



ZION STATION RESTORATION PROJECT FINAL STATUS SURVEY RELEASE RECORD

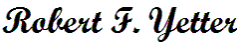
STATION CONSTRUCTION AREA

SURVEY UNIT 10206A

REVISION 1



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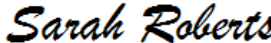
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TABLE OF CONTENTS

1. EXECUTIVE SUMMARY	7
2. SURVEY UNIT DESCRIPTION	7
3. CLASSIFICATION BASIS	8
4. DATA QUALITY OBJECTIVES.....	11
5. SURVEY DESIGN	15
6. SURVEY IMPLEMENTATION.....	22
7. SURVEY RESULTS.....	23
8. QUALITY CONTROL	32
9. INVESTIGATIONS AND RESULTS	32
10. REMEDIATION AND RESULTS.....	32
11. CHANGES FROM THE SURVEY PLAN	32
12. DATA QUALITY ASSESSMENT.....	33
13. ANOMALIES.....	33
14. CONCLUSION	33
15. REFERENCES	35
16. ATTACHMENTS.....	36
ATTACHMENT 1 - FIGURE AND MAP	37
ATTACHMENT 2 - SCAN DATA.....	40
ATTACHMENT 3 - CONSULTATION TRIGGERS FOR RESIDENTIAL AND COMMERCIAL/INDUSTRIAL SOIL CONTAMINATION	47
ATTACHMENT 4 - SIGN TEST	49
ATTACHMENT 5 - QC SAMPLE ASSESSMENT	52
ATTACHMENT 6 - GRAPHICAL PRESENTATIONS	54
ATTACHMENT 7 - SAMPLE ANALYTICAL REPORTS.....	61
ATTACHMENT 8 - EBERLINE ANALYTICAL REPORTS	269

LIST OF TABLES

Table 1 - Dose Significant Radionuclides and Mixture.....	12
Table 2 - Base Case DCGLs for Surface Soils (BcDCGL _{SS}).....	13
Table 3 - Base Case DCGLs for Subsurface Soils (BcDCGL _{SB}).....	13
Table 4 - Operational DCGLs for Surface Soils (OpDCGL _{SS}).....	14
Table 5 - Operational DCGLs for Subsurface Soils (OpDCGL _{SB}).....	14
Table 6 - Surrogate Ratios	15
Table 7 - Investigation Levels	17
Table 8 - Systematic Sample Measurement Locations.....	19
Table 9 - Synopsis of Survey Design	21
Table 10 - Instruments and Detectors.....	23
Table 11 - Synopsis of Scan Results.....	23
Table 12 - Summary of Gamma Spectroscopy Results for Surface Soil Samples Comprising the Statistical Sample Population	27
Table 13 - Summary of Gamma Spectroscopy Results for Subsurface Soil Samples.....	28
Table 14 - Off-Site Analysis Results	29
Table 15 - Summary of Gamma Spectroscopy Results for QC Surface Soil Samples.....	30
Table 16 - Sum of Fractions for Individual Systematic Surface Soil Samples, when compared to the OpDCGLs	30
Table 17 - Sum of Fractions for Subsurface Soil Samples compared to the OpDCGLs.....	31
Table 18 - Sum of Fractions for QC Soil Samples compared to the OpDCGLs.....	31
Table 19 - Basic Statistical Properties of Systematic Sample Population.....	32

LIST OF FIGURES

Figure 1 - Class 3 Open Land Survey Units from Figure 2-6 of the LTP	8
Figure 2 - Class 1 Open Land Survey Units Created from the Original Class 3 Survey Unit 10206. ...	10

LIST OF ACRONYMS AND ABBREVIATIONS

ALARA	As Low As Reasonably Achievable
AMCG	Average Member of the Critical Group
BcDCGL	Base Case Derived Concentration Guideline Level
BcSOF	Base Case Sum of Fractions
C/LT	Characterization/License Termination
cpm	Counts per minute
DQO	Data Quality Objective
DCGL	Derived Concentration Guideline Level
EMC	Elevated Measurement Comparison
FSS	Final Status Survey
GPS	Global Positioning System
HTD	Hard-to-Detect
HSA	Historical Site Assessment
IC	Insignificant Contributor
LBGR	Lower Bound of the Gray Region
LTP	License Termination Plan
MARSSIM	Multi-Agency Radiation Survey and Site Investigation Manual
MDC	Minimum Detectable Concentration
MDCR	Minimum Detectable Count Rate
NAD	North American Datum
NaI	Sodium Iodide
OpDCGL	Operational Derived Concentration Guideline Level
OpSOF	Operational Sum of Fractions
QC	Quality Control
RE	Radiological Engineer
ROC	Radionuclides of Concern
SOF	Sum of Fractions
TEDE	Total Effective Dose Equivalent

TSD	Technical Support Document
UBGR	Upper Bound of the Gray Region
VSP	Visual Sample Plan
ZNPS	Zion Nuclear Power Station
ZSRP	Zion Station Restoration Project

1. EXECUTIVE SUMMARY

This Final Status Survey (FSS) Release Record for Survey Unit 10206A, “Station Construction Area,” has been generated for the Zion Station Restoration Project (ZSRP) in accordance with ZionSolutions procedure ZS-LT-300-001-005, “*Final Status Survey Data Reporting*” (Reference 1) and satisfies the requirements of Section 5.11 of the “*Zion Station Restoration Project License Termination Plan*” (LTP) (Reference 2).

An FSS package (L1-10206A-F) was developed in accordance with ZionSolutions procedure ZS-LT-300-001-001, “*Final Status Survey Package Development*” (Reference 3), the ZSRP LTP, and guidance from NUREG-1575, “*Multi-Agency Radiation Survey and Site Investigation Manual*” (MARSSIM) (Reference 4).

This open land survey unit has a MARSSIM classification of one. A survey plan was designed based upon use of the Sign Test as the nonparametric statistical test for compliance. Both the Type I (α) and Type II (β) decision error rates were set at 0.05. Twenty-four (24) systematic surface soil samples were acquired from the survey unit. In addition, surface scanning was performed on 100% of the total surface area in the survey unit. No areas of elevated activity were detected during the scans. The analytical results for systematic soil samples taken in survey unit 10206A indicated that the Sum of Fractions (SOF) for each sample, when compared to the Operational Derived Concentration Guideline Levels (OpDCGL), was less than 1.0. The maximum Operational SOF (OpSOF) for the systematic samples was 0.422. The mean OpSOF for the systematic samples was 0.061. The mean Base Case SOF (BcSOF) for the systematic samples, when the analytical results were compared to the Base Case DCGLs (BcDCGL), was 0.016, which results in a dose assigned to the survey unit of 0.392 mrem/year Total Effective Dose Equivalent (TEDE). Therefore, the null hypothesis is rejected and survey unit 10206A is acceptable for unrestricted release.

2. SURVEY UNIT DESCRIPTION

Survey unit 10206A, “Station Construction Area,” is a Class 1 open land survey unit and is 2,844 m² in size. The survey unit is bounded on the west by survey unit 10205, the south by survey unit 10207A, on the east by survey unit 10206B, and the north by survey unit 10204A.

The topography of the survey unit is mainly flat with some small dips and depressions. The soil is mostly loam.

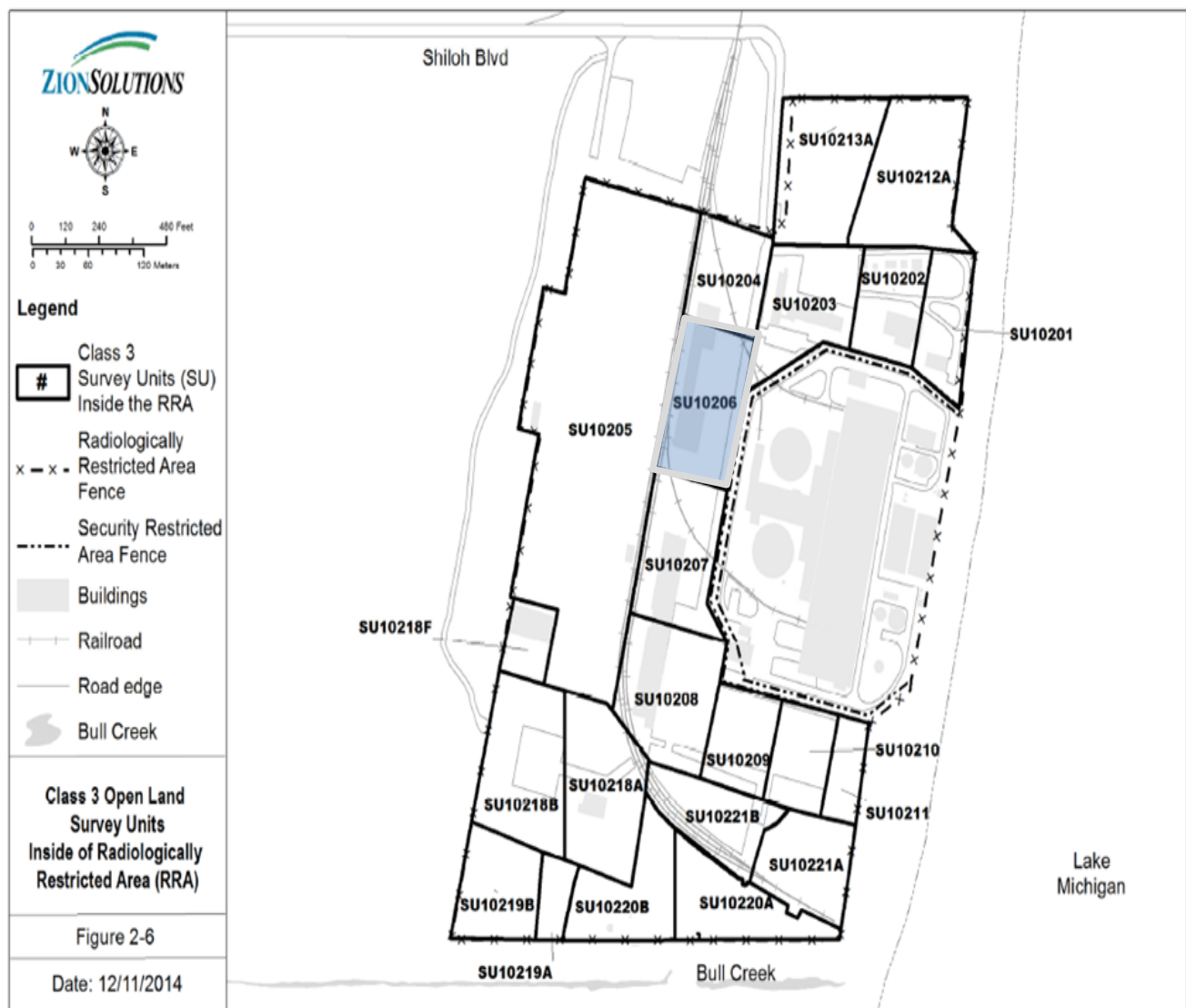
The boundary of the survey unit was defined using a Global Positioning System (GPS) based on the Illinois State Plane System North American Datum (NAD) 1983 East. The reference coordinates associated with the sample locations in this survey unit are presented in Table 8.

3. CLASSIFICATION BASIS

Survey unit 10206A was classified in accordance with ZionSolutions procedure ZS-LT-300-001-002, “Survey Unit Classification” (Reference 5).

The area encompassing this survey unit was formerly described as the “In processing Building/Station Construction Area” and is located within survey unit 10206 as identified in the “Zion Station Historical Site Assessment” (HSA) (Reference 6). Subsequently, this area was described as the “Station Construction Area” (survey unit 10206) in Table 2-29 of the LTP as represented in Figure 2-6 of the LTP, which is replicated below as Figure 1.

Figure 1 - Class 3 Open Land Survey Units from Figure 2-6 of the LTP



A characterization survey was performed in July 2013 for the Class 3 open land survey unit 10206. The following data was obtained:

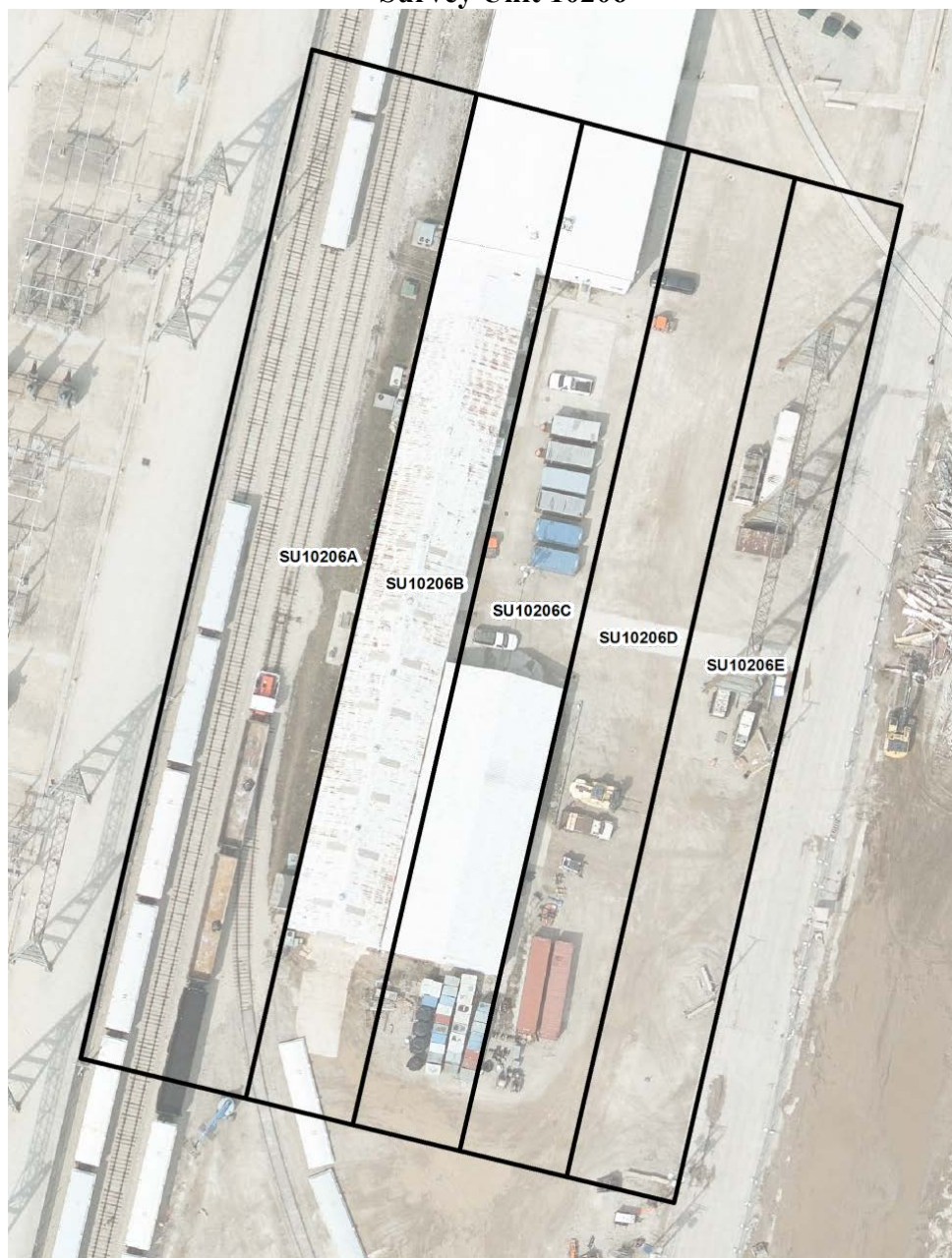
- Six (6) random surface samples.
- Thirteen (13) judgmental surface samples and two (2) judgmental subsurface samples taken at the direction of the cognizant Radiological Engineer (RE).
- Sodium iodide (NaI) walkover scans of approximately 27% of the survey unit.

The results of the characterization survey were:

- The six (6) random surface samples were all <MDC for the ROC.
- All thirteen (13) judgmental surface samples were <MDC for the ROC.
- Both of the judgmental subsurface samples were <MDC for the ROC.

On June 12, 2017, due to changing radiological and operational conditions brought about by site decommissioning activities inside or adjacent to this area, survey unit 10206 was re-classified as a Class 1 and split into five survey units: 10206A, 10206B, 10206C, 10206D and 10206E to comply with the survey unit size recommendations from MARSSIM Section 4.6. Figure 2 below shows the boundaries of the resulting Class 1 survey units. The change in classification was a conservative response and ensured that the survey unit would be surveyed with the appropriate rigor.

Figure 2 - Class 1 Open Land Survey Units Created from the Original Class 3 Survey Unit 10206



An RE and a Characterization/License Termination (C/LT) Supervisor performed a visual inspection and walk-down of the survey unit on September 4, 2019, prior to performing FSS. The purpose of the walk-down was to assess the physical condition of the survey unit, evaluate access points and travel paths, and identify potentially hazardous conditions. A final classification assessment was performed in accordance with ZS-LT-300-001-002, as part of the survey design for FSS. The assessment confirmed that survey unit 10206A was correctly classified as Class 1.

4. DATA QUALITY OBJECTIVES

FSS planning and design hinges on coherence with the Data Quality Objective (DQO) process to ensure, through compliance with explicitly defined inputs and boundaries, that the primary objective of the survey is satisfied. The DQO process, utilized in accordance with MARSSIM, is described in the LTP. The appropriate design for a given survey is developed using the DQO process as outlined in Appendix D of MARSSIM.

The DQO process incorporated hypothesis testing and probabilistic sampling distributions to control decision errors during data analysis. Hypothesis testing is a process based on the scientific method that compares a baseline condition to an alternate condition. The baseline condition is technically known as the null hypothesis. Hypothesis testing rests on the premise that the null hypothesis is true and that sufficient evidence must be provided for rejection. In designing the survey plan, the underlying assumption, or null hypothesis was that residual activity in the survey unit exceeded the release criteria. Rejection of the null hypothesis would indicate that residual activity within the survey unit does not exceed the release criteria. Therefore, the survey unit would satisfy the primary objective of the FSS sample plan.

The primary objective of the FSS sample plan is to demonstrate that the level of residual radioactivity in survey unit 10206A does not exceed the release criteria specified in the LTP and that the potential dose from residual radioactivity is As Low As Reasonably Achievable (ALARA).

ZionSolutions Technical Support Document (TSD) 11-001, *“Technical Support Document for Potential Radionuclides of Concern During the Decommissioning of the Zion Station”* (Reference 7), established the basis for an initial suite of potential Radionuclides of Concern (ROC) for the decommissioning of the Zion Nuclear Power Station (ZNPS).

ZionSolutions TSD 14-019, *“Radionuclides of Concern for Soil and Basement Fill Model Source Terms”* (Reference 8), was written to refine the initial selection of ROC for decommissioning at the ZSRP. The list of ROC was evaluated using Containment and Auxiliary Building concrete core analysis data to evaluate the dose significance of each radionuclide in the end state model. Section 4.4 of TSD 14-019 evaluated the results of the characterization data of surveys taken of soils. The following conclusion was reached: *“The results of surface and subsurface soil characterization in the impacted area surrounding Zion indicate that there is minimal residual radioactivity in soil. Essentially all of the soil results were reported as non-detectable. Other than Cs-137 at very low levels, and Co-60 at a concentration of 0.24 pCi/g in one sample, the results for all radionuclides were less than MDC. Therefore, the direct determination of radionuclide mixture fractions for initial suite radionuclides in soil is not technically feasible due to the MDC biasing issues discussed above. Based on a generalized assumption that the contaminated water that caused concrete contamination would be similar to the source of soil contamination, the ROC and radionuclide mixture derived for the Auxiliary Building concrete was considered to be reasonably representative of soils for FSS planning and implementation.”*

The ROC for surface soils is listed in Table 1 below (from Table 5-2 of the LTP):

Table 1 - Dose Significant Radionuclides and Mixture

Radionuclide	Auxiliary Building % of Total Activity (normalized)⁽¹⁾⁽²⁾
Co-60	0.92%
Ni-63	23.71%
Sr-90	0.05%
Cs-134	0.01%
Cs-137	75.32%

(1) Based on maximum percent of total activity from Table 20 of TSD 14-019, normalized to one for the dose significant radionuclides

(2) Does not include dose significant radionuclides for activated concrete (H-3, Eu-152, Eu-154).

A fundamental precursor to survey design is to establish a relationship between the release criteria and some measurable quantity. This is done through the development of DCGLs. The DCGLs represent average levels of radioactivity above background levels and are presented in terms of surface or mass activity concentrations. Chapter 6 of the LTP describes in detail the modeling used to develop the DCGLs for soils.

Surface soil is defined as soil residing in the first 0.15 m (6 inches) layer of soil. A subsurface soil category, which is defined as a layer of soil beginning at the surface but extending to a depth of 1 m, is also assessed to allow for flexibility in compliance demonstration if contamination deeper than 0.15 m is encountered. Site-specific DCGLs for soil were calculated for both the 0.15 m and 1 m thicknesses. Based on characterization data and historical information, there are no expectations of encountering a source term geometry that is comprised of a clean surface layer of soil over a contaminated subsurface soil layer. ZionSolutions TSD 14-011, “*Soil Area Factors*” (Reference 9) and LTP, Section 6.8 provide the exposure scenarios and modeling parameters that were used to calculate the site-specific DCGLs for soils (referred to as BcDCGL in this Release Record).

At ZNPS, compliance is demonstrated through the summation of dose from four distinct source terms (basements, soils, buried pipe and groundwater) for the end-state. Basements are comprised of the summation of four structural source terms (surfaces, embedded pipe, penetrations and fill). When applied to soil, the DCGLs are expressed in units of activity per unit of mass (pCi/g). The “unity rule” is applied when there is more than one ROC. The measurement results for each singular ROC present in the mixture are compared against their respective DCGL to derive a dose fraction.

The surface and subsurface soil BcDCGLs for the unrestricted release of open land survey units are listed in Tables 5-5 and 5-6 of the LTP and are provided in Table 2 and Table 3, respectively. The Insignificant Contributor (IC) dose percentage of 10% was used to adjust the DCGLs in soils to account for the dose from the eliminated IC radionuclides.

Table 2 - Base Case DCGLs for Surface Soils (BcDCGL_{ss})

Radionuclide	Surface Soil DCGL (pCi/g)
Co-60	4.26
Cs-134	6.77
Cs-137	14.18
Ni-63	3,572.10
Sr-90	12.09

Table 3 - Base Case DCGLs for Subsurface Soils (BcDCGL_{sb})

Radionuclide	Subsurface Soil DCGL (pCi/g)
Co-60	3.44
Cs-134	4.44
Cs-137	7.75
Ni-63	763.02
Sr-90	1.66

Each radionuclide-specific BcDCGL is equivalent to the level of residual radioactivity (above background levels) that could, when considered independently, result in a TEDE of 25 mrem/year to an Average Member of the Critical Group (AMCG). To ensure that the summation of dose from each source term is 25 mrem/year or less after all FSS is completed, the BcDCGLs are reduced based on an expected, or *a priori*, fraction of the 25 mrem/year dose limit from each source term. The reduced DCGLs, or “Operational” DCGLs, can be related to the BcDCGLs as an expected fraction of dose based on an *a priori* assessment of what the expected dose should be based on the results of site characterization, process knowledge and the extent of planned remediation. The OpDCGL is then used as the DCGL for the FSS design of the survey unit (calculation of surrogate DCGLs, investigations levels, etc.). Details of the OpDCGLs derived for each dose component and the basis for the applied *a priori* dose fractions are provided in ZionSolutions TSD 17-004, “Operational Derived Concentration Guideline Levels for Final Status Survey” (Reference 10).

The OpDCGLs for the FSS of surface and subsurface soils are listed in Tables 5-7 and 5-8 of the LTP and are presented in Table 4 and Table 5, respectively.

Table 4 - Operational DCGLs for Surface Soils (OpDCGL_{ss})

Radionuclide	Surface Soil DCGL (pCi/g)
Co-60	1.091
Cs-134	1.733
Cs-137	3.630
Ni-63	914.458
Sr-90	3.095

Table 5 - Operational DCGLs for Subsurface Soils (OpDCGL_{sb})

Radionuclide	Subsurface Soil DCGL (pCi/g)
Co-60	0.881
Cs-134	1.137
Cs-137	1.984
Ni-63	195.333
Sr-90	0.425

In accordance with NUREG-1757, Appendix G, if the HSA indicates that there is no likelihood of substantial subsurface residual radioactivity, subsurface surveys are not necessary. The HSA, as well as the results of the extensive characterization of subsurface soils in the impacted area surrounding the Zion facility have shown that there is minimal residual radioactivity in subsurface soil. Consequently, the ZSRP performed minimal subsurface sampling during FSS.

Instrument DQOs included a verification of the ability of the survey instrument to detect the radiation(s) of interest at the required scan MDC, which for Class 1 open land survey units, is the *a priori* DCGL Elevated Measurement Comparison (DCGL_{EMC}). Survey instrument response checks were required prior to issuance and after the instrument had been used. Control and accountability of survey instruments was required to ensure the quality and prevent the loss of data.

As part of the DQOs applied to laboratory processes, analysis results were reported as actual calculated results. The actual recorded value was used as the recorded FSS result for measurement and/or sample values that are less than MDC. Negative values were recorded as “zero.” For radionuclides less than MDC, the value representing the highest abundance was selected. Results were not reported as “less than MDC.” Sample report summaries included

unique sample identification, analytical method, radionuclide, result, uncertainty, laboratory data qualifiers, units, and the observed MDC.

In accordance with the LTP, for laboratory analysis, MDCs less than 10% of the OpDCGL were preferable while MDCs up to 50% of the OpDCGL were acceptable. The maximum acceptable MDC for measurements obtained using field instruments was the *a priori* DCGL_{EMC}, which was calculated using the methodology described in the LTP, Section 5.6.4.3.

5. SURVEY DESIGN

The level of effort associated with planning a survey is based on the complexity of the survey and nature of the hazards. Guidance for preparing FSS plans is provided in ZS-LT-300-001-001, “*Final Status Survey Package Development.*”

The DQO process determined that Co-60, Ni-63, Sr-90, Cs-134 and Cs-137 would be the ROC in survey unit 10206A. During FSS, concentrations for Hard-to-Detect (HTD) ROC Ni-63 and Sr-90 were inferred using a surrogate approach. Cs-137 is the principle surrogate radionuclide for Sr-90 and Co-60 is the principle surrogate radionuclide for Ni-63. The mean, maximum and 95% Upper Confidence Level (UCL) of the surrogate ratios for concrete core samples taken in the Auxiliary Building basement were calculated in TSD 14-019, “*Radionuclides of Concern for Soil and Basement Fill Model Source Terms,*” and are presented in Table 6. The maximum ratios were used in the surrogate calculations during FSS unless area specific ratios are determined by continuing characterization.

Table 6 - Surrogate Ratios

Ratios	Auxiliary Building		
	Mean	Max	95%UCL
Ni-63/Co-60	44.143	180.450	154.632
Sr-90/Cs-137	0.001	0.002	0.002

For the FSS of survey unit 10206A, the surrogate OpDCGLs for Co-60 and Cs-137 were computed based on the maximum ratios from Table 6.

The equation for calculating a surrogate DCGL is as follows:

Equation 1

$$Surrogate_{DCGL} = \frac{1}{\left[\left(\frac{1}{DCGL_{Sur}}\right) + \left(\frac{R_2}{DCGL_2}\right) + \left(\frac{R_3}{DCGL_3}\right) + \dots \left(\frac{R_n}{DCGL_n}\right)\right]}$$

Where: $DCGL_{Sur}$ = Surrogate radionuclide DCGL
 $DCGL_{2,3\dots n}$ = DCGL for radionuclides to be represented by the surrogate
 R_n = Ratio of concentration (or nuclide mixture fraction) of radionuclide “n” to surrogate radionuclide

Using the OpDCGLs for surface soils presented in Table 4 and the maximum ratios from Table 6, the following surrogate calculations for surface soils were performed:

Equation 2

$$Surrogate_{OpDCGL (Cs-137)} = \frac{1}{\left[\left(\frac{1}{3.630_{(Cs-137)}}\right) + \left(\frac{0.002}{3.095_{(Sr-90)}}\right)\right]} = 3.622 \text{ pCi/g}$$

The surrogate OpDCGL for surface soils that was used for Cs-137 in this survey unit for direct comparison of surface soil sample results to demonstrate compliance is 3.622 pCi/g.

Equation 3

$$Surrogate_{OpDCGL (Co-60)} = \frac{1}{\left[\left(\frac{1}{1.091_{(Co-60)}}\right) + \left(\frac{180.45}{914.458_{(Ni-63)}}\right)\right]} = 0.898 \text{ pCi/g}$$

The surrogate OpDCGL for surface soils that was used for Co-60 in this survey unit for direct comparison of surface soil sample results to demonstrate compliance is 0.898 pCi/g.

Using the BcDCGLs presented in Table 2 and the maximum ratios from Table 6, the following surrogate calculations were performed:

Equation 4

$$Surrogate_{BcDCGL (Cs-137)} = \frac{1}{\left[\left(\frac{1}{14.18_{(Cs-137)}}\right) + \left(\frac{0.002}{12.09_{(Sr-90)}}\right)\right]} = 14.15 \text{ pCi/g}$$

The surrogate BcDCGL for surface soils that was used for Cs-137 in this survey unit for calculating the $DCGL_{EMC}$ is 14.15 pCi/g.

Equation 5

$$Surrogate_{BcDCGL (Co-60)} = \frac{1}{\left[\left(\frac{1}{4.26_{(Co-60)}} \right) + \left(\frac{180.45}{3572.10_{(Ni-63)}} \right) \right]} = 3.51 \text{ pCi/g}$$

The surrogate BcDCGL for surface soils that was used for Co-60 in this survey unit for calculating the DCGL_{EMC} is 3.51 pCi/g.

For this Class 1 open land survey unit, the “Investigation Levels” for area scanning and soil sample measurement results are those levels specified in LTP Chapter 5, Table 5-25, and are reproduced below in Table 7.

Table 7 - Investigation Levels

Classification	Scan Investigation Levels	Direct Investigation Levels
Class 1	>Operational DCGL or >MDC _{scan} if MDC _{scan} is greater than Operational DCGL	> Operational DCGL

The MDC_{scan} for the 2350-1/44-10 was calculated using the methodology of ZionSolutions TSD-11-004, “Ludlum Model 44-10 Detector Sensitivity” (Reference 11) with the following parameters:

- background count rate of 5,000 counts per minute (cpm)
- scan speed of 0.5 m/sec
- distance from detector to surface of 2 inches
- isotopic mix of 95% Cs-137 and 5% Co-60

The calculated MDC_{scan} value was 3.75 pCi/g, which was greater than the calculated Surrogate DCGLs, therefore the scan investigation level was set at the MDC_{scan} of the 2350-1/44-10. The collimator was used during the scan surveys to lower the background count rate.

The Sign Test was selected as the non-parametric statistical test. The use of the Sign Test did not require the selection or use of a background reference area, which simplified survey design and implementation. This approach was conservative since it included background Cs-137 as part of the sample set.

The number of soil samples for FSS was determined in accordance with ZS-LT-300-001-001. The relative shift (Δ/σ) for the survey unit data set is defined as shift (Δ), which is the Upper Bound of the Gray Region (UBGR), or the DCGL (SOF of 1), minus the Lower Bound of the Gray Region (LBGR) (SOF of 0.5), divided by sigma (σ), which is the standard deviation of the data set used for survey design. The optimal value for Δ/σ should range between one and three. The largest value the Δ/σ can have is three. If the Δ/σ exceeds three, then the value of three will

be used for Δ/σ . For this survey design, a conservative estimate of the sample variability of 0.30 was used as the coefficient of variation to calculate Δ/σ .

The calculated relative shift was 1.67. Both the Type I error, or α value and the Type II error, or β value was set at 0.05. The sample size from Table 5.5 of MARSSIM that equates to the Type I and Type II error of 0.05 for use with the Sign Test is an N value of 17.

The computer program Visual Sample Plan (VSP) was used to generate the sample map, in accordance with ZS-LT-300-001-001. The map used was provided by the Survey Mapping/Computer Assisted Design Specialist, with coordinates based on the Illinois State Plane NAD 1983 standard topographical grid coordinate system. However, since the area of this survey unit is 2844 m², which is above the suggested size limitation of 2000 m² for Class 1 open land areas, additional samples were collected to maintain the grid spacing at approximately 11.7 m, which is the calculated result based on a survey unit size of 2000 m². The number of samples generated by VSP for a systematic triangular grid applied to this area at the spacing specified was 24. The Prospective Power Curve generated by VSP showed adequate power for the survey design.

In accordance with Section 5.6.4.3 of the LTP, the *a priori* DCGL_{EMC} values were calculated for the gamma emitting ROC to ensure that the MDC_{scan} of the selected instrument was sufficient to detect small areas of elevated activity in the survey unit. The calculations were:

- To calculate the area bounded by the systematic samples: $A = \frac{A_{SU}}{N} = \frac{2844}{24} = 118.5 \text{ m}^2$
- From the LTP, Table 5-16, the Area Factors for the next larger area (300 m²) were used:
 - Cs-137 - 1.46
 - Cs-134 - 1.30
 - Co-60 - 1.16
- The DCGL_{EMC} is the Surrogate Base Case DCGL times the Area Factor:
 - The DCGL_{EMC} for Cs-137 = 1.46 * 14.15 = 20.66 pCi/g
 - The DCGL_{EMC} for Cs-134 = 1.30 * 6.77 = 8.80 pCi/g
 - The DCGL_{EMC} for Co-60 = 1.16 * 3.51 = 4.07 pCi/g

The calculated MDC_{scan}, of 3.75 pCi/g, is less than the DCGL_{EMC} values calculated above, therefore, the spacing of the statistical systematic sampling and measurement locations was adequate to detect small areas of elevated radioactivity. No adjustment to the sample number was required.

The implementation of quality control (QC) measures as referenced by LTP, Section 5.9 and ZionSolutions procedure ZS-LT-01, “Quality Assurance Project Plan (for Characterization and FSS)” (QAPP) (Reference 12) includes the collection of a soil sample for “split sample” analysis on 5% of the soil samples taken in a survey unit with the locations selected at random. Two (2) surface soil samples (L1-10206A-FQGS-005-SS and L1-10206A-FQGS-013-SS) were selected randomly for split sample analysis for the FSS of this survey unit.

In accordance with section 5.7.1.6.2 of the LTP, a subsurface soil sample was taken at 10% of the systematic surface soil sample locations in the survey unit with the location(s) selected at random. Locations L1-10206A-FSGS-011-SB, L1-10206A-FSGS-012-SB and L1-10206A-FSGS-019-SB were selected for this survey unit.

In accordance with the LTP Chapter 5, three (3) subsurface samples were obtained. Also, if during the performance of FSS, the analysis of a surface soil sample, or the results of a surface gamma scan indicated the potential presence of residual radioactivity at a concentration of 75% of the subsurface OpDCGL, then a biased subsurface soil sample(s) would have been taken to the appropriate depth within the area of concern as part of the investigation. This threshold was encountered at one (1) location; therefore, an additional location was added (sample location L1-10206A-FSGS-003-SB), for a total of four (4) subsurface samples that were collected during the FSS of survey unit 10206A.

The locations of the twenty-four (24) systematic samples as well as the four (4) subsurface samples are listed in Table 8. A map of the systematic sample locations is included in Attachment 1.

Table 8 - Systematic Sample Measurement Locations

MEASUREMENT ID	NORTHING (meters)	EASTING (meters)
L1-10206A-FSGS-001-SS	641820.42	343492.84
L1-10206A-FSGS-002-SS	641820.42	343504.27
L1-10206A-FSGS-003-SS	641830.32	343498.55
L1-10206A-FSGS-004-SS	641830.32	343509.98
L1-10206A-FSGS-005-SS	641840.22	343504.27
L1-10206A-FSGS-006-SS	641850.12	343498.55
L1-10206A-FSGS-007-SS	641850.12	343509.98
L1-10206A-FSGS-008-SS	641860.02	343504.27
L1-10206A-FSGS-009-SS	641860.02	343515.70
L1-10206A-FSGS-010-SS	641869.92	343509.98
L1-10206A-FSGS-011-SS	641869.92	343521.41
L1-10206A-FSGS-012-SS	641879.81	343504.27
L1-10206A-FSGS-013-SS	641879.81	343515.70
L1-10206A-FSGS-014-SS	641889.71	343509.98
L1-10206A-FSGS-015-SS	641889.71	343521.41
L1-10206A-FSGS-016-SS	641899.61	343515.70
L1-10206A-FSGS-017-SS	641899.61	343527.13

Table 8 (continued) - Systematic Sample Measurement Locations

MEASUREMENT ID	NORTHING (meters)	EASTING (meters)
L1-10206A-FSGS-018-SS	641909.51	343509.98
L1-10206A-FSGS-019-SS	641909.51	343521.41
L1-10206A-FSGS-020-SS	641919.41	343515.70
L1-10206A-FSGS-021-SS	641919.41	343527.13
L1-10206A-FSGS-022-SS	641929.31	343521.41
L1-10206A-FSGS-023-SS	641929.31	343532.84
L1-10206A-FSGS-024-SS	641939.21	343527.13
L1-10206A-FSGS-003-SB	641830.32	343498.55
L1-10206A-FSGS-011-SB	641869.92	343521.41
L1-10206A-FSGS-012-SB	641879.81	343504.27
L1-10206A-FSGS-019-SB	641909.51	343521.41

ZSRP LTP, Section 5.1 states that soil samples will be collected during FSS to confirm the HTD to surrogate radionuclide ratios (provided in Table 6). Ten percent (10%) of the FSS samples collected from open land survey units will be analyzed for HTD ROC. Only HTD radionuclides included as ROC (Ni-63 and Sr-90 for soils) will be analyzed in the FSS confirmatory samples. For soil samples with positive results for both a HTD ROC and the corresponding surrogate radionuclide (Cs-137 or Co-60), the HTD surrogate ratio will be derived and compared against the maximum ratio. The maximum ratios will be used unless specific survey information supports the use of a surrogate ratio that is specific to the area. In these cases, the survey unit-specific radiological data and the derived surrogate ratios will be submitted to the NRC for approval. If approved, then the survey unit-specific ratios used and the survey data serving as the basis for the surrogate ratios will be documented in the release record for the survey unit.

In addition, LTP, Section 5.1 states that if levels of residual gamma radioactivity in an individual soil sample exceed an OpSOF of 0.1, then the sample(s) will be analyzed for HTD ROC. Two (2) samples (L1-10206A-FSGS-003-SS and L1-10206A-FSGS-011-SS) exceeded an OpSOF of 0.1 during the FSS of survey unit 10206A and were selected for HTD analysis.

Three (3) samples met the requirement that 10% of the samples collected for the FSS of survey unit 10206A be analyzed for HTD ROC. One (1) additional sample was added because a surface soil sample indicated the potential presence of residual radioactivity at a concentration of 75% of the subsurface OpDCGL. A total of four (4) samples were sent off-site (Eberline Analytical) for analysis of the HTD ROC as specified in LTP, Section 5.1. Eberline analytical reports are provided in Attachment 8.

Table 9 provides a synopsis of the survey design for survey unit 10206A.

Table 9 - Synopsis of Survey Design

FEATURE	DESIGN CRITERIA	BASIS
Survey Unit Area	2,844 m ²	GPS measurements of area
Number of Surface Soil Samples	17+7=24 (Systematic) ⁽¹⁾	• $\sigma = 0.30$ • UBGR = SOF of 1 • LBGR = SOF of 0.5 • Type I error = 0.05 • Type II error = 0.05 • $\Delta/\sigma = 1.67$ (MARSSIM Table 5.5)
Grid Spacing	11.7 m	(LTP Chapter 5, section 5.6.4.5.2)
DCGLs	• Co-60 – 1.091 pCi/g • Cs-134 – 1.733 pCi/g • Cs-137 – 3.630 pCi/g • Ni-63 – 914.458 pCi/g • Sr-90 – 3.095 pCi/g	Operational DCGLs for Surface Soils, (LTP Chapter 5, Table 5-7)
HTD ROC Analysis	Three (3) soil samples selected for HTD ROC analysis	(LTP, Section 5.1)
Measurement Investigation Level	Operational DCGL	(LTP Chapter 5, Table 5-25)
Scan Survey Area Coverage	100%	(LTP Chapter 5, Table 5-24)
QC	Two (2) surface soil samples selected randomly for split sample analysis	(LTP, Section 5.9)
Number of Subsurface Soil Samples	Four (4) systematic surface soil sample locations 3, 11, 12, and 19	(LTP, Section 5.7.1.6.2)

- (1) The sample plan identified a sample variability of 0.30, and N=17 for the number of systematic samples to be collected. However, since the survey unit had a surface area of 2,844 m², seven (7) additional samples were added to maintain the grid spacing of 11.7 m.

6. SURVEY IMPLEMENTATION

Survey instructions for this FSS were incorporated into and performed in accordance with FSS sample plan L1-10206A-F, which was developed in accordance with ZS-LT-300-001-001. The FSS unit was inspected and controlled in accordance with *ZionSolutions* procedure ZS-LT-300-001-003, “*Isolation and Control for Final Status Survey*” (Reference 13).

For survey unit 10206A, compliance with the unrestricted release criteria was demonstrated through a combination of surface scanning with a Ludlum Model 44-10 gamma detector and the sampling of surface soil for isotopic analysis. In accordance with the LTP Chapter 5, three (3) subsurface samples were obtained and analyzed. Also, if during the performance of FSS, the analysis of a surface soil sample, or the results of a surface gamma scan indicated the potential presence of residual radioactivity at a concentration of 75% of the subsurface OpDCGL, then a biased subsurface soil sample(s) would have been taken to the appropriate depth within the area of concern as part of the investigation. This threshold was encountered at one (1) location, therefore another location was added during the FSS of survey unit 10206A.

FSS field activities were conducted under FSS sample plan L1-10206A-F. A “Field Log” (ZS-LT-300-001-001, Attachment 14) was used to document field activities and other information pertaining to the performance of the FSS. FSS field activities were projected to take four (4) working days to complete. Daily briefings were conducted to discuss the expectations for job performance and to review safety aspects of the job. The survey required field activities were performed during normal working hours starting on November 8, 2019, and concluding on November 22, 2019.

The twenty-four (24) systematic surface soil sample locations were marked with flags based on GPS coordinates provided by VSP.

Gamma scans were performed on 100% of the surface area of the survey unit using a Ludlum 2350-1 paired with a Model 44-10 (2-inch x 2-inch) NaI detector operated in the rate-meter mode and using audio response. The probe was positioned within 2 inches of the ground and was moved at a scan speed of approximately 0.5 meters per second. One small area of elevated activity was detected by the scans.

Daily, prior to and following use, each detector was subjected to an Operational Response Check in accordance with *ZionSolutions* procedure ZS-RP-108-004-011, “*Operation of the Ludlum Model 2350-1 Data Logger*” (Reference 14). The daily Operational Response Check compared the background response and the response to check sources ranges established for normal background and detector source response to ensure that the detector was working properly.

The instruments and detectors used for this survey are presented in Table 10. The instruments and detectors were verified to be properly calibrated prior to use.

Table 10 - Instruments and Detectors

Instrument/Detector Type	Serial #	Calibration Due Date
Ludlum 2350-1/Ludlum 44-10	304730/PR375273	1/16/2020
Ludlum 2350-1/Ludlum 44-10	216173/ES0118	10/7/2020
Ludlum 2350-1/Ludlum 44-10	304718/PR363311	9/19/2020
Ludlum 2350-1/Ludlum 44-10	304726/PR363452	8/28/2020
Ludlum 2350-1/Ludlum 44-10	266656/PR311750	7/24/2020
Ludlum 2350-1/Ludlum 44-10	304708/PR321892	9/4/2020
Ludlum 2350-1/Ludlum 44-10	266657/PR308037	10/28/2020
Ludlum 2350-1/Ludlum 44-10	216188/PR372152	12/3/2019
Ludlum 2350-1/Ludlum 44-10	304711/PR321902	1/18/2020

In accordance with the survey design, twenty-four (24) surface soil samples were collected at the designated systematic sample locations. In addition, four (4) subsurface samples were collected at the randomly selected sample locations.

Four (4) samples (L1-10206A-FSGS-003-SB, L1-10206A-FSGS-011-SB, L1-10206A-FSGS-012-SB, and L1-10206A-FSGS-019-SB) were selected for HTD radionuclide analysis.

Two (2) surface soil samples (L1-10206A-FQGS-005-SS and L1-10206A-FQGS-013-SS) were selected randomly for QC sample analysis.

7. SURVEY RESULTS

One hundred percent (100%) of the surface of the survey unit was scanned for elevated radiation levels. One hundred thirty-one (131) 1-meter wide scan rows, as shown on the map in Attachment 1, were marked in the field and scanned with the 2350-1/44-10 using latching mode. Readings were recorded at approximately 10-meter intervals during the scans. Table 11 provides an overview of the scan results. Complete scan results are provided in Attachment 2.

Table 11 - Synopsis of Scan Results

Scan Area	Highest Logged Reading (cpm)	Action Level⁽¹⁾ (cpm)	# of Scan Alarms	Investigation Samples
Row 1	1531	2046	None	None
Row 2	1756	2046	None	None
Row 3	1623	2046	None	None
Row 4	1666	2046	None	None
Row 5	1692	2046	None	None
Row 6	1554	2046	None	None
Row 7	1573	2046	None	None
Row 8	1602	2046	None	None

Table 11 (continued) - Synopsis of Scan Results

Scan Area	Highest Logged Reading (cpm)	Action Level⁽¹⁾ (cpm)	# of Scan Alarms	Investigation Samples
Row 9	1649	2046	None	None
Row 10	1599	2046	None	None
Row 11	1620	2046	None	None
Row 12	1654	2046	None	None
Row 13	1632	2046	None	None
Row 14	1522	2046	None	None
Row 15	1577	2046	None	None
Row 16	1648	2110	None	None
Row 17	1601	2110	None	None
Row 18	1710	2110	None	None
Row 19	1592	2110	None	None
Row 20	1684	2110	None	None
Row 21	1704	2110	None	None
Row 22	1823	2110	None	None
Row 23	1822	2110	None	None
Row 24	1867	2110	None	None
Row 25	1649	2110	None	None
Row 26	1826	2110	None	None
Row 27	1710	2110	None	None
Row 28	1849	2110	None	None
Row 29	1871	2110	None	None
Row 30	1857	2110	None	None
Row 31	1979	2308	None	None
Row 32	2023	2308	None	None
Row 33	1933	2308	None	None
Row 34	1849	2308	None	None
Row 35	2138	2308	None	None
Row 36	2100	2308	None	None
Row 37	2201	2308	None	None
Row 38	1990	2308	None	None
Row 39	2054	2308	None	None
Row 40	2164	2308	None	None
Row 41	2125	2308	None	None
Row 42	2092	2308	None	None
Row 43	2091	2308	None	None
Row 44	2010	2308	None	None
Row 45	2022	2308	None	None
Row 46	2246	2342	None	None
Row 47	2121	2342	None	None

Table 11 (continued) - Synopsis of Scan Results

Scan Area	Highest Logged Reading (cpm)	Action Level⁽¹⁾ (cpm)	# of Scan Alarms	Investigation Samples
Row 48	2159	2342	None	None
Row 49	2143	2342	None	None
Row 50	2040	2342	None	None
Row 51	2011	2342	None	None
Row 52	2120	2342	None	None
Row 53	2112	2342	None	None
Row 54	2290	2342	None	None
Row 55	2175	2342	None	None
Row 56	2202	2342	None	None
Row 57	2238	2342	None	None
Row 58	2230	2342	None	None
Row 59	2127	2342	None	None
Row 60	2090	2342	None	None
Row 61	2213	2673	None	None
Row 62	2005	2673	None	None
Row 63	2033	2673	None	None
Row 64	2086	2673	None	None
Row 65	1466	1446	1	See Note 2 Below
Row 66	2204	2673	None	None
Row 67	2070	2673	None	None
Row 68	2188	2673	None	None
Row 69	2115	2673	None	None
Row 70	2156	2673	None	None
Row 71	2251	2673	None	None
Row 72	2051	2673	None	None
Row 73	2165	2673	None	None
Row 74	2158	2673	None	None
Row 75	2097	2673	None	None
Row 76	1457	1678	None	None
Row 77	1533	1678	None	None
Row 78	1653	1678	None	None
Row 79	1570	1678	None	None
Row 80	1531	1678	None	None
Row 81	1550	1678	None	None
Row 82	1519	1678	None	None
Row 83	1500	1678	None	None
Row 84	1445	1678	None	None
Row 85	1382	1678	None	None
Row 86	1447	1678	None	None

Table 11 (continued) - Synopsis of Scan Results

Scan Area	Highest Logged Reading (cpm)	Action Level⁽¹⁾ (cpm)	# of Scan Alarms	Investigation Samples
Row 87	1352	1678	None	None
Row 88	1363	1678	None	None
Row 89	1415	1678	None	None
Row 90	1359	1678	None	None
Row 91	1406	1665	None	None
Row 92	1438	1665	None	None
Row 93	1548	1665	None	None
Row 94	1469	1665	None	None
Row 95	1482	1665	None	None
Row 96	1481	1665	None	None
Row 97	1460	1665	None	None
Row 98	1380	1665	None	None
Row 99	1412	1665	None	None
Row 100	1447	1665	None	None
Row 101	1350	1665	None	None
Row 102	1441	1665	None	None
Row 103	1379	1665	None	None
Row 104	1466	1665	None	None
Row 105	1446	1665	None	None
Row 106	1523	1864	None	None
Row 107	1510	1864	None	None
Row 108	1420	1864	None	None
Row 109	1399	1864	None	None
Row 110	1517	1864	None	None
Row 111	1452	1864	None	None
Row 112	1542	1864	None	None
Row 113	1554	1864	None	None
Row 114	1676	1864	None	None
Row 115	1654	1864	None	None
Row 116	1598	1864	None	None
Row 117	1606	1864	None	None
Row 118	1636	1987	None	None
Row 119	1405	1864	None	None
Row 120	1470	1864	None	None
Row 121	1614	1617	None	None
Row 122	1546	1617	None	None
Row 123	1556	1617	None	None
Row 124	1467	1617	None	None
Row 125	1534	1617	None	None

Table 11 (continued) - Synopsis of Scan Results

Scan Area	Highest Logged Reading (cpm)	Action Level ⁽¹⁾ (cpm)	# of Scan Alarms	Investigation Samples
Row 126	1501	1617	None	None
Row 127	1510	1617	None	None
Row 128	1522	1617	None	None
Row 129	1524	1617	None	None
Row 130	1563	1617	None	None
Row 131	1490	1617	None	None

- 1) The action level is based on the measurement Minimum Detectable Count Rate (MDCR) plus background in accordance with the FSS plan.
- 2) Could not sample the area due to it consisting of gravel and not soil. Could not reproduce the alarm when the area was re-scanned.

The twenty-four (24) soil samples taken for non-parametric statistical testing and the four (4) subsurface soil samples were analyzed using the on-site gamma spectroscopy system. Summaries of the sample analysis results are provided in Tables 12 and 13 respectively. The basic statistics for the systematic sample population are summarized in Table 19. The gamma spectroscopy results identified no samples with activity level above MDC for Co-60, Cs-134 and Cs-137. The concentrations for Ni-63 and Sr-90 were inferred based on the maximum ratios as specified in Table 6. The mean of the gamma spectroscopic analysis results for the systematic sample population indicated that Cs-137 was present at levels lower than the concentrations of Cs-137 expected to be found in off-site soil in the vicinity of the ZNPS as presented in ZionSolutions TSD 13-004, “*Examination of Cs-137 Global Fallout In Soils At Zion Station*” (Reference 15). The complete gamma spectroscopy reports are presented in Attachment 7.

Table 12 - Summary of Gamma Spectroscopy Results for Surface Soil Samples Comprising the Statistical Sample Population

MEASUREMENT ID	Co-60 ⁽¹⁾ (pCi/g)	Cs-134 ⁽¹⁾ (pCi/g)	Cs-137 ⁽¹⁾ (pCi/g)	Ni-63 ⁽²⁾ (pCi/g)	Sr-90 ⁽²⁾ (pCi/g)
L1-10206A-FSGS-001-SS	1.41E-02	9.04E-03	5.10E-02	2.54E+00	1.02E-04
L1-10206A-FSGS-002-SS	3.38E-03	0.00E+00	5.12E-02	6.10E-01	1.02E-04
L1-10206A-FSGS-003-SS	5.90E-04	2.88E-03	1.52E+00	1.06E-01	3.04E-03
L1-10206A-FSGS-004-SS	1.77E-02	2.09E-04	1.98E-02	3.19E+00	3.96E-05
L1-10206A-FSGS-005-SS	4.59E-02	4.97E-03	6.08E-02	8.28E+00	1.22E-04
L1-10206A-FSGS-006-SS	3.39E-02	1.63E-02	4.19E-02	6.12E+00	8.38E-05

**Table 12 (continued) - Summary of Gamma Spectroscopy Results for Surface Soil Samples
Comprising the Statistical Sample Population**

MEASUREMENT ID	Co-60 ⁽¹⁾ (pCi/g)	Cs-134 ⁽¹⁾ (pCi/g)	Cs-137 ⁽¹⁾ (pCi/g)	Ni-63 ⁽²⁾ (pCi/g)	Sr-90 ⁽²⁾ (pCi/g)
L1-10206A-FSGS-007-SS	0.00E+00	1.38E-02	6.21E-03	0.00E+00	1.24E-05
L1-10206A-FSGS-008-SS	2.58E-02	1.34E-02	5.52E-02	4.66E+00	1.10E-04
L1-10206A-FSGS-009-SS	3.07E-02	1.31E-02	5.39E-02	5.54E+00	1.08E-04
L1-10206A-FSGS-010-SS	5.18E-02	4.05E-02	9.00E-04	9.35E+00	1.80E-06
L1-10206A-FSGS-011-SS	4.89E-02	6.13E-02	9.76E-02	8.82E+00	1.95E-04
L1-10206A-FSGS-012-SS	1.45E-02	2.06E-02	2.96E-02	2.62E+00	5.92E-05
L1-10206A-FSGS-013-SS	1.80E-02	0.00E+00	3.51E-03	3.25E+00	7.02E-06
L1-10206A-FSGS-014-SS	4.84E-02	1.84E-02	6.40E-02	8.73E+00	1.28E-04
L1-10206A-FSGS-015-SS	2.49E-03	1.23E-02	1.20E-02	4.49E-01	2.40E-05
L1-10206A-FSGS-016-SS	1.66E-02	2.90E-02	1.83E-02	3.00E+00	3.66E-05
L1-10206A-FSGS-017-SS	3.52E-02	4.57E-03	2.18E-02	6.35E+00	4.36E-05
L1-10206A-FSGS-018-SS	5.02E-04	2.34E-02	2.00E-02	9.06E-02	4.00E-05
L1-10206A-FSGS-019-SS	8.09E-03	2.14E-02	5.25E-03	1.46E+00	1.05E-05
L1-10206A-FSGS-020-SS	3.29E-02	3.08E-02	7.17E-02	5.94E+00	1.43E-04
L1-10206A-FSGS-021-SS	0.00E+00	2.66E-02	1.84E-02	0.00E+00	3.68E-05
L1-10206A-FSGS-022-SS	1.07E-02	2.59E-02	7.60E-02	1.93E+00	1.52E-04
L1-10206A-FSGS-023-SS	1.39E-02	1.47E-02	3.35E-02	2.51E+00	6.70E-05
L1-10206A-FSGS-024-SS	3.14E-02	3.21E-02	4.36E-02	5.67E+00	8.72E-05

Note: (1) Bold font indicates ROC positively detected at concentration greater than MDC.
(2) Ni-63 and Sr-90 are inferred concentrations using the maximum HTD ratio.

Table 13 - Summary of Gamma Spectroscopy Results for Subsurface Soil Samples

MEASUREMENT ID	Co-60 ⁽¹⁾ (pCi/g)	Cs-134 ⁽¹⁾ (pCi/g)	Cs-137 ⁽¹⁾ (pCi/g)	Ni-63 ⁽²⁾ (pCi/g)	Sr-90 ⁽²⁾ (pCi/g)
L1-10206A-FSGS-003-SB	0.00E+00	0.00E+00	2.69E-01	0.00E+00	5.38E-04
L1-10206A-FSGS-011-SB	3.18E-02	4.21E-03	0.00E+00	5.74E+00	0.00E+00
L1-10206A-FSGS-012-SB	4.63E-03	3.09E-02	1.39E-02	8.35E-01	2.78E-05
L1-10206A-FSGS-019-SB	0.00E+00	0.00E+00	3.75E-02	0.00E+00	7.50E-05

Note: (1) Bold font indicates ROC positively detected at concentration greater than MDC.
(2) Ni-63 and Sr-90 are inferred concentrations using the maximum HTD ratio.

The off-site laboratory, Eberline Analytical, processed the four (4) samples selected for HTD ROC analysis. Samples L1-10206A-FSGS-003-SS, L1-10206A-FSGS-011-SS, L1-10206A-FQGS-005 and L1-10206A-FSGS-003-SB were selected. Only HTD radionuclides included as ROC (Ni-63 and Sr-90 for soils) were included in the analysis. All analyses met the required MDC. Only Cs-137 was detected in the samples at a concentration greater than MDC.

Consequently, comparison of existing ratios verses the maximum ratios from Table 6 was not required. The results are provided in Table 14.

Table 14 - Off-Site Analysis Results

Sample # L1-10206A-FSGS-003-SS-A

ROC	Result (pCi/g)	Uncertainty (pCi/g)	MDC (pCi/g)	>MDC
Co-60	5.49E-02	3.07E-02	6.35E-02	No
Cs-134	8.78E-03	2.71E-02	6.49E-02	No
Cs-137	2.35E+00	2.48E-01	1.05E-01	No
Ni-63	2.68E-01	1.85E+00	3.18E+00	No
Sr-90	-6.67E-02	3.01E-01	6.52E-01	No

Sample # L1-10206A-FSGS-011-SS-A

ROC	Result (pCi/g)	Uncertainty (pCi/g)	MDC (pCi/g)	>MDC
Co-60	5.60E-02	6.71E-02	9.08E-02	No
Cs-134	-2.25E-01	9.89E-02	7.67E-02	No
Cs-137	1.25E-01	6.46E-02	9.62E-02	Yes
Ni-63	3.63E-01	1.88E+00	3.23E+00	No
Sr-90	3.78E-02	2.71E-01	5.75E-01	No

Sample # L1-10206A-FQGS-005-SS-A

ROC	Result (pCi/g)	Uncertainty (pCi/g)	MDC (pCi/g)	>MDC
Co-60	2.12E-02	6.49E-02	1.06E-01	No
Cs-134	6.32E-03	3.13E-02	8.51E-02	No
Cs-137	2.27E-01	6.86E-02	1.51E-01	Yes
Ni-63	9.25E-01	1.94E+00	3.29E+00	No
Sr-90	-2.29E-01	3.45E-01	7.60E-01	No

Sample # L1-10206A-FSGS-003-SB-A

ROC	Result (pCi/g)	Uncertainty (pCi/g)	MDC (pCi/g)	>MDC
Co-60	-2.22E-02	4.55E-02	6.13E-02	No
Cs-134	2.51E-02	1.68E-02	6.14E-02	No
Cs-137	5.13E-01	9.21E-02	9.34E-02	Yes
Ni-63	1.12E+00	1.81E+00	3.07E+00	No
Sr-90 ⁽¹⁾	-3.81E-03	3.64E-02	7.80E-02	No

- (1) Sr-90 recounted February 19, 2020, to achieve adequate MDC

The implementation of survey specific QC measures included the collection of two (2) systematic samples (L1-10206A-FQGS-005-SS and L1-10206A-FQGS-013-SS). The on-site laboratory analyzed the designated QC samples using the on-site gamma spectroscopy system. Gamma spectroscopy results (summarized in Table 15) indicate that concentrations for Cs-137, Co-60 and Cs-134 were less than MDC in the samples. The concentrations for Ni-63 and Sr-90 were inferred based on the maximum ratios as specified in Table 6.

Table 15 - Summary of Gamma Spectroscopy Results for QC Surface Soil Samples

MEASUREMENT ID	Co-60 ⁽¹⁾ (pCi/g)	Cs-134 ⁽¹⁾ (pCi/g)	Cs-137 ⁽¹⁾ (pCi/g)	Ni-63 ⁽²⁾ (pCi/g)	Sr-90 ⁽²⁾ (pCi/g)
L1-10206A-FQGS-005-SS	2.31E-02	2.14E-02	1.14E-01	4.17E+00	2.28E-04
L1-10206A-FQGS-013-SS	5.75E-02	8.00E-03	0.00E+00	1.04E+01	0.00E+00

Note: (1) Bold font indicates ROC positively detected at concentration greater than MDC.

(2) Ni-63 and Sr-90 are inferred concentrations using the maximum HTD ratio.

The SOF or “unity rule” is the mathematical test used to evaluate compliance with radiological criteria for license termination when more than one radionuclide has been determined to be potentially present. The equation for the unity rule is:

Equation 6

$$\frac{C_1}{DCGL_1} + \frac{C_2}{DCGL_2} + \dots + \frac{C_n}{DCGL_n} \leq 1$$

Where: C_n = concentration of radionuclide n

$DCGL_n$ = DCGL of radionuclide n .

The results of the unity rule calculations for the ROC in the systematic sample population when compared against the OpDCGLs for surface soils for survey unit 10206A are provided in Table 16. The results of the unity rule calculations for the ROC for the subsurface samples are presented in Table 17, and the results for the QC samples are presented in Table 18.

Table 16 - Sum of Fractions for Individual Systematic Surface Soil Samples, when compared to the OpDCGLs

MEASUREMENT ID	Fraction of the OpDCGLs for Surface Soils					OpSOF
	Co-60	Cs-134	Cs-137	Ni-63	Sr-90	
L1-10206A-FSGS-001-SS	1.29E-02	5.22E-03	1.40E-02	2.78E-03	3.30E-05	0.035
L1-10206A-FSGS-002-SS	3.10E-03	0.00E+00	1.41E-02	6.67E-04	3.31E-05	0.018
L1-10206A-FSGS-003-SS	5.41E-04	1.66E-03	4.19E-01	1.16E-04	9.82E-04	0.422
L1-10206A-FSGS-004-SS	1.62E-02	1.21E-04	5.45E-03	3.49E-03	1.28E-05	0.025
L1-10206A-FSGS-005-SS	4.21E-02	2.87E-03	1.67E-02	9.06E-03	3.93E-05	0.071
L1-10206A-FSGS-006-SS	3.11E-02	9.41E-03	1.15E-02	6.69E-03	2.71E-05	0.059
L1-10206A-FSGS-007-SS	0.00E+00	7.96E-03	1.71E-03	0.00E+00	4.01E-06	0.010
L1-10206A-FSGS-008-SS	2.36E-02	7.73E-03	1.52E-02	5.09E-03	3.57E-05	0.052

Table 16 (continued) - Sum of Fractions for Systematic Surface Soil Samples compared to the OpDCGLs

MEASUREMENT ID	Fraction of the OpDCGLs for Surface Soils					OpSOF
	Co-60	Cs-134	Cs-137	Ni-63	Sr-90	
L1-10206A-FSGS-009-SS	2.81E-02	7.56E-03	1.48E-02	6.06E-03	3.48E-05	0.057
L1-10206A-FSGS-010-SS	4.75E-02	2.34E-02	2.48E-04	1.02E-02	5.82E-07	0.081
L1-10206A-FSGS-011-SS	4.48E-02	3.54E-02	2.69E-02	9.65E-03	6.31E-05	0.117
L1-10206A-FSGS-012-SS	1.33E-02	1.19E-02	8.15E-03	2.86E-03	1.91E-05	0.036
L1-10206A-FSGS-013-SS	1.65E-02	0.00E+00	9.67E-04	3.55E-03	2.27E-06	0.021
L1-10206A-FSGS-014-SS	4.44E-02	1.06E-02	1.76E-02	9.55E-03	4.14E-05	0.082
L1-10206A-FSGS-015-SS	2.28E-03	7.10E-03	3.31E-03	4.91E-04	7.75E-06	0.013
L1-10206A-FSGS-016-SS	1.52E-02	1.67E-02	5.04E-03	3.28E-03	1.18E-05	0.040
L1-10206A-FSGS-017-SS	3.23E-02	2.64E-03	6.01E-03	6.95E-03	1.41E-05	0.048
L1-10206A-FSGS-018-SS	4.60E-04	1.35E-02	5.51E-03	9.91E-05	1.29E-05	0.020
L1-10206A-FSGS-019-SS	7.42E-03	1.23E-02	1.45E-03	1.60E-03	3.39E-06	0.023
L1-10206A-FSGS-020-SS	3.02E-02	1.78E-02	1.98E-02	6.49E-03	4.63E-05	0.074
L1-10206A-FSGS-021-SS	0.00E+00	1.53E-02	5.07E-03	0.00E+00	1.19E-05	0.020
L1-10206A-FSGS-022-SS	9.81E-03	1.49E-02	2.09E-02	2.11E-03	4.91E-05	0.048
L1-10206A-FSGS-023-SS	1.27E-02	8.48E-03	9.23E-03	2.74E-03	2.16E-05	0.033
L1-10206A-FSGS-024-SS	2.88E-02	1.85E-02	1.20E-02	6.20E-03	2.82E-05	0.066

Systematic Measurements

Number of Systematic Measurements =	24
# of Systematic Measurements with OpSOF ≥ 1 =	0
# of Systematic Measurements with OpSOF > 0.1 (HTD Assessment) =	2
Max Individual Systematic Measurement OpSOF =	0.422
Mean Systematic Measurement OpSOF =	0.061

Table 17 - Sum of Fractions for Subsurface Soil Samples compared to the OpDCGLs

MEASUREMENT ID	Fraction of the OpDCGLs for Subsurface Soils					OpSOF
	Co-60	Cs-134	Cs-137	Ni-63	Sr-90	
L1-10206A-FSGS-003-SB	0.00E+00	0.00E+00	1.36E-01	0.00E+00	1.27E-03	0.137
L1-10206A-FSGS-011-SB	3.61E-02	3.70E-03	0.00E+00	2.94E-02	0.00E+00	0.069
L1-10206A-FSGS-012-SB	5.26E-03	2.72E-02	7.01E-03	4.28E-03	6.54E-05	0.044
L1-10206A-FSGS-019-SB	0.00E+00	0.00E+00	1.89E-02	0.00E+00	1.76E-04	0.019

Table 18 - Sum of Fractions for QC Soil Samples compared to the OpDCGLs

MEASUREMENT ID	Fraction of the OpDCGLs for Surface Soils					OpSOF
	Co-60	Cs-134	Cs-137	Ni-63	Sr-90	
L1-10206A-FQGS-005-SS	2.12E-02	1.23E-02	3.14E-02	4.56E-03	7.37E-05	0.070
L1-10206A-FQGS-013-SS	5.27E-02	4.62E-03	0.00E+00	1.13E-02	0.00E+00	0.069

Table 19 - Basic Statistical Properties of Systematic Sample Population

ROC	Mean (pCi/g)	Median (pCi/g)	Max (pCi/g)	Min (pCi/g)	Std. Dev. (pCi/g)	BcDCGL (pCi/g)	Avg. SOF per ROC	Avg. Dose Per ROC
Co-60	2.11E-02	1.72E-02	5.18E-02	0.00E+00	0.017	4.26	4.94E-03	1.24E-01
Cs-134	1.81E-02	1.55E-02	6.13E-02	0.00E+00	0.014	6.77	2.68E-03	6.70E-02
Cs-137	9.90E-02	3.77E-02	1.52E+00	9.00E-04	0.304	14.18	6.98E-03	1.75E-01
Ni-63	3.80E+00	3.09E+00	9.35E+00	0.00E+00	3.070	3572.1	1.06E-03	2.66E-02
Sr-90	1.98E-04	7.54E-05	3.04E-03	1.80E-06	0.001	12.09	1.64E-05	4.09E-04

The mean BcSOF for survey unit 10206A is 0.016, which equates to a dose of 0.392 mrem/year TEDE.

The mean of all identified isotopes are less than the Consultation Triggers for Residential and Commercial/Industrial Soil Contamination depicted in Table H.1 of NUREG 1757, Vol. 1, (MOU Table 1). The full table is included in Attachment 3 of this Release Record.

8. QUALITY CONTROL

The on-site laboratory processed two (2) split samples, L1-10206A-FSGS-005-SS and L1-10206A-FSGS-013-SS, from the systematic population using gamma spectroscopy analysis. The data was evaluated using acceptance criteria specified in ZS-LT-01, “*Quality Assurance Project Plan (for Characterization and FSS)*.” For systematic sample #5, the standard sample and QC sample both had positive results for Cs-137. However, the resolution was less than four (4), which is not comparable; therefore, K-40 was used in the QC comparison. There was acceptable agreement when using K-40. No further action was necessary. For systematic sample #13, the standard sample and QC sample did not have any positive results for a gamma-emitting ROC, therefore K-40 was used in the QC comparison. There was acceptable agreement when using K-40. Refer to Attachment 5 for data and QC analysis results.

9. INVESTIGATIONS AND RESULTS

No investigations were conducted in this survey unit.

10. REMEDIATION AND RESULTS

No remediation was performed in this survey unit.

11. CHANGES FROM THE SURVEY PLAN

There were no addendums to the FSS plan.

12. DATA QUALITY ASSESSMENT

The DQO sample design and data were reviewed in accordance with *ZionSolutions* procedure ZS-LT-300-001-004, “*Final Status Survey Data Assessment*” (Reference 16) for completeness and consistency. Documentation was complete and legible. Surveys and sample collection were consistent with the DQOs. The sampling design had adequate power as indicated by the Retrospective Power Curve.

The analytical results of all samples were less than an OpSOF of one when compared to the OpDCGLs.

Although MARSSIM states that the Sign Test need not be performed in the instance that no measurements surpass the DCGL, the test was conducted to demonstrate coherence to the statistical principles of the DQO process. The Sign Test was performed on the data and compared to the original assumptions of the DQOs. The evaluation of the Sign Test results clearly demonstrates that the survey unit passes the unrestricted release criteria, thus, the null hypothesis is rejected. The Sign Test is included in Attachment 4.

The preliminary data review consisted of calculating basic statistical quantities (e.g., mean, median, standard deviation). All data was considered valid including negative values, zeros, values reported below the MDC, and values with uncertainties greater than two standard deviations. The mean and median values for each ROC were well below the respective OpDCGLs. Also, the retrospective power curve shows that a sufficient number of samples were collected to achieve the desired power. Therefore, the survey unit meets the unrestricted release criteria with adequate power as required by the DQOs.

The data for Co-60 and Cs-137 is represented graphically through a frequency plot and a quantile plot. All graphical representations are provided in Attachment 6.

13. ANOMALIES

No anomalies were observed during the performance or analyses of the survey.

14. CONCLUSION

Survey unit 10206A has met the DQOs of the FSS plan. The ALARA criteria for soils as specified in Chapter 4 of the LTP were achieved. The EMC for soils was not needed for this survey unit.

All identified ROC were used for statistical testing to determine the adequacy of the survey unit for FSS. Evaluation of the data shows that none of the ROC concentration values exceeds the OpDCGL or any investigational levels; therefore, in accordance with the LTP Section 5.10, the survey unit meets the release criterion.

The sample data passed the Sign Test. The null hypothesis was rejected. The Retrospective Power Curve showed that adequate power was achieved.

The mean BcSOF, when the analytical results were compared to the BcDCGLs, was 0.016, which results in a dose contribution from soil in survey unit 10206A of 0.392 mrem/year TEDE, based on the average concentration of the ROC in samples used for non-parametric statistical sampling.

The conclusion of this Release Record is that survey unit 10206A is acceptable for unrestricted release.

15. REFERENCES

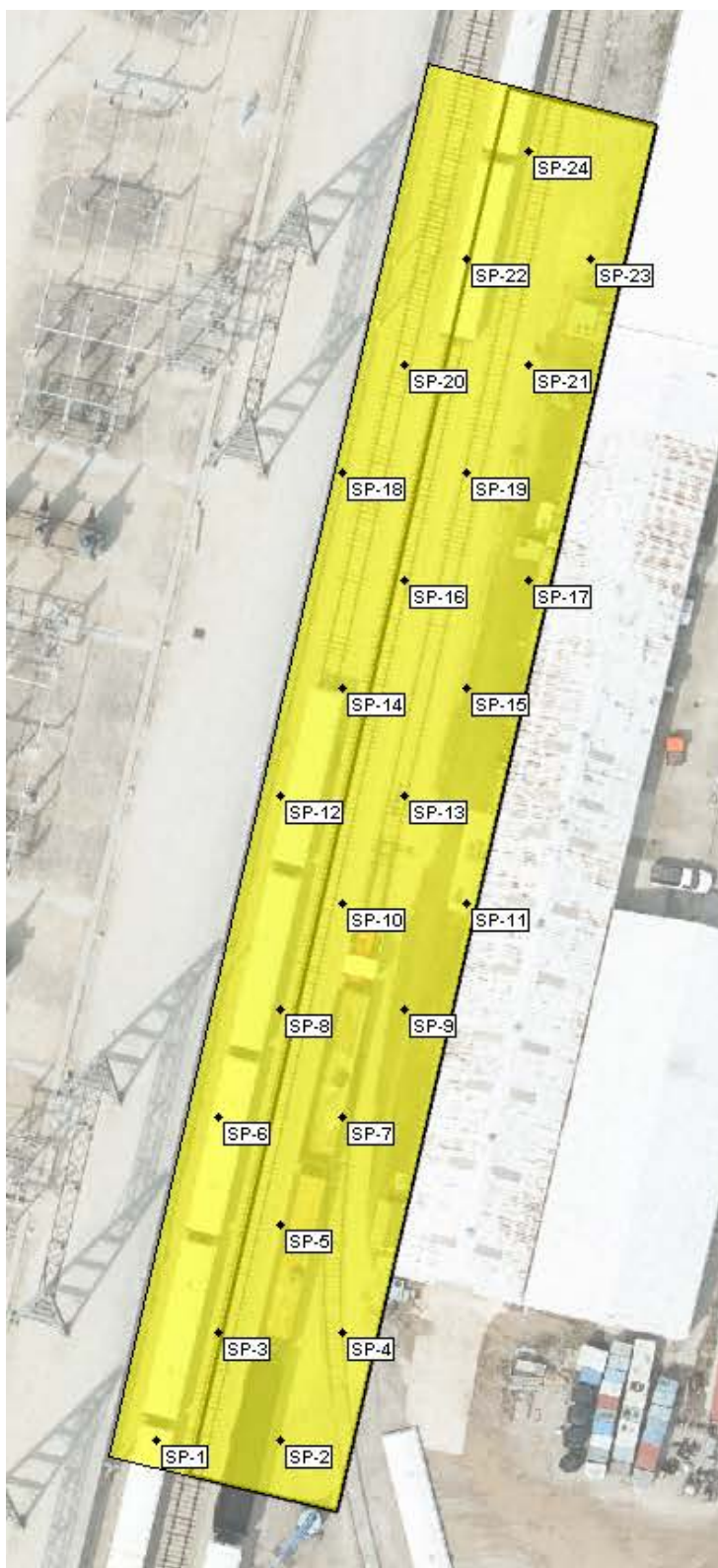
1. *ZionSolutions* procedure ZS-LT-300-001-005, “Final Status Survey Data Reporting”
2. Zion Station Restoration Project License Termination Plan
3. *ZionSolutions* procedure ZS-LT-300-001-001, “Final Status Survey Package Development”
4. NUREG-1575, “Multi-Agency Radiation Survey and Site Investigation Manual”
5. *ZionSolutions* procedure ZS-LT-300-001-002, “Survey Unit Classification”
6. “Zion Station Historical Site Assessment”
7. *ZionSolutions* TSD 11-001, “Technical Support Document for Potential Radionuclides of Concern During the Decommissioning of the Zion Station”
8. *ZionSolutions* TSD 14-019, “Radionuclides of Concern for Soil and Basement Fill Model Source Terms”
9. *ZionSolutions* TSD 14-011, “Soil Area Factors”
10. *ZionSolutions* TSD 17-004, “Operational Derived Concentration Guideline Levels for Final Status Survey”
11. *ZionSolutions* TSD 11-004, “Ludlum Model 44-10 Detector Sensitivity”
12. *ZionSolutions* procedure ZS-LT-01, “Quality Assurance Project Plan (for Characterization and FSS)”
13. *ZionSolutions* procedure ZS-LT-300-001-003, “Isolation and Control for Final Status Survey”
14. *ZionSolutions* procedure ZS-RP-108-004-011, “Operation of the Ludlum Model 2350-1 Data Logger”
15. *ZionSolutions* TSD 13-004, “Examination of Cs-137 Global Fallout In Soils At Zion Station”
16. *ZionSolutions* procedure ZS-LT-300-001-004, “Final Status Survey Data Assessment”

16. ATTACHMENTS

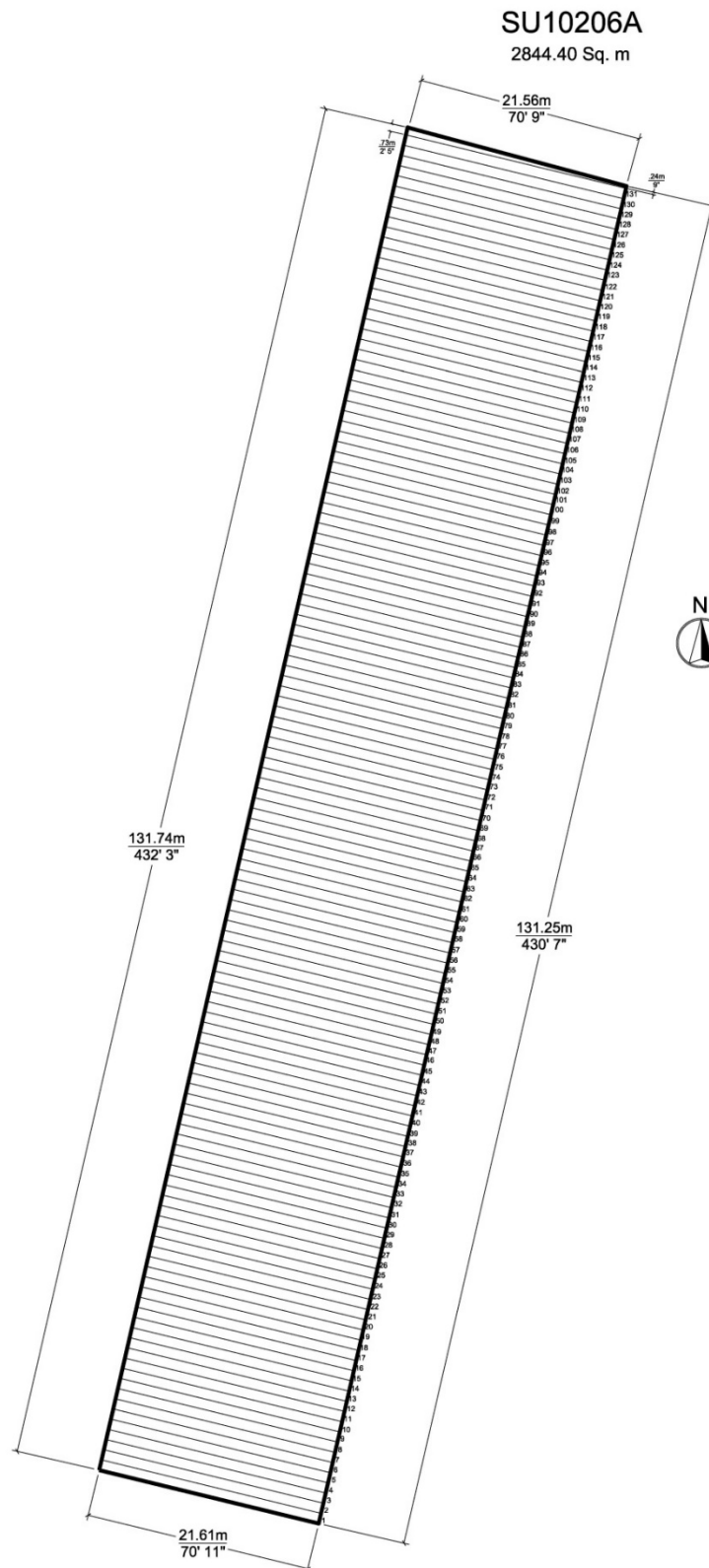
1. Attachment 1 - Figure and Map
2. Attachment 2 - Scan Data
3. Attachment 3 - Consultation Triggers for Residential and Commercial/Industrial Soil Contamination
4. Attachment 4 - Sign Test
5. Attachment 5 - QC Sample Assessment
6. Attachment 6 - Graphical Presentations
7. Attachment 7 - Sample Analytical Reports
8. Attachment 8 - Eberline Analytical Reports

ATTACHMENT 1
FIGURE AND MAP

Survey Unit 10206A Final Status Survey Boundaries and Systematic Sample Points



Survey Unit 10206A Final Status Survey Scan Rows



ATTACHMENT 2

SCAN DATA

FSS RELEASE RECORD – REV. 1
STATION CONSTRUCTION AREA
SURVEY UNIT 10206A



Detector Type	Detector ID	M2350-1 ID	Survey Unit	Location	Date/Time	Scan Logged Result (cpm)	Avg Background (cpm)	Action Level (cpm)	Scan Alarms
44-10	PR311750	266656	10206A	GS001	11/8/2019 9:01	1531	1467	2046	No
44-10	PR311750	266656	10206A	GS001	11/8/2019 9:05	1510	1467	2046	No
44-10	PR311750	266656	10206A	GS002	11/8/2019 9:09	1615	1467	2046	No
44-10	PR311750	266656	10206A	GS002	11/8/2019 9:12	1756	1467	2046	No
44-10	PR311750	266656	10206A	GS003	11/8/2019 9:15	1623	1467	2046	No
44-10	PR311750	266656	10206A	GS003	11/8/2019 9:21	1571	1467	2046	No
44-10	PR311750	266656	10206A	GS004	11/8/2019 9:23	1666	1467	2046	No
44-10	PR311750	266656	10206A	GS004	11/8/2019 9:26	1533	1467	2046	No
44-10	PR311750	266656	10206A	GS005	11/8/2019 9:30	1692	1467	2046	No
44-10	PR311750	266656	10206A	GS005	11/8/2019 9:33	1542	1467	2046	No
44-10	PR311750	266656	10206A	GS006	11/8/2019 9:36	1554	1467	2046	No
44-10	PR311750	266656	10206A	GS006	11/8/2019 9:39	1490	1467	2046	No
44-10	PR311750	266656	10206A	GS007	11/8/2019 9:43	1573	1467	2046	No
44-10	PR311750	266656	10206A	GS007	11/8/2019 9:46	1552	1467	2046	No
44-10	PR311750	266656	10206A	GS008	11/8/2019 9:50	1602	1467	2046	No
44-10	PR311750	266656	10206A	GS008	11/8/2019 9:53	1554	1467	2046	No
44-10	PR311750	266656	10206A	GS009	11/8/2019 9:56	1649	1467	2046	No
44-10	PR311750	266656	10206A	GS009	11/8/2019 10:01	1512	1467	2046	No
44-10	PR311750	266656	10206A	GS010	11/8/2019 10:04	1599	1467	2046	No
44-10	PR311750	266656	10206A	GS010	11/8/2019 10:07	1485	1467	2046	No
44-10	PR311750	266656	10206A	GS011	11/8/2019 10:14	1533	1467	2046	No
44-10	PR311750	266656	10206A	GS011	11/8/2019 10:19	1620	1467	2046	No
44-10	PR311750	266656	10206A	GS012	11/8/2019 10:22	1654	1467	2046	No
44-10	PR311750	266656	10206A	GS012	11/8/2019 10:25	1573	1467	2046	No
44-10	PR311750	266656	10206A	GS013	11/8/2019 10:28	1632	1467	2046	No
44-10	PR311750	266656	10206A	GS013	11/8/2019 10:32	1491	1467	2046	No
44-10	PR311750	266656	10206A	GS014	11/8/2019 10:35	1505	1467	2046	No
44-10	PR311750	266656	10206A	GS014	11/8/2019 10:38	1522	1467	2046	No
44-10	PR311750	266656	10206A	GS015	11/8/2019 10:41	1495	1467	2046	No
44-10	PR311750	266656	10206A	GS015	11/8/2019 10:44	1577	1467	2046	No
44-10	ES0118	216173	10206A	GS016	11/8/2019 9:25	1648	1521	2110	No
44-10	ES0118	216173	10206A	GS017	11/8/2019 9:28	1575	1521	2110	No
44-10	ES0118	216173	10206A	GS018	11/8/2019 9:30	1710	1521	2110	No
44-10	ES0118	216173	10206A	GS019	11/8/2019 9:33	1592	1521	2110	No
44-10	ES0118	216173	10206A	GS020	11/8/2019 9:35	1684	1521	2110	No
44-10	ES0118	216173	10206A	GS021	11/8/2019 9:37	1704	1521	2110	No
44-10	ES0118	216173	10206A	GS022	11/8/2019 9:40	1823	1521	2110	No
44-10	ES0118	216173	10206A	GS023	11/8/2019 9:42	1822	1521	2110	No
44-10	ES0118	216173	10206A	GS024	11/8/2019 9:45	1867	1521	2110	No
44-10	ES0118	216173	10206A	GS025	11/8/2019 9:47	1649	1521	2110	No
44-10	ES0118	216173	10206A	GS026	11/8/2019 9:50	1826	1521	2110	No
44-10	ES0118	216173	10206A	GS027	11/8/2019 9:52	1710	1521	2110	No
44-10	ES0118	216173	10206A	GS028	11/8/2019 9:55	1849	1521	2110	No
44-10	ES0118	216173	10206A	GS029	11/8/2019 9:58	1871	1521	2110	No
44-10	ES0118	216173	10206A	GS030	11/8/2019 10:00	1857	1521	2110	No
44-10	ES0118	216173	10206A	GS016	11/8/2019 10:09	1467	1117	1622	No
44-10	ES0118	216173	10206A	GS017	11/8/2019 10:12	1601	1117	1622	No
44-10	ES0118	216173	10206A	GS018	11/8/2019 10:16	1307	1117	1622	No
44-10	ES0118	216173	10206A	GS019	11/8/2019 10:19	1545	1117	1622	No
44-10	ES0118	216173	10206A	GS020	11/8/2019 10:23	1285	1117	1622	No
44-10	ES0118	216173	10206A	GS021	11/8/2019 10:26	1493	1117	1622	No

FSS RELEASE RECORD – REV. 1
STATION CONSTRUCTION AREA
SURVEY UNIT 10206A



Detector Type	Detector ID	M2350-1 ID	Survey Unit	Location	Date/Time	Scan Logged Result (cpm)	Avg Background (cpm)	Action Level (cpm)	Scan Alarms
44-10	ES0118	216173	10206A	GS022	11/8/2019 10:30	1300	1117	1622	No
44-10	ES0118	216173	10206A	GS023	11/8/2019 10:33	1429	1117	1622	No
44-10	ES0118	216173	10206A	GS024	11/8/2019 10:36	1318	1117	1622	No
44-10	ES0118	216173	10206A	GS024	11/8/2019 9:45	1867	1521	2110	No
44-10	ES0118	216173	10206A	GS025	11/8/2019 9:47	1649	1521	2110	No
44-10	ES0118	216173	10206A	GS026	11/8/2019 9:50	1826	1521	2110	No
44-10	ES0118	216173	10206A	GS027	11/8/2019 9:52	1710	1521	2110	No
44-10	ES0118	216173	10206A	GS028	11/8/2019 9:55	1849	1521	2110	No
44-10	ES0118	216173	10206A	GS029	11/8/2019 9:58	1871	1521	2110	No
44-10	ES0118	216173	10206A	GS030	11/8/2019 10:00	1857	1521	2110	No
44-10	ES0118	216173	10206A	GS016	11/8/2019 10:09	1467	1117	1622	No
44-10	ES0118	216173	10206A	GS017	11/8/2019 10:12	1601	1117	1622	No
44-10	ES0118	216173	10206A	GS018	11/8/2019 10:16	1307	1117	1622	No
44-10	ES0118	216173	10206A	GS019	11/8/2019 10:19	1545	1117	1622	No
44-10	ES0118	216173	10206A	GS020	11/8/2019 10:23	1285	1117	1622	No
44-10	ES0118	216173	10206A	GS021	11/8/2019 10:26	1493	1117	1622	No
44-10	ES0118	216173	10206A	GS022	11/8/2019 10:30	1300	1117	1622	No
44-10	ES0118	216173	10206A	GS023	11/8/2019 10:33	1429	1117	1622	No
44-10	ES0118	216173	10206A	GS024	11/8/2019 10:36	1318	1117	1622	No
44-10	ES0118	216173	10206A	GS024	11/8/2019 9:45	1867	1521	2110	No
44-10	ES0118	216173	10206A	GS025	11/8/2019 9:47	1649	1521	2110	No
44-10	ES0118	216173	10206A	GS026	11/8/2019 9:50	1826	1521	2110	No
44-10	ES0118	216173	10206A	GS027	11/8/2019 10:48	1572	1117	1622	No
44-10	ES0118	216173	10206A	GS028	11/8/2019 10:51	1386	1117	1622	No
44-10	ES0118	216173	10206A	GS029	11/8/2019 10:55	1448	1117	1622	No
44-10	ES0118	216173	10206A	GS030	11/8/2019 10:58	1229	1117	1622	No
44-10	PR308037	266657	10206A	GS031	11/8/2019 8:58	1979	1687	2308	No
44-10	PR308037	266657	10206A	GS031	11/8/2019 9:01	1334	1226	1755	No
44-10	PR308037	266657	10206A	GS032	11/8/2019 9:06	2023	1687	2308	No
44-10	PR308037	266657	10206A	GS032	11/8/2019 9:09	1367	1226	1755	No
44-10	PR308037	266657	10206A	GS033	11/8/2019 9:16	1933	1687	2308	No
44-10	PR308037	266657	10206A	GS033	11/8/2019 9:20	1642	1226	1755	No
44-10	PR308037	266657	10206A	GS034	11/8/2019 9:25	1849	1687	2308	No
44-10	PR308037	266657	10206A	GS034	11/8/2019 9:28	1453	1226	1755	No
44-10	PR308037	266657	10206A	GS035	11/8/2019 9:32	2138	1687	2308	No
44-10	PR308037	266657	10206A	GS035	11/8/2019 9:35	1549	1226	1755	No
44-10	PR308037	266657	10206A	GS036	11/8/2019 9:39	2100	1687	2308	No
44-10	PR308037	266657	10206A	GS036	11/8/2019 9:42	1544	1226	1755	No
44-10	PR308037	266657	10206A	GS037	11/8/2019 9:46	2201	1687	2308	No
44-10	PR308037	266657	10206A	GS037	11/8/2019 9:50	1411	1226	1755	No
44-10	PR308037	266657	10206A	GS038	11/8/2019 9:54	1990	1687	2308	No
44-10	PR308037	266657	10206A	GS038	11/8/2019 9:58	1409	1226	1755	No
44-10	PR308037	266657	10206A	GS039	11/8/2019 10:02	2054	1687	2308	No
44-10	PR308037	266657	10206A	GS039	11/8/2019 10:05	1420	1226	1755	No
44-10	PR308037	266657	10206A	GS040	11/8/2019 10:09	2164	1687	2308	No
44-10	PR308037	266657	10206A	GS040	11/8/2019 10:13	1368	1226	1755	No
44-10	PR308037	266657	10206A	GS041	11/8/2019 10:17	2125	1687	2308	No
44-10	PR308037	266657	10206A	GS041	11/8/2019 10:21	1342	1226	1755	No
44-10	PR308037	266657	10206A	GS042	11/8/2019 10:25	2092	1687	2308	No
44-10	PR308037	266657	10206A	GS042	11/8/2019 10:28	1481	1226	1755	No
44-10	PR308037	266657	10206A	GS043	11/8/2019 10:32	2091	1687	2308	No

FSS RELEASE RECORD – REV. 1
STATION CONSTRUCTION AREA
SURVEY UNIT 10206A



Detector Type	Detector ID	M2350-1 ID	Survey Unit	Location	Date/Time	Scan Logged Result (cpm)	Avg Background (cpm)	Action Level (cpm)	Scan Alarms
44-10	PR308037	266657	10206A	GS043	11/8/2019 10:35	1437	1226	1755	No
44-10	PR308037	266657	10206A	GS044	11/8/2019 10:38	2010	1687	2308	No
44-10	PR308037	266657	10206A	GS044	11/8/2019 10:42	1453	1226	1755	No
44-10	PR308037	266657	10206A	GS045	11/8/2019 10:46	2022	1687	2308	No
44-10	PR308037	266657	10206A	GS045	11/8/2019 10:50	1454	1226	1755	No
44-10	PR363452	304726	10206A	GS046	11/8/2019 8:37	2246	1716	2342	No
44-10	PR363452	304726	10206A	GS047	11/8/2019 8:40	2121	1716	2342	No
44-10	PR363452	304726	10206A	GS048	11/8/2019 8:44	2159	1716	2342	No
44-10	PR363452	304726	10206A	GS049	11/8/2019 8:47	2143	1716	2342	No
44-10	PR363452	304726	10206A	GS050	11/8/2019 8:54	2040	1716	2342	No
44-10	PR363452	304726	10206A	GS051	11/8/2019 8:57	2011	1716	2342	No
44-10	PR363452	304726	10206A	GS052	11/8/2019 9:01	2120	1716	2342	No
44-10	PR363452	304726	10206A	GS053	11/8/2019 9:05	2112	1716	2342	No
44-10	PR363452	304726	10206A	GS054	11/8/2019 9:09	2290	1716	2342	No
44-10	PR363452	304726	10206A	GS055	11/8/2019 10:41	1317	1032	1517	No
44-10	PR363452	304726	10206A	GS056	11/8/2019 10:46	1457	1032	1517	No
44-10	PR363452	304726	10206A	GS057	11/8/2019 10:51	1228	1032	1517	No
44-10	PR363452	304726	10206A	GS058	11/8/2019 10:56	1189	1032	1517	No
44-10	PR363452	304726	10206A	GS059	11/8/2019 11:00	1281	1032	1517	No
44-10	PR363452	304726	10206A	GS060	11/8/2019 11:03	1333	1032	1517	No
44-10	PR363452	304726	10206A	GS055	11/8/2019 10:41	1317	1032	1517	No
44-10	PR363452	304726	10206A	GS056	11/8/2019 10:46	1457	1032	1517	No
44-10	PR363452	304726	10206A	GS057	11/8/2019 10:51	1228	1032	1517	No
44-10	PR363452	304726	10206A	GS058	11/8/2019 10:56	1189	1032	1517	No
44-10	PR363452	304726	10206A	GS059	11/8/2019 11:00	1281	1032	1517	No
44-10	PR363452	304726	10206A	GS060	11/8/2019 11:03	1333	1032	1517	No
44-10	PR363452	304726	10206A	GS055	11/8/2019 10:41	1317	1032	1517	No
44-10	PR363452	304726	10206A	GS056	11/8/2019 10:46	1457	1032	1517	No
44-10	PR363452	304726	10206A	GS057	11/8/2019 10:51	1228	1032	1517	No
44-10	PR363452	304726	10206A	GS058	11/8/2019 10:56	1189	1032	1517	No
44-10	PR363452	304726	10206A	GS059	11/8/2019 11:00	1281	1032	1517	No
44-10	PR363452	304726	10206A	GS060	11/8/2019 11:03	1333	1032	1517	No
44-10	PR375273	304730	10206A	GS061	11/8/2019 9:26	2213	1998	2673	No
44-10	PR375273	304730	10206A	GS061	11/8/2019 9:29	1349	974	1446	No
44-10	PR375273	304730	10206A	GS062	11/8/2019 9:31	2005	1998	2673	No
44-10	PR375273	304730	10206A	GS062	11/8/2019 9:34	1343	974	1446	No
44-10	PR375273	304730	10206A	GS063	11/8/2019 9:37	2033	1998	2673	No
44-10	PR375273	304730	10206A	GS063	11/8/2019 9:40	1371	974	1446	No
44-10	PR375273	304730	10206A	GS064	11/8/2019 9:42	2086	1998	2673	No
44-10	PR375273	304730	10206A	GS064	11/8/2019 9:45	1394	974	1446	No
44-10	PR375273	304730	10206A	GS065	11/8/2019 9:47	2168	1998	2673	No
44-10	PR375273	304730	10206A	GS065	11/8/2019 9:50	1466	974	1446	Yes
44-10	PR375273	304730	10206A	GS066	11/8/2019 9:54	2204	1998	2673	No
44-10	PR375273	304730	10206A	GS066	11/8/2019 9:57	1313	974	1446	No
44-10	PR363311	304718	10206A	GS067	11/8/2019 10:00	2070	1998	2673	No
44-10	PR363311	304718	10206A	GS067	11/8/2019 10:03	1314	974	1446	No
44-10	PR363311	304718	10206A	GS068	11/8/2019 10:05	2188	1998	2673	No
44-10	PR363311	304718	10206A	GS068	11/8/2019 10:08	1002	974	1446	No
44-10	PR363311	304718	10206A	GS069	11/8/2019 10:12	2115	1998	2673	No
44-10	PR363311	304718	10206A	GS069	11/8/2019 10:15	1419	974	1446	No
44-10	PR363311	304718	10206A	GS070	11/8/2019 10:17	2156	1998	2673	No

FSS RELEASE RECORD – REV. 1
STATION CONSTRUCTION AREA
SURVEY UNIT 10206A



Detector Type	Detector ID	M2350-1 ID	Survey Unit	Location	Date/Time	Scan Logged Result (cpm)	Avg Background (cpm)	Action Level (cpm)	Scan Alarms
44-10	PR372152	216188	10206A	GS070	11/8/2019 10:20	1390	974	1446	No
44-10	PR372152	216188	10206A	GS071	11/8/2019 12:53	2251	1998	2673	No
44-10	PR372152	216188	10206A	GS071	11/8/2019 12:56	1316	974	1446	No
44-10	PR372152	216188	10206A	GS072	11/8/2019 12:58	2051	1998	2673	No
44-10	PR372152	216188	10206A	GS072	11/8/2019 13:01	1348	974	1446	No
44-10	PR372152	216188	10206A	GS073	11/8/2019 13:03	2165	1998	2673	No
44-10	PR372152	216188	10206A	GS073	11/8/2019 13:06	1237	974	1446	No
44-10	PR372152	216188	10206A	GS074	11/8/2019 13:08	2158	1998	2673	No
44-10	PR372152	216188	10206A	GS074	11/8/2019 13:11	1189	974	1446	No
44-10	PR372152	216188	10206A	GS075	11/8/2019 13:14	2097	1998	2673	No
44-10	PR372152	216188	10206A	GS075	11/8/2019 13:17	1375	974	1446	No
44-10	PR321892	304708	10206A	GS076	11/8/2019 8:23	1457	1162	1678	No
44-10	PR321892	304708	10206A	GS076	11/8/2019 8:26	1290	1162	1678	No
44-10	PR321892	304708	10206A	GS077	11/8/2019 8:28	1254	1162	1678	No
44-10	PR321892	304708	10206A	GS077	11/8/2019 8:31	1533	1162	1678	No
44-10	PR321892	304708	10206A	GS078	11/8/2019 8:33	1653	1162	1678	No
44-10	PR321892	304708	10206A	GS078	11/8/2019 8:36	1316	1162	1678	No
44-10	PR321892	304708	10206A	GS079	11/8/2019 8:38	1285	1162	1678	No
44-10	PR321892	304708	10206A	GS079	11/8/2019 8:41	1570	1162	1678	No
44-10	PR321892	304708	10206A	GS080	11/8/2019 8:43	1531	1162	1678	No
44-10	PR321892	304708	10206A	GS080	11/8/2019 8:57	1386	1162	1678	No
44-10	PR321892	304708	10206A	GS081	11/8/2019 8:59	1456	1162	1678	No
44-10	PR321892	304708	10206A	GS081	11/8/2019 9:03	1550	1162	1678	No
44-10	PR321892	304708	10206A	GS082	11/8/2019 9:06	1519	1162	1678	No
44-10	PR321892	304708	10206A	GS082	11/8/2019 9:09	1357	1162	1678	No
44-10	PR321892	304708	10206A	GS083	11/8/2019 9:11	1326	1162	1678	No
44-10	PR321892	304708	10206A	GS083	11/8/2019 9:14	1500	1162	1678	No
44-10	PR321892	304708	10206A	GS084	11/8/2019 9:16	1445	1162	1678	No
44-10	PR321892	304708	10206A	GS084	11/8/2019 9:19	1358	1162	1678	No
44-10	PR321892	304708	10206A	GS085	11/8/2019 9:21	1239	1162	1678	No
44-10	PR321892	304708	10206A	GS085	11/8/2019 9:25	1382	1162	1678	No
44-10	PR321892	304708	10206A	GS086	11/8/2019 9:28	1447	1162	1678	No
44-10	PR321892	304708	10206A	GS086	11/8/2019 9:31	1392	1162	1678	No
44-10	PR321892	304708	10206A	GS087	11/8/2019 9:33	1342	1162	1678	No
44-10	PR321892	304708	10206A	GS087	11/8/2019 9:36	1352	1162	1678	No
44-10	PR321892	304708	10206A	GS088	11/8/2019 9:38	1363	1162	1678	No
44-10	PR321892	304708	10206A	GS088	11/8/2019 9:41	1323	1162	1678	No
44-10	PR321892	304708	10206A	GS089	11/8/2019 9:43	1335	1162	1678	No
44-10	PR321892	304708	10206A	GS089	11/8/2019 9:46	1415	1162	1678	No
44-10	PR321892	304708	10206A	GS090	11/8/2019 9:48	1359	1162	1678	No
44-10	PR321892	304708	10206A	GS090	11/8/2019 9:51	1228	1162	1678	No
44-10	PR311750	266656	10206A	GS091	11/8/2019 8:38	1406	1152	1665	No
44-10	PR311750	266656	10206A	GS091	11/8/2019 8:43	1342	1152	1665	No
44-10	PR311750	266656	10206A	GS092	11/8/2019 8:45	1438	1152	1665	No
44-10	PR311750	266656	10206A	GS092	11/8/2019 8:48	1235	1152	1665	No
44-10	PR311750	266656	10206A	GS093	11/8/2019 8:50	1548	1152	1665	No
44-10	PR311750	266656	10206A	GS093	11/8/2019 8:54	1419	1152	1665	No
44-10	PR311750	266656	10206A	GS094	11/8/2019 8:56	1469	1152	1665	No
44-10	PR311756	266669	10206A	GS094	11/8/2019 8:59	1338	1152	1665	No
44-10	PR311756	266669	10206A	GS095	11/8/2019 9:02	1482	1152	1665	No
44-10	PR311756	266669	10206A	GS095	11/8/2019 9:06	1437	1152	1665	No

FSS RELEASE RECORD – REV. 1
STATION CONSTRUCTION AREA
SURVEY UNIT 10206A



Detector Type	Detector ID	M2350-1 ID	Survey Unit	Location	Date/Time	Scan Logged Result (cpm)	Avg Background (cpm)	Action Level (cpm)	Scan Alarms
44-10	PR311756	266669	10206A	GS096	11/8/2019 9:08	1481	1152	1665	No
44-10	PR311756	266669	10206A	GS096	11/8/2019 9:11	1291	1152	1665	No
44-10	PR311756	266669	10206A	GS097	11/8/2019 9:13	1460	1152	1665	No
44-10	PR311756	266669	10206A	GS097	11/8/2019 9:17	1418	1152	1665	No
44-10	PR311756	266669	10206A	GS098	11/8/2019 9:19	1362	1152	1665	No
44-10	PR311756	266669	10206A	GS098	11/8/2019 9:22	1380	1152	1665	No
44-10	PR311756	266669	10206A	GS099	11/8/2019 9:24	1412	1152	1665	No
44-10	PR311756	266669	10206A	GS099	11/8/2019 9:27	1253	1152	1665	No
44-10	PR311756	266669	10206A	GS100	11/8/2019 9:30	1447	1152	1665	No
44-10	PR311756	266669	10206A	GS100	11/8/2019 9:34	1287	1152	1665	No
44-10	PR311756	266669	10206A	GS101	11/8/2019 9:36	1350	1152	1665	No
44-10	PR311756	266669	10206A	GS101	11/8/2019 9:39	1301	1152	1665	No
44-10	PR311756	266669	10206A	GS102	11/8/2019 9:42	1441	1152	1665	No
44-10	PR311756	266669	10206A	GS102	11/8/2019 9:45	1277	1152	1665	No
44-10	PR311756	266669	10206A	GS103	11/8/2019 9:47	1325	1152	1665	No
44-10	PR311756	266669	10206A	GS103	11/8/2019 9:51	1379	1152	1665	No
44-10	PR311756	266669	10206A	GS104	11/8/2019 9:55	1466	1152	1665	No
44-10	PR311756	266669	10206A	GS104	11/8/2019 9:59	1273	1152	1665	No
44-10	PR311756	266669	10206A	GS105	11/8/2019 10:01	1383	1152	1665	No
44-10	PR311756	266669	10206A	GS105	11/8/2019 10:09	1446	1152	1665	No
44-10	PR321902	304711	10206A	GS106	11/8/2019 9:22	1303	1316	1864	No
44-10	PR321902	304711	10206A	GS106	11/8/2019 9:25	1523	1316	1864	No
44-10	PR321902	304711	10206A	GS107	11/8/2019 9:29	1510	1316	1864	No
44-10	PR321902	304711	10206A	GS107	11/8/2019 9:32	1384	1316	1864	No
44-10	PR321902	304711	10206A	GS108	11/8/2019 9:36	1420	1316	1864	No
44-10	PR321902	304711	10206A	GS108	11/8/2019 9:39	1363	1316	1864	No
44-10	PR321902	304711	10206A	GS109	11/8/2019 9:41	1399	1316	1864	No
44-10	PR321902	304711	10206A	GS109	11/8/2019 9:45	1391	1316	1864	No
44-10	PR321902	304711	10206A	GS110	11/8/2019 9:47	1517	1316	1864	No
44-10	PR321902	304711	10206A	GS110	11/8/2019 9:50	1319	1316	1864	No
44-10	PR321902	304711	10206A	GS111	11/8/2019 9:54	1395	1316	1864	No
44-10	PR321902	304711	10206A	GS111	11/8/2019 9:59	1452	1316	1864	No
44-10	PR321902	304711	10206A	GS112	11/8/2019 10:10	1542	1316	1864	No
44-10	PR321902	304711	10206A	GS112	11/8/2019 10:14	1332	1316	1864	No
44-10	PR321902	304711	10206A	GS113	11/8/2019 10:17	1554	1316	1864	No
44-10	PR321902	304711	10206A	GS113	11/8/2019 10:20	1335	1316	1864	No
44-10	PR321902	304711	10206A	GS114	11/8/2019 10:23	1676	1316	1864	No
44-10	PR321902	304711	10206A	GS114	11/8/2019 10:26	1344	1316	1864	No
44-10	PR321902	304711	10206A	GS115	11/8/2019 10:29	1654	1316	1864	No
44-10	PR321902	304711	10206A	GS115	11/8/2019 10:32	1447	1316	1864	No
44-10	PR321902	304711	10206A	GS116	11/8/2019 10:37	1598	1316	1864	No
44-10	PR321902	304711	10206A	GS116	11/8/2019 10:41	1440	1316	1864	No
44-10	PR321902	304711	10206A	GS117	11/8/2019 12:18	1606	1316	1864	No
44-10	PR321902	304711	10206A	GS117	11/8/2019 12:21	1530	1316	1864	No
44-10	PR321902	304711	10206A	GS119	11/8/2019 12:30	1405	1316	1864	No
44-10	PR321902	304711	10206A	GS119	11/8/2019 12:34	1401	1316	1864	No
44-10	PR321902	304711	10206A	GS120	11/8/2019 12:42	1470	1316	1864	No
44-10	PR321902	304711	10206A	GS120	11/8/2019 12:48	1416	1316	1864	No
44-10	PR371152	216188	10206A	GS121	11/8/2019 9:08	1614	1112	1617	No
44-10	PR371152	216188	10206A	GS121	11/8/2019 9:11	1425	1112	1617	No
44-10	PR371152	216188	10206A	GS122	11/8/2019 9:13	1418	1112	1617	No

FSS RELEASE RECORD – REV. 1
 STATION CONSTRUCTION AREA
 SURVEY UNIT 10206A



Detector Type	Detector ID	M2350-1 ID	Survey Unit	Location	Date/Time	Scan Logged Result (cpm)	Avg Background (cpm)	Action Level (cpm)	Scan Alarms
44-10	PR371152	216188	10206A	GS122	11/8/2019 9:16	1546	1112	1617	No
44-10	PR371152	216188	10206A	GS123	11/8/2019 9:18	1556	1112	1617	No
44-10	PR371152	216188	10206A	GS123	11/8/2019 9:21	1385	1112	1617	No
44-10	PR371152	216188	10206A	GS124	11/8/2019 9:23	1415	1112	1617	No
44-10	PR371152	216188	10206A	GS124	11/8/2019 9:26	1467	1112	1617	No
44-10	PR371152	216188	10206A	GS125	11/8/2019 9:28	1534	1112	1617	No
44-10	PR371152	216188	10206A	GS125	11/8/2019 9:31	1337	1112	1617	No
44-10	PR371152	216188	10206A	GS126	11/8/2019 9:33	1501	1112	1617	No
44-10	PR371152	216188	10206A	GS126	11/8/2019 9:36	1455	1112	1617	No
44-10	PR371152	216188	10206A	GS127	11/8/2019 9:38	1510	1112	1617	No
44-10	PR371152	216188	10206A	GS127	11/8/2019 9:41	1322	1112	1617	No
44-10	PR371152	216188	10206A	GS128	11/8/2019 9:43	1392	1112	1617	No
44-10	PR371152	216188	10206A	GS128	11/8/2019 9:46	1522	1112	1617	No
44-10	PR371152	216188	10206A	GS129	11/8/2019 9:48	1524	1112	1617	No
44-10	PR371152	216188	10206A	GS130	11/8/2019 9:53	1345	1112	1617	No
44-10	PR371152	216188	10206A	GS130	11/8/2019 9:56	1563	1112	1617	No
44-10	PR371152	216188	10206A	GS131	11/8/2019 9:58	1490	1112	1617	No
44-10	PR371152	216188	10206A	GS131	11/8/2019 10:01	1272	1112	1617	No
44-10	PR375273	304730	10206A	GS065	11/16/2019 9:18	1694	1433	2005	No
44-10	PR321902	304711	10206A	GS118	11/18/2019 9:06	1636	1417	1987	No
44-10	PR321902	304711	10206A	GS118	11/18/2019 9:08	1542	1417	1987	No

ATTACHMENT 3
**CONSULTATION TRIGGERS FOR RESIDENTIAL AND
COMMERCIAL/INDUSTRIAL SOIL CONTAMINATION**

Table H.1 Consultation Triggers for Residential and Commercial/Industrial Soil Contamination (MOU Table 1)

Except for radium-226, thorium-232, or total uranium, concentrations should be aggregated using a sum of the fraction approach to determine site-specific consultation trigger concentrations. This table is based on single contaminant concentrations for residential and commercial/industrial land use when using generally accepted exposure parameters. Table users should select the appropriate column based on the site's reasonably anticipated land use.

Radionuclide	Residential Soil Concentration	Industrial/Commercial Soil Concentration
H-3	228 pCi/g	423 pCi/g
C-14	46 pCi/g	123,000 pCi/g
Na-22	9 pCi/g	14 pCi/g
S-35	19,600 pCi/g	32,200,000 pCi/g
Cl-36	6 pCi/g	10,700 pCi/g
Ca-45	13,500 pCi/g	3,740,000 pCi/g
Sc-46	105 pCi/g	169 pCi/g
Mn-54	69 pCi/g	112 pCi/g
Fe-55	269,000 pCi/g	2,210,000 pCi/g
Co-57	873 pCi/g	1,420 pCi/g
Co-60	4 pCi/g	6 pCi/g
Ni-59	20,800 pCi/g	1,230,000 pCi/g
Ni-63	9,480 pCi/g	555,000 pCi/g
Sr-90+D	23 pCi/g	1,070 pCi/g
Nb-94	2 pCi/g	3 pCi/g
Tc-99	25 pCi/g	89,400 pCi/g
I-129	60 pCi/g	1,080 pCi/g
Cs-134	16 pCi/g	26 pCi/g
Cs-137+D	6 pCi/g	11 pCi/g
Eu-152	4 pCi/g	7 pCi/g
Eu-154	5 pCi/g	8 pCi/g
Ir-192	336 pCi/g	544 pCi/g
Pb-210+D	15 pCi/g	123 pCi/g
Ra-226	5 pCi/g	5 pCi/g
Ac-227+D	10 pCi/g	21 pCi/g
Th-228+D	15 pCi/g	25 pCi/g
Th-232	5 pCi/g	5 pCi/g
U-234	401 pCi/g	3,310 pCi/g
U-235+D	20 pCi/g	39 pCi/g
U-238+D	74 pCi/g	179 pCi/g
total uranium	47 mg/kg	1230 mg/kg
Pu-238	297 pCi/g	1,640 pCi/g
Pu-239	259 pCi/g	1,430 pCi/g
Pu-241	40,600 pCi/g	172,000 pCi/g
Am-241	187 pCi/g	568 pCi/g
Cm-242	32,200 pCi/g	344,000 pCi/g
Cm-243	35 pCi/g	67 pCi/g

ATTACHMENT 4
SIGN TEST

FSS RELEASE RECORD – REV. 1
STATION CONSTRUCTION AREA
SURVEY UNIT 10206A



Survey Area: No. 10200 **Description:** Radiological Restricted Area Grounds
Survey Unit: No. 10206A **Description:** Station Construction Area
Classification: 1 **Type I (α) Error:** 0.05 **Number of Samples:** 24

#	Fraction of the Release Criterion						Weighted Sum (W _s)	1-W _s	Sign
	Radionuclides of Concern					OpSOF			
	Co-60	Cs-134	Cs-137	Ni-63	Sr-90				
1	1.29E-02	5.22E-03	1.40E-02	2.78E-03	3.30E-05	SOF	0.035	0.965	+
2	3.10E-03	0.00E+00	1.41E-02	6.67E-04	3.31E-05	SOF	0.018	0.982	+
3	5.41E-04	1.66E-03	4.19E-01	1.16E-04	9.82E-04	SOF	0.422	0.578	+
4	1.62E-02	1.21E-04	5.45E-03	3.49E-03	1.28E-05	SOF	0.025	0.975	+
5	4.21E-02	2.87E-03	1.67E-02	9.06E-03	3.93E-05	SOF	0.071	0.929	+
6	3.11E-02	9.41E-03	1.15E-02	6.69E-03	2.71E-05	SOF	0.059	0.941	+
7	0.00E+00	7.96E-03	1.71E-03	0.00E+00	4.01E-06	SOF	0.010	0.990	+
8	2.36E-02	7.73E-03	1.52E-02	5.09E-03	3.57E-05	SOF	0.052	0.948	+
9	2.81E-02	7.56E-03	1.48E-02	6.06E-03	3.48E-05	SOF	0.057	0.943	+
10	4.75E-02	2.34E-02	2.48E-04	1.02E-02	5.82E-07	SOF	0.081	0.919	+
11	4.48E-02	3.54E-02	2.69E-02	9.65E-03	6.31E-05	SOF	0.117	0.883	+
12	1.33E-02	1.19E-02	8.15E-03	2.86E-03	1.91E-05	SOF	0.036	0.964	+
13	1.65E-02	0.00E+00	9.67E-04	3.55E-03	2.27E-06	SOF	0.021	0.979	+
14	4.44E-02	1.06E-02	1.76E-02	9.55E-03	4.14E-05	SOF	0.082	0.918	+
15	2.28E-03	7.10E-03	3.31E-03	4.91E-04	7.75E-06	SOF	0.013	0.987	+
16	1.52E-02	1.67E-02	5.04E-03	3.28E-03	1.18E-05	SOF	0.040	0.960	+
17	3.23E-02	2.64E-03	6.01E-03	6.95E-03	1.41E-05	SOF	0.048	0.952	+
18	4.60E-04	1.35E-02	5.51E-03	9.91E-05	1.29E-05	SOF	0.020	0.980	+
19	7.42E-03	1.23E-02	1.45E-03	1.60E-03	3.39E-06	SOF	0.023	0.977	+
20	3.02E-02	1.78E-02	1.98E-02	6.49E-03	4.63E-05	SOF	0.074	0.926	+
21	0.00E+00	1.53E-02	5.07E-03	0.00E+00	1.19E-05	SOF	0.020	0.980	+

FSS RELEASE RECORD – REV. 1
 STATION CONSTRUCTION AREA
 SURVEY UNIT 10206A



#	Fraction of the Release Criterion						Weighted Sum (W _s)	1-W _s	Sign
	Radionuclides of Concern					OpSOF			
	Co-60	Cs-134	Cs-137	Ni-63	Sr-90				
22	9.81E-03	1.49E-02	2.09E-02	2.11E-03	4.91E-05	SOF	0.048	0.952	+
23	1.27E-02	8.48E-03	9.23E-03	2.74E-03	2.16E-05	SOF	0.033	0.967	+
24	2.88E-02	1.85E-02	1.20E-02	6.20E-03	2.82E-05	SOF	0.066	0.934	+

Critical Value (Table I.3 of MARSSIM) = **16**

Number of Positive Differences (S+) = **24**

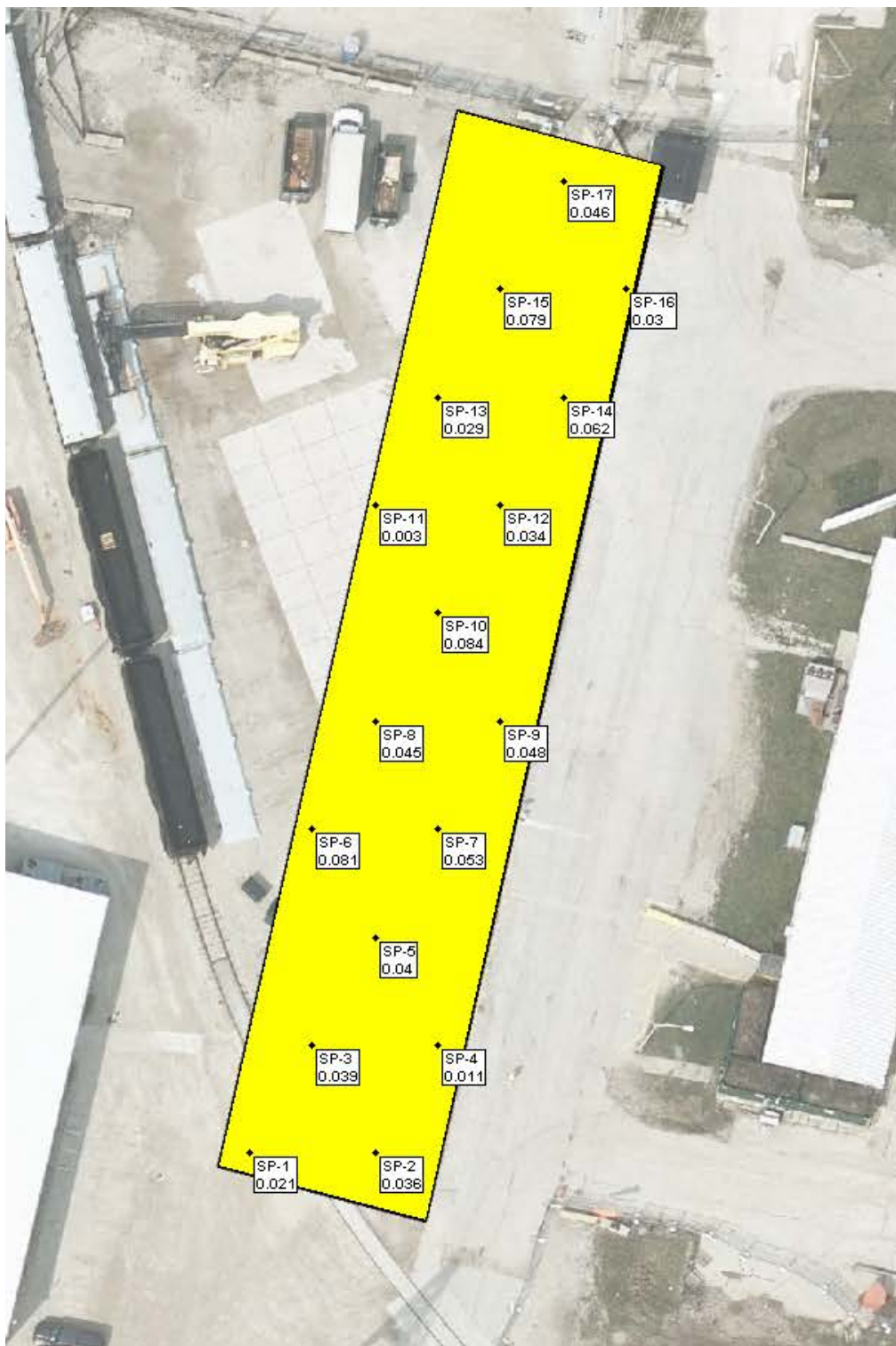
The survey unit ☒ (meets) ☐ (does not meet) the acceptance criteria.

ATTACHMENT 5
QC SAMPLE ASSESSMENT

Duplicate Sample Assessment Form																								
Survey Area #: 10200		Survey Unit #: 10206A		Survey Unit Name: Station Construction Area																				
Sample Plan#: L1-10206A-F																								
Sample Description: Comparison of split samples collected from systematic surface soil samples locations #5 and #13. The samples were analyzed using gamma spectroscopy by on-site HPGe system. The standard/comparison samples were L1-10206A-FSGS-005SS/L1-10206A-FQGS-005SS and L1-10206A-FSGS-013SS/L1-10206A-FQGS-013SS.																								
STANDARD					COMPARISON																			
Radionuclide	Activity Value	Standard Error	Resolution	Agreement Range	Activity Value	Standard Error	Comparison Ratio	Acceptable (Y/N)																
Systematic Sample #5																								
K-40	Cs-137	6.08E-02	1.61E-02	3.78	not comparable	1.14E-01	1.74E-02	N/A																
K-40	6.21E+00	4.43E-01	14.02	0.6-1.66	6.72E+00	4.71E-01	0.92	Y																
Investigation Sample #13																								
K-40	8.62E+00	5.94E-01	14.51	0.6-1.66	9.13E+00	6.20E-01	0.94	Y																
Comments/Corrective Actions: For systematic sample #5, the standard sample and QC sample both had positive results for Cs-137. However the resolution was <4 which is not comparable, therefore K-40 was used in the QC comparison. There was acceptable agreement when using K-40. No further action was necessary. For systematic sample #13, the standard sample and QC sample did not have any positive results for a gamma emitting ROC, therefore K-40 was used in the QC comparison. There was acceptable agreement when using K-40. No further action is necessary.					Table 4-1 from the QAPP is reproduced below to show acceptance criteria used to assess split samples. <table style="margin-left: auto; margin-right: auto; border: none;"> <tr> <td style="text-align: center; padding: 5px;">-</td> <td style="text-align: center; padding: 5px;">Acceptable Ratio</td> </tr> <tr> <td style="text-align: center; padding: 5px;"><u>Resolution</u></td> <td style="text-align: center; padding: 5px;"><u>Acceptable Ratio</u></td> </tr> <tr> <td style="text-align: center; padding: 5px;"><4</td> <td style="text-align: center; padding: 5px;">not comparable</td> </tr> <tr> <td style="text-align: center; padding: 5px;">4-7</td> <td style="text-align: center; padding: 5px;">0.5-2.0</td> </tr> <tr> <td style="text-align: center; padding: 5px;">8-15</td> <td style="text-align: center; padding: 5px;">0.6-1.66</td> </tr> <tr> <td style="text-align: center; padding: 5px;">16-50</td> <td style="text-align: center; padding: 5px;">0.75-1.33</td> </tr> <tr> <td style="text-align: center; padding: 5px;">51-200</td> <td style="text-align: center; padding: 5px;">0.80-1.25</td> </tr> <tr> <td style="text-align: center; padding: 5px;">>200</td> <td style="text-align: center; padding: 5px;">0.85-1.18</td> </tr> </table>				-	Acceptable Ratio	<u>Resolution</u>	<u>Acceptable Ratio</u>	<4	not comparable	4-7	0.5-2.0	8-15	0.6-1.66	16-50	0.75-1.33	51-200	0.80-1.25	>200	0.85-1.18
-	Acceptable Ratio																							
<u>Resolution</u>	<u>Acceptable Ratio</u>																							
<4	not comparable																							
4-7	0.5-2.0																							
8-15	0.6-1.66																							
16-50	0.75-1.33																							
51-200	0.80-1.25																							
>200	0.85-1.18																							

ATTACHMENT 6
GRAPHICAL PRESENTATIONS

Posting Plot

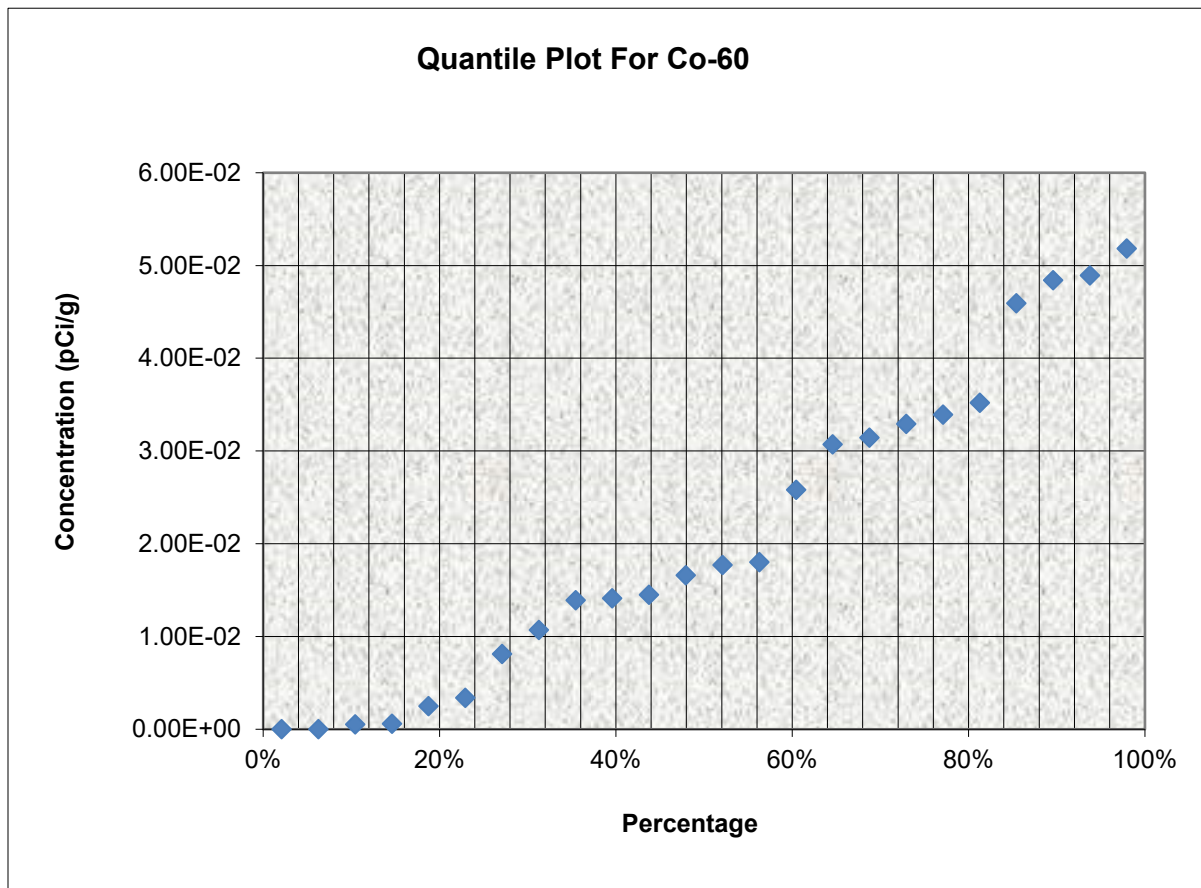


QUANTILE PLOT FOR Co-60

Survey Unit: 10206A

Survey Unit Name: Station Construction Area

Mean: 2.11E-02 pCi/g

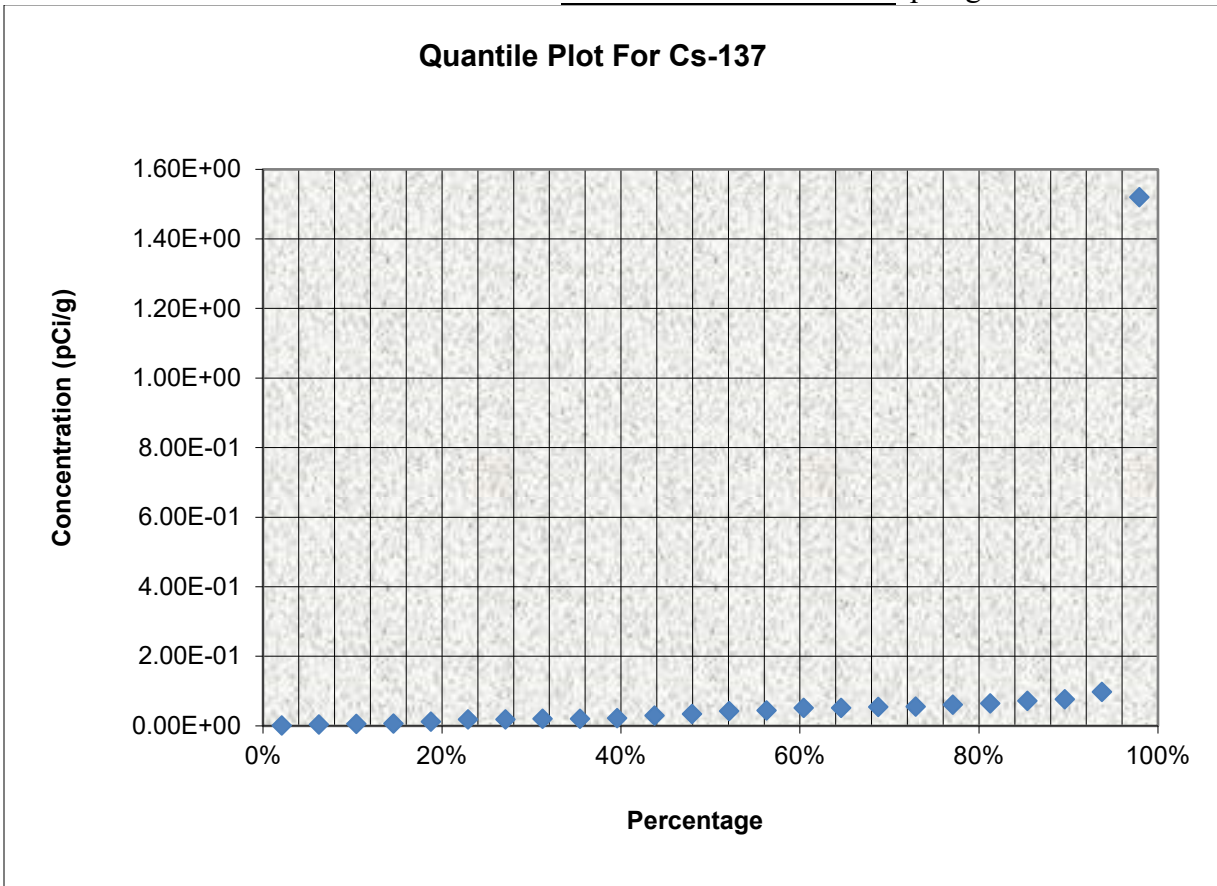


QUANTILE PLOT FOR Cs-137

Survey Unit: 10206A

Survey Unit Name: Station Construction Area

Mean: 9.90E-02 pCi/g



HISTOGRAM FOR Co-60

Survey Unit: 10206A

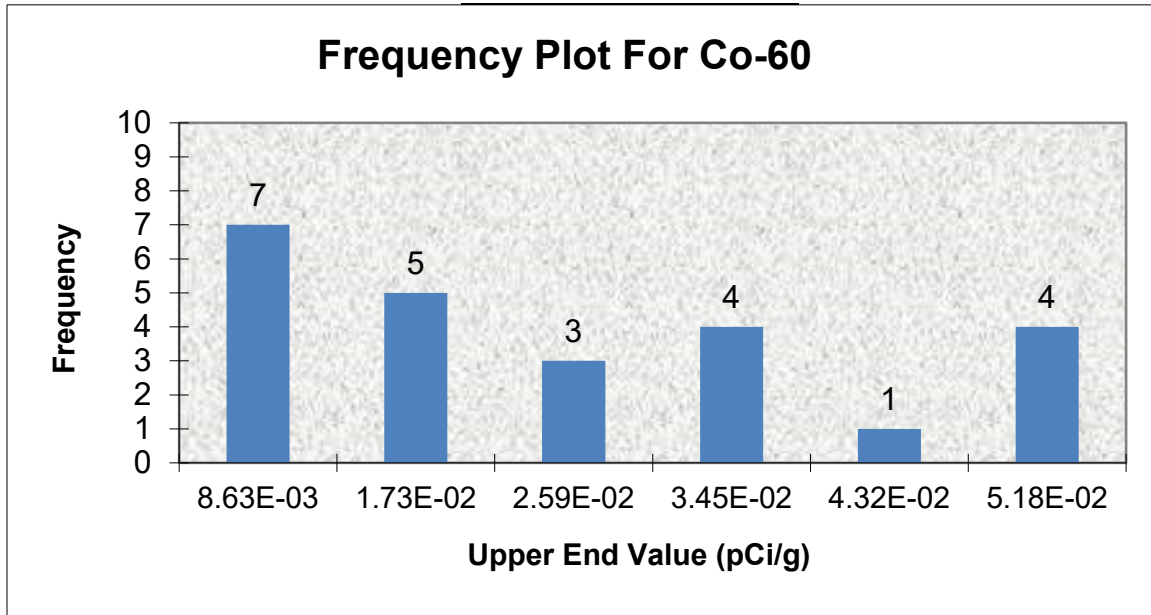
Survey Unit Name: Station Construction Area

Mean: 2.11E-02 pCi/g

Median: 1.72E-02 pCi/g

ST DEV: 0.017

Skew: 0.412



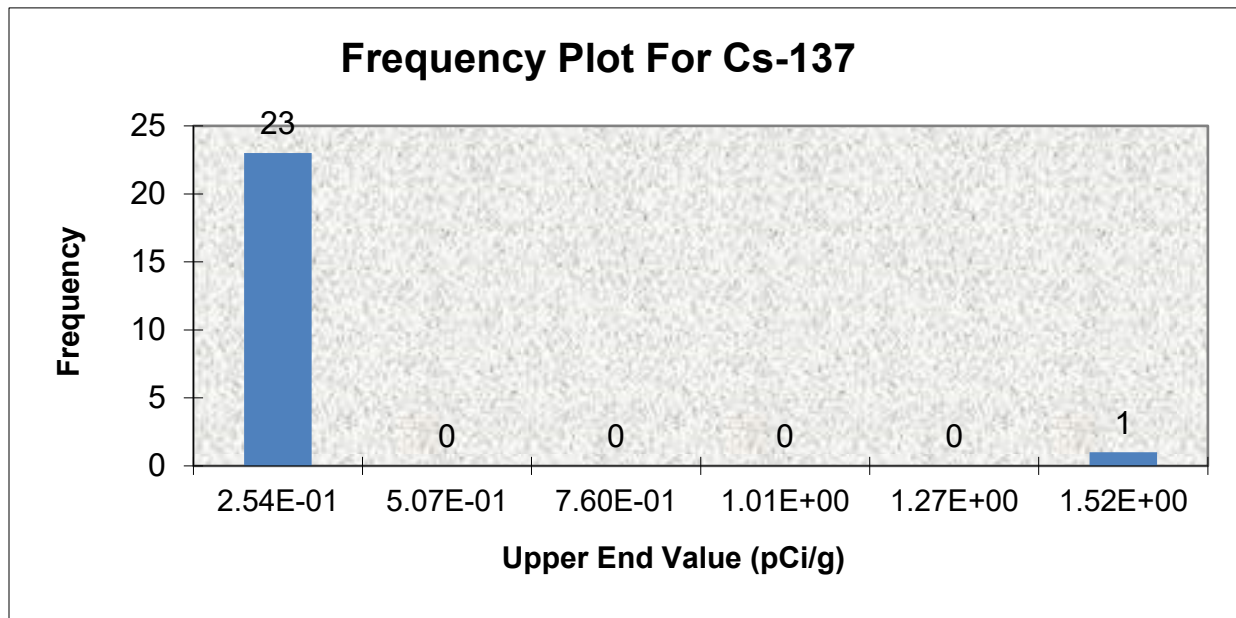
Upper Value	Observation Frequency	Observation %
8.63E-03	7	29%
1.73E-02	5	21%
2.59E-02	3	13%
3.45E-02	4	17%
4.32E-02	1	4%
5.18E-02	4	17%
TOTAL	17	100%

HISTOGRAM FOR Cs-137

Survey Unit: 10206A

Survey Unit Name: Station Construction Area

Mean:	9.90E-02	pCi/g
Median:	3.77E-02	pCi/g
ST DEV:	0.304	
Skew:	4.841	

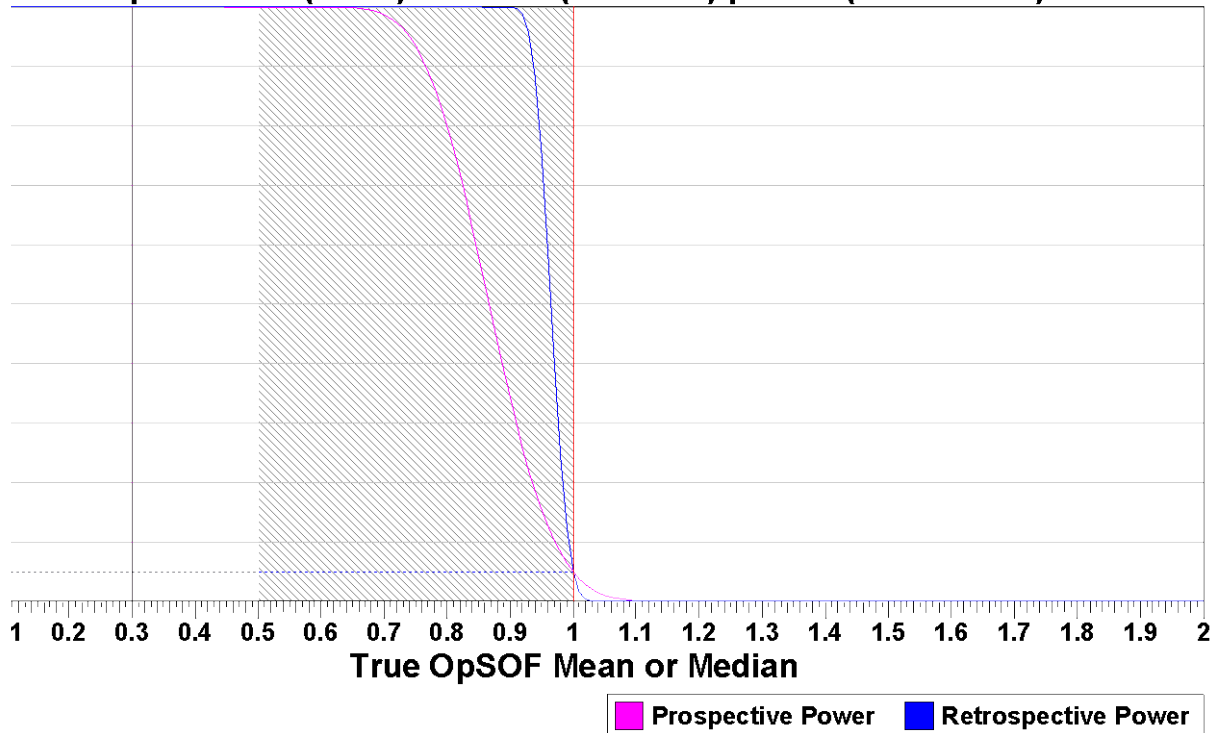


Upper Value	Observation Frequency	Observation %
2.54E-01	23	96%
5.07E-01	0	0%
7.60E-01	0	0%
1.01E+00	0	0%
1.27E+00	0	0%
1.52E+00	1	4%
TOTAL	17	100%

Prospective and Retrospective Power Curves for Survey Unit 10206A

MARSSIM Sign Test (Pro\Retrospective) Power

alpha=5% n=(23\24) std.dev.=(0.3\0.081) power=(100%\100%)



ATTACHMENT 7
SAMPLE ANALYTICAL REPORTS

Analysis Report for 11-Nov-19-10001
L1-10206A-FSGS-001SS

GAMMA SPECTRUM ANALYSIS

Sample Identification : 11-Nov-19-10001
Sample Description : L1-10206A-FSGS-001SS
Sample Type : Soil
Unit :
Sample Point :

Sample Size : 1.507E+03 grams
Facility : Default

Sample Taken On : 11/9/2019 8:00:00AM
Acquisition Started : 11/11/2019 10:48:35AM

Procedure : 130G_SOIL_1
Operator : Administrator
Detector Name : 324
Geometry : 130G_SOIL_1
Live Time : 900.0 seconds
Real Time : 900.3 seconds

Dead Time : 0.03 %

Peak Locate Threshold : 3.00
Peak Locate Range (in channels) : 120 - 4096
Peak Area Range (in channels) : 120 - 4096
Identification Energy Tolerance : 1.000 keV

Energy Calibration Used Done On : 11/4/2019
Efficiency Calibration Used Done On : 11/11/2019
Efficiency Calibration Description :

Sample Number : 81151
Fill Height : 1506.96 gram
Certificate Name : Eu155-Na22
Certificate Date : 1/30/2013 12:00:00PM

PEAK ANALYSIS REPORT

Peak Analysis Performed on : 11/11/2019 11:03:38AM

Peak Analysis From Channel : 120
Peak Analysis To Channel : 4096


Data Validated
0600 11-12-19

Analysis Report for 11-Nov-19-10001
L1-10206A-FSGS-001SS

Peak No.	Energy (keV)	ROI start	ROI end	Peak Centroid	Net Peak Area	Net Area Uncertainty	Continuum Counts	FWHM (keV)
1	238.66	473 -	481	477.49	1.28E+02	18.41	9.84E+01	1.17
2	338.44	672 -	681	676.86	2.70E+01	10.33	3.50E+01	0.88
3	352.08	699 -	709	704.10	5.59E+01	11.59	3.21E+01	1.53
4	609.17	1212 -	1223	1217.92	5.07E+01	9.57	1.63E+01	1.71
5	1460.50	2915 -	2928	2921.06	2.93E+02	17.12	0.00E+00	2.25

M = First peak in a multiplet region
m = Other peak in a multiplet region
F = Fitted singlet
Errors quoted at 1.000sigma

No background subtract performed on this spectrum.

NUCLIDE IDENTIFICATION REPORT

Nuclide Library Used : C:\Canberra\Apex\Root\Default\Library\ZION LIB-BNL.NLB

IDENTIFIED NUCLIDES

Nuclide Name	Id Confidence	Energy (keV)	Yield(%)	Activity (pCi/grams)	Activity Uncertainty
K-40	0.98	1460.82 *	10.66	5.53E+00	4.03E-01
Pb-212	1.00	115.18	0.60		
		238.63 *	43.60	1.79E-01	2.97E-02
		300.09	3.30		
Bi-214	0.99	609.32 *	45.49	1.26E-01	2.50E-02
		768.36	4.89		
		806.18	1.26		
		934.06	3.11		
		1120.29	14.92		
		1155.21	1.63		
		1238.12	5.83		
		1280.98	1.43		

Analysis Report for 11-Nov-19-10001

L1-10206A-FSGS-001SS

Nuclide Name	Id Confidence	Energy (keV)	Yield(%)	Activity (pCi/grams)	Activity Uncertainty
Bi-214	0.99	1377.67	3.99		
		1385.31	0.79		
		1401.52	1.33		
		1407.99	2.39		
		1509.21	2.13		
		1661.27	1.05		
		1729.59	2.88		
		1764.49	15.30		
		1847.43	2.03		
		2118.51	1.16		
Pb-214	0.99	241.99	7.25		
		295.22	18.42		
		351.93 *	35.60	1.23E-01	2.73E-02
		785.96	1.06		
Ac-228	1.00	129.07	2.42		
		209.25	3.89		
		270.24	3.46		
		328.00	2.95		
		338.32 *	11.27	1.82E-01	7.14E-02
		409.46	1.92		
		463.00	4.40		
		794.95	4.25		
		911.20	25.80		
		964.77	4.99		
		968.97	15.80		
		1588.20	3.22		

* = Energy line found in the spectrum.

- = Manually added nuclide.

? = Manually edited nuclide.

@ = Energy line not used for Weighted Mean Activity

Energy Tolerance : 1.000 keV

Nuclide confidence index threshold = 0.30

Errors quoted at 1.000sigma

INTERFERENCE CORRECTED REPORT

Nuclide Name	Nuclide Id Confidence	Wt mean Activity (pCi/grams)	Wt mean Activity Uncertainty	Comments
K-40	0.984	5.53E+00	4.03E-01	

Analysis Report for 11-Nov-19-10001

L1-10206A-FSGS-001SS

Nuclide Name	Nuclide Id Confidence	Wt mean Activity (pCi/grams)	Wt mean Activity Uncertainty	Comments
Pb-212	1.000	1.79E-01	2.97E-02	
Bi-214	0.999	1.26E-01	2.50E-02	
Pb-214	0.998	1.23E-01	2.73E-02	
Ac-228	1.000	1.82E-01	7.14E-02	

? = nuclide is part of an undetermined solution

X = nuclide rejected by the interference analysis

@ = nuclide contains energy lines not used in Weighted Mean Activity

Errors quoted at 1.000sigma

Analysis Report for 11-Nov-19-10001
L1-10206A-FSGS-001SS

UNIDENTIFIED PEAKS

Peak Locate Performed on : 11/11/2019 11:03:38AM
Peak Locate From Channel : 120
Peak Locate To Channel : 4096

Peak No.	Energy (keV)	Peak Size (CPS)	Peak CPS (%) Uncertainty	Peak Type	Tolerance Nuclide
----------	--------------	-----------------	-----------------------------	--------------	----------------------

All peaks were identified.

M = First peak in a multiplet region

m = Other peak in a multiplet region

F = Fitted singlet

Errors quoted at 1.000sigma

NUCLIDE MDA REPORT

Nuclide Library Used : C:\Canberra\Apex\Root\Default\Library\ZION LIB-BNL.NLB

	Nuclide Name	Energy (keV)	Yield(%)	Activity (pCi/grams)	Nuclide MDA (pCi/grams)	Line MDA (pCi/grams)
	An Pk	511.00	100.00	8.31E-02	5.46E-02	5.46E-02
	BE-7	477.60	10.44	-2.41E-01	2.88E-01	2.88E-01
+	K-40	1460.82	* 10.66	5.53E+00	5.43E-02	5.43E-02
	Mn-54	834.85	99.98	2.23E-03	4.19E-02	4.19E-02
	Co-60	1173.23	99.85	1.14E-02	4.58E-02	5.63E-02
		1332.49	99.98	1.41E-02		4.58E-02
	Nb-94	702.65	99.81	1.53E-02	2.58E-02	3.79E-02
		871.09	99.89	-1.27E-02		2.58E-02
	Ag-108m	79.13	6.60	6.17E-01	3.43E-02	1.10E+00
		433.94	90.50	3.89E-03		3.43E-02
		614.28	89.80	6.19E-03		4.49E-02
		722.94	90.80	-1.35E-02		3.68E-02
	Sb-125	176.31	6.84	-4.54E-02	9.46E-02	4.40E-01
		380.45	1.52	-1.31E-01		1.97E+00
		427.87	29.60	-2.29E-02		9.46E-02
		463.36	10.49	5.96E-02		3.12E-01
		600.60	17.65	-5.46E-02		1.77E-01
		606.71	4.98	-9.93E-02		1.04E+00
		635.95	11.22	-4.07E-02		3.07E-01

Analysis Report for 11-Nov-19-10001

L1-10206A-FSGS-001SS

Nuclide Name	Energy (keV)	Yield(%)	Activity (pCi/grams)	Nuclide MDA (pCi/grams)	Line MDA (pCi/grams)
Sb-125	671.44	1.79	6.07E-01	9.46E-02	1.91E+00
Ba-133	79.61	2.65	7.04E-01	6.25E-02	2.57E+00
	81.00	32.90	-2.21E-01		1.71E-01
	276.40	7.16	-1.07E-01		4.37E-01
	302.85	18.34	2.02E-02		1.58E-01
	356.01	62.05	7.38E-03		6.25E-02
	383.85	8.94	-8.09E-02		3.05E-01
Cs-134	475.36	1.48	7.60E-01	3.84E-02	2.16E+00
	563.25	8.34	1.43E-01		3.98E-01
	569.33	15.37	1.59E-02		2.12E-01
	604.72	97.62	-1.11E-02		4.84E-02
	795.86	85.46	9.04E-03		3.84E-02
	801.95	8.69	-2.11E-01		3.04E-01
	1038.61	0.99	5.76E-01		4.28E+00
	1167.97	1.79	-3.87E-01		2.69E+00
	1365.19	3.02	-2.62E-01		1.24E+00
Cs-137	661.66	85.10	5.10E-02	5.22E-02	5.22E-02
Eu-152	121.78	28.67	1.49E-02	1.05E-01	1.05E-01
	244.70	7.61	-1.34E-01		4.14E-01
	295.94	0.45	3.75E+00		7.49E+00
	344.28	26.60	2.40E-02		1.10E-01
	367.79	0.86	2.01E+00		3.78E+00
	411.12	2.24	-5.09E-02		1.41E+00
	443.96	2.83	2.20E-01		9.73E-01
	488.68	0.42	-1.61E+00		7.55E+00
	563.99	0.49	2.42E+00		6.76E+00
	586.26	0.46	7.69E+00		9.68E+00
	678.62	0.47	3.61E-01		6.66E+00
	688.67	0.86	-8.21E-01		3.32E+00
	719.35	0.28	-4.79E+00		1.05E+01
	778.90	12.96	6.88E-02		3.12E-01
	810.45	0.32	8.25E-01		9.63E+00
	867.37	4.26	-1.25E-01		7.38E-01
	919.33	0.43	-3.29E+00		8.80E+00
	964.08	14.65	7.38E-02		3.51E-01
	1085.87	10.24	6.44E-02		4.48E-01
	1089.74	1.73	1.19E-01		2.79E+00
	1112.07	13.69	-1.67E-01		3.23E-01
	1212.95	1.43	-6.38E-01		3.51E+00
	1249.94	0.19	-7.76E+00		2.74E+01
	1299.14	1.63	-1.85E+00		2.44E+00
	1408.01	21.07	-2.79E-02		1.88E-01
	1457.64	0.50	-1.82E+01		3.40E+01
	1528.10	0.28	-2.95E+00		8.26E+00
Eu-154	123.07	40.40	-2.46E-02	7.07E-02	7.07E-02
	247.93	6.89	-2.10E-01		4.00E-01
	591.76	4.95	1.61E-01		6.64E-01
	692.42	1.78	2.17E-02		1.83E+00
	723.30	20.06	4.67E-02		1.76E-01
	756.80	4.52	-2.16E-02		7.47E-01
	873.18	12.08	2.52E-02		2.31E-01

Analysis Report for 11-Nov-19-10001

L1-10206A-FSGS-001SS

Nuclide Name	Energy (keV)	Yield(%)	Activity (pCi/grams)	Nuclide MDA (pCi/grams)	Line MDA (pCi/grams)
Eu-154	996.29	10.48	-1.60E-01	7.07E-02	3.55E-01
	1004.76	18.01	8.20E-02		2.26E-01
	1274.43	34.80	-5.25E-03		1.38E-01
	1596.48	1.80	8.98E-02		1.86E+00
Eu-155	45.30	1.31	6.88E+00	1.64E-01	1.18E+01
	60.01	1.22	-2.23E+00		1.15E+01
	86.55	30.70	4.85E-02		1.64E-01
	105.31	21.10	4.86E-02		1.87E-01
Ra-226	186.21	3.64	4.84E-01	9.35E-01	9.35E-01
Pa-231	27.36	10.30	5.51E-01	1.08E+00	1.08E+00
	283.69	1.70	8.18E-01		1.85E+00
	300.07	2.47	-1.44E+00		1.10E+00
	302.65	2.20	1.68E-01		1.31E+00
	330.06	1.40	3.08E-01		2.14E+00
U-235	143.76	10.96	1.09E-01	6.02E-02	2.83E-01
	163.33	5.08	8.12E-02		6.40E-01
	185.71	57.20	4.12E-02		6.02E-02
	202.11	1.08	1.10E+00		2.90E+00
Am-241	205.31	5.01	-3.54E-01	4.13E-01	5.95E-01
	59.54	35.90	4.63E-02		4.13E-01

- + = Nuclide identified during the nuclide identification
 * = Energy line found in the spectrum
 > = MDA value not calculated
 @ = Half-life too short to be able to perform the decay correction
 ? = CAUTION: MDA value is inconsistent with Currie MDA at 95% confidence level

Analysis Report for 11-Nov-19-10002
L1-10206A-FSGS-002SS

GAMMA SPECTRUM ANALYSIS

Sample Identification : 11-Nov-19-10002
Sample Description : L1-10206A-FSGS-002SS
Sample Type : Soil
Unit :
Sample Point :

Sample Size : 1.428E+03 grams
Facility : Default

Sample Taken On : 11/9/2019 8:02:00AM
Acquisition Started : 11/11/2019 10:48:44AM

Procedure : 130G_SOIL_1
Operator : Administrator
Detector Name : P40818B
Geometry : 130G_SOIL_1
Live Time : 900.0 seconds
Real Time : 901.1 seconds

Dead Time : 0.12 %

Peak Locate Threshold : 3.00
Peak Locate Range (in channels) : 120 - 8192
Peak Area Range (in channels) : 120 - 8192
Identification Energy Tolerance : 1.000 keV

Energy Calibration Used Done On : 11/4/2019
Efficiency Calibration Used Done On : 11/11/2019
Efficiency Calibration Description :

Sample Number : 81152
Fill Height : 1427.81 gram
Certificate Name : Eu155-Na22
Certificate Date : 1/30/2012 12:00:00PM

PEAK ANALYSIS REPORT

Peak Analysis Performed on : 11/11/2019 11:03:48AM

Peak Analysis From Channel : 120
Peak Analysis To Channel : 8192


Data Validated
0600 11-12-19

Analysis Report for 11-Nov-19-10002
L1-10206A-FSGS-002SS

Peak No.	Energy (keV)	ROI start	ROI end	Peak Centroid	Net Peak Area	Net Area Uncertainty	Continuum Counts	FWHM (keV)
1	238.61	950 -	959	954.55	8.30E+01	13.61	4.50E+01	1.02
2	338.37	1349 -	1360	1353.24	3.90E+01	10.04	2.40E+01	0.62
3	351.98	1401 -	1412	1407.65	7.10E+01	10.43	1.50E+01	1.17
4	609.26	2430 -	2442	2436.20	4.22E+01	7.92	7.78E+00	0.61
5	1460.89	5834 -	5854	5843.38	1.70E+02	13.67	4.81E+00	1.52

M = First peak in a multiplet region
m = Other peak in a multiplet region
F = Fitted singlet
Errors quoted at 1.000sigma

No background subtract performed on this spectrum.

NUCLIDE IDENTIFICATION REPORT

Nuclide Library Used : C:\Canberra\Apex\Root\Default\Library\ZION LIB-BNL.NLB

IDENTIFIED NUCLIDES

Nuclide Name	Id Confidence	Energy (keV)	Yield(%)	Activity (pCi/grams)	Activity Uncertainty
K-40	0.99	1460.82 *	10.66	4.34E+00	3.96E-01
Bi-211	0.87	351.07 *	13.02	5.52E-01	9.25E-02
Pb-212	1.00	115.18	0.60		
		238.63 *	43.60	1.51E-01	2.75E-02
		300.09	3.30		
Bi-214	1.00	609.32 *	45.49	1.38E-01	2.72E-02
		768.36	4.89		
		806.18	1.26		
		934.06	3.11		
		1120.29	14.92		
		1155.21	1.63		
		1238.12	5.83		

Analysis Report for 11-Nov-19-10002

L1-10206A-FSGS-002SS

Nuclide Name	Id Confidence	Energy (keV)	Yield(%)	Activity (pCi/grams)	Activity Uncertainty
Bi-214	1.00	1280.98	1.43		
		1377.67	3.99		
		1385.31	0.79		
		1401.52	1.33		
		1407.99	2.39		
		1509.21	2.13		
		1661.27	1.05		
		1729.59	2.88		
		1764.49	15.30		
		1847.43	2.03		
		2118.51	1.16		
Pb-214	1.00	241.99	7.25		
		295.22	18.42		
		351.93 *	35.60	2.02E-01	3.38E-02
		785.96	1.06		
Ac-228	0.57	129.07	2.42		
		209.25	3.89		
		270.24	3.46		
		328.00	2.95		
		338.32 *	11.27	3.41E-01	9.20E-02
		409.46	1.92		
		463.00	4.40		
		794.95	4.25		
		911.20	25.80		
		964.77	4.99		
		968.97	15.80		
		1588.20	3.22		

* = Energy line found in the spectrum.

- = Manually added nuclide.

? = Manually edited nuclide.

@ = Energy line not used for Weighted Mean Activity

Energy Tolerance : 1.000 keV

Nuclide confidence index threshold = 0.30

Errors quoted at 1.000sigma

INTERFERENCE CORRECTED REPORT

Nuclide Name	Nuclide Id Confidence	Wt mean Activity (pCi/grams)	Wt mean Activity Uncertainty	Comments
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Analysis Report for 11-Nov-19-10002

L1-10206A-FSGS-002SS

	Nuclide Name	Nuclide Id Confidence	Wt mean Activity (pCi/grams)	Wt mean Activity Uncertainty	Comments
	K-40	0.999	4.34E+00	3.96E-01	
?	Bi-211	0.876	5.52E-01	9.25E-02	
	Pb-212	1.000	1.51E-01	2.75E-02	
	Bi-214	1.000	1.38E-01	2.72E-02	
?	Pb-214	1.000	2.02E-01	3.38E-02	
	Ac-228	0.574	3.41E-01	9.20E-02	

? = nuclide is part of an undetermined solution

X = nuclide rejected by the interference analysis

@ = nuclide contains energy lines not used in Weighted Mean Activity

Errors quoted at 1.000sigma

Analysis Report for 11-Nov-19-10002
L1-10206A-FSGS-002SS

UNIDENTIFIED PEAKS

Peak Locate Performed on : 11/11/2019 11:03:48AM
Peak Locate From Channel : 120
Peak Locate To Channel : 8192

Peak No.	Energy (keV)	Peak Size (CPS)	Peak CPS (%) Uncertainty	Peak Type	Tolerance Nuclide
All peaks were identified.					
M = First peak in a multiplet region					
m = Other peak in a multiplet region					
F = Fitted singlet					
Errors quoted at 1.000sigma					

NUCLIDE MDA REPORT

Nuclide Library Used : C:\Canberra\Apex\Root\Default\Library\ZION LIB-BNL.NLB

	Nuclide Name	Energy (keV)	Yield(%)	Activity (pCi/grams)	Nuclide MDA (pCi/grams)	Line MDA (pCi/grams)
	An Pk	511.00	100.00	8.44E-02	6.02E-02	6.02E-02
	BE-7	477.60	10.44	4.87E-01	5.14E-01	5.14E-01
+	K-40	1460.82	* 10.66	4.34E+00	4.25E-01	4.25E-01
	Mn-54	834.85	99.98	1.62E-02	4.41E-02	4.41E-02
	Co-60	1173.23	99.85	-2.26E-02	5.43E-02	5.79E-02
		1332.49	99.98	3.38E-03		5.43E-02
	Nb-94	702.65	99.81	2.75E-02	4.19E-02	4.57E-02
		871.09	99.89	-3.00E-03		4.19E-02
	Ag-108m	79.13	6.60	4.09E-01	4.32E-02	1.60E+00
		433.94	90.50	6.87E-03		4.32E-02
		614.28	89.80	-5.29E-02		5.34E-02
		722.94	90.80	-1.43E-03		5.12E-02
	Sb-125	176.31	6.84	-4.48E-01	1.29E-01	5.12E-01
		380.45	1.52	-2.54E+00		2.00E+00
		427.87	29.60	1.46E-02		1.29E-01
		463.36	10.49	1.97E-01		4.03E-01
		600.60	17.65	1.09E-02		2.08E-01
		606.71	4.98	1.55E+00		1.27E+00
		635.95	11.22	-1.31E-02		3.54E-01

Analysis Report for 11-Nov-19-10002

L1-10206A-FSGS-002SS

Nuclide Name	Energy (keV)	Yield(%)	Activity (pCi/grams)	Nuclide MDA (pCi/grams)	Line MDA (pCi/grams)
Sb-125	671.44	1.79	8.03E-01	1.29E-01	2.07E+00
Ba-133	79.61	2.65	-2.47E+00	7.45E-02	3.76E+00
	81.00	32.90	-2.08E-01		2.70E-01
	276.40	7.16	4.42E-02		5.10E-01
	302.85	18.34	2.41E-03		2.08E-01
	356.01	62.05	-7.46E-02		7.45E-02
	383.85	8.94	4.83E-02		3.87E-01
Cs-134	475.36	1.48	4.55E-01	5.42E-02	3.53E+00
	563.25	8.34	1.03E-01		4.87E-01
	569.33	15.37	-2.26E-02		2.25E-01
	604.72	97.62	-2.91E-02		6.08E-02
	795.86	85.46	-1.62E-02		5.42E-02
	801.95	8.69	-3.60E-01		4.17E-01
	1038.61	0.99	4.88E-01		4.52E+00
	1167.97	1.79	2.12E+00		3.29E+00
	1365.19	3.02	-2.47E+00		1.07E+00
Cs-137	661.66	85.10	5.12E-02	5.56E-02	5.56E-02
Eu-152	121.78	28.67	8.54E-02	1.49E-01	1.54E-01
	244.70	7.61	3.63E-01		5.78E-01
	295.94	0.45	1.74E-01		1.02E+01
	344.28	26.60	3.65E-02		1.49E-01
	367.79	0.86	-4.83E-01		3.98E+00
	411.12	2.24	5.81E-01		1.85E+00
	443.96	2.83	5.66E-01		1.32E+00
	488.68	0.42	1.71E+00		9.75E+00
	563.99	0.49	7.19E-02		8.13E+00
	586.26	0.46	1.28E+01		1.19E+01
	678.62	0.47	-7.24E-01		7.70E+00
	688.67	0.86	1.83E+00		4.97E+00
	719.35	0.28	-2.03E-01		1.61E+01
	778.90	12.96	-2.73E-01		2.74E-01
	810.45	0.32	-1.41E+00		1.31E+01
	867.37	4.26	-1.40E+00		9.53E-01
	919.33	0.43	-5.76E-01		8.32E+00
	964.08	14.65	2.50E-01		4.29E-01
	1085.87	10.24	1.00E-01		4.88E-01
	1089.74	1.73	9.31E-01		2.97E+00
	1112.07	13.69	-2.46E-02		3.71E-01
	1212.95	1.43	3.27E+00		4.48E+00
	1249.94	0.19	8.74E+00		2.83E+01
	1299.14	1.63	2.08E+00		3.73E+00
	1408.01	21.07	1.17E-01		2.77E-01
	1457.64	0.50	9.87E+01		3.65E+01
	1528.10	0.28	4.63E-01		1.55E+01
Eu-154	123.07	40.40	3.55E-02	1.08E-01	1.08E-01
	247.93	6.89	-5.69E-02		5.63E-01
	591.76	4.95	2.30E-01		8.06E-01
	692.42	1.78	-2.49E+00		2.41E+00
	723.30	20.06	1.67E-02		2.36E-01
	756.80	4.52	-4.18E-01		9.09E-01
	873.18	12.08	5.61E-02		3.47E-01

Analysis Report for 11-Nov-19-10002

L1-10206A-FSGS-002SS

Nuclide Name	Energy (keV)	Yield(%)	Activity (pCi/grams)	Nuclide MDA (pCi/grams)	Line MDA (pCi/grams)
Eu-154	996.29	10.48	3.38E-01	1.08E-01	4.51E-01
	1004.76	18.01	-6.99E-03		2.10E-01
	1274.43	34.80	-1.86E-01		1.68E-01
	1596.48	1.80	6.95E-02		2.52E+00
Eu-155	45.30	1.31	1.00E+01	2.35E-01	3.06E+01
	60.01	1.22	8.52E+00		2.92E+01
	86.55	30.70	-1.37E-01		2.35E-01
	105.31	21.10	1.04E-01		2.58E-01
Ra-226	186.21	3.64	9.43E-01	1.18E+00	1.18E+00
Pa-231	27.36	10.30	3.22E+00	1.64E+00	3.39E+00
	283.69	1.70	-7.65E-01		1.64E+00
	300.07	2.47	2.25E-01		1.73E+00
	302.65	2.20	1.12E-01		1.73E+00
	330.06	1.40	1.33E+00		2.88E+00
U-235	143.76	10.96	-2.19E-02	7.45E-02	3.66E-01
	163.33	5.08	-2.44E-01		7.87E-01
	185.71	57.20	6.18E-02		7.45E-02
	202.11	1.08	1.57E+00		3.47E+00
	205.31	5.01	-4.80E-01		7.13E-01
Am-241	59.54	35.90	-3.63E-02	1.01E+00	1.01E+00

+ = Nuclide identified during the nuclide identification

* = Energy line found in the spectrum

> = MDA value not calculated

@ = Half-life too short to be able to perform the decay correction

? = CAUTION: MDA value is inconsistent with Currie MDA at 95% confidence level

Analysis Report for 11-Nov-19-10003
L1-10206A-FSGS-003SS

GAMMA SPECTRUM ANALYSIS

Sample Identification : 11-Nov-19-10003
Sample Description : L1-10206A-FSGS-003SS
Sample Type : Soil
Unit :
Sample Point :

Sample Size : 1.343E+03 grams
Facility : Default

Sample Taken On : 11/9/2019 8:04:00AM
Acquisition Started : 11/11/2019 10:48:51AM

Procedure : 130G_SOIL_1
Operator : Administrator
Detector Name : P11314
Geometry : 130G_SOIL_1
Live Time : 900.0 seconds
Real Time : 900.4 seconds

Dead Time : 0.05 %

Peak Locate Threshold : 3.00
Peak Locate Range (in channels) : 120 - 8192
Peak Area Range (in channels) : 120 - 8192
Identification Energy Tolerance : 1.000 keV

Energy Calibration Used Done On : 11/4/2019
Efficiency Calibration Used Done On : 11/11/2019
Efficiency Calibration Description :

Sample Number : 81153
Fill Height : 1343.30 gram
Certificate Name : Eu155-Na22
Certificate Date : 12/22/2008 12:00:00PM

PEAK ANALYSIS REPORT

Peak Analysis Performed on : 11/11/2019 11:04:07AM

Peak Analysis From Channel : 120
Peak Analysis To Channel : 8192


Data Validated
0600 11-12-19

Analysis Report for 11-Nov-19-10003
L1-10206A-FSGS-003SS

Peak No.	Energy (keV)	ROI start	ROI end	Peak Centroid	Net Peak Area	Net Area Uncertainty	Continuum Counts	FWHM (keV)
1	238.53	947 -	961	953.69	8.68E+01	18.47	8.82E+01	0.91
2	338.18	1348 -	1358	1351.80	2.68E+01	10.06	3.12E+01	0.55
3	352.00	1400 -	1413	1407.02	3.01E+01	11.25	3.49E+01	0.44
4	582.86	2324 -	2336	2329.58	4.09E+01	8.38	1.11E+01	0.79
5	608.95	2427 -	2440	2433.85	3.83E+01	9.02	1.57E+01	0.83
6	661.44	2634 -	2654	2643.65	8.97E+02	30.57	1.05E+01	1.54
7	910.94	3636 -	3646	3641.22	2.73E+01	6.58	6.75E+00	0.39
8	1460.12	5827 -	5850	5838.41	2.30E+02	15.52	2.82E+00	1.02

M = First peak in a multiplet region

m = Other peak in a multiplet region

F = Fitted singlet

Errors quoted at 1.000sigma

No background subtract performed on this spectrum.

NUCLIDE IDENTIFICATION REPORT

Nuclide Library Used : C:\Canberra\Apex\Root\Default\Library\ZION LIB-BNL.NLB

IDENTIFIED NUCLIDES

Nuclide Name	Id Confidence	Energy (keV)	Yield(%)	Activity (pCi/grams)	Activity Uncertainty
K-40	0.92	1460.82 *	10.66	5.39E+00	4.32E-01
Cs-137	0.99	661.66 *	85.10	1.52E+00	1.05E-01
Tl-208	0.98	583.19 *	85.00	6.37E-02	1.36E-02
Bi-211	0.87	351.07 *	13.02	2.14E-01	8.18E-02
Pb-212	0.99	115.18 *	0.60		
		238.63 *	43.60	1.42E-01	3.23E-02
		300.09	3.30		
Bi-214	0.99	609.32 *	45.49	1.15E-01	2.80E-02
		768.36	4.89		

Analysis Report for 11-Nov-19-10003

L1-10206A-FSGS-003SS

Nuclide Name	Id Confidence	Energy (keV)	Yield(%)	Activity (pCi/grams)	Activity Uncertainty
Bi-214	0.99	806.18	1.26		
		934.06	3.11		
		1120.29	14.92		
		1155.21	1.63		
		1238.12	5.83		
		1280.98	1.43		
		1377.67	3.99		
		1385.31	0.79		
		1401.52	1.33		
		1407.99	2.39		
		1509.21	2.13		
		1661.27	1.05		
		1729.59	2.88		
		1764.49	15.30		
		1847.43	2.03		
		2118.51	1.16		
Pb-214	1.00	241.99	7.25		
		295.22	18.42		
		351.93 *	35.60	7.83E-02	2.99E-02
		785.96	1.06		
Ac-228	0.99	129.07	2.42		
		209.25	3.89		
		270.24	3.46		
		328.00	2.95		
		338.32 *	11.27	2.13E-01	8.20E-02
		409.46	1.92		
		463.00	4.40		
		794.95	4.25		
		911.20 *	25.80	1.90E-01	4.67E-02
		964.77	4.99		
		968.97	15.80		
		1588.20	3.22		

* = Energy line found in the spectrum.

- = Manually added nuclide.

? = Manually edited nuclide.

@ = Energy line not used for Weighted Mean Activity

Energy Tolerance : 1.000 keV

Nuclide confidence index threshold = 0.30

Errors quoted at 1.000sigma

INTERFERENCE CORRECTED REPORT

Analysis Report for 11-Nov-19-10003

L1-10206A-FSGS-003SS

Nuclide Name	Nuclide Id Confidence	Wt mean Activity (pCi/grams)	Wt mean Activity Uncertainty	Comments
K-40	0.924	5.39E+00	4.32E-01	
Cs-137	0.992	1.52E+00	1.05E-01	
Tl-208	0.984	6.37E-02	1.36E-02	
? Bi-211	0.870	2.14E-01	8.18E-02	
Pb-212	0.998	1.42E-01	3.23E-02	
Bi-214	0.991	1.15E-01	2.80E-02	
? Pb-214	1.000	7.83E-02	2.99E-02	
Ac-228	0.996	1.96E-01	4.06E-02	

? = nuclide is part of an undetermined solution

X = nuclide rejected by the interference analysis

@ = nuclide contains energy lines not used in Weighted Mean Activity

Errors quoted at 1.000sigma

Analysis Report for 11-Nov-19-10003
L1-10206A-FSGS-003SS

UNIDENTIFIED PEAKS

Peak Locate Performed on : 11/11/2019 11:04:07AM
Peak Locate From Channel : 120
Peak Locate To Channel : 8192

Peak No.	Energy (keV)	Peak Size (CPS)	Peak CPS (%) Uncertainty	Peak Type	Tolerance Nuclide
All peaks were identified.					
M = First peak in a multiplet region					
m = Other peak in a multiplet region					
F = Fitted singlet					
Errors quoted at 1.000sigma					

NUCLIDE MDA REPORT

Nuclide Library Used : C:\Canberra\Apex\Root\Default\Library\ZION LIB-BNL.NLB

	Nuclide Name	Energy (keV)	Yield(%)	Activity (pCi/grams)	Nuclide MDA (pCi/grams)	Line MDA (pCi/grams)
	An Pk	511.00	100.00	7.75E-02	6.37E-02	6.37E-02
	BE-7	477.60	10.44	1.45E-01	6.00E-01	6.00E-01
+	K-40	1460.82	* 10.66	5.39E+00	3.29E-01	3.29E-01
	Mn-54	834.85	99.98	2.40E-03	3.86E-02	3.86E-02
	Co-60	1173.23	99.85	5.90E-04	5.13E-02	6.14E-02
		1332.49	99.98	-1.98E-02		5.13E-02
	Nb-94	702.65	99.81	1.07E-02	3.83E-02	3.83E-02
		871.09	99.89	1.61E-02		4.06E-02
	Ag-108m	79.13	6.60	4.43E-01	4.93E-02	1.16E+00
		433.94	90.50	5.56E-04		5.84E-02
		614.28	89.80	-2.32E-02		4.96E-02
		722.94	90.80	-2.04E-02		4.93E-02
	Sb-125	176.31	6.84	7.27E-02	1.82E-01	5.09E-01
		380.45	1.52	1.20E+00		2.96E+00
		427.87	29.60	1.64E-01		1.82E-01
		463.36	10.49	-2.84E-01		4.98E-01
		600.60	17.65	-2.41E-01		2.13E-01
		606.71	4.98	1.81E+00		1.22E+00
		635.95	11.22	-1.29E-01		3.61E-01

Analysis Report for 11-Nov-19-10003

L1-10206A-FSGS-003SS

Nuclide Name	Energy (keV)	Yield(%)	Activity (pCi/grams)	Nuclide MDA (pCi/grams)	Line MDA (pCi/grams)
Sb-125	671.44	1.79	-2.40E-01	1.82E-01	2.03E+00
Ba-133	79.61	2.65	1.77E+00	7.24E-02	2.84E+00
	81.00	32.90	-2.93E-01		1.81E-01
	276.40	7.16	1.01E-01		5.28E-01
	302.85	18.34	5.30E-02		2.18E-01
	356.01	62.05	-1.37E-03		7.24E-02
	383.85	8.94	-3.76E-01		4.72E-01
Cs-134	475.36	1.48	1.46E+00	4.88E-02	4.28E+00
	563.25	8.34	-2.35E-01		5.45E-01
	569.33	15.37	2.09E-01		3.18E-01
	604.72	97.62	-1.39E-02		5.80E-02
	795.86	85.46	2.88E-03		4.88E-02
	801.95	8.69	1.76E-02		5.29E-01
	1038.61	0.99	5.48E-01		4.15E+00
	1167.97	1.79	2.53E+00		3.63E+00
	1365.19	3.02	1.40E-01		1.36E+00
+	Cs-137	*	85.10	4.06E-02	4.06E-02
	Eu-152		28.67	1.20E-01	1.20E-01
	244.70	7.61	-1.64E-01		5.71E-01
	295.94	0.45	4.89E+00		9.97E+00
	344.28	26.60	-6.97E-02		1.60E-01
	367.79	0.86	2.12E+00		5.56E+00
	411.12	2.24	-2.96E-01		1.98E+00
	443.96	2.83	-1.74E-02		1.89E+00
	488.68	0.42	9.36E-01		1.12E+01
	563.99	0.49	-2.12E+00		9.43E+00
	586.26	0.46	8.68E-01		1.32E+01
	678.62	0.47	-1.80E+00		6.69E+00
	688.67	0.86	1.46E+00		4.48E+00
	719.35	0.28	2.47E+00		1.47E+01
	778.90	12.96	2.84E-01		3.80E-01
	810.45	0.32	-1.30E+00		1.31E+01
	867.37	4.26	-5.52E-01		9.49E-01
	919.33	0.43	-1.02E+00		9.09E+00
	964.08	14.65	1.04E-01		3.56E-01
	1085.87	10.24	-3.01E-01		3.58E-01
	1089.74	1.73	3.07E-01		2.37E+00
	1112.07	13.69	-4.46E-01		3.90E-01
	1212.95	1.43	1.07E+00		3.96E+00
	1249.94	0.19	1.30E+01		2.67E+01
	1299.14	1.63	-3.41E+00		2.93E+00
	1408.01	21.07	6.91E-02		1.68E-01
	1457.64	0.50	1.13E+02		3.79E+01
	1528.10	0.28	3.44E-01		1.34E+01
Eu-154	123.07	40.40	-1.70E-02	8.41E-02	8.41E-02
	247.93	6.89	1.32E-01		5.90E-01
	591.76	4.95	-2.70E-01		8.57E-01
	692.42	1.78	6.56E-01		2.13E+00
	723.30	20.06	-5.13E-02		2.30E-01
	756.80	4.52	4.77E-01		1.01E+00
	873.18	12.08	-9.08E-02		3.44E-01

Analysis Report for 11-Nov-19-10003

L1-10206A-FSGS-003SS

Nuclide Name	Energy (keV)	Yield(%)	Activity (pCi/grams)	Nuclide MDA (pCi/grams)	Line MDA (pCi/grams)
Eu-154	996.29	10.48	6.86E-02	8.41E-02	3.92E-01
	1004.76	18.01	-1.35E-01		2.36E-01
	1274.43	34.80	-8.62E-02		1.35E-01
	1596.48	1.80	-1.28E-01		2.32E+00
Eu-155	45.30	1.31	7.03E+00	1.80E-01	1.28E+01
	60.01	1.22	2.06E+00		1.23E+01
	86.55	30.70	3.49E-02		1.80E-01
	105.31	21.10	6.79E-02		2.08E-01
Ra-226	186.21	3.64	4.28E-01	1.07E+00	1.07E+00
Pa-231	27.36	10.30	1.00E+00	1.35E+00	1.35E+00
	283.69	1.70	1.72E+00		2.41E+00
	300.07	2.47	-2.70E+00		1.55E+00
	302.65	2.20	8.22E-01		1.82E+00
	330.06	1.40	2.75E+00		3.44E+00
U-235	143.76	10.96	2.08E-01	6.84E-02	3.37E-01
	163.33	5.08	-1.82E-01		6.93E-01
	185.71	57.20	3.70E-02		6.84E-02
	202.11	1.08	8.22E-01		3.37E+00
Am-241	205.31	5.01	-3.42E-01	4.34E-01	6.83E-01
	59.54	35.90	7.44E-02		4.34E-01

- + = Nuclide identified during the nuclide identification
 * = Energy line found in the spectrum
 > = MDA value not calculated
 @ = Half-life too short to be able to perform the decay correction
 ? = CAUTION: MDA value is inconsistent with Currie MDA at 95% confidence level

Analysis Report for 11-Nov-19-10004
L1-10206A-FSGS-004SS

GAMMA SPECTRUM ANALYSIS

Sample Identification : 11-Nov-19-10004
Sample Description : L1-10206A-FSGS-004SS
Sample Type : Soil
Unit :
Sample Point :

Sample Size : 1.672E+03 grams
Facility : Default

Sample Taken On : 11/9/2019 8:06:00AM
Acquisition Started : 11/11/2019 10:48:58AM

Procedure : 130G_SOIL_1
Operator : Administrator
Detector Name : 352
Geometry : 130G_SOIL_1
Live Time : 900.0 seconds
Real Time : 900.3 seconds

Dead Time : 0.03 %

Peak Locate Threshold : 3.00
Peak Locate Range (in channels) : 120 - 8192
Peak Area Range (in channels) : 120 - 8192
Identification Energy Tolerance : 1.000 keV

Energy Calibration Used Done On : 11/4/2019
Efficiency Calibration Used Done On : 11/11/2019
Efficiency Calibration Description :

Sample Number : 81154
Fill Height : 1671.84 gram
Certificate Name : Eu155-Na22
Certificate Date : 1/7/2013 12:00:00PM

PEAK ANALYSIS REPORT

Peak Analysis Performed on : 11/11/2019 11:04:07AM

Peak Analysis From Channel : 120
Peak Analysis To Channel : 8192


Data Validated
0600 11-12-19

Analysis Report for 11-Nov-19-10004
L1-10206A-FSGS-004SS

Peak No.	Energy (keV)	ROI start	ROI end	Peak Centroid	Net Peak Area	Net Area Uncertainty	Continuum Counts	FWHM (keV)
1	77.12	306 -	313	309.79	1.91E+01	10.82	4.89E+01	0.40
2	238.65	949 -	960	955.07	1.00E+02	15.51	5.57E+01	0.98
3	338.14	1348 -	1357	1352.62	2.10E+01	8.16	2.00E+01	0.76
4	351.83	1401 -	1415	1407.32	8.24E+01	12.25	2.36E+01	1.01
5	583.17	2325 -	2338	2332.00	4.76E+01	9.49	1.54E+01	1.06
6	609.18	2429 -	2444	2435.99	6.61E+01	9.79	9.93E+00	0.78
7	911.35	3639 -	3650	3644.42	1.87E+01	6.67	1.03E+01	0.98
8	1460.72	5830 -	5855	5843.24	3.14E+02	18.09	3.21E+00	1.63

M = First peak in a multiplet region

m = Other peak in a multiplet region

F = Fitted singlet

Errors quoted at 1.000sigma

No background subtract performed on this spectrum.

NUCLIDE IDENTIFICATION REPORT

Nuclide Library Used : C:\Canberra\Apex\Root\Default\Library\ZION LIB-BNL.NLB

IDENTIFIED NUCLIDES

Nuclide Name	Id Confidence	Energy (keV)	Yield(%)	Activity (pCi/grams)	Activity Uncertainty
K-40	0.99	1460.82 *	10.66	6.42E+00	4.63E-01
Tl-208	1.00	583.19 *	85.00	6.68E-02	1.39E-02
Bi-211	0.91	351.07 *	13.02	5.39E-01	9.13E-02
Pb-212	1.00	115.18	0.60		
		238.63 *	43.60	1.55E-01	2.70E-02
		300.09	3.30		
Pb212-XR	1.00	74.82	10.28		
		77.11 *	17.10	1.76E-01	1.02E-01
		87.35	3.97		

Analysis Report for 11-Nov-19-10004

L1-10206A-FSGS-004SS

Nuclide Name	Id Confidence	Energy (keV)	Yield(%)	Activity (pCi/grams)	Activity Uncertainty
Pb212-XR	1.00	89.78	1.46		
Bi-214	0.99	609.32 *	45.49	1.78E-01	2.85E-02
		768.36	4.89		
		806.18	1.26		
		934.06	3.11		
		1120.29	14.92		
		1155.21	1.63		
		1238.12	5.83		
		1280.98	1.43		
		1377.67	3.99		
		1385.31	0.79		
		1401.52	1.33		
		1407.99	2.39		
		1509.21	2.13		
		1661.27	1.05		
		1729.59	2.88		
		1764.49	15.30		
		1847.43	2.03		
		2118.51	1.16		
Pb-214	0.99	241.99	7.25		
		295.22	18.42		
		351.93 *	35.60	1.97E-01	3.33E-02
		785.96	1.06		
Pb214-XR	1.00	74.82	5.80		
		77.11 *	9.70	3.11E-01	1.80E-01
		87.35	2.24		
		89.78	0.82		
Ac-228	0.99	129.07	2.42		
		209.25	3.89		
		270.24	3.46		
		328.00	2.95		
		338.32 *	11.27	1.55E-01	6.14E-02
		409.46	1.92		
		463.00	4.40		
		794.95	4.25		
		911.20 *	25.80	1.16E-01	4.16E-02
		964.77	4.99		
		968.97	15.80		
		1588.20	3.22		

* = Energy line found in the spectrum.

- = Manually added nuclide.

? = Manually edited nuclide.

@ = Energy line not used for Weighted Mean Activity

Energy Tolerance : 1.000 keV

Nuclide confidence index threshold = 0.30

Errors quoted at 1.000sigma

Analysis Report for 11-Nov-19-10004

L1-10206A-FSGS-004SS

INTERFERENCE CORRECTED REPORT

<i>Nuclide Name</i>	<i>Nuclide Id Confidence</i>	<i>Wt mean Activity (pCi/grams)</i>	<i>Wt mean Activity Uncertainty</i>	<i>Comments</i>
K-40	0.998	6.42E+00	4.63E-01	
Tl-208	1.000	6.68E-02	1.39E-02	
? Bi-211	0.912	5.39E-01	9.13E-02	
Pb-212	1.000	1.55E-01	2.70E-02	
? Pb212-XR	1.000	1.76E-01	1.02E-01	
Bi-214	0.999	1.78E-01	2.85E-02	
? Pb-214	0.999	1.97E-01	3.33E-02	
? Pb214-XR	1.000	3.11E-01	1.80E-01	
Ac-228	0.998	1.28E-01	3.45E-02	

? = nuclide is part of an undetermined solution

X = nuclide rejected by the interference analysis

@ = nuclide contains energy lines not used in Weighted Mean Activity

Errors quoted at 1.000sigma

Analysis Report for 11-Nov-19-10004
L1-10206A-FSGS-004SS

UNIDENTIFIED PEAKS

Peak Locate Performed on : 11/11/2019 11:04:07AM
Peak Locate From Channel : 120
Peak Locate To Channel : 8192

Peak No.	Energy (keV)	Peak Size (CPS)	Peak CPS (%) Uncertainty	Peak Type	Tolerance Nuclide
All peaks were identified.					
M = First peak in a multiplet region					
m = Other peak in a multiplet region					
F = Fitted singlet					
Errors quoted at 1.000sigma					

NUCLIDE MDA REPORT

Nuclide Library Used : C:\Canberra\Apex\Root\Default\Library\ZION LIB-BNL.NLB

	Nuclide Name	Energy (keV)	Yield(%)	Activity (pCi/grams)	Nuclide MDA (pCi/grams)	Line MDA (pCi/grams)
	An Pk	511.00	100.00	2.26E-02	4.90E-02	4.90E-02
	BE-7	477.60	10.44	-1.48E-01	3.79E-01	3.79E-01
+	K-40	1460.82	* 10.66	6.42E+00	3.14E-01	3.14E-01
	Mn-54	834.85	99.98	2.61E-02	3.92E-02	3.92E-02
	Co-60	1173.23	99.85	1.77E-02	4.96E-02	6.03E-02
		1332.49	99.98	-1.35E-03		4.96E-02
	Nb-94	702.65	99.81	-8.71E-03	3.88E-02	3.88E-02
		871.09	99.89	9.38E-03		4.16E-02
	Ag-108m	79.13	6.60	1.45E-02	3.92E-02	1.34E+00
		433.94	90.50	-1.74E-03		3.92E-02
		614.28	89.80	-4.15E-02		6.69E-02
		722.94	90.80	2.51E-02		4.79E-02
	Sb-125	176.31	6.84	4.23E-02	1.17E-01	4.37E-01
		380.45	1.52	1.59E-01		2.27E+00
		427.87	29.60	7.29E-02		1.17E-01
		463.36	10.49	6.18E-02		3.54E-01
		600.60	17.65	-1.27E-02		2.24E-01
		606.71	4.98	2.04E+00		1.27E+00
		635.95	11.22	-1.34E-02		3.66E-01

Analysis Report for 11-Nov-19-10004

L1-10206A-FSGS-004SS

Nuclide Name	Energy (keV)	Yield(%)	Activity (pCi/grams)	Nuclide MDA (pCi/grams)	Line MDA (pCi/grams)
Sb-125	671.44	1.79	-2.21E+00	1.17E-01	2.00E+00
Ba-133	79.61	2.65	-2.60E+00	7.11E-02	3.26E+00
	81.00	32.90	-2.90E-01		2.19E-01
	276.40	7.16	4.84E-02		4.67E-01
	302.85	18.34	5.56E-02		2.01E-01
	356.01	62.05	-8.51E-03		7.11E-02
	383.85	8.94	7.56E-02		3.83E-01
Cs-134	475.36	1.48	3.63E-01	5.07E-02	2.58E+00
	563.25	8.34	5.96E-02		4.38E-01
	569.33	15.37	9.67E-02		2.54E-01
	604.72	97.62	2.09E-04		5.94E-02
	795.86	85.46	-4.98E-02		5.07E-02
	801.95	8.69	2.23E-01		5.15E-01
	1038.61	0.99	4.60E-01		4.46E+00
	1167.97	1.79	-2.83E+00		3.27E+00
	1365.19	3.02	-8.61E-02		1.39E+00
Cs-137	661.66	85.10	1.98E-02	6.01E-02	6.01E-02
Eu-152	121.78	28.67	1.73E-04	1.21E-01	1.34E-01
	244.70	7.61	3.50E-01		4.74E-01
	295.94	0.45	5.21E+00		9.44E+00
	344.28	26.60	-4.95E-02		1.21E-01
	367.79	0.86	1.48E+00		3.61E+00
	411.12	2.24	1.77E-01		1.60E+00
	443.96	2.83	-1.41E-01		1.10E+00
	488.68	0.42	-6.97E+00		7.70E+00
	563.99	0.49	2.16E+00		7.44E+00
	586.26	0.46	1.89E+01		1.22E+01
	678.62	0.47	3.13E-02		8.02E+00
	688.67	0.86	5.79E-01		4.58E+00
	719.35	0.28	-2.70E+00		1.39E+01
	778.90	12.96	-1.25E-01		2.99E-01
	810.45	0.32	-4.26E+00		1.26E+01
	867.37	4.26	-8.64E-01		1.02E+00
	919.33	0.43	5.02E+00		1.01E+01
	964.08	14.65	2.42E-01		4.35E-01
	1085.87	10.24	4.37E-02		4.94E-01
	1089.74	1.73	2.53E-01		2.93E+00
	1112.07	13.69	-3.98E-01		3.56E-01
	1212.95	1.43	1.87E+00		4.47E+00
	1249.94	0.19	1.29E+01		3.44E+01
	1299.14	1.63	-9.75E-01		3.19E+00
	1408.01	21.07	1.40E-02		1.74E-01
	1457.64	0.50	1.32E+02		3.84E+01
	1528.10	0.28	4.00E+00		1.09E+01
Eu-154	123.07	40.40	-2.62E-02	9.40E-02	9.40E-02
	247.93	6.89	-3.75E-01		4.55E-01
	591.76	4.95	-1.67E-01		6.99E-01
	692.42	1.78	-1.05E+00		2.22E+00
	723.30	20.06	-3.06E-02		2.08E-01
	756.80	4.52	4.46E-01		8.56E-01
	873.18	12.08	-2.50E-01		3.39E-01

Analysis Report for 11-Nov-19-10004

L1-10206A-FSGS-004SS

Nuclide Name	Energy (keV)	Yield(%)	Activity (pCi/grams)	Nuclide MDA (pCi/grams)	Line MDA (pCi/grams)
Eu-154	996.29	10.48	-2.18E-03	9.40E-02	4.42E-01
	1004.76	18.01	-2.74E-01		2.40E-01
	1274.43	34.80	-8.39E-02		1.38E-01
	1596.48	1.80	-7.52E-01		1.76E+00
Eu-155	45.30	1.31	-9.63E+00	2.05E-01	1.81E+01
	60.01	1.22	1.01E+01		2.23E+01
	86.55	30.70	1.95E-02		2.06E-01
	105.31	21.10	-7.86E-02		2.05E-01
Ra-226	186.21	3.64	7.93E-01	1.07E+00	1.07E+00
Pa-231	27.36	10.30	1.84E+00	1.54E+00	2.22E+00
	283.69	1.70	1.04E+00		2.01E+00
	300.07	2.47	-2.94E+00		1.54E+00
	302.65	2.20	1.52E+00		1.71E+00
	330.06	1.40	-1.69E-01		2.74E+00
U-235	143.76	10.96	-2.51E-01	6.85E-02	3.18E-01
	163.33	5.08	-4.95E-01		6.61E-01
	185.71	57.20	4.39E-02		6.85E-02
	202.11	1.08	-1.73E+00		3.05E+00
Am-241	205.31	5.01	-5.60E-01	7.66E-01	6.24E-01
	59.54	35.90	1.78E-01		7.66E-01

- + = Nuclide identified during the nuclide identification
 * = Energy line found in the spectrum
 > = MDA value not calculated
 @ = Half-life too short to be able to perform the decay correction
 ? = CAUTION: MDA value is inconsistent with Currie MDA at 95% confidence level

Analysis Report for 11-Nov-19-10005
L1-10206A-FSGS-005SS

GAMMA SPECTRUM ANALYSIS

Sample Identification : 11-Nov-19-10005
Sample Description : L1-10206A-FSGS-005SS
Sample Type : Soil
Unit :
Sample Point :

Sample Size : 1.550E+03 grams
Facility : Default

Sample Taken On : 11/9/2019 8:08:00AM
Acquisition Started : 11/11/2019 11:07:25AM

Procedure : 130G_SOIL_1
Operator : Administrator
Detector Name : 324
Geometry : 130G_SOIL_1
Live Time : 900.0 seconds
Real Time : 900.4 seconds

Dead Time : 0.04 %

Peak Locate Threshold : 3.00
Peak Locate Range (in channels) : 120 - 4096
Peak Area Range (in channels) : 120 - 4096
Identification Energy Tolerance : 1.000 keV

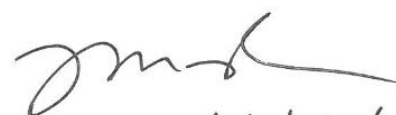
Energy Calibration Used Done On : 11/4/2019
Efficiency Calibration Used Done On : 11/11/2019
Efficiency Calibration Description :

Sample Number : 81155
Fill Height : 1549.62 gram
Certificate Name : Eu155-Na22
Certificate Date : 1/30/2013 12:00:00PM

PEAK ANALYSIS REPORT

Peak Analysis Performed on : 11/11/2019 11:22:27AM

Peak Analysis From Channel : 120
Peak Analysis To Channel : 4096


Data Validated
0600 11-12-19

Analysis Report for 11-Nov-19-10005
L1-10206A-FSGS-005SS

Peak No.	Energy (keV)	ROI start	ROI end	Peak Centroid	Net Peak Area	Net Area Uncertainty	Continuum Counts	FWHM (keV)
1	185.74	367 -	375	371.79	7.14E+01	17.03	1.03E+02	0.93
2	238.66	473 -	481	477.50	1.21E+02	22.19	1.64E+02	1.16
3	295.13	586 -	594	590.32	7.06E+01	14.56	6.64E+01	1.15
4	351.77	699 -	708	703.48	1.10E+02	14.95	5.00E+01	1.21
5	583.06	1161 -	1171	1165.72	8.38E+01	11.29	1.82E+01	1.46
6	609.21	1213 -	1223	1218.00	1.03E+02	12.97	2.75E+01	1.26
7	661.71	1318 -	1328	1322.95	4.36E+01	11.20	3.44E+01	1.40
8	911.23	1816 -	1827	1821.91	6.61E+01	10.55	1.79E+01	1.67
9	1460.62	2914 -	2928	2921.29	3.32E+02	18.77	7.27E+00	1.59
10	1764.34	3524 -	3534	3529.54	2.30E+01	4.80	0.00E+00	1.12

M = First peak in a multiplet region
m = Other peak in a multiplet region
F = Fitted singlet
Errors quoted at 1.000sigma

No background subtract performed on this spectrum.

NUCLIDE IDENTIFICATION REPORT

Nuclide Library Used : C:\Canberra\Apex\Root\Default\Library\ZION LIB-BNL.NLB

IDENTIFIED NUCLIDES

Nuclide Name	Id Confidence	Energy (keV)	Yield(%)	Activity (pCi/grams)	Activity Uncertainty
K-40	0.99	1460.82 *	10.66	6.21E+00	4.43E-01
Cs-137	1.00	661.66 *	85.10	6.08E-02	1.61E-02
Tl-208	0.99	583.19 *	85.00	1.08E-01	1.59E-02
Pb-212	1.00	115.18	0.60		
		238.63 *	43.60	1.69E-01	3.39E-02
		300.09	3.30		
Bi-214	0.99	609.32 *	45.49	2.53E-01	3.55E-02

Analysis Report for 11-Nov-19-10005

L1-10206A-FSGS-005SS

Nuclide Name	Id Confidence	Energy (keV)	Yield(%)	Activity (pCi/grams)	Activity Uncertainty
Bi-214	0.99	768.36	4.89		
		806.18	1.26		
		934.06	3.11		
		1120.29	14.92		
		1155.21	1.63		
		1238.12	5.83		
		1280.98	1.43		
		1377.67	3.99		
		1385.31	0.79		
		1401.52	1.33		
		1407.99	2.39		
		1509.21	2.13		
		1661.27	1.05		
		1729.59	2.88		
		1764.49 *	15.30	3.46E-01	7.34E-02
		1847.43	2.03		
		2118.51	1.16		
Pb-214	0.99	241.99	7.25		
		295.22 *	18.42	2.63E-01	5.83E-02
		351.93 *	35.60	2.40E-01	3.79E-02
Ra-226	0.96	785.96	1.06		
Ac-228	0.74	186.21 *	3.64	1.06E+00	2.67E-01
		129.07	2.42		
		209.25	3.89		
		270.24	3.46		
		328.00	2.95		
		338.32	11.27		
		409.46	1.92		
		463.00	4.40		
		794.95	4.25		
		911.20 *	25.80	3.75E-01	6.20E-02
		964.77	4.99		
		968.97	15.80		
		1588.20	3.22		
U-235	1.00	143.76	10.96		
		163.33	5.08		
		185.71 *	57.20	6.75E-02	1.70E-02
		202.11	1.08		
		205.31	5.01		

* = Energy line found in the spectrum.

- = Manually added nuclide.

? = Manually edited nuclide.

@ = Energy line not used for Weighted Mean Activity

Energy Tolerance : 1.000 keV

Nuclide confidence index threshold = 0.30

Errors quoted at 1.000sigma

Analysis Report for 11-Nov-19-10005

L1-10206A-FSGS-005SS

INTERFERENCE CORRECTED REPORT

	Nuclide Name	Nuclide Id Confidence	Wt mean Activity (pCi/grams)	Wt mean Activity Uncertainty	Comments
	K-40	0.993	6.21E+00	4.43E-01	
	Cs-137	1.000	6.08E-02	1.61E-02	
	Tl-208	0.997	1.08E-01	1.59E-02	
X	Bi-211	0.925			
	Pb-212	1.000	1.69E-01	3.39E-02	
	Bi-214	0.999	2.71E-01	3.19E-02	
	Pb-214	0.997	2.47E-01	3.18E-02	
?	Ra-226	0.965	1.06E+00	2.67E-01	
	Ac-228	0.740	3.75E-01	6.20E-02	
?	U-235	1.000	6.75E-02	1.70E-02	

? = nuclide is part of an undetermined solution

X = nuclide rejected by the interference analysis

@ = nuclide contains energy lines not used in Weighted Mean Activity

Errors quoted at 1.000sigma

Analysis Report for 11-Nov-19-10005
L1-10206A-FSGS-005SS

UNIDENTIFIED PEAKS

Peak Locate Performed on : 11/11/2019 11:22:27AM
Peak Locate From Channel : 120
Peak Locate To Channel : 4096

Peak No.	Energy (keV)	Peak Size (CPS)	Peak CPS (%) Uncertainty	Peak Type	Tolerance Nuclide
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All peaks were identified.

M = First peak in a multiplet region

m = Other peak in a multiplet region

F = Fitted singlet

Errors quoted at 1.000sigma

NUCLIDE MDA REPORT

Nuclide Library Used : C:\Canberra\Apex\Root\Default\Library\ZION LIB-BNL.NLB

	Nuclide Name	Energy (keV)	Yield(%)	Activity (pCi/grams)	Nuclide MDA (pCi/grams)	Line MDA (pCi/grams)
	An Pk	511.00	100.00	6.17E-02	5.47E-02	5.47E-02
	BE-7	477.60	10.44	1.17E-01	3.53E-01	3.53E-01
+	K-40	1460.82	* 10.66	6.21E+00	3.43E-01	3.43E-01
	Mn-54	834.85	99.98	8.78E-03	4.50E-02	4.50E-02
	Co-60	1173.23	99.85	4.59E-02	5.10E-02	6.34E-02
		1332.49	99.98	-3.95E-03		5.10E-02
	Nb-94	702.65	99.81	8.59E-05	3.82E-02	3.91E-02
		871.09	99.89	1.85E-02		3.82E-02
	Ag-108m	79.13	6.60	5.47E-01	3.26E-02	1.25E+00
		433.94	90.50	-7.25E-03		3.26E-02
		614.28	89.80	-1.42E-02		5.52E-02
		722.94	90.80	1.13E-02		4.60E-02
	Sb-125	176.31	6.84	1.30E-01	1.09E-01	5.12E-01
		380.45	1.52	2.31E-01		2.05E+00
		427.87	29.60	3.96E-03		1.09E-01
		463.36	10.49	2.07E-01		3.69E-01
		600.60	17.65	-3.37E-02		1.90E-01
		606.71	4.98	-2.09E-01		1.36E+00
		635.95	11.22	-9.55E-02		2.72E-01

Analysis Report for 11-Nov-19-10005

L1-10206A-FSGS-005SS

Nuclide Name	Energy (keV)	Yield(%)	Activity (pCi/grams)	Nuclide MDA (pCi/grams)	Line MDA (pCi/grams)
Sb-125	671.44	1.79	-1.22E+00	1.09E-01	2.20E+00
Ba-133	79.61	2.65	3.30E-01	7.01E-02	2.89E+00
	81.00	32.90	-3.34E-01		1.90E-01
	276.40	7.16	-1.39E-01		4.46E-01
	302.85	18.34	3.77E-02		1.87E-01
	356.01	62.05	-1.28E-02		7.01E-02
	383.85	8.94	-1.78E-01		3.53E-01
Cs-134	475.36	1.48	7.60E-01	4.84E-02	2.47E+00
	563.25	8.34	-1.18E-01		3.96E-01
	569.33	15.37	-5.96E-02		2.16E-01
	604.72	97.62	-2.76E-02		5.98E-02
	795.86	85.46	4.97E-03		4.84E-02
	801.95	8.69	-5.04E-02		4.65E-01
	1038.61	0.99	8.48E-01		4.90E+00
	1167.97	1.79	7.10E-01		3.43E+00
	1365.19	3.02	-6.72E-01		1.35E+00
+ Cs-137	661.66	* 85.10	6.08E-02	4.69E-02	4.69E-02
Eu-152	121.78	28.67	-1.69E-02	1.17E-01	1.17E-01
	244.70	7.61	-5.24E-02		5.20E-01
	295.94	0.45	8.40E+00		9.95E+00
	344.28	26.60	-8.93E-02		1.26E-01
	367.79	0.86	-3.31E-01		3.67E+00
	411.12	2.24	-2.96E-01		1.45E+00
	443.96	2.83	-1.13E-01		1.11E+00
	488.68	0.42	1.75E+00		8.51E+00
	563.99	0.49	-8.37E-01		6.81E+00
	586.26	0.46	-3.68E+00		1.27E+01
	678.62	0.47	-3.48E+00		7.89E+00
	688.67	0.86	-1.79E+00		4.32E+00
	719.35	0.28	-1.19E+01		1.23E+01
	778.90	12.96	-1.68E-01		3.18E-01
	810.45	0.32	-2.11E-01		1.19E+01
	867.37	4.26	-8.61E-01		8.26E-01
	919.33	0.43	-7.25E+00		7.80E+00
	964.08	14.65	2.51E-02		4.12E-01
	1085.87	10.24	-1.80E-01		4.59E-01
	1089.74	1.73	-1.23E-01		2.77E+00
	1112.07	13.69	3.21E-02		4.08E-01
	1212.95	1.43	-1.91E+00		3.90E+00
	1249.94	0.19	6.39E+00		2.50E+01
	1299.14	1.63	-6.78E-01		2.69E+00
	1408.01	21.07	5.77E-02		2.09E-01
	1457.64	0.50	7.48E-01		3.67E+01
	1528.10	0.28	-9.16E-01		9.14E+00
Eu-154	123.07	40.40	2.10E-02	8.53E-02	8.53E-02
	247.93	6.89	1.22E-01		4.92E-01
	591.76	4.95	-4.35E-01		6.30E-01
	692.42	1.78	0.00E+00		2.23E+00
	723.30	20.06	1.51E-01		2.18E-01
	756.80	4.52	-1.30E-01		8.84E-01
	873.18	12.08	2.94E-03		3.10E-01

Analysis Report for 11-Nov-19-10005

L1-10206A-FSGS-005SS

	Nuclide Name	Energy (keV)	Yield(%)	Activity (pCi/grams)	Nuclide MDA (pCi/grams)	Line MDA (pCi/grams)
	Eu-154	996.29	10.48	2.21E-01	8.53E-02	4.69E-01
		1004.76	18.01	-8.71E-02		2.49E-01
		1274.43	34.80	1.13E-03		1.54E-01
		1596.48	1.80	6.59E-01		2.23E+00
	Eu-155	45.30	1.31	5.94E+00	1.92E-01	1.28E+01
		60.01	1.22	2.43E-01		1.28E+01
		86.55	30.70	8.50E-02		1.92E-01
		105.31	21.10	9.39E-02		2.01E-01
+	Ra-226	186.21	*	1.06E+00	7.88E-01	7.88E-01
	Pa-231	27.36	10.30	2.62E-01	1.04E+00	1.04E+00
		283.69	1.70	-6.98E-01		1.89E+00
		300.07	2.47	-7.92E-01		1.38E+00
		302.65	2.20	3.14E-01		1.56E+00
		330.06	1.40	9.59E-01		2.60E+00
+	U-235	143.76	10.96	1.03E-01	5.02E-02	3.09E-01
		163.33	5.08	-8.44E-02		6.91E-01
		185.71	*	6.75E-02		5.02E-02
		202.11	1.08	1.33E+00		3.41E+00
		205.31	5.01	-5.71E-01		7.03E-01
	Am-241	59.54	35.90	3.88E-02	4.46E-01	4.46E-01

+ = Nuclide identified during the nuclide identification

* = Energy line found in the spectrum

> = MDA value not calculated

@ = Half-life too short to be able to perform the decay correction

? = CAUTION: MDA value is inconsistent with Currie MDA at 95% confidence level

Analysis Report for 11-Nov-19-10006
L1-10206A-FQGS-005SS

GAMMA SPECTRUM ANALYSIS

Sample Identification : 11-Nov-19-10006
Sample Description : L1-10206A-FQGS-005SS
Sample Type : Soil
Unit :
Sample Point :

Sample Size : 1.329E+03 grams
Facility : Default

Sample Taken On : 11/9/2019 8:08:00AM
Acquisition Started : 11/11/2019 11:28:10AM

Procedure : 130G_SOIL_1
Operator : Administrator
Detector Name : 324
Geometry : 130G_SOIL_1
Live Time : 900.0 seconds
Real Time : 900.3 seconds

Dead Time : 0.04 %

Peak Locate Threshold : 3.00
Peak Locate Range (in channels) : 120 - 4096
Peak Area Range (in channels) : 120 - 4096
Identification Energy Tolerance : 1.000 keV

Energy Calibration Used Done On : 11/4/2019
Efficiency Calibration Used Done On : 11/11/2019
Efficiency Calibration Description :

Sample Number : 81159
Fill Height : 1328.85 gram
Certificate Name : Eu155-Na22
Certificate Date : 1/30/2013 12:00:00PM

PEAK ANALYSIS REPORT

Peak Analysis Performed on : 11/11/2019 11:43:13AM

Peak Analysis From Channel : 120
Peak Analysis To Channel : 4096


Data Validated
0600 11-12-19

Analysis Report for 11-Nov-19-10006
L1-10206A-FQGS-005SS

Peak No.	Energy (keV)	ROI start	ROI end	Peak Centroid	Net Peak Area	Net Area Uncertainty	Continuum Counts	FWHM (keV)
1	238.49	472 -	480	477.17	1.49E+02	20.44	1.24E+02	0.94
2	295.20	585 -	595	590.47	4.29E+01	15.28	7.91E+01	1.20
3	338.44	672 -	681	676.85	2.62E+01	12.78	6.08E+01	0.70
4	351.85	700 -	708	703.64	1.40E+02	15.16	4.23E+01	1.13
5	582.98	1163 -	1171	1165.56	6.48E+01	10.54	2.12E+01	1.19
6	609.27	1213 -	1223	1218.13	1.03E+02	12.94	2.72E+01	0.98
7	661.60	1317 -	1328	1322.73	7.84E+01	10.98	1.66E+01	1.30
8	1460.60	2913 -	2928	2921.26	3.42E+02	18.81	3.98E+00	1.91

M = First peak in a multiplet region

m = Other peak in a multiplet region

F = Fitted singlet

Errors quoted at 1.000sigma

No background subtract performed on this spectrum.

NUCLIDE IDENTIFICATION REPORT

Nuclide Library Used : C:\Canberra\Apex\Root\Default\Library\ZION LIB-BNL.NLB

IDENTIFIED NUCLIDES

Nuclide Name	Id Confidence	Energy (keV)	Yield(%)	Activity (pCi/grams)	Activity Uncertainty
K-40	0.99	1460.82 *	10.66	6.72E+00	4.71E-01
Cs-137	1.00	661.66 *	85.10	1.14E-01	1.74E-02
Tl-208	0.99	583.19 *	85.00	8.66E-02	1.50E-02
Bi-211	0.90	351.07 *	13.02	8.64E-01	1.17E-01
Pb-212	0.99	115.18	0.60		
		238.63 *	43.60	2.14E-01	3.42E-02
		300.09	3.30		
Bi-214	1.00	609.32 *	45.49	2.64E-01	3.69E-02
		768.36	4.89		

Analysis Report for 11-Nov-19-10006

L1-10206A-FQGS-005SS

Nuclide Name	Id Confidence	Energy (keV)	Yield(%)	Activity (pCi/grams)	Activity Uncertainty
Bi-214	1.00	806.18	1.26		
		934.06	3.11		
		1120.29	14.92		
		1155.21	1.63		
		1238.12	5.83		
		1280.98	1.43		
		1377.67	3.99		
		1385.31	0.79		
		1401.52	1.33		
		1407.99	2.39		
		1509.21	2.13		
		1661.27	1.05		
		1729.59	2.88		
		1764.49	15.30		
		1847.43	2.03		
		2118.51	1.16		
Pb-214	0.99	241.99	7.25		
		295.22 *	18.42	1.66E-01	6.04E-02
		351.93 *	35.60	3.16E-01	4.26E-02
		785.96	1.06		
Ac-228	1.00	129.07	2.42		
		209.25	3.89		
		270.24	3.46		
		328.00	2.95		
		338.32 *	11.27	1.82E-01	9.01E-02
		409.46	1.92		
		463.00	4.40		
		794.95	4.25		
		911.20	25.80		
		964.77	4.99		
		968.97	15.80		
		1588.20	3.22		

* = Energy line found in the spectrum.

- = Manually added nuclide.

? = Manually edited nuclide.

@ = Energy line not used for Weighted Mean Activity

Energy Tolerance : 1.000 keV

Nuclide confidence index threshold = 0.30

Errors quoted at 1.000sigma

INTERFERENCE CORRECTED REPORT

Analysis Report for 11-Nov-19-10006

L1-10206A-FQGS-005SS

Nuclide Name	Nuclide Id Confidence	Wt mean Activity (pCi/grams)	Wt mean Activity Uncertainty	Comments
K-40	0.992	6.72E+00	4.71E-01	
Cs-137	1.000	1.14E-01	1.74E-02	
Tl-208	0.993	8.66E-02	1.50E-02	
Bi-211	0.908	4.12E-01	2.02E-01	
Pb-212	0.997	2.14E-01	3.42E-02	
Bi-214	1.000	2.64E-01	3.69E-02	
Pb-214	0.999	1.66E-01	6.04E-02	
Ac-228	1.000	1.82E-01	9.01E-02	

? = nuclide is part of an undetermined solution

X = nuclide rejected by the interference analysis

@ = nuclide contains energy lines not used in Weighted Mean Activity

Errors quoted at 1.000sigma

Analysis Report for 11-Nov-19-10006
L1-10206A-FQGS-005SS

UNIDENTIFIED PEAKS

Peak Locate Performed on : 11/11/2019 11:43:13AM
Peak Locate From Channel : 120
Peak Locate To Channel : 4096

Peak No.	Energy (keV)	Peak Size (CPS)	Peak CPS (%) Uncertainty	Peak Type	Tolerance Nuclide
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All peaks were identified.

M = First peak in a multiplet region

m = Other peak in a multiplet region

F = Fitted singlet

Errors quoted at 1.000sigma

NUCLIDE MDA REPORT

Nuclide Library Used : C:\Canberra\Apex\Root\Default\Library\ZION LIB-BNL.NLB

	Nuclide Name	Energy (keV)	Yield(%)	Activity (pCi/grams)	Nuclide MDA (pCi/grams)	Line MDA (pCi/grams)
	An Pk	511.00	100.00	5.40E-02	5.25E-02	5.25E-02
	BE-7	477.60	10.44	1.24E-01	3.70E-01	3.70E-01
+	K-40	1460.82	* 10.66	6.72E+00	2.87E-01	2.87E-01
	Mn-54	834.85	99.98	-1.26E-02	4.02E-02	4.02E-02
	Co-60	1173.23	99.85	1.15E-02	4.86E-02	5.63E-02
		1332.49	99.98	2.31E-02		4.86E-02
	Nb-94	702.65	99.81	5.01E-03	3.76E-02	3.76E-02
		871.09	99.89	-3.79E-03		4.05E-02
	Ag-108m	79.13	6.60	9.08E-01	3.61E-02	1.21E+00
		433.94	90.50	-3.82E-03		3.61E-02
		614.28	89.80	-1.10E-02		5.52E-02
		722.94	90.80	2.56E-02		5.01E-02
	Sb-125	176.31	6.84	-3.57E-02	1.18E-01	5.10E-01
		380.45	1.52	-8.16E-01		2.01E+00
		427.87	29.60	-1.42E-02		1.18E-01
		463.36	10.49	5.71E-02		3.39E-01
		600.60	17.65	-1.24E-01		1.95E-01
		606.71	4.98	-2.06E-01		1.45E+00
		635.95	11.22	-1.21E-02		3.31E-01

Analysis Report for 11-Nov-19-10006

L1-10206A-FQGS-005SS

Nuclide Name	Energy (keV)	Yield(%)	Activity (pCi/grams)	Nuclide MDA (pCi/grams)	Line MDA (pCi/grams)
Sb-125	671.44	1.79	9.04E-01	1.18E-01	2.42E+00
Ba-133	79.61	2.65	1.40E+00	7.89E-02	2.79E+00
	81.00	32.90	-3.21E-01		1.77E-01
	276.40	7.16	5.80E-02		4.79E-01
	302.85	18.34	5.48E-03		1.81E-01
	356.01	62.05	-4.98E-02		7.89E-02
	383.85	8.94	-1.45E-03		3.72E-01
Cs-134	475.36	1.48	9.17E-01	5.68E-02	2.56E+00
	563.25	8.34	2.22E-01		4.63E-01
	569.33	15.37	6.74E-02		2.39E-01
	604.72	97.62	-2.78E-02		6.38E-02
	795.86	85.46	2.14E-02		5.68E-02
	801.95	8.69	9.90E-02		5.31E-01
	1038.61	0.99	1.28E+00		5.12E+00
	1167.97	1.79	-5.34E-01		3.26E+00
	1365.19	3.02	7.77E-01		1.54E+00
+	Cs-137	*	85.10	3.62E-02	3.62E-02
	Eu-152		28.67	1.23E-01	1.23E-01
	244.70	7.61	7.22E-02		5.09E-01
	295.94	0.45	-2.07E-01		9.39E+00
	344.28	26.60	-7.87E-02		1.24E-01
	367.79	0.86	2.09E+00		4.12E+00
	411.12	2.24	-2.07E-01		1.48E+00
	443.96	2.83	1.69E-01		1.02E+00
	488.68	0.42	-2.75E+00		8.51E+00
	563.99	0.49	3.93E+00		7.69E+00
	586.26	0.46	-2.78E+00		1.30E+01
	678.62	0.47	-6.88E+00		7.88E+00
	688.67	0.86	-1.10E+00		4.50E+00
	719.35	0.28	-3.66E+00		1.39E+01
	778.90	12.96	6.36E-02		2.85E-01
	810.45	0.32	-8.24E+00		1.24E+01
	867.37	4.26	-9.21E-01		8.97E-01
	919.33	0.43	-6.31E+00		9.65E+00
	964.08	14.65	3.49E-01		3.91E-01
	1085.87	10.24	-2.43E-01		4.24E-01
	1089.74	1.73	9.51E-02		2.62E+00
	1112.07	13.69	-1.39E-01		3.47E-01
	1212.95	1.43	1.87E+00		4.08E+00
	1249.94	0.19	1.71E+00		3.06E+01
	1299.14	1.63	-1.86E+00		2.39E+00
	1408.01	21.07	4.35E-02		2.25E-01
	1457.64	0.50	-3.95E+00		3.85E+01
	1528.10	0.28	7.14E-01		1.20E+01
Eu-154	123.07	40.40	8.41E-03	8.42E-02	8.42E-02
	247.93	6.89	6.25E-02		4.88E-01
	591.76	4.95	3.89E-01		7.96E-01
	692.42	1.78	4.53E-01		2.24E+00
	723.30	20.06	4.18E-02		2.22E-01
	756.80	4.52	2.81E-01		9.22E-01
	873.18	12.08	9.82E-02		3.41E-01

Analysis Report for 11-Nov-19-10006

L1-10206A-FQGS-005SS

Nuclide Name	Energy (keV)	Yield(%)	Activity (pCi/grams)	Nuclide MDA (pCi/grams)	Line MDA (pCi/grams)
Eu-154	996.29	10.48	-1.01E-01	8.42E-02	4.15E-01
	1004.76	18.01	3.07E-02		2.56E-01
	1274.43	34.80	-7.83E-03		1.52E-01
	1596.48	1.80	4.83E-01		2.60E+00
Eu-155	45.30	1.31	3.65E-01	1.74E-01	1.12E+01
	60.01	1.22	2.40E+00		1.16E+01
	86.55	30.70	6.22E-02		1.86E-01
	105.31	21.10	-5.60E-02		1.74E-01
Ra-226	186.21	3.64	1.31E+00	1.12E+00	1.12E+00
Pa-231	27.36	10.30	8.29E-01	1.15E+00	1.15E+00
	283.69	1.70	-8.64E-01		1.66E+00
	300.07	2.47	1.64E-01		1.36E+00
	302.65	2.20	4.56E-02		1.51E+00
	330.06	1.40	-6.32E-02		2.58E+00
U-235	143.76	10.96	-1.42E-01	7.28E-02	2.76E-01
	163.33	5.08	1.45E-01		7.15E-01
	185.71	57.20	1.04E-01		7.28E-02
	202.11	1.08	1.18E+00		3.20E+00
Am-241	205.31	5.01	-5.51E-01	3.91E-01	6.49E-01
	59.54	35.90	-6.96E-02		3.91E-01

- + = Nuclide identified during the nuclide identification
 * = Energy line found in the spectrum
 > = MDA value not calculated
 @ = Half-life too short to be able to perform the decay correction
 ? = CAUTION: MDA value is inconsistent with Currie MDA at 95% confidence level

Analysis Report for 11-Nov-19-10007
L1-10206A-FSGS-006SS

GAMMA SPECTRUM ANALYSIS

Sample Identification : 11-Nov-19-10007
Sample Description : L1-10206A-FSGS-006SS
Sample Type : Soil
Unit :
Sample Point :

Sample Size : 1.518E+03 grams
Facility : Default

Sample Taken On : 11/9/2019 8:10:00AM
Acquisition Started : 11/11/2019 11:07:31AM

Procedure : 130G_SOIL_1
Operator : Administrator
Detector Name : P40818B
Geometry : 130G_SOIL_1
Live Time : 900.0 seconds
Real Time : 901.2 seconds

Dead Time : 0.13 %

Peak Locate Threshold : 3.00
Peak Locate Range (in channels) : 120 - 8192
Peak Area Range (in channels) : 120 - 8192
Identification Energy Tolerance : 1.000 keV

Energy Calibration Used Done On : 11/4/2019
Efficiency Calibration Used Done On : 11/11/2019
Efficiency Calibration Description :

Sample Number : 81156
Fill Height : 1518.43 gram
Certificate Name : Eu155-Na22
Certificate Date : 1/30/2012 12:00:00PM

PEAK ANALYSIS REPORT

Peak Analysis Performed on : 11/11/2019 11:22:35AM

Peak Analysis From Channel : 120
Peak Analysis To Channel : 8192


Data Validated
0600 11-12-19

Analysis Report for 11-Nov-19-10007
L1-10206A-FSGS-006SS

Peak No.	Energy (keV)	ROI start	ROI end	Peak Centroid	Net Peak Area	Net Area Uncertainty	Continuum Counts	FWHM (keV)
1	238.71	948 -	961	954.95	1.44E+02	16.26	4.37E+01	0.84
2	583.21	2327 -	2338	2332.05	4.23E+01	8.78	1.37E+01	0.55
3	609.38	2431 -	2443	2436.68	2.61E+01	7.92	1.39E+01	0.59
4	911.11	3637 -	3651	3643.41	4.29E+01	7.03	2.07E+00	0.36
5	1460.78	5831 -	5854	5842.96	2.36E+02	16.12	6.00E+00	1.44

M = First peak in a multiplet region

m = Other peak in a multiplet region

F = Fitted singlet

Errors quoted at 1.000sigma

No background subtract performed on this spectrum.

NUCLIDE IDENTIFICATION REPORT

Nuclide Library Used : C:\Canberra\Apex\Root\Default\Library\ZION LIB-BNL.NLB

IDENTIFIED NUCLIDES

Nuclide Name	Id Confidence	Energy (keV)	Yield(%)	Activity (pCi/grams)	Activity Uncertainty
K-40	1.00	1460.82 *	10.66	5.90E+00	4.77E-01
Tl-208	1.00	583.19 *	85.00	7.08E-02	1.53E-02
Pb-212	0.99	115.18	0.60		
		238.63 *	43.60	2.58E-01	3.58E-02
		300.09	3.30		
Bi-214	1.00	609.32 *	45.49	8.41E-02	2.60E-02
		768.36	4.89		
		806.18	1.26		
		934.06	3.11		
		1120.29	14.92		
		1155.21	1.63		
		1238.12	5.83		

Analysis Report for 11-Nov-19-10007

L1-10206A-FSGS-006SS

Nuclide Name	Id Confidence	Energy (keV)	Yield(%)	Activity (pCi/grams)	Activity Uncertainty
Bi-214	1.00	1280.98	1.43		
		1377.67	3.99		
		1385.31	0.79		
		1401.52	1.33		
		1407.99	2.39		
		1509.21	2.13		
		1661.27	1.05		
		1729.59	2.88		
		1764.49	15.30		
		1847.43	2.03		
		2118.51	1.16		
Ac-228	1.00	129.07	2.42		
		209.25	3.89		
		270.24	3.46		
		328.00	2.95		
		338.32	11.27		
		409.46	1.92		
		463.00	4.40		
		794.95	4.25		
		911.20 *	25.80	3.21E-01	5.42E-02
		964.77	4.99		
		968.97	15.80		
		1588.20	3.22		

* = Energy line found in the spectrum.

- = Manually added nuclide.

? = Manually edited nuclide.

@ = Energy line not used for Weighted Mean Activity

Energy Tolerance : 1.000 keV

Nuclide confidence index threshold = 0.30

Errors quoted at 1.000sigma

INTERFERENCE CORRECTED REPORT

Nuclide Name	Nuclide Id Confidence	Wt mean Activity (pCi/grams)	Wt mean Activity Uncertainty	Comments
K-40	1.000	5.90E+00	4.77E-01	
Tl-208	1.000	7.08E-02	1.53E-02	
Pb-212	0.999	2.58E-01	3.58E-02	
Bi-214	1.000	8.41E-02	2.60E-02	

Analysis Report for 11-Nov-19-10007

L1-10206A-FSGS-006SS

<i>Nuclide Name</i>	<i>Nuclide Id Confidence</i>	<i>Wt mean Activity (pCi/grams)</i>	<i>Wt mean Activity Uncertainty</i>	<i>Comments</i>
Ac-228	1.000	3.21E-01	5.42E-02	
? = nuclide is part of an undetermined solution X = nuclide rejected by the interference analysis @ = nuclide contains energy lines not used in Weighted Mean Activity Errors quoted at 1.000sigma				

Analysis Report for 11-Nov-19-10007
L1-10206A-FSGS-006SS

UNIDENTIFIED PEAKS

Peak Locate Performed on : 11/11/2019 11:22:35AM
Peak Locate From Channel : 120
Peak Locate To Channel : 8192

Peak No.	Energy (keV)	Peak Size (CPS)	Peak CPS (%) Uncertainty	Peak Type	Tolerance Nuclide
All peaks were identified.					
M = First peak in a multiplet region					
m = Other peak in a multiplet region					
F = Fitted singlet					
Errors quoted at 1.000sigma					

NUCLIDE MDA REPORT

Nuclide Library Used : C:\Canberra\Apex\Root\Default\Library\ZION LIB-BNL.NLB

	Nuclide Name	Energy (keV)	Yield(%)	Activity (pCi/grams)	Nuclide MDA (pCi/grams)	Line MDA (pCi/grams)
	An Pk	511.00	100.00	5.38E-02	5.77E-02	5.77E-02
	BE-7	477.60	10.44	4.17E-01	4.18E-01	4.18E-01
+	K-40	1460.82	* 10.66	5.90E+00	4.87E-01	4.87E-01
	Mn-54	834.85	99.98	-3.46E-02	4.62E-02	4.62E-02
	Co-60	1173.23	99.85	3.39E-02	5.33E-02	6.35E-02
		1332.49	99.98	3.73E-03		5.33E-02
	Nb-94	702.65	99.81	-1.49E-02	3.57E-02	3.57E-02
		871.09	99.89	-3.07E-02		3.89E-02
	Ag-108m	79.13	6.60	-1.29E+00	4.10E-02	1.53E+00
		433.94	90.50	-1.09E-02		4.10E-02
		614.28	89.80	7.49E-03		5.75E-02
		722.94	90.80	9.30E-03		5.44E-02
	Sb-125	176.31	6.84	-5.38E-02	1.24E-01	5.06E-01
		380.45	1.52	3.31E-01		2.47E+00
		427.87	29.60	-4.38E-02		1.24E-01
		463.36	10.49	1.13E-01		3.84E-01
		600.60	17.65	7.88E-02		2.54E-01
		606.71	4.98	4.57E-01		1.19E+00
		635.95	11.22	-1.33E-01		3.55E-01

Analysis Report for 11-Nov-19-10007

L1-10206A-FSGS-006SS

Nuclide Name	Energy (keV)	Yield(%)	Activity (pCi/grams)	Nuclide MDA (pCi/grams)	Line MDA (pCi/grams)
Sb-125	671.44	1.79	-1.16E+00	1.24E-01	1.93E+00
Ba-133	79.61	2.65	-3.00E+00	6.98E-02	3.68E+00
	81.00	32.90	2.62E-03		2.70E-01
	276.40	7.16	3.17E-01		5.35E-01
	302.85	18.34	1.74E-01		2.12E-01
	356.01	62.05	-8.52E-02		6.98E-02
	383.85	8.94	-4.48E-02		3.86E-01
Cs-134	475.36	1.48	4.18E-01	5.70E-02	2.78E+00
	563.25	8.34	3.81E-02		4.86E-01
	569.33	15.37	7.70E-02		2.70E-01
	604.72	97.62	-1.58E-02		5.70E-02
	795.86	85.46	1.63E-02		6.00E-02
	801.95	8.69	-2.93E-01		5.06E-01
	1038.61	0.99	-4.97E+00		5.62E+00
	1167.97	1.79	7.54E-01		3.36E+00
	1365.19	3.02	-1.47E-01		1.58E+00
Cs-137	661.66	85.10	4.19E-02	5.15E-02	5.15E-02
Eu-152	121.78	28.67	7.96E-02	1.24E-01	1.51E-01
	244.70	7.61	-2.71E-02		4.83E-01
	295.94	0.45	1.18E+00		9.71E+00
	344.28	26.60	1.30E-02		1.24E-01
	367.79	0.86	-1.33E+00		4.40E+00
	411.12	2.24	9.10E-01		1.71E+00
	443.96	2.83	-1.08E+00		1.40E+00
	488.68	0.42	-5.32E-01		8.33E+00
	563.99	0.49	-1.70E+00		8.37E+00
	586.26	0.46	1.59E+01		1.41E+01
	678.62	0.47	-1.18E+00		7.57E+00
	688.67	0.86	1.46E+00		4.80E+00
	719.35	0.28	3.23E+00		1.61E+01
	778.90	12.96	-7.75E-02		2.69E-01
	810.45	0.32	-7.66E-01		1.51E+01
	867.37	4.26	-1.52E-01		9.89E-01
	919.33	0.43	-4.28E-01		1.26E+01
	964.08	14.65	4.79E-01		5.17E-01
	1085.87	10.24	-3.86E-01		4.80E-01
	1089.74	1.73	4.34E-01		3.12E+00
	1112.07	13.69	-2.56E-02		4.08E-01
	1212.95	1.43	-4.46E+00		5.04E+00
	1249.94	0.19	-2.61E+01		3.38E+01
	1299.14	1.63	-4.69E+00		3.03E+00
	1408.01	21.07	-7.31E-02		2.12E-01
	1457.64	0.50	1.21E+02		4.13E+01
	1528.10	0.28	2.94E+00		1.09E+01
Eu-154	123.07	40.40	-2.47E-02	1.02E-01	1.02E-01
	247.93	6.89	1.40E-01		5.13E-01
	591.76	4.95	-6.15E-01		8.33E-01
	692.42	1.78	-2.66E+00		2.14E+00
	723.30	20.06	6.76E-02		2.50E-01
	756.80	4.52	-9.39E-02		8.72E-01
	873.18	12.08	3.42E-02		3.22E-01

Analysis Report for 11-Nov-19-10007

L1-10206A-FSGS-006SS

Nuclide Name	Energy (keV)	Yield(%)	Activity (pCi/grams)	Nuclide MDA (pCi/grams)	Line MDA (pCi/grams)
Eu-154	996.29	10.48	-4.40E-01	1.02E-01	4.19E-01
	1004.76	18.01	-1.10E-01		2.66E-01
	1274.43	34.80	-6.30E-02		1.76E-01
	1596.48	1.80	-1.39E+00		2.16E+00
Eu-155	45.30	1.31	-1.42E+01	2.47E-01	2.72E+01
	60.01	1.22	-1.05E+01		2.74E+01
	86.55	30.70	3.96E-03		2.47E-01
	105.31	21.10	-1.07E-01		2.55E-01
Ra-226	186.21	3.64	3.64E-01	1.08E+00	1.08E+00
Pa-231	27.36	10.30	1.79E+00	1.54E+00	3.27E+00
	283.69	1.70	-2.49E+00		2.05E+00
	300.07	2.47	-1.82E+00		1.54E+00
	302.65	2.20	2.62E-01		1.73E+00
	330.06	1.40	7.41E-01		2.82E+00
U-235	143.76	10.96	-1.71E-01	6.83E-02	3.81E-01
	163.33	5.08	-2.39E-01		7.47E-01
	185.71	57.20	8.97E-03		6.83E-02
	202.11	1.08	1.27E+00		3.36E+00
Am-241	205.31	5.01	-4.96E-01	9.86E-01	6.62E-01
	59.54	35.90	-1.22E-01		9.86E-01

+ = Nuclide identified during the nuclide identification

* = Energy line found in the spectrum

> = MDA value not calculated

@ = Half-life too short to be able to perform the decay correction

? = CAUTION: MDA value is inconsistent with Currie MDA at 95% confidence level

Analysis Report for 11-Nov-19-10008
L1-10206A-FSGS-007SS

GAMMA SPECTRUM ANALYSIS

Sample Identification : 11-Nov-19-10008
Sample Description : L1-10206A-FSGS-007SS
Sample Type : Soil
Unit :
Sample Point :

Sample Size : 1.515E+03 grams
Facility : Default

Sample Taken On : 11/9/2019 8:12:00AM
Acquisition Started : 11/11/2019 11:07:38AM

Procedure : 130G_SOIL_1
Operator : Administrator
Detector Name : P11314
Geometry : 130G_SOIL_1
Live Time : 900.0 seconds
Real Time : 900.4 seconds

Dead Time : 0.04 %

Peak Locate Threshold : 3.00
Peak Locate Range (in channels) : 120 - 8192
Peak Area Range (in channels) : 120 - 8192
Identification Energy Tolerance : 1.000 keV

Energy Calibration Used Done On : 11/4/2019
Efficiency Calibration Used Done On : 11/11/2019
Efficiency Calibration Description :

Sample Number : 81157
Fill Height : 1515.02 gram
Certificate Name : Eu155-Na22
Certificate Date : 12/22/2008 12:00:00PM

PEAK ANALYSIS REPORT

Peak Analysis Performed on : 11/11/2019 11:22:51AM

Peak Analysis From Channel : 120
Peak Analysis To Channel : 8192


Data Validated
0600 11-12-19

Analysis Report for 11-Nov-19-10008
L1-10206A-FSGS-007SS

Peak No.	Energy (keV)	ROI start	ROI end	Peak Centroid	Net Peak Area	Net Area Uncertainty	Continuum Counts	FWHM (keV)
1	77.39	306 -	315	310.09	6.49E+01	15.41	7.51E+01	0.50
2	238.70	946 -	960	954.36	1.63E+02	18.91	6.78E+01	1.11
3	295.17	1172 -	1188	1179.96	8.29E+01	13.13	2.81E+01	1.05
4	338.30	1346 -	1358	1352.29	5.02E+01	10.02	1.88E+01	0.85
5	352.06	1400 -	1413	1407.24	1.03E+02	12.90	2.28E+01	0.91
6	582.92	2321 -	2337	2329.81	6.32E+01	10.48	1.48E+01	1.07
7	910.76	3634 -	3649	3640.52	4.37E+01	8.69	1.03E+01	0.58
8	1460.28	5827 -	5850	5839.07	3.33E+02	18.56	2.88E+00	1.77

M = First peak in a multiplet region

m = Other peak in a multiplet region

F = Fitted singlet

Errors quoted at 1.000sigma

No background subtract performed on this spectrum.

NUCLIDE IDENTIFICATION REPORT

Nuclide Library Used : C:\Canberra\Apex\Root\Default\Library\ZION LIB-BNL.NLB

IDENTIFIED NUCLIDES

Nuclide Name	Id Confidence	Energy (keV)	Yield(%)	Activity (pCi/grams)	Activity Uncertainty
K-40	0.95	1460.82 *	10.66	7.49E+00	5.29E-01
Tl-208	0.98	583.19 *	85.00	9.54E-02	1.68E-02
Pb-212	0.99	115.18	0.60		
		238.63 *	43.60	2.60E-01	3.67E-02
		300.09	3.30		
Pb212-XR	0.99	74.82	10.28		
		77.11 *	17.10	4.55E-01	1.18E-01
		87.35	3.97		
		89.78	1.46		

Analysis Report for 11-Nov-19-10008

L1-10206A-FSGS-007SS

Nuclide Name	Id Confidence	Energy (keV)	Yield(%)	Activity (pCi/grams)	Activity Uncertainty
Pb-214	0.99	241.99	7.25		
		295.22 *	18.42	3.55E-01	6.30E-02
		351.93 *	35.60	2.60E-01	3.86E-02
		785.96	1.06		
Pb214-XR	0.99	74.82	5.80		
		77.11 *	9.70	8.02E-01	2.11E-01
		87.35	2.24		
		89.78	0.82		
Ac-228	0.99	129.07	2.42		
		209.25	3.89		
		270.24	3.46		
		328.00	2.95		
		338.32 *	11.27	3.88E-01	8.38E-02
		409.46	1.92		
		463.00	4.40		
		794.95	4.25		
		911.20 *	25.80	2.95E-01	5.99E-02
		964.77	4.99		
		968.97	15.80		
		1588.20	3.22		

* = Energy line found in the spectrum.

- = Manually added nuclide.

? = Manually edited nuclide.

@ = Energy line not used for Weighted Mean Activity

Energy Tolerance : 1.000 keV

Nuclide confidence index threshold = 0.30

Errors quoted at 1.000sigma

INTERFERENCE CORRECTED REPORT

Nuclide Name	Nuclide Id Confidence	Wt mean Activity (pCi/grams)	Wt mean Activity Uncertainty	Comments
K-40	0.954	7.49E+00	5.29E-01	
Tl-208	0.989	9.54E-02	1.68E-02	
X Bi-211	0.856			
Pb-212	0.999	2.60E-01	3.67E-02	
? Pb212-XR	0.993	4.55E-01	1.18E-01	
Pb-214	0.998	2.86E-01	3.29E-02	
? Pb214-XR	0.993	8.02E-01	2.11E-01	

Analysis Report for 11-Nov-19-10008

L1-10206A-FSGS-007SS

<i>Nuclide Name</i>	<i>Nuclide Id Confidence</i>	<i>Wt mean Activity (pCi/grams)</i>	<i>Wt mean Activity Uncertainty</i>	<i>Comments</i>
Ac-228	0.991	3.26E-01	4.87E-02	
? = nuclide is part of an undetermined solution X = nuclide rejected by the interference analysis @ = nuclide contains energy lines not used in Weighted Mean Activity Errors quoted at 1.000sigma				

Analysis Report for 11-Nov-19-10008
L1-10206A-FSGS-007SS

UNIDENTIFIED PEAKS

Peak Locate Performed on : 11/11/2019 11:22:51AM
Peak Locate From Channel : 120
Peak Locate To Channel : 8192

Peak No.	Energy (keV)	Peak Size (CPS)	Peak CPS (%) Uncertainty	Peak Type	Tolerance Nuclide
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All peaks were identified.

M = First peak in a multiplet region

m = Other peak in a multiplet region

F = Fitted singlet

Errors quoted at 1.000sigma

NUCLIDE MDA REPORT

Nuclide Library Used : C:\Canberra\Apex\Root\Default\Library\ZION LIB-BNL.NLB

	Nuclide Name	Energy (keV)	Yield(%)	Activity (pCi/grams)	Nuclide MDA (pCi/grams)	Line MDA (pCi/grams)
	An Pk	511.00	100.00	5.91E-02	5.50E-02	5.50E-02
	BE-7	477.60	10.44	1.46E-01	3.48E-01	3.48E-01
+	K-40	1460.82	* 10.66	7.49E+00	3.20E-01	3.20E-01
	Mn-54	834.85	99.98	-8.22E-03	5.20E-02	5.20E-02
	Co-60	1173.23	99.85	-3.07E-02	5.56E-02	6.68E-02
		1332.49	99.98	-2.46E-02		5.56E-02
	Nb-94	702.65	99.81	1.47E-02	4.56E-02	4.56E-02
		871.09	99.89	-8.00E-03		4.61E-02
	Ag-108m	79.13	6.60	-5.26E-02	4.04E-02	1.24E+00
		433.94	90.50	-2.16E-02		4.04E-02
		614.28	89.80	-1.33E-01		5.50E-02
		722.94	90.80	2.11E-02		5.43E-02
	Sb-125	176.31	6.84	1.91E-01	1.19E-01	4.91E-01
		380.45	1.52	3.31E-01		2.15E+00
		427.87	29.60	2.48E-02		1.19E-01
		463.36	10.49	2.73E-01		3.62E-01
		600.60	17.65	-2.13E-01		2.35E-01
		606.71	4.98	2.06E+00		1.40E+00
		635.95	11.22	1.96E-01		3.59E-01

Analysis Report for 11-Nov-19-10008

L1-10206A-FSGS-007SS

Nuclide Name	Energy (keV)	Yield(%)	Activity (pCi/grams)	Nuclide MDA (pCi/grams)	Line MDA (pCi/grams)
Sb-125	671.44	1.79	-8.70E-01	1.19E-01	2.40E+00
Ba-133	79.61	2.65	-8.03E-02	6.80E-02	3.01E+00
	81.00	32.90	-1.24E-01		1.85E-01
	276.40	7.16	-4.07E-01		4.34E-01
	302.85	18.34	2.60E-02		1.75E-01
	356.01	62.05	-4.09E-02		6.80E-02
	383.85	8.94	-2.23E-01		3.64E-01
Cs-134	475.36	1.48	-6.01E-01	5.08E-02	2.23E+00
	563.25	8.34	1.42E-02		5.05E-01
	569.33	15.37	1.08E-01		2.67E-01
	604.72	97.62	1.38E-02		6.63E-02
	795.86	85.46	5.11E-03		5.08E-02
	801.95	8.69	-1.21E-01		5.10E-01
	1038.61	0.99	-4.05E+00		5.34E+00
	1167.97	1.79	-5.36E-01		3.63E+00
	1365.19	3.02	-1.66E+00		1.18E+00
Cs-137	661.66	85.10	6.21E-03	5.93E-02	5.93E-02
Eu-152	121.78	28.67	-7.76E-03	1.25E-01	1.25E-01
	244.70	7.61	3.21E-01		5.15E-01
	295.94	0.45	6.37E+00		1.02E+01
	344.28	26.60	3.16E-02		1.29E-01
	367.79	0.86	-8.55E-01		3.69E+00
	411.12	2.24	1.31E-02		1.51E+00
	443.96	2.83	-1.00E+00		1.24E+00
	488.68	0.42	3.73E+00		8.97E+00
	563.99	0.49	-3.43E+00		8.18E+00
	586.26	0.46	-3.94E+00		1.35E+01
	678.62	0.47	3.22E+00		8.24E+00
	688.67	0.86	3.41E-01		4.16E+00
	719.35	0.28	-7.84E+00		1.47E+01
	778.90	12.96	-1.20E-01		3.62E-01
	810.45	0.32	-1.14E+01		1.32E+01
	867.37	4.26	-2.01E-01		1.08E+00
	919.33	0.43	5.14E-01		1.19E+01
	964.08	14.65	7.41E-02		4.41E-01
	1085.87	10.24	-3.44E-01		4.94E-01
	1089.74	1.73	-4.80E-01		3.10E+00
	1112.07	13.69	1.09E-01		4.29E-01
	1212.95	1.43	3.42E+00		5.01E+00
	1249.94	0.19	2.71E+01		3.31E+01
	1299.14	1.63	-1.80E-02		2.90E+00
	1408.01	21.07	9.78E-02		2.38E-01
	1457.64	0.50	1.54E+02		4.35E+01
	1528.10	0.28	7.05E+00		1.45E+01
Eu-154	123.07	40.40	-3.26E-02	9.00E-02	9.00E-02
	247.93	6.89	2.68E-01		5.16E-01
	591.76	4.95	2.48E-01		8.08E-01
	692.42	1.78	-2.48E+00		2.18E+00
	723.30	20.06	9.03E-02		2.49E-01
	756.80	4.52	3.56E-01		1.00E+00
	873.18	12.08	1.78E-01		3.68E-01

Analysis Report for 11-Nov-19-10008

L1-10206A-FSGS-007SS

Nuclide Name	Energy (keV)	Yield(%)	Activity (pCi/grams)	Nuclide MDA (pCi/grams)	Line MDA (pCi/grams)
Eu-154	996.29	10.48	-5.40E-02	9.00E-02	4.65E-01
	1004.76	18.01	3.76E-02		3.05E-01
	1274.43	34.80	-1.13E-01		1.41E-01
	1596.48	1.80	3.58E-01		2.35E+00
Eu-155	45.30	1.31	8.95E+00	1.86E-01	1.22E+01
	60.01	1.22	-1.34E+01		1.26E+01
	86.55	30.70	4.78E-02		1.86E-01
	105.31	21.10	2.71E-02		1.96E-01
Ra-226	186.21	3.64	4.28E-01	9.56E-01	9.56E-01
Pa-231	27.36	10.30	1.18E+00	1.27E+00	1.41E+00
	283.69	1.70	-3.17E+00		1.77E+00
	300.07	2.47	2.06E-03		1.27E+00
	302.65	2.20	-2.36E-01		1.44E+00
	330.06	1.40	-1.43E+00		2.49E+00
U-235	143.76	10.96	-8.88E-02	6.14E-02	3.10E-01
	163.33	5.08	-6.64E-02		5.92E-01
	185.71	57.20	3.97E-02		6.14E-02
	202.11	1.08	-8.19E-01		2.88E+00
	205.31	5.01	-1.97E-01		6.32E-01
Am-241	59.54	35.90	-4.95E-02	4.67E-01	4.67E-01

+ = Nuclide identified during the nuclide identification

* = Energy line found in the spectrum

> = MDA value not calculated

@ = Half-life too short to be able to perform the decay correction

? = CAUTION: MDA value is inconsistent with Currie MDA at 95% confidence level

Analysis Report for 11-Nov-19-10009
L1-10206A-FSGS-008SS

GAMMA SPECTRUM ANALYSIS

Sample Identification : 11-Nov-19-10009
Sample Description : L1-10206A-FSGS-008SS
Sample Type : Soil
Unit :
Sample Point :

Sample Size : 1.508E+03 grams
Facility : Default

Sample Taken On : 11/9/2019 8:14:00AM
Acquisition Started : 11/11/2019 11:50:22AM

Procedure : 130G_SOIL_1
Operator : Administrator
Detector Name : 324
Geometry : 130G_SOIL_1
Live Time : 2700.0 seconds
Real Time : 2700.9 seconds

Dead Time : 0.03 %

Peak Locate Threshold : 3.00
Peak Locate Range (in channels) : 120 - 4096
Peak Area Range (in channels) : 120 - 4096
Identification Energy Tolerance : 1.000 keV

Energy Calibration Used Done On : 11/4/2019
Efficiency Calibration Used Done On : 11/11/2019
Efficiency Calibration Description :

Sample Number : 81162
Fill Height : 1507.82 gram
Certificate Name : Eu155-Na22
Certificate Date : 1/30/2013 12:00:00PM

PEAK ANALYSIS REPORT

Peak Analysis Performed on : 11/11/2019 12:51:45PM

Peak Analysis From Channel : 120
Peak Analysis To Channel : 4096


Data Validated
0600 11-12-19

Analysis Report for 11-Nov-19-10009
L1-10206A-FSGS-008SS

Peak No.	Energy (keV)	ROI start	ROI end	Peak Centroid	Net Peak Area	Net Area Uncertainty	Continuum Counts	FWHM (keV)
1	77.17	151 -	158	154.94	1.21E+02	27.09	3.01E+02	0.93
2	238.66	473 -	481	477.50	4.20E+02	31.83	2.77E+02	1.27
3	295.06	585 -	594	590.19	1.09E+02	21.06	1.48E+02	1.12
4	338.42	672 -	681	676.80	9.71E+01	19.53	1.26E+02	1.70
5	351.80	698 -	708	703.54	1.50E+02	20.53	1.14E+02	1.15
6	477.79	951 -	959	955.32	3.29E+01	13.10	6.51E+01	0.81
7	583.21	1160 -	1171	1166.02	1.74E+02	18.36	6.48E+01	1.38
8	609.19	1212 -	1223	1217.96	1.36E+02	16.72	5.72E+01	1.65
9	661.54	1316 -	1328	1322.62	1.18E+02	15.97	5.21E+01	1.36
10	794.77	1585 -	1593	1589.00	1.94E+01	9.11	2.96E+01	1.27
11	910.78	1818 -	1827	1821.01	9.94E+01	13.18	3.16E+01	1.62
12	968.71	1934 -	1942	1936.88	5.08E+01	11.62	3.62E+01	1.66
13	1173.32	2339 -	2351	2346.24	5.80E+01	13.28	4.50E+01	0.98
14	1332.30	2661 -	2669	2664.42	3.48E+01	8.86	2.02E+01	1.37
15	1460.58	2913 -	2928	2921.21	9.33E+02	30.84	6.03E+00	2.00
16	1764.32	3526 -	3535	3529.49	1.89E+01	6.23	8.09E+00	1.45

M = First peak in a multiplet region
m = Other peak in a multiplet region
F = Fitted singlet
Errors quoted at 1.000sigma

No background subtract performed on this spectrum.

NUCLIDE IDENTIFICATION REPORT

Nuclide Library Used : C:\Canberra\Apex\Root\Default\Library\ZION LIB-BNL.NLB

IDENTIFIED NUCLIDES

Nuclide Name	Id Confidence	Energy (keV)	Yield(%)	Activity (pCi/grams)	Activity Uncertainty
BE-7	0.99	477.60 *	10.44	1.04E-01	4.22E-02

Analysis Report for 11-Nov-19-10009

L1-10206A-FSGS-008SS

Nuclide Name	Id Confidence	Energy (keV)		Yield(%)	Activity (pCi/grams)	Activity Uncertainty
K-40	0.99	1460.82	*	10.66	5.87E+00	3.20E-01
Co-60	0.99	1173.23	*	99.85	3.36E-02	7.80E-03
		1332.49	*	99.98	2.18E-02	5.62E-03
Cs-137	0.99	661.66	*	85.10	5.52E-02	8.17E-03
Tl-208	1.00	583.19	*	85.00	7.51E-02	9.11E-03
Pb-212	1.00	115.18		0.60		
		238.63	*	43.60	1.97E-01	2.18E-02
		300.09		3.30		
Pb212-XR	1.00	74.82		10.28		
		77.11	*	17.10	2.64E-01	6.50E-02
		87.35		3.97		
		89.78		1.46		
Bi-214	0.99	609.32	*	45.49	1.13E-01	1.54E-02
		768.36		4.89		
		806.18		1.26		
		934.06		3.11		
		1120.29		14.92		
		1155.21		1.63		
		1238.12		5.83		
		1280.98		1.43		
		1377.67		3.99		
		1385.31		0.79		
		1401.52		1.33		
		1407.99		2.39		
		1509.21		2.13		
		1661.27		1.05		
		1729.59		2.88		
		1764.49	*	15.30	9.55E-02	3.17E-02
		1847.43		2.03		
		2118.51		1.16		
Pb-214	0.99	241.99		7.25		
		295.22	*	18.42	1.36E-01	2.85E-02
		351.93	*	35.60	1.10E-01	1.74E-02
		785.96		1.06		
Pb214-XR	1.00	74.82		5.80		
		77.11	*	9.70	4.65E-01	1.17E-01
		87.35		2.24		
		89.78		0.82		
Ac-228	0.98	129.07		2.42		
		209.25		3.89		
		270.24		3.46		
		328.00		2.95		
		338.32	*	11.27	2.19E-01	4.74E-02
		409.46		1.92		
		463.00		4.40		
		794.95	*	4.25	2.05E-01	9.71E-02
		911.20	*	25.80	1.89E-01	2.64E-02
		964.77		4.99		
		968.97	*	15.80	1.64E-01	3.83E-02
		1588.20		3.22		

Analysis Report for 11-Nov-19-10009
L1-10206A-FSGS-008SS

* = Energy line found in the spectrum.

- = Manually added nuclide.

? = Manually edited nuclide.

@ = Energy line not used for Weighted Mean Activity

Energy Tolerance : 1.000 keV

Nuclide confidence index threshold = 0.30

Errors quoted at 1.000sigma

INTERFERENCE CORRECTED REPORT

	Nuclide Name	Nuclide Id Confidence	Wt mean Activity (pCi/grams)	Wt mean Activity Uncertainty	Comments
	BE-7	0.994	1.04E-01	4.22E-02	
	K-40	0.990	5.87E+00	3.20E-01	
	Co-60	0.996	2.58E-02	4.56E-03	
	Cs-137	0.998	5.52E-02	8.17E-03	
	Tl-208	1.000	7.51E-02	9.11E-03	
X	Bi-211	0.919			
	Pb-212	1.000	1.97E-01	2.18E-02	
?	Pb212-XR	1.000	2.64E-01	6.50E-02	
	Bi-214	0.998	1.09E-01	1.39E-02	
	Pb-214	0.997	1.17E-01	1.49E-02	
?	Pb214-XR	1.000	4.65E-01	1.17E-01	
	Ac-228	0.989	1.88E-01	1.94E-02	

? = nuclide is part of an undetermined solution

X = nuclide rejected by the interference analysis

@ = nuclide contains energy lines not used in Weighted Mean Activity

Errors quoted at 1.000sigma

Analysis Report for 11-Nov-19-10009
L1-10206A-FSGS-008SS

UNIDENTIFIED PEAKS

Peak Locate Performed on : 11/11/2019 12:51:45PM
Peak Locate From Channel : 120
Peak Locate To Channel : 4096

Peak No.	Energy (keV)	Peak Size (CPS)	Peak CPS (%) Uncertainty	Peak Type	Tolerance Nuclide
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All peaks were identified.

M = First peak in a multiplet region

m = Other peak in a multiplet region

F = Fitted singlet

Errors quoted at 1.000sigma

NUCLIDE MDA REPORT

Nuclide Library Used : C:\Canberra\Apex\Root\Default\Library\ZION LIB-BNL.NLB

	Nuclide Name	Energy (keV)	Yield(%)	Activity (pCi/grams)	Nuclide MDA (pCi/grams)	Line MDA (pCi/grams)
	An Pk	511.00	100.00	6.64E-02	2.85E-02	2.85E-02
+	BE-7	477.60	* 10.44	1.04E-01	1.36E-01	1.36E-01
+	K-40	1460.82	* 10.66	5.87E+00	1.09E-01	1.09E-01
	Mn-54	834.85	99.98	2.02E-02	2.27E-02	2.27E-02
+	Co-60	1173.23	* 99.85	3.36E-02	1.58E-02	2.30E-02
		1332.49	* 99.98	2.18E-02		1.58E-02
	Nb-94	702.65	99.81	-7.63E-03	1.90E-02	1.90E-02
		871.09	99.89	8.03E-03		1.92E-02
	Ag-108m	79.13	6.60	-2.69E-01	1.71E-02	5.40E-01
		433.94	90.50	-1.25E-02		1.71E-02
		614.28	89.80	-6.02E-03		2.44E-02
		722.94	90.80	-6.77E-03		2.47E-02
	Sb-125	176.31	6.84	-4.67E-03	5.58E-02	2.54E-01
		380.45	1.52	-4.64E-01		1.12E+00
		427.87	29.60	5.33E-03		5.58E-02
		463.36	10.49	3.61E-02		1.78E-01
		600.60	17.65	-2.17E-02		1.01E-01
		606.71	4.98	-1.89E-01		5.60E-01
		635.95	11.22	-5.02E-03		1.59E-01

Analysis Report for 11-Nov-19-10009

L1-10206A-FSGS-008SS

Nuclide Name	Energy (keV)	Yield(%)	Activity (pCi/grams)	Nuclide MDA (pCi/grams)	Line MDA (pCi/grams)
Sb-125	671.44	1.79	-1.94E-01	5.58E-02	1.05E+00
Ba-133	79.61	2.65	-7.33E-01	3.27E-02	1.28E+00
	81.00	32.90	-1.15E-01		8.69E-02
	276.40	7.16	5.46E-02		2.37E-01
	302.85	18.34	2.95E-02		9.31E-02
	356.01	62.05	-1.59E-02		3.27E-02
	383.85	8.94	3.93E-02		2.01E-01
Cs-134	475.36	1.48	-2.37E-01	2.48E-02	1.25E+00
	563.25	8.34	7.66E-02		2.13E-01
	569.33	15.37	-3.36E-03		1.11E-01
	604.72	97.62	-7.75E-03		2.61E-02
	795.86	85.46	1.34E-02		2.48E-02
	801.95	8.69	1.10E-02		2.18E-01
	1038.61	0.99	-3.35E-01		2.25E+00
	1167.97	1.79	-2.27E-01		1.84E+00
	1365.19	3.02	-4.08E-01		5.59E-01
+	Cs-137	*	85.10	5.52E-02	1.99E-02
	Eu-152		28.67	-2.45E-02	5.66E-02
	244.70	7.61	-2.85E-01		2.25E-01
	295.94	0.45	-1.18E+00		4.45E+00
	344.28	26.60	-2.41E-02		6.28E-02
	367.79	0.86	5.93E-01		1.90E+00
	411.12	2.24	2.00E-01		7.45E-01
	443.96	2.83	1.04E-01		5.83E-01
	488.68	0.42	2.09E-01		4.33E+00
	563.99	0.49	1.56E+00		3.59E+00
	586.26	0.46	-4.41E-01		6.55E+00
	678.62	0.47	2.21E+00		4.04E+00
	688.67	0.86	-6.95E-01		2.10E+00
	719.35	0.28	-3.35E-02		7.30E+00
	778.90	12.96	-1.35E-01		1.40E-01
	810.45	0.32	4.55E+00		6.38E+00
	867.37	4.26	-2.43E-01		4.36E-01
	919.33	0.43	-4.88E-01		5.00E+00
	964.08	14.65	-1.69E-01		2.05E-01
	1085.87	10.24	1.28E-01		2.43E-01
	1089.74	1.73	3.18E-02		1.37E+00
	1112.07	13.69	4.52E-02		1.93E-01
	1212.95	1.43	6.24E-01		1.94E+00
	1249.94	0.19	2.59E+00		1.34E+01
	1299.14	1.63	-2.15E-01		1.41E+00
	1408.01	21.07	3.97E-02		8.90E-02
	1457.64	0.50	-1.61E+00		2.01E+01
	1528.10	0.28	-1.44E-01		5.28E+00
Eu-154	123.07	40.40	-2.09E-02	4.01E-02	4.01E-02
	247.93	6.89	-4.77E-02		2.36E-01
	591.76	4.95	6.71E-02		3.60E-01
	692.42	1.78	3.73E-01		1.12E+00
	723.30	20.06	4.72E-02		1.17E-01
	756.80	4.52	2.77E-01		4.54E-01
	873.18	12.08	-7.11E-02		1.51E-01

Analysis Report for 11-Nov-19-10009

L1-10206A-FSGS-008SS

Nuclide Name	Energy (keV)	Yield(%)	Activity (pCi/grams)	Nuclide MDA (pCi/grams)	Line MDA (pCi/grams)
Eu-154	996.29	10.48	7.76E-04	4.01E-02	2.28E-01
	1004.76	18.01	7.54E-03		1.23E-01
	1274.43	34.80	1.95E-02		7.21E-02
	1596.48	1.80	-1.35E-01		9.27E-01
Eu-155	45.30	1.31	5.89E-01	8.74E-02	5.77E+00
	60.01	1.22	-5.43E-01		6.23E+00
	86.55	30.70	-3.60E-02		8.74E-02
	105.31	21.10	-1.20E-02		9.54E-02
Ra-226	186.21	3.64	4.56E-01	5.33E-01	5.33E-01
Pa-231	27.36	10.30	5.02E-01	5.76E-01	5.76E-01
	283.69	1.70	-7.09E-01		8.74E-01
	300.07	2.47	8.79E-02		7.14E-01
	302.65	2.20	2.46E-01		7.75E-01
	330.06	1.40	-2.30E-01		1.28E+00
U-235	143.76	10.96	-6.98E-02	3.34E-02	1.37E-01
	163.33	5.08	-5.66E-02		3.59E-01
	185.71	57.20	2.41E-02		3.34E-02
	202.11	1.08	7.34E-01		1.66E+00
Am-241	205.31	5.01	-4.27E-01	2.17E-01	3.45E-01
	59.54	35.90	-3.81E-02		2.17E-01

- + = Nuclide identified during the nuclide identification
 * = Energy line found in the spectrum
 > = MDA value not calculated
 @ = Half-life too short to be able to perform the decay correction
 ? = CAUTION: MDA value is inconsistent with Currie MDA at 95% confidence level

Analysis Report for 11-Nov-19-10010
L1-10206A-FSGS-009SS

GAMMA SPECTRUM ANALYSIS

Sample Identification : 11-Nov-19-10010
Sample Description : L1-10206A-FSGS-009SS
Sample Type : Soil
Unit :
Sample Point :

Sample Size : 1.389E+03 grams
Facility : Default

Sample Taken On : 11/9/2019 8:16:00AM
Acquisition Started : 11/11/2019 11:28:16AM

Procedure : 130G_SOIL_1
Operator : Administrator
Detector Name : P40818B
Geometry : 130G_SOIL_1
Live Time : 900.0 seconds
Real Time : 901.0 seconds

Dead Time : 0.11 %

Peak Locate Threshold : 3.00
Peak Locate Range (in channels) : 120 - 8192
Peak Area Range (in channels) : 120 - 8192
Identification Energy Tolerance : 1.000 keV

Energy Calibration Used Done On : 11/4/2019
Efficiency Calibration Used Done On : 11/11/2019
Efficiency Calibration Description :

Sample Number : 81160
Fill Height : 1388.68 gram
Certificate Name : Eu155-Na22
Certificate Date : 1/30/2012 12:00:00PM

PEAK ANALYSIS REPORT

Peak Analysis Performed on : 11/11/2019 11:43:36AM

Peak Analysis From Channel : 120
Peak Analysis To Channel : 8192


Data Validated
0600 11-12-19

Analysis Report for 11-Nov-19-10010
L1-10206A-FSGS-009SS

Peak No.	Energy (keV)	ROI start	ROI end	Peak Centroid	Net Peak Area	Net Area Uncertainty	Continuum Counts	FWHM (keV)
1	238.59	947 -	960	954.47	6.71E+01	13.50	4.19E+01	0.80
2	352.12	1403 -	1415	1408.20	5.18E+01	9.57	1.52E+01	1.08
3	609.38	2430 -	2443	2436.68	4.84E+01	7.26	1.63E+00	0.62
4	1460.92	5833 -	5853	5843.53	1.41E+02	12.31	2.74E+00	2.43

M = First peak in a multiplet region
m = Other peak in a multiplet region
F = Fitted singlet
Errors quoted at 1.000sigma

No background subtract performed on this spectrum.

NUCLIDE IDENTIFICATION REPORT

Nuclide Library Used : C:\Canberra\Apex\Root\Default\Library\ZION LIB-BNL.NLB

IDENTIFIED NUCLIDES

Nuclide Name	Id Confidence	Energy (keV)	Yield(%)	Activity (pCi/grams)	Activity Uncertainty
K-40	0.99	1460.82 *	10.66	3.63E+00	3.54E-01
Pb-212	1.00	115.18	0.60		
		238.63 *	43.60	1.22E-01	2.66E-02
		300.09	3.30		
Bi-214	1.00	609.32 *	45.49	1.60E-01	2.58E-02
		768.36	4.89		
		806.18	1.26		
		934.06	3.11		
		1120.29	14.92		
		1155.21	1.63		
		1238.12	5.83		
		1280.98	1.43		
		1377.67	3.99		

Analysis Report for 11-Nov-19-10010

L1-10206A-FSGS-009SS

Nuclide Name	Id Confidence	Energy (keV)	Yield(%)	Activity (pCi/grams)	Activity Uncertainty
Bi-214	1.00	1385.31	0.79		
		1401.52	1.33		
		1407.99	2.39		
		1509.21	2.13		
		1661.27	1.05		
		1729.59	2.88		
		1764.49	15.30		
		1847.43	2.03		
		2118.51	1.16		
		241.99	7.25		
Pb-214	0.99	295.22	18.42		
		351.93 *	35.60	1.48E-01	2.99E-02
		785.96	1.06		

* = Energy line found in the spectrum.

- = Manually added nuclide.

? = Manually edited nuclide.

@ = Energy line not used for Weighted Mean Activity

Energy Tolerance : 1.000 keV

Nuclide confidence index threshold = 0.30

Errors quoted at 1.000sigma

INTERFERENCE CORRECTED REPORT

Nuclide Name	Nuclide Id Confidence	Wt mean Activity (pCi/grams)	Wt mean Activity Uncertainty	Comments
K-40	0.998	3.63E+00	3.54E-01	
Pb-212	1.000	1.22E-01	2.66E-02	
Bi-214	1.000	1.60E-01	2.58E-02	
Pb-214	0.997	1.48E-01	2.99E-02	

? = nuclide is part of an undetermined solution

X = nuclide rejected by the interference analysis

@ = nuclide contains energy lines not used in Weighted Mean Activity

Errors quoted at 1.000sigma

Analysis Report for 11-Nov-19-10010
L1-10206A-FSGS-009SS

UNIDENTIFIED PEAKS

Peak Locate Performed on : 11/11/2019 11:43:36AM
Peak Locate From Channel : 120
Peak Locate To Channel : 8192

Peak No.	Energy (keV)	Peak Size (CPS)	Peak CPS (%) Uncertainty	Peak Type	Tolerance Nuclide
All peaks were identified.					
M = First peak in a multiplet region					
m = Other peak in a multiplet region					
F = Fitted singlet					
Errors quoted at 1.000sigma					

NUCLIDE MDA REPORT

Nuclide Library Used : C:\Canberra\Apex\Root\Default\Library\ZION LIB-BNL.NLB

	Nuclide Name	Energy (keV)	Yield(%)	Activity (pCi/grams)	Nuclide MDA (pCi/grams)	Line MDA (pCi/grams)
	An Pk	511.00	100.00	8.55E-02	6.10E-02	6.10E-02
	BE-7	477.60	10.44	2.10E-01	4.50E-01	4.50E-01
+	K-40	1460.82	* 10.66	3.63E+00	3.54E-01	3.54E-01
	Mn-54	834.85	99.98	2.43E-02	3.77E-02	3.77E-02
	Co-60	1173.23	99.85	-1.22E-02	4.98E-02	5.84E-02
		1332.49	99.98	3.07E-02		4.98E-02
	Nb-94	702.65	99.81	-7.84E-03	3.86E-02	4.12E-02
		871.09	99.89	3.35E-03		3.86E-02
	Ag-108m	79.13	6.60	6.45E-01	3.49E-02	1.52E+00
		433.94	90.50	-5.99E-03		4.30E-02
		614.28	89.80	-2.60E-02		5.58E-02
		722.94	90.80	-2.04E-02		3.49E-02
	Sb-125	176.31	6.84	-1.22E-01	1.12E-01	4.89E-01
		380.45	1.52	-2.79E-01		2.42E+00
		427.87	29.60	-7.92E-02		1.12E-01
		463.36	10.49	4.44E-02		3.45E-01
		600.60	17.65	7.59E-02		1.91E-01
		606.71	4.98	1.54E+00		1.18E+00
		635.95	11.22	7.10E-02		3.96E-01

Analysis Report for 11-Nov-19-10010

L1-10206A-FSGS-009SS

Nuclide Name	Energy (keV)	Yield(%)	Activity (pCi/grams)	Nuclide MDA (pCi/grams)	Line MDA (pCi/grams)
Sb-125	671.44	1.79	-9.42E-01	1.12E-01	1.55E+00
Ba-133	79.61	2.65	5.50E-01	6.94E-02	3.63E+00
	81.00	32.90	-3.84E-01		2.43E-01
	276.40	7.16	6.66E-01		5.22E-01
	302.85	18.34	3.46E-02		1.81E-01
	356.01	62.05	-1.52E-02		6.94E-02
	383.85	8.94	-7.12E-03		3.95E-01
Cs-134	475.36	1.48	1.35E+00	5.09E-02	3.06E+00
	563.25	8.34	-2.36E-01		4.16E-01
	569.33	15.37	-1.19E-01		2.00E-01
	604.72	97.62	-1.69E-02		5.09E-02
	795.86	85.46	1.31E-02		5.25E-02
	801.95	8.69	2.96E-02		5.19E-01
	1038.61	0.99	-1.53E-01		4.69E+00
	1167.97	1.79	-8.90E-02		3.04E+00
	1365.19	3.02	5.18E-01		1.26E+00
Cs-137	661.66	85.10	5.39E-02	5.76E-02	5.76E-02
Eu-152	121.78	28.67	4.20E-02	1.20E-01	1.26E-01
	244.70	7.61	2.75E-01		4.98E-01
	295.94	0.45	9.99E+00		9.22E+00
	344.28	26.60	-5.91E-02		1.20E-01
	367.79	0.86	2.65E+00		4.24E+00
	411.12	2.24	2.40E-01		1.65E+00
	443.96	2.83	-1.13E+00		1.16E+00
	488.68	0.42	-5.13E+00		8.52E+00
	563.99	0.49	-2.20E+00		6.89E+00
	586.26	0.46	7.15E-01		9.27E+00
	678.62	0.47	6.61E-01		7.13E+00
	688.67	0.86	6.21E-01		3.83E+00
	719.35	0.28	-1.14E+01		1.04E+01
	778.90	12.96	6.50E-02		2.94E-01
	810.45	0.32	1.56E+00		1.15E+01
	867.37	4.26	-1.62E-01		9.89E-01
	919.33	0.43	5.81E-01		1.08E+01
	964.08	14.65	7.73E-02		3.90E-01
	1085.87	10.24	-2.90E-01		3.76E-01
	1089.74	1.73	-1.29E+00		2.33E+00
	1112.07	13.69	1.58E-01		4.11E-01
	1212.95	1.43	2.18E+00		4.09E+00
	1249.94	0.19	2.72E+01		3.22E+01
	1299.14	1.63	-1.16E-01		3.01E+00
	1408.01	21.07	-1.32E-01		2.18E-01
	1457.64	0.50	7.47E+01		3.32E+01
	1528.10	0.28	-1.21E+01		1.37E+01
Eu-154	123.07	40.40	-6.22E-02	8.31E-02	8.31E-02
	247.93	6.89	-2.13E-01		4.85E-01
	591.76	4.95	-1.40E-01		7.23E-01
	692.42	1.78	6.23E-01		2.09E+00
	723.30	20.06	-8.74E-03		1.70E-01
	756.80	4.52	3.43E-01		9.16E-01
	873.18	12.08	1.15E-01		3.31E-01

Analysis Report for 11-Nov-19-10010

L1-10206A-FSGS-009SS

Nuclide Name	Energy (keV)	Yield(%)	Activity (pCi/grams)	Nuclide MDA (pCi/grams)	Line MDA (pCi/grams)
Eu-154	996.29	10.48	4.99E-02	8.31E-02	4.88E-01
	1004.76	18.01	-4.14E-02		2.29E-01
	1274.43	34.80	6.55E-02		1.48E-01
	1596.48	1.80	-1.60E+00		1.26E+00
Eu-155	45.30	1.31	7.67E+00	2.12E-01	2.57E+01
	60.01	1.22	-8.37E+00		2.52E+01
	86.55	30.70	-3.03E-02		2.26E-01
	105.31	21.10	-3.07E-01		2.12E-01
Ra-226	186.21	3.64	3.63E-01	9.82E-01	9.82E-01
Pa-231	27.36	10.30	1.77E+00	1.31E+00	2.83E+00
	283.69	1.70	-1.24E-01		1.91E+00
	300.07	2.47	-1.47E+00		1.31E+00
	302.65	2.20	1.75E-01		1.52E+00
	330.06	1.40	8.21E-02		2.78E+00
U-235	143.76	10.96	1.10E-01	6.24E-02	3.83E-01
	163.33	5.08	2.99E-01		7.32E-01
	185.71	57.20	2.79E-03		6.24E-02
	202.11	1.08	-8.53E-03		2.97E+00
Am-241	205.31	5.01	8.55E-03	9.16E-01	6.70E-01
	59.54	35.90	-6.01E-02		9.16E-01

+ = Nuclide identified during the nuclide identification

* = Energy line found in the spectrum

> = MDA value not calculated

@ = Half-life too short to be able to perform the decay correction

? = CAUTION: MDA value is inconsistent with Currie MDA at 95% confidence level

Analysis Report for 11-Nov-19-10011
L1-10206A-FSGS-010SS

GAMMA SPECTRUM ANALYSIS

Sample Identification : 11-Nov-19-10011
Sample Description : L1-10206A-FSGS-010SS
Sample Type : Soil
Unit :
Sample Point :

Sample Size : 1.539E+03 grams
Facility : Default

Sample Taken On : 11/9/2019 8:18:00AM
Acquisition Started : 11/11/2019 11:28:23AM

Procedure : 130G_SOIL_1
Operator : Administrator
Detector Name : P11314
Geometry : 130G_SOIL_1
Live Time : 900.0 seconds
Real Time : 900.4 seconds

Dead Time : 0.04 %

Peak Locate Threshold : 3.00
Peak Locate Range (in channels) : 120 - 8192
Peak Area Range (in channels) : 120 - 8192
Identification Energy Tolerance : 1.000 keV

Energy Calibration Used Done On : 11/4/2019
Efficiency Calibration Used Done On : 11/11/2019
Efficiency Calibration Description :

Sample Number : 81161
Fill Height : 1538.83 gram
Certificate Name : Eu155-Na22
Certificate Date : 12/22/2008 12:00:00PM

PEAK ANALYSIS REPORT

Peak Analysis Performed on : 11/11/2019 11:43:31AM

Peak Analysis From Channel : 120
Peak Analysis To Channel : 8192


Data Validated
0600 11-12-19

Analysis Report for 11-Nov-19-10011
L1-10206A-FSGS-010SS

Peak No.	Energy (keV)	ROI start	ROI end	Peak Centroid	Net Peak Area	Net Area Uncertainty	Continuum Counts	FWHM (keV)
1	185.95	739 -	750	743.68	2.74E+01	11.43	4.06E+01	0.86
2	238.68	948 -	962	954.30	1.09E+02	17.99	7.15E+01	0.69
3	295.21	1176 -	1186	1180.14	3.74E+01	9.57	2.26E+01	0.99
4	338.13	1348 -	1356	1351.60	2.23E+01	7.62	1.67E+01	0.47
5	351.91	1400 -	1413	1406.64	8.53E+01	12.40	2.47E+01	0.62
6	582.94	2322 -	2335	2329.88	3.03E+01	9.44	2.07E+01	0.83
7	608.96	2427 -	2443	2433.88	6.25E+01	10.40	1.45E+01	1.27
8	726.83	2901 -	2910	2905.05	1.00E+01	4.63	5.00E+00	0.91
9	910.78	3635 -	3648	3640.56	2.70E+01	6.82	7.00E+00	0.57
10	1459.86	5826 -	5851	5837.37	3.61E+02	19.31	2.95E+00	1.58

M = First peak in a multiplet region
m = Other peak in a multiplet region
F = Fitted singlet
Errors quoted at 1.000sigma

No background subtract performed on this spectrum.

NUCLIDE IDENTIFICATION REPORT

Nuclide Library Used : C:\Canberra\Apex\Root\Default\Library\ZION LIB-BNL.NLB

IDENTIFIED NUCLIDES

Nuclide Name	Id Confidence	Energy (keV)	Yield(%)	Activity (pCi/grams)	Activity Uncertainty
K-40	0.86	1460.82 *	10.66	8.08E+00	5.57E-01
Tl-208	0.99	583.19 *	85.00	4.55E-02	1.44E-02
Bi-212	0.97	39.86 *	1.06		
		727.33 *	6.67	2.23E-01	1.04E-01
		785.37	1.10		
		1620.50	1.47		
Pb-212	1.00	115.18	0.60		

Analysis Report for 11-Nov-19-10011

L1-10206A-FSGS-010SS

Nuclide Name	Id Confidence	Energy (keV)		Yield(%)	Activity (pCi/grams)	Activity Uncertainty
Pb-212	1.00	238.63	*	43.60	1.74E-01	3.18E-02
		300.09		3.30		
Bi-214	0.99	609.32	*	45.49	1.81E-01	3.20E-02
		768.36		4.89		
		806.18		1.26		
		934.06		3.11		
		1120.29		14.92		
		1155.21		1.63		
		1238.12		5.83		
		1280.98		1.43		
		1377.67		3.99		
		1385.31		0.79		
		1401.52		1.33		
		1407.99		2.39		
		1509.21		2.13		
		1661.27		1.05		
		1729.59		2.88		
		1764.49		15.30		
		1847.43		2.03		
		2118.51		1.16		
Pb-214	1.00	241.99		7.25		
		295.22	*	18.42	1.59E-01	4.28E-02
		351.93	*	35.60	2.15E-01	3.56E-02
		785.96		1.06		
Ra-226	0.98	186.21	*	3.64	4.55E-01	1.94E-01
Ac-228	0.99	129.07		2.42		
		209.25		3.89		
		270.24		3.46		
		328.00		2.95		
		338.32	*	11.27	1.72E-01	6.04E-02
		409.46		1.92		
		463.00		4.40		
		794.95		4.25		
		911.20	*	25.80	1.81E-01	4.65E-02
		964.77		4.99		
		968.97		15.80		
		1588.20		3.22		
U-235	0.99	143.76		10.96		
		163.33		5.08		
		185.71	*	57.20	2.90E-02	1.23E-02
		202.11		1.08		
		205.31		5.01		

* = Energy line found in the spectrum.

- = Manually added nuclide.

? = Manually edited nuclide.

@ = Energy line not used for Weighted Mean Activity

Energy Tolerance : 1.000 keV

Nuclide confidence index threshold = 0.30

Errors quoted at 1.000sigma

Analysis Report for 11-Nov-19-10011
L1-10206A-FSGS-010SS

INTERFERENCE CORRECTED REPORT

	Nuclide Name	Nuclide Id Confidence	Wt mean Activity (pCi/grams)	Wt mean Activity Uncertainty	Comments
	K-40	0.862	8.08E+00	5.57E-01	
	Tl-208	0.990	4.55E-02	1.44E-02	
X	Bi-211	0.894			
	Bi-212	0.974	2.23E-01	1.04E-01	
	Pb-212	1.000	1.74E-01	3.18E-02	
	Bi-214	0.992	1.81E-01	3.20E-02	
	Pb-214	1.000	1.92E-01	2.74E-02	
?	Ra-226	0.989	4.55E-01	1.94E-01	
	Ac-228	0.990	1.78E-01	3.68E-02	
?	U-235	0.993	2.90E-02	1.23E-02	

- ? = nuclide is part of an undetermined solution
X = nuclide rejected by the interference analysis
@ = nuclide contains energy lines not used in Weighted Mean Activity

Errors quoted at 1.000sigma

Analysis Report for 11-Nov-19-10011
L1-10206A-FSGS-010SS

UNIDENTIFIED PEAKS

Peak Locate Performed on : 11/11/2019 11:43:31AM
Peak Locate From Channel : 120
Peak Locate To Channel : 8192

Peak No.	Energy (keV)	Peak Size (CPS)	Peak CPS (%) Uncertainty	Peak Type	Tolerance Nuclide
All peaks were identified.					
M = First peak in a multiplet region					
m = Other peak in a multiplet region					
F = Fitted singlet					
Errors quoted at 1.000sigma					

NUCLIDE MDA REPORT

Nuclide Library Used : C:\Canberra\Apex\Root\Default\Library\ZION LIB-BNL.NLB

	Nuclide Name	Energy (keV)	Yield(%)	Activity (pCi/grams)	Nuclide MDA (pCi/grams)	Line MDA (pCi/grams)
	An Pk	511.00	100.00	5.37E-02	5.39E-02	5.39E-02
	BE-7	477.60	10.44	3.80E-01	3.76E-01	3.76E-01
+	K-40	1460.82	* 10.66	8.08E+00	3.24E-01	3.24E-01
	Mn-54	834.85	99.98	1.65E-03	4.55E-02	4.55E-02
	Co-60	1173.23	99.85	5.18E-02	4.19E-02	6.57E-02
		1332.49	99.98	7.95E-03		4.19E-02
	Nb-94	702.65	99.81	-4.94E-02	4.17E-02	4.17E-02
		871.09	99.89	-1.26E-02		4.51E-02
	Ag-108m	79.13	6.60	3.52E-01	3.99E-02	1.20E+00
		433.94	90.50	2.06E-02		3.99E-02
		614.28	89.80	4.80E-03		5.52E-02
		722.94	90.80	-1.55E-02		5.35E-02
	Sb-125	176.31	6.84	1.85E-01	1.06E-01	4.39E-01
		380.45	1.52	-1.15E-01		2.17E+00
		427.87	29.60	-1.04E-01		1.06E-01
		463.36	10.49	8.94E-02		3.45E-01
		600.60	17.65	5.64E-02		2.19E-01
		606.71	4.98	-2.70E-01		1.30E+00
		635.95	11.22	8.16E-02		3.58E-01

Analysis Report for 11-Nov-19-10011
L1-10206A-FSGS-010SS

Nuclide Name	Energy (keV)	Yield(%)	Activity (pCi/grams)	Nuclide MDA (pCi/grams)	Line MDA (pCi/grams)
Sb-125	671.44	1.79	-1.26E+00	1.06E-01	2.04E+00
Ba-133	79.61	2.65	1.22E+00	6.50E-02	2.91E+00
	81.00	32.90	-2.59E-01		1.90E-01
	276.40	7.16	2.43E-01		4.97E-01
	302.85	18.34	6.85E-02		1.69E-01
	356.01	62.05	-8.81E-03		6.50E-02
	383.85	8.94	-1.22E-01		3.62E-01
Cs-134	475.36	1.48	8.61E-01	5.93E-02	2.44E+00
	563.25	8.34	-3.13E-01		4.92E-01
	569.33	15.37	-1.33E-01		2.35E-01
	604.72	97.62	-2.85E-02		6.15E-02
	795.86	85.46	4.05E-02		5.93E-02
	801.95	8.69	5.26E-01		6.00E-01
	1038.61	0.99	-1.64E+00		4.65E+00
	1167.97	1.79	-1.43E-01		3.52E+00
	1365.19	3.02	-1.23E-01		1.41E+00
Cs-137	661.66	85.10	9.00E-04	5.44E-02	5.44E-02
Eu-152	121.78	28.67	9.22E-03	1.13E-01	1.13E-01
	244.70	7.61	5.89E-01		5.27E-01
	295.94	0.45	5.41E+00		8.98E+00
	344.28	26.60	1.40E-02		1.26E-01
	367.79	0.86	2.41E-01		3.60E+00
	411.12	2.24	-7.03E-01		1.59E+00
	443.96	2.83	-6.65E-02		1.25E+00
	488.68	0.42	3.12E+00		8.19E+00
	563.99	0.49	-2.88E+00		8.15E+00
	586.26	0.46	3.78E+00		1.29E+01
	678.62	0.47	2.30E+00		8.76E+00
	688.67	0.86	-3.82E+00		3.87E+00
	719.35	0.28	3.44E+00		1.47E+01
	778.90	12.96	-1.37E-01		3.70E-01
	810.45	0.32	-8.46E+00		1.26E+01
	867.37	4.26	5.79E-01		1.05E+00
	919.33	0.43	7.63E+00		1.19E+01
	964.08	14.65	5.05E-01		4.80E-01
	1085.87	10.24	-2.06E-03		5.54E-01
	1089.74	1.73	3.74E+00		3.70E+00
	1112.07	13.69	-2.06E-01		3.43E-01
	1212.95	1.43	-1.61E+00		4.76E+00
	1249.94	0.19	1.44E+01		3.03E+01
	1299.14	1.63	-1.54E+00		3.28E+00
	1408.01	21.07	-3.39E-02		2.43E-01
	1457.64	0.50	1.74E+02		4.50E+01
	1528.10	0.28	5.26E+00		1.28E+01
Eu-154	123.07	40.40	-1.96E-02	8.00E-02	8.00E-02
	247.93	6.89	3.05E-01		4.94E-01
	591.76	4.95	-1.68E-01		7.94E-01
	692.42	1.78	-1.78E+00		2.13E+00
	723.30	20.06	-7.12E-02		2.39E-01
	756.80	4.52	-4.26E-01		8.91E-01
	873.18	12.08	9.01E-02		4.05E-01

Analysis Report for 11-Nov-19-10011

L1-10206A-FSGS-010SS

	Nuclide Name	Energy (keV)	Yield(%)	Activity (pCi/grams)	Nuclide MDA (pCi/grams)	Line MDA (pCi/grams)
	Eu-154	996.29	10.48	8.44E-02	8.00E-02	4.45E-01
		1004.76	18.01	1.00E-01		2.55E-01
		1274.43	34.80	9.52E-03		1.61E-01
		1596.48	1.80	2.85E-01		1.38E+00
	Eu-155	45.30	1.31	9.13E+00	1.81E-01	1.10E+01
		60.01	1.22	-2.18E-01		1.21E+01
		86.55	30.70	1.33E-01		1.94E-01
		105.31	21.10	2.29E-02		1.81E-01
+	Ra-226	186.21	* 3.64	4.55E-01	6.21E-01	6.21E-01
	Pa-231	27.36	10.30	7.21E-01	1.16E+00	1.16E+00
		283.69	1.70	-8.76E-01		1.82E+00
		300.07	2.47	-1.61E-01		1.23E+00
		302.65	2.20	8.39E-02		1.39E+00
		330.06	1.40	4.71E-01		2.30E+00
+	U-235	143.76	10.96	6.61E-02	3.95E-02	3.17E-01
		163.33	5.08	-3.31E-02		5.96E-01
		185.71	* 57.20	2.90E-02		3.95E-02
		202.11	1.08	-7.14E-01		2.95E+00
		205.31	5.01	-1.78E-01		6.03E-01
	Am-241	59.54	35.90	-5.97E-02	4.14E-01	4.14E-01

+ = Nuclide identified during the nuclide identification

* = Energy line found in the spectrum

> = MDA value not calculated

@ = Half-life too short to be able to perform the decay correction

? = CAUTION: MDA value is inconsistent with Currie MDA at 95% confidence level

Analysis Report for 11-Nov-19-10012
L1-10206A-FSGS-011SS

GAMMA SPECTRUM ANALYSIS

Sample Identification : 11-Nov-19-10012
Sample Description : L1-10206A-FSGS-011SS
Sample Type : Soil
Unit :
Sample Point :

Sample Size : 1.507E+03 grams
Facility : Default

Sample Taken On : 11/9/2019 8:20:00AM
Acquisition Started : 11/11/2019 11:50:29AM

Procedure : 130G_SOIL_1
Operator : Administrator
Detector Name : P40818B
Geometry : 130G_SOIL_1
Live Time : 900.0 seconds
Real Time : 901.4 seconds

Dead Time : 0.15 %

Peak Locate Threshold : 3.00
Peak Locate Range (in channels) : 120 - 8192
Peak Area Range (in channels) : 120 - 8192
Identification Energy Tolerance : 1.000 keV

Energy Calibration Used Done On : 11/4/2019
Efficiency Calibration Used Done On : 11/11/2019
Efficiency Calibration Description :

Sample Number : 81163
Fill Height : 1507.25 gram
Certificate Name : Eu155-Na22
Certificate Date : 1/30/2012 12:00:00PM

PEAK ANALYSIS REPORT

Peak Analysis Performed on : 11/11/2019 12:05:33PM

Peak Analysis From Channel : 120
Peak Analysis To Channel : 8192


Data Validated
0600 11-12-19

Analysis Report for 11-Nov-19-10012
L1-10206A-FSGS-011SS

Peak No.	Energy (keV)	ROI start	ROI end	Peak Centroid	Net Peak Area	Net Area Uncertainty	Continuum Counts	FWHM (keV)
1	238.70	940 -	959	954.89	1.42E+02	21.57	8.87E+01	0.87
2	295.17	1173 -	1188	1180.59	5.70E+01	11.67	2.60E+01	0.68
3	338.32	1348 -	1357	1353.05	2.57E+01	9.44	2.73E+01	0.49
4	351.96	1402 -	1413	1407.58	8.36E+01	13.31	3.74E+01	1.22
5	583.34	2324 -	2339	2332.56	5.90E+01	9.76	1.20E+01	0.99
6	609.37	2429 -	2445	2436.65	9.20E+01	11.30	1.10E+01	0.79
7	969.32	3871 -	3883	3876.27	2.63E+01	6.41	5.66E+00	0.54
8	1460.78	5831 -	5853	5842.95	2.93E+02	17.12	0.00E+00	1.52

M = First peak in a multiplet region

m = Other peak in a multiplet region

F = Fitted singlet

Errors quoted at 1.000sigma

No background subtract performed on this spectrum.

NUCLIDE IDENTIFICATION REPORT

Nuclide Library Used : C:\Canberra\Apex\Root\Default\Library\ZION LIB-BNL.NLB

IDENTIFIED NUCLIDES

Nuclide Name	Id Confidence	Energy (keV)	Yield(%)	Activity (pCi/grams)	Activity Uncertainty
K-40	1.00	1460.82 *	10.66	7.34E+00	5.34E-01
Tl-208	0.99	583.19 *	85.00	9.89E-02	1.74E-02
Pb-212	0.99	115.18	0.60		
		238.63 *	43.60	2.55E-01	4.38E-02
		300.09	3.30		
Bi-214	1.00	609.32 *	45.49	2.97E-01	4.06E-02
		768.36	4.89		
		806.18	1.26		
		934.06	3.11		

Analysis Report for 11-Nov-19-10012

L1-10206A-FSGS-011SS

Nuclide Name	Id Confidence	Energy (keV)	Yield(%)	Activity (pCi/grams)	Activity Uncertainty
Bi-214	1.00	1120.29	14.92		
		1155.21	1.63		
		1238.12	5.83		
		1280.98	1.43		
		1377.67	3.99		
		1385.31	0.79		
		1401.52	1.33		
		1407.99	2.39		
		1509.21	2.13		
		1661.27	1.05		
		1729.59	2.88		
		1764.49	15.30		
		1847.43	2.03		
		2118.51	1.16		
Pb-214	1.00	241.99	7.25		
		295.22 *	18.42	2.73E-01	5.99E-02
		351.93 *	35.60	2.35E-01	4.18E-02
		785.96	1.06		
Ac-228	0.99	129.07	2.42		
		209.25	3.89		
		270.24	3.46		
		328.00	2.95		
		338.32 *	11.27	2.21E-01	8.34E-02
		409.46	1.92		
		463.00	4.40		
		794.95	4.25		
		911.20	25.80		
		964.77	4.99		
		968.97 *	15.80	3.36E-01	8.31E-02
		1588.20	3.22		

* = Energy line found in the spectrum.

- = Manually added nuclide.

? = Manually edited nuclide.

@ = Energy line not used for Weighted Mean Activity

Energy Tolerance : 1.000 keV

Nuclide confidence index threshold = 0.30

Errors quoted at 1.000sigma

INTERFERENCE CORRECTED REPORT

Analysis Report for 11-Nov-19-10012

L1-10206A-FSGS-011SS

	Nuclide Name	Nuclide Id Confidence	Wt mean Activity (pCi/grams)	Wt mean Activity Uncertainty	Comments
	K-40	1.000	7.34E+00	5.34E-01	
	Tl-208	0.996	9.89E-02	1.74E-02	
X	Bi-211	0.880			
	Pb-212	0.999	2.55E-01	4.38E-02	
	Bi-214	1.000	2.97E-01	4.06E-02	
	Pb-214	1.000	2.47E-01	3.43E-02	
	Ac-228	0.996	2.79E-01	5.88E-02	

? = nuclide is part of an undetermined solution

X = nuclide rejected by the interference analysis

@ = nuclide contains energy lines not used in Weighted Mean Activity

Errors quoted at 1.000sigma

Analysis Report for 11-Nov-19-10012
L1-10206A-FSGS-011SS

UNIDENTIFIED PEAKS

Peak Locate Performed on : 11/11/2019 12:05:33PM
Peak Locate From Channel : 120
Peak Locate To Channel : 8192

Peak No.	Energy (keV)	Peak Size (CPS)	Peak CPS (%) Uncertainty	Peak Type	Tolerance Nuclide
All peaks were identified.					
M = First peak in a multiplet region					
m = Other peak in a multiplet region					
F = Fitted singlet					
Errors quoted at 1.000sigma					

NUCLIDE MDA REPORT

Nuclide Library Used : C:\Canberra\Apex\Root\Default\Library\ZION LIB-BNL.NLB

	Nuclide Name	Energy (keV)	Yield(%)	Activity (pCi/grams)	Nuclide MDA (pCi/grams)	Line MDA (pCi/grams)
	An Pk	511.00	100.00	6.97E-02	6.19E-02	6.19E-02
	BE-7	477.60	10.44	3.11E-01	5.07E-01	5.07E-01
+	K-40	1460.82	* 10.66	7.34E+00	7.20E-02	7.20E-02
	Mn-54	834.85	99.98	-2.59E-02	5.85E-02	5.85E-02
	Co-60	1173.23	99.85	4.89E-02	5.92E-02	8.11E-02
		1332.49	99.98	1.18E-03		5.92E-02
	Nb-94	702.65	99.81	-5.11E-03	5.00E-02	5.00E-02
		871.09	99.89	-2.23E-02		5.20E-02
	Ag-108m	79.13	6.60	-7.41E-02	4.49E-02	2.03E+00
		433.94	90.50	-1.06E-02		4.49E-02
		614.28	89.80	-6.00E-02		7.65E-02
		722.94	90.80	9.32E-03		6.17E-02
	Sb-125	176.31	6.84	2.89E-02	1.40E-01	5.83E-01
		380.45	1.52	-2.64E+00		2.50E+00
		427.87	29.60	-9.31E-02		1.40E-01
		463.36	10.49	2.81E-01		4.22E-01
		600.60	17.65	-1.63E-01		2.37E-01
		606.71	4.98	-1.45E-01		1.62E+00
		635.95	11.22	2.27E-02		3.62E-01

Analysis Report for 11-Nov-19-10012

L1-10206A-FSGS-011SS

Nuclide Name	Energy (keV)	Yield(%)	Activity (pCi/grams)	Nuclide MDA (pCi/grams)	Line MDA (pCi/grams)
Sb-125	671.44	1.79	6.58E-01	1.40E-01	2.44E+00
Ba-133	79.61	2.65	-2.78E+00	9.26E-02	4.80E+00
	81.00	32.90	-3.11E-01		3.37E-01
	276.40	7.16	3.52E-01		5.71E-01
	302.85	18.34	3.47E-02		2.12E-01
	356.01	62.05	-6.59E-02		9.26E-02
	383.85	8.94	-8.75E-02		4.42E-01
Cs-134	475.36	1.48	1.76E+00	6.85E-02	3.46E+00
	563.25	8.34	1.86E-01		5.74E-01
	569.33	15.37	-6.21E-02		2.66E-01
	604.72	97.62	-1.71E-02		7.06E-02
	795.86	85.46	6.13E-02		6.85E-02
	801.95	8.69	-2.89E-01		5.38E-01
	1038.61	0.99	2.83E+00		5.73E+00
	1167.97	1.79	-1.55E+00		4.47E+00
	1365.19	3.02	-7.10E-02		1.38E+00
Cs-137	661.66	85.10	9.76E-02	8.00E-02	8.00E-02
Eu-152	121.78	28.67	-3.95E-02	1.41E-01	1.57E-01
	244.70	7.61	1.18E-01		5.91E-01
	295.94	0.45	4.06E+00		1.04E+01
	344.28	26.60	-8.16E-02		1.41E-01
	367.79	0.86	1.21E+00		4.83E+00
	411.12	2.24	-5.55E-01		1.84E+00
	443.96	2.83	3.81E-01		1.57E+00
	488.68	0.42	-2.48E+00		1.05E+01
	563.99	0.49	-5.60E+00		9.52E+00
	586.26	0.46	-5.98E+00		1.52E+01
	678.62	0.47	-1.09E+00		9.15E+00
	688.67	0.86	-5.42E-01		5.50E+00
	719.35	0.28	-3.03E+00		1.84E+01
	778.90	12.96	-5.79E-02		3.66E-01
	810.45	0.32	1.24E+01		1.52E+01
	867.37	4.26	-9.05E-01		1.15E+00
	919.33	0.43	1.13E+00		1.22E+01
	964.08	14.65	-4.43E-01		4.85E-01
	1085.87	10.24	-1.40E-01		6.18E-01
	1089.74	1.73	-2.39E+00		3.56E+00
	1112.07	13.69	-9.37E-02		4.25E-01
	1212.95	1.43	-1.42E+00		4.71E+00
	1249.94	0.19	-1.60E+01		3.79E+01
	1299.14	1.63	9.41E-01		3.58E+00
	1408.01	21.07	-6.95E-02		1.92E-01
	1457.64	0.50	1.46E+02		4.51E+01
	1528.10	0.28	3.92E+00		1.22E+01
Eu-154	123.07	40.40	7.33E-04	1.12E-01	1.12E-01
	247.93	6.89	2.12E-01		6.03E-01
	591.76	4.95	4.85E-01		9.87E-01
	692.42	1.78	-1.08E+00		2.59E+00
	723.30	20.06	6.54E-02		2.82E-01
	756.80	4.52	-3.11E-01		1.05E+00
	873.18	12.08	7.88E-03		4.45E-01

Analysis Report for 11-Nov-19-10012

L1-10206A-FSGS-011SS

Nuclide Name	Energy (keV)	Yield(%)	Activity (pCi/grams)	Nuclide MDA (pCi/grams)	Line MDA (pCi/grams)
Eu-154	996.29	10.48	-5.38E-02	1.12E-01	5.44E-01
	1004.76	18.01	-1.95E-01		3.24E-01
	1274.43	34.80	-9.06E-02		1.76E-01
	1596.48	1.80	7.29E-01		2.87E+00
Eu-155	45.30	1.31	1.47E+01	2.80E-01	3.10E+01
	60.01	1.22	-9.25E+00		3.51E+01
	86.55	30.70	1.06E-01		2.89E-01
	105.31	21.10	5.40E-02		2.80E-01
Ra-226	186.21	3.64	1.12E+00	1.27E+00	1.27E+00
Pa-231	27.36	10.30	2.48E+00	1.57E+00	3.45E+00
	283.69	1.70	-1.03E+00		2.22E+00
	300.07	2.47	-3.70E-01		1.57E+00
	302.65	2.20	-4.54E-01		1.73E+00
	330.06	1.40	-8.94E-01		2.83E+00
U-235	143.76	10.96	-3.58E-02	7.90E-02	4.34E-01
	163.33	5.08	-3.03E-01		7.87E-01
	185.71	57.20	-5.91E-03		7.90E-02
	202.11	1.08	-1.79E+00		3.64E+00
	205.31	5.01	-7.91E-01		8.07E-01
Am-241	59.54	35.90	1.32E-01	1.22E+00	1.22E+00

- + = Nuclide identified during the nuclide identification
 * = Energy line found in the spectrum
 > = MDA value not calculated
 @ = Half-life too short to be able to perform the decay correction
 ? = CAUTION: MDA value is inconsistent with Currie MDA at 95% confidence level

Analysis Report for 11-Nov-19-10013
L1-10206A-FSGS-012SS

GAMMA SPECTRUM ANALYSIS

Sample Identification : 11-Nov-19-10013
Sample Description : L1-10206A-FSGS-012SS
Sample Type : Soil
Unit :
Sample Point :

Sample Size : 1.299E+03 grams
Facility : Default

Sample Taken On : 11/9/2019 8:22:00AM
Acquisition Started : 11/11/2019 11:50:35AM

Procedure : 130G_SOIL_1
Operator : Administrator
Detector Name : P11314
Geometry : 130G_SOIL_1
Live Time : 900.0 seconds
Real Time : 900.3 seconds

Dead Time : 0.03 %

Peak Locate Threshold : 3.00
Peak Locate Range (in channels) : 120 - 8192
Peak Area Range (in channels) : 120 - 8192
Identification Energy Tolerance : 1.000 keV

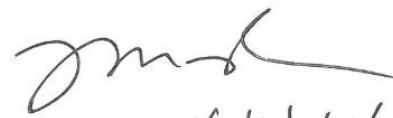
Energy Calibration Used Done On : 11/4/2019
Efficiency Calibration Used Done On : 11/11/2019
Efficiency Calibration Description :

Sample Number : 81164
Fill Height : 1299.44 gram
Certificate Name : Eu155-Na22
Certificate Date : 12/22/2008 12:00:00PM

PEAK ANALYSIS REPORT

Peak Analysis Performed on : 11/11/2019 12:05:45PM

Peak Analysis From Channel : 120
Peak Analysis To Channel : 8192


Data Validated
0600 11-12-79

Analysis Report for 11-Nov-19-10013
L1-10206A-FSGS-012SS

Peak No.	Energy (keV)	ROI start	ROI end	Peak Centroid	Net Peak Area	Net Area Uncertainty	Continuum Counts	FWHM (keV)
1	238.77	950 -	961	954.67	4.36E+01	12.21	3.94E+01	0.74
2	608.70	2427 -	2437	2432.83	2.51E+01	7.30	1.09E+01	0.56
3	1459.98	5829 -	5847	5837.85	1.15E+02	11.83	7.32E+00	2.17

M = First peak in a multiplet region
m = Other peak in a multiplet region
F = Fitted singlet
Errors quoted at 1.000sigma

No background subtract performed on this spectrum.

NUCLIDE IDENTIFICATION REPORT

Nuclide Library Used : C:\Canberra\Apex\Root\Default\Library\ZION LIB-BNL.NLB

IDENTIFIED NUCLIDES

Nuclide Name	Id Confidence	Energy (keV)	Yield(%)	Activity (pCi/grams)	Activity Uncertainty
K-40	0.89	1460.82 *	10.66	2.72E+00	3.04E-01
Pb-212	0.99	115.18	0.60		
		238.63 *	43.60	7.19E-02	2.10E-02
		300.09	3.30		
Bi-214	0.97	609.32 *	45.49	7.60E-02	2.26E-02
		768.36	4.89		
		806.18	1.26		
		934.06	3.11		
		1120.29	14.92		
		1155.21	1.63		
		1238.12	5.83		
		1280.98	1.43		
		1377.67	3.99		
		1385.31	0.79		

Analysis Report for 11-Nov-19-10013

L1-10206A-FSGS-012SS

Nuclide Name	Id Confidence	Energy (keV)	Yield(%)	Activity (pCi/grams)	Activity Uncertainty
Bi-214	0.97	1401.52	1.33		
		1407.99	2.39		
		1509.21	2.13		
		1661.27	1.05		
		1729.59	2.88		
		1764.49	15.30		
		1847.43	2.03		
		2118.51	1.16		

* = Energy line found in the spectrum.

- = Manually added nuclide.

? = Manually edited nuclide.

@ = Energy line not used for Weighted Mean Activity

Energy Tolerance : 1.000 keV

Nuclide confidence index threshold = 0.30

Errors quoted at 1.000sigma

INTERFERENCE CORRECTED REPORT

Nuclide Name	Nuclide Id Confidence	Wt mean Activity (pCi/grams)	Wt mean Activity Uncertainty	Comments
K-40	0.892	2.72E+00	3.04E-01	
Pb-212	0.997	7.19E-02	2.10E-02	
Bi-214	0.975	7.60E-02	2.26E-02	

? = nuclide is part of an undetermined solution

X = nuclide rejected by the interference analysis

@ = nuclide contains energy lines not used in Weighted Mean Activity

Errors quoted at 1.000sigma

Analysis Report for 11-Nov-19-10013
L1-10206A-FSGS-012SS

UNIDENTIFIED PEAKS

Peak Locate Performed on : 11/11/2019 12:05:45PM
Peak Locate From Channel : 120
Peak Locate To Channel : 8192

Peak No.	Energy (keV)	Peak Size (CPS)	Peak CPS (%) Uncertainty	Peak Type	Tolerance Nuclide
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All peaks were identified.

M = First peak in a multiplet region

m = Other peak in a multiplet region

F = Fitted singlet

Errors quoted at 1.000sigma

NUCLIDE MDA REPORT

Nuclide Library Used : C:\Canberra\Apex\Root\Default\Library\ZION LIB-BNL.NLB

	Nuclide Name	Energy (keV)	Yield(%)	Activity (pCi/grams)	Nuclide MDA (pCi/grams)	Line MDA (pCi/grams)
	An Pk	511.00	100.00	1.42E-02	4.86E-02	4.86E-02
	BE-7	477.60	10.44	-2.53E-02	2.91E-01	2.91E-01
+	K-40	1460.82	* 10.66	2.72E+00	4.73E-01	4.73E-01
	Mn-54	834.85	99.98	1.55E-02	2.97E-02	2.97E-02
	Co-60	1173.23	99.85	-1.18E-02	4.07E-02	4.07E-02
		1332.49	99.98	1.45E-02		4.59E-02
	Nb-94	702.65	99.81	-9.86E-03	3.32E-02	3.63E-02
		871.09	99.89	-9.51E-03		3.32E-02
	Ag-108m	79.13	6.60	-2.52E-01	2.86E-02	8.37E-01
		433.94	90.50	-1.82E-03		2.86E-02
		614.28	89.80	-4.23E-02		5.02E-02
		722.94	90.80	-4.22E-03		4.43E-02
	Sb-125	176.31	6.84	-4.59E-02	9.05E-02	3.20E-01
		380.45	1.52	-9.03E-01		1.88E+00
		427.87	29.60	-3.38E-02		9.05E-02
		463.36	10.49	7.01E-02		3.02E-01
		600.60	17.65	-2.36E-02		1.56E-01
		606.71	4.98	6.00E-01		1.06E+00
		635.95	11.22	1.75E-01		3.02E-01

Analysis Report for 11-Nov-19-10013

L1-10206A-FSGS-012SS

Nuclide Name	Energy (keV)	Yield(%)	Activity (pCi/grams)	Nuclide MDA (pCi/grams)	Line MDA (pCi/grams)
Sb-125	671.44	1.79	-1.20E+00	9.05E-02	1.61E+00
Ba-133	79.61	2.65	-5.46E-01	5.98E-02	2.03E+00
	81.00	32.90	-1.94E-01		1.46E-01
	276.40	7.16	2.52E-02		3.64E-01
	302.85	18.34	3.91E-02		1.42E-01
	356.01	62.05	-5.57E-02		5.98E-02
	383.85	8.94	5.44E-02		3.20E-01
Cs-134	475.36	1.48	-7.82E-01	4.05E-02	2.22E+00
	563.25	8.34	-2.25E-01		4.37E-01
	569.33	15.37	2.71E-03		2.22E-01
	604.72	97.62	-4.72E-03		4.74E-02
	795.86	85.46	2.06E-02		4.05E-02
	801.95	8.69	1.41E-01		3.75E-01
	1038.61	0.99	-6.45E+00		4.07E+00
	1167.97	1.79	-8.56E-01		2.18E+00
	1365.19	3.02	-2.19E-01		1.44E+00
Cs-137	661.66	85.10	2.96E-02	4.78E-02	4.78E-02
Eu-152	121.78	28.67	-1.08E-02	8.70E-02	8.70E-02
	244.70	7.61	1.82E-01		4.27E-01
	295.94	0.45	2.55E+00		6.83E+00
	344.28	26.60	-2.89E-02		9.62E-02
	367.79	0.86	-1.09E-01		3.41E+00
	411.12	2.24	-6.69E-01		1.44E+00
	443.96	2.83	4.88E-01		1.14E+00
	488.68	0.42	1.89E+00		6.85E+00
	563.99	0.49	-5.41E+00		7.03E+00
	586.26	0.46	-1.74E+00		8.13E+00
	678.62	0.47	-9.46E-01		6.15E+00
	688.67	0.86	1.15E+00		4.35E+00
	719.35	0.28	2.37E+00		1.44E+01
	778.90	12.96	-5.96E-02		2.28E-01
	810.45	0.32	3.01E+00		1.15E+01
	867.37	4.26	2.57E-01		8.05E-01
	919.33	0.43	-2.79E+00		7.05E+00
	964.08	14.65	6.75E-02		3.28E-01
	1085.87	10.24	3.59E-01		5.19E-01
	1089.74	1.73	1.41E+00		2.96E+00
	1112.07	13.69	-6.20E-02		2.37E-01
	1212.95	1.43	-9.17E-01		3.60E+00
	1249.94	0.19	-6.41E+00		2.33E+01
	1299.14	1.63	-1.07E+00		3.31E+00
	1408.01	21.07	4.16E-03		1.81E-01
	1457.64	0.50	6.32E+01		2.84E+01
	1528.10	0.28	2.78E+00		1.04E+01
Eu-154	123.07	40.40	5.42E-02	6.49E-02	6.49E-02
	247.93	6.89	-1.71E-01		3.75E-01
	591.76	4.95	2.61E-01		6.20E-01
	692.42	1.78	-2.20E+00		1.97E+00
	723.30	20.06	6.54E-02		2.04E-01
	756.80	4.52	2.27E-01		8.24E-01
	873.18	12.08	-6.40E-02		2.85E-01

Analysis Report for 11-Nov-19-10013

L1-10206A-FSGS-012SS

Nuclide Name	Energy (keV)	Yield(%)	Activity (pCi/grams)	Nuclide MDA (pCi/grams)	Line MDA (pCi/grams)
Eu-154	996.29	10.48	1.60E-01	6.49E-02	3.73E-01
	1004.76	18.01	-2.71E-03		2.03E-01
	1274.43	34.80	-2.08E-02		1.45E-01
	1596.48	1.80	9.04E-01		2.20E+00
Eu-155	45.30	1.31	1.71E+00	1.40E-01	8.99E+00
	60.01	1.22	1.85E+00		9.29E+00
	86.55	30.70	-1.18E-02		1.40E-01
	105.31	21.10	-1.90E-02		1.48E-01
Ra-226	186.21	3.64	5.77E-01	7.77E-01	7.77E-01
Pa-231	27.36	10.30	3.70E-01	9.03E-01	9.03E-01
	283.69	1.70	8.31E-02		1.21E+00
	300.07	2.47	-1.69E+00		1.02E+00
	302.65	2.20	4.94E-03		1.17E+00
	330.06	1.40	1.08E+00		2.26E+00
U-235	143.76	10.96	-9.56E-02	4.91E-02	2.27E-01
	163.33	5.08	2.27E-01		4.71E-01
	185.71	57.20	2.16E-02		4.91E-02
	202.11	1.08	1.32E+00		2.42E+00
	205.31	5.01	-5.29E-02		4.69E-01
Am-241	59.54	35.90	6.06E-02	3.24E-01	3.24E-01

- + = Nuclide identified during the nuclide identification
 * = Energy line found in the spectrum
 > = MDA value not calculated
 @ = Half-life too short to be able to perform the decay correction
 ? = CAUTION: MDA value is inconsistent with Currie MDA at 95% confidence level

Analysis Report for 11-Nov-19-10014
L1-10206A-FSGS-013SS

GAMMA SPECTRUM ANALYSIS

Sample Identification : 11-Nov-19-10014
Sample Description : L1-10206A-FSGS-013SS
Sample Type : Soil
Unit :
Sample Point :

Sample Size : 1.497E+03 grams
Facility : Default

Sample Taken On : 11/9/2019 8:24:00AM
Acquisition Started : 11/11/2019 11:50:43AM

Procedure : 130G_SOIL_1
Operator : Administrator
Detector Name : 352
Geometry : 130G_SOIL_1
Live Time : 900.0 seconds
Real Time : 900.3 seconds

Dead Time : 0.03 %

Peak Locate Threshold : 3.00
Peak Locate Range (in channels) : 120 - 8192
Peak Area Range (in channels) : 120 - 8192
Identification Energy Tolerance : 1.000 keV

Energy Calibration Used Done On : 11/4/2019
Efficiency Calibration Used Done On : 11/11/2019
Efficiency Calibration Description :

Sample Number : 81165
Fill Height : 1497.32 gram
Certificate Name : Eu155-Na22
Certificate Date : 1/7/2013 12:00:00PM

PEAK ANALYSIS REPORT

Peak Analysis Performed on : 11/11/2019 12:05:53PM

Peak Analysis From Channel : 120
Peak Analysis To Channel : 8192

Handwritten signature
Data Validated
0600 11-12-79

Analysis Report for 11-Nov-19-10014
L1-10206A-FSGS-013SS

Peak No.	Energy (keV)	ROI start	ROI end	Peak Centroid	Net Peak Area	Net Area Uncertainty	Continuum Counts	FWHM (keV)
1	238.69	948 -	961	955.24	1.33E+02	17.51	6.30E+01	0.79
2	352.04	1400 -	1415	1408.14	8.42E+01	13.86	3.58E+01	0.81
3	510.57	2036 -	2047	2041.76	2.93E+01	8.91	1.97E+01	0.62
4	583.10	2327 -	2337	2331.72	3.65E+01	7.05	5.50E+00	0.82
5	609.40	2430 -	2445	2436.87	5.60E+01	10.49	1.80E+01	0.31
6	911.30	3637 -	3651	3644.22	3.96E+01	8.04	8.39E+00	1.46
7	1460.60	5831 -	5855	5842.76	4.09E+02	21.89	1.75E+01	1.81

M = First peak in a multiplet region

m = Other peak in a multiplet region

F = Fitted singlet

Errors quoted at 1.000sigma

No background subtract performed on this spectrum.

NUCLIDE IDENTIFICATION REPORT

Nuclide Library Used : C:\Canberra\Apex\Root\Default\Library\ZION LIB-BNL.NLB

IDENTIFIED NUCLIDES

Nuclide Name	Id Confidence	Energy (keV)	Yield(%)	Activity (pCi/grams)	Activity Uncertainty
An Pk	0.97	511.00 *	100.00	3.38E-02	1.05E-02
K-40	0.99	1460.82 *	10.66	8.62E+00	5.94E-01
Tl-208	0.99	583.19 *	85.00	5.25E-02	1.06E-02
Bi-211	0.86	351.07 *	13.02	5.63E-01	1.03E-01
Pb-212	0.99	115.18	0.60		
		238.63 *	43.60	2.09E-01	3.23E-02
		300.09	3.30		
Bi-214	1.00	609.32 *	45.49	1.55E-01	3.04E-02
		768.36	4.89		
		806.18	1.26		

Analysis Report for 11-Nov-19-10014

L1-10206A-FSGS-013SS

Nuclide Name	Id Confidence	Energy (keV)	Yield(%)	Activity (pCi/grams)	Activity Uncertainty
Bi-214	1.00	934.06	3.11	2.06E-01	3.77E-02
		1120.29	14.92		
		1155.21	1.63		
		1238.12	5.83		
		1280.98	1.43		
		1377.67	3.99		
		1385.31	0.79		
		1401.52	1.33		
		1407.99	2.39		
		1509.21	2.13		
		1661.27	1.05		
		1729.59	2.88		
		1764.49	15.30		
		1847.43	2.03		
		2118.51	1.16		
Pb-214	0.99	241.99	7.25		
		295.22	18.42		
		351.93 *	35.60		
		785.96	1.06		
Ac-228	1.00	129.07	2.42	2.52E-01	5.22E-02
		209.25	3.89		
		270.24	3.46		
		328.00	2.95		
		338.32	11.27		
		409.46	1.92		
		463.00	4.40		
		794.95	4.25		
		911.20 *	25.80		
		964.77	4.99		
		968.97	15.80		
		1588.20	3.22		

* = Energy line found in the spectrum.

- = Manually added nuclide.

? = Manually edited nuclide.

@ = Energy line not used for Weighted Mean Activity

Energy Tolerance : 1.000 keV

Nuclide confidence index threshold = 0.30

Errors quoted at 1.000sigma

INTERFERENCE CORRECTED REPORT

Analysis Report for 11-Nov-19-10014

L1-10206A-FSGS-013SS

Nuclide Name	Nuclide Id Confidence	Wt mean Activity (pCi/grams)	Wt mean Activity Uncertainty	Comments
An Pk	0.971	3.38E-02	1.05E-02	
K-40	0.992	8.62E+00	5.94E-01	
Tl-208	0.999	5.25E-02	1.06E-02	
? Bi-211	0.861	5.63E-01	1.03E-01	
Pb-212	0.999	2.09E-01	3.23E-02	
Bi-214	1.000	1.55E-01	3.04E-02	
? Pb-214	0.999	2.06E-01	3.77E-02	
Ac-228	1.000	2.52E-01	5.22E-02	

? = nuclide is part of an undetermined solution

X = nuclide rejected by the interference analysis

@ = nuclide contains energy lines not used in Weighted Mean Activity

Errors quoted at 1.000sigma

Analysis Report for 11-Nov-19-10014
L1-10206A-FSGS-013SS

UNIDENTIFIED PEAKS

Peak Locate Performed on : 11/11/2019 12:05:53PM
Peak Locate From Channel : 120
Peak Locate To Channel : 8192

Peak No.	Energy (keV)	Peak Size (CPS)	Peak CPS (%) Uncertainty	Peak Type	Tolerance Nuclide
All peaks were identified.					
M = First peak in a multiplet region					
m = Other peak in a multiplet region					
F = Fitted singlet					
Errors quoted at 1.000sigma					

NUCLIDE MDA REPORT

Nuclide Library Used : C:\Canberra\Apex\Root\Default\Library\ZION LIB-BNL.NLB

	Nuclide Name	Energy (keV)	Yield(%)	Activity (pCi/grams)	Nuclide MDA (pCi/grams)	Line MDA (pCi/grams)
+	An Pk	511.00	* 100.00	3.38E-02	3.10E-02	3.10E-02
	BE-7	477.60	10.44	3.65E-02	3.88E-01	3.88E-01
+	K-40	1460.82	* 10.66	8.62E+00	6.56E-01	6.56E-01
	Mn-54	834.85	99.98	4.68E-02	5.55E-02	5.55E-02
	Co-60	1173.23	99.85	-4.45E-03	4.63E-02	5.89E-02
		1332.49	99.98	1.80E-02		4.63E-02
	Nb-94	702.65	99.81	8.34E-04	4.54E-02	4.54E-02
		871.09	99.89	-3.88E-03		4.91E-02
	Ag-108m	79.13	6.60	7.88E-01	4.27E-02	1.66E+00
		433.94	90.50	2.56E-02		4.27E-02
		614.28	89.80	2.04E-02		6.99E-02
		722.94	90.80	2.25E-02		4.97E-02
	Sb-125	176.31	6.84	-4.08E-02	1.26E-01	4.72E-01
		380.45	1.52	1.17E+00		2.52E+00
		427.87	29.60	3.54E-02		1.26E-01
		463.36	10.49	1.86E-02		3.29E-01
		600.60	17.65	2.39E-02		2.21E-01
		606.71	4.98	9.52E-01		1.25E+00
		635.95	11.22	3.28E-02		3.61E-01

Analysis Report for 11-Nov-19-10014

L1-10206A-FSGS-013SS

Nuclide Name	Energy (keV)	Yield(%)	Activity (pCi/grams)	Nuclide MDA (pCi/grams)	Line MDA (pCi/grams)
Sb-125	671.44	1.79	2.78E-01	1.26E-01	2.40E+00
Ba-133	79.61	2.65	2.94E+00	8.43E-02	3.99E+00
	81.00	32.90	-2.89E-01		2.71E-01
	276.40	7.16	-9.61E-02		5.12E-01
	302.85	18.34	4.37E-02		2.03E-01
	356.01	62.05	6.50E-03		8.43E-02
	383.85	8.94	1.22E-01		4.11E-01
Cs-134	475.36	1.48	-1.27E-01	5.42E-02	2.59E+00
	563.25	8.34	1.23E-01		4.66E-01
	569.33	15.37	1.47E-01		2.42E-01
	604.72	97.62	-3.82E-02		5.95E-02
	795.86	85.46	-2.28E-02		5.42E-02
	801.95	8.69	-5.18E-01		5.63E-01
	1038.61	0.99	-7.73E-01		5.11E+00
	1167.97	1.79	-1.02E+00		3.93E+00
	1365.19	3.02	4.25E-01		1.04E+00
Cs-137	661.66	85.10	3.51E-03	4.94E-02	4.94E-02
Eu-152	121.78	28.67	-5.69E-02	1.32E-01	1.45E-01
	244.70	7.61	-4.13E-02		5.23E-01
	295.94	0.45	8.60E+00		9.98E+00
	344.28	26.60	-3.97E-02		1.32E-01
	367.79	0.86	-3.10E-01		3.90E+00
	411.12	2.24	-1.12E-01		1.44E+00
	443.96	2.83	-9.13E-01		1.24E+00
	488.68	0.42	-1.02E+01		8.71E+00
	563.99	0.49	-1.95E+00		7.62E+00
	586.26	0.46	6.74E+00		1.09E+01
	678.62	0.47	5.58E+00		9.72E+00
	688.67	0.86	-9.56E-02		5.21E+00
	719.35	0.28	8.49E+00		1.55E+01
	778.90	12.96	-5.04E-01		3.32E-01
	810.45	0.32	-4.91E+00		1.60E+01
	867.37	4.26	-1.20E+00		1.07E+00
	919.33	0.43	-1.46E+00		9.38E+00
	964.08	14.65	2.17E-01		4.35E-01
	1085.87	10.24	6.69E-02		5.68E-01
	1089.74	1.73	3.73E-01		3.10E+00
	1112.07	13.69	-4.04E-01		4.63E-01
	1212.95	1.43	1.21E+00		4.80E+00
	1249.94	0.19	2.24E+01		3.62E+01
	1299.14	1.63	1.32E+00		3.81E+00
	1408.01	21.07	1.87E-01		2.41E-01
	1457.64	0.50	1.95E+02		4.60E+01
	1528.10	0.28	4.12E+00		1.12E+01
Eu-154	123.07	40.40	-5.29E-02	1.00E-01	1.00E-01
	247.93	6.89	-9.21E-02		5.16E-01
	591.76	4.95	1.27E-01		8.28E-01
	692.42	1.78	-1.58E+00		2.59E+00
	723.30	20.06	1.58E-02		2.22E-01
	756.80	4.52	-9.83E-01		9.21E-01
	873.18	12.08	3.26E-01		4.28E-01

Analysis Report for 11-Nov-19-10014

L1-10206A-FSGS-013SS

Nuclide Name	Energy (keV)	Yield(%)	Activity (pCi/grams)	Nuclide MDA (pCi/grams)	Line MDA (pCi/grams)
Eu-154	996.29	10.48	2.64E-01	1.00E-01	5.19E-01
	1004.76	18.01	-2.88E-01		2.74E-01
	1274.43	34.80	2.04E-03		1.78E-01
	1596.48	1.80	-1.47E+00		2.08E+00
Eu-155	45.30	1.31	-6.11E+00	2.18E-01	1.99E+01
	60.01	1.22	7.26E+00		2.19E+01
	86.55	30.70	-4.15E-02		2.26E-01
	105.31	21.10	8.02E-02		2.18E-01
Ra-226	186.21	3.64	1.21E+00	1.16E+00	1.16E+00
Pa-231	27.36	10.30	1.03E+00	1.67E+00	2.19E+00
	283.69	1.70	-2.07E-02		2.13E+00
	300.07	2.47	-1.87E+00		1.67E+00
	302.65	2.20	1.87E-01		1.71E+00
	330.06	1.40	-2.45E-01		2.43E+00
U-235	143.76	10.96	1.82E-01	7.28E-02	3.69E-01
	163.33	5.08	4.26E-01		7.07E-01
	185.71	57.20	4.76E-02		7.28E-02
	202.11	1.08	-9.59E-01		3.15E+00
Am-241	205.31	5.01	-4.02E-01	7.67E-01	7.06E-01
	59.54	35.90	2.12E-01		7.67E-01

- + = Nuclide identified during the nuclide identification
 * = Energy line found in the spectrum
 > = MDA value not calculated
 @ = Half-life too short to be able to perform the decay correction
 ? = CAUTION: MDA value is inconsistent with Currie MDA at 95% confidence level

Analysis Report for 11-Nov-19-10015
L1-10206A-FQGS-013SS

GAMMA SPECTRUM ANALYSIS

Sample Identification : 11-Nov-19-10015
Sample Description : L1-10206A-FQGS-013SS
Sample Type : Soil
Unit :
Sample Point :

Sample Size : 1.435E+03 grams
Facility : Default

Sample Taken On : 11/9/2019 8:24:00AM
Acquisition Started : 11/11/2019 12:12:58PM

Procedure : 130G_SOIL_1
Operator : Administrator
Detector Name : 352
Geometry : 130G_SOIL_1
Live Time : 900.0 seconds
Real Time : 900.3 seconds

Dead Time : 0.03 %

Peak Locate Threshold : 3.00
Peak Locate Range (in channels) : 120 - 8192
Peak Area Range (in channels) : 120 - 8192
Identification Energy Tolerance : 1.000 keV

Energy Calibration Used Done On : 11/4/2019
Efficiency Calibration Used Done On : 11/11/2019
Efficiency Calibration Description :

Sample Number : 81166
Fill Height : 1434.82 gram
Certificate Name : Eu155-Na22
Certificate Date : 1/7/2013 12:00:00PM

PEAK ANALYSIS REPORT

Peak Analysis Performed on : 11/11/2019 12:28:00PM

Peak Analysis From Channel : 120
Peak Analysis To Channel : 8192


Data Validated
0600 11-12-19

Analysis Report for 11-Nov-19-10015
L1-10206A-FQGS-013SS

Peak No.	Energy (keV)	ROI start	ROI end	Peak Centroid	Net Peak Area	Net Area Uncertainty	Continuum Counts	FWHM (keV)
1	185.90	740 -	751	744.30	2.50E+01	13.06	5.80E+01	0.42
2	238.56	948 -	961	954.73	1.03E+02	17.07	6.84E+01	0.91
3	295.29	1176 -	1189	1181.39	6.87E+01	10.98	1.83E+01	0.38
4	338.17	1347 -	1359	1352.74	3.93E+01	9.98	2.28E+01	0.62
5	351.95	1400 -	1413	1407.81	1.10E+02	12.62	1.76E+01	1.33
6	583.14	2325 -	2339	2331.89	3.83E+01	10.61	2.57E+01	0.65
7	609.37	2427 -	2444	2436.74	7.76E+01	11.30	1.54E+01	1.23
8	1460.61	5831 -	5854	5842.82	4.28E+02	22.33	1.78E+01	2.23

M = First peak in a multiplet region

m = Other peak in a multiplet region

F = Fitted singlet

Errors quoted at 1.000sigma

No background subtract performed on this spectrum.

NUCLIDE IDENTIFICATION REPORT

Nuclide Library Used : C:\Canberra\Apex\Root\Default\Library\ZION LIB-BNL.NLB

IDENTIFIED NUCLIDES

Nuclide Name	Id Confidence	Energy (keV)	Yield(%)	Activity (pCi/grams)	Activity Uncertainty
K-40	0.99	1460.82 *	10.66	9.13E+00	6.20E-01
Tl-208	1.00	583.19 *	85.00	5.56E-02	1.58E-02
Pb-212	0.99	115.18	0.60		
		238.63 *	43.60	1.63E-01	3.01E-02
		300.09	3.30		
Bi-214	1.00	609.32 *	45.49	2.17E-01	3.41E-02
		768.36	4.89		
		806.18	1.26		
		934.06	3.11		

Analysis Report for 11-Nov-19-10015

L1-10206A-FQGS-013SS

Nuclide Name	Id Confidence	Energy (keV)	Yield(%)	Activity (pCi/grams)	Activity Uncertainty
Bi-214	1.00	1120.29	14.92		
		1155.21	1.63		
		1238.12	5.83		
		1280.98	1.43		
		1377.67	3.99		
		1385.31	0.79		
		1401.52	1.33		
		1407.99	2.39		
		1509.21	2.13		
		1661.27	1.05		
		1729.59	2.88		
		1764.49	15.30		
		1847.43	2.03		
		2118.51	1.16		
Pb-214	1.00	241.99	7.25		
		295.22 *	18.42	2.90E-01	5.17E-02
		351.93 *	35.60	2.72E-01	3.80E-02
		785.96	1.06		
Ra-226	0.98	186.21 *	3.64	4.24E-01	2.24E-01
Ac-228	0.57	129.07	2.42		
		209.25	3.89		
		270.24	3.46		
		328.00	2.95		
		338.32 *	11.27	2.97E-01	7.94E-02
		409.46	1.92		
		463.00	4.40		
		794.95	4.25		
		911.20	25.80		
		964.77	4.99		
		968.97	15.80		
		1588.20	3.22		
U-235	0.99	143.76	10.96		
		163.33	5.08		
		185.71 *	57.20	2.70E-02	1.43E-02
		202.11	1.08		
		205.31	5.01		

* = Energy line found in the spectrum.

- = Manually added nuclide.

? = Manually edited nuclide.

@ = Energy line not used for Weighted Mean Activity

Energy Tolerance : 1.000 keV

Nuclide confidence index threshold = 0.30

Errors quoted at 1.000sigma

Analysis Report for 11-Nov-19-10015
L1-10206A-FQGS-013SS

INTERFERENCE CORRECTED REPORT

	Nuclide Name	Nuclide Id Confidence	Wt mean Activity (pCi/grams)	Wt mean Activity Uncertainty	Comments
	K-40	0.993	9.13E+00	6.20E-01	
	Tl-208	1.000	5.56E-02	1.58E-02	
X	Bi-211	0.882			
	Pb-212	0.999	1.63E-01	3.01E-02	
	Bi-214	1.000	2.17E-01	3.41E-02	
	Pb-214	1.000	2.78E-01	3.06E-02	
?	Ra-226	0.984	4.24E-01	2.24E-01	
	Ac-228	0.571	2.97E-01	7.94E-02	
?	U-235	0.996	2.70E-02	1.43E-02	

- ? = nuclide is part of an undetermined solution
X = nuclide rejected by the interference analysis
@ = nuclide contains energy lines not used in Weighted Mean Activity

Errors quoted at 1.000sigma

Analysis Report for 11-Nov-19-10015
L1-10206A-FQGS-013SS

UNIDENTIFIED PEAKS

Peak Locate Performed on : 11/11/2019 12:28:00PM
Peak Locate From Channel : 120
Peak Locate To Channel : 8192

Peak No.	Energy (keV)	Peak Size (CPS)	Peak CPS (%) Uncertainty	Peak Type	Tolerance Nuclide
All peaks were identified.					
M = First peak in a multiplet region					
m = Other peak in a multiplet region					
F = Fitted singlet					
Errors quoted at 1.000sigma					

NUCLIDE MDA REPORT

Nuclide Library Used : C:\Canberra\Apex\Root\Default\Library\ZION LIB-BNL.NLB

	Nuclide Name	Energy (keV)	Yield(%)	Activity (pCi/grams)	Nuclide MDA (pCi/grams)	Line MDA (pCi/grams)
	An Pk	511.00	100.00	5.65E-02	5.16E-02	5.16E-02
	BE-7	477.60	10.44	8.51E-02	3.88E-01	3.88E-01
+	K-40	1460.82	* 10.66	9.13E+00	6.69E-01	6.69E-01
	Mn-54	834.85	99.98	-6.36E-02	4.58E-02	4.58E-02
	Co-60	1173.23	99.85	5.75E-02	4.56E-02	7.27E-02
		1332.49	99.98	-1.33E-02		4.56E-02
	Nb-94	702.65	99.81	-3.19E-02	3.89E-02	3.89E-02
		871.09	99.89	-6.87E-03		4.40E-02
	Ag-108m	79.13	6.60	-3.64E-01	3.88E-02	1.54E+00
		433.94	90.50	-2.15E-02		3.88E-02
		614.28	89.80	-1.01E-02		7.73E-02
		722.94	90.80	1.76E-02		5.76E-02
	Sb-125	176.31	6.84	2.64E-01	1.25E-01	5.34E-01
		380.45	1.52	-4.32E-01		2.23E+00
		427.87	29.60	-3.44E-02		1.25E-01
		463.36	10.49	1.93E-01		3.98E-01
		600.60	17.65	1.16E-01		2.55E-01
		606.71	4.98	1.70E+00		1.43E+00
		635.95	11.22	4.50E-03		3.65E-01

Analysis Report for 11-Nov-19-10015

L1-10206A-FQGS-013SS

Nuclide Name	Energy (keV)	Yield(%)	Activity (pCi/grams)	Nuclide MDA (pCi/grams)	Line MDA (pCi/grams)
Sb-125	671.44	1.79	-1.61E-01	1.25E-01	2.43E+00
Ba-133	79.61	2.65	-7.01E-01	8.19E-02	3.71E+00
	81.00	32.90	-4.16E-01		2.58E-01
	276.40	7.16	-1.99E-03		5.34E-01
	302.85	18.34	2.25E-01		2.10E-01
	356.01	62.05	-9.91E-02		8.19E-02
	383.85	8.94	2.65E-02		4.11E-01
Cs-134	475.36	1.48	-2.12E+00	6.29E-02	2.53E+00
	563.25	8.34	-2.24E-01		4.16E-01
	569.33	15.37	-1.14E-01		2.34E-01
	604.72	97.62	8.00E-03		6.72E-02
	795.86	85.46	-1.78E-03		6.29E-02
	801.95	8.69	-2.93E-01		5.49E-01
	1038.61	0.99	2.74E-01		5.08E+00
	1167.97	1.79	3.95E+00		4.01E+00
	1365.19	3.02	-1.53E-01		1.58E+00
Cs-137	661.66	85.10	-4.61E-03	5.42E-02	5.42E-02
Eu-152	121.78	28.67	7.58E-02	1.16E-01	1.46E-01
	244.70	7.61	4.75E-02		5.38E-01
	295.94	0.45	7.17E+00		1.01E+01
	344.28	26.60	-1.01E-01		1.16E-01
	367.79	0.86	9.08E-02		4.11E+00
	411.12	2.24	7.57E-01		1.64E+00
	443.96	2.83	-2.56E-01		1.36E+00
	488.68	0.42	7.08E-01		8.48E+00
	563.99	0.49	-7.23E+00		6.84E+00
	586.26	0.46	1.72E+01		1.32E+01
	678.62	0.47	4.19E-01		9.38E+00
	688.67	0.86	-3.21E+00		3.44E+00
	719.35	0.28	1.61E+01		1.74E+01
	778.90	12.96	-4.90E-02		3.41E-01
	810.45	0.32	2.31E-01		1.39E+01
	867.37	4.26	-4.42E-01		1.14E+00
	919.33	0.43	-2.21E+01		9.89E+00
	964.08	14.65	4.17E-01		4.74E-01
	1085.87	10.24	1.05E-01		5.45E-01
	1089.74	1.73	1.24E+00		3.49E+00
	1112.07	13.69	-4.20E-01		3.90E-01
	1212.95	1.43	-1.85E+00		5.01E+00
	1249.94	0.19	4.94E+00		3.45E+01
	1299.14	1.63	-1.85E+00		3.33E+00
	1408.01	21.07	2.10E-01		2.55E-01
	1457.64	0.50	1.98E+02		4.78E+01
	1528.10	0.28	-9.39E-01		1.37E+01
Eu-154	123.07	40.40	4.38E-02	1.02E-01	1.02E-01
	247.93	6.89	-3.12E-01		4.93E-01
	591.76	4.95	-5.99E-01		7.67E-01
	692.42	1.78	8.54E-01		1.94E+00
	723.30	20.06	1.54E-01		2.66E-01
	756.80	4.52	-3.65E-01		9.60E-01
	873.18	12.08	-2.14E-01		3.71E-01

Analysis Report for 11-Nov-19-10015

L1-10206A-FQGS-013SS

	Nuclide Name	Energy (keV)	Yield(%)	Activity (pCi/grams)	Nuclide MDA (pCi/grams)	Line MDA (pCi/grams)
	Eu-154	996.29	10.48	2.68E-01	1.02E-01	5.25E-01
		1004.76	18.01	-2.90E-02		2.82E-01
		1274.43	34.80	-1.10E-01		1.73E-01
		1596.48	1.80	-1.25E+00		1.98E+00
	Eu-155	45.30	1.31	-7.51E+00	2.13E-01	2.05E+01
		60.01	1.22	-8.85E+00		2.19E+01
		86.55	30.70	1.94E-02		2.39E-01
		105.31	21.10	-8.58E-02		2.13E-01
+	Ra-226	186.21	*	3.64	7.44E-01	7.44E-01
	Pa-231	27.36	10.30	2.59E+00	1.59E+00	2.38E+00
		283.69	1.70	-8.38E-01		2.22E+00
		300.07	2.47	1.66E-01		1.59E+00
		302.65	2.20	1.88E+00		1.75E+00
		330.06	1.40	1.51E+00		2.63E+00
+	U-235	143.76	10.96	3.59E-02	4.73E-02	3.44E-01
		163.33	5.08	-3.34E-01		6.76E-01
		185.71	*	57.20	2.70E-02	4.73E-02
		202.11	1.08	6.16E-01		3.38E+00
		205.31	5.01	-4.55E-01		7.06E-01
	Am-241	59.54	35.90	-5.56E-01	7.65E-01	7.65E-01

+ = Nuclide identified during the nuclide identification

* = Energy line found in the spectrum

> = MDA value not calculated

@ = Half-life too short to be able to perform the decay correction

? = CAUTION: MDA value is inconsistent with Currie MDA at 95% confidence level

Analysis Report for 11-Nov-19-10016
L1-10206A-FSGS-014SS

GAMMA SPECTRUM ANALYSIS

Sample Identification : 11-Nov-19-10016
Sample Description : L1-10206A-FSGS-014SS
Sample Type : Soil
Unit :
Sample Point :

Sample Size : 1.498E+03 grams
Facility : Default

Sample Taken On : 11/9/2019 8:26:00AM
Acquisition Started : 11/11/2019 12:13:05PM

Procedure : 130G_SOIL_1
Operator : Administrator
Detector Name : P40818B
Geometry : 130G_SOIL_1
Live Time : 900.0 seconds
Real Time : 901.2 seconds

Dead Time : 0.14 %

Peak Locate Threshold : 3.00
Peak Locate Range (in channels) : 120 - 8192
Peak Area Range (in channels) : 120 - 8192
Identification Energy Tolerance : 1.000 keV

Energy Calibration Used Done On : 11/4/2019
Efficiency Calibration Used Done On : 11/11/2019
Efficiency Calibration Description :

Sample Number : 81167
Fill Height : 1498.02 gram
Certificate Name : Eu155-Na22
Certificate Date : 1/30/2012 12:00:00PM

PEAK ANALYSIS REPORT

Peak Analysis Performed on : 11/11/2019 12:28:16PM

Peak Analysis From Channel : 120
Peak Analysis To Channel : 8192


Data Validated
0600 11-12-19

Analysis Report for 11-Nov-19-10016
L1-10206A-FSGS-014SS

Peak No.	Energy (keV)	ROI start	ROI end	Peak Centroid	Net Peak Area	Net Area Uncertainty	Continuum Counts	FWHM (keV)
1	238.73	949 -	960	955.01	1.34E+02	16.16	5.01E+01	1.16
2	338.43	1348 -	1360	1353.48	3.04E+01	10.20	2.76E+01	0.36
3	352.10	1402 -	1413	1408.11	4.03E+01	10.25	2.57E+01	1.11
4	609.42	2430 -	2441	2436.85	3.45E+01	7.31	7.55E+00	0.29
5	911.07	3637 -	3649	3643.24	3.64E+01	7.78	8.57E+00	0.90
6	1460.83	5833 -	5854	5843.17	2.75E+02	16.86	2.52E+00	1.44

M = First peak in a multiplet region

m = Other peak in a multiplet region

F = Fitted singlet

Errors quoted at 1.000sigma

No background subtract performed on this spectrum.

NUCLIDE IDENTIFICATION REPORT

Nuclide Library Used : C:\Canberra\Apex\Root\Default\Library\ZION LIB-BNL.NLB

IDENTIFIED NUCLIDES

Nuclide Name	Id Confidence	Energy (keV)	Yield(%)	Activity (pCi/grams)	Activity Uncertainty
K-40	1.00	1460.82 *	10.66	6.91E+00	5.19E-01
Pb-212	0.99	115.18	0.60		
		238.63 *	43.60	2.40E-01	3.49E-02
		300.09	3.30		
Bi-214	0.99	609.32 *	45.49	1.11E-01	2.45E-02
		768.36	4.89		
		806.18	1.26		
		934.06	3.11		
		1120.29	14.92		
		1155.21	1.63		
		1238.12	5.83		

Analysis Report for 11-Nov-19-10016

L1-10206A-FSGS-014SS

Nuclide Name	Id Confidence	Energy (keV)	Yield(%)	Activity (pCi/grams)	Activity Uncertainty
Bi-214	0.99	1280.98	1.43		
		1377.67	3.99		
		1385.31	0.79		
		1401.52	1.33		
		1407.99	2.39		
		1509.21	2.13		
		1661.27	1.05		
		1729.59	2.88		
		1764.49	15.30		
		1847.43	2.03		
		2118.51	1.16		
Pb-214	0.99	241.99	7.25		
		295.22	18.42		
		351.93 *	35.60	1.13E-01	3.02E-02
		785.96	1.06		
Ac-228	0.99	129.07	2.42		
		209.25	3.89		
		270.24	3.46		
		328.00	2.95		
		338.32 *	11.27	2.63E-01	9.07E-02
		409.46	1.92		
		463.00	4.40		
		794.95	4.25		
		911.20 *	25.80	2.73E-01	5.94E-02
		964.77	4.99		
		968.97	15.80		
		1588.20	3.22		

* = Energy line found in the spectrum.

- = Manually added nuclide.

? = Manually edited nuclide.

@ = Energy line not used for Weighted Mean Activity

Energy Tolerance : 1.000 keV

Nuclide confidence index threshold = 0.30

Errors quoted at 1.000sigma

INTERFERENCE CORRECTED REPORT

Nuclide Name	Nuclide Id Confidence	Wt mean Activity (pCi/grams)	Wt mean Activity Uncertainty	Comments
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Analysis Report for 11-Nov-19-10016

L1-10206A-FSGS-014SS

Nuclide Name	Nuclide Id Confidence	Wt mean Activity (pCi/grams)	Wt mean Activity Uncertainty	Comments
K-40	1.000	6.91E+00	5.19E-01	
Pb-212	0.999	2.40E-01	3.49E-02	
Bi-214	0.999	1.11E-01	2.45E-02	
Pb-214	0.998	1.13E-01	3.02E-02	
Ac-228	0.999	2.70E-01	4.97E-02	

? = nuclide is part of an undetermined solution

X = nuclide rejected by the interference analysis

@ = nuclide contains energy lines not used in Weighted Mean Activity

Errors quoted at 1.000sigma

Analysis Report for 11-Nov-19-10016
L1-10206A-FSGS-014SS

UNIDENTIFIED PEAKS

Peak Locate Performed on : 11/11/2019 12:28:16PM
Peak Locate From Channel : 120
Peak Locate To Channel : 8192

Peak No.	Energy (keV)	Peak Size (CPS)	Peak CPS (%) Uncertainty	Peak Type	Tolerance Nuclide
All peaks were identified.					
M = First peak in a multiplet region					
m = Other peak in a multiplet region					
F = Fitted singlet					
Errors quoted at 1.000sigma					

NUCLIDE MDA REPORT

Nuclide Library Used : C:\Canberra\Apex\Root\Default\Library\ZION LIB-BNL.NLB

	Nuclide Name	Energy (keV)	Yield(%)	Activity (pCi/grams)	Nuclide MDA (pCi/grams)	Line MDA (pCi/grams)
	An Pk	511.00	100.00	8.66E-02	6.05E-02	6.05E-02
	BE-7	477.60	10.44	1.50E-01	4.74E-01	4.74E-01
+	K-40	1460.82	* 10.66	6.91E+00	3.26E-01	3.26E-01
	Mn-54	834.85	99.98	-1.97E-02	4.64E-02	4.64E-02
	Co-60	1173.23	99.85	4.84E-02	5.93E-02	7.53E-02
		1332.49	99.98	-3.38E-03		5.93E-02
	Nb-94	702.65	99.81	9.55E-03	4.44E-02	4.44E-02
		871.09	99.89	8.41E-03		4.75E-02
	Ag-108m	79.13	6.60	-3.95E-01	4.21E-02	1.78E+00
		433.94	90.50	-3.04E-03		4.21E-02
		614.28	89.80	-5.49E-02		5.71E-02
		722.94	90.80	-7.38E-03		4.88E-02
	Sb-125	176.31	6.84	-1.59E-02	1.23E-01	5.60E-01
		380.45	1.52	1.77E-01		2.69E+00
		427.87	29.60	-3.01E-02		1.23E-01
		463.36	10.49	1.60E-02		3.77E-01
		600.60	17.65	8.76E-02		2.65E-01
		606.71	4.98	2.29E-03		1.19E+00
		635.95	11.22	3.23E-02		3.76E-01

Analysis Report for 11-Nov-19-10016

L1-10206A-FSGS-014SS

Nuclide Name	Energy (keV)	Yield(%)	Activity (pCi/grams)	Nuclide MDA (pCi/grams)	Line MDA (pCi/grams)
Sb-125	671.44	1.79	-1.00E+00	1.23E-01	2.09E+00
Ba-133	79.61	2.65	-1.24E+00	7.23E-02	4.20E+00
	81.00	32.90	-1.15E-01		2.98E-01
	276.40	7.16	3.38E-01		5.45E-01
	302.85	18.34	1.09E-01		2.04E-01
	356.01	62.05	-3.88E-02		7.23E-02
	383.85	8.94	-2.38E-01		4.31E-01
Cs-134	475.36	1.48	5.16E-01	5.02E-02	3.31E+00
	563.25	8.34	1.54E-01		4.25E-01
	569.33	15.37	7.76E-03		2.78E-01
	604.72	97.62	-1.31E-02		5.91E-02
	795.86	85.46	1.84E-02		5.02E-02
	801.95	8.69	-3.99E-01		4.50E-01
	1038.61	0.99	4.82E+00		6.04E+00
	1167.97	1.79	1.75E+00		4.15E+00
	1365.19	3.02	-1.48E-01		1.58E+00
Cs-137	661.66	85.10	6.40E-02	7.26E-02	7.26E-02
Eu-152	121.78	28.67	2.44E-02	1.27E-01	1.60E-01
	244.70	7.61	3.80E-01		5.74E-01
	295.94	0.45	-1.64E-01		9.97E+00
	344.28	26.60	2.18E-03		1.27E-01
	367.79	0.86	3.96E+00		4.33E+00
	411.12	2.24	3.75E-01		1.96E+00
	443.96	2.83	-6.36E-01		1.48E+00
	488.68	0.42	-4.05E+00		9.27E+00
	563.99	0.49	2.84E+00		7.35E+00
	586.26	0.46	1.20E+01		1.37E+01
	678.62	0.47	-6.05E+00		9.32E+00
	688.67	0.86	1.62E+00		5.66E+00
	719.35	0.28	5.75E+00		1.44E+01
	778.90	12.96	-2.62E-01		2.79E-01
	810.45	0.32	-3.25E+00		1.38E+01
	867.37	4.26	-7.57E-02		1.11E+00
	919.33	0.43	-1.41E+01		9.47E+00
	964.08	14.65	-2.82E-02		4.34E-01
	1085.87	10.24	2.44E-01		4.81E-01
	1089.74	1.73	-1.22E+00		3.13E+00
	1112.07	13.69	1.86E-01		5.05E-01
	1212.95	1.43	-1.26E+00		4.25E+00
	1249.94	0.19	-8.00E+00		2.94E+01
	1299.14	1.63	1.41E+00		3.42E+00
	1408.01	21.07	1.68E-02		2.13E-01
	1457.64	0.50	1.45E+02		4.43E+01
	1528.10	0.28	4.91E+00		1.34E+01
Eu-154	123.07	40.40	-1.72E-02	1.10E-01	1.10E-01
	247.93	6.89	-2.35E-01		5.66E-01
	591.76	4.95	3.43E-02		8.61E-01
	692.42	1.78	8.47E-01		2.59E+00
	723.30	20.06	2.57E-02		2.25E-01
	756.80	4.52	-2.85E-01		8.96E-01
	873.18	12.08	-1.01E-01		4.17E-01

Analysis Report for 11-Nov-19-10016

L1-10206A-FSGS-014SS

Nuclide Name	Energy (keV)	Yield(%)	Activity (pCi/grams)	Nuclide MDA (pCi/grams)	Line MDA (pCi/grams)
Eu-154	996.29	10.48	-1.20E-01	1.10E-01	4.98E-01
	1004.76	18.01	1.00E-01		2.79E-01
	1274.43	34.80	-1.13E-01		1.76E-01
	1596.48	1.80	1.48E-01		2.48E+00
Eu-155	45.30	1.31	2.62E+00	2.59E-01	2.87E+01
	60.01	1.22	7.67E+00		3.13E+01
	86.55	30.70	1.03E-01		2.59E-01
	105.31	21.10	-2.78E-02		2.64E-01
Ra-226	186.21	3.64	5.13E-01	9.99E-01	9.99E-01
Pa-231	27.36	10.30	3.30E+00	1.54E+00	3.40E+00
	283.69	1.70	1.04E-01		2.26E+00
	300.07	2.47	-9.53E-01		1.54E+00
	302.65	2.20	9.98E-01		1.73E+00
	330.06	1.40	1.37E+00		2.78E+00
U-235	143.76	10.96	8.34E-02	6.32E-02	4.21E-01
	163.33	5.08	-2.21E-01		7.79E-01
	185.71	57.20	1.38E-03		6.32E-02
	202.11	1.08	-2.85E+00		3.23E+00
Am-241	205.31	5.01	-2.62E-01	1.12E+00	7.48E-01
	59.54	35.90	1.59E-01		1.12E+00

- + = Nuclide identified during the nuclide identification
 * = Energy line found in the spectrum
 > = MDA value not calculated
 @ = Half-life too short to be able to perform the decay correction
 ? = CAUTION: MDA value is inconsistent with Currie MDA at 95% confidence level

Analysis Report for 11-Nov-19-10017
L1-10206A-FSGS-015SS

GAMMA SPECTRUM ANALYSIS

Sample Identification : 11-Nov-19-10017
Sample Description : L1-10206A-FSGS-015SS
Sample Type : Soil
Unit :
Sample Point :

Sample Size : 1.457E+03 grams
Facility : Default

Sample Taken On : 11/9/2019 8:28:00AM
Acquisition Started : 11/11/2019 12:13:16PM

Procedure : 130G_SOIL_1
Operator : Administrator
Detector Name : P11314
Geometry : 130G_SOIL_1
Live Time : 900.0 seconds
Real Time : 900.3 seconds

Dead Time : 0.03 %

Peak Locate Threshold : 3.00
Peak Locate Range (in channels) : 120 - 8192
Peak Area Range (in channels) : 120 - 8192
Identification Energy Tolerance : 1.000 keV

Energy Calibration Used Done On : 11/4/2019
Efficiency Calibration Used Done On : 11/11/2019
Efficiency Calibration Description :

Sample Number : 81168
Fill Height : 1456.85 gram
Certificate Name : Eu155-Na22
Certificate Date : 12/22/2008 12:00:00PM

PEAK ANALYSIS REPORT

Peak Analysis Performed on : 11/11/2019 12:28:19PM

Peak Analysis From Channel : 120
Peak Analysis To Channel : 8192


Data Validated
0600 11-12-19

Analysis Report for 11-Nov-19-10017
L1-10206A-FSGS-015SS

	Peak No.	Energy (keV)	ROI start	ROI end	Peak Centroid	Net Peak Area	Net Area Uncertainty	Continuum Counts	FWHM (keV)
M	1	74.89	296 -	314	300.11	2.38E+01	11.50	5.82E+00	0.46
m	2	77.22	296 -	314	309.43	2.69E+01	11.69	1.81E+01	0.47
	3	238.74	948 -	959	954.55	6.91E+01	11.35	2.39E+01	0.94
	4	583.19	2326 -	2335	2330.86	2.02E+01	5.37	3.79E+00	0.43
	5	609.32	2429 -	2441	2435.32	3.73E+01	7.04	4.73E+00	0.82
	6	1460.16	5828 -	5846	5838.58	1.13E+02	12.02	9.50E+00	1.50

M = First peak in a multiplet region

m = Other peak in a multiplet region

F = Fitted singlet

Errors quoted at 1.000sigma

No background subtract performed on this spectrum.

NUCLIDE IDENTIFICATION REPORT

Nuclide Library Used : C:\Canberra\Apex\Root\Default\Library\ZION LIB-BNL.NLB

IDENTIFIED NUCLIDES

Nuclide Name	Id Confidence	Energy (keV)		Yield(%)	Activity (pCi/grams)	Activity Uncertainty
K-40	0.93	1460.82	*	10.66	2.56E+00	2.95E-01
Tl-208	1.00	583.19	*	85.00	3.08E-02	8.40E-03
Pb-212	0.99	115.18		0.60		
		238.63	*	43.60	1.11E-01	2.03E-02
		300.09		3.30		
Pb212-XR	0.99	74.82	*	10.28	3.07E-01	1.51E-01
		77.11	*	17.10	1.91E-01	8.51E-02
		87.35		3.97		
		89.78		1.46		
Bi-214	1.00	609.32	*	45.49	1.09E-01	2.17E-02
		768.36		4.89		

Analysis Report for 11-Nov-19-10017

L1-10206A-FSGS-015SS

Nuclide Name	Id Confidence	Energy (keV)	Yield(%)	Activity (pCi/grams)	Activity Uncertainty
Bi-214	1.00	806.18	1.26		
		934.06	3.11		
		1120.29	14.92		
		1155.21	1.63		
		1238.12	5.83		
		1280.98	1.43		
		1377.67	3.99		
		1385.31	0.79		
		1401.52	1.33		
		1407.99	2.39		
		1509.21	2.13		
		1661.27	1.05		
		1729.59	2.88		
		1764.49	15.30		
		1847.43	2.03		
		2118.51	1.16		

* = Energy line found in the spectrum.

- = Manually added nuclide.

? = Manually edited nuclide.

@ = Energy line not used for Weighted Mean Activity

Energy Tolerance : 1.000 keV

Nuclide confidence index threshold = 0.30

Errors quoted at 1.000sigma

INTERFERENCE CORRECTED REPORT

Nuclide Name	Nuclide Id Confidence	Wt mean Activity (pCi/grams)	Wt mean Activity Uncertainty	Comments
K-40	0.933	2.56E+00	2.95E-01	
Tl-208	1.000	3.08E-02	8.40E-03	
Pb-212	0.998	1.11E-01	2.03E-02	
Pb212-XR	0.999	2.19E-01	7.42E-02	
Bi-214	1.000	1.09E-01	2.17E-02	
X Pb214-XR	0.999			

Analysis Report for 11-Nov-19-10017

L1-10206A-FSGS-015SS

- ? = nuclide is part of an undetermined solution
- X = nuclide rejected by the interference analysis
- @ = nuclide contains energy lines not used in Weighted Mean Activity

Errors quoted at 1.000sigma

Analysis Report for 11-Nov-19-10017
L1-10206A-FSGS-015SS

UNIDENTIFIED PEAKS

Peak Locate Performed on : 11/11/2019 12:28:19PM
Peak Locate From Channel : 120
Peak Locate To Channel : 8192

Peak No.	Energy (keV)	Peak Size (CPS)	Peak CPS (%) Uncertainty	Peak Type	Tolerance Nuclide
All peaks were identified.					
M = First peak in a multiplet region					
m = Other peak in a multiplet region					
F = Fitted singlet					
Errors quoted at 1.000sigma					

NUCLIDE MDA REPORT

Nuclide Library Used : C:\Canberra\Apex\Root\Default\Library\ZION LIB-BNL.NLB

	Nuclide Name	Energy (keV)	Yield(%)	Activity (pCi/grams)	Nuclide MDA (pCi/grams)	Line MDA (pCi/grams)
	An Pk	511.00	100.00	3.52E-02	4.51E-02	4.51E-02
	BE-7	477.60	10.44	-1.65E-01	2.45E-01	2.45E-01
+	K-40	1460.82	* 10.66	2.56E+00	5.03E-01	5.03E-01
	Mn-54	834.85	99.98	6.71E-03	4.13E-02	4.13E-02
	Co-60	1173.23	99.85	-1.02E-02	4.06E-02	4.06E-02
		1332.49	99.98	2.49E-03		4.09E-02
	Nb-94	702.65	99.81	-1.97E-03	3.07E-02	3.07E-02
		871.09	99.89	-1.00E-02		3.07E-02
	Ag-108m	79.13	6.60	2.15E-01	2.77E-02	7.81E-01
		433.94	90.50	1.75E-03		2.77E-02
		614.28	89.80	-3.05E-02		4.09E-02
		722.94	90.80	2.11E-02		4.28E-02
	Sb-125	176.31	6.84	3.92E-02	9.64E-02	3.50E-01
		380.45	1.52	-3.28E-01		1.95E+00
		427.87	29.60	-8.82E-04		9.64E-02
		463.36	10.49	1.10E-01		3.20E-01
		600.60	17.65	-4.67E-02		2.05E-01
		606.71	4.98	8.10E-01		1.04E+00
		635.95	11.22	1.35E-01		2.63E-01

Analysis Report for 11-Nov-19-10017

L1-10206A-FSGS-015SS

Nuclide Name	Energy (keV)	Yield(%)	Activity (pCi/grams)	Nuclide MDA (pCi/grams)	Line MDA (pCi/grams)
Sb-125	671.44	1.79	2.93E-01	9.64E-02	1.85E+00
Ba-133	79.61	2.65	4.04E-01	4.95E-02	1.89E+00
	81.00	32.90	-8.60E-02		1.18E-01
	276.40	7.16	-2.24E-02		3.62E-01
	302.85	18.34	1.23E-02		1.47E-01
	356.01	62.05	-4.04E-02		4.95E-02
	383.85	8.94	3.59E-02		3.29E-01
Cs-134	475.36	1.48	8.04E-02	3.79E-02	1.77E+00
	563.25	8.34	-3.56E-01		3.93E-01
	569.33	15.37	-3.92E-02		1.93E-01
	604.72	97.62	-3.05E-02		4.68E-02
	795.86	85.46	1.23E-02		3.79E-02
	801.95	8.69	2.29E-01		4.31E-01
	1038.61	0.99	-1.21E+00		3.51E+00
	1167.97	1.79	-1.56E+00		1.91E+00
	1365.19	3.02	-1.91E-01		5.87E-01
Cs-137	661.66	85.10	1.20E-02	3.35E-02	3.35E-02
Eu-152	121.78	28.67	4.67E-04	8.79E-02	8.79E-02
	244.70	7.61	1.79E-02		3.65E-01
	295.94	0.45	-1.56E-01		6.87E+00
	344.28	26.60	4.53E-02		9.64E-02
	367.79	0.86	1.22E-01		2.76E+00
	411.12	2.24	-9.34E-02		1.03E+00
	443.96	2.83	3.88E-01		9.98E-01
	488.68	0.42	-3.20E+00		6.48E+00
	563.99	0.49	-1.21E+01		5.99E+00
	586.26	0.46	5.13E+00		9.39E+00
	678.62	0.47	6.24E-01		6.72E+00
	688.67	0.86	7.61E-01		3.52E+00
	719.35	0.28	-4.59E-01		1.12E+01
	778.90	12.96	5.91E-02		2.20E-01
	810.45	0.32	3.20E+00		9.49E+00
	867.37	4.26	1.10E-01		8.04E-01
	919.33	0.43	-2.64E+00		7.76E+00
	964.08	14.65	1.30E-02		2.52E-01
	1085.87	10.24	-8.20E-02		4.14E-01
	1089.74	1.73	1.16E+00		2.46E+00
	1112.07	13.69	-3.13E-01		3.41E-01
	1212.95	1.43	6.78E-02		2.80E+00
	1249.94	0.19	3.88E+00		2.32E+01
	1299.14	1.63	-2.23E-01		2.00E+00
	1408.01	21.07	-3.78E-02		1.08E-01
	1457.64	0.50	5.56E+01		2.75E+01
	1528.10	0.28	1.78E+00		8.62E+00
Eu-154	123.07	40.40	1.72E-02	6.16E-02	6.16E-02
	247.93	6.89	5.21E-03		3.61E-01
	591.76	4.95	1.72E-01		6.57E-01
	692.42	1.78	-2.05E-01		1.48E+00
	723.30	20.06	6.07E-02		1.90E-01
	756.80	4.52	-3.59E-01		6.43E-01
	873.18	12.08	2.47E-02		2.85E-01

Analysis Report for 11-Nov-19-10017

L1-10206A-FSGS-015SS

Nuclide Name	Energy (keV)	Yield(%)	Activity (pCi/grams)	Nuclide MDA (pCi/grams)	Line MDA (pCi/grams)
Eu-154	996.29	10.48	-1.15E-01	6.16E-02	3.35E-01
	1004.76	18.01	1.77E-01		2.36E-01
	1274.43	34.80	-6.12E-02		1.09E-01
	1596.48	1.80	1.45E-01		2.12E+00
Eu-155	45.30	1.31	2.43E-01	1.33E-01	8.00E+00
	60.01	1.22	-3.23E+00		8.05E+00
	86.55	30.70	3.86E-02		1.33E-01
	105.31	21.10	-3.95E-02		1.33E-01
Ra-226	186.21	3.64	7.59E-01	7.67E-01	7.67E-01
Pa-231	27.36	10.30	5.95E-01	1.04E+00	1.13E+00
	283.69	1.70	3.70E-01		1.40E+00
	300.07	2.47	-8.15E-01		1.04E+00
	302.65	2.20	3.77E-01		1.24E+00
	330.06	1.40	5.74E-01		1.96E+00
U-235	143.76	10.96	1.21E-01	4.84E-02	2.43E-01
	163.33	5.08	1.57E-03		4.96E-01
	185.71	57.20	3.06E-02		4.84E-02
	202.11	1.08	-4.44E-01		2.08E+00
Am-241	205.31	5.01	-1.67E-01	2.83E-01	4.70E-01
	59.54	35.90	-7.82E-02		2.83E-01

+ = Nuclide identified during the nuclide identification

* = Energy line found in the spectrum

> = MDA value not calculated

@ = Half-life too short to be able to perform the decay correction

? = CAUTION: MDA value is inconsistent with Currie MDA at 95% confidence level

Analysis Report for 11-Nov-19-10018
L1-10206A-FSGS-016SS

GAMMA SPECTRUM ANALYSIS

Sample Identification : 11-Nov-19-10018
Sample Description : L1-10206A-FSGS-016SS
Sample Type : Soil
Unit :
Sample Point :

Sample Size : 1.481E+03 grams
Facility : Default

Sample Taken On : 11/9/2019 8:30:00AM
Acquisition Started : 11/11/2019 12:36:55PM

Procedure : 130G_SOIL_1
Operator : Administrator
Detector Name : P40818B
Geometry : 130G_SOIL_1
Live Time : 900.0 seconds
Real Time : 901.0 seconds

Dead Time : 0.11 %

Peak Locate Threshold : 3.00
Peak Locate Range (in channels) : 120 - 8192
Peak Area Range (in channels) : 120 - 8192
Identification Energy Tolerance : 1.000 keV

Energy Calibration Used Done On : 11/4/2019
Efficiency Calibration Used Done On : 11/11/2019
Efficiency Calibration Description :

Sample Number : 81169
Fill Height : 1481.04 gram
Certificate Name : Eu155-Na22
Certificate Date : 1/30/2012 12:00:00PM

PEAK ANALYSIS REPORT

Peak Analysis Performed on : 11/11/2019 12:52:00PM

Peak Analysis From Channel : 120
Peak Analysis To Channel : 8192

DMB
Data Validated
0600 11-12-19

Analysis Report for 11-Nov-19-10018
L1-10206A-FSGS-016SS

Peak No.	Energy (keV)	ROI start	ROI end	Peak Centroid	Net Peak Area	Net Area Uncertainty	Continuum Counts	FWHM (keV)
1	238.78	951 -	960	955.20	8.96E+01	13.50	4.04E+01	1.11
2	295.23	1177 -	1184	1180.83	1.68E+01	7.04	1.62E+01	0.83
3	351.96	1401 -	1412	1407.59	5.05E+01	9.96	1.95E+01	1.19
4	583.18	2327 -	2339	2331.95	3.02E+01	7.33	8.81E+00	0.64
5	609.54	2432 -	2444	2437.31	2.99E+01	6.96	7.06E+00	0.52
6	911.39	3638 -	3652	3644.52	2.75E+01	7.04	7.50E+00	1.02
7	1460.84	5835 -	5854	5843.19	1.32E+02	12.06	4.28E+00	1.25

M = First peak in a multiplet region

m = Other peak in a multiplet region

F = Fitted singlet

Errors quoted at 1.000sigma

No background subtract performed on this spectrum.

NUCLIDE IDENTIFICATION REPORT

Nuclide Library Used : C:\Canberra\Apex\Root\Default\Library\ZION LIB-BNL.NLB

IDENTIFIED NUCLIDES

Nuclide Name	Id Confidence	Energy (keV)	Yield(%)	Activity (pCi/grams)	Activity Uncertainty
K-40	1.00	1460.82 *	10.66	3.32E+00	3.36E-01
Tl-208	1.00	583.19 *	85.00	5.08E-02	1.27E-02
Pb-212	0.99	115.18	0.60		
		238.63 *	43.60	1.61E-01	2.76E-02
		300.09	3.30		
Bi-214	0.99	609.32 *	45.49	9.70E-02	2.33E-02
		768.36	4.89		
		806.18	1.26		
		934.06	3.11		
		1120.29	14.92		

Analysis Report for 11-Nov-19-10018

L1-10206A-FSGS-016SS

Nuclide Name	Id Confidence	Energy (keV)	Yield(%)	Activity (pCi/grams)	Activity Uncertainty
Bi-214	0.99	1155.21	1.63		
		1238.12	5.83		
		1280.98	1.43		
		1377.67	3.99		
		1385.31	0.79		
		1401.52	1.33		
		1407.99	2.39		
		1509.21	2.13		
		1661.27	1.05		
		1729.59	2.88		
		1764.49	15.30		
		1847.43	2.03		
		2118.51	1.16		
Pb-214	1.00	241.99	7.25		
		295.22 *	18.42	8.08E-02	3.44E-02
		351.93 *	35.60	1.42E-01	3.03E-02
		785.96	1.06		
Ac-228	0.99	129.07	2.42		
		209.25	3.89		
		270.24	3.46		
		328.00	2.95		
		338.32	11.27		
		409.46	1.92		
		463.00	4.40		
		794.95	4.25		
		911.20 *	25.80	2.07E-01	5.37E-02
		964.77	4.99		
		968.97	15.80		
		1588.20	3.22		

* = Energy line found in the spectrum.

- = Manually added nuclide.

? = Manually edited nuclide.

@ = Energy line not used for Weighted Mean Activity

Energy Tolerance : 1.000 keV

Nuclide confidence index threshold = 0.30

Errors quoted at 1.000sigma

INTERFERENCE CORRECTED REPORT

Analysis Report for 11-Nov-19-10018

L1-10206A-FSGS-016SS

	Nuclide Name	Nuclide Id Confidence	Wt mean Activity (pCi/grams)	Wt mean Activity Uncertainty	Comments
	K-40	1.000	3.32E+00	3.36E-01	
	Tl-208	1.000	5.08E-02	1.27E-02	
X	Bi-211	0.880			
	Pb-212	0.997	1.61E-01	2.76E-02	
	Bi-214	0.997	9.70E-02	2.33E-02	
	Pb-214	1.000	1.15E-01	2.27E-02	
	Ac-228	0.998	2.07E-01	5.37E-02	

? = nuclide is part of an undetermined solution

X = nuclide rejected by the interference analysis

@ = nuclide contains energy lines not used in Weighted Mean Activity

Errors quoted at 1.000sigma

Analysis Report for 11-Nov-19-10018
L1-10206A-FSGS-016SS

UNIDENTIFIED PEAKS

Peak Locate Performed on : 11/11/2019 12:52:00PM
Peak Locate From Channel : 120
Peak Locate To Channel : 8192

Peak No.	Energy (keV)	Peak Size (CPS)	Peak CPS (%) Uncertainty	Peak Type	Tolerance Nuclide
All peaks were identified.					
M = First peak in a multiplet region					
m = Other peak in a multiplet region					
F = Fitted singlet					
Errors quoted at 1.000sigma					

NUCLIDE MDA REPORT

Nuclide Library Used : C:\Canberra\Apex\Root\Default\Library\ZION LIB-BNL.NLB

	Nuclide Name	Energy (keV)	Yield(%)	Activity (pCi/grams)	Nuclide MDA (pCi/grams)	Line MDA (pCi/grams)
	An Pk	511.00	100.00	2.92E-02	4.85E-02	4.85E-02
	BE-7	477.60	10.44	6.41E-02	3.88E-01	3.88E-01
+	K-40	1460.82	* 10.66	3.32E+00	3.88E-01	3.88E-01
	Mn-54	834.85	99.98	9.17E-04	4.56E-02	4.56E-02
	Co-60	1173.23	99.85	1.66E-02	5.05E-02	5.48E-02
		1332.49	99.98	1.52E-02		5.05E-02
	Nb-94	702.65	99.81	2.73E-02	3.24E-02	4.52E-02
		871.09	99.89	1.69E-02		3.24E-02
	Ag-108m	79.13	6.60	7.87E-01	3.58E-02	1.68E+00
		433.94	90.50	-2.45E-02		3.58E-02
		614.28	89.80	-1.13E-02		5.29E-02
		722.94	90.80	-3.10E-02		4.81E-02
	Sb-125	176.31	6.84	-4.35E-02	1.15E-01	5.26E-01
		380.45	1.52	7.65E-01		2.30E+00
		427.87	29.60	1.86E-03		1.15E-01
		463.36	10.49	-7.80E-02		3.18E-01
		600.60	17.65	-3.11E-02		1.97E-01
		606.71	4.98	1.16E+00		1.08E+00
		635.95	11.22	1.27E-03		2.99E-01

Analysis Report for 11-Nov-19-10018

L1-10206A-FSGS-016SS

Nuclide Name	Energy (keV)	Yield(%)	Activity (pCi/grams)	Nuclide MDA (pCi/grams)	Line MDA (pCi/grams)
Sb-125	671.44	1.79	9.98E-01	1.15E-01	1.94E+00
Ba-133	79.61	2.65	4.24E-01	6.38E-02	3.97E+00
	81.00	32.90	-2.47E-01		2.64E-01
	276.40	7.16	-6.49E-02		4.80E-01
	302.85	18.34	9.08E-02		2.00E-01
	356.01	62.05	-5.28E-02		6.38E-02
	383.85	8.94	-1.36E-01		3.69E-01
Cs-134	475.36	1.48	4.52E-02	4.31E-02	2.83E+00
	563.25	8.34	-2.45E-01		4.51E-01
	569.33	15.37	-9.72E-02		2.46E-01
	604.72	97.62	-4.27E-02		4.52E-02
	795.86	85.46	2.90E-02		4.31E-02
	801.95	8.69	-1.04E-01		3.54E-01
	1038.61	0.99	-2.00E+00		5.10E+00
	1167.97	1.79	-1.03E+00		2.50E+00
	1365.19	3.02	2.17E-01		1.39E+00
Cs-137	661.66	85.10	1.83E-02	4.46E-02	4.46E-02
Eu-152	121.78	28.67	7.40E-02	1.33E-01	1.41E-01
	244.70	7.61	-4.07E-02		4.84E-01
	295.94	0.45	7.91E-02		8.50E+00
	344.28	26.60	-1.23E-02		1.33E-01
	367.79	0.86	1.44E+00		4.08E+00
	411.12	2.24	-3.22E-01		1.55E+00
	443.96	2.83	9.06E-02		1.37E+00
	488.68	0.42	6.43E+00		8.24E+00
	563.99	0.49	3.33E+00		7.78E+00
	586.26	0.46	8.86E+00		1.16E+01
	678.62	0.47	-4.20E-01		7.00E+00
	688.67	0.86	-9.63E-01		4.54E+00
	719.35	0.28	-4.28E+00		1.53E+01
	778.90	12.96	1.18E-01		3.12E-01
	810.45	0.32	-1.23E+01		1.12E+01
	867.37	4.26	3.52E-01		7.23E-01
	919.33	0.43	-2.72E+00		1.01E+01
	964.08	14.65	2.41E-01		4.07E-01
	1085.87	10.24	-3.44E-01		4.30E-01
	1089.74	1.73	1.42E+00		2.87E+00
	1112.07	13.69	4.86E-03		3.48E-01
	1212.95	1.43	3.46E+00		4.10E+00
	1249.94	0.19	-2.14E+01		2.87E+01
	1299.14	1.63	-1.15E+00		2.95E+00
	1408.01	21.07	-1.72E-01		1.93E-01
	1457.64	0.50	7.51E+01		3.19E+01
	1528.10	0.28	-1.01E+01		1.23E+01
Eu-154	123.07	40.40	3.27E-02	9.71E-02	9.71E-02
	247.93	6.89	-1.53E-01		4.69E-01
	591.76	4.95	-1.53E-01		7.70E-01
	692.42	1.78	2.68E-01		2.56E+00
	723.30	20.06	-5.67E-02		2.26E-01
	756.80	4.52	5.87E-01		1.02E+00
	873.18	12.08	-2.57E-01		2.28E-01

Analysis Report for 11-Nov-19-10018

L1-10206A-FSGS-016SS

Nuclide Name	Energy (keV)	Yield(%)	Activity (pCi/grams)	Nuclide MDA (pCi/grams)	Line MDA (pCi/grams)
Eu-154	996.29	10.48	2.75E-01	9.71E-02	4.68E-01
	1004.76	18.01	4.43E-02		2.08E-01
	1274.43	34.80	7.00E-02		1.54E-01
	1596.48	1.80	-3.92E-01		2.18E+00
Eu-155	45.30	1.31	4.24E+00	2.29E-01	2.89E+01
	60.01	1.22	3.18E+00		2.62E+01
	86.55	30.70	-8.43E-02		2.29E-01
	105.31	21.10	-1.18E-01		2.43E-01
Ra-226	186.21	3.64	8.18E-01	9.83E-01	9.83E-01
Pa-231	27.36	10.30	2.16E+00	1.48E+00	3.17E+00
	283.69	1.70	-5.84E-01		1.85E+00
	300.07	2.47	-9.93E-01		1.48E+00
	302.65	2.20	7.97E-01		1.67E+00
	330.06	1.40	-9.20E-02		2.65E+00
U-235	143.76	10.96	-1.38E-01	6.30E-02	3.37E-01
	163.33	5.08	-3.15E-01		7.06E-01
	185.71	57.20	2.68E-02		6.30E-02
	202.11	1.08	2.54E+00		3.41E+00
Am-241	205.31	5.01	-1.96E-01	9.28E-01	6.57E-01
	59.54	35.90	3.79E-02		9.28E-01

+ = Nuclide identified during the nuclide identification

* = Energy line found in the spectrum

> = MDA value not calculated

@ = Half-life too short to be able to perform the decay correction

? = CAUTION: MDA value is inconsistent with Currie MDA at 95% confidence level

Analysis Report for 11-Nov-19-10019
L1-10206A-FSGS-017SS

GAMMA SPECTRUM ANALYSIS

Sample Identification : 11-Nov-19-10019
Sample Description : L1-10206A-FSGS-017SS
Sample Type : Soil
Unit :
Sample Point :

Sample Size : 1.611E+03 grams
Facility : Default

Sample Taken On : 11/9/2019 8:32:00AM
Acquisition Started : 11/11/2019 12:37:02PM

Procedure : 130G_SOIL_1
Operator : Administrator
Detector Name : P11314
Geometry : 130G_SOIL_1
Live Time : 900.0 seconds
Real Time : 900.3 seconds

Dead Time : 0.04 %

Peak Locate Threshold : 3.00
Peak Locate Range (in channels) : 120 - 8192
Peak Area Range (in channels) : 120 - 8192
Identification Energy Tolerance : 1.000 keV

Energy Calibration Used Done On : 11/4/2019
Efficiency Calibration Used Done On : 11/11/2019
Efficiency Calibration Description :

Sample Number : 81170
Fill Height : 1611.26 gram
Certificate Name : Eu155-Na22
Certificate Date : 12/22/2008 12:00:00PM

PEAK ANALYSIS REPORT

Peak Analysis Performed on : 11/11/2019 12:52:16PM

Peak Analysis From Channel : 120
Peak Analysis To Channel : 8192


Data Validated
0600 11-12-19

Analysis Report for 11-Nov-19-10019
L1-10206A-FSGS-017SS

Peak No.	Energy (keV)	ROI start	ROI end	Peak Centroid	Net Peak Area	Net Area Uncertainty	Continuum Counts	FWHM (keV)
1	238.65	949 -	960	954.18	1.30E+02	15.02	3.60E+01	0.88
2	351.98	1399 -	1412	1406.94	6.60E+01	10.24	1.40E+01	1.25
3	583.10	2323 -	2337	2330.51	4.59E+01	9.15	1.31E+01	0.52
4	609.12	2430 -	2439	2434.53	3.66E+01	7.91	1.14E+01	0.45
5	910.80	3635 -	3647	3640.66	3.26E+01	7.46	8.42E+00	0.51
6	968.62	3865 -	3879	3871.90	4.30E+01	7.00	1.97E+00	1.06
7	1460.17	5828 -	5850	5838.63	1.77E+02	14.44	8.33E+00	1.10

M = First peak in a multiplet region

m = Other peak in a multiplet region

F = Fitted singlet

Errors quoted at 1.000sigma

No background subtract performed on this spectrum.

NUCLIDE IDENTIFICATION REPORT

Nuclide Library Used : C:\Canberra\Apex\Root\Default\Library\ZION LIB-BNL.NLB

IDENTIFIED NUCLIDES

Nuclide Name	Id Confidence	Energy (keV)	Yield(%)	Activity (pCi/grams)	Activity Uncertainty
K-40	0.93	1460.82 *	10.66	3.91E+00	3.61E-01
Tl-208	0.99	583.19 *	85.00	6.82E-02	1.42E-02
Bi-211	0.87	351.07 *	13.02	4.49E-01	7.86E-02
Pb-212	1.00	115.18	0.60		
		238.63 *	43.60	2.05E-01	2.88E-02
		300.09	3.30		
Bi-214	0.99	609.32 *	45.49	1.05E-01	2.35E-02
		768.36	4.89		
		806.18	1.26		
		934.06	3.11		

Analysis Report for 11-Nov-19-10019

L1-10206A-FSGS-017SS

Nuclide Name	Id Confidence	Energy (keV)	Yield(%)	Activity (pCi/grams)	Activity Uncertainty
Bi-214	0.99	1120.29	14.92		
		1155.21	1.63		
		1238.12	5.83		
		1280.98	1.43		
		1377.67	3.99		
		1385.31	0.79		
		1401.52	1.33		
		1407.99	2.39		
		1509.21	2.13		
		1661.27	1.05		
		1729.59	2.88		
		1764.49	15.30		
		1847.43	2.03		
		2118.51	1.16		
Pb-214	1.00	241.99	7.25		
		295.22	18.42		
		351.93 *	35.60	1.64E-01	2.87E-02
		785.96	1.06		
Ac-228	0.98	129.07	2.42		
		209.25	3.89		
		270.24	3.46		
		328.00	2.95		
		338.32	11.27		
		409.46	1.92		
		463.00	4.40		
		794.95	4.25		
		911.20 *	25.80	2.16E-01	5.04E-02
		964.77	4.99		
		968.97 *	15.80	4.86E-01	8.18E-02
		1588.20	3.22		

* = Energy line found in the spectrum.

- = Manually added nuclide.

? = Manually edited nuclide.

@ = Energy line not used for Weighted Mean Activity

Energy Tolerance : 1.000 keV

Nuclide confidence index threshold = 0.30

Errors quoted at 1.000sigma

INTERFERENCE CORRECTED REPORT

Analysis Report for 11-Nov-19-10019

L1-10206A-FSGS-017SS

<i>Nuclide Name</i>	<i>Nuclide Id Confidence</i>	<i>Wt mean Activity (pCi/grams)</i>	<i>Wt mean Activity Uncertainty</i>	<i>Comments</i>
K-40	0.935	3.91E+00	3.61E-01	
Tl-208	0.999	6.82E-02	1.42E-02	
? Bi-211	0.876	4.49E-01	7.86E-02	
Pb-212	1.000	2.05E-01	2.88E-02	
Bi-214	0.997	1.05E-01	2.35E-02	
? Pb-214	1.000	1.64E-01	2.87E-02	
Ac-228	0.988	2.90E-01	4.29E-02	

? = nuclide is part of an undetermined solution

X = nuclide rejected by the interference analysis

@ = nuclide contains energy lines not used in Weighted Mean Activity

Errors quoted at 1.000sigma

Analysis Report for 11-Nov-19-10019
L1-10206A-FSGS-017SS

UNIDENTIFIED PEAKS

Peak Locate Performed on : 11/11/2019 12:52:16PM
Peak Locate From Channel : 120
Peak Locate To Channel : 8192

Peak No.	Energy (keV)	Peak Size (CPS)	Peak CPS (%) Uncertainty	Peak Type	Tolerance Nuclide
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All peaks were identified.

M = First peak in a multiplet region

m = Other peak in a multiplet region

F = Fitted singlet

Errors quoted at 1.000sigma

NUCLIDE MDA REPORT

Nuclide Library Used : C:\Canberra\Apex\Root\Default\Library\ZION LIB-BNL.NLB

	Nuclide Name	Energy (keV)	Yield(%)	Activity (pCi/grams)	Nuclide MDA (pCi/grams)	Line MDA (pCi/grams)
	An Pk	511.00	100.00	8.25E-02	5.65E-02	5.65E-02
	BE-7	477.60	10.44	2.39E-02	4.14E-01	4.14E-01
+	K-40	1460.82	* 10.66	3.91E+00	4.86E-01	4.86E-01
	Mn-54	834.85	99.98	6.81E-03	3.85E-02	3.85E-02
	Co-60	1173.23	99.85	-3.93E-02	4.85E-02	5.04E-02
		1332.49	99.98	3.52E-02		4.85E-02
	Nb-94	702.65	99.81	-5.96E-03	3.95E-02	4.00E-02
		871.09	99.89	-4.30E-03		3.95E-02
	Ag-108m	79.13	6.60	4.85E-01	3.91E-02	1.10E+00
		433.94	90.50	7.32E-03		3.91E-02
		614.28	89.80	-8.35E-02		4.84E-02
		722.94	90.80	-1.96E-02		4.55E-02
	Sb-125	176.31	6.84	2.27E-01	1.06E-01	4.55E-01
		380.45	1.52	-1.70E+00		1.96E+00
		427.87	29.60	-3.36E-02		1.06E-01
		463.36	10.49	5.37E-02		3.26E-01
		600.60	17.65	-2.41E-01		1.93E-01
		606.71	4.98	6.33E-01		1.15E+00
		635.95	11.22	-1.33E-02		3.10E-01

Analysis Report for 11-Nov-19-10019

L1-10206A-FSGS-017SS

Nuclide Name	Energy (keV)	Yield(%)	Activity (pCi/grams)	Nuclide MDA (pCi/grams)	Line MDA (pCi/grams)
Sb-125	671.44	1.79	-4.69E-01	1.06E-01	1.89E+00
Ba-133	79.61	2.65	1.25E+00	5.68E-02	2.65E+00
	81.00	32.90	-2.11E-01		1.70E-01
	276.40	7.16	2.80E-01		4.23E-01
	302.85	18.34	8.58E-02		1.68E-01
	356.01	62.05	-4.66E-02		5.68E-02
	383.85	8.94	1.75E-01		3.71E-01
Cs-134	475.36	1.48	9.11E-01	4.73E-02	2.86E+00
	563.25	8.34	-5.09E-01		4.58E-01
	569.33	15.37	1.23E-01		2.36E-01
	604.72	97.62	-7.33E-02		5.24E-02
	795.86	85.46	4.57E-03		4.73E-02
	801.95	8.69	8.46E-02		4.49E-01
	1038.61	0.99	6.03E-01		5.17E+00
	1167.97	1.79	-1.38E+00		2.92E+00
	1365.19	3.02	4.46E-01		1.09E+00
Cs-137	661.66	85.10	2.18E-02	5.85E-02	5.85E-02
Eu-152	121.78	28.67	5.51E-03	9.79E-02	9.79E-02
	244.70	7.61	-2.29E-01		4.36E-01
	295.94	0.45	5.07E-01		8.85E+00
	344.28	26.60	1.72E-02		1.18E-01
	367.79	0.86	5.28E-01		3.45E+00
	411.12	2.24	1.31E-01		1.39E+00
	443.96	2.83	-7.14E-01		1.08E+00
	488.68	0.42	-3.04E-01		6.62E+00
	563.99	0.49	-5.70E+00		7.77E+00
	586.26	0.46	-3.50E+00		1.20E+01
	678.62	0.47	2.12E+00		8.26E+00
	688.67	0.86	1.77E+00		3.92E+00
	719.35	0.28	-4.15E+00		1.35E+01
	778.90	12.96	1.31E-01		2.95E-01
	810.45	0.32	-3.58E+00		1.17E+01
	867.37	4.26	-1.49E-01		9.01E-01
	919.33	0.43	-3.42E+00		1.00E+01
	964.08	14.65	-2.20E-02		4.97E-01
	1085.87	10.24	-1.63E-01		4.14E-01
	1089.74	1.73	1.63E+00		2.71E+00
	1112.07	13.69	-2.80E-01		2.97E-01
	1212.95	1.43	-5.31E+00		4.10E+00
	1249.94	0.19	-2.40E+00		2.39E+01
	1299.14	1.63	-1.67E+00		2.77E+00
	1408.01	21.07	-5.21E-02		2.20E-01
	1457.64	0.50	9.22E+01		3.29E+01
	1528.10	0.28	1.73E+00		8.36E+00
Eu-154	123.07	40.40	-4.04E-02	6.87E-02	6.87E-02
	247.93	6.89	3.03E-01		4.78E-01
	591.76	4.95	1.24E-01		6.81E-01
	692.42	1.78	-1.24E+00		2.03E+00
	723.30	20.06	8.77E-02		2.16E-01
	756.80	4.52	-1.62E-01		8.30E-01
	873.18	12.08	4.75E-02		3.42E-01

Analysis Report for 11-Nov-19-10019

L1-10206A-FSGS-017SS

Nuclide Name	Energy (keV)	Yield(%)	Activity (pCi/grams)	Nuclide MDA (pCi/grams)	Line MDA (pCi/grams)
Eu-154	996.29	10.48	-2.39E-01	6.87E-02	3.72E-01
	1004.76	18.01	6.88E-02		2.36E-01
	1274.43	34.80	1.04E-01		1.39E-01
	1596.48	1.80	-4.50E-01		1.91E+00
Eu-155	45.30	1.31	2.20E+00	1.64E-01	1.08E+01
	60.01	1.22	1.97E+00		1.10E+01
	86.55	30.70	1.20E-02		1.68E-01
	105.31	21.10	-3.95E-02		1.64E-01
Ra-226	186.21	3.64	8.23E-01	8.88E-01	8.88E-01
Pa-231	27.36	10.30	3.07E-01	1.11E+00	1.11E+00
	283.69	1.70	-6.29E-02		1.63E+00
	300.07	2.47	-1.87E+00		1.24E+00
	302.65	2.20	1.70E-01		1.37E+00
	330.06	1.40	-5.15E-01		2.21E+00
U-235	143.76	10.96	-9.17E-02	5.67E-02	2.93E-01
	163.33	5.08	4.80E-03		5.49E-01
	185.71	57.20	5.19E-02		5.67E-02
	202.11	1.08	-1.06E+00		2.67E+00
Am-241	205.31	5.01	-5.31E-01	3.81E-01	5.79E-01
	59.54	35.90	4.84E-02		3.81E-01

+ = Nuclide identified during the nuclide identification

* = Energy line found in the spectrum

> = MDA value not calculated

@ = Half-life too short to be able to perform the decay correction

? = CAUTION: MDA value is inconsistent with Currie MDA at 95% confidence level

Analysis Report for 11-Nov-19-10020
L1-10206A-FSGS-018SS

GAMMA SPECTRUM ANALYSIS

Sample Identification : 11-Nov-19-10020
Sample Description : L1-10206A-FSGS-018SS
Sample Type : Soil
Unit :
Sample Point :

Sample Size : 1.583E+03 grams
Facility : Default

Sample Taken On : 11/9/2019 8:34:00AM
Acquisition Started : 11/11/2019 12:37:11PM

Procedure : 130G_SOIL_1
Operator : Administrator
Detector Name : 352
Geometry : 130G_SOIL_1
Live Time : 900.0 seconds
Real Time : 900.3 seconds

Dead Time : 0.03 %

Peak Locate Threshold : 3.00
Peak Locate Range (in channels) : 120 - 8192
Peak Area Range (in channels) : 120 - 8192
Identification Energy Tolerance : 1.000 keV

Energy Calibration Used Done On : 11/4/2019
Efficiency Calibration Used Done On : 11/11/2019
Efficiency Calibration Description :

Sample Number : 81171
Fill Height : 1583.04 gram
Certificate Name : Eu155-Na22
Certificate Date : 1/7/2013 12:00:00PM

PEAK ANALYSIS REPORT

Peak Analysis Performed on : 11/11/2019 12:52:16PM

Peak Analysis From Channel : 120
Peak Analysis To Channel : 8192


Data Validated
0600 11-12-19

Analysis Report for 11-Nov-19-10020
L1-10206A-FSGS-018SS

Peak No.	Energy (keV)	ROI start	ROI end	Peak Centroid	Net Peak Area	Net Area Uncertainty	Continuum Counts	FWHM (keV)
1	77.27	307 -	316	310.38	3.37E+01	13.70	6.63E+01	0.64
2	238.67	948 -	961	955.17	1.66E+02	19.44	7.70E+01	0.84
3	295.20	1177 -	1189	1181.03	4.68E+01	12.92	4.42E+01	1.15
4	351.79	1398 -	1413	1407.14	1.08E+02	13.74	2.72E+01	0.95
5	583.15	2323 -	2336	2331.90	3.54E+01	10.14	2.46E+01	0.70
6	609.35	2429 -	2444	2436.69	9.71E+01	13.67	2.99E+01	1.20
7	968.60	3868 -	3879	3873.46	2.43E+01	6.79	8.68E+00	0.79
8	1120.01	4474 -	4485	4479.31	1.83E+01	5.02	2.67E+00	0.27
9	1460.67	5832 -	5854	5843.05	3.79E+02	19.98	5.46E+00	0.98

M = First peak in a multiplet region

m = Other peak in a multiplet region

F = Fitted singlet

Errors quoted at 1.000sigma

No background subtract performed on this spectrum.

NUCLIDE IDENTIFICATION REPORT

Nuclide Library Used : C:\Canberra\Apex\Root\Default\Library\ZION LIB-BNL.NLB

IDENTIFIED NUCLIDES

Nuclide Name	Id Confidence	Energy (keV)	Yield(%)	Activity (pCi/grams)	Activity Uncertainty
K-40	0.99	1460.82 *	10.66	7.85E+00	5.36E-01
Tl-208	1.00	583.19 *	85.00	5.02E-02	1.47E-02
Pb-212	1.00	115.18	0.60		
		238.63 *	43.60	2.58E-01	3.68E-02
		300.09	3.30		
Pb212-XR	0.99	74.82	10.28		
		77.11 *	17.10	3.11E-01	1.30E-01
		87.35	3.97		

Analysis Report for 11-Nov-19-10020

L1-10206A-FSGS-018SS

Nuclide Name	Id Confidence	Energy (keV)	Yield(%)	Activity (pCi/grams)	Activity Uncertainty
Pb212-XR	0.99	89.78	1.46		
Bi-214	0.99	609.32 *	45.49	2.65E-01	4.06E-02
		768.36	4.89		
		806.18	1.26		
		934.06	3.11		
		1120.29 *	14.92	2.27E-01	6.28E-02
		1155.21	1.63		
		1238.12	5.83		
		1280.98	1.43		
		1377.67	3.99		
		1385.31	0.79		
		1401.52	1.33		
		1407.99	2.39		
		1509.21	2.13		
		1661.27	1.05		
		1729.59	2.88		
		1764.49	15.30		
		1847.43	2.03		
		2118.51	1.16		
Pb-214	0.99	241.99	7.25		
		295.22 *	18.42	1.93E-01	5.56E-02
		351.93 *	35.60	2.61E-01	3.92E-02
		785.96	1.06		
Pb214-XR	0.99	74.82	5.80		
		77.11 *	9.70	5.48E-01	2.31E-01
		87.35	2.24		
		89.78	0.82		
Ac-228	0.99	129.07	2.42		
		209.25	3.89		
		270.24	3.46		
		328.00	2.95		
		338.32	11.27		
		409.46	1.92		
		463.00	4.40		
		794.95	4.25		
		911.20	25.80		
		964.77	4.99		
		968.97 *	15.80	2.59E-01	7.32E-02
		1588.20	3.22		

* = Energy line found in the spectrum.

- = Manually added nuclide.

? = Manually edited nuclide.

@ = Energy line not used for Weighted Mean Activity

Energy Tolerance : 1.000 keV

Nuclide confidence index threshold = 0.30

Errors quoted at 1.000sigma

Analysis Report for 11-Nov-19-10020
L1-10206A-FSGS-018SS

INTERFERENCE CORRECTED REPORT

	Nuclide Name	Nuclide Id Confidence	Wt mean Activity (pCi/grams)	Wt mean Activity Uncertainty	Comments
	K-40	0.996	7.85E+00	5.36E-01	
	Tl-208	1.000	5.02E-02	1.47E-02	
X	Bi-211	0.921			
	Pb-212	1.000	2.58E-01	3.68E-02	
?	Pb212-XR	0.998	3.11E-01	1.30E-01	
	Bi-214	0.998	2.54E-01	3.41E-02	
	Pb-214	0.998	2.38E-01	3.20E-02	
?	Pb214-XR	0.998	5.48E-01	2.31E-01	
	Ac-228	0.996	2.59E-01	7.32E-02	

- ? = nuclide is part of an undetermined solution
 X = nuclide rejected by the interference analysis
 @ = nuclide contains energy lines not used in Weighted Mean Activity

Errors quoted at 1.000sigma

Analysis Report for 11-Nov-19-10020
L1-10206A-FSGS-018SS

UNIDENTIFIED PEAKS

Peak Locate Performed on : 11/11/2019 12:52:16PM
Peak Locate From Channel : 120
Peak Locate To Channel : 8192

Peak No.	Energy (keV)	Peak Size (CPS)	Peak CPS (%) Uncertainty	Peak Type	Tolerance Nuclide
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All peaks were identified.

M = First peak in a multiplet region

m = Other peak in a multiplet region

F = Fitted singlet

Errors quoted at 1.000sigma

NUCLIDE MDA REPORT

Nuclide Library Used : C:\Canberra\Apex\Root\Default\Library\ZION LIB-BNL.NLB

	Nuclide Name	Energy (keV)	Yield(%)	Activity (pCi/grams)	Nuclide MDA (pCi/grams)	Line MDA (pCi/grams)
	An Pk	511.00	100.00	3.56E-02	5.30E-02	5.30E-02
	BE-7	477.60	10.44	8.28E-02	4.17E-01	4.17E-01
+	K-40	1460.82	* 10.66	7.85E+00	3.78E-01	3.78E-01
	Mn-54	834.85	99.98	3.56E-02	4.79E-02	4.79E-02
	Co-60	1173.23	99.85	5.02E-04	5.14E-02	6.11E-02
		1332.49	99.98	4.43E-04		5.14E-02
	Nb-94	702.65	99.81	2.76E-02	4.93E-02	4.93E-02
		871.09	99.89	2.00E-02		5.72E-02
	Ag-108m	79.13	6.60	5.59E-03	4.59E-02	1.55E+00
		433.94	90.50	1.81E-02		4.59E-02
		614.28	89.80	-2.21E-02		8.43E-02
		722.94	90.80	1.07E-02		5.31E-02
	Sb-125	176.31	6.84	-1.96E-01	1.43E-01	5.13E-01
		380.45	1.52	-1.66E+00		1.97E+00
		427.87	29.60	7.18E-02		1.43E-01
		463.36	10.49	1.71E-01		3.96E-01
		600.60	17.65	-9.52E-02		2.54E-01
		606.71	4.98	2.19E+00		1.59E+00
		635.95	11.22	-3.14E-02		4.12E-01

Analysis Report for 11-Nov-19-10020

L1-10206A-FSGS-018SS

Nuclide Name	Energy (keV)	Yield(%)	Activity (pCi/grams)	Nuclide MDA (pCi/grams)	Line MDA (pCi/grams)
Sb-125	671.44	1.79	9.70E-01	1.43E-01	2.49E+00
Ba-133	79.61	2.65	5.74E-01	8.11E-02	3.78E+00
	81.00	32.90	-5.00E-04		2.58E-01
	276.40	7.16	-2.01E-01		5.27E-01
	302.85	18.34	4.85E-02		2.20E-01
	356.01	62.05	-4.91E-02		8.11E-02
	383.85	8.94	-1.75E-01		3.73E-01
Cs-134	475.36	1.48	8.77E-01	5.82E-02	2.77E+00
	563.25	8.34	2.38E-01		4.76E-01
	569.33	15.37	-7.95E-02		2.42E-01
	604.72	97.62	-3.77E-02		7.49E-02
	795.86	85.46	2.34E-02		5.82E-02
	801.95	8.69	-1.51E-01		5.14E-01
	1038.61	0.99	-7.57E-01		5.50E+00
	1167.97	1.79	-9.59E-01		3.19E+00
	1365.19	3.02	4.31E-01		1.45E+00
Cs-137	661.66	85.10	2.00E-02	6.07E-02	6.07E-02
Eu-152	121.78	28.67	5.99E-02	1.42E-01	1.53E-01
	244.70	7.61	3.81E-01		5.68E-01
	295.94	0.45	8.80E+00		1.09E+01
	344.28	26.60	-4.48E-02		1.42E-01
	367.79	0.86	-1.64E+00		4.19E+00
	411.12	2.24	9.47E-01		1.79E+00
	443.96	2.83	5.70E-01		1.43E+00
	488.68	0.42	-3.05E+00		9.91E+00
	563.99	0.49	2.68E+00		7.89E+00
	586.26	0.46	-9.68E+00		1.28E+01
	678.62	0.47	-5.72E+00		8.94E+00
	688.67	0.86	3.86E+00		4.90E+00
	719.35	0.28	3.25E+00		1.61E+01
	778.90	12.96	-3.35E-01		3.23E-01
	810.45	0.32	4.26E+00		1.51E+01
	867.37	4.26	-1.50E+00		1.29E+00
	919.33	0.43	-2.42E+01		9.84E+00
	964.08	14.65	3.87E-01		4.99E-01
	1085.87	10.24	-8.83E-01		5.08E-01
	1089.74	1.73	-1.00E+00		3.32E+00
	1112.07	13.69	8.80E-03		4.15E-01
	1212.95	1.43	6.47E-01		4.83E+00
	1249.94	0.19	-1.51E+01		2.61E+01
	1299.14	1.63	-2.66E+00		3.96E+00
	1408.01	21.07	7.66E-03		2.19E-01
	1457.64	0.50	1.72E+02		4.29E+01
	1528.10	0.28	6.49E+00		1.33E+01
Eu-154	123.07	40.40	-1.47E-02	1.05E-01	1.05E-01
	247.93	6.89	-2.00E-01		4.99E-01
	591.76	4.95	-7.89E-01		7.18E-01
	692.42	1.78	-4.90E-01		2.31E+00
	723.30	20.06	8.67E-02		2.40E-01
	756.80	4.52	1.07E+00		1.12E+00
	873.18	12.08	5.36E-02		4.78E-01

Analysis Report for 11-Nov-19-10020

L1-10206A-FSGS-018SS

Nuclide Name	Energy (keV)	Yield(%)	Activity (pCi/grams)	Nuclide MDA (pCi/grams)	Line MDA (pCi/grams)
Eu-154	996.29	10.48	4.71E-01	1.05E-01	5.50E-01
	1004.76	18.01	-1.89E-01		3.11E-01
	1274.43	34.80	-4.72E-02		1.76E-01
	1596.48	1.80	4.75E-01		2.27E+00
Eu-155	45.30	1.31	-1.04E-01	2.36E-01	2.21E+01
	60.01	1.22	-1.82E+01		2.24E+01
	86.55	30.70	5.70E-02		2.49E-01
	105.31	21.10	6.04E-02		2.36E-01
Ra-226	186.21	3.64	4.45E-01	1.15E+00	1.15E+00
Pa-231	27.36	10.30	1.43E+00	1.74E+00	2.37E+00
	283.69	1.70	1.52E-01		2.10E+00
	300.07	2.47	3.08E-02		1.74E+00
	302.65	2.20	-8.23E-02		1.82E+00
	330.06	1.40	3.04E-02		2.55E+00
U-235	143.76	10.96	-2.88E-01	7.41E-02	3.60E-01
	163.33	5.08	5.81E-02		7.46E-01
	185.71	57.20	6.02E-02		7.41E-02
	202.11	1.08	2.57E+00		3.54E+00
	205.31	5.01	-4.75E-01		7.58E-01
Am-241	59.54	35.90	-6.48E-01	7.94E-01	7.94E-01

- + = Nuclide identified during the nuclide identification
 * = Energy line found in the spectrum
 > = MDA value not calculated
 @ = Half-life too short to be able to perform the decay correction
 ? = CAUTION: MDA value is inconsistent with Currie MDA at 95% confidence level

Analysis Report for 11-Nov-19-10021
L1-10206A-FSGS-019SS

GAMMA SPECTRUM ANALYSIS

Sample Identification : 11-Nov-19-10021
Sample Description : L1-10206A-FSGS-019SS
Sample Type : Soil
Unit :
Sample Point :

Sample Size : 1.526E+03 grams
Facility : Default

Sample Taken On : 11/9/2019 8:36:00AM
Acquisition Started : 11/11/2019 12:56:28PM

Procedure : 130G_SOIL_1
Operator : Administrator
Detector Name : 324
Geometry : 130G_SOIL_1
Live Time : 900.0 seconds
Real Time : 900.3 seconds

Dead Time : 0.03 %

Peak Locate Threshold : 3.00
Peak Locate Range (in channels) : 120 - 4096
Peak Area Range (in channels) : 120 - 4096
Identification Energy Tolerance : 1.000 keV

Energy Calibration Used Done On : 11/4/2019
Efficiency Calibration Used Done On : 11/11/2019
Efficiency Calibration Description :

Sample Number : 81172
Fill Height : 1525.66 gram
Certificate Name : Eu155-Na22
Certificate Date : 1/30/2013 12:00:00PM

PEAK ANALYSIS REPORT

Peak Analysis Performed on : 11/11/2019 1:11:31PM

Peak Analysis From Channel : 120
Peak Analysis To Channel : 4096


Data Validated
0600 11-12-19

Analysis Report for 11-Nov-19-10021
L1-10206A-FSGS-019SS

Peak No.	Energy (keV)	ROI start	ROI end	Peak Centroid	Net Peak Area	Net Area Uncertainty	Continuum Counts	FWHM (keV)
1	77.20	151 -	158	155.00	5.02E+01	14.35	7.68E+01	0.64
2	238.67	473 -	481	477.52	1.35E+02	17.66	8.31E+01	1.21
3	351.67	698 -	708	703.28	7.75E+01	11.24	2.05E+01	1.02
4	582.73	1161 -	1170	1165.06	5.62E+01	9.77	1.68E+01	1.44
5	911.22	1817 -	1827	1821.90	3.51E+01	7.33	7.86E+00	1.41
6	968.89	1934 -	1942	1937.23	1.44E+01	6.30	1.16E+01	0.76
7	1460.63	2913 -	2928	2921.32	2.08E+02	14.83	4.00E+00	1.86

M = First peak in a multiplet region
m = Other peak in a multiplet region
F = Fitted singlet
Errors quoted at 1.000sigma

No background subtract performed on this spectrum.

NUCLIDE IDENTIFICATION REPORT

Nuclide Library Used : C:\Canberra\Apex\Root\Default\Library\ZION LIB-BNL.NLB

IDENTIFIED NUCLIDES

Nuclide Name	Id Confidence	Energy (keV)	Yield(%)	Activity (pCi/grams)	Activity Uncertainty
K-40	0.99	1460.82 *	10.66	3.91E+00	3.27E-01
Tl-208	0.96	583.19 *	85.00	7.25E-02	1.33E-02
Bi-211	0.94	351.07 *	13.02	4.64E-01	7.70E-02
Pb-212	1.00	115.18	0.60		
		238.63 *	43.60	1.89E-01	2.91E-02
		300.09	3.30		
Pb212-XR	0.99	74.82	10.28		
		77.11 *	17.10	3.28E-01	9.96E-02
		87.35	3.97		
		89.78	1.46		

Analysis Report for 11-Nov-19-10021

L1-10206A-FSGS-019SS

Nuclide Name	Id Confidence	Energy (keV)	Yield(%)	Activity (pCi/grams)	Activity Uncertainty
Pb-214	0.99	241.99	7.25		
		295.22	18.42		
		351.93 *	35.60	1.70E-01	2.81E-02
		785.96	1.06		
Pb214-XR	0.99	74.82	5.80		
		77.11 *	9.70	5.78E-01	1.78E-01
		87.35	2.24		
		89.78	0.82		
Ac-228	1.00	129.07	2.42		
		209.25	3.89		
		270.24	3.46		
		328.00	2.95		
		338.32	11.27		
		409.46	1.92		
		463.00	4.40		
		794.95	4.25		
		911.20 *	25.80	2.00E-01	4.27E-02
		964.77	4.99		
		968.97 *	15.80	1.39E-01	6.13E-02
		1588.20	3.22		

* = Energy line found in the spectrum.

- = Manually added nuclide.

? = Manually edited nuclide.

@ = Energy line not used for Weighted Mean Activity

Energy Tolerance : 1.000 keV

Nuclide confidence index threshold = 0.30

Errors quoted at 1.000sigma

INTERFERENCE CORRECTED REPORT

Nuclide Name	Nuclide Id Confidence	Wt mean Activity (pCi/grams)	Wt mean Activity Uncertainty	Comments
K-40	0.994	3.91E+00	3.27E-01	
Tl-208	0.967	7.25E-02	1.33E-02	
? Bi-211	0.945	4.64E-01	7.70E-02	
Pb-212	1.000	1.89E-01	2.91E-02	
? Pb212-XR	0.999	3.28E-01	9.96E-02	
? Pb-214	0.994	1.70E-01	2.81E-02	
? Pb214-XR	0.999	5.78E-01	1.78E-01	

Analysis Report for 11-Nov-19-10021

L1-10206A-FSGS-019SS

<i>Nuclide Name</i>	<i>Nuclide Id Confidence</i>	<i>Wt mean Activity (pCi/grams)</i>	<i>Wt mean Activity Uncertainty</i>	<i>Comments</i>
Ac-228	1.000	1.80E-01	3.50E-02	
? = nuclide is part of an undetermined solution X = nuclide rejected by the interference analysis @ = nuclide contains energy lines not used in Weighted Mean Activity Errors quoted at 1.000sigma				

Analysis Report for 11-Nov-19-10021
L1-10206A-FSGS-019SS

UNIDENTIFIED PEAKS

Peak Locate Performed on : 11/11/2019 1:11:31PM
Peak Locate From Channel : 120
Peak Locate To Channel : 4096

Peak No.	Energy (keV)	Peak Size (CPS)	Peak CPS (%) Uncertainty	Peak Type	Tolerance Nuclide
All peaks were identified.					
M = First peak in a multiplet region					
m = Other peak in a multiplet region					
F = Fitted singlet					
Errors quoted at 1.000sigma					

NUCLIDE MDA REPORT

Nuclide Library Used : C:\Canberra\Apex\Root\Default\Library\ZION LIB-BNL.NLB

	Nuclide Name	Energy (keV)	Yield(%)	Activity (pCi/grams)	Nuclide MDA (pCi/grams)	Line MDA (pCi/grams)
	An Pk	511.00	100.00	4.13E-02	4.47E-02	4.47E-02
	BE-7	477.60	10.44	1.87E-01	3.35E-01	3.35E-01
+	K-40	1460.82	* 10.66	3.91E+00	2.75E-01	2.75E-01
	Mn-54	834.85	99.98	-2.24E-02	2.99E-02	2.99E-02
	Co-60	1173.23	99.85	8.09E-03	3.66E-02	4.65E-02
		1332.49	99.98	-2.34E-03		3.66E-02
	Nb-94	702.65	99.81	1.25E-02	2.88E-02	3.33E-02
		871.09	99.89	-1.11E-02		2.88E-02
	Ag-108m	79.13	6.60	-1.86E-01	3.03E-02	8.97E-01
		433.94	90.50	-7.93E-03		3.03E-02
		614.28	89.80	-1.26E-02		4.38E-02
		722.94	90.80	2.53E-02		4.34E-02
	Sb-125	176.31	6.84	3.99E-01	9.31E-02	4.92E-01
		380.45	1.52	-1.78E-01		2.02E+00
		427.87	29.60	1.80E-02		9.31E-02
		463.36	10.49	1.03E-01		3.08E-01
		600.60	17.65	-4.95E-02		1.70E-01
		606.71	4.98	1.34E+00		1.06E+00
		635.95	11.22	-1.55E-02		2.88E-01

Analysis Report for 11-Nov-19-10021

L1-10206A-FSGS-019SS

Nuclide Name	Energy (keV)	Yield(%)	Activity (pCi/grams)	Nuclide MDA (pCi/grams)	Line MDA (pCi/grams)
Sb-125	671.44	1.79	1.85E-01	9.31E-02	1.56E+00
Ba-133	79.61	2.65	-6.24E-01	5.19E-02	2.14E+00
	81.00	32.90	-1.11E-01		1.45E-01
	276.40	7.16	1.03E-01		4.14E-01
	302.85	18.34	-6.45E-02		1.50E-01
	356.01	62.05	-3.12E-03		5.19E-02
	383.85	8.94	8.45E-02		3.41E-01
Cs-134	475.36	1.48	9.78E-01	3.92E-02	2.25E+00
	563.25	8.34	4.29E-02		3.46E-01
	569.33	15.37	6.68E-02		2.20E-01
	604.72	97.62	7.15E-03		4.69E-02
	795.86	85.46	2.14E-02		3.92E-02
	801.95	8.69	-1.63E-01		3.04E-01
	1038.61	0.99	8.90E-01		3.66E+00
	1167.97	1.79	-3.02E+00		2.34E+00
	1365.19	3.02	-6.33E-02		1.04E+00
Cs-137	661.66	85.10	5.25E-03	4.49E-02	4.49E-02
Eu-152	121.78	28.67	2.89E-02	9.05E-02	1.04E-01
	244.70	7.61	-3.62E-01		4.13E-01
	295.94	0.45	2.85E+00		7.52E+00
	344.28	26.60	-9.45E-02		9.05E-02
	367.79	0.86	-1.39E+00		3.37E+00
	411.12	2.24	3.79E-01		1.38E+00
	443.96	2.83	-6.67E-02		9.70E-01
	488.68	0.42	-4.90E-02		6.97E+00
	563.99	0.49	9.63E-01		5.76E+00
	586.26	0.46	-3.25E+00		1.15E+01
	678.62	0.47	2.18E+00		5.96E+00
	688.67	0.86	-1.34E+00		3.23E+00
	719.35	0.28	1.35E+00		1.14E+01
	778.90	12.96	1.51E-03		2.59E-01
	810.45	0.32	3.82E-01		9.84E+00
	867.37	4.26	2.26E-01		7.93E-01
	919.33	0.43	-1.48E+00		8.59E+00
	964.08	14.65	-2.31E-01		3.03E-01
	1085.87	10.24	7.02E-02		4.16E-01
	1089.74	1.73	-7.54E-01		2.04E+00
	1112.07	13.69	-1.80E-01		2.46E-01
	1212.95	1.43	-1.43E-01		3.14E+00
	1249.94	0.19	1.64E+01		2.46E+01
	1299.14	1.63	9.57E-01		2.70E+00
	1408.01	21.07	3.47E-02		1.67E-01
	1457.64	0.50	-1.69E+00		2.91E+01
	1528.10	0.28	2.51E+00		1.08E+01
Eu-154	123.07	40.40	-3.49E-04	7.23E-02	7.23E-02
	247.93	6.89	1.18E-01		4.24E-01
	591.76	4.95	3.53E-01		6.72E-01
	692.42	1.78	-1.03E+00		1.57E+00
	723.30	20.06	9.38E-02		1.97E-01
	756.80	4.52	-7.24E-01		7.30E-01
	873.18	12.08	2.24E-02		2.46E-01

Analysis Report for 11-Nov-19-10021
L1-10206A-FSGS-019SS

Nuclide Name	Energy (keV)	Yield(%)	Activity (pCi/grams)	Nuclide MDA (pCi/grams)	Line MDA (pCi/grams)
Eu-154	996.29	10.48	3.23E-01	7.23E-02	4.13E-01
	1004.76	18.01	-7.33E-02		1.63E-01
	1274.43	34.80	1.83E-02		1.15E-01
	1596.48	1.80	-1.39E-01		1.33E+00
Eu-155	45.30	1.31	2.25E+00	1.49E-01	1.02E+01
	60.01	1.22	1.92E+00		1.13E+01
	86.55	30.70	-3.37E-02		1.49E-01
	105.31	21.10	-5.34E-02		1.55E-01
Ra-226	186.21	3.64	1.65E-01	8.80E-01	8.80E-01
Pa-231	27.36	10.30	8.16E-01	9.86E-01	9.86E-01
	283.69	1.70	8.22E-01		1.68E+00
	300.07	2.47	-7.31E-01		1.20E+00
	302.65	2.20	-5.37E-01		1.25E+00
	330.06	1.40	8.23E-01		2.21E+00
U-235	143.76	10.96	9.51E-02	5.61E-02	2.65E-01
	163.33	5.08	-2.00E-01		5.82E-01
	185.71	57.20	1.99E-02		5.61E-02
	202.11	1.08	4.89E-01		2.91E+00
Am-241	205.31	5.01	-1.40E-01	4.02E-01	5.93E-01
	59.54	35.90	9.45E-02		4.02E-01

- + = Nuclide identified during the nuclide identification
 * = Energy line found in the spectrum
 > = MDA value not calculated
 @ = Half-life too short to be able to perform the decay correction
 ? = CAUTION: MDA value is inconsistent with Currie MDA at 95% confidence level

Analysis Report for 11-Nov-19-10022
L1-10206A-FSGS-020SS

GAMMA SPECTRUM ANALYSIS

Sample Identification : 11-Nov-19-10022
Sample Description : L1-10206A-FSGS-020SS
Sample Type : Soil
Unit :
Sample Point :

Sample Size : 1.482E+03 grams
Facility : Default

Sample Taken On : 11/9/2019 8:38:00AM
Acquisition Started : 11/11/2019 12:56:34PM

Procedure : 130G_SOIL_1
Operator : Administrator
Detector Name : P40818B
Geometry : 130G_SOIL_1
Live Time : 900.0 seconds
Real Time : 901.2 seconds

Dead Time : 0.13 %

Peak Locate Threshold : 3.00
Peak Locate Range (in channels) : 120 - 8192
Peak Area Range (in channels) : 120 - 8192
Identification Energy Tolerance : 1.000 keV

Energy Calibration Used Done On : 11/4/2019
Efficiency Calibration Used Done On : 11/11/2019
Efficiency Calibration Description :

Sample Number : 81173
Fill Height : 1482.10 gram
Certificate Name : Eu155-Na22
Certificate Date : 1/30/2012 12:00:00PM

PEAK ANALYSIS REPORT

Peak Analysis Performed on : 11/11/2019 1:11:38PM

Peak Analysis From Channel : 120
Peak Analysis To Channel : 8192


Data Validated
0600 11-12-19

Analysis Report for 11-Nov-19-10022
L1-10206A-FSGS-020SS

Peak No.	Energy (keV)	ROI start	ROI end	Peak Centroid	Net Peak Area	Net Area Uncertainty	Continuum Counts	FWHM (keV)
1	238.64	950 -	960	954.66	9.38E+01	14.26	4.42E+01	0.94
2	295.14	1176 -	1186	1180.45	2.68E+01	8.54	1.93E+01	0.54
3	338.45	1349 -	1358	1353.57	1.90E+01	8.72	2.50E+01	0.61
4	351.83	1401 -	1411	1407.06	5.31E+01	10.27	2.19E+01	0.59
5	511.08	2039 -	2048	2043.65	1.94E+01	8.43	2.16E+01	0.69
6	583.38	2325 -	2341	2332.74	4.79E+01	8.54	8.09E+00	0.78
7	609.09	2430 -	2443	2435.51	4.14E+01	8.39	9.57E+00	0.58
8	661.68	2640 -	2651	2645.81	3.91E+01	7.87	8.88E+00	0.94
9	911.24	3638 -	3650	3643.93	2.30E+01	7.56	1.30E+01	0.39
10	1460.85	5833 -	5853	5843.22	1.97E+02	14.36	2.50E+00	0.70

M = First peak in a multiplet region
m = Other peak in a multiplet region
F = Fitted singlet
Errors quoted at 1.000sigma

No background subtract performed on this spectrum.

NUCLIDE IDENTIFICATION REPORT

Nuclide Library Used : C:\Canberra\Apex\Root\Default\Library\ZION LIB-BNL.NLB

IDENTIFIED NUCLIDES

Nuclide Name	Id Confidence	Energy (keV)	Yield(%)	Activity (pCi/grams)	Activity Uncertainty
An Pk	0.99	511.00 *	100.00	2.61E-02	1.15E-02
K-40	1.00	1460.82 *	10.66	4.97E+00	4.21E-01
Cs-137	1.00	661.66 *	85.10	7.17E-02	1.51E-02
Tl-208	0.99	583.19 *	85.00	8.06E-02	1.52E-02
Pb-212	1.00	115.18	0.60		
		238.63 *	43.60	1.69E-01	2.90E-02
		300.09	3.30		

Analysis Report for 11-Nov-19-10022

L1-10206A-FSGS-020SS

Nuclide Name	Id Confidence	Energy (keV)		Yield(%)	Activity (pCi/grams)	Activity Uncertainty
Bi-214	0.99	609.32	*	45.49	1.34E-01	2.83E-02
		768.36		4.89		
		806.18		1.26		
		934.06		3.11		
		1120.29		14.92		
		1155.21		1.63		
		1238.12		5.83		
		1280.98		1.43		
		1377.67		3.99		
		1385.31		0.79		
		1401.52		1.33		
		1407.99		2.39		
		1509.21		2.13		
		1661.27		1.05		
		1729.59		2.88		
		1764.49		15.30		
		1847.43		2.03		
		2118.51		1.16		
Pb-214	0.99	241.99		7.25	1.28E-01	4.22E-02
		295.22	*	18.42		
		351.93	*	35.60		
Ac-228	1.00	785.96		1.06	1.50E-01	3.13E-02
		129.07		2.42		
		209.25		3.89		
		270.24		3.46		
		328.00		2.95		
		338.32	*	11.27		
		409.46		1.92		
		463.00		4.40		
		794.95		4.25		
		911.20	*	25.80		
		964.77		4.99		
		968.97		15.80		
		1588.20		3.22		

* = Energy line found in the spectrum.

- = Manually added nuclide.

? = Manually edited nuclide.

@ = Energy line not used for Weighted Mean Activity

Energy Tolerance : 1.000 keV

Nuclide confidence index threshold = 0.30

Errors quoted at 1.000sigma

INTERFERENCE CORRECTED REPORT

Analysis Report for 11-Nov-19-10022

L1-10206A-FSGS-020SS

	Nuclide Name	Nuclide Id Confidence	Wt mean Activity (pCi/grams)	Wt mean Activity Uncertainty	Comments
	An Pk	0.999	2.61E-02	1.15E-02	
	K-40	1.000	4.97E+00	4.21E-01	
	Cs-137	1.000	7.17E-02	1.51E-02	
	Tl-208	0.994	8.06E-02	1.52E-02	
X	Bi-211	0.911			
	Pb-212	1.000	1.69E-01	2.90E-02	
	Bi-214	0.996	1.34E-01	2.83E-02	
	Pb-214	0.999	1.42E-01	2.52E-02	
	Ac-228	1.000	1.70E-01	4.59E-02	

? = nuclide is part of an undetermined solution

X = nuclide rejected by the interference analysis

@ = nuclide contains energy lines not used in Weighted Mean Activity

Errors quoted at 1.000sigma

Analysis Report for 11-Nov-19-10022
L1-10206A-FSGS-020SS

UNIDENTIFIED PEAKS

Peak Locate Performed on : 11/11/2019 1:11:38PM
Peak Locate From Channel : 120
Peak Locate To Channel : 8192

Peak No.	Energy (keV)	Peak Size (CPS)	Peak CPS (%) Uncertainty	Peak Type	Tolerance Nuclide
All peaks were identified.					
M = First peak in a multiplet region					
m = Other peak in a multiplet region					
F = Fitted singlet					
Errors quoted at 1.000sigma					

NUCLIDE MDA REPORT

Nuclide Library Used : C:\Canberra\Apex\Root\Default\Library\ZION LIB-BNL.NLB

	Nuclide Name	Energy (keV)	Yield(%)	Activity (pCi/grams)	Nuclide MDA (pCi/grams)	Line MDA (pCi/grams)
+	An Pk	511.00	* 100.00	2.61E-02	3.67E-02	3.67E-02
	BE-7	477.60	10.44	-3.49E-01	3.84E-01	3.84E-01
+	K-40	1460.82	* 10.66	4.97E+00	3.26E-01	3.26E-01
	Mn-54	834.85	99.98	2.75E-03	4.65E-02	4.65E-02
	Co-60	1173.23	99.85	-3.88E-02	6.09E-02	7.00E-02
		1332.49	99.98	3.29E-02		6.09E-02
	Nb-94	702.65	99.81	2.37E-02	4.86E-02	5.15E-02
		871.09	99.89	-1.22E-02		4.86E-02
	Ag-108m	79.13	6.60	9.73E-01	4.51E-02	1.81E+00
		433.94	90.50	1.31E-02		4.51E-02
		614.28	89.80	1.83E-04		5.66E-02
		722.94	90.80	-4.07E-02		4.90E-02
	Sb-125	176.31	6.84	2.59E-01	1.09E-01	5.13E-01
		380.45	1.52	6.09E-01		2.56E+00
		427.87	29.60	-1.83E-02		1.09E-01
		463.36	10.49	1.01E-01		4.21E-01
		600.60	17.65	-1.36E-01		2.30E-01
		606.71	4.98	1.22E+00		1.25E+00
		635.95	11.22	2.70E-01		4.18E-01

Analysis Report for 11-Nov-19-10022

L1-10206A-FSGS-020SS

Nuclide Name	Energy (keV)	Yield(%)	Activity (pCi/grams)	Nuclide MDA (pCi/grams)	Line MDA (pCi/grams)
Sb-125	671.44	1.79	2.14E-01	1.09E-01	2.45E+00
Ba-133	79.61	2.65	6.97E-02	7.89E-02	4.20E+00
	81.00	32.90	-2.18E-01		2.88E-01
	276.40	7.16	1.18E-01		5.05E-01
	302.85	18.34	8.79E-02		2.08E-01
	356.01	62.05	-5.56E-02		7.89E-02
	383.85	8.94	-4.31E-02		4.11E-01
Cs-134	475.36	1.48	4.44E-01	5.46E-02	2.83E+00
	563.25	8.34	1.87E-01		5.25E-01
	569.33	15.37	-8.71E-02		2.75E-01
	604.72	97.62	-3.81E-02		5.88E-02
	795.86	85.46	3.08E-02		5.46E-02
	801.95	8.69	-1.46E-01		4.87E-01
	1038.61	0.99	9.16E-01		5.44E+00
	1167.97	1.79	8.91E-01		3.85E+00
	1365.19	3.02	-3.79E-01		1.71E+00
+ Cs-137	661.66	* 85.10	7.17E-02	3.50E-02	3.50E-02
Eu-152	121.78	28.67	7.48E-02	1.38E-01	1.61E-01
	244.70	7.61	1.64E-01		5.49E-01
	295.94	0.45	-3.48E-01		9.15E+00
	344.28	26.60	-5.97E-02		1.38E-01
	367.79	0.86	1.24E+00		3.45E+00
	411.12	2.24	-1.18E+00		1.55E+00
	443.96	2.83	-1.39E-01		1.33E+00
	488.68	0.42	1.29E+00		9.06E+00
	563.99	0.49	-1.14E+00		8.67E+00
	586.26	0.46	-2.47E+00		1.31E+01
	678.62	0.47	2.52E+00		9.35E+00
	688.67	0.86	7.53E-01		5.36E+00
	719.35	0.28	2.68E+00		1.23E+01
	778.90	12.96	5.83E-02		3.27E-01
	810.45	0.32	6.19E+00		1.44E+01
	867.37	4.26	1.54E-01		1.20E+00
	919.33	0.43	-4.53E+00		1.01E+01
	964.08	14.65	4.12E-01		4.82E-01
	1085.87	10.24	-1.98E-01		5.19E-01
	1089.74	1.73	9.17E-01		3.01E+00
	1112.07	13.69	-5.36E-02		4.35E-01
	1212.95	1.43	-3.77E+00		4.09E+00
	1249.94	0.19	2.06E+01		3.64E+01
	1299.14	1.63	1.97E+00		3.05E+00
	1408.01	21.07	-9.29E-03		2.41E-01
	1457.64	0.50	1.04E+02		3.81E+01
	1528.10	0.28	1.97E+00		9.52E+00
Eu-154	123.07	40.40	4.85E-02	1.14E-01	1.14E-01
	247.93	6.89	5.19E-03		5.45E-01
	591.76	4.95	2.54E-01		8.64E-01
	692.42	1.78	-8.71E-01		2.72E+00
	723.30	20.06	-1.93E-01		2.22E-01
	756.80	4.52	3.11E-01		9.59E-01
	873.18	12.08	2.30E-01		4.26E-01

Analysis Report for 11-Nov-19-10022

L1-10206A-FSGS-020SS

Nuclide Name	Energy (keV)	Yield(%)	Activity (pCi/grams)	Nuclide MDA (pCi/grams)	Line MDA (pCi/grams)
Eu-154	996.29	10.48	1.56E-01	1.14E-01	4.10E-01
	1004.76	18.01	9.63E-02		2.92E-01
	1274.43	34.80	-8.15E-02		1.70E-01
	1596.48	1.80	1.28E+00		2.63E+00
Eu-155	45.30	1.31	-1.42E+01	2.40E-01	3.05E+01
	60.01	1.22	-1.18E+01		2.88E+01
	86.55	30.70	-3.39E-02		2.57E-01
	105.31	21.10	2.25E-02		2.40E-01
Ra-226	186.21	3.64	5.16E-01	1.07E+00	1.07E+00
Pa-231	27.36	10.30	1.21E+00	1.50E+00	3.05E+00
	283.69	1.70	-1.42E-02		2.13E+00
	300.07	2.47	-3.42E-01		1.50E+00
	302.65	2.20	5.84E-01		1.75E+00
	330.06	1.40	2.05E-01		2.84E+00
U-235	143.76	10.96	3.54E-02	6.85E-02	3.89E-01
	163.33	5.08	2.11E-01		7.06E-01
	185.71	57.20	1.58E-02		6.85E-02
	202.11	1.08	1.00E+00		3.36E+00
Am-241	205.31	5.01	2.47E-01	1.01E+00	7.25E-01
	59.54	35.90	-2.18E-01		1.01E+00

- + = Nuclide identified during the nuclide identification
 * = Energy line found in the spectrum
 > = MDA value not calculated
 @ = Half-life too short to be able to perform the decay correction
 ? = CAUTION: MDA value is inconsistent with Currie MDA at 95% confidence level

Analysis Report for 11-Nov-19-10023
L1-10206A-FSGS-021SS

GAMMA SPECTRUM ANALYSIS

Sample Identification : 11-Nov-19-10023
Sample Description : L1-10206A-FSGS-021SS
Sample Type : Soil
Unit :
Sample Point :

Sample Size : 1.484E+03 grams
Facility : Default

Sample Taken On : 11/9/2019 8:40:00AM
Acquisition Started : 11/11/2019 12:56:41PM

Procedure : 130G_SOIL_1
Operator : Administrator
Detector Name : P11314
Geometry : 130G_SOIL_1
Live Time : 900.0 seconds
Real Time : 900.3 seconds

Dead Time : 0.04 %

Peak Locate Threshold : 3.00
Peak Locate Range (in channels) : 120 - 8192
Peak Area Range (in channels) : 120 - 8192
Identification Energy Tolerance : 1.000 keV

Energy Calibration Used Done On : 11/4/2019
Efficiency Calibration Used Done On : 11/11/2019
Efficiency Calibration Description :

Sample Number : 81174
Fill Height : 1483.75 gram
Certificate Name : Eu155-Na22
Certificate Date : 12/22/2008 12:00:00PM

PEAK ANALYSIS REPORT

Peak Analysis Performed on : 11/11/2019 1:11:54PM

Peak Analysis From Channel : 120
Peak Analysis To Channel : 8192


Data Validated
0600 11-12-19

Analysis Report for 11-Nov-19-10023
L1-10206A-FSGS-021SS

Peak No.	Energy (keV)	ROI start	ROI end	Peak Centroid	Net Peak Area	Net Area Uncertainty	Continuum Counts	FWHM (keV)
1	209.15	833 -	841	836.33	1.33E+01	6.92	1.58E+01	0.43
2	238.76	947 -	962	954.63	9.80E+01	14.77	4.00E+01	1.35
3	338.18	1346 -	1357	1351.81	2.60E+01	6.96	9.00E+00	0.36
4	351.83	1402 -	1413	1406.32	4.32E+01	10.08	2.28E+01	1.22
5	583.01	2325 -	2336	2330.17	4.14E+01	7.93	8.64E+00	1.10
6	1460.13	5828 -	5849	5838.44	1.54E+02	12.41	0.00E+00	1.09

M = First peak in a multiplet region
m = Other peak in a multiplet region
F = Fitted singlet
Errors quoted at 1.000sigma

No background subtract performed on this spectrum.

NUCLIDE IDENTIFICATION REPORT

Nuclide Library Used : C:\Canberra\Apex\Root\Default\Library\ZION LIB-BNL.NLB

IDENTIFIED NUCLIDES

Nuclide Name	Id Confidence	Energy (keV)	Yield(%)	Activity (pCi/grams)	Activity Uncertainty
K-40	0.92	1460.82 *	10.66	3.49E+00	3.19E-01
Tl-208	0.99	583.19 *	85.00	6.27E-02	1.26E-02
Bi-211	0.91	351.07 *	13.02	2.99E-01	7.39E-02
Pb-212	0.99	115.18	0.60		
		238.63 *	43.60	1.56E-01	2.68E-02
		300.09	3.30		
Pb-214	0.99	241.99	7.25		
		295.22	18.42		
		351.93 *	35.60	1.10E-01	2.70E-02
		785.96	1.06		
Ac-228	1.00	129.07	2.42		

Analysis Report for 11-Nov-19-10023

L1-10206A-FSGS-021SS

Nuclide Name	Id Confidence	Energy (keV)	Yield(%)	Activity (pCi/grams)	Activity Uncertainty
Ac-228	1.00	209.25 *	3.89	2.21E-01	1.17E-01
		270.24	3.46		
		328.00	2.95		
		338.32 *	11.27	2.02E-01	5.66E-02
		409.46	1.92		
		463.00	4.40		
		794.95	4.25		
		911.20	25.80		
		964.77	4.99		
		968.97	15.80		
		1588.20	3.22		

* = Energy line found in the spectrum.

- = Manually added nuclide.

? = Manually edited nuclide.

@ = Energy line not used for Weighted Mean Activity

Energy Tolerance : 1.000 keV

Nuclide confidence index threshold = 0.30

Errors quoted at 1.000sigma

INTERFERENCE CORRECTED REPORT

Nuclide Name	Nuclide Id Confidence	Wt mean Activity (pCi/grams)	Wt mean Activity Uncertainty	Comments
K-40	0.926	3.49E+00	3.19E-01	
Tl-208	0.995	6.27E-02	1.26E-02	
? Bi-211	0.913	2.99E-01	7.39E-02	
Pb-212	0.998	1.56E-01	2.68E-02	
? Pb-214	0.999	1.10E-01	2.70E-02	
Ac-228	1.000	2.06E-01	5.09E-02	

? = nuclide is part of an undetermined solution

X = nuclide rejected by the interference analysis

@ = nuclide contains energy lines not used in Weighted Mean Activity

Errors quoted at 1.000sigma

Analysis Report for 11-Nov-19-10023
L1-10206A-FSGS-021SS

UNIDENTIFIED PEAKS

Peak Locate Performed on : 11/11/2019 1:11:54PM
Peak Locate From Channel : 120
Peak Locate To Channel : 8192

Peak No.	Energy (keV)	Peak Size (CPS)	Peak CPS (%) Uncertainty	Peak Type	Tolerance Nuclide
All peaks were identified.					
M = First peak in a multiplet region					
m = Other peak in a multiplet region					
F = Fitted singlet					
Errors quoted at 1.000sigma					

NUCLIDE MDA REPORT

Nuclide Library Used : C:\Canberra\Apex\Root\Default\Library\ZION LIB-BNL.NLB

	Nuclide Name	Energy (keV)	Yield(%)	Activity (pCi/grams)	Nuclide MDA (pCi/grams)	Line MDA (pCi/grams)
	An Pk	511.00	100.00	7.78E-02	5.44E-02	5.44E-02
	BE-7	477.60	10.44	-7.89E-02	3.32E-01	3.32E-01
+	K-40	1460.82	* 10.66	3.49E+00	6.51E-02	6.51E-02
	Mn-54	834.85	99.98	1.87E-03	3.74E-02	3.74E-02
	Co-60	1173.23	99.85	-2.46E-02	3.89E-02	5.15E-02
		1332.49	99.98	-7.88E-03		3.89E-02
	Nb-94	702.65	99.81	2.82E-02	3.18E-02	4.21E-02
		871.09	99.89	-1.26E-02		3.18E-02
	Ag-108m	79.13	6.60	2.24E-01	2.94E-02	9.77E-01
		433.94	90.50	-1.42E-02		2.94E-02
		614.28	89.80	-7.40E-02		4.27E-02
		722.94	90.80	1.77E-02		4.09E-02
	Sb-125	176.31	6.84	-3.58E-02	9.43E-02	3.65E-01
		380.45	1.52	-3.05E-01		1.84E+00
		427.87	29.60	2.63E-02		9.43E-02
		463.36	10.49	2.13E-02		2.76E-01
		600.60	17.65	9.04E-02		1.93E-01
		606.71	4.98	6.36E-01		9.80E-01
		635.95	11.22	2.61E-02		3.28E-01

Analysis Report for 11-Nov-19-10023

L1-10206A-FSGS-021SS

Nuclide Name	Energy (keV)	Yield(%)	Activity (pCi/grams)	Nuclide MDA (pCi/grams)	Line MDA (pCi/grams)
Sb-125	671.44	1.79	-6.08E-01	9.43E-02	1.80E+00
Ba-133	79.61	2.65	7.82E-01	5.69E-02	2.37E+00
	81.00	32.90	-3.13E-01		1.56E-01
	276.40	7.16	-1.10E-01		4.48E-01
	302.85	18.34	1.59E-02		1.59E-01
	356.01	62.05	-8.40E-04		5.69E-02
	383.85	8.94	-1.41E-01		2.84E-01
Cs-134	475.36	1.48	1.74E+00	4.56E-02	2.40E+00
	563.25	8.34	-2.18E-01		4.60E-01
	569.33	15.37	3.72E-02		2.14E-01
	604.72	97.62	6.33E-03		4.56E-02
	795.86	85.46	2.66E-02		5.36E-02
	801.95	8.69	-4.14E-01		4.49E-01
	1038.61	0.99	9.18E-01		4.26E+00
	1167.97	1.79	-1.76E+00		2.81E+00
	1365.19	3.02	1.59E-01		1.31E+00
Cs-137	661.66	85.10	1.84E-02	4.52E-02	4.52E-02
Eu-152	121.78	28.67	-6.30E-03	1.00E-01	1.02E-01
	244.70	7.61	-2.48E-01		3.81E-01
	295.94	0.45	1.03E+00		7.60E+00
	344.28	26.60	5.06E-02		1.00E-01
	367.79	0.86	-1.97E-01		3.87E+00
	411.12	2.24	-2.82E-01		1.35E+00
	443.96	2.83	6.27E-01		1.10E+00
	488.68	0.42	3.39E-01		4.90E+00
	563.99	0.49	-1.90E+01		6.24E+00
	586.26	0.46	-1.39E+00		1.18E+01
	678.62	0.47	-2.30E+00		6.87E+00
	688.67	0.86	2.23E+00		4.35E+00
	719.35	0.28	-3.96E+00		1.11E+01
	778.90	12.96	-5.98E-02		2.95E-01
	810.45	0.32	1.29E+00		1.01E+01
	867.37	4.26	2.14E-01		7.15E-01
	919.33	0.43	-2.26E+00		9.31E+00
	964.08	14.65	1.20E-01		3.62E-01
	1085.87	10.24	4.03E-01		4.77E-01
	1089.74	1.73	-1.53E+00		2.65E+00
	1112.07	13.69	1.20E-01		3.55E-01
	1212.95	1.43	1.20E-01		2.99E+00
	1249.94	0.19	2.28E+00		2.30E+01
	1299.14	1.63	-8.54E-01		2.75E+00
	1408.01	21.07	-5.57E-03		2.17E-01
	1457.64	0.50	7.48E+01		3.01E+01
	1528.10	0.28	-7.31E+00		8.57E+00
Eu-154	123.07	40.40	-2.09E-02	7.24E-02	7.24E-02
	247.93	6.89	3.63E-02		4.18E-01
	591.76	4.95	-4.74E-01		6.26E-01
	692.42	1.78	-7.55E-01		1.99E+00
	723.30	20.06	8.00E-02		1.85E-01
	756.80	4.52	-4.75E-02		7.09E-01
	873.18	12.08	1.18E-01		2.92E-01

Analysis Report for 11-Nov-19-10023

L1-10206A-FSGS-021SS

Nuclide Name	Energy (keV)	Yield(%)	Activity (pCi/grams)	Nuclide MDA (pCi/grams)	Line MDA (pCi/grams)
Eu-154	996.29	10.48	3.10E-02	7.24E-02	3.58E-01
	1004.76	18.01	1.06E-01		2.29E-01
	1274.43	34.80	1.07E-01		1.42E-01
	1596.48	1.80	-6.98E-01		1.96E+00
Eu-155	45.30	1.31	2.42E+00	1.51E-01	1.01E+01
	60.01	1.22	-4.89E+00		9.89E+00
	86.55	30.70	8.43E-02		1.63E-01
	105.31	21.10	-6.62E-02		1.51E-01
Ra-226	186.21	3.64	4.74E-01	7.31E-01	7.31E-01
Pa-231	27.36	10.30	4.19E-01	1.04E+00	1.04E+00
	283.69	1.70	-1.15E+00		1.56E+00
	300.07	2.47	-1.36E+00		1.19E+00
	302.65	2.20	1.12E-01		1.31E+00
	330.06	1.40	1.65E+00		2.26E+00
U-235	143.76	10.96	-1.07E-01	4.65E-02	2.39E-01
	163.33	5.08	1.98E-02		5.01E-01
	185.71	57.20	2.69E-02		4.65E-02
	202.11	1.08	-9.36E-01		2.29E+00
Am-241	205.31	5.01	-1.13E-01	3.60E-01	5.28E-01
	59.54	35.90	8.21E-03		3.60E-01

- + = Nuclide identified during the nuclide identification
 * = Energy line found in the spectrum
 > = MDA value not calculated
 @ = Half-life too short to be able to perform the decay correction
 ? = CAUTION: MDA value is inconsistent with Currie MDA at 95% confidence level

Analysis Report for 11-Nov-19-10024
L1-10206A-FSGS-022SS

GAMMA SPECTRUM ANALYSIS

Sample Identification : 11-Nov-19-10024
Sample Description : L1-10206A-FSGS-022SS
Sample Type : Soil
Unit :
Sample Point :

Sample Size : 1.738E+03 grams
Facility : Default

Sample Taken On : 11/9/2019 8:42:00AM
Acquisition Started : 11/11/2019 12:56:49PM

Procedure : 130G_SOIL_1
Operator : Administrator
Detector Name : 352
Geometry : 130G_SOIL_1
Live Time : 900.0 seconds
Real Time : 900.3 seconds

Dead Time : 0.03 %

Peak Locate Threshold : 3.00
Peak Locate Range (in channels) : 120 - 8192
Peak Area Range (in channels) : 120 - 8192
Identification Energy Tolerance : 1.000 keV

Energy Calibration Used Done On : 11/4/2019
Efficiency Calibration Used Done On : 11/11/2019
Efficiency Calibration Description :

Sample Number : 81175
Fill Height : 1738.37 gram
Certificate Name : Eu155-Na22
Certificate Date : 1/7/2013 12:00:00PM

PEAK ANALYSIS REPORT

Peak Analysis Performed on : 11/11/2019 1:11:53PM

Peak Analysis From Channel : 120
Peak Analysis To Channel : 8192


Data Validated
0600 11-12-19

Analysis Report for 11-Nov-19-10024
L1-10206A-FSGS-022SS

Peak No.	Energy (keV)	ROI start	ROI end	Peak Centroid	Net Peak Area	Net Area Uncertainty	Continuum Counts	FWHM (keV)
1	238.66	945 -	960	955.10	1.32E+02	17.19	5.49E+01	1.24
2	351.98	1402 -	1414	1407.91	4.60E+01	9.69	1.80E+01	1.14
3	583.29	2326 -	2339	2332.49	4.15E+01	8.89	1.35E+01	1.17
4	609.08	2428 -	2443	2435.58	5.10E+01	8.66	8.00E+00	0.68
5	661.55	2637 -	2653	2645.39	5.02E+01	9.81	1.48E+01	0.77
6	1460.70	5831 -	5853	5843.19	2.74E+02	17.22	5.75E+00	1.22

M = First peak in a multiplet region

m = Other peak in a multiplet region

F = Fitted singlet

Errors quoted at 1.000sigma

No background subtract performed on this spectrum.

NUCLIDE IDENTIFICATION REPORT

Nuclide Library Used : C:\Canberra\Apex\Root\Default\Library\ZION LIB-BNL.NLB

IDENTIFIED NUCLIDES

Nuclide Name	Id Confidence	Energy (keV)	Yield(%)	Activity (pCi/grams)	Activity Uncertainty
K-40	0.99	1460.82 *	10.66	5.56E+00	4.24E-01
Cs-137	0.99	661.66 *	85.10	7.60E-02	1.55E-02
Tl-208	0.99	583.19 *	85.00	5.79E-02	1.29E-02
Bi-211	0.87	351.07 *	13.02	2.99E-01	6.76E-02
Pb-212	1.00	115.18	0.60		
		238.63 *	43.60	2.03E-01	3.11E-02
		300.09	3.30		
Bi-214	0.99	609.32 *	45.49	1.37E-01	2.46E-02
		768.36	4.89		
		806.18	1.26		
		934.06	3.11		

Analysis Report for 11-Nov-19-10024

L1-10206A-FSGS-022SS

Nuclide Name	Id Confidence	Energy (keV)	Yield(%)	Activity (pCi/grams)	Activity Uncertainty
Bi-214	0.99	1120.29	14.92		
		1155.21	1.63		
		1238.12	5.83		
		1280.98	1.43		
		1377.67	3.99		
		1385.31	0.79		
		1401.52	1.33		
		1407.99	2.39		
		1509.21	2.13		
		1661.27	1.05		
		1729.59	2.88		
		1764.49	15.30		
		1847.43	2.03		
		2118.51	1.16		
Pb-214	1.00	241.99	7.25		
		295.22	18.42		
		351.93 *	35.60	1.09E-01	2.47E-02
		785.96	1.06		

* = Energy line found in the spectrum.

- = Manually added nuclide.

? = Manually edited nuclide.

@ = Energy line not used for Weighted Mean Activity

Energy Tolerance : 1.000 keV

Nuclide confidence index threshold = 0.30

Errors quoted at 1.000sigma

INTERFERENCE CORRECTED REPORT

Nuclide Name	Nuclide Id Confidence	Wt mean Activity (pCi/grams)	Wt mean Activity Uncertainty	Comments
K-40	0.998	5.56E+00	4.24E-01	
Cs-137	0.998	7.60E-02	1.55E-02	
Tl-208	0.998	5.79E-02	1.29E-02	
? Bi-211	0.876	2.99E-01	6.76E-02	
Pb-212	1.000	2.03E-01	3.11E-02	
Bi-214	0.996	1.37E-01	2.46E-02	
? Pb-214	1.000	1.09E-01	2.47E-02	

Analysis Report for 11-Nov-19-10024

L1-10206A-FSGS-022SS

- ? = nuclide is part of an undetermined solution
- X = nuclide rejected by the interference analysis
- @ = nuclide contains energy lines not used in Weighted Mean Activity

Errors quoted at 1.000sigma

Analysis Report for 11-Nov-19-10024
L1-10206A-FSGS-022SS

UNIDENTIFIED PEAKS

Peak Locate Performed on : 11/11/2019 1:11:53PM
Peak Locate From Channel : 120
Peak Locate To Channel : 8192

Peak No.	Energy (keV)	Peak Size (CPS)	Peak CPS (%) Uncertainty	Peak Type	Tolerance Nuclide
All peaks were identified.					
M = First peak in a multiplet region					
m = Other peak in a multiplet region					
F = Fitted singlet					
Errors quoted at 1.000sigma					

NUCLIDE MDA REPORT

Nuclide Library Used : C:\Canberra\Apex\Root\Default\Library\ZION LIB-BNL.NLB

	Nuclide Name	Energy (keV)	Yield(%)	Activity (pCi/grams)	Nuclide MDA (pCi/grams)	Line MDA (pCi/grams)
	An Pk	511.00	100.00	2.75E-02	4.48E-02	4.48E-02
	BE-7	477.60	10.44	3.84E-02	4.07E-01	4.07E-01
+	K-40	1460.82	* 10.66	5.56E+00	3.83E-01	3.83E-01
	Mn-54	834.85	99.98	2.23E-02	4.57E-02	4.57E-02
	Co-60	1173.23	99.85	1.07E-02	5.43E-02	7.11E-02
		1332.49	99.98	5.82E-03		5.43E-02
	Nb-94	702.65	99.81	-4.95E-03	3.85E-02	3.85E-02
		871.09	99.89	1.05E-02		4.13E-02
	Ag-108m	79.13	6.60	1.95E-01	4.01E-02	1.43E+00
		433.94	90.50	-1.73E-02		4.01E-02
		614.28	89.80	-6.18E-02		5.87E-02
		722.94	90.80	1.68E-02		4.87E-02
	Sb-125	176.31	6.84	1.12E-01	1.11E-01	4.85E-01
		380.45	1.52	5.53E-01		2.33E+00
		427.87	29.60	-3.73E-02		1.11E-01
		463.36	10.49	1.51E-01		3.87E-01
		600.60	17.65	8.12E-02		2.38E-01
		606.71	4.98	4.63E-01		1.18E+00
		635.95	11.22	-1.11E-01		3.26E-01

Analysis Report for 11-Nov-19-10024

L1-10206A-FSGS-022SS

Nuclide Name	Energy (keV)	Yield(%)	Activity (pCi/grams)	Nuclide MDA (pCi/grams)	Line MDA (pCi/grams)
Sb-125	671.44	1.79	6.90E-01	1.11E-01	2.18E+00
Ba-133	79.61	2.65	5.81E-01	6.31E-02	3.48E+00
	81.00	32.90	-4.56E-01		2.30E-01
	276.40	7.16	-1.13E-01		4.71E-01
	302.85	18.34	1.52E-01		1.88E-01
	356.01	62.05	5.18E-03		6.31E-02
	383.85	8.94	1.83E-04		3.87E-01
Cs-134	475.36	1.48	1.64E-02	4.96E-02	2.79E+00
	563.25	8.34	3.24E-01		4.00E-01
	569.33	15.37	5.82E-02		2.18E-01
	604.72	97.62	2.59E-02		5.77E-02
	795.86	85.46	-2.89E-02		4.96E-02
	801.95	8.69	7.56E-02		4.75E-01
	1038.61	0.99	-1.96E+00		4.85E+00
	1167.97	1.79	2.26E+00		3.96E+00
	1365.19	3.02	1.20E-01		1.06E+00
+	Cs-137	*	85.10	3.92E-02	3.92E-02
	Eu-152		28.67	1.18E-01	1.44E-01
	244.70	7.61	4.73E-03		4.63E-01
	295.94	0.45	2.90E+00		8.50E+00
	344.28	26.60	1.74E-02		1.18E-01
	367.79	0.86	1.77E-01		3.66E+00
	411.12	2.24	7.99E-01		1.45E+00
	443.96	2.83	6.54E-01		1.30E+00
	488.68	0.42	-6.89E-01		9.08E+00
	563.99	0.49	-6.83E+00		6.12E+00
	586.26	0.46	7.85E+00		1.14E+01
	678.62	0.47	5.15E+00		7.96E+00
	688.67	0.86	-1.96E+00		3.82E+00
	719.35	0.28	4.35E+00		1.42E+01
	778.90	12.96	-6.94E-02		3.02E-01
	810.45	0.32	6.64E+00		1.23E+01
	867.37	4.26	5.40E-02		9.84E-01
	919.33	0.43	-1.09E+01		9.26E+00
	964.08	14.65	4.55E-01		3.94E-01
	1085.87	10.24	1.60E-01		4.40E-01
	1089.74	1.73	7.13E-01		2.76E+00
	1112.07	13.69	1.73E-01		4.32E-01
	1212.95	1.43	-7.23E-01		3.32E+00
	1249.94	0.19	-5.74E+00		2.95E+01
	1299.14	1.63	7.03E-01		2.98E+00
	1408.01	21.07	-3.99E-02		1.64E-01
	1457.64	0.50	1.20E+02		3.59E+01
	1528.10	0.28	2.38E+00		8.87E+00
Eu-154	123.07	40.40	4.66E-02	1.02E-01	1.02E-01
	247.93	6.89	-3.26E-01		4.74E-01
	591.76	4.95	1.04E-01		7.05E-01
	692.42	1.78	-1.58E-01		2.08E+00
	723.30	20.06	5.75E-02		2.21E-01
	756.80	4.52	7.65E-01		1.06E+00
	873.18	12.08	-1.26E-01		3.48E-01

Analysis Report for 11-Nov-19-10024

L1-10206A-FSGS-022SS

Nuclide Name	Energy (keV)	Yield(%)	Activity (pCi/grams)	Nuclide MDA (pCi/grams)	Line MDA (pCi/grams)
Eu-154	996.29	10.48	-1.96E-01	1.02E-01	3.81E-01
	1004.76	18.01	-1.15E-01		2.28E-01
	1274.43	34.80	-6.49E-02		1.25E-01
	1596.48	1.80	-7.95E-01		2.41E+00
Eu-155	45.30	1.31	2.16E+00	2.03E-01	1.95E+01
	60.01	1.22	-1.63E+00		2.16E+01
	86.55	30.70	-1.27E-01		2.03E-01
	105.31	21.10	6.98E-03		2.04E-01
Ra-226	186.21	3.64	2.76E-01	9.33E-01	9.33E-01
Pa-231	27.36	10.30	9.28E-01	1.46E+00	2.12E+00
	283.69	1.70	-2.76E-01		1.97E+00
	300.07	2.47	-1.62E+00		1.46E+00
	302.65	2.20	7.70E-01		1.55E+00
	330.06	1.40	-1.70E+00		2.45E+00
U-235	143.76	10.96	-1.12E-02	5.97E-02	3.30E-01
	163.33	5.08	-2.64E-01		6.31E-01
	185.71	57.20	3.08E-03		5.97E-02
	202.11	1.08	1.80E+00		3.14E+00
	205.31	5.01	-4.09E-01		6.60E-01
Am-241	59.54	35.90	-4.05E-01	7.66E-01	7.66E-01

- + = Nuclide identified during the nuclide identification
 * = Energy line found in the spectrum
 > = MDA value not calculated
 @ = Half-life too short to be able to perform the decay correction
 ? = CAUTION: MDA value is inconsistent with Currie MDA at 95% confidence level

Analysis Report for 11-Nov-19-10025
L1-10206A-FSGS-023SS

GAMMA SPECTRUM ANALYSIS

Sample Identification : 11-Nov-19-10025
Sample Description : L1-10206A-FSGS-023SS
Sample Type : Soil
Unit :
Sample Point :

Sample Size : 1.545E+03 grams
Facility : Default

Sample Taken On : 11/9/2019 8:44:00AM
Acquisition Started : 11/11/2019 1:18:39PM

Procedure : 130G_SOIL_1
Operator : Administrator
Detector Name : 324
Geometry : 130G_SOIL_1
Live Time : 900.0 seconds
Real Time : 900.3 seconds

Dead Time : 0.03 %

Peak Locate Threshold : 3.00
Peak Locate Range (in channels) : 120 - 4096
Peak Area Range (in channels) : 120 - 4096
Identification Energy Tolerance : 1.000 keV

Energy Calibration Used Done On : 11/4/2019
Efficiency Calibration Used Done On : 11/11/2019
Efficiency Calibration Description :

Sample Number : 81176
Fill Height : 1544.96 gram
Certificate Name : Eu155-Na22
Certificate Date : 1/30/2013 12:00:00PM

PEAK ANALYSIS REPORT

Peak Analysis Performed on : 11/11/2019 1:33:42PM

Peak Analysis From Channel : 120
Peak Analysis To Channel : 4096


Data Validated
0600 11-12-19

Analysis Report for 11-Nov-19-10025
L1-10206A-FSGS-023SS

Peak No.	Energy (keV)	ROI start	ROI end	Peak Centroid	Net Peak Area	Net Area Uncertainty	Continuum Counts	FWHM (keV)
1	238.67	473 -	481	477.51	1.28E+02	18.01	8.99E+01	1.25
2	295.25	587 -	594	590.56	2.51E+01	11.05	4.69E+01	0.95
3	352.09	699 -	709	704.11	8.45E+01	12.63	3.15E+01	1.58
4	582.94	1161 -	1169	1165.48	4.22E+01	9.21	1.98E+01	0.80
5	609.27	1213 -	1223	1218.12	3.76E+01	9.65	2.34E+01	1.27
6	661.84	1320 -	1329	1323.22	2.40E+01	7.79	1.60E+01	1.45
7	911.10	1816 -	1827	1821.64	4.00E+01	8.37	1.20E+01	1.83
8	1460.56	2915 -	2927	2921.18	2.45E+02	16.15	6.25E+00	1.80

M = First peak in a multiplet region

m = Other peak in a multiplet region

F = Fitted singlet

Errors quoted at 1.000sigma

No background subtract performed on this spectrum.

NUCLIDE IDENTIFICATION REPORT

Nuclide Library Used : C:\Canberra\Apex\Root\Default\Library\ZION LIB-BNL.NLB

IDENTIFIED NUCLIDES

Nuclide Name	Id Confidence	Energy (keV)	Yield(%)	Activity (pCi/grams)	Activity Uncertainty
K-40	0.98	1460.82 *	10.66	4.59E+00	3.62E-01
Cs-137	0.99	661.66 *	85.10	3.35E-02	1.11E-02
Tl-208	0.99	583.19 *	85.00	5.43E-02	1.23E-02
Pb-212	1.00	115.18	0.60		
		238.63 *	43.60	1.79E-01	2.91E-02
		300.09	3.30		
Bi-214	1.00	609.32 *	45.49	9.31E-02	2.45E-02
		768.36	4.89		
		806.18	1.26		

Analysis Report for 11-Nov-19-10025

L1-10206A-FSGS-023SS

Nuclide Name	Id Confidence	Energy (keV)	Yield(%)	Activity (pCi/grams)	Activity Uncertainty
Bi-214	1.00	934.06	3.11		
		1120.29	14.92		
		1155.21	1.63		
		1238.12	5.83		
		1280.98	1.43		
		1377.67	3.99		
		1385.31	0.79		
		1401.52	1.33		
		1407.99	2.39		
		1509.21	2.13		
		1661.27	1.05		
		1729.59	2.88		
		1764.49	15.30		
		1847.43	2.03		
		2118.51	1.16		
Pb-214	0.99	241.99	7.25		
		295.22 *	18.42	9.39E-02	4.20E-02
		351.93 *	35.60	1.85E-01	3.13E-02
		785.96	1.06		
Ac-228	0.99	129.07	2.42		
		209.25	3.89		
		270.24	3.46		
		328.00	2.95		
		338.32	11.27		
		409.46	1.92		
		463.00	4.40		
		794.95	4.25		
		911.20 *	25.80	2.27E-01	4.85E-02
		964.77	4.99		
		968.97	15.80		
		1588.20	3.22		

* = Energy line found in the spectrum.

- = Manually added nuclide.

? = Manually edited nuclide.

@ = Energy line not used for Weighted Mean Activity

Energy Tolerance : 1.000 keV

Nuclide confidence index threshold = 0.30

Errors quoted at 1.000sigma

INTERFERENCE CORRECTED REPORT

Analysis Report for 11-Nov-19-10025

L1-10206A-FSGS-023SS

Nuclide Name	Nuclide Id Confidence	Wt mean Activity (pCi/grams)	Wt mean Activity Uncertainty	Comments
K-40	0.989	4.59E+00	3.62E-01	
Cs-137	0.994	3.35E-02	1.11E-02	
Tl-208	0.990	5.43E-02	1.23E-02	
Pb-212	1.000	1.79E-01	2.91E-02	
Bi-214	1.000	9.31E-02	2.45E-02	
Pb-214	0.998	1.52E-01	2.51E-02	
Ac-228	0.999	2.27E-01	4.85E-02	

? = nuclide is part of an undetermined solution

X = nuclide rejected by the interference analysis

@ = nuclide contains energy lines not used in Weighted Mean Activity

Errors quoted at 1.000sigma

Analysis Report for 11-Nov-19-10025
L1-10206A-FSGS-023SS

UNIDENTIFIED PEAKS

Peak Locate Performed on : 11/11/2019 1:33:42PM
Peak Locate From Channel : 120
Peak Locate To Channel : 4096

Peak No.	Energy (keV)	Peak Size (CPS)	Peak CPS (%) Uncertainty	Peak Type	Tolerance Nuclide
All peaks were identified.					
M = First peak in a multiplet region					
m = Other peak in a multiplet region					
F = Fitted singlet					
Errors quoted at 1.000sigma					

NUCLIDE MDA REPORT

Nuclide Library Used : C:\Canberra\Apex\Root\Default\Library\ZION LIB-BNL.NLB

	Nuclide Name	Energy (keV)	Yield(%)	Activity (pCi/grams)	Nuclide MDA (pCi/grams)	Line MDA (pCi/grams)
	An Pk	511.00	100.00	5.87E-02	5.01E-02	5.01E-02
	BE-7	477.60	10.44	2.58E-01	3.54E-01	3.54E-01
+	K-40	1460.82	* 10.66	4.59E+00	3.09E-01	3.09E-01
	Mn-54	834.85	99.98	1.94E-02	4.23E-02	4.23E-02
	Co-60	1173.23	99.85	1.16E-02	4.55E-02	4.55E-02
		1332.49	99.98	1.39E-02		4.65E-02
	Nb-94	702.65	99.81	2.06E-02	3.32E-02	3.32E-02
		871.09	99.89	1.02E-02		3.53E-02
	Ag-108m	79.13	6.60	6.34E-01	3.33E-02	1.05E+00
		433.94	90.50	2.32E-03		3.33E-02
		614.28	89.80	-8.09E-03		4.46E-02
		722.94	90.80	-1.11E-02		4.04E-02
	Sb-125	176.31	6.84	1.44E-01	1.10E-01	4.55E-01
		380.45	1.52	-2.29E-01		1.61E+00
		427.87	29.60	5.11E-02		1.10E-01
		463.36	10.49	2.29E-02		3.20E-01
		600.60	17.65	8.38E-02		2.03E-01
		606.71	4.98	2.28E-01		1.04E+00
		635.95	11.22	5.68E-02		3.19E-01

Analysis Report for 11-Nov-19-10025

L1-10206A-FSGS-023SS

Nuclide Name	Energy (keV)	Yield(%)	Activity (pCi/grams)	Nuclide MDA (pCi/grams)	Line MDA (pCi/grams)
Sb-125	671.44	1.79	5.05E-01	1.10E-01	1.67E+00
Ba-133	79.61	2.65	8.11E-02	6.67E-02	2.42E+00
	81.00	32.90	-2.24E-01		1.56E-01
	276.40	7.16	-2.14E-01		3.53E-01
	302.85	18.34	-2.37E-02		1.53E-01
	356.01	62.05	-8.45E-03		6.67E-02
	383.85	8.94	-6.94E-02		2.70E-01
Cs-134	475.36	1.48	1.53E+00	4.51E-02	2.36E+00
	563.25	8.34	1.15E-01		4.12E-01
	569.33	15.37	-8.78E-02		2.01E-01
	604.72	97.62	9.12E-03		4.71E-02
	795.86	85.46	1.47E-02		4.51E-02
	801.95	8.69	-1.54E-02		4.52E-01
	1038.61	0.99	3.01E-01		3.84E+00
	1167.97	1.79	-2.44E+00		2.12E+00
	1365.19	3.02	-8.94E-02		9.23E-01
+	Cs-137	*	85.10	3.35E-02	3.27E-02
	Eu-152		28.67	-4.12E-02	1.05E-01
	244.70	7.61	-1.50E-01		4.44E-01
	295.94	0.45	3.00E+00		7.75E+00
	344.28	26.60	-6.71E-02		1.13E-01
	367.79	0.86	-7.29E-01		3.16E+00
	411.12	2.24	-6.18E-02		1.45E+00
	443.96	2.83	-6.62E-01		8.34E-01
	488.68	0.42	9.05E-01		7.78E+00
	563.99	0.49	2.18E-01		6.81E+00
	586.26	0.46	-6.47E+00		1.10E+01
	678.62	0.47	-1.14E+00		6.09E+00
	688.67	0.86	7.15E-01		4.07E+00
	719.35	0.28	-2.15E+00		1.16E+01
	778.90	12.96	-7.19E-02		2.53E-01
	810.45	0.32	-9.21E-01		1.07E+01
	867.37	4.26	-3.96E-01		7.91E-01
	919.33	0.43	-5.78E-01		9.73E+00
	964.08	14.65	-1.06E-01		3.16E-01
	1085.87	10.24	-1.08E-01		4.06E-01
	1089.74	1.73	-1.59E-01		2.55E+00
	1112.07	13.69	-1.02E-01		3.32E-01
	1212.95	1.43	8.23E-01		3.19E+00
	1249.94	0.19	-6.72E+00		2.55E+01
	1299.14	1.63	-5.57E-01		2.81E+00
	1408.01	21.07	2.31E-03		1.59E-01
	1457.64	0.50	-7.34E+00		3.18E+01
	1528.10	0.28	3.25E+00		1.14E+01
Eu-154	123.07	40.40	-1.05E-02	7.78E-02	7.78E-02
	247.93	6.89	-3.72E-02		4.40E-01
	591.76	4.95	2.35E-01		6.60E-01
	692.42	1.78	3.25E-02		1.91E+00
	723.30	20.06	-8.04E-02		1.77E-01
	756.80	4.52	-1.84E-01		8.11E-01
	873.18	12.08	6.96E-03		2.99E-01

Analysis Report for 11-Nov-19-10025

L1-10206A-FSGS-023SS

Nuclide Name	Energy (keV)	Yield(%)	Activity (pCi/grams)	Nuclide MDA (pCi/grams)	Line MDA (pCi/grams)
Eu-154	996.29	10.48	1.37E-01	7.78E-02	3.98E-01
	1004.76	18.01	-6.89E-02		2.06E-01
	1274.43	34.80	-2.22E-02		1.12E-01
	1596.48	1.80	3.57E-01		1.33E+00
Eu-155	45.30	1.31	-3.03E+00	1.63E-01	1.02E+01
	60.01	1.22	-3.18E+00		1.04E+01
	86.55	30.70	3.37E-02		1.68E-01
	105.31	21.10	-1.19E-02		1.63E-01
Ra-226	186.21	3.64	1.23E-01	8.99E-01	8.99E-01
Pa-231	27.36	10.30	4.58E-01	9.74E-01	9.74E-01
	283.69	1.70	-5.00E-01		1.57E+00
	300.07	2.47	1.59E-02		1.25E+00
	302.65	2.20	-1.97E-01		1.27E+00
	330.06	1.40	2.26E-02		2.29E+00
U-235	143.76	10.96	-1.14E-02	5.66E-02	2.51E-01
	163.33	5.08	9.30E-03		6.14E-01
	185.71	57.20	5.26E-03		5.66E-02
	202.11	1.08	-1.13E+00		2.83E+00
	205.31	5.01	-4.94E-01		5.79E-01
Am-241	59.54	35.90	-3.73E-02	3.67E-01	3.67E-01

+ = Nuclide identified during the nuclide identification

* = Energy line found in the spectrum

> = MDA value not calculated

@ = Half-life too short to be able to perform the decay correction

? = CAUTION: MDA value is inconsistent with Currie MDA at 95% confidence level

Analysis Report for 11-Nov-19-10026
L1-10206A-FSGS-024SS

GAMMA SPECTRUM ANALYSIS

Sample Identification : 11-Nov-19-10026
Sample Description : L1-10206A-FSGS-024SS
Sample Type : Soil
Unit :
Sample Point :

Sample Size : 1.683E+03 grams
Facility : Default

Sample Taken On : 11/9/2019 8:46:00AM
Acquisition Started : 11/11/2019 1:18:45PM

Procedure : 130G_SOIL_1
Operator : Administrator
Detector Name : P40818B
Geometry : 130G_SOIL_1
Live Time : 900.0 seconds
Real Time : 901.1 seconds

Dead Time : 0.12 %

Peak Locate Threshold : 3.00
Peak Locate Range (in channels) : 120 - 8192
Peak Area Range (in channels) : 120 - 8192
Identification Energy Tolerance : 1.000 keV

Energy Calibration Used Done On : 11/4/2019
Efficiency Calibration Used Done On : 11/11/2019
Efficiency Calibration Description :

Sample Number : 81177
Fill Height : 1682.75 gram
Certificate Name : Eu155-Na22
Certificate Date : 1/30/2012 12:00:00PM

PEAK ANALYSIS REPORT

Peak Analysis Performed on : 11/11/2019 1:33:49PM

Peak Analysis From Channel : 120
Peak Analysis To Channel : 8192


Data Validated
0600 11-12-19

Analysis Report for 11-Nov-19-10026
L1-10206A-FSGS-024SS

Peak No.	Energy (keV)	ROI start	ROI end	Peak Centroid	Net Peak Area	Net Area Uncertainty	Continuum Counts	FWHM (keV)
1	238.73	950 -	960	954.99	8.77E+01	13.25	3.63E+01	0.90
2	352.00	1401 -	1413	1407.73	5.06E+01	9.73	1.64E+01	0.85
3	583.17	2327 -	2338	2331.88	3.76E+01	8.31	1.24E+01	0.38
4	609.21	2428 -	2443	2436.01	5.07E+01	8.80	8.32E+00	0.61
5	1460.83	5833 -	5852	5843.16	1.75E+02	13.23	0.00E+00	1.56

M = First peak in a multiplet region
m = Other peak in a multiplet region
F = Fitted singlet
Errors quoted at 1.000sigma

No background subtract performed on this spectrum.

NUCLIDE IDENTIFICATION REPORT

Nuclide Library Used : C:\Canberra\Apex\Root\Default\Library\ZION LIB-BNL.NLB

IDENTIFIED NUCLIDES

Nuclide Name	Id Confidence	Energy (keV)	Yield(%)	Activity (pCi/grams)	Activity Uncertainty
K-40	1.00	1460.82 *	10.66	4.25E+00	3.71E-01
Tl-208	1.00	583.19 *	85.00	6.15E-02	1.41E-02
Bi-211	0.87	351.07 *	13.02	3.80E-01	7.93E-02
Pb-212	0.99	115.18	0.60		
		238.63 *	43.60	1.54E-01	2.64E-02
		300.09	3.30		
Bi-214	0.99	609.32 *	45.49	1.59E-01	2.93E-02
		768.36	4.89		
		806.18	1.26		
		934.06	3.11		
		1120.29	14.92		
		1155.21	1.63		

Analysis Report for 11-Nov-19-10026

L1-10206A-FSGS-024SS

Nuclide Name	Id Confidence	Energy (keV)	Yield(%)	Activity (pCi/grams)	Activity Uncertainty
Bi-214	0.99	1238.12	5.83		
		1280.98	1.43		
		1377.67	3.99		
		1385.31	0.79		
		1401.52	1.33		
		1407.99	2.39		
		1509.21	2.13		
		1661.27	1.05		
		1729.59	2.88		
		1764.49	15.30		
		1847.43	2.03		
		2118.51	1.16		
Pb-214	1.00	241.99	7.25		
		295.22	18.42		
		351.93 *	35.60	1.39E-01	2.90E-02
		785.96	1.06		

* = Energy line found in the spectrum.

- = Manually added nuclide.

? = Manually edited nuclide.

@ = Energy line not used for Weighted Mean Activity

Energy Tolerance : 1.000 keV

Nuclide confidence index threshold = 0.30

Errors quoted at 1.000sigma

INTERFERENCE CORRECTED REPORT

Nuclide Name	Nuclide Id Confidence	Wt mean Activity (pCi/grams)	Wt mean Activity Uncertainty	Comments
K-40	1.000	4.25E+00	3.71E-01	
Tl-208	1.000	6.15E-02	1.41E-02	
? Bi-211	0.871	3.80E-01	7.93E-02	
Pb-212	0.999	1.54E-01	2.64E-02	
Bi-214	0.999	1.59E-01	2.93E-02	
? Pb-214	1.000	1.39E-01	2.90E-02	

Analysis Report for 11-Nov-19-10026

L1-10206A-FSGS-024SS

- ? = nuclide is part of an undetermined solution
- X = nuclide rejected by the interference analysis
- @ = nuclide contains energy lines not used in Weighted Mean Activity

Errors quoted at 1.000sigma

Analysis Report for 11-Nov-19-10026
L1-10206A-FSGS-024SS

UNIDENTIFIED PEAKS

Peak Locate Performed on : 11/11/2019 1:33:49PM
Peak Locate From Channel : 120
Peak Locate To Channel : 8192

Peak No.	Energy (keV)	Peak Size (CPS)	Peak CPS (%) Uncertainty	Peak Type	Tolerance Nuclide
All peaks were identified.					
M = First peak in a multiplet region					
m = Other peak in a multiplet region					
F = Fitted singlet					
Errors quoted at 1.000sigma					

NUCLIDE MDA REPORT

Nuclide Library Used : C:\Canberra\Apex\Root\Default\Library\ZION LIB-BNL.NLB

	Nuclide Name	Energy (keV)	Yield(%)	Activity (pCi/grams)	Nuclide MDA (pCi/grams)	Line MDA (pCi/grams)
	An Pk	511.00	100.00	4.24E-02	5.69E-02	5.69E-02
	BE-7	477.60	10.44	1.79E-01	4.01E-01	4.01E-01
+	K-40	1460.82	* 10.66	4.25E+00	6.99E-02	6.99E-02
	Mn-54	834.85	99.98	4.33E-02	5.10E-02	5.10E-02
	Co-60	1173.23	99.85	-4.33E-02	4.87E-02	5.29E-02
		1332.49	99.98	3.14E-02		4.87E-02
	Nb-94	702.65	99.81	-2.66E-02	3.29E-02	3.29E-02
		871.09	99.89	1.83E-02		4.02E-02
	Ag-108m	79.13	6.60	-5.04E-01	3.71E-02	1.58E+00
		433.94	90.50	-2.40E-02		3.71E-02
		614.28	89.80	-4.05E-02		5.73E-02
		722.94	90.80	6.19E-03		4.67E-02
	Sb-125	176.31	6.84	-3.29E-01	1.11E-01	4.93E-01
		380.45	1.52	-2.43E+00		2.27E+00
		427.87	29.60	1.62E-02		1.11E-01
		463.36	10.49	-8.12E-02		3.45E-01
		600.60	17.65	-5.84E-02		2.41E-01
		606.71	4.98	1.01E+00		1.28E+00
		635.95	11.22	1.15E-02		3.60E-01

Analysis Report for 11-Nov-19-10026

L1-10206A-FSGS-024SS

Nuclide Name	Energy (keV)	Yield(%)	Activity (pCi/grams)	Nuclide MDA (pCi/grams)	Line MDA (pCi/grams)
Sb-125	671.44	1.79	-6.41E-01	1.11E-01	2.03E+00
Ba-133	79.61	2.65	-1.71E-01	6.93E-02	3.74E+00
	81.00	32.90	-9.89E-02		2.67E-01
	276.40	7.16	6.65E-02		4.44E-01
	302.85	18.34	1.11E-01		1.79E-01
	356.01	62.05	-4.29E-02		6.93E-02
	383.85	8.94	2.08E-01		4.33E-01
Cs-134	475.36	1.48	2.42E+00	4.43E-02	2.81E+00
	563.25	8.34	-1.85E-02		3.69E-01
	569.33	15.37	1.09E-01		2.44E-01
	604.72	97.62	1.32E-02		6.16E-02
	795.86	85.46	3.21E-02		4.43E-02
	801.95	8.69	-1.78E-01		4.38E-01
	1038.61	0.99	2.67E+00		4.82E+00
	1167.97	1.79	-4.82E-01		3.08E+00
	1365.19	3.02	4.90E-01		1.19E+00
Cs-137	661.66	85.10	4.36E-02	5.77E-02	5.77E-02
Eu-152	121.78	28.67	-5.50E-02	1.16E-01	1.32E-01
	244.70	7.61	2.91E-01		4.93E-01
	295.94	0.45	1.72E+00		8.65E+00
	344.28	26.60	-1.49E-01		1.16E-01
	367.79	0.86	1.42E+00		4.19E+00
	411.12	2.24	4.26E-01		1.78E+00
	443.96	2.83	-3.52E-01		1.17E+00
	488.68	0.42	4.57E-01		7.87E+00
	563.99	0.49	-3.58E+00		6.10E+00
	586.26	0.46	9.53E+00		1.20E+01
	678.62	0.47	1.48E+00		8.28E+00
	688.67	0.86	-2.45E+00		3.40E+00
	719.35	0.28	6.99E+00		1.62E+01
	778.90	12.96	3.38E-02		3.03E-01
	810.45	0.32	-2.70E-01		1.31E+01
	867.37	4.26	-9.91E-01		9.39E-01
	919.33	0.43	-5.08E+00		8.30E+00
	964.08	14.65	1.80E-01		4.48E-01
	1085.87	10.24	1.20E-01		5.34E-01
	1089.74	1.73	6.12E-02		3.23E+00
	1112.07	13.69	2.42E-01		3.81E-01
	1212.95	1.43	-2.91E+00		4.20E+00
	1249.94	0.19	1.84E+00		3.41E+01
	1299.14	1.63	-2.51E-01		2.28E+00
	1408.01	21.07	7.14E-02		2.25E-01
	1457.64	0.50	9.10E+01		3.43E+01
	1528.10	0.28	-6.42E+00		1.48E+01
Eu-154	123.07	40.40	-5.24E-03	9.46E-02	9.46E-02
	247.93	6.89	1.55E-01		4.84E-01
	591.76	4.95	2.79E-01		7.34E-01
	692.42	1.78	-3.80E-01		2.09E+00
	723.30	20.06	-6.41E-02		2.07E-01
	756.80	4.52	5.71E-01		9.11E-01
	873.18	12.08	-1.01E-01		3.42E-01

Analysis Report for 11-Nov-19-10026

L1-10206A-FSGS-024SS

Nuclide Name	Energy (keV)	Yield(%)	Activity (pCi/grams)	Nuclide MDA (pCi/grams)	Line MDA (pCi/grams)
Eu-154	996.29	10.48	-6.67E-02	9.46E-02	4.53E-01
	1004.76	18.01	-2.05E-02		2.32E-01
	1274.43	34.80	-4.55E-02		1.40E-01
	1596.48	1.80	-5.21E-01		1.93E+00
Eu-155	45.30	1.31	4.23E+00	2.42E-01	2.86E+01
	60.01	1.22	-7.58E+00		2.72E+01
	86.55	30.70	4.33E-02		2.42E-01
	105.31	21.10	-7.20E-02		2.46E-01
Ra-226	186.21	3.64	-4.09E-02	9.90E-01	9.90E-01
Pa-231	27.36	10.30	2.38E+00	1.36E+00	3.28E+00
	283.69	1.70	1.83E+00		2.04E+00
	300.07	2.47	-3.25E-01		1.36E+00
	302.65	2.20	5.59E-01		1.48E+00
	330.06	1.40	1.41E+00		2.56E+00
U-235	143.76	10.96	-8.64E-02	6.43E-02	3.56E-01
	163.33	5.08	-5.64E-01		6.42E-01
	185.71	57.20	3.33E-02		6.43E-02
	202.11	1.08	5.43E-01		3.34E+00
	205.31	5.01	1.45E-01		7.68E-01
Am-241	59.54	35.90	7.16E-02	9.95E-01	9.95E-01

+ = Nuclide identified during the nuclide identification

* = Energy line found in the spectrum

> = MDA value not calculated

@ = Half-life too short to be able to perform the decay correction

? = CAUTION: MDA value is inconsistent with Currie MDA at 95% confidence level

Analysis Report for 19-Nov-19-10021
L1-10206A-FSGS-011SB

GAMMA SPECTRUM ANALYSIS

Sample Identification : 19-Nov-19-10021
Sample Description : L1-10206A-FSGS-011SB
Sample Type : Soil
Unit :
Sample Point :

Sample Size : 1.517E+03 grams
Facility : Default

Sample Taken On : 11/15/2019 10:00:00AM
Acquisition Started : 11/19/2019 10:43:18AM

Procedure : 130G_SOIL_1
Operator : Administrator
Detector Name : P40818B
Geometry : 130G_SOIL_1
Live Time : 900.0 seconds
Real Time : 901.5 seconds

Dead Time : 0.16 %

Peak Locate Threshold : 3.00
Peak Locate Range (in channels) : 120 - 8192
Peak Area Range (in channels) : 120 - 8192
Identification Energy Tolerance : 1.000 keV

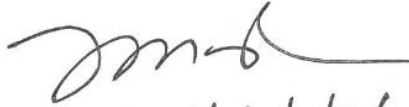
Energy Calibration Used Done On : 11/4/2019
Efficiency Calibration Used Done On : 11/19/2019
Efficiency Calibration Description :

Sample Number : 81404
Fill Height : 1517.24 gram
Certificate Name : Eu155-Na22
Certificate Date : 1/30/2012 12:00:00PM

PEAK ANALYSIS REPORT

Peak Analysis Performed on : 11/19/2019 10:58:22AM

Peak Analysis From Channel : 120
Peak Analysis To Channel : 8192


Data Validated
1530 11-19-19

Analysis Report for 19-Nov-19-10021
L1-10206A-FSGS-011SB

Peak No.	Energy (keV)	ROI start	ROI end	Peak Centroid	Net Peak Area	Net Area Uncertainty	Continuum Counts	FWHM (keV)
1	77.32	307 -	314	310.00	2.55E+01	11.21	4.85E+01	0.73
2	238.77	948 -	961	955.16	1.02E+02	18.12	8.23E+01	1.00
3	295.28	1175 -	1185	1181.04	4.80E+01	11.24	3.30E+01	1.25
4	351.89	1399 -	1413	1407.31	8.48E+01	12.90	2.82E+01	0.80
5	583.30	2326 -	2339	2332.39	5.25E+01	9.03	1.05E+01	1.15
6	609.24	2428 -	2444	2436.11	8.02E+01	12.75	2.58E+01	0.68
7	911.52	3638 -	3652	3645.03	2.85E+01	7.50	9.51E+00	0.38
8	968.74	3868 -	3880	3873.93	1.73E+01	6.78	1.07E+01	0.85
9	1120.10	4473 -	4485	4479.51	2.52E+01	5.50	1.77E+00	0.82
10	1461.03	5832 -	5854	5843.96	3.91E+02	19.77	0.00E+00	1.61

M = First peak in a multiplet region
m = Other peak in a multiplet region
F = Fitted singlet
Errors quoted at 1.000sigma

No background subtract performed on this spectrum.

NUCLIDE IDENTIFICATION REPORT

Nuclide Library Used : C:\Canberra\Apex\Root\Default\Library\ZION LIB-BNL.NLB

IDENTIFIED NUCLIDES

Nuclide Name	Id Confidence	Energy (keV)	Yield(%)	Activity (pCi/grams)	Activity Uncertainty
K-40	0.99	1460.82 *	10.66	9.77E+00	6.51E-01
Tl-208	0.99	583.19 *	85.00	8.78E-02	1.60E-02
Pb-212	0.99	115.18	0.60		
		238.63 *	43.60	1.82E-01	3.56E-02
		300.09	3.30		
Pb212-XR	0.99	74.82	10.28		
		77.11 *	17.10	3.08E-01	1.39E-01

Analysis Report for 19-Nov-19-10021

L1-10206A-FSGS-011SB

Nuclide Name	Id Confidence	Energy (keV)	Yield(%)	Activity (pCi/grams)	Activity Uncertainty
Pb212-XR	0.99	87.35	3.97		
		89.78	1.46		
Bi-214	0.99	609.32 *	45.49	2.58E-01	4.39E-02
		768.36	4.89		
		806.18	1.26		
		934.06	3.11		
		1120.29 *	14.92	3.75E-01	8.30E-02
		1155.21	1.63		
		1238.12	5.83		
		1280.98	1.43		
		1377.67	3.99		
		1385.31	0.79		
		1401.52	1.33		
		1407.99	2.39		
		1509.21	2.13		
		1661.27	1.05		
		1729.59	2.88		
		1764.49	15.30		
		1847.43	2.03		
		2118.51	1.16		
Pb-214	1.00	241.99	7.25		
		295.22 *	18.42	2.29E-01	5.67E-02
		351.93 *	35.60	2.38E-01	4.09E-02
		785.96	1.06		
Pb214-XR	0.99	74.82	5.80		
		77.11 *	9.70	5.43E-01	2.47E-01
		87.35	2.24		
		89.78	0.82		
Ac-228	0.99	129.07	2.42		
		209.25	3.89		
		270.24	3.46		
		328.00	2.95		
		338.32	11.27		
		409.46	1.92		
		463.00	4.40		
		794.95	4.25		
		911.20 *	25.80	2.13E-01	5.68E-02
		964.77	4.99		
		968.97 *	15.80	2.20E-01	8.67E-02
		1588.20	3.22		

* = Energy line found in the spectrum.

- = Manually added nuclide.

? = Manually edited nuclide.

@ = Energy line not used for Weighted Mean Activity

Energy Tolerance : 1.000 keV

Nuclide confidence index threshold = 0.30

Errors quoted at 1.000sigma

Analysis Report for 19-Nov-19-10021
L1-10206A-FSGS-011SB

INTERFERENCE CORRECTED REPORT

	Nuclide Name	Nuclide Id Confidence	Wt mean Activity (pCi/grams)	Wt mean Activity Uncertainty	Comments
	K-40	0.993	9.77E+00	6.51E-01	
	Tl-208	0.998	8.78E-02	1.60E-02	
X	Bi-211	0.897			
	Pb-212	0.997	1.82E-01	3.56E-02	
?	Pb212-XR	0.996	3.08E-01	1.39E-01	
	Bi-214	0.999	2.84E-01	3.88E-02	
	Pb-214	1.000	2.35E-01	3.32E-02	
?	Pb214-XR	0.996	5.43E-01	2.47E-01	
	Ac-228	0.994	2.15E-01	4.75E-02	

- ? = nuclide is part of an undetermined solution
X = nuclide rejected by the interference analysis
@ = nuclide contains energy lines not used in Weighted Mean Activity

Errors quoted at 1.000sigma

Analysis Report for 19-Nov-19-10021
L1-10206A-FSGS-011SB

UNIDENTIFIED PEAKS

Peak Locate Performed on : 11/19/2019 10:58:22AM
Peak Locate From Channel : 120
Peak Locate To Channel : 8192

Peak No.	Energy (keV)	Peak Size (CPS)	Peak CPS (%) Uncertainty	Peak Type	Tolerance Nuclide
All peaks were identified.					
M = First peak in a multiplet region					
m = Other peak in a multiplet region					
F = Fitted singlet					
Errors quoted at 1.000sigma					

NUCLIDE MDA REPORT

Nuclide Library Used : C:\Canberra\Apex\Root\Default\Library\ZION LIB-BNL.NLB

	Nuclide Name	Energy (keV)	Yield(%)	Activity (pCi/grams)	Nuclide MDA (pCi/grams)	Line MDA (pCi/grams)
	An Pk	511.00	100.00	5.39E-02	6.07E-02	6.07E-02
	BE-7	477.60	10.44	2.87E-01	4.38E-01	4.38E-01
+	K-40	1460.82	* 10.66	9.77E+00	7.19E-02	7.19E-02
	Mn-54	834.85	99.98	3.13E-02	5.57E-02	5.57E-02
	Co-60	1173.23	99.85	-2.15E-02	5.78E-02	6.96E-02
		1332.49	99.98	3.18E-02		5.78E-02
	Nb-94	702.65	99.81	3.19E-02	4.71E-02	4.71E-02
		871.09	99.89	3.84E-03		4.83E-02
	Ag-108m	79.13	6.60	-3.25E-01	4.88E-02	1.81E+00
		433.94	90.50	3.05E-02		4.88E-02
		614.28	89.80	-9.18E-03		7.51E-02
		722.94	90.80	-1.97E-02		6.35E-02
	Sb-125	176.31	6.84	2.64E-02	1.42E-01	5.94E-01
		380.45	1.52	-1.34E+00		2.59E+00
		427.87	29.60	3.55E-02		1.42E-01
		463.36	10.49	1.57E-01		4.02E-01
		600.60	17.65	-2.76E-02		2.74E-01
		606.71	4.98	2.18E+00		1.71E+00
		635.95	11.22	2.26E-01		4.37E-01

Analysis Report for 19-Nov-19-10021

L1-10206A-FSGS-011SB

Nuclide Name	Energy (keV)	Yield(%)	Activity (pCi/grams)	Nuclide MDA (pCi/grams)	Line MDA (pCi/grams)
Sb-125	671.44	1.79	-4.12E-01	1.42E-01	2.56E+00
Ba-133	79.61	2.65	-1.13E+00	7.94E-02	4.44E+00
	81.00	32.90	-1.21E-01		3.15E-01
	276.40	7.16	-3.92E-02		5.64E-01
	302.85	18.34	-1.13E-01		2.21E-01
	356.01	62.05	-8.62E-02		7.94E-02
	383.85	8.94	2.36E-01		4.73E-01
Cs-134	475.36	1.48	-1.63E+00	6.27E-02	2.69E+00
	563.25	8.34	-5.26E-01		4.80E-01
	569.33	15.37	8.34E-02		2.93E-01
	604.72	97.62	4.21E-03		7.76E-02
	795.86	85.46	-5.62E-04		6.27E-02
	801.95	8.69	-3.87E-01		4.62E-01
	1038.61	0.99	2.51E+00		6.22E+00
	1167.97	1.79	-4.78E-01		3.88E+00
	1365.19	3.02	4.08E-01		1.64E+00
Cs-137	661.66	85.10	-2.28E-03	5.55E-02	5.55E-02
Eu-152	121.78	28.67	-4.83E-02	1.50E-01	1.65E-01
	244.70	7.61	5.05E-01		6.10E-01
	295.94	0.45	7.73E+00		1.16E+01
	344.28	26.60	-1.58E-02		1.50E-01
	367.79	0.86	-1.05E+00		4.83E+00
	411.12	2.24	2.41E-01		1.97E+00
	443.96	2.83	-1.90E-01		1.38E+00
	488.68	0.42	3.63E+00		1.20E+01
	563.99	0.49	1.20E+00		8.50E+00
	586.26	0.46	-3.38E+00		1.47E+01
	678.62	0.47	9.48E-01		9.14E+00
	688.67	0.86	3.01E+00		5.07E+00
	719.35	0.28	-2.35E+00		1.89E+01
	778.90	12.96	-6.52E-02		3.59E-01
	810.45	0.32	7.58E+00		1.59E+01
	867.37	4.26	-1.89E-01		1.23E+00
	919.33	0.43	1.07E+00		1.30E+01
	964.08	14.65	-7.63E-02		5.64E-01
	1085.87	10.24	-1.59E-01		5.99E-01
	1089.74	1.73	-5.34E-01		3.72E+00
	1112.07	13.69	3.40E-02		4.33E-01
	1212.95	1.43	2.59E+00		5.79E+00
	1249.94	0.19	-1.07E+01		3.78E+01
	1299.14	1.63	-2.99E+00		4.32E+00
	1408.01	21.07	1.54E-02		2.56E-01
	1457.64	0.50	2.00E+02		5.23E+01
	1528.10	0.28	-1.03E+00		1.33E+01
Eu-154	123.07	40.40	2.32E-02	1.17E-01	1.17E-01
	247.93	6.89	-5.01E-02		5.81E-01
	591.76	4.95	-1.07E-01		9.64E-01
	692.42	1.78	-6.23E-02		2.46E+00
	723.30	20.06	1.57E-01		3.05E-01
	756.80	4.52	3.45E-01		1.33E+00
	873.18	12.08	-5.05E-01		3.68E-01

Analysis Report for 19-Nov-19-10021

L1-10206A-FSGS-011SB

Nuclide Name	Energy (keV)	Yield(%)	Activity (pCi/grams)	Nuclide MDA (pCi/grams)	Line MDA (pCi/grams)
Eu-154	996.29	10.48	-1.70E-01	1.17E-01	4.65E-01
	1004.76	18.01	2.56E-01		3.23E-01
	1274.43	34.80	2.79E-02		1.96E-01
	1596.48	1.80	-3.38E-01		2.33E+00
Eu-155	45.30	1.31	7.00E+00	2.77E-01	3.17E+01
	60.01	1.22	-1.10E+01		3.35E+01
	86.55	30.70	-1.04E-01		2.77E-01
	105.31	21.10	2.03E-02		2.93E-01
Ra-226	186.21	3.64	1.36E+00	1.26E+00	1.26E+00
Pa-231	27.36	10.30	3.38E+00	1.72E+00	3.83E+00
	283.69	1.70	6.89E-02		2.22E+00
	300.07	2.47	-1.77E+00		1.72E+00
	302.65	2.20	-1.22E+00		1.86E+00
	330.06	1.40	6.61E-01		2.91E+00
U-235	143.76	10.96	-3.27E-01	7.87E-02	4.20E-01
	163.33	5.08	2.63E-01		8.64E-01
	185.71	57.20	5.75E-02		7.87E-02
	202.11	1.08	-1.94E+00		3.55E+00
	205.31	5.01	-2.37E-01		8.03E-01
Am-241	59.54	35.90	2.99E-02	1.22E+00	1.22E+00

+ = Nuclide identified during the nuclide identification

* = Energy line found in the spectrum

> = MDA value not calculated

@ = Half-life too short to be able to perform the decay correction

? = CAUTION: MDA value is inconsistent with Currie MDA at 95% confidence level

Analysis Report for 19-Nov-19-10022
L1-10206A-FSGS-012SB

GAMMA SPECTRUM ANALYSIS

Sample Identification : 19-Nov-19-10022
Sample Description : L1-10206A-FSGS-012SB
Sample Type : Soil
Unit :
Sample Point :

Sample Size : 1.528E+03 grams
Facility : Default

Sample Taken On : 11/15/2019 10:10:00AM
Acquisition Started : 11/19/2019 10:43:24AM

Procedure : 130G_SOIL_1
Operator : Administrator
Detector Name : P11314
Geometry : 130G_SOIL_1
Live Time : 900.0 seconds
Real Time : 900.3 seconds

Dead Time : 0.04 %

Peak Locate Threshold : 3.00
Peak Locate Range (in channels) : 120 - 8192
Peak Area Range (in channels) : 120 - 8192
Identification Energy Tolerance : 1.000 keV

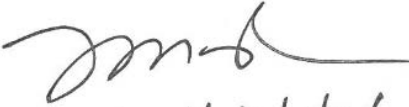
Energy Calibration Used Done On : 11/4/2019
Efficiency Calibration Used Done On : 11/19/2019
Efficiency Calibration Description :

Sample Number : 81405
Fill Height : 1528.20 gram
Certificate Name : Eu155-Na22
Certificate Date : 12/22/2008 12:00:00PM

PEAK ANALYSIS REPORT

Peak Analysis Performed on : 11/19/2019 10:58:43AM

Peak Analysis From Channel : 120
Peak Analysis To Channel : 8192


Data Validated
1530 11-19-19

Analysis Report for 19-Nov-19-10022
L1-10206A-FSGS-012SB

Peak No.	Energy (keV)	ROI start	ROI end	Peak Centroid	Net Peak Area	Net Area Uncertainty	Continuum Counts	FWHM (keV)
1	77.26	307 -	313	309.58	3.43E+01	11.40	4.97E+01	0.63
2	238.67	949 -	961	954.26	1.28E+02	16.99	5.87E+01	1.18
3	338.27	1347 -	1358	1352.17	1.95E+01	9.50	2.75E+01	0.89
4	351.97	1400 -	1414	1406.90	8.03E+01	12.60	2.67E+01	1.37
5	609.17	2428 -	2441	2434.71	7.73E+01	10.71	1.37E+01	0.81
6	910.54	3633 -	3646	3639.62	3.54E+01	8.12	1.06E+01	0.43
7	1460.07	5826 -	5850	5838.21	3.88E+02	20.30	6.00E+00	2.17

M = First peak in a multiplet region

m = Other peak in a multiplet region

F = Fitted singlet

Errors quoted at 1.000sigma

No background subtract performed on this spectrum.

NUCLIDE IDENTIFICATION REPORT

Nuclide Library Used : C:\Canberra\Apex\Root\Default\Library\ZION LIB-BNL.NLB

IDENTIFIED NUCLIDES

Nuclide Name	Id Confidence	Energy (keV)	Yield(%)	Activity (pCi/grams)	Activity Uncertainty
K-40	0.91	1460.82 *	10.66	8.70E+00	5.92E-01
Bi-211	0.87	351.07 *	13.02	5.53E-01	9.75E-02
Pb-212	1.00	115.18	0.60		
		238.63 *	43.60	2.04E-01	3.16E-02
		300.09	3.30		
Pb212-XR	0.99	74.82	10.28		
		77.11 *	17.10	2.41E-01	8.40E-02
		87.35	3.97		
		89.78	1.46		
Bi-214	0.99	609.32 *	45.49	2.24E-01	3.38E-02

Analysis Report for 19-Nov-19-10022

L1-10206A-FSGS-012SB

Nuclide Name	Id Confidence	Energy (keV)	Yield(%)	Activity (pCi/grams)	Activity Uncertainty
Bi-214	0.99	768.36	4.89		
		806.18	1.26		
		934.06	3.11		
		1120.29	14.92		
		1155.21	1.63		
		1238.12	5.83		
		1280.98	1.43		
		1377.67	3.99		
		1385.31	0.79		
		1401.52	1.33		
		1407.99	2.39		
		1509.21	2.13		
		1661.27	1.05		
		1729.59	2.88		
		1764.49	15.30		
		1847.43	2.03		
		2118.51	1.16		
Pb-214	1.00	241.99	7.25		
		295.22	18.42		
		351.93 *	35.60	2.02E-01	3.56E-02
Pb214-XR	0.99	785.96	1.06		
		74.82	5.80		
		77.11 *	9.70	4.26E-01	1.49E-01
		87.35	2.24		
Ac-228	0.97	89.78	0.82		
		129.07	2.42		
		209.25	3.89		
		270.24	3.46		
		328.00	2.95		
		338.32 *	11.27	1.51E-01	7.44E-02
		409.46	1.92		
		463.00	4.40		
		794.95	4.25		
		911.20 *	25.80	2.38E-01	5.56E-02
		964.77	4.99		
		968.97	15.80		
		1588.20	3.22		

* = Energy line found in the spectrum.

- = Manually added nuclide.

? = Manually edited nuclide.

@ = Energy line not used for Weighted Mean Activity

Energy Tolerance : 1.000 keV

Nuclide confidence index threshold = 0.30

Errors quoted at 1.000sigma

Analysis Report for 19-Nov-19-10022
L1-10206A-FSGS-012SB

INTERFERENCE CORRECTED REPORT

<i>Nuclide Name</i>	<i>Nuclide Id Confidence</i>	<i>Wt mean Activity (pCi/grams)</i>	<i>Wt mean Activity Uncertainty</i>	<i>Comments</i>
K-40	0.913	8.70E+00	5.92E-01	
? Bi-211	0.878	5.53E-01	9.75E-02	
Pb-212	1.000	2.04E-01	3.16E-02	
? Pb212-XR	0.998	2.41E-01	8.40E-02	
Bi-214	0.999	2.24E-01	3.38E-02	
? Pb-214	1.000	2.02E-01	3.56E-02	
? Pb214-XR	0.998	4.26E-01	1.49E-01	
Ac-228	0.979	2.07E-01	4.45E-02	

- ? = nuclide is part of an undetermined solution
 X = nuclide rejected by the interference analysis
 @ = nuclide contains energy lines not used in Weighted Mean Activity

Errors quoted at 1.000sigma

Analysis Report for 19-Nov-19-10022
L1-10206A-FSGS-012SB

UNIDENTIFIED PEAKS

Peak Locate Performed on : 11/19/2019 10:58:43AM
Peak Locate From Channel : 120
Peak Locate To Channel : 8192

Peak No.	Energy (keV)	Peak Size (CPS)	Peak CPS (%) Uncertainty	Peak Type	Tolerance Nuclide
All peaks were identified.					
M = First peak in a multiplet region					
m = Other peak in a multiplet region					
F = Fitted singlet					
Errors quoted at 1.000sigma					

NUCLIDE MDA REPORT

Nuclide Library Used : C:\Canberra\Apex\Root\Default\Library\ZION LIB-BNL.NLB

	Nuclide Name	Energy (keV)	Yield(%)	Activity (pCi/grams)	Nuclide MDA (pCi/grams)	Line MDA (pCi/grams)
	An Pk	511.00	100.00	4.23E-02	5.66E-02	5.66E-02
	BE-7	477.60	10.44	4.81E-02	3.51E-01	3.51E-01
+	K-40	1460.82	* 10.66	8.70E+00	4.38E-01	4.38E-01
	Mn-54	834.85	99.98	-2.00E-02	4.26E-02	4.26E-02
	Co-60	1173.23	99.85	4.63E-03	5.31E-02	5.81E-02
		1332.49	99.98	-5.38E-02		5.31E-02
	Nb-94	702.65	99.81	-1.20E-02	4.00E-02	4.43E-02
		871.09	99.89	-3.70E-02		4.00E-02
	Ag-108m	79.13	6.60	-6.89E-01	3.95E-02	1.11E+00
		433.94	90.50	1.99E-02		3.95E-02
		614.28	89.80	-1.21E-02		6.43E-02
		722.94	90.80	3.91E-02		5.16E-02
	Sb-125	176.31	6.84	4.54E-02	1.27E-01	4.63E-01
		380.45	1.52	8.62E-01		2.41E+00
		427.87	29.60	1.07E-02		1.27E-01
		463.36	10.49	4.66E-02		4.07E-01
		600.60	17.65	-2.04E-02		1.99E-01
		606.71	4.98	2.03E+00		1.42E+00
		635.95	11.22	1.53E-01		4.08E-01

Analysis Report for 19-Nov-19-10022

L1-10206A-FSGS-012SB

Nuclide Name	Energy (keV)	Yield(%)	Activity (pCi/grams)	Nuclide MDA (pCi/grams)	Line MDA (pCi/grams)
Sb-125	671.44	1.79	-8.30E-01	1.27E-01	2.23E+00
Ba-133	79.61	2.65	-1.79E+00	6.44E-02	2.77E+00
	81.00	32.90	-2.68E-01		1.85E-01
	276.40	7.16	2.74E-01		4.67E-01
	302.85	18.34	1.48E-01		1.83E-01
	356.01	62.05	-9.60E-03		6.44E-02
	383.85	8.94	-7.78E-02		3.93E-01
Cs-134	475.36	1.48	-6.42E-01	5.80E-02	2.23E+00
	563.25	8.34	-2.31E-01		5.32E-01
	569.33	15.37	-2.38E-01		2.43E-01
	604.72	97.62	-4.15E-02		6.35E-02
	795.86	85.46	3.09E-02		5.80E-02
	801.95	8.69	9.67E-02		5.02E-01
	1038.61	0.99	-3.07E+00		5.51E+00
	1167.97	1.79	-8.85E-01		3.29E+00
	1365.19	3.02	7.89E-01		1.71E+00
Cs-137	661.66	85.10	1.39E-02	4.99E-02	4.99E-02
Eu-152	121.78	28.67	-3.73E-02	1.15E-01	1.17E-01
	244.70	7.61	-3.12E-02		5.05E-01
	295.94	0.45	4.53E+00		9.95E+00
	344.28	26.60	-1.02E-01		1.15E-01
	367.79	0.86	1.10E+00		3.77E+00
	411.12	2.24	7.61E-01		1.59E+00
	443.96	2.83	7.28E-02		1.27E+00
	488.68	0.42	4.85E+00		1.02E+01
	563.99	0.49	-1.44E+01		7.86E+00
	586.26	0.46	1.20E+01		1.26E+01
	678.62	0.47	4.73E+00		8.77E+00
	688.67	0.86	1.13E-01		4.15E+00
	719.35	0.28	-5.18E+00		1.26E+01
	778.90	12.96	-2.52E-01		3.29E-01
	810.45	0.32	-1.50E+00		1.10E+01
	867.37	4.26	1.82E-01		1.13E+00
	919.33	0.43	5.15E+00		1.26E+01
	964.08	14.65	-4.64E-03		4.65E-01
	1085.87	10.24	-1.75E-03		5.55E-01
	1089.74	1.73	8.47E-01		3.58E+00
	1112.07	13.69	8.85E-02		4.91E-01
	1212.95	1.43	3.82E+00		5.56E+00
	1249.94	0.19	3.35E+01		3.54E+01
	1299.14	1.63	-1.28E+00		3.49E+00
	1408.01	21.07	9.37E-02		2.30E-01
	1457.64	0.50	1.89E+02		4.70E+01
	1528.10	0.28	4.40E+00		1.20E+01
Eu-154	123.07	40.40	-2.66E-03	8.36E-02	8.36E-02
	247.93	6.89	2.33E-01		5.19E-01
	591.76	4.95	-8.33E-01		7.38E-01
	692.42	1.78	-1.27E+00		2.25E+00
	723.30	20.06	1.82E-01		2.37E-01
	756.80	4.52	1.78E-01		1.07E+00
	873.18	12.08	6.46E-02		3.54E-01

Analysis Report for 19-Nov-19-10022

L1-10206A-FSGS-012SB

Nuclide Name	Energy (keV)	Yield(%)	Activity (pCi/grams)	Nuclide MDA (pCi/grams)	Line MDA (pCi/grams)
Eu-154	996.29	10.48	2.38E-01	8.36E-02	5.57E-01
	1004.76	18.01	4.04E-02		2.91E-01
	1274.43	34.80	5.39E-03		2.04E-01
	1596.48	1.80	9.99E-01		2.22E+00
Eu-155	45.30	1.31	2.94E+00	1.93E-01	1.15E+01
	60.01	1.22	3.99E+00		1.21E+01
	86.55	30.70	2.60E-02		1.93E-01
	105.31	21.10	-2.69E-02		1.94E-01
Ra-226	186.21	3.64	1.17E+00	1.01E+00	1.01E+00
Pa-231	27.36	10.30	1.01E+00	1.34E+00	1.34E+00
	283.69	1.70	8.98E-01		2.00E+00
	300.07	2.47	-2.63E+00		1.37E+00
	302.65	2.20	1.50E+00		1.53E+00
	330.06	1.40	1.45E+00		2.83E+00
U-235	143.76	10.96	-1.01E-01	6.35E-02	3.15E-01
	163.33	5.08	9.81E-02		6.45E-01
	185.71	57.20	6.71E-02		6.35E-02
	202.11	1.08	-1.35E-01		2.96E+00
	205.31	5.01	-6.24E-01		6.18E-01
Am-241	59.54	35.90	5.10E-02	4.24E-01	4.24E-01

- + = Nuclide identified during the nuclide identification
 * = Energy line found in the spectrum
 > = MDA value not calculated
 @ = Half-life too short to be able to perform the decay correction
 ? = CAUTION: MDA value is inconsistent with Currie MDA at 95% confidence level

Analysis Report for 19-Nov-19-10023
L1-10206A-FSGS-019SB

GAMMA SPECTRUM ANALYSIS

Sample Identification : 19-Nov-19-10023
Sample Description : L1-10206A-FSGS-019SB
Sample Type : Soil
Unit :
Sample Point :

Sample Size : 1.774E+03 grams
Facility : Default

Sample Taken On : 11/15/2019 10:25:00AM
Acquisition Started : 11/19/2019 10:43:30AM

Procedure : 130G_SOIL_1
Operator : Administrator
Detector Name : 352
Geometry : 130G_SOIL_1
Live Time : 900.0 seconds
Real Time : 900.3 seconds

Dead Time : 0.03 %

Peak Locate Threshold : 3.00
Peak Locate Range (in channels) : 120 - 8192
Peak Area Range (in channels) : 120 - 8192
Identification Energy Tolerance : 1.000 keV

Energy Calibration Used Done On : 11/4/2019
Efficiency Calibration Used Done On : 11/19/2019
Efficiency Calibration Description :

Sample Number : 81406
Fill Height : 1773.69 gram
Certificate Name : Eu155-Na22
Certificate Date : 1/7/2013 12:00:00PM

PEAK ANALYSIS REPORT

Peak Analysis Performed on : 11/19/2019 10:58:36AM

Peak Analysis From Channel : 120
Peak Analysis To Channel : 8192


Data Validated
1530 11-19-19

Analysis Report for 19-Nov-19-10023
L1-10206A-FSGS-019SB

	Peak No.	Energy (keV)	ROI start	ROI end	Peak Centroid	Net Peak Area	Net Area Uncertainty	Continuum Counts	FWHM (keV)
M m	1	238.65	946 -	963	955.06	1.57E+02	19.82	7.20E+01	0.97
	2	294.91	1175 -	1206	1179.85	3.08E+01	6.41	1.44E+01	0.54
	3	300.56	1175 -	1206	1202.43	1.53E+01	4.88	1.38E+01	0.55
	4	351.85	1401 -	1414	1407.39	7.91E+01	12.72	2.99E+01	1.46
	5	583.25	2327 -	2340	2332.31	4.69E+01	9.55	1.61E+01	0.61
	6	609.31	2428 -	2443	2436.52	6.00E+01	10.67	1.80E+01	1.31
	7	911.24	3636 -	3651	3643.99	3.90E+01	8.31	9.98E+00	0.51
	8	1460.57	5830 -	5855	5842.66	4.41E+02	21.87	9.20E+00	1.94

M = First peak in a multiplet region

m = Other peak in a multiplet region

F = Fitted singlet

Errors quoted at 1.000sigma

No background subtract performed on this spectrum.

NUCLIDE IDENTIFICATION REPORT

Nuclide Library Used : C:\Canberra\Apex\Root\Default\Library\ZION LIB-BNL.NLB

IDENTIFIED NUCLIDES

Nuclide Name	Id Confidence	Energy (keV)	Yield(%)	Activity (pCi/grams)	Activity Uncertainty
K-40	0.99	1460.82 *	10.66	8.90E+00	5.87E-01
Tl-208	0.99	583.19 *	85.00	6.52E-02	1.38E-02
Pb-212	0.99	115.18	0.60		
		238.63 *	43.60	2.41E-01	3.61E-02
		300.09 *	3.30	3.50E-01	1.16E-01
		609.32 *	45.49	1.60E-01	3.01E-02
Bi-214	1.00	768.36	4.89		
		806.18	1.26		
		934.06	3.11		

Analysis Report for 19-Nov-19-10023

L1-10206A-FSGS-019SB

Nuclide Name	Id Confidence	Energy (keV)	Yield(%)	Activity (pCi/grams)	Activity Uncertainty
Bi-214	1.00	1120.29	14.92		
		1155.21	1.63		
		1238.12	5.83		
		1280.98	1.43		
		1377.67	3.99		
		1385.31	0.79		
		1401.52	1.33		
		1407.99	2.39		
		1509.21	2.13		
		1661.27	1.05		
		1729.59	2.88		
		1764.49	15.30		
		1847.43	2.03		
		2118.51	1.16		
Pb-214	0.99	241.99	7.25		
		295.22 *	18.42	1.25E-01	2.79E-02
		351.93 *	35.60	1.88E-01	3.37E-02
		785.96	1.06		
Ac-228	1.00	129.07	2.42		
		209.25	3.89		
		270.24	3.46		
		328.00	2.95		
		338.32	11.27		
		409.46	1.92		
		463.00	4.40		
		794.95	4.25		
		911.20 *	25.80	2.39E-01	5.19E-02
		964.77	4.99		
		968.97	15.80		
		1588.20	3.22		

* = Energy line found in the spectrum.

- = Manually added nuclide.

? = Manually edited nuclide.

@ = Energy line not used for Weighted Mean Activity

Energy Tolerance : 1.000 keV

Nuclide confidence index threshold = 0.30

Errors quoted at 1.000sigma

INTERFERENCE CORRECTED REPORT

Analysis Report for 19-Nov-19-10023

L1-10206A-FSGS-019SB

	Nuclide Name	Nuclide Id Confidence	Wt mean Activity (pCi/grams)	Wt mean Activity Uncertainty	Comments
	K-40	0.990	8.90E+00	5.87E-01	
	Tl-208	0.999	6.52E-02	1.38E-02	
X	Bi-211	0.908			
	Pb-212	0.998	2.50E-01	3.44E-02	
	Bi-214	1.000	1.60E-01	3.01E-02	
	Pb-214	0.995	1.51E-01	2.15E-02	
	Ac-228	1.000	2.39E-01	5.19E-02	
X	Pa-231	0.995			

? = nuclide is part of an undetermined solution

X = nuclide rejected by the interference analysis

@ = nuclide contains energy lines not used in Weighted Mean Activity

Errors quoted at 1.000sigma

Analysis Report for 19-Nov-19-10023
L1-10206A-FSGS-019SB

UNIDENTIFIED PEAKS

Peak Locate Performed on : 11/19/2019 10:58:36AM
Peak Locate From Channel : 120
Peak Locate To Channel : 8192

Peak No.	Energy (keV)	Peak Size (CPS)	Peak CPS (%) Uncertainty	Peak Type	Tolerance Nuclide
All peaks were identified.					
M = First peak in a multiplet region					
m = Other peak in a multiplet region					
F = Fitted singlet					
Errors quoted at 1.000sigma					

NUCLIDE MDA REPORT

Nuclide Library Used : C:\Canberra\Apex\Root\Default\Library\ZION LIB-BNL.NLB

	Nuclide Name	Energy (keV)	Yield(%)	Activity (pCi/grams)	Nuclide MDA (pCi/grams)	Line MDA (pCi/grams)
	An Pk	511.00	100.00	4.89E-02	5.80E-02	5.80E-02
	BE-7	477.60	10.44	2.63E-01	3.89E-01	3.89E-01
+	K-40	1460.82	* 10.66	8.90E+00	4.78E-01	4.78E-01
	Mn-54	834.85	99.98	1.39E-02	4.51E-02	4.51E-02
	Co-60	1173.23	99.85	-2.61E-04	4.68E-02	6.71E-02
		1332.49	99.98	-2.12E-02		4.68E-02
	Nb-94	702.65	99.81	1.52E-02	4.40E-02	4.73E-02
		871.09	99.89	2.13E-02		4.40E-02
	Ag-108m	79.13	6.60	-1.66E+00	3.92E-02	1.43E+00
		433.94	90.50	6.49E-03		3.92E-02
		614.28	89.80	8.94E-03		6.92E-02
		722.94	90.80	-1.74E-02		5.35E-02
	Sb-125	176.31	6.84	-3.31E-02	1.42E-01	4.70E-01
		380.45	1.52	1.85E-01		2.25E+00
		427.87	29.60	6.43E-02		1.42E-01
		463.36	10.49	-1.53E-01		3.98E-01
		600.60	17.65	9.66E-02		2.27E-01
		606.71	4.98	1.34E+00		1.24E+00
		635.95	11.22	-1.12E-01		3.49E-01

Analysis Report for 19-Nov-19-10023

L1-10206A-FSGS-019SB

Nuclide Name	Energy (keV)	Yield(%)	Activity (pCi/grams)	Nuclide MDA (pCi/grams)	Line MDA (pCi/grams)
Sb-125	671.44	1.79	-1.63E+00	1.42E-01	2.24E+00
Ba-133	79.61	2.65	-2.65E-02	7.34E-02	3.59E+00
	81.00	32.90	-5.40E-01		2.45E-01
	276.40	7.16	7.06E-02		4.94E-01
	302.85	18.34	3.24E-02		2.00E-01
	356.01	62.05	-2.41E-02		7.34E-02
	383.85	8.94	2.50E-01		3.93E-01
Cs-134	475.36	1.48	1.55E+00	5.57E-02	2.36E+00
	563.25	8.34	1.74E-02		4.17E-01
	569.33	15.37	1.28E-02		2.58E-01
	604.72	97.62	-1.70E-02		5.86E-02
	795.86	85.46	-4.67E-03		5.57E-02
	801.95	8.69	-3.73E-01		4.89E-01
	1038.61	0.99	8.70E-02		4.76E+00
	1167.97	1.79	-4.35E-01		3.81E+00
	1365.19	3.02	-1.06E+00		1.37E+00
Cs-137	661.66	85.10	3.75E-02	5.70E-02	5.70E-02
Eu-152	121.78	28.67	-8.53E-02	1.27E-01	1.28E-01
	244.70	7.61	2.91E-02		5.16E-01
	295.94	0.45	-3.94E-01		9.02E+00
	344.28	26.60	-1.31E-01		1.27E-01
	367.79	0.86	5.56E-01		3.79E+00
	411.12	2.24	4.85E-01		1.75E+00
	443.96	2.83	-3.51E-01		1.13E+00
	488.68	0.42	4.89E+00		8.33E+00
	563.99	0.49	-5.15E+00		6.87E+00
	586.26	0.46	1.11E+01		1.23E+01
	678.62	0.47	6.91E-02		8.53E+00
	688.67	0.86	-1.46E+00		4.47E+00
	719.35	0.28	1.05E+01		1.59E+01
	778.90	12.96	-3.11E-01		3.48E-01
	810.45	0.32	-1.10E+01		1.29E+01
	867.37	4.26	-5.21E-01		1.01E+00
	919.33	0.43	-2.47E+00		1.11E+01
	964.08	14.65	1.83E-01		4.19E-01
	1085.87	10.24	-3.16E-01		5.10E-01
	1089.74	1.73	-5.12E-02		2.80E+00
	1112.07	13.69	-8.01E-02		3.64E-01
	1212.95	1.43	-1.89E+00		4.80E+00
	1249.94	0.19	9.41E+00		3.32E+01
	1299.14	1.63	1.52E+00		4.09E+00
	1408.01	21.07	2.39E-01		2.62E-01
	1457.64	0.50	1.93E+02		4.50E+01
	1528.10	0.28	-3.20E+00		1.07E+01
Eu-154	123.07	40.40	2.65E-02	9.21E-02	9.21E-02
	247.93	6.89	-1.82E-01		5.09E-01
	591.76	4.95	5.12E-01		8.46E-01
	692.42	1.78	-7.17E-01		2.33E+00
	723.30	20.06	9.93E-02		2.45E-01
	756.80	4.52	1.23E-01		9.55E-01
	873.18	12.08	-3.91E-01		3.47E-01

Analysis Report for 19-Nov-19-10023

L1-10206A-FSGS-019SB

Nuclide Name	Energy (keV)	Yield(%)	Activity (pCi/grams)	Nuclide MDA (pCi/grams)	Line MDA (pCi/grams)
Eu-154	996.29	10.48	2.40E-02	9.21E-02	4.44E-01
	1004.76	18.01	2.37E-01		2.81E-01
	1274.43	34.80	4.57E-02		1.61E-01
	1596.48	1.80	1.32E+00		2.90E+00
Eu-155	45.30	1.31	-1.96E+01	2.18E-01	1.89E+01
	60.01	1.22	1.27E+01		2.27E+01
	86.55	30.70	-1.39E-01		2.27E-01
	105.31	21.10	-7.44E-02		2.18E-01
Ra-226	186.21	3.64	3.50E-01	1.00E+00	1.00E+00
Pa-231	27.36	10.30	1.76E+00	6.35E-01	2.28E+00
	283.69	1.70	-9.52E-01		2.01E+00
	300.07	* 2.47	4.68E-01		6.35E-01
	302.65	2.20	4.03E-01		1.68E+00
	330.06	1.40	1.01E+00		2.63E+00
U-235	143.76	10.96	-1.66E-01	6.30E-02	3.52E-01
	163.33	5.08	-6.48E-01		6.62E-01
	185.71	57.20	-7.83E-03		6.30E-02
	202.11	1.08	-6.26E-02		3.19E+00
	205.31	5.01	-2.39E-01		6.89E-01
Am-241	59.54	35.90	2.74E-01	7.98E-01	7.98E-01

+ = Nuclide identified during the nuclide identification

* = Energy line found in the spectrum

> = MDA value not calculated

@ = Half-life too short to be able to perform the decay correction

? = CAUTION: MDA value is inconsistent with Currie MDA at 95% confidence level

Analysis Report for 23-Nov-19-10032
L1-10206A-FSGS-003SB

GAMMA SPECTRUM ANALYSIS

Sample Identification : 23-Nov-19-10032
Sample Description : L1-10206A-FSGS-003SB
Sample Type : Soil
Unit :
Sample Point :

Sample Size : 1.373E+03 grams
Facility : Default

Sample Taken On : 11/22/2019 8:30:00AM
Acquisition Started : 11/23/2019 10:42:03AM

Procedure : 130G_SOIL_1
Operator : Administrator
Detector Name : P11314
Geometry : 130G_SOIL_1
Live Time : 900.0 seconds
Real Time : 900.3 seconds

Dead Time : 0.03 %

Peak Locate Threshold : 3.00
Peak Locate Range (in channels) : 120 - 8192
Peak Area Range (in channels) : 120 - 8192
Identification Energy Tolerance : 1.000 keV

Energy Calibration Used Done On : 11/4/2019
Efficiency Calibration Used Done On : 11/23/2019
Efficiency Calibration Description :

Sample Number : 81589
Fill Height : 1372.97 gram
Certificate Name : Eu155-Na22
Certificate Date : 12/22/2008 12:00:00PM

PEAK ANALYSIS REPORT

Peak Analysis Performed on : 11/23/2019 10:57:16AM

Peak Analysis From Channel : 120
Peak Analysis To Channel : 8192

Handwritten signature
Data Validated
0700 11-24-19

Analysis Report for 23-Nov-19-10032
L1-10206A-FSGS-003SB

Peak No.	Energy (keV)	ROI start	ROI end	Peak Centroid	Net Peak Area	Net Area Uncertainty	Continuum Counts	FWHM (keV)
1	77.33	307 -	316	309.84	3.45E+01	11.66	4.05E+01	0.53
2	238.75	947 -	960	954.58	1.28E+02	15.89	4.54E+01	1.23
3	351.73	1399 -	1414	1405.92	4.89E+01	12.07	3.21E+01	1.13
4	609.08	2428 -	2440	2434.38	4.63E+01	8.48	9.75E+00	0.99
5	661.46	2637 -	2651	2643.75	1.59E+02	13.04	3.75E+00	1.43
6	1460.13	5827 -	5848	5838.45	2.25E+02	15.00	0.00E+00	1.46

M = First peak in a multiplet region

m = Other peak in a multiplet region

F = Fitted singlet

Errors quoted at 1.000sigma

No background subtract performed on this spectrum.

NUCLIDE IDENTIFICATION REPORT

Nuclide Library Used : C:\Canberra\Apex\Root\Default\Library\ZION LIB-BNL.NLB

IDENTIFIED NUCLIDES

Nuclide Name	Id Confidence	Energy (keV)	Yield(%)	Activity (pCi/grams)	Activity Uncertainty
K-40	0.92	1460.82 *	10.66	5.22E+00	4.16E-01
Cs-137	0.99	661.66 *	85.10	2.69E-01	2.73E-02
Bi-211	0.93	351.07 *	13.02	3.45E-01	8.96E-02
Pb-212	0.99	115.18	0.60		
		238.63 *	43.60	2.07E-01	3.08E-02
		300.09	3.30		
Pb212-XR	0.99	74.82	10.28		
		77.11 *	17.10	2.45E-01	8.66E-02
		87.35	3.97		
		89.78	1.46		
Bi-214	0.99	609.32 *	45.49	1.38E-01	2.66E-02

Analysis Report for 23-Nov-19-10032

L1-10206A-FSGS-003SB

Nuclide Name	Id Confidence	Energy (keV)	Yield(%)	Activity (pCi/grams)	Activity Uncertainty
Bi-214	0.99	768.36	4.89		
		806.18	1.26		
		934.06	3.11		
		1120.29	14.92		
		1155.21	1.63		
		1238.12	5.83		
		1280.98	1.43		
		1377.67	3.99		
		1385.31	0.79		
		1401.52	1.33		
		1407.99	2.39		
		1509.21	2.13		
		1661.27	1.05		
		1729.59	2.88		
		1764.49	15.30		
		1847.43	2.03		
		2118.51	1.16		
Pb-214	0.99	241.99	7.25		
		295.22	18.42		
		351.93 *	35.60	1.26E-01	3.28E-02
Pb214-XR	0.99	785.96	1.06		
		74.82	5.80		
		77.11 *	9.70	4.32E-01	1.54E-01
		87.35	2.24		
		89.78	0.82		

* = Energy line found in the spectrum.

- = Manually added nuclide.

? = Manually edited nuclide.

@ = Energy line not used for Weighted Mean Activity

Energy Tolerance : 1.000 keV

Nuclide confidence index threshold = 0.30

Errors quoted at 1.000sigma

INTERFERENCE CORRECTED REPORT

Nuclide Name	Nuclide Id Confidence	Wt mean Activity (pCi/grams)	Wt mean Activity Uncertainty	Comments
K-40	0.926	5.22E+00	4.16E-01	
Cs-137	0.994	2.69E-01	2.73E-02	

Analysis Report for 23-Nov-19-10032

L1-10206A-FSGS-003SB

	Nuclide Name	Nuclide Id Confidence	Wt mean Activity (pCi/grams)	Wt mean Activity Uncertainty	Comments
?	Bi-211	0.933	3.45E-01	8.96E-02	
	Pb-212	0.998	2.07E-01	3.08E-02	
?	Pb212-XR	0.996	2.45E-01	8.66E-02	
	Bi-214	0.996	1.38E-01	2.66E-02	
?	Pb-214	0.996	1.26E-01	3.28E-02	
?	Pb214-XR	0.996	4.32E-01	1.54E-01	

? = nuclide is part of an undetermined solution

X = nuclide rejected by the interference analysis

@ = nuclide contains energy lines not used in Weighted Mean Activity

Errors quoted at 1.000sigma

Analysis Report for 23-Nov-19-10032
L1-10206A-FSGS-003SB

UNIDENTIFIED PEAKS

Peak Locate Performed on : 11/23/2019 10:57:16AM
Peak Locate From Channel : 120
Peak Locate To Channel : 8192

Peak No.	Energy (keV)	Peak Size (CPS)	Peak CPS (%) Uncertainty	Peak Type	Tolerance Nuclide
All peaks were identified.					
M = First peak in a multiplet region					
m = Other peak in a multiplet region					
F = Fitted singlet					
Errors quoted at 1.000sigma					

NUCLIDE MDA REPORT

Nuclide Library Used : C:\Canberra\Apex\Root\Default\Library\ZION LIB-BNL.NLB

	Nuclide Name	Energy (keV)	Yield(%)	Activity (pCi/grams)	Nuclide MDA (pCi/grams)	Line MDA (pCi/grams)
	An Pk	511.00	100.00	5.59E-03	5.24E-02	5.24E-02
	BE-7	477.60	10.44	-1.31E-01	3.34E-01	3.34E-01
+	K-40	1460.82	* 10.66	5.22E+00	6.68E-02	6.68E-02
	Mn-54	834.85	99.98	-2.34E-03	3.92E-02	3.92E-02
	Co-60	1173.23	99.85	-1.38E-02	4.34E-02	4.81E-02
		1332.49	99.98	-4.20E-04		4.34E-02
	Nb-94	702.65	99.81	7.33E-03	4.03E-02	4.03E-02
		871.09	99.89	2.63E-02		4.12E-02
	Ag-108m	79.13	6.60	7.32E-02	4.10E-02	9.65E-01
		433.94	90.50	-1.00E-02		4.10E-02
		614.28	89.80	-6.27E-02		4.62E-02
		722.94	90.80	1.26E-02		4.75E-02
	Sb-125	176.31	6.84	1.26E-01	1.29E-01	4.46E-01
		380.45	1.52	6.50E-01		1.98E+00
		427.87	29.60	6.61E-02		1.29E-01
		463.36	10.49	3.90E-02		3.82E-01
		600.60	17.65	-1.69E-01		1.97E-01
		606.71	4.98	1.76E+00		1.23E+00
		635.95	11.22	1.31E-01		3.63E-01

Analysis Report for 23-Nov-19-10032

L1-10206A-FSGS-003SB

Nuclide Name	Energy (keV)	Yield(%)	Activity (pCi/grams)	Nuclide MDA (pCi/grams)	Line MDA (pCi/grams)
Sb-125	671.44	1.79	-8.31E-01	1.29E-01	1.93E+00
Ba-133	79.61	2.65	1.33E-01	6.08E-02	2.36E+00
	81.00	32.90	-2.24E-02		1.52E-01
	276.40	7.16	1.54E-01		3.91E-01
	302.85	18.34	1.49E-01		1.98E-01
	356.01	62.05	-3.07E-02		6.08E-02
	383.85	8.94	-2.34E-01		3.10E-01
Cs-134	475.36	1.48	1.05E+00	4.43E-02	2.45E+00
	563.25	8.34	-5.49E-01		4.22E-01
	569.33	15.37	4.40E-03		2.18E-01
	604.72	97.62	-2.17E-02		5.63E-02
	795.86	85.46	-1.04E-02		4.43E-02
	801.95	8.69	1.54E-01		3.81E-01
	1038.61	0.99	2.25E+00		5.02E+00
	1167.97	1.79	6.11E-01		3.17E+00
	1365.19	3.02	9.75E-02		1.62E+00
+	Cs-137	*	85.10	2.37E-02	2.37E-02
	Eu-152		28.67	9.85E-02	9.85E-02
	244.70	7.61	2.30E-01		4.65E-01
	295.94	0.45	1.26E+00		8.61E+00
	344.28	26.60	1.52E-02		1.27E-01
	367.79	0.86	-7.85E-01		3.44E+00
	411.12	2.24	1.19E-01		1.66E+00
	443.96	2.83	4.41E-01		1.46E+00
	488.68	0.42	-2.87E+00		7.44E+00
	563.99	0.49	-9.44E+00		6.37E+00
	586.26	0.46	1.49E+01		1.19E+01
	678.62	0.47	2.52E+00		8.02E+00
	688.67	0.86	6.56E-01		4.36E+00
	719.35	0.28	5.31E+00		1.46E+01
	778.90	12.96	-5.68E-02		2.42E-01
	810.45	0.32	2.44E+00		1.10E+01
	867.37	4.26	-5.86E-01		1.01E+00
	919.33	0.43	-5.79E+00		1.02E+01
	964.08	14.65	2.34E-01		4.58E-01
	1085.87	10.24	-9.04E-02		3.97E-01
	1089.74	1.73	-1.61E+00		2.64E+00
	1112.07	13.69	1.35E-02		3.47E-01
	1212.95	1.43	5.50E-01		3.44E+00
	1249.94	0.19	1.17E+00		3.08E+01
	1299.14	1.63	3.14E-01		2.99E+00
	1408.01	21.07	-4.17E-01		1.78E-01
	1457.64	0.50	1.09E+02		3.68E+01
	1528.10	0.28	4.93E-01		1.33E+01
Eu-154	123.07	40.40	0.00E+00	7.09E-02	7.09E-02
	247.93	6.89	-1.89E-01		4.54E-01
	591.76	4.95	4.89E-01		8.62E-01
	692.42	1.78	-7.03E-01		1.84E+00
	723.30	20.06	1.62E-01		2.25E-01
	756.80	4.52	-2.96E-01		8.48E-01
	873.18	12.08	-5.08E-02		2.99E-01

Analysis Report for 23-Nov-19-10032

L1-10206A-FSGS-003SB

Nuclide Name	Energy (keV)	Yield(%)	Activity (pCi/grams)	Nuclide MDA (pCi/grams)	Line MDA (pCi/grams)
Eu-154	996.29	10.48	-9.96E-02	7.09E-02	4.11E-01
	1004.76	18.01	-2.66E-02		2.58E-01
	1274.43	34.80	-5.09E-03		1.49E-01
	1596.48	1.80	8.86E-01		2.16E+00
Eu-155	45.30	1.31	-2.20E+00	1.56E-01	1.00E+01
	60.01	1.22	3.51E+00		1.15E+01
	86.55	30.70	-1.09E-02		1.56E-01
	105.31	21.10	-9.18E-02		1.63E-01
Ra-226	186.21	3.64	5.88E-01	8.55E-01	8.55E-01
Pa-231	27.36	10.30	2.70E-01	1.15E+00	1.15E+00
	283.69	1.70	7.13E-01		1.81E+00
	300.07	2.47	-1.80E+00		1.43E+00
	302.65	2.20	1.54E+00		1.67E+00
	330.06	1.40	-6.29E-02		2.54E+00
U-235	143.76	10.96	2.50E-02	5.46E-02	2.95E-01
	163.33	5.08	-1.64E-01		5.58E-01
	185.71	57.20	4.75E-02		5.46E-02
	202.11	1.08	9.99E-01		2.81E+00
Am-241	205.31	5.01	-1.46E-01	3.97E-01	6.11E-01
	59.54	35.90	5.31E-02		3.97E-01

- + = Nuclide identified during the nuclide identification
 * = Energy line found in the spectrum
 > = MDA value not calculated
 @ = Half-life too short to be able to perform the decay correction
 ? = CAUTION: MDA value is inconsistent with Currie MDA at 95% confidence level

ATTACHMENT 8
EBERLINE ANALYTICAL REPORTS



EBERLINE

ANALYTICAL

EBERLINE ANALYTICAL CORPORATION
601 SCARBORO ROAD
OAK RIDGE, TENNESSEE 37830
PHONE (865) 481-0683
FAX (865) 483-4621

EBS-OR-46575

January 21, 2020

Jeffrey Graham
Zion Solutions, LLC
2701 Deborah Avenue
Zion, IL 60099

CASE NARRATIVE
Work Order # 19-12037-OR

SAMPLE RECEIPT

This work order contains sixteen solid samples received 12/09/2019. Samples were analyzed for Total Strontium, Tritium, Nickel-63 and by Gamma Spectroscopy.

<u>CLIENT ID</u>	<u>LAB ID</u>	<u>CLIENT ID</u>	<u>LAB ID</u>
L1-10206-A-FSGS-003-SS-A	19-12037-04	L1-10206-C-FSGS-011-SS-A	19-12037-12
L1-10206-A-FSGS-011-SS-A	19-12037-05	L1-10206-D-FSGS-001-SS-A	19-12037-13
L1-10206-A-FQGS-005-SS-A	19-12037-06	L1-10206-D-FSGS-017-SS-A	19-12037-14
L1-10206-A-FSGS-003-SB-A	19-12037-07	L1-10206-E-FSGS-002-SS-A	19-12037-15
L1-10206-B-FSGS-010-SS-A	19-12037-08	L1-10206-E-FSGS-014-SS-A	19-12037-16
L1-10206-B-FSGS-012-SS-A	19-12037-09	L1-12205-B-FSGS-116-SB-A	19-12037-17
L1-10206-B-FSGS-004-SS-A	19-12037-10	L1-12205-C-FSGS-109-SS-A	19-12037-18
L1-10206-C-FSGS-007-SS-A	19-12037-11	L1-12209-C-FSGS-009-SS-A	19-12037-19

ANALYTICAL METHODS

Total Strontium was analyzed using EIChroM Method SRW01 Modified. Tritium was performed using Method LANL ER-210 Modified. Nickel-63 was performed using Method ASTM 3500-Ni Modified. Gamma Spectroscopy was performed using EPA Method 901.1 Modified.

Laboratory qualifiers are as follows:

U - Result is less than the MDA.

ANALYTICAL RESULTS

Combined Standard Uncertainty is reported at 1-sigma value.

Minimum Detectable Activity (MDA) values for data represented in this report are sample-specific. MDA measurements are determined based on factors and conditions including instrument settings, aliquot size and matrix type.

ANALYTICAL RESULTS CONTINUED

TOTAL STRONTIUM

Samples were prepared by acid digestion as appropriate for the matrix. Digested samples were acidified and were selectively extracted and precipitated. Precipitates were then mounted on 47mm filters. Filters were reweighed to determine aliquot size. Sample activities were determined by gas flow proportional counting.

Samples demonstrated acceptable results for all Total Strontium analyses. Strontium-90 results are reported from Total Strontium. Chemical recovery was acceptable for all samples. The Total Strontium method blank demonstrated an acceptable result. Results for the Total Strontium duplicate demonstrated a high relative percent difference; however, normalized difference is within acceptable limits for the analytical technique. Results for the Total Strontium laboratory control sample demonstrated an acceptable percent recovery.

TRITIUM

A representative aliquot of each sample was equilibrated with Tritium free water. Equilibrates were transferred into round-bottomed distillation flasks and attached to single stage stills. A portion of each middle distillation fraction was transferred to a liquid scintillation vial and cocktail was added. Samples were counted by beta liquid scintillation.

Samples demonstrated acceptable results for all Tritium analyses. The Tritium method blank demonstrated an acceptable result. Results for the Tritium duplicate demonstrated a high relative percent difference; however, normalized difference is within acceptable limits for the analytical technique. Results for the Tritium laboratory control sample demonstrated an acceptable percent recovery.

NICKEL-63

A representative aliquot of each sample was prepared by leaching in acids. Aliquots were placed into appropriately sized beakers. Stable elemental Nickel carrier was added to each sample prior to digestion. Samples were digested in concentrated Nitric acid. After digestion, each sample pH was adjusted and Nickel-63 was precipitated selectively with Dimethylglyoxime. Precipitates were selectively separated, redissolved, and residual acid was effectively neutralized. Sample residuals were placed into scintillation vials, scintillation cocktail was added, and Nickel-63 activity was determined by beta liquid scintillation.

Samples demonstrated acceptable results for all Nickel-63 analyses. The Nickel-63 method blank demonstrated an acceptable result. Results for the Nickel-63 duplicate demonstrated a high relative percent difference; however, normalized difference is within acceptable limits for the analytical technique. Results for the Nickel-63 laboratory control sample demonstrated an acceptable percent recovery.

GAMMA SPECTROSCOPY

Samples for Gamma Spectroscopy analysis were prepared by transferring a known mass of each homogenized sample to a standard geometry container. Samples were counted on High Purity Germanium (HPGe) gamma ray detectors.

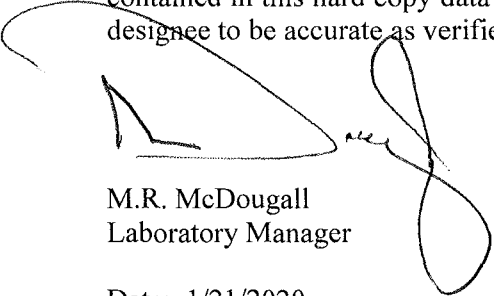
ANALYTICAL RESULTS CONTINUED

GAMMA SPECTROSCOPY CONTINUED

Samples demonstrated acceptable results for all gamma-emitting radionuclides as reported. The method blank demonstrated acceptable results for all radionuclides as reported. Results for the Cobalt-60, Cesium-137 and Potassium-40 replicate demonstrated an acceptable relative percent difference and normalized difference recovery. Results for the Cobalt-60 and Cesium-137 laboratory control sample demonstrated an acceptable percent recovery.

CERTIFICATION OF ACCURACY

I certify that this data report is in compliance with the terms and conditions of the Purchase Order, both technically and for completeness, for other than the conditions detailed above. Release of the data contained in this hard copy data package has been authorized by the cognizant project manager or his/her designee to be accurate as verified by the following signature.



M.R. McDougall
Laboratory Manager

Date: 1/21/2020

Eberline Analytical wants and encourages your feedback regarding our performance providing radioanalytical services. Please visit <http://eberlineanalytical.com/> to provide us with feedback on our services.

Eberline Analytical Final Report of Analysis			Report To:					Work Order Details:						
			Patricia Giza					SDG:	19-12037					
			Zion Solutions					Purchase Order:	677118					
			2701 Deborah Ave					Analysis Category:	ENVIRONMENTAL					
			Zion, IL 60099					Sample Matrix:	SO					
Lab ID	Sample Type	Client ID	Sample Date	Receipt Date	Analysis Date	Batch ID	Analyte	Method	Result	CU	CSU	MDA	Qualifier	Report Units
19-12037-01	LCS	KNOWN	12/09/19 00:00	12/9/2019	12/18/2019	19-12037	Tritium	LANL ER-210 Modified	2.04E+02	7.34E+00				pCi/g
19-12037-01	LCS	SPIKE	12/09/19 00:00	12/9/2019	12/18/2019	19-12037	Tritium	LANL ER-210 Modified	2.05E+02	7.72E+00	1.38E+01	5.60E+00		pCi/g
19-12037-02	MBL	BLANK	12/09/19 00:00	12/9/2019	12/18/2019	19-12037	Tritium	LANL ER-210 Modified	0.00E+00	3.21E+00	3.21E+00	5.56E+00	U	pCi/g
19-12037-03	DUP	L1-10206-A-FSGS-003-SS-A	11/09/19 08:30	12/9/2019	12/18/2019	19-12037	Tritium	LANL ER-210 Modified	7.30E-01	3.17E+00	3.17E+00	5.46E+00	U	pCi/g
19-12037-04	DO	L1-10206-A-FSGS-003-SS-A	11/09/19 08:30	12/9/2019	12/18/2019	19-12037	Tritium	LANL ER-210 Modified	3.66E-01	3.17E+00	3.17E+00	5.48E+00	U	pCi/g
19-12037-05	TRG	L1-10206-A-FSGS-011-SS-A	11/09/19 08:20	12/9/2019	12/18/2019	19-12037	Tritium	LANL ER-210 Modified	-2.10E+00	2.94E+00	2.94E+00	5.24E+00	U	pCi/g
19-12037-06	TRG	L1-10206-A-FQGS-005-SS-A	11/09/19 08:05	12/9/2019	12/18/2019	19-12037	Tritium	LANL ER-210 Modified	6.75E+00	3.30E+00	3.33E+00	5.32E+00		pCi/g
19-12037-07	TRG	L1-10206-A-FSGS-003-SB-A	11/22/19 08:04	12/9/2019	12/18/2019	19-12037	Tritium	LANL ER-210 Modified	-2.20E+00	3.07E+00	3.07E+00	5.47E+00	U	pCi/g
19-12037-08	TRG	L1-10206-B-FSGS-010-SS-A	10/28/19 13:18	12/9/2019	12/18/2019	19-12037	Tritium	LANL ER-210 Modified	-2.09E+00	2.92E+00	2.92E+00	5.21E+00	U	pCi/g
19-12037-09	TRG	L1-10206-B-FSGS-012-SS-A	10/28/19 13:22	12/9/2019	12/18/2019	19-12037	Tritium	LANL ER-210 Modified	0.00E+00	3.12E+00	3.12E+00	5.41E+00	U	pCi/g
19-12037-10	TRG	L1-10206-B-FSGS-004-SS-A	11/19/19 12:32	12/9/2019	12/18/2019	19-12037	Tritium	LANL ER-210 Modified	-1.76E+00	2.97E+00	2.97E+00	5.27E+00	U	pCi/g
19-12037-11	TRG	L1-10206-C-FSGS-007-SS-A	10/28/19 09:12	12/9/2019	12/18/2019	19-12037	Tritium	LANL ER-210 Modified	-2.26E+00	2.91E+00	2.91E+00	5.19E+00	U	pCi/g
19-12037-12	TRG	L1-10206-C-FSGS-011-SS-A	10/28/19 09:20	12/9/2019	12/18/2019	19-12037	Tritium	LANL ER-210 Modified	1.78E-01	3.07E+00	3.07E+00	5.31E+00	U	pCi/g
19-12037-13	TRG	L1-10206-D-FSGS-001-SS-A	11/04/19 08:20	12/9/2019	12/18/2019	19-12037	Tritium	LANL ER-210 Modified	-7.11E-01	3.04E+00	3.04E+00	5.32E+00	U	pCi/g
19-12037-14	TRG	L1-10206-D-FSGS-017-SS-A	11/04/19 08:52	12/9/2019	12/18/2019	19-12037	Tritium	LANL ER-210 Modified	-2.01E+00	3.07E+00	3.07E+00	5.45E+00	U	pCi/g
19-12037-15	TRG	L1-10206-E-FSGS-002-SS-A	11/05/19 09:02	12/9/2019	12/18/2019	19-12037	Tritium	LANL ER-210 Modified	-5.22E-01	2.98E+00	2.98E+00	5.21E+00	U	pCi/g
19-12037-16	TRG	L1-10206-E-FSGS-014-SS-A	11/05/19 09:26	12/9/2019	12/18/2019	19-12037	Tritium	LANL ER-210 Modified	-6.91E-01	2.95E+00	2.95E+00	5.17E+00	U	pCi/g
19-12037-17	TRG	L1-12205-B-FSGS-116-SB-A	10/01/19 08:35	12/9/2019	12/18/2019	19-12037	Tritium	LANL ER-210 Modified	-1.30E+00	3.15E+00	3.15E+00	5.56E+00	U	pCi/g
19-12037-18	TRG	L1-12205-C-FSGS-109-SS-A	09/24/19 09:24	12/9/2019	12/18/2019	19-12037	Tritium	LANL ER-210 Modified	-7.16E-01	3.06E+00	3.06E+00	5.36E+00	U	pCi/g
19-12037-19	TRG	L1-12209-C-FSGS-009-SS-A	11/22/19 14:34	12/9/2019	12/18/2019	19-12037	Tritium	LANL ER-210 Modified	3.18E+00	3.16E+00	3.17E+00	5.29E+00	U	pCi/g

CU=Counting Uncertainty;CSU=Combined Standard Uncertainty (1-sigma);MDA=Minimal Detected Activity;LCS=Laboratory Control Sample;MBL=Blank;DUP=Duplicate;TRG=Normal Sample;DO=Duplicate Original;U=Non-detect



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Eberline Analytical Final Report of Analysis			Report To:					Work Order Details:						
			Patricia Giza					SDG:	19-12037					
			Zion Solutions					Purchase Order:	677118					
			2701 Deborah Ave					Analysis Category:	ENVIRONMENTAL					
			Zion, IL 60099					Sample Matrix:	SO					
Lab ID	Sample Type	Client ID	Sample Date	Receipt Date	Analysis Date	Batch ID	Analyte	Method	Result	CU	CSU	MDA	Qualifier	Report Units
19-12037-01	LCS	KNOWN	12/09/19 00:00	12/9/2019	12/17/2019	19-12037	Nickel-63	ASTM 3500-Ni Modified	1.52E+03	4.57E+01				pCi/g
19-12037-01	LCS	SPIKE	12/09/19 00:00	12/9/2019	12/17/2019	19-12037	Nickel-63	ASTM 3500-Ni Modified	1.54E+03	1.35E+01	9.17E+01	3.20E+00		pCi/g
19-12037-02	MBL	BLANK	12/09/19 00:00	12/9/2019	12/17/2019	19-12037	Nickel-63	ASTM 3500-Ni Modified	0.00E+00	1.82E+00	1.82E+00	3.15E+00	U	pCi/g
19-12037-03	DUP	L1-10206-A-FSGS-003-SS-A	11/09/19 08:30	12/9/2019	12/17/2019	19-12037	Nickel-63	ASTM 3500-Ni Modified	8.23E-01	1.91E+00	1.91E+00	3.25E+00	U	pCi/g
19-12037-04	DO	L1-10206-A-FSGS-003-SS-A	11/09/19 08:30	12/9/2019	12/17/2019	19-12037	Nickel-63	ASTM 3500-Ni Modified	2.68E-01	1.85E+00	1.85E+00	3.18E+00	U	pCi/g
19-12037-05	DO	L1-10206-A-FSGS-011-SS-A	11/09/19 08:20	12/9/2019	12/17/2019	19-12037	Nickel-63	ASTM 3500-Ni Modified	3.63E-01	1.88E+00	1.88E+00	3.23E+00	U	pCi/g
19-12037-06	TRG	L1-10206-A-FQGS-005-SS-A	11/09/19 08:05	12/9/2019	12/17/2019	19-12037	Nickel-63	ASTM 3500-Ni Modified	9.25E-01	1.94E+00	1.94E+00	3.29E+00	U	pCi/g
19-12037-07	TRG	L1-10206-A-FSGS-003-SB-A	11/22/19 08:04	12/9/2019	12/17/2019	19-12037	Nickel-63	ASTM 3500-Ni Modified	1.12E+00	1.81E+00	1.81E+00	3.07E+00	U	pCi/g
19-12037-08	TRG	L1-10206-B-FSGS-010-SS-A	10/28/19 13:18	12/9/2019	12/17/2019	19-12037	Nickel-63	ASTM 3500-Ni Modified	-3.65E-01	1.87E+00	1.87E+00	3.25E+00	U	pCi/g
19-12037-09	TRG	L1-10206-B-FSGS-012-SS-A	10/28/19 13:22	12/9/2019	12/18/2019	19-12037	Nickel-63	ASTM 3500-Ni Modified	6.44E-01	1.92E+00	1.92E+00	3.27E+00	U	pCi/g
19-12037-10	TRG	L1-10206-B-FSGS-004-SS-A	11/19/19 12:32	12/9/2019	12/18/2019	19-12037	Nickel-63	ASTM 3500-Ni Modified	3.62E-01	1.88E+00	1.88E+00	3.22E+00	U	pCi/g
19-12037-11	TRG	L1-10206-C-FSGS-007-SS-A	10/28/19 09:12	12/9/2019	12/18/2019	19-12037	Nickel-63	ASTM 3500-Ni Modified	4.46E-01	1.85E+00	1.85E+00	3.18E+00	U	pCi/g
19-12037-12	TRG	L1-10206-C-FSGS-011-SS-A	10/28/19 09:20	12/9/2019	12/18/2019	19-12037	Nickel-63	ASTM 3500-Ni Modified	8.77E+00	2.06E+00	2.13E+00	3.12E+00		pCi/g
19-12037-13	TRG	L1-10206-D-FSGS-001-SS-A	11/04/19 08:20	12/9/2019	12/18/2019	19-12037	Nickel-63	ASTM 3500-Ni Modified	5.96E-01	1.77E+00	1.77E+00	3.03E+00	U	pCi/g
19-12037-14	TRG	L1-10206-D-FSGS-017-SS-A	11/04/19 08:52	12/9/2019	12/18/2019	19-12037	Nickel-63	ASTM 3500-Ni Modified	1.76E-01	1.82E+00	1.82E+00	3.14E+00	U	pCi/g
19-12037-15	TRG	L1-10206-E-FSGS-002-SS-A	11/05/19 09:02	12/9/2019	12/18/2019	19-12037	Nickel-63	ASTM 3500-Ni Modified	6.27E-01	1.87E+00	1.87E+00	3.19E+00	U	pCi/g
19-12037-16	TRG	L1-10206-E-FSGS-014-SS-A	11/05/19 09:26	12/9/2019	12/18/2019	19-12037	Nickel-63	ASTM 3500-Ni Modified	1.45E+00	1.91E+00	1.91E+00	3.22E+00	U	pCi/g
19-12037-17	TRG	L1-12205-B-FSGS-116-SB-A	10/01/19 08:35	12/9/2019	12/18/2019	19-12037	Nickel-63	ASTM 3500-Ni Modified	-2.68E-01	1.83E+00	1.83E+00	3.18E+00	U	pCi/g
19-12037-18	TRG	L1-12205-C-FSGS-109-SS-A	09/24/19 09:24	12/9/2019	12/18/2019	19-12037	Nickel-63	ASTM 3500-Ni Modified	8.88E-01	2.32E+00	2.32E+00	3.95E+00	U	pCi/g
19-12037-19	TRG	L1-12209-C-FSGS-009-SS-A	11/22/19 14:34	12/9/2019	12/18/2019	19-12037	Nickel-63	ASTM 3500-Ni Modified	-1.08E+01	1.61E+00	1.73E+00	3.42E+00	U	pCi/g

CU=Counting Uncertainty;CSU=Combined Standard Uncertainty (1-sigma);MDA=Minimal Detected Activity;LCS=Laboratory Control Sample;MBL=Blank;DUP=Duplicate;TRG=Normal Sample;DO=Duplicate Original;U=Non-detect



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Eberline Analytical Final Report of Analysis			Report To:						Work Order Details:						
			Patricia Giza						SDG:	19-12037					
			Zion Solutions						Purchase Order:	677118					
			2701 Deborah Ave						Analysis Category:	ENVIRONMENTAL					
			Zion, IL 60099						Sample Matrix:	SO					
Lab ID	Sample Type	Client ID	Sample Date	Receipt Date	Analysis Date	Batch ID	Analyte	Method	Result	CU	CSU	MDA	Qualifier	Report Units	
19-12037-01	LCS	KNOWN	12/09/19 00:00	12/9/2019	12/17/2019	19-12037	Strontium-90	EiChroM SRW01 Modified	5.03E+01	2.82E-01				pCi/g	
19-12037-01	LCS	SPIKE	12/09/19 00:00	12/9/2019	12/17/2019	19-12037	Strontium-90	EiChroM SRW01 Modified	4.87E+01	1.36E+00	1.70E+01	7.09E-01		pCi/g	
19-12037-02	MBL	BLANK	12/09/19 00:00	12/9/2019	12/17/2019	19-12037	Strontium-90	EiChroM SRW01 Modified	2.09E-02	3.95E-01	3.95E-01	8.42E-01	U	pCi/g	
19-12037-03	DUP	L1-10206-A-FSGS-003-SS-A	11/09/19 08:30	12/9/2019	12/17/2019	19-12037	Strontium-90	EiChroM SRW01 Modified	1.58E-01	3.04E-01	3.09E-01	6.33E-01	U	pCi/g	
19-12037-04	DO	L1-10206-A-FSGS-003-SS-A	11/09/19 08:30	12/9/2019	12/17/2019	19-12037	Strontium-90	EiChroM SRW01 Modified	-6.67E-02	3.01E-01	3.02E-01	6.52E-01	U	pCi/g	
19-12037-05	TRG	L1-10206-A-FSGS-011-SS-A	11/09/19 08:20	12/9/2019	12/17/2019	19-12037	Strontium-90	EiChroM SRW01 Modified	3.78E-02	2.71E-01	2.71E-01	5.75E-01	U	pCi/g	
19-12037-06	TRG	L1-10206-A-FQGS-005-SS-A	11/09/19 08:05	12/9/2019	12/17/2019	19-12037	Strontium-90	EiChroM SRW01 Modified	-2.29E-01	3.45E-01	3.54E-01	7.60E-01	U	pCi/g	
19-12037-07	TRG	L1-10206-A-FSGS-003-SB-A	11/22/19 08:04	12/9/2019	12/17/2019	19-12037	Strontium-90	EiChroM SRW01 Modified	1.95E-01	2.78E-01	2.86E-01	5.73E-01	U	pCi/g	
19-12037-08	TRG	L1-10206-B-FSGS-010-SS-A	10/28/19 13:18	12/9/2019	12/17/2019	19-12037	Strontium-90	EiChroM SRW01 Modified	2.71E-01	2.76E-01	2.92E-01	5.59E-01	U	pCi/g	
19-12037-09	TRG	L1-10206-B-FSGS-012-SS-A	10/28/19 13:22	12/9/2019	12/17/2019	19-12037	Strontium-90	EiChroM SRW01 Modified	-6.10E-02	3.44E-01	3.45E-01	7.39E-01	U	pCi/g	
19-12037-10	TRG	L1-10206-B-FIGS-004-SS-A	11/19/19 12:32	12/9/2019	12/17/2019	19-12037	Strontium-90	EiChroM SRW01 Modified	-1.30E-01	2.95E-01	2.99E-01	6.51E-01	U	pCi/g	
19-12037-11	TRG	L1-10206-C-FSGS-007-SS-A	10/28/19 09:12	12/9/2019	12/17/2019	19-12037	Strontium-90	EiChroM SRW01 Modified	-1.49E-01	2.96E-01	3.01E-01	6.52E-01	U	pCi/g	
19-12037-12	TRG	L1-10206-C-FSGS-011-SS-A	10/28/19 09:20	12/9/2019	12/17/2019	19-12037	Strontium-90	EiChroM SRW01 Modified	2.76E-02	3.53E-01	3.53E-01	7.51E-01	U	pCi/g	
19-12037-13	TRG	L1-10206-D-FIGS-001-SS-A	11/04/19 08:20	12/9/2019	12/17/2019	19-12037	Strontium-90	EiChroM SRW01 Modified	-1.44E-01	3.53E-01	3.56E-01	7.69E-01	U	pCi/g	
19-12037-14	TRG	L1-10206-D-FSGS-017-SS-A	11/04/19 08:52	12/9/2019	12/17/2019	19-12037	Strontium-90	EiChroM SRW01 Modified	6.62E-02	3.07E-01	3.08E-01	6.56E-01	U	pCi/g	
19-12037-15	TRG	L1-10206-E-FSGS-002-SS-A	11/05/19 09:02	12/9/2019	12/17/2019	19-12037	Strontium-90	EiChroM SRW01 Modified	-6.35E-02	3.39E-01	3.39E-01	7.35E-01	U	pCi/g	
19-12037-16	TRG	L1-10206-E-FSGS-014-SS-A	11/05/19 09:26	12/9/2019	12/17/2019	19-12037	Strontium-90	EiChroM SRW01 Modified	4.04E-01	4.05E-01	4.29E-01	8.20E-01	U	pCi/g	
19-12037-17	TRG	L1-12205-B-FSGS-116-SB-A	10/01/19 08:35	12/9/2019	12/17/2019	19-12037	Strontium-90	EiChroM SRW01 Modified	-1.85E-01	3.26E-01	3.32E-01	7.18E-01	U	pCi/g	
19-12037-18	TRG	L1-12205-C-FSGS-109-SS-A	09/24/19 09:24	12/9/2019	12/17/2019	19-12037	Strontium-90	EiChroM SRW01 Modified	1.13E-01	3.65E-01	3.67E-01	7.66E-01	U	pCi/g	
19-12037-19	TRG	L1-12209-C-FIGS-009-SS-A	11/22/19 14:34	12/9/2019	12/17/2019	19-12037	Strontium-90	EiChroM SRW01 Modified	-1.37E-01	3.54E-01	3.57E-01	7.75E-01	U	pCi/g	
19-12037-01	LCS	KNOWN	12/09/19 00:00	12/9/2019	12/11/2019	19-12037	Cobalt-60	EPA 901.1 Modified	1.31E+02	5.10E+00				pCi/g	
19-12037-01	LCS	KNOWN	12/09/19 00:00	12/9/2019	12/11/2019	19-12037	Cesium-137	EPA 901.1 Modified	8.26E+01	3.39E+00				pCi/g	
19-12037-01	LCS	SPIKE	12/09/19 00:00	12/9/2019	12/11/2019	19-12037	Cobalt-60	EPA 901.1 Modified	1.30E+02	7.95E+00	1.04E+01	1.56E+00		pCi/g	
19-12037-01	LCS	SPIKE	12/09/19 00:00	12/9/2019	12/11/2019	19-12037	Cesium-137	EPA 901.1 Modified	8.53E+01	7.65E+00	8.82E+00	2.07E+00		pCi/g	

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Eberline Analytical Final Report of Analysis			Report To:					Work Order Details:						
			Patricia Giza					SDG:	19-12037					
			Zion Solutions					Purchase Order:	677118					
			2701 Deborah Ave					Analysis Category:	ENVIRONMENTAL					
			Zion, IL 60099					Sample Matrix:	SO					
Lab ID	Sample Type	Client ID	Sample Date	Receipt Date	Analysis Date	Batch ID	Analyte	Method	Result	CU	CSU	MDA	Qualifier	Report Units
19-12037-02	MBL	BLANK	12/09/19 00:00	12/9/2019	12/11/2019	19-12037	Actinium-228	EPA 901.1 Modified	-3.08E-02	7.95E-02	7.95E-02	1.06E-01	U	pCi/g
19-12037-02	MBL	BLANK	12/09/19 00:00	12/9/2019	12/11/2019	19-12037	Silver-108m	EPA 901.1 Modified	-3.05E-05	1.93E-02	1.93E-02	2.53E-02	U	pCi/g
19-12037-02	MBL	BLANK	12/09/19 00:00	12/9/2019	12/11/2019	19-12037	Americium-241	EPA 901.1 Modified	-1.62E-02	4.67E-02	4.67E-02	6.50E-02	U	pCi/g
19-12037-02	MBL	BLANK	12/09/19 00:00	12/9/2019	12/11/2019	19-12037	Barium-133	EPA 901.1 Modified	-8.12E-03	2.49E-02	2.49E-02	3.55E-02	U	pCi/g
19-12037-02	MBL	BLANK	12/09/19 00:00	12/9/2019	12/11/2019	19-12037	Bismuth-214	EPA 901.1 Modified	3.61E-03	4.48E-02	4.48E-02	6.53E-02	U	pCi/g
19-12037-02	MBL	BLANK	12/09/19 00:00	12/9/2019	12/11/2019	19-12037	Cobalt-60	EPA 901.1 Modified	0.00E+00	1.76E-02	1.76E-02	2.98E-02	U	pCi/g
19-12037-02	MBL	BLANK	12/09/19 00:00	12/9/2019	12/11/2019	19-12037	Cesium-134	EPA 901.1 Modified	4.47E-03	2.31E-02	2.31E-02	3.03E-02	U	pCi/g
19-12037-02	MBL	BLANK	12/09/19 00:00	12/9/2019	12/11/2019	19-12037	Cesium-137	EPA 901.1 Modified	-1.45E-02	2.31E-02	2.32E-02	2.86E-02	U	pCi/g
19-12037-02	MBL	BLANK	12/09/19 00:00	12/9/2019	12/11/2019	19-12037	Europium-152	EPA 901.1 Modified	3.86E-03	7.12E-02	7.12E-02	8.25E-02	U	pCi/g
19-12037-02	MBL	BLANK	12/09/19 00:00	12/9/2019	12/11/2019	19-12037	Europium-154	EPA 901.1 Modified	2.16E-02	3.74E-02	3.74E-02	4.11E-02	U	pCi/g
19-12037-02	MBL	BLANK	12/09/19 00:00	12/9/2019	12/11/2019	19-12037	Europium-155	EPA 901.1 Modified	2.08E-02	2.54E-02	2.54E-02	6.13E-02	U	pCi/g
19-12037-02	MBL	BLANK	12/09/19 00:00	12/9/2019	12/11/2019	19-12037	Holmium-166m	EPA 901.1 Modified	3.23E-02	3.61E-02	3.61E-02	3.23E-02	U	pCi/g
19-12037-02	MBL	BLANK	12/09/19 00:00	12/9/2019	12/11/2019	19-12037	Iodine-129	EPA 901.1 Modified	-3.67E-02	7.81E-02	7.81E-02	1.11E-01	U	pCi/g
19-12037-02	MBL	BLANK	12/09/19 00:00	12/9/2019	12/11/2019	19-12037	Potassium-40	EPA 901.1 Modified	-7.72E-03	1.77E-01	1.77E-01	3.10E-01	U	pCi/g
19-12037-02	MBL	BLANK	12/09/19 00:00	12/9/2019	12/11/2019	19-12037	Manganese-54	EPA 901.1 Modified	1.58E-02	1.61E-02	1.61E-02	3.07E-02	U	pCi/g
19-12037-02	MBL	BLANK	12/09/19 00:00	12/9/2019	12/11/2019	19-12037	Molybdenum-93	EPA 901.1 Modified	1.32E-02	1.66E-02	1.66E-02	1.80E-02	U	pCi/g
19-12037-02	MBL	BLANK	12/09/19 00:00	12/9/2019	12/11/2019	19-12037	Niobium-94	EPA 901.1 Modified	-9.82E-03	1.99E-02	1.99E-02	2.46E-02	U	pCi/g
19-12037-02	MBL	BLANK	12/09/19 00:00	12/9/2019	12/11/2019	19-12037	Lead-210	EPA 901.1 Modified	4.50E-01	3.88E-01	3.89E-01	6.17E-01	U	pCi/g
19-12037-02	MBL	BLANK	12/09/19 00:00	12/9/2019	12/11/2019	19-12037	Lead-212	EPA 901.1 Modified	1.52E-02	3.05E-02	3.05E-02	4.82E-02	U	pCi/g
19-12037-02	MBL	BLANK	12/09/19 00:00	12/9/2019	12/11/2019	19-12037	Lead-214	EPA 901.1 Modified	2.44E-02	3.80E-02	3.81E-02	6.40E-02	U	pCi/g
19-12037-02	MBL	BLANK	12/09/19 00:00	12/9/2019	12/11/2019	19-12037	Promethium-145	EPA 901.1 Modified	6.55E-03	3.34E-02	3.34E-02	9.53E-02	U	pCi/g
19-12037-02	MBL	BLANK	12/09/19 00:00	12/9/2019	12/11/2019	19-12037	Radium-226	EPA 901.1 Modified	3.61E-03	4.48E-02	4.48E-02	6.53E-02	U	pCi/g
19-12037-02	MBL	BLANK	12/09/19 00:00	12/9/2019	12/11/2019	19-12037	Antimony-125	EPA 901.1 Modified	-7.85E-02	5.40E-02	5.41E-02	5.50E-02	U	pCi/g
19-12037-02	MBL	BLANK	12/09/19 00:00	12/9/2019	12/11/2019	19-12037	Thorium-234	EPA 901.1 Modified	9.85E-01	3.89E-01	3.92E-01	6.77E-01	U	pCi/g
19-12037-02	MBL	BLANK	12/09/19 00:00	12/9/2019	12/11/2019	19-12037	Thallium-208	EPA 901.1 Modified	3.56E-02	5.41E-02	5.42E-02	8.95E-02	U	pCi/g
19-12037-02	MBL	BLANK	12/09/19 00:00	12/9/2019	12/11/2019	19-12037	Uranium-235	EPA 901.1 Modified	2.89E-02	1.14E-01	1.14E-01	1.76E-01	U	pCi/g

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			Patricia Giza						SDG:		19-12037				
			Zion Solutions						Purchase Order:		677118				
			2701 Deborah Ave						Analysis Category:		ENVIRONMENTAL				
			Zion, IL 60099						Sample Matrix:		SO				
Lab ID	Sample Type	Client ID	Sample Date	Receipt Date	Analysis Date	Batch ID	Analyte	Method	Result	CU	CSU	MDA	Qualifier	Report Units	
19-12037-03	DUP	L1-10206-A-FSGS-003-SS-A	11/09/19 08:30	12/9/2019	12/11/2019	19-12037	Actinium-228	EPA 901.1 Modified	4.10E-01	1.80E-01	1.82E-01	3.34E-01		pCi/g	
19-12037-03	DUP	L1-10206-A-FSGS-003-SS-A	11/09/19 08:30	12/9/2019	12/11/2019	19-12037	Silver-108m	EPA 901.1 Modified	1.15E-02	4.04E-02	4.04E-02	6.38E-02	U	pCi/g	
19-12037-03	DUP	L1-10206-A-FSGS-003-SS-A	11/09/19 08:30	12/9/2019	12/11/2019	19-12037	Americium-241	EPA 901.1 Modified	-7.99E-02	1.09E-01	1.09E-01	1.29E-01	U	pCi/g	
19-12037-03	DUP	L1-10206-A-FSGS-003-SS-A	11/09/19 08:30	12/9/2019	12/11/2019	19-12037	Barium-133	EPA 901.1 Modified	5.66E-02	4.01E-02	4.02E-02	7.43E-02	U	pCi/g	
19-12037-03	DUP	L1-10206-A-FSGS-003-SS-A	11/09/19 08:30	12/9/2019	12/11/2019	19-12037	Bismuth-214	EPA 901.1 Modified	2.71E-01	1.09E-01	1.10E-01	1.71E-01		pCi/g	
19-12037-03	DUP	L1-10206-A-FSGS-003-SS-A	11/09/19 08:30	12/9/2019	12/11/2019	19-12037	Cobalt-60	EPA 901.1 Modified	4.93E-02	2.94E-02	2.95E-02	6.34E-02	U	pCi/g	
19-12037-03	DUP	L1-10206-A-FSGS-003-SS-A	11/09/19 08:30	12/9/2019	12/11/2019	19-12037	Cesium-134	EPA 901.1 Modified	1.53E-02	2.31E-02	2.31E-02	6.82E-02	U	pCi/g	
19-12037-03	DUP	L1-10206-A-FSGS-003-SS-A	11/09/19 08:30	12/9/2019	12/11/2019	19-12037	Cesium-137	EPA 901.1 Modified	2.29E+00	2.43E-01	2.70E-01	1.05E-01		pCi/g	
19-12037-03	DUP	L1-10206-A-FSGS-003-SS-A	11/09/19 08:30	12/9/2019	12/11/2019	19-12037	Europium-152	EPA 901.1 Modified	1.10E-02	1.27E-01	1.27E-01	2.03E-01	U	pCi/g	
19-12037-03	DUP	L1-10206-A-FSGS-003-SS-A	11/09/19 08:30	12/9/2019	12/11/2019	19-12037	Europium-154	EPA 901.1 Modified	0.00E+00	6.24E-02	6.24E-02	1.04E-01	U	pCi/g	
19-12037-03	DUP	L1-10206-A-FSGS-003-SS-A	11/09/19 08:30	12/9/2019	12/11/2019	19-12037	Europium-155	EPA 901.1 Modified	-6.58E-02	1.16E-01	1.16E-01	1.42E-01	U	pCi/g	
19-12037-03	DUP	L1-10206-A-FSGS-003-SS-A	11/09/19 08:30	12/9/2019	12/11/2019	19-12037	Holmium-166m	EPA 901.1 Modified	3.52E-03	6.25E-02	6.25E-02	7.59E-02	U	pCi/g	
19-12037-03	DUP	L1-10206-A-FSGS-003-SS-A	11/09/19 08:30	12/9/2019	12/11/2019	19-12037	Iodine-129	EPA 901.1 Modified	-4.47E-02	1.51E-01	1.52E-01	1.84E-01	U	pCi/g	
19-12037-03	DUP	L1-10206-A-FSGS-003-SS-A	11/09/19 08:30	12/9/2019	12/11/2019	19-12037	Potassium-40	EPA 901.1 Modified	9.09E+00	1.37E+00	1.45E+00	6.99E-01		pCi/g	
19-12037-03	DUP	L1-10206-A-FSGS-003-SS-A	11/09/19 08:30	12/9/2019	12/11/2019	19-12037	Manganese-54	EPA 901.1 Modified	-5.03E-02	4.46E-02	4.47E-02	5.14E-02	U	pCi/g	
19-12037-03	DUP	L1-10206-A-FSGS-003-SS-A	11/09/19 08:30	12/9/2019	12/11/2019	19-12037	Molybdenum-93	EPA 901.1 Modified	-1.28E-02	3.63E-02	3.63E-02	4.78E-02	U	pCi/g	
19-12037-03	DUP	L1-10206-A-FSGS-003-SS-A	11/09/19 08:30	12/9/2019	12/11/2019	19-12037	Niobium-94	EPA 901.1 Modified	-6.57E-03	3.33E-02	3.33E-02	5.07E-02	U	pCi/g	
19-12037-03	DUP	L1-10206-A-FSGS-003-SS-A	11/09/19 08:30	12/9/2019	12/11/2019	19-12037	Lead-210	EPA 901.1 Modified	1.30E+00	1.25E+00	1.25E+00	2.08E+00	U	pCi/g	
19-12037-03	DUP	L1-10206-A-FSGS-003-SS-A	11/09/19 08:30	12/9/2019	12/11/2019	19-12037	Lead-212	EPA 901.1 Modified	3.80E-01	1.38E-01	1.40E-01	2.01E-01		pCi/g	
19-12037-03	DUP	L1-10206-A-FSGS-003-SS-A	11/09/19 08:30	12/9/2019	12/11/2019	19-12037	Lead-214	EPA 901.1 Modified	3.35E-01	1.22E-01	1.23E-01	2.09E-01		pCi/g	
19-12037-03	DUP	L1-10206-A-FSGS-003-SS-A	11/09/19 08:30	12/9/2019	12/11/2019	19-12037	Promethium-145	EPA 901.1 Modified	5.29E-02	1.59E-01	1.59E-01	2.10E-01	U	pCi/g	
19-12037-03	DUP	L1-10206-A-FSGS-003-SS-A	11/09/19 08:30	12/9/2019	12/11/2019	19-12037	Radium-226	EPA 901.1 Modified	2.71E-01	1.09E-01	1.10E-01	1.71E-01		pCi/g	
19-12037-03	DUP	L1-10206-A-FSGS-003-SS-A	11/09/19 08:30	12/9/2019	12/11/2019	19-12037	Antimony-125	EPA 901.1 Modified	-2.75E-02	1.29E-01	1.29E-01	2.05E-01	U	pCi/g	
19-12037-03	DUP	L1-10206-A-FSGS-003-SS-A	11/09/19 08:30	12/9/2019	12/11/2019	19-12037	Thorium-234	EPA 901.1 Modified	8.53E-01	9.90E-01	9.91E-01	1.35E+00	U	pCi/g	
19-12037-03	DUP	L1-10206-A-FSGS-003-SS-A	11/09/19 08:30	12/9/2019	12/11/2019	19-12037	Thallium-208	EPA 901.1 Modified	2.87E-01	1.35E-01	1.36E-01	2.17E-01		pCi/g	
19-12037-03	DUP	L1-10206-A-FSGS-003-SS-A	11/09/19 08:30	12/9/2019	12/11/2019	19-12037	Uranium-235	EPA 901.1 Modified	-1.03E-01	3.25E-01	3.25E-01	4.10E-01	U	pCi/g	

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			Zion, IL 60099					Sample Matrix:	SO					
Lab ID	Sample Type	Client ID	Sample Date	Receipt Date	Analysis Date	Batch ID	Analyte	Method	Result	CU	CSU	MDA	Qualifier	Report Units
19-12037-04	DO	L1-10206-A-FSGS-003-SS-A	11/09/19 08:30	12/9/2019	12/11/2019	19-12037	Actinium-228	EPA 901.1 Modified	3.44E-01	1.51E-01	1.52E-01	2.90E-01		pCi/g
19-12037-04	DO	L1-10206-A-FSGS-003-SS-A	11/09/19 08:30	12/9/2019	12/11/2019	19-12037	Silver-108m	EPA 901.1 Modified	-7.62E-03	4.12E-02	4.12E-02	6.22E-02	U	pCi/g
19-12037-04	DO	L1-10206-A-FSGS-003-SS-A	11/09/19 08:30	12/9/2019	12/11/2019	19-12037	Americium-241	EPA 901.1 Modified	-5.04E-02	1.08E-01	1.09E-01	1.31E-01	U	pCi/g
19-12037-04	DO	L1-10206-A-FSGS-003-SS-A	11/09/19 08:30	12/9/2019	12/11/2019	19-12037	Barium-133	EPA 901.1 Modified	-6.98E-03	4.28E-02	4.28E-02	8.80E-02	U	pCi/g
19-12037-04	DO	L1-10206-A-FSGS-003-SS-A	11/09/19 08:30	12/9/2019	12/11/2019	19-12037	Bismuth-214	EPA 901.1 Modified	1.84E-01	9.82E-02	9.86E-02	6.69E-02		pCi/g
19-12037-04	DO	L1-10206-A-FSGS-003-SS-A	11/09/19 08:30	12/9/2019	12/11/2019	19-12037	Cobalt-60	EPA 901.1 Modified	5.49E-02	3.07E-02	3.09E-02	6.35E-02	U	pCi/g
19-12037-04	DO	L1-10206-A-FSGS-003-SS-A	11/09/19 08:30	12/9/2019	12/11/2019	19-12037	Cesium-134	EPA 901.1 Modified	8.78E-03	2.71E-02	2.71E-02	6.49E-02	U	pCi/g
19-12037-04	DO	L1-10206-A-FSGS-003-SS-A	11/09/19 08:30	12/9/2019	12/11/2019	19-12037	Cesium-137	EPA 901.1 Modified	2.35E+00	2.48E-01	2.76E-01	1.05E-01		pCi/g
19-12037-04	DO	L1-10206-A-FSGS-003-SS-A	11/09/19 08:30	12/9/2019	12/11/2019	19-12037	Europium-152	EPA 901.1 Modified	3.32E-02	1.70E-01	1.70E-01	2.01E-01	U	pCi/g
19-12037-04	DO	L1-10206-A-FSGS-003-SS-A	11/09/19 08:30	12/9/2019	12/11/2019	19-12037	Europium-154	EPA 901.1 Modified	8.71E-02	1.12E-01	1.12E-01	9.90E-02	U	pCi/g
19-12037-04	DO	L1-10206-A-FSGS-003-SS-A	11/09/19 08:30	12/9/2019	12/11/2019	19-12037	Europium-155	EPA 901.1 Modified	-9.54E-02	1.26E-01	1.26E-01	1.54E-01	U	pCi/g
19-12037-04	DO	L1-10206-A-FSGS-003-SS-A	11/09/19 08:30	12/9/2019	12/11/2019	19-12037	Holmium-166m	EPA 901.1 Modified	-1.32E-02	3.98E-02	3.99E-02	7.47E-02	U	pCi/g
19-12037-04	DO	L1-10206-A-FSGS-003-SS-A	11/09/19 08:30	12/9/2019	12/11/2019	19-12037	Iodine-129	EPA 901.1 Modified	-9.48E-04	1.41E-01	1.41E-01	1.83E-01	U	pCi/g
19-12037-04	DO	L1-10206-A-FSGS-003-SS-A	11/09/19 08:30	12/9/2019	12/11/2019	19-12037	Potassium-40	EPA 901.1 Modified	9.03E+00	1.36E+00	1.43E+00	6.39E-01		pCi/g
19-12037-04	DO	L1-10206-A-FSGS-003-SS-A	11/09/19 08:30	12/9/2019	12/11/2019	19-12037	Manganese-54	EPA 901.1 Modified	-8.51E-03	4.33E-02	4.33E-02	6.58E-02	U	pCi/g
19-12037-04	DO	L1-10206-A-FSGS-003-SS-A	11/09/19 08:30	12/9/2019	12/11/2019	19-12037	Molybdenum-93	EPA 901.1 Modified	2.79E-02	3.16E-02	3.16E-02	5.38E-02	U	pCi/g
19-12037-04	DO	L1-10206-A-FSGS-003-SS-A	11/09/19 08:30	12/9/2019	12/11/2019	19-12037	Niobium-94	EPA 901.1 Modified	3.23E-03	2.65E-02	2.65E-02	4.46E-02	U	pCi/g
19-12037-04	DO	L1-10206-A-FSGS-003-SS-A	11/09/19 08:30	12/9/2019	12/11/2019	19-12037	Lead-210	EPA 901.1 Modified	1.14E+00	1.19E+00	1.19E+00	1.98E+00	U	pCi/g
19-12037-04	DO	L1-10206-A-FSGS-003-SS-A	11/09/19 08:30	12/9/2019	12/11/2019	19-12037	Lead-212	EPA 901.1 Modified	4.12E-01	1.31E-01	1.32E-01	1.80E-01		pCi/g
19-12037-04	DO	L1-10206-A-FSGS-003-SS-A	11/09/19 08:30	12/9/2019	12/11/2019	19-12037	Lead-214	EPA 901.1 Modified	2.19E-01	1.36E-01	1.37E-01	2.66E-01	U	pCi/g
19-12037-04	DO	L1-10206-A-FSGS-003-SS-A	11/09/19 08:30	12/9/2019	12/11/2019	19-12037	Promethium-145	EPA 901.1 Modified	1.21E-01	1.58E-01	1.58E-01	2.16E-01	U	pCi/g
19-12037-04	DO	L1-10206-A-FSGS-003-SS-A	11/09/19 08:30	12/9/2019	12/11/2019	19-12037	Radium-226	EPA 901.1 Modified	1.84E-01	9.82E-02	9.86E-02	6.69E-02		pCi/g
19-12037-04	DO	L1-10206-A-FSGS-003-SS-A	11/09/19 08:30	12/9/2019	12/11/2019	19-12037	Antimony-125	EPA 901.1 Modified	4.78E-02	1.17E-01	1.17E-01	1.97E-01	U	pCi/g
19-12037-04	DO	L1-10206-A-FSGS-003-SS-A	11/09/19 08:30	12/9/2019	12/11/2019	19-12037	Thorium-234	EPA 901.1 Modified	1.42E-01	9.76E-01	9.76E-01	1.28E+00	U	pCi/g
19-12037-04	DO	L1-10206-A-FSGS-003-SS-A	11/09/19 08:30	12/9/2019	12/11/2019	19-12037	Thallium-208	EPA 901.1 Modified	3.59E-01	1.21E-01	1.22E-01	1.69E-01		pCi/g
19-12037-04	DO	L1-10206-A-FSGS-003-SS-A	11/09/19 08:30	12/9/2019	12/11/2019	19-12037	Uranium-235	EPA 901.1 Modified	2.59E-01	3.00E-01	3.01E-01	4.25E-01	U	pCi/g

CU=Counting Uncertainty;CSU=Combined Standard Uncertainty (1-sigma);MDA=Minimal Detected Activity;LCS=Laboratory Control Sample;MBL=Blank;DUP=Duplicate;TRG=Normal Sample;DO=Duplicate Original;U=Non-detect



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Eberline Analytical Final Report of Analysis			Report To:					Work Order Details:						
			Patricia Giza					SDG:	19-12037					
			Zion Solutions					Purchase Order:	677118					
			2701 Deborah Ave					Analysis Category:	ENVIRONMENTAL					
			Zion, IL 60099					Sample Matrix:	SO					
Lab ID	Sample Type	Client ID	Sample Date	Receipt Date	Analysis Date	Batch ID	Analyte	Method	Result	CU	CSU	MDA	Qualifier	Report Units
19-12037-05	TRG	L1-10206-A-FSGS-011-SS-A	11/09/19 08:20	12/9/2019	12/11/2019	19-12037	Actinium-228	EPA 901.1 Modified	4.42E-01	1.80E-01	1.81E-01	3.92E-01		pCi/g
19-12037-05	TRG	L1-10206-A-FSGS-011-SS-A	11/09/19 08:20	12/9/2019	12/11/2019	19-12037	Silver-108m	EPA 901.1 Modified	-1.24E-02	1.85E-02	1.85E-02	6.74E-02	U	pCi/g
19-12037-05	TRG	L1-10206-A-FSGS-011-SS-A	11/09/19 08:20	12/9/2019	12/11/2019	19-12037	Americium-241	EPA 901.1 Modified	-1.11E-01	1.01E-01	1.01E-01	1.47E-01	U	pCi/g
19-12037-05	TRG	L1-10206-A-FSGS-011-SS-A	11/09/19 08:20	12/9/2019	12/11/2019	19-12037	Barium-133	EPA 901.1 Modified	1.30E-02	2.37E-02	2.37E-02	1.25E-01	U	pCi/g
19-12037-05	TRG	L1-10206-A-FSGS-011-SS-A	11/09/19 08:20	12/9/2019	12/11/2019	19-12037	Bismuth-214	EPA 901.1 Modified	3.76E-01	1.16E-01	1.18E-01	2.32E-01		pCi/g
19-12037-05	TRG	L1-10206-A-FSGS-011-SS-A	11/09/19 08:20	12/9/2019	12/11/2019	19-12037	Cobalt-60	EPA 901.1 Modified	5.60E-02	6.71E-02	6.72E-02	9.08E-02	U	pCi/g
19-12037-05	TRG	L1-10206-A-FSGS-011-SS-A	11/09/19 08:20	12/9/2019	12/11/2019	19-12037	Cesium-134	EPA 901.1 Modified	-2.25E-01	9.89E-02	9.96E-02	7.67E-02	U	pCi/g
19-12037-05	TRG	L1-10206-A-FSGS-011-SS-A	11/09/19 08:20	12/9/2019	12/11/2019	19-12037	Cesium-137	EPA 901.1 Modified	1.25E-01	6.46E-02	6.50E-02	9.62E-02		pCi/g
19-12037-05	TRG	L1-10206-A-FSGS-011-SS-A	11/09/19 08:20	12/9/2019	12/11/2019	19-12037	Europium-152	EPA 901.1 Modified	-5.76E-02	1.43E-01	1.44E-01	2.03E-01	U	pCi/g
19-12037-05	TRG	L1-10206-A-FSGS-011-SS-A	11/09/19 08:20	12/9/2019	12/11/2019	19-12037	Europium-154	EPA 901.1 Modified	-1.21E-02	1.53E-01	1.53E-01	1.02E-01	U	pCi/g
19-12037-05	TRG	L1-10206-A-FSGS-011-SS-A	11/09/19 08:20	12/9/2019	12/11/2019	19-12037	Europium-155	EPA 901.1 Modified	-5.57E-04	9.94E-02	9.94E-02	1.65E-01	U	pCi/g
19-12037-05	TRG	L1-10206-A-FSGS-011-SS-A	11/09/19 08:20	12/9/2019	12/11/2019	19-12037	Holmium-166m	EPA 901.1 Modified	9.41E-02	5.00E-02	5.02E-02	8.03E-02		pCi/g
19-12037-05	TRG	L1-10206-A-FSGS-011-SS-A	11/09/19 08:20	12/9/2019	12/11/2019	19-12037	Iodine-129	EPA 901.1 Modified	-1.18E-01	1.39E-01	1.39E-01	3.99E-01	U	pCi/g
19-12037-05	TRG	L1-10206-A-FSGS-011-SS-A	11/09/19 08:20	12/9/2019	12/11/2019	19-12037	Potassium-40	EPA 901.1 Modified	1.16E+01	1.75E+00	1.85E+00	1.83E+00		pCi/g
19-12037-05	TRG	L1-10206-A-FSGS-011-SS-A	11/09/19 08:20	12/9/2019	12/11/2019	19-12037	Manganese-54	EPA 901.1 Modified	4.98E-02	5.13E-02	5.14E-02	9.21E-02	U	pCi/g
19-12037-05	TRG	L1-10206-A-FSGS-011-SS-A	11/09/19 08:20	12/9/2019	12/11/2019	19-12037	Molybdenum-93	EPA 901.1 Modified	-1.78E-02	4.73E-02	4.73E-02	6.30E-02	U	pCi/g
19-12037-05	TRG	L1-10206-A-FSGS-011-SS-A	11/09/19 08:20	12/9/2019	12/11/2019	19-12037	Niobium-94	EPA 901.1 Modified	-4.65E-02	5.42E-02	5.43E-02	6.36E-02	U	pCi/g
19-12037-05	TRG	L1-10206-A-FSGS-011-SS-A	11/09/19 08:20	12/9/2019	12/11/2019	19-12037	Lead-210	EPA 901.1 Modified	1.40E+00	1.48E+00	1.48E+00	2.46E+00	U	pCi/g
19-12037-05	TRG	L1-10206-A-FSGS-011-SS-A	11/09/19 08:20	12/9/2019	12/11/2019	19-12037	Lead-212	EPA 901.1 Modified	4.05E-01	1.13E-01	1.15E-01	3.37E-01		pCi/g
19-12037-05	TRG	L1-10206-A-FSGS-011-SS-A	11/09/19 08:20	12/9/2019	12/11/2019	19-12037	Lead-214	EPA 901.1 Modified	4.65E-01	1.34E-01	1.36E-01	2.37E-01		pCi/g
19-12037-05	TRG	L1-10206-A-FSGS-011-SS-A	11/09/19 08:20	12/9/2019	12/11/2019	19-12037	Promethium-145	EPA 901.1 Modified	1.15E-01	1.71E-01	1.71E-01	2.82E-01	U	pCi/g
19-12037-05	TRG	L1-10206-A-FSGS-011-SS-A	11/09/19 08:20	12/9/2019	12/11/2019	19-12037	Radium-226	EPA 901.1 Modified	3.76E-01	1.16E-01	1.18E-01	2.32E-01		pCi/g
19-12037-05	TRG	L1-10206-A-FSGS-011-SS-A	11/09/19 08:20	12/9/2019	12/11/2019	19-12037	Antimony-125	EPA 901.1 Modified	9.80E-02	1.17E-01	1.17E-01	2.01E-01	U	pCi/g
19-12037-05	TRG	L1-10206-A-FSGS-011-SS-A	11/09/19 08:20	12/9/2019	12/11/2019	19-12037	Thorium-234	EPA 901.1 Modified	1.53E+00	8.52E-01	8.56E-01	1.47E+00	U	pCi/g
19-12037-05	TRG	L1-10206-A-FSGS-011-SS-A	11/09/19 08:20	12/9/2019	12/11/2019	19-12037	Thallium-208	EPA 901.1 Modified	4.08E-01	1.46E-01	1.47E-01	2.63E-01		pCi/g
19-12037-05	TRG	L1-10206-A-FSGS-011-SS-A	11/09/19 08:20	12/9/2019	12/11/2019	19-12037	Uranium-235	EPA 901.1 Modified	-3.17E-01	2.89E-01	2.89E-01	3.88E-01	U	pCi/g

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			Patricia Giza					SDG:	19-12037					
			Zion Solutions					Purchase Order:	677118					
			2701 Deborah Ave					Analysis Category:	ENVIRONMENTAL					
			Zion, IL 60099					Sample Matrix:	SO					
Lab ID	Sample Type	Client ID	Sample Date	Receipt Date	Analysis Date	Batch ID	Analyte	Method	Result	CU	CSU	MDA	Qualifier	Report Units
19-12037-06	TRG	L1-10206-A-FQGS-005-SS-A	11/09/19 08:05	12/9/2019	12/11/2019	19-12037	Actinium-228	EPA 901.1 Modified	5.59E-01	1.99E-01	2.01E-01	3.24E-01		pCi/g
19-12037-06	TRG	L1-10206-A-FQGS-005-SS-A	11/09/19 08:05	12/9/2019	12/11/2019	19-12037	Silver-108m	EPA 901.1 Modified	-1.09E-02	6.57E-02	6.57E-02	6.98E-02	U	pCi/g
19-12037-06	TRG	L1-10206-A-FQGS-005-SS-A	11/09/19 08:05	12/9/2019	12/11/2019	19-12037	Americium-241	EPA 901.1 Modified	-1.39E-01	1.01E-01	1.01E-01	1.51E-01	U	pCi/g
19-12037-06	TRG	L1-10206-A-FQGS-005-SS-A	11/09/19 08:05	12/9/2019	12/11/2019	19-12037	Barium-133	EPA 901.1 Modified	1.78E-02	3.26E-02	3.26E-02	1.26E-01	U	pCi/g
19-12037-06	TRG	L1-10206-A-FQGS-005-SS-A	11/09/19 08:05	12/9/2019	12/11/2019	19-12037	Bismuth-214	EPA 901.1 Modified	4.78E-01	1.43E-01	1.45E-01	9.25E-02		pCi/g
19-12037-06	TRG	L1-10206-A-FQGS-005-SS-A	11/09/19 08:05	12/9/2019	12/11/2019	19-12037	Cobalt-60	EPA 901.1 Modified	2.12E-02	6.49E-02	6.49E-02	1.06E-01	U	pCi/g
19-12037-06	TRG	L1-10206-A-FQGS-005-SS-A	11/09/19 08:05	12/9/2019	12/11/2019	19-12037	Cesium-134	EPA 901.1 Modified	6.32E-03	3.13E-02	3.13E-02	8.51E-02	U	pCi/g
19-12037-06	TRG	L1-10206-A-FQGS-005-SS-A	11/09/19 08:05	12/9/2019	12/11/2019	19-12037	Cesium-137	EPA 901.1 Modified	2.27E-01	6.86E-02	6.95E-02	1.51E-01		pCi/g
19-12037-06	TRG	L1-10206-A-FQGS-005-SS-A	11/09/19 08:05	12/9/2019	12/11/2019	19-12037	Europium-152	EPA 901.1 Modified	7.42E-02	1.10E-01	1.10E-01	2.08E-01	U	pCi/g
19-12037-06	TRG	L1-10206-A-FQGS-005-SS-A	11/09/19 08:05	12/9/2019	12/11/2019	19-12037	Europium-154	EPA 901.1 Modified	3.87E-02	1.70E-01	1.70E-01	1.07E-01	U	pCi/g
19-12037-06	TRG	L1-10206-A-FQGS-005-SS-A	11/09/19 08:05	12/9/2019	12/11/2019	19-12037	Europium-155	EPA 901.1 Modified	2.11E-01	1.19E-01	1.20E-01	2.00E-01		pCi/g
19-12037-06	TRG	L1-10206-A-FQGS-005-SS-A	11/09/19 08:05	12/9/2019	12/11/2019	19-12037	Holmium-166m	EPA 901.1 Modified	-5.58E-02	9.33E-02	9.33E-02	8.32E-02	U	pCi/g
19-12037-06	TRG	L1-10206-A-FQGS-005-SS-A	11/09/19 08:05	12/9/2019	12/11/2019	19-12037	Iodine-129	EPA 901.1 Modified	8.50E-02	2.59E-01	2.59E-01	4.24E-01	U	pCi/g
19-12037-06	TRG	L1-10206-A-FQGS-005-SS-A	11/09/19 08:05	12/9/2019	12/11/2019	19-12037	Potassium-40	EPA 901.1 Modified	1.17E+01	1.82E+00	1.92E+00	1.06E+00		pCi/g
19-12037-06	TRG	L1-10206-A-FQGS-005-SS-A	11/09/19 08:05	12/9/2019	12/11/2019	19-12037	Manganese-54	EPA 901.1 Modified	-2.96E-02	5.86E-02	5.86E-02	8.06E-02	U	pCi/g
19-12037-06	TRG	L1-10206-A-FQGS-005-SS-A	11/09/19 08:05	12/9/2019	12/11/2019	19-12037	Molybdenum-93	EPA 901.1 Modified	1.19E-02	4.36E-02	4.36E-02	5.52E-02	U	pCi/g
19-12037-06	TRG	L1-10206-A-FQGS-005-SS-A	11/09/19 08:05	12/9/2019	12/11/2019	19-12037	Niobium-94	EPA 901.1 Modified	-8.23E-04	4.11E-02	4.11E-02	6.54E-02	U	pCi/g
19-12037-06	TRG	L1-10206-A-FQGS-005-SS-A	11/09/19 08:05	12/9/2019	12/11/2019	19-12037	Lead-210	EPA 901.1 Modified	1.35E+00	1.59E+00	1.59E+00	2.66E+00	U	pCi/g
19-12037-06	TRG	L1-10206-A-FQGS-005-SS-A	11/09/19 08:05	12/9/2019	12/11/2019	19-12037	Lead-212	EPA 901.1 Modified	6.09E-01	1.67E-01	1.70E-01	2.14E-01	U	pCi/g
19-12037-06	TRG	L1-10206-A-FQGS-005-SS-A	11/09/19 08:05	12/9/2019	12/11/2019	19-12037	Lead-214	EPA 901.1 Modified	5.70E-01	1.41E-01	1.44E-01	1.99E-01		pCi/g
19-12037-06	TRG	L1-10206-A-FQGS-005-SS-A	11/09/19 08:05	12/9/2019	12/11/2019	19-12037	Promethium-145	EPA 901.1 Modified	-1.36E-02	1.71E-01	1.71E-01	2.77E-01	U	pCi/g
19-12037-06	TRG	L1-10206-A-FQGS-005-SS-A	11/09/19 08:05	12/9/2019	12/11/2019	19-12037	Radium-226	EPA 901.1 Modified	4.78E-01	1.43E-01	1.45E-01	9.25E-02		pCi/g
19-12037-06	TRG	L1-10206-A-FQGS-005-SS-A	11/09/19 08:05	12/9/2019	12/11/2019	19-12037	Antimony-125	EPA 901.1 Modified	7.96E-02	1.08E-01	1.08E-01	2.01E-01	U	pCi/g
19-12037-06	TRG	L1-10206-A-FQGS-005-SS-A	11/09/19 08:05	12/9/2019	12/11/2019	19-12037	Thorium-234	EPA 901.1 Modified	8.57E-01	8.89E-01	8.91E-01	1.49E+00	U	pCi/g
19-12037-06	TRG	L1-10206-A-FQGS-005-SS-A	11/09/19 08:05	12/9/2019	12/11/2019	19-12037	Thallium-208	EPA 901.1 Modified	5.21E-01	1.74E-01	1.76E-01	1.58E-01		pCi/g
19-12037-06	TRG	L1-10206-A-FQGS-005-SS-A	11/09/19 08:05	12/9/2019	12/11/2019	19-12037	Uranium-235	EPA 901.1 Modified	6.98E-02	2.84E-01	2.84E-01	4.27E-01	U	pCi/g

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Lab ID	Sample Type	Client ID	Sample Date	Receipt Date	Analysis Date	Batch ID	Analyte	Method	Result	CU	CSU	MDA	Qualifier	Report Units
19-12037-07	TRG	L1-10206-A-FSGS-003-SB-A	11/22/19 08:04	12/9/2019	12/11/2019	19-12037	Actinium-228	EPA 901.1 Modified	3.17E-01	1.65E-01	1.66E-01	2.85E-01		pCi/g
19-12037-07	TRG	L1-10206-A-FSGS-003-SB-A	11/22/19 08:04	12/9/2019	12/11/2019	19-12037	Silver-108m	EPA 901.1 Modified	1.50E-02	2.47E-02	2.47E-02	5.22E-02	U	pCi/g
19-12037-07	TRG	L1-10206-A-FSGS-003-SB-A	11/22/19 08:04	12/9/2019	12/11/2019	19-12037	Americium-241	EPA 901.1 Modified	-5.80E-03	3.40E-02	3.40E-02	1.36E-01	U	pCi/g
19-12037-07	TRG	L1-10206-A-FSGS-003-SB-A	11/22/19 08:04	12/9/2019	12/11/2019	19-12037	Barium-133	EPA 901.1 Modified	-2.77E-03	1.86E-02	1.86E-02	8.56E-02	U	pCi/g
19-12037-07	TRG	L1-10206-A-FSGS-003-SB-A	11/22/19 08:04	12/9/2019	12/11/2019	19-12037	Bismuth-214	EPA 901.1 Modified	3.30E-01	9.43E-02	9.58E-02	5.82E-02		pCi/g
19-12037-07	TRG	L1-10206-A-FSGS-003-SB-A	11/22/19 08:04	12/9/2019	12/11/2019	19-12037	Cobalt-60	EPA 901.1 Modified	-2.22E-02	4.55E-02	4.55E-02	6.13E-02	U	pCi/g
19-12037-07	TRG	L1-10206-A-FSGS-003-SB-A	11/22/19 08:04	12/9/2019	12/11/2019	19-12037	Cesium-134	EPA 901.1 Modified	2.51E-02	1.68E-02	1.68E-02	6.14E-02	U	pCi/g
19-12037-07	TRG	L1-10206-A-FSGS-003-SB-A	11/22/19 08:04	12/9/2019	12/11/2019	19-12037	Cesium-137	EPA 901.1 Modified	5.13E-01	9.21E-02	9.58E-02	9.34E-02		pCi/g
19-12037-07	TRG	L1-10206-A-FSGS-003-SB-A	11/22/19 08:04	12/9/2019	12/11/2019	19-12037	Europium-152	EPA 901.1 Modified	2.59E-02	6.04E-02	6.04E-02	1.71E-01	U	pCi/g
19-12037-07	TRG	L1-10206-A-FSGS-003-SB-A	11/22/19 08:04	12/9/2019	12/11/2019	19-12037	Europium-154	EPA 901.1 Modified	-5.90E-02	1.23E-01	1.23E-01	8.77E-02	U	pCi/g
19-12037-07	TRG	L1-10206-A-FSGS-003-SB-A	11/22/19 08:04	12/9/2019	12/11/2019	19-12037	Europium-155	EPA 901.1 Modified	-3.00E-02	1.04E-01	1.04E-01	1.48E-01	U	pCi/g
19-12037-07	TRG	L1-10206-A-FSGS-003-SB-A	11/22/19 08:04	12/9/2019	12/11/2019	19-12037	Holmium-166m	EPA 901.1 Modified	5.69E-03	6.96E-02	6.96E-02	6.50E-02	U	pCi/g
19-12037-07	TRG	L1-10206-A-FSGS-003-SB-A	11/22/19 08:04	12/9/2019	12/11/2019	19-12037	Iodine-129	EPA 901.1 Modified	-1.82E-01	1.66E-01	1.67E-01	2.21E-01	U	pCi/g
19-12037-07	TRG	L1-10206-A-FSGS-003-SB-A	11/22/19 08:04	12/9/2019	12/11/2019	19-12037	Potassium-40	EPA 901.1 Modified	8.89E+00	1.36E+00	1.44E+00	8.52E-01		pCi/g
19-12037-07	TRG	L1-10206-A-FSGS-003-SB-A	11/22/19 08:04	12/9/2019	12/11/2019	19-12037	Manganese-54	EPA 901.1 Modified	6.66E-03	4.01E-02	4.01E-02	5.97E-02	U	pCi/g
19-12037-07	TRG	L1-10206-A-FSGS-003-SB-A	11/22/19 08:04	12/9/2019	12/11/2019	19-12037	Molybdenum-93	EPA 901.1 Modified	-3.15E-02	4.14E-02	4.14E-02	5.05E-02	U	pCi/g
19-12037-07	TRG	L1-10206-A-FSGS-003-SB-A	11/22/19 08:04	12/9/2019	12/11/2019	19-12037	Niobium-94	EPA 901.1 Modified	1.51E-02	4.15E-02	4.15E-02	5.74E-02	U	pCi/g
19-12037-07	TRG	L1-10206-A-FSGS-003-SB-A	11/22/19 08:04	12/9/2019	12/11/2019	19-12037	Lead-210	EPA 901.1 Modified	4.12E-01	8.92E-01	8.92E-01	1.35E+00	U	pCi/g
19-12037-07	TRG	L1-10206-A-FSGS-003-SB-A	11/22/19 08:04	12/9/2019	12/11/2019	19-12037	Lead-212	EPA 901.1 Modified	3.42E-01	1.20E-01	1.21E-01	1.74E-01		pCi/g
19-12037-07	TRG	L1-10206-A-FSGS-003-SB-A	11/22/19 08:04	12/9/2019	12/11/2019	19-12037	Lead-214	EPA 901.1 Modified	3.63E-01	1.11E-01	1.13E-01	1.96E-01		pCi/g
19-12037-07	TRG	L1-10206-A-FSGS-003-SB-A	11/22/19 08:04	12/9/2019	12/11/2019	19-12037	Promethium-145	EPA 901.1 Modified	-4.03E-02	1.28E-01	1.28E-01	1.86E-01	U	pCi/g
19-12037-07	TRG	L1-10206-A-FSGS-003-SB-A	11/22/19 08:04	12/9/2019	12/11/2019	19-12037	Radium-226	EPA 901.1 Modified	3.30E-01	9.43E-02	9.58E-02	5.82E-02		pCi/g
19-12037-07	TRG	L1-10206-A-FSGS-003-SB-A	11/22/19 08:04	12/9/2019	12/11/2019	19-12037	Antimony-125	EPA 901.1 Modified	-3.72E-02	1.07E-01	1.07E-01	1.56E-01	U	pCi/g
19-12037-07	TRG	L1-10206-A-FSGS-003-SB-A	11/22/19 08:04	12/9/2019	12/11/2019	19-12037	Thorium-234	EPA 901.1 Modified	1.52E+00	1.16E+00	1.16E+00	1.92E+00	U	pCi/g
19-12037-07	TRG	L1-10206-A-FSGS-003-SB-A	11/22/19 08:04	12/9/2019	12/11/2019	19-12037	Thallium-208	EPA 901.1 Modified	3.32E-01	1.15E-01	1.17E-01	1.65E-01		pCi/g
19-12037-07	TRG	L1-10206-A-FSGS-003-SB-A	11/22/19 08:04	12/9/2019	12/11/2019	19-12037	Uranium-235	EPA 901.1 Modified	-1.57E-01	2.61E-01	2.62E-01	3.64E-01	U	pCi/g

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Eberline Analytical Final Report of Analysis			Report To:					Work Order Details:						
			Patricia Giza					SDG:	19-12037					
			Zion Solutions					Purchase Order:	677118					
			2701 Deborah Ave					Analysis Category:	ENVIRONMENTAL					
			Zion, IL 60099					Sample Matrix:	SO					
Lab ID	Sample Type	Client ID	Sample Date	Receipt Date	Analysis Date	Batch ID	Analyte	Method	Result	CU	CSU	MDA	Qualifier	Report Units
19-12037-08	TRG	L1-10206-B-FSGS-010-SS-A	10/28/19 13:18	12/9/2019	12/11/2019	19-12037	Actinium-228	EPA 901.1 Modified	5.71E-01	2.05E-01	2.07E-01	4.45E-01		pCi/g
19-12037-08	TRG	L1-10206-B-FSGS-010-SS-A	10/28/19 13:18	12/9/2019	12/11/2019	19-12037	Silver-108m	EPA 901.1 Modified	5.52E-03	2.62E-02	2.62E-02	5.58E-02	U	pCi/g
19-12037-08	TRG	L1-10206-B-FSGS-010-SS-A	10/28/19 13:18	12/9/2019	12/11/2019	19-12037	Americium-241	EPA 901.1 Modified	7.50E-02	7.89E-02	7.90E-02	1.61E-01	U	pCi/g
19-12037-08	TRG	L1-10206-B-FSGS-010-SS-A	10/28/19 13:18	12/9/2019	12/11/2019	19-12037	Barium-133	EPA 901.1 Modified	-3.83E-02	2.65E-02	2.66E-02	7.51E-02	U	pCi/g
19-12037-08	TRG	L1-10206-B-FSGS-010-SS-A	10/28/19 13:18	12/9/2019	12/11/2019	19-12037	Bismuth-214	EPA 901.1 Modified	6.09E-01	1.51E-01	1.54E-01	2.40E-01		pCi/g
19-12037-08	TRG	L1-10206-B-FSGS-010-SS-A	10/28/19 13:18	12/9/2019	12/11/2019	19-12037	Cobalt-60	EPA 901.1 Modified	7.12E-02	5.01E-02	5.03E-02	7.47E-02	U	pCi/g
19-12037-08	TRG	L1-10206-B-FSGS-010-SS-A	10/28/19 13:18	12/9/2019	12/11/2019	19-12037	Cesium-134	EPA 901.1 Modified	-3.10E-04	2.90E-02	2.90E-02	8.76E-02	U	pCi/g
19-12037-08	TRG	L1-10206-B-FSGS-010-SS-A	10/28/19 13:18	12/9/2019	12/11/2019	19-12037	Cesium-137	EPA 901.1 Modified	1.70E-01	7.45E-02	7.50E-02	1.10E-01		pCi/g
19-12037-08	TRG	L1-10206-B-FSGS-010-SS-A	10/28/19 13:18	12/9/2019	12/11/2019	19-12037	Europium-152	EPA 901.1 Modified	1.25E-01	1.28E-01	1.28E-01	2.30E-01	U	pCi/g
19-12037-08	TRG	L1-10206-B-FSGS-010-SS-A	10/28/19 13:18	12/9/2019	12/11/2019	19-12037	Europium-154	EPA 901.1 Modified	8.82E-02	1.57E-01	1.57E-01	1.15E-01	U	pCi/g
19-12037-08	TRG	L1-10206-B-FSGS-010-SS-A	10/28/19 13:18	12/9/2019	12/11/2019	19-12037	Europium-155	EPA 901.1 Modified	3.30E-02	1.41E-01	1.41E-01	1.85E-01	U	pCi/g
19-12037-08	TRG	L1-10206-B-FSGS-010-SS-A	10/28/19 13:18	12/9/2019	12/11/2019	19-12037	Holmium-166m	EPA 901.1 Modified	3.03E-02	7.62E-02	7.63E-02	8.35E-02	U	pCi/g
19-12037-08	TRG	L1-10206-B-FSGS-010-SS-A	10/28/19 13:18	12/9/2019	12/11/2019	19-12037	Iodine-129	EPA 901.1 Modified	7.23E-02	1.27E-01	1.27E-01	1.86E-01	U	pCi/g
19-12037-08	TRG	L1-10206-B-FSGS-010-SS-A	10/28/19 13:18	12/9/2019	12/11/2019	19-12037	Potassium-40	EPA 901.1 Modified	1.31E+01	1.86E+00	1.98E+00	1.12E+00		pCi/g
19-12037-08	TRG	L1-10206-B-FSGS-010-SS-A	10/28/19 13:18	12/9/2019	12/11/2019	19-12037	Manganese-54	EPA 901.1 Modified	-1.67E-02	5.38E-02	5.38E-02	7.63E-02	U	pCi/g
19-12037-08	TRG	L1-10206-B-FSGS-010-SS-A	10/28/19 13:18	12/9/2019	12/11/2019	19-12037	Molybdenum-93	EPA 901.1 Modified	2.70E-03	4.43E-02	4.43E-02	4.74E-02	U	pCi/g
19-12037-08	TRG	L1-10206-B-FSGS-010-SS-A	10/28/19 13:18	12/9/2019	12/11/2019	19-12037	Niobium-94	EPA 901.1 Modified	-6.87E-02	5.66E-02	5.67E-02	6.49E-02	U	pCi/g
19-12037-08	TRG	L1-10206-B-FSGS-010-SS-A	10/28/19 13:18	12/9/2019	12/11/2019	19-12037	Lead-210	EPA 901.1 Modified	1.22E+00	1.30E+00	1.30E+00	2.16E+00	U	pCi/g
19-12037-08	TRG	L1-10206-B-FSGS-010-SS-A	10/28/19 13:18	12/9/2019	12/11/2019	19-12037	Lead-212	EPA 901.1 Modified	4.31E-01	1.13E-01	1.15E-01	1.93E-01		pCi/g
19-12037-08	TRG	L1-10206-B-FSGS-010-SS-A	10/28/19 13:18	12/9/2019	12/11/2019	19-12037	Lead-214	EPA 901.1 Modified	6.21E-01	1.47E-01	1.50E-01	2.37E-01		pCi/g
19-12037-08	TRG	L1-10206-B-FSGS-010-SS-A	10/28/19 13:18	12/9/2019	12/11/2019	19-12037	Promethium-145	EPA 901.1 Modified	1.82E-02	1.72E-01	1.72E-01	2.23E-01	U	pCi/g
19-12037-08	TRG	L1-10206-B-FSGS-010-SS-A	10/28/19 13:18	12/9/2019	12/11/2019	19-12037	Radium-226	EPA 901.1 Modified	6.09E-01	1.51E-01	1.54E-01	2.40E-01		pCi/g
19-12037-08	TRG	L1-10206-B-FSGS-010-SS-A	10/28/19 13:18	12/9/2019	12/11/2019	19-12037	Antimony-125	EPA 901.1 Modified	-3.67E-02	1.00E-01	1.00E-01	1.58E-01	U	pCi/g
19-12037-08	TRG	L1-10206-B-FSGS-010-SS-A	10/28/19 13:18	12/9/2019	12/11/2019	19-12037	Thorium-234	EPA 901.1 Modified	1.01E+00	9.80E-01	9.81E-01	1.63E+00	U	pCi/g
19-12037-08	TRG	L1-10206-B-FSGS-010-SS-A	10/28/19 13:18	12/9/2019	12/11/2019	19-12037	Thallium-208	EPA 901.1 Modified	4.65E-01	1.44E-01	1.46E-01	2.21E-01		pCi/g
19-12037-08	TRG	L1-10206-B-FSGS-010-SS-A	10/28/19 13:18	12/9/2019	12/11/2019	19-12037	Uranium-235	EPA 901.1 Modified	4.22E-02	3.37E-01	3.37E-01	4.48E-01	U	pCi/g

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			Patricia Giza					SDG:	19-12037					
			Zion Solutions					Purchase Order:	677118					
			2701 Deborah Ave					Analysis Category:	ENVIRONMENTAL					
			Zion, IL 60099					Sample Matrix:	SO					
Lab ID	Sample Type	Client ID	Sample Date	Receipt Date	Analysis Date	Batch ID	Analyte	Method	Result	CU	CSU	MDA	Qualifier	Report Units
19-12037-09	TRG	L1-10206-B-FSGS-012-SS-A	10/28/19 13:22	12/9/2019	12/11/2019	19-12037	Actinium-228	EPA 901.1 Modified	4.65E-01	2.55E-01	2.56E-01	4.47E-01		pCi/g
19-12037-09	TRG	L1-10206-B-FSGS-012-SS-A	10/28/19 13:22	12/9/2019	12/11/2019	19-12037	Silver-108m	EPA 901.1 Modified	-8.50E-02	7.04E-02	7.05E-02	6.81E-02	U	pCi/g
19-12037-09	TRG	L1-10206-B-FSGS-012-SS-A	10/28/19 13:22	12/9/2019	12/11/2019	19-12037	Americium-241	EPA 901.1 Modified	-2.45E-01	1.10E-01	1.11E-01	1.48E-01	U	pCi/g
19-12037-09	TRG	L1-10206-B-FSGS-012-SS-A	10/28/19 13:22	12/9/2019	12/11/2019	19-12037	Barium-133	EPA 901.1 Modified	2.07E-02	1.16E-01	1.16E-01	1.34E-01	U	pCi/g
19-12037-09	TRG	L1-10206-B-FSGS-012-SS-A	10/28/19 13:22	12/9/2019	12/11/2019	19-12037	Bismuth-214	EPA 901.1 Modified	5.15E-01	1.36E-01	1.39E-01	2.09E-01		pCi/g
19-12037-09	TRG	L1-10206-B-FSGS-012-SS-A	10/28/19 13:22	12/9/2019	12/11/2019	19-12037	Cobalt-60	EPA 901.1 Modified	-1.83E-02	7.20E-02	7.20E-02	9.23E-02	U	pCi/g
19-12037-09	TRG	L1-10206-B-FSGS-012-SS-A	10/28/19 13:22	12/9/2019	12/11/2019	19-12037	Cesium-134	EPA 901.1 Modified	-4.66E-01	1.62E-01	1.64E-01	8.27E-02	U	pCi/g
19-12037-09	TRG	L1-10206-B-FSGS-012-SS-A	10/28/19 13:22	12/9/2019	12/11/2019	19-12037	Cesium-137	EPA 901.1 Modified	2.41E-01	7.48E-02	7.58E-02	1.79E-01		pCi/g
19-12037-09	TRG	L1-10206-B-FSGS-012-SS-A	10/28/19 13:22	12/9/2019	12/11/2019	19-12037	Europium-152	EPA 901.1 Modified	1.26E-01	1.38E-01	1.38E-01	2.25E-01	U	pCi/g
19-12037-09	TRG	L1-10206-B-FSGS-012-SS-A	10/28/19 13:22	12/9/2019	12/11/2019	19-12037	Europium-154	EPA 901.1 Modified	1.30E-01	1.48E-01	1.48E-01	1.15E-01	U	pCi/g
19-12037-09	TRG	L1-10206-B-FSGS-012-SS-A	10/28/19 13:22	12/9/2019	12/11/2019	19-12037	Europium-155	EPA 901.1 Modified	2.92E-02	4.76E-02	4.76E-02	1.77E-01	U	pCi/g
19-12037-09	TRG	L1-10206-B-FSGS-012-SS-A	10/28/19 13:22	12/9/2019	12/11/2019	19-12037	Holmium-166m	EPA 901.1 Modified	-3.81E-02	8.39E-02	8.39E-02	8.93E-02	U	pCi/g
19-12037-09	TRG	L1-10206-B-FSGS-012-SS-A	10/28/19 13:22	12/9/2019	12/11/2019	19-12037	Iodine-129	EPA 901.1 Modified	-2.48E-01	2.64E-01	2.65E-01	3.85E-01	U	pCi/g
19-12037-09	TRG	L1-10206-B-FSGS-012-SS-A	10/28/19 13:22	12/9/2019	12/11/2019	19-12037	Potassium-40	EPA 901.1 Modified	1.39E+01	2.05E+00	2.17E+00	1.31E+00		pCi/g
19-12037-09	TRG	L1-10206-B-FSGS-012-SS-A	10/28/19 13:22	12/9/2019	12/11/2019	19-12037	Manganese-54	EPA 901.1 Modified	4.07E-02	5.33E-02	5.33E-02	9.35E-02	U	pCi/g
19-12037-09	TRG	L1-10206-B-FSGS-012-SS-A	10/28/19 13:22	12/9/2019	12/11/2019	19-12037	Molybdenum-93	EPA 901.1 Modified	2.14E-02	4.58E-02	4.58E-02	6.64E-02	U	pCi/g
19-12037-09	TRG	L1-10206-B-FSGS-012-SS-A	10/28/19 13:22	12/9/2019	12/11/2019	19-12037	Niobium-94	EPA 901.1 Modified	1.30E-02	5.11E-02	5.11E-02	7.34E-02	U	pCi/g
19-12037-09	TRG	L1-10206-B-FSGS-012-SS-A	10/28/19 13:22	12/9/2019	12/11/2019	19-12037	Lead-210	EPA 901.1 Modified	1.33E+00	1.14E+00	1.14E+00	1.92E+00	U	pCi/g
19-12037-09	TRG	L1-10206-B-FSGS-012-SS-A	10/28/19 13:22	12/9/2019	12/11/2019	19-12037	Lead-212	EPA 901.1 Modified	8.83E-01	1.90E-01	1.96E-01	1.98E-01		pCi/g
19-12037-09	TRG	L1-10206-B-FSGS-012-SS-A	10/28/19 13:22	12/9/2019	12/11/2019	19-12037	Lead-214	EPA 901.1 Modified	6.86E-01	1.77E-01	1.81E-01	2.66E-01		pCi/g
19-12037-09	TRG	L1-10206-B-FSGS-012-SS-A	10/28/19 13:22	12/9/2019	12/11/2019	19-12037	Promethium-145	EPA 901.1 Modified	-1.13E-01	1.75E-01	1.75E-01	2.69E-01	U	pCi/g
19-12037-09	TRG	L1-10206-B-FSGS-012-SS-A	10/28/19 13:22	12/9/2019	12/11/2019	19-12037	Radium-226	EPA 901.1 Modified	5.15E-01	1.36E-01	1.39E-01	2.09E-01		pCi/g
19-12037-09	TRG	L1-10206-B-FSGS-012-SS-A	10/28/19 13:22	12/9/2019	12/11/2019	19-12037	Antimony-125	EPA 901.1 Modified	-4.05E-02	1.44E-01	1.44E-01	2.05E-01	U	pCi/g
19-12037-09	TRG	L1-10206-B-FSGS-012-SS-A	10/28/19 13:22	12/9/2019	12/11/2019	19-12037	Thorium-234	EPA 901.1 Modified	1.54E+00	9.21E-01	9.24E-01	1.56E+00	U	pCi/g
19-12037-09	TRG	L1-10206-B-FSGS-012-SS-A	10/28/19 13:22	12/9/2019	12/11/2019	19-12037	Thallium-208	EPA 901.1 Modified	4.57E-01	1.56E-01	1.58E-01	1.52E-01		pCi/g
19-12037-09	TRG	L1-10206-B-FSGS-012-SS-A	10/28/19 13:22	12/9/2019	12/11/2019	19-12037	Uranium-235	EPA 901.1 Modified	9.98E-02	3.09E-01	3.09E-01	4.63E-01	U	pCi/g

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			Zion, IL 60099					Sample Matrix:	SO					
Lab ID	Sample Type	Client ID	Sample Date	Receipt Date	Analysis Date	Batch ID	Analyte	Method	Result	CU	CSU	MDA	Qualifier	Report Units
19-12037-10	TRG	L1-10206-B-FIGS-004-SS-A	11/19/19 12:32	12/9/2019	12/11/2019	19-12037	Actinium-228	EPA 901.1 Modified	5.01E-01	1.61E-01	1.63E-01	2.76E-01		pCi/g
19-12037-10	TRG	L1-10206-B-FIGS-004-SS-A	11/19/19 12:32	12/9/2019	12/11/2019	19-12037	Silver-108m	EPA 901.1 Modified	7.64E-03	3.14E-02	3.14E-02	5.59E-02	U	pCi/g
19-12037-10	TRG	L1-10206-B-FIGS-004-SS-A	11/19/19 12:32	12/9/2019	12/11/2019	19-12037	Americium-241	EPA 901.1 Modified	-1.33E-01	1.13E-01	1.13E-01	1.51E-01	U	pCi/g
19-12037-10	TRG	L1-10206-B-FIGS-004-SS-A	11/19/19 12:32	12/9/2019	12/11/2019	19-12037	Barium-133	EPA 901.1 Modified	2.41E-03	1.96E-02	1.96E-02	9.77E-02	U	pCi/g
19-12037-10	TRG	L1-10206-B-FIGS-004-SS-A	11/19/19 12:32	12/9/2019	12/11/2019	19-12037	Bismuth-214	EPA 901.1 Modified	4.73E-01	1.24E-01	1.26E-01	1.97E-01		pCi/g
19-12037-10	TRG	L1-10206-B-FIGS-004-SS-A	11/19/19 12:32	12/9/2019	12/11/2019	19-12037	Cobalt-60	EPA 901.1 Modified	1.55E-02	3.45E-02	3.45E-02	5.34E-02	U	pCi/g
19-12037-10	TRG	L1-10206-B-FIGS-004-SS-A	11/19/19 12:32	12/9/2019	12/11/2019	19-12037	Cesium-134	EPA 901.1 Modified	-5.02E-03	2.24E-02	2.24E-02	7.64E-02	U	pCi/g
19-12037-10	TRG	L1-10206-B-FIGS-004-SS-A	11/19/19 12:32	12/9/2019	12/11/2019	19-12037	Cesium-137	EPA 901.1 Modified	1.89E-01	7.34E-02	7.40E-02	1.09E-01		pCi/g
19-12037-10	TRG	L1-10206-B-FIGS-004-SS-A	11/19/19 12:32	12/9/2019	12/11/2019	19-12037	Europium-152	EPA 901.1 Modified	2.17E-02	8.77E-02	8.77E-02	1.95E-01	U	pCi/g
19-12037-10	TRG	L1-10206-B-FIGS-004-SS-A	11/19/19 12:32	12/9/2019	12/11/2019	19-12037	Europium-154	EPA 901.1 Modified	1.54E-02	1.46E-01	1.46E-01	9.97E-02	U	pCi/g
19-12037-10	TRG	L1-10206-B-FIGS-004-SS-A	11/19/19 12:32	12/9/2019	12/11/2019	19-12037	Europium-155	EPA 901.1 Modified	3.44E-01	1.62E-01	1.63E-01	1.98E-01		pCi/g
19-12037-10	TRG	L1-10206-B-FIGS-004-SS-A	11/19/19 12:32	12/9/2019	12/11/2019	19-12037	Holmium-166m	EPA 901.1 Modified	-1.05E-02	7.85E-02	7.85E-02	7.35E-02	U	pCi/g
19-12037-10	TRG	L1-10206-B-FIGS-004-SS-A	11/19/19 12:32	12/9/2019	12/11/2019	19-12037	Iodine-129	EPA 901.1 Modified	-9.59E-02	1.56E-01	1.56E-01	2.19E-01	U	pCi/g
19-12037-10	TRG	L1-10206-B-FIGS-004-SS-A	11/19/19 12:32	12/9/2019	12/11/2019	19-12037	Potassium-40	EPA 901.1 Modified	1.35E+01	1.83E+00	1.95E+00	1.14E+00		pCi/g
19-12037-10	TRG	L1-10206-B-FIGS-004-SS-A	11/19/19 12:32	12/9/2019	12/11/2019	19-12037	Manganese-54	EPA 901.1 Modified	1.94E-02	4.54E-02	4.54E-02	6.65E-02	U	pCi/g
19-12037-10	TRG	L1-10206-B-FIGS-004-SS-A	11/19/19 12:32	12/9/2019	12/11/2019	19-12037	Molybdenum-93	EPA 901.1 Modified	7.59E-03	3.90E-02	3.90E-02	4.14E-02	U	pCi/g
19-12037-10	TRG	L1-10206-B-FIGS-004-SS-A	11/19/19 12:32	12/9/2019	12/11/2019	19-12037	Niobium-94	EPA 901.1 Modified	3.79E-03	4.37E-02	4.37E-02	6.16E-02	U	pCi/g
19-12037-10	TRG	L1-10206-B-FIGS-004-SS-A	11/19/19 12:32	12/9/2019	12/11/2019	19-12037	Lead-210	EPA 901.1 Modified	1.90E+00	9.66E-01	9.71E-01	1.53E+00	U	pCi/g
19-12037-10	TRG	L1-10206-B-FIGS-004-SS-A	11/19/19 12:32	12/9/2019	12/11/2019	19-12037	Lead-212	EPA 901.1 Modified	6.12E-01	1.52E-01	1.55E-01	1.95E-01		pCi/g
19-12037-10	TRG	L1-10206-B-FIGS-004-SS-A	11/19/19 12:32	12/9/2019	12/11/2019	19-12037	Lead-214	EPA 901.1 Modified	4.88E-01	1.30E-01	1.32E-01	2.20E-01		pCi/g
19-12037-10	TRG	L1-10206-B-FIGS-004-SS-A	11/19/19 12:32	12/9/2019	12/11/2019	19-12037	Promethium-145	EPA 901.1 Modified	-1.03E-02	1.31E-01	1.31E-01	1.92E-01	U	pCi/g
19-12037-10	TRG	L1-10206-B-FIGS-004-SS-A	11/19/19 12:32	12/9/2019	12/11/2019	19-12037	Radium-226	EPA 901.1 Modified	4.73E-01	1.24E-01	1.26E-01	1.97E-01		pCi/g
19-12037-10	TRG	L1-10206-B-FIGS-004-SS-A	11/19/19 12:32	12/9/2019	12/11/2019	19-12037	Antimony-125	EPA 901.1 Modified	6.21E-02	1.13E-01	1.13E-01	1.74E-01	U	pCi/g
19-12037-10	TRG	L1-10206-B-FIGS-004-SS-A	11/19/19 12:32	12/9/2019	12/11/2019	19-12037	Thorium-234	EPA 901.1 Modified	1.28E+00	1.24E+00	1.24E+00	2.07E+00	U	pCi/g
19-12037-10	TRG	L1-10206-B-FIGS-004-SS-A	11/19/19 12:32	12/9/2019	12/11/2019	19-12037	Thallium-208	EPA 901.1 Modified	3.77E-01	1.15E-01	1.17E-01	1.47E-01		pCi/g
19-12037-10	TRG	L1-10206-B-FIGS-004-SS-A	11/19/19 12:32	12/9/2019	12/11/2019	19-12037	Uranium-235	EPA 901.1 Modified	4.04E-02	2.85E-01	2.85E-01	4.22E-01	U	pCi/g

CU=Counting Uncertainty;CSU=Combined Standard Uncertainty (1-sigma);MDA=Minimal Detected Activity;LCS=Laboratory Control Sample;MBL=Blank;DUP=Duplicate;TRG=Normal Sample;DO=Duplicate Original;U=Non-detect



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Eberline Analytical Final Report of Analysis			Report To:						Work Order Details:						
			Patricia Giza						SDG:		19-12037				
			Zion Solutions						Purchase Order:		677118				
			2701 Deborah Ave						Analysis Category:		ENVIRONMENTAL				
			Zion, IL 60099						Sample Matrix:		SO				
Lab ID	Sample Type	Client ID	Sample Date	Receipt Date	Analysis Date	Batch ID	Analyte	Method	Result	CU	CSU	MDA	Qualifier	Report Units	
19-12037-11	TRG	L1-10206-C-FSGS-007-SS-A	10/28/19 09:12	12/9/2019	12/11/2019	19-12037	Actinium-228	EPA 901.1 Modified	4.92E-01	1.77E-01	1.78E-01	3.19E-01		pCi/g	
19-12037-11	TRG	L1-10206-C-FSGS-007-SS-A	10/28/19 09:12	12/9/2019	12/11/2019	19-12037	Silver-108m	EPA 901.1 Modified	-2.15E-03	2.53E-02	2.53E-02	5.47E-02	U	pCi/g	
19-12037-11	TRG	L1-10206-C-FSGS-007-SS-A	10/28/19 09:12	12/9/2019	12/11/2019	19-12037	Americium-241	EPA 901.1 Modified	-4.07E-02	1.22E-01	1.22E-01	1.52E-01	U	pCi/g	
19-12037-11	TRG	L1-10206-C-FSGS-007-SS-A	10/28/19 09:12	12/9/2019	12/11/2019	19-12037	Barium-133	EPA 901.1 Modified	6.72E-03	3.62E-02	3.62E-02	7.06E-02	U	pCi/g	
19-12037-11	TRG	L1-10206-C-FSGS-007-SS-A	10/28/19 09:12	12/9/2019	12/11/2019	19-12037	Bismuth-214	EPA 901.1 Modified	5.86E-01	1.17E-01	1.20E-01	3.35E-01		pCi/g	
19-12037-11	TRG	L1-10206-C-FSGS-007-SS-A	10/28/19 09:12	12/9/2019	12/11/2019	19-12037	Cobalt-60	EPA 901.1 Modified	2.45E-02	4.58E-02	4.59E-02	7.63E-02	U	pCi/g	
19-12037-11	TRG	L1-10206-C-FSGS-007-SS-A	10/28/19 09:12	12/9/2019	12/11/2019	19-12037	Cesium-134	EPA 901.1 Modified	-5.16E-03	3.09E-02	3.09E-02	6.91E-02	U	pCi/g	
19-12037-11	TRG	L1-10206-C-FSGS-007-SS-A	10/28/19 09:12	12/9/2019	12/11/2019	19-12037	Cesium-137	EPA 901.1 Modified	8.72E-02	5.16E-02	5.18E-02	1.28E-01	U	pCi/g	
19-12037-11	TRG	L1-10206-C-FSGS-007-SS-A	10/28/19 09:12	12/9/2019	12/11/2019	19-12037	Europium-152	EPA 901.1 Modified	1.16E-02	1.94E-01	1.94E-01	1.96E-01	U	pCi/g	
19-12037-11	TRG	L1-10206-C-FSGS-007-SS-A	10/28/19 09:12	12/9/2019	12/11/2019	19-12037	Europium-154	EPA 901.1 Modified	3.47E-02	1.42E-01	1.43E-01	1.00E-01	U	pCi/g	
19-12037-11	TRG	L1-10206-C-FSGS-007-SS-A	10/28/19 09:12	12/9/2019	12/11/2019	19-12037	Europium-155	EPA 901.1 Modified	1.83E-01	9.61E-02	9.65E-02	2.05E-01	U	pCi/g	
19-12037-11	TRG	L1-10206-C-FSGS-007-SS-A	10/28/19 09:12	12/9/2019	12/11/2019	19-12037	Holmium-166m	EPA 901.1 Modified	3.33E-02	7.76E-02	7.76E-02	7.69E-02	U	pCi/g	
19-12037-11	TRG	L1-10206-C-FSGS-007-SS-A	10/28/19 09:12	12/9/2019	12/11/2019	19-12037	Iodine-129	EPA 901.1 Modified	2.61E-03	1.36E-01	1.36E-01	1.78E-01	U	pCi/g	
19-12037-11	TRG	L1-10206-C-FSGS-007-SS-A	10/28/19 09:12	12/9/2019	12/11/2019	19-12037	Potassium-40	EPA 901.1 Modified	1.26E+01	1.83E+00	1.94E+00	1.26E+00		pCi/g	
19-12037-11	TRG	L1-10206-C-FSGS-007-SS-A	10/28/19 09:12	12/9/2019	12/11/2019	19-12037	Manganese-54	EPA 901.1 Modified	-1.68E-02	4.93E-02	4.93E-02	7.26E-02	U	pCi/g	
19-12037-11	TRG	L1-10206-C-FSGS-007-SS-A	10/28/19 09:12	12/9/2019	12/11/2019	19-12037	Molybdenum-93	EPA 901.1 Modified	-1.76E-02	3.36E-02	3.36E-02	4.81E-02	U	pCi/g	
19-12037-11	TRG	L1-10206-C-FSGS-007-SS-A	10/28/19 09:12	12/9/2019	12/11/2019	19-12037	Niobium-94	EPA 901.1 Modified	7.70E-03	4.07E-02	4.07E-02	6.62E-02	U	pCi/g	
19-12037-11	TRG	L1-10206-C-FSGS-007-SS-A	10/28/19 09:12	12/9/2019	12/11/2019	19-12037	Lead-210	EPA 901.1 Modified	1.47E+00	1.12E+00	1.13E+00	1.62E+00	U	pCi/g	
19-12037-11	TRG	L1-10206-C-FSGS-007-SS-A	10/28/19 09:12	12/9/2019	12/11/2019	19-12037	Lead-212	EPA 901.1 Modified	3.96E-01	9.69E-02	9.90E-02	2.34E-01		pCi/g	
19-12037-11	TRG	L1-10206-C-FSGS-007-SS-A	10/28/19 09:12	12/9/2019	12/11/2019	19-12037	Lead-214	EPA 901.1 Modified	5.84E-01	1.29E-01	1.32E-01	2.07E-01		pCi/g	
19-12037-11	TRG	L1-10206-C-FSGS-007-SS-A	10/28/19 09:12	12/9/2019	12/11/2019	19-12037	Promethium-145	EPA 901.1 Modified	-1.64E-01	1.73E-01	1.74E-01	2.05E-01	U	pCi/g	
19-12037-11	TRG	L1-10206-C-FSGS-007-SS-A	10/28/19 09:12	12/9/2019	12/11/2019	19-12037	Radium-226	EPA 901.1 Modified	5.86E-01	1.17E-01	1.20E-01	3.35E-01		pCi/g	
19-12037-11	TRG	L1-10206-C-FSGS-007-SS-A	10/28/19 09:12	12/9/2019	12/11/2019	19-12037	Antimony-125	EPA 901.1 Modified	-2.45E-02	9.00E-02	9.00E-02	1.49E-01	U	pCi/g	
19-12037-11	TRG	L1-10206-C-FSGS-007-SS-A	10/28/19 09:12	12/9/2019	12/11/2019	19-12037	Thorium-234	EPA 901.1 Modified	7.56E-01	1.10E+00	1.10E+00	1.49E+00	U	pCi/g	
19-12037-11	TRG	L1-10206-C-FSGS-007-SS-A	10/28/19 09:12	12/9/2019	12/11/2019	19-12037	Thallium-208	EPA 901.1 Modified	3.32E-01	1.38E-01	1.39E-01	2.74E-01		pCi/g	
19-12037-11	TRG	L1-10206-C-FSGS-007-SS-A	10/28/19 09:12	12/9/2019	12/11/2019	19-12037	Uranium-235	EPA 901.1 Modified	1.80E-01	3.26E-01	3.26E-01	4.46E-01	U	pCi/g	

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Eberline Analytical Final Report of Analysis			Report To:					Work Order Details:						
			Patricia Giza					SDG:	19-12037					
			Zion Solutions					Purchase Order:	677118					
			2701 Deborah Ave					Analysis Category:	ENVIRONMENTAL					
			Zion, IL 60099					Sample Matrix:	SO					
Lab ID	Sample Type	Client ID	Sample Date	Receipt Date	Analysis Date	Batch ID	Analyte	Method	Result	CU	CSU	MDA	Qualifier	Report Units
19-12037-12	TRG	L1-10206-C-FSGS-011-SS-A	10/28/19 09:20	12/9/2019	12/11/2019	19-12037	Actinium-228	EPA 901.1 Modified	6.29E-01	2.00E-01	2.03E-01	3.22E-01		pCi/g
19-12037-12	TRG	L1-10206-C-FSGS-011-SS-A	10/28/19 09:20	12/9/2019	12/11/2019	19-12037	Silver-108m	EPA 901.1 Modified	3.08E-02	4.02E-02	4.02E-02	7.04E-02	U	pCi/g
19-12037-12	TRG	L1-10206-C-FSGS-011-SS-A	10/28/19 09:20	12/9/2019	12/11/2019	19-12037	Americium-241	EPA 901.1 Modified	-1.73E-01	1.19E-01	1.19E-01	1.71E-01	U	pCi/g
19-12037-12	TRG	L1-10206-C-FSGS-011-SS-A	10/28/19 09:20	12/9/2019	12/11/2019	19-12037	Barium-133	EPA 901.1 Modified	-4.26E-02	1.50E-01	1.50E-01	1.44E-01	U	pCi/g
19-12037-12	TRG	L1-10206-C-FSGS-011-SS-A	10/28/19 09:20	12/9/2019	12/11/2019	19-12037	Bismuth-214	EPA 901.1 Modified	7.81E-01	1.60E-01	1.65E-01	2.07E-01		pCi/g
19-12037-12	TRG	L1-10206-C-FSGS-011-SS-A	10/28/19 09:20	12/9/2019	12/11/2019	19-12037	Cobalt-60	EPA 901.1 Modified	3.62E-02	7.93E-02	7.93E-02	1.04E-01	U	pCi/g
19-12037-12	TRG	L1-10206-C-FSGS-011-SS-A	10/28/19 09:20	12/9/2019	12/11/2019	19-12037	Cesium-134	EPA 901.1 Modified	3.94E-03	2.92E-02	2.92E-02	9.18E-02	U	pCi/g
19-12037-12	TRG	L1-10206-C-FSGS-011-SS-A	10/28/19 09:20	12/9/2019	12/11/2019	19-12037	Cesium-137	EPA 901.1 Modified	1.57E-01	6.63E-02	6.68E-02	9.16E-02		pCi/g
19-12037-12	TRG	L1-10206-C-FSGS-011-SS-A	10/28/19 09:20	12/9/2019	12/11/2019	19-12037	Europium-152	EPA 901.1 Modified	2.33E-02	1.45E-01	1.45E-01	2.25E-01	U	pCi/g
19-12037-12	TRG	L1-10206-C-FSGS-011-SS-A	10/28/19 09:20	12/9/2019	12/11/2019	19-12037	Europium-154	EPA 901.1 Modified	2.29E-02	1.76E-01	1.76E-01	1.19E-01	U	pCi/g
19-12037-12	TRG	L1-10206-C-FSGS-011-SS-A	10/28/19 09:20	12/9/2019	12/11/2019	19-12037	Europium-155	EPA 901.1 Modified	5.33E-02	1.36E-01	1.36E-01	2.01E-01	U	pCi/g
19-12037-12	TRG	L1-10206-C-FSGS-011-SS-A	10/28/19 09:20	12/9/2019	12/11/2019	19-12037	Holmium-166m	EPA 901.1 Modified	1.72E-01	8.50E-02	8.55E-02	9.40E-02	U	pCi/g
19-12037-12	TRG	L1-10206-C-FSGS-011-SS-A	10/28/19 09:20	12/9/2019	12/11/2019	19-12037	Iodine-129	EPA 901.1 Modified	-4.46E-02	1.43E-01	1.43E-01	4.28E-01	U	pCi/g
19-12037-12	TRG	L1-10206-C-FSGS-011-SS-A	10/28/19 09:20	12/9/2019	12/11/2019	19-12037	Potassium-40	EPA 901.1 Modified	1.45E+01	2.15E+00	2.28E+00	1.24E+00		pCi/g
19-12037-12	TRG	L1-10206-C-FSGS-011-SS-A	10/28/19 09:20	12/9/2019	12/11/2019	19-12037	Manganese-54	EPA 901.1 Modified	3.09E-02	5.70E-02	5.71E-02	9.66E-02	U	pCi/g
19-12037-12	TRG	L1-10206-C-FSGS-011-SS-A	10/28/19 09:20	12/9/2019	12/11/2019	19-12037	Molybdenum-93	EPA 901.1 Modified	4.26E-02	4.56E-02	4.57E-02	8.19E-02	U	pCi/g
19-12037-12	TRG	L1-10206-C-FSGS-011-SS-A	10/28/19 09:20	12/9/2019	12/11/2019	19-12037	Niobium-94	EPA 901.1 Modified	6.94E-03	3.21E-02	3.21E-02	8.01E-02	U	pCi/g
19-12037-12	TRG	L1-10206-C-FSGS-011-SS-A	10/28/19 09:20	12/9/2019	12/11/2019	19-12037	Lead-210	EPA 901.1 Modified	1.24E+00	1.18E+00	1.18E+00	1.99E+00	U	pCi/g
19-12037-12	TRG	L1-10206-C-FSGS-011-SS-A	10/28/19 09:20	12/9/2019	12/11/2019	19-12037	Lead-212	EPA 901.1 Modified	6.12E-01	1.51E-01	1.54E-01	2.55E-01		pCi/g
19-12037-12	TRG	L1-10206-C-FSGS-011-SS-A	10/28/19 09:20	12/9/2019	12/11/2019	19-12037	Lead-214	EPA 901.1 Modified	8.75E-01	1.91E-01	1.96E-01	2.29E-01		pCi/g
19-12037-12	TRG	L1-10206-C-FSGS-011-SS-A	10/28/19 09:20	12/9/2019	12/11/2019	19-12037	Promethium-145	EPA 901.1 Modified	-9.32E-02	1.90E-01	1.90E-01	2.98E-01	U	pCi/g
19-12037-12	TRG	L1-10206-C-FSGS-011-SS-A	10/28/19 09:20	12/9/2019	12/11/2019	19-12037	Radium-226	EPA 901.1 Modified	7.81E-01	1.60E-01	1.65E-01	2.07E-01		pCi/g
19-12037-12	TRG	L1-10206-C-FSGS-011-SS-A	10/28/19 09:20	12/9/2019	12/11/2019	19-12037	Antimony-125	EPA 901.1 Modified	5.79E-02	1.50E-01	1.50E-01	2.39E-01	U	pCi/g
19-12037-12	TRG	L1-10206-C-FSGS-011-SS-A	10/28/19 09:20	12/9/2019	12/11/2019	19-12037	Thorium-234	EPA 901.1 Modified	9.94E-01	1.02E+00	1.02E+00	1.70E+00	U	pCi/g
19-12037-12	TRG	L1-10206-C-FSGS-011-SS-A	10/28/19 09:20	12/9/2019	12/11/2019	19-12037	Thallium-208	EPA 901.1 Modified	4.29E-01	1.74E-01	1.75E-01	3.18E-01		pCi/g
19-12037-12	TRG	L1-10206-C-FSGS-011-SS-A	10/28/19 09:20	12/9/2019	12/11/2019	19-12037	Uranium-235	EPA 901.1 Modified	-6.02E-02	3.24E-01	3.24E-01	4.75E-01	U	pCi/g

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Eberline Analytical Final Report of Analysis			Report To:					Work Order Details:						
			Patricia Giza					SDG:	19-12037					
			Zion Solutions					Purchase Order:	677118					
			2701 Deborah Ave					Analysis Category:	ENVIRONMENTAL					
			Zion, IL 60099					Sample Matrix:	SO					
Lab ID	Sample Type	Client ID	Sample Date	Receipt Date	Analysis Date	Batch ID	Analyte	Method	Result	CU	CSU	MDA	Qualifier	Report Units
19-12037-13	TRG	L1-10206-D-FIGS-001-SS-A	11/04/19 08:20	12/9/2019	12/11/2019	19-12037	Actinium-228	EPA 901.1 Modified	2.81E-01	1.83E-01	1.83E-01	3.39E-01	U	pCi/g
19-12037-13	TRG	L1-10206-D-FIGS-001-SS-A	11/04/19 08:20	12/9/2019	12/11/2019	19-12037	Silver-108m	EPA 901.1 Modified	-4.94E-03	4.93E-02	4.93E-02	5.30E-02	U	pCi/g
19-12037-13	TRG	L1-10206-D-FIGS-001-SS-A	11/04/19 08:20	12/9/2019	12/11/2019	19-12037	Americium-241	EPA 901.1 Modified	-1.31E-01	1.02E-01	1.02E-01	1.31E-01	U	pCi/g
19-12037-13	TRG	L1-10206-D-FIGS-001-SS-A	11/04/19 08:20	12/9/2019	12/11/2019	19-12037	Barium-133	EPA 901.1 Modified	-1.53E-02	7.57E-02	7.57E-02	9.38E-02	U	pCi/g
19-12037-13	TRG	L1-10206-D-FIGS-001-SS-A	11/04/19 08:20	12/9/2019	12/11/2019	19-12037	Bismuth-214	EPA 901.1 Modified	3.99E-01	9.52E-02	9.74E-02	5.37E-02		pCi/g
19-12037-13	TRG	L1-10206-D-FIGS-001-SS-A	11/04/19 08:20	12/9/2019	12/11/2019	19-12037	Cobalt-60	EPA 901.1 Modified	8.37E-01	9.10E-02	1.01E-01	1.07E-01		pCi/g
19-12037-13	TRG	L1-10206-D-FIGS-001-SS-A	11/04/19 08:20	12/9/2019	12/11/2019	19-12037	Cesium-134	EPA 901.1 Modified	1.38E-02	2.44E-02	2.45E-02	8.07E-02	U	pCi/g
19-12037-13	TRG	L1-10206-D-FIGS-001-SS-A	11/04/19 08:20	12/9/2019	12/11/2019	19-12037	Cesium-137	EPA 901.1 Modified	1.45E-01	7.53E-02	7.57E-02	1.18E-01		pCi/g
19-12037-13	TRG	L1-10206-D-FIGS-001-SS-A	11/04/19 08:20	12/9/2019	12/11/2019	19-12037	Europium-152	EPA 901.1 Modified	-6.40E-02	1.66E-01	1.66E-01	1.86E-01	U	pCi/g
19-12037-13	TRG	L1-10206-D-FIGS-001-SS-A	11/04/19 08:20	12/9/2019	12/11/2019	19-12037	Europium-154	EPA 901.1 Modified	-5.21E-02	1.19E-01	1.19E-01	9.34E-02	U	pCi/g
19-12037-13	TRG	L1-10206-D-FIGS-001-SS-A	11/04/19 08:20	12/9/2019	12/11/2019	19-12037	Europium-155	EPA 901.1 Modified	-1.87E-03	1.02E-01	1.02E-01	1.48E-01	U	pCi/g
19-12037-13	TRG	L1-10206-D-FIGS-001-SS-A	11/04/19 08:20	12/9/2019	12/11/2019	19-12037	Holmium-166m	EPA 901.1 Modified	-4.02E-02	8.33E-02	8.34E-02	6.59E-02	U	pCi/g
19-12037-13	TRG	L1-10206-D-FIGS-001-SS-A	11/04/19 08:20	12/9/2019	12/11/2019	19-12037	Iodine-129	EPA 901.1 Modified	5.74E-02	1.52E-01	1.52E-01	2.27E-01	U	pCi/g
19-12037-13	TRG	L1-10206-D-FIGS-001-SS-A	11/04/19 08:20	12/9/2019	12/11/2019	19-12037	Potassium-40	EPA 901.1 Modified	7.73E+00	1.23E+00	1.29E+00	8.85E-01		pCi/g
19-12037-13	TRG	L1-10206-D-FIGS-001-SS-A	11/04/19 08:20	12/9/2019	12/11/2019	19-12037	Manganese-54	EPA 901.1 Modified	-1.60E-02	5.40E-02	5.40E-02	7.16E-02	U	pCi/g
19-12037-13	TRG	L1-10206-D-FIGS-001-SS-A	11/04/19 08:20	12/9/2019	12/11/2019	19-12037	Molybdenum-93	EPA 901.1 Modified	-1.17E-02	4.67E-02	4.67E-02	4.51E-02	U	pCi/g
19-12037-13	TRG	L1-10206-D-FIGS-001-SS-A	11/04/19 08:20	12/9/2019	12/11/2019	19-12037	Niobium-94	EPA 901.1 Modified	-8.34E-03	5.24E-02	5.24E-02	6.58E-02	U	pCi/g
19-12037-13	TRG	L1-10206-D-FIGS-001-SS-A	11/04/19 08:20	12/9/2019	12/11/2019	19-12037	Lead-210	EPA 901.1 Modified	1.27E+00	8.87E-01	8.89E-01	1.40E+00	U	pCi/g
19-12037-13	TRG	L1-10206-D-FIGS-001-SS-A	11/04/19 08:20	12/9/2019	12/11/2019	19-12037	Lead-212	EPA 901.1 Modified	3.44E-01	1.11E-01	1.12E-01	1.56E-01		pCi/g
19-12037-13	TRG	L1-10206-D-FIGS-001-SS-A	11/04/19 08:20	12/9/2019	12/11/2019	19-12037	Lead-214	EPA 901.1 Modified	3.41E-01	1.09E-01	1.10E-01	2.23E-01		pCi/g
19-12037-13	TRG	L1-10206-D-FIGS-001-SS-A	11/04/19 08:20	12/9/2019	12/11/2019	19-12037	Promethium-145	EPA 901.1 Modified	3.09E-03	1.21E-01	1.21E-01	1.79E-01	U	pCi/g
19-12037-13	TRG	L1-10206-D-FIGS-001-SS-A	11/04/19 08:20	12/9/2019	12/11/2019	19-12037	Radium-226	EPA 901.1 Modified	3.99E-01	9.52E-02	9.74E-02	5.37E-02		pCi/g
19-12037-13	TRG	L1-10206-D-FIGS-001-SS-A	11/04/19 08:20	12/9/2019	12/11/2019	19-12037	Antimony-125	EPA 901.1 Modified	2.33E-02	1.08E-01	1.08E-01	1.68E-01	U	pCi/g
19-12037-13	TRG	L1-10206-D-FIGS-001-SS-A	11/04/19 08:20	12/9/2019	12/11/2019	19-12037	Thorium-234	EPA 901.1 Modified	1.32E+00	1.24E+00	1.24E+00	2.07E+00	U	pCi/g
19-12037-13	TRG	L1-10206-D-FIGS-001-SS-A	11/04/19 08:20	12/9/2019	12/11/2019	19-12037	Thallium-208	EPA 901.1 Modified	2.67E-01	1.13E-01	1.13E-01	2.40E-01		pCi/g
19-12037-13	TRG	L1-10206-D-FIGS-001-SS-A	11/04/19 08:20	12/9/2019	12/11/2019	19-12037	Uranium-235	EPA 901.1 Modified	1.89E-01	2.45E-01	2.45E-01	3.79E-01	U	pCi/g

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			Patricia Giza					SDG:	19-12037					
			Zion Solutions					Purchase Order:	677118					
			2701 Deborah Ave					Analysis Category:	ENVIRONMENTAL					
			Zion, IL 60099					Sample Matrix:	SO					
Lab ID	Sample Type	Client ID	Sample Date	Receipt Date	Analysis Date	Batch ID	Analyte	Method	Result	CU	CSU	MDA	Qualifier	Report Units
19-12037-14	TRG	L1-10206-D-FSGS-017-SS-A	11/04/19 08:52	12/9/2019	12/11/2019	19-12037	Actinium-228	EPA 901.1 Modified	2.73E-01	1.08E-01	1.09E-01	2.04E-01		pCi/g
19-12037-14	TRG	L1-10206-D-FSGS-017-SS-A	11/04/19 08:52	12/9/2019	12/11/2019	19-12037	Silver-108m	EPA 901.1 Modified	4.01E-03	1.31E-02	1.31E-02	4.23E-02	U	pCi/g
19-12037-14	TRG	L1-10206-D-FSGS-017-SS-A	11/04/19 08:52	12/9/2019	12/11/2019	19-12037	Americium-241	EPA 901.1 Modified	1.69E-02	5.56E-02	5.56E-02	1.08E-01	U	pCi/g
19-12037-14	TRG	L1-10206-D-FSGS-017-SS-A	11/04/19 08:52	12/9/2019	12/11/2019	19-12037	Barium-133	EPA 901.1 Modified	6.15E-03	2.46E-02	2.46E-02	5.36E-02	U	pCi/g
19-12037-14	TRG	L1-10206-D-FSGS-017-SS-A	11/04/19 08:52	12/9/2019	12/11/2019	19-12037	Bismuth-214	EPA 901.1 Modified	1.78E-01	9.19E-02	9.24E-02	1.61E-01		pCi/g
19-12037-14	TRG	L1-10206-D-FSGS-017-SS-A	11/04/19 08:52	12/9/2019	12/11/2019	19-12037	Cobalt-60	EPA 901.1 Modified	4.91E-02	2.81E-02	2.82E-02	6.17E-02	U	pCi/g
19-12037-14	TRG	L1-10206-D-FSGS-017-SS-A	11/04/19 08:52	12/9/2019	12/11/2019	19-12037	Cesium-134	EPA 901.1 Modified	4.06E-03	2.07E-02	2.07E-02	5.20E-02	U	pCi/g
19-12037-14	TRG	L1-10206-D-FSGS-017-SS-A	11/04/19 08:52	12/9/2019	12/11/2019	19-12037	Cesium-137	EPA 901.1 Modified	1.26E-01	5.72E-02	5.75E-02	8.48E-02		pCi/g
19-12037-14	TRG	L1-10206-D-FSGS-017-SS-A	11/04/19 08:52	12/9/2019	12/11/2019	19-12037	Europium-152	EPA 901.1 Modified	7.45E-02	9.13E-02	9.14E-02	1.49E-01	U	pCi/g
19-12037-14	TRG	L1-10206-D-FSGS-017-SS-A	11/04/19 08:52	12/9/2019	12/11/2019	19-12037	Europium-154	EPA 901.1 Modified	-8.84E-04	1.01E-01	1.01E-01	7.75E-02	U	pCi/g
19-12037-14	TRG	L1-10206-D-FSGS-017-SS-A	11/04/19 08:52	12/9/2019	12/11/2019	19-12037	Europium-155	EPA 901.1 Modified	-8.95E-02	1.01E-01	1.02E-01	1.21E-01	U	pCi/g
19-12037-14	TRG	L1-10206-D-FSGS-017-SS-A	11/04/19 08:52	12/9/2019	12/11/2019	19-12037	Holmium-166m	EPA 901.1 Modified	2.97E-03	6.23E-02	6.23E-02	5.69E-02	U	pCi/g
19-12037-14	TRG	L1-10206-D-FSGS-017-SS-A	11/04/19 08:52	12/9/2019	12/11/2019	19-12037	Iodine-129	EPA 901.1 Modified	1.21E-02	8.52E-02	8.52E-02	1.19E-01	U	pCi/g
19-12037-14	TRG	L1-10206-D-FSGS-017-SS-A	11/04/19 08:52	12/9/2019	12/11/2019	19-12037	Potassium-40	EPA 901.1 Modified	6.37E+00	1.06E+00	1.11E+00	6.46E-01		pCi/g
19-12037-14	TRG	L1-10206-D-FSGS-017-SS-A	11/04/19 08:52	12/9/2019	12/11/2019	19-12037	Manganese-54	EPA 901.1 Modified	-1.30E-02	3.98E-02	3.98E-02	5.81E-02	U	pCi/g
19-12037-14	TRG	L1-10206-D-FSGS-017-SS-A	11/04/19 08:52	12/9/2019	12/11/2019	19-12037	Molybdenum-93	EPA 901.1 Modified	2.72E-02	3.03E-02	3.03E-02	4.58E-02	U	pCi/g
19-12037-14	TRG	L1-10206-D-FSGS-017-SS-A	11/04/19 08:52	12/9/2019	12/11/2019	19-12037	Niobium-94	EPA 901.1 Modified	-7.47E-03	3.28E-02	3.28E-02	4.68E-02	U	pCi/g
19-12037-14	TRG	L1-10206-D-FSGS-017-SS-A	11/04/19 08:52	12/9/2019	12/11/2019	19-12037	Lead-210	EPA 901.1 Modified	1.05E+00	8.26E-01	8.28E-01	1.20E+00	U	pCi/g
19-12037-14	TRG	L1-10206-D-FSGS-017-SS-A	11/04/19 08:52	12/9/2019	12/11/2019	19-12037	Lead-212	EPA 901.1 Modified	2.79E-01	7.60E-02	7.73E-02	1.55E-01		pCi/g
19-12037-14	TRG	L1-10206-D-FSGS-017-SS-A	11/04/19 08:52	12/9/2019	12/11/2019	19-12037	Lead-214	EPA 901.1 Modified	2.83E-01	9.06E-02	9.18E-02	1.39E-01		pCi/g
19-12037-14	TRG	L1-10206-D-FSGS-017-SS-A	11/04/19 08:52	12/9/2019	12/11/2019	19-12037	Promethium-145	EPA 901.1 Modified	-5.50E-02	1.22E-01	1.22E-01	1.48E-01	U	pCi/g
19-12037-14	TRG	L1-10206-D-FSGS-017-SS-A	11/04/19 08:52	12/9/2019	12/11/2019	19-12037	Radium-226	EPA 901.1 Modified	1.78E-01	9.19E-02	9.24E-02	1.61E-01		pCi/g
19-12037-14	TRG	L1-10206-D-FSGS-017-SS-A	11/04/19 08:52	12/9/2019	12/11/2019	19-12037	Antimony-125	EPA 901.1 Modified	1.78E-02	7.43E-02	7.43E-02	1.30E-01	U	pCi/g
19-12037-14	TRG	L1-10206-D-FSGS-017-SS-A	11/04/19 08:52	12/9/2019	12/11/2019	19-12037	Thorium-234	EPA 901.1 Modified	9.20E-01	8.11E-01	8.12E-01	1.34E+00	U	pCi/g
19-12037-14	TRG	L1-10206-D-FSGS-017-SS-A	11/04/19 08:52	12/9/2019	12/11/2019	19-12037	Thallium-208	EPA 901.1 Modified	3.36E-01	1.08E-01	1.09E-01	3.76E-02		pCi/g
19-12037-14	TRG	L1-10206-D-FSGS-017-SS-A	11/04/19 08:52	12/9/2019	12/11/2019	19-12037	Uranium-235	EPA 901.1 Modified	1.31E-01	2.41E-01	2.41E-01	3.36E-01	U	pCi/g

CU=Counting Uncertainty;CSU=Combined Standard Uncertainty (1-sigma);MDA=Minimal Detected Activity;LCS=Laboratory Control Sample;MBL=Blank;DUP=Duplicate;TRG=Normal Sample;DO=Duplicate Original;U=Non-detect



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			2701 Deborah Ave						Analysis Category:		ENVIRONMENTAL				
			Zion, IL 60099						Sample Matrix:		SO				
Lab ID	Sample Type	Client ID	Sample Date	Receipt Date	Analysis Date	Batch ID	Analyte	Method	Result	CU	CSU	MDA	Qualifier	Report Units	
19-12037-15	TRG	L1-10206-E-FSGS-002-SS-A	11/05/19 09:02	12/9/2019	12/11/2019	19-12037	Actinium-228	EPA 901.1 Modified	2.94E-01	1.81E-01	1.82E-01	3.28E-01	U	pCi/g	
19-12037-15	TRG	L1-10206-E-FSGS-002-SS-A	11/05/19 09:02	12/9/2019	12/11/2019	19-12037	Silver-108m	EPA 901.1 Modified	-7.29E-03	4.85E-02	4.85E-02	5.41E-02	U	pCi/g	
19-12037-15	TRG	L1-10206-E-FSGS-002-SS-A	11/05/19 09:02	12/9/2019	12/11/2019	19-12037	Americium-241	EPA 901.1 Modified	-1.63E-01	9.62E-02	9.66E-02	1.37E-01	U	pCi/g	
19-12037-15	TRG	L1-10206-E-FSGS-002-SS-A	11/05/19 09:02	12/9/2019	12/11/2019	19-12037	Barium-133	EPA 901.1 Modified	-5.34E-02	7.83E-02	7.84E-02	9.68E-02	U	pCi/g	
19-12037-15	TRG	L1-10206-E-FSGS-002-SS-A	11/05/19 09:02	12/9/2019	12/11/2019	19-12037	Bismuth-214	EPA 901.1 Modified	3.26E-01	1.14E-01	1.15E-01	8.84E-02		pCi/g	
19-12037-15	TRG	L1-10206-E-FSGS-002-SS-A	11/05/19 09:02	12/9/2019	12/11/2019	19-12037	Cobalt-60	EPA 901.1 Modified	1.41E-02	6.76E-02	6.76E-02	6.94E-02	U	pCi/g	
19-12037-15	TRG	L1-10206-E-FSGS-002-SS-A	11/05/19 09:02	12/9/2019	12/11/2019	19-12037	Cesium-134	EPA 901.1 Modified	1.16E-03	2.90E-02	2.90E-02	6.83E-02	U	pCi/g	
19-12037-15	TRG	L1-10206-E-FSGS-002-SS-A	11/05/19 09:02	12/9/2019	12/11/2019	19-12037	Cesium-137	EPA 901.1 Modified	4.07E-02	4.84E-02	4.84E-02	8.55E-02	U	pCi/g	
19-12037-15	TRG	L1-10206-E-FSGS-002-SS-A	11/05/19 09:02	12/9/2019	12/11/2019	19-12037	Europium-152	EPA 901.1 Modified	-2.01E-02	1.62E-01	1.62E-01	1.84E-01	U	pCi/g	
19-12037-15	TRG	L1-10206-E-FSGS-002-SS-A	11/05/19 09:02	12/9/2019	12/11/2019	19-12037	Europium-154	EPA 901.1 Modified	1.36E-01	1.44E-01	1.44E-01	9.34E-02	U	pCi/g	
19-12037-15	TRG	L1-10206-E-FSGS-002-SS-A	11/05/19 09:02	12/9/2019	12/11/2019	19-12037	Europium-155	EPA 901.1 Modified	4.80E-02	8.86E-02	8.87E-02	1.50E-01	U	pCi/g	
19-12037-15	TRG	L1-10206-E-FSGS-002-SS-A	11/05/19 09:02	12/9/2019	12/11/2019	19-12037	Holmium-166m	EPA 901.1 Modified	3.60E-02	8.73E-02	8.73E-02	7.21E-02	U	pCi/g	
19-12037-15	TRG	L1-10206-E-FSGS-002-SS-A	11/05/19 09:02	12/9/2019	12/11/2019	19-12037	Iodine-129	EPA 901.1 Modified	1.18E-01	2.28E-01	2.28E-01	3.77E-01	U	pCi/g	
19-12037-15	TRG	L1-10206-E-FSGS-002-SS-A	11/05/19 09:02	12/9/2019	12/11/2019	19-12037	Potassium-40	EPA 901.1 Modified	1.48E+01	2.10E+00	2.23E+00	1.13E+00		pCi/g	
19-12037-15	TRG	L1-10206-E-FSGS-002-SS-A	11/05/19 09:02	12/9/2019	12/11/2019	19-12037	Manganese-54	EPA 901.1 Modified	-6.76E-02	5.81E-02	5.82E-02	6.98E-02	U	pCi/g	
19-12037-15	TRG	L1-10206-E-FSGS-002-SS-A	11/05/19 09:02	12/9/2019	12/11/2019	19-12037	Molybdenum-93	EPA 901.1 Modified	4.51E-02	3.43E-02	3.44E-02	6.60E-02	U	pCi/g	
19-12037-15	TRG	L1-10206-E-FSGS-002-SS-A	11/05/19 09:02	12/9/2019	12/11/2019	19-12037	Niobium-94	EPA 901.1 Modified	-8.49E-03	4.66E-02	4.66E-02	6.51E-02	U	pCi/g	
19-12037-15	TRG	L1-10206-E-FSGS-002-SS-A	11/05/19 09:02	12/9/2019	12/11/2019	19-12037	Lead-210	EPA 901.1 Modified	6.63E-01	1.01E+00	1.01E+00	1.69E+00	U	pCi/g	
19-12037-15	TRG	L1-10206-E-FSGS-002-SS-A	11/05/19 09:02	12/9/2019	12/11/2019	19-12037	Lead-212	EPA 901.1 Modified	2.57E-01	9.60E-02	9.69E-02	1.89E-01		pCi/g	
19-12037-15	TRG	L1-10206-E-FSGS-002-SS-A	11/05/19 09:02	12/9/2019	12/11/2019	19-12037	Lead-214	EPA 901.1 Modified	2.26E-01	1.34E-01	1.34E-01	2.04E-01		pCi/g	
19-12037-15	TRG	L1-10206-E-FSGS-002-SS-A	11/05/19 09:02	12/9/2019	12/11/2019	19-12037	Promethium-145	EPA 901.1 Modified	3.05E-02	1.52E-01	1.52E-01	2.50E-01	U	pCi/g	
19-12037-15	TRG	L1-10206-E-FSGS-002-SS-A	11/05/19 09:02	12/9/2019	12/11/2019	19-12037	Radium-226	EPA 901.1 Modified	3.26E-01	1.14E-01	1.15E-01	8.84E-02		pCi/g	
19-12037-15	TRG	L1-10206-E-FSGS-002-SS-A	11/05/19 09:02	12/9/2019	12/11/2019	19-12037	Antimony-125	EPA 901.1 Modified	1.28E-01	1.17E-01	1.17E-01	2.04E-01	U	pCi/g	
19-12037-15	TRG	L1-10206-E-FSGS-002-SS-A	11/05/19 09:02	12/9/2019	12/11/2019	19-12037	Thorium-234	EPA 901.1 Modified	2.31E+00	7.91E-01	8.00E-01	1.42E+00	U	pCi/g	
19-12037-15	TRG	L1-10206-E-FSGS-002-SS-A	11/05/19 09:02	12/9/2019	12/11/2019	19-12037	Thallium-208	EPA 901.1 Modified	3.55E-01	1.32E-01	1.33E-01	1.51E-01		pCi/g	
19-12037-15	TRG	L1-10206-E-FSGS-002-SS-A	11/05/19 09:02	12/9/2019	12/11/2019	19-12037	Uranium-235	EPA 901.1 Modified	-3.02E-01	2.66E-01	2.66E-01	3.55E-01	U	pCi/g	

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Eberline Analytical Final Report of Analysis			Report To:					Work Order Details:						
			Patricia Giza					SDG:	19-12037					
			Zion Solutions					Purchase Order:	677118					
			2701 Deborah Ave					Analysis Category:	ENVIRONMENTAL					
			Zion, IL 60099					Sample Matrix:	SO					
Lab ID	Sample Type	Client ID	Sample Date	Receipt Date	Analysis Date	Batch ID	Analyte	Method	Result	CU	CSU	MDA	Qualifier	Report Units
19-12037-16	TRG	L1-10206-E-FSGS-014-SS-A	11/05/19 09:26	12/9/2019	12/11/2019	19-12037	Actinium-228	EPA 901.1 Modified	1.35E-01	1.42E-01	1.42E-01	2.30E-01	U	pCi/g
19-12037-16	TRG	L1-10206-E-FSGS-014-SS-A	11/05/19 09:26	12/9/2019	12/11/2019	19-12037	Silver-108m	EPA 901.1 Modified	-1.17E-02	3.48E-02	3.48E-02	3.89E-02	U	pCi/g
19-12037-16	TRG	L1-10206-E-FSGS-014-SS-A	11/05/19 09:26	12/9/2019	12/11/2019	19-12037	Americium-241	EPA 901.1 Modified	-9.81E-02	7.93E-02	7.94E-02	1.03E-01	U	pCi/g
19-12037-16	TRG	L1-10206-E-FSGS-014-SS-A	11/05/19 09:26	12/9/2019	12/11/2019	19-12037	Barium-133	EPA 901.1 Modified	-1.89E-03	2.24E-02	2.24E-02	6.07E-02	U	pCi/g
19-12037-16	TRG	L1-10206-E-FSGS-014-SS-A	11/05/19 09:26	12/9/2019	12/11/2019	19-12037	Bismuth-214	EPA 901.1 Modified	1.75E-01	7.36E-02	7.41E-02	4.71E-02		pCi/g
19-12037-16	TRG	L1-10206-E-FSGS-014-SS-A	11/05/19 09:26	12/9/2019	12/11/2019	19-12037	Cobalt-60	EPA 901.1 Modified	4.54E-03	2.97E-02	2.97E-02	3.94E-02	U	pCi/g
19-12037-16	TRG	L1-10206-E-FSGS-014-SS-A	11/05/19 09:26	12/9/2019	12/11/2019	19-12037	Cesium-134	EPA 901.1 Modified	-1.64E-03	1.91E-02	1.91E-02	5.61E-02	U	pCi/g
19-12037-16	TRG	L1-10206-E-FSGS-014-SS-A	11/05/19 09:26	12/9/2019	12/11/2019	19-12037	Cesium-137	EPA 901.1 Modified	1.35E-02	3.50E-02	3.50E-02	5.29E-02	U	pCi/g
19-12037-16	TRG	L1-10206-E-FSGS-014-SS-A	11/05/19 09:26	12/9/2019	12/11/2019	19-12037	Europium-152	EPA 901.1 Modified	-3.24E-02	7.85E-02	7.85E-02	1.38E-01	U	pCi/g
19-12037-16	TRG	L1-10206-E-FSGS-014-SS-A	11/05/19 09:26	12/9/2019	12/11/2019	19-12037	Europium-154	EPA 901.1 Modified	-6.95E-03	9.67E-02	9.67E-02	6.98E-02	U	pCi/g
19-12037-16	TRG	L1-10206-E-FSGS-014-SS-A	11/05/19 09:26	12/9/2019	12/11/2019	19-12037	Europium-155	EPA 901.1 Modified	-6.00E-02	8.05E-02	8.06E-02	1.10E-01	U	pCi/g
19-12037-16	TRG	L1-10206-E-FSGS-014-SS-A	11/05/19 09:26	12/9/2019	12/11/2019	19-12037	Holmium-166m	EPA 901.1 Modified	-1.67E-02	5.36E-02	5.36E-02	5.19E-02	U	pCi/g
19-12037-16	TRG	L1-10206-E-FSGS-014-SS-A	11/05/19 09:26	12/9/2019	12/11/2019	19-12037	Iodine-129	EPA 901.1 Modified	-3.15E-02	1.22E-01	1.22E-01	1.77E-01	U	pCi/g
19-12037-16	TRG	L1-10206-E-FSGS-014-SS-A	11/05/19 09:26	12/9/2019	12/11/2019	19-12037	Potassium-40	EPA 901.1 Modified	6.97E+00	1.10E+00	1.16E+00	7.88E-01		pCi/g
19-12037-16	TRG	L1-10206-E-FSGS-014-SS-A	11/05/19 09:26	12/9/2019	12/11/2019	19-12037	Manganese-54	EPA 901.1 Modified	2.73E-02	3.37E-02	3.38E-02	5.54E-02	U	pCi/g
19-12037-16	TRG	L1-10206-E-FSGS-014-SS-A	11/05/19 09:26	12/9/2019	12/11/2019	19-12037	Molybdenum-93	EPA 901.1 Modified	1.21E-02	2.52E-02	2.52E-02	2.56E-02	U	pCi/g
19-12037-16	TRG	L1-10206-E-FSGS-014-SS-A	11/05/19 09:26	12/9/2019	12/11/2019	19-12037	Niobium-94	EPA 901.1 Modified	1.57E-02	3.21E-02	3.21E-02	4.69E-02	U	pCi/g
19-12037-16	TRG	L1-10206-E-FSGS-014-SS-A	11/05/19 09:26	12/9/2019	12/11/2019	19-12037	Lead-210	EPA 901.1 Modified	6.24E-01	6.53E-01	6.54E-01	1.02E+00	U	pCi/g
19-12037-16	TRG	L1-10206-E-FSGS-014-SS-A	11/05/19 09:26	12/9/2019	12/11/2019	19-12037	Lead-212	EPA 901.1 Modified	1.64E-01	6.15E-02	6.20E-02	1.37E-01		pCi/g
19-12037-16	TRG	L1-10206-E-FSGS-014-SS-A	11/05/19 09:26	12/9/2019	12/11/2019	19-12037	Lead-214	EPA 901.1 Modified	1.50E-01	7.89E-02	7.92E-02	1.45E-01		pCi/g
19-12037-16	TRG	L1-10206-E-FSGS-014-SS-A	11/05/19 09:26	12/9/2019	12/11/2019	19-12037	Promethium-145	EPA 901.1 Modified	6.41E-02	9.42E-02	9.42E-02	1.47E-01	U	pCi/g
19-12037-16	TRG	L1-10206-E-FSGS-014-SS-A	11/05/19 09:26	12/9/2019	12/11/2019	19-12037	Radium-226	EPA 901.1 Modified	1.75E-01	7.36E-02	7.41E-02	4.71E-02		pCi/g
19-12037-16	TRG	L1-10206-E-FSGS-014-SS-A	11/05/19 09:26	12/9/2019	12/11/2019	19-12037	Antimony-125	EPA 901.1 Modified	3.95E-02	8.06E-02	8.06E-02	1.25E-01	U	pCi/g
19-12037-16	TRG	L1-10206-E-FSGS-014-SS-A	11/05/19 09:26	12/9/2019	12/11/2019	19-12037	Thorium-234	EPA 901.1 Modified	9.47E-01	6.84E-01	6.86E-01	1.07E+00	U	pCi/g
19-12037-16	TRG	L1-10206-E-FSGS-014-SS-A	11/05/19 09:26	12/9/2019	12/11/2019	19-12037	Thallium-208	EPA 901.1 Modified	1.74E-01	1.02E-01	1.02E-01	1.75E-01	U	pCi/g
19-12037-16	TRG	L1-10206-E-FSGS-014-SS-A	11/05/19 09:26	12/9/2019	12/11/2019	19-12037	Uranium-235	EPA 901.1 Modified	3.10E-02	1.99E-01	1.99E-01	2.96E-01	U	pCi/g

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			Patricia Giza					SDG:	19-12037					
			Zion Solutions					Purchase Order:	677118					
			2701 Deborah Ave					Analysis Category:	ENVIRONMENTAL					
			Zion, IL 60099					Sample Matrix:	SO					
Lab ID	Sample Type	Client ID	Sample Date	Receipt Date	Analysis Date	Batch ID	Analyte	Method	Result	CU	CSU	MDA	Qualifier	Report Units
19-12037-17	TRG	L1-12205-B-FSGS-116-SB-A	10/01/19 08:35	12/9/2019	12/11/2019	19-12037	Actinium-228	EPA 901.1 Modified	5.02E-01	2.21E-01	2.22E-01	3.53E-01		pCi/g
19-12037-17	TRG	L1-12205-B-FSGS-116-SB-A	10/01/19 08:35	12/9/2019	12/11/2019	19-12037	Silver-108m	EPA 901.1 Modified	-3.85E-02	5.51E-02	5.52E-02	4.64E-02	U	pCi/g
19-12037-17	TRG	L1-12205-B-FSGS-116-SB-A	10/01/19 08:35	12/9/2019	12/11/2019	19-12037	Americium-241	EPA 901.1 Modified	-1.62E-01	1.30E-01	1.31E-01	1.46E-01	U	pCi/g
19-12037-17	TRG	L1-12205-B-FSGS-116-SB-A	10/01/19 08:35	12/9/2019	12/11/2019	19-12037	Barium-133	EPA 901.1 Modified	-8.32E-02	7.29E-02	7.30E-02	7.63E-02	U	pCi/g
19-12037-17	TRG	L1-12205-B-FSGS-116-SB-A	10/01/19 08:35	12/9/2019	12/11/2019	19-12037	Bismuth-214	EPA 901.1 Modified	5.40E-01	1.34E-01	1.37E-01	2.30E-01		pCi/g
19-12037-17	TRG	L1-12205-B-FSGS-116-SB-A	10/01/19 08:35	12/9/2019	12/11/2019	19-12037	Cobalt-60	EPA 901.1 Modified	-2.59E-02	6.51E-02	6.51E-02	6.96E-02	U	pCi/g
19-12037-17	TRG	L1-12205-B-FSGS-116-SB-A	10/01/19 08:35	12/9/2019	12/11/2019	19-12037	Cesium-134	EPA 901.1 Modified	2.09E-04	2.86E-02	2.86E-02	6.89E-02	U	pCi/g
19-12037-17	TRG	L1-12205-B-FSGS-116-SB-A	10/01/19 08:35	12/9/2019	12/11/2019	19-12037	Cesium-137	EPA 901.1 Modified	6.69E-02	6.06E-02	6.07E-02	9.91E-02	U	pCi/g
19-12037-17	TRG	L1-12205-B-FSGS-116-SB-A	10/01/19 08:35	12/9/2019	12/11/2019	19-12037	Europium-152	EPA 901.1 Modified	2.01E-01	1.37E-01	1.37E-01	2.14E-01	U	pCi/g
19-12037-17	TRG	L1-12205-B-FSGS-116-SB-A	10/01/19 08:35	12/9/2019	12/11/2019	19-12037	Europium-154	EPA 901.1 Modified	-8.54E-02	1.60E-01	1.60E-01	1.12E-01	U	pCi/g
19-12037-17	TRG	L1-12205-B-FSGS-116-SB-A	10/01/19 08:35	12/9/2019	12/11/2019	19-12037	Europium-155	EPA 901.1 Modified	-5.91E-02	1.39E-01	1.39E-01	1.74E-01	U	pCi/g
19-12037-17	TRG	L1-12205-B-FSGS-116-SB-A	10/01/19 08:35	12/9/2019	12/11/2019	19-12037	Holmium-166m	EPA 901.1 Modified	-4.61E-02	7.96E-02	7.97E-02	8.01E-02	U	pCi/g
19-12037-17	TRG	L1-12205-B-FSGS-116-SB-A	10/01/19 08:35	12/9/2019	12/11/2019	19-12037	Iodine-129	EPA 901.1 Modified	9.12E-02	1.19E-01	1.19E-01	1.78E-01	U	pCi/g
19-12037-17	TRG	L1-12205-B-FSGS-116-SB-A	10/01/19 08:35	12/9/2019	12/11/2019	19-12037	Potassium-40	EPA 901.1 Modified	1.51E+01	1.99E+00	2.14E+00	9.16E-01		pCi/g
19-12037-17	TRG	L1-12205-B-FSGS-116-SB-A	10/01/19 08:35	12/9/2019	12/11/2019	19-12037	Manganese-54	EPA 901.1 Modified	-1.59E-02	5.72E-02	5.72E-02	8.34E-02	U	pCi/g
19-12037-17	TRG	L1-12205-B-FSGS-116-SB-A	10/01/19 08:35	12/9/2019	12/11/2019	19-12037	Molybdenum-93	EPA 901.1 Modified	3.14E-03	4.40E-02	4.40E-02	5.92E-02	U	pCi/g
19-12037-17	TRG	L1-12205-B-FSGS-116-SB-A	10/01/19 08:35	12/9/2019	12/11/2019	19-12037	Niobium-94	EPA 901.1 Modified	-2.54E-02	4.76E-02	4.76E-02	6.69E-02	U	pCi/g
19-12037-17	TRG	L1-12205-B-FSGS-116-SB-A	10/01/19 08:35	12/9/2019	12/11/2019	19-12037	Lead-210	EPA 901.1 Modified	1.14E+00	1.17E+00	1.17E+00	1.63E+00	U	pCi/g
19-12037-17	TRG	L1-12205-B-FSGS-116-SB-A	10/01/19 08:35	12/9/2019	12/11/2019	19-12037	Lead-212	EPA 901.1 Modified	4.89E-01	1.08E-01	1.11E-01	2.14E-01		pCi/g
19-12037-17	TRG	L1-12205-B-FSGS-116-SB-A	10/01/19 08:35	12/9/2019	12/11/2019	19-12037	Lead-214	EPA 901.1 Modified	7.38E-01	1.67E-01	1.71E-01	2.61E-01		pCi/g
19-12037-17	TRG	L1-12205-B-FSGS-116-SB-A	10/01/19 08:35	12/9/2019	12/11/2019	19-12037	Promethium-145	EPA 901.1 Modified	-4.31E-02	1.58E-01	1.58E-01	1.95E-01	U	pCi/g
19-12037-17	TRG	L1-12205-B-FSGS-116-SB-A	10/01/19 08:35	12/9/2019	12/11/2019	19-12037	Radium-226	EPA 901.1 Modified	5.40E-01	1.34E-01	1.37E-01	2.30E-01		pCi/g
19-12037-17	TRG	L1-12205-B-FSGS-116-SB-A	10/01/19 08:35	12/9/2019	12/11/2019	19-12037	Antimony-125	EPA 901.1 Modified	-3.89E-02	1.00E-01	1.00E-01	1.61E-01	U	pCi/g
19-12037-17	TRG	L1-12205-B-FSGS-116-SB-A	10/01/19 08:35	12/9/2019	12/11/2019	19-12037	Thorium-234	EPA 901.1 Modified	1.63E+00	1.12E+00	1.12E+00	1.57E+00	U	pCi/g
19-12037-17	TRG	L1-12205-B-FSGS-116-SB-A	10/01/19 08:35	12/9/2019	12/11/2019	19-12037	Thallium-208	EPA 901.1 Modified	4.89E-01	1.34E-01	1.36E-01	4.36E-02		pCi/g
19-12037-17	TRG	L1-12205-B-FSGS-116-SB-A	10/01/19 08:35	12/9/2019	12/11/2019	19-12037	Uranium-235	EPA 901.1 Modified	-6.83E-02	3.34E-01	3.34E-01	4.20E-01	U	pCi/g

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			Zion, IL 60099					Sample Matrix:	SO					
Lab ID	Sample Type	Client ID	Sample Date	Receipt Date	Analysis Date	Batch ID	Analyte	Method	Result	CU	CSU	MDA	Qualifier	Report Units
19-12037-18	TRG	L1-12205-C-FSGS-109-SS-A	09/24/19 09:24	12/9/2019	12/11/2019	19-12037	Actinium-228	EPA 901.1 Modified	3.33E-01	1.87E-01	1.88E-01	3.60E-01	U	pCi/g
19-12037-18	TRG	L1-12205-C-FSGS-109-SS-A	09/24/19 09:24	12/9/2019	12/11/2019	19-12037	Silver-108m	EPA 901.1 Modified	1.69E-03	2.35E-02	2.35E-02	5.89E-02	U	pCi/g
19-12037-18	TRG	L1-12205-C-FSGS-109-SS-A	09/24/19 09:24	12/9/2019	12/11/2019	19-12037	Americium-241	EPA 901.1 Modified	-2.67E-01	1.04E-01	1.05E-01	1.41E-01	U	pCi/g
19-12037-18	TRG	L1-12205-C-FSGS-109-SS-A	09/24/19 09:24	12/9/2019	12/11/2019	19-12037	Barium-133	EPA 901.1 Modified	8.96E-03	2.50E-02	2.50E-02	1.11E-01	U	pCi/g
19-12037-18	TRG	L1-12205-C-FSGS-109-SS-A	09/24/19 09:24	12/9/2019	12/11/2019	19-12037	Bismuth-214	EPA 901.1 Modified	3.62E-01	1.24E-01	1.25E-01	9.12E-02		pCi/g
19-12037-18	TRG	L1-12205-C-FSGS-109-SS-A	09/24/19 09:24	12/9/2019	12/11/2019	19-12037	Cobalt-60	EPA 901.1 Modified	-1.69E-02	7.22E-02	7.22E-02	8.12E-02	U	pCi/g
19-12037-18	TRG	L1-12205-C-FSGS-109-SS-A	09/24/19 09:24	12/9/2019	12/11/2019	19-12037	Cesium-134	EPA 901.1 Modified	5.58E-03	2.69E-02	2.69E-02	8.11E-02	U	pCi/g
19-12037-18	TRG	L1-12205-C-FSGS-109-SS-A	09/24/19 09:24	12/9/2019	12/11/2019	19-12037	Cesium-137	EPA 901.1 Modified	3.45E-03	5.41E-02	5.41E-02	8.46E-02	U	pCi/g
19-12037-18	TRG	L1-12205-C-FSGS-109-SS-A	09/24/19 09:24	12/9/2019	12/11/2019	19-12037	Europium-152	EPA 901.1 Modified	2.18E-02	1.84E-01	1.84E-01	1.98E-01	U	pCi/g
19-12037-18	TRG	L1-12205-C-FSGS-109-SS-A	09/24/19 09:24	12/9/2019	12/11/2019	19-12037	Europium-154	EPA 901.1 Modified	-6.08E-03	1.73E-01	1.73E-01	9.91E-02	U	pCi/g
19-12037-18	TRG	L1-12205-C-FSGS-109-SS-A	09/24/19 09:24	12/9/2019	12/11/2019	19-12037	Europium-155	EPA 901.1 Modified	-1.26E-01	1.08E-01	1.08E-01	1.47E-01	U	pCi/g
19-12037-18	TRG	L1-12205-C-FSGS-109-SS-A	09/24/19 09:24	12/9/2019	12/11/2019	19-12037	Holmium-166m	EPA 901.1 Modified	-5.12E-02	7.62E-02	7.63E-02	7.10E-02	U	pCi/g
19-12037-18	TRG	L1-12205-C-FSGS-109-SS-A	09/24/19 09:24	12/9/2019	12/11/2019	19-12037	Iodine-129	EPA 901.1 Modified	-3.85E-02	2.32E-01	2.32E-01	3.75E-01	U	pCi/g
19-12037-18	TRG	L1-12205-C-FSGS-109-SS-A	09/24/19 09:24	12/9/2019	12/11/2019	19-12037	Potassium-40	EPA 901.1 Modified	1.54E+01	2.18E+00	2.32E+00	1.19E+00		pCi/g
19-12037-18	TRG	L1-12205-C-FSGS-109-SS-A	09/24/19 09:24	12/9/2019	12/11/2019	19-12037	Manganese-54	EPA 901.1 Modified	-4.83E-03	5.91E-02	5.91E-02	9.08E-02	U	pCi/g
19-12037-18	TRG	L1-12205-C-FSGS-109-SS-A	09/24/19 09:24	12/9/2019	12/11/2019	19-12037	Molybdenum-93	EPA 901.1 Modified	2.70E-02	3.90E-02	3.90E-02	5.98E-02	U	pCi/g
19-12037-18	TRG	L1-12205-C-FSGS-109-SS-A	09/24/19 09:24	12/9/2019	12/11/2019	19-12037	Niobium-94	EPA 901.1 Modified	4.13E-02	4.58E-02	4.58E-02	8.36E-02	U	pCi/g
19-12037-18	TRG	L1-12205-C-FSGS-109-SS-A	09/24/19 09:24	12/9/2019	12/11/2019	19-12037	Lead-210	EPA 901.1 Modified	7.38E-01	1.02E+00	1.02E+00	1.69E+00	U	pCi/g
19-12037-18	TRG	L1-12205-C-FSGS-109-SS-A	09/24/19 09:24	12/9/2019	12/11/2019	19-12037	Lead-212	EPA 901.1 Modified	2.66E-01	9.59E-02	9.69E-02	1.88E-01		pCi/g
19-12037-18	TRG	L1-12205-C-FSGS-109-SS-A	09/24/19 09:24	12/9/2019	12/11/2019	19-12037	Lead-214	EPA 901.1 Modified	3.41E-01	1.31E-01	1.33E-01	2.37E-01		pCi/g
19-12037-18	TRG	L1-12205-C-FSGS-109-SS-A	09/24/19 09:24	12/9/2019	12/11/2019	19-12037	Promethium-145	EPA 901.1 Modified	-7.94E-03	1.65E-01	1.65E-01	2.69E-01	U	pCi/g
19-12037-18	TRG	L1-12205-C-FSGS-109-SS-A	09/24/19 09:24	12/9/2019	12/11/2019	19-12037	Radium-226	EPA 901.1 Modified	3.62E-01	1.24E-01	1.25E-01	9.12E-02		pCi/g
19-12037-18	TRG	L1-12205-C-FSGS-109-SS-A	09/24/19 09:24	12/9/2019	12/11/2019	19-12037	Antimony-125	EPA 901.1 Modified	3.99E-02	1.32E-01	1.32E-01	2.06E-01	U	pCi/g
19-12037-18	TRG	L1-12205-C-FSGS-109-SS-A	09/24/19 09:24	12/9/2019	12/11/2019	19-12037	Thorium-234	EPA 901.1 Modified	1.61E+00	8.41E-01	8.45E-01	1.46E+00	U	pCi/g
19-12037-18	TRG	L1-12205-C-FSGS-109-SS-A	09/24/19 09:24	12/9/2019	12/11/2019	19-12037	Thallium-208	EPA 901.1 Modified	2.89E-01	1.26E-01	1.27E-01	1.55E-01		pCi/g
19-12037-18	TRG	L1-12205-C-FSGS-109-SS-A	09/24/19 09:24	12/9/2019	12/11/2019	19-12037	Uranium-235	EPA 901.1 Modified	2.33E-01	2.70E-01	2.70E-01	4.24E-01	U	pCi/g

CU=Counting Uncertainty;CSU=Combined Standard Uncertainty (1-sigma);MDA=Minimal Detected Activity;LCS=Laboratory Control Sample;MBL=Blank;DUP=Duplicate;TRG=Normal Sample;DO=Duplicate Original;U=Non-detect



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Eberline Analytical Final Report of Analysis			Report To:					Work Order Details:						
			Patricia Giza					SDG:	19-12037					
			Zion Solutions					Purchase Order:	677118					
			2701 Deborah Ave					Analysis Category:	ENVIRONMENTAL					
			Zion, IL 60099					Sample Matrix:	SO					
Lab ID	Sample Type	Client ID	Sample Date	Receipt Date	Analysis Date	Batch ID	Analyte	Method	Result	CU	CSU	MDA	Qualifier	Report Units
19-12037-19	TRG	L1-12209-C-FIGS-009-SS-A	11/22/19 14:34	12/9/2019	12/11/2019	19-12037	Actinium-228	EPA 901.1 Modified	8.24E-01	2.44E-01	2.47E-01	3.60E-01		pCi/g
19-12037-19	TRG	L1-12209-C-FIGS-009-SS-A	11/22/19 14:34	12/9/2019	12/11/2019	19-12037	Silver-108m	EPA 901.1 Modified	5.78E-03	3.39E-02	3.39E-02	5.93E-02	U	pCi/g
19-12037-19	TRG	L1-12209-C-FIGS-009-SS-A	11/22/19 14:34	12/9/2019	12/11/2019	19-12037	Americium-241	EPA 901.1 Modified	-1.38E-01	1.37E-01	1.37E-01	1.88E-01	U	pCi/g
19-12037-19	TRG	L1-12209-C-FIGS-009-SS-A	11/22/19 14:34	12/9/2019	12/11/2019	19-12037	Barium-133	EPA 901.1 Modified	-1.78E-01	1.45E-01	1.45E-01	1.18E-01	U	pCi/g
19-12037-19	TRG	L1-12209-C-FIGS-009-SS-A	11/22/19 14:34	12/9/2019	12/11/2019	19-12037	Bismuth-214	EPA 901.1 Modified	7.26E-01	1.37E-01	1.42E-01	2.37E-01		pCi/g
19-12037-19	TRG	L1-12209-C-FIGS-009-SS-A	11/22/19 14:34	12/9/2019	12/11/2019	19-12037	Cobalt-60	EPA 901.1 Modified	8.89E-02	4.59E-02	4.62E-02	9.24E-02	U	pCi/g
19-12037-19	TRG	L1-12209-C-FIGS-009-SS-A	11/22/19 14:34	12/9/2019	12/11/2019	19-12037	Cesium-134	EPA 901.1 Modified	7.79E-03	1.96E-02	1.96E-02	8.97E-02	U	pCi/g
19-12037-19	TRG	L1-12209-C-FIGS-009-SS-A	11/22/19 14:34	12/9/2019	12/11/2019	19-12037	Cesium-137	EPA 901.1 Modified	2.07E-01	7.93E-02	8.00E-02	1.16E-01		pCi/g
19-12037-19	TRG	L1-12209-C-FIGS-009-SS-A	11/22/19 14:34	12/9/2019	12/11/2019	19-12037	Europium-152	EPA 901.1 Modified	-1.54E-01	2.33E-01	2.34E-01	2.45E-01	U	pCi/g
19-12037-19	TRG	L1-12209-C-FIGS-009-SS-A	11/22/19 14:34	12/9/2019	12/11/2019	19-12037	Europium-154	EPA 901.1 Modified	9.31E-02	1.70E-01	1.70E-01	1.24E-01	U	pCi/g
19-12037-19	TRG	L1-12209-C-FIGS-009-SS-A	11/22/19 14:34	12/9/2019	12/11/2019	19-12037	Europium-155	EPA 901.1 Modified	4.50E-02	1.46E-01	1.46E-01	2.14E-01	U	pCi/g
19-12037-19	TRG	L1-12209-C-FIGS-009-SS-A	11/22/19 14:34	12/9/2019	12/11/2019	19-12037	Holmium-166m	EPA 901.1 Modified	3.44E-02	9.30E-02	9.30E-02	9.15E-02	U	pCi/g
19-12037-19	TRG	L1-12209-C-FIGS-009-SS-A	11/22/19 14:34	12/9/2019	12/11/2019	19-12037	Iodine-129	EPA 901.1 Modified	3.24E-02	1.95E-01	1.95E-01	2.90E-01	U	pCi/g
19-12037-19	TRG	L1-12209-C-FIGS-009-SS-A	11/22/19 14:34	12/9/2019	12/11/2019	19-12037	Potassium-40	EPA 901.1 Modified	1.69E+01	2.28E+00	2.44E+00	1.46E+00		pCi/g
19-12037-19	TRG	L1-12209-C-FIGS-009-SS-A	11/22/19 14:34	12/9/2019	12/11/2019	19-12037	Manganese-54	EPA 901.1 Modified	5.16E-02	5.35E-02	5.36E-02	8.64E-02	U	pCi/g
19-12037-19	TRG	L1-12209-C-FIGS-009-SS-A	11/22/19 14:34	12/9/2019	12/11/2019	19-12037	Molybdenum-93	EPA 901.1 Modified	-2.18E-03	4.89E-02	4.89E-02	4.54E-02	U	pCi/g
19-12037-19	TRG	L1-12209-C-FIGS-009-SS-A	11/22/19 14:34	12/9/2019	12/11/2019	19-12037	Niobium-94	EPA 901.1 Modified	-3.35E-03	3.51E-02	3.51E-02	7.55E-02	U	pCi/g
19-12037-19	TRG	L1-12209-C-FIGS-009-SS-A	11/22/19 14:34	12/9/2019	12/11/2019	19-12037	Lead-210	EPA 901.1 Modified	1.32E+00	1.27E+00	1.27E+00	2.10E+00	U	pCi/g
19-12037-19	TRG	L1-12209-C-FIGS-009-SS-A	11/22/19 14:34	12/9/2019	12/11/2019	19-12037	Lead-212	EPA 901.1 Modified	8.16E-01	1.85E-01	1.89E-01	2.22E-01		pCi/g
19-12037-19	TRG	L1-12209-C-FIGS-009-SS-A	11/22/19 14:34	12/9/2019	12/11/2019	19-12037	Lead-214	EPA 901.1 Modified	6.82E-01	1.54E-01	1.58E-01	4.59E-01		pCi/g
19-12037-19	TRG	L1-12209-C-FIGS-009-SS-A	11/22/19 14:34	12/9/2019	12/11/2019	19-12037	Promethium-145	EPA 901.1 Modified	6.06E-02	1.65E-01	1.65E-01	2.49E-01	U	pCi/g
19-12037-19	TRG	L1-12209-C-FIGS-009-SS-A	11/22/19 14:34	12/9/2019	12/11/2019	19-12037	Radium-226	EPA 901.1 Modified	7.26E-01	1.37E-01	1.42E-01	2.37E-01		pCi/g
19-12037-19	TRG	L1-12209-C-FIGS-009-SS-A	11/22/19 14:34	12/9/2019	12/11/2019	19-12037	Antimony-125	EPA 901.1 Modified	6.31E-02	1.27E-01	1.27E-01	2.01E-01	U	pCi/g
19-12037-19	TRG	L1-12209-C-FIGS-009-SS-A	11/22/19 14:34	12/9/2019	12/11/2019	19-12037	Thorium-234	EPA 901.1 Modified	1.63E+00	1.21E+00	1.22E+00	1.84E+00	U	pCi/g
19-12037-19	TRG	L1-12209-C-FIGS-009-SS-A	11/22/19 14:34	12/9/2019	12/11/2019	19-12037	Thallium-208	EPA 901.1 Modified	5.99E-01	1.82E-01	1.85E-01	3.35E-01		pCi/g
19-12037-19	TRG	L1-12209-C-FIGS-009-SS-A	11/22/19 14:34	12/9/2019	12/11/2019	19-12037	Uranium-235	EPA 901.1 Modified	1.64E-01	3.43E-01	3.43E-01	5.17E-01	U	pCi/g

CU=Counting Uncertainty;CSU=Combined Standard Uncertainty (1-sigma);MDA=Minimal Detected Activity;LCS=Laboratory Control Sample;MBL=Blank;DUP=Duplicate;TRG=Normal Sample;DO=Duplicate Original;U=Non-detect



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REC'D DEC 09 2019

Attachment 1 – Chain-of-Custody Form

19-12037

	Sample ID	Sample Log	Matrix	Sample Type	Sample Container				Sample Date	Sample Time	Analysis Type	Preservative	Remarks
					Vol	Unit	Type	Qty					
4	L1-10206-A-FSGS-003-SS-A	NA	NA	SOIL	500	ml	MARINELLI	1	11/9/19	0830	5 ROC HTD	NA	704.46
5	L1-10206-A-FSGS-011-SS-A	NA	NA	SOIL	500	ml	MARINELLI	1	11/9/19	0820	5 ROC HTD	NA	698.73
6	L1-10206-A-FQGS-005-SS-A	NA	NA	SOIL	500	ml	MARINELLI	1	11/9/19	0805	5 ROC HTD	NA	652.41
7	L1-10206-A-FSGS-003-SB-A	NA	NA	SOIL	500	ml	MARINELLI	1	11/22/19	0804	5 ROC HTD	NA	699.36
8	L1-10206-B-FSGS-010-SS-A	NA	NA	SOIL	500	ml	MARINELLI	1	10/28/19	1318	5 ROC HTD	NA	628.06
9	L1-10206-B-FSGS-012-SS-A	NA	NA	SOIL	500	ml	MARINELLI	1	10/28/19	1322	5 ROC HTD	NA	736.13
10	L1-10206-B-FSGS-004-SS-A	NA	NA	SOIL	500	ml	MARINELLI	1	11/19/19	1232	5 ROC HTD	NA	743.97
11	L1-10206-C-FSGS-007-SS-A	NA	NA	SOIL	500	ml	MARINELLI	1	10/28/19	0912	5 ROC HTD	NA	671.93
12	L1-10206-C-FSGS-011-SS-A	NA	NA	SOIL	500	ml	MARINELLI	1	10/28/19	0920	5 ROC HTD	NA	643.92
13	L1-10206-D-FSGS-001-SS-A	NA	NA	SOIL	500	ml	MARINELLI	1	11/4/19	0820	5 ROC HTD	NA	755.09
14	L1-10206-D-FSGS-017-SS-A	NA	NA	SOIL	500	ml	MARINELLI	1	11/4/19	0852	5 ROC HTD	NA	773.48
15	L1-10206-E-FSGS-002-SS-A	NA	NA	SOIL	500	ml	MARINELLI	1	11/5/19	0902	5 ROC HTD	NA	692.88
16	L1-10206-E-FSGS-014-SS-A	NA	NA	SOIL	500	ml	MARINELLI	1	11/5/19	0926	5 ROC HTD	NA	834.10
17	L1-12205-B-FSGS-116-SB-A	NA	NA	SOIL	500	ml	MARINELLI	1	10/1/19	0835	5 ROC HTD	NA	679.58
18	L1-12205-C-FSGS-109-SS-A	NA	NA	SOIL	500	ml	MARINELLI	1	9/24/19	0924	5 ROC HTD	NA	681.98
19	L1-12209-C-FSGS-009-SS-A	NA	NA	SOIL	500	ml	MARINELLI	1	11/22/19	1434	5 ROC HTD	NA	661.17

Rec'd 12-9-19 1439
1 of 2

REC'D DEC 09 2019

19-12037

ZS-WM-131
Revision 0
Information Use

Laboratory: EBERLINE LABS	Date Submitted To Lab:	Ship Container No.: NA	Cooler Temperature: N/A	Airbill Number: FedEx Ground 7771 4626 0705	
Relinquished by: Jack Nucin	Date (mm/dd/yyyy): 12/4/19	Time: 0910	Received by: Richard F. Rickett	Date: (mm/dd/yyyy): 12/04/2019	0910
Relinquished by: Richard F. Rickett	Date (mm/dd/yyyy): 12/05/2019	Time: 1600	Received by: FedEx Ground	Date: (mm/dd/yyyy): 12/05/2019	1600
Relinquished by: FedEx	Date (mm/dd/yyyy):	Time:	Received by: Christopher Spencer	Date: (mm/dd/yyyy): 12/9/2019	1439
Relinquished by:	Date (mm/dd/yyyy):	Time:	Received by:	Date: (mm/dd/yyyy):	
Comments Po # 67718 HTD's 14 Day Turn Around					

REC'D DEC 09 2019



EBERLINE ANALYTICAL CORPORATION
601 SCARBORO ROAD
OAK RIDGE, TENNESSEE 37830
PHONE (865) 481-0683
FAX (865) 483-4621

EBS-OR-46839

February 26, 2020

Jeffrey Graham
Zion Solutions, LLC
2701 Deborah Avenue
Zion, IL 60099

CASE NARRATIVE
Work Order # 20-02089-OR

SAMPLE RECEIPT

This work order contains sixteen soil samples relogged 02/18/2020 per client request. Samples were analyzed for Total Strontium.

<u>CLIENT ID</u>	<u>LAB ID</u>	<u>CLIENT ID</u>	<u>LAB ID</u>
L1-12205A-FSGS-101-SB-A	20-02089-04	L1-10213C-FIGS-003-SB-A	20-02089-12
L1-12205D-FSGS-111-SB-A	20-02089-05	L1-12201C-FSGS-013-SB-A	20-02089-13
L1-10208B-FSGS-017-SB-A	20-02089-06	L1-10203B-FSGS-004-SB-A	20-02089-14
L1-10207D-FIGS-001-SB-A	20-02089-07	L1-10213B-FIGS-001-SB-A	20-02089-15
L1-10208D-FIGS-004-SB-A	20-02089-08	L1-10213B-FIGS-002-SB-A	20-02089-16
L1-10208D-FIGS-006-SB-A	20-02089-09	L1-10213B-FIGS-008-SB-A	20-02089-17
L1-10206A-FSGS-003-SB-A	20-02089-10	L2-10214E-FSGS-006-SB-A	20-02089-18
L1-12205B-FSGS-116-SB-A	20-02089-11	L1-10212C-FSGS-009-SB-A	20-02089-19

ANALYTICAL METHODS

Total Strontium was analyzed using EIChroM Method SRW01 Modified.

Laboratory qualifiers are as follows:

U - Result is less than the MDA.

ANALYTICAL RESULTS

Combined Standard Uncertainty is reported at 1-sigma value.

Minimum Detectable Activity (MDA) values for data represented in this report are sample-specific. MDA measurements are determined based on factors and conditions including instrument settings, aliquot size and matrix type.

ANALYTICAL RESULTS CONTINUED

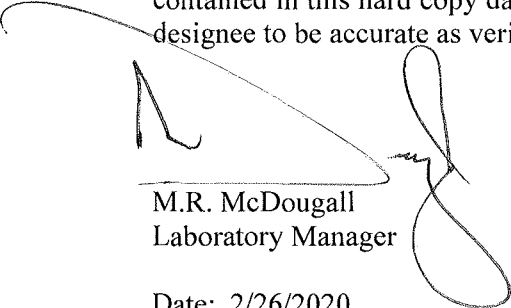
TOTAL STRONTIUM

Samples were prepared by acid digestion as appropriate for the matrix. Chemical separations were conducted by selective precipitations. Strontium was precipitated and mounted on filter media and then attached to planchets. Chemical recovery was determined by use of a stable Strontium carrier and subsequent mass measurements. Samples were counted by gas flow proportional counting and corrected for Yttrium-90 ingrowth.

Large aliquots were analyzed to improve method detection limits as best possible. Samples demonstrated acceptable results for all Total Strontium determinations. Strontium-90 results are reported from Total Strontium assuming secular equilibrium. Chemical recovery was acceptable for all samples. Results for the Total Strontium method blank demonstrated acceptable results. Results for the Total Strontium duplicate demonstrated a high relative percent difference; however, normalized difference is within acceptable limits for the analytical technique. Results for the Total Strontium laboratory control sample demonstrated an acceptable percent recovery.

CERTIFICATION OF ACCURACY

I certify that this data report is in compliance with the terms and conditions of the Purchase Order, both technically and for completeness, for other than the conditions detailed above. Release of the data contained in this hard copy data package has been authorized by the cognizant project manager or his/her designee to be accurate as verified by the following signature.



M.R. McDougall
Laboratory Manager

Date: 2/26/2020

Eberline Analytical wants and encourages your feedback regarding our performance providing radioanalytical services. Please visit <http://eberlineanalytical.com/> to provide us with feedback on our services.

Eberline Analytical Final Report of Analysis			Report To:						Work Order Details:						
			Jeffrey Graham						SDG:	20-02089					
			Zion Solutions						Purchase Order:	677118					
			2701 Deborah Ave						Analysis Category:	ENVIRONMENTAL					
			Zion, IL 60099						Sample Matrix:	SO					
Lab ID	Sample Type	Client ID	Sample Date	Receipt Date	Analysis Date	Batch ID	Analyte	Method	Result	CU	CSU	MDA	Qualifier	Report Units	
20-02089-01	LCS	KNOWN	02/18/20 00:00	2/18/2020	2/19/2020	20-02089	Strontium-90	EiChroM SRW01 Modified	4.97E+01	2.79E-01				pCi/g	
20-02089-01	LCS	SPIKE	02/18/20 00:00	2/18/2020	2/19/2020	20-02089	Strontium-90	EiChroM SRW01 Modified	4.97E+01	1.40E+00	1.74E+01	7.18E-01		pCi/g	
20-02089-02	MBL	BLANK	02/18/20 00:00	2/18/2020	2/19/2020	20-02089	Strontium-90	EiChroM SRW01 Modified	1.18E-01	3.80E-01	3.83E-01	7.99E-01	U	pCi/g	
20-02089-03	DUP	L1-12205A-FSGS-101-SB-A	10/01/19 08:25	2/18/2020	2/19/2020	20-02089	Strontium-90	EiChroM SRW01 Modified	4.92E-02	3.41E-02	3.82E-02	6.72E-02	U	pCi/g	
20-02089-04	DO	L1-12205A-FSGS-101-SB-A	10/01/19 08:25	2/18/2020	2/19/2020	20-02089	Strontium-90	EiChroM SRW01 Modified	2.59E-02	2.99E-02	3.12E-02	6.09E-02	U	pCi/g	
20-02089-05	TRG	L1-12205D-FSGS-111-SB-A	09/16/19 14:00	2/18/2020	2/19/2020	20-02089	Strontium-90	EiChroM SRW01 Modified	2.77E-02	3.04E-02	3.19E-02	6.19E-02	U	pCi/g	
20-02089-06	TRG	L1-10208B-FSGS-017-SB-A	09/05/19 08:20	2/18/2020	2/19/2020	20-02089	Strontium-90	EiChroM SRW01 Modified	6.85E-02	4.23E-02	4.85E-02	8.33E-02	U	pCi/g	
20-02089-07	TRG	L1-10207D-FIGS-001-SB-A	09/17/19 14:40	2/18/2020	2/19/2020	20-02089	Strontium-90	EiChroM SRW01 Modified	2.12E-02	3.86E-02	3.93E-02	8.01E-02	U	pCi/g	
20-02089-08	TRG	L1-10208D-FIGS-004-SB-A	10/21/19 13:00	2/18/2020	2/19/2020	20-02089	Strontium-90	EiChroM SRW01 Modified	-1.75E-03	3.64E-02	3.64E-02	7.76E-02	U	pCi/g	
20-02089-09	TRG	L1-10208D-FIGS-006-SB-A	10/17/19 14:40	2/18/2020	2/19/2020	20-02089	Strontium-90	EiChroM SRW01 Modified	1.84E-03	3.33E-02	3.34E-02	7.11E-02	U	pCi/g	
20-02089-10	TRG	L1-10206A-FSGS-003-SB-A	11/22/19 08:04	2/18/2020	2/19/2020	20-02089	Strontium-90	EiChroM SRW01 Modified	-3.81E-03	3.64E-02	3.64E-02	7.80E-02	U	pCi/g	
20-02089-11	TRG	L1-12205B-FSGS-116-SB-A	10/01/19 08:35	2/18/2020	2/19/2020	20-02089	Strontium-90	EiChroM SRW01 Modified	5.29E-02	3.90E-02	4.31E-02	7.76E-02	U	pCi/g	
20-02089-12	TRG	L1-10213C-FIGS-003-SB-A	11/14/19 12:35	2/18/2020	2/19/2020	20-02089	Strontium-90	EiChroM SRW01 Modified	2.62E-02	3.34E-02	3.46E-02	6.85E-02	U	pCi/g	
20-02089-13	TRG	L1-12201C-FSGS-013-SB-A	09/23/19 08:45	2/18/2020	2/19/2020	20-02089	Strontium-90	EiChroM SRW01 Modified	4.06E-02	3.11E-02	3.41E-02	6.18E-02	U	pCi/g	
20-02089-14	TRG	L1-10203B-FSGS-004-SB-A	11/22/19 09:25	2/18/2020	2/19/2020	20-02089	Strontium-90	EiChroM SRW01 Modified	5.10E-02	3.17E-02	3.63E-02	6.17E-02	U	pCi/g	
20-02089-15	TRG	L1-10213B-FIGS-001-SB-A	11/06/19 10:30	2/18/2020	2/19/2020	20-02089	Strontium-90	EiChroM SRW01 Modified	5.03E-02	3.95E-02	4.32E-02	7.91E-02	U	pCi/g	
20-02089-16	TRG	L1-10213B-FIGS-002-SB-A	11/06/19 10:32	2/18/2020	2/19/2020	20-02089	Strontium-90	EiChroM SRW01 Modified	4.09E-02	2.97E-02	3.29E-02	5.88E-02	U	pCi/g	
20-02089-17	TRG	L1-10213B-FIGS-008-SB-A	11/06/19 10:44	2/18/2020	2/19/2020	20-02089	Strontium-90	EiChroM SRW01 Modified	2.20E-02	3.25E-02	3.34E-02	6.70E-02	U	pCi/g	
20-02089-18	TRG	L2-10214E-FSGS-006-SB-A	12/11/19 12:55	2/18/2020	2/19/2020	20-02089	Strontium-90	EiChroM SRW01 Modified	4.27E-02	3.29E-02	3.61E-02	6.54E-02	U	pCi/g	
20-02089-19	TRG	L1-10212C-FSGS-009-SB-A	09/23/19 12:35	2/18/2020	2/19/2020	20-02089	Strontium-90	EiChroM SRW01 Modified	2.84E-02	3.18E-02	3.33E-02	6.48E-02	U	pCi/g	

CU=Counting Uncertainty;CSU=Combined Standard Uncertainty (1-sigma);MDA=Minimal Detected Activity;LCS=Laboratory Control Sample;MBL=Blank;DUP=Duplicate;TRG=Normal Sample;DO=Duplicate Original;U=Non-detect



EBERLINE ANALYTICAL CORPORATION

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REC'D FEB 17 2020

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ZS-WM-131
Revision 0
Information Use**ZIONSOLUTIONS** LLC
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20-02089

19-10093

2-18-20

Attachment 1 - Chain-of-Custody Form

Sample ID	Sample Log	Matrix	Sample Type	Vol	Unit	Type	Qty	Sample Date	Sample Time	Analysis Type	Preservative	Remarks
L1-12107-A-FSGS-012-SS-A	NA	NA	SOIL	500	ml	MARINELLI	1	9/26/2019	0722	5 ROC HTD	NA	939.51
L1-12105-A-FSGS-016-SS-A	NA	NA	SOIL	500	ml	MARINELLI	1	9/30/2019	1330	5 ROC HTD	NA	1026.88
L1-12105-A-FSGS-002-SS-A	NA	NA	SOIL	500	ml	MARINELLI	1	9/30/2019	1302	5 ROC HTD	NA	969.33
L1-12107-A-FSGS-010-SB-A	NA	NA	SOIL	500	ml	MARINELLI	1	9/30/2019	1225	5 ROC HTD	NA	923.24
L1-12205-A-FSGS-111-SS-A	NA	NA	SOIL	500	ml	MARINELLI	1	9/25/2019	1305	5 ROC HTD	NA	952.09
L1-12104-A-FSGS-011-SS-A	NA	NA	SOIL	500	ml	MARINELLI	1	10/1/2019	0920	5 ROC HTD	NA	1013.10
L1-12104-A-FSGS-013-SS-A	NA	NA	SOIL	500	ml	MARINELLI	1	10/1/2019	0924	5 ROC HTD	NA	975.70
L1-12205-A-FSGS-101-SB-A	NA	NA	SOIL	500	ml	MARINELLI	1	10/1/2019	0825	5 ROC HTD	NA	859.10
L1-12109-A-FSGS-012-SS-A	NA	NA	SOIL	500	ml	MARINELLI	1	9/17/2019	0922	5 ROC HTD	NA	1013.58
L1-12205-C-FSGS-105-SS-A	NA	NA	SOIL	500	ml	MARINELLI	1	9/24/2019	1308	5 ROC HTD	NA	979.04
L1-12111-A-FSGS-003-SS-A	NA	NA	SOIL	500	ml	MARINELLI	1	9/16/2019	0806	5 ROC HTD	NA	1122.70
L1-12205-D-FSGS-111-SB-A	NA	NA	SOIL	500	ml	MARINELLI	1	9/16/2019	1400	5 ROC HTD	NA	974.36
L1-12205-E-FSGS-104-SS-A	NA	NA	SOIL	500	ml	MARINELLI	1	9/9/2019	1306	5 ROC HTD	NA	1087.82
L1-12205-E-QIGS-101-SS-A	NA	NA	SOIL	500	ml	MARINELLI	1	9/11/2019	0900	5 ROC HTD	NA	829.86
L1-12205-D-FSGS-117-SS-A	NA	NA	SOIL	500	ml	MARINELLI	1	9/9/2019	1022	5 ROC HTD	NA	1028.72
L1-12205-E-FSGS-117-SS-A	NA	NA	SOIL	500	ml	MARINELLI	1	9/9/2019	1332	5 ROC HTD	NA	1106.09
L1-12205-A-FSGS-116-SS-A	NA	NA	SOIL	500	ml	MARINELLI	1	9/25/2019	1315	5 ROC HTD	NA	1078.92

Rec 10-21-19 @ 1100

REC'D FEB 17 2020

REC'D NOV 08 2019

ZS-WM-131

Revision 0

Information Use

20-02089

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11-18-20

Attachment 1 - Chain-of-Custody Form

Sample ID	Sample Log	Matrix	Sample Type	Vol	Unit	Type	Qty	Sample Date	Sample Time	Analysis Type	Preservative	Remarks
LI-10207-A-FIGS-011-SS-A	NA	NA	SOIL	500	ml	MARINELLI	1	10/28/19	1451	5 ROC HTD	NA	801.99
L1-10207-A-FSGS-008-SS-A	NA	NA	SOIL	500	ml	MARINELLI	1	10/16/19	1334	5 ROC HTD	NA	811.21
L1-10207-A-FIGS-012-SS-A	NA	NA	SOIL	500	ml	MARINELLI	1	10/29/19	1330	5 ROC HTD	NA	922.44
L1-10207-A-FIGS-013-SS-A	NA	NA	SOIL	500	ml	MARINELLI	1	10/29/19	1332	5 ROC HTD	NA	841.51
L1-10207-A-FSGS-003-SS-A	NA	NA	SOIL	500	ml	MARINELLI	1	10/16/19	1324	5 ROC HTD	NA	876.15
L1-10207-A-FIGS-015-SS-A	NA	NA	SOIL	500	ml	MARINELLI	1	10/29/19	1336	5 ROC HTD	NA	893.62
L1-10207-A-FSGS-002-SS-A	NA	NA	SOIL	500	ml	MARINELLI	1	10/16/19	1328	5 ROC HTD	NA	746.34
L1-10207-A-FSGS-002-SS-A	NA	NA	SOIL	500	ml	MARINELLI	1	10/16/19	1322	5 ROC HTD	NA	867.31
L1-10208-B-FSGS-003-SS-A	NA	NA	SOIL	500	ml	MARINELLI	1	8/12/19	0834	5 ROC HTD	NA	1071.96
L1-10208-B-FSGS-017-SB-A	NA	NA	SOIL	500	ml	MARINELLI	1	9/5/19	0820	5 ROC HTD	NA	970.53
L1-10207-A-FIGS-004-SS-A	NA	NA	SOIL	500	ml	MARINELLI	1	10/22/19	0749	5 ROC HTD	NA	853.76
L1-10207-A-FIGS-005-SS-A	NA	NA	SOIL	500	ml	MARINELLI	1	10/22/19	0801	5 ROC HTD	NA	837.38
L1-10207-A-FIGS-003-SS-A	NA	NA	SOIL	500	ml	MARINELLI	1	10/22/19	0747	5 ROC HTD	NA	896.71
L1-10207-A-FIGS-002-SS-A	NA	NA	SOIL	500	ml	MARINELLI	1	10/22/19	0745	5 ROC HTD	NA	939.31
L1-10208-C-QIGS-004-SS-A	NA	NA	SOIL	500	ml	MARINELLI	1	9/4/19	1330	5 ROC HTD	NA	959.99
L1-10207-A-FIGS-006-SS-A	NA	NA	SOIL	500	ml	MARINELLI	1	10/22/19	0803	5 ROC HTD	NA	814.48
L1-10208-A-FSGS-021-SS-A	NA	NA	SOIL	500	ml	MARINELLI	1	10/8/19	1340	5 ROC HTD	NA	855.69

REC 11-8-19 1015

* Container ID LI-10207-A-FSGS-005-SS-A

11/8/19

REC'D FEB 17 2020


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REC'D NOV 18 2019

 ZS-WM-131
 Revision 0
 Information Use

201-02089

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11/18/19

Attachment 1 - Chain-of-Custody Form

Sample ID	Sample Log	Matrix	Sample Type	Vol	Sample Container Unit	Type	Qty	Sample Date	Sample Time	Analysis Type	Preservative	Remarks
L1-10208-D-FIGS-004-SB-A	NA	NA	SOIL	500	ml	MARINELLI	1	10/21/19	1300	5 ROC HTD	NA	914.30
L1-10207-D-FSGS-016-SS-A	NA	NA	SOIL	500	ml	MARINELLI	1	9/4/19	0802	5 ROC HTD	NA	1024.75
L1-10207-B-FSGS-011-SB-A	NA	NA	SOIL	500	ml	MARINELLI	1	9/5/19	1025	5 ROC HTD	NA	872.84
L1-10208-D-FIGS-006-SB-A	NA	NA	SOIL	500	ml	MARINELLI	1	10/17/19	1440	5 ROC HTD	NA	905.70
L110207-B-FIGS-008-SS-A	NA	NA	SOIL	500	ml	MARINELLI	1	9/3/19	1334	5 ROC HTD	NA	1010.14
L1-10207-D-FIGS-001-SB-A	NA	NA	SOIL	500	ml	MARINELLI	1	9/17/19	1440	5 ROC HTD	NA	862.15
L1-10207-C-FSGS-004-SS-A	NA	NA	SOIL	500	ml	MARINELLI	1	8/28/19	1308	5 ROC HTD	NA	818.80
L1-10207-C-FSGS-006-SS-A	NA	NA	SOIL	500	ml	MARINELLI	1	8/28/19	1312	5 ROC HTD	NA	885.89
L1-10207-C-FIGS-008-SS-A	NA	NA	SOIL	500	ml	MARINELLI	1	8/28/19	0904	5 ROC HTD	NA	876.14
L1-10208-D-FIGS-003-SS-A	NA	NA	SOIL	500	ml	MARINELLI	1	10/17/19	1434	5 ROC HTD	NA	828.80
L1-10207-C-FSGS-012-SS-A	NA	NA	SOIL	500	ml	MARINELLI	1	8/28/19	1326	5 ROC HTD	NA	934.84
L1-10207-B-FIGS-002-SS-A	NA	NA	SOIL	500	ml	MARINELLI	1	8-29-19	0704	5 ROC HTD	NA	1023.19
L1-10207-B-FSGS-001-SS-A	NA	NA	SOIL	500	ml	MARINELLI	1	9/18/19	0720	5 ROC HTD	NA	1076.31
L1-10207-A-FIGS-018-SS-A	NA	NA	SOIL	500	ml	MARINELLI	1	10/30/19	1304	5 ROC HTD	NA	1031.36
L1-10208-D-FSGS-004-SS-A	NA	NA	SOIL	500	ml	MARINELLI	1	10/21/19	1300	5 ROC HTD	NA	937.47
L1-10207-D-FIGS-002-SS-A	NA	NA	SOIL	500	ml	MARINELLI	1	9/6/19	1250	5 ROC HTD	NA	994.32

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REC'D FEB 17 2020

ZS-WM-131
Revision 0
Information Use

~~REC'D DEC 09 2019~~

20-02089

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Attachment 1 - Chain-of-Custody Form

Sample ID	Sample Log	Matrix	Sample Type	Vol	Unit	Type	Qty	Sample Date	Sample Time	Analysis Type	Preservative	Remarks
L1-10206-A-FSGS-003-SS-A	NA	NA	SOIL	500	ml	MARINELLI	1	11/9/19	0830	5 ROC HTD	NA	704.46
L1-10206-A-FSGS-011-SS-A	NA	NA	SOIL	500	ml	MARINELLI	1	11/9/19	0820	5 ROC HTD	NA	698.73
L1-10206-A-FQGS-005-SS-A	NA	NA	SOIL	500	ml	MARINELLI	1	11/9/19	0805	5 ROC HTD	NA	652.41
L1-10206-A-FSGS-003-SB-A	NA	NA	SOIL	500	ml	MARINELLI	1	11/22/19	0804	5 ROC HTD	NA	699.36
L1-10206-B-FSGS-010-SS-A	NA	NA	SOIL	500	ml	MARINELLI	1	10/28/19	1318	5 ROC HTD	NA	628.06
L1-10206-B-FSGS-012-SS-A	NA	NA	SOIL	500	ml	MARINELLI	1	10/28/19	1322	5 ROC HTD	NA	736.13
L1-10206-B-FSGS-004-SS-A	NA	NA	SOIL	500	ml	MARINELLI	1	11/19/19	1232	5 ROC HTD	NA	743.97
L1-10206-C-FSGS-007-SS-A	NA	NA	SOIL	500	ml	MARINELLI	1	10/28/19	0912	5 ROC HTD	NA	671.93
L1-10206-C-FSGS-011-SS-A	NA	NA	SOIL	500	ml	MARINELLI	1	10/28/19	0920	5 ROC HTD	NA	643.92
L1-10206-D-FSGS-001-SS-A	NA	NA	SOIL	500	ml	MARINELLI	1	11/4/19	0820	5 ROC HTD	NA	755.09
L1-10206-D-FSGS-017-SS-A	NA	NA	SOIL	500	ml	MARINELLI	1	11/4/19	0852	5 ROC HTD	NA	773.48
L1-10206-E-FSGS-002-SS-A	NA	NA	SOIL	500	ml	MARINELLI	1	11/5/19	0902	5 ROC HTD	NA	692.88
L1-10206-E-FSGS-014-SS-A	NA	NA	SOIL	500	ml	MARINELLI	1	11/5/19	0926	5 ROC HTD	NA	834.10
L1-12205-B-FSGS-116-SB-A	NA	NA	SOIL	500	ml	MARINELLI	1	10/1/19	0835	5 ROC HTD	NA	679.58
L1-12205-C-FSGS-109-SS-A	NA	NA	SOIL	500	ml	MARINELLI	1	9/24/19	0924	5 ROC HTD	NA	681.98
L1-12209-C-FSGS-009-SS-A	NA	NA	SOIL	500	ml	MARINELLI	1	11/22/19	1434	5 ROC HTD	NA	661.17

REC'D 12-9-19 14:39
1 of 2

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REC'D DEC 16 2019

REC'D FEB 17 2020

ZS-WM-131
Revision 0
Information Use

Attachment 1 - Chain-of-Custody Form

Sample ID	Sample Log	Matrix	Sample Type	Sample Container				Sample Date	Sample Time	Analysis Type	Preservative	Remarks
				Vol	Unit	Type	Qty					
L1-12201-A-FSGS-002-SS-A	NA	NA	SOIL	500	ml	MARINELLI	1	10/7/19	0822	5 ROC HTD	NA	857.35
L1-12201-A-FSGS-006-SS-A	NA	NA	SOIL	500	ml	MARINELLI	1	10/7/19	0830	5 ROC HTD	NA	800.06
L1-12201-B-FSGS-013-SS-A	NA	NA	SOIL	500	ml	MARINELLI	1	9/23/19	0824	5 ROC HTD	NA	944.12
L1-12201-B-FSGS-015-SS-A	NA	NA	SOIL	500	ml	MARINELLI	1	9/23/19	0828	5 ROC HTD	NA	836.06
L1-12201-C-FSGS-006-SS-A	NA	NA	SOIL	500	ml	MARINELLI	1	10/1/19	1240	5 ROC HTD	NA	753.32
L1-12201-C-FSGS-013-SB-A	NA	NA	SOIL	500	ml	MARINELLI	1	9/23/19	0845	5 ROC HTD	NA	712.42
L1-12202-A-FSGS-001-SS-A	NA	NA	SOIL	500	ml	MARINELLI	1	10/8/19	0800	5 ROC HTD	NA	779.07
L1-12202-A-FSGS-004-SS-A	NA	NA	SOIL	500	ml	MARINELLI	1	10/8/19	0806	5 ROC HTD	NA	797.37
L1-12202-B-FSGS-002-SS-A	NA	NA	SOIL	500	ml	MARINELLI	1	10/8/19	0722	5 ROC HTD	NA	844.73
L1-12202-B-FSGS-007-SS-A	NA	NA	SOIL	500	ml	MARINELLI	1	10/8/19	0732	5 ROC HTD	NA	671.18
L1-10207-E-FSGS-002-SS-A	NA	NA	SOIL	500	ml	MARINELLI	1	10/22/19	1302	5 ROC HTD	NA	705.16
L1-10207-E-FSGS-008-SS-A	NA	NA	SOIL	500	ml	MARINELLI	1	10/22/19	1314	5 ROC HTD	NA	889.02
L1-10213-C-FSGS-001-SS-A	NA	NA	SOIL	500	ml	MARINELLI	1	11/14/19	0906	5 ROC HTD	NA	526.84
L1-10213-C-QIGS-001-SS-A	NA	NA	SOIL	500	ml	MARINELLI	1	11/14/19	0906	5 ROC HTD	NA	670.18
L1-10213-C-FSGS-005-SS-A	NA	NA	SOIL	500	ml	MARINELLI	1	11/14/19	0914	5 ROC HTD	NA	579.96
L1-10213-C-FSGS-003-SB-A	NA	NA	SOIL	500	ml	MARINELLI	1	11/14/19	1235	5 ROC HTD	NA	626.28



REC'D FEB 17 2020

20-02089

REC'D DEC 23 2019

ZS-WM-131
Revision 0
Information Use

~~19-12107~~ *BS-2-18-20*

Attachment 1 - Chain-of-Custody Form

Sample ID	Sample Log	Matrix	Sample Type	Sample Container				Sample Date	Sample Time	Analysis Type	Preservative	Remarks
				Vol	Unit	Type	Qty					
L1-10204-A-FSGS-019-SS-A	NA	NA	SOIL	500	ml	MARINELLI	1	11/15/19	1406	5 ROC HTD	NA	1043.76
L1-10204-A-FQGS-019-SS-A	NA	NA	SOIL	500	ml	MARINELLI	1	11/15/19	1406	5 ROC HTD	NA	977.21
L1-10204-B-FSGS-001-SS-A	NA	NA	SOIL	500	ml	MARINELLI	1	11/07/19	0845	5 ROC HTD	NA	954.70
L1-10204-B-FSGS-013-SS-A	NA	NA	SOIL	500	ml	MARINELLI	1	11/07/19	1009	5 ROC HTD	NA	1033.88
L1-10204-C-FSGS-004-SS-A	NA	NA	SOIL	500	ml	MARINELLI	1	11/11/19	1308	5 ROC HTD	NA	982.38
L1-10204-C-FSGS-011-SS-A	NA	NA	SOIL	500	ml	MARINELLI	1	11/11/19	1322	5 ROC HTD	NA	1013.39
L1-10204-D-FSGS-012-SS-A	NA	NA	SOIL	500	ml	MARINELLI	1	11/13/19	0902	5 ROC HTD	NA	919.65
L1-10204-D-FSGS-008-SB-A	NA	NA	SOIL	500	ml	MARINELLI	1	11/15/19	1430	5 ROC HTD	NA	1148.05
L1-10203-A-FSGS-010-SS-A	NA	NA	SOIL	500	ml	MARINELLI	1	11/20/19	1258	5 ROC HTD	NA	989.28
L1-10203-A-FSGS-012-SS-A	NA	NA	SOIL	500	ml	MARINELLI	1	11/20/19	1302	5 ROC HTD	NA	938.63
L1-10203-B-FSGS-005-SS-A	NA	NA	SOIL	500	ml	MARINELLI	1	11/20/19	0808	5 ROC HTD	NA	938.58
L1-10203-B-FSGS-010-SS-A	NA	NA	SOIL	500	ml	MARINELLI	1	11/20/19	0818	5 ROC HTD	NA	992.39
L1-10203-B-FSGS-013-SS-A	NA	NA	SOIL	500	ml	MARINELLI	1	11/20/19	0824	5 ROC HTD	NA	969.63
L1-10203-B-FSGS-004-SB-A	NA	NA	SOIL	500	ml	MARINELLI	1	11/22/19	0925	5 ROC HTD	NA	1061.94
L1-10203-C-FJGS-001-SS-A	NA	NA	SOIL	500	ml	MARINELLI	1	11/22/19	1300	5 ROC HTD	NA	747.67
L1-10213-C-FJGS-003-SS-A	NA	NA	SOIL	500	ml	MARINELLI	1	11/22/19	1304	5 ROC HTD	NA	883.59

Rec BS 12-23-19 @ 1038

ZS-WM-131
Revision 0
Information Use

ZION SOLUTIONS LLC
An Energy Solutions Company

REC'D FEB 17 2020

~~REC'D JAN - 9 2020~~

20-02089

Attachment 1 – Chain-of-Custody Form

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20-02089

REC'D FEB 17 2020

REC'D JAN - 9 2020

ZS-WM-131

Revision 0

Information Use

~~205-01037~~ ~~12-18-20~~

Attachment 1 - Chain-of-Custody Form

Sample ID	Sample Log	Matrix	Sample Type	Sample Container				Sample Date	Sample Time	Analysis Type	Preservative	Remarks
Vol	Unit	Type	Qty									
L2-10214-A-FIGS-001-SS-A	NA	NA	SOIL	500	ml	MARINELLI	1	12/16/19	1334	5 ROC HTD	NA	706.48
L2-10214-A-QIGS-001-SS-A	NA	NA	SOIL	500	ml	MARINELLI	1	12/16/19	1334	5 ROC HTD	NA	624.27
L2-10214-A-FIGS-002-SS-A	NA	NA	SOIL	500	ml	MARINELLI	1	12/16/19	1336	5 ROC HTD	NA	640.46
L2-10214-B-FSGS-003-SS-A	NA	NA	SOIL	500	ml	MARINELLI	1	12/14/19	1234	5 ROC HTD	NA	586.29
L2-10214-B-FSGS-015-SS-A	NA	NA	SOIL	500	ml	MARINELLI	1	12/14/19	1258	5 ROC HTD	NA	700.59
L2-10214-C-FSGS-016-SS-A	NA	NA	SOIL	500	ml	MARINELLI	1	12/13/19	1330	5 ROC HTD	NA	493.05
L2-10214-C-FIGS-005-SS-A	NA	NA	SOIL	500	ml	MARINELLI	1	12/13/19	1308	5 ROC HTD	NA	679.18
L2-10214-D-FSGS-007-SS-A	NA	NA	SOIL	500	ml	MARINELLI	1	12/11/19	1002	5 ROC HTD	NA	488.04
L2-10214-D-FSGS-003-SS-A	NA	NA	SOIL	500	ml	MARINELLI	1	12/11/19	0924	5 ROC HTD	NA	541.25
L2-10214-D-FIGS-006-SS-A	NA	NA	SOIL	500	ml	MARINELLI	1	12/11/19	0930	5 ROC HTD	NA	538.3
L2-10214-E-FSGS-008-SS-A	NA	NA	SOIL	500	ml	MARINELLI	1	12/10/19	1244	5 ROC HTD	NA	659.59
L2-10214-E-FSGS-006-SB-A	NA	NA	SOIL	500	ml	MARINELLI	1	12/11/19	1255	5 ROC HTD	NA	842.9
L2-10214-F-FSGS-001-SS-A	NA	NA	SOIL	500	ml	MARINELLI	1	12/12/19	1000	5 ROC HTD	NA	572.48
L2-10214-F-QIGS-001-SS-A	NA	NA	SOIL	500	ml	MARINELLI	1	12/12/19	1245	5 ROC HTD	NA	557.5

REC 1-9-20 1327

20-02089

REC'D FEB 17 2020

ZS-WM-131
Revision 0
Information Use

REC'D JAN 14 2020

20-01055 *AS 2-18-20*

Attachment 1 - Chain-of-Custody Form

Sample ID	Sample Log	Matrix	Sample Type	Vol	Unit	Type	Qty	Sample Date	Sample Time	Analysis Type	Preservative	Remarks
L1-10212C-FSGS-011-SS-A	NA	NA	SOIL	250	ml	MARINELLI	1	9/23/19	0936	5 ROC HTD	NA	456.07
L1-10212C-FSGS-014-SS-A	NA	NA	SOIL	250	ml	MARINELLI	1	9/23/19	0944	5 ROC HTD	NA	380.67
L1-10212C-FSGS-009-SB-A	NA	NA	SOIL	250	ml	MARINELLI	1	9/23/19	1235	5 ROC HTD	NA	508.99
L1-10212D-FSGS-007-SS-A	NA	NA	SOIL	250	ml	MARINELLI	1	8/15/19	0842	5 ROC HTD	NA	443.80
L1-10212D-FSGS-008-SS-A	NA	NA	SOIL	250	ml	MARINELLI	1	8/15/19	0844	5 ROC HTD	NA	395.12
L1-10212D-FSGS-010-SS-A	NA	NA	SOIL	250	ml	MARINELLI	1	8/15/19	0848	5 ROC HTD	NA	455.83
L1-10212D-FSGS-014-SS-A	NA	NA	SOIL	250	ml	MARINELLI	1	8/15/19	0858	5 ROC HTD	NA	417.26
L1-10212D-FSGS-020-SS-A	NA	NA	SOIL	250	ml	MARINELLI	1	8/15/19	0912	5 ROC HTD	NA	472.61
L1-10212D-FQGS-010-SS-A	NA	NA	SOIL	250	ml	MARINELLI	1	8/15/19	0848	5 ROC HTD	NA	471.95
L1-10212D-FSGS-103-SS-A	NA	NA	SOIL	250	ml	MARINELLI	1	9/5/19	1314	5 ROC HTD	NA	383.96
L1-10212D-FSGS-105-SS-A	NA	NA	SOIL	250	ml	MARINELLI	1	9/5/19	1318	5 ROC HTD	NA	414.19
L1-10212D-FSGS-107-SS-A	NA	NA	SOIL	250	ml	MARINELLI	1	9/5/19	1322	5 ROC HTD	NA	464.13
L1-10212D-FSG-108-SS-A	NA	NA	SOIL	250	ml	MARINELLI	1	9/5/19	1324	5 ROC HTD	NA	445.79
L1-10212D-FSGS-109-SS-A	NA	NA	SOIL	250	ml	MARINELLI	1	9/5/19	1326	5 ROC HTD	NA	464.03
L1-10212D-FSGS-110-SS-A	NA	NA	SOIL	250	ml	MARINELLI	1	9/5/19	1328	5 ROC HTD	NA	486.23
L1-10212D-FSGS-112-SS-A	NA	NA	SOIL	250	ml	MARINELLI	1	9/5/19	1332	5 ROC HTD	NA	355.60

Laboratory: *Rec AS 1-14-20*

Date Submitted To Lab:

Ship Container No.:

Cooler Temperature:

Airbill Number:

00956