-137	661.7	10983	1.120E+05	3.178E+03	0.7	1.2	2.8	HPGe
Y-88	898.0	106.6	4.205E+05	1.193E+04	0.8	1.1	2.7	HPGe
Co-60	1173.2	1925.4	2.184E+05	6.196E+03	0.7	1.1	2.6	HPGe
Co-60	1332.5	1925.4	2.185E+05	6.199E+03	0.7	1.1	2.6	HPGe
Y-88	1836.1	106.6	4.444E+05	1.261E+04	0.7	1.1	2.6	HPGe

* Master Source refers to Analytics' 8-isotope mixture which is calibrated quarterly.

Calibration Methods: 4π LS - 4 pi Liquid Scintillation Counting, HPGe - High Purity Germanium Gamma-Ray Spectrometer, IC - Ionization Chamber. **Uncertainty:** U - Relative expanded uncertainty, k = 2. See NIST Technical Note 1297, "Guidelines for Evaluating and Expressing the Uncertainty of NIST Measurement Results."

Comments:
5.31740 grams 4M HCl solution with approximately 30 microg/g each of Cd, Co, Ce, Hg, Sn, Cs, and Y carriers.

This standard will expire one year after the calibration date.

Source Prepared by: [signature] for
W. Mao, Radiochemist

QA Approved: [signature] Date: 5-13-09
D. M. Montgomery, QA Manager

End of Certificate

Corporate Office
24937 Avenue Tibbitts Valencia, California 91355

Laboratory
1380 Seaboard Industrial Blvd. Atlanta, Georgia, 30318

Eckert & Ziegler
Analytics

1380 Seaboard Industrial Blvd.
Atlanta, Georgia 30318
Tel 404•352•8677
Fax 404•352•2837
www.analyticsinc.com

CERTIFICATE OF CALIBRATION

Standard Radionuclide Source

83725-334

5 mL Liquid in Flame Sealed Vial

Customer: Test America St. Louis/Earth City, MO
P.O. No.: 2397508, Item 1
Reference Date: 01-Jan-2011 12:00 PM EST **Grams of Master Source:** 0.028066

This standard radionuclide source was prepared using aliquots measured gravimetrically from master radionuclide solutions. Calibration and purity were checked using a germanium gamma spectrometer system. At the time of calibration no interfering gamma-ray emitting impurities were detected. The gamma-ray emission rates for the most intense gamma-ray lines are given. Eckert & Ziegler Analytics (EZA) maintains traceability to the National Institute of Standards and Technology through a Measurements Assurance Program as described in USNRC Regulatory Guide 4.15, Revision 1, February, 1979, and compliance with ANSI N42.22-1995, "Traceability of Radioactive Sources to NIST." EZA is accredited by the Health Physics Society (HPS) for the production of NIST-traceable sources, and this source was produced in accordance with the HPS accreditation requirements. Customers may report any concerns with the accreditation program to the HPS Secretariat, 1313 Dolley Madison Blvd., Ste. 402, McLean, VA 22101.

Nuclide	Gamma-Ray Energy (keV)	Half-Life, Days	Master Source* γps/gram	This Source γps	Uncertainty, % Type u_A	u_B	U	Calibration Method
Am-241	59.5	1.580E+05	———	3.261E+03	0.1	0.9	1.8	4π LS
Cd-109	88.0	4.626E+02	1.697E+05	4.763E+03	0.8	1.7	3.8	HPGe
Co-57	122.1	2.718E+02	8.711E+04	2.445E+03	0.5	1.3	2.8	HPGe
Ce-139	165.9	1.376E+02	1.247E+05	3.500E+03	0.5	1.1	2.4	HPGe
Hg-203	279.2	4.661E+01	2.753E+05	7.727E+03	0.4	1.1	2.3	HPGe
Sn-113	391.7	1.151E+02	1.769E+05	4.965E+03	0.5	1.1	2.4	HPGe
Cs-137	661.7	1.098E+04	1.109E+05	3.113E+03	0.7	1.2	2.8	HPGe
Y-88	898.0	1.066E+02	4.224E+05	1.186E+04	0.5	1.1	2.4	HPGe
Co-60	1173.2	1.925E+03	2.142E+05	6.012E+03	0.6	1.1	2.5	HPGe
Co-60	1332.5	1.925E+03	2.143E+05	6.015E+03	0.6	1.1	2.5	HPGe
Y-88	1836.1	1.066E+02	4.472E+05	1.255E+04	0.5	1.1	2.4	HPGe

* Master Source refers to Analytics' 8-isotope mixture which is calibrated quarterly.

Calibration Methods: 4π LS - 4 pi Liquid Scintillation Counting, HPGe - High Purity Germanium Gamma-Ray Spectrometer, IC - Ionization Chamber. **Uncertainty:** U - Relative expanded uncertainty, k = 2. See NIST Technical Note 1297, "Guidelines for Evaluating and Expressing the Uncertainty of NIST Measurement Results."

(Certificate continued on reverse side)

ACCREDITED SOURCE CALIBRATION LABORATORY HEALTH PHYSICS SOCIETY FOUNDED 1956

Comments:
5.30203 grams 4M HCl solution with approximately 30 μg/g each of Cd, Co, Ce, Hg, Sn, Cs, and Y carriers.

This standard will expire one year after the reference date.

Source Prepared by: MITaskaeva
M. I. Taskaeva, Radiochemist

QA Approved: _____ Date: 13/JAN/11
J. D. McCorvey, QA Manager Alternate

Reagent

Source H_00002

Eckert & Ziegler
Analytics

1380 Seaboard Industrial Blvd.
Atlanta, Georgia 30318
Tel 404•352•8677
Fax 404•352•2837
www.analyticsinc.com

CERTIFICATE OF CALIBRATION

Standard Radionuclide Source

83725-334

5 mL Liquid in Flame Sealed Vial

Customer: Test America St. Louis/Earth City, MO
P.O. No.: 2397508, Item 1
Reference Date: 01-Jan-2011 12:00 PM EST **Grams of Master Source:** 0.028066

This standard radionuclide source was prepared using aliquots measured gravimetrically from master radionuclide solutions. Calibration and purity were checked using a germanium gamma spectrometer system. At the time of calibration no interfering gamma-ray emitting impurities were detected. The gamma-ray emission rates for the most intense gamma-ray lines are given. Eckert & Ziegler Analytics (EZA) maintains traceability to the National Institute of Standards and Technology through a Measurements Assurance Program as described in USNRC Regulatory Guide 4.15, Revision 1, February, 1979, and compliance with ANSI N42.22-1995, "Traceability of Radioactive Sources to NIST." EZA is accredited by the Health Physics Society (HPS) for the production of NIST-traceable sources, and this source was produced in accordance with the HPS accreditation requirements. Customers may report any concerns with the accreditation program to the HPS Secretariat, 1313 Dolley Madison Blvd., Ste. 402, McLean, VA 22101.

Nuclide	Gamma-Ray Energy (keV)	Half-Life, Days	Master Source* γps/gram	This Source γps	Uncertainty, % Type u_A	u_B	U	Calibration Method
Am-241	59.5	1.580E+05	———	3.261E+03	0.1	0.9	1.8	4π LS
Cd-109	88.0	4.626E+02	1.697E+05	4.763E+03	0.8	1.7	3.8	HPGe
Co-57	122.1	2.718E+02	8.711E+04	2.445E+03	0.5	1.3	2.8	HPGe
Ce-139	165.9	1.376E+02	1.247E+05	3.500E+03	0.5	1.1	2.4	HPGe
Hg-203	279.2	4.661E+01	2.753E+05	7.727E+03	0.4	1.1	2.3	HPGe
Sn-113	391.7	1.151E+02	1.769E+05	4.965E+03	0.5	1.1	2.4	HPGe
Cs-137	661.7	1.098E+04	1.109E+05	3.113E+03	0.7	1.2	2.8	HPGe
Y-88	898.0	1.066E+02	4.224E+05	1.186E+04	0.5	1.1	2.4	HPGe
Co-60	1173.2	1.925E+03	2.142E+05	6.012E+03	0.6	1.1	2.5	HPGe
Co-60	1332.5	1.925E+03	2.143E+05	6.015E+03	0.6	1.1	2.5	HPGe
Y-88	1836.1	1.066E+02	4.472E+05	1.255E+04	0.5	1.1	2.4	HPGe

* Master Source refers to Analytics' 8-isotope mixture which is calibrated quarterly.

Calibration Methods: 4π LS - 4 pi Liquid Scintillation Counting, HPGe - High Purity Germanium Gamma-Ray Spectrometer, IC - Ionization Chamber. **Uncertainty:** U - Relative expanded uncertainty, k = 2. See NIST Technical Note 1297, "Guidelines for Evaluating and Expressing the Uncertainty of NIST Measurement Results."

(Certificate continued on reverse side)

Comments:
5.30203 grams 4M HCl solution with approximately 30 µg/g each of Cd, Co, Ce, Hg, Sn, Cs, and Y carriers.

This standard will expire one year after the reference date.

Source Prepared by: MITaskaeva
M. I. Taskaeva, Radiochemist

QA Approved: _____ Date: 13/JAN/11
J. D. McCorvey, QA Manager Alternate

Reagent

STD AL_00019

1773038
ID: STD AL_000 19
Exp 07/30/20 Prod DAS Jan 31/30/19
AL

CERTIFICATE OF ANALYSIS

Single-Element Aqueous CRM — Product #: TA-10M11

SE Std Aluminum (Al) – 10,000 µg/mL — Lot #: 169484-37

Matrix: 5% HNO_3

Element	Certified Concentration & Uncertainty
Al	**10,030 ± 20 µg/mL (w/v)** **9428 ± 22 µg/g (w/w)**

Intended Use: This solution is intended for use as a certified reference material (CRM) or calibration standard for inductively coupled plasma optical emission spectroscopy (ICP-OES), inductively coupled plasma mass spectrometry (ICP-MS), flame or furnace atomic absorption spectroscopy (AA or GFAA), and other techniques for elemental analysis.

Certification & Traceability: This CRM was manufactured, processed, and certified under a quality management system that is registered/accredited to **ISO 9001**, **ISO 17034**, and **ISO/IEC 17025**. This CRM was prepared to a nominal concentration of 10,000 µg/mL by gravimetric methods using 99.999% pure aluminum nitrate [$Al(NO_3)_3$] dissolved in high purity nitric acid (HNO_3) and diluted with filtered (0.22 µm), 18 M-ohm deionized water. The balances used in the preparation of this CRM are calibrated regularly with traceability to NIST, using a calibration provider that is accredited to ISO/IEC 17025 by a mutually recognized accreditation body. All volumetric dilutions are performed in Class A calibrated glassware. The certified concentration and uncertainty were determined using the "High Performance ICP-OES" protocol developed by NIST, and both the certified concentration and uncertainty values are traceable to **NIST SRM 3101a, lot #140903**. The uncertainty associated with the certified concentration represents the expanded uncertainty at the 95% confidence level using a coverage factor of k=2.

Indicative Values: ICP-MS was used to determine trace metal concentrations for this product (nd = not determined).

Trace Concentrations (µg/L)

Ag	<5	Co	<10	Ge	<5	Mg	<50	Pd	<5	Si	<1000	V	<10
Al	MAJOR	Cs	<5	Hf	<2	Mn	<10	Pr	<2	Sm	<2	W	16
As	<20	Cr	89	Hg	<5	Mo	<5	Pt	<5	Sn	<5	Y	<5
Au	<5	Cu	<10	Ho	<2	Na	3315	Rb	<5	Sr	<10	Yb	<2
B	<50	Dy	<2	In	nd	Nb	<5	Re	<2	Ta	<5	Zn	30
Ba	<10	Er	<2	Ir	<2	Nd	<2	Rh	<5	Tb	<5		
Bi	<2	Eu	<2	K	<250	Ni	<20	Ru	<5	Te	<10		
Ca	330	Fe	890	La	<5	Os	<5	Sb	<5	Ti	<20		
Cd	<5	Ga	681	Li	<20	P	<1000	Sc	<50	Tl	10		
Ce	<2	Gd	<2	Lu	<2	Pb	<10	Se	<20	Tm	<2		

Instructions for Use: We recommend that the solution be thoroughly mixed by repeated shaking or swirling of the bottle immediately prior to use. To achieve the highest accuracy, the analyst should: (1) use only pre-cleaned containers and transferware, (2) not pipette directly from the CRM's original container, (3) never pour used product back into the original container, (4) make dilutions using calibrated balances or certified class A volumetric flasks and pipettes, (5) use a minimum sub-sample size of 500 µL, and (6) dilute with the same matrix as the original CRM or other chemically suitable matrix. The solution should be kept tightly capped and stored under normal laboratory conditions. Do not freeze, heat, or immerse the bottle or its contents, and avoid exposure to direct sunlight or moisture.

Period of Validity: CPI International ensures the accuracy of this solution for **18 months** from the certification date shown below, provided the instructions for use are followed. During the period of validity, the purchaser will be notified if this product is recalled due to any significant changes in the stability of the solution.

Chuck Goudreau

Chuck Goudreau, Certifying Officer

July 19, 2019
Certification Date

CPI International waives all responsibility for any damages resulting from the usage and/or implementation of the products/data described herein.

USA
5580 Skylane Boulevard P: 707.525.5788
Santa Rosa, CA 95403 P: 800.878.7654
F: 707.545.7901

Europe
Nieuwe Hemweg 7P P: +31 20 638 05 97
1013BG Amsterdam F: +31 20 420 28 36
The Netherlands

www.cpiinternational.com

Health and Safety Information: Refer to the Safety Data Sheet (SDS)

Homogeneity: This solution was determined to be homogeneous by procedures consistent with the requirements of ISO Guide 34 and ISO Guide 35. Replicate samples of the finished solution were analyzed to confirm its homogeneity, in accordance with QSP 6-13 Assessment of Homogeneity and Stability. To ensure homogeneity, users should not take a smaller sub-sample than specified in the Instructions for Use, as doing so will invalidate the certified values and uncertainties.

Quality Manual Rev: No. 5, 03/01/2013

Further Information: Please contact CPI International for further information about this CRM

Quality Certifications: This CRM was prepared under a quality management system that is registered/accredited to the following:

- ISO 9001 – Quality Management Systems – Requirements (TUV NORD Cert. No. 44 100 16560231)
- ISO/IEC 17025 – General Requirements for the Competence of Testing and Calibration Laboratories (A2LA Cert. No. 2848.01)
- ISO Guide 34 – General Requirements for the Competence of Reference Material Producers (A2LA Cert. No. 2848.02)
  - ISO Guide 34 references additional requirements specified in ISO Guide 31 and ISO Guide 35

Reagent

Tuna Can LCS_00009

TestAmerica

St. Louis Radiological Standard Verification

Printed: 9/17/2019 12:40 PM

Standard ID Number: 1798543
True Value = 27.51 pCi/L or g
Date Analyzed: 9/13/2019

Radionuclide: Cs-137

	Replicates	
#1	28.54	pCi/L or g
#2	26.76	pCi/L or g
#3	26.73	pCi/L or g

Tuna Can LCS - 00009

Mean = 27.343333

1 sigma = 1.0364523

1.96 sigma = 2.031446

True Value minus 5% = 26.1345 (True Value - 5%)
True Value plus 5% = 28.8855 (True Value + 5%)

Accuracy:
Mean value within 5% of Certified (True) Value? Yes **(Acceptance Criteria)**

Precision:
1.96 sigma Value Within 10% of Mean Value? Yes **(Acceptance Criteria)**

Standard Reverification Acceptable? Yes

Note: Criteria for reverification of radiological standards is taken from the DoD/DOE Consolidated QSM and LANL Statements of Work

1st Reviewed By/Date: cmm 9/17/19

2nd Reviewed By/Date: CJP 9/17/19

Standard ID Number: 1798543

True Value = 11.16 pCi/L or g

Date Analyzed: 9/13/2019

Radionuclide: Co-60

	Replicates	
#1	11	pCi/L or g
#2	10.57	pCi/L or g
#3	10.6	pCi/L or g

Mean = 10.723333

1 sigma = 0.2400694

1.96 sigma = 0.470536

True Value minus 5% = 10.602 (True Value - 5%)

True Value plus 5% = 11.718 (True Value + 5%)

Accuracy:

Mean value within 5% of Certified (True) Value? Yes **(Acceptance Criteria)**

Precision:

1.96 sigma Value Within 10% of Mean Value? Yes **(Acceptance Criteria)**

Standard Reverification Acceptable? Yes

Note: Criteria for reverification of radiological standards is taken from the DoD/DOE Consolidated QSM and LANL Statements of Work

1st Reviewed By/Date: cmm 9/17/19

2nd Reviewed By/Date: CJP 9/17/19

TestAmerica

St. Louis Radiological Standard Verification

Printed: 9/17/2019 12:44 PM

Standard ID Number: 1798543
True Value = 96.62 pCi/L or g
Date Analyzed: 9/13/2019

Radionuclide: Am-241

	Replicates	
#1	101.7	pCi/L or g
#2	96.41	pCi/L or g
#3	95.48	pCi/L or g

Mean = 97.863333

1 sigma = 3.355031

1.96 sigma = 6.575861

True Value minus 5% = 91.789 (True Value - 5%)
True Value plus 5% = 101.451 (True Value + 5%)

Accuracy:
Mean value within 5% of Certified (True) Value? **Yes** **(Acceptance Criteria)**

Precision:
1.96 sigma Value Within 10% of Mean Value? **Yes** **(Acceptance Criteria)**

Standard Reverification Acceptable? **Yes**

Note: Criteria for reverification of radiological standards is taken from the DoD/DOE Consolidated QSM and LANL Statements of Work

1st Reviewed By/Date: Cmm 9/17/19

2nd Reviewed By/Date: CJO 9/17/19

eurofins

Analysis Report for Gamma Spectroscopy

Batch: 442821 **Operator:**

MQO

SampID	WRKNO	Aliquot	Sigma	Instrument	Detector	CountDateTime	CountDuration
LCS 160-442821~2-	LCS	341.90g	1.00	GammaVision	GV05	9 / 13 / 19 11:44	30

Analyte	Cmpnd#	Activity	TotalUnc	CountUnc	MDA	MLCC	Act/MDA
AC-228	11136	4.065E-001pCi/g	3.032E-001	3.025E-001	1.192E+000	5.689E-001	0.34	0.3032
AG-108M	10982	1.185E-001pCi/g	7.877E-002	7.853E-002	3.100E-001	1.503E-001	0.38	0.0788
AG-110M	10973	2.000E-001pCi/g	9.003E-002	8.945E-002	5.914E-001	2.852E-001	0.34	0.0900
AM-241	10818	1.017E+002pCi/g	5.329E+000	7.416E-001	8.130E-001	4.000E-001	125.08	5.3292
BA-133	10469	1.514E-001pCi/g	1.488E-001	1.485E-001	4.938E-001	2.411E-001	0.31	0.1488
BA-140	10463	2.083E-001pCi/g	2.262E-001	2.259E-001	9.621E-001	4.604E-001	0.22	0.2262
BE-7	10435	1.114E+000pCi/g	1.027E+000	1.025E+000	3.407E+000	1.660E+000	0.33	1.0267
BI-207	10195	-2.863E-001pCi/g	2.010E-001	2.004E-001	5.293E-001	2.527E-001	-0.54	0.2010
BI-210M	10173	-1.581E-001pCi/g	2.131E-001	2.129E-001	4.979E-001	2.433E-001	-0.32	0.2131
BI-212	10160	9.310E-001pCi/g	1.149E+000	1.148E+000	3.868E+000	1.848E+000	0.24	1.1488
BI-214	10154	2.326E-001pCi/g	2.064E-001	2.060E-001	1.071E+000	5.232E-001	0.22	0.2064
CD-109	9254	1.444E+000pCi/g	2.033E+000	2.031E+000	6.744E+000	3.327E+000	0.21	2.0327
CD-113M	17462	8.913E+002pCi/g	1.147E+003	1.145E+003	3.822E+003	1.865E+003	0.23	1,146.6992
CE-139	9241	4.620E-002pCi/g	7.074E-002	7.060E-002	2.355E-001	1.154E-001	0.20	0.0707
CE-141	9235	-8.939E-002pCi/g	1.306E-001	1.305E-001	4.344E-001	2.135E-001	-0.21	0.1306
CE-144	9221	-3.028E-002pCi/g	5.116E-001	5.116E-001	1.716E+000	8.424E-001	-0.02	0.5116
CF-249	9215	9.341E-002pCi/g	1.575E-001	1.574E-001	5.640E-001	2.762E-001	0.17	0.1575
CF-251	13690	2.026E-002pCi/g	3.341E-001	3.341E-001	8.977E-001	4.371E-001	0.02	0.3341
CO-56	8704	-5.180E-002pCi/g	6.396E-002	6.391E-002	3.155E-001	1.504E-001	-0.16	0.0640
CO-57	13694	5.022E-002pCi/g	6.294E-002	6.288E-002	2.192E-001	1.077E-001	0.23	0.0629
CO-58	8698	1.213E-001pCi/g	1.166E-001	1.164E-001	3.887E-001	1.872E-001	0.31	0.1166
CO-60	8692	1.100E+001pCi/g	5.892E-001	2.058E-001	5.871E-002	1.856E-002	187.32	0.5892
CR-51	8604	8.324E-001pCi/g	8.498E-001	8.486E-001	2.823E+000	1.378E+000	0.29	0.8498
CS-134	8553	1.015E-001pCi/g	1.246E-001	1.244E-001	4.184E-001	2.010E-001	0.24	0.1246
CS-136	8546	-1.530E-001pCi/g	1.378E-001	1.376E-001	4.578E-001	2.217E-001	-0.33	0.1378
CS-137	8539	2.854E+001pCi/g	1.538E+000	4.012E-001	2.446E-001	1.153E-001	116.69	1.5381
EU-152	7145	3.020E-001pCi/g	2.418E-001	2.413E-001	6.436E-001	3.160E-001	0.47	0.2418
EU-154	7138	2.290E-001pCi/g	2.544E-001	2.542E-001	4.328E-001	2.123E-001	0.53	0.2544
EU-155	7131	-2.454E-001pCi/g	3.675E-001	3.673E-001	1.219E+000	6.019E-001	-0.20	0.3675
FE-59	7073	-3.237E-001pCi/g	3.238E-001	3.234E-001	7.052E-001	3.364E-001	-0.46	0.3238
GA-68	18005	-9.487E-001pCi/g	6.188E+000	6.188E+000	1.372E+001	6.538E+000	-0.07	6.1878
GD-153	6824	1.957E-001pCi/g	1.591E-001	1.586E-001	6.377E-001	3.133E-001	0.31	0.1591
HF-181	6495	-1.709E-001pCi/g	1.588E-001	1.585E-001	5.263E-001	2.574E-001	-0.32	0.1588
HG-203	6466	4.060E-002pCi/g	9.570E-002	9.567E-002	2.441E-001	1.184E-001	0.17	0.0957
I-131	6380	1.133E-001pCi/g	1.081E-001	1.079E-001	2.735E-001	1.323E-001	0.41	0.1081
IR-192	6303	-1.012E-001pCi/g	1.012E-001	1.010E-001	3.357E-001	1.641E-001	-0.30	0.1012
K-40	6148	8.569E-001pCi/g	3.415E-001	3.387E-001	9.090E-001	3.452E-001	0.94	0.3415
KR-85	6111	9.028E+000pCi/g	2.406E+001	2.405E+001	8.100E+001	3.937E+001	0.11	24.0589
LA-140	6096	7.687E-002pCi/g	2.802E-002	2.772E-002	7.164E-002	2.265E-002	1.07	0.0280
MN-54	5382	1.261E-001pCi/g	1.134E-001	1.132E-001	2.567E-001	1.210E-001	0.49	0.1134
NA-22	5201	-5.117E-003pCi/g	3.600E-002	3.600E-002	1.376E-001	5.841E-002	-0.04	0.0360
NB-94	5160	1.661E-002pCi/g	9.748E-002	9.747E-002	2.349E-001	1.110E-001	0.07	0.0975
NB-95	5154	1.187E-001pCi/g	9.088E-002	9.067E-002	3.014E-001	1.439E-001	0.39	0.0909
ND-147	5083	3.185E-001pCi/g	3.051E-001	3.045E-001	1.867E+000	8.952E-001	0.17	0.3051
NP-237	4757	-4.197E-001pCi/g	6.528E-001	6.524E-001	2.166E+000	1.070E+000	-0.19	0.6528
NP-239	4751	2.244E-001pCi/g	3.296E-001	3.293E-001	1.094E+000	5.396E-001	0.21	0.3296
PA-231	4541	1.010E+000pCi/g	4.359E+000	4.359E+000	1.455E+001	7.166E+000	0.07	4.3590
PA-233	4535	2.171E-001pCi/g	3.533E-001	3.532E-001	1.175E+000	5.785E-001	0.18	0.3533
PA-234	4528	2.721E-001pCi/g	3.471E-001	3.468E-001	1.153E+000	5.669E-001	0.24	0.3471

MOQ

PA-234M	19453	-2.323E+001pCi/g	1.952E+001	1.948E+001	6.495E+001	3.146E+001	-0.36	19.5162
PB-210	4467	7.535E+002pCi/g	4.494E+001	7.890E+000	1.440E+001	7.124E+000	52.31	44.9442
PB-212	4454	5.468E-001pCi/g	1.146E-001	1.090E-001	3.328E-001	1.605E-001	1.64	0.1146
PB-214	4448	4.716E-001pCi/g	1.908E-001	1.892E-001	8.029E-001	3.920E-001	0.59	0.1908
PM-144	19585	1.555E-002pCi/g	9.547E-002	9.547E-002	2.297E-001	1.085E-001	0.07	0.0955
PM-146	2464	5.132E-002pCi/g	8.496E-002	8.492E-002	4.790E-001	2.327E-001	0.11	0.0850
RH-106	1882	6.982E-001pCi/g	1.483E+000	1.482E+000	4.967E+000	2.426E+000	0.14	1.4829
RU-103	1828	-3.450E-002pCi/g	1.159E-001	1.159E-001	2.848E-001	1.372E-001	-0.12	0.1159
SB-124	1784	1.827E-001pCi/g	1.472E-001	1.469E-001	4.788E-001	2.337E-001	0.38	0.1472
SB-125	1777	2.430E-001pCi/g	3.275E-001	3.273E-001	9.103E-001	4.411E-001	0.27	0.3275
SC-46	1739	-1.702E-001pCi/g	1.569E-001	1.567E-001	5.215E-001	2.531E-001	-0.33	0.1569
SN-113	1570	1.532E-001pCi/g	1.719E-001	1.717E-001	5.714E-001	2.796E-001	0.27	0.1719
SN-126	17459	7.612E-001pCi/g	7.746E-001	7.736E-001	2.567E+000	1.261E+000	0.30	0.7746
TA-182	1301	7.726E-002pCi/g	1.583E-001	1.582E-001	9.973E-001	4.719E-001	0.08	0.1583
TC-99M	17412	5.631E-002pCi/g	7.110E-002	7.103E-002	2.361E-001	1.161E-001	0.24	0.0711
TH-227	1058	4.902E-001pCi/g	6.613E-001	6.606E-001	2.739E+000	1.330E+000	0.18	0.6613
TH-229	1046	5.186E-001pCi/g	1.499E+000	1.498E+000	4.004E+000	1.953E+000	0.13	1.4985
TH-234	1027	4.812E-001pCi/g	1.366E+000	1.366E+000	4.548E+000	2.244E+000	0.11	1.3664
TL-208	929	1.257E-001pCi/g	1.203E-001	1.201E-001	2.658E-001	1.265E-001	0.47	0.1203
TL-210	20861	4.217E-002pCi/g	6.801E-002	6.796E-002	3.680E-001	1.769E-001	0.11	0.0680
U-235	281	5.621E-001pCi/g	5.410E-001	5.402E-001	1.918E+000	9.431E-001	0.29	0.5410
Y-88	74	3.754E-002pCi/g	6.236E-002	6.233E-002	1.503E-001	6.088E-002	0.25	0.0624
ZN-65	31	9.256E-003pCi/g	2.828E-001	2.828E-001	9.678E-001	4.655E-001	0.01	0.2828
ZR-95	7	-1.121E-001pCi/g	1.959E-001	1.958E-001	4.656E-001	2.205E-001	-0.24	0.1959

Laboratory Control Sample Information

Sample ID	WRKNO	Analyte	Activity	StdAdded	Recovery	ZFactor
LCS 160-442821~2-A	LCS 160-442821~2-A	CS-137	2.854E+001 pCi/g	2.751E+001	103.76%	0.6435
		CO-60	1.100E+001 pCi/g	1.116E+001	98.53%	-0.2636
		AM-241	1.017E+002 pCi/g	9.662E+001	105.24%	0.9035

Sample Duplicate Information

Sample ID	Dup Sample ID	Analyte	Samp Activity	Dup Activity	RPD	RER	DER	Flag	ZFactor

Blanks Information

SampID	WRKNO	Analyte	Activity	UncTotal	ZFactor	
MB 160-442821~1-A	MB	AC-228	4.342E-002	4.965E-002	0.8746	
MB 160-442821~1-A	MB	AG-108M	1.098E-003	9.817E-004	1.1182	
MB 160-442821~1-A	MB	AG-110M	2.340E-002	1.797E-002	1.3022	
MB 160-442821~1-A	MB	AM-241	-5.731E-002	8.274E-002	-0.6926	
MB 160-442821~1-A	MB	BA-133	2.852E-002	3.243E-002	0.8794	
MB 160-442821~1-A	MB	BA-140	5.953E-002	6.662E-002	0.8937	
MB 160-442821~1-A	MB	BE-7	-2.994E-001	3.208E-001	-0.9335	
MB 160-442821~1-A	MB	BI-207	-1.018E-002	4.105E-002	-0.2481	
MB 160-442821~1-A	MB	BI-210M	-9.908E-003	3.572E-002	-0.2774	
MB 160-442821~1-A	MB	BI-212	1.756E-001	3.078E-001	0.5704	
MB 160-442821~1-A	MB	BI-214	1.393E-001	5.312E-002	2.6221	B
MB 160-442821~1-A	MB	CD-109	0.000E+000	1.699E-001	0.0000	
MB 160-442821~1-A	MB	CD-113M	2.503E+002	2.082E+002	1.2023	
MB 160-442821~1-A	MB	CE-139	-2.124E-002	2.417E-002	-0.8787	
MB 160-442821~1-A	MB	CE-141	-2.884E-002	3.258E-002	-0.8852	
MB 160-442821~1-A	MB	CE-144	1.170E-001	2.066E-001	0.5664	
MB 160-442821~1-A	MB	CF-249	1.170E-002	1.645E-002	0.7112	
MB 160-442821~1-A	MB	CF-251	1.837E-002	8.164E-002	0.2250	
MB 160-442821~1-A	MB	CO-56	-4.823E-002	4.988E-002	-0.9671	
MB 160-442821~1-A	MB	CO-57	5.510E-003	2.192E-002	0.2514	
MB 160-442821~1-A	MB	CO-58	4.697E-003	2.933E-002	0.1601	
MB 160-442821~1-A	MB	CO-60	1.531E-002	6.888E-003	2.2223	
MB 160-442821~1-A	MB	CR-51	-3.047E-001	5.786E-001	-0.5267	
MB 160-442821~1-A	MB	CS-134	3.841E-002	1.494E-002	2.5710	
MB 160-442821~1-A	MB	CS-136	1.257E-002	3.856E-003	3.2593	B
MB 160-442821~1-A	MB	CS-137	2.393E-002	2.558E-002	0.9358	
MB 160-442821~1-A	MB	EU-152	6.044E-002	2.721E-002	2.2212	
MB 160-442821~1-A	MB	EU-154	7.072E-002	5.279E-002	1.3396	
MB 160-442821~1-A	MB	EU-155	2.661E-002	4.693E-002	0.5670	
MB 160-442821~1-A	MB	FE-59	2.751E-002	5.674E-002	0.4849	
MB 160-442821~1-A	MB	GA-68	-6.817E-002	1.080E+000	-0.0631	
MB 160-442821~1-A	MB	GD-153	-4.201E-002	6.752E-002	-0.6221	
MB 160-442821~1-A	MB	HF-181	5.102E-003	8.664E-003	0.5889	
MB 160-442821~1-A	MB	HG-203	-1.206E-002	2.101E-002	-0.5742	
MB 160-442821~1-A	MB	I-131	3.155E-003	2.491E-002	0.1267	
MB 160-442821~1-A	MB	IR-192	3.111E-002	6.103E-002	0.5098	
MB 160-442821~1-A	MB	K-40	-5.436E-001	7.228E-001	-0.7520	
MB 160-442821~1-A	MB	KR-85	-4.929E+000	1.024E+001	-0.4813	
MB 160-442821~1-A	MB	LA-140	1.338E-002	1.479E-002	0.9047	
MB 160-442821~1-A	MB	MN-54	-1.909E-002	3.907E-002	-0.4885	
MB 160-442821~1-A	MB	NA-22	1.521E-002	2.411E-002	0.6309	
MB 160-442821~1-A	MB	NB-94	5.593E-002	1.577E-002	3.5459	B
MB 160-442821~1-A	MB	NB-95	7.234E-003	2.219E-002	0.3260	
MB 160-442821~1-A	MB	ND-147	-1.671E-001	2.340E-001	-0.7140	
MB 160-442821~1-A	MB	NP-237	1.084E-001	1.795E-001	0.6038	
MB 160-442821~1-A	MB	NP-239	4.730E-002	7.053E-002	0.6706	
MB 160-442821~1-A	MB	PA-231	-9.465E-001	1.811E+000	-0.5226	
MB 160-442821~1-A	MB	PA-233	0.000E+000	2.543E-002	0.0000	
MB 160-442821~1-A	MB	PA-234	1.397E-001	4.096E-002	3.4108	B
MB 160-442821~1-A	MB	PA-234M	0.000E+000	1.839E+000	0.0000	
MB 160-442821~1-A	MB	PB-210	-1.447E+000	8.300E-001	-1.7435	

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MB 160-442821~1-A	MB	PB-212	-4.364E-002	5.625E-002	-0.7757
MB 160-442821~1-A	MB	PB-214	-1.562E-002	5.292E-002	-0.2952
MB 160-442821~1-A	MB	PM-144	-4.228E-003	3.382E-002	-0.1250
MB 160-442821~1-A	MB	PM-146	1.686E-002	2.497E-002	0.6753
MB 160-442821~1-A	MB	RH-106	-3.312E-001	5.169E-001	-0.6409
MB 160-442821~1-A	MB	RU-103	-2.513E-002	3.575E-002	-0.7031
MB 160-442821~1-A	MB	SB-124	5.135E-002	2.113E-002	2.4307
MB 160-442821~1-A	MB	SB-125	5.517E-002	4.524E-002	1.2193
MB 160-442821~1-A	MB	SC-46	0.000E+000	7.064E-003	0.0000
MB 160-442821~1-A	MB	SN-113	3.065E-002	3.577E-002	0.8568
MB 160-442821~1-A	MB	SN-126	1.684E-001	2.381E-001	0.7074
MB 160-442821~1-A	MB	TA-182	-1.911E-001	1.577E-001	-1.2114
MB 160-442821~1-A	MB	TC-99M	1.568E-009	2.393E-002	0.0000
MB 160-442821~1-A	MB	TH-227	1.868E-001	1.347E-001	1.3870
MB 160-442821~1-A	MB	TH-229	8.086E-001	3.483E-001	2.3215
MB 160-442821~1-A	MB	TH-234	2.642E-001	3.173E-001	0.8327
MB 160-442821~1-A	MB	TL-208	1.480E-002	1.817E-002	0.8144
MB 160-442821~1-A	MB	TL-210	3.150E-002	2.108E-002	1.4946
MB 160-442821~1-A	MB	U-235	-2.885E-002	2.377E-002	-1.2138
MB 160-442821~1-A	MB	Y-88	-3.249E-002	6.078E-002	-0.5346
MB 160-442821~1-A	MB	ZN-65	0.000E+000	1.165E-002	0.0000
MB 160-442821~1-A	MB	ZR-95	3.349E-002	2.726E-002	1.2286

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Analysis Report for Gamma Spectroscopy

Batch: 442120 **Operator:**

MQO

SampID	WRKNO	Aliquot	Sigma	Instrument	Detector	CountDateTime	CountDuration
LCS 160-442120~2-	LCS	341.90g	1.00	GammaVision	GV09	9 / 14 / 19 8:40	60

Analyte	Cmpnd#	Activity	TotalUnc	CountUnc	MDA	MLCC	Act/MDA	
AC-228	11136	7.971E-001pCi/g	1.503E-001	1.447E-001	4.116E-001	1.986E-001	1.94	0.1503
AG-108M	10982	3.273E-002pCi/g	4.460E-002	4.457E-002	1.527E-001	7.503E-002	0.21	0.0446
AG-110M	10973	5.611E-002pCi/g	3.263E-002	3.250E-002	2.862E-001	1.403E-001	0.20	0.0326
AM-241	10818	9.641E+001pCi/g	5.030E+000	5.156E-001	7.152E-001	3.553E-001	134.81	5.0300
BA-133	10469	2.162E-002pCi/g	7.888E-002	7.887E-002	2.627E-001	1.297E-001	0.08	0.0789
BA-140	10463	-1.914E-001pCi/g	1.490E-001	1.486E-001	4.960E-001	2.422E-001	-0.39	0.1490
BE-7	10435	-7.246E-001pCi/g	6.106E-001	6.094E-001	2.407E+000	1.191E+000	-0.30	0.6106
BI-207	10195	5.167E-002pCi/g	2.099E-002	2.083E-002	2.146E-001	1.041E-001	0.24	0.0210
BI-210M	10173	-6.957E-002pCi/g	5.753E-002	5.738E-002	2.573E-001	1.269E-001	-0.27	0.0575
BI-212	10160	-5.523E-002pCi/g	5.526E-001	5.526E-001	1.865E+000	9.090E-001	-0.03	0.5526
BI-214	10154	3.852E-001pCi/g	9.766E-002	9.559E-002	1.944E-001	9.385E-002	1.98	0.0977
CD-109	9254	-1.750E-007pCi/g	1.700E+000	1.700E+000	5.634E+000	2.802E+000	0.00	1.7005
CD-113M	17462	-3.881E+002pCi/g	6.515E+002	6.511E+002	2.163E+003	1.067E+003	-0.18	651.5354
CE-139	9241	3.894E-002pCi/g	2.479E-002	2.452E-002	8.082E-002	3.962E-002	0.48	0.0248
CE-141	9235	-1.547E-002pCi/g	6.406E-002	6.405E-002	1.753E-001	8.643E-002	-0.09	0.0641
CE-144	9221	-3.154E-001pCi/g	4.499E-001	4.496E-001	1.487E+000	7.386E-001	-0.21	0.4499
CF-249	9215	1.781E-001pCi/g	7.734E-002	7.680E-002	1.477E-001	7.216E-002	1.21	0.0773
CF-251	13690	4.070E-002pCi/g	1.991E-001	1.991E-001	5.029E-001	2.476E-001	0.08	0.1991
CO-56	8704	4.653E-002pCi/g	2.373E-002	2.361E-002	1.308E-001	6.340E-002	0.36	0.0237
CO-57	13694	-7.288E-003pCi/g	3.710E-002	3.710E-002	1.234E-001	6.105E-002	-0.06	0.0371
CO-58	8698	-1.897E-003pCi/g	4.758E-002	4.758E-002	1.605E-001	7.834E-002	-0.01	0.0476
CO-60	8692	1.057E+001pCi/g	5.418E-001	1.102E-001	6.740E-002	3.087E-002	156.79	0.5418
CR-51	8604	-4.284E-001pCi/g	4.158E-001	4.152E-001	1.418E+000	6.993E-001	-0.30	0.4158
CS-134	8553	1.120E-001pCi/g	6.138E-002	6.111E-002	1.766E-001	8.610E-002	0.63	0.0614
CS-136	8546	5.864E-002pCi/g	5.392E-002	5.381E-002	1.583E-001	7.721E-002	0.37	0.0539
CS-137	8539	2.676E+001pCi/g	1.407E+000	2.042E-001	1.233E-001	5.972E-002	217.05	1.4070
EU-152	7145	2.923E-003pCi/g	2.591E-003	2.586E-003	3.641E-001	1.801E-001	0.01	0.0026
EU-154	7138	1.735E-001pCi/g	1.133E-001	1.130E-001	2.371E-001	1.172E-001	0.73	0.1133
EU-155	7131	-1.792E-001pCi/g	9.195E-002	9.143E-002	8.405E-001	4.176E-001	-0.21	0.0920
FE-59	7073	8.888E-002pCi/g	1.334E-001	1.333E-001	2.797E-001	1.356E-001	0.32	0.1334
GA-68	18005	1.010E+000pCi/g	2.873E+000	2.873E+000	6.059E+000	2.932E+000	0.17	2.8732
GD-153	6824	-1.271E-001pCi/g	1.790E-001	1.788E-001	5.913E-001	2.938E-001	-0.21	0.1790
HF-181	6495	2.184E-001pCi/g	6.810E-002	6.717E-002	1.316E-001	6.420E-002	1.66	0.0681
HG-203	6466	-6.342E-002pCi/g	4.983E-002	4.970E-002	1.642E-001	8.104E-002	-0.39	0.0498
I-131	6380	-7.256E-002pCi/g	6.388E-002	6.377E-002	1.531E-001	7.523E-002	-0.47	0.0639
IR-192	6303	5.827E-002pCi/g	8.760E-002	8.753E-002	2.897E-001	1.438E-001	0.20	0.0876
K-40	6148	-4.085E-001pCi/g	2.930E-001	2.922E-001	8.645E-001	4.037E-001	-0.47	0.2930
KR-85	6111	0.000E+000pCi/g	5.958E+000	5.958E+000	3.921E+001	1.929E+001	0.00	5.9582
LA-140	6096	4.473E-002pCi/g	5.970E-002	5.965E-002	6.482E-002	2.897E-002	0.69	0.0597
MN-54	5382	-7.301E-002pCi/g	4.126E-002	4.109E-002	1.409E-001	6.850E-002	-0.52	0.0413
NA-22	5201	2.624E-002pCi/g	2.169E-002	2.165E-002	7.265E-002	3.359E-002	0.36	0.0217
NB-94	5160	6.374E-002pCi/g	3.242E-002	3.225E-002	1.519E-001	7.421E-002	0.42	0.0324
NB-95	5154	1.963E-003pCi/g	3.822E-002	3.822E-002	1.295E-001	6.292E-002	0.02	0.0382
ND-147	5083	3.119E-001pCi/g	3.848E-001	3.844E-001	8.917E-001	4.351E-001	0.35	0.3848
NP-237	4757	-2.992E-001pCi/g	4.987E-001	4.984E-001	1.648E+000	8.195E-001	-0.18	0.4987
NP-239	4751	1.640E-001pCi/g	2.323E-001	2.321E-001	7.677E-001	3.814E-001	0.21	0.2323
PA-231	4541	0.000E+000pCi/g	8.169E-001	8.169E-001	8.598E+000	4.266E+000	0.00	0.8169
PA-233	4535	-1.500E-003pCi/g	1.125E-001	1.125E-001	7.025E-001	3.486E-001	0.00	0.1125
PA-234	4528	-1.929E-001pCi/g	2.743E-001	2.742E-001	9.070E-001	4.503E-001	-0.21	0.2743

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PA-234M	19453	-6.978E-002pCi/g	7.541E+000	7.541E+000	2.662E+001	1.304E+001	0.00	7.5414
PB-210	4467	7.539E+002pCi/g	4.451E+001	4.662E+000	8.529E+000	4.237E+000	88.39	44.5104
PB-212	4454	4.619E-001pCi/g	6.836E-002	6.148E-002	1.884E-001	9.237E-002	2.45	0.0684
PB-214	4448	5.844E-001pCi/g	1.236E-001	1.198E-001	2.710E-001	1.327E-001	2.16	0.1236
PM-144	19585	-6.206E-002pCi/g	4.852E-002	4.841E-002	1.603E-001	7.840E-002	-0.39	0.0485
PM-146	2464	-6.084E-002pCi/g	1.020E-001	1.019E-001	2.355E-001	1.159E-001	-0.26	0.1020
RH-106	1882	-5.583E-001pCi/g	4.539E-001	4.529E-001	1.500E+000	7.343E-001	-0.37	0.4539
RU-103	1828	1.549E-002pCi/g	6.208E-002	6.208E-002	1.443E-001	7.070E-002	0.11	0.0621
SB-124	1784	1.007E-001pCi/g	7.453E-002	7.434E-002	2.350E-001	1.160E-001	0.43	0.0745
SB-125	1777	3.494E-002pCi/g	3.557E-002	3.553E-002	4.848E-001	2.384E-001	0.07	0.0356
SC-46	1739	-8.326E-002pCi/g	6.719E-002	6.705E-002	2.219E-001	1.089E-001	-0.38	0.0672
SN-113	1570	2.746E-002pCi/g	8.897E-002	8.896E-002	2.960E-001	1.462E-001	0.09	0.0890
SN-126	17459	-9.609E-001pCi/g	2.197E+000	2.197E+000	7.250E+000	3.617E+000	-0.13	2.1975
TA-182	1301	1.103E-001pCi/g	1.129E-001	1.128E-001	6.531E-001	3.195E-001	0.17	0.1129
TC-99M	17412	0.000E+000pCi/g	2.204E-002	2.204E-002	2.009E-001	9.974E-002	0.00	0.0220
TH-227	1058	1.587E-001pCi/g	6.160E-001	6.159E-001	1.487E+000	7.316E-001	0.11	0.6160
TH-229	1046	8.150E-002pCi/g	9.665E-001	9.665E-001	2.331E+000	1.150E+000	0.03	0.9665
TH-234	1027	-6.906E-001pCi/g	9.853E-001	9.845E-001	3.256E+000	1.618E+000	-0.21	0.9853
TL-208	929	2.594E-001pCi/g	5.669E-002	5.507E-002	1.124E-001	5.442E-002	2.31	0.0567
TL-210	20861	6.163E-002pCi/g	4.864E-002	4.851E-002	1.607E-001	7.843E-002	0.38	0.0486
U-235	281	-7.046E-003pCi/g	2.801E-001	2.801E-001	1.559E+000	7.744E-001	0.00	0.2801
Y-88	74	-2.679E-002pCi/g	3.451E-002	3.447E-002	7.939E-002	3.598E-002	-0.34	0.0345
ZN-65	31	0.000E+000pCi/g	5.246E-002	5.246E-002	4.458E-001	2.180E-001	0.00	0.0525
ZR-95	7	-4.438E-002pCi/g	9.905E-002	9.902E-002	2.154E-001	1.044E-001	-0.21	0.0990

Laboratory Control Sample Information

Sample ID	WRKNO	Analyte	Activity	StdAdded	Recovery	ZFactor
LCS 160-442120-2-A	LCS 160-442120-2-A	CS-137	2.678E+001 pCi/g	2.751E+001	97.29%	-0.5032
		CO-60	1.057E+001 pCi/g	1.116E+001	94.72%	-1.0238
		AM-241	9.641E+001 pCi/g	9.662E+001	99.78%	-0.0397

Sample Duplicate Information

Sample ID	Dup Sample ID	Analyte	Samp Activity	Dup Activity	RPD	RER	DER	Flag	ZFactor

Blanks Information

SampID	WRKNO	Analyte	Activity	UncTotal	ZFactor	
MB 160-442120~1-A	MB	AC-228	5.038E-002	6.932E-002	0.7269	
MB 160-442120~1-A	MB	AG-108M	-2.019E-003	1.779E-002	-0.1135	
MB 160-442120~1-A	MB	AG-110M	1.355E-002	8.550E-003	1.5843	
MB 160-442120~1-A	MB	AM-241	8.122E-002	3.041E-002	2.6706	B
MB 160-442120~1-A	MB	BA-133	3.808E-002	3.757E-002	1.0134	
MB 160-442120~1-A	MB	BA-140	5.589E-002	6.413E-002	0.8716	
MB 160-442120~1-A	MB	BE-7	-2.362E-001	2.241E-001	-1.0541	
MB 160-442120~1-A	MB	BI-207	-3.482E-002	3.785E-002	-0.9199	
MB 160-442120~1-A	MB	BI-210M	2.544E-002	3.260E-002	0.7805	
MB 160-442120~1-A	MB	BI-212	-8.612E-002	2.928E-001	-0.2941	
MB 160-442120~1-A	MB	BI-214	5.043E-002	2.960E-002	1.7036	
MB 160-442120~1-A	MB	CD-109	0.000E+000	5.558E-002	0.0000	
MB 160-442120~1-A	MB	CD-113M	-2.718E+002	2.332E+002	-1.1655	
MB 160-442120~1-A	MB	CE-139	8.248E-003	1.261E-002	0.6540	
MB 160-442120~1-A	MB	CE-141	1.554E-002	2.028E-002	0.7666	
MB 160-442120~1-A	MB	CE-144	-8.111E-002	1.145E-001	-0.7084	
MB 160-442120~1-A	MB	CF-249	-1.188E-002	1.048E-002	-1.1341	
MB 160-442120~1-A	MB	CF-251	5.139E-002	5.501E-002	0.9341	
MB 160-442120~1-A	MB	CO-56	-2.889E-002	2.222E-002	-1.3004	
MB 160-442120~1-A	MB	CO-57	0.000E+000	3.364E-003	0.0000	
MB 160-442120~1-A	MB	CO-58	-3.584E-002	3.227E-002	-1.1107	
MB 160-442120~1-A	MB	CO-60	4.012E-002	1.616E-002	2.4828	
MB 160-442120~1-A	MB	CR-51	-1.270E-001	1.698E-001	-0.7477	
MB 160-442120~1-A	MB	CS-134	-1.612E-002	1.891E-002	-0.8523	
MB 160-442120~1-A	MB	CS-136	-3.609E-002	3.421E-002	-1.0549	
MB 160-442120~1-A	MB	CS-137	-1.037E-002	2.149E-002	-0.4826	
MB 160-442120~1-A	MB	EU-152	3.567E-002	4.750E-002	0.7510	
MB 160-442120~1-A	MB	EU-154	-2.863E-003	3.819E-003	-0.7496	
MB 160-442120~1-A	MB	EU-155	3.121E-002	5.034E-002	0.6200	
MB 160-442120~1-A	MB	FE-59	0.000E+000	1.408E-002	0.0000	
MB 160-442120~1-A	MB	GA-68	-3.205E-001	1.137E+000	-0.2819	
MB 160-442120~1-A	MB	GD-153	-8.809E-003	2.630E-002	-0.3350	
MB 160-442120~1-A	MB	HF-181	-7.435E-003	1.632E-002	-0.4555	
MB 160-442120~1-A	MB	HG-203	-3.647E-003	1.563E-002	-0.2334	
MB 160-442120~1-A	MB	I-131	1.087E-002	2.227E-002	0.4882	
MB 160-442120~1-A	MB	IR-192	1.725E-002	1.795E-002	0.9608	
MB 160-442120~1-A	MB	K-40	-3.512E-001	2.481E-001	-1.4153	
MB 160-442120~1-A	MB	KR-85	4.077E-001	7.276E+000	0.0560	
MB 160-442120~1-A	MB	LA-140	2.570E-002	3.839E-002	0.6695	
MB 160-442120~1-A	MB	MN-54	3.578E-002	1.805E-002	1.9827	
MB 160-442120~1-A	MB	NA-22	2.253E-002	1.014E-002	2.2222	
MB 160-442120~1-A	MB	NB-94	6.478E-003	2.167E-002	0.2990	
MB 160-442120~1-A	MB	NB-95	1.486E-002	1.298E-002	1.1450	
MB 160-442120~1-A	MB	ND-147	-6.652E-002	1.630E-001	-0.4081	
MB 160-442120~1-A	MB	NP-237	-6.577E-002	1.185E-001	-0.5549	
MB 160-442120~1-A	MB	NP-239	2.935E-002	4.639E-002	0.6326	
MB 160-442120~1-A	MB	PA-231	4.500E-001	7.725E-001	0.5825	
MB 160-442120~1-A	MB	PA-233	-3.527E-003	4.296E-003	-0.8211	
MB 160-442120~1-A	MB	PA-234	7.125E-002	2.403E-002	2.9648	B
MB 160-442120~1-A	MB	PA-234M	-3.788E-001	3.085E+000	-0.1228	
MB 160-442120~1-A	MB	PB-210	4.436E-001	4.168E-001	1.0644	

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MB 160-442120~1-A	MB	PB-212	2.139E-002	3.051E-002	0.7012
MB 160-442120~1-A	MB	PB-214	-8.911E-002	4.874E-002	-1.8281
MB 160-442120~1-A	MB	PM-144	-1.187E-002	2.398E-002	-0.4951
MB 160-442120~1-A	MB	PM-146	2.447E-002	2.423E-002	1.0103
MB 160-442120~1-A	MB	RH-106	1.992E-001	2.993E-001	0.6655
MB 160-442120~1-A	MB	RU-103	1.656E-002	1.646E-002	1.0059
MB 160-442120~1-A	MB	SB-124	0.000E+000	2.446E-003	0.0000
MB 160-442120~1-A	MB	SB-125	-2.440E-002	6.866E-002	-0.3554
MB 160-442120~1-A	MB	SC-46	3.218E-002	3.784E-002	0.8503
MB 160-442120~1-A	MB	SN-113	2.292E-002	3.145E-002	0.7289
MB 160-442120~1-A	MB	SN-126	-8.506E-002	1.236E-001	-0.6881
MB 160-442120~1-A	MB	TA-182	3.492E-002	3.263E-002	1.0702
MB 160-442120~1-A	MB	TC-99M	8.082E-003	1.222E-002	0.6612
MB 160-442120~1-A	MB	TH-227	9.868E-002	7.124E-002	1.3853
MB 160-442120~1-A	MB	TH-229	-1.062E-001	2.439E-001	-0.4355
MB 160-442120~1-A	MB	TH-234	3.187E-001	1.473E-001	2.1643
MB 160-442120~1-A	MB	TL-208	2.143E-002	2.075E-002	1.0326
MB 160-442120~1-A	MB	TL-210	0.000E+000	6.153E-003	0.0000
MB 160-442120~1-A	MB	U-235	0.000E+000	6.083E-002	0.0000
MB 160-442120~1-A	MB	Y-88	-8.251E-003	3.406E-002	-0.2423
MB 160-442120~1-A	MB	ZN-65	0.000E+000	1.591E-002	0.0000
MB 160-442120~1-A	MB	ZR-95	-5.364E-002	4.850E-002	-1.1060

eurofins

Analysis Report for Gamma Spectroscopy

Batch: 442823 **Operator:**

MQO

SampID	WRKNO	Aliquot	Sigma	Instrument	Detector	CountDateTime	CountDuration
LCS 160-442823~2-	LCS	341.90g	1.00	GammaVision	GV09	9 / 16 / 19 12:14	30

Analyte	Cmpnd#	Activity	TotalUnc	CountUnc	MDA	MLCC	Act/MDA	
AC-228	11136	6.724E-001pCi/g	2.591E-001	2.568E-001	7.430E-001	3.570E-001	0.91	0.2591
AG-108M	10982	-1.190E-001pCi/g	9.958E-002	9.939E-002	2.499E-001	1.223E-001	-0.48	0.0996
AG-110M	10973	1.853E-001pCi/g	9.373E-002	9.325E-002	2.068E-001	9.777E-002	0.90	0.0937
AM-241	10818	9.548E+001pCi/g	5.008E+000	7.231E-001	1.000E+000	4.956E-001	95.46	5.0078
BA-133	10469	-1.290E-001pCi/g	1.142E-001	1.140E-001	3.776E-001	1.854E-001	-0.34	0.1142
BA-140	10463	1.955E-001pCi/g	2.786E-001	2.784E-001	6.644E-001	3.207E-001	0.29	0.2786
BE-7	10435	-9.489E-001pCi/g	9.176E-001	9.163E-001	3.134E+000	1.542E+000	-0.30	0.9176
BI-207	10195	2.664E-001pCi/g	1.265E-001	1.258E-001	2.603E-001	1.238E-001	1.02	0.1265
BI-210M	10173	1.661E-001pCi/g	1.132E-001	1.127E-001	3.306E-001	1.619E-001	0.50	0.1132
BI-212	10160	2.393E-001pCi/g	7.710E-001	7.709E-001	2.616E+000	1.261E+000	0.09	0.7710
BI-214	10154	7.373E-001pCi/g	1.497E-001	1.447E-001	3.057E-001	1.462E-001	2.41	0.1497
CD-109	9254	0.000E+000pCi/g	2.460E+000	2.460E+000	8.144E+000	4.041E+000	0.00	2.4597
CD-113M	17462	6.783E+002pCi/g	7.899E+002	7.887E+002	2.626E+003	1.285E+003	0.26	789.9314
CE-139	9241	1.721E-002pCi/g	5.608E-002	5.606E-002	1.873E-001	9.206E-002	0.09	0.0561
CE-141	9235	1.046E-001pCi/g	1.449E-001	1.448E-001	4.799E-001	2.375E-001	0.22	0.1449
CE-144	9221	-4.470E-001pCi/g	6.207E-001	6.203E-001	2.056E+000	1.017E+000	-0.22	0.6207
CF-249	9215	1.160E-001pCi/g	1.282E-001	1.280E-001	4.248E-001	2.090E-001	0.27	0.1282
CF-251	13690	5.206E-001pCi/g	2.747E-001	2.708E-001	6.761E-001	3.304E-001	0.77	0.2747
CO-56	8704	-8.547E-002pCi/g	1.448E-002	1.380E-002	2.127E-001	1.024E-001	-0.40	0.0145
CO-57	13694	2.886E-002pCi/g	4.356E-002	4.353E-002	1.450E-001	7.119E-002	0.20	0.0436
CO-58	8698	-9.765E-002pCi/g	7.729E-002	7.712E-002	2.558E-001	1.241E-001	-0.38	0.0773
CO-60	8692	1.060E+001pCi/g	5.540E-001	1.547E-001	9.301E-002	4.084E-002	113.91	0.5540
CR-51	8604	7.292E-001pCi/g	1.114E+000	1.113E+000	3.690E+000	1.826E+000	0.20	1.1135
CS-134	8553	7.654E-002pCi/g	7.075E-002	7.064E-002	2.642E-001	1.277E-001	0.29	0.0708
CS-136	8546	6.184E-002pCi/g	7.324E-002	7.315E-002	1.602E-001	7.624E-002	0.39	0.0732
CS-137	8539	2.673E+001pCi/g	1.418E+000	2.785E-001	1.324E-001	6.235E-002	201.85	1.4182
EU-152	7145	2.260E-001pCi/g	1.711E-001	1.706E-001	5.105E-001	2.513E-001	0.44	0.1711
EU-154	7138	2.733E-001pCi/g	2.123E-001	2.119E-001	3.313E-001	1.629E-001	0.82	0.2123
EU-155	7131	-7.752E-004pCi/g	8.424E-001	8.424E-001	9.424E-001	4.659E-001	0.00	0.8424
FE-59	7073	1.249E-001pCi/g	1.787E-001	1.786E-001	3.787E-001	1.808E-001	0.33	0.1787
GA-68	18005	3.556E+000pCi/g	3.616E+000	3.610E+000	7.614E+000	3.637E+000	0.47	3.6158
GD-153	6824	-1.813E-003pCi/g	3.058E-001	3.058E-001	1.015E+000	5.038E-001	0.00	0.3058
HF-181	6495	-5.114E-002pCi/g	3.197E-002	3.186E-002	4.147E-001	2.041E-001	-0.12	0.0320
HG-203	6466	0.000E+000pCi/g	4.588E-002	4.588E-002	2.137E-001	1.047E-001	0.00	0.0459
I-131	6380	-2.889E-002pCi/g	8.399E-002	8.398E-002	2.043E-001	9.955E-002	-0.14	0.0840
IR-192	6303	2.376E-002pCi/g	2.199E-002	2.194E-002	4.211E-001	2.083E-001	0.06	0.0220
K-40	6148	6.048E-001pCi/g	4.192E-001	4.181E-001	9.646E-001	4.251E-001	0.63	0.4192
KR-85	6111	1.568E+001pCi/g	1.702E+001	1.700E+001	5.656E+001	2.765E+001	0.28	17.0214
LA-140	6096	3.176E-002pCi/g	2.687E-002	2.682E-002	1.433E-001	6.478E-002	0.22	0.0269
MN-54	5382	8.473E-002pCi/g	7.587E-002	7.575E-002	1.653E-001	7.874E-002	0.51	0.0759
NA-22	5201	2.692E-002pCi/g	3.216E-002	3.213E-002	1.111E-001	5.008E-002	0.24	0.0322
NB-94	5160	5.878E-002pCi/g	6.815E-002	6.808E-002	2.277E-001	1.103E-001	0.26	0.0682
NB-95	5154	-4.254E-002pCi/g	6.355E-002	6.351E-002	2.136E-001	1.031E-001	-0.20	0.0636
ND-147	5083	6.142E-001pCi/g	5.324E-001	5.312E-001	1.235E+000	5.958E-001	0.50	0.5324
NP-237	4757	0.000E+000pCi/g	7.137E-001	7.137E-001	2.363E+000	1.173E+000	0.00	0.7137
NP-239	4751	2.218E-001pCi/g	2.468E-001	2.465E-001	8.166E-001	4.034E-001	0.27	0.2468
PA-231	4541	1.832E-007pCi/g	3.612E+000	3.612E+000	1.203E+001	5.951E+000	0.00	3.6123
PA-233	4535	-2.068E-001pCi/g	1.061E-001	1.055E-001	1.003E+000	4.961E-001	-0.21	0.1061
PA-234	4528	1.581E-001pCi/g	1.386E-001	1.383E-001	1.273E+000	6.304E-001	0.12	0.1386

			MQO					
PA-234M	19453	1.368E+001pCi/g	1.117E+001	1.115E+001	3.699E+001	1.796E+001	0.37	11.1677
PB-210	4467	7.468E+002pCi/g	4.435E+001	6.596E+000	1.224E+001	6.066E+000	61.01	44.3456
PB-212	4454	1.469E-001pCi/g	1.416E-001	1.412E-001	4.680E-001	2.303E-001	0.31	0.1416
PB-214	4448	3.138E-001pCi/g	1.033E-001	1.020E-001	3.489E-001	1.689E-001	0.90	0.1033
PM-144	19585	-7.643E-002pCi/g	6.127E-002	6.114E-002	2.031E-001	9.808E-002	-0.38	0.0613
PM-146	2464	-1.680E-001pCi/g	1.637E-001	1.635E-001	5.415E-001	2.669E-001	-0.31	0.1637
RA-226	1950	-6.088E-001pCi/g	1.720E+000	1.719E+000	4.352E+000	2.135E+000	-0.14	1.7203
RH-106	1882	-1.486E-002pCi/g	1.004E+000	1.004E+000	3.371E+000	1.654E+000	0.00	1.0040
RU-103	1826	-7.203E-002pCi/g	8.998E-002	8.990E-002	2.091E-001	1.016E-001	0.34	0.0900
SB-124	1784	6.042E-002pCi/g	5.935E-002	5.926E-002	1.535E-001	6.235E-002	0.39	0.0594
SB-125	1777	6.502E-002pCi/g	8.889E-002	8.883E-002	6.829E-001	3.334E-001	0.10	0.0889
SC-46	1739	9.829E-002pCi/g	7.906E-002	7.890E-002	2.619E-001	1.268E-001	0.38	0.0791
SN-113	1570	1.196E-001pCi/g	1.325E-001	1.324E-001	4.393E-001	2.161E-001	0.27	0.1325
SN-126	17459	-1.363E+000pCi/g	3.097E+000	3.097E+000	1.023E+001	5.098E+000	-0.13	3.0975
TA-182	1301	9.317E-002pCi/g	1.172E-001	1.171E-001	4.631E-001	2.120E-001	0.20	0.1172
TC-99M	17412	9.948E-003pCi/g	8.246E-002	8.246E-002	2.742E-001	1.358E-001	0.04	0.0825
TH-227	1058	4.056E-001pCi/g	8.725E-001	8.721E-001	2.114E+000	1.033E+000	0.19	0.8725
TH-229	1046	2.328E-001pCi/g	1.336E+000	1.336E+000	3.238E+000	1.587E+000	0.07	1.3360
TH-234	1027	1.014E+000pCi/g	1.182E+000	1.181E+000	3.911E+000	1.935E+000	0.26	1.1823
TL-208	929	9.316E-002pCi/g	9.328E-002	9.316E-002	2.088E-001	1.009E-001	0.45	0.0933
TL-210	20861	-6.981E-002pCi/g	6.709E-002	6.697E-002	2.234E-001	1.079E-001	-0.31	0.0671
U-235	281	2.461E-001pCi/g	6.522E-001	6.520E-001	2.165E+000	1.072E+000	0.11	0.6522
Y-88	74	1.431E-002pCi/g	3.545E-002	3.544E-002	7.939E-002	3.227E-002	0.18	0.0355
ZN-65	31	2.116E-001pCi/g	1.817E-001	1.814E-001	6.031E-001	2.918E-001	0.35	0.1817
ZR-95	7	9.079E-002pCi/g	6.198E-002	6.180E-002	3.173E-001	1.520E-001	0.29	0.0620

Laboratory Control Sample Information

Sample ID	WRKNO	Analyte	Activity	StdAdded	Recovery	ZFactor
LCS 160-442823-2-A	LCS 160-442823-2-A	CS-137	2.678E+001 pCi/g	2.750E+001	97.19%	-0.5172
		CO-60	1.060E+001 pCi/g	1.115E+001	95.04%	-0.9417
		AM-241	9.548E+001 pCi/g	9.662E+001	98.82%	-0.2149

Sample Duplicate Information

Sample ID	Dup Sample ID	Analyte	Samp Activity	Dup Activity	RPD	RER	DER	Flag	ZFactor

Blanks Information

SampID	WRKNO	Analyte	Activity	UncTotal	ZFactor	
MB 160-442823~1-A	MB	AC-228	-2.670E-001	1.221E-001	-2.1868	
MB 160-442823~1-A	MB	AG-108M	8.076E-003	2.308E-002	0.3499	
MB 160-442823~1-A	MB	AG-110M	2.302E-002	2.088E-002	1.1024	
MB 160-442823~1-A	MB	AM-241	-9.497E-003	4.616E-002	-0.2058	
MB 160-442823~1-A	MB	BA-133	2.048E-002	2.342E-002	0.8744	
MB 160-442823~1-A	MB	BA-140	-5.370E-002	1.253E-001	-0.4285	
MB 160-442823~1-A	MB	BE-7	4.138E-001	1.266E-001	3.2697	B
MB 160-442823~1-A	MB	BI-207	-3.668E-003	2.589E-002	-0.1417	
MB 160-442823~1-A	MB	BI-210M	-1.420E-002	3.524E-002	-0.4029	
MB 160-442823~1-A	MB	BI-212	-4.888E-002	4.215E-001	-0.1160	
MB 160-442823~1-A	MB	BI-214	-3.981E-002	6.986E-002	-0.5698	
MB 160-442823~1-A	MB	CD-109	1.223E-001	5.078E-001	0.2408	
MB 160-442823~1-A	MB	CD-113M	2.431E+002	2.488E+002	0.9773	
MB 160-442823~1-A	MB	CE-139	9.176E-003	1.152E-002	0.7962	
MB 160-442823~1-A	MB	CE-141	1.703E-002	1.988E-002	0.8563	
MB 160-442823~1-A	MB	CE-144	0.000E+000	3.266E-002	0.0000	
MB 160-442823~1-A	MB	CF-249	1.966E-002	3.165E-002	0.6213	
MB 160-442823~1-A	MB	CF-251	4.419E-002	7.716E-002	0.5727	
MB 160-442823~1-A	MB	CO-56	4.158E-002	1.830E-002	2.2722	
MB 160-442823~1-A	MB	CO-57	8.727E-003	1.124E-002	0.7767	
MB 160-442823~1-A	MB	CO-58	2.064E-002	2.951E-002	0.6997	
MB 160-442823~1-A	MB	CO-60	-6.800E-004	1.850E-003	-0.3677	
MB 160-442823~1-A	MB	CR-51	-5.597E-002	2.692E-001	-0.2079	
MB 160-442823~1-A	MB	CS-134	5.739E-002	2.362E-002	2.4301	
MB 160-442823~1-A	MB	CS-136	4.922E-003	1.775E-002	0.2773	
MB 160-442823~1-A	MB	CS-137	-1.613E-002	3.318E-002	-0.4862	
MB 160-442823~1-A	MB	EU-152	2.338E-001	7.497E-002	3.1193	B
MB 160-442823~1-A	MB	EU-154	-2.806E-002	3.302E-002	-0.8499	
MB 160-442823~1-A	MB	EU-155	2.834E-002	4.016E-002	0.7056	
MB 160-442823~1-A	MB	FE-59	7.038E-002	3.167E-002	2.2222	
MB 160-442823~1-A	MB	GA-68	2.782E-001	1.396E+000	0.1993	
MB 160-442823~1-A	MB	GD-153	-3.444E-002	4.289E-002	-0.8028	
MB 160-442823~1-A	MB	HF-181	-9.881E-003	1.492E-002	-0.6621	
MB 160-442823~1-A	MB	HG-203	1.554E-003	1.954E-002	0.0796	
MB 160-442823~1-A	MB	I-131	-3.610E-002	4.098E-002	-0.8810	
MB 160-442823~1-A	MB	IR-192	-4.305E-003	2.237E-002	-0.1924	
MB 160-442823~1-A	MB	K-40	-3.196E-001	3.711E-001	-0.8614	
MB 160-442823~1-A	MB	KR-85	-3.262E-001	9.021E+000	-0.0362	
MB 160-442823~1-A	MB	LA-140	5.449E-002	2.532E-002	2.1521	
MB 160-442823~1-A	MB	MN-54	2.105E-002	3.117E-002	0.6753	
MB 160-442823~1-A	MB	NA-22	4.506E-002	2.028E-002	2.2222	
MB 160-442823~1-A	MB	NB-94	-3.259E-002	3.136E-002	-1.0392	
MB 160-442823~1-A	MB	NB-95	3.923E-003	2.587E-002	0.1516	
MB 160-442823~1-A	MB	ND-147	-9.977E-002	2.329E-001	-0.4284	
MB 160-442823~1-A	MB	NP-237	5.696E-002	1.302E-001	0.4375	
MB 160-442823~1-A	MB	NP-239	1.829E-002	6.185E-002	0.2957	
MB 160-442823~1-A	MB	PA-231	5.165E-001	7.402E-001	0.6977	
MB 160-442823~1-A	MB	PA-233	5.654E-002	9.581E-002	0.5902	
MB 160-442823~1-A	MB	PA-234	5.529E-002	7.081E-002	0.7806	
MB 160-442823~1-A	MB	PA-234M	-3.788E-001	4.634E+000	-0.0817	
MB 160-442823~1-A	MB	PB-210	-5.436E-001	5.026E-001	-1.0817	

			MQO		
MB 160-442823~1-A	MB	PB-212	2.182E-002	5.574E-002	0.3915
MB 160-442823~1-A	MB	PB-214	-1.606E-002	2.120E-002	-0.7576
MB 160-442823~1-A	MB	PM-144	2.009E-002	2.556E-002	0.7861
MB 160-442823~1-A	MB	PM-146	0.000E+000	1.429E-002	0.0000
MB 160-442823~1-A	MB	RA-226	-8.911E-001	5.769E-001	-1.5448
MB 160-442823~1-A	MB	RH-106	-3.984E-001	5.691E-001	-0.7001
MB 160-442823~1-A	MB	RU-103	-1.800E-002	3.639E-002	-0.4947
MB 160-442823~1-A	MB	SB-124	-1.501E-002	3.062E-002	-0.4903
MB 160-442823~1-A	MB	SB-125	7.401E-002	1.104E-001	0.6704
MB 160-442823~1-A	MB	SC-46	0.000E+000	6.658E-003	0.0000
MB 160-442823~1-A	MB	SN-113	2.050E-002	3.589E-002	0.5713
MB 160-442823~1-A	MB	SN-126	-1.522E-001	2.089E-001	-0.7283
MB 160-442823~1-A	MB	TA-182	-2.146E-001	2.532E-001	-0.8474
MB 160-442823~1-A	MB	TC-99M	1.200E-002	8.068E-003	1.4873
MB 160-442823~1-A	MB	TH-227	5.859E-002	4.199E-002	1.3951
MB 160-442823~1-A	MB	TH-229	2.743E-001	2.554E-001	1.0741
MB 160-442823~1-A	MB	TH-234	4.142E-001	2.246E-001	1.8439
MB 160-442823~1-A	MB	TL-208	1.547E-002	2.050E-002	0.7547
MB 160-442823~1-A	MB	TL-210	2.520E-002	2.582E-002	0.9760
MB 160-442823~1-A	MB	U-235	-7.543E-003	1.229E-001	-0.0613
MB 160-442823~1-A	MB	Y-88	-2.074E-003	4.228E-002	-0.0491
MB 160-442823~1-A	MB	ZN-65	0.000E+000	3.183E-002	0.0000
MB 160-442823~1-A	MB	ZR-95	0.000E+000	1.068E-002	0.0000

Reagent

Tuna Can_00002

Rc'd 2/3/10

Eckert & Ziegler
Analytics

1380 Seaboard Industrial Blvd.
Atlanta, Georgia 30318
Tel 404·352·8677
Fax 404·352·2837
www.analyticsinc.com

CERTIFICATE OF CALIBRATION

Standard Radionuclide Source

81427-334

1.0 Liter Sand in 1 Liter HDPE Silgan Jar

Customer: TestAmerica/St. Louis, MO
P.O. No.: 2339090, Item 1
Reference Date: 01-Jan-2010 12:00 PM EST **Grams of Master Source:** 0.017570

This standard radionuclide source was prepared using aliquots measured gravimetrically from master radionuclide solutions. Calibration and purity were checked using a germanium gamma spectrometer system. At the time of calibration no interfering gamma-ray emitting impurities were detected. The gamma-ray emission rates for the most intense gamma-ray lines are given. Eckert & Ziegler Analytics (EZA) maintains traceability to the National Institute of Standards and Technology through a Measurements Assurance Program as described in USNRC Regulatory Guide 4.15, Revision 1, February, 1979, and compliance with ANSI N42.22-1995, "Traceability of Radioactive Sources to NIST." EZA is accredited by the Health Physics Society (HPS) for the production of NIST-traceable sources, and this source was produced in accordance with the HPS accreditation requirements. Customers may report any concerns with the accreditation program to the HPS Secretariat, 1313 Dolley Madison Blvd., Ste. 402, McLean, VA 22101.

Nuclide	Gamma-Ray Energy (keV)	Half-Life, Days	Master Source* γps/gram	This Source γps	Uncertainty, % Type u_A	u_B	U	Calibration Method
Pb-210	46.5	8.120E+03	———	3.141E+03	0.1	2.1	4.1	4π LS
Am-241	59.5	1.580E+05	———	2.034E+03	0.1	1.7	3.5	4π LS
Cd-109	88.0	4.626E+02	1.606E+05	2.822E+03	0.4	2.3	4.7	HPGe
Co-57	122.1	2.718E+02	8.471E+04	1.488E+03	0.5	2.0	4.1	HPGe
Ce-139	165.9	1.376E+02	1.209E+05	2.124E+03	0.4	1.9	3.9	HPGe
Hg-203	279.2	4.661E+01	2.726E+05	4.790E+03	0.4	1.9	3.9	HPGe
Sn-113	391.7	1.151E+02	1.672E+05	2.938E+03	0.5	1.9	3.9	HPGe
Cs-137	661.7	1.098E+04	1.096E+05	1.926E+03	0.6	1.9	4.0	HPGe
Y-88	898.0	1.066E+02	4.077E+05	7.163E+03	0.4	1.9	3.9	HPGe
Co-60	1173.2	1.925E+03	2.055E+05	3.611E+03	0.5	1.9	3.9	HPGe
Co-60	1332.5	1.925E+03	2.056E+05	3.612E+03	0.7	1.9	4.0	HPGe
Y-88	1836.1	1.066E+02	4.308E+05	7.569E+03	0.5	1.9	3.9	HPGe

* Master Source refers to Analytics' 8-isotope mixture which is calibrated quarterly.

Calibration Methods: 4π LS - 4 pi Liquid Scintillation Counting, HPGe - High Purity Germanium Gamma-Ray Spectrometer, IC - Ionization Chamber. **Uncertainty:** U - Relative expanded uncertainty, k = 2. See NIST Technical Note 1297, "Guidelines for Evaluating and Expressing the Uncertainty of NIST Measurement Results."

(Certificate continued on reverse side)

Corporate Office
24937 Avenue Tibbitts Valencia, California 91355

Laboratory
1380 Seaboard Industrial Blvd. Atlanta, Georgia 30318

Comments:
1550 grams of sand.
This standard will expire one year after the reference date.

Source Prepared by: _____
W. Mao, Radiochemist

QA Approved: _____ Date: 2/1/10
J. D. McCorvey, QA Manager Alternate

Reagent

Tuna Can_00003

Eckert & Ziegler
Analytics

1380 Seaboard Industrial Blvd.
Atlanta, Georgia 30318
Tel 404·352·8677
Fax 404·352·2837
www.analyticsinc.com

CERTIFICATE OF CALIBRATION

Standard Radionuclide Source

90099

1.0 Liter Sand in 1 Liter Wide Mouth HDPE Silgan Jar

Customer: TestAmerica St. Louis / Earth City, MO
P.O. No.: 2454150, Item 1
Reference Date: 01-Jan-2012 12:00 PM EST **Grams of Master Source:** 0.017180

This standard radionuclide source was prepared using aliquots measured gravimetrically from master radionuclide solutions. Additional radionuclides were added gravimetrically from solutions calibrated by gamma-ray spectrometry, ionization chamber, or liquid scintillation counting. Calibration and purity were checked using a germanium gamma spectrometer system. At the time of calibration no interfering gamma-ray emitting impurities were detected. The gamma-ray emission rates for the most intense gamma-ray lines are given. Eckert & Ziegler Analytics (EZA) maintains traceability to the National Institute of Standards and Technology through a Measurements Assurance Program as described in USNRC Regulatory Guide 4.15, Revision 2, July 2007, and compliance with ANSI N42.22-1995, "Traceability of Radioactive Sources to NIST." EZA is accredited by the Health Physics Society (HPS) for the production of NIST-traceable sources, and this source was produced in accordance with the HPS accreditation requirements. Customers may report any concerns with the accreditation program to the HPS Secretariat, 1313 Dolley Madison Blvd., Ste. 402, McLean, VA 22101.

Nuclide	Gamma-Ray Energy (keV)	Half-Life, Days	Master Source* γps/gram	This Source γps	Uncertainty* , % Type u_A	u_B	U	Calibration Method*
Pb-210	46.5	8.100E+03	———	3.094E+03	0.1	2.1	4.1	4π LS
Am-241	59.5	1.580E-05	———	2.037E+03	0.1	1.7	3.5	4π LS
Cd-109	88.0	4.626E-02	1.677E+05	2.881E+03	0.5	2.3	4.7	HPGe
Co-57	122.1	2.718E-02	8.795E+04	1.511E+03	0.4	2.0	4.1	HPGe
Ce-139	165.9	1.376E+02	1.245E+05	2.139E+03	0.4	1.9	3.9	HPGe
Hg-203	279.2	4.661E+01	2.707E+05	4.651E+03	0.3	1.9	3.8	HPGe
Sn-113	391.7	1.151E+02	1.755E+05	3.015E+03	0.4	1.9	3.9	HPGe
Cs-137	661.7	1.098E+04	1.128E+05	1.938E+03	0.7	1.9	4.0	HPGe
Y-88	898.0	1.066E+02	4.228E+05	7.264E+03	0.5	1.9	3.9	HPGe
Co-60	1173.2	1.925E+03	2.084E+05	3.580E+03	0.6	1.9	4.0	HPGe
Co-60	1332.5	1.925E+03	2.084E+05	3.581E+03	0.7	1.9	4.0	HPGe
Y-88	1836.1	1.066E+02	4.476E+05	7.690E+03	0.7	1.9	4.0	HPGe

* Master Source refers to Analytics' 8-isotope mixture which is calibrated quarterly.

Calibration Methods: 4π LS - 4 pi Liquid Scintillation Counting, HPGe - High Purity Germanium Gamma-Ray Spectrometer, IC - Ionization Chamber. **Uncertainty:** U - Relative expanded uncertainty, k = 2. See NIST Technical Note 1297, "Guidelines for Evaluating and Expressing the Uncertainty of NIST Measurement Results."

(Certificate continued on reverse side)

Comments:
1550 grams of sand. Homogenous down to 10 grams aliquot.
This standard will expire one year after the reference date.

Source Prepared by: _____
Z. Dimitrova, Radiochemist

QA Approved: _____ Date: 30 JAN 12
J.D. McCorvey, Counting Room Manager

Reagent

Tuna Can_00006

Eckert & Ziegler
Analytics

1380 Seaboard Industrial Blvd.
Atlanta, Georgia 30318
Tel 404·352·8677
Fax 404·352·2837
www.analyticsInc.com

CERTIFICATE OF CALIBRATION

Standard Radionuclide Source

83814-334

1.0 Liter Sand in 1 Liter Wide Mouth HDPE Silgan Jar

Customer: Test America St. Louis
P.O. No.: 2395112, Item 1
Reference Date: 01-Jan-2011 12:00 PM EST **Grams of Master Source:** 0.016927

This standard radionuclide source was prepared using aliquots measured gravimetrically from master radionuclide solutions. Calibration and purity were checked using a germanium gamma spectrometer system. At the time of calibration no interfering gamma-ray emitting impurities were detected. The gamma-ray emission rates for the most intense gamma-ray lines are given. Eckert & Ziegler Analytics (EZA) maintains traceability to the National Institute of Standards and Technology through a Measurements Assurance Program as described in USNRC Regulatory Guide 4.15, Revision 1, February, 1979, and compliance with ANSI N42.22-1995, "Traceability of Radioactive Sources to NIST." EZA is accredited by the Health Physics Society (HPS) for the production of NIST-traceable sources, and this source was produced in accordance with the HPS accreditation requirements. Customers may report any concerns with the accreditation program to the HPS Secretariat, 1313 Dolley Madison Blvd., Ste. 402, McLean, VA 22101.

Nuclide	Gamma-Ray Energy (keV)	Half-Life, Days	Master Source* γps/gram	This Source γps	Uncertainty, % Type u_A	u_B	U	Calibration Method
Pb-210	46.5	8.120E+03	———	3.021E+03	0.1	2.1	4.1	4π LS
Am-241	59.5	1.580E+05	———	2.090E+03	0.1	1.7	3.5	4π LS
Cd-109	88.0	4.626E+02	1.697E+05	2.873E+03	0.8	2.3	4.9	HPGe
Co-57	122.1	2.718E+02	8.711E+04	1.475E+03	0.5	2.0	4.1	HPGe
Ce-139	165.9	1.376E+02	1.247E+05	2.111E+03	0.5	1.9	3.9	HPGe
Hg-203	279.2	4.661E+01	2.753E+05	4.660E+03	0.4	1.9	3.9	HPGe
Sn-113	391.7	1.151E+02	1.769E+05	2.994E+03	0.5	1.9	3.9	HPGe
Cs-137	661.7	1.098E+04	1.109E+05	1.877E+03	0.7	1.9	4.0	HPGe
Y-88	898.0	1.066E+02	4.224E+05	7.150E+03	0.5	1.9	3.9	HPGe
Co-60	1173.2	1.925E+03	2.142E+05	3.626E+03	0.6	1.9	4.0	HPGe
Co-60	1332.5	1.925E+03	2.143E+05	3.627E+03	0.6	1.9	4.0	HPGe
Y-88	1836.1	1.066E+02	4.472E+05	7.570E+03	0.5	1.9	3.9	HPGe

* Master Source refers to Analytics' 8-isotope mixture which is calibrated quarterly.

Calibration Methods: 4π LS - 4 pi Liquid Scintillation Counting, HPGe - High Purity Germanium Gamma-Ray Spectrometer, IC - Ionization Chamber. **Uncertainty:** U - Relative expanded uncertainty, k = 2. See NIST Technical Note 1297, "Guidelines for Evaluating and Expressing the Uncertainty of NIST Measurement Results."

(Certificate continued on reverse side)

Comments:
1550 grams of sand. Homogeneous down to 10 gram aliquot.
This standard will expire one year after the reference date.

Source Prepared by: _____
Z. Dimitrova, Radiochemist

QA Approved: _____ Date: 2/11/11
J. D. McCorvey, QA Manager Alternate