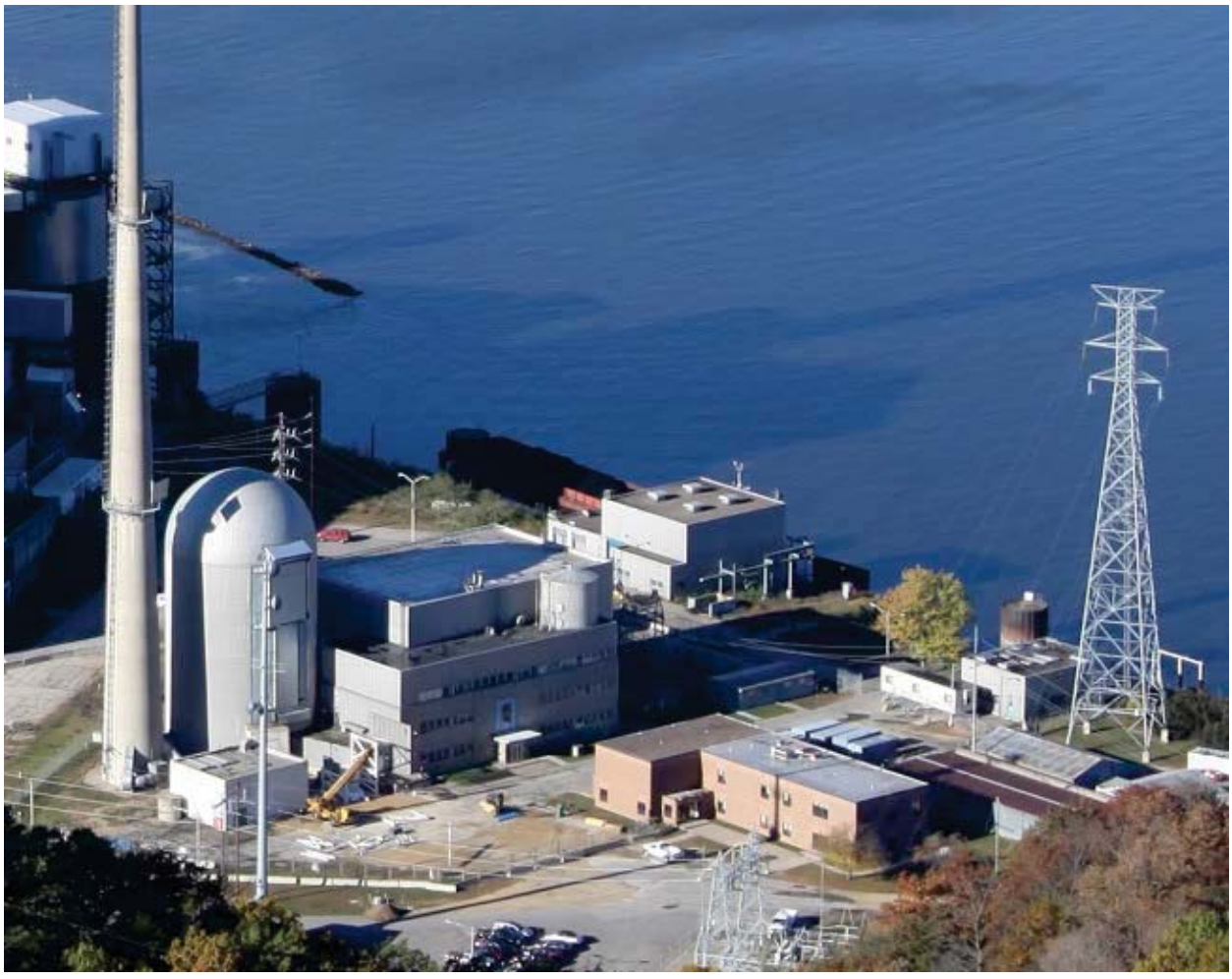
LACROSSE SOLUTIONS

LA CROSSE BOILING WATER REACTOR
FINAL STATUS SURVEY RELEASE RECORD

SURVEY UNIT L3-012-102



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LIST OF ACRONYMS AND ABBREVIATIONS

ALARA	As Low As Reasonably Achievable
DQA	Data Quality Assessment
DQO	Data Quality Objective
DCGL	Derived Concentration Guideline Level
$DCGL_S$	Soil Derived Concentration Guideline Level
FSS	Final Status Survey
GPS	Global Positioning System
HSA	Historical Site Assessment
IC	Insignificant Contributors
LACBWR	La Crosse Boiling Water Reactor
LBGR	Lower Bound of the Gray Region
LTP	License Termination Plan
M&E	Material and Equipment
MARSSIM	Multi-Agency Radiation Survey and Site Investigation Manual
MDC	Minimum Detectable Concentration
MDCR	Minimal Detectable Count Rate
NaI	Sodium Iodide
$OpDCGL_S$	Soil Operational Derived Concentration Guideline Level
QAPP	Quality Assurance Project Plan
QC	Quality Control
RCA	Radiologically Controlled Area
ROC	Radionuclides of Concern
SOF	Sum-of-Fraction
TEDE	Total Effective Dose Equivalent
UBGR	Upper Bound of the Gray Region
UCL	Upper Confidence Limit
URS	Unconditional Release Survey

1. EXECUTIVE SUMMARY

This Final Status Survey (FSS) Release Record for survey unit L3-012-102, has been generated in accordance with LaCrosse*Solutions* procedure LC-FS-PR-009, *Final Status Survey Data Reporting* (Reference 1) and satisfies the requirements of Section 5.11 of the *La Crosse Boiling Water Reactor License Termination Plan* (LTP) (Reference 2).

An FSS sample plan for this survey unit was developed in accordance with LaCrosse*Solutions* procedure LC-FS-PR-002, *Final Status Survey Package Development* (Reference 3), the LACBWR LTP, and with guidance from NUREG-1575, Revision 1, *Multi-Agency Radiation Survey and Site Investigation Manual* (MARSSIM) (Reference 4).

This survey unit has a MARSSIM classification of 3. A survey plan was designed based upon use of the Sign Test as the nonparametric statistical test for compliance. Both the Type I (α) and Type II (β) decision error rates were set at 0.05. Twenty-eight (28) soil samples were acquired from the survey unit at randomly selected locations. In addition, soil scanning was performed on 10% (1,171 m^2) of the total surface area in the survey unit.

The analytical results for all soil samples taken in survey unit L3-012-102 indicate that the maximum Sum-of-Fraction (SOF), considering the concentration of all applicable Radionuclides of Concern (ROC) either by direct measurement or by inference, is equal to 0.0514 when applying the respective Operational Derived Concentration Guideline Levels ($OpDCGL_S$) for soil. Therefore, the null hypothesis is rejected and survey unit L3-012-102 is acceptable for unrestricted release. The total SOF for all ROCs when applying the respective Base Case DCGLs ($DCGL_S$) for soil is 0.009. This SOF equates to a dose for the survey unit of 0.2247 mrem/yr.

2. SURVEY UNIT DESCRIPTION

L3-012-102 is an impacted Class 3 survey unit. This survey unit includes the current LACBWR Site Switchyard and Transmission Sub-Station Switch House grounds, which are located on the north end of the LACBWR Site. The surface area of the survey unit is 11,711 m^2. The boundary of the survey unit and the location of the soil samples were defined using a Global Positioning System (GPS). Refer to Attachment 1 of this report for figures and maps depicting survey unit L3-012-102.

3. CLASSIFICATION BASIS

Based on the Historical Site Assessment (HSA) (Reference 5), open land survey unit L3-012-102 has been identified as a Class 3 area. The facilities within this survey unit were all used in the support of the LACBWR nuclear steam system. This classification is also selected based on the fact that this survey unit is outside the buffer area to the RCA with low potential for contamination translocation due to personnel and equipment movements or surface water runoff from the Radiologically Controlled Area (RCA). The following summarizes the results of the characterization surveys for survey unit L3-012-102.

The initial site characterization surveys performed by Energy*Solutions* were conducted between October 9, 2014, and August 6, 2015. Surface scans and random and biased surface and subsurface soils samples were taken in all Class 1, 2, 3, and non-impacted open land area survey units with the exception of survey unit L3-012-102 (Switchyard). Survey unit L3-012-102 was not surveyed during this characterization activity as the survey unit is the site switchyard which was active at the time of the survey operations and safety considerations prohibited surveys and samplings inside the switchyard. MARSSIM states that when preliminary data is not obtained, it may be reasonable to assume a coefficient of variation on the order of 30%, based on experience.

Section 5.1 of the LTP states that the actual Insignificant Contributor (IC) dose will be calculated for each individual sample result using the DCGLs from TSD RS-TD-313196-004, *LACBWR Soil DCGL, Basement Concrete DCGL, and Buried Pipe DCGL*, Table 4 (Reference 6) for soils. If the IC dose calculated is less than the IC dose assigned for DCGL adjustment, then no further action is required to be taken. If the actual IC dose calculated from the sample result is greater than the IC dose assigned for DCGL adjustment, then a minimum of five (5) additional investigation samples will be taken around the original sample location. Each investigation sample will be analyzed by the on-site gamma spectroscopy system and sent for HTD analysis (full suite of radionuclides from LTP Table 5-1). As with the original sample, the actual IC dose will be calculated for each investigation sample. In this case, the actual calculated maximum IC dose from an individual sample observed in the survey unit will be used to readjust the DCGLs in that survey unit. If the maximum IC dose exceeds 10%, then the additional radionuclides that were the cause of the IC dose exceeding 10% will be added as additional ROC for that survey unit. The survey unit-specific DCGLs used for compliance, the ROC for that survey unit, and the survey data serving as the basis for the IC dose adjustment are required to be documented in the release record for the survey unit.

Based upon review of the historical information, the results of the characterization survey data, and completion of a final Survey Unit Classification Worksheet, the correct final classification of survey unit L3-012-102 was determined to be Class 3.

4. DATA QUALITY OBJECTIVES

Final Status Survey planning and design hinges on coherence with the Data Quality Objective (DQO) process to ensure, through compliance with explicitly defined inputs and boundaries, that the primary objective of the survey is satisfied. The DQO process is described in the LACBWR LTP in accordance with MARSSIM. The appropriate design for a given survey was developed using the DQO process as outlined in Appendix D of MARSSIM. A summary of seven steps of the DQO process are outlined as follows.

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 was to demonstrate that the level of residual radioactivity in survey unit L3-012-102 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).

LaCrosse*Solutions* TSD RS-TD-313196-001, *Radionuclides of Concern during LACBWR Decommissioning* (Reference 7) established the basis for an initial suite of potential ROC for decommissioning. LTP Chapter 2 provides detailed characterization data that describes the results of surveys taken of soil. Surface and subsurface soil samples were taken in each impacted open land survey units and analyzed for the presence of plant-derived radionuclides. The results of surface and subsurface soil characterization in the impacted area surrounding LACBWR indicate that there is minimal residual radioactivity in soil.

Insignificant dose contributors were determined to be consistent with the guidance contained in Section 3.3 of NUREG-1757, Volume 2, Revision 1, *Consolidated Decommissioning Guidance – Characterization, Survey, and Determination of Radiological Criteria, Final Report* (Reference 8). In all soil and concrete scenarios, Cs-137, Co-60, Sr-90, Eu-152 and Eu-154 contribute nearly 100% of the total dose. The remaining radionuclides were designated as insignificant dose contributors and are eliminated from further detailed evaluation. Therefore, the final ROCs for LACBWR soil, basement concrete and buried piping are Cs-137, Co-60, Sr-90, Eu-152 and Eu-154.

LTP Chapter 6, Section 6.14.1 discusses the process used to derive the ROC for the decommissioning of LACBWR, including the elimination of insignificant dose contributors from the initial suite. Table 4-1 presents the ROC for the decommissioning of soil at LACBWR and the normalized mixture fractions based on the radionuclide mixture.

Table 4-1 - Dose Significant Radionuclides and Mixture for Soil

Radionuclide	Fraction of Total Activity (normalized)(1)
Co-60	0.064
Sr-90	0.098
Cs-137	0.829
Eu-152	0.005
Eu-154	0.003

(1) Based on maximum percent of total activity from Table 22 of RS-TD-313196-001, normalized to one for the dose significant radionuclides.

LTP, Section 5.2 states that each radionuclide-specific Base Case DCGL 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/yr to an Average Member of the Critical Group. To ensure that the summation of dose from each source term is 25 mrem/yr or less after all FSS is completed, the Base Case DCGLs are reduced based on an expected, or *a priori*, fraction of the 25 mrem/yr dose limit from each source term. The reduced DCGLs, or "Operational" DCGLs can be related to the Base Case DCGLs 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 Operational DCGL is then used as the DCGL for the FSS design of the survey unit (calculation of surrogate DCGLs, investigations levels, etc.). Details of the Operational DCGLs derived for each dose component and the basis for the applied *a priori* dose fractions are provided in LC-FS-TSD-002, *Operational Derived Concentration Guideline Levels for Final Status Survey* (Reference 9).

The dose contribution from each ROC is accounted for using the SOF to ensure that the total dose from all ROC does not exceed the dose criterion. A Base Case DCGL that is established for the average residual radioactivity in a survey unit is equivalent to a $DCGL_W$. The $DCGL_W$ can be multiplied by Area Factors, in Class 1 survey units, to obtain a Base Case DCGL that represents the same dose to an individual for residual radioactivity over a smaller area within a survey unit.

At LACBWR, compliance is demonstrated through the summation of dose from five (5) distinct source terms for the end-state (basements, soils, buried pipe, above-ground

structures, and groundwater). When applied to soil, the DCGLs are expressed in units of activity per unit of mass (pCi/g).

For LACBWR, soil is defined as a layer of soil beginning at the surface but extending to a depth of 1 m to allow for flexibility in compliance demonstration if contamination deeper than 0.15 m is encountered. Based on characterization data and historical information, there are no expectations of encountering a source term geometry that is comprised of a clean surface layer of soil over a contaminated subsurface soil layer. Energy*Solutions* TSD RS-TD-313196-004 and LTP Chapter 6, Sections 6.4 and 6.8 provide the exposure scenarios and modeling parameters that were used to calculate the site-specific soil DCGLs. The adjusted soil DCGLs for the unrestricted release of open land survey units as provided in Chapter 6, Section 6.16.1 are reproduced in Table 4-2. The insignificant dose contributor percentages for the most limiting basement scenario was used to adjust the DCGLs for soil to account for the dose from the eliminated insignificant contributor radionuclides.

Table 4-2 - Base Case DCGLs for Soil

Radionuclide	$DCGL_S$ (pCi/g)
Co-60	10.6
Sr-90	5470
Cs-137	48.3
Eu-152	23.6
Eu-154	21.9

The Operational DCGLs are then used as the DCGL for the FSS design of the survey unit (calculation of surrogate DCGLs, investigation levels, etc.). The $OpDCGL_S$ for the unrestricted release of soil are provided in Table 4-3.

Table 4-3 - Operational DCGLs for Soil

Radionuclide	$OpDCGL_S$ (pCi/g)
Co-60	3.83
Sr-90	1970.45
Cs-137	17.39
Eu-152	8.51
Eu-154	7.89

Instrument DQOs included a verification of the ability of the survey instrument to detect the radiation(s) of interest relative to the Operational DCGL. Survey instrument response

checks were required prior to issuance and after the instrument had been used. Control and accountability of survey instruments was required to assure the quality and prevent the loss of data.

As part of the DQOs applied to laboratory processes, analysis results were reported as actual concentrations, therefore, the actual concentrations are used as the recorded FSS result for measurement and/or sample values even if less than the reported MDC. Negative reported concentrations are recorded as "zero". Results were not reported as "less than MDC" (<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 Operational DCGL were preferable while MDCs up to 50% of the Operational DCGL were acceptable. The minimum acceptable MDC for measurements obtained using field instruments was 50% of the applicable Operational DCGL.

5. SURVEY DESIGN

The level of effort associated with planning a survey is based on the complexity of the survey and nature of the hazards. Guidance for preparing FSS plans is provided in procedure LC-FS-PR-002, *Final Status Survey Package Development*. The FSS of minor solid items such as, but not limited to, the switchyard structures, telephone poles, fencing, culverts, duct banks and electrical conduit are designated as miscellaneous material and equipment (M&E) and are surveyed in accordance with LC-FS-PR-017, *Unconditional Release of Material and Equipment and Secondary Structures* (Reference 10).

The DQO process validated that Co-60, Sr-90, Cs-137, Eu-152, and Eu-154 would be the ROC in survey unit L3-012-102 as presented in LTP Section 5.1. During the data analysis of the FSS results, concentrations for the HTD ROC Sr-90 are inferred using a surrogate approach. Cs-137 is the principle surrogate radionuclide for Sr-90. During characterization, both Sr-90 and Cs-137 was positively detected in all thirty (30) concrete core samples assessed in the Reactor Building, Tunnel, and Waste Treatment Building (WTB). The 95% Upper Confidence Limit (UCL) of the Cs-137 fractions was chosen to represent the overall nuclide mix for soils/buried pipe, the Reactor Building, and the Waste Gas Tank Vault (WGTV). The surrogate ratio for soil is given in Table 5-1.

Table 5-1 - Soil Surrogate Ratio

Radionuclides	Ratio
Sr-90/Cs-137	0.502

The equation for calculating a surrogate DCGL is as follows:

Equation 1

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

Where: $DCGL_{Sur}$ = Surrogate radionuclide DCGL

$DCGL_{2,3...n}$ = 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 Operational DCGLs presented in Table 4-3 and the ratio from Table 5-1, the following surrogate calculation was performed:

Equation 2

$$Surrogate_{DCGL\ (Cs-137)} = \frac{1}{\left[\left(\frac{1}{17.39_{(Cs-137)}}\right) + \left(\frac{0.502}{1970.45_{(Sr-90)}}\right)\right]} = 17.31\ pCi/g$$

The surrogate Operational DCGL that was used for Cs-137 in this survey unit for direct comparison of sample results to demonstrate compliance was 17.31 pCi/g.

The action levels for survey unit L3-012-102 are based on the 50% of the Operational DCGL and are presented in Table 5-2.

Table 5-2 - Action Levels for Survey Unit L3-012-102

ROC	Action Level (pCi/g)
Co-60	1.915(1)
Cs-137	8.655(2)
Eu-152	4.255(1)
Eu-154	3.945(1)

(1) Based on 50% of the Operational DCGL.
(2) Based on 50% of the surrogate adjusted DCGL of Cs-137 while inferring Sr-90.

The Sign Test was selected as the non-parametric statistical test. The use of the Sign Test did not require the selection or use of a background reference area, which simplified survey

design and implementation. This approach was conservative since it included background Cs-137 as part of the sample set.

The number of soil samples for FSS was determined in accordance with procedure LC-FS-PR-002. The relative shift (Δ/σ) for the survey unit data set is defined as shift (Δ), which is the Upper Boundary of the Gray Region (UBGR), or the DCGL (SOF of 1), minus the Lower Bound of the Gray Region (LBGR) (SOF of 0.5), divided by sigma (σ), which is the standard deviation of the data set used for survey design. The optimal value for Δ/σ should range between one (1) and three (3). The largest value the Δ/σ can have is three (3). If the Δ/σ exceeds three (3), then the value of three (3) will be used for Δ/σ. There was no characterization data collected in the survey unit due to safety reasons; therefore, the sigma value used was the MARSSIM recommended value of 0.3. The Δ/σ for survey unit L3-012-102 was calculated as follows:

Equation 3

$$\Delta/\sigma = 0.5/0.3 = 1.67$$

Both the Type I error, or α value, and the Type II error, or β value, was set at 0.05. The sample size from Table 5.5 of MARSSIM that equates to the Type I and Type II error of 0.05 and a relative shift of 1.7 for use with the Sign Test is an N value of seventeen (17).

A Prospective Power Curve was generated using COMPASS, a software package developed under the sponsorship of the United States Nuclear Regulatory Commission (USNRC) for implementation of the MARSSIM in support of the decommissioning license termination rule (10CFR20, Subpart E). The result of the COMPASS computer run showed adequate power for the survey design. The survey design specified seventeen (17) soil samples for non-parametric statistical testing. Though only seventeen (17) soil samples were required, as a conservative measure, twenty-eight (28) soil samples were collected during FSS. Two (2) samples were collected at each location; one sample from the top 15 cm of gravel, and one sample of soil approximately one-foot in depth.

As the survey unit was designated as Class 3, sample locations were selected at random. The random locations of the soil samples were selected using Visual Sample Plan (VSP) in accordance with LC-FS-PR-002. Input parameters included use of aerial photographs and the random sampling tool set with a predetermined number of sample locations. The random coordinates generated with VSP were integrated with a GPS to identify sample locations in the field. Table 5-3 lists the random samples collected for FSS and the corresponding GPS coordinates, based on the Wisconsin State Plane North American Datum 1983 coordinate system.

Table 5-3 - Random Sample Locations

Sample ID	Northing	Easting
L3-012-102-FSGS-001-SG	571295.6038	1642424.9983
L3-012-102-FSGS-002-SG	571491.0516	1642361.3973
L3-012-102-FSGS-003-SG	571686.4994	1642488.5992
L3-012-102-FSGS-004-SG	571556.2009	1642373.3225
L3-012-102-FSGS-005-SG	571252.1710	1642436.9235
L3-012-102-FSGS-006-SG	571447.6188	1642277.9210
L3-012-102-FSGS-007-SG	571643.0666	1642405.1230
L3-012-102-FSGS-008-SG	571317.3202	1642341.5220
L3-012-102-FSGS-009-SG	571512.7680	1642468.7239
L3-012-102-FSGS-010-SG	571382.4695	1642389.2227
L3-012-102-FSGS-011-SG	571577.9173	1642325.6218
L3-012-102-FSGS-012-SG	571773.3651	1642452.8237
L3-012-102-FSGS-013-SG	571215.9769	1642293.8213
L3-012-102-FSGS-014-SG	571411.4247	1642421.0232
L3-012-102-FSGS-001-SS	571295.6038	1642424.9983
L3-012-102-FSGS-002-SS	571491.0516	1642361.3973
L3-012-102-FSGS-003-SS	571686.4994	1642488.5992
L3-012-102-FSGS-004-SS	571556.2009	1642373.3225
L3-012-102-FSGS-005-SS	571252.1710	1642436.9235
L3-012-102-FSGS-006-SS	571447.6188	1642277.9210
L3-012-102-FSGS-007-SS	571643.0666	1642405.1230
L3-012-102-FSGS-008-SS	571317.3202	1642341.5220
L3-012-102-FSGS-009-SS	571512.7680	1642468.7239
L3-012-102-FSGS-010-SS	571382.4695	1642389.2227
L3-012-102-FSGS-011-SS	571577.9173	1642325.6218
L3-012-102-FSGS-012-SS	571773.3651	1642452.8237
L3-012-102-FSGS-013-SS	571215.9769	1642293.8213
L3-012-102-FSGS-014-SS	571411.4247	1642421.0232

Only one (1) judgmental sample was required for survey design; however, two (2) judgmental soil samples were collected. In total, thirty (30) soil samples were collected for the FSS of survey unit L3-012-102. The coordinates for the judgmental samples are provided in Table 5-4.

Table 5-4 - Judgmental Sample Locations

Sample ID	Northing	Easting
L3-012-102-FJGS-015-SG	571616.2020	1642271.9770
L3-012-102-FJGS-015-SS	571616.2020	1642271.9770

The LACBWR LTP Chapter 5, Section 5.1 states that soil samples will be collected during FSS to confirm the HTD to surrogate radionuclide ratio. Ten percent (10%) of the FSS samples collected from open land survey units (including excavations where major sub-grade structures previously resided) will be analyzed for HTD ROC. In addition, if any sample has a SOF of 10% of the Operational DCGL or more, it must be sent for HTD ROC analysis. Only the HTD radionuclide included as ROC (Sr-90) will be analyzed in the FSS confirmatory samples. For samples with positive results for both the HTD ROC and the corresponding surrogate radionuclide (Cs-137), the HTD surrogate ratio will be derived and compared against the 95% UCL ratio (see Table 5-1). If the derived ratio from the confirmatory samples exceeds the 95% UCL ratio, then the area-specific ratio as determined by actual survey data will be used.

The selection of three (3) soil samples, L3-012-102-FSGS-004-SG, L3-0120-102-FSGS-008-SS, and L3-012-102-FSGS-009-SS, met the requirement that a minimum of 10% of the samples collected for the FSS of survey unit L3-012-102 be analyzed for HTD ROC. The selected samples were sent off-site (GEL Laboratories) for analysis of the HTD ROC as specified in LTP Chapter 5, Section 5.1.

The implementation of quality control measures as referenced by LTP Chapter 5, Section 5.9 and LaCrosse*Solutions* LC-QA-PN-001, *Final Status Survey Quality Assurance Project Plan* (QAPP) (Reference 11) includes the collection of a soil sample for "split sample" analysis on 5% of the soil samples taken in a survey unit with the locations selected at random. Two (2) soil samples, L3-012-102-QSGS-008-SG and L3-012-102-QSGS-008-SS, were designated for split sample QC analysis for the FSS of this survey unit.

LTP Chapter 5, Section 5.6.4.4 states that for Class 3 survey units, judgmental surface scans will typically be performed on areas with the greatest potential of contamination and that for open land areas, this will include surface drainage areas and collection points. Section 5.6.4.4 further notes that in the absence of these features, the locations of these judgmental scans will be at the discretion of the survey designer.

Review of historical information provided in the HSA, combined with the results of site characterization surveys in the survey unit and the walkdown of the survey unit in preparation for the FSS, did not indicate any areas for increased contamination potential. Therefore, the survey designers used discretion to choose the scan locations. Because there were no areas with elevated contamination potential, the scan areas were selected at the random sample locations with sufficient scan area at each location to meet the required scan percentage as defined in the FSS survey design. In most cases, this allows for the scanned areas to be evenly distributed throughout the survey unit.

For survey unit L3-012-102, 10% scan coverage was selected, which equates to 1,171 m^2. Fourteen (14) 84 m^2 scan grids were set up surrounding each sample location, with an additional two (2) judgmental scan grids totaling 1,344 m^2, exceeding the 10% minimum. The judgmental scan areas were not established based on elevated contamination potential, but rather to ensure an even distribution of scanning throughout the survey unit. A map of the scan grid locations is provided in Attachment 1. Additionally, judgmental scanning was performed on any miscellaneous M&E present in the survey unit, in accordance with LC-FS-PR-017.

For this Class 3 open land survey unit, the "Investigation Levels" for area scanning and soil sample measurement results are those levels specified in LTP Chapter 5, Table 5-16, and are reproduced below in Table 5-5.

Table 5-5 - Investigation Levels

Classification	Scan Investigation Levels	Direct Investigation Levels
Class 3	>Operational DCGL or >MDC_{scan} if MDC_{scan} is greater than Operational DCGL	>0.5 Operational DCGL

Table 5-6 provides a synopsis of the survey design for survey unit L3-012-102.

Table 5-6 - Synopsis of Survey Design

Feature	Design Criteria	Basis
Survey Unit Surface Area	11,711 m^2	GPS
Number of Random Samples (N)	17 (Required) 28 (Obtained)	• σ = 0.3 • UBGR = SOF of 1 • LBGR = SOF of 0.5 • Type I error = 0.05 • Type II error = 0.05 • Δ/σ = 1.7 • MARSSIM Table 5.5
Action Levels	Co-60: 1.915 pCi/g Cs-137: 8.655 pCi/g Eu-152: 4.255 pCi/g Eu-154**:** 3.945 pCi/g	50% Operational DCGLs for soil, LTP Chapter 5, Table 5-6
Scan and Direct Investigation Levels	See Table 5-5	LTP Chapter 5, Table 5-16
Scan Areal Coverage	1,171 m^2 or 10% areal coverage	LTP Chapter 5, Table 5-15
Number of Judgmental Samples	1 2	Per Sample Plan Actual Number Obtained
HTD ROC Analysis	2 samples 3	LTP 5.1 & Signed Sample Plan Actual Number Obtained
QC	1 split sample selected at random 2	LTP Chapter 5, Section 5.9 Actual Number Obtained

6. SURVEY IMPLEMENTATION

For survey unit L3-012-102, compliance with the unrestricted release criteria was demonstrated through a combination of soil scanning with a Ludlum Model 44-10 gamma detector and the sampling of soil for isotopic analysis.

An FSS Supervisor performed a visual inspection and walk-down of the survey unit on March 12, 2018, prior to performing FSS. The purpose of the walk-down was to assess the

physical condition of the survey unit, evaluate access points and travel paths, and identify potentially hazardous conditions.

FSS field activities were conducted under the FSS Sample Plan, which included DQOs, survey design, detailed FSS instructions, job safety analysis, and related procedures for reference. A "Field Log" was used to document field activities and other information pertaining to the performance of the FSS. FSS field activities commenced on March 12, 2018.

FSS field activities were projected to take four (4) working days to complete. Daily briefings were conducted to discuss the expectations for job performance and to review safety aspects of the job. The survey required field activities were performed during normal working hours and concluded on March 14, 2018.

Fourteen (14) random soil sample locations were marked with flags based on GPS coordinates provided. Though only seventeen (17) soil samples were required, as a conservative measure, twenty-eight (28) soil samples were collected during FSS. Two samples were collected at each location; one sample from the top 15 cm of gravel, and one sample of soil approximately one-foot in depth. Each soil sample consisted of approximately one (1) liter. Two (2) judgmental soil samples were also collected during implementation of FSS. All soil samples were collected, controlled, transported, stored and transferred to the on-site laboratory using the Chain-of-Custody (CoC) process from LC-FS-PR-012, *Chain of Custody Protocol* (Reference 12), and in accordance with LC-FS-PR-004, *Sample Media Collection for Site Characterization and Final Status Survey* (Reference 13), LC-FS-PR-005, *Sample Media Preparation for Site Characterization and Final Status Survey* (Reference 14), and LC-FS-PR-001, *Sample Storage* (Reference 15).

A total of sixteen (16) scan grids, constituting a total scan coverage of 1,344 m^2, or approximately 10% of the surface area in the survey unit, were established. Background was assessed in the survey unit using a Ludlum 2350-1 paired with a Ludlum Model 44-10 (2"x 2") sodium iodide (NaI) detector. The background was established as the average of five (5) 1-minute static measurements, while maintaining the detector 6" from the soil. In survey unit L3-012-102, background ranged from 4,891 counts per minute (cpm) up to 7,082 cpm.

All designated scan areas and sample locations as denoted in Attachment 1 were scanned using a Ludlum 2350-1 paired with a Model 44-10 2"x 2" NaI detector operated in the rate-meter mode and using audio response. The probe was positioned no more than 3" from the ground and was moved at a scan speed not to exceed 0.5 meters per second. In accordance with RS-TD-313196-006, *Ludlum Model 44-10 Detector Sensitivity* (Reference 16), the scan MDC was sufficient to detect residual radioactivity at the action level (50% of the

adjusted surrogate Cs-137 DCGL, or 8.655 pCi/g). No alarms were encountered during the scan survey. Complete scan results are provided in Attachment 2.

The survey design specified that a minimum of two (2) samples were required for HTD ROC analysis. In total, three (3) samples (L3-012-102-FSGS-004-SG, L3-012-102-FSGS-008-SS, and L3-012-102-FSGS-009-SS) were selected for HTD radionuclide analysis.

The survey design specified one (1) sample to be collected for QC split analysis. The implementation of survey specific QC measures included the collection of two (2) sample, L3-012-102-QSGS-008-SG and L3-012-102-QSGS-008-SS, for split and duplicate sample analysis.

7. SURVEY RESULTS

All areas identified in the FSS plan were scanned. Table 7-1 provides an overview of the scan results for all sixteen (16) scan grids (identified as 1-16), 14 random sample locations (identified as SP01-SP14), 1 judgmental location (identified as SP15), and 1 QC sample location (identified as QC08). Complete scan results are provided in Attachment 2.

Table 7-1 - Synopsis of Scan Results

Scan Area	Highest Logged Reading (cpm)	Action Level[(1)] (cpm)	# of Scan Alarms	Investigation Samples
1	8,162	8,354	0	0
2	6,639	8,354	0	0
3	5,390	6,901	0	0
4	7,572	8,354	0	0
5	5,132	5,948	0	0
6	6,573	7,803	0	0
7	6,100	6,901	0	0
8	8,125	8,354	0	0
9	6,300	6,901	0	0
10	8,192	8,354	0	0
11	5,577	7,803	0	0
12	6,400	6,901	0	0
13	4,718	5,948	0	0
14	6,000	6,901	0	0
15	5,252	7,803	0	0

Scan Area	Highest Logged Reading (cpm)	Action Level(1) (cpm)	# of Scan Alarms	Investigation Samples
16	5,438	7,803	0	0
QC 8	6,848	6,901	0	0
SP01	6,578	8,218	0	0
SP02	5,684	8,296	0	0
SP03	5,409	8,218	0	0
SP04	5,333	8,296	0	0
SP05	7,428	8,296	0	0
SP06	6,970	8,218	0	0
SP07	5,135	8,218	0	0
SP08	7,653	8,218	0	0
SP09	5,595	8,218	0	0
SP10	6,518	8,218	0	0
SP11	5,915	8,296	0	0
SP12	5,230	8,296	0	0
SP13	8,205	8,218	0	0
SP14	6,329	8,218	0	0
SP15	4,626	6,901	0	0
QC SP08	7,457	8,296	0	0

(1) Action Level based on the average background plus $MDCR_{Surveyor}$. $\boldsymbol{MDCR_{Surveyor} = (1.38\sqrt{Background\left(\frac{1}{60}\right)}60)/\sqrt{0.5}.}$

The Action Level was determined by taking the average of five (5) 1-minute static measurements plus the associated $MDCR_{Surveyor}$. The $MDCR_{Surveyor}$ should not exceed 1,762cpm. The value of 1,762 cpm equates to 100% Cs-137 having a 0.2206 µR/hr/pCi/g value for a detector to end cap distance of 3 inches, 8.5 pCi/g for 50% of the $OpDCGL_S$ and a detector response for Cs-137 of 940 cpm/µr/hr. (0.2206*8.5pCi/g*940cpm/µR/hr = 1,762cpm.)

The surveys of miscellaneous M&E within the survey unit did not identify any activity above background.

The on-site laboratory analyzed the twenty-eight (28) soil samples taken for non-parametric statistical testing using the on-site gamma spectroscopy system. A summary of the gamma spectroscopy results for the twenty-eight (28) samples collected for non-parametric

statistical testing is provided in Table 7-2. Gamma spectroscopy results revealed fifteen (15) samples above MDC for Cs-137 at a maximum concentration of 0.417 pCi/g. There were no samples above MDC for any other ROC. The concentration for Sr-90 was inferred based on the ratio specified in Table 5-1. The gamma spectroscopy reports for these samples are presented in Attachment 7. The basic statistics for the random sample population is summarized in Table 7-3.

Table 7-2 - Summary of Gamma Spectroscopy Results for Soil Samples Comprising the Statistical Sample Population

Sample ID	Co-60 (pCi/g)	Cs-137 (pCi/g)	Eu-152 (pCi/g)	Eu-154 (pCi/g)	Sr-90 (pCi/g)
L3-012-102-FSGS-001-SG	2.86E-02	**3.15E-02**	6.16E-03	6.29E-02	1.58E-02
L3-012-102-FSGS-002-SG	2.45E-02	**1.28E-01**	0.00E+00	3.88E-02	6.43E-02
L3-012-102-FSGS-003-SG	5.10E-02	7.66E-02	1.36E-01	9.09E-02	3.85E-02
L3-012-102-FSGS-004-SG	3.98E-02	**4.17E-01**	3.28E-02	2.83E-02	2.09E-01
L3-012-102-FSGS-005-SG	1.71E-02	5.16E-02	1.94E-01	2.60E-02	2.59E-02
L3-012-102-FSGS-006-SG	2.17E-02	7.41E-02	4.86E-02	5.04E-03	3.72E-02
L3-012-102-FSGS-007-SG	9.01E-04	8.06E-02	4.52E-02	4.30E-02	4.05E-02
L3-012-102-FSGS-008-SG	3.96E-02	2.58E-02	9.22E-03	7.11E-03	1.30E-02
L3-012-102-FSGS-009-SG	4.97E-02	**3.88E-01**	3.78E-02	9.14E-02	1.95E-01
L3-012-102-FSGS-010-SG	4.31E-02	7.35E-02	2.73E-02	1.52E-01	3.69E-02
L3-012-102-FSGS-011-SG	1.80E-02	**4.93E-02**	0.00E+00	0.00E+00	2.47E-02
L3-012-102-FSGS-012-SG	9.68E-03	5.87E-02	1.98E-02	2.07E-02	2.95E-02
L3-012-102-FSGS-013-SG	4.43E-02	5.92E-02	0.00E+00	7.36E-03	2.97E-02
L3-012-102-FSGS-014-SG	2.16E-02	6.77E-02	9.25E-02	1.18E-02	3.40E-02
L3-012-102-FSGS-001-SS	5.19E-02	5.78E-02	3.96E-02	1.15E-02	2.90E-02
L3-012-102-FSGS-002-SS	5.78E-02	**3.48E-02**	2.46E-02	9.10E-03	1.75E-02
L3-012-102-FSGS-003-SS	2.22E-02	**1.93E-01**	0.00E+00	2.79E-02	9.69E-02
L3-012-102-FSGS-004-SS	5.58E-02	**1.52E-01**	0.00E+00	1.32E-02	7.63E-02
L3-012-102-FSGS-005-SS	1.01E-02	3.30E-02	0.00E+00	9.52E-02	1.66E-02
L3-012-102-FSGS-006-SS	4.07E-02	**7.14E-02**	2.32E-03	7.30E-02	3.58E-02
L3-012-102-FSGS-007-SS	3.47E-02	5.49E-02	1.19E-02	1.04E-01	2.76E-02
L3-012-102-FSGS-008-SS	5.85E-03	**3.32E-02**	2.90E-02	1.25E-01	1.67E-02
L3-012-102-FSGS-009-SS	3.13E-02	**3.44E-01**	5.65E-03	4.00E-02	1.73E-01

Sample ID	Co-60 (pCi/g)	Cs-137 (pCi/g)	Eu-152 (pCi/g)	Eu-154 (pCi/g)	Sr-90 (pCi/g)
L3-012-102-FSGS-010-SS	4.85E-03	**3.33E-02**	9.78E-02	3.86E-02	1.67E-02
L3-012-102-FSGS-011-SS	3.62E-02	**2.45E-02**	7.38E-02	3.75E-02	1.23E-02
L3-012-102-FSGS-012-SS	5.04E-02	6.43E-02	5.58E-02	1.02E-01	3.23E-02
L3-012-102-FSGS-013-SS	3.39E-02	**2.32E-02**	9.84E-02	5.53E-02	1.16E-02
L3-012-102-FSGS-014-SS	3.31E-02	**3.84E-02**	6.07E-02	6.51E-02	1.93E-02

Note: Bold values indicate concentrations greater than MDC.

Table 7-3 - Basic Statistical Properties of Random Sample Population

ROC	Mean (pCi/g)	Median (pCi/g)	Max (pCi/g)	Min (pCi/g)	Std. Dev. (pCi/g)	BcDCGL (pCi/g)	Avg SOF per ROC	Avg Dose per ROC
Co-60	3.14E-02	3.35E-02	5.78E-02	9.01E-04	1.64E-02	1.06E+01	2.96E-03	7.40E-02
Sr-90	4.91E-02	2.96E-02	2.09E-01	1.16E-02	5.43E-02	5.47E+03	8.98E-06	2.24E-04
Cs-137	9.78E-02	5.90E-02	4.17E-01	2.32E-02	1.08E-01	4.83E+01	2.03E-03	5.06E-02
Eu-152	4.10E-02	2.82E-02	1.94E-01	0.00E+00	4.73E-02	2.36E+01	1.74E-03	4.35E-02
Eu-154	4.94E-02	3.87E-02	1.52E-01	0.00E+00	4.09E-02	2.19E+01	2.25E-03	5.64E-02

The off-site laboratory, GEL Laboratories, processed the three (3) samples (L3-012-102-FSGS-004-SG, L3-012-102-FSGS-008-SS, and L3-012-102-FSGS-009-SS) selected for HTD analysis. All samples were analyzed for Sr-90. The analyses met the required MDC. Laboratory results revealed that Sr-90 was not detected in any of the samples. The results are provided in Table 7-4.

Table 7-4 - Off-Site Analysis Results

Sample ID	Sr-90 (pCi/g)	Uncertainty (pCi/g)	MDC (pCi/g)
L3-012-102-FSGS-004-SG	8.96E-02	2.07E-01	3.64E-01
L3-012-102-FSGS-008-SS	1.44E-02	1.98E-01	3.77E-01
L3-012-102-FSGS-009-SS	-5.56E-02	1.74E-01	3.68E-01

Note: Bold values indicate concentrations greater than MDC.

The on-site laboratory analyzed the two (2) judgmental soil samples using the on-site gamma spectroscopy system. A summary of the analytical results for the judgmental soil samples are provided in Table 7-5. No ROC was identified above the MDC for the judgmental samples. The concentration for Sr-90 was inferred based on the ratio specified in Table 5-1. The gamma spectroscopy report for the judgmental samples are presented in Attachment 7.

Table 7-5 - Summary of Gamma Spectroscopy Results for Judgmental Soil Samples

Sample ID	Co-60 (pCi/g)	Cs-137 (pCi/g)	Eu-152 (pCi/g)	Eu-154 (pCi/g)	Sr-90 (pCi/g)
L3-012-102-FJGS-015-SS	7.02E-02	7.20E-02	5.33E-03	1.31E-02	3.61E-02
L3-012-102-FJGS-015-SG	6.20E-02	6.84E-02	3.16E-02	3.78E-02	3.43E-02

Note: Bold values indicate concentrations greater than MDC.

The implementation of survey specific QC measures included the collection of two (2) samples (L3-012-102-QSGS-008-SG and L3-012-102-QSGS-008-SS) for split sample analysis. The on-site laboratory analyzed the designated QC samples using the on-site gamma spectroscopy system. A summary of the analytical results for the QC samples is provided in Table 7-6. Gamma spectroscopy results revealed two (2) samples above MDC for Cs-137, with a maximum concentration 0.0363 pCi/g, and no other ROC was detected above MDC. The concentration for Sr-90 was inferred based on the ratio specified in Table 5-1.

Table 7-6 - Summary of Gamma Spectroscopy Results for QC Soil Samples

Sample ID	Co-60 (pCi/g)	Cs-137 (pCi/g)	Eu-152 (pCi/g)	Eu-154 (pCi/g)	Sr-90 (pCi/g)
L3-012-102-QSGS-008-SG	1.91E-02	**3.63E-02**	1.77E-02	9.82E-03	1.82E-02
L3-012-102-QSGS-008-SS	7.02E-02	**3.42E-02**	1.98E-01	9.19E-02	1.72E-02

Note: Bold values indicate concentrations greater than MDC.

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

Equation 4

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

Where: C_n = concentration of radionuclide *n*

$DCGL_n$ = DCGL of radionuclide *n*.

The results of the unity rule calculation for the ROC in the random sample population for survey unit L3-012-102 are provided in Table 7-7.

Table 7-7 - Sum-of-Fractions for Individual Soil Samples (Random and QC)

Sample ID	Fraction of Operational DCGL					SOF
	Co-60	Cs-137	Eu-152	Eu-154	Sr-90	
L3-012-102-FSGS-001-SG	0.0075	0.0018	0.0007	0.0080	0.0000	0.0180
L3-012-102-FSGS-002-SG	0.0064	0.0074	0.0000	0.0049	0.0000	0.0187
L3-012-102-FSGS-003-SG	0.0133	0.0044	0.0160	0.0115	0.0000	0.0452
L3-012-102-FSGS-004-SG	0.0104	0.0240	0.0039	0.0036	0.0001	0.0419
L3-012-102-FSGS-005-SG	0.0045	0.0030	0.0228	0.0033	0.0000	0.0335
L3-012-102-FSGS-006-SG	0.0057	0.0043	0.0057	0.0006	0.0000	0.0163
L3-012-102-FSGS-007-SG	0.0002	0.0046	0.0053	0.0054	0.0000	0.0157
L3-012-102-FSGS-008-SG	0.0103	0.0015	0.0011	0.0009	0.0000	0.0138
L3-012-102-FSGS-009-SG	0.0130	0.0223	0.0044	0.0116	0.0001	0.0514
L3-012-102-FSGS-010-SG	0.0113	0.0042	0.0032	0.0193	0.0000	0.0380
L3-012-102-FSGS-011-SG	0.0047	0.0028	0.0000	0.0000	0.0000	0.0075
L3-012-102-FSGS-012-SG	0.0025	0.0034	0.0023	0.0026	0.0000	0.0109
L3-012-102-FSGS-013-SG	0.0116	0.0034	0.0000	0.0009	0.0000	0.0159
L3-012-102-FSGS-014-SG	0.0056	0.0039	0.0109	0.0015	0.0000	0.0219
L3-012-102-QSGS-008-SG	0.0050	0.0021	0.0021	0.0012	0.0000	0.0104
L3-012-102-QSGS-008-SS	0.0183	0.0020	0.0233	0.0116	0.0000	0.0552
L3-012-102-FSGS-001-SS	0.0136	0.0033	0.0047	0.0015	0.0000	0.0230
L3-012-102-FSGS-002-SS	0.0151	0.0020	0.0029	0.0012	0.0000	0.0211
L3-012-102-FSGS-003-SS	0.0058	0.0111	0.0000	0.0035	0.0000	0.0205
L3-012-102-FSGS-004-SS	0.0146	0.0087	0.0000	0.0017	0.0000	0.0250
L3-012-102-FSGS-005-SS	0.0026	0.0019	0.0000	0.0121	0.0000	0.0166
L3-012-102-FSGS-006-SS	0.0106	0.0041	0.0003	0.0093	0.0000	0.0243
L3-012-102-FSGS-007-SS	0.0091	0.0032	0.0014	0.0132	0.0000	0.0268
L3-012-102-FSGS-008-SS	0.0015	0.0019	0.0034	0.0158	0.0000	0.0227
L3-012-102-FSGS-009-SS	0.0082	0.0198	0.0007	0.0051	0.0001	0.0338
L3-012-102-FSGS-010-SS	0.0013	0.0019	0.0115	0.0049	0.0000	0.0196
L3-012-102-FSGS-011-SS	0.0095	0.0014	0.0087	0.0048	0.0000	0.0243

Sample ID	Fraction of Operational DCGL					SOF
	Co-60	Cs-137	Eu-152	Eu-154	Sr-90	
L3-012-102-FSGS-012-SS	0.0132	0.0037	0.0066	0.0129	0.0000	0.0364
L3-012-102-FSGS-013-SS	0.0089	0.0013	0.0116	0.0070	0.0000	0.0288
L3-012-102-FSGS-014-SS	0.0086	0.0022	0.0071	0.0083	0.0000	0.0262

Random Measurements

Number of Random Measurements =	28
# of Random Measurements with SOF $\geq$ 1 =	0
# of Random Measurements with SOF > 0.1 (HTD Assessment) =	0
Max Individual Random Measurement SOF =	0.0514
Mean Random Measurement SOF =	0.0249

The results of the unity rule calculation for the ROC in the judgmental sample population for survey unit L3-012-102 are provided in Table 7-8.

Table 7-8 - Sum-of-Fractions for Individual Soil Samples (Judgmental)

Sample ID	Fraction of Operational DCGL					SOF
	Co-60	Cs-137	Eu-152	Eu-154	Sr-90	
L3-012-102-FJGS-015-SS	0.0183	0.0041	0.0006	0.0017	0.0000	0.0248
L3-012-102-FJGS-015-SG	0.0162	0.0039	0.0037	0.0048	0.0000	0.0286

Judgmental Measurements

Number of Judgmental Measurements =	2
# of Judgmental Measurements with SOF $\geq$ 1 =	0
# of Judgmental Measurements with SOF > 0.1 (HTD Assessment) =	0
Max Individual Judgmental Measurement SOF =	0.0286
Mean Judgmental Measurement SOF =	0.0267

8. QUALITY CONTROL

The on-site laboratory processed two (2) split and duplicate samples (L3-012-102-QSGS-008-SG and L3-012-102-QSGS-008-SS) using gamma spectroscopy analysis. The data was evaluated using USNRC acceptance criteria specified in Inspection Procedure No. 84750,

Radioactive Waste Treatment, and Effluent and Environmental Monitoring (Reference 17). There was acceptable agreement between field split and duplicate results. Refer to Attachment 4 for data and quality control analysis results.

9. INVESTIGATIONS AND RESULTS

No investigations were performed during the performance or analyses of the survey.

10. REMEDIATION AND RESULTS

Historically, no radiological remedial action as described by MARSSIM Section 5.4 was performed in this survey unit prior to or as a result of the FSS. Chapter 4 of the LTP determined that remediation beyond that required to meet the release criteria is unnecessary and that the remaining residual radioactivity in soil was ALARA.

11. CHANGES FROM THE FINAL STATUS SURVEY PLAN

There were no addendums to the FSS plan.

12. DATA QUALITY ASSESSMENT (DQA)

The DQO sample design and data were reviewed in accordance with LC-FS-PR-008, *Final Status Survey Data Assessment* (Reference 18) for completeness and consistency. Documentation was complete and legible. Surveys and the collection of samples were consistent with the DQOs and were sufficient to ensure that the survey unit was properly designated as Class 3. The survey design had adequate power as indicated by the Retrospective Power Curve (see Attachment 6).

The analytical results indicated that all samples were less than a SOF of one (1) when compared to the $OpDCGL_S$. Additionally, the maximum activity for each ROC did not exceed 10% of their respective $OpDCGL_S$.

Although MARSSIM states that the Sign Test need not be performed in the instance that no measurements surpass the DCGL, the test was conducted to demonstrate coherence to the statistical principles of the DQO process. The Sign Test was performed on the data and compared to the original assumptions of the DQOs. The evaluation of the Sign Test results clearly demonstrates that the survey unit passes the unrestricted release criteria, thus, the null hypothesis is rejected. The results of the Sign Test are presented in Attachment 3.

The data assessment and review consisted of calculating basic statistical quantities (e.g., mean, median, standard deviation). All data was considered valid including negative values, zeros, values reported below the MDC, and values with uncertainties that exceeded two standard deviations. The mean and median values for each ROC were well below the respective Operational DCGLs. Also, the retrospective power curve shows that a sufficient

number of samples were collected to achieve the desired power. Therefore, the survey unit meets the unrestricted release criteria with adequate power as required by the DQOs.

The mean of all identified isotopes is less than the Consultation Triggers for Residential Soil Concentration depicted in Table H.1 of NUREG 1757, Vol.1, Rev. 2 (MOU Table 1). The full table is included in Attachment 5 of this release record.

The data for Cs-137 is presented graphically through a frequency plot and quantile plot. All graphical presentations are provided in Attachment 6.

13. ANOMALIES

No anomalies were identified during the FSS of this survey unit.

14. CONCLUSION

Survey unit L3-012-102 has met the DQOs of the FSS plan. The ALARA criteria as specified in Chapter 4 of the LTP were achieved. The Elevated Measurement Comparison for soils was not applicable and remediation was not required.

All identified ROC were used for statistical testing to determine the adequacy of the survey unit for FSS. Evaluation of the data shows that none of the random sample ROC concentration values exceeds the $OpDCGL_S$; therefore, in accordance with LTP Section 5.11, the survey unit meets the release criteria.

The sample data passed the Sign Test. The null hypothesis was rejected. The Retrospective Power Curve showed that adequate power was achieved. The survey unit is properly classified as Class 3.

The dose contribution from soil in survey unit L3-012-102 is 0.2247 mrem/yr TEDE, based on the average concentration of the ROC in samples used for non-parametric statistical sampling.

Survey unit L3-012-102 is acceptable for unrestricted release.

15. REFERENCES

1. LC-FS-PR-009, Final Status Survey Data Reporting
2. *La Crosse Boiling Water Reactor License Termination Plan (LTP)*
3. LC-FS-PR-002, *Final Status Survey Package Development*
4. NUREG-1575, Revision 1, *Multi-Agency Radiation Survey and Site Investigation Manual* (MARSSIM)
5. *La Crosse Boiling Water Reactor Historical Site Assessment* (HSA)
6. RS-TD-313196-004, *LACBWR Soil DCGL, Basement Concrete DCGL, and Buried Pipe DCGL*

7. RS-TD-313196-001, *Radionuclides of Concern during LACBWR Decommissioning*
8. NUREG-1757, Volume 2, Revision 1, *Consolidated Decommissioning Guidance – Characterization, Survey, and Determination of Radiological Criteria, Final Report*
9. LC-FS-TSD-002, *Operational Derived Concentration Guideline Levels for Final Status Survey*
10. LC-FS-PR-017, *Unconditional Release of Material and Equipment and Secondary Structures*
11. LC-QA-PN-001, *Final Status Survey Quality Assurance Project Plan* (QAPP)
12. LC-FS-PR-012, *Chain of Custody Protocol*
13. LC-FS-PR-004, *Sample Media Collection for Site Characterization and Final Status Survey*
14. LC-FS-PR-005, *Sample Media Preparation for Site Characterization and Final Status Survey*
15. LC-FS-PR-001, *Sample Storage*
16. RS-TD-313196-006, *Ludlum Model 44-10 Detector Sensitivity*
17. USNRC Inspection Procedure No. 84750, *Radioactive Waste Treatment, and Effluent and Environmental Monitoring*
18. LC-FS-PR-008, *Final Status Survey Data Assessment*

16. ATTACHMENTS

Attachment 1 – Figures and Maps

Attachment 2 – Scan Data

Attachment 3 – Sign Test

Attachment 4 – Quality Control Assessment

Attachment 5 – Consultation Triggers for Residential Soil Concentrations

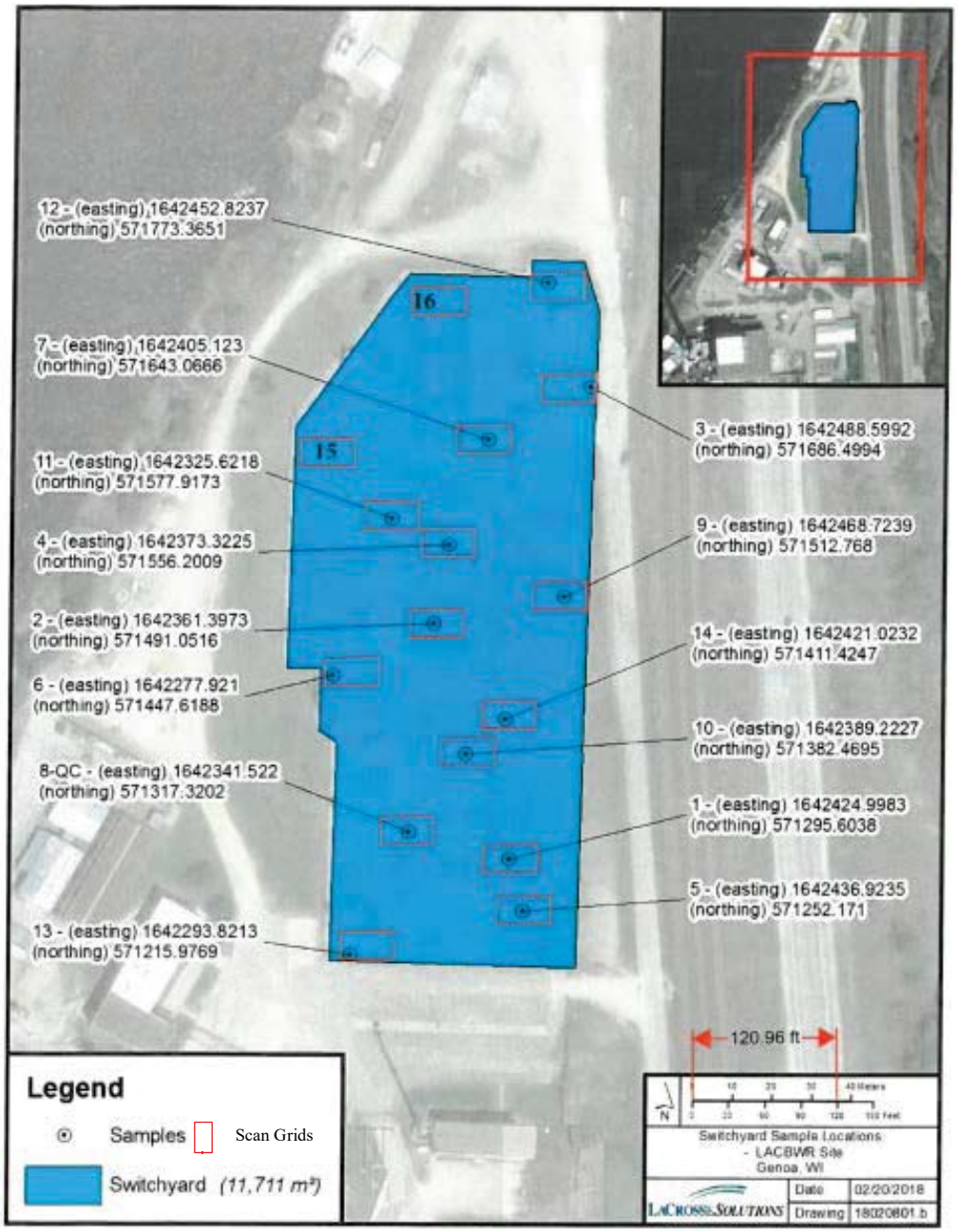
Attachment 6 – Graphical Presentations

Attachment 7 – Sample Analytical Reports

Attachment 8 – GEL Laboratories Analytical Reports

ATTACHMENT 1
FIGURES AND MAPS

Figure 16-1 - L3-012-102 Sample Locations Map



ATTACHMENT 2
SCAN DATA

Table 16-1 - L3-012-102 Complete Scan Data

Detector Type	Detector ID	M2350-1 ID	Location	Scan Logged Result (cpm)	Avg Background (cpm)	Action Level(1) (cpm)	Scan Alarms
44-10	357776	325246	1	6,600	5,754	6,901	0
44-10	162398	126195	1	8,162	7,082	8,354	0
44-10	357783	325261	2	6,639	7,082	8,354	0
44-10	162398	126195	2	6,555	6,041	7,803	0
44-18	357776	325246	3	5,390	5,754	6,901	0
44-10	357783	325261	4	7,572	7,082	8,354	0
44-10	162398	126195	4	6,453	6,041	7,803	0
44-10	357783	325261	5	5,132	4,891	5,948	0
44-10	357783	325261	6	6,573	6,041	7,803	0
44-10	357776	325246	7	5,295	7,082	8,354	0
44-10	162398	126195	7	6,100	5,754	6,901	0
44-10	357783	325261	8	8,125	7,082	8,354	0
44-10	162398	126195	8	7,023	6,041	7,803	0
44-10	357776	325246	9	5,863	7,082	8,354	0
44-10	162398	126195	9	6,300	5,754	6,901	0
44-10	357776	325246	10	8,192	7,082	8,354	0
44-10	162398	126195	10	6,800	5,754	6,901	0
44-10	357783	325261	11	5,577	6,041	7,803	0
44-10	357776	325246	12	6,400	5,754	6,901	0
44-10	357783	325261	13	4,718	4,891	5,948	0
44-10	357776	325246	14	6,000	5,754	6,901	0
44-10	357783	325261	15	5,252	6,041	7,803	0
44-10	357783	325261	16	5,438	6,041	7,803	0
44-10	357776	325246	QC 8	6,848	5,754	6,901	0
44-10	357776	325246	QC SP08	7,457	7,029	8,296	0
44-10	357776	325246	QC SP08	6,806	7,029	8,296	0
44-10	357776	325246	QC SP08	6,939	7,029	8,296	0
44-10	357783	325261	SP01	6,578	6,957	8,218	0
44-10	357783	325261	SP01	5,901	6,957	8,218	0
44-10	357783	325261	SP01	5,798	6,957	8,218	0

Detector Type	Detector ID	M2350-1 ID	Location	Scan Logged Result (cpm)	Avg Background (cpm)	Action Level[(1)] (cpm)	Scan Alarms
44-10	357776	325246	SP02	5,684	7,029	8,296	0
44-10	357776	325246	SP02	5,427	7,029	8,296	0
44-10	357776	325246	SP02	5,209	7,029	8,296	0
44-18	357783	325261	SP03	5,182	6,957	8,218	0
44-10	357783	325261	SP03	5,409	6,957	8,218	0
44-10	357783	325261	SP03	4,673	6,957	8,218	0
44-18	357776	325246	SP04	5,225	7,029	8,296	0
44-10	357776	325246	SP04	5,333	7,029	8,296	0
44-10	357776	325246	SP04	4,709	7,029	8,296	0
44-10	357776	325246	SP05	7,428	7,029	8,296	0
44-10	357776	325246	SP05	7,032	7,029	8,296	0
44-10	357776	325246	SP05	6,364	7,029	8,296	0
44-10	357776	325246	SP06	6,970	7,029	8,296	0
44-10	357776	325246	SP06	6,482	7,029	8,296	0
44-10	357776	325246	SP06	6,845	7,029	8,296	0
44-10	357783	325261	SP07	5,135	6,957	8,218	0
44-10	357783	325261	SP07	4,655	6,957	8,218	0
44-10	357783	325261	SP07	5,055	6,957	8,218	0
44-10	357783	325261	SP08	7,358	6,957	8,218	0
44-18	357783	325261	SP08	7,653	6,957	8,218	0
44-10	357783	325261	SP08	6,516	6,957	8,218	0
44-10	357783	325261	SP09	5,595	6,957	8,218	0
44-10	357783	325261	SP09	5,270	6,957	8,218	0
44-10	357783	325261	SP09	5,191	6,957	8,218	0
44-10	357783	325261	SP10	6,518	6,957	8,218	0
44-10	357783	325261	SP10	5,869	6,957	8,218	0
44-10	357776	325246	SP11	5,218	7,029	8,296	0
44-10	357776	325246	SP11	5,915	7,029	8,296	0
44-10	357776	325246	SP11	4,820	7,029	8,296	0
44-10	357776	325246	SP12	5,230	7,029	8,296	0
44-10	357776	325246	SP12	4,887	7,029	8,296	0

Detector Type	Detector ID	M2350-1 ID	Location	Scan Logged Result (cpm)	Avg Background (cpm)	Action Level(1) (cpm)	Scan Alarms
44-10	357776	325246	SP12	4,508	7,029	8,296	0
44-10	357783	325261	SP13	7,886	6,957	8,218	0
44-10	357783	325261	SP13	8,199	6,957	8,218	0
44-10	357783	325261	SP13	8,205	6,957	8,218	0
44-10	357783	325261	SP14	6,226	6,957	8,218	0
44-10	357783	325261	SP14	5,444	6,957	8,218	0
44-10	357783	325261	SP14	6,329	6,957	8,218	0
44-10	357776	325246	SP15	4,535	5,754	6,901	0
44-10	357776	325246	SP15	4,257	5,754	6,901	0
44-10	357776	325246	SP15	4,626	5,754	6,901	0

(1) Action Level based on the average background plus $MDCR_{SURVEYOR}$.

$$MDCR_{SURVEYOR} = (1.38\sqrt{Background\left(\frac{1}{60}\right)60})/\sqrt{0.5}$$

***At each sample location scanning consisted of a pre-scan, a scan post removal of gravel, and a scan post removal of soil sample; with the exception of SP10 which did not have a third scan.**

***Average Background established by taking the average of 5 1-minute static readings in each sample location.**

ATTACHMENT 3
SIGN TEST

Table 16-2 - L3-012-102 Sign Test

#	SOF (W_S)	1-W_S	Sign
1	0.0180	0.98	+1
2	0.0187	0.98	+1
3	0.0452	0.95	+1
4	0.0419	0.96	+1
5	0.0335	0.97	+1
6	0.0163	0.98	+1
7	0.0157	0.98	+1
8	0.0138	0.99	+1
9	0.0514	0.95	+1
10	0.0380	0.96	+1
11	0.0075	0.99	+1
12	0.0109	0.99	+1
13	0.0159	0.98	+1
14	0.0219	0.98	+1
15	0.0230	0.98	+1
16	0.0211	0.98	+1
17	0.0205	0.98	+1
18	0.0250	0.97	+1
19	0.0166	0.98	+1
20	0.0243	0.98	+1
21	0.0268	0.97	+1
22	0.0227	0.98	+1
23	0.0338	0.97	+1
24	0.0196	0.98	+1
25	0.0243	0.98	+1
26	0.0364	0.96	+1
27	0.0288	0.97	+1
28	0.0262	0.97	+1

Number of positive differences (S+) 28

Critical Value 18

Survey Unit Meets the Acceptance Criteria

ATTACHMENT 4
QUALITY CONTROL ASSESSMENT

Table 16-3 - L3-012-102 QC Assessment

STANDARD							COMPARISON				
Sample ID	Radionuclide	Activity Value	Standard Error	Resolution	Agreement Range (Low to High)		Sample ID	Activity Value	Standard Error	Comparison Ratio	Acceptable (Y/N)
L3-012-102-FSGS-008-SG	K-40*	4.69E+00	5.64E-01	8	0.6	1.66	L3-012-102-FQGS-008-SG	4.52E+00	5.10E-01	0.96	Y
L3-012-102-FSGS-008-SS	Cs-137	3.32E-02	2.53E-02	1	0.4	2.5	L3-012-102-FQGS-008-SS	3.42E-02	2.39E-02	1.03	Y

Comments/Corrective Actions: *K-40 was substituted for the assessment because Cs-137 was identified at a low level in only the comparison sample.

Table is provided to show acceptance criteria used to assess split samples.

Resolution	Acceptable Ratio
<4	0.4-2.5
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
CONSULTATION TRIGGERS FOR RESIDENTIAL SOIL CONCENTRATION

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

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

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

ATTACHMENT 6
GRAPHICAL PRESENTATIONS

Figure 16-2 - Quantile Plot for Cs-137 Concentration

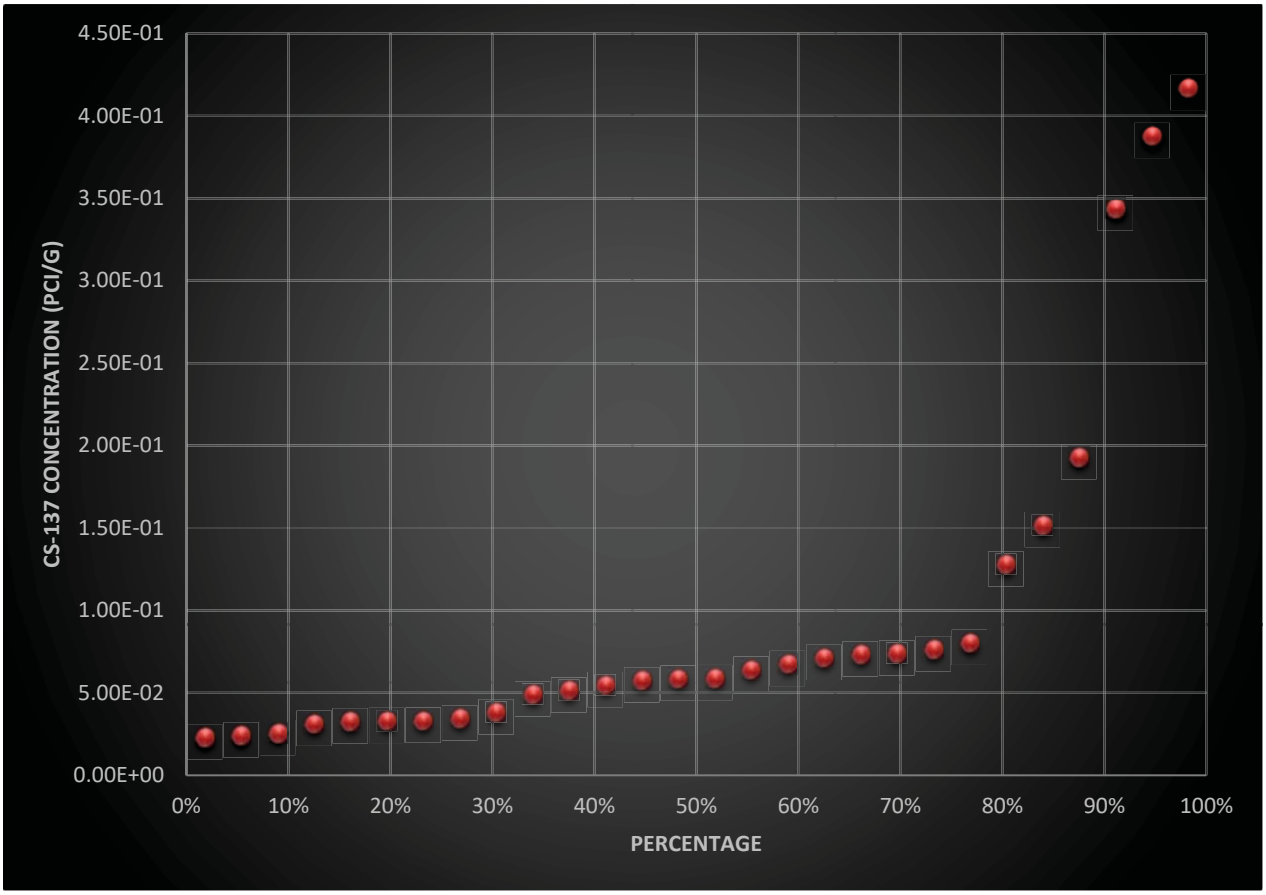


Figure 16-3 - Histogram for Cs-137 Concentration

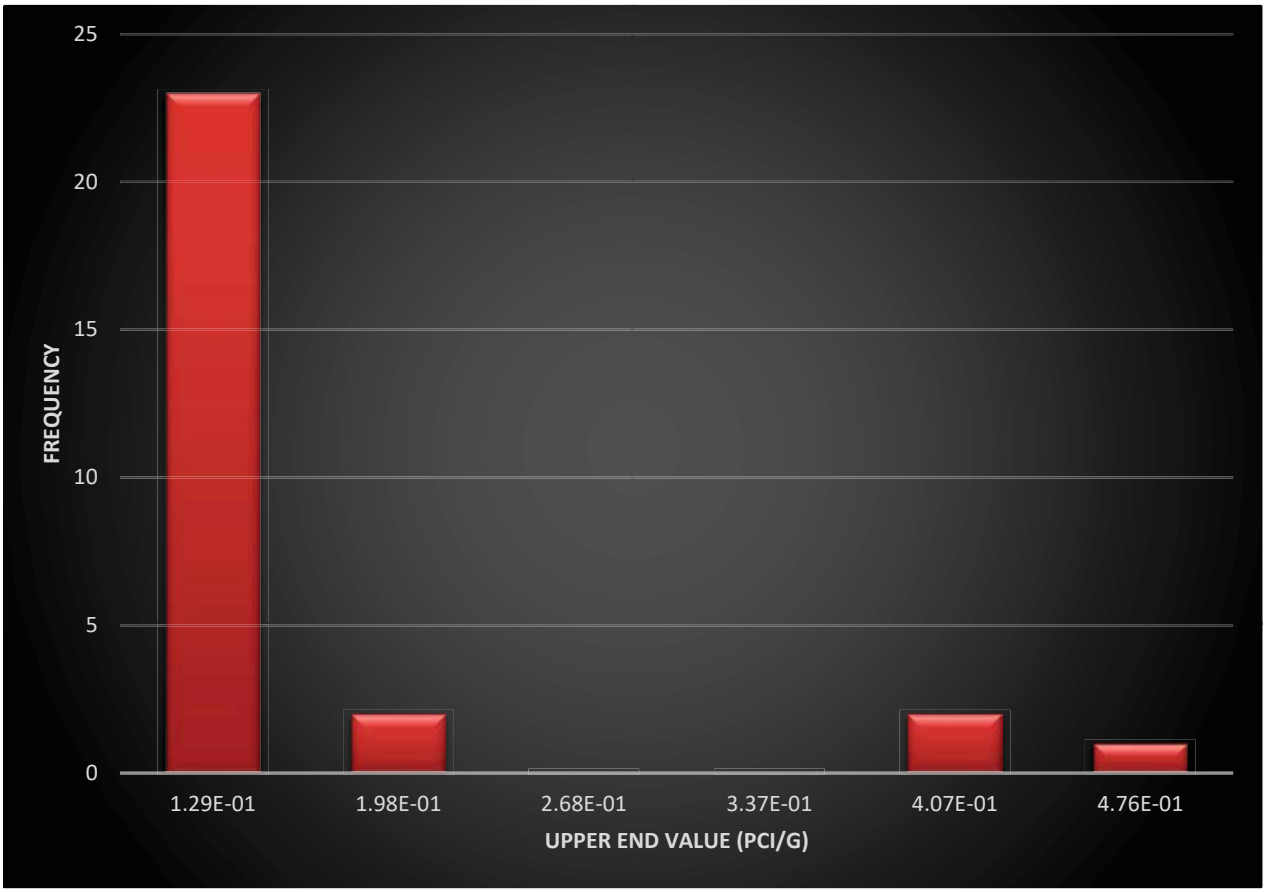
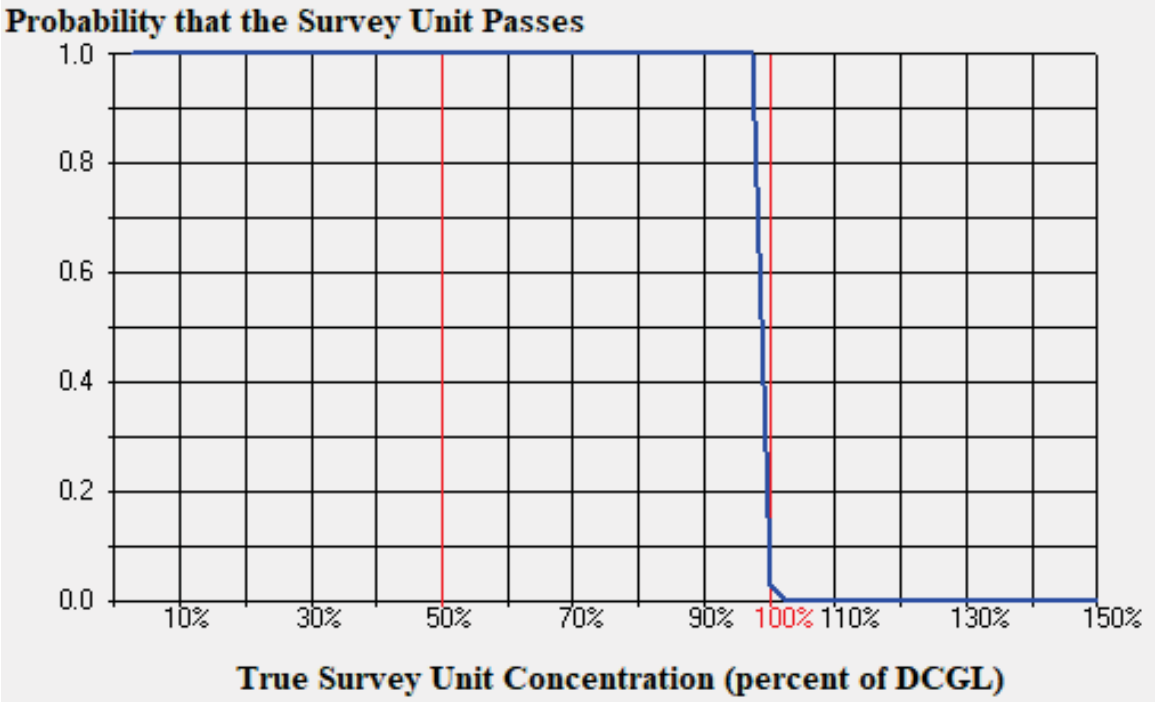


Figure 16-4 - Retrospective Power Curve for L3-012-102



ATTACHMENT 7
SAMPLE ANALYTICAL REPORTS

Apex-Gamma

Analysis Report for L3-012-102-FSGS-001-SG

L3-012-102-SWITCHYARD OPEN LAND

GAMMA SPECTRUM ANALYSIS

Sample Identification	: L3-012-102-FSGS-001-SG
Sample Description	: L3-012-102-SWITCHYARD OPEN LAND
Sample Type	: 500 ml Marinelli
Unit	:
Sample Point	:
Sample Size	: 8.638E+02 grams
Facility	: Dairyland_NPP
Sample Taken On	: 3/12/2018 1:16:00PM
Acquisition Started	: 3/19/2018 3:54:07PM
Procedure	: 500ml Marinelli
Operator	: Administrator
Detector Name	: HOTLAB
Geometry	: 500ml Marinelli
Live Time	: 3600.0 seconds
Real Time	: 3610.9 seconds
Dead Time	: 0.30 %
Peak Locate Threshold	: 3.00
Peak Locate Range (in channels)	: 100 - 4096
Peak Area Range (in channels)	: 100 - 4096
Identification Energy Tolerance	: 1.000 keV
Energy Calibration Used Done On	: 7/8/2014
Efficiency Calibration Used Done On	: 7/8/2014
Efficiency Calibration Description	:
Sample Number	: 5586

PEAK ANALYSIS REPORT

Peak Analysis Performed on : 1/25/2019 7:06:49AM

Peak Analysis From Channel : 100

Peak Analysis To Channel : 4096

Analysis Report for L3-012-102-FSGS-001-SG

L3-012-102-SWITCHYARD OPEN LAND

	Peak No.	Energy (keV)	ROI start	ROI end	Peak Centroid	Net Peak Area	Net Area Uncertainty	Continuum Counts	FWHM (keV)
F	1	76.47	147 -	160	153.50	1.49E+02	52.95	1.09E+03	2.86
	2	238.49	470 -	481	477.46	4.71E+01	57.07	6.04E+02	0.76
F	3	295.28	586 -	595	591.00	1.28E+02	31.83	2.65E+02	1.73
F	4	351.76	698 -	712	703.94	2.09E+02	34.66	2.71E+02	1.78
F	5	583.28	1159 -	1171	1166.90	4.51E+01	17.85	7.46E+01	1.99
F	6	609.27	1211 -	1225	1218.88	1.51E+02	27.47	1.05E+02	1.77
F	7	661.58	1318 -	1330	1323.47	1.06E+02	24.47	1.18E+02	1.65
F	8	720.70	1438 -	1447	1441.69	1.38E+01	9.91	5.96E+01	0.68
F	9	910.96	1817 -	1827	1822.15	3.27E+01	15.63	5.48E+01	1.98
F	10	1120.19	2236 -	2246	2240.57	2.33E+01	14.45	7.61E+01	1.51
F	11	1460.69	2912 -	2930	2921.49	3.16E+02	36.30	3.31E+01	2.47

M = First peak in a multiplet region
m = Other peak in a multiplet region
F = Fitted singlet
Errors quoted at 2.000sigma

BACKGROUND SUBTRACT REPORT

Peak Analysis Performed on : 1/25/2019 7:06:49AM

Env. Background File : C:\Canberra\Apex\Root\Dairyland_NPP\Data\0000001364.CNF

	Peak No.	Energy (keV)	Original Area	Orig. Area Uncertainty	Ambient Background	Backgr. Uncert.	Subtracted Area	Subtracted Uncert.
F	1	76.47	1.49E+02	52.95			1.49E+02	5.30E+01
	2	238.49	4.71E+01	57.07			4.71E+01	5.71E+01
F	3	295.28	1.28E+02	31.83			1.28E+02	3.18E+01
F	4	351.76	2.09E+02	34.66	8.36E+01	3.72E+01	1.25E+02	5.09E+01
F	5	583.28	4.51E+01	17.85			4.51E+01	1.79E+01
F	6	609.27	1.51E+02	27.47	4.12E+01	2.42E+01	1.10E+02	3.66E+01
F	7	661.58	1.06E+02	24.47	6.61E+01	2.54E+01	4.03E+01	3.53E+01
F	8	720.70	1.38E+01	9.91			1.38E+01	9.91E+00
F	9	910.96	3.27E+01	15.63			3.27E+01	1.56E+01
F	10	1120.19	2.33E+01	14.45			2.33E+01	1.44E+01
F	11	1460.69	3.16E+02	36.30	5.63E+01	1.71E+01	2.60E+02	4.01E+01

M = First peak in a multiplet region
m = Other peak in a multiplet region
F = Fitted singlet
Errors quoted at 2.000sigma

Analysis Report for L3-012-102-FSGS-001-SG
L3-012-102-SWITCHYARD OPEN LAND

NUCLIDE IDENTIFICATION REPORT

Nuclide Library Used : C:\Canberra\Apex\Root\Dairyland_NPP\Library\HOTLAB.NLB

IDENTIFIED NUCLIDES

Nuclide Name	Id Confidence	Energy (keV)		Yield(%)	Activity (pCi/grams)	Activity Uncertainty
K-40	0.99	1460.75	*	10.67	3.28E+00	5.38E-01
CS-137	0.99	661.65	*	85.12	3.15E-02	2.76E-02
PB-212	0.98	77.11	*	17.50	2.46E-01	8.89E-02
		238.63	*	44.60	2.81E-02	3.41E-02
BI-214	0.58	609.31	*	46.30	1.47E-01	4.95E-02
		1120.29	*	15.10	1.65E-01	1.03E-01
		1238.11		5.94		
		1377.67		4.11		
		1407.98		2.48		
		1509.19		2.19		
		1764.49		15.80		
PB-214	0.98	77.11	*	10.70	4.02E-01	1.45E-01
		295.21	*	19.20	2.12E-01	5.37E-02
		351.92	*	37.20	1.25E-01	5.12E-02

* = Energy line found in the spectrum.
\- = Manually added nuclide.
? = Manually edited nuclide.
@ = Energy line not used for Weighted Mean Activity
Energy Tolerance : 1.000 keV
Nuclide confidence index threshold = 0.30
Errors quoted at 2.000sigma

INTERFERENCE CORRECTED REPORT

Nuclide Name	Nuclide Id Confidence	Wt mean Activity (pCi/grams)	Wt mean Activity Uncertainty	Comments

Analysis Report for L3-012-102-FSGS-001-SG

L3-012-102-SWITCHYARD OPEN LAND

Nuclide Name	Nuclide Id Confidence	Wt mean Activity (pCi/grams)	Wt mean Activity Uncertainty	Comments
K-40	0.999	3.28E+00	5.38E-01	
CS-137	0.999	3.15E-02	2.76E-02	
PB-212	0.980	4.21E-02	3.20E-02	
BI-214	0.585	1.50E-01	4.46E-02	
PB-214	0.987	1.77E-01	3.61E-02	

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

Errors quoted at 2.000sigma

Analysis Report for L3-012-102-FSGS-001-SG

L3-012-102-SWITCHYARD OPEN LAND

UNIDENTIFIED PEAKS

Peak Locate Performed on : 1/25/2019 7:06:49AM
Peak Locate From Channel : 100
Peak Locate To Channel : 4096

Peak No.		Energy (keV)	Peak Size (CPS)	Peak CPS (%) Uncertainty	Peak Type	Tolerance Nuclide
F	5	583.28	1.25263E-02	19.79		
F	8	720.70	3.82907E-03	35.94		
F	9	910.96	9.09249E-03	23.88	Tol.	AC-228 PA-228

M = First peak in a multiplet region
m = Other peak in a multiplet region
F = Fitted singlet
Errors quoted at 2.000sigma

NUCLIDE MDA REPORT

Nuclide Library Used : C:\Canberra\Apex\Root\Dairyland_NPP\Library\HOTLAB.NLB

	Nuclide Name	Energy (keV)		Yield(%)	Activity (pCi/grams)	Nuclide MDA (pCi/grams)	Line MDA (pCi/grams)
+	K-40	1460.75	*	10.67	3.28E+00	5.99E-01	5.99E-01
+	@ AR-41	1293.64		99.16	1.00E+26	1.00E+26	1.00E+26
+	CO-60	1173.22		100.00	-4.17E-02	4.48E-02	5.17E-02
		1332.49		100.00	2.86E-02		4.48E-02
+	KR-85	513.99		0.43	1.12E+01	8.81E+00	8.81E+00
+	Y-88	898.04		93.70	2.67E-02	3.24E-02	4.55E-02
		1836.06		99.20	-5.84E-03		3.24E-02
+	NB-94	702.63		100.00	1.22E-02	3.74E-02	3.82E-02
		871.10		100.00	-3.78E-02		3.74E-02
+	I-131	284.30		6.06	3.05E-01	6.38E-02	9.33E-01
		364.48		81.20	-1.14E-02		6.38E-02
		636.97		7.27	3.75E-01		8.95E-01
+	CS-134	604.70		97.60	6.16E-03	4.59E-02	5.07E-02

Analysis Report for L3-012-102-FSGS-001-SG

L3-012-102-SWITCHYARD OPEN LAND

	Nuclide Name	Energy (keV)		Yield(%)	Activity (pCi/grams)	Nuclide MDA (pCi/grams)	Line MDA (pCi/grams)
	CS-134	795.84		85.40	1.25E-02	4.59E-02	4.59E-02
+	CS-137	661.65	*	85.12	3.15E-02	5.25E-02	5.25E-02
+	CE-144	80.12		1.36	-1.92E-01	2.57E-01	3.04E+00
		133.51		11.09	-5.01E-02		2.57E-01
+	EU-152	121.78		28.40	-3.82E-02	9.57E-02	9.57E-02
		344.28		26.60	6.16E-03		1.19E-01
		1408.00		20.74	7.42E-02		1.80E-01
+	EU-154	123.07		40.40	-2.17E-02	6.75E-02	6.75E-02
		723.30		19.70	6.29E-02		1.94E-01
		1274.51		35.50	-4.22E-03		1.37E-01
+	EU-155	86.54		32.80	-7.01E-02	1.05E-01	1.05E-01
		105.31		21.80	-4.40E-02		1.32E-01
+	BI-214	609.31	*	46.30	1.47E-01	8.43E-02	8.43E-02
		1120.29	*	15.10	1.65E-01		2.42E-01
		1238.11		5.94	3.27E-01		8.23E-01
		1377.67		4.11	4.28E-01		1.03E+00
		1407.98		2.48	6.20E-01		1.50E+00
		1509.19		2.19	1.99E-01		1.73E+00
		1764.49		15.80	8.69E-02		2.86E-01
+	PB-214	77.11	*	10.70	4.02E-01	9.70E-02	3.53E-01
		295.21	*	19.20	2.12E-01		9.85E-02
		351.92	*	37.20	1.25E-01		9.70E-02
+	PA-228	89.95		22.00	5.01E+01	1.99E+01	3.35E+01
		93.35		35.00	1.45E+01		1.99E+01
		105.00		16.30	8.65E+00		3.89E+01
		129.22		2.97	9.89E+00		2.07E+02
		338.32		5.30	1.72E+01		1.28E+02
		463.00		13.80	3.56E+01		5.31E+01
		911.23		16.70	5.68E+01		6.20E+01
+	AM-241	59.54		36.30	9.37E-02	2.01E-01	2.01E-01
+	CM-243	103.76		23.00	8.73E-02	1.26E-01	1.26E-01
		228.18		10.60	3.87E-02		2.54E-01
		277.60		14.00	-2.16E-01		2.15E-01

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

Apex-Gamma

Analysis Report for L3-012-102-FSGS-001-SS

L3-012-102-SWITCHYARD OPEN LAND

GAMMA SPECTRUM ANALYSIS

Sample Identification	: L3-012-102-FSGS-001-SS
Sample Description	: L3-012-102-SWITCHYARD OPEN LAND
Sample Type	: 500 ml Marinelli
Unit	:
Sample Point	:
Sample Size	: 8.658E+02 grams
Facility	: Dairyland_NPP
Sample Taken On	: 3/12/2018 1:20:00PM
Acquisition Started	: 3/16/2018 9:54:47AM
Procedure	: 500ml Marinelli
Operator	: Administrator
Detector Name	: HOTLAB
Geometry	: 500ml Marinelli
Live Time	: 3600.0 seconds
Real Time	: 3610.4 seconds
Dead Time	: 0.29 %
Peak Locate Threshold	: 3.00
Peak Locate Range (in channels)	: 100 - 4096
Peak Area Range (in channels)	: 100 - 4096
Identification Energy Tolerance	: 1.000 keV
Energy Calibration Used Done On	: 7/8/2014
Efficiency Calibration Used Done On	: 7/8/2014
Efficiency Calibration Description	:
Sample Number	: 5588

PEAK ANALYSIS REPORT

Peak Analysis Performed on : 1/25/2019 7:08:01AM

Peak Analysis From Channel : 100

Peak Analysis To Channel : 4096

Analysis Report for L3-012-102-FSGS-001-SS

L3-012-102-SWITCHYARD OPEN LAND

	Peak No.	Energy (keV)	ROI start	ROI end	Peak Centroid	Net Peak Area	Net Area Uncertainty	Continuum Counts	FWHM (keV)
F	1	186.14	367 -	379	372.79	8.20E+01	39.02	6.85E+02	2.15
F	2	238.42	473 -	482	477.32	1.12E+02	36.41	5.15E+02	1.60
F	3	294.88	584 -	596	590.21	1.14E+02	30.88	3.36E+02	1.75
F	4	351.83	699 -	710	704.10	1.81E+02	34.01	2.50E+02	1.80
F	5	582.53	1161 -	1169	1165.40	3.23E+01	16.61	7.20E+01	1.67
F	6	609.14	1210 -	1225	1218.62	1.51E+02	27.70	1.12E+02	2.08
F	7	1460.40	2911 -	2929	2920.90	3.80E+02	39.48	1.93E+01	2.60

M = First peak in a multiplet region
m = Other peak in a multiplet region
F = Fitted singlet
Errors quoted at 2.000sigma

BACKGROUND SUBTRACT REPORT

Peak Analysis Performed on : 1/25/2019 7:08:01AM

Env. Background File : C:\Canberra\Apex\Root\Dairyland_NPP\Data\0000001364.CNF

	Peak No.	Energy (keV)	Original Area	Orig. Area Uncertainty	Ambient Background	Backgr. Uncert.	Subtracted Area	Subtracted Uncert.
F	1	186.14	8.20E+01	39.02			8.20E+01	3.90E+01
F	2	238.42	1.12E+02	36.41			1.12E+02	3.64E+01
F	3	294.88	1.14E+02	30.88			1.14E+02	3.09E+01
F	4	351.83	1.81E+02	34.01	8.36E+01	3.72E+01	9.72E+01	5.04E+01
F	5	582.53	3.23E+01	16.61			3.23E+01	1.66E+01
F	6	609.14	1.51E+02	27.70	4.12E+01	2.42E+01	1.10E+02	3.68E+01
F	7	1460.40	3.80E+02	39.48	5.63E+01	1.71E+01	3.24E+02	4.30E+01

M = First peak in a multiplet region
m = Other peak in a multiplet region
F = Fitted singlet
Errors quoted at 2.000sigma

Analysis Report for L3-012-102-FSGS-001-SS
L3-012-102-SWITCHYARD OPEN LAND

NUCLIDE IDENTIFICATION REPORT

Nuclide Library Used : C:\Canberra\Apex\Root\Dairyland_NPP\Library\HOTLAB.NLB

IDENTIFIED NUCLIDES

Nuclide Name	Id Confidence	Energy (keV)		Yield(%)	Activity (pCi/grams)	Activity Uncertainty
K-40	0.98	1460.75	*	10.67	4.07E+00	5.87E-01
PB-212	0.55	77.11		17.50		
		238.63	*	44.60	6.68E-02	2.19E-02
BI-214	0.34	609.31	*	46.30	1.46E-01	4.96E-02
		1120.29		15.10		
		1238.11		5.94		
		1377.67		4.11		
		1407.98		2.48		
		1509.19		2.19		
		1764.49		15.80		
PB-214	0.71	77.11		10.70		
		295.21	*	19.20	1.88E-01	5.18E-02
		351.92	*	37.20	9.70E-02	5.05E-02
RA-226	0.99	186.21	*	3.28	5.59E-01	2.68E-01

* = Energy line found in the spectrum.
\- = Manually added nuclide.
? = Manually edited nuclide.
@ = Energy line not used for Weighted Mean Activity
Energy Tolerance : 1.000 keV
Nuclide confidence index threshold = 0.30
Errors quoted at 2.000sigma

INTERFERENCE CORRECTED REPORT

Nuclide Name	Nuclide Id Confidence	Wt mean Activity (pCi/grams)	Wt mean Activity Uncertainty	Comments
K-40	0.980	4.07E+00	5.87E-01	
PB-212	0.555	6.68E-02	2.19E-02	

Analysis Report for L3-012-102-FSGS-001-SS

L3-012-102-SWITCHYARD OPEN LAND

Nuclide Name	Nuclide Id Confidence	Wt mean Activity (pCi/grams)	Wt mean Activity Uncertainty	Comments
BI-214	0.347	1.46E-01	4.96E-02	
PB-214	0.716	1.41E-01	3.62E-02	
RA-226	0.999	5.59E-01	2.68E-01	

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

Errors quoted at 2.000sigma

Analysis Report for L3-012-102-FSGS-001-SS

L3-012-102-SWITCHYARD OPEN LAND

UNIDENTIFIED PEAKS

Peak Locate Performed on : 1/25/2019 7:08:01AM
Peak Locate From Channel : 100
Peak Locate To Channel : 4096

	Peak No.	Energy (keV)	Peak Size (CPS)	Peak CPS (%) Uncertainty	Peak Type	Tolerance Nuclide
F	5	582.53	8.97488E-03	25.71		

M = First peak in a multiplet region
m = Other peak in a multiplet region
F = Fitted singlet
Errors quoted at 2.000sigma

NUCLIDE MDA REPORT

Nuclide Library Used : C:\Canberra\Apex\Root\Dairyland_NPP\Library\HOTLAB.NLB

	Nuclide Name	Energy (keV)		Yield(%)	Activity (pCi/grams)	Nuclide MDA (pCi/grams)	Line MDA (pCi/grams)
+	K-40	1460.75	*	10.67	4.07E+00	5.62E-01	5.62E-01
+	AR-41	1293.64		99.16	3.06E+13	9.29E+13	9.29E+13
+	CO-60	1173.22		100.00	9.47E-03	5.21E-02	5.85E-02
		1332.49		100.00	5.19E-02		5.21E-02
+	KR-85	513.99		0.43	8.90E+00	8.85E+00	8.85E+00
+	Y-88	898.04		93.70	-2.05E-02	3.58E-02	4.76E-02
		1836.06		99.20	-4.04E-03		3.58E-02
+	NB-94	702.63		100.00	1.65E-02	3.84E-02	3.84E-02
		871.10		100.00	-3.71E-02		4.09E-02
+	I-131	284.30		6.06	3.13E-01	4.94E-02	6.84E-01
		364.48		81.20	-4.94E-02		4.94E-02
		636.97		7.27	-4.93E-01		6.51E-01
+	CS-134	604.70		97.60	-9.33E-03	4.69E-02	5.07E-02
		795.84		85.40	-1.87E-02		4.69E-02
+	CS-137	661.65		85.12	5.78E-02	5.74E-02	5.74E-02
+	CE-144	80.12		1.36	2.62E+00	2.54E-01	3.12E+00
		133.51		11.09	-3.10E-02		2.54E-01

Analysis Report for L3-012-102-FSGS-001-SS

L3-012-102-SWITCHYARD OPEN LAND

	Nuclide Name	Energy (keV)		Yield(%)	Activity (pCi/grams)	Nuclide MDA (pCi/grams)	Line MDA (pCi/grams)
+	EU-152	121.78		28.40	-2.52E-02	9.57E-02	9.57E-02
		344.28		26.60	-1.03E-01		1.21E-01
		1408.00		20.74	3.96E-02		1.90E-01
+	EU-154	123.07		40.40	1.15E-02	6.79E-02	6.79E-02
		723.30		19.70	6.03E-02		1.92E-01
		1274.51		35.50	7.72E-02		1.37E-01
+	EU-155	86.54		32.80	-6.55E-02	1.08E-01	1.08E-01
		105.31		21.80	-6.25E-03		1.31E-01
+	BI-214	609.31	*	46.30	1.46E-01	8.62E-02	8.62E-02
		1120.29		15.10	1.08E-01		3.88E-01
		1238.11		5.94	-2.43E-01		1.05E+00
		1377.67		4.11	1.77E-01		1.11E+00
		1407.98		2.48	3.31E-01		1.59E+00
		1509.19		2.19	3.08E-01		1.64E+00
		1764.49		15.80	2.42E-01		2.97E-01
+	PB-214	77.11		10.70	2.46E-01	9.23E-02	4.17E-01
		295.21	*	19.20	1.88E-01		1.19E-01
		351.92	*	37.20	9.70E-02		9.23E-02
+	PA-228	89.95		22.00	2.36E+00	1.77E+00	2.99E+00
		93.35		35.00	1.22E+00		1.77E+00
		105.00		16.30	-1.14E+00		3.26E+00
		129.22		2.97	1.52E+01		1.80E+01
		338.32		5.30	-1.61E+00		1.06E+01
		463.00		13.80	2.43E+00		4.50E+00
		911.23		16.70	3.75E+00		5.25E+00
+	AM-241	59.54		36.30	-8.61E-02	1.98E-01	1.98E-01
+	CM-243	103.76		23.00	1.54E-02	1.24E-01	1.24E-01
		228.18		10.60	-1.12E-01		2.58E-01
		277.60		14.00	-2.15E-02		2.16E-01

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

Apex-Gamma

Analysis Report for L3-012-102-FSGS-002-SG
L3-012-102-SWITCHYARD OPEN LAND

GAMMA SPECTRUM ANALYSIS

Sample Identification	: L3-012-102-FSGS-002-SG
Sample Description	: L3-012-102-SWITCHYARD OPEN LAND
Sample Type	: 500 ml Marinelli
Unit	:
Sample Point	:
Sample Size	: 1.018E+03 grams
Facility	: Dairyland_NPP
Sample Taken On	: 3/12/2018 1:56:00PM
Acquisition Started	: 3/20/2018 5:51:00AM
Procedure	: 500ml Marinelli
Operator	: Administrator
Detector Name	: HOTLAB
Geometry	: 500ml Marinelli
Live Time	: 3600.0 seconds
Real Time	: 3611.0 seconds
Dead Time	: 0.31 %
Peak Locate Threshold	: 3.00
Peak Locate Range (in channels)	: 100 - 4096
Peak Area Range (in channels)	: 100 - 4096
Identification Energy Tolerance	: 1.000 keV
Energy Calibration Used Done On	: 7/8/2014
Efficiency Calibration Used Done On	: 7/8/2014
Efficiency Calibration Description	:
Sample Number	: 5590

PEAK ANALYSIS REPORT

Peak Analysis Performed on : 1/25/2019 7:09:25AM

Peak Analysis From Channel	: 100
Peak Analysis To Channel	: 4096

Analysis Report for L3-012-102-FSGS-002-SG

L3-012-102-SWITCHYARD OPEN LAND

	Peak No.	Energy (keV)	ROI start	ROI end	Peak Centroid	Net Peak Area	Net Area Uncertainty	Continuum Counts	FWHM (keV)
F	1	77.13	148 -	162	154.81	1.70E+02	52.55	1.34E+03	2.24
F	2	185.90	366 -	380	372.30	1.19E+02	41.27	8.74E+02	1.99
F	3	238.59	469 -	485	477.67	2.11E+02	41.74	7.42E+02	1.91
F	4	295.14	585 -	595	590.74	1.76E+02	35.67	3.38E+02	1.66
F	5	338.26	673 -	681	676.95	3.74E+01	21.64	2.35E+02	1.15
F	6	351.84	699 -	710	704.10	2.87E+02	39.53	2.51E+02	1.71
F	7	582.66	1162 -	1172	1165.67	3.18E+01	15.60	1.34E+02	0.88
F	8	609.10	1210 -	1227	1218.53	2.23E+02	32.54	1.17E+02	2.11
F	9	661.44	1318 -	1331	1323.20	2.59E+02	35.19	1.09E+02	2.18
F	10	910.44	1815 -	1826	1821.12	3.01E+01	15.21	6.08E+01	1.84
F	11	1119.91	2233 -	2245	2240.01	5.41E+01	18.10	4.85E+01	2.57
F	12	1237.30	2470 -	2479	2474.76	1.59E+01	12.74	5.02E+01	1.73
F	13	1377.18	2750 -	2759	2754.50	2.30E+01	10.83	1.00E+01	2.19
F	14	1460.66	2912 -	2930	2921.43	2.88E+02	34.84	3.76E+01	2.56

M = First peak in a multiplet region
m = Other peak in a multiplet region
F = Fitted singlet
Errors quoted at 2.000sigma

BACKGROUND SUBTRACT REPORT

Peak Analysis Performed on : 1/25/2019 7:09:25AM

Env. Background File : C:\Canberra\Apex\Root\Dairyland_NPP\Data\0000001364.CNF

	Peak No.	Energy (keV)	Original Area	Orig. Area Uncertainty	Ambient Background	Backgr. Uncert.	Subtracted Area	Subtracted Uncert.
F	1	77.13	1.70E+02	52.55			1.70E+02	5.26E+01
F	2	185.90	1.19E+02	41.27			1.19E+02	4.13E+01
F	3	238.59	2.11E+02	41.74			2.11E+02	4.17E+01
F	4	295.14	1.76E+02	35.67			1.76E+02	3.57E+01
F	5	338.26	3.74E+01	21.64			3.74E+01	2.16E+01
F	6	351.84	2.87E+02	39.53	8.36E+01	3.72E+01	2.03E+02	5.43E+01
F	7	582.66	3.18E+01	15.60			3.18E+01	1.56E+01
F	8	609.10	2.23E+02	32.54	4.12E+01	2.42E+01	1.82E+02	4.06E+01
F	9	661.44	2.59E+02	35.19	6.61E+01	2.54E+01	1.92E+02	4.34E+01
F	10	910.44	3.01E+01	15.21			3.01E+01	1.52E+01
F	11	1119.91	5.41E+01	18.10			5.41E+01	1.81E+01
F	12	1237.30	1.59E+01	12.74			1.59E+01	1.27E+01
F	13	1377.18	2.30E+01	10.83			2.30E+01	1.08E+01
F	14	1460.66	2.88E+02	34.84	5.63E+01	1.71E+01	2.32E+02	3.88E+01

Analysis Report for L3-012-102-FSGS-002-SG
L3-012-102-SWITCHYARD OPEN LAND

M = First peak in a multiplet region
m = Other peak in a multiplet region
F = Fitted singlet
Errors quoted at 2.000sigma

NUCLIDE IDENTIFICATION REPORT

Nuclide Library Used : C:\Canberra\Apex\Root\Dairyland_NPP\Library\HOTLAB.NLB

IDENTIFIED NUCLIDES

Nuclide Name	Id Confidence	Energy (keV)		Yield(%)	Activity (pCi/grams)	Activity Uncertainty
K-40	0.99	1460.75	*	10.67	2.48E+00	4.38E-01
CS-137	0.99	661.65	*	85.12	1.28E-01	2.96E-02
PB-212	1.00	77.11	*	17.50	2.35E-01	7.43E-02
		238.63	*	44.60	1.07E-01	2.19E-02
BI-214	0.71	609.31	*	46.30	2.06E-01	4.73E-02
		1120.29	*	15.10	3.25E-01	1.10E-01
		1238.11	*	5.94	2.65E-01	2.13E-01
		1377.67	*	4.11	6.07E-01	2.88E-01
		1407.98		2.48		
		1509.19		2.19		
		1764.49		15.80		
PB-214	0.99	77.11	*	10.70	3.84E-01	1.21E-01
		295.21	*	19.20	2.48E-01	5.16E-02
		351.92	*	37.20	1.72E-01	4.69E-02
RA-226	0.98	186.21	*	3.28	6.91E-01	2.42E-01

* = Energy line found in the spectrum.
\- = Manually added nuclide.
? = Manually edited nuclide.
@ = Energy line not used for Weighted Mean Activity
Energy Tolerance : 1.000 keV
Nuclide confidence index threshold = 0.30
Errors quoted at 2.000sigma

INTERFERENCE CORRECTED REPORT

Analysis Report for L3-012-102-FSGS-002-SG

L3-012-102-SWITCHYARD OPEN LAND

Nuclide Name	Nuclide Id Confidence	Wt mean Activity (pCi/grams)	Wt mean Activity Uncertainty	Comments
K-40	0.999	2.48E+00	4.38E-01	
CS-137	0.993	1.28E-01	2.96E-02	
PB-212	1.000	1.07E-01	2.10E-02	
BI-214	0.717	2.34E-01	4.21E-02	
PB-214	0.999	2.07E-01	3.34E-02	
RA-226	0.985	6.91E-01	2.42E-01	

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

Errors quoted at 2.000sigma

Analysis Report for L3-012-102-FSGS-002-SG

L3-012-102-SWITCHYARD OPEN LAND

UNIDENTIFIED PEAKS

Peak Locate Performed on : 1/25/2019 7:09:25AM
Peak Locate From Channel : 100
Peak Locate To Channel : 4096

	Peak No.	Energy (keV)	Peak Size (CPS)	Peak CPS (%) Uncertainty	Peak Type	Tolerance Nuclide
F	5	338.26	1.03897E-02	28.93	Tol.	AC-228 PA-228
F	7	582.66	8.84604E-03	24.49		
F	10	910.44	8.35905E-03	25.26	Tol.	PA-228

M = First peak in a multiplet region
m = Other peak in a multiplet region
F = Fitted singlet
Errors quoted at 2.000sigma

NUCLIDE MDA REPORT

Nuclide Library Used : C:\Canberra\Apex\Root\Dairyland_NPP\Library\HOTLAB.NLB

		Nuclide Name	Energy (keV)		Yield(%)	Activity (pCi/grams)	Nuclide MDA (pCi/grams)	Line MDA (pCi/grams)
+		K-40	1460.75	*	10.67	2.48E+00	5.18E-01	5.18E-01
+	@	AR-41	1293.64		99.16	1.00E+26	1.00E+26	1.00E+26
+		CO-60	1173.22		100.00	2.03E-02	4.01E-02	4.66E-02
			1332.49		100.00	2.45E-02		4.01E-02
+		KR-85	513.99		0.43	1.10E+01	7.66E+00	7.66E+00
+		Y-88	898.04		93.70	-1.05E-02	3.04E-02	3.87E-02
			1836.06		99.20	-3.34E-02		3.04E-02
+		NB-94	702.63		100.00	-2.75E-02	2.87E-02	2.87E-02
			871.10		100.00	5.62E-03		3.64E-02
+		I-131	284.30		6.06	-1.41E-01	6.51E-02	8.27E-01
			364.48		81.20	2.05E-02		6.51E-02
			636.97		7.27	1.02E-01		8.15E-01
+		CS-134	604.70		97.60	1.66E-03	4.20E-02	4.87E-02

Analysis Report for L3-012-102-FSGS-002-SG

L3-012-102-SWITCHYARD OPEN LAND

	Nuclide Name	Energy (keV)		Yield(%)	Activity (pCi/grams)	Nuclide MDA (pCi/grams)	Line MDA (pCi/grams)
	CS-134	795.84		85.40	2.17E-05	4.20E-02	4.20E-02
+	CS-137	661.65	*	85.12	1.28E-01	4.46E-02	4.46E-02
+	CE-144	80.12		1.36	-1.16E+00	2.31E-01	2.82E+00
		133.51		11.09	7.98E-02		2.31E-01
+	EU-152	121.78		28.40	-3.35E-02	8.89E-02	8.89E-02
		344.28		26.60	-1.03E-01		1.13E-01
		1408.00		20.74	-7.15E-04		1.78E-01
+	EU-154	123.07		40.40	-2.67E-03	6.25E-02	6.25E-02
		723.30		19.70	-4.11E-02		1.52E-01
		1274.51		35.50	3.88E-02		1.19E-01
+	EU-155	86.54		32.80	-7.77E-02	9.99E-02	9.99E-02
		105.31		21.80	-1.65E-03		1.21E-01
+	BI-214	609.31	*	46.30	2.06E-01	7.56E-02	7.56E-02
		1120.29	*	15.10	3.25E-01		1.74E-01
		1238.11	*	5.94	2.65E-01		4.64E-01
		1377.67	*	4.11	6.07E-01		3.64E-01
		1407.98		2.48	-5.97E-03		1.48E+00
		1509.19		2.19	1.01E+00		1.37E+00
		1764.49		15.80	1.09E-01		2.53E-01
+	PB-214	77.11	*	10.70	3.84E-01	7.85E-02	3.34E-01
		295.21	*	19.20	2.48E-01		9.65E-02
		351.92	*	37.20	1.72E-01		7.85E-02
+	PA-228	89.95		22.00	8.00E+01	2.87E+01	4.90E+01
		93.35		35.00	1.21E+01		2.87E+01
		105.00		16.30	-1.32E+01		5.40E+01
		129.22		2.97	-3.03E+01		2.83E+02
		338.32		5.30	8.37E+01		1.78E+02
		463.00		13.80	1.47E+01		7.46E+01
		911.23		16.70	3.50E+01		8.19E+01
+	AM-241	59.54		36.30	5.88E-02	1.82E-01	1.82E-01
+	CM-243	103.76		23.00	-5.17E-02	1.14E-01	1.14E-01
		228.18		10.60	8.07E-02		2.34E-01
		277.60		14.00	-1.68E-02		1.91E-01

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

Apex-Gamma

Analysis Report for L3-012-102-FSGS-002-SS

L3-012-102-SWITCHYARD OPEN LAND

GAMMA SPECTRUM ANALYSIS

Sample Identification	: L3-012-102-FSGS-002-SS
Sample Description	: L3-012-102-SWITCHYARD OPEN LAND
Sample Type	: 500 ml Marinelli
Unit	:
Sample Point	:
Sample Size	: 9.078E+02 grams
Facility	: Dairyland_NPP
Sample Taken On	: 3/12/2018 2:03:00PM
Acquisition Started	: 3/16/2018 11:07:16AM
Procedure	: 500ml Marinelli
Operator	: Administrator
Detector Name	: HOTLAB
Geometry	: 500ml Marinelli
Live Time	: 3600.0 seconds
Real Time	: 3610.1 seconds
Dead Time	: 0.28 %
Peak Locate Threshold	: 3.00
Peak Locate Range (in channels)	: 100 - 4096
Peak Area Range (in channels)	: 100 - 4096
Identification Energy Tolerance	: 1.000 keV
Energy Calibration Used Done On	: 7/8/2014
Efficiency Calibration Used Done On	: 7/8/2014
Efficiency Calibration Description	:
Sample Number	: 5592

PEAK ANALYSIS REPORT

Peak Analysis Performed on : 1/25/2019 7:10:36AM

Peak Analysis From Channel	: 100
Peak Analysis To Channel	: 4096

Analysis Report for L3-012-102-FSGS-002-SS

L3-012-102-SWITCHYARD OPEN LAND

	Peak No.	Energy (keV)	ROI start	ROI end	Peak Centroid	Net Peak Area	Net Area Uncertainty	Continuum Counts	FWHM (keV)
F	1	238.49	469 -	481	477.45	7.57E+01	33.16	6.75E+02	1.32
F	2	295.12	586 -	595	590.70	1.40E+02	31.91	2.47E+02	1.69
F	3	351.75	697 -	712	703.93	2.53E+02	37.76	3.49E+02	1.66
F	4	583.00	1161 -	1170	1166.34	3.32E+01	17.46	9.24E+01	1.63
F	5	609.23	1214 -	1226	1218.80	1.99E+02	31.08	9.29E+01	1.93
F	6	661.28	1317 -	1329	1322.88	1.13E+02	26.11	1.19E+02	2.04
F	7	1460.48	2913 -	2928	2921.08	2.05E+02	29.35	2.00E+01	2.35

M = First peak in a multiplet region
m = Other peak in a multiplet region
F = Fitted singlet
Errors quoted at 2.000sigma

BACKGROUND SUBTRACT REPORT

Peak Analysis Performed on : 1/25/2019 7:10:36AM

Env. Background File : C:\Canberra\Apex\Root\Dairyland_NPP\Data\0000001364.CNF

	Peak No.	Energy (keV)	Original Area	Orig. Area Uncertainty	Ambient Background	Backgr. Uncert.	Subtracted Area	Subtracted Uncert.
F	1	238.49	7.57E+01	33.16			7.57E+01	3.32E+01
F	2	295.12	1.40E+02	31.91			1.40E+02	3.19E+01
F	3	351.75	2.53E+02	37.76	8.36E+01	3.72E+01	1.70E+02	5.30E+01
F	4	583.00	3.32E+01	17.46			3.32E+01	1.75E+01
F	5	609.23	1.99E+02	31.08	4.12E+01	2.42E+01	1.58E+02	3.94E+01
F	6	661.28	1.13E+02	26.11	6.61E+01	2.54E+01	4.67E+01	3.64E+01
F	7	1460.48	2.05E+02	29.35	5.63E+01	1.71E+01	1.49E+02	3.40E+01

M = First peak in a multiplet region
m = Other peak in a multiplet region
F = Fitted singlet
Errors quoted at 2.000sigma

Analysis Report for L3-012-102-FSGS-002-SS

L3-012-102-SWITCHYARD OPEN LAND

NUCLIDE IDENTIFICATION REPORT

Nuclide Library Used : C:\Canberra\Apex\Root\Dairyland_NPP\Library\HOTLAB.NLB

IDENTIFIED NUCLIDES

Nuclide Name	Id Confidence	Energy (keV)		Yield(%)	Activity (pCi/grams)	Activity Uncertainty
K-40	0.98	1460.75	*	10.67	1.79E+00	4.20E-01
CS-137	0.97	661.65	*	85.12	3.48E-02	2.72E-02
PB-212	0.55	77.11		17.50		
		238.63	*	44.60	4.30E-02	1.90E-02
BI-214	0.34	609.31	*	46.30	2.01E-01	5.12E-02
		1120.29		15.10		
		1238.11		5.94		
		1377.67		4.11		
		1407.98		2.48		
		1509.19		2.19		
		1764.49		15.80		
PB-214	0.71	77.11		10.70		
		295.21	*	19.20	2.20E-01	5.14E-02
		351.92	*	37.20	1.62E-01	5.10E-02

* = Energy line found in the spectrum.
\- = Manually added nuclide.
? = Manually edited nuclide.
@ = Energy line not used for Weighted Mean Activity
Energy Tolerance : 1.000 keV
Nuclide confidence index threshold = 0.30
Errors quoted at 2.000sigma

INTERFERENCE CORRECTED REPORT

Nuclide Name	Nuclide Id Confidence	Wt mean Activity (pCi/grams)	Wt mean Activity Uncertainty	Comments
K-40	0.989	1.79E+00	4.20E-01	
CS-137	0.979	3.48E-02	2.72E-02	

Analysis Report for L3-012-102-FSGS-002-SS

L3-012-102-SWITCHYARD OPEN LAND

Nuclide Name	Nuclide Id Confidence	Wt mean Activity (pCi/grams)	Wt mean Activity Uncertainty	Comments
PB-212	0.558	4.30E-02	1.90E-02	
BI-214	0.349	2.01E-01	5.12E-02	
PB-214	0.719	1.91E-01	3.62E-02	

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

Errors quoted at 2.000sigma

Analysis Report for L3-012-102-FSGS-002-SS

L3-012-102-SWITCHYARD OPEN LAND

UNIDENTIFIED PEAKS

Peak Locate Performed on : 1/25/2019 7:10:36AM
Peak Locate From Channel : 100
Peak Locate To Channel : 4096

	Peak No.	Energy (keV)	Peak Size (CPS)	Peak CPS (%) Uncertainty	Peak Type	Tolerance Nuclide
F	4	583.00	9.23368E-03	26.26		

M = First peak in a multiplet region
m = Other peak in a multiplet region
F = Fitted singlet
Errors quoted at 2.000sigma

NUCLIDE MDA REPORT

Nuclide Library Used : C:\Canberra\Apex\Root\Dairyland_NPP\Library\HOTLAB.NLB

	Nuclide Name	Energy (keV)		Yield(%)	Activity (pCi/grams)	Nuclide MDA (pCi/grams)	Line MDA (pCi/grams)
+	K-40	1460.75	*	10.67	1.79E+00	5.32E-01	5.32E-01
+	AR-41	1293.64		99.16	-2.43E+13	9.72E+13	9.72E+13
+	CO-60	1173.22		100.00	5.78E-02	4.90E-02	5.12E-02
		1332.49		100.00	3.37E-02		4.90E-02
+	KR-85	513.99		0.43	8.26E+00	8.70E+00	8.70E+00
+	Y-88	898.04		93.70	-1.19E-02	3.93E-02	4.12E-02
		1836.06		99.20	1.08E-02		3.93E-02
+	NB-94	702.63		100.00	6.42E-03	3.22E-02	3.22E-02
		871.10		100.00	-3.52E-02		3.54E-02
+	I-131	284.30		6.06	-2.17E-01	5.18E-02	6.36E-01
		364.48		81.20	1.71E-02		5.18E-02
		636.97		7.27	3.13E-01		5.99E-01
+	CS-134	604.70		97.60	-5.43E-02	4.29E-02	5.18E-02
		795.84		85.40	-4.43E-02		4.29E-02
+	CS-137	661.65	*	85.12	3.48E-02	5.02E-02	5.02E-02
+	CE-144	80.12		1.36	4.55E-01	2.38E-01	2.90E+00
		133.51		11.09	6.01E-02		2.38E-01

Analysis Report for L3-012-102-FSGS-002-SS

L3-012-102-SWITCHYARD OPEN LAND

	Nuclide Name	Energy (keV)		Yield(%)	Activity (pCi/grams)	Nuclide MDA (pCi/grams)	Line MDA (pCi/grams)
+	EU-152	121.78		28.40	2.46E-02	9.32E-02	9.32E-02
		344.28		26.60	5.82E-02		1.19E-01
		1408.00		20.74	1.18E-01		1.92E-01
+	EU-154	123.07		40.40	9.10E-03	6.50E-02	6.50E-02
		723.30		19.70	8.40E-02		1.83E-01
		1274.51		35.50	-1.77E-02		1.23E-01
+	EU-155	86.54		32.80	-1.21E-01	9.91E-02	9.91E-02
		105.31		21.80	3.97E-02		1.26E-01
+	BI-214	609.31	*	46.30	2.01E-01	7.70E-02	7.70E-02
		1120.29		15.10	2.55E-01		3.57E-01
		1238.11		5.94	6.09E-01		8.76E-01
		1377.67		4.11	3.20E-01		1.00E+00
		1407.98		2.48	9.87E-01		1.61E+00
		1509.19		2.19	-7.27E-01		1.67E+00
		1764.49		15.80	3.03E-01		3.29E-01
+	PB-214	77.11		10.70	2.93E-01	9.08E-02	3.96E-01
		295.21	*	19.20	2.20E-01		9.08E-02
		351.92	*	37.20	1.62E-01		9.95E-02
+	PA-228	89.95		22.00	1.64E+00	1.64E+00	2.76E+00
		93.35		35.00	-1.23E-01		1.64E+00
		105.00		16.30	2.10E+00		3.24E+00
		129.22		2.97	-4.48E+00		1.68E+01
		338.32		5.30	1.11E+00		1.08E+01
		463.00		13.80	1.04E+00		4.23E+00
		911.23		16.70	3.45E+00		4.78E+00
+	AM-241	59.54		36.30	9.66E-02	1.93E-01	1.93E-01
+	CM-243	103.76		23.00	1.43E-01	1.22E-01	1.22E-01
		228.18		10.60	-1.81E-01		2.37E-01
		277.60		14.00	-2.21E-01		1.94E-01

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

Apex-Gamma

Analysis Report for L3-012-102-FSGS-003-SG

L3-012-102 SWITCHYARD OPEN LAND

GAMMA SPECTRUM ANALYSIS

Sample Identification	: L3-012-102-FSGS-003-SG
Sample Description	: L3-012-102 SWITCHYARD OPEN LAND
Sample Type	: 500 ml Marinelli
Unit	:
Sample Point	:
Sample Size	: 1.075E+03 grams
Facility	: Dairyland_NPP
Sample Taken On	: 2/27/2018 3:01:00PM
Acquisition Started	: 3/14/2018 10:44:31AM
Procedure	: 500ml Marinelli
Operator	: Administrator
Detector Name	: HOTLAB
Geometry	: 500ml Marinelli
Live Time	: 3600.0 seconds
Real Time	: 3610.7 seconds
Dead Time	: 0.30 %
Peak Locate Threshold	: 3.00
Peak Locate Range (in channels)	: 100 - 4096
Peak Area Range (in channels)	: 100 - 4096
Identification Energy Tolerance	: 1.000 keV
Energy Calibration Used Done On	: 7/8/2014
Efficiency Calibration Used Done On	: 7/8/2014
Efficiency Calibration Description	:
Sample Number	: 5594

PEAK ANALYSIS REPORT

Peak Analysis Performed on : 1/25/2019 7:12:01AM

Peak Analysis From Channel : 100

Peak Analysis To Channel : 4096

Analysis Report for L3-012-102-FSGS-003-SG

L3-012-102 SWITCHYARD OPEN LAND

	Peak No.	Energy (keV)	ROI start	ROI end	Peak Centroid	Net Peak Area	Net Area Uncertainty	Continuum Counts	FWHM (keV)
F	1	185.58	368 -	379	371.65	1.24E+02	39.55	6.69E+02	2.21
F	2	238.51	469 -	481	477.50	2.07E+02	41.38	5.80E+02	1.72
F	3	295.09	587 -	596	590.64	8.01E+01	29.45	3.62E+02	1.43
F	4	337.86	672 -	684	676.15	4.53E+01	23.23	2.98E+02	1.41
F	5	351.76	697 -	710	703.96	2.38E+02	36.73	3.17E+02	1.55
F	6	583.01	1159 -	1173	1166.36	6.12E+01	21.57	1.39E+02	2.15
F	7	609.13	1212 -	1224	1218.59	1.44E+02	28.10	1.17E+02	2.03
F	8	910.48	1816 -	1826	1821.20	2.25E+01	14.37	8.80E+01	1.35
F	9	968.85	1933 -	1943	1937.93	3.31E+01	16.30	6.54E+01	2.05
F	10	1460.40	2911 -	2929	2920.91	4.75E+02	43.91	1.97E+01	2.51
F	11	1763.64	3522 -	3534	3527.36	1.80E+01	10.63	1.74E+01	2.33

M = First peak in a multiplet region
m = Other peak in a multiplet region
F = Fitted singlet
Errors quoted at 2.000sigma

BACKGROUND SUBTRACT REPORT

Peak Analysis Performed on : 1/25/2019 7:12:01AM

Env. Background File : C:\Canberra\Apex\Root\Dairyland_NPP\Data\0000001364.CNF

	Peak No.	Energy (keV)	Original Area	Orig. Area Uncertainty	Ambient Background	Backgr. Uncert.	Subtracted Area	Subtracted Uncert.
F	1	185.58	1.24E+02	39.55			1.24E+02	3.96E+01
F	2	238.51	2.07E+02	41.38			2.07E+02	4.14E+01
F	3	295.09	8.01E+01	29.45			8.01E+01	2.94E+01
F	4	337.86	4.53E+01	23.23			4.53E+01	2.32E+01
F	5	351.76	2.38E+02	36.73	8.36E+01	3.72E+01	1.55E+02	5.23E+01
F	6	583.01	6.12E+01	21.57			6.12E+01	2.16E+01
F	7	609.13	1.44E+02	28.10	4.12E+01	2.42E+01	1.02E+02	3.71E+01
F	8	910.48	2.25E+01	14.37			2.25E+01	1.44E+01
F	9	968.85	3.31E+01	16.30			3.31E+01	1.63E+01
F	10	1460.40	4.75E+02	43.91	5.63E+01	1.71E+01	4.18E+02	4.71E+01
F	11	1763.64	1.80E+01	10.63			1.80E+01	1.06E+01

M = First peak in a multiplet region
m = Other peak in a multiplet region
F = Fitted singlet
Errors quoted at 2.000sigma

Analysis Report for L3-012-102-FSGS-003-SG

L3-012-102 SWITCHYARD OPEN LAND

NUCLIDE IDENTIFICATION REPORT

Nuclide Library Used : C:\Canberra\Apex\Root\Dairyland_NPP\Library\HOTLAB.NLB

IDENTIFIED NUCLIDES

Nuclide Name	Id Confidence	Energy (keV)		Yield(%)	Activity (pCi/grams)	Activity Uncertainty
K-40	0.98	1460.75	*	10.67	4.24E+00	5.33E-01
PB-212	0.55	77.11		17.50		
		238.63	*	44.60	9.93E-02	2.05E-02
BI-214	0.53	609.31	*	46.30	1.10E-01	4.02E-02
		1120.29		15.10		
		1238.11		5.94		
		1377.67		4.11		
		1407.98		2.48		
		1509.19		2.19		
		1764.49	*	15.80	1.44E-01	8.57E-02
PB-214	0.71	77.11		10.70		
		295.21	*	19.20	1.07E-01	3.95E-02
		351.92	*	37.20	1.24E-01	4.24E-02
RA-226	0.93	186.21	*	3.28	6.82E-01	2.20E-01

* = Energy line found in the spectrum.
\- = Manually added nuclide.
? = Manually edited nuclide.
@ = Energy line not used for Weighted Mean Activity
Energy Tolerance : 1.000 keV
Nuclide confidence index threshold = 0.30
Errors quoted at 2.000sigma

INTERFERENCE CORRECTED REPORT

Nuclide Name	Nuclide Id Confidence	Wt mean Activity (pCi/grams)	Wt mean Activity Uncertainty	Comments

Analysis Report for L3-012-102-FSGS-003-SG

L3-012-102 SWITCHYARD OPEN LAND

Nuclide Name	Nuclide Id Confidence	Wt mean Activity (pCi/grams)	Wt mean Activity Uncertainty	Comments
K-40	0.980	4.24E+00	5.33E-01	
PB-212	0.559	9.93E-02	2.05E-02	
BI-214	0.530	1.16E-01	3.64E-02	
PB-214	0.719	1.15E-01	2.89E-02	
RA-226	0.938	6.82E-01	2.20E-01	

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

Errors quoted at 2.000sigma

Analysis Report for L3-012-102-FSGS-003-SG

L3-012-102 SWITCHYARD OPEN LAND

UNIDENTIFIED PEAKS

Peak Locate Performed on : 1/25/2019 7:12:01AM
Peak Locate From Channel : 100
Peak Locate To Channel : 4096

	Peak No.	Energy (keV)	Peak Size (CPS)	Peak CPS (%) Uncertainty	Peak Type	Tolerance Nuclide
F	4	337.86	1.25699E-02	25.67	Tol.	AC-228 PA-228
F	6	583.01	1.70022E-02	17.62		
F	8	910.48	6.24513E-03	31.96	Tol.	PA-228
F	9	968.85	9.20245E-03	24.61	Tol.	AC-228

M = First peak in a multiplet region
m = Other peak in a multiplet region
F = Fitted singlet
Errors quoted at 2.000sigma

NUCLIDE MDA REPORT

Nuclide Library Used : C:\Canberra\Apex\Root\Dairyland_NPP\Library\HOTLAB.NLB

	Nuclide Name	Energy (keV)		Yield(%)	Activity (pCi/grams)	Nuclide MDA (pCi/grams)	Line MDA (pCi/grams)
+	K-40	1460.75	*	10.67	4.24E+00	4.54E-01	4.54E-01
+	@ AR-41	1293.64		99.16	1.00E+26	1.00E+26	1.00E+26
+	CO-60	1173.22		100.00	2.36E-02	4.32E-02	4.98E-02
		1332.49		100.00	5.10E-02		4.32E-02
+	KR-85	513.99		0.43	5.47E+00	7.14E+00	7.14E+00
+	Y-88	898.04		93.70	3.69E-03	3.10E-02	4.32E-02
		1836.06		99.20	-2.86E-02		3.10E-02
+	NB-94	702.63		100.00	-1.38E-02	3.03E-02	3.03E-02
		871.10		100.00	-1.88E-02		3.50E-02
+	I-131	284.30		6.06	-3.44E-01	1.03E-01	1.51E+00
		364.48		81.20	-4.01E-02		1.03E-01

Analysis Report for L3-012-102-FSGS-003-SG

L3-012-102 SWITCHYARD OPEN LAND

	Nuclide Name	Energy (keV)		Yield(%)	Activity (pCi/grams)	Nuclide MDA (pCi/grams)	Line MDA (pCi/grams)
	I-131	636.97		7.27	7.03E-02	1.03E-01	1.54E+00
+	CS-134	604.70		97.60	-2.05E-02	3.97E-02	4.08E-02
		795.84		85.40	-2.20E-02		3.97E-02
+	CS-137	661.65		85.12	7.66E-02	4.64E-02	4.64E-02
+	CE-144	80.12		1.36	-1.36E-01	2.21E-01	2.71E+00
		133.51		11.09	1.70E-01		2.21E-01
+	EU-152	121.78		28.40	-5.30E-02	8.17E-02	8.17E-02
		344.28		26.60	-1.77E-03		1.08E-01
		1408.00		20.74	1.36E-01		1.74E-01
+	EU-154	123.07		40.40	-1.72E-02	5.76E-02	5.76E-02
		723.30		19.70	9.09E-02		1.62E-01
		1274.51		35.50	-5.53E-02		1.05E-01
+	EU-155	86.54		32.80	-2.68E-02	9.29E-02	9.29E-02
		105.31		21.80	-5.89E-02		1.15E-01
+	BI-214	609.31	*	46.30	1.10E-01	6.81E-02	6.81E-02
		1120.29		15.10	1.86E-01		2.95E-01
		1238.11		5.94	-1.58E-01		8.41E-01
		1377.67		4.11	7.30E-01		8.40E-01
		1407.98		2.48	1.14E+00		1.45E+00
		1509.19		2.19	-1.80E-01		1.22E+00
		1764.49	*	15.80	1.44E-01		1.54E-01
+	PB-214	77.11		10.70	1.12E-01	8.00E-02	3.55E-01
		295.21	*	19.20	1.07E-01		9.28E-02
		351.92	*	37.20	1.24E-01		8.00E-02
+	PA-228	89.95		22.00	4.32E+03	5.84E+03	9.93E+03
		93.35		35.00	-2.85E+03		5.84E+03
		105.00		16.30	-3.39E+03		1.14E+04
		129.22		2.97	2.57E+04		5.92E+04
		338.32		5.30	9.83E+03		3.73E+04
		463.00		13.80	5.79E+03		1.47E+04
		911.23		16.70	9.18E+03		1.82E+04
+	AM-241	59.54		36.30	5.52E-02	1.68E-01	1.68E-01
+	CM-243	103.76		23.00	1.74E-02	1.10E-01	1.10E-01
		228.18		10.60	-5.03E-02		2.24E-01
		277.60		14.00	-5.68E-02		1.85E-01

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

Analysis Report for L3-012-102-FSGS-003-SG

L3-012-102 SWITCHYARD OPEN LAND

Apex-Gamma

Analysis Report for L3-012-102-FSGS-003-SS

L3-012-102 SWITCHYARD OPEN LAND

GAMMA SPECTRUM ANALYSIS

Sample Identification	: L3-012-102-FSGS-003-SS
Sample Description	: L3-012-102 SWITCHYARD OPEN LAND
Sample Type	: 500 ml Marinelli
Unit	:
Sample Point	:
Sample Size	: 8.686E+02 grams
Facility	: Dairyland_NPP
Sample Taken On	: 2/27/2018 3:04:00PM
Acquisition Started	: 3/13/2018 11:19:24AM
Procedure	: 500ml Marinelli
Operator	: Administrator
Detector Name	: HOTLAB
Geometry	: 500ml Marinelli
Live Time	: 3600.0 seconds
Real Time	: 3610.5 seconds
Dead Time	: 0.29 %
Peak Locate Threshold	: 3.00
Peak Locate Range (in channels)	: 100 - 4096
Peak Area Range (in channels)	: 100 - 4096
Identification Energy Tolerance	: 1.000 keV
Energy Calibration Used Done On	: 7/8/2014
Efficiency Calibration Used Done On	: 7/8/2014
Efficiency Calibration Description	:
Sample Number	: 5596

PEAK ANALYSIS REPORT

Peak Analysis Performed on : 1/25/2019 7:13:33AM

Peak Analysis From Channel	: 100
Peak Analysis To Channel	: 4096

Analysis Report for L3-012-102-FSGS-003-SS

L3-012-102 SWITCHYARD OPEN LAND

	Peak No.	Energy (keV)	ROI start	ROI end	Peak Centroid	Net Peak Area	Net Area Uncertainty	Continuum Counts	FWHM (keV)
F	1	185.61	368 -	379	371.71	9.38E+01	38.54	7.47E+02	1.82
F	2	238.85	469 -	485	478.17	2.75E+02	48.75	7.51E+02	2.70
F	3	295.01	586 -	595	590.48	1.13E+02	30.59	3.28E+02	1.36
F	4	351.93	700 -	712	704.29	2.66E+02	38.74	2.72E+02	1.83
F	5	583.13	1160 -	1174	1166.61	8.20E+01	23.29	1.13E+02	2.56
F	6	609.16	1212 -	1224	1218.65	1.72E+02	30.20	1.20E+02	1.97
F	7	661.53	1318 -	1329	1323.37	3.14E+02	37.87	9.33E+01	1.85
F	8	1377.30	2749 -	2759	2754.72	1.66E+01	9.53	1.10E+01	1.83
F	9	1460.60	2912 -	2930	2921.32	3.63E+02	39.37	5.18E+01	2.60

M = First peak in a multiplet region
m = Other peak in a multiplet region
F = Fitted singlet
Errors quoted at 2.000sigma

BACKGROUND SUBTRACT REPORT

Peak Analysis Performed on : 1/25/2019 7:13:33AM

Env. Background File : C:\Canberra\Apex\Root\Dairyland_NPP\Data\0000001364.CNF

	Peak No.	Energy (keV)	Original Area	Orig. Area Uncertainty	Ambient Background	Backgr. Uncert.	Subtracted Area	Subtracted Uncert.
F	1	185.61	9.38E+01	38.54			9.38E+01	3.85E+01
F	2	238.85	2.75E+02	48.75			2.75E+02	4.87E+01
F	3	295.01	1.13E+02	30.59			1.13E+02	3.06E+01
F	4	351.93	2.66E+02	38.74	8.36E+01	3.72E+01	1.82E+02	5.37E+01
F	5	583.13	8.20E+01	23.29			8.20E+01	2.33E+01
F	6	609.16	1.72E+02	30.20	4.12E+01	2.42E+01	1.31E+02	3.87E+01
F	7	661.53	3.14E+02	37.87	6.61E+01	2.54E+01	2.48E+02	4.56E+01
F	8	1377.30	1.66E+01	9.53			1.66E+01	9.53E+00
F	9	1460.60	3.63E+02	39.37	5.63E+01	1.71E+01	3.07E+02	4.29E+01

M = First peak in a multiplet region
m = Other peak in a multiplet region
F = Fitted singlet
Errors quoted at 2.000sigma

Analysis Report for L3-012-102-FSGS-003-SS

L3-012-102 SWITCHYARD OPEN LAND

NUCLIDE IDENTIFICATION REPORT

Nuclide Library Used : C:\Canberra\Apex\Root\Dairyland_NPP\Library\HOTLAB.NLB

IDENTIFIED NUCLIDES

Nuclide Name	Id Confidence	Energy (keV)		Yield(%)	Activity (pCi/grams)	Activity Uncertainty
K-40	0.99	1460.75	*	10.67	3.85E+00	5.79E-01
CS-137	0.99	661.65	*	85.12	1.93E-01	3.70E-02
PB-212	0.55	77.11		17.50		
		238.63	*	44.60	1.63E-01	3.02E-02
BI-214	0.40	609.31	*	46.30	1.74E-01	5.22E-02
		1120.29		15.10		
		1238.11		5.94		
		1377.67	*	4.11	5.15E-01	2.96E-01
		1407.98		2.48		
		1509.19		2.19		
		1764.49		15.80		
PB-214	0.72	77.11		10.70		
		295.21	*	19.20	1.85E-01	5.12E-02
		351.92	*	37.20	1.81E-01	5.42E-02
RA-226	0.94	186.21	*	3.28	6.36E-01	2.64E-01

* = Energy line found in the spectrum.
\- = Manually added nuclide.
? = Manually edited nuclide.
@ = Energy line not used for Weighted Mean Activity
Energy Tolerance : 1.000 keV
Nuclide confidence index threshold = 0.30
Errors quoted at 2.000sigma

INTERFERENCE CORRECTED REPORT

Nuclide Name	Nuclide Id Confidence	Wt mean Activity (pCi/grams)	Wt mean Activity Uncertainty	Comments
K-40	0.997	3.85E+00	5.79E-01	

Analysis Report for L3-012-102-FSGS-003-SS

L3-012-102 SWITCHYARD OPEN LAND

Nuclide Name	Nuclide Id Confidence	Wt mean Activity (pCi/grams)	Wt mean Activity Uncertainty	Comments
CS-137	0.998	1.93E-01	3.70E-02	
PB-212	0.554	1.63E-01	3.02E-02	
BI-214	0.405	1.84E-01	5.14E-02	
PB-214	0.720	1.83E-01	3.72E-02	
RA-226	0.944	6.36E-01	2.64E-01	

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

Errors quoted at 2.000sigma

Analysis Report for L3-012-102-FSGS-003-SS

L3-012-102 SWITCHYARD OPEN LAND

UNIDENTIFIED PEAKS

Peak Locate Performed on : 1/25/2019 7:13:33AM
Peak Locate From Channel : 100
Peak Locate To Channel : 4096

	Peak No.	Energy (keV)	Peak Size (CPS)	Peak CPS (%) Uncertainty	Peak Type	Tolerance Nuclide
F	5	583.13	2.27698E-02	14.21		

M = First peak in a multiplet region
m = Other peak in a multiplet region
F = Fitted singlet
Errors quoted at 2.000sigma

NUCLIDE MDA REPORT

Nuclide Library Used : C:\Canberra\Apex\Root\Dairyland_NPP\Library\HOTLAB.NLB

	Nuclide Name	Energy (keV)		Yield(%)	Activity (pCi/grams)	Nuclide MDA (pCi/grams)	Line MDA (pCi/grams)
+	K-40	1460.75	*	10.67	3.85E+00	6.42E-01	6.42E-01
+	@ AR-41	1293.64		99.16	1.00E+26	1.00E+26	1.00E+26
+	CO-60	1173.22		100.00	-8.78E-02	5.24E-02	5.80E-02
		1332.49		100.00	2.22E-02		5.24E-02
+	KR-85	513.99		0.43	1.11E+01	9.55E+00	9.55E+00
+	Y-88	898.04		93.70	3.58E-02	3.70E-02	5.18E-02
		1836.06		99.20	-2.30E-02		3.70E-02
+	NB-94	702.63		100.00	3.04E-02	3.96E-02	3.96E-02
		871.10		100.00	5.40E-04		4.28E-02
+	I-131	284.30		6.06	-4.56E-01	1.34E-01	1.65E+00
		364.48		81.20	1.71E-01		1.34E-01
		636.97		7.27	1.09E-01		1.76E+00
+	CS-134	604.70		97.60	-8.72E-03	4.70E-02	5.42E-02
		795.84		85.40	7.81E-03		4.70E-02
+	CS-137	661.65	*	85.12	1.93E-01	4.97E-02	4.97E-02
+	CE-144	80.12		1.36	-2.09E+00	2.75E-01	3.34E+00
		133.51		11.09	1.76E-01		2.75E-01

Analysis Report for L3-012-102-FSGS-003-SS

L3-012-102 SWITCHYARD OPEN LAND

	Nuclide Name	Energy (keV)		Yield(%)	Activity (pCi/grams)	Nuclide MDA (pCi/grams)	Line MDA (pCi/grams)
+	EU-152	121.78		28.40	-6.08E-02	1.00E-01	1.00E-01
		344.28		26.60	-3.20E-01		1.30E-01
		1408.00		20.74	-4.73E-02		2.13E-01
+	EU-154	123.07		40.40	-6.44E-02	7.01E-02	7.01E-02
		723.30		19.70	2.79E-02		1.95E-01
		1274.51		35.50	1.01E-01		1.44E-01
+	EU-155	86.54		32.80	-4.37E-02	1.15E-01	1.15E-01
		105.31		21.80	-2.21E-02		1.38E-01
+	BI-214	609.31	*	46.30	1.74E-01	8.47E-02	8.47E-02
		1120.29		15.10	1.57E-01		4.09E-01
		1238.11		5.94	9.46E-01		1.05E+00
		1377.67	*	4.11	5.15E-01		4.52E-01
		1407.98		2.48	-3.95E-01		1.77E+00
		1509.19		2.19	5.35E-01		1.74E+00
		1764.49		15.80	2.55E-01		3.22E-01
+	PB-214	77.11		10.70	5.68E-01	9.50E-02	4.46E-01
		295.21	*	19.20	1.85E-01		1.09E-01
		351.92	*	37.20	1.81E-01		9.50E-02
+	PA-228	89.95		22.00	6.48E+03	3.52E+03	5.97E+03
		93.35		35.00	-5.66E+02		3.52E+03
		105.00		16.30	-1.26E+03		6.62E+03
		129.22		2.97	9.22E+03		3.49E+04
		338.32		5.30	-4.24E+03		2.22E+04
		463.00		13.80	3.54E+03		9.52E+03
		911.23		16.70	2.93E+02		1.08E+04
+	AM-241	59.54		36.30	3.67E-02	2.06E-01	2.06E-01
+	CM-243	103.76		23.00	3.45E-02	1.34E-01	1.34E-01
		228.18		10.60	4.67E-02		2.91E-01
		277.60		14.00	8.89E-02		2.21E-01

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

Apex-Gamma

Analysis Report for L3-012-102-FSGS-004-SG

L3-012-102 SWITCHYARD OPEN LAND

GAMMA SPECTRUM ANALYSIS

Sample Identification	: L3-012-102-FSGS-004-SG
Sample Description	: L3-012-102 SWITCHYARD OPEN LAND
Sample Type	: 500 ml Marinelli
Unit	:
Sample Point	:
Sample Size	: 1.064E+03 grams
Facility	: Dairyland_NPP
Sample Taken On	: 2/27/2018 2:47:00PM
Acquisition Started	: 3/14/2018 11:45:51AM
Procedure	: 500ml Marinelli
Operator	: Administrator
Detector Name	: HOTLAB
Geometry	: 500ml Marinelli
Live Time	: 3600.0 seconds
Real Time	: 3611.1 seconds
Dead Time	: 0.31 %
Peak Locate Threshold	: 3.00
Peak Locate Range (in channels)	: 100 - 4096
Peak Area Range (in channels)	: 100 - 4096
Identification Energy Tolerance	: 1.000 keV
Energy Calibration Used Done On	: 7/8/2014
Efficiency Calibration Used Done On	: 7/8/2014
Efficiency Calibration Description	:
Sample Number	: 5598

PEAK ANALYSIS REPORT

Peak Analysis Performed on : 1/25/2019 7:14:48AM

Peak Analysis From Channel	: 100
Peak Analysis To Channel	: 4096

Analysis Report for L3-012-102-FSGS-004-SG

L3-012-102 SWITCHYARD OPEN LAND

	Peak No.	Energy (keV)	ROI start	ROI end	Peak Centroid	Net Peak Area	Net Area Uncertainty	Continuum Counts	FWHM (keV)
F	1	75.90	147 -	161	152.35	2.80E+02	65.81	1.52E+03	3.99
F	2	92.49	182 -	192	185.53	1.08E+02	43.31	1.11E+03	1.34
F	3	185.72	368 -	379	371.94	9.14E+01	40.29	8.30E+02	1.82
F	4	238.56	469 -	485	477.59	3.12E+02	48.94	8.76E+02	2.06
F	5	295.14	587 -	595	590.73	1.45E+02	35.74	3.85E+02	1.54
F	6	351.69	695 -	708	703.81	3.04E+02	42.48	3.96E+02	1.85
F	7	510.28	1012 -	1029	1020.94	8.09E+01	26.92	2.25E+02	2.99
F	8	583.13	1158 -	1173	1166.61	6.43E+01	23.82	2.00E+02	2.22
F	9	609.04	1212 -	1227	1218.42	2.60E+02	35.01	1.33E+02	1.94
F	10	661.50	1315 -	1332	1323.32	7.23E+02	56.74	1.33E+02	1.93
F	11	910.87	1817 -	1827	1821.99	5.18E+01	17.78	6.24E+01	1.61
F	12	968.95	1934 -	1943	1938.13	2.84E+01	14.13	6.33E+01	1.22
F	13	1120.14	2234 -	2247	2240.46	5.81E+01	17.84	4.59E+01	2.27
F	14	1460.50	2912 -	2929	2921.12	3.66E+02	38.86	2.26E+01	2.61
F	15	1764.47	3522 -	3537	3529.02	4.74E+01	14.89	1.23E+01	3.01

M = First peak in a multiplet region
m = Other peak in a multiplet region
F = Fitted singlet
Errors quoted at 2.000sigma

BACKGROUND SUBTRACT REPORT

Peak Analysis Performed on : 1/25/2019 7:14:48AM

Env. Background File : C:\Canberra\Apex\Root\Dairyland_NPP\Data\0000001364.CNF

	Peak No.	Energy (keV)	Original Area	Orig. Area Uncertainty	Ambient Background	Backgr. Uncert.	Subtracted Area	Subtracted Uncert.
F	1	75.90	2.80E+02	65.81			2.80E+02	6.58E+01
F	2	92.49	1.08E+02	43.31			1.08E+02	4.33E+01
F	3	185.72	9.14E+01	40.29			9.14E+01	4.03E+01
F	4	238.56	3.12E+02	48.94			3.12E+02	4.89E+01
F	5	295.14	1.45E+02	35.74			1.45E+02	3.57E+01
F	6	351.69	3.04E+02	42.48	8.36E+01	3.72E+01	2.20E+02	5.65E+01
F	7	510.28	8.09E+01	26.92			8.09E+01	2.69E+01
F	8	583.13	6.43E+01	23.82			6.43E+01	2.38E+01
F	9	609.04	2.60E+02	35.01	4.12E+01	2.42E+01	2.19E+02	4.26E+01
F	10	661.50	7.23E+02	56.74	6.61E+01	2.54E+01	6.56E+02	6.22E+01
F	11	910.87	5.18E+01	17.78			5.18E+01	1.78E+01
F	12	968.95	2.84E+01	14.13			2.84E+01	1.41E+01
F	13	1120.14	5.81E+01	17.84			5.81E+01	1.78E+01
F	14	1460.50	3.66E+02	38.86	5.63E+01	1.71E+01	3.10E+02	4.25E+01

Analysis Report for L3-012-102-FSGS-004-SG

L3-012-102 SWITCHYARD OPEN LAND

	Peak No.	Energy (keV)	Original Area	Orig. Area Uncertainty	Ambient Background	Backgr. Uncert.	Subtracted Area	Subtracted Uncert.
F	15	1764.47	4.74E+01	14.89	1.52E+01	9.80E+00	3.23E+01	1.78E+01

M = First peak in a multiplet region
m = Other peak in a multiplet region
F = Fitted singlet
Errors quoted at 2.000sigma

NUCLIDE IDENTIFICATION REPORT

Nuclide Library Used : C:\Canberra\Apex\Root\Dairyland_NPP\Library\HOTLAB.NLB

IDENTIFIED NUCLIDES

Nuclide Name	Id Confidence	Energy (keV)		Yield(%)	Activity (pCi/grams)	Activity Uncertainty
K-40	0.99	1460.75	*	10.67	3.17E+00	4.69E-01
CS-137	0.99	661.65	*	85.12	4.17E-01	4.55E-02
PB-212	0.56	77.11		17.50		
		238.63	*	44.60	1.51E-01	2.50E-02
BI-214	0.78	609.31	*	46.30	2.36E-01	4.79E-02
		1120.29	*	15.10	3.34E-01	1.04E-01
		1238.11		5.94		
		1377.67		4.11		
		1407.98		2.48		
		1509.19		2.19		
		1764.49	*	15.80	2.61E-01	1.45E-01
PB-214	0.71	77.11		10.70		
		295.21	*	19.20	1.95E-01	4.90E-02
		351.92	*	37.20	1.78E-01	4.66E-02
RA-226	0.96	186.21	*	3.28	5.06E-01	2.25E-01

* = Energy line found in the spectrum.
\- = Manually added nuclide.
? = Manually edited nuclide.
@ = Energy line not used for Weighted Mean Activity
Energy Tolerance : 1.000 keV
Nuclide confidence index threshold = 0.30
Errors quoted at 2.000sigma

Analysis Report for L3-012-102-FSGS-004-SG

L3-012-102 SWITCHYARD OPEN LAND

INTERFERENCE CORRECTED REPORT

Nuclide Name	Nuclide Id Confidence	Wt mean Activity (pCi/grams)	Wt mean Activity Uncertainty	Comments
K-40	0.990	3.17E+00	4.69E-01	
CS-137	0.997	4.17E-01	4.55E-02	
PB-212	0.560	1.51E-01	2.50E-02	
BI-214	0.781	2.54E-01	4.17E-02	
PB-214	0.717	1.86E-01	3.38E-02	
RA-226	0.962	5.06E-01	2.25E-01	

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

Errors quoted at 2.000sigma

Analysis Report for L3-012-102-FSGS-004-SG

L3-012-102 SWITCHYARD OPEN LAND

UNIDENTIFIED PEAKS

Peak Locate Performed on : 1/25/2019 7:14:48AM
Peak Locate From Channel : 100
Peak Locate To Channel : 4096

	Peak No.	Energy (keV)	Peak Size (CPS)	Peak CPS (%) Uncertainty	Peak Type	Tolerance Nuclide
F	1	75.90	7.76977E-02	11.76		
F	2	92.49	3.00345E-02	20.03	Tol.	PA-228
F	7	510.28	2.24820E-02	16.63		
F	8	583.13	1.78706E-02	18.51		
F	11	910.87	1.43940E-02	17.16	Tol.	AC-228 PA-228
F	12	968.95	7.90176E-03	24.83	Tol.	AC-228

M = First peak in a multiplet region
m = Other peak in a multiplet region
F = Fitted singlet
Errors quoted at 2.000sigma

NUCLIDE MDA REPORT

Nuclide Library Used : C:\Canberra\Apex\Root\Dairyland_NPP\Library\HOTLAB.NLB

	Nuclide Name	Energy (keV)		Yield(%)	Activity (pCi/grams)	Nuclide MDA (pCi/grams)	Line MDA (pCi/grams)
+	K-40	1460.75	*	10.67	3.17E+00	4.62E-01	4.62E-01
+	@ AR-41	1293.64		99.16	1.00E+26	1.00E+26	1.00E+26
+	CO-60	1173.22		100.00	2.00E-02	4.39E-02	4.78E-02
		1332.49		100.00	3.98E-02		4.39E-02
+	KR-85	513.99		0.43	-3.10E+00	8.16E+00	8.16E+00
+	Y-88	898.04		93.70	6.87E-03	3.37E-02	4.22E-02
		1836.06		99.20	-4.23E-02		3.37E-02

Analysis Report for L3-012-102-FSGS-004-SG

L3-012-102 SWITCHYARD OPEN LAND

	Nuclide Name	Energy (keV)		Yield(%)	Activity (pCi/grams)	Nuclide MDA (pCi/grams)	Line MDA (pCi/grams)
+	NB-94	702.63		100.00	-1.14E-02	2.99E-02	2.99E-02
		871.10		100.00	-4.24E-02		3.33E-02
+	I-131	284.30		6.06	2.69E-01	1.23E-01	1.71E+00
		364.48		81.20	-2.56E-02		1.23E-01
		636.97		7.27	-1.58E-01		1.52E+00
+	CS-134	604.70		97.60	-2.07E-02	3.79E-02	4.95E-02
		795.84		85.40	-2.48E-02		3.79E-02
+	CS-137	661.65	*	85.12	4.17E-01	4.57E-02	4.57E-02
+	CE-144	80.12		1.36	-1.30E-01	2.40E-01	3.00E+00
		133.51		11.09	-2.07E-01		2.40E-01
+	EU-152	121.78		28.40	-6.67E-02	9.16E-02	9.16E-02
		344.28		26.60	3.28E-02		1.20E-01
		1408.00		20.74	1.20E-01		1.95E-01
+	EU-154	123.07		40.40	2.83E-02	6.51E-02	6.51E-02
		723.30		19.70	2.16E-02		1.66E-01
		1274.51		35.50	-6.45E-02		1.17E-01
+	EU-155	86.54		32.80	-3.95E-02	1.02E-01	1.02E-01
		105.31		21.80	6.23E-02		1.26E-01
+	BI-214	609.31	*	46.30	2.36E-01	7.33E-02	7.33E-02
		1120.29	*	15.10	3.34E-01		1.67E-01
		1238.11		5.94	-7.56E-02		8.21E-01
		1377.67		4.11	-1.35E-01		8.83E-01
		1407.98		2.48	9.97E-01		1.63E+00
		1509.19		2.19	1.22E+00		1.49E+00
		1764.49	*	15.80	2.61E-01		2.25E-01
+	PB-214	77.11		10.70	3.96E-01	8.57E-02	3.91E-01
		295.21	*	19.20	1.95E-01		9.35E-02
		351.92	*	37.20	1.78E-01		8.57E-02
+	PA-228	89.95		22.00	-4.12E+03	6.76E+03	1.15E+04
		93.35		35.00	2.58E+03		6.76E+03
		105.00		16.30	2.83E+03		1.31E+04
		129.22		2.97	-1.54E+04		6.80E+04
		338.32		5.30	2.40E+04		4.41E+04
		463.00		13.80	-3.99E+03		1.88E+04
		911.23		16.70	1.69E+04		1.93E+04
+	AM-241	59.54		36.30	-6.84E-02	1.82E-01	1.82E-01
+	CM-243	103.76		23.00	1.52E-02	1.19E-01	1.19E-01
		228.18		10.60	-1.75E-01		2.40E-01
		277.60		14.00	-5.93E-02		2.03E-01

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

Analysis Report for L3-012-102-FSGS-004-SG

L3-012-102 SWITCHYARD OPEN LAND

Apex-Gamma

Analysis Report for L3-012-102-FSGS-004-SS

L3-012-102 SWITCHYARD OPEN LAND

GAMMA SPECTRUM ANALYSIS

Sample Identification	: L3-012-102-FSGS-004-SS
Sample Description	: L3-012-102 SWITCHYARD OPEN LAND
Sample Type	: 500 ml Marinelli
Unit	:
Sample Point	:
Sample Size	: 7.934E+02 grams
Facility	: Dairyland_NPP
Sample Taken On	: 2/27/2018 2:49:00PM
Acquisition Started	: 3/13/2018 12:30:01PM
Procedure	: 500ml Marinelli
Operator	: Administrator
Detector Name	: HOTLAB
Geometry	: 500ml Marinelli
Live Time	: 3600.0 seconds
Real Time	: 3610.2 seconds
Dead Time	: 0.28 %
Peak Locate Threshold	: 3.00
Peak Locate Range (in channels)	: 100 - 4096
Peak Area Range (in channels)	: 100 - 4096
Identification Energy Tolerance	: 1.000 keV
Energy Calibration Used Done On	: 7/8/2014
Efficiency Calibration Used Done On	: 7/8/2014
Efficiency Calibration Description	:
Sample Number	: 5600

PEAK ANALYSIS REPORT

Peak Analysis Performed on : 1/25/2019 7:16:08AM

Peak Analysis From Channel	: 100
Peak Analysis To Channel	: 4096

Analysis Report for L3-012-102-FSGS-004-SS

L3-012-102 SWITCHYARD OPEN LAND

	Peak No.	Energy (keV)	ROI start	ROI end	Peak Centroid	Net Peak Area	Net Area Uncertainty	Continuum Counts	FWHM (keV)
M	1	74.70	142 -	162	149.95	1.19E+02	37.16	7.24E+02	1.56
m	2	77.18	142 -	162	154.91	1.26E+02	37.70	7.06E+02	1.56
F	3	185.90	369 -	376	372.29	8.32E+01	32.66	3.93E+02	1.50
F	4	238.37	474 -	481	477.21	9.61E+01	32.29	3.87E+02	1.33
F	5	295.06	582 -	596	590.57	1.65E+02	35.03	4.09E+02	1.89
F	6	351.86	699 -	712	704.15	2.36E+02	37.01	2.85E+02	1.81
F	7	609.32	1211 -	1226	1218.97	1.79E+02	30.33	1.49E+02	1.76
F	8	661.53	1314 -	1330	1323.37	2.45E+02	33.90	1.08E+02	2.05
F	9	1238.21	2471 -	2481	2476.57	2.56E+01	12.75	3.09E+01	1.72
F	10	1460.59	2913 -	2929	2921.29	1.85E+02	27.84	1.29E+01	2.70
F	11	1763.70	3522 -	3533	3527.48	2.82E+01	11.63	9.04E+00	2.19

M = First peak in a multiplet region
m = Other peak in a multiplet region
F = Fitted singlet
Errors quoted at 2.000sigma

BACKGROUND SUBTRACT REPORT

Peak Analysis Performed on : 1/25/2019 7:16:08AM

Env. Background File : C:\Canberra\Apex\Root\Dairyland_NPP\Data\0000001364.CNF

	Peak No.	Energy (keV)	Original Area	Orig. Area Uncertainty	Ambient Background	Backgr. Uncert.	Subtracted Area	Subtracted Uncert.
M	1	74.70	1.19E+02	37.16			1.19E+02	3.72E+01
m	2	77.18	1.26E+02	37.70			1.26E+02	3.77E+01
F	3	185.90	8.32E+01	32.66			8.32E+01	3.27E+01
F	4	238.37	9.61E+01	32.29			9.61E+01	3.23E+01
F	5	295.06	1.65E+02	35.03			1.65E+02	3.50E+01
F	6	351.86	2.36E+02	37.01	8.36E+01	3.72E+01	1.53E+02	5.25E+01
F	7	609.32	1.79E+02	30.33	4.12E+01	2.42E+01	1.37E+02	3.88E+01
F	8	661.53	2.45E+02	33.90	6.61E+01	2.54E+01	1.79E+02	4.24E+01
F	9	1238.21	2.56E+01	12.75			2.56E+01	1.28E+01
F	10	1460.59	1.85E+02	27.84	5.63E+01	1.71E+01	1.29E+02	3.27E+01
F	11	1763.70	2.82E+01	11.63	1.52E+01	9.80E+00	1.30E+01	1.52E+01

M = First peak in a multiplet region
m = Other peak in a multiplet region
F = Fitted singlet
Errors quoted at 2.000sigma

Analysis Report for L3-012-102-FSGS-004-SS

L3-012-102 SWITCHYARD OPEN LAND

NUCLIDE IDENTIFICATION REPORT

Nuclide Library Used : C:\Canberra\Apex\Root\Dairyland_NPP\Library\HOTLAB.NLB

IDENTIFIED NUCLIDES

Nuclide Name	Id Confidence	Energy (keV)		Yield(%)	Activity (pCi/grams)	Activity Uncertainty
K-40	0.99	1460.75	*	10.67	1.77E+00	4.59E-01
CS-137	0.99	661.65	*	85.12	1.52E-01	3.70E-02
PB-212	0.99	77.11	*	17.50	2.24E-01	6.84E-02
		238.63	*	44.60	6.24E-02	2.12E-02
BI-214	0.62	609.31	*	46.30	1.99E-01	5.74E-02
		1120.29		15.10		
		1238.11	*	5.94	5.48E-01	2.74E-01
		1377.67		4.11		
		1407.98		2.48		
		1509.19		2.19		
		1764.49	*	15.80	1.41E-01	1.65E-01
PB-214	0.99	77.11	*	10.70	3.66E-01	1.12E-01
		295.21	*	19.20	2.97E-01	6.48E-02
		351.92	*	37.20	1.66E-01	5.77E-02
RA-226	0.98	186.21	*	3.28	6.18E-01	2.45E-01

* = Energy line found in the spectrum.
\- = Manually added nuclide.
? = Manually edited nuclide.
@ = Energy line not used for Weighted Mean Activity
Energy Tolerance : 1.000 keV
Nuclide confidence index threshold = 0.30
Errors quoted at 2.000sigma

INTERFERENCE CORRECTED REPORT

Analysis Report for L3-012-102-FSGS-004-SS

L3-012-102 SWITCHYARD OPEN LAND

Nuclide Name	Nuclide Id Confidence	Wt mean Activity (pCi/grams)	Wt mean Activity Uncertainty	Comments
K-40	0.996	1.77E+00	4.59E-01	
CS-137	0.998	1.52E-01	3.70E-02	
PB-212	0.992	6.43E-02	2.04E-02	
BI-214	0.624	2.06E-01	5.32E-02	
PB-214	0.998	2.29E-01	4.04E-02	
RA-226	0.984	6.18E-01	2.45E-01	

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

Errors quoted at 2.000sigma

Analysis Report for L3-012-102-FSGS-004-SS

L3-012-102 SWITCHYARD OPEN LAND

UNIDENTIFIED PEAKS

Peak Locate Performed on : 1/25/2019 7:16:08AM
Peak Locate From Channel : 100
Peak Locate To Channel : 4096

	Peak No.	Energy (keV)	Peak Size (CPS)	Peak CPS (%) Uncertainty	Peak Type	Tolerance Nuclide
M	1	74.70	3.29559E-02	15.66		

M = First peak in a multiplet region
m = Other peak in a multiplet region
F = Fitted singlet
Errors quoted at 2.000sigma

NUCLIDE MDA REPORT

Nuclide Library Used : C:\Canberra\Apex\Root\Dairyland_NPP\Library\HOTLAB.NLB

	Nuclide Name	Energy (keV)		Yield(%)	Activity (pCi/grams)	Nuclide MDA (pCi/grams)	Line MDA (pCi/grams)
+	K-40	1460.75	*	10.67	1.77E+00	5.90E-01	5.90E-01
+	@ AR-41	1293.64		99.16	1.00E+26	1.00E+26	1.00E+26
+	CO-60	1173.22		100.00	1.86E-02	5.52E-02	5.52E-02
		1332.49		100.00	5.58E-02		6.03E-02
+	KR-85	513.99		0.43	6.14E+00	9.94E+00	9.94E+00
+	Y-88	898.04		93.70	-2.02E-02	4.28E-02	5.26E-02
		1836.06		99.20	1.32E-02		4.28E-02
+	NB-94	702.63		100.00	5.01E-03	3.87E-02	3.87E-02
		871.10		100.00	-1.54E-02		4.22E-02
+	I-131	284.30		6.06	-2.78E-02	1.29E-01	1.81E+00
		364.48		81.20	3.03E-02		1.29E-01
		636.97		7.27	2.40E-01		1.68E+00
+	CS-134	604.70		97.60	1.75E-03	4.81E-02	5.82E-02
		795.84		85.40	-7.90E-02		4.81E-02
+	CS-137	661.65	*	85.12	1.52E-01	5.80E-02	5.80E-02
+	CE-144	80.12		1.36	-5.97E-01	2.83E-01	3.45E+00

Analysis Report for L3-012-102-FSGS-004-SS

L3-012-102 SWITCHYARD OPEN LAND

	Nuclide Name	Energy (keV)		Yield(%)	Activity (pCi/grams)	Nuclide MDA (pCi/grams)	Line MDA (pCi/grams)
	CE-144	133.51		11.09	6.68E-02	2.83E-01	2.83E-01
+	EU-152	121.78		28.40	-2.52E-02	1.06E-01	1.06E-01
		344.28		26.60	-1.22E-01		1.36E-01
		1408.00		20.74	-3.75E-02		2.15E-01
+	EU-154	123.07		40.40	1.32E-02	7.48E-02	7.48E-02
		723.30		19.70	9.75E-02		2.16E-01
		1274.51		35.50	-2.98E-02		1.22E-01
+	EU-155	86.54		32.80	-8.60E-04	1.19E-01	1.19E-01
		105.31		21.80	-1.73E-02		1.45E-01
+	BI-214	609.31	*	46.30	1.99E-01	1.02E-01	1.02E-01
		1120.29		15.10	3.87E-01		4.42E-01
		1238.11	*	5.94	5.48E-01		4.90E-01
		1377.67		4.11	4.03E-01		1.04E+00
		1407.98		2.48	-3.13E-01		1.80E+00
		1509.19		2.19	1.10E+00		2.11E+00
		1764.49	*	15.80	1.41E-01		2.85E-01
+	PB-214	77.11	*	10.70	3.66E-01	1.06E-01	2.61E-01
		295.21	*	19.20	2.97E-01		1.49E-01
		351.92	*	37.20	1.66E-01		1.06E-01
+	PA-228	89.95		22.00	9.12E+03	3.82E+03	6.50E+03
		93.35		35.00	1.24E+03		3.82E+03
		105.00		16.30	-3.51E+03		7.19E+03
		129.22		2.97	1.23E+02		3.80E+04
		338.32		5.30	1.15E+03		2.37E+04
		463.00		13.80	4.53E+03		1.03E+04
		911.23		16.70	7.97E+03		1.14E+04
+	AM-241	59.54		36.30	7.00E-02	2.16E-01	2.16E-01
+	CM-243	103.76		23.00	-5.93E-04	1.37E-01	1.37E-01
		228.18		10.60	1.19E-01		2.87E-01
		277.60		14.00	1.83E-01		2.42E-01

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

Apex-Gamma

Analysis Report for L3-012-102-FSGS-005-SG

L3-012-102-SWITCHYARD OPEN LAND

GAMMA SPECTRUM ANALYSIS

Sample Identification	: L3-012-102-FSGS-005-SG
Sample Description	: L3-012-102-SWITCHYARD OPEN LAND
Sample Type	: 500 ml Marinelli
Unit	:
Sample Point	:
Sample Size	: 9.468E+02 grams
Facility	: Dairyland_NPP
Sample Taken On	: 3/12/2018 12:58:00AM
Acquisition Started	: 3/20/2018 8:26:01AM
Procedure	: 500ml Marinelli
Operator	: Administrator
Detector Name	: HOTLAB
Geometry	: 500ml Marinelli
Live Time	: 3600.0 seconds
Real Time	: 3611.2 seconds
Dead Time	: 0.31 %
Peak Locate Threshold	: 3.00
Peak Locate Range (in channels)	: 100 - 4096
Peak Area Range (in channels)	: 100 - 4096
Identification Energy Tolerance	: 1.000 keV
Energy Calibration Used Done On	: 7/8/2014
Efficiency Calibration Used Done On	: 7/8/2014
Efficiency Calibration Description	:
Sample Number	: 5602

PEAK ANALYSIS REPORT

Peak Analysis Performed on : 1/25/2019 7:17:59AM

Peak Analysis From Channel	: 100
Peak Analysis To Channel	: 4096

Analysis Report for L3-012-102-FSGS-005-SG

L3-012-102-SWITCHYARD OPEN LAND

	Peak No.	Energy (keV)	ROI start	ROI end	Peak Centroid	Net Peak Area	Net Area Uncertainty	Continuum Counts	FWHM (keV)
M	1	238.51	469 -	491	477.49	2.30E+02	40.03	4.27E+02	1.81
m	2	241.75	469 -	491	483.98	9.44E+01	30.96	4.98E+02	1.81
F	3	295.23	582 -	596	590.91	1.47E+02	32.96	4.01E+02	1.69
F	4	338.30	671 -	682	677.04	6.90E+01	27.08	2.41E+02	2.12
F	5	351.87	695 -	709	704.18	2.66E+02	38.95	3.34E+02	1.70
F	6	582.94	1159 -	1174	1166.22	7.44E+01	22.95	1.39E+02	2.30
F	7	609.17	1213 -	1227	1218.67	1.71E+02	29.73	1.47E+02	1.77
F	8	910.72	1817 -	1827	1821.67	3.53E+01	16.11	7.81E+01	1.50
F	9	969.06	1934 -	1943	1938.34	3.21E+01	15.66	5.35E+01	2.02
F	10	1120.64	2236 -	2249	2241.46	5.55E+01	17.89	4.30E+01	2.44
F	11	1460.68	2913 -	2931	2921.47	4.72E+02	43.98	2.85E+01	2.59
F	12	1764.31	3522 -	3536	3528.69	4.33E+01	14.32	1.15E+01	2.86

M = First peak in a multiplet region
m = Other peak in a multiplet region
F = Fitted singlet
Errors quoted at 2.000sigma

BACKGROUND SUBTRACT REPORT

Peak Analysis Performed on : 1/25/2019 7:17:59AM

Env. Background File : C:\Canberra\Apex\Root\Dairyland_NPP\Data\0000001364.CNF

	Peak No.	Energy (keV)	Original Area	Orig. Area Uncertainty	Ambient Background	Backgr. Uncert.	Subtracted Area	Subtracted Uncert.
M	1	238.51	2.30E+02	40.03			2.30E+02	4.00E+01
m	2	241.75	9.44E+01	30.96			9.44E+01	3.10E+01
F	3	295.23	1.47E+02	32.96			1.47E+02	3.30E+01
F	4	338.30	6.90E+01	27.08			6.90E+01	2.71E+01
F	5	351.87	2.66E+02	38.95	8.36E+01	3.72E+01	1.82E+02	5.39E+01
F	6	582.94	7.44E+01	22.95			7.44E+01	2.30E+01
F	7	609.17	1.71E+02	29.73	4.12E+01	2.42E+01	1.30E+02	3.83E+01
F	8	910.72	3.53E+01	16.11			3.53E+01	1.61E+01
F	9	969.06	3.21E+01	15.66			3.21E+01	1.57E+01
F	10	1120.64	5.55E+01	17.89			5.55E+01	1.79E+01
F	11	1460.68	4.72E+02	43.98	5.63E+01	1.71E+01	4.16E+02	4.72E+01
F	12	1764.31	4.33E+01	14.32	1.52E+01	9.80E+00	2.81E+01	1.74E+01

Analysis Report for L3-012-102-FSGS-005-SG

L3-012-102-SWITCHYARD OPEN LAND

M = First peak in a multiplet region
m = Other peak in a multiplet region
F = Fitted singlet
Errors quoted at 2.000sigma

NUCLIDE IDENTIFICATION REPORT

Nuclide Library Used : C:\Canberra\Apex\Root\Dairyland_NPP\Library\HOTLAB.NLB

IDENTIFIED NUCLIDES

Nuclide Name	Id Confidence	Energy (keV)		Yield(%)	Activity (pCi/grams)	Activity Uncertainty
K-40	0.99	1460.75	*	10.67	4.78E+00	6.05E-01
PB-212	0.55	77.11		17.50		
		238.63	*	44.60	1.25E-01	2.27E-02
BI-214	0.78	609.31	*	46.30	1.58E-01	4.75E-02
		1120.29	*	15.10	3.59E-01	1.17E-01
		1238.11		5.94		
		1377.67		4.11		
		1407.98		2.48		
		1509.19		2.19		
		1764.49	*	15.80	2.56E-01	1.59E-01
PB-214	0.72	77.11		10.70		
		295.21	*	19.20	2.22E-01	5.10E-02
		351.92	*	37.20	1.66E-01	4.98E-02
AC-228	0.58	209.28		4.40		
		338.32	*	11.40	1.98E-01	7.84E-02
		794.70		4.60		
		911.60	*	27.70	1.03E-01	4.74E-02
		964.60		5.20		
		969.11	*	16.60	1.66E-01	8.12E-02

* = Energy line found in the spectrum.
\- = Manually added nuclide.
? = Manually edited nuclide.
@ = Energy line not used for Weighted Mean Activity
Energy Tolerance : 1.000 keV
Nuclide confidence index threshold = 0.30
Errors quoted at 2.000sigma

Analysis Report for L3-012-102-FSGS-005-SG

L3-012-102-SWITCHYARD OPEN LAND

INTERFERENCE CORRECTED REPORT

Nuclide Name	Nuclide Id Confidence	Wt mean Activity (pCi/grams)	Wt mean Activity Uncertainty	Comments
K-40	0.999	4.78E+00	6.05E-01	
PB-212	0.559	1.25E-01	2.27E-02	
BI-214	0.782	1.91E-01	4.24E-02	
PB-214	0.721	1.94E-01	3.56E-02	
AC-228	0.584	1.36E-01	3.63E-02	

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

Errors quoted at 2.000sigma

Analysis Report for L3-012-102-FSGS-005-SG

L3-012-102-SWITCHYARD OPEN LAND

UNIDENTIFIED PEAKS

Peak Locate Performed on : 1/25/2019 7:17:59AM
Peak Locate From Channel : 100
Peak Locate To Channel : 4096

	Peak No.	Energy (keV)	Peak Size (CPS)	Peak CPS (%) Uncertainty	Peak Type	Tolerance Nuclide
m	2	241.75	2.62176E-02	16.40		
F	6	582.94	2.06738E-02	15.42		

M = First peak in a multiplet region
m = Other peak in a multiplet region
F = Fitted singlet
Errors quoted at 2.000sigma

NUCLIDE MDA REPORT

Nuclide Library Used : C:\Canberra\Apex\Root\Dairyland_NPP\Library\HOTLAB.NLB

	Nuclide Name	Energy (keV)		Yield(%)	Activity (pCi/grams)	Nuclide MDA (pCi/grams)	Line MDA (pCi/grams)
+	K-40	1460.75	*	10.67	4.78E+00	5.36E-01	5.36E-01
+	@ AR-41	1293.64		99.16	1.00E+26	1.00E+26	1.00E+26
+	CO-60	1173.22		100.00	1.71E-02	4.71E-02	5.44E-02
		1332.49		100.00	1.25E-02		4.71E-02
+	KR-85	513.99		0.43	2.35E+00	8.80E+00	8.80E+00
+	Y-88	898.04		93.70	8.52E-03	3.55E-02	4.38E-02
		1836.06		99.20	-1.32E-02		3.55E-02
+	NB-94	702.63		100.00	1.28E-03	3.63E-02	3.63E-02
		871.10		100.00	1.62E-02		3.76E-02
+	I-131	284.30		6.06	7.27E-01	7.06E-02	9.78E-01
		364.48		81.20	-4.83E-02		7.06E-02
		636.97		7.27	3.59E-01		9.02E-01
+	CS-134	604.70		97.60	-1.27E-02	4.42E-02	4.89E-02
		795.84		85.40	9.26E-03		4.42E-02

Analysis Report for L3-012-102-FSGS-005-SG

L3-012-102-SWITCHYARD OPEN LAND

	Nuclide Name	Energy (keV)		Yield(%)	Activity (pCi/grams)	Nuclide MDA (pCi/grams)	Line MDA (pCi/grams)
+	CS-137	661.65		85.12	5.16E-02	5.18E-02	5.18E-02
+	CE-144	80.12		1.36	1.43E+00	2.47E-01	3.06E+00
		133.51		11.09	9.04E-02		2.47E-01
+	EU-152	121.78		28.40	-2.55E-02	9.75E-02	9.75E-02
		344.28		26.60	-2.99E-02		1.24E-01
		1408.00		20.74	1.94E-01		2.03E-01
+	EU-154	123.07		40.40	2.60E-02	6.86E-02	6.86E-02
		723.30		19.70	3.41E-02		1.86E-01
		1274.51		35.50	1.26E-01		1.27E-01
+	EU-155	86.54		32.80	-1.48E-02	1.07E-01	1.07E-01
		105.31		21.80	2.35E-02		1.27E-01
+	BI-214	609.31	*	46.30	1.58E-01	8.37E-02	8.37E-02
		1120.29	*	15.10	3.59E-01		1.81E-01
		1238.11		5.94	1.52E-01		9.27E-01
		1377.67		4.11	5.21E-01		1.02E+00
		1407.98		2.48	1.62E+00		1.69E+00
		1509.19		2.19	-4.01E-01		1.47E+00
		1764.49	*	15.80	2.56E-01		2.49E-01
+	PB-214	77.11		10.70	4.98E-01	9.30E-02	4.12E-01
		295.21	*	19.20	2.22E-01		1.24E-01
		351.92	*	37.20	1.66E-01		9.30E-02
+	PA-228	89.95		22.00	1.39E+02	5.03E+01	8.57E+01
		93.35		35.00	3.38E+01		5.03E+01
		105.00		16.30	2.81E+00		9.17E+01
		129.22		2.97	3.79E+02		5.04E+02
		338.32		5.30	3.13E+02		3.16E+02
		463.00		13.80	-7.03E+01		1.29E+02
		911.23		16.70	4.52E+01		1.50E+02
+	AM-241	59.54		36.30	4.37E-02	1.98E-01	1.98E-01
+	CM-243	103.76		23.00	-9.22E-02	1.19E-01	1.19E-01
		228.18		10.60	-4.09E-02		2.50E-01
		277.60		14.00	-1.76E-01		2.09E-01

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

Apex-Gamma

Analysis Report for L3-012-102-FSGS-005-SS
L3-012-102-SWITCHYARD OPEN LAND

GAMMA SPECTRUM ANALYSIS

Sample Identification	: L3-012-102-FSGS-005-SS
Sample Description	: L3-012-102-SWITCHYARD OPEN LAND
Sample Type	: 500 ml Marinelli
Unit	:
Sample Point	:
Sample Size	: 8.737E+02 grams
Facility	: Dairyland_NPP
Sample Taken On	: 3/12/2018 1:04:00PM
Acquisition Started	: 3/16/2018 1:11:02PM
Procedure	: 500ml Marinelli
Operator	: Administrator
Detector Name	: HOTLAB
Geometry	: 500ml Marinelli
Live Time	: 3600.0 seconds
Real Time	: 3610.7 seconds
Dead Time	: 0.30 %
Peak Locate Threshold	: 3.00
Peak Locate Range (in channels)	: 100 - 4096
Peak Area Range (in channels)	: 100 - 4096
Identification Energy Tolerance	: 1.000 keV
Energy Calibration Used Done On	: 7/8/2014
Efficiency Calibration Used Done On	: 7/8/2014
Efficiency Calibration Description	:
Sample Number	: 5604

PEAK ANALYSIS REPORT

Peak Analysis Performed on : 1/25/2019 7:35:19AM

Peak Analysis From Channel	: 100
Peak Analysis To Channel	: 4096

Analysis Report for L3-012-102-FSGS-005-SS

L3-012-102-SWITCHYARD OPEN LAND

	Peak No.	Energy (keV)	ROI start	ROI end	Peak Centroid	Net Peak Area	Net Area Uncertainty	Continuum Counts	FWHM (keV)
F	1	77.27	148 -	162	155.09	1.37E+02	46.21	1.36E+03	1.67
F	2	238.58	472 -	485	477.63	2.54E+02	43.31	5.04E+02	2.17
F	3	295.08	582 -	595	590.61	9.79E+01	31.31	3.74E+02	2.01
F	4	338.54	671 -	682	677.51	4.35E+01	22.61	2.78E+02	1.40
F	5	352.01	697 -	712	704.45	1.62E+02	32.20	3.38E+02	1.65
F	6	583.10	1160 -	1173	1166.54	7.42E+01	22.06	1.41E+02	1.69
F	7	609.29	1213 -	1225	1218.91	1.38E+02	27.67	1.27E+02	1.88
F	8	910.89	1817 -	1828	1822.01	2.81E+01	13.68	6.29E+01	1.29
F	9	1120.05	2235 -	2247	2240.29	3.77E+01	16.43	6.90E+01	1.89
F	10	1460.67	2914 -	2932	2921.46	4.64E+02	43.54	2.07E+01	2.55

M = First peak in a multiplet region
m = Other peak in a multiplet region
F = Fitted singlet
Errors quoted at 2.000sigma

BACKGROUND SUBTRACT REPORT

Peak Analysis Performed on : 1/25/2019 7:35:19AM

Env. Background File : C:\Canberra\Apex\Root\Dairyland_NPP\Data\0000001364.CNF

	Peak No.	Energy (keV)	Original Area	Orig. Area Uncertainty	Ambient Background	Backgr. Uncert.	Subtracted Area	Subtracted Uncert.
F	1	77.27	1.37E+02	46.21			1.37E+02	4.62E+01
F	2	238.58	2.54E+02	43.31			2.54E+02	4.33E+01
F	3	295.08	9.79E+01	31.31			9.79E+01	3.13E+01
F	4	338.54	4.35E+01	22.61			4.35E+01	2.26E+01
F	5	352.01	1.62E+02	32.20	8.36E+01	3.72E+01	7.81E+01	4.92E+01
F	6	583.10	7.42E+01	22.06			7.42E+01	2.21E+01
F	7	609.29	1.38E+02	27.67	4.12E+01	2.42E+01	9.65E+01	3.68E+01
F	8	910.89	2.81E+01	13.68			2.81E+01	1.37E+01
F	9	1120.05	3.77E+01	16.43			3.77E+01	1.64E+01
F	10	1460.67	4.64E+02	43.54	5.63E+01	1.71E+01	4.07E+02	4.68E+01

M = First peak in a multiplet region
m = Other peak in a multiplet region
F = Fitted singlet
Errors quoted at 2.000sigma

Analysis Report for L3-012-102-FSGS-005-SS

L3-012-102-SWITCHYARD OPEN LAND

NUCLIDE IDENTIFICATION REPORT

Nuclide Library Used : C:\Canberra\Apex\Root\Dairyland_NPP\Library\HOTLAB.NLB

IDENTIFIED NUCLIDES

Nuclide Name	Id Confidence	Energy (keV)		Yield(%)	Activity (pCi/grams)	Activity Uncertainty
K-40	0.99	1460.75	*	10.67	5.08E+00	6.48E-01
PB-212	0.99	77.11	*	17.50	2.20E-01	7.56E-02
		238.63	*	44.60	1.50E-01	2.67E-02
BI-214	0.58	609.31	*	46.30	1.27E-01	4.90E-02
		1120.29	*	15.10	2.63E-01	1.16E-01
		1238.11		5.94		
		1377.67		4.11		
		1407.98		2.48		
		1509.19		2.19		
		1764.49		15.80		
PB-214	0.99	77.11	*	10.70	3.60E-01	1.24E-01
		295.21	*	19.20	1.60E-01	5.18E-02
		351.92	*	37.20	7.72E-02	4.88E-02

* = Energy line found in the spectrum.
\- = Manually added nuclide.
? = Manually edited nuclide.
@ = Energy line not used for Weighted Mean Activity
Energy Tolerance : 1.000 keV
Nuclide confidence index threshold = 0.30
Errors quoted at 2.000sigma

INTERFERENCE CORRECTED REPORT

Nuclide Name	Nuclide Id Confidence	Wt mean Activity (pCi/grams)	Wt mean Activity Uncertainty	Comments
K-40	0.999	5.08E+00	6.48E-01	
PB-212	0.999	1.50E-01	2.53E-02	
BI-214	0.584	1.48E-01	4.51E-02	

Analysis Report for L3-012-102-FSGS-005-SS

L3-012-102-SWITCHYARD OPEN LAND

Nuclide Name	Nuclide Id Confidence	Wt mean Activity (pCi/grams)	Wt mean Activity Uncertainty	Comments
PB-214	0.998	1.16E-01	3.43E-02	

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

Errors quoted at 2.000sigma

Analysis Report for L3-012-102-FSGS-005-SS
L3-012-102-SWITCHYARD OPEN LAND

UNIDENTIFIED PEAKS

Peak Locate Performed on : 1/25/2019 7:35:19AM
Peak Locate From Channel : 100
Peak Locate To Channel : 4096

	Peak No.	Energy (keV)	Peak Size (CPS)	Peak CPS (%) Uncertainty	Peak Type	Tolerance Nuclide
F	4	338.54	1.20821E-02	25.99	Tol.	AC-228 PA-228
F	6	583.10	2.06146E-02	14.86		
F	8	910.89	7.80560E-03	24.35	Tol.	AC-228 PA-228

M = First peak in a multiplet region
m = Other peak in a multiplet region
F = Fitted singlet
Errors quoted at 2.000sigma

NUCLIDE MDA REPORT

Nuclide Library Used : C:\Canberra\Apex\Root\Dairyland_NPP\Library\HOTLAB.NLB

	Nuclide Name	Energy (keV)		Yield(%)	Activity (pCi/grams)	Nuclide MDA (pCi/grams)	Line MDA (pCi/grams)
+	K-40	1460.75	*	10.67	5.08E+00	5.57E-01	5.57E-01
+	AR-41	1293.64		99.16	-2.20E+14	4.18E+14	4.18E+14
+	CO-60	1173.22		100.00	5.25E-03	4.84E-02	5.91E-02
		1332.49		100.00	1.01E-02		4.84E-02
+	KR-85	513.99		0.43	7.48E+00	8.90E+00	8.90E+00
+	Y-88	898.04		93.70	1.59E-02	2.78E-02	4.85E-02
		1836.06		99.20	-2.62E-02		2.78E-02
+	NB-94	702.63		100.00	8.72E-04	3.70E-02	3.70E-02
		871.10		100.00	-1.14E-03		4.04E-02
+	I-131	284.30		6.06	1.04E-01	5.41E-02	6.89E-01
		364.48		81.20	7.35E-03		5.41E-02

Analysis Report for L3-012-102-FSGS-005-SS

L3-012-102-SWITCHYARD OPEN LAND

	Nuclide Name	Energy (keV)		Yield(%)	Activity (pCi/grams)	Nuclide MDA (pCi/grams)	Line MDA (pCi/grams)
	I-131	636.97		7.27	-3.94E-01	5.41E-02	6.72E-01
+	CS-134	604.70		97.60	3.12E-03	4.79E-02	5.02E-02
		795.84		85.40	-2.75E-02		4.79E-02
+	CS-137	661.65		85.12	3.30E-02	5.50E-02	5.50E-02
+	CE-144	80.12		1.36	-6.24E-01	2.55E-01	3.22E+00
		133.51		11.09	-1.42E-01		2.55E-01
+	EU-152	121.78		28.40	-8.58E-02	9.73E-02	9.73E-02
		344.28		26.60	-1.71E-02		1.22E-01
		1408.00		20.74	-1.46E-01		1.88E-01
+	EU-154	123.07		40.40	-5.33E-02	6.86E-02	6.86E-02
		723.30		19.70	9.52E-02		1.92E-01
		1274.51		35.50	-1.03E-01		1.42E-01
+	EU-155	86.54		32.80	-7.89E-02	1.12E-01	1.12E-01
		105.31		21.80	-6.80E-03		1.39E-01
+	BI-214	609.31	*	46.30	1.27E-01	8.53E-02	8.53E-02
		1120.29	*	15.10	2.63E-01		2.39E-01
		1238.11		5.94	3.18E-01		1.06E+00
		1377.67		4.11	-1.14E-01		1.08E+00
		1407.98		2.48	-1.22E+00		1.57E+00
		1509.19		2.19	1.12E+00		1.76E+00
		1764.49		15.80	1.65E-01		2.65E-01
+	PB-214	77.11	*	10.70	3.60E-01	1.03E-01	3.91E-01
		295.21	*	19.20	1.60E-01		1.27E-01
		351.92	*	37.20	7.72E-02		1.03E-01
+	PA-228	89.95		22.00	2.53E+00	2.01E+00	3.41E+00
		93.35		35.00	1.69E-01		2.01E+00
		105.00		16.30	2.50E+00		3.93E+00
		129.22		2.97	1.18E+01		1.99E+01
		338.32		5.30	1.07E+01		1.31E+01
		463.00		13.80	4.01E+00		5.52E+00
		911.23		16.70	3.34E+00		6.18E+00
+	AM-241	59.54		36.30	2.33E-01	2.07E-01	2.07E-01
+	CM-243	103.76		23.00	3.43E-02	1.33E-01	1.33E-01
		228.18		10.60	-1.85E-02		2.65E-01
		277.60		14.00	7.93E-02		2.19E-01

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

Analysis Report for L3-012-102-FSGS-005-SS

L3-012-102-SWITCHYARD OPEN LAND

Apex-Gamma

Analysis Report for L3-012-102-FSGS-006-SG
L3-012-102-SWITCHYARD OPEN LAND

GAMMA SPECTRUM ANALYSIS

Sample Identification	: L3-012-102-FSGS-006-SG
Sample Description	: L3-012-102-SWITCHYARD OPEN LAND
Sample Type	: 500 ml Marinelli
Unit	:
Sample Point	:
Sample Size	: 1.172E+03 grams
Facility	: Dairyland_NPP
Sample Taken On	: 3/12/2018 1:38:00AM
Acquisition Started	: 3/20/2018 9:27:49AM
Procedure	: 500ml Marinelli
Operator	: Administrator
Detector Name	: HOTLAB
Geometry	: 500ml Marinelli
Live Time	: 3600.0 seconds
Real Time	: 3610.6 seconds
Dead Time	: 0.29 %
Peak Locate Threshold	: 3.00
Peak Locate Range (in channels)	: 100 - 4096
Peak Area Range (in channels)	: 100 - 4096
Identification Energy Tolerance	: 1.000 keV
Energy Calibration Used Done On	: 7/8/2014
Efficiency Calibration Used Done On	: 7/8/2014
Efficiency Calibration Description	:
Sample Number	: 5606

PEAK ANALYSIS REPORT

Peak Analysis Performed on : 1/25/2019 8:39:52AM

Peak Analysis From Channel	: 100
Peak Analysis To Channel	: 4096

Analysis Report for L3-012-102-FSGS-006-SG

L3-012-102-SWITCHYARD OPEN LAND

	Peak No.	Energy (keV)	ROI start	ROI end	Peak Centroid	Net Peak Area	Net Area Uncertainty	Continuum Counts	FWHM (keV)
F	1	92.43	183 -	190	185.40	5.38E+01	31.49	6.71E+02	0.79
F	2	238.39	472 -	481	477.26	1.63E+02	40.56	6.39E+02	1.36
F	3	295.03	587 -	598	590.51	1.17E+02	31.32	3.62E+02	1.78
F	4	351.70	695 -	708	703.83	2.13E+02	36.20	3.01E+02	1.89
F	5	582.88	1158 -	1170	1166.10	5.66E+01	19.92	1.08E+02	1.93
F	6	609.15	1213 -	1225	1218.64	1.62E+02	28.45	8.36E+01	2.07
F	7	910.92	1817 -	1827	1822.07	1.96E+01	1.69	5.62E+01	0.63
F	8	1119.72	2235 -	2247	2239.62	2.11E+01	11.55	7.83E+01	0.68
F	9	1332.36	2660 -	2670	2664.87	1.41E+01	11.34	4.72E+01	1.46
F	10	1460.53	2913 -	2929	2921.18	3.90E+02	40.61	4.21E+01	2.63
F	11	1763.95	3522 -	3534	3527.97	3.60E+01	12.79	6.50E+00	2.58

M = First peak in a multiplet region
m = Other peak in a multiplet region
F = Fitted singlet
Errors quoted at 2.000sigma

BACKGROUND SUBTRACT REPORT

Peak Analysis Performed on : 1/25/2019 8:39:52AM

Env. Background File : C:\Canberra\Apex\Root\Dairyland_NPP\Data\0000001364.CNF

	Peak No.	Energy (keV)	Original Area	Orig. Area Uncertainty	Ambient Background	Backgr. Uncert.	Subtracted Area	Subtracted Uncert.
F	1	92.43	5.38E+01	31.49			5.38E+01	3.15E+01
F	2	238.39	1.63E+02	40.56			1.63E+02	4.06E+01
F	3	295.03	1.17E+02	31.32			1.17E+02	3.13E+01
F	4	351.70	2.13E+02	36.20	8.36E+01	3.72E+01	1.30E+02	5.19E+01
F	5	582.88	5.66E+01	19.92			5.66E+01	1.99E+01
F	6	609.15	1.62E+02	28.45	4.12E+01	2.42E+01	1.21E+02	3.74E+01
F	7	910.92	1.96E+01	1.69			1.96E+01	1.69E+00
F	8	1119.72	2.11E+01	11.55			2.11E+01	1.16E+01
F	9	1332.36	1.41E+01	11.34			1.41E+01	1.13E+01
F	10	1460.53	3.90E+02	40.61	5.63E+01	1.71E+01	3.34E+02	4.41E+01
F	11	1763.95	3.60E+01	12.79	1.52E+01	9.80E+00	2.08E+01	1.61E+01

M = First peak in a multiplet region
m = Other peak in a multiplet region
F = Fitted singlet
Errors quoted at 2.000sigma

Analysis Report for L3-012-102-FSGS-006-SG

L3-012-102-SWITCHYARD OPEN LAND

NUCLIDE IDENTIFICATION REPORT

Nuclide Library Used : C:\Canberra\Apex\Root\Dairyland_NPP\Library\HOTLAB.NLB

IDENTIFIED NUCLIDES

Nuclide Name	Id Confidence	Energy (keV)		Yield(%)	Activity (pCi/grams)	Activity Uncertainty
K-40	0.99	1460.75	*	10.67	3.10E+00	4.44E-01
PB-212	0.55	77.11		17.50		
		238.63	*	44.60	7.18E-02	1.82E-02
BI-214	0.76	609.31	*	46.30	1.19E-01	3.73E-02
		1120.29	*	15.10	1.10E-01	6.04E-02
		1238.11		5.94		
		1377.67		4.11		
		1407.98		2.48		
		1509.19		2.19		
		1764.49	*	15.80	1.53E-01	1.19E-01
PB-214	0.71	77.11		10.70		
		295.21	*	19.20	1.42E-01	3.88E-02
		351.92	*	37.20	9.55E-02	3.85E-02

* = Energy line found in the spectrum.
\- = Manually added nuclide.
? = Manually edited nuclide.
@ = Energy line not used for Weighted Mean Activity
Energy Tolerance : 1.000 keV
Nuclide confidence index threshold = 0.30
Errors quoted at 2.000sigma

INTERFERENCE CORRECTED REPORT

Nuclide Name	Nuclide Id Confidence	Wt mean Activity (pCi/grams)	Wt mean Activity Uncertainty	Comments
K-40	0.993	3.10E+00	4.44E-01	

Analysis Report for L3-012-102-FSGS-006-SG

L3-012-102-SWITCHYARD OPEN LAND

Nuclide Name	Nuclide Id Confidence	Wt mean Activity (pCi/grams)	Wt mean Activity Uncertainty	Comments
PB-212	0.554	7.18E-02	1.82E-02	
BI-214	0.769	1.19E-01	3.07E-02	
PB-214	0.716	1.19E-01	2.74E-02	

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

Errors quoted at 2.000sigma

Analysis Report for L3-012-102-FSGS-006-SG

L3-012-102-SWITCHYARD OPEN LAND

UNIDENTIFIED PEAKS

Peak Locate Performed on : 1/25/2019 8:39:52AM
Peak Locate From Channel : 100
Peak Locate To Channel : 4096

Peak No.		Energy (keV)	Peak Size (CPS)	Peak CPS (%) Uncertainty	Peak Type	Tolerance Nuclide
F	1	92.43	1.49366E-02	29.28	Tol.	PA-228
F	5	582.88	1.57276E-02	17.59		
F	7	910.92	5.43134E-03	4.33	Tol.	AC-228 PA-228
F	9	1332.36	3.91687E-03	40.22	Tol.	CO-60

M = First peak in a multiplet region
m = Other peak in a multiplet region
F = Fitted singlet
Errors quoted at 2.000sigma

NUCLIDE MDA REPORT

Nuclide Library Used : C:\Canberra\Apex\Root\Dairyland_NPP\Library\HOTLAB.NLB

	Nuclide Name	Energy (keV)		Yield(%)	Activity (pCi/grams)	Nuclide MDA (pCi/grams)	Line MDA (pCi/grams)
+	K-40	1460.75	*	10.67	3.10E+00	4.53E-01	4.53E-01
+	@ AR-41	1293.64		99.16	1.00E+26	1.00E+26	1.00E+26
+	CO-60	1173.22		100.00	2.17E-02	3.83E-02	4.14E-02
		1332.49		100.00	-2.94E-03		3.83E-02
+	KR-85	513.99		0.43	7.16E+00	7.11E+00	7.11E+00
+	Y-88	898.04		93.70	-3.41E-03	2.87E-02	3.47E-02
		1836.06		99.20	1.10E-02		2.87E-02
+	NB-94	702.63		100.00	-5.38E-03	2.66E-02	2.66E-02
		871.10		100.00	-1.22E-02		2.92E-02
+	I-131	284.30		6.06	2.72E-01	5.20E-02	7.78E-01
		364.48		81.20	-2.00E-02		5.20E-02

Analysis Report for L3-012-102-FSGS-006-SG

L3-012-102-SWITCHYARD OPEN LAND

	Nuclide Name	Energy (keV)		Yield(%)	Activity (pCi/grams)	Nuclide MDA (pCi/grams)	Line MDA (pCi/grams)
	I-131	636.97		7.27	-6.62E-01	5.20E-02	7.63E-01
+	CS-134	604.70		97.60	-1.35E-02	3.32E-02	3.80E-02
		795.84		85.40	-2.34E-02		3.32E-02
+	CS-137	661.65		85.12	7.41E-02	4.05E-02	4.05E-02
+	CE-144	80.12		1.36	4.55E-02	2.03E-01	2.46E+00
		133.51		11.09	1.77E-01		2.03E-01
+	EU-152	121.78		28.40	-8.57E-03	7.62E-02	7.62E-02
		344.28		26.60	4.86E-02		9.59E-02
		1408.00		20.74	-4.43E-02		1.38E-01
+	EU-154	123.07		40.40	5.04E-03	5.39E-02	5.39E-02
		723.30		19.70	3.09E-02		1.56E-01
		1274.51		35.50	-1.13E-02		9.34E-02
+	EU-155	86.54		32.80	-2.91E-02	8.53E-02	8.53E-02
		105.31		21.80	-3.51E-02		1.04E-01
+	BI-214	609.31	*	46.30	1.19E-01	5.84E-02	5.84E-02
		1120.29	*	15.10	1.10E-01		1.89E-01
		1238.11		5.94	-3.47E-02		7.33E-01
		1377.67		4.11	-1.34E-01		8.40E-01
		1407.98		2.48	-3.70E-01		1.16E+00
		1509.19		2.19	6.15E-02		1.21E+00
		1764.49	*	15.80	1.53E-01		1.87E-01
+	PB-214	77.11		10.70	6.00E-01	7.25E-02	3.33E-01
		295.21	*	19.20	1.42E-01		8.99E-02
		351.92	*	37.20	9.55E-02		7.25E-02
+	PA-228	89.95		22.00	4.40E+01	4.01E+01	6.78E+01
		93.35		35.00	-2.70E+00		4.01E+01
		105.00		16.30	-1.39E+01		7.65E+01
		129.22		2.97	4.88E+01		4.07E+02
		338.32		5.30	1.01E+02		2.47E+02
		463.00		13.80	2.04E+00		1.00E+02
		911.23		16.70	1.03E+02		1.15E+02
+	AM-241	59.54		36.30	3.51E-02	1.57E-01	1.57E-01
+	CM-243	103.76		23.00	-1.01E-03	9.96E-02	9.96E-02
		228.18		10.60	3.37E-02		2.06E-01
		277.60		14.00	-4.16E-03		1.66E-01

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

Analysis Report for L3-012-102-FSGS-006-SG

L3-012-102-SWITCHYARD OPEN LAND

Apex-Gamma

Analysis Report for L3-012-102-FSGS-006-SS
L3-012-102-SWITCHYARD OPEN LAND

GAMMA SPECTRUM ANALYSIS

Sample Identification	: L3-012-102-FSGS-006-SS
Sample Description	: L3-012-102-SWITCHYARD OPEN LAND
Sample Type	: 500 ml Marinelli
Unit	:
Sample Point	:
Sample Size	: 9.876E+02 grams
Facility	: Dairyland_NPP
Sample Taken On	: 3/12/2018 1:42:00PM
Acquisition Started	: 3/19/2018 9:08:32AM
Procedure	: 500ml Marinelli
Operator	: Administrator
Detector Name	: HOTLAB
Geometry	: 500ml Marinelli
Live Time	: 3600.0 seconds
Real Time	: 3610.9 seconds
Dead Time	: 0.30 %
Peak Locate Threshold	: 3.00
Peak Locate Range (in channels)	: 100 - 4096
Peak Area Range (in channels)	: 100 - 4096
Identification Energy Tolerance	: 1.000 keV
Energy Calibration Used Done On	: 7/8/2014
Efficiency Calibration Used Done On	: 7/8/2014
Efficiency Calibration Description	:
Sample Number	: 5608

PEAK ANALYSIS REPORT

Peak Analysis Performed on : 1/25/2019 8:41:15AM

Peak Analysis From Channel	: 100
Peak Analysis To Channel	: 4096

Analysis Report for L3-012-102-FSGS-006-SS

L3-012-102-SWITCHYARD OPEN LAND

	Peak No.	Energy (keV)	ROI start	ROI end	Peak Centroid	Net Peak Area	Net Area Uncertainty	Continuum Counts	FWHM (keV)
F	1	76.12	147 -	158	152.78	2.94E+02	62.81	1.18E+03	3.29
F	2	238.60	469 -	485	477.67	3.41E+02	48.28	8.07E+02	1.83
F	3	295.22	587 -	598	590.90	1.66E+02	35.62	3.88E+02	1.76
F	4	338.17	672 -	685	676.78	5.99E+01	22.89	3.46E+02	1.02
F	5	351.71	695 -	710	703.86	2.17E+02	36.16	3.01E+02	1.91
F	6	583.08	1159 -	1173	1166.50	9.55E+01	24.94	1.50E+02	2.10
F	7	609.21	1215 -	1225	1218.75	1.73E+02	29.62	9.86E+01	1.98
F	8	661.56	1316 -	1328	1323.44	1.71E+02	30.68	1.38E+02	1.94
F	9	768.58	1532 -	1542	1537.45	2.90E+01	15.69	6.96E+01	1.76
F	10	911.24	1813 -	1829	1822.71	7.39E+01	20.80	8.96E+01	2.35
F	11	1332.33	2660 -	2669	2664.79	2.28E+01	10.69	9.50E+00	1.74
F	12	1460.41	2912 -	2932	2920.92	5.55E+02	48.47	3.28E+01	2.53

M = First peak in a multiplet region
m = Other peak in a multiplet region
F = Fitted singlet
Errors quoted at 2.000sigma

BACKGROUND SUBTRACT REPORT

Peak Analysis Performed on : 1/25/2019 8:41:15AM

Env. Background File : C:\Canberra\Apex\Root\Dairyland_NPP\Data\0000001364.CNF

	Peak No.	Energy (keV)	Original Area	Orig. Area Uncertainty	Ambient Background	Backgr. Uncert.	Subtracted Area	Subtracted Uncert.
F	1	76.12	2.94E+02	62.81			2.94E+02	6.28E+01
F	2	238.60	3.41E+02	48.28			3.41E+02	4.83E+01
F	3	295.22	1.66E+02	35.62			1.66E+02	3.56E+01
F	4	338.17	5.99E+01	22.89			5.99E+01	2.29E+01
F	5	351.71	2.17E+02	36.16	8.36E+01	3.72E+01	1.34E+02	5.19E+01
F	6	583.08	9.55E+01	24.94			9.55E+01	2.49E+01
F	7	609.21	1.73E+02	29.62	4.12E+01	2.42E+01	1.32E+02	3.83E+01
F	8	661.56	1.71E+02	30.68	6.61E+01	2.54E+01	1.04E+02	3.98E+01
F	9	768.58	2.90E+01	15.69			2.90E+01	1.57E+01
F	10	911.24	7.39E+01	20.80			7.39E+01	2.08E+01
F	11	1332.33	2.28E+01	10.69			2.28E+01	1.07E+01
F	12	1460.41	5.55E+02	48.47	5.63E+01	1.71E+01	4.99E+02	5.14E+01

Analysis Report for L3-012-102-FSGS-006-SS

L3-012-102-SWITCHYARD OPEN LAND

M = First peak in a multiplet region
m = Other peak in a multiplet region
F = Fitted singlet
Errors quoted at 2.000sigma

NUCLIDE IDENTIFICATION REPORT

Nuclide Library Used : C:\Canberra\Apex\Root\Dairyland_NPP\Library\HOTLAB.NLB

IDENTIFIED NUCLIDES

Nuclide Name	Id Confidence	Energy (keV)		Yield(%)	Activity (pCi/grams)	Activity Uncertainty
K-40	0.98	1460.75	*	10.67	5.50E+00	6.44E-01
CS-137	0.99	661.65	*	85.12	7.14E-02	2.75E-02
PB-212	0.95	77.11	*	17.50	4.28E-01	9.56E-02
		238.63	*	44.60	1.78E-01	2.68E-02
BI-214	0.34	609.31	*	46.30	1.54E-01	4.54E-02
		1120.29		15.10		
		1238.11		5.94		
		1377.67		4.11		
		1407.98		2.48		
		1509.19		2.19		
		1764.49		15.80		
PB-214	0.97	77.11	*	10.70	7.00E-01	1.56E-01
		295.21	*	19.20	2.41E-01	5.29E-02
		351.92	*	37.20	1.17E-01	4.57E-02
AC-228	0.30	209.28		4.40		
		338.32	*	11.40	1.65E-01	6.35E-02
		794.70		4.60		
		911.60	*	27.70	2.07E-01	5.91E-02
		964.60		5.20		
		969.11		16.60		

* = Energy line found in the spectrum.
\- = Manually added nuclide.
? = Manually edited nuclide.
@ = Energy line not used for Weighted Mean Activity
Energy Tolerance : 1.000 keV
Nuclide confidence index threshold = 0.30
Errors quoted at 2.000sigma

Analysis Report for L3-012-102-FSGS-006-SS

L3-012-102-SWITCHYARD OPEN LAND

INTERFERENCE CORRECTED REPORT

Nuclide Name	Nuclide Id Confidence	Wt mean Activity (pCi/grams)	Wt mean Activity Uncertainty	Comments
K-40	0.981	5.50E+00	6.44E-01	
CS-137	0.999	7.14E-02	2.75E-02	
PB-212	0.956	1.88E-01	2.59E-02	
BI-214	0.349	1.54E-01	4.54E-02	
PB-214	0.971	1.80E-01	3.38E-02	
AC-228	0.302	1.88E-01	4.33E-02	

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

Errors quoted at 2.000sigma

Analysis Report for L3-012-102-FSGS-006-SS

L3-012-102-SWITCHYARD OPEN LAND

UNIDENTIFIED PEAKS

Peak Locate Performed on : 1/25/2019 8:41:15AM
Peak Locate From Channel : 100
Peak Locate To Channel : 4096

	Peak No.	Energy (keV)	Peak Size (CPS)	Peak CPS (%) Uncertainty	Peak Type	Tolerance Nuclide
F	6	583.08	2.65402E-02	13.05		
F	9	768.58	8.05810E-03	27.04		
F	11	1332.33	6.32848E-03	23.47		

M = First peak in a multiplet region
m = Other peak in a multiplet region
F = Fitted singlet
Errors quoted at 2.000sigma

NUCLIDE MDA REPORT

Nuclide Library Used : C:\Canberra\Apex\Root\Dairyland_NPP\Library\HOTLAB.NLB

	Nuclide Name	Energy (keV)		Yield(%)	Activity (pCi/grams)	Nuclide MDA (pCi/grams)	Line MDA (pCi/grams)
+	K-40	1460.75	*	10.67	5.50E+00	5.24E-01	5.24E-01
+	@ AR-41	1293.64		99.16	1.00E+26	1.00E+26	1.00E+26
+	CO-60	1173.22		100.00	2.44E-02	4.23E-02	5.30E-02
		1332.49		100.00	4.07E-02		4.23E-02
+	KR-85	513.99		0.43	5.56E+00	8.88E+00	8.88E+00
+	Y-88	898.04		93.70	1.59E-02	3.20E-02	4.47E-02
		1836.06		99.20	-3.97E-02		3.20E-02
+	NB-94	702.63		100.00	1.48E-02	3.39E-02	3.39E-02
		871.10		100.00	-1.65E-02		4.09E-02
+	I-131	284.30		6.06	2.09E-01	6.26E-02	8.43E-01
		364.48		81.20	-6.34E-02		6.26E-02
		636.97		7.27	3.14E-02		8.56E-01
+	CS-134	604.70		97.60	-1.13E-01	4.18E-02	4.91E-02
		795.84		85.40	-1.30E-02		4.18E-02
+	CS-137	661.65	*	85.12	7.14E-02	4.73E-02	4.73E-02

Analysis Report for L3-012-102-FSGS-006-SS

L3-012-102-SWITCHYARD OPEN LAND

	Nuclide Name	Energy (keV)		Yield(%)	Activity (pCi/grams)	Nuclide MDA (pCi/grams)	Line MDA (pCi/grams)
+	CE-144	80.12		1.36	-1.99E+00	2.42E-01	3.11E+00
		133.51		11.09	5.48E-02		2.42E-01
+	EU-152	121.78		28.40	2.32E-03	9.66E-02	9.66E-02
		344.28		26.60	-2.05E-02		1.18E-01
		1408.00		20.74	6.98E-02		1.79E-01
+	EU-154	123.07		40.40	-2.64E-02	6.77E-02	6.77E-02
		723.30		19.70	7.30E-02		1.79E-01
		1274.51		35.50	6.64E-02		1.32E-01
+	EU-155	86.54		32.80	-3.18E-02	1.03E-01	1.03E-01
		105.31		21.80	3.43E-02		1.29E-01
+	BI-214	609.31	*	46.30	1.54E-01	7.04E-02	7.04E-02
		1120.29		15.10	5.38E-01		3.73E-01
		1238.11		5.94	5.71E-02		9.07E-01
		1377.67		4.11	5.70E-01		9.70E-01
		1407.98		2.48	5.83E-01		1.49E+00
		1509.19		2.19	-2.47E-01		1.38E+00
		1764.49		15.80	1.25E-01		3.11E-01
+	PB-214	77.11	*	10.70	7.00E-01	8.79E-02	3.09E-01
		295.21	*	19.20	2.41E-01		1.10E-01
		351.92	*	37.20	1.17E-01		8.79E-02
+	PA-228	89.95		22.00	8.79E+00	1.52E+01	2.54E+01
		93.35		35.00	4.57E+00		1.52E+01
		105.00		16.30	1.03E+01		3.02E+01
		129.22		2.97	4.77E+01		1.59E+02
		338.32		5.30	1.16E+02		1.04E+02
		463.00		13.80	7.24E+00		4.20E+01
		911.23		16.70	3.92E+01		5.17E+01
+	AM-241	59.54		36.30	5.59E-02	1.88E-01	1.88E-01
+	CM-243	103.76		23.00	4.07E-02	1.23E-01	1.23E-01
		228.18		10.60	-3.76E-02		2.52E-01
		277.60		14.00	-1.82E-01		1.97E-01

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

Apex-Gamma

Analysis Report for L3-012-102-FSGS-007-SG

L3-012-102 SWITCHYARD OPEN LAND

GAMMA SPECTRUM ANALYSIS

Sample Identification	: L3-012-102-FSGS-007-SG
Sample Description	: L3-012-102 SWITCHYARD OPEN LAND
Sample Type	: 500 ml Marinelli
Unit	:
Sample Point	:
Sample Size	: 9.803E+02 grams
Facility	: Dairyland_NPP
Sample Taken On	: 2/27/2018 2:55:00PM
Acquisition Started	: 3/14/2018 2:01:15PM
Procedure	: 500ml Marinelli
Operator	: Administrator
Detector Name	: HOTLAB
Geometry	: 500ml Marinelli
Live Time	: 3600.0 seconds
Real Time	: 3610.9 seconds
Dead Time	: 0.30 %
Peak Locate Threshold	: 3.00
Peak Locate Range (in channels)	: 100 - 4096
Peak Area Range (in channels)	: 100 - 4096
Identification Energy Tolerance	: 1.000 keV
Energy Calibration Used Done On	: 7/8/2014
Efficiency Calibration Used Done On	: 7/8/2014
Efficiency Calibration Description	:
Sample Number	: 5610

PEAK ANALYSIS REPORT

Peak Analysis Performed on : 1/25/2019 9:16:05AM

Peak Analysis From Channel	: 100
Peak Analysis To Channel	: 4096

Analysis Report for L3-012-102-FSGS-007-SG

L3-012-102 SWITCHYARD OPEN LAND

	Peak No.	Energy (keV)	ROI start	ROI end	Peak Centroid	Net Peak Area	Net Area Uncertainty	Continuum Counts	FWHM (keV)
F	1	76.35	147 -	161	153.25	2.31E+02	63.01	1.37E+03	4.22
F	2	92.89	182 -	193	186.32	8.96E+01	44.14	1.07E+03	1.69
F	3	186.53	367 -	376	373.55	6.18E+01	2.68	6.09E+02	0.48
M	4	238.49	472 -	490	477.45	1.82E+02	37.83	4.71E+02	1.67
m	5	241.64	472 -	490	483.75	6.89E+01	27.87	4.33E+02	1.68
F	6	295.11	587 -	596	590.66	1.28E+02	31.94	3.11E+02	1.57
F	7	351.84	696 -	712	704.11	2.45E+02	36.97	3.36E+02	1.73
F	8	477.55	950 -	960	955.48	2.64E+01	15.39	1.42E+02	0.91
F	9	609.31	1213 -	1227	1218.95	1.97E+02	31.75	1.41E+02	1.94
F	10	1460.56	2913 -	2930	2921.23	4.05E+02	40.83	2.13E+01	2.62
F	11	1764.00	3522 -	3534	3528.06	3.04E+01	12.44	1.32E+01	2.39

M = First peak in a multiplet region
m = Other peak in a multiplet region
F = Fitted singlet
Errors quoted at 2.000sigma

BACKGROUND SUBTRACT REPORT

Peak Analysis Performed on : 1/25/2019 9:16:05AM

Env. Background File : C:\Canberra\Apex\Root\Dairyland_NPP\Data\0000001364.CNF

	Peak No.	Energy (keV)	Original Area	Orig. Area Uncertainty	Ambient Background	Backgr. Uncert.	Subtracted Area	Subtracted Uncert.
F	1	76.35	2.31E+02	63.01			2.31E+02	6.30E+01
F	2	92.89	8.96E+01	44.14			8.96E+01	4.41E+01
F	3	186.53	6.18E+01	2.68			6.18E+01	2.68E+00
M	4	238.49	1.82E+02	37.83			1.82E+02	3.78E+01
m	5	241.64	6.89E+01	27.87			6.89E+01	2.79E+01
F	6	295.11	1.28E+02	31.94			1.28E+02	3.19E+01
F	7	351.84	2.45E+02	36.97	8.36E+01	3.72E+01	1.62E+02	5.25E+01
F	8	477.55	2.64E+01	15.39			2.64E+01	1.54E+01
F	9	609.31	1.97E+02	31.75	4.12E+01	2.42E+01	1.56E+02	3.99E+01
F	10	1460.56	4.05E+02	40.83	5.63E+01	1.71E+01	3.49E+02	4.43E+01
F	11	1764.00	3.04E+01	12.44	1.52E+01	9.80E+00	1.52E+01	1.58E+01

M = First peak in a multiplet region
m = Other peak in a multiplet region
F = Fitted singlet
Errors quoted at 2.000sigma

Analysis Report for L3-012-102-FSGS-007-SG

L3-012-102 SWITCHYARD OPEN LAND

NUCLIDE IDENTIFICATION REPORT

Nuclide Library Used : C:\Canberra\Apex\Root\Dairyland_NPP\Library\HOTLAB.NLB

IDENTIFIED NUCLIDES

Nuclide Name	Id Confidence	Energy (keV)		Yield(%)	Activity (pCi/grams)	Activity Uncertainty
K-40	0.99	1460.75	*	10.67	3.88E+00	5.37E-01
PB-212	0.97	77.11	*	17.50	3.37E-01	9.45E-02
		238.63	*	44.60	9.55E-02	2.05E-02
BI-214	0.54	609.31	*	46.30	1.83E-01	4.80E-02
		1120.29		15.10		
		1238.11		5.94		
		1377.67		4.11		
		1407.98		2.48		
		1509.19		2.19		
		1764.49	*	15.80	1.34E-01	1.39E-01
PB-214	0.98	77.11	*	10.70	5.51E-01	1.55E-01
		295.21	*	19.20	1.87E-01	4.75E-02
		351.92	*	37.20	1.43E-01	4.67E-02
RA-226	0.98	186.21	*	3.28	3.73E-01	2.60E-02

* = Energy line found in the spectrum.
\- = Manually added nuclide.
? = Manually edited nuclide.
@ = Energy line not used for Weighted Mean Activity
Energy Tolerance : 1.000 keV
Nuclide confidence index threshold = 0.30
Errors quoted at 2.000sigma

INTERFERENCE CORRECTED REPORT

Nuclide Name	Nuclide Id Confidence	Wt mean Activity (pCi/grams)	Wt mean Activity Uncertainty	Comments

Analysis Report for L3-012-102-FSGS-007-SG

L3-012-102 SWITCHYARD OPEN LAND

Nuclide Name	Nuclide Id Confidence	Wt mean Activity (pCi/grams)	Wt mean Activity Uncertainty	Comments
K-40	0.994	3.88E+00	5.37E-01	
PB-212	0.972	1.02E-01	2.01E-02	
BI-214	0.546	1.78E-01	4.54E-02	
PB-214	0.984	1.74E-01	3.26E-02	
RA-226	0.984	3.73E-01	2.60E-02	

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

Errors quoted at 2.000sigma

Analysis Report for L3-012-102-FSGS-007-SG

L3-012-102 SWITCHYARD OPEN LAND

UNIDENTIFIED PEAKS

Peak Locate Performed on : 1/25/2019 9:16:05AM
Peak Locate From Channel : 100
Peak Locate To Channel : 4096

	Peak No.	Energy (keV)	Peak Size (CPS)	Peak CPS (%) Uncertainty	Peak Type	Tolerance Nuclide
F	2	92.89	2.49012E-02	24.62	Tol.	PA-228
m	5	241.64	1.91469E-02	20.22		
F	8	477.55	7.34156E-03	29.12	Sum	

M = First peak in a multiplet region
m = Other peak in a multiplet region
F = Fitted singlet
Errors quoted at 2.000sigma

NUCLIDE MDA REPORT

Nuclide Library Used : C:\Canberra\Apex\Root\Dairyland_NPP\Library\HOTLAB.NLB

	Nuclide Name	Energy (keV)		Yield(%)	Activity (pCi/grams)	Nuclide MDA (pCi/grams)	Line MDA (pCi/grams)
+	K-40	1460.75	*	10.67	3.88E+00	4.97E-01	4.97E-01
+	@ AR-41	1293.64		99.16	1.00E+26	1.00E+26	1.00E+26
+	CO-60	1173.22		100.00	-4.74E-03	4.71E-02	5.10E-02
		1332.49		100.00	9.01E-04		4.71E-02
+	KR-85	513.99		0.43	9.65E+00	8.77E+00	8.77E+00
+	Y-88	898.04		93.70	-1.08E-02	3.21E-02	4.31E-02
		1836.06		99.20	-2.28E-04		3.21E-02
+	NB-94	702.63		100.00	2.48E-03	3.09E-02	3.09E-02
		871.10		100.00	-8.84E-03		3.77E-02
+	I-131	284.30		6.06	5.43E-01	1.19E-01	1.68E+00
		364.48		81.20	4.08E-02		1.19E-01
		636.97		7.27	1.10E+00		1.65E+00

Analysis Report for L3-012-102-FSGS-007-SG

L3-012-102 SWITCHYARD OPEN LAND

	Nuclide Name	Energy (keV)		Yield(%)	Activity (pCi/grams)	Nuclide MDA (pCi/grams)	Line MDA (pCi/grams)
+	CS-134	604.70		97.60	-2.46E-02	4.37E-02	5.04E-02
		795.84		85.40	5.54E-03		4.37E-02
+	CS-137	661.65		85.12	8.06E-02	5.02E-02	5.02E-02
+	CE-144	80.12		1.36	-1.33E+00	2.40E-01	3.00E+00
		133.51		11.09	2.61E-02		2.40E-01
+	EU-152	121.78		28.40	-1.05E-01	8.96E-02	8.96E-02
		344.28		26.60	4.52E-02		1.13E-01
		1408.00		20.74	2.34E-01		2.15E-01
+	EU-154	123.07		40.40	-9.75E-03	6.40E-02	6.40E-02
		723.30		19.70	-1.68E-01		1.68E-01
		1274.51		35.50	4.30E-02		1.22E-01
+	EU-155	86.54		32.80	-6.70E-02	1.01E-01	1.01E-01
		105.31		21.80	4.22E-03		1.25E-01
+	BI-214	609.31	*	46.30	1.83E-01	7.95E-02	7.95E-02
		1120.29		15.10	1.05E-01		3.50E-01
		1238.11		5.94	1.42E-01		9.29E-01
		1377.67		4.11	2.74E-01		9.68E-01
		1407.98		2.48	1.95E+00		1.80E+00
		1509.19		2.19	1.33E+00		1.77E+00
		1764.49	*	15.80	1.34E-01		2.42E-01
+	PB-214	77.11	*	10.70	5.51E-01	9.20E-02	3.55E-01
		295.21	*	19.20	1.87E-01		9.44E-02
		351.92	*	37.20	1.43E-01		9.20E-02
+	PA-228	89.95		22.00	3.88E+03	7.48E+03	1.25E+04
		93.35		35.00	3.30E+03		7.48E+03
		105.00		16.30	1.83E+03		1.39E+04
		129.22		2.97	-3.14E+03		7.14E+04
		338.32		5.30	7.33E+03		4.49E+04
		463.00		13.80	1.34E+04		1.94E+04
		911.23		16.70	3.41E+04		2.26E+04
+	AM-241	59.54		36.30	-7.42E-02	1.84E-01	1.84E-01
+	CM-243	103.76		23.00	2.30E-02	1.20E-01	1.20E-01
		228.18		10.60	-5.84E-02		2.40E-01
		277.60		14.00	-7.06E-02		1.94E-01

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

Apex-Gamma

Analysis Report for L3-012-102-FSGS-007-SS

L3-012-102 SWITCHYARD OPEN LAND

GAMMA SPECTRUM ANALYSIS

Sample Identification	: L3-012-102-FSGS-007-SS
Sample Description	: L3-012-102 SWITCHYARD OPEN LAND
Sample Type	: 500 ml Marinelli
Unit	:
Sample Point	:
Sample Size	: 7.810E+02 grams
Facility	: Dairyland_NPP
Sample Taken On	: 2/27/2018 2:57:00PM
Acquisition Started	: 3/13/2018 2:15:02PM
Procedure	: 500ml Marinelli
Operator	: Administrator
Detector Name	: HOTLAB
Geometry	: 500ml Marinelli
Live Time	: 3600.0 seconds
Real Time	: 3610.8 seconds
Dead Time	: 0.30 %
Peak Locate Threshold	: 3.00
Peak Locate Range (in channels)	: 100 - 4096
Peak Area Range (in channels)	: 100 - 4096
Identification Energy Tolerance	: 1.000 keV
Energy Calibration Used Done On	: 7/8/2014
Efficiency Calibration Used Done On	: 7/8/2014
Efficiency Calibration Description	:
Sample Number	: 5612

PEAK ANALYSIS REPORT

Peak Analysis Performed on : 1/25/2019 9:22:31AM

Peak Analysis From Channel	: 100
Peak Analysis To Channel	: 4096

Analysis Report for L3-012-102-FSGS-007-SS

L3-012-102 SWITCHYARD OPEN LAND

	Peak No.	Energy (keV)	ROI start	ROI end	Peak Centroid	Net Peak Area	Net Area Uncertainty	Continuum Counts	FWHM (keV)
F	1	76.91	147 -	161	154.37	1.95E+02	57.34	1.30E+03	2.86
F	2	238.63	473 -	485	477.74	2.09E+02	41.86	5.75E+02	1.97
F	3	295.01	582 -	596	590.47	1.01E+02	31.01	4.58E+02	1.66
F	4	351.87	700 -	709	704.17	2.01E+02	34.74	2.06E+02	1.76
F	5	510.17	1016 -	1028	1020.71	6.28E+01	23.49	1.68E+02	2.49
F	6	583.23	1161 -	1175	1166.81	5.83E+01	20.11	1.43E+02	1.64
F	7	609.21	1209 -	1226	1218.75	1.81E+02	29.96	1.30E+02	2.04
F	8	911.04	1818 -	1827	1822.31	2.26E+01	15.06	8.37E+01	1.55
F	9	1460.76	2913 -	2930	2921.63	4.74E+02	44.03	2.14E+01	2.56

M = First peak in a multiplet region
m = Other peak in a multiplet region
F = Fitted singlet
Errors quoted at 2.000sigma

BACKGROUND SUBTRACT REPORT

Peak Analysis Performed on : 1/25/2019 9:22:31AM

Env. Background File : C:\Canberra\Apex\Root\Dairyland_NPP\Data\0000001364.CNF

	Peak No.	Energy (keV)	Original Area	Orig. Area Uncertainty	Ambient Background	Backgr. Uncert.	Subtracted Area	Subtracted Uncert.
F	1	76.91	1.95E+02	57.34			1.95E+02	5.73E+01
F	2	238.63	2.09E+02	41.86			2.09E+02	4.19E+01
F	3	295.01	1.01E+02	31.01			1.01E+02	3.10E+01
F	4	351.87	2.01E+02	34.74	8.36E+01	3.72E+01	1.17E+02	5.09E+01
F	5	510.17	6.28E+01	23.49			6.28E+01	2.35E+01
F	6	583.23	5.83E+01	20.11			5.83E+01	2.01E+01
F	7	609.21	1.81E+02	29.96	4.12E+01	2.42E+01	1.40E+02	3.85E+01
F	8	911.04	2.26E+01	15.06			2.26E+01	1.51E+01
F	9	1460.76	4.74E+02	44.03	5.63E+01	1.71E+01	4.18E+02	4.72E+01

M = First peak in a multiplet region
m = Other peak in a multiplet region
F = Fitted singlet
Errors quoted at 2.000sigma

Analysis Report for L3-012-102-FSGS-007-SS

L3-012-102 SWITCHYARD OPEN LAND

NUCLIDE IDENTIFICATION REPORT

Nuclide Library Used : C:\Canberra\Apex\Root\Dairyland_NPP\Library\HOTLAB.NLB

IDENTIFIED NUCLIDES

Nuclide Name	Id Confidence	Energy (keV)		Yield(%)	Activity (pCi/grams)	Activity Uncertainty
K-40	1.00	1460.75	*	10.67	5.83E+00	7.34E-01
PB-212	0.99	77.11	*	17.50	3.54E-01	1.06E-01
		238.63	*	44.60	1.38E-01	2.86E-02
BI-214	0.34	609.31	*	46.30	2.06E-01	5.80E-02
		1120.29		15.10		
		1238.11		5.94		
		1377.67		4.11		
		1407.98		2.48		
		1509.19		2.19		
		1764.49		15.80		
PB-214	0.99	77.11	*	10.70	5.78E-01	1.74E-01
		295.21	*	19.20	1.84E-01	5.75E-02
		351.92	*	37.20	1.30E-01	5.67E-02

* = Energy line found in the spectrum.
\- = Manually added nuclide.
? = Manually edited nuclide.
@ = Energy line not used for Weighted Mean Activity
Energy Tolerance : 1.000 keV
Nuclide confidence index threshold = 0.30
Errors quoted at 2.000sigma

INTERFERENCE CORRECTED REPORT

Nuclide Name	Nuclide Id Confidence	Wt mean Activity (pCi/grams)	Wt mean Activity Uncertainty	Comments
K-40	1.000	5.83E+00	7.34E-01	
PB-212	0.998	1.46E-01	2.76E-02	
BI-214	0.349	2.06E-01	5.80E-02	

Analysis Report for L3-012-102-FSGS-007-SS

L3-012-102 SWITCHYARD OPEN LAND

Nuclide Name	Nuclide Id Confidence	Wt mean Activity (pCi/grams)	Wt mean Activity Uncertainty	Comments
PB-214	0.997	1.66E-01	3.94E-02	

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

Errors quoted at 2.000sigma

Analysis Report for L3-012-102-FSGS-007-SS

L3-012-102 SWITCHYARD OPEN LAND

UNIDENTIFIED PEAKS

Peak Locate Performed on : 1/25/2019 9:22:31AM
Peak Locate From Channel : 100
Peak Locate To Channel : 4096

Peak No.		Energy (keV)	Peak Size (CPS)	Peak CPS (%) Uncertainty	Peak Type	Tolerance Nuclide
F	5	510.17	1.74312E-02	18.72		
F	6	583.23	1.62075E-02	17.24		
F	8	911.04	6.27934E-03	33.30	Tol.	AC-228 PA-228

M = First peak in a multiplet region
m = Other peak in a multiplet region
F = Fitted singlet
Errors quoted at 2.000sigma

NUCLIDE MDA REPORT

Nuclide Library Used : C:\Canberra\Apex\Root\Dairyland_NPP\Library\HOTLAB.NLB

		Nuclide Name	Energy (keV)		Yield(%)	Activity (pCi/grams)	Nuclide MDA (pCi/grams)	Line MDA (pCi/grams)
+		K-40	1460.75	*	10.67	5.83E+00	6.25E-01	6.25E-01
+	@	AR-41	1293.64		99.16	1.00E+26	1.00E+26	1.00E+26
+		CO-60	1173.22		100.00	2.37E-02	6.23E-02	6.53E-02
			1332.49		100.00	3.47E-02		6.23E-02
+		KR-85	513.99		0.43	9.89E+00	1.02E+01	1.02E+01
+		Y-88	898.04		93.70	-5.54E-02	3.46E-02	5.64E-02
			1836.06		99.20	-2.67E-02		3.46E-02
+		NB-94	702.63		100.00	2.24E-03	4.07E-02	4.07E-02
			871.10		100.00	-3.39E-02		4.52E-02
+		I-131	284.30		6.06	-2.98E-01	1.46E-01	1.78E+00
			364.48		81.20	6.28E-02		1.46E-01
			636.97		7.27	-1.22E-01		1.89E+00
+		CS-134	604.70		97.60	-1.83E-03	5.45E-02	6.03E-02

Analysis Report for L3-012-102-FSGS-007-SS

L3-012-102 SWITCHYARD OPEN LAND

	Nuclide Name	Energy (keV)		Yield(%)	Activity (pCi/grams)	Nuclide MDA (pCi/grams)	Line MDA (pCi/grams)
	CS-134	795.84		85.40	-6.56E-02	5.45E-02	5.45E-02
+	CS-137	661.65		85.12	5.49E-02	5.68E-02	5.68E-02
+	CE-144	80.12		1.36	-1.08E+00	2.92E-01	3.69E+00
		133.51		11.09	1.02E-01		2.92E-01
+	EU-152	121.78		28.40	1.19E-02	1.09E-01	1.09E-01
		344.28		26.60	-3.82E-01		1.34E-01
		1408.00		20.74	7.49E-02		2.24E-01
+	EU-154	123.07		40.40	-2.49E-02	7.65E-02	7.65E-02
		723.30		19.70	1.04E-01		2.26E-01
		1274.51		35.50	7.25E-02		1.71E-01
+	EU-155	86.54		32.80	-4.95E-02	1.26E-01	1.26E-01
		105.31		21.80	-4.19E-04		1.50E-01
+	BI-214	609.31	*	46.30	2.06E-01	1.01E-01	1.01E-01
		1120.29		15.10	2.19E-01		4.50E-01
		1238.11		5.94	4.83E-02		1.27E+00
		1377.67		4.11	3.14E-01		1.20E+00
		1407.98		2.48	6.25E-01		1.87E+00
		1509.19		2.19	3.47E-01		1.64E+00
		1764.49		15.80	3.98E-01		3.59E-01
+	PB-214	77.11	*	10.70	5.78E-01	9.68E-02	4.30E-01
		295.21	*	19.20	1.84E-01		1.60E-01
		351.92	*	37.20	1.30E-01		9.68E-02
+	PA-228	89.95		22.00	8.46E+03	4.07E+03	7.06E+03
		93.35		35.00	-1.39E+03		4.07E+03
		105.00		16.30	-2.75E+03		7.83E+03
		129.22		2.97	3.19E+03		4.10E+04
		338.32		5.30	2.83E+03		2.56E+04
		463.00		13.80	1.58E+03		1.10E+04
		911.23		16.70	4.21E+03		1.32E+04
+	AM-241	59.54		36.30	-4.82E-02	2.21E-01	2.21E-01
+	CM-243	103.76		23.00	-1.26E-02	1.42E-01	1.42E-01
		228.18		10.60	-1.44E-01		2.94E-01
		277.60		14.00	-6.21E-02		2.34E-01

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

Apex-Gamma

Analysis Report for L3-012-102-FSGS-008-SG

L3-012-102-SWITCHYARD OPEN LAND

GAMMA SPECTRUM ANALYSIS

Sample Identification	: L3-012-102-FSGS-008-SG
Sample Description	: L3-012-102-SWITCHYARD OPEN LAND
Sample Type	: 500 ml Marinelli
Unit	:
Sample Point	:
Sample Size	: 1.103E+03 grams
Facility	: Dairyland_NPP
Sample Taken On	: 3/12/2018 1:04:00PM
Acquisition Started	: 3/20/2018 10:34:07AM
Procedure	: 500ml Marinelli
Operator	: Administrator
Detector Name	: HOTLAB
Geometry	: 500ml Marinelli
Live Time	: 3600.0 seconds
Real Time	: 3611.1 seconds
Dead Time	: 0.31 %
Peak Locate Threshold	: 3.00
Peak Locate Range (in channels)	: 100 - 4096
Peak Area Range (in channels)	: 100 - 4096
Identification Energy Tolerance	: 1.000 keV
Energy Calibration Used Done On	: 7/8/2014
Efficiency Calibration Used Done On	: 7/8/2014
Efficiency Calibration Description	:
Sample Number	: 5614

PEAK ANALYSIS REPORT

Peak Analysis Performed on : 1/25/2019 9:24:51AM

Peak Analysis From Channel	: 100
Peak Analysis To Channel	: 4096

Analysis Report for L3-012-102-FSGS-008-SG

L3-012-102-SWITCHYARD OPEN LAND

	Peak No.	Energy (keV)	ROI start	ROI end	Peak Centroid	Net Peak Area	Net Area Uncertainty	Continuum Counts	FWHM (keV)
F	1	76.57	151 -	160	153.68	1.21E+02	46.19	1.12E+03	1.67
F	2	186.15	369 -	380	372.80	8.30E+01	38.73	8.34E+02	1.67
F	3	238.72	469 -	485	477.91	3.66E+02	51.37	7.85E+02	2.10
F	4	295.20	584 -	598	590.84	1.11E+02	33.79	4.81E+02	2.02
F	5	351.83	700 -	712	704.09	2.14E+02	36.86	3.26E+02	1.73
F	6	463.20	921 -	933	926.78	3.37E+01	19.89	1.96E+02	1.62
F	7	477.61	950 -	963	955.61	8.10E+01	24.92	2.02E+02	1.84
F	8	582.92	1161 -	1170	1166.17	9.07E+01	25.62	1.51E+02	1.79
F	9	609.25	1212 -	1226	1218.84	1.61E+02	29.85	1.44E+02	2.15
F	10	910.77	1813 -	1829	1821.78	7.39E+01	22.65	1.10E+02	2.93
F	11	968.72	1933 -	1943	1937.67	2.87E+01	16.17	8.60E+01	1.73
F	12	1460.56	2913 -	2932	2921.24	5.31E+02	47.62	4.88E+01	2.46

M = First peak in a multiplet region
m = Other peak in a multiplet region
F = Fitted singlet
Errors quoted at 2.000sigma

BACKGROUND SUBTRACT REPORT

Peak Analysis Performed on : 1/25/2019 9:24:51AM

Env. Background File : C:\Canberra\Apex\Root\Dairyland_NPP\Data\0000001364.CNF

	Peak No.	Energy (keV)	Original Area	Orig. Area Uncertainty	Ambient Background	Backgr. Uncert.	Subtracted Area	Subtracted Uncert.
F	1	76.57	1.21E+02	46.19			1.21E+02	4.62E+01
F	2	186.15	8.30E+01	38.73			8.30E+01	3.87E+01
F	3	238.72	3.66E+02	51.37			3.66E+02	5.14E+01
F	4	295.20	1.11E+02	33.79			1.11E+02	3.38E+01
F	5	351.83	2.14E+02	36.86	8.36E+01	3.72E+01	1.30E+02	5.24E+01
F	6	463.20	3.37E+01	19.89			3.37E+01	1.99E+01
F	7	477.61	8.10E+01	24.92			8.10E+01	2.49E+01
F	8	582.92	9.07E+01	25.62			9.07E+01	2.56E+01
F	9	609.25	1.61E+02	29.85	4.12E+01	2.42E+01	1.20E+02	3.84E+01
F	10	910.77	7.39E+01	22.65			7.39E+01	2.26E+01
F	11	968.72	2.87E+01	16.17			2.87E+01	1.62E+01
F	12	1460.56	5.31E+02	47.62	5.63E+01	1.71E+01	4.75E+02	5.06E+01

Analysis Report for L3-012-102-FSGS-008-SG

L3-012-102-SWITCHYARD OPEN LAND

M = First peak in a multiplet region
m = Other peak in a multiplet region
F = Fitted singlet
Errors quoted at 2.000sigma

NUCLIDE IDENTIFICATION REPORT

Nuclide Library Used : C:\Canberra\Apex\Root\Dairyland_NPP\Library\HOTLAB.NLB

IDENTIFIED NUCLIDES

Nuclide Name	Id Confidence	Energy (keV)		Yield(%)	Activity (pCi/grams)	Activity Uncertainty
K-40	0.99	1460.75	*	10.67	4.69E+00	5.64E-01
PB-212	0.98	77.11	*	17.50	1.56E-01	6.05E-02
		238.63	*	44.60	1.71E-01	2.56E-02
BI-214	0.34	609.31	*	46.30	1.25E-01	4.07E-02
		1120.29		15.10		
		1238.11		5.94		
		1377.67		4.11		
		1407.98		2.48		
		1509.19		2.19		
		1764.49		15.80		
PB-214	0.99	77.11	*	10.70	2.56E-01	9.89E-02
		295.21	*	19.20	1.44E-01	4.44E-02
		351.92	*	37.20	1.02E-01	4.13E-02
RA-226	0.99	186.21	*	3.28	4.44E-01	2.09E-01

* = Energy line found in the spectrum.
\- = Manually added nuclide.
? = Manually edited nuclide.
@ = Energy line not used for Weighted Mean Activity
Energy Tolerance : 1.000 keV
Nuclide confidence index threshold = 0.30
Errors quoted at 2.000sigma

INTERFERENCE CORRECTED REPORT

Analysis Report for L3-012-102-FSGS-008-SG

L3-012-102-SWITCHYARD OPEN LAND

Nuclide Name	Nuclide Id Confidence	Wt mean Activity (pCi/grams)	Wt mean Activity Uncertainty	Comments
K-40	0.994	4.69E+00	5.64E-01	
PB-212	0.986	1.59E-01	2.37E-02	
BI-214	0.349	1.25E-01	4.07E-02	
PB-214	0.992	1.11E-01	2.91E-02	
RA-226	0.999	4.44E-01	2.09E-01	

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

Errors quoted at 2.000sigma

Analysis Report for L3-012-102-FSGS-008-SG

L3-012-102-SWITCHYARD OPEN LAND

UNIDENTIFIED PEAKS

Peak Locate Performed on : 1/25/2019 9:24:51AM
Peak Locate From Channel : 100
Peak Locate To Channel : 4096

	Peak No.	Energy (keV)	Peak Size (CPS)	Peak CPS (%) Uncertainty	Peak Type	Tolerance Nuclide
F	6	463.20	9.35550E-03	29.53	Tol.	SB-125 PA-228
F	7	477.61	2.25003E-02	15.38	Sum	
F	8	582.92	2.51808E-02	14.13		
F	10	910.77	2.05299E-02	15.32	Tol.	AC-228 PA-228
F	11	968.72	7.98401E-03	28.14	Tol.	AC-228

M = First peak in a multiplet region
m = Other peak in a multiplet region
F = Fitted singlet
Errors quoted at 2.000sigma

NUCLIDE MDA REPORT

Nuclide Library Used : C:\Canberra\Apex\Root\Dairyland_NPP\Library\HOTLAB.NLB

	Nuclide Name	Energy (keV)		Yield(%)	Activity (pCi/grams)	Nuclide MDA (pCi/grams)	Line MDA (pCi/grams)
+	K-40	1460.75	*	10.67	4.69E+00	4.98E-01	4.98E-01
+	@ AR-41	1293.64		99.16	1.00E+26	1.00E+26	1.00E+26
+	CO-60	1173.22		100.00	2.32E-03	4.40E-02	4.71E-02
		1332.49		100.00	3.96E-02		4.40E-02
+	KR-85	513.99		0.43	8.56E+00	7.88E+00	7.88E+00
+	Y-88	898.04		93.70	1.35E-02	2.80E-02	4.01E-02
		1836.06		99.20	4.56E-03		2.80E-02

Analysis Report for L3-012-102-FSGS-008-SG

L3-012-102-SWITCHYARD OPEN LAND

	Nuclide Name	Energy (keV)		Yield(%)	Activity (pCi/grams)	Nuclide MDA (pCi/grams)	Line MDA (pCi/grams)
+	NB-94	702.63		100.00	1.08E-02	3.22E-02	3.22E-02
		871.10		100.00	-1.29E-02		3.26E-02
+	I-131	284.30		6.06	1.28E-01	5.96E-02	8.54E-01
		364.48		81.20	2.07E-02		5.96E-02
		636.97		7.27	-7.84E-01		7.35E-01
+	CS-134	604.70		97.60	2.56E-03	4.10E-02	4.25E-02
		795.84		85.40	-8.27E-03		4.10E-02
+	CS-137	661.65		85.12	2.58E-02	4.65E-02	4.65E-02
+	CE-144	80.12		1.36	-4.88E-01	2.28E-01	2.77E+00
		133.51		11.09	-1.05E-01		2.28E-01
+	EU-152	121.78		28.40	9.22E-03	8.97E-02	8.97E-02
		344.28		26.60	-2.12E-01		1.15E-01
		1408.00		20.74	1.26E-01		1.80E-01
+	EU-154	123.07		40.40	7.11E-03	6.30E-02	6.30E-02
		723.30		19.70	-2.27E-01		1.63E-01
		1274.51		35.50	3.31E-02		1.21E-01
+	EU-155	86.54		32.80	-3.63E-02	9.77E-02	9.77E-02
		105.31		21.80	-4.58E-02		1.18E-01
+	BI-214	609.31	*	46.30	1.25E-01	7.14E-02	7.14E-02
		1120.29		15.10	-2.49E-02		3.03E-01
		1238.11		5.94	-7.10E-01		8.45E-01
		1377.67		4.11	-2.76E-01		9.52E-01
		1407.98		2.48	1.05E+00		1.51E+00
		1509.19		2.19	6.71E-01		1.59E+00
		1764.49		15.80	2.34E-02		2.24E-01
+	PB-214	77.11	*	10.70	2.56E-01	7.81E-02	2.55E-01
		295.21	*	19.20	1.44E-01		1.16E-01
		351.92	*	37.20	1.02E-01		7.81E-02
+	PA-228	89.95		22.00	6.62E+01	3.32E+01	5.62E+01
		93.35		35.00	-4.21E+00		3.32E+01
		105.00		16.30	-1.58E+01		6.26E+01
		129.22		2.97	1.09E+01		3.36E+02
		338.32		5.30	5.63E+01		2.12E+02
		463.00		13.80	-1.08E+01		8.42E+01
		911.23		16.70	1.17E+02		1.13E+02
+	AM-241	59.54		36.30	1.69E-02	1.77E-01	1.77E-01
+	CM-243	103.76		23.00	-1.49E-02	1.12E-01	1.12E-01
		228.18		10.60	9.26E-02		2.38E-01
		277.60		14.00	-3.24E-02		1.86E-01

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

Analysis Report for L3-012-102-FSGS-008-SG

L3-012-102-SWITCHYARD OPEN LAND

Apex-Gamma

Analysis Report for L3-012-102-QSGS-008-SG
L3-012-102-SWITCHYARD OPEN LAND

GAMMA SPECTRUM ANALYSIS

Sample Identification	: L3-012-102-QSGS-008-SG
Sample Description	: L3-012-102-SWITCHYARD OPEN LAND
Sample Type	: 500 ml Marinelli
Unit	:
Sample Point	:
Sample Size	: 1.281E+03 grams
Facility	: Dairyland_NPP
Sample Taken On	: 3/12/2018 1:19:00PM
Acquisition Started	: 3/20/2018 2:44:02PM
Procedure	: 500ml Marinelli
Operator	: Administrator
Detector Name	: HOTLAB
Geometry	: 500ml Marinelli
Live Time	: 3600.0 seconds
Real Time	: 3610.8 seconds
Dead Time	: 0.30 %
Peak Locate Threshold	: 3.00
Peak Locate Range (in channels)	: 100 - 4096
Peak Area Range (in channels)	: 100 - 4096
Identification Energy Tolerance	: 1.000 keV
Energy Calibration Used Done On	: 7/8/2014
Efficiency Calibration Used Done On	: 7/8/2014
Efficiency Calibration Description	:
Sample Number	: 5616

PEAK ANALYSIS REPORT

Peak Analysis Performed on : 1/25/2019 9:27:18AM

Peak Analysis From Channel : 100
Peak Analysis To Channel : 4096

Analysis Report for L3-012-102-QSGS-008-SG

L3-012-102-SWITCHYARD OPEN LAND

	Peak No.	Energy (keV)	ROI start	ROI end	Peak Centroid	Net Peak Area	Net Area Uncertainty	Continuum Counts	FWHM (keV)
F	1	185.81	364 -	379	372.12	1.06E+02	42.42	1.01E+03	2.08
F	2	238.61	471 -	485	477.70	3.57E+02	50.83	7.93E+02	1.94
F	3	295.19	586 -	596	590.84	1.24E+02	33.05	3.77E+02	1.59
	4	338.25	673 -	683	676.94	3.49E+01	38.42	2.78E+02	1.32
F	5	351.95	699 -	710	704.33	2.43E+02	38.45	2.87E+02	1.91
F	6	477.66	949 -	960	955.70	3.04E+01	18.31	1.92E+02	1.25
F	7	583.13	1161 -	1173	1166.60	9.03E+01	25.94	1.88E+02	1.91
F	8	609.09	1213 -	1225	1218.52	1.58E+02	29.70	1.50E+02	1.80
F	9	661.61	1317 -	1330	1323.54	1.35E+02	27.90	1.28E+02	2.32
F	10	768.01	1531 -	1540	1536.30	2.37E+01	14.74	8.74E+01	1.29
F	11	911.41	1817 -	1831	1823.06	5.33E+01	20.63	1.06E+02	2.68
F	12	968.92	1933 -	1943	1938.05	3.34E+01	16.65	7.19E+01	2.01
F	13	1460.61	2911 -	2929	2921.33	5.87E+02	49.35	2.41E+01	2.54

M = First peak in a multiplet region
m = Other peak in a multiplet region
F = Fitted singlet
Errors quoted at 2.000sigma

BACKGROUND SUBTRACT REPORT

Peak Analysis Performed on : 1/25/2019 9:27:18AM

Env. Background File : C:\Canberra\Apex\Root\Dairyland_NPP\Data\0000001364.CNF

	Peak No.	Energy (keV)	Original Area	Orig. Area Uncertainty	Ambient Background	Backgr. Uncert.	Subtracted Area	Subtracted Uncert.
F	1	185.81	1.06E+02	42.42			1.06E+02	4.24E+01
F	2	238.61	3.57E+02	50.83			3.57E+02	5.08E+01
F	3	295.19	1.24E+02	33.05			1.24E+02	3.31E+01
	4	338.25	3.49E+01	38.42			3.49E+01	3.84E+01
F	5	351.95	2.43E+02	38.45	8.36E+01	3.72E+01	1.60E+02	5.35E+01
F	6	477.66	3.04E+01	18.31			3.04E+01	1.83E+01
F	7	583.13	9.03E+01	25.94			9.03E+01	2.59E+01
F	8	609.09	1.58E+02	29.70	4.12E+01	2.42E+01	1.17E+02	3.83E+01
F	9	661.61	1.35E+02	27.90	6.61E+01	2.54E+01	6.87E+01	3.77E+01
F	10	768.01	2.37E+01	14.74			2.37E+01	1.47E+01
F	11	911.41	5.33E+01	20.63			5.33E+01	2.06E+01
F	12	968.92	3.34E+01	16.65			3.34E+01	1.67E+01
F	13	1460.61	5.87E+02	49.35	5.63E+01	1.71E+01	5.31E+02	5.22E+01

Analysis Report for L3-012-102-QSGS-008-SG

L3-012-102-SWITCHYARD OPEN LAND

M = First peak in a multiplet region
m = Other peak in a multiplet region
F = Fitted singlet
Errors quoted at 2.000sigma

NUCLIDE IDENTIFICATION REPORT

Nuclide Library Used : C:\Canberra\Apex\Root\Dairyland_NPP\Library\HOTLAB.NLB

IDENTIFIED NUCLIDES

Nuclide Name	Id Confidence	Energy (keV)		Yield(%)	Activity (pCi/grams)	Activity Uncertainty
K-40	0.99	1460.75	*	10.67	4.52E+00	5.10E-01
CS-137	1.00	661.65	*	85.12	3.63E-02	2.00E-02
PB-212	0.56	77.11		17.50		
		238.63	*	44.60	1.44E-01	2.18E-02
BI-214	0.34	609.31	*	46.30	1.05E-01	3.49E-02
		1120.29		15.10		
		1238.11		5.94		
		1377.67		4.11		
		1407.98		2.48		
		1509.19		2.19		
		1764.49		15.80		
PB-214	0.72	77.11		10.70		
		295.21	*	19.20	1.39E-01	3.75E-02
		351.92	*	37.20	1.08E-01	3.65E-02
RA-226	0.97	186.21	*	3.28	4.87E-01	1.97E-01
AC-228	0.62	209.28		4.40		
		338.32	*	11.40	7.42E-02	8.16E-02
		794.70		4.60		
		911.60	*	27.70	1.15E-01	4.49E-02
		964.60		5.20		
		969.11	*	16.60	1.28E-01	6.38E-02

* = Energy line found in the spectrum.
\- = Manually added nuclide.
? = Manually edited nuclide.
@ = Energy line not used for Weighted Mean Activity
Energy Tolerance : 1.000 keV
Nuclide confidence index threshold = 0.30
Errors quoted at 2.000sigma

Analysis Report for L3-012-102-QSGS-008-SG

L3-012-102-SWITCHYARD OPEN LAND

INTERFERENCE CORRECTED REPORT

Nuclide Name	Nuclide Id Confidence	Wt mean Activity (pCi/grams)	Wt mean Activity Uncertainty	Comments
K-40	0.997	4.52E+00	5.10E-01	
CS-137	1.000	3.63E-02	2.00E-02	
PB-212	0.560	1.44E-01	2.18E-02	
BI-214	0.346	1.05E-01	3.49E-02	
PB-214	0.721	1.23E-01	2.61E-02	
RA-226	0.975	4.87E-01	1.97E-01	
AC-228	0.629	1.12E-01	3.35E-02	

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

Errors quoted at 2.000sigma

Analysis Report for L3-012-102-QSGS-008-SG

L3-012-102-SWITCHYARD OPEN LAND

UNIDENTIFIED PEAKS

Peak Locate Performed on : 1/25/2019 9:27:18AM
Peak Locate From Channel : 100
Peak Locate To Channel : 4096

	Peak No.	Energy (keV)	Peak Size (CPS)	Peak CPS (%) Uncertainty	Peak Type	Tolerance Nuclide
F	6	477.66	8.45008E-03	30.09	Sum	
F	7	583.13	2.50780E-02	14.36		
F	10	768.01	6.59110E-03	31.06		

M = First peak in a multiplet region
m = Other peak in a multiplet region
F = Fitted singlet
Errors quoted at 2.000sigma

NUCLIDE MDA REPORT

Nuclide Library Used : C:\Canberra\Apex\Root\Dairyland_NPP\Library\HOTLAB.NLB

	Nuclide Name	Energy (keV)		Yield(%)	Activity (pCi/grams)	Nuclide MDA (pCi/grams)	Line MDA (pCi/grams)
+	K-40	1460.75	*	10.67	4.52E+00	3.89E-01	3.89E-01
+	@ AR-41	1293.64		99.16	1.00E+26	1.00E+26	1.00E+26
+	CO-60	1173.22		100.00	1.91E-02	3.96E-02	4.32E-02
		1332.49		100.00	1.52E-02		3.96E-02
+	KR-85	513.99		0.43	1.36E+01	7.00E+00	7.00E+00
+	Y-88	898.04		93.70	1.15E-02	2.20E-02	3.72E-02
		1836.06		99.20	-1.03E-02		2.20E-02
+	NB-94	702.63		100.00	9.24E-03	2.73E-02	2.73E-02
		871.10		100.00	-8.92E-03		3.21E-02
+	I-131	284.30		6.06	-2.58E-01	5.35E-02	7.28E-01
		364.48		81.20	-7.97E-03		5.35E-02
		636.97		7.27	-6.76E-01		7.05E-01
+	CS-134	604.70		97.60	-1.35E-02	3.39E-02	3.72E-02
		795.84		85.40	-7.01E-02		3.39E-02
+	CS-137	661.65	*	85.12	3.63E-02	3.63E-02	3.63E-02

Analysis Report for L3-012-102-QSGS-008-SG

L3-012-102-SWITCHYARD OPEN LAND

	Nuclide Name	Energy (keV)		Yield(%)	Activity (pCi/grams)	Nuclide MDA (pCi/grams)	Line MDA (pCi/grams)
+	CE-144	80.12		1.36	2.83E-01	1.91E-01	2.45E+00
		133.51		11.09	-6.84E-02		1.91E-01
+	EU-152	121.78		28.40	-2.61E-02	7.39E-02	7.39E-02
		344.28		26.60	-2.57E-02		9.38E-02
		1408.00		20.74	1.77E-02		1.48E-01
+	EU-154	123.07		40.40	9.82E-03	5.21E-02	5.21E-02
		723.30		19.70	8.74E-02		1.42E-01
		1274.51		35.50	3.01E-02		1.07E-01
+	EU-155	86.54		32.80	-3.69E-02	8.55E-02	8.55E-02
		105.31		21.80	7.69E-03		1.05E-01
+	BI-214	609.31	*	46.30	1.05E-01	6.05E-02	6.05E-02
		1120.29		15.10	3.11E-01		3.16E-01
		1238.11		5.94	7.15E-01		7.52E-01
		1377.67		4.11	7.97E-01		8.32E-01
		1407.98		2.48	1.48E-01		1.24E+00
		1509.19		2.19	1.51E+00		1.38E+00
		1764.49		15.80	1.69E-01		2.30E-01
+	PB-214	77.11		10.70	2.97E-01	6.42E-02	3.25E-01
		295.21	*	19.20	1.39E-01		8.11E-02
		351.92	*	37.20	1.08E-01		6.42E-02
+	PA-228	89.95		22.00	2.58E+01	3.28E+01	5.55E+01
		93.35		35.00	-1.10E+01		3.28E+01
		105.00		16.30	-1.99E+01		6.33E+01
		129.22		2.97	-7.88E+01		3.13E+02
		338.32		5.30	-5.24E+01		1.99E+02
		463.00		13.80	1.90E+00		8.05E+01
		911.23		16.70	5.77E+01		1.04E+02
+	AM-241	59.54		36.30	2.04E-02	1.53E-01	1.53E-01
+	CM-243	103.76		23.00	-2.01E-02	1.01E-01	1.01E-01
		228.18		10.60	-1.32E-01		1.95E-01
		277.60		14.00	5.62E-02		1.65E-01

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

Apex-Gamma

Analysis Report for L3-012-102-QSGS-008-SS
L3-012-102-SWITCHYARD OPEN LAND

GAMMA SPECTRUM ANALYSIS

Sample Identification	: L3-012-102-QSGS-008-SS
Sample Description	: L3-012-102-SWITCHYARD OPEN LAND
Sample Type	: 500 ml Marinelli
Unit	:
Sample Point	:
Sample Size	: 1.031E+03 grams
Facility	: Dairyland_NPP
Sample Taken On	: 3/12/2018 1:22:00PM
Acquisition Started	: 3/19/2018 2:52:21PM
Procedure	: 500ml Marinelli
Operator	: Administrator
Detector Name	: HOTLAB
Geometry	: 500ml Marinelli
Live Time	: 3600.0 seconds
Real Time	: 3611.0 seconds
Dead Time	: 0.30 %
Peak Locate Threshold	: 3.00
Peak Locate Range (in channels)	: 100 - 4096
Peak Area Range (in channels)	: 100 - 4096
Identification Energy Tolerance	: 1.000 keV
Energy Calibration Used Done On	: 7/8/2014
Efficiency Calibration Used Done On	: 7/8/2014
Efficiency Calibration Description	:
Sample Number	: 5618

PEAK ANALYSIS REPORT

Peak Analysis Performed on : 1/25/2019 9:28:48AM

Peak Analysis From Channel	: 100
Peak Analysis To Channel	: 4096

Analysis Report for L3-012-102-QSGS-008-SS

L3-012-102-SWITCHYARD OPEN LAND

	Peak No.	Energy (keV)	ROI start	ROI end	Peak Centroid	Net Peak Area	Net Area Uncertainty	Continuum Counts	FWHM (keV)
F	1	186.16	367 -	380	372.82	7.32E+01	30.28	7.57E+02	1.10
F	2	238.70	469 -	485	477.87	3.87E+02	50.18	6.70E+02	2.09
F	3	295.11	587 -	596	590.67	1.21E+02	32.09	3.12E+02	1.64
F	4	337.85	672 -	681	676.14	7.18E+01	27.44	2.37E+02	2.00
F	5	351.99	697 -	711	704.42	1.99E+02	35.87	3.31E+02	1.98
F	6	582.96	1159 -	1173	1166.25	1.12E+02	25.08	1.28E+02	1.83
F	7	609.32	1214 -	1226	1218.98	1.44E+02	28.99	1.41E+02	2.19
F	8	661.55	1317 -	1332	1323.42	1.18E+02	25.97	1.23E+02	2.16
F	9	911.22	1816 -	1829	1822.68	5.54E+01	20.41	9.70E+01	2.43
F	10	969.35	1934 -	1946	1938.92	3.43E+01	16.79	7.94E+01	2.01
F	11	1021.63	2039 -	2049	2043.47	1.96E+01	10.87	3.04E+01	1.28
F	12	1120.08	2235 -	2246	2240.34	3.79E+01	16.21	6.94E+01	1.75
F	13	1332.34	2660 -	2670	2664.82	1.33E+01	10.73	3.69E+01	1.67
F	14	1460.60	2913 -	2930	2921.32	5.34E+02	47.46	3.11E+01	2.53

M = First peak in a multiplet region
m = Other peak in a multiplet region
F = Fitted singlet
Errors quoted at 2.000sigma

BACKGROUND SUBTRACT REPORT

Peak Analysis Performed on : 1/25/2019 9:28:48AM

Env. Background File : C:\Canberra\Apex\Root\Dairyland_NPP\Data\0000001364.CNF

	Peak No.	Energy (keV)	Original Area	Orig. Area Uncertainty	Ambient Background	Backgr. Uncert.	Subtracted Area	Subtracted Uncert.
F	1	186.16	7.32E+01	30.28			7.32E+01	3.03E+01
F	2	238.70	3.87E+02	50.18			3.87E+02	5.02E+01
F	3	295.11	1.21E+02	32.09			1.21E+02	3.21E+01
F	4	337.85	7.18E+01	27.44			7.18E+01	2.74E+01
F	5	351.99	1.99E+02	35.87	8.36E+01	3.72E+01	1.16E+02	5.17E+01
F	6	582.96	1.12E+02	25.08			1.12E+02	2.51E+01
F	7	609.32	1.44E+02	28.99	4.12E+01	2.42E+01	1.03E+02	3.78E+01
F	8	661.55	1.18E+02	25.97	6.61E+01	2.54E+01	5.22E+01	3.63E+01
F	9	911.22	5.54E+01	20.41			5.54E+01	2.04E+01
F	10	969.35	3.43E+01	16.79			3.43E+01	1.68E+01
F	11	1021.63	1.96E+01	10.87			1.96E+01	1.09E+01
F	12	1120.08	3.79E+01	16.21			3.79E+01	1.62E+01
F	13	1332.34	1.33E+01	10.73			1.33E+01	1.07E+01
F	14	1460.60	5.34E+02	47.46	5.63E+01	1.71E+01	4.78E+02	5.05E+01

Analysis Report for L3-012-102-QSGS-008-SS

L3-012-102-SWITCHYARD OPEN LAND

M = First peak in a multiplet region
m = Other peak in a multiplet region
F = Fitted singlet
Errors quoted at 2.000sigma

NUCLIDE IDENTIFICATION REPORT

Nuclide Library Used : C:\Canberra\Apex\Root\Dairyland_NPP\Library\HOTLAB.NLB

IDENTIFIED NUCLIDES

Nuclide Name	Id Confidence	Energy (keV)		Yield(%)	Activity (pCi/grams)	Activity Uncertainty
K-40	0.99	1460.75	*	10.67	5.05E+00	6.03E-01
CS-137	0.99	661.65	*	85.12	3.42E-02	2.39E-02
PB-212	0.56	77.11		17.50		
		238.63	*	44.60	1.94E-01	2.70E-02
BI-214	0.58	609.31	*	46.30	1.15E-01	4.27E-02
		1120.29	*	15.10	2.25E-01	9.67E-02
		1238.11		5.94		
		1377.67		4.11		
		1407.98		2.48		
		1509.19		2.19		
		1764.49		15.80		
PB-214	0.72	77.11		10.70		
		295.21	*	19.20	1.69E-01	4.53E-02
		351.92	*	37.20	9.70E-02	4.36E-02
RA-226	1.00	186.21	*	3.28	4.19E-01	1.75E-01
AC-228	0.61	209.28		4.40		
		338.32	*	11.40	1.89E-01	7.29E-02
		794.70		4.60		
		911.60	*	27.70	1.49E-01	5.53E-02
		964.60		5.20		
		969.11	*	16.60	1.63E-01	8.00E-02

* = Energy line found in the spectrum.
\- = Manually added nuclide.
? = Manually edited nuclide.
@ = Energy line not used for Weighted Mean Activity
Energy Tolerance : 1.000 keV
Nuclide confidence index threshold = 0.30
Errors quoted at 2.000sigma

Analysis Report for L3-012-102-QSGS-008-SS

L3-012-102-SWITCHYARD OPEN LAND

INTERFERENCE CORRECTED REPORT

Nuclide Name	Nuclide Id Confidence	Wt mean Activity (pCi/grams)	Wt mean Activity Uncertainty	Comments
K-40	0.997	5.05E+00	6.03E-01	
CS-137	0.999	3.42E-02	2.39E-02	
PB-212	0.560	1.94E-01	2.70E-02	
BI-214	0.584	1.33E-01	3.91E-02	
PB-214	0.720	1.31E-01	3.14E-02	
RA-226	1.000	4.19E-01	1.75E-01	
AC-228	0.616	1.63E-01	3.86E-02	

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

Errors quoted at 2.000sigma

Analysis Report for L3-012-102-QSGS-008-SS

L3-012-102-SWITCHYARD OPEN LAND

UNIDENTIFIED PEAKS

Peak Locate Performed on : 1/25/2019 9:28:48AM
Peak Locate From Channel : 100
Peak Locate To Channel : 4096

	Peak No.	Energy (keV)	Peak Size (CPS)	Peak CPS (%) Uncertainty	Peak Type	Tolerance Nuclide
F	6	582.96	3.12132E-02	11.16		
F	11	1021.63	5.43329E-03	27.78		
F	13	1332.34	3.68251E-03	40.45		

M = First peak in a multiplet region
m = Other peak in a multiplet region
F = Fitted singlet
Errors quoted at 2.000sigma

NUCLIDE MDA REPORT

Nuclide Library Used : C:\Canberra\Apex\Root\Dairyland_NPP\Library\HOTLAB.NLB

	Nuclide Name	Energy (keV)		Yield(%)	Activity (pCi/grams)	Nuclide MDA (pCi/grams)	Line MDA (pCi/grams)
+	K-40	1460.75	*	10.67	5.05E+00	4.96E-01	4.96E-01
+	@ AR-41	1293.64		99.16	1.00E+26	1.00E+26	1.00E+26
+	CO-60	1173.22		100.00	7.02E-02	4.23E-02	5.49E-02
		1332.49		100.00	4.86E-02		4.23E-02
+	KR-85	513.99		0.43	1.33E+01	8.27E+00	8.27E+00
+	Y-88	898.04		93.70	-2.97E-02	2.81E-02	4.05E-02
		1836.06		99.20	-4.76E-02		2.81E-02
+	NB-94	702.63		100.00	1.28E-02	3.24E-02	3.24E-02
		871.10		100.00	-2.51E-02		3.25E-02
+	I-131	284.30		6.06	-1.27E-01	6.25E-02	8.02E-01
		364.48		81.20	-1.24E-02		6.25E-02
		636.97		7.27	-1.29E-01		7.97E-01
+	CS-134	604.70		97.60	-4.26E-02	4.12E-02	4.50E-02
		795.84		85.40	1.61E-02		4.12E-02
+	CS-137	661.65	*	85.12	3.42E-02	4.57E-02	4.57E-02

Analysis Report for L3-012-102-QSGS-008-SS

L3-012-102-SWITCHYARD OPEN LAND

	Nuclide Name	Energy (keV)		Yield(%)	Activity (pCi/grams)	Nuclide MDA (pCi/grams)	Line MDA (pCi/grams)
+	CE-144	80.12		1.36	2.48E+00	2.35E-01	2.95E+00
		133.51		11.09	1.41E-01		2.35E-01
+	EU-152	121.78		28.40	-2.91E-03	8.84E-02	8.84E-02
		344.28		26.60	-1.83E-02		1.13E-01
		1408.00		20.74	1.98E-01		1.91E-01
+	EU-154	123.07		40.40	-3.80E-02	6.16E-02	6.16E-02
		723.30		19.70	9.19E-02		1.81E-01
		1274.51		35.50	-7.07E-02		1.24E-01
+	EU-155	86.54		32.80	-1.16E-02	1.03E-01	1.03E-01
		105.31		21.80	-9.88E-03		1.25E-01
+	BI-214	609.31	*	46.30	1.15E-01	7.41E-02	7.41E-02
		1120.29	*	15.10	2.25E-01		1.99E-01
		1238.11		5.94	6.87E-01		9.80E-01
		1377.67		4.11	2.41E-01		9.12E-01
		1407.98		2.48	1.65E+00		1.60E+00
		1509.19		2.19	4.33E-02		1.40E+00
		1764.49		15.80	3.60E-01		2.78E-01
+	PB-214	77.11		10.70	3.30E-01	8.54E-02	3.92E-01
		295.21	*	19.20	1.69E-01		9.00E-02
		351.92	*	37.20	9.70E-02		8.54E-02
+	PA-228	89.95		22.00	2.62E+01	1.83E+01	3.10E+01
		93.35		35.00	-1.76E+00		1.83E+01
		105.00		16.30	1.29E+01		3.58E+01
		129.22		2.97	1.33E+02		1.81E+02
		338.32		5.30	8.87E+01		1.17E+02
		463.00		13.80	-7.36E-01		4.42E+01
		911.23		16.70	4.58E+01		5.96E+01
+	AM-241	59.54		36.30	3.24E-02	1.83E-01	1.83E-01
+	CM-243	103.76		23.00	1.03E-01	1.21E-01	1.21E-01
		228.18		10.60	5.14E-03		2.42E-01
		277.60		14.00	-4.12E-03		1.97E-01

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

Apex-Gamma

Analysis Report for L3-012-102-FSGS-008-SS
L3-012-102-SWITCHYARD OPEN LAND

GAMMA SPECTRUM ANALYSIS

Sample Identification	: L3-012-102-FSGS-008-SS
Sample Description	: L3-012-102-SWITCHYARD OPEN LAND
Sample Type	: 500 ml Marinelli
Unit	:
Sample Point	:
Sample Size	: 9.798E+02 grams
Facility	: Dairyland_NPP
Sample Taken On	: 3/12/2018 1:09:00PM
Acquisition Started	: 3/19/2018 10:10:22AM
Procedure	: 500ml Marinelli
Operator	: Administrator
Detector Name	: HOTLAB
Geometry	: 500ml Marinelli
Live Time	: 3600.0 seconds
Real Time	: 3610.6 seconds
Dead Time	: 0.29 %
Peak Locate Threshold	: 3.00
Peak Locate Range (in channels)	: 100 - 4096
Peak Area Range (in channels)	: 100 - 4096
Identification Energy Tolerance	: 1.000 keV
Energy Calibration Used Done On	: 7/8/2014
Efficiency Calibration Used Done On	: 7/8/2014
Efficiency Calibration Description	:
Sample Number	: 5620

PEAK ANALYSIS REPORT

Peak Analysis Performed on : 1/25/2019 9:29:59AM

Peak Analysis From Channel	: 100
Peak Analysis To Channel	: 4096

Analysis Report for L3-012-102-FSGS-008-SS

L3-012-102-SWITCHYARD OPEN LAND

	Peak No.	Energy (keV)	ROI start	ROI end	Peak Centroid	Net Peak Area	Net Area Uncertainty	Continuum Counts	FWHM (keV)
M	1	238.42	473 -	492	477.31	3.18E+02	44.93	4.03E+02	1.75
m	2	241.77	473 -	492	484.00	9.22E+01	29.78	4.68E+02	1.75
F	3	295.16	583 -	595	590.78	1.03E+02	31.91	4.52E+02	1.61
F	4	338.36	673 -	682	677.16	4.19E+01	20.76	2.43E+02	1.02
F	5	351.71	697 -	712	703.85	1.87E+02	34.62	4.20E+02	1.55
F	6	510.30	1014 -	1029	1020.98	6.50E+01	24.17	2.19E+02	2.14
F	7	583.11	1162 -	1173	1166.56	8.83E+01	23.54	1.13E+02	1.87
F	8	609.15	1212 -	1225	1218.64	1.83E+02	30.35	1.30E+02	1.71
F	9	661.57	1318 -	1328	1323.46	1.14E+02	26.36	1.13E+02	1.91
F	10	910.97	1816 -	1830	1822.17	7.09E+01	21.68	1.13E+02	2.16
F	11	968.69	1933 -	1943	1937.61	2.97E+01	14.02	7.94E+01	0.99
F	12	1460.65	2913 -	2929	2921.41	5.09E+02	45.83	3.34E+01	2.63

M = First peak in a multiplet region
m = Other peak in a multiplet region
F = Fitted singlet
Errors quoted at 2.000sigma

BACKGROUND SUBTRACT REPORT

Peak Analysis Performed on : 1/25/2019 9:29:59AM

Env. Background File : C:\Canberra\Apex\Root\Dairyland_NPP\Data\0000001364.CNF

	Peak No.	Energy (keV)	Original Area	Orig. Area Uncertainty	Ambient Background	Backgr. Uncert.	Subtracted Area	Subtracted Uncert.
M	1	238.42	3.18E+02	44.93			3.18E+02	4.49E+01
m	2	241.77	9.22E+01	29.78			9.22E+01	2.98E+01
F	3	295.16	1.03E+02	31.91			1.03E+02	3.19E+01
F	4	338.36	4.19E+01	20.76			4.19E+01	2.08E+01
F	5	351.71	1.87E+02	34.62	8.36E+01	3.72E+01	1.03E+02	5.08E+01
F	6	510.30	6.50E+01	24.17			6.50E+01	2.42E+01
F	7	583.11	8.83E+01	23.54			8.83E+01	2.35E+01
F	8	609.15	1.83E+02	30.35	4.12E+01	2.42E+01	1.42E+02	3.88E+01
F	9	661.57	1.14E+02	26.36	6.61E+01	2.54E+01	4.82E+01	3.66E+01
F	10	910.97	7.09E+01	21.68			7.09E+01	2.17E+01
F	11	968.69	2.97E+01	14.02			2.97E+01	1.40E+01
F	12	1460.65	5.09E+02	45.83	5.63E+01	1.71E+01	4.53E+02	4.89E+01

Analysis Report for L3-012-102-FSGS-008-SS

L3-012-102-SWITCHYARD OPEN LAND

M = First peak in a multiplet region
m = Other peak in a multiplet region
F = Fitted singlet
Errors quoted at 2.000sigma

NUCLIDE IDENTIFICATION REPORT

Nuclide Library Used : C:\Canberra\Apex\Root\Dairyland_NPP\Library\HOTLAB.NLB

IDENTIFIED NUCLIDES

Nuclide Name	Id Confidence	Energy (keV)		Yield(%)	Activity (pCi/grams)	Activity Uncertainty
K-40	0.99	1460.75	*	10.67	5.03E+00	6.11E-01
CS-137	0.99	661.65	*	85.12	3.32E-02	2.53E-02
PB-212	0.55	77.11		17.50		
		238.63	*	44.60	1.67E-01	2.52E-02
BI-214	0.34	609.31	*	46.30	1.67E-01	4.66E-02
		1120.29		15.10		
		1238.11		5.94		
		1377.67		4.11		
		1407.98		2.48		
		1509.19		2.19		
		1764.49		15.80		
PB-214	0.71	77.11		10.70		
		295.21	*	19.20	1.50E-01	4.72E-02
		351.92	*	37.20	9.08E-02	4.50E-02
AC-228	0.60	209.28		4.40		
		338.32	*	11.40	1.16E-01	5.79E-02
		794.70		4.60		
		911.60	*	27.70	2.01E-01	6.20E-02
		964.60		5.20		
		969.11	*	16.60	1.48E-01	7.02E-02

* = Energy line found in the spectrum.
\- = Manually added nuclide.
? = Manually edited nuclide.
@ = Energy line not used for Weighted Mean Activity
Energy Tolerance : 1.000 keV
Nuclide confidence index threshold = 0.30
Errors quoted at 2.000sigma

Analysis Report for L3-012-102-FSGS-008-SS

L3-012-102-SWITCHYARD OPEN LAND

INTERFERENCE CORRECTED REPORT

Nuclide Name	Nuclide Id Confidence	Wt mean Activity (pCi/grams)	Wt mean Activity Uncertainty	Comments
K-40	0.998	5.03E+00	6.11E-01	
CS-137	0.999	3.32E-02	2.53E-02	
PB-212	0.555	1.67E-01	2.52E-02	
BI-214	0.348	1.67E-01	4.66E-02	
PB-214	0.717	1.19E-01	3.26E-02	
AC-228	0.601	1.54E-01	3.62E-02	

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

Errors quoted at 2.000sigma

Analysis Report for L3-012-102-FSGS-008-SS

L3-012-102-SWITCHYARD OPEN LAND

UNIDENTIFIED PEAKS

Peak Locate Performed on : 1/25/2019 9:29:59AM
Peak Locate From Channel : 100
Peak Locate To Channel : 4096

	Peak No.	Energy (keV)	Peak Size (CPS)	Peak CPS (%) Uncertainty	Peak Type	Tolerance Nuclide
m	2	241.77	2.56035E-02	16.15		
F	6	510.30	1.80493E-02	18.60		
F	7	583.11	2.45254E-02	13.33		

M = First peak in a multiplet region
m = Other peak in a multiplet region
F = Fitted singlet
Errors quoted at 2.000sigma

NUCLIDE MDA REPORT

Nuclide Library Used : C:\Canberra\Apex\Root\Dairyland_NPP\Library\HOTLAB.NLB

		Nuclide Name	Energy (keV)		Yield(%)	Activity (pCi/grams)	Nuclide MDA (pCi/grams)	Line MDA (pCi/grams)
+		K-40	1460.75	*	10.67	5.03E+00	5.23E-01	5.23E-01
+	@	AR-41	1293.64		99.16	1.00E+26	1.00E+26	1.00E+26
+		CO-60	1173.22		100.00	5.85E-03	4.96E-02	5.48E-02
			1332.49		100.00	9.90E-04		4.96E-02
+		KR-85	513.99		0.43	1.16E+01	8.67E+00	8.67E+00
+		Y-88	898.04		93.70	-7.32E-03	2.95E-02	4.09E-02
			1836.06		99.20	-4.95E-03		2.95E-02
+		NB-94	702.63		100.00	-1.26E-02	3.58E-02	3.58E-02
			871.10		100.00	-1.58E-02		3.65E-02
+		I-131	284.30		6.06	-4.56E-01	6.86E-02	8.29E-01
			364.48		81.20	3.19E-02		6.86E-02
			636.97		7.27	6.94E-01		8.38E-01
+		CS-134	604.70		97.60	-1.40E-03	4.69E-02	4.93E-02

Analysis Report for L3-012-102-FSGS-008-SS

L3-012-102-SWITCHYARD OPEN LAND

	Nuclide Name	Energy (keV)		Yield(%)	Activity (pCi/grams)	Nuclide MDA (pCi/grams)	Line MDA (pCi/grams)
	CS-134	795.84		85.40	-1.03E-03	4.69E-02	4.69E-02
+	CS-137	661.65	*	85.12	3.32E-02	4.51E-02	4.51E-02
+	CE-144	80.12		1.36	4.04E-01	2.41E-01	3.05E+00
		133.51		11.09	8.54E-02		2.41E-01
+	EU-152	121.78		28.40	-4.98E-02	9.25E-02	9.25E-02
		344.28		26.60	2.90E-02		1.17E-01
		1408.00		20.74	1.44E-01		1.98E-01
+	EU-154	123.07		40.40	-1.14E-02	6.49E-02	6.49E-02
		723.30		19.70	1.25E-01		2.06E-01
		1274.51		35.50	-1.79E-01		1.21E-01
+	EU-155	86.54		32.80	-4.34E-02	1.06E-01	1.06E-01
		105.31		21.80	8.92E-02		1.31E-01
+	BI-214	609.31	*	46.30	1.67E-01	7.74E-02	7.74E-02
		1120.29		15.10	1.28E-01		3.50E-01
		1238.11		5.94	-2.30E-01		9.93E-01
		1377.67		4.11	9.50E-01		1.10E+00
		1407.98		2.48	1.21E+00		1.65E+00
		1509.19		2.19	-1.53E-01		1.52E+00
		1764.49		15.80	4.39E-01		3.43E-01
+	PB-214	77.11		10.70	5.83E-01	9.69E-02	4.12E-01
		295.21	*	19.20	1.50E-01		1.21E-01
		351.92	*	37.20	9.08E-02		9.69E-02
+	PA-228	89.95		22.00	4.21E+01	1.66E+01	2.82E+01
		93.35		35.00	3.09E+00		1.66E+01
		105.00		16.30	2.83E+01		3.23E+01
		129.22		2.97	-8.22E+01		1.60E+02
		338.32		5.30	2.19E+01		1.04E+02
		463.00		13.80	3.19E+01		4.30E+01
		911.23		16.70	4.51E+01		5.63E+01
+	AM-241	59.54		36.30	-2.03E-02	1.93E-01	1.93E-01
+	CM-243	103.76		23.00	2.83E-02	1.24E-01	1.24E-01
		228.18		10.60	-3.31E-02		2.46E-01
		277.60		14.00	-8.20E-02		2.02E-01

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

Apex-Gamma

Analysis Report for L3-012-102-FSGS-009-SG

L3-012-102 SWITCHYARD OPEN LAND

GAMMA SPECTRUM ANALYSIS

Sample Identification	: L3-012-102-FSGS-009-SG
Sample Description	: L3-012-102 SWITCHYARD OPEN LAND
Sample Type	: 500 ml Marinelli
Unit	:
Sample Point	:
Sample Size	: 1.081E+03 grams
Facility	: Dairyland_NPP
Sample Taken On	: 2/27/2018 2:46:00PM
Acquisition Started	: 3/15/2018 5:42:11AM
Procedure	: 500ml Marinelli
Operator	: Administrator
Detector Name	: HOTLAB
Geometry	: 500ml Marinelli
Live Time	: 3600.0 seconds
Real Time	: 3610.9 seconds
Dead Time	: 0.30 %
Peak Locate Threshold	: 3.00
Peak Locate Range (in channels)	: 100 - 4096
Peak Area Range (in channels)	: 100 - 4096
Identification Energy Tolerance	: 1.000 keV
Energy Calibration Used Done On	: 7/8/2014
Efficiency Calibration Used Done On	: 7/8/2014
Efficiency Calibration Description	:
Sample Number	: 5622

PEAK ANALYSIS REPORT

Peak Analysis Performed on : 1/25/2019 9:33:08AM

Peak Analysis From Channel	: 100
Peak Analysis To Channel	: 4096

Analysis Report for L3-012-102-FSGS-009-SG

L3-012-102 SWITCHYARD OPEN LAND

	Peak No.	Energy (keV)	ROI start	ROI end	Peak Centroid	Net Peak Area	Net Area Uncertainty	Continuum Counts	FWHM (keV)
F	1	76.36	147 -	159	153.26	2.34E+02	63.31	1.37E+03	3.12
M	2	238.66	474 -	492	477.79	2.16E+02	40.13	4.62E+02	1.61
m	3	241.75	474 -	492	483.98	1.11E+02	31.90	4.64E+02	1.61
F	4	294.98	583 -	598	590.41	2.12E+02	39.57	5.40E+02	1.90
F	5	351.86	698 -	711	704.15	3.56E+02	43.97	3.66E+02	1.66
F	6	583.08	1163 -	1171	1166.50	6.36E+01	22.33	1.22E+02	1.84
F	7	609.12	1212 -	1225	1218.57	2.54E+02	35.12	1.19E+02	2.10
F	8	661.45	1316 -	1331	1323.22	6.87E+02	55.43	1.41E+02	1.89
F	9	911.80	1817 -	1828	1823.84	2.54E+01	13.39	7.75E+01	0.87
F	10	968.87	1933 -	1943	1937.96	1.94E+01	14.02	7.59E+01	1.55
F	11	1120.29	2235 -	2246	2240.75	3.19E+01	13.44	4.20E+01	1.34
F	12	1460.49	2913 -	2930	2921.10	2.65E+02	33.52	2.70E+01	2.61

M = First peak in a multiplet region
m = Other peak in a multiplet region
F = Fitted singlet
Errors quoted at 2.000sigma

BACKGROUND SUBTRACT REPORT

Peak Analysis Performed on : 1/25/2019 9:33:08AM

Env. Background File : C:\Canberra\Apex\Root\Dairyland_NPP\Data\0000001364.CNF

	Peak No.	Energy (keV)	Original Area	Orig. Area Uncertainty	Ambient Background	Backgr. Uncert.	Subtracted Area	Subtracted Uncert.
F	1	76.36	2.34E+02	63.31			2.34E+02	6.33E+01
M	2	238.66	2.16E+02	40.13			2.16E+02	4.01E+01
m	3	241.75	1.11E+02	31.90			1.11E+02	3.19E+01
F	4	294.98	2.12E+02	39.57			2.12E+02	3.96E+01
F	5	351.86	3.56E+02	43.97	8.36E+01	3.72E+01	2.72E+02	5.76E+01
F	6	583.08	6.36E+01	22.33			6.36E+01	2.23E+01
F	7	609.12	2.54E+02	35.12	4.12E+01	2.42E+01	2.13E+02	4.27E+01
F	8	661.45	6.87E+02	55.43	6.61E+01	2.54E+01	6.21E+02	6.10E+01
F	9	911.80	2.54E+01	13.39			2.54E+01	1.34E+01
F	10	968.87	1.94E+01	14.02			1.94E+01	1.40E+01
F	11	1120.29	3.19E+01	13.44			3.19E+01	1.34E+01
F	12	1460.49	2.65E+02	33.52	5.63E+01	1.71E+01	2.08E+02	3.76E+01

Analysis Report for L3-012-102-FSGS-009-SG

L3-012-102 SWITCHYARD OPEN LAND

M = First peak in a multiplet region
m = Other peak in a multiplet region
F = Fitted singlet
Errors quoted at 2.000sigma

NUCLIDE IDENTIFICATION REPORT

Nuclide Library Used : C:\Canberra\Apex\Root\Dairyland_NPP\Library\HOTLAB.NLB

IDENTIFIED NUCLIDES

Nuclide Name	Id Confidence	Energy (keV)		Yield(%)	Activity (pCi/grams)	Activity Uncertainty
K-40	0.98	1460.75	*	10.67	2.10E+00	3.97E-01
CS-137	0.99	661.65	*	85.12	3.88E-01	4.35E-02
PB-212	0.97	77.11	*	17.50	3.10E-01	8.62E-02
		238.63	*	44.60	1.03E-01	1.99E-02
BI-214	0.58	609.31	*	46.30	2.27E-01	4.72E-02
		1120.29	*	15.10	1.80E-01	7.64E-02
		1238.11		5.94		
		1377.67		4.11		
		1407.98		2.48		
		1509.19		2.19		
		1764.49		15.80		
PB-214	0.98	77.11	*	10.70	5.07E-01	1.41E-01
		295.21	*	19.20	2.81E-01	5.41E-02
		351.92	*	37.20	2.17E-01	4.72E-02

* = Energy line found in the spectrum.
\- = Manually added nuclide.
? = Manually edited nuclide.
@ = Energy line not used for Weighted Mean Activity
Energy Tolerance : 1.000 keV
Nuclide confidence index threshold = 0.30
Errors quoted at 2.000sigma

INTERFERENCE CORRECTED REPORT

Analysis Report for L3-012-102-FSGS-009-SG

L3-012-102 SWITCHYARD OPEN LAND

Nuclide Name	Nuclide Id Confidence	Wt mean Activity (pCi/grams)	Wt mean Activity Uncertainty	Comments
K-40	0.989	2.10E+00	3.97E-01	
CS-137	0.994	3.88E-01	4.35E-02	
PB-212	0.975	1.06E-01	1.94E-02	
BI-214	0.582	2.14E-01	4.01E-02	
PB-214	0.983	2.50E-01	3.46E-02	

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

Errors quoted at 2.000sigma

Analysis Report for L3-012-102-FSGS-009-SG

L3-012-102 SWITCHYARD OPEN LAND

UNIDENTIFIED PEAKS

Peak Locate Performed on : 1/25/2019 9:33:08AM
Peak Locate From Channel : 100
Peak Locate To Channel : 4096

	Peak No.	Energy (keV)	Peak Size (CPS)	Peak CPS (%) Uncertainty	Peak Type	Tolerance Nuclide
m	3	241.75	3.08584E-02	14.36		
F	6	583.08	1.76745E-02	17.54		
F	9	911.80	7.04549E-03	26.41	Tol.	AC-228 PA-228
F	10	968.87	5.37824E-03	36.21	Tol.	AC-228

M = First peak in a multiplet region
m = Other peak in a multiplet region
F = Fitted singlet
Errors quoted at 2.000sigma

NUCLIDE MDA REPORT

Nuclide Library Used : C:\Canberra\Apex\Root\Dairyland_NPP\Library\HOTLAB.NLB

	Nuclide Name	Energy (keV)		Yield(%)	Activity (pCi/grams)	Nuclide MDA (pCi/grams)	Line MDA (pCi/grams)
+	K-40	1460.75	*	10.67	2.10E+00	4.64E-01	4.64E-01
+	@ AR-41	1293.64		99.16	1.00E+26	1.00E+26	1.00E+26
+	CO-60	1173.22		100.00	4.97E-02	4.19E-02	4.46E-02
		1332.49		100.00	3.25E-02		4.19E-02
+	KR-85	513.99		0.43	1.33E+01	8.16E+00	8.16E+00
+	Y-88	898.04		93.70	-5.42E-02	3.01E-02	3.76E-02
		1836.06		99.20	-2.21E-02		3.01E-02
+	NB-94	702.63		100.00	1.55E-02	2.99E-02	2.99E-02
		871.10		100.00	-1.49E-02		3.01E-02

Analysis Report for L3-012-102-FSGS-009-SG

L3-012-102 SWITCHYARD OPEN LAND

	Nuclide Name	Energy (keV)		Yield(%)	Activity (pCi/grams)	Nuclide MDA (pCi/grams)	Line MDA (pCi/grams)
+	I-131	284.30		6.06	-8.49E-01	1.29E-01	1.70E+00
		364.48		81.20	-2.46E-02		1.29E-01
		636.97		7.27	-3.06E-02		1.46E+00
+	CS-134	604.70		97.60	8.13E-03	3.90E-02	5.04E-02
		795.84		85.40	-5.21E-02		3.90E-02
+	CS-137	661.65	*	85.12	3.88E-01	4.49E-02	4.49E-02
+	CE-144	80.12		1.36	-1.40E+00	2.33E-01	2.93E+00
		133.51		11.09	-2.45E-01		2.33E-01
+	EU-152	121.78		28.40	-2.13E-02	8.79E-02	8.79E-02
		344.28		26.60	3.78E-02		1.13E-01
		1408.00		20.74	6.27E-02		1.91E-01
+	EU-154	123.07		40.40	-4.59E-04	6.20E-02	6.20E-02
		723.30		19.70	9.14E-02		1.64E-01
		1274.51		35.50	-1.79E-02		1.06E-01
+	EU-155	86.54		32.80	-1.23E-02	9.96E-02	9.96E-02
		105.31		21.80	4.16E-02		1.20E-01
+	BI-214	609.31	*	46.30	2.27E-01	6.86E-02	6.86E-02
		1120.29	*	15.10	1.80E-01		1.51E-01
		1238.11		5.94	6.09E-01		7.35E-01
		1377.67		4.11	1.08E+00		8.69E-01
		1407.98		2.48	5.23E-01		1.59E+00
		1509.19		2.19	-1.46E-01		1.38E+00
		1764.49		15.80	3.60E-01		2.84E-01
+	PB-214	77.11	*	10.70	5.07E-01	8.25E-02	3.09E-01
		295.21	*	19.20	2.81E-01		1.28E-01
		351.92	*	37.20	2.17E-01		8.25E-02
+	PA-228	89.95		22.00	2.34E+04	1.14E+04	1.95E+04
		93.35		35.00	-1.74E+03		1.14E+04
		105.00		16.30	-3.63E+03		2.18E+04
		129.22		2.97	-4.97E+04		1.15E+05
		338.32		5.30	4.96E+04		7.40E+04
		463.00		13.80	-7.77E+03		3.29E+04
		911.23		16.70	2.12E+04		3.34E+04
+	AM-241	59.54		36.30	3.01E-03	1.77E-01	1.77E-01
+	CM-243	103.76		23.00	3.93E-02	1.14E-01	1.14E-01
		228.18		10.60	-4.22E-02		2.35E-01
		277.60		14.00	-8.04E-03		1.96E-01

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

Analysis Report for L3-012-102-FSGS-009-SG

L3-012-102 SWITCHYARD OPEN LAND

Apex-Gamma

Analysis Report for L3-012-102-FSGS-009-SS

L3-012-102 SWITCHYARD OPEN LAND

GAMMA SPECTRUM ANALYSIS

Sample Identification	: L3-012-102-FSGS-009-SS
Sample Description	: L3-012-102 SWITCHYARD OPEN LAND
Sample Type	: 500 ml Marinelli
Unit	:
Sample Point	:
Sample Size	: 9.672E+02 grams
Facility	: Dairyland_NPP
Sample Taken On	: 2/27/2018 2:48:00PM
Acquisition Started	: 3/14/2018 5:43:42AM
Procedure	: 500ml Marinelli
Operator	: Administrator
Detector Name	: HOTLAB
Geometry	: 500ml Marinelli
Live Time	: 3600.0 seconds
Real Time	: 3610.9 seconds
Dead Time	: 0.30 %
Peak Locate Threshold	: 3.00
Peak Locate Range (in channels)	: 100 - 4096
Peak Area Range (in channels)	: 100 - 4096
Identification Energy Tolerance	: 1.000 keV
Energy Calibration Used Done On	: 7/8/2014
Efficiency Calibration Used Done On	: 7/8/2014
Efficiency Calibration Description	:
Sample Number	: 5624

PEAK ANALYSIS REPORT

Peak Analysis Performed on : 1/25/2019 9:34:45AM

Peak Analysis From Channel : 100

Peak Analysis To Channel : 4096

Analysis Report for L3-012-102-FSGS-009-SS

L3-012-102 SWITCHYARD OPEN LAND

	Peak No.	Energy (keV)	ROI start	ROI end	Peak Centroid	Net Peak Area	Net Area Uncertainty	Continuum Counts	FWHM (keV)
F	1	76.79	147 -	159	154.13	1.36E+02	49.08	1.40E+03	1.64
F	2	93.18	183 -	193	186.90	8.54E+01	40.06	9.47E+02	1.35
F	3	185.42	367 -	378	371.34	1.19E+02	40.75	7.67E+02	1.83
F	4	238.46	469 -	481	477.40	1.15E+02	39.18	8.42E+02	1.36
F	5	295.18	587 -	598	590.81	1.69E+02	35.63	4.39E+02	1.52
M	6	351.87	698 -	721	704.17	3.24E+02	41.46	2.44E+02	1.87
m	7	356.96	698 -	721	714.35	4.02E+01	20.57	2.18E+02	1.87
F	8	582.80	1158 -	1171	1165.95	6.61E+01	22.18	1.32E+02	2.03
F	9	609.17	1213 -	1225	1218.67	2.05E+02	31.75	1.12E+02	1.79
F	10	661.47	1316 -	1329	1323.26	5.59E+02	50.77	1.49E+02	1.90
F	11	911.31	1817 -	1830	1822.86	4.54E+01	16.21	4.98E+01	1.89
F	12	1119.92	2234 -	2245	2240.02	3.96E+01	16.35	4.83E+01	2.17
F	13	1332.04	2658 -	2669	2664.22	2.60E+01	12.09	1.73E+01	2.38
F	14	1460.58	2913 -	2929	2921.28	2.54E+02	32.45	2.14E+01	2.67
F	15	1764.14	3521 -	3535	3528.35	5.36E+01	15.44	7.57E+00	2.78

M = First peak in a multiplet region
m = Other peak in a multiplet region
F = Fitted singlet
Errors quoted at 2.000sigma

BACKGROUND SUBTRACT REPORT

Peak Analysis Performed on : 1/25/2019 9:34:45AM

Env. Background File : C:\Canberra\Apex\Root\Dairyland_NPP\Data\0000001364.CNF

	Peak No.	Energy (keV)	Original Area	Orig. Area Uncertainty	Ambient Background	Backgr. Uncert.	Subtracted Area	Subtracted Uncert.
F	1	76.79	1.36E+02	49.08			1.36E+02	4.91E+01
F	2	93.18	8.54E+01	40.06			8.54E+01	4.01E+01
F	3	185.42	1.19E+02	40.75			1.19E+02	4.07E+01
F	4	238.46	1.15E+02	39.18			1.15E+02	3.92E+01
F	5	295.18	1.69E+02	35.63			1.69E+02	3.56E+01
M	6	351.87	3.24E+02	41.46	8.36E+01	3.72E+01	2.41E+02	5.57E+01
m	7	356.96	4.02E+01	20.57			4.02E+01	2.06E+01
F	8	582.80	6.61E+01	22.18			6.61E+01	2.22E+01
F	9	609.17	2.05E+02	31.75	4.12E+01	2.42E+01	1.64E+02	3.99E+01
F	10	661.47	5.59E+02	50.77	6.61E+01	2.54E+01	4.93E+02	5.68E+01
F	11	911.31	4.54E+01	16.21			4.54E+01	1.62E+01
F	12	1119.92	3.96E+01	16.35			3.96E+01	1.64E+01
F	13	1332.04	2.60E+01	12.09			2.60E+01	1.21E+01
F	14	1460.58	2.54E+02	32.45	5.63E+01	1.71E+01	1.97E+02	3.67E+01

Analysis Report for L3-012-102-FSGS-009-SS

L3-012-102 SWITCHYARD OPEN LAND

	Peak No.	Energy (keV)	Original Area	Orig. Area Uncertainty	Ambient Background	Backgr. Uncert.	Subtracted Area	Subtracted Uncert.
F	15	1764.14	5.36E+01	15.44	1.52E+01	9.80E+00	3.84E+01	1.83E+01

M = First peak in a multiplet region
m = Other peak in a multiplet region
F = Fitted singlet
Errors quoted at 2.000sigma

NUCLIDE IDENTIFICATION REPORT

Nuclide Library Used : C:\Canberra\Apex\Root\Dairyland_NPP\Library\HOTLAB.NLB

IDENTIFIED NUCLIDES

Nuclide Name	Id Confidence	Energy (keV)		Yield(%)	Activity (pCi/grams)	Activity Uncertainty
K-40	0.99	1460.75	*	10.67	2.22E+00	4.31E-01
CS-137	0.99	661.65	*	85.12	3.44E-01	4.38E-02
PB-212	0.99	77.11	*	17.50	1.99E-01	7.31E-02
		238.63	*	44.60	6.12E-02	2.11E-02
BI-214	0.77	609.31	*	46.30	1.95E-01	4.88E-02
		1120.29	*	15.10	2.50E-01	1.04E-01
		1238.11		5.94		
		1377.67		4.11		
		1407.98		2.48		
		1509.19		2.19		
		1764.49	*	15.80	3.42E-01	1.64E-01
PB-214	0.99	77.11	*	10.70	3.26E-01	1.20E-01
		295.21	*	19.20	2.50E-01	5.41E-02
		351.92	*	37.20	2.15E-01	5.09E-02
RA-226	0.90	186.21	*	3.28	7.26E-01	2.51E-01

* = Energy line found in the spectrum.
\- = Manually added nuclide.
? = Manually edited nuclide.
@ = Energy line not used for Weighted Mean Activity
Energy Tolerance : 1.000 keV
Nuclide confidence index threshold = 0.30
Errors quoted at 2.000sigma

Analysis Report for L3-012-102-FSGS-009-SS

L3-012-102 SWITCHYARD OPEN LAND

INTERFERENCE CORRECTED REPORT

Nuclide Name	Nuclide Id Confidence	Wt mean Activity (pCi/grams)	Wt mean Activity Uncertainty	Comments
K-40	0.996	2.22E+00	4.31E-01	
CS-137	0.995	3.44E-01	4.38E-02	
PB-212	0.992	6.10E-02	2.04E-02	
BI-214	0.779	2.14E-01	4.26E-02	
PB-214	0.997	2.31E-01	3.55E-02	
RA-226	0.905	7.26E-01	2.51E-01	

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

Errors quoted at 2.000sigma

Analysis Report for L3-012-102-FSGS-009-SS

L3-012-102 SWITCHYARD OPEN LAND

UNIDENTIFIED PEAKS

Peak Locate Performed on : 1/25/2019 9:34:45AM
Peak Locate From Channel : 100
Peak Locate To Channel : 4096

	Peak No.	Energy (keV)	Peak Size (CPS)	Peak CPS (%) Uncertainty	Peak Type	Tolerance Nuclide
F	2	93.18	2.37116E-02	23.47	Tol.	PA-228
m	7	356.96	1.11557E-02	25.61		
F	8	582.80	1.83589E-02	16.78		
F	11	911.31	1.26008E-02	17.87	Tol.	AC-228 PA-228
F	13	1332.04	7.22429E-03	23.25	Tol.	CO-60

M = First peak in a multiplet region
m = Other peak in a multiplet region
F = Fitted singlet
Errors quoted at 2.000sigma

NUCLIDE MDA REPORT

Nuclide Library Used : C:\Canberra\Apex\Root\Dairyland_NPP\Library\HOTLAB.NLB

	Nuclide Name	Energy (keV)		Yield(%)	Activity (pCi/grams)	Nuclide MDA (pCi/grams)	Line MDA (pCi/grams)
+	K-40	1460.75	*	10.67	2.22E+00	5.04E-01	5.04E-01
+	@ AR-41	1293.64		99.16	1.00E+26	1.00E+26	1.00E+26
+	CO-60	1173.22		100.00	3.13E-02	4.53E-02	4.53E-02
		1332.49		100.00	2.58E-02		4.65E-02
+	KR-85	513.99		0.43	8.00E+00	8.84E+00	8.84E+00
+	Y-88	898.04		93.70	-2.18E-02	3.34E-02	4.01E-02
		1836.06		99.20	-8.60E-03		3.34E-02

Analysis Report for L3-012-102-FSGS-009-SS

L3-012-102 SWITCHYARD OPEN LAND

	Nuclide Name	Energy (keV)		Yield(%)	Activity (pCi/grams)	Nuclide MDA (pCi/grams)	Line MDA (pCi/grams)
+	NB-94	702.63		100.00	-2.14E-02	3.12E-02	3.12E-02
		871.10		100.00	-1.16E-02		3.65E-02
+	I-131	284.30		6.06	9.46E-02	1.33E-01	1.75E+00
		364.48		81.20	3.69E-02		1.33E-01
		636.97		7.27	-7.47E-01		1.56E+00
+	CS-134	604.70		97.60	-2.81E-02	3.99E-02	5.00E-02
		795.84		85.40	-4.87E-02		3.99E-02
+	CS-137	661.65	*	85.12	3.44E-01	4.97E-02	4.97E-02
+	CE-144	80.12		1.36	-4.33E-04	2.51E-01	3.25E+00
		133.51		11.09	-1.44E-01		2.51E-01
+	EU-152	121.78		28.40	5.65E-03	9.63E-02	9.63E-02
		344.28		26.60	1.02E-02		1.27E-01
		1408.00		20.74	9.29E-02		2.06E-01
+	EU-154	123.07		40.40	4.00E-02	6.81E-02	6.81E-02
		723.30		19.70	1.53E-01		1.80E-01
		1274.51		35.50	-5.41E-02		9.70E-02
+	EU-155	86.54		32.80	1.99E-02	1.09E-01	1.09E-01
		105.31		21.80	1.43E-02		1.29E-01
+	BI-214	609.31	*	46.30	1.95E-01	7.49E-02	7.49E-02
		1120.29	*	15.10	2.50E-01		1.81E-01
		1238.11		5.94	1.16E-01		8.60E-01
		1377.67		4.11	3.48E-02		9.90E-01
		1407.98		2.48	7.75E-01		1.72E+00
		1509.19		2.19	4.37E-01		1.54E+00
		1764.49	*	15.80	3.42E-01		2.32E-01
+	PB-214	77.11	*	10.70	3.26E-01	7.87E-02	3.46E-01
		295.21	*	19.20	2.50E-01		1.20E-01
		351.92	*	37.20	2.15E-01		7.87E-02
+	PA-228	89.95		22.00	-1.14E+03	5.86E+03	1.00E+04
		93.35		35.00	2.06E+03		5.86E+03
		105.00		16.30	3.10E+03		1.10E+04
		129.22		2.97	3.07E+03		5.97E+04
		338.32		5.30	2.30E+04		3.94E+04
		463.00		13.80	-9.26E+03		1.62E+04
		911.23		16.70	5.18E+03		1.59E+04
+	AM-241	59.54		36.30	2.79E-03	1.99E-01	1.99E-01
+	CM-243	103.76		23.00	-9.52E-03	1.21E-01	1.21E-01
		228.18		10.60	-5.55E-02		2.57E-01
		277.60		14.00	-4.76E-03		2.14E-01

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

Analysis Report for L3-012-102-FSGS-009-SS

L3-012-102 SWITCHYARD OPEN LAND

Apex-Gamma

Analysis Report for L3-012-102-FSGS-010-SG
L3-012-102-SWITCHYARD OPEN LAND

GAMMA SPECTRUM ANALYSIS

Sample Identification	: L3-012-102-FSGS-010-SG
Sample Description	: L3-012-102-SWITCHYARD OPEN LAND
Sample Type	: 500 ml Marinelli
Unit	:
Sample Point	:
Sample Size	: 1.243E+03 grams
Facility	: Dairyland_NPP
Sample Taken On	: 3/12/2018 1:49:00PM
Acquisition Started	: 3/20/2018 11:36:36AM
Procedure	: 500ml Marinelli
Operator	: Administrator
Detector Name	: HOTLAB
Geometry	: 500ml Marinelli
Live Time	: 3600.0 seconds
Real Time	: 3611.2 seconds
Dead Time	: 0.31 %
Peak Locate Threshold	: 3.00
Peak Locate Range (in channels)	: 100 - 4096
Peak Area Range (in channels)	: 100 - 4096
Identification Energy Tolerance	: 1.000 keV
Energy Calibration Used Done On	: 7/8/2014
Efficiency Calibration Used Done On	: 7/8/2014
Efficiency Calibration Description	:
Sample Number	: 5626

PEAK ANALYSIS REPORT

Peak Analysis Performed on : 1/25/2019 9:38:08AM

Peak Analysis From Channel	: 100
Peak Analysis To Channel	: 4096

Analysis Report for L3-012-102-FSGS-010-SG

L3-012-102-SWITCHYARD OPEN LAND

	Peak No.	Energy (keV)	ROI start	ROI end	Peak Centroid	Net Peak Area	Net Area Uncertainty	Continuum Counts	FWHM (keV)
M	1	238.50	470 -	491	477.47	2.91E+02	45.60	5.57E+02	1.77
m	2	242.04	470 -	491	484.55	1.00E+02	32.12	5.14E+02	1.77
F	3	295.21	586 -	599	590.87	1.36E+02	36.05	5.04E+02	1.88
F	4	338.32	674 -	681	677.07	4.79E+01	23.29	2.22E+02	1.24
F	5	351.87	699 -	712	704.17	2.88E+02	40.35	3.01E+02	1.95
F	6	477.74	951 -	961	955.86	5.54E+01	22.38	1.73E+02	1.63
F	7	583.15	1162 -	1172	1166.64	7.37E+01	22.54	1.27E+02	1.65
F	8	609.24	1214 -	1225	1218.82	2.15E+02	32.43	1.02E+02	1.78
F	9	727.57	1450 -	1460	1455.43	2.88E+01	15.05	8.34E+01	1.32
F	10	911.24	1817 -	1827	1822.73	3.12E+01	16.49	7.71E+01	1.83
F	11	1120.23	2233 -	2247	2240.65	5.70E+01	19.45	8.20E+01	2.52
F	12	1331.46	2658 -	2667	2663.06	1.83E+01	11.77	3.24E+01	1.72
F	13	1460.60	2914 -	2929	2921.31	5.04E+02	45.88	4.37E+01	2.41
F	14	1764.83	3523 -	3536	3529.72	3.47E+01	12.39	6.44E+00	2.31

M = First peak in a multiplet region
m = Other peak in a multiplet region
F = Fitted singlet
Errors quoted at 2.000sigma

BACKGROUND SUBTRACT REPORT

Peak Analysis Performed on : 1/25/2019 9:38:08AM

Env. Background File : C:\Canberra\Apex\Root\Dairyland_NPP\Data\0000001364.CNF

	Peak No.	Energy (keV)	Original Area	Orig. Area Uncertainty	Ambient Background	Backgr. Uncert.	Subtracted Area	Subtracted Uncert.
M	1	238.50	2.91E+02	45.60			2.91E+02	4.56E+01
m	2	242.04	1.00E+02	32.12			1.00E+02	3.21E+01
F	3	295.21	1.36E+02	36.05			1.36E+02	3.61E+01
F	4	338.32	4.79E+01	23.29			4.79E+01	2.33E+01
F	5	351.87	2.88E+02	40.35	8.36E+01	3.72E+01	2.05E+02	5.49E+01
F	6	477.74	5.54E+01	22.38			5.54E+01	2.24E+01
F	7	583.15	7.37E+01	22.54			7.37E+01	2.25E+01
F	8	609.24	2.15E+02	32.43	4.12E+01	2.42E+01	1.74E+02	4.05E+01
F	9	727.57	2.88E+01	15.05			2.88E+01	1.51E+01
F	10	911.24	3.12E+01	16.49			3.12E+01	1.65E+01
F	11	1120.23	5.70E+01	19.45			5.70E+01	1.95E+01
F	12	1331.46	1.83E+01	11.77			1.83E+01	1.18E+01
F	13	1460.60	5.04E+02	45.88	5.63E+01	1.71E+01	4.47E+02	4.90E+01
F	14	1764.83	3.47E+01	12.39	1.52E+01	9.80E+00	1.96E+01	1.58E+01

Analysis Report for L3-012-102-FSGS-010-SG

L3-012-102-SWITCHYARD OPEN LAND

M = First peak in a multiplet region
m = Other peak in a multiplet region
F = Fitted singlet
Errors quoted at 2.000sigma

NUCLIDE IDENTIFICATION REPORT

Nuclide Library Used : C:\Canberra\Apex\Root\Dairyland_NPP\Library\HOTLAB.NLB

IDENTIFIED NUCLIDES

Nuclide Name	Id Confidence	Energy (keV)		Yield(%)	Activity (pCi/grams)	Activity Uncertainty
K-40	0.99	1460.75	*	10.67	3.92E+00	4.81E-01
BI-212	0.58	727.17	*	11.80	1.23E-01	6.46E-02
		785.42		2.00		
		1620.56		2.75		
PB-212	0.55	77.11		17.50		
		238.63	*	44.60	1.21E-01	1.99E-02
BI-214	0.78	609.31	*	46.30	1.61E-01	3.86E-02
		1120.29	*	15.10	2.80E-01	9.65E-02
		1238.11		5.94		
		1377.67		4.11		
		1407.98		2.48		
		1509.19		2.19		
		1764.49	*	15.80	1.36E-01	1.10E-01
PB-214	0.72	77.11		10.70		
		295.21	*	19.20	1.57E-01	4.22E-02
		351.92	*	37.20	1.42E-01	3.88E-02
AC-228	0.30	209.28		4.40		
		338.32	*	11.40	1.05E-01	5.12E-02
		794.70		4.60		
		911.60	*	27.70	6.97E-02	3.69E-02
		964.60		5.20		
		969.11		16.60		

* = Energy line found in the spectrum.
\- = Manually added nuclide.
? = Manually edited nuclide.
@ = Energy line not used for Weighted Mean Activity
Energy Tolerance : 1.000 keV
Nuclide confidence index threshold = 0.30
Errors quoted at 2.000sigma

Analysis Report for L3-012-102-FSGS-010-SG

L3-012-102-SWITCHYARD OPEN LAND

INTERFERENCE CORRECTED REPORT

Nuclide Name	Nuclide Id Confidence	Wt mean Activity (pCi/grams)	Wt mean Activity Uncertainty	Comments
K-40	0.996	3.92E+00	4.81E-01	
BI-212	0.587	1.23E-01	6.46E-02	
PB-212	0.558	1.21E-01	1.99E-02	
BI-214	0.784	1.74E-01	3.40E-02	
PB-214	0.721	1.49E-01	2.85E-02	
AC-228	0.303	8.17E-02	2.99E-02	

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

Errors quoted at 2.000sigma

Analysis Report for L3-012-102-FSGS-010-SG

L3-012-102-SWITCHYARD OPEN LAND

UNIDENTIFIED PEAKS

Peak Locate Performed on : 1/25/2019 9:38:08AM
Peak Locate From Channel : 100
Peak Locate To Channel : 4096

	Peak No.	Energy (keV)	Peak Size (CPS)	Peak CPS (%) Uncertainty	Peak Type	Tolerance Nuclide
m	2	242.04	2.78226E-02	16.04		
F	6	477.74	1.53930E-02	20.19	Sum	
F	7	583.15	2.04692E-02	15.29		
F	12	1331.46	5.08789E-03	32.13		

M = First peak in a multiplet region
m = Other peak in a multiplet region
F = Fitted singlet
Errors quoted at 2.000sigma

NUCLIDE MDA REPORT

Nuclide Library Used : C:\Canberra\Apex\Root\Dairyland_NPP\Library\HOTLAB.NLB

	Nuclide Name	Energy (keV)		Yield(%)	Activity (pCi/grams)	Nuclide MDA (pCi/grams)	Line MDA (pCi/grams)
+	K-40	1460.75	*	10.67	3.92E+00	4.27E-01	4.27E-01
+	@ AR-41	1293.64		99.16	1.00E+26	1.00E+26	1.00E+26
+	CO-60	1173.22		100.00	4.30E-02	3.82E-02	4.39E-02
		1332.49		100.00	4.31E-02		3.82E-02
+	KR-85	513.99		0.43	7.98E+00	7.18E+00	7.18E+00
+	Y-88	898.04		93.70	1.17E-02	2.63E-02	3.68E-02
		1836.06		99.20	-2.33E-02		2.63E-02
+	NB-94	702.63		100.00	1.38E-02	2.87E-02	2.87E-02
		871.10		100.00	-2.14E-02		2.98E-02
+	I-131	284.30		6.06	-2.52E-02	5.43E-02	7.44E-01
		364.48		81.20	1.19E-02		5.43E-02
		636.97		7.27	-1.21E-01		7.43E-01

Analysis Report for L3-012-102-FSGS-010-SG

L3-012-102-SWITCHYARD OPEN LAND

	Nuclide Name	Energy (keV)		Yield(%)	Activity (pCi/grams)	Nuclide MDA (pCi/grams)	Line MDA (pCi/grams)
+	CS-134	604.70		97.60	-4.47E-02	3.66E-02	3.98E-02
		795.84		85.40	2.03E-02		3.66E-02
+	CS-137	661.65		85.12	7.35E-02	4.21E-02	4.21E-02
+	CE-144	80.12		1.36	1.85E+00	2.00E-01	2.51E+00
		133.51		11.09	-7.23E-02		2.00E-01
+	EU-152	121.78		28.40	-2.43E-02	7.64E-02	7.64E-02
		344.28		26.60	-8.57E-02		9.63E-02
		1408.00		20.74	2.73E-02		1.72E-01
+	EU-154	123.07		40.40	-1.33E-02	5.39E-02	5.39E-02
		723.30		19.70	1.52E-01		1.49E-01
		1274.51		35.50	3.75E-02		1.10E-01
+	EU-155	86.54		32.80	-4.66E-02	8.71E-02	8.71E-02
		105.31		21.80	8.27E-02		1.06E-01
+	BI-214	609.31	*	46.30	1.61E-01	5.69E-02	5.69E-02
		1120.29	*	15.10	2.80E-01		1.90E-01
		1238.11		5.94	6.87E-01		7.94E-01
		1377.67		4.11	-2.27E-02		7.84E-01
		1407.98		2.48	2.28E-01		1.44E+00
		1509.19		2.19	-7.20E-01		1.24E+00
		1764.49	*	15.80	1.36E-01		1.77E-01
+	PB-214	77.11		10.70	2.31E-01	6.86E-02	3.35E-01
		295.21	*	19.20	1.57E-01		1.03E-01
		351.92	*	37.20	1.42E-01		6.86E-02
+	PA-228	89.95		22.00	5.34E+01	2.96E+01	5.05E+01
		93.35		35.00	2.08E+01		2.96E+01
		105.00		16.30	3.03E+01		5.66E+01
		129.22		2.97	2.47E+02		2.96E+02
		338.32		5.30	2.73E+02		1.92E+02
		463.00		13.80	1.40E+01		7.47E+01
		911.23		16.70	1.00E+02		8.78E+01
+	AM-241	59.54		36.30	2.01E-02	1.57E-01	1.57E-01
+	CM-243	103.76		23.00	3.90E-03	9.98E-02	9.98E-02
		228.18		10.60	-1.35E-01		2.00E-01
		277.60		14.00	-1.69E-01		1.60E-01

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

Apex-Gamma

Analysis Report for L3-012-102-FSGS-010-SS

L3-012-102-SWITCHYARD OPEN LAND

GAMMA SPECTRUM ANALYSIS

Sample Identification	: L3-012-102-FSGS-010-SS
Sample Description	: L3-012-102-SWITCHYARD OPEN LAND
Sample Type	: 500 ml Marinelli
Unit	:
Sample Point	:
Sample Size	: 9.763E+02 grams
Facility	: Dairyland_NPP
Sample Taken On	: 3/12/2018 1:53:00PM
Acquisition Started	: 3/19/2018 11:12:40AM
Procedure	: 500ml Marinelli
Operator	: Administrator
Detector Name	: HOTLAB
Geometry	: 500ml Marinelli
Live Time	: 3600.0 seconds
Real Time	: 3611.1 seconds
Dead Time	: 0.31 %
Peak Locate Threshold	: 3.00
Peak Locate Range (in channels)	: 100 - 4096
Peak Area Range (in channels)	: 100 - 4096
Identification Energy Tolerance	: 1.000 keV
Energy Calibration Used Done On	: 7/8/2014
Efficiency Calibration Used Done On	: 7/8/2014
Efficiency Calibration Description	:
Sample Number	: 5628

PEAK ANALYSIS REPORT

Peak Analysis Performed on : 1/25/2019 9:40:26AM

Peak Analysis From Channel	: 100
Peak Analysis To Channel	: 4096

Analysis Report for L3-012-102-FSGS-010-SS

L3-012-102-SWITCHYARD OPEN LAND

	Peak No.	Energy (keV)	ROI start	ROI end	Peak Centroid	Net Peak Area	Net Area Uncertainty	Continuum Counts	FWHM (keV)
F	1	63.80	125 -	131	128.15	6.68E+01	37.15	6.73E+02	1.13
F	2	76.35	147 -	161	153.25	3.47E+02	68.28	1.48E+03	4.15
F	3	238.54	470 -	485	477.56	3.33E+02	48.07	8.04E+02	1.70
F	4	295.00	584 -	596	590.46	1.42E+02	33.68	4.18E+02	1.59
F	5	351.70	698 -	712	703.82	2.46E+02	37.12	2.82E+02	1.86
F	6	582.97	1161 -	1172	1166.28	1.12E+02	25.13	9.60E+01	2.06
F	7	609.30	1214 -	1227	1218.93	1.78E+02	29.23	8.56E+01	2.01
F	8	661.59	1318 -	1332	1323.49	1.14E+02	24.91	1.17E+02	1.85
F	9	911.11	1814 -	1829	1822.47	6.92E+01	19.54	7.13E+01	2.06
F	10	1120.01	2234 -	2246	2240.21	4.38E+01	17.19	5.85E+01	2.41
F	11	1460.63	2913 -	2930	2921.38	5.10E+02	46.53	5.26E+01	2.35

M = First peak in a multiplet region
m = Other peak in a multiplet region
F = Fitted singlet
Errors quoted at 2.000sigma

BACKGROUND SUBTRACT REPORT

Peak Analysis Performed on : 1/25/2019 9:40:26AM

Env. Background File : C:\Canberra\Apex\Root\Dairyland_NPP\Data\0000001364.CNF

	Peak No.	Energy (keV)	Original Area	Orig. Area Uncertainty	Ambient Background	Backgr. Uncert.	Subtracted Area	Subtracted Uncert.
F	1	63.80	6.68E+01	37.15			6.68E+01	3.72E+01
F	2	76.35	3.47E+02	68.28			3.47E+02	6.83E+01
F	3	238.54	3.33E+02	48.07			3.33E+02	4.81E+01
F	4	295.00	1.42E+02	33.68			1.42E+02	3.37E+01
F	5	351.70	2.46E+02	37.12	8.36E+01	3.72E+01	1.62E+02	5.26E+01
F	6	582.97	1.12E+02	25.13			1.12E+02	2.51E+01
F	7	609.30	1.78E+02	29.23	4.12E+01	2.42E+01	1.36E+02	3.80E+01
F	8	661.59	1.14E+02	24.91	6.61E+01	2.54E+01	4.81E+01	3.56E+01
F	9	911.11	6.92E+01	19.54			6.92E+01	1.95E+01
F	10	1120.01	4.38E+01	17.19			4.38E+01	1.72E+01
F	11	1460.63	5.10E+02	46.53	5.63E+01	1.71E+01	4.54E+02	4.96E+01

M = First peak in a multiplet region
m = Other peak in a multiplet region
F = Fitted singlet
Errors quoted at 2.000sigma

Analysis Report for L3-012-102-FSGS-010-SS

L3-012-102-SWITCHYARD OPEN LAND

NUCLIDE IDENTIFICATION REPORT

Nuclide Library Used : C:\Canberra\Apex\Root\Dairyland_NPP\Library\HOTLAB.NLB

IDENTIFIED NUCLIDES

Nuclide Name	Id Confidence	Energy (keV)		Yield(%)	Activity (pCi/grams)	Activity Uncertainty
K-40	0.99	1460.75	*	10.67	5.06E+00	6.21E-01
CS-137	0.99	661.65	*	85.12	3.33E-02	2.47E-02
PB-212	0.97	77.11	*	17.50	5.08E-01	1.05E-01
		238.63	*	44.60	1.76E-01	2.70E-02
BI-214	0.58	609.31	*	46.30	1.61E-01	4.57E-02
		1120.29	*	15.10	2.74E-01	1.08E-01
		1238.11		5.94		
		1377.67		4.11		
		1407.98		2.48		
		1509.19		2.19		
		1764.49		15.80		
PB-214	0.97	77.11	*	10.70	8.31E-01	1.72E-01
		295.21	*	19.20	2.07E-01	5.04E-02
		351.92	*	37.20	1.44E-01	4.70E-02

* = Energy line found in the spectrum.
\- = Manually added nuclide.
? = Manually edited nuclide.
@ = Energy line not used for Weighted Mean Activity
Energy Tolerance : 1.000 keV
Nuclide confidence index threshold = 0.30
Errors quoted at 2.000sigma

INTERFERENCE CORRECTED REPORT

Nuclide Name	Nuclide Id Confidence	Wt mean Activity (pCi/grams)	Wt mean Activity Uncertainty	Comments

Analysis Report for L3-012-102-FSGS-010-SS

L3-012-102-SWITCHYARD OPEN LAND

Nuclide Name	Nuclide Id Confidence	Wt mean Activity (pCi/grams)	Wt mean Activity Uncertainty	Comments
K-40	0.998	5.06E+00	6.21E-01	
CS-137	0.999	3.33E-02	2.47E-02	
PB-212	0.974	1.89E-01	2.62E-02	
BI-214	0.583	1.78E-01	4.21E-02	
PB-214	0.979	1.87E-01	3.37E-02	

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

Errors quoted at 2.000sigma

Analysis Report for L3-012-102-FSGS-010-SS

L3-012-102-SWITCHYARD OPEN LAND

UNIDENTIFIED PEAKS

Peak Locate Performed on : 1/25/2019 9:40:26AM
Peak Locate From Channel : 100
Peak Locate To Channel : 4096

Peak No.		Energy (keV)	Peak Size (CPS)	Peak CPS (%) Uncertainty	Peak Type	Tolerance Nuclide
F	1	63.80	1.85490E-02	27.82		
F	6	582.97	3.12166E-02	11.18		
F	9	911.11	1.92249E-02	14.11	Tol.	AC-228 PA-228

M = First peak in a multiplet region
m = Other peak in a multiplet region
F = Fitted singlet
Errors quoted at 2.000sigma

NUCLIDE MDA REPORT

Nuclide Library Used : C:\Canberra\Apex\Root\Dairyland_NPP\Library\HOTLAB.NLB

	Nuclide Name	Energy (keV)		Yield(%)	Activity (pCi/grams)	Nuclide MDA (pCi/grams)	Line MDA (pCi/grams)
+	K-40	1460.75	*	10.67	5.06E+00	5.68E-01	5.68E-01
+	@ AR-41	1293.64		99.16	1.00E+26	1.00E+26	1.00E+26
+	CO-60	1173.22		100.00	4.85E-03	4.50E-02	5.60E-02
		1332.49		100.00	4.61E-03		4.50E-02
+	KR-85	513.99		0.43	9.11E+00	8.67E+00	8.67E+00
+	Y-88	898.04		93.70	-2.40E-02	3.24E-02	4.17E-02
		1836.06		99.20	2.47E-03		3.24E-02
+	NB-94	702.63		100.00	-9.22E-03	3.46E-02	3.46E-02
		871.10		100.00	-5.53E-03		3.87E-02
+	I-131	284.30		6.06	-3.62E-01	6.59E-02	8.65E-01
		364.48		81.20	1.50E-02		6.59E-02
		636.97		7.27	-8.23E-02		8.95E-01
+	CS-134	604.70		97.60	-4.73E-02	4.49E-02	4.81E-02

Analysis Report for L3-012-102-FSGS-010-SS

L3-012-102-SWITCHYARD OPEN LAND

	Nuclide Name	Energy (keV)		Yield(%)	Activity (pCi/grams)	Nuclide MDA (pCi/grams)	Line MDA (pCi/grams)
	CS-134	795.84		85.40	-3.62E-02	4.49E-02	4.49E-02
+	CS-137	661.65	*	85.12	3.33E-02	4.74E-02	4.74E-02
+	CE-144	80.12		1.36	-5.00E-01	2.49E-01	3.23E+00
		133.51		11.09	-2.87E-02		2.49E-01
+	EU-152	121.78		28.40	-4.97E-03	9.65E-02	9.65E-02
		344.28		26.60	9.78E-02		1.22E-01
		1408.00		20.74	6.66E-03		1.91E-01
+	EU-154	123.07		40.40	3.86E-02	6.81E-02	6.81E-02
		723.30		19.70	1.95E-02		2.07E-01
		1274.51		35.50	-5.58E-02		1.38E-01
+	EU-155	86.54		32.80	-3.23E-02	1.09E-01	1.09E-01
		105.31		21.80	-1.15E-02		1.30E-01
+	BI-214	609.31	*	46.30	1.61E-01	7.16E-02	7.16E-02
		1120.29	*	15.10	2.74E-01		1.98E-01
		1238.11		5.94	4.43E-01		1.01E+00
		1377.67		4.11	1.74E-01		9.53E-01
		1407.98		2.48	5.56E-02		1.59E+00
		1509.19		2.19	4.51E-01		1.40E+00
		1764.49		15.80	2.77E-01		3.06E-01
+	PB-214	77.11	*	10.70	8.31E-01	8.70E-02	3.71E-01
		295.21	*	19.20	2.07E-01		1.17E-01
		351.92	*	37.20	1.44E-01		8.70E-02
+	PA-228	89.95		22.00	3.19E+01	1.69E+01	2.88E+01
		93.35		35.00	8.10E+00		1.69E+01
		105.00		16.30	-3.12E+00		3.21E+01
		129.22		2.97	-2.92E+00		1.68E+02
		338.32		5.30	-3.34E-01		1.07E+02
		463.00		13.80	1.89E+00		4.33E+01
		911.23		16.70	1.99E+01		5.29E+01
+	AM-241	59.54		36.30	-1.71E-01	1.99E-01	1.99E-01
+	CM-243	103.76		23.00	2.09E-02	1.23E-01	1.23E-01
		228.18		10.60	-3.56E-02		2.60E-01
		277.60		14.00	1.29E-02		2.11E-01

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

Apex-Gamma

Analysis Report for L3-012-102-FSGS-011-SG

L3-012-102 SWITCHYARD OPEN LAND

GAMMA SPECTRUM ANALYSIS

Sample Identification	: L3-012-102-FSGS-011-SG
Sample Description	: L3-012-102 SWITCHYARD OPEN LAND
Sample Type	: 500 ml Marinelli
Unit	:
Sample Point	:
Sample Size	: 1.015E+03 grams
Facility	: Dairyland_NPP
Sample Taken On	: 2/27/2018 2:57:00PM
Acquisition Started	: 3/15/2018 6:58:38AM
Procedure	: 500ml Marinelli
Operator	: Administrator
Detector Name	: HOTLAB
Geometry	: 500ml Marinelli
Live Time	: 3600.0 seconds
Real Time	: 3611.1 seconds
Dead Time	: 0.31 %
Peak Locate Threshold	: 3.00
Peak Locate Range (in channels)	: 100 - 4096
Peak Area Range (in channels)	: 100 - 4096
Identification Energy Tolerance	: 1.000 keV
Energy Calibration Used Done On	: 7/8/2014
Efficiency Calibration Used Done On	: 7/8/2014
Efficiency Calibration Description	:
Sample Number	: 5630

PEAK ANALYSIS REPORT

Peak Analysis Performed on : 1/25/2019 9:44:18AM

Peak Analysis From Channel	: 100
Peak Analysis To Channel	: 4096

Analysis Report for L3-012-102-FSGS-011-SG

L3-012-102 SWITCHYARD OPEN LAND

	Peak No.	Energy (keV)	ROI start	ROI end	Peak Centroid	Net Peak Area	Net Area Uncertainty	Continuum Counts	FWHM (keV)
F	1	238.58	473 -	485	477.64	2.72E+02	45.68	6.43E+02	1.97
F	2	294.99	582 -	595	590.44	1.38E+02	33.30	4.05E+02	1.70
F	3	338.67	672 -	682	677.78	3.75E+01	18.21	2.84E+02	0.61
F	4	351.90	701 -	710	704.24	2.06E+02	35.69	2.69E+02	1.80
F	5	478.09	950 -	960	956.57	3.63E+01	18.99	1.54E+02	1.49
F	6	583.01	1161 -	1174	1166.36	1.03E+02	24.85	1.36E+02	1.86
F	7	609.10	1212 -	1223	1218.53	1.98E+02	32.02	1.11E+02	2.10
F	8	661.46	1316 -	1331	1323.24	1.40E+02	27.84	1.47E+02	2.06
F	9	860.15	1717 -	1726	1720.55	2.53E+01	13.43	6.39E+01	1.13
F	10	911.13	1814 -	1827	1822.50	6.67E+01	19.45	6.37E+01	2.21
F	11	1120.35	2236 -	2248	2240.88	3.93E+01	16.57	8.45E+01	1.61
F	12	1460.65	2915 -	2929	2921.41	4.59E+02	43.45	2.03E+01	2.50

M = First peak in a multiplet region
m = Other peak in a multiplet region
F = Fitted singlet
Errors quoted at 2.000sigma

BACKGROUND SUBTRACT REPORT

Peak Analysis Performed on : 1/25/2019 9:44:18AM

Env. Background File : C:\Canberra\Apex\Root\Dairyland_NPP\Data\0000001364.CNF

	Peak No.	Energy (keV)	Original Area	Orig. Area Uncertainty	Ambient Background	Backgr. Uncert.	Subtracted Area	Subtracted Uncert.
F	1	238.58	2.72E+02	45.68			2.72E+02	4.57E+01
F	2	294.99	1.38E+02	33.30			1.38E+02	3.33E+01
F	3	338.67	3.75E+01	18.21			3.75E+01	1.82E+01
F	4	351.90	2.06E+02	35.69	8.36E+01	3.72E+01	1.23E+02	5.16E+01
F	5	478.09	3.63E+01	18.99			3.63E+01	1.90E+01
F	6	583.01	1.03E+02	24.85			1.03E+02	2.49E+01
F	7	609.10	1.98E+02	32.02	4.12E+01	2.42E+01	1.57E+02	4.01E+01
F	8	661.46	1.40E+02	27.84	6.61E+01	2.54E+01	7.41E+01	3.77E+01
F	9	860.15	2.53E+01	13.43			2.53E+01	1.34E+01
F	10	911.13	6.67E+01	19.45			6.67E+01	1.94E+01
F	11	1120.35	3.93E+01	16.57			3.93E+01	1.66E+01
F	12	1460.65	4.59E+02	43.45	5.63E+01	1.71E+01	4.03E+02	4.67E+01

Analysis Report for L3-012-102-FSGS-011-SG

L3-012-102 SWITCHYARD OPEN LAND

M = First peak in a multiplet region
m = Other peak in a multiplet region
F = Fitted singlet
Errors quoted at 2.000sigma

NUCLIDE IDENTIFICATION REPORT

Nuclide Library Used : C:\Canberra\Apex\Root\Dairyland_NPP\Library\HOTLAB.NLB

IDENTIFIED NUCLIDES

Nuclide Name	Id Confidence	Energy (keV)		Yield(%)	Activity (pCi/grams)	Activity Uncertainty
K-40	0.99	1460.75	*	10.67	4.33E+00	5.56E-01
CS-137	0.99	661.65	*	85.12	4.93E-02	2.52E-02
PB-212	0.56	77.11		17.50		
		238.63	*	44.60	1.38E-01	2.43E-02
BI-214	0.58	609.31	*	46.30	1.78E-01	4.66E-02
		1120.29	*	15.10	2.37E-01	1.00E-01
		1238.11		5.94		
		1377.67		4.11		
		1407.98		2.48		
		1509.19		2.19		
		1764.49		15.80		
PB-214	0.71	77.11		10.70		
		295.21	*	19.20	1.94E-01	4.79E-02
		351.92	*	37.20	1.04E-01	4.42E-02

* = Energy line found in the spectrum.
\- = Manually added nuclide.
? = Manually edited nuclide.
@ = Energy line not used for Weighted Mean Activity
Energy Tolerance : 1.000 keV
Nuclide confidence index threshold = 0.30
Errors quoted at 2.000sigma

INTERFERENCE CORRECTED REPORT

Analysis Report for L3-012-102-FSGS-011-SG

L3-012-102 SWITCHYARD OPEN LAND

Nuclide Name	Nuclide Id Confidence	Wt mean Activity (pCi/grams)	Wt mean Activity Uncertainty	Comments
K-40	0.998	4.33E+00	5.56E-01	
CS-137	0.995	4.93E-02	2.52E-02	
PB-212	0.560	1.38E-01	2.43E-02	
BI-214	0.581	1.89E-01	4.23E-02	
PB-214	0.719	1.46E-01	3.25E-02	

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

Errors quoted at 2.000sigma

Analysis Report for L3-012-102-FSGS-011-SG

L3-012-102 SWITCHYARD OPEN LAND

UNIDENTIFIED PEAKS

Peak Locate Performed on : 1/25/2019 9:44:18AM
Peak Locate From Channel : 100
Peak Locate To Channel : 4096

	Peak No.	Energy (keV)	Peak Size (CPS)	Peak CPS (%) Uncertainty	Peak Type	Tolerance Nuclide
F	3	338.67	1.04204E-02	24.27	Tol.	AC-228 PA-228
F	5	478.09	1.00758E-02	26.18	Sum	
F	6	583.01	2.86926E-02	12.03		
F	9	860.15	7.03382E-03	26.52		
F	10	911.13	1.85352E-02	14.57	Tol.	AC-228 PA-228

M = First peak in a multiplet region
m = Other peak in a multiplet region
F = Fitted singlet
Errors quoted at 2.000sigma

NUCLIDE MDA REPORT

Nuclide Library Used : C:\Canberra\Apex\Root\Dairyland_NPP\Library\HOTLAB.NLB

	Nuclide Name	Energy (keV)		Yield(%)	Activity (pCi/grams)	Nuclide MDA (pCi/grams)	Line MDA (pCi/grams)
+	K-40	1460.75	*	10.67	4.33E+00	4.72E-01	4.72E-01
+	@ AR-41	1293.64		99.16	1.00E+26	1.00E+26	1.00E+26
+	CO-60	1173.22		100.00	1.80E-02	4.52E-02	5.21E-02
		1332.49		100.00	1.55E-02		4.52E-02
+	KR-85	513.99		0.43	1.04E+01	8.67E+00	8.67E+00
+	Y-88	898.04		93.70	8.04E-03	3.21E-02	4.09E-02
		1836.06		99.20	-8.51E-03		3.21E-02
+	NB-94	702.63		100.00	1.30E-02	3.36E-02	3.36E-02
		871.10		100.00	2.10E-02		3.63E-02

Analysis Report for L3-012-102-FSGS-011-SG

L3-012-102 SWITCHYARD OPEN LAND

	Nuclide Name	Energy (keV)		Yield(%)	Activity (pCi/grams)	Nuclide MDA (pCi/grams)	Line MDA (pCi/grams)
+	I-131	284.30		6.06	-8.31E-01	1.36E-01	1.72E+00
		364.48		81.20	-1.10E-01		1.36E-01
		636.97		7.27	4.65E-02		1.73E+00
+	CS-134	604.70		97.60	8.53E-02	4.27E-02	4.79E-02
		795.84		85.40	-2.27E-02		4.27E-02
+	CS-137	661.65	*	85.12	4.93E-02	4.82E-02	4.82E-02
+	CE-144	80.12		1.36	-4.55E-02	2.50E-01	3.01E+00
		133.51		11.09	1.87E-01		2.50E-01
+	EU-152	121.78		28.40	-5.36E-02	9.18E-02	9.18E-02
		344.28		26.60	-3.21E-01		1.15E-01
		1408.00		20.74	-1.44E-02		1.76E-01
+	EU-154	123.07		40.40	-7.31E-03	6.49E-02	6.49E-02
		723.30		19.70	-1.45E-02		1.83E-01
		1274.51		35.50	-7.18E-02		1.17E-01
+	EU-155	86.54		32.80	-1.19E-01	1.03E-01	1.03E-01
		105.31		21.80	-4.70E-02		1.25E-01
+	BI-214	609.31	*	46.30	1.78E-01	7.05E-02	7.05E-02
		1120.29	*	15.10	2.37E-01		2.26E-01
		1238.11		5.94	-4.29E-01		9.25E-01
		1377.67		4.11	6.29E-01		9.69E-01
		1407.98		2.48	-1.20E-01		1.47E+00
		1509.19		2.19	-1.08E+00		1.45E+00
		1764.49		15.80	1.75E-01		2.91E-01
+	PB-214	77.11		10.70	4.23E-01	7.87E-02	4.00E-01
		295.21	*	19.20	1.94E-01		1.13E-01
		351.92	*	37.20	1.04E-01		7.87E-02
+	PA-228	89.95		22.00	4.02E+04	1.26E+04	2.14E+04
		93.35		35.00	3.30E+03		1.26E+04
		105.00		16.30	5.56E+03		2.38E+04
		129.22		2.97	-3.17E+04		1.26E+05
		338.32		5.30	3.30E+04		7.84E+04
		463.00		13.80	1.61E+04		3.16E+04
		911.23		16.70	4.22E+04		3.96E+04
+	AM-241	59.54		36.30	1.40E-02	1.86E-01	1.86E-01
+	CM-243	103.76		23.00	5.06E-02	1.20E-01	1.20E-01
		228.18		10.60	1.20E-01		2.45E-01
		277.60		14.00	-2.70E-02		1.98E-01

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

Analysis Report for L3-012-102-FSGS-011-SG

L3-012-102 SWITCHYARD OPEN LAND

Apex-Gamma

Analysis Report for L3-012-102-FSGS-011-SS

L3-012-102 SWITCHYARD OPEN LAND

GAMMA SPECTRUM ANALYSIS

Sample Identification	: L3-012-102-FSGS-011-SS
Sample Description	: L3-012-102 SWITCHYARD OPEN LAND
Sample Type	: 500 ml Marinelli
Unit	:
Sample Point	:
Sample Size	: 1.045E+03 grams
Facility	: Dairyland_NPP
Sample Taken On	: 2/27/2018 3:01:00PM
Acquisition Started	: 3/14/2018 7:00:13AM
Procedure	: 500ml Marinelli
Operator	: Administrator
Detector Name	: HOTLAB
Geometry	: 500ml Marinelli
Live Time	: 3600.0 seconds
Real Time	: 3610.6 seconds
Dead Time	: 0.29 %
Peak Locate Threshold	: 3.00
Peak Locate Range (in channels)	: 100 - 4096
Peak Area Range (in channels)	: 100 - 4096
Identification Energy Tolerance	: 1.000 keV
Energy Calibration Used Done On	: 7/8/2014
Efficiency Calibration Used Done On	: 7/8/2014
Efficiency Calibration Description	:
Sample Number	: 5632

PEAK ANALYSIS REPORT

Peak Analysis Performed on : 1/25/2019 9:46:17AM

Peak Analysis From Channel : 100

Peak Analysis To Channel : 4096

Analysis Report for L3-012-102-FSGS-011-SS

L3-012-102 SWITCHYARD OPEN LAND

	Peak No.	Energy (keV)	ROI start	ROI end	Peak Centroid	Net Peak Area	Net Area Uncertainty	Continuum Counts	FWHM (keV)
F	1	76.76	147 -	159	154.07	1.90E+02	56.79	1.34E+03	2.31
F	2	238.58	473 -	485	477.64	3.35E+02	48.21	6.39E+02	1.80
F	3	295.11	587 -	597	590.67	9.08E+01	30.08	3.77E+02	1.56
F	4	338.41	673 -	684	677.25	8.24E+01	28.80	2.82E+02	2.10
F	5	351.82	696 -	710	704.06	2.58E+02	38.04	3.19E+02	1.74
F	6	583.06	1158 -	1172	1166.47	1.04E+02	24.82	1.72E+02	1.53
F	7	609.23	1215 -	1227	1218.79	1.63E+02	28.92	1.11E+02	1.88
F	8	661.64	1319 -	1328	1323.59	1.04E+02	24.98	9.89E+01	1.82
F	9	727.43	1450 -	1461	1455.15	1.89E+01	13.36	9.00E+01	1.29
F	10	910.88	1817 -	1829	1822.00	5.11E+01	19.49	1.11E+02	1.87
F	11	968.96	1932 -	1943	1938.15	4.60E+01	18.28	8.94E+01	1.89
F	12	1119.51	2232 -	2247	2239.20	4.10E+01	16.82	6.92E+01	2.38
F	13	1460.65	2913 -	2930	2921.41	4.85E+02	44.69	3.06E+01	2.54

M = First peak in a multiplet region
m = Other peak in a multiplet region
F = Fitted singlet
Errors quoted at 2.000sigma

BACKGROUND SUBTRACT REPORT

Peak Analysis Performed on : 1/25/2019 9:46:17AM

Env. Background File : C:\Canberra\Apex\Root\Dairyland_NPP\Data\0000001364.CNF

	Peak No.	Energy (keV)	Original Area	Orig. Area Uncertainty	Ambient Background	Backgr. Uncert.	Subtracted Area	Subtracted Uncert.
F	1	76.76	1.90E+02	56.79			1.90E+02	5.68E+01
F	2	238.58	3.35E+02	48.21			3.35E+02	4.82E+01
F	3	295.11	9.08E+01	30.08			9.08E+01	3.01E+01
F	4	338.41	8.24E+01	28.80			8.24E+01	2.88E+01
F	5	351.82	2.58E+02	38.04	8.36E+01	3.72E+01	1.75E+02	5.32E+01
F	6	583.06	1.04E+02	24.82			1.04E+02	2.48E+01
F	7	609.23	1.63E+02	28.92	4.12E+01	2.42E+01	1.22E+02	3.77E+01
F	8	661.64	1.04E+02	24.98	6.61E+01	2.54E+01	3.78E+01	3.56E+01
F	9	727.43	1.89E+01	13.36			1.89E+01	1.34E+01
F	10	910.88	5.11E+01	19.49			5.11E+01	1.95E+01
F	11	968.96	4.60E+01	18.28			4.60E+01	1.83E+01
F	12	1119.51	4.10E+01	16.82			4.10E+01	1.68E+01
F	13	1460.65	4.85E+02	44.69	5.63E+01	1.71E+01	4.29E+02	4.79E+01

Analysis Report for L3-012-102-FSGS-011-SS

L3-012-102 SWITCHYARD OPEN LAND

M = First peak in a multiplet region
m = Other peak in a multiplet region
F = Fitted singlet
Errors quoted at 2.000sigma

NUCLIDE IDENTIFICATION REPORT

Nuclide Library Used : C:\Canberra\Apex\Root\Dairyland_NPP\Library\HOTLAB.NLB

IDENTIFIED NUCLIDES

Nuclide Name	Id Confidence	Energy (keV)		Yield(%)	Activity (pCi/grams)	Activity Uncertainty
K-40	0.99	1460.75	*	10.67	4.47E+00	5.58E-01
CS-137	1.00	661.65	*	85.12	2.45E-02	2.31E-02
BI-212	0.59	727.17	*	11.80	9.62E-02	6.81E-02
		785.42		2.00		
		1620.56		2.75		
PB-212	0.99	77.11	*	17.50	2.58E-01	7.89E-02
		238.63	*	44.60	1.66E-01	2.53E-02
BI-214	0.56	609.31	*	46.30	1.35E-01	4.23E-02
		1120.29	*	15.10	2.40E-01	9.90E-02
		1238.11		5.94		
		1377.67		4.11		
		1407.98		2.48		
		1509.19		2.19		
		1764.49		15.80		
PB-214	0.99	77.11	*	10.70	4.22E-01	1.29E-01
		295.21	*	19.20	1.24E-01	4.16E-02
		351.92	*	37.20	1.45E-01	4.46E-02
AC-228	0.59	209.28		4.40		
		338.32	*	11.40	2.15E-01	7.57E-02
		794.70		4.60		
		911.60	*	27.70	1.35E-01	5.20E-02
		964.60		5.20		
		969.11	*	16.60	2.15E-01	8.61E-02

* = Energy line found in the spectrum.
\- = Manually added nuclide.
? = Manually edited nuclide.
@ = Energy line not used for Weighted Mean Activity
Energy Tolerance : 1.000 keV
Nuclide confidence index threshold = 0.30
Errors quoted at 2.000sigma

Analysis Report for L3-012-102-FSGS-011-SS

L3-012-102 SWITCHYARD OPEN LAND

INTERFERENCE CORRECTED REPORT

Nuclide Name	Nuclide Id Confidence	Wt mean Activity (pCi/grams)	Wt mean Activity Uncertainty	Comments
K-40	0.998	4.47E+00	5.58E-01	
CS-137	1.000	2.45E-02	2.31E-02	
BI-212	0.598	9.62E-02	6.81E-02	
PB-212	0.994	1.67E-01	2.41E-02	
BI-214	0.569	1.51E-01	3.89E-02	
PB-214	0.995	1.35E-01	2.97E-02	
AC-228	0.599	1.72E-01	3.84E-02	

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

Errors quoted at 2.000sigma

Analysis Report for L3-012-102-FSGS-011-SS

L3-012-102 SWITCHYARD OPEN LAND

UNIDENTIFIED PEAKS

Peak Locate Performed on : 1/25/2019 9:46:17AM
Peak Locate From Channel : 100
Peak Locate To Channel : 4096

	Peak No.	Energy (keV)	Peak Size (CPS)	Peak CPS (%) Uncertainty	Peak Type	Tolerance Nuclide
F	6	583.06	2.88298E-02	11.96		

M = First peak in a multiplet region
m = Other peak in a multiplet region
F = Fitted singlet
Errors quoted at 2.000sigma

NUCLIDE MDA REPORT

Nuclide Library Used : C:\Canberra\Apex\Root\Dairyland_NPP\Library\HOTLAB.NLB

	Nuclide Name	Energy (keV)		Yield(%)	Activity (pCi/grams)	Nuclide MDA (pCi/grams)	Line MDA (pCi/grams)
+	K-40	1460.75	*	10.67	4.47E+00	4.87E-01	4.87E-01
+	@ AR-41	1293.64		99.16	1.00E+26	1.00E+26	1.00E+26
+	CO-60	1173.22		100.00	5.53E-03	4.53E-02	5.08E-02
		1332.49		100.00	3.62E-02		4.53E-02
+	KR-85	513.99		0.43	1.12E+01	8.36E+00	8.36E+00
+	Y-88	898.04		93.70	-1.49E-02	3.09E-02	4.46E-02
		1836.06		99.20	-1.33E-02		3.09E-02
+	NB-94	702.63		100.00	7.44E-03	3.50E-02	3.50E-02
		871.10		100.00	-4.36E-02		3.54E-02
+	I-131	284.30		6.06	-4.63E-02	1.11E-01	1.55E+00
		364.48		81.20	1.26E-02		1.11E-01
		636.97		7.27	1.69E-02		1.48E+00
+	CS-134	604.70		97.60	-8.51E-02	4.00E-02	4.51E-02
		795.84		85.40	-4.23E-02		4.00E-02
+	CS-137	661.65	*	85.12	2.45E-02	4.09E-02	4.09E-02
+	CE-144	80.12		1.36	-9.51E-01	2.36E-01	2.95E+00
		133.51		11.09	4.13E-02		2.36E-01

Analysis Report for L3-012-102-FSGS-011-SS

L3-012-102 SWITCHYARD OPEN LAND

	Nuclide Name	Energy (keV)		Yield(%)	Activity (pCi/grams)	Nuclide MDA (pCi/grams)	Line MDA (pCi/grams)
+	EU-152	121.78		28.40	-7.23E-02	8.81E-02	8.81E-02
		344.28		26.60	-1.52E-02		1.18E-01
		1408.00		20.74	7.38E-02		1.71E-01
+	EU-154	123.07		40.40	-1.98E-02	6.23E-02	6.23E-02
		723.30		19.70	-3.21E-03		1.73E-01
		1274.51		35.50	3.75E-02		1.30E-01
+	EU-155	86.54		32.80	-2.16E-02	9.91E-02	9.91E-02
		105.31		21.80	-2.88E-02		1.20E-01
+	BI-214	609.31	*	46.30	1.35E-01	6.97E-02	6.97E-02
		1120.29	*	15.10	2.40E-01		2.14E-01
		1238.11		5.94	-1.77E-01		8.11E-01
		1377.67		4.11	3.83E-01		8.64E-01
		1407.98		2.48	6.15E-01		1.43E+00
		1509.19		2.19	8.34E-01		1.26E+00
		1764.49		15.80	1.72E-01		2.53E-01
+	PB-214	77.11	*	10.70	4.22E-01	8.33E-02	3.13E-01
		295.21	*	19.20	1.24E-01		1.00E-01
		351.92	*	37.20	1.45E-01		8.33E-02
+	PA-228	89.95		22.00	4.56E+03	5.65E+03	9.47E+03
		93.35		35.00	1.92E+03		5.65E+03
		105.00		16.30	-7.46E+03		1.06E+04
		129.22		2.97	-5.16E+04		5.51E+04
		338.32		5.30	3.22E+04		3.74E+04
		463.00		13.80	2.11E+03		1.47E+04
		911.23		16.70	2.92E+04		1.99E+04
+	AM-241	59.54		36.30	1.73E-01	1.84E-01	1.84E-01
+	CM-243	103.76		23.00	-8.27E-02	1.14E-01	1.14E-01
		228.18		10.60	9.98E-02		2.44E-01
		277.60		14.00	1.32E-01		1.95E-01

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

Apex-Gamma

Analysis Report for L3-012-102-FSGS-012-SG

L3-012-102 SWITCHYARD OPEN LAND

GAMMA SPECTRUM ANALYSIS

Sample Identification	: L3-012-102-FSGS-012-SG
Sample Description	: L3-012-102 SWITCHYARD OPEN LAND
Sample Type	: 500 ml Marinelli
Unit	:
Sample Point	:
Sample Size	: 1.065E+03 grams
Facility	: Dairyland_NPP
Sample Taken On	: 2/27/2018 1:07:00PM
Acquisition Started	: 3/15/2018 8:00:41AM
Procedure	: 500ml Marinelli
Operator	: Administrator
Detector Name	: HOTLAB
Geometry	: 500ml Marinelli
Live Time	: 3600.0 seconds
Real Time	: 3610.8 seconds
Dead Time	: 0.30 %
Peak Locate Threshold	: 3.00
Peak Locate Range (in channels)	: 100 - 4096
Peak Area Range (in channels)	: 100 - 4096
Identification Energy Tolerance	: 1.000 keV
Energy Calibration Used Done On	: 7/8/2014
Efficiency Calibration Used Done On	: 7/8/2014
Efficiency Calibration Description	:
Sample Number	: 5634

PEAK ANALYSIS REPORT

Peak Analysis Performed on : 1/25/2019 9:47:50AM

Peak Analysis From Channel	: 100
Peak Analysis To Channel	: 4096

Analysis Report for L3-012-102-FSGS-012-SG

L3-012-102 SWITCHYARD OPEN LAND

	Peak No.	Energy (keV)	ROI start	ROI end	Peak Centroid	Net Peak Area	Net Area Uncertainty	Continuum Counts	FWHM (keV)
F	1	76.74	147 -	161	154.03	1.67E+02	53.85	1.60E+03	2.02
F	2	185.83	367 -	378	372.16	7.14E+01	36.18	7.62E+02	1.53
F	3	238.43	474 -	481	477.33	2.19E+02	43.91	5.59E+02	1.39
F	4	295.13	587 -	597	590.71	1.17E+02	31.77	3.70E+02	1.54
F	5	338.27	673 -	683	676.98	5.65E+01	24.34	2.87E+02	1.33
F	6	351.74	695 -	710	703.91	2.51E+02	38.91	3.54E+02	1.94
F	7	409.40	814 -	823	819.21	3.40E+01	18.93	1.55E+02	1.34
F	8	463.10	921 -	931	926.59	3.39E+01	17.53	1.42E+02	1.25
F	9	582.81	1160 -	1171	1165.95	8.73E+01	24.70	1.32E+02	2.04
F	10	609.31	1213 -	1226	1218.94	1.84E+02	31.50	1.56E+02	1.95
F	11	911.00	1815 -	1831	1822.24	7.21E+01	21.67	9.63E+01	2.97
F	12	968.78	1933 -	1943	1937.79	2.17E+01	12.19	9.94E+01	0.69
F	13	1120.13	2233 -	2246	2240.44	2.89E+01	15.75	9.06E+01	1.90
F	14	1460.64	2914 -	2929	2921.40	5.48E+02	48.15	2.83E+01	2.70

M = First peak in a multiplet region
m = Other peak in a multiplet region
F = Fitted singlet
Errors quoted at 2.000sigma

BACKGROUND SUBTRACT REPORT

Peak Analysis Performed on : 1/25/2019 9:47:50AM

Env. Background File : C:\Canberra\Apex\Root\Dairyland_NPP\Data\0000001364.CNF

	Peak No.	Energy (keV)	Original Area	Orig. Area Uncertainty	Ambient Background	Backgr. Uncert.	Subtracted Area	Subtracted Uncert.
F	1	76.74	1.67E+02	53.85			1.67E+02	5.39E+01
F	2	185.83	7.14E+01	36.18			7.14E+01	3.62E+01
F	3	238.43	2.19E+02	43.91			2.19E+02	4.39E+01
F	4	295.13	1.17E+02	31.77			1.17E+02	3.18E+01
F	5	338.27	5.65E+01	24.34			5.65E+01	2.43E+01
F	6	351.74	2.51E+02	38.91	8.36E+01	3.72E+01	1.68E+02	5.38E+01
F	7	409.40	3.40E+01	18.93			3.40E+01	1.89E+01
F	8	463.10	3.39E+01	17.53			3.39E+01	1.75E+01
F	9	582.81	8.73E+01	24.70			8.73E+01	2.47E+01
F	10	609.31	1.84E+02	31.50	4.12E+01	2.42E+01	1.43E+02	3.97E+01
F	11	911.00	7.21E+01	21.67			7.21E+01	2.17E+01
F	12	968.78	2.17E+01	12.19			2.17E+01	1.22E+01
F	13	1120.13	2.89E+01	15.75			2.89E+01	1.57E+01
F	14	1460.64	5.48E+02	48.15	5.63E+01	1.71E+01	4.92E+02	5.11E+01

Analysis Report for L3-012-102-FSGS-012-SG

L3-012-102 SWITCHYARD OPEN LAND

M = First peak in a multiplet region
m = Other peak in a multiplet region
F = Fitted singlet
Errors quoted at 2.000sigma

NUCLIDE IDENTIFICATION REPORT

Nuclide Library Used : C:\Canberra\Apex\Root\Dairyland_NPP\Library\HOTLAB.NLB

IDENTIFIED NUCLIDES

Nuclide Name	Id Confidence	Energy (keV)		Yield(%)	Activity (pCi/grams)	Activity Uncertainty
K-40	0.99	1460.75	*	10.67	5.03E+00	5.93E-01
PB-212	0.99	77.11	*	17.50	2.22E-01	7.32E-02
		238.63	*	44.60	1.06E-01	2.19E-02
BI-214	0.58	609.31	*	46.30	1.55E-01	4.38E-02
		1120.29	*	15.10	1.66E-01	9.07E-02
		1238.11		5.94		
		1377.67		4.11		
		1407.98		2.48		
		1509.19		2.19		
		1764.49		15.80		
PB-214	0.99	77.11	*	10.70	3.63E-01	1.20E-01
		295.21	*	19.20	1.58E-01	4.34E-02
		351.92	*	37.20	1.36E-01	4.42E-02
RA-226	0.97	186.21	*	3.28	3.95E-01	2.01E-01
AC-228	0.60	209.28		4.40		
		338.32	*	11.40	1.44E-01	6.26E-02
		794.70		4.60		
		911.60	*	27.70	1.88E-01	5.70E-02
		964.60		5.20		
		969.11	*	16.60	9.95E-02	5.61E-02

* = Energy line found in the spectrum.
\- = Manually added nuclide.
? = Manually edited nuclide.
@ = Energy line not used for Weighted Mean Activity
Energy Tolerance : 1.000 keV
Nuclide confidence index threshold = 0.30
Errors quoted at 2.000sigma

Analysis Report for L3-012-102-FSGS-012-SG

L3-012-102 SWITCHYARD OPEN LAND

INTERFERENCE CORRECTED REPORT

Nuclide Name	Nuclide Id Confidence	Wt mean Activity (pCi/grams)	Wt mean Activity Uncertainty	Comments
K-40	0.998	5.03E+00	5.93E-01	
PB-212	0.990	1.08E-01	2.11E-02	
BI-214	0.584	1.57E-01	3.95E-02	
PB-214	0.993	1.49E-01	3.00E-02	
RA-226	0.977	3.95E-01	2.01E-01	
AC-228	0.606	1.43E-01	3.37E-02	

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

Errors quoted at 2.000sigma

Analysis Report for L3-012-102-FSGS-012-SG

L3-012-102 SWITCHYARD OPEN LAND

UNIDENTIFIED PEAKS

Peak Locate Performed on : 1/25/2019 9:47:50AM
Peak Locate From Channel : 100
Peak Locate To Channel : 4096

	Peak No.	Energy (keV)	Peak Size (CPS)	Peak CPS (%) Uncertainty	Peak Type	Tolerance Nuclide
F	7	409.40	9.44097E-03	27.85		
F	8	463.10	9.40448E-03	25.89	Tol.	PA-228
F	9	582.81	2.42583E-02	14.14		

M = First peak in a multiplet region
m = Other peak in a multiplet region
F = Fitted singlet
Errors quoted at 2.000sigma

NUCLIDE MDA REPORT

Nuclide Library Used : C:\Canberra\Apex\Root\Dairyland_NPP\Library\HOTLAB.NLB

	Nuclide Name	Energy (keV)		Yield(%)	Activity (pCi/grams)	Nuclide MDA (pCi/grams)	Line MDA (pCi/grams)
+	K-40	1460.75	*	10.67	5.03E+00	4.70E-01	4.70E-01
+	@ AR-41	1293.64		99.16	1.00E+26	1.00E+26	1.00E+26
+	CO-60	1173.22		100.00	9.68E-03	4.28E-02	5.03E-02
		1332.49		100.00	8.74E-03		4.28E-02
+	KR-85	513.99		0.43	1.11E+01	8.54E+00	8.54E+00
+	Y-88	898.04		93.70	2.42E-02	3.39E-02	4.63E-02
		1836.06		99.20	4.68E-03		3.39E-02
+	NB-94	702.63		100.00	-2.85E-04	3.38E-02	3.38E-02
		871.10		100.00	-3.03E-02		3.61E-02
+	I-131	284.30		6.06	-2.98E-01	1.25E-01	1.70E+00
		364.48		81.20	-1.34E-02		1.25E-01
		636.97		7.27	-1.22E+00		1.65E+00

Analysis Report for L3-012-102-FSGS-012-SG

L3-012-102 SWITCHYARD OPEN LAND

	Nuclide Name	Energy (keV)		Yield(%)	Activity (pCi/grams)	Nuclide MDA (pCi/grams)	Line MDA (pCi/grams)
+	CS-134	604.70		97.60	-1.93E-02	4.18E-02	4.65E-02
		795.84		85.40	-3.32E-02		4.18E-02
+	CS-137	661.65		85.12	5.87E-02	4.80E-02	4.80E-02
+	CE-144	80.12		1.36	-1.14E+00	2.37E-01	2.89E+00
		133.51		11.09	1.05E-01		2.37E-01
+	EU-152	121.78		28.40	-3.31E-02	8.80E-02	8.80E-02
		344.28		26.60	1.98E-02		1.13E-01
		1408.00		20.74	1.35E-01		1.84E-01
+	EU-154	123.07		40.40	2.07E-02	6.24E-02	6.24E-02
		723.30		19.70	1.41E-01		1.83E-01
		1274.51		35.50	-1.56E-03		1.36E-01
+	EU-155	86.54		32.80	-7.06E-02	9.84E-02	9.84E-02
		105.31		21.80	4.42E-02		1.24E-01
+	BI-214	609.31	*	46.30	1.55E-01	7.43E-02	7.43E-02
		1120.29	*	15.10	1.66E-01		2.27E-01
		1238.11		5.94	-2.57E-01		9.11E-01
		1377.67		4.11	-6.75E-03		8.48E-01
		1407.98		2.48	1.13E+00		1.53E+00
		1509.19		2.19	2.54E-01		1.47E+00
		1764.49		15.80	3.38E-01		2.94E-01
+	PB-214	77.11	*	10.70	3.63E-01	8.49E-02	3.51E-01
		295.21	*	19.20	1.58E-01		9.73E-02
		351.92	*	37.20	1.36E-01		8.49E-02
+	PA-228	89.95		22.00	3.45E+04	1.30E+04	2.22E+04
		93.35		35.00	-2.06E+03		1.30E+04
		105.00		16.30	1.51E+04		2.57E+04
		129.22		2.97	5.05E+04		1.32E+05
		338.32		5.30	1.09E+05		8.51E+04
		463.00		13.80	3.36E+04		3.48E+04
		911.23		16.70	3.78E+04		4.30E+04
+	AM-241	59.54		36.30	1.17E-01	1.81E-01	1.81E-01
+	CM-243	103.76		23.00	5.59E-02	1.18E-01	1.18E-01
		228.18		10.60	-3.42E-02		2.36E-01
		277.60		14.00	1.88E-01		1.97E-01

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

Apex-Gamma

Analysis Report for L3-012-102-FSGS-012-SS

L3-012-102 SWITCHYARD OPEN LAND

GAMMA SPECTRUM ANALYSIS

Sample Identification	: L3-012-102-FSGS-012-SS
Sample Description	: L3-012-102 SWITCHYARD OPEN LAND
Sample Type	: 500 ml Marinelli
Unit	:
Sample Point	:
Sample Size	: 9.115E+02 grams
Facility	: Dairyland_NPP
Sample Taken On	: 2/27/2018 3:10:00PM
Acquisition Started	: 3/14/2018 8:02:34AM
Procedure	: 500ml Marinelli
Operator	: Administrator
Detector Name	: HOTLAB
Geometry	: 500ml Marinelli
Live Time	: 3600.0 seconds
Real Time	: 3610.6 seconds
Dead Time	: 0.29 %
Peak Locate Threshold	: 3.00
Peak Locate Range (in channels)	: 100 - 4096
Peak Area Range (in channels)	: 100 - 4096
Identification Energy Tolerance	: 1.000 keV
Energy Calibration Used Done On	: 7/8/2014
Efficiency Calibration Used Done On	: 7/8/2014
Efficiency Calibration Description	:
Sample Number	: 5636

PEAK ANALYSIS REPORT

Peak Analysis Performed on : 1/25/2019 9:49:07AM

Peak Analysis From Channel : 100

Peak Analysis To Channel : 4096

Analysis Report for L3-012-102-FSGS-012-SS

L3-012-102 SWITCHYARD OPEN LAND

	Peak No.	Energy (keV)	ROI start	ROI end	Peak Centroid	Net Peak Area	Net Area Uncertainty	Continuum Counts	FWHM (keV)
F	1	185.44	365 -	377	371.37	7.91E+01	37.72	7.46E+02	1.82
F	2	238.42	473 -	485	477.31	2.10E+02	40.54	6.30E+02	1.54
F	3	294.91	587 -	597	590.28	1.06E+02	28.99	3.17E+02	1.39
F	4	337.87	672 -	684	676.18	4.75E+01	21.28	2.44E+02	1.23
F	5	351.77	695 -	711	703.96	2.49E+02	37.48	3.74E+02	1.69
F	6	609.11	1213 -	1224	1218.56	1.46E+02	27.77	1.14E+02	1.66
F	7	910.94	1816 -	1829	1822.11	5.56E+01	18.40	7.92E+01	1.81
F	8	968.91	1934 -	1943	1938.03	2.58E+01	13.44	7.70E+01	0.95
F	9	1460.61	2913 -	2929	2921.34	5.65E+02	48.42	1.70E+01	2.48

M = First peak in a multiplet region
m = Other peak in a multiplet region
F = Fitted singlet
Errors quoted at 2.000sigma

BACKGROUND SUBTRACT REPORT

Peak Analysis Performed on : 1/25/2019 9:49:07AM

Env. Background File : C:\Canberra\Apex\Root\Dairyland_NPP\Data\0000001364.CNF

	Peak No.	Energy (keV)	Original Area	Orig. Area Uncertainty	Ambient Background	Backgr. Uncert.	Subtracted Area	Subtracted Uncert.
F	1	185.44	7.91E+01	37.72			7.91E+01	3.77E+01
F	2	238.42	2.10E+02	40.54			2.10E+02	4.05E+01
F	3	294.91	1.06E+02	28.99			1.06E+02	2.90E+01
F	4	337.87	4.75E+01	21.28			4.75E+01	2.13E+01
F	5	351.77	2.49E+02	37.48	8.36E+01	3.72E+01	1.66E+02	5.28E+01
F	6	609.11	1.46E+02	27.77	4.12E+01	2.42E+01	1.05E+02	3.68E+01
F	7	910.94	5.56E+01	18.40			5.56E+01	1.84E+01
F	8	968.91	2.58E+01	13.44			2.58E+01	1.34E+01
F	9	1460.61	5.65E+02	48.42	5.63E+01	1.71E+01	5.09E+02	5.14E+01

M = First peak in a multiplet region
m = Other peak in a multiplet region
F = Fitted singlet
Errors quoted at 2.000sigma

Analysis Report for L3-012-102-FSGS-012-SS

L3-012-102 SWITCHYARD OPEN LAND

NUCLIDE IDENTIFICATION REPORT

Nuclide Library Used : C:\Canberra\Apex\Root\Dairyland_NPP\Library\HOTLAB.NLB

IDENTIFIED NUCLIDES

Nuclide Name	Id Confidence	Energy (keV)		Yield(%)	Activity (pCi/grams)	Activity Uncertainty
K-40	0.99	1460.75	*	10.67	6.08E+00	7.01E-01
PB-212	0.55	77.11		17.50		
		238.63	*	44.60	1.19E-01	2.37E-02
BI-214	0.34	609.31	*	46.30	1.32E-01	4.71E-02
		1120.29		15.10		
		1238.11		5.94		
		1377.67		4.11		
		1407.98		2.48		
		1509.19		2.19		
		1764.49		15.80		
PB-214	0.71	77.11		10.70		
		295.21	*	19.20	1.67E-01	4.62E-02
		351.92	*	37.20	1.57E-01	5.06E-02
RA-226	0.90	186.21	*	3.28	5.11E-01	2.45E-01
AC-228	0.59	209.28		4.40		
		338.32	*	11.40	1.41E-01	6.38E-02
		794.70		4.60		
		911.60	*	27.70	1.69E-01	5.64E-02
		964.60		5.20		
		969.11	*	16.60	1.38E-01	7.23E-02

* = Energy line found in the spectrum.
\- = Manually added nuclide.
? = Manually edited nuclide.
@ = Energy line not used for Weighted Mean Activity
Energy Tolerance : 1.000 keV
Nuclide confidence index threshold = 0.30
Errors quoted at 2.000sigma

INTERFERENCE CORRECTED REPORT

Analysis Report for L3-012-102-FSGS-012-SS

L3-012-102 SWITCHYARD OPEN LAND

Nuclide Name	Nuclide Id Confidence	Wt mean Activity (pCi/grams)	Wt mean Activity Uncertainty	Comments
K-40	0.997	6.08E+00	7.01E-01	
PB-212	0.555	1.19E-01	2.37E-02	
BI-214	0.346	1.32E-01	4.71E-02	
PB-214	0.715	1.62E-01	3.41E-02	
RA-226	0.908	5.11E-01	2.45E-01	
AC-228	0.599	1.52E-01	3.65E-02	

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

Errors quoted at 2.000sigma

Analysis Report for L3-012-102-FSGS-012-SS

L3-012-102 SWITCHYARD OPEN LAND

UNIDENTIFIED PEAKS

Peak Locate Performed on : 1/25/2019 9:49:07AM
Peak Locate From Channel : 100
Peak Locate To Channel : 4096

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

All peaks were identified.

M = First peak in a multiplet region
m = Other peak in a multiplet region
F = Fitted singlet
Errors quoted at 2.000sigma

NUCLIDE MDA REPORT

Nuclide Library Used : C:\Canberra\Apex\Root\Dairyland_NPP\Library\HOTLAB.NLB

	Nuclide Name	Energy (keV)		Yield(%)	Activity (pCi/grams)	Nuclide MDA (pCi/grams)	Line MDA (pCi/grams)
+	K-40	1460.75	*	10.67	6.08E+00	5.24E-01	5.24E-01
+	@ AR-41	1293.64		99.16	1.00E+26	1.00E+26	1.00E+26
+	CO-60	1173.22		100.00	5.04E-02	4.97E-02	6.21E-02
		1332.49		100.00	8.79E-03		4.97E-02
+	KR-85	513.99		0.43	1.15E+01	9.76E+00	9.76E+00
+	Y-88	898.04		93.70	-4.51E-02	3.65E-02	4.45E-02
		1836.06		99.20	-2.60E-02		3.65E-02
+	NB-94	702.63		100.00	-1.94E-02	3.69E-02	3.69E-02
		871.10		100.00	2.71E-02		4.64E-02
+	I-131	284.30		6.06	1.88E+00	1.27E-01	1.80E+00
		364.48		81.20	7.58E-03		1.27E-01
		636.97		7.27	-8.20E-01		1.61E+00
+	CS-134	604.70		97.60	-3.77E-03	4.68E-02	4.94E-02
		795.84		85.40	-1.36E-02		4.68E-02
+	CS-137	661.65		85.12	6.43E-02	5.35E-02	5.35E-02
+	CE-144	80.12		1.36	2.49E+00	2.54E-01	3.30E+00
		133.51		11.09	-2.18E-05		2.54E-01
+	EU-152	121.78		28.40	-1.35E-01	9.82E-02	9.82E-02

Analysis Report for L3-012-102-FSGS-012-SS

L3-012-102 SWITCHYARD OPEN LAND

	Nuclide Name	Energy (keV)		Yield(%)	Activity (pCi/grams)	Nuclide MDA (pCi/grams)	Line MDA (pCi/grams)
	EU-152	344.28		26.60	-2.78E-02	9.82E-02	1.26E-01
		1408.00		20.74	5.58E-02		2.07E-01
+	EU-154	123.07		40.40	-2.33E-02	6.98E-02	6.98E-02
		723.30		19.70	1.02E-01		2.18E-01
		1274.51		35.50	-1.81E-03		1.39E-01
+	EU-155	86.54		32.80	-3.39E-02	1.13E-01	1.13E-01
		105.31		21.80	-1.95E-02		1.36E-01
+	BI-214	609.31	*	46.30	1.32E-01	7.91E-02	7.91E-02
		1120.29		15.10	1.84E-01		3.96E-01
		1238.11		5.94	8.62E-01		1.05E+00
		1377.67		4.11	7.55E-01		1.09E+00
		1407.98		2.48	4.66E-01		1.72E+00
		1509.19		2.19	1.28E+00		1.81E+00
		1764.49		15.80	4.11E-01		3.34E-01
+	PB-214	77.11		10.70	3.83E-01	1.02E-01	4.30E-01
		295.21	*	19.20	1.67E-01		1.05E-01
		351.92	*	37.20	1.57E-01		1.02E-01
+	PA-228	89.95		22.00	1.20E+04	6.41E+03	1.09E+04
		93.35		35.00	2.99E+03		6.41E+03
		105.00		16.30	4.87E+03		1.24E+04
		129.22		2.97	1.61E+04		6.38E+04
		338.32		5.30	1.00E+04		4.09E+04
		463.00		13.80	6.69E+03		1.61E+04
		911.23		16.70	1.44E+04		2.07E+04
+	AM-241	59.54		36.30	3.81E-02	2.00E-01	2.00E-01
+	CM-243	103.76		23.00	7.78E-02	1.29E-01	1.29E-01
		228.18		10.60	-4.99E-02		2.64E-01
		277.60		14.00	-1.25E-01		2.16E-01

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

Apex-Gamma

Analysis Report for L3-012-102-FSGS-013-SG
L3-012-102-SWITCHYARD OPEN LAND

GAMMA SPECTRUM ANALYSIS

Sample Identification	: L3-012-102-FSGS-013-SG
Sample Description	: L3-012-102-SWITCHYARD OPEN LAND
Sample Type	: 500 ml Marinelli
Unit	:
Sample Point	:
Sample Size	: 9.165E+02 grams
Facility	: Dairyland_NPP
Sample Taken On	: 3/12/2018 3:07:00PM
Acquisition Started	: 3/20/2018 12:38:40PM
Procedure	: 500ml Marinelli
Operator	: Administrator
Detector Name	: HOTLAB
Geometry	: 500ml Marinelli
Live Time	: 3600.0 seconds
Real Time	: 3610.5 seconds
Dead Time	: 0.29 %
Peak Locate Threshold	: 3.00
Peak Locate Range (in channels)	: 100 - 4096
Peak Area Range (in channels)	: 100 - 4096
Identification Energy Tolerance	: 1.000 keV
Energy Calibration Used Done On	: 7/8/2014
Efficiency Calibration Used Done On	: 7/8/2014
Efficiency Calibration Description	:
Sample Number	: 5638

PEAK ANALYSIS REPORT

Peak Analysis Performed on : 1/25/2019 9:52:58AM

Peak Analysis From Channel	: 100
Peak Analysis To Channel	: 4096

Analysis Report for L3-012-102-FSGS-013-SG

L3-012-102-SWITCHYARD OPEN LAND

	Peak No.	Energy (keV)	ROI start	ROI end	Peak Centroid	Net Peak Area	Net Area Uncertainty	Continuum Counts	FWHM (keV)
F	1	238.52	469 -	482	477.51	8.78E+01	33.51	6.13E+02	1.51
F	2	295.17	585 -	596	590.79	1.35E+02	32.09	2.89E+02	1.84
F	3	351.88	697 -	710	704.19	2.21E+02	36.49	2.71E+02	2.10
F	4	477.66	950 -	960	955.69	5.91E+01	21.91	1.35E+02	1.86
F	5	583.13	1163 -	1173	1166.61	4.36E+01	18.06	9.66E+01	1.58
F	6	609.06	1213 -	1225	1218.45	1.32E+02	26.96	9.45E+01	2.50
F	7	968.42	1933 -	1942	1937.06	2.26E+01	11.51	3.41E+01	1.09
F	8	1460.61	2913 -	2931	2921.33	3.48E+02	38.18	3.56E+01	2.54

M = First peak in a multiplet region
m = Other peak in a multiplet region
F = Fitted singlet
Errors quoted at 2.000sigma

BACKGROUND SUBTRACT REPORT

Peak Analysis Performed on : 1/25/2019 9:52:58AM

Env. Background File : C:\Canberra\Apex\Root\Dairyland_NPP\Data\0000001364.CNF

	Peak No.	Energy (keV)	Original Area	Orig. Area Uncertainty	Ambient Background	Backgr. Uncert.	Subtracted Area	Subtracted Uncert.
F	1	238.52	8.78E+01	33.51			8.78E+01	3.35E+01
F	2	295.17	1.35E+02	32.09			1.35E+02	3.21E+01
F	3	351.88	2.21E+02	36.49	8.36E+01	3.72E+01	1.37E+02	5.21E+01
F	4	477.66	5.91E+01	21.91			5.91E+01	2.19E+01
F	5	583.13	4.36E+01	18.06			4.36E+01	1.81E+01
F	6	609.06	1.32E+02	26.96	4.12E+01	2.42E+01	9.06E+01	3.62E+01
F	7	968.42	2.26E+01	11.51			2.26E+01	1.15E+01
F	8	1460.61	3.48E+02	38.18	5.63E+01	1.71E+01	2.91E+02	4.18E+01

M = First peak in a multiplet region
m = Other peak in a multiplet region
F = Fitted singlet
Errors quoted at 2.000sigma

Analysis Report for L3-012-102-FSGS-013-SG

L3-012-102-SWITCHYARD OPEN LAND

NUCLIDE IDENTIFICATION REPORT

Nuclide Library Used : C:\Canberra\Apex\Root\Dairyland_NPP\Library\HOTLAB.NLB

IDENTIFIED NUCLIDES

Nuclide Name	Id Confidence	Energy (keV)		Yield(%)	Activity (pCi/grams)	Activity Uncertainty
K-40	0.99	1460.75	*	10.67	3.46E+00	5.33E-01
PB-212	0.55	77.11		17.50		
		238.63	*	44.60	4.94E-02	1.90E-02
BI-214	0.34	609.31	*	46.30	1.14E-01	4.60E-02
		1120.29		15.10		
		1238.11		5.94		
		1377.67		4.11		
		1407.98		2.48		
		1509.19		2.19		
		1764.49		15.80		
PB-214	0.72	77.11		10.70		
		295.21	*	19.20	2.10E-01	5.11E-02
		351.92	*	37.20	1.29E-01	4.95E-02

* = Energy line found in the spectrum.
\- = Manually added nuclide.
? = Manually edited nuclide.
@ = Energy line not used for Weighted Mean Activity
Energy Tolerance : 1.000 keV
Nuclide confidence index threshold = 0.30
Errors quoted at 2.000sigma

INTERFERENCE CORRECTED REPORT

Nuclide Name	Nuclide Id Confidence	Wt mean Activity (pCi/grams)	Wt mean Activity Uncertainty	Comments
K-40	0.997	3.46E+00	5.33E-01	
PB-212	0.559	4.94E-02	1.90E-02	
BI-214	0.344	1.14E-01	4.60E-02	

Analysis Report for L3-012-102-FSGS-013-SG

L3-012-102-SWITCHYARD OPEN LAND

Nuclide Name	Nuclide Id Confidence	Wt mean Activity (pCi/grams)	Wt mean Activity Uncertainty	Comments
PB-214	0.721	1.69E-01	3.56E-02	

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

Errors quoted at 2.000sigma

Analysis Report for L3-012-102-FSGS-013-SG

L3-012-102-SWITCHYARD OPEN LAND

UNIDENTIFIED PEAKS

Peak Locate Performed on : 1/25/2019 9:52:58AM
Peak Locate From Channel : 100
Peak Locate To Channel : 4096

	Peak No.	Energy (keV)	Peak Size (CPS)	Peak CPS (%) Uncertainty	Peak Type	Tolerance Nuclide
F	4	477.66	1.64049E-02	18.55	Sum	
F	5	583.13	1.21223E-02	20.70		
F	7	968.42	6.26414E-03	25.51	Tol.	AC-228

M = First peak in a multiplet region
m = Other peak in a multiplet region
F = Fitted singlet
Errors quoted at 2.000sigma

NUCLIDE MDA REPORT

Nuclide Library Used : C:\Canberra\Apex\Root\Dairyland_NPP\Library\HOTLAB.NLB

	Nuclide Name	Energy (keV)		Yield(%)	Activity (pCi/grams)	Nuclide MDA (pCi/grams)	Line MDA (pCi/grams)
+	K-40	1460.75	*	10.67	3.46E+00	5.69E-01	5.69E-01
+	@ AR-41	1293.64		99.16	1.00E+26	1.00E+26	1.00E+26
+	CO-60	1173.22		100.00	-1.19E-02	4.85E-02	4.85E-02
		1332.49		100.00	4.43E-02		4.93E-02
+	KR-85	513.99		0.43	1.22E+01	8.38E+00	8.38E+00
+	Y-88	898.04		93.70	-2.39E-02	3.07E-02	3.66E-02
		1836.06		99.20	-1.97E-02		3.07E-02
+	NB-94	702.63		100.00	1.18E-02	3.44E-02	3.44E-02
		871.10		100.00	2.45E-04		3.63E-02
+	I-131	284.30		6.06	3.25E-01	6.59E-02	8.90E-01
		364.48		81.20	-2.09E-02		6.59E-02
		636.97		7.27	-1.64E-01		9.03E-01
+	CS-134	604.70		97.60	-3.41E-02	4.43E-02	4.47E-02
		795.84		85.40	3.45E-03		4.43E-02

Analysis Report for L3-012-102-FSGS-013-SG

L3-012-102-SWITCHYARD OPEN LAND

	Nuclide Name	Energy (keV)		Yield(%)	Activity (pCi/grams)	Nuclide MDA (pCi/grams)	Line MDA (pCi/grams)
+	CS-137	661.65		85.12	5.92E-02	5.05E-02	5.05E-02
+	CE-144	80.12		1.36	3.61E-01	2.36E-01	2.79E+00
		133.51		11.09	8.58E-02		2.36E-01
+	EU-152	121.78		28.40	-5.59E-02	9.33E-02	9.33E-02
		344.28		26.60	-5.10E-03		1.11E-01
		1408.00		20.74	-1.78E-02		1.82E-01
+	EU-154	123.07		40.40	-5.06E-02	6.50E-02	6.50E-02
		723.30		19.70	7.36E-03		1.73E-01
		1274.51		35.50	5.74E-02		1.25E-01
+	EU-155	86.54		32.80	-7.04E-02	9.89E-02	9.89E-02
		105.31		21.80	3.07E-02		1.26E-01
+	BI-214	609.31	*	46.30	1.14E-01	7.70E-02	7.70E-02
		1120.29		15.10	1.33E-01		3.40E-01
		1238.11		5.94	3.33E-01		8.58E-01
		1377.67		4.11	2.75E-01		9.21E-01
		1407.98		2.48	-1.49E-01		1.52E+00
		1509.19		2.19	-7.41E-01		1.55E+00
		1764.49		15.80	2.54E-01		2.53E-01
+	PB-214	77.11		10.70	4.67E-01	9.05E-02	3.85E-01
		295.21	*	19.20	2.10E-01		1.02E-01
		351.92	*	37.20	1.29E-01		9.05E-02
+	PA-228	89.95		22.00	7.18E+01	3.47E+01	5.76E+01
		93.35		35.00	8.02E+00		3.47E+01
		105.00		16.30	4.05E+01		6.78E+01
		129.22		2.97	-2.64E+02		3.48E+02
		338.32		5.30	3.41E+01		2.02E+02
		463.00		13.80	6.58E+01		9.28E+01
		911.23		16.70	5.11E+01		9.65E+01
+	AM-241	59.54		36.30	3.43E-02	1.90E-01	1.90E-01
+	CM-243	103.76		23.00	4.20E-02	1.21E-01	1.21E-01
		228.18		10.60	-5.06E-02		2.45E-01
		277.60		14.00	-1.05E-01		1.94E-01

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

Apex-Gamma

Analysis Report for L3-012-102-FSGS-013-SS

L3-012-102-SWITCHYARD OPEN LAND

GAMMA SPECTRUM ANALYSIS

Sample Identification	: L3-012-102-FSGS-013-SS
Sample Description	: L3-012-102-SWITCHYARD OPEN LAND
Sample Type	: 500 ml Marinelli
Unit	:
Sample Point	:
Sample Size	: 9.270E+02 grams
Facility	: Dairyland_NPP
Sample Taken On	: 3/12/2018 12:57:00PM
Acquisition Started	: 3/19/2018 12:45:44PM
Procedure	: 500ml Marinelli
Operator	: Administrator
Detector Name	: HOTLAB
Geometry	: 500ml Marinelli
Live Time	: 3600.0 seconds
Real Time	: 3610.9 seconds
Dead Time	: 0.30 %
Peak Locate Threshold	: 3.00
Peak Locate Range (in channels)	: 100 - 4096
Peak Area Range (in channels)	: 100 - 4096
Identification Energy Tolerance	: 1.000 keV
Energy Calibration Used Done On	: 7/8/2014
Efficiency Calibration Used Done On	: 7/8/2014
Efficiency Calibration Description	:
Sample Number	: 5640

PEAK ANALYSIS REPORT

Peak Analysis Performed on : 1/25/2019 9:54:59AM

Peak Analysis From Channel	: 100
Peak Analysis To Channel	: 4096

Analysis Report for L3-012-102-FSGS-013-SS

L3-012-102-SWITCHYARD OPEN LAND

	Peak No.	Energy (keV)	ROI start	ROI end	Peak Centroid	Net Peak Area	Net Area Uncertainty	Continuum Counts	FWHM (keV)
F	1	238.69	471 -	485	477.86	2.25E+02	40.95	6.50E+02	1.66
F	2	294.81	586 -	595	590.08	1.10E+02	32.01	2.94E+02	1.98
F	3	351.80	697 -	708	704.04	2.36E+02	36.69	2.40E+02	1.72
F	4	477.34	950 -	960	955.07	3.07E+01	19.01	1.46E+02	1.66
F	5	583.06	1163 -	1175	1166.47	8.93E+01	23.06	1.16E+02	1.89
F	6	609.14	1209 -	1223	1218.60	1.77E+02	29.80	1.18E+02	1.90
F	7	661.40	1317 -	1328	1323.12	9.79E+01	24.51	1.17E+02	1.86
F	8	910.95	1816 -	1828	1822.14	5.37E+01	19.12	8.49E+01	2.00
F	9	969.19	1934 -	1943	1938.60	2.08E+01	13.54	5.46E+01	1.66
F	10	1120.27	2236 -	2246	2240.71	2.27E+01	13.79	6.08E+01	1.64
F	11	1460.72	2912 -	2930	2921.56	5.04E+02	46.85	2.86E+01	2.51
F	12	1764.32	3522 -	3535	3528.72	3.41E+01	12.20	3.62E+00	2.90

M = First peak in a multiplet region
m = Other peak in a multiplet region
F = Fitted singlet
Errors quoted at 2.000sigma

BACKGROUND SUBTRACT REPORT

Peak Analysis Performed on : 1/25/2019 9:54:59AM

Env. Background File : C:\Canberra\Apex\Root\Dairyland_NPP\Data\0000001364.CNF

	Peak No.	Energy (keV)	Original Area	Orig. Area Uncertainty	Ambient Background	Backgr. Uncert.	Subtracted Area	Subtracted Uncert.
F	1	238.69	2.25E+02	40.95			2.25E+02	4.09E+01
F	2	294.81	1.10E+02	32.01			1.10E+02	3.20E+01
F	3	351.80	2.36E+02	36.69	8.36E+01	3.72E+01	1.53E+02	5.23E+01
F	4	477.34	3.07E+01	19.01			3.07E+01	1.90E+01
F	5	583.06	8.93E+01	23.06			8.93E+01	2.31E+01
F	6	609.14	1.77E+02	29.80	4.12E+01	2.42E+01	1.35E+02	3.84E+01
F	7	661.40	9.79E+01	24.51	6.61E+01	2.54E+01	3.18E+01	3.53E+01
F	8	910.95	5.37E+01	19.12			5.37E+01	1.91E+01
F	9	969.19	2.08E+01	13.54			2.08E+01	1.35E+01
F	10	1120.27	2.27E+01	13.79			2.27E+01	1.38E+01
F	11	1460.72	5.04E+02	46.85	5.63E+01	1.71E+01	4.47E+02	4.99E+01
F	12	1764.32	3.41E+01	12.20	1.52E+01	9.80E+00	1.89E+01	1.56E+01

Analysis Report for L3-012-102-FSGS-013-SS

L3-012-102-SWITCHYARD OPEN LAND

M = First peak in a multiplet region
m = Other peak in a multiplet region
F = Fitted singlet
Errors quoted at 2.000sigma

NUCLIDE IDENTIFICATION REPORT

Nuclide Library Used : C:\Canberra\Apex\Root\Dairyland_NPP\Library\HOTLAB.NLB

IDENTIFIED NUCLIDES

Nuclide Name	Id Confidence	Energy (keV)		Yield(%)	Activity (pCi/grams)	Activity Uncertainty
K-40	1.00	1460.75	*	10.67	5.26E+00	6.55E-01
CS-137	0.99	661.65	*	85.12	2.32E-02	2.57E-02
PB-212	0.56	77.11		17.50		
		238.63	*	44.60	1.25E-01	2.37E-02
BI-214	0.78	609.31	*	46.30	1.68E-01	4.86E-02
		1120.29	*	15.10	1.50E-01	9.12E-02
		1238.11		5.94		
		1377.67		4.11		
		1407.98		2.48		
		1509.19		2.19		
		1764.49	*	15.80	1.76E-01	1.46E-01
PB-214	0.71	77.11		10.70		
		295.21	*	19.20	1.69E-01	5.00E-02
		351.92	*	37.20	1.42E-01	4.92E-02

* = Energy line found in the spectrum.
\- = Manually added nuclide.
? = Manually edited nuclide.
@ = Energy line not used for Weighted Mean Activity
Energy Tolerance : 1.000 keV
Nuclide confidence index threshold = 0.30
Errors quoted at 2.000sigma

INTERFERENCE CORRECTED REPORT

Analysis Report for L3-012-102-FSGS-013-SS

L3-012-102-SWITCHYARD OPEN LAND

Nuclide Name	Nuclide Id Confidence	Wt mean Activity (pCi/grams)	Wt mean Activity Uncertainty	Comments
K-40	1.000	5.26E+00	6.55E-01	
CS-137	0.990	2.32E-02	2.57E-02	
PB-212	0.560	1.25E-01	2.37E-02	
BI-214	0.785	1.65E-01	4.11E-02	
PB-214	0.713	1.55E-01	3.51E-02	

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

Errors quoted at 2.000sigma

Analysis Report for L3-012-102-FSGS-013-SS

L3-012-102-SWITCHYARD OPEN LAND

UNIDENTIFIED PEAKS

Peak Locate Performed on : 1/25/2019 9:54:59AM
Peak Locate From Channel : 100
Peak Locate To Channel : 4096

Peak No.		Energy (keV)	Peak Size (CPS)	Peak CPS (%) Uncertainty	Peak Type	Tolerance Nuclide
F	4	477.34	8.53590E-03	30.94	Sum	
F	5	583.06	2.48171E-02	12.91		
F	8	910.95	1.49088E-02	17.82	Tol.	AC-228 PA-228
F	9	969.19	5.79127E-03	32.48	Tol.	AC-228

M = First peak in a multiplet region
m = Other peak in a multiplet region
F = Fitted singlet
Errors quoted at 2.000sigma

NUCLIDE MDA REPORT

Nuclide Library Used : C:\Canberra\Apex\Root\Dairyland_NPP\Library\HOTLAB.NLB

	Nuclide Name	Energy (keV)		Yield(%)	Activity (pCi/grams)	Nuclide MDA (pCi/grams)	Line MDA (pCi/grams)
+	K-40	1460.75	*	10.67	5.26E+00	5.48E-01	5.48E-01
+	@ AR-41	1293.64		99.16	1.00E+26	1.00E+26	1.00E+26
+	CO-60	1173.22		100.00	-2.36E-03	4.57E-02	5.62E-02
		1332.49		100.00	3.39E-02		4.57E-02
+	KR-85	513.99		0.43	8.58E+00	8.80E+00	8.80E+00
+	Y-88	898.04		93.70	2.02E-02	3.01E-02	4.60E-02
		1836.06		99.20	-6.47E-03		3.01E-02
+	NB-94	702.63		100.00	-7.32E-03	3.27E-02	3.27E-02
		871.10		100.00	-2.25E-02		3.73E-02
+	I-131	284.30		6.06	-2.29E-01	6.54E-02	8.49E-01
		364.48		81.20	-1.77E-02		6.54E-02

Analysis Report for L3-012-102-FSGS-013-SS

L3-012-102-SWITCHYARD OPEN LAND

	Nuclide Name	Energy (keV)		Yield(%)	Activity (pCi/grams)	Nuclide MDA (pCi/grams)	Line MDA (pCi/grams)
	I-131	636.97		7.27	-1.11E+00	6.54E-02	8.50E-01
+	CS-134	604.70		97.60	1.01E-01	4.47E-02	4.95E-02
		795.84		85.40	-1.83E-02		4.47E-02
+	CS-137	661.65	*	85.12	2.32E-02	4.83E-02	4.83E-02
+	CE-144	80.12		1.36	1.42E+00	2.50E-01	3.09E+00
		133.51		11.09	1.99E-01		2.50E-01
+	EU-152	121.78		28.40	-3.87E-02	9.36E-02	9.36E-02
		344.28		26.60	9.84E-02		1.25E-01
		1408.00		20.74	1.03E-01		1.82E-01
+	EU-154	123.07		40.40	-4.96E-03	6.64E-02	6.64E-02
		723.30		19.70	5.53E-02		2.05E-01
		1274.51		35.50	1.32E-02		1.47E-01
+	EU-155	86.54		32.80	-9.55E-02	1.06E-01	1.06E-01
		105.31		21.80	-3.76E-02		1.29E-01
+	BI-214	609.31	*	46.30	1.68E-01	8.06E-02	8.06E-02
		1120.29	*	15.10	1.50E-01		2.04E-01
		1238.11		5.94	7.74E-01		9.86E-01
		1377.67		4.11	3.92E-01		8.54E-01
		1407.98		2.48	8.58E-01		1.52E+00
		1509.19		2.19	4.19E-01		1.53E+00
		1764.49	*	15.80	1.76E-01		2.29E-01
+	PB-214	77.11		10.70	5.91E-01	8.54E-02	4.18E-01
		295.21	*	19.20	1.69E-01		9.79E-02
		351.92	*	37.20	1.42E-01		8.54E-02
+	PA-228	89.95		22.00	3.06E+01	1.87E+01	3.13E+01
		93.35		35.00	1.88E+01		1.87E+01
		105.00		16.30	3.50E+00		3.47E+01
		129.22		2.97	-2.93E+01		1.81E+02
		338.32		5.30	1.72E+02		1.24E+02
		463.00		13.80	-7.33E+00		4.52E+01
		911.23		16.70	6.71E+01		6.28E+01
+	AM-241	59.54		36.30	-2.97E-02	1.95E-01	1.95E-01
+	CM-243	103.76		23.00	-5.49E-02	1.23E-01	1.23E-01
		228.18		10.60	-6.13E-02		2.54E-01
		277.60		14.00	-7.53E-02		2.04E-01

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

Analysis Report for L3-012-102-FSGS-013-SS

L3-012-102-SWITCHYARD OPEN LAND

Apex-Gamma

Analysis Report for L3-012-102-FSGS-014-SG

L3-012-102-SWITCHYARD OPEN LAND

GAMMA SPECTRUM ANALYSIS

Sample Identification	: L3-012-102-FSGS-014-SG
Sample Description	: L3-012-102-SWITCHYARD OPEN LAND
Sample Type	: 500 ml Marinelli
Unit	:
Sample Point	:
Sample Size	: 1.016E+03 grams
Facility	: Dairyland_NPP
Sample Taken On	: 3/12/2018 1:58:00PM
Acquisition Started	: 3/20/2018 1:41:52PM
Procedure	: 500ml Marinelli
Operator	: Administrator
Detector Name	: HOTLAB
Geometry	: 500ml Marinelli
Live Time	: 3600.0 seconds
Real Time	: 3610.9 seconds
Dead Time	: 0.30 %
Peak Locate Threshold	: 3.00
Peak Locate Range (in channels)	: 100 - 4096
Peak Area Range (in channels)	: 100 - 4096
Identification Energy Tolerance	: 1.000 keV
Energy Calibration Used Done On	: 7/8/2014
Efficiency Calibration Used Done On	: 7/8/2014
Efficiency Calibration Description	:
Sample Number	: 5642

PEAK ANALYSIS REPORT

Peak Analysis Performed on : 1/25/2019 9:56:19AM

Peak Analysis From Channel	: 100
Peak Analysis To Channel	: 4096

Analysis Report for L3-012-102-FSGS-014-SG

L3-012-102-SWITCHYARD OPEN LAND

	Peak No.	Energy (keV)	ROI start	ROI end	Peak Centroid	Net Peak Area	Net Area Uncertainty	Continuum Counts	FWHM (keV)
F	1	77.16	148 -	158	154.86	9.16E+01	38.02	1.10E+03	1.03
M	2	238.43	473 -	488	477.34	1.64E+02	36.00	4.13E+02	1.60
m	3	241.83	473 -	488	484.13	7.64E+01	28.41	3.95E+02	1.60
F	4	295.02	587 -	595	590.49	1.30E+02	31.58	2.58E+02	1.62
F	5	351.86	700 -	712	704.15	2.31E+02	35.96	2.34E+02	1.77
F	6	583.32	1161 -	1174	1166.98	6.80E+01	21.19	1.18E+02	1.85
F	7	609.07	1211 -	1224	1218.47	1.45E+02	28.49	1.29E+02	2.12
F	8	911.14	1817 -	1829	1822.51	4.25E+01	17.42	7.15E+01	2.26
F	9	1460.57	2913 -	2930	2921.24	4.30E+02	41.96	1.80E+01	2.49
F	10	1764.27	3523 -	3534	3528.60	3.04E+01	12.73	1.75E+01	2.32

M = First peak in a multiplet region
m = Other peak in a multiplet region
F = Fitted singlet
Errors quoted at 2.000sigma

BACKGROUND SUBTRACT REPORT

Peak Analysis Performed on : 1/25/2019 9:56:19AM

Env. Background File : C:\Canberra\Apex\Root\Dairyland_NPP\Data\0000001364.CNF

	Peak No.	Energy (keV)	Original Area	Orig. Area Uncertainty	Ambient Background	Backgr. Uncert.	Subtracted Area	Subtracted Uncert.
F	1	77.16	9.16E+01	38.02			9.16E+01	3.80E+01
M	2	238.43	1.64E+02	36.00			1.64E+02	3.60E+01
m	3	241.83	7.64E+01	28.41			7.64E+01	2.84E+01
F	4	295.02	1.30E+02	31.58			1.30E+02	3.16E+01
F	5	351.86	2.31E+02	35.96	8.36E+01	3.72E+01	1.47E+02	5.17E+01
F	6	583.32	6.80E+01	21.19			6.80E+01	2.12E+01
F	7	609.07	1.45E+02	28.49	4.12E+01	2.42E+01	1.04E+02	3.74E+01
F	8	911.14	4.25E+01	17.42			4.25E+01	1.74E+01
F	9	1460.57	4.30E+02	41.96	5.63E+01	1.71E+01	3.74E+02	4.53E+01
F	10	1764.27	3.04E+01	12.73	1.52E+01	9.80E+00	1.52E+01	1.61E+01

M = First peak in a multiplet region
m = Other peak in a multiplet region
F = Fitted singlet
Errors quoted at 2.000sigma

Analysis Report for L3-012-102-FSGS-014-SG

L3-012-102-SWITCHYARD OPEN LAND

NUCLIDE IDENTIFICATION REPORT

Nuclide Library Used : C:\Canberra\Apex\Root\Dairyland_NPP\Library\HOTLAB.NLB

IDENTIFIED NUCLIDES

Nuclide Name	Id Confidence	Energy (keV)		Yield(%)	Activity (pCi/grams)	Activity Uncertainty
K-40	0.99	1460.75	*	10.67	4.01E+00	5.35E-01
PB-212	0.99	77.11	*	17.50	1.27E-01	5.33E-02
		238.63	*	44.60	8.30E-02	1.88E-02
BI-214	0.54	609.31	*	46.30	1.17E-01	4.29E-02
		1120.29		15.10		
		1238.11		5.94		
		1377.67		4.11		
		1407.98		2.48		
		1509.19		2.19		
		1764.49	*	15.80	1.29E-01	1.37E-01
PB-214	0.99	77.11	*	10.70	2.07E-01	8.72E-02
		295.21	*	19.20	1.83E-01	4.53E-02
		351.92	*	37.20	1.25E-01	4.44E-02

* = Energy line found in the spectrum.
\- = Manually added nuclide.
? = Manually edited nuclide.
@ = Energy line not used for Weighted Mean Activity
Energy Tolerance : 1.000 keV
Nuclide confidence index threshold = 0.30
Errors quoted at 2.000sigma

INTERFERENCE CORRECTED REPORT

Nuclide Name	Nuclide Id Confidence	Wt mean Activity (pCi/grams)	Wt mean Activity Uncertainty	Comments
K-40	0.995	4.01E+00	5.35E-01	
PB-212	0.996	7.81E-02	1.78E-02	
BI-214	0.546	1.18E-01	4.09E-02	

Analysis Report for L3-012-102-FSGS-014-SG

L3-012-102-SWITCHYARD OPEN LAND

Nuclide Name	Nuclide Id Confidence	Wt mean Activity (pCi/grams)	Wt mean Activity Uncertainty	Comments
PB-214	0.998	1.45E-01	3.00E-02	

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

Errors quoted at 2.000sigma

Analysis Report for L3-012-102-FSGS-014-SG
L3-012-102-SWITCHYARD OPEN LAND

UNIDENTIFIED PEAKS

Peak Locate Performed on : 1/25/2019 9:56:19AM
Peak Locate From Channel : 100
Peak Locate To Channel : 4096

Peak No.		Energy (keV)	Peak Size (CPS)	Peak CPS (%) Uncertainty	Peak Type	Tolerance Nuclide
m	3	241.83	2.12126E-02	18.60		
F	6	583.32	1.88840E-02	15.58		
F	8	911.14	1.18193E-02	20.47	Tol.	AC-228 PA-228

M = First peak in a multiplet region
m = Other peak in a multiplet region
F = Fitted singlet
Errors quoted at 2.000sigma

NUCLIDE MDA REPORT

Nuclide Library Used : C:\Canberra\Apex\Root\Dairyland_NPP\Library\HOTLAB.NLB

	Nuclide Name	Energy (keV)		Yield(%)	Activity (pCi/grams)	Nuclide MDA (pCi/grams)	Line MDA (pCi/grams)
+	K-40	1460.75	*	10.67	4.01E+00	4.74E-01	4.74E-01
+	@ AR-41	1293.64		99.16	1.00E+26	1.00E+26	1.00E+26
+	CO-60	1173.22		100.00	1.03E-02	4.24E-02	4.72E-02
		1332.49		100.00	2.16E-02		4.24E-02
+	KR-85	513.99		0.43	9.54E+00	8.02E+00	8.02E+00
+	Y-88	898.04		93.70	3.31E-02	3.38E-02	4.38E-02
		1836.06		99.20	1.41E-02		3.38E-02
+	NB-94	702.63		100.00	1.03E-02	3.36E-02	3.36E-02
		871.10		100.00	2.16E-02		3.63E-02
+	I-131	284.30		6.06	7.14E-01	6.20E-02	8.66E-01
		364.48		81.20	-5.35E-02		6.20E-02

Analysis Report for L3-012-102-FSGS-014-SG

L3-012-102-SWITCHYARD OPEN LAND

	Nuclide Name	Energy (keV)		Yield(%)	Activity (pCi/grams)	Nuclide MDA (pCi/grams)	Line MDA (pCi/grams)
	I-131	636.97		7.27	-1.60E-01	6.20E-02	8.81E-01
+	CS-134	604.70		97.60	-1.07E-02	4.26E-02	4.36E-02
		795.84		85.40	-2.44E-02		4.26E-02
+	CS-137	661.65		85.12	6.77E-02	4.70E-02	4.70E-02
+	CE-144	80.12		1.36	-1.14E+00	2.27E-01	2.87E+00
		133.51		11.09	1.43E-01		2.27E-01
+	EU-152	121.78		28.40	-1.54E-02	8.73E-02	8.73E-02
		344.28		26.60	-2.69E-01		1.09E-01
		1408.00		20.74	9.25E-02		1.76E-01
+	EU-154	123.07		40.40	1.18E-02	6.18E-02	6.18E-02
		723.30		19.70	-4.38E-02		1.59E-01
		1274.51		35.50	6.56E-02		1.23E-01
+	EU-155	86.54		32.80	3.24E-02	9.98E-02	9.98E-02
		105.31		21.80	-1.48E-02		1.21E-01
+	BI-214	609.31	*	46.30	1.17E-01	7.43E-02	7.43E-02
		1120.29		15.10	2.18E-01		3.28E-01
		1238.11		5.94	-4.40E-02		8.82E-01
		1377.67		4.11	-1.23E-01		8.41E-01
		1407.98		2.48	7.73E-01		1.47E+00
		1509.19		2.19	-2.73E-01		1.54E+00
		1764.49	*	15.80	1.29E-01		2.41E-01
+	PB-214	77.11	*	10.70	2.07E-01	7.84E-02	2.76E-01
		295.21	*	19.20	1.83E-01		8.10E-02
		351.92	*	37.20	1.25E-01		7.84E-02
+	PA-228	89.95		22.00	6.50E+01	3.61E+01	6.10E+01
		93.35		35.00	2.94E+01		3.61E+01
		105.00		16.30	-4.95E+01		6.82E+01
		129.22		2.97	-7.83E+01		3.54E+02
		338.32		5.30	-4.57E+01		2.19E+02
		463.00		13.80	7.79E+00		9.10E+01
		911.23		16.70	1.12E+02		1.12E+02
+	AM-241	59.54		36.30	1.25E-03	1.80E-01	1.80E-01
+	CM-243	103.76		23.00	-3.75E-02	1.14E-01	1.14E-01
		228.18		10.60	3.47E-02		2.23E-01
		277.60		14.00	4.12E-02		1.90E-01

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

Analysis Report for L3-012-102-FSGS-014-SG

L3-012-102-SWITCHYARD OPEN LAND

Apex-Gamma

Analysis Report for L3-012-102-FSGS-014-SS

L3-012-102-SWITCHYARD OPEN LAND

GAMMA SPECTRUM ANALYSIS

Sample Identification	: L3-012-102-FSGS-014-SS
Sample Description	: L3-012-102-SWITCHYARD OPEN LAND
Sample Type	: 500 ml Marinelli
Unit	:
Sample Point	:
Sample Size	: 8.992E+02 grams
Facility	: Dairyland_NPP
Sample Taken On	: 3/12/2018 2:02:00PM
Acquisition Started	: 3/19/2018 1:47:23PM
Procedure	: 500ml Marinelli
Operator	: Administrator
Detector Name	: HOTLAB
Geometry	: 500ml Marinelli
Live Time	: 3600.0 seconds
Real Time	: 3611.2 seconds
Dead Time	: 0.31 %
Peak Locate Threshold	: 3.00
Peak Locate Range (in channels)	: 100 - 4096
Peak Area Range (in channels)	: 100 - 4096
Identification Energy Tolerance	: 1.000 keV
Energy Calibration Used Done On	: 7/8/2014
Efficiency Calibration Used Done On	: 7/8/2014
Efficiency Calibration Description	:
Sample Number	: 5644

PEAK ANALYSIS REPORT

Peak Analysis Performed on : 1/25/2019 9:57:48AM

Peak Analysis From Channel	: 100
Peak Analysis To Channel	: 4096

Analysis Report for L3-012-102-FSGS-014-SS

L3-012-102-SWITCHYARD OPEN LAND

	Peak No.	Energy (keV)	ROI start	ROI end	Peak Centroid	Net Peak Area	Net Area Uncertainty	Continuum Counts	FWHM (keV)
F	1	76.42	148 -	158	153.39	1.73E+02	56.77	1.07E+03	3.57
F	2	238.73	472 -	485	477.94	3.18E+02	47.08	6.40E+02	1.79
	3	295.17	586 -	597	590.79	5.03E+01	49.08	4.31E+02	1.81
F	4	351.90	698 -	712	704.22	2.15E+02	35.30	2.85E+02	1.79
F	5	583.03	1159 -	1174	1166.40	1.00E+02	24.89	1.31E+02	2.36
F	6	609.21	1211 -	1224	1218.75	1.43E+02	28.12	1.65E+02	1.73
F	7	661.35	1316 -	1329	1323.02	1.17E+02	26.48	1.33E+02	2.00
F	8	911.03	1818 -	1829	1822.31	3.85E+01	16.26	7.55E+01	1.54
F	9	969.02	1934 -	1944	1938.26	2.91E+01	16.04	8.12E+01	1.73
F	10	1460.67	2914 -	2930	2921.45	4.39E+02	42.46	2.07E+01	2.54
F	11	1764.46	3522 -	3535	3528.99	3.50E+01	12.77	7.00E+00	2.86

M = First peak in a multiplet region
m = Other peak in a multiplet region
F = Fitted singlet
Errors quoted at 2.000sigma

BACKGROUND SUBTRACT REPORT

Peak Analysis Performed on : 1/25/2019 9:57:48AM

Env. Background File : C:\Canberra\Apex\Root\Dairyland_NPP\Data\0000001364.CNF

	Peak No.	Energy (keV)	Original Area	Orig. Area Uncertainty	Ambient Background	Backgr. Uncert.	Subtracted Area	Subtracted Uncert.
F	1	76.42	1.73E+02	56.77			1.73E+02	5.68E+01
F	2	238.73	3.18E+02	47.08			3.18E+02	4.71E+01
	3	295.17	5.03E+01	49.08			5.03E+01	4.91E+01
F	4	351.90	2.15E+02	35.30	8.36E+01	3.72E+01	1.31E+02	5.13E+01
F	5	583.03	1.00E+02	24.89			1.00E+02	2.49E+01
F	6	609.21	1.43E+02	28.12	4.12E+01	2.42E+01	1.01E+02	3.71E+01
F	7	661.35	1.17E+02	26.48	6.61E+01	2.54E+01	5.11E+01	3.67E+01
F	8	911.03	3.85E+01	16.26			3.85E+01	1.63E+01
F	9	969.02	2.91E+01	16.04			2.91E+01	1.60E+01
F	10	1460.67	4.39E+02	42.46	5.63E+01	1.71E+01	3.83E+02	4.58E+01
F	11	1764.46	3.50E+01	12.77	1.52E+01	9.80E+00	1.98E+01	1.61E+01

M = First peak in a multiplet region
m = Other peak in a multiplet region
F = Fitted singlet
Errors quoted at 2.000sigma

Analysis Report for L3-012-102-FSGS-014-SS

L3-012-102-SWITCHYARD OPEN LAND

NUCLIDE IDENTIFICATION REPORT

Nuclide Library Used : C:\Canberra\Apex\Root\Dairyland_NPP\Library\HOTLAB.NLB

IDENTIFIED NUCLIDES

Nuclide Name	Id Confidence	Energy (keV)		Yield(%)	Activity (pCi/grams)	Activity Uncertainty
K-40	0.99	1460.75	*	10.67	4.64E+00	6.12E-01
CS-137	0.98	661.65	*	85.12	3.84E-02	2.76E-02
PB-212	0.97	77.11	*	17.50	2.76E-01	9.20E-02
		238.63	*	44.60	1.82E-01	2.86E-02
BI-214	0.55	609.31	*	46.30	1.30E-01	4.81E-02
		1120.29		15.10		
		1238.11		5.94		
		1377.67		4.11		
		1407.98		2.48		
		1509.19		2.19		
		1764.49	*	15.80	1.90E-01	1.55E-01
PB-214	0.98	77.11	*	10.70	4.51E-01	1.50E-01
		295.21	*	19.20	8.01E-02	7.82E-02
		351.92	*	37.20	1.26E-01	4.97E-02

* = Energy line found in the spectrum.
\- = Manually added nuclide.
? = Manually edited nuclide.
@ = Energy line not used for Weighted Mean Activity
Energy Tolerance : 1.000 keV
Nuclide confidence index threshold = 0.30
Errors quoted at 2.000sigma

INTERFERENCE CORRECTED REPORT

Nuclide Name	Nuclide Id Confidence	Wt mean Activity (pCi/grams)	Wt mean Activity Uncertainty	Comments

Analysis Report for L3-012-102-FSGS-014-SS

L3-012-102-SWITCHYARD OPEN LAND

Nuclide Name	Nuclide Id Confidence	Wt mean Activity (pCi/grams)	Wt mean Activity Uncertainty	Comments
K-40	0.999	4.64E+00	6.12E-01	
CS-137	0.986	3.84E-02	2.76E-02	
PB-212	0.978	1.84E-01	2.74E-02	
BI-214	0.552	1.35E-01	4.59E-02	
PB-214	0.988	1.16E-01	4.05E-02	

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

Errors quoted at 2.000sigma

Analysis Report for L3-012-102-FSGS-014-SS

L3-012-102-SWITCHYARD OPEN LAND

UNIDENTIFIED PEAKS

Peak Locate Performed on : 1/25/2019 9:57:48AM
Peak Locate From Channel : 100
Peak Locate To Channel : 4096

Peak No.		Energy (keV)	Peak Size (CPS)	Peak CPS (%) Uncertainty	Peak Type	Tolerance Nuclide
F	5	583.03	2.78950E-02	12.39		
F	8	911.03	1.06982E-02	21.10	Tol.	AC-228 PA-228
F	9	969.02	8.07281E-03	27.59	Tol.	AC-228

M = First peak in a multiplet region
m = Other peak in a multiplet region
F = Fitted singlet
Errors quoted at 2.000sigma

NUCLIDE MDA REPORT

Nuclide Library Used : C:\Canberra\Apex\Root\Dairyland_NPP\Library\HOTLAB.NLB

	Nuclide Name	Energy (keV)		Yield(%)	Activity (pCi/grams)	Nuclide MDA (pCi/grams)	Line MDA (pCi/grams)
+	K-40	1460.75	*	10.67	4.64E+00	5.40E-01	5.40E-01
+	@ AR-41	1293.64		99.16	1.00E+26	1.00E+26	1.00E+26
+	CO-60	1173.22		100.00	3.31E-02	4.71E-02	5.61E-02
		1332.49		100.00	2.75E-02		4.71E-02
+	KR-85	513.99		0.43	1.09E+01	9.61E+00	9.61E+00
+	Y-88	898.04		93.70	-6.00E-03	3.52E-02	4.70E-02
		1836.06		99.20	-4.05E-02		3.52E-02
+	NB-94	702.63		100.00	3.02E-02	3.78E-02	3.78E-02
		871.10		100.00	-1.98E-02		4.30E-02
+	I-131	284.30		6.06	-1.29E-01	6.95E-02	9.04E-01
		364.48		81.20	2.17E-02		6.95E-02
		636.97		7.27	-3.18E-01		9.31E-01

Analysis Report for L3-012-102-FSGS-014-SS

L3-012-102-SWITCHYARD OPEN LAND

	Nuclide Name	Energy (keV)		Yield(%)	Activity (pCi/grams)	Nuclide MDA (pCi/grams)	Line MDA (pCi/grams)
+	CS-134	604.70		97.60	-4.34E-03	4.71E-02	5.19E-02
		795.84		85.40	-2.61E-02		4.71E-02
+	CS-137	661.65	*	85.12	3.84E-02	5.23E-02	5.23E-02
+	CE-144	80.12		1.36	-2.96E+00	2.64E-01	3.26E+00
		133.51		11.09	8.00E-02		2.64E-01
+	EU-152	121.78		28.40	-6.98E-02	9.85E-02	9.85E-02
		344.28		26.60	6.07E-02		1.22E-01
		1408.00		20.74	1.14E-01		2.11E-01
+	EU-154	123.07		40.40	-3.92E-02	6.94E-02	6.94E-02
		723.30		19.70	-7.02E-02		1.86E-01
		1274.51		35.50	6.51E-02		1.39E-01
+	EU-155	86.54		32.80	3.10E-02	1.15E-01	1.15E-01
		105.31		21.80	8.29E-02		1.40E-01
+	BI-214	609.31	*	46.30	1.30E-01	8.94E-02	8.94E-02
		1120.29		15.10	1.07E-01		3.82E-01
		1238.11		5.94	3.49E-01		9.97E-01
		1377.67		4.11	-7.39E-02		9.83E-01
		1407.98		2.48	9.54E-01		1.77E+00
		1509.19		2.19	1.01E+00		1.76E+00
		1764.49	*	15.80	1.90E-01		2.46E-01
+	PB-214	77.11	*	10.70	4.51E-01	9.46E-02	3.13E-01
		295.21	*	19.20	8.01E-02		1.27E-01
		351.92	*	37.20	1.26E-01		9.46E-02
+	PA-228	89.95		22.00	5.55E+01	1.95E+01	3.35E+01
		93.35		35.00	9.03E+00		1.95E+01
		105.00		16.30	2.53E+01		3.75E+01
		129.22		2.97	-2.44E+01		1.94E+02
		338.32		5.30	1.88E+01		1.22E+02
		463.00		13.80	5.50E+00		4.97E+01
		911.23		16.70	7.03E+01		6.07E+01
+	AM-241	59.54		36.30	1.46E-01	2.05E-01	2.05E-01
+	CM-243	103.76		23.00	5.52E-02	1.33E-01	1.33E-01
		228.18		10.60	1.31E-01		2.77E-01
		277.60		14.00	1.19E-01		2.17E-01

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

Apex-Gamma

Analysis Report for L3-012-102-FJGS-015-SG

L3-012-102-SWITCHYARD OPEN LAND

GAMMA SPECTRUM ANALYSIS

Sample Identification	: L3-012-102-FJGS-015-SG
Sample Description	: L3-012-102-SWITCHYARD OPEN LAND
Sample Type	: 500 ml Marinelli
Unit	:
Sample Point	:
Sample Size	: 8.088E+02 grams
Facility	: Dairyland_NPP
Sample Taken On	: 3/14/2018 2:56:00PM
Acquisition Started	: 3/20/2018 5:33:34PM
Procedure	: 500ml Marinelli
Operator	: Administrator
Detector Name	: HOTLAB
Geometry	: 500ml Marinelli
Live Time	: 3600.0 seconds
Real Time	: 3611.1 seconds
Dead Time	: 0.31 %
Peak Locate Threshold	: 3.00
Peak Locate Range (in channels)	: 100 - 4096
Peak Area Range (in channels)	: 100 - 4096
Identification Energy Tolerance	: 1.000 keV
Energy Calibration Used Done On	: 7/8/2014
Efficiency Calibration Used Done On	: 7/8/2014
Efficiency Calibration Description	:
Sample Number	: 5646

PEAK ANALYSIS REPORT

Peak Analysis Performed on : 1/25/2019 9:59:14AM

Peak Analysis From Channel	: 100
Peak Analysis To Channel	: 4096

Analysis Report for L3-012-102-FJGS-015-SG

L3-012-102-SWITCHYARD OPEN LAND

	Peak No.	Energy (keV)	ROI start	ROI end	Peak Centroid	Net Peak Area	Net Area Uncertainty	Continuum Counts	FWHM (keV)
F	1	238.84	470 -	485	478.15	1.37E+02	41.91	6.44E+02	2.88
F	2	295.04	586 -	598	590.52	1.59E+02	33.35	3.57E+02	1.60
F	3	351.76	695 -	708	703.95	2.32E+02	36.16	2.44E+02	1.78
F	4	609.23	1211 -	1225	1218.78	2.07E+02	30.88	6.72E+01	2.06
F	5	1460.62	2913 -	2929	2921.35	1.53E+02	25.20	8.50E+00	2.45
F	6	1764.03	3523 -	3534	3528.13	2.97E+01	12.00	9.73E+00	2.47

M = First peak in a multiplet region
m = Other peak in a multiplet region
F = Fitted singlet
Errors quoted at 2.000sigma

BACKGROUND SUBTRACT REPORT

Peak Analysis Performed on : 1/25/2019 9:59:14AM

Env. Background File : C:\Canberra\Apex\Root\Dairyland_NPP\Data\0000001364.CNF

	Peak No.	Energy (keV)	Original Area	Orig. Area Uncertainty	Ambient Background	Backgr. Uncert.	Subtracted Area	Subtracted Uncert.
F	1	238.84	1.37E+02	41.91			1.37E+02	4.19E+01
F	2	295.04	1.59E+02	33.35			1.59E+02	3.34E+01
F	3	351.76	2.32E+02	36.16	8.36E+01	3.72E+01	1.48E+02	5.19E+01
F	4	609.23	2.07E+02	30.88	4.12E+01	2.42E+01	1.65E+02	3.92E+01
F	5	1460.62	1.53E+02	25.20	5.63E+01	1.71E+01	9.63E+01	3.05E+01
F	6	1764.03	2.97E+01	12.00	1.52E+01	9.80E+00	1.45E+01	1.55E+01

M = First peak in a multiplet region
m = Other peak in a multiplet region
F = Fitted singlet
Errors quoted at 2.000sigma

Analysis Report for L3-012-102-FJGS-015-SG

L3-012-102-SWITCHYARD OPEN LAND

NUCLIDE IDENTIFICATION REPORT

Nuclide Library Used : C:\Canberra\Apex\Root\Dairyland_NPP\Library\HOTLAB.NLB

IDENTIFIED NUCLIDES

Nuclide Name	Id Confidence	Energy (keV)		Yield(%)	Activity (pCi/grams)	Activity Uncertainty
K-40	0.99	1460.75	*	10.67	1.30E+00	4.17E-01
PB-212	0.55	77.11		17.50		
		238.63	*	44.60	8.73E-02	2.71E-02
BI-214	0.54	609.31	*	46.30	2.36E-01	5.74E-02
		1120.29		15.10		
		1238.11		5.94		
		1377.67		4.11		
		1407.98		2.48		
		1509.19		2.19		
		1764.49	*	15.80	1.55E-01	1.65E-01
PB-214	0.71	77.11		10.70		
		295.21	*	19.20	2.81E-01	6.05E-02
		351.92	*	37.20	1.58E-01	5.59E-02

* = Energy line found in the spectrum.
\- = Manually added nuclide.
? = Manually edited nuclide.
@ = Energy line not used for Weighted Mean Activity
Energy Tolerance : 1.000 keV
Nuclide confidence index threshold = 0.30
Errors quoted at 2.000sigma

INTERFERENCE CORRECTED REPORT

Nuclide Name	Nuclide Id Confidence	Wt mean Activity (pCi/grams)	Wt mean Activity Uncertainty	Comments
K-40	0.997	1.30E+00	4.17E-01	
PB-212	0.555	8.73E-02	2.71E-02	
BI-214	0.546	2.27E-01	5.42E-02	

Analysis Report for L3-012-102-FJGS-015-SG

L3-012-102-SWITCHYARD OPEN LAND

Nuclide Name	Nuclide Id Confidence	Wt mean Activity (pCi/grams)	Wt mean Activity Uncertainty	Comments
PB-214	0.718	2.15E-01	4.11E-02	

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

Errors quoted at 2.000sigma

Analysis Report for L3-012-102-FJGS-015-SG

L3-012-102-SWITCHYARD OPEN LAND

UNIDENTIFIED PEAKS

Peak Locate Performed on : 1/25/2019 9:59:14AM
Peak Locate From Channel : 100
Peak Locate To Channel : 4096

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

All peaks were identified.

M = First peak in a multiplet region
m = Other peak in a multiplet region
F = Fitted singlet
Errors quoted at 2.000sigma

NUCLIDE MDA REPORT

Nuclide Library Used : C:\Canberra\Apex\Root\Dairyland_NPP\Library\HOTLAB.NLB

	Nuclide Name	Energy (keV)		Yield(%)	Activity (pCi/grams)	Nuclide MDA (pCi/grams)	Line MDA (pCi/grams)
+	K-40	1460.75	*	10.67	1.30E+00	5.66E-01	5.66E-01
+	@ AR-41	1293.64		99.16	1.00E+26	1.00E+26	1.00E+26
+	CO-60	1173.22		100.00	4.34E-02	5.20E-02	5.22E-02
		1332.49		100.00	6.20E-02		5.20E-02
+	KR-85	513.99		0.43	1.82E+01	1.01E+01	1.01E+01
+	Y-88	898.04		93.70	-2.37E-03	3.18E-02	4.28E-02
		1836.06		99.20	-2.02E-02		3.18E-02
+	NB-94	702.63		100.00	1.40E-02	3.64E-02	3.64E-02
		871.10		100.00	9.64E-03		4.16E-02
+	I-131	284.30		6.06	1.07E-01	6.15E-02	8.44E-01
		364.48		81.20	-6.25E-03		6.15E-02
		636.97		7.27	3.53E-01		8.04E-01
+	CS-134	604.70		97.60	2.18E-03	4.59E-02	5.63E-02
		795.84		85.40	-3.00E-02		4.59E-02
+	CS-137	661.65		85.12	6.84E-02	5.28E-02	5.28E-02
+	CE-144	80.12		1.36	9.68E-01	2.60E-01	3.24E+00
		133.51		11.09	-2.58E-02		2.60E-01
+	EU-152	121.78		28.40	-5.40E-02	1.02E-01	1.02E-01

Analysis Report for L3-012-102-FJGS-015-SG

L3-012-102-SWITCHYARD OPEN LAND

	Nuclide Name	Energy (keV)		Yield(%)	Activity (pCi/grams)	Nuclide MDA (pCi/grams)	Line MDA (pCi/grams)
	EU-152	344.28		26.60	3.16E-02	1.02E-01	1.26E-01
		1408.00		20.74	1.42E-01		2.26E-01
+	EU-154	123.07		40.40	3.78E-02	7.30E-02	7.30E-02
		723.30		19.70	1.55E-02		1.85E-01
		1274.51		35.50	2.43E-03		1.39E-01
+	EU-155	86.54		32.80	1.26E-02	1.12E-01	1.12E-01
		105.31		21.80	-1.06E-02		1.35E-01
+	BI-214	609.31	*	46.30	2.36E-01	8.29E-02	8.29E-02
		1120.29		15.10	5.54E-01		3.82E-01
		1238.11		5.94	-2.01E-01		8.91E-01
		1377.67		4.11	2.04E-01		1.13E+00
		1407.98		2.48	1.19E+00		1.89E+00
		1509.19		2.19	1.27E+00		1.87E+00
		1764.49	*	15.80	1.55E-01		2.83E-01
+	PB-214	77.11		10.70	5.22E-01	1.00E-01	4.38E-01
		295.21	*	19.20	2.81E-01		1.32E-01
		351.92	*	37.20	1.58E-01		1.00E-01
+	PA-228	89.95		22.00	8.53E+00	9.89E+00	1.65E+01
		93.35		35.00	1.09E-01		9.89E+00
		105.00		16.30	4.33E+00		1.88E+01
		129.22		2.97	3.67E+01		1.01E+02
		338.32		5.30	1.59E+01		6.28E+01
		463.00		13.80	3.06E+01		2.54E+01
		911.23		16.70	1.52E+01		2.87E+01
+	AM-241	59.54		36.30	6.95E-02	2.15E-01	2.15E-01
+	CM-243	103.76		23.00	7.39E-02	1.31E-01	1.31E-01
		228.18		10.60	-4.72E-02		2.72E-01
		277.60		14.00	-8.29E-03		2.16E-01

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

Apex-Gamma

Analysis Report for L3-012-102-FJGS-015-SS
03/14/18 - 1459

GAMMA SPECTRUM ANALYSIS

Sample Identification	: L3-012-102-FJGS-015-SS
Sample Description	: 03/14/18 - 1459
Sample Type	: 500 ml Marinelli
Unit	:
Sample Point	:
Sample Size	: 8.568E+02 grams
Facility	: Dairyland_NPP
Sample Taken On	: 3/14/2018 2:59:00PM
Acquisition Started	: 10/16/2018 10:44:55AM
Procedure	: 500ml Marinelli
Operator	: Administrator
Detector Name	: HOTLAB
Geometry	: 500ml Marinelli
Live Time	: 3600.0 seconds
Real Time	: 3609.9 seconds
Dead Time	: 0.28 %
Peak Locate Threshold	: 3.00
Peak Locate Range (in channels)	: 100 - 4096
Peak Area Range (in channels)	: 100 - 4096
Identification Energy Tolerance	: 1.000 keV
Energy Calibration Used Done On	: 7/8/2014
Efficiency Calibration Used Done On	: 7/8/2014
Efficiency Calibration Description	:
Sample Number	: 5648

PEAK ANALYSIS REPORT

Peak Analysis Performed on : 1/25/2019 10:00:32AM

Peak Analysis From Channel	: 100
Peak Analysis To Channel	: 4096

Analysis Report for L3-012-102-FJGS-015-SS

03/14/18 - 1459

	Peak No.	Energy (keV)	ROI start	ROI end	Peak Centroid	Net Peak Area	Net Area Uncertainty	Continuum Counts	FWHM (keV)
F	1	238.37	470 -	481	477.22	7.07E+01	35.89	5.75E+02	1.85
F	2	295.42	586 -	595	591.30	1.05E+02	30.75	2.55E+02	1.91
F	3	352.05	698 -	711	704.53	2.11E+02	36.03	2.63E+02	2.09
F	4	582.72	1161 -	1172	1165.78	4.71E+01	17.48	6.43E+01	2.06
F	5	609.32	1212 -	1226	1218.97	1.47E+02	28.46	1.02E+02	2.66
F	6	1461.05	2914 -	2931	2922.20	2.76E+02	33.97	2.21E+01	2.87

M = First peak in a multiplet region
m = Other peak in a multiplet region
F = Fitted singlet
Errors quoted at 2.000sigma

BACKGROUND SUBTRACT REPORT

Peak Analysis Performed on : 1/25/2019 10:00:32AM

Env. Background File : C:\Canberra\Apex\Root\Dairyland_NPP\Data\0000001364.CNF

	Peak No.	Energy (keV)	Original Area	Orig. Area Uncertainty	Ambient Background	Backgr. Uncert.	Subtracted Area	Subtracted Uncert.
F	1	238.37	7.07E+01	35.89			7.07E+01	3.59E+01
F	2	295.42	1.05E+02	30.75			1.05E+02	3.08E+01
F	3	352.05	2.11E+02	36.03	8.36E+01	3.72E+01	1.28E+02	5.18E+01
F	4	582.72	4.71E+01	17.48			4.71E+01	1.75E+01
F	5	609.32	1.47E+02	28.46	4.12E+01	2.42E+01	1.06E+02	3.74E+01
F	6	1461.05	2.76E+02	33.97	5.63E+01	1.71E+01	2.20E+02	3.80E+01

M = First peak in a multiplet region
m = Other peak in a multiplet region
F = Fitted singlet
Errors quoted at 2.000sigma

Analysis Report for L3-012-102-FJGS-015-SS

03/14/18 - 1459

NUCLIDE IDENTIFICATION REPORT

Nuclide Library Used : C:\Canberra\Apex\Root\Dairyland_NPP\Library\HOTLAB.NLB

IDENTIFIED NUCLIDES

Nuclide Name	Id Confidence	Energy (keV)		Yield(%)	Activity (pCi/grams)	Activity Uncertainty
K-40	0.98	1460.75	*	10.67	2.80E+00	5.08E-01
PB-212	0.55	77.11		17.50		
		238.63	*	44.60	4.25E-02	2.17E-02
BI-214	0.35	609.31	*	46.30	1.42E-01	5.09E-02
		1120.29		15.10		
		1238.11		5.94		
		1377.67		4.11		
		1407.98		2.48		
		1509.19		2.19		
		1764.49		15.80		
PB-214	0.71	77.11		10.70		
		295.21	*	19.20	1.75E-01	5.21E-02
		351.92	*	37.20	1.29E-01	5.26E-02

* = Energy line found in the spectrum.
\- = Manually added nuclide.
? = Manually edited nuclide.
@ = Energy line not used for Weighted Mean Activity
Energy Tolerance : 1.000 keV
Nuclide confidence index threshold = 0.30
Errors quoted at 2.000sigma

INTERFERENCE CORRECTED REPORT

Nuclide Name	Nuclide Id Confidence	Wt mean Activity (pCi/grams)	Wt mean Activity Uncertainty	Comments
K-40	0.986	2.80E+00	5.08E-01	
PB-212	0.553	4.25E-02	2.17E-02	
BI-214	0.350	1.42E-01	5.09E-02	

Analysis Report for L3-012-102-FJGS-015-SS

03/14/18 - 1459

Nuclide Name	Nuclide Id Confidence	Wt mean Activity (pCi/grams)	Wt mean Activity Uncertainty	Comments
PB-214	0.718	1.52E-01	3.70E-02	

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

Errors quoted at 2.000sigma

Analysis Report for L3-012-102-FJGS-015-SS

03/14/18 - 1459

UNIDENTIFIED PEAKS

Peak Locate Performed on : 1/25/2019 10:00:32AM
Peak Locate From Channel : 100
Peak Locate To Channel : 4096

	Peak No.	Energy (keV)	Peak Size (CPS)	Peak CPS (%) Uncertainty	Peak Type	Tolerance Nuclide
F	4	582.72	1.30777E-02	18.57		

M = First peak in a multiplet region
m = Other peak in a multiplet region
F = Fitted singlet
Errors quoted at 2.000sigma

NUCLIDE MDA REPORT

Nuclide Library Used : C:\Canberra\Apex\Root\Dairyland_NPP\Library\HOTLAB.NLB

	Nuclide Name	Energy (keV)		Yield(%)	Activity (pCi/grams)	Nuclide MDA (pCi/grams)	Line MDA (pCi/grams)
+	K-40	1460.75	*	10.67	2.80E+00	5.72E-01	5.72E-01
+	@ AR-41	1293.64		99.16	1.00E+26	1.00E+26	1.00E+26
+	CO-60	1173.22		100.00	7.02E-02	5.13E-02	6.35E-02
		1332.49		100.00	4.45E-02		5.13E-02
+	KR-85	513.99		0.43	1.41E+01	8.95E+00	8.95E+00
+	Y-88	898.04		93.70	-9.69E-02	1.39E-01	1.60E-01
		1836.06		99.20	-2.43E-01		1.39E-01
+	NB-94	702.63		100.00	-8.66E-03	3.34E-02	3.34E-02
		871.10		100.00	3.61E-04		4.10E-02
+	I-131	284.30		6.06	7.63E+06	4.33E+06	5.52E+07
		364.48		81.20	-5.88E+05		4.33E+06
		636.97		7.27	1.04E+07		6.00E+07
+	CS-134	604.70		97.60	-4.88E-03	5.34E-02	5.96E-02
		795.84		85.40	-4.61E-02		5.34E-02
+	CS-137	661.65		85.12	7.20E-02	5.33E-02	5.33E-02
+	CE-144	80.12		1.36	-2.45E+00	4.08E-01	5.00E+00
		133.51		11.09	3.40E-02		4.08E-01

Analysis Report for L3-012-102-FJGS-015-SS

03/14/18 - 1459

	Nuclide Name	Energy (keV)		Yield(%)	Activity (pCi/grams)	Nuclide MDA (pCi/grams)	Line MDA (pCi/grams)
+	EU-152	121.78		28.40	5.33E-03	9.74E-02	9.74E-02
		344.28		26.60	-1.29E-02		1.23E-01
		1408.00		20.74	1.38E-02		1.76E-01
+	EU-154	123.07		40.40	1.31E-02	6.97E-02	6.97E-02
		723.30		19.70	5.08E-03		1.97E-01
		1274.51		35.50	-4.98E-02		1.31E-01
+	EU-155	86.54		32.80	6.89E-02	1.16E-01	1.16E-01
		105.31		21.80	2.77E-02		1.43E-01
+	BI-214	609.31	*	46.30	1.42E-01	8.48E-02	8.48E-02
		1120.29		15.10	2.68E-01		3.63E-01
		1238.11		5.94	1.51E-01		8.98E-01
		1377.67		4.11	3.78E-01		1.04E+00
		1407.98		2.48	1.12E-01		1.43E+00
		1509.19		2.19	6.90E-02		1.80E+00
		1764.49		15.80	1.98E-01		3.04E-01
+	PB-214	77.11		10.70	4.72E-01	9.62E-02	4.12E-01
		295.21	*	19.20	1.75E-01		9.77E-02
		351.92	*	37.20	1.29E-01		9.62E-02
+	@ PA-228	89.95		22.00	1.00E+26	1.00E+26	1.00E+26
	@	93.35		35.00	1.00E+26		1.00E+26
	@	105.00		16.30	1.00E+26		1.00E+26
	@	129.22		2.97	1.00E+26		1.00E+26
	@	338.32		5.30	1.00E+26		1.00E+26
	@	463.00		13.80	1.00E+26		1.00E+26
	@	911.23		16.70	1.00E+26		1.00E+26
+	AM-241	59.54		36.30	6.95E-02	2.04E-01	2.04E-01
+	CM-243	103.76		23.00	4.20E-02	1.28E-01	1.28E-01
		228.18		10.60	-4.75E-02		2.51E-01
		277.60		14.00	-9.93E-02		2.06E-01

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

Apex-Gamma

Analysis Report for L3-012-102-FJGS-015-SS SPLIT
03/14/18 - 1459

GAMMA SPECTRUM ANALYSIS

Sample Identification	: L3-012-102-FJGS-015-SS SPLIT
Sample Description	: 03/14/18 - 1459
Sample Type	: 500 ml Marinelli
Unit	:
Sample Point	:
Sample Size	: 8.568E+02 grams
Facility	: Dairyland_NPP
Sample Taken On	: 3/14/2018 2:59:00PM
Acquisition Started	: 10/16/2018 10:44:55AM
Procedure	: 500ml Marinelli
Operator	: Administrator
Detector Name	: HOTLAB
Geometry	: 500ml Marinelli
Live Time	: 3600.0 seconds
Real Time	: 3609.9 seconds
Dead Time	: 0.28 %
Peak Locate Threshold	: 3.00
Peak Locate Range (in channels)	: 100 - 4096
Peak Area Range (in channels)	: 100 - 4096
Identification Energy Tolerance	: 1.000 keV
Energy Calibration Used Done On	: 7/8/2014
Efficiency Calibration Used Done On	: 7/8/2014
Efficiency Calibration Description	:
Sample Number	: 5650

PEAK ANALYSIS REPORT

Peak Analysis Performed on : 1/25/2019 10:01:46AM

Peak Analysis From Channel	: 100
Peak Analysis To Channel	: 4096

Analysis Report for L3-012-102-FJGS-015-SS SPLIT

03/14/18 - 1459

	Peak No.	Energy (keV)	ROI start	ROI end	Peak Centroid	Net Peak Area	Net Area Uncertainty	Continuum Counts	FWHM (keV)
F	1	238.37	470 -	481	477.22	7.07E+01	35.89	5.75E+02	1.85
F	2	295.42	586 -	595	591.30	1.05E+02	30.75	2.55E+02	1.91
F	3	352.05	698 -	711	704.53	2.11E+02	36.03	2.63E+02	2.09
F	4	582.72	1161 -	1172	1165.78	4.71E+01	17.48	6.43E+01	2.06
F	5	609.32	1212 -	1226	1218.97	1.47E+02	28.46	1.02E+02	2.66
F	6	1461.05	2914 -	2931	2922.20	2.76E+02	33.97	2.21E+01	2.87

M = First peak in a multiplet region
m = Other peak in a multiplet region
F = Fitted singlet
Errors quoted at 2.000sigma

BACKGROUND SUBTRACT REPORT

Peak Analysis Performed on : 1/25/2019 10:01:46AM

Env. Background File : C:\Canberra\Apex\Root\Dairyland_NPP\Data\0000001364.CNF

	Peak No.	Energy (keV)	Original Area	Orig. Area Uncertainty	Ambient Background	Backgr. Uncert.	Subtracted Area	Subtracted Uncert.
F	1	238.37	7.07E+01	35.89			7.07E+01	3.59E+01
F	2	295.42	1.05E+02	30.75			1.05E+02	3.08E+01
F	3	352.05	2.11E+02	36.03	8.36E+01	3.72E+01	1.28E+02	5.18E+01
F	4	582.72	4.71E+01	17.48			4.71E+01	1.75E+01
F	5	609.32	1.47E+02	28.46	4.12E+01	2.42E+01	1.06E+02	3.74E+01
F	6	1461.05	2.76E+02	33.97	5.63E+01	1.71E+01	2.20E+02	3.80E+01

M = First peak in a multiplet region
m = Other peak in a multiplet region
F = Fitted singlet
Errors quoted at 2.000sigma

Analysis Report for L3-012-102-FJGS-015-SS SPLIT

03/14/18 - 1459

NUCLIDE IDENTIFICATION REPORT

Nuclide Library Used : C:\Canberra\Apex\Root\Dairyland_NPP\Library\HOTLAB.NLB

IDENTIFIED NUCLIDES

Nuclide Name	Id Confidence	Energy (keV)		Yield(%)	Activity (pCi/grams)	Activity Uncertainty
K-40	0.98	1460.75	*	10.67	2.80E+00	5.08E-01
PB-212	0.55	77.11		17.50		
		238.63	*	44.60	4.25E-02	2.17E-02
BI-214	0.35	609.31	*	46.30	1.42E-01	5.09E-02
		1120.29		15.10		
		1238.11		5.94		
		1377.67		4.11		
		1407.98		2.48		
		1509.19		2.19		
		1764.49		15.80		
PB-214	0.71	77.11		10.70		
		295.21	*	19.20	1.75E-01	5.21E-02
		351.92	*	37.20	1.29E-01	5.26E-02

* = Energy line found in the spectrum.
\- = Manually added nuclide.
? = Manually edited nuclide.
@ = Energy line not used for Weighted Mean Activity
Energy Tolerance : 1.000 keV
Nuclide confidence index threshold = 0.30
Errors quoted at 2.000sigma

INTERFERENCE CORRECTED REPORT

Nuclide Name	Nuclide Id Confidence	Wt mean Activity (pCi/grams)	Wt mean Activity Uncertainty	Comments
K-40	0.986	2.80E+00	5.08E-01	
PB-212	0.553	4.25E-02	2.17E-02	
BI-214	0.350	1.42E-01	5.09E-02	

Analysis Report for L3-012-102-FJGS-015-SS SPLIT

03/14/18 - 1459

Nuclide Name	Nuclide Id Confidence	Wt mean Activity (pCi/grams)	Wt mean Activity Uncertainty	Comments
PB-214	0.718	1.52E-01	3.70E-02	

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

Errors quoted at 2.000sigma

Analysis Report for L3-012-102-FJGS-015-SS SPLIT

03/14/18 - 1459

UNIDENTIFIED PEAKS

Peak Locate Performed on : 1/25/2019 10:01:46AM
Peak Locate From Channel : 100
Peak Locate To Channel : 4096

	Peak No.	Energy (keV)	Peak Size (CPS)	Peak CPS (%) Uncertainty	Peak Type	Tolerance Nuclide
F	4	582.72	1.30777E-02	18.57		

M = First peak in a multiplet region
m = Other peak in a multiplet region
F = Fitted singlet
Errors quoted at 2.000sigma

NUCLIDE MDA REPORT

Nuclide Library Used : C:\Canberra\Apex\Root\Dairyland_NPP\Library\HOTLAB.NLB

	Nuclide Name	Energy (keV)		Yield(%)	Activity (pCi/grams)	Nuclide MDA (pCi/grams)	Line MDA (pCi/grams)
+	K-40	1460.75	*	10.67	2.80E+00	5.72E-01	5.72E-01
+	@ AR-41	1293.64		99.16	1.00E+26	1.00E+26	1.00E+26
+	CO-60	1173.22		100.00	7.02E-02	5.13E-02	6.35E-02
		1332.49		100.00	4.45E-02		5.13E-02
+	KR-85	513.99		0.43	1.41E+01	8.95E+00	8.95E+00
+	Y-88	898.04		93.70	-9.69E-02	1.39E-01	1.60E-01
		1836.06		99.20	-2.43E-01		1.39E-01
+	NB-94	702.63		100.00	-8.66E-03	3.34E-02	3.34E-02
		871.10		100.00	3.61E-04		4.10E-02
+	I-131	284.30		6.06	7.63E+06	4.33E+06	5.52E+07
		364.48		81.20	-5.88E+05		4.33E+06
		636.97		7.27	1.04E+07		6.00E+07
+	CS-134	604.70		97.60	-4.88E-03	5.34E-02	5.96E-02
		795.84		85.40	-4.61E-02		5.34E-02
+	CS-137	661.65		85.12	7.20E-02	5.33E-02	5.33E-02
+	CE-144	80.12		1.36	-2.45E+00	4.08E-01	5.00E+00
		133.51		11.09	3.40E-02		4.08E-01

Analysis Report for L3-012-102-FJGS-015-SS SPLIT

03/14/18 - 1459

		Nuclide Name	Energy (keV)		Yield(%)	Activity (pCi/grams)	Nuclide MDA (pCi/grams)	Line MDA (pCi/grams)
+		EU-152	121.78		28.40	5.33E-03	9.74E-02	9.74E-02
			344.28		26.60	-1.29E-02		1.23E-01
			1408.00		20.74	1.38E-02		1.76E-01
+		EU-154	123.07		40.40	1.31E-02	6.97E-02	6.97E-02
			723.30		19.70	5.08E-03		1.97E-01
			1274.51		35.50	-4.98E-02		1.31E-01
+		EU-155	86.54		32.80	6.89E-02	1.16E-01	1.16E-01
			105.31		21.80	2.77E-02		1.43E-01
+		BI-214	609.31	*	46.30	1.42E-01	8.48E-02	8.48E-02
			1120.29		15.10	2.68E-01		3.63E-01
			1238.11		5.94	1.51E-01		8.98E-01
			1377.67		4.11	3.78E-01		1.04E+00
			1407.98		2.48	1.12E-01		1.43E+00
			1509.19		2.19	6.90E-02		1.80E+00
			1764.49		15.80	1.98E-01		3.04E-01
+		PB-214	77.11		10.70	4.72E-01	9.62E-02	4.12E-01
			295.21	*	19.20	1.75E-01		9.77E-02
			351.92	*	37.20	1.29E-01		9.62E-02
+	@	PA-228	89.95		22.00	1.00E+26	1.00E+26	1.00E+26
	@		93.35		35.00	1.00E+26		1.00E+26
	@		105.00		16.30	1.00E+26		1.00E+26
	@		129.22		2.97	1.00E+26		1.00E+26
	@		338.32		5.30	1.00E+26		1.00E+26
	@		463.00		13.80	1.00E+26		1.00E+26
	@		911.23		16.70	1.00E+26		1.00E+26
+		AM-241	59.54		36.30	6.95E-02	2.04E-01	2.04E-01
+		CM-243	103.76		23.00	4.20E-02	1.28E-01	1.28E-01
			228.18		10.60	-4.75E-02		2.51E-01
			277.60		14.00	-9.93E-02		2.06E-01

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

Apex-Gamma

Analysis Report for L3-012-102-FSGS-008-SG SPLIT
03/12/18 - 1304

GAMMA SPECTRUM ANALYSIS

Sample Identification	: L3-012-102-FSGS-008-SG SPLIT
Sample Description	: 03/12/18 - 1304
Sample Type	: 500 ml Marinelli
Unit	:
Sample Point	:
Sample Size	: 1.030E+03 grams
Facility	: Dairyland_NPP
Sample Taken On	: 3/12/2018 1:04:00PM
Acquisition Started	: 10/17/2018 10:57:11AM
Procedure	: 500ml Marinelli
Operator	: Administrator
Detector Name	: HOTLAB
Geometry	: 500ml Marinelli
Live Time	: 3600.0 seconds
Real Time	: 3609.8 seconds
Dead Time	: 0.27 %
Peak Locate Threshold	: 3.00
Peak Locate Range (in channels)	: 100 - 4096
Peak Area Range (in channels)	: 100 - 4096
Identification Energy Tolerance	: 1.000 keV
Energy Calibration Used Done On	: 7/8/2014
Efficiency Calibration Used Done On	: 7/8/2014
Efficiency Calibration Description	:
Sample Number	: 5652

PEAK ANALYSIS REPORT

Peak Analysis Performed on : 1/25/2019 10:02:53AM

Peak Analysis From Channel	: 100
Peak Analysis To Channel	: 4096

Analysis Report for L3-012-102-FSGS-008-SG SPLIT

03/12/18 - 1304

	Peak No.	Energy (keV)	ROI start	ROI end	Peak Centroid	Net Peak Area	Net Area Uncertainty	Continuum Counts	FWHM (keV)
F	1	238.81	470 -	486	478.10	3.77E+02	53.96	7.28E+02	3.08
F	2	351.90	699 -	711	704.24	1.53E+02	33.41	2.85E+02	2.05
F	3	583.06	1161 -	1172	1166.47	9.42E+01	24.25	1.05E+02	2.15
F	4	609.43	1214 -	1227	1219.20	1.10E+02	26.55	1.35E+02	2.47
F	5	911.52	1817 -	1830	1823.27	6.55E+01	20.09	6.73E+01	2.69
F	6	1460.85	2914 -	2931	2921.82	5.81E+02	49.19	3.60E+01	2.90

M = First peak in a multiplet region
m = Other peak in a multiplet region
F = Fitted singlet
Errors quoted at 2.000sigma

BACKGROUND SUBTRACT REPORT

Peak Analysis Performed on : 1/25/2019 10:02:53AM

Env. Background File : C:\Canberra\Apex\Root\Dairyland_NPP\Data\0000001364.CNF

	Peak No.	Energy (keV)	Original Area	Orig. Area Uncertainty	Ambient Background	Backgr. Uncert.	Subtracted Area	Subtracted Uncert.
F	1	238.81	3.77E+02	53.96			3.77E+02	5.40E+01
F	2	351.90	1.53E+02	33.41	8.36E+01	3.72E+01	6.95E+01	5.00E+01
F	3	583.06	9.42E+01	24.25			9.42E+01	2.42E+01
F	4	609.43	1.10E+02	26.55	4.12E+01	2.42E+01	6.88E+01	3.59E+01
F	5	911.52	6.55E+01	20.09			6.55E+01	2.01E+01
F	6	1460.85	5.81E+02	49.19	5.63E+01	1.71E+01	5.25E+02	5.21E+01

M = First peak in a multiplet region
m = Other peak in a multiplet region
F = Fitted singlet
Errors quoted at 2.000sigma

Analysis Report for L3-012-102-FSGS-008-SG SPLIT

03/12/18 - 1304

NUCLIDE IDENTIFICATION REPORT

Nuclide Library Used : C:\Canberra\Apex\Root\Dairyland_NPP\Library\HOTLAB.NLB

IDENTIFIED NUCLIDES

Nuclide Name	Id Confidence	Energy (keV)		Yield(%)	Activity (pCi/grams)	Activity Uncertainty
K-40	0.99	1460.75	*	10.67	5.56E+00	6.31E-01
PB-212	0.55	77.11		17.50		
		238.63	*	44.60	1.89E-01	2.88E-02
BI-214	0.34	609.31	*	46.30	7.70E-02	4.04E-02
		1120.29		15.10		
		1238.11		5.94		
		1377.67		4.11		
		1407.98		2.48		
		1509.19		2.19		
		1764.49		15.80		

* = Energy line found in the spectrum.
\- = Manually added nuclide.
? = Manually edited nuclide.
@ = Energy line not used for Weighted Mean Activity
Energy Tolerance : 1.000 keV
Nuclide confidence index threshold = 0.30
Errors quoted at 2.000sigma

INTERFERENCE CORRECTED REPORT

Nuclide Name	Nuclide Id Confidence	Wt mean Activity (pCi/grams)	Wt mean Activity Uncertainty	Comments
K-40	0.998	5.56E+00	6.31E-01	
PB-212	0.556	1.89E-01	2.88E-02	
BI-214	0.348	7.70E-02	4.04E-02	

Analysis Report for L3-012-102-FSGS-008-SG SPLIT

03/12/18 - 1304

? = 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 2.000sigma

Analysis Report for L3-012-102-FSGS-008-SG SPLIT

03/12/18 - 1304

UNIDENTIFIED PEAKS

Peak Locate Performed on : 1/25/2019 10:02:53AM
Peak Locate From Channel : 100
Peak Locate To Channel : 4096

	Peak No.	Energy (keV)	Peak Size (CPS)	Peak CPS (%) Uncertainty	Peak Type	Tolerance Nuclide
F	2	351.90	1.92923E-02	36.00	Tol.	PB-214
F	3	583.06	2.61603E-02	12.87		
F	5	911.52	1.81862E-02	15.34	Tol.	AC-228 PA-228

M = First peak in a multiplet region
m = Other peak in a multiplet region
F = Fitted singlet
Errors quoted at 2.000sigma

NUCLIDE MDA REPORT

Nuclide Library Used : C:\Canberra\Apex\Root\Dairyland_NPP\Library\HOTLAB.NLB

		Nuclide Name	Energy (keV)		Yield(%)	Activity (pCi/grams)	Nuclide MDA (pCi/grams)	Line MDA (pCi/grams)
+		K-40	1460.75	*	10.67	5.56E+00	5.07E-01	5.07E-01
+	@	AR-41	1293.64		99.16	1.00E+26	1.00E+26	1.00E+26
+		CO-60	1173.22		100.00	2.51E-02	4.91E-02	5.65E-02
			1332.49		100.00	2.64E-02		4.91E-02
+		KR-85	513.99		0.43	3.60E+00	7.79E+00	7.79E+00
+		Y-88	898.04		93.70	1.15E-01	1.22E-01	1.71E-01
			1836.06		99.20	3.18E-02		1.22E-01
+		NB-94	702.63		100.00	-9.52E-03	3.17E-02	3.17E-02
			871.10		100.00	7.57E-03		3.43E-02
+		I-131	284.30		6.06	-4.08E+06	4.88E+06	6.62E+07
			364.48		81.20	-6.70E+05		4.88E+06
			636.97		7.27	-3.06E+07		6.82E+07

Analysis Report for L3-012-102-FSGS-008-SG SPLIT

03/12/18 - 1304

	Nuclide Name	Energy (keV)		Yield(%)	Activity (pCi/grams)	Nuclide MDA (pCi/grams)	Line MDA (pCi/grams)
+	CS-134	604.70		97.60	-5.83E-02	4.93E-02	4.93E-02
		795.84		85.40	7.72E-03		5.16E-02
+	CS-137	661.65		85.12	8.60E-02	5.02E-02	5.02E-02
+	CE-144	80.12		1.36	3.57E+00	3.79E-01	4.98E+00
		133.51		11.09	-1.00E-01		3.79E-01
+	EU-152	121.78		28.40	-1.68E-02	8.84E-02	8.84E-02
		344.28		26.60	-5.34E-02		1.10E-01
		1408.00		20.74	1.39E-02		1.58E-01
+	EU-154	123.07		40.40	-5.58E-02	6.29E-02	6.29E-02
		723.30		19.70	6.21E-02		1.94E-01
		1274.51		35.50	9.18E-02		1.43E-01
+	EU-155	86.54		32.80	-3.89E-02	1.08E-01	1.08E-01
		105.31		21.80	3.07E-02		1.31E-01
+	BI-214	609.31	*	46.30	7.70E-02	7.43E-02	7.43E-02
		1120.29		15.10	2.82E-01		3.43E-01
		1238.11		5.94	-1.01E-01		9.71E-01
		1377.67		4.11	5.43E-01		9.22E-01
		1407.98		2.48	1.13E-01		1.28E+00
		1509.19		2.19	-5.44E-01		1.38E+00
		1764.49		15.80	2.40E-01		2.81E-01
+	PB-214	77.11		10.70	4.51E-01	8.46E-02	3.94E-01
		295.21		19.20	2.73E-01		1.57E-01
		351.92		37.20	1.51E-01		8.46E-02
+	@ PA-228	89.95		22.00	1.00E+26	1.00E+26	1.00E+26
	@	93.35		35.00	1.00E+26		1.00E+26
	@	105.00		16.30	1.00E+26		1.00E+26
	@	129.22		2.97	1.00E+26		1.00E+26
	@	338.32		5.30	1.00E+26		1.00E+26
	@	463.00		13.80	1.00E+26		1.00E+26
	@	911.23		16.70	1.00E+26		1.00E+26
+	AM-241	59.54		36.30	1.27E-01	1.82E-01	1.82E-01
+	CM-243	103.76		23.00	-3.64E-02	1.17E-01	1.17E-01
		228.18		10.60	-2.39E-02		2.36E-01
		277.60		14.00	-4.48E-02		1.87E-01

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

ATTACHMENT 8
GEL LABORATORIES ANALYTICAL REPORTS

GEL Laboratories LLC
a member of The GEL Group INC

PO Box 30712 Charleston SC 29417
2040 Savage Road Charleston SC 29407
P 843.556.8171
F 843.766.1178

gel.com

June 07, 2018

Mr. Jason Q. Spaide
LaCrosseSolutions
S4601 State Hwy 35
Genoa, Wisconsin 54632

Re: LACBWR Site Restoration Project
Work Order: 449877

Dear Mr. Spaide:

GEL Laboratories, LLC (GEL) appreciates the opportunity to provide the enclosed analytical results for the sample(s) we received on May 10, 2018. This original data report has been prepared and reviewed in accordance with GEL's standard operating procedures.

Our policy is to provide high quality, personalized analytical services to enable you to meet your analytical needs on time every time. We trust that you will find everything in order and to your satisfaction. If you have any questions, please do not hesitate to call me at (843) 556-8171, ext. 4453.

Sincerely,

Kaitlyn Stone for
Edith Kent
Project Manager

Purchase Order: 672583
Enclosures

GEL LABORATORIES LLC
2040 Savage Road Charleston SC 29407 - (843) 556-8171 - www.gel.com

Certificate of Analysis Report
for

ENRG070 LaCrosseSolutions, LLC (672583)

Client SDG: 449877 GEL Work Order: 449877

The Qualifiers in this report are defined as follows:

* A quality control analyte recovery is outside of specified acceptance criteria

** Analyte is a Tracer compound

** Analyte is a surrogate compound

U Analyte was analyzed for, but not detected above the MDL, MDA, MDC or LOD.

UI Gamma Spectroscopy--Uncertain identification

Where the analytical method has been performed under NELAP certification, the analysis has met all of the requirements of the NELAC standard unless qualified on the Certificate of Analysis.

The designation ND, if present, appears in the result column when the analyte concentration is not detected above the limit as defined in the 'U' qualifier above.

This data report has been prepared and reviewed in accordance with GEL Laboratories LLC standard operating procedures. Please direct any questions to your Project Manager, Edith Kent.

Reviewed by _____

GEL LABORATORIES LLC
2040 Savage Road Charleston SC 29407 - (843) 556-8171 - www.gel.com

Certificate of Analysis

Report Date: June 7, 2018

Company : LaCrosseSolutions
Address : S4601 State Hwy 35

Genoa, Wisconsin 54632
Contact: Mr. Jason Q. Spaide
Project: LACBWR Site Restoration Project

Client Sample ID: L3-012-102-FSGS-004-SG
Sample ID: 449877001
Matrix: Soil
Collect Date: 12-MAR-18 14:47
Receive Date: 10-MAY-18
Collector: Client

Project: ENRG07001
Client ID: ENRG070

Parameter	Qualifier	Result	Uncertainty	MDC	RL	Units	PF	DF	Analyst	Date	Time	Batch	Method
Rad Gas Flow Proportional Counting													
GFPC, Sr90, Solid "Dry Weight Corrected"													
Strontium-90	U	0.0896	+/-0.207	0.364	0.400	pCi/g			LXB3	05/22/18	1648	1765102	1

The following Prep Methods were performed:

Method	Description	Analyst	Date	Time	Prep Batch
Dry Soil Prep	Dry Soil Prep GL-RAD-A-021	MPK1	05/11/18	0856	1763443

The following Analytical Methods were performed:

Method	Description	Analyst Comments
	EPA 905.0 Modified/DOE RP501 Rev. 1 Modified	

Surrogate/Tracer Recovery	Test	Result	Nominal	Recovery%	Acceptable Limits
Strontium Carrier	GFPC, Sr90, Solid "Dry Weight Corrected"			97.9	(25%-125%)

Notes:
Counting Uncertainty is calculated at the 95% confidence level (1.96-sigma).

Column headers are defined as follows:

DF: Dilution Factor
DL: Detection Limit
MDA: Minimum Detectable Activity
MDC: Minimum Detectable Concentration
Lc/LC: Critical Level
PF: Prep Factor
RL: Reporting Limit
SQL: Sample Quantitation Limit

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2040 Savage Road Charleston SC 29407 - (843) 556-8171 - www.gel.com

Certificate of Analysis

Report Date: June 7, 2018

Company : LaCrosseSolutions
Address : S4601 State Hwy 35

Genoa, Wisconsin 54632
Contact: Mr. Jason Q. Spaide
Project: LACBWR Site Restoration Project

Client Sample ID: L3-012-102-FSGS-009-SS
Sample ID: 449877002
Matrix: Soil
Collect Date: 12-MAR-18 14:48
Receive Date: 10-MAY-18
Collector: Client

Project: ENRG07001
Client ID: ENRG070

Parameter	Qualifier	Result	Uncertainty	MDC	RL	Units	PF	DF	Analyst	Date	Time	Batch	Method
Rad Gas Flow Proportional Counting													
GFPC, Sr90, Solid "Dry Weight Corrected"													
Strontium-90	U	-0.0556	+/-0.174	0.368	0.400	pCi/g			LXB3	05/22/18	1648	1765102	1

The following Prep Methods were performed:

Method	Description	Analyst	Date	Time	Prep Batch
Dry Soil Prep	Dry Soil Prep GL-RAD-A-021	MPK1	05/11/18	0856	1763443

The following Analytical Methods were performed:

Method	Description	Analyst Comments
	EPA 905.0 Modified/DOE RP501 Rev. 1 Modified	

Surrogate/Tracer Recovery	Test	Result	Nominal	Recovery%	Acceptable Limits
Strontium Carrier	GFPC, Sr90, Solid "Dry Weight Corrected"			78.8	(25%-125%)

Notes:
Counting Uncertainty is calculated at the 95% confidence level (1.96-sigma).

Column headers are defined as follows:

DF: Dilution Factor
DL: Detection Limit
MDA: Minimum Detectable Activity
MDC: Minimum Detectable Concentration
Lc/LC: Critical Level
PF: Prep Factor
RL: Reporting Limit
SQL: Sample Quantitation Limit

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2040 Savage Road Charleston SC 29407 - (843) 556-8171 - www.gel.com

Certificate of Analysis

Report Date: June 7, 2018

Company : LaCrosseSolutions
Address : S4601 State Hwy 35

Genoa, Wisconsin 54632
Contact: Mr. Jason Q. Spaide
Project: LACBWR Site Restoration Project

Client Sample ID: L3-012-102-FSGS-008-SS
Sample ID: 449877003
Matrix: Soil
Collect Date: 12-MAR-18 13:22
Receive Date: 10-MAY-18
Collector: Client

Project: ENRG07001
Client ID: ENRG070

Parameter	Qualifier	Result	Uncertainty	MDC	RL	Units	PF	DF	Analyst	Date	Time	Batch	Method
Rad Gas Flow Proportional Counting													
GFPC, Sr90, Solid "Dry Weight Corrected"													
Strontium-90	U	0.0144	+/-0.198	0.377	0.400	pCi/g			LXB3	05/22/18	1648	1765102	1

The following Prep Methods were performed:

Method	Description	Analyst	Date	Time	Prep Batch
Dry Soil Prep	Dry Soil Prep GL-RAD-A-021	MPK1	05/11/18	0856	1763443

The following Analytical Methods were performed:

Method	Description	Analyst Comments
	EPA 905.0 Modified/DOE RP501 Rev. 1 Modified	

Surrogate/Tracer Recovery	Test	Result	Nominal	Recovery%	Acceptable Limits
Strontium Carrier	GFPC, Sr90, Solid "Dry Weight Corrected"			88.3	(25%-125%)

Notes:
Counting Uncertainty is calculated at the 95% confidence level (1.96-sigma).

Column headers are defined as follows:

DF: Dilution Factor
DL: Detection Limit
MDA: Minimum Detectable Activity
MDC: Minimum Detectable Concentration
Lc/LC: Critical Level
PF: Prep Factor
RL: Reporting Limit
SQL: Sample Quantitation Limit

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2040 Savage Road Charleston SC 29407 - (843) 556-8171 - www.gel.com

Certificate of Analysis

Report Date: June 7, 2018

Company : LaCrosseSolutions
Address : S4601 State Hwy 35

Genoa, Wisconsin 54632
Contact: Mr. Jason Q. Spaide
Project: LACBWR Site Restoration Project

Client Sample ID: L1-PAD-Q01-AJGS-103-SS
Sample ID: 449877004
Matrix: Soil
Collect Date: 04-MAR-18 14:45
Receive Date: 10-MAY-18
Collector: Client

Project: ENRG07001
Client ID: ENRG070

Parameter	Qualifier	Result	Uncertainty	MDC	RL	Units	PF	DF	Analyst	Date	Time	Batch	Method
Rad Gas Flow Proportional Counting													
GFPC, Sr90, Solid "Dry Weight Corrected"													
Strontium-90	U	0.126	+/-0.218	0.376	0.400	pCi/g			LXB3	05/22/18	1648	1765102	1

The following Prep Methods were performed:

Method	Description	Analyst	Date	Time	Prep Batch
Dry Soil Prep	Dry Soil Prep GL-RAD-A-021	MPK1	05/11/18	0856	1763443

The following Analytical Methods were performed:

Method	Description	Analyst Comments
	EPA 905.0 Modified/DOE RP501 Rev. 1 Modified	

Surrogate/Tracer Recovery	Test	Result	Nominal	Recovery%	Acceptable Limits
Strontium Carrier	GFPC, Sr90, Solid "Dry Weight Corrected"			100	(25%-125%)

Notes:
Counting Uncertainty is calculated at the 95% confidence level (1.96-sigma).

Column headers are defined as follows:

DF: Dilution Factor
DL: Detection Limit
MDA: Minimum Detectable Activity
MDC: Minimum Detectable Concentration
Lc/LC: Critical Level
PF: Prep Factor
RL: Reporting Limit
SQL: Sample Quantitation Limit

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Certificate of Analysis

Report Date: June 7, 2018

Company : LaCrosseSolutions
Address : S4601 State Hwy 35

Genoa, Wisconsin 54632
Contact: Mr. Jason Q. Spaide
Project: LACBWR Site Restoration Project

Client Sample ID: L1-PAD-Q03-AJGS-201-SS
Sample ID: 449877005
Matrix: Soil
Collect Date: 20-MAR-18 10:23
Receive Date: 10-MAY-18
Collector: Client

Project: ENRG07001
Client ID: ENRG070

Parameter	Qualifier	Result	Uncertainty	MDC	RL	Units	PF	DF	Analyst	Date	Time	Batch	Method
Rad Gas Flow Proportional Counting													
GFPC, Sr90, Solid "Dry Weight Corrected"													
Strontium-90	U	-0.137	+/-0.175	0.385	0.400	pCi/g			LXB3	05/22/18	1648	1765102	1

The following Prep Methods were performed:

Method	Description	Analyst	Date	Time	Prep Batch
Dry Soil Prep	Dry Soil Prep GL-RAD-A-021	MPK1	05/11/18	0856	1763443

The following Analytical Methods were performed:

Method	Description	Analyst Comments
	EPA 905.0 Modified/DOE RP501 Rev. 1 Modified	

Surrogate/Tracer Recovery	Test	Result	Nominal	Recovery%	Acceptable Limits
Strontium Carrier	GFPC, Sr90, Solid "Dry Weight Corrected"			88.3	(25%-125%)

Notes:
Counting Uncertainty is calculated at the 95% confidence level (1.96-sigma).

Column headers are defined as follows:

DF: Dilution Factor
DL: Detection Limit
MDA: Minimum Detectable Activity
MDC: Minimum Detectable Concentration
Lc/LC: Critical Level
PF: Prep Factor
RL: Reporting Limit
SQL: Sample Quantitation Limit

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Certificate of Analysis

Report Date: June 7, 2018

Company : LaCrosseSolutions
Address : S4601 State Hwy 35

Genoa, Wisconsin 54632
Contact: Mr. Jason Q. Spaide
Project: LACBWR Site Restoration Project

Client Sample ID: L1-PAD-Q03-AJGS-303-SS
Sample ID: 449877006
Matrix: Soil
Collect Date: 27-MAR-18 15:44
Receive Date: 10-MAY-18
Collector: Client

Project: ENRG07001
Client ID: ENRG070

Parameter	Qualifier	Result	Uncertainty	MDC	RL	Units	PF	DF	Analyst	Date	Time	Batch	Method
Rad Gas Flow Proportional Counting													
GFPC, Sr90, Solid "Dry Weight Corrected"													
Strontium-90	U	-0.0191	+/-0.189	0.361	0.400	pCi/g			LXB3	05/22/18	1648	1765102	1

The following Prep Methods were performed:

Method	Description	Analyst	Date	Time	Prep Batch
Dry Soil Prep	Dry Soil Prep GL-RAD-A-021	MPK1	05/11/18	0856	1763443

The following Analytical Methods were performed:

Method	Description	Analyst Comments
	EPA 905.0 Modified/DOE RP501 Rev. 1 Modified	

Surrogate/Tracer Recovery	Test	Result	Nominal	Recovery%	Acceptable Limits
Strontium Carrier	GFPC, Sr90, Solid "Dry Weight Corrected"			95.5	(25%-125%)

Notes:
Counting Uncertainty is calculated at the 95% confidence level (1.96-sigma).

Column headers are defined as follows:

DF: Dilution Factor
DL: Detection Limit
MDA: Minimum Detectable Activity
MDC: Minimum Detectable Concentration
Lc/LC: Critical Level
PF: Prep Factor
RL: Reporting Limit
SQL: Sample Quantitation Limit

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Certificate of Analysis

Report Date: June 7, 2018

Company : LaCrosseSolutions
Address : S4601 State Hwy 35

Genoa, Wisconsin 54632
Contact: Mr. Jason Q. Spaide
Project: LACBWR Site Restoration Project

Client Sample ID: L1-PAD-Q02-AJGS-401-SS
Sample ID: 449877007
Matrix: Soil
Collect Date: 02-APR-18 14:46
Receive Date: 10-MAY-18
Collector: Client

Project: ENRG07001
Client ID: ENRG070

Parameter	Qualifier	Result	Uncertainty	MDC	RL	Units	PF	DF	Analyst	Date	Time	Batch	Method
Rad Gas Flow Proportional Counting													
GFPC, Sr90, Solid "Dry Weight Corrected"													
Strontium-90	U	0.0628	+/-0.206	0.376	0.400	pCi/g			LXB3	05/22/18	1649	1765102	1

The following Prep Methods were performed:

Method	Description	Analyst	Date	Time	Prep Batch
Dry Soil Prep	Dry Soil Prep GL-RAD-A-021	MPK1	05/11/18	0856	1763443

The following Analytical Methods were performed:

Method	Description	Analyst Comments
	EPA 905.0 Modified/DOE RP501 Rev. 1 Modified	

Surrogate/Tracer Recovery	Test	Result	Nominal	Recovery%	Acceptable Limits
Strontium Carrier	GFPC, Sr90, Solid "Dry Weight Corrected"			93.1	(25%-125%)

Notes:
Counting Uncertainty is calculated at the 95% confidence level (1.96-sigma).

Column headers are defined as follows:

DF: Dilution Factor
DL: Detection Limit
MDA: Minimum Detectable Activity
MDC: Minimum Detectable Concentration
Lc/LC: Critical Level
PF: Prep Factor
RL: Reporting Limit
SQL: Sample Quantitation Limit

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Certificate of Analysis

Report Date: June 7, 2018

Company : LaCrosseSolutions
Address : S4601 State Hwy 35

Genoa, Wisconsin 54632
Contact: Mr. Jason Q. Spaide
Project: LACBWR Site Restoration Project

Client Sample ID: L1-PAD-Q01-AJGS-501-SS
Sample ID: 449877008
Matrix: Soil
Collect Date: 02-MAY-18 14:45
Receive Date: 10-MAY-18
Collector: Client

Project: ENRG07001
Client ID: ENRG070

Parameter	Qualifier	Result	Uncertainty	MDC	RL	Units	PF	DF	Analyst	Date	Time	Batch	Method
Rad Gas Flow Proportional Counting													
GFPC, Sr90, Solid "Dry Weight Corrected"													
Strontium-90	U	0.0497	+/-0.200	0.369	0.400	pCi/g			LXB3	05/22/18	1649	1765102	1

The following Prep Methods were performed:

Method	Description	Analyst	Date	Time	Prep Batch
Dry Soil Prep	Dry Soil Prep GL-RAD-A-021	MPK1	05/11/18	0856	1763443

The following Analytical Methods were performed:

Method	Description	Analyst Comments
	EPA 905.0 Modified/DOE RP501 Rev. 1 Modified	

Surrogate/Tracer Recovery	Test	Result	Nominal	Recovery%	Acceptable Limits
Strontium Carrier	GFPC, Sr90, Solid "Dry Weight Corrected"			83.5	(25%-125%)

Notes:
Counting Uncertainty is calculated at the 95% confidence level (1.96-sigma).

Column headers are defined as follows:

DF: Dilution Factor
DL: Detection Limit
MDA: Minimum Detectable Activity
MDC: Minimum Detectable Concentration
Lc/LC: Critical Level
PF: Prep Factor
RL: Reporting Limit
SQL: Sample Quantitation Limit

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Certificate of Analysis

Report Date: June 7, 2018

Company : LaCrosseSolutions
Address : S4601 State Hwy 35

Genoa, Wisconsin 54632
Contact: Mr. Jason Q. Spaide
Project: LACBWR Site Restoration Project

Client Sample ID: L2-SUB-102-AJGS-024-SB
Sample ID: 449877009
Matrix: Soil
Collect Date: 05-APR-18 14:58
Receive Date: 10-MAY-18
Collector: Client

Project: ENRG07001
Client ID: ENRG070

Parameter	Qualifier	Result	Uncertainty	MDC	RL	Units	PF	DF	Analyst	Date	Time	Batch	Method
Rad Alpha Spec Analysis													
Alphaspec Isotopic Am241 Am243, Cm243/244, Solid "Dry Weight Corrected"													
Americium-241	U	0.0136	+/-0.0192	0.0298	0.400	pCi/g			BXA4	06/03/18	2146	1764672	1
Americium-243	U	0.0157	+/-0.0274	0.0473	0.400	pCi/g							
Curium-243/244	U	-3.38E-05	+/-0.011	0.0239	0.400	pCi/g							
Alphaspec Np, Solid "Dry Weight Corrected"													
Neptunium-237	U	0.00131	+/-0.00388	0.00687	0.010	pCi/g			BXA4	06/02/18	1857	1764673	2
Alphaspec Pu238, 239/240, Solid "Dry Weight Corrected"													
Plutonium-238	U	-0.00711	+/-0.024	0.0624	0.400	pCi/g			BXA4	06/02/18	1801	1764674	3
Plutonium-239/240	U	0.0312	+/-0.0379	0.0509	0.400	pCi/g							
Liquid Scint Pu241, Solid "Dry Weight Corrected"													
Plutonium-241	U	0.935	+/-2.60	4.41	5.00	pCi/g			BXA4	06/05/18	0640	1764675	4
Rad Gamma Spec Analysis													
Gamma Ni59, Solid "Dry Weight Corrected"													
Nickel-59	U	0.577	+/-1.37	2.86	5.00	pCi/g			TXJ1	05/24/18	0839	1763607	5
Gamma, Cs137, Co60, Nb94, Eu152, Eu154, Eu155 "Dry Weight Corrected"													
Cesium-137	U	0.00146	+/-0.0333	0.0636	1.00	pCi/g			RXF2	05/14/18	1401	1763697	6
Cobalt-60	U	0.0379	+/-0.0424	0.0869		pCi/g							
Europium-152	U	0.00914	+/-0.0655	0.128		pCi/g							
Europium-154	U	0.0149	+/-0.0833	0.179		pCi/g							
Europium-155	UI	0.00	+/-0.129	0.150		pCi/g							
Niobium-94	U	0.0183	+/-0.0191	0.0456		pCi/g							
Rad Gas Flow Proportional Counting													
GFPC, Sr90, Solid "Dry Weight Corrected"													
Strontium-90	U	-0.223	+/-0.162	0.373	0.400	pCi/g			LXB3	05/22/18	1648	1765102	7
Rad Liquid Scintillation Analysis													
LSC, Tritium Distillation, Solid "As Received"													
Tritium	U	2.40	+/-4.17	7.13	10.0	pCi/g			MXH8	05/17/18	1647	1763551	8
Liquid Scint C14, Solid "As Received"													
Carbon-14	U	0.617	+/-2.27	3.88	5.00	pCi/g			BXM4	05/21/18	1217	1765373	9
Liquid Scint Tc99, Solid "As Received"													
Technetium-99	U	0.126	+/-0.692	1.20	2.00	pCi/g			CXS7	05/20/18	1944	1763527	10
Liquid Scint Fe55, Solid "Dry Weight Corrected"													
Iron-55	U	2.06	+/-3.52	5.66	10.0	pCi/g			TXJ1	05/25/18	2118	1763512	11
Liquid Scint Ni63, Solid "Dry Weight Corrected"													

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Certificate of Analysis

Report Date: June 7, 2018

Company : LaCrosseSolutions
Address : S4601 State Hwy 35

Genoa, Wisconsin 54632
Contact: Mr. Jason Q. Spaide
Project: LACBWR Site Restoration Project

Client Sample ID: L2-SUB-102-AJGS-024-SB
Sample ID: 449877009

Project: ENRG07001
Client ID: ENRG070

Parameter	Qualifier	Result	Uncertainty	MDC	RL	Units	PF	DF	Analyst	Date	Time	Batch	Method
Rad Liquid Scintillation Analysis													
Liquid Scint Ni63, Solid "Dry Weight Corrected"													
Nickel-63	U	0.432	+/-1.76	3.01	5.00	pCi/g			TXJ1	05/25/18	1759	1763518	12

The following Prep Methods were performed:

Method	Description	Analyst	Date	Time	Prep Batch
Dry Soil Prep	Dry Soil Prep GL-RAD-A-021	MPK1	05/11/18	0856	1763443

The following Analytical Methods were performed:

Method	Description	Analyst Comments
	DOE EML HASL-300, Am-05-RC Modified	
2	ASTM C 1475-00 Modified	
3	DOE EML HASL-300, Pu-11-RC Modified	
4	DOE EML HASL-300, Pu-11-RC Modified	
5	DOE RESL Ni-1	
6	DOE HASL 300, 4.5.2.3/Ga-01-R	
7	EPA 905.0 Modified/DOE RP501 Rev. 1 Modified	
8	EPA 906.0 Modified	
9	EPA EERF C-01 Modified	
10	DOE EML HASL-300, Tc-02-RC Modified	
11	DOE RESL Fe-1, Modified	
12	DOE RESL Ni-1, Modified	

Surrogate/Tracer Recovery	Test	Result	Nominal	Recovery%	Acceptable Limits
Americium-243 Tracer	Alphaspec Isotopic Am241 Am243, Cm243/244, Solid "Dry Weight Corrected"			102	(15%-125%)
Curium-243/244 Tracer	Alphaspec Isotopic Am241 Am243, Cm243/244, Solid "Dry Weight Corrected"			88.6	(15%-125%)
Americium-243 Tracer	Alphaspec Np, Solid "Dry Weight Corrected"			94.5	(15%-125%)
Plutonium-236 Tracer	Alphaspec Pu238, 239/240, Solid "Dry Weight Corrected"			78	(15%-125%)
Plutonium-236 Tracer	Liquid Scint Pu241, Solid "Dry Weight Corrected"			78	(15%-125%)
Nickel Carrier	Gamma Ni59, Solid "Dry Weight Corrected"			96.2	(25%-125%)
Strontium Carrier	GFPC, Sr90, Solid "Dry Weight Corrected"			93.1	(25%-125%)
Technetium-99m Tracer	Liquid Scint Tc99, Solid "As Received"			87.2	(15%-125%)
Iron-59 Tracer	Liquid Scint Fe55, Solid "Dry Weight Corrected"			69.9	(15%-125%)
Nickel Carrier	Liquid Scint Ni63, Solid "Dry Weight Corrected"			64.5	(25%-125%)

Notes:

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Certificate of Analysis

Report Date: June 7, 2018

Company : LaCrosseSolutions
Address : S4601 State Hwy 35

Genoa, Wisconsin 54632
Contact: Mr. Jason Q. Spaide
Project: LACBWR Site Restoration Project

Client Sample ID: L2-SUB-102-AJGS-024-SB
Sample ID: 449877009

Project: ENRG07001
Client ID: ENRG070

Parameter	Qualifier	Result	Uncertainty	MDC	RL	Units	PF	DF	Analyst Date	Time	Batch	Method

Counting Uncertainty is calculated at the 95% confidence level (1.96-sigma).

Column headers are defined as follows:

DF: Dilution Factor
DL: Detection Limit
MDA: Minimum Detectable Activity
MDC: Minimum Detectable Concentration
Lc/LC: Critical Level
PF: Prep Factor
RL: Reporting Limit
SQL: Sample Quantitation Limit

Certificate of Analysis

Report Date: June 7, 2018

Company : LaCrosseSolutions
Address : S4601 State Hwy 35

Genoa, Wisconsin 54632
Contact: Mr. Jason Q. Spaide
Project: LACBWR Site Restoration Project

Client Sample ID: L2-SUB-102-AJGS-001-SS
Sample ID: 449877010
Matrix: Soil
Collect Date: 30-MAR-18 12:05
Receive Date: 10-MAY-18
Collector: Client

Project: ENRG07001
Client ID: ENRG070

Parameter	Qualifier	Result	Uncertainty	MDC	RL	Units	PF	DF	Analyst	Date	Time	Batch	Method
Rad Alpha Spec Analysis													
Alphaspec Isotopic Am241 Am243, Cm243/244, Solid "Dry Weight Corrected"													
Americium-241	U	0.00462	+/-0.0137	0.0248	0.400	pCi/g			BXA4	06/03/18	2146	1764672	1
Americium-243	U	-0.00366	+/-0.0221	0.047	0.400	pCi/g							
Curium-243/244	U	-0.0156	+/-0.0158	0.0424	0.400	pCi/g							
Alphaspec Np, Solid "Dry Weight Corrected"													
Neptunium-237	U	0.0017	+/-0.00329	0.00498	0.010	pCi/g			BXA4	06/02/18	1854	1764673	2
Alphaspec Pu238, 239/240, Solid "Dry Weight Corrected"													
Plutonium-238	U	0.00662	+/-0.0312	0.0577	0.400	pCi/g			BXA4	06/04/18	1044	1764674	3
Plutonium-239/240	U	-0.0108	+/-0.0238	0.072	0.400	pCi/g							
Liquid Scint Pu241, Solid "Dry Weight Corrected"													
Plutonium-241	U	1.06	+/-3.25	5.53	5.00	pCi/g			BXA4	06/05/18	0841	1764675	4
Rad Gamma Spec Analysis													
Gamma Ni59, Solid "Dry Weight Corrected"													
Nickel-59	U	-0.102	+/-0.199	0.342	5.00	pCi/g			TXJ1	05/24/18	0939	1763607	5
Gamma, Cs137, Co60, Nb94, Eu152, Eu154, Eu155 "Dry Weight Corrected"													
Cesium-137	UI	0.00	+/-0.0402	0.0482	1.00	pCi/g			RXF2	05/14/18	1402	1763697	6
Cobalt-60	U	-0.000419	+/-0.0304	0.0626		pCi/g							
Europium-152	U	0.0163	+/-0.0748	0.134		pCi/g							
Europium-154	U	-0.0315	+/-0.0968	0.183		pCi/g							
Europium-155	U	0.0278	+/-0.0799	0.147		pCi/g							
Niobium-94	U	-0.0102	+/-0.0248	0.0437		pCi/g							
Rad Gas Flow Proportional Counting													
GFPC, Sr90, Solid "Dry Weight Corrected"													
Strontium-90	U	-0.19	+/-0.179	0.389	0.400	pCi/g			LXB3	05/22/18	1648	1765102	7
Rad Liquid Scintillation Analysis													
LSC, Tritium Distillation, Solid "As Received"													
Tritium	U	2.31	+/-3.97	6.79	10.0	pCi/g			MXH8	05/17/18	1739	1763551	8
Liquid Scint C14, Solid "As Received"													
Carbon-14	U	0.0526	+/-2.06	3.52	5.00	pCi/g			BXM4	05/18/18	0526	1763558	9
Liquid Scint Tc99, Solid "As Received"													
Technetium-99	U	0.669	+/-0.715	1.20	2.00	pCi/g			CXS7	05/20/18	2017	1763527	10
Liquid Scint Fe55, Solid "Dry Weight Corrected"													
Iron-55	U	1.36	+/-3.76	6.14	10.0	pCi/g			TXJ1	05/25/18	2150	1763512	11
Liquid Scint Ni63, Solid "Dry Weight Corrected"													

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Certificate of Analysis

Report Date: June 7, 2018

Company : LaCrosseSolutions
Address : S4601 State Hwy 35

Genoa, Wisconsin 54632
Contact: Mr. Jason Q. Spaide
Project: LACBWR Site Restoration Project

Client Sample ID: L2-SUB-102-AJGS-001-SS
Sample ID: 449877010

Project: ENRG07001
Client ID: ENRG070

Parameter	Qualifier	Result	Uncertainty	MDC	RL	Units	PF	DF	Analyst	Date	Time	Batch	Method
Rad Liquid Scintillation Analysis													
Liquid Scint Ni63, Solid "Dry Weight Corrected"													
Nickel-63	U	-0.371	+/-1.31	2.28	5.00	pCi/g			TXJ1	05/25/18	1831	1763518	12

The following Prep Methods were performed:

Method	Description	Analyst	Date	Time	Prep Batch
Dry Soil Prep	Dry Soil Prep GL-RAD-A-021	MPK1	05/11/18	0856	1763443

The following Analytical Methods were performed:

Method	Description	Analyst Comments
	DOE EML HASL-300, Am-05-RC Modified	
2	ASTM C 1475-00 Modified	
3	DOE EML HASL-300, Pu-11-RC Modified	
4	DOE EML HASL-300, Pu-11-RC Modified	
5	DOE RESL Ni-1	
6	DOE HASL 300, 4.5.2.3/Ga-01-R	
7	EPA 905.0 Modified/DOE RP501 Rev. 1 Modified	
8	EPA 906.0 Modified	
9	EPA EERF C-01 Modified	
10	DOE EML HASL-300, Tc-02-RC Modified	
11	DOE RESL Fe-1, Modified	
12	DOE RESL Ni-1, Modified	

Surrogate/Tracer Recovery	Test	Result	Nominal	Recovery%	Acceptable Limits
Americium-243 Tracer	Alphaspec Isotopic Am241 Am243, Cm243/244, Solid "Dry Weight Corrected"			92.2	(15%-125%)
Curium-243/244 Tracer	Alphaspec Isotopic Am241 Am243, Cm243/244, Solid "Dry Weight Corrected"			92.1	(15%-125%)
Americium-243 Tracer	Alphaspec Np, Solid "Dry Weight Corrected"			105	(15%-125%)
Plutonium-236 Tracer	Alphaspec Pu238, 239/240, Solid "Dry Weight Corrected"			63.8	(15%-125%)
Plutonium-236 Tracer	Liquid Scint Pu241, Solid "Dry Weight Corrected"			63.8	(15%-125%)
Nickel Carrier	Gamma Ni59, Solid "Dry Weight Corrected"			91.5	(25%-125%)
Strontium Carrier	GFPC, Sr90, Solid "Dry Weight Corrected"			93.1	(25%-125%)
Technetium-99m Tracer	Liquid Scint Tc99, Solid "As Received"			91.5	(15%-125%)
Iron-59 Tracer	Liquid Scint Fe55, Solid "Dry Weight Corrected"			67.6	(15%-125%)
Nickel Carrier	Liquid Scint Ni63, Solid "Dry Weight Corrected"			85.5	(25%-125%)

Notes:

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Certificate of Analysis

Report Date: June 7, 2018

Company : LaCrosseSolutions
Address : S4601 State Hwy 35

Genoa, Wisconsin 54632
Contact: Mr. Jason Q. Spaide
Project: LACBWR Site Restoration Project

Client Sample ID: L2-SUB-102-AJGS-001-SS
Sample ID: 449877010

Project: ENRG07001
Client ID: ENRG070

Parameter	Qualifier	Result	Uncertainty	MDC	RL	Units	PF	DF	Analyst Date	Time	Batch	Method

Counting Uncertainty is calculated at the 95% confidence level (1.96-sigma).

Column headers are defined as follows:

DF: Dilution Factor
DL: Detection Limit
MDA: Minimum Detectable Activity
MDC: Minimum Detectable Concentration
Lc/LC: Critical Level
PF: Prep Factor
RL: Reporting Limit
SQL: Sample Quantitation Limit

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Certificate of Analysis

Report Date: June 7, 2018

Company : LaCrosseSolutions
Address : S4601 State Hwy 35

Genoa, Wisconsin 54632
Contact: Mr. Jason Q. Spaide
Project: LACBWR Site Restoration Project

Client Sample ID: L2-SUB-102-AJGS-019-SB
Sample ID: 449877011
Matrix: Soil
Collect Date: 05-APR-18 12:29
Receive Date: 10-MAY-18
Collector: Client

Project: ENRG07001
Client ID: ENRG070

Parameter	Qualifier	Result	Uncertainty	MDC	RL	Units	PF	DF	Analyst	Date	Time	Batch	Method
Rad Alpha Spec Analysis													
Alphaspec Isotopic Am241 Am243, Cm243/244, Solid "Dry Weight Corrected"													
Americium-241	U	0.00558	+/-0.0212	0.0403	0.400	pCi/g			BXA4	06/03/18	2146	1764672	1
Americium-243	U	0.00333	+/-0.0128	0.0238	0.400	pCi/g							
Curium-243/244	U	0.0111	+/-0.0285	0.0519	0.400	pCi/g							
Alphaspec Np, Solid "Dry Weight Corrected"													
Neptunium-237	U	-0.00146	+/-0.00325	0.008	0.010	pCi/g			BXA4	06/02/18	1854	1764673	2
Alphaspec Pu238, 239/240, Solid "Dry Weight Corrected"													
Plutonium-238	U	0.0383	+/-0.0479	0.0722	0.400	pCi/g			BXA4	06/02/18	1801	1764674	3
Plutonium-239/240	U	0.00665	+/-0.0298	0.0583	0.400	pCi/g							
Liquid Scint Pu241, Solid "Dry Weight Corrected"													
Plutonium-241	U	-0.596	+/-3.22	5.54	5.00	pCi/g			BXA4	06/05/18	1042	1764675	4
Rad Gamma Spec Analysis													
Gamma Ni59, Solid "Dry Weight Corrected"													
Nickel-59	U	-0.0772	+/-1.38	2.73	5.00	pCi/g			TXJ1	05/24/18	0942	1763607	5
Gamma, Cs137, Co60, Nb94, Eu152, Eu154, Eu155 "Dry Weight Corrected"													
Cesium-137	U	0.0445	+/-0.037	0.0542	1.00	pCi/g			RXF2	05/14/18	1402	1763697	6
Cobalt-60	U	-0.018	+/-0.0282	0.0477		pCi/g							
Europium-152	U	0.0106	+/-0.0689	0.136		pCi/g							
Europium-154	U	-0.0209	+/-0.0943	0.178		pCi/g							
Europium-155	U	0.036	+/-0.0741	0.142		pCi/g							
Niobium-94	U	-0.0111	+/-0.0318	0.0484		pCi/g							
Rad Gas Flow Proportional Counting													
GFPC, Sr90, Solid "Dry Weight Corrected"													
Strontium-90	U	-0.0228	+/-0.213	0.394	0.400	pCi/g			LXB3	05/22/18	1649	1765102	7
Rad Liquid Scintillation Analysis													
LSC, Tritium Distillation, Solid "As Received"													
Tritium	U	2.76	+/-4.15	7.05	10.0	pCi/g			MXH8	05/17/18	1832	1763551	8
Liquid Scint C14, Solid "As Received"													
Carbon-14	U	-0.879	+/-2.10	3.64	5.00	pCi/g			BXM4	05/18/18	0613	1763558	9
Liquid Scint Tc99, Solid "As Received"													
Technetium-99	U	0.196	+/-0.609	1.05	2.00	pCi/g			CXS7	05/20/18	2049	1763527	10
Liquid Scint Fe55, Solid "Dry Weight Corrected"													
Iron-55	U	-1.89	+/-3.40	5.83	10.0	pCi/g			TXJ1	05/25/18	2221	1763512	11
Liquid Scint Ni63, Solid "Dry Weight Corrected"													

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Genoa, Wisconsin 54632
Contact: Mr. Jason Q. Spaide
Project: LACBWR Site Restoration Project

Client Sample ID: L2-SUB-102-AJGS-019-SB
Sample ID: 449877011
Project: ENRG07001
Client ID: ENRG070

Parameter	Qualifier	Result	Uncertainty	MDC	RL	Units	PF	DF	Analyst	Date	Time	Batch	Method
Rad Liquid Scintillation Analysis													
Liquid Scint Ni63, Solid "Dry Weight Corrected"													
Nickel-63	U	-0.0474	+/-1.67	2.88	5.00	pCi/g			TXJ1	05/25/18	1903	1763518	12

The following Prep Methods were performed:

Method	Description	Analyst	Date	Time	Prep Batch
Dry Soil Prep	Dry Soil Prep GL-RAD-A-021	MPK1	05/11/18	0856	1763443

The following Analytical Methods were performed:

Method	Description	Analyst Comments
	DOE EML HASL-300, Am-05-RC Modified	
2	ASTM C 1475-00 Modified	
3	DOE EML HASL-300, Pu-11-RC Modified	
4	DOE EML HASL-300, Pu-11-RC Modified	
5	DOE RESL Ni-1	
6	DOE HASL 300, 4.5.2.3/Ga-01-R	
7	EPA 905.0 Modified/DOE RP501 Rev. 1 Modified	
8	EPA 906.0 Modified	
9	EPA EERF C-01 Modified	
10	DOE EML HASL-300, Tc-02-RC Modified	
11	DOE RESL Fe-1, Modified	
12	DOE RESL Ni-1, Modified	

Surrogate/Tracer Recovery	Test	Result	Nominal	Recovery%	Acceptable Limits
Americium-243 Tracer	Alphaspec Isotopic Am241 Am243, Cm243/244, Solid "Dry Weight Corrected"			81.1	(15%-125%)
Curium-243/244 Tracer	Alphaspec Isotopic Am241 Am243, Cm243/244, Solid "Dry Weight Corrected"			94	(15%-125%)
Americium-243 Tracer	Alphaspec Np, Solid "Dry Weight Corrected"			102	(15%-125%)
Plutonium-236 Tracer	Alphaspec Pu238, 239/240, Solid "Dry Weight Corrected"			63.8	(15%-125%)
Plutonium-236 Tracer	Liquid Scint Pu241, Solid "Dry Weight Corrected"			63.8	(15%-125%)
Nickel Carrier	Gamma Ni59, Solid "Dry Weight Corrected"			95.8	(25%-125%)
Strontium Carrier	GFPC, Sr90, Solid "Dry Weight Corrected"			100	(25%-125%)
Technetium-99m Tracer	Liquid Scint Tc99, Solid "As Received"			98.8	(15%-125%)
Iron-59 Tracer	Liquid Scint Fe55, Solid "Dry Weight Corrected"			69.8	(15%-125%)
Nickel Carrier	Liquid Scint Ni63, Solid "Dry Weight Corrected"			68	(25%-125%)

Notes:

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Certificate of Analysis

Report Date: June 7, 2018

Company : LaCrosseSolutions
Address : S4601 State Hwy 35

Genoa, Wisconsin 54632
Contact: Mr. Jason Q. Spaide
Project: LACBWR Site Restoration Project

Client Sample ID: L2-SUB-102-AJGS-019-SB
Sample ID: 449877011

Project: ENRG07001
Client ID: ENRG070

Parameter	Qualifier	Result	Uncertainty	MDC	RL	Units	PF	DF	Analyst Date	Time	Batch	Method

Counting Uncertainty is calculated at the 95% confidence level (1.96-sigma).

Column headers are defined as follows:

DF: Dilution Factor
DL: Detection Limit
MDA: Minimum Detectable Activity
MDC: Minimum Detectable Concentration
Lc/LC: Critical Level
PF: Prep Factor
RL: Reporting Limit
SQL: Sample Quantitation Limit

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Certificate of Analysis

Report Date: June 7, 2018

Company : LaCrosseSolutions
Address : S4601 State Hwy 35

Genoa, Wisconsin 54632
Contact: Mr. Jason Q. Spaide
Project: LACBWR Site Restoration Project

Client Sample ID: L2-SUB-102-AJGS-001-AV
Sample ID: 449877012
Matrix: Soil
Collect Date: 30-MAR-18 10:40
Receive Date: 10-MAY-18
Collector: Client

Project: ENRG07001
Client ID: ENRG070

Parameter	Qualifier	Result	Uncertainty	MDC	RL	Units	PF	DF	Analyst	Date	Time	Batch	Method
Rad Alpha Spec Analysis													
Alphaspec Isotopic Am241 Am243, Cm243/244, Solid "Dry Weight Corrected"													
Americium-241	U	-0.0098	+/-0.0131	0.0358	0.400	pCi/g			BXA4	06/03/18	2208	1764672	1
Americium-243	U	0.00895	+/-0.0222	0.0395	0.400	pCi/g							
Curium-243/244	U	-0.0114	+/-0.0154	0.040	0.400	pCi/g							
Alphaspec Np, Solid "Dry Weight Corrected"													
Neptunium-237	U	0.000668	+/-0.00384	0.00743	0.010	pCi/g			BXA4	06/02/18	1854	1764673	2
Alphaspec Pu238, 239/240, Solid "Dry Weight Corrected"													
Plutonium-238	U	0.00761	+/-0.026	0.0482	0.400	pCi/g			BXA4	06/02/18	1801	1764674	3
Plutonium-239/240	U	0.00205	+/-0.0214	0.0446	0.400	pCi/g							
Liquid Scint Pu241, Solid "Dry Weight Corrected"													
Plutonium-241	U	-0.314	+/-2.38	4.10	5.00	pCi/g			BXA4	06/05/18	1243	1764675	4
Rad Gamma Spec Analysis													
Gamma Ni59, Solid "Dry Weight Corrected"													
Nickel-59	U	-0.154	+/-0.809	1.54	5.00	pCi/g			TXJ1	05/24/18	1455	1763607	5
Gamma, Cs137, Co60, Nb94, Eu152, Eu154, Eu155 "Dry Weight Corrected"													
Cesium-137	U	0.00275	+/-0.031	0.0614	1.00	pCi/g			RXF2	05/14/18	1402	1763697	6
Cobalt-60	U	0.00804	+/-0.0244	0.0574		pCi/g							
Europium-152	U	0.0111	+/-0.0662	0.135		pCi/g							
Europium-154	U	-0.003	+/-0.0689	0.144		pCi/g							
Europium-155	U	-0.004	+/-0.0691	0.127		pCi/g							
Niobium-94	U	0.0519	+/-0.0574	0.065		pCi/g							
Rad Gas Flow Proportional Counting													
GFPC, Sr90, Solid "Dry Weight Corrected"													
Strontium-90	U	-0.00285	+/-0.199	0.374	0.400	pCi/g			LXB3	05/22/18	1648	1765102	7
Rad Liquid Scintillation Analysis													
LSC, Tritium Distillation, Solid "As Received"													
Tritium	U	3.40	+/-4.14	6.99	10.0	pCi/g			MXH8	05/17/18	1924	1763551	8
Liquid Scint C14, Solid "As Received"													
Carbon-14	U	-1.1	+/-1.95	3.38	5.00	pCi/g			BXM4	05/18/18	0700	1763558	9
Liquid Scint Tc99, Solid "As Received"													
Technetium-99	U	-0.289	+/-0.667	1.18	2.00	pCi/g			CXS7	05/20/18	2121	1763527	10
Liquid Scint Fe55, Solid "Dry Weight Corrected"													
Iron-55		7.46	+/-3.65	5.43	10.0	pCi/g			TXJ1	05/25/18	2253	1763512	11
Liquid Scint Ni63, Solid "Dry Weight Corrected"													

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Certificate of Analysis

Report Date: June 7, 2018

Company : LaCrosseSolutions
Address : S4601 State Hwy 35

Genoa, Wisconsin 54632
Contact: Mr. Jason Q. Spaide
Project: LACBWR Site Restoration Project

Client Sample ID: L2-SUB-102-AJGS-001-AV
Sample ID: 449877012
Project: ENRG07001
Client ID: ENRG070

Parameter	Qualifier	Result	Uncertainty	MDC	RL	Units	PF	DF	Analyst	Date	Time	Batch	Method
Rad Liquid Scintillation Analysis													
Liquid Scint Ni63, Solid "Dry Weight Corrected"													
Nickel-63	U	-0.177	+/-1.31	2.28	5.00	pCi/g			TXJ1	05/25/18	1934	1763518	12

The following Prep Methods were performed:

Method	Description	Analyst	Date	Time	Prep Batch
Dry Soil Prep	Dry Soil Prep GL-RAD-A-021	MPK1	05/11/18	0856	1763443

The following Analytical Methods were performed:

Method	Description	Analyst Comments
	DOE EML HASL-300, Am-05-RC Modified	
2	ASTM C 1475-00 Modified	
3	DOE EML HASL-300, Pu-11-RC Modified	
4	DOE EML HASL-300, Pu-11-RC Modified	
5	DOE RESL Ni-1	
6	DOE HASL 300, 4.5.2.3/Ga-01-R	
7	EPA 905.0 Modified/DOE RP501 Rev. 1 Modified	
8	EPA 906.0 Modified	
9	EPA EERF C-01 Modified	
10	DOE EML HASL-300, Tc-02-RC Modified	
11	DOE RESL Fe-1, Modified	
12	DOE RESL Ni-1, Modified	

Surrogate/Tracer Recovery	Test	Result	Nominal	Recovery%	Acceptable Limits
Americium-243 Tracer	Alphaspec Isotopic Am241 Am243, Cm243/244, Solid "Dry Weight Corrected"			90.5	(15%-125%)
Curium-243/244 Tracer	Alphaspec Isotopic Am241 Am243, Cm243/244, Solid "Dry Weight Corrected"			59	(15%-125%)
Americium-243 Tracer	Alphaspec Np, Solid "Dry Weight Corrected"			101	(15%-125%)
Plutonium-236 Tracer	Alphaspec Pu238, 239/240, Solid "Dry Weight Corrected"			86.7	(15%-125%)
Plutonium-236 Tracer	Liquid Scint Pu241, Solid "Dry Weight Corrected"			86.7	(15%-125%)
Nickel Carrier	Gamma Ni59, Solid "Dry Weight Corrected"			111	(25%-125%)
Strontium Carrier	GFPC, Sr90, Solid "Dry Weight Corrected"			95.5	(25%-125%)
Technetium-99m Tracer	Liquid Scint Tc99, Solid "As Received"			89.6	(15%-125%)
Iron-59 Tracer	Liquid Scint Fe55, Solid "Dry Weight Corrected"			66.7	(15%-125%)
Nickel Carrier	Liquid Scint Ni63, Solid "Dry Weight Corrected"			84	(25%-125%)

Notes:

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Certificate of Analysis

Report Date: June 7, 2018

Company : LaCrosseSolutions
Address : S4601 State Hwy 35

Genoa, Wisconsin 54632
Contact: Mr. Jason Q. Spaide
Project: LACBWR Site Restoration Project

Client Sample ID: L2-SUB-102-AJGS-001-AV
Sample ID: 449877012

Project: ENRG07001
Client ID: ENRG070

Parameter	Qualifier	Result	Uncertainty	MDC	RL	Units	PF	DF	Analyst Date	Time	Batch	Method

Counting Uncertainty is calculated at the 95% confidence level (1.96-sigma).

Column headers are defined as follows:

DF: Dilution Factor
DL: Detection Limit
MDA: Minimum Detectable Activity
MDC: Minimum Detectable Concentration
Lc/LC: Critical Level
PF: Prep Factor
RL: Reporting Limit
SQL: Sample Quantitation Limit

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Certificate of Analysis

Report Date: June 7, 2018

Company : LaCrosseSolutions
Address : S4601 State Hwy 35

Genoa, Wisconsin 54632
Contact: Mr. Jason Q. Spaide
Project: LACBWR Site Restoration Project

Client Sample ID: L2-SUB-VAR-AJGS-004-SB
Sample ID: 449877013
Matrix: Soil
Collect Date: 06-APR-18 13:24
Receive Date: 10-MAY-18
Collector: Client

Project: ENRG07001
Client ID: ENRG070

Parameter	Qualifier	Result	Uncertainty	MDC	RL	Units	PF	DF	Analyst	Date	Time	Batch	Method
Rad Alpha Spec Analysis													
Alphaspec Isotopic Am241 Am243, Cm243/244, Solid "Dry Weight Corrected"													
Americium-241	U	0.0119	+/-0.0178	0.0273	0.400	pCi/g			BXA4	06/03/18	2208	1764672	1
Americium-243	U	0.011	+/-0.0164	0.0252	0.400	pCi/g							
Curium-243/244	U	-0.00695	+/-0.0173	0.0409	0.400	pCi/g							
Alphaspec Np, Solid "Dry Weight Corrected"													
Neptunium-237	U	0.00207	+/-0.004	0.00606	0.010	pCi/g			BXA4	06/02/18	1855	1764673	2
Alphaspec Pu238, 239/240, Solid "Dry Weight Corrected"													
Plutonium-238	U	0.0456	+/-0.0505	0.0666	0.400	pCi/g			BXA4	06/02/18	1801	1764674	3
Plutonium-239/240	U	0.0406	+/-0.0464	0.058	0.400	pCi/g							
Liquid Scint Pu241, Solid "Dry Weight Corrected"													
Plutonium-241	U	-3.77	+/-3.53	6.18	5.00	pCi/g			BXA4	06/05/18	1444	1764675	4
Rad Gamma Spec Analysis													
Gamma Ni59, Solid "Dry Weight Corrected"													
Nickel-59	U	0.0765	+/-0.421	0.935	5.00	pCi/g			TXJ1	05/24/18	1456	1763607	5
Gamma, Cs137, Co60, Nb94, Eu152, Eu154, Eu155 "Dry Weight Corrected"													
Cesium-137		0.369	+/-0.0794	0.0396	1.00	pCi/g			RXF2	05/14/18	1403	1763697	6
Cobalt-60	U	0.000997	+/-0.0251	0.0484		pCi/g							
Europium-152	U	0.0361	+/-0.0543	0.116		pCi/g							
Europium-154	U	-0.0448	+/-0.072	0.109		pCi/g							
Europium-155	U	0.00864	+/-0.0585	0.116		pCi/g							
Niobium-94	U	0.00999	+/-0.0202	0.0433		pCi/g							
Rad Gas Flow Proportional Counting													
GFPC, Sr90, Solid "Dry Weight Corrected"													
Strontium-90	U	-0.191	+/-0.177	0.385	0.400	pCi/g			LXB3	05/22/18	1649	1765102	7
Rad Liquid Scintillation Analysis													
LSC, Tritium Distillation, Solid "As Received"													
Tritium	U	2.18	+/-1.70	2.80	10.0	pCi/g			MXH8	05/17/18	2016	1763551	8
Liquid Scint C14, Solid "As Received"													
Carbon-14	U	1.38	+/-2.13	3.61	5.00	pCi/g			BXM4	05/18/18	0747	1763558	9
Liquid Scint Tc99, Solid "As Received"													
Technetium-99	U	0.779	+/-0.686	1.14	2.00	pCi/g			CXS7	05/20/18	2153	1763527	10
Liquid Scint Fe55, Solid "Dry Weight Corrected"													
Iron-55	U	0.444	+/-3.29	5.43	10.0	pCi/g			TXJ1	05/25/18	2325	1763512	11
Liquid Scint Ni63, Solid "Dry Weight Corrected"													

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Certificate of Analysis

Report Date: June 7, 2018

Company : LaCrosseSolutions
Address : S4601 State Hwy 35

Genoa, Wisconsin 54632
Contact: Mr. Jason Q. Spaide
Project: LACBWR Site Restoration Project

Client Sample ID: L2-SUB-VAR-AJGS-004-SB
Sample ID: 449877013

Project: ENRG07001
Client ID: ENRG070

Parameter	Qualifier	Result	Uncertainty	MDC	RL	Units	PF	DF	Analyst	Date	Time	Batch	Method
Rad Liquid Scintillation Analysis													
Liquid Scint Ni63, Solid "Dry Weight Corrected"													
Nickel-63	U	-0.269	+/-1.59	2.77	5.00	pCi/g			TXJ1	05/25/18	2006	1763518	12

The following Prep Methods were performed:

Method	Description	Analyst	Date	Time	Prep Batch
Dry Soil Prep	Dry Soil Prep GL-RAD-A-021	MPK1	05/11/18	0856	1763443

The following Analytical Methods were performed:

Method	Description	Analyst Comments
	DOE EML HASL-300, Am-05-RC Modified	
2	ASTM C 1475-00 Modified	
3	DOE EML HASL-300, Pu-11-RC Modified	
4	DOE EML HASL-300, Pu-11-RC Modified	
5	DOE RESL Ni-1	
6	DOE HASL 300, 4.5.2.3/Ga-01-R	
7	EPA 905.0 Modified/DOE RP501 Rev. 1 Modified	
8	EPA 906.0 Modified	
9	EPA EERF C-01 Modified	
10	DOE EML HASL-300, Tc-02-RC Modified	
11	DOE RESL Fe-1, Modified	
12	DOE RESL Ni-1, Modified	

Surrogate/Tracer Recovery	Test	Result	Nominal	Recovery%	Acceptable Limits
Americium-243 Tracer	Alphaspec Isotopic Am241 Am243, Cm243/244, Solid "Dry Weight Corrected"			81.4	(15%-125%)
Curium-243/244 Tracer	Alphaspec Isotopic Am241 Am243, Cm243/244, Solid "Dry Weight Corrected"			87.4	(15%-125%)
Americium-243 Tracer	Alphaspec Np, Solid "Dry Weight Corrected"			103	(15%-125%)
Plutonium-236 Tracer	Alphaspec Pu238, 239/240, Solid "Dry Weight Corrected"			56.5	(15%-125%)
Plutonium-236 Tracer	Liquid Scint Pu241, Solid "Dry Weight Corrected"			56.5	(15%-125%)
Nickel Carrier	Gamma Ni59, Solid "Dry Weight Corrected"			94.4	(25%-125%)
Strontium Carrier	GFPC, Sr90, Solid "Dry Weight Corrected"			93.1	(25%-125%)
Technetium-99m Tracer	Liquid Scint Tc99, Solid "As Received"			94.5	(15%-125%)
Iron-59 Tracer	Liquid Scint Fe55, Solid "Dry Weight Corrected"			72.2	(15%-125%)
Nickel Carrier	Liquid Scint Ni63, Solid "Dry Weight Corrected"			71.1	(25%-125%)

Notes:

Certificate of Analysis

Report Date: June 7, 2018

Company : LaCrosseSolutions
Address : S4601 State Hwy 35
Genoa, Wisconsin 54632
Contact: Mr. Jason Q. Spaide
Project: LACBWR Site Restoration Project

Client Sample ID: L2-SUB-VAR-AJGS-004-SB
Sample ID: 449877013
Project: ENRG07001
Client ID: ENRG070

Parameter	Qualifier	Result	Uncertainty	MDC	RL	Units	PF	DF	Analyst Date	Time	Batch	Method

Counting Uncertainty is calculated at the 95% confidence level (1.96-sigma).

Column headers are defined as follows:

DF: Dilution Factor
DL: Detection Limit
MDA: Minimum Detectable Activity
MDC: Minimum Detectable Concentration
Lc/LC: Critical Level
PF: Prep Factor
RL: Reporting Limit
SQL: Sample Quantitation Limit

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Certificate of Analysis

Report Date: June 7, 2018

Company : LaCrosseSolutions
Address : S4601 State Hwy 35

Genoa, Wisconsin 54632
Contact: Mr. Jason Q. Spaide
Project: LACBWR Site Restoration Project

Client Sample ID: L4-OFF-SOL-AJGS-B01-SB
Sample ID: 449877014
Matrix: Soil
Collect Date: 23-MAR-18 13:25
Receive Date: 10-MAY-18
Collector: Client

Project: ENRG07001
Client ID: ENRG070

Parameter	Qualifier	Result	Uncertainty	MDC	RL	Units	PF	DF	Analyst	Date	Time	Batch	Method
Rad Alpha Spec Analysis													
Alphaspec Isotopic Am241 Am243, Cm243/244, Solid "Dry Weight Corrected"													
Americium-241	U	-0.0147	+/-0.0148	0.0397	0.400	pCi/g			BXA4	06/03/18	2208	1764672	1
Americium-243	U	0.00944	+/-0.0183	0.0303	0.400	pCi/g							
Curium-243/244	U	-0.0117	+/-0.0141	0.0371	0.400	pCi/g							
Alphaspec Np, Solid "Dry Weight Corrected"													
Neptunium-237	U	-0.000155	+/-0.00427	0.00904	0.010	pCi/g			BXA4	06/02/18	1855	1764673	2
Alphaspec Pu238, 239/240, Solid "Dry Weight Corrected"													
Plutonium-238	U	0.033	+/-0.0584	0.0974	0.400	pCi/g			BXA4	06/02/18	1801	1764674	3
Plutonium-239/240	U	0.0325	+/-0.0526	0.0814	0.400	pCi/g							
Liquid Scint Pu241, Solid "Dry Weight Corrected"													
Plutonium-241	U	0.611	+/-3.55	6.06	5.00	pCi/g			BXA4	06/05/18	1646	1764675	4
Rad Gamma Spec Analysis													
Gamma Ni59, Solid "Dry Weight Corrected"													
Nickel-59	U	0.708	+/-1.67	3.50	5.00	pCi/g			TXJ1	05/24/18	1725	1763607	5
Gamma, Cs137, Co60, Nb94, Eu152, Eu154, Eu155 "Dry Weight Corrected"													
Cesium-137	U	-0.0113	+/-0.0356	0.0651	1.00	pCi/g			RXF2	05/14/18	1403	1763697	6
Cobalt-60	U	0.020	+/-0.0326	0.078		pCi/g							
Europium-152	U	-0.0485	+/-0.0727	0.132		pCi/g							
Europium-154	U	-0.0347	+/-0.130	0.249		pCi/g							
Europium-155	U	0.0747	+/-0.0829	0.169		pCi/g							
Niobium-94	U	0.00467	+/-0.023	0.0479		pCi/g							
Rad Gas Flow Proportional Counting													
GFPC, Sr90, Solid "Dry Weight Corrected"													
Strontium-90	U	0.113	+/-0.210	0.367	0.400	pCi/g			LXB3	05/22/18	1648	1765102	7
Rad Liquid Scintillation Analysis													
LSC, Tritium Distillation, Solid "As Received"													
Tritium	U	1.47	+/-1.68	2.83	10.0	pCi/g			MXH8	05/17/18	2108	1763551	8
Liquid Scint C14, Solid "As Received"													
Carbon-14	U	0.796	+/-2.07	3.52	5.00	pCi/g			BXM4	05/18/18	0834	1763558	9
Liquid Scint Tc99, Solid "As Received"													
Technetium-99	U	-0.27	+/-0.708	1.25	2.00	pCi/g			CXS7	05/20/18	2225	1763527	10
Liquid Scint Fe55, Solid "Dry Weight Corrected"													
Iron-55	U	1.31	+/-3.78	6.18	10.0	pCi/g			TXJ1	05/25/18	2356	1763512	11
Liquid Scint Ni63, Solid "Dry Weight Corrected"													

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Certificate of Analysis

Report Date: June 7, 2018

Company : LaCrosseSolutions
Address : S4601 State Hwy 35

Genoa, Wisconsin 54632
Contact: Mr. Jason Q. Spaide
Project: LACBWR Site Restoration Project

Client Sample ID: L4-OFF-SOL-AJGS-B01-SB
Sample ID: 449877014
Project: ENRG07001
Client ID: ENRG070

Parameter	Qualifier	Result	Uncertainty	MDC	RL	Units	PF	DF	Analyst	Date	Time	Batch	Method
Rad Liquid Scintillation Analysis													
Liquid Scint Ni63, Solid "Dry Weight Corrected"													
Nickel-63	U	-0.785	+/-1.41	2.47	5.00	pCi/g			TXJ1	05/25/18	2038	1763518	12

The following Prep Methods were performed:

Method	Description	Analyst	Date	Time	Prep Batch
Dry Soil Prep	Dry Soil Prep GL-RAD-A-021	MPK1	05/11/18	0856	1763443

The following Analytical Methods were performed:

Method	Description	Analyst Comments
	DOE EML HASL-300, Am-05-RC Modified	
2	ASTM C 1475-00 Modified	
3	DOE EML HASL-300, Pu-11-RC Modified	
4	DOE EML HASL-300, Pu-11-RC Modified	
5	DOE RESL Ni-1	
6	DOE HASL 300, 4.5.2.3/Ga-01-R	
7	EPA 905.0 Modified/DOE RP501 Rev. 1 Modified	
8	EPA 906.0 Modified	
9	EPA EERF C-01 Modified	
10	DOE EML HASL-300, Tc-02-RC Modified	
11	DOE RESL Fe-1, Modified	
12	DOE RESL Ni-1, Modified	

Surrogate/Tracer Recovery	Test	Result	Nominal	Recovery%	Acceptable Limits
Americium-243 Tracer	Alphaspec Isotopic Am241 Am243, Cm243/244, Solid "Dry Weight Corrected"			88.6	(15%-125%)
Curium-243/244 Tracer	Alphaspec Isotopic Am241 Am243, Cm243/244, Solid "Dry Weight Corrected"			66.8	(15%-125%)
Americium-243 Tracer	Alphaspec Np, Solid "Dry Weight Corrected"			96.1	(15%-125%)
Plutonium-236 Tracer	Alphaspec Pu238, 239/240, Solid "Dry Weight Corrected"			58.5	(15%-125%)
Plutonium-236 Tracer	Liquid Scint Pu241, Solid "Dry Weight Corrected"			58.5	(15%-125%)
Nickel Carrier	Gamma Ni59, Solid "Dry Weight Corrected"			78.4	(25%-125%)
Strontium Carrier	GFPC, Sr90, Solid "Dry Weight Corrected"			95.5	(25%-125%)
Technetium-99m Tracer	Liquid Scint Tc99, Solid "As Received"			85.2	(15%-125%)
Iron-59 Tracer	Liquid Scint Fe55, Solid "Dry Weight Corrected"			67.4	(15%-125%)
Nickel Carrier	Liquid Scint Ni63, Solid "Dry Weight Corrected"			79.3	(25%-125%)

Notes:

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Certificate of Analysis

Report Date: June 7, 2018

Company : LaCrosseSolutions
Address : S4601 State Hwy 35

Genoa, Wisconsin 54632
Contact: Mr. Jason Q. Spaide
Project: LACBWR Site Restoration Project

Client Sample ID: L4-OFF-SOL-AJGS-B01-SB
Sample ID: 449877014

Project: ENRG07001
Client ID: ENRG070

Parameter	Qualifier	Result	Uncertainty	MDC	RL	Units	PF	DF	Analyst Date	Time	Batch	Method

Counting Uncertainty is calculated at the 95% confidence level (1.96-sigma).

Column headers are defined as follows:

DF: Dilution Factor
DL: Detection Limit
MDA: Minimum Detectable Activity
MDC: Minimum Detectable Concentration
Lc/LC: Critical Level
PF: Prep Factor
RL: Reporting Limit
SQL: Sample Quantitation Limit

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Certificate of Analysis

Report Date: June 7, 2018

Company : LaCrosseSolutions
Address : S4601 State Hwy 35

Genoa, Wisconsin 54632
Contact: Mr. Jason Q. Spaide
Project: LACBWR Site Restoration Project

Client Sample ID: S1-102-CWD-FIFS-A02-SM
Sample ID: 449877015
Matrix: Soil
Collect Date: 24-APR-18 08:30
Receive Date: 10-MAY-18
Collector: Client

Project: ENRG07001
Client ID: ENRG070

Parameter	Qualifier	Result	Uncertainty	MDC	RL	Units	PF	DF	Analyst	Date	Time	Batch	Method
Rad Alpha Spec Analysis													
Alphaspec Isotopic Am241 Am243, Cm243/244, Solid "Dry Weight Corrected"													
Americium-241	U	0.067	+/-0.136	0.196	0.400	pCi/g			BXA4	06/07/18	0928	1770886	1
Americium-243	U	0.0132	+/-0.085	0.174	0.400	pCi/g							
Curium-243/244	U	-0.0325	+/-0.0806	0.241	0.400	pCi/g							
Alphaspec Np, Solid "Dry Weight Corrected"													
Neptunium-237	U	-0.00174	+/-0.00276	0.00751	0.010	pCi/g			BXA4	06/02/18	1855	1764673	2
Alphaspec Pu238, 239/240, Solid "Dry Weight Corrected"													
Plutonium-238	U	0.0288	+/-0.0433	0.0673	0.400	pCi/g			BXA4	06/02/18	1801	1764674	3
Plutonium-239/240	U	0.0306	+/-0.0387	0.0481	0.400	pCi/g							
Liquid Scint Pu241, Solid "Dry Weight Corrected"													
Plutonium-241	U	-0.992	+/-2.98	5.15	5.00	pCi/g			BXA4	06/05/18	1847	1764675	4
Rad Gamma Spec Analysis													
Gamma Ni59, Solid "Dry Weight Corrected"													
Nickel-59	U	0.162	+/-0.403	1.17	5.00	pCi/g			TXJ1	05/24/18	1726	1763607	5
Gamma, Cs137, Co60, Nb94, Eu152, Eu154, Eu155 "Dry Weight Corrected"													
Cesium-137		8.23	+/-0.306	0.059	1.00	pCi/g			RXF2	05/14/18	1707	1763697	6
Cobalt-60		0.299	+/-0.0796	0.0469		pCi/g							
Europium-152	UI	0.00	+/-0.442	0.228		pCi/g							
Europium-154	U	0.0207	+/-0.0797	0.176		pCi/g							
Europium-155	U	0.095	+/-0.0929	0.187		pCi/g							
Niobium-94	U	0.0383	+/-0.0424	0.0587		pCi/g							
Rad Gas Flow Proportional Counting													
GFPC, Sr90, Solid "Dry Weight Corrected"													
Strontium-90	U	-0.0228	+/-0.216	0.393	0.400	pCi/g			LXB3	05/22/18	1648	1765102	7
Rad Liquid Scintillation Analysis													
LSC, Tritium Distillation, Solid "As Received"													
Tritium	U	1.57	+/-3.62	6.23	10.0	pCi/g			MXH8	05/17/18	2200	1763551	8
Liquid Scint C14, Solid "As Received"													
Carbon-14	U	-1.57	+/-2.08	3.63	5.00	pCi/g			BXM4	05/18/18	0921	1763558	9
Liquid Scint Tc99, Solid "As Received"													
Technetium-99	U	-0.0495	+/-0.904	1.54	2.00	pCi/g			CXS7	05/20/18	1710	1763527	10
Liquid Scint Fe55, Solid "Dry Weight Corrected"													
Iron-55	U	1.33	+/-4.39	7.22	10.0	pCi/g			TXJ1	05/26/18	0028	1763512	11
Liquid Scint Ni63, Solid "Dry Weight Corrected"													

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Certificate of Analysis

Report Date: June 7, 2018

Company : LaCrosseSolutions
Address : S4601 State Hwy 35

Genoa, Wisconsin 54632
Contact: Mr. Jason Q. Spaide
Project: LACBWR Site Restoration Project

Client Sample ID: S1-102-CWD-FIFS-A02-SM
Sample ID: 449877015
Project: ENRG07001
Client ID: ENRG070

Parameter	Qualifier	Result	Uncertainty	MDC	RL	Units	PF	DF	Analyst	Date	Time	Batch	Method
Rad Liquid Scintillation Analysis													
Liquid Scint Ni63, Solid "Dry Weight Corrected"													
Nickel-63		3.34	+/-1.64	2.66	5.00	pCi/g			TXJ1	05/25/18	2109	1763518	12

The following Prep Methods were performed:

Method	Description	Analyst	Date	Time	Prep Batch
Dry Soil Prep	Dry Soil Prep GL-RAD-A-021	MPK1	05/11/18	0856	1763443

The following Analytical Methods were performed:

Method	Description	Analyst Comments
	DOE EML HASL-300, Am-05-RC Modified	
2	ASTM C 1475-00 Modified	
3	DOE EML HASL-300, Pu-11-RC Modified	
4	DOE EML HASL-300, Pu-11-RC Modified	
5	DOE RESL Ni-1	
6	DOE HASL 300, 4.5.2.3/Ga-01-R	
7	EPA 905.0 Modified/DOE RP501 Rev. 1 Modified	
8	EPA 906.0 Modified	
9	EPA EERF C-01 Modified	
10	DOE EML HASL-300, Tc-02-RC Modified	
11	DOE RESL Fe-1, Modified	
12	DOE RESL Ni-1, Modified	

Surrogate/Tracer Recovery	Test	Result	Nominal	Recovery%	Acceptable Limits
Americium-243 Tracer	Alphaspec Isotopic Am241 Am243, Cm243/244, Solid "Dry Weight Corrected"			61.6	(15%-125%)
Curium-243/244 Tracer	Alphaspec Isotopic Am241 Am243, Cm243/244, Solid "Dry Weight Corrected"			48.5	(15%-125%)
Americium-243 Tracer	Alphaspec Np, Solid "Dry Weight Corrected"			97.8	(15%-125%)
Plutonium-236 Tracer	Alphaspec Pu238, 239/240, Solid "Dry Weight Corrected"			67.4	(15%-125%)
Plutonium-236 Tracer	Liquid Scint Pu241, Solid "Dry Weight Corrected"			67.4	(15%-125%)
Nickel Carrier	Gamma Ni59, Solid "Dry Weight Corrected"			92	(25%-125%)
Strontium Carrier	GFPC, Sr90, Solid "Dry Weight Corrected"			105	(25%-125%)
Technetium-99m Tracer	Liquid Scint Tc99, Solid "As Received"			42.6	(15%-125%)
Iron-59 Tracer	Liquid Scint Fe55, Solid "Dry Weight Corrected"			60.8	(15%-125%)
Nickel Carrier	Liquid Scint Ni63, Solid "Dry Weight Corrected"			75	(25%-125%)

Notes:

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Certificate of Analysis

Report Date: June 7, 2018

Company : LaCrosseSolutions
Address : S4601 State Hwy 35

Genoa, Wisconsin 54632
Contact: Mr. Jason Q. Spaide
Project: LACBWR Site Restoration Project

Client Sample ID: S1-102-CWD-FIFS-A02-SM
Sample ID: 449877015

Project: ENRG07001
Client ID: ENRG070

Parameter	Qualifier	Result	Uncertainty	MDC	RL	Units	PF	DF	Analyst Date	Time	Batch	Method

Counting Uncertainty is calculated at the 95% confidence level (1.96-sigma).

Column headers are defined as follows:

DF: Dilution Factor
DL: Detection Limit
MDA: Minimum Detectable Activity
MDC: Minimum Detectable Concentration
Lc/LC: Critical Level
PF: Prep Factor
RL: Reporting Limit
SQL: Sample Quantitation Limit

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Certificate of Analysis

Report Date: June 7, 2018

Company : LaCrosseSolutions
Address : S4601 State Hwy 35

Genoa, Wisconsin 54632
Contact: Mr. Jason Q. Spaide
Project: LACBWR Site Restoration Project

Client Sample ID: L2-SUB-103-AJGS-002-SB
Sample ID: 449877016
Matrix: Soil
Collect Date: 23-FEB-18 14:03
Receive Date: 10-MAY-18
Collector: Client

Project: ENRG07001
Client ID: ENRG070

Parameter	Qualifier	Result	Uncertainty	MDC	RL	Units	PF	DF	Analyst	Date	Time	Batch	Method
Rad Alpha Spec Analysis													
Alphaspec Isotopic Am241 Am243, Cm243/244, Solid "Dry Weight Corrected"													
Americium-241	U	-0.0124	+/-0.0192	0.049	0.400	pCi/g			BXA4	06/03/18	2208	1764672	1
Americium-243	U	-0.00173	+/-0.0184	0.0391	0.400	pCi/g							
Curium-243/244	U	-0.0266	+/-0.0218	0.0599	0.400	pCi/g							
Alphaspec Np, Solid "Dry Weight Corrected"													
Neptunium-237	U	0.000265	+/-0.00323	0.0063	0.010	pCi/g			BXA4	06/02/18	1855	1764673	2
Alphaspec Pu238, 239/240, Solid "Dry Weight Corrected"													
Plutonium-238	U	-0.0199	+/-0.0284	0.0747	0.400	pCi/g			BXA4	06/02/18	1801	1764674	3
Plutonium-239/240	U	0.00196	+/-0.0224	0.0476	0.400	pCi/g							
Liquid Scint Pu241, Solid "Dry Weight Corrected"													
Plutonium-241	U	-0.292	+/-2.14	3.68	5.00	pCi/g			BXA4	06/05/18	2048	1764675	4
Rad Gamma Spec Analysis													
Gamma Ni59, Solid "Dry Weight Corrected"													
Nickel-59	U	-0.612	+/-1.35	2.53	5.00	pCi/g			TXJ1	05/24/18	2137	1763607	5
Gamma, Cs137, Co60, Nb94, Eu152, Eu154, Eu155 "Dry Weight Corrected"													
Cesium-137	UI	0.00	+/-0.0406	0.0489	1.00	pCi/g			RXF2	05/14/18	1707	1763697	6
Cobalt-60	U	0.014	+/-0.028	0.066		pCi/g							
Europium-152	U	-0.0424	+/-0.0667	0.119		pCi/g							
Europium-154	U	0.0129	+/-0.105	0.196		pCi/g							
Europium-155	U	0.00458	+/-0.0649	0.132		pCi/g							
Niobium-94	U	0.00695	+/-0.0253	0.0518		pCi/g							
Rad Gas Flow Proportional Counting													
GFPC, Sr90, Solid "Dry Weight Corrected"													
Strontium-90	U	0.209	+/-0.172	0.268	0.400	pCi/g			LXB3	05/23/18	1036	1765102	7
Rad Liquid Scintillation Analysis													
LSC, Tritium Distillation, Solid "As Received"													
Tritium	U	-0.41	+/-3.66	6.50	10.0	pCi/g			MXH8	05/17/18	2252	1763551	8
Liquid Scint C14, Solid "As Received"													
Carbon-14	U	-1.82	+/-2.12	3.71	5.00	pCi/g			BXM4	05/18/18	1009	1763558	9
Liquid Scint Tc99, Solid "As Received"													
Technetium-99	U	-0.412	+/-0.585	1.05	2.00	pCi/g			CXS7	05/20/18	2257	1763527	10
Liquid Scint Fe55, Solid "Dry Weight Corrected"													
Iron-55	U	0.466	+/-3.22	5.30	10.0	pCi/g			TXJ1	05/26/18	0100	1763512	11
Liquid Scint Ni63, Solid "Dry Weight Corrected"													

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Certificate of Analysis

Report Date: June 7, 2018

Company : LaCrosseSolutions
Address : S4601 State Hwy 35

Genoa, Wisconsin 54632
Contact: Mr. Jason Q. Spaide
Project: LACBWR Site Restoration Project

Client Sample ID: L2-SUB-103-AJGS-002-SB
Sample ID: 449877016

Project: ENRG07001
Client ID: ENRG070

Parameter	Qualifier	Result	Uncertainty	MDC	RL	Units	PF	DF	Analyst	Date	Time	Batch	Method
Rad Liquid Scintillation Analysis													
Liquid Scint Ni63, Solid "Dry Weight Corrected"													
Nickel-63	U	-0.353	+/-1.49	2.60	5.00	pCi/g			TXJ1	05/25/18	2141	1763518	12

The following Prep Methods were performed:

Method	Description	Analyst	Date	Time	Prep Batch
Dry Soil Prep	Dry Soil Prep GL-RAD-A-021	MPK1	05/11/18	0856	1763443

The following Analytical Methods were performed:

Method	Description	Analyst Comments
	DOE EML HASL-300, Am-05-RC Modified	
2	ASTM C 1475-00 Modified	
5	DOE EML HASL-300, Pu-11-RC Modified	
4	DOE EML HASL-300, Pu-11-RC Modified	
5	DOE RESL Ni-1	
6	DOE HASL 300, 4.5.2.3/Ga-01-R	
7	EPA 905.0 Modified/DOE RP501 Rev. 1 Modified	
8	EPA 906.0 Modified	
9	EPA EERF C-01 Modified	
10	DOE EML HASL-300, Tc-02-RC Modified	
11	DOE RESL Fe-1, Modified	
12	DOE RESL Ni-1, Modified	

Surrogate/Tracer Recovery	Test	Result	Nominal	Recovery%	Acceptable Limits
Americium-243 Tracer	Alphaspec Isotopic Am241 Am243, Cm243/244, Solid "Dry Weight Corrected"			80.1	(15%-125%)
Curium-243/244 Tracer	Alphaspec Isotopic Am241 Am243, Cm243/244, Solid "Dry Weight Corrected"			80	(15%-125%)
Americium-243 Tracer	Alphaspec Np, Solid "Dry Weight Corrected"			101	(15%-125%)
Plutonium-236 Tracer	Alphaspec Pu238, 239/240, Solid "Dry Weight Corrected"			95.3	(15%-125%)
Plutonium-236 Tracer	Liquid Scint Pu241, Solid "Dry Weight Corrected"			95.3	(15%-125%)
Nickel Carrier	Gamma Ni59, Solid "Dry Weight Corrected"			101	(25%-125%)
Strontium Carrier	GFPC, Sr90, Solid "Dry Weight Corrected"			95.5	(25%-125%)
Technetium-99m Tracer	Liquid Scint Tc99, Solid "As Received"			97.3	(15%-125%)
Iron-59 Tracer	Liquid Scint Fe55, Solid "Dry Weight Corrected"			73.1	(15%-125%)
Nickel Carrier	Liquid Scint Ni63, Solid "Dry Weight Corrected"			75.4	(25%-125%)

Notes:

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Certificate of Analysis

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Company : LaCrosseSolutions
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Genoa, Wisconsin 54632
Contact: Mr. Jason Q. Spaide
Project: LACBWR Site Restoration Project

Client Sample ID: L2-SUB-103-AJGS-002-SB
Sample ID: 449877016

Project: ENRG07001
Client ID: ENRG070

Parameter	Qualifier	Result	Uncertainty	MDC	RL	Units	PF	DF	Analyst Date	Time	Batch	Method

Counting Uncertainty is calculated at the 95% confidence level (1.96-sigma).

Column headers are defined as follows:

DF: Dilution Factor
DL: Detection Limit
MDA: Minimum Detectable Activity
MDC: Minimum Detectable Concentration
Lc/LC: Critical Level
PF: Prep Factor
RL: Reporting Limit
SQL: Sample Quantitation Limit

QC Summary

Report Date: June 7, 2018

LaCrosseSolutions
S4601 State Hwy 35
Genoa, Wisconsin
Contact: Mr. Jason Q. Spaide

Workorder: 449877

Parmname	NOM	Sample	Qual	QC	Units	RPD%	REC%	Range	Anlst	Date Time
Rad Alpha Spec										
Batch 1764672										
QC1204029320 449877009 DUP										
Americium-241	U	0.0136	U	0.00375	pCi/g	N/A			N/A BXA4	06/03/18 21:4
	Uncertainty	+/-0.0192		+/-0.0127						
Americium-243	U	0.0157	U	0.0277	pCi/g	N/A			N/A	
	Uncertainty	+/-0.0274		+/-0.0249						
Curium-243/244	U	-3.38E-05	U	-0.0026	pCi/g	N/A			N/A	
	Uncertainty	+/-0.011		+/-0.0108						
QC1204029321 LCS										
Americium-241	1.94			1.82	pCi/g		93.8	(75%-125%)		06/03/18 21:4
	Uncertainty			+/-0.150						
Americium-243			U	0.024	pCi/g			(75%-125%)		
	Uncertainty			+/-0.0216						
Curium-243/244	2.40			2.30	pCi/g		95.7	(75%-125%)		
	Uncertainty			+/-0.166						
QC1204029319 MB										
Americium-241			U	0.00211	pCi/g					06/05/18 09:4
	Uncertainty			+/-0.0221						
Americium-243			U	0.00436	pCi/g					
	Uncertainty			+/-0.0182						
Curium-243/244			U	-0.00297	pCi/g					
	Uncertainty			+/-0.0278						
Batch 1764673										
QC1204029323 449877009 DUP										
Neptunium-237	U	0.00131	U	0.000957	pCi/g	N/A			N/A BXA4	06/02/18 18:5
	Uncertainty	+/-0.00388		+/-0.00461						
QC1204029324 LCS										
Neptunium-237	1.48			1.57	pCi/g		106	(75%-125%)		06/02/18 18:5
	Uncertainty			+/-0.0679						
QC1204029322 MB										
Neptunium-237			U	-0.00112	pCi/g					06/02/18 18:5
	Uncertainty			+/-0.00244						

QC Summary

Workorder: 449877

Parmname	NOM	Sample	Qual	QC	Units	RPD%	REC%	Range	Anlst	Date Time
Rad Alpha Spec										
Batch 1764674										
QC1204029326 449877009 DUP										
Plutonium-238	U	-0.00711	U	0.00608	pCi/g	N/A			N/A BXA4	06/02/18 18:0
	Uncertainty	+/-0.024		+/-0.0228						
Plutonium-239/240	U	0.0312	U	0.0144	pCi/g	N/A			N/A	
	Uncertainty	+/-0.0379		+/-0.0326						
QC1204029327 LCS										
Plutonium-238			U	0.033	pCi/g					06/02/18 17:5
	Uncertainty			+/-0.0418						
Plutonium-239/240	1.95			1.72	pCi/g		88.3	(75%-125%)		
	Uncertainty			+/-0.250						
QC1204029325 MB										
Plutonium-238			U	-0.0151	pCi/g					06/02/18 18:0
	Uncertainty			+/-0.0378						
Plutonium-239/240			U	0.0233	pCi/g					
	Uncertainty			+/-0.0379						
Batch 1764675										
QC1204029329 449877009 DUP										
Plutonium-241	U	0.935	U	-0.684	pCi/g	N/A			N/A BXA4	06/06/18 00:5
	Uncertainty	+/-2.60		+/-2.82						
QC1204029330 LCS										
Plutonium-241	69.2			90.6	pCi/g		131*	(75%-125%)		06/06/18 04:0
	Uncertainty			+/-10.6						
QC1204029328 MB										
Plutonium-241			U	-0.414	pCi/g					06/05/18 22:4
	Uncertainty			+/-2.80						
Batch 1770886										
QC1204043372 449877015 DUP										
Americium-241	U	0.067	U	0.0877	pCi/g	N/A			N/A BXA4	06/06/18 09:0
	Uncertainty	+/-0.136		+/-0.0893						
Americium-243	U	0.0132	U	0.0314	pCi/g	N/A			N/A	
	Uncertainty	+/-0.085		+/-0.0864						
Curium-243/244	U	-0.0325	U	-0.00875	pCi/g	N/A			N/A	
	Uncertainty	+/-0.0806		+/-0.0387						

QC Summary

Workorder: 449877

Parmname	NOM	Sample	Qual	QC	Units	RPD%	REC%	Range	Anlst	Date Time
Rad Alpha Spec										
Batch 1770886										
QC1204043373 LCS										
Americium-241	3.83			3.50	pCi/g		91.5	(75%-125%)	BXA4	06/06/18 09:0
	Uncertainty			+/-0.417						
Americium-243			U	-0.0133	pCi/g			(75%-125%)		
	Uncertainty			+/-0.0449						
Curium-243/244	4.74			4.39	pCi/g		92.5	(75%-125%)		
	Uncertainty			+/-0.463						
QC1204043371 MB										
Americium-241			U	0.0315	pCi/g					06/06/18 09:0
	Uncertainty			+/-0.0999						
Americium-243			U	0.0111	pCi/g					
	Uncertainty			+/-0.0619						
Curium-243/244			U	-0.00372	pCi/g					
	Uncertainty			+/-0.0321						
Rad Gamma Spec										
Batch 1763607										
QC1204026770 449877009 DUP										
Nickel-59	U	0.577	U	1.15	pCi/g	N/A		N/A	TXJ1	05/25/18 06:1
	Uncertainty	+/-1.37		+/-1.33						
QC1204026771 LCS										
Nickel-59	92.0			80.1	pCi/g		87.2	(75%-125%)		05/25/18 06:1
	Uncertainty			+/-5.92						
QC1204026769 MB										
Nickel-59			U	0.775	pCi/g					05/24/18 21:3
	Uncertainty			+/-1.39						
Batch 1763697										
QC1204026986 449877009 DUP										
Cesium-137	U	0.00146	U	0.0132	pCi/g	N/A		N/A	RXF2	05/14/18 17:0
	Uncertainty	+/-0.0333		+/-0.0439						
Cobalt-60	U	0.0379	U	0.0132	pCi/g	N/A		N/A		
	Uncertainty	+/-0.0424		+/-0.0416						
Europium-152	U	0.00914	U	0.0143	pCi/g	N/A		N/A		
	Uncertainty	+/-0.0655		+/-0.0972						

QC Summary

Workorder: 449877

Parmname	NOM	Sample	Qual	QC	Units	RPD%	REC%	Range	Anlst	Date Time
Rad Gamma Spec										
Batch 1763697										
Europium-154	U	0.0149	U	0.0302	pCi/g	N/A		N/A	RXF2	05/14/18 17:0
	Uncertainty	+/-0.0833		+/-0.141						
Europium-155	UI	0.00	U	0.0842	pCi/g	N/A		N/A		
	Uncertainty	+/-0.129		+/-0.0712						
Niobium-94	U	0.0183	U	0.0142	pCi/g	N/A		N/A		
	Uncertainty	+/-0.0191		+/-0.0351						
QC1204026987 LCS										
Americium-241	488			567	pCi/g		116	(75%-125%)		05/14/18 17:0
	Uncertainty			+/-14.7						
Cesium-137	173			168	pCi/g		97.6	(75%-125%)		
	Uncertainty			+/-3.16						
Cobalt-60	130			127	pCi/g		97.8	(75%-125%)		
	Uncertainty			+/-3.30						
Europium-152			U	-0.424	pCi/g					
	Uncertainty			+/-1.48						
Europium-154			U	-0.169	pCi/g					
	Uncertainty			+/-0.846						
Europium-155			U	-0.628	pCi/g					
	Uncertainty			+/-1.24						
Niobium-94			U	0.529	pCi/g					
	Uncertainty			+/-0.442						
QC1204026985 MB										
Cesium-137			U	0.00433	pCi/g					05/14/18 17:0
	Uncertainty			+/-0.0166						
Cobalt-60			U	0.00328	pCi/g					
	Uncertainty			+/-0.0221						
Europium-152			U	0.00387	pCi/g					
	Uncertainty			+/-0.0407						
Europium-154			U	-0.0139	pCi/g					
	Uncertainty			+/-0.0688						
Europium-155			U	-0.0207	pCi/g					
	Uncertainty			+/-0.0384						

QC Summary

Workorder: 449877

Parmname	NOM	Sample	Qual	QC	Units	RPD%	REC%	Range	Anlst	Date Time
Rad Gamma Spec										
Batch 1763697										
Niobium-94			U	0.0152	pCi/g				RXF2	05/14/18 17:0
	Uncertainty			+/-0.0121						
Rad Gas Flow										
Batch 1765102										
QC1204030329 449877005 DUP										
Strontium-90	U	-0.137	U	-0.0855	pCi/g	N/A		N/A	LXB3	05/22/18 16:4
	Uncertainty	+/-0.175		+/-0.192						
QC1204030330 LCS										
Strontium-90	21.5			22.2	pCi/g		103	(75%-125%)		05/22/18 16:4
	Uncertainty			+/-1.25						
QC1204030328 MB										
Strontium-90			U	-0.0123	pCi/g					05/22/18 16:4
	Uncertainty			+/-0.179						
Rad Liquid Scintillation										
Batch 1763512										
QC1204026506 449493001 DUP										
Iron-55	U	0.839	U	-1.31	pCi/g	N/A		N/A	TXJ1	05/26/18 02:0
	Uncertainty	+/-4.13		+/-3.87						
QC1204026507 LCS										
Iron-55	106			94.7	pCi/g		89	(75%-125%)		05/26/18 02:3
	Uncertainty			+/-5.96						
QC1204026505 MB										
Iron-55			U	-0.679	pCi/g					05/26/18 01:3
	Uncertainty			+/-2.67						
Batch 1763518										
QC1204026519 449493001 DUP										
Nickel-63	U	2.48	U	1.03	pCi/g	N/A		N/A	TXJ1	05/25/18 22:4
	Uncertainty	+/-1.91		+/-1.58						
QC1204026520 LCS										
Nickel-63	85.6			86.2	pCi/g		101	(75%-125%)		05/25/18 23:1
	Uncertainty			+/-3.08						
QC1204026518 MB										
Nickel-63			U	-0.212	pCi/g					05/25/18 22:1
	Uncertainty			+/-1.44						

QC Summary

Workorder: 449877

Parmname	NOM	Sample	Qual	QC	Units	RPD%	REC%	Range	Anlst	Date Time
Rad Liquid Scintillation										
Batch 1763527										
QC1204026545 449493001 DUP										
Technetium-99	U	0.580	U	0.0653	pCi/g	N/A			N/A CXS7	05/21/18 00:0
	Uncertainty	+/-0.754		+/-0.642						
QC1204026546 LCS										
Technetium-99	40.9			36.0	pCi/g		87.9	(75%-125%)		05/21/18 00:3
	Uncertainty			+/-1.38						
QC1204026544 MB										
Technetium-99			U	-0.0178	pCi/g					05/20/18 23:2
	Uncertainty			+/-0.560						
Batch 1763551										
QC1204026612 449877009 DUP										
Tritium	U	2.40	U	4.95	pCi/g	N/A			N/A MXH8	05/18/18 00:3
	Uncertainty	+/-4.17		+/-4.27						
QC1204026614 LCS										
Tritium	24.9			25.2	pCi/g		101	(75%-125%)		05/18/18 02:2
	Uncertainty			+/-2.69						
QC1204026611 MB										
Tritium			U	0.995	pCi/g					05/17/18 23:4
	Uncertainty			+/-1.70						
QC1204026613 449877009 MS										
Tritium	126 U	2.40		112	pCi/g		89	(75%-125%)		05/18/18 01:2
	Uncertainty	+/-4.17		+/-12.5						
Batch 1763558										
QC1204026633 449877010 DUP										
Carbon-14	U	0.0526	U	-0.719	pCi/g	N/A			N/A BXM4	05/18/18 11:4
	Uncertainty	+/-2.06		+/-1.97						
QC1204026635 LCS										
Carbon-14	136			104	pCi/g		76.5	(75%-125%)		05/21/18 08:3
	Uncertainty			+/-6.50						
QC1204026632 MB										
Carbon-14			U	-0.0751	pCi/g					05/18/18 10:5
	Uncertainty			+/-1.97						
QC1204026634 449877010 MS										
Carbon-14	334 U	0.0526		265	pCi/g		79.5	(75%-125%)		05/18/18 12:3
	Uncertainty	+/-2.06		+/-9.21						

QC Summary

Workorder: 449877

Parmname	NOM	Sample	Qual	QC	Units	RPD%	REC%	Range	Anlst	Date Time
Rad Liquid Scintillation										
Batch 1765373										
QC1204030910 449877009 DUP										
Carbon-14	U	0.617	U	-1.16	pCi/g	N/A			N/A BXM4	05/21/18 13:3
	Uncertainty	+/-2.27		+/-2.14						
QC1204030912 LCS										
Carbon-14	136			131	pCi/g		95.7	(75%-125%)		05/21/18 15:0
	Uncertainty			+/-4.42						
QC1204030909 MB										
Carbon-14			U	-0.0248	pCi/g					05/21/18 12:5
	Uncertainty			+/-2.16						
QC1204030911 449877009 MS										
Carbon-14	351 U	0.617		346	pCi/g		98.7	(75%-125%)		05/21/18 14:2
	Uncertainty	+/-2.27		+/-11.5						

Notes:

Counting Uncertainty is calculated at the 95% confidence level (1.96-sigma).

The Qualifiers in this report are defined as follows:

**	Analyte is a Tracer compound
<	Result is less than value reported
>	Result is greater than value reported
BD	Results are either below the MDC or tracer recovery is low
FA	Failed analysis.
H	Analytical holding time was exceeded
J	Value is estimated
K	Analyte present. Reported value may be biased high. Actual value is expected to be lower.
L	Analyte present. Reported value may be biased low. Actual value is expected to be higher.
M	M if above MDC and less than LLD
M	REMP Result > MDC/CL and < RDL
N/A	RPD or %Recovery limits do not apply.
N1	See case narrative
ND	Analyte concentration is not detected above the detection limit
NJ	Consult Case Narrative, Data Summary package, or Project Manager concerning this qualifier
Q	One or more quality control criteria have not been met. Refer to the applicable narrative or DER.
R	Sample results are rejected
U	Analyte was analyzed for, but not detected above the MDL, MDA, MDC or LOD.
UI	Gamma Spectroscopy--Uncertain identification
UJ	Gamma Spectroscopy--Uncertain identification

QC Summary

Workorder: 449877

Parmname	NOM	Sample	Qual	QC	Units	RPD%	REC%	Range	Anlst	Date	Time

UL Not considered detected. The associated number is the reported concentration, which may be inaccurate due to a low bias.

X Consult Case Narrative, Data Summary package, or Project Manager concerning this qualifier

Y Other specific qualifiers were required to properly define the results. Consult case narrative.

^ RPD of sample and duplicate evaluated using +/-RL. Concentrations are <5X the RL. Qualifier Not Applicable for Radiochemistry.

h Preparation or preservation holding time was exceeded

N/A indicates that spike recovery limits do not apply when sample concentration exceeds spike conc. by a factor of 4 or more or %RPD not applicable.
^ The Relative Percent Difference (RPD) obtained from the sample duplicate (DUP) is evaluated against the acceptance criteria when the sample is greater than five times (5X) the contract required detection limit (RL). In cases where either the sample or duplicate value is less than 5X the RL, a control limit of +/- the RL is used to evaluate the DUP result.
* Indicates that a Quality Control parameter was not within specifications.
For PS, PSD, and SDILT results, the values listed are the measured amounts, not final concentrations.

Where the analytical method has been performed under NELAP certification, the analysis has met all of the requirements of the NELAC standard unless qualified on the QC Summary.

Radiochemistry
Technical Case Narrative
LaCrosseSolutions, LLC (ENRG)
SDG #: 449877

Product: **Alphaspec Isotopic Am241 Am243, Cm243/244, Solid**
Analytical Method: DOE EML HASL-300, Am-05-RC Modified
Analytical Procedure: GL-RAD-A-011 REV# 26
Analytical Batch: 1764672

Preparation Method: Dry Soil Prep
Preparation Procedure: GL-RAD-A-021 REV# 22
Preparation Batch: 1763443

The following samples were analyzed using the above methods and analytical procedure(s).

GEL Sample ID#	Client Sample Identification
449877009	L2-SUB-102-AJGS-024-SB
449877010	L2-SUB-102-AJGS-001-SS
449877011	L2-SUB-102-AJGS-019-SB
449877012	L2-SUB-102-AJGS-001-AV
449877013	L2-SUB-VAR-AJGS-004-SB
449877014	L4-OFF-SOL-AJGS-B01-SB
449877016	L2-SUB-103-AJGS-002-SB
1204029319	Method Blank (MB)
1204029320	449877009(L2-SUB-102-AJGS-024-SB) Sample Duplicate (DUP)
1204029321	Laboratory Control Sample (LCS)

The samples in this SDG were analyzed on a "dry weight" basis.

Data Summary:

All sample data provided in this report met the acceptance criteria specified in the analytical methods and procedures for initial calibration, continuing calibration, instrument controls and process controls where applicable, with the following exceptions.

Technical Information

Recounts
The U-232 traced portion of sample 1204029319 (MB) was recounted due to results more negative than the three sigma TPU. The second count is reported.

Product: **Alphaspec Np, Solid**
Analytical Method: ASTM C 1475-00 Modified
Analytical Procedure: GL-RAD-A-032 REV# 21
Analytical Batch: 1764673

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Preparation Method: Dry Soil Prep
Preparation Procedure: GL-RAD-A-021 REV# 22
Preparation Batch: 1763443

The following samples were analyzed using the above methods and analytical procedure(s).

GEL Sample ID#	Client Sample Identification
449877009	L2-SUB-102-AJGS-024-SB
449877010	L2-SUB-102-AJGS-001-SS
449877011	L2-SUB-102-AJGS-019-SB
449877012	L2-SUB-102-AJGS-001-AV
449877013	L2-SUB-VAR-AJGS-004-SB
449877014	L4-OFF-SOL-AJGS-B01-SB
449877015	S1-102-CWD-FIFS-A02-SM
449877016	L2-SUB-103-AJGS-002-SB
1204029322	Method Blank (MB)
1204029323	449877009(L2-SUB-102-AJGS-024-SB) Sample Duplicate (DUP)
1204029324	Laboratory Control Sample (LCS)

The samples in this SDG were analyzed on a "dry weight" basis.

Data Summary:

There are no exceptions, anomalies or deviations from the specified methods. All sample data provided in this report met the acceptance criteria specified in the analytical methods and procedures for initial calibration, continuing calibration, instrument controls and process controls where applicable.

Product: **Alphaspec Pu238, 239/240, Solid**
Analytical Method: DOE EML HASL-300, Pu-11-RC Modified
Analytical Procedure: GL-RAD-A-011 REV# 26
Analytical Batch: 1764674

Preparation Method: Dry Soil Prep
Preparation Procedure: GL-RAD-A-021 REV# 22
Preparation Batch: 1763443

The following samples were analyzed using the above methods and analytical procedure(s).

GEL Sample ID#	Client Sample Identification
449877009	L2-SUB-102-AJGS-024-SB
449877010	L2-SUB-102-AJGS-001-SS
449877011	L2-SUB-102-AJGS-019-SB
449877012	L2-SUB-102-AJGS-001-AV
449877013	L2-SUB-VAR-AJGS-004-SB
449877014	L4-OFF-SOL-AJGS-B01-SB
449877015	S1-102-CWD-FIFS-A02-SM
449877016	L2-SUB-103-AJGS-002-SB
1204029325	Method Blank (MB)
1204029326	449877009(L2-SUB-102-AJGS-024-SB) Sample Duplicate (DUP)
1204029327	Laboratory Control Sample (LCS)

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The samples in this SDG were analyzed on a "dry weight" basis.

Data Summary:

All sample data provided in this report met the acceptance criteria specified in the analytical methods and procedures for initial calibration, continuing calibration, instrument controls and process controls where applicable, with the following exceptions.

Technical Information

Recounts
Sample 449877010 (L2-SUB-102-AJGS-001-SS) was recounted due to a suspected false positive. The recount is reported.

Miscellaneous Information

Additional Comments
Samples 449877009 (L2-SUB-102-AJGS-024-SB), 449877011 (L2-SUB-102-AJGS-019-SB), 449877012 (L2-SUB-102-AJGS-001-AV) and 449877013 (L2-SUB-VAR-AJGS-004-SB) did not meet the resolution requirement of having a full width half maximum of 100 keV or less for the tracer; however, the tracer yield requirement was met and the tracer peaks are within the tracer region of interest.

Product: **Alphaspec Isotopic Am241 Am243, Cm243/244, Solid**
Analytical Method: DOE EML HASL-300, Am-05-RC Modified
Analytical Procedure: GL-RAD-A-011 REV# 26
Analytical Batch: 1770886

Preparation Method: Dry Soil Prep
Preparation Procedure: GL-RAD-A-021 REV# 22
Preparation Batch: 1763443

The following samples were analyzed using the above methods and analytical procedure(s).

GEL Sample ID#	Client Sample Identification
449877015	S1-102-CWD-FIFS-A02-SM
1204043371	Method Blank (MB)
1204043372	449877015(S1-102-CWD-FIFS-A02-SM) Sample Duplicate (DUP)
1204043373	Laboratory Control Sample (LCS)

The samples in this SDG were analyzed on a "dry weight" basis.

Data Summary:

All sample data provided in this report met the acceptance criteria specified in the analytical methods and procedures for initial calibration, continuing calibration, instrument controls and process controls where applicable, with the following exceptions.

Technical Information

Sample Re-prep/Re-analysis
Sample 449877015 (S1-102-CWD-FIFS-A02-SM) was reprepped due to suspected interference. The reanalysis

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is being reported.

Recounts
The Am-243 traced portion of sample 449877015 (S1-102-CWD-FIFS-A02-SM) was recounted due to a suspected false positive. The recount is being reported.

Product: **Dry Weight**
Preparation Method: Dry Soil Prep
Preparation Procedure: GL-RAD-A-021 REV# 22
Preparation Batch: 1763443

The following samples were analyzed using the above methods and analytical procedure(s).

GEL Sample ID#	Client Sample Identification
449877001	L3-012-102-FSGS-004-SG
449877002	L3-012-102-FSGS-009-SS
449877003	L3-012-102-FSGS-008-SS
449877004	L1-PAD-Q01-AJGS-103-SS
449877005	L1-PAD-Q03-AJGS-201-SS
449877006	L1-PAD-Q03-AJGS-303-SS
449877007	L1-PAD-Q02-AJGS-401-SS
449877008	L1-PAD-Q01-AJGS-501-SS
449877009	L2-SUB-102-AJGS-024-SB
449877010	L2-SUB-102-AJGS-001-SS
449877011	L2-SUB-102-AJGS-019-SB
449877012	L2-SUB-102-AJGS-001-AV
449877013	L2-SUB-VAR-AJGS-004-SB
449877014	L4-OFF-SOL-AJGS-B01-SB
449877015	S1-102-CWD-FIFS-A02-SM
449877016	L2-SUB-103-AJGS-002-SB

The samples in this SDG were analyzed on an "as received" basis.

Data Summary:

All sample data provided in this report met the acceptance criteria specified in the analytical methods and procedures for initial calibration, continuing calibration, instrument controls and process controls where applicable, with the following exceptions.

Miscellaneous Information

Additional Comments
Sample 449877012 was asphalt. It count not be sieved. 449877012 (L2-SUB-102-AJGS-001-AV).

Product: **Gamma Ni59, Solid**
Analytical Method: DOE RESL Ni-1
Analytical Procedure: GL-RAD-A-022 REV# 18

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Analytical Batch: 1763607

Preparation Method: Dry Soil Prep
Preparation Procedure: GL-RAD-A-021 REV# 22
Preparation Batch: 1763443

The following samples were analyzed using the above methods and analytical procedure(s).

GEL Sample ID#	Client Sample Identification
449877009	L2-SUB-102-AJGS-024-SB
449877010	L2-SUB-102-AJGS-001-SS
449877011	L2-SUB-102-AJGS-019-SB
449877012	L2-SUB-102-AJGS-001-AV
449877013	L2-SUB-VAR-AJGS-004-SB
449877014	L4-OFF-SOL-AJGS-B01-SB
449877015	S1-102-CWD-FIFS-A02-SM
449877016	L2-SUB-103-AJGS-002-SB
1204026769	Method Blank (MB)
1204026770	449877009(L2-SUB-102-AJGS-024-SB) Sample Duplicate (DUP)
1204026771	Laboratory Control Sample (LCS)

The samples in this SDG were analyzed on a "dry weight" basis.

Data Summary:

There are no exceptions, anomalies or deviations from the specified methods. All sample data provided in this report met the acceptance criteria specified in the analytical methods and procedures for initial calibration, continuing calibration, instrument controls and process controls where applicable.

Product: Gamma, Cs137, Co60, Nb94, Eu152, Eu154, Eu155
Analytical Method: DOE HASL 300, 4.5.2.3/Ga-01-R
Analytical Procedure: GL-RAD-A-013 REV# 27
Analytical Batch: 1763697

Preparation Method: Dry Soil Prep
Preparation Procedure: GL-RAD-A-021 REV# 22
Preparation Batch: 1763443

The following samples were analyzed using the above methods and analytical procedure(s).

GEL Sample ID#	Client Sample Identification
449877009	L2-SUB-102-AJGS-024-SB
449877010	L2-SUB-102-AJGS-001-SS
449877011	L2-SUB-102-AJGS-019-SB
449877012	L2-SUB-102-AJGS-001-AV
449877013	L2-SUB-VAR-AJGS-004-SB
449877014	L4-OFF-SOL-AJGS-B01-SB
449877015	S1-102-CWD-FIFS-A02-SM
449877016	L2-SUB-103-AJGS-002-SB
1204026985	Method Blank (MB)
1204026986	449877009(L2-SUB-102-AJGS-024-SB) Sample Duplicate (DUP)

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1204026987 Laboratory Control Sample (LCS)

The samples in this SDG were analyzed on a "dry weight" basis.

Data Summary:

There are no exceptions, anomalies or deviations from the specified methods. All sample data provided in this report met the acceptance criteria specified in the analytical methods and procedures for initial calibration, continuing calibration, instrument controls and process controls where applicable.

Qualifier Information

Qualifier	Reason	Analyte	Sample	Client Sample
UI	Results are considered a false positive due to high counting uncertainty.	Cesium-137	449877016	L2-SUB-103-AJGS-002-SB
UI	Results are considered a false positive due to high peak-width.		449877010	L2-SUB-102-AJGS-001-SS
UI	Results are considered a false positive due to low abundance.	Europium-152	449877015	S1-102-CWD-FIFS-A02-SM
		Europium-155	449877009	L2-SUB-102-AJGS-024-SB

Product: **GFPC, Sr90, Solid**
Analytical Method: EPA 905.0 Modified/DOE RP501 Rev. 1 Modified
Analytical Procedure: GL-RAD-A-004 REV# 19
Analytical Batch: 1765102

Preparation Method: Dry Soil Prep
Preparation Procedure: GL-RAD-A-021 REV# 22
Preparation Batch: 1763443

The following samples were analyzed using the above methods and analytical procedure(s).

GEL Sample ID#	Client Sample Identification
449877001	L3-012-102-FSGS-004-SG
449877002	L3-012-102-FSGS-009-SS
449877003	L3-012-102-FSGS-008-SS
449877004	L1-PAD-Q01-AJGS-103-SS
449877005	L1-PAD-Q03-AJGS-201-SS
449877006	L1-PAD-Q03-AJGS-303-SS
449877007	L1-PAD-Q02-AJGS-401-SS
449877008	L1-PAD-Q01-AJGS-501-SS
449877009	L2-SUB-102-AJGS-024-SB
449877010	L2-SUB-102-AJGS-001-SS

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449877011	L2-SUB-102-AJGS-019-SB
449877012	L2-SUB-102-AJGS-001-AV
449877013	L2-SUB-VAR-AJGS-004-SB
449877014	L4-OFF-SOL-AJGS-B01-SB
449877015	S1-102-CWD-FIFS-A02-SM
449877016	L2-SUB-103-AJGS-002-SB
1204030328	Method Blank (MB)
1204030329	449877005(L1-PAD-Q03-AJGS-201-SS) Sample Duplicate (DUP)
1204030330	Laboratory Control Sample (LCS)

The samples in this SDG were analyzed on a "dry weight" basis.

Data Summary:

All sample data provided in this report met the acceptance criteria specified in the analytical methods and procedures for initial calibration, continuing calibration, instrument controls and process controls where applicable, with the following exceptions.

Technical Information

Recounts
Sample 449877016 (L2-SUB-103-AJGS-002-SB) was recounted due to results more negative than the three sigma TPU. The second count is reported.

Product: **Liquid Scint Pu241, Solid**
Analytical Method: DOE EML HASL-300, Pu-11-RC Modified
Analytical Procedure: GL-RAD-A-035 REV# 19
Analytical Batch: 1764675

Preparation Method: Dry Soil Prep
Preparation Procedure: GL-RAD-A-021 REV# 22
Preparation Batch: 1763443

The following samples were analyzed using the above methods and analytical procedure(s).

GEL Sample ID#	Client Sample Identification
449877009	L2-SUB-102-AJGS-024-SB
449877010	L2-SUB-102-AJGS-001-SS
449877011	L2-SUB-102-AJGS-019-SB
449877012	L2-SUB-102-AJGS-001-AV
449877013	L2-SUB-VAR-AJGS-004-SB
449877014	L4-OFF-SOL-AJGS-B01-SB
449877015	S1-102-CWD-FIFS-A02-SM
449877016	L2-SUB-103-AJGS-002-SB
1204029328	Method Blank (MB)
1204029329	449877009(L2-SUB-102-AJGS-024-SB) Sample Duplicate (DUP)
1204029330	Laboratory Control Sample (LCS)

The samples in this SDG were analyzed on a "dry weight" basis.

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Data Summary:

All sample data provided in this report met the acceptance criteria specified in the analytical methods and procedures for initial calibration, continuing calibration, instrument controls and process controls where applicable, with the following exceptions.

Quality Control (QC) Information

Laboratory Control Sample (LCS) Recovery
The Laboratory Control Sample (See Below) does not meet the recovery requirement, however, all sample results are less than the MDC. Since the sample results are non-detects, the implied high bias does not carry over to the associated samples.

Sample	Analyte	Value
1204029330 (LCS)	Plutonium-241	131* (75%-125%)

RDL Met
Samples (See Below) did not meet the detection limits, however the 10CFR61 limitations were met.

Sample	Analyte	Value
449877010 (L2-SUB-102-AJGS-001-SS)	Plutonium-241	Result 1.06 < MDA 5.53 > RDL 5 pCi/g
449877011 (L2-SUB-102-AJGS-019-SB)	Plutonium-241	Result -0.596 < MDA 5.54 > RDL 5 pCi/g
449877013 (L2-SUB-VAR-AJGS-004-SB)	Plutonium-241	Result -3.77 < MDA 6.18 > RDL 5 pCi/g
449877014 (L4-OFF-SOL-AJGS-B01-SB)	Plutonium-241	Result 0.611 < MDA 6.06 > RDL 5 pCi/g

Miscellaneous Information

Additional Comments
Samples 449877009 (L2-SUB-102-AJGS-024-SB), 449877011 (L2-SUB-102-AJGS-019-SB), 449877012 (L2-SUB-102-AJGS-001-AV) and 449877013 (L2-SUB-VAR-AJGS-004-SB) did not meet the resolution requirement of having a full width half maximum of 100 keV or less for the tracer; however, the tracer yield requirement was met and the tracer peaks are within the tracer region of interest.

Product: **Liquid Scint Fe55, Solid**
Analytical Method: DOE RESL Fe-1, Modified
Analytical Procedure: GL-RAD-A-040 REV# 13
Analytical Batch: 1763512

Preparation Method: Dry Soil Prep
Preparation Procedure: GL-RAD-A-021 REV# 22
Preparation Batch: 1763443

The following samples were analyzed using the above methods and analytical procedure(s).

GEL Sample ID#	Client Sample Identification
449877009	L2-SUB-102-AJGS-024-SB

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449877010	L2-SUB-102-AJGS-001-SS
449877011	L2-SUB-102-AJGS-019-SB
449877012	L2-SUB-102-AJGS-001-AV
449877013	L2-SUB-VAR-AJGS-004-SB
449877014	L4-OFF-SOL-AJGS-B01-SB
449877015	S1-102-CWD-FIFS-A02-SM
449877016	L2-SUB-103-AJGS-002-SB
1204026505	Method Blank (MB)
1204026506	449493001(S1-102-CWD-FIFS-A01-SM) Sample Duplicate (DUP)
1204026507	Laboratory Control Sample (LCS)

The samples in this SDG were analyzed on a "dry weight" basis.

Data Summary:

All sample data provided in this report met the acceptance criteria specified in the analytical methods and procedures for initial calibration, continuing calibration, instrument controls and process controls where applicable, with the following exceptions.

Technical Information

Recounts
Sample 449877012 (L2-SUB-102-AJGS-001-AV) was recounted to verify sample results. The recount results are similar to the original results. Original results are reported.

Product: **Liquid Scint Ni63, Solid**
Analytical Method: DOE RESL Ni-1, Modified
Analytical Procedure: GL-RAD-A-022 REV# 18
Analytical Batch: 1763518

Preparation Method: Dry Soil Prep
Preparation Procedure: GL-RAD-A-021 REV# 22
Preparation Batch: 1763443

The following samples were analyzed using the above methods and analytical procedure(s).

GEL Sample ID#	Client Sample Identification
449877009	L2-SUB-102-AJGS-024-SB
449877010	L2-SUB-102-AJGS-001-SS
449877011	L2-SUB-102-AJGS-019-SB
449877012	L2-SUB-102-AJGS-001-AV
449877013	L2-SUB-VAR-AJGS-004-SB
449877014	L4-OFF-SOL-AJGS-B01-SB
449877015	S1-102-CWD-FIFS-A02-SM
449877016	L2-SUB-103-AJGS-002-SB
1204026518	Method Blank (MB)
1204026519	449493001(S1-102-CWD-FIFS-A01-SM) Sample Duplicate (DUP)
1204026520	Laboratory Control Sample (LCS)

The samples in this SDG were analyzed on a "dry weight" basis.

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Data Summary:

All sample data provided in this report met the acceptance criteria specified in the analytical methods and procedures for initial calibration, continuing calibration, instrument controls and process controls where applicable, with the following exceptions.

Technical Information

Recounts
Sample 449877015 (S1-102-CWD-FIFS-A02-SM) was recounted to verify sample results. The recount results are similar to the original results. Original results are reported.

Product: **Liquid Scint Tc99, Solid**
Analytical Method: DOE EML HASL-300, Tc-02-RC Modified
Analytical Procedure: GL-RAD-A-059 REV# 5
Analytical Batch: 1763527

The following samples were analyzed using the above methods and analytical procedure(s).

GEL Sample ID#	Client Sample Identification
449877009	L2-SUB-102-AJGS-024-SB
449877010	L2-SUB-102-AJGS-001-SS
449877011	L2-SUB-102-AJGS-019-SB
449877012	L2-SUB-102-AJGS-001-AV
449877013	L2-SUB-VAR-AJGS-004-SB
449877014	L4-OFF-SOL-AJGS-B01-SB
449877015	S1-102-CWD-FIFS-A02-SM
449877016	L2-SUB-103-AJGS-002-SB
1204026544	Method Blank (MB)
1204026545	449493001(S1-102-CWD-FIFS-A01-SM) Sample Duplicate (DUP)
1204026546	Laboratory Control Sample (LCS)

The samples in this SDG were analyzed on an "as received" basis.

Data Summary:

There are no exceptions, anomalies or deviations from the specified methods. All sample data provided in this report met the acceptance criteria specified in the analytical methods and procedures for initial calibration, continuing calibration, instrument controls and process controls where applicable.

Product: **LSC, Tritium Distillation, Solid**
Analytical Method: EPA 906.0 Modified
Analytical Procedure: GL-RAD-A-002 REV# 22
Analytical Batch: 1763551

The following samples were analyzed using the above methods and analytical procedure(s).

GEL Sample ID#	Client Sample Identification

GEL Laboratories LLC PO Box 30712 Charleston, SC 29417 2040 Savage Road Charleston, SC 29407 P 843.556.8171 F 843.766.1178 www.gel.com

449877009	L2-SUB-102-AJGS-024-SB
449877010	L2-SUB-102-AJGS-001-SS
449877011	L2-SUB-102-AJGS-019-SB
449877012	L2-SUB-102-AJGS-001-AV
449877013	L2-SUB-VAR-AJGS-004-SB
449877014	L4-OFF-SOL-AJGS-B01-SB
449877015	S1-102-CWD-FIFS-A02-SM
449877016	L2-SUB-103-AJGS-002-SB
1204026611	Method Blank (MB)
1204026612	449877009(L2-SUB-102-AJGS-024-SB) Sample Duplicate (DUP)
1204026613	449877009(L2-SUB-102-AJGS-024-SB) Matrix Spike (MS)
1204026614	Laboratory Control Sample (LCS)

The samples in this SDG were analyzed on an "as received" basis.

Data Summary:

All sample data provided in this report met the acceptance criteria specified in the analytical methods and procedures for initial calibration, continuing calibration, instrument controls and process controls where applicable, with the following exceptions.

Miscellaneous Information

Additional Comments
The matrix spike, 1204026613 (L2-SUB-102-AJGS-024-SBMS), aliquot was reduced to conserve sample volume.

Product: **Liquid Scint C14, Solid**
Analytical Method: EPA EERF C-01 Modified
Analytical Procedure: GL-RAD-A-003 REV# 16
Analytical Batch: 1763558

The following samples were analyzed using the above methods and analytical procedure(s).

GEL Sample ID#	Client Sample Identification
449877010	L2-SUB-102-AJGS-001-SS
449877011	L2-SUB-102-AJGS-019-SB
449877012	L2-SUB-102-AJGS-001-AV
449877013	L2-SUB-VAR-AJGS-004-SB
449877014	L4-OFF-SOL-AJGS-B01-SB
449877015	S1-102-CWD-FIFS-A02-SM
449877016	L2-SUB-103-AJGS-002-SB
1204026632	Method Blank (MB)
1204026633	449877010(L2-SUB-102-AJGS-001-SS) Sample Duplicate (DUP)
1204026634	449877010(L2-SUB-102-AJGS-001-SS) Matrix Spike (MS)
1204026635	Laboratory Control Sample (LCS)

The samples in this SDG were analyzed on an "as received" basis.

Data Summary:

All sample data provided in this report met the acceptance criteria specified in the analytical methods and

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procedures for initial calibration, continuing calibration, instrument controls and process controls where applicable, with the following exceptions.

Technical Information

Recounts
Sample 1204026635 (LCS) was recounted due to low recovery. The recount is reported.

Miscellaneous Information

Additional Comments
The matrix spike, 1204026634 (L2-SUB-102-AJGS-001-SSMS), aliquot was reduced to conserve sample volume.

Product: Liquid Scint C14, Solid
Analytical Method: EPA EERF C-01 Modified
Analytical Procedure: GL-RAD-A-003 REV# 16
Analytical Batch: 1765373

The following samples were analyzed using the above methods and analytical procedure(s).

GEL Sample ID#	Client Sample Identification
449877009	L2-SUB-102-AJGS-024-SB
1204030909	Method Blank (MB)
1204030910	449877009(L2-SUB-102-AJGS-024-SB) Sample Duplicate (DUP)
1204030911	449877009(L2-SUB-102-AJGS-024-SB) Matrix Spike (MS)
1204030912	Laboratory Control Sample (LCS)

The samples in this SDG were analyzed on an "as received" basis.

Data Summary:

All sample data provided in this report met the acceptance criteria specified in the analytical methods and procedures for initial calibration, continuing calibration, instrument controls and process controls where applicable, with the following exceptions.

Miscellaneous Information

Additional Comments
The matrix spike, 1204030911 (L2-SUB-102-AJGS-024-SBMS), aliquot was reduced to conserve sample volume.

Certification Statement

Where the analytical method has been performed under NELAP certification, the analysis has met all of the requirements of the NELAC standard unless otherwise noted in the analytical case narrative.

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Page: 1 of 2
Project # LACBWR Site
GEL Quote #:
COC Number (1):
PO Number: 672583

GEL Laboratories LLC
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Chemistry | Radiochemistry | Radiobioassay | Specialty Analytics

Chain of Custody and Analytical Request

GEL Work Order Number: 449877 GEL Project Manager:

GEL Laboratories, LLC
2040 Savage Road
Charleston, SC 29407
Phone: (843) 556-8171
Fax: (843) 766-1178

Client Name: La Crosse Solutions Phone # 608-689-4259
Project/Site Name: LACBWR-Genoa WI Fax #
Address: 54601 State Road 35
Collected By: Send Results To:Scott Zoller sgzoller@energysolutions.com

Sample Analysis Requested (5) (Fill in the number of containers for each test)

Sample ID * For composites - indicate start and stop date/time	*Date Collected (mm-dd-yy)	*Time Collected (Military) (hhmm)	QC Code (2)	Field Filtered (3)	Sample Matrix (4)	Should this sample be considered: Radioactive (If yes, please supply isotopic info.)	Should this sample be considered: (7) Known or possible Hazards	Total number of containers	Sr90	Ni59, Co60, Nb94	Cs137, Eu152, Eu154	Eu155, Pu241	H3, C14, Fe55	Ni63, Tc99	Np237, Pu238	Pu239, Pu240	Am241, Am243	Cm243, Cm244	<-- Preservative Type (6) / Comments
L3-012-102-FSGS-004-SG	03/12/18	1447	N	N	SO	N	N	1	1										All samples are to be
L3-012-102-FSGS-009-SS	03/12/18	1448	N	N	SO	N	N	1	1										returned please
L3-012-102-FSGS-008-SS	03/12/18	1322	N	N	SO	N	N	1	1										
L1-PAD-Q01-AJGS-103-SS	03/04/18	1445	N	N	SO	N	N	1	1										
L1-PAD-Q03-AJGS-201-SS	03/20/18	1023	N	N	SO	N	N	1	1										
L1-PAD-Q03-AJGS-303-SS	03/27/18	1544	N	N	SO	N	N	1	1										
L1-PAD-Q02-AJGS-401-SS	04/02/18	1446	N	N	SO	N	N	1	1										
L1-PAD-Q01-AJGS-501-SS	05/02/18	1445	N	N	SO	N	N	1	1										
L2-SUB-102-AJGS-024-SB	04/05/18	1458	N	N	SO	N	N	1	1	1	1	1	1	1	1	1	1	1	MDC <0.01pCi Np-237
L2-SUB-102-AJGS-001-SB	03/30/18	1329	N	N	SO	N	N	1	1	1	1	1	1	1	1	1	1	1	MDC <0.01pCi Np-237

Chain of Custody Signatures

Relinquished By (Signed)	Date	Time	Received by (signed)	Date	Time
1. Will Childers	5-4-18	1515	1	5/4/18	9:15
2			2		
3			3		

TAT Requested: Normal: _X__ Rush: _____ Specify: _____ (Subject to Surcharge)

Fax Results: [ ] Yes [X] No

Select Deliverable: [ ] C of A [ ] QC Summary [ ] level 1 [X] Level 2 [ ] Level 3 [ ] Level 4

Additional Remarks: None

For Lab Receiving Use Only: Custody Seal Intact? [ ] Yes [ ] No *Cooler Temp:* _____ °C

> *For sample shipping and delivery details, see Sample Receipt & Review form (SRR.)*

Sample Collection Time Zone: [ ] Eastern [ ] Pacific [X] Central [ ] Mountain [ ] Other:

1.) Chain of Custody Number = Client Determined

2.) QC Codes: N = Normal Sample, TB = Trip Blank, FD = Field Duplicate, EB = Equipment Blank, MS = Matrix Spike Sample, MSD = Matrix Spike Duplicate Sample, G = Grab, C = Composite

3.) Field Filtered: For liquid matrices, indicate with a - Y - for yes the sample was field filtered or - N - for sample was not field filtered.

4.) Matrix Codes: DW=Drinking Water, GW=Groundwater, SW=Surface Water, WW=Waste Water, W=Water, ML=Misc Liquid, SO=Soil, SD=Sediment, SL=Sludge, SS=Solid Waste, O=Oil, F=Filter, P=Wipe, U=Urine, F=Fecal, N=Nasal

5.) Sample Analysis Requested: Analytical method requested (i.e. 8260B, 6010B/7470A) and number of containers provided for each (i.e. *8260B* - 3, *6010B/7470A* - 1).

6.) Preservative Type: HA = Hydrochloric Acid, NI = Nitric Acid, SH = Sodium Hydroxide, SA = Sulfuric Acid, AA = Ascorbic Acid, HX = Hexane, ST = Sodium Thiosulfate, If no preservative is added = leave field blank

7.) KNOWN OR POSSIBLE HAZARDS

RCRA Metals
As = Arsenic Hg= Mercury
Ba = Barium Se= Selenium
Cd = Cadmium Ag= Silver
Cr = Chromium MR= Misc. RCRA metals
Pb = Lead

Characteristic Hazards
FL = Flammable/Ignitable
CO = Corrosive
RE = Reactive

TSCA Regulated
PCB = Polychlorinated biphenyls

Listed Waste
LW= Listed Waste
(F,K,P and U-listed wastes.)
Waste code(s):

Other
OT= Other / Unknown
(i.e.: High/low pH, ashestos, beryllium, irritants, other misc. health hazards, etc.)
Description:

Please provide any additional details below regarding handling and/or disposal concerns. *(i.e.: Origin of sample(s), type of site collected from, odd matrices, etc.)*

Page: 2 of 2
Project # LACBWR Site
GEL Quote #:
COC Number (1):
PO Number: 672583

GEL Laboratories LLC
gel.com
Chemistry | Radiochemistry | Radiobioassay | Specialty Analytics

Chain of Custody and Analytical Request

GEL Work Order Number: *GEL Project Manager:*

GEL Laboratories, LLC
2040 Savage Road
Charleston, SC 29407
Phone: (843) 556-8171
Fax: (843) 766-1178

Client Name: La Crosse Solutions Phone # 608-689-4259
Project/Site Name: LACBWR-Genoa WI Fax #
Address: 54601 State Road 35
Collected By: Send Results To:Scott Zoller sgzoller@energysolutions.com

Sample Analysis Requested (5) (Fill in the number of containers for each test)

Sample ID * For composites - indicate start and stop date/time	*Date Collected (mm-dd-yy)	*Time Collected (Military) (hhmm)	QC Code (2)	Field Filtered (3)	Sample Matrix (4)	Should this sample be considered: Radioactive (If yes, please supply isotopic info.)	Should this sample be considered: (7) Known or possible Hazards	Total number of containers	Sr90	Ni59, Co60, Nb94	Cs137, Eu152, Eu154	Eu155, Pu241	H3, C14, Fe55	Ni63, Tc99	Np237, Pu238	Pu239, Pu240	Am241, Am243	Cm243, Cm244	<-- Preservative Type (6) Comments Note: extra sample is required for sample specific QC
L2-SUB-102-AJGS-019-SB	04/05/18	1229	N	N	SO	N	N	1	1	1	1	1	1	1	1	1	1	1	MDC <0.01pCi Np-237
L2-SUB-102-AJGS-001-AV	03/30/18	1040	N	N	SO	N	N	1	1	1	1	1	1	1	1	1	1	1	MDC <0.01pCi Np-237
L2-SUB-VAR-AJGS-004-SB	04/06/18	1324	N	N	SO	N	N	1	1	1	1	1	1	1	1	1	1	1	MDC <0.01pCi Np-237
L4-OFF-SOL-AJGS-B01-SB	03/23/18	1325	N	N	SO	N	N	1	1	1	1	1	1	1	1	1	1	1	MDC <0.01pCi Np-237
S1-102-CWD-FIFS-A02-SM	04/24/18	0830	N	N	SO	N	N	1	1	1	1	1	1	1	1	1	1	1	MDC <0.01pCi Np-237
L2-SUB-103-AJGS-002-SB	02/23/18	1403	N	N	SO	N	N	1	1	1	1	1	1	1	1	1	1	1	MDC <0.01pCi Np-237

Chain of Custody Signatures

Relinquished By (Signed)	Date	Time	Received by (signed)	Date	Time
1. Will Childers	5-4-18	1515	1	5/10/18	9:15
2			2		
3			3		

TAT Requested: Normal: _X__ Rush: _____ Specify: _____ (Subject to Surcharge)

Fax Results: [ ] Yes [X] No

Select Deliverable: [ ] C of A [ ] QC Summary [ ] level 1 [X] Level 2 [ ] Level 3 [ ] Level 4

Additional Remarks: None

For Lab Receiving Use Only: *Custody Seal Intact?* [ ] *Yes* [ ] *No* ***Cooler Temp:*** _____ °C

> ***For sample shipping and delivery details, see Sample Receipt & Review form (SRR.)***

Sample Collection Time Zone: [ ] Eastern [ ] Pacific [X] Central [ ] Mountain [ ] Other:

1.) Chain of Custody Number = Client Determined

2.) QC Codes: N = Normal Sample, TB = Trip Blank, FD = Field Duplicate, EB = Equipment Blank, MS = Matrix Spike Sample, MSD = Matrix Spike Duplicate Sample, G = Grab, C = Composite

3.) Field Filtered: For liquid matrices, indicate with a - Y - for yes the sample was field filtered or - N - for sample was not field filtered.

4.) Matrix Codes: DW=Drinking Water, GW=Groundwater, SW=Surface Water, WW=Waste Water, W=Water, ML=Misc Liquid, SO=Soil, SD=Sediment, SL=Sludge, SS=Solid Waste, O=Oil, F=Filter, P=Wipe, U=Urine, F=Fecal, N=Nasal

5.) Sample Analysis Requested: Analytical method requested (i.e. 8260B, 6010B/7470A) and number of containers provided for each (i.e. *8260B - 3, 6010B/7470A - 1*).

6.) Preservative Type: HA = Hydrochloric Acid, NI = Nitric Acid, SH = Sodium Hydroxide, SA = Sulfuric Acid, AA = Ascorbic Acid, HX = Hexane, ST = Sodium Thiosulfate, If no preservative is added = leave field blank

7.) KNOWN OR POSSIBLE HAZARDS

RCRA Metals
As = Arsenic Hg= Mercury
Ba = Barium Se= Selenium
Cd = Cadmium Ag= Silver
Cr = Chromium MR= Misc. RCRA metals
Pb = Lead

Characteristic Hazards
FL = Flammable/Ignitable
CO = Corrosive
RE = Reactive

TSCA Regulated
PCB = Polychlorinated biphenyls

Listed Waste
LW= Listed Waste
(F,K,P and U-listed wastes.)
Waste code(s):

Other
OT= Other / Unknown
(i.e.: High/low pH, asbestos, beryllium, irritants, other misc. health hazards, etc.)
Description:

Please provide any additional details below regarding handling and/or disposal concerns. *(i.e.: Origin of sample(s), type of site collected from, odd matrices, etc.)*

GEL Laboratories LLC

SAMPLE RECEIPT & REVIEW FORM

Client: ENRG	**SDG/AR/COC/Work Order:** 449877
Received By: ZKW	**Date Received:** 5/10/18
Carrier and Tracking Number	Circle Applicable: FedEx Express FedEx Ground UPS Field Services Courier Other 7721 6511 0770

Suspected Hazard Information	Yes	No	*If Net Counts > 100cpm on samples not marked "radioactive", contact the Radiation Safety Group for further investigation.
Shipped as a DOT Hazardous?		✓	Hazard Class Shipped: UN#:
COC/Samples marked or classified as radioactive?		✓	Maximum Net Counts Observed* (Observed Counts - Area Background Counts): 0 CPM / mR/Hr **Classified as: Rad 1 Rad 2 Rad 3**
Is package, COC, and/or Samples marked HAZ?		✓	If yes, select Hazards below, and contact the GEL Safety Group. PCB's Flammable Foreign Soil RCRA Asbestos Beryllium Other:

	Sample Receipt Criteria	Yes	NA	No	**Comments/Qualifiers (Required for Non-Conforming Items)**
1	Shipping containers received intact and sealed?	✓			Circle Applicable: Seals broken Damaged container Leaking container Other (describe)
2	Chain of custody documents included with shipment?	✓			
3	Samples requiring cold preservation within (0 ≤ 6 deg. C)?*	•	✓		Preservation Method: Wet Ice Ice Packs Dry ice None Other: *all temperatures are recorded in Celsius **TEMP:** 21.2
4	Daily check performed and passed on IR temperature gun?	✓			**Temperature Device Serial #:** IR3-16 Secondary Temperature Device Serial # (If Applicable):
5	Sample containers intact and sealed?	✓			Circle Applicable: Seals broken Damaged container Leaking container Other (describe)
6	Samples requiring chemical preservation at proper pH?		✓		Sample ID's and Containers Affected: If Preservation added, Lot#:
7	Do any samples require Volatile Analysis?			✓	If Yes, Are Encores or Soil Kits present? Yes___ No___ (If yes, take to VOA Freezer) Do VOA vials contain acid preservation? Yes___ No___ N/A___ (If unknown, select No) VOA vials free of headspace? Yes___ No___ N/A___ Sample ID's and containers affected:
8	Samples received within holding time?	✓			ID's and tests affected:
9	Sample ID's on COC match ID's on bottles?			✓	Sample ID's and containers affected: We rec'd -001-SS, COC has -001-SB
10	Date & time on COC match date & time on bottles?			✓	Sample ID's affected: Sample -001-SS was collected 3/30 @ 12:05
11	Number of containers received match number indicated on COC?	✓			Sample ID's affected:
12	Are sample containers identifiable as GEL provided?			✓	
13	COC form is properly signed in relinquished/received sections?	✓			

Comments (Use Continuation Form if needed):

Client Emailed
001-SS is the correct sample.

PM (or PMA) review: Initials QS Date 5/11/18 Page 1 of 1

GL-CHL-SR-001 Rev 5

Subject: RE: Soils Received Today from LaCrosse, 05/10/18 - Sample Receipt Discrepancy - Please Advise
From: "Scott G. Zoller" <sgzoller@energysolutions.com>
Date: 5/10/2018 2:02 PM
To: "Edie Kent (emk@gel.com)" <emk@gel.com>
CC: "Jason Q. Spaide" <jqspaide@energysolutions.com>, "Joseph D. Jacobsen" <jdjacobsen@energysolutions.com>, "Bill M. Bishop" <bmbishop@energysolutions.com>

Edie,

The L2-SUB-102-AJGS-001-SS is the correct sample to analyze. The sample time of 1205 is correct. The identification of the –SB sample ending is incorrect on the CoC and should be -SS.

If you any further questions, let me know.

Thank you.

Scott Zoller

From: Joseph D. Jacobsen
Sent: Thursday, May 10, 2018 11:08 AM
To: Scott G. Zoller
Cc: Jason Q. Spaide; Joseph D. Jacobsen
Subject: FW: Soils Received Today from LaCrosse, 05/10/18 - Sample Receipt Discrepancy - Please Advise

Here is one for you...

Joe J

From: Edie Kent [mailto:emk@gel.com]
Sent: Thursday, May 10, 2018 11:06 AM
To: Joseph D. Jacobsen; Jason Q. Spaide
Cc: team.kent
Subject: Soils Received Today from LaCrosse, 05/10/18 - Sample Receipt Discrepancy - Please Advise

We did not receive sample L2-SUB-102-AJGS-001-SB. We did receive a container labeled L2-SUB-102-AJGS-001-SS. The data of collection matches L2-SUB-102-AJGS-001-SB but the time of collection does not match the chain. It is 12:05. Please advise on whether the sample we received is the correct sample and if so, what the ID and time of collection are.

Edie

--
Edith M. Kent
Project Manager

GEL Laboratories LLC
2040 Savage Road, Charleston, SC 29407 | PO Box 30712, Charleston, SC 29417
Office Direct: 843.769.7385 | Office Main: 843.556.8171 | Fax: 843.766.1178
E-Mail: emk@gel.com | Website: www.gel.com
Analytical Testing | Environmental | Engineering | Surveying

List of current GEL Certifications as of 07 June 2018

State	Certification
Alaska	17-018
Arkansas	88-0651
CLIA	42D0904046
California	2940
Colorado	SC00012
Connecticut	PH-0169
Delaware	SC00012
DoD ELAP/ ISO17025 A2LA	2567.01
Florida NELAP	E87156
Foreign Soils Permit	P330-15-00283, P330-15-00253
Georgia	SC00012
Georgia SDWA	967
Hawaii	SC00012
Idaho Chemistry	SC00012
Idaho Radiochemistry	SC00012
Illinois NELAP	200029
Indiana	C-SC-01
Kansas NELAP	E-10332
Kentucky SDWA	90129
Kentucky Wastewater	90129
Louisiana NELAP	03046 (AI33904)
Louisiana SDWA	LA180011
Maryland	270
Massachusetts	M-SC012
Michigan	9976
Mississippi	SC00012
Nebraska	NE-OS-26-13
Nevada	SC000122018-1
New Hampshire NELAP	205415
New Jersey NELAP	SC002
New Mexico	SC00012
New York NELAP	11501
North Carolina	233
North Carolina SDWA	45709
North Dakota	R-158
Oklahoma	9904
Pennsylvania NELAP	68-00485
Puerto Rico	SC00012
S. Carolina Radiochem	10120002
South Carolina Chemistry	10120001
Tennessee	TN 02934
Texas NELAP	T104704235-18-13
Utah NELAP	SC000122018-26
Vermont	VT87156
Virginia NELAP	460202
Washington	C780
West Virginia	997404