




ZION STATION RESTORATION PROJECT FINAL STATUS SURVEY RELEASE RECORD

Revision 2

UNIT 1 EAST & WEST STEAM TUNNEL VALVE HOUSES SURVEY UNITS 06213 & 06214



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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-Fraction
BFM	Basement Fill Model
DQA	Data Quality Assessment
DQO	Data Quality Objective
DCGL	Derived Concentration Guideline Level
EMC	Elevated Measurement Comparison
FOV	Field of View
FSS	Final Status Survey
HTD	Hard-to-Detect
IC	Insignificant Contributor
ISOCS	In Situ Object Counting System
LTP	License Termination Plan
LBGR	Lower Bound of the Gray Region
MARSSIM	Multi-Agency Radiation Survey and Site Investigation Manual
MDC	Minimum Detectable Concentration
MDCR	Minimum Detectable Count Rate
OpDCGL	Operational Derived Concentration Guideline Level
OpSOF	Operational Sum of Fractions
QAPP	Quality Assurance Project Plan
QC	Quality Control

RE	Radiological Engineer
ROC	Radionuclides of Concern
SOF	Sum of Fractions
TEDE	Total Effective Dose Equivalent
UBGR	Upper Bound of the Gray Region
UCL	Upper Confidence Level
ZNPS	Zion Nuclear Power Station
ZSRP	Zion Station Restoration Project

1. EXECUTIVE SUMMARY

This Final Status Survey (FSS) Release Record for survey units 06213 and 06214, “Unit 1 East and West Steam Tunnel Valve Houses,” was 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).

The FSS Sample Plans for survey units 06213 and 06214 were developed in accordance with ZionSolutions procedure ZS-LT-300-001-001, “*Final Status Survey Package Development*” (Reference 3), the ZSRP LTP, and with guidance from NUREG-1575, “*Multi-Agency Radiation Survey and Site Investigation Manual*” (MARSSIM) (Reference 4).

In April of 2016, an FSS was conducted on the Turbine Building basement structure. The sample plan design for the FSS of the Turbine Building did not include the surface area of the Unit 1 East and West Steam Tunnel Valve Houses. Separate sample plans were written to include fifty-two (52) systematic measurements to represent the surface area of the Unit 1 East and West Steam Tunnel Valve Houses. The weighted average activity of the systematic measurements of this FSS will be added to the systematic mean of the Turbine Building basement FSS.

FSS was performed on the Unit 1 East and West Steam Tunnel Valve Houses to demonstrate that the concentrations of residual radioactivity were equal to or below site-specific Derived Concentration Guideline Levels (DCGL) corresponding to the dose criterion in 10 CFR 20.1402. In accordance with ZSRP LTP, Section 5.5.2.1.2 and Table 5-19, the Turbine Building survey unit has a MARSSIM classification of 3. The Unit 1 East and West Steam Tunnel Valve Houses were re-classified as a Class 1 due to the discovery of radioactive material concentrations in excess of the Operational DCGLs (OpDCGL) from ZionSolutions TSD 17-004, “*Operational Derived Concentration Guideline Levels for Final Status Survey*” (Reference 5) during the performance of the FSS.

A Sample 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. The Canberra *In Situ* Object Counting System (ISOCS) and was selected as the primary instrument used to perform FSS. To ensure 100% of the surface area was surveyed in accordance with the classification, twenty-six (26) ISOCS measurement locations were selected in each Valve House (for a total of 52 measurements) using several adjusted Field of View (FOV) geometries as specified in ZionSolutions TSD 14-022, “*Use of In-Situ Gamma Spectroscopy for Final Status Survey of End State Structures*” (Reference 6).

The results of the FSS showed that the Operational Sum of Fractions (OpSOF) for 49 of the 52 ISOCS measurements taken was less than one (1) when applying the respective Operational DCGL (OpDCGL) for the Turbine Building basement. Three (3) ISOCS measurements exceed the OpDCGL but were below the Base Case DCGLs (BcDCGL). The mean concentration for each ROC was below the BcDCGL, and the survey unit passed the Sign Test; therefore, the null hypothesis is rejected and the Unit 1 East and West Steam Tunnel Valve Houses are acceptable for unrestricted release.

2. SURVEY UNIT DESCRIPTION

Both the Unit 1 East and West Steam Tunnel Valve Houses were located on the 570 foot elevation and housed the East and West Main Steam Valves. The Valve houses were adjacent to each of the Containment buildings on the East and West sides of Unit 1, with a mirror image of that footprint for Unit 2. The entrances into the Unit 1 East and West Steam Tunnel Valve Houses were from each of the Main Steam Tunnels leading to each respective containment structure Valve House at the Turbine Building 570 foot elevation (See Figures 1, 2 and 3). The surface area of each of the Unit 1 Valve House structural survey units is 304 m².

Figure 1 - Unit 1 East and West Steam Tunnel Valve Houses

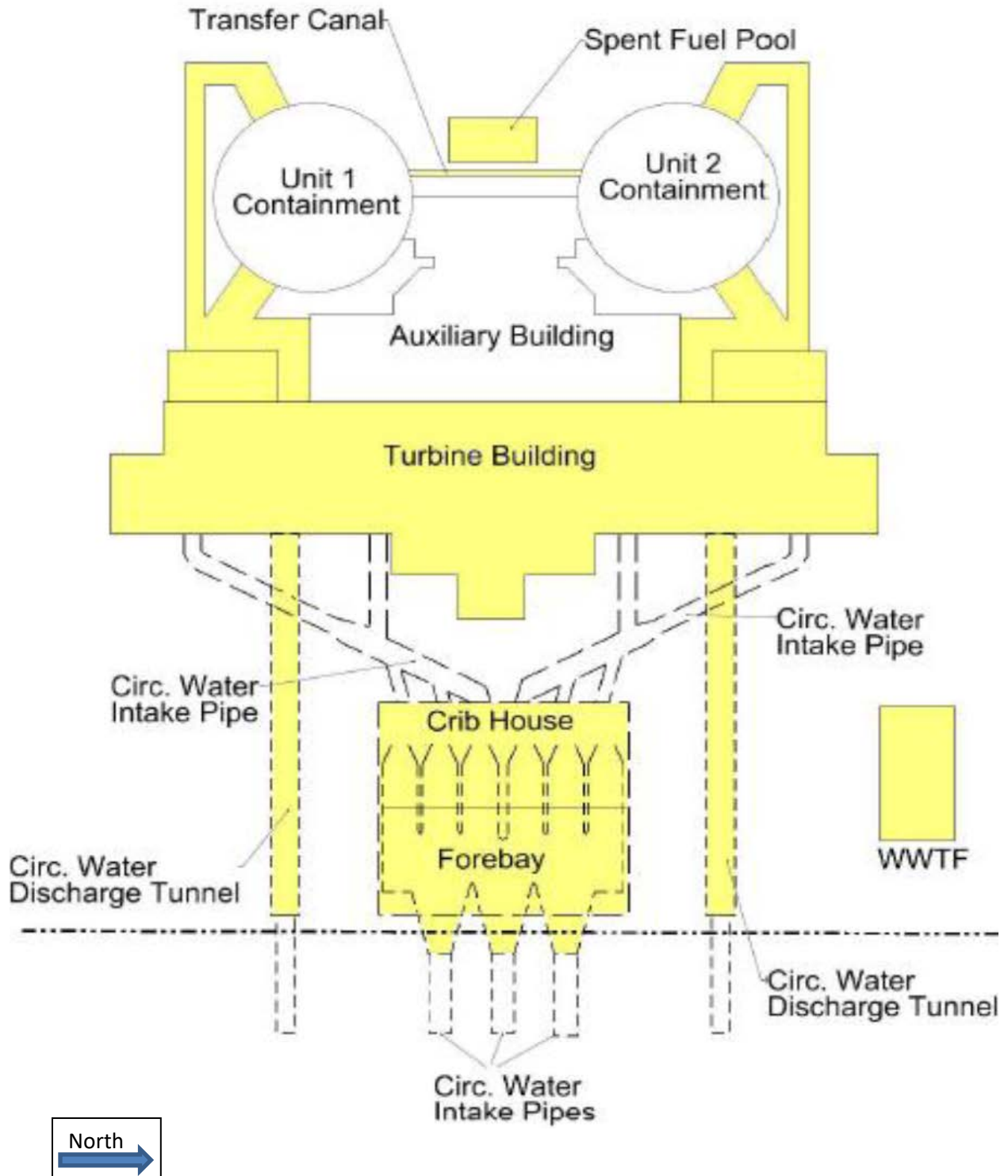


Figure 2 - Unit 1 East Steam Tunnel Valve House Detail

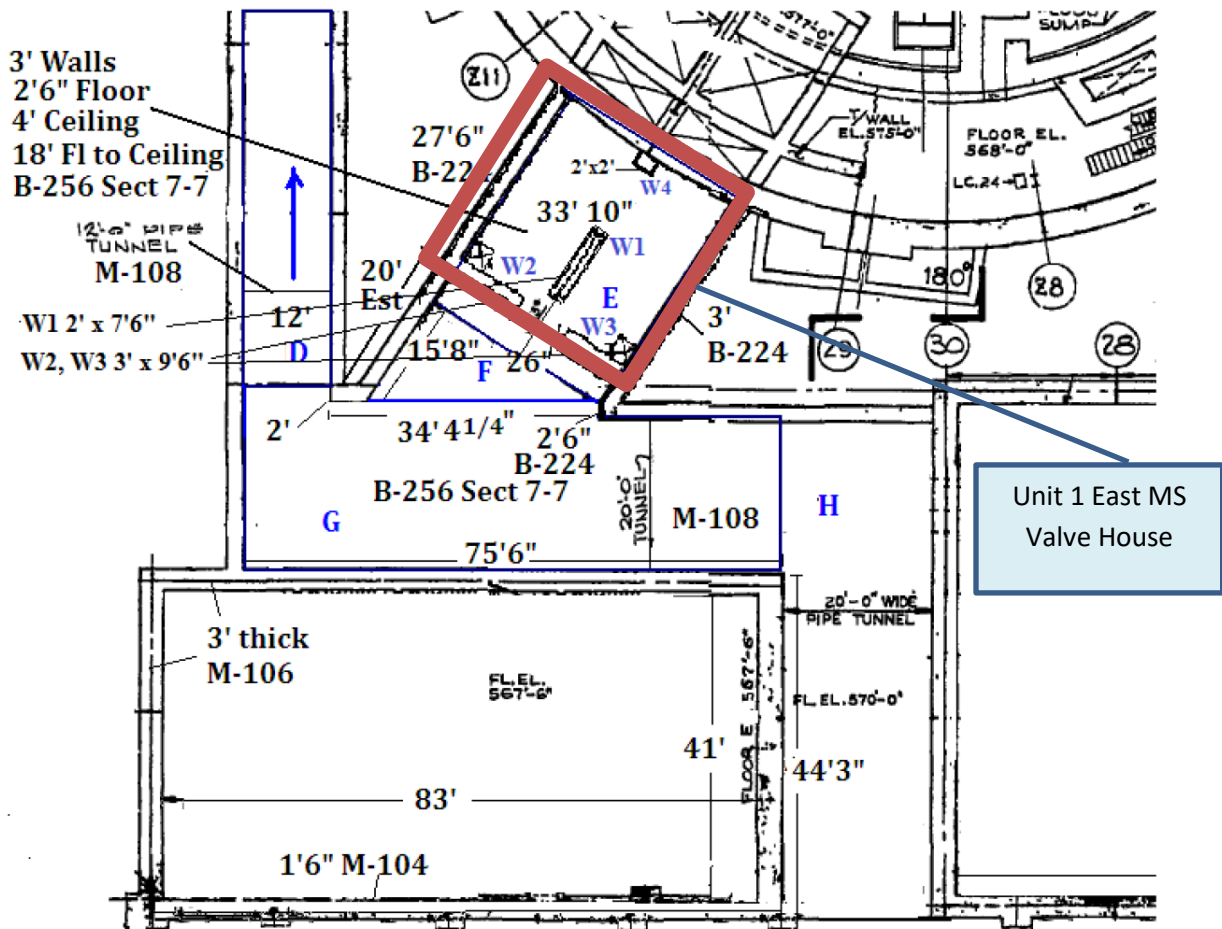
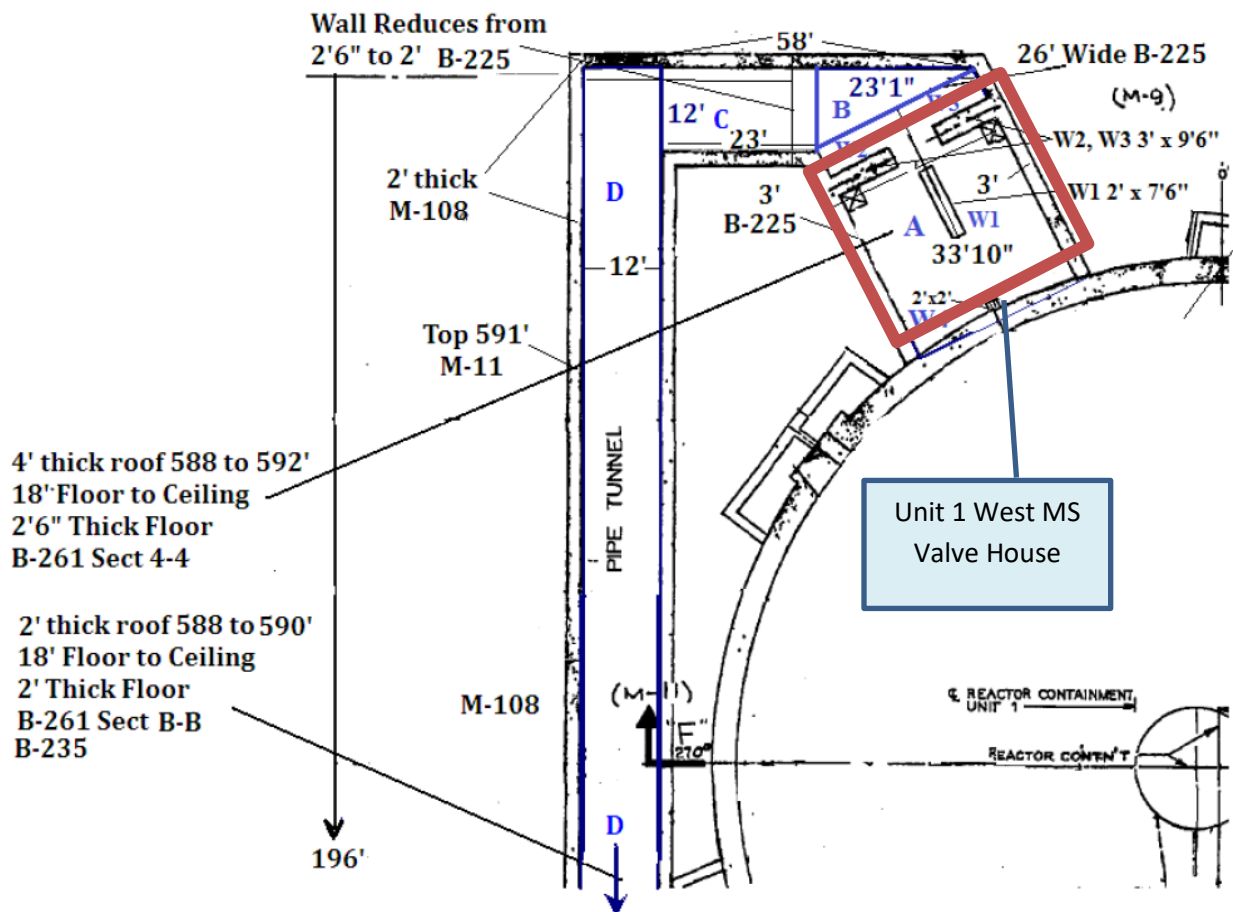


Figure 3 - Unit 1 West Steam Tunnel Valve House Detail



3. CLASSIFICATION BASIS

Survey unit 06100 (Turbine Building) was classified in accordance with ZionSolutions procedure ZS-LT-300-001-002, "Survey Unit Classification" (Reference 7). In accordance with ZSRP LTP, Section 5.5.2.1.2 and Table 5-19, the Turbine Building survey unit was assigned a MARSSIM classification of 3. In April of 2016, an FSS was conducted on the Turbine Building basement structure. The surface area of the Unit 1 East and West Steam Tunnel Valve Houses was included with the Turbine Building for the DCGL calculation; however, the surface area was not included in the FSS of the Turbine Building basement. In addition, the demolition of the Valve Houses occurred two years after the demolition of the Turbine Building basement. Consequently, a separate FSS was required of the Valve Houses prior to backfill.

The Unit 1 East and West Steam Tunnel Valve Houses were classified, as the Turbine Building, in accordance with ZSRP LTP, Section 5.5.2.1.2 as a Class 3 survey unit. A final classification assessment was performed in accordance with procedure ZS-LT-300-001-002 as part of the survey design for FSS. Upon completion of Survey Unit Classification basis for final classification, which included a review of the “*Zion Station Historical Site Assessment*” (HSA) (Reference 8), the classification for survey design remained Class 3. During the performance of FSS, it was observed that many survey measurements exceeded 50% of the OpDCGLs and several exceeded an OpSOF of one. Consequently, the Unit 1 East and West Steam Tunnel Valve Houses, survey units 06213 and 06214, were reclassified from Class 3 to Class 1, and the FSS was redesigned accordingly.

The FSS Radiological Engineer (RE) performed a visual inspection and walk-down of the survey units on April 19, 2018, prior to performing FSS. The purpose of the walk-down was to evaluate and assess the physical condition of the survey units, access points, travel paths and identify potentially hazardous conditions.

4. DATA QUALITY OBJECTIVES (DQO)

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 objectives of the survey is satisfied. The DQO process, utilized in accordance with MARSSIM, is described in the ZSRP 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 units 06213 and 06214 did 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 TSD 11-001, “*Technical Support Document for Potential Radionuclides of Concern During the Decommissioning of the Zion Station*” (Reference 9) established the

basis for an initial suite of potential ROC for the decommissioning of the Zion Nuclear Power Station (ZNPS). LTP Chapter 2 provides detailed characterization data that described contamination levels in the basements. Concrete core samples, collected during characterization surveys, were obtained at biased locations where there were elevated contact dose rates and/or evidence of leaks/spills. The collected core samples were analyzed for the presence of plant-derived radionuclides.

LTP, Section 6.5.2 discusses the process used to derive the ROC for the decommissioning of ZNPS, including the elimination of insignificant dose contributors (IC) from the initial suite. LTP, Section 6.5.2 also states that the Auxiliary Building basement ROC and the IC percentage of 5% for adjusting ROC DCGLs will also be applied to all other Basements including those for the Main Steam Valve Houses unless different values are justified by the results of continuing characterization or FSS Hard-to-Detect (HTD) analysis. Table 1 presents the ROC for the Valve House structural surfaces and the normalized fractions based on the radionuclide mixture.

Table 1 - Dose Significant Radionuclides and Mixture

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

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

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 structures.

The end state basements will be comprised of steel and/or concrete structures which will be covered by at least three feet of clean soil and physically altered to a condition which would not realistically allow the remaining structures, if excavated, to be occupied. The exposure pathways in the Basement Fill Model (BFM) are associated with residual radioactivity in floors and walls released through leaching into water contained in the interstitial spaces of the fill material. The BFM assumes that the inventory of residual radioactivity in a given building is released either instantly or over time by diffusion, depending on whether the activity is surficial or volumetric, respectively. The activity

released into the fill water will adsorb onto the clean fill, as a function of the radionuclide-specific distribution coefficients, resulting in equilibrium concentrations between the fill and the water. Consequently, the only potential exposure pathways after backfilling, assuming the “as-left” geometry, are associated with the residual radioactivity in the water contained in the fill.

The final outputs of the BFM are the basement DCGL, in units of pCi/m², which are calculated using the BFM Groundwater (GW) and BFM Drilling Spoils Dose Factors (LTP, Tables 6-24 and 6-25). The DCGLs for basement structure surfaces are calculated separately for the GW and Drilling Spoils scenarios and for the summation of both scenarios. The summation DCGL is designated as the BcDCGL and is used during FSS to demonstrate compliance (analogous to the DCGL_w as defined in MARSSIM). The BcDCGLs are radionuclide-specific concentrations that represent the 10 CFR 20.1402 dose criterion of 25 mrem/year and are calculated for each ROC and each backfilled Basement.

When applied to structures, the DCGLs are expressed in units of activity per unit of area (pCi/m²). 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 BcDCGLs for the unrestricted release of the Turbine Building (including the Main Steam Valve houses) are provided in Table 2. The Insignificant Contributor (IC) dose percentage of 5% was used to adjust the Turbine Building BcDCGLs to account for the dose from the eliminated IC radionuclides.

Table 2 - Base Case DCGLs (BcDCGL_B) from LTP Chapter 5, Table 5-3

Radionuclide	Turbine Building BcDCGL _B (pCi/m ²)
Co-60	7.03E+07
Ni-63	2.18E+09
Sr-90	7.74E+05
Cs-134	1.59E+07
Cs-137	2.11E+07

Each radionuclide-specific BcDCGL is equivalent to the level of residual radioactivity (above background levels) that could, when considered independently, result in a Total Effective Dose Equivalent (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 TSD 17-004. The OpDCGL_B for FSS of the Unit 1 East and West Valve Houses are provided in Table 3.

Table 3 - Operational DCGLs (OpDCGL_B) from LTP Chapter 5, Table 5-4

Radionuclide	Turbine Building DCGL _B (pCi/m ²)
Co-60	5.98E+06
Ni-63	1.85E+08
Sr-90	6.58E+04
Cs-134	1.35E+06
Cs-137	1.79E+06

Instrument DQOs included a verification of the ability of the survey instrument to detect the radiation(s) of interest relative to the OpDCGL. The Canberra ISOCS was selected as the primary instrument used to perform FSS of basement surfaces. Response checks were required prior to issuance and after each use. Control and accountability of ISOCS units was required to assure data quality.

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 Minimum Detectable Concentration (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 50% of the applicable OpDCGL.

5. SURVEY DESIGN

Guidance for preparing FSS plans was provided in procedure ZS-LT-300-001-001. The Canberra ISOCS was selected as the primary instrument for performing FSS of basement surfaces. The ISOCS was selected as the instrument of choice to perform FSS of basement surfaces due to the fact that an ISOCS measurement will provide results that can be used directly to determine total activity with depth in concrete, and the surface area covered by a single ISOCS measurement is large (a nominal FOV of 10-30 m²), which essentially eliminates the need for a scan surveys. In addition, after an ISOCS measurement is collected, it can be tested against a variety of geometry assumptions to address uncertainty in the source term geometry if necessary.

The source term geometry for ISOCS efficiency calibration (i.e., concentration depth profile and areal distribution of the residual radioactivity in structures) is required to generate efficiency curves (i.e., efficiency as a function of energy) for the ISOCS gamma spectroscopy measurements. The ISOCS efficiency calibration basis chosen for the FSS of the Main Steam Valve Houses concrete are documented in *ZionSolutions* TSD 14-022. The ISOCS geometry utilized for the Main Steam Valve Houses employed a 28 m² FOV. A second geometry employing a 2.5 meter stand-off was also used. The selection of this latter geometry was necessitated in situations where there was limited accessibility due to structural constraints.

Sample size determination for the FSS of Turbine Building basement is addressed in LTP, Section 5.5.2.2. The surface areas of the Main Steam Valve Houses were not originally included in the Turbine Building basement survey unit. Consequently, the weighted average activity of the ISOCS measurements taken in the Main Steam Valve Houses will be added to the systematic mean of the Turbine Building basement FSS. This is addressed in LTP, Section 5.5.6.1. The total basement area used in the weighted average calculation is the adjusted surface area used to calculate the DCGLs in LTP, Section 6.6.8. The adjusted area for the Turbine Building from LTP, Table 5-23 is 27,135 m². In accordance with TSD 14-014, “*End State Surface Areas, Volumes, and Source Terms of Ancillary Buildings*,” (Reference 10), the total surface area of each of the two Unit 1 Main Steam Valve Houses is 304 m².

The area-weighted SOF is calculated in accordance with LTP, Equation 5-8, which is reproduced as Equation 1. The $SOF_{Bi,B}$ variable in the equation is based on the mean of the judgmental samples.

Equation 1

$$SOF_{B,B} = \sum_{i=1}^n \frac{SA_{SUI,B}}{SA_{Adjust,B}} * SOF_{Bi,B}$$

where:

- $SOF_{B,B}$ = total surface SOF including all surface survey units in basement (B)
- $SA_{SUi,B}$ = surface area of survey unit (i) in basement (B)
- $SA_{Adjust,B}$ = adjusted surface area for DCGL calculation (Table 5-23) for basement (B)
- $SOF_{Bi,B}$ = SOF_B for survey unit (i) in basement (B)

This sample plan for each of the Unit 1 East and West Main Steam Valve Houses consisted of twenty-six (26) systematic measurement/sample locations, ensuring 100% areal coverage of the surface area. Figures 4 and 5 in this release record and Attachment 1, “Figures and Maps,” illustrate the locations of the ISOCS measurements taken.

The DQO process determined that Co-60, Ni-63, Sr-90, Cs-134, Cs-137 would be the ROC in survey units 06213 and 06214. During FSS, concentrations of HTD ROC Ni-63, and Sr-90 are inferred using a surrogate approach as specified in LTP, Section 5.2.11. 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 were calculated in TSD 14-019 , “*Radionuclides of Concern for Soil and Basement Fill Model Source Terms*” (Reference 11) and are presented in LTP, Table 5-15, which is reproduced as Table 4 below.

Table 4 - 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 units 06213 and 06214, the surrogate OpDCGLs for Co-60 and Cs-137 are based on the maximum ratios from Table 4. The equation for calculating a surrogate DCGL is as follows:

Equation 2

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

- 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 the Turbine Building presented in Table 3 and the maximum ratios from Table 4, the following surrogate calculations were performed for FSS units 06213 and 06214

Equation 3

$$Surrogate_{DCGL (Cs-137)} = \frac{1}{\left[\left(\frac{1}{1.79E + 06_{(Cs-137)}}\right) + \left(\frac{0.002}{6.58E + 04_{(Sr-90)}}\right)\right]} = 1.70E + 06 \text{ pCi/m}^2$$

The surrogate OpDCGL that was used for Cs-137 in FSS units 06213 and 06214 for direct comparison of sample results to demonstrate compliance is 1.70E+06 pCi/m².

Equation 4

$$Surrogate_{DCGL (Co-60)} = \frac{1}{\left[\left(\frac{1}{5.98E + 06_{(Co-60)}}\right) + \left(\frac{180.45}{1.85E + 08_{(Ni-63)}}\right)\right]} = 8.75E + 05 \text{ pCi/m}^2$$

The surrogate OpDCGL that was used for Co-60 in FSS units 06213 and 06214 for direct comparison of sample results to demonstrate compliance is 8.75E+05 pCi/m².

For these Class 1 basement structure survey units, the “Investigation Levels” for ISOCS measurement results are those levels specified in LTP Chapter 5, Table 5-25, and are reproduced below in Table 5.

Table 5 - Investigation Levels

Classification	Direct Investigation Levels
Class 1	>Operational DCGL

In compliance with ZS-LT-01, “Quality Assurance Project Plan (for Characterization and FSS)” (QAPP) (Reference 12), replicate measurements were performed on 5% of the ISOCS measurement locations.

Table 6 provides a synopsis of the survey design for survey units 06213 and 06214.

Table 6 - Synopsis of the Survey Design

FEATURE	DESIGN CRITERIA	BASIS
Survey Unit Area	304 m ² each Valve House, 608 m ² total	LTP, Table 5-23
Number of Measurements	26 (systematic) in each Valve House (52 measurements total)	<ul style="list-style-type: none"> • $\sigma = 0.3$ • UBGR = SOF of 1 • LBGR = SOF of 0.5 • Type I error = 0.05 • Type II error = 0.05 • $\Delta/\sigma = 3$ (adjusted) MARSSIM Table 5-5
Measurement Spacing	100% Areal Coverage (Planned for 28 m ² FOV)	LTP, Section 5.5.2.2
OpDCGL _B	<ul style="list-style-type: none"> • Co-60 – 5.98E+06 pCi/m² • Ni-63 – 1.85E+08 pCi/m² • Sr-90 – 6.58E+04 pCi/m² • Cs-134 – 1.35E+06 pCi/m² • Cs-137 – 1.79E+06 pCi/m² 	Operational DCGLs for Turbine Building Basement Unit 1 East Main Steam Valve House, (LTP, Table 5-4)
HTD ROC Analysis	3 Concrete Core samples in each Valve House selected for HTD ROC analysis (6 samples total)	LTP, Section 5.1
Measurement Investigation Level	>Operational DCGL	LTP, Table 5-25
Scan Survey Area Coverage	304 m ² 100% areal scan coverage (each Valve House); 608 m ² total surface area and scan coverage	ZS-LT-300-001-001, Attachment 1
QC	5% Replicate ISOCS Measurements	LTP, Section 5.9

6. SURVEY IMPLEMENTATION

For the systematic measurements performed in survey units 06213 and 06214, compliance with the unrestricted release criteria was demonstrated through a combination of direct measurements using the ISOCS and analysis of concrete core samples obtained from the Main Steam Valve Houses. The concrete core data was used to validate the ratios of gamma emitters to HTD ROC.

A walk down was performed by FSS personnel on April 18, 2018. A turnover survey and groundwater pump out was required to permit acceptance of the Main Steam Valve House survey units for FSS. Characterization data from 2012 and 2013, including 10 concrete core samples did not identify any conditions precluding turnover; however, turnover surveys were utilized to confirm demolition work in the area had not altered conditions. The Main Steam Valve Houses were deemed acceptable for turnover and FSS commenced on April 25, 2018.

“Field Logs” (ZS-LT-300-001-001, Attachment 14) were used to document field activities and other information pertaining to the performance of the FSS. Daily briefings were conducted to discuss the expectations for job performance and to review safety aspects of the job.

ZionSolutions TSD 14-022 provides the initial justification for the selection of reasonably conservative geometries and efficiency calibrations for the ISOCS based on the physical conditions of the remediated surface and the anticipated depth and distribution of activity. All ISOCS measurements were acquired using an approved geometry. One source to detector distance was utilized to ensure 100% measurement coverage. The primary ISOCS geometry utilized was “3M90D_CP_2IN,” and is described in detail in Attachment 2.

The ISOCS detector was positioned horizontally or vertically to the surface at the center-point of each selected measurement location. The exposed face of the detector was positioned at a distance of 3 meters from the surface with the 90-degree collimation shield installed; this orientation corresponded to a nominal FOV of 28 m² for walls.

The measured activity for each gamma-emitting ROC (and any other gamma-emitting radionuclides positively detected by ISOCS) was recorded in units of pCi/m². Background was not subtracted from any measurement. An OpSOF calculation was performed for each measurement by dividing the reported concentration of each ROC by the OpDCGL for each ROC to derive an individual ROC fraction. The individual ROC fractions were then summed to provide a total OpSOF value for the measurement.

Two (2) replicate measurements were taken with the ISOCS in each of the two Unit 1 Valve Houses during FSS. The locations selected for taking replicate measurements were at locations 002 and 020 in the East Valve house, and at locations 007 and 016 in the West Valve House. These locations were randomly selected using the Microsoft® Excel

RANDBETWEEN function. The number of replicate measurements satisfies the 5% requirement in the QAPP.

7. SURVEY RESULTS

The SOF or “unity rule” was applied to the data used for the survey planning, data evaluation and statistical tests for basement surfaces since multiple radionuclide-specific measurements were performed and concentrations inferred based on known relationships. The application of the unity rule served to normalize the data to allow for an accurate comparison of the various data measurements to the release criteria. When the unity rule was applied, the $DCGL_W$ (used for the nonparametric statistical test) becomes one (1). The $BcDCGL_B$ is directly analogous to the $DCGL_W$ as defined in MARSSIM. The use and application of the unity rule was performed in accordance with section 4.3.3 of MARSSIM.

For building surfaces, areas of elevated activity are defined as any area identified by measurement/sample (systematic or judgmental) that exceeded the $OpDCGL$ but was less than the $BcDCGL$. Any area that exceeded the $BcDCGL$ would have required remediation. ISOCS measurements indicated the $OpSOF$ exceeded one for 2 of the 26 measurements taken in the Unit 1 East Valve House and one of the 26 measurements taken in the Unit 1 West Valve House. The result of all ISOCS measurements taken in both Valve Houses were below the $BcDCGLs$.

The sample population consisted of twenty-six (26) direct measurements for each of the Unit 1 Valve Houses, and measurements were acquired using the ISOCS. The concentrations for Ni-63 and Sr-90 were inferred based on the maximum ratios as specified in LTP, Table 5-15. The complete ISOCS gamma spectroscopy reports are presented in Attachment 5. The ISOCS measured concentration results from the Unit 1 East Steam Tunnel Valve House are listed in Table 7.

Direct measurement locations were denoted on the concrete surfaces of the Unit 1 East and West Valve Houses by marking an approximate 4 meter by 4 meter grid pattern using a random start point that was overlaid over the exposed surface, providing sufficient overlap between locations to ensure 100% areal coverage. ISOCS measurement locations are shown below in Figures 4 and 5, as well as in Attachment 1.

Figure 4 - Unit 1 East Steam Tunnel Valve House ISOCS Survey and Sample Map

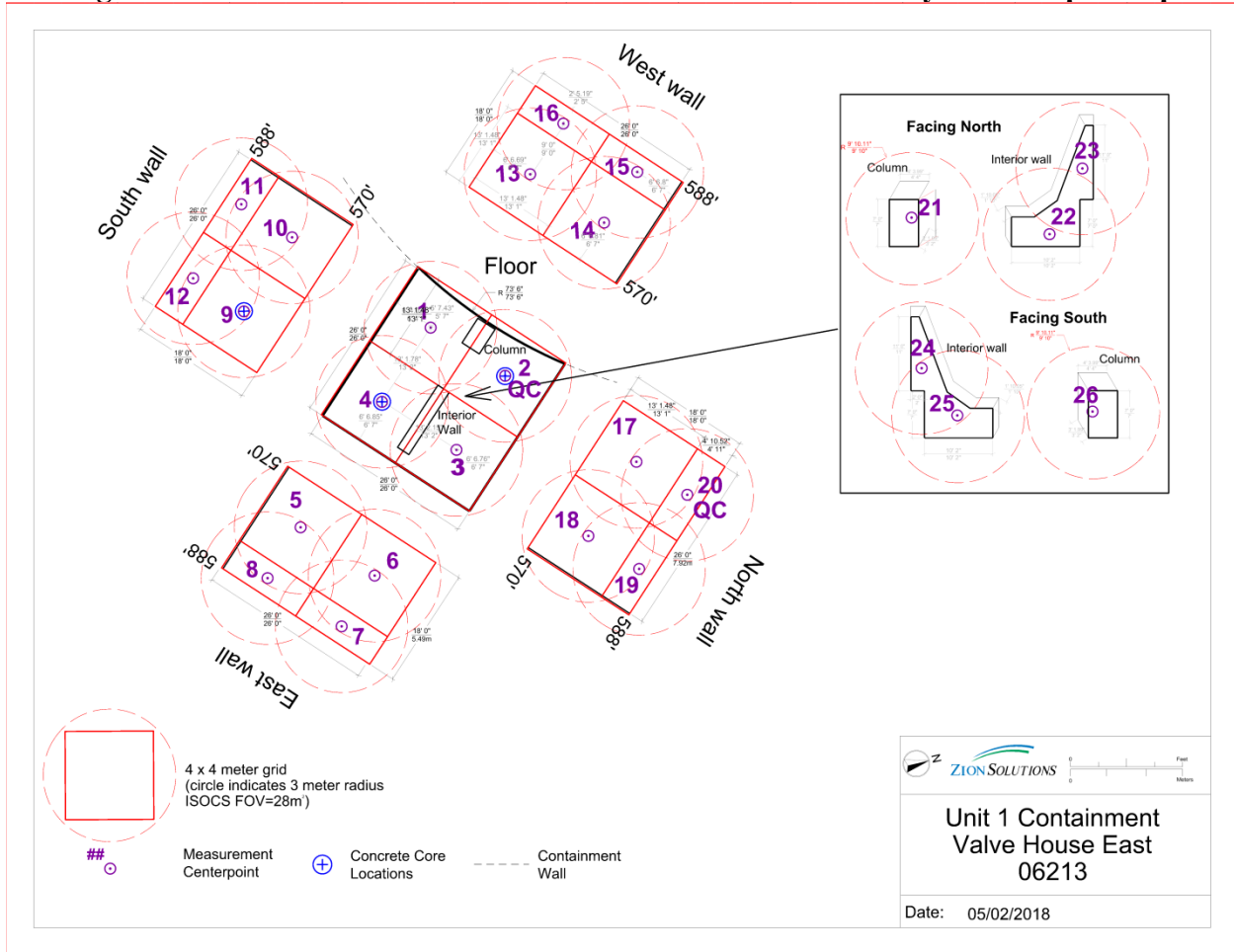


Figure 5 - Unit 1 West Steam Tunnel Valve House ISOCS Survey and Sample Map

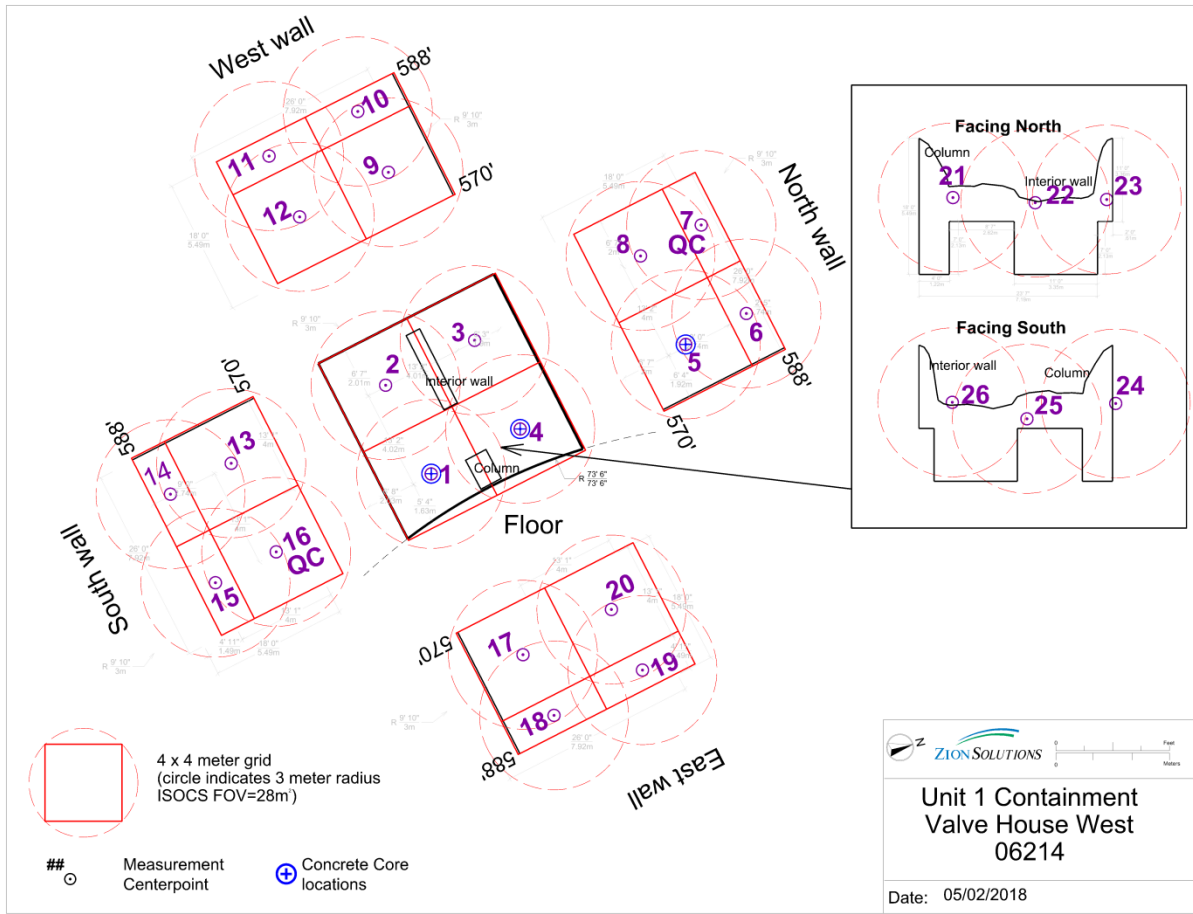


Table 7 - Unit 1 East Steam Tunnel Valve House - ISOCS Results for FSS

Measurement ID	Co-60 (pCi/m ²)	Ni-63 ⁽¹⁾ (pCi/m ²)	Sr-90 ⁽¹⁾ (pCi/m ²)	Cs-134 (pCi/m ²)	Cs-137 (pCi/m ²)	OpSOF
B1-6213A-FSFC-001-GD	2.42E+04	4.37E+06	3.02E+03	3.88E+04	1.51E+06	0.946
B1-6213A-FSFC-002-GD	3.75E+03	6.77E+05	1.41E+04	6.71E+04	7.06E+06	4.213
B1-6213A-FSFC-003-GD	1.99E+04	3.59E+06	3.16E+03	2.33E+04	1.58E+06	0.971
B1-6213A-FSFC-004-GD	1.98E+04	3.57E+06	1.51E+03	4.66E+04	7.55E+05	0.502
B1-6213A-FSWC-005-GD	3.52E+02	6.35E+04	1.37E+02	5.04E+03	6.85E+04	0.044
B1-6213A-FSWC-006-GD	9.10E+02	1.64E+05	8.14E+01	2.19E+04	4.07E+04	0.041
B1-6213A-FSWC-007-GD	3.40E+04	6.14E+06	5.86E+01	7.80E+04	2.93E+04	0.114
B1-6213A-FSWC-008-GD	3.13E+04	5.65E+06	6.14E+01	5.45E+03	3.07E+04	0.058
B1-6213A-FSWC-009-GD	2.69E+04	4.85E+06	2.26E+02	3.48E+04	1.13E+05	0.123
B1-6213A-FSWC-010-GD	0.00E+00	0.00E+00	9.00E+02	2.75E+04	4.50E+05	0.285
B1-6213A-FSWC-011-GD	3.34E+04	6.03E+06	4.24E+01	4.33E+04	2.12E+04	0.083
B1-6213A-FSWC-012-GD	4.69E+03	8.46E+05	0.00E+00	8.07E+04	0.00E+00	0.065
B1-6213A-FSWC-013-GD	1.85E+04	3.34E+06	2.90E+02	1.89E+04	1.45E+05	0.121
B1-6213A-FSWC-014-GD	2.98E+04	5.38E+06	6.60E+02	4.40E+04	3.30E+05	0.261
B1-6213A-FSWC-015-GD	1.20E+04	2.17E+06	7.94E+01	5.12E+04	3.97E+04	0.075
B1-6213A-FSWC-016-GD	2.10E+04	3.79E+06	5.44E+01	4.74E+04	2.72E+04	0.075
B1-6213A-FSWC-017-GD	0.00E+00	0.00E+00	5.04E+03	4.09E+04	2.52E+06	1.515
B1-6213A-FSWC-018-GD	4.26E+04	7.69E+06	1.11E+03	3.69E+03	5.55E+05	0.378
B1-6213A-FSWC-019-GD	2.12E+04	3.83E+06	8.16E+01	6.66E+04	4.08E+04	0.098
B1-6213A-FSWC-020-GD	0.00E+00	0.00E+00	3.78E+02	2.97E+04	1.89E+05	0.133
B1-6213A-FSWC-021-GD	1.46E+04	2.63E+06	1.94E+03	1.59E+03	9.72E+05	0.590
B1-6213A-FSWC-022-GD	7.08E+03	1.28E+06	7.74E+02	5.28E+04	3.87E+05	0.275
B1-6213A-FSWC-023-GD	5.24E+03	9.46E+05	8.50E+02	6.51E+03	4.25E+05	0.261
B1-6213A-FSWC-024-GD	0.00E+00	0.00E+00	1.67E+02	3.26E+04	8.36E+04	0.073
B1-6213A-FSWC-025-GD	0.00E+00	0.00E+00	3.00E+02	4.32E+04	1.50E+05	0.120
B1-6213A-FSWC-026-GD	1.79E+04	3.23E+06	6.12E+02	4.17E+04	3.06E+05	0.232

(1) Concentrations are inferred

Twenty-six (26) ISOCS measurements were taken in the Unit 1 East Steam Tunnel Valve House. Of the 26 measurements, two measurements exceeded a OpSOF of one. The mean OpSOF was 0.448, and the max OpSOF was 4.213.

In order to assess the dose contribution from the Unit 1 East Main Steam Valve House, the concentration of each ROC in each systematic measurement was also compared against the respective BcDCGLs. The calculation of the mean BcSOF for the Unit 1 East Steam Tunnel Valve House and the resultant dose is presented in Table 8.

Table 8 - Basic Statistical Properties of ISOCS Measurements in the Unit 1 East Steam Tunnel Valve House

Individual Measurement Metrics

Total Number of Systematic Measurements	=	26
Number of Quality Control Measurements	=	2
Number of Judgmental/Investigational Measurements	=	0
Total Number of Measurements	=	28

Mean Systematic Measurement OpSOF	=	0.448
Max Individual Systematic Measurement OpSOF	=	4.213
Number of Systematic Measurements with OpSOF >1	=	2

Statistical Quantities - Systematic Measurement Population

ROC	Mean (pCi/m ²)	Median (pCi/m ²)	Max (pCi/m ²)	Min (pCi/m ²)	Std. Dev. (pCi/m ²)	BcDCGL (pCi/m ²)	Avg. SOF per ROC	Avg. Dose Per ROC
Co-60	1.50E+04	1.63E+04	4.26E+04	0.00E+00	1.30E+04	7.03E+07	0.000	0.005
Ni-63	2.70E+06	2.93E+06	7.69E+06	0.00E+00	2.35E+06	2.18E+09	0.001	0.031
Sr-90	1.37E+03	3.39E+02	1.41E+04	0.00E+00	2.87E+03	7.74E+05	0.002	0.044
Cs-134	3.67E+04	3.99E+04	8.07E+04	1.59E+03	2.23E+04	1.59E+07	0.002	0.058
Cs-137	6.86E+05	1.70E+05	7.06E+06	0.00E+00	1.43E+06	2.11E+07	0.032	0.812

The mean BcSOF from measurements taken on basement structural surfaces in the Unit 1 East Steam Tunnel Valve House is 0.038. This is derived by summing the average BcSOF per ROC resulting from the average concentration in Table 8. Using Equation 5-5 from LTP, Section 5.5.4, the adjustment to the mean BcSOF from elevated measurements B1-6213A-FSFC-002-GD and B1-6213A-FSWC-017-GD is 0.013. The adjusted mean BcSOF for the Unit 1 East Steam Tunnel Valve House is 0.051, which equates to a dose of 1.285 mrem/year.

The ISOCS measured concentration results from the Unit 1 West Steam Tunnel Valve House are listed in Table 9.

Table 9 - Unit 1 West Steam Tunnel Valve House - ISOCS Results for FSS

Measurement ID	Co-60 (pCi/m ²)	Ni-63 ⁽¹⁾ (pCi/m ²)	Sr-90 ⁽¹⁾ (pCi/m ²)	Cs-134 (pCi/m ²)	Cs-137 (pCi/m ²)	OpSOF
B1-6214A-FSFC-001-GD	2.56E+04	4.62E+06	1.41E+03	0.00E+00	7.04E+05	0.444
B1-6214A-FSFC-002-GD	0.00E+00	0.00E+00	5.20E+02	5.42E+04	2.60E+05	0.193
B1-6214A-FSFC-003-GD	2.98E+04	5.38E+06	1.72E+03	6.33E+04	8.58E+05	0.586
B1-6214A-FSFC-004-GD	2.84E+04	5.12E+06	6.06E+03	0.00E+00	3.03E+06	1.817
B1-6214A-FSWC-005-GD	2.74E+04	4.94E+06	2.58E+03	7.01E+04	1.29E+06	0.843
B1-6214A-FSWC-006-GD	1.10E+04	1.98E+06	8.86E+01	3.86E+04	4.43E+04	0.067
B1-6214A-FSWC-007-GD	2.98E+04	5.38E+06	5.72E+01	3.79E+04	2.86E+04	0.079
B1-6214A-FSWC-008-GD	2.98E+04	5.38E+06	3.54E+02	6.00E+04	1.77E+05	0.183
B1-6214A-FSWC-009-GD	1.46E+04	2.63E+06	1.01E+02	6.10E+04	5.05E+04	0.092
B1-6214A-FSWC-010-GD	3.91E+03	7.06E+05	6.82E+01	2.02E+04	3.41E+04	0.040
B1-6214A-FSWC-011-GD	7.23E+03	1.30E+06	5.94E+01	1.42E+04	2.97E+04	0.036
B1-6214A-FSWC-012-GD	1.85E+04	3.34E+06	6.48E+01	7.88E+04	3.24E+04	0.099
B1-6214A-FSWC-013-GD	0.00E+00	0.00E+00	7.30E+01	5.16E+04	3.65E+04	0.060
B1-6214A-FSWC-014-GD	1.01E+03	1.82E+05	8.00E+01	4.05E+04	4.00E+04	0.055
B1-6214A-FSWC-015-GD	6.04E+03	1.09E+06	6.26E+01	2.07E+04	3.13E+04	0.041
B1-6214A-FSWC-016-GD	1.04E+04	1.88E+06	3.58E+02	6.59E+04	1.79E+05	0.166
B1-6214A-FSWC-017-GD	1.12E+04	2.02E+06	2.38E+02	1.81E+04	1.19E+05	0.096
B1-6214A-FSWC-018-GD	1.14E+04	2.06E+06	6.22E+01	5.58E+04	3.11E+04	0.073
B1-6214A-FSWC-019-GD	1.99E+04	3.59E+06	9.32E+01	9.19E+04	4.66E+04	0.118
B1-6214A-FSWC-020-GD	1.56E+04	2.82E+06	3.40E+02	3.72E+04	1.70E+05	0.146
B1-6214A-FSWC-021-GD	0.00E+00	0.00E+00	3.64E+02	3.22E+04	1.82E+05	0.131
B1-6214A-FSWC-022-GD	2.80E+04	5.05E+06	2.62E+02	6.97E+04	1.31E+05	0.161
B1-6214A-FSWC-023-GD	1.99E+04	3.59E+06	9.52E+01	4.16E+04	4.76E+04	0.082
B1-6214A-FSWC-024-GD	3.41E+04	6.15E+06	4.26E+02	0.00E+00	2.13E+05	0.164
B1-6214A-FSWC-025-GD	2.84E+04	5.12E+06	1.02E+03	3.97E+04	5.09E+05	0.362
B1-6214A-FSWC-026-GD	5.67E+03	1.02E+06	8.02E+01	8.11E+04	4.01E+04	0.090

(1) Concentrations are inferred

Twenty-six (26) ISOCS measurements were taken in the Unit 1 West Steam Tunnel Valve House. Of the 26 measurements, one measurement exceeded a OpSOF of one when compared to the OpDCGLs. The mean OpSOF was 0.239, and the max OpSOF was 1.817.

In order to assess the dose contribution from the Unit 1 West Steam Tunnel Valve House, the concentration of each ROC in each systematic measurement was also compared against the respective BcDCGLs. The calculation of the mean BcSOF for the Unit 1 West Steam Tunnel Valve House and the resultant dose is presented in Table 10.

Table 10 - Basic Statistical Properties of ISOCS Measurements in the Unit 1 West Steam Tunnel Valve House

Individual Measurement Metrics

Total Number of Systematic Measurements	=	26
Number of Quality Control Measurements	=	2
Number of Judgmental/Investigational Measurements	=	0
Total Number of Measurements	=	28
Mean Systematic Measurement OpSOF	=	0.239
Max Individual Systematic Measurement OpSOF	=	1.817
Number of Systematic Measurements with OpSOF >1	=	1

Statistical Quantities - Systematic Measurement Population

ROC	Mean (pCi/m ²)	Median (pCi/m ²)	Max (pCi/m ²)	Min (pCi/m ²)	Std. Dev. (pCi/m ²)	BcDCGL (pCi/m ²)	Avg. SOF per ROC	Avg. Dose Per ROC
Co-60	1.61E+04	1.51E+04	3.41E+04	0.00E+00	1.12E+04	7.07E+07	0.000	0.006
Ni-63	2.90E+06	2.72E+06	6.15E+06	0.00E+00	2.02E+06	2.18E+09	0.001	0.033
Sr-90	6.40E+02	1.70E+02	6.06E+03	5.72E+01	1.26E+03	7.74E+05	0.001	0.021
Cs-134	4.40E+04	4.11E+04	9.19E+04	0.00E+00	2.58E+04	1.59E+07	0.003	0.069
Cs-137	3.20E+05	8.48E+04	3.03E+06	2.86E+04	6.31E+05	2.11E+07	0.015	0.379

The mean BcSOF from measurements taken on basement structural surfaces in the Unit 1 West Steam Tunnel Valve House is 0.020. This is derived by summing the average BcSOF per ROC resulting from the average concentration in Table 10. Using Equation 5-5 from LTP, Section 5.5.4, the adjustment to the mean BcSOF from elevated measurement B1-6214A-FSFC-004-GD is 0.012. The adjusted mean BcSOF for the Unit 1 West Steam Tunnel Valve House is 0.033, which equates to a dose of 0.816 mrem/year.

Six (6) concrete core samples, three for each Valve House, were acquired at 10% of the locations where ISOCS measurements were collected, with the locations selected at random. The first top ½-inch puck from each concrete core sample, representing the concrete from the exposed surface to a depth of ½ inch, were analyzed on-site and at an off-site laboratory (Eberline) for gamma emitters and HTD radionuclides to confirm the surrogate ROCs.

The results of the analysis of concrete core samples taken in the Unit 1 East Steam Tunnel Valve House are presented in Table 11 below.

Table 11 - FSS Concrete Core Samples Taken in Unit 1 East Steam Tunnel Valve House

B1-06213A-FSFC-002-CV			
ROC	Result (pCi/g)	Uncertainty (pCi/g)	MDC (pCi/g)
Co-60	8.50E-03	5.49E-02	7.82E-02
Ni-63	3.18E+00	1.12E+00	1.80E+00
Sr-90	7.28E-02	2.27E-01	4.77E-01
Cs-134	0.00E+00	6.82E-02	1.10E-01
Cs-137	9.24E+01	9.00E+00	3.04E-01
B1-06213A-FSFC-004-CV			
ROC	Result (pCi/g)	Uncertainty (pCi/g)	MDC (pCi/g)
Co-60	0.00E+00	7.29E-02	9.75E-02
Ni-63	1.00E+00	9.70E-01	1.62E+00
Sr-90	3.63E-01	2.20E-01	4.29E-01
Cs-134	1.45E-03	3.33E-02	1.07E-01
Cs-137	1.07E+00	2.02E-01	2.24E-01
B1-06213A-FSWC-009-CV			
ROC	Result (pCi/g)	Uncertainty (pCi/g)	MDC (pCi/g)
Co-60	5.16E-02	1.09E-01	1.83E-01
Ni-63	5.96E-01	1.07E+00	1.82E+00
Sr-90	3.61E-01	2.75E-01	4.98E-01
Cs-134	7.41E-03	6.93E-02	1.91E-01
Cs-137	6.95E-02	1.51E-01	2.31E-01

In sample B1-06213A-FSFC-002-CV, Cs-137 and Ni-63 were positively detected; however, Co-60 was less than MDC. In sample B1-06213A-FSFC-004-CV, Cs-137 was positively detected; however, Sr-90 was less than MDC. No ROC were positively detected in sample B1-06213A-FSFC-009-CV. LTP, Section 5.1 states, “For sample(s) analyzed for HTD radionuclides during continuing characterization, if the analysis of the sample indicates positive results (greater than MDC) for both a HTD ROC and the corresponding surrogate radionuclide (Cs-137 or Co-60), then the HTD to surrogate ratio will be derived.” As both the HTD ROC and the surrogate ROC were not positively detected in the samples, the assessment of the Eberline sample results against the maximum surrogate ratio in LTP, Table 5-15 was not required.

The results of the analysis of concrete core samples taken in the Unit 1 West Steam Tunnel Valve House are presented in Table 12 below.

Table 12 - FSS Concrete Core Samples Taken in Unit 1 West Main Steam Valve House

B1-06214A-FSFC-001-CV			
ROC	Result (pCi/g)	Uncertainty (pCi/g)	MDC (pCi/g)
Co-60	6.87E-02	9.05E-02	1.66E-01
Ni-63	6.77E-01	1.08E+00	1.83E+00
Sr-90	8.14E-01	2.35E-01	4.06E-01
Cs-134	0.00E+00	8.90E-02	1.94E-01
Cs-137	1.48E+01	1.84E+00	3.09E-01
B1-06214A-FSFC-004-CV			
ROC	Result (pCi/g)	Uncertainty (pCi/g)	MDC (pCi/g)
Co-60	0.00E+00	1.03E-01	1.45E-01
Ni-63	2.07E+00	1.10E+00	1.80E+00
Sr-90	4.17E-01	2.46E-01	4.81E-01
Cs-134	2.76E-02	7.97E-02	1.78E-01
Cs-137	4.16E+01	4.13E+00	3.77E-01
B1-06214A-FSWC-005-CV			
ROC	Result (pCi/g)	Uncertainty (pCi/g)	MDC (pCi/g)
Co-60	4.21E-02	1.42E-01	2.26E-01
Ni-63	2.09E-01	9.98E-01	1.70E+00
Sr-90	2.61E-01	2.33E-01	4.69E-01
Cs-134	0.00E+00	3.60E-01	2.24E-01
Cs-137	1.33E+00	3.29E-01	3.96E-01

In sample B1-06214A-FSFC-004-CV, Ni-63 and Cs-137 were both positively detected; however, both Co-60 and Sr-90 were less than MDC. In sample B1-06214A-FSWC-005-CV, only Cs-137 was positively detected. All other ROC were less than MDC. In sample B1-06214A-FSFC-001-CV, both Sr-90 and Cs-137 were both positively indicated; however, based on the absence of detectable Sr-90 in any concrete or soils outside of the Containment Buildings and the results of other concrete cores taken in and around this area, it was assumed that the single positive Sr-90 result was an outlier and was not used.

To validate this assumption, concrete core B1-06214A-FSFC-001-CV was retrieved from the sample archive and analyzed for the full suite of potential radionuclides from LTP, Table 5-1. The results are provided in Table 13.

Table 13 – Eberline Re-Analysis Results for Sample B1-06214A-FSFC-001-CV

Nuclides	B1-06214A-FSFC-001-CV		
	Result (pCi/g)	Uncert. (pCi/g)	MDC (pCi/g)
H-3	3.86E+00	2.40E+00	3.94E+00
C-14	0.00E+00	3.49E-01	6.09E-01
Mn-54	4.62E-01	4.28E-01	8.84E-01
Fe-55	6.56E-02	1.89E-01	3.14E-01
Ni-59	0.00E+00	9.97E-02	1.53E-01
Co-60	0.00E+00	1.85E-01	2.88E-01
Ni-63	2.70E-01	1.37E+00	2.33E+00
Sr-90	4.13E-02	2.90E-02	5.70E-02
Nb-94	2.32E-02	1.21E-01	1.79E-01
Tc-99	1.49E+00	6.88E-01	1.13E+00
Ag-108m	3.17E-02	1.22E-01	1.39E-01
Sb-125	4.16E-01	4.52E-01	7.29E-01
Cs-134	0.00E+00	9.97E-02	3.59E-01
Cs-137	2.89E-03	1.48E-01	2.07E-01
Eu-152	0.00E+00	5.24E-01	3.08E-01
Eu-154	0.00E+00	4.60E-01	1.72E-01
Eu-155	2.44E-01	2.07E-01	3.25E-01
Np-237	2.94E-02	4.98E-02	8.80E-02
Pu-238	0.00E+00	3.23E-02	6.77E-02
Pu-239/240	0.00E+00	4.43E-02	9.58E-02
Pu-241	9.59E-01	3.72E+00	6.33E+00
Am-241	0.00E+00	4.60E-02	1.37E-01
Am-243	4.43E-02	5.81E-02	8.86E-02
Cm-243/244	3.47E-02	6.62E-02	1.22E-01

The reanalysis of concrete core B1-06214A-FSFC-001-CV for the full suite of radionuclides indicated no radionuclide concentrations greater than MDC, including Sr-90, consequently supporting the original contention that the Sr-90 result in the initial analysis was a “false positive.” As Sr-90 was not positively detected, a readjustment of the surrogate ratio is not necessary, and the use of the maximum ratios from LTP, Table 5-15 was appropriate.

For the samples submitted for full isotopic analysis, Tc-99 was initially identified as “positively detected” at concentrations greater than MDC. Upon consultation with the laboratory, false positives for Tc-99 can be caused by “noise equivalent” for the analytical technique and an absolute value that is less than the MDC is not appropriate for a beta liquid scintillation method when the MDC is $\pm 200\%$ of the value. With concurrence of the laboratory, the positively identified Tc-99 initially identified during the full isotopic analysis of samples from this survey unit was changed to a false positive.

8. QUALITY CONTROL

The implementation of required QC measures included the collection of two (2) additional ISOCS measurements in each of the Unit 1 East and West Steam Tunnel Valve Houses for “replicate measurement” analysis. The concentrations for Ni-63 and Sr-90 were inferred based on the maximum ratios as specified in LTP, Table 5-15. The replicate ISOCS measurement results are presented in Table 14 for Unit 1 East Valve House, and Table 15 for Unit 1 West Valve House.

Table 14 - Summary of ISOCS Replicate Measurements for QC Unit 1 East Valve House

Measurement ID	Co-60 (pCi/m ²)	Ni-63 ⁽¹⁾ (pCi/m ²)	Sr-90 ⁽¹⁾ (pCi/m ²)	Cs-134 (pCi/m ²)	Cs-137 (pCi/m ²)	OpSOF
B1-6213A-FQFC-002-GD	2.10E+03	3.79E+05	1.41E+04	0.00E+00	7.04E+06	4.149
B1-6213A-FQWC-020-GD	1.43E+04	2.58E+06	2.44E+02	5.45E+04	1.22E+05	0.129

(1) Concentrations are inferred

Table 15 - Summary of ISOCS Replicate Measurements for QC Unit 1 West Valve House

Measurement ID	Co-60 (pCi/m ²)	Ni-63 ⁽¹⁾ (pCi/m ²)	Sr-90 ⁽¹⁾ (pCi/m ²)	Cs-134 (pCi/m ²)	Cs-137 (pCi/m ²)	OpSOF
B1-6214A-FQWC-007-GD	3.41E+04	6.15E+06	5.70E+01	3.19E+03	2.85E+04	0.058
B1-6214A-FQWC-016-GD	1.04E+04	1.88E+06	4.26E+02	2.72E+04	2.13E+05	0.158

(1) Concentrations are inferred

The replicate measurement assessments are presented in Attachment 4. All replicate ISOCS measurements met the required acceptance criteria.

9. INVESTIGATION AND RESULTS

No measurements were taken for an investigation during the performance of FSS in this survey unit.

10. REMEDIATION AND RESULTS

No remediation was required prior to performance of FSS.

11. CHANGES FROM THE FINAL STATUS SURVEY PLAN

The survey design for this FSS was revised based on a change in classification. During the performance of the initial survey, FSS results indicated radiological concentrations in excess of 50% of the OpDCGL with several measurements exceeding an OpSOF of one. Consequently, the survey unit was reclassified as Class 1 and the survey design was revised accordingly.

In addition, there were changes to the ISOCS survey plans as noted. Those changes were required due to structural interferences restricting placement of the ISOCS detector that were not obvious when the FSS plan was first written. The changes in ISOCS measurement locations were made to ensure 100% areal coverage of the survey unit.

12. DATA QUALITY ASSESSMENT (DQA)

The DQO sample design and data were reviewed in accordance with ZionSolutions procedure ZS-LT-300-001-004, “Final Status Survey Data Assessment” (Reference 13), for completeness and consistency. Documentation was complete and legible. Surveys and the collection of measurements were consistent with the DQOs and were sufficient to ensure that the survey unit was properly designated as Class 1.

The preliminary data review consisted of calculating basic statistical quantities (e.g., mean, median, standard deviation). All data was considered valid and the values reported below the MDC, and values with uncertainties that exceeded two standard deviations.

All measurement results were individually reviewed and validated. The FOV for the number of measurements taken was sufficient to meet the requirement of 100% areal coverage of surfaces for a Class 1 survey unit. The instrumentation used to perform the FSS were in calibration, capable of detecting the activity with an adequate MDC and successfully response checked prior to and following use. An adequate number of replicate measurements were taken and the results meet the acceptance criteria as specified in the QAPP.

The analytical results for 49 of the 52 ISOCS measurements taken were less than an OpSOF of one. Three ISOCS measurements exceeded the OpDCGL but were less than the BcDCGLs.

13. ANOMALIES

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

14. CONCLUSION

ISOCS measurements indicated the OpSOF exceeded one for 2 of the 26 measurements taken in the Unit 1 East Valve House and one of the 26 measurements taken in the Unit 1 West Valve House. All results for both Valve Houses were below the BcDCGLs. The mean BcSOF for each ROC was less than their respective BcDCGLs. In addition, the measurements results in both Valve Houses passed the Sign Test. The mean BcSOF for survey unit 06213, adjusted for the dose from the two elevated measurements was 0.051, which equates to a dose of 1.285 mrem/year. The mean BcSOF for survey unit 06214, adjusted for the dose from the one elevated measurement was 0.033, which equates to a dose of 0.816 mrem/year.

Survey units 06213 and 06214 are 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”

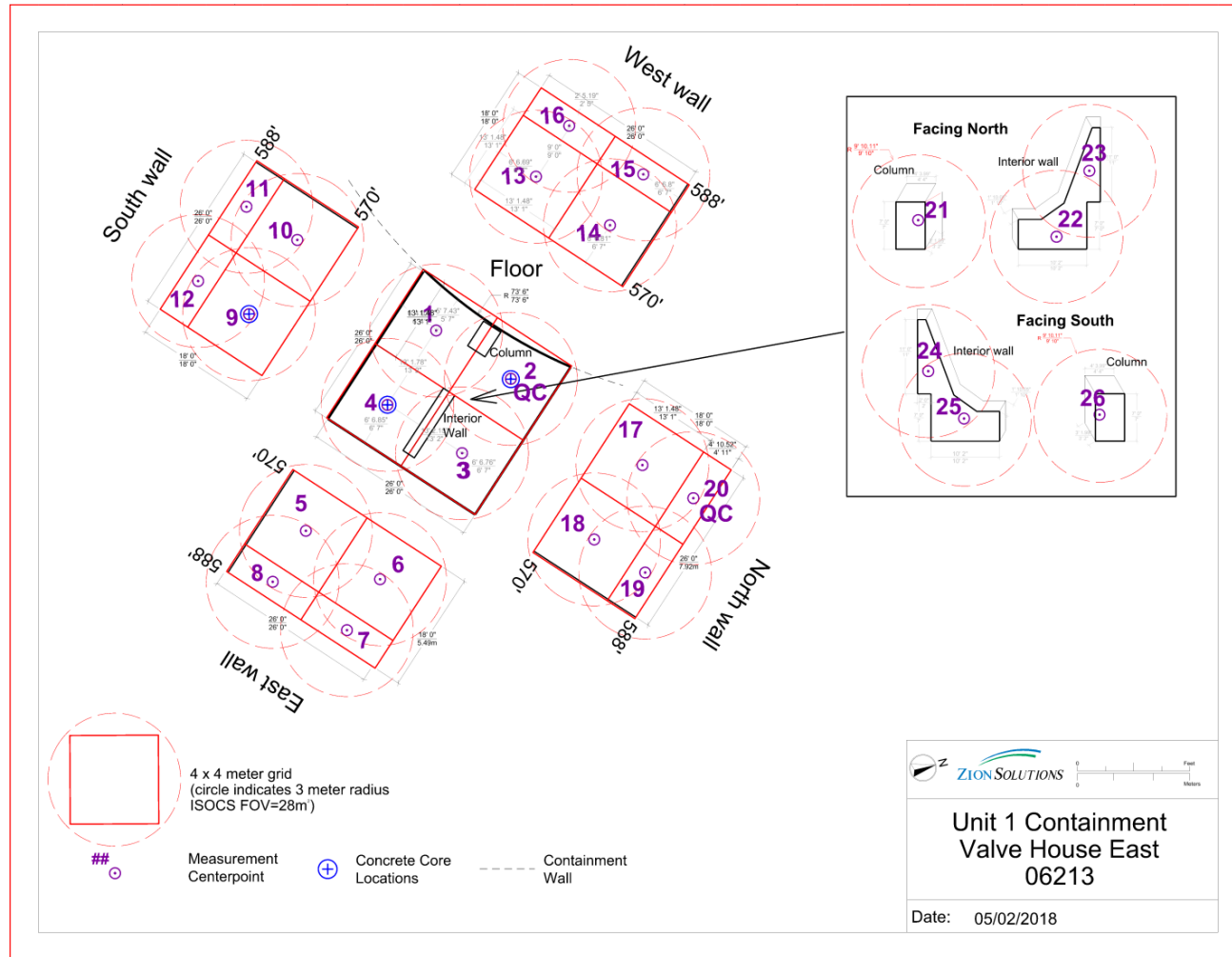
5. *ZionSolutions* TSD 17-004, “Operational Derived Concentration Guideline Levels for Final Status Survey”
6. *ZionSolutions* TSD 14-022, “Use of In-Situ Gamma Spectroscopy for Final Status Survey of End State Structures”
7. *ZionSolutions* procedure ZS-LT-300-001-002, “Survey Unit Classification”
8. “Zion Station Historical Site Assessment”
9. *ZionSolutions* TSD 11-001, “Technical Support Document for Potential Radionuclides of Concern During the Decommissioning of the Zion Station”
10. *ZionSolutions* TSD 14-014, “End State Surface Areas, Volumes, and Source Terms of Ancillary Buildings”
11. *ZionSolutions* TSD 14-019 , “*Radionuclides of Concern for Soil and Basement Fill Model Source Terms*”
12. *ZionSolutions* ZS-LT-01, “Quality Assurance Project Plan (for Characterization and FSS)”
13. *ZionSolutions* procedure ZS-LT-300-001-004, “Final Status Survey Data Assessment”

16. ATTACHMENTS

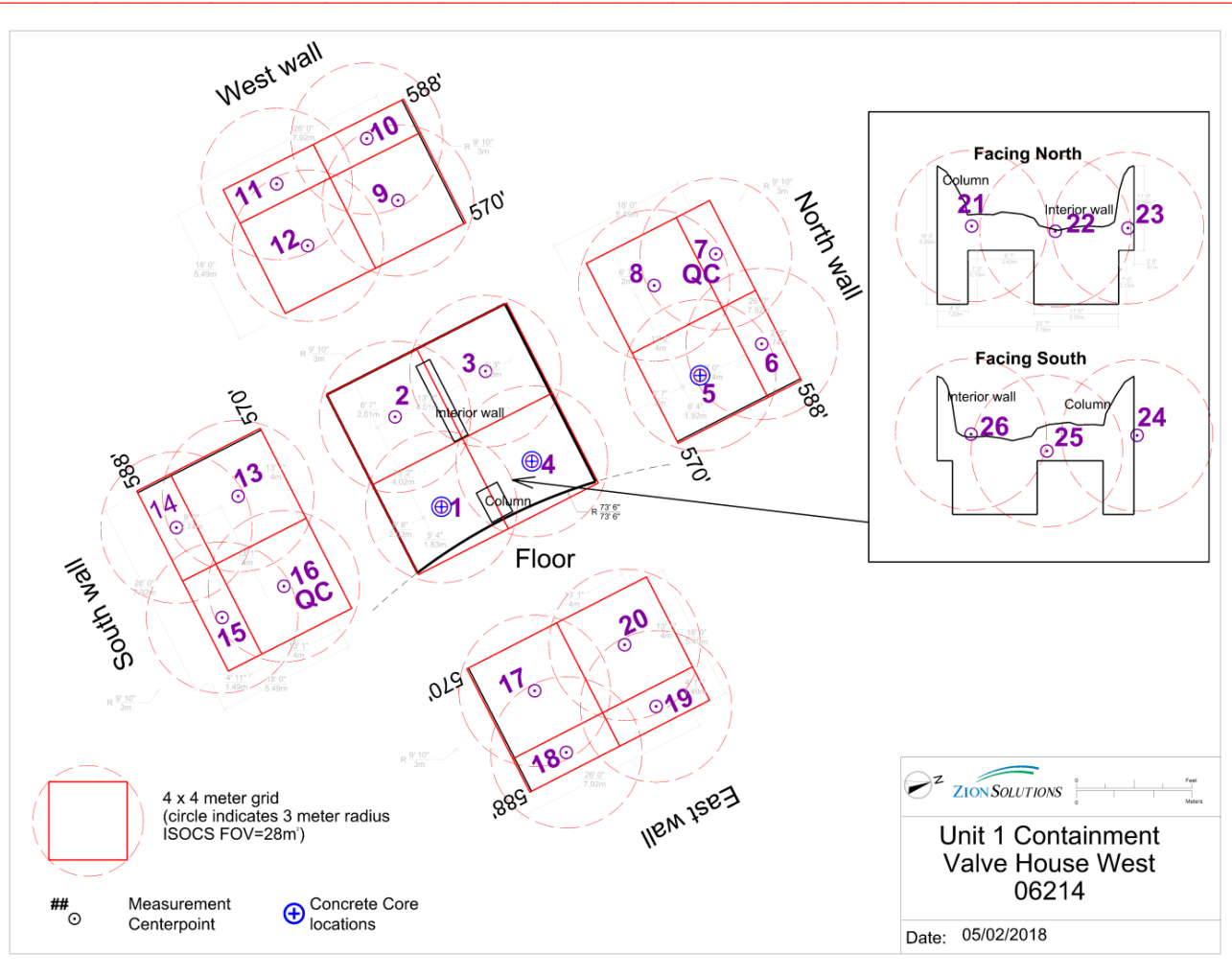
- Attachment 1 - Figures and Maps
- Attachment 2 - ISOCS Geometry
- Attachment 3 - Sign Test
- Attachment 4 - QC Measurement Assessments
- Attachment 5 - ISOCS Analytical Reports
- Attachment 6 - Eberline Reports

ATTACHMENT 1
FIGURES AND MAPS

FSS RELEASE RECORD – REV. 2
 UNIT 1 EAST & WEST STEAM TUNNEL VALVE HOUSES
 SURVEY UNITS 06213 & 06214



FSS RELEASE RECORD – REV. 2
 UNIT 1 EAST & WEST STEAM TUNNEL VALVE HOUSES
 SURVEY UNITS 06213 & 06214



ATTACHMENT 2

ISOCS GEOMETRY

Geometry Composer Report



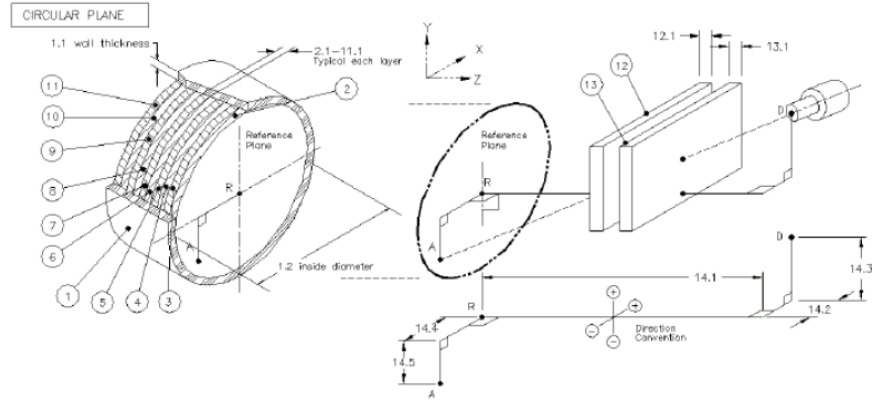
Date: Monday, August 06, 2018 - 07:17:39
Description: 3M90D_CP_2in
Comment: 3M90D_CP_2in
File Name: C:\GENIE2K\GENIE2K 6279\isocs\data\GEOMETRY\In-Situ\CIRCULAR_PLANE\3M90D_CP_2in.geo
Software: ISOCS
Template: CIRCULAR_PLANE, Version: (default)
Detector: 6279
Collimator: 50mm-90d new (newISOCS 50mm side 90deg collimation [large hole collimator])
Environment: Temperature = 22 °C, Pressure = 760 mm Hg, Relative Humidity = 30%
Integration: Convergence = 1.00%, MDRPN = 2⁴ (16), CRPN = 2⁴ (16)

Dimensions (m)

No.	Description	d.1	d.2	d.3	d.4	d.5	d.6	Material	Density	Rel. Conc.
1	Side Walls	0	6					none		
2	Layer 1	0.0508						concrete	2.3	1.00
3	Layer 2	0						<none>		
4	Layer 3	0						<none>		
5	Layer 4	0						<none>		
6	Layer 5	0						<none>		
7	Layer 6	0						<none>		
8	Layer 7	0						<none>		
9	Layer 8	0						<none>		
10	Layer 9	0						<none>		
11	Layer 10	0						<none>		
12	Absorber1									
13	Absorber2									
14	Source-Detector	3	0	0	0	0				

List of energies for efficiency curve generation

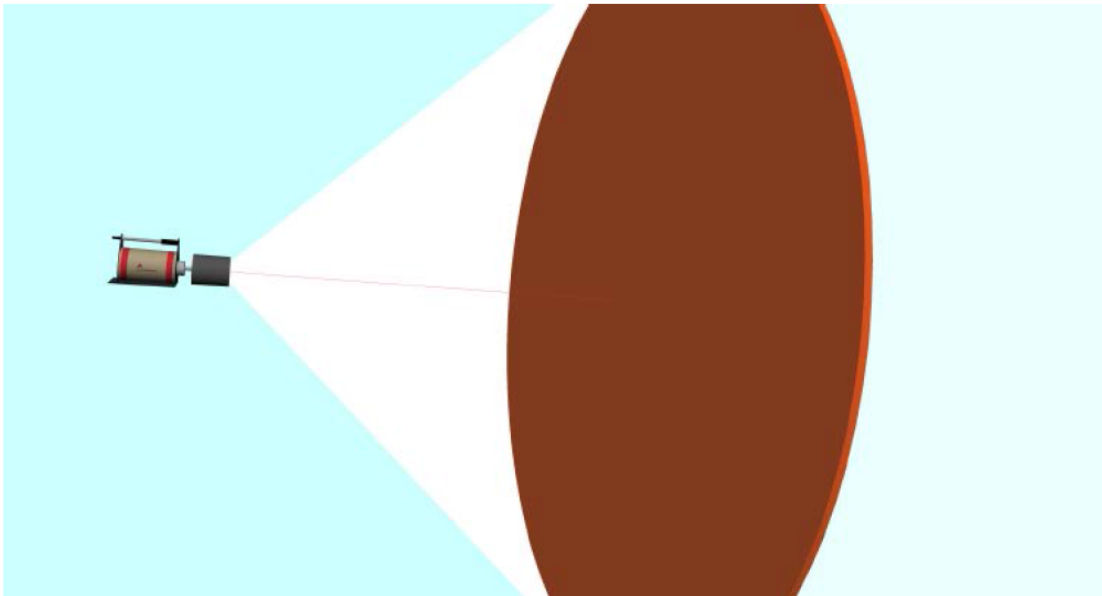
45.0 60.0 80.0 100.0 150.0 200.0 300.0 500.0
 700.0 1000.0 1400.0 2000.0



Geometry Composer Report



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Comment: 3M90D_CP_2in
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Software: ISOCS
Template: CIRCULAR_PLANE, Version: (default)



ISOCS/LABSOCS RESULTS

ISOCS/LabSOCS File: C:\GENIE2K\GENIE2K 6279\isocs\data\GEOMETRY\In-Situ\CIRCULAR_PLF
 ISOCS/LabSOCS Time: 02/01/18 15:39:20
 Template: CIRCULAR_PLANE
 Geom Description: 3M90D_CP_2IN
 Comment: ISOCS:3M90D_CP_2IN
 Detector: 6279
 Collimator: 50MM-90D_NEW
 Convergence: 1.00 %
 Area [Sq Meters]: 2.8274e+001 (C)
 Mass [Grams]: 3.3754e+006 (C)
 Length [Meters]: not used
 (C) = Value calculated by ISOCS
 (U) = Value modified by user

Energy	Efficiency	%Uncertainty	%Convergence	Final # of Voxels
45.00	1.14591e-006	15.0	-0.626085	16370
60.00	2.01464e-006	10.0	-0.484620	16370
80.00	2.83495e-006	10.0	-0.405412	16370
100.00	3.18353e-006	10.0	-0.385577	16370
150.00	3.29044e-006	10.0	-0.347269	16370
200.00	3.00483e-006	8.0	-0.314720	16370
300.00	2.44314e-006	8.0	-0.263555	16370
500.00	1.83624e-006	6.0	-0.207017	16370
700.00	1.54187e-006	6.0	-0.182104	16370
1000.00	1.29479e-006	4.0	-0.164646	16370
1400.00	1.09318e-006	4.0	-0.155201	16370
2000.00	8.73162e-007	4.0	-0.147414	16370



Geometry Composer Report

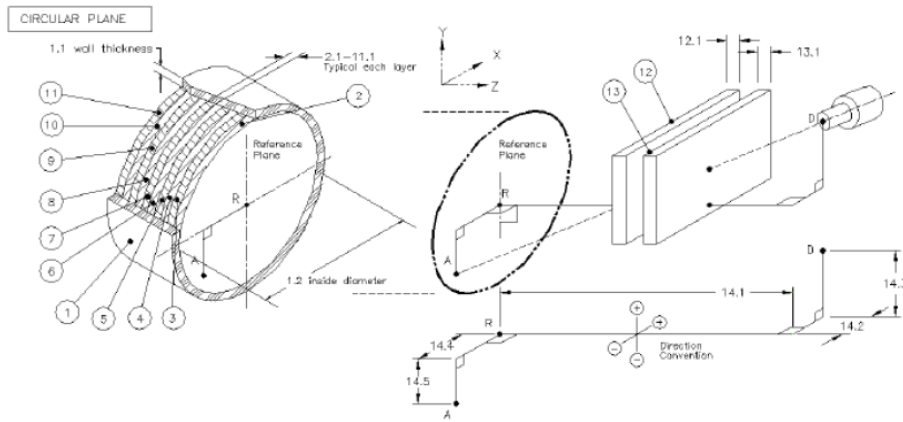
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Software: ISOCS
Template: CIRCULAR_PLANE, Version: (default)
Detector: 6279
Collimator: 50mm-90d new (newISOCS 50mm side 90deg collimation [large hole collimator])
Environment: Temperature = 22 °C, Pressure = 760 mm Hg, Relative Humidity = 30%
Integration: Convergence = 1.00%, MDRPN = 2⁴ (16), CRPN = 2⁴ (16)

Dimensions (m)

No.	Description	d.1	d.2	d.3	d.4	d.5	d.6	Material	Density	Rel. Conc.
1	Side Walls	0	5					none		
2	Layer 1	0.0508						concrete	2.3	1.00
3	Layer 2	0						<none>		
4	Layer 3	0						<none>		
5	Layer 4	0						<none>		
6	Layer 5	0						<none>		
7	Layer 6	0						<none>		
8	Layer 7	0						<none>		
9	Layer 8	0						<none>		
10	Layer 9	0						<none>		
11	Layer 10	0						<none>		
12	Absorber1									
13	Absorber2									
14	Source-Detector	2.5	0	0	0	0				

List of energies for efficiency curve generation

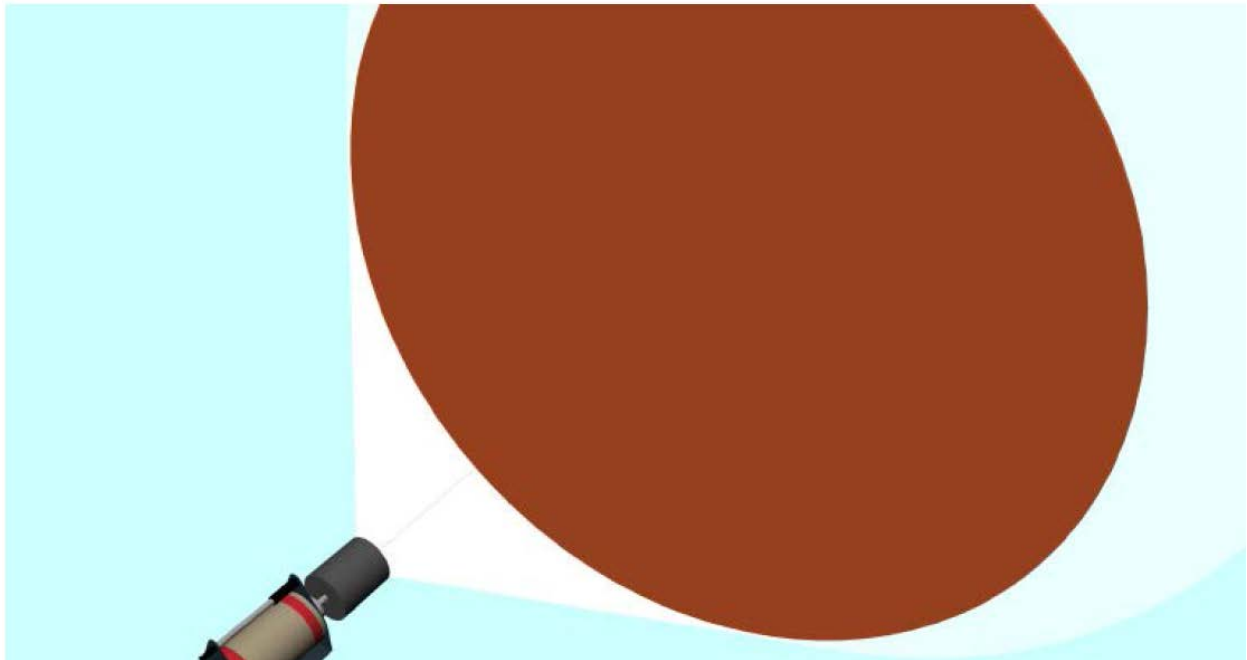
45.0 60.0 80.0 100.0 150.0 200.0 300.0 500.0
 700.0 1000.0 1400.0 2000.0



Geometry Composer Report



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Comment: 2.5M90D_CP_2in
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Software: ISOCS
Template: CIRCULAR_PLANE, Version: (default)



ATTACHMENT 3
SIGN TEST

Sign Test – Unit 1 East Main Steam Valve House

Survey Area 06000 Description Turbine Building
 Survey Unit 06213 Description Unit 1 East Main Steam Valve House
 Classification 1 Type I Error 0.05 # of Measurements 26

#	SOF (Ws)	1-Ws	Sign
1	0.946	0.054	+1
2	4.213	(3.213)	-1
3	0.971	0.029	+1
4	0.502	0.498	+1
5	0.044	0.956	+1
6	0.041	0.959	+1
7	0.114	0.886	+1
8	0.058	0.942	+1
9	0.123	0.877	+1
10	0.285	0.715	+1
11	0.083	0.917	+1
12	0.065	0.935	+1
13	0.121	0.879	+1
14	0.261	0.739	+1
15	0.075	0.925	+1
16	0.075	0.925	+1
17	1.515	(0.515)	-1
18	0.378	0.622	+1
19	0.098	0.902	+1
20	0.133	0.867	+1
21	0.590	0.410	+1
22	0.275	0.725	+1
23	0.261	0.739	+1
24	0.073	0.927	+1
25	0.120	0.880	+1
26	0.232	0.768	+1

Number of Positive Differences (S+) = 24

Critical Value = 17

Survey Unit Meets the Acceptance Criteria

Sign Test – Unit 1 West Main Steam Valve House

Survey Area 06000 Description Turbine Building
 Survey Unit 06214 Description Unit 1 West Main Steam Valve House
 Classification 1 Type I Error 0.05 # of Measurements 26

#	SOF (Ws)	1-Ws	Sign
1	0.444	0.556	+1
2	0.193	0.807	+1
3	0.586	0.414	+1
4	1.817	(0.817)	-1
5	0.843	0.157	+1
6	0.067	0.933	+1
7	0.079	0.921	+1
8	0.183	0.817	+1
9	0.092	0.908	+1
10	0.040	0.960	+1
11	0.036	0.964	+1
12	0.099	0.901	+1
13	0.060	0.940	+1
14	0.055	0.945	+1
15	0.041	0.959	+1
16	0.166	0.834	+1
17	0.096	0.904	+1
18	0.073	0.927	+1
19	0.118	0.882	+1
20	0.146	0.854	+1
21	0.131	0.869	+1
22	0.161	0.839	+1
23	0.082	0.918	+1
24	0.000	1.000	+1
25	0.362	0.638	+1
26	0.090	0.910	+1

Number of Positive Differences (S+) = 25

Critical Value = 17

Survey Unit Meets the Acceptance Criteria

ATTACHMENT 4
QC MEASUREMENT
ASSESSMENTS



Replicate Measurement Assessment

Survey Unit # 06000 Survey Unit Name Unit 1 East Main Steam Valve House
 Sample Plan # B1-06213A-F

Sample Description: Comparison of systematic and QC ISOCS measurements at location #02 and location #20. The standard measurements ID are B1-6213A-FSFC-002-GD and B1-6213A-FSWC-020-GD. The comparison measurements ID are B1-6213A-FQFC-002-GD and B1-6213A-FQWC-020-GD.

STANDARD					COMPARISON															
ROC	Activity Value	Standard Error	Resolution	Agreement Range	Activity Value	Standard Error	Comparison Ratio	Acceptable (Y/N)												
B1-6213A-FSFC-002-GD					B1-6213A-FQFC-002-GD															
Cs-137	7.06E+06	8.68E+05	8	0.6-1.66	7.04E+06	8.66E+05	1.0	Y												
B1-6213A-FSWC-020-GD					B1-6213A-FQWC-020-GD															
Cs-137	1.89E+05	4.15E+04	5	0.5-2.0	1.22E+05	3.05E+04	1.5	Y												
Comments/Corrective Actions: There was acceptable agreement between the standard measurement and the replicate measurement. Based on the professional judgment of the Radiological Engineer, the same conclusion was reached for each measurement. No further action is necessary.					Table is provided to show acceptance criteria used to assess split samples.															
					<table style="margin-left: auto; margin-right: auto;"> <thead> <tr> <th><u>Resolution</u></th> <th><u>Agreement Range</u></th> </tr> </thead> <tbody> <tr> <td>4 - 7</td> <td>0.5 - 2.0</td> </tr> <tr> <td>8 - 15</td> <td>0.6 - 1.66</td> </tr> <tr> <td>16 - 50</td> <td>0.75 - 1.33</td> </tr> <tr> <td>51 - 200</td> <td>0.80 - 1.25</td> </tr> <tr> <td>>200</td> <td>0.85 - 1.18</td> </tr> </tbody> </table>				<u>Resolution</u>	<u>Agreement Range</u>	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
<u>Resolution</u>	<u>Agreement Range</u>																			
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																			

Replicate Measurement Assessment

Survey Unit # 06000 Survey Unit Name Unit 1 West Main Steam Valve House
 Sample Plan # B1-06214A-F

Sample Description: Comparison of systematic and QC ISOCS measurements at location #07 and location #16. The standard measurements ID are B1-6214A-FSWC-007-GD and B1-6214AF-SWC-016-GD. The comparison measurements ID are B1-6214A-FQWC-007-GD and B1-6214A-FQWC-016-GD.

STANDARD					COMPARISON															
ROC	Activity Value	Standard Error	Resolution	Agreement Range	Activity Value	Standard Error	Comparison Ratio	Acceptable (Y/N)												
B1-6214A-FSWC-007-GD					B1-6214A-FQWC-007-GD															
Cs-137	2.86E+04	1.67E+04	2	0.4-2.5	2.85E+04	1.65E+04	1.0	Y												
B1-6214AF-SWC-016-GD					B1-6214A-FQWC-016-GD															
Cs-137	1.79E+05	3.84E+04	5	0.5-2.0	2.13E+05	4.28E+04	0.8	Y												
Comments/Corrective Actions: There was acceptable agreement between the standard measurement and the replicate measurement. Based on the professional judgment of the Radiological Engineer, the same conclusion was reached for each measurement. No further action is necessary.					Table is provided to show acceptance criteria used to assess split samples. <table style="margin-left: auto; margin-right: auto;"> <thead> <tr> <th><u>Resolution</u></th> <th><u>Agreement Range</u></th> </tr> </thead> <tbody> <tr> <td>4 - 7</td> <td>0.5 - 2.0</td> </tr> <tr> <td>8 - 15</td> <td>0.6 - 1.66</td> </tr> <tr> <td>16 - 50</td> <td>0.75 - 1.33</td> </tr> <tr> <td>51 - 200</td> <td>0.80 - 1.25</td> </tr> <tr> <td>>200</td> <td>0.85 - 1.18</td> </tr> </tbody> </table>				<u>Resolution</u>	<u>Agreement Range</u>	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
<u>Resolution</u>	<u>Agreement Range</u>																			
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 5
ISOCS ANALYTICAL REPORTS

***** G A M M A S P E C T R U M A N A L Y S I S *****

Filename: C:\GENIE2K\CAMFILES\00001048.CNF

Report Generated On : 5/3/2018 3:45:59 PM
Sample Title : B106213AFSFC001GD
Sample Description : U1 East Valve House Floor
Sample Identification :
Sample Type : Gamma Direct
Sample Geometry : 3M90D_CP_2IN

Peak Locate Threshold : 3.00
Peak Locate Range (in channels) : 85 - 8192
Peak Area Range (in channels) : 85 - 8192
Identification Energy Tolerance : 10.000 keV

Sample Size : 2.830E+001 M^2

Sample Taken On : 4/26/2018 9:09:00 AM
Acquisition Started : 4/26/2018 9:09:30 AM

Live Time : 600.0 seconds
Real Time : 600.6 seconds

Dead Time : 0.11 %

Energy Calibration Used Done On : 12/28/2017
Efficiency Calibration Used Done On : 2/1/2018
Efficiency ID : 3M90D_CP_2IN

Data Validated
5-4-18 0900
[Signature]

 ***** P E A K A N A L Y S I S R E P O R T *****

Detector Name: 6279

Sample Title: B106213AFSFC001GD

Peak Analysis Performed on: 5/3/2018 3:45:59 PM

Peak Analysis From Channel: 85

Peak Analysis To Channel: 8192

Peak No.	ROI start	ROI end	Peak centroid	Energy (keV)	FWHM (keV)	Net Peak Area	Net Area Uncert.	Continuum Counts
1	120-	157	128.72	32.10	0.74	3.03E+002	77.22	2.08E+002
2	286-	347	300.86	75.18	0.93	3.30E+002	201.50	1.10E+003
3	945-	962	953.14	238.41	0.47	1.99E+001	44.54	1.46E+002
4	1316-	1333	1324.74	331.37	0.39	2.94E+001	28.10	5.16E+001
5	1399-	1416	1407.36	352.04	0.45	2.54E+001	30.00	5.96E+001
6	2037-	2054	2045.24	511.58	0.80	2.67E+001	18.93	1.93E+001
7	2426-	2444	2435.54	609.18	1.21	5.20E+001	21.60	1.90E+001
8	2634-	2657	2645.51	661.67	1.52	1.28E+003	75.26	3.31E+001
9	3635-	3652	3643.43	911.10	0.28	2.30E+001	9.59	0.00E+000
10	5834-	5853	5843.71	1460.65	0.73	6.82E+001	18.41	4.75E+000
11	7050-	7069	7059.99	1764.19	0.50	1.20E+001	6.93	0.00E+000

M = First peak in a multiplet region

m = Other peak in a multiplet region

F = Fitted singlet

Errors quoted at 2.000 sigma

 ***** N U C L I D E I D E N T I F I C A T I O N R E P O R T *****

Sample Title: B106213AFSFC001GD
 Nuclide Library Used: C:\GENIE2K\CAMFILES\Zion Lib-BNL.NLB

IDENTIFIED NUCLIDES

Nuclide Name	Id Confidence	Energy (keV)	Yield (%)	Activity (pCi/M ²)	Activity Uncertainty
K-40	1.000	1460.82*	10.66	9.57406E+005	2.71287E+005
Cs-137	1.000	661.66*	85.10	1.51136E+006	2.02000E+005
Pb-212	1.000	238.63*	43.60	2.64518E+004	5.93439E+004
Bi-214	0.706	609.32*	45.49	1.09707E+005	4.74784E+004
		1120.29	14.92		
Pb-214	0.437	1764.49*	15.30	1.32107E+005	7.70027E+004
		295.22	18.42		
Ac-228	0.539	351.93*	35.60	5.08785E+004	6.05263E+004
		338.32*	11.27	1.79700E+005	1.74027E+005
		911.20*	25.80	1.04706E+005	4.48296E+004
		968.97	15.80		

* = Energy line found in the spectrum.

@ = Energy line not used for Weighted Mean Activity

Energy Tolerance : 10.000 keV

Nuclide confidence index threshold = 0.30

Errors quoted at 2.000 sigma

 ***** I N T E R F E R E N C E C O R R E C T E D R E P O R T *****

Nuclide Name	Nuclide Id Confidence	Wt mean Activity (pCi/M^2)	Wt mean Activity Uncertainty
K-40	1.000	9.574061E+005	2.712873E+005
Cs-137	1.000	1.511362E+006	2.019996E+005
Pb-212	1.000	2.645176E+004	5.934392E+004
Bi-214	0.706	1.158774E+005	4.041380E+004
Pb-214	0.437	5.087850E+004	6.052627E+004
Ac-228	0.539	1.093724E+005	4.341235E+004

? = 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 2.000 sigma

***** U N I D E N T I F I E D P E A K S *****

Peak Locate Performed on: 5/3/2018 3:45:59 PM
Peak Locate From Channel: 85
Peak Locate To Channel: 8192

Peak No.	Energy (keV)	Peak Size in Counts per Second	Peak CPS % Uncertainty	Peak Type	Tol. Nuclide
1	32.10	5.0485E-001	25.49		
2	75.18	5.5071E-001	60.98		
6	511.58	4.4520E-002	70.86		

M = First peak in a multiplet region

m = Other peak in a multiplet region

F = Fitted singlet

Errors quoted at 2.000 sigma

 ***** N U C L I D E M D A R E P O R T *****

Detector Name: 6279
 Sample Geometry: 3M90D_CP_2IN
 Sample Title: B106213AFSFC001GD
 Nuclide Library Used: C:\GENIE2K\CAMFILES\Zion Lib-BNL.NLB

	Nuclide Name	Energy (keV)	Yield (%)	Line MDA (pCi/M ²)	Nuclide MDA (pCi/M ²)	Activity (pCi/M ²)	Dec. Level (pCi/M ²)
+	K-40	1460.82*	10.66	2.252E+005	2.25E+005	9.574E+005	9.364E+004
	Co-60	1173.23	99.85	3.704E+004	3.11E+004	-5.624E+003	1.671E+004
		1332.49	99.98	3.110E+004		2.415E+004	1.363E+004
	Nb-94	702.65	99.81	3.405E+004	3.40E+004	1.158E+004	1.562E+004
		871.09	99.89	3.610E+004		2.110E+004	1.650E+004
	Ag-108m	433.90	90.50	6.814E+004	4.19E+004	-1.916E+004	3.287E+004
		614.30	89.80	5.811E+004		5.371E+002	2.760E+004
		722.90	90.80	4.188E+004		-2.373E+004	1.938E+004
	Cs-134	604.72	97.62	5.343E+004	3.84E+004	3.879E+004	2.539E+004
		795.86	85.46	3.838E+004		-5.094E+004	1.745E+004
+	Cs-137	661.66*	85.10	4.789E+004	4.79E+004	1.511E+006	2.235E+004
	Eu-152	121.78	28.67	2.538E+005	1.52E+005	-2.640E+004	1.246E+005
		344.28	26.60	2.182E+005		9.562E+004	1.055E+005
		1408.01	21.07	1.518E+005		-3.345E+004	6.652E+004
	Eu-154	123.07	40.40	1.809E+005	1.04E+005	5.743E+004	8.880E+004
		723.30	20.06	1.929E+005		5.665E+003	8.940E+004
		1274.43	34.80	1.036E+005		4.957E+004	4.642E+004
	Eu-155	86.55	30.70	3.026E+005	3.03E+005	1.382E+005	1.489E+005
		105.31	21.10	3.663E+005		3.229E+005	1.800E+005
	Tl-208	583.19	85.00	5.148E+004	5.15E+004	8.837E+003	2.424E+004
	Bi-212	727.33	6.67	5.615E+005	5.62E+005	6.440E+005	2.594E+005
+	Pb-212	238.63*	43.60	9.899E+004	9.90E+004	2.645E+004	4.770E+004
+	Bi-214	609.32*	45.49	6.159E+004	2.98E+004	1.097E+005	2.794E+004
		1120.29	14.92	2.898E+005		1.683E+005	1.331E+005
		1764.49*	15.30	2.979E+004		1.321E+005	0.000E+000
+	Pb-214	295.22	18.42	3.188E+005	9.84E+004	2.521E+005	1.546E+005
		351.93*	35.60	9.844E+004		5.088E+004	4.651E+004
	Ra-226	186.21	3.64	1.749E+006	1.75E+006	1.868E+006	8.555E+005
+	Ac-228	338.32*	11.27	2.771E+005	1.23E+004	1.797E+005	1.303E+005
		911.20*	25.80	1.232E+004		1.047E+005	0.000E+000
		968.97	15.80	2.286E+005		-6.512E+004	1.039E+005
	Am-241	59.54	35.90	3.169E+005	3.17E+005	-4.538E+004	1.554E+005

+ = Nuclide identified during the nuclide identification
 * = Energy line found in the spectrum
 > = Calculated MDA is zero due to zero counts in the region, or the region is outside the spectrum, or MDA has not been calculated
 @ = Half-life too short to be able to perform the decay correction

Filename: C:\GENIE2K\CAMFILES\00001044.CNF

Report Generated On : 5/3/2018 3:43:09 PM

Sample Title : B106213AFSFC002GD
Sample Description : U1 East Valve House Floor
Sample Identification :
Sample Type : Gamma Direct
Sample Geometry : 3M90D_CP_2IN

Peak Locate Threshold : 3.00
Peak Locate Range (in channels) : 85 - 8192
Peak Area Range (in channels) : 85 - 8192
Identification Energy Tolerance : 10.000 keV


Sample Size : 2.830E+001 M²

Sample Taken On : 4/26/2018 8:13:00 AM
Acquisition Started : 4/26/2018 8:13:19 AM

Live Time : 600.0 seconds
Real Time : 601.6 seconds

Dead Time : 0.27 %

Energy Calibration Used Done On : 12/28/2017
Efficiency Calibration Used Done On : 2/1/2018
Efficiency ID : 3M90D_CP_2IN

Data Validated
5-4-18 0905


 ***** P E A K A N A L Y S I S R E P O R T *****

Detector Name: 6279
 Sample Title: B106213AFSFC002GD
 Peak Analysis Performed on: 5/3/2018 3:43:08 PM
 Peak Analysis From Channel: 85
 Peak Analysis To Channel: 8192

Peak No.	ROI start	ROI end	Peak centroid	Energy (keV)	FWHM (keV)	Net Peak Area	Net Area Uncert.	Continuum Counts
1	80-	155	128.78	32.11	1.05	1.25E+003	252.72	1.37E+003
2	282-	355	300.21	75.02	1.07	1.20E+003	324.64	2.45E+003
3	1397-	1416	1406.49	351.82	1.77	4.26E+001	55.81	2.08E+002
4	2426-	2443	2434.80	608.99	1.18	3.35E+001	23.33	3.15E+001
5	2629-	2658	2643.42	661.15	1.46	5.99E+003	157.50	4.44E+001
6	3632-	3649	3640.64	910.40	0.33	1.16E+001	8.96	2.38E+000
7	4465-	4484	4474.50	1118.73	0.26	6.62E+000	13.55	1.04E+001
8	5830-	5849	5839.77	1459.66	1.31	7.60E+001	17.44	0.00E+000

M = First peak in a multiplet region
 m = Other peak in a multiplet region
 F = Fitted singlet

Errors quoted at 2.000 sigma

 ***** N U C L I D E I D E N T I F I C A T I O N R E P O R T *****

Sample Title: B106213AFSFC002GD
 Nuclide Library Used: C:\GENIE2K\CAMFILES\Zion Lib-BNL.NLB

IDENTIFIED NUCLIDES

Nuclide Name	Id Confidence	Energy (keV)	Yield (%)	Activity (pCi/M ²)	Activity Uncertainty
K-40	0.998	1460.82*	10.66	1.06572E+006	2.61422E+005
Cs-137	1.000	661.66*	85.10	7.05701E+006	8.67549E+005
Bi-214	0.735	609.32*	45.49	7.07182E+004	4.99715E+004
		1120.29*	14.92	5.76909E+004	1.18241E+005
		1764.49	15.30		
Pb-214	0.437	295.22	18.42		
		351.93*	35.60	8.51389E+004	1.12370E+005

* = Energy line found in the spectrum.
 @ = Energy line not used for Weighted Mean Activity
 Energy Tolerance : 10.000 keV
 Nuclide confidence index threshold = 0.30
 Errors quoted at 2.000 sigma

 ***** I N T E R F E R E N C E C O R R E C T E D R E P O R T *****

Nuclide Name	Nuclide Id Confidence	Wt mean Activity (pCi/M^2)	Wt mean Activity Uncertainty
K-40	0.998	1.065723E+006	2.614219E+005
Cs-137	1.000	7.057013E+006	8.675494E+005
Bi-214	0.735	6.874401E+004	4.602957E+004
Pb-214	0.437	8.513886E+004	1.123696E+005

? = 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 2.000 sigma

***** U N I D E N T I F I E D P E A K S *****

Peak Locate Performed on: 5/3/2018 3:43:08 PM
 Peak Locate From Channel: 85
 Peak Locate To Channel: 8192

Peak No.	Energy (keV)	Peak Size in Counts per Second	Peak CPS % Uncertainty	Peak Type	Tol. Nuclide
1	32.11	2.0753E+000	20.30		
2	75.02	1.9955E+000	27.11		
6	910.40	1.9375E-002	77.11	Tol.	Ac-228

M = First peak in a multiplet region
 m = Other peak in a multiplet region
 F = Fitted singlet

Errors quoted at 2.000 sigma

 ***** N U C L I D E M D A R E P O R T *****

Detector Name: 6279
 Sample Geometry: 3M90D_CP_2IN
 Sample Title: B1062I3AFSFC002GD
 Nuclide Library Used: C:\GENIE2K\CAMFILES\Zion Lib-BNL.NLB

	Nuclide Name	Energy (keV)	Yield (%)	Line MDA (pCi/M ²)	Nuclide MDA (pCi/M ²)	Activity (pCi/M ²)	Dec. Level (pCi/M ²)
+	K-40	1460.82*	10.66	3.795E+004	3.79E+004	1.066E+006	0.000E+000
	Co-60	1173.23	99.85	4.086E+004	2.47E+004	3.752E+003	1.862E+004
		1332.49	99.98	2.474E+004		-2.699E+003	1.045E+004
	Nb-94	702.65	99.81	3.050E+004	3.05E+004	-7.638E+003	1.385E+004
		871.09	99.89	3.567E+004		3.136E+004	1.628E+004
	Ag-108m	433.90	90.50	1.275E+005	3.92E+004	6.528E+004	6.257E+004
		614.30	89.80	6.940E+004		5.962E+004	3.325E+004
		722.90	90.80	3.917E+004		4.079E+004	1.802E+004
	Cs-134	604.72	97.62	6.551E+004	4.04E+004	6.714E+004	3.143E+004
		795.86	85.46	4.037E+004		-4.502E+003	1.845E+004
+	Cs-137	661.66*	85.10	5.919E+004	5.92E+004	7.057E+006	2.800E+004
	Eu-152	121.78	28.67	4.008E+005	1.35E+005	-9.152E+004	1.981E+005
		344.28	26.60	3.675E+005		-3.632E+004	1.801E+005
		1408.01	21.07	1.351E+005		2.041E+004	5.817E+004
	Eu-154	123.07	40.40	2.848E+005	8.51E+004	1.009E+005	1.407E+005
		723.30	20.06	1.792E+005		3.206E+004	8.251E+004
		1274.43	34.80	8.507E+004		1.995E+004	3.714E+004
	Eu-155	86.55	30.70	4.489E+005	4.49E+005	-3.307E+004	2.221E+005
		105.31	21.10	5.602E+005		-5.815E+005	2.769E+005
	Tl-208	583.19	85.00	7.039E+004	7.04E+004	3.342E+004	3.370E+004
	Bi-212	727.33	6.67	5.238E+005	5.24E+005	2.365E+004	2.406E+005
	Pb-212	238.63	43.60	2.475E+005	2.48E+005	-2.051E+005	1.220E+005
+	Bi-214	609.32*	45.49	7.604E+004	7.60E+004	7.072E+004	3.516E+004
		1120.29*	14.92	2.034E+005		5.769E+004	8.990E+004
		1764.49	15.30	2.215E+005		1.541E+005	9.584E+004
+	Pb-214	295.22	18.42	5.349E+005	1.84E+005	6.230E+003	2.627E+005
		351.93*	35.60	1.840E+005		8.514E+004	8.928E+004
	Ra-226	186.21	3.64	2.989E+006	2.99E+006	3.946E+005	1.475E+006
	Ac-228	338.32	11.27	8.544E+005	1.38E+005	-9.910E+004	4.188E+005
		911.20	25.80	1.376E+005		-1.883E+004	6.266E+004
		968.97	15.80	2.060E+005		1.393E+005	9.261E+004
	Am-241	59.54	35.90	4.545E+005	4.54E+005	-2.090E+004	2.242E+005

+ = Nuclide identified during the nuclide identification

* = Energy line found in the spectrum

> = Calculated MDA is zero due to zero counts in the region, or the region is outside the spectrum, or MDA has not been calculated

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

Filename: C:\GENIE2K\CAMFILES\00001046.CNF

Report Generated On : 5/3/2018 3:41:42 PM

Sample Title : B106213AFSFC003GD
Sample Description : U1 East Valve House Floor
Sample Identification :
Sample Type : Gamma Direct
Sample Geometry : 3M90D_CP_2IN

Peak Locate Threshold : 3.00
Peak Locate Range (in channels) : 85 - 8192
Peak Area Range (in channels) : 85 - 8192
Identification Energy Tolerance : 10.000 keV


Sample Size : 2.830E+001 M^2

Sample Taken On : 4/26/2018 8:37:00 AM
Acquisition Started : 4/26/2018 8:37:19 AM

Live Time : 600.0 seconds
Real Time : 600.8 seconds

Dead Time : 0.13 %

Energy Calibration Used Done On : 12/28/2017
Efficiency Calibration Used Done On : 2/1/2018
Efficiency ID : 3M90D_CP_2IN

Data Validated
5-~~3~~-4-18 0910


 ***** P E A K A N A L Y S I S R E P O R T *****

Detector Name: 6279
 Sample Title: B106213AFSFC003GD
 Peak Analysis Performed on: 5/3/2018 3:41:41 PM
 Peak Analysis From Channel: 85
 Peak Analysis To Channel: 8192

Peak No.	ROI start	ROI end	Peak centroid	Energy (keV)	FWHM (keV)	Net Peak Area	Net Area Uncert.	Continuum Counts
1	117-	156	128.48	32.04	0.98	3.61E+002	97.00	3.26E+002
2	279-	347	298.16	74.51	0.90	4.10E+002	250.19	1.54E+003
3	945-	962	953.07	238.39	0.43	4.85E+001	43.97	1.31E+002
4	1398-	1415	1406.76	351.89	0.62	2.90E+001	31.48	6.70E+001
5	2426-	2443	2434.86	609.01	0.49	4.99E+001	17.88	9.07E+000
6	2632-	2657	2644.61	661.44	1.37	1.34E+003	75.56	2.00E+001
7	5831-	5852	5841.67	1460.14	1.73	8.18E+001	21.20	8.18E+000
8	7047-	7066	7056.85	1763.41	0.50	1.60E+001	8.00	0.00E+000

M = First peak in a multiplet region
 m = Other peak in a multiplet region
 F = Fitted singlet

Errors quoted at 2.000 sigma

 ***** N U C L I D E I D E N T I F I C A T I O N R E P O R T *****

Sample Title: B106213AFSFC003GD
 Nuclide Library Used: C:\GENIE2K\CAMFILES\Zion Lib-BNL.NLB

IDENTIFIED NUCLIDES

Nuclide Name	Id Confidence	Energy (keV)	Yield (%)	Activity (pCi/M ²)	Activity Uncertainty
K-40	0.999	1460.82*	10.66	1.14764E+006	3.13633E+005
Cs-137	1.000	661.66*	85.10	1.57833E+006	2.09400E+005
Pb-212	1.000	238.63*	43.60	6.44709E+004	5.93461E+004
Bi-214	0.706	609.32*	45.49	1.05408E+005	3.98213E+004
		1120.29	14.92		
		1764.49*	15.30	1.76094E+005	8.91695E+004
Pb-214	0.437	295.22	18.42		
		351.93*	35.60	5.79803E+004	6.35761E+004

* = Energy line found in the spectrum.
 @ = Energy line not used for Weighted Mean Activity
 Energy Tolerance : 10.000 keV
 Nuclide confidence index threshold = 0.30
 Errors quoted at 2.000 sigma

 ***** INTERFERENCE CORRECTED REPORT *****

Nuclide Name	Nuclide Id Confidence	Wt mean Activity (pCi/M ²)	Wt mean Activity Uncertainty
K-40	0.999	1.147641E+006	3.136333E+005
Cs-137	1.000	1.578329E+006	2.093996E+005
Pb-212	1.000	6.447090E+004	5.934611E+004
Bi-214	0.706	1.171611E+005	3.636032E+004
Pb-214	0.437	5.798030E+004	6.357606E+004

? = 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 2.000 sigma

***** UNIDENTIFIED PEAKS *****

Peak Locate Performed on: 5/3/2018 3:41:41 PM
 Peak Locate From Channel: 85
 Peak Locate To Channel: 8192

Peak No.	Energy (keV)	Peak Size in Counts per Second	Peak CPS % Uncertainty	Peak Type	Tol. Nuclide
1	32.04	6.0215E-001	26.85		
2	74.51	6.8362E-001	61.00		

M = First peak in a multiplet region
 m = Other peak in a multiplet region
 F = Fitted singlet

Errors quoted at 2.000 sigma

 ***** N U C L I D E M D A R E P O R T *****

Detector Name: 6279
 Sample Geometry: 3M90D_CP_2IN
 Sample Title: B1062I3AFSFC003GD
 Nuclide Library Used: C:\GENIE2K\CAMFILES\Zion Lib-BNL.NLB

	Nuclide Name	Energy (keV)	Yield (%)	Line MDA (pCi/M^2)	Nuclide MDA (pCi/M^2)	Activity (pCi/M^2)	Dec. Level (pCi/M^2)
+	K-40	1460.82*	10.66	2.931E+005	2.93E+005	1.148E+006	1.276E+005
	Co-60	1173.23	99.85	4.287E+004	2.86E+004	1.080E+004	1.963E+004
		1332.49	99.98	2.857E+004		1.989E+004	1.236E+004
	Nb-94	702.65	99.81	3.723E+004	3.52E+004	-2.270E+004	1.721E+004
		871.09	99.89	3.522E+004		6.582E+003	1.606E+004
	Ag-108m	433.90	90.50	7.569E+004	4.61E+004	-2.726E+004	3.665E+004
		614.30	89.80	5.485E+004		1.203E+004	2.597E+004
		722.90	90.80	4.612E+004		1.420E+004	2.150E+004
	Cs-134	604.72	97.62	5.364E+004	3.89E+004	2.328E+004	2.549E+004
		795.86	85.46	3.889E+004		-9.124E+003	1.770E+004
+	Cs-137	661.66*	85.10	3.940E+004	3.94E+004	1.578E+006	1.811E+004
	Eu-152	121.78	28.67	2.917E+005	1.40E+005	3.842E+005	1.435E+005
		344.28	26.60	2.420E+005		2.863E+004	1.174E+005
		1408.01	21.07	1.395E+005		1.982E+004	6.037E+004
	Eu-154	123.07	40.40	2.039E+005	1.07E+005	-9.404E+004	1.003E+005
		723.30	20.06	2.073E+005		3.922E+003	9.656E+004
		1274.43	34.80	1.073E+005		1.078E+005	4.824E+004
	Eu-155	86.55	30.70	3.410E+005	3.41E+005	1.106E+005	1.681E+005
		105.31	21.10	4.123E+005		-1.500E+005	2.030E+005
	Tl-208	583.19	85.00	5.515E+004	5.52E+004	-3.185E+004	2.608E+004
	Bi-212	727.33	6.67	6.342E+005	6.34E+005	2.060E+005	2.958E+005
+	Pb-212	238.63*	43.60	9.475E+004	9.48E+004	6.447E+004	4.558E+004
+	Bi-214	609.32*	45.49	4.377E+004	2.98E+004	1.054E+005	1.903E+004
		1120.29	14.92	2.835E+005		-2.181E+004	1.300E+005
		1764.49*	15.30	2.978E+004		1.761E+005	0.000E+000
+	Pb-214	295.22	18.42	3.511E+005	1.03E+005	6.420E+004	1.708E+005
		351.93*	35.60	1.028E+005		5.798E+004	4.868E+004
	Ra-226	186.21	3.64	1.970E+006	1.97E+006	-8.782E+005	9.656E+005
	Ac-228	338.32	11.27	5.369E+005	1.68E+005	1.179E+005	2.601E+005
		911.20	25.80	1.680E+005		1.514E+005	7.783E+004
		968.97	15.80	2.376E+005		1.946E+005	1.084E+005
	Am-241	59.54	35.90	3.459E+005	3.46E+005	4.297E+005	1.699E+005

+ = Nuclide identified during the nuclide identification
 * = Energy line found in the spectrum
 > = Calculated MDA is zero due to zero counts in the region, or the region is outside the spectrum, or MDA has not been calculated
 @ = Half-life too short to be able to perform the decay correction

Filename: C:\GENIE2K\CAMFILES\00001047.CNF

Report Generated On : 5/3/2018 3:44:32 PM

Sample Title : B106213AFSFC004GD
Sample Description : U1 East Valve House Floor
Sample Identification :
Sample Type : Gamma Direct
Sample Geometry : 3M90D_CP_2IN

Peak Locate Threshold : 3.00
Peak Locate Range (in channels) : 85 - 8192
Peak Area Range (in channels) : 85 - 8192
Identification Energy Tolerance : 10.000 keV

Sample Size : 2.830E+001 M^2

Sample Taken On : 4/26/2018 8:53:00 AM
Acquisition Started : 4/26/2018 8:53:35 AM

Live Time : 600.0 seconds
Real Time : 600.6 seconds

Dead Time : 0.09 %

Energy Calibration Used Done On : 12/28/2017
Efficiency Calibration Used Done On : 2/1/2018
Efficiency ID : 3M90D_CP_2IN

*Data Validated
5-4-18 0915*



 ***** P E A K A N A L Y S I S R E P O R T *****

Detector Name: 6279

Sample Title: B106213AFSFC004GD

Peak Analysis Performed on: 5/3/2018 3:44:32 PM

Peak Analysis From Channel: 85

Peak Analysis To Channel: 8192

Peak No.	ROI start	ROI end	Peak centroid	Energy (keV)	FWHM (keV)	Net Peak Area	Net Area Uncert.	Continuum Counts
1	120-	154	128.38	32.01	0.62	1.14E+002	70.51	2.04E+002
2	284-	347	297.76	74.41	1.07	1.77E+002	214.24	1.22E+003
3	418-	433	425.35	106.34	0.39	3.56E+001	47.89	1.78E+002
4	947-	965	955.08	238.89	0.38	3.28E+001	39.24	1.04E+002
5	1170-	1187	1178.51	294.79	0.32	2.80E+001	29.91	6.00E+001
6	1397-	1418	1407.11	351.98	0.29	6.32E+001	30.46	4.28E+001
7	2033-	2050	2041.91	510.75	0.32	3.65E+001	19.31	1.75E+001
8	2323-	2340	2331.86	583.25	0.78	1.65E+001	15.55	1.35E+001
9	2427-	2444	2435.79	609.24	1.07	6.80E+001	19.73	9.00E+000
10	2633-	2657	2645.35	661.63	1.52	6.41E+002	54.20	2.22E+001
11	5835-	5854	5844.09	1460.74	1.83	7.13E+001	18.69	4.66E+000

M = First peak in a multiplet region

m = Other peak in a multiplet region

F = Fitted singlet

Errors quoted at 2.000 sigma

 ***** N U C L I D E I D E N T I F I C A T I O N R E P O R T *****

Sample Title: B106213AFSFC004GD
 Nuclide Library Used: C:\GENIE2K\CAMFILES\Zion Lib-BNL.NLB

IDENTIFIED NUCLIDES

Nuclide Name	Id Confidence	Energy (keV)	Yield (%)	Activity (pCi/M ²)	Activity Uncertainty
K-40	1.000	1460.82*	10.66	1.00078E+006	2.76174E+005
Cs-137	1.000	661.66*	85.10	7.54876E+005	1.10883E+005
Tl-208	1.000	583.19*	85.00	1.82275E+004	1.73137E+004
Pb-212	1.000	238.63*	43.60	4.35688E+004	5.26718E+004
Bi-214	0.442	609.32*	45.49	1.43578E+005	4.50884E+004
		1120.29	14.92		
		1764.49	15.30		
Pb-214	1.000	295.22*	18.42	9.80024E+004	1.06025E+005
		351.93*	35.60	1.26405E+005	6.38287E+004

* = Energy line found in the spectrum.
 @ = Energy line not used for Weighted Mean Activity
 Energy Tolerance : 10.000 keV
 Nuclide confidence index threshold = 0.30
 Errors quoted at 2.000 sigma

 ***** I N T E R F E R E N C E C O R R E C T E D R E P O R T *****

Nuclide Name	Nuclide Id Confidence	Wt mean Activity (pCi/M^2)	Wt mean Activity Uncertainty
K-40	1.000	1.000780E+006	2.761740E+005
Cs-137	1.000	7.548760E+005	1.108828E+005
Tl-208	1.000	1.822755E+004	1.731371E+004
Pb-212	1.000	4.356879E+004	5.267182E+004
Bi-214	0.442	1.435776E+005	4.508840E+004
Pb-214	1.000	1.188496E+005	5.468402E+004

? = 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 2.000 sigma

***** UNIDENTIFIED PEAKS *****

Peak Locate Performed on: 5/3/2018 3:44:32 PM
Peak Locate From Channel: 85
Peak Locate To Channel: 8192

Peak No.	Energy (keV)	Peak Size in Counts per Second	Peak CPS % Uncertainty	Peak Type	Tol. Nuclide
1	32.01	1.8919E-001	62.12		
2	74.41	2.9517E-001	120.97		
3	106.34	5.9346E-002	134.49		
7	510.75	6.0833E-002	52.92		

M = First peak in a multiplet region
m = Other peak in a multiplet region
F = Fitted singlet

Errors quoted at 2.000 sigma

 ***** N U C L I D E M D A R E P O R T *****

Detector Name: 6279
 Sample Geometry: 3M90D_CP_2IN
 Sample Title: B106213AFSFC004GD
 Nuclide Library Used: C:\GENIE2K\CAMFILES\Zion Lib-BNL.NLB

	Nuclide Name	Energy (keV)	Yield (%)	Line MDA (pCi/M^2)	Nuclide MDA (pCi/M^2)	Activity (pCi/M^2)	Dec. Level (pCi/M^2)
+	K-40	1460.82*	10.66	2.223E+005	2.22E+005	1.001E+006	9.218E+004
	Co-60	1173.23	99.85	3.137E+004	3.14E+004	1.132E+004	1.388E+004
		1332.49	99.98	3.689E+004		1.982E+004	1.652E+004
	Nb-94	702.65	99.81	3.291E+004	3.29E+004	-1.322E+004	1.505E+004
		871.09	99.89	4.170E+004		2.352E+004	1.930E+004
	Ag-108m	433.90	90.50	5.414E+004	4.37E+004	1.372E+002	2.587E+004
		614.30	89.80	6.011E+004		9.692E+004	2.860E+004
		722.90	90.80	4.370E+004		-1.822E+004	2.029E+004
	Cs-134	604.72	97.62	5.505E+004	4.23E+004	4.661E+004	2.620E+004
		795.86	85.46	4.227E+004		1.311E+004	1.939E+004
+	Cs-137	661.66*	85.10	4.068E+004	4.07E+004	7.549E+005	1.875E+004
	Eu-152	121.78	28.67	2.387E+005	1.35E+005	2.204E+005	1.170E+005
		344.28	26.60	2.010E+005		-6.211E+004	9.691E+004
		1408.01	21.07	1.351E+005		9.016E+004	5.817E+004
	Eu-154	123.07	40.40	1.691E+005	1.04E+005	1.780E+005	8.292E+004
		723.30	20.06	1.978E+005		-1.931E+005	9.185E+004
		1274.43	34.80	1.036E+005		-7.383E+004	4.642E+004
	Eu-155	86.55	30.70	2.997E+005	3.00E+005	9.550E+004	1.475E+005
		105.31	21.10	3.513E+005		-2.649E+003	1.725E+005
+	Tl-208	583.19*	85.00	2.708E+004	2.71E+004	1.823E+004	1.204E+004
	Bi-212	727.33	6.67	5.918E+005	5.92E+005	-8.955E+004	2.745E+005
+	Pb-212	238.63*	43.60	8.573E+004	8.57E+004	4.357E+004	4.107E+004
+	Bi-214	609.32*	45.49	4.331E+004	4.33E+004	1.436E+005	1.880E+004
		1120.29	14.92	2.835E+005		2.601E+005	1.300E+005
		1764.49	15.30	2.145E+005		-1.129E+005	9.235E+004
+	Pb-214	295.22*	18.42	1.708E+005	9.10E+004	9.800E+004	8.068E+004
		351.93*	35.60	9.096E+004		1.264E+005	4.277E+004
	Ra-226	186.21	3.64	1.548E+006	1.55E+006	-6.922E+005	7.548E+005
	Ac-228	338.32	11.27	4.326E+005	1.64E+005	2.981E+005	2.079E+005
		911.20	25.80	1.636E+005		1.416E+005	7.564E+004
		968.97	15.80	2.677E+005		1.086E+005	1.235E+005
	Am-241	59.54	35.90	3.023E+005	3.02E+005	2.634E+005	1.481E+005

+ = Nuclide identified during the nuclide identification
 * = Energy line found in the spectrum
 > = Calculated MDA is zero due to zero counts in the region, or the region is outside the spectrum, or MDA has not been calculated
 @ = Half-life too short to be able to perform the decay correction

Filename: C:\GENIE2K\CAMFILES\00001025.CNF

Report Generated On : 5/3/2018 3:20:14 PM

Sample Title : B106213AFSWC005GD
Sample Description : U1 East Valve House Wall
Sample Identification :
Sample Type : Gamma Direct
Sample Geometry : 3M90D_CP_2IN

Peak Locate Threshold : 3.00
Peak Locate Range (in channels) : 85 - 8192
Peak Area Range (in channels) : 85 - 8192
Identification Energy Tolerance : 10.000 keV


Sample Size : 2.830E+001 M²

Sample Taken On : 4/25/2018 10:16:00 AM
Acquisition Started : 4/25/2018 10:16:53 AM

Live Time : 600.0 seconds
Real Time : 600.5 seconds

Dead Time : 0.08 %

Energy Calibration Used Done On : 12/28/2017
Efficiency Calibration Used Done On : 2/1/2018
Efficiency ID : 3M90D_CP_2IN

Data Validated
5-4-18 / 0920


 ***** P E A K A N A L Y S I S R E P O R T *****

Detector Name: 6279
 Sample Title: B106213AFSWC005GD
 Peak Analysis Performed on: 5/3/2018 3:20:14 PM
 Peak Analysis From Channel: 85
 Peak Analysis To Channel: 8192

Peak No.	ROI start	ROI end	Peak centroid	Energy (keV)	FWHM (keV)	Net Peak Area	Net Area Uncert.	Continuum Counts
1	281-	347	300.02	74.97	0.68	3.05E+002	193.98	9.46E+002
2	1173-	1190	1181.73	295.60	0.74	3.60E+001	26.22	4.10E+001
3	1401-	1418	1409.27	352.52	0.49	6.49E+001	24.52	2.61E+001
4	1601-	1618	1610.00	402.73	0.34	1.81E+001	16.77	1.59E+001
5	2036-	2053	2044.93	511.50	0.79	3.13E+001	18.15	1.57E+001
6	2327-	2344	2335.06	584.05	1.08	1.50E+001	17.79	1.70E+001
7	2431-	2448	2439.93	610.27	1.10	3.92E+001	19.14	1.58E+001
8	2641-	2658	2649.40	662.64	1.24	5.81E+001	18.01	6.91E+000
9	3639-	3656	3647.68	912.16	0.34	1.96E+001	15.14	1.14E+001
10	5842-	5861	5851.53	1462.60	1.13	1.14E+002	22.05	2.35E+000

M = First peak in a multiplet region
 m = Other peak in a multiplet region
 F = Fitted singlet

Errors quoted at 2.000 sigma

 ***** N U C L I D E I D E N T I F I C A T I O N R E P O R T *****

Sample Title: B106213AFSWC005GD
 Nuclide Library Used: C:\GENIE2K\CAMFILES\Zion Lib-BNL.NLB

..... IDENTIFIED NUCLIDES

Nuclide Name	Id Confidence	Energy (keV)	Yield (%)	Activity (pCi/M^2)	Activity Uncertainty
K-40	0.995	1460.82*	10.66	1.59565E+006	3.39247E+005
Cs-137	0.998	661.66*	85.10	6.84865E+004	2.27712E+004
Tl-208	0.999	583.19*	85.00	1.65391E+004	1.97651E+004
Bi-214	0.441	609.32*	45.49	8.28318E+004	4.16636E+004
		1120.29	14.92		
		1764.49	15.30		
Pb-214	1.000	295.22*	18.42	1.26439E+005	9.42299E+004
		351.93*	35.60	1.30058E+005	5.28247E+004

* = Energy line found in the spectrum.
 @ = Energy line not used for Weighted Mean Activity
 Energy Tolerance : 10.000 keV
 Nuclide confidence index threshold = 0.30
 Errors quoted at 2.000 sigma

 ***** INTERFERENCE CORRECTED REPORT *****

Nuclide Name	Nuclide Id Confidence	Wt mean Activity (pCi/M ²)	Wt mean Activity Uncertainty
K-40	0.995	1.595648E+006	3.392471E+005
Cs-137	0.998	6.848645E+004	2.277124E+004
Tl-208	0.999	1.653912E+004	1.976508E+004
Bi-214	0.441	8.283177E+004	4.166355E+004
Pb-214	1.000	1.291925E+005	4.607818E+004

? = 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 2.000 sigma

***** UNIDENTIFIED PEAKS *****

Peak Locate Performed on: 5/3/2018 3:20:14 PM
Peak Locate From Channel: 85
Peak Locate To Channel: 8192

Peak No.	Energy (keV)	Peak Size in Counts per Second	Peak CPS % Uncertainty	Peak Type	Tol. Nuclide
1	74.97	5.0783E-001	63.66		
4	402.73	3.0196E-002	92.56		
5	511.50	5.2163E-002	57.99		
9	912.16	3.2675E-002	77.21	Sum	

M = First peak in a multiplet region

m = Other peak in a multiplet region

F = Fitted singlet

Errors quoted at 2.000 sigma

 ***** N U C L I D E M D A R E P O R T *****

Detector Name: 6279
 Sample Geometry: 3M90D_CP_2IN
 Sample Title: B1062I3AFSWC005GD
 Nuclide Library Used: C:\GENIE2K\CAMFILES\Zion Lib-BNL.NLB

	Nuclide Name	Energy (keV)	Yield (%)	Line MDA (pCi/M^2)	Nuclide MDA (pCi/M^2)	Activity (pCi/M^2)	Dec. Level (pCi/M^2)
+	K-40	1460.82*	10.66	1.683E+005	1.68E+005	1.596E+006	6.516E+004
	Co-60	1173.23	99.85	4.923E+004	3.41E+004	3.521E+002	2.281E+004
		1332.49	99.98	3.413E+004		-1.776E+003	1.514E+004
	Nb-94	702.65	99.81	3.442E+004	3.44E+004	2.464E+003	1.581E+004
		871.09	99.89	3.477E+004		3.878E+003	1.583E+004
	Ag-108m	433.90	90.50	4.377E+004	3.54E+004	1.006E+004	2.069E+004
		614.30	89.80	5.388E+004		-1.369E+004	2.548E+004
		722.90	90.80	3.537E+004		-6.352E+003	1.612E+004
	Cs-134	604.72	97.62	4.803E+004	4.27E+004	5.042E+003	2.269E+004
		795.86	85.46	4.273E+004		-4.946E+004	1.962E+004
+	Cs-137	661.66*	85.10	2.179E+004	2.18E+004	6.849E+004	9.302E+003
	Eu-152	121.78	28.67	2.238E+005	1.48E+005	2.561E+004	1.096E+005
		344.28	26.60	1.851E+005		6.267E+004	8.896E+004
		1408.01	21.07	1.478E+005		-6.502E+003	6.454E+004
	Eu-154	123.07	40.40	1.581E+005	9.98E+004	6.934E+004	7.742E+004
		723.30	20.06	1.560E+005		-9.859E+004	7.094E+004
		1274.43	34.80	9.985E+004		4.242E+004	4.453E+004
	Eu-155	86.55	30.70	2.739E+005	2.74E+005	-3.661E+004	1.346E+005
		105.31	21.10	3.293E+005		1.316E+005	1.614E+005
+	Tl-208	583.19*	85.00	3.212E+004	3.21E+004	1.654E+004	1.456E+004
	Bi-212	727.33	6.67	4.950E+005	4.95E+005	-6.433E+004	2.262E+005
	Pb-212	238.63	43.60	1.102E+005	1.10E+005	6.767E+004	5.330E+004
+	Bi-214	609.32*	45.49	5.606E+004	5.61E+004	8.283E+004	2.517E+004
		1120.29	14.92	2.929E+005		1.941E+005	1.346E+005
		1764.49	15.30	2.859E+005		1.927E+004	1.281E+005
+	Pb-214	295.22*	18.42	1.441E+005	6.63E+004	1.264E+005	6.730E+004
		351.93*	35.60	6.631E+004		1.301E+005	3.045E+004
	Ra-226	186.21	3.64	1.463E+006	1.46E+006	7.444E+005	7.122E+005
	Ac-228	338.32	11.27	3.619E+005	1.84E+005	1.165E+005	1.726E+005
		911.20	25.80	1.844E+005		1.154E+005	8.604E+004
		968.97	15.80	2.677E+005		1.346E+005	1.235E+005
	Am-241	59.54	35.90	2.869E+005	2.87E+005	1.335E+005	1.404E+005

- + = Nuclide identified during the nuclide identification
- * = Energy line found in the spectrum
- > = Calculated MDA is zero due to zero counts in the region, or the region is outside the spectrum, or MDA has not been calculated
- @ = Half-life too short to be able to perform the decay correction

***** GAMMA SPECTRUM ANALYSIS *****

Filename: C:\GENIE2K\CAMFILES\00001037.CNF

Report Generated On : 5/3/2018 3:09:04 PM

Sample Title : B106213AFSWC006GD
Sample Description : U1 East Valve House Wall
Sample Identification :
Sample Type : Gamma Direct
Sample Geometry : 3M90D_CP_2IN

Peak Locate Threshold : 3.00
Peak Locate Range (in channels) : 85 - 8192
Peak Area Range (in channels) : 85 - 8192
Identification Energy Tolerance : 10.000 keV


Sample Size : 2.830E+001 M^2

Sample Taken On : 4/25/2018 3:07:00 PM
Acquisition Started : 4/25/2018 3:07:09 PM

Live Time : 600.0 seconds
Real Time : 600.5 seconds

Dead Time : 0.08 %

Energy Calibration Used Done On : 12/28/2017
Efficiency Calibration Used Done On : 2/1/2018
Efficiency ID : 3M90D_CP_2IN

Data Validated ?
5-4-18 0925


 ***** P E A K A N A L Y S I S R E P O R T *****

Detector Name: 6279

Sample Title: B106213AFSWC006GD

Peak Analysis Performed on: 5/3/2018 3:09:03 PM

Peak Analysis From Channel: 85

Peak Analysis To Channel: 8192

Peak No.	ROI start	ROI end	Peak centroid	Energy (keV)	FWHM (keV)	Net Peak Area	Net Area Uncert.	Continuum Counts
1	283-	308	300.35	75.06	1.28	2.55E+002	87.37	3.89E+002
2	946-	963	954.63	238.78	0.97	1.56E+001	32.90	7.84E+001
3	1399-	1416	1407.62	352.10	0.50	5.16E+001	20.84	1.74E+001
4	2035-	2052	2043.70	511.19	1.52	1.70E+001	18.04	1.90E+001
5	2325-	2342	2333.85	583.75	0.38	1.88E+001	16.60	1.52E+001
6	2428-	2445	2436.85	609.50	0.27	3.69E+001	19.07	1.61E+001
7	2638-	2655	2646.31	661.87	0.43	3.45E+001	14.88	6.48E+000
8	5837-	5857	5846.30	1461.29	1.55	8.07E+001	18.82	2.33E+000

M = First peak in a multiplet region

m = Other peak in a multiplet region

F = Fitted singlet

Errors quoted at 2.000 sigma

 ***** N U C L I D E I D E N T I F I C A T I O N R E P O R T *****

Sample Title: B106213AFSWC006GD
 Nuclide Library Used: C:\GENIE2K\CAMFILES\Zion Lib-BNL.NLB

..... IDENTIFIED NUCLIDES

Nuclide Name	Id Confidence	Energy (keV)	Yield (%)	Activity (pCi/M ²)	Activity Uncertainty
K-40	1.000	1460.82*	10.66	1.13194E+006	2.81809E+005
Cs-137	1.000	661.66*	85.10	4.06797E+004	1.82002E+004
Tl-208	0.999	583.19*	85.00	2.07792E+004	1.85196E+004
Pb-212	1.000	238.63*	43.60	2.07487E+004	4.38815E+004
Bi-214	0.442	609.32*	45.49	7.79515E+004	4.13510E+004
		1120.29	14.92		
		1764.49	15.30		
Pb-214	0.437	295.22	18.42		
		351.93*	35.60	1.03234E+005	4.44698E+004

* = Energy line found in the spectrum.

@ = Energy line not used for Weighted Mean Activity

Energy Tolerance : 10.000 keV

Nuclide confidence index threshold = 0.30

Errors quoted at 2.000 sigma

 ***** I N T E R F E R E N C E C O R R E C T E D R E P O R T *****

Nuclide Name	Nuclide Id Confidence	Wt mean Activity (pCi/M ²)	Wt mean Activity Uncertainty
K-40	1.000	1.131944E+006	2.818086E+005
Cs-137	1.000	4.067970E+004	1.820019E+004
Tl-208	0.999	2.077920E+004	1.851956E+004
Pb-212	1.000	2.074870E+004	4.388149E+004
Bi-214	0.442	7.795147E+004	4.135099E+004
Pb-214	0.437	1.032337E+005	4.446976E+004

? = 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 2.000 sigma

***** U N I D E N T I F I E D P E A K S *****

Peak Locate Performed on: 5/3/2018 3:09:03 PM
 Peak Locate From Channel: 85
 Peak Locate To Channel: 8192

Peak No.	Energy (keV)	Peak Size in Counts per Second	Peak CPS % Uncertainty	Peak Type	Tol. Nuclide
1	75.06	4.2425E-001	34.32		
4	511.19	2.8275E-002	106.34		

M = First peak in a multiplet region

m = Other peak in a multiplet region

F = Fitted singlet

Errors quoted at 2.000 sigma

 ***** N U C L I D E M D A R E P O R T *****

Detector Name: 6279
 Sample Geometry: 3M90D_CP_2IN
 Sample Title: B106213AFSWC006GD
 Nuclide Library Used: C:\GENIE2K\CAMFILES\Zion Lib-BNL.NLB

	Nuclide Name	Energy (keV)	Yield (%)	Line MDA (pCi/M ²)	Nuclide MDA (pCi/M ²)	Activity (pCi/M ²)	Dec. Level (pCi/M ²)
+	K-40	1460.82*	10.66	1.677E+005	1.68E+005	1.132E+006	6.486E+004
	Co-60	1173.23	99.85	3.927E+004	3.34E+004	9.097E+002	1.783E+004
		1332.49	99.98	3.340E+004		-5.391E+004	1.478E+004
	Nb-94	702.65	99.81	3.655E+004	3.61E+004	-1.279E+004	1.687E+004
		871.09	99.89	3.610E+004		-1.468E+004	1.650E+004
	Ag-108m	433.90	90.50	3.899E+004	3.90E+004	-3.155E+004	1.830E+004
		614.30	89.80	5.556E+004		6.308E+004	2.633E+004
		722.90	90.80	4.225E+004		-6.450E+003	1.956E+004
	Cs-134	604.72	97.62	4.803E+004	4.41E+004	2.193E+004	2.269E+004
		795.86	85.46	4.407E+004		2.183E+004	2.030E+004
+	Cs-137	661.66*	85.10	2.088E+004	2.09E+004	4.068E+004	8.845E+003
	Eu-152	121.78	28.67	2.255E+005	1.70E+005	4.520E+004	1.104E+005
		344.28	26.60	1.700E+005		2.496E+004	8.141E+004
		1408.01	21.07	1.701E+005		1.526E+005	7.568E+004
	Eu-154	123.07	40.40	1.593E+005	1.05E+005	2.905E+004	7.799E+004
		723.30	20.06	1.946E+005		7.060E+004	9.022E+004
		1274.43	34.80	1.055E+005		-6.984E+004	4.734E+004
	Eu-155	86.55	30.70	2.861E+005	2.86E+005	-4.690E+004	1.407E+005
		105.31	21.10	3.469E+005		3.345E+005	1.703E+005
+	Tl-208	583.19*	85.00	2.873E+004	2.87E+004	2.078E+004	1.287E+004
	Bi-212	727.33	6.67	6.251E+005	6.25E+005	5.016E+005	2.912E+005
+	Pb-212	238.63*	43.60	7.347E+004	7.35E+004	2.075E+004	3.493E+004
+	Bi-214	609.32*	45.49	5.678E+004	5.68E+004	7.795E+004	2.553E+004
		1120.29	14.92	2.637E+005		-1.671E+005	1.201E+005
		1764.49	15.30	2.471E+005		7.952E+004	1.087E+005
+	Pb-214	295.22	18.42	2.242E+005	5.51E+004	-4.069E+004	1.073E+005
		351.93*	35.60	5.511E+004		1.032E+005	2.485E+004
	Ra-226	186.21	3.64	1.564E+006	1.56E+006	1.469E+006	7.627E+005
	Ac-228	338.32	11.27	3.571E+005	1.58E+005	-4.323E+005	1.702E+005
		911.20	25.80	1.575E+005		6.701E+004	7.261E+004
		968.97	15.80	2.625E+005		1.954E+005	1.209E+005
	Am-241	59.54	35.90	3.044E+005	3.04E+005	1.960E+005	1.492E+005

- + = Nuclide identified during the nuclide identification
- * = Energy line found in the spectrum
- > = Calculated MDA is zero due to zero counts in the region, or the region is outside the spectrum, or MDA has not been calculated
- @ = Half-life too short to be able to perform the decay correction

***** G A M M A S P E C T R U M A N A L Y S I S *****

Filename: C:\GENIE2K\CAMFILES\00001030.CNF

Report Generated On : 5/3/2018 3:16:27 PM

Sample Title : B106213AFSWC007GD
Sample Description : U1 East Valve House Wall
Sample Identification :
Sample Type : Gamma Direct
Sample Geometry : 3M90D_CP_2IN

Peak Locate Threshold : 3.00
Peak Locate Range (in channels) : 85 - 8192
Peak Area Range (in channels) : 85 - 8192
Identification Energy Tolerance : 10.000 keV

Sample Size : 2.830E+001 M^2

Sample Taken On : 4/25/2018 1:32:00 PM
Acquisition Started : 4/25/2018 1:32:39 PM

Live Time : 600.0 seconds
Real Time : 600.4 seconds

Dead Time : 0.07 %

Energy Calibration Used Done On : 12/28/2017
Efficiency Calibration Used Done On : 2/1/2018
Efficiency ID : 3M90D_CP_2IN

Data Validated

5-4-18 0930



 ***** P E A K A N A L Y S I S R E P O R T *****

Detector Name: 6279

Sample Title: B106213AFSWC007GD

Peak Analysis Performed on: 5/3/2018 3:16:26 PM

Peak Analysis From Channel: 85

Peak Analysis To Channel: 8192

Peak No.	ROI start	ROI end	Peak centroid	Energy (keV)	FWHM (keV)	Net Peak Area	Net Area Uncert.	Continuum Counts
1	292-	348	299.95	74.96	0.84	-9.68E+001	187.08	1.09E+003
2	945-	962	953.34	238.46	0.67	1.44E+001	32.44	7.36E+001
3	1398-	1415	1406.16	351.74	0.84	2.69E+001	22.05	2.91E+001
4	1914-	1931	1922.48	480.88	0.26	1.59E+001	10.89	4.07E+000
5	2320-	2337	2328.04	582.30	0.28	1.03E+001	13.96	9.70E+000
6	2426-	2443	2434.14	608.82	1.10	3.74E+001	18.15	1.36E+001
7	2634-	2651	2642.84	661.00	0.41	2.49E+001	14.20	7.08E+000
8	4941-	4960	4950.39	1237.59	1.00	1.10E+001	6.63	0.00E+000
9	5317-	5336	5326.80	1331.59	0.78	2.15E+001	11.02	2.47E+000
10	5830-	5849	5839.44	1459.58	0.82	6.50E+001	16.12	0.00E+000
11	7045-	7064	7054.04	1762.70	0.25	1.40E+001	7.48	0.00E+000

M = First peak in a multiplet region

m = Other peak in a multiplet region

F = Fitted singlet

Errors quoted at 2.000 sigma

 ***** N U C L I D E I D E N T I F I C A T I O N R E P O R T *****

Sample Title: B106213AFSWC007GD
 Nuclide Library Used: C:\GENIE2K\CAMFILES\Zion Lib-BNL.NLB

IDENTIFIED NUCLIDES

Nuclide Name	Id Confidence	Energy (keV)	Yield (%)	Activity (pCi/M ²)	Activity Uncertainty
K-40	0.998	1460.82*	10.66	9.11441E+005	2.39553E+005
Cs-137	0.999	661.66*	85.10	2.93452E+004	1.70911E+004
Tl-208	0.999	583.19*	85.00	1.13687E+004	1.54677E+004
Pb-212	1.000	238.63*	43.60	1.91804E+004	4.32247E+004
Bi-214	0.705	609.32*	45.49	7.89027E+004	3.94732E+004
		1120.29	14.92		
		1764.49*	15.30	1.54043E+005	8.32590E+004
Pb-214	0.437	295.22	18.42		
		351.93*	35.60	5.37308E+004	4.48394E+004

* = Energy line found in the spectrum.
 @ = Energy line not used for Weighted Mean Activity
 Energy Tolerance : 10.000 keV
 Nuclide confidence index threshold = 0.30
 Errors quoted at 2.000 sigma

***** I N T E R F E R E N C E C O R R E C T E D R E P O R T *****

Nuclide Name	Nuclide Id Confidence	Wt mean Activity (pCi/M ²)	Wt mean Activity Uncertainty
K-40	0.998	9.114414E+005	2.395530E+005
Cs-137	0.999	2.934518E+004	1.709115E+004
Tl-208	0.999	1.136873E+004	1.546765E+004
Pb-212	1.000	1.918037E+004	4.322468E+004
Bi-214	0.705	9.269265E+004	3.566764E+004
Pb-214	0.437	5.373084E+004	4.483939E+004

? = 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 2.000 sigma

***** U N I D E N T I F I E D P E A K S *****

Peak Locate Performed on: 5/3/2018 3:16:26 PM
Peak Locate From Channel: 85
Peak Locate To Channel: 8192

Peak No.	Energy (keV)	Peak Size in Counts per Second	Peak CPS % Uncertainty	Peak Type	Tol. Nuclide
1	74.96	-1.6134E-001	-193.25		
4	480.88	2.6542E-002	68.37	Sum	
8	1237.59	1.8333E-002	60.30	Sum	
9	1331.59	3.5885E-002	51.19	Sum	

M = First peak in a multiplet region

m = Other peak in a multiplet region

F = Fitted singlet

Errors quoted at 2.000 sigma

 ***** N U C L I D E M D A R E P O R T *****

Detector Name: 6279
 Sample Geometry: 3M90D_CP_2IN
 Sample Title: B106213AFSWC007GD
 Nuclide Library Used: C:\GENIE2K\CAMFILES\Zion Lib-BNL.NLB

	Nuclide Name	Energy (keV)	Yield (%)	Line MDA (pCi/M ²)	Nuclide MDA (pCi/M ²)	Activity (pCi/M ²)	Dec. Level (pCi/M ²)
+	K-40	1460.82*	10.66	3.794E+004	3.79E+004	9.114E+005	0.000E+000
	Co-60	1173.23	99.85	4.432E+004	4.29E+004	2.835E+004	2.035E+004
		1332.49	99.98	4.295E+004		3.397E+004	1.955E+004
	Nb-94	702.65	99.81	3.291E+004	3.29E+004	-2.590E+003	1.505E+004
		871.09	99.89	3.567E+004		-1.607E+004	1.628E+004
	Ag-108m	433.90	90.50	3.609E+004	3.54E+004	2.433E+004	1.685E+004
		614.30	89.80	5.111E+004		6.511E+004	2.410E+004
		722.90	90.80	3.537E+004		2.127E+004	1.612E+004
	Cs-134	604.72	97.62	4.543E+004	3.99E+004	7.798E+004	2.139E+004
		795.86	85.46	3.989E+004		-5.788E+003	1.820E+004
+	Cs-137	661.66*	85.10	2.275E+004	2.28E+004	2.935E+004	9.783E+003
	Eu-152	121.78	28.67	2.174E+005	1.21E+005	4.423E+004	1.064E+005
		344.28	26.60	1.569E+005		-2.800E+004	7.486E+004
		1408.01	21.07	1.208E+005		6.935E+004	5.102E+004
	Eu-154	123.07	40.40	1.554E+005	8.27E+004	2.096E+005	7.606E+004
		723.30	20.06	1.601E+005		9.108E+004	7.299E+004
		1274.43	34.80	8.271E+004		2.461E+004	3.596E+004
	Eu-155	86.55	30.70	2.646E+005	2.65E+005	1.182E+004	1.299E+005
		105.31	21.10	3.163E+005		-3.915E+005	1.550E+005
+	Tl-208	583.19*	85.00	2.549E+004	2.55E+004	1.137E+004	1.125E+004
	Bi-212	727.33	6.67	4.829E+005	4.83E+005	7.567E+004	2.201E+005
+	Pb-212	238.63*	43.60	7.255E+004	7.25E+004	1.918E+004	3.447E+004
+	Bi-214	609.32*	45.49	5.230E+004	2.98E+004	7.890E+004	2.329E+004
		1120.29	14.92	2.671E+005		2.026E+005	1.218E+005
		1764.49*	15.30	2.977E+004		1.540E+005	0.000E+000
+	Pb-214	295.22	18.42	2.192E+005	6.95E+004	1.078E+005	1.048E+005
		351.93*	35.60	6.946E+004		5.373E+004	3.202E+004
	Ra-226	186.21	3.64	1.288E+006	1.29E+006	2.605E+005	6.245E+005
	Ac-228	338.32	11.27	3.332E+005	1.48E+005	1.523E+005	1.582E+005
		911.20	25.80	1.480E+005		1.067E+005	6.782E+004
		968.97	15.80	2.376E+005		4.633E+004	1.084E+005
	Am-241	59.54	35.90	3.046E+005	3.05E+005	4.002E+005	1.493E+005

+ = Nuclide identified during the nuclide identification

* = Energy line found in the spectrum

> = Calculated MDA is zero due to zero counts in the region, or the region is outside the spectrum, or MDA has not been calculated

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

***** GAMMA SPECTRUM ANALYSIS *****

Filename: C:\GENIE2K\CAMFILES\00001029.CNF

Report Generated On : 5/3/2018 3:17:22 PM

Sample Title : B106213AFSWC008GD
Sample Description : U1 East Valve House Wall
Sample Identification :
Sample Type : Gamma Direct
Sample Geometry : 3M90D_CP_2IN

Peak Locate Threshold : 3.00
Peak Locate Range (in channels) : 85 - 8192
Peak Area Range (in channels) : 85 - 8192
Identification Energy Tolerance : 10.000 keV

Sample Size : 2.830E+001 M^2

Sample Taken On : 4/25/2018 1:19:00 PM
Acquisition Started : 4/25/2018 1:20:00 PM

Live Time : 600.0 seconds
Real Time : 600.4 seconds

Dead Time : 0.07 %

Energy Calibration Used Done On : 12/28/2017
Efficiency Calibration Used Done On : 2/1/2018
Efficiency ID : 3M90D_CP_2IN

Data Validated

5-4-18 0935



 ***** P E A K A N A L Y S I S R E P O R T *****

Detector Name: 6279
 Sample Title: B106213AFSWC008GD
 Peak Analysis Performed on: 5/3/2018 3:17:22 PM
 Peak Analysis From Channel: 85
 Peak Analysis To Channel: 8192

Peak No.	ROI start	ROI end	Peak centroid	Energy (keV)	FWHM (keV)	Net Peak Area	Net Area Uncert.	Continuum Counts
1	283-	347	299.66	74.88	1.33	3.63E+002	176.00	7.95E+002
2	1397-	1414	1405.71	351.63	0.32	3.31E+001	21.41	2.49E+001
3	2032-	2049	2040.38	510.37	0.26	2.58E+001	18.57	1.82E+001
4	2427-	2444	2435.10	609.06	1.02	2.73E+001	17.69	1.57E+001
5	2635-	2652	2643.54	661.18	1.20	2.61E+001	14.02	6.90E+000
6	3635-	3652	3643.82	911.19	0.44	1.20E+001	12.85	9.00E+000
7	5318-	5337	5327.86	1331.86	0.31	1.60E+001	8.00	0.00E+000
8	5834-	5853	5843.32	1460.55	1.77	5.57E+001	15.94	2.33E+000

M = First peak in a multiplet region
 m = Other peak in a multiplet region
 F = Fitted singlet

Errors quoted at 2.000 sigma

 ***** N U C L I D E I D E N T I F I C A T I O N R E P O R T *****

Sample Title: B106213AFSWC008GD
 Nuclide Library Used: C:\GENIE2K\CAMFILES\Zion Lib-BNL.NLB

IDENTIFIED NUCLIDES

Nuclide Name	Id Confidence	Energy (keV)	Yield (%)	Activity (pCi/M ²)	Activity Uncertainty
K-40	1.000	1460.82*	10.66	7.80975E+005	2.33718E+005
Cs-137	1.000	661.66*	85.10	3.07348E+004	1.69167E+004
Bi-214	0.442	609.32*	45.49	5.77000E+004	3.79900E+004
		1120.29	14.92		
		1764.49	15.30		
Pb-214	0.437	295.22	18.42	6.62389E+004	4.39454E+004
		351.93*	35.60		

* = Energy line found in the spectrum.
 @ = Energy line not used for Weighted Mean Activity
 Energy Tolerance : 10.000 keV
 Nuclide confidence index threshold = 0.30
 Errors quoted at 2.000 sigma

 ***** I N T E R F E R E N C E C O R R E C T E D R E P O R T *****

Nuclide Name	Nuclide Id Confidence	Wt mean Activity (pCi/M ²)	Wt mean Activity Uncertainty
K-40	1.000	7.809746E+005	2.337175E+005
Cs-137	1.000	3.073484E+004	1.691671E+004
Bi-214	0.442	5.770004E+004	3.798996E+004
Pb-214	0.437	6.623887E+004	4.394543E+004

? = 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 2.000 sigma

***** U N I D E N T I F I E D P E A K S *****

Peak Locate Performed on: 5/3/2018 3:17:22 PM
 Peak Locate From Channel: 85
 Peak Locate To Channel: 8192

Peak No.	Energy (keV)	Peak Size in Counts per Second	Peak CPS % Uncertainty	Peak Type	Tol. Nuclide
1	74.88	6.0456E-001	48.52		
3	510.37	4.2955E-002	72.04		
6	911.19	2.0000E-002	107.04	Tol.	Ac-228
7	1331.86	2.6667E-002	50.00	Sum	

M = First peak in a multiplet region
 m = Other peak in a multiplet region
 F = Fitted singlet

Errors quoted at 2.000 sigma

 ***** N U C L I D E M D A R E P O R T *****

Detector Name: 6279
 Sample Geometry: 3M90D_CP_2IN
 Sample Title: B106213AFSWC008GD
 Nuclide Library Used: C:\GENIE2K\CAMFILES\Zion Lib-BNL.NLB

	Nuclide Name	Energy (keV)	Yield (%)	Line MDA (pCi/M ²)	Nuclide MDA (pCi/M ²)	Activity (pCi/M ²)	Dec. Level (pCi/M ²)
+	K-40	1460.82*	10.66	1.675E+005	1.68E+005	7.810E+005	6.478E+004
	Co-60	1173.23	99.85	3.873E+004	3.48E+004	1.368E+004	1.756E+004
		1332.49	99.98	3.484E+004		3.125E+004	1.550E+004
	Nb-94	702.65	99.81	3.478E+004	3.04E+004	-1.076E+004	1.599E+004
		871.09	99.89	3.040E+004		-7.299E+003	1.364E+004
	Ag-108m	433.90	90.50	3.990E+004	3.67E+004	1.307E+004	1.875E+004
		614.30	89.80	4.979E+004		5.325E+004	2.344E+004
		722.90	90.80	3.668E+004		-1.481E+004	1.678E+004
	Cs-134	604.72	97.62	4.267E+004	3.84E+004	-7.946E+003	2.001E+004
795.86		85.46	3.838E+004		5.448E+003	1.745E+004	
+	Cs-137	661.66*	85.10	2.178E+004	2.18E+004	3.073E+004	9.297E+003
	Eu-152	121.78	28.67	2.066E+005	1.56E+005	-3.017E+005	1.010E+005
344.28		26.60	1.559E+005		-1.437E+005	7.436E+004	
1408.01		21.07	1.768E+005		1.664E+005	7.904E+004	
Eu-154	123.07	40.40	1.457E+005	9.59E+004	-9.490E+004	7.122E+004	
	723.30	20.06	1.699E+005		5.111E+004	7.790E+004	
	1274.43	34.80	9.589E+004		-6.081E+003	4.255E+004	
Eu-155	86.55	30.70	2.660E+005	2.66E+005	1.462E+005	1.306E+005	
	105.31	21.10	2.971E+005		-6.866E+004	1.453E+005	
Tl-208	583.19	85.00	4.041E+004	4.04E+004	-4.158E+004	1.871E+004	
Bi-212	727.33	6.67	5.125E+005	5.12E+005	-1.770E+005	2.349E+005	
Pb-212	238.63	43.60	1.054E+005	1.05E+005	2.593E+004	5.092E+004	
+	Bi-214	609.32*	45.49	5.528E+004	5.53E+004	5.770E+004	2.478E+004
		1120.29	14.92	2.671E+005		-1.163E+004	1.218E+005
		1764.49	15.30	2.282E+005		5.432E+004	9.920E+004
+	Pb-214	295.22	18.42	2.279E+005	6.48E+004	2.546E+005	1.092E+005
		351.93*	35.60	6.479E+004		6.624E+004	2.969E+004
Ra-226	186.21	3.64	1.327E+006	1.33E+006	-9.341E+004	6.444E+005	
Ac-228	338.32	11.27	3.252E+005	1.56E+005	-1.232E+005	1.542E+005	
	911.20	25.80	1.560E+005		7.707E+004	7.183E+004	
	968.97	15.80	2.376E+005		3.329E+004	1.084E+005	
Am-241	59.54	35.90	2.999E+005	3.00E+005	3.999E+005	1.469E+005	

+ = Nuclide identified during the nuclide identification
 * = Energy line found in the spectrum
 > = Calculated MDA is zero due to zero counts in the region, or the region is outside the spectrum, or MDA has not been calculated
 @ = Half-life too short to be able to perform the decay correction

***** G A M M A S P E C T R U M A N A L Y S I S *****

Filename: C:\GENIE2K\CAMFILES\00001024.CNF

Report Generated On : 5/3/2018 3:21:10 PM

Sample Title : B106213AFSWC009GD
Sample Description : U1 East Valve House Wall
Sample Identification :
Sample Type : Gamma Direct
Sample Geometry : 3M90D_CP_2IN

Peak Locate Threshold : 3.00
Peak Locate Range (in channels) : 85 - 8192
Peak Area Range (in channels) : 85 - 8192
Identification Energy Tolerance : 10.000 keV

Sample Size : 2.830E+001 M^2

Sample Taken On : 4/25/2018 10:01:00 AM
Acquisition Started : 4/25/2018 10:01:06 AM

Live Time : 600.0 seconds
Real Time : 600.4 seconds

Dead Time : 0.07 %

Energy Calibration Used Done On : 12/28/2017
Efficiency Calibration Used Done On : 2/1/2018
Efficiency ID : 3M90D_CP_2IN

Data Validated
5-4-18 0940



 ***** P E A K A N A L Y S I S R E P O R T *****

Detector Name: 6279

Sample Title: B106213AFSWC009GD

Peak Analysis Performed on: 5/3/2018 3:21:10 PM

Peak Analysis From Channel: 85

Peak Analysis To Channel: 8192

Peak No.	ROI start	ROI end	Peak centroid	Energy (keV)	FWHM (keV)	Net Peak Area	Net Area Uncert.	Continuum Counts
1	121-	136	128.13	31.95	0.59	5.74E+001	28.32	4.76E+001
2	285-	348	300.84	75.18	1.21	2.62E+002	193.75	1.00E+003
3	947-	964	955.95	239.11	0.93	3.85E+001	35.61	8.55E+001
4	1175-	1192	1183.12	295.95	0.26	2.00E+001	24.62	3.90E+001
5	1401-	1418	1409.37	352.54	0.34	4.66E+001	23.02	2.64E+001
6	2328-	2345	2336.12	584.32	0.25	2.42E+001	16.41	1.28E+001
7	2432-	2451	2440.94	610.52	0.53	4.00E+001	21.03	2.00E+001
8	2641-	2660	2650.34	662.88	1.29	9.60E+001	22.90	1.00E+001
9	3643-	3660	3651.81	913.19	0.46	1.74E+001	12.47	6.60E+000
10	5846-	5865	5855.62	1463.62	1.21	8.26E+001	19.05	2.38E+000
11	7066-	7085	7075.28	1768.00	0.77	1.30E+001	11.06	5.00E+000

M = First peak in a multiplet region

m = Other peak in a multiplet region

F = Fitted singlet

Errors quoted at 2.000 sigma

 ***** N U C L I D E I D E N T I F I C A T I O N R E P O R T *****

Sample Title: B106213AFSWC009GD
 Nuclide Library Used: C:\GENIE2K\CAMFILES\Zion Lib-BNL.NLB

..... IDENTIFIED NUCLIDES

Nuclide Name	Id Confidence	Energy (keV)	Yield (%)	Activity (pCi/M^2)	Activity Uncertainty
K-40	0.988	1460.82*	10.66	1.16054E+006	2.85970E+005
Cs-137	0.998	661.66*	85.10	1.13205E+005	3.02332E+004
Tl-208	0.998	583.19*	85.00	2.67322E+004	1.84244E+004
Pb-212	1.000	238.63*	43.60	5.12393E+004	4.81150E+004
Bi-214	0.701	609.32*	45.49	8.45501E+004	4.56071E+004
		1120.29	14.92		
		1764.49*	15.30	1.43311E+005	1.22476E+005
Pb-214	0.999	295.22*	18.42	7.02038E+004	8.72182E+004
		351.93*	35.60	9.33102E+004	4.81789E+004

* = Energy line found in the spectrum.
 @ = Energy line not used for Weighted Mean Activity
 Energy Tolerance : 10.000 keV
 Nuclide confidence index threshold = 0.30
 Errors quoted at 2.000 sigma

 ***** I N T E R F E R E N C E C O R R E C T E D R E P O R T *****

Nuclide Name	Nuclide Id Confidence	Wt mean Activity (pCi/M ²)	Wt mean Activity Uncertainty
K-40	0.988	1.160540E+006	2.859696E+005
Cs-137	0.998	1.132050E+005	3.023324E+004
Tl-208	0.998	2.673221E+004	1.842440E+004
Pb-212	1.000	5.123932E+004	4.811496E+004
Bi-214	0.701	9.170596E+004	4.274000E+004
Pb-214	0.999	8.790795E+004	4.217239E+004

? = 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 2.000 sigma

***** UNIDENTIFIED PEAKS *****

Peak Locate Performed on: 5/3/2018 3:21:10 PM
Peak Locate From Channel: 85
Peak Locate To Channel: 8192

Peak No.	Energy (keV)	Peak Size in Counts per Second	Peak CPS % Uncertainty	Peak Type	Tol. Nuclide
1	31.95	9.5659E-002	49.35		
2	75.18	4.3597E-001	74.07		
9	913.19	2.8993E-002	71.67	Sum	

M = First peak in a multiplet region
m = Other peak in a multiplet region
F = Fitted singlet

Errors quoted at 2.000 sigma

 ***** N U C L I D E M D A R E P O R T *****

Detector Name: 6279
 Sample Geometry: 3M90D_CP_2IN
 Sample Title: B106213AFSWC009GD
 Nuclide Library Used: C:\GENIE2K\CAMFILES\Zion Lib-BNL.NLB

	Nuclide Name	Energy (keV)	Yield (%)	Line MDA (pCi/M ²)	Nuclide MDA (pCi/M ²)	Activity (pCi/M ²)	Dec. Level (pCi/M ²)
+	K-40	1460.82*	10.66	1.698E+005	1.70E+005	1.161E+006	6.588E+004
	Co-60	1173.23	99.85	4.086E+004	3.94E+004	1.901E+004	1.862E+004
		1332.49	99.98	3.944E+004		2.693E+004	1.780E+004
	Nb-94	702.65	99.81	3.405E+004	3.40E+004	-2.887E+004	1.562E+004
		871.09	99.89	3.780E+004		1.377E+004	1.734E+004
	Ag-108m	433.90	90.50	4.438E+004	4.19E+004	2.452E+004	2.099E+004
		614.30	89.80	5.533E+004		6.025E+004	2.621E+004
		722.90	90.80	4.188E+004		-2.530E+004	1.938E+004
	Cs-134	604.72	97.62	5.026E+004	4.32E+004	3.480E+004	2.381E+004
		795.86	85.46	4.318E+004		-5.017E+004	1.985E+004
+	Cs-137	661.66*	85.10	2.618E+004	2.62E+004	1.132E+005	1.149E+004
	Eu-152	121.78	28.67	2.336E+005	1.16E+005	2.937E+005	1.145E+005
		344.28	26.60	1.812E+005		-4.971E+004	8.703E+004
		1408.01	21.07	1.156E+005		6.242E+004	4.840E+004
	Eu-154	123.07	40.40	1.636E+005	1.17E+005	-1.102E+005	8.017E+004
		723.30	20.06	1.879E+005		-1.633E+005	8.688E+004
		1274.43	34.80	1.175E+005		8.976E+004	5.333E+004
	Eu-155	86.55	30.70	2.787E+005	2.79E+005	-4.916E+004	1.370E+005
		105.31	21.10	3.417E+005		8.613E+004	1.677E+005
+	Tl-208	583.19*	85.00	2.688E+004	2.69E+004	2.673E+004	1.194E+004
	Bi-212	727.33	6.67	5.615E+005	5.62E+005	2.572E+005	2.594E+005
+	Pb-212	238.63*	43.60	7.668E+004	7.67E+004	5.124E+004	3.654E+004
+	Bi-214	609.32*	45.49	6.415E+004	6.42E+004	8.455E+004	2.922E+004
		1120.29	14.92	2.835E+005		-2.181E+004	1.300E+005
		1764.49*	15.30	1.819E+005		1.433E+005	7.605E+004
+	Pb-214	295.22*	18.42	1.421E+005	6.65E+004	7.020E+004	6.628E+004
		351.93*	35.60	6.651E+004		9.331E+004	3.054E+004
	Ra-226	186.21	3.64	1.452E+006	1.45E+006	1.559E+006	7.068E+005
	Ac-228	338.32	11.27	3.772E+005	1.71E+005	-8.398E+004	1.802E+005
		911.20	25.80	1.708E+005		1.605E+005	7.926E+004
		968.97	15.80	2.316E+005		-5.746E+004	1.054E+005
	Am-241	59.54	35.90	3.012E+005	3.01E+005	4.241E+005	1.476E+005

+ = Nuclide identified during the nuclide identification
 * = Energy line found in the spectrum
 > = Calculated MDA is zero due to zero counts in the region, or the region is outside the spectrum, or MDA has not been calculated
 @ = Half-life too short to be able to perform the decay correction

***** G A M M A S P E C T R U M A N A L Y S I S *****

Filename: C:\GENIE2K\CAMFILES\00001023.CNF

Report Generated On : 5/3/2018 3:22:03 PM

Sample Title : B106213AFSWC010GD
Sample Description : U1 East Valve House Wall
Sample Identification :
Sample Type : Gamma Direct
Sample Geometry : 3M90D_CP_2IN

Peak Locate Threshold : 3.00
Peak Locate Range (in channels) : 85 - 8192
Peak Area Range (in channels) : 85 - 8192
Identification Energy Tolerance : 10.000 keV

Sample Size : 2.830E+001 M²

Sample Taken On : 4/25/2018 9:45:00 AM
Acquisition Started : 4/25/2018 9:45:44 AM

Live Time : 600.0 seconds
Real Time : 600.5 seconds

Dead Time : 0.08 %

Energy Calibration Used Done On : 12/28/2017
Efficiency Calibration Used Done On : 2/1/2018
Efficiency ID : 3M90D_CP_2IN

Data Validated
5-4-18 0945



 ***** P E A K A N A L Y S I S R E P O R T *****

Detector Name: 6279

Sample Title: B106213AFSWC010GD

Peak Analysis Performed on: 5/3/2018 3:22:03 PM

Peak Analysis From Channel: 85

Peak Analysis To Channel: 8192

Peak No.	ROI start	ROI end	Peak centroid	Energy (keV)	FWHM (keV)	Net Peak Area	Net Area Uncert.	Continuum Counts
1	120-	137	128.47	32.04	1.16	7.05E+001	43.18	1.22E+002
2	282-	352	299.40	74.82	1.25	5.21E+002	213.74	1.10E+003
3	947-	964	955.41	238.97	0.34	2.83E+001	38.09	1.03E+002
4	1173-	1190	1181.97	295.66	1.27	3.11E+001	25.81	4.09E+001
5	1400-	1417	1408.63	352.36	1.21	3.90E+001	24.98	3.60E+001
6	2035-	2052	2043.97	511.26	1.23	2.44E+001	18.86	1.86E+001
7	2327-	2344	2335.23	584.09	0.29	2.36E+001	15.83	1.14E+001
8	2431-	2449	2439.51	610.17	0.80	6.41E+001	18.67	6.90E+000
9	2636-	2661	2648.36	662.38	1.27	3.82E+002	43.94	2.33E+001
10	3639-	3656	3647.41	912.09	0.60	1.88E+001	10.20	2.18E+000
11	4475-	4494	4484.69	1121.28	0.35	1.51E+001	11.58	4.93E+000
12	5839-	5859	5849.08	1461.99	0.49	8.10E+001	18.00	0.00E+000

M = First peak in a multiplet region

m = Other peak in a multiplet region

F = Fitted singlet

Errors quoted at 2.000 sigma

 ***** N U C L I D E I D E N T I F I C A T I O N R E P O R T *****

Sample Title: B106213AFSWC010GD
 Nuclide Library Used: C:\GENIE2K\CAMFILES\Zion Lib-BNL.NLB

IDENTIFIED NUCLIDES

Nuclide Name	Id Confidence	Energy (keV)	Yield (%)	Activity (pCi/M ²)	Activity Uncertainty
K-40	0.998	1460.82*	10.66	1.13698E+006	2.71267E+005
Cs-137	0.999	661.66*	85.10	4.49993E+005	7.48530E+004
Tl-208	0.999	583.19*	85.00	2.60668E+004	1.77747E+004
Pb-212	1.000	238.63*	43.60	3.77010E+004	5.10458E+004
Bi-214	0.734	609.32*	45.49	1.35440E+005	4.26757E+004
		1120.29*	14.92	1.31570E+005	1.01642E+005
		1764.49	15.30		
Pb-214	1.000	295.22*	18.42	1.09172E+005	9.22638E+004
		351.93*	35.60	7.80877E+004	5.13619E+004

* = Energy line found in the spectrum.
 @ = Energy line not used for Weighted Mean Activity
 Energy Tolerance : 10.000 keV
 Nuclide confidence index threshold = 0.30
 Errors quoted at 2.000 sigma

 ***** I N T E R F E R E N C E C O R R E C T E D R E P O R T *****

Nuclide Name	Nuclide Id Confidence	Wt mean Activity (pCi/M^2)	Wt mean Activity Uncertainty
K-40	0.998	1.136977E+006	2.712666E+005
Cs-137	0.999	4.499927E+005	7.485300E+004
Tl-208	0.999	2.606682E+004	1.777473E+004
Pb-212	1.000	3.770099E+004	5.104584E+004
Bi-214	0.734	1.348601E+005	3.934815E+004
Pb-214	1.000	8.544173E+004	4.487687E+004

? = 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 2.000 sigma

***** UNIDENTIFIED PEAKS *****

Peak Locate Performed on: 5/3/2018 3:22:03 PM
 Peak Locate From Channel: 85
 Peak Locate To Channel: 8192

Peak No.	Energy (keV)	Peak Size in Counts per Second	Peak CPS % Uncertainty	Peak Type	Tol. Nuclide
1	32.04	1.1750E-001	61.24		
2	74.82	8.6788E-001	41.05		
6	511.26	4.0620E-002	77.37		
10	912.09	3.1369E-002	54.18	Sum	

M = First peak in a multiplet region
 m = Other peak in a multiplet region
 F = Fitted singlet

Errors quoted at 2.000 sigma

 ***** N U C L I D E M D A R E P O R T *****

Detector Name: 6279
 Sample Geometry: 3M90D_CP_2IN
 Sample Title: B106213AFSWC010GD
 Nuclide Library Used: C:\GENIE2K\CAMFILES\Zion Lib-BNL.NLB

	Nuclide Name	Energy (keV)	Yield (%)	Line MDA (pCi/M ²)	Nuclide MDA (pCi/M ²)	Activity (pCi/M ²)	Dec. Level (pCi/M ²)
+	K-40	1460.82*	10.66	3.798E+004	3.80E+004	1.137E+006	0.000E+000
	Co-60	1173.23	99.85	3.981E+004	2.77E+004	-2.713E+004	1.810E+004
		1332.49	99.98	2.767E+004		-2.989E+004	1.192E+004
	Nb-94	702.65	99.81	3.367E+004	3.37E+004	2.046E+004	1.543E+004
		871.09	99.89	3.821E+004		1.725E+003	1.755E+004
	Ag-108m	433.90	90.50	5.414E+004	3.96E+004	6.063E+004	2.587E+004
		614.30	89.80	5.461E+004		1.426E+004	2.585E+004
		722.90	90.80	3.957E+004		1.509E+004	1.822E+004
	Cs-134	604.72	97.62	5.070E+004	3.89E+004	2.754E+004	2.402E+004
		795.86	85.46	3.889E+004		-3.505E+004	1.770E+004
+	Cs-137	661.66*	85.10	4.215E+004	4.21E+004	4.500E+005	1.948E+004
	Eu-152	121.78	28.67	2.449E+005	1.85E+005	5.173E+004	1.201E+005
		344.28	26.60	1.847E+005		1.673E+005	8.875E+004
		1408.01	21.07	1.895E+005		1.942E+005	8.537E+004
	Eu-154	123.07	40.40	1.724E+005	9.17E+004	-1.223E+005	8.455E+004
		723.30	20.06	1.827E+005		7.811E+004	8.428E+004
		1274.43	34.80	9.174E+004		-8.859E+004	4.047E+004
	Eu-155	86.55	30.70	3.049E+005	3.05E+005	-4.487E+004	1.501E+005
		105.31	21.10	3.601E+005		1.658E+005	1.769E+005
+	Tl-208	583.19*	85.00	2.572E+004	2.57E+004	2.607E+004	1.136E+004
	Bi-212	727.33	6.67	5.510E+005	5.51E+005	4.547E+005	2.542E+005
+	Pb-212	238.63*	43.60	8.365E+004	8.36E+004	3.770E+004	4.002E+004
+	Bi-214	609.32*	45.49	3.908E+004	3.91E+004	1.354E+005	1.668E+004
		1120.29*	14.92	1.470E+005		1.316E+005	6.170E+004
		1764.49	15.30	2.215E+005		4.542E+004	9.584E+004
+	Pb-214	295.22*	18.42	1.439E+005	7.67E+004	1.092E+005	6.719E+004
		351.93*	35.60	7.667E+004		7.809E+004	3.563E+004
	Ra-226	186.21	3.64	1.620E+006	1.62E+006	3.675E+005	7.909E+005
	Ac-228	338.32	11.27	3.984E+005	1.50E+005	8.059E+004	1.908E+005
		911.20	25.80	1.496E+005		4.862E+004	6.864E+004
		968.97	15.80	2.433E+005		6.880E+004	1.113E+005
	Am-241	59.54	35.90	3.165E+005	3.17E+005	5.363E+005	1.552E+005

+ = Nuclide identified during the nuclide identification
 * = Energy line found in the spectrum
 > = Calculated MDA is zero due to zero counts in the region, or the region is outside the spectrum, or MDA has not been calculated
 @ = Half-life too short to be able to perform the decay correction

Filename: C:\GENIE2K\CAMFILES\00001022.CNF

Report Generated On : 5/3/2018 3:22:57 PM

Sample Title : B106213AFSWC011GD
Sample Description : U1 East Valve House Wall
Sample Identification :
Sample Type : Gamma Direct
Sample Geometry : 3M90D_CP_2IN

Peak Locate Threshold : 3.00
Peak Locate Range (in channels) : 85 - 8192
Peak Area Range (in channels) : 85 - 8192
Identification Energy Tolerance : 10.000 keV

Sample Size : 2.830E+001 M²

Sample Taken On : 4/25/2018 9:30:00 AM
Acquisition Started : 4/25/2018 9:30:06 AM

Live Time : 600.0 seconds
Real Time : 600.4 seconds

Dead Time : 0.07 %

Energy Calibration Used Done On : 12/28/2017
Efficiency Calibration Used Done On : 2/1/2018
Efficiency ID : 3M90D_CP_2IN

Data Validated
5-4-18 0950
RJM

 ***** P E A K A N A L Y S I S R E P O R T *****

Detector Name: 6279
 Sample Title: B106213AFSWC011GD
 Peak Analysis Performed on: 5/3/2018 3:22:57 PM
 Peak Analysis From Channel: 85
 Peak Analysis To Channel: 8192

Peak No.	ROI start	ROI end	Peak centroid	Energy (keV)	FWHM (keV)	Net Peak Area	Net Area Uncert.	Continuum Counts
1	292-	348	300.79	75.17	0.66	2.34E+001	186.46	1.06E+003
2	947-	964	955.78	239.07	1.01	4.23E+001	29.49	5.38E+001
3	1172-	1189	1180.39	295.26	1.04	2.40E+001	21.78	2.90E+001
4	1400-	1417	1408.59	352.35	1.27	3.03E+001	21.04	2.47E+001
5	2430-	2447	2438.12	609.82	1.03	4.34E+001	16.87	8.62E+000
6	2639-	2656	2647.42	662.15	0.25	1.80E+001	11.19	4.02E+000
7	3638-	3655	3646.37	911.83	1.19	1.35E+001	10.87	4.53E+000
8	5839-	5858	5848.47	1461.83	0.86	7.26E+001	19.83	7.39E+000

M = First peak in a multiplet region
 m = Other peak in a multiplet region
 F = Fitted singlet

Errors quoted at 2.000 sigma

 ***** N U C L I D E I D E N T I F I C A T I O N R E P O R T *****

Sample Title: B106213AFSWC011GD
 Nuclide Library Used: C:\GENIE2K\CAMFILES\Zion Lib-BNL.NLB

..... IDENTIFIED NUCLIDES

Nuclide Name	Id Confidence	Energy (keV)	Yield (%)	Activity (pCi/M ²)	Activity Uncertainty
K-40	0.998	1460.82*	10.66	1.01913E+006	2.92095E+005
Cs-137	1.000	661.66*	85.10	2.11870E+004	1.34366E+004
Pb-212	1.000	238.63*	43.60	5.62250E+004	4.02865E+004
Bi-214	0.442	609.32*	45.49	9.16494E+004	3.73073E+004
		1120.29	14.92		
		1764.49	15.30		
Pb-214	1.000	295.22*	18.42	8.40661E+004	7.75785E+004
		351.93*	35.60	6.06034E+004	4.30989E+004

* = Energy line found in the spectrum.
 @ = Energy line not used for Weighted Mean Activity
 Energy Tolerance : 10.000 keV
 Nuclide confidence index threshold = 0.30
 Errors quoted at 2.000 sigma

 ***** I N T E R F E R E N C E C O R R E C T E D R E P O R T *****

Nuclide Name	Nuclide Id Confidence	Wt mean Activity (pCi/M^2)	Wt mean Activity Uncertainty
K-40	0.998	1.019132E+006	2.920946E+005
Cs-137	1.000	2.118703E+004	1.343657E+004
Pb-212	1.000	5.622499E+004	4.028654E+004
Bi-214	0.442	9.164941E+004	3.730731E+004
Pb-214	1.000	6.613699E+004	3.767525E+004

? = 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 2.000 sigma

***** U N I D E N T I F I E D P E A K S *****

Peak Locate Performed on: 5/3/2018 3:22:57 PM
 Peak Locate From Channel: 85
 Peak Locate To Channel: 8192

Peak No.	Energy (keV)	Peak Size in Counts per Second	Peak CPS % Uncertainty	Peak Type	Tol. Nuclide
1	75.17	3.9027E-002	796.27		
7	911.83	2.2454E-002	80.65	Sum	

M = First peak in a multiplet region
 m = Other peak in a multiplet region
 F = Fitted singlet

Errors quoted at 2.000 sigma

 ***** N U C L I D E M D A R E P O R T *****

Detector Name: 6279
 Sample Geometry: 3M90D_CP_2IN
 Sample Title: B106213AFSWC011GD
 Nuclide Library Used: C:\GENIE2K\CAMFILES\Zion Lib-BNL.NLB

	Nuclide Name	Energy (keV)	Yield (%)	Line MDA (pCi/M^2)	Nuclide MDA (pCi/M^2)	Activity (pCi/M^2)	Dec. Level (pCi/M^2)
+	K-40	1460.82*	10.66	2.722E+005	2.72E+005	1.019E+006	1.171E+005
	Co-60	1173.23	99.85	3.273E+004	3.03E+004	3.335E+002	1.456E+004
		1332.49	99.98	3.028E+004		-8.878E+003	1.322E+004
	Nb-94	702.65	99.81	3.252E+004	2.38E+004	8.167E+003	1.486E+004
		871.09	99.89	2.384E+004		-3.048E+004	1.036E+004
	Ag-108m	433.90	90.50	3.708E+004	3.71E+004	9.830E+003	1.734E+004
		614.30	89.80	4.676E+004		4.754E+004	2.193E+004
		722.90	90.80	3.795E+004		-1.237E+004	1.741E+004
	Cs-134	604.72	97.62	4.395E+004	3.89E+004	4.331E+004	2.065E+004
		795.86	85.46	3.889E+004		1.952E+004	1.770E+004
+	Cs-137	661.66*	85.10	1.736E+004	1.74E+004	2.119E+004	7.084E+003
	Eu-152	121.78	28.67	2.235E+005	1.10E+005	7.246E+004	1.094E+005
		344.28	26.60	1.672E+005		7.924E+003	8.000E+004
		1408.01	21.07	1.100E+005		-9.883E+004	4.563E+004
	Eu-154	123.07	40.40	1.558E+005	9.59E+004	-1.571E+004	7.627E+004
		723.30	20.06	1.737E+005		-4.664E+004	7.977E+004
		1274.43	34.80	9.589E+004		-7.416E+004	4.255E+004
	Eu-155	86.55	30.70	2.737E+005	2.74E+005	9.486E+003	1.345E+005
		105.31	21.10	3.297E+005		1.995E+004	1.616E+005
	Tl-208	583.19	85.00	4.599E+004	4.60E+004	-5.563E+002	2.150E+004
	Bi-212	727.33	6.67	5.238E+005	5.24E+005	1.302E+005	2.406E+005
+	Pb-212	238.63*	43.60	6.155E+004	6.16E+004	5.622E+004	2.898E+004
+	Bi-214	609.32*	45.49	4.235E+004	4.24E+004	9.165E+004	1.832E+004
		1120.29	14.92	2.637E+005		2.922E+004	1.201E+005
		1764.49	15.30	1.835E+005		-1.569E+005	7.684E+004
+	Pb-214	295.22*	18.42	1.218E+005	6.45E+004	8.407E+004	5.613E+004
		351.93*	35.60	6.450E+004		6.060E+004	2.954E+004
	Ra-226	186.21	3.64	1.381E+006	1.38E+006	2.698E+005	6.710E+005
	Ac-228	338.32	11.27	3.702E+005	1.41E+005	-2.564E+005	1.767E+005
		911.20	25.80	1.412E+005		1.969E+004	6.442E+004
		968.97	15.80	2.517E+005		8.108E+004	1.155E+005
	Am-241	59.54	35.90	3.075E+005	3.07E+005	5.790E+004	1.507E+005


+ = Nuclide identified during the nuclide identification
 * = Energy line found in the spectrum
 > = Calculated MDA is zero due to zero counts in the region, or the region is outside the spectrum, or MDA has not been calculated
 @ = Half-life too short to be able to perform the decay correction

***** G A M M A S P E C T R U M A N A L Y S I S *****

Filename: C:\GENIE2K\CAMFILES\00001028.CNF

Report Generated On : 5/3/2018 3:18:18 PM
Sample Title : B106213AFSWC012GD
Sample Description : U1 East Valve House Wall
Sample Identification :
Sample Type : Gamma Direct
Sample Geometry : 3M90D_CP_2IN
Peak Locate Threshold : 3.00
Peak Locate Range (in channels) : 85 - 8192
Peak Area Range (in channels) : 85 - 8192
Identification Energy Tolerance : 10.000 keV
Sample Size : 2.830E+001 M^2
Sample Taken On : 4/25/2018 1:05:00 PM
Acquisition Started : 4/25/2018 1:05:26 PM
Live Time : 600.0 seconds
Real Time : 600.5 seconds
Dead Time : 0.08 %

Energy Calibration Used Done On : 12/28/2017
Efficiency Calibration Used Done On : 2/1/2018
Efficiency ID : 3M90D_CP_2IN

Data Validated
5448 0955


 ***** P E A K A N A L Y S I S R E P O R T *****

Detector Name: 6279

Sample Title: B106213AFSWC012GD

Peak Analysis Performed on: 5/3/2018 3:18:18 PM

Peak Analysis From Channel: 85

Peak Analysis To Channel: 8192

Peak No.	ROI start	ROI end	Peak centroid	Energy (keV)	FWHM (keV)	Net Peak Area	Net Area Uncert.	Continuum Counts
1	286-	347	300.60	75.12	0.86	1.03E+002	204.37	1.17E+003
2	736-	751	743.60	185.98	0.78	3.49E+001	31.00	6.81E+001
3	1171-	1188	1179.89	295.14	1.07	1.03E+001	24.48	4.27E+001
4	1399-	1416	1407.38	352.05	1.21	3.20E+001	19.21	1.80E+001
5	2036-	2053	2044.48	511.39	0.31	2.14E+001	18.51	1.96E+001
6	2322-	2339	2330.97	583.03	0.31	1.03E+001	14.99	1.37E+001
7	2427-	2445	2436.31	609.37	0.58	5.31E+001	17.46	6.92E+000
8	5835-	5854	5844.02	1460.72	0.40	6.90E+001	16.61	0.00E+000

M = First peak in a multiplet region

m = Other peak in a multiplet region

F = Fitted singlet

Errors quoted at 2.000 sigma

 ***** N U C L I D E I D E N T I F I C A T I O N R E P O R T *****

Sample Title: B106213AFSWC012GD
 Nuclide Library Used: C:\GENIE2K\CAMFILES\Zion Lib-BNL.NLB

IDENTIFIED NUCLIDES

Nuclide Name	Id Confidence	Energy (keV)	Yield (%)	Activity (pCi/M^2)	Activity Uncertainty
K-40	1.000	1460.82*	10.66	9.68008E+005	2.47764E+005
Tl-208	1.000	583.19*	85.00	1.14130E+004	1.66124E+004
Bi-214	0.442	609.32*	45.49	1.12095E+005	3.92484E+004
		1120.29	14.92		
		1764.49	15.30		
Pb-214	1.000	295.22*	18.42	3.62002E+004	8.60587E+004
		351.93*	35.60	6.40401E+004	3.96294E+004
Ra-226	1.000	186.21*	3.64	4.95853E+005	4.49177E+005

* = Energy line found in the spectrum.
 @ = Energy line not used for Weighted Mean Activity
 Energy Tolerance : 10.000 keV
 Nuclide confidence index threshold = 0.30
 Errors quoted at 2.000 sigma

 ***** INTERFERENCE CORRECTED REPORT *****

Nuclide Name	Nuclide Id Confidence	Wt mean Activity (pCi/M^2)	Wt mean Activity Uncertainty
K-40	1.000	9.680080E+005	2.477637E+005
Tl-208	1.000	1.141297E+004	1.661237E+004
Bi-214	0.442	1.120946E+005	3.924838E+004
Pb-214	1.000	5.916942E+004	3.599619E+004
Ra-226	1.000	4.958530E+005	4.491775E+005

? = 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 2.000 sigma

***** UNIDENTIFIED PEAKS *****

Peak Locate Performed on: 5/3/2018 3:18:18 PM
 Peak Locate From Channel: 85
 Peak Locate To Channel: 8192

Peak No.	Energy (keV)	Peak Size in Counts per Second	Peak CPS % Uncertainty	Peak Type	Tol. Nuclide
1	75.12	1.7214E-001	197.87		
5	511.39	3.5589E-002	86.69		

M = First peak in a multiplet region
 m = Other peak in a multiplet region
 F = Fitted singlet

Errors quoted at 2.000 sigma

 ***** N U C L I D E M D A R E P O R T *****

Detector Name: 6279
 Sample Geometry: 3M90D_CP_2IN
 Sample Title: B106213AFSWC012GD
 Nuclide Library Used: C:\GENIE2K\CAMFILES\Zion Lib-BNL.NLB

	Nuclide Name	Energy (keV)	Yield (%)	Line MDA (pCi/M ²)	Nuclide MDA (pCi/M ²)	Activity (pCi/M ²)	Dec. Level (pCi/M ²)
+	K-40	1460.82*	10.66	3.796E+004	3.80E+004	9.680E+005	0.000E+000
	Co-60	1173.23	99.85	4.086E+004	2.94E+004	1.788E+004	1.862E+004
		1332.49	99.98	2.944E+004		4.688E+003	1.280E+004
	Nb-94	702.65	99.81	3.514E+004	3.04E+004	3.639E+004	1.617E+004
		871.09	99.89	3.040E+004		-5.065E+003	1.364E+004
	Ag-108m	433.90	90.50	3.708E+004	3.63E+004	-5.670E+004	1.734E+004
		614.30	89.80	5.264E+004		4.669E+004	2.486E+004
		722.90	90.80	3.625E+004		3.325E+004	1.656E+004
	Cs-134	604.72	97.62	4.982E+004	4.04E+004	8.067E+004	2.359E+004
		795.86	85.46	4.037E+004		3.459E+004	1.845E+004
	Cs-137	661.66	85.10	4.156E+004	4.16E+004	-3.522E+003	1.918E+004
	Eu-152	121.78	28.67	2.315E+005	1.21E+005	-4.259E+002	1.134E+005
		344.28	26.60	1.643E+005		2.013E+005	7.856E+004
		1408.01	21.07	1.208E+005		6.935E+004	5.102E+004
	Eu-154	123.07	40.40	1.623E+005	8.27E+004	-1.328E+005	7.951E+004
		723.30	20.06	1.621E+005		8.498E+004	7.400E+004
		1274.43	34.80	8.271E+004		5.986E+004	3.596E+004
	Eu-155	86.55	30.70	2.885E+005	2.89E+005	1.942E+005	1.419E+005
		105.31	21.10	3.387E+005		3.590E+005	1.661E+005
+	Tl-208	583.19*	85.00	2.759E+004	2.76E+004	1.141E+004	1.230E+004
	Bi-212	727.33	6.67	4.950E+005	4.95E+005	1.083E+005	2.262E+005
	Pb-212	238.63	43.60	1.115E+005	1.11E+005	1.237E+005	5.393E+004
+	Bi-214	609.32*	45.49	3.911E+004	3.91E+004	1.121E+005	1.670E+004
		1120.29	14.92	2.637E+005		-7.415E+004	1.201E+005
		1764.49	15.30	1.918E+005		1.101E+005	8.100E+004
+	Pb-214	295.22*	18.42	1.458E+005	5.65E+004	3.620E+004	6.815E+004
		351.93*	35.60	5.654E+004		6.404E+004	2.556E+004
+	Ra-226	186.21*	3.64	7.092E+005	7.09E+005	4.959E+005	3.353E+005
	Ac-228	338.32	11.27	3.571E+005	1.36E+005	-9.958E+004	1.702E+005
		911.20	25.80	1.358E+005		9.772E+004	6.176E+004
		968.97	15.80	2.651E+005		-2.210E+005	1.222E+005
	Am-241	59.54	35.90	3.295E+005	3.29E+005	1.339E+005	1.617E+005

+ = Nuclide identified during the nuclide identification

* = Energy line found in the spectrum

> = Calculated MDA is zero due to zero counts in the region, or the region is outside the spectrum, or MDA has not been calculated

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

***** G A M M A S P E C T R U M A N A L Y S I S *****

Filename: C:\GENIE2K\CAMFILES\00001020.CNF

Report Generated On : 5/3/2018 3:06:57 PM

Sample Title : B106213AFSWC013GD
Sample Description : U1 East Valve House Wall
Sample Identification :
Sample Type : Gamma Direct
Sample Geometry : 3M90D_CP_2IN

Peak Locate Threshold : 3.00
Peak Locate Range (in channels) : 85 - 8192
Peak Area Range (in channels) : 85 - 8192
Identification Energy Tolerance : 10.000 keV

Sample Size : 2.830E+001 M²

Sample Taken On : 4/25/2018 9:00:00 AM
Acquisition Started : 4/25/2018 9:00:29 AM

Live Time : 600.0 seconds
Real Time : 600.4 seconds

Dead Time : 0.07 %

Energy Calibration Used Done On : 12/28/2017
Efficiency Calibration Used Done On : 2/1/2018
Efficiency ID : 3M90D_CP_2IN

Data Validated
54-18 - 1000
[Signature]

```
*****
*****          P E A K    A N A L Y S I S    R E P O R T          *****
*****
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Detector Name: 6279
Sample Title: B106213AFSWC013GD
Peak Analysis Performed on: 5/3/2018    3:06:57 PM
Peak Analysis From Channel: 85
Peak Analysis To Channel: 8192
```

Peak No.	ROI start	ROI end	Peak centroid	Energy (keV)	FWHM (keV)	Net Peak Area	Net Area Uncert.	Continuum Counts
1	121-	136	128.27	31.99	0.73	3.03E+001	30.70	6.67E+001
2	283-	346	300.03	74.98	1.23	3.38E+002	174.65	7.94E+002
3	1173-	1190	1181.20	295.46	0.79	1.28E+001	22.85	3.53E+001
4	1345-	1362	1353.38	338.54	0.25	5.21E+000	21.83	3.28E+001
5	1400-	1417	1408.80	352.40	0.54	1.50E+001	23.65	3.40E+001
6	2324-	2341	2332.27	583.35	0.89	1.32E+001	16.09	1.58E+001
7	2427-	2444	2435.89	609.26	1.05	1.72E+001	19.38	2.08E+001
8	2637-	2657	2646.30	661.87	1.19	1.23E+002	24.54	7.62E+000
9	5837-	5856	5846.61	1461.37	0.92	8.20E+001	18.11	0.00E+000

```
M = First peak in a multiplet region
m = Other peak in a multiplet region
F = Fitted singlet
```

Errors quoted at 2.000 sigma

 ***** N U C L I D E I D E N T I F I C A T I O N R E P O R T *****

Sample Title: B106213AFSWC013GD
 Nuclide Library Used: C:\GENIE2K\CAMFILES\Zion Lib-BNL.NLB

IDENTIFIED NUCLIDES

Nuclide Name	Id Confidence	Energy (keV)	Yield (%)	Activity (pCi/M ²)	Activity Uncertainty
K-40	1.000	1460.82*	10.66	1.15071E+006	2.73086E+005
Cs-137	1.000	661.66*	85.10	1.45379E+005	3.37803E+004
Tl-208	1.000	583.19*	85.00	1.46101E+004	1.78676E+004
Bi-214	0.442	609.32*	45.49	3.63119E+004	4.11427E+004
		1120.29	14.92		
		1764.49	15.30		
Pb-214	1.000	295.22*	18.42	4.47462E+004	8.05177E+004
		351.93*	35.60		

* = Energy line found in the spectrum.
 @ = Energy line not used for Weighted Mean Activity
 Energy Tolerance : 10.000 keV
 Nuclide confidence index threshold = 0.30
 Errors quoted at 2.000 sigma

 ***** I N T E R F E R E N C E C O R R E C T E D R E P O R T *****

Nuclide Name	Nuclide Id Confidence	Wt mean Activity (pCi/M^2)	Wt mean Activity Uncertainty
K-40	1.000	1.150707E+006	2.730862E+005
Cs-137	1.000	1.453789E+005	3.378027E+004
Tl-208	1.000	1.461006E+004	1.786757E+004
Bi-214	0.442	3.631194E+004	4.114274E+004
Pb-214	1.000	3.379565E+004	4.095197E+004

? = 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 2.000 sigma

***** U N I D E N T I F I E D P E A K S *****

Peak Locate Performed on: 5/3/2018 3:06:57 PM
 Peak Locate From Channel: 85
 Peak Locate To Channel: 8192

Peak No.	Energy (keV)	Peak Size in Counts per Second	Peak CPS % Uncertainty	Peak Type	Tol. Nuclide
1	31.99	5.0498E-002	101.32		
2	74.98	5.6272E-001	51.73		
4	338.54	8.6842E-003	419.05	Tol.	Ac-228

M = First peak in a multiplet region
 m = Other peak in a multiplet region
 F = Fitted singlet

Errors quoted at 2.000 sigma

 ***** N U C L I D E M D A R E P O R T *****

Detector Name: 6279
 Sample Geometry: 3M90D_CP_2IN
 Sample Title: B106213AFSWC013GD
 Nuclide Library Used: C:\GENIE2K\CAMFILES\Zion Lib-BNL.NLB

	Nuclide Name	Energy (keV)	Yield (%)	Line MDA (pCi/M ²)	Nuclide MDA (pCi/M ²)	Activity (pCi/M ²)	Dec. Level (pCi/M ²)
+	K-40	1460.82*	10.66	3.797E+004	3.80E+004	1.151E+006	0.000E+000
	Co-60	1173.23	99.85	4.188E+004	2.77E+004	6.785E+003	1.913E+004
		1332.49	99.98	2.767E+004		1.847E+004	1.192E+004
	Nb-94	702.65	99.81	3.514E+004	3.09E+004	2.368E+004	1.617E+004
		871.09	99.89	3.092E+004		1.851E+004	1.390E+004
	Ag-108m	433.90	90.50	3.899E+004	3.58E+004	1.089E+004	1.830E+004
		614.30	89.80	5.032E+004		6.263E+004	2.371E+004
		722.90	90.80	3.581E+004		-1.633E+004	1.634E+004
	Cs-134	604.72	97.62	4.135E+004	3.94E+004	-2.127E+003	1.935E+004
		795.86	85.46	3.939E+004		1.890E+004	1.795E+004
+	Cs-137	661.66*	85.10	2.341E+004	2.34E+004	1.454E+005	1.011E+004
	Eu-152	121.78	28.67	2.151E+005	1.16E+005	6.900E+004	1.053E+005
		344.28	26.60	1.643E+005		1.527E+005	7.856E+004
		1408.01	21.07	1.156E+005		-3.757E+004	4.840E+004
	Eu-154	123.07	40.40	1.517E+005	8.27E+004	1.714E+005	7.420E+004
		723.30	20.06	1.601E+005		-1.290E+005	7.299E+004
		1274.43	34.80	8.271E+004		4.855E+003	3.596E+004
	Eu-155	86.55	30.70	2.693E+005	2.69E+005	-4.485E+004	1.323E+005
		105.31	21.10	3.034E+005		-3.414E+005	1.485E+005
+	Tl-208	583.19*	85.00	2.908E+004	2.91E+004	1.461E+004	1.305E+004
	Bi-212	727.33	6.67	5.067E+005	5.07E+005	-5.835E+004	2.320E+005
	Pb-212	238.63	43.60	1.024E+005	1.02E+005	4.644E+004	4.939E+004
+	Bi-214	609.32*	45.49	6.653E+004	6.65E+004	3.631E+004	3.041E+004
		1120.29	14.92	2.496E+005		-4.885E+005	1.130E+005
		1764.49	15.30	1.918E+005		1.101E+005	8.100E+004
+	Pb-214	295.22*	18.42	1.348E+005	7.90E+004	4.475E+004	6.266E+004
		351.93*	35.60	7.902E+004		2.997E+004	3.680E+004
	Ra-226	186.21	3.64	1.394E+006	1.39E+006	5.053E+005	6.775E+005
	Ac-228	338.32	11.27	3.559E+005	1.58E+005	3.872E+005	1.696E+005
		911.20	25.80	1.575E+005		7.001E+004	7.261E+004
		968.97	15.80	2.224E+005		2.452E+005	1.008E+005
	Am-241	59.54	35.90	2.655E+005	2.66E+005	6.701E+004	1.297E+005

+ = Nuclide identified during the nuclide identification

* = Energy line found in the spectrum

> = Calculated MDA is zero due to zero counts in the region, or the region is outside the spectrum, or MDA has not been calculated

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

Filename: C:\GENIE2K\CAMFILES\00001034.CNF

Report Generated On : 5/3/2018 3:11:21 PM

Sample Title : B106213AFSWC014GD
Sample Description : U1 East Valve House Wall
Sample Identification :
Sample Type : Gamma Direct
Sample Geometry : 3M90D_CP_2IN

Peak Locate Threshold : 3.00
Peak Locate Range (in channels) : 85 - 8192
Peak Area Range (in channels) : 85 - 8192
Identification Energy Tolerance : 10.000 keV

Sample Size : 2.830E+001 M^2

Sample Taken On : 4/25/2018 2:28:00 PM
Acquisition Started : 4/25/2018 2:28:35 PM

Live Time : 600.0 seconds
Real Time : 600.5 seconds

Dead Time : 0.09 %

Energy Calibration Used Done On : 12/28/2017
Efficiency Calibration Used Done On : 2/1/2018
Efficiency ID : 3M90D_CP_2IN



Data Validated
5-4-18 1005

 ***** P E A K A N A L Y S I S R E P O R T *****

Detector Name: 6279
 Sample Title: B106213AFSWC014GD
 Peak Analysis Performed on: 5/3/2018 3:11:21 PM
 Peak Analysis From Channel: 85
 Peak Analysis To Channel: 8192

	Peak No.	ROI start	ROI end	Peak centroid	Energy (keV)	FWHM (keV)	Net Peak Area	Net Area Uncert.	Continuum Counts
M	1	121-	193	128.89	32.14	0.92	9.28E+000	106.40	9.30E+001
m	2	121-	193	185.53	46.32	0.94	3.97E+000	45.47	1.01E+002
M	3	292-	353	300.35	75.06	0.78	1.63E+002	35.68	2.69E+002
m	4	292-	353	340.66	85.14	0.79	7.08E+001	27.53	2.09E+002
	5	1399-	1416	1407.38	352.04	1.23	5.35E+001	22.21	2.15E+001
	6	2428-	2445	2436.77	609.48	0.91	2.64E+001	17.56	1.56E+001
	7	2635-	2657	2645.64	661.70	1.63	2.80E+002	38.17	2.22E+001
	8	3635-	3652	3643.96	911.23	0.58	2.09E+001	10.54	2.12E+000
	9	5834-	5854	5843.93	1460.70	1.59	8.90E+001	18.87	0.00E+000

M = First peak in a multiplet region
 m = Other peak in a multiplet region
 F = Fitted singlet

Errors quoted at 2.000 sigma

 ***** N U C L I D E I D E N T I F I C A T I O N R E P O R T *****

Sample Title: B106213AFSWC014GD
 Nuclide Library Used: C:\GENIE2K\CAMFILES\Zion Lib-BNL.NLB

IDENTIFIED NUCLIDES

Nuclide Name	Id Confidence	Energy (keV)	Yield (%)	Activity (pCi/M ²)	Activity Uncertainty
K-40	1.000	1460.82*	10.66	1.24858E+006	2.86042E+005
Cs-137	1.000	661.66*	85.10	3.29694E+005	5.99127E+004
Eu-155	0.331	86.55*	30.70	1.25327E+005	5.48027E+004
		105.31	21.10		
Bi-214	0.442	609.32*	45.49	5.57259E+004	3.76881E+004
		1120.29	14.92		
		1764.49	15.30		
Pb-214	0.437	295.22	18.42	1.06987E+005	4.72458E+004
		351.93*	35.60		

* = Energy line found in the spectrum.
 @ = Energy line not used for Weighted Mean Activity
 Energy Tolerance : 10.000 keV
 Nuclide confidence index threshold = 0.30
 Errors quoted at 2.000 sigma

 ***** INTERFERENCE CORRECTED REPORT *****

Nuclide Name	Nuclide Id Confidence	Wt mean Activity (pCi/M ²)	Wt mean Activity Uncertainty
K-40	1.000	1.248578E+006	2.860425E+005
Cs-137	1.000	3.296939E+005	5.991271E+004
Eu-155	0.331	1.253268E+005	5.480268E+004
Bi-214	0.442	5.572595E+004	3.768805E+004
Pb-214	0.437	1.069868E+005	4.724577E+004

? = 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 2.000 sigma

***** UNIDENTIFIED PEAKS *****

Peak Locate Performed on: 5/3/2018 3:11:21 PM
 Peak Locate From Channel: 85
 Peak Locate To Channel: 8192

Peak No.	Energy (keV)	Peak Size in Counts per Second	Peak CPS % Uncertainty	Peak Type	Tol. Nuclide
M 1	32.14	1.5474E-002	1145.98		
m 2	46.32	6.6090E-003	1146.69		
M 3	75.06	2.7120E-001	21.93		
8	911.23	3.4801E-002	50.47	Tol.	Ac-228

M = First peak in a multiplet region
 m = Other peak in a multiplet region
 F = Fitted singlet

Errors quoted at 2.000 sigma

 ***** N U C L I D E M D A R E P O R T *****

Detector Name: 6279
 Sample Geometry: 3M90D_CP_2IN
 Sample Title: B106213AFSWC014GD
 Nuclide Library Used: C:\GENIE2K\CAMFILES\Zion Lib-BNL.NLB

	Nuclide Name	Energy (keV)	Yield (%)	Line MDA (pCi/M^2)	Nuclide MDA (pCi/M^2)	Activity (pCi/M^2)	Dec. Level (pCi/M^2)
+	K-40	1460.82*	10.66	3.796E+004	3.80E+004	1.249E+006	0.000E+000
	Co-60	1173.23	99.85	3.761E+004	3.41E+004	-1.890E+002	1.700E+004
		1332.49	99.98	3.413E+004		2.983E+004	1.514E+004
	Nb-94	702.65	99.81	3.405E+004	2.99E+004	2.257E+003	1.562E+004
		871.09	99.89	2.987E+004		-1.089E+004	1.338E+004
	Ag-108m	433.90	90.50	5.058E+004	3.71E+004	2.547E+004	2.409E+004
		614.30	89.80	5.032E+004		1.345E+004	2.371E+004
		722.90	90.80	3.711E+004		-6.552E+004	1.699E+004
	Cs-134	604.72	97.62	4.318E+004	4.04E+004	4.403E+004	2.027E+004
		795.86	85.46	4.037E+004		2.254E+004	1.845E+004
+	Cs-137	661.66*	85.10	3.878E+004	3.88E+004	3.297E+005	1.780E+004
	Eu-152	121.78	28.67	2.677E+005	1.16E+005	-4.150E+004	1.315E+005
		344.28	26.60	1.723E+005		1.347E+003	8.256E+004
		1408.01	21.07	1.156E+005		-1.179E+005	4.840E+004
	Eu-154	123.07	40.40	1.887E+005	8.74E+004	-6.313E+004	9.268E+004
		723.30	20.06	1.699E+005		-5.857E+004	7.790E+004
		1274.43	34.80	8.736E+004		-1.896E+004	3.828E+004
+	Eu-155	86.55*	30.70	1.238E+005	1.24E+005	1.253E+005	5.950E+004
		105.31	21.10	3.982E+005		1.092E+002	1.959E+005
	Tl-208	583.19	85.00	4.599E+004	4.60E+004	-2.174E+003	2.150E+004
	Bi-212	727.33	6.67	5.125E+005	5.12E+005	3.193E+005	2.349E+005
	Pb-212	238.63	43.60	1.267E+005	1.27E+005	9.209E+004	6.155E+004
+	Bi-214	609.32*	45.49	5.520E+004	5.52E+004	5.573E+004	2.474E+004
		1120.29	14.92	2.803E+005		3.490E+005	1.284E+005
		1764.49	15.30	2.410E+005		1.872E+005	1.056E+005
+	Pb-214	295.22	18.42	2.560E+005	6.05E+004	-1.459E+005	1.232E+005
		351.93*	35.60	6.045E+004		1.070E+005	2.752E+004
	Ra-226	186.21	3.64	1.731E+006	1.73E+006	-8.111E+005	8.465E+005
	Ac-228	338.32	11.27	3.571E+005	1.56E+005	8.943E+004	1.702E+005
		911.20	25.80	1.560E+005		1.208E+005	7.183E+004
		968.97	15.80	2.286E+005		2.862E+004	1.039E+005
	Am-241	59.54	35.90	3.341E+005	3.34E+005	3.680E+005	1.640E+005

- + = Nuclide identified during the nuclide identification
- * = Energy line found in the spectrum
- > = Calculated MDA is zero due to zero counts in the region, or the region is outside the spectrum, or MDA has not been calculated
- @ = Half-life too short to be able to perform the decay correction

Filename: C:\GENIE2K\CAMFILES\00001033.CNF

Report Generated On : 5/3/2018 3:12:13 PM

Sample Title : B106213AFSWC015GD
Sample Description : U1 East Valve House Wall
Sample Identification :
Sample Type : Gamma Direct
Sample Geometry : 3M90D_CP_2IN

Peak Locate Threshold : 3.00
Peak Locate Range (in channels) : 85 - 8192
Peak Area Range (in channels) : 85 - 8192
Identification Energy Tolerance : 10.000 keV

Sample Size : 2.830E+001 M^2

Sample Taken On : 4/25/2018 2:15:00 PM
Acquisition Started : 4/25/2018 2:15:18 PM

Live Time : 600.0 seconds
Real Time : 600.4 seconds

Dead Time : 0.07 %

Energy Calibration Used Done On : 12/28/2017
Efficiency Calibration Used Done On : 2/1/2018
Efficiency ID : 3M90D_CP_2IN

Data Validated
Σ 4-18 1010
[Signature]

 ***** P E A K A N A L Y S I S R E P O R T *****

Detector Name: 6279
 Sample Title: B106213AFSWC015GD
 Peak Analysis Performed on: 5/3/2018 3:12:12 PM
 Peak Analysis From Channel: 85
 Peak Analysis To Channel: 8192

Peak No.	ROI start	ROI end	Peak centroid	Energy (keV)	FWHM (keV)	Net Peak Area	Net Area Uncert.	Continuum Counts
1	121-	136	128.78	32.12	0.78	3.60E+001	28.27	5.30E+001
2	282-	346	299.81	74.92	0.90	2.75E+002	191.23	9.49E+002
3	945-	962	953.75	238.56	0.64	2.73E+001	31.50	6.77E+001
4	1172-	1189	1180.08	295.18	0.89	2.95E+001	24.39	3.35E+001
5	1342-	1359	1350.49	337.81	0.39	3.01E+001	19.51	1.99E+001
6	1398-	1416	1407.02	351.95	1.20	4.67E+001	23.84	2.83E+001
7	2035-	2052	2043.96	511.26	0.29	3.05E+001	17.29	1.35E+001
8	2323-	2340	2331.29	583.11	1.04	1.05E+001	17.73	2.05E+001
9	2428-	2445	2436.21	609.34	0.34	4.28E+001	15.01	4.19E+000
10	2637-	2654	2645.74	661.73	0.37	3.37E+001	18.31	1.53E+001
11	5833-	5854	5844.30	1460.79	1.66	9.27E+001	22.27	8.29E+000
12	7050-	7069	7059.67	1764.11	0.75	1.27E+001	9.16	2.33E+000

M = First peak in a multiplet region
 m = Other peak in a multiplet region
 F = Fitted singlet

Errors quoted at 2.000 sigma

 ***** N U C L I D E I D E N T I F I C A T I O N R E P O R T *****

Sample Title: B106213AFSWC015GD
 Nuclide Library Used: C:\GENIE2K\CAMFILES\Zion Lib-BNL.NLB

IDENTIFIED NUCLIDES

Nuclide Name	Id Confidence	Energy (keV)	Yield (%)	Activity (pCi/M ²)	Activity Uncertainty
K-40	1.000	1460.82*	10.66	1.30061E+006	3.32259E+005
Cs-137	1.000	661.66*	85.10	3.96786E+004	2.20920E+004
Tl-208	1.000	583.19*	85.00	1.15890E+004	1.96281E+004
Pb-212	1.000	238.63*	43.60	3.63467E+004	4.22809E+004
Bi-214	0.706	609.32*	45.49	9.03956E+004	3.35070E+004
		1120.29	14.92		
		1764.49*	15.30	1.39443E+005	1.01424E+005
Pb-214	1.000	295.22*	18.42	1.03397E+005	8.71458E+004
		351.93*	35.60	9.35050E+004	4.97182E+004

* = Energy line found in the spectrum.
 @ = Energy line not used for Weighted Mean Activity
 Energy Tolerance : 10.000 keV
 Nuclide confidence index threshold = 0.30
 Errors quoted at 2.000 sigma

***** INTERFERENCE CORRECTED REPORT *****

Nuclide Name	Nuclide Id Confidence	Wt mean Activity (pCi/M ²)	Wt mean Activity Uncertainty
K-40	1.000	1.300613E+006	3.322586E+005
Cs-137	1.000	3.967863E+004	2.209197E+004
Tl-208	1.000	1.158898E+004	1.962813E+004
Pb-212	1.000	3.634666E+004	4.228089E+004
Bi-214	0.706	9.522199E+004	3.181576E+004
Pb-214	1.000	9.593404E+004	4.318444E+004

? = 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 2.000 sigma

***** UNIDENTIFIED PEAKS *****

Peak Locate Performed on: 5/3/2018 3:12:12 PM
 Peak Locate From Channel: 85
 Peak Locate To Channel: 8192

Peak No.	Energy (keV)	Peak Size in Counts per Second	Peak CPS % Uncertainty	Peak Type	Tol. Nuclide
1	32.12	6.0009E-002	78.52		
2	74.92	4.5761E-001	69.65		
5	337.81	5.0117E-002	64.89	Tol.	Ac-228
7	511.26	5.0890E-002	56.63		

M = First peak in a multiplet region
 m = Other peak in a multiplet region
 F = Fitted singlet

Errors quoted at 2.000 sigma

 ***** N U C L I D E M D A R E P O R T *****

Detector Name: 6279
 Sample Geometry: 3M90D_CP_2IN
 Sample Title: B106213AFSWC015GD
 Nuclide Library Used: C:\GENIE2K\CAMFILES\Zion Lib-BNL.NLB

	Nuclide Name	Energy (keV)	Yield (%)	Line MDA (pCi/M^2)	Nuclide MDA (pCi/M^2)	Activity (pCi/M^2)	Dec. Level (pCi/M^2)
+	K-40	1460.82*	10.66	2.962E+005	2.96E+005	1.301E+006	1.291E+005
	Co-60	1173.23	99.85	3.137E+004	3.14E+004	-1.361E+004	1.388E+004
		1332.49	99.98	3.340E+004		1.202E+004	1.478E+004
	Nb-94	702.65	99.81	3.050E+004	3.05E+004	1.154E+003	1.385E+004
		871.09	99.89	3.143E+004		-1.553E+004	1.416E+004
	Ag-108m	433.90	90.50	3.805E+004	3.58E+004	4.277E+003	1.783E+004
		614.30	89.80	5.162E+004		5.355E+004	2.436E+004
		722.90	90.80	3.581E+004		-1.586E+004	1.634E+004
	Cs-134	604.72	97.62	4.567E+004	3.89E+004	5.124E+004	2.151E+004
		795.86	85.46	3.889E+004		1.503E+004	1.770E+004
+	Cs-137	661.66*	85.10	3.063E+004	3.06E+004	3.968E+004	1.372E+004
	Eu-152	121.78	28.67	2.292E+005	1.56E+005	-4.154E+003	1.123E+005
		344.28	26.60	1.727E+005		8.319E+004	8.279E+004
		1408.01	21.07	1.557E+005		-3.121E+004	6.845E+004
	Eu-154	123.07	40.40	1.630E+005	9.17E+004	1.315E+005	7.987E+004
		723.30	20.06	1.661E+005		-4.968E+004	7.597E+004
		1274.43	34.80	9.174E+004		-1.097E+004	4.047E+004
	Eu-155	86.55	30.70	2.780E+005	2.78E+005	-6.314E+004	1.366E+005
		105.31	21.10	3.313E+005		-2.607E+005	1.625E+005
+	Tl-208	583.19*	85.00	3.297E+004	3.30E+004	1.159E+004	1.499E+004
	Bi-212	727.33	6.67	5.238E+005	5.24E+005	-1.461E+005	2.406E+005
+	Pb-212	238.63*	43.60	6.857E+004	6.86E+004	3.635E+004	3.249E+004
+	Bi-214	609.32*	45.49	3.126E+004	3.13E+004	9.040E+004	1.277E+004
		1120.29	14.92	2.384E+005		5.452E+004	1.074E+005
		1764.49*	15.30	1.341E+005		1.394E+005	5.216E+004
+	Pb-214	295.22*	18.42	1.355E+005	6.97E+004	1.034E+005	6.302E+004
		351.93*	35.60	6.971E+004		9.350E+004	3.215E+004
	Ra-226	186.21	3.64	1.346E+006	1.35E+006	4.853E+005	6.537E+005
	Ac-228	338.32	11.27	3.595E+005	1.51E+005	-8.554E+004	1.714E+005
		911.20	25.80	1.512E+005		6.829E+003	6.945E+004
		968.97	15.80	2.517E+005		1.924E+005	1.155E+005
	Am-241	59.54	35.90	2.881E+005	2.88E+005	-1.496E+005	1.410E+005

+ = Nuclide identified during the nuclide identification
 * = Energy line found in the spectrum
 > = Calculated MDA is zero due to zero counts in the region, or the region is outside the spectrum, or MDA has not been calculated
 @ = Half-life too short to be able to perform the decay correction

***** G A M M A S P E C T R U M A N A L Y S I S *****

Filename: C:\GENIE2K\CAMFILES\00001021.CNF

Report Generated On : 5/3/2018 3:24:07 PM

Sample Title : B106213AFSWC016GD
Sample Description : U1 East Valve House Wall
Sample Identification :
Sample Type : Gamma Direct
Sample Geometry : 3M90D_CP_2IN

Peak Locate Threshold : 3.00
Peak Locate Range (in channels) : 85 - 8192
Peak Area Range (in channels) : 85 - 8192
Identification Energy Tolerance : 10.000 keV


Sample Size : 2.830E+001 M²

Sample Taken On : 4/25/2018 9:13:00 AM
Acquisition Started : 4/25/2018 9:13:06 AM

Live Time : 600.0 seconds
Real Time : 600.4 seconds

Dead Time : 0.07 %

Energy Calibration Used Done On : 12/28/2017
Efficiency Calibration Used Done On : 2/1/2018
Efficiency ID : 3M90D_CP_2IN

Data Validated
5/4/18 1015


 ***** P E A K A N A L Y S I S R E P O R T *****

Detector Name: 6279

Sample Title: B106213AFSWC016GD

Peak Analysis Performed on: 5/3/2018 3:24:06 PM

Peak Analysis From Channel: 85

Peak Analysis To Channel: 8192

Peak No.	ROI start	ROI end	Peak centroid	Energy (keV)	FWHM (keV)	Net Peak Area	Net Area Uncert.	Continuum Counts
1	121-	136	128.44	32.03	0.40	4.63E+000	29.12	6.84E+001
2	284-	317	300.74	75.15	0.80	2.49E+002	96.47	3.95E+002
3	947-	964	955.35	238.96	0.84	2.30E+001	32.07	7.20E+001
4	1173-	1190	1181.67	295.58	0.25	6.51E-001	24.91	4.73E+001
5	1399-	1417	1408.17	352.24	1.06	3.71E+001	23.79	3.09E+001
6	2035-	2052	2043.92	511.25	0.44	3.25E+001	17.48	1.35E+001
7	2325-	2342	2333.04	583.55	0.82	1.15E+001	14.96	1.35E+001
8	2429-	2446	2437.89	609.76	0.72	3.65E+001	17.93	1.35E+001
9	2640-	2657	2648.36	662.38	1.47	2.31E+001	17.18	1.39E+001
10	3637-	3654	3645.77	911.68	0.35	1.11E+001	15.64	1.39E+001
11	5839-	5858	5848.46	1461.83	0.56	6.54E+001	17.32	2.62E+000

M = First peak in a multiplet region

m = Other peak in a multiplet region

F = Fitted singlet

Errors quoted at 2.000 sigma

 ***** N U C L I D E I D E N T I F I C A T I O N R E P O R T *****

Sample Title: B106213AFSWC016GD
 Nuclide Library Used: C:\GENIE2K\CAMFILES\Zion Lib-BNL.NLB

IDENTIFIED NUCLIDES

Nuclide Name	Id Confidence	Energy (keV)	Yield (%)	Activity (pCi/M ²)	Activity Uncertainty
K-40	0.998	1460.82*	10.66	9.17694E+005	2.55777E+005
Cs-137	0.999	661.66*	85.10	2.72230E+004	2.05179E+004
Tl-208	1.000	583.19*	85.00	1.27074E+004	1.66013E+004
Pb-212	1.000	238.63*	43.60	3.06008E+004	4.29474E+004
Bi-214	0.442	609.32*	45.49	7.71019E+004	3.89950E+004
		1120.29	14.92		
		1764.49	15.30		
Pb-214	1.000	295.22*	18.42	2.28530E+003	8.74299E+004
		351.93*	35.60	7.42757E+004	4.89107E+004

* = Energy line found in the spectrum.
 @ = Energy line not used for Weighted Mean Activity
 Energy Tolerance : 10.000 keV
 Nuclide confidence index threshold = 0.30
 Errors quoted at 2.000 sigma

 ***** I N T E R F E R E N C E C O R R E C T E D R E P O R T *****

Nuclide Name	Nuclide Id Confidence	Wt mean Activity (pCi/M ²)	Wt mean Activity Uncertainty
K-40	0.998	9.176937E+005	2.557770E+005
Cs-137	0.999	2.722302E+004	2.051788E+004
Tl-208	1.000	1.270739E+004	1.660126E+004
Pb-212	1.000	3.060075E+004	4.294741E+004
Bi-214	0.442	7.710189E+004	3.899501E+004
Pb-214	1.000	5.711594E+004	4.268529E+004

? = 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 2.000 sigma

***** UNIDENTIFIED PEAKS *****

Peak Locate Performed on: 5/3/2018 3:24:06 PM
Peak Locate From Channel: 85
Peak Locate To Channel: 8192

Peak No.	Energy (keV)	Peak Size in Counts per Second	Peak CPS % Uncertainty	Peak Type	Tol. Nuclide
1	32.03	7.7169E-003	628.83		
2	75.15	4.1495E-001	38.75		
6	511.25	5.4167E-002	53.79		
10	911.68	1.8500E-002	140.89	Sum	

M = First peak in a multiplet region
m = Other peak in a multiplet region
F = Fitted singlet

Errors quoted at 2.000 sigma

 ***** N U C L I D E M D A R E P O R T *****

Detector Name: 6279
 Sample Geometry: 3M90D_CP_2IN
 Sample Title: B106213AFSWC016GD
 Nuclide Library Used: C:\GENIE2K\CAMFILES\Zion Lib-BNL.NLB

	Nuclide Name	Energy (keV)	Yield (%)	Line MDA (pCi/M^2)	Nuclide MDA (pCi/M^2)	Activity (pCi/M^2)	Dec. Level (pCi/M^2)
+	K-40	1460.82*	10.66	1.809E+005	1.81E+005	9.177E+005	7.146E+004
	Co-60	1173.23	99.85	3.873E+004	3.69E+004	4.269E+004	1.756E+004
		1332.49	99.98	3.689E+004		2.100E+004	1.652E+004
	Nb-94	702.65	99.81	3.405E+004	3.40E+004	-9.313E+003	1.562E+004
		871.09	99.89	3.522E+004		-1.760E+004	1.606E+004
	Ag-108m	433.90	90.50	3.899E+004	3.90E+004	-9.120E+003	1.830E+004
		614.30	89.80	5.412E+004		5.451E+004	2.561E+004
		722.90	90.80	3.957E+004		1.981E+004	1.822E+004
	Cs-134	604.72	97.62	4.687E+004	3.34E+004	4.744E+004	2.211E+004
		795.86	85.46	3.341E+004		-3.208E+004	1.496E+004
+	Cs-137	661.66*	85.10	3.081E+004	3.08E+004	2.722E+004	1.381E+004
	Eu-152	121.78	28.67	2.135E+005	1.26E+005	-1.171E+005	1.044E+005
		344.28	26.60	1.657E+005		9.133E+004	7.928E+004
		1408.01	21.07	1.258E+005		7.629E+004	5.351E+004
	Eu-154	123.07	40.40	1.509E+005	7.77E+004	5.636E+004	7.382E+004
		723.30	20.06	1.774E+005		1.830E+004	8.161E+004
		1274.43	34.80	7.775E+004		-3.492E+004	3.347E+004
	Eu-155	86.55	30.70	2.614E+005	2.61E+005	1.916E+005	1.283E+005
		105.31	21.10	3.138E+005		2.432E+005	1.537E+005
	Tl-208	583.19*	85.00	2.723E+004	2.72E+004	1.271E+004	1.212E+004
	Bi-212	727.33	6.67	5.349E+005	5.35E+005	-2.720E+005	2.461E+005
+	Pb-212	238.63*	43.60	7.057E+004	7.06E+004	3.060E+004	3.348E+004
+	Bi-214	609.32*	45.49	5.175E+004	5.18E+004	7.710E+004	2.302E+004
		1120.29	14.92	2.671E+005		-3.554E+005	1.218E+005
		1764.49	15.30	2.410E+005		1.872E+005	1.056E+005
+	Pb-214	295.22*	18.42	1.530E+005	7.27E+004	2.285E+003	7.176E+004
		351.93*	35.60	7.272E+004		7.428E+004	3.365E+004
	Ra-226	186.21	3.64	1.228E+006	1.23E+006	4.355E+005	5.949E+005
	Ac-228	338.32	11.27	3.472E+005	1.75E+005	1.055E+005	1.652E+005
		911.20	25.80	1.750E+005		2.283E+005	8.135E+004
		968.97	15.80	2.517E+005		3.218E+005	1.155E+005
	Am-241	59.54	35.90	2.820E+005	2.82E+005	2.307E+005	1.380E+005

+ = Nuclide identified during the nuclide identification
 * = Energy line found in the spectrum
 > = Calculated MDA is zero due to zero counts in the region, or the region is outside the spectrum, or MDA has not been calculated
 @ = Half-life too short to be able to perform the decay correction

***** G A M M A S P E C T R U M A N A L Y S I S *****

Filename: C:\GENIE2K\CAMFILES\00001035.CNF

Report Generated On : 5/3/2018 3:49:22 PM

Sample Title : B106213AFSWC017GD
Sample Description : U1 East Valve House Wall
Sample Identification :
Sample Type : Gamma Direct
Sample Geometry : 3M90D_CP_2IN

Peak Locate Threshold : 3.00
Peak Locate Range (in channels) : 85 - 8192
Peak Area Range (in channels) : 85 - 8192
Identification Energy Tolerance : 10.000 keV

Sample Size : 2.830E+001 M²

Sample Taken On : 4/25/2018 2:41:00 PM
Acquisition Started : 4/25/2018 2:41:13 PM

Live Time : 600.0 seconds
Real Time : 600.9 seconds

Dead Time : 0.16 %

Energy Calibration Used Done On : 12/28/2017
Efficiency Calibration Used Done On : 2/1/2018
Efficiency ID : 3M90D_CP_2IN

Data Validated

SLH 1020



 ***** P E A K A N A L Y S I S R E P O R T *****

Detector Name: 6279

Sample Title: B106213AFSWC017GD

Peak Analysis Performed on: 5/3/2018 3:49:21 PM

Peak Analysis From Channel: 85

Peak Analysis To Channel: 8192

Peak No.	ROI start	ROI end	Peak centroid	Energy (keV)	FWHM (keV)	Net Peak Area	Net Area Uncert.	Continuum Counts
1	120-	155	128.67	32.09	1.19	5.67E+002	110.64	4.45E+002
2	285-	347	300.76	75.16	1.00	3.37E+002	294.91	2.38E+003
3	719-	735	727.90	182.05	0.51	9.28E+000	60.72	2.89E+002
4	1398-	1415	1406.90	351.92	1.37	3.53E+001	39.09	1.05E+002
5	2428-	2446	2437.20	609.59	1.29	5.71E+001	19.72	1.19E+001
6	2633-	2660	2646.52	661.92	1.35	2.14E+003	94.85	2.44E+001
7	5836-	5855	5845.73	1461.15	1.03	5.94E+001	18.58	7.58E+000

M = First peak in a multiplet region

m = Other peak in a multiplet region

F = Fitted singlet

Errors quoted at 2.000 sigma

 ***** N U C L I D E I D E N T I F I C A T I O N R E P O R T *****

Sample Title: B106213AFSWC017GD
 Nuclide Library Used: C:\GENIE2K\CAMFILES\Zion Lib-BNL.NLB

IDENTIFIED NUCLIDES

Nuclide Name	Id Confidence	Energy (keV)	Yield (%)	Activity (pCi/M ²)	Activity Uncertainty
K-40	1.000	1460.82*	10.66	8.33734E+005	2.70554E+005
Cs-137	1.000	661.66*	85.10	2.52121E+006	3.22745E+005
Bi-214	0.442	609.32*	45.49	1.20679E+005	4.41071E+004
		1120.29	14.92		
		1764.49	15.30		
Pb-214	0.437	295.22	18.42	7.06878E+004	7.89287E+004
		351.93*	35.60		
Ra-226	0.973	186.21*	3.64	1.31030E+005	8.58116E+005

* = Energy line found in the spectrum.
 @ = Energy line not used for Weighted Mean Activity
 Energy Tolerance : 10.000 keV
 Nuclide confidence index threshold = 0.30
 Errors quoted at 2.000 sigma

 ***** I N T E R F E R E N C E C O R R E C T E D R E P O R T *****

Nuclide Name	Nuclide Id Confidence	Wt mean Activity (pCi/M^2)	Wt mean Activity Uncertainty
K-40	1.000	8.337336E+005	2.705536E+005
Cs-137	1.000	2.521207E+006	3.227451E+005
Bi-214	0.442	1.206788E+005	4.410706E+004
Pb-214	0.437	7.068779E+004	7.892871E+004
Ra-226	0.973	1.310302E+005	8.581158E+005

? = 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 2.000 sigma

***** U N I D E N T I F I E D P E A K S *****

Peak Locate Performed on: 5/3/2018 3:49:21 PM
 Peak Locate From Channel: 85
 Peak Locate To Channel: 8192

Peak No.	Energy (keV)	Peak Size in Counts per Second	Peak CPS % Uncertainty	Peak Type	Tol. Nuclide
1	32.09	9.4514E-001	19.51		
2	75.16	5.6196E-001	87.47		

M = First peak in a multiplet region
 m = Other peak in a multiplet region
 F = Fitted singlet

Errors quoted at 2.000 sigma

 ***** N U C L I D E M D A R E P O R T *****

Detector Name: 6279
 Sample Geometry: 3M90D_CP_2IN
 Sample Title: B106213AFSWC017GD
 Nuclide Library Used: C:\GENIE2K\CAMFILES\Zion Lib-BNL.NLB

	Nuclide Name	Energy (keV)	Yield (%)	Line MDA (pCi/M^2)	Nuclide MDA (pCi/M^2)	Activity (pCi/M^2)	Dec. Level (pCi/M^2)
+	K-40	1460.82*	10.66	2.773E+005	2.77E+005	8.337E+005	1.197E+005
	Co-60	1173.23	99.85	3.981E+004	3.34E+004	-1.409E+004	1.810E+004
		1332.49	99.98	3.340E+004		-6.144E+003	1.478E+004
	Nb-94	702.65	99.81	2.877E+004	2.88E+004	-4.091E+003	1.298E+004
		871.09	99.89	3.738E+004		3.476E+004	1.713E+004
	Ag-108m	433.90	90.50	8.914E+004	3.21E+004	5.238E+004	4.337E+004
		614.30	89.80	6.204E+004		1.016E+005	2.957E+004
		722.90	90.80	3.206E+004		3.349E+004	1.447E+004
	Cs-134	604.72	97.62	5.718E+004	3.94E+004	4.092E+004	2.727E+004
		795.86	85.46	3.939E+004		-2.053E+004	1.795E+004
+	Cs-137	661.66*	85.10	4.372E+004	4.37E+004	2.521E+006	2.027E+004
	Eu-152	121.78	28.67	3.442E+005	1.40E+005	1.247E+005	1.698E+005
		344.28	26.60	2.723E+005		-1.141E+005	1.326E+005
		1408.01	21.07	1.395E+005		3.133E+004	6.037E+004
	Eu-154	123.07	40.40	2.442E+005	9.38E+004	3.852E+005	1.205E+005
		723.30	20.06	1.452E+005		1.517E+005	6.551E+004
		1274.43	34.80	9.384E+004		3.347E+004	4.152E+004
	Eu-155	86.55	30.70	4.167E+005	4.17E+005	1.391E+005	2.060E+005
		105.31	21.10	5.078E+005		3.201E+004	2.507E+005
	Tl-208	583.19	85.00	5.952E+004	5.95E+004	2.182E+004	2.827E+004
	Bi-212	727.33	6.67	4.239E+005	4.24E+005	-9.141E+004	1.906E+005
	Pb-212	238.63	43.60	1.968E+005	1.97E+005	3.355E+004	9.658E+004
+	Bi-214	609.32*	45.49	4.972E+004	4.97E+004	1.207E+005	2.200E+004
		1120.29	14.92	2.738E+005		3.315E+005	1.251E+005
		1764.49	15.30	2.347E+005		1.762E+005	1.025E+005
+	Pb-214	295.22	18.42	3.971E+005	1.28E+005	1.863E+005	1.938E+005
		351.93*	35.60	1.280E+005		7.069E+004	6.129E+004
+	Ra-226	186.21*	3.64	1.442E+006	1.44E+006	1.310E+005	7.020E+005
	Ac-228	338.32	11.27	6.132E+005	1.36E+005	4.669E+005	2.983E+005
		911.20	25.80	1.358E+005		1.202E+004	6.176E+004
		968.97	15.80	2.160E+005		-1.749E+005	9.762E+004
	Am-241	59.54	35.90	4.209E+005	4.21E+005	1.550E+005	2.074E+005

+ = Nuclide identified during the nuclide identification
 * = Energy line found in the spectrum
 > = Calculated MDA is zero due to zero counts in the region, or the region is outside the spectrum, or MDA has not been calculated
 @ = Half-life too short to be able to perform the decay correction

***** G A M M A S P E C T R U M A N A L Y S I S *****

Filename: C:\GENIE2K\CAMFILES\00001036.CNF

Report Generated On : 5/3/2018 3:09:59 PM

Sample Title : B106213AFSWC018GD
Sample Description : U1 East Valve House Wall
Sample Identification :
Sample Type : Gamma Direct
Sample Geometry : 3M90D_CP_2IN

Peak Locate Threshold : 3.00
Peak Locate Range (in channels) : 85 - 8192
Peak Area Range (in channels) : 85 - 8192
Identification Energy Tolerance : 10.000 keV


Sample Size : 2.830E+001 M^2

Sample Taken On : 4/25/2018 2:54:00 PM
Acquisition Started : 4/25/2018 2:54:43 PM

Live Time : 600.0 seconds
Real Time : 600.6 seconds

Dead Time : 0.10 %

Energy Calibration Used Done On : 12/28/2017
Efficiency Calibration Used Done On : 2/1/2018
Efficiency ID : 3M90D_CP_2IN

Data Validated
54-18 1025


 ***** P E A K A N A L Y S I S R E P O R T *****

Detector Name: 6279

Sample Title: B106213AFSWC018GD

Peak Analysis Performed on: 5/3/2018 3:09:58 PM

Peak Analysis From Channel: 85

Peak Analysis To Channel: 8192

Peak No.	ROI start	ROI end	Peak centroid	Energy (keV)	FWHM (keV)	Net Peak Area	Net Area Uncert.	Continuum Counts
1	121-	138	128.81	32.12	1.06	1.29E+002	44.91	1.15E+002
2	292-	347	300.47	75.08	0.71	-7.99E+001	222.83	1.55E+003
3	946-	964	955.28	238.94	0.49	-3.09E-001	45.25	1.48E+002
4	1173-	1190	1181.64	295.57	0.58	1.27E+001	33.68	8.33E+001
5	1400-	1417	1408.01	352.20	0.32	7.50E+001	28.65	4.00E+001
6	2033-	2050	2041.63	510.68	0.96	2.87E+001	22.31	2.93E+001
7	2325-	2342	2333.30	583.61	0.43	1.75E+001	15.51	1.15E+001
8	2429-	2446	2437.62	609.69	1.44	4.18E+001	18.39	1.32E+001
9	2635-	2658	2646.58	661.94	1.12	4.71E+002	49.05	3.27E+001
10	3637-	3654	3645.47	911.61	1.32	2.28E+001	14.06	8.24E+000
11	3868-	3885	3876.48	969.33	0.31	1.69E+001	9.78	2.14E+000
12	5837-	5856	5846.24	1461.28	1.26	7.10E+001	18.82	5.00E+000

M = First peak in a multiplet region

m = Other peak in a multiplet region

F = Fitted singlet

Errors quoted at 2.000 sigma

 ***** N U C L I D E I D E N T I F I C A T I O N R E P O R T *****

Sample Title: B106213AFSWC018GD
 Nuclide Library Used: C:\GENIE2K\CAMFILES\Zion Lib-BNL.NLB

..... IDENTIFIED NUCLIDES

Nuclide Name	Id Confidence	Energy (keV)	Yield (%)	Activity (pCi/M ²)	Activity Uncertainty
K-40	1.000	1460.82*	10.66	9.96304E+005	2.77929E+005
Cs-137	1.000	661.66*	85.10	5.55384E+005	8.82530E+004
Tl-208	1.000	583.19*	85.00	1.93289E+004	1.72946E+004
Pb-212	1.000	238.63*	43.60	-4.11268E+002	6.01950E+004
Bi-214	0.442	609.32*	45.49	8.83116E+004	4.02785E+004
		1120.29	14.92		
		1764.49	15.30		
Pb-214	1.000	295.22*	18.42	4.46541E+004	1.18427E+005
		351.93*	35.60	1.50132E+005	6.15963E+004
Ac-228	0.582	338.32	11.27		
		911.20*	25.80	1.03633E+005	6.47872E+004
		968.97*	15.80	1.29156E+005	7.58991E+004

* = Energy line found in the spectrum.
 @ = Energy line not used for Weighted Mean Activity
 Energy Tolerance : 10.000 keV
 Nuclide confidence index threshold = 0.30
 Errors quoted at 2.000 sigma

 ***** I N T E R F E R E N C E C O R R E C T E D R E P O R T *****

Nuclide Name	Nuclide Id Confidence	Wt mean Activity (pCi/M ²)	Wt mean Activity Uncertainty
K-40	1.000	9.963045E+005	2.779288E+005
Cs-137	1.000	5.553842E+005	8.825300E+004
Tl-208	1.000	1.932892E+004	1.729465E+004
Pb-212	1.000	-4.112678E+002	6.019504E+004
Bi-214	0.442	8.831158E+004	4.027850E+004
Pb-214	1.000	1.276730E+005	5.464660E+004
Ac-228	0.582	1.143910E+005	4.927637E+004

? = 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 2.000 sigma

***** UNIDENTIFIED PEAKS *****

Peak Locate Performed on: 5/3/2018 3:09:58 PM
Peak Locate From Channel: 85
Peak Locate To Channel: 8192

Peak No.	Energy (keV)	Peak Size in Counts per Second	Peak CPS % Uncertainty	Peak Type	Tol. Nuclide
1	32.12	2.1582E-001	34.68		
2	75.08	-1.3318E-001	-278.86		
6	510.68	4.7766E-002	77.84		

M = First peak in a multiplet region

m = Other peak in a multiplet region

F = Fitted singlet

Errors quoted at 2.000 sigma

 ***** N U C L I D E M D A R E P O R T *****

Detector Name: 6279
 Sample Geometry: 3M90D_CP_2IN
 Sample Title: B106213AFSWC018GD
 Nuclide Library Used: C:\GENIE2K\CAMFILES\Zion Lib-BNL.NLB

	Nuclide Name	Energy (keV)	Yield (%)	Line MDA (pCi/M ²)	Nuclide MDA (pCi/M ²)	Activity (pCi/M ²)	Dec. Level (pCi/M ²)
+	K-40	1460.82*	10.66	2.315E+005	2.31E+005	9.963E+005	9.675E+004
	Co-60	1173.23	99.85	3.526E+004	3.53E+004	2.925E+003	1.583E+004
		1332.49	99.98	4.004E+004		4.262E+004	1.810E+004
	Nb-94	702.65	99.81	3.920E+004	3.43E+004	3.756E+004	1.820E+004
		871.09	99.89	3.432E+004		-2.322E+004	1.560E+004
	Ag-108m	433.90	90.50	5.686E+004	3.75E+004	4.999E+004	2.723E+004
		614.30	89.80	5.111E+004		2.714E+002	2.410E+004
		722.90	90.80	3.753E+004		-3.680E+004	1.720E+004
	Cs-134	604.72	97.62	4.825E+004	4.04E+004	3.685E+003	2.280E+004
		795.86	85.46	4.037E+004		7.972E+003	1.845E+004
+	Cs-137	661.66*	85.10	4.740E+004	4.74E+004	5.554E+005	2.211E+004
	Eu-152	121.78	28.67	2.735E+005	1.48E+005	2.758E+004	1.344E+005
		344.28	26.60	2.287E+005		6.116E+004	1.108E+005
		1408.01	21.07	1.478E+005		4.378E+004	6.454E+004
	Eu-154	123.07	40.40	1.934E+005	8.51E+004	1.395E+005	9.503E+004
		723.30	20.06	1.661E+005		-2.301E+005	7.597E+004
		1274.43	34.80	8.507E+004		2.500E+004	3.714E+004
	Eu-155	86.55	30.70	3.273E+005	3.27E+005	3.277E+005	1.613E+005
		105.31	21.10	3.884E+005		-2.000E+005	1.910E+005
+	Tl-208	583.19*	85.00	2.673E+004	2.67E+004	1.933E+004	1.187E+004
	Bi-212	727.33	6.67	5.510E+005	5.51E+005	-2.096E+005	2.542E+005
+	Pb-212	238.63*	43.60	1.027E+005	1.03E+005	-4.113E+002	4.953E+004
+	Bi-214	609.32*	45.49	5.117E+004	5.12E+004	8.831E+004	2.273E+004
		1120.29	14.92	2.803E+005		2.532E+005	1.284E+005
		1764.49	15.30	2.410E+005		7.901E+004	1.056E+005
+	Pb-214	295.22*	18.42	1.995E+005	8.06E+004	4.465E+004	9.502E+004
		351.93*	35.60	8.058E+004		1.501E+005	3.758E+004
	Ra-226	186.21	3.64	1.661E+006	1.66E+006	-1.292E+005	8.115E+005
+	Ac-228	338.32	11.27	4.752E+005	8.78E+004	-5.651E+005	2.292E+005
		911.20*	25.80	8.964E+004		1.036E+005	3.866E+004
		968.97*	15.80	8.776E+004		1.292E+005	3.351E+004
	Am-241	59.54	35.90	3.400E+005	3.40E+005	1.008E+005	1.670E+005

+ = Nuclide identified during the nuclide identification
 * = Energy line found in the spectrum
 > = Calculated MDA is zero due to zero counts in the region, or the region is outside the spectrum, or MDA has not been calculated
 @ = Half-life too short to be able to perform the decay correction

***** GAMMA SPECTRUM ANALYSIS *****

Filename: C:\GENIE2K\CAMFILES\00001031.CNF

Report Generated On : 5/3/2018 3:14:00 PM

Sample Title : B106213AFSWC019GD
Sample Description : U1 East Valve House Wall
Sample Identification :
Sample Type : Gamma Direct
Sample Geometry : 3M90D_CP_2IN

Peak Locate Threshold : 3.00
Peak Locate Range (in channels) : 85 - 8192
Peak Area Range (in channels) : 85 - 8192
Identification Energy Tolerance : 10.000 keV


Sample Size : 2.830E+001 M²

Sample Taken On : 4/25/2018 1:46:00 PM
Acquisition Started : 4/25/2018 1:46:29 PM

Live Time : 600.0 seconds
Real Time : 600.5 seconds

Dead Time : 0.08 %

Energy Calibration Used Done On : 12/28/2017
Efficiency Calibration Used Done On : 2/1/2018
Efficiency ID : 3M90D_CP_2IN

Data Validated
5418 1030


 ***** P E A K A N A L Y S I S R E P O R T *****

Detector Name: 6279
 Sample Title: B106213AFSWC019GD
 Peak Analysis Performed on: 5/3/2018 3:14:00 PM
 Peak Analysis From Channel: 85
 Peak Analysis To Channel: 8192

Peak No.	ROI start	ROI end	Peak centroid	Energy (keV)	FWHM (keV)	Net Peak Area	Net Area Uncert.	Continuum Counts
1	121-	136	128.08	31.94	0.33	2.84E+001	32.72	7.86E+001
2	282-	309	299.41	74.82	0.97	3.37E+002	90.63	3.81E+002
3	944-	961	952.15	238.16	0.33	2.55E+001	30.71	6.45E+001
4	1048-	1065	1056.22	264.20	0.96	1.55E+001	27.42	5.25E+001
5	1172-	1189	1180.68	295.34	0.76	2.90E+001	23.63	3.00E+001
6	1398-	1415	1406.08	351.72	0.46	5.10E+001	20.95	1.80E+001
7	2426-	2443	2434.01	608.79	0.57	3.70E+001	17.05	1.10E+001
8	2633-	2650	2641.53	660.67	1.24	3.46E+001	17.84	1.34E+001
9	5829-	5848	5838.19	1459.27	0.63	6.17E+001	16.64	2.26E+000

M = First peak in a multiplet region
 m = Other peak in a multiplet region
 F = Fitted singlet

Errors quoted at 2.000 sigma

 ***** N U C L I D E I D E N T I F I C A T I O N R E P O R T *****

Sample Title: B106213AFSWC019GD
 Nuclide Library Used: C:\GENIE2K\CAMFILES\Zion Lib-BNL.NLB

..... IDENTIFIED NUCLIDES

Nuclide Name	Id Confidence	Energy (keV)	Yield (%)	Activity (pCi/M ²)	Activity Uncertainty
K-40	0.996	1460.82*	10.66	8.65644E+005	2.45114E+005
Cs-137	0.998	661.66*	85.10	4.07845E+004	2.15617E+004
Pb-212	1.000	238.63*	43.60	3.38872E+004	4.11588E+004
Bi-214	0.442	609.32*	45.49	7.80386E+004	3.71937E+004
		1120.29	14.92		
		1764.49	15.30		
Pb-214	1.000	295.22*	18.42	1.01738E+005	8.44960E+004
		351.93*	35.60		

* = Energy line found in the spectrum.
 @ = Energy line not used for Weighted Mean Activity
 Energy Tolerance : 10.000 keV
 Nuclide confidence index threshold = 0.30
 Errors quoted at 2.000 sigma

 ***** INTERFERENCE CORRECTED REPORT *****

Nuclide Name	Nuclide Id Confidence	Wt mean Activity (pCi/M ²)	Wt mean Activity Uncertainty
K-40	0.996	8.656440E+005	2.451143E+005
Cs-137	0.998	4.078447E+004	2.156170E+004
Pb-212	1.000	3.388724E+004	4.115876E+004
Bi-214	0.442	7.803856E+004	3.719375E+004
Pb-214	1.000	1.019517E+005	3.944642E+004

? = 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 2.000 sigma

***** UNIDENTIFIED PEAKS *****

Peak Locate Performed on: 5/3/2018 3:14:00 PM
 Peak Locate From Channel: 85
 Peak Locate To Channel: 8192

Peak No.	Energy (keV)	Peak Size in Counts per Second	Peak CPS % Uncertainty	Peak Type	Tol. Nuclide
1	31.94	4.7282E-002	115.35		
2	74.82	5.6084E-001	26.93		
4	264.20	2.5760E-002	177.42		

M = First peak in a multiplet region
 m = Other peak in a multiplet region
 F = Fitted singlet

Errors quoted at 2.000 sigma

 ***** N U C L I D E M D A R E P O R T *****

Detector Name: 6279
 Sample Geometry: 3M90D_CP_2IN
 Sample Title: B106213AFSWC019GD
 Nuclide Library Used: C:\GENIE2K\CAMFILES\Zion Lib-BNL.NLB

	Nuclide Name	Energy (keV)	Yield (%)	Line MDA (pCi/M ²)	Nuclide MDA (pCi/M ²)	Activity (pCi/M ²)	Dec. Level (pCi/M ²)
+	K-40	1460.82*	10.66	1.641E+005	1.64E+005	8.656E+005	6.309E+004
	Co-60	1173.23	99.85	3.526E+004	3.53E+004	-1.119E+004	1.583E+004
		1332.49	99.98	3.622E+004		2.119E+004	1.619E+004
	Nb-94	702.65	99.81	3.790E+004	3.14E+004	-3.152E+003	1.755E+004
		871.09	99.89	3.143E+004		-7.189E+003	1.416E+004
	Ag-108m	433.90	90.50	4.377E+004	3.49E+004	1.150E+004	2.069E+004
		614.30	89.80	5.238E+004		4.872E+004	2.474E+004
		722.90	90.80	3.492E+004		1.031E+004	1.590E+004
	Cs-134	604.72	97.62	4.420E+004	4.09E+004	6.661E+004	2.077E+004
		795.86	85.46	4.086E+004		-1.890E+004	1.869E+004
+	Cs-137	661.66*	85.10	2.914E+004	2.91E+004	4.078E+004	1.298E+004
	Eu-152	121.78	28.67	2.322E+005	1.62E+005	-3.015E+005	1.138E+005
		344.28	26.60	1.619E+005		-6.341E+004	7.735E+004
		1408.01	21.07	1.666E+005		-8.975E+004	7.394E+004
	Eu-154	123.07	40.40	1.640E+005	8.96E+004	-1.780E+004	8.037E+004
		723.30	20.06	1.601E+005		5.048E+004	7.299E+004
		1274.43	34.80	8.958E+004		2.561E+004	3.939E+004
	Eu-155	86.55	30.70	2.948E+005	2.95E+005	1.678E+005	1.450E+005
		105.31	21.10	3.457E+005		1.706E+005	1.696E+005
	Tl-208	583.19	85.00	4.313E+004	4.31E+004	4.556E+004	2.007E+004
	Bi-212	727.33	6.67	4.890E+005	4.89E+005	2.824E+005	2.232E+005
+	Pb-212	238.63*	43.60	6.696E+004	6.70E+004	3.389E+004	3.169E+004
+	Bi-214	609.32*	45.49	4.721E+004	4.72E+004	7.804E+004	2.075E+004
		1120.29	14.92	2.671E+005		1.207E+005	1.218E+005
		1764.49	15.30	2.145E+005		1.431E+005	9.235E+004
+	Pb-214	295.22*	18.42	1.309E+005	5.59E+004	1.017E+005	6.070E+004
		351.93*	35.60	5.585E+004		1.020E+005	2.522E+004
	Ra-226	186.21	3.64	1.429E+006	1.43E+006	8.034E+005	6.951E+005
	Ac-228	338.32	11.27	3.332E+005	1.48E+005	-2.300E+005	1.582E+005
		911.20	25.80	1.480E+005		-5.252E+004	6.782E+004
		968.97	15.80	2.255E+005		-1.833E+005	1.024E+005
	Am-241	59.54	35.90	3.219E+005	3.22E+005	-3.268E+004	1.579E+005

+ = Nuclide identified during the nuclide identification
 * = Energy line found in the spectrum
 > = Calculated MDA is zero due to zero counts in the region, or the region is outside the spectrum, or MDA has not been calculated
 @ = Half-life too short to be able to perform the decay correction

***** GAMMA SPECTRUM ANALYSIS *****

Filename: C:\GENIE2K\CAMFILES\00001032.CNF

Report Generated On : 5/3/2018 3:13:00 PM

Sample Title : B106213AFSWC020GD
Sample Description : U1 East Valve House Wall
Sample Identification :
Sample Type : Gamma Direct
Sample Geometry : 3M90D_CP_2IN

Peak Locate Threshold : 3.00
Peak Locate Range (in channels) : 85 - 8192
Peak Area Range (in channels) : 85 - 8192
Identification Energy Tolerance : 10.000 keV


Sample Size : 2.830E+001 M^2

Sample Taken On : 4/25/2018 1:59:00 PM
Acquisition Started : 4/25/2018 1:59:48 PM

Live Time : 600.0 seconds
Real Time : 600.5 seconds

Dead Time : 0.08 %

Energy Calibration Used Done On : 12/28/2017
Efficiency Calibration Used Done On : 2/1/2018
Efficiency ID : 3M90D_CP_2IN

Data Validated
5418 1035


 ***** P E A K A N A L Y S I S R E P O R T *****

Detector Name: 6279
 Sample Title: B106213AFSWC020GD
 Peak Analysis Performed on: 5/3/2018 3:13:00 PM
 Peak Analysis From Channel: 85
 Peak Analysis To Channel: 8192

Peak No.	ROI start	ROI end	Peak centroid	Energy (keV)	FWHM (keV)	Net Peak Area	Net Area Uncert.	Continuum Counts
1	121-	136	128.92	32.15	0.37	4.89E+001	36.47	9.41E+001
2	292-	350	300.46	75.08	0.83	4.61E+001	201.08	1.21E+003
3	664-	679	671.11	167.84	0.62	8.94E+000	35.43	9.81E+001
4	945-	962	953.36	238.46	1.48	4.10E+001	30.69	5.90E+001
5	1172-	1189	1180.67	295.33	0.68	1.32E+001	26.96	5.18E+001
6	1398-	1415	1406.25	351.76	1.71	3.90E+001	22.60	2.70E+001
7	2032-	2049	2040.85	510.48	0.59	3.45E+001	17.71	1.35E+001
8	2322-	2339	2330.24	582.85	0.76	2.41E+001	13.70	6.85E+000
9	2427-	2444	2435.35	609.13	0.78	4.26E+001	17.91	1.14E+001
10	2634-	2654	2643.96	661.28	1.51	1.60E+002	29.50	1.58E+001
11	3634-	3651	3642.15	910.78	1.01	1.00E+001	15.50	1.40E+001
12	5832-	5851	5841.86	1460.18	1.13	9.36E+001	20.19	2.41E+000
13	7047-	7066	7056.35	1763.28	1.31	1.70E+001	8.25	0.00E+000

M = First peak in a multiplet region
 m = Other peak in a multiplet region
 F = Fitted singlet

Errors quoted at 2.000 sigma

 ***** N U C L I D E I D E N T I F I C A T I O N R E P O R T *****

Sample Title: B106213AFSWC020GD
 Nuclide Library Used: C:\GENIE2K\CAMFILES\Zion Lib-BNL.NLB

IDENTIFIED NUCLIDES

Nuclide Name	Id Confidence	Energy (keV)	Yield (%)	Activity (pCi/M ²)	Activity Uncertainty
K-40	0.999	1460.82*	10.66	1.31262E+006	3.05254E+005
Cs-137	1.000	661.66*	85.10	1.88734E+005	4.14810E+004
Tl-208	1.000	583.19*	85.00	2.66636E+004	1.54596E+004
Pb-212	1.000	238.63*	43.60	5.44379E+004	4.17324E+004
Bi-214	0.706	609.32*	45.49	8.99330E+004	3.93370E+004
		1120.29	14.92		
		1764.49*	15.30	1.87091E+005	9.19815E+004
Pb-214	1.000	295.22*	18.42	4.63688E+004	9.48851E+004
		351.93*	35.60	7.80139E+004	4.66883E+004

* = Energy line found in the spectrum.
 @ = Energy line not used for Weighted Mean Activity
 Energy Tolerance : 10.000 keV
 Nuclide confidence index threshold = 0.30
 Errors quoted at 2.000 sigma

***** I N T E R F E R E N C E C O R R E C T E D R E P O R T *****

Nuclide Name	Nuclide Id Confidence	Wt mean Activity (pCi/M ²)	Wt mean Activity Uncertainty
K-40	0.999	1.312621E+006	3.052540E+005
Cs-137	1.000	1.887338E+005	4.148095E+004
Tl-208	1.000	2.666355E+004	1.545962E+004
Pb-212	1.000	5.443792E+004	4.173240E+004
Bi-214	0.706	1.049552E+005	3.616830E+004
Pb-214	1.000	7.184559E+004	4.189163E+004

? = 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 2.000 sigma

***** UNIDENTIFIED PEAKS *****

Peak Locate Performed on: 5/3/2018 3:13:00 PM
Peak Locate From Channel: 85
Peak Locate To Channel: 8192

Peak No.	Energy (keV)	Peak Size in Counts per Second	Peak CPS % Uncertainty	Peak Type	Tol. Nuclide
1	32.15	8.1428E-002	74.65		
2	75.08	7.6870E-002	435.98		
3	167.84	1.4907E-002	396.11		
7	510.48	5.7500E-002	51.34		
11	910.78	1.6701E-002	154.71	Sum	

M = First peak in a multiplet region

m = Other peak in a multiplet region

F = Fitted singlet

Errors quoted at 2.000 sigma

 ***** N U C L I D E M D A R E P O R T *****

Detector Name: 6279
 Sample Geometry: 3M90D_CP_2IN
 Sample Title: B1062I3AFSWC020GD
 Nuclide Library Used: C:\GENIE2K\CAMFILES\Zion Lib-BNL.NLB

	Nuclide Name	Energy (keV)	Yield (%)	Line MDA (pCi/M ²)	Nuclide MDA (pCi/M ²)	Activity (pCi/M ²)	Dec. Level (pCi/M ²)
+	K-40	1460.82*	10.66	1.710E+005	1.71E+005	1.313E+006	6.654E+004
	Co-60	1173.23	99.85	3.704E+004	3.03E+004	-3.492E+004	1.671E+004
		1332.49	99.98	3.028E+004		-4.794E+003	1.322E+004
	Nb-94	702.65	99.81	3.689E+004	2.82E+004	-2.596E+004	1.704E+004
		871.09	99.89	2.821E+004		-3.926E+004	1.255E+004
	Ag-108m	433.90	90.50	4.101E+004	4.00E+004	-4.397E+004	1.931E+004
		614.30	89.80	4.844E+004		5.377E+004	2.277E+004
		722.90	90.80	3.997E+004		-5.793E+003	1.842E+004
	Cs-134	604.72	97.62	4.420E+004	4.09E+004	2.968E+004	2.077E+004
		795.86	85.46	4.086E+004		-3.208E+003	1.869E+004
+	Cs-137	661.66*	85.10	3.251E+004	3.25E+004	1.887E+005	1.466E+004
	Eu-152	121.78	28.67	2.362E+005	1.48E+005	8.173E+004	1.158E+005
		344.28	26.60	1.750E+005		-5.613E+004	8.392E+004
		1408.01	21.07	1.478E+005		1.110E+005	6.454E+004
	Eu-154	123.07	40.40	1.660E+005	8.03E+004	-2.037E+004	8.136E+004
		723.30	20.06	1.827E+005		1.425E+005	8.428E+004
		1274.43	34.80	8.028E+004		-3.991E+004	3.474E+004
	Eu-155	86.55	30.70	2.882E+005	2.88E+005	-2.742E+004	1.417E+005
		105.31	21.10	3.487E+005		-6.493E+004	1.711E+005
+	Tl-208	583.19*	85.00	2.032E+004	2.03E+004	2.666E+004	8.664E+003
	Bi-212	727.33	6.67	5.457E+005	5.46E+005	5.592E+005	2.515E+005
+	Pb-212	238.63*	43.60	6.459E+004	6.46E+004	5.444E+004	3.050E+004
+	Bi-214	609.32*	45.49	4.833E+004	2.98E+004	8.993E+004	2.131E+004
		1120.29	14.92	2.898E+005		2.881E+005	1.331E+005
		1764.49*	15.30	2.978E+004		1.871E+005	0.000E+000
+	Pb-214	295.22*	18.42	1.593E+005	6.74E+004	4.637E+004	7.492E+004
		351.93*	35.60	6.738E+004		7.801E+004	3.099E+004
	Ra-226	186.21	3.64	1.452E+006	1.45E+006	5.471E+005	7.068E+005
	Ac-228	338.32	11.27	3.795E+005	1.62E+005	3.275E+004	1.814E+005
		911.20	25.80	1.621E+005		2.800E+004	7.489E+004
		968.97	15.80	2.599E+005		1.860E+004	1.196E+005
	Am-241	59.54	35.90	3.134E+005	3.13E+005	2.005E+005	1.537E+005

+ = Nuclide identified during the nuclide identification

* = Energy line found in the spectrum

> = Calculated MDA is zero due to zero counts in the region, or the region is outside the spectrum, or MDA has not been calculated

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

***** GAMMA SPECTRUM ANALYSIS *****

Filename: 6279

Report Generated On : 5/3/2018 10:16:27 AM ✓
Sample Title : B106213AFSWC021GD ✓
Sample Description : U1 East Valve House Interior Wal ✓
Sample Identification : ✓
Sample Type : Gamma Direct ✓
Sample Geometry : 3M90D_CP_2IN ✓
Peak Locate Threshold : 3.00
Peak Locate Range (in channels) : 85 - 8192
Peak Area Range (in channels) : 85 - 8192
Identification Energy Tolerance : 10.000 keV
Sample Size : 2.830E+001 M^2 ✓
Sample Taken On : 5/3/2018 10:06:00 AM ✓
Acquisition Started : 5/3/2018 10:06:26 AM ✓
Live Time : 600.0 seconds
Real Time : 600.6 seconds
Dead Time : 0.10 % ✓
Energy Calibration Used Done On : 12/28/2017 ✓
Efficiency Calibration Used Done On : 2/1/2018 ✓
Efficiency ID : 3M90D_CP_2IN ✓

Data Validated
5/3/18 1500



 ***** P E A K A N A L Y S I S R E P O R T *****

Detector Name: 6279
 Sample Title: B106213AFSWC021GD
 Peak Analysis Performed on: 5/3/2018 10:16:27 AM
 Peak Analysis From Channel: 85
 Peak Analysis To Channel: 8192

Peak No.	ROI start	ROI end	Peak centroid	Energy (keV)	FWHM (keV)	Net Peak Area	Net Area Uncert.	Continuum Counts
1	120-	155	129.16	32.21	1.02	1.49E+002	73.03	2.10E+002
2	291-	347	300.75	75.16	0.95	2.12E+001	198.04	1.19E+003
3	1399-	1417	1407.96	352.19	1.48	5.26E+001	26.77	3.74E+001
4	2035-	2052	2043.70	511.19	0.36	2.64E+001	19.00	1.96E+001
5	2429-	2446	2437.09	609.56	0.62	4.50E+001	20.40	1.80E+001
6	2635-	2660	2646.77	661.99	1.54	8.25E+002	58.79	9.45E+000
7	3638-	3655	3646.43	911.85	0.27	1.51E+001	11.57	4.93E+000
8	4473-	4492	4482.06	1120.62	0.35	5.77E+000	10.47	5.23E+000
9	5837-	5856	5846.96	1461.46	0.89	5.35E+001	15.77	2.46E+000

M = First peak in a multiplet region
 m = Other peak in a multiplet region
 F = Fitted singlet

Errors quoted at 2.000 sigma

 ***** N U C L I D E I D E N T I F I C A T I O N R E P O R T *****

Sample Title: B106213AFSWC021GD
 Nuclide Library Used: C:\GENIE2K\CAMFILES\Zion Lib-BNL.NLB

IDENTIFIED NUCLIDES

Nuclide Name	Id Confidence	Energy (keV)	Yield (%)	Activity (pCi/M ²)	Activity Uncertainty
K-40	0.999	1460.82*	10.66	7.51296E+005	2.30768E+005
Cs-137	1.000	661.66*	85.10	9.71640E+005	1.35702E+005
Bi-214	0.735	609.32*	45.49	9.50411E+004	4.45827E+004
		1120.29*	14.92	5.03678E+004	9.14056E+004
		1764.49	15.30		
Pb-214	0.437	295.22	18.42		
		351.93*	35.60	1.05290E+005	5.58575E+004

* = Energy line found in the spectrum.
 @ = Energy line not used for Weighted Mean Activity
 Energy Tolerance : 10.000 keV
 Nuclide confidence index threshold = 0.30
 Errors quoted at 2.000 sigma

 ***** INTERFERENCE CORRECTED REPORT *****

Nuclide Name	Nuclide Id Confidence	Wt mean Activity (pCi/M^2)	Wt mean Activity Uncertainty
K-40	0.999	7.512956E+005	2.307683E+005 ✓
Cs-137	1.000	9.716405E+005	1.357018E+005 ✓
Bi-214	0.735	8.645587E+004	4.007048E+004
Pb-214	0.437	1.052899E+005	5.585747E+004

? = 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 2.000 sigma

***** UNIDENTIFIED PEAKS *****

Peak Locate Performed on: 5/3/2018 10:16:27 AM
 Peak Locate From Channel: 85
 Peak Locate To Channel: 8192

Peak No.	Energy (keV)	Peak Size in Counts per Second	Peak CPS % Uncertainty	Peak Type	Tol. Nuclide
1	32.21	2.4818E-001	49.04		
2	75.16	3.5276E-002	935.64		
4	511.19	4.4058E-002	71.88		
7	911.85	2.5125E-002	76.75	Tol.	Ac-228

M = First peak in a multiplet region
 m = Other peak in a multiplet region
 F = Fitted singlet

Errors quoted at 2.000 sigma

 ***** N U C L I D E M D A R E P O R T *****

Detector Name: 6279
 Sample Geometry: 3M90D_CP_2IN
 Sample Title: B106213AFSWC021GD
 Nuclide Library Used: C:\GENIE2K\CAMFILES\Zion Lib-BNL.NLB

	Nuclide Name	Energy (keV)	Yield (%)	Line MDA (pCi/M ²)	Nuclide MDA (pCi/M ²)	Activity (pCi/M ²)	Dec. Level (pCi/M ²)
+	K-40	1460.82*	10.66	1.739E+005	1.74E+005	7.513E+005	6.795E+004
	Co-60	1173.23	99.85	4.238E+004	3.48E+004	-3.040E+004	1.938E+004
		1332.49	99.98	3.484E+004		1.464E+004	1.550E+004
	Nb-94	702.65	99.81	3.442E+004	3.24E+004	4.455E+004	1.581E+004
		871.09	99.89	3.243E+004		-2.470E+004	1.466E+004
	Ag-108m	433.90	90.50	6.062E+004	3.58E+004	-5.883E+004	2.911E+004
		614.30	89.80	5.363E+004		5.100E+004	2.536E+004
		722.90	90.80	3.581E+004		-1.909E+004	1.634E+004
	Cs-134	604.72	97.62	5.070E+004	4.09E+004	1.592E+003	2.402E+004
		795.86	85.46	4.086E+004		8.988E+003	1.869E+004
+	Cs-137	661.66*	85.10	2.755E+004	2.76E+004	9.716E+005	1.218E+004
	Eu-152	121.78	28.67	2.411E+005	1.31E+005	2.516E+004	1.182E+005
		344.28	26.60	2.056E+005		-6.150E+004	9.923E+004
		1408.01	21.07	1.305E+005		8.322E+004	5.589E+004
	Eu-154	123.07	40.40	1.698E+005	9.79E+004	-1.127E+005	8.326E+004
		723.30	20.06	1.641E+005		-8.443E+004	7.499E+004
		1274.43	34.80	9.789E+004		8.780E+004	4.355E+004
	Eu-155	86.55	30.70	2.939E+005	2.94E+005	-4.144E+004	1.446E+005
		105.31	21.10	3.539E+005		6.563E+004	1.738E+005
	Tl-208	583.19	85.00	5.490E+004	5.49E+004	-1.300E+002	2.595E+004
	Bi-212	727.33	6.67	4.768E+005	4.77E+005	-9.246E+005	2.170E+005
	Pb-212	238.63	43.60	1.326E+005	1.33E+005	-2.136E+004	6.451E+004
+	Bi-214	609.32*	45.49	5.913E+004	5.91E+004	9.504E+004	2.671E+004
		1120.29*	14.92	1.571E+005		5.037E+004	6.672E+004
		1764.49	15.30	2.471E+005		1.982E+005	1.087E+005
+	Pb-214	295.22	18.42	2.772E+005	7.95E+004	6.418E+004	1.339E+005
		351.93*	35.60	7.951E+004		1.053E+005	3.705E+004
	Ra-226	186.21	3.64	1.630E+006	1.63E+006	1.743E+005	7.958E+005
	Ac-228	338.32	11.27	4.501E+005	1.58E+005	-4.048E+005	2.167E+005
		911.20	25.80	1.575E+005		1.613E+005	7.261E+004
		968.97	15.80	2.224E+005		8.236E+004	1.008E+005
	Am-241	59.54	35.90	3.158E+005	3.16E+005	4.102E+005	1.549E+005

+ = Nuclide identified during the nuclide identification

* = Energy line found in the spectrum

> = Calculated MDA is zero due to zero counts in the region, or the region is outside the spectrum, or MDA has not been calculated

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

***** GAMMA SPECTRUM ANALYSIS *****

Filename: 6279

Report Generated On : 5/3/2018 10:35:38 AM ✓

Sample Title : B106213AFSWC022GD ✓
Sample Description : U1 East Valve House Interior Wal ✓
Sample Identification :
Sample Type : Gamma Direct ✓
Sample Geometry : 3M90D_CP_2IN ✓

Peak Locate Threshold : 3.00
Peak Locate Range (in channels) : 85 - 8192
Peak Area Range (in channels) : 85 - 8192
Identification Energy Tolerance : 10.000 keV

Sample Size : 2.830E+001 M^2 ✓

Sample Taken On : 5/3/2018 10:25:00 AM ✓
Acquisition Started : 5/3/2018 10:25:36 AM ✓

Live Time : 600.0 seconds
Real Time : 600.5 seconds

Dead Time : 0.09 % ✓

Energy Calibration Used Done On : 12/28/2017 ✓
Efficiency Calibration Used Done On : 2/1/2018
Efficiency ID : 3M90D_CP_2IN

Data Validated
5-3-18 1510



 ***** P E A K A N A L Y S I S R E P O R T *****

Detector Name: 6279
 Sample Title: B106213AFSWC022GD
 Peak Analysis Performed on: 5/3/2018 10:35:37 AM
 Peak Analysis From Channel: 85
 Peak Analysis To Channel: 8192

Peak No.	ROI start	ROI end	Peak centroid	Energy (keV)	FWHM (keV)	Net Peak Area	Net Area Uncert.	Continuum Counts
1	121-	137	129.47	32.29	0.84	6.54E+001	37.36	9.06E+001
2	283-	309	299.85	74.93	0.83	2.44E+002	93.52	4.44E+002
3	945-	962	953.51	238.50	0.48	1.12E+001	32.70	7.88E+001
4	1400-	1417	1408.12	352.23	0.36	3.18E+001	26.43	4.32E+001
5	1954-	1971	1962.84	490.97	0.37	-2.22E+000	15.97	2.02E+001
6	2427-	2444	2435.58	609.18	0.60	4.10E+001	16.82	9.00E+000
7	2634-	2657	2645.62	661.70	1.39	3.28E+002	39.94	1.78E+001
8	5834-	5853	5843.80	1460.67	1.15	6.74E+001	17.51	2.56E+000

M = First peak in a multiplet region
 m = Other peak in a multiplet region
 F = Fitted singlet

Errors quoted at 2.000 sigma

 ***** N U C L I D E I D E N T I F I C A T I O N R E P O R T *****

Sample Title: B106213AFSWC022GD
 Nuclide Library Used: C:\GENIE2K\CAMFILES\Zion Lib-BNL.NLB

IDENTIFIED NUCLIDES

Nuclide Name	Id Confidence	Energy (keV)	Yield (%)	Activity (pCi/M ²)	Activity Uncertainty
K-40	1.000	1460.82*	10.66	9.46090E+005	2.59033E+005
Cs-137	1.000	661.66*	85.10	3.86685E+005	6.61136E+004
Pb-212	1.000	238.63*	43.60	1.49493E+004	4.35257E+004
Bi-214	0.442	609.32*	45.49	8.65650E+004	3.69991E+004
		1120.29	14.92		
		1764.49	15.30		
Pb-214	0.437	295.22	18.42	6.35984E+004	5.37524E+004
		351.93*	35.60		

* = Energy line found in the spectrum.
 @ = Energy line not used for Weighted Mean Activity
 Energy Tolerance : 10.000 keV
 Nuclide confidence index threshold = 0.30
 Errors quoted at 2.000 sigma

 ***** I N T E R F E R E N C E C O R R E C T E D R E P O R T *****

Nuclide Name	Nuclide Id Confidence	Wt mean Activity (pCi/M^2)	Wt mean Activity Uncertainty
K-40	1.000	9.460899E+005	2.590330E+005 ✓
Cs-137	1.000	3.866853E+005	6.611361E+004 ✓
Pb-212	1.000	1.494932E+004	4.352569E+004
Bi-214	0.442	8.656503E+004	3.699910E+004
Pb-214	0.437	6.359844E+004	5.375240E+004

? = 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 2.000 sigma

***** U N I D E N T I F I E D P E A K S *****

Peak Locate Performed on: 5/3/2018 10:35:37 AM
 Peak Locate From Channel: 85
 Peak Locate To Channel: 8192

Peak No.	Energy (keV)	Peak Size in Counts per Second	Peak CPS % Uncertainty	Peak Type	Tol. Nuclide
1	32.29	1.0896E-001	57.14		
2	74.93	4.0706E-001	38.29		
5	490.97	-3.7037E-003	-718.67		

M = First peak in a multiplet region
 m = Other peak in a multiplet region
 F = Fitted singlet

Errors quoted at 2.000 sigma

 ***** N U C L I D E M D A R E P O R T *****

Detector Name: 6279
 Sample Geometry: 3M90D_CP_2IN
 Sample Title: B106213AFSWC022GD
 Nuclide Library Used: C:\GENIE2K\CAMFILES\Zion Lib-BNL.NLB

	Nuclide Name	Energy (keV)	Yield (%)	Line MDA (pCi/M^2)	Nuclide MDA (pCi/M^2)	Activity (pCi/M^2)	Dec. Level (pCi/M^2)
+	K-40	1460.82*	10.66	1.781E+005	1.78E+005	9.461E+005	7.008E+004
	Co-60	1173.23	99.85	3.646E+004	2.94E+004	-4.273E+004	1.642E+004
		1332.49	99.98	2.944E+004		7.079E+003	1.280E+004
	Nb-94	702.65	99.81	3.329E+004	3.33E+004	-2.217E+004	1.525E+004
		871.09	99.89	3.821E+004		-9.422E+003	1.755E+004
	Ag-108m	433.90	90.50	4.951E+004	4.04E+004	1.146E+004	2.356E+004
		614.30	89.80	5.085E+004		6.912E+004	2.397E+004
		722.90	90.80	4.036E+004		3.147E+004	1.862E+004
	Cs-134	604.72	97.62	4.982E+004	4.13E+004	5.177E+004	2.359E+004
		795.86	85.46	4.133E+004		2.476E+004	1.893E+004
+	Cs-137	661.66*	85.10	3.577E+004	3.58E+004	3.867E+005	1.629E+004
	Eu-152	121.78	28.67	2.402E+005	1.52E+005	5.217E+003	1.178E+005
		344.28	26.60	1.759E+005		2.437E+004	8.437E+004
		1408.01	21.07	1.518E+005		-5.038E+004	6.652E+004
	Eu-154	123.07	40.40	1.684E+005	9.98E+004	8.050E+004	8.253E+004
		723.30	20.06	1.792E+005		3.541E+004	8.251E+004
		1274.43	34.80	9.985E+004		4.793E+004	4.453E+004
	Eu-155	86.55	30.70	2.911E+005	2.91E+005	3.810E+002	1.432E+005
		105.31	21.10	3.515E+005		1.139E+005	1.725E+005
	Tl-208	583.19	85.00	5.202E+004	5.20E+004	5.326E+004	2.451E+004
	Bi-212	727.33	6.67	5.125E+005	5.12E+005	1.718E+005	2.349E+005
+	Pb-212	238.63*	43.60	7.357E+004	7.36E+004	1.495E+004	3.498E+004
+	Bi-214	609.32*	45.49	4.357E+004	4.36E+004	8.657E+004	1.893E+004
		1120.29	14.92	2.929E+005		1.059E+005	1.346E+005
		1764.49	15.30	2.471E+005		1.982E+005	1.087E+005
+	Pb-214	295.22	18.42	2.460E+005	8.41E+004	-1.537E+005	1.183E+005
		351.93*	35.60	8.413E+004		6.360E+004	3.936E+004
	Ra-226	186.21	3.64	1.502E+006	1.50E+006	-2.544E+005	7.320E+005
	Ac-228	338.32	11.27	3.737E+005	1.53E+005	-3.020E+005	1.785E+005
		911.20	25.80	1.528E+005		2.003E+005	7.025E+004
		968.97	15.80	2.517E+005		-4.191E+005	1.155E+005
	Am-241	59.54	35.90	3.127E+005	3.13E+005	-2.168E+005	1.533E+005

+ = Nuclide identified during the nuclide identification
 * = Energy line found in the spectrum
 > = Calculated MDA is zero due to zero counts in the region, or the region is outside the spectrum, or MDA has not been calculated
 @ = Half-life too short to be able to perform the decay correction

Filename: 6279

Report Generated On : 5/3/2018 12:49:39 PM ✓
Sample Title : B106213AFSWC023GD ✓
Sample Description : U1 East Valve House Interior Wal
Sample Identification :
Sample Type : Gamma Direct
Sample Geometry : 3M90D_CP_2IN
Peak Locate Threshold : 3.00
Peak Locate Range (in channels) : 85 - 8192 ✓
Peak Area Range (in channels) : 85 - 8192
Identification Energy Tolerance : 10.000 keV
Sample Size : 2.830E+001 M^2 ✓
Sample Taken On : 5/3/2018 12:39:00 PM ✓
Acquisition Started : 5/3/2018 12:39:38 PM ✓
Live Time : 600.0 seconds
Real Time : 600.6 seconds
Dead Time : 0.10 % ✓
Energy Calibration Used Done On : 12/28/2017 ✓
Efficiency Calibration Used Done On : 2/1/2018 ✓
Efficiency ID : 3M90D_CP_2IN

Data Validated
5-3-18 Q1515



 ***** P E A K A N A L Y S I S R E P O R T *****

Detector Name: 6279
 Sample Title: B106213AFSWC023GD
 Peak Analysis Performed on: 5/3/2018 12:49:39 PM
 Peak Analysis From Channel: 85
 Peak Analysis To Channel: 8192

Peak No.	ROI start	ROI end	Peak centroid	Energy (keV)	FWHM (keV)	Net Peak Area	Net Area Uncert.	Continuum Counts
1	122-	137	129.26	32.23	0.76	5.43E+001	36.84	9.47E+001
2	281-	347	299.90	74.94	1.11	3.87E+002	200.50	1.02E+003
3	396-	411	403.57	100.89	0.43	-1.86E+001	54.49	2.53E+002
4	1398-	1415	1406.82	351.91	0.56	4.58E+001	23.26	2.72E+001
5	2426-	2443	2434.23	608.85	0.27	1.15E+001	17.24	1.85E+001
6	2633-	2656	2644.98	661.54	1.35	3.61E+002	39.84	8.94E+000
7	5834-	5853	5843.43	1460.58	1.92	5.30E+001	16.80	5.00E+000
8	7051-	7070	7060.52	1764.32	1.00	1.50E+001	7.75	0.00E+000

M = First peak in a multiplet region
 m = Other peak in a multiplet region
 F = Fitted singlet

Errors quoted at 2.000 sigma

 ***** N U C L I D E I D E N T I F I C A T I O N R E P O R T *****

Sample Title: B106213AFSWC023GD
 Nuclide Library Used: C:\GENIE2K\CAMFILES\Zion Lib-BNL.NLB

IDENTIFIED NUCLIDES

Nuclide Name	Id Confidence	Energy (keV)	Yield (%)	Activity (pCi/M^2)	Activity Uncertainty
K-40	1.000	1460.82*	10.66	7.43495E+005	2.44416E+005
Cs-137	1.000	661.66*	85.10	4.25320E+005	6.93677E+004
Bi-214	0.706	609.32*	45.49	2.42383E+004	3.64999E+004
		1120.29	14.92		
		1764.49*	15.30	1.65142E+005	8.62987E+004
Pb-214	0.437	295.22	18.42		
		351.93*	35.60	9.15713E+004	4.85221E+004

* = Energy line found in the spectrum.
 @ = Energy line not used for Weighted Mean Activity
 Energy Tolerance : 10.000 keV
 Nuclide confidence index threshold = 0.30
 Errors quoted at 2.000 sigma

 ***** INTERFERENCE CORRECTED REPORT *****

Nuclide Name	Nuclide Id Confidence	Wt mean Activity (pCi/M^2)	Wt mean Activity Uncertainty
K-40	1.000	7.434953E+005	2.444164E+005
Cs-137	1.000	4.253205E+005	6.936768E+004 ✓
Bi-214	0.706	4.561917E+004	3.361676E+004
Pb-214	0.437	9.157126E+004	4.852206E+004

? = 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 2.000 sigma

***** UNIDENTIFIED PEAKS *****

Peak Locate Performed on: 5/3/2018 12:49:39 PM
 Peak Locate From Channel: 85
 Peak Locate To Channel: 8192

Peak No.	Energy (keV)	Peak Size in Counts per Second	Peak CPS % Uncertainty	Peak Type	Tol. Nuclide
1	32.23	9.0481E-002	67.87		
2	74.94	6.4450E-001	51.85		
3	100.89	-3.0954E-002	-293.38	Tol.	Eu-155

M = First peak in a multiplet region
 m = Other peak in a multiplet region
 F = Fitted singlet

Errors quoted at 2.000 sigma

 ***** N U C L I D E M D A R E P O R T *****

Detector Name: 6279
 Sample Geometry: 3M90D_CP_2IN
 Sample Title: B106213AFSWC023GD
 Nuclide Library Used: C:\GENIE2K\CAMFILES\Zion Lib-BNL.NLB

	Nuclide Name	Energy (keV)	Yield (%)	Line MDA (pCi/M ²)	Nuclide MDA (pCi/M ²)	Activity (pCi/M ²)	Dec. Level (pCi/M ²)
+	K-40	1460.82*	10.66	2.316E+005	2.32E+005	7.435E+005	9.680E+004
	Co-60	1173.23	99.85	3.646E+004	3.03E+004	2.433E+004	1.642E+004
		1332.49	99.98	3.028E+004		5.238E+003	1.322E+004
	Nb-94	702.65	99.81	3.291E+004	3.04E+004	7.412E+003	1.505E+004
		871.09	99.89	3.040E+004		-8.217E+003	1.364E+004
	Ag-108m	433.90	90.50	4.969E+004	3.88E+004	-2.179E+004	2.365E+004
		614.30	89.80	4.472E+004		2.301E+004	2.091E+004
		722.90	90.80	3.877E+004		5.082E+004	1.782E+004
	Cs-134	604.72	97.62	4.318E+004	3.94E+004	6.507E+003	2.027E+004
		795.86	85.46	3.939E+004		-6.414E+003	1.795E+004
+	Cs-137	661.66*	85.10	2.639E+004	2.64E+004	4.253E+005	1.160E+004
	Eu-152	121.78	28.67	2.437E+005	1.16E+005	2.592E+004	1.195E+005
		344.28	26.60	1.905E+005		-9.430E+004	9.169E+004
		1408.01	21.07	1.156E+005		6.242E+004	4.840E+004
	Eu-154	123.07	40.40	1.733E+005	9.59E+004	-2.348E+004	8.502E+004
		723.30	20.06	1.755E+005		1.698E+005	8.070E+004
		1274.43	34.80	9.589E+004		4.466E+004	4.255E+004
	Eu-155	86.55	30.70	2.935E+005	2.94E+005	1.088E+005	1.444E+005
		105.31	21.10	3.487E+005		-2.268E+005	1.711E+005
	Tl-208	583.19	85.00	4.953E+004	4.95E+004	4.584E+004	2.327E+004
	Bi-212	727.33	6.67	4.950E+005	4.95E+005	-2.563E+005	2.262E+005
	Pb-212	238.63	43.60	1.269E+005	1.27E+005	1.092E+005	6.163E+004
+	Bi-214	609.32*	45.49	6.074E+004	2.98E+004	2.424E+004	2.752E+004
		1120.29	14.92	2.867E+005		2.615E+005	1.315E+005
		1764.49*	15.30	2.979E+004		1.651E+005	0.000E+000
+	Pb-214	295.22	18.42	2.629E+005	6.77E+004	1.339E+005	1.267E+005
		351.93*	35.60	6.770E+004		9.157E+004	3.114E+004
	Ra-226	186.21	3.64	1.487E+006	1.49E+006	-9.509E+005	7.244E+005
	Ac-228	338.32	11.27	4.246E+005	1.26E+005	4.676E+005	2.039E+005
		911.20	25.80	1.264E+005		1.320E+005	5.704E+004
		968.97	15.80	2.778E+005		-1.871E+004	1.285E+005
	Am-241	59.54	35.90	3.351E+005	3.35E+005	4.614E+004	1.645E+005

+ = Nuclide identified during the nuclide identification
 * = Energy line found in the spectrum
 > = Calculated MDA is zero due to zero counts in the region, or the region is outside the spectrum, or MDA has not been calculated
 @ = Half-life too short to be able to perform the decay correction

***** GAMMA SPECTRUM ANALYSIS *****

Filename: 6279

Report Generated On : 5/3/2018 1:06:33 PM ✓
Sample Title : B106213AFSWC024GD ✓
Sample Description : U1 East Valve House Interior Wal ✓
Sample Identification :
Sample Type : Gamma Direct
Sample Geometry : 3M90D_CP_2IN
Peak Locate Threshold : 3.00
Peak Locate Range (in channels) : 85 - 8192
Peak Area Range (in channels) : 85 - 8192
Identification Energy Tolerance : 10.000 keV
Sample Size : 2.830E+001 M^2 ✓
Sample Taken On : 5/3/2018 12:56:00 PM ✓
Acquisition Started : 5/3/2018 12:56:31 PM ✓
Live Time : 600.0 seconds
Real Time : 600.5 seconds
Dead Time : 0.08 % ✓
Energy Calibration Used Done On : 12/28/2017 ✓
Efficiency Calibration Used Done On : 2/1/2018 ✓
Efficiency ID : 3M90D_CP_2IN ✓

Data Validated
5-3-18 / 1515



 ***** P E A K A N A L Y S I S R E P O R T *****

Detector Name: 6279

Sample Title: B106213AFSWC024GD

Peak Analysis Performed on: 5/3/2018 1:06:32 PM

Peak Analysis From Channel: 85

Peak Analysis To Channel: 8192

Peak No.	ROI start	ROI end	Peak centroid	Energy (keV)	FWHM (keV)	Net Peak Area	Net Area Uncert.	Continuum Counts
1	284-	346	299.09	74.74	1.16	3.68E+002	188.09	9.46E+002
2	945-	962	953.40	238.47	1.04	1.07E+001	33.58	8.33E+001
3	1171-	1188	1179.69	295.09	1.04	2.56E+001	22.14	2.94E+001
4	1398-	1415	1406.59	351.85	0.54	3.26E+001	19.99	1.94E+001
5	2322-	2339	2330.09	582.81	0.99	3.14E+001	14.54	6.64E+000
6	2427-	2444	2435.77	609.23	0.45	4.03E+001	16.73	8.73E+000
7	2635-	2654	2644.25	661.36	1.41	7.10E+001	25.56	2.40E+001
8	5833-	5852	5842.10	1460.24	0.59	5.72E+001	16.46	2.76E+000

M = First peak in a multiplet region

m = Other peak in a multiplet region

F = Fitted singlet

Errors quoted at 2.000 sigma

 ***** N U C L I D E I D E N T I F I C A T I O N R E P O R T *****

Sample Title: B106213AFSWC024GD
 Nuclide Library Used: C:\GENIE2K\CAMFILES\Zion Lib-BNL.NLB

IDENTIFIED NUCLIDES

Nuclide Name	Id Confidence	Energy (keV)	Yield (%)	Activity (pCi/M ²)	Activity Uncertainty
K-40	0.999	1460.82*	10.66	8.02824E+005	2.41228E+005
Cs-137	1.000	661.66*	85.10	8.36123E+004	3.17395E+004
Tl-208	1.000	583.19*	85.00	3.46318E+004	1.65915E+004
Pb-212	1.000	238.63*	43.60	1.41851E+004	4.46925E+004
Bi-214	0.442	609.32*	45.49	8.50172E+004	3.67828E+004
		1120.29	14.92		
		1764.49	15.30		
Pb-214	1.000	295.22*	18.42	8.97369E+004	7.89689E+004
		351.93*	35.60		

* = Energy line found in the spectrum.
 @ = Energy line not used for Weighted Mean Activity
 Energy Tolerance : 10.000 keV
 Nuclide confidence index threshold = 0.30
 Errors quoted at 2.000 sigma

 ***** I N T E R F E R E N C E C O R R E C T E D R E P O R T *****

Nuclide Name	Nuclide Id Confidence	Wt mean Activity (pCi/M^2)	Wt mean Activity Uncertainty
K-40	0.999	8.028243E+005	2.412277E+005
Cs-137	1.000	8.361232E+004	✓ 3.173949E+004 ✓
Tl-208	1.000	3.463179E+004	1.659151E+004
Pb-212	1.000	1.418511E+004	4.469251E+004
Bi-214	0.442	8.501725E+004	3.678285E+004
Pb-214	1.000	7.039116E+004	3.649915E+004

? = 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 2.000 sigma

***** U N I D E N T I F I E D P E A K S *****

Peak Locate Performed on: 5/3/2018 1:06:32 PM
 Peak Locate From Channel: 85
 Peak Locate To Channel: 8192

Peak No.	Energy (keV)	Peak Size in Counts per Second	Peak CPS % Uncertainty	Peak Type	Tol. Nuclide
1	74.74	6.1254E-001	51.18		

M = First peak in a multiplet region
 m = Other peak in a multiplet region
 F = Fitted singlet

Errors quoted at 2.000 sigma

 ***** N U C L I D E M D A R E P O R T *****

Detector Name: 6279
 Sample Geometry: 3M90D_CP_2IN
 Sample Title: B106213AFSWC024GD
 Nuclide Library Used: C:\GENIE2K\CAMFILES\Zion Lib-BNL.NLB

	Nuclide Name	Energy (keV)	Yield (%)	Line MDA (pCi/M^2)	Nuclide MDA (pCi/M^2)	Activity (pCi/M^2)	Dec. Level (pCi/M^2)
+	K-40	1460.82*	10.66	1.877E+005	1.88E+005	8.028E+005	7.488E+004
	Co-60	1173.23	99.85	3.338E+004	3.03E+004	-2.735E+004	1.489E+004
		1332.49	99.98	3.028E+004	0.00 E0	-9.322E+003	1.322E+004
	Nb-94	702.65	99.81	3.478E+004	3.19E+004	1.491E+004	1.599E+004
		871.09	99.89	3.193E+004		9.836E+003	1.441E+004
	Ag-108m	433.90	90.50	4.035E+004	3.71E+004	-1.427E+004	1.898E+004
		614.30	89.80	5.111E+004		6.156E+004	2.410E+004
		722.90	90.80	3.711E+004		3.390E+004	1.699E+004
	Cs-134	604.72	97.62	4.687E+004	4.49E+004	3.259E+004	2.211E+004
		795.86	85.46	4.495E+004		8.361E+003	2.073E+004
+	Cs-137	661.66*	85.10	4.043E+004	4.04E+004	8.361E+004	1.862E+004
	Eu-152	121.78	28.67	2.391E+005	1.35E+005	2.120E+005	1.172E+005
		344.28	26.60	1.633E+005		4.011E+004	7.808E+004
		1408.01	21.07	1.351E+005		9.016E+004	5.817E+004
	Eu-154	123.07	40.40	1.671E+005	9.59E+004	-1.686E+005	8.190E+004
		723.30	20.06	1.680E+005		-1.020E+004	7.694E+004
		1274.43	34.80	9.589E+004		-5.136E+004	4.255E+004
	Eu-155	86.55	30.70	2.863E+005	2.86E+005	-2.927E+004	1.408E+005
		105.31	21.10	3.401E+005		1.611E+005	1.669E+005
+	Tl-208	583.19*	85.00	1.984E+004	1.98E+004	3.463E+004	8.427E+003
	Bi-212	727.33	6.67	4.829E+005	4.83E+005	-7.736E+005	2.201E+005
+	Pb-212	238.63*	43.60	7.562E+004	7.56E+004	1.419E+004	3.601E+004
+	Bi-214	609.32*	45.49	4.360E+004	4.36E+004	8.502E+004	1.894E+004
		1120.29	14.92	2.959E+005		1.016E+005	1.361E+005
		1764.49	15.30	2.589E+005		2.202E+005	1.145E+005
+	Pb-214	295.22*	18.42	1.231E+005	5.94E+004	8.974E+004	5.681E+004
		351.93*	35.60	5.942E+004		6.514E+004	2.700E+004
	Ra-226	186.21	3.64	1.397E+006	1.40E+006	-8.731E+004	6.792E+005
	Ac-228	338.32	11.27	3.607E+005	1.64E+005	-1.802E+005	1.720E+005
		911.20	25.80	1.636E+005		8.978E+004	7.564E+004
		968.97	15.80	2.376E+005		1.207E+005	1.084E+005
	Am-241	59.54	35.90	3.189E+005	3.19E+005	3.801E+005	1.564E+005

+ = Nuclide identified during the nuclide identification
 * = Energy line found in the spectrum
 > = Calculated MDA is zero due to zero counts in the region, or the region is outside the spectrum, or MDA has not been calculated
 @ = Half-life too short to be able to perform the decay correction

***** GAMMA SPECTRUM ANALYSIS *****

Filename: 6279

Report Generated On : 5/3/2018 1:19:50 PM ✓
Sample Title : B106213AFSWC025GD ✓
Sample Description : U1 East Valve House Interior Wal ✓
Sample Identification : ✓
Sample Type : Gamma Direct ✓
Sample Geometry : 3M90D_CP_2IN ✓
Peak Locate Threshold : 3.00
Peak Locate Range (in channels) : 85 - 8192
Peak Area Range (in channels) : 85 - 8192
Identification Energy Tolerance : 10.000 keV
Sample Size : 2.830E+001 M² ✓
Sample Taken On : 5/3/2018 1:09:00 PM
Acquisition Started : 5/3/2018 1:09:49 PM
Live Time : 600.0 seconds ✓
Real Time : 600.5 seconds ✓
Dead Time : 0.08 %
Energy Calibration Used Done On : 12/28/2017 ✓
Efficiency Calibration Used Done On : 2/1/2018 ✓
Efficiency ID : 3M90D_CP_2IN

Data Validated
5/3/18 1520



 ***** P E A K A N A L Y S I S R E P O R T *****

Detector Name: 6279
 Sample Title: B106213AFSWC025GD
 Peak Analysis Performed on: 5/3/2018 1:19:50 PM
 Peak Analysis From Channel: 85
 Peak Analysis To Channel: 8192

Peak No.	ROI start	ROI end	Peak centroid	Energy (keV)	FWHM (keV)	Net Peak Area	Net Area Uncert.	Continuum Counts
1	120-	135	127.45	31.78	0.59	3.44E+001	33.95	8.16E+001
2	284-	347	298.85	74.68	1.00	2.48E+002	201.35	1.08E+003
3	945-	962	953.90	238.60	0.59	4.87E+001	34.08	7.43E+001
4	1171-	1188	1179.91	295.14	1.18	2.40E+001	23.65	3.50E+001
5	1397-	1414	1405.75	351.64	0.55	3.82E+001	22.39	2.68E+001
6	2321-	2338	2329.17	582.58	0.65	7.93E+000	14.28	1.31E+001
7	2426-	2444	2434.27	608.86	1.36	5.21E+001	18.07	8.92E+000
8	2635-	2653	2643.75	661.23	1.11	1.28E+002	26.54	1.43E+001
9	5830-	5849	5839.02	1459.47	1.56	7.90E+001	17.78	0.00E+000

M = First peak in a multiplet region
 m = Other peak in a multiplet region
 F = Fitted singlet

Errors quoted at 2.000 sigma

 ***** N U C L I D E I D E N T I F I C A T I O N R E P O R T *****

Sample Title: B106213AFSWC025GD
 Nuclide Library Used: C:\GENIE2K\CAMFILES\Zion Lib-BNL.NLB

IDENTIFIED NUCLIDES

Nuclide Name	Id Confidence	Energy (keV)	Yield (%)	Activity (pCi/M ²)	Activity Uncertainty
K-40	0.997	1460.82*	10.66	1.10770E+006	2.67168E+005
Cs-137	1.000	661.66*	85.10	1.50451E+005	3.60986E+004
Tl-208	0.999	583.19*	85.00	8.75345E+003	1.58033E+004
Pb-212	1.000	238.63*	43.60	6.47695E+004	4.64946E+004
Bi-214	0.442	609.32*	45.49	1.09923E+005	4.03717E+004
		1120.29	14.92		
		1764.49	15.30		
Pb-214	1.000	295.22*	18.42	8.42406E+004	8.40403E+004
		351.93*	35.60		

* = Energy line found in the spectrum.
 @ = Energy line not used for Weighted Mean Activity
 Energy Tolerance : 10.000 keV
 Nuclide confidence index threshold = 0.30
 Errors quoted at 2.000 sigma

 ***** I N T E R F E R E N C E C O R R E C T E D R E P O R T *****

Nuclide Name	Nuclide Id Confidence	Wt mean Activity (pCi/M ²)	Wt mean Activity Uncertainty
K-40	0.997	1.107702E+006	2.671684E+005
Cs-137	1.000	1.504509E+005	3.609858E+004 ✓
Tl-208	0.999	8.753450E+003	1.580328E+004
Pb-212	1.000	6.476945E+004	4.649455E+004
Bi-214	0.442	1.099234E+005	4.037172E+004
Pb-214	1.000	7.825437E+004	4.049207E+004

? = 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 2.000 sigma

***** U N I D E N T I F I E D P E A K S *****

Peak Locate Performed on: 5/3/2018 1:19:50 PM
Peak Locate From Channel: 85
Peak Locate To Channel: 8192

Peak No.	Energy (keV)	Peak Size in Counts per Second	Peak CPS % Uncertainty	Peak Type	Tol. Nuclide
1	31.78	5.7270E-002	98.80		
2	74.68	4.1379E-001	81.10		

M = First peak in a multiplet region

m = Other peak in a multiplet region

F = Fitted singlet

Errors quoted at 2.000 sigma

 ***** N U C L I D E M D A R E P O R T *****

Detector Name: 6279
 Sample Geometry: 3M90D_CP_2IN
 Sample Title: B106213AFSWC025GD
 Nuclide Library Used: C:\GENIE2K\CAMFILES\Zion Lib-BNL.NLB

	Nuclide Name	Energy (keV)	Yield (%)	Line MDA (pCi/M ²)	Nuclide MDA (pCi/M ²)	Activity (pCi/M ²)	Dec. Level (pCi/M ²)
+	K-40	1460.82*	10.66	3.794E+004	3.79E+004	1.108E+006	0.000E+000
	Co-60	1173.23	99.85	3.526E+004	2.47E+004	5.237E+004	1.583E+004
		1332.49	99.98	2.474E+004	0.000E+000	-1.158E+004	1.045E+004
	Nb-94	702.65	99.81	3.723E+004	3.09E+004	-2.159E+004	1.721E+004
		871.09	99.89	3.092E+004		-4.066E+004	1.390E+004
	Ag-108m	433.90	90.50	4.654E+004	3.88E+004	2.763E+004	2.207E+004
		614.30	89.80	5.264E+004		7.644E+004	2.486E+004
		722.90	90.80	3.877E+004		3.940E+004	1.782E+004
	Cs-134	604.72	97.62	4.663E+004	4.32E+004	3.954E+004	2.199E+004
		795.86	85.46	4.318E+004		-2.324E+004	1.985E+004
+	Cs-137	661.66*	85.10	3.011E+004	3.01E+004	1.505E+005	1.346E+004
	Eu-152	121.78	28.67	2.301E+005	1.48E+005	-2.550E+005	1.127E+005
		344.28	26.60	1.700E+005		1.109E+005	8.141E+004
		1408.01	21.07	1.478E+005		2.817E+004	6.454E+004
	Eu-154	123.07	40.40	1.619E+005	7.77E+004	-7.672E+004	7.931E+004
		723.30	20.06	1.737E+005		1.164E+005	7.977E+004
		1274.43	34.80	7.775E+004		2.310E+004	3.347E+004
	Eu-155	86.55	30.70	2.937E+005	2.94E+005	6.874E+004	1.445E+005
		105.31	21.10	3.412E+005		-1.743E+005	1.674E+005
+	Tl-208	583.19*	85.00	2.682E+004	2.68E+004	8.753E+003	1.192E+004
	Bi-212	727.33	6.67	5.294E+005	5.29E+005	3.772E+005	2.434E+005
+	Pb-212	238.63*	43.60	7.158E+004	7.16E+004	6.477E+004	3.399E+004
+	Bi-214	609.32*	45.49	4.348E+004	4.35E+004	1.099E+005	1.889E+004
		1120.29	14.92	3.019E+005		-3.421E+005	1.391E+005
		1764.49	15.30	2.347E+005		1.762E+005	1.025E+005
+	Pb-214	295.22*	18.42	1.337E+005	6.68E+004	8.424E+004	6.209E+004
		351.93*	35.60	6.680E+004		7.644E+004	3.070E+004
	Ra-226	186.21	3.64	1.535E+006	1.53E+006	-8.755E+005	7.482E+005
	Ac-228	338.32	11.27	3.460E+005	1.59E+005	-3.912E+005	1.646E+005
		911.20	25.80	1.591E+005		7.071E+004	7.338E+004
		968.97	15.80	2.490E+005		-2.808E+004	1.141E+005
	Am-241	59.54	35.90	3.172E+005	3.17E+005	3.275E+005	1.556E+005

+ = Nuclide identified during the nuclide identification

* = Energy line found in the spectrum

> = Calculated MDA is zero due to zero counts in the region, or the region is outside the spectrum, or MDA has not been calculated

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

***** GAMMA SPECTRUM ANALYSIS *****

Filename: 6279

Report Generated On : 5/3/2018 1:32:11 PM ✓
Sample Title : B106213AFSWC026GD
Sample Description : U1 East Valve House Interior Wal ✓
Sample Identification :
Sample Type : Gamma Direct ✓
Sample Geometry : 3M90D_CP_2IN ✓
Peak Locate Threshold : 3.00
Peak Locate Range (in channels) : 85 - 8192
Peak Area Range (in channels) : 85 - 8192
Identification Energy Tolerance : 10.000 keV
Sample Size : 2.830E+001 M² ✓
Sample Taken On : 5/3/2018 1:22:00 PM ✓
Acquisition Started : 5/3/2018 1:22:10 PM ✓
Live Time : 600.0 seconds
Real Time : 600.5 seconds
Dead Time : 0.08 % ✓
Energy Calibration Used Done On : 12/28/2017 ✓
Efficiency Calibration Used Done On : 2/1/2018 ✓
Efficiency ID : 3M90D_CP_2IN ✓

Data Validated
5-3-18 / 1530



 ***** P E A K A N A L Y S I S R E P O R T *****

Detector Name: 6279

Sample Title: B106213AFSWC026GD

Peak Analysis Performed on: 5/3/2018 1:32:11 PM

Peak Analysis From Channel: 85

Peak Analysis To Channel: 8192

Peak No.	ROI start	ROI end	Peak centroid	Energy (keV)	FWHM (keV)	Net Peak Area	Net Area Uncert.	Continuum Counts
1	122-	137	129.85	32.38	0.74	3.04E+001	38.12	1.08E+002
2	285-	347	299.74	74.90	1.46	2.47E+002	207.90	1.17E+003
3	945-	962	953.37	238.47	0.53	3.07E+001	35.10	8.53E+001
4	1398-	1415	1406.17	351.74	0.38	2.12E+001	24.46	3.58E+001
5	2322-	2339	2330.23	582.84	0.30	1.35E+001	15.17	1.35E+001
6	2427-	2444	2435.33	609.12	0.77	4.81E+001	16.83	6.86E+000
7	2635-	2655	2645.32	661.62	1.30	2.60E+002	36.14	1.84E+001
8	5834-	5854	5843.31	1460.54	1.28	8.70E+001	18.65	0.00E+000

M = First peak in a multiplet region

m = Other peak in a multiplet region

F = Fitted singlet

Errors quoted at 2.000 sigma

 ***** N U C L I D E I D E N T I F I C A T I O N R E P O R T *****

Sample Title: B106213AFSWC026GD
 Nuclide Library Used: C:\GENIE2K\CAMFILES\Zion Lib-BNL.NLB

IDENTIFIED NUCLIDES

Nuclide Name	Id Confidence	Energy (keV)	Yield (%)	Activity (pCi/M ²)	Activity Uncertainty
K-40	1.000	1460.82*	10.66	1.22044E+006	2.82334E+005
Cs-137	1.000	661.66*	85.10	3.05802E+005	5.62247E+004
Tl-208	1.000	583.19*	85.00	1.49081E+004	1.68466E+004
Pb-212	1.000	238.63*	43.60	4.07941E+004	4.71187E+004
Bi-214	0.442	609.32*	45.49	1.01637E+005	3.75770E+004
		1120.29	14.92		
		1764.49	15.30		
Pb-214	0.437	295.22	18.42	4.23921E+004	4.93411E+004
		351.93*	35.60		

* = Energy line found in the spectrum.
 @ = Energy line not used for Weighted Mean Activity
 Energy Tolerance : 10.000 keV
 Nuclide confidence index threshold = 0.30
 Errors quoted at 2.000 sigma

 ***** INTERFERENCE CORRECTED REPORT *****

Nuclide Name	Nuclide Id Confidence	Wt mean Activity (pCi/M ²)	Wt mean Activity Uncertainty
K-40	1.000	1.220438E+006	2.823342E+005 ✓
Cs-137	1.000	3.058017E+005	5.622470E+004 ✓
Tl-208	1.000	1.490806E+004	1.684658E+004
Pb-212	1.000	4.079406E+004	4.711867E+004
Bi-214	0.442	1.016366E+005	3.757704E+004
Pb-214	0.437	4.239205E+004	4.934113E+004

? = 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 2.000 sigma

***** UNIDENTIFIED PEAKS *****

Peak Locate Performed on: 5/3/2018 1:32:11 PM
 Peak Locate From Channel: 85
 Peak Locate To Channel: 8192

Peak No.	Energy (keV)	Peak Size in Counts per Second	Peak CPS % Uncertainty	Peak Type	Tol. Nuclide
1	32.38	5.0598E-002	125.58		
2	74.90	4.1121E-001	84.26		

M = First peak in a multiplet region
 m = Other peak in a multiplet region
 F = Fitted singlet

Errors quoted at 2.000 sigma

 ***** N U C L I D E M D A R E P O R T *****

Detector Name: 6279
 Sample Geometry: 3M90D_CP_2IN
 Sample Title: B106213AFSWC026GD
 Nuclide Library Used: C:\GENIE2K\CAMFILES\Zion Lib-BNL.NLB


	Nuclide Name	Energy (keV)	Yield (%)	Line MDA (pCi/M^2)	Nuclide MDA (pCi/M^2)	Activity (pCi/M^2)	Dec. Level (pCi/M^2)
+	K-40	1460.82*	10.66	3.796E+004	3.80E+004	1.220E+006	0.000E+000
	Co-60	1173.23	99.85	3.587E+004	3.55E+004	5.361E+003	1.613E+004
		1332.49	99.98	3.554E+004		1.788E+004	1.585E+004
	Nb-94	702.65	99.81	3.442E+004	3.29E+004	-2.041E+004	1.581E+004
		871.09	99.89	3.291E+004		-3.139E+004	1.490E+004
	Ag-108m	433.90	90.50	4.749E+004	3.80E+004	1.383E+003	2.255E+004
		614.30	89.80	4.899E+004		1.302E+003	2.304E+004
		722.90	90.80	3.795E+004		2.454E+004	1.741E+004
	Cs-134	604.72	97.62	4.780E+004	3.57E+004	4.166E+004	2.257E+004
		795.86	85.46	3.571E+004		-3.059E+004	1.611E+004
+	Cs-137	661.66*	85.10	3.490E+004	3.49E+004	3.058E+005	1.585E+004
	Eu-152	121.78	28.67	2.454E+005	1.10E+005	-5.786E+004	1.204E+005
		344.28	26.60	1.732E+005		-4.867E+003	8.302E+004
		1408.01	21.07	1.100E+005		-1.101E+005	4.563E+004
	Eu-154	123.07	40.40	1.721E+005	9.17E+004	1.843E+004	8.440E+004
		723.30	20.06	1.680E+005		-8.040E+003	7.694E+004
		1274.43	34.80	9.174E+004		-5.965E+004	4.047E+004
	Eu-155	86.55	30.70	3.024E+005	3.02E+005	-6.218E+004	1.488E+005
		105.31	21.10	3.613E+005		9.898E+004	1.775E+005
+	Tl-208	583.19*	85.00	2.709E+004	2.71E+004	1.491E+004	1.205E+004
	Bi-212	727.33	6.67	5.009E+005	5.01E+005	4.697E+005	2.291E+005
+	Pb-212	238.63*	43.60	7.642E+004	7.64E+004	4.079E+004	3.641E+004
+	Bi-214	609.32*	45.49	3.880E+004	3.88E+004	1.016E+005	1.654E+004
		1120.29	14.92	2.705E+005		1.562E+005	1.234E+005
		1764.49	15.30	2.531E+005		2.092E+005	1.116E+005
+	Pb-214	295.22	18.42	2.321E+005	8.00E+004	1.798E+005	1.113E+005
		351.93*	35.60	7.999E+004		4.239E+004	3.729E+004
	Ra-226	186.21	3.64	1.545E+006	1.55E+006	-6.241E+005	7.533E+005
	Ac-228	338.32	11.27	3.896E+005	1.30E+005	-2.107E+005	1.864E+005
		911.20	25.80	1.303E+005		3.671E+001	5.897E+004
		968.97	15.80	2.405E+005		1.267E+005	1.099E+005
	Am-241	59.54	35.90	3.071E+005	3.07E+005	1.411E+005	1.505E+005

+ = Nuclide identified during the nuclide identification
 * = Energy line found in the spectrum
 > = Calculated MDA is zero due to zero counts in the region, or the region is outside the spectrum, or MDA has not been calculated
 @ = Half-life too short to be able to perform the decay correction

***** GAMMA SPECTRUM ANALYSIS *****

Filename: C:\GENIE2K\CAMFILES\00001045.CNF

Report Generated On : 5/3/2018 3:00:42 PM ✓
Sample Title : B106213AFQFC002GD ✓
Sample Description : U1 East Valve House Floor QC ✓
Sample Identification : QC ✓
Sample Type : Gamma Direct ✓
Sample Geometry : 3M90D_CP_2IN ✓
Peak Locate Threshold : 3.00
Peak Locate Range (in channels) : 85 - 8192
Peak Area Range (in channels) : 85 - 8192
Identification Energy Tolerance : 10.000 keV
Sample Size : 2.830E+001 M² ✓
Sample Taken On : 4/26/2018 8:24:00 AM ✓
Acquisition Started : 4/26/2018 8:24:34 AM ✓
Live Time : 600.0 seconds ✓
Real Time : 601.6 seconds ✓
Dead Time : 0.27 % ✓
Energy Calibration Used Done On : 12/28/2017
Efficiency Calibration Used Done On : 2/1/2018
Efficiency ID : 3M90D_CP_2IN

Data Validated
5/4/18 0800


***** P E A K A N A L Y S I S R E P O R T *****

Detector Name: 6279

Sample Title: B106213AFQFC002GD

Peak Analysis Performed on: 5/3/2018 3:00:42 PM

Peak Analysis From Channel: 85

Peak Analysis To Channel: 8192

	Peak No.	ROI start	ROI end	Peak centroid	Energy (keV)	FWHM (keV)	Net Peak Area	Net Area Uncert.	Continuum Counts
M	1	77-	156	88.41	22.01	1.12	7.20E+001	26.17	1.93E+002
m	2	77-	156	128.74	32.10	1.13	1.07E+003	71.57	2.05E+002
	3	292-	346	300.21	75.02	0.86	-2.82E+002	301.69	2.92E+003
	4	1399-	1416	1407.07	351.97	0.54	6.42E+001	49.20	1.66E+002
	5	2428-	2445	2436.65	609.45	1.02	3.46E+001	23.49	3.14E+001
	6	2629-	2658	2643.64	661.20	1.49	5.98E+003	157.59	4.83E+001
	7	4469-	4488	4478.08	1119.63	1.07	1.27E+001	12.35	7.26E+000
	8	5832-	5851	5841.61	1460.12	0.79	6.57E+001	17.12	2.28E+000

M = First peak in a multiplet region

m = Other peak in a multiplet region

F = Fitted singlet

Errors quoted at 2.000 sigma

 ***** N U C L I D E I D E N T I F I C A T I O N R E P O R T *****

Sample Title: B106213AFQFC002GD
 Nuclide Library Used: C:\GENIE2K\CAMFILES\Zion Lib-BNL.NLB

IDENTIFIED NUCLIDES

Nuclide Name	Id Confidence	Energy (keV)	Yield (%)	Activity (pCi/M ²)	Activity Uncertainty
K-40	0.999	1460.82*	10.66	9.21762E+005	2.53169E+005
Cs-137	1.000	661.66*	85.10	7.04329E+006	8.65965E+005
Bi-214	0.735	609.32*	45.49	7.29860E+004	5.03840E+004
		1120.29*	14.92	1.11087E+005	1.08088E+005
		1764.49	15.30		
Pb-214	0.437	295.22	18.42		
		351.93*	35.60	1.28552E+005	1.00321E+005

* = Energy line found in the spectrum.
 @ = Energy line not used for Weighted Mean Activity
 Energy Tolerance : 10.000 keV
 Nuclide confidence index threshold = 0.30
 Errors quoted at 2.000 sigma

 ***** INTERFERENCE CORRECTED REPORT *****

Nuclide Name	Nuclide Id Confidence	Wt mean Activity (pCi/M ²)	Wt mean Activity Uncertainty
K-40	0.999	9.217619E+005	2.531692E+005
Cs-137	1.000	7.043295E+006	8.659645E+005
Bi-214	0.735	7.978693E+004	4.566639E+004
Pb-214	0.437	1.285518E+005	1.003208E+005

? = 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 2.000 sigma

***** UNIDENTIFIED PEAKS *****

Peak Locate Performed on: 5/3/2018 3:00:42 PM
 Peak Locate From Channel: 85
 Peak Locate To Channel: 8192

Peak No.	Energy (keV)	Peak Size in Counts per Second	Peak CPS % Uncertainty	Peak Type	Tol. Nuclide
M 1	22.01	1.2004E-001	36.34		
m 2	32.10	1.7897E+000	6.66		
3	75.02	-4.6979E-001	-107.03		

M = First peak in a multiplet region
 m = Other peak in a multiplet region
 F = Fitted singlet

Errors quoted at 2.000 sigma

 ***** N U C L I D E M D A R E P O R T *****

Detector Name: 6279
 Sample Geometry: 3M90D_CP_2IN
 Sample Title: B106213AFQFC002GD
 Nuclide Library Used: C:\GENIE2K\CAMFILES\Zion Lib-BNL.NLB

	Nuclide Name	Energy (keV)	Yield (%)	Line MDA (pCi/M ²)	Nuclide MDA (pCi/M ²)	Activity (pCi/M ²)	Dec. Level (pCi/M ²)
+	K-40	1460.82*	10.66	1.651E+005	1.65E+005	9.218E+005	6.358E+004
	Co-60	1173.23	99.85	3.646E+004	2.67E+004	3.736E+004	1.642E+004
		1332.49	99.98	2.674E+004		2.101E+003	1.145E+004
	Nb-94	702.65	99.81	3.133E+004	3.13E+004	-1.778E+004	1.426E+004
		871.09	99.89	3.143E+004		-1.549E+004	1.416E+004
	Ag-108m	433.90	90.50	1.240E+005	3.58E+004	-3.166E+004	6.079E+004
		614.30	89.80	6.996E+004		-1.827E+004	3.353E+004
		722.90	90.80	3.581E+004		6.017E+003	1.634E+004
	Cs-134	604.72	97.62	6.551E+004	3.79E+004	-1.225E+004	3.143E+004
		795.86	85.46	3.786E+004		-1.014E+004	1.719E+004
+	Cs-137	661.66*	85.10	6.168E+004	6.17E+004	7.043E+006	2.925E+004
	Eu-152	121.78	28.67	3.966E+005	1.10E+005	-7.598E+003	1.960E+005
		344.28	26.60	3.630E+005		1.391E+005	1.779E+005
		1408.01	21.07	1.100E+005		-9.883E+004	4.563E+004
	Eu-154	123.07	40.40	2.811E+005	6.95E+004	-2.544E+005	1.389E+005
		723.30	20.06	1.621E+005		-2.353E+004	7.400E+004
		1274.43	34.80	6.952E+004		-4.689E+004	2.936E+004
	Eu-155	86.55	30.70	4.480E+005	4.48E+005	3.834E+005	2.216E+005
		105.31	21.10	5.597E+005		-3.144E+004	2.767E+005
	Tl-208	583.19	85.00	7.020E+004	7.02E+004	-6.938E+004	3.360E+004
	Bi-212	727.33	6.67	5.009E+005	5.01E+005	-1.925E+005	2.291E+005
	Pb-212	238.63	43.60	2.456E+005	2.46E+005	1.104E+005	1.210E+005
+	Bi-214	609.32*	45.49	7.637E+004	7.64E+004	7.299E+004	3.533E+004
		1120.29*	14.92	1.682E+005		1.111E+005	7.231E+004
		1764.49	15.30	1.747E+005		8.808E+004	7.245E+004
+	Pb-214	295.22	18.42	5.356E+005	1.59E+005	2.684E+005	2.631E+005
		351.93*	35.60	1.585E+005		1.286E+005	7.656E+004
	Ra-226	186.21	3.64	3.004E+006	3.00E+006	1.144E+006	1.483E+006
	Ac-228	338.32	11.27	8.283E+005	1.38E+005	-6.673E+005	4.058E+005
		911.20	25.80	1.376E+005		1.089E+005	6.266E+004
		968.97	15.80	2.490E+005		3.141E+005	1.141E+005
	Am-241	59.54	35.90	4.640E+005	4.64E+005	3.952E+005	2.290E+005

+ = Nuclide identified during the nuclide identification
 * = Energy line found in the spectrum
 > = Calculated MDA is zero due to zero counts in the region, or the region is outside the spectrum, or MDA has not been calculated
 @ = Half-life too short to be able to perform the decay correction

***** GAMMA SPECTRUM ANALYSIS *****

Filename: 6279

Report Generated On : 5/3/2018 1:46:34 PM ✓
Sample Title : B106213AFQWC020GD ✓
Sample Description : U1 East Valve House Exterior Wal ✓
Sample Identification : QC ✓
Sample Type : Gamma Direct ✓
Sample Geometry : 3M90D_CP_2IN ✓
Peak Locate Threshold : 3.00 ✓
Peak Locate Range (in channels) : 85 - 8192 ✓
Peak Area Range (in channels) : 85 - 8192 ✓
Identification Energy Tolerance : 10.000 keV ✓
Sample Size : 2.830E+001 M^2 ✓
Sample Taken On : 5/3/2018 1:36:00 PM ✓
Acquisition Started : 5/3/2018 1:36:32 PM ✓
Live Time : 600.0 seconds ✓
Real Time : 600.5 seconds ✓
Dead Time : 0.08 % ✓
Energy Calibration Used Done On : 12/28/2017 ✓
Efficiency Calibration Used Done On : 2/1/2018 ✓
Efficiency ID : 3M90D_CP_2IN ✓

Data Validated
5-3-18 / 1535



 ***** P E A K A N A L Y S I S R E P O R T *****

Detector Name: 6279
 Sample Title: B106213AFQWC020GD
 Peak Analysis Performed on: 5/3/2018 1:46:33 PM
 Peak Analysis From Channel: 85
 Peak Analysis To Channel: 8192

Peak No.	ROI start	ROI end	Peak centroid	Energy (keV)	FWHM (keV)	Net Peak Area	Net Area Uncert.	Continuum Counts
1	121-	136	128.40	32.02	0.66	3.37E+001	34.59	8.13E+001
2	284-	347	300.60	75.12	1.22	1.85E+002	206.83	1.13E+003
3	1399-	1416	1407.11	351.98	0.68	4.10E+001	21.74	2.30E+001
4	2323-	2340	2331.39	583.13	0.60	2.10E+001	16.02	1.20E+001
5	2427-	2444	2435.58	609.18	0.69	4.46E+001	16.87	7.36E+000
6	2635-	2654	2645.63	661.70	0.93	1.04E+002	22.71	7.31E+000
7	5834-	5853	5843.43	1460.58	1.35	7.60E+001	17.44	0.00E+000

M = First peak in a multiplet region
 m = Other peak in a multiplet region
 F = Fitted singlet

Errors quoted at 2.000 sigma

 ***** N U C L I D E I D E N T I F I C A T I O N R E P O R T *****

Sample Title: B106213AFQWC020GD
 Nuclide Library Used: C:\GENIE2K\CAMFILES\Zion Lib-BNL.NLB

IDENTIFIED NUCLIDES

Nuclide Name	Id Confidence	Energy (keV)	Yield (%)	Activity (pCi/M^2)	Activity Uncertainty
K-40	1.000	1460.82*	10.66	1.06614E+006	2.61525E+005
Cs-137	1.000	661.66*	85.10	1.22159E+005	3.05160E+004
Tl-208	1.000	583.19*	85.00	2.31461E+004	1.79102E+004
Bi-214	0.442	609.32*	45.49	9.42592E+004	3.73850E+004
		1120.29	14.92		
		1764.49	15.30		
Pb-214	0.437	295.22	18.42		
		351.93*	35.60	8.19800E+004	4.51993E+004

* = Energy line found in the spectrum.
 @ = Energy line not used for Weighted Mean Activity
 Energy Tolerance : 10.000 keV
 Nuclide confidence index threshold = 0.30
 Errors quoted at 2.000 sigma

 ***** INTERFERENCE CORRECTED REPORT *****

Nuclide Name	Nuclide Id Confidence	Wt mean Activity (pCi/M^2)	Wt mean Activity Uncertainty
K-40	1.000	1.066144E+006	2.615251E+005
Cs-137	1.000	1.221595E+005 ✓	3.051605E+004 ✓
Tl-208	1.000	2.314609E+004	1.791017E+004
Bi-214	0.442	9.425920E+004	3.738498E+004
Pb-214	0.437	8.197998E+004	4.519935E+004

? = 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 2.000 sigma

***** UNIDENTIFIED PEAKS *****

Peak Locate Performed on: 5/3/2018 1:46:33 PM
 Peak Locate From Channel: 85
 Peak Locate To Channel: 8192

Peak No.	Energy (keV)	Peak Size in Counts per Second	Peak CPS % Uncertainty	Peak Type	Tol. Nuclide
1	32.02	5.6185E-002	102.60		
2	75.12	3.0795E-001	111.94		

M = First peak in a multiplet region
 m = Other peak in a multiplet region
 F = Fitted singlet

Errors quoted at 2.000 sigma

 ***** N U C L I D E M D A R E P O R T *****

Detector Name: 6279
 Sample Geometry: 3M90D_CP_2IN
 Sample Title: B106213AFQWC020GD
 Nuclide Library Used: C:\GENIE2K\CAMFILES\Zion Lib-BNL.NLB

	Nuclide Name	Energy (keV)	Yield (%)	Line MDA (pCi/M ²)	Nuclide MDA (pCi/M ²)	Activity (pCi/M ²)	Dec. Level (pCi/M ²)
+	K-40	1460.82*	10.66	3.796E+004	3.80E+004	1.066E+006	0.000E+000
	Co-60	1173.23	99.85	3.526E+004	3.48E+004	5.670E+003	1.583E+004
		1332.49	99.98	3.484E+004		1.427E+004	1.550E+004
	Nb-94	702.65	99.81	3.757E+004	3.43E+004	1.240E+003	1.738E+004
		871.09	99.89	3.432E+004		-1.929E+004	1.560E+004
	Ag-108m	433.90	90.50	4.557E+004	3.54E+004	3.351E+004	2.159E+004
		614.30	89.80	4.733E+004		3.934E+004	2.221E+004
		722.90	90.80	3.537E+004		-1.811E+004	1.612E+004
	Cs-134	604.72	97.62	4.369E+004	4.13E+004	5.453E+004	2.052E+004
		795.86	85.46	4.133E+004		5.531E+004	1.893E+004
+	Cs-137	661.66*	85.10	2.267E+004	2.27E+004	1.222E+005	9.743E+003
	Eu-152	121.78	28.67	2.271E+005	1.52E+005	1.661E+005	1.112E+005
		344.28	26.60	1.750E+005		1.325E+004	8.392E+004
		1408.01	21.07	1.518E+005		-8.180E+004	6.652E+004
	Eu-154	123.07	40.40	1.595E+005	1.05E+005	9.024E+004	7.809E+004
		723.30	20.06	1.581E+005		-1.445E+005	7.197E+004
		1274.43	34.80	1.055E+005		1.696E+004	4.734E+004
	Eu-155	86.55	30.70	2.838E+005	2.84E+005	1.799E+005	1.395E+005
		105.31	21.10	3.412E+005		1.241E+005	1.674E+005
+	Tl-208	583.19*	85.00	2.687E+004	2.69E+004	2.315E+004	1.194E+004
	Bi-212	727.33	6.67	4.950E+005	4.95E+005	-2.256E+005	2.262E+005
	Pb-212	238.63	43.60	1.158E+005	1.16E+005	1.318E+005	5.610E+004
+	Bi-214	609.32*	45.49	4.150E+004	4.15E+004	9.426E+004	1.789E+004
		1120.29	14.92	2.803E+005		6.788E+004	1.284E+005
		1764.49	15.30	2.215E+005		1.541E+005	9.584E+004
+	Pb-214	295.22	18.42	2.477E+005	6.33E+004	1.394E+005	1.191E+005
		351.93*	35.60	6.325E+004		8.198E+004	2.892E+004
	Ra-226	186.21	3.64	1.320E+006	1.32E+006	1.021E+006	6.410E+005
	Ac-228	338.32	11.27	3.737E+005	1.26E+005	3.594E+005	1.785E+005
		911.20	25.80	1.264E+005		-3.323E+005	5.704E+004
		968.97	15.80	2.255E+005		1.612E+005	1.024E+005
	Am-241	59.54	35.90	3.080E+005	3.08E+005	5.300E+005	1.510E+005

+ = Nuclide identified during the nuclide identification
 * = Energy line found in the spectrum
 > = Calculated MDA is zero due to zero counts in the region, or the region is outside the spectrum, or MDA has not been calculated
 @ = Half-life too short to be able to perform the decay correction

Filename: C:\GENIE2K\CAMFILES\00001052.CNF

Report Generated On : 5/5/2018 9:57:05 AM

Sample Title : B106214AFSFC001GD ✓
Sample Description : U1 West Valve House Floor ✓
Sample Identification :
Sample Type : Gamma Direct ✓
Sample Geometry : 3M90D_CP_2IN ✓

Peak Locate Threshold : 3.00
Peak Locate Range (in channels) : 85 - 8192 ✓
Peak Area Range (in channels) : 85 - 8192 ✓
Identification Energy Tolerance : 10.000 keV ✓

Sample Size : 2.830E+001 M² ✓

Sample Taken On : 4/26/2018 12:38:00 PM ✓
Acquisition Started : 4/26/2018 12:38:15 PM ✓

Live Time : 600.0 seconds
Real Time : 600.5 seconds

Dead Time : 0.09 %

Energy Calibration Used Done On : 12/28/2017 ✓
Efficiency Calibration Used Done On : 2/1/2018 ✓
Efficiency ID : 3M90D_CP_2IN ✓

Data Validated

5-5-18 1140



 ***** P E A K A N A L Y S I S R E P O R T *****

Detector Name: 6279
 Sample Title: B106214AFSFC001GD
 Peak Analysis Performed on: 5/5/2018 9:57:04 AM
 Peak Analysis From Channel: 85
 Peak Analysis To Channel: 8192

Peak No.	ROI start	ROI end	Peak centroid	Energy (keV)	FWHM (keV)	Net Peak Area	Net Area Uncert.	Continuum Counts
1	119-	156	128.63	32.08	0.89	1.44E+002	70.09	1.83E+002
2	291-	310	300.63	75.13	0.76	2.58E+002	72.46	3.01E+002
3	946-	963	954.33	238.70	0.63	8.42E+000	40.38	1.15E+002
4	1171-	1188	1179.80	295.11	0.35	2.87E+001	30.54	5.93E+001
5	1399-	1416	1407.32	352.03	1.53	3.45E+001	28.70	5.05E+001
6	2036-	2053	2044.81	511.47	0.59	3.00E+001	18.83	1.80E+001
7	2324-	2341	2332.92	583.52	0.42	1.80E+001	18.24	2.00E+001
8	2429-	2446	2437.27	609.61	1.43	5.58E+001	16.62	4.15E+000
9	2633-	2658	2646.59	661.94	1.52	5.98E+002	53.78	2.94E+001
10	3637-	3654	3645.35	911.58	0.41	1.53E+001	12.21	6.72E+000
11	5837-	5856	5846.37	1461.31	0.89	7.30E+001	17.09	0.00E+000

M = First peak in a multiplet region
 m = Other peak in a multiplet region
 F = Fitted singlet

Errors quoted at 2.000 sigma

 ***** N U C L I D E I D E N T I F I C A T I O N R E P O R T *****

Sample Title: B106214AFSFC001GD
 Nuclide Library Used: C:\GENIE2K\CAMFILES\Zion Lib-BNL.NLB

IDENTIFIED NUCLIDES

Nuclide Name	Id Confidence	Energy (keV)	Yield (%)	Activity (pCi/M ²)	Activity Uncertainty
K-40	1.000	1460.82*	10.66	1.02438E+006	2.55758E+005
Cs-137	1.000	661.66*	85.10	7.04206E+005	1.05679E+005
Tl-208	1.000	583.19*	85.00	1.98384E+004	2.02974E+004
Pb-212	1.000	238.63*	43.60	1.11974E+004	5.37214E+004
Bi-214	0.442	609.32*	45.49	1.17961E+005	3.78559E+004
		1120.29	14.92		
		1764.49	15.30		
Pb-214	1.000	295.22*	18.42	1.00598E+005	1.08318E+005
		351.93*	35.60	6.90179E+004	5.83635E+004

* = Energy line found in the spectrum.
 @ = Energy line not used for Weighted Mean Activity
 Energy Tolerance : 10.000 keV
 Nuclide confidence index threshold = 0.30
 Errors quoted at 2.000 sigma

***** INTERFERENCE CORRECTED REPORT *****

Nuclide Name	Nuclide Id Confidence	Wt mean Activity (pCi/M ²)	Wt mean Activity Uncertainty
K-40	1.000	1.024384E+006	2.557577E+005
Cs-137	1.000	7.042056E+005	1.056792E+005
Tl-208	1.000	1.983844E+004	2.029743E+004
Pb-212	1.000	1.119737E+004	5.372136E+004
Bi-214	0.442	1.179609E+005	3.785593E+004
Pb-214	1.000	7.612339E+004	5.137980E+004

? = 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 2.000 sigma

***** U N I D E N T I F I E D P E A K S *****

Peak Locate Performed on: 5/5/2018 9:57:04 AM
Peak Locate From Channel: 85
Peak Locate To Channel: 8192

Peak No.	Energy (keV)	Peak Size in Counts per Second	Peak CPS % Uncertainty	Peak Type	Tol. Nuclide
1	32.08	2.3973E-001	48.73		
2	75.13	4.3053E-001	28.05		
6	511.47	5.0000E-002	62.77		
10	911.58	2.5473E-002	79.92	Sum	

M = First peak in a multiplet region

m = Other peak in a multiplet region

F = Fitted singlet

Errors quoted at 2.000 sigma

 ***** N U C L I D E M D A R E P O R T *****

Detector Name: 6279
 Sample Geometry: 3M90D_CP_2IN
 Sample Title: B106214AFSFC001GD
 Nuclide Library Used: C:\GENIE2K\CAMFILES\Zion Lib-BNL.NLB

	Nuclide Name	Energy (keV)	Yield (%)	Line MDA (pCi/M ²)	Nuclide MDA (pCi/M ²)	Activity (pCi/M ²)	Dec. Level (pCi/M ²)
+	K-40	1460.82*	10.66	3.797E+004	3.80E+004	1.024E+006	0.000E+000
	Co-60	1173.23	99.85	4.188E+004	3.19E+004	-4.773E+004	1.913E+004
		1332.49	99.98	3.189E+004		2.557E+004	1.402E+004
	Nb-94	702.65	99.81	3.585E+004	3.59E+004	1.793E+004	1.653E+004
		871.09	99.89	3.610E+004		7.794E+003	1.650E+004
	Ag-108m	433.90	90.50	6.003E+004	4.19E+004	7.591E+003	2.882E+004
		614.30	89.80	5.580E+004		4.217E+004	2.645E+004
		722.90	90.80	4.188E+004		-2.420E+004	1.938E+004
	Cs-134	604.72	97.62	5.026E+004	4.36E+004	-5.422E+003	2.381E+004
		795.86	85.46	4.363E+004		-3.430E+004	2.007E+004
+	Cs-137	661.66*	85.10	4.661E+004	4.66E+004	7.042E+005	2.171E+004
	Eu-152	121.78	28.67	2.350E+005	1.16E+005	2.573E+005	1.152E+005
		344.28	26.60	2.048E+005		1.512E+005	9.884E+004
		1408.01	21.07	1.156E+005		6.242E+004	4.840E+004
	Eu-154	123.07	40.40	1.636E+005	9.38E+004	-1.339E+005	8.017E+004
		723.30	20.06	1.913E+005		-1.048E+005	8.857E+004
		1274.43	34.80	9.384E+004		-4.784E+004	4.152E+004
	Eu-155	86.55	30.70	2.770E+005	2.77E+005	-7.765E+004	1.361E+005
		105.31	21.10	3.508E+005		4.174E+005	1.722E+005
+	Tl-208	583.19*	85.00	3.235E+004	3.24E+004	1.984E+004	1.468E+004
	Bi-212	727.33	6.67	5.457E+005	5.46E+005	-2.405E+005	2.515E+005
+	Pb-212	238.63*	43.60	9.100E+004	9.10E+004	1.120E+004	4.370E+004
+	Bi-214	609.32*	45.49	3.096E+004	3.10E+004	1.180E+005	1.262E+004
		1120.29	14.92	2.496E+005		-9.681E+004	1.130E+005
		1764.49	15.30	2.145E+005		1.431E+005	9.235E+004
+	Pb-214	295.22*	18.42	1.745E+005	9.16E+004	1.006E+005	8.251E+004
		351.93*	35.60	9.164E+004		6.902E+004	4.311E+004
	Ra-226	186.21	3.64	1.577E+006	1.58E+006	1.900E+005	7.692E+005
	Ac-228	338.32	11.27	4.405E+005	1.58E+005	1.463E+005	2.119E+005
		911.20	25.80	1.575E+005		7.137E+004	7.261E+004
		968.97	15.80	2.599E+005		2.033E+005	1.196E+005
	Am-241	59.54	35.90	3.035E+005	3.04E+005	8.937E+004	1.487E+005

+ = Nuclide identified during the nuclide identification

* = Energy line found in the spectrum

> = Calculated MDA is zero due to zero counts in the region, or the region is outside the spectrum, or MDA has not been calculated

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

Filename: C:\GENIE2K\CAMFILES\00001053.CNF

Report Generated On : 5/5/2018 9:56:03 AM

Sample Title : B106214AFSFC002GD ✓
Sample Description : U1 West Valve House Floor ✓
Sample Identification :
Sample Type : Gamma Direct
Sample Geometry : 3M90D_CP_2IN

Peak Locate Threshold : 3.00
Peak Locate Range (in channels) : 85 - 8192
Peak Area Range (in channels) : 85 - 8192
Identification Energy Tolerance : 10.000 keV

Sample Size : 2.830E+001 M² ✓

Sample Taken On : 4/26/2018 12:52:00 PM ✓
Acquisition Started : 4/26/2018 12:52:14 PM ✓

Live Time : 600.0 seconds
Real Time : 600.4 seconds ✓

Dead Time : 0.07 % ✓

Energy Calibration Used Done On : 12/28/2017 ✓
Efficiency Calibration Used Done On : 2/1/2018 ✓
Efficiency ID : 3M90D_CP_2IN

Data Validated
5-5-18 1141



 ***** P E A K A N A L Y S I S R E P O R T *****

Detector Name: 6279
 Sample Title: B106214AFSFC002GD
 Peak Analysis Performed on: 5/5/2018 9:56:02 AM
 Peak Analysis From Channel: 85
 Peak Analysis To Channel: 8192

	Peak No.	ROI start	ROI end	Peak centroid	Energy (keV)	FWHM (keV)	Net Peak Area	Net Area Uncert.	Continuum Counts
M	1	247-	309	254.26	63.52	1.02	2.64E+001	22.96	1.69E+002
m	2	247-	309	300.44	75.08	1.03	1.22E+002	34.12	1.92E+002
	3	959-	976	967.26	241.94	0.25	1.79E+001	31.19	6.91E+001
	4	1398-	1417	1407.06	351.96	1.20	5.28E+001	29.60	4.72E+001
	5	2034-	2051	2042.81	510.97	0.34	3.25E+001	17.48	1.35E+001
	6	2324-	2341	2332.42	583.39	0.52	1.29E+001	17.69	1.91E+001
	7	2427-	2446	2436.17	609.33	0.76	6.30E+001	19.81	1.00E+001
	8	2634-	2656	2645.37	661.64	1.34	2.21E+002	33.93	1.73E+001
	9	3635-	3652	3643.23	911.05	0.33	1.99E+001	10.33	2.09E+000
	10	4472-	4491	4481.56	1120.50	0.28	1.77E+001	10.16	2.33E+000
	11	5835-	5854	5844.81	1460.92	0.81	7.30E+001	19.03	5.00E+000
	12	7051-	7070	7060.68	1764.36	0.42	2.10E+001	9.17	0.00E+000

M = First peak in a multiplet region
 m = Other peak in a multiplet region
 F = Fitted singlet

Errors quoted at 2.000 sigma

 ***** N U C L I D E I D E N T I F I C A T I O N R E P O R T *****

Sample Title: B106214AFSFC002GD
 Nuclide Library Used: C:\GENIE2K\CAMFILES\Zion Lib-BNL.NLB

..... IDENTIFIED NUCLIDES

Nuclide Name	Id Confidence	Energy (keV)	Yield (%)	Activity (pCi/M ²)	Activity Uncertainty
K-40	1.000	1460.82*	10.66	1.02421E+006	2.81415E+005
Cs-137	1.000	661.66*	85.10	2.60035E+005	5.07273E+004
Tl-208	1.000	583.19*	85.00	1.42334E+004	1.96154E+004
Pb-212	0.983	238.63*	43.60	2.39733E+004	4.19362E+004
Bi-214	1.000	609.32*	45.49	1.33031E+005	4.47859E+004
		1120.29*	14.92	1.54208E+005	8.94826E+004
		1764.49*	15.30	2.31202E+005	1.02590E+005
Pb-214	0.437	295.22	18.42		
		351.93*	35.60	1.05633E+005	6.12955E+004
Am-241	0.975	59.54*	35.90	5.42134E+004	4.84626E+004

* = Energy line found in the spectrum.

@ = Energy line not used for Weighted Mean Activity

Energy Tolerance : 10.000 keV

Nuclide confidence index threshold = 0.30

Errors quoted at 2.000 sigma

 ***** INTERFERENCE CORRECTED REPORT *****

Nuclide Name	Nuclide Id Confidence	Wt mean Activity (pCi/M ²)	Wt mean Activity Uncertainty
K-40	1.000	1.024212E+006	2.814145E+005
Cs-137	1.000	2.600346E+005	5.072734E+004
Tl-208	1.000	1.423343E+004	1.961539E+004
Pb-212	0.983	2.397329E+004	4.193617E+004
Bi-214	1.000	1.496951E+005	3.730763E+004
Pb-214	0.437	1.056326E+005	6.129548E+004
Am-241	0.975	5.421337E+004	4.846257E+004

? = 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 2.000 sigma

***** UNIDENTIFIED PEAKS *****

Peak Locate Performed on: 5/5/2018 9:56:02 AM
 Peak Locate From Channel: 85
 Peak Locate To Channel: 8192

Peak No.	Energy (keV)	Peak Size in Counts per Second	Peak CPS % Uncertainty	Peak Type	Tol. Nuclide
m 2	75.08	2.0386E-001	27.90		
5	510.97	5.4167E-002	53.79		
9	911.05	3.3182E-002	51.87	Sum	

M = First peak in a multiplet region
 m = Other peak in a multiplet region
 F = Fitted singlet

Errors quoted at 2.000 sigma

 ***** N U C L I D E M D A R E P O R T *****

Detector Name: 6279
 Sample Geometry: 3M90D_CP_2IN
 Sample Title: B106214AFSFC002GD
 Nuclide Library Used: C:\GENIE2K\CAMFILES\Zion Lib-BNL.NLB

	Nuclide Name	Energy (keV)	Yield (%)	Line MDA (pCi/M ²)	Nuclide MDA (pCi/M ²)	Activity (pCi/M ²)	Dec. Level (pCi/M ²)
+	K-40	1460.82*	10.66	2.312E+005	2.31E+005	1.024E+006	9.664E+004
	Co-60	1173.23	99.85	3.465E+004	3.34E+004	-1.211E+004	1.552E+004
		1332.49	99.98	3.340E+004		-1.516E+004	1.478E+004
	Nb-94	702.65	99.81	3.442E+004	3.43E+004	-9.880E+002	1.581E+004
		871.09	99.89	3.432E+004		-2.138E+004	1.560E+004
	Ag-108m	433.90	90.50	4.787E+004	3.71E+004	1.109E+004	2.274E+004
		614.30	89.80	5.509E+004		5.927E+004	2.609E+004
		722.90	90.80	3.711E+004		-2.867E+004	1.699E+004
	Cs-134	604.72	97.62	5.177E+004	3.89E+004	5.415E+004	2.456E+004
		795.86	85.46	3.889E+004		-3.505E+004	1.770E+004
+	Cs-137	661.66*	85.10	3.495E+004	3.49E+004	2.600E+005	1.588E+004
	Eu-152	121.78	28.67	2.167E+005	1.44E+005	-5.344E+004	1.060E+005
		344.28	26.60	1.942E+005		-2.645E+003	9.353E+004
		1408.01	21.07	1.437E+005		1.549E+004	6.249E+004
	Eu-154	123.07	40.40	1.534E+005	8.51E+004	2.962E+004	7.506E+004
		723.30	20.06	1.699E+005		-1.187E+005	7.790E+004
		1274.43	34.80	8.507E+004		-1.593E+005	3.714E+004
	Eu-155	86.55	30.70	2.689E+005	2.69E+005	-4.216E+004	1.321E+005
		105.31	21.10	3.246E+005		-6.675E+004	1.591E+005
+	Tl-208	583.19*	85.00	3.237E+004	3.24E+004	1.423E+004	1.469E+004
	Bi-212	727.33	6.67	5.349E+005	5.35E+005	3.348E+005	2.461E+005
+	Pb-212	238.63*	43.60	6.974E+004	6.97E+004	2.397E+004	3.306E+004
+	Bi-214	609.32*	45.49	4.689E+004	2.98E+004	1.330E+005	2.059E+004
		1120.29*	14.92	1.054E+005		1.542E+005	4.090E+004
		1764.49*	15.30	2.979E+004		2.312E+005	0.000E+000
+	Pb-214	295.22	18.42	2.420E+005	9.03E+004	-1.658E+005	1.163E+005
		351.93*	35.60	9.028E+004		1.056E+005	4.243E+004
	Ra-226	186.21	3.64	1.344E+006	1.34E+006	-1.725E+005	6.528E+005
	Ac-228	338.32	11.27	3.918E+005	1.65E+005	-1.044E+004	1.875E+005
		911.20	25.80	1.651E+005		1.892E+005	7.637E+004
		968.97	15.80	2.753E+005		2.279E+005	1.273E+005
+	Am-241	59.54*	35.90	1.299E+005	1.30E+005	5.421E+004	6.217E+004

+ = Nuclide identified during the nuclide identification

* = Energy line found in the spectrum

> = Calculated MDA is zero due to zero counts in the region, or the region is outside the spectrum, or MDA has not been calculated

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

***** GAMMA SPECTRUM ANALYSIS *****

Filename: C:\GENIE2K\CAMFILES\00001065.CNF

Report Generated On : 5/5/2018 9:42:54 AM

Sample Title : B106214AFSFC003GD
Sample Description : Unit 1 West Valve House ✓
Sample Identification :
Sample Type : Gamma Direct
Sample Geometry :

Peak Locate Threshold : 3.00
Peak Locate Range (in channels) : 85 - 8192
Peak Area Range (in channels) : 85 - 8192 ✓
Identification Energy Tolerance : 10.000 keV


Sample Size : 2.830E+001 M² ✓

Sample Taken On : 4/26/2018 10:21:00 AM
Acquisition Started : 4/26/2018 10:21:41 AM

Live Time : 600.0 seconds
Real Time : 600.6 seconds

Dead Time : 0.10 % ✓

Energy Calibration Used Done On : 12/28/2017 ✓
Efficiency Calibration Used Done On : 2/1/2018
Efficiency ID : 3M90D_CP_2IN

Data Validated
5-5-18 / 1148


 ***** P E A K A N A L Y S I S R E P O R T *****

Detector Name: 6279

Sample Title: B106214AFSFC003GD

Peak Analysis Performed on: 5/5/2018 9:42:54 AM

Peak Analysis From Channel: 85

Peak Analysis To Channel: 8192

Peak No.	ROI start	ROI end	Peak centroid	Energy (keV)	FWHM (keV)	Net Peak Area	Net Area Uncert.	Continuum Counts
1	118-	136	128.74	32.10	1.03	1.23E+002	43.24	1.02E+002
2	282-	347	299.97	74.96	0.83	1.98E+002	218.40	1.26E+003
3	946-	963	954.51	238.75	0.95	2.03E+001	39.32	1.11E+002
4	1172-	1190	1181.23	295.47	0.98	6.53E+001	28.65	4.07E+001
5	1398-	1416	1406.65	351.86	0.94	6.05E+001	28.56	4.25E+001
6	1937-	1954	1945.04	486.52	0.63	1.05E+001	19.70	2.65E+001
7	2428-	2445	2436.28	609.36	0.35	4.41E+001	19.06	1.39E+001
8	2635-	2659	2646.30	661.87	1.35	7.28E+002	56.50	1.76E+001
9	5836-	5857	5845.71	1461.14	1.81	1.14E+002	22.12	2.50E+000
10	7052-	7071	7061.84	1764.65	0.38	1.60E+001	8.00	0.00E+000

M = First peak in a multiplet region

m = Other peak in a multiplet region

F = Fitted singlet

Errors quoted at 2.000 sigma

 ***** N U C L I D E I D E N T I F I C A T I O N R E P O R T *****

Sample Title: B106214AFSFC003GD
 Nuclide Library Used: C:\GENIE2K\CAMFILES\Zion Lib-BNL.NLB

..... IDENTIFIED NUCLIDES

Nuclide Name	Id Confidence	Energy (keV)	Yield (%)	Activity (pCi/M ²)	Activity Uncertainty
K-40	1.000	1460.82*	10.66	1.59259E+006	3.39808E+005
Cs-137	1.000	661.66*	85.10	8.58290E+005	1.22704E+005
Pb-212	1.000	238.63*	43.60	2.70084E+004	5.24710E+004
Bi-214	0.706	609.32*	45.49	9.31313E+004	4.17825E+004
		1120.29	14.92		
		1764.49*	15.30	1.76172E+005	8.92092E+004
Pb-214	1.000	295.22*	18.42	2.29073E+005	1.07026E+005
		351.93*	35.60	1.20992E+005	5.99449E+004

* = Energy line found in the spectrum.

@ = Energy line not used for Weighted Mean Activity

Energy Tolerance : 10.000 keV

Nuclide confidence index threshold = 0.30

Errors quoted at 2.000 sigma

***** I N T E R F E R E N C E C O R R E C T E D R E P O R T *****

Nuclide Name	Nuclide Id Confidence	Wt mean Activity (pCi/M ²)	Wt mean Activity Uncertainty
K-40	1.000	1.592592E+006	3.398077E+005
Cs-137	1.000	8.582900E+005	1.227035E+005
Pb-212	1.000	2.700843E+004	5.247100E+004
Bi-214	0.706	1.080705E+005	3.783793E+004
Pb-214	1.000	1.468010E+005	5.230021E+004

? = 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 2.000 sigma

***** U N I D E N T I F I E D P E A K S *****

Peak Locate Performed on: 5/5/2018 9:42:54 AM
Peak Locate From Channel: 85
Peak Locate To Channel: 8192

Peak No.	Energy (keV)	Peak Size in Counts per Second	Peak CPS % Uncertainty	Peak Type	Tol. Nuclide
1	32.10	2.0493E-001	35.17		
2	74.96	3.2969E-001	110.41		
6	486.52	1.7432E-002	188.37	Sum	

M = First peak in a multiplet region

m = Other peak in a multiplet region

F = Fitted singlet

Errors quoted at 2.000 sigma

 ***** N U C L I D E M D A R E P O R T *****

Detector Name: 6279
 Sample Geometry:
 Sample Title: B106214AFSFC003GD
 Nuclide Library Used: C:\GENIE2K\CAMFILES\Zion Lib-BNL.NLB

	Nuclide Name	Energy (keV)	Yield (%)	Line MDA (pCi/M ²)	Nuclide MDA (pCi/M ²)	Activity (pCi/M ²)	Dec. Level (pCi/M ²)
+	K-40	1460.82*	10.66	1.752E+005	1.75E+005	1.593E+006	6.860E+004
	Co-60	1173.23	99.85	3.817E+004	3.41E+004	-2.963E+004	1.728E+004
		1332.49	99.98	3.413E+004		2.983E+004	1.514E+004
	Nb-94	702.65	99.81	3.655E+004	3.43E+004	7.015E+003	1.687E+004
		871.09	99.89	3.432E+004		-1.736E+004	1.560E+004
	Ag-108m	433.90	90.50	6.076E+004	3.92E+004	-4.045E+004	2.918E+004
		614.30	89.80	5.509E+004		8.425E+004	2.609E+004
		722.90	90.80	3.917E+004		-2.083E+004	1.802E+004
	Cs-134	604.72	97.62	5.343E+004	3.94E+004	6.332E+004	2.539E+004
		795.86	85.46	3.939E+004		9.272E+003	1.795E+004
+	Cs-137	661.66*	85.10	3.554E+004	3.55E+004	8.583E+005	1.617E+004
	Eu-152	121.78	28.67	2.491E+005	1.63E+005	-1.893E+005	1.222E+005
		344.28	26.60	2.094E+005		-6.910E+004	1.011E+005
		1408.01	21.07	1.631E+005		1.387E+005	7.215E+004
	Eu-154	123.07	40.40	1.769E+005	9.59E+004	-8.088E+004	8.679E+004
		723.30	20.06	1.810E+005		8.403E+004	8.340E+004
		1274.43	34.80	9.589E+004		-7.411E+003	4.255E+004
	Eu-155	86.55	30.70	3.006E+005	3.01E+005	-8.610E+004	1.479E+005
		105.31	21.10	3.697E+005		-1.973E+005	1.816E+005
	Tl-208	583.19	85.00	5.148E+004	5.15E+004	5.357E+004	2.424E+004
	Bi-212	727.33	6.67	5.294E+005	5.29E+005	1.657E+005	2.434E+005
+	Pb-212	238.63*	43.60	8.732E+004	8.73E+004	2.701E+004	4.186E+004
+	Bi-214	609.32*	45.49	5.321E+004	2.98E+004	9.313E+004	2.375E+004
		1120.29	14.92	2.898E+005		-1.609E+005	1.331E+005
		1764.49*	15.30	2.980E+004		1.762E+005	0.000E+000
+	Pb-214	295.22*	18.42	1.461E+005	8.43E+004	2.291E+005	6.829E+004
		351.93*	35.60	8.426E+004		1.210E+005	3.942E+004
	Ra-226	186.21	3.64	1.708E+006	1.71E+006	1.670E+006	8.348E+005
	Ac-228	338.32	11.27	4.520E+005	1.62E+005	-5.773E+004	2.177E+005
		911.20	25.80	1.621E+005		1.428E+005	7.489E+004
		968.97	15.80	2.651E+005		-4.597E+004	1.222E+005
	Am-241	59.54	35.90	3.167E+005	3.17E+005	2.269E+005	1.553E+005

+ = Nuclide identified during the nuclide identification

* = Energy line found in the spectrum

> = Calculated MDA is zero due to zero counts in the region, or the region is outside the spectrum, or MDA has not been calculated

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

Filename: C:\GENIE2K\CAMFILES\00001064.CNF

Report Generated On : 5/5/2018 9:44:28 AM ✓

Sample Title : B106214AFSFC004GD ✓
Sample Description : Unit 1 West Valve House ✓
Sample Identification :
Sample Type : Gamma Direct
Sample Geometry :

Peak Locate Threshold : 3.00
Peak Locate Range (in channels) : 85 - 8192 ✓
Peak Area Range (in channels) : 85 - 8192 ✓
Identification Energy Tolerance : 10.000 keV

Sample Size : 2.830E+001 M² ✓


Sample Taken On : 4/26/2018 10:07:00 AM
Acquisition Started : 4/26/2018 10:07:26 AM

Live Time : 600.0 seconds
Real Time : 600.9 seconds ✓✓

Dead Time : 0.15 % ✓

Energy Calibration Used Done On : 12/28/2017 ✓
Efficiency Calibration Used Done On : 2/1/2018
Efficiency ID : 3M90D_CP_2IN

*Data Validated
5-5-18 / 1150*



 ***** P E A K A N A L Y S I S R E P O R T *****

Detector Name: 6279
 Sample Title: B106214AFSFC004GD
 Peak Analysis Performed on: 5/5/2018 9:44:28 AM
 Peak Analysis From Channel: 85
 Peak Analysis To Channel: 8192

Peak No.	ROI start	ROI end	Peak centroid	Energy (keV)	FWHM (keV)	Net Peak Area	Net Area Uncert.	Continuum Counts
1	119-	155	128.62	32.07	1.14	5.17E+002	106.22	3.96E+002
2	282-	348	299.04	74.73	1.09	3.56E+002	271.38	1.89E+003
3	522-	542	534.32	133.61	0.59	4.28E+001	75.54	3.81E+002
4	820-	835	827.76	207.04	0.48	6.82E+000	49.81	2.04E+002
5	1172-	1189	1180.17	295.21	0.77	2.23E+001	42.08	1.29E+002
6	1397-	1415	1406.20	351.75	0.37	2.77E+001	39.84	1.09E+002
7	2426-	2443	2434.92	609.02	0.95	1.71E+001	22.24	3.19E+001
8	2632-	2658	2645.30	661.62	1.37	2.57E+003	103.46	2.38E+001
9	3634-	3651	3642.21	910.79	0.72	1.68E+001	14.25	1.02E+001
10	5834-	5853	5843.11	1460.50	0.72	7.30E+001	17.09	0.00E+000

M = First peak in a multiplet region
 m = Other peak in a multiplet region
 F = Fitted singlet

Errors quoted at 2.000 sigma

 ***** N U C L I D E I D E N T I F I C A T I O N R E P O R T *****

Sample Title: B106214AFSFC004GD
 Nuclide Library Used: C:\GENIE2K\CAMFILES\Zion Lib-BNL.NLB

IDENTIFIED NUCLIDES

Nuclide Name	Id Confidence	Energy (keV)	Yield (%)	Activity (pCi/M ²)	Activity Uncertainty
K-40	1.000	1460.82*	10.66	1.02402E+006	2.55668E+005
Cs-137	1.000	661.66*	85.10	3.02899E+006	3.83635E+005
Bi-214	0.442	609.32*	45.49	3.61678E+004	4.71455E+004
		1120.29	14.92		
		1764.49	15.30		
Pb-214	1.000	295.22*	18.42	7.82434E+004	1.48149E+005
		351.93*	35.60	5.54175E+004	8.01321E+004

* = Energy line found in the spectrum.

@ = Energy line not used for Weighted Mean Activity

Energy Tolerance : 10.000 keV

Nuclide confidence index threshold = 0.30

Errors quoted at 2.000 sigma

 ***** I N T E R F E R E N C E C O R R E C T E D R E P O R T *****

Nuclide Name	Nuclide Id Confidence	Wt mean Activity (pCi/M^2)	Wt mean Activity Uncertainty
K-40	1.000	1.024024E+006	2.556678E+005
Cs-137	1.000	3.028994E+006	3.836348E+005
Bi-214	0.442	3.616782E+004	4.714555E+004
Pb-214	1.000	6.058400E+004	7.048246E+004

? = 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 2.000 sigma

***** U N I D E N T I F I E D P E A K S *****

Peak Locate Performed on: 5/5/2018 9:44:28 AM
 Peak Locate From Channel: 85
 Peak Locate To Channel: 8192

Peak No.	Energy (keV)	Peak Size in Counts per Second	Peak CPS % Uncertainty	Peak Type	Tol. Nuclide
1	32.07	8.6209E-001	20.53		
2	74.73	5.9341E-001	76.22		
3	133.61	7.1360E-002	176.42		
4	207.04	1.1359E-002	730.90		
9	910.79	2.7963E-002	84.90	Sum	

M = First peak in a multiplet region
 m = Other peak in a multiplet region
 F = Fitted singlet

Errors quoted at 2.000 sigma

 ***** N U C L I D E M D A R E P O R T *****

Detector Name: 6279
 Sample Geometry:
 Sample Title: B106214AFSFC004GD
 Nuclide Library Used: C:\GENIE2K\CAMFILES\Zion Lib-BNL.NLB

	Nuclide Name	Energy (keV)	Yield (%)	Line MDA (pCi/M ²)	Nuclide MDA (pCi/M ²)	Activity (pCi/M ²)	Dec. Level (pCi/M ²)
+	K-40	1460.82*	10.66	3.796E+004	3.80E+004	1.024E+006	0.000E+000
	Co-60	1173.23	99.85	3.817E+004	3.34E+004	-7.575E+003	1.728E+004
		1332.49	99.98	3.340E+004		2.841E+004	1.478E+004
	Nb-94	702.65	99.81	3.689E+004	3.34E+004	2.022E+004	1.704E+004
		871.09	99.89	3.339E+004		-2.274E+004	1.514E+004
	Ag-108m	433.90	90.50	9.146E+004	4.19E+004	2.375E+004	4.453E+004
		614.30	89.80	5.766E+004		-2.593E+004	2.738E+004
		722.90	90.80	4.188E+004		-2.427E+004	1.938E+004
	Cs-134	604.72	97.62	5.564E+004	4.49E+004	-3.867E+004	2.649E+004
		795.86	85.46	4.495E+004		-4.683E+003	2.073E+004
+	Cs-137	661.66*	85.10	4.289E+004	4.29E+004	3.029E+006	1.985E+004
	Eu-152	121.78	28.67	3.202E+005	1.63E+005	6.243E+004	1.578E+005
		344.28	26.60	2.867E+005		1.773E+005	1.398E+005
		1408.01	21.07	1.631E+005		1.387E+005	7.215E+004
	Eu-154	123.07	40.40	2.256E+005	8.96E+004	2.479E+004	1.112E+005
		723.30	20.06	1.929E+005		-9.456E+004	8.940E+004
		1274.43	34.80	8.958E+004		-1.018E+005	3.939E+004
	Eu-155	86.55	30.70	3.661E+005	3.66E+005	-8.972E+004	1.807E+005
		105.31	21.10	4.527E+005		-8.376E+004	2.232E+005
	Tl-208	583.19	85.00	6.159E+004	6.16E+004	1.039E+004	2.930E+004
	Bi-212	727.33	6.67	5.966E+005	5.97E+005	-4.100E+005	2.770E+005
	Pb-212	238.63	43.60	1.802E+005	1.80E+005	-2.509E+004	8.830E+004
+	Bi-214	609.32*	45.49	7.739E+004	7.74E+004	3.617E+004	3.584E+004
		1120.29	14.92	2.771E+005		6.655E+004	1.267E+005
		1764.49	15.30	2.701E+005		1.041E+005	1.201E+005
+	Pb-214	295.22*	18.42	2.461E+005	1.32E+005	7.824E+004	1.183E+005
		351.93*	35.60	1.319E+005		5.542E+004	6.323E+004
	Ra-226	186.21	3.64	2.218E+006	2.22E+006	3.574E+005	1.090E+006
	Ac-228	338.32	11.27	6.593E+005	1.72E+005	3.851E+005	3.213E+005
		911.20	25.80	1.722E+005		-1.450E+004	7.996E+004
		968.97	15.80	2.405E+005		1.283E+005	1.099E+005
	Am-241	59.54	35.90	3.868E+005	3.87E+005	-4.588E+005	1.904E+005

+ = Nuclide identified during the nuclide identification

* = Energy line found in the spectrum

> = Calculated MDA is zero due to zero counts in the region, or the region is outside the spectrum, or MDA has not been calculated

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

***** GAMMA SPECTRUM ANALYSIS *****

Filename: C:\GENIE2K\CAMFILES\00001055.CNF

Report Generated On : 5/5/2018 9:53:39 AM

Sample Title : B106214AFSWC005GD ✓
Sample Description : U1 West Valve House Wall ✓
Sample Identification :
Sample Type : Gamma Direct ✓
Sample Geometry : 3M90D_CP_2IN ✓

Peak Locate Threshold : 3.00
Peak Locate Range (in channels) : 85 - 8192
Peak Area Range (in channels) : 85 - 8192
Identification Energy Tolerance : 10.000 keV

Sample Size : 2.830E+001 M² ✓

Sample Taken On : 4/26/2018 1:22:00 PM
Acquisition Started : 4/26/2018 1:22:41 PM

Live Time : 600.0 seconds ✓
Real Time : 600.6 seconds ✓

Dead Time : 0.11 % ✓

Energy Calibration Used Done On : 12/28/2017 ✓
Efficiency Calibration Used Done On : 2/1/2018 ✓
Efficiency ID : 3M90D_CP_2IN ✓

Data Validated

5-5-18 1155



 ***** P E A K A N A L Y S I S R E P O R T *****

Detector Name: 6279
 Sample Title: B106214AFSWC005GD
 Peak Analysis Performed on: 5/5/2018 9:53:39 AM
 Peak Analysis From Channel: 85
 Peak Analysis To Channel: 8192

Peak No.	ROI start	ROI end	Peak centroid	Energy (keV)	FWHM (keV)	Net Peak Area	Net Area Uncert.	Continuum Counts
1	119-	155	128.97	32.16	0.91	2.23E+002	85.32	2.83E+002
2	219-	234	226.55	56.59	0.33	1.84E+001	52.28	2.21E+002
3	293-	348	300.61	75.12	1.14	-2.42E+002	240.61	1.84E+003
4	1398-	1416	1407.48	352.07	0.26	4.86E+001	31.07	5.64E+001
5	2034-	2051	2042.13	510.80	0.73	1.71E+001	26.57	4.79E+001
6	2428-	2445	2436.27	609.36	0.57	3.05E+001	19.90	2.05E+001
7	2633-	2659	2645.78	661.74	1.42	1.10E+003	67.50	9.96E+000
8	3635-	3652	3643.61	911.14	0.25	9.60E+000	13.77	1.14E+001
9	4472-	4491	4481.24	1120.42	0.79	1.89E+001	10.17	2.11E+000
10	5835-	5854	5844.11	1460.74	1.21	7.05E+001	18.48	4.47E+000

M = First peak in a multiplet region
 m = Other peak in a multiplet region
 F = Fitted singlet

Errors quoted at 2.000 sigma

 ***** N U C L I D E I D E N T I F I C A T I O N R E P O R T *****

Sample Title: B106214AFSWC005GD
 Nuclide Library Used: C:\GENIE2K\CAMFILES\Zion Lib-BNL.NLB

..... IDENTIFIED NUCLIDES

Nuclide Name	Id Confidence	Energy (keV)	Yield (%)	Activity (pCi/M ²)	Activity Uncertainty
K-40	1.000	1460.82*	10.66	9.89528E+005	2.73191E+005
Cs-137	1.000	661.66*	85.10	1.29132E+006	1.74281E+005
Bi-214	0.735	609.32*	45.49	6.43123E+004	4.27368E+004
		1120.29*	14.92	1.64828E+005	8.97302E+004
		1764.49	15.30		
Pb-214	0.437	295.22	18.42		
		351.93*	35.60	9.72266E+004	6.38592E+004
Am-241	0.986	59.54*	35.90	4.54183E+004	1.29467E+005

* = Energy line found in the spectrum.

@ = Energy line not used for Weighted Mean Activity

Energy Tolerance : 10.000 keV

Nuclide confidence index threshold = 0.30

Errors quoted at 2.000 sigma

***** INTERFERENCE CORRECTED REPORT *****

Nuclide Name	Nuclide Id Confidence	Wt mean Activity (pCi/M ²)	Wt mean Activity Uncertainty
K-40	1.000	9.895284E+005	2.731907E+005
Cs-137	1.000	1.291321E+006	1.742807E+005
Bi-214	0.735	8.289759E+004	3.858401E+004
Pb-214	0.437	9.722664E+004	6.385919E+004
Am-241	0.986	4.541830E+004	1.294672E+005

? = 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 2.000 sigma

***** U N I D E N T I F I E D P E A K S *****

Peak Locate Performed on: 5/5/2018 9:53:39 AM
Peak Locate From Channel: 85
Peak Locate To Channel: 8192

Peak No.	Energy (keV)	Peak Size in Counts per Second	Peak CPS % Uncertainty	Peak Type	Tol. Nuclide
1	32.16	3.7168E-001	38.26		
3	75.12	-4.0353E-001	-99.38		
5	510.80	2.8429E-002	155.76		
8	911.14	1.5992E-002	143.55	Tol.	Ac-228

M = First peak in a multiplet region

m = Other peak in a multiplet region

F = Fitted singlet

Errors quoted at 2.000 sigma

 ***** N U C L I D E M D A R E P O R T *****

Detector Name: 6279
 Sample Geometry: 3M90D_CP_2IN
 Sample Title: B106214AFSWC005GD
 Nuclide Library Used: C:\GENIE2K\CAMFILES\Zion Lib-BNL.NLB

	Nuclide Name	Energy (keV)	Yield (%)	Line MDA (pCi/M^2)	Nuclide MDA (pCi/M^2)	Activity (pCi/M^2)	Dec. Level (pCi/M^2)
+	K-40	1460.82*	10.66	2.161E+005	2.16E+005	9.895E+005	8.904E+004
	Co-60	1173.23	99.85	3.873E+004	2.67E+004	2.735E+004	1.756E+004
		1332.49	99.98	2.674E+004		-2.699E+004	1.145E+004
	Nb-94	702.65	99.81	3.405E+004	2.99E+004	1.354E+004	1.562E+004
		871.09	99.89	2.987E+004		-1.867E+004	1.338E+004
	Ag-108m	433.90	90.50	6.497E+004	3.88E+004	4.712E+004	3.129E+004
		614.30	89.80	5.533E+004		4.028E+004	2.621E+004
		722.90	90.80	3.877E+004		1.425E+004	1.782E+004
	Cs-134	604.72	97.62	5.091E+004	4.23E+004	7.008E+004	2.413E+004
		795.86	85.46	4.227E+004		4.288E+002	1.939E+004
+	Cs-137	661.66*	85.10	2.863E+004	2.86E+004	1.291E+006	1.272E+004
	Eu-152	121.78	28.67	2.925E+005	1.52E+005	-9.186E+004	1.439E+005
		344.28	26.60	2.221E+005		-1.115E+004	1.075E+005
		1408.01	21.07	1.518E+005		1.179E+005	6.652E+004
	Eu-154	123.07	40.40	2.058E+005	9.59E+004	-8.432E+004	1.012E+005
		723.30	20.06	1.755E+005		6.997E+004	8.070E+004
		1274.43	34.80	9.589E+004		4.295E+004	4.255E+004
	Eu-155	86.55	30.70	3.457E+005	3.46E+005	1.605E+005	1.705E+005
		105.31	21.10	4.063E+005		-1.645E+005	2.000E+005
	Tl-208	583.19	85.00	5.439E+004	5.44E+004	5.444E+004	2.570E+004
	Bi-212	727.33	6.67	5.294E+005	5.29E+005	-8.414E+004	2.434E+005
	Pb-212	238.63	43.60	1.510E+005	1.51E+005	3.716E+004	7.371E+004
+	Bi-214	609.32*	45.49	6.325E+004	6.33E+004	6.431E+004	2.877E+004
		1120.29*	14.92	9.944E+004		1.648E+005	3.792E+004
		1764.49	15.30	2.347E+005		1.762E+005	1.025E+005
+	Pb-214	295.22	18.42	3.293E+005	9.68E+004	1.266E+005	1.599E+005
		351.93*	35.60	9.683E+004		9.723E+004	4.571E+004
	Ra-226	186.21	3.64	1.919E+006	1.92E+006	9.689E+005	9.403E+005
	Ac-228	338.32	11.27	5.007E+005	1.59E+005	-1.628E+005	2.420E+005
		911.20	25.80	1.591E+005		1.098E+005	7.338E+004
		968.97	15.80	2.286E+005		-5.273E+004	1.039E+005
+	Am-241	59.54*	35.90	2.161E+005	2.16E+005	4.542E+004	1.047E+005

+ = Nuclide identified during the nuclide identification
 * = Energy line found in the spectrum
 > = Calculated MDA is zero due to zero counts in the region, or the region is outside the spectrum, or MDA has not been calculated
 @ = Half-life too short to be able to perform the decay correction

Filename: C:\GENIE2K\CAMFILES\00001085.CNF

Report Generated On : 5/5/2018 10:10:03 AM
Sample Title : B106214AFSWC006GD
Sample Description : U1 West Valve House Wall
Sample Identification :
Sample Type : Gamma Direct
Sample Geometry : 3M90D_CP_2IN
Peak Locate Threshold : 3.00
Peak Locate Range (in channels) : 85 - 8192
Peak Area Range (in channels) : 85 - 8192
Identification Energy Tolerance : 10.000 keV
Sample Size : 2.830E+001 M^2
Sample Taken On : 5/1/2018 8:26:00 AM
Acquisition Started : 5/1/2018 8:26:11 AM
Live Time : 600.0 seconds
Real Time : 600.4 seconds
Dead Time : 0.06 %
Energy Calibration Used Done On : 12/28/2017
Efficiency Calibration Used Done On : 2/1/2018
Efficiency ID : 3M90D_CP_2IN

✓
✓
✓
✓
✓
✓
✓

Data Validated
5-5-18/1155
Ogim

 ***** P E A K A N A L Y S I S R E P O R T *****

Detector Name: 6279
 Sample Title: B106214AFSWC006GD
 Peak Analysis Performed on: 5/5/2018 10:10:03 AM
 Peak Analysis From Channel: 85
 Peak Analysis To Channel: 8192

Peak No.	ROI start	ROI end	Peak centroid	Energy (keV)	FWHM (keV)	Net Peak Area	Net Area Uncert.	Continuum Counts
1	285-	346	300.30	75.04	1.18	7.77E+001	193.96	1.04E+003
2	946-	963	954.01	238.62	0.40	1.12E+001	31.91	7.28E+001
3	1400-	1417	1408.48	352.32	0.54	4.56E+001	21.22	2.04E+001
4	2323-	2340	2331.75	583.22	0.91	2.00E+001	14.06	9.00E+000
5	2428-	2445	2436.97	609.53	1.18	4.40E+001	17.12	9.00E+000
6	2637-	2654	2645.44	661.65	0.69	3.76E+001	13.55	2.39E+000
7	5835-	5854	5844.83	1460.92	0.57	6.46E+001	17.08	2.42E+000

M = First peak in a multiplet region
 m = Other peak in a multiplet region
 F = Fitted singlet

Errors quoted at 2.000 sigma

 ***** N U C L I D E I D E N T I F I C A T I O N R E P O R T *****

Sample Title: B106214AFSWC006GD
 Nuclide Library Used: C:\GENIE2K\CAMFILES\Zion Lib-BNL.NLB

IDENTIFIED NUCLIDES

Nuclide Name	Id Confidence	Energy (keV)	Yield (%)	Activity (pCi/M ²)	Activity Uncertainty
K-40	1.000	1460.82*	10.66	9.06055E+005	2.52288E+005
Cs-137	1.000	661.66*	85.10	4.43035E+004	1.68244E+004
Tl-208	1.000	583.19*	85.00	2.20935E+004	1.57618E+004
Pb-212	1.000	238.63*	43.60	1.48778E+004	4.24984E+004
Bi-214	0.442	609.32*	45.49	9.29265E+004	3.78388E+004
		1120.29	14.92		
		1764.49	15.30		
Pb-214	0.437	295.22	18.42	9.12939E+004	4.46216E+004
		351.93*	35.60		

* = Energy line found in the spectrum.
 @ = Energy line not used for Weighted Mean Activity
 Energy Tolerance : 10.000 keV
 Nuclide confidence index threshold = 0.30
 Errors quoted at 2.000 sigma

 ***** I N T E R F E R E N C E C O R R E C T E D R E P O R T *****

Nuclide Name	Nuclide Id Confidence	Wt mean Activity (pCi/M ²)	Wt mean Activity Uncertainty
K-40	1.000	9.060553E+005	2.522882E+005
Cs-137	1.000	4.430345E+004	1.682436E+004
Tl-208	1.000	2.209347E+004	1.576179E+004
Pb-212	1.000	1.487784E+004	4.249842E+004
Bi-214	0.442	9.292655E+004	3.783882E+004
Pb-214	0.437	9.129389E+004	4.462159E+004

? = 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 2.000 sigma

***** U N I D E N T I F I E D P E A K S *****

Peak Locate Performed on: 5/5/2018 10:10:03 AM
 Peak Locate From Channel: 85
 Peak Locate To Channel: 8192

Peak No.	Energy (keV)	Peak Size in Counts per Second	Peak CPS % Uncertainty	Peak Type	Tol. Nuclide
1	75.04	1.2946E-001	249.70		

M = First peak in a multiplet region
 m = Other peak in a multiplet region
 F = Fitted singlet

Errors quoted at 2.000 sigma

 ***** N U C L I D E M D A R E P O R T *****

Detector Name: 6279
 Sample Geometry: 3M90D_CP_2IN
 Sample Title: B106214AFSWC006GD
 Nuclide Library Used: C:\GENIE2K\CAMFILES\Zion Lib-BNL.NLB

	Nuclide Name	Energy (keV)	Yield (%)	Line MDA (pCi/M^2)	Nuclide MDA (pCi/M^2)	Activity (pCi/M^2)	Dec. Level (pCi/M^2)
+	K-40	1460.82*	10.66	1.717E+005	1.72E+005	9.061E+005	6.687E+004
	Co-60	1173.23	99.85	3.402E+004	3.40E+004	-2.196E+004	1.521E+004
		1332.49	99.98	4.004E+004		1.101E+004	1.810E+004
	Nb-94	702.65	99.81	3.585E+004	3.34E+004	2.720E+004	1.653E+004
		871.09	99.89	3.339E+004		1.384E+003	1.514E+004
	Ag-108m	433.90	90.50	3.781E+004	3.78E+004	1.463E+004	1.771E+004
		614.30	89.80	5.111E+004		7.387E+004	2.410E+004
		722.90	90.80	3.917E+004		8.489E+003	1.802E+004
	Cs-134	604.72	97.62	4.395E+004	3.89E+004	3.863E+004	2.065E+004
		795.86	85.46	3.889E+004		-9.629E+003	1.770E+004
+	Cs-137	661.66*	85.10	1.434E+004	1.43E+004	4.430E+004	5.577E+003
	Eu-152	121.78	28.67	2.118E+005	1.40E+005	2.244E+005	1.036E+005
		344.28	26.60	1.657E+005		6.529E+004	7.928E+004
		1408.01	21.07	1.395E+005		9.709E+004	6.037E+004
	Eu-154	123.07	40.40	1.479E+005	1.02E+005	-2.499E+004	7.228E+004
		723.30	20.06	1.792E+005		8.859E+004	8.251E+004
		1274.43	34.80	1.018E+005		9.578E+004	4.548E+004
	Eu-155	86.55	30.70	2.640E+005	2.64E+005	5.518E+004	1.296E+005
		105.31	21.10	3.040E+005		-3.767E+004	1.488E+005
+	Tl-208	583.19*	85.00	2.271E+004	2.27E+004	2.209E+004	9.862E+003
	Bi-212	727.33	6.67	5.615E+005	5.62E+005	4.463E+005	2.594E+005
+	Pb-212	238.63*	43.60	7.184E+004	7.18E+004	1.488E+004	3.412E+004
+	Bi-214	609.32*	45.49	4.330E+004	4.33E+004	9.293E+004	1.879E+004
		1120.29	14.92	3.048E+005		4.187E+005	1.406E+005
		1764.49	15.30	2.282E+005		1.652E+005	9.920E+004
+	Pb-214	295.22	18.42	2.303E+005	5.93E+004	7.193E+004	1.104E+005
		351.93*	35.60	5.931E+004		9.129E+004	2.695E+004
	Ra-226	186.21	3.64	1.245E+006	1.24E+006	-2.934E+005	6.031E+005
	Ac-228	338.32	11.27	3.447E+005	1.51E+005	-8.718E+004	1.640E+005
		911.20	25.80	1.512E+005		1.958E+005	6.945E+004
		968.97	15.80	2.433E+005		6.694E+004	1.113E+005
	Am-241	59.54	35.90	3.013E+005	3.01E+005	7.284E+004	1.476E+005

+ = Nuclide identified during the nuclide identification
 * = Energy line found in the spectrum
 > = Calculated MDA is zero due to zero counts in the region, or the region is outside the spectrum, or MDA has not been calculated
 @ = Half-life too short to be able to perform the decay correction

***** G A M M A S P E C T R U M A N A L Y S I S *****

Filename: C:\GENIE2K\CAMFILES\00001071.CNF

Report Generated On : 5/5/2018 10:06:51 AM ✓

Sample Title : B106214AFSWC007GD
Sample Description : U1 West Valve House Wall
Sample Identification :
Sample Type : Gamma Direct
Sample Geometry : 3M90D_CP_2IN ✓

Peak Locate Threshold : 3.00
Peak Locate Range (in channels) : 85 - 8192
Peak Area Range (in channels) : 85 - 8192
Identification Energy Tolerance : 10.000 keV

Sample Size : 2.830E+001 M² ✓

Sample Taken On : 4/30/2018 12:37:00 PM
Acquisition Started : 4/30/2018 12:37:44 PM ✓

Live Time : 600.0 seconds
Real Time : 600.7 seconds

Dead Time : 0.12 %

Energy Calibration Used Done On : 12/28/2017 ✓
Efficiency Calibration Used Done On : 2/1/2018
Efficiency ID : 3M90D_CP_2IN

Data Validated
5-5-18 / 1200



 ***** P E A K A N A L Y S I S R E P O R T *****

Detector Name: 6279
 Sample Title: B106214AFSWC007GD
 Peak Analysis Performed on: 5/5/2018 10:06:51 AM
 Peak Analysis From Channel: 85
 Peak Analysis To Channel: 8192

Peak No.	ROI start	ROI end	Peak centroid	Energy (keV)	FWHM (keV)	Net Peak Area	Net Area Uncert.	Continuum Counts
1	293-	347	300.60	75.12	0.43	-1.22E+002	181.16	1.06E+003
2	946-	963	954.72	238.80	0.94	1.14E+001	30.19	6.56E+001
3	1399-	1416	1407.62	352.10	1.27	4.69E+001	23.30	2.71E+001
4	2035-	2052	2043.76	511.21	0.58	3.10E+001	15.21	8.00E+000
5	2323-	2340	2331.87	583.25	0.59	1.18E+001	13.89	1.12E+001
6	2428-	2445	2436.65	609.45	0.44	3.19E+001	14.40	6.06E+000
7	2639-	2656	2647.50	662.17	0.29	2.43E+001	13.83	6.75E+000
8	4473-	4492	4482.46	1120.72	1.11	1.63E+001	12.85	6.72E+000
9	5837-	5856	5846.25	1461.28	0.34	5.63E+001	18.96	9.66E+000

M = First peak in a multiplet region
 m = Other peak in a multiplet region
 F = Fitted singlet

Errors quoted at 2.000 sigma

 ***** N U C L I D E I D E N T I F I C A T I O N R E P O R T *****

Sample Title: B106214AFSWC007GD
 Nuclide Library Used: C:\GENIE2K\CAMFILES\Zion Lib-BNL.NLB

IDENTIFIED NUCLIDES

Nuclide Name	Id Confidence	Energy (keV)	Yield (%)	Activity (pCi/M ²)	Activity Uncertainty
K-40	1.000	1460.82*	10.66	7.90602E+005	2.74790E+005
Cs-137	1.000	661.66*	85.10	2.85802E+004	1.66575E+004
Tl-208	1.000	583.19*	85.00	1.30763E+004	1.54229E+004
Pb-212	1.000	238.63*	43.60	1.52261E+004	4.02330E+004
Bi-214	0.735	609.32*	45.49	6.74533E+004	3.14732E+004
		1120.29*	14.92	1.42074E+005	1.12717E+005
		1764.49	15.30		
Pb-214	0.437	295.22	18.42		
		351.93*	35.60	9.37836E+004	4.87072E+004

* = Energy line found in the spectrum.
 @ = Energy line not used for Weighted Mean Activity
 Energy Tolerance : 10.000 keV
 Nuclide confidence index threshold = 0.30
 Errors quoted at 2.000 sigma

***** I N T E R F E R E N C E C O R R E C T E D R E P O R T *****

Nuclide Name	Nuclide Id Confidence	Wt mean Activity (pCi/M ²)	Wt mean Activity Uncertainty
K-40	1.000	7.906021E+005	2.747904E+005
Cs-137	1.000	2.858016E+004	1.665754E+004
Tl-208	1.000	1.307633E+004	1.542287E+004
Pb-212	1.000	1.522613E+004	4.023296E+004
Bi-214	0.735	7.285041E+004	3.031366E+004
Pb-214	0.437	9.378363E+004	4.870721E+004

? = 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 2.000 sigma

***** U N I D E N T I F I E D P E A K S *****

Peak Locate Performed on: 5/5/2018 10:06:51 AM
Peak Locate From Channel: 85
Peak Locate To Channel: 8192

Peak No.	Energy (keV)	Peak Size in Counts per Second	Peak CPS % Uncertainty	Peak Type	Tol. Nuclide
1	75.12	-2.0264E-001	-149.00		
4	511.21	5.1667E-002	49.06		

M = First peak in a multiplet region
m = Other peak in a multiplet region
F = Fitted singlet

Errors quoted at 2.000 sigma

 ***** N U C L I D E M D A R E P O R T *****

Detector Name: 6279
 Sample Geometry: 3M90D_CP_2IN
 Sample Title: B106214AFSWC007GD
 Nuclide Library Used: C:\GENIE2K\CAMFILES\Zion Lib-BNL.NLB

	Nuclide Name	Energy (keV)	Yield (%)	Line MDA (pCi/M^2)	Nuclide MDA (pCi/M^2)	Activity (pCi/M^2)	Dec. Level (pCi/M^2)
+	K-40	1460.82*	10.66	3.054E+005	3.05E+005	7.906E+005	1.337E+005
	Co-60	1173.23	99.85	3.465E+004	3.41E+004	1.642E+004	1.552E+004
		1332.49	99.98	3.413E+004		2.983E+004	1.514E+004
	Nb-94	702.65	99.81	3.585E+004	3.09E+004	3.694E+004	1.653E+004
		871.09	99.89	3.092E+004		-4.196E+003	1.390E+004
	Ag-108m	433.90	90.50	3.265E+004	3.26E+004	-6.235E+003	1.513E+004
		614.30	89.80	4.412E+004		3.404E+004	2.061E+004
		722.90	90.80	4.405E+004		-3.813E+003	2.046E+004
	Cs-134	604.72	97.62	4.293E+004	3.22E+004	3.786E+004	2.014E+004
		795.86	85.46	3.218E+004		-2.378E+004	1.435E+004
+	Cs-137	661.66*	85.10	2.201E+004	2.20E+004	2.858E+004	9.412E+003
	Eu-152	121.78	28.67	2.027E+005	1.44E+005	-1.319E+005	9.901E+004
		344.28	26.60	1.681E+005		7.791E+004	8.047E+004
		1408.01	21.07	1.437E+005		-2.046E+005	6.249E+004
	Eu-154	123.07	40.40	1.436E+005	8.74E+004	1.513E+004	7.014E+004
		723.30	20.06	2.026E+005		-1.177E+004	9.423E+004
		1274.43	34.80	8.736E+004		1.966E+004	3.828E+004
	Eu-155	86.55	30.70	2.632E+005	2.63E+005	6.168E+004	1.292E+005
		105.31	21.10	3.036E+005		1.770E+005	1.486E+005
+	Tl-208	583.19*	85.00	2.491E+004	2.49E+004	1.308E+004	1.096E+004
	Bi-212	727.33	6.67	5.868E+005	5.87E+005	3.813E+005	2.721E+005
+	Pb-212	238.63*	43.60	6.798E+004	6.80E+004	1.523E+004	3.219E+004
+	Bi-214	609.32*	45.49	3.671E+004	3.67E+004	6.745E+004	1.550E+004
		1120.29*	14.92	1.672E+005		1.421E+005	7.178E+004
		1764.49	15.30	2.282E+005		1.523E+004	9.920E+004
+	Pb-214	295.22	18.42	2.285E+005	6.75E+004	1.247E+005	1.095E+005
		351.93*	35.60	6.751E+004		9.378E+004	3.105E+004
	Ra-226	186.21	3.64	1.234E+006	1.23E+006	-1.749E+005	5.976E+005
	Ac-228	338.32	11.27	3.383E+005	1.30E+005	3.356E+004	1.608E+005
		911.20	25.80	1.303E+005		8.958E+003	5.897E+004
		968.97	15.80	2.094E+005		-1.796E+005	9.431E+004
	Am-241	59.54	35.90	3.144E+005	3.14E+005	5.781E+005	1.542E+005

+ = Nuclide identified during the nuclide identification
 * = Energy line found in the spectrum
 > = Calculated MDA is zero due to zero counts in the region, or the region is outside the spectrum, or MDA has not been calculated
 @ = Half-life too short to be able to perform the decay correction

***** G A M M A S P E C T R U M A N A L Y S I S *****

Filename: C:\GENIE2K\CAMFILES\00001056.CNF

Report Generated On : 5/5/2018 9:52:43 AM

Sample Title : B106214AFSWC008GD
Sample Description : U1 West Valve House Wall
Sample Identification :
Sample Type : Gamma Direct
Sample Geometry : 3M90D_CP_2IN

Peak Locate Threshold : 3.00
Peak Locate Range (in channels) : 85 - 8192
Peak Area Range (in channels) : 85 - 8192
Identification Energy Tolerance : 10.000 keV


Sample Size : 2.830E+001 M²

Sample Taken On : 4/26/2018 1:36:00 PM
Acquisition Started : 4/26/2018 1:36:13 PM

Live Time : 600.0 seconds
Real Time : 600.5 seconds

Dead Time : 0.08 %

Energy Calibration Used Done On : 12/28/2017
Efficiency Calibration Used Done On : 2/1/2018
Efficiency ID : 3M90D_CP_2IN

Data Validated
5-5-18 12:00


 ***** P E A K A N A L Y S I S R E P O R T *****

Detector Name: 6279

Sample Title: B106214AFSWC008GD

Peak Analysis Performed on: 5/5/2018 9:52:43 AM

Peak Analysis From Channel: 85

Peak Analysis To Channel: 8192

Peak No.	ROI start	ROI end	Peak centroid	Energy (keV)	FWHM (keV)	Net Peak Area	Net Area Uncert.	Continuum Counts
1	121-	136	128.12	31.95	0.51	3.74E+001	35.68	9.26E+001
2	284-	347	300.39	75.07	0.85	3.65E+002	183.52	8.76E+002
3	945-	962	953.01	238.38	0.36	7.47E+000	35.41	9.15E+001
4	1172-	1189	1180.65	295.33	0.56	3.25E+001	25.67	4.05E+001
5	1398-	1415	1406.67	351.87	0.90	3.33E+001	23.45	3.17E+001
6	2428-	2445	2436.92	609.52	0.71	4.09E+001	16.89	9.12E+000
7	2635-	2656	2645.85	661.75	1.47	1.50E+002	31.18	2.47E+001
8	3636-	3653	3644.98	911.49	0.40	1.87E+001	11.53	4.28E+000
9	3866-	3883	3874.85	968.92	0.41	1.57E+001	9.68	2.26E+000
10	5835-	5855	5844.97	1460.96	1.04	9.42E+001	20.50	2.82E+000
11	7051-	7070	7060.52	1764.32	0.25	1.20E+001	6.93	0.00E+000

M = First peak in a multiplet region

m = Other peak in a multiplet region

F = Fitted singlet

Errors quoted at 2.000 sigma

 ***** N U C L I D E I D E N T I F I C A T I O N R E P O R T *****

Sample Title: B106214AFSWC008GD
 Nuclide Library Used: C:\GENIE2K\CAMFILES\Zion Lib-BNL.NLB

..... IDENTIFIED NUCLIDES

Nuclide Name	Id Confidence	Energy (keV)	Yield (%)	Activity (pCi/M ²)	Activity Uncertainty
K-40	1.000	1460.82*	10.66	1.32133E+006	3.09675E+005
Cs-137	1.000	661.66*	85.10	1.77023E+005	4.24471E+004
Pb-212	1.000	238.63*	43.60	9.92574E+003	4.70825E+004
Bi-214	0.706	609.32*	45.49	8.63363E+004	3.71401E+004
		1120.29	14.92		
		1764.49*	15.30	1.32114E+005	7.70063E+004
Pb-214	1.000	295.22*	18.42	1.14032E+005	9.18815E+004
		351.93*	35.60	6.65614E+004	4.79631E+004
		338.32	11.27		
Ac-228	0.582	911.20*	25.80	8.52272E+004	5.31500E+004
		968.97*	15.80	1.20556E+005	7.50145E+004

* = Energy line found in the spectrum.

@ = Energy line not used for Weighted Mean Activity

Energy Tolerance : 10.000 keV

Nuclide confidence index threshold = 0.30

Errors quoted at 2.000 sigma

***** INTERFERENCE CORRECTED REPORT *****

Nuclide Name	Nuclide Id Confidence	Wt mean Activity (pCi/M ²)	Wt mean Activity Uncertainty
K-40	1.000	1.321329E+006	3.096750E+005
Cs-137	1.000	1.770234E+005	4.244713E+004
Pb-212	1.000	9.925742E+003	4.708252E+004
Bi-214	0.706	9.497513E+004	3.345256E+004
Pb-214	1.000	7.672686E+004	4.251865E+004
Ac-228	0.582	9.703497E+004	4.336767E+004

? = 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 2.000 sigma

***** U N I D E N T I F I E D P E A K S *****

Peak Locate Performed on: 5/5/2018 9:52:43 AM
Peak Locate From Channel: 85
Peak Locate To Channel: 8192

Peak No.	Energy (keV)	Peak Size in Counts per Second	Peak CPS % Uncertainty	Peak Type	Tol. Nuclide
1	31.95	6.2282E-002	95.49		
2	75.07	6.0849E-001	50.26		

M = First peak in a multiplet region

m = Other peak in a multiplet region

F = Fitted singlet

Errors quoted at 2.000 sigma

 ***** N U C L I D E M D A R E P O R T *****

Detector Name: 6279
 Sample Geometry: 3M90D_CP_2IN
 Sample Title: B106214AFSWC008GD
 Nuclide Library Used: C:\GENIE2K\CAMFILES\Zion Lib-BNL.NLB

	Nuclide Name	Energy (keV)	Yield (%)	Line MDA (pCi/M ²)	Nuclide MDA (pCi/M ²)	Activity (pCi/M ²)	Dec. Level (pCi/M ²)
+	K-40	1460.82*	10.66	1.903E+005	1.90E+005	1.321E+006	7.618E+004
	Co-60	1173.23	99.85	3.873E+004	3.41E+004	1.390E+004	1.756E+004
		1332.49	99.98	3.413E+004		2.983E+004	1.514E+004
	Nb-94	702.65	99.81	3.291E+004	3.29E+004	-2.590E+003	1.505E+004
		871.09	99.89	3.780E+004		-3.393E+004	1.734E+004
	Ag-108m	433.90	90.50	4.861E+004	3.49E+004	-8.743E+003	2.311E+004
		614.30	89.80	5.085E+004		3.357E+004	2.397E+004
		722.90	90.80	3.492E+004		3.985E+003	1.590E+004
	Cs-134	604.72	97.62	4.825E+004	4.18E+004	5.995E+004	2.280E+004
		795.86	85.46	4.180E+004		-3.409E+004	1.916E+004
+	Cs-137	661.66*	85.10	4.054E+004	4.05E+004	1.770E+005	1.868E+004
	Eu-152	121.78	28.67	2.272E+005	1.35E+005	4.296E+004	1.113E+005
		344.28	26.60	1.838E+005		1.375E+005	8.832E+004
		1408.01	21.07	1.351E+005		9.016E+004	5.817E+004
	Eu-154	123.07	40.40	1.609E+005	1.13E+005	-2.059E+004	7.881E+004
		723.30	20.06	1.581E+005		6.484E+004	7.197E+004
		1274.43	34.80	1.125E+005		6.522E+004	5.085E+004
	Eu-155	86.55	30.70	2.805E+005	2.81E+005	1.709E+005	1.379E+005
		105.31	21.10	3.367E+005		2.407E+005	1.651E+005
	Tl-208	583.19	85.00	4.378E+004	4.38E+004	3.693E+004	2.040E+004
	Bi-212	727.33	6.67	4.446E+005	4.45E+005	-2.628E+003	2.009E+005
+	Pb-212	238.63*	43.60	8.007E+004	8.01E+004	9.926E+003	3.824E+004
+	Bi-214	609.32*	45.49	4.402E+004	2.98E+004	8.634E+004	1.915E+004
		1120.29	14.92	2.898E+005		1.731E+005	1.331E+005
		1764.49*	15.30	2.979E+004		1.321E+005	0.000E+000
+	Pb-214	295.22*	18.42	1.422E+005	7.26E+004	1.140E+005	6.636E+004
		351.93*	35.60	7.261E+004		6.656E+004	3.360E+004
	Ra-226	186.21	3.64	1.457E+006	1.46E+006	1.663E+005	7.091E+005
+	Ac-228	338.32	11.27	4.132E+005	6.94E+004	3.484E+005	1.983E+005
		911.20*	25.80	6.941E+004		8.523E+004	2.854E+004
		968.97*	15.80	9.070E+004		1.206E+005	3.498E+004
	Am-241	59.54	35.90	3.008E+005	3.01E+005	3.850E+005	1.474E+005

+ = Nuclide identified during the nuclide identification

* = Energy line found in the spectrum

> = Calculated MDA is zero due to zero counts in the region, or the region is outside the spectrum, or MDA has not been calculated

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

***** G A M M A S P E C T R U M A N A L Y S I S *****

Filename: C:\GENIE2K\CAMFILES\00001057.CNF

Report Generated On : 5/5/2018 9:49:55 AM

Sample Title : B106214AFSWC009GD
Sample Description : U1 West Valve House Wall
Sample Identification :
Sample Type : Gamma Direct
Sample Geometry : 3M90D_CP_2IN

Peak Locate Threshold : 3.00
Peak Locate Range (in channels) : 85 - 8192
Peak Area Range (in channels) : 85 - 8192
Identification Energy Tolerance : 10.000 keV

Sample Size : 2.830E+001 M^2

Sample Taken On : 4/26/2018 1:49:00 PM
Acquisition Started : 4/26/2018 1:49:44 PM

Live Time : 600.0 seconds
Real Time : 600.5 seconds

Dead Time : 0.08 %

Energy Calibration Used Done On : 12/28/2017
Efficiency Calibration Used Done On : 2/1/2018
Efficiency ID : 3M90D_CP_2IN

Data Validated
5-5-18 1210
[Signature]

 ***** P E A K A N A L Y S I S R E P O R T *****

Detector Name: 6279
 Sample Title: B106214AFSWC009GD
 Peak Analysis Performed on: 5/5/2018 9:49:54 AM
 Peak Analysis From Channel: 85
 Peak Analysis To Channel: 8192

Peak No.	ROI start	ROI end	Peak centroid	Energy (keV)	FWHM (keV)	Net Peak Area	Net Area Uncert.	Continuum Counts
1	292-	308	299.96	74.96	0.82	8.04E+001	65.60	3.18E+002
2	1172-	1189	1180.47	295.28	0.59	1.73E+001	25.51	4.47E+001
3	1399-	1416	1407.92	352.18	0.64	4.58E+001	23.72	2.92E+001
4	2324-	2341	2332.69	583.46	0.29	1.76E+001	18.04	1.84E+001
5	2428-	2446	2437.05	609.55	1.24	4.98E+001	17.25	7.20E+000
6	2638-	2655	2646.37	661.89	0.49	4.29E+001	14.97	4.11E+000
7	5836-	5855	5845.28	1461.04	0.87	9.47E+001	21.38	5.28E+000

M = First peak in a multiplet region
 m = Other peak in a multiplet region
 F = Fitted singlet

Errors quoted at 2.000 sigma

 ***** N U C L I D E I D E N T I F I C A T I O N R E P O R T *****

Sample Title: B106214AFSWC009GD
 Nuclide Library Used: C:\GENIE2K\CAMFILES\Zion Lib-BNL.NLB

..... IDENTIFIED NUCLIDES

Nuclide Name	Id Confidence	Energy (keV)	Yield (%)	Activity (pCi/M ²)	Activity Uncertainty
K-40	1.000	1460.82*	10.66	1.32902E+006	3.21377E+005
Cs-137	1.000	661.66*	85.10	5.05417E+004	1.86495E+004
Tl-208	1.000	583.19*	85.00	1.93972E+004	2.00658E+004
Bi-214	0.442	609.32*	45.49	1.05174E+005	3.85702E+004
		1120.29	14.92		
		1764.49	15.30		
Pb-214	1.000	295.22*	18.42	6.08311E+004	9.00345E+004
		351.93*	35.60	9.17305E+004	4.94179E+004

* = Energy line found in the spectrum.

@ = Energy line not used for Weighted Mean Activity

Energy Tolerance : 10.000 keV

Nuclide confidence index threshold = 0.30

Errors quoted at 2.000 sigma

 ***** I N T E R F E R E N C E C O R R E C T E D R E P O R T *****

Nuclide Name	Nuclide Id Confidence	Wt mean Activity (pCi/M ²)	Wt mean Activity Uncertainty
K-40	1.000	1.329017E+006	3.213774E+005
Cs-137	1.000	5.054170E+004	1.864945E+004
Tl-208	1.000	1.939723E+004	2.006579E+004
Bi-214	0.442	1.051741E+005	3.857018E+004
Pb-214	1.000	8.457677E+004	4.332128E+004

? = 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 2.000 sigma

***** U N I D E N T I F I E D P E A K S *****

Peak Locate Performed on: 5/5/2018 9:49:54 AM
 Peak Locate From Channel: 85
 Peak Locate To Channel: 8192

Peak No.	Energy (keV)	Peak Size in Counts per Second	Peak CPS % Uncertainty	Peak Type	Tol. Nuclide
1	74.96	1.3407E-001	81.54		

M = First peak in a multiplet region

m = Other peak in a multiplet region

F = Fitted singlet

Errors quoted at 2.000 sigma

 ***** N U C L I D E M D A R E P O R T *****

Detector Name: 6279
 Sample Geometry: 3M90D_CP_2IN
 Sample Title: B106214AFSWC009GD
 Nuclide Library Used: C:\GENIE2K\CAMFILES\Zion Lib-BNL.NLB

	Nuclide Name	Energy (keV)	Yield (%)	Line MDA (pCi/M ²)	Nuclide MDA (pCi/M ²)	Activity (pCi/M ²)	Dec. Level (pCi/M ²)
+	K-40	1460.82*	10.66	2.419E+005	2.42E+005	1.329E+006	1.020E+005
	Co-60	1173.23	99.85	4.384E+004	3.41E+004	-2.001E+003	2.012E+004
		1332.49	99.98	3.413E+004		1.463E+004	1.514E+004
	Nb-94	702.65	99.81	3.514E+004	3.51E+004	1.417E+004	1.617E+004
		871.09	99.89	3.522E+004		7.021E+003	1.606E+004
	Ag-108m	433.90	90.50	4.167E+004	3.84E+004	-1.523E+004	1.964E+004
		614.30	89.80	5.289E+004		2.499E+004	2.499E+004
		722.90	90.80	3.836E+004		1.392E+004	1.762E+004
	Cs-134	604.72	97.62	4.710E+004	4.36E+004	6.098E+004	2.222E+004
		795.86	85.46	4.363E+004		-9.883E+003	2.007E+004
+	Cs-137	661.66*	85.10	1.722E+004	1.72E+004	5.054E+004	7.015E+003
	Eu-152	121.78	28.67	2.233E+005	1.40E+005	1.811E+005	1.093E+005
		344.28	26.60	1.709E+005		-3.648E+004	8.187E+004
		1408.01	21.07	1.395E+005		-5.623E+004	6.037E+004
	Eu-154	123.07	40.40	1.571E+005	9.79E+004	-1.247E+004	7.690E+004
		723.30	20.06	1.699E+005		-5.590E+004	7.790E+004
		1274.43	34.80	9.789E+004		9.977E+002	4.355E+004
	Eu-155	86.55	30.70	2.712E+005	2.71E+005	-2.939E+004	1.332E+005
		105.31	21.10	3.138E+005		-1.532E+005	1.537E+005
+	Tl-208	583.19*	85.00	3.202E+004	3.20E+004	1.940E+004	1.452E+004
	Bi-212	727.33	6.67	5.182E+005	5.18E+005	3.351E+005	2.378E+005
	Pb-212	238.63	43.60	1.149E+005	1.15E+005	2.501E+004	5.567E+004
+	Bi-214	609.32*	45.49	4.019E+004	4.02E+004	1.052E+005	1.724E+004
		1120.29	14.92	2.803E+005		-2.268E+004	1.284E+005
		1764.49	15.30	2.282E+005		5.982E+004	9.920E+004
+	Pb-214	295.22*	18.42	1.487E+005	6.95E+004	6.083E+004	6.959E+004
		351.93*	35.60	6.954E+004		9.173E+004	3.206E+004
	Ra-226	186.21	3.64	1.432E+006	1.43E+006	1.971E+005	6.967E+005
	Ac-228	338.32	11.27	3.595E+005	1.64E+005	2.894E+005	1.714E+005
		911.20	25.80	1.636E+005		1.377E+005	7.564E+004
		968.97	15.80	2.572E+005		-7.753E+004	1.182E+005
	Am-241	59.54	35.90	2.817E+005	2.82E+005	4.665E+003	1.378E+005

+ = Nuclide identified during the nuclide identification

* = Energy line found in the spectrum

> = Calculated MDA is zero due to zero counts in the region, or the region is outside the spectrum, or MDA has not been calculated

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

***** G A M M A S P E C T R U M A N A L Y S I S *****

Filename: C:\GENIE2K\CAMFILES\00001086.CNF

Report Generated On : 5/5/2018 10:11:17 AM

Sample Title : B106214AFSWC010GD
Sample Description : U1 West Valve House Wall
Sample Identification :
Sample Type : Gamma Direct
Sample Geometry : 3M90D_CP_2IN

Peak Locate Threshold : 3.00
Peak Locate Range (in channels) : 85 - 8192
Peak Area Range (in channels) : 85 - 8192
Identification Energy Tolerance : 10.000 keV

Sample Size : 2.830E+001 M^2

Sample Taken On : 5/1/2018 8:39:00 AM
Acquisition Started : 5/1/2018 8:39:05 AM

Live Time : 600.0 seconds
Real Time : 600.4 seconds

Dead Time : 0.07 %

Energy Calibration Used Done On : 12/28/2017
Efficiency Calibration Used Done On : 2/1/2018
Efficiency ID : 3M90D_CP_2IN

Data Validated
SS-18 1230
[Signature]

 ***** P E A K A N A L Y S I S R E P O R T *****

Detector Name: 6279
 Sample Title: B106214AFSWC010GD
 Peak Analysis Performed on: 5/5/2018 10:11:17 AM
 Peak Analysis From Channel: 85
 Peak Analysis To Channel: 8192

Peak No.	ROI start	ROI end	Peak centroid	Energy (keV)	FWHM (keV)	Net Peak Area	Net Area Uncert.	Continuum Counts
1	293-	309	300.60	75.12	0.79	6.41E+001	69.63	3.61E+002
2	947-	964	955.79	239.07	0.98	3.97E+001	32.77	6.93E+001
3	1173-	1190	1181.07	295.43	0.31	9.34E+000	24.34	4.27E+001
4	1399-	1416	1407.48	352.07	0.91	3.33E+001	20.44	2.17E+001
5	2033-	2050	2041.40	510.62	0.50	2.33E+001	16.61	1.37E+001
6	2428-	2445	2436.45	609.40	0.40	3.23E+001	15.59	8.74E+000
7	2639-	2656	2647.01	662.05	0.80	2.89E+001	17.23	1.21E+001
8	3635-	3652	3643.86	911.20	0.27	1.25E+001	10.42	4.50E+000
9	5836-	5855	5845.33	1461.05	0.65	6.50E+001	16.12	0.00E+000

M = First peak in a multiplet region
 m = Other peak in a multiplet region
 F = Fitted singlet

Errors quoted at 2.000 sigma

 ***** N U C L I D E I D E N T I F I C A T I O N R E P O R T *****

Sample Title: B106214AFSWC010GD
 Nuclide Library Used: C:\GENIE2K\CAMFILES\Zion Lib-BNL.NLB

IDENTIFIED NUCLIDES

Nuclide Name	Id Confidence	Energy (keV)	Yield (%)	Activity (pCi/M ²)	Activity Uncertainty
K-40	1.000	1460.82*	10.66	9.12020E+005	2.39705E+005
Cs-137	1.000	661.66*	85.10	3.40529E+004	2.07156E+004
Pb-212	1.000	238.63*	43.60	5.27823E+004	4.44378E+004
Bi-214	0.442	609.32*	45.49	6.81163E+004	3.39277E+004
		1120.29	14.92		
		1764.49	15.30		
Pb-214	1.000	295.22*	18.42	3.27817E+004	8.55611E+004
		351.93*	35.60		

* = Energy line found in the spectrum.
 @ = Energy line not used for Weighted Mean Activity
 Energy Tolerance : 10.000 keV
 Nuclide confidence index threshold = 0.30
 Errors quoted at 2.000 sigma

 ***** I N T E R F E R E N C E C O R R E C T E D R E P O R T *****

Nuclide Name	Nuclide Id Confidence	Wt mean Activity (pCi/M ²)	Wt mean Activity Uncertainty
K-40	1.000	9.120198E+005	2.397050E+005
Cs-137	1.000	3.405290E+004	2.071559E+004
Pb-212	1.000	5.278230E+004	4.443779E+004
Bi-214	0.442	6.811626E+004	3.392771E+004
Pb-214	1.000	6.001554E+004	3.777183E+004

? = 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 2.000 sigma

***** U N I D E N T I F I E D P E A K S *****

Peak Locate Performed on: 5/5/2018 10:11:17 AM
 Peak Locate From Channel: 85
 Peak Locate To Channel: 8192

Peak No.	Energy (keV)	Peak Size in Counts per Second	Peak CPS % Uncertainty	Peak Type	Tol. Nuclide
1	75.12	1.0677E-001	108.68		
5	510.62	3.8851E-002	71.24		
8	911.20	2.0833E-002	83.34	Sum	

M = First peak in a multiplet region
 m = Other peak in a multiplet region
 F = Fitted singlet

Errors quoted at 2.000 sigma

 ***** N U C L I D E M D A R E P O R T *****

Detector Name: 6279
 Sample Geometry: 3M90D_CP_2IN
 Sample Title: B106214AFSWC010GD
 Nuclide Library Used: C:\GENIE2K\CAMFILES\Zion Lib-BNL.NLB

	Nuclide Name	Energy (keV)	Yield (%)	Line MDA (pCi/M ²)	Nuclide MDA (pCi/M ²)	Activity (pCi/M ²)	Dec. Level (pCi/M ²)
+	K-40	1460.82*	10.66	3.797E+004	3.80E+004	9.120E+005	0.000E+000
	Co-60	1173.23	99.85	3.981E+004	3.69E+004	2.064E+004	1.810E+004
		1332.49	99.98	3.689E+004		3.906E+003	1.652E+004
	Nb-94	702.65	99.81	3.655E+004	3.29E+004	-1.373E+004	1.687E+004
		871.09	99.89	3.291E+004		-3.594E+004	1.490E+004
	Ag-108m	433.90	90.50	3.945E+004	3.94E+004	1.924E+004	1.853E+004
		614.30	89.80	4.532E+004		4.721E+004	2.120E+004
		722.90	90.80	4.074E+004		3.263E+004	1.881E+004
	Cs-134	604.72	97.62	4.081E+004	4.08E+004	2.017E+004	1.908E+004
		795.86	85.46	4.227E+004		-2.605E+004	1.939E+004
+	Cs-137	661.66*	85.10	2.930E+004	2.93E+004	3.405E+004	1.305E+004
	Eu-152	121.78	28.67	2.205E+005	8.33E+004	1.334E+005	1.079E+005
		344.28	26.60	1.662E+005		5.522E+004	7.952E+004
		1408.01	21.07	8.330E+004		-1.344E+005	3.227E+004
	Eu-154	123.07	40.40	1.527E+005	9.79E+004	-1.301E+005	7.468E+004
		723.30	20.06	1.845E+005		8.925E+004	8.516E+004
		1274.43	34.80	9.789E+004		4.267E+004	4.355E+004
	Eu-155	86.55	30.70	2.723E+005	2.72E+005	8.352E+004	1.338E+005
		105.31	21.10	3.183E+005		-2.702E+005	1.559E+005
	Tl-208	583.19	85.00	4.346E+004	4.35E+004	2.375E+004	2.023E+004
	Bi-212	727.33	6.67	5.294E+005	5.29E+005	5.468E+005	2.434E+005
+	Pb-212	238.63*	43.60	6.983E+004	6.98E+004	5.278E+004	3.311E+004
+	Bi-214	609.32*	45.49	4.282E+004	4.28E+004	6.812E+004	1.855E+004
		1120.29	14.92	2.568E+005		-1.919E+005	1.166E+005
		1764.49	15.30	2.215E+005		1.541E+005	9.584E+004
+	Pb-214	295.22*	18.42	1.455E+005	6.09E+004	3.278E+004	6.799E+004
		351.93*	35.60	6.095E+004		6.661E+004	2.776E+004
	Ra-226	186.21	3.64	1.339E+006	1.34E+006	7.430E+005	6.503E+005
	Ac-228	338.32	11.27	3.396E+005	1.32E+005	1.677E+005	1.615E+005
		911.20	25.80	1.321E+005		6.011E+003	5.991E+004
		968.97	15.80	2.192E+005		1.897E+004	9.923E+004
	Am-241	59.54	35.90	3.232E+005	3.23E+005	-1.492E+005	1.586E+005

+ = Nuclide identified during the nuclide identification
 * = Energy line found in the spectrum
 > = Calculated MDA is zero due to zero counts in the region, or the region is outside the spectrum, or MDA has not been calculated
 @ = Half-life too short to be able to perform the decay correction

***** G A M M A S P E C T R U M A N A L Y S I S *****

Filename: C:\GENIE2K\CAMFILES\00001076.CNF

Report Generated On : 5/5/2018 10:03:39 AM

Sample Title : B106214AFSWC011GD
Sample Description : U1 West Valve House Wall
Sample Identification :
Sample Type : Gamma Direct
Sample Geometry : 3M90D_CP_2IN

Peak Locate Threshold : 3.00
Peak Locate Range (in channels) : 85 - 8192
Peak Area Range (in channels) : 85 - 8192
Identification Energy Tolerance : 10.000 keV

Sample Size : 2.830E+001 M^2

Sample Taken On : 4/30/2018 1:24:00 PM
Acquisition Started : 4/30/2018 1:24:15 PM

Live Time : 600.0 seconds
Real Time : 600.4 seconds

Dead Time : 0.07 %

Energy Calibration Used Done On : 12/28/2017
Efficiency Calibration Used Done On : 2/1/2018
Efficiency ID : 3M90D_CP_2IN

Data Validated

5-5-18 1215



 ***** P E A K A N A L Y S I S R E P O R T *****

Detector Name: 6279
 Sample Title: B106214AFSWC011GD
 Peak Analysis Performed on: 5/5/2018 10:03:38 AM
 Peak Analysis From Channel: 85
 Peak Analysis To Channel: 8192

	Peak No.	ROI start	ROI end	Peak centroid	Energy (keV)	FWHM (keV)	Net Peak Area	Net Area Uncert.	Continuum Counts
M	1	282-	354	298.37	74.56	3.48	2.76E+002	53.96	5.10E+002
m	2	282-	354	340.99	85.23	3.49	1.28E+002	44.15	4.92E+002
	3	1399-	1416	1407.35	352.04	0.77	3.29E+001	20.46	2.21E+001
	4	2035-	2052	2043.32	511.10	0.93	2.02E+001	19.04	2.08E+001
	5	2429-	2446	2437.75	609.73	0.98	3.03E+001	14.43	6.69E+000
	6	2639-	2656	2647.23	662.10	0.52	2.52E+001	13.83	6.84E+000
	7	3637-	3654	3645.10	911.51	1.41	1.29E+001	15.08	1.21E+001
	8	4474-	4493	4483.49	1120.98	0.52	9.00E+000	10.30	5.00E+000
	9	5837-	5856	5846.06	1461.23	0.41	4.13E+001	16.05	6.67E+000
	10	7052-	7071	7061.65	1764.60	0.29	1.20E+001	6.93	0.00E+000

M = First peak in a multiplet region
 m = Other peak in a multiplet region
 F = Fitted singlet

Errors quoted at 2.000 sigma

 ***** N U C L I D E I D E N T I F I C A T I O N R E P O R T *****

Sample Title: B106214AFSWC011GD
 Nuclide Library Used: C:\GENIE2K\CAMFILES\Zion Lib-BNL.NLB

IDENTIFIED NUCLIDES

Nuclide Name	Id Confidence	Energy (keV)	Yield (%)	Activity (pCi/M ²)	Activity Uncertainty
K-40	1.000	1460.82*	10.66	5.79924E+005	2.30799E+005
Cs-137	1.000	661.66*	85.10	2.96559E+004	1.66779E+004
Eu-155	0.331	86.55*	30.70	2.26839E+005	9.03471E+004
		105.31	21.10		
Bi-214	1.000	609.32*	45.49	6.40261E+004	3.14455E+004
		1120.29*	14.92	7.85388E+004	9.00921E+004
		1764.49*	15.30	1.32127E+005	7.70141E+004
Pb-214	0.437	295.22	18.42		
		351.93*	35.60	6.59313E+004	4.21081E+004

* = Energy line found in the spectrum.
 @ = Energy line not used for Weighted Mean Activity
 Energy Tolerance : 10.000 keV
 Nuclide confidence index threshold = 0.30
 Errors quoted at 2.000 sigma

 ***** I N T E R F E R E N C E C O R R E C T E D R E P O R T *****

Nuclide Name	Nuclide Id Confidence	Wt mean Activity (pCi/M^2)	Wt mean Activity Uncertainty
K-40	1.000	5.799236E+005	2.307990E+005
Cs-137	1.000	2.965588E+004	1.667790E+004
Eu-155	0.331	2.268388E+005	9.034714E+004
Bi-214	1.000	7.420929E+004	2.770188E+004
Pb-214	0.437	6.593128E+004	4.210811E+004

? = 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 2.000 sigma

***** UNIDENTIFIED PEAKS *****

Peak Locate Performed on: 5/5/2018 10:03:38 AM
 Peak Locate From Channel: 85
 Peak Locate To Channel: 8192

Peak No.	Energy (keV)	Peak Size in Counts per Second	Peak CPS % Uncertainty	Peak Type	Tol. Nuclide
M 1	74.56	4.5921E-001	19.58		
4	511.10	3.3699E-002	94.18		
7	911.51	2.1567E-002	116.52	Tol.	Ac-228

M = First peak in a multiplet region
 m = Other peak in a multiplet region
 F = Fitted singlet

Errors quoted at 2.000 sigma

 ***** N U C L I D E M D A R E P O R T *****

Detector Name: 6279
 Sample Geometry: 3M90D_CP_2IN
 Sample Title: B106214AFSWC011GD
 Nuclide Library Used: C:\GENIE2K\CAMFILES\Zion Lib-BNL.NLB

	Nuclide Name	Energy (keV)	Yield (%)	Line MDA (pCi/M ²)	Nuclide MDA (pCi/M ²)	Activity (pCi/M ²)	Dec. Level (pCi/M ²)
+	K-40	1460.82*	10.66	2.598E+005	2.60E+005	5.799E+005	1.109E+005
	Co-60	1173.23	99.85	3.402E+004	3.40E+004	7.227E+003	1.521E+004
		1332.49	99.98	3.413E+004		1.136E+004	1.514E+004
	Nb-94	702.65	99.81	4.107E+004	3.29E+004	4.378E+004	1.913E+004
		871.09	99.89	3.291E+004		-8.110E+004	1.490E+004
	Ag-108m	433.90	90.50	3.733E+004	3.63E+004	-2.375E+004	1.747E+004
		614.30	89.80	4.442E+004		3.061E+004	2.076E+004
		722.90	90.80	3.625E+004		-2.840E+004	1.656E+004
	Cs-134	604.72	97.62	3.885E+004	3.88E+004	1.418E+004	1.810E+004
		795.86	85.46	4.180E+004		9.647E+002	1.916E+004
+	Cs-137	661.66*	85.10	2.163E+004	2.16E+004	2.966E+004	9.220E+003
	Eu-152	121.78	28.67	2.112E+005	1.52E+005	2.253E+005	1.033E+005
		344.28	26.60	1.609E+005		-6.298E+004	7.686E+004
		1408.01	21.07	1.518E+005		1.179E+005	6.652E+004
	Eu-154	123.07	40.40	1.480E+005	8.51E+004	-5.779E+004	7.234E+004
		723.30	20.06	1.601E+005		-1.953E+005	7.299E+004
		1274.43	34.80	8.507E+004		3.037E+004	3.714E+004
+	Eu-155	86.55*	30.70	1.875E+005	1.87E+005	2.268E+005	9.135E+004
		105.31	21.10	3.208E+005		3.172E+005	1.572E+005
	Tl-208	583.19	85.00	4.750E+004	4.75E+004	-7.073E+003	2.226E+004
	Bi-212	727.33	6.67	5.009E+005	5.01E+005	1.278E+005	2.291E+005
	Pb-212	238.63	43.60	1.098E+005	1.10E+005	9.826E+004	5.312E+004
+	Bi-214	609.32*	45.49	3.814E+004	2.98E+004	6.403E+004	1.621E+004
		1120.29*	14.92	1.438E+005		7.854E+004	6.008E+004
		1764.49*	15.30	2.979E+004		1.321E+005	0.000E+000
+	Pb-214	295.22	18.42	2.134E+005	6.12E+004	4.078E+004	1.019E+005
		351.93*	35.60	6.115E+004		6.593E+004	2.787E+004
	Ra-226	186.21	3.64	1.339E+006	1.34E+006	6.837E+005	6.503E+005
	Ac-228	338.32	11.27	3.383E+005	1.69E+005	2.708E+003	1.608E+005
		911.20	25.80	1.694E+005		-4.002E+004	7.855E+004
		968.97	15.80	1.720E+005		-1.877E+005	7.562E+004
	Am-241	59.54	35.90	3.251E+005	3.25E+005	2.058E+005	1.595E+005

+ = Nuclide identified during the nuclide identification

* = Energy line found in the spectrum

> = Calculated MDA is zero due to zero counts in the region, or the region is outside the spectrum, or MDA has not been calculated

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

***** G A M M A S P E C T R U M A N A L Y S I S *****

Filename: C:\GENIE2K\CAMFILES\00001058.CNF

Report Generated On : 5/5/2018 9:48:52 AM
Sample Title : B106214AFSWC012GD
Sample Description : U1 West Valve House Wall
Sample Identification :
Sample Type : Gamma Direct
Sample Geometry : 3M90D_CP_2IN
Peak Locate Threshold : 3.00
Peak Locate Range (in channels) : 85 - 8192
Peak Area Range (in channels) : 85 - 8192
Identification Energy Tolerance : 10.000 keV
Sample Size : 2.830E+001 M^2
Sample Taken On : 4/26/2018 2:07:00 PM
Acquisition Started : 4/26/2018 2:07:33 PM
Live Time : 600.0 seconds
Real Time : 600.4 seconds
Dead Time : 0.07 %

Energy Calibration Used Done On : 12/28/2017
Efficiency Calibration Used Done On : 2/1/2018
Efficiency ID : 3M90D_CP_2IN

Data Validated
5-5-18 12:35
[Signature]

 ***** P E A K A N A L Y S I S R E P O R T *****

Detector Name: 6279

Sample Title: B106214AFSWC012GD

Peak Analysis Performed on: 5/5/2018 9:48:52 AM

Peak Analysis From Channel: 85

Peak Analysis To Channel: 8192

Peak No.	ROI start	ROI end	Peak centroid	Energy (keV)	FWHM (keV)	Net Peak Area	Net Area Uncert.	Continuum Counts
1	292-	309	300.45	75.08	0.82	9.66E+001	65.68	3.01E+002
2	946-	963	954.56	238.76	0.55	1.27E+001	33.38	8.13E+001
3	1173-	1190	1181.83	295.62	0.34	3.91E+001	22.50	2.69E+001
4	1398-	1415	1406.97	351.94	0.63	3.29E+001	22.54	2.81E+001
5	2321-	2338	2329.89	582.76	0.92	2.59E+001	15.04	9.13E+000
6	2429-	2446	2437.02	609.54	0.96	5.60E+001	19.80	1.30E+001
7	2637-	2654	2645.51	661.67	0.95	2.75E+001	13.00	4.50E+000
8	4472-	4491	4481.68	1120.53	0.47	1.20E+001	10.87	5.00E+000
9	5836-	5855	5845.29	1461.04	0.91	8.97E+001	19.75	2.34E+000

M = First peak in a multiplet region

m = Other peak in a multiplet region

F = Fitted singlet

Errors quoted at 2.000 sigma

 ***** N U C L I D E I D E N T I F I C A T I O N R E P O R T *****

Sample Title: B106214AFSWC012GD
 Nuclide Library Used: C:\GENIE2K\CAMFILES\Zion Lib-BNL.NLB

IDENTIFIED NUCLIDES

Nuclide Name	Id Confidence	Energy (keV)	Yield (%)	Activity (pCi/M ²)	Activity Uncertainty
K-40	1.000	1460.82*	10.66	1.25806E+006	2.97909E+005
Cs-137	1.000	661.66*	85.10	3.23978E+004	1.57967E+004
Tl-208	1.000	583.19*	85.00	2.85677E+004	1.69548E+004
Pb-212	1.000	238.63*	43.60	1.68997E+004	4.44802E+004
Bi-214	0.735	609.32*	45.49	1.18195E+005	4.41638E+004
		1120.29*	14.92	1.04697E+005	9.51897E+004
		1764.49	15.30		
Pb-214	1.000	295.22*	18.42	1.37333E+005	8.20003E+004
		351.93*	35.60	6.58829E+004	4.61758E+004

* = Energy line found in the spectrum.
 @ = Energy line not used for Weighted Mean Activity
 Energy Tolerance : 10.000 keV
 Nuclide confidence index threshold = 0.30
 Errors quoted at 2.000 sigma

***** I N T E R F E R E N C E C O R R E C T E D R E P O R T *****

Nuclide Name	Nuclide Id Confidence	Wt mean Activity (pCi/M ²)	Wt mean Activity Uncertainty
K-40	1.000	1.258064E+006	2.979087E+005
Cs-137	1.000	3.239785E+004	1.579667E+004
Tl-208	1.000	2.856765E+004	1.695484E+004
Pb-212	1.000	1.689967E+004	4.448016E+004
Bi-214	0.735	1.158040E+005	4.006201E+004
Pb-214	1.000	8.308511E+004	4.023510E+004

? = 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 2.000 sigma

***** U N I D E N T I F I E D P E A K S *****

Peak Locate Performed on: 5/5/2018 9:48:52 AM
Peak Locate From Channel: 85
Peak Locate To Channel: 8192

Peak No.	Energy (keV)	Peak Size in Counts per Second	Peak CPS % Uncertainty	Peak Type	Tol. Nuclide
1	75.08	1.6100E-001	67.99		

M = First peak in a multiplet region

m = Other peak in a multiplet region

F = Fitted singlet

Errors quoted at 2.000 sigma

 ***** N U C L I D E M D A R E P O R T *****

Detector Name: 6279
 Sample Geometry: 3M90D_CP_2IN
 Sample Title: B106214AFSWC012GD
 Nuclide Library Used: C:\GENIE2K\CAMFILES\Zion Lib-BNL.NLB

	Nuclide Name	Energy (keV)	Yield (%)	Line MDA (pCi/M ²)	Nuclide MDA (pCi/M ²)	Activity (pCi/M ²)	Dec. Level (pCi/M ²)
+	K-40	1460.82*	10.66	1.676E+005	1.68E+005	1.258E+006	6.480E+004
	Co-60	1173.23	99.85	4.432E+004	2.77E+004	1.371E+004	2.035E+004
		1332.49	99.98	2.767E+004		1.847E+004	1.192E+004
	Nb-94	702.65	99.81	3.442E+004	3.24E+004	1.560E+003	1.581E+004
		871.09	99.89	3.243E+004		-9.681E+003	1.466E+004
	Ag-108m	433.90	90.50	4.294E+004	3.80E+004	1.591E+004	2.027E+004
		614.30	89.80	5.604E+004		6.970E+004	2.656E+004
		722.90	90.80	3.795E+004		-9.817E+003	1.741E+004
	Cs-134	604.72	97.62	5.198E+004	4.09E+004	7.875E+004	2.466E+004
		795.86	85.46	4.086E+004		-3.137E+004	1.869E+004
+	Cs-137	661.66*	85.10	1.806E+004	1.81E+004	3.240E+004	7.436E+003
	Eu-152	121.78	28.67	2.035E+005	1.21E+005	-1.873E+005	9.941E+004
		344.28	26.60	1.799E+005		6.084E+004	8.637E+004
		1408.01	21.07	1.208E+005		-8.496E+004	5.102E+004
	Eu-154	123.07	40.40	1.436E+005	1.17E+005	-1.283E+005	7.014E+004
		723.30	20.06	1.737E+005		1.481E+004	7.977E+004
		1274.43	34.80	1.175E+005		3.568E+003	5.333E+004
	Eu-155	86.55	30.70	2.534E+005	2.53E+005	-2.772E+005	1.243E+005
		105.31	21.10	3.028E+005		4.196E+004	1.482E+005
+	Tl-208	583.19*	85.00	2.310E+004	2.31E+004	2.857E+004	1.006E+004
	Bi-212	727.33	6.67	5.125E+005	5.12E+005	-4.625E+004	2.349E+005
+	Pb-212	238.63*	43.60	7.495E+004	7.49E+004	1.690E+004	3.567E+004
+	Bi-214	609.32*	45.49	5.077E+004	5.08E+004	1.182E+005	2.253E+004
		1120.29*	14.92	1.438E+005		1.047E+005	6.009E+004
		1764.49	15.30	2.410E+005		1.872E+005	1.056E+005
+	Pb-214	295.22*	18.42	1.175E+005	6.93E+004	1.373E+005	5.401E+004
		351.93*	35.60	6.929E+004		6.588E+004	3.194E+004
	Ra-226	186.21	3.64	1.320E+006	1.32E+006	-3.635E+005	6.410E+005
	Ac-228	338.32	11.27	3.907E+005	1.54E+005	3.905E+005	1.870E+005
		911.20	25.80	1.544E+005		-6.880E+003	7.105E+004
		968.97	15.80	2.462E+005		-1.915E+004	1.127E+005
	Am-241	59.54	35.90	2.649E+005	2.65E+005	2.496E+005	1.294E+005

+ = Nuclide identified during the nuclide identification

* = Energy line found in the spectrum

> = Calculated MDA is zero due to zero counts in the region, or the region is outside the spectrum, or MDA has not been calculated

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

Filename: C:\GENIE2K\CAMFILES\00001059.CNF

Report Generated On : 5/5/2018 9:47:46 AM

Sample Title : B106214AFSWC013GD
Sample Description : U1 West Valve House Wall
Sample Identification :
Sample Type : Gamma Direct
Sample Geometry : 3M90D_CP_2IN

Peak Locate Threshold : 3.00
Peak Locate Range (in channels) : 85 - 8192
Peak Area Range (in channels) : 85 - 8192
Identification Energy Tolerance : 10.000 keV

Sample Size : 2.830E+001 M²

Sample Taken On : 4/26/2018 2:22:00 PM
Acquisition Started : 4/26/2018 2:23:00 PM

Live Time : 600.0 seconds
Real Time : 600.4 seconds

Dead Time : 0.07 %

Energy Calibration Used Done On : 12/28/2017
Efficiency Calibration Used Done On : 2/1/2018
Efficiency ID : 3M90D_CP_2IN

Data Validated

5-5-18 1240



 ***** P E A K A N A L Y S I S R E P O R T *****

Detector Name: 6279
 Sample Title: B106214AFSWC013GD
 Peak Analysis Performed on: 5/5/2018 9:47:45 AM
 Peak Analysis From Channel: 85
 Peak Analysis To Channel: 8192

Peak No.	ROI start	ROI end	Peak centroid	Energy (keV)	FWHM (keV)	Net Peak Area	Net Area Uncert.	Continuum Counts
1	292-	309	300.17	75.01	0.63	5.20E+001	69.83	3.57E+002
2	444-	460	452.53	113.14	0.32	1.19E+001	47.44	1.76E+002
3	737-	752	744.32	186.16	0.46	1.98E+001	30.03	6.82E+001
4	945-	962	953.92	238.60	1.03	1.68E+001	32.85	7.62E+001
5	1172-	1189	1180.35	295.25	1.68	3.60E+001	22.26	2.70E+001
6	1399-	1416	1407.30	352.03	0.41	5.77E+001	21.36	1.73E+001
7	1843-	1860	1851.27	463.07	0.40	1.58E+001	13.71	9.16E+000
8	2033-	2050	2041.65	510.68	0.77	2.48E+001	15.21	9.18E+000
9	2324-	2341	2332.93	583.52	1.31	2.36E+001	15.78	1.14E+001
10	2428-	2445	2436.49	609.41	0.41	4.23E+001	17.55	1.07E+001
11	2638-	2655	2646.40	661.89	0.78	3.10E+001	15.53	9.00E+000
12	5836-	5855	5845.59	1461.11	0.88	8.30E+001	18.22	0.00E+000

M = First peak in a multiplet region
 m = Other peak in a multiplet region
 F = Fitted singlet

Errors quoted at 2.000 sigma

 ***** N U C L I D E I D E N T I F I C A T I O N R E P O R T *****

Sample Title: B106214AFSWC013GD
 Nuclide Library Used: C:\GENIE2K\CAMFILES\Zion Lib-BNL.NLB

..... IDENTIFIED NUCLIDES

Nuclide Name	Id Confidence	Energy (keV)	Yield (%)	Activity (pCi/M ²)	Activity Uncertainty
K-40	1.000	1460.82*	10.66	1.16461E+006	2.74940E+005
Cs-137	1.000	661.66*	85.10	3.65276E+004	1.88148E+004
Eu-152	0.615	121.78*	28.67	2.04695E+004	8.20003E+004
		344.28*	26.60	1.54484E+005	6.19694E+004
		1408.01	21.07		
Tl-208	1.000	583.19*	85.00	2.61245E+004	1.77223E+004
Pb-212	1.000	238.63*	43.60	2.22933E+004	4.38266E+004
Bi-214	0.442	609.32*	45.49	8.93909E+004	3.85888E+004
		1120.29	14.92		
		1764.49	15.30		
Pb-214	1.000	295.22*	18.42	1.26296E+005	8.06700E+004
		351.93*	35.60	1.15429E+005	4.61014E+004
Ra-226	1.000	186.21*	3.64	2.81626E+005	4.29935E+005

* = Energy line found in the spectrum.

@ = Energy line not used for Weighted Mean Activity

Energy Tolerance : 10.000 keV

Nuclide confidence index threshold = 0.30

Errors quoted at 2.000 sigma

***** INTERFERENCE CORRECTED REPORT *****

Nuclide Name	Nuclide Id Confidence	Wt mean Activity (pCi/M ²)	Wt mean Activity Uncertainty
K-40	1.000	1.164612E+006	2.749404E+005
Cs-137	1.000	3.652757E+004	1.881480E+004
Eu-152	0.615	9.858073E+003	6.845552E+004
Tl-208	1.000	2.612452E+004	1.772229E+004
Pb-212	1.000	2.229329E+004	4.382655E+004
Bi-214	0.442	8.939091E+004	3.858884E+004
Pb-214	1.000	1.125514E+005	5.557562E+004
Ra-226	1.000	2.816263E+005	4.299352E+005

? = 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 2.000 sigma

***** U N I D E N T I F I E D P E A K S *****

Peak Locate Performed on: 5/5/2018 9:47:45 AM
Peak Locate From Channel: 85
Peak Locate To Channel: 8192

Peak No.	Energy (keV)	Peak Size in Counts per Second	Peak CPS % Uncertainty	Peak Type	Tol. Nuclide
1	75.01	8.6646E-002	134.31		
7	463.07	2.6400E-002	86.52	Sum	
8	510.68	4.1373E-002	61.25		

M = First peak in a multiplet region

m = Other peak in a multiplet region

F = Fitted singlet

Errors quoted at 2.000 sigma

 ***** N U C L I D E M D A R E P O R T *****

Detector Name: 6279
 Sample Geometry: 3M90D_CP_2IN
 Sample Title: B106214AFSWC013GD
 Nuclide Library Used: C:\GENIE2K\CAMFILES\Zion Lib-BNL.NLB

	Nuclide Name	Energy (keV)	Yield (%)	Line MDA (pCi/M ²)	Nuclide MDA (pCi/M ²)	Activity (pCi/M ²)	Dec. Level (pCi/M ²)
+	K-40	1460.82*	10.66	3.797E+004	3.80E+004	1.165E+006	0.000E+000
	Co-60	1173.23	99.85	4.188E+004	2.86E+004	-3.636E+004	1.913E+004
		1332.49	99.98	2.857E+004		-1.618E+004	1.236E+004
	Nb-94	702.65	99.81	3.920E+004	3.09E+004	2.756E+004	1.820E+004
		871.09	99.89	3.092E+004		-2.029E+004	1.390E+004
	Ag-108m	433.90	90.50	4.123E+004	3.88E+004	-1.480E+004	1.942E+004
		614.30	89.80	4.789E+004		2.913E+004	2.249E+004
		722.90	90.80	3.877E+004		2.685E+004	1.782E+004
	Cs-134	604.72	97.62	4.567E+004	4.09E+004	5.164E+004	2.151E+004
		795.86	85.46	4.086E+004		-4.410E+004	1.869E+004
+	Cs-137	661.66*	85.10	2.416E+004	2.42E+004	3.653E+004	1.049E+004
+	Eu-152	121.78*	28.67	1.380E+005	7.34E+004	2.047E+004	6.665E+004
		344.28*	26.60	7.340E+004		1.545E+005	3.308E+004
		1408.01	21.07	1.833E+005		9.756E+004	8.227E+004
	Eu-154	123.07	40.40	1.485E+005	8.27E+004	3.511E+004	7.261E+004
		723.30	20.06	1.755E+005		7.101E+004	8.070E+004
		1274.43	34.80	8.271E+004		-3.326E+004	3.596E+004
	Eu-155	86.55	30.70	2.650E+005	2.65E+005	1.016E+005	1.301E+005
		105.31	21.10	3.210E+005		1.417E+005	1.573E+005
+	Tl-208	583.19*	85.00	2.559E+004	2.56E+004	2.612E+004	1.130E+004
	Bi-212	727.33	6.67	5.349E+005	5.35E+005	2.067E+005	2.461E+005
+	Pb-212	238.63*	43.60	7.318E+004	7.32E+004	2.229E+004	3.479E+004
+	Bi-214	609.32*	45.49	4.663E+004	4.66E+004	8.939E+004	2.046E+004
		1120.29	14.92	2.771E+005		2.331E+005	1.267E+005
		1764.49	15.30	2.073E+005		-7.982E+004	8.873E+004
+	Pb-214	295.22*	18.42	1.177E+005	5.48E+004	1.263E+005	5.410E+004
		351.93*	35.60	5.485E+004		1.154E+005	2.472E+004
+	Ra-226	186.21*	3.64	7.096E+005	7.10E+005	2.816E+005	3.356E+005
	Ac-228	338.32	11.27	3.447E+005	1.56E+005	3.097E+004	1.640E+005
		911.20	25.80	1.560E+005		2.049E+004	7.183E+004
		968.97	15.80	2.224E+005		5.088E+003	1.008E+005
	Am-241	59.54	35.90	2.838E+005	2.84E+005	4.491E+004	1.389E+005

+ = Nuclide identified during the nuclide identification

* = Energy line found in the spectrum

> = Calculated MDA is zero due to zero counts in the region, or the region is outside the spectrum, or MDA has not been calculated

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

***** G A M M A S P E C T R U M A N A L Y S I S *****

Filename: C:\GENIE2K\CAMFILES\00001077.CNF

Report Generated On : 5/5/2018 10:01:33 AM

Sample Title : B106214AFSWC014GD
Sample Description : U1 West Valve House Wall
Sample Identification :
Sample Type : Gamma Direct
Sample Geometry : 3M90D_CP_2IN

Peak Locate Threshold : 3.00
Peak Locate Range (in channels) : 85 - 8192
Peak Area Range (in channels) : 85 - 8192
Identification Energy Tolerance : 10.000 keV

Sample Size : 2.830E+001 M²

Sample Taken On : 4/30/2018 1:37:00 PM
Acquisition Started : 4/30/2018 1:37:34 PM

Live Time : 600.0 seconds
Real Time : 600.4 seconds

Dead Time : 0.06 %

Energy Calibration Used Done On : 12/28/2017
Efficiency Calibration Used Done On : 2/1/2018
Efficiency ID : 3M90D_CP_2IN

Data Validated
5-5-18 1245
[Signature]

 ***** P E A K A N A L Y S I S R E P O R T *****

Detector Name: 6279
 Sample Title: B106214AFSWC014GD
 Peak Analysis Performed on: 5/5/2018 10:01:32 AM
 Peak Analysis From Channel: 85
 Peak Analysis To Channel: 8192

Peak No.	ROI start	ROI end	Peak centroid	Energy (keV)	FWHM (keV)	Net Peak Area	Net Area Uncert.	Continuum Counts
1	285-	308	300.39	75.07	0.85	1.12E+002	85.43	4.28E+002
2	946-	963	954.90	238.85	0.88	9.02E-001	32.61	8.11E+001
3	1399-	1416	1407.37	352.04	0.56	2.23E+001	21.56	2.77E+001
4	2036-	2053	2044.79	511.47	0.59	2.29E+001	15.35	1.11E+001
5	2429-	2446	2437.00	609.54	1.24	3.02E+001	14.48	6.76E+000
6	4473-	4492	4482.77	1120.80	0.75	1.60E+001	14.32	1.00E+001
7	5838-	5857	5847.61	1461.62	0.96	6.40E+001	16.00	0.00E+000

M = First peak in a multiplet region
 m = Other peak in a multiplet region
 F = Fitted singlet

Errors quoted at 2.000 sigma

 ***** N U C L I D E I D E N T I F I C A T I O N R E P O R T *****

Sample Title: B106214AFSWC014GD
 Nuclide Library Used: C:\GENIE2K\CAMFILES\Zion Lib-BNL.NLB

..... IDENTIFIED NUCLIDES

Nuclide Name	Id Confidence	Energy (keV)	Yield (%)	Activity (pCi/M ²)	Activity Uncertainty
K-40	0.999	1460.82*	10.66	8.98209E+005	2.37713E+005
Pb-212	1.000	238.63*	43.60	1.20037E+003	4.33710E+004
Bi-214	0.735	609.32*	45.49	6.38589E+004	3.15260E+004
		1120.29*	14.92	1.39613E+005	1.25411E+005
		1764.49	15.30		
Pb-214	0.437	295.22	18.42		
		351.93*	35.60	4.46678E+004	4.36645E+004

* = Energy line found in the spectrum.

@ = Energy line not used for Weighted Mean Activity

Energy Tolerance : 10.000 keV

Nuclide confidence index threshold = 0.30

Errors quoted at 2.000 sigma

 ***** I N T E R F E R E N C E C O R R E C T E D R E P O R T *****

Nuclide Name	Nuclide Id Confidence	Wt mean Activity (pCi/M^2)	Wt mean Activity Uncertainty
K-40	0.999	8.982095E+005	2.377126E+005
Pb-212	1.000	1.200371E+003	4.337100E+004
Bi-214	0.735	6.836146E+004	3.057471E+004
Pb-214	0.437	4.466783E+004	4.366451E+004

? = 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 2.000 sigma

***** U N I D E N T I F I E D P E A K S *****

Peak Locate Performed on: 5/5/2018 10:01:32 AM
 Peak Locate From Channel: 85
 Peak Locate To Channel: 8192

Peak No.	Energy (keV)	Peak Size in Counts per Second	Peak CPS % Uncertainty	Peak Type	Tol. Nuclide
1	75.07	1.8644E-001	76.37		
4	511.47	3.8199E-002	66.96		

M = First peak in a multiplet region
 m = Other peak in a multiplet region
 F = Fitted singlet

Errors quoted at 2.000 sigma

 ***** N U C L I D E M D A R E P O R T *****

Detector Name: 6279
 Sample Geometry: 3M90D_CP_2IN
 Sample Title: B106214AFSWC014GD
 Nuclide Library Used: C:\GENIE2K\CAMFILES\Zion Lib-BNL.NLB

	Nuclide Name	Energy (keV)	Yield (%)	Line MDA (pCi/M^2)	Nuclide MDA (pCi/M^2)	Activity (pCi/M^2)	Dec. Level (pCi/M^2)
+	K-40	1460.82*	10.66	3.798E+004	3.80E+004	8.982E+005	0.000E+000
	Co-60	1173.23	99.85	3.873E+004	2.67E+004	-5.524E+002	1.756E+004
		1332.49	99.98	2.674E+004		1.006E+003	1.145E+004
	Nb-94	702.65	99.81	3.367E+004	3.29E+004	2.098E+004	1.543E+004
		871.09	99.89	3.291E+004		-4.653E+004	1.490E+004
	Ag-108m	433.90	90.50	3.708E+004	3.71E+004	-6.340E+003	1.734E+004
		614.30	89.80	4.412E+004		-1.716E+004	2.061E+004
		722.90	90.80	3.711E+004		9.861E+003	1.699E+004
	Cs-134	604.72	97.62	4.081E+004	4.08E+004	4.047E+004	1.908E+004
		795.86	85.46	4.495E+004		2.307E+004	2.073E+004
	Cs-137	661.66	85.10	4.805E+004	4.81E+004	3.999E+004	2.243E+004
	Eu-152	121.78	28.67	2.059E+005	1.56E+005	-9.739E+004	1.006E+005
		344.28	26.60	1.564E+005		1.578E+004	7.461E+004
		1408.01	21.07	1.631E+005		5.080E+004	7.215E+004
	Eu-154	123.07	40.40	1.458E+005	9.79E+004	-6.017E+004	7.128E+004
		723.30	20.06	1.661E+005		4.063E+004	7.597E+004
		1274.43	34.80	9.789E+004		5.007E+004	4.355E+004
	Eu-155	86.55	30.70	2.717E+005	2.72E+005	1.275E+004	1.335E+005
		105.31	21.10	3.136E+005		-1.569E+005	1.536E+005
	Tl-208	583.19	85.00	4.213E+004	4.21E+004	5.308E+004	1.957E+004
	Bi-212	727.33	6.67	4.768E+005	4.77E+005	-2.558E+005	2.170E+005
+	Pb-212	238.63*	43.60	7.482E+004	7.48E+004	1.200E+003	3.561E+004
+	Bi-214	609.32*	45.49	3.843E+004	3.84E+004	6.386E+004	1.636E+004
		1120.29*	14.92	1.940E+005		1.396E+005	8.520E+004
		1764.49	15.30	2.215E+005		1.541E+005	9.584E+004
+	Pb-214	295.22	18.42	2.198E+005	6.92E+004	-6.042E+004	1.051E+005
		351.93*	35.60	6.922E+004		4.467E+004	3.190E+004
	Ra-226	186.21	3.64	1.193E+006	1.19E+006	-7.591E+005	5.771E+005
	Ac-228	338.32	11.27	3.383E+005	1.36E+005	5.873E+004	1.608E+005
		911.20	25.80	1.358E+005		6.032E+004	6.176E+004
		968.97	15.80	2.346E+005		2.758E+005	1.069E+005
	Am-241	59.54	35.90	3.184E+005	3.18E+005	-5.883E+004	1.562E+005

+ = Nuclide identified during the nuclide identification
 * = Energy line found in the spectrum
 > = Calculated MDA is zero due to zero counts in the region, or the region is outside the spectrum, or MDA has not been calculated
 @ = Half-life too short to be able to perform the decay correction

Filename: C:\GENIE2K\CAMFILES\00001078.CNF

Report Generated On : 5/5/2018 10:00:36 AM

Sample Title : B106214AFSWC015GD
Sample Description : U1 West Valve House Wall
Sample Identification :
Sample Type : Gamma Direct
Sample Geometry : 3M90D_CP_2IN

Peak Locate Threshold : 3.00
Peak Locate Range (in channels) : 85 - 8192
Peak Area Range (in channels) : 85 - 8192
Identification Energy Tolerance : 10.000 keV

Sample Size : 2.830E+001 M^2

Sample Taken On : 4/30/2018 1:53:00 PM
Acquisition Started : 4/30/2018 1:53:47 PM

Live Time : 600.0 seconds
Real Time : 600.4 seconds

Dead Time : 0.07 %

Energy Calibration Used Done On : 12/28/2017
Efficiency Calibration Used Done On : 2/1/2018
Efficiency ID : 3M90D_CP_2IN

Data Validated
5-5-18 1250
[Signature]

 ***** P E A K A N A L Y S I S R E P O R T *****

Detector Name: 6279
 Sample Title: B106214AFSWC015GD
 Peak Analysis Performed on: 5/5/2018 10:00:36 AM
 Peak Analysis From Channel: 85
 Peak Analysis To Channel: 8192

Peak No.	ROI start	ROI end	Peak centroid	Energy (keV)	FWHM (keV)	Net Peak Area	Net Area Uncert.	Continuum Counts
1	283-	347	298.75	74.66	0.93	1.74E+002	185.39	9.14E+002
2	945-	962	953.54	238.51	0.30	-3.44E+000	34.15	8.84E+001
3	1401-	1418	1409.21	352.50	0.74	2.58E+001	19.81	2.22E+001
4	2325-	2342	2333.42	583.64	0.44	1.41E+001	16.31	1.59E+001
5	2430-	2447	2438.67	609.96	0.98	2.03E+001	16.89	1.57E+001
6	3641-	3658	3649.38	912.58	1.06	2.30E+001	9.59	0.00E+000
7	5841-	5860	5850.02	1462.22	1.24	7.44E+001	18.97	4.59E+000

M = First peak in a multiplet region
 m = Other peak in a multiplet region
 F = Fitted singlet

Errors quoted at 2.000 sigma

 ***** N U C L I D E I D E N T I F I C A T I O N R E P O R T *****

Sample Title: B106214AFSWC015GD
 Nuclide Library Used: C:\GENIE2K\CAMFILES\Zion Lib-BNL.NLB

IDENTIFIED NUCLIDES

Nuclide Name	Id Confidence	Energy (keV)	Yield (%)	Activity (pCi/M ²)	Activity Uncertainty
K-40	0.997	1460.82*	10.66	1.04451E+006	2.81320E+005
Tl-208	1.000	583.19*	85.00	1.55817E+004	1.81180E+004
Pb-212	1.000	238.63*	43.60	-4.57003E+003	4.53912E+004
Bi-214	0.441	609.32*	45.49	4.29589E+004	3.60460E+004
		1120.29	14.92		
		1764.49	15.30		
Pb-214	0.436	295.22	18.42		
		351.93*	35.60	5.15905E+004	4.04239E+004

* = Energy line found in the spectrum.
 @ = Energy line not used for Weighted Mean Activity
 Energy Tolerance : 10.000 keV
 Nuclide confidence index threshold = 0.30
 Errors quoted at 2.000 sigma

 ***** I N T E R F E R E N C E C O R R E C T E D R E P O R T *****

Nuclide Name	Nuclide Id Confidence	Wt mean Activity (pCi/M^2)	Wt mean Activity Uncertainty
K-40	0.997	1.044510E+006	2.813200E+005
Tl-208	1.000	1.558168E+004	1.811801E+004
Pb-212	1.000	-4.570029E+003	4.539119E+004
Bi-214	0.441	4.295887E+004	3.604596E+004
Pb-214	0.436	5.159054E+004	4.042387E+004

? = 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 2.000 sigma

***** U N I D E N T I F I E D P E A K S *****

Peak Locate Performed on: 5/5/2018 10:00:36 AM
 Peak Locate From Channel: 85
 Peak Locate To Channel: 8192

Peak No.	Energy (keV)	Peak Size in Counts per Second	Peak CPS % Uncertainty	Peak Type	Tol. Nuclide
1	74.66	2.9026E-001	106.45		
6	912.58	3.8333E-002	41.70	Tol.	Ac-228

M = First peak in a multiplet region
 m = Other peak in a multiplet region
 F = Fitted singlet

Errors quoted at 2.000 sigma

 ***** N U C L I D E M D A R E P O R T *****

Detector Name: 6279
 Sample Geometry: 3M90D_CP_2IN
 Sample Title: B106214AFSWC015GD
 Nuclide Library Used: C:\GENIE2K\CAMFILES\Zion Lib-BNL.NLB

	Nuclide Name	Energy (keV)	Yield (%)	Line MDA (pCi/M ²)	Nuclide MDA (pCi/M ²)	Activity (pCi/M ²)	Dec. Level (pCi/M ²)
+	K-40	1460.82*	10.66	2.201E+005	2.20E+005	1.045E+006	9.108E+004
	Co-60	1173.23	99.85	4.086E+004	2.94E+004	-3.799E+004	1.862E+004
		1332.49	99.98	2.944E+004		6.037E+003	1.280E+004
	Nb-94	702.65	99.81	3.329E+004	3.33E+004	-1.282E+004	1.525E+004
		871.09	99.89	3.477E+004		2.925E+004	1.583E+004
	Ag-108m	433.90	90.50	3.684E+004	3.68E+004	1.808E+004	1.722E+004
		614.30	89.80	4.619E+004		6.220E+003	2.164E+004
		722.90	90.80	3.836E+004		3.834E+004	1.762E+004
	Cs-134	604.72	97.62	4.188E+004	4.04E+004	2.068E+004	1.961E+004
		795.86	85.46	4.037E+004		-4.502E+003	1.845E+004
	Cs-137	661.66	85.10	4.529E+004	4.53E+004	3.127E+004	2.105E+004
	Eu-152	121.78	28.67	2.084E+005	1.21E+005	2.482E+005	1.019E+005
		344.28	26.60	1.564E+005		4.761E+004	7.461E+004
		1408.01	21.07	1.208E+005		-1.288E+005	5.102E+004
	Eu-154	123.07	40.40	1.463E+005	9.59E+004	8.792E+004	7.150E+004
		723.30	20.06	1.737E+005		1.164E+005	7.977E+004
		1274.43	34.80	9.589E+004		4.779E+004	4.255E+004
	Eu-155	86.55	30.70	2.576E+005	2.58E+005	4.033E+004	1.264E+005
		105.31	21.10	3.004E+005		-3.292E+005	1.470E+005
+	Tl-208	583.19*	85.00	2.930E+004	2.93E+004	1.558E+004	1.316E+004
	Bi-212	727.33	6.67	5.182E+005	5.18E+005	1.819E+005	2.378E+005
+	Pb-212	238.63*	43.60	7.869E+004	7.87E+004	-4.570E+003	3.755E+004
+	Bi-214	609.32*	45.49	5.533E+004	5.53E+004	4.296E+004	2.481E+004
		1120.29	14.92	2.671E+005		2.109E+005	1.218E+005
		1764.49	15.30	2.282E+005		1.652E+005	9.920E+004
+	Pb-214	295.22	18.42	2.236E+005	6.15E+004	1.621E+005	1.070E+005
		351.93*	35.60	6.148E+004		5.159E+004	2.803E+004
	Ra-226	186.21	3.64	1.257E+006	1.26E+006	1.494E+005	6.094E+005
	Ac-228	338.32	11.27	3.472E+005	1.36E+005	1.586E+005	1.652E+005
		911.20	25.80	1.358E+005		1.040E+005	6.176E+004
		968.97	15.80	2.316E+005		-2.945E+005	1.054E+005
	Am-241	59.54	35.90	2.905E+005	2.91E+005	7.523E+004	1.422E+005

+ = Nuclide identified during the nuclide identification

* = Energy line found in the spectrum

> = Calculated MDA is zero due to zero counts in the region, or the region is outside the spectrum, or MDA has not been calculated

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

***** G A M M A S P E C T R U M A N A L Y S I S *****

Filename: C:\GENIE2K\CAMFILES\00001061.CNF

Report Generated On : 5/5/2018 9:45:45 AM

Sample Title : B106214AFSWC016GD
Sample Description : U1 West Valve House Wall
Sample Identification :
Sample Type : Gamma Direct
Sample Geometry : 3M90D_CP_2IN

Peak Locate Threshold : 3.00
Peak Locate Range (in channels) : 85 - 8192
Peak Area Range (in channels) : 85 - 8192
Identification Energy Tolerance : 10.000 keV

Sample Size : 2.830E+001 M^2

Sample Taken On : 4/26/2018 2:52:00 PM
Acquisition Started : 4/26/2018 2:52:32 PM

Live Time : 600.0 seconds
Real Time : 600.4 seconds

Dead Time : 0.07 %

Energy Calibration Used Done On : 12/28/2017
Efficiency Calibration Used Done On : 2/1/2018
Efficiency ID : 3M90D_CP_2IN

Data Verified
5-5-18 1255
[Signature]

 ***** P E A K A N A L Y S I S R E P O R T *****

Detector Name: 6279
 Sample Title: B106214AFSWC016GD
 Peak Analysis Performed on: 5/5/2018 9:45:45 AM
 Peak Analysis From Channel: 85
 Peak Analysis To Channel: 8192

Peak No.	ROI start	ROI end	Peak centroid	Energy (keV)	FWHM (keV)	Net Peak Area	Net Area Uncert.	Continuum Counts
1	286-	346	299.94	74.95	0.85	2.18E+002	176.78	8.73E+002
2	946-	963	954.66	238.79	1.28	3.74E+001	34.65	7.96E+001
3	1172-	1189	1180.24	295.22	0.79	3.20E+001	24.47	3.60E+001
4	1399-	1416	1407.84	352.16	1.20	4.98E+001	23.57	2.72E+001
5	2429-	2446	2437.60	609.69	1.36	3.87E+001	20.49	2.03E+001
6	2571-	2588	2579.57	645.19	0.74	1.28E+001	10.46	4.21E+000
7	2636-	2657	2646.38	661.89	1.14	1.52E+002	26.98	8.10E+000
8	4473-	4492	4482.64	1120.77	0.34	8.54E+000	14.48	1.25E+001
9	5836-	5856	5846.35	1461.31	0.78	8.40E+001	18.33	0.00E+000
10	7055-	7074	7064.79	1765.39	0.50	1.70E+001	8.25	0.00E+000

M = First peak in a multiplet region
 m = Other peak in a multiplet region
 F = Fitted singlet

Errors quoted at 2.000 sigma

 ***** N U C L I D E I D E N T I F I C A T I O N R E P O R T *****

Sample Title: B106214AFSWC016GD
 Nuclide Library Used: C:\GENIE2K\CAMFILES\Zion Lib-BNL.NLB

..... IDENTIFIED NUCLIDES

Nuclide Name	Id Confidence	Energy (keV)	Yield (%)	Activity (pCi/M ²)	Activity Uncertainty
K-40	1.000	1460.82*	10.66	1.17874E+006	2.76840E+005
Cs-137	1.000	661.66*	85.10	1.78988E+005	3.83750E+004
Pb-212	1.000	238.63*	43.60	4.97916E+004	4.67796E+004
Bi-214	1.000	609.32*	45.49	8.17154E+004	4.43858E+004
		1120.29*	14.92	7.44801E+004	1.26485E+005
		1764.49*	15.30	1.87232E+005	9.20507E+004
Pb-214	1.000	295.22*	18.42	1.12258E+005	8.77114E+004
		351.93*	35.60	9.97169E+004	4.94893E+004

* = Energy line found in the spectrum.

@ = Energy line not used for Weighted Mean Activity

Energy Tolerance : 10.000 keV

Nuclide confidence index threshold = 0.30

Errors quoted at 2.000 sigma

***** I N T E R F E R E N C E C O R R E C T E D R E P O R T *****

Nuclide Name	Nuclide Id Confidence	Wt mean Activity (pCi/M ²)	Wt mean Activity Uncertainty
K-40	1.000	1.178741E+006	2.768399E+005
Cs-137	1.000	1.789881E+005	3.837503E+004
Pb-212	1.000	4.979155E+004	4.677960E+004
Bi-214	1.000	9.915522E+004	3.812152E+004
Pb-214	1.000	1.027453E+005	4.310180E+004

? = 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 2.000 sigma

***** U N I D E N T I F I E D P E A K S *****

Peak Locate Performed on: 5/5/2018 9:45:45 AM
Peak Locate From Channel: 85
Peak Locate To Channel: 8192

Peak No.	Energy (keV)	Peak Size in Counts per Second	Peak CPS % Uncertainty	Peak Type	Tol. Nuclide
1	74.95	3.6377E-001	81.00		
6	645.19	2.1324E-002	81.73	Sum	

M = First peak in a multiplet region
m = Other peak in a multiplet region
F = Fitted singlet

Errors quoted at 2.000 sigma

 ***** N U C L I D E M D A R E P O R T *****

Detector Name: 6279
 Sample Geometry: 3M90D_CP_2IN
 Sample Title: B106214AFSWC016GD
 Nuclide Library Used: C:\GENIE2K\CAMFILES\Zion Lib-BNL.NLB

	Nuclide Name	Energy (keV)	Yield (%)	Line MDA (pCi/M ²)	Nuclide MDA (pCi/M ²)	Activity (pCi/M ²)	Dec. Level (pCi/M ²)
+	K-40	1460.82*	10.66	3.797E+004	3.80E+004	1.179E+006	0.000E+000
	Co-60	1173.23	99.85	3.526E+004	3.34E+004	-2.335E+004	1.583E+004
		1332.49	99.98	3.340E+004		1.041E+004	1.478E+004
	Nb-94	702.65	99.81	3.823E+004	3.48E+004	2.504E+003	1.771E+004
		871.09	99.89	3.477E+004		-2.150E+004	1.583E+004
	Ag-108m	433.90	90.50	4.273E+004	4.15E+004	6.300E+003	2.017E+004
		614.30	89.80	5.509E+004		5.705E+004	2.609E+004
		722.90	90.80	4.150E+004		-4.021E+004	1.919E+004
	Cs-134	604.72	97.62	4.871E+004	3.84E+004	6.586E+004	2.303E+004
		795.86	85.46	3.838E+004		-9.647E+003	1.745E+004
+	Cs-137	661.66*	85.10	2.445E+004	2.44E+004	1.790E+005	1.063E+004
	Eu-152	121.78	28.67	2.150E+005	1.16E+005	-1.380E+005	1.052E+005
		344.28	26.60	1.690E+005		5.950E+004	8.094E+004
		1408.01	21.07	1.156E+005		-2.061E+004	4.840E+004
	Eu-154	123.07	40.40	1.516E+005	1.02E+005	2.678E+004	7.414E+004
		723.30	20.06	1.862E+005		-2.221E+005	8.602E+004
		1274.43	34.80	1.018E+005		4.839E+004	4.548E+004
	Eu-155	86.55	30.70	2.670E+005	2.67E+005	-7.656E+004	1.311E+005
		105.31	21.10	3.134E+005		1.428E+004	1.535E+005
	Tl-208	583.19	85.00	4.720E+004	4.72E+004	4.744E+004	2.211E+004
	Bi-212	727.33	6.67	5.615E+005	5.62E+005	4.613E+005	2.594E+005
+	Pb-212	238.63*	43.60	7.452E+004	7.45E+004	4.979E+004	3.546E+004
+	Bi-214	609.32*	45.49	6.230E+004	2.98E+004	8.172E+004	2.829E+004
		1120.29*	14.92	2.138E+005		7.448E+004	9.508E+004
		1764.49*	15.30	2.980E+004		1.872E+005	0.000E+000
+	Pb-214	295.22*	18.42	1.347E+005	6.76E+004	1.123E+005	6.261E+004
		351.93*	35.60	6.758E+004		9.972E+004	3.108E+004
	Ra-226	186.21	3.64	1.371E+006	1.37E+006	-1.249E+006	6.661E+005
	Ac-228	338.32	11.27	3.472E+005	1.67E+005	6.570E+004	1.652E+005
		911.20	25.80	1.665E+005		1.940E+005	7.711E+004
		968.97	15.80	2.192E+005		7.470E+004	9.923E+004
	Am-241	59.54	35.90	2.797E+005	2.80E+005	9.200E+004	1.368E+005

+ = Nuclide identified during the nuclide identification

* = Energy line found in the spectrum

> = Calculated MDA is zero due to zero counts in the region, or the region is outside the spectrum, or MDA has not been calculated

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

***** G A M M A S P E C T R U M A N A L Y S I S *****

Filename: C:\GENIE2K\CAMFILES\00001060.CNF

Report Generated On : 5/5/2018 9:46:47 AM

Sample Title : B106214AFSWC017GD
Sample Description : U1 West Valve House Wall
Sample Identification :
Sample Type : Gamma Direct
Sample Geometry : 3M90D_CP_2IN

Peak Locate Threshold : 3.00
Peak Locate Range (in channels) : 85 - 8192
Peak Area Range (in channels) : 85 - 8192
Identification Energy Tolerance : 10.000 keV

Sample Size : 2.830E+001 M²

Sample Taken On : 4/26/2018 2:37:00 PM
Acquisition Started : 4/26/2018 2:37:05 PM

Live Time : 600.0 seconds
Real Time : 600.4 seconds

Dead Time : 0.06 %

Energy Calibration Used Done On : 12/28/2017
Efficiency Calibration Used Done On : 2/1/2018
Efficiency ID : 3M90D_CP_2IN

Data Validated
5-5-18 1300
Rajiv

 ***** P E A K A N A L Y S I S R E P O R T *****

Detector Name: 6279
 Sample Title: B106214AFSWC017GD
 Peak Analysis Performed on: 5/5/2018 9:46:46 AM
 Peak Analysis From Channel: 85
 Peak Analysis To Channel: 8192

Peak No.	ROI start	ROI end	Peak centroid	Energy (keV)	FWHM (keV)	Net Peak Area	Net Area Uncert.	Continuum Counts
1	120-	135	127.47	31.79	0.68	2.64E+001	30.28	6.66E+001
2	291-	350	299.88	74.94	1.06	6.36E+001	169.12	8.38E+002
3	946-	963	954.56	238.76	0.56	1.79E+001	29.70	6.21E+001
4	1399-	1416	1407.09	351.97	0.74	5.23E+001	20.94	1.77E+001
5	2037-	2054	2045.60	511.67	0.35	2.20E+001	16.03	1.30E+001
6	2429-	2446	2437.14	609.58	1.52	3.65E+001	17.98	1.35E+001
7	2637-	2656	2646.30	661.87	1.34	1.01E+002	23.78	1.06E+001
8	3637-	3654	3645.30	911.57	0.67	1.22E+001	11.77	6.78E+000
9	5837-	5856	5846.67	1461.39	1.50	6.60E+001	16.25	0.00E+000
10	7053-	7072	7062.56	1764.83	0.44	1.30E+001	7.21	0.00E+000

M = First peak in a multiplet region
 m = Other peak in a multiplet region
 F = Fitted singlet

Errors quoted at 2.000 sigma

 ***** N U C L I D E I D E N T I F I C A T I O N R E P O R T *****

Sample Title: B106214AFSWC017GD
 Nuclide Library Used: C:\GENIE2K\CAMFILES\Zion Lib-BNL.NLB

IDENTIFIED NUCLIDES

Nuclide Name	Id Confidence	Energy (keV)	Yield (%)	Activity (pCi/M ²)	Activity Uncertainty
K-40	0.999	1460.82*	10.66	9.26185E+005	2.41780E+005
Cs-137	1.000	661.66*	85.10	1.19428E+005	3.14816E+004
Pb-212	1.000	238.63*	43.60	2.37886E+004	3.96810E+004
Bi-214	0.706	609.32*	45.49	7.70897E+004	3.90834E+004
		1120.29	14.92		
		1764.49*	15.30	1.43149E+005	8.02284E+004
Pb-214	0.437	295.22	18.42		
		351.93*	35.60	1.04668E+005	4.47426E+004

* = Energy line found in the spectrum.
 @ = Energy line not used for Weighted Mean Activity
 Energy Tolerance : 10.000 keV
 Nuclide confidence index threshold = 0.30
 Errors quoted at 2.000 sigma

***** I N T E R F E R E N C E C O R R E C T E D R E P O R T *****

Nuclide Name	Nuclide Id Confidence	Wt mean Activity (pCi/M ²)	Wt mean Activity Uncertainty
K-40	0.999	9.261850E+005	2.417796E+005
Cs-137	1.000	1.194277E+005	3.148159E+004
Pb-212	1.000	2.378860E+004	3.968100E+004
Bi-214	0.706	8.975986E+004	3.513599E+004
Pb-214	0.437	1.046678E+005	4.474260E+004

? = 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 2.000 sigma

***** U N I D E N T I F I E D P E A K S *****

Peak Locate Performed on: 5/5/2018 9:46:46 AM
Peak Locate From Channel: 85
Peak Locate To Channel: 8192

Peak No.	Energy (keV)	Peak Size in Counts per Second	Peak CPS % Uncertainty	Peak Type	Tol. Nuclide
1	31.79	4.3992E-002	114.73		
2	74.94	1.0596E-001	266.02		
5	511.67	3.6714E-002	72.75		
8	911.57	2.0373E-002	96.26	Tol.	Ac-228

M = First peak in a multiplet region

m = Other peak in a multiplet region

F = Fitted singlet

Errors quoted at 2.000 sigma

 ***** N U C L I D E M D A R E P O R T *****

Detector Name: 6279
 Sample Geometry: 3M90D_CP_2IN
 Sample Title: B106214AFSWC017GD
 Nuclide Library Used: C:\GENIE2K\CAMFILES\Zion Lib-BNL.NLB

	Nuclide Name	Energy (keV)	Yield (%)	Line MDA (pCi/M ²)	Nuclide MDA (pCi/M ²)	Activity (pCi/M ²)	Dec. Level (pCi/M ²)
+	K-40	1460.82*	10.66	3.797E+004	3.80E+004	9.262E+005	0.000E+000
	Co-60	1173.23	99.85	4.034E+004	3.34E+004	3.774E+003	1.836E+004
		1332.49	99.98	3.340E+004		1.120E+004	1.478E+004
	Nb-94	702.65	99.81	3.790E+004	3.04E+004	2.146E+004	1.755E+004
		871.09	99.89	3.040E+004		-2.681E+004	1.364E+004
	Ag-108m	433.90	90.50	3.875E+004	3.49E+004	-1.190E+004	1.818E+004
		614.30	89.80	5.032E+004		4.456E+004	2.371E+004
		722.90	90.80	3.492E+004		-5.182E+004	1.590E+004
	Cs-134	604.72	97.62	4.615E+004	4.62E+004	1.807E+004	2.175E+004
		795.86	85.46	4.787E+004		4.184E+004	2.219E+004
+	Cs-137	661.66*	85.10	2.773E+004	2.77E+004	1.194E+005	1.227E+004
	Eu-152	121.78	28.67	2.004E+005	1.63E+005	-1.260E+005	9.787E+004
		344.28	26.60	1.709E+005		-2.850E+004	8.187E+004
		1408.01	21.07	1.631E+005		1.387E+005	7.215E+004
	Eu-154	123.07	40.40	1.412E+005	6.65E+004	-6.729E+003	6.893E+004
		723.30	20.06	1.641E+005		-1.510E+005	7.499E+004
		1274.43	34.80	6.650E+004		-8.480E+004	2.785E+004
	Eu-155	86.55	30.70	2.422E+005	2.42E+005	-5.434E+003	1.187E+005
		105.31	21.10	2.901E+005		2.596E+004	1.419E+005
	Tl-208	583.19	85.00	4.568E+004	4.57E+004	3.380E+004	2.135E+004
	Bi-212	727.33	6.67	5.294E+005	5.29E+005	3.183E+005	2.434E+005
+	Pb-212	238.63*	43.60	6.588E+004	6.59E+004	2.379E+004	3.114E+004
+	Bi-214	609.32*	45.49	5.196E+004	2.98E+004	7.709E+004	2.312E+004
		1120.29	14.92	2.603E+005		-9.122E+004	1.183E+005
		1764.49*	15.30	2.980E+004		1.431E+005	0.000E+000
+	Pb-214	295.22	18.42	2.172E+005	5.53E+004	1.996E+005	1.039E+005
		351.93*	35.60	5.528E+004		1.047E+005	2.493E+004
	Ra-226	186.21	3.64	1.252E+006	1.25E+006	-5.391E+005	6.067E+005
	Ac-228	338.32	11.27	3.725E+005	1.54E+005	3.457E+005	1.779E+005
		911.20	25.80	1.544E+005		6.169E+004	7.105E+004
		968.97	15.80	2.160E+005		7.112E+004	9.762E+004
	Am-241	59.54	35.90	2.544E+005	2.54E+005	-2.910E+005	1.242E+005

+ = Nuclide identified during the nuclide identification

* = Energy line found in the spectrum

> = Calculated MDA is zero due to zero counts in the region, or the region is outside the spectrum, or MDA has not been calculated

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

***** G A M M A S P E C T R U M A N A L Y S I S *****

Filename: C:\GENIE2K\CAMFILES\00001079.CNF

Report Generated On : 5/5/2018 10:29:44 AM

Sample Title : B106214AFSWC018GD
Sample Description : U1 West Valve House Wall
Sample Identification :
Sample Type : Gamma Direct
Sample Geometry : 3M90D_CP_2IN

Peak Locate Threshold : 3.00
Peak Locate Range (in channels) : 85 - 8192
Peak Area Range (in channels) : 85 - 8192
Identification Energy Tolerance : 10.000 keV


Sample Size : 2.830E+001 M^2

Sample Taken On : 4/30/2018 2:06:00 PM
Acquisition Started : 4/30/2018 2:06:32 PM

Live Time : 600.0 seconds
Real Time : 600.4 seconds

Dead Time : 0.07 %

Energy Calibration Used Done On : 12/28/2017
Efficiency Calibration Used Done On : 2/1/2018
Efficiency ID : 3M90D_CP_2IN

Data Validated
5-5-18 1370


 ***** P E A K A N A L Y S I S R E P O R T *****

Detector Name: 6279
 Sample Title: B106214AFSWC018GD
 Peak Analysis Performed on: 5/5/2018 10:29:44 AM
 Peak Analysis From Channel: 85
 Peak Analysis To Channel: 8192

Peak No.	ROI start	ROI end	Peak centroid	Energy (keV)	FWHM (keV)	Net Peak Area	Net Area Uncert.	Continuum Counts
1	294-	310	301.23	75.28	0.91	6.40E+001	60.04	2.63E+002
2	344-	359	351.44	87.84	0.75	2.81E+001	49.71	1.95E+002
3	945-	962	953.81	238.58	0.32	2.15E+001	32.69	7.45E+001
4	1173-	1191	1181.79	295.61	0.66	5.29E+001	24.81	2.91E+001
5	1400-	1418	1408.69	352.37	1.02	4.74E+001	22.18	2.16E+001
6	2037-	2054	2045.18	511.56	1.25	3.10E+001	21.54	2.60E+001
7	2431-	2448	2439.46	610.16	0.68	5.73E+001	17.13	4.68E+000
8	3640-	3657	3648.03	912.25	0.42	2.40E+001	9.80	0.00E+000
9	4477-	4496	4486.65	1121.77	0.30	1.60E+001	11.61	5.00E+000
10	5842-	5861	5851.33	1462.55	0.72	7.87E+001	18.61	2.33E+000

M = First peak in a multiplet region
 m = Other peak in a multiplet region
 F = Fitted singlet

Errors quoted at 2.000 sigma

 ***** N U C L I D E I D E N T I F I C A T I O N R E P O R T *****

Sample Title: B106214AFSWC018GD
 Nuclide Library Used: C:\GENIE2K\CAMFILES\Zion Lib-BNL.NLB

IDENTIFIED NUCLIDES

Nuclide Name	Id Confidence	Energy (keV)	Yield (%)	Activity (pCi/M ²)	Activity Uncertainty
K-40	0.995	1460.82*	10.66	1.10449E+006	2.78273E+005
Eu-155	0.331	86.55*	30.70	4.89328E+004	8.71462E+004
		105.31	21.10		
Pb-212	1.000	238.63*	43.60	2.85988E+004	4.36992E+004
Bi-214	0.734	609.32*	45.49	1.21128E+005	3.90091E+004
		1120.29*	14.92	1.39674E+005	1.01979E+005
		1764.49	15.30		
Pb-214	1.000	295.22*	18.42	1.85837E+005	9.20487E+004
		351.93*	35.60	9.49275E+004	4.66240E+004

* = Energy line found in the spectrum.

@ = Energy line not used for Weighted Mean Activity

Energy Tolerance : 10.000 keV

Nuclide confidence index threshold = 0.30

Errors quoted at 2.000 sigma

***** I N T E R F E R E N C E C O R R E C T E D R E P O R T *****

Nuclide Name	Nuclide Id Confidence	Wt mean Activity (pCi/M ²)	Wt mean Activity Uncertainty
K-40	0.995	1.104491E+006	2.782731E+005
Eu-155	0.331	4.893283E+004	8.714617E+004
Pb-212	1.000	2.859882E+004	4.369923E+004
Bi-214	0.734	1.234950E+005	3.643452E+004
Pb-214	1.000	1.134889E+005	4.159283E+004

? = 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 2.000 sigma

***** U N I D E N T I F I E D P E A K S *****

Peak Locate Performed on: 5/5/2018 10:29:44 AM
Peak Locate From Channel: 85
Peak Locate To Channel: 8192

Peak No.	Energy (keV)	Peak Size in Counts per Second	Peak CPS % Uncertainty	Peak Type	Tol. Nuclide
1	75.28	1.0675E-001	93.73		
6	511.56	5.1608E-002	69.57		
8	912.25	4.0000E-002	40.82	Sum	

M = First peak in a multiplet region

m = Other peak in a multiplet region

F = Fitted singlet

Errors quoted at 2.000 sigma

 ***** N U C L I D E M D A R E P O R T *****

Detector Name: 6279
 Sample Geometry: 3M90D_CP_2IN
 Sample Title: B106214AFSWC018GD
 Nuclide Library Used: C:\GENIE2K\CAMFILES\Zion Lib-BNL.NLB

	Nuclide Name	Energy (keV)	Yield (%)	Line MDA (pCi/M ²)	Nuclide MDA (pCi/M ²)	Activity (pCi/M ²)	Dec. Level (pCi/M ²)
+	K-40	1460.82*	10.66	1.676E+005	1.68E+005	1.104E+006	6.481E+004
	Co-60	1173.23	99.85	3.817E+004	3.19E+004	-1.668E+004	1.728E+004
		1332.49	99.98	3.189E+004		1.144E+004	1.402E+004
	Nb-94	702.65	99.81	3.442E+004	3.29E+004	2.439E+004	1.581E+004
		871.09	99.89	3.291E+004		-1.855E+002	1.490E+004
	Ag-108m	433.90	90.50	3.609E+004	3.61E+004	2.329E+004	1.685E+004
		614.30	89.80	5.188E+004		5.654E+004	2.449E+004
		722.90	90.80	4.334E+004		1.671E+004	2.011E+004
	Cs-134	604.72	97.62	5.156E+004	3.99E+004	5.575E+004	2.445E+004
		795.86	85.46	3.989E+004		3.414E+004	1.820E+004
	Cs-137	661.66	85.10	4.457E+004	4.46E+004	3.110E+004	2.069E+004
	Eu-152	121.78	28.67	1.968E+005	1.48E+005	1.005E+005	9.607E+004
		344.28	26.60	1.672E+005		8.918E+003	8.000E+004
		1408.01	21.07	1.478E+005		3.316E+004	6.454E+004
	Eu-154	123.07	40.40	1.393E+005	8.27E+004	4.512E+004	6.800E+004
		723.30	20.06	1.962E+005		1.318E+005	9.104E+004
		1274.43	34.80	8.271E+004		1.437E+004	3.596E+004
+	Eu-155	86.55*	30.70	1.439E+005	1.44E+005	4.893E+004	6.959E+004
		105.31	21.10	2.906E+005		-3.956E+005	1.421E+005
	Tl-208	583.19	85.00	4.750E+004	4.75E+004	4.978E+004	2.226E+004
	Bi-212	727.33	6.67	5.563E+005	5.56E+005	9.816E+003	2.568E+005
+	Pb-212	238.63*	43.60	7.214E+004	7.21E+004	2.860E+004	3.427E+004
+	Bi-214	609.32*	45.49	3.353E+004	3.35E+004	1.211E+005	1.391E+004
		1120.29*	14.92	1.445E+005		1.397E+005	6.043E+004
		1764.49	15.30	2.471E+005		8.059E+004	1.087E+005
+	Pb-214	295.22*	18.42	1.256E+005	6.27E+004	1.858E+005	5.804E+004
		351.93*	35.60	6.268E+004		9.493E+004	2.863E+004
	Ra-226	186.21	3.64	1.230E+006	1.23E+006	-2.377E+005	5.958E+005
	Ac-228	338.32	11.27	3.422E+005	1.53E+005	-1.443E+005	1.627E+005
		911.20	25.80	1.528E+005		5.924E+004	7.025E+004
		968.97	15.80	2.376E+005		1.135E+005	1.084E+005
	Am-241	59.54	35.90	2.600E+005	2.60E+005	-2.000E+005	1.270E+005

+ = Nuclide identified during the nuclide identification

* = Energy line found in the spectrum

> = Calculated MDA is zero due to zero counts in the region, or the region is outside the spectrum, or MDA has not been calculated

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

***** G A M M A S P E C T R U M A N A L Y S I S *****

Filename: C:\GENIE2K\CAMFILES\00001074.CNF

Report Generated On : 5/5/2018 10:04:43 AM

Sample Title : B106214AFSWC019GD
Sample Description : U1 West Valve House Wall
Sample Identification :
Sample Type : Gamma Direct
Sample Geometry : 3M90D_CP_2IN

Peak Locate Threshold : 3.00
Peak Locate Range (in channels) : 85 - 8192
Peak Area Range (in channels) : 85 - 8192
Identification Energy Tolerance : 10.000 keV

Sample Size : 2.830E+001 M²

Sample Taken On : 4/30/2018 1:05:00 PM
Acquisition Started : 4/30/2018 1:05:14 PM

Live Time : 600.0 seconds
Real Time : 600.5 seconds

Dead Time : 0.08 %

Energy Calibration Used Done On : 12/28/2017
Efficiency Calibration Used Done On : 2/1/2018
Efficiency ID : 3M90D_CP_2IN

Data Validated
5-5-18/1320
[Signature]

 ***** P E A K A N A L Y S I S R E P O R T *****

Detector Name: 6279
 Sample Title: B106214AFSWC019GD
 Peak Analysis Performed on: 5/5/2018 10:04:43 AM
 Peak Analysis From Channel: 85
 Peak Analysis To Channel: 8192

Peak No.	ROI start	ROI end	Peak centroid	Energy (keV)	FWHM (keV)	Net Peak Area	Net Area Uncert.	Continuum Counts
1	287-	347	300.44	75.08	0.79	4.18E+001	185.07	9.68E+002
2	946-	963	954.53	238.75	0.96	4.42E+001	32.60	6.78E+001
3	1173-	1190	1181.39	295.51	0.95	4.32E+001	20.76	1.98E+001
4	1400-	1417	1408.52	352.33	0.85	5.53E+001	21.84	1.97E+001
5	2430-	2447	2438.82	610.00	0.86	4.77E+001	19.08	1.33E+001
6	2640-	2657	2648.07	662.31	0.55	3.95E+001	14.73	4.50E+000
7	5839-	5858	5848.94	1461.95	1.36	8.20E+001	18.11	0.00E+000
8	7057-	7076	7066.44	1765.80	0.25	1.50E+001	7.75	0.00E+000

M = First peak in a multiplet region
 m = Other peak in a multiplet region
 F = Fitted singlet

Errors quoted at 2.000 sigma

 ***** N U C L I D E I D E N T I F I C A T I O N R E P O R T *****

Sample Title: B106214AFSWC019GD
 Nuclide Library Used: C:\GENIE2K\CAMFILES\Zion Lib-BNL.NLB

..... IDENTIFIED NUCLIDES

Nuclide Name	Id Confidence	Energy (keV)	Yield (%)	Activity (pCi/M ²)	Activity Uncertainty
K-40	0.998	1460.82*	10.66	1.15100E+006	2.73155E+005
Cs-137	0.999	661.66*	85.10	4.65585E+004	1.82405E+004
Pb-212	1.000	238.63*	43.60	5.88354E+004	4.43910E+004
Bi-214	0.705	609.32*	45.49	1.00722E+005	4.20974E+004
		1120.29	14.92		
		1764.49*	15.30	1.65229E+005	8.63442E+004
Pb-214	1.000	295.22*	18.42	1.51506E+005	7.67983E+004
		351.93*	35.60	1.10659E+005	4.67594E+004

* = Energy line found in the spectrum.

@ = Energy line not used for Weighted Mean Activity

Energy Tolerance : 10.000 keV

Nuclide confidence index threshold = 0.30

Errors quoted at 2.000 sigma

 ***** INTERFERENCE CORRECTED REPORT *****

Nuclide Name	Nuclide Id Confidence	Wt mean Activity (pCi/M ²)	Wt mean Activity Uncertainty
K-40	0.998	1.150996E+006	2.731548E+005
Cs-137	0.999	4.655847E+004	1.824046E+004
Pb-212	1.000	5.883537E+004	4.439098E+004
Bi-214	0.705	1.131107E+005	3.783956E+004
Pb-214	1.000	1.217062E+005	3.993891E+004

? = 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 2.000 sigma

***** UNIDENTIFIED PEAKS *****

Peak Locate Performed on: 5/5/2018 10:04:43 AM
 Peak Locate From Channel: 85
 Peak Locate To Channel: 8192

Peak No.	Energy (keV)	Peak Size in Counts per Second	Peak CPS % Uncertainty	Peak Type	Tol. Nuclide
1	75.08	6.9694E-002	442.58		

M = First peak in a multiplet region
 m = Other peak in a multiplet region
 F = Fitted singlet

Errors quoted at 2.000 sigma

 ***** N U C L I D E M D A R E P O R T *****

Detector Name: 6279
 Sample Geometry: 3M90D_CP_2IN
 Sample Title: B106214AFSWC019GD
 Nuclide Library Used: C:\GENIE2K\CAMFILES\Zion Lib-BNL.NLB

	Nuclide Name	Energy (keV)	Yield (%)	Line MDA (pCi/M ²)	Nuclide MDA (pCi/M ²)	Activity (pCi/M ²)	Dec. Level (pCi/M ²)
+	K-40	1460.82*	10.66	3.798E+004	3.80E+004	1.151E+006	0.000E+000
	Co-60	1173.23	99.85	3.981E+004	2.86E+004	6.180E+002	1.810E+004
		1332.49	99.98	2.857E+004		1.989E+004	1.236E+004
	Nb-94	702.65	99.81	3.367E+004	3.37E+004	-4.689E+004	1.543E+004
		871.09	99.89	3.522E+004		3.185E+004	1.606E+004
	Ag-108m	433.90	90.50	3.852E+004	3.84E+004	-3.629E+004	1.806E+004
		614.30	89.80	5.264E+004		4.650E+004	2.486E+004
		722.90	90.80	3.836E+004		2.570E+004	1.762E+004
	Cs-134	604.72	97.62	5.134E+004	4.27E+004	9.189E+004	2.435E+004
		795.86	85.46	4.273E+004		-1.375E+004	1.962E+004
+	Cs-137	661.66*	85.10	1.808E+004	1.81E+004	4.656E+004	7.445E+003
	Eu-152	121.78	28.67	2.107E+005	1.52E+005	-1.781E+005	1.030E+005
		344.28	26.60	1.704E+005		-6.261E+004	8.164E+004
		1408.01	21.07	1.518E+005		2.958E+004	6.652E+004
	Eu-154	123.07	40.40	1.482E+005	1.11E+005	-1.579E+005	7.245E+004
		723.30	20.06	1.737E+005		-6.634E+004	7.977E+004
		1274.43	34.80	1.108E+005		1.157E+005	5.000E+004
	Eu-155	86.55	30.70	2.621E+005	2.62E+005	1.442E+005	1.287E+005
		105.31	21.10	3.171E+005		-6.865E+004	1.554E+005
	Tl-208	583.19	85.00	4.280E+004	4.28E+004	4.391E+004	1.991E+004
	Bi-212	727.33	6.67	5.294E+005	5.29E+005	3.695E+005	2.434E+005
+	Pb-212	238.63*	43.60	6.872E+004	6.87E+004	5.884E+004	3.256E+004
+	Bi-214	609.32*	45.49	5.149E+004	2.98E+004	1.007E+005	2.289E+004
		1120.29	14.92	2.637E+005		3.303E+004	1.201E+005
		1764.49*	15.30	2.981E+004		1.652E+005	0.000E+000
+	Pb-214	295.22*	18.42	1.023E+005	5.81E+004	1.515E+005	4.640E+004
		351.93*	35.60	5.811E+004		1.107E+005	2.635E+004
	Ra-226	186.21	3.64	1.320E+006	1.32E+006	-8.727E+005	6.410E+005
	Ac-228	338.32	11.27	3.607E+005	1.39E+005	2.505E+005	1.720E+005
		911.20	25.80	1.394E+005		-2.504E+004	6.355E+004
		968.97	15.80	1.841E+005		-1.647E+005	8.168E+004
	Am-241	59.54	35.90	2.819E+005	2.82E+005	2.752E+005	1.379E+005

+ = Nuclide identified during the nuclide identification

* = Energy line found in the spectrum

> = Calculated MDA is zero due to zero counts in the region, or the region is outside the spectrum, or MDA has not been calculated

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

***** G A M M A S P E C T R U M A N A L Y S I S *****

Filename: C:\GENIE2K\CAMFILES\00001054.CNF

Report Generated On : 5/5/2018 9:54:45 AM

Sample Title : B106214AFSWC020GD
Sample Description : U1 West Valve House Wall
Sample Identification :
Sample Type : Gamma Direct
Sample Geometry : 3M90D_CP_2IN

Peak Locate Threshold : 3.00
Peak Locate Range (in channels) : 85 - 8192
Peak Area Range (in channels) : 85 - 8192
Identification Energy Tolerance : 10.000 keV

Sample Size : 2.830E+001 M^2

Sample Taken On : 4/26/2018 1:07:00 PM
Acquisition Started : 4/26/2018 1:07:58 PM

Live Time : 600.0 seconds
Real Time : 600.4 seconds

Dead Time : 0.07 %

Energy Calibration Used Done On : 12/28/2017
Efficiency Calibration Used Done On : 2/1/2018
Efficiency ID : 3M90D_CP_2IN

Data Validated
5-5-18 1330
[Signature]

 ***** P E A K A N A L Y S I S R E P O R T *****

Detector Name: 6279
 Sample Title: B106214AFSWC020GD
 Peak Analysis Performed on: 5/5/2018 9:54:44 AM
 Peak Analysis From Channel: 85
 Peak Analysis To Channel: 8192

Peak No.	ROI start	ROI end	Peak centroid	Energy (keV)	FWHM (keV)	Net Peak Area	Net Area Uncert.	Continuum Counts
1	121-	136	128.06	31.93	0.53	1.19E+001	32.12	7.81E+001
2	293-	347	300.23	75.03	0.51	-3.93E+002	204.44	1.37E+003
3	946-	963	954.27	238.69	0.58	9.93E+000	32.42	7.41E+001
4	1171-	1188	1179.10	294.94	0.48	1.27E+001	23.03	3.63E+001
5	1399-	1416	1407.21	352.00	0.69	4.46E+001	20.05	1.64E+001
6	2427-	2444	2435.61	609.19	0.62	2.33E+001	15.67	1.07E+001
7	2636-	2657	2645.66	661.71	0.94	1.44E+002	25.91	5.93E+000
8	5835-	5854	5844.29	1460.79	0.88	6.66E+001	17.30	2.38E+000
9	7053-	7072	7062.34	1764.78	0.41	1.28E+001	9.08	2.25E+000

M = First peak in a multiplet region
 m = Other peak in a multiplet region
 F = Fitted singlet

Errors quoted at 2.000 sigma

 ***** N U C L I D E I D E N T I F I C A T I O N R E P O R T *****

Sample Title: B106214AFSWC020GD
 Nuclide Library Used: C:\GENIE2K\CAMFILES\Zion Lib-BNL.NLB

..... IDENTIFIED NUCLIDES

Nuclide Name	Id Confidence	Energy (keV)	Yield (%)	Activity (pCi/M ²)	Activity Uncertainty
K-40	1.000	1460.82*	10.66	9.34589E+005	2.55873E+005
Cs-137	1.000	661.66*	85.10	1.69735E+005	3.67061E+004
Pb-212	1.000	238.63*	43.60	1.32020E+004	4.31597E+004
Bi-214	0.706	609.32*	45.49	4.91978E+004	3.36186E+004
		1120.29	14.92		
		1764.49*	15.30	1.40394E+005	1.00615E+005
Pb-214	1.000	295.22*	18.42	4.43657E+004	8.10551E+004
		351.93*	35.60	8.93202E+004	4.22860E+004

* = Energy line found in the spectrum.

@ = Energy line not used for Weighted Mean Activity

Energy Tolerance : 10.000 keV

Nuclide confidence index threshold = 0.30

Errors quoted at 2.000 sigma

 ***** I N T E R F E R E N C E C O R R E C T E D R E P O R T *****

Nuclide Name	Nuclide Id Confidence	Wt mean Activity (pCi/M ²)	Wt mean Activity Uncertainty
K-40	1.000	9.345891E+005	2.558730E+005
Cs-137	1.000	1.697346E+005	3.670608E+004
Pb-212	1.000	1.320200E+004	4.315965E+004
Bi-214	0.706	5.835666E+004	3.188572E+004
Pb-214	1.000	7.970276E+004	3.749083E+004

? = 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 2.000 sigma

***** U N I D E N T I F I E D P E A K S *****

Peak Locate Performed on: 5/5/2018 9:54:44 AM
 Peak Locate From Channel: 85
 Peak Locate To Channel: 8192

Peak No.	Energy (keV)	Peak Size in Counts per Second	Peak CPS % Uncertainty	Peak Type	Tol. Nuclide
1	31.93	1.9907E-002	268.87		
2	75.03	-6.5449E-001	-52.06		

M = First peak in a multiplet region

m = Other peak in a multiplet region

F = Fitted singlet

Errors quoted at 2.000 sigma

 ***** N U C L I D E M D A R E P O R T *****

Detector Name: 6279
 Sample Geometry: 3M90D_CP_2IN
 Sample Title: B106214AFSWC020GD
 Nuclide Library Used: C:\GENIE2K\CAMFILES\Zion Lib-BNL.NLB

	Nuclide Name	Energy (keV)	Yield (%)	Line MDA (pCi/M^2)	Nuclide MDA (pCi/M^2)	Activity (pCi/M^2)	Dec. Level (pCi/M^2)
+	K-40	1460.82*	10.66	1.699E+005	1.70E+005	9.346E+005	6.599E+004
	Co-60	1173.23	99.85	3.761E+004	2.58E+004	-4.136E+003	1.700E+004
		1332.49	99.98	2.576E+004		1.563E+004	1.096E+004
	Nb-94	702.65	99.81	3.478E+004	2.88E+004	-1.335E+004	1.599E+004
		871.09	99.89	2.878E+004		-2.182E+004	1.283E+004
	Ag-108m	433.90	90.50	4.145E+004	4.04E+004	-1.609E+004	1.953E+004
		614.30	89.80	4.561E+004		1.316E+004	2.135E+004
		722.90	90.80	4.036E+004		-1.145E+004	1.862E+004
	Cs-134	604.72	97.62	4.081E+004	3.89E+004	3.719E+004	1.908E+004
		795.86	85.46	3.889E+004		-6.663E+004	1.770E+004
+	Cs-137	661.66*	85.10	2.208E+004	2.21E+004	1.697E+005	9.448E+003
	Eu-152	121.78	28.67	2.274E+005	1.40E+005	-1.087E+005	1.114E+005
		344.28	26.60	1.643E+005		1.058E+005	7.856E+004
		1408.01	21.07	1.395E+005		3.220E+003	6.037E+004
	Eu-154	123.07	40.40	1.614E+005	8.27E+004	1.666E+005	7.906E+004
		723.30	20.06	1.774E+005		-2.963E+005	8.161E+004
		1274.43	34.80	8.271E+004		5.986E+004	3.596E+004
	Eu-155	86.55	30.70	2.664E+005	2.66E+005	-6.797E+004	1.308E+005
		105.31	21.10	3.283E+005		3.092E+005	1.610E+005
	Tl-208	583.19	85.00	4.179E+004	4.18E+004	-1.667E+004	1.940E+004
	Bi-212	727.33	6.67	4.950E+005	4.95E+005	-5.519E+004	2.262E+005
+	Pb-212	238.63*	43.60	7.316E+004	7.32E+004	1.320E+004	3.478E+004
+	Bi-214	609.32*	45.49	4.860E+004	4.86E+004	4.920E+004	2.144E+004
		1120.29	14.92	2.989E+005		3.011E+005	1.376E+005
		1764.49*	15.30	1.314E+005		1.404E+005	5.079E+004
+	Pb-214	295.22*	18.42	1.358E+005	5.46E+004	4.437E+004	6.316E+004
		351.93*	35.60	5.461E+004		8.932E+004	2.460E+004
	Ra-226	186.21	3.64	1.405E+006	1.40E+006	7.385E+005	6.832E+005
	Ac-228	338.32	11.27	3.534E+005	1.36E+005	2.519E+005	1.684E+005
		911.20	25.80	1.358E+005		-7.917E+004	6.176E+004
		968.97	15.80	2.517E+005		1.516E+005	1.155E+005
	Am-241	59.54	35.90	2.863E+005	2.86E+005	2.135E+005	1.401E+005

+ = Nuclide identified during the nuclide identification
 * = Energy line found in the spectrum
 > = Calculated MDA is zero due to zero counts in the region, or the region is outside the spectrum, or MDA has not been calculated
 @ = Half-life too short to be able to perform the decay correction

***** GAMMA SPECTRUM ANALYSIS *****

Filename: 6279

Report Generated On : 5/4/2018 10:16:59 AM ✓

Sample Title : B106214AFSWC021GD ✓
Sample Description : U1 WEST VALVE HOUSE ✓
Sample Identification : 021
Sample Type : GAMMA DIRECT
Sample Geometry : 3M90D_CP_2IN

Peak Locate Threshold : 3.00
Peak Locate Range (in channels) : 85 - 8192
Peak Area Range (in channels) : 85 - 8192
Identification Energy Tolerance : 10.000 keV

Sample Size : 2.830E+001 ✓

Sample Taken On : 5/4/2018 10:05:00 AM ✓
Acquisition Started : 5/4/2018 10:06:57 AM ✓

Live Time : 600.0 seconds
Real Time : 600.7 seconds

Dead Time : 0.11 % ✓

Energy Calibration Used Done On : 12/28/2017 ✓
Efficiency Calibration Used Done On : 2/1/2018 ✓
Efficiency ID : 3M90D_CP_2IN ✓

Data Validated
5-5-18 0800



 ***** P E A K A N A L Y S I S R E P O R T *****

Detector Name: 6279
 Sample Title: B106214AFSWC021GD
 Peak Analysis Performed on: 5/4/2018 10:16:58 AM
 Peak Analysis From Channel: 85
 Peak Analysis To Channel: 8192

Peak No.	ROI start	ROI end	Peak centroid	Energy (keV)	FWHM (keV)	Net Peak Area	Net Area Uncert.	Continuum Counts
1	291-	346	300.28	75.04	0.54	2.32E+002	160.06	7.66E+002
2	945-	962	953.14	238.41	0.49	-2.21E+001	33.37	9.21E+001
3	1399-	1416	1407.35	352.04	1.04	3.10E+001	20.25	2.20E+001
4	2322-	2339	2330.83	582.99	0.66	2.33E+001	13.42	6.66E+000
5	2427-	2444	2435.47	609.16	0.39	3.65E+001	15.15	6.49E+000
6	2635-	2655	2644.97	661.53	1.40	1.54E+002	29.08	1.58E+001
7	5833-	5852	5842.67	1460.39	0.57	6.92E+001	18.55	4.82E+000
8	7050-	7069	7059.29	1764.01	0.33	1.30E+001	7.21	0.00E+000

M = First peak in a multiplet region
 m = Other peak in a multiplet region
 F = Fitted singlet

Errors quoted at 2.000 sigma

 ***** N U C L I D E I D E N T I F I C A T I O N R E P O R T *****

Sample Title: B106214AFSWC021GD
 Nuclide Library Used: C:\GENIE2K\CAMFILES\Zion Lib-BNL.NLB

IDENTIFIED NUCLIDES

Nuclide Name	Id Confidence	Energy (keV)	Yield (%)	Activity (pCi/)	Activity Uncertainty
K-40	1.000	1460.82*	10.66	9.70332E+005	2.73517E+005
Cs-137	1.000	661.66*	85.10	1.81703E+005	4.06198E+004
Tl-208	1.000	583.19*	85.00	2.57796E+004	1.51387E+004
Pb-212	1.000	238.63*	43.60	-2.93068E+004	4.45946E+004
Bi-214	0.706	609.32*	45.49	7.70867E+004	3.33002E+004
		1120.29	14.92		
		1764.49*	15.30	1.43107E+005	8.02050E+004
Pb-214	0.437	295.22	18.42		
		351.93*	35.60	6.20570E+004	4.15727E+004

* = Energy line found in the spectrum.
 @ = Energy line not used for Weighted Mean Activity
 Energy Tolerance : 10.000 keV
 Nuclide confidence index threshold = 0.30
 Errors quoted at 2.000 sigma

 ***** I N T E R F E R E N C E C O R R E C T E D R E P O R T *****

Nuclide Name	Nuclide Id Confidence	Wt mean Activity (pCi/)	Wt mean Activity Uncertainty
K-40	1.000	9.703315E+005	2.735167E+005
Cs-137	1.000	1.817032E+005	4.061978E+004 ✓
Tl-208	1.000	2.577963E+004	1.513869E+004
Pb-212	1.000	-2.930679E+004	4.459465E+004
Bi-214	0.706	8.679408E+004	3.075478E+004
Pb-214	0.437	6.205700E+004	4.157270E+004

? = 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 2.000 sigma

***** U N I D E N T I F I E D P E A K S *****

Peak Locate Performed on: 5/4/2018 10:16:58 AM
 Peak Locate From Channel: 85
 Peak Locate To Channel: 8192

Peak No.	Energy (keV)	Peak Size in Counts per Second	Peak CPS % Uncertainty	Peak Type	Tol. Nuclide
1	75.04	3.8735E-001	68.87		

M = First peak in a multiplet region
 m = Other peak in a multiplet region
 F = Fitted singlet

Errors quoted at 2.000 sigma

 ***** N U C L I D E M D A R E P O R T *****

Detector Name: 6279
 Sample Geometry: 3M90D_CP_2IN
 Sample Title: B106214AFSWC021GD
 Nuclide Library Used: C:\GENIE2K\CAMFILES\Zion Lib-BNL.NLB

	Nuclide Name	Energy (keV)	Yield (%)	Line MDA (pCi/)	Nuclide MDA (pCi/)	Activity (pCi/)	Dec. Level (pCi/)
+	K-40	1460.82*	10.66	2.274E+005	2.27E+005	9.703E+005	9.474E+004
	Co-60	1173.23	99.85	3.402E+004	2.77E+004 ✓	2.443E+004	1.521E+004
		1332.49	99.98	2.767E+004	@.00E0 ✓	-1.314E+004	1.192E+004
	Nb-94	702.65	99.81	3.478E+004	3.39E+004	3.612E+004	1.599E+004
		871.09	99.89	3.386E+004		-1.712E+004	1.537E+004
	Ag-108m	433.90	90.50	4.336E+004	3.92E+004	2.212E+002	2.048E+004
		614.30	89.80	4.761E+004		1.674E+004	2.235E+004
		722.90	90.80	3.917E+004		-1.813E+004	1.802E+004
	Cs-134	604.72	97.62	4.445E+004	3.16E+004 ✓	3.218E+004 ✓	2.090E+004
		795.86	85.46	3.155E+004		2.321E+004 ✓	1.404E+004
+	Cs-137	661.66*	85.10	3.251E+004	3.25E+004 ✓	1.817E+005	1.466E+004
	Eu-152	121.78	28.67	2.090E+005	1.31E+005	1.253E+005	1.022E+005
		344.28	26.60	1.599E+005		-7.885E+004	7.637E+004
		1408.01	21.07	1.305E+005		-6.213E+003	5.589E+004
	Eu-154	123.07	40.40	1.463E+005	8.27E+004	1.161E+004	7.150E+004
		723.30	20.06	1.774E+005		-3.207E+004	8.161E+004
		1274.43	34.80	8.271E+004		7.583E+003	3.596E+004
	Eu-155	86.55	30.70	2.621E+005	2.62E+005	2.496E+004	1.287E+005
		105.31	21.10	3.204E+005		1.318E+005	1.570E+005
+	Tl-208	583.19*	85.00	1.990E+004	1.99E+004	2.578E+004	8.456E+003
	Bi-212	727.33	6.67	5.349E+005	5.35E+005	3.824E+005	2.461E+005
+	Pb-212	238.63*	43.60	7.937E+004	7.94E+004	-2.931E+004	3.789E+004
+	Bi-214	609.32*	45.49	3.744E+004	2.98E+004	7.709E+004	1.586E+004
		1120.29	14.92	2.568E+005		7.666E+003	1.166E+005
		1764.49*	15.30	2.979E+004		1.431E+005	0.000E+000
+	Pb-214	295.22	18.42	2.153E+005	6.11E+004	5.766E+004	1.029E+005
		351.93*	35.60	6.109E+004		6.206E+004	2.784E+004
	Ra-226	186.21	3.64	1.349E+006	1.35E+006	6.438E+005	6.553E+005
	Ac-228	338.32	11.27	3.497E+005	1.53E+005	1.295E+005	1.665E+005
		911.20	25.80	1.528E+005		1.524E+005	7.025E+004
		968.97	15.80	2.346E+005		-4.980E+004	1.069E+005
	Am-241	59.54	35.90	2.951E+005	2.95E+005	-1.715E+005	1.445E+005

+ = Nuclide identified during the nuclide identification
 * = Energy line found in the spectrum
 > = Calculated MDA is zero due to zero counts in the region, or the region is outside the spectrum, or MDA has not been calculated
 @ = Half-life too short to be able to perform the decay correction

***** GAMMA SPECTRUM ANALYSIS *****

Filename: 6279

Report Generated On	: 5/4/2018 10:46:31 AM	✓
Sample Title	: B106214AFSWC022GD	
Sample Description	: U1 WEST VALVE HOUSE	✓
Sample Identification	: 022	
Sample Type	: GAMMA DIRECT	
Sample Geometry	: 3M90D_CP_2IN	
Peak Locate Threshold	: 3.00	✓
Peak Locate Range (in channels)	: 85 - 8192	
Peak Area Range (in channels)	: 85 - 8192	
Identification Energy Tolerance	: 10.000 keV	
Sample Size	: 2.830E+001	✓
Sample Taken On	: 5/4/2018 10:22:00 AM	
Acquisition Started	: 5/4/2018 10:36:29 AM	✓
Live Time	: 600.0 seconds	
Real Time	: 600.5 seconds	
Dead Time	: 0.07 %	✓
Energy Calibration Used Done On	: 12/28/2017	
Efficiency Calibration Used Done On	: 2/1/2018	✓
Efficiency ID	: 3M90D_CP_2IN	

Date Validated
5-5-18 0805



 ***** P E A K A N A L Y S I S R E P O R T *****

Detector Name: 6279
 Sample Title: B106214AFSWC022GD
 Peak Analysis Performed on: 5/4/2018 10:46:31 AM
 Peak Analysis From Channel: 85
 Peak Analysis To Channel: 8192

Peak No.	ROI start	ROI end	Peak centroid	Energy (keV)	FWHM (keV)	Net Peak Area	Net Area Uncert.	Continuum Counts
1	293-	347	300.84	75.18	0.95	-2.83E+002	198.68	1.28E+003
2	945-	962	953.37	238.46	0.45	1.05E+001	32.45	7.65E+001
3	1397-	1414	1405.81	351.65	0.62	1.77E+001	24.27	3.83E+001
4	2427-	2444	2435.58	609.18	0.43	4.00E+001	16.64	9.00E+000
5	2634-	2654	2644.93	661.52	0.74	1.12E+002	24.46	1.04E+001
6	3637-	3654	3645.23	911.55	0.47	8.00E+000	12.29	9.00E+000
7	5834-	5853	5843.67	1460.64	1.27	7.20E+001	16.97	0.00E+000
8	7051-	7070	7060.61	1764.34	0.50	1.30E+001	7.21	0.00E+000

M = First peak in a multiplet region
 m = Other peak in a multiplet region
 F = Fitted singlet

Errors quoted at 2.000 sigma

 ***** N U C L I D E I D E N T I F I C A T I O N R E P O R T *****

Sample Title: B106214AFSWC022GD
 Nuclide Library Used: C:\GENIE2K\CAMFILES\Zion Lib-BNL.NLB

IDENTIFIED NUCLIDES

Nuclide Name	Id Confidence	Energy (keV)	Yield (%)	Activity (pCi/)	Activity Uncertainty
K-40	1.000	1460.82*	10.66	1.01006E+006	2.53715E+005
Cs-137	1.000	661.66*	85.10	1.31406E+005	3.28479E+004
Pb-212	1.000	238.63*	43.60	1.39551E+004	4.31877E+004
Bi-214	0.706	609.32*	45.49	8.44537E+004	3.65772E+004
		1120.29	14.92		
		1764.49*	15.30	1.43124E+005	8.02144E+004
		295.22	18.42		
Pb-214	0.437	351.93*	35.60	3.53750E+004	4.88357E+004

* = Energy line found in the spectrum.
 @ = Energy line not used for Weighted Mean Activity
 Energy Tolerance : 10.000 keV
 Nuclide confidence index threshold = 0.30
 Errors quoted at 2.000 sigma

 ***** INTERFERENCE CORRECTED REPORT *****

Nuclide Name	Nuclide Id Confidence	Wt mean Activity (pCi/)	Wt mean Activity Uncertainty
K-40	1.000	1.010057E+006	2.537155E+005
Cs-137	1.000	1.314063E+005	3.284790E+004 ✓
Pb-212	1.000	1.395506E+004	4.318773E+004
Bi-214	0.706	9.455305E+004	3.328048E+004
Pb-214	0.437	3.537504E+004	4.883568E+004

? = 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 2.000 sigma

***** UNIDENTIFIED PEAKS *****

Peak Locate Performed on: 5/4/2018 10:46:31 AM
 Peak Locate From Channel: 85
 Peak Locate To Channel: 8192

Peak No.	Energy (keV)	Peak Size in Counts per Second	Peak CPS % Uncertainty	Peak Type	Tol. Nuclide
1	75.18	-4.7244E-001	-70.09		
6	911.55	1.3333E-002	153.69	Tol.	Ac-228

M = First peak in a multiplet region
 m = Other peak in a multiplet region
 F = Fitted singlet

Errors quoted at 2.000 sigma

 ***** N U C L I D E M D A R E P O R T *****

Detector Name: 6279
 Sample Geometry: 3M90D_CP_2IN
 Sample Title: B106214AFSWC022GD
 Nuclide Library Used: C:\GENIE2K\CAMFILES\Zion Lib-BNL.NLB

	Nuclide Name	Energy (keV)	Yield (%)	Line MDA (pCi/)	Nuclide MDA (pCi/)	Activity (pCi/)	Dec. Level (pCi/)
+	K-40	1460.82*	10.66	3.796E+004	3.80E+004	1.010E+006	0.000E+000
	Co-60	1173.23	99.85	3.206E+004	3.19E+004	2.802E+004	1.422E+004
		1332.49	99.98	3.189E+004		-3.630E+003	1.402E+004
	Nb-94	702.65	99.81	3.550E+004	3.55E+004	7.839E+003	1.635E+004
		871.09	99.89	3.653E+004		-1.281E+004	1.671E+004
	Ag-108m	433.90	90.50	4.013E+004	3.96E+004	8.016E+003	1.887E+004
		614.30	89.80	4.952E+004		6.445E+003	2.331E+004
		722.90	90.80	3.957E+004		1.665E+004	1.822E+004
	Cs-134	604.72	97.62	4.780E+004	4.09E+004	6.974E+004	2.257E+004
		795.86	85.46	4.086E+004		-4.519E+004	1.869E+004
+	Cs-137	661.66*	85.10	2.707E+004	2.71E+004	1.314E+005	1.194E+004
	Eu-152	121.78	28.67	2.150E+005	1.44E+005	1.018E+005	1.052E+005
		344.28	26.60	1.523E+005		6.902E+004	7.255E+004
		1408.01	21.07	1.437E+005		4.531E+004	6.249E+004
	Eu-154	123.07	40.40	1.509E+005	9.79E+004	4.217E+004	7.382E+004
		723.30	20.06	1.792E+005		7.148E+004	8.251E+004
		1274.43	34.80	9.789E+004		3.769E+004	4.355E+004
	Eu-155	86.55	30.70	2.755E+005	2.76E+005	2.149E+005	1.354E+005
		105.31	21.10	3.206E+005		-7.948E+004	1.571E+005
	Tl-208	583.19	85.00	4.111E+004	4.11E+004	1.602E+004	1.906E+004
	Bi-212	727.33	6.67	5.238E+005	5.24E+005	3.831E+005	2.406E+005
+	Pb-212	238.63*	43.60	7.311E+004	7.31E+004	1.396E+004	3.476E+004
+	Bi-214	609.32*	45.49	4.328E+004	2.98E+004	8.445E+004	1.878E+004
		1120.29	14.92	2.738E+005		-1.477E+005	1.251E+005
		1764.49*	15.30	2.979E+004		1.431E+005	0.000E+000
+	Pb-214	295.22	18.42	2.242E+005	8.03E+004	9.908E+004	1.073E+005
		351.93*	35.60	8.032E+004		3.538E+004	3.746E+004
	Ra-226	186.21	3.64	1.339E+006	1.34E+006	7.158E+005	6.503E+005
	Ac-228	338.32	11.27	3.252E+005	1.46E+005	2.219E+005	1.542E+005
		911.20	25.80	1.463E+005		-4.726E+004	6.699E+004
		968.97	15.80	2.316E+005		-3.508E+004	1.054E+005
	Am-241	59.54	35.90	3.061E+005	3.06E+005	1.425E+005	1.500E+005

+ = Nuclide identified during the nuclide identification
 * = Energy line found in the spectrum
 > = Calculated MDA is zero due to zero counts in the region, or the region is outside the spectrum, or MDA has not been calculated
 @ = Half-life too short to be able to perform the decay correction

Filename: 6279

Report Generated On : 5/4/2018 10:59:50 AM ✓

Sample Title : B106214AFSWC023GD ✓
Sample Description : U1 WEST VALVE HOUSE ✓
Sample Identification : 023
Sample Type : GAMMA DIRECT
Sample Geometry : 3M90D_CP_2IN

Peak Locate Threshold : 3.00
Peak Locate Range (in channels) : 85 - 8192
Peak Area Range (in channels) : 85 - 8192
Identification Energy Tolerance : 10.000 keV

Sample Size : 2.830E+001 ✓

Sample Taken On : 5/4/2018 10:47:00 AM
Acquisition Started : 5/4/2018 10:49:49 AM ✓

Live Time : 600.0 seconds
Real Time : 600.4 seconds

Dead Time : 0.07 % ✓

Energy Calibration Used Done On : 12/28/2017 ✓
Efficiency Calibration Used Done On : 2/1/2018 ✓
Efficiency ID : 3M90D_CP_2IN

Data Validated
5-5-18 0920

R. J. [Signature]

 ***** P E A K A N A L Y S I S R E P O R T *****

Detector Name: 6279
 Sample Title: B106214AFSWC023GD
 Peak Analysis Performed on: 5/4/2018 10:59:50 AM
 Peak Analysis From Channel: 85
 Peak Analysis To Channel: 8192

	Peak No.	ROI start	ROI end	Peak centroid	Energy (keV)	FWHM (keV)	Net Peak Area	Net Area Uncert.	Continuum Counts
M	1	139-	196	146.23	36.48	0.94	1.80E+001	13.18	3.71E+001
m	2	139-	196	187.55	46.82	0.95	2.60E+001	17.34	7.06E+001
	3	292-	346	299.74	74.90	0.93	1.34E+002	167.45	8.74E+002
	4	946-	963	954.21	238.68	0.81	2.60E+001	32.33	7.10E+001
	5	1171-	1188	1179.67	295.08	0.36	2.29E+001	20.16	2.41E+001
	6	1398-	1415	1406.98	351.95	1.01	4.68E+001	20.76	1.82E+001
	7	2034-	2051	2042.09	510.79	1.01	2.06E+001	18.29	1.84E+001
	8	2323-	2340	2331.65	583.20	1.16	1.66E+001	14.72	1.14E+001
	9	2428-	2445	2436.01	609.29	0.66	3.85E+001	17.03	1.05E+001
	10	2637-	2654	2645.16	661.58	0.52	4.04E+001	15.69	6.56E+000
	11	5833-	5852	5842.80	1460.42	0.78	5.94E+001	16.59	2.59E+000

M = First peak in a multiplet region
 m = Other peak in a multiplet region
 F = Fitted singlet

Errors quoted at 2.000 sigma

 ***** N U C L I D E I D E N T I F I C A T I O N R E P O R T *****

Sample Title: B106214AFSWC023GD
 Nuclide Library Used: C:\GENIE2K\CAMFILES\Zion Lib-BNL.NLB

..... IDENTIFIED NUCLIDES

Nuclide Name	Id Confidence	Energy (keV)	Yield (%)	Activity (pCi/)	Activity Uncertainty
K-40	1.000	1460.82*	10.66	8.33378E+005	2.43726E+005
Cs-137	1.000	661.66*	85.10	4.76410E+004	1.93530E+004
Tl-208	1.000	583.19*	85.00	1.83648E+004	1.64105E+004
Pb-212	1.000	238.63*	43.60	3.45471E+004	4.33429E+004
Bi-214	0.442	609.32*	45.49	8.12942E+004	3.72654E+004
		1120.29	14.92		
		1764.49	15.30		
Pb-214	1.000	295.22*	18.42	8.02735E+004	7.18580E+004
		351.93*	35.60	9.36437E+004	4.38404E+004

* = Energy line found in the spectrum.
 @ = Energy line not used for Weighted Mean Activity
 Energy Tolerance : 10.000 keV
 Nuclide confidence index threshold = 0.30
 Errors quoted at 2.000 sigma

 ***** INTERFERENCE CORRECTED REPORT *****

Nuclide Name	Nuclide Id Confidence	Wt mean Activity (pCi/)	Wt mean Activity Uncertainty
K-40	1.000	8.333778E+005	2.437256E+005
Cs-137	1.000	4.764101E+004 ✓	1.935295E+004 ✓
Tl-208	1.000	1.836480E+004	1.641053E+004
Pb-212	1.000	3.454706E+004	4.334286E+004
Bi-214	0.442	8.129416E+004	3.726541E+004
Pb-214	1.000	9.001697E+004	3.742505E+004

? = 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 2.000 sigma

***** U N I D E N T I F I E D P E A K S *****

Peak Locate Performed on: 5/4/2018 10:59:50 AM
Peak Locate From Channel: 85
Peak Locate To Channel: 8192

Peak No.	Energy (keV)	Peak Size in Counts per Second	Peak CPS % Uncertainty	Peak Type	Tol. Nuclide
M 1	36.48	3.0004E-002	73.22		
m 2	46.82	4.3344E-002	66.68		
3	74.90	2.2271E-001	125.31		
7	510.79	3.4402E-002	88.63		

M = First peak in a multiplet region

m = Other peak in a multiplet region

F = Fitted singlet

Errors quoted at 2.000 sigma

 ***** N U C L I D E M D A R E P O R T *****

Detector Name: 6279
 Sample Geometry: 3M90D_CP_2IN
 Sample Title: B106214AFSWC023GD
 Nuclide Library Used: C:\GENIE2K\CAMFILES\Zion Lib-BNL.NLB


	Nuclide Name	Energy (keV)	Yield (%)	Line MDA (pCi/)	Nuclide MDA (pCi/)	Activity (pCi/)	Dec. Level (pCi/)
+	K-40	1460.82*	10.66	1.795E+005	1.80E+005	8.334E+005	7.078E+004
	Co-60	1173.23	99.85	3.927E+004	2.86E+004	1.617E+003	1.783E+004
		1332.49	99.98	2.857E+004		1.989E+004	1.236E+004
	Nb-94	702.65	99.81	3.550E+004	3.55E+004	-6.087E+003	1.635E+004
		871.09	99.89	3.567E+004		-1.832E+004	1.628E+004
	Ag-108m	433.90	90.50	4.294E+004	4.26E+004	-3.077E+004	2.027E+004
		614.30	89.80	4.926E+004		5.773E+004	2.317E+004
		722.90	90.80	4.261E+004		1.208E+004	1.974E+004
	Cs-134	604.72	97.62	4.215E+004	3.68E+004	4.156E+004	1.975E+004
		795.86	85.46	3.680E+004		-1.178E+005	1.666E+004
+	Cs-137	661.66*	85.10	2.101E+004	2.10E+004	4.764E+004	8.909E+003
	Eu-152	121.78	28.67	2.070E+005	1.16E+005	1.845E+005	1.012E+005
		344.28	26.60	1.628E+005		5.726E+004	7.784E+004
		1408.01	21.07	1.156E+005		6.242E+004	4.840E+004
	Eu-154	123.07	40.40	1.449E+005	1.02E+005	-1.241E+005	7.083E+004
		723.30	20.06	1.913E+005		8.855E+003	8.857E+004
		1274.43	34.80	1.018E+005		3.991E+003	4.548E+004
	Eu-155	86.55	30.70	2.683E+005	2.68E+005	1.579E+005	1.318E+005
		105.31	21.10	3.104E+005		-3.006E+004	1.520E+005
+	Tl-208	583.19*	85.00	2.526E+004	2.53E+004	1.836E+004	1.114E+004
	Bi-212	727.33	6.67	5.819E+005	5.82E+005	3.358E+004	2.696E+005
+	Pb-212	238.63*	43.60	7.069E+004	7.07E+004	3.455E+004	3.355E+004
+	Bi-214	609.32*	45.49	4.623E+004	4.62E+004	8.129E+004	2.026E+004
		1120.29	14.92	2.637E+005		3.053E+005	1.201E+005
		1764.49	15.30	2.347E+005		2.821E+004	1.025E+005
+	Pb-214	295.22*	18.42	1.119E+005	5.68E+004	8.027E+004	5.118E+004
		351.93*	35.60	5.681E+004		9.364E+004	2.570E+004
	Ra-226	186.21	3.64	1.349E+006	1.35E+006	1.183E+005	6.553E+005
	Ac-228	338.32	11.27	3.571E+005	1.32E+005	5.085E+005	1.702E+005
		911.20	25.80	1.321E+005		4.218E+004	5.991E+004
		968.97	15.80	2.316E+005		4.110E+004	1.054E+005
	Am-241	59.54	35.90	2.951E+005	2.95E+005	2.630E+005	1.445E+005

+ = Nuclide identified during the nuclide identification
 * = Energy line found in the spectrum
 > = Calculated MDA is zero due to zero counts in the region, or the region is outside the spectrum, or MDA has not been calculated
 @ = Half-life too short to be able to perform the decay correction

***** GAMMA SPECTRUM ANALYSIS *****

Filename: 6279

Report Generated On : 5/4/2018 1:01:13 PM ✓
Sample Title : B106214AFSWC024GD ✓
Sample Description : U1 WEST VALVE HOUSE ✓
Sample Identification : 024 ✓
Sample Type : GAMMA DIRECT ✓
Sample Geometry : 3M90D_CP_2IN
Peak Locate Threshold : 3.00
Peak Locate Range (in channels) : 85 - 8192
Peak Area Range (in channels) : 85 - 8192
Identification Energy Tolerance : 10.000 keV
Sample Size : 2.830E+001 ✓
Sample Taken On : 5/4/2018 12:49:00 PM ✓
Acquisition Started : 5/4/2018 12:51:11 PM ✓
Live Time : 600.0 seconds ✓
Real Time : 600.6 seconds ✓
Dead Time : 0.10 %
Energy Calibration Used Done On : 12/28/2017 ✓
Efficiency Calibration Used Done On : 2/1/2018
Efficiency ID : 3M90D_CP_2IN

Data Validated
5-5-18 0915


 ***** P E A K A N A L Y S I S R E P O R T *****

Detector Name: 6279
 Sample Title: B106214AFSWC024GD
 Peak Analysis Performed on: 5/4/2018 1:01:13 PM
 Peak Analysis From Channel: 85
 Peak Analysis To Channel: 8192

Peak No.	ROI start	ROI end	Peak centroid	Energy (keV)	FWHM (keV)	Net Peak Area	Net Area Uncert.	Continuum Counts
1	291-	348	299.56	74.86	0.67	2.27E+002	157.57	7.21E+002
2	945-	962	953.50	238.50	0.32	5.71E+000	34.33	8.63E+001
3	1399-	1416	1407.56	352.09	0.59	2.46E+001	21.09	2.64E+001
4	2427-	2444	2435.78	609.23	0.48	2.78E+001	16.83	1.32E+001
5	2634-	2655	2644.79	661.49	0.44	1.81E+002	29.78	1.09E+001
6	4471-	4490	4480.26	1120.17	0.68	1.74E+001	13.39	7.64E+000
7	5832-	5852	5842.61	1460.37	0.56	7.84E+001	18.73	2.57E+000

M = First peak in a multiplet region
 m = Other peak in a multiplet region
 F = Fitted singlet

Errors quoted at 2.000 sigma

 ***** N U C L I D E I D E N T I F I C A T I O N R E P O R T *****

Sample Title: B106214AFSWC024GD
 Nuclide Library Used: C:\GENIE2K\CAMFILES\Zion Lib-BNL.NLB

IDENTIFIED NUCLIDES

Nuclide Name	Id Confidence	Energy (keV)	Yield (%)	Activity (pCi/)	Activity Uncertainty
K-40	1.000	1460.82*	10.66	1.10016E+006	2.79538E+005
Cs-137	1.000	661.66*	85.10	2.13357E+005	4.34422E+004
Pb-212	1.000	238.63*	43.60	7.59206E+003	4.56499E+004
Bi-214	0.735	609.32*	45.49	5.86823E+004	3.62270E+004
		1120.29*	14.92	1.51438E+005	1.17422E+005
		1764.49	15.30		
Pb-214	0.437	295.22	18.42		
		351.93*	35.60	4.93285E+004	4.28442E+004

* = Energy line found in the spectrum.

@ = Energy line not used for Weighted Mean Activity

Energy Tolerance : 10.000 keV

Nuclide confidence index threshold = 0.30

Errors quoted at 2.000 sigma

 ***** INTERFERENCE CORRECTED REPORT *****

Nuclide Name	Nuclide Id Confidence	Wt mean Activity (pCi/)	Wt mean Activity Uncertainty
K-40	1.000	1.100165E+006	2.795384E+005
Cs-137	1.000	2.133571E+005	4.344220E+004 ✓
Pb-212	1.000	7.592057E+003	4.564995E+004
Bi-214	0.735	6.674380E+004	3.461694E+004
Pb-214	0.437	4.932848E+004	4.284417E+004

? = 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 2.000 sigma

***** UNIDENTIFIED PEAKS *****

Peak Locate Performed on: 5/4/2018 1:01:13 PM
 Peak Locate From Channel: 85
 Peak Locate To Channel: 8192

Peak No.	Energy (keV)	Peak Size in Counts per Second	Peak CPS % Uncertainty	Peak Type	Tol. Nuclide
1	74.86	3.7790E-001	69.49		

M = First peak in a multiplet region

m = Other peak in a multiplet region

F = Fitted singlet

Errors quoted at 2.000 sigma

 ***** N U C L I D E M D A R E P O R T *****

Detector Name: 6279
 Sample Geometry: 3M90D_CP_2IN
 Sample Title: B106214AFSWC024GD
 Nuclide Library Used: C:\GENIE2K\CAMFILES\Zion Lib-BNL.NLB

	Nuclide Name	Energy (keV)	Yield (%)	Line MDA (pCi/)	Nuclide MDA (pCi/)	Activity (pCi/)	Dec. Level (pCi/)
+	K-40	1460.82*	10.66	1.784E+005	1.78E+005	1.100E+006	7.021E+004
	Co-60	1173.23	99.85	3.338E+004	3.34E+004	-2.735E+004	1.489E+004
		1332.49	99.98	3.622E+004		3.409E+004	1.619E+004
	Nb-94	702.65	99.81	2.877E+004	2.88E+004	-4.689E+003	1.298E+004
		871.09	99.89	3.477E+004		5.973E+003	1.583E+004
	Ag-108m	433.90	90.50	4.478E+004	3.40E+004	-6.448E+002	2.119E+004
		614.30	89.80	4.648E+004		-5.511E+004	2.179E+004
		722.90	90.80	3.400E+004		-9.817E+003	1.544E+004
	Cs-134	604.72	97.62	4.615E+004	3.94E+004	-1.795E+004	2.175E+004
		795.86	85.46	3.939E+004	0.0E0	-7.002E+004	1.795E+004
+	Cs-137	661.66*	85.10	2.789E+004	2.79E+004	2.134E+005	1.235E+004
	Eu-152	121.78	28.67	1.954E+005	1.67E+005	-6.814E+004	9.540E+004
		344.28	26.60	1.672E+005		7.630E+004	8.000E+004
		1408.01	21.07	1.864E+005		1.167E+005	8.384E+004
	Eu-154	123.07	40.40	1.377E+005	9.79E+004	-3.921E+004	6.723E+004
		723.30	20.06	1.560E+005		1.915E+004	7.094E+004
		1274.43	34.80	9.789E+004		8.780E+004	4.355E+004
	Eu-155	86.55	30.70	2.509E+005	2.51E+005	-1.592E+004	1.231E+005
		105.31	21.10	2.985E+005		-9.123E+004	1.461E+005
	Tl-208	583.19	85.00	4.599E+004	4.60E+004	3.259E+004	2.150E+004
	Bi-212	727.33	6.67	4.829E+005	4.83E+005	4.071E+005	2.201E+005
+	Pb-212	238.63*	43.60	7.793E+004	7.79E+004	7.592E+003	3.717E+004
+	Bi-214	609.32*	45.49	5.127E+004	5.13E+004	5.868E+004	2.278E+004
		1120.29*	14.92	1.740E+005		1.514E+005	7.519E+004
		1764.49	15.30	2.410E+005		7.901E+004	1.056E+005
+	Pb-214	295.22	18.42	2.345E+005	6.67E+004	3.289E+005	1.125E+005
		351.93*	35.60	6.666E+004		4.933E+004	3.062E+004
	Ra-226	186.21	3.64	1.291E+006	1.29E+006	5.365E+005	6.263E+005
	Ac-228	338.32	11.27	3.643E+005	1.38E+005	-5.001E+004	1.738E+005
		911.20	25.80	1.376E+005		1.792E+004	6.266E+004
		968.97	15.80	1.990E+005		1.025E+005	8.912E+004
	Am-241	59.54	35.90	2.771E+005	2.77E+005	2.203E+005	1.355E+005

+ = Nuclide identified during the nuclide identification
 * = Energy line found in the spectrum
 > = Calculated MDA is zero due to zero counts in the region, or the region is outside the spectrum, or MDA has not been calculated
 @ = Half-life too short to be able to perform the decay correction

***** GAMMA SPECTRUM ANALYSIS *****

Filename: 6279

Report Generated On : 5/4/2018 1:17:16 PM ✓
Sample Title : B106214AFSWC025GD ✓
Sample Description : U1 WEST VALVE HOUSE ✓
Sample Identification : 025
Sample Type : GAMMA DIRECT
Sample Geometry : 3M90D_CP_2IN
Peak Locate Threshold : 3.00
Peak Locate Range (in channels) : 85 - 8192
Peak Area Range (in channels) : 85 - 8192
Identification Energy Tolerance : 10.000 keV
Sample Size : 2.830E+001 ✓
Sample Taken On : 5/4/2018 1:06:00 PM ✓
Acquisition Started : 5/4/2018 1:07:15 PM ✓
Live Time : 600.0 seconds
Real Time : 600.5 seconds
Dead Time : 0.08 % ✓
Energy Calibration Used Done On : 12/28/2017 ✓
Efficiency Calibration Used Done On : 2/1/2018 ✓
Efficiency ID : 3M90D_CP_2IN ✓

Data Validated
5-5-18 / 0920
[Signature]

 ***** P E A K A N A L Y S I S R E P O R T *****

Detector Name: 6279
 Sample Title: B106214AFSWC025GD
 Peak Analysis Performed on: 5/4/2018 1:17:16 PM
 Peak Analysis From Channel: 85
 Peak Analysis To Channel: 8192

Peak No.	ROI start	ROI end	Peak centroid	Energy (keV)	FWHM (keV)	Net Peak Area	Net Area Uncert.	Continuum Counts
1	121-	136	128.75	32.11	0.81	4.17E+001	32.31	7.23E+001
2	284-	313	300.14	75.00	0.69	2.57E+002	96.03	4.31E+002
3	1170-	1187	1178.74	294.85	0.33	4.00E+001	24.65	3.40E+001
4	1396-	1414	1405.04	351.46	0.51	4.51E+001	25.31	3.19E+001
5	2032-	2049	2040.66	510.43	0.35	2.19E+001	16.98	1.41E+001
6	2426-	2443	2434.66	608.96	0.76	2.87E+001	16.98	1.33E+001
7	2633-	2657	2645.01	661.55	1.34	4.32E+002	44.38	1.50E+001
8	4472-	4491	4481.39	1120.45	0.74	1.40E+001	12.67	7.04E+000
9	5833-	5852	5842.21	1460.27	1.41	6.97E+001	17.58	2.27E+000
10	7050-	7069	7059.96	1764.18	0.75	1.30E+001	7.21	0.00E+000

M = First peak in a multiplet region
 m = Other peak in a multiplet region
 F = Fitted singlet

Errors quoted at 2.000 sigma

 ***** N U C L I D E I D E N T I F I C A T I O N R E P O R T *****

Sample Title: B106214AFSWC025GD
 Nuclide Library Used: C:\GENIE2K\CAMFILES\Zion Lib-BNL.NLB

IDENTIFIED NUCLIDES

Nuclide Name	Id Confidence	Energy (keV)	Yield (%)	Activity (pCi/)	Activity Uncertainty
K-40	1.000	1460.82*	10.66	9.78047E+005	2.60808E+005
Cs-137	1.000	661.66*	85.10	5.08917E+005	8.04300E+004
Bi-214	1.000	609.32*	45.49	6.05887E+004	3.65829E+004
		1120.29*	14.92	1.21831E+005	1.10937E+005
		1764.49*	15.30	1.43116E+005	8.02098E+004
Pb-214	1.000	295.22*	18.42	1.40219E+005	8.92877E+004
		351.93*	35.60	9.01088E+004	5.23665E+004

* = Energy line found in the spectrum.
 @ = Energy line not used for Weighted Mean Activity
 Energy Tolerance : 10.000 keV
 Nuclide confidence index threshold = 0.30
 Errors quoted at 2.000 sigma

 ***** INTERFERENCE CORRECTED REPORT *****

Nuclide Name	Nuclide Id Confidence	Wt mean Activity (pCi/)	Wt mean Activity Uncertainty
K-40	1.000	9.780472E+005	2.608081E+005 ✓
Cs-137	1.000	5.089172E+005	8.042996E+004 ✓
Bi-214	1.000	7.868376E+004	3.188045E+004
Pb-214	1.000	1.029339E+005	4.517083E+004

? = 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 2.000 sigma

***** UNIDENTIFIED PEAKS *****

Peak Locate Performed on: 5/4/2018 1:17:16 PM
 Peak Locate From Channel: 85
 Peak Locate To Channel: 8192

Peak No.	Energy (keV)	Peak Size in Counts per Second	Peak CPS % Uncertainty	Peak Type	Tol. Nuclide
1	32.11	6.9430E-002	77.56		
2	75.00	4.2803E-001	37.39		
5	510.43	3.6481E-002	77.58		

M = First peak in a multiplet region
 m = Other peak in a multiplet region
 F = Fitted singlet

Errors quoted at 2.000 sigma

 ***** N U C L I D E M D A R E P O R T *****

Detector Name: 6279
 Sample Geometry: 3M90D_CP_2IN
 Sample Title: B106214AFSWC025GD
 Nuclide Library Used: C:\GENIE2K\CAMFILES\Zion Lib-BNL.NLB

	Nuclide Name	Energy (keV)	Yield (%)	Line MDA (pCi/)	Nuclide MDA (pCi/)	Activity (pCi/)	Dec. Level (pCi/)
+	K-40	1460.82*	10.66	1.647E+005	1.65E+005	9.780E+005	6.336E+004
	Co-60	1173.23	99.85	3.704E+004	3.34E+004	✓1.003E+004	✓1.671E+004
		1332.49	99.98	3.340E+004		2.841E+004	✓1.478E+004
	Nb-94	702.65	99.81	3.252E+004	2.76E+004	1.886E+004	1.486E+004
		871.09	99.89	2.764E+004		1.165E+004	1.226E+004
	Ag-108m	433.90	90.50	5.496E+004	4.22E+004	2.190E+004	2.628E+004
		614.30	89.80	4.979E+004		2.040E+004	2.344E+004
		722.90	90.80	4.225E+004		2.453E+004	1.956E+004
	Cs-134	604.72	97.62	4.369E+004	4.09E+004	✓3.969E+004	✓2.052E+004
		795.86	85.46	4.086E+004		-5.639E+004	1.869E+004
+	Cs-137	661.66*	85.10	3.333E+004	3.33E+004	✓5.089E+005	1.507E+004
	Eu-152	121.78	28.67	2.216E+005	1.56E+005	1.854E+003	1.085E+005
		344.28	26.60	1.799E+005		-7.122E+004	8.637E+004
		1408.01	21.07	1.557E+005		-6.107E+004	6.845E+004
	Eu-154	123.07	40.40	1.570E+005	8.51E+004	4.015E+004	7.685E+004
		723.30	20.06	1.913E+005		1.701E+005	8.857E+004
		1274.43	34.80	8.507E+004		6.385E+004	3.714E+004
	Eu-155	86.55	30.70	2.770E+005	2.77E+005	3.347E+005	1.361E+005
		105.31	21.10	3.106E+005		-2.441E+005	1.521E+005
	Tl-208	583.19	85.00	4.280E+004	4.28E+004	-2.403E+004	1.991E+004
	Bi-212	727.33	6.67	5.615E+005	5.62E+005	1.900E+005	2.594E+005
	Pb-212	238.63	43.60	1.216E+005	1.22E+005	1.070E+004	5.901E+004
+	Bi-214	609.32*	45.49	5.147E+004	2.98E+004	6.059E+004	2.288E+004
		1120.29*	14.92	1.704E+005		1.218E+005	7.338E+004
		1764.49*	15.30	2.979E+004		1.431E+005	0.000E+000
+	Pb-214	295.22*	18.42	1.315E+005	7.60E+004	1.402E+005	6.101E+004
		351.93*	35.60	7.596E+004		9.011E+004	3.528E+004
	Ra-226	186.21	3.64	1.426E+006	1.43E+006	-1.331E+005	6.935E+005
	Ac-228	338.32	11.27	3.885E+005	1.43E+005	6.706E+005	1.859E+005
		911.20	25.80	1.429E+005		3.058E+004	6.529E+004
		968.97	15.80	2.316E+005		3.628E+004	1.054E+005
	Am-241	59.54	35.90	3.082E+005	3.08E+005	1.914E+005	1.511E+005

+ = Nuclide identified during the nuclide identification

* = Energy line found in the spectrum

> = Calculated MDA is zero due to zero counts in the region, or the region is outside the spectrum, or MDA has not been calculated

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

***** GAMMA SPECTRUM ANALYSIS *****

Filename: 6279

Report Generated On : 5/4/2018 1:33:00 PM ✓

Sample Title : B106214AFSWC026GD ✓
Sample Description : U1 WEST VALVE HOUSE ✓
Sample Identification : 026
Sample Type : GAMMA DIRECT
Sample Geometry : 3M90D_CP_2IN

Peak Locate Threshold : 3.00
Peak Locate Range (in channels) : 85 - 8192
Peak Area Range (in channels) : 85 - 8192
Identification Energy Tolerance : 10.000 keV

Sample Size : 2.830E+001 ✓

Sample Taken On : 5/4/2018 1:20:00 PM ✓
Acquisition Started : 5/4/2018 1:22:59 PM ✓

Live Time : 600.0 seconds ✓
Real Time : 600.5 seconds ✓

Dead Time : 0.07 %

Energy Calibration Used Done On : 12/28/2017 ✓
Efficiency Calibration Used Done On : 2/1/2018 ✓
Efficiency ID : 3M90D_CP_2IN

Data Validated

5-5-18 0945



 ***** P E A K A N A L Y S I S R E P O R T *****

Detector Name: 6279
 Sample Title: B106214AFSWC026GD
 Peak Analysis Performed on: 5/4/2018 1:32:59 PM
 Peak Analysis From Channel: 85
 Peak Analysis To Channel: 8192

Peak No.	ROI start	ROI end	Peak centroid	Energy (keV)	FWHM (keV)	Net Peak Area	Net Area Uncert.	Continuum Counts
1	287-	310	298.71	74.65	1.00	2.21E+002	75.40	3.00E+002
2	946-	963	954.45	238.74	0.82	1.48E+001	31.31	7.02E+001
3	1399-	1417	1407.74	352.14	1.34	4.78E+001	21.84	2.12E+001
4	2324-	2341	2332.54	583.42	0.30	1.20E+001	12.85	9.00E+000
5	2427-	2444	2435.59	609.19	0.54	4.66E+001	18.34	1.14E+001
6	2636-	2653	2644.87	661.51	1.46	3.41E+001	15.94	8.94E+000
7	5835-	5854	5844.16	1460.76	0.46	6.30E+001	15.87	0.00E+000
8	7051-	7070	7060.73	1764.37	0.94	1.30E+001	7.21	0.00E+000

M = First peak in a multiplet region

m = Other peak in a multiplet region

F = Fitted singlet

Errors quoted at 2.000 sigma

 ***** N U C L I D E I D E N T I F I C A T I O N R E P O R T *****

Sample Title: B106214AFSWC026GD
 Nuclide Library Used: C:\GENIE2K\CAMFILES\Zion Lib-BNL.NLB

..... IDENTIFIED NUCLIDES

Nuclide Name	Id Confidence	Energy (keV)	Yield (%)	Activity (pCi/)	Activity Uncertainty
K-40	1.000	1460.82*	10.66	8.83847E+005	2.35562E+005
Cs-137	1.000	661.66*	85.10	4.01190E+004	1.93822E+004
Tl-208	1.000	583.19*	85.00	1.32584E+004	1.42862E+004
Pb-212	1.000	238.63*	43.60	1.97284E+004	4.17575E+004
Bi-214	0.706	609.32*	45.49	9.84417E+004	4.04837E+004
		1120.29	14.92		
		1764.49*	15.30	1.43126E+005	8.02153E+004
Pb-214	0.437	295.22	18.42		
		351.93*	35.60	9.57619E+004	4.60050E+004

* = Energy line found in the spectrum.
 @ = Energy line not used for Weighted Mean Activity
 Energy Tolerance : 10.000 keV
 Nuclide confidence index threshold = 0.30
 Errors quoted at 2.000 sigma

 ***** I N T E R F E R E N C E C O R R E C T E D R E P O R T *****

Nuclide Name	Nuclide Id Confidence	Wt mean Activity (pCi/)	Wt mean Activity Uncertainty
K-40	1.000	8.838467E+005	2.355622E+005
Cs-137	1.000	4.011900E+004	1.938223E+004
Tl-208	1.000	1.325842E+004	1.428625E+004
Pb-212	1.000	1.972838E+004	4.175748E+004
Bi-214	0.706	1.075127E+005	3.614166E+004
Pb-214	0.437	9.576194E+004	4.600496E+004

? = 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 2.000 sigma

***** U N I D E N T I F I E D P E A K S *****

Peak Locate Performed on: 5/4/2018 1:32:59 PM
 Peak Locate From Channel: 85
 Peak Locate To Channel: 8192

Peak No.	Energy (keV)	Peak Size in Counts per Second	Peak CPS % Uncertainty	Peak Type	Tol. Nuclide
1	74.65	3.6875E-001	34.08		

M = First peak in a multiplet region
 m = Other peak in a multiplet region
 F = Fitted singlet

Errors quoted at 2.000 sigma

 ***** N U C L I D E M D A R E P O R T *****

Detector Name: 6279
 Sample Geometry: 3M90D_CP_2IN
 Sample Title: B106214AFSWC026GD
 Nuclide Library Used: C:\GENIE2K\CAMFILES\Zion Lib-BNL.NLB

	Nuclide Name	Energy (keV)	Yield (%)	Line MDA (pCi/)	Nuclide MDA (pCi/)	Activity (pCi/)	Dec. Level (pCi/)
+	K-40	1460.82*	10.66	3.796E+004	3.80E+004	8.838E+005	0.000E+000
	Co-60	1173.23	99.85	3.526E+004	2.47E+004	5.670E+003	1.583E+004
		1332.49	99.98	2.474E+004		-2.735E+003	1.045E+004
	Nb-94	702.65	99.81	3.655E+004	3.57E+004	-1.334E+004	1.687E+004
		871.09	99.89	3.567E+004		1.710E+003	1.628E+004
	Ag-108m	433.90	90.50	4.035E+004	3.96E+004	3.095E+004	1.898E+004
		614.30	89.80	5.213E+004		6.069E+004	2.461E+004
		722.90	90.80	3.957E+004		-2.297E+004	1.822E+004
	Cs-134	604.72	97.62	4.982E+004	4.54E+004	8.108E+004	2.359E+004
		795.86	85.46	4.537E+004		3.634E+004	2.095E+004
+	Cs-137	661.66*	85.10	2.422E+004	2.42E+004	4.012E+004	1.051E+004
	Eu-152	121.78	28.67	2.060E+005	1.59E+005	1.773E+004	1.007E+005
		344.28	26.60	1.652E+005		5.489E+004	7.905E+004
		1408.01	21.07	1.594E+005		-1.000E+005	7.033E+004
	Eu-154	123.07	40.40	1.440E+005	9.79E+004	-3.349E+004	7.037E+004
		723.30	20.06	1.792E+005		-4.047E+004	8.251E+004
		1274.43	34.80	9.789E+004		-4.367E+004	4.355E+004
	Eu-155	86.55	30.70	2.577E+005	2.58E+005	-3.663E+005	1.265E+005
		105.31	21.10	3.096E+005		2.177E+005	1.516E+005
+	Tl-208	583.19*	85.00	2.266E+004	2.27E+004	1.326E+004	9.834E+003
	Bi-212	727.33	6.67	5.294E+005	5.29E+005	3.172E+004	2.434E+005
+	Pb-212	238.63*	43.60	6.998E+004	7.00E+004	1.973E+004	3.319E+004
+	Bi-214	609.32*	45.49	4.821E+004	2.98E+004	9.844E+004	2.125E+004
		1120.29	14.92	2.803E+005		2.623E+005	1.284E+005
		1764.49*	15.30	2.979E+004		1.431E+005	0.000E+000
+	Pb-214	295.22	18.42	2.019E+005	6.11E+004	-1.805E+005	9.622E+004
		351.93*	35.60	6.107E+004		9.576E+004	2.783E+004
	Ra-226	186.21	3.64	1.300E+006	1.30E+006	8.544E+005	6.306E+005
	Ac-228	338.32	11.27	3.252E+005	1.45E+005	-2.430E+005	1.542E+005
		911.20	25.80	1.446E+005		-1.760E+004	6.614E+004
		968.97	15.80	2.405E+005		1.283E+005	1.099E+005
	Am-241	59.54	35.90	2.783E+005	2.78E+005	-4.442E+004	1.361E+005

+ = Nuclide identified during the nuclide identification

* = Energy line found in the spectrum

> = Calculated MDA is zero due to zero counts in the region, or the region is outside the spectrum, or MDA has not been calculated

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

Filename: C:\GENIE2K\CAMFILES\00001073.CNF

Report Generated On : 5/5/2018 10:05:42 AM ✓

Sample Title : B106214AFQWC007GD
Sample Description : U1 West Valve House Wall QC ✓
Sample Identification : QC
Sample Type : Gamma Direct
Sample Geometry : 3M90D_CP_2IN

Peak Locate Threshold : 3.00
Peak Locate Range (in channels) : 85 - 8192
Peak Area Range (in channels) : 85 - 8192 ✓
Identification Energy Tolerance : 10.000 keV


Sample Size : 2.830E+001 M² ✓

Sample Taken On : 4/30/2018 12:49:00 PM
Acquisition Started : 4/30/2018 12:49:23 PM

Live Time : 600.0 seconds ✓
Real Time : 600.4 seconds

Dead Time : 0.07 % ✓

Energy Calibration Used Done On : 12/28/2017 ✓
Efficiency Calibration Used Done On : 2/1/2018
Efficiency ID : 3M90D_CP_2IN

Data Validated
5/5/18 - 1030


 ***** P E A K A N A L Y S I S R E P O R T *****

Detector Name: 6279
 Sample Title: B106214AFQWC007GD
 Peak Analysis Performed on: 5/5/2018 10:05:42 AM
 Peak Analysis From Channel: 85
 Peak Analysis To Channel: 8192

Peak No.	ROI start	ROI end	Peak centroid	Energy (keV)	FWHM (keV)	Net Peak Area	Net Area Uncert.	Continuum Counts
1	179-	194	186.62	46.59	0.68	1.62E+001	38.12	1.11E+002
2	293-	308	300.21	75.02	0.94	3.18E+001	65.36	3.40E+002
3	946-	964	955.24	238.93	0.27	4.29E+001	28.22	4.41E+001
4	1399-	1416	1407.71	352.13	0.67	4.03E+001	17.97	1.17E+001
5	2036-	2053	2044.75	511.46	0.32	4.08E+001	13.82	2.15E+000
6	2430-	2447	2438.09	609.81	0.67	3.06E+001	15.86	9.40E+000
7	2639-	2656	2647.52	662.17	0.73	2.42E+001	13.68	6.83E+000
8	5838-	5857	5847.25	1461.53	1.08	6.40E+001	18.06	5.00E+000

M = First peak in a multiplet region
 m = Other peak in a multiplet region
 F = Fitted singlet

Errors quoted at 2.000 sigma

 ***** N U C L I D E I D E N T I F I C A T I O N R E P O R T *****

Sample Title: B106214AFQWC007GD
 Nuclide Library Used: C:\GENIE2K\CAMFILES\Zion Lib-BNL.NLB

IDENTIFIED NUCLIDES

Nuclide Name	Id Confidence	Energy (keV)	Yield (%)	Activity (pCi/M^2)	Activity Uncertainty
K-40	0.999	1460.82*	10.66	8.98175E+005	2.65240E+005
Cs-137	1.000	661.66*	85.10	2.84852E+004	1.64781E+004
Pb-212	1.000	238.63*	43.60	5.70460E+004	3.86558E+004
Bi-214	0.442	609.32*	45.49	6.46416E+004	3.43896E+004
		1120.29	14.92		
		1764.49	15.30		
Pb-214	0.437	295.22	18.42	8.06091E+004	3.79268E+004
		351.93*	35.60		

* = Energy line found in the spectrum.
 @ = Energy line not used for Weighted Mean Activity
 Energy Tolerance : 10.000 keV
 Nuclide confidence index threshold = 0.30
 Errors quoted at 2.000 sigma

 ***** I N T E R F E R E N C E C O R R E C T E D R E P O R T *****

Nuclide Name	Nuclide Id Confidence	Wt mean Activity (pCi/M^2)	Wt mean Activity Uncertainty
K-40	0.999	8.981747E+005	2.652398E+005
Cs-137	1.000	2.848523E+004	1.647807E+004
Pb-212	1.000	5.704599E+004	3.865582E+004
Bi-214	0.442	6.464161E+004	3.438957E+004
Pb-214	0.437	8.060908E+004	3.792685E+004

? = 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 2.000 sigma

***** U N I D E N T I F I E D P E A K S *****

Peak Locate Performed on: 5/5/2018 10:05:42 AM
 Peak Locate From Channel: 85
 Peak Locate To Channel: 8192

Peak No.	Energy (keV)	Peak Size in Counts per Second	Peak CPS % Uncertainty	Peak Type	Tol. Nuclide
1	46.59	2.7060E-002	234.75		
2	75.02	5.2969E-002	205.66		
5	511.46	6.8081E-002	33.84		

M = First peak in a multiplet region
 m = Other peak in a multiplet region
 F = Fitted singlet

Errors quoted at 2.000 sigma

 ***** N U C L I D E M D A R E P O R T *****

Detector Name: 6279
 Sample Geometry: 3M90D_CP_2IN
 Sample Title: B106214AFQWC007GD
 Nuclide Library Used: C:\GENIE2K\CAMFILES\Zion Lib-BNL.NLB

	Nuclide Name	Energy (keV)	Yield (%)	Line MDA (pCi/M^2)	Nuclide MDA (pCi/M^2)	Activity (pCi/M^2)	Dec. Level (pCi/M^2)
+	K-40	1460.82*	10.66	2.316E+005	2.32E+005	8.982E+005	9.679E+004
	Co-60	1173.23	99.85	3.273E+004	3.27E+004	3.335E+002	1.456E+004
		1332.49	99.98	3.622E+004		3.409E+004	1.619E+004
	Nb-94	702.65	99.81	3.757E+004	3.09E+004	3.238E+004	1.738E+004
		871.09	99.89	3.092E+004		-3.845E+003	1.390E+004
	Ag-108m	433.90	90.50	4.273E+004	3.35E+004	-1.447E+003	2.017E+004
		614.30	89.80	4.532E+004		5.067E+004	2.120E+004
		722.90	90.80	3.352E+004		-2.322E+004	1.520E+004
	Cs-134	604.72	97.62	3.913E+004	3.91E+004	3.185E+003	1.824E+004
		795.86	85.46	4.086E+004		2.553E+004	1.869E+004
+	Cs-137	661.66*	85.10	2.162E+004	2.16E+004	2.849E+004	9.216E+003
	Eu-152	121.78	28.67	2.062E+005	1.04E+005	-3.003E+003	1.008E+005
		344.28	26.60	1.475E+005		-7.030E+004	7.016E+004
		1408.01	21.07	1.041E+005		-2.923E+004	4.269E+004
	Eu-154	123.07	40.40	1.455E+005	8.74E+004	6.137E+004	7.111E+004
		723.30	20.06	1.496E+005		-1.088E+005	6.773E+004
		1274.43	34.80	8.736E+004		2.412E+004	3.828E+004
	Eu-155	86.55	30.70	2.636E+005	2.64E+005	2.165E+005	1.294E+005
		105.31	21.10	3.014E+005		-4.201E+005	1.475E+005
	Tl-208	583.19	85.00	4.041E+004	4.04E+004	2.287E+003	1.871E+004
	Bi-212	727.33	6.67	4.512E+005	4.51E+005	9.538E+003	2.043E+005
+	Pb-212	238.63*	43.60	5.830E+004	5.83E+004	5.705E+004	2.735E+004
+	Bi-214	609.32*	45.49	4.520E+004	4.52E+004	6.464E+004	1.974E+004
		1120.29	14.92	2.637E+005		3.053E+005	1.201E+005
		1764.49	15.30	2.347E+005		3.423E+004	1.025E+005
+	Pb-214	295.22	18.42	2.127E+005	4.73E+004	3.835E+004	1.016E+005
		351.93*	35.60	4.728E+004		8.061E+004	2.093E+004
	Ra-226	186.21	3.64	1.248E+006	1.25E+006	-8.335E+005	6.049E+005
	Ac-228	338.32	11.27	3.292E+005	1.48E+005	1.536E+005	1.562E+005
		911.20	25.80	1.480E+005		1.429E+005	6.782E+004
		968.97	15.80	2.255E+005		1.132E+004	1.024E+005
	Am-241	59.54	35.90	2.986E+005	2.99E+005	-1.007E+005	1.463E+005

+ = Nuclide identified during the nuclide identification
 * = Energy line found in the spectrum
 > = Calculated MDA is zero due to zero counts in the region, or the region is outside the spectrum, or MDA has not been calculated
 @ = Half-life too short to be able to perform the decay correction

Filename: C:\GENIE2K\CAMFILES\00001144.CNF

Report Generated On : 5/4/2018 3:57:55 PM ✓

Sample Title : B106214AFQWC016GD ✓
Sample Description : U1 WEST VALVE HOUSE ✓
Sample Identification : 016QC ✓
Sample Type : GAMMA DIRECT ✓
Sample Geometry : 3M90D_CP_2IN

Peak Locate Threshold : 3.00
Peak Locate Range (in channels) : 85 - 8192 ✓
Peak Area Range (in channels) : 85 - 8192 ✓
Identification Energy Tolerance : 10.000 keV

Sample Size : 2.830E+001 ✓

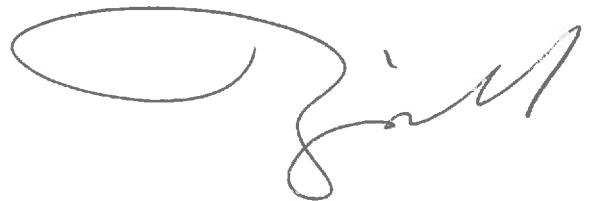
Sample Taken On : 5/4/2018 1:35:00 PM ✓
Acquisition Started : 5/4/2018 1:37:04 PM ✓

Live Time : 600.0 seconds
Real Time : 600.5 seconds

Dead Time : 0.08 % ✓

Energy Calibration Used Done On : 12/28/2017 ✓
Efficiency Calibration Used Done On : 2/1/2018 ✓
Efficiency ID : 3M90D_CP_2IN

*Data Validated
5-5-18 / 1000*



 ***** P E A K A N A L Y S I S R E P O R T *****

Detector Name: 6279

Sample Title: B106214AFQWC016GD

Peak Analysis Performed on: 5/4/2018 3:57:55 PM

Peak Analysis From Channel: 85

Peak Analysis To Channel: 8192

	Peak No.	ROI start	ROI end	Peak centroid	Energy (keV)	FWHM (keV)	Net Peak Area	Net Area Uncert.	Continuum Counts
	1	119-	136	127.55	31.81	0.45	4.24E+001	30.96	6.06E+001
M	2	285-	352	298.60	74.62	2.93	1.71E+002	47.78	4.48E+002
m	3	285-	352	342.61	85.63	2.94	9.26E+001	39.48	3.80E+002
	4	946-	963	954.18	238.67	0.67	7.50E+000	32.23	7.65E+001
	5	1171-	1188	1179.89	295.14	0.30	4.73E+001	22.58	2.47E+001
	6	1398-	1415	1406.62	351.86	0.86	3.74E+001	21.67	2.46E+001
	7	2428-	2445	2436.10	609.32	1.44	4.45E+001	16.18	6.52E+000
	8	2635-	2656	2645.12	661.57	1.17	1.81E+002	29.20	8.47E+000
	9	3634-	3651	3642.08	910.76	0.38	1.85E+001	12.56	6.46E+000
	10	5834-	5853	5843.80	1460.67	0.60	9.02E+001	20.67	4.80E+000

M = First peak in a multiplet region

m = Other peak in a multiplet region

F = Fitted singlet

Errors quoted at 2.000 sigma

 ***** N U C L I D E I D E N T I F I C A T I O N R E P O R T *****

Sample Title: B106214AFQWC016GD
 Nuclide Library Used: C:\GENIE2K\CAMFILES\Zion Lib-BNL.NLB

IDENTIFIED NUCLIDES

Nuclide Name	Id Confidence	Energy (keV)	Yield (%)	Activity (pCi/)	Activity Uncertainty
K-40	1.000	1460.82*	10.66	1.26539E+006	3.10121E+005
Cs-137	1.000	661.66*	85.10	2.12663E+005	4.28396E+004
Eu-155	0.332	86.55*	30.70	1.63553E+005	7.69828E+004
		105.31	21.10		
Pb-212	1.000	238.63*	43.60	9.97225E+003	4.28798E+004
Bi-214	0.442	609.32*	45.49	9.39135E+004	3.59844E+004
		1120.29	14.92		
		1764.49	15.30		
Pb-214	1.000	295.22*	18.42	1.66023E+005	8.35415E+004
		351.93*	35.60		

* = Energy line found in the spectrum.
 @ = Energy line not used for Weighted Mean Activity
 Energy Tolerance : 10.000 keV
 Nuclide confidence index threshold = 0.30
 Errors quoted at 2.000 sigma

 ***** I N T E R F E R E N C E C O R R E C T E D R E P O R T *****

Nuclide Name	Nuclide Id Confidence	Wt mean Activity (pCi/)	Wt mean Activity Uncertainty
K-40	1.000	1.265394E+006	3.101206E+005
Cs-137	1.000	2.126627E+005	✓ 4.283962E+004 ✓
Eu-155	0.332	1.635526E+005	7.698284E+004
Pb-212	1.000	9.972252E+003	4.287982E+004
Bi-214	0.442	9.391345E+004	3.598444E+004
Pb-214	1.000	9.514257E+004	3.946394E+004

? = 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 2.000 sigma

***** U N I D E N T I F I E D P E A K S *****

Peak Locate Performed on: 5/4/2018 3:57:55 PM
 Peak Locate From Channel: 85
 Peak Locate To Channel: 8192

Peak No.	Energy (keV)	Peak Size in Counts per Second	Peak CPS % Uncertainty	Peak Type	Tol. Nuclide
1	31.81	7.0607E-002	73.07		
M 2	74.62	2.8564E-001	27.88		
9	910.76	3.0900E-002	67.73	Sum	

M = First peak in a multiplet region
 m = Other peak in a multiplet region
 F = Fitted singlet

Errors quoted at 2.000 sigma

 ***** N U C L I D E M D A R E P O R T *****

Detector Name: 6279
 Sample Geometry: 3M90D_CP_2IN
 Sample Title: B106214AFQWC016GD
 Nuclide Library Used: C:\GENIE2K\CAMFILES\Zion Lib-BNL.NLB

	Nuclide Name	Energy (keV)	Yield (%)	Line MDA (pCi/)	Nuclide MDA (pCi/)	Activity (pCi/)	Dec. Level (pCi/)
+	K-40	1460.82*	10.66	2.262E+005	2.26E+005	1.265E+006	9.411E+004
	Co-60	1173.23	99.85	3.338E+004	3.19E+004	3.069E+004	1.489E+004
		1332.49	99.98	3.189E+004		1.042E+004	1.402E+004
	Nb-94	702.65	99.81	3.723E+004	3.14E+004	-1.166E+004	1.721E+004
		871.09	99.89	3.143E+004		-3.469E+004	1.416E+004
	Ag-108m	433.90	90.50	4.123E+004	3.96E+004	-4.275E+004	1.942E+004
		614.30	89.80	5.162E+004		6.325E+004	2.436E+004
		722.90	90.80	3.957E+004		3.003E+004	1.822E+004
	Cs-134	604.72	97.62	4.757E+004	4.36E+004	2.720E+004	2.246E+004
		795.86	85.46	4.363E+004		4.547E+004	2.007E+004
+	Cs-137	661.66*	85.10	2.531E+004	2.53E+004	2.127E+005	1.106E+004
	Eu-152	121.78	28.67	2.179E+005	1.60E+005	1.516E+005	1.066E+005
		344.28	26.60	1.604E+005		3.364E+004	7.661E+004
		1408.01	21.07	1.631E+005		6.389E+004	7.215E+004
	Eu-154	123.07	40.40	1.518E+005	9.17E+004	-1.351E+005	7.425E+004
		723.30	20.06	1.755E+005		-3.898E+004	8.070E+004
		1274.43	34.80	9.174E+004		-5.976E+004	4.047E+004
+	Eu-155	86.55*	30.70	1.650E+005	1.65E+005	1.636E+005	8.010E+004
		105.31	21.10	3.194E+005		8.445E+004	1.565E+005
	Tl-208	583.19	85.00	4.568E+004	4.57E+004	2.158E+004	2.135E+004
	Bi-212	727.33	6.67	5.349E+005	5.35E+005	5.519E+004	2.461E+005
+	Pb-212	238.63*	43.60	7.306E+004	7.31E+004	9.972E+003	3.473E+004
+	Bi-214	609.32*	45.49	3.754E+004	3.75E+004	9.391E+004	1.591E+004
		1120.29	14.92	2.771E+005		2.338E+005	1.267E+005
		1764.49	15.30	2.282E+005		1.872E+004	9.920E+004
+	Pb-214	295.22*	18.42	1.128E+005	6.43E+004	1.660E+005	5.165E+004
		351.93*	35.60	6.429E+004		7.478E+004	2.944E+004
	Ra-226	186.21	3.64	1.389E+006	1.39E+006	-1.082E+006	6.751E+005
	Ac-228	338.32	11.27	3.292E+005	1.56E+005	2.612E+005	1.562E+005
		911.20	25.80	1.560E+005		6.431E+004	7.183E+004
		968.97	15.80	2.255E+005		1.622E+005	1.024E+005
	Am-241	59.54	35.90	2.785E+005	2.79E+005	6.023E+004	1.362E+005

+ = Nuclide identified during the nuclide identification
 * = Energy line found in the spectrum
 > = Calculated MDA is zero due to zero counts in the region, or the region is outside the spectrum, or MDA has not been calculated
 @ = Half-life too short to be able to perform the decay correction

ATTACHMENT 6

EBERLINE REPORTS

(Note - Samples B3-06213A-FIWC-011-CV, B3-06213A-FIFC-015-CV, B3-06214A-FIFC-001-CV and B3-06214A-FIWC-009-CV were taken as part of the initial survey design. The results for these samples are included in the report from Eberline however, they were not used to demonstrate compliance and are included for information only)



EBERLINE ANALYTICAL CORPORATION
601 SCARBORO ROAD
OAK RIDGE, TENNESSEE 37830
PHONE (865) 481-0683
FAX (865) 483-4621

EBS-OR-43799

June 5, 2018

Patricia Giza
Zion Solutions, LLC
101 Shiloh Blvd
Zion, IL 60099

CASE NARRATIVE
Work Order # 18-05068-OR

SAMPLE RECEIPT

This work order contains fourteen solid samples received 05/15/2018. 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>
B3-06213AFIWC-011CV	18-05068-04	B3-06216-AFSFC-002CV	18-05068-11
B3-06213-AFIFC-015CV	18-05068-05	B1-06214-AFSWC-005CV	18-05068-12
B3-06214-AFIFC-001CV	18-05068-06	B1-06214-AFSFC-004CV	18-05068-13
B3-06214-AFIWC-009CV	18-05068-07	B1-06214-AFSFC-001CV	18-05068-14
B3-06215-AFSWC-013CV	18-05068-08	B1-06213-AFSWC-009CV	18-05068-15
B3-06215-AFSFC-003CV	18-05068-09	B1-06213-AFSFC-004CV	18-05068-16
B3-06216-AFSWC-006CV	18-05068-10	B1-06213-AFSFC-002CV	18-05068-17

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 aliquoting as appropriate and leaching in acids followed by adding Strontium recovery carriers to each sample. Chemical separations were conducted using selective extractions. Strontium precipitate was mounted on tared filter media. Chemical recovery was determined by Strontium carrier mass determinations. Samples were counted by gas flow proportional counting and corrected for Yttrium-90 ingrowth.

Samples demonstrated acceptable results for all Total Strontium analyses. Strontium-90 results are reported from Total Strontium due to secular equilibrium. 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 diluted and 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 then 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 placed into an appropriately sized beaker. Stable elemental Nickel carrier was added to each sample prior to digestion. Samples were digested in concentrated Nitric acid. After digestion, samples 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 an acceptable relative percent difference and normalized difference. Results for the Nickel-63 laboratory control sample demonstrated an acceptable percent recovery.

GAMMA SPECTROSCOPY

Samples for Gamma Spectroscopy analysis was prepared by transferring a known mass/aliquot of each homogenized sample to a standard geometry container. Samples were counted on a High Purity Germanium (HPGe) gamma ray detector.

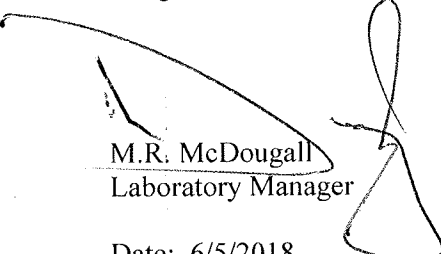
ANALYTICAL RESULTS CONTINUED

GAMMA SPECTROSCOPY CONTINUED

Samples demonstrated acceptable results for all gamma-emitting radionuclides as reported. Some Cobalt-60 and Cesium-137 results demonstrated slightly high method detection limits. Some samples demonstrated results that are greater than the method detection limit. These results are reported from the Canberra Gamma Apex "Nuclide MDA Report" and are not positive. These results are qualified as non-detect (U). The method blank demonstrated acceptable results for all radionuclides as reported. Results for the Actinium-228 replicate demonstrated a high relative percent difference; however, normalized difference is within acceptable limits for the analytical technique. Results for the Cesium-137 and Potassium-40 replicate demonstrated an acceptable relative percent difference and normalized difference. 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: 6/5/2018

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 Zion Solutions, LLC 101 Shiloh Blvd Zion, IL 60099					SDG: 18-05068 Purchase Order: 677118 Analysis Category: ENVIRONMENTAL 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
18-05068-01	LCS	KNOWN	05/15/18 00:00	5/15/2018	5/18/2018	18-05068	Tritium	LANL ER-210 Modified	2.24E+02	8.08E+00				pCi/g			
18-05068-01	LCS	SPIKE	05/15/18 00:00	5/15/2018	5/18/2018	18-05068	Tritium	LANL ER-210 Modified	2.02E+02	5.40E+00	1.25E+01	3.70E+00		pCi/g			
18-05068-02	MBL	BLANK	05/15/18 00:00	5/15/2018	5/18/2018	18-05068	Tritium	LANL ER-210 Modified	1.51E+00	2.18E+00	2.19E+00	3.69E+00	U	pCi/g			
18-05068-03	DUP	B3-06213AFIWC-011CV	05/02/18 09:00	5/15/2018	5/18/2018	18-05068	Tritium	LANL ER-210 Modified	3.25E+00	2.25E+00	2.26E+00	3.72E+00	U	pCi/g			
18-05068-04	DO	B3-06213AFIWC-011CV	05/02/18 09:00	5/15/2018	5/18/2018	18-05068	Tritium	LANL ER-210 Modified	1.15E+00	2.21E+00	2.21E+00	3.75E+00	U	pCi/g			
18-05068-05	TRG	B3-06213-AFIFC-015CV	05/02/18 08:45	5/15/2018	5/18/2018	18-05068	Tritium	LANL ER-210 Modified	1.88E-01	2.14E+00	2.14E+00	3.67E+00	U	pCi/g			
18-05068-06	TRG	B3-06214-AFIFC-001CV	05/03/18 13:30	5/15/2018	5/18/2018	18-05068	Tritium	LANL ER-210 Modified	3.61E-01	2.05E+00	2.05E+00	3.52E+00	U	pCi/g			
18-05068-07	TRG	B3-06214-AFIWC-009CV	05/03/18 15:30	5/15/2018	5/18/2018	18-05068	Tritium	LANL ER-210 Modified	5.68E-01	2.16E+00	2.16E+00	3.69E+00	U	pCi/g			
18-05068-08	TRG	B3-06215-AFSWC-013CV	04/26/18 13:00	5/15/2018	5/18/2018	18-05068	Tritium	LANL ER-210 Modified	-9.63E-01	2.15E+00	2.15E+00	3.75E+00	U	pCi/g			
18-05068-09	TRG	B3-06215-AFSFC-003CV	04/26/18 13:40	5/15/2018	5/18/2018	18-05068	Tritium	LANL ER-210 Modified	5.37E-01	2.04E+00	2.04E+00	3.49E+00	U	pCi/g			
18-05068-10	TRG	B3-06216-AFSWC-006CV	04/30/18 08:35	5/15/2018	5/18/2018	18-05068	Tritium	LANL ER-210 Modified	5.47E-01	2.08E+00	2.08E+00	3.55E+00	U	pCi/g			
18-05068-11	TRG	B3-06216-AFSFC-002CV	04/26/18 15:20	5/15/2018	5/19/2018	18-05068	Tritium	LANL ER-210 Modified	2.65E+00	2.21E+00	2.22E+00	3.69E+00	U	pCi/g			
18-05068-12	TRG	B1-06214-AFSWC-005CV	05/05/18 14:35	5/15/2018	5/19/2018	18-05068	Tritium	LANL ER-210 Modified	2.15E+00	2.08E+00	2.09E+00	3.48E+00	U	pCi/g			
18-05068-13	TRG	B1-06214-AFSFC-004CV	05/05/18 14:55	5/15/2018	5/19/2018	18-05068	Tritium	LANL ER-210 Modified	7.14E-01	2.04E+00	2.04E+00	3.48E+00	U	pCi/g			
18-05068-14	TRG	B1-06214-AFSFC-001CV	05/05/18 15:15	5/15/2018	5/19/2018	18-05068	Tritium	LANL ER-210 Modified	2.71E+02	5.98E+00	1.63E+01	3.54E+00		pCi/g			
18-05068-15	TRG	B1-06213-AFSWC-009CV	05/05/18 09:05	5/15/2018	5/19/2018	18-05068	Tritium	LANL ER-210 Modified	0.00E+00	2.05E+00	2.05E+00	3.54E+00	U	pCi/g			
18-05068-16	TRG	B1-06213-AFSFC-004CV	05/05/18 10:25	5/15/2018	5/19/2018	18-05068	Tritium	LANL ER-210 Modified	-7.61E-01	2.13E+00	2.13E+00	3.71E+00	U	pCi/g			
18-05068-17	TRG	B1-06213-AFSFC-002CV	05/05/18 13:00	5/15/2018	5/19/2018	18-05068	Tritium	LANL ER-210 Modified	-5.66E-01	2.12E+00	2.12E+00	3.67E+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



EBERLINE ANALYTICAL CORPORATION

601 SCARBORO ROAD OAK RIDGE, TN 37830 865/481-0683 FAX 865/483-4621

Eberline Analytical Final Report of Analysis			Report To:					Work Order Details:						
			Patricia Giza Zion Solutions, LLC 101 Shiloh Blvd Zion, IL 60099					SDG:	18-05068					
								Purchase Order:	677118					
								Analysis Category:	ENVIRONMENTAL					
					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
18-05068-01	LCS	KNOWN	05/15/18 00:00	5/15/2018	5/17/2018	18-05068	Nickel-63	ASTM 3500-Ni Modified	1.53E+03	4.58E+01				pCi/g
18-05068-01	LCS	SPIKE	05/15/18 00:00	5/15/2018	5/17/2018	18-05068	Nickel-63	ASTM 3500-Ni Modified	1.49E+03	9.03E+00	8.81E+01	2.05E+00		pCi/g
18-05068-02	MBL	BLANK	05/15/18 00:00	5/15/2018	5/17/2018	18-05068	Nickel-63	ASTM 3500-Ni Modified	1.36E+00	1.24E+00	1.24E+00	2.07E+00	U	pCi/g
18-05068-03	DUP	B3-06213AFIWC-011CV	05/02/18 09:00	5/15/2018	5/17/2018	18-05068	Nickel-63	ASTM 3500-Ni Modified	1.04E+02	2.43E+00	6.58E+00	1.76E+00		pCi/g
18-05068-04	DO	B3-06213AFIWC-011CV	05/02/18 09:00	5/15/2018	5/17/2018	18-05068	Nickel-63	ASTM 3500-Ni Modified	1.02E+02	2.41E+00	6.45E+00	1.77E+00		pCi/g
18-05068-05	TRG	B3-06213-AFIFC-015CV	05/02/18 08:45	5/15/2018	5/17/2018	18-05068	Nickel-63	ASTM 3500-Ni Modified	1.92E+01	1.38E+00	1.79E+00	1.74E+00		pCi/g
18-05068-06	TRG	B3-06214-AFIFC-001CV	05/03/18 13:30	5/15/2018	5/17/2018	18-05068	Nickel-63	ASTM 3500-Ni Modified	5.86E+01	1.95E+00	3.96E+00	1.77E+00		pCi/g
18-05068-07	TRG	B3-06214-AFIWC-009CV	05/03/18 15:30	5/15/2018	5/17/2018	18-05068	Nickel-63	ASTM 3500-Ni Modified	3.51E+01	1.45E+00	2.53E+00	1.48E+00		pCi/g
18-05068-08	TRG	B3-06215-AFSWC-013CV	04/26/18 13:00	5/15/2018	5/17/2018	18-05068	Nickel-63	ASTM 3500-Ni Modified	1.03E+00	1.00E+00	1.00E+00	1.68E+00	U	pCi/g
18-05068-09	TRG	B3-06215-AFSFC-003CV	04/26/18 13:40	5/15/2018	5/18/2018	18-05068	Nickel-63	ASTM 3500-Ni Modified	1.35E+00	1.10E+00	1.10E+00	1.83E+00	U	pCi/g
18-05068-10	TRG	B3-06216-AFSWC-006CV	04/30/18 08:35	5/15/2018	5/18/2018	18-05068	Nickel-63	ASTM 3500-Ni Modified	1.06E+00	1.11E+00	1.11E+00	1.85E+00	U	pCi/g
18-05068-11	TRG	B3-06216-AFSFC-002CV	04/26/18 15:20	5/15/2018	5/18/2018	18-05068	Nickel-63	ASTM 3500-Ni Modified	4.16E-01	9.95E-01	9.95E-01	1.69E+00	U	pCi/g
18-05068-12	TRG	B1-06214-AFSWC-005CV	05/05/18 14:35	5/15/2018	5/18/2018	18-05068	Nickel-63	ASTM 3500-Ni Modified	2.09E-01	9.98E-01	9.98E-01	1.70E+00	U	pCi/g
18-05068-13	TRG	B1-06214-AFSFC-004CV	05/05/18 14:55	5/15/2018	5/18/2018	18-05068	Nickel-63	ASTM 3500-Ni Modified	2.07E+00	1.10E+00	1.10E+00	1.80E+00		pCi/g
18-05068-14	TRG	B1-06214-AFSFC-001CV	05/05/18 15:15	5/15/2018	5/18/2018	18-05068	Nickel-63	ASTM 3500-Ni Modified	6.77E-01	1.08E+00	1.09E+00	1.83E+00	U	pCi/g
18-05068-15	TRG	B1-06213-AFSWC-009CV	05/05/18 09:05	5/15/2018	5/18/2018	18-05068	Nickel-63	ASTM 3500-Ni Modified	5.96E-01	1.07E+00	1.07E+00	1.82E+00	U	pCi/g
18-05068-16	TRG	B1-06213-AFSFC-004CV	05/05/18 10:25	5/15/2018	5/18/2018	18-05068	Nickel-63	ASTM 3500-Ni Modified	1.00E+00	9.70E-01	9.72E-01	1.62E+00	U	pCi/g
18-05068-17	TRG	B1-06213-AFSFC-002CV	05/05/18 13:00	5/15/2018	5/18/2018	18-05068	Nickel-63	ASTM 3500-Ni Modified	3.18E+00	1.12E+00	1.14E+00	1.80E+00		pCi/g

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EBERLINE ANALYTICAL CORPORATION

601 SCARBORO ROAD OAK RIDGE, TN 37830 865/481-0683 FAX 865/483-4621

Eberline Analytical Final Report of Analysis			Report To:					Work Order Details:									
			Patricia Giza Zion Solutions, LLC 101 Shiloh Blvd Zion, IL 60099					SDG: 18-05068 Purchase Order: 677118 Analysis Category: ENVIRONMENTAL 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
18-05068-01	LCS	KNOWN	05/15/18 00:00	5/15/2018	5/18/2018	18-05068	Strontium-90	EiChroM SRW01 Modified	4.98E+01	2.79E-01					pCi/g		
18-05068-01	LCS	SPIKE	05/15/18 00:00	5/15/2018	5/18/2018	18-05068	Strontium-90	EiChroM SRW01 Modified	4.85E+01	2.73E+00	1.71E+01	1.17E+00			pCi/g		
18-05068-02	MBL	BLANK	05/15/18 00:00	5/15/2018	5/18/2018	18-05068	Strontium-90	EiChroM SRW01 Modified	4.81E-01	2.86E-01	3.31E-01	5.53E-01	U		pCi/g		
18-05068-03	DUP	B3-06213AFIWC-011CV	05/02/18 09:00	5/15/2018	5/18/2018	18-05068	Strontium-90	EiChroM SRW01 Modified	6.25E-01	2.64E-01	3.42E-01	4.98E-01			pCi/g		
18-05068-04	DO	B3-06213AFIWC-011CV	05/02/18 09:00	5/15/2018	5/18/2018	18-05068	Strontium-90	EiChroM SRW01 Modified	4.07E-01	2.46E-01	2.84E-01	4.80E-01	U		pCi/g		
18-05068-05	TRG	B3-06213-AFIFC-015CV	05/02/18 08:45	5/15/2018	5/18/2018	18-05068	Strontium-90	EiChroM SRW01 Modified	1.60E-01	2.35E-01	2.42E-01	4.86E-01	U		pCi/g		
18-05068-06	TRG	B3-06214-AFIFC-001CV	05/03/18 13:30	5/15/2018	5/18/2018	18-05068	Strontium-90	EiChroM SRW01 Modified	8.96E-01	2.63E-01	4.08E-01	4.72E-01			pCi/g		
18-05068-07	TRG	B3-06214-AFIWC-009CV	05/03/18 15:30	5/15/2018	5/18/2018	18-05068	Strontium-90	EiChroM SRW01 Modified	6.26E-01	2.34E-01	3.19E-01	4.35E-01			pCi/g		
18-05068-08	TRG	B3-06215-AFSWC-013CV	04/26/18 13:00	5/15/2018	5/18/2018	18-05068	Strontium-90	EiChroM SRW01 Modified	3.47E-01	2.20E-01	2.51E-01	4.32E-01	U		pCi/g		
18-05068-09	TRG	B3-06215-AFSFC-003CV	04/26/18 13:40	5/15/2018	5/18/2018	18-05068	Strontium-90	EiChroM SRW01 Modified	2.43E-01	2.64E-01	2.77E-01	5.38E-01	U		pCi/g		
18-05068-10	TRG	B3-06216-AFSWC-006CV	04/30/18 08:35	5/15/2018	5/18/2018	18-05068	Strontium-90	EiChroM SRW01 Modified	4.58E-01	2.51E-01	2.97E-01	4.86E-01	U		pCi/g		
18-05068-11	TRG	B3-06216-AFSFC-002CV	04/26/18 15:20	5/15/2018	5/18/2018	18-05068	Strontium-90	EiChroM SRW01 Modified	3.35E-01	2.59E-01	2.84E-01	5.19E-01	U		pCi/g		
18-05068-12	TRG	B1-06214-AFSWC-005CV	05/05/18 14:35	5/15/2018	5/18/2018	18-05068	Strontium-90	EiChroM SRW01 Modified	2.61E-01	2.33E-01	2.50E-01	4.69E-01	U		pCi/g		
18-05068-13	TRG	B1-06214-AFSFC-004CV	05/05/18 14:55	5/15/2018	5/18/2018	18-05068	Strontium-90	EiChroM SRW01 Modified	4.17E-01	2.46E-01	2.86E-01	4.81E-01	U		pCi/g		
18-05068-14	TRG	B1-06214-AFSFC-001CV	05/05/18 15:15	5/15/2018	5/18/2018	18-05068	Strontium-90	EiChroM SRW01 Modified	8.14E-01	2.35E-01	3.68E-01	4.06E-01			pCi/g		
18-05068-15	TRG	B1-06213-AFSWC-009CV	05/05/18 09:05	5/15/2018	5/18/2018	18-05068	Strontium-90	EiChroM SRW01 Modified	3.61E-01	2.51E-01	2.81E-01	4.98E-01	U		pCi/g		
18-05068-16	TRG	B1-06213-AFSFC-004CV	05/05/18 10:25	5/15/2018	5/18/2018	18-05068	Strontium-90	EiChroM SRW01 Modified	3.63E-01	2.20E-01	2.53E-01	4.29E-01	U		pCi/g		
18-05068-17	TRG	B1-06213-AFSFC-002CV	05/05/18 13:00	5/15/2018	5/18/2018	18-05068	Strontium-90	EiChroM SRW01 Modified	7.28E-02	2.27E-01	2.29E-01	4.77E-01	U		pCi/g		

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EBERLINE ANALYTICAL CORPORATION

601 SCARBORO ROAD OAK RIDGE, TN 37830 865/481-0683 FAX 865/483-4621

<h1 style="margin: 0;">Eberline Analytical</h1> <h2 style="margin: 0;">Final Report of Analysis</h2>			Report To:						Work Order Details:								
			Patricia Giza Zion Solutions, LLC 101 Shiloh Blvd Zion, IL 60099						SDG:	18-05068							
									Purchase Order:	677118							
									Analysis Category:	ENVIRONMENTAL							
						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			
18-05068-01	LCS	KNOWN	05/15/18 00:00	5/15/2018	5/16/2018	18-05068	Cobalt-60	EPA 901.1 Modified	2.71E+02	1.06E+01				pCi/g			
18-05068-01	LCS	KNOWN	05/15/18 00:00	5/15/2018	5/16/2018	18-05068	Cesium-137	EPA 901.1 Modified	1.69E+02	6.75E+00				pCi/g			
18-05068-01	LCS	SPIKE	05/15/18 00:00	5/15/2018	5/16/2018	18-05068	Cobalt-60	EPA 901.1 Modified	2.72E+02	1.55E+01	2.09E+01	2.17E+00		pCi/g			
18-05068-01	LCS	SPIKE	05/15/18 00:00	5/15/2018	5/16/2018	18-05068	Cesium-137	EPA 901.1 Modified	1.91E+02	2.29E+01	2.49E+01	2.52E+00		pCi/g			
18-05068-02	MBL	BLANK	05/15/18 00:00	5/15/2018	5/15/2018	18-05068	Actinium-228	EPA 901.1 Modified	8.29E-02	1.12E-01	1.12E-01	1.99E-01	U	pCi/g			
18-05068-02	MBL	BLANK	05/15/18 00:00	5/15/2018	5/15/2018	18-05068	Silver-108m	EPA 901.1 Modified	-2.22E-03	3.36E-02	3.36E-02	4.25E-02	U	pCi/g			
18-05068-02	MBL	BLANK	05/15/18 00:00	5/15/2018	5/15/2018	18-05068	Americium-241	EPA 901.1 Modified	1.76E-02	1.71E-02	1.71E-02	6.76E-02	U	pCi/g			
18-05068-02	MBL	BLANK	05/15/18 00:00	5/15/2018	5/15/2018	18-05068	Barium-133	EPA 901.1 Modified	3.89E-02	4.48E-02	4.48E-02	5.66E-02	U	pCi/g			
18-05068-02	MBL	BLANK	05/15/18 00:00	5/15/2018	5/15/2018	18-05068	Bismuth-214	EPA 901.1 Modified	9.97E-02	7.68E-02	7.69E-02	1.24E-01	U	pCi/g			
18-05068-02	MBL	BLANK	05/15/18 00:00	5/15/2018	5/15/2018	18-05068	Cobalt-60	EPA 901.1 Modified	-4.88E-02	3.78E-02	3.79E-02	4.86E-02	U	pCi/g			
18-05068-02	MBL	BLANK	05/15/18 00:00	5/15/2018	5/15/2018	18-05068	Cesium-134	EPA 901.1 Modified	-1.00E-01	5.38E-02	5.40E-02	4.98E-02	U	pCi/g			
18-05068-02	MBL	BLANK	05/15/18 00:00	5/15/2018	5/15/2018	18-05068	Cesium-137	EPA 901.1 Modified	1.37E-02	3.45E-02	3.45E-02	5.27E-02	U	pCi/g			
18-05068-02	MBL	BLANK	05/15/18 00:00	5/15/2018	5/15/2018	18-05068	Europium-152	EPA 901.1 Modified	-9.88E-03	1.03E-01	1.03E-01	8.54E-02	U	pCi/g			
18-05068-02	MBL	BLANK	05/15/18 00:00	5/15/2018	5/15/2018	18-05068	Europium-154	EPA 901.1 Modified	-1.11E-02	8.58E-02	8.58E-02	4.35E-02	U	pCi/g			
18-05068-02	MBL	BLANK	05/15/18 00:00	5/15/2018	5/15/2018	18-05068	Europium-155	EPA 901.1 Modified	-3.47E-02	4.45E-02	4.45E-02	6.14E-02	U	pCi/g			
18-05068-02	MBL	BLANK	05/15/18 00:00	5/15/2018	5/15/2018	18-05068	Holmium-166m	EPA 901.1 Modified	-2.19E-02	6.12E-02	6.13E-02	3.34E-02	U	pCi/g			
18-05068-02	MBL	BLANK	05/15/18 00:00	5/15/2018	5/15/2018	18-05068	Iodine-129	EPA 901.1 Modified	2.42E-03	1.57E-02	1.57E-02	2.34E-02	U	pCi/g			
18-05068-02	MBL	BLANK	05/15/18 00:00	5/15/2018	5/15/2018	18-05068	Potassium-40	EPA 901.1 Modified	5.07E-01	5.95E-01	5.95E-01	9.92E-01	U	pCi/g			
18-05068-02	MBL	BLANK	05/15/18 00:00	5/15/2018	5/15/2018	18-05068	Manganese-54	EPA 901.1 Modified	-5.28E-03	3.07E-02	3.07E-02	4.72E-02	U	pCi/g			
18-05068-02	MBL	BLANK	05/15/18 00:00	5/15/2018	5/15/2018	18-05068	Niobium-94	EPA 901.1 Modified	7.19E-03	3.07E-02	3.07E-02	4.87E-02	U	pCi/g			
18-05068-02	MBL	BLANK	05/15/18 00:00	5/15/2018	5/15/2018	18-05068	Lead-210	EPA 901.1 Modified	3.46E-01	2.73E-01	2.74E-01	4.34E-01	U	pCi/g			
18-05068-02	MBL	BLANK	05/15/18 00:00	5/15/2018	5/15/2018	18-05068	Lead-212	EPA 901.1 Modified	5.68E-02	4.16E-02	4.17E-02	6.65E-02	U	pCi/g			
18-05068-02	MBL	BLANK	05/15/18 00:00	5/15/2018	5/15/2018	18-05068	Lead-214	EPA 901.1 Modified	4.12E-02	6.21E-02	6.21E-02	9.75E-02	U	pCi/g			
18-05068-02	MBL	BLANK	05/15/18 00:00	5/15/2018	5/15/2018	18-05068	Promethium-145	EPA 901.1 Modified	7.39E-03	2.75E-02	2.75E-02	4.14E-02	U	pCi/g			
18-05068-02	MBL	BLANK	05/15/18 00:00	5/15/2018	5/15/2018	18-05068	Radium-226	EPA 901.1 Modified	9.97E-02	7.68E-02	7.69E-02	1.24E-01	U	pCi/g			
18-05068-02	MBL	BLANK	05/15/18 00:00	5/15/2018	5/15/2018	18-05068	Antimony-125	EPA 901.1 Modified	-3.50E-02	9.31E-02	9.32E-02	1.23E-01	U	pCi/g			
18-05068-02	MBL	BLANK	05/15/18 00:00	5/15/2018	5/15/2018	18-05068	Thorium-234	EPA 901.1 Modified	6.76E-01	3.39E-01	3.41E-01	5.49E-01	U	pCi/g			
18-05068-02	MBL	BLANK	05/15/18 00:00	5/15/2018	5/15/2018	18-05068	Thallium-208	EPA 901.1 Modified	1.56E-01	1.12E-01	1.12E-01	1.80E-01	U	pCi/g			
18-05068-02	MBL	BLANK	05/15/18 00:00	5/15/2018	5/15/2018	18-05068	Uranium-235	EPA 901.1 Modified	-4.57E-03	3.33E-01	3.33E-01	1.82E-01	U	pCi/g			

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			Patricia Giza Zion Solutions, LLC 101 Shiloh Blvd Zion, IL 60099						SDG: 18-05068						
									Purchase Order: 677118						
									Analysis Category: ENVIRONMENTAL						
						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	
18-05068-03	DUP	B3-06213AFIWC-011CV	05/02/18 09:00	5/15/2018	5/15/2018	18-05068	Actinium-228	EPA 901.1 Modified	2.51E-01	6.12E-01	6.12E-01	9.41E-01	U	pCi/g	
18-05068-03	DUP	B3-06213AFIWC-011CV	05/02/18 09:00	5/15/2018	5/15/2018	18-05068	Silver-108m	EPA 901.1 Modified	4.59E-02	2.26E-01	2.26E-01	3.35E-01	U	pCi/g	
18-05068-03	DUP	B3-06213AFIWC-011CV	05/02/18 09:00	5/15/2018	5/15/2018	18-05068	Americium-241	EPA 901.1 Modified	-6.46E-01	1.48E+00	1.48E+00	1.85E+00	U	pCi/g	
18-05068-03	DUP	B3-06213AFIWC-011CV	05/02/18 09:00	5/15/2018	5/15/2018	18-05068	Barium-133	EPA 901.1 Modified	1.03E+00	1.38E+00	1.38E+00	1.83E+00	U	pCi/g	
18-05068-03	DUP	B3-06213AFIWC-011CV	05/02/18 09:00	5/15/2018	5/15/2018	18-05068	Bismuth-214	EPA 901.1 Modified	1.14E+00	4.88E-01	4.91E-01	1.42E+00	U	pCi/g	
18-05068-03	DUP	B3-06213AFIWC-011CV	05/02/18 09:00	5/15/2018	5/15/2018	18-05068	Cobalt-60	EPA 901.1 Modified	-5.14E-02	1.27E-01	1.27E-01	1.31E-01	U	pCi/g	
18-05068-03	DUP	B3-06213AFIWC-011CV	05/02/18 09:00	5/15/2018	5/15/2018	18-05068	Cesium-134	EPA 901.1 Modified	-1.71E-01	5.51E-01	5.51E-01	3.32E-01	U	pCi/g	
18-05068-03	DUP	B3-06213AFIWC-011CV	05/02/18 09:00	5/15/2018	5/15/2018	18-05068	Cesium-137	EPA 901.1 Modified	2.83E+03	2.95E+02	3.29E+02	3.74E+00	U	pCi/g	
18-05068-03	DUP	B3-06213AFIWC-011CV	05/02/18 09:00	5/15/2018	5/15/2018	18-05068	Europium-152	EPA 901.1 Modified	4.12E+00	5.44E+00	5.44E+00	8.86E-01	U	pCi/g	
18-05068-03	DUP	B3-06213AFIWC-011CV	05/02/18 09:00	5/15/2018	5/15/2018	18-05068	Europium-154	EPA 901.1 Modified	-7.33E-02	3.16E-01	3.16E-01	4.73E-01	U	pCi/g	
18-05068-03	DUP	B3-06213AFIWC-011CV	05/02/18 09:00	5/15/2018	5/15/2018	18-05068	Europium-155	EPA 901.1 Modified	1.96E+00	1.42E+00	1.43E+00	2.37E+00	U	pCi/g	
18-05068-03	DUP	B3-06213AFIWC-011CV	05/02/18 09:00	5/15/2018	5/15/2018	18-05068	Holmium-166m	EPA 901.1 Modified	-4.51E-02	4.01E-01	4.01E-01	5.88E-01	U	pCi/g	
18-05068-03	DUP	B3-06213AFIWC-011CV	05/02/18 09:00	5/15/2018	5/15/2018	18-05068	Iodine-129	EPA 901.1 Modified	-1.93E+01	3.19E+00	3.34E+00	3.27E+00	U	pCi/g	
18-05068-03	DUP	B3-06213AFIWC-011CV	05/02/18 09:00	5/15/2018	5/15/2018	18-05068	Potassium-40	EPA 901.1 Modified	7.97E+00	1.68E+00	1.73E+00	3.36E+00	U	pCi/g	
18-05068-03	DUP	B3-06213AFIWC-011CV	05/02/18 09:00	5/15/2018	5/15/2018	18-05068	Manganese-54	EPA 901.1 Modified	-6.07E-02	1.85E-01	1.85E-01	2.67E-01	U	pCi/g	
18-05068-03	DUP	B3-06213AFIWC-011CV	05/02/18 09:00	5/15/2018	5/15/2018	18-05068	Niobium-94	EPA 901.1 Modified	9.92E-02	1.70E-01	1.70E-01	2.62E-01	U	pCi/g	
18-05068-03	DUP	B3-06213AFIWC-011CV	05/02/18 09:00	5/15/2018	5/15/2018	18-05068	Lead-210	EPA 901.1 Modified	-1.67E+01	1.42E+01	1.42E+01	1.76E+01	U	pCi/g	
18-05068-03	DUP	B3-06213AFIWC-011CV	05/02/18 09:00	5/15/2018	5/15/2018	18-05068	Lead-212	EPA 901.1 Modified	-7.03E-02	1.36E+00	1.36E+00	2.14E+00	U	pCi/g	
18-05068-03	DUP	B3-06213AFIWC-011CV	05/02/18 09:00	5/15/2018	5/15/2018	18-05068	Lead-214	EPA 901.1 Modified	1.82E+00	2.16E+00	2.17E+00	3.60E+00	U	pCi/g	
18-05068-03	DUP	B3-06213AFIWC-011CV	05/02/18 09:00	5/15/2018	5/15/2018	18-05068	Promethium-145	EPA 901.1 Modified	1.08E+02	9.57E+00	1.11E+01	3.55E+00	U	pCi/g	
18-05068-03	DUP	B3-06213AFIWC-011CV	05/02/18 09:00	5/15/2018	5/15/2018	18-05068	Radium-226	EPA 901.1 Modified	1.14E+00	4.88E-01	4.91E-01	1.42E+00	U	pCi/g	
18-05068-03	DUP	B3-06213AFIWC-011CV	05/02/18 09:00	5/15/2018	5/15/2018	18-05068	Antimony-125	EPA 901.1 Modified	2.88E+00	4.98E+00	4.98E+00	5.63E+00	U	pCi/g	
18-05068-03	DUP	B3-06213AFIWC-011CV	05/02/18 09:00	5/15/2018	5/15/2018	18-05068	Thorium-234	EPA 901.1 Modified	3.47E+00	1.36E+01	1.36E+01	1.72E+01	U	pCi/g	
18-05068-03	DUP	B3-06213AFIWC-011CV	05/02/18 09:00	5/15/2018	5/15/2018	18-05068	Thallium-208	EPA 901.1 Modified	1.03E+00	2.41E+00	2.41E+00	9.25E-01	U	pCi/g	
18-05068-03	DUP	B3-06213AFIWC-011CV	05/02/18 09:00	5/15/2018	5/15/2018	18-05068	Uranium-235	EPA 901.1 Modified	7.33E+00	1.25E+01	1.25E+01	6.22E+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 Zion Solutions, LLC 101 Shiloh Blvd Zion, IL 60099						SDG: 18-05068 Purchase Order: 677118 Analysis Category: ENVIRONMENTAL 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
18-05068-04	DO	B3-06213AFIWC-011CV	05/02/18 09:00	5/15/2018	5/15/2018	18-05068	Actinium-228	EPA 901.1 Modified	5.28E-01	3.79E-01	3.80E-01	7.02E-01	U	pCi/g			
18-05068-04	DO	B3-06213AFIWC-011CV	05/02/18 09:00	5/15/2018	5/15/2018	18-05068	Silver-108m	EPA 901.1 Modified	-6.39E-02	2.30E-01	2.30E-01	3.30E-01	U	pCi/g			
18-05068-04	DO	B3-06213AFIWC-011CV	05/02/18 09:00	5/15/2018	5/15/2018	18-05068	Americium-241	EPA 901.1 Modified	-1.28E+00	1.48E+00	1.49E+00	1.84E+00	U	pCi/g			
18-05068-04	DO	B3-06213AFIWC-011CV	05/02/18 09:00	5/15/2018	5/15/2018	18-05068	Barium-133	EPA 901.1 Modified	8.41E-01	1.81E+00	1.81E+00	1.83E+00	U	pCi/g			
18-05068-04	DO	B3-06213AFIWC-011CV	05/02/18 09:00	5/15/2018	5/15/2018	18-05068	Bismuth-214	EPA 901.1 Modified	-2.69E-01	1.47E+00	1.47E+00	1.34E+00	U	pCi/g			
18-05068-04	DO	B3-06213AFIWC-011CV	05/02/18 09:00	5/15/2018	5/15/2018	18-05068	Cobalt-60	EPA 901.1 Modified	-1.76E-02	1.22E-01	1.22E-01	1.10E-01	U	pCi/g			
18-05068-04	DO	B3-06213AFIWC-011CV	05/02/18 09:00	5/15/2018	5/15/2018	18-05068	Cesium-134	EPA 901.1 Modified	3.12E-01	7.14E-01	7.14E-01	3.28E-01	U	pCi/g			
18-05068-04	DO	B3-06213AFIWC-011CV	05/02/18 09:00	5/15/2018	5/15/2018	18-05068	Cesium-137	EPA 901.1 Modified	2.82E+03	2.95E+02	3.28E+02	2.86E+00		pCi/g			
18-05068-04	DO	B3-06213AFIWC-011CV	05/02/18 09:00	5/15/2018	5/15/2018	18-05068	Europium-152	EPA 901.1 Modified	3.15E+00	5.43E+00	5.44E+00	8.66E-01	U	pCi/g			
18-05068-04	DO	B3-06213AFIWC-011CV	05/02/18 09:00	5/15/2018	5/15/2018	18-05068	Europium-154	EPA 901.1 Modified	-2.90E-01	3.29E-01	3.29E-01	4.38E-01	U	pCi/g			
18-05068-04	DO	B3-06213AFIWC-011CV	05/02/18 09:00	5/15/2018	5/15/2018	18-05068	Europium-155	EPA 901.1 Modified	5.22E-01	1.24E+00	1.24E+00	1.95E+00	U	pCi/g			
18-05068-04	DO	B3-06213AFIWC-011CV	05/02/18 09:00	5/15/2018	5/15/2018	18-05068	Holmium-166m	EPA 901.1 Modified	-3.17E-01	4.01E-01	4.01E-01	5.59E-01	U	pCi/g			
18-05068-04	DO	B3-06213AFIWC-011CV	05/02/18 09:00	5/15/2018	5/15/2018	18-05068	Iodine-129	EPA 901.1 Modified	4.09E+00	2.65E+00	2.66E+00	3.34E+00	U	pCi/g			
18-05068-04	DO	B3-06213AFIWC-011CV	05/02/18 09:00	5/15/2018	5/15/2018	18-05068	Potassium-40	EPA 901.1 Modified	7.70E+00	1.69E+00	1.74E+00	1.54E+00		pCi/g			
18-05068-04	DO	B3-06213AFIWC-011CV	05/02/18 09:00	5/15/2018	5/15/2018	18-05068	Manganese-54	EPA 901.1 Modified	1.31E-01	1.83E-01	1.83E-01	2.85E-01	U	pCi/g			
18-05068-04	DO	B3-06213AFIWC-011CV	05/02/18 09:00	5/15/2018	5/15/2018	18-05068	Niobium-94	EPA 901.1 Modified	7.69E-03	1.66E-01	1.66E-01	2.40E-01	U	pCi/g			
18-05068-04	DO	B3-06213AFIWC-011CV	05/02/18 09:00	5/15/2018	5/15/2018	18-05068	Lead-210	EPA 901.1 Modified	-1.34E+01	1.42E+01	1.42E+01	1.76E+01	U	pCi/g			
18-05068-04	DO	B3-06213AFIWC-011CV	05/02/18 09:00	5/15/2018	5/15/2018	18-05068	Lead-212	EPA 901.1 Modified	1.49E+00	1.39E+00	1.39E+00	2.16E+00	U	pCi/g			
18-05068-04	DO	B3-06213AFIWC-011CV	05/02/18 09:00	5/15/2018	5/15/2018	18-05068	Lead-214	EPA 901.1 Modified	-2.72E+00	2.90E+00	2.90E+00	4.07E+00	U	pCi/g			
18-05068-04	DO	B3-06213AFIWC-011CV	05/02/18 09:00	5/15/2018	5/15/2018	18-05068	Promethium-145	EPA 901.1 Modified	1.05E+02	9.29E+00	1.07E+01	3.53E+00	U	pCi/g			
18-05068-04	DO	B3-06213AFIWC-011CV	05/02/18 09:00	5/15/2018	5/15/2018	18-05068	Radium-226	EPA 901.1 Modified	-2.69E-01	1.47E+00	1.47E+00	1.34E+00	U	pCi/g			
18-05068-04	DO	B3-06213AFIWC-011CV	05/02/18 09:00	5/15/2018	5/15/2018	18-05068	Antimony-125	EPA 901.1 Modified	-7.82E-01	4.96E+00	4.96E+00	5.61E+00	U	pCi/g			
18-05068-04	DO	B3-06213AFIWC-011CV	05/02/18 09:00	5/15/2018	5/15/2018	18-05068	Thorium-234	EPA 901.1 Modified	1.20E+00	1.36E+01	1.36E+01	1.71E+01	U	pCi/g			
18-05068-04	DO	B3-06213AFIWC-011CV	05/02/18 09:00	5/15/2018	5/15/2018	18-05068	Thallium-208	EPA 901.1 Modified	2.95E+00	2.39E+00	2.40E+00	9.00E-01	U	pCi/g			
18-05068-04	DO	B3-06213AFIWC-011CV	05/02/18 09:00	5/15/2018	5/15/2018	18-05068	Uranium-235	EPA 901.1 Modified	-5.38E+00	1.25E+01	1.25E+01	6.19E+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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<h1 style="margin: 0;">Eberline Analytical</h1> <h2 style="margin: 0;">Final Report of Analysis</h2>			Report To:						Work Order Details:						
			Patricia Giza Zion Solutions, LLC 101 Shiloh Blvd Zion, IL 60099						SDG: 18-05068						
									Purchase Order: 677118						
									Analysis Category: ENVIRONMENTAL						
Lab ID	Sample Type	Client ID	Sample Date	Receipt Date	Analysis Date	Batch ID	Analyte	Method	Result	CU	CSU	MDA	Qualifier	Report Units	
18-05068-05	TRG	B3-06213-AFIFC-015CV	05/02/18 08:45	5/15/2018	5/15/2018	18-05068	Actinium-228	EPA 901.1 Modified	6.88E-01	4.42E-01	4.43E-01	7.70E-01	U	pCi/g	
18-05068-05	TRG	B3-06213-AFIFC-015CV	05/02/18 08:45	5/15/2018	5/15/2018	18-05068	Silver-108m	EPA 901.1 Modified	1.94E-02	1.37E-01	1.37E-01	2.14E-01	U	pCi/g	
18-05068-05	TRG	B3-06213-AFIFC-015CV	05/02/18 08:45	5/15/2018	5/15/2018	18-05068	Americium-241	EPA 901.1 Modified	-1.29E+00	1.23E+00	1.23E+00	1.83E+00	U	pCi/g	
18-05068-05	TRG	B3-06213-AFIFC-015CV	05/02/18 08:45	5/15/2018	5/15/2018	18-05068	Barium-133	EPA 901.1 Modified	-3.79E-01	2.13E+00	2.13E+00	1.84E+00	U	pCi/g	
18-05068-05	TRG	B3-06213-AFIFC-015CV	05/02/18 08:45	5/15/2018	5/15/2018	18-05068	Bismuth-214	EPA 901.1 Modified	1.24E+00	1.66E+00	1.66E+00	1.15E+00	U	pCi/g	
18-05068-05	TRG	B3-06213-AFIFC-015CV	05/02/18 08:45	5/15/2018	5/15/2018	18-05068	Cobalt-60	EPA 901.1 Modified	3.73E-02	1.08E-01	1.08E-01	1.42E-01	U	pCi/g	
18-05068-05	TRG	B3-06213-AFIFC-015CV	05/02/18 08:45	5/15/2018	5/15/2018	18-05068	Cesium-134	EPA 901.1 Modified	9.00E-02	7.98E-01	7.98E-01	1.99E-01	U	pCi/g	
18-05068-05	TRG	B3-06213-AFIFC-015CV	05/02/18 08:45	5/15/2018	5/15/2018	18-05068	Cesium-137	EPA 901.1 Modified	1.19E+03	1.22E+02	1.37E+02	3.17E+00		pCi/g	
18-05068-05	TRG	B3-06213-AFIFC-015CV	05/02/18 08:45	5/15/2018	5/15/2018	18-05068	Europium-152	EPA 901.1 Modified	1.32E+00	6.44E+00	6.44E+00	8.97E-01	U	pCi/g	
18-05068-05	TRG	B3-06213-AFIFC-015CV	05/02/18 08:45	5/15/2018	5/15/2018	18-05068	Europium-154	EPA 901.1 Modified	-1.11E-01	3.29E-01	3.29E-01	4.75E-01	U	pCi/g	
18-05068-05	TRG	B3-06213-AFIFC-015CV	05/02/18 08:45	5/15/2018	5/15/2018	18-05068	Europium-155	EPA 901.1 Modified	2.86E-01	1.32E+00	1.32E+00	1.99E+00	U	pCi/g	
18-05068-05	TRG	B3-06213-AFIFC-015CV	05/02/18 08:45	5/15/2018	5/15/2018	18-05068	Holmium-166m	EPA 901.1 Modified	1.62E-01	2.28E-01	2.29E-01	3.66E-01	U	pCi/g	
18-05068-05	TRG	B3-06213-AFIFC-015CV	05/02/18 08:45	5/15/2018	5/15/2018	18-05068	Iodine-129	EPA 901.1 Modified	4.58E+02	1.89E+02	1.90E+02	1.07E+01	U	pCi/g	
18-05068-05	TRG	B3-06213-AFIFC-015CV	05/02/18 08:45	5/15/2018	5/15/2018	18-05068	Potassium-40	EPA 901.1 Modified	7.48E+00	1.56E+00	1.61E+00	1.38E+00		pCi/g	
18-05068-05	TRG	B3-06213-AFIFC-015CV	05/02/18 08:45	5/15/2018	5/15/2018	18-05068	Manganese-54	EPA 901.1 Modified	4.62E-02	1.13E-01	1.13E-01	1.85E-01	U	pCi/g	
18-05068-05	TRG	B3-06213-AFIFC-015CV	05/02/18 08:45	5/15/2018	5/15/2018	18-05068	Niobium-94	EPA 901.1 Modified	-5.32E-02	1.06E-01	1.06E-01	1.56E-01	U	pCi/g	
18-05068-05	TRG	B3-06213-AFIFC-015CV	05/02/18 08:45	5/15/2018	5/15/2018	18-05068	Lead-210	EPA 901.1 Modified	-2.15E+02	2.44E+01	2.68E+01	2.51E+01	U	pCi/g	
18-05068-05	TRG	B3-06213-AFIFC-015CV	05/02/18 08:45	5/15/2018	5/15/2018	18-05068	Lead-212	EPA 901.1 Modified	9.83E-01	1.41E+00	1.41E+00	3.18E+00	U	pCi/g	
18-05068-05	TRG	B3-06213-AFIFC-015CV	05/02/18 08:45	5/15/2018	5/15/2018	18-05068	Lead-214	EPA 901.1 Modified	1.98E+00	3.40E+00	3.41E+00	4.89E+00	U	pCi/g	
18-05068-05	TRG	B3-06213-AFIFC-015CV	05/02/18 08:45	5/15/2018	5/15/2018	18-05068	Promethium-145	EPA 901.1 Modified	-1.36E+01	2.56E+00	2.66E+00	6.22E+00	U	pCi/g	
18-05068-05	TRG	B3-06213-AFIFC-015CV	05/02/18 08:45	5/15/2018	5/15/2018	18-05068	Radium-226	EPA 901.1 Modified	1.24E+00	1.66E+00	1.66E+00	1.15E+00	U	pCi/g	
18-05068-05	TRG	B3-06213-AFIFC-015CV	05/02/18 08:45	5/15/2018	5/15/2018	18-05068	Antimony-125	EPA 901.1 Modified	-6.17E+00	5.98E+00	5.98E+00	6.61E+00	U	pCi/g	
18-05068-05	TRG	B3-06213-AFIFC-015CV	05/02/18 08:45	5/15/2018	5/15/2018	18-05068	Thorium-234	EPA 901.1 Modified	-7.58E+00	1.11E+01	1.11E+01	1.66E+01	U	pCi/g	
18-05068-05	TRG	B3-06213-AFIFC-015CV	05/02/18 08:45	5/15/2018	5/15/2018	18-05068	Thallium-208	EPA 901.1 Modified	1.37E+00	2.70E+00	2.70E+00	4.58E-01	U	pCi/g	
18-05068-05	TRG	B3-06213-AFIFC-015CV	05/02/18 08:45	5/15/2018	5/15/2018	18-05068	Uranium-235	EPA 901.1 Modified	-1.42E+01	1.91E+01	1.91E+01	8.33E+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 Zion Solutions, LLC 101 Shiloh Blvd Zion, IL 60099						SDG: 18-05068 Purchase Order: 677118 Analysis Category: ENVIRONMENTAL 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
18-05068-06	TRG	B3-06214-AFIFC-001CV	05/03/18 13:30	5/15/2018	5/15/2018	18-05068	Actinium-228	EPA 901.1 Modified	2.18E-01	5.51E-01	5.51E-01	8.55E-01	U	pCi/g			
18-05068-06	TRG	B3-06214-AFIFC-001CV	05/03/18 13:30	5/15/2018	5/15/2018	18-05068	Silver-108m	EPA 901.1 Modified	-2.00E-01	2.23E-01	2.23E-01	3.07E-01	U	pCi/g			
18-05068-06	TRG	B3-06214-AFIFC-001CV	05/03/18 13:30	5/15/2018	5/15/2018	18-05068	Americium-241	EPA 901.1 Modified	-9.06E-02	1.41E+00	1.41E+00	1.77E+00	U	pCi/g			
18-05068-06	TRG	B3-06214-AFIFC-001CV	05/03/18 13:30	5/15/2018	5/15/2018	18-05068	Barium-133	EPA 901.1 Modified	-9.20E-01	1.66E+00	1.66E+00	1.72E+00	U	pCi/g			
18-05068-06	TRG	B3-06214-AFIFC-001CV	05/03/18 13:30	5/15/2018	5/15/2018	18-05068	Bismuth-214	EPA 901.1 Modified	1.60E-01	1.43E+00	1.43E+00	1.22E+00	U	pCi/g			
18-05068-06	TRG	B3-06214-AFIFC-001CV	05/03/18 13:30	5/15/2018	5/15/2018	18-05068	Cobalt-60	EPA 901.1 Modified	1.84E-01	8.58E-02	8.63E-02	1.67E-01		pCi/g			
18-05068-06	TRG	B3-06214-AFIFC-001CV	05/03/18 13:30	5/15/2018	5/15/2018	18-05068	Cesium-134	EPA 901.1 Modified	-6.47E-02	5.23E-01	5.23E-01	2.88E-01	U	pCi/g			
18-05068-06	TRG	B3-06214-AFIFC-001CV	05/03/18 13:30	5/15/2018	5/15/2018	18-05068	Cesium-137	EPA 901.1 Modified	2.55E+03	2.47E+02	2.80E+02	1.68E+00		pCi/g			
18-05068-06	TRG	B3-06214-AFIFC-001CV	05/03/18 13:30	5/15/2018	5/15/2018	18-05068	Europium-152	EPA 901.1 Modified	3.36E+00	4.99E+00	4.99E+00	8.64E-01	U	pCi/g			
18-05068-06	TRG	B3-06214-AFIFC-001CV	05/03/18 13:30	5/15/2018	5/15/2018	18-05068	Europium-154	EPA 901.1 Modified	-3.26E-01	3.23E-01	3.23E-01	4.18E-01	U	pCi/g			
18-05068-06	TRG	B3-06214-AFIFC-001CV	05/03/18 13:30	5/15/2018	5/15/2018	18-05068	Europium-155	EPA 901.1 Modified	2.03E+00	1.47E+00	1.47E+00	1.86E+00	U	pCi/g			
18-05068-06	TRG	B3-06214-AFIFC-001CV	05/03/18 13:30	5/15/2018	5/15/2018	18-05068	Holmium-166m	EPA 901.1 Modified	-2.83E-01	3.71E-01	3.71E-01	5.19E-01	U	pCi/g			
18-05068-06	TRG	B3-06214-AFIFC-001CV	05/03/18 13:30	5/15/2018	5/15/2018	18-05068	Iodine-129	EPA 901.1 Modified	-1.33E+02	1.23E+01	1.41E+01	1.43E+00	U	pCi/g			
18-05068-06	TRG	B3-06214-AFIFC-001CV	05/03/18 13:30	5/15/2018	5/15/2018	18-05068	Potassium-40	EPA 901.1 Modified	6.59E+00	1.67E+00	1.70E+00	1.90E+00		pCi/g			
18-05068-06	TRG	B3-06214-AFIFC-001CV	05/03/18 13:30	5/15/2018	5/15/2018	18-05068	Manganese-54	EPA 901.1 Modified	-8.49E-02	1.71E-01	1.71E-01	2.46E-01	U	pCi/g			
18-05068-06	TRG	B3-06214-AFIFC-001CV	05/03/18 13:30	5/15/2018	5/15/2018	18-05068	Niobium-94	EPA 901.1 Modified	-8.04E-02	1.66E-01	1.66E-01	2.36E-01	U	pCi/g			
18-05068-06	TRG	B3-06214-AFIFC-001CV	05/03/18 13:30	5/15/2018	5/15/2018	18-05068	Lead-210	EPA 901.1 Modified	9.08E+00	8.99E+00	9.01E+00	1.32E+01	U	pCi/g			
18-05068-06	TRG	B3-06214-AFIFC-001CV	05/03/18 13:30	5/15/2018	5/15/2018	18-05068	Lead-212	EPA 901.1 Modified	8.56E-01	1.60E+00	1.60E+00	2.02E+00	U	pCi/g			
18-05068-06	TRG	B3-06214-AFIFC-001CV	05/03/18 13:30	5/15/2018	5/15/2018	18-05068	Lead-214	EPA 901.1 Modified	1.34E+00	2.63E+00	2.63E+00	3.31E+00	U	pCi/g			
18-05068-06	TRG	B3-06214-AFIFC-001CV	05/03/18 13:30	5/15/2018	5/15/2018	18-05068	Promethium-145	EPA 901.1 Modified	6.12E+01	5.57E+00	6.40E+00	2.60E+00	U	pCi/g			
18-05068-06	TRG	B3-06214-AFIFC-001CV	05/03/18 13:30	5/15/2018	5/15/2018	18-05068	Radium-226	EPA 901.1 Modified	1.60E-01	1.43E+00	1.43E+00	1.22E+00	U	pCi/g			
18-05068-06	TRG	B3-06214-AFIFC-001CV	05/03/18 13:30	5/15/2018	5/15/2018	18-05068	Antimony-125	EPA 901.1 Modified	-1.60E+00	3.60E+00	3.61E+00	4.58E+00	U	pCi/g			
18-05068-06	TRG	B3-06214-AFIFC-001CV	05/03/18 13:30	5/15/2018	5/15/2018	18-05068	Thorium-234	EPA 901.1 Modified	-4.60E+00	1.30E+01	1.30E+01	1.63E+01	U	pCi/g			
18-05068-06	TRG	B3-06214-AFIFC-001CV	05/03/18 13:30	5/15/2018	5/15/2018	18-05068	Thallium-208	EPA 901.1 Modified	2.70E+00	1.82E+00	1.82E+00	5.55E-01	U	pCi/g			
18-05068-06	TRG	B3-06214-AFIFC-001CV	05/03/18 13:30	5/15/2018	5/15/2018	18-05068	Uranium-235	EPA 901.1 Modified	3.12E+00	1.42E+01	1.42E+01	5.89E+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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<h1 style="margin: 0;">Eberline Analytical</h1> <h2 style="margin: 0;">Final Report of Analysis</h2>			Report To:						Work Order Details:						
			Patricia Giza						SDG:	18-05068					
			Zion Solutions, LLC						Purchase Order:	677118					
			101 Shiloh Blvd						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	
18-05068-07	TRG	B3-06214-AFIWC-009CV	05/03/18 15:30	5/15/2018	5/15/2018	18-05068	Actinium-228	EPA 901.1 Modified	4.76E-01	5.07E-01	5.07E-01	8.61E-01	U	pCi/g	
18-05068-07	TRG	B3-06214-AFIWC-009CV	05/03/18 15:30	5/15/2018	5/15/2018	18-05068	Silver-108m	EPA 901.1 Modified	1.20E-01	1.68E-01	1.68E-01	2.75E-01	U	pCi/g	
18-05068-07	TRG	B3-06214-AFIWC-009CV	05/03/18 15:30	5/15/2018	5/15/2018	18-05068	Americium-241	EPA 901.1 Modified	-1.71E+00	1.72E+00	1.72E+00	2.78E+00	U	pCi/g	
18-05068-07	TRG	B3-06214-AFIWC-009CV	05/03/18 15:30	5/15/2018	5/15/2018	18-05068	Barium-133	EPA 901.1 Modified	-2.95E+00	3.35E+00	3.36E+00	2.78E+00	U	pCi/g	
18-05068-07	TRG	B3-06214-AFIWC-009CV	05/03/18 15:30	5/15/2018	5/15/2018	18-05068	Bismuth-214	EPA 901.1 Modified	1.11E+00	2.56E+00	2.56E+00	1.36E+00	U	pCi/g	
18-05068-07	TRG	B3-06214-AFIWC-009CV	05/03/18 15:30	5/15/2018	5/15/2018	18-05068	Cobalt-60	EPA 901.1 Modified	1.26E-02	6.67E-02	6.67E-02	2.50E-01	U	pCi/g	
18-05068-07	TRG	B3-06214-AFIWC-009CV	05/03/18 15:30	5/15/2018	5/15/2018	18-05068	Cesium-134	EPA 901.1 Modified	-1.61E-01	1.23E+00	1.23E+00	2.63E-01	U	pCi/g	
18-05068-07	TRG	B3-06214-AFIWC-009CV	05/03/18 15:30	5/15/2018	5/15/2018	18-05068	Cesium-137	EPA 901.1 Modified	2.35E+03	2.40E+02	2.69E+02	3.78E+00		pCi/g	
18-05068-07	TRG	B3-06214-AFIWC-009CV	05/03/18 15:30	5/15/2018	5/15/2018	18-05068	Europium-152	EPA 901.1 Modified	2.07E+00	9.86E+00	9.86E+00	1.01E+00	U	pCi/g	
18-05068-07	TRG	B3-06214-AFIWC-009CV	05/03/18 15:30	5/15/2018	5/15/2018	18-05068	Europium-154	EPA 901.1 Modified	-3.09E-02	3.35E-01	3.35E-01	5.16E-01	U	pCi/g	
18-05068-07	TRG	B3-06214-AFIWC-009CV	05/03/18 15:30	5/15/2018	5/15/2018	18-05068	Europium-155	EPA 901.1 Modified	5.94E-01	1.54E+00	1.54E+00	3.01E+00	U	pCi/g	
18-05068-07	TRG	B3-06214-AFIWC-009CV	05/03/18 15:30	5/15/2018	5/15/2018	18-05068	Holmium-166m	EPA 901.1 Modified	-3.59E-01	3.15E-01	3.15E-01	4.25E-01	U	pCi/g	
18-05068-07	TRG	B3-06214-AFIWC-009CV	05/03/18 15:30	5/15/2018	5/15/2018	18-05068	Iodine-129	EPA 901.1 Modified	1.05E+03	4.33E+02	4.36E+02	1.73E+01	U	pCi/g	
18-05068-07	TRG	B3-06214-AFIWC-009CV	05/03/18 15:30	5/15/2018	5/15/2018	18-05068	Potassium-40	EPA 901.1 Modified	7.99E+00	1.94E+00	1.98E+00	1.84E+00		pCi/g	
18-05068-07	TRG	B3-06214-AFIWC-009CV	05/03/18 15:30	5/15/2018	5/15/2018	18-05068	Manganese-54	EPA 901.1 Modified	1.56E-02	1.40E-01	1.40E-01	2.21E-01	U	pCi/g	
18-05068-07	TRG	B3-06214-AFIWC-009CV	05/03/18 15:30	5/15/2018	5/15/2018	18-05068	Niobium-94	EPA 901.1 Modified	-6.95E-02	1.05E-01	1.05E-01	2.09E-01	U	pCi/g	
18-05068-07	TRG	B3-06214-AFIWC-009CV	05/03/18 15:30	5/15/2018	5/15/2018	18-05068	Lead-210	EPA 901.1 Modified	-4.37E+02	4.70E+01	5.21E+01	3.90E+01	U	pCi/g	
18-05068-07	TRG	B3-06214-AFIWC-009CV	05/03/18 15:30	5/15/2018	5/15/2018	18-05068	Lead-212	EPA 901.1 Modified	-3.23E-01	1.22E+00	1.22E+00	4.81E+00	U	pCi/g	
18-05068-07	TRG	B3-06214-AFIWC-009CV	05/03/18 15:30	5/15/2018	5/15/2018	18-05068	Lead-214	EPA 901.1 Modified	1.51E+00	5.19E+00	5.19E+00	7.50E+00	U	pCi/g	
18-05068-07	TRG	B3-06214-AFIWC-009CV	05/03/18 15:30	5/15/2018	5/15/2018	18-05068	Promethium-145	EPA 901.1 Modified	-2.79E+01	5.03E+00	5.23E+00	1.00E+01	U	pCi/g	
18-05068-07	TRG	B3-06214-AFIWC-009CV	05/03/18 15:30	5/15/2018	5/15/2018	18-05068	Radium-226	EPA 901.1 Modified	1.11E+00	2.56E+00	2.56E+00	1.36E+00	U	pCi/g	
18-05068-07	TRG	B3-06214-AFIWC-009CV	05/03/18 15:30	5/15/2018	5/15/2018	18-05068	Antimony-125	EPA 901.1 Modified	-9.73E-01	4.04E+00	4.04E+00	1.02E+01	U	pCi/g	
18-05068-07	TRG	B3-06214-AFIWC-009CV	05/03/18 15:30	5/15/2018	5/15/2018	18-05068	Thorium-234	EPA 901.1 Modified	-8.85E+00	1.30E+01	1.30E+01	2.52E+01	U	pCi/g	
18-05068-07	TRG	B3-06214-AFIWC-009CV	05/03/18 15:30	5/15/2018	5/15/2018	18-05068	Thallium-208	EPA 901.1 Modified	5.02E-01	4.08E+00	4.08E+00	7.59E-01	U	pCi/g	
18-05068-07	TRG	B3-06214-AFIWC-009CV	05/03/18 15:30	5/15/2018	5/15/2018	18-05068	Uranium-235	EPA 901.1 Modified	-4.21E+01	2.93E+01	2.94E+01	1.25E+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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<h1 style="margin: 0;">Eberline Analytical</h1> <h2 style="margin: 0;">Final Report of Analysis</h2>			Report To:						Work Order Details:						
			Patricia Giza Zion Solutions, LLC 101 Shiloh Blvd Zion, IL 60099						SDG:	18-05068					
									Purchase Order:	677118					
									Analysis Category:	ENVIRONMENTAL					
						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	
18-05068-08	TRG	B3-06215-AFSWC-013CV	04/26/18 13:00	5/15/2018	5/15/2018	18-05068	Actinium-228	EPA 901.1 Modified	5.16E-01	2.03E-01	2.05E-01	3.76E-01		pCi/g	
18-05068-08	TRG	B3-06215-AFSWC-013CV	04/26/18 13:00	5/15/2018	5/15/2018	18-05068	Silver-108m	EPA 901.1 Modified	4.43E-03	4.59E-02	4.59E-02	8.53E-02	U	pCi/g	
18-05068-08	TRG	B3-06215-AFSWC-013CV	04/26/18 13:00	5/15/2018	5/15/2018	18-05068	Americium-241	EPA 901.1 Modified	4.79E-02	1.26E-01	1.26E-01	1.68E-01	U	pCi/g	
18-05068-08	TRG	B3-06215-AFSWC-013CV	04/26/18 13:00	5/15/2018	5/15/2018	18-05068	Barium-133	EPA 901.1 Modified	-1.85E-01	1.16E-01	1.17E-01	1.09E-01	U	pCi/g	
18-05068-08	TRG	B3-06215-AFSWC-013CV	04/26/18 13:00	5/15/2018	5/15/2018	18-05068	Bismuth-214	EPA 901.1 Modified	6.52E-01	2.19E-01	2.22E-01	3.49E-01		pCi/g	
18-05068-08	TRG	B3-06215-AFSWC-013CV	04/26/18 13:00	5/15/2018	5/15/2018	18-05068	Cobalt-60	EPA 901.1 Modified	1.98E-01	7.80E-02	7.86E-02	1.67E-01		pCi/g	
18-05068-08	TRG	B3-06215-AFSWC-013CV	04/26/18 13:00	5/15/2018	5/15/2018	18-05068	Cesium-134	EPA 901.1 Modified	-3.17E-03	2.86E-02	2.86E-02	9.06E-02	U	pCi/g	
18-05068-08	TRG	B3-06215-AFSWC-013CV	04/26/18 13:00	5/15/2018	5/15/2018	18-05068	Cesium-137	EPA 901.1 Modified	3.51E-01	1.27E-01	1.29E-01	1.83E-01		pCi/g	
18-05068-08	TRG	B3-06215-AFSWC-013CV	04/26/18 13:00	5/15/2018	5/15/2018	18-05068	Europium-152	EPA 901.1 Modified	1.70E-02	2.39E-01	2.39E-01	2.30E-01	U	pCi/g	
18-05068-08	TRG	B3-06215-AFSWC-013CV	04/26/18 13:00	5/15/2018	5/15/2018	18-05068	Europium-154	EPA 901.1 Modified	3.98E-02	2.17E-01	2.17E-01	1.16E-01	U	pCi/g	
18-05068-08	TRG	B3-06215-AFSWC-013CV	04/26/18 13:00	5/15/2018	5/15/2018	18-05068	Europium-155	EPA 901.1 Modified	3.34E-01	1.36E-01	1.37E-01	2.08E-01	U	pCi/g	
18-05068-08	TRG	B3-06215-AFSWC-013CV	04/26/18 13:00	5/15/2018	5/15/2018	18-05068	Holmium-166m	EPA 901.1 Modified	5.22E-02	1.01E-01	1.01E-01	9.66E-02	U	pCi/g	
18-05068-08	TRG	B3-06215-AFSWC-013CV	04/26/18 13:00	5/15/2018	5/15/2018	18-05068	Iodine-129	EPA 901.1 Modified	-6.01E-03	8.27E-02	8.27E-02	1.07E-01	U	pCi/g	
18-05068-08	TRG	B3-06215-AFSWC-013CV	04/26/18 13:00	5/15/2018	5/15/2018	18-05068	Potassium-40	EPA 901.1 Modified	5.75E+00	1.27E+00	1.30E+00	1.48E+00		pCi/g	
18-05068-08	TRG	B3-06215-AFSWC-013CV	04/26/18 13:00	5/15/2018	5/15/2018	18-05068	Manganese-54	EPA 901.1 Modified	7.66E-02	6.92E-02	6.93E-02	1.24E-01	U	pCi/g	
18-05068-08	TRG	B3-06215-AFSWC-013CV	04/26/18 13:00	5/15/2018	5/15/2018	18-05068	Niobium-94	EPA 901.1 Modified	3.81E-02	6.22E-02	6.23E-02	1.06E-01	U	pCi/g	
18-05068-08	TRG	B3-06215-AFSWC-013CV	04/26/18 13:00	5/15/2018	5/15/2018	18-05068	Lead-210	EPA 901.1 Modified	1.17E+00	8.92E-01	8.94E-01	1.50E+00	U	pCi/g	
18-05068-08	TRG	B3-06215-AFSWC-013CV	04/26/18 13:00	5/15/2018	5/15/2018	18-05068	Lead-212	EPA 901.1 Modified	3.95E-01	1.45E-01	1.47E-01	2.18E-01	U	pCi/g	
18-05068-08	TRG	B3-06215-AFSWC-013CV	04/26/18 13:00	5/15/2018	5/15/2018	18-05068	Lead-214	EPA 901.1 Modified	6.51E-01	1.64E-01	1.68E-01	3.30E-01		pCi/g	
18-05068-08	TRG	B3-06215-AFSWC-013CV	04/26/18 13:00	5/15/2018	5/15/2018	18-05068	Promethium-145	EPA 901.1 Modified	5.53E-02	8.78E-02	8.78E-02	1.43E-01	U	pCi/g	
18-05068-08	TRG	B3-06215-AFSWC-013CV	04/26/18 13:00	5/15/2018	5/15/2018	18-05068	Radium-226	EPA 901.1 Modified	6.52E-01	2.19E-01	2.22E-01	3.49E-01		pCi/g	
18-05068-08	TRG	B3-06215-AFSWC-013CV	04/26/18 13:00	5/15/2018	5/15/2018	18-05068	Antimony-125	EPA 901.1 Modified	9.92E-03	1.63E-01	1.63E-01	2.74E-01	U	pCi/g	
18-05068-08	TRG	B3-06215-AFSWC-013CV	04/26/18 13:00	5/15/2018	5/15/2018	18-05068	Thorium-234	EPA 901.1 Modified	2.13E+00	1.28E+00	1.28E+00	1.86E+00	U	pCi/g	
18-05068-08	TRG	B3-06215-AFSWC-013CV	04/26/18 13:00	5/15/2018	5/15/2018	18-05068	Thallium-208	EPA 901.1 Modified	4.43E-01	2.22E-01	2.23E-01	4.80E-01	U	pCi/g	
18-05068-08	TRG	B3-06215-AFSWC-013CV	04/26/18 13:00	5/15/2018	5/15/2018	18-05068	Uranium-235	EPA 901.1 Modified	4.26E-01	8.94E-01	8.95E-01	5.20E-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



EBERLINE ANALYTICAL CORPORATION

601 SCARBORO ROAD OAK RIDGE, TN 37830 865/481-0683 Fax 865/483-4621

<h1 style="margin: 0;">Eberline Analytical</h1> <h2 style="margin: 0;">Final Report of Analysis</h2>			Report To:						Work Order Details:						
			Patricia Giza Zion Solutions, LLC 101 Shiloh Blvd Zion, IL 60099						SDG: 18-05068						
									Purchase Order: 677118						
									Analysis Category: ENVIRONMENTAL						
						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	
18-05068-09	TRG	B3-06215-AFSFC-003CV	04/26/18 13:40	5/15/2018	5/16/2018	18-05068	Actinium-228	EPA 901.1 Modified	6.29E-01	3.52E-01	3.53E-01	6.48E-01	U	pCi/g	
18-05068-09	TRG	B3-06215-AFSFC-003CV	04/26/18 13:40	5/15/2018	5/16/2018	18-05068	Silver-108m	EPA 901.1 Modified	6.92E-03	6.66E-02	6.66E-02	1.56E-01	U	pCi/g	
18-05068-09	TRG	B3-06215-AFSFC-003CV	04/26/18 13:40	5/15/2018	5/16/2018	18-05068	Americium-241	EPA 901.1 Modified	-6.46E-01	3.34E-01	3.36E-01	3.72E-01	U	pCi/g	
18-05068-09	TRG	B3-06215-AFSFC-003CV	04/26/18 13:40	5/15/2018	5/16/2018	18-05068	Barium-133	EPA 901.1 Modified	3.71E-02	2.06E-01	2.06E-01	3.85E-01	U	pCi/g	
18-05068-09	TRG	B3-06215-AFSFC-003CV	04/26/18 13:40	5/15/2018	5/16/2018	18-05068	Bismuth-214	EPA 901.1 Modified	7.91E-01	3.44E-01	3.46E-01	6.06E-01	U	pCi/g	
18-05068-09	TRG	B3-06215-AFSFC-003CV	04/26/18 13:40	5/15/2018	5/16/2018	18-05068	Cobalt-60	EPA 901.1 Modified	-4.94E-03	9.77E-02	9.77E-02	1.51E-01	U	pCi/g	
18-05068-09	TRG	B3-06215-AFSFC-003CV	04/26/18 13:40	5/15/2018	5/16/2018	18-05068	Cesium-134	EPA 901.1 Modified	-5.00E-03	8.07E-02	8.07E-02	1.73E-01	U	pCi/g	
18-05068-09	TRG	B3-06215-AFSFC-003CV	04/26/18 13:40	5/15/2018	5/16/2018	18-05068	Cesium-137	EPA 901.1 Modified	7.00E+01	7.39E+00	8.21E+00	7.81E-01	U	pCi/g	
18-05068-09	TRG	B3-06215-AFSFC-003CV	04/26/18 13:40	5/15/2018	5/16/2018	18-05068	Europium-152	EPA 901.1 Modified	-3.59E-01	9.44E-01	9.44E-01	6.04E-01	U	pCi/g	
18-05068-09	TRG	B3-06215-AFSFC-003CV	04/26/18 13:40	5/15/2018	5/16/2018	18-05068	Europium-154	EPA 901.1 Modified	1.70E-01	2.04E-01	2.04E-01	3.03E-01	U	pCi/g	
18-05068-09	TRG	B3-06215-AFSFC-003CV	04/26/18 13:40	5/15/2018	5/16/2018	18-05068	Europium-155	EPA 901.1 Modified	-4.20E-02	2.63E-01	2.63E-01	4.15E-01	U	pCi/g	
18-05068-09	TRG	B3-06215-AFSFC-003CV	04/26/18 13:40	5/15/2018	5/16/2018	18-05068	Holmium-166m	EPA 901.1 Modified	2.84E-02	1.39E-01	1.39E-01	2.24E-01	U	pCi/g	
18-05068-09	TRG	B3-06215-AFSFC-003CV	04/26/18 13:40	5/15/2018	5/16/2018	18-05068	Iodine-129	EPA 901.1 Modified	-1.49E-02	4.44E-01	4.44E-01	5.62E-01	U	pCi/g	
18-05068-09	TRG	B3-06215-AFSFC-003CV	04/26/18 13:40	5/15/2018	5/16/2018	18-05068	Potassium-40	EPA 901.1 Modified	7.13E+00	1.78E+00	1.82E+00	1.94E+00	U	pCi/g	
18-05068-09	TRG	B3-06215-AFSFC-003CV	04/26/18 13:40	5/15/2018	5/16/2018	18-05068	Manganese-54	EPA 901.1 Modified	-2.74E-02	9.97E-02	9.97E-02	1.48E-01	U	pCi/g	
18-05068-09	TRG	B3-06215-AFSFC-003CV	04/26/18 13:40	5/15/2018	5/16/2018	18-05068	Niobium-94	EPA 901.1 Modified	6.82E-02	7.61E-02	7.62E-02	1.36E-01	U	pCi/g	
18-05068-09	TRG	B3-06215-AFSFC-003CV	04/26/18 13:40	5/15/2018	5/16/2018	18-05068	Lead-210	EPA 901.1 Modified	2.18E-01	3.01E+00	3.01E+00	3.82E+00	U	pCi/g	
18-05068-09	TRG	B3-06215-AFSFC-003CV	04/26/18 13:40	5/15/2018	5/16/2018	18-05068	Lead-212	EPA 901.1 Modified	1.10E-01	2.71E-01	2.71E-01	4.37E-01	U	pCi/g	
18-05068-09	TRG	B3-06215-AFSFC-003CV	04/26/18 13:40	5/15/2018	5/16/2018	18-05068	Lead-214	EPA 901.1 Modified	7.31E-01	4.37E-01	4.39E-01	8.28E-01	U	pCi/g	
18-05068-09	TRG	B3-06215-AFSFC-003CV	04/26/18 13:40	5/15/2018	5/16/2018	18-05068	Promethium-145	EPA 901.1 Modified	2.35E+00	4.57E-01	4.72E-01	6.21E-01	U	pCi/g	
18-05068-09	TRG	B3-06215-AFSFC-003CV	04/26/18 13:40	5/15/2018	5/16/2018	18-05068	Radium-226	EPA 901.1 Modified	7.91E-01	3.44E-01	3.46E-01	6.06E-01	U	pCi/g	
18-05068-09	TRG	B3-06215-AFSFC-003CV	04/26/18 13:40	5/15/2018	5/16/2018	18-05068	Antimony-125	EPA 901.1 Modified	1.72E-01	8.48E-01	8.48E-01	1.24E+00	U	pCi/g	
18-05068-09	TRG	B3-06215-AFSFC-003CV	04/26/18 13:40	5/15/2018	5/16/2018	18-05068	Thorium-234	EPA 901.1 Modified	6.65E+00	2.88E+00	2.90E+00	4.01E+00	U	pCi/g	
18-05068-09	TRG	B3-06215-AFSFC-003CV	04/26/18 13:40	5/15/2018	5/16/2018	18-05068	Thallium-208	EPA 901.1 Modified	2.65E-01	4.73E-01	4.73E-01	7.31E-01	U	pCi/g	
18-05068-09	TRG	B3-06215-AFSFC-003CV	04/26/18 13:40	5/15/2018	5/16/2018	18-05068	Uranium-235	EPA 901.1 Modified	9.74E-01	2.31E+00	2.31E+00	1.18E+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



EBERLINE ANALYTICAL CORPORATION

601 SCARBORO ROAD OAK RIDGE, TN 37830 865/481-0683 FAX 865/483-4621

Eberline Analytical Final Report of Analysis			Report To:						Work Order Details:								
			Patricia Giza Zion Solutions, LLC 101 Shiloh Blvd Zion, IL 60099						SDG: 18-05068 Purchase Order: 677118 Analysis Category: ENVIRONMENTAL 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
18-05068-10	TRG	B3-06216-AFSWC-006CV	04/30/18 08:35	5/15/2018	5/16/2018	18-05068	Actinium-228	EPA 901.1 Modified	5.87E-01	2.73E-01	2.75E-01	5.12E-01		pCi/g			
18-05068-10	TRG	B3-06216-AFSWC-006CV	04/30/18 08:35	5/15/2018	5/16/2018	18-05068	Silver-108m	EPA 901.1 Modified	-1.64E-02	7.63E-02	7.63E-02	7.76E-02	U	pCi/g			
18-05068-10	TRG	B3-06216-AFSWC-006CV	04/30/18 08:35	5/15/2018	5/16/2018	18-05068	Americium-241	EPA 901.1 Modified	-5.89E-02	8.79E-02	8.80E-02	1.64E-01	U	pCi/g			
18-05068-10	TRG	B3-06216-AFSWC-006CV	04/30/18 08:35	5/15/2018	5/16/2018	18-05068	Barium-133	EPA 901.1 Modified	-7.20E-02	1.05E-01	1.05E-01	1.20E-01	U	pCi/g			
18-05068-10	TRG	B3-06216-AFSWC-006CV	04/30/18 08:35	5/15/2018	5/16/2018	18-05068	Bismuth-214	EPA 901.1 Modified	7.37E-01	1.91E-01	1.94E-01	3.05E-01		pCi/g			
18-05068-10	TRG	B3-06216-AFSWC-006CV	04/30/18 08:35	5/15/2018	5/16/2018	18-05068	Cobalt-60	EPA 901.1 Modified	7.92E-02	5.37E-02	5.39E-02	1.09E-01	U	pCi/g			
18-05068-10	TRG	B3-06216-AFSWC-006CV	04/30/18 08:35	5/15/2018	5/16/2018	18-05068	Cesium-134	EPA 901.1 Modified	-1.56E-01	9.04E-02	9.07E-02	9.11E-02	U	pCi/g			
18-05068-10	TRG	B3-06216-AFSWC-006CV	04/30/18 08:35	5/15/2018	5/16/2018	18-05068	Cesium-137	EPA 901.1 Modified	2.58E-01	1.08E-01	1.09E-01	1.57E-01		pCi/g			
18-05068-10	TRG	B3-06216-AFSWC-006CV	04/30/18 08:35	5/15/2018	5/16/2018	18-05068	Europium-152	EPA 901.1 Modified	1.92E-01	1.85E-01	1.85E-01	2.33E-01	U	pCi/g			
18-05068-10	TRG	B3-06216-AFSWC-006CV	04/30/18 08:35	5/15/2018	5/16/2018	18-05068	Europium-154	EPA 901.1 Modified	9.59E-02	1.81E-01	1.81E-01	1.18E-01	U	pCi/g			
18-05068-10	TRG	B3-06216-AFSWC-006CV	04/30/18 08:35	5/15/2018	5/16/2018	18-05068	Europium-155	EPA 901.1 Modified	7.63E-02	1.46E-01	1.46E-01	1.95E-01	U	pCi/g			
18-05068-10	TRG	B3-06216-AFSWC-006CV	04/30/18 08:35	5/15/2018	5/16/2018	18-05068	Holmium-166m	EPA 901.1 Modified	5.61E-02	1.18E-01	1.18E-01	9.87E-02	U	pCi/g			
18-05068-10	TRG	B3-06216-AFSWC-006CV	04/30/18 08:35	5/15/2018	5/16/2018	18-05068	Iodine-129	EPA 901.1 Modified	8.67E-02	7.39E-02	7.40E-02	1.13E-01	U	pCi/g			
18-05068-10	TRG	B3-06216-AFSWC-006CV	04/30/18 08:35	5/15/2018	5/16/2018	18-05068	Potassium-40	EPA 901.1 Modified	4.81E+00	1.15E+00	1.17E+00	1.08E+00		pCi/g			
18-05068-10	TRG	B3-06216-AFSWC-006CV	04/30/18 08:35	5/15/2018	5/16/2018	18-05068	Manganese-54	EPA 901.1 Modified	2.11E-02	6.37E-02	6.37E-02	1.03E-01	U	pCi/g			
18-05068-10	TRG	B3-06216-AFSWC-006CV	04/30/18 08:35	5/15/2018	5/16/2018	18-05068	Niobium-94	EPA 901.1 Modified	3.35E-02	6.53E-02	6.53E-02	1.09E-01	U	pCi/g			
18-05068-10	TRG	B3-06216-AFSWC-006CV	04/30/18 08:35	5/15/2018	5/16/2018	18-05068	Lead-210	EPA 901.1 Modified	1.17E+00	8.86E-01	8.89E-01	1.49E+00	U	pCi/g			
18-05068-10	TRG	B3-06216-AFSWC-006CV	04/30/18 08:35	5/15/2018	5/16/2018	18-05068	Lead-212	EPA 901.1 Modified	3.95E-01	1.82E-01	1.83E-01	2.84E-01		pCi/g			
18-05068-10	TRG	B3-06216-AFSWC-006CV	04/30/18 08:35	5/15/2018	5/16/2018	18-05068	Lead-214	EPA 901.1 Modified	8.38E-01	2.81E-01	2.85E-01	3.81E-01		pCi/g			
18-05068-10	TRG	B3-06216-AFSWC-006CV	04/30/18 08:35	5/15/2018	5/16/2018	18-05068	Promethium-145	EPA 901.1 Modified	-1.99E-02	8.75E-02	8.75E-02	1.31E-01	U	pCi/g			
18-05068-10	TRG	B3-06216-AFSWC-006CV	04/30/18 08:35	5/15/2018	5/16/2018	18-05068	Radium-226	EPA 901.1 Modified	7.37E-01	1.91E-01	1.94E-01	3.05E-01		pCi/g			
18-05068-10	TRG	B3-06216-AFSWC-006CV	04/30/18 08:35	5/15/2018	5/16/2018	18-05068	Antimony-125	EPA 901.1 Modified	1.37E-01	1.59E-01	1.59E-01	2.80E-01	U	pCi/g			
18-05068-10	TRG	B3-06216-AFSWC-006CV	04/30/18 08:35	5/15/2018	5/16/2018	18-05068	Thorium-234	EPA 901.1 Modified	2.01E+00	1.44E+00	1.44E+00	2.36E+00	U	pCi/g			
18-05068-10	TRG	B3-06216-AFSWC-006CV	04/30/18 08:35	5/15/2018	5/16/2018	18-05068	Thallium-208	EPA 901.1 Modified	2.90E-01	1.92E-01	1.93E-01	4.00E-01	U	pCi/g			
18-05068-10	TRG	B3-06216-AFSWC-006CV	04/30/18 08:35	5/15/2018	5/16/2018	18-05068	Uranium-235	EPA 901.1 Modified	-4.12E-01	1.01E+00	1.01E+00	5.11E-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



EBERLINE ANALYTICAL CORPORATION

601 SCARBORO ROAD OAK RIDGE, TN 37830 865/481-0683 FAX 865/483-4621

Eberline Analytical Final Report of Analysis			Report To:						Work Order Details:							
			Patricia Giza						SDG:	18-05068						
			Zion Solutions, LLC						Purchase Order:	677118						
			101 Shiloh Blvd						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		
18-05068-11	TRG	B3-06216-AFSFC-002CV	04/26/18 15:20	5/15/2018	5/16/2018	18-05068	Actinium-228	EPA 901.1 Modified	7.17E-01	5.60E-01	5.62E-01	9.88E-01	U	pCi/g		
18-05068-11	TRG	B3-06216-AFSFC-002CV	04/26/18 15:20	5/15/2018	5/16/2018	18-05068	Silver-108m	EPA 901.1 Modified	7.43E-02	1.63E-01	1.63E-01	2.67E-01	U	pCi/g		
18-05068-11	TRG	B3-06216-AFSFC-002CV	04/26/18 15:20	5/15/2018	5/16/2018	18-05068	Americium-241	EPA 901.1 Modified	-5.16E-01	3.33E-01	3.34E-01	5.04E-01	U	pCi/g		
18-05068-11	TRG	B3-06216-AFSFC-002CV	04/26/18 15:20	5/15/2018	5/16/2018	18-05068	Barium-133	EPA 901.1 Modified	1.24E-02	1.65E-01	1.65E-01	5.34E-01	U	pCi/g		
18-05068-11	TRG	B3-06216-AFSFC-002CV	04/26/18 15:20	5/15/2018	5/16/2018	18-05068	Bismuth-214	EPA 901.1 Modified	9.55E-01	4.94E-01	4.96E-01	8.22E-01	U	pCi/g		
18-05068-11	TRG	B3-06216-AFSFC-002CV	04/26/18 15:20	5/15/2018	5/16/2018	18-05068	Cobalt-60	EPA 901.1 Modified	5.31E-02	1.42E-01	1.42E-01	2.48E-01	U	pCi/g		
18-05068-11	TRG	B3-06216-AFSFC-002CV	04/26/18 15:20	5/15/2018	5/16/2018	18-05068	Cesium-134	EPA 901.1 Modified	4.96E-01	2.40E-01	2.41E-01	2.77E-01	U	pCi/g		
18-05068-11	TRG	B3-06216-AFSFC-002CV	04/26/18 15:20	5/15/2018	5/16/2018	18-05068	Cesium-137	EPA 901.1 Modified	2.03E+01	2.20E+00	2.43E+00	5.26E-01		pCi/g		
18-05068-11	TRG	B3-06216-AFSFC-002CV	04/26/18 15:20	5/15/2018	5/16/2018	18-05068	Europium-152	EPA 901.1 Modified	3.44E-01	8.06E-01	8.06E-01	8.34E-01	U	pCi/g		
18-05068-11	TRG	B3-06216-AFSFC-002CV	04/26/18 15:20	5/15/2018	5/16/2018	18-05068	Europium-154	EPA 901.1 Modified	-1.23E-01	4.12E-01	4.13E-01	4.24E-01	U	pCi/g		
18-05068-11	TRG	B3-06216-AFSFC-002CV	04/26/18 15:20	5/15/2018	5/16/2018	18-05068	Europium-155	EPA 901.1 Modified	5.37E-01	2.79E-01	2.80E-01	5.88E-01	U	pCi/g		
18-05068-11	TRG	B3-06216-AFSFC-002CV	04/26/18 15:20	5/15/2018	5/16/2018	18-05068	Holmium-166m	EPA 901.1 Modified	-1.29E-01	2.79E-01	2.79E-01	3.47E-01	U	pCi/g		
18-05068-11	TRG	B3-06216-AFSFC-002CV	04/26/18 15:20	5/15/2018	5/16/2018	18-05068	Iodine-129	EPA 901.1 Modified	-7.75E+00	3.72E+00	3.74E+00	2.41E+00	U	pCi/g		
18-05068-11	TRG	B3-06216-AFSFC-002CV	04/26/18 15:20	5/15/2018	5/16/2018	18-05068	Potassium-40	EPA 901.1 Modified	8.04E+00	2.43E+00	2.46E+00	2.97E+00		pCi/g		
18-05068-11	TRG	B3-06216-AFSFC-002CV	04/26/18 15:20	5/15/2018	5/16/2018	18-05068	Manganese-54	EPA 901.1 Modified	9.11E-02	1.45E-01	1.45E-01	2.46E-01	U	pCi/g		
18-05068-11	TRG	B3-06216-AFSFC-002CV	04/26/18 15:20	5/15/2018	5/16/2018	18-05068	Niobium-94	EPA 901.1 Modified	-8.88E-02	1.53E-01	1.53E-01	2.16E-01	U	pCi/g		
18-05068-11	TRG	B3-06216-AFSFC-002CV	04/26/18 15:20	5/15/2018	5/16/2018	18-05068	Lead-210	EPA 901.1 Modified	-9.76E+00	3.71E+00	3.74E+00	6.20E+00	U	pCi/g		
18-05068-11	TRG	B3-06216-AFSFC-002CV	04/26/18 15:20	5/15/2018	5/16/2018	18-05068	Lead-212	EPA 901.1 Modified	-9.72E-03	9.45E-02	9.45E-02	7.10E-01	U	pCi/g		
18-05068-11	TRG	B3-06216-AFSFC-002CV	04/26/18 15:20	5/15/2018	5/16/2018	18-05068	Lead-214	EPA 901.1 Modified	1.64E+00	8.52E-01	8.56E-01	1.23E+00		pCi/g		
18-05068-11	TRG	B3-06216-AFSFC-002CV	04/26/18 15:20	5/15/2018	5/16/2018	18-05068	Promethium-145	EPA 901.1 Modified	4.51E-02	3.86E-01	3.86E-01	1.29E+00	U	pCi/g		
18-05068-11	TRG	B3-06216-AFSFC-002CV	04/26/18 15:20	5/15/2018	5/16/2018	18-05068	Radium-226	EPA 901.1 Modified	9.55E-01	4.94E-01	4.96E-01	8.22E-01	U	pCi/g		
18-05068-11	TRG	B3-06216-AFSFC-002CV	04/26/18 15:20	5/15/2018	5/16/2018	18-05068	Antimony-125	EPA 901.1 Modified	-6.83E-01	1.07E+00	1.07E+00	1.52E+00	U	pCi/g		
18-05068-11	TRG	B3-06216-AFSFC-002CV	04/26/18 15:20	5/15/2018	5/16/2018	18-05068	Thorium-234	EPA 901.1 Modified	-1.55E+00	2.52E+00	2.52E+00	4.67E+00	U	pCi/g		
18-05068-11	TRG	B3-06216-AFSFC-002CV	04/26/18 15:20	5/15/2018	5/16/2018	18-05068	Thallium-208	EPA 901.1 Modified	7.01E-01	2.91E-01	2.94E-01	1.20E-01		pCi/g		
18-05068-11	TRG	B3-06216-AFSFC-002CV	04/26/18 15:20	5/15/2018	5/16/2018	18-05068	Uranium-235	EPA 901.1 Modified	-1.58E-01	3.80E+00	3.80E+00	1.87E+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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<h1 style="margin: 0;">Eberline Analytical</h1> <h2 style="margin: 0;">Final Report of Analysis</h2>			Report To:					Work Order Details:									
			Patricia Giza Zion Solutions, LLC 101 Shiloh Blvd Zion, IL 60099					SDG: 18-05068		Purchase Order: 677118		Analysis Category: ENVIRONMENTAL		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
18-05068-12	TRG	B1-06214-AFSWC-005CV	05/05/18 14:35	5/15/2018	5/16/2018	18-05068	Actinium-228	EPA 901.1 Modified	6.46E-01	5.15E-01	5.16E-01	9.17E-01	U	pCi/g			
18-05068-12	TRG	B1-06214-AFSWC-005CV	05/05/18 14:35	5/15/2018	5/16/2018	18-05068	Silver-108m	EPA 901.1 Modified	4.20E-03	1.50E-01	1.50E-01	1.74E-01	U	pCi/g			
18-05068-12	TRG	B1-06214-AFSWC-005CV	05/05/18 14:35	5/15/2018	5/16/2018	18-05068	Americium-241	EPA 901.1 Modified	-1.84E-01	1.71E-01	1.71E-01	2.33E-01	U	pCi/g			
18-05068-12	TRG	B1-06214-AFSWC-005CV	05/05/18 14:35	5/15/2018	5/16/2018	18-05068	Barium-133	EPA 901.1 Modified	5.49E-02	9.73E-02	9.73E-02	2.69E-01	U	pCi/g			
18-05068-12	TRG	B1-06214-AFSWC-005CV	05/05/18 14:35	5/15/2018	5/16/2018	18-05068	Bismuth-214	EPA 901.1 Modified	6.66E-01	3.27E-01	3.29E-01	5.46E-01		pCi/g			
18-05068-12	TRG	B1-06214-AFSWC-005CV	05/05/18 14:35	5/15/2018	5/16/2018	18-05068	Cobalt-60	EPA 901.1 Modified	4.21E-02	1.42E-01	1.42E-01	2.26E-01	U	pCi/g			
18-05068-12	TRG	B1-06214-AFSWC-005CV	05/05/18 14:35	5/15/2018	5/16/2018	18-05068	Cesium-134	EPA 901.1 Modified	-9.90E-01	3.60E-01	3.63E-01	2.24E-01	U	pCi/g			
18-05068-12	TRG	B1-06214-AFSWC-005CV	05/05/18 14:35	5/15/2018	5/16/2018	18-05068	Cesium-137	EPA 901.1 Modified	1.33E+00	3.29E-01	3.36E-01	3.96E-01		pCi/g			
18-05068-12	TRG	B1-06214-AFSWC-005CV	05/05/18 14:35	5/15/2018	5/16/2018	18-05068	Europium-152	EPA 901.1 Modified	-2.40E-01	4.67E-01	4.67E-01	3.70E-01	U	pCi/g			
18-05068-12	TRG	B1-06214-AFSWC-005CV	05/05/18 14:35	5/15/2018	5/16/2018	18-05068	Europium-154	EPA 901.1 Modified	-1.50E-01	3.66E-01	3.67E-01	1.84E-01	U	pCi/g			
18-05068-12	TRG	B1-06214-AFSWC-005CV	05/05/18 14:35	5/15/2018	5/16/2018	18-05068	Europium-155	EPA 901.1 Modified	5.44E-02	1.95E-01	1.95E-01	2.88E-01	U	pCi/g			
18-05068-12	TRG	B1-06214-AFSWC-005CV	05/05/18 14:35	5/15/2018	5/16/2018	18-05068	Holmium-166m	EPA 901.1 Modified	-5.73E-02	2.70E-01	2.70E-01	1.46E-01	U	pCi/g			
18-05068-12	TRG	B1-06214-AFSWC-005CV	05/05/18 14:35	5/15/2018	5/16/2018	18-05068	Iodine-129	EPA 901.1 Modified	5.31E-04	2.86E-02	2.86E-02	1.05E-01	U	pCi/g			
18-05068-12	TRG	B1-06214-AFSWC-005CV	05/05/18 14:35	5/15/2018	5/16/2018	18-05068	Potassium-40	EPA 901.1 Modified	5.38E+00	2.56E+00	2.57E+00	3.76E+00		pCi/g			
18-05068-12	TRG	B1-06214-AFSWC-005CV	05/05/18 14:35	5/15/2018	5/16/2018	18-05068	Manganese-54	EPA 901.1 Modified	-8.35E-02	1.43E-01	1.43E-01	2.11E-01	U	pCi/g			
18-05068-12	TRG	B1-06214-AFSWC-005CV	05/05/18 14:35	5/15/2018	5/16/2018	18-05068	Niobium-94	EPA 901.1 Modified	9.26E-02	1.22E-01	1.22E-01	2.09E-01	U	pCi/g			
18-05068-12	TRG	B1-06214-AFSWC-005CV	05/05/18 14:35	5/15/2018	5/16/2018	18-05068	Lead-210	EPA 901.1 Modified	1.95E+00	1.29E+00	1.29E+00	2.04E+00	U	pCi/g			
18-05068-12	TRG	B1-06214-AFSWC-005CV	05/05/18 14:35	5/15/2018	5/16/2018	18-05068	Lead-212	EPA 901.1 Modified	3.08E-01	1.92E-01	1.93E-01	3.07E-01	U	pCi/g			
18-05068-12	TRG	B1-06214-AFSWC-005CV	05/05/18 14:35	5/15/2018	5/16/2018	18-05068	Lead-214	EPA 901.1 Modified	3.75E-01	3.19E-01	3.20E-01	5.13E-01	U	pCi/g			
18-05068-12	TRG	B1-06214-AFSWC-005CV	05/05/18 14:35	5/15/2018	5/16/2018	18-05068	Promethium-145	EPA 901.1 Modified	-1.47E-01	1.33E-01	1.33E-01	1.82E-01	U	pCi/g			
18-05068-12	TRG	B1-06214-AFSWC-005CV	05/05/18 14:35	5/15/2018	5/16/2018	18-05068	Radium-226	EPA 901.1 Modified	6.66E-01	3.27E-01	3.29E-01	5.46E-01		pCi/g			
18-05068-12	TRG	B1-06214-AFSWC-005CV	05/05/18 14:35	5/15/2018	5/16/2018	18-05068	Antimony-125	EPA 901.1 Modified	-2.80E-01	4.19E-01	4.20E-01	5.31E-01	U	pCi/g			
18-05068-12	TRG	B1-06214-AFSWC-005CV	05/05/18 14:35	5/15/2018	5/16/2018	18-05068	Thorium-234	EPA 901.1 Modified	2.29E+00	1.53E+00	1.53E+00	2.39E+00	U	pCi/g			
18-05068-12	TRG	B1-06214-AFSWC-005CV	05/05/18 14:35	5/15/2018	5/16/2018	18-05068	Thallium-208	EPA 901.1 Modified	5.87E-01	4.79E-01	4.80E-01	7.60E-01	U	pCi/g			
18-05068-12	TRG	B1-06214-AFSWC-005CV	05/05/18 14:35	5/15/2018	5/16/2018	18-05068	Uranium-235	EPA 901.1 Modified	-8.81E-01	1.48E+00	1.48E+00	7.97E-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 Zion Solutions, LLC 101 Shiloh Blvd Zion, IL 60099						SDG: 18-05068 Purchase Order: 677118 Analysis Category: ENVIRONMENTAL 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
18-05068-13	TRG	B1-06214-AFSFC-004CV	05/05/18 14:55	5/15/2018	5/16/2018	18-05068	Actinium-228	EPA 901.1 Modified	4.42E-01	3.91E-01	3.91E-01	6.97E-01	U	pCi/g			
18-05068-13	TRG	B1-06214-AFSFC-004CV	05/05/18 14:55	5/15/2018	5/16/2018	18-05068	Silver-108m	EPA 901.1 Modified	-1.91E-03	7.95E-02	7.95E-02	1.57E-01	U	pCi/g			
18-05068-13	TRG	B1-06214-AFSFC-004CV	05/05/18 14:55	5/15/2018	5/16/2018	18-05068	Americium-241	EPA 901.1 Modified	1.10E-01	2.54E-01	2.54E-01	3.38E-01	U	pCi/g			
18-05068-13	TRG	B1-06214-AFSFC-004CV	05/05/18 14:55	5/15/2018	5/16/2018	18-05068	Barium-133	EPA 901.1 Modified	3.79E-02	1.76E-01	1.76E-01	3.37E-01	U	pCi/g			
18-05068-13	TRG	B1-06214-AFSFC-004CV	05/05/18 14:55	5/15/2018	5/16/2018	18-05068	Bismuth-214	EPA 901.1 Modified	1.04E+00	3.00E-01	3.05E-01	5.83E-01		pCi/g			
18-05068-13	TRG	B1-06214-AFSFC-004CV	05/05/18 14:55	5/15/2018	5/16/2018	18-05068	Cobalt-60	EPA 901.1 Modified	-2.45E-02	1.03E-01	1.03E-01	1.45E-01	U	pCi/g			
18-05068-13	TRG	B1-06214-AFSFC-004CV	05/05/18 14:55	5/15/2018	5/16/2018	18-05068	Cesium-134	EPA 901.1 Modified	2.76E-02	7.97E-02	7.97E-02	1.78E-01	U	pCi/g			
18-05068-13	TRG	B1-06214-AFSFC-004CV	05/05/18 14:55	5/15/2018	5/16/2018	18-05068	Cesium-137	EPA 901.1 Modified	4.16E+01	4.13E+00	4.65E+00	3.77E-01		pCi/g			
18-05068-13	TRG	B1-06214-AFSFC-004CV	05/05/18 14:55	5/15/2018	5/16/2018	18-05068	Europium-152	EPA 901.1 Modified	3.06E-01	7.54E-01	7.54E-01	5.40E-01	U	pCi/g			
18-05068-13	TRG	B1-06214-AFSFC-004CV	05/05/18 14:55	5/15/2018	5/16/2018	18-05068	Europium-154	EPA 901.1 Modified	1.45E-01	2.59E-01	2.59E-01	2.77E-01	U	pCi/g			
18-05068-13	TRG	B1-06214-AFSFC-004CV	05/05/18 14:55	5/15/2018	5/16/2018	18-05068	Europium-155	EPA 901.1 Modified	4.39E-01	2.78E-01	2.79E-01	3.88E-01	U	pCi/g			
18-05068-13	TRG	B1-06214-AFSFC-004CV	05/05/18 14:55	5/15/2018	5/16/2018	18-05068	Holmium-166m	EPA 901.1 Modified	1.51E-02	8.18E-02	8.18E-02	2.09E-01	U	pCi/g			
18-05068-13	TRG	B1-06214-AFSFC-004CV	05/05/18 14:55	5/15/2018	5/16/2018	18-05068	Iodine-129	EPA 901.1 Modified	-1.55E+00	3.70E-01	3.79E-01	2.48E-01	U	pCi/g			
18-05068-13	TRG	B1-06214-AFSFC-004CV	05/05/18 14:55	5/15/2018	5/16/2018	18-05068	Potassium-40	EPA 901.1 Modified	6.79E+00	2.05E+00	2.08E+00	2.64E+00		pCi/g			
18-05068-13	TRG	B1-06214-AFSFC-004CV	05/05/18 14:55	5/15/2018	5/16/2018	18-05068	Manganese-54	EPA 901.1 Modified	1.16E-01	9.41E-02	9.43E-02	1.73E-01	U	pCi/g			
18-05068-13	TRG	B1-06214-AFSFC-004CV	05/05/18 14:55	5/15/2018	5/16/2018	18-05068	Niobium-94	EPA 901.1 Modified	-1.47E-02	8.85E-02	8.85E-02	1.35E-01	U	pCi/g			
18-05068-13	TRG	B1-06214-AFSFC-004CV	05/05/18 14:55	5/15/2018	5/16/2018	18-05068	Lead-210	EPA 901.1 Modified	3.23E+00	1.72E+00	1.73E+00	2.89E+00	U	pCi/g			
18-05068-13	TRG	B1-06214-AFSFC-004CV	05/05/18 14:55	5/15/2018	5/16/2018	18-05068	Lead-212	EPA 901.1 Modified	5.64E-01	2.52E-01	2.54E-01	7.69E-01	U	pCi/g			
18-05068-13	TRG	B1-06214-AFSFC-004CV	05/05/18 14:55	5/15/2018	5/16/2018	18-05068	Lead-214	EPA 901.1 Modified	8.85E-01	5.79E-01	5.81E-01	9.29E-01	U	pCi/g			
18-05068-13	TRG	B1-06214-AFSFC-004CV	05/05/18 14:55	5/15/2018	5/16/2018	18-05068	Promethium-145	EPA 901.1 Modified	7.29E-01	2.40E-01	2.43E-01	3.97E-01	U	pCi/g			
18-05068-13	TRG	B1-06214-AFSFC-004CV	05/05/18 14:55	5/15/2018	5/16/2018	18-05068	Radium-226	EPA 901.1 Modified	1.04E+00	3.00E-01	3.05E-01	5.83E-01		pCi/g			
18-05068-13	TRG	B1-06214-AFSFC-004CV	05/05/18 14:55	5/15/2018	5/16/2018	18-05068	Antimony-125	EPA 901.1 Modified	-3.85E-01	5.64E-01	5.64E-01	8.76E-01	U	pCi/g			
18-05068-13	TRG	B1-06214-AFSFC-004CV	05/05/18 14:55	5/15/2018	5/16/2018	18-05068	Thorium-234	EPA 901.1 Modified	2.01E+00	2.60E+00	2.61E+00	3.51E+00	U	pCi/g			
18-05068-13	TRG	B1-06214-AFSFC-004CV	05/05/18 14:55	5/15/2018	5/16/2018	18-05068	Thallium-208	EPA 901.1 Modified	4.65E-01	4.14E-01	4.14E-01	7.02E-01	U	pCi/g			
18-05068-13	TRG	B1-06214-AFSFC-004CV	05/05/18 14:55	5/15/2018	5/16/2018	18-05068	Uranium-235	EPA 901.1 Modified	1.55E+00	2.39E+00	2.39E+00	1.13E+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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<h1 style="margin: 0;">Eberline Analytical</h1> <h2 style="margin: 0;">Final Report of Analysis</h2>			Report To:						Work Order Details:						
			Patricia Giza Zion Solutions, LLC 101 Shiloh Blvd Zion, IL 60099						SDG: 18-05068						
									Purchase Order: 677118						
									Analysis Category: ENVIRONMENTAL						
						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	
18-05068-14	TRG	B1-06214-AFSFC-001CV	05/05/18 15:15	5/15/2018	5/16/2018	18-05068	Actinium-228	EPA 901.1 Modified	6.95E-01	4.52E-01	4.54E-01	7.82E-01	U	pCi/g	
18-05068-14	TRG	B1-06214-AFSFC-001CV	05/05/18 15:15	5/15/2018	5/16/2018	18-05068	Silver-108m	EPA 901.1 Modified	4.11E-03	1.10E-01	1.10E-01	1.76E-01	U	pCi/g	
18-05068-14	TRG	B1-06214-AFSFC-001CV	05/05/18 15:15	5/15/2018	5/16/2018	18-05068	Americium-241	EPA 901.1 Modified	-1.14E-01	1.62E-01	1.62E-01	2.25E-01	U	pCi/g	
18-05068-14	TRG	B1-06214-AFSFC-001CV	05/05/18 15:15	5/15/2018	5/16/2018	18-05068	Barium-133	EPA 901.1 Modified	2.06E-02	9.48E-02	9.48E-02	2.60E-01	U	pCi/g	
18-05068-14	TRG	B1-06214-AFSFC-001CV	05/05/18 15:15	5/15/2018	5/16/2018	18-05068	Bismuth-214	EPA 901.1 Modified	8.03E-01	2.96E-01	2.99E-01	4.89E-01		pCi/g	
18-05068-14	TRG	B1-06214-AFSFC-001CV	05/05/18 15:15	5/15/2018	5/16/2018	18-05068	Cobalt-60	EPA 901.1 Modified	6.87E-02	9.05E-02	9.05E-02	1.66E-01	U	pCi/g	
18-05068-14	TRG	B1-06214-AFSFC-001CV	05/05/18 15:15	5/15/2018	5/16/2018	18-05068	Cesium-134	EPA 901.1 Modified	-4.36E-02	8.90E-02	8.90E-02	1.94E-01	U	pCi/g	
18-05068-14	TRG	B1-06214-AFSFC-001CV	05/05/18 15:15	5/15/2018	5/16/2018	18-05068	Cesium-137	EPA 901.1 Modified	1.48E+01	1.84E+00	1.99E+00	3.09E-01		pCi/g	
18-05068-14	TRG	B1-06214-AFSFC-001CV	05/05/18 15:15	5/15/2018	5/16/2018	18-05068	Europium-152	EPA 901.1 Modified	3.75E-02	4.30E-01	4.30E-01	3.62E-01	U	pCi/g	
18-05068-14	TRG	B1-06214-AFSFC-001CV	05/05/18 15:15	5/15/2018	5/16/2018	18-05068	Europium-154	EPA 901.1 Modified	1.34E-01	2.55E-01	2.55E-01	1.84E-01	U	pCi/g	
18-05068-14	TRG	B1-06214-AFSFC-001CV	05/05/18 15:15	5/15/2018	5/16/2018	18-05068	Europium-155	EPA 901.1 Modified	4.72E-01	2.28E-01	2.29E-01	3.55E-01		pCi/g	
18-05068-14	TRG	B1-06214-AFSFC-001CV	05/05/18 15:15	5/15/2018	5/16/2018	18-05068	Holmium-166m	EPA 901.1 Modified	2.08E-01	2.06E-01	2.06E-01	1.52E-01	U	pCi/g	
18-05068-14	TRG	B1-06214-AFSFC-001CV	05/05/18 15:15	5/15/2018	5/16/2018	18-05068	Iodine-129	EPA 901.1 Modified	3.54E-01	8.68E-02	8.87E-02	1.39E-01	U	pCi/g	
18-05068-14	TRG	B1-06214-AFSFC-001CV	05/05/18 15:15	5/15/2018	5/16/2018	18-05068	Potassium-40	EPA 901.1 Modified	7.23E+00	1.94E+00	1.98E+00	2.25E+00		pCi/g	
18-05068-14	TRG	B1-06214-AFSFC-001CV	05/05/18 15:15	5/15/2018	5/16/2018	18-05068	Manganese-54	EPA 901.1 Modified	-4.05E-02	1.17E-01	1.17E-01	1.74E-01	U	pCi/g	
18-05068-14	TRG	B1-06214-AFSFC-001CV	05/05/18 15:15	5/15/2018	5/16/2018	18-05068	Niobium-94	EPA 901.1 Modified	1.21E-01	1.10E-01	1.10E-01	1.60E-01	U	pCi/g	
18-05068-14	TRG	B1-06214-AFSFC-001CV	05/05/18 15:15	5/15/2018	5/16/2018	18-05068	Lead-210	EPA 901.1 Modified	1.47E+00	1.30E+00	1.31E+00	1.98E+00	U	pCi/g	
18-05068-14	TRG	B1-06214-AFSFC-001CV	05/05/18 15:15	5/15/2018	5/16/2018	18-05068	Lead-212	EPA 901.1 Modified	7.32E-01	3.39E-01	3.41E-01	5.34E-01		pCi/g	
18-05068-14	TRG	B1-06214-AFSFC-001CV	05/05/18 15:15	5/15/2018	5/16/2018	18-05068	Lead-214	EPA 901.1 Modified	8.67E-01	4.57E-01	4.59E-01	6.95E-01		pCi/g	
18-05068-14	TRG	B1-06214-AFSFC-001CV	05/05/18 15:15	5/15/2018	5/16/2018	18-05068	Promethium-145	EPA 901.1 Modified	-5.72E-01	1.93E-01	1.95E-01	2.12E-01	U	pCi/g	
18-05068-14	TRG	B1-06214-AFSFC-001CV	05/05/18 15:15	5/15/2018	5/16/2018	18-05068	Radium-226	EPA 901.1 Modified	8.03E-01	2.96E-01	2.99E-01	4.89E-01		pCi/g	
18-05068-14	TRG	B1-06214-AFSFC-001CV	05/05/18 15:15	5/15/2018	5/16/2018	18-05068	Antimony-125	EPA 901.1 Modified	-2.58E-01	6.19E-01	6.19E-01	8.10E-01	U	pCi/g	
18-05068-14	TRG	B1-06214-AFSFC-001CV	05/05/18 15:15	5/15/2018	5/16/2018	18-05068	Thorium-234	EPA 901.1 Modified	1.98E+00	1.48E+00	1.48E+00	2.25E+00	U	pCi/g	
18-05068-14	TRG	B1-06214-AFSFC-001CV	05/05/18 15:15	5/15/2018	5/16/2018	18-05068	Thallium-208	EPA 901.1 Modified	7.99E-01	3.88E-01	3.90E-01	6.67E-01		pCi/g	
18-05068-14	TRG	B1-06214-AFSFC-001CV	05/05/18 15:15	5/15/2018	5/16/2018	18-05068	Uranium-235	EPA 901.1 Modified	-4.56E-01	1.66E+00	1.66E+00	7.90E-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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<h1 style="margin: 0;">Eberline Analytical</h1> <h2 style="margin: 0;">Final Report of Analysis</h2>			Report To:						Work Order Details:						
			Patricia Giza Zion Solutions, LLC 101 Shiloh Blvd Zion, IL 60099						SDG:	18-05068					
									Purchase Order:	677118					
									Analysis Category:	ENVIRONMENTAL					
						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	
18-05068-15	TRG	B1-06213-AFSWC-009CV	05/05/18 09:05	5/15/2018	5/16/2018	18-05068	Actinium-228	EPA 901.1 Modified	3.41E-01	4.07E-01	4.07E-01	7.00E-01	U	pCi/g	
18-05068-15	TRG	B1-06213-AFSWC-009CV	05/05/18 09:05	5/15/2018	5/16/2018	18-05068	Silver-108m	EPA 901.1 Modified	4.07E-02	1.10E-01	1.10E-01	1.81E-01	U	pCi/g	
18-05068-15	TRG	B1-06213-AFSWC-009CV	05/05/18 09:05	5/15/2018	5/16/2018	18-05068	Americium-241	EPA 901.1 Modified	-1.68E-01	9.15E-02	9.19E-02	2.88E-01	U	pCi/g	
18-05068-15	TRG	B1-06213-AFSWC-009CV	05/05/18 09:05	5/15/2018	5/16/2018	18-05068	Barium-133	EPA 901.1 Modified	-1.31E-02	8.15E-02	8.15E-02	3.26E-01	U	pCi/g	
18-05068-15	TRG	B1-06213-AFSWC-009CV	05/05/18 09:05	5/15/2018	5/16/2018	18-05068	Bismuth-214	EPA 901.1 Modified	8.12E-01	3.50E-01	3.52E-01	5.04E-01		pCi/g	
18-05068-15	TRG	B1-06213-AFSWC-009CV	05/05/18 09:05	5/15/2018	5/16/2018	18-05068	Cobalt-60	EPA 901.1 Modified	5.16E-02	1.09E-01	1.09E-01	1.83E-01	U	pCi/g	
18-05068-15	TRG	B1-06213-AFSWC-009CV	05/05/18 09:05	5/15/2018	5/16/2018	18-05068	Cesium-134	EPA 901.1 Modified	7.41E-03	6.93E-02	6.93E-02	1.91E-01	U	pCi/g	
18-05068-15	TRG	B1-06213-AFSWC-009CV	05/05/18 09:05	5/15/2018	5/16/2018	18-05068	Cesium-137	EPA 901.1 Modified	6.95E-02	1.51E-01	1.51E-01	2.31E-01	U	pCi/g	
18-05068-15	TRG	B1-06213-AFSWC-009CV	05/05/18 09:05	5/15/2018	5/16/2018	18-05068	Europium-152	EPA 901.1 Modified	-5.74E-03	3.91E-01	3.91E-01	4.56E-01	U	pCi/g	
18-05068-15	TRG	B1-06213-AFSWC-009CV	05/05/18 09:05	5/15/2018	5/16/2018	18-05068	Europium-154	EPA 901.1 Modified	-1.07E-01	3.22E-01	3.22E-01	2.31E-01	U	pCi/g	
18-05068-15	TRG	B1-06213-AFSWC-009CV	05/05/18 09:05	5/15/2018	5/16/2018	18-05068	Europium-155	EPA 901.1 Modified	3.52E-01	2.65E-01	2.66E-01	4.29E-01	U	pCi/g	
18-05068-15	TRG	B1-06213-AFSWC-009CV	05/05/18 09:05	5/15/2018	5/16/2018	18-05068	Holmium-166m	EPA 901.1 Modified	8.18E-02	1.94E-01	1.94E-01	1.80E-01	U	pCi/g	
18-05068-15	TRG	B1-06213-AFSWC-009CV	05/05/18 09:05	5/15/2018	5/16/2018	18-05068	Iodine-129	EPA 901.1 Modified	-3.21E+00	1.60E+00	1.61E+00	1.15E+00	U	pCi/g	
18-05068-15	TRG	B1-06213-AFSWC-009CV	05/05/18 09:05	5/15/2018	5/16/2018	18-05068	Potassium-40	EPA 901.1 Modified	4.95E+00	1.53E+00	1.55E+00	3.21E+00	U	pCi/g	
18-05068-15	TRG	B1-06213-AFSWC-009CV	05/05/18 09:05	5/15/2018	5/16/2018	18-05068	Manganese-54	EPA 901.1 Modified	2.87E-02	1.01E-01	1.01E-01	1.66E-01	U	pCi/g	
18-05068-15	TRG	B1-06213-AFSWC-009CV	05/05/18 09:05	5/15/2018	5/16/2018	18-05068	Niobium-94	EPA 901.1 Modified	-5.07E-02	1.19E-01	1.19E-01	1.74E-01	U	pCi/g	
18-05068-15	TRG	B1-06213-AFSWC-009CV	05/05/18 09:05	5/15/2018	5/16/2018	18-05068	Lead-210	EPA 901.1 Modified	-1.86E+00	2.27E+00	2.27E+00	3.37E+00	U	pCi/g	
18-05068-15	TRG	B1-06213-AFSWC-009CV	05/05/18 09:05	5/15/2018	5/16/2018	18-05068	Lead-212	EPA 901.1 Modified	6.66E-01	2.83E-01	2.85E-01	4.15E-01		pCi/g	
18-05068-15	TRG	B1-06213-AFSWC-009CV	05/05/18 09:05	5/15/2018	5/16/2018	18-05068	Lead-214	EPA 901.1 Modified	5.50E-01	3.55E-01	3.56E-01	5.35E-01		pCi/g	
18-05068-15	TRG	B1-06213-AFSWC-009CV	05/05/18 09:05	5/15/2018	5/16/2018	18-05068	Promethium-145	EPA 901.1 Modified	-9.94E-01	4.91E-01	4.94E-01	6.30E-01	U	pCi/g	
18-05068-15	TRG	B1-06213-AFSWC-009CV	05/05/18 09:05	5/15/2018	5/16/2018	18-05068	Radium-226	EPA 901.1 Modified	8.12E-01	3.50E-01	3.52E-01	5.04E-01		pCi/g	
18-05068-15	TRG	B1-06213-AFSWC-009CV	05/05/18 09:05	5/15/2018	5/16/2018	18-05068	Antimony-125	EPA 901.1 Modified	-2.43E-01	4.00E-01	4.00E-01	5.66E-01	U	pCi/g	
18-05068-15	TRG	B1-06213-AFSWC-009CV	05/05/18 09:05	5/15/2018	5/16/2018	18-05068	Thorium-234	EPA 901.1 Modified	-5.86E-01	5.34E-01	5.35E-01	2.67E+00	U	pCi/g	
18-05068-15	TRG	B1-06213-AFSWC-009CV	05/05/18 09:05	5/15/2018	5/16/2018	18-05068	Thallium-208	EPA 901.1 Modified	1.11E+00	6.05E-01	6.08E-01	5.88E-01		pCi/g	
18-05068-15	TRG	B1-06213-AFSWC-009CV	05/05/18 09:05	5/15/2018	5/16/2018	18-05068	Uranium-235	EPA 901.1 Modified	7.19E-01	1.87E+00	1.87E+00	1.03E+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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<h1 style="margin: 0;">Eberline Analytical</h1> <h2 style="margin: 0;">Final Report of Analysis</h2>			Report To:						Work Order Details:								
			Patricia Giza Zion Solutions, LLC 101 Shiloh Blvd Zion, IL 60099						SDG: 18-05068 Purchase Order: 677118 Analysis Category: ENVIRONMENTAL 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
18-05068-16	TRG	B1-06213-AFSFC-004CV	05/05/18 10:25	5/15/2018	5/16/2018	18-05068	Actinium-228	EPA 901.1 Modified	2.71E-01	2.63E-01	2.64E-01	4.48E-01	U	pCi/g			
18-05068-16	TRG	B1-06213-AFSFC-004CV	05/05/18 10:25	5/15/2018	5/16/2018	18-05068	Silver-108m	EPA 901.1 Modified	-4.64E-02	7.64E-02	7.65E-02	8.78E-02	U	pCi/g			
18-05068-16	TRG	B1-06213-AFSFC-004CV	05/05/18 10:25	5/15/2018	5/16/2018	18-05068	Americium-241	EPA 901.1 Modified	-3.24E-01	1.64E-01	1.64E-01	1.66E-01	U	pCi/g			
18-05068-16	TRG	B1-06213-AFSFC-004CV	05/05/18 10:25	5/15/2018	5/16/2018	18-05068	Barium-133	EPA 901.1 Modified	4.21E-02	5.65E-02	5.65E-02	1.48E-01	U	pCi/g			
18-05068-16	TRG	B1-06213-AFSFC-004CV	05/05/18 10:25	5/15/2018	5/16/2018	18-05068	Bismuth-214	EPA 901.1 Modified	5.87E-01	2.07E-01	2.09E-01	2.89E-01		pCi/g			
18-05068-16	TRG	B1-06213-AFSFC-004CV	05/05/18 10:25	5/15/2018	5/16/2018	18-05068	Cobalt-60	EPA 901.1 Modified	-3.44E-02	7.29E-02	7.29E-02	9.75E-02	U	pCi/g			
18-05068-16	TRG	B1-06213-AFSFC-004CV	05/05/18 10:25	5/15/2018	5/16/2018	18-05068	Cesium-134	EPA 901.1 Modified	1.45E-03	3.33E-02	3.33E-02	1.07E-01	U	pCi/g			
18-05068-16	TRG	B1-06213-AFSFC-004CV	05/05/18 10:25	5/15/2018	5/16/2018	18-05068	Cesium-137	EPA 901.1 Modified	1.07E+00	2.02E-01	2.09E-01	2.24E-01		pCi/g			
18-05068-16	TRG	B1-06213-AFSFC-004CV	05/05/18 10:25	5/15/2018	5/16/2018	18-05068	Europium-152	EPA 901.1 Modified	-9.15E-02	2.80E-01	2.80E-01	2.17E-01	U	pCi/g			
18-05068-16	TRG	B1-06213-AFSFC-004CV	05/05/18 10:25	5/15/2018	5/16/2018	18-05068	Europium-154	EPA 901.1 Modified	4.68E-02	1.76E-01	1.76E-01	1.12E-01	U	pCi/g			
18-05068-16	TRG	B1-06213-AFSFC-004CV	05/05/18 10:25	5/15/2018	5/16/2018	18-05068	Europium-155	EPA 901.1 Modified	-2.09E-02	1.19E-01	1.19E-01	1.91E-01	U	pCi/g			
18-05068-16	TRG	B1-06213-AFSFC-004CV	05/05/18 10:25	5/15/2018	5/16/2018	18-05068	Holmium-166m	EPA 901.1 Modified	-1.41E-02	1.16E-01	1.16E-01	9.99E-02	U	pCi/g			
18-05068-16	TRG	B1-06213-AFSFC-004CV	05/05/18 10:25	5/15/2018	5/16/2018	18-05068	Iodine-129	EPA 901.1 Modified	4.29E-02	4.69E-02	4.69E-02	1.25E-01	U	pCi/g			
18-05068-16	TRG	B1-06213-AFSFC-004CV	05/05/18 10:25	5/15/2018	5/16/2018	18-05068	Potassium-40	EPA 901.1 Modified	6.36E+00	1.21E+00	1.25E+00	1.01E+00		pCi/g			
18-05068-16	TRG	B1-06213-AFSFC-004CV	05/05/18 10:25	5/15/2018	5/16/2018	18-05068	Manganese-54	EPA 901.1 Modified	-6.77E-03	5.96E-02	5.96E-02	9.13E-02	U	pCi/g			
18-05068-16	TRG	B1-06213-AFSFC-004CV	05/05/18 10:25	5/15/2018	5/16/2018	18-05068	Niobium-94	EPA 901.1 Modified	8.75E-03	5.96E-02	5.96E-02	9.15E-02	U	pCi/g			
18-05068-16	TRG	B1-06213-AFSFC-004CV	05/05/18 10:25	5/15/2018	5/16/2018	18-05068	Lead-210	EPA 901.1 Modified	1.29E+00	1.19E+00	1.19E+00	1.64E+00	U	pCi/g			
18-05068-16	TRG	B1-06213-AFSFC-004CV	05/05/18 10:25	5/15/2018	5/16/2018	18-05068	Lead-212	EPA 901.1 Modified	4.56E-01	1.27E-01	1.30E-01	2.37E-01		pCi/g			
18-05068-16	TRG	B1-06213-AFSFC-004CV	05/05/18 10:25	5/15/2018	5/16/2018	18-05068	Lead-214	EPA 901.1 Modified	5.99E-01	1.72E-01	1.75E-01	2.59E-01		pCi/g			
18-05068-16	TRG	B1-06213-AFSFC-004CV	05/05/18 10:25	5/15/2018	5/16/2018	18-05068	Promethium-145	EPA 901.1 Modified	5.93E-02	1.26E-01	1.26E-01	1.69E-01	U	pCi/g			
18-05068-16	TRG	B1-06213-AFSFC-004CV	05/05/18 10:25	5/15/2018	5/16/2018	18-05068	Radium-226	EPA 901.1 Modified	5.87E-01	2.07E-01	2.09E-01	2.89E-01		pCi/g			
18-05068-16	TRG	B1-06213-AFSFC-004CV	05/05/18 10:25	5/15/2018	5/16/2018	18-05068	Antimony-125	EPA 901.1 Modified	3.82E-02	1.83E-01	1.83E-01	2.81E-01	U	pCi/g			
18-05068-16	TRG	B1-06213-AFSFC-004CV	05/05/18 10:25	5/15/2018	5/16/2018	18-05068	Thorium-234	EPA 901.1 Modified	2.23E+00	1.40E+00	1.40E+00	1.94E+00	U	pCi/g			
18-05068-16	TRG	B1-06213-AFSFC-004CV	05/05/18 10:25	5/15/2018	5/16/2018	18-05068	Thallium-208	EPA 901.1 Modified	4.50E-01	2.04E-01	2.06E-01	4.78E-01	U	pCi/g			
18-05068-16	TRG	B1-06213-AFSFC-004CV	05/05/18 10:25	5/15/2018	5/16/2018	18-05068	Uranium-235	EPA 901.1 Modified	3.09E-01	7.21E-01	7.21E-01	4.80E-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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<h1 style="margin: 0;">Eberline Analytical</h1> <h2 style="margin: 0;">Final Report of Analysis</h2>			Report To:					Work Order Details:							
			Patricia Giza Zion Solutions, LLC 101 Shiloh Blvd Zion, IL 60099					SDG:	18-05068						
								Purchase Order:	677118						
								Analysis Category:	ENVIRONMENTAL						
					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	
18-05068-17	TRG	B1-06213-AFSFC-002CV	05/05/18 13:00	5/15/2018	5/16/2018	18-05068	Actinium-228	EPA 901.1 Modified	3.22E-01	2.26E-01	2.26E-01	4.15E-01	U	pCi/g	
18-05068-17	TRG	B1-06213-AFSFC-002CV	05/05/18 13:00	5/15/2018	5/16/2018	18-05068	Silver-108m	EPA 901.1 Modified	-9.65E-02	8.09E-02	8.11E-02	9.11E-02	U	pCi/g	
18-05068-17	TRG	B1-06213-AFSFC-002CV	05/05/18 13:00	5/15/2018	5/16/2018	18-05068	Americium-241	EPA 901.1 Modified	7.14E-02	2.44E-01	2.44E-01	3.15E-01	U	pCi/g	
18-05068-17	TRG	B1-06213-AFSFC-002CV	05/05/18 13:00	5/15/2018	5/16/2018	18-05068	Barium-133	EPA 901.1 Modified	8.52E-02	1.81E-01	1.81E-01	3.09E-01	U	pCi/g	
18-05068-17	TRG	B1-06213-AFSFC-002CV	05/05/18 13:00	5/15/2018	5/16/2018	18-05068	Bismuth-214	EPA 901.1 Modified	3.10E-01	3.24E-01	3.24E-01	5.37E-01	U	pCi/g	
18-05068-17	TRG	B1-06213-AFSFC-002CV	05/05/18 13:00	5/15/2018	5/16/2018	18-05068	Cobalt-60	EPA 901.1 Modified	8.50E-03	5.49E-02	5.49E-02	7.82E-02	U	pCi/g	
18-05068-17	TRG	B1-06213-AFSFC-002CV	05/05/18 13:00	5/15/2018	5/16/2018	18-05068	Cesium-134	EPA 901.1 Modified	-1.36E-02	6.82E-02	6.82E-02	1.10E-01	U	pCi/g	
18-05068-17	TRG	B1-06213-AFSFC-002CV	05/05/18 13:00	5/15/2018	5/16/2018	18-05068	Cesium-137	EPA 901.1 Modified	9.24E+01	9.00E+00	1.02E+01	3.04E-01	U	pCi/g	
18-05068-17	TRG	B1-06213-AFSFC-002CV	05/05/18 13:00	5/15/2018	5/16/2018	18-05068	Europium-152	EPA 901.1 Modified	-3.28E-01	8.39E-01	8.39E-01	5.05E-01	U	pCi/g	
18-05068-17	TRG	B1-06213-AFSFC-002CV	05/05/18 13:00	5/15/2018	5/16/2018	18-05068	Europium-154	EPA 901.1 Modified	3.14E-02	1.58E-01	1.58E-01	2.54E-01	U	pCi/g	
18-05068-17	TRG	B1-06213-AFSFC-002CV	05/05/18 13:00	5/15/2018	5/16/2018	18-05068	Europium-155	EPA 901.1 Modified	2.48E-01	2.59E-01	2.59E-01	3.39E-01	U	pCi/g	
18-05068-17	TRG	B1-06213-AFSFC-002CV	05/05/18 13:00	5/15/2018	5/16/2018	18-05068	Holmium-166m	EPA 901.1 Modified	6.82E-02	1.05E-01	1.05E-01	1.73E-01	U	pCi/g	
18-05068-17	TRG	B1-06213-AFSFC-002CV	05/05/18 13:00	5/15/2018	5/16/2018	18-05068	Iodine-129	EPA 901.1 Modified	-3.65E+00	5.19E-01	5.51E-01	2.44E-01	U	pCi/g	
18-05068-17	TRG	B1-06213-AFSFC-002CV	05/05/18 13:00	5/15/2018	5/16/2018	18-05068	Potassium-40	EPA 901.1 Modified	4.94E+00	1.25E+00	1.27E+00	1.47E+00		pCi/g	
18-05068-17	TRG	B1-06213-AFSFC-002CV	05/05/18 13:00	5/15/2018	5/16/2018	18-05068	Manganese-54	EPA 901.1 Modified	-6.50E-02	6.21E-02	6.22E-02	7.54E-02	U	pCi/g	
18-05068-17	TRG	B1-06213-AFSFC-002CV	05/05/18 13:00	5/15/2018	5/16/2018	18-05068	Niobium-94	EPA 901.1 Modified	9.42E-03	4.99E-02	4.99E-02	7.83E-02	U	pCi/g	
18-05068-17	TRG	B1-06213-AFSFC-002CV	05/05/18 13:00	5/15/2018	5/16/2018	18-05068	Lead-210	EPA 901.1 Modified	5.46E-01	1.58E+00	1.58E+00	2.39E+00	U	pCi/g	
18-05068-17	TRG	B1-06213-AFSFC-002CV	05/05/18 13:00	5/15/2018	5/16/2018	18-05068	Lead-212	EPA 901.1 Modified	5.32E-02	2.78E-01	2.78E-01	3.58E-01	U	pCi/g	
18-05068-17	TRG	B1-06213-AFSFC-002CV	05/05/18 13:00	5/15/2018	5/16/2018	18-05068	Lead-214	EPA 901.1 Modified	4.11E-01	4.62E-01	4.62E-01	7.67E-01	U	pCi/g	
18-05068-17	TRG	B1-06213-AFSFC-002CV	05/05/18 13:00	5/15/2018	5/16/2018	18-05068	Promethium-145	EPA 901.1 Modified	1.74E+00	2.66E-01	2.80E-01	3.94E-01	U	pCi/g	
18-05068-17	TRG	B1-06213-AFSFC-002CV	05/05/18 13:00	5/15/2018	5/16/2018	18-05068	Radium-226	EPA 901.1 Modified	3.10E-01	3.24E-01	3.24E-01	5.37E-01	U	pCi/g	
18-05068-17	TRG	B1-06213-AFSFC-002CV	05/05/18 13:00	5/15/2018	5/16/2018	18-05068	Antimony-125	EPA 901.1 Modified	4.35E-02	6.04E-01	6.04E-01	8.89E-01	U	pCi/g	
18-05068-17	TRG	B1-06213-AFSFC-002CV	05/05/18 13:00	5/15/2018	5/16/2018	18-05068	Thorium-234	EPA 901.1 Modified	1.05E+00	2.30E+00	2.31E+00	2.98E+00	U	pCi/g	
18-05068-17	TRG	B1-06213-AFSFC-002CV	05/05/18 13:00	5/15/2018	5/16/2018	18-05068	Thallium-208	EPA 901.1 Modified	4.96E-01	3.36E-01	3.36E-01	5.01E-01	U	pCi/g	
18-05068-17	TRG	B1-06213-AFSFC-002CV	05/05/18 13:00	5/15/2018	5/16/2018	18-05068	Uranium-235	EPA 901.1 Modified	1.24E-01	1.24E+00	1.24E+00	1.06E+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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601 SCARBORO ROAD OAK RIDGE, TN 37830 865/481-0683 FAX 865/483-4621

Attachment 1 – Chain-of-Custody Form

18-05068

REC'D MAY 15 2018

Sample ID	Sample Log	Matrix	Sample Type	Sample Container				Sample Date	Sample Time	Analysis Type	Preservative	Remarks
				Vol	Unit	Type	Qty					
4 B3-06213AFIWC-011CV	NA	NA	Concrete	57.94	Cm ³	Puck	1	05-02-2018	0900	5ROC/HTD	NA	0.0-0.5" 93.79g
5 B3-06213-AFIFC-015CV	NA	NA	Concrete	57.94	Cm ³	Puck	1	05-02-2018	0845	5ROC/HTD	NA	0.0-0.5" 121.03g
6 B3-06214-AFIFC-001CV	NA	NA	Concrete	57.94	Cm ³	Puck	1	05-03-2018	1330	5ROC/HTD	NA	0.0-0.5" 105.79g
7 B3-06214-AFIWC-009CV	NA	NA	Concrete	57.94	Cm ³	Puck	1	05-03-2018	1530	5ROC/HTD	NA	0.0-0.5" 97.96g
8 B3-06215-AFSWC-013CV	NA	NA	Concrete	57.94	Cm ³	Puck	1	04-26-2018	1300	5ROC/HTD	NA	0.0-0.5" 128.37g
9 B3-06215-AFSFC-003CV	NA	NA	Concrete	57.94	Cm ³	Puck	1	04-26-2018	1340	5ROC/HTD	NA	0.0-0.5" 86.71g
10 B3-06216-AFSWC-006CV	NA	NA	Concrete	57.94	Cm ³	Puck	1	04-30-2018	0835	5ROC/HTD	NA	0.0-0.5" 124.13g
11 B3-06216 AFSFC-002CV	NA	NA	Concrete	57.94	Cm ³	Puck	1	04-26-2018	1520	5ROC/HTD	NA	0.0-0.5" 85.09g
12 B1-06214-AFSWC-005CV	NA	NA	Concrete	57.94	Cm ³	Puck	1	05-05-2018	1435	5ROC/HTD	NA	0.0-0.5" 104.84g
13 B1-06214-AFSFC-004CV	NA	NA	Concrete	57.94	Cm ³	Puck	1	05-05-2018	1455	5ROC/HTD	NA	0.0-0.5" 90.02g
14 B1-06214-AFSFC-001CV	NA	NA	Concrete	57.94	Cm ³	Puck	1	05-05-2018	1515	5ROC/HTD	NA	0.0-0.5" 142.60g
15 B1-06213-AFSWC-009CV	NA	NA	Concrete	57.94	Cm ³	Puck	1	05-05-2018	0905	5ROC/HTD	NA	0.0-0.5" 108.80g
16 B1-06213-AFSFC-004CV	NA	NA	Concrete	57.94	Cm ³	Puck	1	05-05-2018	1025	5ROC/HTD	NA	0.0-0.5" 123.56g
17 B1-06213-AFSFC-002CV	NA	NA	Concrete	57.94	Cm ³	Puck	1	05-05-2018	1300	5ROC/HTD	NA	0.0-0.5" 144.65g

REC AS 5-15-18 / 0750

18-05068

REC'D MAY 15 2018

Laboratory: <u>Eberline Labs</u>		Date Submitted To Lab:		Ship Container No.: <u>N/A</u>		Cooler Temperature: <u>N/A</u>		Airbill Number: FEDEX First Overnight 8107 0645 6574			
Relinquished by: Reed R. Smith		Date (mm/dd/yyyy): 05-14-2018		Time: 0819		Received by: Richard F. Biskert		Date: (mm/dd/yyyy): 05/14/2018		Time: 14:00	
Relinquished by: Richard F. Biskert		Date (mm/dd/yyyy): 05/14/2018		Time: 1630		Received by: FedEx Express		Date: (mm/dd/yyyy): 05/14/2018		Time: 1630	
Relinquished by: Fed Ex		Date (mm/dd/yyyy):		Time:		Received by: Kendall Spencer		Date: (mm/dd/yyyy): 05/15/2018		Time: 0750	
Relinquished by:		Date (mm/dd/yyyy):		Time:		Received by:		Date: (mm/dd/yyyy):		Time:	
Comments PO# 677118. 7 Day turnaround. 5-ROC/HTD.											



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EBS-OR-47182

May 8, 2020

Gerald Wood
Zion Solutions, LLC
2701 Deborah Avenue
Zion, IL 60099

CASE NARRATIVE
Work Order # 20-04072-OR

SAMPLE RECEIPT

This work order contains nine solid samples received 04/25/2020. Samples were analyzed for Isotopic Plutonium, Plutonium-241, Neptunium-237, Americium-241/243, Curium-243/244, Total Strontium, Technetium-99, Tritium, Carbon-14, Promethium-147, Nickel-59/63, Iron-55 and by Gamma Spectroscopy.

<u>CLIENT ID</u>	<u>LAB ID</u>	<u>CLIENT ID</u>	<u>LAB ID</u>
B1-06202A-FSWC-040-CV	20-04072-04	B2-08201-CJWC-A018-CV 0 5-1 0	20-04072-09
B1-06214A-FSFC-001-CV	20-04072-05	L2-10214C-RJGS-001-SM-A	20-04072-10
B2-08101A-BJFC-007-CV 0 0-0 5	20-04072-06	L1-12109L-CJGS-001-SB-A	20-04072-11
B2-08101A-BJFC-007-CV 0 5-1 0	20-04072-07	L1-12106L-CJGS-001-SB-A	20-04072-12
B2-08201-CJWC-A018-CV 0 0-0 5	20-04072-08		

ANALYTICAL METHODS

Isotopic Plutonium and Plutonium-241 were analyzed using Method EML Pu-02 Modified. Neptunium-237 was analyzed using EIChroM Method ACW08 Modified. Americium and Curium were analyzed using Method EML Am-01 Modified. Total Strontium was analyzed using EIChroM Method SRW01 Modified. Technetium-99 was analyzed using EIChroM Method TCS01 Modified. Tritium was performed using Method LANL ER-210 Modified. Carbon-14 was performed using EPA Method 520.0 Modified. Promethium-147 was performed using Method EML Pm-01 Modified. Nickel-59/63 was performed using Method ASTM 3500-Ni Modified. Iron-55 was performed using EML Method Fe-01-01 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.

ANALYTICAL RESULTS CONTINUED

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.

ISOTOPIC PLUTONIUM

Samples were prepared by removing representative aliquots followed by mixed acid digestions as appropriate. Plutonium was selectively extracted by ion exchange. Plutonium was eluted, micro-precipitated and mounted on micro-porous filter media. Sample activities were determined by alpha spectroscopy using energy specific regions of interest for Plutonium-238 and Plutonium-239. Chemical recovery was determined using a Plutonium-242 tracer. Activity of the Plutonium-242 tracer was determined by alpha spectroscopy using an energy specific region of interest.

Samples demonstrated acceptable results for all Plutonium analyses. Chemical recovery was acceptable for all samples. The Plutonium-238 and Plutonium-239/240 method blank demonstrated acceptable results. Results for the Plutonium-238 and Plutonium-239/240 duplicate demonstrated a high relative percent difference; however, normalized difference is within acceptable limits for the analytical technique. Results for the Plutonium-238 and Plutonium-239 laboratory control sample demonstrated an acceptable percent recovery.

PLUTONIUM-241

Following sample analysis for Isotopic Plutonium, filter media used was dissolved. Dissolved samples were placed into scintillation vials, scintillation cocktail was added and Plutonium-241 was determined by liquid scintillation counting. Analytical tracer recovery was determined by yields from the Isotopic Plutonium tracer.

Samples demonstrated acceptable results for all Plutonium-241 analyses. All sample results demonstrated slightly high method detection limits. Chemical recovery was acceptable for all samples. The Plutonium-241 method blank demonstrated an acceptable result. Results for the Plutonium-241 duplicate demonstrated a high relative percent difference; however, normalized difference is within acceptable limits for the analytical technique. Results for the Plutonium-241 laboratory control sample demonstrated an acceptable percent recovery.

NEPTUNIUM-237

Samples were prepared by removing representative aliquots followed by mixed acid digestions as appropriate. Sample residues were dissolved in dilute acid and Neptunium was selectively separated using EIChroM stabilized selective resins. Neptunium was eluted, micro-precipitated and mounted on micro-porous filter media. Sample activities were determined by alpha spectroscopy using an energy specific region of interest for Neptunium-237 activity. A Neptunium-239 tracer was used for chemical yields, which was determined by beta proportional counting.

Samples demonstrated acceptable results for all Neptunium-237 analyses. Chemical recovery was acceptable for all samples. The Neptunium-237 method blank demonstrated an acceptable result. Results for the Neptunium-237 duplicate demonstrated a high relative percent difference; however, normalized difference is within acceptable limits for the analytical technique. Results for the Neptunium-237 laboratory control sample demonstrated an acceptable percent recovery.

ANALYTICAL RESULTS CONTINUED

AMERICIUM-241

Samples were prepared by removing representative aliquots followed by mixed acid digestions as appropriate. Samples were co-precipitated with Calcium Phosphate. Precipitates were nitrate converted using Nitric acid and Aluminum Nitrate. The Americium fractions were separated from other elements using the EIChroM, TRU and UTEVA resins. The separated Americium fractions were mounted on a membrane filter by micro-precipitation and counted on the alpha spectroscopy system. Analytical tracer recovery was determined using an Americium-243 standard and subsequent activity determination by alpha spectroscopy.

Samples demonstrated acceptable results for all Americium-241 analyses. Chemical recovery was acceptable for all samples. The Americium-241 method blank demonstrated an acceptable result. Results for the Americium-241 duplicate demonstrated an acceptable relative percent difference and normalized difference. Results for the Americium-241 laboratory control sample demonstrated an acceptable percent recovery.

AMERICIUM-243

Samples were prepared by removing representative aliquots followed by mixed acid digestions as appropriate. Samples were co-precipitated with Calcium Phosphate. Precipitates were nitrate converted using Nitric acid and Aluminum Nitrate. The Americium fractions were separated from other elements using the EIChroM, TRU and UTEVA resins. The separated Americium fractions were mounted on a membrane filter by micro-precipitation and counted on the alpha spectroscopy system. Analytical tracer recovery was determined using a Curium-244 standard and subsequent activity determination by alpha spectroscopy.

Samples demonstrated acceptable results for all Americium-243 analyses. Chemical recovery was low for laboratory fraction -06 (Client ID: B2-08101A-BJFC-007-CV 0 0-0 5). Chemical recovery was acceptable for all other samples. The Americium-243 method blank demonstrated an acceptable result. Results for the Americium-243 duplicate demonstrated a high relative percent difference; however, normalized difference is within acceptable limits for the analytical technique. Results for the Americium-243 laboratory control sample demonstrated an acceptable percent recovery.

CURIUM-243/244

Samples were prepared by removing representative aliquots followed by mixed acid digestions as appropriate. Samples were co-precipitated with Calcium Phosphate. Precipitates were nitrate converted using Nitric acid and Aluminum Nitrate. The Curium fractions were separated from other elements using the EIChroM, TRU and UTEVA resins. The separated Curium fractions were mounted on a membrane filter by micro-precipitation and counted on the alpha spectroscopy system. Analytical tracer recovery was determined using an Americium-243 standard and subsequent activity determination by alpha spectroscopy.

Samples demonstrated acceptable results for all Curium-243/244 analyses. Chemical recovery was acceptable for all samples. The Curium-243/244 method blank demonstrated an acceptable result. Results for the Curium-243/244 duplicate demonstrated an acceptable relative percent difference and normalized difference. Results for the Curium-244 laboratory control sample demonstrated an acceptable percent recovery.

ANALYTICAL RESULTS CONTINUED

TOTAL STRONTIUM

Samples were prepared by acid digestion as appropriate for the matrix. Digested samples were acidified and 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 is reported from Total Strontium assuming secular equilibrium. 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.

TECHNETIUM-99

A representative aliquot was removed from each sample followed by leaching in acids. Samples were prepared by oxidative reactions with Nitric acid and Hydrogen Peroxide. After complete oxidization, Technetium was selectively extracted using EIChrom stabilized resins. Special cleanup chemistry was conducted for complete removal of interferences associated with Uranium. Processed resins were transferred to liquid scintillation vials, scintillation cocktail was added, and samples were counted by beta liquid scintillation.

Samples demonstrated acceptable results for all Technetium-99 analyses. The Technetium-99 method blank demonstrated an acceptable result. Results for the Technetium-99 duplicate demonstrated a high relative percent difference; however, normalized difference is within acceptable limits for the analytical technique. Results for the Technetium-99 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.

CARBON-14

A representative aliquot of each sample was placed into a 1-liter reaction vessel. A carbonate solution was added. Samples were oxidized using Potassium Permanganate. Carbon Dioxide was evolved and Carbon-14 was captured into Harvey brand, Carb-Sorb cocktail. Carbon-14 beta emissions were then determined by beta liquid scintillation using an energy selective region.

ANALYTICAL RESULTS CONTINUED

CARBON-14 CONTINUED

Samples demonstrated acceptable results for all Carbon-14 analyses. The Carbon-14 method blank demonstrated an acceptable result. Results for the Carbon-14 duplicate demonstrated a high relative percent difference; however, normalized difference is within acceptable limits for the analytical technique. Results for the Carbon-14 laboratory control sample demonstrated an acceptable percent recovery.

PROMETHIUM-147

Samples were prepared by leaching in HNO₃. Aliquots were taken to near dryness. Sample residues were dissolved in deionized water. The pH of each sample was adjusted with HNO₃. Samples were extracted with scintillation extractant. Organic phase of each sample was transferred to scintillation vials. Promethium-147 was determined by liquid scintillation counting.

Samples demonstrated acceptable results for all Promethium-147 analyses. The Promethium-147 method blank demonstrated an acceptable result. Results for the Promethium-147 duplicate demonstrated an acceptable relative percent difference and normalized difference. Results for the Promethium-147 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.

NICKEL-59

Representative aliquots were removed from samples and placed into Petri geometry containers. Samples were counted by low-energy photon spectroscopy.

Samples demonstrated acceptable results for all Nickel-59 analyses. The Nickel-59 method blank demonstrated an acceptable result. Results for the Nickel-59 replicate demonstrated a high relative percent difference; however, normalized difference is within acceptable limits for the analytical technique. Results for the Iron-55 laboratory control sample demonstrated a statistically acceptable percent recovery.

ANALYTICAL RESULTS CONTINUED

IRON-55

Representative aliquots were removed from samples and placed into Petri geometry containers. Samples were counted by low-energy photon spectroscopy.

Samples demonstrated acceptable results for all Iron-55 analyses. The Iron-55 method blank demonstrated an acceptable result. Results for the Iron-55 replicate demonstrated a high relative percent difference; however, normalized difference is within acceptable limits for the analytical technique. Results for the Iron-55 laboratory control sample demonstrated an acceptable percent recovery.

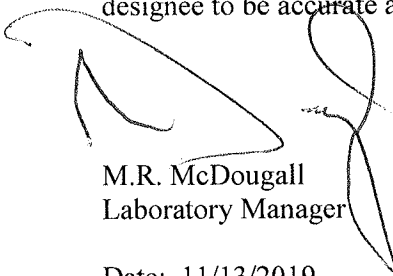
GAMMA SPECTROSCOPY

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.

Samples demonstrated acceptable results for all gamma-emitting radionuclides as reported. Cobalt-60 results for laboratory fraction -08 (Client ID: B2-08201-CJWC-A018-CV 0 0-0 5) demonstrated a slightly high method detection limit. The method blank demonstrated acceptable results for all radionuclides as reported. Results for the Bismuth-214 and Potassium-40 replicate demonstrated an acceptable relative percent difference and normalized difference. Results for the Thorium-234 replicate demonstrated a high relative percent; however, normalized difference is within acceptable limits for the analytical technique. 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: 11/13/2019

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.

<h1 style="margin: 0;">Eberline Analytical</h1> <h2 style="margin: 0;">Final Report of Analysis</h2>			Report To:					Work Order Details:							
			Gerald Wood Zion Solutions 2701 Deborah Ave Zion, IL 60099					SDG:	20-04072						
								Purchase Order:	677116						
								Analysis Category:	ENVIRONMENTAL						
								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	
20-04072-01	LCS	KNOWN	04/25/20 00:00	4/25/2020	4/30/2020	20-04072	Americium-241	EML Am-01 Modified	5.55E+00	1.66E-01				pCi/g	
20-04072-01	LCS	SPIKE	04/25/20 00:00	4/25/2020	4/30/2020	20-04072	Americium-241	EML Am-01 Modified	5.47E+00	1.01E+00	1.10E+00	1.40E-01		pCi/g	
20-04072-02	MBL	BLANK	04/25/20 00:00	4/25/2020	4/30/2020	20-04072	Americium-241	EML Am-01 Modified	6.96E-02	7.57E-02	7.59E-02	9.09E-02	U	pCi/g	
20-04072-03	DUP	B1-06202A-FSWC-040-CV	06/18/18 10:30	4/25/2020	4/30/2020	20-04072	Americium-241	EML Am-01 Modified	7.52E-02	8.00E-02	8.02E-02	1.11E-01	U	pCi/g	
20-04072-04	DO	B1-06202A-FSWC-040-CV	06/18/18 10:30	4/25/2020	4/30/2020	20-04072	Americium-241	EML Am-01 Modified	6.44E-02	8.10E-02	8.12E-02	1.29E-01	U	pCi/g	
20-04072-05	TRG	B1-06214A-FSFC-001-CV	05/05/18 15:15	4/25/2020	4/30/2020	20-04072	Americium-241	EML Am-01 Modified	-4.34E-04	4.60E-02	4.60E-02	1.37E-01	U	pCi/g	
20-04072-06	TRG	B2-08101A-BJFC-007-CV 0 0-0 5	05/09/12 14:22	4/25/2020	4/30/2020	20-04072	Americium-241	EML Am-01 Modified	4.23E-02	5.13E-02	5.14E-02	6.24E-02	U	pCi/g	
20-04072-07	TRG	B2-08101A-BJFC-007-CV 0 5-1 0	05/09/12 14:22	4/25/2020	4/30/2020	20-04072	Americium-241	EML Am-01 Modified	2.06E-02	5.15E-02	5.16E-02	1.07E-01	U	pCi/g	
20-04072-08	TRG	B2-08201-CJWC-A018-CV 0 0-0 5	05/10/12 12:56	4/25/2020	4/30/2020	20-04072	Americium-241	EML Am-01 Modified	-1.29E-02	4.50E-02	4.50E-02	1.27E-01	U	pCi/g	
20-04072-09	TRG	B2-08201-CJWC-A018-CV 0 5-1 0	05/10/12 12:56	4/25/2020	4/30/2020	20-04072	Americium-241	EML Am-01 Modified	1.73E-02	5.61E-02	5.61E-02	1.16E-01	U	pCi/g	
20-04072-10	TRG	L2-10214C-RJGS-001-SM-A	05/07/19 07:45	4/25/2020	4/30/2020	20-04072	Americium-241	EML Am-01 Modified	3.36E-02	5.17E-02	5.18E-02	8.85E-02	U	pCi/g	
20-04072-11	TRG	L1-12109L-CJGS-001-SB-A	08/21/19 10:25	4/25/2020	4/30/2020	20-04072	Americium-241	EML Am-01 Modified	6.61E-02	6.77E-02	6.79E-02	9.05E-02	U	pCi/g	
20-04072-12	TRG	L1-12106L-CJGS-001-SB-A	08/14/19 13:30	4/25/2020	4/30/2020	20-04072	Americium-241	EML Am-01 Modified	4.47E-02	6.86E-02	6.87E-02	1.02E-01	U	pCi/g	
20-04072-01	LCS	KNOWN	04/25/20 00:00	4/25/2020	4/30/2020	20-04072	Americium-243	EML Am-01 Modified	6.05E+00	1.82E-01				pCi/g	
20-04072-01	LCS	SPIKE	04/25/20 00:00	4/25/2020	4/30/2020	20-04072	Americium-243	EML Am-01 Modified	5.41E+00	7.46E-01	1.10E+00	9.62E-02		pCi/g	
20-04072-02	MBL	BLANK	04/25/20 00:00	4/25/2020	4/30/2020	20-04072	Americium-243	EML Am-01 Modified	5.60E-02	6.78E-02	6.83E-02	8.26E-02	U	pCi/g	
20-04072-03	DUP	B1-06202A-FSWC-040-CV	06/18/18 10:30	4/25/2020	4/30/2020	20-04072	Americium-243	EML Am-01 Modified	7.10E-02	7.33E-02	7.40E-02	7.74E-02	U	pCi/g	
20-04072-04	DO	B1-06202A-FSWC-040-CV	06/18/18 10:30	4/25/2020	4/30/2020	20-04072	Americium-243	EML Am-01 Modified	2.85E-02	6.17E-02	6.18E-02	1.22E-01	U	pCi/g	
20-04072-05	TRG	B1-06214A-FSFC-001-CV	05/05/18 15:15	4/25/2020	4/30/2020	20-04072	Americium-243	EML Am-01 Modified	4.43E-02	5.81E-02	5.84E-02	8.86E-02	U	pCi/g	
20-04072-06	TRG	B2-08101A-BJFC-007-CV 0 0-0 5	05/09/12 14:22	4/25/2020	4/30/2020	20-04072	Americium-243	EML Am-01 Modified	2.02E-01	3.46E-01	3.47E-01	6.07E-01	U	pCi/g	
20-04072-07	TRG	B2-08101A-BJFC-007-CV 0 5-1 0	05/09/12 14:22	4/25/2020	4/30/2020	20-04072	Americium-243	EML Am-01 Modified	5.82E-02	7.03E-02	7.09E-02	8.58E-02	U	pCi/g	
20-04072-08	TRG	B2-08201-CJWC-A018-CV 0 0-0 5	05/10/12 12:56	4/25/2020	4/30/2020	20-04072	Americium-243	EML Am-01 Modified	1.14E-01	1.16E-01	1.17E-01	1.56E-01	U	pCi/g	
20-04072-09	TRG	B2-08201-CJWC-A018-CV 0 5-1 0	05/10/12 12:56	4/25/2020	4/30/2020	20-04072	Americium-243	EML Am-01 Modified	6.77E-02	7.96E-02	8.03E-02	1.17E-01	U	pCi/g	
20-04072-10	TRG	L2-10214C-RJGS-001-SM-A	05/07/19 07:45	4/25/2020	4/30/2020	20-04072	Americium-243	EML Am-01 Modified	1.41E-02	3.38E-02	3.39E-02	7.10E-02	U	pCi/g	
20-04072-11	TRG	L1-12109L-CJGS-001-SB-A	08/21/19 10:25	4/25/2020	4/30/2020	20-04072	Americium-243	EML Am-01 Modified	-1.41E-02	3.49E-02	3.50E-02	9.95E-02	U	pCi/g	
20-04072-12	TRG	L1-12106L-CJGS-001-SB-A	08/14/19 13:30	4/25/2020	4/30/2020	20-04072	Americium-243	EML Am-01 Modified	-2.63E-02	4.75E-02	4.77E-02	1.46E-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



EBERLINE ANALYTICAL CORPORATION

601 SCARBORO ROAD OAK RIDGE, TN 37830 865/481-0683 FAX 865/483-4621

Eberline Analytical Final Report of Analysis			Report To:						Work Order Details:							
			Gerald Wood						SDG:	20-04072						
			Zion Solutions						Purchase Order:	677116						
			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		
20-04072-01	LCS	KNOWN	04/25/20 00:00	4/25/2020	4/30/2020	20-04072	Curium-243/244	EML Am-01 Modified	5.99E+00	1.08E-01				pCi/g		
20-04072-01	LCS	SPIKE	04/25/20 00:00	4/25/2020	4/30/2020	20-04072	Curium-243/244	EML Am-01 Modified	5.83E+00	1.07E+00	1.28E+00	1.07E-01		pCi/g		
20-04072-02	MBL	BLANK	04/25/20 00:00	4/25/2020	4/30/2020	20-04072	Curium-243/244	EML Am-01 Modified	1.14E-01	9.99E-02	1.01E-01	1.14E-01		pCi/g		
20-04072-03	DUP	B1-06202A-FSWC-040-CV	06/18/18 10:30	4/25/2020	4/30/2020	20-04072	Curium-243/244	EML Am-01 Modified	2.29E-02	4.96E-02	4.96E-02	9.78E-02	U	pCi/g		
20-04072-04	DO	B1-06202A-FSWC-040-CV	06/18/18 10:30	4/25/2020	4/30/2020	20-04072	Curium-243/244	EML Am-01 Modified	2.12E-02	4.60E-02	4.60E-02	9.08E-02	U	pCi/g		
20-04072-05	TRG	B1-06214A-FSFC-001-CV	05/05/18 15:15	4/25/2020	4/30/2020	20-04072	Curium-243/244	EML Am-01 Modified	3.47E-02	6.62E-02	6.63E-02	1.22E-01	U	pCi/g		
20-04072-06	TRG	B2-08101A-BJFC-007-CV 0 0-0 5	05/09/12 14:22	4/25/2020	4/30/2020	20-04072	Curium-243/244	EML Am-01 Modified	1.24E-02	2.98E-02	2.98E-02	6.24E-02	U	pCi/g		
20-04072-07	TRG	B2-08101A-BJFC-007-CV 0 5-1 0	05/09/12 14:22	4/25/2020	4/30/2020	20-04072	Curium-243/244	EML Am-01 Modified	8.35E-02	7.99E-02	8.06E-02	8.57E-02	U	pCi/g		
20-04072-08	TRG	B2-08201-CJWC-A018-CV 0 0-0 5	05/10/12 12:56	4/25/2020	4/30/2020	20-04072	Curium-243/244	EML Am-01 Modified	4.05E-02	6.63E-02	6.64E-02	1.16E-01	U	pCi/g		
20-04072-09	TRG	B2-08201-CJWC-A018-CV 0 5-1 0	05/10/12 12:56	4/25/2020	4/30/2020	20-04072	Curium-243/244	EML Am-01 Modified	6.71E-02	7.25E-02	7.30E-02	1.05E-01	U	pCi/g		
20-04072-10	TRG	L2-10214C-RJGS-001-SM-A	05/07/19 07:45	4/25/2020	4/30/2020	20-04072	Curium-243/244	EML Am-01 Modified	1.53E-02	4.19E-02	4.19E-02	8.65E-02	U	pCi/g		
20-04072-11	TRG	L1-12109L-CJGS-001-SB-A	08/21/19 10:25	4/25/2020	4/30/2020	20-04072	Curium-243/244	EML Am-01 Modified	2.31E-02	4.97E-02	4.98E-02	9.66E-02	U	pCi/g		
20-04072-12	TRG	L1-12106L-CJGS-001-SB-A	08/14/19 13:30	4/25/2020	4/30/2020	20-04072	Curium-243/244	EML Am-01 Modified	4.59E-02	7.04E-02	7.06E-02	1.05E-01	U	pCi/g		
20-04072-01	LCS	KNOWN	04/25/20 00:00	4/25/2020	4/27/2020	20-04072	Carbon-14	EPA 520.0 Modified	1.32E+03	3.70E+01				pCi/g		
20-04072-01	LCS	SPIKE	04/25/20 00:00	4/25/2020	4/27/2020	20-04072	Carbon-14	EPA 520.0 Modified	1.30E+03	9.67E+00	1.81E+02	4.08E+00		pCi/g		
20-04072-02	MBL	BLANK	04/25/20 00:00	4/25/2020	4/27/2020	20-04072	Carbon-14	EPA 520.0 Modified	-3.73E-01	4.65E-01	4.68E-01	7.99E-01	U	pCi/g		
20-04072-03	DUP	B1-06202A-FSWC-040-CV	06/18/18 10:30	4/25/2020	4/27/2020	20-04072	Carbon-14	EPA 520.0 Modified	-5.57E-01	3.64E-01	3.72E-01	6.32E-01	U	pCi/g		
20-04072-04	DO	B1-06202A-FSWC-040-CV	06/18/18 10:30	4/25/2020	4/27/2020	20-04072	Carbon-14	EPA 520.0 Modified	-4.31E-01	3.70E-01	3.75E-01	6.39E-01	U	pCi/g		
20-04072-05	TRG	B1-06214A-FSFC-001-CV	05/05/18 15:15	4/25/2020	4/28/2020	20-04072	Carbon-14	EPA 520.0 Modified	-6.32E-01	3.49E-01	3.60E-01	6.09E-01	U	pCi/g		
20-04072-06	TRG	B2-08101A-BJFC-007-CV 0 0-0 5	05/09/12 14:22	4/25/2020	4/28/2020	20-04072	Carbon-14	EPA 520.0 Modified	-4.56E-01	3.63E-01	3.69E-01	6.28E-01	U	pCi/g		
20-04072-07	TRG	B2-08101A-BJFC-007-CV 0 5-1 0	05/09/12 14:22	4/25/2020	4/28/2020	20-04072	Carbon-14	EPA 520.0 Modified	-2.87E-01	4.03E-01	4.04E-01	6.91E-01	U	pCi/g		
20-04072-08	TRG	B2-08201-CJWC-A018-CV 0 0-0 5	05/10/12 12:56	4/25/2020	4/28/2020	20-04072	Carbon-14	EPA 520.0 Modified	-6.71E-01	3.91E-01	4.02E-01	6.81E-01	U	pCi/g		
20-04072-09	TRG	B2-08201-CJWC-A018-CV 0 5-1 0	05/10/12 12:56	4/25/2020	4/28/2020	20-04072	Carbon-14	EPA 520.0 Modified	-5.32E-01	3.69E-01	3.77E-01	6.41E-01	U	pCi/g		
20-04072-10	TRG	L2-10214C-RJGS-001-SM-A	05/07/19 07:45	4/25/2020	4/28/2020	20-04072	Carbon-14	EPA 520.0 Modified	-4.72E-01	3.76E-01	3.81E-01	6.50E-01	U	pCi/g		
20-04072-11	TRG	L1-12109L-CJGS-001-SB-A	08/21/19 10:25	4/25/2020	4/28/2020	20-04072	Carbon-14	EPA 520.0 Modified	-4.92E-01	3.91E-01	3.97E-01	6.77E-01	U	pCi/g		
20-04072-12	TRG	L1-12106L-CJGS-001-SB-A	08/14/19 13:30	4/25/2020	4/28/2020	20-04072	Carbon-14	EPA 520.0 Modified	-3.28E-01	3.68E-01	3.71E-01	6.33E-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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			Gerald Wood						SDG:	20-04072						
			Zion Solutions						Purchase Order:	677116						
			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		
20-04072-01	LCS	KNOWN	04/25/20 00:00	4/25/2020	4/28/2020	20-04072	Iron-55	EML Fe-01-01 Modified	4.08E+03	3.50E+02				pCi/g		
20-04072-01	LCS	SPIKE	04/25/20 00:00	4/25/2020	4/28/2020	20-04072	Iron-55	EML Fe-01-01 Modified	3.41E+03	2.32E+02	6.33E+02	2.51E+02		pCi/g		
20-04072-02	MBL	BLANK	04/25/20 00:00	4/25/2020	4/28/2020	20-04072	Iron-55	EML Fe-01-01 Modified	5.18E+00	1.92E+01	1.92E+01	3.01E+01	U	pCi/g		
20-04072-03	DUP	B1-06202A-FSWC-040-CV	06/18/18 10:30	4/25/2020	4/28/2020	20-04072	Iron-55	EML Fe-01-01 Modified	3.19E-02	1.31E-01	1.31E-01	2.15E-01	U	pCi/g		
20-04072-04	DO	B1-06202A-FSWC-040-CV	06/18/18 10:30	4/25/2020	4/28/2020	20-04072	Iron-55	EML Fe-01-01 Modified	-3.00E-02	1.41E-01	1.41E-01	2.23E-01	U	pCi/g		
20-04072-05	TRG	B1-06214A-FSFC-001-CV	05/05/18 15:15	4/25/2020	4/28/2020	20-04072	Iron-55	EML Fe-01-01 Modified	6.56E-02	1.89E-01	1.89E-01	3.14E-01	U	pCi/g		
20-04072-06	TRG	B2-08101A-BJFC-007-CV 0 0-0 5	05/09/12 14:22	4/25/2020	4/28/2020	20-04072	Iron-55	EML Fe-01-01 Modified	7.56E-01	2.76E+00	2.76E+00	4.46E+00	U	pCi/g		
20-04072-07	TRG	B2-08101A-BJFC-007-CV 0 5-1 0	05/09/12 14:22	4/25/2020	4/29/2020	20-04072	Iron-55	EML Fe-01-01 Modified	-1.76E+00	2.08E+00	2.10E+00	3.04E+00	U	pCi/g		
20-04072-08	TRG	B2-08201-CJWC-A018-CV 0 0-0 5	05/10/12 12:56	4/25/2020	4/29/2020	20-04072	Iron-55	EML Fe-01-01 Modified	-1.79E-01	3.22E+00	3.22E+00	5.12E+00	U	pCi/g		
20-04072-09	TRG	B2-08201-CJWC-A018-CV 0 5-1 0	05/10/12 12:56	4/25/2020	4/29/2020	20-04072	Iron-55	EML Fe-01-01 Modified	1.34E+00	2.55E+00	2.56E+00	4.30E+00	U	pCi/g		
20-04072-10	TRG	L2-10214C-RJGS-001-SM-A	05/07/19 07:45	4/25/2020	4/29/2020	20-04072	Iron-55	EML Fe-01-01 Modified	5.91E-02	6.71E-02	6.79E-02	1.15E-01	U	pCi/g		
20-04072-11	TRG	L1-12109L-CJGS-001-SB-A	08/21/19 10:25	4/25/2020	4/29/2020	20-04072	Iron-55	EML Fe-01-01 Modified	-1.82E-02	3.86E-01	3.86E-01	6.15E-01	U	pCi/g		
20-04072-12	TRG	L1-12106L-CJGS-001-SB-A	08/14/19 13:30	4/25/2020	4/29/2020	20-04072	Iron-55	EML Fe-01-01 Modified	1.85E-01	2.37E-01	2.39E-01	4.04E-01	U	pCi/g		
20-04072-01	LCS	KNOWN	04/25/20 00:00	4/25/2020	4/30/2020	20-04072	Tritium	LANL ER-210 Modified	3.61E+02	1.30E+01				pCi/g		
20-04072-01	LCS	SPIKE	04/25/20 00:00	4/25/2020	4/30/2020	20-04072	Tritium	LANL ER-210 Modified	3.69E+02	6.96E+00	2.18E+01	3.62E+00		pCi/g		
20-04072-02	MBL	BLANK	04/25/20 00:00	4/25/2020	4/30/2020	20-04072	Tritium	LANL ER-210 Modified	2.05E+00	2.16E+00	2.16E+00	3.62E+00	U	pCi/g		
20-04072-03	DUP	B1-06202A-FSWC-040-CV	06/18/18 10:30	4/25/2020	4/30/2020	20-04072	Tritium	LANL ER-210 Modified	1.85E+00	2.36E+00	2.37E+00	3.98E+00	U	pCi/g		
20-04072-04	DO	B1-06202A-FSWC-040-CV	06/18/18 10:30	4/25/2020	4/30/2020	20-04072	Tritium	LANL ER-210 Modified	3.70E+00	2.42E+00	2.42E+00	3.98E+00	U	pCi/g		
20-04072-05	TRG	B1-06214A-FSFC-001-CV	05/05/18 15:15	4/25/2020	5/1/2020	20-04072	Tritium	LANL ER-210 Modified	3.86E+00	2.40E+00	2.41E+00	3.94E+00	U	pCi/g		
20-04072-06	TRG	B2-08101A-BJFC-007-CV 0 0-0 5	05/09/12 14:22	4/25/2020	5/1/2020	20-04072	Tritium	LANL ER-210 Modified	4.97E+00	3.43E+00	3.44E+00	5.67E+00	U	pCi/g		
20-04072-07	TRG	B2-08101A-BJFC-007-CV 0 5-1 0	05/09/12 14:22	4/25/2020	5/1/2020	20-04072	Tritium	LANL ER-210 Modified	6.35E+00	5.68E+00	5.69E+00	9.48E+00	U	pCi/g		
20-04072-08	TRG	B2-08201-CJWC-A018-CV 0 0-0 5	05/10/12 12:56	4/25/2020	5/1/2020	20-04072	Tritium	LANL ER-210 Modified	4.02E+00	3.34E+00	3.35E+00	5.56E+00	U	pCi/g		
20-04072-09	TRG	B2-08201-CJWC-A018-CV 0 5-1 0	05/10/12 12:56	4/25/2020	5/1/2020	20-04072	Tritium	LANL ER-210 Modified	6.41E+00	3.46E+00	3.47E+00	5.64E+00		pCi/g		
20-04072-10	TRG	L2-10214C-RJGS-001-SM-A	05/07/19 07:45	4/25/2020	5/1/2020	20-04072	Tritium	LANL ER-210 Modified	2.74E+00	2.28E+00	2.28E+00	3.79E+00	U	pCi/g		
20-04072-11	TRG	L1-12109L-CJGS-001-SB-A	08/21/19 10:25	4/25/2020	5/1/2020	20-04072	Tritium	LANL ER-210 Modified	8.51E+00	2.36E+00	2.41E+00	3.67E+00		pCi/g		
20-04072-12	TRG	L1-12106L-CJGS-001-SB-A	08/14/19 13:30	4/25/2020	5/1/2020	20-04072	Tritium	LANL ER-210 Modified	1.50E+00	2.16E+00	2.16E+00	3.64E+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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			Gerald Wood						SDG:	20-04072					
			Zion Solutions						Purchase Order:	677116					
			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	
20-04072-01	LCS	KNOWN	04/25/20 00:00	4/25/2020	4/28/2020	20-04072	Iron-55	ASTM 3500-Ni Modified	4.08E+03	3.50E+02				pCi/g	
20-04072-01	LCS	SPIKE	04/25/20 00:00	4/25/2020	4/28/2020	20-04072	Iron-55	ASTM 3500-Ni Modified	3.05E+03	2.42E+02	3.20E+02	2.94E+02		pCi/g	
20-04072-02	MBL	BLANK	04/25/20 00:00	4/25/2020	4/28/2020	20-04072	Nickel-59	ASTM 3500-Ni Modified	-2.65E+00	1.49E+01	1.49E+01	2.28E+01	U	pCi/g	
20-04072-03	DUP	B1-06202A-FSWC-040-CV	06/18/18 10:30	4/25/2020	4/28/2020	20-04072	Nickel-59	ASTM 3500-Ni Modified	-2.89E-02	7.41E-02	7.41E-02	1.11E-01	U	pCi/g	
20-04072-04	DO	B1-06202A-FSWC-040-CV	06/18/18 10:30	4/25/2020	4/28/2020	20-04072	Nickel-59	ASTM 3500-Ni Modified	1.46E-02	7.26E-02	7.27E-02	1.15E-01	U	pCi/g	
20-04072-05	TRG	B1-06214A-FSFC-001-CV	05/05/18 15:15	4/25/2020	4/28/2020	20-04072	Nickel-59	ASTM 3500-Ni Modified	-4.18E-03	9.97E-02	9.97E-02	1.53E-01	U	pCi/g	
20-04072-06	TRG	B2-08101A-BJFC-007-CV 0 0-0 5	05/09/12 14:22	4/25/2020	4/28/2020	20-04072	Nickel-59	ASTM 3500-Ni Modified	1.10E-02	2.98E-01	2.98E-01	4.67E-01	U	pCi/g	
20-04072-07	TRG	B2-08101A-BJFC-007-CV 0 5-1 0	05/09/12 14:22	4/25/2020	4/29/2020	20-04072	Nickel-59	ASTM 3500-Ni Modified	7.38E-02	1.97E-01	1.97E-01	3.17E-01	U	pCi/g	
20-04072-08	TRG	B2-08201-CJWC-A018-CV 0 0-0 5	05/10/12 12:56	4/25/2020	4/29/2020	20-04072	Nickel-59	ASTM 3500-Ni Modified	1.08E-01	3.31E-01	3.31E-01	5.28E-01	U	pCi/g	
20-04072-09	TRG	B2-08201-CJWC-A018-CV 0 5-1 0	05/10/12 12:56	4/25/2020	4/29/2020	20-04072	Nickel-59	ASTM 3500-Ni Modified	3.79E-02	2.76E-01	2.76E-01	4.38E-01	U	pCi/g	
20-04072-10	TRG	L2-10214C-RJGS-001-SM-A	05/07/19 07:45	4/25/2020	4/29/2020	20-04072	Nickel-59	ASTM 3500-Ni Modified	-6.28E-03	4.68E-02	4.68E-02	7.12E-02	U	pCi/g	
20-04072-11	TRG	L1-12109L-CJGS-001-SB-A	08/21/19 10:25	4/25/2020	4/29/2020	20-04072	Nickel-59	ASTM 3500-Ni Modified	1.80E-01	2.62E-01	2.63E-01	4.32E-01	U	pCi/g	
20-04072-12	TRG	L1-12106L-CJGS-001-SB-A	08/14/19 13:30	4/25/2020	4/29/2020	20-04072	Nickel-59	ASTM 3500-Ni Modified	-1.36E-01	1.78E-01	1.78E-01	2.52E-01	U	pCi/g	
20-04072-01	LCS	KNOWN	04/25/20 00:00	4/25/2020	4/30/2020	20-04072	Nickel-63	ASTM 3500-Ni Modified	1.46E+03	4.39E+01				pCi/g	
20-04072-01	LCS	SPIKE	04/25/20 00:00	4/25/2020	4/30/2020	20-04072	Nickel-63	ASTM 3500-Ni Modified	1.48E+03	9.06E+00	8.76E+01	2.19E+00		pCi/g	
20-04072-02	MBL	BLANK	04/25/20 00:00	4/25/2020	4/30/2020	20-04072	Nickel-63	ASTM 3500-Ni Modified	-8.58E-01	1.28E+00	1.28E+00	2.22E+00	U	pCi/g	
20-04072-03	DUP	B1-06202A-FSWC-040-CV	06/18/18 10:30	4/25/2020	4/30/2020	20-04072	Nickel-63	ASTM 3500-Ni Modified	9.36E-01	1.30E+00	1.31E+00	2.20E+00	U	pCi/g	
20-04072-04	DO	B1-06202A-FSWC-040-CV	06/18/18 10:30	4/25/2020	4/30/2020	20-04072	Nickel-63	ASTM 3500-Ni Modified	1.45E+00	1.32E+00	1.32E+00	2.20E+00	U	pCi/g	
20-04072-05	TRG	B1-06214A-FSFC-001-CV	05/05/18 15:15	4/25/2020	4/30/2020	20-04072	Nickel-63	ASTM 3500-Ni Modified	2.70E-01	1.37E+00	1.37E+00	2.33E+00	U	pCi/g	
20-04072-06	TRG	B2-08101A-BJFC-007-CV 0 0-0 5	05/09/12 14:22	4/25/2020	4/30/2020	20-04072	Nickel-63	ASTM 3500-Ni Modified	4.56E-01	1.39E+00	1.39E+00	2.36E+00	U	pCi/g	
20-04072-07	TRG	B2-08101A-BJFC-007-CV 0 5-1 0	05/09/12 14:22	4/25/2020	4/30/2020	20-04072	Nickel-63	ASTM 3500-Ni Modified	7.46E-01	1.42E+00	1.42E+00	2.41E+00	U	pCi/g	
20-04072-08	TRG	B2-08201-CJWC-A018-CV 0 0-0 5	05/10/12 12:56	4/25/2020	4/30/2020	20-04072	Nickel-63	ASTM 3500-Ni Modified	-6.62E-01	1.41E+00	1.41E+00	2.44E+00	U	pCi/g	
20-04072-09	TRG	B2-08201-CJWC-A018-CV 0 5-1 0	05/10/12 12:56	4/25/2020	4/30/2020	20-04072	Nickel-63	ASTM 3500-Ni Modified	5.54E-01	1.41E+00	1.41E+00	2.38E+00	U	pCi/g	
20-04072-10	TRG	L2-10214C-RJGS-001-SM-A	05/07/19 07:45	4/25/2020	4/30/2020	20-04072	Nickel-63	ASTM 3500-Ni Modified	-1.73E-01	1.30E+00	1.30E+00	2.24E+00	U	pCi/g	
20-04072-11	TRG	L1-12109L-CJGS-001-SB-A	08/21/19 10:25	4/25/2020	4/30/2020	20-04072	Nickel-63	ASTM 3500-Ni Modified	7.13E-01	1.36E+00	1.36E+00	2.30E+00	U	pCi/g	
20-04072-12	TRG	L1-12106L-CJGS-001-SB-A	08/14/19 13:30	4/25/2020	4/30/2020	20-04072	Nickel-63	ASTM 3500-Ni Modified	-1.09E+00	1.24E+00	1.24E+00	2.16E+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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<h1 style="margin: 0;">Eberline Analytical</h1> <h2 style="margin: 0;">Final Report of Analysis</h2>			Report To:					Work Order Details:								
			Gerald Wood					SDG:	20-04072							
			Zion Solutions					Purchase Order:	677116							
			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		
20-04072-01	LCS	KNOWN	04/25/20 00:00	4/25/2020	4/29/2020	20-04072	Neptunium-237	EIChroM ACW08 Mod	1.02E+01	3.67E-01				pCi/g		
20-04072-01	LCS	SPIKE	04/25/20 00:00	4/25/2020	4/29/2020	20-04072	Neptunium-237	EIChroM ACW08 Mod	1.17E+01	9.71E-01	1.67E+00	1.19E-01		pCi/g		
20-04072-02	MBL	BLANK	04/25/20 00:00	4/25/2020	4/29/2020	20-04072	Neptunium-237	EIChroM ACW08 Mod	5.84E-02	8.35E-02	8.37E-02	1.37E-01	U	pCi/g		
20-04072-03	DUP	B1-06202A-FSWC-040-CV	06/18/18 10:30	4/25/2020	4/29/2020	20-04072	Neptunium-237	EIChroM ACW08 Mod	-2.75E-03	3.22E-02	3.22E-02	6.75E-02	U	pCi/g		
20-04072-04	DO	B1-06202A-FSWC-040-CV	06/18/18 10:30	4/25/2020	4/29/2020	20-04072	Neptunium-237	EIChroM ACW08 Mod	4.76E-02	5.74E-02	5.76E-02	7.02E-02	U	pCi/g		
20-04072-05	TRG	B1-06214A-FSFC-001-CV	05/05/18 15:15	4/25/2020	4/29/2020	20-04072	Neptunium-237	EIChroM ACW08 Mod	2.94E-02	4.98E-02	4.99E-02	8.80E-02	U	pCi/g		
20-04072-06	TRG	B2-08101A-BJFC-007-CV 0 0-0 5	05/09/12 14:22	4/25/2020	4/29/2020	20-04072	Neptunium-237	EIChroM ACW08 Mod	7.53E-02	7.65E-02	7.70E-02	1.03E-01	U	pCi/g		
20-04072-07	TRG	B2-08101A-BJFC-007-CV 0 5-1 0	05/09/12 14:22	4/25/2020	4/29/2020	20-04072	Neptunium-237	EIChroM ACW08 Mod	4.84E-02	6.93E-02	6.95E-02	1.14E-01	U	pCi/g		
20-04072-08	TRG	B2-08201-CJWC-A018-CV 0 0-0 5	05/10/12 12:56	4/25/2020	4/29/2020	20-04072	Neptunium-237	EIChroM ACW08 Mod	4.18E-02	5.04E-02	5.07E-02	6.17E-02	U	pCi/g		
20-04072-09	TRG	B2-08201-CJWC-A018-CV 0 5-1 0	05/10/12 12:56	4/25/2020	4/29/2020	20-04072	Neptunium-237	EIChroM ACW08 Mod	4.72E-02	7.22E-02	7.24E-02	1.23E-01	U	pCi/g		
20-04072-10	TRG	L2-10214C-RJGS-001-SM-A	05/07/19 07:45	4/25/2020	4/29/2020	20-04072	Neptunium-237	EIChroM ACW08 Mod	7.03E-02	6.64E-02	6.69E-02	8.17E-02	U	pCi/g		
20-04072-11	TRG	L1-12109L-CJGS-001-SB-A	08/21/19 10:25	4/25/2020	4/29/2020	20-04072	Neptunium-237	EIChroM ACW08 Mod	4.14E-02	4.99E-02	5.01E-02	6.10E-02	U	pCi/g		
20-04072-12	TRG	L1-12106L-CJGS-001-SB-A	08/14/19 13:30	4/25/2020	4/29/2020	20-04072	Neptunium-237	EIChroM ACW08 Mod	1.52E-02	5.68E-02	5.68E-02	1.23E-01	U	pCi/g		
20-04072-01	LCS	KNOWN	04/25/20 00:00	4/25/2020	4/29/2020	20-04072	Promethium-147	EML Pm-01 Modified	5.99E+01	1.62E+00				pCi/g		
20-04072-01	LCS	SPIKE	04/25/20 00:00	4/25/2020	4/29/2020	20-04072	Promethium-147	EML Pm-01 Modified	5.89E+01	1.77E+00	9.02E+00	1.51E+00		pCi/g		
20-04072-02	MBL	BLANK	04/25/20 00:00	4/25/2020	4/29/2020	20-04072	Promethium-147	EML Pm-01 Modified	5.01E-01	8.91E-01	8.94E-01	1.51E+00	U	pCi/g		
20-04072-03	DUP	B1-06202A-FSWC-040-CV	06/18/18 10:30	4/25/2020	4/29/2020	20-04072	Promethium-147	EML Pm-01 Modified	1.47E+00	1.41E+00	1.43E+00	2.36E+00	U	pCi/g		
20-04072-04	DO	B1-06202A-FSWC-040-CV	06/18/18 10:30	4/25/2020	4/29/2020	20-04072	Promethium-147	EML Pm-01 Modified	1.63E+00	1.46E+00	1.48E+00	2.44E+00	U	pCi/g		
20-04072-05	TRG	B1-06214A-FSFC-001-CV	05/05/18 15:15	4/25/2020	4/30/2020	20-04072	Promethium-147	EML Pm-01 Modified	1.38E+00	1.52E+00	1.53E+00	2.55E+00	U	pCi/g		
20-04072-06	TRG	B2-08101A-BJFC-007-CV 0 0-0 5	05/09/12 14:22	4/25/2020	4/30/2020	20-04072	Promethium-147	EML Pm-01 Modified	1.34E+01	7.54E+00	7.80E+00	1.24E+01		pCi/g		
20-04072-07	TRG	B2-08101A-BJFC-007-CV 0 5-1 0	05/09/12 14:22	4/25/2020	4/30/2020	20-04072	Promethium-147	EML Pm-01 Modified	1.17E+01	7.08E+00	7.30E+00	1.17E+01	U	pCi/g		
20-04072-08	TRG	B2-08201-CJWC-A018-CV 0 0-0 5	05/10/12 12:56	4/25/2020	4/30/2020	20-04072	Promethium-147	EML Pm-01 Modified	7.99E+00	7.19E+00	7.29E+00	1.20E+01	U	pCi/g		
20-04072-09	TRG	B2-08201-CJWC-A018-CV 0 5-1 0	05/10/12 12:56	4/25/2020	4/30/2020	20-04072	Promethium-147	EML Pm-01 Modified	1.10E+01	7.27E+00	7.46E+00	1.20E+01	U	pCi/g		
20-04072-10	TRG	L2-10214C-RJGS-001-SM-A	05/07/19 07:45	4/25/2020	4/30/2020	20-04072	Promethium-147	EML Pm-01 Modified	9.09E-01	1.18E+00	1.19E+00	1.99E+00	U	pCi/g		
20-04072-11	TRG	L1-12109L-CJGS-001-SB-A	08/21/19 10:25	4/25/2020	4/30/2020	20-04072	Promethium-147	EML Pm-01 Modified	1.66E+00	1.14E+00	1.17E+00	1.90E+00	U	pCi/g		
20-04072-12	TRG	L1-12106L-CJGS-001-SB-A	08/14/19 13:30	4/25/2020	4/30/2020	20-04072	Promethium-147	EML Pm-01 Modified	7.42E-02	1.04E+00	1.04E+00	1.78E+00	U	pCi/g		

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Eberline Analytical Final Report of Analysis			Report To:						Work Order Details:							
			Gerald Wood						SDG:	20-04072						
			Zion Solutions						Purchase Order:	677116						
			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		
20-04072-01	LCS	KNOWN	04/25/20 00:00	4/25/2020	4/30/2020	20-04072	Plutonium-238	EML Pu-02 Modified	7.13E+00	1.50E-01				pCi/g		
20-04072-01	LCS	SPIKE	04/25/20 00:00	4/25/2020	4/30/2020	20-04072	Plutonium-238	EML Pu-02 Modified	5.64E+00	7.02E-01	8.87E-01	1.36E-01		pCi/g		
20-04072-02	MBL	BLANK	04/25/20 00:00	4/25/2020	4/30/2020	20-04072	Plutonium-238	EML Pu-02 Modified	-1.22E-02	5.21E-02	5.21E-02	1.45E-01	U	pCi/g		
20-04072-03	DUP	B1-06202A-FSWC-040-CV	06/18/18 10:30	4/25/2020	4/30/2020	20-04072	Plutonium-238	EML Pu-02 Modified	7.21E-02	9.43E-02	9.45E-02	1.52E-01	U	pCi/g		
20-04072-04	DO	B1-06202A-FSWC-040-CV	06/18/18 10:30	4/25/2020	4/30/2020	20-04072	Plutonium-238	EML Pu-02 Modified	5.50E-02	7.41E-02	7.42E-02	1.16E-01	U	pCi/g		
20-04072-05	TRG	B1-06214A-FSFC-001-CV	05/05/18 15:15	4/25/2020	4/30/2020	20-04072	Plutonium-238	EML Pu-02 Modified	-2.76E-03	3.23E-02	3.23E-02	6.77E-02	U	pCi/g		
20-04072-06	TRG	B2-08101A-BJFC-007-CV 0 0-0 5	05/09/12 14:22	4/25/2020	4/30/2020	20-04072	Plutonium-238	EML Pu-02 Modified	-8.11E-03	4.81E-02	4.81E-02	1.14E-01	U	pCi/g		
20-04072-07	TRG	B2-08101A-BJFC-007-CV 0 5-1 0	05/09/12 14:22	4/25/2020	4/30/2020	20-04072	Plutonium-238	EML Pu-02 Modified	-1.77E-02	4.37E-02	4.37E-02	1.25E-01	U	pCi/g		
20-04072-08	TRG	B2-08201-CJWC-A018-CV 0 0-0 5	05/10/12 12:56	4/25/2020	4/30/2020	20-04072	Plutonium-238	EML Pu-02 Modified	-2.84E-02	5.91E-02	5.92E-02	1.75E-01	U	pCi/g		
20-04072-09	TRG	B2-08201-CJWC-A018-CV 0 5-1 0	05/10/12 12:56	4/25/2020	4/30/2020	20-04072	Plutonium-238	EML Pu-02 Modified	-2.21E-02	6.72E-02	6.72E-02	1.83E-01	U	pCi/g		
20-04072-10	TRG	L2-10214C-RJGS-001-SM-A	05/07/19 07:45	4/25/2020	4/30/2020	20-04072	Plutonium-238	EML Pu-02 Modified	3.03E-02	8.41E-02	8.42E-02	1.82E-01	U	pCi/g		
20-04072-11	TRG	L1-12109L-CJGS-001-SB-A	08/21/19 10:25	4/25/2020	4/30/2020	20-04072	Plutonium-238	EML Pu-02 Modified	1.84E-02	6.63E-02	6.63E-02	1.50E-01	U	pCi/g		
20-04072-12	TRG	L1-12106L-CJGS-001-SB-A	08/14/19 13:30	4/25/2020	4/30/2020	20-04072	Plutonium-238	EML Pu-02 Modified	-2.11E-02	3.38E-02	3.38E-02	1.06E-01	U	pCi/g		
20-04072-01	LCS	KNOWN	04/25/20 00:00	4/25/2020	4/30/2020	20-04072	Plutonium-239/240	EML Pu-02 Modified	5.63E+00	1.80E-01				pCi/g		
20-04072-01	LCS	SPIKE	04/25/20 00:00	4/25/2020	4/30/2020	20-04072	Plutonium-239/240	EML Pu-02 Modified	5.93E+00	7.24E-01	9.21E-01	8.31E-02		pCi/g		
20-04072-02	MBL	BLANK	04/25/20 00:00	4/25/2020	4/30/2020	20-04072	Plutonium-239/240	EML Pu-02 Modified	-1.47E-02	3.81E-02	3.82E-02	1.28E-01	U	pCi/g		
20-04072-03	DUP	B1-06202A-FSWC-040-CV	06/18/18 10:30	4/25/2020	4/30/2020	20-04072	Plutonium-239/240	EML Pu-02 Modified	-3.56E-03	4.03E-02	4.03E-02	1.23E-01	U	pCi/g		
20-04072-04	DO	B1-06202A-FSWC-040-CV	06/18/18 10:30	4/25/2020	4/30/2020	20-04072	Plutonium-239/240	EML Pu-02 Modified	3.60E-02	6.36E-02	6.37E-02	1.15E-01	U	pCi/g		
20-04072-05	TRG	B1-06214A-FSFC-001-CV	05/05/18 15:15	4/25/2020	4/30/2020	20-04072	Plutonium-239/240	EML Pu-02 Modified	0.00E+00	4.43E-02	4.43E-02	9.58E-02	U	pCi/g		
20-04072-06	TRG	B2-08101A-BJFC-007-CV 0 0-0 5	05/09/12 14:22	4/25/2020	4/30/2020	20-04072	Plutonium-239/240	EML Pu-02 Modified	0.00E+00	6.21E-02	6.21E-02	1.34E-01	U	pCi/g		
20-04072-07	TRG	B2-08101A-BJFC-007-CV 0 5-1 0	05/09/12 14:22	4/25/2020	4/30/2020	20-04072	Plutonium-239/240	EML Pu-02 Modified	-3.32E-03	3.89E-02	3.89E-02	8.16E-02	U	pCi/g		
20-04072-08	TRG	B2-08201-CJWC-A018-CV 0 0-0 5	05/10/12 12:56	4/25/2020	4/30/2020	20-04072	Plutonium-239/240	EML Pu-02 Modified	1.72E-02	5.27E-02	5.27E-02	1.25E-01	U	pCi/g		
20-04072-09	TRG	B2-08201-CJWC-A018-CV 0 5-1 0	05/10/12 12:56	4/25/2020	4/30/2020	20-04072	Plutonium-239/240	EML Pu-02 Modified	4.02E-02	8.70E-02	8.71E-02	1.72E-01	U	pCi/g		
20-04072-10	TRG	L2-10214C-RJGS-001-SM-A	05/07/19 07:45	4/25/2020	4/30/2020	20-04072	Plutonium-239/240	EML Pu-02 Modified	-5.12E-03	5.98E-02	5.98E-02	1.26E-01	U	pCi/g		
20-04072-11	TRG	L1-12109L-CJGS-001-SB-A	08/21/19 10:25	4/25/2020	4/30/2020	20-04072	Plutonium-239/240	EML Pu-02 Modified	1.88E-02	4.51E-02	4.51E-02	9.45E-02	U	pCi/g		
20-04072-12	TRG	L1-12106L-CJGS-001-SB-A	08/14/19 13:30	4/25/2020	4/30/2020	20-04072	Plutonium-239/240	EML Pu-02 Modified	1.02E-02	3.11E-02	3.11E-02	7.38E-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



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			Gerald Wood						SDG:	20-04072						
			Zion Solutions						Purchase Order:	677116						
			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		
20-04072-01	LCS	KNOWN	04/25/20 00:00	4/25/2020	5/1/2020	20-04072	Plutonium-241	EML Pu-02 Modified	2.83E+02	1.30E+01				pCi/g		
20-04072-01	LCS	SPIKE	04/25/20 00:00	4/25/2020	5/1/2020	20-04072	Plutonium-241	EML Pu-02 Modified	3.08E+02	8.37E+00	2.64E+01	7.08E+00		pCi/g		
20-04072-02	MBL	BLANK	04/25/20 00:00	4/25/2020	5/1/2020	20-04072	Plutonium-241	EML Pu-02 Modified	-1.57E+00	4.81E+00	4.81E+00	8.28E+00	U	pCi/g		
20-04072-03	DUP	B1-06202A-FSWC-040-CV	06/18/18 10:30	4/25/2020	5/1/2020	20-04072	Plutonium-241	EML Pu-02 Modified	-1.14E+00	5.83E+00	5.84E+00	1.00E+01	U	pCi/g		
20-04072-04	DO	B1-06202A-FSWC-040-CV	06/18/18 10:30	4/25/2020	5/1/2020	20-04072	Plutonium-241	EML Pu-02 Modified	1.51E+00	5.85E+00	5.85E+00	9.95E+00	U	pCi/g		
20-04072-05	TRG	B1-06214A-FSFC-001-CV	05/05/18 15:15	4/25/2020	5/1/2020	20-04072	Plutonium-241	EML Pu-02 Modified	9.59E-01	3.72E+00	3.72E+00	6.33E+00	U	pCi/g		
20-04072-06	TRG	B2-08101A-BJFC-007-CV 0 0-0 5	05/09/12 14:22	4/25/2020	5/1/2020	20-04072	Plutonium-241	EML Pu-02 Modified	-1.47E+00	7.51E+00	7.52E+00	1.29E+01	U	pCi/g		
20-04072-07	TRG	B2-08101A-BJFC-007-CV 0 5-1 0	05/09/12 14:22	4/25/2020	5/1/2020	20-04072	Plutonium-241	EML Pu-02 Modified	2.44E+00	7.59E+00	7.59E+00	1.29E+01	U	pCi/g		
20-04072-08	TRG	B2-08201-CJWC-A018-CV 0 0-0 5	05/10/12 12:56	4/25/2020	5/1/2020	20-04072	Plutonium-241	EML Pu-02 Modified	7.81E+00	9.44E+00	9.46E+00	1.59E+01	U	pCi/g		
20-04072-09	TRG	B2-08201-CJWC-A018-CV 0 5-1 0	05/10/12 12:56	4/25/2020	5/1/2020	20-04072	Plutonium-241	EML Pu-02 Modified	-8.68E+00	1.01E+01	1.01E+01	1.76E+01	U	pCi/g		
20-04072-10	TRG	L2-10214C-RJGS-001-SM-A	05/07/19 07:45	4/25/2020	5/1/2020	20-04072	Plutonium-241	EML Pu-02 Modified	-1.04E+00	8.03E+00	8.03E+00	1.38E+01	U	pCi/g		
20-04072-11	TRG	L1-12109L-CJGS-001-SB-A	08/21/19 10:25	4/25/2020	5/1/2020	20-04072	Plutonium-241	EML Pu-02 Modified	-7.34E-01	5.65E+00	5.65E+00	9.68E+00	U	pCi/g		
20-04072-12	TRG	L1-12106L-CJGS-001-SB-A	08/14/19 13:30	4/25/2020	5/1/2020	20-04072	Plutonium-241	EML Pu-02 Modified	-4.80E+00	4.25E+00	4.27E+00	7.44E+00	U	pCi/g		
20-04072-01	LCS	KNOWN	04/25/20 00:00	4/25/2020	5/1/2020	20-04072	Technetium-99	EiChroM TCS01 Modified	1.01E+03	2.22E+01				pCi/g		
20-04072-01	LCS	SPIKE	04/25/20 00:00	4/25/2020	5/1/2020	20-04072	Technetium-99	EiChroM TCS01 Modified	1.04E+03	5.96E+00	1.04E+02	1.42E+00		pCi/g		
20-04072-02	MBL	BLANK	04/25/20 00:00	4/25/2020	5/1/2020	20-04072	Technetium-99	EiChroM TCS01 Modified	2.58E-01	8.27E-01	8.28E-01	1.41E+00	U	pCi/g		
20-04072-03	DUP	B1-06202A-FSWC-040-CV	06/18/18 10:30	4/25/2020	5/1/2020	20-04072	Technetium-99	EiChroM TCS01 Modified	1.00E+00	6.85E-01	6.92E-01	1.14E+00	U	pCi/g		
20-04072-04	DO	B1-06202A-FSWC-040-CV	06/18/18 10:30	4/25/2020	5/1/2020	20-04072	Technetium-99	EiChroM TCS01 Modified	1.79E+00	7.12E-01	7.34E-01	1.16E+00		pCi/g		
20-04072-05	TRG	B1-06214A-FSFC-001-CV	05/05/18 15:15	4/25/2020	5/1/2020	20-04072	Technetium-99	EiChroM TCS01 Modified	1.49E+00	6.88E-01	7.04E-01	1.13E+00		pCi/g		
20-04072-06	TRG	B2-08101A-BJFC-007-CV 0 0-0 5	05/09/12 14:22	4/25/2020	5/1/2020	20-04072	Technetium-99	EiChroM TCS01 Modified	2.07E+00	6.99E-01	7.28E-01	1.13E+00		pCi/g		
20-04072-07	TRG	B2-08101A-BJFC-007-CV 0 5-1 0	05/09/12 14:22	4/25/2020	5/1/2020	20-04072	Technetium-99	EiChroM TCS01 Modified	1.29E+00	7.36E-01	7.47E-01	1.21E+00		pCi/g		
20-04072-08	TRG	B2-08201-CJWC-A018-CV 0 0-0 5	05/10/12 12:56	4/25/2020	5/1/2020	20-04072	Technetium-99	EiChroM TCS01 Modified	9.57E-01	5.63E-01	5.71E-01	9.30E-01		pCi/g		
20-04072-09	TRG	B2-08201-CJWC-A018-CV 0 5-1 0	05/10/12 12:56	4/25/2020	5/1/2020	20-04072	Technetium-99	EiChroM TCS01 Modified	1.71E+00	6.65E-01	6.87E-01	1.08E+00		pCi/g		
20-04072-10	TRG	L2-10214C-RJGS-001-SM-A	05/07/19 07:45	4/25/2020	5/1/2020	20-04072	Technetium-99	EiChroM TCS01 Modified	1.46E+00	6.40E-01	6.56E-01	1.04E+00		pCi/g		
20-04072-11	TRG	L1-12109L-CJGS-001-SB-A	08/21/19 10:25	4/25/2020	5/1/2020	20-04072	Technetium-99	EiChroM TCS01 Modified	1.73E+00	7.60E-01	7.80E-01	1.24E+00		pCi/g		
20-04072-12	TRG	L1-12106L-CJGS-001-SB-A	08/14/19 13:30	4/25/2020	5/1/2020	20-04072	Technetium-99	EiChroM TCS01 Modified	1.17E+00	5.13E-01	5.26E-01	8.38E-01		pCi/g		

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601 SCARBORO ROAD OAK RIDGE, TN 37830 865/481-0683 FAX 865/483-4621

Eberline Analytical Final Report of Analysis			Report To:						Work Order Details:						
			Gerald Wood						SDG:	20-04072					
			Zion Solutions						Purchase Order:	677116					
			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	
20-04072-01	LCS	KNOWN	04/25/20 00:00	4/25/2020	4/29/2020	20-04072	Strontium-90	EiChroM SRW01 Modified	5.02E+01	2.81E-01				pCi/g	
20-04072-01	LCS	SPIKE	04/25/20 00:00	4/25/2020	4/29/2020	20-04072	Strontium-90	EiChroM SRW01 Modified	5.18E+01	1.42E+00	1.81E+01	6.90E-01		pCi/g	
20-04072-02	MBL	BLANK	04/25/20 00:00	4/25/2020	4/29/2020	20-04072	Strontium-90	EiChroM SRW01 Modified	1.96E-02	2.87E-02	2.95E-02	5.93E-02	U	pCi/g	
20-04072-03	DUP	B1-06202A-FSWC-040-CV	06/18/18 10:30	4/25/2020	4/29/2020	20-04072	Strontium-90	EiChroM SRW01 Modified	-5.27E-03	3.58E-02	3.58E-02	7.73E-02	U	pCi/g	
20-04072-04	DO	B1-06202A-FSWC-040-CV	06/18/18 10:30	4/25/2020	4/29/2020	20-04072	Strontium-90	EiChroM SRW01 Modified	9.38E-03	3.70E-02	3.72E-02	7.85E-02	U	pCi/g	
20-04072-05	TRG	B1-06214A-FSFC-001-CV	05/05/18 15:15	4/25/2020	4/29/2020	20-04072	Strontium-90	EiChroM SRW01 Modified	4.13E-02	2.90E-02	3.23E-02	5.70E-02	U	pCi/g	
20-04072-06	TRG	B2-08101A-BJFC-007-CV 0 0-0 5	05/09/12 14:22	4/25/2020	4/29/2020	20-04072	Strontium-90	EiChroM SRW01 Modified	2.48E-02	3.32E-02	3.43E-02	6.82E-02	U	pCi/g	
20-04072-07	TRG	B2-08101A-BJFC-007-CV 0 5-1 0	05/09/12 14:22	4/25/2020	4/29/2020	20-04072	Strontium-90	EiChroM SRW01 Modified	-8.90E-04	3.25E-02	3.25E-02	6.96E-02	U	pCi/g	
20-04072-08	TRG	B2-08201-CJWC-A018-CV 0 0-0 5	05/10/12 12:56	4/25/2020	4/29/2020	20-04072	Strontium-90	EiChroM SRW01 Modified	-2.77E-02	2.69E-02	2.86E-02	6.12E-02	U	pCi/g	
20-04072-09	TRG	B2-08201-CJWC-A018-CV 0 5-1 0	05/10/12 12:56	4/25/2020	4/29/2020	20-04072	Strontium-90	EiChroM SRW01 Modified	3.48E-03	2.83E-02	2.83E-02	6.04E-02	U	pCi/g	
20-04072-10	TRG	L2-10214C-RJGS-001-SM-A	05/07/19 07:45	4/25/2020	4/29/2020	20-04072	Strontium-90	EiChroM SRW01 Modified	-9.40E-03	3.41E-02	3.42E-02	7.39E-02	U	pCi/g	
20-04072-11	TRG	L1-12109L-CJGS-001-SB-A	08/21/19 10:25	4/25/2020	4/29/2020	20-04072	Strontium-90	EiChroM SRW01 Modified	-2.56E-02	3.76E-02	3.86E-02	8.28E-02	U	pCi/g	
20-04072-12	TRG	L1-12106L-CJGS-001-SB-A	08/14/19 13:30	4/25/2020	4/29/2020	20-04072	Strontium-90	EiChroM SRW01 Modified	2.42E-02	3.09E-02	3.20E-02	6.34E-02	U	pCi/g	
20-04072-01	LCS	KNOWN	04/25/20 00:00	4/25/2020	4/27/2020	20-04072	Cobalt-60	EPA 901.1 Modified	2.62E+02	1.02E+01				pCi/g	
20-04072-01	LCS	KNOWN	04/25/20 00:00	4/25/2020	4/27/2020	20-04072	Cesium-137	EPA 901.1 Modified	1.94E+02	7.96E+00				pCi/g	
20-04072-01	LCS	SPIKE	04/25/20 00:00	4/25/2020	4/27/2020	20-04072	Cobalt-60	EPA 901.1 Modified	2.37E+02	1.45E+01	1.89E+01	2.39E+00		pCi/g	
20-04072-01	LCS	SPIKE	04/25/20 00:00	4/25/2020	4/27/2020	20-04072	Cesium-137	EPA 901.1 Modified	1.56E+02	1.37E+01	1.59E+01	1.57E+00		pCi/g	

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Eberline Analytical Final Report of Analysis				Report To:					Work Order Details:							
				Gerald Wood					SDG:	20-04072						
				Zion Solutions					Purchase Order:	677116						
				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		
20-04072-02	MBL	BLANK	04/25/20 00:00	4/25/2020	4/27/2020	20-04072	Actinium-228	EPA 901.1 Modified	-1.34E-02	7.02E-02	7.02E-02	1.12E-01	U	pCi/g		
20-04072-02	MBL	BLANK	04/25/20 00:00	4/25/2020	4/27/2020	20-04072	Silver-108m	EPA 901.1 Modified	-1.07E-02	3.23E-02	3.23E-02	3.11E-02	U	pCi/g		
20-04072-02	MBL	BLANK	04/25/20 00:00	4/25/2020	4/27/2020	20-04072	Barium-133	EPA 901.1 Modified	-1.49E-02	3.36E-02	3.36E-02	3.93E-02	U	pCi/g		
20-04072-02	MBL	BLANK	04/25/20 00:00	4/25/2020	4/27/2020	20-04072	Bismuth-214	EPA 901.1 Modified	-1.14E-02	6.22E-02	6.22E-02	9.39E-02	U	pCi/g		
20-04072-02	MBL	BLANK	04/25/20 00:00	4/25/2020	4/27/2020	20-04072	Cobalt-60	EPA 901.1 Modified	5.05E-03	2.55E-02	2.55E-02	4.40E-02	U	pCi/g		
20-04072-02	MBL	BLANK	04/25/20 00:00	4/25/2020	4/27/2020	20-04072	Cesium-134	EPA 901.1 Modified	2.32E-03	2.89E-02	2.89E-02	3.62E-02	U	pCi/g		
20-04072-02	MBL	BLANK	04/25/20 00:00	4/25/2020	4/27/2020	20-04072	Cesium-137	EPA 901.1 Modified	1.42E-02	2.86E-02	2.87E-02	5.01E-02	U	pCi/g		
20-04072-02	MBL	BLANK	04/25/20 00:00	4/25/2020	4/27/2020	20-04072	Europium-152	EPA 901.1 Modified	7.98E-02	7.05E-02	7.06E-02	9.37E-02	U	pCi/g		
20-04072-02	MBL	BLANK	04/25/20 00:00	4/25/2020	4/27/2020	20-04072	Europium-154	EPA 901.1 Modified	1.97E-02	6.70E-02	6.70E-02	4.51E-02	U	pCi/g		
20-04072-02	MBL	BLANK	04/25/20 00:00	4/25/2020	4/27/2020	20-04072	Europium-155	EPA 901.1 Modified	9.34E-03	4.73E-02	4.73E-02	6.30E-02	U	pCi/g		
20-04072-02	MBL	BLANK	04/25/20 00:00	4/25/2020	4/27/2020	20-04072	Holmium-166m	EPA 901.1 Modified	3.65E-02	4.29E-02	4.29E-02	3.72E-02	U	pCi/g		
20-04072-02	MBL	BLANK	04/25/20 00:00	4/25/2020	4/27/2020	20-04072	Iodine-129	EPA 901.1 Modified	-2.51E-03	5.23E-02	5.23E-02	7.37E-02	U	pCi/g		
20-04072-02	MBL	BLANK	04/25/20 00:00	4/25/2020	4/27/2020	20-04072	Potassium-40	EPA 901.1 Modified	3.19E-01	2.51E-01	2.52E-01	5.75E-01	U	pCi/g		
20-04072-02	MBL	BLANK	04/25/20 00:00	4/25/2020	4/27/2020	20-04072	Manganese-54	EPA 901.1 Modified	7.72E-03	2.13E-02	2.13E-02	3.63E-02	U	pCi/g		
20-04072-02	MBL	BLANK	04/25/20 00:00	4/25/2020	4/27/2020	20-04072	Molybdenum-93	EPA 901.1 Modified	-6.89E-03	2.12E-02	2.12E-02	3.08E-02	U	pCi/g		
20-04072-02	MBL	BLANK	04/25/20 00:00	4/25/2020	4/27/2020	20-04072	Niobium-94	EPA 901.1 Modified	1.50E-02	2.37E-02	2.37E-02	3.65E-02	U	pCi/g		
20-04072-02	MBL	BLANK	04/25/20 00:00	4/25/2020	4/27/2020	20-04072	Lead-210	EPA 901.1 Modified	3.17E-01	4.58E-01	4.58E-01	6.69E-01	U	pCi/g		
20-04072-02	MBL	BLANK	04/25/20 00:00	4/25/2020	4/27/2020	20-04072	Lead-212	EPA 901.1 Modified	2.73E-02	4.45E-02	4.45E-02	6.52E-02	U	pCi/g		
20-04072-02	MBL	BLANK	04/25/20 00:00	4/25/2020	4/27/2020	20-04072	Lead-214	EPA 901.1 Modified	2.00E-02	5.02E-02	5.02E-02	7.53E-02	U	pCi/g		
20-04072-02	MBL	BLANK	04/25/20 00:00	4/25/2020	4/27/2020	20-04072	Promethium-145	EPA 901.1 Modified	3.32E-02	6.87E-02	6.87E-02	9.40E-02	U	pCi/g		
20-04072-02	MBL	BLANK	04/25/20 00:00	4/25/2020	4/27/2020	20-04072	Radium-226	EPA 901.1 Modified	-1.14E-02	6.22E-02	6.22E-02	9.39E-02	U	pCi/g		
20-04072-02	MBL	BLANK	04/25/20 00:00	4/25/2020	4/27/2020	20-04072	Antimony-125	EPA 901.1 Modified	1.99E-02	4.96E-02	4.96E-02	9.23E-02	U	pCi/g		
20-04072-02	MBL	BLANK	04/25/20 00:00	4/25/2020	4/27/2020	20-04072	Thorium-234	EPA 901.1 Modified	7.38E-01	4.14E-01	4.15E-01	6.72E-01	U	pCi/g		
20-04072-02	MBL	BLANK	04/25/20 00:00	4/25/2020	4/27/2020	20-04072	Thallium-208	EPA 901.1 Modified	8.23E-02	6.42E-02	6.44E-02	1.28E-01	U	pCi/g		
20-04072-02	MBL	BLANK	04/25/20 00:00	4/25/2020	4/27/2020	20-04072	Uranium-235	EPA 901.1 Modified	8.75E-02	1.50E-01	1.50E-01	2.15E-01	U	pCi/g		

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<h1 style="margin: 0;">Eberline Analytical</h1> <h2 style="margin: 0;">Final Report of Analysis</h2>				Report To:					Work Order Details:						
				Gerald Wood					SDG:	20-04072					
				Zion Solutions					Purchase Order:	677116					
				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	
20-04072-03	DUP	B1-06202A-FSWC-040-CV	06/18/18 10:30	4/25/2020	4/27/2020	20-04072	Actinium-228	EPA 901.1 Modified	3.56E-01	2.24E-01	2.24E-01	5.24E-01	U	pCi/g	
20-04072-03	DUP	B1-06202A-FSWC-040-CV	06/18/18 10:30	4/25/2020	4/27/2020	20-04072	Silver-108m	EPA 901.1 Modified	1.25E-02	4.64E-02	4.64E-02	7.07E-02	U	pCi/g	
20-04072-03	DUP	B1-06202A-FSWC-040-CV	06/18/18 10:30	4/25/2020	4/27/2020	20-04072	Barium-133	EPA 901.1 Modified	1.50E-03	2.56E-02	2.57E-02	1.41E-01	U	pCi/g	
20-04072-03	DUP	B1-06202A-FSWC-040-CV	06/18/18 10:30	4/25/2020	4/27/2020	20-04072	Bismuth-214	EPA 901.1 Modified	3.97E-01	1.88E-01	1.89E-01	2.74E-01		pCi/g	
20-04072-03	DUP	B1-06202A-FSWC-040-CV	06/18/18 10:30	4/25/2020	4/27/2020	20-04072	Cobalt-60	EPA 901.1 Modified	3.90E-02	8.20E-02	8.21E-02	1.20E-01	U	pCi/g	
20-04072-03	DUP	B1-06202A-FSWC-040-CV	06/18/18 10:30	4/25/2020	4/27/2020	20-04072	Cesium-134	EPA 901.1 Modified	-2.78E-01	1.81E-01	1.82E-01	1.78E-01	U	pCi/g	
20-04072-03	DUP	B1-06202A-FSWC-040-CV	06/18/18 10:30	4/25/2020	4/27/2020	20-04072	Cesium-137	EPA 901.1 Modified	-3.81E-03	5.23E-02	5.23E-02	8.14E-02	U	pCi/g	
20-04072-03	DUP	B1-06202A-FSWC-040-CV	06/18/18 10:30	4/25/2020	4/27/2020	20-04072	Europium-152	EPA 901.1 Modified	-2.06E-01	2.83E-01	2.83E-01	2.37E-01	U	pCi/g	
20-04072-03	DUP	B1-06202A-FSWC-040-CV	06/18/18 10:30	4/25/2020	4/27/2020	20-04072	Europium-154	EPA 901.1 Modified	1.01E-01	1.56E-01	1.56E-01	1.24E-01	U	pCi/g	
20-04072-03	DUP	B1-06202A-FSWC-040-CV	06/18/18 10:30	4/25/2020	4/27/2020	20-04072	Europium-155	EPA 901.1 Modified	1.92E-01	9.66E-02	9.71E-02	2.57E-01	U	pCi/g	
20-04072-03	DUP	B1-06202A-FSWC-040-CV	06/18/18 10:30	4/25/2020	4/27/2020	20-04072	Holmium-166m	EPA 901.1 Modified	7.09E-02	4.66E-02	4.67E-02	9.07E-02	U	pCi/g	
20-04072-03	DUP	B1-06202A-FSWC-040-CV	06/18/18 10:30	4/25/2020	4/27/2020	20-04072	Iodine-129	EPA 901.1 Modified	-9.48E-02	1.40E-01	1.40E-01	2.12E-01	U	pCi/g	
20-04072-03	DUP	B1-06202A-FSWC-040-CV	06/18/18 10:30	4/25/2020	4/27/2020	20-04072	Potassium-40	EPA 901.1 Modified	5.33E+00	1.33E+00	1.36E+00	1.17E+00		pCi/g	
20-04072-03	DUP	B1-06202A-FSWC-040-CV	06/18/18 10:30	4/25/2020	4/27/2020	20-04072	Manganese-54	EPA 901.1 Modified	-1.27E-01	2.81E-01	2.81E-01	4.02E-01	U	pCi/g	
20-04072-03	DUP	B1-06202A-FSWC-040-CV	06/18/18 10:30	4/25/2020	4/27/2020	20-04072	Molybdenum-93	EPA 901.1 Modified	4.05E-03	4.95E-02	4.95E-02	8.09E-02	U	pCi/g	
20-04072-03	DUP	B1-06202A-FSWC-040-CV	06/18/18 10:30	4/25/2020	4/27/2020	20-04072	Niobium-94	EPA 901.1 Modified	3.53E-02	3.29E-02	3.30E-02	7.25E-02	U	pCi/g	
20-04072-03	DUP	B1-06202A-FSWC-040-CV	06/18/18 10:30	4/25/2020	4/27/2020	20-04072	Lead-210	EPA 901.1 Modified	7.39E-01	1.03E+00	1.03E+00	1.73E+00	U	pCi/g	
20-04072-03	DUP	B1-06202A-FSWC-040-CV	06/18/18 10:30	4/25/2020	4/27/2020	20-04072	Lead-212	EPA 901.1 Modified	3.69E-01	1.43E-01	1.44E-01	2.13E-01		pCi/g	
20-04072-03	DUP	B1-06202A-FSWC-040-CV	06/18/18 10:30	4/25/2020	4/27/2020	20-04072	Lead-214	EPA 901.1 Modified	4.16E-01	1.57E-01	1.59E-01	2.60E-01		pCi/g	
20-04072-03	DUP	B1-06202A-FSWC-040-CV	06/18/18 10:30	4/25/2020	4/27/2020	20-04072	Promethium-145	EPA 901.1 Modified	2.20E-02	1.30E-01	1.30E-01	2.16E-01	U	pCi/g	
20-04072-03	DUP	B1-06202A-FSWC-040-CV	06/18/18 10:30	4/25/2020	4/27/2020	20-04072	Radium-226	EPA 901.1 Modified	3.97E-01	1.88E-01	1.89E-01	2.74E-01		pCi/g	
20-04072-03	DUP	B1-06202A-FSWC-040-CV	06/18/18 10:30	4/25/2020	4/27/2020	20-04072	Antimony-125	EPA 901.1 Modified	1.79E-02	7.68E-02	7.68E-02	3.30E-01	U	pCi/g	
20-04072-03	DUP	B1-06202A-FSWC-040-CV	06/18/18 10:30	4/25/2020	4/27/2020	20-04072	Thorium-234	EPA 901.1 Modified	2.06E+00	9.35E-01	9.41E-01	1.65E+00	U	pCi/g	
20-04072-03	DUP	B1-06202A-FSWC-040-CV	06/18/18 10:30	4/25/2020	4/27/2020	20-04072	Thallium-208	EPA 901.1 Modified	2.57E-01	1.41E-01	1.42E-01	2.77E-01	U	pCi/g	
20-04072-03	DUP	B1-06202A-FSWC-040-CV	06/18/18 10:30	4/25/2020	4/27/2020	20-04072	Uranium-235	EPA 901.1 Modified	9.50E-02	2.66E-01	2.66E-01	4.10E-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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601 SCARBORO ROAD OAK RIDGE, TN 37830 865/481-0683 FAX 865/483-4621

Eberline Analytical Final Report of Analysis				Report To:					Work Order Details:						
				Gerald Wood					SDG:	20-04072					
				Zion Solutions					Purchase Order:	677116					
				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	
20-04072-04	DO	B1-06202A-FSWC-040-CV	06/18/18 10:30	4/25/2020	4/27/2020	20-04072	Actinium-228	EPA 901.1 Modified	4.58E-01	1.84E-01	1.86E-01	5.56E-01	U	pCi/g	
20-04072-04	DO	B1-06202A-FSWC-040-CV	06/18/18 10:30	4/25/2020	4/27/2020	20-04072	Silver-108m	EPA 901.1 Modified	9.84E-03	3.48E-02	3.48E-02	6.21E-02	U	pCi/g	
20-04072-04	DO	B1-06202A-FSWC-040-CV	06/18/18 10:30	4/25/2020	4/27/2020	20-04072	Barium-133	EPA 901.1 Modified	-1.08E-01	1.24E-01	1.25E-01	1.25E-01	U	pCi/g	
20-04072-04	DO	B1-06202A-FSWC-040-CV	06/18/18 10:30	4/25/2020	4/27/2020	20-04072	Bismuth-214	EPA 901.1 Modified	3.95E-01	1.24E-01	1.26E-01	2.81E-01		pCi/g	
20-04072-04	DO	B1-06202A-FSWC-040-CV	06/18/18 10:30	4/25/2020	4/27/2020	20-04072	Cobalt-60	EPA 901.1 Modified	1.48E-02	5.69E-02	5.69E-02	1.08E-01	U	pCi/g	
20-04072-04	DO	B1-06202A-FSWC-040-CV	06/18/18 10:30	4/25/2020	4/27/2020	20-04072	Cesium-134	EPA 901.1 Modified	4.12E-02	6.30E-02	6.31E-02	1.57E-01	U	pCi/g	
20-04072-04	DO	B1-06202A-FSWC-040-CV	06/18/18 10:30	4/25/2020	4/27/2020	20-04072	Cesium-137	EPA 901.1 Modified	1.37E-01	8.16E-02	8.19E-02	1.23E-01		pCi/g	
20-04072-04	DO	B1-06202A-FSWC-040-CV	06/18/18 10:30	4/25/2020	4/27/2020	20-04072	Europium-152	EPA 901.1 Modified	-4.18E-01	2.79E-01	2.80E-01	2.32E-01	U	pCi/g	
20-04072-04	DO	B1-06202A-FSWC-040-CV	06/18/18 10:30	4/25/2020	4/27/2020	20-04072	Europium-154	EPA 901.1 Modified	-3.08E-02	1.08E-01	1.08E-01	1.23E-01	U	pCi/g	
20-04072-04	DO	B1-06202A-FSWC-040-CV	06/18/18 10:30	4/25/2020	4/27/2020	20-04072	Europium-155	EPA 901.1 Modified	1.47E-01	1.48E-01	1.48E-01	2.41E-01	U	pCi/g	
20-04072-04	DO	B1-06202A-FSWC-040-CV	06/18/18 10:30	4/25/2020	4/27/2020	20-04072	Holmium-166m	EPA 901.1 Modified	2.05E-02	9.15E-02	9.15E-02	8.70E-02	U	pCi/g	
20-04072-04	DO	B1-06202A-FSWC-040-CV	06/18/18 10:30	4/25/2020	4/27/2020	20-04072	Iodine-129	EPA 901.1 Modified	-1.46E-02	1.39E-01	1.39E-01	2.25E-01	U	pCi/g	
20-04072-04	DO	B1-06202A-FSWC-040-CV	06/18/18 10:30	4/25/2020	4/27/2020	20-04072	Potassium-40	EPA 901.1 Modified	5.71E+00	1.33E+00	1.36E+00	1.03E+00		pCi/g	
20-04072-04	DO	B1-06202A-FSWC-040-CV	06/18/18 10:30	4/25/2020	4/27/2020	20-04072	Manganese-54	EPA 901.1 Modified	-3.94E-02	2.94E-01	2.94E-01	3.94E-01	U	pCi/g	
20-04072-04	DO	B1-06202A-FSWC-040-CV	06/18/18 10:30	4/25/2020	4/27/2020	20-04072	Molybdenum-93	EPA 901.1 Modified	1.65E-02	5.15E-02	5.15E-02	8.71E-02	U	pCi/g	
20-04072-04	DO	B1-06202A-FSWC-040-CV	06/18/18 10:30	4/25/2020	4/27/2020	20-04072	Niobium-94	EPA 901.1 Modified	-6.70E-03	5.79E-02	5.79E-02	7.05E-02	U	pCi/g	
20-04072-04	DO	B1-06202A-FSWC-040-CV	06/18/18 10:30	4/25/2020	4/27/2020	20-04072	Lead-210	EPA 901.1 Modified	1.52E+00	1.36E+00	1.36E+00	2.25E+00	U	pCi/g	
20-04072-04	DO	B1-06202A-FSWC-040-CV	06/18/18 10:30	4/25/2020	4/27/2020	20-04072	Lead-212	EPA 901.1 Modified	3.09E-01	1.09E-01	1.10E-01	2.26E-01		pCi/g	
20-04072-04	DO	B1-06202A-FSWC-040-CV	06/18/18 10:30	4/25/2020	4/27/2020	20-04072	Lead-214	EPA 901.1 Modified	4.22E-01	1.26E-01	1.28E-01	3.22E-01		pCi/g	
20-04072-04	DO	B1-06202A-FSWC-040-CV	06/18/18 10:30	4/25/2020	4/27/2020	20-04072	Promethium-145	EPA 901.1 Modified	5.31E-02	1.32E-01	1.33E-01	2.22E-01	U	pCi/g	
20-04072-04	DO	B1-06202A-FSWC-040-CV	06/18/18 10:30	4/25/2020	4/27/2020	20-04072	Radium-226	EPA 901.1 Modified	3.95E-01	1.24E-01	1.26E-01	2.81E-01		pCi/g	
20-04072-04	DO	B1-06202A-FSWC-040-CV	06/18/18 10:30	4/25/2020	4/27/2020	20-04072	Antimony-125	EPA 901.1 Modified	1.54E-01	1.81E-01	1.81E-01	3.19E-01	U	pCi/g	
20-04072-04	DO	B1-06202A-FSWC-040-CV	06/18/18 10:30	4/25/2020	4/27/2020	20-04072	Thorium-234	EPA 901.1 Modified	1.20E+00	1.43E+00	1.43E+00	2.40E+00	U	pCi/g	
20-04072-04	DO	B1-06202A-FSWC-040-CV	06/18/18 10:30	4/25/2020	4/27/2020	20-04072	Thallium-208	EPA 901.1 Modified	3.67E-01	1.71E-01	1.72E-01	2.42E-01		pCi/g	
20-04072-04	DO	B1-06202A-FSWC-040-CV	06/18/18 10:30	4/25/2020	4/27/2020	20-04072	Uranium-235	EPA 901.1 Modified	8.27E-02	2.71E-01	2.71E-01	4.15E-01	U	pCi/g	

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601 SCARBORO ROAD OAK RIDGE, TN 37830 865/481-0683 FAX 865/483-4621

Eberline Analytical Final Report of Analysis			Report To:					Work Order Details:								
			Gerald Wood					SDG:	20-04072							
			Zion Solutions					Purchase Order:	677116							
			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		
20-04072-05	TRG	B1-06214A-FSFC-001-CV	05/05/18 15:15	4/25/2020	4/27/2020	20-04072	Actinium-228	EPA 901.1 Modified	-1.27E-01	1.49E-01	1.49E-01	8.49E-01	U	pCi/g		
20-04072-05	TRG	B1-06214A-FSFC-001-CV	05/05/18 15:15	4/25/2020	4/27/2020	20-04072	Silver-108m	EPA 901.1 Modified	3.17E-02	1.22E-01	1.22E-01	1.39E-01	U	pCi/g		
20-04072-05	TRG	B1-06214A-FSFC-001-CV	05/05/18 15:15	4/25/2020	4/27/2020	20-04072	Barium-133	EPA 901.1 Modified	1.07E-02	6.60E-02	6.60E-02	2.75E-01	U	pCi/g		
20-04072-05	TRG	B1-06214A-FSFC-001-CV	05/05/18 15:15	4/25/2020	4/27/2020	20-04072	Bismuth-214	EPA 901.1 Modified	7.03E-01	2.65E-01	2.67E-01	2.56E-01		pCi/g		
20-04072-05	TRG	B1-06214A-FSFC-001-CV	05/05/18 15:15	4/25/2020	4/27/2020	20-04072	Cobalt-60	EPA 901.1 Modified	-5.41E-02	1.85E-01	1.85E-01	2.88E-01	U	pCi/g		
20-04072-05	TRG	B1-06214A-FSFC-001-CV	05/05/18 15:15	4/25/2020	4/27/2020	20-04072	Cesium-134	EPA 901.1 Modified	-4.09E-02	9.97E-02	9.97E-02	3.59E-01	U	pCi/g		
20-04072-05	TRG	B1-06214A-FSFC-001-CV	05/05/18 15:15	4/25/2020	4/27/2020	20-04072	Cesium-137	EPA 901.1 Modified	2.89E-03	1.48E-01	1.48E-01	2.07E-01	U	pCi/g		
20-04072-05	TRG	B1-06214A-FSFC-001-CV	05/05/18 15:15	4/25/2020	4/27/2020	20-04072	Europium-152	EPA 901.1 Modified	-3.69E-01	5.24E-01	5.25E-01	3.08E-01	U	pCi/g		
20-04072-05	TRG	B1-06214A-FSFC-001-CV	05/05/18 15:15	4/25/2020	4/27/2020	20-04072	Europium-154	EPA 901.1 Modified	-3.41E-01	4.60E-01	4.60E-01	1.72E-01	U	pCi/g		
20-04072-05	TRG	B1-06214A-FSFC-001-CV	05/05/18 15:15	4/25/2020	4/27/2020	20-04072	Europium-155	EPA 901.1 Modified	2.44E-01	2.07E-01	2.08E-01	3.25E-01	U	pCi/g		
20-04072-05	TRG	B1-06214A-FSFC-001-CV	05/05/18 15:15	4/25/2020	4/27/2020	20-04072	Holmium-166m	EPA 901.1 Modified	-3.48E-02	1.83E-01	1.83E-01	1.39E-01	U	pCi/g		
20-04072-05	TRG	B1-06214A-FSFC-001-CV	05/05/18 15:15	4/25/2020	4/27/2020	20-04072	Iodine-129	EPA 901.1 Modified	2.86E-02	2.40E-01	2.40E-01	3.60E-01	U	pCi/g		
20-04072-05	TRG	B1-06214A-FSFC-001-CV	05/05/18 15:15	4/25/2020	4/27/2020	20-04072	Potassium-40	EPA 901.1 Modified	6.45E+00	1.84E+00	1.87E+00	8.62E-01		pCi/g		
20-04072-05	TRG	B1-06214A-FSFC-001-CV	05/05/18 15:15	4/25/2020	4/27/2020	20-04072	Manganese-54	EPA 901.1 Modified	4.62E-01	4.28E-01	4.28E-01	8.84E-01	U	pCi/g		
20-04072-05	TRG	B1-06214A-FSFC-001-CV	05/05/18 15:15	4/25/2020	4/27/2020	20-04072	Molybdenum-93	EPA 901.1 Modified	3.42E-02	1.02E-01	1.02E-01	1.37E-01	U	pCi/g		
20-04072-05	TRG	B1-06214A-FSFC-001-CV	05/05/18 15:15	4/25/2020	4/27/2020	20-04072	Niobium-94	EPA 901.1 Modified	2.32E-02	1.21E-01	1.21E-01	1.79E-01	U	pCi/g		
20-04072-05	TRG	B1-06214A-FSFC-001-CV	05/05/18 15:15	4/25/2020	4/27/2020	20-04072	Lead-210	EPA 901.1 Modified	1.38E+00	1.56E+00	1.56E+00	2.45E+00	U	pCi/g		
20-04072-05	TRG	B1-06214A-FSFC-001-CV	05/05/18 15:15	4/25/2020	4/27/2020	20-04072	Lead-212	EPA 901.1 Modified	7.02E-01	2.39E-01	2.42E-01	3.38E-01		pCi/g		
20-04072-05	TRG	B1-06214A-FSFC-001-CV	05/05/18 15:15	4/25/2020	4/27/2020	20-04072	Lead-214	EPA 901.1 Modified	5.56E-01	2.39E-01	2.41E-01	4.17E-01		pCi/g		
20-04072-05	TRG	B1-06214A-FSFC-001-CV	05/05/18 15:15	4/25/2020	4/27/2020	20-04072	Promethium-145	EPA 901.1 Modified	-2.11E-01	2.32E-01	2.32E-01	3.16E-01	U	pCi/g		
20-04072-05	TRG	B1-06214A-FSFC-001-CV	05/05/18 15:15	4/25/2020	4/27/2020	20-04072	Radium-226	EPA 901.1 Modified	7.03E-01	2.65E-01	2.67E-01	2.56E-01		pCi/g		
20-04072-05	TRG	B1-06214A-FSFC-001-CV	05/05/18 15:15	4/25/2020	4/27/2020	20-04072	Antimony-125	EPA 901.1 Modified	4.16E-01	4.52E-01	4.52E-01	7.29E-01	U	pCi/g		
20-04072-05	TRG	B1-06214A-FSFC-001-CV	05/05/18 15:15	4/25/2020	4/27/2020	20-04072	Thorium-234	EPA 901.1 Modified	2.43E+00	1.33E+00	1.33E+00	2.19E+00	U	pCi/g		
20-04072-05	TRG	B1-06214A-FSFC-001-CV	05/05/18 15:15	4/25/2020	4/27/2020	20-04072	Thallium-208	EPA 901.1 Modified	4.50E-01	2.41E-01	2.42E-01	4.10E-01		pCi/g		
20-04072-05	TRG	B1-06214A-FSFC-001-CV	05/05/18 15:15	4/25/2020	4/27/2020	20-04072	Uranium-235	EPA 901.1 Modified	5.84E-01	4.01E-01	4.02E-01	6.81E-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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<h1 style="margin: 0;">Eberline Analytical</h1> <h2 style="margin: 0;">Final Report of Analysis</h2>			Report To:						Work Order Details:											
			Gerald Wood						SDG:	20-04072										
			Zion Solutions						Purchase Order:	677116										
			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						
20-04072-06	TRG	B2-08101A-BJFC-007-CV 0 0-0 5	05/09/12 14:22	4/25/2020	4/27/2020	20-04072	Actinium-228	EPA 901.1 Modified	7.82E-01	8.24E-01	8.25E-01	1.38E+00	U	pCi/g						
20-04072-06	TRG	B2-08101A-BJFC-007-CV 0 0-0 5	05/09/12 14:22	4/25/2020	4/27/2020	20-04072	Silver-108m	EPA 901.1 Modified	-7.38E-02	2.77E-01	2.77E-01	2.37E-01	U	pCi/g						
20-04072-06	TRG	B2-08101A-BJFC-007-CV 0 0-0 5	05/09/12 14:22	4/25/2020	4/27/2020	20-04072	Barium-133	EPA 901.1 Modified	2.93E-01	5.75E-01	5.76E-01	7.52E-01	U	pCi/g						
20-04072-06	TRG	B2-08101A-BJFC-007-CV 0 0-0 5	05/09/12 14:22	4/25/2020	4/27/2020	20-04072	Bismuth-214	EPA 901.1 Modified	1.34E+00	4.57E-01	4.62E-01	3.37E-01		pCi/g						
20-04072-06	TRG	B2-08101A-BJFC-007-CV 0 0-0 5	05/09/12 14:22	4/25/2020	4/27/2020	20-04072	Cobalt-60	EPA 901.1 Modified	-5.83E-01	5.59E-01	5.60E-01	7.34E-01	U	pCi/g						
20-04072-06	TRG	B2-08101A-BJFC-007-CV 0 0-0 5	05/09/12 14:22	4/25/2020	4/27/2020	20-04072	Cesium-134	EPA 901.1 Modified	4.82E-01	1.88E+00	1.88E+00	3.99E+00	U	pCi/g						
20-04072-06	TRG	B2-08101A-BJFC-007-CV 0 0-0 5	05/09/12 14:22	4/25/2020	4/27/2020	20-04072	Cesium-137	EPA 901.1 Modified	1.15E-01	2.37E-01	2.37E-01	3.78E-01	U	pCi/g						
20-04072-06	TRG	B2-08101A-BJFC-007-CV 0 0-0 5	05/09/12 14:22	4/25/2020	4/27/2020	20-04072	Europium-152	EPA 901.1 Modified	2.89E-01	8.81E-01	8.81E-01	9.93E-01	U	pCi/g						
20-04072-06	TRG	B2-08101A-BJFC-007-CV 0 0-0 5	05/09/12 14:22	4/25/2020	4/27/2020	20-04072	Europium-154	EPA 901.1 Modified	4.41E-01	9.70E-01	9.70E-01	6.53E-01	U	pCi/g						
20-04072-06	TRG	B2-08101A-BJFC-007-CV 0 0-0 5	05/09/12 14:22	4/25/2020	4/27/2020	20-04072	Europium-155	EPA 901.1 Modified	6.54E-02	1.28E+00	1.28E+00	1.85E+00	U	pCi/g						
20-04072-06	TRG	B2-08101A-BJFC-007-CV 0 0-0 5	05/09/12 14:22	4/25/2020	4/27/2020	20-04072	Holmium-166m	EPA 901.1 Modified	3.81E-01	2.78E-01	2.79E-01	3.12E-01	U	pCi/g						
20-04072-06	TRG	B2-08101A-BJFC-007-CV 0 0-0 5	05/09/12 14:22	4/25/2020	4/27/2020	20-04072	Iodine-129	EPA 901.1 Modified	2.64E-01	6.11E-01	6.11E-01	9.18E-01	U	pCi/g						
20-04072-06	TRG	B2-08101A-BJFC-007-CV 0 0-0 5	05/09/12 14:22	4/25/2020	4/27/2020	20-04072	Potassium-40	EPA 901.1 Modified	8.56E+00	3.05E+00	3.08E+00	3.60E+00		pCi/g						
20-04072-06	TRG	B2-08101A-BJFC-007-CV 0 0-0 5	05/09/12 14:22	4/25/2020	4/27/2020	20-04072	Manganese-54	EPA 901.1 Modified	-1.66E+01	1.31E+02	1.31E+02	1.78E+02	U	pCi/g						
20-04072-06	TRG	B2-08101A-BJFC-007-CV 0 0-0 5	05/09/12 14:22	4/25/2020	4/27/2020	20-04072	Molybdenum-93	EPA 901.1 Modified	6.50E-02	3.10E-01	3.10E-01	4.58E-01	U	pCi/g						
20-04072-06	TRG	B2-08101A-BJFC-007-CV 0 0-0 5	05/09/12 14:22	4/25/2020	4/27/2020	20-04072	Niobium-94	EPA 901.1 Modified	1.74E-02	1.98E-01	1.98E-01	2.70E-01	U	pCi/g						
20-04072-06	TRG	B2-08101A-BJFC-007-CV 0 0-0 5	05/09/12 14:22	4/25/2020	4/27/2020	20-04072	Lead-210	EPA 901.1 Modified	4.33E+00	4.51E+00	4.51E+00	7.13E+00	U	pCi/g						
20-04072-06	TRG	B2-08101A-BJFC-007-CV 0 0-0 5	05/09/12 14:22	4/25/2020	4/27/2020	20-04072	Lead-212	EPA 901.1 Modified	1.07E+00	4.84E-01	4.88E-01	7.40E-01		pCi/g						
20-04072-06	TRG	B2-08101A-BJFC-007-CV 0 0-0 5	05/09/12 14:22	4/25/2020	4/27/2020	20-04072	Lead-214	EPA 901.1 Modified	1.33E+00	4.24E-01	4.30E-01	1.24E+00		pCi/g						
20-04072-06	TRG	B2-08101A-BJFC-007-CV 0 0-0 5	05/09/12 14:22	4/25/2020	4/27/2020	20-04072	Promethium-145	EPA 901.1 Modified	3.88E-01	6.81E-01	6.81E-01	1.06E+00	U	pCi/g						
20-04072-06	TRG	B2-08101A-BJFC-007-CV 0 0-0 5	05/09/12 14:22	4/25/2020	4/27/2020	20-04072	Radium-226	EPA 901.1 Modified	1.34E+00	4.57E-01	4.62E-01	3.37E-01		pCi/g						
20-04072-06	TRG	B2-08101A-BJFC-007-CV 0 0-0 5	05/09/12 14:22	4/25/2020	4/27/2020	20-04072	Antimony-125	EPA 901.1 Modified	-1.51E+00	3.40E+00	3.40E+00	4.75E+00	U	pCi/g						
20-04072-06	TRG	B2-08101A-BJFC-007-CV 0 0-0 5	05/09/12 14:22	4/25/2020	4/27/2020	20-04072	Thorium-234	EPA 901.1 Modified	7.69E+00	3.52E+00	3.54E+00	5.86E+00	U	pCi/g						
20-04072-06	TRG	B2-08101A-BJFC-007-CV 0 0-0 5	05/09/12 14:22	4/25/2020	4/27/2020	20-04072	Thallium-208	EPA 901.1 Modified	3.80E-01	6.33E-01	6.33E-01	9.84E-01	U	pCi/g						
20-04072-06	TRG	B2-08101A-BJFC-007-CV 0 0-0 5	05/09/12 14:22	4/25/2020	4/27/2020	20-04072	Uranium-235	EPA 901.1 Modified	2.58E-01	1.08E+00	1.08E+00	1.65E+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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<h1 style="margin: 0;">Eberline Analytical</h1> <h2 style="margin: 0;">Final Report of Analysis</h2>			Report To:						Work Order Details:							
			Gerald Wood Zion Solutions 2701 Deborah Ave Zion, IL 60099						SDG:	20-04072						
									Purchase Order:	677116						
									Analysis Category:	ENVIRONMENTAL						
												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		
20-04072-07	TRG	B2-08101A-BJFC-007-CV 0 5-1 0	05/09/12 14:22	4/25/2020	4/27/2020	20-04072	Actinium-228	EPA 901.1 Modified	1.48E+00	6.73E-01	6.77E-01	1.21E+00		pCi/g		
20-04072-07	TRG	B2-08101A-BJFC-007-CV 0 5-1 0	05/09/12 14:22	4/25/2020	4/27/2020	20-04072	Silver-108m	EPA 901.1 Modified	-1.03E-01	1.41E-01	1.41E-01	2.06E-01	U	pCi/g		
20-04072-07	TRG	B2-08101A-BJFC-007-CV 0 5-1 0	05/09/12 14:22	4/25/2020	4/27/2020	20-04072	Barium-133	EPA 901.1 Modified	8.29E-02	1.69E-01	1.69E-01	4.70E-01	U	pCi/g		
20-04072-07	TRG	B2-08101A-BJFC-007-CV 0 5-1 0	05/09/12 14:22	4/25/2020	4/27/2020	20-04072	Bismuth-214	EPA 901.1 Modified	1.22E+00	6.96E-01	6.98E-01	1.08E+00		pCi/g		
20-04072-07	TRG	B2-08101A-BJFC-007-CV 0 5-1 0	05/09/12 14:22	4/25/2020	4/27/2020	20-04072	Cobalt-60	EPA 901.1 Modified	1.19E-01	4.80E-01	4.80E-01	7.55E-01	U	pCi/g		
20-04072-07	TRG	B2-08101A-BJFC-007-CV 0 5-1 0	05/09/12 14:22	4/25/2020	4/27/2020	20-04072	Cesium-134	EPA 901.1 Modified	0.00E+00	1.27E+00	1.27E+00	3.23E+00	U	pCi/g		
20-04072-07	TRG	B2-08101A-BJFC-007-CV 0 5-1 0	05/09/12 14:22	4/25/2020	4/27/2020	20-04072	Cesium-137	EPA 901.1 Modified	-1.22E-01	2.28E-01	2.28E-01	3.10E-01	U	pCi/g		
20-04072-07	TRG	B2-08101A-BJFC-007-CV 0 5-1 0	05/09/12 14:22	4/25/2020	4/27/2020	20-04072	Europium-152	EPA 901.1 Modified	-2.32E-01	8.27E-01	8.27E-01	9.63E-01	U	pCi/g		
20-04072-07	TRG	B2-08101A-BJFC-007-CV 0 5-1 0	05/09/12 14:22	4/25/2020	4/27/2020	20-04072	Europium-154	EPA 901.1 Modified	-1.58E-01	8.76E-01	8.76E-01	6.04E-01	U	pCi/g		
20-04072-07	TRG	B2-08101A-BJFC-007-CV 0 5-1 0	05/09/12 14:22	4/25/2020	4/27/2020	20-04072	Europium-155	EPA 901.1 Modified	1.69E+00	1.08E+00	1.08E+00	1.65E+00	U	pCi/g		
20-04072-07	TRG	B2-08101A-BJFC-007-CV 0 5-1 0	05/09/12 14:22	4/25/2020	4/27/2020	20-04072	Holmium-166m	EPA 901.1 Modified	8.14E-02	3.02E-01	3.02E-01	2.88E-01	U	pCi/g		
20-04072-07	TRG	B2-08101A-BJFC-007-CV 0 5-1 0	05/09/12 14:22	4/25/2020	4/27/2020	20-04072	Iodine-129	EPA 901.1 Modified	3.45E-01	3.43E-01	3.43E-01	5.53E-01	U	pCi/g		
20-04072-07	TRG	B2-08101A-BJFC-007-CV 0 5-1 0	05/09/12 14:22	4/25/2020	4/27/2020	20-04072	Potassium-40	EPA 901.1 Modified	1.15E+01	3.01E+00	3.07E+00	1.92E+00		pCi/g		
20-04072-07	TRG	B2-08101A-BJFC-007-CV 0 5-1 0	05/09/12 14:22	4/25/2020	4/27/2020	20-04072	Manganese-54	EPA 901.1 Modified	-1.12E+02	1.23E+02	1.23E+02	1.52E+02	U	pCi/g		
20-04072-07	TRG	B2-08101A-BJFC-007-CV 0 5-1 0	05/09/12 14:22	4/25/2020	4/27/2020	20-04072	Molybdenum-93	EPA 901.1 Modified	3.27E-02	2.06E-01	2.06E-01	3.48E-01	U	pCi/g		
20-04072-07	TRG	B2-08101A-BJFC-007-CV 0 5-1 0	05/09/12 14:22	4/25/2020	4/27/2020	20-04072	Niobium-94	EPA 901.1 Modified	1.51E-01	1.20E-01	1.21E-01	2.46E-01	U	pCi/g		
20-04072-07	TRG	B2-08101A-BJFC-007-CV 0 5-1 0	05/09/12 14:22	4/25/2020	4/27/2020	20-04072	Lead-210	EPA 901.1 Modified	3.88E+00	4.40E+00	4.40E+00	7.34E+00	U	pCi/g		
20-04072-07	TRG	B2-08101A-BJFC-007-CV 0 5-1 0	05/09/12 14:22	4/25/2020	4/27/2020	20-04072	Lead-212	EPA 901.1 Modified	7.44E-01	2.85E-01	2.88E-01	7.47E-01	U	pCi/g		
20-04072-07	TRG	B2-08101A-BJFC-007-CV 0 5-1 0	05/09/12 14:22	4/25/2020	4/27/2020	20-04072	Lead-214	EPA 901.1 Modified	9.94E-01	4.58E-01	4.61E-01	7.75E-01		pCi/g		
20-04072-07	TRG	B2-08101A-BJFC-007-CV 0 5-1 0	05/09/12 14:22	4/25/2020	4/27/2020	20-04072	Promethium-145	EPA 901.1 Modified	2.32E-01	5.73E-01	5.73E-01	7.98E-01	U	pCi/g		
20-04072-07	TRG	B2-08101A-BJFC-007-CV 0 5-1 0	05/09/12 14:22	4/25/2020	4/27/2020	20-04072	Radium-226	EPA 901.1 Modified	1.22E+00	6.96E-01	6.98E-01	1.08E+00		pCi/g		
20-04072-07	TRG	B2-08101A-BJFC-007-CV 0 5-1 0	05/09/12 14:22	4/25/2020	4/27/2020	20-04072	Antimony-125	EPA 901.1 Modified	1.05E+00	2.55E+00	2.55E+00	4.60E+00	U	pCi/g		
20-04072-07	TRG	B2-08101A-BJFC-007-CV 0 5-1 0	05/09/12 14:22	4/25/2020	4/27/2020	20-04072	Thonium-234	EPA 901.1 Modified	3.08E+00	3.34E+00	3.35E+00	4.83E+00	U	pCi/g		
20-04072-07	TRG	B2-08101A-BJFC-007-CV 0 5-1 0	05/09/12 14:22	4/25/2020	4/27/2020	20-04072	Thallium-208	EPA 901.1 Modified	3.96E-01	6.22E-01	6.22E-01	1.04E+00	U	pCi/g		
20-04072-07	TRG	B2-08101A-BJFC-007-CV 0 5-1 0	05/09/12 14:22	4/25/2020	4/27/2020	20-04072	Uranium-235	EPA 901.1 Modified	1.48E-01	9.48E-01	9.48E-01	1.30E+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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<h1 style="margin: 0;">Eberline Analytical</h1> <h2 style="margin: 0;">Final Report of Analysis</h2>			Report To:						Work Order Details:						
			Gerald Wood Zion Solutions 2701 Deborah Ave Zion, IL 60099						SDG:	20-04072					
									Purchase Order:	677116					
									Analysis Category:	ENVIRONMENTAL					
						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	
20-04072-08	TRG	B2-08201-CJWC-A018-CV 0 0-0 5	05/10/12 12:56	4/25/2020	4/27/2020	20-04072	Actinium-228	EPA 901.1 Modified	1.89E+00	1.33E+00	1.34E+00	2.70E+00	U	pCi/g	
20-04072-08	TRG	B2-08201-CJWC-A018-CV 0 0-0 5	05/10/12 12:56	4/25/2020	4/27/2020	20-04072	Silver-108m	EPA 901.1 Modified	-1.60E-01	3.91E-01	3.91E-01	4.55E-01	U	pCi/g	
20-04072-08	TRG	B2-08201-CJWC-A018-CV 0 0-0 5	05/10/12 12:56	4/25/2020	4/27/2020	20-04072	Barium-133	EPA 901.1 Modified	1.34E-01	2.59E-01	2.59E-01	9.98E-01	U	pCi/g	
20-04072-08	TRG	B2-08201-CJWC-A018-CV 0 0-0 5	05/10/12 12:56	4/25/2020	4/27/2020	20-04072	Bismuth-214	EPA 901.1 Modified	1.31E+00	6.33E-01	6.36E-01	9.56E-01		pCi/g	
20-04072-08	TRG	B2-08201-CJWC-A018-CV 0 0-0 5	05/10/12 12:56	4/25/2020	4/27/2020	20-04072	Cobalt-60	EPA 901.1 Modified	-8.17E-01	1.52E+00	1.52E+00	1.60E+00	U	pCi/g	
20-04072-08	TRG	B2-08201-CJWC-A018-CV 0 0-0 5	05/10/12 12:56	4/25/2020	4/27/2020	20-04072	Cesium-134	EPA 901.1 Modified	-5.14E+00	6.77E+00	6.77E+00	7.60E+00	U	pCi/g	
20-04072-08	TRG	B2-08201-CJWC-A018-CV 0 0-0 5	05/10/12 12:56	4/25/2020	4/27/2020	20-04072	Cesium-137	EPA 901.1 Modified	8.97E-02	4.50E-01	4.50E-01	6.93E-01	U	pCi/g	
20-04072-08	TRG	B2-08201-CJWC-A018-CV 0 0-0 5	05/10/12 12:56	4/25/2020	4/27/2020	20-04072	Europium-152	EPA 901.1 Modified	-1.78E+00	2.31E+00	2.31E+00	1.19E+00	U	pCi/g	
20-04072-08	TRG	B2-08201-CJWC-A018-CV 0 0-0 5	05/10/12 12:56	4/25/2020	4/27/2020	20-04072	Europium-154	EPA 901.1 Modified	-2.01E-01	1.86E+00	1.86E+00	8.00E-01	U	pCi/g	
20-04072-08	TRG	B2-08201-CJWC-A018-CV 0 0-0 5	05/10/12 12:56	4/25/2020	4/27/2020	20-04072	Europium-155	EPA 901.1 Modified	4.58E-01	1.26E+00	1.26E+00	1.94E+00	U	pCi/g	
20-04072-08	TRG	B2-08201-CJWC-A018-CV 0 0-0 5	05/10/12 12:56	4/25/2020	4/27/2020	20-04072	Holmium-166m	EPA 901.1 Modified	3.42E-01	5.13E-01	5.13E-01	3.33E-01	U	pCi/g	
20-04072-08	TRG	B2-08201-CJWC-A018-CV 0 0-0 5	05/10/12 12:56	4/25/2020	4/27/2020	20-04072	Iodine-129	EPA 901.1 Modified	-1.99E-02	7.20E-01	7.20E-01	1.08E+00	U	pCi/g	
20-04072-08	TRG	B2-08201-CJWC-A018-CV 0 0-0 5	05/10/12 12:56	4/25/2020	4/27/2020	20-04072	Potassium-40	EPA 901.1 Modified	6.63E+00	4.17E+00	4.18E+00	5.44E+00		pCi/g	
20-04072-08	TRG	B2-08201-CJWC-A018-CV 0 0-0 5	05/10/12 12:56	4/25/2020	4/27/2020	20-04072	Manganese-54	EPA 901.1 Modified	-2.99E+01	2.03E+02	2.03E+02	3.28E+02	U	pCi/g	
20-04072-08	TRG	B2-08201-CJWC-A018-CV 0 0-0 5	05/10/12 12:56	4/25/2020	4/27/2020	20-04072	Molybdenum-93	EPA 901.1 Modified	-2.37E-01	5.55E-01	5.55E-01	7.95E-01	U	pCi/g	
20-04072-08	TRG	B2-08201-CJWC-A018-CV 0 0-0 5	05/10/12 12:56	4/25/2020	4/27/2020	20-04072	Niobium-94	EPA 901.1 Modified	2.62E-01	3.39E-01	3.39E-01	5.03E-01	U	pCi/g	
20-04072-08	TRG	B2-08201-CJWC-A018-CV 0 0-0 5	05/10/12 12:56	4/25/2020	4/27/2020	20-04072	Lead-210	EPA 901.1 Modified	6.20E+00	4.99E+00	5.00E+00	8.26E+00	U	pCi/g	
20-04072-08	TRG	B2-08201-CJWC-A018-CV 0 0-0 5	05/10/12 12:56	4/25/2020	4/27/2020	20-04072	Lead-212	EPA 901.1 Modified	8.14E-01	3.71E-01	3.73E-01	1.02E+00	U	pCi/g	
20-04072-08	TRG	B2-08201-CJWC-A018-CV 0 0-0 5	05/10/12 12:56	4/25/2020	4/27/2020	20-04072	Lead-214	EPA 901.1 Modified	1.25E+00	7.13E-01	7.16E-01	1.26E+00	U	pCi/g	
20-04072-08	TRG	B2-08201-CJWC-A018-CV 0 0-0 5	05/10/12 12:56	4/25/2020	4/27/2020	20-04072	Promethium-145	EPA 901.1 Modified	-2.10E-01	7.80E-01	7.80E-01	1.14E+00	U	pCi/g	
20-04072-08	TRG	B2-08201-CJWC-A018-CV 0 0-0 5	05/10/12 12:56	4/25/2020	4/27/2020	20-04072	Radium-226	EPA 901.1 Modified	1.31E+00	6.33E-01	6.36E-01	9.56E-01		pCi/g	
20-04072-08	TRG	B2-08201-CJWC-A018-CV 0 0-0 5	05/10/12 12:56	4/25/2020	4/27/2020	20-04072	Antimony-125	EPA 901.1 Modified	-2.89E-01	6.44E+00	6.44E+00	9.17E+00	U	pCi/g	
20-04072-08	TRG	B2-08201-CJWC-A018-CV 0 0-0 5	05/10/12 12:56	4/25/2020	4/27/2020	20-04072	Thorium-234	EPA 901.1 Modified	7.28E+00	4.18E+00	4.20E+00	6.66E+00		pCi/g	
20-04072-08	TRG	B2-08201-CJWC-A018-CV 0 0-0 5	05/10/12 12:56	4/25/2020	4/27/2020	20-04072	Thallium-208	EPA 901.1 Modified	5.36E-01	9.57E-01	9.58E-01	1.57E+00	U	pCi/g	
20-04072-08	TRG	B2-08201-CJWC-A018-CV 0 0-0 5	05/10/12 12:56	4/25/2020	4/27/2020	20-04072	Uranium-235	EPA 901.1 Modified	7.87E-01	1.10E+00	1.10E+00	1.81E+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



EBERLINE ANALYTICAL CORPORATION

601 SCARBORO ROAD OAK RIDGE, TN 37830 865/481-0683 FAX 865/483-4621

Eberline Analytical Final Report of Analysis			Report To:						Work Order Details:							
			Gerald Wood						SDG:	20-04072						
			Zion Solutions						Purchase Order:	677116						
			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		
20-04072-09	TRG	B2-08201-CJWC-A018-CV 0 5-1 0	05/10/12 12:56	4/25/2020	4/27/2020	20-04072	Actinium-228	EPA 901.1 Modified	-2.94E-01	8.38E-01	8.38E-01	1.11E+00	U	pCi/g		
20-04072-09	TRG	B2-08201-CJWC-A018-CV 0 5-1 0	05/10/12 12:56	4/25/2020	4/27/2020	20-04072	Silver-108m	EPA 901.1 Modified	1.31E-01	1.19E-01	1.19E-01	2.29E-01	U	pCi/g		
20-04072-09	TRG	B2-08201-CJWC-A018-CV 0 5-1 0	05/10/12 12:56	4/25/2020	4/27/2020	20-04072	Barium-133	EPA 901.1 Modified	-5.55E-02	1.21E-01	1.21E-01	6.16E-01	U	pCi/g		
20-04072-09	TRG	B2-08201-CJWC-A018-CV 0 5-1 0	05/10/12 12:56	4/25/2020	4/27/2020	20-04072	Bismuth-214	EPA 901.1 Modified	9.88E-01	4.95E-01	4.98E-01	8.46E-01		pCi/g		
20-04072-09	TRG	B2-08201-CJWC-A018-CV 0 5-1 0	05/10/12 12:56	4/25/2020	4/27/2020	20-04072	Cobalt-60	EPA 901.1 Modified	6.65E-02	1.81E-01	1.81E-01	8.74E-01	U	pCi/g		
20-04072-09	TRG	B2-08201-CJWC-A018-CV 0 5-1 0	05/10/12 12:56	4/25/2020	4/27/2020	20-04072	Cesium-134	EPA 901.1 Modified	0.00E+00	1.33E+00	1.33E+00	4.46E+00	U	pCi/g		
20-04072-09	TRG	B2-08201-CJWC-A018-CV 0 5-1 0	05/10/12 12:56	4/25/2020	4/27/2020	20-04072	Cesium-137	EPA 901.1 Modified	2.52E-01	2.28E-01	2.28E-01	4.02E-01	U	pCi/g		
20-04072-09	TRG	B2-08201-CJWC-A018-CV 0 5-1 0	05/10/12 12:56	4/25/2020	4/27/2020	20-04072	Europium-152	EPA 901.1 Modified	8.30E-02	6.27E-01	6.27E-01	1.02E+00	U	pCi/g		
20-04072-09	TRG	B2-08201-CJWC-A018-CV 0 5-1 0	05/10/12 12:56	4/25/2020	4/27/2020	20-04072	Europium-154	EPA 901.1 Modified	4.39E-01	8.07E-01	8.07E-01	6.61E-01	U	pCi/g		
20-04072-09	TRG	B2-08201-CJWC-A018-CV 0 5-1 0	05/10/12 12:56	4/25/2020	4/27/2020	20-04072	Europium-155	EPA 901.1 Modified	-8.71E-02	1.16E+00	1.16E+00	1.69E+00	U	pCi/g		
20-04072-09	TRG	B2-08201-CJWC-A018-CV 0 5-1 0	05/10/12 12:56	4/25/2020	4/27/2020	20-04072	Holmium-166m	EPA 901.1 Modified	2.90E-02	3.43E-01	3.43E-01	2.93E-01	U	pCi/g		
20-04072-09	TRG	B2-08201-CJWC-A018-CV 0 5-1 0	05/10/12 12:56	4/25/2020	4/27/2020	20-04072	Iodine-129	EPA 901.1 Modified	-3.76E-01	5.87E-01	5.87E-01	8.14E-01	U	pCi/g		
20-04072-09	TRG	B2-08201-CJWC-A018-CV 0 5-1 0	05/10/12 12:56	4/25/2020	4/27/2020	20-04072	Potassium-40	EPA 901.1 Modified	8.11E+00	3.11E+00	3.14E+00	3.93E+00		pCi/g		
20-04072-09	TRG	B2-08201-CJWC-A018-CV 0 5-1 0	05/10/12 12:56	4/25/2020	4/27/2020	20-04072	Manganese-54	EPA 901.1 Modified	-5.06E+01	1.56E+02	1.56E+02	1.90E+02	U	pCi/g		
20-04072-09	TRG	B2-08201-CJWC-A018-CV 0 5-1 0	05/10/12 12:56	4/25/2020	4/27/2020	20-04072	Molybdenum-93	EPA 901.1 Modified	-8.88E-02	3.31E-01	3.31E-01	4.46E-01	U	pCi/g		
20-04072-09	TRG	B2-08201-CJWC-A018-CV 0 5-1 0	05/10/12 12:56	4/25/2020	4/27/2020	20-04072	Niobium-94	EPA 901.1 Modified	-7.09E-02	2.12E-01	2.12E-01	2.82E-01	U	pCi/g		
20-04072-09	TRG	B2-08201-CJWC-A018-CV 0 5-1 0	05/10/12 12:56	4/25/2020	4/27/2020	20-04072	Lead-210	EPA 901.1 Modified	4.42E+00	3.86E+00	3.87E+00	6.32E+00	U	pCi/g		
20-04072-09	TRG	B2-08201-CJWC-A018-CV 0 5-1 0	05/10/12 12:56	4/25/2020	4/27/2020	20-04072	Lead-212	EPA 901.1 Modified	3.96E-01	3.85E-01	3.86E-01	6.35E-01	U	pCi/g		
20-04072-09	TRG	B2-08201-CJWC-A018-CV 0 5-1 0	05/10/12 12:56	4/25/2020	4/27/2020	20-04072	Lead-214	EPA 901.1 Modified	9.67E-01	4.55E-01	4.57E-01	9.06E-01		pCi/g		
20-04072-09	TRG	B2-08201-CJWC-A018-CV 0 5-1 0	05/10/12 12:56	4/25/2020	4/27/2020	20-04072	Promethium-145	EPA 901.1 Modified	9.01E-02	6.14E-01	6.14E-01	9.28E-01	U	pCi/g		
20-04072-09	TRG	B2-08201-CJWC-A018-CV 0 5-1 0	05/10/12 12:56	4/25/2020	4/27/2020	20-04072	Radium-226	EPA 901.1 Modified	9.88E-01	4.95E-01	4.98E-01	8.46E-01		pCi/g		
20-04072-09	TRG	B2-08201-CJWC-A018-CV 0 5-1 0	05/10/12 12:56	4/25/2020	4/27/2020	20-04072	Antimony-125	EPA 901.1 Modified	-1.17E+00	3.21E+00	3.21E+00	4.56E+00	U	pCi/g		
20-04072-09	TRG	B2-08201-CJWC-A018-CV 0 5-1 0	05/10/12 12:56	4/25/2020	4/27/2020	20-04072	Thorium-234	EPA 901.1 Modified	5.06E+00	3.29E+00	3.30E+00	5.36E+00	U	pCi/g		
20-04072-09	TRG	B2-08201-CJWC-A018-CV 0 5-1 0	05/10/12 12:56	4/25/2020	4/27/2020	20-04072	Thallium-208	EPA 901.1 Modified	7.44E-01	5.68E-01	5.69E-01	9.58E-01	U	pCi/g		
20-04072-09	TRG	B2-08201-CJWC-A018-CV 0 5-1 0	05/10/12 12:56	4/25/2020	4/27/2020	20-04072	Uranium-235	EPA 901.1 Modified	1.69E-01	9.78E-01	9.78E-01	1.49E+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



EBERLINE ANALYTICAL CORPORATION

601 SCARBORO ROAD OAK RIDGE, TN 37830 865/481-0683 FAX 865/483-4621

<h1 style="margin: 0;">Eberline Analytical</h1> <h2 style="margin: 0;">Final Report of Analysis</h2>			Report To:					Work Order Details:							
			Gerald Wood Zion Solutions 2701 Deborah Ave Zion, IL 60099					SDG:	20-04072						
								Purchase Order:	677116						
								Analysis Category:	ENVIRONMENTAL						
								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	
20-04072-10	TRG	L2-10214C-RJGS-001-SM-A	05/07/19 07:45	4/25/2020	4/27/2020	20-04072	Actinium-228	EPA 901.1 Modified	2.05E-01	8.86E-02	8.92E-02	1.84E-01		pCi/g	
20-04072-10	TRG	L2-10214C-RJGS-001-SM-A	05/07/19 07:45	4/25/2020	4/27/2020	20-04072	Silver-108m	EPA 901.1 Modified	2.26E-02	1.67E-02	1.67E-02	3.00E-02	U	pCi/g	
20-04072-10	TRG	L2-10214C-RJGS-001-SM-A	05/07/19 07:45	4/25/2020	4/27/2020	20-04072	Barium-133	EPA 901.1 Modified	4.61E-03	3.41E-02	3.41E-02	4.72E-02	U	pCi/g	
20-04072-10	TRG	L2-10214C-RJGS-001-SM-A	05/07/19 07:45	4/25/2020	4/27/2020	20-04072	Bismuth-214	EPA 901.1 Modified	1.82E-01	4.48E-02	4.58E-02	1.49E-01		pCi/g	
20-04072-10	TRG	L2-10214C-RJGS-001-SM-A	05/07/19 07:45	4/25/2020	4/27/2020	20-04072	Cobalt-60	EPA 901.1 Modified	2.65E-01	3.39E-02	3.65E-02	4.51E-02		pCi/g	
20-04072-10	TRG	L2-10214C-RJGS-001-SM-A	05/07/19 07:45	4/25/2020	4/27/2020	20-04072	Cesium-134	EPA 901.1 Modified	-1.57E-01	4.61E-02	4.68E-02	3.57E-02	U	pCi/g	
20-04072-10	TRG	L2-10214C-RJGS-001-SM-A	05/07/19 07:45	4/25/2020	4/27/2020	20-04072	Cesium-137	EPA 901.1 Modified	2.18E+00	2.50E-01	2.74E-01	5.19E-02		pCi/g	
20-04072-10	TRG	L2-10214C-RJGS-001-SM-A	05/07/19 07:45	4/25/2020	4/27/2020	20-04072	Europium-152	EPA 901.1 Modified	1.33E-02	6.46E-02	6.46E-02	7.87E-02	U	pCi/g	
20-04072-10	TRG	L2-10214C-RJGS-001-SM-A	05/07/19 07:45	4/25/2020	4/27/2020	20-04072	Europium-154	EPA 901.1 Modified	4.61E-02	5.72E-02	5.72E-02	4.12E-02	U	pCi/g	
20-04072-10	TRG	L2-10214C-RJGS-001-SM-A	05/07/19 07:45	4/25/2020	4/27/2020	20-04072	Europium-155	EPA 901.1 Modified	-8.47E-03	4.60E-02	4.60E-02	6.57E-02	U	pCi/g	
20-04072-10	TRG	L2-10214C-RJGS-001-SM-A	05/07/19 07:45	4/25/2020	4/27/2020	20-04072	Holmium-166m	EPA 901.1 Modified	5.79E-03	2.77E-02	2.77E-02	2.78E-02	U	pCi/g	
20-04072-10	TRG	L2-10214C-RJGS-001-SM-A	05/07/19 07:45	4/25/2020	4/27/2020	20-04072	Iodine-129	EPA 901.1 Modified	9.89E-03	2.49E-02	2.49E-02	7.80E-02	U	pCi/g	
20-04072-10	TRG	L2-10214C-RJGS-001-SM-A	05/07/19 07:45	4/25/2020	4/27/2020	20-04072	Potassium-40	EPA 901.1 Modified	5.09E+00	6.51E-01	7.02E-01	4.74E-01		pCi/g	
20-04072-10	TRG	L2-10214C-RJGS-001-SM-A	05/07/19 07:45	4/25/2020	4/27/2020	20-04072	Manganese-54	EPA 901.1 Modified	7.01E-03	3.94E-02	3.94E-02	5.91E-02	U	pCi/g	
20-04072-10	TRG	L2-10214C-RJGS-001-SM-A	05/07/19 07:45	4/25/2020	4/27/2020	20-04072	Molybdenum-93	EPA 901.1 Modified	-1.32E-02	1.69E-02	1.69E-02	2.01E-02	U	pCi/g	
20-04072-10	TRG	L2-10214C-RJGS-001-SM-A	05/07/19 07:45	4/25/2020	4/27/2020	20-04072	Niobium-94	EPA 901.1 Modified	2.40E-02	1.67E-02	1.68E-02	2.53E-02	U	pCi/g	
20-04072-10	TRG	L2-10214C-RJGS-001-SM-A	05/07/19 07:45	4/25/2020	4/27/2020	20-04072	Lead-210	EPA 901.1 Modified	4.98E-01	4.11E-01	4.12E-01	6.82E-01	U	pCi/g	
20-04072-10	TRG	L2-10214C-RJGS-001-SM-A	05/07/19 07:45	4/25/2020	4/27/2020	20-04072	Lead-212	EPA 901.1 Modified	2.12E-01	5.56E-02	5.66E-02	7.94E-02		pCi/g	
20-04072-10	TRG	L2-10214C-RJGS-001-SM-A	05/07/19 07:45	4/25/2020	4/27/2020	20-04072	Lead-214	EPA 901.1 Modified	2.10E-01	5.98E-02	6.07E-02	1.09E-01		pCi/g	
20-04072-10	TRG	L2-10214C-RJGS-001-SM-A	05/07/19 07:45	4/25/2020	4/27/2020	20-04072	Promethium-145	EPA 901.1 Modified	-4.66E-02	4.65E-02	4.66E-02	7.14E-02	U	pCi/g	
20-04072-10	TRG	L2-10214C-RJGS-001-SM-A	05/07/19 07:45	4/25/2020	4/27/2020	20-04072	Radium-226	EPA 901.1 Modified	1.82E-01	4.48E-02	4.58E-02	1.49E-01		pCi/g	
20-04072-10	TRG	L2-10214C-RJGS-001-SM-A	05/07/19 07:45	4/25/2020	4/27/2020	20-04072	Antimony-125	EPA 901.1 Modified	3.80E-02	7.98E-02	7.99E-02	1.18E-01	U	pCi/g	
20-04072-10	TRG	L2-10214C-RJGS-001-SM-A	05/07/19 07:45	4/25/2020	4/27/2020	20-04072	Thorium-234	EPA 901.1 Modified	8.17E-01	2.93E-01	2.96E-01	4.86E-01	U	pCi/g	
20-04072-10	TRG	L2-10214C-RJGS-001-SM-A	05/07/19 07:45	4/25/2020	4/27/2020	20-04072	Thallium-208	EPA 901.1 Modified	1.80E-01	5.83E-02	5.91E-02	9.63E-02		pCi/g	
20-04072-10	TRG	L2-10214C-RJGS-001-SM-A	05/07/19 07:45	4/25/2020	4/27/2020	20-04072	Uranium-235	EPA 901.1 Modified	1.17E-01	1.05E-01	1.05E-01	1.57E-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:						
				Gerald Wood					SDG:	20-04072					
				Zion Solutions					Purchase Order:	677116					
				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	
20-04072-11	TRG	L1-12109L-CJGS-001-SB-A	08/21/19 10:25	4/25/2020	4/27/2020	20-04072	Actinium-228	EPA 901.1 Modified	1.11E+00	2.50E-01	2.57E-01	4.54E-01		pCi/g	
20-04072-11	TRG	L1-12109L-CJGS-001-SB-A	08/21/19 10:25	4/25/2020	4/27/2020	20-04072	Silver-108m	EPA 901.1 Modified	2.57E-03	4.71E-02	4.71E-02	7.80E-02	U	pCi/g	
20-04072-11	TRG	L1-12109L-CJGS-001-SB-A	08/21/19 10:25	4/25/2020	4/27/2020	20-04072	Barium-133	EPA 901.1 Modified	8.15E-03	2.98E-02	2.98E-02	1.50E-01	U	pCi/g	
20-04072-11	TRG	L1-12109L-CJGS-001-SB-A	08/21/19 10:25	4/25/2020	4/27/2020	20-04072	Bismuth-214	EPA 901.1 Modified	1.24E+00	1.90E-01	2.00E-01	2.55E-01		pCi/g	
20-04072-11	TRG	L1-12109L-CJGS-001-SB-A	08/21/19 10:25	4/25/2020	4/27/2020	20-04072	Cobalt-60	EPA 901.1 Modified	9.43E-02	7.75E-02	7.76E-02	1.18E-01	U	pCi/g	
20-04072-11	TRG	L1-12109L-CJGS-001-SB-A	08/21/19 10:25	4/25/2020	4/27/2020	20-04072	Cesium-134	EPA 901.1 Modified	4.83E-02	5.80E-02	5.81E-02	1.47E-01	U	pCi/g	
20-04072-11	TRG	L1-12109L-CJGS-001-SB-A	08/21/19 10:25	4/25/2020	4/27/2020	20-04072	Cesium-137	EPA 901.1 Modified	1.47E-01	8.15E-02	8.18E-02	1.31E-01		pCi/g	
20-04072-11	TRG	L1-12109L-CJGS-001-SB-A	08/21/19 10:25	4/25/2020	4/27/2020	20-04072	Europium-152	EPA 901.1 Modified	-2.05E-03	1.31E-01	1.31E-01	2.52E-01	U	pCi/g	
20-04072-11	TRG	L1-12109L-CJGS-001-SB-A	08/21/19 10:25	4/25/2020	4/27/2020	20-04072	Europium-154	EPA 901.1 Modified	-1.19E-01	2.01E-01	2.01E-01	1.31E-01	U	pCi/g	
20-04072-11	TRG	L1-12109L-CJGS-001-SB-A	08/21/19 10:25	4/25/2020	4/27/2020	20-04072	Europium-155	EPA 901.1 Modified	1.01E+00	1.84E-01	1.91E-01	2.67E-01		pCi/g	
20-04072-11	TRG	L1-12109L-CJGS-001-SB-A	08/21/19 10:25	4/25/2020	4/27/2020	20-04072	Holmium-166m	EPA 901.1 Modified	2.38E-01	8.51E-02	8.60E-02	1.38E-01		pCi/g	
20-04072-11	TRG	L1-12109L-CJGS-001-SB-A	08/21/19 10:25	4/25/2020	4/27/2020	20-04072	Iodine-129	EPA 901.1 Modified	-1.11E-01	2.16E-01	2.17E-01	3.07E-01	U	pCi/g	
20-04072-11	TRG	L1-12109L-CJGS-001-SB-A	08/21/19 10:25	4/25/2020	4/27/2020	20-04072	Potassium-40	EPA 901.1 Modified	2.59E+01	2.65E+00	2.96E+00	1.93E+00		pCi/g	
20-04072-11	TRG	L1-12109L-CJGS-001-SB-A	08/21/19 10:25	4/25/2020	4/27/2020	20-04072	Manganese-54	EPA 901.1 Modified	1.33E-01	1.23E-01	1.23E-01	1.76E-01	U	pCi/g	
20-04072-11	TRG	L1-12109L-CJGS-001-SB-A	08/21/19 10:25	4/25/2020	4/27/2020	20-04072	Molybdenum-93	EPA 901.1 Modified	1.49E-02	6.62E-02	6.62E-02	9.11E-02	U	pCi/g	
20-04072-11	TRG	L1-12109L-CJGS-001-SB-A	08/21/19 10:25	4/25/2020	4/27/2020	20-04072	Niobium-94	EPA 901.1 Modified	2.92E-02	6.45E-02	6.45E-02	9.12E-02	U	pCi/g	
20-04072-11	TRG	L1-12109L-CJGS-001-SB-A	08/21/19 10:25	4/25/2020	4/27/2020	20-04072	Lead-210	EPA 901.1 Modified	2.40E+00	1.43E+00	1.43E+00	2.34E+00		pCi/g	
20-04072-11	TRG	L1-12109L-CJGS-001-SB-A	08/21/19 10:25	4/25/2020	4/27/2020	20-04072	Lead-212	EPA 901.1 Modified	1.15E+00	1.89E-01	1.98E-01	2.88E-01		pCi/g	
20-04072-11	TRG	L1-12109L-CJGS-001-SB-A	08/21/19 10:25	4/25/2020	4/27/2020	20-04072	Lead-214	EPA 901.1 Modified	1.35E+00	2.32E-01	2.42E-01	3.27E-01		pCi/g	
20-04072-11	TRG	L1-12109L-CJGS-001-SB-A	08/21/19 10:25	4/25/2020	4/27/2020	20-04072	Promethium-145	EPA 901.1 Modified	4.47E-02	1.81E-01	1.81E-01	2.63E-01	U	pCi/g	
20-04072-11	TRG	L1-12109L-CJGS-001-SB-A	08/21/19 10:25	4/25/2020	4/27/2020	20-04072	Radium-226	EPA 901.1 Modified	1.24E+00	1.90E-01	2.00E-01	2.55E-01		pCi/g	
20-04072-11	TRG	L1-12109L-CJGS-001-SB-A	08/21/19 10:25	4/25/2020	4/27/2020	20-04072	Antimony-125	EPA 901.1 Modified	-1.85E-01	1.95E-01	1.96E-01	2.67E-01	U	pCi/g	
20-04072-11	TRG	L1-12109L-CJGS-001-SB-A	08/21/19 10:25	4/25/2020	4/27/2020	20-04072	Thorium-234	EPA 901.1 Modified	6.92E+00	1.33E+00	1.37E+00	1.97E+00	U	pCi/g	
20-04072-11	TRG	L1-12109L-CJGS-001-SB-A	08/21/19 10:25	4/25/2020	4/27/2020	20-04072	Thallium-208	EPA 901.1 Modified	9.01E-01	1.88E-01	1.93E-01	3.50E-01		pCi/g	
20-04072-11	TRG	L1-12109L-CJGS-001-SB-A	08/21/19 10:25	4/25/2020	4/27/2020	20-04072	Uranium-235	EPA 901.1 Modified	5.96E-01	3.59E-01	3.60E-01	5.40E-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



EBERLINE ANALYTICAL CORPORATION

601 SCARBORO ROAD OAK RIDGE, TN 37830 865/481-0683 FAX 865/483-4621

Eberline Analytical Final Report of Analysis			Report To:					Work Order Details:								
			Gerald Wood					SDG:	20-04072							
			Zion Solutions					Purchase Order:	677116							
			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		
20-04072-12	TRG	L1-12106L-CJGS-001-SB-A	08/14/19 13:30	4/25/2020	4/27/2020	20-04072	Actinium-228	EPA 901.1 Modified	5.36E-01	1.52E-01	1.54E-01	3.38E-01		pCi/g		
20-04072-12	TRG	L1-12106L-CJGS-001-SB-A	08/14/19 13:30	4/25/2020	4/27/2020	20-04072	Silver-108m	EPA 901.1 Modified	4.17E-03	2.76E-02	2.76E-02	4.45E-02	U	pCi/g		
20-04072-12	TRG	L1-12106L-CJGS-001-SB-A	08/14/19 13:30	4/25/2020	4/27/2020	20-04072	Barium-133	EPA 901.1 Modified	-3.19E-01	1.03E-01	1.05E-01	6.63E-02	U	pCi/g		
20-04072-12	TRG	L1-12106L-CJGS-001-SB-A	08/14/19 13:30	4/25/2020	4/27/2020	20-04072	Bismuth-214	EPA 901.1 Modified	6.70E-01	1.24E-01	1.29E-01	1.96E-01		pCi/g		
20-04072-12	TRG	L1-12106L-CJGS-001-SB-A	08/14/19 13:30	4/25/2020	4/27/2020	20-04072	Cobalt-60	EPA 901.1 Modified	2.89E-02	5.38E-02	5.38E-02	7.28E-02	U	pCi/g		
20-04072-12	TRG	L1-12106L-CJGS-001-SB-A	08/14/19 13:30	4/25/2020	4/27/2020	20-04072	Cesium-134	EPA 901.1 Modified	1.56E-02	3.25E-02	3.25E-02	7.48E-02	U	pCi/g		
20-04072-12	TRG	L1-12106L-CJGS-001-SB-A	08/14/19 13:30	4/25/2020	4/27/2020	20-04072	Cesium-137	EPA 901.1 Modified	1.92E-01	6.43E-02	6.50E-02	9.63E-02		pCi/g		
20-04072-12	TRG	L1-12106L-CJGS-001-SB-A	08/14/19 13:30	4/25/2020	4/27/2020	20-04072	Europium-152	EPA 901.1 Modified	1.34E-01	1.31E-01	1.31E-01	1.51E-01	U	pCi/g		
20-04072-12	TRG	L1-12106L-CJGS-001-SB-A	08/14/19 13:30	4/25/2020	4/27/2020	20-04072	Europium-154	EPA 901.1 Modified	1.57E-02	1.25E-01	1.25E-01	7.86E-02	U	pCi/g		
20-04072-12	TRG	L1-12106L-CJGS-001-SB-A	08/14/19 13:30	4/25/2020	4/27/2020	20-04072	Europium-155	EPA 901.1 Modified	6.02E-02	6.89E-02	6.90E-02	1.15E-01	U	pCi/g		
20-04072-12	TRG	L1-12106L-CJGS-001-SB-A	08/14/19 13:30	4/25/2020	4/27/2020	20-04072	Holmium-166m	EPA 901.1 Modified	6.21E-02	6.76E-02	6.77E-02	9.36E-02	U	pCi/g		
20-04072-12	TRG	L1-12106L-CJGS-001-SB-A	08/14/19 13:30	4/25/2020	4/27/2020	20-04072	Iodine-129	EPA 901.1 Modified	9.17E-02	8.74E-02	8.76E-02	1.23E-01	U	pCi/g		
20-04072-12	TRG	L1-12106L-CJGS-001-SB-A	08/14/19 13:30	4/25/2020	4/27/2020	20-04072	Potassium-40	EPA 901.1 Modified	1.95E+01	2.02E+00	2.25E+00	1.14E+00		pCi/g		
20-04072-12	TRG	L1-12106L-CJGS-001-SB-A	08/14/19 13:30	4/25/2020	4/27/2020	20-04072	Manganese-54	EPA 901.1 Modified	3.61E-02	7.05E-02	7.05E-02	1.09E-01	U	pCi/g		
20-04072-12	TRG	L1-12106L-CJGS-001-SB-A	08/14/19 13:30	4/25/2020	4/27/2020	20-04072	Molybdenum-93	EPA 901.1 Modified	1.21E-02	2.17E-02	2.17E-02	5.50E-02	U	pCi/g		
20-04072-12	TRG	L1-12106L-CJGS-001-SB-A	08/14/19 13:30	4/25/2020	4/27/2020	20-04072	Niobium-94	EPA 901.1 Modified	-3.10E-03	4.05E-02	4.05E-02	5.95E-02	U	pCi/g		
20-04072-12	TRG	L1-12106L-CJGS-001-SB-A	08/14/19 13:30	4/25/2020	4/27/2020	20-04072	Lead-210	EPA 901.1 Modified	1.41E+00	1.05E+00	1.06E+00	1.75E+00	U	pCi/g		
20-04072-12	TRG	L1-12106L-CJGS-001-SB-A	08/14/19 13:30	4/25/2020	4/27/2020	20-04072	Lead-212	EPA 901.1 Modified	4.37E-01	9.77E-02	1.00E-01	1.33E-01		pCi/g		
20-04072-12	TRG	L1-12106L-CJGS-001-SB-A	08/14/19 13:30	4/25/2020	4/27/2020	20-04072	Lead-214	EPA 901.1 Modified	6.06E-01	1.21E-01	1.25E-01	2.08E-01		pCi/g		
20-04072-12	TRG	L1-12106L-CJGS-001-SB-A	08/14/19 13:30	4/25/2020	4/27/2020	20-04072	Promethium-145	EPA 901.1 Modified	-2.10E-01	1.25E-01	1.25E-01	1.45E-01	U	pCi/g		
20-04072-12	TRG	L1-12106L-CJGS-001-SB-A	08/14/19 13:30	4/25/2020	4/27/2020	20-04072	Radium-226	EPA 901.1 Modified	6.70E-01	1.24E-01	1.29E-01	1.96E-01		pCi/g		
20-04072-12	TRG	L1-12106L-CJGS-001-SB-A	08/14/19 13:30	4/25/2020	4/27/2020	20-04072	Antimony-125	EPA 901.1 Modified	3.25E-02	1.02E-01	1.03E-01	1.69E-01	U	pCi/g		
20-04072-12	TRG	L1-12106L-CJGS-001-SB-A	08/14/19 13:30	4/25/2020	4/27/2020	20-04072	Thorium-234	EPA 901.1 Modified	1.10E+00	7.84E-01	7.86E-01	1.30E+00	U	pCi/g		
20-04072-12	TRG	L1-12106L-CJGS-001-SB-A	08/14/19 13:30	4/25/2020	4/27/2020	20-04072	Thallium-208	EPA 901.1 Modified	5.15E-01	1.24E-01	1.26E-01	2.10E-01		pCi/g		
20-04072-12	TRG	L1-12106L-CJGS-001-SB-A	08/14/19 13:30	4/25/2020	4/27/2020	20-04072	Uranium-235	EPA 901.1 Modified	-1.06E-01	2.46E-01	2.46E-01	3.09E-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



EBERLINE ANALYTICAL CORPORATION

601 SCARBORO ROAD OAK RIDGE, TN 37830 865/481-0683 FAX 865/483-4621

20-04072
REC'D APR 25 2020

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						
B2-06207C-JFCCV-002- 0.0-0.5	NA	NA	Concrete	120.18	gm	Plastic bag	1	11-19-2012	1045	FULL SUITE and 5 ROC	NA	NA	
B2-06207C-JFCCV-002- 0.5-1.0	NA	NA	Concrete	129.04	gm	Plastic bag	1	11-19-2012	1045	FULL SUITE and 5 ROC	NA	NA	
B2-06104C-JFCCV-003- 0.5-1.0	NA	NA	Concrete	115.89	gm	Plastic bag	1	11-12-2012	1008	FULL SUITE and 5 ROC	NA	NA	
B2-06104C-JFCCV-003- 1.0-1.5	NA	NA	Concrete	118.77	gm	Plastic bag	1	11-12-2012	1008	FULL SUITE and 5 ROC	NA	NA	
B1-06201A-FSFC-009-CV	NA	NA	Concrete	298.87	gm	Plastic bag	1	06-07-2018	1130	FULL SUITE and 5 ROC	NA	NA	
B1-06201A-FSWC-041-CV	NA	NA	Concrete	231.42	gm	Plastic bag	1	06-18-2018	0900	FULL SUITE and 5 ROC	NA	NA	
B1-06201A-FSWC-050-CV	NA	NA	Concrete	259.58	gm	Plastic bag	1	06-07-2018	1300	FULL SUITE and 5 ROC	NA	NA	
B1-06202A-FSFC-028-CV	NA	NA	Concrete	244.20	gm	Plastic bag	1	06-18-2018	1450	FULL SUITE and 5 ROC	NA	NA	
B1-06202A-FSWC-033CV	NA	NA	Concrete	274.50	gm	Plastic bag	1	06-18-2018	1344	FULL SUITE and 5 ROC	NA	NA	
B1-06202A-FSWC-040-CV	NA	NA	Concrete	389.08	gm	Plastic bag	1	06-18-2018	1030	FULL SUITE and 5 ROC	NA	NA	
B1-06214A-FSFC-001-CV	NA	NA	Concrete	298.3	gm	Plastic bag	1	05-05-2018	1515	FULL SUITE and 5 ROC	NA	NA	
Laboratory: 1.1. Eberline Labs				Date Submitted To Lab: NA				Ship Container No.: NA		Cooler Temperature: NA		Airbill Number: Fed Ex Priority Overnight 8132 0229 0060	
Relinquished by: <i>Cheryl M. Baldwin</i>				Date: 04/24/2020	Time: 1145			Received by: <i>Richard F. Rickert</i>		Date: 04/24/2020	Time: 1145		
Relinquished by: <i>Richard F. Rickert</i>				Date: 04/24/2020	Time: 1600			Received by: <i>Fed Ex Priority Overnight</i>		Date: 04/24/2020	Time: 1600		
Relinquished by: <i>Fed Ex</i>				Date: 4/25/20	Time: 9:10am			Received by: <i>E. Towery</i>		Date: 4/25/20	Time: 910am		
Comments FULL SUITE and 5 ROC EXPEDITE													

20-04072
REC'D APR 25 2020

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						
6 B2-08101A-BJFC-007-CV 0.0-0.5	NA	NA	Concrete	120.18	gms	Plastic	1	05-09-2012	1422	FULL SUITE and 5 ROC	NA	NA	
7 B2-08101A-BJFC-007-CV 0.5-1.0	NA	NA	Concrete	175.02	gms	Plastic	1	05-09-2012	1422	FULL SUITE and 5 ROC	NA	NA	
8 B2-08201-CJWC-A018-CV 0.0-0.5	NA	NA	Concrete	123.37	gms	Plastic	1	05-10-2012	1256	FULL SUITE and 5 ROC	NA	NA	
9 B2-08201-CJWC-A018-CV 0.5-1.0	NA	NA	Concrete	132.37	gms	Plastic	1	05-10-2012	1256	FULL SUITE and 5 ROC	NA	NA	
10 L2-10214C-RJGS-001-SM-A	NA	NA	Sediment	561.53	gms	Marinelli	1	05-07-2019	0745	FULL SUITE and 5 ROC	NA	NA	
11 L1-12109L-CJGS-001-SB-A	NA	NA	Soil	145.65	gms	Marinelli	1	08-21-2019	1025	FULL SUITE and 5 ROC	NA	NA	
12 L1-12106L-CJGS-001-SB-A	NA	NA	Soil	174.32	gms	Marinelli	1	08-14-2019	1330	FULL SUITE and 5 ROC	NA	NA	
Laboratory:				Date Submitted To Lab:				Ship Container No.:		Cooler Temperature:		Airbill Number:	
1.1. <u>Eberline Labs</u>				NA				NA		NA		Fed Ex Priority Overnight 8132 0229 0060	
Relinquished by:			Date:	Time:	Received by:			Date:	Time:				
Deby Baldwin			04/24/2020	1145	Richard F. Rickett			04/24/2020	1145				
Relinquished by:			Date:	Time:	Received by:			Date:	Time:				
Richard F. Rickett			04/24/2020	1600	Fed Ex Priority Overnight			04/24/2020	1600				
Relinquished by:			Date:	Time:	Received by:			Date:	Time:				
Fed Ex			4/25/20	9:10am	E Touery			4/25/20	9:10am				
Comments													
FULL SUITE and 5 ROC				EXPEDITE									