FINAL STATUS SURVEY REPORT

SURVEY UNIT P1-R1
(WEST ACCESS ROAD)

MIDNITE MINE SUPERFUND SITE
STEVENS COUNTY, WA

REVISION 1

PREPARED FOR:

DAWN MINING COMPANY
P.O. BOX 250
FORD, WA 99013

PREPARED BY:

ENVIRONMENTAL RESTORATION GROUP INC.
8809 WASHINGTON ST. NE, SUITE 150
ALBUQUERQUE NM 87113

JUNE 28, 2017

Table of Contents

1. Introduction 1
2. Methods 1
2.1 Deviations from FSS Work Plan 1
3. Final Status Survey Compliance Evaluation Criteria 2
4. Final Status Survey Results 3
4.1 Non-bedrock Areas 3
4.1.1 Gamma Survey 3
4.1.2 Surface Material Sampling 4
4.2 Exposed Bedrock Areas 6
5. Summary of Comparisons with Compliance Evaluation Criteria 6
6. Quality Assurance / Quality Control 9
7. Conclusions 11
8. References 11
FIGURES 13
Attachment 1 – Table of Analytical Results 27
Attachment 2 – Field Logbook Notes 32
Attachment 3 – Calibration Certificates for Gamma Survey Instruments 47
Attachment 4 – Laboratory Data Validation Reports 63
Attachment 5 – Laboratory Data Reports 69

Figures

Figure 1: Class 1 Survey Unit P1-R1 (West Access Road) with insert of aerial imagery taken after completion of remedial excavations. 14

Figure 2: Final status gamma survey data for non-bedrock areas within the West Access Road Survey Unit. Gamma cutoff level = 27 µR/hr 15

Figure 3: FSS predictions of Ra-226 concentrations based on gamma survey data for non-bedrock areas within the West Access Road Survey Unit. Cleanup level for Ra-226 = 4.7 pCi/g. 16

Figure 4: Kriged Renderings of FSS Gamma Scan Data: Gamma Radiation (left); Gamma-based predictions of Ra-226 in surface soils (right). 17

Figure 5: FSS sampling locations and respective ID numbers for surface materials within the West Access Road Survey Unit 18

Figure 6: Map of color-coded and annotated sampling results for Ra-226 across the West Access Road Survey Unit, along with corresponding descriptive statistics. Cleanup level for Ra-226 = 4.7 pCi/g. 19

Figure 7: Map of annotated sampling results for natural uranium (U-nat, mg/kg) across Survey Unit P1-R1 and corresponding descriptive statistics. Also shown are color-coded results for Ra-226. Cleanup level for U-nat = 43 mg/kg. 20

Figure 8: Map of annotated sampling results for lead-210 (Pb-210, mg/kg) across Survey Unit P1-R1 and corresponding descriptive statistics. Color-coded sampling results for Ra-226 across Survey Unit P1-R1 are also shown. Cleanup level for Pb-210 = 7.5 pCi/g. 21

Figure 9: Final status gamma survey data for exposed bedrock areas within the West Access Road Survey Unit..... 22

Figure 10: Quality control charts applicable to the instrumentation used for the Final status gamma surveys of the West Access Road Survey Unit, including static background at the control points in the ERG soils lab (top left) and Envirocon trailer (top right), Cs-137 source check at the control points (middle left and right), and background along the originally established QC field strip near the West Access Road gate, just outside the ERG soils lab (bottom). The detector used for the August 8, 2016 FSS gamma scanning was ERG-3, and MFG-12 was used for the November 16, 2016 FSS gamma scanning (multiple detectors were used to establish all control limits in accordance with Appendix S)..... 23

Figure 11: Gamma scan coverage map for the southern portion of Survey Unit P1-R1, with each measurement symbol sized at approximately 3-meters diameter based on a fishnet transect grid overlay of exactly 3-meter spacing. 24

Figure 12: Gamma scan coverage map for the middle section of Survey Unit P1-R1, with each measurement symbol sized at approximately 3-meters diameter based on a fishnet transect grid overlay of exactly 3-meter spacing. 25

Figure 13: Gamma scan coverage map for the northern portion of Survey Unit P1-R1, with each measurement symbol sized at approximately 3-meters diameter based on a fishnet transect grid overlay of exactly 3-meter spacing. 26

Tables

Table 1: Data Evaluation Matrix for FSS of Class 1 Survey Unit P1-R1 (West Access Road) 7

1. Introduction

A Final Status Survey (FSS) of Survey Unit P1-R1 (West Access Road) was performed in accordance with the approved FSS Work Plan for Survey Unit P1-R1 along the West Access Road (ERG, 2016a and 2017a). This Report presents FSS survey data for Survey Unit P1-R1 (Figure 1) and evaluation of the data with respect to the "Compliance Evaluation Criteria" specified in the FSS Work Plan (Revision 3) as approved by the U.S. Environmental Protection Agency (EPA) for cleanup of surface materials at the Midnite Mine Superfund Site (Site) (ERG, 2017a). The FSS included a supplementary investigation conducted at one original sampling location (Location 13) due to a measured radium-226 (Ra-226) concentration that exceeded the 4.7 pCi/g cleanup level for surface materials. The results of this supplementary investigation are included in this report to document that a small hot spot was identified and was subsequently excavated and sampled to verify compliance with the Ra-226 cleanup level.

2. Methods

The methods used for the FSS included the following elements:

- Final status gamma radiation survey (referred to as "gamma survey").
- Final status soil sampling and testing for radiological constituents applicable to surface materials as specified in the Compliance Evaluation Criteria detailed in the FSS Work Plan.[1]
- Determination and documentation of exposed competent bedrock in portions of the West Access Road.

Details of the methods used for each of the above FSS elements, along with the results of the bedrock determination, are presented in detail in the FSS Work Plan for the West Access Road (Revision 3; ERG, 2017a) and are incorporated into this FSS Report by reference.

2.1 Deviations from FSS Work Plan

There were several deviations from the methods specified in the FSS Work Plan, including the following:

1. Final status gamma survey data were collected in two separate field efforts. After an initial post-excavation gamma survey was performed across the West Access Road (August 8, 2016), there were a few areas that did not quite meet specifications on scan coverage, and subsequent wet weather led to EPA concerns about potential erosion and transport of surface materials since the time

[1] A random number generator was used to select the 33% of samples to be analyzed for U-nat and Pb-210. Field duplicate samples were collected for 5% of the planned 75 grid samples, resulting in 4 field duplicates, and 1 additional field duplicate was collected for the 33% of samples to be analyzed for U-nat and Pb-210 (a random number generator was also used to select field duplicate sampling locations). As set forth in Appendix S, the field duplicates are used for QA/QC but are not included in the surface material data set used for Compliance Evaluation Criteria.

of the original final status gamma survey. As a result, a second final status gamma survey was performed on November 16, 2016 and results of both surveys were combined. This is discussed further in Section 4.1.1

2. Although 75 samples of surface materials were collected on a triangular grid with a randomized starting point as prescribed in the FSS Work Plan (November 16-17), concurrent final status gamma scanning could not be conducted across several small stormwater retention ponds, and "biased" soil samples were collected along the edges of three of these ponds to augment analytical data coverage in these areas.

3. Final Status Survey Compliance Evaluation Criteria

Criteria for evaluation of compliance with cleanup levels based on FSS data for surface materials in a given survey unit are summarized from the FSS Work Plan (Revision 3; ERG, 2017a) as follows:

1. At least 95 percent of gamma readings across the survey unit are less than or equal to the gamma cutoff level.[2,3]
2. At least 95 percent of predicted Ra-226 concentrations in surface materials based on gamma survey data and the regression equation for the gamma/Ra-226 correlation are less than or equal to the cleanup level (4.7 pCi/g).[3]
3. All sampling results for Ra-226 are less than or equal to the Ra-226 cleanup level in order to meet the FSS Compliance Evaluation Criterion (cleanup level). If any sample exceeds the 4.7 pCi/g cleanup level for Ra-226, a secondary investigation will be conducted to determine if a hot spot exists. If so, it will be remediated to cleanup levels, re-surveyed, resampled and results documented. If not, the secondary sampling data will be documented and will replace the original sample result.[4]
4. At least 95 percent of the offsite analysis results for natural uranium (U-nat) and lead-210 (Pb-210) are less than or equal to respective cleanup levels (43 mg/kg and 7.5 pCi/g, respectively).
5. No single sampling result for U-nat or Pb-210 exceeds a secondary cleanup level of twice the cleanup level. If this occurs, a secondary investigation will be conducted to determine if a hot spot exists. If so, it will be remediated to cleanup levels, re-surveyed, and results documented. If not, the secondary sampling data will be documented and will replace the original sample result.

---

[2] The gamma cutoff level has been established at 27 µR/hr for surface materials based on a correlation report approved by EPA (ERG, 2016b).

[3] Consistent with Appendix S specifications, the gamma cutoff and gamma survey-based prediction of Ra-226 levels do not apply where bedrock has become exposed. A final status gamma survey will be conducted across areas of exposed bedrock to document final gamma radiation readings before final grading and revegetation efforts are conducted.

[4] FSS soil sampling was not conducted in areas of exposed bedrock. However, soil sampling density was increased in non-bedrock areas to ensure that the total number of samples collected in the Survey Unit met the minimum 75 sample collections and analysis requirements specified in Appendix S.

6. Exposed bedrock will not be evaluated in a context of compliance with cleanup levels, but gamma scans will be conducted to document gamma readings above the exposed bedrock.

FSS results for the West Access Road, along with the respective evaluation related to the above Compliance Evaluation Criteria, are detailed in Sections 4 and 5. Discussion of quality assurance / quality control (QA/QC) for FSS data, along with gamma scan coverage, is provided in Section 6 of this report.

4. Final Status Survey Results

For the purposes of this report, FSS results are divided into two sub-sections, one for areas that were excavated to meet the 27 µR/hr gamma cutoff level (ERG, 2016b) before competent bedrock was reached (non-bedrock areas), and one for areas where the gamma cutoff could not be met before excavations had exposed competent bedrock at the ground surface (exposed bedrock areas). Compliance Evaluation Criteria 1-5 in Section 3 of this Report apply only to non-bedrock areas. Compliance Evaluation Criterion number 6 applies only to exposed bedrock areas.

4.1 Non-bedrock Areas

4.1.1 Gamma Survey

Summary of Field Work and Conditions Relevant to Data Collection

Final status gamma survey data were collected in two separate field efforts. Initially, field personnel from Environmental Restoration Group (ERG) performed a post-excavation gamma survey in the West Access Road on August 8, 2016. EPA raised concerns about potential erosion and transport of surface materials since the original final status gamma survey. As a result, a second final status gamma survey was performed on November 16, 2016 and results of both surveys were combined[5] to represent a single final status gamma survey data set. Although wet ground conditions existed during the second gamma survey, and such conditions can slightly influence gamma radiation emissions from surface materials, applicable data quality control (QC) measurements taken the day of each survey fell within acceptable QC limits, which, in conjunction with calibration data, demonstrate that gamma survey results are comparable and of acceptable quality, and are thus usable for evaluation against applicable Compliance Evaluation Criteria (see Section 6). Data on gamma survey coverage is discussed in Section 6.

Results Applicable to Compliance Evaluation Criterion 1

Final status gamma survey results for non-bedrock areas are shown in Figure 2, along with general summary statistics describing relevant distributional characteristics. These results show that over 95% of the West Access Road has gamma readings below the 27 µR/hr gamma cutoff level (95% of measured

[5] The Field Program Director (Randy Whicker, ERG) provided oversight for all gamma survey work to ensure compliance with specifications of the FSS Work Plan (ERG, 2016a) and Appendix S of the RA Work Plan (MWH, 2016).

gamma readings are less than 26.7 µR/hr). The Survey Unit passes Compliance Evaluation Criterion Number 1.

Results Applicable to Compliance Evaluation Criterion 2

Predicted Ra-226 concentrations based on FSS gamma scan data are shown in Figure 3, along with general summary statistics describing relevant distributional characteristics. The data in Figures 11-13 show that the target scan coverage of 100% was essentially achieved across the survey unit (small gaps in coverage occurred in some areas due to terrain that could not be safely traversed, or where physical obstructions prevented access). These results show that 100% of the West Access Road has gamma-based predictions of Ra-226 concentrations in surface materials that are below the 4.7 pCi/g cleanup level. The West Access Road Survey Unit passes Compliance Evaluation Criterion Number 2.

Presentation of Interpolated (Kriged) Data as Specified in Appendix S

Appendix S (S.4.2.1) specifies that gamma survey data will be geostatistically interpolated (kriged) to aid with spatial interpretation. Kriged maps of both gamma radiation readings and gamma-based predictions of Ra-226 concentrations in surface soils based on the gamma/Ra-226 correlation (ERG, 2016b) are shown in Figure 4.

4.1.2 Surface Material Sampling

Summary of Field Work and Conditions Relevant to Data Collection

FSS sampling of surface materials was conducted by ERG and Envirocon personnel across the West Access Road on November 16-17, 2016.[6] There were 75 samples collected on a triangular grid with a randomized starting point as described in the FSS Work Plan. Since gamma scanning could not be conducted across several small stormwater retention ponds, "biased" soil samples were collected along the edges of three of these ponds to augment analytical data coverage in these areas. The biased sampling locations were labeled B1, B2 and B3. FSS sampling locations and respective abbreviated ID numbers for the West Access Road are mapped in Figure 5. For example, the figure uses sample ID 1 for P1R1-1-0015-SOIL-DIS-01. Since the three biased samples are intended to supplement the gamma survey, only Ra-226 analysis is necessary (i.e., samples will not be analyzed for U-nat and Pb-210.

Laboratory Analysis of Surface Material Samples

All samples were sent to an approved offsite laboratory [Inter-Mountain Labs, Inc. (IML), Sheridan, Wyoming] for analysis in accordance with the FSS Work Plan (ERG, 2017a). Samples analyzed for Ra-226 met the required 21 days for full ingrowth before laboratory analysis. A total of 75 grid samples and 3 biased samples were analyzed for Ra-226, and 33% of the planned 75 grid samples (i.e., 25 samples) were also analyzed for U-nat and Pb-210. Tabulated analytical laboratory results for surface material cleanup

[6] The Field Program Director (Randy Whicker, ERG) led the field sample collection effort in accordance with the FSS Work Plan (ERG, 2016a) and Appendix S of the RA Work Plan (MWH, 2016). A representative for EPA (Steve Demus, CH2M) was present onsite for several hours on November 16, 2016 to observe the field sampling effort.

constituents are provided in Attachment 1, field logbook notes are found in Attachment 2, a laboratory data validation report is provided in Attachment 4, and the Level IV laboratory data reports are provided in Attachment 5.

Data Applicable to Compliance Evaluation Criterion 3

FSS soil sample analysis results for Ra-226 in surface soils are mapped in Figure 6, along with insets that provide summary statistics describing the data distribution. In general, Ra-226 concentrations were below the 4.7 pCi/g cleanup level for Ra-226 (average = 1.9 pCi/g; median = 1.7 pCi/g). Only one sample analysis result exceeded the 4.7 pCi/g cleanup level for Ra-226 (this sample was collected at Location 13 as shown in Figure 6 with a Ra-226 concentration of 5.8 pCi/g).

Because one sample did not meet the Ra-226 cleanup level, a supplemental investigation was conducted to determine whether a "hot spot" at sampling Location 13 could be confirmed. This supplemental investigation was conducted on February 28, 2017, and included gamma scanning along with collection of three soil samples at locations which appeared to bound a small hot spot based on the gamma scan readings.

Samples from the supplemental investigation were sent to the offsite lab, and once dried, crushed, canned and sealed for analysis, the samples were counted the same day they were sealed (day-zero counting) to obtain early indications regarding Ra-226 concentrations. Because the day-zero result for one sample (taken at the center of the area in question) exceeded the cleanup level, it was confirmed that a hot spot existed. The day-zero Ra-226 results for these samples, along with the findings of the supplemental study, were reported to EPA in a technical memorandum dated April 3, 2017 (ERG, 2017b). The memorandum, including plans for additional excavation to bedrock, was approved by EPA the following day.

The additional soil excavation was conducted on April 5, 2017. Because bedrock was not reached after several feet of excavation, a plan for collection of two additional samples at the bottom of the excavation was developed and approved by EPA via email on April 20, 2017. The two samples were collected on May 1, 2017, and final Ra-226 analysis results were received from the lab on May 30, 2017. The results were as follows:

P1R1-13(R1)-0015-SOI-DIS-01 = 1.1 ± 0.1 pCi/g
P1R1-13(R2)-0015-SOI-DIS-01 = 2.1 ± 0.2 pCi/g

Because these results are less than the Ra-226 cleanup level, the Survey Unit passes Compliance Evaluation Criterion Number 3.

Data Applicable to Compliance Evaluation Criterion 4

FSS soil sample analysis results for U-nat and Pb-210 in surface soils are mapped in Figures 7 and 8 respectively, along with insets that provide summary statistics that describe corresponding data

distributions. In both cases, 100% of samples had concentrations below respective cleanup levels. This demonstrates that the Survey Unit passes Compliance Evaluation Criterion Number 4.

Data Applicable to Compliance Evaluation Criterion 5

None of the analytical laboratory data for U-nat or Pb-210 (Attachment 1) exceeded a value that is two times that of a corresponding cleanup level. For all results, the maximum reported concentration of 37.7 mg/kg U-nat (Figure 7) is below the cleanup level of 43 mg/kg, and the maximum reported concentration of 6.2 pCi/g (Figure 8) is below the cleanup level of 7.5 pCi/g. The Survey Unit passes Compliance Evaluation Criterion 5.

4.2 Exposed Bedrock Areas

Data Applicable to Compliance Evaluation Criterion 6

Final status gamma survey data for areas where identified/documented bedrock is exposed at the ground surface (exposed bedrock areas) are presented in Figure 9. Gamma survey data are saved as a separate gamma scan file (all FSS data are archived at Worthington-Miller Environmental offices in Fort Collins, CO). Compliance Evaluation Criterion 6 involves no spatial, quantitative or statistical evaluation, only documentation of gamma readings above exposed bedrock areas. As previously documented in Attachment 1 of the FSS Work Plan (ERG, 2016a and 2017a), areas of exposed bedrock have been delineated and documented consistent with Attachment S-3 of Appendix S. The survey unit passes Compliance Evaluation Criterion 6.

5. Summary of Comparisons with Compliance Evaluation Criteria

A table that summarizes the FSS results for the West Access Road relative to the Compliance Evaluation Criteria specified in Appendix S, and summarized in Table 1 of the FSS Work Plan (ERG, 2017a) is provided in this Section (Table 1).

Table 1: Data Evaluation Matrix for FSS of Class 1 Survey Unit P1-R1 (West Access Road)

No.	Compliance Evaluation Criterion for FSS [Appendix S, Section 4.2 (MWH, 2015 and 2016)]	Data Collected	Number of Samples or Coverage for the FSS Unit	Constituent	Gamma Cutoff Level[1]	ROD Cleanup Level[5]	ROD Cleanup Level Times Two[6]	Question	Answer	Conclusion
1	At least 95 percent of gamma readings across the survey unit must be less than or equal to the gamma cutoff level[3] in use at the time of the FSS. Gamma readings are used to predict Radium-226 concentrations.	Field Gamma Survey in µR/hr	100% gamma scan areal coverage	NA	27 µR/hr	NA	NA	Are 95% of the µR/hr gamma readings ≤ 27 µR/hr?	Y	Compliance Evaluation Criterion Met
2	At least 95 percent of predicted Ra-226 concentrations in surface materials based on gamma survey data and the gamma radiation/Radium-226 correlations (i.e., the respective regression equation in use at the time of the final status gamma survey) must be less than or equal to the ROD cleanup level (4.7 pCi/g Radium-226).	Field Gamma Survey in µR/hr	100% gamma scan areal coverage	Radium-226 (predicted value based on following equation): $y=0.39e^{0.07x}$ Where: X = gamma (µR/hr) Y = Radium-226 (pCi/g)[4]	NA	4.7 pCi/g Radium-226	NA	Are 95% of the predicted Radium-226 concentrations ≤ 4.7 pCi/g?	Y	Compliance Evaluation Criterion Met
3	All direct sampling results for Radium-226 must be ≤ the Radium-226 cleanup level.	Surface Material (Soil) Samples	75 samples, along with 2 additional samples from bottom of additional excavation at Location 13	Radium-226	NA	4.7 pCi/g Radium-226	NA	Are all analytical lab results for Radium-226 ≤ the cleanup level?	Y (Initially, one sample exceeded the cleanup level. Additional excavation and sampling was completed to verify compliance.)	Compliance Evaluation Criterion Met
4	At least 95 percent of the sample results for U-nat and Pb-210 in soil that are analyzed in the offsite laboratory must be less than or equal to respective ROD cleanup levels.	Surface Material (Soil) Samples	25 samples (33% of 75)	Uranium, Total (U-nat)	NA	43 mg/kg U-nat	NA	Are 24 samples ≤ 43 mg/kg?	Y	Compliance Evaluation Criterion Met
				Pb-210	NA	7.5 pCi/g Pb-210	NA	Are 24 samples ≤ 7.5 pCi/g?	Y	Compliance Evaluation Criterion Met

No.	Compliance Evaluation Criterion for FSS [Appendix S, Section 4.2 (MWH, 2015 and 2016)]	Data Collected	Number of Samples or Coverage for the FSS Unit	Constituent	Gamma Cutoff Level[1]	ROD Cleanup Level[5]	ROD Cleanup Level Times Two[6]	Question	Answer	Conclusion
5	No single individual surface material sampling result for any analytical parameter can exceed a secondary cleanup level of twice the respective ROD cleanup level.	Surface Material (Soil) Samples	[same data set as collected for Numbers 3 and 4]	U-nat	NA	NA	86 mg/kg U-nat	Are 25 sample concentrations ≤ 86 mg/kg?	Y	Compliance Evaluation Criterion Met
				Pb-210	NA	NA	15 pCi/g Pb-210	Are 25 sample concentrations ≤ 15.0 pCi/g?	Y	Compliance Evaluation Criterion Met
6	Exposed bedrock will not be evaluated in a context of compliance with ROD cleanup levels, but gamma scans must be conducted to document gamma readings.	Field Gamma Survey in µR/hr	100% gamma scan areal coverage	NA	None[2]	NA	NA	Has a separate gamma scan survey been performed over the exposed areas of bedrock and saved as a separate gamma scan file? Have areas of exposed bedrock been delineated and documented consistent with Attachment S-3 of Appendix S?	Y	Compliance Evaluation Criterion Met
Compliance Evaluation Criteria 1 through 5 are Met for Surface Materials									Y	Compliance Evaluation Criteria Met Surface Material in Survey Unit is in Compliance with ROD Cleanup Levels. No further excavation required.
Compliance Evaluation Criterion 6 is Met for Exposed Bedrock									Y	Exposed Bedrock in Survey Unit has been documented consistent with Appendix S, Attachment 3. No further excavation required.

NA = Not Applicable

1. Gamma cutoff level from *Report: Gamma Radiation/Radium-226 Correlation and Gamma Cutoff Levels for Remedial Action*. Revision 1. September 2, 2016. ERG for Dawn Mining Company.
2. As indicated in Appendix S (*Section 4.2.3.1*), the gamma cutoff level does not apply in areas excavated to bedrock that exceeds the gamma cutoff due to natural geologic characteristics.
3. Gamma cutoff levels are referred to in Appendix S as gamma cutoff values.
4. x = µR/hr from field measurement, y = predicted concentration of Radium-226 in pCi/g. Equation is from Figure 4 in *Report: Gamma Radiation/Radium-226 Correlation and Gamma Cutoff Levels for Remedial Action*. Revision 1. September 2, 2016. ERG for Dawn Mining Company.
5. U.S. Environmental Protection Agency (EPA). 2006. Midnite Mine Superfund Site, Spokane Indian Reservation, Washington, Record of Decision. Office of Environmental Cleanup. EPA Region 10. September.
6. Appendix S (4.2.3)

6. Quality Assurance / Quality Control

Quality assurance (QA) includes qualitative aspects of program planning and operational management that are necessary to ensure an appropriate overall analytical design and proper implementation of planned methods and procedures. Quality control (QC) includes quantitative measures to monitor analytical method performance and to allow respective estimation of data uncertainty (accuracy and precision). The FSS of the West Access Road included the following QA/QC program elements as specified in the quality assurance project plan (QAPP) for Appendix S (Attachment S-2) of the RA Work Plan (MWH, 2016):

Final Status Survey QA Summary:

- The gamma survey, surface material sampling, and supporting measurements and laboratory analyses were subject to the data QA/QC program outlined in the QAPP, and the organizational structure defined therein was observed for FSS implementation.
- Applicable standard operating procedures (SOPs) provided in the QAPP were followed, including:
    - AS-SOP 1 (Decontamination for Field Sampling)
    - AS-SOP 2 (Surface Material and Sediment Sampling)
    - AS-SOP 3 (Onsite Sample Processing)[7]
    - AS-SOP 6 (Gamma surveys)
- All personnel involved in the oversight, management and implementation of the FSS were qualified by education, training and experience to perform these functions.
- The DQO process was used to develop the analytical approaches necessary to produce environmental data of the type, quantity and quality necessary to reliably support correct decisions regarding compliance with Compliance Evaluation Criteria. DQO statements are provided in the QAPP.
- The radioanalytical approaches and methodologies used for the FSS are consistent with relevant regulatory guidance (e.g. MARSSIM) and their effectiveness is supported by published results in peer-reviewed scientific journals.
- Detailed notes were kept in a field logbook to document daily activities and any relevant observations regarding environmental or equipment related conditions that could affect FSS data.
- The offsite laboratory used to analyze surface material samples (Inter-Mountain Labs, Sheridan, Wyoming) is fully qualified and appropriately accredited for analysis of the constituents specified in

[7] The onsite soil analysis laboratory was not operational at the time of the FSS and thus, all samples were sent to an approved offsite laboratory for analysis. However, AS-SOP 3 includes applicable instruction on chain-of-custody requirements that were followed.

Appendix S of the RA Work Plan in terms of cleanup levels for surface materials. Inter-Mountain Labs meets the QA/QC criteria specified in the QAPP for offsite laboratory analysis of samples.

- Chain-of-custody protocols specified in the QAPP were followed for sample shipping and offsite laboratory analysis. Copies of chain-of-custody forms are included with the data report from the offsite lab.
- FSS data were reviewed and verified/validated by qualified personnel as defined in the QAPP, including the Field Program Director (Randy Whicker, ERG) and Project Quality Assurance Manager (Jill Richards, WME), prior to data analysis and inclusion of results in this FSS Report. Although analytical results for Pb-210 in two soil samples were qualified due to reported results falling below the detection limit, this does not change the conclusions of the FSS.

Final Status Survey QC Summary:

- Gamma survey instrumentation used for the FSS (Ludlum Model 44-10 NaI-based scintillometer, coupled with a Ludlum Model 2350-1 ratemeter) was calibrated by the manufacturer within one year prior to use for the FSS of Survey Unit P1-R1. Calibration results were within ± 5% or less of known exposure rate reference readings from a Cs-137 calibration source (the manufacturer's tolerance limit for acceptable response is ± 10%). Applicable calibration certificates are provided in Attachment 3.
- QC measurements were performed for gamma survey instrumentation to verify proper function and help quantify measurement precision and data reproducibility. QC charts for static background, a Cs-137 check source, and along a previously established background field strip near the West Access Road gate are provided in Figure 10. The response to each of these QC measurement parameters for the detector/ratemeter pairing used for the two FSS gamma scans (ERG-3 and MFG-12) were within acceptable control limits on the day of each survey. Original control limits for static background and Cs-137 check source QC charts were established in the ERG soils lab near the West Access Road gate, and subsequent control limits were established the day of the second FSS gamma survey at a new control point within an Envirocon trailer.[8] For field strip QC measurements, previously established control limits for the QC chart were used for both FSS gamma scanning efforts. Because the field strip QC results on respective scan days were each within acceptable control limits, it is expected that wet ground conditions in Survey Unit P1-R1 during the second scanning effort did not significantly influence gamma survey results.
- Analysis of samples in the offsite soils lab included all QC protocols specified in the QAPP, including as applicable, analysis of laboratory control samples, matrix spikes, method blanks, replicate counting, and analysis of field duplicates. Details are provided in the Data Validation Report (Attachment 4). Based on these and other QC indicators, the analytical laboratory data were found to be usable for the data presentations and evaluations provided in this Interim FSS Report.

[8] The original indoor control point for daily static QC measurements with gamma survey instrumentation was inside of ERG's onsite soils lab trailer. A new static QC measurement control point for the second survey was necessary as the onsite soils lab was no longer operational or present onsite.

In summary, the QA/QC protocols required by the QAPP for Appendix S were followed, and respective QC metrics indicate that the data are of acceptable quality to meet the DQO's specified in the QAPP for Appendix S. This provides reasonable assurance that the likelihood of a Type I decision error (incorrectly determining that a survey unit meets applicable cleanup levels) is limited to 5% or less as intended by the design of the Analytical Support and Verification Plan (Appendix S).

In addition to conventional QA/QC documentation as provided above, final status gamma survey coverage was evaluated as indicated in the FSS Work Plan for Survey Unit P1-R1 (ERG, 2017a). Figures 11-13 show the FSS gamma scan data, with the symbol size for each data point set at approximately 3-meters diameter. A 3-meter spacing grid overlay is provided in these figures to aid with review of coverage. The only significant areas where the target coverage of 100% (a maximum of 3-meter spacing between adjacent measurements) was not achieved are along the edges of the Survey Unit boundaries due to very steep slopes that could not be safely scanned by field personnel. This is particularly true along the western edges of the Survey Unit, but also in portions of the eastern edges. Small gaps in target coverage occasionally occurred in central portions of the Survey Unit due to the presence of trees, vegetation and/or steep slopes. The kriged scan results shown in Figure 4 provide geostatistically interpolated coverage in the relatively small percentage of areas that were inaccessible to the walkover survey.

7. Conclusions

As documented in this report, the FSS of Survey Unit P1-R1 (West Access Road) provides the required analytical reporting of surface materials to demonstrate that the Compliance Evaluation Criteria as specified in Appendix S of the RA Work Plan (MWH, 2016) and the FSS Work Plan for this Survey Unit (ERG, 2017a) have been achieved. This includes areas excavated to bedrock refusal as documented in Attachment 1 to the FSS Work Plan for the West Access Road (ERG, 2017a). The QA/QC protocols required by the QAPP for Appendix S were followed, and respective QC metrics identify that the data are of acceptable quality to meet the DQO's specified in the QAPP. Remedial Action along the West Access Road has successfully achieved compliance with ROD cleanup levels for surface materials within Survey Unit P1-R1.

Upon EPA approval of this FSS report, the West Access Road Survey Unit will be regraded and revegetated in accordance with required plans and specifications.

8. References

Environmental Restoration Group, Inc. (ERG). 2016a. Final Status Survey Work Plan, West Access Road. Midnite Mine Superfund Site, Stevens County, WA. Revision 2. November 3, 2016.

Environmental Restoration Group, Inc. (ERG). 2016b. Gamma Radiation / Radium-226 Correlation and Gamma Cutoff Levels for Remedial Action. Midnite Mine, Stevens County, WA. Revision 1. September 2, 2016.

Environmental Restoration Group, Inc. (ERG). 2017a. Final Status Survey Work Plan, West Access Road. Midnite Mine Superfund Site, Stevens County, WA. Revision 3. May 9, 2017.

Environmental Restoration Group, Inc. (ERG). 2017b. Supplemental sampling at West Access Road FSS sampling Location 13 (Survey Unit P1-R1). Technical Memorandum dated April 3, 2017.

MWH Americas, Inc. (MWH). 2015. Midnite Mine Superfund Site 100 Percent Design Basis of Design Report. Revised October 2015.

MWH Americas, Inc. (MWH). 2016. Midnite Mine Superfund Site Remedial Action Work Plan. Revision 4. April 2016.

FIGURES

Figure 1: Class 1 Survey Unit P1-R1 (West Access Road) with insert of aerial imagery taken after completion of remedial excavations.

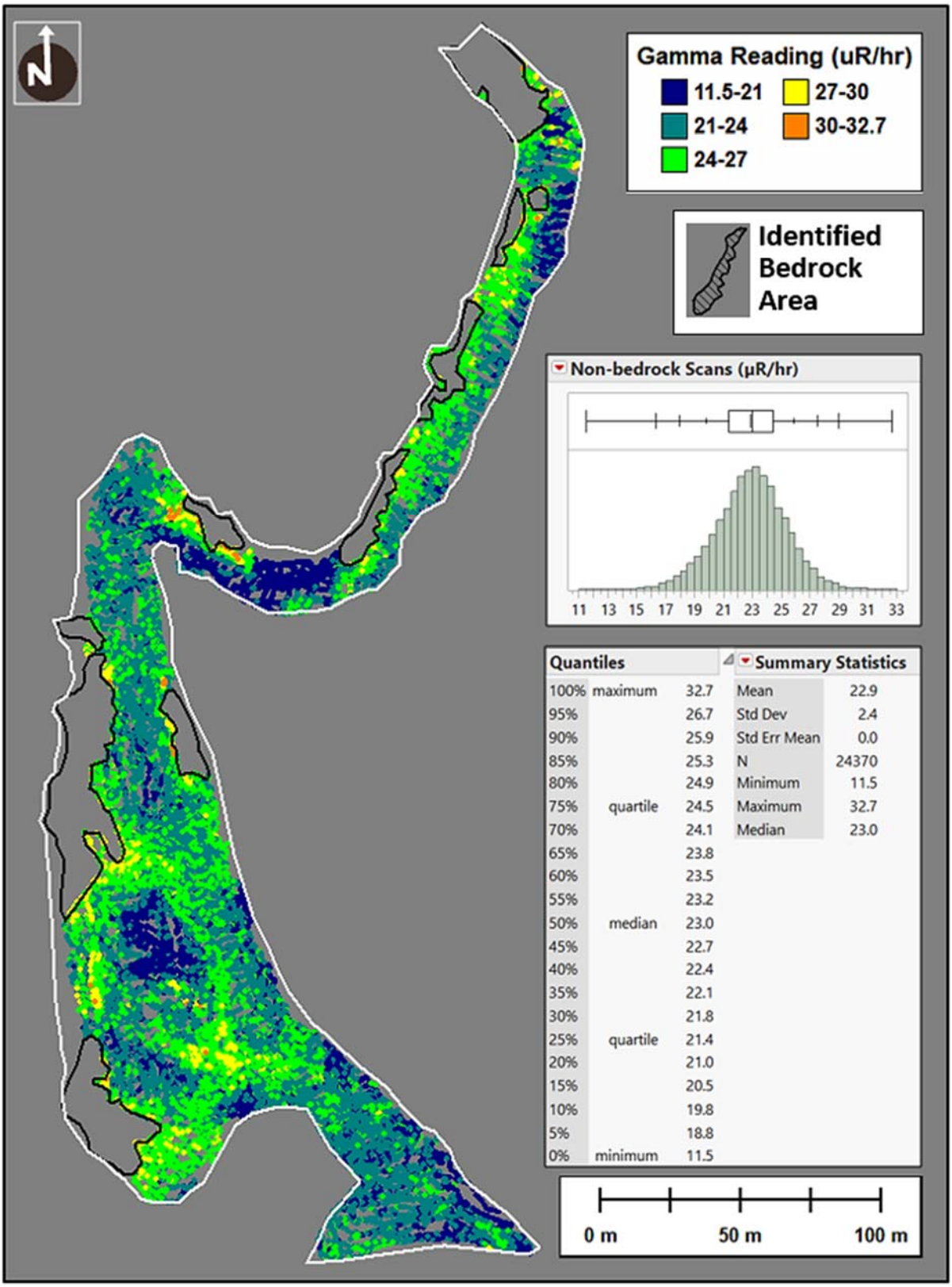


Figure 2: Final status gamma survey data for non-bedrock areas within the West Access Road Survey Unit. Gamma cutoff level = 27 µR/hr.

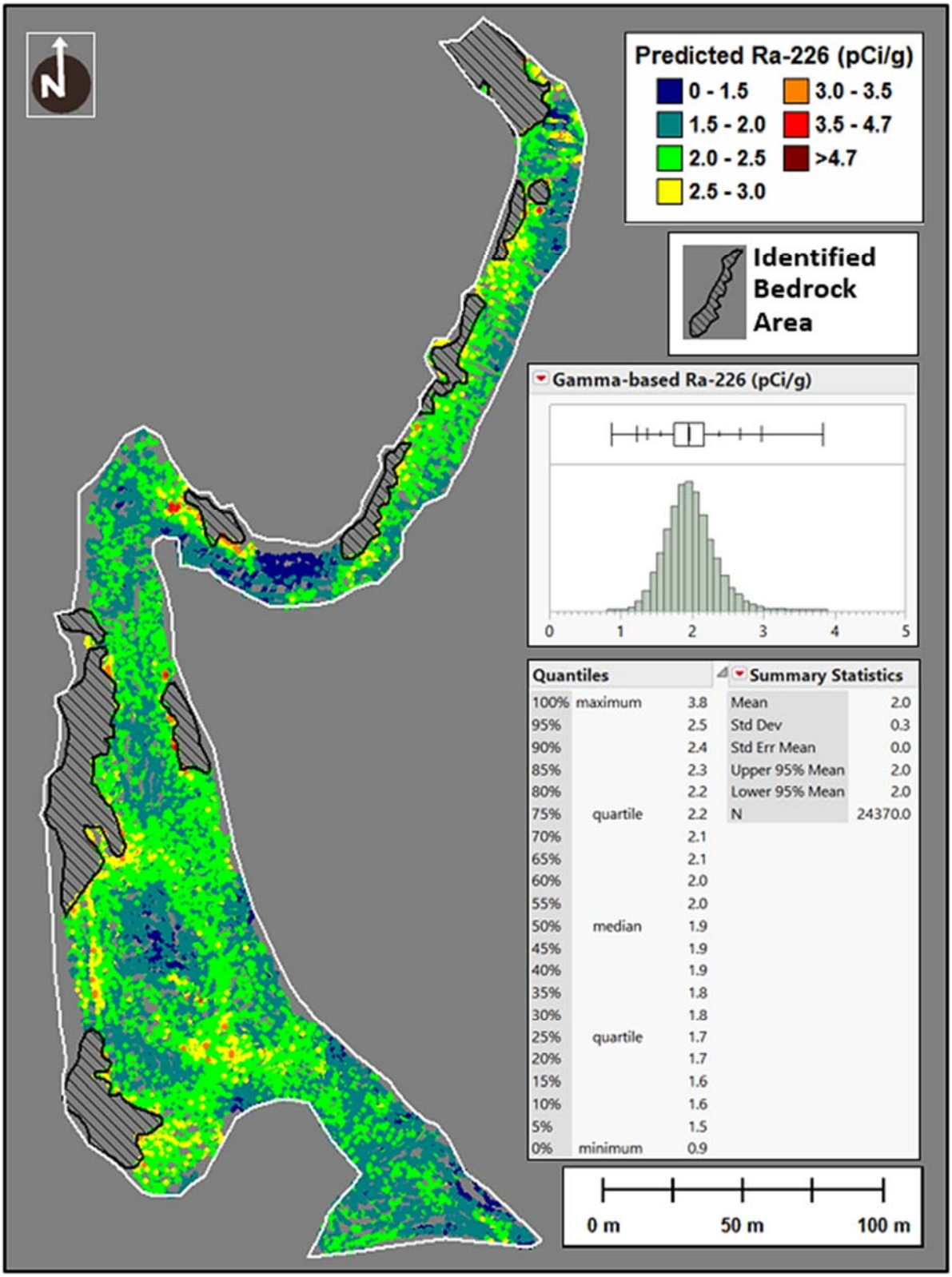


Figure 3: FSS predictions of Ra-226 concentrations based on gamma survey data for non-bedrock areas within the West Access Road Survey Unit. Cleanup level for Ra-226 = 4.7 pCi/g.

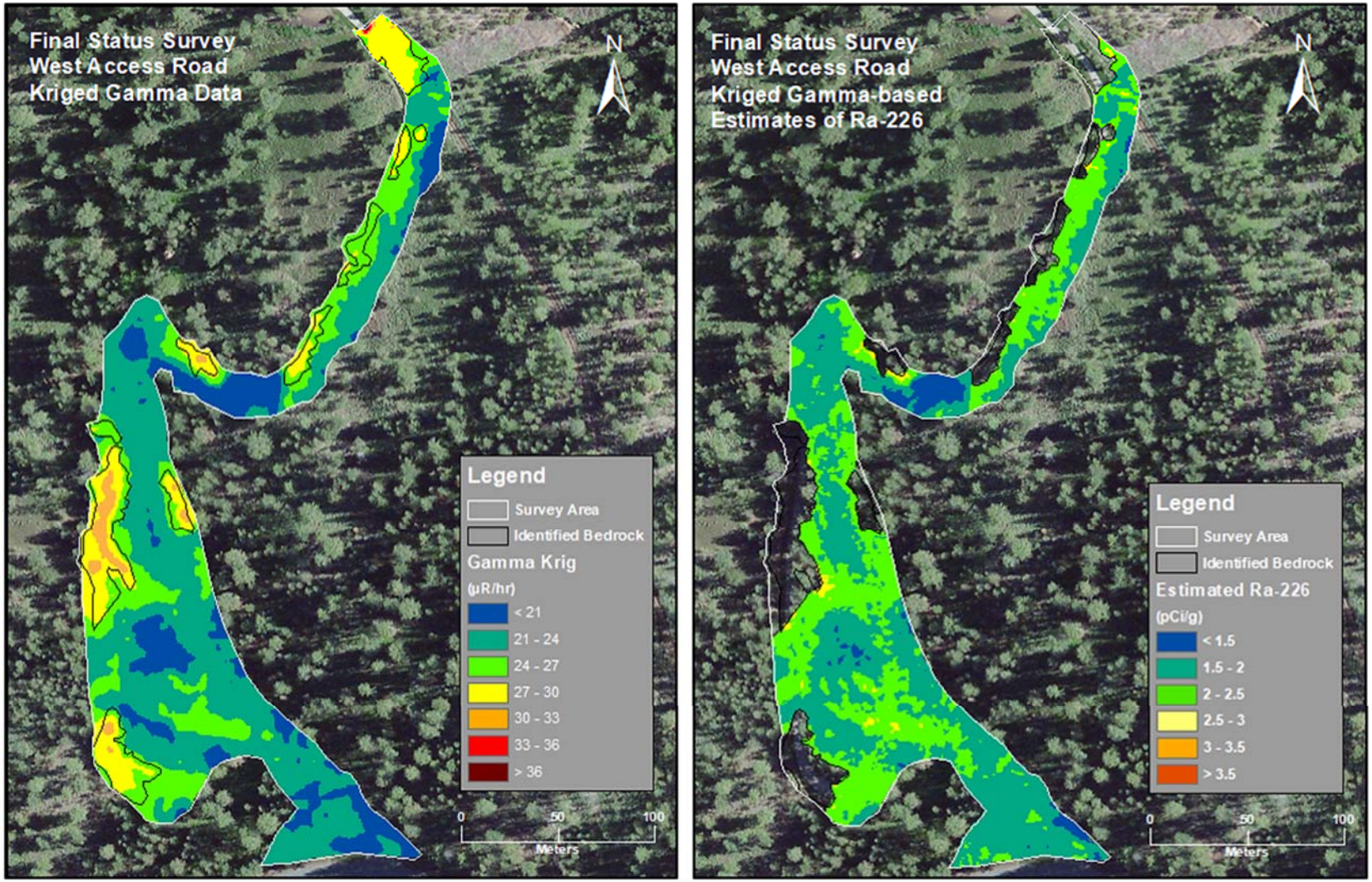


Figure 4: Kriged Renderings of FSS Gamma Scan Data: Gamma Radiation (left); Gamma-based predictions of Ra-226 in surface soils (right).

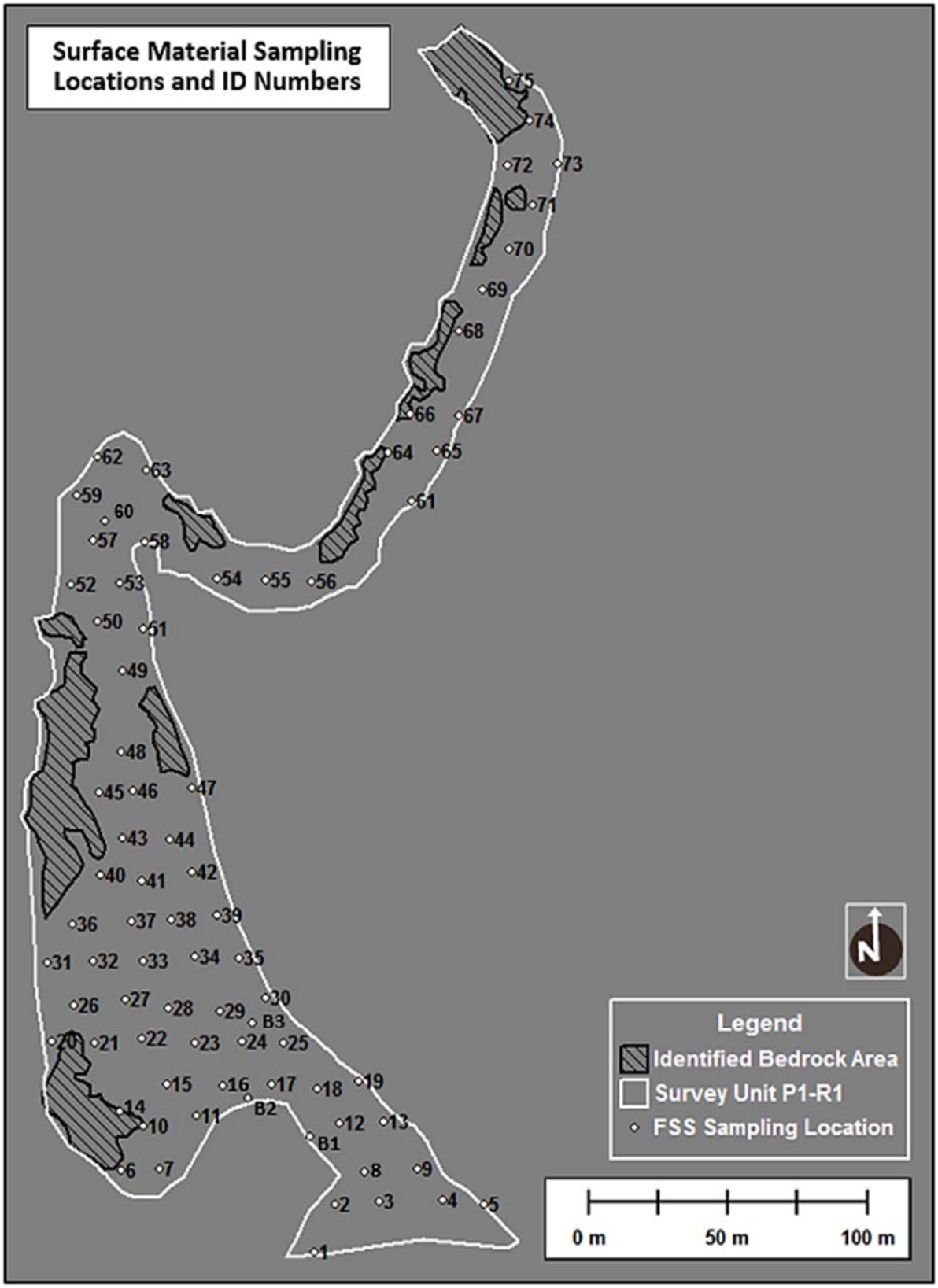
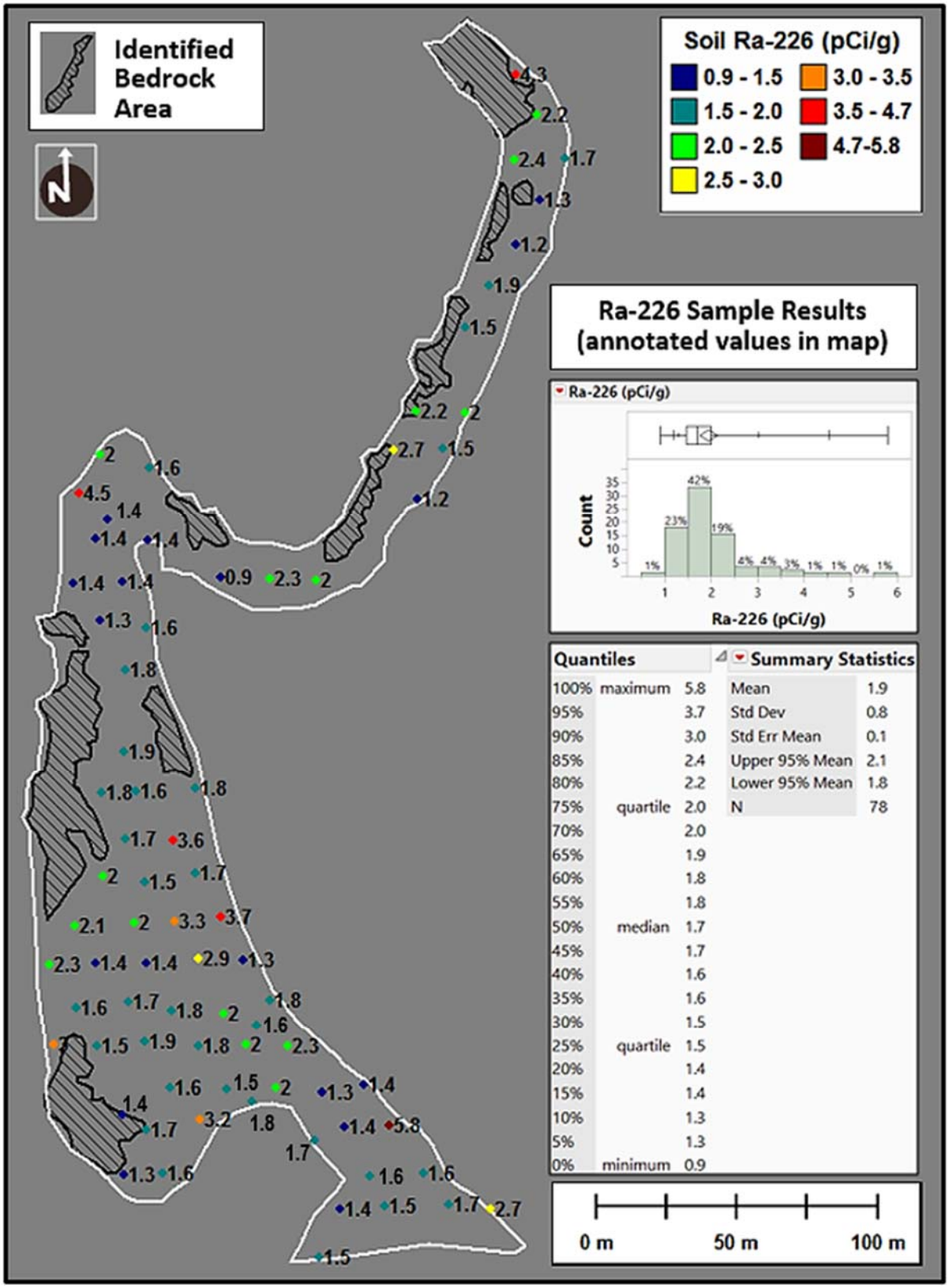


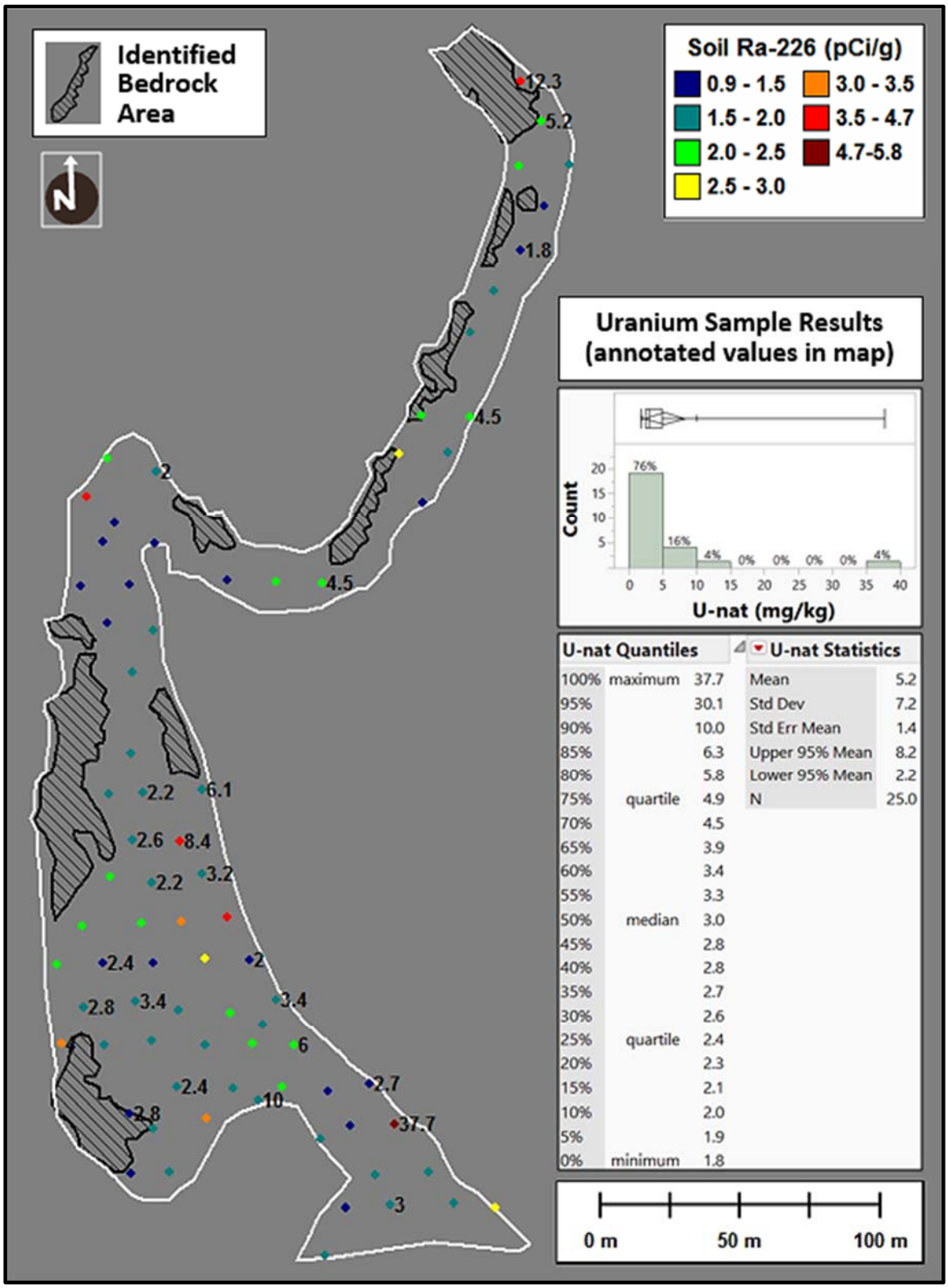
Figure 5: FSS sampling locations and respective ID numbers for surface materials within the West Access Road Survey Unit.



Quantiles		
100%	maximum	5.8
95%		3.7
90%		3.0
85%		2.4
80%		2.2
75%	quartile	2.0
70%		2.0
65%		1.9
60%		1.8
55%		1.8
50%	median	1.7
45%		1.7
40%		1.6
35%		1.6
30%		1.5
25%	quartile	1.5
20%		1.4
15%		1.4
10%		1.3
5%		1.3
0%	minimum	0.9

Summary Statistics	
Mean	1.9
Std Dev	0.8
Std Err Mean	0.1
Upper 95% Mean	2.1
Lower 95% Mean	1.8
N	78

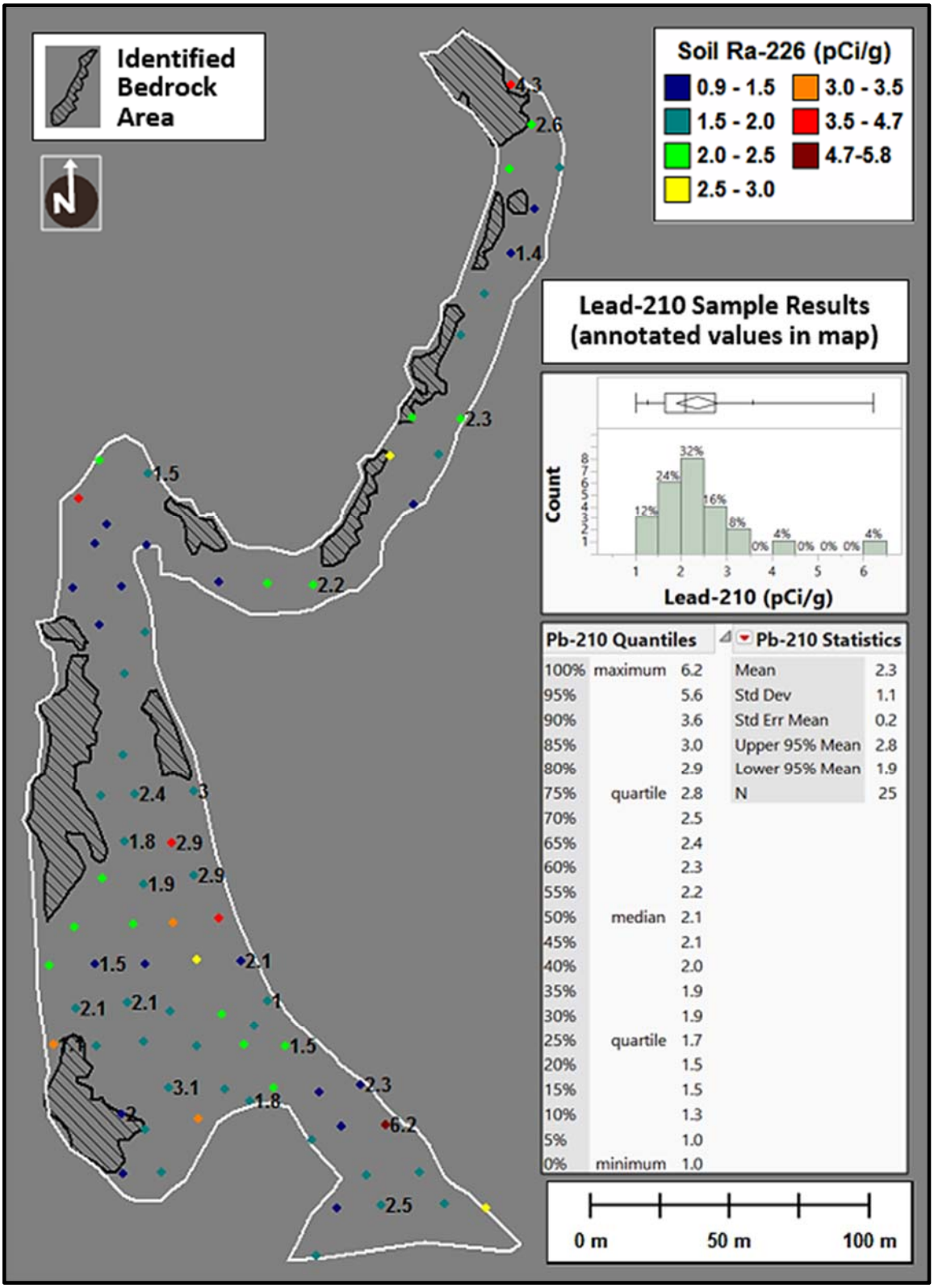
Figure 6: Map of color-coded and annotated sampling results for Ra-226 across the West Access Road Survey Unit, along with corresponding descriptive statistics. Cleanup level for Ra-226 = 4.7 pCi/g.



U-nat Quantiles		
100%	maximum	37.7
95%		30.1
90%		10.0
85%		6.3
80%		5.8
75%	quartile	4.9
70%		4.5
65%		3.9
60%		3.4
55%		3.3
50%	median	3.0
45%		2.8
40%		2.8
35%		2.7
30%		2.6
25%	quartile	2.4
20%		2.3
15%		2.1
10%		2.0
5%		1.9
0%	minimum	1.8

U-nat Statistics	
Mean	5.2
Std Dev	7.2
Std Err Mean	1.4
Upper 95% Mean	8.2
Lower 95% Mean	2.2
N	25.0

Figure 7: Map of annotated sampling results for natural uranium (U-nat, mg/kg) across Survey Unit P1-R1 and corresponding descriptive statistics. Also shown are color-coded results for Ra-226. Cleanup level for U-nat = 43 mg/kg.



Pb-210 Quantiles		
100%	maximum	6.2
95%		5.6
90%		3.6
85%		3.0
80%		2.9
75%	quartile	2.8
70%		2.5
65%		2.4
60%		2.3
55%		2.2
50%	median	2.1
45%		2.1
40%		2.0
35%		1.9
30%		1.9
25%	quartile	1.7
20%		1.5
15%		1.5
10%		1.3
5%		1.0
0%	minimum	1.0

Pb-210 Statistics	
Mean	2.3
Std Dev	1.1
Std Err Mean	0.2
Upper 95% Mean	2.8
Lower 95% Mean	1.9
N	25

Figure 8: Map of annotated sampling results for lead-210 (Pb-210, mg/kg) across Survey Unit P1-R1 and corresponding descriptive statistics. Color-coded sampling results for Ra-226 across Survey Unit P1-R1 are also shown. Cleanup level for Pb-210 = 7.5 pCi/g.

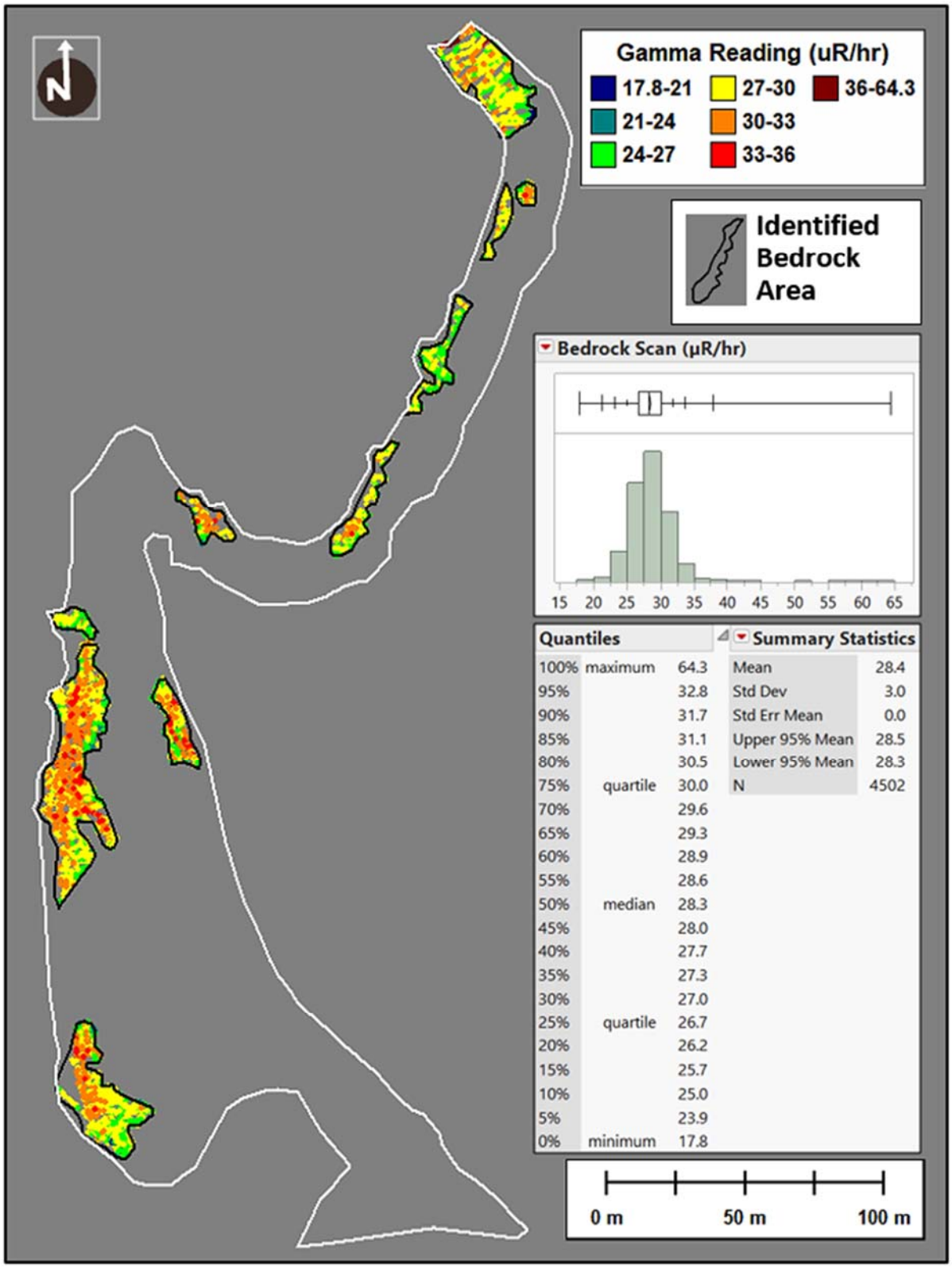


Figure 9: Final status gamma survey data for exposed bedrock areas within the West Access Road Survey Unit.

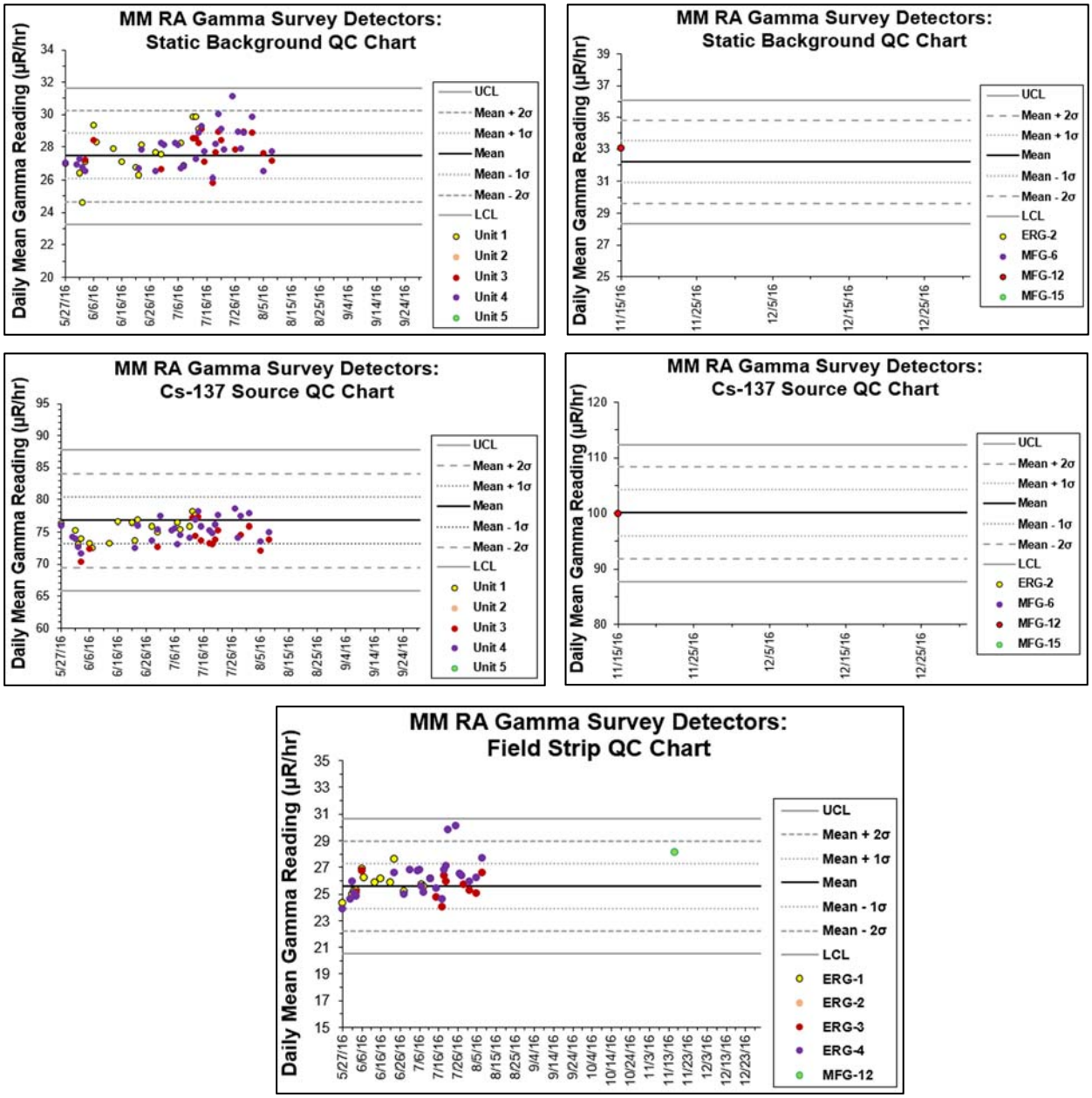


Figure 10: Quality control charts applicable to the instrumentation used for the Final status gamma surveys of the West Access Road Survey Unit, including static background at the control points in the ERG soils lab (top left) and Envirocon trailer (top right), Cs-137 source check at the control points (middle left and right), and background along the originally established QC field strip near the West Access Road gate, just outside the ERG soils lab (bottom). The detector used for the August 8, 2016 FSS gamma scanning was ERG-3, and MFG-12 was used for the November 16, 2016 FSS gamma scanning (multiple detectors were used to establish all control limits in accordance with Appendix S).

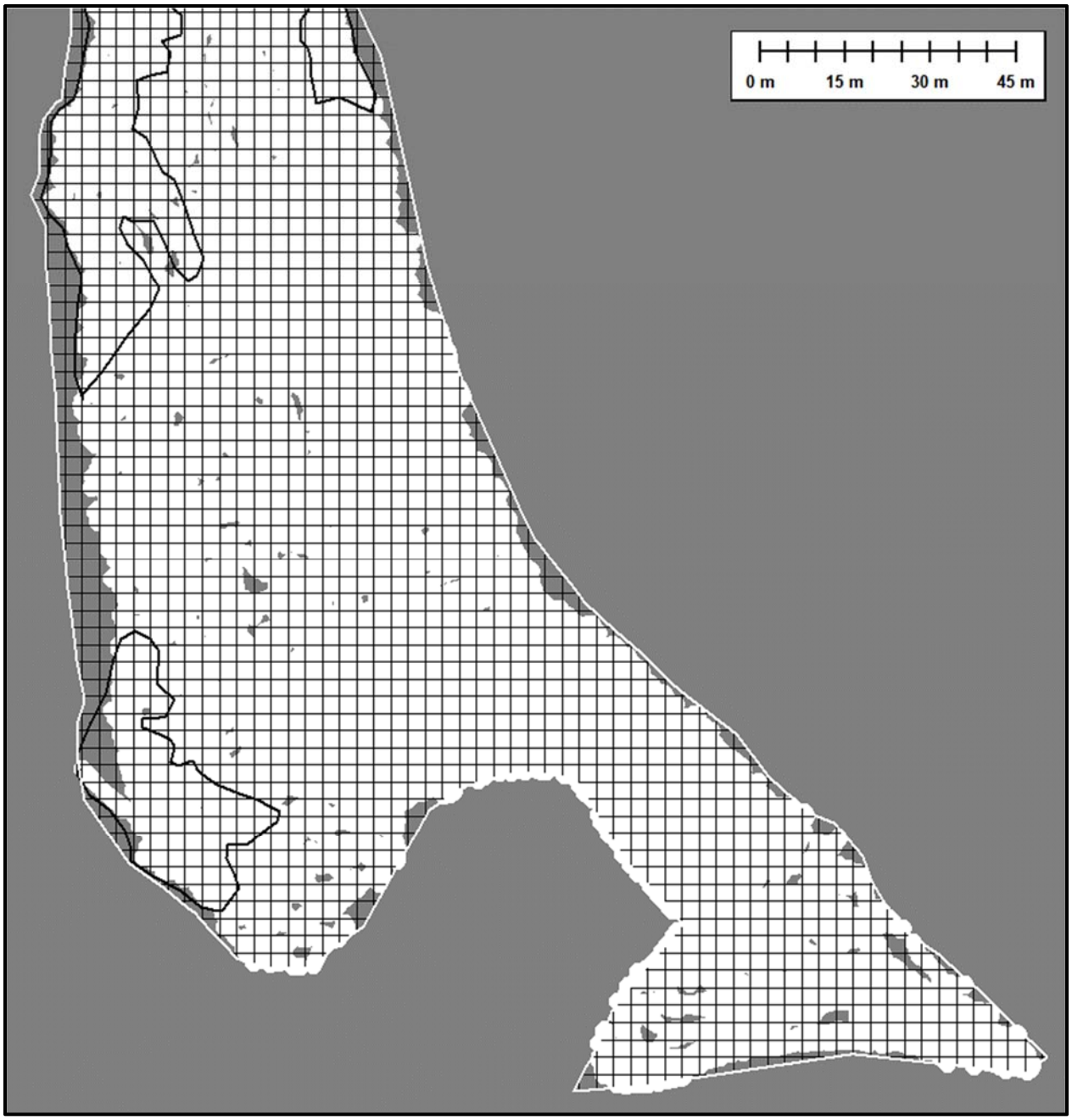


Figure 11: Gamma scan coverage map for the southern portion of Survey Unit P1-R1, with each measurement symbol sized at approximately 3-meters diameter based on a fishnet transect grid overlay of exactly 3-meter spacing.

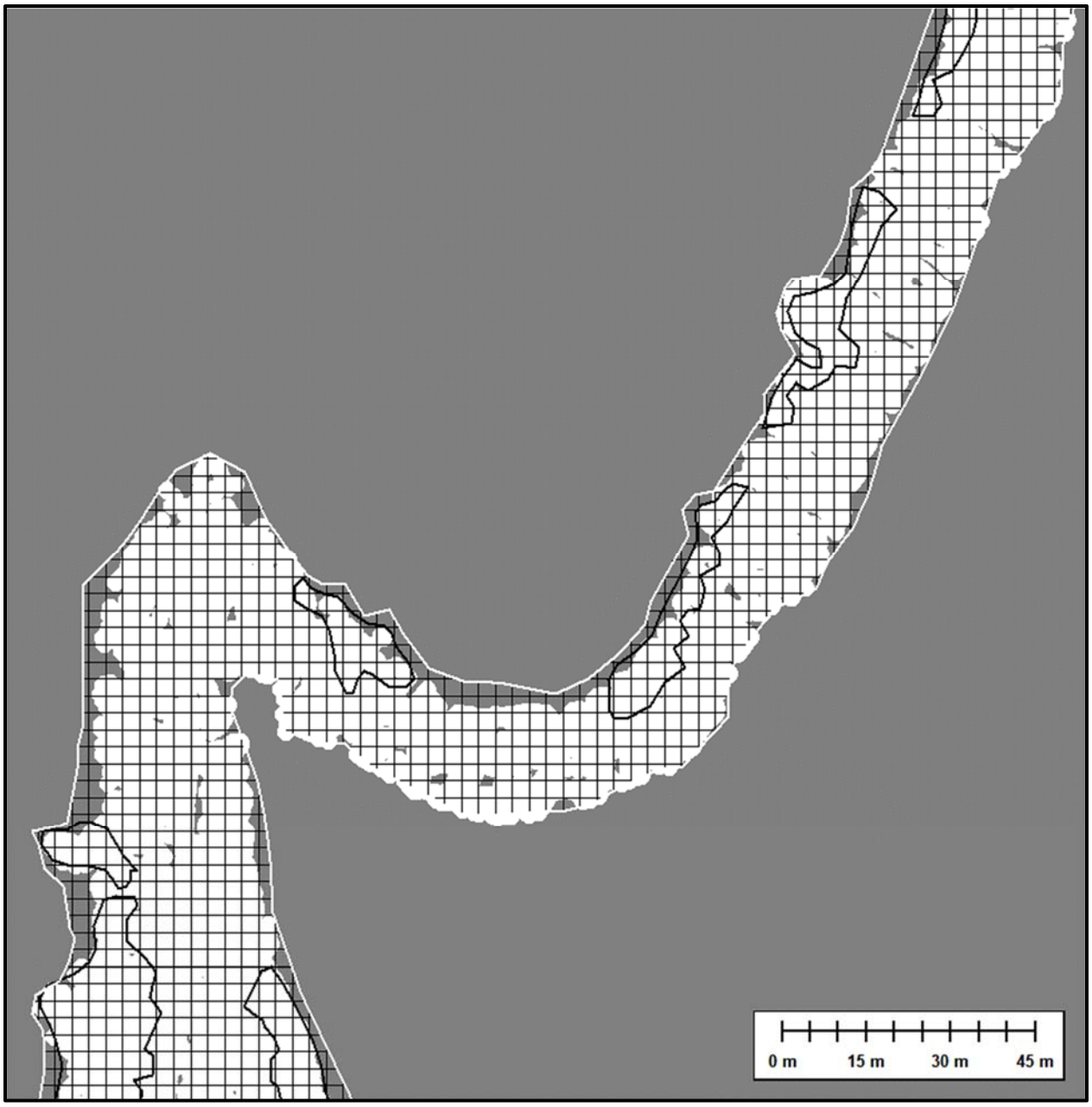


Figure 12: Gamma scan coverage map for the middle section of Survey Unit P1-R1, with each measurement symbol sized at approximately 3-meters diameter based on a fishnet transect grid overlay of exactly 3-meter spacing.

Figure 13: Gamma scan coverage map for the northern portion of Survey Unit P1-R1, with each measurement symbol sized at approximately 3-meters diameter based on a fishnet transect grid overlay of exactly 3-meter spacing.

Attachment 1 – Table of Analytical Results

Sample ID	Sample Date	Latitude	Longitude	Ra-226 Result (pCi/g)			U-nat Result (mg/kg)		Lead-210 Result (pCi/g)		
				Lab Result	Precision (±)	Reporting Level	Lab Result	Reporting Level	Lab Result	Precision (±)	Reporting Level
P1R1-1-0015-SOI-DIS-01	11/16/16	47.92954	118.10010	1.5	0.2	0.2					
P1R1-2-0015-SOI-DIS-01	11/16/16	47.92969	118.09999	1.4	0.2	0.2					
P1R1-3-0015-SOI-DIS-01	11/16/16	47.92969	118.09978	1.5	0.2	0.2	2.95	0.05	2.5	0.5	1.35
P1R1-3-0015-SOI-DIS-02	11/16/16	"	"	1.3	0.2	0.2					
P1R1-4-0015-SOI-DIS-01	11/16/16	47.92969	118.09948	1.7	0.2	0.2					
P1R1-5-0015-SOI-DIS-01	11/16/16	47.92967	118.09928	2.7	0.3	0.2					
P1R1-6-0015-SOI-DIS-01	11/16/16	47.92982	-118.10101	1.3	0.2	0.2					
P1R1-7-0015-SOI-DIS-01	11/16/16	47.92982	118.10083	1.6	0.2	0.2					
P1R1-8-0015-SOI-DIS-01	11/16/16	47.92979	118.09985	1.6	0.2	0.2	2.82	0.05	1.9	0.5	1.35
P1R1-9-0015-SOI-DIS-01	11/16/16	47.92979	118.09959	1.6	0.2	0.2					
P1R1-10-0015-SOI-DIS-01	11/16/16	47.92996	118.10090	1.7	0.2	0.2					
P1R1-11-0015-SOI-DIS-01	11/16/16	47.92999	118.10064	3.2	0.3	0.2					
P1R1-12-0015-SOI-DIS-01	11/16/16	47.92995	118.09996	1.4	0.2	0.2					
P1R1-13-0015-SOI-DIS-01	11/16/16	47.92995	118.09975	5.8	0.3	0.2	37.7	0.05	6.2	0.6	1.35
P1R1-14-0015-SOI-DIS-01	11/16/16	47.93001	118.10101	1.4	0.2	0.2	2.77	0.05	2.0	0.5	1.35
P1R1-15-0015-SOI-DIS-01	11/16/16	47.93009	118.10078	1.6	0.2	0.2	2.43	0.05	3.1	0.5	1.35
P1R1-16-0015-SOI-DIS-01	11/16/16	47.93008	118.10051	1.5	0.2	0.2					
P1R1-17-0015-SOI-DIS-01	11/16/16	47.93008	118.10028	2.0	0.2	0.2					
P1R1-18-0015-SOI-DIS-01	11/16/16	47.93006	118.10006	1.3	0.2	0.2					
P1R1-19-0015-SOI-DIS-01	11/16/16	47.93008	118.09986	1.4	0.2	0.2	2.67	0.05	2.3	0.4	1.35
P1R1-20-0015-SOI-DIS-01	11/17/16	47.93024	118.10132	3.0	0.3	0.2	3.95	0.05	1.1	0.3	1.35
P1R1-20-0015-SOI-DIS-02	11/17/16	"	"	2.8	0.2	0.2	4.53	0.05	1.7	0.3	1.35
P1R1-21-0015-SOI-DIS-01	11/17/16	47.93023	118.10112	1.5	0.2	0.2					
P1R1-22-0015-SOI-DIS-01	11/17/16	47.93024	118.10089	1.9	0.2	0.2					
P1R1-23-0015-SOI-DIS-01	11/17/16	47.93022	118.10064	1.8	0.2	0.2					
P1R1-24-0015-SOI-DIS-01	11/17/16	47.93022	118.10041	2.0	0.2	0.2					
P1R1-25-0015-SOI-DIS-01	11/17/16	47.93021	118.10021	2.3	0.2	0.2	6.00	0.05	1.5	0.4	1.35

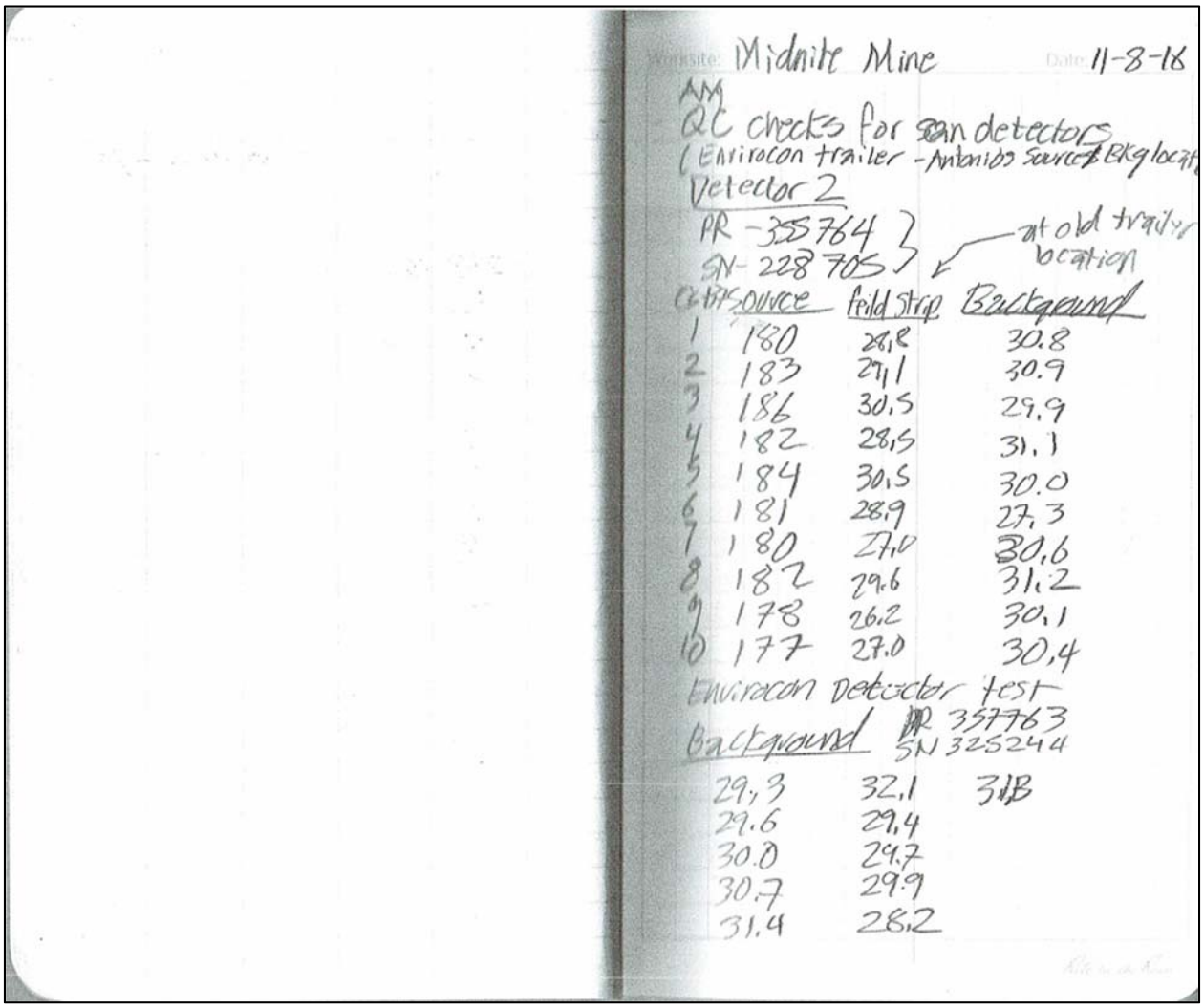
Sample ID	Sample Date	Latitude	Longitude	Ra-226 Result (pCi/g)			U-nat Result (mg/kg)		Lead-210 Result (pCi/g)		
				Lab Result	Precision (±)	Reporting Level	Lab Result	Reporting Level	Lab Result	Precision (±)	Reporting Level
P1R1-26-0015-SOI-DIS-01	11/17/16	47.93036	118.10121	1.6	0.2	0.2	2.77	0.05	2.1	0.4	1.35
P1R1-27-0015-SOI-DIS-01	11/17/16	47.93037	118.10096	1.7	0.2	0.2	3.39	0.05	2.1	0.4	1.35
P1R1-28-0015-SOI-DIS-01	11/17/16	47.93034	118.10076	1.8	0.2	0.2					
P1R1-29-0015-SOI-DIS-01	11/17/16	47.93032	118.10051	2.0	0.2	0.2					
P1R1-30-0015-SOI-DIS-01	11/16/16	47.93036	118.10029	1.8	0.2	0.2	3.36	0.05	1.0	0.4	1.35
P1R1-30-0015-SOI-DIS-02	11/16/16	"	"	2.0	0.2	0.2	2.76	0.05	1.7	0.6	1.35
P1R1-31-0015-SOI-DIS-01	11/17/16	47.93050	118.10133	2.3	0.2	0.2					
P1R1-32-0015-SOI-DIS-01	11/17/16	47.93050	118.10111	1.4	0.2	0.2	2.36	0.05	1.5	0.4	1.35
P1R1-33-0015-SOI-DIS-01	11/16/16	47.93049	118.10087	1.4	0.2	0.2					
P1R1-34-0015-SOI-DIS-01	11/16/16	47.93050	118.10062	2.9	0.2	0.2					
P1R1-35-0015-SOI-DIS-01	11/16/16	47.93049	118.10041	1.3	0.2	0.2	1.95	0.05	2.1	0.4	1.35
P1R1-36-0015-SOI-DIS-01	11/17/16	47.93062	118.10120	2.1	0.2	0.2					
P1R1-37-0015-SOI-DIS-01	11/16/16	47.93062	118.10092	2.0	0.2	0.2					
P1R1-38-0015-SOI-DIS-01	11/16/16	47.93062	118.10073	3.3	0.3	0.2					
P1R1-39-0015-SOI-DIS-01	11/16/16	47.93063	118.10051	3.7	0.3	0.2					
P1R1-40-0015-SOI-DIS-01	11/16/16	47.93077	118.10106	2.0	0.2	0.2					
P1R1-41-0015-SOI-DIS-01	11/16/16	47.93075	118.10086	1.5	0.2	0.2	2.23	0.05	1.9	0.4	1.35
P1R1-42-0015-SOI-DIS-01	11/16/16	47.93077	118.10062	1.7	0.2	0.2	3.23	0.05	2.9	1.0	1.35
P1R1-43-0015-SOI-DIS-01	11/16/16	47.93089	118.10095	1.7	0.2	0.2	2.60	0.05	1.8	0.5	1.35
P1R1-43-0015-SOI-DIS-02	11/16/16	"	"	1.8	0.2	0.2	2.94	0.05	2.4	0.8	1.35
P1R1-44-0015-SOI-DIS-01	11/16/16	47.93088	118.10072	3.6	0.3	0.2	8.41	0.05	2.9	0.6	1.35
P1R1-45-0015-SOI-DIS-01	11/16/16	47.93104	118.10105	1.8	0.2	0.2					
P1R1-46-0015-SOI-DIS-01	11/16/16	47.93104	118.10089	1.6	0.2	0.2	2.15	0.05	2.4	0.8	1.35
P1R1-46-0015-SOI-DIS-02	11/16/16	"	"	1.6	0.2	0.2	1.93	0.05	1.7	0.6	1.35
P1R1-47-0015-SOI-DIS-01	11/16/16	47.93104	118.10061	1.8	0.2	0.2	6.08	0.05	3.0	0.6	1.35
P1R1-48-0015-SOI-DIS-01	11/16/16	47.93117	118.10094	1.9	0.2	0.2					
P1R1-49-0015-SOI-DIS-01	11/17/16	47.93143	118.10092	1.8	0.2	0.2					

Sample ID	Sample Date	Latitude	Longitude	Ra-226 Result (pCi/g)			U-nat Result (mg/kg)		Lead-210 Result (pCi/g)		
				Lab Result	Precision (±)	Reporting Level	Lab Result	Reporting Level	Lab Result	Precision (±)	Reporting Level
P1R1-50-0015-SOI-DIS-01	11/17/16	47.93159	118.10103	1.3	0.1	0.2					
P1R1-51-0015-SOI-DIS-01	11/17/16	47.93156	118.10081	1.6	0.2	0.2					
P1R1-52-0015-SOI-DIS-01	11/17/16	47.93171	118.10115	1.4	0.2	0.2					
P1R1-53-0015-SOI-DIS-01	11/17/16	47.93171	118.10092	1.4	0.2	0.2					
P1R1-54-0015-SOI-DIS-01	11/17/16	47.93171	118.10045	0.9	0.1	0.2					
P1R1-55-0015-SOI-DIS-01	11/17/16	47.93170	118.10022	2.3	0.2	0.2					
P1R1-56-0015-SOI-DIS-01	11/17/16	47.93169	118.10000	2.0	0.2	0.2	4.53	0.05	2.2	0.4	1.35
P1R1-57-0015-SOI-DIS-01	11/17/16	47.93185	118.10104	1.4	0.2	0.2					
P1R1-58-0015-SOI-DIS-01	11/17/16	47.93184	118.10079	1.4	0.2	0.2					
P1R1-59-0015-SOI-DIS-01	11/17/16	47.93200	118.10111	4.5	0.3	0.2					
P1R1-60-0015-SOI-DIS-01	11/17/16	47.93191	118.10098	1.4	0.2	0.2					
P1R1-61-0015-SOI-DIS-01	11/17/16	47.93194	118.09951	1.2	0.2	0.2					
P1R1-62-0015-SOI-DIS-01	11/17/16	47.93212	118.10100	2.0	0.2	0.2					
P1R1-63-0015-SOI-DIS-01	11/17/16	47.93207	118.10077	1.6	0.2	0.2	1.95	0.05	1.5	0.6	1.35
P1R1-64-0015-SOI-DIS-01	11/17/16	47.93210	118.09961	2.7	0.2	0.2					
P1R1-65-0015-SOI-DIS-01	11/17/16	47.93210	118.09938	1.5	0.2	0.2					
P1R1-66-0015-SOI-DIS-01	11/17/16	47.93222	118.09950	2.2	0.2	0.2					
P1R1-67-0015-SOI-DIS-01	11/17/16	47.93221	118.09927	2.0	0.2	0.2	4.45	0.05	2.3	0.4	1.35
P1R1-68-0015-SOI-DIS-01	11/17/16	47.93248	118.09925	1.5	0.2	0.2					
P1R1-69-0015-SOI-DIS-01	11/17/16	47.93261	118.09913	1.9	0.2	0.2					
P1R1-70-0015-SOI-DIS-01	11/17/16	47.93274	118.09900	1.2	0.2	0.2	1.84	0.05	1.4	0.6	1.35
P1R1-71-0015-SOI-DIS-01	11/17/16	47.93288	118.09888	1.3	0.2	0.2					
P1R1-72-0015-SOI-DIS-01	11/17/16	47.93301	118.09899	2.4	0.2	0.2					
P1R1-73-0015-SOI-DIS-01	11/17/16	47.93301	118.09875	1.7	0.2	0.2					
P1R1-74-0015-SOI-DIS-01	11/17/16	47.93315	118.09888	2.2	0.2	0.2	5.20	0.05	2.6	0.5	1.35
P1R1-75-0015-SOI-DIS-01	11/17/16	47.93328	118.09897	4.3	0.3	0.2	12.3	0.05	4.3	0.6	1.35
P1R1-B1-0015-SOI-01	11/17/16	47.92991	118.10010	1.7	0.2	0.2					

Sample ID	Sample Date	Latitude	Longitude	Ra-226 Result (pCi/g)			U-nat Result (mg/kg)		Lead-210 Result (pCi/g)		
				Lab Result	Precision (±)	Reporting Level	Lab Result	Reporting Level	Lab Result	Precision (±)	Reporting Level
P1R1-B2-0015-SOI-01	11/17/16	47.93004	118.10039	1.8	0.2	0.2	9.98	0.05	1.8	0.3	1.35
P1R1-B3-0015-SOI-01	11/17/16	47.93028	118.10036	1.6	0.2	0.2					
Additional Samples at Location 13 after Hot Spot Removal											
P1R1-13(R1)-0015-SOI-DIS-01	5/1/17	47.92995	118.09975	1.1	0.1	0.2					
P1R1-13(R2)-0015-SOI-DIS-01	5/1/17	47.92995	118.09975	2.1	0.2	0.2					

Attachment 2 – Field Logbook Notes

Field Notes documented by Randy Whicker, ERG. Two Envirocon field staff assisted with sample collection (Isaiah Wynne and Monty Ford, Jr.). Initials of sampling personnel are shown in the logbook notes.



Worksite: Midnite Mine Date: 11-8-16

AM

QC checks for scan detectors

(Envirocon trailer - Antonios Source & Bkg locat

Detector 2

PR - 355764 }
SN - 228705 } at old trailer location

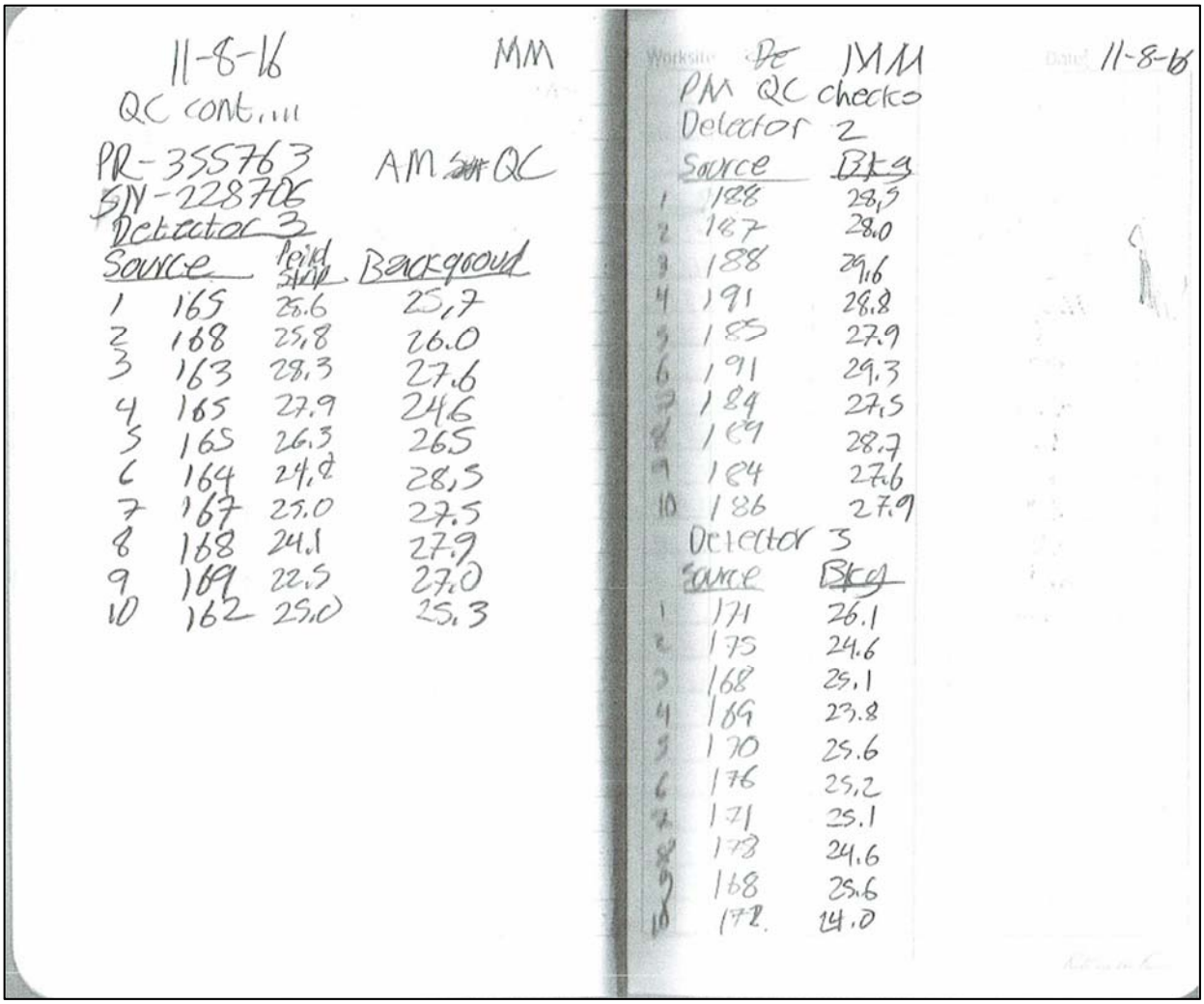
CL	Source	Feild Strip	Background
1	180	28.8	30.8
2	183	29.1	30.9
3	186	30.5	29.9
4	182	28.5	31.1
5	184	30.5	30.0
6	181	28.9	27.3
7	180	27.0	30.6
8	182	29.6	31.2
9	178	26.2	30.1
10	177	27.0	30.4

Envirocon Detector test

Background PR 357763 SN 325244

29.3	32.1	31.3
29.6	29.4	
30.0	29.7	
30.7	29.9	
31.4	28.2	

Field Notes documented by Randy Whicker, ERG. Two Envirocon field staff assisted with sample collection (Isaiah Wynne and Monty Ford, Jr.). Initials of sampling personnel are shown in the logbook notes.



11-8-16 MM

QC cont...

PR-355763 AM QC

SN-228706

Detector 3

Source	Peak	Background
1	165	25.6	25.7
2	168	25.8	26.0
3	163	28.3	27.6
4	165	27.9	24.6
5	165	26.3	26.5
6	164	24.2	28.5
7	167	25.0	27.5
8	168	24.1	27.9
9	169	22.5	27.0
10	162	25.0	25.3

Worksite Be MM Date 11-8-16

PM QC checks

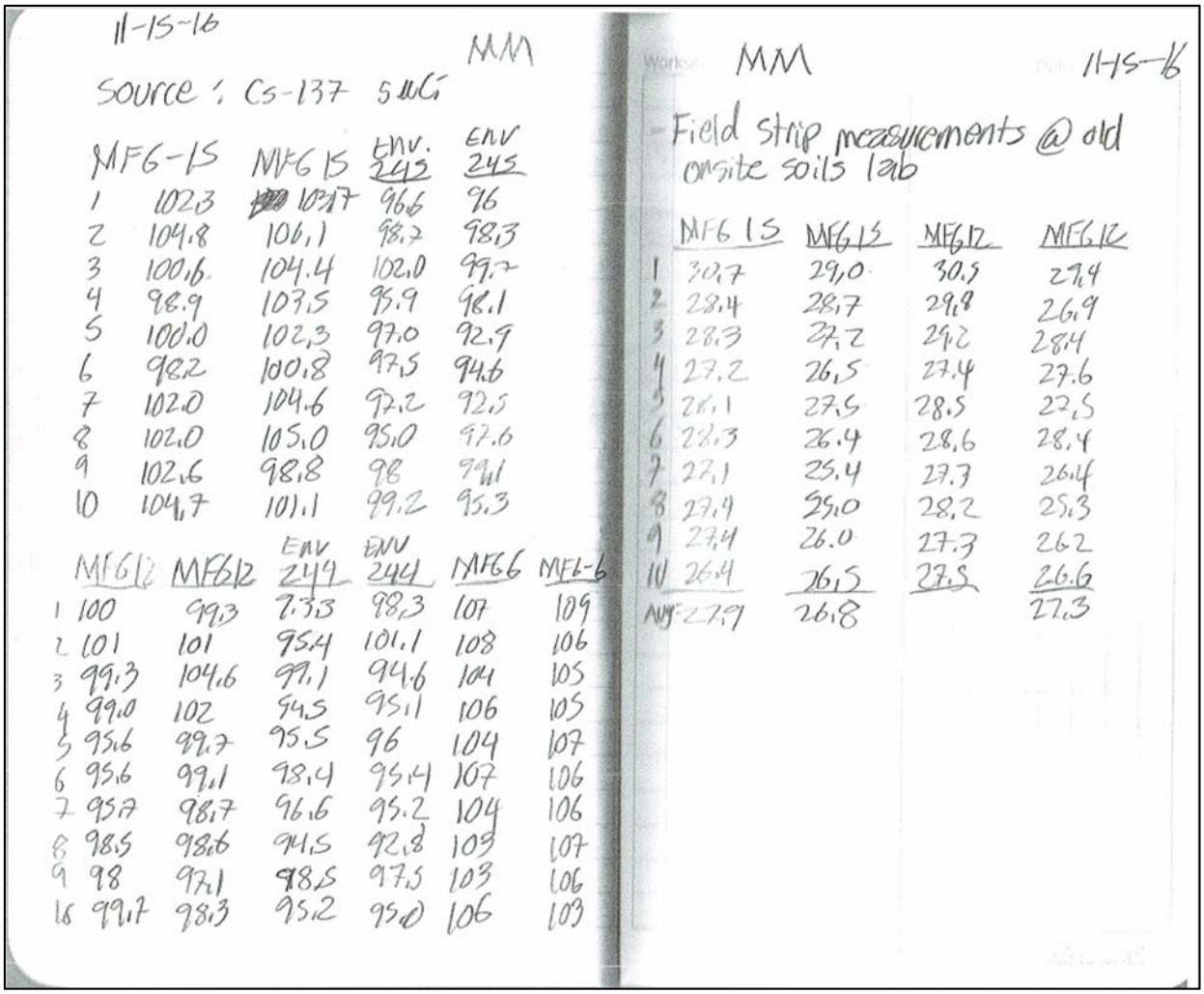
Detector 2

Source	Bkg
1	188	28.5
2	187	28.0
3	188	29.6
4	191	28.8
5	185	27.9
6	191	29.3
7	184	27.5
8	189	28.7
9	184	27.6
10	186	27.9

Detector 3

Source	Bkg
1	171	26.1
2	175	24.6
3	168	25.1
4	169	23.8
5	170	25.6
6	176	25.2
7	171	25.1
8	178	24.6
9	168	25.6
10	172	24.0

Field Notes documented by Randy Whicker, ERG. Two Envirocon field staff assisted with sample collection (Isaiah Wynne and Monty Ford, Jr.). Initials of sampling personnel are shown in the logbook notes.



11-15-16

MM

Source: Cs-137 5 uCi

	MFG-15	MFG 15	ENV. 245	ENV 245
1	102.3	102.7	96.6	96
2	104.8	106.1	98.7	98.3
3	100.6	104.4	102.0	99.7
4	98.9	103.5	95.9	98.1
5	100.0	102.3	97.0	92.9
6	98.2	100.8	97.5	94.6
7	102.0	104.6	97.2	92.5
8	102.0	105.0	95.0	97.6
9	102.6	98.8	98	99.1
10	104.7	101.1	99.2	95.3

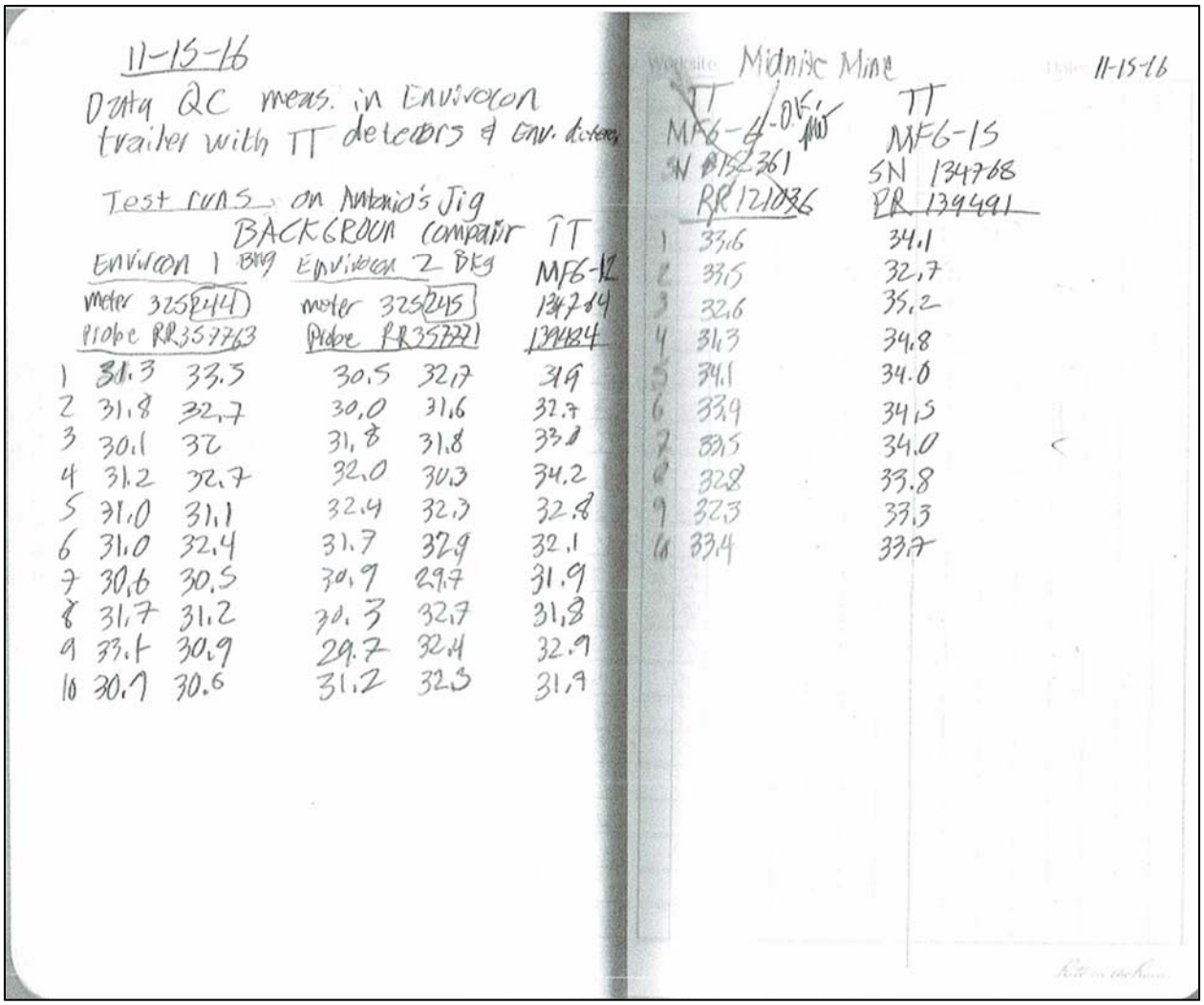
	MFG12	MFG12	ENV 244	ENV 244	MFG6	MFG-6
1	100	99.3	93.3	98.3	107	109
2	101	101	95.4	101.1	108	106
3	99.3	104.6	99.1	94.6	104	105
4	99.0	102	94.5	95.1	106	105
5	95.6	99.7	95.5	96	104	107
6	95.6	99.1	98.4	95.4	107	106
7	95.7	98.7	96.6	95.2	104	106
8	98.5	98.6	94.5	92.8	103	107
9	98	97.1	98.5	97.5	103	106
10	99.7	98.3	95.2	95.0	106	103

MM 11-15-16

Field strip measurements @ old onsite soils lab

	MFG 15	MFG15	MFG12	MFG12
1	30.7	29.0	30.5	27.4
2	28.4	28.7	29.8	26.9
3	28.3	27.2	29.2	28.4
4	27.2	26.5	27.4	27.6
5	28.1	27.5	28.5	27.5
6	28.3	26.4	28.6	28.4
7	27.1	25.4	27.3	26.4
8	27.4	25.0	28.2	25.3
9	27.4	26.0	27.3	26.2
10	26.4	26.5	27.5	26.6
Avg	27.9	26.8		27.3

Field Notes documented by Randy Whicker, ERG. Two Envirocon field staff assisted with sample collection (Isaiah Wynne and Monty Ford, Jr.). Initials of sampling personnel are shown in the logbook notes.



11-15-16

Data QC meas. in Envirocon trailer with TT detectors & Env. detectors

Test runs on Antonio's Jig

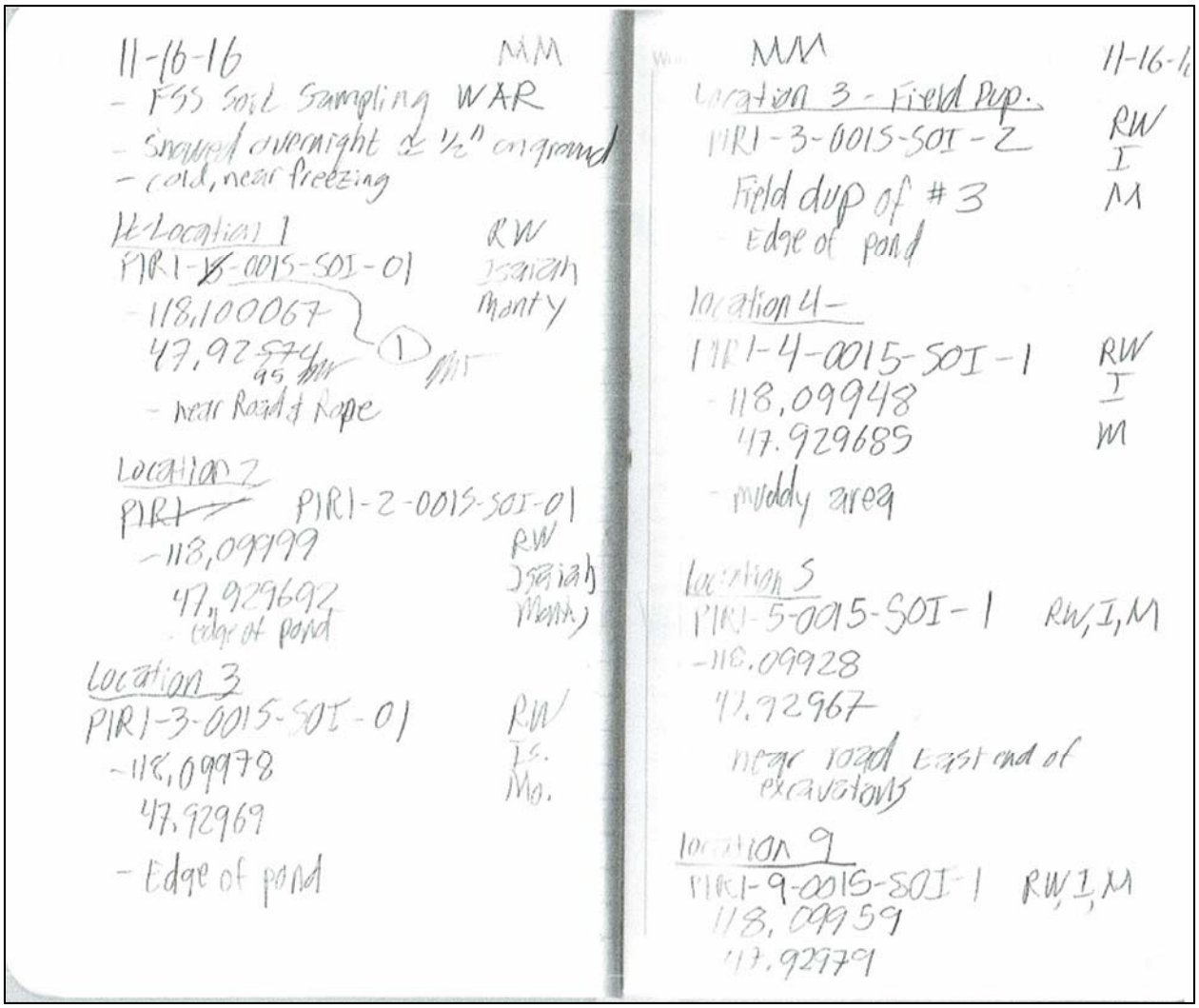
BACKGROUN compair TT

	Envirocon 1 Bkg		Envirocon 2 Bkg		TT MF6-12
	meter 325 244		meter 325 245		134784
	Probe RR357763		Probe RR357721		134184
1	31.3	33.5	30.5	32.7	31.9
2	31.8	32.7	30.0	31.6	32.7
3	30.1	32	31.8	31.8	33.0
4	31.2	32.7	32.0	30.3	34.2
5	31.0	31.1	32.4	32.3	32.8
6	31.0	32.4	31.7	32.9	32.1
7	30.6	30.5	30.9	29.7	31.9
8	31.7	31.2	30.3	32.7	31.8
9	33.1	30.9	29.7	32.4	32.9
10	30.7	30.6	31.2	32.3	31.9

Worksite: Midnite Mine Date: 11-15-16

	TT MF6-4 SN 152361 RR 121036	TT MF6-15 SN 134768 RR 139491
1	33.6	34.1
2	33.5	32.7
3	32.6	35.2
4	31.3	34.8
5	34.1	34.0
6	33.9	34.5
7	33.5	34.0
8	32.8	33.8
9	32.3	33.3
10	33.4	33.7

Field Notes documented by Randy Whicker, ERG. Two Envirocon field staff assisted with sample collection (Isaiah Wynne and Monty Ford, Jr.). Initials of sampling personnel are shown in the logbook notes.



11-16-16 MM
- FSS Soil Sampling WAR
- Snowed overnight ≈ ½" on ground
- cold, near freezing

Lt-Location 1 RW
PIR1-~~15~~-0015-SOI-01 Isaiah
-118,100067 Monty
47,92~~574~~ 95 ①
- near Road & Rope

Location 2
~~PIR1~~ PIR1-2-0015-SOI-01
-118,09999 RW
47,929692 Isaiah
- edge of pond Monty

Location 3
PIR1-3-0015-SOI-01 RW
-118,09978 Is.
47,92969 Mo.
- Edge of pond

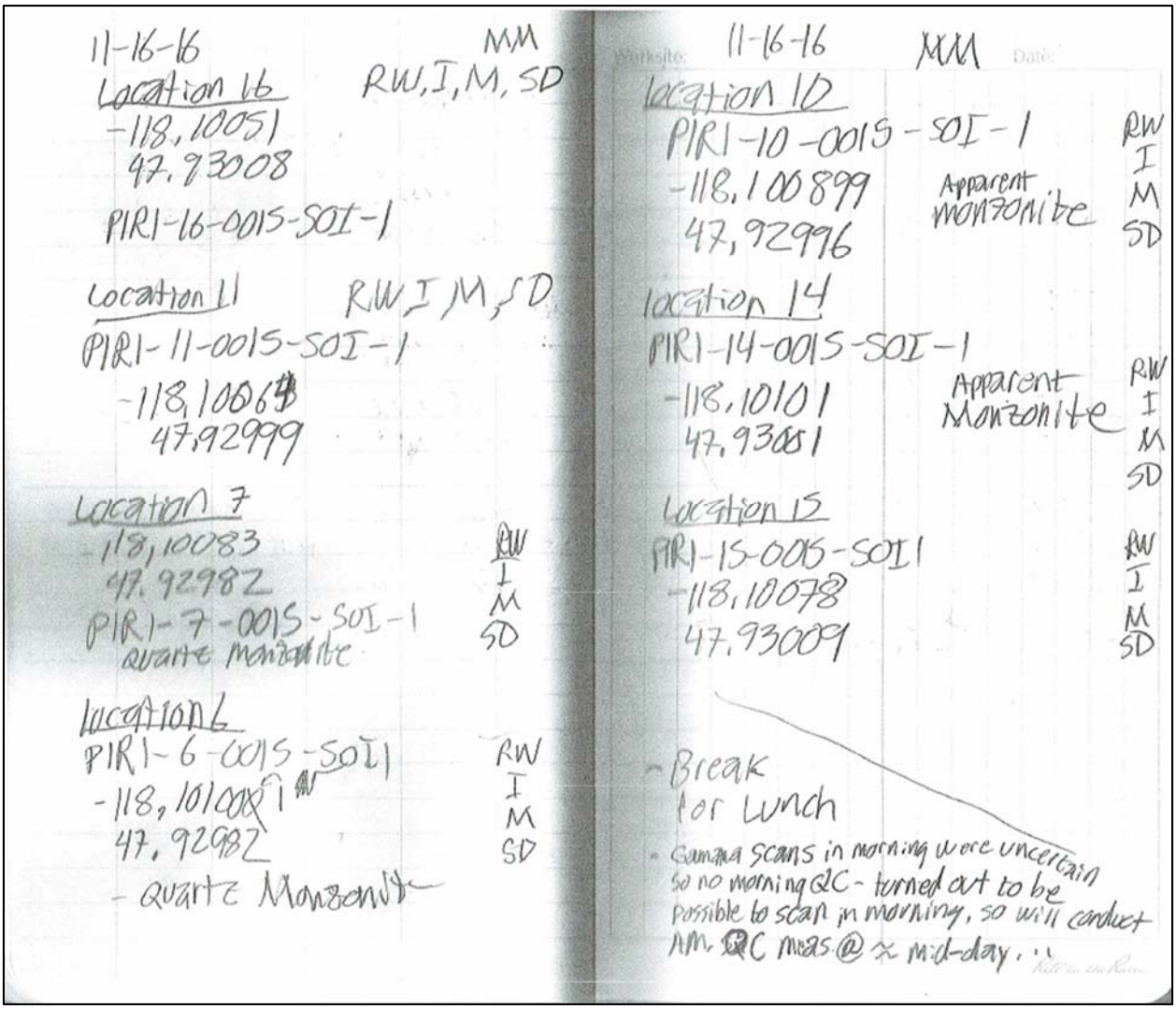
MM 11-16-16
Location 3 - Field Dup.
PIR1-3-0015-SOI-2 RW
Field dup of #3 I
Edge of pond M

location 4-
PIR1-4-0015-SOI-1 RW
-118,09948 I
47.929685 M
- muddy area

location 5
PIR1-5-0015-SOI-1 RW,I,M
-118.09928
47.92967
near road East end of excavations

location 9
PIR1-9-0015-SOI-1 RW,I,M
118,09959
47.92979

Field Notes documented by Randy Whicker, ERG. Two Envirocon field staff assisted with sample collection (Isaiah Wynne and Monty Ford, Jr.). Initials of sampling personnel are shown in the logbook notes.



11-16-16 MM
Location 16 RW, I, M, SD
-118.10051
47.93008
PIR1-16-0015-SOI-1

Location 11 RW, I, M, SD
PIR1-11-0015-SOI-1
-118.10064
47.92999

Location 7
-118.10083
47.92982
PIR1-7-0015-SOI-1
Quartz Monzonite
RW I M SD

Location 6
PIR1-6-0015-SOI1
-118.101001
47.92982
- Quartz Monzonite
RW I M SD

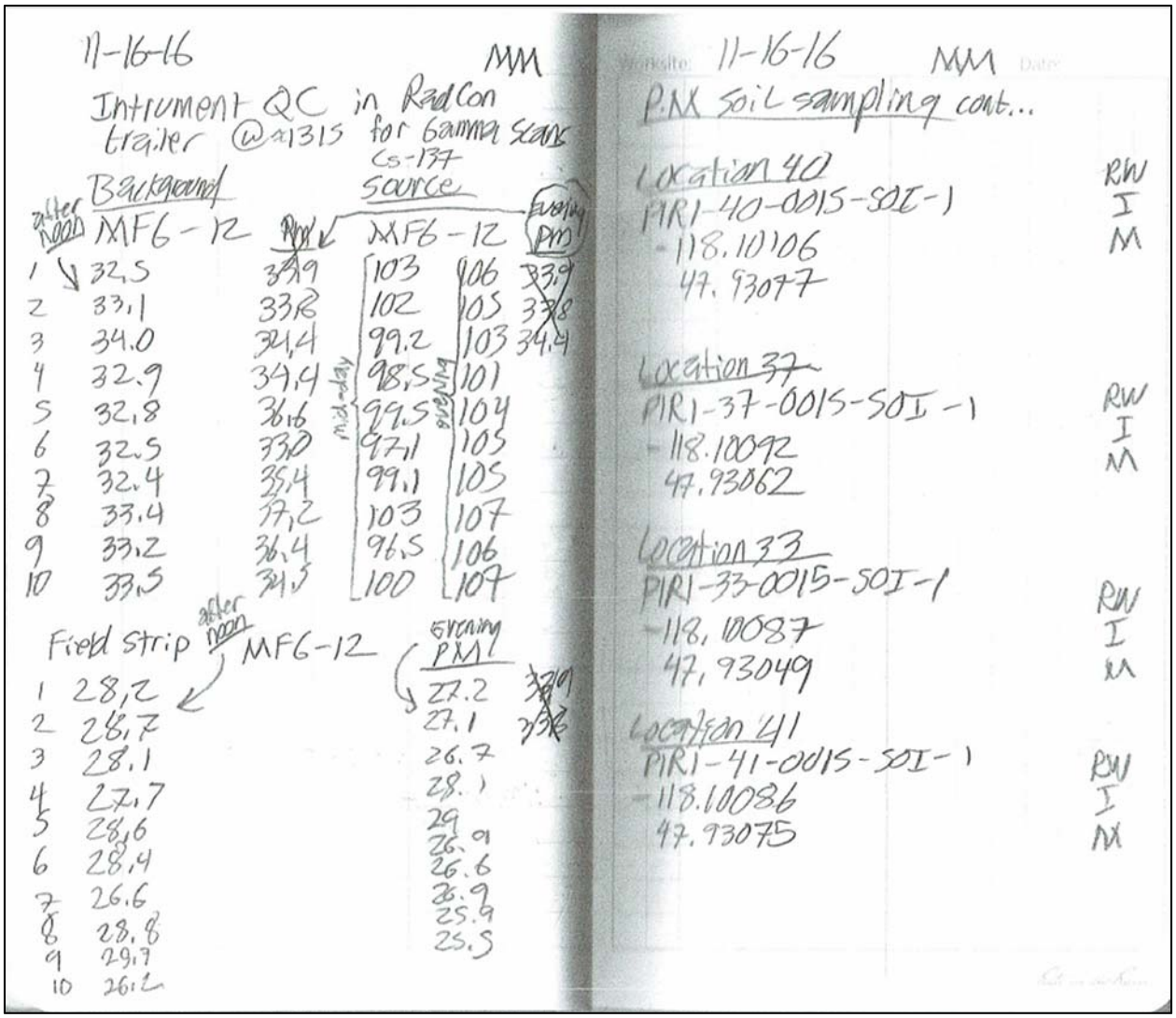
11-16-16 MM
Location 10
PIR1-10-0015-SOI-1
-118.100899
47.92996
Apparent Monzonite
RW I M SD

Location 14
PIR1-14-0015-SOI-1
-118.10101
47.93001
Apparent Monzonite
RW I M SD

Location 15
PIR1-15-0015-SOI1
-118.10078
47.93009
RW I M SD

- Break for Lunch
- Gamma scans in morning were uncertain so no morning QC - turned out to be possible to scan in morning, so will conduct AM. QC meas @ ~ mid-day.

Field Notes documented by Randy Whicker, ERG. Two Envirocon field staff assisted with sample collection (Isaiah Wynne and Monty Ford, Jr.). Initials of sampling personnel are shown in the logbook notes.



11-16-16 MM

Intrument QC in RadCon trailer @ ≈1315 for Gamma Scans

	Background MF6-12 (after noon)	Rpm	Source MF6-12 (mid-day)	Source MF6-12 (evening)	Evening PM
1	32.5	33.9	103	106	33.9
2	33.1	33.8	102	105	33.8
3	34.0	34.4	99.2	103	34.4
4	32.9	34.4	98.5	101	
5	32.8	36.6	99.5	104	
6	32.5	33.0	97.1	105	
7	32.4	35.4	99.1	105	
8	33.4	37.2	103	107	
9	33.2	36.4	96.5	106	
10	33.5	34.5	100	107	

Field strip MF6-12 (after noon) / Evening PM

1	28.2	27.2	33.9
2	28.7	27.1	33.8
3	28.1	26.7	
4	27.7	28.1	
5	28.6	29	
6	28.4	26.9	
7	26.6	26.6	
8	28.8	26.9	
9	29.9	25.9	
10	26.2	25.5	

Worksite: 11-16-16 MM Date:

P.M soil sampling cont...

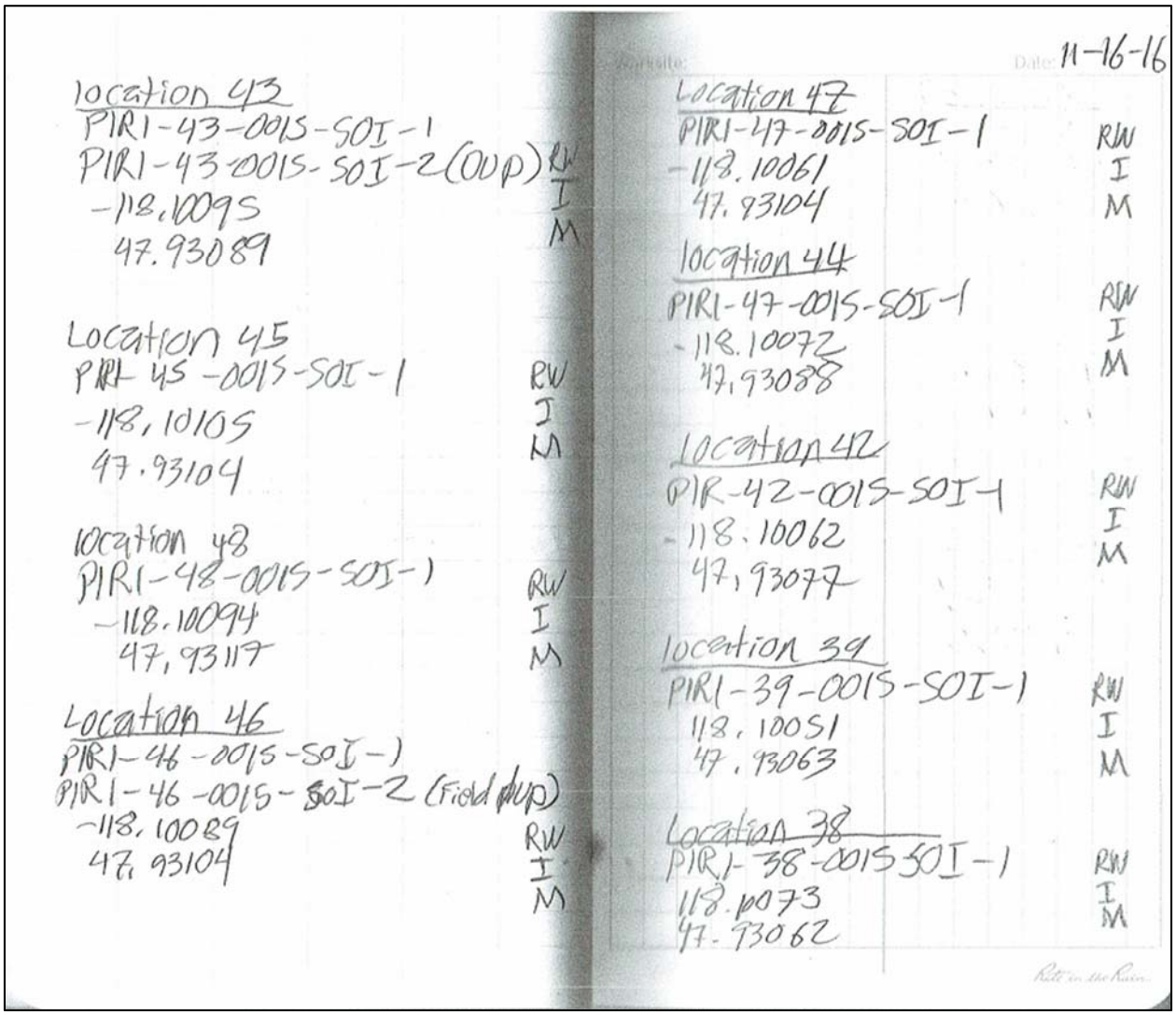
Location 40
PIR1-40-0015-SOI-1
-118.10106
47.93077
RW I M

Location 37
PIR1-37-0015-SOI-1
-118.10092
47.93062
RW I M

Location 33
PIR1-33-0015-SOI-1
-118.10087
47.93049
RW I M

Location 41
PIR1-41-0015-SOI-1
-118.10086
47.93075
RW I M

Field Notes documented by Randy Whicker, ERG. Two Envirocon field staff assisted with sample collection (Isaiah Wynne and Monty Ford, Jr.). Initials of sampling personnel are shown in the logbook notes.



location 43
PIR1-43-0015-SOI-1
PIR1-43-0015-SOI-2 (Dup) RW
-118.10095 I
47.93089 M

Location 45
PIR 45-0015-SOI-1 RW
-118.10105 I
47.93104 M

location 48
PIR1-48-0015-SOI-1 RW
-118.10094 I
47.93117 M

Location 46
PIR1-46-0015-SOI-1
PIR1-46-0015-SOI-2 (Field dup)
-118.10089 RW
47.93104 I
M

Date: 11-16-16

Location 47
PIR1-47-0015-SOI-1 RW
-118.10061 I
47.93104 M

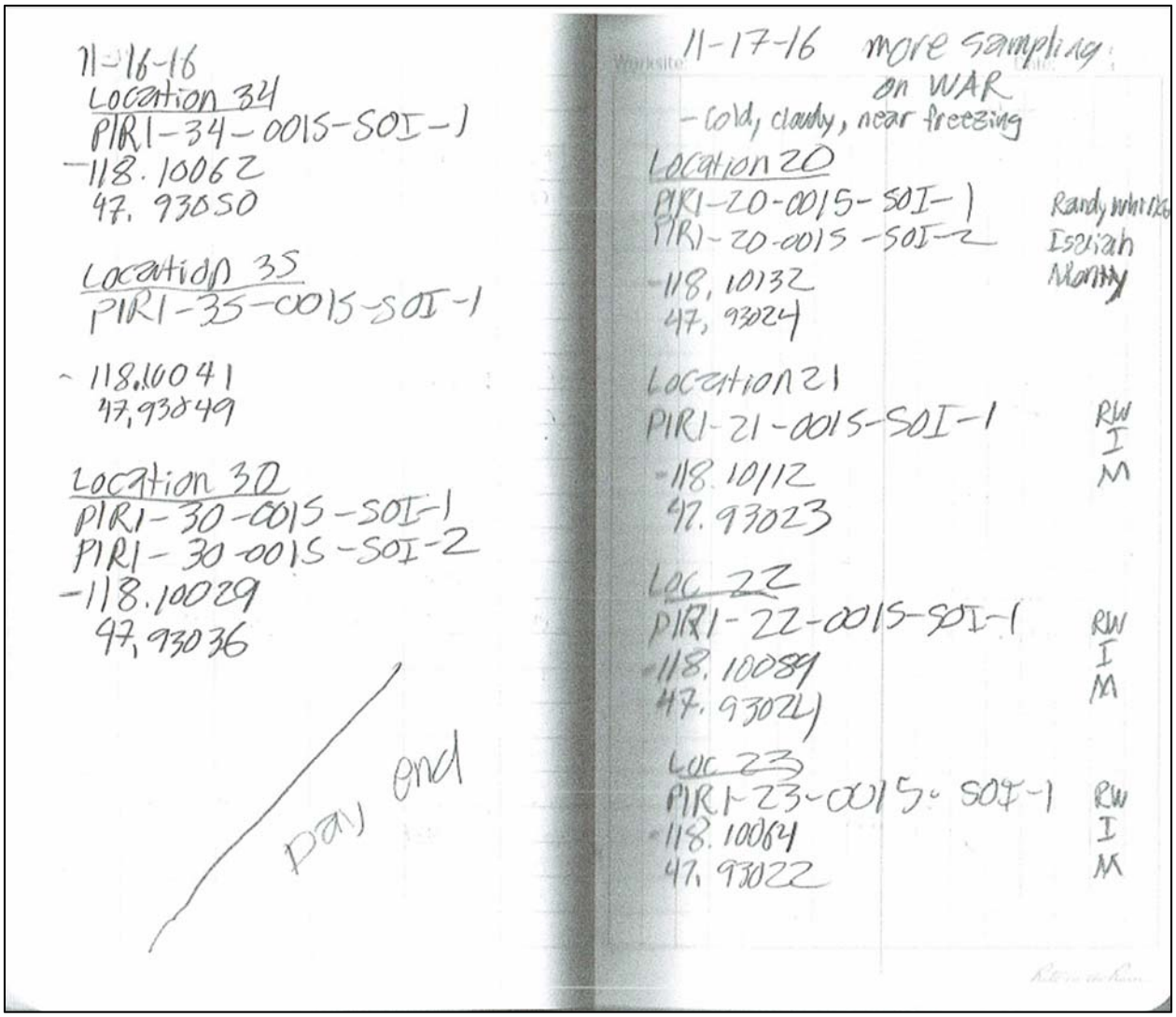
location 44
PIR1-47-0015-SOI-1 RW
-118.10072 I
47.93088 M

location 42
PIR-42-0015-SOI-1 RW
-118.10062 I
47.93077 M

location 39
PIR1-39-0015-SOI-1 RW
118.10051 I
47.93063 M

Location 38
PIR1-38-0015 SOI-1 RW
118.10073 I
47.93062 M

Field Notes documented by Randy Whicker, ERG. Two Envirocon field staff assisted with sample collection (Isaiah Wynne and Monty Ford, Jr.). Initials of sampling personnel are shown in the logbook notes.



11-16-16
Location 34
PIR1-34-0015-SOI-1
-118.10062
47.93050

Location 35
PIR1-35-0015-SOI-1

-118.10041
47.93049

Location 30
PIR1-30-0015-SOI-1
PIR1-30-0015-SOI-2
-118.10029
47.93036

day end

11-17-16 more sampling on WAR
- cold, cloudy, near freezing

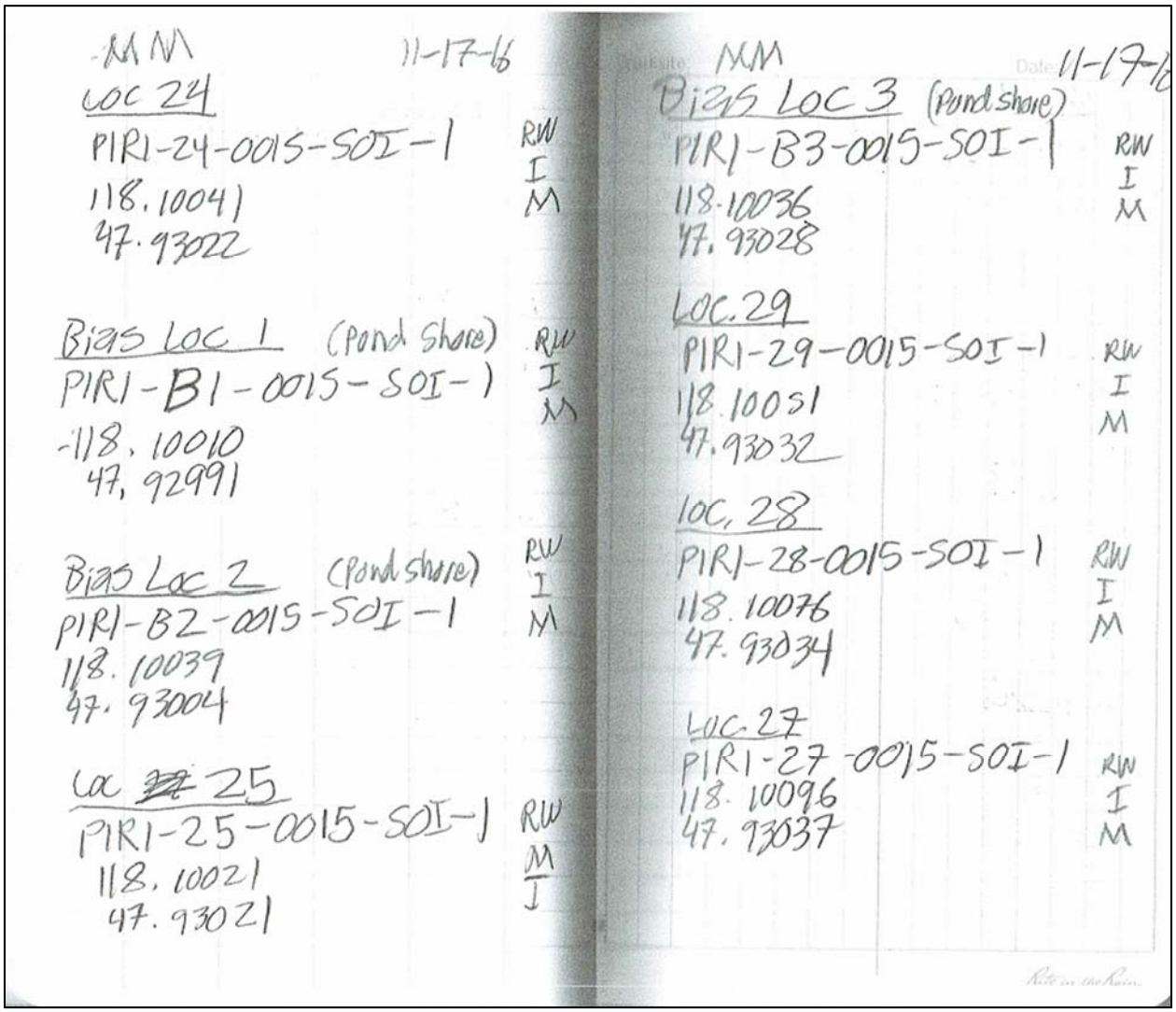
Location 20
PIR1-20-0015-SOI-1 Randy Whicker
PIR1-20-0015-SOI-2 Isaiah
-118.10132 Monty
47.93024

Location 21
PIR1-21-0015-SOI-1 RW I M
-118.10112
47.93023

Loc 22
PIR1-22-0015-SOI-1 RW I M
-118.10089
47.93024

Loc 23
PIR1-23-0015-SOI-1 RW I M
-118.10064
47.93022

Field Notes documented by Randy Whicker, ERG. Two Envirocon field staff assisted with sample collection (Isaiah Wynne and Monty Ford, Jr.). Initials of sampling personnel are shown in the logbook notes.



MM 11-17-16

Loc 24
PIR1-24-0015-SOI-1 RW I M
118.10041
47.93022

Bias Loc 1 (Pond Shore) RW I M
PIR1-B1-0015-SOI-1
118.10010
47.92991

Bias Loc 2 (Pond shore) RW I M
PIR1-B2-0015-SOI-1
118.10039
47.93004

Loc ~~24~~ 25
PIR1-25-0015-SOI-1 RW M I

MM 11-17-16

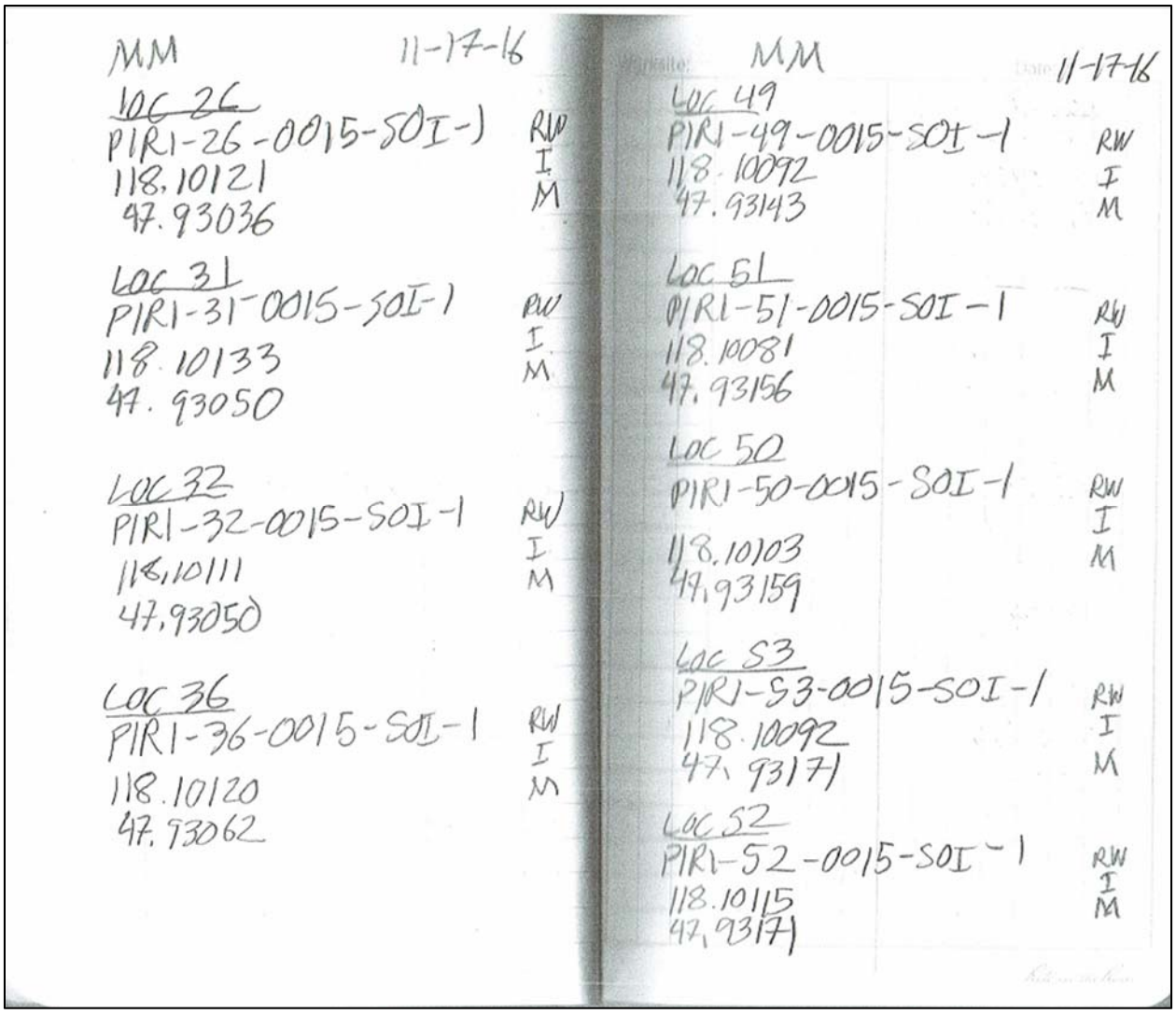
Bias Loc 3 (Pond shore)
PIR1-B3-0015-SOI-1 RW I M
118.10036
47.93028

Loc. 29
PIR1-29-0015-SOI-1 RW I M
118.10051
47.93032

loc. 28
PIR1-28-0015-SOI-1 RW I M
118.10076
47.93034

Loc. 27
PIR1-27-0015-SOI-1 RW I M
118.10096
47.93037

Field Notes documented by Randy Whicker, ERG. Two Envirocon field staff assisted with sample collection (Isaiah Wynne and Monty Ford, Jr.). Initials of sampling personnel are shown in the logbook notes.



MM 11-17-16

LOC 26
PIR1-26-0015-SOI-1 RW I M
118.10121
47.93036

LOC 31
PIR1-31-0015-SOI-1 RW I M
118.10133
47.93050

LOC 32
PIR1-32-0015-SOI-1 RW I M
118.10111
47.93050

LOC 36
PIR1-36-0015-SOI-1 RW I M
118.10120
47.93062

MM 11-17-16

LOC 49
PIR1-49-0015-SOI-1 RW I M
118.10092
47.93143

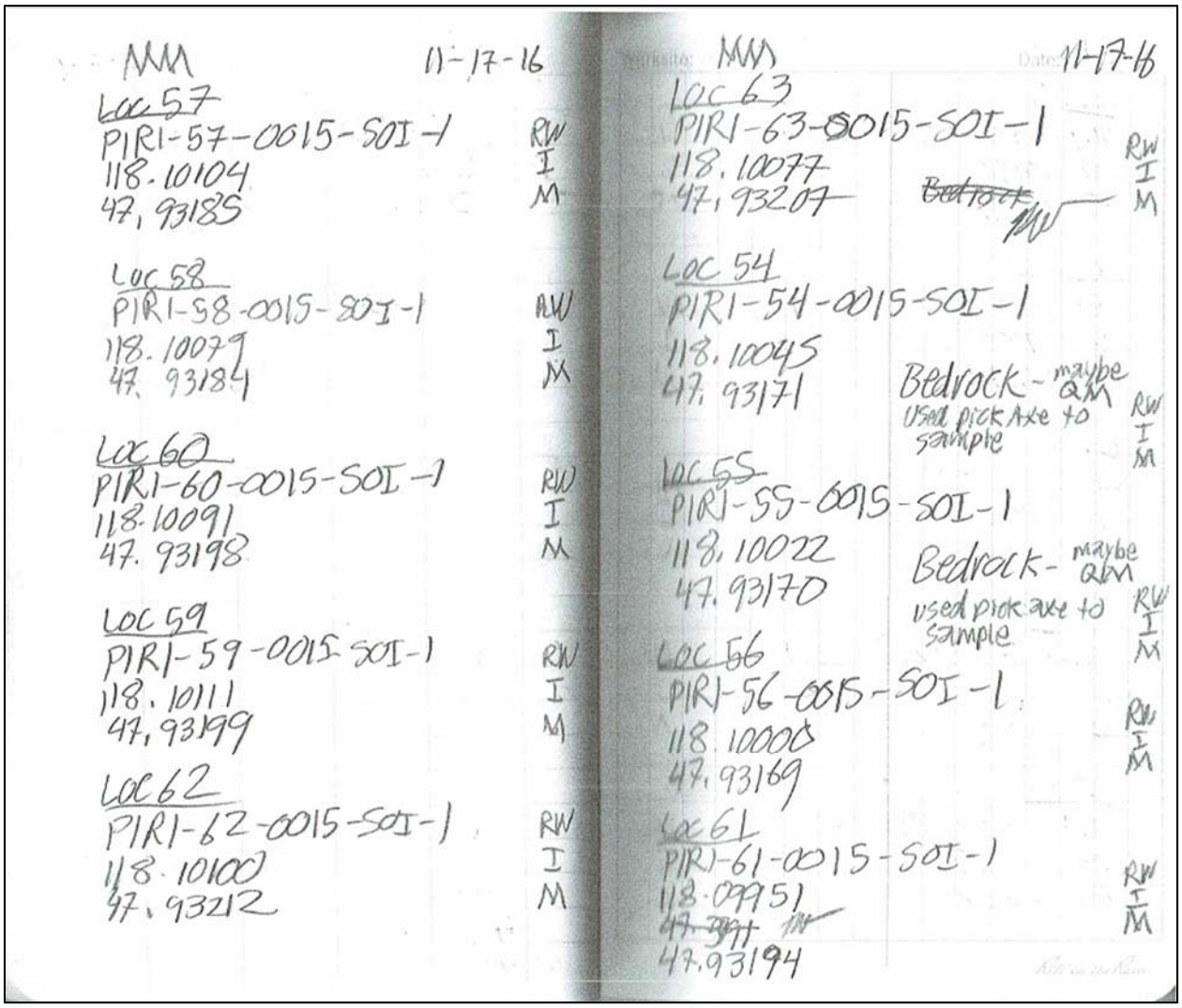
LOC 51
PIR1-51-0015-SOI-1 RW I M
118.10081
47.93156

LOC 50
PIR1-50-0015-SOI-1 RW I M
118.10103
47.93159

LOC 53
PIR1-53-0015-SOI-1 RW I M
118.10092
47.93171

LOC 52
PIR1-52-0015-SOI-1 RW I M
118.10115
47.93171

Field Notes documented by Randy Whicker, ERG. Two Envirocon field staff assisted with sample collection (Isaiah Wynne and Monty Ford, Jr.). Initials of sampling personnel are shown in the logbook notes.



MM 11-17-16

Loc 57
PIRI-57-0015-SOI-1 RW I M
118.10104
47.93185

Loc 58
PIRI-58-0015-SOI-1 RW I M
118.10079
47.93184

Loc 60
PIRI-60-0015-SOI-1 RW I M
118.10091
47.93198

Loc 59
PIRI-59-0015-SOI-1 RW I M
118.10111
47.93199

Loc 62
PIRI-62-0015-SOI-1 RW I M
118.10100
47.93212

MM Date: 11-17-16

Loc 63
PIRI-63-0015-SOI-1 RW I M
118.10077
47.93207 ~~Bedrock~~

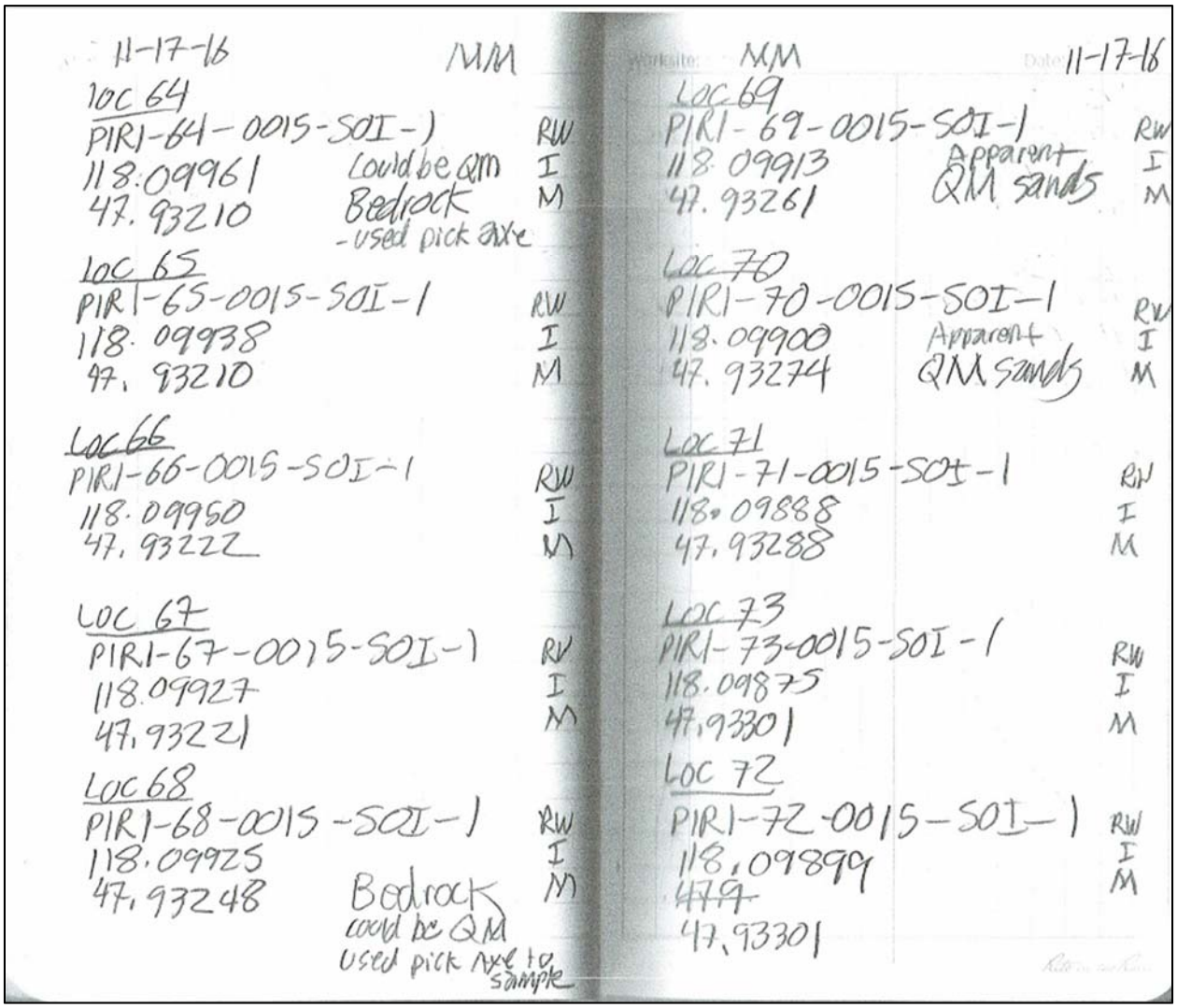
Loc 54
PIRI-54-0015-SOI-1
118.10045
47.93171 Bedrock - maybe QM
Used pick Axe to sample RW I M

Loc 55
PIRI-55-0015-SOI-1
118.10022
47.93170 Bedrock - maybe QM
used pick axe to sample RW I M

Loc 56
PIRI-56-0015-SOI-1 RW I M
118.10000
47.93169

Loc 61
PIRI-61-0015-SOI-1 RW I M
118.09951
~~47.9311~~
47.93194

Field Notes documented by Randy Whicker, ERG. Two Envirocon field staff assisted with sample collection (Isaiah Wynne and Monty Ford, Jr.). Initials of sampling personnel are shown in the logbook notes.



11-17-16 MM

loc 64
PIRI-64-0015-SOI-1 RW
118.09961 Could be QM I
47.93210 Bedrock M
- used pick axe

loc 65
PIRI-65-0015-SOI-1 RW
118.09938 I
47.93210 M

Loc 66
PIRI-66-0015-SOI-1 RW
118.09950 I
47.93222 M

Loc 67
PIRI-67-0015-SOI-1 RW
118.09927 I
47.93221 M

Loc 68
PIRI-68-0015-SOI-1 RW
118.09925 I
47.93248 Bedrock M
could be QM
used pick axe to sample

Worksite: MM Date: 11-17-16

Loc 69
PIRI-69-0015-SOI-1 RW
118.09913 Apparent I
47.93261 QM sands M

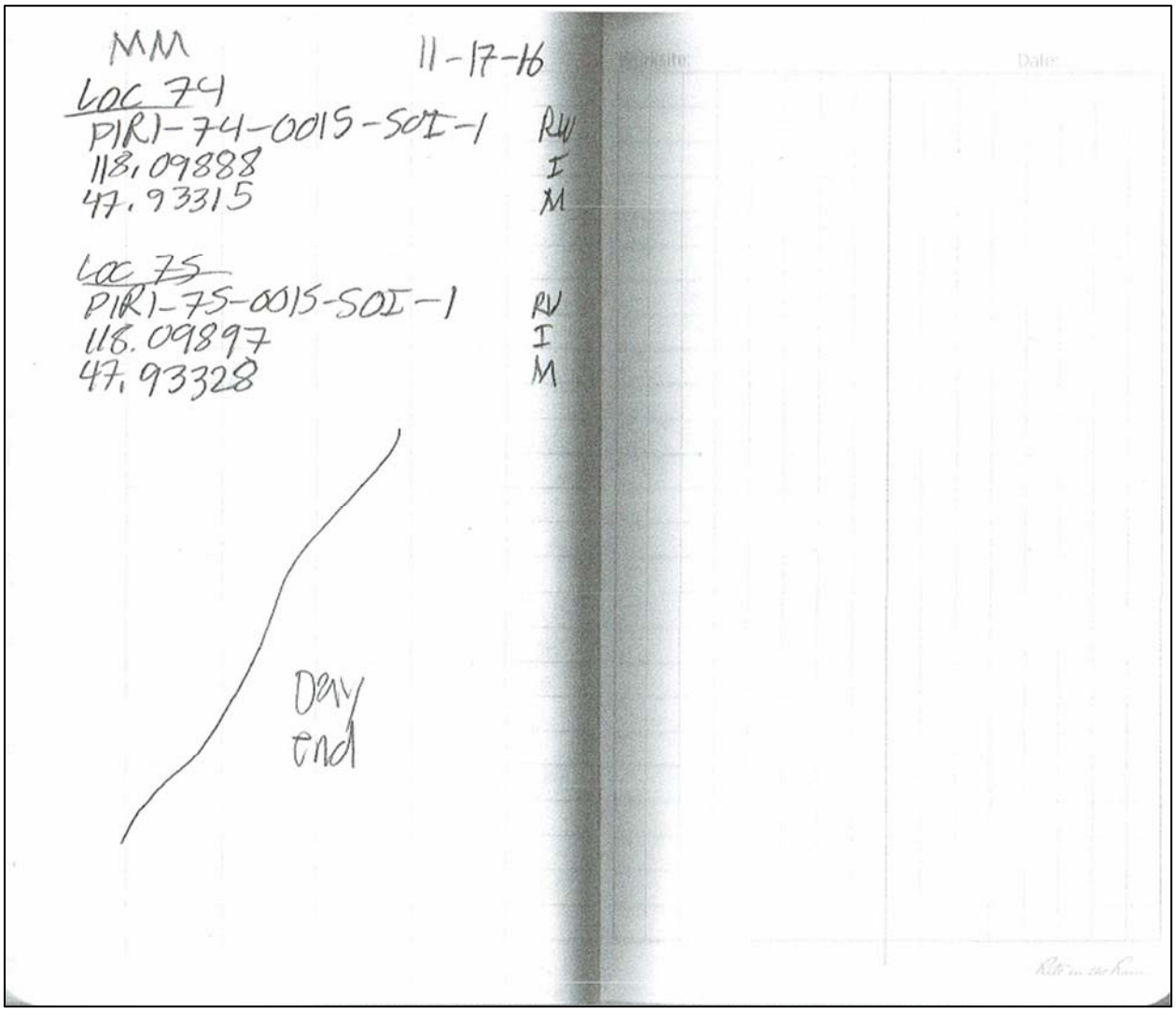
Loc 70
PIRI-70-0015-SOI-1 RW
118.09900 Apparent I
47.93274 QM sands M

Loc 71
PIRI-71-0015-SOI-1 RW
118.09888 I
47.93288 M

Loc 73
PIRI-73-0015-SOI-1 RW
118.09875 I
47.93301 M

Loc 72
PIRI-72-0015-SOI-1 RW
118.09899 I
~~47.9~~ M
47.93301

Field Notes documented by Randy Whicker, ERG. Two Envirocon field staff assisted with sample collection (Isaiah Wynne and Monty Ford, Jr.). Initials of sampling personnel are shown in the logbook notes.



MM 11-17-16

Loc 74
PIR1-74-0015-SOI-1 RW
118.09888 I
47.93315 M

Loc 75
PIR1-75-0015-SOI-1 RW
118.09897 I
47.93328 M

Day end

Attachment 3 – Calibration Certificates for Gamma Survey Instruments

Designer and Manufacturer of Scientific and Industrial Instruments

UNIT 2

CERTIFICATE OF CALIBRATION

LUDLUM MEASUREMENTS, INC.
501 Oak Street, 325-235-5494, Sweetwater, TX 79556, U.S.A.
10744 Dutchtown Road, 865-392-4601, Knoxville, TN 37932, U.S.A.

CUSTOMER ERG

Mfg. Ludlum Measurements, Inc. Model 2350-1 ORDER NO. 20287527/434162

Cal. Date 15-Apr-16 Cal Due Date 15-Apr-17 Serial No. 228705

Check mark ✓ applies to applicable instr. and/or detector IAW mfg. spec. Cal. Interval 1 Year Meterface N/A

☐ New Instrument Instrument Received ☐ Within Toler. +-10% ☐ 10-20% ☐ Out of Tol. ☐ Requiring Repair ☑ Other-See comments

T. 73 °F RH 38 % Alt 701.0 mm Hg

☑ Mechanical check
☑ F/S Resp. check
☑ Audio check
☑ Ratemeter Linearity check
☑ Data Log check
☑ Calibrated in accordance with LMI SOP 14.8

☑ Reset check
☑ Alarm Setting check
☑ Integrated Dose check
☑ Overload check

☑ Window Operation
☑ Battery check (Min. Volt) 4.4 VDC
☑ Recycle Mode check
☑ Scaler Readout check
☑ Calibrated in accordance with LMI SOP 14.9

☐ Input Sens. Linearity

Threshold Dial Ratio 100 = 10 mV

☑ HV Readout (2 points) Ref./Inst. 500 / 499 V Ref./Inst. 2000 / 1975 V

COMMENTS: *Firmware:* 37122N258
I/O Firmware: 37123N05 Resolution for Cs137=9.2%
Calibrated with coiled cable. No as found data due to new 44-10.
Gamma Calibration: GM detectors positioned perpendicular to source except for M 44-9 in which the front of probe faces source.

	Probe Model	Serial #	High Voltage	Threshold	Units/ Time Base	Dead Time Correction Factor	Calibration Constant	Linearity ±10%*
Detector # 1	LMI44-10	PR355764	950	100	7 / 1	8.556159E-06	1.000000E+00	
Detector # 2	LMI44-10	PR355764	950	100	4 / 2	8.556164E-06	5.052604E+10	✓
Detector # 3	CS137	662KEV	676	642	7 / 1	0.000000E+00	1.000000E+00	
Detector #								
Detector #								
Detector #								
Detector #								
Detector #								
Detector #								
Detector #								
Detector #								
Detector #								
Detector #								
Detector #								
Detector #								
Detector #								

Units: 0 -- rad, 1 -- Gray, 2 -- rem, 3 -- Sv, 4 -- R, 5 -- C/Kg, 6 -- Disintegrations, 7 -- Counts, 8 -- Ci/cm sq., 9 -- Bq/cm sq.
Time Base: 0 -- Seconds, 1 -- Minutes, 2 -- Hours

* See attached detector documentation, if applica

Digital Readout	REFERENCE CAL. POINT	INSTRUMENT RECEIVED	INSTRUMENT METER READING*	REFERENCE CAL. POINT	INSTRUMENT RECEIVED	INSTRUMENT METER READING*
	400kcpm	400 (10)	400 (10)	400cpm	40 (10)	40 (10)
	40kcpm	40.1	40.1	40cpm	4	4
	4kcpm	4.0	4.0			

Ludlum Measurements, Inc. certifies that the above instrument has been calibrated by standards traceable to the National Institute of Standards and Technology, or to the calibration facilities of other International Standards Organization members, or have been derived from accepted values of natural physical constants or have been derived by the ratio type of calibration techniques. The calibration system conforms to the requirements of ANSI/NCSL Z540-1-1994 and ANSI N323-1978.

Reference Instruments and/or Sources: Cs-137 S/N: ☐ 059 ☐ 2171CP ☐ 2261CP ☐ 720 ☐ 734 ☐ 781 ☐ 1131 ☐ 1616 ☐ 1696 ☐ 1909 ☐ 1916CP ☐ 5105 ☐ 5717CO ☐ 5719CO ☐ 60646 ☐ 70897 ☐ 73410 ☐ E552 ☐ G112 ☐ M565 ☐ S-394 ☐ S-1054 ☐ T10081 ☐ T10082 Neutron Am-241 Be S/N: ☐ T-924 Ra-226 S/N: ☐ Y982

State of Texas Calibration License No. LO-1963

☐ Alpha S/N ☐ Beta S/N ☐ Other

☑ m 500 S/N 289158 ☐ Ra-226 S/N Y982 ☑ Multimeter S/N 93870637

Calibrated By: Jeremy Simpson Date 15 Apr 16
Reviewed By: [illegible] Date 18 Apr 16

FORM C44A 09/28/2015 Page 1 of 3

This certificate shall not be reproduced except in full without the written approval of Ludlum Measurements, Inc.

Designer and Manufacturer of Scientific and Industrial Instruments

Unit 2

LUDLUM MEASUREMENTS, INC.
501 Oak Street
325-235-5494
Sweetwater, TX 79556, U.S.A.

10744 Dutchtown Road
865-392-4601
Knoxville, TN 37932, U.S.A.

Bench Test Data For Detector

Detector 44-10 Serial No. PR355764

Order #. 20287527/434162

Customer ERG

Counter 2350-1 Serial No. 228705

Counter Input Sensitivity 10.00 mV

Count Time 6 Seconds

Distance Source to Detector Surface

Other Cal Constant = 1.000000E+00 Dead Time = 8.556159E-06

High Voltage	Background	Isotope Am241 Size 30.7pCi	Isotope Size	Isotope Size	Isotope Size
850	773	12378			
900	756	12768			
* 950	750	12705			
1000	732	12667			
1050	750	12555			
1100	731	12648			
1150	704	12696			
1200	1150	13750			

Signature Jeremy Thompson

Date 15 Apr 16

FORM C4A 02/26/2013 Page 2 of 3 • *Serving The Nuclear Industry Since 1962* •

Designer and Manufacturer of Scientific and Industrial Instruments

unit 2

LUDLUM MEASUREMENTS, INC.
501 Oak Street
325-235-5494
Sweetwater, TX 79556, U.S.A.

10744 Dutchtown Road
865-392-4601
Knoxville, TN 37932, U.S.A.

Model 2350 Bench Test Data

Customer ERG Date 15-Apr-16 Order #. 20287291 20287527/434162

Model 2350-1 Serial No. 228705 Detector 44-10 Serial No. PR355764

Source Cs137 & Na22

High Voltage 950 V As Found NA V. Input 10.00 mV As Found NA mV.

Cal. Constant 5.052604E+10 as found NA

Dead Time 8.556164E-06 as found

Alarm Setting: Ratemeter 1000000000.000000 as found

Scaler 1000000.000000 as found

Integrated dose 1000000000.0000 as found

Overload ☐ On ☐ Off as found ☐ On ☐ Off Window 1000 as found

Detector Received: ☐ Within Toler. +-10% ☐ 10-20% ☐ Out of Tol. ☐ Requiring Repair ☑ Other-See comments

Reference Point	"As Found" Readings: Meter Reading	After Adjustment Readings: Meter Reading
2000 μR/hr	NA	1.52 mR/hr
1500		1.45
1000		1.02
500		50.6 μR/hr
200		201
150		149
100		98.5

Other No as found readings due to NSL 44-10.

Signature Jeremy Sharpe Date 15. Apr. 16

FORM C6-1 02/26/2013 Page 3 of 3

• *Serving The Nuclear Industry Since 1962* •

Designer and Manufacturer of Scientific and Industrial Instruments

Unit 3

CERTIFICATE OF CALIBRATION

LUDLUM MEASUREMENTS, INC.
501 Oak Street
325-235-5494
Sweetwater, TX 79556, U.S.A.
☐ 10744 Dutchtown Road
865-392-4601
Knoxville, TN 37932, U.S.A.

CUSTOMER ERG ORDER NO. 20287527/434162 20287527

Mfg. Ludlum Measurements, Inc. Model 2350-1 Serial No. 228706

Cal. Date 15-Apr-16 Cal Due Date 15-Apr-17 Cal. Interval 1 Year Meterface N/A

Check mark ☑ applies to applicable instr. and/or detector IAW mfg. spec. T. 73 °F RH 38 % Alt 701.0 mm Hg

☐ New Instrument Instrument Received ☐ Within Toler. +-10% ☐ 10-20% ☐ Out of Tol. ☐ Requiring Repair ☑ Other-See comments

☑ Mechanical check ☐ Input Sens. Linearity
☑ F/S Resp. check ☑ Reset check ☑ Window Operation
☑ Audio check ☑ Alarm Setting check ☑ Battery check (Min. Volt) 4.4 VDC
☑ Ratemeter Linearity check ☑ Integrated Dose check ☑ Recycle Mode check
☑ Data Log check ☑ Overload check ☑ Scaler Readout check Threshold Dial Ratio 100 = 10 mV
☑ Calibrated in accordance with LMI SOP 14.8 ☑ Calibrated in accordance with LMI SOP 14.9

☑ HV Readout (2 points) Ref./Inst. 500 / 494 V Ref./Inst. 2000 / 1978 V

COMMENTS: *Firmware:* 37122N2~~3~~ 8 37
I/O Firmware: 37123N05 Resolution for Cs137=9.06%
Calibrated with coiled cable. No as found data due to new 44-10.
Gamma Calibration: GM detectors positioned perpendicular to source except for M 44-9 in which the front of probe faces source.

	Probe Model	Serial #	High Voltage	Threshold	Units/ Time Base	Dead Time Correction Factor	Calibration Constant	Linearity ±10%*
Detector # 1	LMI44-10	PR355763	900	100	7 / 1	1.373557E-05	1.000000E+00	
Detector # 2	LMI44-10	PR355763	900	100	4 / 2	1.373557E-05	5.603372E+10	✓
Detector # 3	CS137	662KEV	661	642	7 / 1	0.000000E+00	1.000000E+00	
Detector #								
Detector #								
Detector #								
Detector #								
Detector #								
Detector #								
Detector #								
Detector #								
Detector #								
Detector #								
Detector #								
Detector #								
Detector #								

Units: 0 -- rad, 1 -- Gray, 2 -- rem, 3 -- Sv, 4 -- R, 5 -- C/Kg, 6 -- Disintegrations, 7 -- Counts, 8 -- Ci/cm sq., 9 -- Bq/cm sq.
Time Base: 0 -- Seconds, 1 -- Minutes, 2 -- Hours

* See attached detector documentation, if applica

Digital Readout	REFERENCE CAL. POINT	INSTRUMENT RECEIVED	INSTRUMENT METER READING*	REFERENCE CAL. POINT	INSTRUMENT RECEIVED	INSTRUMENT METER READING*
	400kcpm	39980 (0)	39980 (0)	400cpm	40 (0)	40 (0)
	40kcpm	3998	3998	40cpm	4	4
	4kcpm	399	399			

Ludlum Measurements, Inc. certifies that the above instrument has been calibrated by standards traceable to the National Institute of Standards and Technology, or to the calibration facilities of other International Standards Organization members, or have been derived from accepted values of natural physical constants or have been derived by the ratio type of calibration techniques. The calibration system conforms to the requirements of ANSI/NCSL Z540-1-1994 and ANSI N323-1978. State of Texas Calibration License No. LO-1963

Reference Instruments and/or Sources: Cs-137 S/N: ☐ 059 ☐ 2171CP ☐ 2261CP ☐ 720 ☐ 734 ☐ 781 ☐ 1131 ☐ 1616 ☐ 1696 ☐ 1909 ☐ 1916CP ☐ 5105 ☐ 5717CO ☐ 5719CO ☐ 60646 ☐ 70697 ☐ 73410 ☐ E552 ☐ G112 ☐ M565 ☐ S-394 ☐ S-1054 ☐ T10081 ☐ T10082 Neutron Am-241 Be S/N: ☐ T-304 Ra-226 S/N: ☐ Y982

☐ Alpha S/N ☐ Beta S/N ☐ Other

☑ m 500 S/N 289158 ☐ Ra-226 S/N Y982 ☑ Multimeter S/N 93870637

Calibrated By: Jeremy Brown Date 15-Apr-16
Reviewed By: Phil H. Date 18 Apr 16

FORM C44A 09/28/2015 Page 1 of 3

This certificate shall not be reproduced except in full, without the written approval of Ludlum Measurements, Inc.

Designer and Manufacturer of Scientific and Industrial Instruments

Unit 3

LUDLUM MEASUREMENTS, INC.
501 Oak Street
325-235-5494
Sweetwater, TX 79556, U.S.A.

10744 Dutchtown Road
865-392-4601
Knoxville, TN 37932, U.S.A.

Bench Test Data For Detector

Detector 44-10 Serial No. PR355763

Customer ERG

Order #. 20287527/434162

Counter 2350-1 Serial No. 228706

Counter Input Sensitivity 10.00 mV

Count Time 6 seconds

Distance Source to Detector Surface

Other Cal Constant = 1.000000E+00 Dead Time = 1.373557E-05

High Voltage	Background	Isotope Am241 Size 50.7 pCi	Isotope Size	Isotope Size	Isotope Size
800	767	12477			
850	742	12540			
*900	751	12750			
950	756	12645			
1000	767	12706			
1050	762	12466			
1100	824	12823			
1150	422	13262			
1200	1442	14720			

Signature Jeremy Thompson

Date 15 April 16

FORM C4A 02/26/2013 Page 2 of 3

• *Serving The Nuclear Industry Since 1962* •

Designer and Manufacturer of Scientific and Industrial Instruments

Unit 3

LUDLUM MEASUREMENTS, INC.
501 Oak Street
325-235-5494
Sweetwater, TX 79556, U.S.A.

10744 Dutchtown Road
865-392-4601
Knoxville, TN 37932, U.S.A.

Model 2350 Bench Test Data

Customer ERG Date 15-Apr-16 Order #. 20287297 20287527/434182

Model 2350-1 Serial No. 228706 Detector 44-10 Serial No. PR355763

Source Cs137 - 3 mCi

High Voltage 900 V As Found NA V. Input 10.00 mV As Found NA mV.

Cal. Constant 5.603372E+10 as found NA

Dead Time 1.373557E-05 as found

Alarm Setting: Ratemeter 1000000000.000000 as found

Scaler 1000000.000000 as found

Integrated dose 1000000000.0000 as found

Overload ☐ On ☑ Off as found ☐ On ☐ Off Window 1000 as found NA

Detector Received: ☐ Within Toler. +-10% ☐ 10-20% ☐ Out of Tol. ☐ Requiring Repair ☑ Other-See comments

Reference Point	"As Found" Readings: Meter Reading	After Adjustment Readings: Meter Reading
2000 μR/hr	NA	1.94 mR/hr
1500		1.50
1000		1.01
500		502 μR/hr
200		200
150		153
100		102

Other No as found data due to new 44-10.

Signature Jeremy Thompson Date 15-Apr-16

LM CS-1 02/26/2013 Page 3 of 3

• *Serving The Nuclear Industry Since 1962* •

Designer and Manufacturer of Scientific and Industrial Instruments

MFG-12

CERTIFICATE OF CALIBRATION

LUDLUM MEASUREMENTS, INC.
501 Oak Street, Sweetwater, TX 79556, U.S.A. 325-235-5494
☐ 10744 Dutchtown Road, Knoxville, TN 37932, U.S.A. 865-392-4601

CUSTOMER TETRA TECH MFG, INC. ORDER NO. 20285871/433017

Mfg. Ludlum Measurements, Inc. Model 2350-1 Serial No. 134764

Cal. Date 14-Mar-16 Cal Due Date 14-Mar-17 Cal. Interval 1 Year Meterface N/A

Check mark ✓ applies to applicable instr. and/or detector IAW mfg. spec. T. 74 °F RH 31 % Alt 701.0 mm Hg

☐ New Instrument Instrument Received ☑ Within Toler. +-10% ☐ 10-20% ☐ Out of Tol. ☐ Requiring Repair ☐ Other-See comments

☑ Mechanical check ☐ Input Sens. Linearity

☑ F/S Resp. check ☑ Reset check ☐ Window Operation

☑ Audio check ☑ Alarm Setting check ☑ Battery check (Min. Volt) 4.4 VDC

☑ Ratemeter Linearity check ☑ Integrated Dose check ☑ Recycle Mode check

☑ Data Log check ☑ Overload check ☑ Scaler Readout check Threshold Dial Ratio 100 = 10 mV

☑ Calibrated in accordance with LMI SOP 14.8 ☑ Calibrated in accordance with LMI SOP 14.9

☑ HV Readout (2 points) Ref./Inst. 500 / 501 V Ref./Inst. 2000 / 1999 V

COMMENTS: *Firmware: 37122N21*

I/O Firmware: 37123N05 Calibrated with 39" cable.

Resolution for Cs137=9.37%

Gamma Calibration: GM detectors positioned perpendicular to source except for M 44-9 in which the front of probe faces source.

	Probe Model	Serial #	High Voltage	Threshold	Units/ Time Base	Dead Time Correction Factor	Calibration Constant	Linearity ±10%*
Detector # 1	LMI44-10	PR139484	900	100	4 / 2	1.382029E-05	5.535037E+10	✓
Detector # 2	LMI44-10	PR139484	900	100	7 / 1	1.382029E-05	1.000000E+00	
Detector # 3	CS137PK	662KEV	601	642	7 / 1	0.000000E+00	1.000000E+00	
Detector #								
Detector #								
Detector #								
Detector #								
Detector #								
Detector #								
Detector #								
Detector #								
Detector #								
Detector #								
Detector #								
Detector #								
Detector #								

Units: 0 -- rad, 1 -- Gray, 2 -- rem, 3 -- Sv, 4 -- R, 5 -- C/Kg, 6 -- Disintegrations, 7 -- Counts, 8 -- C/cm sq., 9 -- Bq/cm sq.

Time Base: 0 -- Seconds, 1 -- Minutes, 2 -- Hours

* See attached detector documentation, if applica

Digital Readout	REFERENCE CAL. POINT	INSTRUMENT RECEIVED	INSTRUMENT METER READING*	REFERENCE CAL. POINT	INSTRUMENT RECEIVED	INSTRUMENT METER READING*
	400kcpm	4010 (0)	4007 (0)	400cpm	40 (0)	40 (0)
	40kcpm	402	402	40cpm	4	4
	4kcpm	400	400			

Ludlum Measurements, Inc. certifies that the above instrument has been calibrated by standards traceable to the National Institute of Standards and Technology, or to the calibration facilities of other International Standards Organization members, or have been derived from accepted values of natural physical constants or have been derived by the ratio type of calibration techniques. The calibration system conforms to the requirements of ANSI/NCSL Z540-1-1994 and ANSI N323-1978. State of Texas Calibration License No. LO-1963

Reference Instruments and/or Sources: Cs-137 S/N: ☐ 059 ☐ 2171CP ☐ 2261CP ☐ 720 ☐ 734 ☐ 781 ☐ 1131 ☐ 1616 ☐ 1696 ☐ 1909 ☐ 1916CP ☐ 5105 ☐ 5717CO ☐ 5719CO ☐ 60646 ☐ 70897 ☐ 73410 ☐ E552 ☐ G112 ☐ M565 ☐ S-394 ☐ S-1054 ☐ T10051 ☐ T10082 Neutron Am-241 Be S/N: ☐ T-304 Ra-226 S/N: ☐ Y982

☐ Alpha S/N ☐ Beta S/N ☐ Other

☑ m 500 S/N 289158 ☐ Ra-228 S/N Y982 ☑ Multimeter S/N 93870837

Calibrated By: Jeremy Thompson Date 14-Mar-16

Reviewed By: Donnie Mickes Date 14 Mar 16

FORM C44A 09/28/2015 Page 1 of 3

This certificate shall not be reproduced except in full, without the written approval of Ludlum Measurements, Inc.

Designer and Manufacturer of Scientific and Industrial Instruments

LUDLUM MEASUREMENTS, INC.
501 Oak Street, 325-235-5494, Sweetwater, TX 79556, U.S.A.
☐ 10744 Dutchtown Road, 865-392-4601, Knoxville, TN 37932, U.S.A.

Model 2350 Bench Test Data

Customer TETRA TECH MFG, INC. Date 14-Mar-16 Order #. 20285871/433017

Model 2350-1 Serial No. 134764 Detector 44-10 Serial No. PR139484

Source Cs137 1.5mCi

High Voltage 900 V As Found 900 V. Input 10.00 mV As Found 10 mV.

Cal. Constant 5.535037E+10 as found 5.535037E+10

Dead Time 1.382029E-05 as found 1.382029E-05

Alarm Setting: Ratemeter 1000000000.000000 as found 1.0 E+09
Scaler 1000000.000000 as found 1.0 E+06
Integrated dose 1000000000.0000 as found 1.0 E+09

Overload ☐ On ☑ Off as found ☐ On ☑ Off Window 1000 as found 1000

Detector Received: ☑ Within Toler. +-10% ☐ 10-20% ☐ Out of Tol. ☐ Requiring Repair ☐ Other-See comments

Reference Point	"As Found" Readings: Meter Reading	After Adjustment Readings: Meter Reading
2000 μR/hr	1.91 mR/hr	1.91 mR/hr
1500	1.48	1.48
1000	1.02	1.02
500	497 μR/hr	497 μR/hr
200	198	198
150	149	149
100	98.1	98.1

Other

Signature Jeremy Thompson Date 14-Mar-16

FORM C6-1 02/26/2013 Page 2 of 3 • *Serving The Nuclear Industry Since 1962* •

Designer and Manufacturer of Scientific and Industrial Instruments

LUDLUM MEASUREMENTS, INC.
501 Oak Street, 325-235-5494, Sweetwater, TX 79556, U.S.A.
10744 Dutchtown Road, 865-392-4601, Knoxville, TN 37932, U.S.A.

Bench Test Data For Detector

Detector 44-10 Serial No. PR139484

Customer TETRA TECH MFG, INC. Order #. 20285871/433017

Counter 2350-1 Serial No. 134764 Counter Input Sensitivity 10.00 mV

Count Time 6 Seconds Distance Source to Detector Surface

Other Cal Constant = 1.000000E+00 Dead Time = 1.382029E-05

High Voltage	Background	Isotope Am241 Size 20.77pCi	Isotope Size	Isotope Size	Isotope Size
800	736	12151			
850	744	12243			
~~900~~	754	12231			
950	771	12417			
1000	751	12373			
1050	756	12287			
1100	894	12439			
1150	1387	13611			

Signature Jeremy Thompson Date 14-Mar-16

FORM C4A 02/26/2013 Page 3 of 3 • *Serving The Nuclear Industry Since 1962* •

Designer and Manufacturer of Scientific and Industrial Instruments

CERTIFICATE OF CALIBRATION

LUDLUM MEASUREMENTS, INC.
501 Oak Street, 325-235-5494, Sweetwater, TX 79556, U.S.A.
☐ 10744 Dutchtown Road, 865-392-4601, Knoxville, TN 37932, U.S.A.

CUSTOMER WYNSOR ENVIRONMENTAL ORDER NO. 20293336

Ludlum Measurements, Inc. Model 2350-1 Serial No. 325244

Cal. Date 1-Aug-16 Cal Due Date 1-Aug-17 Cal. Interval 1 Year Meterface NA

Check mark ☑ applies to applicable instr. and/or detector IAW mfg. spec. T. 73 °F RH 44 % Alt 704.8 mm Hg

☑ New Instrument Instrument Received ☐ Within Toler. +-10% ☐ 10-20% ☐ Out of Tol. ☐ Requiring Repair ☐ Other-See comments

☑ Mechanical check ☑ Input Sens. Linearity

☑ F/S Resp. check ☑ Reset check ☑ Window Operation

☑ Audio check ☑ Alarm Setting check ☑ Battery check (Min. Volt) 4.4 VDC

☑ Ratemeter Linearity check ☑ Integrated Dose check ☑ Recycle Mode check

☑ Data Log check ☑ Overload check ☑ Scaler Readout check Threshold Dial Ratio ___ mV

☑ Calibrated in accordance with LMI SOP 14.8 ☑ Calibrated in accordance with LMI SOP 14.9

☑ HV Readout (2 points) Ref./Inst. 500 / 500 V Ref./Inst. 2000 / 1501 V

COMMENTS: *Firmware:* 37122N32

ID 37123N05

Resolution for Cs137 ≈ 10.5%

Efficiency for Cs137, Source size 1848724 dpm, Source count: ≈ 219996 cpm, Background: ≈ 7537 cpm, Efficiency: ≈ 11.4% 4pi.

Gamma Calibration: GM detectors positioned perpendicular to source except for M 44-9 in which the front of probe faces source.

	Probe Model	Serial #	High Voltage	Threshold	Units/ Time Base	Dead Time Correction Factor	Calibration Constant	Linearity ±10%*
Detector #1	44-10	PR357763	750	100	7 / 1	0.000000E+00	1.000000E+00	
Detector #2	44-10PEAK	PR357763	520	642	7 / 1	0.000000E+00	1.000000E+00	
Detector #3	44-10	PR357763	750	100	4 / 2	1.100000E-05	5.289352E+10	✓
Detector #								
Detector #								
Detector #								
Detector #								
Detector #								
Detector #								
Detector #								

Units:0 – rad,1 – Gray2 – rem3 – Sv,4 – R,5 – C/Kg6 – Disintegration/s – Counts8 – Ci/cm sq.9 – Bq/cm sq.
Time Base0 – Seconds1 – Minutes2 – Hours

* See attached detector documentation, if app

Digital Readout	REFERENCE CAL. POINT	INSTRUMENT RECEIVED	INSTRUMENT METER READING*	REFERENCE CAL. POINT	INSTRUMENT RECEIVED	INSTRUMENT METER READING*
	400 Kcpm		400 11(0)	400cpm		40 (0)
	40 Kcpm		400 ✓	40 cpm		4 ✓
	4 Kcpm		400 ✓			

Ludlum Measurements, Inc. certifies that the above instrument has been calibrated by standards traceable to the National Institute of Standards and Technology, or to the calibration facilities of other International Standards Organization members, or have been derived from accepted values of natural physical constants or have been derived by the ratio type of calibration techniques. The calibration system conforms to the requirements of ANSI/NCSL Z540-1-1994 and ANSI N323-1978. State of Texas Calibration License No. LO-1983

Reference Instruments and/or Sources: Cs-137 S/N: ☐ 059 ☐ 2171CP ☐ 2261CP ☑ 720 ☐ 734 ☐ 781 ☐ 1131 ☑ 1616 ☐ 1686 ☐ 1909 ☐ 1916CP ☐ 2324/2521 ☐ 5717CO ☐ 5719CO ☐ 60646 ☐ 70897 ☐ 73410 ☐ E552 ☐ G112 ☐ 2168CP ☐ S-394 ☐ S-1054 ☐ T10031 ☐ T10082 Neutron Am-241 Be ☐ T-304 Ra-226 ☐ Y932

☐ Alpha S/N ☐ Beta S/N ☑ Other Am241~0.72µCi

☑ m 500 S/N 235943 ☑ Multimeter S/N 94890214

Calibrator Tina Mazzo Title Calibrator Date 1-Aug-16

QC'd By Diane Dehoen Title Final QC Date 4 Aug 16

FORM C44C 07/25/2016 Page 1 of 3

This certificate shall not be reproduced except in full, without the written approval of Ludlum Measurements, Inc.

Designer and Manufacturer of Scientific and Industrial Instruments

LUDLUM MEASUREMENTS, INC.
501 Oak Street
325-235-5494
Sweetwater, TX 79556, U.S.A.

10744 Dutchtown Road
865-392-4601
Knoxville, TN 37932, U.S.A.

Bench Test Data For Detector

Detector 44-10 Serial No. PR357763

Customer WYNSOR ENVIRONMENTAL Order #. 20293336

Counter 2350-1 Serial No. 325244 Counter Input Sensitivity 10.00 mV

Count Time 60 Seconds Distance Source to Detector Surface

Other Cal Constant = 1.000000E+00 Dead Time = 0.000000E+00

High Voltage	Background	Isotope Am241 Size 5.02uCi	Isotope Size	Isotope Size	Isotope Size
500	476	485			
550	618	5834			
600	698	10265			
650	730	11283			
700	734	11354			
750	792	11444			
800	766	11190			
850	667	11610			
900	867	11702			
950	1571	13400			

Signature Ana Ortego Date 1-Aug-16

FORM C4A 02/28/2013 Page 2 of 3 • *Serving The Nuclear Industry Since 1962* •

Designer and Manufacturer of Scientific and Industrial Instruments

LUDLUM MEASUREMENTS, INC.
501 Oak Street, 325-235-5494, Sweetwater, TX 79556, U.S.A.
☐ 10744 Dutchtown Road, 865-382-4601, Knoxville, TN 37932, U.S.A.

Model 2350 Bench Test Data

Customer WYNSOR ENVIRONMENTAL Date 1-Aug-16 Order #. 20293336

Model 2350-1 Serial No. 325244 Detector #4-10 Serial No. PR357763

Source Cs137 424mCi, 3mCi

High Voltage 750 V As Found ____ V. Input 10.00 mV As Found ____ mV.

Cal. Constant 5.289352E+10 as found ____

Dead Time 1.100000E-05 as found ____

Alarm Setting: Ratemeter 1000000000.000000 as found ____

Scaler 1000000.000000 as found ____

Integrated dose 1000000000.0000 as found ____

Overload ☐On ☑Off as found ☐On ☐Off Window ±10% ~~1000~~ (OFF) as found ____

Detector Received: ☐ Within Toler. +-10% ☐ 10-20% ☐ Out of Tol. ☐ Requiring Repair ☐ Other-See comments

Reference Point	"As Found" Readings: Meter Reading	After Adjustment Readings: Meter Reading
2mR/hr		1.86 mR/hr
1mR/hr		1.10 mR/hr
500μR/hr		503 μR/hr
200μR/hr		202 μR/hr
100μR/hr		99.1 μR/hr

Other ____

Signature [illegible] Date 1-Aug-16

FORM C5-1 02/26/2013 Page 3 of 3 • *Serving The Nuclear Industry Since 1962* •

Designer and Manufacturer of Scientific and Industrial Instruments

CERTIFICATE OF CALIBRATION

LUDLUM MEASUREMENTS, INC.
501 Oak Street
325-235-5494
Sweetwater, TX 79556, U.S.A.
☐ 10744 Dutchtown Road
865-392-4601
Knoxville, TN 37932, U.S.A.

CUSTOMER WYNSOR ENVIRONMENTAL ORDER NO. 20293336

M. Ludlum Measurements, Inc. Model 2350-1 Serial No. 325245

Cal. Date 1-Aug-16 Cal Due Date 1-Aug-17 Cal. Interval 1 Year Meterface NA

Check mark ☑ applies to applicable instr. and/or detector IAW mfg. spec. T. 73 °F RH 44 % Alt 704.8 mm Hg

☑ New Instrument Instrument Received ☐ Within Toler. +-10% ☐ 10-20% ☐ Out of Tol. ☐ Requiring Repair ☐ Other-See comments

☑ Mechanical check ☑ Input Sens. Linearity
☑ F/S Resp. check ☑ Reset check ☑ Window Operation
☑ Audio check ☑ Alarm Setting check ☑ Battery check (Min. Volt) 4.4 VDC
☑ Ratemeter Linearity check ☑ Integrated Dose check ☑ Recycle Mode check
☑ Data Log check ☑ Overload check ☑ Scaler Readout check Threshold Dial Ratio = mV
☑ Calibrated in accordance with LMI SOP 14.8 ☑ Calibrated in accordance with LMI SOP 14.9

☑ HV Readout (2 points) Ref./Inst. 500 / 501 V Ref./Inst. 2000 / 1993 V

COMMENTS: *Firmware: 37122N32*

IO 37123N05

Resolution for Cs137 ≈ 10.4%
Efficiency for Cs137, source size, 848724 dpm, source count: ≈ 226715 dpm,
Background: ≈ 7981 cpm, Efficiency: ≈ 11.8%. ysi

Gamma Calibration: GM detectors positioned perpendicular to source except for M 44-9 in which the front of probe faces source.

	Probe Model	Serial #	High Voltage	Threshold	Units/ Time Base	Dead Time Correction Factor	Calibration Constant	Linearity ±10%*
Detector #1	44-10	PR357771	650	100	7 / 1	0.000000E+00	1.000000E+00	
Detector #2	44-10PEAK	PR357771	462	100	7 / 1	0.000000E+00	1.000000E+00	
Detector #3	44-10	PR357771	650	100	4 / 2	1.323235E-05	5.275088E+10	✓
Detector #								
Detector #								
Detector #								
Detector #								
Detector #								
Detector #								
Detector #								

Units: 0 – rad, 1 – Gray, 2 – rem, 3 – Sv, 4 – R, 5 – C/Kg, 6 – Disintegration, 7 – Counts, 8 – Ci/cm sq, 9 – Bq/cm sq.
Time Base: 0 – Seconds, 1 – Minutes, 2 – Hours

* See attached detector documentation, if app

Digital Readout	REFERENCE CAL. POINT	INSTRUMENT RECEIVED	INSTRUMENT METER READING*	REFERENCE CAL. POINT	INSTRUMENT RECEIVED	INSTRUMENT METER READING*
	400 Kcpm	40041 (0)		400 cpm		40 (0)
	40 Kcpm	4010)		40 cpm		4)
	4 Kcpm	401)				

Ludlum Measurements, Inc. certifies that the above instrument has been calibrated by standards traceable to the National Institute of Standards and Technology, or to the calibration facilities of other International Standards Organization members, or have been derived from accepted values of natural physical constants or have been derived by the ratio type of calibration techniques. The calibration system conforms to the requirements of ANSI/NCSL Z540-1-1994 and ANSI N323-1978. State of Texas Calibration License No. LO-1963

Reference Instruments and/or Sources: Cs-137 S/N ☐ 059 ☐ 2171CP ☐ 2261CP ☑ 720 ☐ 734 ☐ 781 ☐ 1131 ☑ 1516 ☐ 1696 ☐ 1909 ☐ 1916CP ☐ 2324/2521
☐ 5717CO ☐ 5719CO ☐ 60545 ☐ 70697 ☐ 73410 ☐ E552 ☐ G112 ☐ 2166CP ☐ S-394 ☐ S-1054 ☐ T10081 ☐ T10082 Neutron Am-241 Be ☐ T-304 Ra-226 ☐ Y982

☐ Alpha S/N ☐ Beta S/N ☑ Other Am241~0.72µCi

☑ m 500 S/N 235943 ☑ Multimeter S/N 94890214

Calibrator [signature] Title Calibrator Date 1-Aug-16

QC'd By [signature] Title Final QC Date 4 Aug 16

FORM C44C 07/25/2016 Page 1 of 3

This certificate shall not be reproduced except in full, without the written approval of Ludlum Measurements, Inc.

Designer and Manufacturer of Scientific and Industrial Instruments

LUDLUM MEASUREMENTS, INC.
501 Oak Street
325-235-5494
Sweetwater, TX 79556, U.S.A.

☐ 10744 Dutchtown Road
865-392-4601
Knoxville, TN 37932, U.S.A.

Bench Test Data For Detector

Detector 44-10 Serial No. PR357771

Customer WYNSOR ENVIRONMENTAL Order #. 20293336

Counter 2350-1 Serial No. 325245 Counter Input Sensitivity 10.00 mV

Count Time 60 seconds Distance Source to Detector Surface

Other Cal Constant = 1.000000E+00 Dead Time = 0.000000E+00

High Voltage	Background	Isotope Am241 Size 50.92uCi	Isotope Size	Isotope Size	Isotope Size
500	658	9793			
550	672	11772			
600	744	11887			
650	725	11873			
700	702	11955			
750	754	12007			
800	984	12980			
850	2094	19199			

Signature Dina Ortego Date 1-Aug-16

FORM C4A 02/26/2013 Page 2 of 3 • *Serving The Nuclear Industry Since 1962* •

Designer and Manufacturer of Scientific and Industrial Instruments

LUDLUM MEASUREMENTS, INC.

501 Oak Street, 325-235-5494, Sweetwater, TX 79556, U.S.A.

☐ 10744 Dutchtown Road, 865-392-4501, Knoxville, TN 37932, U.S.A.

Model 2350 Bench Test Data

Customer WYNSOR ENVIRONMENTAL Date 1-Aug-16 Order #. 20293336

Model 2350-1 Serial No. 325245 Detector 44-10 Serial No. PR357771

Source Cs137 42.4mCi, 3mCi

High Voltage 650 V As Found ____ V. Input 0.00 mV As Found ____ mV.

Cal. Constant 5.275088E+10 as found ____

Dead Time 1.323235E-05 as found ____

Alarm Setting: Ratemeter 1000000000.000000 as found ____

Scaler 1000000.000000 as found ____

Integrated dose 1000000000.0000 as found ____

Overload ☐ On ☑ Off as found ☐ On ☐ Off Window ~~100-49~~ TW (OFF) as found ____

Detector Received: ☐ Within Toler. +-10% ☐ 10-20% ☐ Out of Tol. ☐ Requiring Repair ☐ Other-See comments

Reference Point	"As Found" Readings: Meter Reading	After Adjustment Readings: Meter Reading
2mR/hr		2.00mR/hr
1mR/hr		1.10 mR/hr
500μR/hr		506 μR/hr
200μR/hr		201 μR/hr
100μR/hr		99.7 μR/hr

Other ____

Signature [illegible] Date 1-Aug-16

FORM C5-1 02/26/2013 Page 3 of 3 • *Serving The Nuclear Industry Since 1962* •

Attachment 4 – Laboratory Data Validation Reports

MEMORANDUM

TO: Randy Whicker,
Lou Miller

FROM: Jill Richards
Worthington Miller Environmental, LLC

DATE: January 25, 2017

SUBJECT: Data Validation for Midnite Mine Remedial Support: Final Status Survey Soil Samples from Survey Unit P1-R1 (West Access Road)

This data validation report covers the validation of the laboratory report generated for soil samples collected as part of the Final Status Survey (FSS) of Survey Unit P1-R1 (West Access Road) at the Midnite Mine Superfund Site during Remedial Action (RA) construction activities in 2016. The samples were collected November 16-17, 2016 in accordance with the approved FSS Work Plan (ERG, 2016) and RA Work Plan (MWH, 2016). This validation report addresses quality control (QC) for FSS samples sent offsite for RA verification purposes. This validation includes laboratory report S1611422 from Inter-Mountain Labs (IML) located in Sheridan, WY.

The data were verified and validated according to the Quality Assurance Project Plan (QAPP) for the Analytical Support and Verification Plan for Remediation of Surface Materials and Sediments (Appendix S: Attachment S-2, of the Remedial Action Work Plan, Rev 4, April 2016), with additional review guidance provided from the U.S. Environmental Protection Agency (USEPA) CLP National Functional Guidelines for Inorganic Superfund Data Review (USEPA, 2010), radiochemical data verification and validation guidance from the Multi-Agency Radiological Laboratory Analytical Protocols Manual (MARLAP) (USEPA et al., 2004), and specific method requirements.

LAB REPORT: IML# S1611422

Sample IDs			
P1R1-1-0015-SOI-DIS-01	P1R1-22-0015-SOI-DIS-01	P1R1-43-0015-SOI-DIS-01	P1R1-64-0015-SOI-DIS-01
P1R1-2-0015-SOI-DIS-01	P1R1-23-0015-SOI-DIS-01	P1R1-44-0015-SOI-DIS-01	P1R1-65-0015-SOI-DIS-01
P1R1-3-0015-SOI-DIS-01	P1R1-24-0015-SOI-DIS-01	P1R1-45-0015-SOI-DIS-01	P1R1-66-0015-SOI-DIS-01
P1R1-4-0015-SOI-DIS-01	P1R1-25-0015-SOI-DIS-01	P1R1-46-0015-SOI-DIS-01	P1R1-67-0015-SOI-DIS-01
P1R1-5-0015-SOI-DIS-01	P1R1-26-0015-SOI-DIS-01	P1R1-47-0015-SOI-DIS-01	P1R1-68-0015-SOI-DIS-01
P1R1-6-0015-SOI-DIS-01	P1R1-27-0015-SOI-DIS-01	P1R1-48-0015-SOI-DIS-01	P1R1-69-0015-SOI-DIS-01
P1R1-7-0015-SOI-DIS-01	P1R1-28-0015-SOI-DIS-01	P1R1-49-0015-SOI-DIS-01	P1R1-70-0015-SOI-DIS-01
P1R1-8-0015-SOI-DIS-01	P1R1-29-0015-SOI-DIS-01	P1R1-50-0015-SOI-DIS-01	P1R1-71-0015-SOI-DIS-01
P1R1-9-0015-SOI-DIS-01	P1R1-30-0015-SOI-DIS-01	P1R1-51-0015-SOI-DIS-01	P1R1-72-0015-SOI-DIS-01
P1R1-10-0015-SOI-DIS-01	P1R1-31-0015-SOI-DIS-01	P1R1-52-0015-SOI-DIS-01	P1R1-73-0015-SOI-DIS-01
P1R1-11-0015-SOI-DIS-01	P1R1-32-0015-SOI-DIS-01	P1R1-53-0015-SOI-DIS-01	P1R1-74-0015-SOI-DIS-01
P1R1-12-0015-SOI-DIS-01	P1R1-33-0015-SOI-DIS-01	P1R1-54-0015-SOI-DIS-01	P1R1-75-0015-SOI-DIS-01
P1R1-13-0015-SOI-DIS-01	P1R1-34-0015-SOI-DIS-01	P1R1-55-0015-SOI-DIS-01	P1R1-B1-0015-SOI-01
P1R1-14-0015-SOI-DIS-01	P1R1-35-0015-SOI-DIS-01	P1R1-56-0015-SOI-DIS-01	P1R1-B2-0015-SOI-01
P1R1-15-0015-SOI-DIS-01	P1R1-36-0015-SOI-DIS-01	P1R1-57-0015-SOI-DIS-01	P1R1-B3-0015-SOI-01
P1R1-16-0015-SOI-DIS-01	P1R1-37-0015-SOI-DIS-01	P1R1-58-0015-SOI-DIS-01	Field Duplicates:
P1R1-17-0015-SOI-DIS-01	P1R1-38-0015-SOI-DIS-01	P1R1-59-0015-SOI-DIS-01	P1R1-20-0015-SOI-DIS-02
P1R1-18-0015-SOI-DIS-01	P1R1-39-0015-SOI-DIS-01	P1R1-60-0015-SOI-DIS-01	P1R1-30-0015-SOI-DIS-02
P1R1-19-0015-SOI-DIS-01	P1R1-40-0015-SOI-DIS-01	P1R1-61-0015-SOI-DIS-01	P1R1-43-0015-SOI-DIS-02
P1R1-20-0015-SOI-DIS-01	P1R1-41-0015-SOI-DIS-01	P1R1-62-0015-SOI-DIS-01	P1R1-46-0015-SOI-DIS-02
P1R1-21-0015-SOI-DIS-01	P1R1-42-0015-SOI-DIS-01	P1R1-63-0015-SOI-DIS-01	P1R1-3-0015-SOI-02

Overview: Sample Handling and Analyses

- 83 soil samples sampled 11/16/16 – 11/17/16 were sent for analysis to IML Labs in Sheridan, WY.
- The sample cooler temperature was 10.8° C.
- The samples were analyzed within recommended holding times.
- COCs were complete, and the samples were analyzed for natural uranium (U-nat) by ICP-MS M6020, Lead-210 (Pb-210) by M909.0 and Radium-226 (Ra-226) by Gamma Spectroscopy M901.1.
- The detection limits for the analyses met the project target detection limits per the project QAPP.
- Five field QC (field duplicate) samples were submitted with this sample batch. Note that the field duplicate for sample P1R1-3-0015-SOI-DIS-01 was mislabeled on COC as P1R1-3-0015-SOI-02; it should have been labeled P1R1-3-0015-SOI-DIS-02.

Run Log Review:

Sample required frequencies and placement of calibration blanks, calibration verification standards (per USEPA CLP 2010 and MARLAP 2004) and the quality control samples required in the project QAPP were checked for each run batch.

ICP-MS Calibration data were reviewed within the raw data for U-nat analysis:

- ICP-MS initial calibrations were reviewed and within guidelines; correlation coefficients were > 0.995 for target analyte.
- The initial calibration blanks (ICB) and continuing calibration blanks (CCB) were at the proper frequency and placement and were all less than the practical quantitation limit (PQL).
- All initial calibration verification (ICV) and continuing calibration verification (CCV) sample % recoveries were at proper frequency and placement and within project limits (90-110%).

ICP-MS Interference check samples:

- Interference Check Sample (ICS): ICSA and ICSAB samples were listed as part of the batch in the run log, and ICSAB recovery was within limits.
- Serial Dilution (SD): a SD was performed and was within limits.

ICP-MS Tune Analysis:

- Results for the MS tuning sample were present and within guidelines (RSD <5%).

ICP-MS Internal Standards:

- The internal standards (ISTD) were reviewed within the raw data for the ICP-MS analysis. ISTD analyzed included: Li, Sc, In, Re, Th, Ge, Y and Rh. ISTD % Recoveries were within the % Relative Intensity (RI) method (6020) limit (60-125%) for the samples, standards and QC.

Radionuclide Raw Data: Review of the raw data was completed to verify documentation of applicable required elements per MARLAP recommendations. In addition to preservation and sample receipt information noted above, the following elements were present per method requirements and reviewed for each analysis:

- Run logs,
- Tracking: Data were linked to the specific instrument/detector on which they were counted,
- Sample size (aliquant) and count times,
- Sample, calibration, QC and blank spectrum for Ra-226,
- Background and efficiency reports for Pb-210,
- Spectral resolution data: full width at half maximum (FWHM), and
- Traceability: Documentation of standards and reference materials used.

Accuracy

The accuracy of the data was evaluated based on the method blank results, extraction efficiency (lab control sample (LCS) % recoveries, and matrix spike (MS)/matrix spike duplicate (MSD) % recoveries.

- Method blank: All analytes were non-detect (ND) in the method blank.
- LCS Recoveries: LCS recoveries were within limits for all analytes reported.

- MS/MSD Recoveries: The MS/MSD recoveries were within laboratory and project limits.

Precision

Laboratory precision was based on the MS/MSD RPDs for the Pb-210 and U-nat analysis, and the analytical duplicate RPDs for the Ra-226 analysis. The limits for both are 20 % RPD for concentrations > 5x the reporting limit.

- The MS/MSD RPDs were within limits.
- The analytical duplicate RPDs were within limits

The field duplicates were evaluated as follows: a control limit of 5x the reporting limit was utilized to assess the absolute difference between the sample results when one or both sample results were less than 10x the reporting limit, otherwise a relative percent difference (RPD) of 50% was applied. Field precision was measured for five samples. Primary sample/field duplicate comparisons were within project control limits for all analyses.

Completeness

Analytical results were reported for all samples submitted. The results were determined to be usable as reported with no data qualifications.

References

Environmental Restoration Group, Inc. (ERG). 2016. Final Status Survey Work Plan, West Access Road. Midnite Mine, Stevens County, WA. Revision 2. November 3, 2016.

MWH Americas, Inc. (MWH). 2016. Midnite Mine Superfund Site Remedial Action Work Plan. Revision 4. April.

U.S. Environmental Protection Agency; U.S. Department of Defense; U.S. Department of Energy; U.S. Department of Homeland Security; U.S. Nuclear Regulatory Commission; U.S. Food and Drug Administration; U.S. Geological Survey; National Institute of Standards and Technology. (USEPA et al.). 2004. Multi-Agency Radiological Laboratory Analytical Protocols Manual (MARLAP). NUREG -1576, EPA 402-N-04-001A, NTIS PB2004-105421. July 2004

U.S. Environmental Protection Agency (USEPA). 2010. CLP National Functional Guidelines for Inorganic Superfund Data Review. Office of Remediation and Technology Innovation, USEPA, Washington, DC 20460. OSWER 9240.1-51. January.

MEMORANDUM

TO: Randy Whicker,
Lou Miller

FROM: Jill Richards
Worthington Miller Environmental, LLC

DATE: June 19, 2017

SUBJECT: Data Validation for Midnite Mine Remedial Support: Final Status Survey Soil Samples from Survey Unit P1-R1 (West Access Road)

This data validation report covers the validation of the laboratory report generated for two soil samples collected as part of the Final Status Survey (FSS) of Survey Unit P1-R1 (West Access Road) at the Midnite Mine Superfund Site during Remedial Action (RA) construction activities in 2017. The samples were collected May 1, 2017 in accordance with the approved FSS Work Plan (ERG, 2016) and RA Work Plan (MWH, 2016). This validation report addresses quality control (QC) FSS samples sent offsite for RA verification purposes. This validation includes laboratory report S170570001 from Inter-Mountain Labs (IML) located in Sheridan, WY.

The data were verified and validated according to the Quality Assurance Project Plan (QAPP) for the Analytical Support and Verification Plan for Remediation of Surface Materials and Sediments (Appendix S: Attachment S-2, of the Remedial Action Work Plan, Rev 4, April 2016), with additional radiochemical data verification and validation guidance from the Multi-Agency Radiological Laboratory Analytical Protocols Manual (MARLAP) (USEPA et al., 2004), along with specific method requirements.

LAB REPORT: IML# S1705070001

Sample IDs	
P1R1-13(R1)-0015-SOI-DIS-01	P1R1-13(R2)-0015-SOI-DIS-01

Overview: Sample Handling and Analyses

- Two soil samples sampled 5/1/2017 were sent for analysis to IML Labs in Sheridan, WY.
- The sample cooler temperature was 16.7° C.
- The samples were analyzed within recommended holding times.
- COCs were complete, and the samples were analyzed for Radium-226 (Ra-226) by Gamma Spectroscopy M901.1.
- There was an error in the laboratory transcription of one of the sample IDs - sample P1R1-13(R2)-0015-SOI-DIS-01 was incorrectly listed in the report as P1R1-13(R12)-0015-SOI-DIS-01. The laboratory was contacted and released a revised report with the correct sample ID to match the COC.
- The detection limits for the analyses met the project target detection limits per the project QAPP.
- No field QC (field duplicate) samples were submitted with this sample batch.

Run Log Review:

Quality control sample placement and frequencies per MARLAP (2004) and the project QAPP were checked and confirmed in the run batch.

Radionuclide Raw Data: Review of the raw data was completed to verify documentation of applicable required elements per MARLAP recommendations. In addition to preservation and sample receipt information noted above, the following elements were present per method requirements and reviewed for each analysis:

- Run logs,
- Tracking: Data were linked to the specific instrument/detector on which they were counted,
- Sample size (aliquant) and count times,
- Sample, calibration, QC and blank spectrum,
- Background and efficiency reports,
- Spectral resolution data: full width at half maximum (FWHM), and
- Traceability: Documentation of standards and reference materials used.

Accuracy

The accuracy of the data was evaluated based on the method blank results and extraction efficiency (lab control sample (LCS) % recoveries.

- Method blank: Ra-226 was non-detect (ND) in the method blank.
- LCS Recoveries: The LCS recoveries were within limits.

Precision

Laboratory precision was based on the analytical duplicate RPD for the Ra-226 analysis. The limits are 20 % RPD for concentrations > 5x the reporting limit.

- The analytical duplicate RPD was within limits.

Completeness

Analytical results were reported for all samples submitted. The results were determined to be usable as reported with no data qualifications.

References

Environmental Restoration Group, Inc. (ERG). 2016. Final Status Survey Work Plan, West Access Road. Midnite Mine, Stevens County, WA. Revision 2. November 3, 2016.

MWH Americas, Inc. (MWH). 2016. Midnite Mine Superfund Site Remedial Action Work Plan. Revision 4. April.

U.S. Environmental Protection Agency; U.S. Department of Defense; U.S. Department of Energy; U.S. Department of Homeland Security; U.S. Nuclear Regulatory Commission; U.S. Food and Drug Administration; U.S. Geological Survey; National Institute of Standards and Technology. (USEPA et al.). 2004. Multi-Agency Radiological Laboratory Analytical Protocols Manual (MARLAP). NUREG -1576, EPA 402-N-04-001A, NTIS PB2004-105421. July 2004

Attachment 5 – Laboratory Data Reports

Inter-Mountain Labs
Your Environmental Monitoring Partner
1673 Terra Avenue, Sheridan, Wyoming 82801 ph: (307) 672-8945

Date: 6/19/2017

CLIENT: Dawn Mining Company
Project: Midnite Mine Remedial Action
Lab Order: S1611422

CASE NARRATIVE

Report ID: S1611422002
(Replaces S1611422001)

This report contains:

Case Narrative - 2 page
Sample Analysis Report - 83 pages
Analytical QC Summary Report - 5 page
ICP-MS Data and Supporting Documentation - 105 pages
Gamma Spec LIMS Report and Export File - 8 pages
Gamma Spec Ra 226 Spectrum and ROI Data - 214 pages
Gamma Spec Ra 226 Standards Certificates - 17 pages
Gamma Spec Ra 226 ROI Calibration and Blanks - 32 pages
Pb 210 909.0Mod Data and Supporting Documentation - 38 pages
Original COC, Condition Upon Receipt and Supporting Documentation - 9 page

---

Samples P1R1-1-0015-SOI-DIS-01, P1R1-10-0015-SOI-DIS-01, P1R1-11-0015-SOI-DIS-01, P1R1-12-0015-SOI-DIS-01, P1R1-13-0015-SOI-DIS-01, P1R1-14-0015-SOI-DIS-01, P1R1-15-0015-SOI-DIS-01, P1R1-16-0015-SOI-DIS-01, P1R1-17-0015-SOI-DIS-01, P1R1-18-0015-SOI-DIS-01, P1R1-19-0015-SOI-DIS-01, P1R1-2-0015-SOI-DIS-01, P1R1-20-0015-SOI-DIS-01, P1R1-20-0015-SOI-DIS-02, P1R1-21-0015-SOI-DIS-01, P1R1-22-0015-SOI-DIS-01, P1R1-23-0015-SOI-DIS-01, P1R1-24-0015-SOI-DIS-01, P1R1-25-0015-SOI-DIS-01, P1R1-26-0015-SOI-DIS-01, P1R1-27-0015-SOI-DIS-01, P1R1-28-0015-SOI-DIS-01, P1R1-29-0015-SOI-DIS-01, P1R1-3-0015-SOI-02, P1R1-3-0015-SOI-DIS-01, P1R1-30-0015-SOI-DIS-01, P1R1-30-0015-SOI-DIS-02, P1R1-31-0015-SOI-DIS-01, P1R1-32-0015-SOI-DIS-01, P1R1-33-0015-SOI-DIS-01, P1R1-34-0015-SOI-DIS-01, P1R1-35-0015-SOI-DIS-01, P1R1-36-0015-SOI-DIS-01, P1R1-37-0015-SOI-DIS-01, P1R1-38-0015-SOI-DIS-01, P1R1-39-0015-SOI-DIS-01, P1R1-4-0015-SOI-DIS-01, P1R1-40-0015-SOI-DIS-01, P1R1-41-0015-SOI-DIS-01, P1R1-42-0015-SOI-DIS-01, P1R1-43-0015-SOI-DIS-01, P1R1-43-0015-SOI-DIS-02, P1R1-44-0015-SOI-DIS-01, P1R1-45-0015-SOI-DIS-01, P1R1-46-0015-SOI-DIS-01, P1R1-46-0015-SOI-DIS-02, P1R1-47-0015-SOI-DIS-01, P1R1-48-0015-SOI-DIS-01, P1R1-49-0015-SOI-DIS-01, P1R1-5-0015-SOI-DIS-01, P1R1-50-0015-SOI-DIS-01, P1R1-51-0015-SOI-DIS-01, P1R1-52-0015-SOI-DIS-01, P1R1-53-0015-SOI-DIS-01, P1R1-54-0015-SOI-DIS-01, P1R1-55-0015-SOI-DIS-01, P1R1-56-0015-SOI-DIS-01, P1R1-57-0015-SOI-DIS-01, P1R1-58-0015-SOI-DIS-01, P1R1-59-0015-SOI-DIS-01, P1R1-6-0015-SOI-DIS-01, P1R1-60-0015-SOI-DIS-01, P1R1-61-0015-SOI-DIS-01, P1R1-62-0015-SOI-DIS-01, P1R1-63-0015-SOI-DIS-01, P1R1-64-0015-SOI-DIS-01, P1R1-65-0015-SOI-DIS-01, P1R1-66-0015-SOI-DIS-01, P1R1-67-0015-SOI-DIS-01, P1R1-68-0015-SOI-DIS-01, P1R1-69-0015-SOI-DIS-01, P1R1-7-0015-SOI-DIS-01, P1R1-70-0015-SOI-DIS-01, P1R1-71-0015-SOI-DIS-01, P1R1-72-0015-SOI-DIS-01, P1R1-73-0015-SOI-DIS-01, P1R1-74-0015-SOI-DIS-01, P1R1-75-0015-SOI-DIS-01, P1R1-8-0015-SOI-DIS-01, P1R1-9-0015-SOI-DIS-01, P1R1-B1-0015-SOI-01, P1R1-B2-0015-SOI-01, and P1R1-B3-0015-SOI-01 were received on November 23, 2016. .

All samples were received and analyzed within the EPA recommended holding times, except those noted below in this case narrative. Samples were analyzed using the methods outlined in the following references:

U.S.E.P.A. 600 "Methods for Chemical Analysis of Water and Wastes", 1993
"Standard Methods For The Examination of Water and Wastewater", 20th ed., 1998
Test Methods for Evaluating Solid Waste, Physical/Chemical Methods, SW846, 3rd Edition
Methods indicated with the Monday, March 12, 2007 Federal Register, 40 CFR Part 122, 136 et al.
US EPA Methods from Technology Transfer Network Ambient Monitoring Technology Information Center, 2009

Reviewed by:
Wade Nieuwsma, Assistant Laboratory Manager

CASE NARRATIVE

Report ID: S1611422002
(Replaces S1611422001)

All Quality objectives were achieved except as noted below:

The reporting limit for EPA 909.0 Mod (Lead 210) was raised due to low chemical yield recovery on the method blank.

Report ID S1611422002 replaces Report ID S1611422001,

Sample S1611422-020 (P1R1-20-0015-SOI-DIS-01) on page 22 of this report was revised 6/19/2017; a J qualifier was added to Pb 210 analysis to indicate the value reported is under the reporting limit.

Sample S1611422-031 (P1R1-30-0015-SOI-DIS-01) on page 33 of this report was revised 6/19/2017; a J qualifier was added to Pb 210 analysis to indicate the value reported is under the reporting limit

Reviewed by:

Wade Nieuwsma, Assistant Laboratory Manager

Sample Analysis Report

Company: Dawn Mining Company
8809 Washington St. NE Suite 150
Albuquerque, NM 87113

Date Reported 1/17/2017
Report ID S1611422001

ProjectName: Midnite Mine Remedial Action
Lab ID: S1611422-001
ClientSample ID: P1R1-1-0015-SOI-DIS-01
COC: WEB

WorkOrder: S1611422
CollectionDate: 11/16/2016
DateReceived: 11/23/2016 12:20:00 PM
FieldSampler: RW
Matrix: Soil

Comments

Analyses	Result	Units	Qual	RL	Method	Date Analyzed/Init	
Radionuclides - Total							
Radium 226	1.5	pCi/g		0.2	EPA 901.1 Mod.	12/29/2016 1457	MB
Radium 226 Precision (±)	0.2	pCi/g			EPA 901.1 Mod.	12/29/2016 1457	MB

These results apply only to the samples tested.

RL - Reporting Limit

Qualifiers:

B	Analyte detected in the associated Method Blank
E	Value above quantitation range
J	Analyte detected below quantitation limits
M	Value exceeds Monthly Ave or MCL or is less than LCL
O	Outside the Range of Dilutions
X	Matrix Effect
C	Calculated Value
H	Holding times for preparation or analysis exceeded
L	Analyzed by another laboratory
ND	Not Detected at the Reporting Limit
S	Spike Recovery outside accepted recovery limits

Reviewed by: _____
Wade Nieuwsma, Assistant Laboratory Manager

Sample Analysis Report

Company: Dawn Mining Company
8809 Washington St. NE Suite 150
Albuquerque, NM 87113

Date Reported 1/17/2017
Report ID S1611422001

ProjectName: Midnite Mine Remedial Action
Lab ID: S1611422-002
ClientSample ID: P1R1-2-0015-SOI-DIS-01
COC: WEB

WorkOrder: S1611422
CollectionDate: 11/16/2016
DateReceived: 11/23/2016 12:20:00 PM
FieldSampler: RW
Matrix: Soil

Comments

Analyses	Result	Units	Qual	RL	Method	Date Analyzed/Init	
Radionuclides - Total							
Radium 226	1.4	pCi/g		0.2	EPA 901.1 Mod.	12/29/2016 1620	MB
Radium 226 Precision (±)	0.2	pCi/g			EPA 901.1 Mod.	12/29/2016 1620	MB

These results apply only to the samples tested.

RL - Reporting Limit

Qualifiers:

B	Analyte detected in the associated Method Blank	C	Calculated Value
E	Value above quantitation range	H	Holding times for preparation or analysis exceeded
J	Analyte detected below quantitation limits	L	Analyzed by another laboratory
M	Value exceeds Monthly Ave or MCL or is less than LCL	ND	Not Detected at the Reporting Limit
O	Outside the Range of Dilutions	S	Spike Recovery outside accepted recovery limits
X	Matrix Effect		

Reviewed by: _____
Wade Nieuwsma, Assistant Laboratory Manager

Sample Analysis Report

Company: Dawn Mining Company
8809 Washington St. NE Suite 150
Albuquerque, NM 87113

Date Reported 1/17/2017
Report ID S1611422001

ProjectName: Midnite Mine Remedial Action
Lab ID: S1611422-003
ClientSample ID: P1R1-3-0015-SOI-DIS-01
COC: WEB

WorkOrder: S1611422
CollectionDate: 11/16/2016
DateReceived: 11/23/2016 12:20:00 PM
FieldSampler: RW
Matrix: Soil

Comments

Analyses	Result	Units	Qual	RL	Method	Date Analyzed/Init	
Metals - Total							
Uranium	2.95	mg/Kg		0.05	6020A	12/12/2016 1421	MS
Radionuclides - Total							
Lead 210	2.5	pCi/g		1.35	EPA 909.0 Mod.	01/12/2017 1051	MB
Lead 210 Precision (±)	0.5	pCi/g			EPA 909.0 Mod.	01/12/2017 1051	MB
Radium 226	1.5	pCi/g		0.2	EPA 901.1 Mod.	12/30/2016 827	MB
Radium 226 Precision (±)	0.2	pCi/g			EPA 901.1 Mod.	12/30/2016 827	MB

These results apply only to the samples tested.

RL - Reporting Limit

Qualifiers:

B	Analyte detected in the associated Method Blank	C	Calculated Value
E	Value above quantitation range	H	Holding times for preparation or analysis exceeded
J	Analyte detected below quantitation limits	L	Analyzed by another laboratory
M	Value exceeds Monthly Ave or MCL or is less than LCL	ND	Not Detected at the Reporting Limit
O	Outside the Range of Dilutions	S	Spike Recovery outside accepted recovery limits
X	Matrix Effect		

Reviewed by: _____
Wade Nieuwsma, Assistant Laboratory Manager

Sample Analysis Report

Company: Dawn Mining Company
8809 Washington St. NE Suite 150
Albuquerque, NM 87113

Date Reported 1/17/2017
Report ID S1611422001

ProjectName: Midnite Mine Remedial Action
Lab ID: S1611422-004
ClientSample ID: P1R1-4-0015-SOI-DIS-01
COC: WEB

WorkOrder: S1611422
CollectionDate: 11/16/2016
DateReceived: 11/23/2016 12:20:00 PM
FieldSampler: RW
Matrix: Soil

Comments

Analyses	Result	Units	Qual	RL	Method	Date Analyzed/Init	
Radionuclides - Total							
Radium 226	1.7	pCi/g		0.2	EPA 901.1 Mod.	12/30/2016 945	MB
Radium 226 Precision (±)	0.2	pCi/g			EPA 901.1 Mod.	12/30/2016 945	MB

These results apply only to the samples tested.

RL - Reporting Limit

Qualifiers:

B	Analyte detected in the associated Method Blank
E	Value above quantitation range
J	Analyte detected below quantitation limits
M	Value exceeds Monthly Ave or MCL or is less than LCL
O	Outside the Range of Dilutions
X	Matrix Effect
C	Calculated Value
H	Holding times for preparation or analysis exceeded
L	Analyzed by another laboratory
ND	Not Detected at the Reporting Limit
S	Spike Recovery outside accepted recovery limits

Reviewed by: _____
Wade Nieuwsma, Assistant Laboratory Manager

Sample Analysis Report

Company: Dawn Mining Company
8809 Washington St. NE Suite 150
Albuquerque, NM 87113

Date Reported 1/17/2017
Report ID S1611422001

ProjectName: Midnite Mine Remedial Action
Lab ID: S1611422-005
ClientSample ID: P1R1-5-0015-SOI-DIS-01
COC: WEB

WorkOrder: S1611422
CollectionDate: 11/16/2016
DateReceived: 11/23/2016 12:20:00 PM
FieldSampler: RW
Matrix: Soil

Comments

Analyses	Result	Units	Qual	RL	Method	Date Analyzed/Init	
Radionuclides - Total							
Radium 226	2.7	pCi/g		0.2	EPA 901.1 Mod.	12/30/2016 1102	MB
Radium 226 Precision (±)	0.3	pCi/g			EPA 901.1 Mod.	12/30/2016 1102	MB

These results apply only to the samples tested.

RL - Reporting Limit

Qualifiers:

B	Analyte detected in the associated Method Blank
E	Value above quantitation range
J	Analyte detected below quantitation limits
M	Value exceeds Monthly Ave or MCL or is less than LCL
O	Outside the Range of Dilutions
X	Matrix Effect
C	Calculated Value
H	Holding times for preparation or analysis exceeded
L	Analyzed by another laboratory
ND	Not Detected at the Reporting Limit
S	Spike Recovery outside accepted recovery limits

Reviewed by: _____
Wade Nieuwsma, Assistant Laboratory Manager

Sample Analysis Report

Company: Dawn Mining Company
8809 Washington St. NE Suite 150
Albuquerque, NM 87113

Date Reported 1/17/2017
Report ID S1611422001

ProjectName: Midnite Mine Remedial Action
Lab ID: S1611422-006
ClientSample ID: P1R1-6-0015-SOI-DIS-01
COC: WEB

WorkOrder: S1611422
CollectionDate: 11/16/2016
DateReceived: 11/23/2016 12:20:00 PM
FieldSampler: RW
Matrix: Soil

Comments

Analyses	Result	Units	Qual	RL	Method	Date Analyzed/Init	
Radionuclides - Total							
Radium 226	1.3	pCi/g		0.2	EPA 901.1 Mod.	12/30/2016 1218	MB
Radium 226 Precision (±)	0.2	pCi/g			EPA 901.1 Mod.	12/30/2016 1218	MB

These results apply only to the samples tested.

RL - Reporting Limit

Qualifiers:

B	Analyte detected in the associated Method Blank
E	Value above quantitation range
J	Analyte detected below quantitation limits
M	Value exceeds Monthly Ave or MCL or is less than LCL
O	Outside the Range of Dilutions
X	Matrix Effect
C	Calculated Value
H	Holding times for preparation or analysis exceeded
L	Analyzed by another laboratory
ND	Not Detected at the Reporting Limit
S	Spike Recovery outside accepted recovery limits

Reviewed by: _____
Wade Nieuwsma, Assistant Laboratory Manager

Sample Analysis Report

Company: Dawn Mining Company
8809 Washington St. NE Suite 150
Albuquerque, NM 87113

Date Reported 1/17/2017
Report ID S1611422001

ProjectName: Midnite Mine Remedial Action
Lab ID: S1611422-007
ClientSample ID: P1R1-7-0015-SOI-DIS-01
COC: WEB

WorkOrder: S1611422
CollectionDate: 11/16/2016
DateReceived: 11/23/2016 12:20:00 PM
FieldSampler: RW
Matrix: Soil

Comments

Analyses	Result	Units	Qual	RL	Method	Date Analyzed/Init	
Radionuclides - Total							
Radium 226	1.6	pCi/g		0.2	EPA 901.1 Mod.	12/30/2016 1336	MB
Radium 226 Precision (±)	0.2	pCi/g			EPA 901.1 Mod.	12/30/2016 1336	MB

These results apply only to the samples tested.

RL - Reporting Limit

Qualifiers:

B	Analyte detected in the associated Method Blank
E	Value above quantitation range
J	Analyte detected below quantitation limits
M	Value exceeds Monthly Ave or MCL or is less than LCL
O	Outside the Range of Dilutions
X	Matrix Effect
C	Calculated Value
H	Holding times for preparation or analysis exceeded
L	Analyzed by another laboratory
ND	Not Detected at the Reporting Limit
S	Spike Recovery outside accepted recovery limits

Reviewed by: _____
Wade Nieuwsma, Assistant Laboratory Manager

Sample Analysis Report

Company: Dawn Mining Company
8809 Washington St. NE Suite 150
Albuquerque, NM 87113

Date Reported 1/17/2017
Report ID S1611422001

ProjectName: Midnite Mine Remedial Action
Lab ID: S1611422-008
ClientSample ID: P1R1-8-0015-SOI-DIS-01
COC: WEB

WorkOrder: S1611422
CollectionDate: 11/16/2016
DateReceived: 11/23/2016 12:20:00 PM
FieldSampler: RW
Matrix: Soil

Comments

Analyses	Result	Units	Qual	RL	Method	Date Analyzed/Init	
Metals - Total							
Uranium	2.82	mg/Kg		0.05	6020A	12/12/2016 1433	MS
Radionuclides - Total							
Lead 210	1.9	pCi/g		1.35	EPA 909.0 Mod.	01/12/2017 1051	MB
Lead 210 Precision (±)	0.5	pCi/g			EPA 909.0 Mod.	01/12/2017 1051	MB
Radium 226	1.6	pCi/g		0.2	EPA 901.1 Mod.	12/30/2016 1336	MB
Radium 226 Precision (±)	0.2	pCi/g			EPA 901.1 Mod.	12/30/2016 1336	MB

These results apply only to the samples tested.

RL - Reporting Limit

Qualifiers:

B	Analyte detected in the associated Method Blank	C	Calculated Value
E	Value above quantitation range	H	Holding times for preparation or analysis exceeded
J	Analyte detected below quantitation limits	L	Analyzed by another laboratory
M	Value exceeds Monthly Ave or MCL or is less than LCL	ND	Not Detected at the Reporting Limit
O	Outside the Range of Dilutions	S	Spike Recovery outside accepted recovery limits
X	Matrix Effect		

Reviewed by: _____
Wade Nieuwsma, Assistant Laboratory Manager

Sample Analysis Report

Company: Dawn Mining Company
8809 Washington St. NE Suite 150
Albuquerque, NM 87113

Date Reported 1/17/2017
Report ID S1611422001

ProjectName: Midnite Mine Remedial Action
Lab ID: S1611422-009
ClientSample ID: P1R1-9-0015-SOI-DIS-01
COC: WEB

WorkOrder: S1611422
CollectionDate: 11/16/2016
DateReceived: 11/23/2016 12:20:00 PM
FieldSampler: RW
Matrix: Soil

Comments

Analyses	Result	Units	Qual	RL	Method	Date Analyzed/Init	
Radionuclides - Total							
Radium 226	1.6	pCi/g		0.2	EPA 901.1 Mod.	12/30/2016 1610	MB
Radium 226 Precision (±)	0.2	pCi/g			EPA 901.1 Mod.	12/30/2016 1610	MB

These results apply only to the samples tested.

RL - Reporting Limit

Qualifiers:

B	Analyte detected in the associated Method Blank
E	Value above quantitation range
J	Analyte detected below quantitation limits
M	Value exceeds Monthly Ave or MCL or is less than LCL
O	Outside the Range of Dilutions
X	Matrix Effect
C	Calculated Value
H	Holding times for preparation or analysis exceeded
L	Analyzed by another laboratory
ND	Not Detected at the Reporting Limit
S	Spike Recovery outside accepted recovery limits

Reviewed by: _____
Wade Nieuwsma, Assistant Laboratory Manager

Sample Analysis Report

Company: Dawn Mining Company
8809 Washington St. NE Suite 150
Albuquerque, NM 87113

Date Reported 1/17/2017
Report ID S1611422001

ProjectName: Midnite Mine Remedial Action
Lab ID: S1611422-010
ClientSample ID: P1R1-10-0015-SOI-DIS-01
COC: WEB

WorkOrder: S1611422
CollectionDate: 11/16/2016
DateReceived: 11/23/2016 12:20:00 PM
FieldSampler: RW
Matrix: Soil

Comments

Analyses	Result	Units	Qual	RL	Method	Date Analyzed/Init	
Radionuclides - Total							
Radium 226	1.7	pCi/g		0.2	EPA 901.1 Mod.	01/03/2017 804	MB
Radium 226 Precision (±)	0.2	pCi/g			EPA 901.1 Mod.	01/03/2017 804	MB

These results apply only to the samples tested.

RL - Reporting Limit

Qualifiers:

B	Analyte detected in the associated Method Blank
E	Value above quantitation range
J	Analyte detected below quantitation limits
M	Value exceeds Monthly Ave or MCL or is less than LCL
O	Outside the Range of Dilutions
X	Matrix Effect
C	Calculated Value
H	Holding times for preparation or analysis exceeded
L	Analyzed by another laboratory
ND	Not Detected at the Reporting Limit
S	Spike Recovery outside accepted recovery limits

Reviewed by: _____
Wade Nieuwsma, Assistant Laboratory Manager

Sample Analysis Report

Company: Dawn Mining Company
8809 Washington St. NE Suite 150
Albuquerque, NM 87113

Date Reported 1/17/2017
Report ID S1611422001

ProjectName: Midnite Mine Remedial Action
Lab ID: S1611422-011
ClientSample ID: P1R1-11-0015-SOI-DIS-01
COC: WEB

WorkOrder: S1611422
CollectionDate: 11/16/2016
DateReceived: 11/23/2016 12:20:00 PM
FieldSampler: RW
Matrix: Soil

Comments

Analyses	Result	Units	Qual	RL	Method	Date Analyzed/Init	
Radionuclides - Total							
Radium 226	3.2	pCi/g		0.2	EPA 901.1 Mod.	01/03/2017 929	MB
Radium 226 Precision (±)	0.3	pCi/g			EPA 901.1 Mod.	01/03/2017 929	MB

These results apply only to the samples tested.

RL - Reporting Limit

Qualifiers:

B	Analyte detected in the associated Method Blank
E	Value above quantitation range
J	Analyte detected below quantitation limits
M	Value exceeds Monthly Ave or MCL or is less than LCL
O	Outside the Range of Dilutions
X	Matrix Effect
C	Calculated Value
H	Holding times for preparation or analysis exceeded
L	Analyzed by another laboratory
ND	Not Detected at the Reporting Limit
S	Spike Recovery outside accepted recovery limits

Reviewed by: _____
Wade Nieuwsma, Assistant Laboratory Manager

Sample Analysis Report

Company: Dawn Mining Company
8809 Washington St. NE Suite 150
Albuquerque, NM 87113

Date Reported 1/17/2017
Report ID S1611422001

ProjectName: Midnite Mine Remedial Action
Lab ID: S1611422-012
ClientSample ID: P1R1-12-0015-SOI-DIS-01
COC: WEB

WorkOrder: S1611422
CollectionDate: 11/16/2016
DateReceived: 11/23/2016 12:20:00 PM
FieldSampler: RW
Matrix: Soil

Comments

Analyses	Result	Units	Qual	RL	Method	Date Analyzed/Init	
Radionuclides - Total							
Radium 226	1.4	pCi/g		0.2	EPA 901.1 Mod.	01/03/2017 1103	MB
Radium 226 Precision (±)	0.2	pCi/g			EPA 901.1 Mod.	01/03/2017 1103	MB

These results apply only to the samples tested.

RL - Reporting Limit

Qualifiers:

B	Analyte detected in the associated Method Blank	C	Calculated Value
E	Value above quantitation range	H	Holding times for preparation or analysis exceeded
J	Analyte detected below quantitation limits	L	Analyzed by another laboratory
M	Value exceeds Monthly Ave or MCL or is less than LCL	ND	Not Detected at the Reporting Limit
O	Outside the Range of Dilutions	S	Spike Recovery outside accepted recovery limits
X	Matrix Effect		

Reviewed by: _____
Wade Nieuwsma, Assistant Laboratory Manager

Sample Analysis Report

Company: Dawn Mining Company
8809 Washington St. NE Suite 150
Albuquerque, NM 87113

Date Reported 1/17/2017
Report ID S1611422001

ProjectName: Midnite Mine Remedial Action
Lab ID: S1611422-013
ClientSample ID: P1R1-13-0015-SOI-DIS-01
COC: WEB

WorkOrder: S1611422
CollectionDate: 11/16/2016
DateReceived: 11/23/2016 12:20:00 PM
FieldSampler: RW
Matrix: Soil

Comments

Analyses	Result	Units	Qual	RL	Method	Date Analyzed/Init	
Metals - Total							
Uranium	37.7	mg/Kg		0.05	6020A	12/12/2016 1519	MS
Radionuclides - Total							
Lead 210	6.2	pCi/g		1.35	EPA 909.0 Mod.	01/12/2017 1051	MB
Lead 210 Precision (±)	0.6	pCi/g			EPA 909.0 Mod.	01/12/2017 1051	MB
Radium 226	5.8	pCi/g		0.2	EPA 901.1 Mod.	01/03/2017 1227	MB
Radium 226 Precision (±)	0.3	pCi/g			EPA 901.1 Mod.	01/03/2017 1227	MB

These results apply only to the samples tested.

RL - Reporting Limit

Qualifiers:

B	Analyte detected in the associated Method Blank
E	Value above quantitation range
J	Analyte detected below quantitation limits
M	Value exceeds Monthly Ave or MCL or is less than LCL
O	Outside the Range of Dilutions
X	Matrix Effect
C	Calculated Value
H	Holding times for preparation or analysis exceeded
L	Analyzed by another laboratory
ND	Not Detected at the Reporting Limit
S	Spike Recovery outside accepted recovery limits

Reviewed by: _____
Wade Nieuwsma, Assistant Laboratory Manager

Sample Analysis Report

Company: Dawn Mining Company
8809 Washington St. NE Suite 150
Albuquerque, NM 87113

Date Reported 1/17/2017
Report ID S1611422001

ProjectName: Midnite Mine Remedial Action
Lab ID: S1611422-014
ClientSample ID: P1R1-14-0015-SOI-DIS-01
COC: WEB

WorkOrder: S1611422
CollectionDate: 11/16/2016
DateReceived: 11/23/2016 12:20:00 PM
FieldSampler: RW
Matrix: Soil

Comments

Analyses	Result	Units	Qual	RL	Method	Date Analyzed/Init	
Metals - Total							
Uranium	2.77	mg/Kg		0.05	6020A	12/12/2016 1525	MS
Radionuclides - Total							
Lead 210	2.0	pCi/g		1.35	EPA 909.0 Mod.	01/12/2017 1051	MB
Lead 210 Precision (±)	0.5	pCi/g			EPA 909.0 Mod.	01/12/2017 1051	MB
Radium 226	1.4	pCi/g		0.2	EPA 901.1 Mod.	01/03/2017 1626	MB
Radium 226 Precision (±)	0.2	pCi/g			EPA 901.1 Mod.	01/03/2017 1626	MB

These results apply only to the samples tested.

RL - Reporting Limit

Qualifiers:

B	Analyte detected in the associated Method Blank	C	Calculated Value
E	Value above quantitation range	H	Holding times for preparation or analysis exceeded
J	Analyte detected below quantitation limits	L	Analyzed by another laboratory
M	Value exceeds Monthly Ave or MCL or is less than LCL	ND	Not Detected at the Reporting Limit
O	Outside the Range of Dilutions	S	Spike Recovery outside accepted recovery limits
X	Matrix Effect		

Reviewed by: _____
Wade Nieuwsma, Assistant Laboratory Manager

Sample Analysis Report

Company: Dawn Mining Company
8809 Washington St. NE Suite 150
Albuquerque, NM 87113

Date Reported 1/17/2017
Report ID S1611422001

ProjectName: Midnite Mine Remedial Action
Lab ID: S1611422-015
ClientSample ID: P1R1-15-0015-SOI-DIS-01
COC: WEB

WorkOrder: S1611422
CollectionDate: 11/16/2016
DateReceived: 11/23/2016 12:20:00 PM
FieldSampler: RW
Matrix: Soil

Comments

Analyses	Result	Units	Qual	RL	Method	Date Analyzed/Init	
Metals - Total							
Uranium	2.43	mg/Kg		0.05	6020A	12/12/2016 1530	MS
Radionuclides - Total							
Lead 210	3.1	pCi/g		1.35	EPA 909.0 Mod.	01/12/2017 1051	MB
Lead 210 Precision (±)	0.5	pCi/g			EPA 909.0 Mod.	01/12/2017 1051	MB
Radium 226	1.6	pCi/g		0.2	EPA 901.1 Mod.	01/04/2017 806	MB
Radium 226 Precision (±)	0.2	pCi/g			EPA 901.1 Mod.	01/04/2017 806	MB

These results apply only to the samples tested.

RL - Reporting Limit

Qualifiers:

B	Analyte detected in the associated Method Blank	C	Calculated Value
E	Value above quantitation range	H	Holding times for preparation or analysis exceeded
J	Analyte detected below quantitation limits	L	Analyzed by another laboratory
M	Value exceeds Monthly Ave or MCL or is less than LCL	ND	Not Detected at the Reporting Limit
O	Outside the Range of Dilutions	S	Spike Recovery outside accepted recovery limits
X	Matrix Effect		

Reviewed by: _____
Wade Nieuwsma, Assistant Laboratory Manager

Sample Analysis Report

Company: Dawn Mining Company
8809 Washington St. NE Suite 150
Albuquerque, NM 87113

Date Reported 1/17/2017
Report ID S1611422001

ProjectName: Midnite Mine Remedial Action
Lab ID: S1611422-016
ClientSample ID: P1R1-16-0015-SOI-DIS-01
COC: WEB

WorkOrder: S1611422
CollectionDate: 11/16/2016
DateReceived: 11/23/2016 12:20:00 PM
FieldSampler: RW
Matrix: Soil

Comments

Analyses	Result	Units	Qual	RL	Method	Date Analyzed/Init	
Radionuclides - Total							
Radium 226	1.5	pCi/g		0.2	EPA 901.1 Mod.	01/04/2017 922	MB
Radium 226 Precision (±)	0.2	pCi/g			EPA 901.1 Mod.	01/04/2017 922	MB

These results apply only to the samples tested.

RL - Reporting Limit

Qualifiers:

B	Analyte detected in the associated Method Blank
E	Value above quantitation range
J	Analyte detected below quantitation limits
M	Value exceeds Monthly Ave or MCL or is less than LCL
O	Outside the Range of Dilutions
X	Matrix Effect
C	Calculated Value
H	Holding times for preparation or analysis exceeded
L	Analyzed by another laboratory
ND	Not Detected at the Reporting Limit
S	Spike Recovery outside accepted recovery limits

Reviewed by: _____
Wade Nieuwsma, Assistant Laboratory Manager

Sample Analysis Report

Company: Dawn Mining Company
8809 Washington St. NE Suite 150
Albuquerque, NM 87113

Date Reported 1/17/2017
Report ID S1611422001

ProjectName: Midnite Mine Remedial Action
Lab ID: S1611422-017
ClientSample ID: P1R1-17-0015-SOI-DIS-01
COC: WEB

WorkOrder: S1611422
CollectionDate: 11/16/2016
DateReceived: 11/23/2016 12:20:00 PM
FieldSampler: RW
Matrix: Soil

Comments

Analyses	Result	Units	Qual	RL	Method	Date Analyzed/Init	
Radionuclides - Total							
Radium 226	2.0	pCi/g		0.2	EPA 901.1 Mod.	01/04/2017 1041	MB
Radium 226 Precision (±)	0.2	pCi/g			EPA 901.1 Mod.	01/04/2017 1041	MB

These results apply only to the samples tested.

RL - Reporting Limit

Qualifiers:

B	Analyte detected in the associated Method Blank	C	Calculated Value
E	Value above quantitation range	H	Holding times for preparation or analysis exceeded
J	Analyte detected below quantitation limits	L	Analyzed by another laboratory
M	Value exceeds Monthly Ave or MCL or is less than LCL	ND	Not Detected at the Reporting Limit
O	Outside the Range of Dilutions	S	Spike Recovery outside accepted recovery limits
X	Matrix Effect		

Reviewed by: _____
Wade Nieuwsma, Assistant Laboratory Manager

Sample Analysis Report

Company: Dawn Mining Company
8809 Washington St. NE Suite 150
Albuquerque, NM 87113

Date Reported 1/17/2017
Report ID S1611422001

ProjectName: Midnite Mine Remedial Action
Lab ID: S1611422-018
ClientSample ID: P1R1-18-0015-SOI-DIS-01
COC: WEB

WorkOrder: S1611422
CollectionDate: 11/16/2016
DateReceived: 11/23/2016 12:20:00 PM
FieldSampler: RW
Matrix: Soil

Comments

Analyses	Result	Units	Qual	RL	Method	Date Analyzed/Init	
Radionuclides - Total							
Radium 226	1.3	pCi/g		0.2	EPA 901.1 Mod.	01/04/2017 1422	MB
Radium 226 Precision (±)	0.2	pCi/g			EPA 901.1 Mod.	01/04/2017 1422	MB

These results apply only to the samples tested.

RL - Reporting Limit

Qualifiers:

B	Analyte detected in the associated Method Blank
E	Value above quantitation range
J	Analyte detected below quantitation limits
M	Value exceeds Monthly Ave or MCL or is less than LCL
O	Outside the Range of Dilutions
X	Matrix Effect
C	Calculated Value
H	Holding times for preparation or analysis exceeded
L	Analyzed by another laboratory
ND	Not Detected at the Reporting Limit
S	Spike Recovery outside accepted recovery limits

Reviewed by: _____
Wade Nieuwsma, Assistant Laboratory Manager

Sample Analysis Report

Company: Dawn Mining Company
8809 Washington St. NE Suite 150
Albuquerque, NM 87113

Date Reported 1/17/2017
Report ID S1611422001

ProjectName: Midnite Mine Remedial Action
Lab ID: S1611422-019
ClientSample ID: P1R1-19-0015-SOI-DIS-01
COC: WEB

WorkOrder: S1611422
CollectionDate: 11/16/2016
DateReceived: 11/23/2016 12:20:00 PM
FieldSampler: RW
Matrix: Soil

Comments

Analyses	Result	Units	Qual	RL	Method	Date Analyzed/Init	
Metals - Total							
Uranium	2.67	mg/Kg		0.05	6020A	12/12/2016 1536	MS
Radionuclides - Total							
Lead 210	2.3	pCi/g		1.35	EPA 909.0 Mod.	01/12/2017 1051	MB
Lead 210 Precision (±)	0.4	pCi/g			EPA 909.0 Mod.	01/12/2017 1051	MB
Radium 226	1.4	pCi/g		0.2	EPA 901.1 Mod.	01/04/2017 1542	MB
Radium 226 Precision (±)	0.2	pCi/g			EPA 901.1 Mod.	01/04/2017 1542	MB

These results apply only to the samples tested.

RL - Reporting Limit

Qualifiers:

B	Analyte detected in the associated Method Blank	C	Calculated Value
E	Value above quantitation range	H	Holding times for preparation or analysis exceeded
J	Analyte detected below quantitation limits	L	Analyzed by another laboratory
M	Value exceeds Monthly Ave or MCL or is less than LCL	ND	Not Detected at the Reporting Limit
O	Outside the Range of Dilutions	S	Spike Recovery outside accepted recovery limits
X	Matrix Effect		

Reviewed by: _____
Wade Nieuwsma, Assistant Laboratory Manager

Sample Analysis Report

Company: Dawn Mining Company
8809 Washington St. NE Suite 150
Albuquerque, NM 87113

Date Reported 6/19/2017
Report ID S1611422002
(Replaces S1611422001)

ProjectName: Midnite Mine Remedial Action
Lab ID: S1611422-020
ClientSample ID: P1R1-20-0015-SOI-DIS-01
COC: WEB

WorkOrder: S1611422
CollectionDate: 11/17/2016
DateReceived: 11/23/2016 12:20:00 PM
FieldSampler: RW
Matrix: Soil

Comments

Analyses	Result	Units	Qual	RL	Method	Date Analyzed/Init	
Metals - Total							
Uranium	3.95	mg/Kg		0.0500	6020A	12/12/2016 1542	MS
Radionuclides - Total							
Lead 210	1.1	pCi/g	J	1.35	EPA 909.0 Mod.	01/12/2017 1457	MB
Lead 210 Precision (±)	0.3	pCi/g	J		EPA 909.0 Mod.	01/12/2017 1457	MB
Radium 226	3.0	pCi/g		0.200	EPA 901.1 Mod.	01/04/2017 2221	MB
Radium 226 Precision (±)	0.3	pCi/g			EPA 901.1 Mod.	01/04/2017 2221	MB

These results apply only to the samples tested.

RL - Reporting Limit

Qualifiers:

B	Analyte detected in the associated Method Blank
E	Value above quantitation range
H	Holding times for preparation or analysis exceeded
L	Analyzed by another laboratory
ND	Not Detected at the Reporting Limit
S	Spike Recovery outside accepted recovery limits
C	Calculated Value
G	Analyzed at IML Gillette laboratory
J	Analyte detected below quantitation limits
M	Value exceeds Monthly Ave or MCL or is less than LCL
O	Outside the Range of Dilutions
X	Matrix Effect

Reviewed by: _____
Wade Nieuwsma, Assistant Laboratory Manager

Sample Analysis Report

Company: Dawn Mining Company
8809 Washington St. NE Suite 150
Albuquerque, NM 87113

Date Reported 1/17/2017
Report ID S1611422001

ProjectName: Midnite Mine Remedial Action
Lab ID: S1611422-021
ClientSample ID: P1R1-20-0015-SOI-DIS-02
COC: WEB

WorkOrder: S1611422
CollectionDate: 11/17/2016
DateReceived: 11/23/2016 12:20:00 PM
FieldSampler: RW
Matrix: Soil

Comments

Analyses	Result	Units	Qual	RL	Method	Date Analyzed/Init	
Metals - Total							
Uranium	4.53	mg/Kg		0.05	6020A	12/12/2016 1548	MS
Radionuclides - Total							
Lead 210	1.7	pCi/g		1.35	EPA 909.0 Mod.	01/12/2017 1457	MB
Lead 210 Precision (±)	0.3	pCi/g			EPA 909.0 Mod.	01/12/2017 1457	MB
Radium 226	2.8	pCi/g		0.2	EPA 901.1 Mod.	01/05/2017 1645	MB
Radium 226 Precision (±)	0.2	pCi/g			EPA 901.1 Mod.	01/05/2017 1645	MB

These results apply only to the samples tested.

RL - Reporting Limit

Qualifiers:

B	Analyte detected in the associated Method Blank	C	Calculated Value
E	Value above quantitation range	H	Holding times for preparation or analysis exceeded
J	Analyte detected below quantitation limits	L	Analyzed by another laboratory
M	Value exceeds Monthly Ave or MCL or is less than LCL	ND	Not Detected at the Reporting Limit
O	Outside the Range of Dilutions	S	Spike Recovery outside accepted recovery limits
X	Matrix Effect		

Reviewed by: _____
Wade Nieuwsma, Assistant Laboratory Manager

Sample Analysis Report

Company: Dawn Mining Company
8809 Washington St. NE Suite 150
Albuquerque, NM 87113

Date Reported 1/17/2017
Report ID S1611422001

ProjectName: Midnite Mine Remedial Action
Lab ID: S1611422-022
ClientSample ID: P1R1-21-0015-SOI-DIS-01
COC: WEB

WorkOrder: S1611422
CollectionDate: 11/17/2016
DateReceived: 11/23/2016 12:20:00 PM
FieldSampler: RW
Matrix: Soil

Comments

Analyses	Result	Units	Qual	RL	Method	Date Analyzed/Init	
Radionuclides - Total							
Radium 226	1.5	pCi/g		0.2	EPA 901.1 Mod.	01/05/2017 1801	MB
Radium 226 Precision (±)	0.2	pCi/g			EPA 901.1 Mod.	01/05/2017 1801	MB

These results apply only to the samples tested.

RL - Reporting Limit

Qualifiers:

B	Analyte detected in the associated Method Blank
E	Value above quantitation range
J	Analyte detected below quantitation limits
M	Value exceeds Monthly Ave or MCL or is less than LCL
O	Outside the Range of Dilutions
X	Matrix Effect
C	Calculated Value
H	Holding times for preparation or analysis exceeded
L	Analyzed by another laboratory
ND	Not Detected at the Reporting Limit
S	Spike Recovery outside accepted recovery limits

Reviewed by: _____
Wade Nieuwsma, Assistant Laboratory Manager

Sample Analysis Report

Company: Dawn Mining Company
8809 Washington St. NE Suite 150
Albuquerque, NM 87113

Date Reported 1/17/2017
Report ID S1611422001

ProjectName: Midnite Mine Remedial Action
Lab ID: S1611422-023
ClientSample ID: P1R1-22-0015-SOI-DIS-01
COC: WEB

WorkOrder: S1611422
CollectionDate: 11/17/2016
DateReceived: 11/23/2016 12:20:00 PM
FieldSampler: RW
Matrix: Soil

Comments

Analyses	Result	Units	Qual	RL	Method	Date Analyzed/Init	
Radionuclides - Total							
Radium 226	1.9	pCi/g		0.2	EPA 901.1 Mod.	01/05/2017 1918	MB
Radium 226 Precision (±)	0.2	pCi/g			EPA 901.1 Mod.	01/05/2017 1918	MB

These results apply only to the samples tested.

RL - Reporting Limit

Qualifiers:

B	Analyte detected in the associated Method Blank	C	Calculated Value
E	Value above quantitation range	H	Holding times for preparation or analysis exceeded
J	Analyte detected below quantitation limits	L	Analyzed by another laboratory
M	Value exceeds Monthly Ave or MCL or is less than LCL	ND	Not Detected at the Reporting Limit
O	Outside the Range of Dilutions	S	Spike Recovery outside accepted recovery limits
X	Matrix Effect		

Reviewed by: _____
Wade Nieuwsma, Assistant Laboratory Manager

Sample Analysis Report

Company: Dawn Mining Company
8809 Washington St. NE Suite 150
Albuquerque, NM 87113

Date Reported 1/17/2017
Report ID S1611422001

ProjectName: Midnite Mine Remedial Action
Lab ID: S1611422-024
ClientSample ID: P1R1-23-0015-SOI-DIS-01
COC: WEB

WorkOrder: S1611422
CollectionDate: 11/17/2016
DateReceived: 11/23/2016 12:20:00 PM
FieldSampler: RW
Matrix: Soil

Comments

Analyses	Result	Units	Qual	RL	Method	Date Analyzed/Init	
Radionuclides - Total							
Radium 226	1.8	pCi/g		0.2	EPA 901.1 Mod.	01/05/2017 2034	MB
Radium 226 Precision (±)	0.2	pCi/g			EPA 901.1 Mod.	01/05/2017 2034	MB

These results apply only to the samples tested.

RL - Reporting Limit

Qualifiers:

B	Analyte detected in the associated Method Blank
E	Value above quantitation range
J	Analyte detected below quantitation limits
M	Value exceeds Monthly Ave or MCL or is less than LCL
O	Outside the Range of Dilutions
X	Matrix Effect
C	Calculated Value
H	Holding times for preparation or analysis exceeded
L	Analyzed by another laboratory
ND	Not Detected at the Reporting Limit
S	Spike Recovery outside accepted recovery limits

Reviewed by: _____
Wade Nieuwsma, Assistant Laboratory Manager

Sample Analysis Report

Company: Dawn Mining Company
8809 Washington St. NE Suite 150
Albuquerque, NM 87113

Date Reported 1/17/2017
Report ID S1611422001

ProjectName: Midnite Mine Remedial Action
Lab ID: S1611422-025
ClientSample ID: P1R1-24-0015-SOI-DIS-01
COC: WEB

WorkOrder: S1611422
CollectionDate: 11/17/2016
DateReceived: 11/23/2016 12:20:00 PM
FieldSampler: RW
Matrix: Soil

Comments

Analyses	Result	Units	Qual	RL	Method	Date Analyzed/Init	
Radionuclides - Total							
Radium 226	2.0	pCi/g		0.2	EPA 901.1 Mod.	01/05/2017 2151	MB
Radium 226 Precision (±)	0.2	pCi/g			EPA 901.1 Mod.	01/05/2017 2151	MB

These results apply only to the samples tested.

RL - Reporting Limit

Qualifiers:

B	Analyte detected in the associated Method Blank	C	Calculated Value
E	Value above quantitation range	H	Holding times for preparation or analysis exceeded
J	Analyte detected below quantitation limits	L	Analyzed by another laboratory
M	Value exceeds Monthly Ave or MCL or is less than LCL	ND	Not Detected at the Reporting Limit
O	Outside the Range of Dilutions	S	Spike Recovery outside accepted recovery limits
X	Matrix Effect		

Reviewed by: _____
Wade Nieuwsma, Assistant Laboratory Manager

Sample Analysis Report

Company: Dawn Mining Company
8809 Washington St. NE Suite 150
Albuquerque, NM 87113

Date Reported 1/17/2017
Report ID S1611422001

ProjectName: Midnite Mine Remedial Action
Lab ID: S1611422-026
ClientSample ID: P1R1-25-0015-SOI-DIS-01
COC: WEB

WorkOrder: S1611422
CollectionDate: 11/17/2016
DateReceived: 11/23/2016 12:20:00 PM
FieldSampler: RW
Matrix: Soil

Comments

Analyses	Result	Units	Qual	RL	Method	Date Analyzed/Init	
Metals - Total							
Uranium	6.00	mg/Kg		0.05	6020A	12/12/2016 1553	MS
Radionuclides - Total							
Lead 210	1.5	pCi/g		1.35	EPA 909.0 Mod.	01/12/2017 1457	MB
Lead 210 Precision (±)	0.4	pCi/g			EPA 909.0 Mod.	01/12/2017 1457	MB
Radium 226	2.3	pCi/g		0.2	EPA 901.1 Mod.	01/05/2017 2307	MB
Radium 226 Precision (±)	0.2	pCi/g			EPA 901.1 Mod.	01/05/2017 2307	MB

These results apply only to the samples tested.

RL - Reporting Limit

Qualifiers:

B	Analyte detected in the associated Method Blank	C	Calculated Value
E	Value above quantitation range	H	Holding times for preparation or analysis exceeded
J	Analyte detected below quantitation limits	L	Analyzed by another laboratory
M	Value exceeds Monthly Ave or MCL or is less than LCL	ND	Not Detected at the Reporting Limit
O	Outside the Range of Dilutions	S	Spike Recovery outside accepted recovery limits
X	Matrix Effect		

Reviewed by: _____
Wade Nieuwsma, Assistant Laboratory Manager

Sample Analysis Report

Company: Dawn Mining Company
8809 Washington St. NE Suite 150
Albuquerque, NM 87113

Date Reported 1/17/2017
Report ID S1611422001

ProjectName: Midnite Mine Remedial Action
Lab ID: S1611422-027
ClientSample ID: P1R1-26-0015-SOI-DIS-01
COC: WEB

WorkOrder: S1611422
CollectionDate: 11/17/2016
DateReceived: 11/23/2016 12:20:00 PM
FieldSampler: RW
Matrix: Soil

Comments

Analyses	Result	Units	Qual	RL	Method	Date Analyzed/Init	
Metals - Total							
Uranium	2.77	mg/Kg		0.05	6020A	12/12/2016 1611	MS
Radionuclides - Total							
Lead 210	2.1	pCi/g		1.35	EPA 909.0 Mod.	01/12/2017 1457	MB
Lead 210 Precision (±)	0.4	pCi/g			EPA 909.0 Mod.	01/12/2017 1457	MB
Radium 226	1.6	pCi/g		0.2	EPA 901.1 Mod.	01/06/2017 023	MB
Radium 226 Precision (±)	0.2	pCi/g			EPA 901.1 Mod.	01/06/2017 023	MB

These results apply only to the samples tested.

RL - Reporting Limit

Qualifiers:

B	Analyte detected in the associated Method Blank
E	Value above quantitation range
J	Analyte detected below quantitation limits
M	Value exceeds Monthly Ave or MCL or is less than LCL
O	Outside the Range of Dilutions
X	Matrix Effect
C	Calculated Value
H	Holding times for preparation or analysis exceeded
L	Analyzed by another laboratory
ND	Not Detected at the Reporting Limit
S	Spike Recovery outside accepted recovery limits

Reviewed by: _____
Wade Nieuwsma, Assistant Laboratory Manager

Sample Analysis Report

Company: Dawn Mining Company
8809 Washington St. NE Suite 150
Albuquerque, NM 87113

Date Reported 1/17/2017
Report ID S1611422001

ProjectName: Midnite Mine Remedial Action
Lab ID: S1611422-028
ClientSample ID: P1R1-27-0015-SOI-DIS-01
COC: WEB

WorkOrder: S1611422
CollectionDate: 11/17/2016
DateReceived: 11/23/2016 12:20:00 PM
FieldSampler: RW
Matrix: Soil

Comments

Analyses	Result	Units	Qual	RL	Method	Date Analyzed/Init	
Metals - Total							
Uranium	3.39	mg/Kg		0.05	6020A	12/12/2016 1616	MS
Radionuclides - Total							
Lead 210	2.1	pCi/g		1.35	EPA 909.0 Mod.	01/12/2017 1457	MB
Lead 210 Precision (±)	0.4	pCi/g			EPA 909.0 Mod.	01/12/2017 1457	MB
Radium 226	1.7	pCi/g		0.2	EPA 901.1 Mod.	01/06/2017 139	MB
Radium 226 Precision (±)	0.2	pCi/g			EPA 901.1 Mod.	01/06/2017 139	MB

These results apply only to the samples tested.

RL - Reporting Limit

Qualifiers:

B	Analyte detected in the associated Method Blank	C	Calculated Value
E	Value above quantitation range	H	Holding times for preparation or analysis exceeded
J	Analyte detected below quantitation limits	L	Analyzed by another laboratory
M	Value exceeds Monthly Ave or MCL or is less than LCL	ND	Not Detected at the Reporting Limit
O	Outside the Range of Dilutions	S	Spike Recovery outside accepted recovery limits
X	Matrix Effect		

Reviewed by: _____
Wade Nieuwsma, Assistant Laboratory Manager

Sample Analysis Report

Company: Dawn Mining Company
8809 Washington St. NE Suite 150
Albuquerque, NM 87113

Date Reported 1/17/2017
Report ID S1611422001

ProjectName: Midnite Mine Remedial Action
Lab ID: S1611422-029
ClientSample ID: P1R1-28-0015-SOI-DIS-01
COC: WEB

WorkOrder: S1611422
CollectionDate: 11/17/2016
DateReceived: 11/23/2016 12:20:00 PM
FieldSampler: RW
Matrix: Soil

Comments

Analyses	Result	Units	Qual	RL	Method	Date Analyzed/Init	
Radionuclides - Total							
Radium 226	1.8	pCi/g		0.2	EPA 901.1 Mod.	01/06/2017 256	MB
Radium 226 Precision (±)	0.2	pCi/g			EPA 901.1 Mod.	01/06/2017 256	MB

These results apply only to the samples tested.

RL - Reporting Limit

Qualifiers:

B	Analyte detected in the associated Method Blank
E	Value above quantitation range
J	Analyte detected below quantitation limits
M	Value exceeds Monthly Ave or MCL or is less than LCL
O	Outside the Range of Dilutions
X	Matrix Effect
C	Calculated Value
H	Holding times for preparation or analysis exceeded
L	Analyzed by another laboratory
ND	Not Detected at the Reporting Limit
S	Spike Recovery outside accepted recovery limits

Reviewed by: _____
Wade Nieuwsma, Assistant Laboratory Manager

Sample Analysis Report

Company: Dawn Mining Company
8809 Washington St. NE Suite 150
Albuquerque, NM 87113

Date Reported 1/17/2017
Report ID S1611422001

ProjectName: Midnite Mine Remedial Action
Lab ID: S1611422-030
ClientSample ID: P1R1-29-0015-SOI-DIS-01
COC: WEB

WorkOrder: S1611422
CollectionDate: 11/17/2016
DateReceived: 11/23/2016 12:20:00 PM
FieldSampler: RW
Matrix: Soil

Comments

Analyses	Result	Units	Qual	RL	Method	Date Analyzed/Init	
Radionuclides - Total							
Radium 226	2.0	pCi/g		0.2	EPA 901.1 Mod.	01/06/2017 412	MB
Radium 226 Precision (±)	0.2	pCi/g			EPA 901.1 Mod.	01/06/2017 412	MB

These results apply only to the samples tested.

RL - Reporting Limit

Qualifiers:

B	Analyte detected in the associated Method Blank	C	Calculated Value
E	Value above quantitation range	H	Holding times for preparation or analysis exceeded
J	Analyte detected below quantitation limits	L	Analyzed by another laboratory
M	Value exceeds Monthly Ave or MCL or is less than LCL	ND	Not Detected at the Reporting Limit
O	Outside the Range of Dilutions	S	Spike Recovery outside accepted recovery limits
X	Matrix Effect		

Reviewed by: _____
Wade Nieuwsma, Assistant Laboratory Manager

Sample Analysis Report

Company: Dawn Mining Company
8809 Washington St. NE Suite 150
Albuquerque, NM 87113

Date Reported 6/19/2017
Report ID S1611422002
(Replaces S1611422001)

ProjectName: Midnite Mine Remedial Action
Lab ID: S1611422-031
ClientSample ID: P1R1-30-0015-SOI-DIS-01
COC: WEB

WorkOrder: S1611422
CollectionDate: 11/16/2016
DateReceived: 11/23/2016 12:20:00 PM
FieldSampler: RW
Matrix: Soil

Comments

Analyses	Result	Units	Qual	RL	Method	Date Analyzed/Init	
Metals - Total							
Uranium	3.36	mg/Kg		0.0500	6020A	12/12/2016 1628	MS
Radionuclides - Total							
Lead 210	1.0	pCi/g	J	1.35	EPA 909.0 Mod.	01/12/2017 1457	MB
Lead 210 Precision (±)	0.4	pCi/g	J		EPA 909.0 Mod.	01/12/2017 1457	MB
Radium 226	1.8	pCi/g		0.200	EPA 901.1 Mod.	01/06/2017 529	MB
Radium 226 Precision (±)	0.2	pCi/g			EPA 901.1 Mod.	01/06/2017 529	MB

These results apply only to the samples tested.

RL - Reporting Limit

Qualifiers:

B	Analyte detected in the associated Method Blank	C	Calculated Value
E	Value above quantitation range	G	Analyzed at IML Gillette laboratory
H	Holding times for preparation or analysis exceeded	J	Analyte detected below quantitation limits
L	Analyzed by another laboratory	M	Value exceeds Monthly Ave or MCL or is less than LCL
ND	Not Detected at the Reporting Limit	O	Outside the Range of Dilutions
S	Spike Recovery outside accepted recovery limits	X	Matrix Effect

Reviewed by: _____
Wade Nieuwsma, Assistant Laboratory Manager

Sample Analysis Report

Company: Dawn Mining Company
8809 Washington St. NE Suite 150
Albuquerque, NM 87113

Date Reported 1/17/2017
Report ID S1611422001

ProjectName: Midnite Mine Remedial Action
Lab ID: S1611422-032
ClientSample ID: P1R1-30-0015-SOI-DIS-02
COC: WEB

WorkOrder: S1611422
CollectionDate: 11/16/2016
DateReceived: 11/23/2016 12:20:00 PM
FieldSampler: RW
Matrix: Soil

Comments

Analyses	Result	Units	Qual	RL	Method	Date Analyzed/Init	
Metals - Total							
Uranium	2.76	mg/Kg		0.05	6020A	12/12/2016 1720	MS
Radionuclides - Total							
Lead 210	1.7	pCi/g		1.35	EPA 909.0 Mod.	01/12/2017 1457	MB
Lead 210 Precision (±)	0.6	pCi/g			EPA 909.0 Mod.	01/12/2017 1457	MB
Radium 226	2.0	pCi/g		0.2	EPA 901.1 Mod.	01/06/2017 645	MB
Radium 226 Precision (±)	0.2	pCi/g			EPA 901.1 Mod.	01/06/2017 645	MB

These results apply only to the samples tested.

RL - Reporting Limit

Qualifiers:

B	Analyte detected in the associated Method Blank	C	Calculated Value
E	Value above quantitation range	H	Holding times for preparation or analysis exceeded
J	Analyte detected below quantitation limits	L	Analyzed by another laboratory
M	Value exceeds Monthly Ave or MCL or is less than LCL	ND	Not Detected at the Reporting Limit
O	Outside the Range of Dilutions	S	Spike Recovery outside accepted recovery limits
X	Matrix Effect		

Reviewed by: _____
Wade Nieuwsma, Assistant Laboratory Manager

Sample Analysis Report

Company: Dawn Mining Company
8809 Washington St. NE Suite 150
Albuquerque, NM 87113

Date Reported 1/17/2017
Report ID S1611422001

ProjectName: Midnite Mine Remedial Action
Lab ID: S1611422-033
ClientSample ID: P1R1-31-0015-SOI-DIS-01
COC: WEB

WorkOrder: S1611422
CollectionDate: 11/17/2016
DateReceived: 11/23/2016 12:20:00 PM
FieldSampler: RW
Matrix: Soil

Comments

Analyses	Result	Units	Qual	RL	Method	Date Analyzed/Init	
Radionuclides - Total							
Radium 226	2.3	pCi/g		0.2	EPA 901.1 Mod.	01/06/2017 802	MB
Radium 226 Precision (±)	0.2	pCi/g			EPA 901.1 Mod.	01/06/2017 802	MB

These results apply only to the samples tested.

RL - Reporting Limit

Qualifiers:

B	Analyte detected in the associated Method Blank	C	Calculated Value
E	Value above quantitation range	H	Holding times for preparation or analysis exceeded
J	Analyte detected below quantitation limits	L	Analyzed by another laboratory
M	Value exceeds Monthly Ave or MCL or is less than LCL	ND	Not Detected at the Reporting Limit
O	Outside the Range of Dilutions	S	Spike Recovery outside accepted recovery limits
X	Matrix Effect		

Reviewed by: _____
Wade Nieuwsma, Assistant Laboratory Manager

Sample Analysis Report

Company: Dawn Mining Company
8809 Washington St. NE Suite 150
Albuquerque, NM 87113

Date Reported 1/17/2017
Report ID S1611422001

ProjectName: Midnite Mine Remedial Action
Lab ID: S1611422-034
ClientSample ID: P1R1-32-0015-SOI-DIS-01
COC: WEB

WorkOrder: S1611422
CollectionDate: 11/17/2016
DateReceived: 11/23/2016 12:20:00 PM
FieldSampler: RW
Matrix: Soil

Comments

Analyses	Result	Units	Qual	RL	Method	Date Analyzed/Init	
Metals - Total							
Uranium	2.36	mg/Kg		0.05	6020A	12/12/2016 1725	MS
Radionuclides - Total							
Lead 210	1.5	pCi/g		1.35	EPA 909.0 Mod.	01/12/2017 1457	MB
Lead 210 Precision (±)	0.4	pCi/g			EPA 909.0 Mod.	01/12/2017 1457	MB
Radium 226	1.4	pCi/g		0.2	EPA 901.1 Mod.	01/06/2017 918	MB
Radium 226 Precision (±)	0.2	pCi/g			EPA 901.1 Mod.	01/06/2017 918	MB

These results apply only to the samples tested.

RL - Reporting Limit

Qualifiers:

B	Analyte detected in the associated Method Blank	C	Calculated Value
E	Value above quantitation range	H	Holding times for preparation or analysis exceeded
J	Analyte detected below quantitation limits	L	Analyzed by another laboratory
M	Value exceeds Monthly Ave or MCL or is less than LCL	ND	Not Detected at the Reporting Limit
O	Outside the Range of Dilutions	S	Spike Recovery outside accepted recovery limits
X	Matrix Effect		

Reviewed by: _____
Wade Nieuwsma, Assistant Laboratory Manager

Sample Analysis Report

Company: Dawn Mining Company
8809 Washington St. NE Suite 150
Albuquerque, NM 87113

Date Reported 1/17/2017
Report ID S1611422001

ProjectName: Midnite Mine Remedial Action
Lab ID: S1611422-035
ClientSample ID: P1R1-33-0015-SOI-DIS-01
COC: WEB

WorkOrder: S1611422
CollectionDate: 11/16/2016
DateReceived: 11/23/2016 12:20:00 PM
FieldSampler: RW
Matrix: Soil

Comments

Analyses	Result	Units	Qual	RL	Method	Date Analyzed/Init	
Radionuclides - Total							
Radium 226	1.4	pCi/g		0.2	EPA 901.1 Mod.	01/06/2017 1034	MB
Radium 226 Precision (±)	0.2	pCi/g			EPA 901.1 Mod.	01/06/2017 1034	MB

These results apply only to the samples tested.

RL - Reporting Limit

Qualifiers:

B	Analyte detected in the associated Method Blank	C	Calculated Value
E	Value above quantitation range	H	Holding times for preparation or analysis exceeded
J	Analyte detected below quantitation limits	L	Analyzed by another laboratory
M	Value exceeds Monthly Ave or MCL or is less than LCL	ND	Not Detected at the Reporting Limit
O	Outside the Range of Dilutions	S	Spike Recovery outside accepted recovery limits
X	Matrix Effect		

Reviewed by: _____
Wade Nieuwsma, Assistant Laboratory Manager

Sample Analysis Report

Company: Dawn Mining Company
8809 Washington St. NE Suite 150
Albuquerque, NM 87113

Date Reported 1/17/2017
Report ID S1611422001

ProjectName: Midnite Mine Remedial Action
Lab ID: S1611422-036
ClientSample ID: P1R1-34-0015-SOI-DIS-01
COC: WEB

WorkOrder: S1611422
CollectionDate: 11/16/2016
DateReceived: 11/23/2016 12:20:00 PM
FieldSampler: RW
Matrix: Soil

Comments

Analyses	Result	Units	Qual	RL	Method	Date Analyzed/Init	
Radionuclides - Total							
Radium 226	2.9	pCi/g		0.2	EPA 901.1 Mod.	01/06/2017 1151	MB
Radium 226 Precision (±)	0.2	pCi/g			EPA 901.1 Mod.	01/06/2017 1151	MB

These results apply only to the samples tested.

RL - Reporting Limit

Qualifiers:

B	Analyte detected in the associated Method Blank	C	Calculated Value
E	Value above quantitation range	H	Holding times for preparation or analysis exceeded
J	Analyte detected below quantitation limits	L	Analyzed by another laboratory
M	Value exceeds Monthly Ave or MCL or is less than LCL	ND	Not Detected at the Reporting Limit
O	Outside the Range of Dilutions	S	Spike Recovery outside accepted recovery limits
X	Matrix Effect		

Reviewed by: _____
Wade Nieuwsma, Assistant Laboratory Manager

Sample Analysis Report

Company: Dawn Mining Company
8809 Washington St. NE Suite 150
Albuquerque, NM 87113

Date Reported 1/17/2017
Report ID S1611422001

ProjectName: Midnite Mine Remedial Action
Lab ID: S1611422-037
ClientSample ID: P1R1-35-0015-SOI-DIS-01
COC: WEB

WorkOrder: S1611422
CollectionDate: 11/16/2016
DateReceived: 11/23/2016 12:20:00 PM
FieldSampler: RW
Matrix: Soil

Comments

Analyses	Result	Units	Qual	RL	Method	Date Analyzed/Init	
Metals - Total							
Uranium	1.95	mg/Kg		0.05	6020A	12/12/2016 1731	MS
Radionuclides - Total							
Lead 210	2.1	pCi/g		1.35	EPA 909.0 Mod.	01/12/2017 1457	MB
Lead 210 Precision (±)	0.4	pCi/g			EPA 909.0 Mod.	01/12/2017 1457	MB
Radium 226	1.3	pCi/g		0.2	EPA 901.1 Mod.	01/06/2017 1307	MB
Radium 226 Precision (±)	0.2	pCi/g			EPA 901.1 Mod.	01/06/2017 1307	MB

These results apply only to the samples tested.

RL - Reporting Limit

Qualifiers:

B	Analyte detected in the associated Method Blank	C	Calculated Value
E	Value above quantitation range	H	Holding times for preparation or analysis exceeded
J	Analyte detected below quantitation limits	L	Analyzed by another laboratory
M	Value exceeds Monthly Ave or MCL or is less than LCL	ND	Not Detected at the Reporting Limit
O	Outside the Range of Dilutions	S	Spike Recovery outside accepted recovery limits
X	Matrix Effect		

Reviewed by: _____
Wade Nieuwsma, Assistant Laboratory Manager

Sample Analysis Report

Company: Dawn Mining Company
8809 Washington St. NE Suite 150
Albuquerque, NM 87113

Date Reported 1/17/2017
Report ID S1611422001

ProjectName: Midnite Mine Remedial Action
Lab ID: S1611422-038
ClientSample ID: P1R1-36-0015-SOI-DIS-01
COC: WEB

WorkOrder: S1611422
CollectionDate: 11/17/2016
DateReceived: 11/23/2016 12:20:00 PM
FieldSampler: RW
Matrix: Soil

Comments

Analyses	Result	Units	Qual	RL	Method	Date Analyzed/Init	
Radionuclides - Total							
Radium 226	2.1	pCi/g		0.2	EPA 901.1 Mod.	01/06/2017 1424	MB
Radium 226 Precision (±)	0.2	pCi/g			EPA 901.1 Mod.	01/06/2017 1424	MB

These results apply only to the samples tested.

RL - Reporting Limit

Qualifiers:

B	Analyte detected in the associated Method Blank	C	Calculated Value
E	Value above quantitation range	H	Holding times for preparation or analysis exceeded
J	Analyte detected below quantitation limits	L	Analyzed by another laboratory
M	Value exceeds Monthly Ave or MCL or is less than LCL	ND	Not Detected at the Reporting Limit
O	Outside the Range of Dilutions	S	Spike Recovery outside accepted recovery limits
X	Matrix Effect		

Reviewed by: _____
Wade Nieuwsma, Assistant Laboratory Manager

Sample Analysis Report

Company: Dawn Mining Company
8809 Washington St. NE Suite 150
Albuquerque, NM 87113

Date Reported 1/17/2017
Report ID S1611422001

ProjectName: Midnite Mine Remedial Action
Lab ID: S1611422-039
ClientSample ID: P1R1-37-0015-SOI-DIS-01
COC: WEB

WorkOrder: S1611422
CollectionDate: 11/16/2016
DateReceived: 11/23/2016 12:20:00 PM
FieldSampler: RW
Matrix: Soil

Comments

Analyses	Result	Units	Qual	RL	Method	Date Analyzed/Init	
Radionuclides - Total							
Radium 226	2.0	pCi/g		0.2	EPA 901.1 Mod.	01/06/2017 1540	MB
Radium 226 Precision (±)	0.2	pCi/g			EPA 901.1 Mod.	01/06/2017 1540	MB

These results apply only to the samples tested.

RL - Reporting Limit

Qualifiers:

B	Analyte detected in the associated Method Blank
E	Value above quantitation range
J	Analyte detected below quantitation limits
M	Value exceeds Monthly Ave or MCL or is less than LCL
O	Outside the Range of Dilutions
X	Matrix Effect
C	Calculated Value
H	Holding times for preparation or analysis exceeded
L	Analyzed by another laboratory
ND	Not Detected at the Reporting Limit
S	Spike Recovery outside accepted recovery limits

Reviewed by:
Wade Nieuwsma, Assistant Laboratory Manager

Sample Analysis Report

Company: Dawn Mining Company
8809 Washington St. NE Suite 150
Albuquerque, NM 87113

Date Reported 1/17/2017
Report ID S1611422001

ProjectName: Midnite Mine Remedial Action
Lab ID: S1611422-040
ClientSample ID: P1R1-38-0015-SOI-DIS-01
COC: WEB

WorkOrder: S1611422
CollectionDate: 11/16/2016
DateReceived: 11/23/2016 12:20:00 PM
FieldSampler: RW
Matrix: Soil

Comments

Analyses	Result	Units	Qual	RL	Method	Date Analyzed/Init	
Radionuclides - Total							
Radium 226	3.3	pCi/g		0.2	EPA 901.1 Mod.	01/06/2017 1657	MB
Radium 226 Precision (±)	0.3	pCi/g			EPA 901.1 Mod.	01/06/2017 1657	MB

These results apply only to the samples tested.

RL - Reporting Limit

Qualifiers:

B	Analyte detected in the associated Method Blank	C	Calculated Value
E	Value above quantitation range	H	Holding times for preparation or analysis exceeded
J	Analyte detected below quantitation limits	L	Analyzed by another laboratory
M	Value exceeds Monthly Ave or MCL or is less than LCL	ND	Not Detected at the Reporting Limit
O	Outside the Range of Dilutions	S	Spike Recovery outside accepted recovery limits
X	Matrix Effect		

Reviewed by: _____
Wade Nieuwsma, Assistant Laboratory Manager

Sample Analysis Report

Company: Dawn Mining Company
8809 Washington St. NE Suite 150
Albuquerque, NM 87113

Date Reported 1/17/2017
Report ID S1611422001

ProjectName: Midnite Mine Remedial Action
Lab ID: S1611422-041
ClientSample ID: P1R1-39-0015-SOI-DIS-01
COC: WEB

WorkOrder: S1611422
CollectionDate: 11/16/2016
DateReceived: 11/23/2016 12:20:00 PM
FieldSampler: RW
Matrix: Soil

Comments

Analyses	Result	Units	Qual	RL	Method	Date Analyzed/Init	
Radionuclides - Total							
Radium 226	3.7	pCi/g		0.2	EPA 901.1 Mod.	01/07/2017 1530	MB
Radium 226 Precision (±)	0.3	pCi/g			EPA 901.1 Mod.	01/07/2017 1530	MB

These results apply only to the samples tested.

RL - Reporting Limit

Qualifiers:

B	Analyte detected in the associated Method Blank	C	Calculated Value
E	Value above quantitation range	H	Holding times for preparation or analysis exceeded
J	Analyte detected below quantitation limits	L	Analyzed by another laboratory
M	Value exceeds Monthly Ave or MCL or is less than LCL	ND	Not Detected at the Reporting Limit
O	Outside the Range of Dilutions	S	Spike Recovery outside accepted recovery limits
X	Matrix Effect		

Reviewed by: _____
Wade Nieuwsma, Assistant Laboratory Manager

Sample Analysis Report

Company: Dawn Mining Company
8809 Washington St. NE Suite 150
Albuquerque, NM 87113

Date Reported 1/17/2017
Report ID S1611422001

ProjectName: Midnite Mine Remedial Action
Lab ID: S1611422-042
ClientSample ID: P1R1-40-0015-SOI-DIS-01
COC: WEB

WorkOrder: S1611422
CollectionDate: 11/16/2016
DateReceived: 11/23/2016 12:20:00 PM
FieldSampler: RW
Matrix: Soil

Comments

Analyses	Result	Units	Qual	RL	Method	Date Analyzed/Init	
Radionuclides - Total							
Radium 226	2.0	pCi/g		0.2	EPA 901.1 Mod.	01/07/2017 1646	MB
Radium 226 Precision (±)	0.2	pCi/g			EPA 901.1 Mod.	01/07/2017 1646	MB

These results apply only to the samples tested.

RL - Reporting Limit

Qualifiers:

B	Analyte detected in the associated Method Blank
E	Value above quantitation range
J	Analyte detected below quantitation limits
M	Value exceeds Monthly Ave or MCL or is less than LCL
O	Outside the Range of Dilutions
X	Matrix Effect
C	Calculated Value
H	Holding times for preparation or analysis exceeded
L	Analyzed by another laboratory
ND	Not Detected at the Reporting Limit
S	Spike Recovery outside accepted recovery limits

Reviewed by:
Wade Nieuwsma, Assistant Laboratory Manager

Sample Analysis Report

Company: Dawn Mining Company
8809 Washington St. NE Suite 150
Albuquerque, NM 87113

Date Reported 1/17/2017
Report ID S1611422001

ProjectName: Midnite Mine Remedial Action
Lab ID: S1611422-043
ClientSample ID: P1R1-41-0015-SOI-DIS-01
COC: WEB

WorkOrder: S1611422
CollectionDate: 11/16/2016
DateReceived: 11/23/2016 12:20:00 PM
FieldSampler: RW
Matrix: Soil

Comments

Analyses	Result	Units	Qual	RL	Method	Date Analyzed/Init	
Metals - Total							
Uranium	2.23	mg/Kg		0.05	6020A	12/12/2016 1737	MS
Radionuclides - Total							
Lead 210	1.9	pCi/g		1.35	EPA 909.0 Mod.	01/12/2017 1457	MB
Lead 210 Precision (±)	0.4	pCi/g			EPA 909.0 Mod.	01/12/2017 1457	MB
Radium 226	1.5	pCi/g		0.2	EPA 901.1 Mod.	01/07/2017 1803	MB
Radium 226 Precision (±)	0.2	pCi/g			EPA 901.1 Mod.	01/07/2017 1803	MB

These results apply only to the samples tested.

RL - Reporting Limit

Qualifiers:

B	Analyte detected in the associated Method Blank	C	Calculated Value
E	Value above quantitation range	H	Holding times for preparation or analysis exceeded
J	Analyte detected below quantitation limits	L	Analyzed by another laboratory
M	Value exceeds Monthly Ave or MCL or is less than LCL	ND	Not Detected at the Reporting Limit
O	Outside the Range of Dilutions	S	Spike Recovery outside accepted recovery limits
X	Matrix Effect		

Reviewed by: _____
Wade Nieuwsma, Assistant Laboratory Manager

Sample Analysis Report

Company: Dawn Mining Company
8809 Washington St. NE Suite 150
Albuquerque, NM 87113

Date Reported 1/17/2017
Report ID S1611422001

ProjectName: Midnite Mine Remedial Action
Lab ID: S1611422-044
ClientSample ID: P1R1-42-0015-SOI-DIS-01
COC: WEB

WorkOrder: S1611422
CollectionDate: 11/16/2016
DateReceived: 11/23/2016 12:20:00 PM
FieldSampler: RW
Matrix: Soil

Comments

Analyses	Result	Units	Qual	RL	Method	Date Analyzed/Init	
Metals - Total							
Uranium	3.23	mg/Kg		0.05	6020A	12/12/2016 1811	MS
Radionuclides - Total							
Lead 210	2.9	pCi/g		1.35	EPA 909.0 Mod.	01/16/2017 1408	MB
Lead 210 Precision (±)	1.0	pCi/g			EPA 909.0 Mod.	01/16/2017 1408	MB
Radium 226	1.7	pCi/g		0.2	EPA 901.1 Mod.	01/07/2017 1919	MB
Radium 226 Precision (±)	0.2	pCi/g			EPA 901.1 Mod.	01/07/2017 1919	MB

These results apply only to the samples tested.

RL - Reporting Limit

Qualifiers:

B	Analyte detected in the associated Method Blank	C	Calculated Value
E	Value above quantitation range	H	Holding times for preparation or analysis exceeded
J	Analyte detected below quantitation limits	L	Analyzed by another laboratory
M	Value exceeds Monthly Ave or MCL or is less than LCL	ND	Not Detected at the Reporting Limit
O	Outside the Range of Dilutions	S	Spike Recovery outside accepted recovery limits
X	Matrix Effect		

Reviewed by: _____
Wade Nieuwsma, Assistant Laboratory Manager

Sample Analysis Report

Company: Dawn Mining Company
8809 Washington St. NE Suite 150
Albuquerque, NM 87113

Date Reported 1/17/2017
Report ID S1611422001

ProjectName: Midnite Mine Remedial Action
Lab ID: S1611422-045
ClientSample ID: P1R1-43-0015-SOI-DIS-01
COC: WEB

WorkOrder: S1611422
CollectionDate: 11/16/2016
DateReceived: 11/23/2016 12:20:00 PM
FieldSampler: RW
Matrix: Soil

Comments

Analyses	Result	Units	Qual	RL	Method	Date Analyzed/Init	
Metals - Total							
Uranium	2.60	mg/Kg		0.05	6020A	12/12/2016 1834	MS
Radionuclides - Total							
Lead 210	1.8	pCi/g		1.35	EPA 909.0 Mod.	01/16/2017 1408	MB
Lead 210 Precision (±)	0.5	pCi/g			EPA 909.0 Mod.	01/16/2017 1408	MB
Radium 226	1.7	pCi/g		0.2	EPA 901.1 Mod.	01/07/2017 2036	MB
Radium 226 Precision (±)	0.2	pCi/g			EPA 901.1 Mod.	01/07/2017 2036	MB

These results apply only to the samples tested.

RL - Reporting Limit

Qualifiers:

B	Analyte detected in the associated Method Blank	C	Calculated Value
E	Value above quantitation range	H	Holding times for preparation or analysis exceeded
J	Analyte detected below quantitation limits	L	Analyzed by another laboratory
M	Value exceeds Monthly Ave or MCL or is less than LCL	ND	Not Detected at the Reporting Limit
O	Outside the Range of Dilutions	S	Spike Recovery outside accepted recovery limits
X	Matrix Effect		

Reviewed by: _____
Wade Nieuwsma, Assistant Laboratory Manager

Sample Analysis Report

Company: Dawn Mining Company
8809 Washington St. NE Suite 150
Albuquerque, NM 87113

Date Reported 1/17/2017
Report ID S1611422001

ProjectName: Midnite Mine Remedial Action
Lab ID: S1611422-046
ClientSample ID: P1R1-43-0015-SOI-DIS-02
COC: WEB

WorkOrder: S1611422
CollectionDate: 11/16/2016
DateReceived: 11/23/2016 12:20:00 PM
FieldSampler: RW
Matrix: Soil

Comments

Analyses	Result	Units	Qual	RL	Method	Date Analyzed/Init	
Metals - Total							
Uranium	2.94	mg/Kg		0.05	6020A	12/12/2016 1909	MS
Radionuclides - Total							
Lead 210	2.4	pCi/g		1.35	EPA 909.0 Mod.	01/16/2017 1408	MB
Lead 210 Precision (±)	0.8	pCi/g			EPA 909.0 Mod.	01/16/2017 1408	MB
Radium 226	1.8	pCi/g		0.2	EPA 901.1 Mod.	01/07/2017 2152	MB
Radium 226 Precision (±)	0.2	pCi/g			EPA 901.1 Mod.	01/07/2017 2152	MB

These results apply only to the samples tested.

RL - Reporting Limit

Qualifiers:

B	Analyte detected in the associated Method Blank	C	Calculated Value
E	Value above quantitation range	H	Holding times for preparation or analysis exceeded
J	Analyte detected below quantitation limits	L	Analyzed by another laboratory
M	Value exceeds Monthly Ave or MCL or is less than LCL	ND	Not Detected at the Reporting Limit
O	Outside the Range of Dilutions	S	Spike Recovery outside accepted recovery limits
X	Matrix Effect		

Reviewed by: _____
Wade Nieuwsma, Assistant Laboratory Manager

Sample Analysis Report

Company: Dawn Mining Company
8809 Washington St. NE Suite 150
Albuquerque, NM 87113

Date Reported 1/17/2017
Report ID S1611422001

ProjectName: Midnite Mine Remedial Action
Lab ID: S1611422-047
ClientSample ID: P1R1-44-0015-SOI-DIS-01
COC: WEB

WorkOrder: S1611422
CollectionDate: 11/16/2016
DateReceived: 11/23/2016 12:20:00 PM
FieldSampler: RW
Matrix: Soil

Comments

Analyses	Result	Units	Qual	RL	Method	Date Analyzed/Init	
Metals - Total							
Uranium	8.41	mg/Kg		0.05	6020A	12/12/2016 1914	MS
Radionuclides - Total							
Lead 210	2.9	pCi/g		1.35	EPA 909.0 Mod.	01/16/2017 1408	MB
Lead 210 Precision (±)	0.6	pCi/g			EPA 909.0 Mod.	01/16/2017 1408	MB
Radium 226	3.6	pCi/g		0.2	EPA 901.1 Mod.	01/07/2017 2309	MB
Radium 226 Precision (±)	0.3	pCi/g			EPA 901.1 Mod.	01/07/2017 2309	MB

These results apply only to the samples tested.

RL - Reporting Limit

Qualifiers:

B	Analyte detected in the associated Method Blank
E	Value above quantitation range
J	Analyte detected below quantitation limits
M	Value exceeds Monthly Ave or MCL or is less than LCL
O	Outside the Range of Dilutions
X	Matrix Effect
C	Calculated Value
H	Holding times for preparation or analysis exceeded
L	Analyzed by another laboratory
ND	Not Detected at the Reporting Limit
S	Spike Recovery outside accepted recovery limits

Reviewed by: _____
Wade Nieuwsma, Assistant Laboratory Manager

Sample Analysis Report

Company: Dawn Mining Company
8809 Washington St. NE Suite 150
Albuquerque, NM 87113

Date Reported 1/17/2017
Report ID S1611422001

ProjectName: Midnite Mine Remedial Action
Lab ID: S1611422-048
ClientSample ID: P1R1-45-0015-SOI-DIS-01
COC: WEB

WorkOrder: S1611422
CollectionDate: 11/16/2016
DateReceived: 11/23/2016 12:20:00 PM
FieldSampler: RW
Matrix: Soil

Comments

Analyses	Result	Units	Qual	RL	Method	Date Analyzed/Init	
Radionuclides - Total							
Radium 226	1.8	pCi/g		0.2	EPA 901.1 Mod.	01/08/2017 025	MB
Radium 226 Precision (±)	0.2	pCi/g			EPA 901.1 Mod.	01/08/2017 025	MB

These results apply only to the samples tested.

RL - Reporting Limit

Qualifiers:

B	Analyte detected in the associated Method Blank
E	Value above quantitation range
J	Analyte detected below quantitation limits
M	Value exceeds Monthly Ave or MCL or is less than LCL
O	Outside the Range of Dilutions
X	Matrix Effect
C	Calculated Value
H	Holding times for preparation or analysis exceeded
L	Analyzed by another laboratory
ND	Not Detected at the Reporting Limit
S	Spike Recovery outside accepted recovery limits

Reviewed by: _____
Wade Nieuwsma, Assistant Laboratory Manager

Sample Analysis Report

Company: Dawn Mining Company
8809 Washington St. NE Suite 150
Albuquerque, NM 87113

Date Reported 1/17/2017
Report ID S1611422001

ProjectName: Midnite Mine Remedial Action
Lab ID: S1611422-049
ClientSample ID: P1R1-46-0015-SOI-DIS-01
COC: WEB

WorkOrder: S1611422
CollectionDate: 11/16/2016
DateReceived: 11/23/2016 12:20:00 PM
FieldSampler: RW
Matrix: Soil

Comments

Analyses	Result	Units	Qual	RL	Method	Date Analyzed/Init	
Metals - Total							
Uranium	2.15	mg/Kg		0.05	6020A	12/12/2016 1920	MS
Radionuclides - Total							
Lead 210	2.4	pCi/g		1.35	EPA 909.0 Mod.	01/16/2017 1408	MB
Lead 210 Precision (±)	0.8	pCi/g			EPA 909.0 Mod.	01/16/2017 1408	MB
Radium 226	1.6	pCi/g		0.2	EPA 901.1 Mod.	01/08/2017 142	MB
Radium 226 Precision (±)	0.2	pCi/g			EPA 901.1 Mod.	01/08/2017 142	MB

These results apply only to the samples tested.

RL - Reporting Limit

Qualifiers:

B	Analyte detected in the associated Method Blank	C	Calculated Value
E	Value above quantitation range	H	Holding times for preparation or analysis exceeded
J	Analyte detected below quantitation limits	L	Analyzed by another laboratory
M	Value exceeds Monthly Ave or MCL or is less than LCL	ND	Not Detected at the Reporting Limit
O	Outside the Range of Dilutions	S	Spike Recovery outside accepted recovery limits
X	Matrix Effect		

Reviewed by: _____
Wade Nieuwsma, Assistant Laboratory Manager

Sample Analysis Report

Company: Dawn Mining Company
8809 Washington St. NE Suite 150
Albuquerque, NM 87113

Date Reported 1/17/2017
Report ID S1611422001

ProjectName: Midnite Mine Remedial Action
Lab ID: S1611422-050
ClientSample ID: P1R1-46-0015-SOI-DIS-02
COC: WEB

WorkOrder: S1611422
CollectionDate: 11/16/2016
DateReceived: 11/23/2016 12:20:00 PM
FieldSampler: RW
Matrix: Soil

Comments

Analyses	Result	Units	Qual	RL	Method	Date Analyzed/Init	
Metals - Total							
Uranium	1.93	mg/Kg		0.05	6020A	12/12/2016 1937	MS
Radionuclides - Total							
Lead 210	1.7	pCi/g		1.35	EPA 909.0 Mod.	01/16/2017 1408	MB
Lead 210 Precision (±)	0.6	pCi/g			EPA 909.0 Mod.	01/16/2017 1408	MB
Radium 226	1.6	pCi/g		0.2	EPA 901.1 Mod.	01/08/2017 259	MB
Radium 226 Precision (±)	0.2	pCi/g			EPA 901.1 Mod.	01/08/2017 259	MB

These results apply only to the samples tested.

RL - Reporting Limit

Qualifiers:

B	Analyte detected in the associated Method Blank	C	Calculated Value
E	Value above quantitation range	H	Holding times for preparation or analysis exceeded
J	Analyte detected below quantitation limits	L	Analyzed by another laboratory
M	Value exceeds Monthly Ave or MCL or is less than LCL	ND	Not Detected at the Reporting Limit
O	Outside the Range of Dilutions	S	Spike Recovery outside accepted recovery limits
X	Matrix Effect		

Reviewed by: _____
Wade Nieuwsma, Assistant Laboratory Manager

Sample Analysis Report

Company: Dawn Mining Company
8809 Washington St. NE Suite 150
Albuquerque, NM 87113

Date Reported 1/17/2017
Report ID S1611422001

ProjectName: Midnite Mine Remedial Action
Lab ID: S1611422-051
ClientSample ID: P1R1-47-0015-SOI-DIS-01
COC: WEB

WorkOrder: S1611422
CollectionDate: 11/16/2016
DateReceived: 11/23/2016 12:20:00 PM
FieldSampler: RW
Matrix: Soil

Comments

Analyses	Result	Units	Qual	RL	Method	Date Analyzed/Init	
Metals - Total							
Uranium	6.08	mg/Kg		0.05	6020A	12/12/2016 1943	MS
Radionuclides - Total							
Lead 210	3.0	pCi/g		1.35	EPA 909.0 Mod.	01/16/2017 2225	MB
Lead 210 Precision (±)	0.6	pCi/g			EPA 909.0 Mod.	01/16/2017 2225	MB
Radium 226	1.8	pCi/g		0.2	EPA 901.1 Mod.	01/08/2017 415	MB
Radium 226 Precision (±)	0.2	pCi/g			EPA 901.1 Mod.	01/08/2017 415	MB

These results apply only to the samples tested.

RL - Reporting Limit

Qualifiers:

B	Analyte detected in the associated Method Blank	C	Calculated Value
E	Value above quantitation range	H	Holding times for preparation or analysis exceeded
J	Analyte detected below quantitation limits	L	Analyzed by another laboratory
M	Value exceeds Monthly Ave or MCL or is less than LCL	ND	Not Detected at the Reporting Limit
O	Outside the Range of Dilutions	S	Spike Recovery outside accepted recovery limits
X	Matrix Effect		

Reviewed by: _____
Wade Nieuwsma, Assistant Laboratory Manager

Sample Analysis Report

Company: Dawn Mining Company
8809 Washington St. NE Suite 150
Albuquerque, NM 87113

Date Reported 1/17/2017
Report ID S1611422001

ProjectName: Midnite Mine Remedial Action
Lab ID: S1611422-052
ClientSample ID: P1R1-48-0015-SOI-DIS-01
COC: WEB

WorkOrder: S1611422
CollectionDate: 11/16/2016
DateReceived: 11/23/2016 12:20:00 PM
FieldSampler: RW
Matrix: Soil

Comments

Analyses	Result	Units	Qual	RL	Method	Date Analyzed/Init	
Radionuclides - Total							
Radium 226	1.9	pCi/g		0.2	EPA 901.1 Mod.	01/08/2017 532	MB
Radium 226 Precision (±)	0.2	pCi/g			EPA 901.1 Mod.	01/08/2017 532	MB

These results apply only to the samples tested.

RL - Reporting Limit

Qualifiers:

B	Analyte detected in the associated Method Blank
E	Value above quantitation range
J	Analyte detected below quantitation limits
M	Value exceeds Monthly Ave or MCL or is less than LCL
O	Outside the Range of Dilutions
X	Matrix Effect
C	Calculated Value
H	Holding times for preparation or analysis exceeded
L	Analyzed by another laboratory
ND	Not Detected at the Reporting Limit
S	Spike Recovery outside accepted recovery limits

Reviewed by: _____
Wade Nieuwsma, Assistant Laboratory Manager

Sample Analysis Report

Company: Dawn Mining Company
8809 Washington St. NE Suite 150
Albuquerque, NM 87113

Date Reported 1/17/2017
Report ID S1611422001

ProjectName: Midnite Mine Remedial Action
Lab ID: S1611422-053
ClientSample ID: P1R1-49-0015-SOI-DIS-01
COC: WEB

WorkOrder: S1611422
CollectionDate: 11/17/2016
DateReceived: 11/23/2016 12:20:00 PM
FieldSampler: RW
Matrix: Soil

Comments

Analyses	Result	Units	Qual	RL	Method	Date Analyzed/Init	
Radionuclides - Total							
Radium 226	1.8	pCi/g		0.2	EPA 901.1 Mod.	01/08/2017 648	MB
Radium 226 Precision (±)	0.2	pCi/g			EPA 901.1 Mod.	01/08/2017 648	MB

These results apply only to the samples tested.

RL - Reporting Limit

Qualifiers:

B	Analyte detected in the associated Method Blank
E	Value above quantitation range
J	Analyte detected below quantitation limits
M	Value exceeds Monthly Ave or MCL or is less than LCL
O	Outside the Range of Dilutions
X	Matrix Effect
C	Calculated Value
H	Holding times for preparation or analysis exceeded
L	Analyzed by another laboratory
ND	Not Detected at the Reporting Limit
S	Spike Recovery outside accepted recovery limits

Reviewed by: _____
Wade Nieuwsma, Assistant Laboratory Manager

Sample Analysis Report

Company: Dawn Mining Company
8809 Washington St. NE Suite 150
Albuquerque, NM 87113

Date Reported 1/17/2017
Report ID S1611422001

ProjectName: Midnite Mine Remedial Action
Lab ID: S1611422-054
ClientSample ID: P1R1-50-0015-SOI-DIS-01
COC: WEB

WorkOrder: S1611422
CollectionDate: 11/17/2016
DateReceived: 11/23/2016 12:20:00 PM
FieldSampler: RW
Matrix: Soil

Comments

Analyses	Result	Units	Qual	RL	Method	Date Analyzed/Init	
Radionuclides - Total							
Radium 226	1.3	pCi/g		0.2	EPA 901.1 Mod.	01/08/2017 922	MB
Radium 226 Precision (±)	0.1	pCi/g			EPA 901.1 Mod.	01/08/2017 922	MB

These results apply only to the samples tested.

RL - Reporting Limit

Qualifiers:

B	Analyte detected in the associated Method Blank
E	Value above quantitation range
J	Analyte detected below quantitation limits
M	Value exceeds Monthly Ave or MCL or is less than LCL
O	Outside the Range of Dilutions
X	Matrix Effect
C	Calculated Value
H	Holding times for preparation or analysis exceeded
L	Analyzed by another laboratory
ND	Not Detected at the Reporting Limit
S	Spike Recovery outside accepted recovery limits

Reviewed by: _____
Wade Nieuwsma, Assistant Laboratory Manager

Sample Analysis Report

Company: Dawn Mining Company
8809 Washington St. NE Suite 150
Albuquerque, NM 87113

Date Reported 1/17/2017
Report ID S1611422001

ProjectName: Midnite Mine Remedial Action
Lab ID: S1611422-055
ClientSample ID: P1R1-51-0015-SOI-DIS-01
COC: WEB

WorkOrder: S1611422
CollectionDate: 11/17/2016
DateReceived: 11/23/2016 12:20:00 PM
FieldSampler: RW
Matrix: Soil

Comments

Analyses	Result	Units	Qual	RL	Method	Date Analyzed/Init	
Radionuclides - Total							
Radium 226	1.6	pCi/g		0.2	EPA 901.1 Mod.	01/08/2017 922	MB
Radium 226 Precision (±)	0.2	pCi/g			EPA 901.1 Mod.	01/08/2017 922	MB

These results apply only to the samples tested.

RL - Reporting Limit

Qualifiers:

B	Analyte detected in the associated Method Blank
E	Value above quantitation range
J	Analyte detected below quantitation limits
M	Value exceeds Monthly Ave or MCL or is less than LCL
O	Outside the Range of Dilutions
X	Matrix Effect
C	Calculated Value
H	Holding times for preparation or analysis exceeded
L	Analyzed by another laboratory
ND	Not Detected at the Reporting Limit
S	Spike Recovery outside accepted recovery limits

Reviewed by: _____
Wade Nieuwsma, Assistant Laboratory Manager

Sample Analysis Report

Company: Dawn Mining Company
8809 Washington St. NE Suite 150
Albuquerque, NM 87113

Date Reported 1/17/2017
Report ID S1611422001

ProjectName: Midnite Mine Remedial Action
Lab ID: S1611422-056
ClientSample ID: P1R1-52-0015-SOI-DIS-01
COC: WEB

WorkOrder: S1611422
CollectionDate: 11/17/2016
DateReceived: 11/23/2016 12:20:00 PM
FieldSampler: RW
Matrix: Soil

Comments

Analyses	Result	Units	Qual	RL	Method	Date Analyzed/Init	
Radionuclides - Total							
Radium 226	1.4	pCi/g		0.2	EPA 901.1 Mod.	01/08/2017 1038	MB
Radium 226 Precision (±)	0.2	pCi/g			EPA 901.1 Mod.	01/08/2017 1038	MB

These results apply only to the samples tested.

RL - Reporting Limit

Qualifiers:

B	Analyte detected in the associated Method Blank	C	Calculated Value
E	Value above quantitation range	H	Holding times for preparation or analysis exceeded
J	Analyte detected below quantitation limits	L	Analyzed by another laboratory
M	Value exceeds Monthly Ave or MCL or is less than LCL	ND	Not Detected at the Reporting Limit
O	Outside the Range of Dilutions	S	Spike Recovery outside accepted recovery limits
X	Matrix Effect		

Reviewed by: _____
Wade Nieuwsma, Assistant Laboratory Manager

Sample Analysis Report

Company: Dawn Mining Company
8809 Washington St. NE Suite 150
Albuquerque, NM 87113

Date Reported 1/17/2017
Report ID S1611422001

ProjectName: Midnite Mine Remedial Action
Lab ID: S1611422-057
ClientSample ID: P1R1-53-0015-SOI-DIS-01
COC: WEB

WorkOrder: S1611422
CollectionDate: 11/17/2016
DateReceived: 11/23/2016 12:20:00 PM
FieldSampler: RW
Matrix: Soil

Comments

Analyses	Result	Units	Qual	RL	Method	Date Analyzed/Init	
Radionuclides - Total							
Radium 226	1.4	pCi/g		0.2	EPA 901.1 Mod.	01/08/2017 1155	MB
Radium 226 Precision (±)	0.2	pCi/g			EPA 901.1 Mod.	01/08/2017 1155	MB

These results apply only to the samples tested.

RL - Reporting Limit

Qualifiers:

B	Analyte detected in the associated Method Blank
E	Value above quantitation range
J	Analyte detected below quantitation limits
M	Value exceeds Monthly Ave or MCL or is less than LCL
O	Outside the Range of Dilutions
X	Matrix Effect
C	Calculated Value
H	Holding times for preparation or analysis exceeded
L	Analyzed by another laboratory
ND	Not Detected at the Reporting Limit
S	Spike Recovery outside accepted recovery limits

Reviewed by: _____
Wade Nieuwsma, Assistant Laboratory Manager

Sample Analysis Report

Company: Dawn Mining Company
8809 Washington St. NE Suite 150
Albuquerque, NM 87113

Date Reported 1/17/2017
Report ID S1611422001

ProjectName: Midnite Mine Remedial Action
Lab ID: S1611422-058
ClientSample ID: P1R1-54-0015-SOI-DIS-01
COC: WEB

WorkOrder: S1611422
CollectionDate: 11/17/2016
DateReceived: 11/23/2016 12:20:00 PM
FieldSampler: RW
Matrix: Soil

Comments

Analyses	Result	Units	Qual	RL	Method	Date Analyzed/Init	
Radionuclides - Total							
Radium 226	0.9	pCi/g		0.2	EPA 901.1 Mod.	01/08/2017 1311	MB
Radium 226 Precision (±)	0.1	pCi/g			EPA 901.1 Mod.	01/08/2017 1311	MB

These results apply only to the samples tested.

RL - Reporting Limit

Qualifiers:

B	Analyte detected in the associated Method Blank
E	Value above quantitation range
J	Analyte detected below quantitation limits
M	Value exceeds Monthly Ave or MCL or is less than LCL
O	Outside the Range of Dilutions
X	Matrix Effect
C	Calculated Value
H	Holding times for preparation or analysis exceeded
L	Analyzed by another laboratory
ND	Not Detected at the Reporting Limit
S	Spike Recovery outside accepted recovery limits

Reviewed by: _____
Wade Nieuwsma, Assistant Laboratory Manager

Sample Analysis Report

Company: Dawn Mining Company
8809 Washington St. NE Suite 150
Albuquerque, NM 87113

Date Reported 1/17/2017
Report ID S1611422001

ProjectName: Midnite Mine Remedial Action
Lab ID: S1611422-059
ClientSample ID: P1R1-55-0015-SOI-DIS-01
COC: WEB

WorkOrder: S1611422
CollectionDate: 11/17/2016
DateReceived: 11/23/2016 12:20:00 PM
FieldSampler: RW
Matrix: Soil

Comments

Analyses	Result	Units	Qual	RL	Method	Date Analyzed/Init	
Radionuclides - Total							
Radium 226	2.3	pCi/g		0.2	EPA 901.1 Mod.	01/08/2017 1428	MB
Radium 226 Precision (±)	0.2	pCi/g			EPA 901.1 Mod.	01/08/2017 1428	MB

These results apply only to the samples tested.

RL - Reporting Limit

Qualifiers:

B	Analyte detected in the associated Method Blank	C	Calculated Value
E	Value above quantitation range	H	Holding times for preparation or analysis exceeded
J	Analyte detected below quantitation limits	L	Analyzed by another laboratory
M	Value exceeds Monthly Ave or MCL or is less than LCL	ND	Not Detected at the Reporting Limit
O	Outside the Range of Dilutions	S	Spike Recovery outside accepted recovery limits
X	Matrix Effect		

Reviewed by: _____
Wade Nieuwsma, Assistant Laboratory Manager

Sample Analysis Report

Company: Dawn Mining Company
8809 Washington St. NE Suite 150
Albuquerque, NM 87113

Date Reported 1/17/2017
Report ID S1611422001

ProjectName: Midnite Mine Remedial Action
Lab ID: S1611422-060
ClientSample ID: P1R1-56-0015-SOI-DIS-01
COC: WEB

WorkOrder: S1611422
CollectionDate: 11/17/2016
DateReceived: 11/23/2016 12:20:00 PM
FieldSampler: RW
Matrix: Soil

Comments

Analyses	Result	Units	Qual	RL	Method	Date Analyzed/Init	
Metals - Total							
Uranium	4.53	mg/Kg		0.05	6020A	12/12/2016 1949	MS
Radionuclides - Total							
Lead 210	2.2	pCi/g		1.35	EPA 909.0 Mod.	01/16/2017 2225	MB
Lead 210 Precision (±)	0.4	pCi/g			EPA 909.0 Mod.	01/16/2017 2225	MB
Radium 226	2.0	pCi/g		0.2	EPA 901.1 Mod.	01/08/2017 1544	MB
Radium 226 Precision (±)	0.2	pCi/g			EPA 901.1 Mod.	01/08/2017 1544	MB

These results apply only to the samples tested.

RL - Reporting Limit

Qualifiers:

B	Analyte detected in the associated Method Blank	C	Calculated Value
E	Value above quantitation range	H	Holding times for preparation or analysis exceeded
J	Analyte detected below quantitation limits	L	Analyzed by another laboratory
M	Value exceeds Monthly Ave or MCL or is less than LCL	ND	Not Detected at the Reporting Limit
O	Outside the Range of Dilutions	S	Spike Recovery outside accepted recovery limits
X	Matrix Effect		

Reviewed by: _____
Wade Nieuwsma, Assistant Laboratory Manager

Sample Analysis Report

Company: Dawn Mining Company
8809 Washington St. NE Suite 150
Albuquerque, NM 87113

Date Reported 1/17/2017
Report ID S1611422001

ProjectName: Midnite Mine Remedial Action
Lab ID: S1611422-061
ClientSample ID: P1R1-57-0015-SOI-DIS-01
COC: WEB

WorkOrder: S1611422
CollectionDate: 11/17/2016
DateReceived: 11/23/2016 12:20:00 PM
FieldSampler: RW
Matrix: Soil

Comments

Analyses	Result	Units	Qual	RL	Method	Date Analyzed/Init	
Radionuclides - Total							
Radium 226	1.4	pCi/g		0.2	EPA 901.1 Mod.	01/08/2017 2333	MB
Radium 226 Precision (±)	0.2	pCi/g			EPA 901.1 Mod.	01/08/2017 2333	MB

These results apply only to the samples tested.

RL - Reporting Limit

Qualifiers:

B	Analyte detected in the associated Method Blank
E	Value above quantitation range
J	Analyte detected below quantitation limits
M	Value exceeds Monthly Ave or MCL or is less than LCL
O	Outside the Range of Dilutions
X	Matrix Effect
C	Calculated Value
H	Holding times for preparation or analysis exceeded
L	Analyzed by another laboratory
ND	Not Detected at the Reporting Limit
S	Spike Recovery outside accepted recovery limits

Reviewed by: _____
Wade Nieuwsma, Assistant Laboratory Manager

Sample Analysis Report

Company: Dawn Mining Company
8809 Washington St. NE Suite 150
Albuquerque, NM 87113

Date Reported 1/17/2017
Report ID S1611422001

ProjectName: Midnite Mine Remedial Action
Lab ID: S1611422-062
ClientSample ID: P1R1-58-0015-SOI-DIS-01
COC: WEB

WorkOrder: S1611422
CollectionDate: 11/17/2016
DateReceived: 11/23/2016 12:20:00 PM
FieldSampler: RW
Matrix: Soil

Comments

Analyses	Result	Units	Qual	RL	Method	Date Analyzed/Init	
Radionuclides - Total							
Radium 226	1.4	pCi/g		0.2	EPA 901.1 Mod.	01/09/2017 049	MB
Radium 226 Precision (±)	0.2	pCi/g			EPA 901.1 Mod.	01/09/2017 049	MB

These results apply only to the samples tested.

RL - Reporting Limit

Qualifiers:

B	Analyte detected in the associated Method Blank
E	Value above quantitation range
J	Analyte detected below quantitation limits
M	Value exceeds Monthly Ave or MCL or is less than LCL
O	Outside the Range of Dilutions
X	Matrix Effect
C	Calculated Value
H	Holding times for preparation or analysis exceeded
L	Analyzed by another laboratory
ND	Not Detected at the Reporting Limit
S	Spike Recovery outside accepted recovery limits

Reviewed by:
Wade Nieuwsma, Assistant Laboratory Manager

Sample Analysis Report

Company: Dawn Mining Company
8809 Washington St. NE Suite 150
Albuquerque, NM 87113

Date Reported 1/17/2017
Report ID S1611422001

ProjectName: Midnite Mine Remedial Action
Lab ID: S1611422-063
ClientSample ID: P1R1-59-0015-SOI-DIS-01
COC: WEB

WorkOrder: S1611422
CollectionDate: 11/17/2016
DateReceived: 11/23/2016 12:20:00 PM
FieldSampler: RW
Matrix: Soil

Comments

Analyses	Result	Units	Qual	RL	Method	Date Analyzed/Init	
Radionuclides - Total							
Radium 226	4.5	pCi/g		0.2	EPA 901.1 Mod.	01/09/2017 206	MB
Radium 226 Precision (±)	0.3	pCi/g			EPA 901.1 Mod.	01/09/2017 206	MB

These results apply only to the samples tested.

RL - Reporting Limit

Qualifiers:

B	Analyte detected in the associated Method Blank
E	Value above quantitation range
J	Analyte detected below quantitation limits
M	Value exceeds Monthly Ave or MCL or is less than LCL
O	Outside the Range of Dilutions
X	Matrix Effect
C	Calculated Value
H	Holding times for preparation or analysis exceeded
L	Analyzed by another laboratory
ND	Not Detected at the Reporting Limit
S	Spike Recovery outside accepted recovery limits

Reviewed by: _____
Wade Nieuwsma, Assistant Laboratory Manager

Sample Analysis Report

Company: Dawn Mining Company
8809 Washington St. NE Suite 150
Albuquerque, NM 87113

Date Reported 1/17/2017
Report ID S1611422001

ProjectName: Midnite Mine Remedial Action
Lab ID: S1611422-064
ClientSample ID: P1R1-60-0015-SOI-DIS-01
COC: WEB

WorkOrder: S1611422
CollectionDate: 11/17/2016
DateReceived: 11/23/2016 12:20:00 PM
FieldSampler: RW
Matrix: Soil

Comments

Analyses	Result	Units	Qual	RL	Method	Date Analyzed/Init	
Radionuclides - Total							
Radium 226	1.4	pCi/g		0.2	EPA 901.1 Mod.	01/09/2017 322	MB
Radium 226 Precision (±)	0.2	pCi/g			EPA 901.1 Mod.	01/09/2017 322	MB

These results apply only to the samples tested.

RL - Reporting Limit

Qualifiers:

B	Analyte detected in the associated Method Blank
E	Value above quantitation range
J	Analyte detected below quantitation limits
M	Value exceeds Monthly Ave or MCL or is less than LCL
O	Outside the Range of Dilutions
X	Matrix Effect
C	Calculated Value
H	Holding times for preparation or analysis exceeded
L	Analyzed by another laboratory
ND	Not Detected at the Reporting Limit
S	Spike Recovery outside accepted recovery limits

Reviewed by: _____
Wade Nieuwsma, Assistant Laboratory Manager

Sample Analysis Report

Company: Dawn Mining Company
8809 Washington St. NE Suite 150
Albuquerque, NM 87113

Date Reported 1/17/2017
Report ID S1611422001

ProjectName: Midnite Mine Remedial Action
Lab ID: S1611422-065
ClientSample ID: P1R1-61-0015-SOI-DIS-01
COC: WEB

WorkOrder: S1611422
CollectionDate: 11/17/2016
DateReceived: 11/23/2016 12:20:00 PM
FieldSampler: RW
Matrix: Soil

Comments

Analyses	Result	Units	Qual	RL	Method	Date Analyzed/Init	
Radionuclides - Total							
Radium 226	1.2	pCi/g		0.2	EPA 901.1 Mod.	01/09/2017 439	MB
Radium 226 Precision (±)	0.2	pCi/g			EPA 901.1 Mod.	01/09/2017 439	MB

These results apply only to the samples tested.

RL - Reporting Limit

Qualifiers:

B	Analyte detected in the associated Method Blank
E	Value above quantitation range
J	Analyte detected below quantitation limits
M	Value exceeds Monthly Ave or MCL or is less than LCL
O	Outside the Range of Dilutions
X	Matrix Effect
C	Calculated Value
H	Holding times for preparation or analysis exceeded
L	Analyzed by another laboratory
ND	Not Detected at the Reporting Limit
S	Spike Recovery outside accepted recovery limits

Reviewed by: _____
Wade Nieuwsma, Assistant Laboratory Manager

Sample Analysis Report

Company: Dawn Mining Company
8809 Washington St. NE Suite 150
Albuquerque, NM 87113

Date Reported 1/17/2017
Report ID S1611422001

ProjectName: Midnite Mine Remedial Action
Lab ID: S1611422-066
ClientSample ID: P1R1-62-0015-SOI-DIS-01
COC: WEB

WorkOrder: S1611422
CollectionDate: 11/17/2016
DateReceived: 11/23/2016 12:20:00 PM
FieldSampler: RW
Matrix: Soil

Comments

Analyses	Result	Units	Qual	RL	Method	Date Analyzed/Init	
Radionuclides - Total							
Radium 226	2.0	pCi/g		0.2	EPA 901.1 Mod.	01/09/2017 556	MB
Radium 226 Precision (±)	0.2	pCi/g			EPA 901.1 Mod.	01/09/2017 556	MB

These results apply only to the samples tested.

RL - Reporting Limit

Qualifiers:

B	Analyte detected in the associated Method Blank
E	Value above quantitation range
J	Analyte detected below quantitation limits
M	Value exceeds Monthly Ave or MCL or is less than LCL
O	Outside the Range of Dilutions
X	Matrix Effect
C	Calculated Value
H	Holding times for preparation or analysis exceeded
L	Analyzed by another laboratory
ND	Not Detected at the Reporting Limit
S	Spike Recovery outside accepted recovery limits

Reviewed by: _____
Wade Nieuwsma, Assistant Laboratory Manager

Sample Analysis Report

Company: Dawn Mining Company
8809 Washington St. NE Suite 150
Albuquerque, NM 87113

Date Reported 1/17/2017
Report ID S1611422001

ProjectName: Midnite Mine Remedial Action
Lab ID: S1611422-067
ClientSample ID: P1R1-63-0015-SOI-DIS-01
COC: WEB

WorkOrder: S1611422
CollectionDate: 11/17/2016
DateReceived: 11/23/2016 12:20:00 PM
FieldSampler: RW
Matrix: Soil

Comments

Analyses	Result	Units	Qual	RL	Method	Date Analyzed/Init	
Metals - Total							
Uranium	1.95	mg/Kg		0.05	6020A	12/12/2016 1954	MS
Radionuclides - Total							
Lead 210	1.5	pCi/g		1.35	EPA 909.0 Mod.	01/16/2017 2225	MB
Lead 210 Precision (±)	0.6	pCi/g			EPA 909.0 Mod.	01/16/2017 2225	MB
Radium 226	1.6	pCi/g		0.2	EPA 901.1 Mod.	01/09/2017 712	MB
Radium 226 Precision (±)	0.2	pCi/g			EPA 901.1 Mod.	01/09/2017 712	MB

These results apply only to the samples tested.

RL - Reporting Limit

Qualifiers:

B	Analyte detected in the associated Method Blank	C	Calculated Value
E	Value above quantitation range	H	Holding times for preparation or analysis exceeded
J	Analyte detected below quantitation limits	L	Analyzed by another laboratory
M	Value exceeds Monthly Ave or MCL or is less than LCL	ND	Not Detected at the Reporting Limit
O	Outside the Range of Dilutions	S	Spike Recovery outside accepted recovery limits
X	Matrix Effect		

Reviewed by: _____
Wade Nieuwsma, Assistant Laboratory Manager

Sample Analysis Report

Company: Dawn Mining Company
8809 Washington St. NE Suite 150
Albuquerque, NM 87113

Date Reported 1/17/2017
Report ID S1611422001

ProjectName: Midnite Mine Remedial Action
Lab ID: S1611422-068
ClientSample ID: P1R1-64-0015-SOI-DIS-01
COC: WEB

WorkOrder: S1611422
CollectionDate: 11/17/2016
DateReceived: 11/23/2016 12:20:00 PM
FieldSampler: RW
Matrix: Soil

Comments

Analyses	Result	Units	Qual	RL	Method	Date Analyzed/Init	
Radionuclides - Total							
Radium 226	2.7	pCi/g		0.2	EPA 901.1 Mod.	01/09/2017 828	MB
Radium 226 Precision (±)	0.2	pCi/g			EPA 901.1 Mod.	01/09/2017 828	MB

These results apply only to the samples tested.

RL - Reporting Limit

Qualifiers:

B	Analyte detected in the associated Method Blank	C	Calculated Value
E	Value above quantitation range	H	Holding times for preparation or analysis exceeded
J	Analyte detected below quantitation limits	L	Analyzed by another laboratory
M	Value exceeds Monthly Ave or MCL or is less than LCL	ND	Not Detected at the Reporting Limit
O	Outside the Range of Dilutions	S	Spike Recovery outside accepted recovery limits
X	Matrix Effect		

Reviewed by: _____
Wade Nieuwsma, Assistant Laboratory Manager

Sample Analysis Report

Company: Dawn Mining Company
8809 Washington St. NE Suite 150
Albuquerque, NM 87113

Date Reported 1/17/2017
Report ID S1611422001

ProjectName: Midnite Mine Remedial Action
Lab ID: S1611422-069
ClientSample ID: P1R1-65-0015-SOI-DIS-01
COC: WEB

WorkOrder: S1611422
CollectionDate: 11/17/2016
DateReceived: 11/23/2016 12:20:00 PM
FieldSampler: RW
Matrix: Soil

Comments

Analyses	Result	Units	Qual	RL	Method	Date Analyzed/Init	
Radionuclides - Total							
Radium 226	1.5	pCi/g		0.2	EPA 901.1 Mod.	01/09/2017 945	MB
Radium 226 Precision (±)	0.2	pCi/g			EPA 901.1 Mod.	01/09/2017 945	MB

These results apply only to the samples tested.

RL - Reporting Limit

Qualifiers:

B	Analyte detected in the associated Method Blank
E	Value above quantitation range
J	Analyte detected below quantitation limits
M	Value exceeds Monthly Ave or MCL or is less than LCL
O	Outside the Range of Dilutions
X	Matrix Effect
C	Calculated Value
H	Holding times for preparation or analysis exceeded
L	Analyzed by another laboratory
ND	Not Detected at the Reporting Limit
S	Spike Recovery outside accepted recovery limits

Reviewed by:
Wade Nieuwsma, Assistant Laboratory Manager

Sample Analysis Report

Company: Dawn Mining Company
8809 Washington St. NE Suite 150
Albuquerque, NM 87113

Date Reported 1/17/2017
Report ID S1611422001

ProjectName: Midnite Mine Remedial Action
Lab ID: S1611422-070
ClientSample ID: P1R1-66-0015-SOI-DIS-01
COC: WEB

WorkOrder: S1611422
CollectionDate: 11/17/2016
DateReceived: 11/23/2016 12:20:00 PM
FieldSampler: RW
Matrix: Soil

Comments

Analyses	Result	Units	Qual	RL	Method	Date Analyzed/Init	
Radionuclides - Total							
Radium 226	2.2	pCi/g		0.2	EPA 901.1 Mod.	01/09/2017 1101	MB
Radium 226 Precision (±)	0.2	pCi/g			EPA 901.1 Mod.	01/09/2017 1101	MB

These results apply only to the samples tested.

RL - Reporting Limit

Qualifiers:

B	Analyte detected in the associated Method Blank
E	Value above quantitation range
J	Analyte detected below quantitation limits
M	Value exceeds Monthly Ave or MCL or is less than LCL
O	Outside the Range of Dilutions
X	Matrix Effect
C	Calculated Value
H	Holding times for preparation or analysis exceeded
L	Analyzed by another laboratory
ND	Not Detected at the Reporting Limit
S	Spike Recovery outside accepted recovery limits

Reviewed by: _____
Wade Nieuwsma, Assistant Laboratory Manager

Sample Analysis Report

Company: Dawn Mining Company
8809 Washington St. NE Suite 150
Albuquerque, NM 87113

Date Reported 1/17/2017
Report ID S1611422001

ProjectName: Midnite Mine Remedial Action
Lab ID: S1611422-071
ClientSample ID: P1R1-67-0015-SOI-DIS-01
COC: WEB

WorkOrder: S1611422
CollectionDate: 11/17/2016
DateReceived: 11/23/2016 12:20:00 PM
FieldSampler: RW
Matrix: Soil

Comments

Analyses	Result	Units	Qual	RL	Method	Date Analyzed/Init	
Metals - Total							
Uranium	4.45	mg/Kg		0.05	6020A	12/12/2016 2000	MS
Radionuclides - Total							
Lead 210	2.3	pCi/g		1.35	EPA 909.0 Mod.	01/16/2017 2225	MB
Lead 210 Precision (±)	0.4	pCi/g			EPA 909.0 Mod.	01/16/2017 2225	MB
Radium 226	2.0	pCi/g		0.2	EPA 901.1 Mod.	01/09/2017 1218	MB
Radium 226 Precision (±)	0.2	pCi/g			EPA 901.1 Mod.	01/09/2017 1218	MB

These results apply only to the samples tested.

RL - Reporting Limit

Qualifiers:

B	Analyte detected in the associated Method Blank	C	Calculated Value
E	Value above quantitation range	H	Holding times for preparation or analysis exceeded
J	Analyte detected below quantitation limits	L	Analyzed by another laboratory
M	Value exceeds Monthly Ave or MCL or is less than LCL	ND	Not Detected at the Reporting Limit
O	Outside the Range of Dilutions	S	Spike Recovery outside accepted recovery limits
X	Matrix Effect		

Reviewed by: _____
Wade Nieuwsma, Assistant Laboratory Manager

Sample Analysis Report

Company: Dawn Mining Company
8809 Washington St. NE Suite 150
Albuquerque, NM 87113

Date Reported 1/17/2017
Report ID S1611422001

ProjectName: Midnite Mine Remedial Action
Lab ID: S1611422-072
ClientSample ID: P1R1-68-0015-SOI-DIS-01
COC: WEB

WorkOrder: S1611422
CollectionDate: 11/17/2016
DateReceived: 11/23/2016 12:20:00 PM
FieldSampler: RW
Matrix: Soil

Comments

Analyses	Result	Units	Qual	RL	Method	Date Analyzed/Init	
Radionuclides - Total							
Radium 226	1.5	pCi/g		0.2	EPA 901.1 Mod.	01/09/2017 1334	MB
Radium 226 Precision (±)	0.2	pCi/g			EPA 901.1 Mod.	01/09/2017 1334	MB

These results apply only to the samples tested.

RL - Reporting Limit

Qualifiers:

B	Analyte detected in the associated Method Blank	C	Calculated Value
E	Value above quantitation range	H	Holding times for preparation or analysis exceeded
J	Analyte detected below quantitation limits	L	Analyzed by another laboratory
M	Value exceeds Monthly Ave or MCL or is less than LCL	ND	Not Detected at the Reporting Limit
O	Outside the Range of Dilutions	S	Spike Recovery outside accepted recovery limits
X	Matrix Effect		

Reviewed by: _____
Wade Nieuwsma, Assistant Laboratory Manager

Sample Analysis Report

Company: Dawn Mining Company
8809 Washington St. NE Suite 150
Albuquerque, NM 87113

Date Reported 1/17/2017
Report ID S1611422001

ProjectName: Midnite Mine Remedial Action
Lab ID: S1611422-073
ClientSample ID: P1R1-69-0015-SOI-DIS-01
COC: WEB

WorkOrder: S1611422
CollectionDate: 11/17/2016
DateReceived: 11/23/2016 12:20:00 PM
FieldSampler: RW
Matrix: Soil

Comments

Analyses	Result	Units	Qual	RL	Method	Date Analyzed/Init	
Radionuclides - Total							
Radium 226	1.9	pCi/g		0.2	EPA 901.1 Mod.	01/09/2017 1451	MB
Radium 226 Precision (±)	0.2	pCi/g			EPA 901.1 Mod.	01/09/2017 1451	MB

These results apply only to the samples tested.

RL - Reporting Limit

Qualifiers:

B	Analyte detected in the associated Method Blank	C	Calculated Value
E	Value above quantitation range	H	Holding times for preparation or analysis exceeded
J	Analyte detected below quantitation limits	L	Analyzed by another laboratory
M	Value exceeds Monthly Ave or MCL or is less than LCL	ND	Not Detected at the Reporting Limit
O	Outside the Range of Dilutions	S	Spike Recovery outside accepted recovery limits
X	Matrix Effect		

Reviewed by: _____
Wade Nieuwsma, Assistant Laboratory Manager

Sample Analysis Report

Company: Dawn Mining Company
8809 Washington St. NE Suite 150
Albuquerque, NM 87113

Date Reported 1/17/2017
Report ID S1611422001

ProjectName: Midnite Mine Remedial Action
Lab ID: S1611422-074
ClientSample ID: P1R1-70-0015-SOI-DIS-01
COC: WEB

WorkOrder: S1611422
CollectionDate: 11/17/2016
DateReceived: 11/23/2016 12:20:00 PM
FieldSampler: RW
Matrix: Soil

Comments

Analyses	Result	Units	Qual	RL	Method	Date Analyzed/Init	
Metals - Total							
Uranium	1.84	mg/Kg		0.05	6020A	12/12/2016 2006	MS
Radionuclides - Total							
Lead 210	1.4	pCi/g		1.35	EPA 909.0 Mod.	01/16/2017 2225	MB
Lead 210 Precision (±)	0.6	pCi/g			EPA 909.0 Mod.	01/16/2017 2225	MB
Radium 226	1.2	pCi/g		0.2	EPA 901.1 Mod.	01/09/2017 1607	MB
Radium 226 Precision (±)	0.2	pCi/g			EPA 901.1 Mod.	01/09/2017 1607	MB

These results apply only to the samples tested.

RL - Reporting Limit

Qualifiers:

B	Analyte detected in the associated Method Blank	C	Calculated Value
E	Value above quantitation range	H	Holding times for preparation or analysis exceeded
J	Analyte detected below quantitation limits	L	Analyzed by another laboratory
M	Value exceeds Monthly Ave or MCL or is less than LCL	ND	Not Detected at the Reporting Limit
O	Outside the Range of Dilutions	S	Spike Recovery outside accepted recovery limits
X	Matrix Effect		

Reviewed by: _____
Wade Nieuwsma, Assistant Laboratory Manager

Sample Analysis Report

Company: Dawn Mining Company
8809 Washington St. NE Suite 150
Albuquerque, NM 87113

Date Reported 1/17/2017
Report ID S1611422001

ProjectName: Midnite Mine Remedial Action
Lab ID: S1611422-075
ClientSample ID: P1R1-71-0015-SOI-DIS-01
COC: WEB

WorkOrder: S1611422
CollectionDate: 11/17/2016
DateReceived: 11/23/2016 12:20:00 PM
FieldSampler: RW
Matrix: Soil

Comments

Analyses	Result	Units	Qual	RL	Method	Date Analyzed/Init	
Radionuclides - Total							
Radium 226	1.3	pCi/g		0.2	EPA 901.1 Mod.	01/09/2017 1724	MB
Radium 226 Precision (±)	0.2	pCi/g			EPA 901.1 Mod.	01/09/2017 1724	MB

These results apply only to the samples tested.

RL - Reporting Limit

Qualifiers:

B	Analyte detected in the associated Method Blank	C	Calculated Value
E	Value above quantitation range	H	Holding times for preparation or analysis exceeded
J	Analyte detected below quantitation limits	L	Analyzed by another laboratory
M	Value exceeds Monthly Ave or MCL or is less than LCL	ND	Not Detected at the Reporting Limit
O	Outside the Range of Dilutions	S	Spike Recovery outside accepted recovery limits
X	Matrix Effect		

Reviewed by: _____
Wade Nieuwsma, Assistant Laboratory Manager

Sample Analysis Report

Company: Dawn Mining Company
8809 Washington St. NE Suite 150
Albuquerque, NM 87113

Date Reported 1/17/2017
Report ID S1611422001

ProjectName: Midnite Mine Remedial Action
Lab ID: S1611422-076
ClientSample ID: P1R1-72-0015-SOI-DIS-01
COC: WEB

WorkOrder: S1611422
CollectionDate: 11/17/2016
DateReceived: 11/23/2016 12:20:00 PM
FieldSampler: RW
Matrix: Soil

Comments

Analyses	Result	Units	Qual	RL	Method	Date Analyzed/Init	
Radionuclides - Total							
Radium 226	2.4	pCi/g		0.2	EPA 901.1 Mod.	01/09/2017 1840	MB
Radium 226 Precision (±)	0.2	pCi/g			EPA 901.1 Mod.	01/09/2017 1840	MB

These results apply only to the samples tested.

RL - Reporting Limit

Qualifiers:

B	Analyte detected in the associated Method Blank	C	Calculated Value
E	Value above quantitation range	H	Holding times for preparation or analysis exceeded
J	Analyte detected below quantitation limits	L	Analyzed by another laboratory
M	Value exceeds Monthly Ave or MCL or is less than LCL	ND	Not Detected at the Reporting Limit
O	Outside the Range of Dilutions	S	Spike Recovery outside accepted recovery limits
X	Matrix Effect		

Reviewed by: _____
Wade Nieuwsma, Assistant Laboratory Manager

Sample Analysis Report

Company: Dawn Mining Company
8809 Washington St. NE Suite 150
Albuquerque, NM 87113

Date Reported 1/17/2017
Report ID S1611422001

ProjectName: Midnite Mine Remedial Action
Lab ID: S1611422-077
ClientSample ID: P1R1-73-0015-SOI-DIS-01
COC: WEB

WorkOrder: S1611422
CollectionDate: 11/17/2016
DateReceived: 11/23/2016 12:20:00 PM
FieldSampler: RW
Matrix: Soil

Comments

Analyses	Result	Units	Qual	RL	Method	Date Analyzed/Init	
Radionuclides - Total							
Radium 226	1.7	pCi/g		0.2	EPA 901.1 Mod.	01/09/2017 1956	MB
Radium 226 Precision (±)	0.2	pCi/g			EPA 901.1 Mod.	01/09/2017 1956	MB

These results apply only to the samples tested.

RL - Reporting Limit

Qualifiers:

B	Analyte detected in the associated Method Blank
E	Value above quantitation range
J	Analyte detected below quantitation limits
M	Value exceeds Monthly Ave or MCL or is less than LCL
O	Outside the Range of Dilutions
X	Matrix Effect
C	Calculated Value
H	Holding times for preparation or analysis exceeded
L	Analyzed by another laboratory
ND	Not Detected at the Reporting Limit
S	Spike Recovery outside accepted recovery limits

Reviewed by: _____
Wade Nieuwsma, Assistant Laboratory Manager

Sample Analysis Report

Company: Dawn Mining Company
8809 Washington St. NE Suite 150
Albuquerque, NM 87113

Date Reported 1/17/2017
Report ID S1611422001

ProjectName: Midnite Mine Remedial Action
Lab ID: S1611422-078
ClientSample ID: P1R1-74-0015-SOI-DIS-01
COC: WEB

WorkOrder: S1611422
CollectionDate: 11/17/2016
DateReceived: 11/23/2016 12:20:00 PM
FieldSampler: RW
Matrix: Soil

Comments

Analyses	Result	Units	Qual	RL	Method	Date Analyzed/Init	
Metals - Total							
Uranium	5.20	mg/Kg		0.05	6020A	12/12/2016 2017	MS
Radionuclides - Total							
Lead 210	2.6	pCi/g		1.35	EPA 909.0 Mod.	01/16/2017 2225	MB
Lead 210 Precision (±)	0.5	pCi/g			EPA 909.0 Mod.	01/16/2017 2225	MB
Radium 226	2.2	pCi/g		0.2	EPA 901.1 Mod.	01/09/2017 2113	MB
Radium 226 Precision (±)	0.2	pCi/g			EPA 901.1 Mod.	01/09/2017 2113	MB

These results apply only to the samples tested.

RL - Reporting Limit

Qualifiers:

B	Analyte detected in the associated Method Blank	C	Calculated Value
E	Value above quantitation range	H	Holding times for preparation or analysis exceeded
J	Analyte detected below quantitation limits	L	Analyzed by another laboratory
M	Value exceeds Monthly Ave or MCL or is less than LCL	ND	Not Detected at the Reporting Limit
O	Outside the Range of Dilutions	S	Spike Recovery outside accepted recovery limits
X	Matrix Effect		

Reviewed by: _____
Wade Nieuwsma, Assistant Laboratory Manager

Sample Analysis Report

Company: Dawn Mining Company
8809 Washington St. NE Suite 150
Albuquerque, NM 87113

Date Reported 1/17/2017
Report ID S1611422001

ProjectName: Midnite Mine Remedial Action
Lab ID: S1611422-079
ClientSample ID: P1R1-75-0015-SOI-DIS-01
COC: WEB

WorkOrder: S1611422
CollectionDate: 11/17/2016
DateReceived: 11/23/2016 12:20:00 PM
FieldSampler: RW
Matrix: Soil

Comments

Analyses	Result	Units	Qual	RL	Method	Date Analyzed/Init	
Metals - Total							
Uranium	12.3	mg/Kg		0.05	6020A	12/12/2016 2103	MS
Radionuclides - Total							
Lead 210	4.3	pCi/g		1.35	EPA 909.0 Mod.	01/16/2017 2225	MB
Lead 210 Precision (±)	0.6	pCi/g			EPA 909.0 Mod.	01/16/2017 2225	MB
Radium 226	4.3	pCi/g		0.2	EPA 901.1 Mod.	01/09/2017 2229	MB
Radium 226 Precision (±)	0.3	pCi/g			EPA 901.1 Mod.	01/09/2017 2229	MB

These results apply only to the samples tested.

RL - Reporting Limit

Qualifiers:

B	Analyte detected in the associated Method Blank
E	Value above quantitation range
J	Analyte detected below quantitation limits
M	Value exceeds Monthly Ave or MCL or is less than LCL
O	Outside the Range of Dilutions
X	Matrix Effect
C	Calculated Value
H	Holding times for preparation or analysis exceeded
L	Analyzed by another laboratory
ND	Not Detected at the Reporting Limit
S	Spike Recovery outside accepted recovery limits

Reviewed by: _____
Wade Nieuwsma, Assistant Laboratory Manager

Sample Analysis Report

Company: Dawn Mining Company
8809 Washington St. NE Suite 150
Albuquerque, NM 87113

Date Reported 1/17/2017
Report ID S1611422001

ProjectName: Midnite Mine Remedial Action
Lab ID: S1611422-080
ClientSample ID: P1R1-B1-0015-SOI-01
COC: WEB

WorkOrder: S1611422
CollectionDate: 11/17/2016
DateReceived: 11/23/2016 12:20:00 PM
FieldSampler: RW
Matrix: Soil

Comments

Analyses	Result	Units	Qual	RL	Method	Date Analyzed/Init	
Radionuclides - Total							
Radium 226	1.7	pCi/g		0.2	EPA 901.1 Mod.	01/09/2017 2345	MB
Radium 226 Precision (±)	0.2	pCi/g			EPA 901.1 Mod.	01/09/2017 2345	MB

These results apply only to the samples tested.

RL - Reporting Limit

Qualifiers:

B	Analyte detected in the associated Method Blank
E	Value above quantitation range
J	Analyte detected below quantitation limits
M	Value exceeds Monthly Ave or MCL or is less than LCL
O	Outside the Range of Dilutions
X	Matrix Effect
C	Calculated Value
H	Holding times for preparation or analysis exceeded
L	Analyzed by another laboratory
ND	Not Detected at the Reporting Limit
S	Spike Recovery outside accepted recovery limits

Reviewed by: _____
Wade Nieuwsma, Assistant Laboratory Manager

Sample Analysis Report

Company: Dawn Mining Company
8809 Washington St. NE Suite 150
Albuquerque, NM 87113

Date Reported 1/17/2017
Report ID S1611422001

ProjectName: Midnite Mine Remedial Action
Lab ID: S1611422-081
ClientSample ID: P1R1-B2-0015-SOI-01
COC: WEB

WorkOrder: S1611422
CollectionDate: 11/17/2016
DateReceived: 11/23/2016 12:20:00 PM
FieldSampler: RW
Matrix: Soil

Comments

Analyses	Result	Units	Qual	RL	Method	Date Analyzed/Init	
Metals - Total							
Uranium	9.98	mg/Kg		0.05	6020A	12/12/2016 2109	MS
Radionuclides - Total							
Lead 210	1.8	pCi/g		1.35	EPA 909.0 Mod.	01/16/2017 2225	MB
Lead 210 Precision (±)	0.3	pCi/g			EPA 909.0 Mod.	01/16/2017 2225	MB
Radium 226	1.8	pCi/g		0.2	EPA 901.1 Mod.	01/10/2017 809	MB
Radium 226 Precision (±)	0.2	pCi/g			EPA 901.1 Mod.	01/10/2017 809	MB

These results apply only to the samples tested.

RL - Reporting Limit

Qualifiers:

B	Analyte detected in the associated Method Blank	C	Calculated Value
E	Value above quantitation range	H	Holding times for preparation or analysis exceeded
J	Analyte detected below quantitation limits	L	Analyzed by another laboratory
M	Value exceeds Monthly Ave or MCL or is less than LCL	ND	Not Detected at the Reporting Limit
O	Outside the Range of Dilutions	S	Spike Recovery outside accepted recovery limits
X	Matrix Effect		

Reviewed by: _____
Wade Nieuwsma, Assistant Laboratory Manager

Sample Analysis Report

Company: Dawn Mining Company
8809 Washington St. NE Suite 150
Albuquerque, NM 87113

Date Reported 1/17/2017
Report ID S1611422001

ProjectName: Midnite Mine Remedial Action
Lab ID: S1611422-082
ClientSample ID: P1R1-B3-0015-SOI-01
COC: WEB

WorkOrder: S1611422
CollectionDate: 11/17/2016
DateReceived: 11/23/2016 12:20:00 PM
FieldSampler: RW
Matrix: Soil

Comments

Analyses	Result	Units	Qual	RL	Method	Date Analyzed/Init	
Radionuclides - Total							
Radium 226	1.6	pCi/g		0.2	EPA 901.1 Mod.	01/10/2017 925	MB
Radium 226 Precision (±)	0.2	pCi/g			EPA 901.1 Mod.	01/10/2017 925	MB

These results apply only to the samples tested.

RL - Reporting Limit

Qualifiers:

B	Analyte detected in the associated Method Blank
E	Value above quantitation range
J	Analyte detected below quantitation limits
M	Value exceeds Monthly Ave or MCL or is less than LCL
O	Outside the Range of Dilutions
X	Matrix Effect
C	Calculated Value
H	Holding times for preparation or analysis exceeded
L	Analyzed by another laboratory
ND	Not Detected at the Reporting Limit
S	Spike Recovery outside accepted recovery limits

Reviewed by: _____
Wade Nieuwsma, Assistant Laboratory Manager

Sample Analysis Report

Company: Dawn Mining Company
8809 Washington St. NE Suite 150
Albuquerque, NM 87113

Date Reported 1/17/2017
Report ID S1611422001

ProjectName: Midnite Mine Remedial Action
Lab ID: S1611422-083
ClientSample ID: P1R1-3-0015-SOI-02
COC: WEB

WorkOrder: S1611422
CollectionDate: 11/16/2016
DateReceived: 11/23/2016 12:20:00 PM
FieldSampler: RW
Matrix: Soil

Comments

Analyses	Result	Units	Qual	RL	Method	Date Analyzed/Init	
Radionuclides - Total							
Radium 226	1.3	pCi/g		0.2	EPA 901.1 Mod.	01/10/2017 1042	MB
Radium 226 Precision (±)	0.2	pCi/g			EPA 901.1 Mod.	01/10/2017 1042	MB

These results apply only to the samples tested.

RL - Reporting Limit

Qualifiers:

B	Analyte detected in the associated Method Blank
E	Value above quantitation range
J	Analyte detected below quantitation limits
M	Value exceeds Monthly Ave or MCL or is less than LCL
O	Outside the Range of Dilutions
X	Matrix Effect
C	Calculated Value
H	Holding times for preparation or analysis exceeded
L	Analyzed by another laboratory
ND	Not Detected at the Reporting Limit
S	Spike Recovery outside accepted recovery limits

Reviewed by: _____
Wade Nieuwsma, Assistant Laboratory Manager

ANALYTICAL QC SUMMARY REPORT

CLIENT: Dawn Mining Company
Work Order: S1611422
Project: Midnite Mine Remedial Action

Date: 1/17/2017
Report ID: S1611422001

Radium By Gamma Spectroscopy in Soil Sample Type **MBLK** Units: pCi/g

MB-12699 (12/29/16 10:39) RunNo: 142384 PrepDate: 12/29/16 11:56 BatchID 12699

Analyte	Result	RL	Spike	Ref Samp	%REC	% Rec Limits	Qual
Radium 226	ND	0.2					

MB2-12699 (01/06/17 21:42) RunNo: 142352 PrepDate: 12/29/16 11:56 BatchID 12699

Analyte	Result	RL	Spike	Ref Samp	%REC	% Rec Limits	Qual
Radium 226	ND	0.2					

MB3-12699 (01/07/17 12:56) RunNo: 142359 PrepDate: 12/29/16 11:56 BatchID 12699

Analyte	Result	RL	Spike	Ref Samp	%REC	% Rec Limits	Qual
Radium 226	ND	0.2					

MB4-12699 (01/08/17 21:00) RunNo: 142369 PrepDate: 12/29/16 11:56 BatchID 12699

Analyte	Result	RL	Spike	Ref Samp	%REC	% Rec Limits	Qual
Radium 226	ND	0.2					

Radium By Gamma Spectroscopy in Soil Sample Type **LCS** Units: pCi/g

ROCKYFLATS-12699 (12/29/16 13:36) RunNo: 142384 PrepDate: 12/29/16 11:56 BatchID 12699

Analyte	Result	RL	Spike	Ref Samp	%REC	% Rec Limits	Qual
Radium 226	1.2	0.2	1.15		106	70 - 130	

LCS-15-3-12699 (01/05/17 11:22) RunNo: 142384 PrepDate: 12/29/16 11:56 BatchID 12699

Analyte	Result	RL	Spike	Ref Samp	%REC	% Rec Limits	Qual
Radium 226	37.0	0.2	37.9		97.7	70 - 130	

UTS-4-12699 (01/05/17 11:24) RunNo: 142384 PrepDate: 12/29/16 11:56 BatchID 12699

Analyte	Result	RL	Spike	Ref Samp	%REC	% Rec Limits	Qual
Radium 226	1020	0.2	978		104	70 - 130	

LCS2-15-3-12699 (01/05/17 15:28) RunNo: 142352 PrepDate: 12/29/16 11:56 BatchID 12699

Analyte	Result	RL	Spike	Ref Samp	%REC	% Rec Limits	Qual
Radium 226	37.3	0.2	37.9		98.3	70 - 130	

LCS3-15-3-12699 (01/07/17 14:13) RunNo: 142359 PrepDate: 12/29/16 11:56 BatchID 12699

Analyte	Result	RL	Spike	Ref Samp	%REC	% Rec Limits	Qual
Radium 226	37.9	0.2	37.9		100	70 - 130	

ROCKYFLATS-001-12699 (01/08/17 18:18) RunNo: 142359 PrepDate: 12/29/16 11:56 BatchID 12699

Analyte	Result	RL	Spike	Ref Samp	%REC	% Rec Limits	Qual
Radium 226	1.4	0.2	1.15		118	70 - 130	

LCS4-15-3-12699 (01/08/17 22:16) RunNo: 142369 PrepDate: 12/29/16 11:56 BatchID 12699

Analyte	Result	RL	Spike	Ref Samp	%REC	% Rec Limits	Qual
Radium 226	37.2	0.2	37.9		98.2	70 - 130	

Qualifiers:

B	Analyte detected in the associated Method Blank	E	Value above quantitation range
H	Holding times for preparation or analysis exceeded	J	Analyte detected below quantitation limits
L	Analyzed by another laboratory	ND	Not Detected at the Reporting Limit
O	Outside the Range of Dilutions	R	RPD outside accepted recovery limits
S	Spike Recovery outside accepted recovery limits	X	Matrix Effect

ANALYTICAL QC SUMMARY REPORT

CLIENT: Dawn Mining Company
Work Order: S1611422
Project: Midnite Mine Remedial Action

Date: 1/17/2017
Report ID: S1611422001

Radium By Gamma Spectroscopy in Soil Sample Type **LCS** Units: pCi/g

UTS-4-001-12699 (01/10/17 02:19) RunNo: 142369 PrepDate: 12/29/16 11:56 BatchID 12699

Analyte	Result	RL	Spike	Ref Samp	%REC	% Rec Limits	Qual
Radium 226	925	0.2	978		94.6	70 - 130	

Radium By Gamma Spectroscopy in Soil Sample Type **DUP** Units: pCi/g

S1611422-020AD (01/05/17 08:17) RunNo: 142384 PrepDate: 12/29/16 11:56 BatchID 12699

Analyte	Result	RL	Ref Samp	%RPD	%REC	% RPD Limits	Qual
Radium 226	3.6	0.2	3.0	17.5		20	

S1611422-040AD (01/06/17 18:14) RunNo: 142352 PrepDate: 12/29/16 11:56 BatchID 12699

Analyte	Result	RL	Ref Samp	%RPD	%REC	% RPD Limits	Qual
Radium 226	3.4	0.2	3.3	0.480		20	

S1611422-060AD (01/08/17 17:01) RunNo: 142359 PrepDate: 12/29/16 11:56 BatchID 12699

Analyte	Result	RL	Ref Samp	%RPD	%REC	% RPD Limits	Qual
Radium 226	2.4	0.2	2.1	16.7		20	

S1611422-080AD (01/10/17 01:02) RunNo: 142369 PrepDate: 12/29/16 11:56 BatchID 12699

Analyte	Result	RL	Ref Samp	%RPD	%REC	% RPD Limits	Qual
Radium 226	1.6	0.2	1.7	7.59		20	

Qualifiers:

B	Analyte detected in the associated Method Blank	E	Value above quantitation range
H	Holding times for preparation or analysis exceeded	J	Analyte detected below quantitation limits
L	Analyzed by another laboratory	ND	Not Detected at the Reporting Limit
O	Outside the Range of Dilutions	R	RPD outside accepted recovery limits
S	Spike Recovery outside accepted recovery limits	X	Matrix Effect

ANALYTICAL QC SUMMARY REPORT

CLIENT: Dawn Mining Company
Work Order: S1611422
Project: Midnite Mine Remedial Action

Date: 1/17/2017
Report ID: S1611422001

Lead 210 in Soil - EPA 909.0 Sample Type **MBLK** Units: pCi/g

MB-16 (01/12/17 10:51) RunNo: 142420 PrepDate: 12/13/16 0:00 BatchID 12629

Analyte	Result	RL	Spike	Ref Samp	%REC	% Rec Limits	Qual
Lead 210	ND	1.35					

MB-17 (01/16/17 14:08) RunNo: 142471 PrepDate: 12/09/16 8:50 BatchID 12631

Analyte	Result	RL	Spike	Ref Samp	%REC	% Rec Limits	Qual
Lead 210	ND	1.35					

Lead 210 in Soil - EPA 909.0 Sample Type **LCS** Units: pCi/g

LCS-16 (01/12/17 10:51) RunNo: 142420 PrepDate: 12/13/16 0:00 BatchID 12629

Analyte	Result	RL	Spike	Ref Samp	%REC	% Rec Limits	Qual
Lead 210	12.6	1.35	13.6		93.2	50 - 150	

UTS-4 (01/12/17 10:51) RunNo: 142420 PrepDate: 12/08/16 9:00 BatchID 12629

Analyte	Result	RL	Spike	Ref Samp	%REC	% Rec Limits	Qual
Lead 210	739	1.35	875		84.4	50 - 150	

LCS-17 (01/16/17 14:08) RunNo: 142471 PrepDate: 12/09/16 8:50 BatchID 12631

Analyte	Result	RL	Spike	Ref Samp	%REC	% Rec Limits	Qual
Lead 210	13.6	1.35	11.2		121	50 - 150	

UTS-4 (01/16/17 14:08) RunNo: 142471 PrepDate: 12/09/16 8:50 BatchID 12631

Analyte	Result	RL	Spike	Ref Samp	%REC	% Rec Limits	Qual
Lead 210	849	1.35	875		97.0	50 - 150	

Lead 210 in Soil - EPA 909.0 Sample Type **MS** Units: pCi/g

S1611422-008A MS (01/12/17 10:51) RunNo: 142420 PrepDate: 12/13/16 0:00 BatchID 12629

Analyte	Result	RL	Spike	Ref Samp	%REC	% Rec Limits	Qual
Lead 210	15.8	1.35	13.6	1.95	102	50 - 150	

S1611422-045A MS (01/16/17 14:08) RunNo: 142471 PrepDate: 12/09/16 8:50 BatchID 12631

Analyte	Result	RL	Spike	Ref Samp	%REC	% Rec Limits	Qual
Lead 210	13.8	1.35	11.2	1.82	107	50 - 150	

Lead 210 in Soil - EPA 909.0 Sample Type **MSD** Units: pCi/g

S1611422-008A MSD (01/12/17 10:51) RunNo: 142420 PrepDate: 12/13/16 0:00 BatchID 12629

Analyte	Result	RL	Conc	%RPD	%REC	% RPD Limits	Qual
Lead 210	15.2	1.35	15.8	3.73	97.9	20	

S1611422-045A MSD (01/16/17 14:08) RunNo: 142471 PrepDate: 12/09/16 8:50 BatchID 12631

Analyte	Result	RL	Conc	%RPD	%REC	% RPD Limits	Qual
Lead 210	13.3	1.35	13.8	3.73		30	

Qualifiers:

B	Analyte detected in the associated Method Blank	E	Value above quantitation range
H	Holding times for preparation or analysis exceeded	J	Analyte detected below quantitation limits
L	Analyzed by another laboratory	ND	Not Detected at the Reporting Limit
O	Outside the Range of Dilutions	R	RPD outside accepted recovery limits
S	Spike Recovery outside accepted recovery limits	X	Matrix Effect

ANALYTICAL QC SUMMARY REPORT

CLIENT: Dawn Mining Company
Work Order: S1611422
Project: Midnite Mine Remedial Action

Date: 1/17/2017
Report ID: S1611422001

Total (3050) Metals by ICPMS - 6020 Sample Type **MBLK** Units: mg/Kg

MB-12629 (12/12/16 13:59) RunNo: 141711 PrepDate: 12/08/16 9:00 BatchID 12629

Analyte	Result	RL	Spike	Ref Samp	%REC	% Rec Limits	Qual
Uranium	ND	1					

MB-12631 (12/12/16 17:48) RunNo: 141711 PrepDate: 12/09/16 8:50 BatchID 12631

Analyte	Result	RL	Spike	Ref Samp	%REC	% Rec Limits	Qual
Uranium	ND	1					

Total (3050) Metals by ICPMS - 6020 Sample Type **LCS** Units: mg/Kg

LCS-12629 (12/12/16 14:10) RunNo: 141711 PrepDate: 12/08/16 9:00 BatchID 12629

Analyte	Result	RL	Spike	Ref Samp	%REC	% Rec Limits	Qual
Uranium	48	1	50		95.6	80 - 120	

LCS-12631 (12/12/16 18:00) RunNo: 141711 PrepDate: 12/09/16 8:50 BatchID 12631

Analyte	Result	RL	Spike	Ref Samp	%REC	% Rec Limits	Qual
Uranium	47	1	50		93.0	80 - 120	

Total (3050) Metals by ICPMS - 6020 Sample Type **MS** Units: mg/Kg

S1611422-008AS (12/12/16 14:44) RunNo: 141711 PrepDate: 12/08/16 9:00 BatchID 12629

Analyte	Result	RL	Spike	Ref Samp	%REC	% Rec Limits	Qual
Uranium	45.9	0.05	50	2.82	86.2	75 - 125	

S1611422-031AS (12/12/16 16:40) RunNo: 141711 PrepDate: 12/08/16 9:00 BatchID 12629

Analyte	Result	RL	Spike	Ref Samp	%REC	% Rec Limits	Qual
Uranium	45.0	0.05	50	3.36	83.2	75 - 125	

S1611422-045AS (12/12/16 18:46) RunNo: 141711 PrepDate: 12/09/16 8:50 BatchID 12631

Analyte	Result	RL	Spike	Ref Samp	%REC	% Rec Limits	Qual
Uranium	46.5	0.05	50	2.60	87.9	75 - 125	

S1611422-078AS (12/12/16 20:29) RunNo: 141711 PrepDate: 12/09/16 8:50 BatchID 12631

Analyte	Result	RL	Spike	Ref Samp	%REC	% Rec Limits	Qual
Uranium	48.6	0.05	50	5.20	86.8	75 - 125	

Total (3050) Metals by ICPMS - 6020 Sample Type **MSD** Units: mg/Kg

S1611422-008AMSD (12/12/16 15:02) RunNo: 141711 PrepDate: 12/08/16 9:00 BatchID 12629

Analyte	Result	RL	Conc	%RPD	%REC	% RPD Limits	Qual
Uranium	46.4	0.05	45.9	0.978	87.1	20	

S1611422-031AMSD (12/12/16 16:45) RunNo: 141711 PrepDate: 12/08/16 9:00 BatchID 12629

Analyte	Result	RL	Conc	%RPD	%REC	% RPD Limits	Qual
Uranium	44.9	0.05	45.0	0.104	83.1	20	

S1611422-045AMSD (12/12/16 18:51) RunNo: 141711 PrepDate: 12/09/16 8:50 BatchID 12631

Analyte	Result	RL	Conc	%RPD	%REC	% RPD Limits	Qual
Uranium	46.8	0.05	46.5	0.622	88.5	20	

Qualifiers:

B	Analyte detected in the associated Method Blank	E	Value above quantitation range
H	Holding times for preparation or analysis exceeded	J	Analyte detected below quantitation limits
L	Analyzed by another laboratory	ND	Not Detected at the Reporting Limit
O	Outside the Range of Dilutions	R	RPD outside accepted recovery limits
S	Spike Recovery outside accepted recovery limits	X	Matrix Effect

ANALYTICAL QC SUMMARY REPORT

CLIENT: Dawn Mining Company
Work Order: S1611422
Project: Midnite Mine Remedial Action

Date: 1/17/2017
Report ID: S1611422001

Total (3050) Metals by ICPMS - 6020 Sample Type **MSD** Units: mg/Kg

S1611422-078AMSD (12/12/16 20:46) RunNo: 141711 PrepDate: 12/09/16 8:50 BatchID 12631

Analyte	Result	RL	Conc	%RPD	%REC	% RPD Limits	Qual
Uranium	48.8	0.05	48.6	0.471	87.3	20	

Total (3050) Metals by ICPMS - 6020 Sample Type **ICSA** Units: mg/Kg

ICS (12/12/16 13:30) RunNo: 141711

Analyte	Result	RL	Conc	%RPD	%REC	% RPD Limits	Qual
Uranium	ND	0.01	ND				

Total (3050) Metals by ICPMS - 6020 Sample Type **ICSAB** Units: mg/Kg

ICSAB (12/12/16 13:36) RunNo: 141711

Analyte	Result	RL	Conc	%RPD	%REC	% RPD Limits	Qual
Uranium	0.02	0.01	ND		101		

Total (3050) Metals by ICPMS - 6020 Sample Type **SD** Units: mg/Kg

S1611422-008AX5 (12/12/16 14:39) RunNo: 141711 PrepDate: 12/08/16 9:00 BatchID 12629

Analyte	Result	RL	Conc	%PD	%REC	% PD Limits	Qual
Uranium	3	1	3	8.25		10	

Qualifiers:

B	Analyte detected in the associated Method Blank	E	Value above quantitation range
H	Holding times for preparation or analysis exceeded	J	Analyte detected below quantitation limits
L	Analyzed by another laboratory	ND	Not Detected at the Reporting Limit
O	Outside the Range of Dilutions	R	RPD outside accepted recovery limits
S	Spike Recovery outside accepted recovery limits	X	Matrix Effect

Inter-Mountain Laboratories

PREP BATCH REPORT

Prep Start Date: 12/13/2016 8:45:00 AM
Prep End Date: 12/13/2016 2:21:14 PM

ThermometerID: 150672332
BalanceID: 1119460219

Prep Factor Unit mL / g
PipetteID:

Prep Batch 12641 Prep Code: 3050B_S

Technician: Randy Herman RH

Filter Lot: NA

Sample ID	Matrix	Container Weight (g)	Final Weight (g)	Begin Temp °C	End Temp °C	PrepStart	PrepEnd	Init Samp Amt	Final Vol (ml)
LCS-12641	Soil		100.00	94.5	94.4	12/13/2016	12/13/2016	1	100
MB-12641	Soil		100.00	94.5	94.4	12/13/2016	12/13/2016	1	100
S1611422-044A	Soil		100.00	94.5	94.4	12/13/2016	12/13/2016	1	100
S1611422-044AD	Soil		100.00	94.5	94.4	12/13/2016	12/13/2016	1	100
S1611422-045A	Soil		100.00	94.5	94.4	12/13/2016	12/13/2016	1	100
S1611422-045AMS	Soil		100.00	94.5	94.4	12/13/2016	12/13/2016	1	100
S1611422-045AS	Soil		100.00	94.5	94.4	12/13/2016	12/13/2016	1	100
S1611422-046A	Soil		100.00	94.5	94.4	12/13/2016	12/13/2016	1	100
S1611422-047A	Soil		100.00	94.5	94.4	12/13/2016	12/13/2016	1	100
S1611422-049A	Soil		100.00	94.5	94.4	12/13/2016	12/13/2016	1	100
S1611422-050A	Soil		100.00	94.5	94.4	12/13/2016	12/13/2016	1	100
S1611422-051A	Soil		100.00	94.5	94.4	12/13/2016	12/13/2016	1	100
S1611422-060A	Soil		100.00	94.5	94.4	12/13/2016	12/13/2016	1	100
S1611422-067A	Soil		100.00	94.5	94.4	12/13/2016	12/13/2016	1	100
S1611422-071A	Soil		100.00	94.5	94.4	12/13/2016	12/13/2016	1	100
S1611422-074A	Soil		100.00	94.5	94.4	12/13/2016	12/13/2016	1	100
S1611422-078A	Soil		100.00	94.5	94.4	12/13/2016	12/13/2016	1	100
S1611422-079A	Soil		100.00	94.5	94.4	12/13/2016	12/13/2016	1	100
S1611422-081A	Soil		100.00	94.5	94.4	12/13/2016	12/13/2016	1	100
UTS-4	Soil		100.00	94.5	94.4	12/13/2016	12/13/2016	0.1	100

*Was told to do 1 MS/MSD per batch by Wade

Number	Reagent Name	
409	H2O2, 30% Hydrogen Peroxide	
416	HNO3 (Trace Metals Grade)	

Soln ID	Soln Name	Samp Type	Amt Add	Units
RAD16-4			0.5	ml

Inter-Mountain Laboratories

PREP BATCH REPORT

Prep Start Date: 12/8/2016 9:00:00 AM
Prep End Date: 12/8/2016 2:59:37 PM

ThermometerID: 151963184
BalanceID: 1119460219

Prep Factor Unit mL / g

PipetteID: M032

Prep Batch 12629 Prep Code: 3050B_S

Technician: Randy Herman RH

Filter Lot: NA

Sample ID	Matrix	Container Weight (g)	Final Weight (g)	Begin Temp °C	End Temp °C	PrepStart	PrepEnd	Init Samp Amt	Final Vol (ml)
LCS-12629	Soil		100.00	94.8	94.4	12/8/2016	12/8/2016	1	100
LLQC-12629	Soil		100.00	94.8	94.4	12/8/2016	12/8/2016	1	100
MB-12629	Soil		100.00	94.8	94.4	12/8/2016	12/8/2016	1	100
S1611422-003A	Soil		100.00	94.8	94.4	12/8/2016	12/8/2016	1	100
S1611422-003AD	Soil		100.00	94.8	94.4	12/8/2016	12/8/2016	1	100
S1611422-008A	Soil		100.00	94.8	94.4	12/8/2016	12/8/2016	1	100
S1611422-008AMS	Soil		100.00	94.8	94.4	12/8/2016	12/8/2016	1	100
S1611422-008AS	Soil		100.00	94.8	94.4	12/8/2016	12/8/2016	1	100
S1611422-013A	Soil		100.00	94.8	94.4	12/8/2016	12/8/2016	1	100
S1611422-014A	Soil		100.00	94.8	94.4	12/8/2016	12/8/2016	1	100
S1611422-015A	Soil		100.00	94.8	94.4	12/8/2016	12/8/2016	1	100
S1611422-019A	Soil		100.00	94.8	94.4	12/8/2016	12/8/2016	1	100
S1611422-020A	Soil		100.00	94.8	94.4	12/8/2016	12/8/2016	1	100
S1611422-021A	Soil		100.00	94.8	94.4	12/8/2016	12/8/2016	1	100
S1611422-026A	Soil		100.00	94.8	94.4	12/8/2016	12/8/2016	1	100
S1611422-027A	Soil		100.00	94.8	94.4	12/8/2016	12/8/2016	1	100
S1611422-028A	Soil		100.00	94.8	94.4	12/8/2016	12/8/2016	1	100
S1611422-028AD	Soil		100.00	94.8	94.4	12/8/2016	12/8/2016	1	100
S1611422-031A	Soil		100.00	94.8	94.4	12/8/2016	12/8/2016	1	100
S1611422-031AMS	Soil		100.00	94.8	94.4	12/8/2016	12/8/2016	1	100
S1611422-031AS	Soil		100.00	94.8	94.4	12/8/2016	12/8/2016	1	100
S1611422-032A	Soil		100.00	94.8	94.4	12/8/2016	12/8/2016	1	100
S1611422-034A	Soil		100.00	94.8	94.4	12/8/2016	12/8/2016	1	100
S1611422-037A	Soil		100.00	94.8	94.4	12/8/2016	12/8/2016	1	100
S1611422-043A	Soil		100.00	94.8	94.4	12/8/2016	12/8/2016	1	100

Number	Reagent Name
409	H2O2, 30% Hydrogen Peroxide
416	HNO3 (Trace Metals Grade)

Soln ID	Soln Name	Samp Type	AmtAdd	Units
M-062016-1	1ppm ICP-MS Water Standard		0.5	ml
M-101216-1	200.2/3020/3050 Digestion Spiker A		5	ml

Inter-Mountain Laboratories

PREP BATCH REPORT

Prep Start Date: 12/8/2016 9:00:00 AM
Prep End Date: 12/8/2016 2:59:37 PM

ThermometerID: 151963184
BalanceID: 1119460219

Prep Factor Unit mL / g
PipetteID: M032

Prep Batch 12629 Prep Code: 3050B_S Technician: Randy Herman Filter Lot: NA

Sample ID	Matrix	Container Weight (g)	Final Weight (g)	Begin Temp °C	End Temp °C	PrepStart	PrepEnd	Init Samp Amt	Final Vol (ml)
UTS-4	Soil		100.00	94.8	94.4	12/8/2016	12/8/2016	0.1	100

Number	Reagent Name
409	H2O2, 30% Hydrogen Peroxide
416	HNO3 (Trace Metals Grade)

Soln ID	Soln Name	SampType	AmtAdd	Units
M-062016-1	1ppm ICP-MS Water Standard		0.5	ml
M-101216-1	200.2/3020/3050 Digestion Spiker A		5	ml

Inter-Mountain Laboratories

PREP BATCH REPORT

Prep Start Date: 12/9/2016 8:50:00 AM
Prep End Date: 12/9/2016 3:09:07 PM

ThermometerID: 151963184
BalanceID: 1119460219

Prep Factor Unit: mL / g
PipetteID: M032

Prep Batch 12631 Prep Code: 3050B_S

Technician: Randy Herman RH

Filter Lot: NA

Sample ID	Matrix	Container Weight (g)	Final Weight (g)	Begin Temp °C	End Temp °C	PrepStart	PrepEnd	Init Samp Amt	Final Vol (ml)
LCS-12631	Soil		100.00	94.5	94.4	12/9/2016	12/9/2016	1	100
LLQC-12631	Soil		100.00	94.5	94.4	12/9/2016	12/9/2016	1	100
MB-12631	Soil		100.00	94.5	94.4	12/9/2016	12/9/2016	1	100
S1611422-044A	Soil		100.00	94.5	94.4	12/9/2016	12/9/2016	1	100
S1611422-044AD	Soil		100.00	94.5	94.4	12/9/2016	12/9/2016	1	100
S1611422-045A	Soil		100.00	94.5	94.4	12/9/2016	12/9/2016	1	100
S1611422-045AMS	Soil		100.00	94.5	94.4	12/9/2016	12/9/2016	1	100
S1611422-045AS	Soil		100.00	94.5	94.4	12/9/2016	12/9/2016	1	100
S1611422-046A	Soil		100.00	94.5	94.4	12/9/2016	12/9/2016	1	100
S1611422-047A	Soil		100.00	94.5	94.4	12/9/2016	12/9/2016	1	100
S1611422-049A	Soil		100.00	94.5	94.4	12/9/2016	12/9/2016	1	100
S1611422-050A	Soil		100.00	94.5	94.4	12/9/2016	12/9/2016	1	100
S1611422-051A	Soil		100.00	94.5	94.4	12/9/2016	12/9/2016	1	100
S1611422-060A	Soil		100.00	94.5	94.4	12/9/2016	12/9/2016	1	100
S1611422-067A	Soil		100.00	94.5	94.4	12/9/2016	12/9/2016	1	100
S1611422-071A	Soil		100.00	94.5	94.4	12/9/2016	12/9/2016	1	100
S1611422-074A	Soil		100.00	94.5	94.4	12/9/2016	12/9/2016	1	100
S1611422-074AD	Soil		100.00	94.5	94.4	12/9/2016	12/9/2016	1	100
S1611422-078A	Soil		100.00	94.5	94.4	12/9/2016	12/9/2016	1	100
S1611422-078AMS	Soil		100.00	94.5	94.4	12/9/2016	12/9/2016	1	100
S1611422-078AS	Soil		100.00	94.5	94.4	12/9/2016	12/9/2016	1	100
S1611422-079A	Soil		100.00	94.5	94.4	12/9/2016	12/9/2016	1	100
S1611422-081A	Soil		100.00	94.5	94.4	12/9/2016	12/9/2016	1	100
UTS-4	Soil		100.00	94.5	94.4	12/9/2016	12/9/2016	0.1	100

Number	Reagent Name
409	H2O2, 30% Hydrogen Peroxide
416	HNO3 (Trace Metals Grade)

Soln ID	Soln Name	Samp Type	AmtAdd	Units
M-062016-1	1ppm ICP-MS Water Standard		0.5	ml
M-101216-1	200.2/3020/3050 Digestion Spiker A		5	ml

Inter-Mountain Laboratories

PREP BATCH REPORT

Prep Start Date: 12/12/2016 8:50:00 AM
Prep End Date: 12/12/2016 3:16:07 PM

ThermometerID: 150672332
BalanceID: 1119460219

Prep Factor Unit mL / g
PipetteID:

Prep Batch 12637 Prep Code: 3050B_S

Technician: Randy Herman CH

Filter Lot: NA

Sample ID	Matrix	Container Weight (g)	Final Weight (g)	Begin Temp °C	End Temp °C	PrepStart	PrepEnd	Init Samp Amt	Final Vol (ml)
LCS-12637	Soil		100.00	94.3	94.0	12/12/2016	12/12/2016	1	100
MB-12637	Soil		100.00	94.3	94.0	12/12/2016	12/12/2016	1	100
S1611422-003A	Soil		100.00	94.3	94.0	12/12/2016	12/12/2016	1	100
S1611422-003AD	Soil		100.00	94.3	94.0	12/12/2016	12/12/2016	1	100
S1611422-008A	Soil		100.00	94.3	94.0	12/12/2016	12/12/2016	1	100
S1611422-008AMS	Soil		100.00	94.3	94.0	12/12/2016	12/12/2016	1	100
S1611422-008AS	Soil		100.00	94.3	94.0	12/12/2016	12/12/2016	1	100
S1611422-013A	Soil		100.00	94.3	94.0	12/12/2016	12/12/2016	1	100
S1611422-014A	Soil		100.00	94.3	94.0	12/12/2016	12/12/2016	1	100
S1611422-015A	Soil		100.00	94.3	94.0	12/12/2016	12/12/2016	1	100
S1611422-019A	Soil		100.00	94.3	94.0	12/12/2016	12/12/2016	1	100
S1611422-020A	Soil		100.00	94.3	94.0	12/12/2016	12/12/2016	1	100
S1611422-021A	Soil		100.00	94.3	94.0	12/12/2016	12/12/2016	1	100
S1611422-026A	Soil		100.00	94.3	94.0	12/12/2016	12/12/2016	1	100
S1611422-027A	Soil		100.00	94.3	94.0	12/12/2016	12/12/2016	1	100
S1611422-028A	Soil		100.00	94.3	94.0	12/12/2016	12/12/2016	1	100
S1611422-031A	Soil		100.00	94.3	94.0	12/12/2016	12/12/2016	1	100
S1611422-032A	Soil		100.00	94.3	94.0	12/12/2016	12/12/2016	1	100
S1611422-034A	Soil		100.00	94.3	94.0	12/12/2016	12/12/2016	1	100
S1611422-037A	Soil		100.00	94.3	94.0	12/12/2016	12/12/2016	1	100
S1611422-043A	Soil		100.00	94.3	94.0	12/12/2016	12/12/2016	1	100
UTS-4	Soil		100.00	94.3	94.0	12/12/2016	12/12/2016	0.1	100

1 ms & msd per batch as told to do by Wade

Number	Reagent Name
409	H2O2, 30% Hydrogen Peroxide
416	HNO3 (Trace Metals Grade)

Soln ID	Soln Name	Samp Type	AmtAdd	Units
RAD16-4			0.5	ml

Inter-Mountain Laboratories

Standard LOG

Standard ID:	M-062016-1		
Standard Name	1ppm ICP-MS Water Standard	Type:	Secondary
Date Prepared	6/20/2016	BY:	Aaron Woslager
Date Expires:	6/16/2017		
Department	ME	Status:	Opened
Vendor:			
Lot Number:			

Comments:

Chemical/Solvent	Lot No.	Expires	Amt.	Final Volume:	1000 mL
HNO3 (Trace Metals Grade)	H2615		20 mL		

Stock Source		Expires	Base Units	Lot No.	Amount Added
IML-MSCAL-1C-21	IML-MSCAL-1C-21	6/16/2017	µg/mL	K2-MEB642048	50 mL
IML-MSCAL-2B-22	IML-MSCAL-2B-22	6/16/2017	µg/mL	K2-MEB642047	50 mL

Analytes	CAS	Conc: µg/mL
Ag		1
Al		1
As		1
B		1
Ba		1
Be		1
Bi		1
Ca		1
Cd		1
Co		1
Cr3		1
Cu		1
Fe		1
Ga		1
K		1
La		1
Mg		1
Mn		1
Mo		1
Na		1
Ni		1
Pb		1
Sb		1
Se		1
Sn		1
Sr		1
Ti		1
Tl		1
U		1
V		1
Zn		1
Zr		1

Page: *1 of 1*

Inter-Mountain Laboratories

Spike LOG

Standard ID:	M-101216-1		
Standard Name	200.2/3020/3050 Digestion Spiker A	Type:	Secondary
Date Prepared	10/12/2016	BY:	Randy Herman
Date Expires:	12/18/2016		
Department	ME	Status:	Opened
Vendor:			
Lot Number:			

Comments:

Chemical/Solvent	Lot No.	Expires	Amt.	Final Volume:	1000 mL
HNO3 (Trace Metals Grade)	C579809		20 mL		

Stock Source		Expires	Base Units	Lot No.	Amount Added
Al-11	Aluminum (Al)	9/13/2017	µg/mL	091314	25 mL
As-8	Arsenic (As)	9/30/2017	µg/mL	093014	10 mL
B-17	Boron (B)	12/19/2017	µg/mL	121914	25 mL
Ba-9	Barium (Ba)	8/21/2017	µg/mL	082114	10 mL
Be-8	Beryllium (Be)	12/30/2017	µg/mL	123014	10 mL
Bi-15	Bismuth (Bi)	7/2/2017	µg/mL	070214	10 mL
Cd-8	Cadmium (Cd)	6/27/2017	µg/mL	062714	10 mL
Co-8	Cobalt (Co)	9/26/2017	µg/mL	092614	10 mL
Cr-8	Chromium (Cr)	7/16/2017	µg/mL	071614	10 mL
Cu-8	Copper (Cu)	9/12/2017	µg/mL	091214	10 mL
Fe-10	Iron (Fe)	10/21/2017	µg/mL	102114	25 mL
Ga-5	Gallium (Ga)	1/29/2017	µg/mL	012914	10 mL
La-12	Lanthanum (La)	1/23/2018	µg/mL	012315	10 mL
Li-14	Lithium (Li)	12/27/2016	µg/mL	122713	25 mL
Mn-9	Manganese (Mn)	9/30/2017	µg/mL	093014	10 mL
Mo-9	Molybdenum (Mo)	12/18/2016	µg/mL	121813	10 mL
Ni-9	Nickel (Ni)	10/24/2017	µg/mL	102414	25 mL
P-19	Phosphorous (P)	3/2/2018	µg/mL	030215	25 mL
Pb-13	Lead (Pb)	1/6/2018	µg/mL	010615	10 mL
Sb-8	Antimony (Sb)	12/31/2017	µg/mL	123114	10 mL
Se-9	Selenium (Se)	12/20/2017	µg/mL	122014	20 mL
Sr-7	Strontium (Sr)	10/6/2017	µg/mL	100614	10 mL
Ti-8	Titanium (Ti)	12/20/2017	µg/mL	122014	10 mL
Tl-8	Thallium (Tl)	12/20/2017	µg/mL	122014	10 mL
U-17	Uranium (U)	8/29/2017	µg/mL	082914	10 mL
V-9	Vanadium (V)	10/6/2017	µg/mL	100614	10 mL
Zn-9	Zinc (Zn)	12/20/2017	µg/mL	122014	10 mL
Zr-5	Zirconium (Zr)	8/21/2017	µg/mL	082114	10 mL

Analytes	CAS	Conc: µg/mL
Al		25
As		10
B		25
Ba		10
Be		10
Bi		10

Page: *1 of 2*

Inter-Mountain Laboratories

Spike LOG

Standard ID:	M-101216-1		
Standard Name	200.2/3020/3050 Digestion Spiker A	Type:	Secondary
Date Prepared	10/12/2016	BY:	Randy Herman
Date Expires:	12/18/2016		
Department	ME	Status:	Opened
Vendor:			
Lot Number:			

Comments:

Cd	10
Co	10
Cr	10
Cu	10
Fe	25
Ga	10
La	10
Li	25
Mn	10
Mo	10
Ni	25
P	25
Pb	10
Sb	10
Se	20
Sr	10
Ti	10
Tl	10
U	10
V	10
Zn	10
Zr	10

Inter-Mountain Laboratories

Standard LOG

Standard ID:	M-062016-1		
Standard Name	1ppm ICP-MS Water Standard	Type:	Secondary
Date Prepared	6/20/2016	BY:	Aaron Woslager
Date Expires:	6/16/2017		
Department	ME	Status:	Opened
Vendor:			
Lot Number:			

Comments:

Chemical/Solvent	Lot No.	Expires	Amt.	Final Volume:	1000 mL
HNO3 (Trace Metals Grade)	H2615		20 mL		

Stock Source		Expires	Base Units	Lot No.	Amount Added
IML-MSCAL-1C-21	IML-MSCAL-1C-21	6/16/2017	µg/mL	K2-MEB642048	50 mL
IML-MSCAL-2B-22	IML-MSCAL-2B-22	6/16/2017	µg/mL	K2-MEB642047	50 mL

Analytes	CAS	Conc: µg/mL
Ag		1
Al		1
As		1
B		1
Ba		1
Be		1
Bi		1
Ca		1
Cd		1
Co		1
Cr3		1
Cu		1
Fe		1
Ga		1
K		1
La		1
Mg		1
Mn		1
Mo		1
Na		1
Ni		1
Pb		1
Sb		1
Se		1
Sn		1
Sr		1
Ti		1
Tl		1
U		1
V		1
Zn		1
Zr		1

Page: *1 of 1*

Inter-Mountain Laboratories

Spike LOG

Standard ID:	M-101216-1		
Standard Name	200.2/3020/3050 Digestion Spiker A	Type:	Secondary
Date Prepared	10/12/2016	BY:	Randy Herman
Date Expires:	12/18/2016		
Department	ME	Status:	Opened
Vendor:			
Lot Number:			

Comments:

Chemical/Solvent	Lot No.	Expires	Amt.	Final Volume:	1000 mL
HNO3 (Trace Metals Grade)	C579809		20 mL		

Stock Source		Expires	Base Units	Lot No.	Amount Added
Al-11	Aluminum (Al)	9/13/2017	µg/mL	091314	25 mL
As-8	Arsenic (As)	9/30/2017	µg/mL	093014	10 mL
B-17	Boron (B)	12/19/2017	µg/mL	121914	25 mL
Ba-9	Barium (Ba)	8/21/2017	µg/mL	082114	10 mL
Be-8	Beryllium (Be)	12/30/2017	µg/mL	123014	10 mL
Bi-15	Bismuth (Bi)	7/2/2017	µg/mL	070214	10 mL
Cd-8	Cadmium (Cd)	6/27/2017	µg/mL	062714	10 mL
Co-8	Cobalt (Co)	9/26/2017	µg/mL	092614	10 mL
Cr-8	Chromium (Cr)	7/16/2017	µg/mL	071614	10 mL
Cu-8	Copper (Cu)	9/12/2017	µg/mL	091214	10 mL
Fe-10	Iron (Fe)	10/21/2017	µg/mL	102114	25 mL
Ga-5	Gallium (Ga)	1/29/2017	µg/mL	012914	10 mL
La-12	Lanthanum (La)	1/23/2018	µg/mL	012315	10 mL
Li-14	Lithium (Li)	12/27/2016	µg/mL	122713	25 mL
Mn-9	Manganese (Mn)	9/30/2017	µg/mL	093014	10 mL
Mo-9	Molybdenum (Mo)	12/18/2016	µg/mL	121813	10 mL
Ni-9	Nickel (Ni)	10/24/2017	µg/mL	102414	25 mL
P-19	Phosphorous (P)	3/2/2018	µg/mL	030215	25 mL
Pb-13	Lead (Pb)	1/6/2018	µg/mL	010615	10 mL
Sb-8	Antimony (Sb)	12/31/2017	µg/mL	123114	10 mL
Se-9	Selenium (Se)	12/20/2017	µg/mL	122014	20 mL
Sr-7	Strontium (Sr)	10/6/2017	µg/mL	100614	10 mL
Ti-8	Titanium (Ti)	12/20/2017	µg/mL	122014	10 mL
Tl-8	Thallium (Tl)	12/20/2017	µg/mL	122014	10 mL
U-17	Uranium (U)	8/29/2017	µg/mL	082914	10 mL
V-9	Vanadium (V)	10/6/2017	µg/mL	100614	10 mL
Zn-9	Zinc (Zn)	12/20/2017	µg/mL	122014	10 mL
Zr-5	Zirconium (Zr)	8/21/2017	µg/mL	082114	10 mL

Analytes	CAS	Conc:	µg/mL
Al			25
As			10
B			25
Ba			10
Be			10
Bi			10

Page: *1 of 2*

Inter-Mountain Laboratories

Spike LOG

Standard ID:	M-101216-1		
Standard Name	200.2/3020/3050 Digestion Spiker A	Type:	Secondary
Date Prepared	10/12/2016	BY:	Randy Herman
Date Expires:	12/18/2016		
Department	ME	Status:	Opened
Vendor:			
Lot Number:			

Comments:

Cd	10
Co	10
Cr	10
Cu	10
Fe	25
Ga	10
La	10
Li	25
Mn	10
Mo	10
Ni	25
P	25
Pb	10
Sb	10
Se	20
Sr	10
Ti	10
Tl	10
U	10
V	10
Zn	10
Zr	10

Inter-Mountain Laboratories

Standard LOG

Standard ID:	M-050216-3		
Standard Name	1ppb ICP-MS Water Standard	Type:	Tertiary
Date Prepared	5/2/2016	BY:	Aaron Woslager
Date Expires:	2/2/2017		
Department	ME	Status:	Opened
Vendor:			
Lot Number:			
Comments:	x2		

Chemical/Solvent	Lot No.	Expires	Amt.	Final Volume:	1000 mL
HNO3 (Trace Metals Grade)	D2315		20 mL		

Stock Source		Expires	Base Units	Lot No.	Amount Added
M-040416-2	100ppb ICP-MS Water Stand	2/2/2017	µg/mL		10 mL

Analytes	CAS	Conc: µg/mL
Ag		0.001
Al		0.001
As		0.001
B		0.001
Ba		0.001
Be		0.001
Bi		0.001
Ca		0.001
Cd		0.001
Co		0.001
Cr3		0.001
Cu		0.001
Fe		0.001
Ga		0.001
K		0.001
La		0.001
Mg		0.001
Mn		0.001
Mo		0.001
Na		0.001
Ni		0.001
Pb		0.001
Sb		0.001
Se		0.001
Sn		0.001
Sr		0.001
Ti		0.001
Tl		0.001
U		0.001
V		0.001
Zn		0.001
Zr		0.001

Inter-Mountain Laboratories

Standard LOG

Standard ID:	M-070516-1		
Standard Name	10ppb ICP-MS Water Standard	Type:	Tertiary
Date Prepared	7/5/2016	BY:	Aaron Woslager
Date Expires:	6/16/2017		
Department	ME	Status:	Opened
Vendor:			
Lot Number:			
Comments:	x2		

Chemical/Solvent	Lot No.	Expires	Amt.	Final Volume:	1000 mL
HNO3 (Trace Metals Grade)	H2615		20 mL		

Stock Source		Expires	Base Units	Lot No.	Amount Added
M-062016-1	1ppm ICP-MS Water Standar	6/16/2017	µg/mL		10 mL

Analytes	CAS	Conc: µg/mL
Ag		0.01
Al		0.01
As		0.01
B		0.01
Ba		0.01
Be		0.01
Bi		0.01
Ca		0.01
Cd		0.01
Co		0.01
Cr3		0.01
Cu		0.01
Fe		0.01
Ga		0.01
K		0.01
La		0.01
Mg		0.01
Mn		0.01
Mo		0.01
Na		0.01
Ni		0.01
Pb		0.01
Sb		0.01
Se		0.01
Sn		0.01
Sr		0.01
Ti		0.01
Tl		0.01
U		0.01
V		0.01
Zn		0.01
Zr		0.01

Inter-Mountain Laboratories

Standard LOG

Standard ID:	M-101816-2		
Standard Name	20ppb ICP-MS Water Standard	Type:	Secondary
Date Prepared	10/18/2016	BY:	Aaron Woslager
Date Expires:	6/16/2017		
Department	ME	Status:	Opened
Vendor:			
Lot Number:			

Comments:

Chemical/Solvent	Lot No.	Expires	Amt.	Final Volume:	1000 mL
HNO3 (Trace Metals Grade)	C579809		20 mL		

Stock Source		Expires	Base Units	Lot No.	Amount Added
IML-MSCAL-1C-21	IML-MSCAL-1C-21	6/16/2017	µg/mL	K2-MEB642048	1 mL
IML-MSCAL-2B-22	IML-MSCAL-2B-22	6/16/2017	µg/mL	K2-MEB642047	1 mL

Analytes	CAS	Conc: µg/mL
Ag		0.02
Al		0.02
As		0.02
B		0.02
Ba		0.02
Be		0.02
Bi		0.02
Ca		0.02
Cd		0.02
Co		0.02
Cr3		0.02
Cu		0.02
Fe		0.02
Ga		0.02
K		0.02
La		0.02
Mg		0.02
Mn		0.02
Mo		0.02
Na		0.02
Ni		0.02
Pb		0.02
Sb		0.02
Se		0.02
Sn		0.02
Sr		0.02
Ti		0.02
Tl		0.02
U		0.02
V		0.02
Zn		0.02
Zr		0.02

Page: *1 of 1*

Inter-Mountain Laboratories

Standard LOG

Standard ID:	M-040416-2		
Standard Name	100ppb ICP-MS Water Standard	Type:	Secondary
Date Prepared	4/4/2016	BY:	Aaron Woslager
Date Expires:	2/2/2017		
Department	ME	Status:	Opened
Vendor:			
Lot Number:			

Comments:

Chemical/Solvent	Lot No.	Expires	Amt.	Final Volume:	1000 mL
HNO3 (Trace Metals Grade)	D2315		20 mL		

Stock Source		Expires	Base Units	Lot No.	Amount Added
IML-MSCAL-1C-20	IML-MSCAL-1C-20	2/2/2017	µg/mL	J2-MEB613063	5 mL
IML-MSCAL-2B-21	IML-MSCAL-2B-21	2/2/2017	µg/mL	J2-MEB613062	5 mL

Analytes	CAS	Conc: µg/mL
Ag		0.1
Al		0.1
As		0.1
B		0.1
Ba		0.1
Be		0.1
Bi		0.1
Ca		0.1
Cd		0.1
Co		0.1
Cr3		0.1
Cu		0.1
Fe		0.1
Ga		0.1
K		0.1
La		0.1
Mg		0.1
Mn		0.1
Mo		0.1
Na		0.1
Ni		0.1
Pb		0.1
Sb		0.1
Se		0.1
Sn		0.1
Sr		0.1
Tl		0.1
Tl		0.1
U		0.1
V		0.1
Zn		0.1
Zr		0.1

Page: *1 of 1*

Inter-Mountain Laboratories

Standard LOG

Standard ID:	M-072916-3		
Standard Name	200ppb ICP-MS Water Standard	Type:	Secondary
Date Prepared	7/29/2016	BY:	Aaron Woslager
Date Expires:	6/16/2017		
Department	ME	Status:	Opened
Vendor:			
Lot Number:			

Comments:

Chemical/Solvent	Lot No.	Expires	Amt.	Final Volume:	1000 mL
HNO3 (Trace Metals Grade)	H2615		20 mL		

Stock Source		Expires	Base Units	Lot No.	Amount Added
IML-MSCAL-1C-21	IML-MSCAL-1C-21	6/16/2017	µg/mL	K2-MEB642048	10 mL
IML-MSCAL-2B-22	IML-MSCAL-2B-22	6/16/2017	µg/mL	K2-MEB642047	10 mL

Analytes	CAS	Conc: µg/mL
Ag		0.2
Al		0.2
As		0.2
B		0.2
Ba		0.2
Be		0.2
Bi		0.2
Ca		0.2
Cd		0.2
Co		0.2
Cr3		0.2
Cu		0.2
Fe		0.2
Ga		0.2
K		0.2
La		0.2
Mg		0.2
Mn		0.2
Mo		0.2
Na		0.2
Ni		0.2
Pb		0.2
Sb		0.2
Se		0.2
Sn		0.2
Sr		0.2
Ti		0.2
Tl		0.2
U		0.2
V		0.2
Zn		0.2
Zr		0.2

Page: *1 of 1*

Inter-Mountain Laboratories

Standard LOG

Standard ID:	M-060616-1		
Standard Name	QCS 200.8	Type:	Secondary
Date Prepared	6/6/2016	BY:	Aaron Woslager
Date Expires:	1/29/2017		
Department	ME	Status:	Opened
Vendor:			
Lot Number:			

Comments:

Chemical/Solvent	Lot No.	Expires	Amt.	Final Volume:	2000 mL
HNO3 (Trace Metals Grade)	F1015		40 mL		

Stock Source		Expires	Base Units	Lot No.	Amount Added
Bi-15	Bismuth (Bi)	7/2/2017	µg/mL	070214	0.2 mL
Ga-5	Gallium (Ga)	1/29/2017	µg/mL	012914	0.2 mL
La-12	Lanthanum (La)	1/23/2018	µg/mL	012315	0.2 mL
SPEX-CL-CAL-2-2	SPEX-CL-CAL-2	1/30/2017	µg/mL	CL-12-156YPY	2 mL
U-17	Uranium (U)	8/29/2017	µg/mL	082914	0.2 mL
Zr-5	Zirconium (Zr)	8/21/2017	µg/mL	082114	0.2 mL

Analytes	CAS	Conc: µg/mL
Ag		0.1
Al		0.1
As		0.1
Ba		0.1
Be		0.1
Bi		0.1
Ca		0.1
Cd		0.1
Co		0.1
Cr		0.1
Cu		0.1
Fe		0.1
Ga		0.1
K		0.1
La		0.1
Mg		0.1
Mn		0.1
Mo		0.1
Na		0.1
Ni		0.1
Pb		0.1
Sb		0.1
Se		0.1
Sn		0.1
Sr		0.1
Ti		0.1
Tl		0.1
U		0.1

Inter-Mountain Laboratories

Standard LOG

Standard ID:	M-060616-1		
Standard Name	QCS 200.8	Type:	Secondary
Date Prepared	6/6/2016	BY:	Aaron Woslager
Date Expires:	1/29/2017		
Department	ME	Status:	Opened
Vendor:			
Lot Number:			

Comments:

V	0.1
Zn	0.1
Zr	0.1

Inter-Mountain Laboratories

Standard LOG

Standard ID:	M-120916-2		
Standard Name	ICS Solution for 6020A ICPMS	Type:	Secondary
Date Prepared	12/9/2016	BY:	Mary Slipp
Date Expires:	6/16/2017		
Department	ME	Status:	Opened
Vendor:			
Lot Number:			

Comments:

Chemical/Solvent	Lot No.	Expires	Amt.	Final Volume:	100 mL
HNO3 (Trace Metals Grade)	C579809		2 mL		

Stock Source		Expires	Base Units	Lot No.	Amount Added
6020ICS-OA-13	6020ICS-OA-13	7/1/2017	µg/mL	J2-MEB613036	2.5 mL

Analytes	CAS	Conc: µg/mL
Al		25
C		50
Ca		25
Cl		250
Fe		25
K		25
Mg		25
Mo		0.5
Na		25
P		25
S		25
Ti		0.5

Page: *1 of 1*

Inter-Mountain Laboratories

Standard LOG

Standard ID:	M-120916-3		
Standard Name	ICSAB Solution for 6020A ICPMS	Type:	Tertiary
Date Prepared	12/9/2016	BY:	Mary Slipp
Date Expires:	6/16/2017		
Department	ME	Status:	Opened
Vendor:			
Lot Number:			

Comments:

Chemical/Solvent	Lot No.	Expires	Amt.	Final Volume:	100 mL
HNO3 (Trace Metals Grade)	C579809		2 mL		

Stock Source		Expires	Base Units	Lot No.	Amount Added
6020ICS-OA-13	6020ICS-OA-13	7/1/2017	µg/mL	J2-MEB613036	2.5 mL
M-062016-1	1ppm ICP-MS Water Standar	6/16/2017	µg/mL		2 mL

Analytes	CAS	Conc: µg/mL
Ag		0.02
Al		25
As		0.02
B		0.02
Ba		0.02
Be		0.02
Bi		0.02
C		50
Ca		25
Cd		0.02
Cl		250
Co		0.02
Cr3		0.02
Cu		0.02
Fe		25
Ga		0.02
K		25
La		0.02
Mg		25
Mn		0.02
Mo		0.5
Na		25
Ni		0.02
P		25
Pb		0.02
S		25
Sb		0.02
Se		0.02
Sn		0.02
Sr		0.02
Ti		0.5
Tl		0.02

Inter-Mountain Laboratories

Standard LOG

Standard ID:	M-120916-3		
Standard Name	ICSAB Solution for 6020A ICPMS	Type:	Tertiary
Date Prepared	12/9/2016	BY:	Mary Slipp
Date Expires:	6/16/2017		
Department	ME	Status:	Opened
Vendor:			
Lot Number:			

Comments:

U	0.02
V	0.02
Zn	0.02
Zr	0.02

Inter-Mountain Laboratories

Standard LOG

Standard ID:	M-091416-3		
Standard Name	1ppm ICP-MS Internal Standard for Agilent IC	Type:	Secondary
Date Prepared	9/14/2016	BY:	Aaron Woslager
Date Expires:	8/1/2017		
Department	ME	Status:	Opened
Vendor:			
Lot Number:			

Comments:

Chemical/Solvent	Lot No.	Expires	Amt.	Final Volume:	2000 mL
HNO3 (Trace Metals Grade)	F1015		40 mL		

Stock Source		Expires	Base Units	Lot No.	Amount Added
IML-MSISS-1A-18	IML-MSISS-1A-18	8/1/2017	µg/mL	J2-MEB569129	100 mL
In-12	Indium (In)	10/6/2018	µg/mL	100615	2 mL
Sc-14	Scandium (Sc)	8/18/2017	µg/mL	081814	2 mL
Th-17	Thorium (Th)	7/14/2018	µg/mL	071415	2 mL
Y-15	Yttrium (Y)	6/26/2018	µg/mL	062615	2 mL

Analytes	CAS	Conc:	µg/mL
Ge			1
In			1
Li6			1
Re			1
Rh			1
Sc			1
Th			1
Y			1

Page: *1 of 1*

Inter-Mountain Laboratories

Standard LOG

Standard ID:	M-032416-2		
Standard Name	1ppb Agilent Tuning Solution	Type:	Tertiary
Date Prepared	3/24/2016	BY:	Aaron Woslager
Date Expires:	2/22/2017		
Department	ME	Status:	Opened
Vendor:			
Lot Number:			

Comments:

Chemical/Solvent	Lot No.	Expires	Amt.	Final Volume:	2000 mL
HNO3 (Trace Metals Grade)	B2815		40 mL		

Stock Source		Expires	Base Units	Lot No.	Amount Added
M-032416-1	10ppm Li and Y Solution for	2/22/2017	µg/mL		0.2 mL
VAR-TS-MS-13	VAR-TS-MS	3/23/2017	µg/mL	K2-MEB603108	0.2 mL

Analytes	CAS	Conc: µg/mL
Ba		0.001
Be		0.001
Ce		0.001
Co		0.001
In		0.001
Li		0.001
Mg		0.001
Pb		0.001
Th		0.001
Tl		0.001
Y		0.001

Inter-Mountain Laboratories

Standard LOG

Standard ID:	M-032416-4		
Standard Name	10ppb Agilent Tuning Solution	Type:	Tertiary
Date Prepared	3/24/2016	BY:	Aaron Woslager
Date Expires:	2/22/2017		
Department	ME	Status:	Opened
Vendor:			
Lot Number:			

Comments:

Chemical/Solvent	Lot No.	Expires	Amt.	Final Volume:	2000 mL
HNO3 (Trace Metals Grade)	B2815		40 mL		

Stock Source		Expires	Base Units	Lot No.	Amount Added
M-032416-3	100ppm Li and Y Solution for	2/22/2017	µg/mL		0.2 mL
VAR-TS-MS-13	VAR-TS-MS	3/23/2017	µg/mL	K2-MEB603108	2 mL

Analytes	CAS	Conc: µg/mL
Ba		0.01
Be		0.01
Ce		0.01
Co		0.01
In		0.01
Li		0.01
Mg		0.01
Pb		0.01
Th		0.01
Tl		0.01
Y		0.01

Page: *1 of 1*

Inter-Mountain Laboratories

Standard LOG

Standard ID:	M-102616-3		
Standard Name	2% HNO3 + 2% HCl DI Rinse	Type:	Other
Date Prepared	10/26/2016	BY:	Aaron Woslager
Date Expires:	10/26/2017		
Department	ME	Status:	Opened
Vendor:			
Lot Number:			

Comments: x2

Chemical/Solvent	Lot No.	Expires	Amt.	Final Volume:	1000 mL
HCl (Trace Metal Grade)	C469945		20 mL		
HNO3 (Trace Metals Grade)	C579809		20 mL		

Stock Source	Expires	Base Units	Lot No.	Amount Added

Analytes	CAS	Conc:	µg/mL

Page: *1 of 1*

Inter-Mountain Laboratories

Standard LOG

Standard ID:	M-102716-7		
Standard Name	Agilent PA Solution	Type:	Secondary
Date Prepared	10/27/2016	BY:	Aaron Woslager
Date Expires:	7/31/2017		
Department	ME	Status:	Opened
Vendor:			
Lot Number:			

Comments:

Chemical/Solvent	Lot No.	Expires	Amt.	Final Volume:	1000 mL
HNO3 (Trace Metals Grade)	C579809		20 mL		

Stock Source		Expires	Base Units	Lot No.	Amount Added
PA Tuning 1-7	PA Tuning Solution 1	7/31/2017	µg/mL	22-221VYY2	20 mL
PA Tuning 2-7	PA Tuning Solution 2	7/31/2017	µg/mL	22-223VYY2	20 mL

Analytes	CAS	Conc: µg/mL
Al		0.1
As		0.4
Ba		0.1
Be		0.4
Bi		0.1
Cd		0.4
Co		0.1
Cr		0.1
Cu		0.1
Ge		0.2
In		0.1
Ir		0.1
Li6		0.1
Lu		0.1
Mg		0.2
Mn		0.1
Mo		0.2
Na		0.1
Ni		0.2
Pb		0.2
Pd		0.2
Ru		0.2
Sb		0.2
Sc		0.1
Sn		0.2
Sr		0.1
Th		0.1
Ti		0.1
Tl		0.1
U		0.1
V		0.1
Y		0.05

Inter-Mountain Laboratories

Standard LOG

Standard ID:	M-102716-7		
Standard Name	Agilent PA Solution	Type:	Secondary
Date Prepared	10/27/2016	BY:	Aaron Woslager
Date Expires:	7/31/2017		
Department	ME	Status:	Opened
Vendor:			
Lot Number:			

Comments:

Yb	0.05
Zn	0.4

Inter-Mountain Laboratories

Standard LOG

Standard ID:	M-101016-1		
Standard Name	10ppm ICPMS Spike Solution	Type:	Secondary
Date Prepared	10/10/2016	BY:	Mary Slipp
Date Expires:	2/2/2017		
Department	ME	Status:	Opened
Vendor:			
Lot Number:			

Comments:

Chemical/Solvent	Lot No.	Expires	Amt.	Final Volume:	200 mL

Stock Source		Expires	Base Units	Lot No.	Amount Added
IML-MSCAL-1C-20	IML-MSCAL-1C-20	2/2/2017	µg/mL	J2-MEB613063	100 mL
IML-MSCAL-2B-21	IML-MSCAL-2B-21	2/2/2017	µg/mL	J2-MEB613062	100 mL

Analytes	CAS	Conc:	µg/mL
Ag			10
Al			10
As			10
B			10
Ba			10
Be			10
Bi			10
Ca			10
Cd			10
Co			10
Cr3			10
Cu			10
Fe			10
Ga			10
K			10
La			10
Mg			10
Mn			10
Mo			10
Na			10
Ni			10
Pb			10
Sb			10
Se			10
Sn			10
Sr			10
Ti			10
Tl			10
U			10
V			10
Zn			10
Zr			10

Page: *1 of 1*

US EPA Tune Check Sample Report

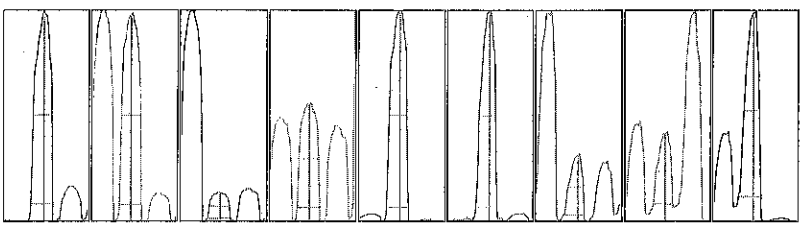
Batch Folder D:\2016\Dec_2016\121216.b
Report Comment
Instrument Name G3281A JP11231114

[NoGas]

Mass	Count (Mean)	RSD% (Actual)	RSD% (Required)	RSD% (Flag)
9	82008	0.57	5.00	
24	318221	0.50	5.00	
25	42843	0.60	5.00	
26	49003	0.74	5.00	
59	536317	0.32	5.00	
115	851809	0.35	5.00	
206	193838	0.47	5.00	
207	189749	0.30	5.00	
208	396091	0.21	5.00	

Mass	Replicate 1 Count	Replicate 2 Count	Replicate 3 Count	Replicate 4 Count	Replicate 5 Count
9	81807	82181	81608	81699	82746
24	315665	319538	318459	317928	319515
25	42485	42854	43210	42791	42877
26	48714	48755	49018	48921	49609
59	536516	533569	535935	537932	537631
115	852478	851942	851502	855722	847404
206	193510	192443	194875	194257	194106
207	188888	189436	190020	190259	190143
208	397164	395918	396244	394837	396292

Integration Time [sec] = 0.1



Mass	Peak Height	Axis (Actual)	Axis (Required)	Axis (Flag)	Width-X% (Actual)	Width-X% (Required)	Width-X% (Flag)
9	13093	8.95	8.9 - 9.1		0.791	0.900	
24	49431	23.90	23.9 - 24.1		0.791	0.900	
25	6439	24.90	24.9 - 25.1		0.791	0.900	
26	7440	25.90	25.9 - 26.1		0.796	0.900	
59	89169	58.95	58.9 - 59.1		0.778	0.900	
115	152718	115.00	114.9 - 115.1		0.768	0.900	
206	34445	206.00	205.9 - 206.1		0.731	0.900	
207	31072	206.95	206.9 - 207.1		0.699	0.900	
208	74175	207.95	207.9 - 208.1		0.804	0.900	

X% = 5 **Integration Time [sec] =** 0.1 **Acquisition Time [sec] =** 199 **Y Axis =** Linear

Tune Parameters

Plasma Paramters

ParameterName	Value	Unit	ParameterName	Value	Unit	ParameterName	Value	Unit
RF Power	1550	W	Carrier Gas	0.90	L/min	S/C Temp	2	°C
RF Matching	1.30	V	Option Gas	0.0	%	Makeup/Dilution Gas	0.30	L/min
Smpl Depth	8.0	mm	Nebulizer Pump	0.10	rps	Gas Switch	Dilution Gas	

Lenses Parameters

ParameterName	Value	Unit	ParameterName	Value	Unit	ParameterName	Value	Unit
Extract 1	0.0	V	Omega Lens	12.2	V	Deflect	15.4	V
Extract 2	-90.0	V	Cell Entrance	-40	V	Plate Bias	-50	V
Omega Bias	-115	V	Cell Exit	-56	V			

Cell Parameters

US EPA Tune Check Sample Report

ParameterName	Value	Unit	ParameterName	Value	Unit	ParameterName	Value	Unit
OctP Bias	-8.0	V	He Flow	0.0	mL/min	Energy Discrimination	5.0	V
ParameterName	**Value**	**Unit**	**ParameterName**	**Value**	**Unit**	**ParameterName**	**Value**	**Unit**
OctP RF	130	V	H2 Flow	0.0	mL/min			
Use Gas	false		3rd Gas Flow	0	%			

Sample			238 U [NoGas]		6 Li (ISTD) [NoGas]		7 [Li] (ISTD) [NoGas]		45 Sc (ISTD
Sample Name	Acq. Date-Time	Dilution	CPS	CPS RSD	CPS	CPS RSD	CPS	CPS RSD	CPS
Calibration Blank	12/12/2016 11:42 AM	1	195	11.94992841	9661181.35	0.042106592	524414.89	0.711167844	14429421.09
1ppb Standard	12/12/2016 11:47 AM	1	138371.01	0.909605084	9507312.857	0.526398738	516712.3033	0.077359069	14216673.88
10ppb Standard	12/12/2016 11:53 AM	1	1378918.207	0.927604349	9375131.223	0.580638683	505805.7933	0.557612077	13963029.17
20ppb Standard	12/12/2016 11:59 AM	1	2766070.167	1.008214704	9027832.257	0.26785779	494835.9533	0.556591834	13654503.9
100ppb Standard	12/12/2016 12:04 PM	1	13474384.33	0.841418012	8711965.42	0.80848659	469329.0767	0.464446063	12941503.65
200ppb Standard	12/12/2016 12:10 PM	1	26279731.33	0.826297926	8357898.453	0.286234735	447773.54	0.091649793	12494733.95
Calibration Blank	12/12/2016 12:16 PM	1	860.0233333	3.241554868	8538391.497	0.418321945	462298.0167	0.532804886	12591357.56
ICV	12/12/2016 12:21 PM	1	2643334	0.649288477	8437362.82	0.717392481	457655.5733	0.449158084	12502277.28
ICB	12/12/2016 12:27 PM	1	364.6666667	6.016264231	8677358.237	0.286288226	470162.3233	0.334857903	12706201.16
QCS	12/12/2016 12:33 PM	1	12546298.33	0.321912921	8326001.73	0.151659592	450958.63	0.548221696	12266809.79
QCS-ICV	12/12/2016 12:39 PM	1	12384020	0.353343679	8162316.36	0.615491613	442353.1967	0.502766886	12080458.41
LLICV-1ppb	12/12/2016 1:19 PM	1	123731.1667	1.149682645	8296275	0.474463361	449121.2833	0.753062673	12181011.74
CCB	12/12/2016 1:24 PM	1	146	3.138750476	8335797.71	0.543919094	452094.6167	0.857618328	12212663.68
ics	12/12/2016 1:30 PM	1	219	6.909929658	8244323.187	3.969180109	448251.8233	2.810431462	11977389.52
icsab	12/12/2016 1:36 PM	1	2966760.833	1.451030165	10017229.53	3.212098516	545067.1867	2.87660635	14920073.3
CCV	12/12/2016 1:41 PM	1	3068564.333	0.460004241	10670134.22	0.463990516	565396.5567	0.360861412	16027018.25
CCB	12/12/2016 1:47 PM	1	368.0066667	13.91849571	10656545.44	0.416629757	570988.31	0.293974958	16012194.36
Rgt H2O check	12/12/2016 1:53 PM	1	203.6666667	3.813806939	10724049.91	0.722760807	573065.41	0.408133761	16127201.58
MB-12629	12/12/2016 1:59 PM	2	574.01	6.259557925	10156866.98	0.500085536	546888.8167	0.20540833	15545109.94
LLQC-12629	12/12/2016 2:04 PM	2	345727.5733	0.801661066	10191962.64	0.700959732	548073.14	0.894818625	15424997.72
LCS-12629	12/12/2016 2:10 PM	2	33968301.33	1.340639347	7890392.123	0.769240543	31477469.86	0.599266388	13796582.51
UTS-4	12/12/2016 2:16 PM	11	12222112.33	0.404172022	9546816.573	0.540745056	1688936.497	0.800684167	14215210.55
S1611422-003A	12/12/2016 2:21 PM	11	429654.7833	0.17607214	9738782.193	0.441296686	1165025.647	0.400262051	14549238.31
S1611422-003Ad	12/12/2016 2:27 PM	11	423238.24	0.930097184	9480964.683	0.151609441	1137108.077	0.165384126	14297918.87
S1611422-008A	12/12/2016 2:33 PM	11	394263.0067	0.66730055	9210386.113	0.961779499	1149178.81	0.353598274	13861617.78
S1611422-008Ax5	12/12/2016 2:39 PM	55	80081.93	0.847916717	9444868.787	0.376975456	634467.7	0.485384267	14102488.88
S1611422-008As	12/12/2016 2:44 PM	11	6426028.667	0.730794592	8680863.733	0.851281004	6745060.29	0.843006854	13325552.52
CCV	12/12/2016 2:50 PM	1	2792377.583	0.546436535	9159594.563	0.700496426	496717.3933	0.295016902	13829734.17
CCB	12/12/2016 2:56 PM	1	1699.77	32.1538039	9268147.047	0.654984226	498118.4167	0.265369948	13769639.18
S1611422-008Amsd	12/12/2016 3:02 PM	11	6228072.333	0.241260409	8421526.477	1.102423907	6558983.91	0.978406806	12772936.72
S1611422-013A	12/12/2016 3:19 PM	11	4990633.833	0.475317645	8565316.087	0.866142925	1417171.853	0.720258417	13133780.87
S1611422-014A	12/12/2016 3:25 PM	11	353927.1767	0.542340059	8572210.463	1.079265979	1187327.8	1.025810832	12618955.05
S1611422-015A	12/12/2016 3:30 PM	11	304727.0533	0.799439079	8511604.413	0.324407912	929714.6833	0.742741871	12465525.62
S1611422-019A	12/12/2016 3:36 PM	11	328750.0033	0.481182354	8375506.63	0.903238942	958093.8833	2.08682977	12256309.23
S1611422-020A	12/12/2016 3:42 PM	11	508761.53	0.8259613	8473330.283	0.370377467	976622.08	0.685106721	12414419.78
S1611422-021A	12/12/2016 3:48 PM	11	587465.5833	0.652935641	8343458.213	0.295418003	1057490.2	0.958779827	12205167.29
S1611422-026A	12/12/2016 3:53 PM	11	751862.3333	1.015825741	8286039.24	0.24758094	948283.2233	2.185023164	12129111.19

Sample			238 U [NoGas]		6 Li (ISTD) [NoGas]		7 [Li] (ISTD) [NoGas]		45 Sc (ISTD
CCV	12/12/2016 3:59 PM	1	2587004.167	0.912645178	8312515.63	0.743268962	447193.3333	0.719176382	12319641.73
CCB	12/12/2016 4:05 PM	1	340	8.00626917	8402943.983	0.971551024	450295.3633	0.621529304	12403973.12
S1611422-027A	12/12/2016 4:11 PM	11	337959.6367	0.572035645	8017216.943	0.159518471	1226331.93	0.707567027	12021255.91
S1611422-028A	12/12/2016 4:16 PM	11	420522.58	0.822008361	7927747.88	0.660288401	865930.3467	0.285813873	11680786.2
S1611422-028Ad	12/12/2016 4:22 PM	11	416592.0633	0.55408679	7883534.823	0.348598211	858642.57	0.246295249	11623371.76
S1611422-031A	12/12/2016 4:28 PM	11	417343.3467	1.107305196	7934605.193	0.572901413	790109.19	0.374460909	11665083.42
S1611422-031As	12/12/2016 4:40 PM	11	5603720.167	0.719201035	7689189.857	0.262717249	5655201.443	0.372078512	11601884.81
S1611422-031Amsd	12/12/2016 4:45 PM	11	5543161.833	0.578207224	7595197.943	0.525907062	5580809.22	0.078385853	11437959.82
CCV	12/12/2016 5:08 PM	1	2433625.5	0.630433008	7673181.723	1.519766836	411971.0833	1.06949919	11375067.6
CCB	12/12/2016 5:14 PM	1	448.6766667	9.509156088	7894518.69	0.820538459	420659.3933	0.536799898	11521229.54
S1611422-032A	12/12/2016 5:20 PM	11	323359.3333	0.921260548	7725592.42	0.518686447	691404.2267	0.342089627	11337272.33
S1611422-034A	12/12/2016 5:25 PM	11	276078.6367	0.516776866	7554402.003	0.550818226	1030728.743	0.478035218	11100822.89
S1611422-037A	12/12/2016 5:31 PM	11	227510.77	0.485940299	7523079.003	0.541601736	822674.93	0.619723682	11023217.62
S1611422-043A	12/12/2016 5:37 PM	11	260280.9767	0.945003025	7540961.17	0.228672009	812346.91	0.646689466	11061969.01
blk	12/12/2016 5:43 PM	1	147	7.199323295	7822976.137	0.821928946	420742.05	1.487270744	11388990.66
MB-12631	12/12/2016 5:48 PM	2	2877.26	3.49846983	7592050.647	1.025040592	407525.5933	0.619506012	11312949.83
LLQC-12631	12/12/2016 5:54 PM	2	269118.03	0.829345028	7613406.737	0.923733491	410693.0567	1.037826194	11373011.49
LCS-12631	12/12/2016 6:00 PM	2	26858227.33	0.570503845	5843891.113	0.292528119	23343781.3	0.379972325	10214041.26
UTS-4	12/12/2016 6:05 PM	11	9622573	0.139611573	7196306.64	1.087571805	1262877.693	1.409858313	10618363.75
S1611422-044A	12/12/2016 6:11 PM	11	378190.8233	0.722995684	7457960.807	0.895169366	842377.3767	0.780433669	11027111.78
CCV	12/12/2016 6:17 PM	1	2389602.5	0.305158593	7286973.277	0.695684755	396641.8933	0.528625947	10980232.06
CCB	12/12/2016 6:23 PM	1	434.6733333	9.532309258	7490392.757	1.130731463	405593.11	1.208545265	11074202.62
S1611422-044Ad	12/12/2016 6:28 PM	11	372935.4867	0.989821515	7325621.017	0.508284219	821683.3167	0.424459232	10852356.51
S1611422-045A	12/12/2016 6:34 PM	11	294035.27	0.238541526	7181685.097	0.572265457	715264.5033	1.015420059	10589443.19
S1611422-045Ax5	12/12/2016 6:40 PM	55	60951.44667	0.325977738	7257750.877	1.080547684	460187.9333	0.650839621	10667830.96
S1611422-045As	12/12/2016 6:46 PM	11	5377401	0.945326427	6700540.807	0.99927914	5174798.683	0.766534312	10538687.36
S1611422-045Amsd	12/12/2016 6:51 PM	11	5356403.833	0.774922728	6625212.607	0.985071567	5141251.88	0.63063483	10361847.92
S1611422-046A	12/12/2016 7:09 PM	11	337508.4567	1.16162372	7184677.96	0.079624367	778646.6667	0.13843226	10610722.91
S1611422-047A	12/12/2016 7:14 PM	11	950019.1667	0.971697431	7061637.55	0.545024447	865084.0467	0.426489854	10499039.03
S1611422-049A	12/12/2016 7:20 PM	11	240099.9967	1.000893353	7056872.567	0.559576743	817168.0033	0.448407978	10485649.58
CCV	12/12/2016 7:26 PM	1	2339275.167	0.528698208	7047194.693	1.121726465	382858.7367	0.406302922	10667182.91
CCB	12/12/2016 7:31 PM	1	360.3333333	0.698412066	7204651.067	1.45777104	390686.4767	1.23369719	10739065.96
S1611422-050A	12/12/2016 7:37 PM	11	214464.5267	0.746720213	6999828.763	0.855765423	754836.1333	0.513746865	10489399.58
S1611422-051A	12/12/2016 7:43 PM	11	693601.5	1.115560673	6933135.4	0.537350021	790055.9433	0.710893404	10287314.59
S1611422-060A	12/12/2016 7:49 PM	11	511507.1367	0.772493094	7023310.82	0.974479436	792001.55	0.848166838	10655736.52
S1611422-067A	12/12/2016 7:54 PM	11	229174.9533	1.035441764	7053201.057	0.253047914	832841.9667	0.511531386	10575795.97
S1611422-071A	12/12/2016 8:00 PM	11	500427.96	0.625911534	7004451.813	0.551676063	760784.6767	0.486159731	10411423.75
S1611422-074A	12/12/2016 8:06 PM	11	216093.3767	0.761732681	7009394.98	0.620499448	1091605.337	0.84630435	10633099.58

Sample			238 U [NoGas]		6 Li (ISTD) [NoGas]		7 [Li] (ISTD) [NoGas]		45 Sc (ISTD
S1611422-074Ad	12/12/2016 8:12 PM	11	215998.8467	1.226241862	7004210.153	0.259610337	1094978.95	0.381244808	10522167.64
S1611422-078A	12/12/2016 8:17 PM	11	569209.8333	1.193919588	6917913.033	0.30707833	731252.82	0.319840715	10285394.59
S1611422-078As	12/12/2016 8:29 PM	11	5308072	0.680839797	6464962.17	0.372782163	4905686.057	0.2111209	10267539.59
CCV	12/12/2016 8:35 PM	1	2267931.583	0.252752693	6725572.523	0.909455889	368188.64	0.698570299	10263251.54
CCB	12/12/2016 8:40 PM	1	275	13.89928353	6839464.253	0.767732041	370651.2433	1.139189838	10277969.32
S1611422-078Amsd	12/12/2016 8:46 PM	11	5309853.667	0.911836333	6396611.527	0.664521364	4819557.31	0.546186473	10160220.43
S1611422-079A	12/12/2016 9:03 PM	11	1333059.04	0.916457442	6643763.91	1.917636866	723144.6067	0.931156498	10054650.71
S1611422-081A	12/12/2016 9:09 PM	11	1101265.293	0.904419932	6699417.523	0.758399524	902193.37	1.289755353	10200362.65
CCV	12/12/2016 9:15 PM	1	2244690.5	0.305259801	6640830.153	1.031412477	363608.69	0.605215457	10204970.15
LLCCV-1ppb	12/12/2016 9:21 PM	1	109856.2867	0.615186263	6814833.093	1.03220458	367848.45	0.986218939	10308137.37
CCB	12/12/2016 9:26 PM	1	197	10.59929595	6864902.113	1.386516157	372044.2133	1.888922674	10404715.42
CCV	12/12/2016 9:43 PM	1	2213299.417	1.052685789	6205667.49	0.97238357	340643.8767	0.965639813	9670046.56
CCB	12/12/2016 9:49 PM	1	337	7.912339244	6431701.563	1.344791397	346577.99	1.488156594	9791669.887

Sample			) [NoGas]	45 Sc (ISTD) [He]		45 Sc (ISTD) [H2]		72 Ge (ISTD) [NoGas]	
Sample Name	Acq. Date-Time	Dilution	CPS RSD	CPS	CPS RSD	CPS	CPS RSD	CPS	CPS RSD
Calibration Blank	12/12/2016 11:42 AM	1	0.397611422	379765.36	0.618013524	7178986.66	0.573058377	2787931.42	1.101304478
1ppb Standard	12/12/2016 11:47 AM	1	0.187403343	376967.6833	0.684449806	7066243.33	0.667630458	2724761.627	0.52199761
10ppb Standard	12/12/2016 11:53 AM	1	0.293796433	366772.3733	0.464457049	6966819.587	0.757343337	2677093.017	0.379955079
20ppb Standard	12/12/2016 11:59 AM	1	0.575226302	361078.1267	0.769545281	6814437.087	0.502042899	2644038.647	0.824868331
100ppb Standard	12/12/2016 12:04 PM	1	1.530903822	341366.62	0.158429812	6425610.16	0.714483793	2505037.197	0.126131543
200ppb Standard	12/12/2016 12:10 PM	1	0.317372305	332020.3	0.6108878	6326763.917	0.812771852	2405170.53	0.08920483
Calibration Blank	12/12/2016 12:16 PM	1	0.181806958	336585.4367	0.267518996	6310928.22	0.658297224	2442840.46	0.776400756
ICV	12/12/2016 12:21 PM	1	0.432552127	337006.4467	0.177287704	6265998.64	0.864244345	2423435.39	1.012879939
ICB	12/12/2016 12:27 PM	1	0.679484654	339783.9533	1.114065407	6414267.94	0.505507262	2454380.877	0.517232902
QCS	12/12/2016 12:33 PM	1	0.598069603	324591.7167	1.324171265	6069142.817	0.462199568	2382314.973	1.40013648
QCS-ICV	12/12/2016 12:39 PM	1	0.625993358	323154.1267	0.797360009	6047514.897	0.581124027	2339351.297	0.179231775
LLICV-1ppb	12/12/2016 1:19 PM	1	0.594217071	331558.6033	0.414477843	6092628.093	1.151259872	2362764.21	0.470359612
CCB	12/12/2016 1:24 PM	1	0.523675749	330648.14	0.456455325	6123920.867	0.921134611	2382304.627	1.152874589
ics	12/12/2016 1:30 PM	1	4.215615673	344885.8033	1.390492572	7072909.163	0.684387943	2303644.767	3.256566276
icsab	12/12/2016 1:36 PM	1	3.148689859	409279.8633	0.773518069	8208014.95	0.595562935	2773062.113	2.689903016
CCV	12/12/2016 1:41 PM	1	0.768065002	409107.4667	0.052352784	7912014.687	0.871040503	3073598.35	0.654574635
CCB	12/12/2016 1:47 PM	1	0.166283838	415258.9833	0.99899938	8065156.347	1.14730904	3077488.28	0.349849488
Rgt H2O check	12/12/2016 1:53 PM	1	0.583463824	416506.06	0.424074063	8030029.68	0.549537764	3121670.087	0.457839269
MB-12629	12/12/2016 1:59 PM	2	0.539871682	400982.0233	0.649163846	7727922.47	1.265447855	2892991.693	0.779078034
LLQC-12629	12/12/2016 2:04 PM	2	0.539052527	396820.8533	0.688799094	7652594.417	0.981004546	2902791.41	0.80963094
LCS-12629	12/12/2016 2:10 PM	2	1.300922971	349195.95	0.449804109	6748061.677	1.3618423	2561484.137	1.781655856
UTS-4	12/12/2016 2:16 PM	11	0.043914082	369173.75	0.193832292	7290848.043	0.267485915	2770066.973	0.53042489
S1611422-003A	12/12/2016 2:21 PM	11	0.812597393	374983.7433	1.006623743	7347789.707	0.220527856	2789554.057	0.907843887
S1611422-003Ad	12/12/2016 2:27 PM	11	0.754259941	368407.5367	0.427920565	7135232.497	0.2695906	2769305.933	0.415933193
S1611422-008A	12/12/2016 2:33 PM	11	0.589009894	359575.0067	1.12245742	6944203.473	0.725522018	2630626.007	0.948849957
S1611422-008Ax5	12/12/2016 2:39 PM	55	0.511170954	359055.8333	0.056270581	6942537.64	1.10791707	2728301.07	0.669418333
S1611422-008As	12/12/2016 2:44 PM	11	0.085982718	345481.68	0.272760961	6756093.483	1.268325391	2547029.343	0.236294122
CCV	12/12/2016 2:50 PM	1	0.202511453	357619.59	1.108876505	6882579.31	0.488032016	2663957.187	1.253306491
CCB	12/12/2016 2:56 PM	1	0.364837941	358169.5233	0.403227255	6849448.48	0.601934427	2655827.673	0.147056416
S1611422-008Amsd	12/12/2016 3:02 PM	11	0.937344266	332386.9367	0.684655613	6475382.103	0.917735751	2443060.457	0.328820037
S1611422-013A	12/12/2016 3:19 PM	11	0.529107429	339284.0833	0.821668712	6487519.183	0.876702254	2476020.18	0.627821152
S1611422-014A	12/12/2016 3:25 PM	11	0.357006689	328845.6133	0.346356374	6352042.247	0.078797966	2413135.18	0.606463163
S1611422-015A	12/12/2016 3:30 PM	11	0.158518637	324602.7367	0.286486077	6258941.28	0.621032652	2383638.17	1.070692839
S1611422-019A	12/12/2016 3:36 PM	11	0.073935675	322882.2567	0.596385549	6200192.253	0.339642488	2348705.047	0.434371582
S1611422-020A	12/12/2016 3:42 PM	11	0.967732802	320435.1	0.39141415	6180496.557	0.638709423	2390138.587	1.387003775
S1611422-021A	12/12/2016 3:48 PM	11	0.408966471	316666.82	0.478918486	6105402.953	0.763096952	2358552.407	0.523911341
S1611422-026A	12/12/2016 3:53 PM	11	0.243692358	315750.83	0.533562212	6090674.62	0.158420359	2351741.017	0.544510634

Sample			) [NoGas]	45 Sc (ISTD) [He]		45 Sc (ISTD) [H2]		72 Ge (ISTD) [NoGas]	
CCV	12/12/2016 3:59 PM	1	0.592594277	323828.7367	0.8632512	6150511.007	1.262334854	2384503.517	0.462209777
CCB	12/12/2016 4:05 PM	1	0.818050711	327607	0.194160662	6198231.973	0.819773882	2411513.933	0.505198436
S1611422-027A	12/12/2016 4:11 PM	11	0.979254984	311916.2467	0.359893879	5963853.377	0.827798651	2315298.867	0.947991221
S1611422-028A	12/12/2016 4:16 PM	11	0.40362503	305481.3433	0.594065647	5876854.35	0.33924008	2254989.91	0.490982329
S1611422-028Ad	12/12/2016 4:22 PM	11	0.683211991	305749.19	1.110609625	5827655.6	0.689370219	2253017.41	0.458287381
S1611422-031A	12/12/2016 4:28 PM	11	0.877388993	307096.9467	0.878372589	5799373.937	0.398936636	2259716.577	0.6794009
S1611422-031As	12/12/2016 4:40 PM	11	1.129913053	300098.2067	0.331173188	5672623.943	0.430853298	2246372.687	0.656313406
S1611422-031Amsd	12/12/2016 4:45 PM	11	0.5859345	297148.5233	0.677759603	5700830.467	0.980910252	2208733.8	1.086424364
CCV	12/12/2016 5:08 PM	1	0.596593933	300906.3933	0.215916557	5653591.583	1.468134153	2207422.483	0.59944747
CCB	12/12/2016 5:14 PM	1	0.229489552	307093.0967	0.563411127	5789873.243	0.814912317	2257324.077	0.434014327
S1611422-032A	12/12/2016 5:20 PM	11	0.658071013	296574.8733	0.485330153	5523593.81	0.734421401	2215481.857	1.563878728
S1611422-034A	12/12/2016 5:25 PM	11	1.15515657	294873.8833	0.679284961	5560013.947	0.561146967	2164958.387	0.788403009
S1611422-037A	12/12/2016 5:31 PM	11	0.553581404	292827.7967	0.912610657	5515996.587	0.989794216	2147537.137	0.43541389
S1611422-043A	12/12/2016 5:37 PM	11	0.529390306	294188.2267	0.551795462	5514921.17	1.154595492	2145260.75	1.001779233
blk	12/12/2016 5:43 PM	1	0.315007798	307956.8667	0.907445723	5772815.603	0.6350425	2226405.327	0.747256377
MB-12631	12/12/2016 5:48 PM	2	0.730699356	308207.6433	0.642572954	5701839.217	0.607763201	2147794.917	0.801372969
LLQC-12631	12/12/2016 5:54 PM	2	0.465086403	306197.3067	0.55854558	5701481.857	0.73035764	2160763.11	0.317630654
LCS-12631	12/12/2016 6:00 PM	2	0.159982949	276092.69	0.474740879	5140189.1	0.973901114	1939730.41	0.191486252
UTS-4	12/12/2016 6:05 PM	11	0.594843954	290443.5733	0.275290431	5473185.2	0.455076326	2092528.32	0.226226344
S1611422-044A	12/12/2016 6:11 PM	11	1.0868961	294148.06	0.530408164	5394646.867	0.582832596	2155856.093	1.004206829
CCV	12/12/2016 6:17 PM	1	0.356991055	297484.5967	0.474779526	5499978.67	0.70027671	2143204.08	0.094948078
CCB	12/12/2016 6:23 PM	1	0.234505693	302989.31	0.56887921	5573661.72	0.328558737	2169110.05	0.48369155
S1611422-044Ad	12/12/2016 6:28 PM	11	0.980526501	288639.6933	1.098665229	5292490.62	0.814478706	2123999.083	1.107866421
S1611422-045A	12/12/2016 6:34 PM	11	0.926465511	287054.2133	1.019578999	5241573.54	1.174033175	2085979.567	0.490583139
S1611422-045Ax5	12/12/2016 6:40 PM	55	0.364259897	290404.5567	0.407084697	5352362.703	0.60838636	2100609.293	0.478691645
S1611422-045As	12/12/2016 6:46 PM	11	1.311577821	280106.5967	0.272655035	5140452.293	0.66299544	2035412.907	1.221730965
S1611422-045Amsd	12/12/2016 6:51 PM	11	0.47669039	277611.8133	0.2724938	5120446.603	0.60777605	2012582.003	0.201486884
S1611422-046A	12/12/2016 7:09 PM	11	0.11112385	287384.78	0.515844664	5252136.873	0.728639072	2077379.5	0.973536965
S1611422-047A	12/12/2016 7:14 PM	11	0.925841934	281951.1067	0.169429711	5223358.96	0.739601007	2043083.947	0.717269615
S1611422-049A	12/12/2016 7:20 PM	11	0.352626514	283078.6967	0.09706892	5200471.18	0.272816326	2051084.017	1.385429344
CCV	12/12/2016 7:26 PM	1	0.47689361	292087.5767	0.901188415	5363883.813	0.172446977	2086899.433	0.847660751
CCB	12/12/2016 7:31 PM	1	0.848112092	295443.1667	0.576039557	5419931.313	0.648650475	2112769.917	0.677968937
S1611422-050A	12/12/2016 7:37 PM	11	1.268512996	281426.4233	0.446030433	5146253.267	0.984171643	2050269.223	0.546185258
S1611422-051A	12/12/2016 7:43 PM	11	0.383403264	279575.4733	0.555336343	5135798.13	0.850874689	2010982.627	1.116029516
S1611422-060A	12/12/2016 7:49 PM	11	0.523541209	288373.0167	0.782838875	5318301.597	0.939516218	2048757.557	0.1014386
S1611422-067A	12/12/2016 7:54 PM	11	0.693413459	283274.7	0.510551187	5207943.263	0.335416672	2060028.6	1.248311222
S1611422-071A	12/12/2016 8:00 PM	11	0.806590947	282433.9367	1.055609657	5168980.35	0.474939381	2048259.5	0.541257764
S1611422-074A	12/12/2016 8:06 PM	11	0.591845454	287344.25	0.66329676	5267118.54	0.992415766	2068573.043	0.511800361

Sample			) [NoGas]	45 Sc (ISTD) [He]		45 Sc (ISTD) [H2]		72 Ge (ISTD) [NoGas]	
S1611422-074Ad	12/12/2016 8:12 PM	11	0.691971246	285811.62	0.761203327	5214478.543	0.174841171	2062965.613	0.847540889
S1611422-078A	12/12/2016 8:17 PM	11	0.479992799	278595.3267	0.202128829	5071671.603	0.117112708	2008487.423	1.034771163
S1611422-078As	12/12/2016 8:29 PM	11	0.604562228	279185.0767	0.570964279	5091784.937	0.580186658	2007663.88	0.210096629
CCV	12/12/2016 8:35 PM	1	0.593161342	280023.7567	0.627639657	5141226.323	0.230835796	2014916.66	0.524878886
CCB	12/12/2016 8:40 PM	1	1.033321687	283908.27	0.519590169	5171010.213	0.417144248	2034824.99	0.815023965
S1611422-078Amsd	12/12/2016 8:46 PM	11	0.775665403	274193.3933	0.292910616	5022223.69	0.469827467	1980447.98	1.324074351
S1611422-079A	12/12/2016 9:03 PM	11	0.550251076	276497.02	0.953653411	5064135.493	0.4449085	1973933.183	0.506385315
S1611422-081A	12/12/2016 9:09 PM	11	0.516423575	280229.1267	0.51812967	5136249.797	0.241296365	2005570.613	0.366378343
CCV	12/12/2016 9:15 PM	1	0.283121171	280934.02	1.387326659	5131123.547	0.692247507	2022829.363	0.352700848
LLCCV-1ppb	12/12/2016 9:21 PM	1	0.967365685	285543.0067	0.767986683	5245748.267	0.713541333	2046728.39	0.534494771
CCB	12/12/2016 9:26 PM	1	0.64895612	288193.5633	0.294990286	5248430.067	0.768962431	2082531.167	0.642607313
CCV	12/12/2016 9:43 PM	1	0.360342331	267910.7967	0.191104351	4838426.057	0.951439613	1927362.843	0.266958349
CCB	12/12/2016 9:49 PM	1	0.184399942	271661.0367	0.15681015	4944041.33	1.130851421	1966887.49	0.258727517

Sample			72 Ge (ISTD) [He]		72 Ge (ISTD) [H2]		89 Y (ISTD) [NoGas]		89 Y (IST
Sample Name	Acq. Date-Time	Dilution	CPS	CPS RSD	CPS	CPS RSD	CPS	CPS RSD	CPS
Calibration Blank	12/12/2016 11:42 AM	1	266760.5	0.709596038	1743323.473	0.372070608	23805999.61	0.466889442	2434148.79
1ppb Standard	12/12/2016 11:47 AM	1	261494.45	0.475468475	1720185.07	0.270101603	23384562.41	0.480884774	2403530.877
10ppb Standard	12/12/2016 11:53 AM	1	257629.8933	1.201632732	1689034.933	0.913299614	23001689.64	0.597198584	2379403.447
20ppb Standard	12/12/2016 11:59 AM	1	252776.9833	1.032277817	1650119.203	0.110601431	22716424.1	0.412642007	2320712.823
100ppb Standard	12/12/2016 12:04 PM	1	239033.2633	1.105108469	1559823.513	0.289446108	21850913.02	0.874556927	2188783.597
200ppb Standard	12/12/2016 12:10 PM	1	232026.57	1.01622492	1534637.647	0.830493768	20870811.95	0.49930518	2146353.527
Calibration Blank	12/12/2016 12:16 PM	1	236667.5767	0.962928877	1553881.57	0.277764749	20949440.83	0.422908891	2182408.177
ICV	12/12/2016 12:21 PM	1	233089.8	0.59997484	1535305.25	1.072788992	20918419.17	0.648016948	2158584.843
ICB	12/12/2016 12:27 PM	1	240555.2933	0.457513981	1567744.207	0.716245817	21074625.27	0.52531406	2196546.167
QCS	12/12/2016 12:33 PM	1	227399.42	0.606458146	1485628.727	0.943149121	20417502.52	0.965868559	2093945.68
QCS-ICV	12/12/2016 12:39 PM	1	224588.15	0.745925471	1486915.463	0.601964915	20027951.98	0.1530921	2082124.083
LLICV-1ppb	12/12/2016 1:19 PM	1	231479.5233	0.697148059	1495272.72	0.645228876	20239240.86	0.932799812	2139724.43
CCB	12/12/2016 1:24 PM	1	235112.7333	0.624283352	1505754.973	1.422855502	20221149.2	0.917589192	2143778.597
ics	12/12/2016 1:30 PM	1	235315.4433	1.860528992	1640082.16	0.062720456	19901675.32	3.556918553	2176390.677
icsab	12/12/2016 1:36 PM	1	269951.2067	0.562545529	1877701.87	0.652204067	24123331.82	2.657835629	2511159.21
CCV	12/12/2016 1:41 PM	1	284816.0133	0.851623314	1897624.923	0.143414664	26473130.06	0.19814618	2581234.137
CCB	12/12/2016 1:47 PM	1	286952.16	0.448324034	1937724.713	0.720427696	26375092.84	0.593463454	2604478.857
Rgt H2O check	12/12/2016 1:53 PM	1	292119.5467	0.716983189	1949870.06	0.790434358	26606027.28	0.662149808	2615716.493
MB-12629	12/12/2016 1:59 PM	2	269368.8333	0.527991599	1803918.957	0.857747904	25698034.54	0.044601883	2539651.427
LLQC-12629	12/12/2016 2:04 PM	2	268671.3333	0.784797642	1809389.44	0.634941783	25628235.1	0.868277052	2518852.053
LCS-12629	12/12/2016 2:10 PM	2	231650.7533	1.237007174	1556963.79	0.34998297	23273495.74	1.599780774	2224870.327
UTS-4	12/12/2016 2:16 PM	11	259539.0433	0.440195821	1766102.15	0.521711495	24153097.93	0.655688289	2389333.933
S1611422-003A	12/12/2016 2:21 PM	11	263274.1133	0.545699994	1750273.82	0.55577316	25482471.76	0.307469044	2522102.61
S1611422-003Ad	12/12/2016 2:27 PM	11	256765.1	0.73440838	1696221.913	0.651628619	25328605.66	1.060033636	2463399.693
S1611422-008A	12/12/2016 2:33 PM	11	247348.01	0.221201478	1645974.76	0.280479226	24471569.58	0.643329303	2428799.697
S1611422-008Ax5	12/12/2016 2:39 PM	55	253033.36	0.822709389	1690311.427	0.756156629	23777195.72	0.434962216	2327893.1
S1611422-008As	12/12/2016 2:44 PM	11	240434.3667	0.530346056	1612376.393	0.389033345	23651885.73	0.263877347	2346183.933
CCV	12/12/2016 2:50 PM	1	252198.73	0.823938468	1666411.84	0.279812564	22991031.31	0.855598947	2295367.477
CCB	12/12/2016 2:56 PM	1	251430.5733	0.513780136	1658110.973	0.209791275	22723640.21	0.595152675	2289230.463
S1611422-008Amsd	12/12/2016 3:02 PM	11	234630.19	0.495858125	1544872.09	0.387993736	22536967.44	0.181023846	2281504.423
S1611422-013A	12/12/2016 3:19 PM	11	235326.4233	0.519781878	1535026.257	0.637103584	23453662.96	1.058637499	2368931.433
S1611422-014A	12/12/2016 3:25 PM	11	229625.73	1.432249518	1509607.58	0.897828292	22564456.88	0.451856583	2266925.533
S1611422-015A	12/12/2016 3:30 PM	11	225660.2933	0.817429566	1493251.57	0.955206298	21724421.92	1.083298857	2197045.193
S1611422-019A	12/12/2016 3:36 PM	11	225208.0567	0.672370479	1474657.233	0.682111121	21190929.16	0.467537516	2154554.22
S1611422-020A	12/12/2016 3:42 PM	11	227104.0967	1.063708997	1488227.613	0.607804881	22102563.01	0.183672971	2224002.687
S1611422-021A	12/12/2016 3:48 PM	11	223698.6567	1.760455324	1474872.023	0.178051462	22111394.12	0.489908035	2231026.3
S1611422-026A	12/12/2016 3:53 PM	11	223168.5333	0.104932418	1460068.067	0.810830592	21356164.71	0.931251719	2165252.137

Sample			72 Ge (ISTD) [He]		72 Ge (ISTD) [H2]		89 Y (ISTD) [NoGas]		89 Y (IST
CCV	12/12/2016 3:59 PM	1	226398.7067	0.161726789	1503121.297	0.344390737	20512965.85	0.137403781	2100339.78
CCB	12/12/2016 4:05 PM	1	230696.1867	0.213383506	1529489.14	0.320977383	20682453.07	0.109392437	2123870.613
S1611422-027A	12/12/2016 4:11 PM	11	217217.7767	0.658080442	1409237.963	1.393419759	21037528.61	1.29971817	2131247.487
S1611422-028A	12/12/2016 4:16 PM	11	215001.6533	0.277881003	1408705.537	0.823225694	20751775.29	0.371431458	2125419.43
S1611422-028Ad	12/12/2016 4:22 PM	11	215529.1967	0.756045334	1392604.947	1.402519584	20603686.4	0.570344523	2106000.47
S1611422-031A	12/12/2016 4:28 PM	11	215675.48	0.774689723	1397073.487	1.21041278	20484421.41	0.56733954	2074859.5
S1611422-031As	12/12/2016 4:40 PM	11	210967.07	0.994985857	1354609.287	0.171916733	20243685.31	1.057592688	2045579.57
S1611422-031Amsd	12/12/2016 4:45 PM	11	208944.8167	0.803026891	1347598.627	0.622530886	19936146.43	1.336716508	2025908.113
CCV	12/12/2016 5:08 PM	1	210877.24	0.633995045	1382454.807	0.654034309	18913941.47	0.297695273	1957805.477
CCB	12/12/2016 5:14 PM	1	218405.93	0.669172415	1435231.057	0.603737705	19194053.68	0.350244801	2004751.657
S1611422-032A	12/12/2016 5:20 PM	11	207726.8333	0.369253124	1318798.143	0.278426307	19661958.66	1.508156702	2005330.89
S1611422-034A	12/12/2016 5:25 PM	11	205565.8367	0.398967398	1314405.677	0.990973277	19622212.56	0.688746824	2023076.723
S1611422-037A	12/12/2016 5:31 PM	11	205871.1233	0.300198285	1316886.097	0.70809081	19302110.9	0.432881178	1986337.213
S1611422-043A	12/12/2016 5:37 PM	11	208027.2233	0.686687517	1314575.227	1.020258228	19344294.79	0.476194532	2010948.183
blk	12/12/2016 5:43 PM	1	216456.9267	1.116631055	1412372.163	0.756250868	18858677.58	0.588628249	1989784.99
MB-12631	12/12/2016 5:48 PM	2	207912.2833	0.513821744	1355195.537	0.421513827	18880094.25	0.342954692	2010199.503
LLQC-12631	12/12/2016 5:54 PM	2	208846.18	0.940631223	1344448.803	0.719725273	18852234.81	0.57716852	1978893.463
LCS-12631	12/12/2016 6:00 PM	2	187423.8433	0.527008001	1216098.873	0.171195941	17211154.87	0.708054166	1811833.607
UTS-4	12/12/2016 6:05 PM	11	206630.51	0.289939024	1336891.647	0.9463767	18025192.06	0.201362717	1925465.827
S1611422-044A	12/12/2016 6:11 PM	11	204908.0833	0.530173413	1307268.177	0.226423012	19295100.9	1.015321747	2001970.06
CCV	12/12/2016 6:17 PM	1	209382.0567	0.105229094	1342156.093	0.887039487	18249886.5	0.471934479	1933928.467
CCB	12/12/2016 6:23 PM	1	213458.7367	0.81321912	1374518.383	0.298120919	18529420.38	0.682060208	1963789.503
S1611422-044Ad	12/12/2016 6:28 PM	11	202884.5567	0.862423212	1282860.503	0.891521783	19096851.46	0.699017956	1971947.98
S1611422-045A	12/12/2016 6:34 PM	11	201216.3167	0.252150032	1277144.08	0.411728461	18766669.81	0.980559874	1954137.42
S1611422-045Ax5	12/12/2016 6:40 PM	55	205435.3167	0.922418975	1319007.03	0.268143655	18064718.73	0.164826501	1916120.063
S1611422-045As	12/12/2016 6:46 PM	11	195946.43	0.352000903	1237724.673	0.315790528	18924971.47	1.317404208	1971244.437
S1611422-045Amsd	12/12/2016 6:51 PM	11	193371.2467	0.722202492	1236260.263	0.992291086	18558985.93	0.872064904	1951697.77
S1611422-046A	12/12/2016 7:09 PM	11	202309.14	0.42211436	1272081.373	0.520242264	18959107.58	1.249562531	1987259.087
S1611422-047A	12/12/2016 7:14 PM	11	200062.1767	0.49938006	1268198.04	0.649717621	18722591.48	0.868599733	1971853.743
S1611422-049A	12/12/2016 7:20 PM	11	199215.4733	0.234130417	1266778.94	0.178720927	18426124.82	1.006900213	1945050.34
CCV	12/12/2016 7:26 PM	1	205539.5933	0.729011654	1315910.123	0.412143106	17904225.96	0.06690078	1895289.3
CCB	12/12/2016 7:31 PM	1	208868.7267	0.480489743	1339829.147	0.801370608	17988489.84	0.425714836	1931527.077
S1611422-050A	12/12/2016 7:37 PM	11	197725.76	0.200385474	1252408.423	0.299393911	18222357.61	1.073478457	1915826.8
S1611422-051A	12/12/2016 7:43 PM	11	197314.5033	0.573767183	1244757.413	0.378660864	18216581.5	1.290831278	1926284.577
S1611422-060A	12/12/2016 7:49 PM	11	199294.0833	0.900101828	1274803.387	0.088821642	18817762.03	0.890889866	1990749.577
S1611422-067A	12/12/2016 7:54 PM	11	200083.5333	0.514367693	1269898.943	0.093663857	18447947.04	1.296470448	1931791.8
S1611422-071A	12/12/2016 8:00 PM	11	195981.6033	0.886705496	1265444.707	0.704333884	18467293.71	0.690364452	1936019.503
S1611422-074A	12/12/2016 8:06 PM	11	199016.3267	0.823500982	1272193.803	0.304985299	18846925.36	1.095689069	1993488.183

Sample			72 Ge (ISTD) [He]		72 Ge (ISTD) [H2]		89 Y (ISTD) [NoGas]		89 Y (IST
S1611422-074Ad	12/12/2016 8:12 PM	11	200183.26	0.112427657	1263331.267	0.963471264	18784265.92	1.212744592	1978518.463
S1611422-078A	12/12/2016 8:17 PM	11	195134.4733	0.5412571	1243288.147	0.347725396	17867547.07	0.81007638	1883485.41
S1611422-078As	12/12/2016 8:29 PM	11	194230.3933	0.628496423	1241076.027	0.725390294	17695254.85	0.738179138	1883008.19
CCV	12/12/2016 8:35 PM	1	197187.8733	0.399959941	1258364.183	0.285287655	17034082.66	0.164603162	1844969.58
CCB	12/12/2016 8:40 PM	1	200918.6433	0.728757017	1289865.47	0.358336391	17258678.21	0.692141307	1862577.217
S1611422-078Amsd	12/12/2016 8:46 PM	11	193668.9167	1.341158714	1221777.31	0.326464398	17658958.74	1.526634191	1869096.107
S1611422-079A	12/12/2016 9:03 PM	11	196006.2033	1.021466189	1242817.243	0.405975761	17752343.18	0.839091223	1913765.48
S1611422-081A	12/12/2016 9:09 PM	11	197953.7433	0.822282304	1249357.033	0.873080384	18841048.14	0.742260604	2011047.283
CCV	12/12/2016 9:15 PM	1	199288.1233	0.320133971	1279956.06	1.393073388	17161592.65	0.169001074	1845885.34
LLCCV-1ppb	12/12/2016 9:21 PM	1	204852.1733	1.022199386	1292881.373	0.41332901	17225419.87	0.465096841	1883356.247
CCB	12/12/2016 9:26 PM	1	204109.36	0.578685075	1302634.877	0.262848408	17422777.64	0.677707733	1889989.717
CCV	12/12/2016 9:43 PM	1	188783.77	1.397498739	1205967	0.463793873	16250781.02	0.177303505	1767290.417
CCB	12/12/2016 9:49 PM	1	194346.2467	0.723592454	1240643.63	0.506121759	16466967.12	0.456216001	1800522.707

Sample			'D) [He]	103 Rh (ISTD) [NoGas]		103 Rh (ISTD) [He]		103 Rh (ISTD) [H2]	
Sample Name	Acq. Date-Time	Dilution	CPS RSD	CPS	CPS RSD	CPS	CPS RSD	CPS	CPS RSD
Calibration Blank	12/12/2016 11:42 AM	1	0.910437856	22230679.67	0.761900375	9251224.077	0.043805597	7238106.657	0.547384102
1ppb Standard	12/12/2016 11:47 AM	1	0.334054677	21806430.25	0.873539436	9138557.693	0.226045257	7184123.603	1.56797417
10ppb Standard	12/12/2016 11:53 AM	1	0.712811111	21554652.48	0.959154757	9029797.973	0.245319598	7085141.94	0.620900309
20ppb Standard	12/12/2016 11:59 AM	1	0.207976999	21122766.94	0.52282698	8822092.147	0.497506413	6917373.333	0.809393061
100ppb Standard	12/12/2016 12:04 PM	1	0.497764202	20102159.2	0.48395515	8318141.337	0.288948175	6541087.793	0.928888337
200ppb Standard	12/12/2016 12:10 PM	1	0.911120855	19427812.56	0.317581968	8097929.123	0.533186687	6379950.16	0.840214576
Calibration Blank	12/12/2016 12:16 PM	1	0.118493483	19632176.44	0.480955154	8200438.007	0.530968174	6463696.827	0.141797199
ICV	12/12/2016 12:21 PM	1	0.702765127	19595872.55	0.695490413	8205517.173	0.198861042	6470140.16	1.115338675
ICB	12/12/2016 12:27 PM	1	0.669310137	19887031.43	1.079716555	8340692.723	0.413651579	6589963.767	0.717324038
QCS	12/12/2016 12:33 PM	1	0.677899439	19128116.46	0.552957629	7944960.517	0.432634127	6314841	0.28518486
QCS-ICV	12/12/2016 12:39 PM	1	0.298212172	18774946.48	0.604661202	7909286.353	0.322836793	6230075.723	0.416080335
LLICV-1ppb	12/12/2016 1:19 PM	1	0.241530618	19013890.91	0.671905128	8076256.347	0.34300903	6436195.577	0.43556034
CCB	12/12/2016 1:24 PM	1	0.677787889	19093473.13	0.61818893	8088301.343	0.662703392	6473965.297	1.786545524
ics	12/12/2016 1:30 PM	1	1.753527652	17629750.41	2.711855394	7837439.13	1.298874013	6336137.527	0.51069204
icsab	12/12/2016 1:36 PM	1	0.770140857	21087216.94	2.165047589	9034182.7	0.930181805	7068067.22	0.682583143
CCV	12/12/2016 1:41 PM	1	0.204139427	24470089.03	0.368805909	9831843.22	0.242531583	7609436.92	0.250745224
CCB	12/12/2016 1:47 PM	1	0.345490708	24420699.03	0.303947363	10013162.1	0.254156594	7705559.417	0.499910012
Rgt H2O check	12/12/2016 1:53 PM	1	0.437406283	24617033.46	0.309639503	10047443.49	0.94928065	7753791.357	0.830408207
MB-12629	12/12/2016 1:59 PM	2	0.598979882	23611504.62	0.253773436	9637292.67	0.485067192	7423455.817	0.406663025
LLQC-12629	12/12/2016 2:04 PM	2	0.741243574	23562260.17	1.029684595	9558864.897	0.364566877	7338477.21	1.242608825
LCS-12629	12/12/2016 2:10 PM	2	0.231328185	20996355.28	1.593718343	8443648.273	0.072906771	6396523.353	1.068822081
UTS-4	12/12/2016 2:16 PM	11	0.093693596	21560452.47	0.850207187	8917135.757	0.591322782	6898383.473	1.07488632
S1611422-003A	12/12/2016 2:21 PM	11	0.456605198	21858572.47	1.031198961	8931726.867	0.398511583	6902474.17	1.210055235
S1611422-003Ad	12/12/2016 2:27 PM	11	0.996679941	21674118.02	0.758558143	8808933.54	0.725701092	6692611.403	0.866906237
S1611422-008A	12/12/2016 2:33 PM	11	0.844402554	20674019.74	0.48431201	8492611.883	0.183521915	6514335.713	1.486243108
S1611422-008Ax5	12/12/2016 2:39 PM	55	0.124390892	21514115.26	1.261320884	8763972.987	1.22700582	6777631.957	1.915905972
S1611422-008As	12/12/2016 2:44 PM	11	0.313581195	19904101.99	0.115895674	8223231.617	0.416971996	6412666.83	0.429706212
CCV	12/12/2016 2:50 PM	1	0.418945329	21406626.37	0.645523712	8739627.153	0.375991861	6801550.01	1.01527705
CCB	12/12/2016 2:56 PM	1	0.581008086	21245795.27	0.534458907	8744820.487	0.130916013	6833897.507	0.594429942
S1611422-008Amsd	12/12/2016 3:02 PM	11	0.230070102	19190112.57	0.254291048	7934237.187	0.263410582	6208426.283	1.162947812
S1611422-013A	12/12/2016 3:19 PM	11	0.286172007	19237394.23	0.711343704	7925979.13	0.078955513	6160531.697	0.852481683
S1611422-014A	12/12/2016 3:25 PM	11	0.133669034	18735713.7	0.372174155	7761747.19	0.742889164	6078599.34	0.684401659
S1611422-015A	12/12/2016 3:30 PM	11	0.985707529	18727660.37	1.087053473	7712161.913	0.293385457	6043502.953	0.72177345
S1611422-019A	12/12/2016 3:36 PM	11	0.584246215	18350382.05	0.998173752	7650896.083	0.33572961	5991228.927	0.283319402
S1611422-020A	12/12/2016 3:42 PM	11	0.543125545	18677698.14	0.938817504	7737448.303	0.151834455	6022693.373	1.891874381
S1611422-021A	12/12/2016 3:48 PM	11	0.652499596	18446725.38	0.571604746	7614843.863	0.299440413	6005131.15	1.146910261
S1611422-026A	12/12/2016 3:53 PM	11	0.407996948	18249420.39	0.262636458	7582477.753	1.23661251	5935574.35	0.708455357

Sample			'D) [He]	103 Rh (ISTD) [NoGas]		103 Rh (ISTD) [He]		103 Rh (ISTD) [H2]	
CCV	12/12/2016 3:59 PM	1	0.77091945	19228744.79	1.123477883	7973628.297	0.43376879	6275992.807	0.939754345
CCB	12/12/2016 4:05 PM	1	0.599479948	19375069.79	0.806615223	8063123.013	0.348335367	6405630.58	1.258781717
S1611422-027A	12/12/2016 4:11 PM	11	0.464071052	17838054.85	1.33792647	7361719.707	0.630133355	5766496.437	1.898059668
S1611422-028A	12/12/2016 4:16 PM	11	0.222809843	17697841.52	0.489402985	7339176.097	0.435753463	5815920.603	1.030336578
S1611422-028Ad	12/12/2016 4:22 PM	11	0.388036501	17767599.85	0.60300792	7349638.877	0.625128582	5807581.437	0.347849405
S1611422-031A	12/12/2016 4:28 PM	11	0.249858866	17736650.41	1.031044282	7378721.653	1.192314129	5755711.02	1.209395955
S1611422-031As	12/12/2016 4:40 PM	11	0.284334586	17632452.08	1.884575889	7254025.543	0.356687513	5686454.5	0.889108797
S1611422-031Amsd	12/12/2016 4:45 PM	11	0.938208035	17363739.31	0.986649828	7168939.717	0.960294924	5693078.94	1.008977541
CCV	12/12/2016 5:08 PM	1	0.339238786	17684926.52	0.259685911	7471566.37	0.373971075	5916564.903	1.005216163
CCB	12/12/2016 5:14 PM	1	1.257741935	18095154.84	0.254203757	7655099.973	0.616456841	6084707.533	0.241930218
S1611422-032A	12/12/2016 5:20 PM	11	0.061581084	17384927.64	2.213159471	7193109.713	0.815275602	5642264.773	1.19444916
S1611422-034A	12/12/2016 5:25 PM	11	0.191379442	16694658.23	0.315256498	6953789.307	0.816910987	5532311.723	1.442679724
S1611422-037A	12/12/2016 5:31 PM	11	0.222795159	16781659.89	0.688317001	6996031.39	0.431816585	5539619.223	0.668965474
S1611422-043A	12/12/2016 5:37 PM	11	0.110070718	16863033.22	1.280096286	7050803.33	0.639306752	5609669.363	0.671972612
blk	12/12/2016 5:43 PM	1	0.787315207	17902113.73	0.85863239	7574471.643	0.673340787	6051212.397	0.547402359
MB-12631	12/12/2016 5:48 PM	2	0.36249839	17565150.97	0.613362645	7470695.813	0.699180755	5991245.597	1.138403563
LLQC-12631	12/12/2016 5:54 PM	2	0.31194626	17660168.74	0.293935679	7432964.427	0.949710264	5978165.043	1.357606855
LCS-12631	12/12/2016 6:00 PM	2	0.865083573	15911864.93	0.473596436	6705818.07	0.56775229	5393896.59	0.57092911
UTS-4	12/12/2016 6:05 PM	11	0.413105215	16489195.46	0.806276662	7062470.553	0.35261918	5718926.023	0.733495566
S1611422-044A	12/12/2016 6:11 PM	11	0.84944273	16890909.33	0.408535193	6992721.527	0.554763547	5641768.663	1.068393252
CCV	12/12/2016 6:17 PM	1	0.418450261	17230227.65	1.163400413	7304792.767	0.301151669	5859428.517	0.401726567
CCB	12/12/2016 6:23 PM	1	0.890282144	17575793.19	0.520042777	7470670.533	0.060522501	6011858.93	1.045070496
S1611422-044Ad	12/12/2016 6:28 PM	11	0.786673024	16743515.44	1.159546792	6902330.697	1.006597125	5537144.64	1.192289711
S1611422-045A	12/12/2016 6:34 PM	11	0.424965504	16433013.24	0.607576678	6860492.503	0.050664358	5499440.337	0.476453593
S1611422-045Ax5	12/12/2016 6:40 PM	55	0.184042866	16855670.44	0.119637328	7083075.553	0.295168891	5734940.05	1.374396416
S1611422-045As	12/12/2016 6:46 PM	11	0.257826529	16095034.91	0.865887327	6675936.68	0.381671497	5370237.427	1.099523612
S1611422-045Amsd	12/12/2016 6:51 PM	11	0.579286866	15807292.71	0.85291735	6610397.237	0.31181629	5374862.287	0.453007907
S1611422-046A	12/12/2016 7:09 PM	11	0.061327987	16346795.46	0.492378203	6869069.033	0.688845054	5535307.557	0.658465528
S1611422-047A	12/12/2016 7:14 PM	11	0.165017303	16165506.02	1.080327722	6768840.423	0.195796975	5502382.56	1.575763557
S1611422-049A	12/12/2016 7:20 PM	11	0.639025704	16215340.46	1.641034541	6753985.983	0.654461863	5484294.507	1.046068432
CCV	12/12/2016 7:26 PM	1	0.639760824	16905500.99	0.440409012	7184244.993	0.151669407	5820168.103	0.320444994
CCB	12/12/2016 7:31 PM	1	0.675739504	17021247.66	0.565599977	7269643.323	0.425010212	5910632.68	1.136931167
S1611422-050A	12/12/2016 7:37 PM	11	0.0981638	16155943.8	1.099054789	6728528.067	0.430574259	5432401.45	0.499927608
S1611422-051A	12/12/2016 7:43 PM	11	0.263124999	15915854.92	0.68231813	6654291.68	0.263280415	5426136.31	0.141435369
S1611422-060A	12/12/2016 7:49 PM	11	0.842255102	16084002.7	0.654672219	6741054.593	0.412153577	5512742.14	0.547450428
S1611422-067A	12/12/2016 7:54 PM	11	0.078022838	16152951.58	1.569753099	6713784.593	0.48551972	5491186.45	0.237100126
S1611422-071A	12/12/2016 8:00 PM	11	0.241198355	16165740.47	0.880105601	6696030.71	0.734895117	5536416.863	0.815026166
S1611422-074A	12/12/2016 8:06 PM	11	1.20733696	16178942.13	0.367246185	6786326.95	0.332838002	5555320.197	0.317181921

Sample			D) [He]	103 Rh (ISTD) [NoGas]		103 Rh (ISTD) [He]		103 Rh (ISTD) [H2]	
S1611422-074Ad	12/12/2016 8:12 PM	11	0.276615836	16083807.14	0.529265595	6790472.23	0.411497834	5519389.5	1.013455218
S1611422-078A	12/12/2016 8:17 PM	11	0.675898881	15859455.48	1.303232222	6635393.347	0.397398482	5415242.147	0.812619746
S1611422-078As	12/12/2016 8:29 PM	11	0.517554348	15790454.93	0.4102755	6595002.237	0.796807775	5402431.45	0.429733027
CCV	12/12/2016 8:35 PM	1	0.563313212	16183417.69	0.497956815	6913520.977	0.290300687	5674007.137	0.808451718
CCB	12/12/2016 8:40 PM	1	0.807124031	16400133.79	0.944254423	6986978.333	0.819461053	5775172.963	0.419557188
S1611422-078Amsd	12/12/2016 8:46 PM	11	0.536607995	15682037.71	1.005746337	6595258.627	0.167800339	5387903.257	0.455180533
S1611422-079A	12/12/2016 9:03 PM	11	0.512862801	15631479.93	0.217662199	6638552.097	0.255610851	5516460.337	0.597347873
S1611422-081A	12/12/2016 9:09 PM	11	0.243113115	15688947.16	0.68923926	6668412.097	0.072447367	5487818.117	0.731452608
CCV	12/12/2016 9:15 PM	1	0.230511668	16294858.24	0.543177515	6955792.363	0.19248729	5742006.857	0.383489705
LLCCV-1ppb	12/12/2016 9:21 PM	1	0.160422069	16506813.23	0.250479796	7098104.717	0.511147906	5858778.1	0.340783993
CCB	12/12/2016 9:26 PM	1	0.313699796	16603329.34	0.584602254	7080088.33	0.280443993	5872042.13	0.69170995
CCV	12/12/2016 9:43 PM	1	0.356426153	15489908.27	0.52429764	6611151.96	0.643391586	5433816.033	0.94993472
CCB	12/12/2016 9:49 PM	1	0.173988775	15705172.71	0.297529181	6779843.897	0.503033943	5592147.137	0.466946182

Sample			115 In (ISTD) [NoGas]		115 In (ISTD) [He]		115 In (ISTD) [H2]		185 Re (ISTI
Sample Name	Acq. Date-Time	Dilution	CPS	CPS RSD	CPS	CPS RSD	CPS	CPS RSD	CPS
Calibration Blank	12/12/2016 11:42 AM	1	24564983.66	0.604661033	3296958.203	0.887499873	17698508.18	0.152175556	10228830.98
1ppb Standard	12/12/2016 11:47 AM	1	24071991.42	0.809976589	3251566.747	0.798932533	17329693.2	1.005482133	10042737.93
10ppb Standard	12/12/2016 11:53 AM	1	23734560.64	1.230773591	3223962.997	0.287121255	17174148.76	0.421404735	9885221.27
20ppb Standard	12/12/2016 11:59 AM	1	23146186.83	0.707283314	3136235.013	0.823325771	16831822.66	1.01302692	9797325.167
100ppb Standard	12/12/2016 12:04 PM	1	22270300.62	1.088591035	3004152.657	0.448722264	16089652.69	0.762502364	9471706.01
200ppb Standard	12/12/2016 12:10 PM	1	21670671.45	0.764310486	2942119.957	0.752539271	15921574.36	0.971773294	9341862.407
Calibration Blank	12/12/2016 12:16 PM	1	21579890.5	0.768108198	2951304.887	0.648378866	15776415.48	0.075568891	9257757.41
ICV	12/12/2016 12:21 PM	1	21613167.21	0.494737302	2961951.55	0.255440239	15719817.15	0.9672991	9242643.523
ICB	12/12/2016 12:27 PM	1	21794341.29	0.536165012	2976893.91	0.521861956	15930802.14	0.814998208	9220230.467
QCS	12/12/2016 12:33 PM	1	21077250.68	1.049850905	2870022.667	0.770015201	15322856.61	0.882438063	9086767.417
QCS-ICV	12/12/2016 12:39 PM	1	20837442.81	0.898895461	2841659.68	0.49681189	15115561.06	0.925492431	8981894.363
LLICV-1ppb	12/12/2016 1:19 PM	1	20892314.12	0.859570935	2906229.883	0.643791858	15080132.18	0.552110789	8932577.423
CCB	12/12/2016 1:24 PM	1	20771137.75	0.304584402	2922617.73	0.863603279	15170368.84	0.981581817	8957864.09
ics	12/12/2016 1:30 PM	1	20441240.94	2.393681157	2896512.317	0.907373344	16806673.22	0.331276151	9263334.633
icsab	12/12/2016 1:36 PM	1	24349660.75	2.279708183	3290340.913	0.101955332	18943387.58	0.384846293	10639081.8
CCV	12/12/2016 1:41 PM	1	26919813.39	0.8557852	3485241.387	0.252624713	19406335.9	0.822780431	11187430.95
CCB	12/12/2016 1:47 PM	1	26868815.65	0.539202565	3477014.513	0.423871399	19490890.34	0.822714069	11104811.5
Rgt H2O check	12/12/2016 1:53 PM	1	26971262.39	0.363974415	3489368.473	0.126879677	19574834.78	1.521193535	11104244.28
MB-12629	12/12/2016 1:59 PM	2	25998163.61	0.279142111	3368499.73	0.564286291	18715222.59	0.821980901	10870668.18
LLQC-12629	12/12/2016 2:04 PM	2	26046178.58	1.011752925	3352813.687	0.737458531	18601179.82	0.748518942	10785706.51
LCS-12629	12/12/2016 2:10 PM	2	23547463.9	1.129873319	2989148.63	0.881862641	16700713.78	1.516027634	10185542.93
UTS-4	12/12/2016 2:16 PM	11	24246641.14	0.37707508	3147097.307	0.29008694	17747375.4	0.562387865	10356051.26
S1611422-003A	12/12/2016 2:21 PM	11	24244590.2	0.95066039	3162384.803	0.228344673	17683600.97	0.936727395	10375087.37
S1611422-003Ad	12/12/2016 2:27 PM	11	24204135.29	0.805082278	3104242.377	0.205554406	17290053.2	0.567319893	10293165.15
S1611422-008A	12/12/2016 2:33 PM	11	23021181.39	0.432505105	3033158.837	0.576897659	16736313.22	1.369951785	9987100.717
S1611422-008Ax5	12/12/2016 2:39 PM	55	23862768.41	0.612695553	3081822.033	0.597154801	17096493.21	1.2458885	10112010.43
S1611422-008As	12/12/2016 2:44 PM	11	22329042.19	1.063376924	2932743.633	0.667674988	16332152.13	0.966294295	9730177.117
CCV	12/12/2016 2:50 PM	1	23382135.06	0.683231313	3085207.587	0.385760647	16986193.77	0.945520704	9999569.6
CCB	12/12/2016 2:56 PM	1	23311335.27	0.272608254	3093583.7	0.297634234	16848537.66	1.101783601	9812937.11
S1611422-008Amsd	12/12/2016 3:02 PM	11	21409095.95	0.152573152	2852115.373	0.322746924	15631891.05	0.914281669	9393062.123
S1611422-013A	12/12/2016 3:19 PM	11	21447854.08	0.307043351	2856547.523	0.699011504	15528407.72	0.343514028	9373705.183
S1611422-014A	12/12/2016 3:25 PM	11	20897967.68	0.539477666	2794336.693	0.588286185	15330894.95	0.89612476	9180705.467
S1611422-015A	12/12/2016 3:30 PM	11	20960111.83	0.79188515	2789873.503	0.337987211	15188829.95	0.717758092	9146547.97
S1611422-019A	12/12/2016 3:36 PM	11	20488359.27	1.025486621	2753676.627	0.87665376	14965945.52	0.766415246	9063471.027
S1611422-020A	12/12/2016 3:42 PM	11	20868613.99	0.178816264	2781640.793	0.085549385	15009182.74	1.201057516	9061147.977
S1611422-021A	12/12/2016 3:48 PM	11	20533661.83	0.374223299	2739786.557	0.368500615	14915891.63	0.946675182	9082126.303
S1611422-026A	12/12/2016 3:53 PM	11	20524481.69	1.133049973	2729215.447	0.137250404	14850352.19	0.088228681	9024693.257

Sample			115 In (ISTD) [NoGas]		115 In (ISTD) [He]		115 In (ISTD) [H2]		185 Re (ISTI
CCV	12/12/2016 3:59 PM	1	21147464.95	0.933371704	2845965.233	0.399444492	15303276.61	0.959454906	9139031.58
CCB	12/12/2016 4:05 PM	1	21301736.77	0.590147194	2882779.4	0.590494526	15440066.61	0.96592299	9225515.747
S1611422-027A	12/12/2016 4:11 PM	11	20025084.02	1.012655984	2678232.533	1.608095282	14356597.21	0.774170776	8856764.37
S1611422-028A	12/12/2016 4:16 PM	11	19791383.6	0.242212535	2669632.187	0.51715671	14355658.32	0.731853522	8738726.317
S1611422-028Ad	12/12/2016 4:22 PM	11	19730516.36	0.512443703	2672830.727	0.719617248	14222385.54	0.742153553	8767716.04
S1611422-031A	12/12/2016 4:28 PM	11	19822078.62	0.64417849	2659981.493	1.179003328	14242786.66	0.831483304	8724439.93
S1611422-031As	12/12/2016 4:40 PM	11	19575278.01	0.930839434	2626776.977	0.540946887	13939630	1.002475151	8697192.71
S1611422-031Amsd	12/12/2016 4:45 PM	11	19288737.04	0.822318243	2590640.873	0.358186418	13985516.66	1.080848681	8585200.493
CCV	12/12/2016 5:08 PM	1	19486741.08	0.200104926	2667045.797	0.279390762	14179416.1	0.544614594	8613777.713
CCB	12/12/2016 5:14 PM	1	19878959.25	0.369609564	2731131.003	0.260215955	14481992.2	1.257923611	8682805.487
S1611422-032A	12/12/2016 5:20 PM	11	19282198.89	1.166568242	2611400.797	0.259550023	13576477.24	1.137097316	8597565.213
S1611422-034A	12/12/2016 5:25 PM	11	18619531.32	1.208954194	2540138.23	0.608287454	13469271.69	0.579434976	8386666.333
S1611422-037A	12/12/2016 5:31 PM	11	18682728.83	0.318165565	2550110.593	0.783604781	13460250.3	1.383529135	8344428.28
S1611422-043A	12/12/2016 5:37 PM	11	18890290.91	1.134257666	2561074.067	0.507495236	13484198.35	1.369378162	8421754.39
blk	12/12/2016 5:43 PM	1	19565566.45	0.420493335	2725503.71	0.595057984	14335413.87	0.211457458	8593688.827
MB-12631	12/12/2016 5:48 PM	2	19347866.98	0.438323876	2698175.797	0.181667583	13965162.5	0.778788188	8512341.603
LLQC-12631	12/12/2016 5:54 PM	2	19381759.01	0.246311998	2708898.78	1.179234949	13969555	1.676306684	8606313.27
LCS-12631	12/12/2016 6:00 PM	2	17836466.64	0.617021526	2463817.263	0.440700674	12930846.71	0.608069549	8166459.677
UTS-4	12/12/2016 6:05 PM	11	18341911.17	0.255475079	2596060.453	1.000133933	13602793.35	1.062364159	8245733.563
S1611422-044A	12/12/2016 6:11 PM	11	18829019.82	0.83268495	2567645.87	0.237882794	13371596.41	0.989048268	8400783.277
CCV	12/12/2016 6:17 PM	1	18969815.7	0.816075589	2647084.41	0.799200866	13668941.96	0.820574225	8482692.997
CCB	12/12/2016 6:23 PM	1	19274427.87	0.090699876	2707968.157	0.434836541	13944533.34	0.635240227	8515034.107
S1611422-044Ad	12/12/2016 6:28 PM	11	18629301.11	0.707862676	2533412.12	0.492028779	13075249.76	0.489921084	8331611.057
S1611422-045A	12/12/2016 6:34 PM	11	18259213.91	0.682864715	2506503.51	0.580408055	13081119.48	0.443424639	8236853.007
S1611422-045Ax5	12/12/2016 6:40 PM	55	18551654.54	0.185458667	2571046.08	0.282643714	13382149.75	0.790332889	8353930.22
S1611422-045As	12/12/2016 6:46 PM	11	17902557.98	1.648756197	2465540.457	0.341894998	12674018.39	0.935877757	8227292.73
S1611422-045Amsd	12/12/2016 6:51 PM	11	17699953.95	0.932898939	2453950.457	0.325560992	12672041.16	0.636592669	8121486.343
S1611422-046A	12/12/2016 7:09 PM	11	18317038.64	1.502661749	2516124.69	0.226031065	12985849.76	0.778261304	8182483.563
S1611422-047A	12/12/2016 7:14 PM	11	18002539.54	1.157586698	2480172.75	0.458087917	12852328.66	0.309679065	8144839.953
S1611422-049A	12/12/2016 7:20 PM	11	17871488.02	1.332070995	2492359.14	0.716889537	12781082.55	0.560803777	8127613.287
CCV	12/12/2016 7:26 PM	1	18531894.25	0.282995604	2616193.16	0.477761455	13464225.85	0.735085864	8314281.893
CCB	12/12/2016 7:31 PM	1	18659037.14	0.289864972	2646874.62	0.357870066	13661966.4	0.492932762	8312810.78
S1611422-050A	12/12/2016 7:37 PM	11	18042119.74	1.212579303	2481119.903	1.057741411	12731738.38	0.47657417	8165139.4
S1611422-051A	12/12/2016 7:43 PM	11	17667675.27	0.911426933	2458182.333	0.250057653	12735618.38	0.120470087	8013397.737
S1611422-060A	12/12/2016 7:49 PM	11	17882490.38	1.024153035	2494708.793	0.760882249	12789008.1	1.163397836	8175721.063
S1611422-067A	12/12/2016 7:54 PM	11	17995949.42	1.423723338	2506528.233	0.7271268	12793348.38	0.062338876	8087089.403
S1611422-071A	12/12/2016 8:00 PM	11	17977069.08	0.768542686	2490509.9	1.157114826	12860580.6	0.348937623	8053314.123
S1611422-074A	12/12/2016 8:06 PM	11	18015106.64	0.915559837	2506684.207	0.648031402	12848333.1	0.461882607	8146642.733

Sample			115 In (ISTD) [NoGas]		115 In (ISTD) [He]		115 In (ISTD) [H2]		185 Re (ISTI
S1611422-074Ad	12/12/2016 8:12 PM	11	17894092.8	1.245721443	2503549.067	0.487619305	12696048.39	0.746308565	8092958.293
S1611422-078A	12/12/2016 8:17 PM	11	17606245.82	0.912626816	2459995.873	0.946370764	12546085.61	0.76855373	7992947.737
S1611422-078As	12/12/2016 8:29 PM	11	17550644.83	0.650458202	2463507.68	0.866847133	12556492.56	0.281209504	7989657.183
CCV	12/12/2016 8:35 PM	1	17853785.23	0.658527194	2540549.83	0.146161353	12887978.38	0.596420184	8052725.793
CCB	12/12/2016 8:40 PM	1	18005416.4	1.273194229	2572444.69	0.482644286	13080086.42	0.500853694	8096183.567
S1611422-078Amsd	12/12/2016 8:46 PM	11	17466607.28	1.00847094	2431982.683	0.619943734	12364948.4	0.245755219	7958828.017
S1611422-079A	12/12/2016 9:03 PM	11	17341281.74	0.607067086	2455403.863	0.601753314	12500340.06	0.458769523	7929673.85
S1611422-081A	12/12/2016 9:09 PM	11	17429857.51	0.426396029	2455415.11	1.295414637	12550741.72	0.092131173	7919724.13
CCV	12/12/2016 9:15 PM	1	17887742.77	0.94258051	2549734.203	0.768434926	12918538.65	0.319245938	8001423.57
LLCCV-1ppb	12/12/2016 9:21 PM	1	18127065.73	0.204645037	2593528.023	0.707759701	13095610.31	0.738848252	8056476.07
CCB	12/12/2016 9:26 PM	1	18172801.33	0.758735125	2595693.717	1.039907373	13098512.26	0.325257026	8099272.46
CCV	12/12/2016 9:43 PM	1	17135018.09	1.05803983	2439242.127	0.323963861	12293319.23	0.995872584	7783315.523
CCB	12/12/2016 9:49 PM	1	17340120.32	0.759437368	2507641.983	0.382343163	12603440.61	0.952415282	7823146.913

Sample			D) [NoGas]	232 Th (ISTD) [NoGas]	
Sample Name	Acq. Date-Time	Dilution	CPS RSD	CPS	CPS RSD
Calibration Blank	12/12/2016 11:42 AM	1	0.277099302	21385110.26	0.832695405
1ppb Standard	12/12/2016 11:47 AM	1	1.231777775	21109775.83	0.14065795
10ppb Standard	12/12/2016 11:53 AM	1	0.816113232	21053043.61	0.57048063
20ppb Standard	12/12/2016 11:59 AM	1	1.028069403	20874061.95	0.600050586
100ppb Standard	12/12/2016 12:04 PM	1	1.074436612	20733860.84	0.753791126
200ppb Standard	12/12/2016 12:10 PM	1	1.318038656	20072761.43	1.002351447
Calibration Blank	12/12/2016 12:16 PM	1	0.560668266	19894235.32	0.705995847
ICV	12/12/2016 12:21 PM	1	0.336540112	19852295.32	1.039134273
ICB	12/12/2016 12:27 PM	1	0.613931932	19934194.76	0.274101812
QCS	12/12/2016 12:33 PM	1	1.473649152	19732460.33	0.947824199
QCS-ICV	12/12/2016 12:39 PM	1	0.172577627	19484253.67	0.207233733
LLICV-1ppb	12/12/2016 1:19 PM	1	0.701578095	19061392.02	0.296178435
CCB	12/12/2016 1:24 PM	1	0.554647066	19010760.36	0.158597016
ics	12/12/2016 1:30 PM	1	2.547355587	19876899.21	2.090950052
icsab	12/12/2016 1:36 PM	1	1.247998738	22501880.22	1.095733282
CCV	12/12/2016 1:41 PM	1	0.932253486	23768490.17	0.556807059
CCB	12/12/2016 1:47 PM	1	0.821043819	23139574.63	1.164318383
Rgt H2O check	12/12/2016 1:53 PM	1	1.076380296	23224679.63	0.783731486
MB-12629	12/12/2016 1:59 PM	2	0.425736076	22786087.43	0.928462867
LLQC-12629	12/12/2016 2:04 PM	2	1.362364102	22643251.32	0.890602075
LCS-12629	12/12/2016 2:10 PM	2	1.459143471	21735600.81	1.514218789
UTS-4	12/12/2016 2:16 PM	11	0.518417586	22091464.12	0.809960825
S1611422-003A	12/12/2016 2:21 PM	11	0.863756552	24466904.03	0.378172242
S1611422-003Ad	12/12/2016 2:27 PM	11	0.848998977	24335399.03	0.810032712
S1611422-008A	12/12/2016 2:33 PM	11	0.266436125	23490809.07	0.742048307
S1611422-008Ax5	12/12/2016 2:39 PM	55	0.49012441	21996068.02	0.839623297
S1611422-008As	12/12/2016 2:44 PM	11	0.581524208	23540934.62	0.165109262
CCV	12/12/2016 2:50 PM	1	0.714437223	21178106.94	0.805104618
CCB	12/12/2016 2:56 PM	1	0.316073961	20846769.17	0.30371805
S1611422-008Amsd	12/12/2016 3:02 PM	11	0.784156056	22594430.21	0.721915348
S1611422-013A	12/12/2016 3:19 PM	11	0.337060981	22267641.89	0.517493904
S1611422-014A	12/12/2016 3:25 PM	11	0.187809798	21516545.81	0.983301026
S1611422-015A	12/12/2016 3:30 PM	11	0.326682785	21084190.83	0.514255188
S1611422-019A	12/12/2016 3:36 PM	11	0.208576747	20711730.29	0.979662716
S1611422-020A	12/12/2016 3:42 PM	11	0.947023657	21665916.91	0.681722035
S1611422-021A	12/12/2016 3:48 PM	11	0.346451134	21813849.69	0.498563942
S1611422-026A	12/12/2016 3:53 PM	11	0.604568957	21086755.28	1.098882191

Sample			D) [NoGas]	232 Th (ISTD) [NoGas]	
CCV	12/12/2016 3:59 PM	1	0.664052085	19521738.67	0.723296396
CCB	12/12/2016 4:05 PM	1	0.561083004	19472634.22	0.325230782
S1611422-027A	12/12/2016 4:11 PM	11	1.252891118	20528946.96	1.047002315
S1611422-028A	12/12/2016 4:16 PM	11	0.616065459	20874839.17	0.649348513
S1611422-028Ad	12/12/2016 4:22 PM	11	0.615169887	20783545.29	0.824225471
S1611422-031A	12/12/2016 4:28 PM	11	0.320644969	20867139.73	0.648316105
S1611422-031As	12/12/2016 4:40 PM	11	0.729197909	20974621.94	0.493435543
S1611422-031Amsd	12/12/2016 4:45 PM	11	1.544238497	20770150.28	0.604275651
CCV	12/12/2016 5:08 PM	1	0.570142183	18376784.27	0.312408268
CCB	12/12/2016 5:14 PM	1	0.651934318	18491058.71	0.36159428
S1611422-032A	12/12/2016 5:20 PM	11	1.554421188	19706947.55	1.009521579
S1611422-034A	12/12/2016 5:25 PM	11	0.800536685	19699109.77	0.636704806
S1611422-037A	12/12/2016 5:31 PM	11	0.967235256	19647250.88	0.765475298
S1611422-043A	12/12/2016 5:37 PM	11	0.541992926	19654738.67	0.818660141
blk	12/12/2016 5:43 PM	1	0.764038209	18279851.5	0.239185054
MB-12631	12/12/2016 5:48 PM	2	0.510076513	17948983.17	0.324030025
LLQC-12631	12/12/2016 5:54 PM	2	0.815603513	18104553.17	0.834692915
LCS-12631	12/12/2016 6:00 PM	2	0.527252611	17663855.41	0.716524059
UTS-4	12/12/2016 6:05 PM	11	0.921197896	17997567.62	0.918596885
S1611422-044A	12/12/2016 6:11 PM	11	1.145965981	19698330.88	0.12205932
CCV	12/12/2016 6:17 PM	1	0.542299642	18090398.72	0.505307439
CCB	12/12/2016 6:23 PM	1	0.648386633	18076499.28	0.55469656
S1611422-044Ad	12/12/2016 6:28 PM	11	0.767837436	19567083.67	0.480060458
S1611422-045A	12/12/2016 6:34 PM	11	0.505560854	19053276.47	0.973293871
S1611422-045Ax5	12/12/2016 6:40 PM	55	0.83704758	18040507.62	0.552538994
S1611422-045As	12/12/2016 6:46 PM	11	1.404130282	19442328.12	0.795124789
S1611422-045Amsd	12/12/2016 6:51 PM	11	0.837675776	19246812.57	0.721933269
S1611422-046A	12/12/2016 7:09 PM	11	0.72207001	19315425.9	0.487590846
S1611422-047A	12/12/2016 7:14 PM	11	0.750843592	18994228.69	0.775632712
S1611422-049A	12/12/2016 7:20 PM	11	1.539229208	18740057.03	0.935773396
CCV	12/12/2016 7:26 PM	1	0.26073459	17846518.74	0.533867951
CCB	12/12/2016 7:31 PM	1	0.695660154	17777523.18	0.366200515
S1611422-050A	12/12/2016 7:37 PM	11	1.284777951	18703453.15	1.378576981
S1611422-051A	12/12/2016 7:43 PM	11	1.98918305	19187285.9	0.558980525
S1611422-060A	12/12/2016 7:49 PM	11	1.377105517	19012565.91	0.585858552
S1611422-067A	12/12/2016 7:54 PM	11	1.243616981	19788173.66	1.076065103
S1611422-071A	12/12/2016 8:00 PM	11	1.328663975	18899948.7	0.712565604
S1611422-074A	12/12/2016 8:06 PM	11	0.756274054	19756972.55	1.260782075

Sample			D) [NoGas]	232 Th (ISTD) [NoGas]	
S1611422-074Ad	12/12/2016 8:12 PM	11	0.649649148	19576151.44	0.624100969
S1611422-078A	12/12/2016 8:17 PM	11	0.755374463	18421484.27	1.066167272
S1611422-078As	12/12/2016 8:29 PM	11	0.465204358	18377160.94	0.804355788
CCV	12/12/2016 8:35 PM	1	0.619589756	17382317.09	0.515558537
CCB	12/12/2016 8:40 PM	1	0.684230854	17503007.64	1.499074398
S1611422-078Amsd	12/12/2016 8:46 PM	11	0.78081747	18296696.49	1.092454738
S1611422-079A	12/12/2016 9:03 PM	11	0.756671281	18194913.17	1.089053759
S1611422-081A	12/12/2016 9:09 PM	11	0.643322924	18558963.15	0.473939078
CCV	12/12/2016 9:15 PM	1	0.635005143	17161861.54	0.2628978
LLCCV-1ppb	12/12/2016 9:21 PM	1	0.972481403	17297280.98	0.452156904
CCB	12/12/2016 9:26 PM	1	0.624833697	17283130.98	1.335249835
CCV	12/12/2016 9:43 PM	1	1.580505497	16849991	1.035002065
CCB	12/12/2016 9:49 PM	1	0.694919552	16964919.32	0.441121166

Sample			238 U [NoGas]	6 Li (ISTD) [NoGas]	45 Sc (ISTD) [NoGas]	45 Sc (ISTD) [He]
Sample Name	Acq. Date-Time	Dilution	Conc. [ppb]	QC Measured Value	QC Measured Value	QC Measured Value
Calibration Blank	12/12/2016 11:42 AM	1	0	100	100	100
1ppb Standard	12/12/2016 11:47 AM	1	1.001267056	98.40735322	98.52560119	99.26331441
10ppb Standard	12/12/2016 11:53 AM	1	10.01743546	97.03918065	96.76777104	96.57868041
20ppb Standard	12/12/2016 11:59 AM	1	20.26818671	93.44439287	94.62960305	95.0792686
100ppb Standard	12/12/2016 12:04 PM	1	99.41004085	90.17494967	89.68830814	89.88882504
200ppb Standard	12/12/2016 12:10 PM	1	200.2672828	86.51010835	86.59206676	87.42774749
Calibration Blank	12/12/2016 12:16 PM	1	0.005216742	88.37833788	87.26169591	88.62984151
ICV	12/12/2016 12:21 PM	1	20.36720916	87.33262025	86.64434421	88.74070207
ICB	12/12/2016 12:27 PM	1	0.001402883	89.81674106	88.05759483	89.47207648
QCS	12/12/2016 12:33 PM	1	97.26164924	86.1799549	85.01248741	85.4716493
QCS-ICV	12/12/2016 12:39 PM	1	97.22260877	84.48569657	83.72101922	85.0931024
LLICV-1ppb	12/12/2016 1:19 PM	1	0.991559986	85.8722624	84.41788247	87.3061733
CCB	12/12/2016 1:24 PM	1	-0.000220881	86.28135016	84.63723944	87.06642965
ics	12/12/2016 1:30 PM	1	0.000288663	85.33452471	83.00672249	90.81549811
icsab	12/12/2016 1:36 PM	1	20.16607736	103.6853482	103.4003596	107.7717734
CCV	12/12/2016 1:41 PM	1	19.74719073	110.4433696	111.0718035	107.7263779
CCB	12/12/2016 1:47 PM	1	0.001035574	110.3027162	110.9690698	109.3461982
Rgt H2O check	12/12/2016 1:53 PM	1	-5.43141E-05	111.0014347	111.7661026	109.6745791
MB-12629	12/12/2016 1:59 PM	2	0.004917914	105.1306937	107.7320416	105.5867821
LLQC-12629	12/12/2016 2:04 PM	2	4.668556127	105.4939584	106.8996297	104.4910608
LCS-12629	12/12/2016 2:10 PM	2	478.119838	81.67109008	95.61424826	91.95044803
UTS-4	12/12/2016 2:16 PM	11	930.9182076	98.81624439	98.51545987	97.21101208
S1611422-003A	12/12/2016 2:21 PM	11	29.53288133	100.8032231	100.8303675	98.74090236
S1611422-003Ad	12/12/2016 2:27 PM	11	29.24844278	98.13463116	99.08865214	97.00925241
S1611422-008A	12/12/2016 2:33 PM	11	28.22558882	95.33395327	96.06496124	94.6834663
S1611422-008Ax5	12/12/2016 2:39 PM	55	30.55414425	97.76101332	97.73426662	94.54675733
S1611422-008As	12/12/2016 2:44 PM	11	459.2919646	89.85302541	92.34987625	90.97240464
CCV	12/12/2016 2:50 PM	1	20.16775184	94.80822512	95.84399876	94.16856503
CCB	12/12/2016 2:56 PM	1	0.011069536	95.93181942	95.42752331	94.31337375
S1611422-008Amsd	12/12/2016 3:02 PM	11	463.8065977	87.16870299	88.52009124	87.52429044
S1611422-013A	12/12/2016 3:19 PM	11	377.0969389	88.65702626	91.02084405	89.34045046
S1611422-014A	12/12/2016 3:25 PM	11	27.6630293	88.72838789	87.45295443	86.59178745
S1611422-015A	12/12/2016 3:30 PM	11	24.30314528	88.10107279	86.38964471	85.47455109
S1611422-019A	12/12/2016 3:36 PM	11	26.69318713	86.69236532	84.93971556	85.02151346
S1611422-020A	12/12/2016 3:42 PM	11	39.49594007	87.70490871	86.03546672	84.37712697
S1611422-021A	12/12/2016 3:48 PM	11	45.29963834	86.36064174	84.58528732	83.38486164
S1611422-026A	12/12/2016 3:53 PM	11	59.98010955	85.76631511	84.05819685	83.14366271

Sample			238 U [NoGas]	6 Li (ISTD) [NoGas]	45 Sc (ISTD) [NoGas]	45 Sc (ISTD) [He]
CCV	12/12/2016 3:59 PM	1	20.27046439	86.04036431	85.37862783	85.27074104
CCB	12/12/2016 4:05 PM	1	0.001274883	86.97636116	85.96306837	86.26563518
S1611422-027A	12/12/2016 4:11 PM	11	27.68638608	82.98381588	83.31072905	82.13393835
S1611422-028A	12/12/2016 4:16 PM	11	33.88159796	82.05774835	80.95117696	80.43949647
S1611422-028Ad	12/12/2016 4:22 PM	11	33.71225976	81.60011222	80.55327851	80.51002598
S1611422-031A	12/12/2016 4:28 PM	11	33.63677029	82.12872635	80.84235222	80.86491792
S1611422-031As	12/12/2016 4:40 PM	11	449.5233113	79.58850557	80.40436784	79.02200629
S1611422-031Amsd	12/12/2016 4:45 PM	11	449.0550144	78.61562337	79.26832095	78.24529423
CCV	12/12/2016 5:08 PM	1	20.25562807	79.42281017	78.83245994	79.2348184
CCB	12/12/2016 5:14 PM	1	0.002315206	81.71380294	79.84540381	80.86390414
S1611422-032A	12/12/2016 5:20 PM	11	27.59404858	79.96529762	78.5705279	78.09424044
S1611422-034A	12/12/2016 5:25 PM	11	23.56637881	78.19335679	76.93186593	77.64633492
S1611422-037A	12/12/2016 5:31 PM	11	19.46932017	77.86914178	76.39403927	77.10755838
S1611422-043A	12/12/2016 5:37 PM	11	22.26739917	78.05423474	76.66259745	77.46578747
blk	12/12/2016 5:43 PM	1	-0.000165376	80.97328736	78.92895069	81.09135248
MB-12631	12/12/2016 5:48 PM	2	0.046251008	78.58304664	78.40196605	81.15738711
LLQC-12631	12/12/2016 5:54 PM	2	4.544809231	78.80409715	78.81821051	80.62802428
LCS-12631	12/12/2016 6:00 PM	2	465.177088	60.48836992	70.78621654	72.70086192
UTS-4	12/12/2016 6:05 PM	11	899.6586539	74.48681874	73.58828658	76.47974353
S1611422-044A	12/12/2016 6:11 PM	11	32.28954662	77.1951228	76.42102696	77.45521076
CCV	12/12/2016 6:17 PM	1	20.20435178	75.42528199	76.09613714	78.33378923
CCB	12/12/2016 6:23 PM	1	0.002282322	77.53081622	76.74737985	79.78329303
S1611422-044Ad	12/12/2016 6:28 PM	11	32.05379719	75.82531319	75.20992314	76.00474496
S1611422-045A	12/12/2016 6:34 PM	11	25.95272888	74.33547551	73.38785886	75.5872556
S1611422-045Ax5	12/12/2016 6:40 PM	55	28.34848215	75.12280966	73.93110849	76.46946964
S1611422-045As	12/12/2016 6:46 PM	11	465.3673405	69.3552948	73.03610652	73.75780578
S1611422-045Amsd	12/12/2016 6:51 PM	11	468.2693352	68.57559512	71.81055883	73.10087822
S1611422-046A	12/12/2016 7:09 PM	11	29.38546437	74.36645375	73.53533341	75.67430057
S1611422-047A	12/12/2016 7:14 PM	11	84.14226618	73.09289924	72.7613323	74.24350306
S1611422-049A	12/12/2016 7:20 PM	11	21.54259692	73.04357833	72.66853961	74.54042061
CCV	12/12/2016 7:26 PM	1	20.04910176	72.94340555	73.9266173	76.91264329
CCB	12/12/2016 7:31 PM	1	0.00170493	74.5731894	74.42478734	77.79623888
S1611422-050A	12/12/2016 7:37 PM	11	19.27968097	72.45313497	72.69452818	74.10534319
S1611422-051A	12/12/2016 7:43 PM	11	60.8089133	71.7628119	71.29402159	73.61795013
S1611422-060A	12/12/2016 7:49 PM	11	45.25298118	72.69619072	73.84729055	75.93452353
S1611422-067A	12/12/2016 7:54 PM	11	19.47235605	73.00557562	73.29327976	74.5920323
S1611422-071A	12/12/2016 8:00 PM	11	44.53725626	72.50098678	72.15413346	74.37064209
S1611422-074A	12/12/2016 8:06 PM	11	18.38942231	72.55215202	73.69041009	75.66362819

Sample			238 U [NoGas]	6 Li (ISTD) [NoGas]	45 Sc (ISTD) [NoGas]	45 Sc (ISTD) [He]
S1611422-074Ad	12/12/2016 8:12 PM	11	18.54986225	72.49848543	72.92162013	75.26005531
S1611422-078A	12/12/2016 8:17 PM	11	51.97738297	71.60524974	71.28071545	73.35985743
S1611422-078As	12/12/2016 8:29 PM	11	486.007196	66.91689076	71.15697523	73.51515069
CCV	12/12/2016 8:35 PM	1	19.95698308	69.61439062	71.1272578	73.73599232
CCB	12/12/2016 8:40 PM	1	0.001009688	70.79324987	71.22925619	74.75886426
S1611422-078Amsd	12/12/2016 8:46 PM	11	488.3023015	66.20941368	70.41322285	72.2007382
S1611422-079A	12/12/2016 9:03 PM	11	123.2643791	68.76761412	69.68159463	72.80733029
S1611422-081A	12/12/2016 9:09 PM	11	99.82806097	69.34366803	70.69141987	73.79007044
CCV	12/12/2016 9:15 PM	1	20.00579795	68.73724768	70.72335116	73.9756833
LLCCV-1ppb	12/12/2016 9:21 PM	1	0.970109229	70.53830009	71.43832937	75.18932392
CCB	12/12/2016 9:26 PM	1	0.000349475	71.05654955	72.1076428	75.8872698
CCV	12/12/2016 9:43 PM	1	20.09115606	64.23300904	67.01617825	70.54640177
CCB	12/12/2016 9:49 PM	1	0.001642486	66.57262016	67.85906256	71.5339168

Sa	45 Sc (ISTD) [H2]	72 Ge (ISTD) [NoGas]	72 Ge (ISTD) [He]	72 Ge (ISTD) [H2]	89 Y (ISTD) [NoGas]	89 Y (ISTD) [He]
Sample Name	QC Measured Value	QC Measured Value	QC Measured Value	QC Measured Value	QC Measured Value	QC Measured Value
Calibration Blank	100	100	100	100	100	100
1ppb Standard	98.42953699	97.73416975	98.02592588	98.67274182	98.22970171	98.74215112
10ppb Standard	97.04460973	96.02434972	96.57722689	96.885917	96.62139805	97.75094507
20ppb Standard	94.92199121	94.83872622	94.75802577	94.65364452	95.42310539	95.33980966
100ppb Standard	89.50581	89.85289877	89.60594366	89.47413014	91.78742073	89.91987695
200ppb Standard	88.12892705	86.27079249	86.97935789	88.02942599	87.67038683	88.17675959
Calibration Blank	87.90834304	87.62197099	88.71912321	89.13329016	88.00067704	89.65796116
ICV	87.28249455	86.9259327	87.37792889	88.06772085	87.87036677	88.67924805
ICB	89.34781807	88.0359129	90.17650414	89.92847459	88.52652952	90.2387798
QCS	84.54038298	85.45098908	85.24478699	85.21819097	85.7662054	86.02373399
QCS-ICV	84.23911595	83.90992977	84.19093157	85.29200037	84.12985091	85.5380777
LLICV-1ppb	84.86752214	84.74972494	86.77428755	85.77138683	85.01739559	87.90442223
CCB	85.30341616	85.45061796	88.13626205	86.37266671	84.94139934	88.070976
ics	98.522389	82.62917625	88.21225156	94.07790264	83.59941043	89.41074948
icsab	114.3338933	99.4666545	101.1960941	107.7081734	101.3329926	103.1637515
CCV	110.2107451	110.2465551	106.7684359	108.8509937	111.2036062	106.0425783
CCB	112.3439383	110.3860826	107.5692091	111.1511858	110.7917889	106.9975208
Rgt H2O check	111.8546399	111.9708349	109.5062975	111.8478636	111.7618571	107.4591867
MB-12629	107.6464247	103.7683952	100.9777809	103.47586	107.9477231	104.3342723
LLQC-12629	106.5971394	104.1199001	100.7163104	103.7896562	107.654522	103.4797899
LCS-12629	93.99741212	91.87758774	86.83847621	89.31009155	97.76315267	91.40239643
UTS-4	101.5581779	99.35922216	97.29290631	101.3066236	101.4580287	98.15891055
S1611422-003A	102.3513492	100.0582022	98.69306488	100.3986837	107.0422254	103.6133297
S1611422-003Ad	99.39052452	99.3319245	96.25304346	97.29817439	106.3958921	101.2016892
S1611422-008A	96.72957762	94.35762974	92.72287689	94.4159122	102.7958077	99.78024789
S1611422-008Ax5	96.70637332	97.86112565	94.8541332	96.95913882	99.87900575	95.63479067
S1611422-008As	94.10929151	91.35911038	90.13117259	92.48865274	99.35262587	96.38621694
CCV	95.87118121	95.5531821	94.54125705	95.58821788	96.57662642	94.29856902
CCB	95.40968391	95.2615855	94.25329962	95.11206604	95.45341754	94.04644748
S1611422-008Amsd	90.1991104	87.62986202	87.95537195	88.61649107	94.66927585	93.72904535
S1611422-013A	90.36817438	88.81209065	88.21636762	88.05171732	98.51996699	97.32073253
S1611422-014A	88.48104262	86.55647563	86.07935958	86.59365878	94.78474861	93.1301136
S1611422-015A	87.18418875	85.49845068	84.59284389	85.65545023	91.25607944	90.25928088
S1611422-019A	86.36584168	84.24543839	84.4233148	84.58884745	89.01507815	88.51366148
S1611422-020A	86.09148964	85.73161339	85.1340797	85.36726753	92.84450716	91.36675193
S1611422-021A	85.0454701	84.59865224	83.8574889	84.60116816	92.88160332	91.65529688
S1611422-026A	84.84031115	84.35433525	83.65876257	83.75198803	89.70917019	88.95315461

Sa	45 Sc (ISTD) [H2]	72 Ge (ISTD) [NoGas]	72 Ge (ISTD) [He]	72 Ge (ISTD) [H2]	89 Y (ISTD) [NoGas]	89 Y (ISTD) [He]
CCV	85.67380465	85.5294897	84.86965149	86.22159454	86.16721073	86.28641719
CCB	86.33853588	86.49832331	86.48063962	87.73409889	86.87916243	87.25311378
S1611422-027A	83.07374925	83.04719585	81.42801377	80.83628683	88.37070047	87.5561714
S1611422-028A	81.86189261	80.88398064	80.59725984	80.80574593	87.17035886	87.31674246
S1611422-028Ad	81.17657653	80.81322926	80.795019	79.8821887	86.54829346	86.51897035
S1611422-031A	80.7826259	81.05352092	80.84985596	80.13851176	86.04730632	85.23963319
S1611422-031As	79.01705647	80.57489042	79.08482328	77.70269301	85.03606502	84.03675151
S1611422-031Amsd	79.40996044	79.22482541	78.32674503	77.30054963	83.74421053	83.22860631
CCV	78.75194441	79.17778994	79.05114888	79.29995941	79.45031412	80.43080541
CCB	80.65028558	80.9677046	81.87341454	82.32729488	80.62695958	82.35945415
S1611422-032A	76.94113489	79.4668707	77.87016194	75.64850491	82.59245142	82.38325029
S1611422-034A	77.44845074	77.65465001	77.06007324	75.39654555	82.42549306	83.11228679
S1611422-037A	76.83530905	77.02976914	77.17451547	75.53882666	81.08086706	81.60294972
S1611422-043A	76.82032898	76.94811768	77.98276856	75.40627123	81.25806563	82.61402062
blk	80.41268046	79.85868342	81.14279538	81.01606988	79.21817144	81.74459171
MB-12631	79.42401187	77.03901542	77.93968122	77.73632131	79.30813475	82.58326326
LLQC-12631	79.419034	77.5041701	78.28976929	77.1198704	79.19110777	81.29714467
LCS-12631	71.60048268	69.57597293	70.25921879	69.75750008	72.29755168	74.43397109
UTS-4	76.23896602	75.05666406	77.4591853	76.68637904	75.71701402	79.10222393
S1611422-044A	75.14496296	77.32816087	76.8135025	74.98712641	81.05142072	82.24518025
CCV	76.6121868	76.87434722	78.49065235	76.98835666	76.66087035	79.44988715
CCB	77.63855797	77.80356556	80.01886961	78.84471266	77.83508645	80.67664193
S1611422-044Ad	73.72197318	76.18548534	76.05494692	73.58706075	80.21864982	81.01180947
S1611422-045A	73.01272155	74.82176756	75.42957697	73.25915698	78.83168158	80.28011385
S1611422-045Ax5	74.55596391	75.34651958	77.01114545	75.66048701	75.88305059	78.71828013
S1611422-045As	71.60414884	73.00799769	73.4540646	70.99799276	79.49664697	80.98290642
S1611422-045Amsd	71.32547873	72.18907857	72.48871053	70.91399171	77.95928016	80.17988785
S1611422-046A	73.15986395	74.51329273	75.83924157	72.96875151	79.64003987	81.64082224
S1611422-047A	72.75900078	73.28314936	74.99692671	72.74599691	78.64652519	81.00793803
S1611422-049A	72.44018448	73.57010298	74.67952464	72.66459492	77.4011809	79.90679732
CCV	74.7164477	74.85476215	77.05023545	75.48284317	75.20888116	77.86250815
CCB	75.49716374	75.78270762	78.29822131	76.85487904	75.56284187	79.35123295
S1611422-050A	71.68495375	73.54087725	74.12107865	71.84027764	76.54523191	78.70623225
S1611422-051A	71.53931848	72.13171071	73.96691164	71.40140269	76.52096864	79.13585992
S1611422-060A	74.08150828	73.48665545	74.70899302	73.12489083	79.04630067	81.78421898
S1611422-067A	72.54426718	73.89093524	75.00493264	72.84356362	77.49284779	79.36210835
S1611422-071A	72.00153162	73.46879071	73.46724996	72.58806102	77.57411582	79.53579137
S1611422-074A	73.36855171	74.19741492	74.60487091	72.97520069	79.16880481	81.89672675

Sa	45 Sc (ISTD) [H2]	72 Ge (ISTD) [NoGas]	72 Ge (ISTD) [He]	72 Ge (ISTD) [H2]	89 Y (ISTD) [NoGas]	89 Y (ISTD) [He]
S1611422-074Ad	72.63530064	73.99628264	75.04231698	72.46683051	78.9055962	81.28173888
S1611422-078A	70.64606529	72.04221054	73.14968795	71.31712305	75.05480702	77.37757929
S1611422-078As	70.92623483	72.01267096	72.81077721	71.19023209	74.3310726	77.35797408
CCV	71.61493073	72.27282011	73.9194421	72.18191016	71.55373828	75.79526722
CCB	72.02980669	72.98690977	75.31798873	73.98887755	72.49717924	76.51862632
S1611422-078Amsd	69.95727848	71.03646689	72.60029752	70.08322487	74.17860637	76.78643616
S1611422-079A	70.54109073	70.80278837	73.47647172	71.29011124	74.57087908	78.62154885
S1611422-081A	71.54560999	71.93758781	74.20654232	71.66524471	79.14411681	82.61809186
CCV	71.47420367	72.55663998	74.70675881	73.42045694	72.08935955	75.83288859
LLCCV-1ppb	73.07087358	73.41387149	76.79254362	74.1618749	72.35747355	77.37227299
CCB	73.10822983	74.69807728	76.51408661	74.72135244	73.1864989	77.64479002
CCV	67.39706153	69.13236206	70.7690119	69.17631859	68.26338438	72.60404228
CCB	68.86823397	70.55006719	72.85420693	71.16542908	69.17150043	73.96929531

Sa	103 Rh (ISTD) [NoGas]	103 Rh (ISTD) [He]	103 Rh (ISTD) [H2]	115 In (ISTD) [NoGas]	115 In (ISTD) [He]
Sample Name	QC Measured Value	QC Measured Value	QC Measured Value	QC Measured Value	QC Measured Value
Calibration Blank	100	100	100	100	100
1ppb Standard	98.0916039	98.78214621	99.25418268	97.99310983	98.62323227
10ppb Standard	96.95903498	97.60652102	97.88667501	96.61948472	97.78598326
20ppb Standard	95.01628943	95.36134974	95.56882292	94.22431191	95.12510684
100ppb Standard	90.42530187	89.91395374	90.37014932	90.65872353	91.11891845
200ppb Standard	87.39189646	87.53359616	88.14390921	88.21773197	89.23740537
Calibration Blank	88.31118407	88.64165367	89.3009337	87.8481777	89.51599337
ICV	88.14787872	88.69655632	89.3899533	87.98364171	89.83891719
ICB	89.45759522	90.15772026	91.04540841	88.72117151	90.29213373
QCS	86.0437771	85.88010031	87.24437618	85.80201383	87.05062332
QCS-ICV	84.4551168	85.49448471	86.07327881	84.82579551	86.19034591
LLICV-1ppb	85.52995766	87.29932688	88.92098282	85.04916756	88.14882398
CCB	85.88794141	87.42952583	89.4428005	84.55587854	88.64588356
ics	79.30369505	84.71786074	87.53860405	83.212923	87.85408058
icsab	94.8563753	97.6539172	97.65077465	99.12345591	99.79929106
CCV	110.0735083	106.2761332	105.1302127	109.5861237	105.710815
CCB	109.8513378	108.236078	106.4582187	109.3785203	105.4612858
Rgt H2O check	110.7345067	108.6066385	107.12458	109.7955641	105.8359936
MB-12629	106.2113483	104.1731623	102.5607409	105.8342394	102.1699252
LLQC-12629	105.9898326	103.3254066	101.3866962	106.0297004	101.694152
LCS-12629	94.44765337	91.27060596	88.3728806	95.85784472	90.6638315
UTS-4	96.98512503	96.38871227	95.30646342	98.70408005	95.45457093
S1611422-003A	98.32615463	96.54643313	95.36297954	98.695731	95.91825581
S1611422-003Ad	97.49642541	95.21911335	92.46356431	98.53104576	94.15473856
S1611422-008A	92.99769527	91.79987224	90.00054879	93.71543538	91.99870455
S1611422-008Ax5	96.77668689	94.73311763	93.63818852	97.14139742	93.47470739
S1611422-008As	89.53438348	88.88803847	88.59591512	90.89785075	88.95301221
CCV	96.29317091	94.46995426	93.96863479	95.18481829	93.57739457
CCB	95.56970629	94.52609097	94.41554029	94.896604	93.83145036
S1611422-008Amsd	86.32265344	85.76418775	85.77417518	87.15290125	86.50747742
S1611422-013A	86.53533998	85.67492328	85.1124747	87.31067921	86.64190891
S1611422-014A	84.27863645	83.89967777	83.98051629	85.0721823	84.75499297
S1611422-015A	84.24241024	83.36369165	83.49563277	85.32516088	84.61962
S1611422-019A	82.54530371	82.70144599	82.77342696	83.40473397	83.52173297
S1611422-020A	84.01766577	83.63702186	83.20813244	84.95268825	84.36991377
S1611422-021A	82.97868374	82.31174383	82.96549685	83.58915319	83.10043342
S1611422-026A	82.09114907	81.96188624	82.00451626	83.55178239	82.77980121

Sa	103 Rh (ISTD) [NoGas]	103 Rh (ISTD) [He]	103 Rh (ISTD) [H2]	115 In (ISTD) [NoGas]	115 In (ISTD) [He]
CCV	86.4964323	86.18998125	86.70765857	86.08784456	86.3209376
CCB	87.15464428	87.15736368	88.49870393	86.7158597	87.43754765
S1611422-027A	80.24070839	79.57562854	79.66857509	81.51881675	81.23343907
S1611422-028A	79.60998846	79.33194608	80.35140789	80.56746085	80.97258206
S1611422-028Ad	79.92378152	79.44504225	80.2361959	80.31968035	81.06959694
S1611422-031A	79.78456201	79.75940905	79.51956628	80.69241523	80.679867
S1611422-031As	79.31584791	78.41152136	78.56273429	79.68773061	79.6727412
S1611422-031Amsd	78.10710048	77.4917963	78.65425601	78.52126957	78.57669748
CCV	79.55189309	80.76300291	81.74188616	79.32731139	80.8941343
CCB	81.39721819	82.74688744	84.06490567	80.92396691	82.83790194
S1611422-032A	78.2024117	77.75305899	77.95221929	78.49465382	79.20636646
S1611422-034A	75.09738107	75.16615368	76.43313349	75.79704335	77.0449024
S1611422-037A	75.48873961	75.62276443	76.53409222	76.05431001	77.34737404
S1611422-043A	75.85478027	76.21481516	77.50188868	76.89926105	77.67990701
blk	80.52886371	81.87534515	83.60214465	79.64819647	82.66722057
MB-12631	79.01310813	80.75359273	82.77365727	78.76197779	81.83833795
LLQC-12631	79.44052545	80.34573982	82.59293938	78.89994666	82.16357663
LCS-12631	71.57615135	72.48573826	74.52082217	72.60931611	74.73001207
UTS-4	74.17315036	76.34093061	79.01135331	74.66689748	78.74107869
S1611422-044A	75.98017506	75.58698685	77.94536515	76.64983651	77.8792363
CCV	77.50652659	78.96028359	80.95250311	77.22299336	80.28868571
CCB	79.06097991	80.75331947	83.05844629	78.4630193	82.13534991
S1611422-044Ad	75.3171549	74.60991799	76.49990395	75.83681457	76.84089284
S1611422-045A	73.92042655	74.15767304	75.97899005	74.33025056	76.02472811
S1611422-045Ax5	75.8216604	76.5636579	79.23259938	75.52072819	77.98236803
S1611422-045As	72.40010271	72.16273895	74.19395266	72.87836305	74.78227823
S1611422-045Amsd	71.10575539	71.45429818	74.25784866	72.05359545	74.43074208
S1611422-046A	73.53259416	74.25038002	76.47452323	74.56564552	76.31654801
S1611422-047A	72.71710206	73.16697085	76.01963913	73.28537153	75.22609014
S1611422-049A	72.94127172	73.00640356	75.76973878	72.75188239	75.59571539
CCV	76.04581256	77.65723686	80.41009036	75.44028728	79.35172358
CCB	76.56647439	78.58033989	81.65992794	75.95786506	80.28232258
S1611422-050A	72.67408844	72.73121925	75.05279637	73.44649597	75.25481824
S1611422-051A	71.5940995	71.92876991	74.96623865	71.92219427	74.55909908
S1611422-060A	72.35047662	72.86662324	76.16276468	72.79667118	75.6669827
S1611422-067A	72.66062855	72.57185144	75.86495627	73.25854421	76.02547799
S1611422-071A	72.71815666	72.37994296	76.48984915	73.18168546	75.53962612
S1611422-074A	72.77754155	73.35598937	76.75101322	73.33653011	76.03020882

Sa	103 Rh (ISTD) [NoGas]	103 Rh (ISTD) [He]	103 Rh (ISTD) [H2]	115 In (ISTD) [NoGas]	115 In (ISTD) [He]
S1611422-074Ad	72.34959693	73.40079728	76.25460306	72.84390271	75.93511692
S1611422-078A	71.34039856	71.72449064	74.81572742	71.67212509	74.61410554
S1611422-078As	71.0300142	71.28788777	74.63873781	71.44578263	74.7206221
CCV	72.79767389	74.73087798	78.39076441	72.67981722	77.05738664
CCB	73.77252533	75.52490649	79.78844796	73.29708275	78.02478926
S1611422-078Amsd	70.54232233	71.29065918	74.43801967	71.10367961	73.7644378
S1611422-079A	70.31489889	71.75863477	76.21413442	70.59349998	74.47482534
S1611422-081A	70.57340302	72.08140287	75.81842016	70.95407735	74.47516646
CCV	73.29896558	75.18780548	79.33023274	72.81805277	77.33595776
LLCCV-1ppb	74.25240019	76.72611384	80.94351711	73.7922971	78.66426759
CCB	74.68655744	76.53136786	81.12676987	73.97847921	78.72995521
CCV	69.67806879	71.46245627	75.07233992	69.75383468	73.98462389
CCB	70.64639023	73.28591158	77.25980566	70.58877205	76.05925913

Sa	115 In (ISTD) [H2]	185 Re (ISTD) [NoGas]	232 Th (ISTD) [NoGas]
Sample Name	QC Measured Value	QC Measured Value	QC Measured Value
Calibration Blank	100	100	100
1ppb Standard	97.91612387	98.18070074	98.71249466
10ppb Standard	97.03726769	96.64077243	98.44720626
20ppb Standard	95.10305891	95.78147479	97.61026103
100ppb Standard	90.9096548	92.59812806	96.95465952
200ppb Standard	89.95997967	91.32873957	93.86325897
Calibration Blank	89.13980387	90.50650488	93.02844397
ICV	88.82001235	90.35874717	92.83232623
ICB	90.01211841	90.13963066	93.21530036
QCS	86.57710839	88.83485742	92.27195973
QCS-ICV	85.40584837	87.80958822	91.11130796
LLICV-1ppb	85.2056683	87.3274516	89.13394313
CCB	85.71552295	87.57466134	88.89718184
ics	94.96095968	90.56102942	92.94737771
icsab	107.0338098	104.0107303	105.2221847
CCV	109.6495574	109.3715496	111.1450438
CCB	110.1273064	108.5638381	108.2041399
Rgt H2O check	110.6016088	108.5582927	108.6021037
MB-12629	105.7446334	106.2747855	106.5511805
LLQC-12629	105.1002696	105.4441757	105.8832573
LCS-12629	94.36226832	99.57680351	101.6389466
UTS-4	100.2761093	101.2437421	103.3030171
S1611422-003A	99.91577134	101.4298446	114.4109323
S1611422-003Ad	97.69215021	100.6289494	113.7959951
S1611422-008A	94.56341207	97.63677527	109.8465651
S1611422-008Ax5	96.59849877	98.85792863	102.8569306
S1611422-008As	92.27982357	95.1250161	110.0809598
CCV	95.97528557	97.75867467	99.03202123
CCB	95.1975019	95.93410165	97.48263589
S1611422-008Amsd	88.32321281	91.82928276	105.6549624
S1611422-013A	87.73851195	91.64004373	104.126851
S1611422-014A	86.62252653	89.75322287	100.6146124
S1611422-015A	85.8198318	89.41928934	98.59285536
S1611422-019A	84.56049157	88.60710519	96.8511737
S1611422-020A	84.80479022	88.58439439	101.3130942
S1611422-021A	84.27767737	88.78948456	102.0048502
S1611422-026A	83.90736684	88.22800254	98.6048471

Sa	115 In (ISTD) [H2]	185 Re (ISTD) [NoGas]	232 Th (ISTD) [NoGas]
CCV	86.4664776	89.34580694	91.28659346
CCB	87.23936758	90.19130109	91.05697368
S1611422-027A	81.11755555	86.58628134	95.99645132
S1611422-028A	81.11225066	85.43230731	97.61389545
S1611422-028Ad	80.35923365	85.7157192	97.18699147
S1611422-031A	80.47450391	85.29263947	97.57789167
S1611422-031As	78.76161007	85.0262628	98.08049472
S1611422-031Amsd	79.02087859	83.93139461	97.12435441
CCV	80.11644799	84.21077375	85.93261408
CCB	81.82606157	84.88560915	86.46697856
S1611422-032A	76.7097266	84.05227567	92.15265812
S1611422-034A	76.10399446	81.99046743	92.11600748
S1611422-037A	76.05302185	81.57753605	91.87350751
S1611422-043A	76.18833301	82.33349839	91.90852151
blk	80.99786561	84.014379	85.4793418
MB-12631	78.90587364	83.2191051	83.93215163
LLQC-12631	78.9306921	84.1377992	84.6596204
LCS-12631	73.06178901	79.83766368	82.59885121
UTS-4	76.85841772	80.61266805	84.15933982
S1611422-044A	75.55211022	82.12847874	92.11236529
CCV	77.23217016	82.92925177	84.59343207
CCB	78.78931485	83.24542778	84.52843618
S1611422-044Ad	73.87769422	81.45223118	91.49863352
S1611422-045A	73.91085929	80.52584917	89.09599358
S1611422-045Ax5	75.61173864	81.67042975	84.36013373
S1611422-045As	71.61065925	80.43238515	90.91525775
S1611422-045Amsd	71.59948755	79.39799141	90.00099758
S1611422-046A	73.37256694	79.99431782	90.32184385
S1611422-047A	72.61814682	79.62630304	88.81987727
S1611422-049A	72.21559249	79.45789018	87.63133228
CCV	76.07548452	81.28281628	83.45301248
CCB	77.19275692	81.26843425	83.13037887
S1611422-050A	71.93678841	79.82475628	87.46016699
S1611422-051A	71.95871116	78.34128604	89.72264191
S1611422-060A	72.26037342	79.92820567	88.90562489
S1611422-067A	72.28489684	79.06171701	92.53248366
S1611422-071A	72.66477189	78.73152014	88.37900981
S1611422-074A	72.59557115	79.64392753	92.38658256

Sa	115 In (ISTD) [H2]	185 Re (ISTD) [NoGas]	232 Th (ISTD) [NoGas]
S1611422-074Ad	71.73513301	79.11909298	91.54103581
S1611422-078A	70.88781429	78.14136095	86.141638
S1611422-078As	70.94661554	78.10919155	85.93437542
CCV	72.81957464	78.72576846	81.28233557
CCB	73.90502232	79.15062418	81.8467028
S1611422-078Amsd	69.86435394	77.80779673	85.55811155
S1611422-079A	70.62934303	77.52277719	85.08215736
S1611422-081A	70.91412221	77.42550586	86.78450999
CCV	72.99224612	78.22422314	80.25145221
LLCCV-1ppb	73.99273531	78.76243224	80.8846939
CCB	74.00913185	79.18082209	80.81852638
CCV	69.45963528	76.091936	78.79309851
CCB	71.21188113	76.48133915	79.3305207

[Correction Equation]

Data File D:\2016\Dec_2016\121216.b\224_CCB.d

NoGas

Mc(6) = M(6) * 1 - M(7) * 0.0813
Mc(51) = M(51) * 1 + M(52) * 0.3524 - M(53) * 3.1081
Mc(75) = M(75) * 1 - M(77) * 3 + M(82) * 2.2 - M(83) * 2
Mc(82) = M(82) * 1 - M(83) * 1
Mc(111) = M(106) * 0.764 - M(108) * 1.073 + M(111) * 1
Mc(114) = - M(108) * 1.52 + M(114) * 1 - M(118) * 0.027
Mc(115) = M(115) * 1 - M(118) * 0.016
Mc(208) = M(208) * 1 + M(206) * 1 + M(207) * 1

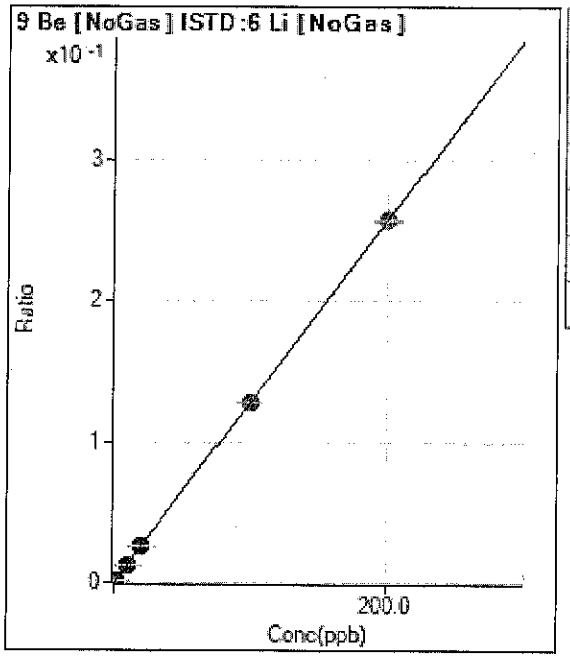
He

H2

Calibration for 224_CCB.d

Batch Folder: D:\2016\Dec_2016\121216.b\
Analysis File: 121216.batch.bin
DA Date-Time: 12/13/2016 8:42:49 AM
Calibration Title:
Calibration Method: External Calibration
VIS Interpolation Fit:

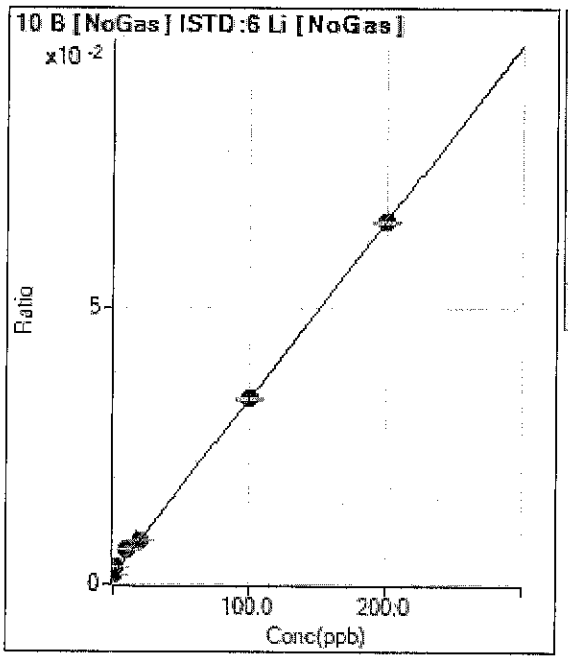
Level	Standard Data File	Sample Name	Acq. Date-Time
1	004CALB.d	Calibration Blank	12/12/2016 11:42:01 AM
2	005CALS.d	1ppb Standard	12/12/2016 11:47:44 AM
3	006CALS.d	10ppb Standard	12/12/2016 11:53:25 AM
4	007CALS.d	20ppb Standard	12/12/2016 11:59:07 AM
5	008CALS.d	100ppb Standard	12/12/2016 12:04:50 PM
6	009CALS.d	200ppb Standard	12/12/2016 12:10:34 PM



	Rjct	Conc.	Calc Conc.	CPS	Ratio	Det.	RSD
1	☐	0.000	0.000	120.00	0.0000	P	7.4
2	☐	1.000	0.992	12232.84	0.0013	P	3.0
3	☐	10.000	9.737	117390.25	0.0125	P	2.0
4	☐	20.000	20.243	234915.00	0.0260	P	0.5
5	☐	100.000	99.642	1115408.64	0.1280	A	0.5
6	☐	200.000	200.168	2149537.41	0.2572	A	0.5

y = 0.0013 * x + 1.2421E-005
R = 1.0000
DL = 0.002143
BEC = 0.009668

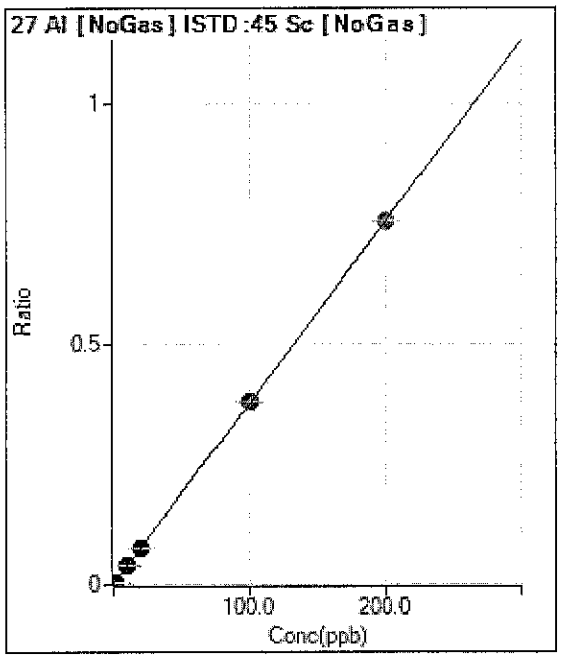
Weight: <None>
Min Conc: <None>



	Rjct	Conc.	Calc Conc.	CPS	Ratio	Det.	RSD
1	☐	0.000	0.000	15310.60	0.0016	P	1.7
2	☐	1.000	4.330	28255.38	0.0030	P	1.1
3	☐	10.000	14.628	58793.70	0.0063	P	1.7
4	☐	20.000	20.329	73104.05	0.0081	P	1.7
5	☐	100.000	99.957	292785.76	0.0336	P	0.7
6	☐	200.000	199.741	548082.86	0.0656	P	0.3

y = 3.2038E-004 * x + 0.0016
R = 0.9997
DL = 0.2567
BEC = 4.947

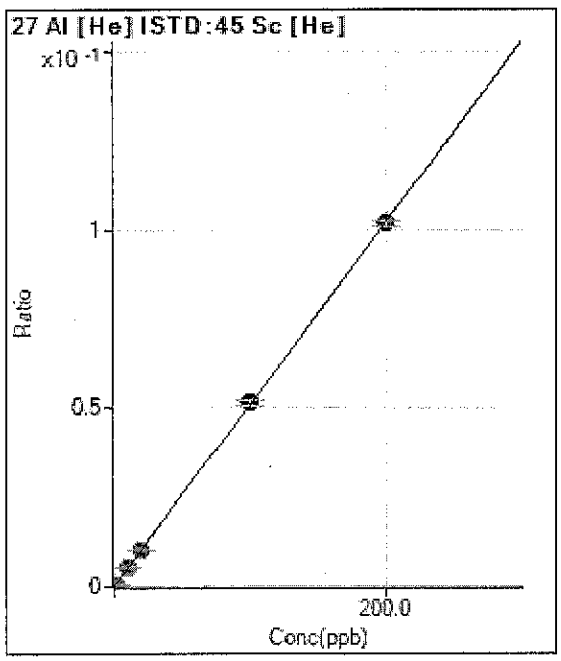
Weight: <None>
Min Conc: <None>



	Rjct	Conc.	Calc Conc.	CPS	Ratio	Det.	RSD
1	☐	0.000	0.000	13439.27	0.0009	P	3.0
2	☐	1.000	1.139	74443.57	0.0052	P	0.6
3	☐	10.000	9.942	537536.39	0.0385	P	0.2
4	☐	20.000	20.003	1044733.67	0.0765	P	0.3
5	☐	100.000	100.475	4924848.28	0.3806	A	0.9
6	☐	200.000	199.764	9442841.57	0.7557	A	0.1

y = 0.0038 * x + 9.3140E-004
R = 1.0000
DL = 0.02186
BEC = 0.2465

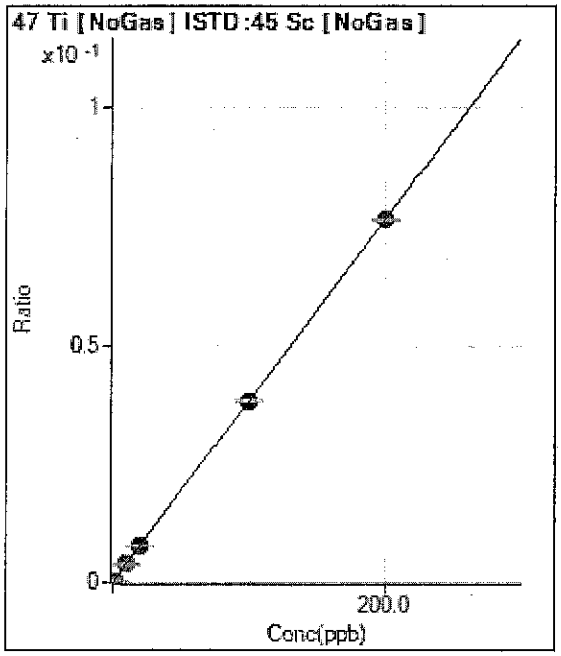
Weight: <None>
Min Conc: <None>



	Rjct	Conc.	Calc Conc.	CPS	Ratio	Det.	RSD
1	☐	0.000	0.000	53.33	0.0001	P	26.6
2	☐	1.000	1.100	264.45	0.0007	P	11.4
3	☐	10.000	10.210	1962.33	0.0054	P	6.1
4	☐	20.000	19.794	3698.16	0.0102	P	1.9
5	☐	100.000	100.998	17644.99	0.0517	P	3.0
6	☐	200.000	199.510	33856.02	0.1020	P	1.4

y = 5.1038E-004 * x + 1.4029E-004
R = 1.0000
DL = 0.2191
BEC = 0.2749

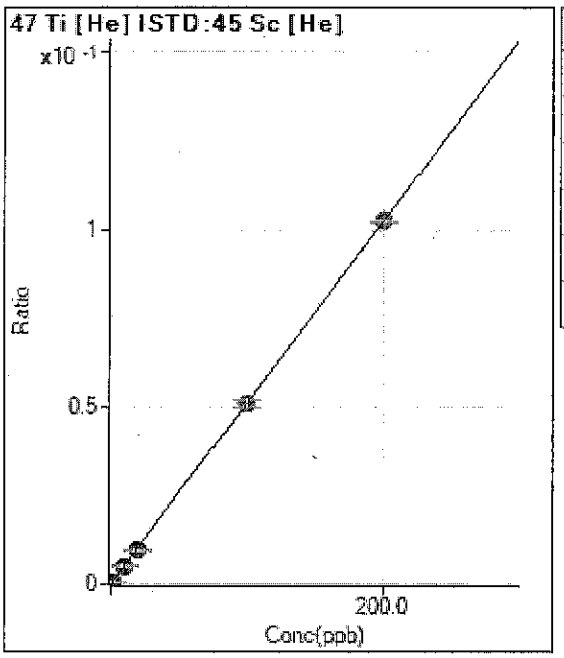
Weight: <None>
Min Conc: <None>



	Rjct	Conc.	Calc Conc.	CPS	Ratio	Det.	RSD
1	☐	0.000	0.000	904.48	0.0001	P	8.3
2	☐	1.000	0.958	6094.37	0.0004	P	2.5
3	☐	10.000	9.943	53943.02	0.0039	P	0.8
4	☐	20.000	20.209	106330.06	0.0078	P	0.7
5	☐	100.000	99.906	495010.22	0.0383	P	0.5
6	☐	200.000	200.029	956114.69	0.0765	P	0.4

y = 3.8224E-004 * x + 6.2669E-005
R = 1.0000
DL = 0.0408
BEC = 0.164

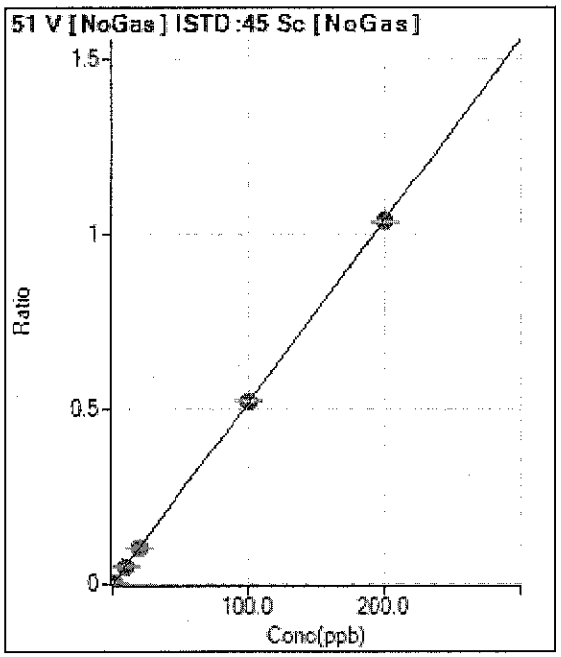
Weight: <None>
Min Conc: <None>



	Rjct	Conc.	Calc Conc.	CPS	Ratio	Det.	RSD
1	☐	0.000	0.000	3.33	0.0000	P	173.2
2	☐	1.000	0.882	173.33	0.0005	P	16.2
3	☐	10.000	10.023	1882.32	0.0051	P	5.9
4	☐	20.000	18.903	3491.45	0.0097	P	5.6
5	☐	100.000	100.003	17454.94	0.0511	P	4.2
6	☐	200.000	200.108	33969.01	0.1023	P	0.6

y = 5.1123E-004 * x + 8.7152E-006
R = 1.0000
DL = 0.08858
BEC = 0.01705

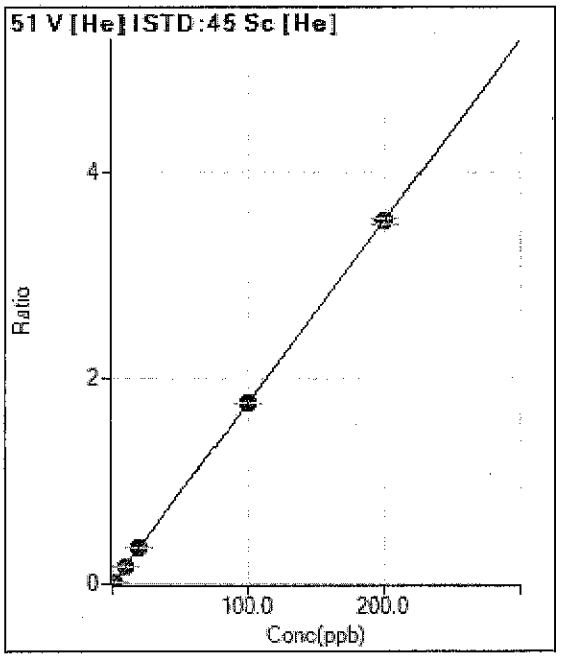
Weight: <None>
Min Conc: <None>



	Rjct	Conc.	Calc Conc.	CPS	Ratio	Det.	RSD
1	☐	0.000	0.000	9251.99	0.0006	P	11.6
2	☐	1.000	0.993	82324.14	0.0058	P	1.9
3	☐	10.000	9.911	726511.53	0.0520	P	0.4
4	☐	20.000	20.004	1425120.30	0.1044	A	0.7
5	☐	100.000	100.850	6775333.60	0.5236	A	0.7
6	☐	200.000	199.579	12938526.73	1.0355	A	0.3

y = 0.0052 * x + 6.4123E-004
R = 1.0000
DL = 0.04298
BEC = 0.1237

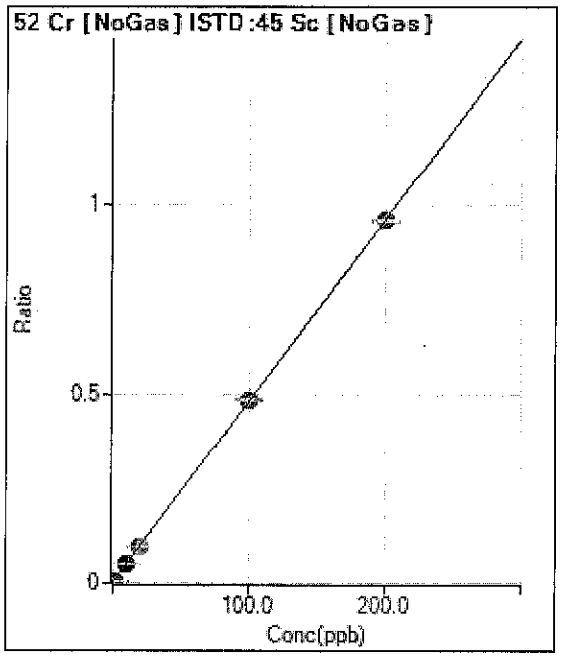
Weight: <None>
Min Conc: <None>



	Rjct	Conc.	Calc Conc.	CPS	Ratio	Det.	RSD
1	☐	0.000	0.000	23.34	0.0001	P	65.6
2	☐	1.000	0.987	6576.76	0.0174	P	1.8
3	☐	10.000	10.009	64685.48	0.1764	P	1.2
4	☐	20.000	20.193	128446.82	0.3557	P	1.0
5	☐	100.000	99.815	600194.64	1.7582	P	0.5
6	☐	200.000	200.073	1170061.45	3.5242	P	1.3

y = 0.0176 * x + 6.1422E-005
R = 1.0000
DL = 0.006862
BEC = 0.003487

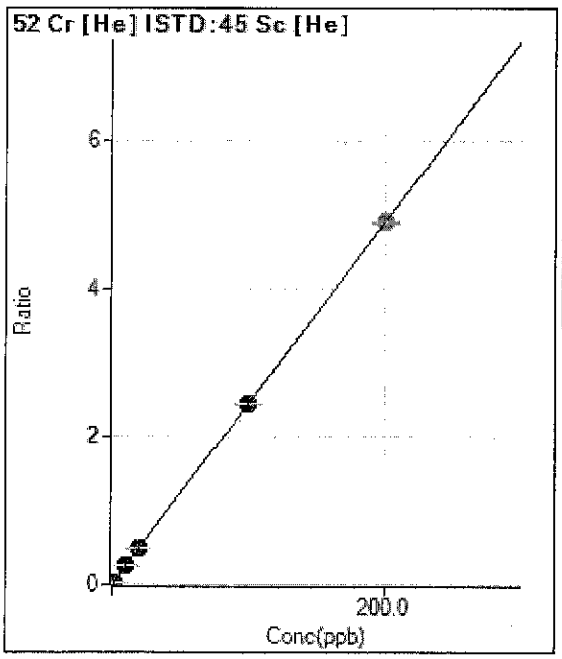
Weight: <None>
Min Conc: <None>



	Rjct	Conc.	Calc Conc.	CPS	Ratio	Det.	RSD
1	☐	0.000	0.000	30750.14	0.0021	P	1.2
2	☐	1.000	1.109	105898.91	0.0074	P	0.6
3	☐	10.000	10.019	700866.97	0.0502	P	0.4
4	☐	20.000	19.931	1334718.04	0.0977	M	1.0
5	☐	100.000	100.786	6284696.00	0.4856	A	0.3
6	☐	200.000	199.613	11991827.30	0.9597	A	0.3

y = 0.0048 * x + 0.0021
R = 1.0000
DL = 0.01569
BEC = 0.4442

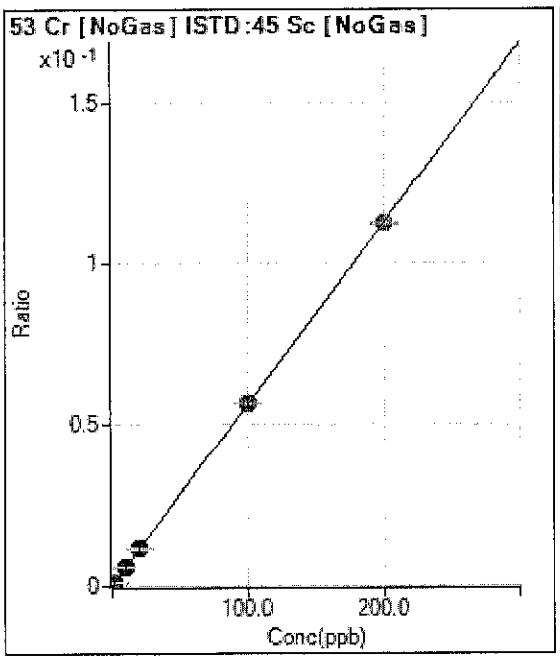
Weight: <None>
Min Conc: <None>



	Rjct	Conc.	Calc Conc.	CPS	Ratio	Det.	RSD
1	☐	0.000	0.000	255.56	0.0007	P	5.9
2	☐	1.000	1.113	10545.28	0.0280	P	4.4
3	☐	10.000	10.222	92195.67	0.2514	P	1.2
4	☐	20.000	20.242	179481.64	0.4971	P	1.1
5	☐	100.000	99.631	834314.95	2.4440	P	0.3
6	☐	200.000	200.148	1629922.99	4.9091	A	0.3

y = 0.0245 * x + 6.7294E-004
R = 1.0000
DL = 0.004856
BEC = 0.02744

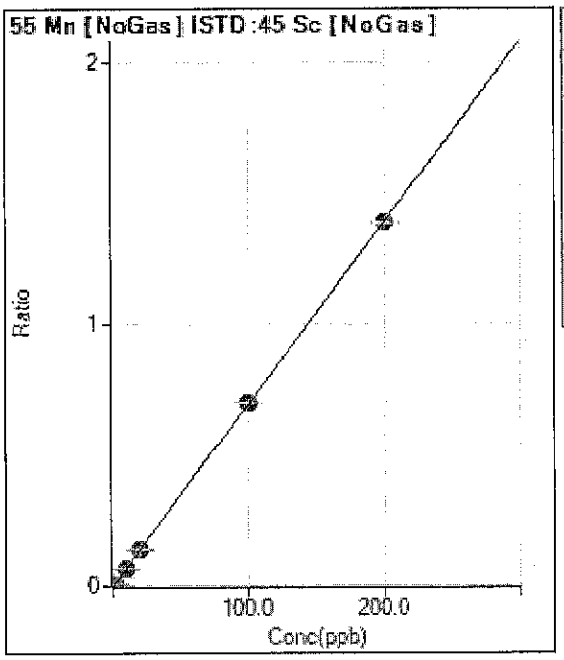
Weight: <None>
Min Conc: <None>



	Rjct	Conc.	Calc Conc.	CPS	Ratio	Det.	RSD
1	☐	0.000	0.000	6122.15	0.0004	P	4.0
2	☐	1.000	0.952	13623.97	0.0010	P	4.8
3	☐	10.000	9.992	84204.36	0.0060	P	2.2
4	☐	20.000	19.981	158867.97	0.0116	P	0.8
5	☐	100.000	100.250	733390.11	0.0567	P	0.2
6	☐	200.000	199.877	1406464.35	0.1126	A	0.4

y = 5.6105E-004 * x + 4.2425E-004
R = 1.0000
DL = 0.09051
BEC = 0.7562

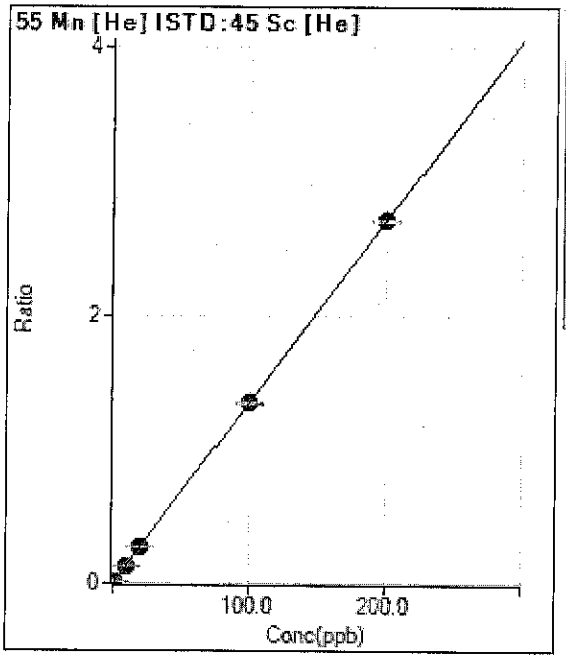
Weight: <None>
Min Conc: <None>



	Rjct	Conc.	Calc Conc.	CPS	Ratio	Det.	RSD
1	☐	0.000	0.000	3793.73	0.0003	P	4.9
2	☐	1.000	1.008	103403.56	0.0073	P	0.7
3	☐	10.000	9.941	968976.70	0.0694	P	0.3
4	☐	20.000	20.063	1908744.23	0.1398	A	0.4
5	☐	100.000	100.600	9056954.36	0.6999	A	0.5
6	☐	200.000	199.696	17355384.31	1.3890	A	0.4

y = 0.0070 * x + 2.6294E-004
R = 1.0000
DL = 0.005609
BEC = 0.03781

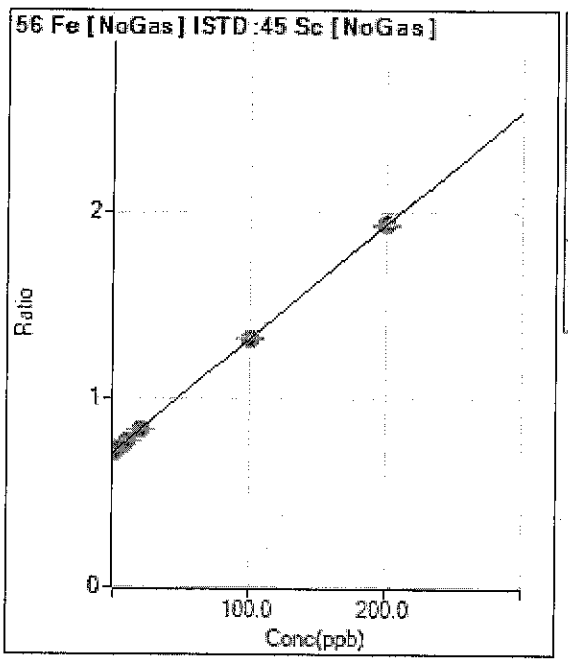
Weight: <None>
Min Conc: <None>



	Rjct	Conc.	Calc Conc.	CPS	Ratio	Det.	RSD
1	☐	0.000	0.000	23.33	0.0001	P	75.9
2	☐	1.000	0.984	5041.81	0.0134	P	2.6
3	☐	10.000	9.932	49290.52	0.1344	P	0.8
4	☐	20.000	20.234	98839.51	0.2737	P	0.1
5	☐	100.000	99.476	459300.59	1.3455	P	0.7
6	☐	200.000	200.242	899200.87	2.7083	P	0.7

y = 0.0135 * x + 6.1504E-005
R = 1.0000
DL = 0.01036
BEC = 0.004547

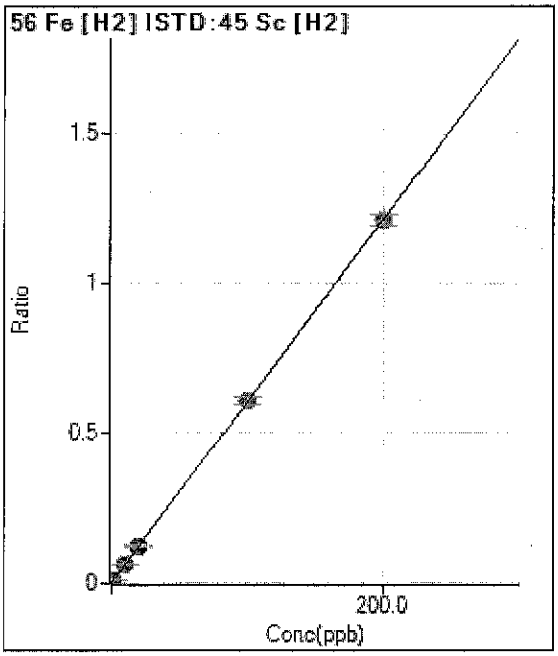
Weight: <None>
Min Conc: <None>



	Rjct	Conc.	Calc Conc.	CPS	Ratio	Det.	RSD
1	☐	0.000	0.000	10387034.08	0.7198	A	0.7
2	☐	1.000	0.678	10292119.04	0.7239	A	0.7
3	☐	10.000	9.668	10868096.10	0.7783	A	0.7
4	☐	20.000	19.856	11469471.76	0.8400	A	0.1
5	☐	100.000	99.809	17131313.67	1.3237	A	0.5
6	☐	200.000	200.128	24123255.52	1.9307	A	0.8

y = 0.0061 * x + 0.7198
R = 1.0000
DL = 2.353
BEC = 1.19

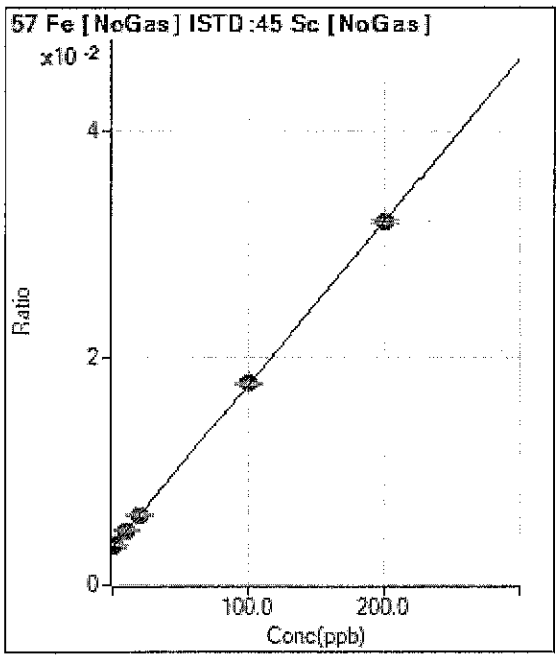
Weight: <None>
Min Conc: <None>



	Rjct	Conc.	Calc Conc.	CPS	Ratio	Det.	RSD
1	☐	0.000	0.000	18282.49	0.0025	P	3.2
2	☐	1.000	2.027	104651.32	0.0148	P	3.9
3	☐	10.000	10.130	444778.89	0.0638	P	4.0
4	☐	20.000	20.254	852356.84	0.1251	P	3.4
5	☐	100.000	100.359	3917926.93	0.6097	A	3.9
6	☐	200.000	199.784	7663251.36	1.2112	A	3.2

y = 0.0060 * x + 0.0025
R = 1.0000
DL = 0.03989
BEC = 0.421

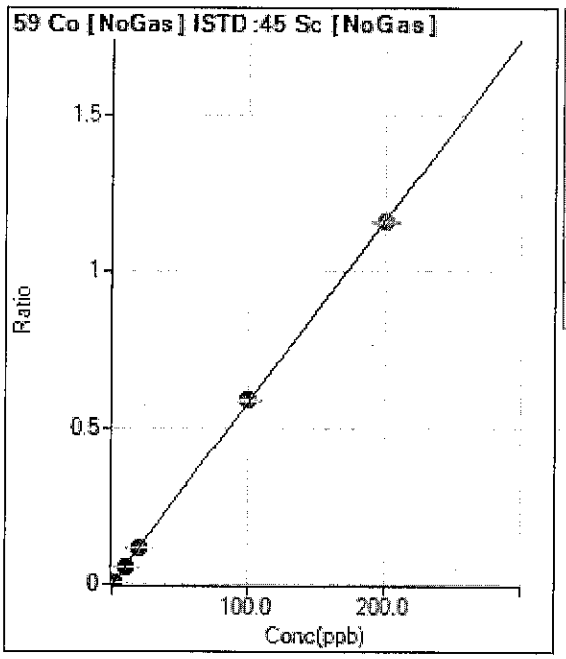
Weight: <None>
Min Conc: <None>



	Rjct	Conc.	Calc Conc.	CPS	Ratio	Det.	RSD
1	☐	0.000	0.000	47696.03	0.0033	P	3.4
2	☐	1.000	1.890	50841.15	0.0036	P	1.6
3	☐	10.000	10.540	67253.36	0.0048	P	1.8
4	☐	20.000	20.004	84304.78	0.0062	P	1.0
5	☐	100.000	100.542	229362.16	0.0177	P	0.7
6	☐	200.000	199.697	399112.19	0.0319	P	1.0

y = 1.4341E-004 * x + 0.0033
R = 1.0000
DL = 2.37
BEC = 23.05

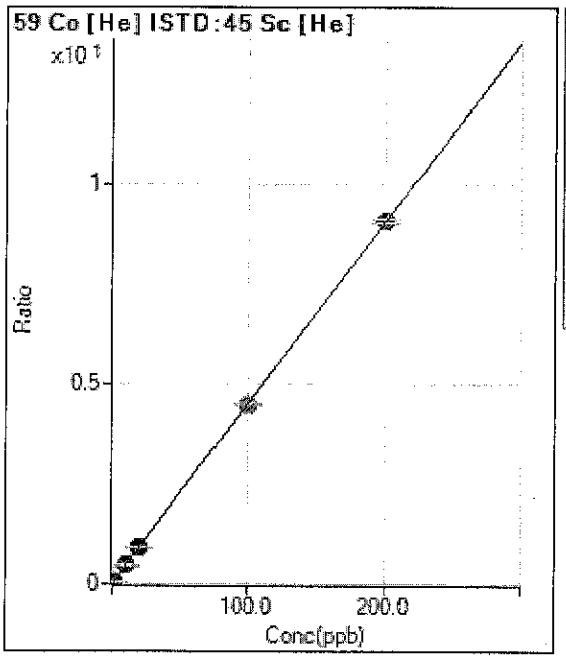
Weight: <None>
Min Conc: <None>



	Rjct	Conc.	Calc Conc.	CPS	Ratio	Det.	RSD
1		0.000	0.000	281.11	0.0000	P	28.4
2		1.000	0.984	81723.03	0.0057	P	0.7
3		10.000	9.942	808143.47	0.0579	P	0.1
4		20.000	19.954	1585854.00	0.1161	A	0.8
5		100.000	101.026	7608572.20	0.5880	A	0.8
6		200.000	199.494	14506423.87	1.1610	A	0.9

y = 0.0058 * x + 1.9495E-005
R = 1.0000
DL = 0.002855
BEC = 0.00335

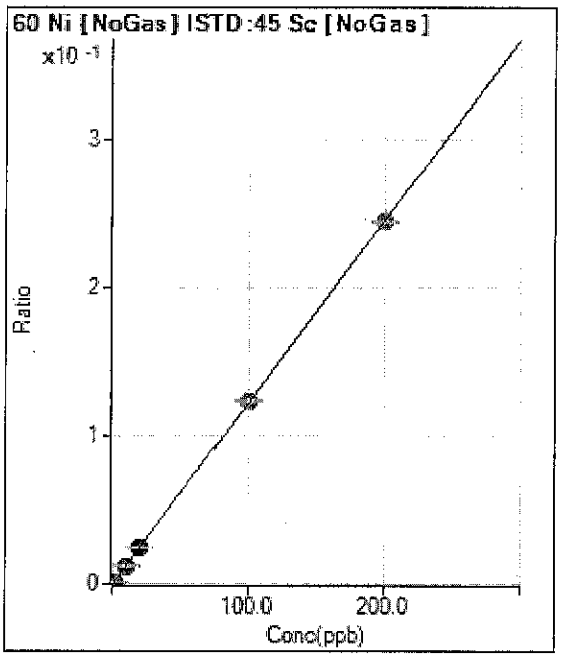
Weight: <None>
Min Conc: <None>



	Rjct	Conc.	Calc Conc.	CPS	Ratio	Det.	RSD
1		0.000	0.000	47.78	0.0001	P	27.7
2		1.000	1.009	17308.22	0.0459	P	2.4
3		10.000	10.114	168316.28	0.4589	P	1.8
4		20.000	20.343	333257.37	0.9230	P	0.8
5		100.000	99.097	1534636.29	4.4956	A	0.6
6		200.000	200.411	3018555.16	9.0917	A	0.9

y = 0.0454 * x + 1.2569E-004
R = 1.0000
DL = 0.002304
BEC = 0.002771

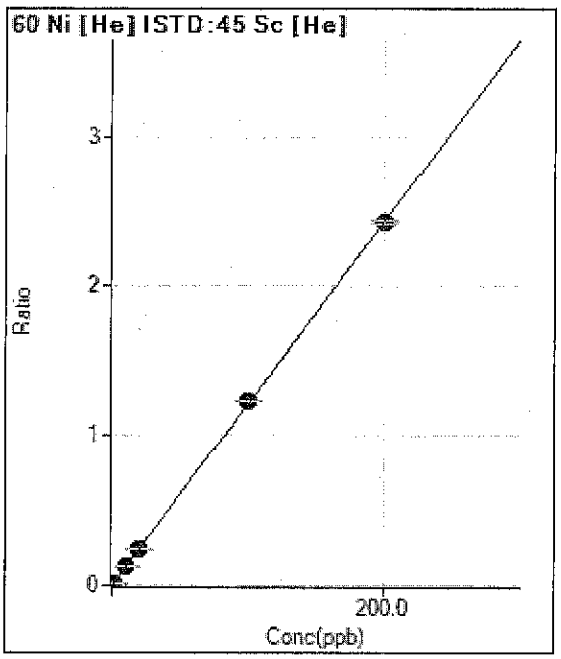
Weight: <None>
Min Conc: <None>



	Rjct	Conc.	Calc Conc.	CPS	Ratio	Det.	RSD
1	☐	0.000	0.000	846.69	0.0001	P	11.0
2	☐	1.000	1.070	19463.72	0.0014	P	0.8
3	☐	10.000	9.988	171684.46	0.0123	P	1.2
4	☐	20.000	20.070	336583.88	0.0246	P	0.4
5	☐	100.000	100.577	1595548.10	0.1233	A	1.0
6	☐	200.000	199.705	3058017.52	0.2447	A	0.4

y = 0.0012 * x + 5.8662E-005
R = 1.0000
DL = 0.01574
BEC = 0.04788

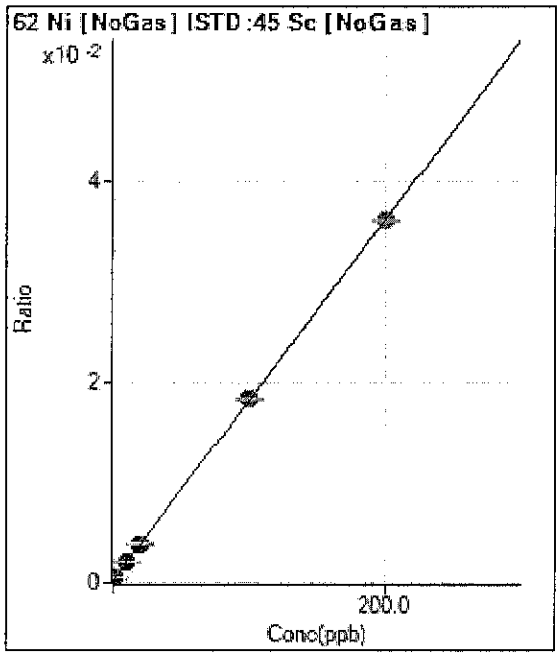
Weight: <None>
Min Conc: <None>



	Rjct	Conc.	Calc Conc.	CPS	Ratio	Det.	RSD
1	☐	0.000	0.000	261.11	0.0007	P	11.6
2	☐	1.000	1.058	5111.84	0.0136	P	2.6
3	☐	10.000	10.139	45492.16	0.1240	P	1.0
4	☐	20.000	20.428	89981.97	0.2492	P	0.7
5	☐	100.000	101.307	420951.61	1.2331	P	0.8
6	☐	200.000	199.297	805199.83	2.4253	P	1.1

y = 0.0122 * x + 6.8787E-004
R = 1.0000
DL = 0.01959
BEC = 0.05654

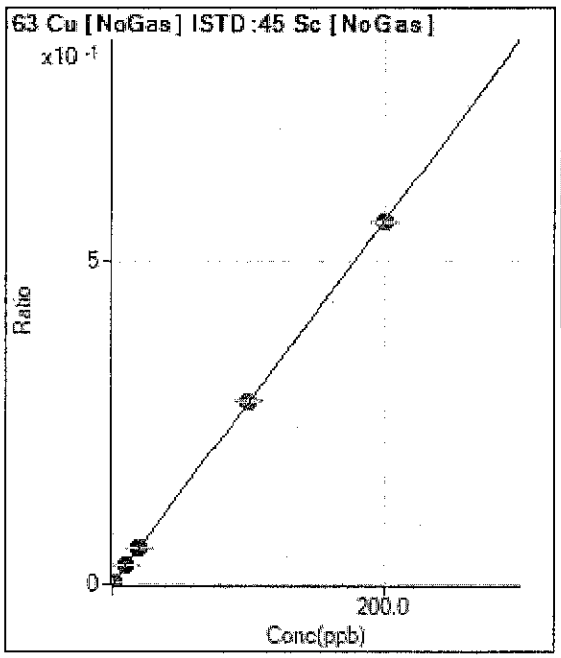
Weight: <None>
Min Conc: <None>



	Rjct	Conc.	Calc Conc.	CPS	Ratio	Det.	RSD
1		0.000	0.000	4251.62	0.0003	P	3.8
2		1.000	1.073	6928.00	0.0005	P	1.8
3		10.000	10.032	29276.85	0.0021	P	1.1
4		20.000	20.204	53580.73	0.0039	P	0.8
5		100.000	100.597	237661.54	0.0184	P	1.1
6		200.000	199.679	451877.12	0.0362	P	0.9

y = 1.7964E-004 * x + 2.9462E-004
R = 1.0000
DL = 0.1883
BEC = 1.64

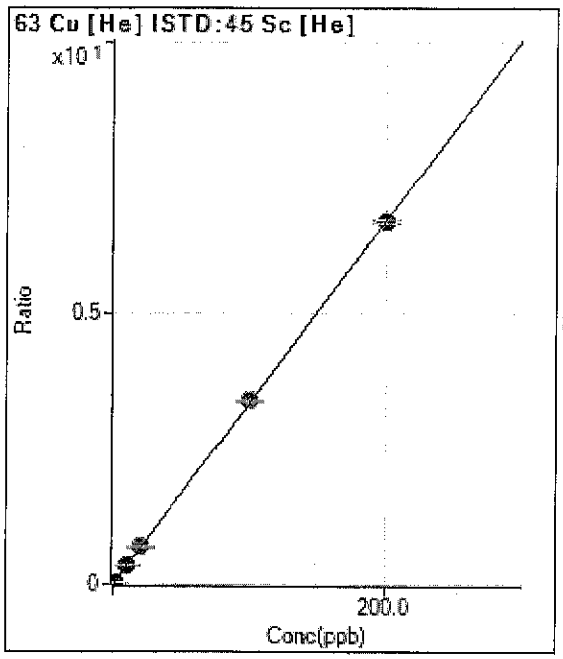
Weight: <None>
Min Conc: <None>



	Rjct	Conc.	Calc Conc.	CPS	Ratio	Det.	RSD
1		0.000	0.000	1912.32	0.0001	P	7.1
2		1.000	1.007	42198.80	0.0030	P	1.0
3		10.000	10.097	398926.85	0.0286	P	1.0
4		20.000	20.367	785125.00	0.0575	P	0.7
5		100.000	100.734	3673250.69	0.2839	A	0.8
6		200.000	199.591	7025703.89	0.5623	A	0.7

y = 0.0028 * x + 1.3253E-004
R = 1.0000
DL = 0.01007
BEC = 0.04706

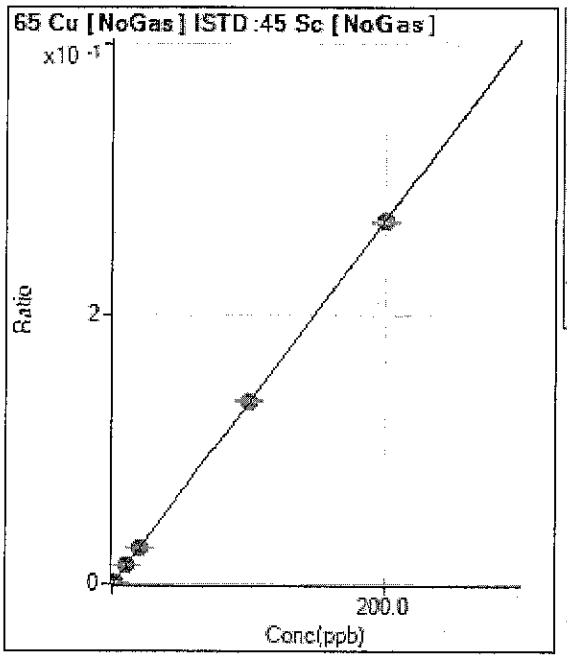
Weight: <None>
Min Conc: <None>



	Rjct	Conc.	Calc Conc.	CPS	Ratio	Det.	RSD
1	☐	0.000	0.000	564.46	0.0015	P	13.1
2	☐	1.000	1.014	13380.48	0.0355	P	1.0
3	☐	10.000	10.292	127139.97	0.3466	P	0.7
4	☐	20.000	20.610	250094.70	0.6926	P	0.7
5	☐	100.000	100.951	1156192.56	3.3870	P	0.5
6	☐	200.000	199.449	2221168.32	6.6901	A	1.0

y = 0.0335 * x + 0.0015
R = 1.0000
DL = 0.01736
BEC = 0.04433

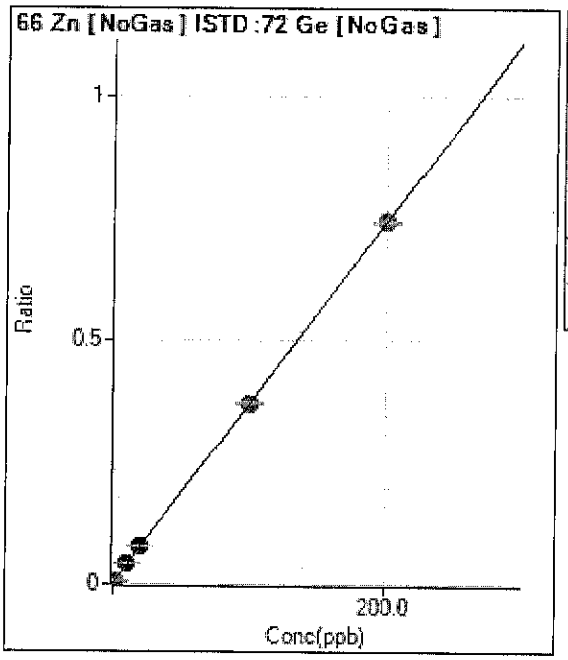
Weight: <None>
Min Conc: <None>



	Rjct	Conc.	Calc Conc.	CPS	Ratio	Det.	RSD
1	☐	0.000	0.000	914.47	0.0001	P	2.1
2	☐	1.000	1.005	20141.18	0.0014	P	1.7
3	☐	10.000	10.217	193007.09	0.0138	P	0.7
4	☐	20.000	20.254	373306.43	0.0273	P	0.3
5	☐	100.000	100.875	1758740.28	0.1359	A	1.0
6	☐	200.000	199.526	3358167.71	0.2688	A	0.8

y = 0.0013 * x + 6.3372E-005
R = 1.0000
DL = 0.003029
BEC = 0.04706

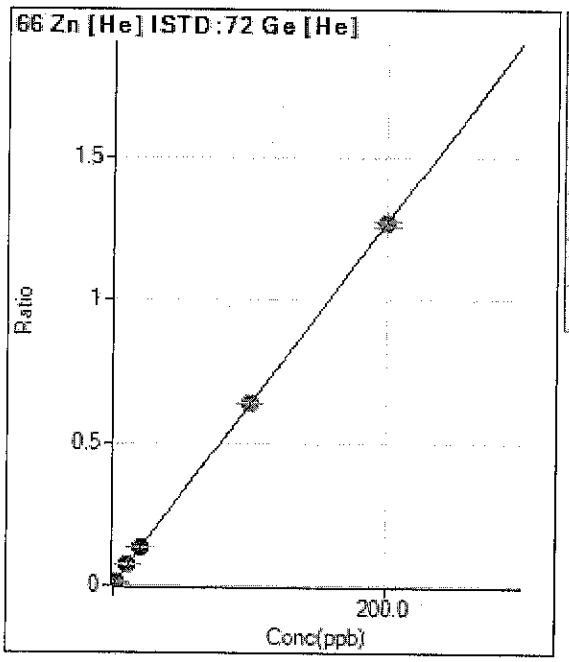
Weight: <None>
Min Conc: <None>



	Rjct	Conc.	Calc Conc.	CPS	Ratio	Det.	RSD
1	☐	0.000	0.000	7065.83	0.0025	P	3.7
2	☐	1.000	1.323	20245.75	0.0074	P	1.2
3	☐	10.000	10.710	112915.58	0.0422	P	1.2
4	☐	20.000	20.295	205328.20	0.0777	P	1.5
5	☐	100.000	99.647	930332.64	0.3714	P	1.1
6	☐	200.000	200.110	1787657.92	0.7433	A	0.6

y = 0.0037 * x + 0.0025
R = 1.0000
DL = 0.07498
BEC = 0.6847

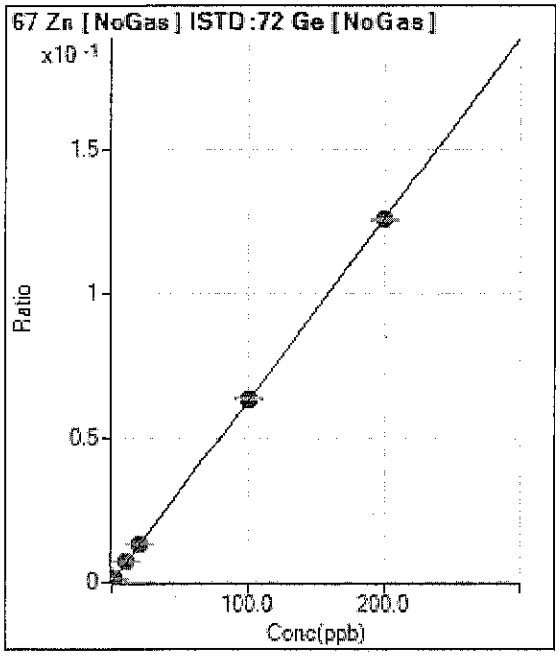
Weight: <None>
Min Conc: <None>



	Rjct	Conc.	Calc Conc.	CPS	Ratio	Det.	RSD
1	☐	0.000	0.000	1234.49	0.0046	P	10.1
2	☐	1.000	1.276	3319.20	0.0127	P	2.3
3	☐	10.000	10.748	18685.19	0.0725	P	0.2
4	☐	20.000	20.452	33827.01	0.1338	P	1.1
5	☐	100.000	100.257	152484.28	0.6380	P	0.8
6	☐	200.000	199.788	293888.53	1.2667	P	1.2

y = 0.0063 * x + 0.0046
R = 1.0000
DL = 0.2228
BEC = 0.7329

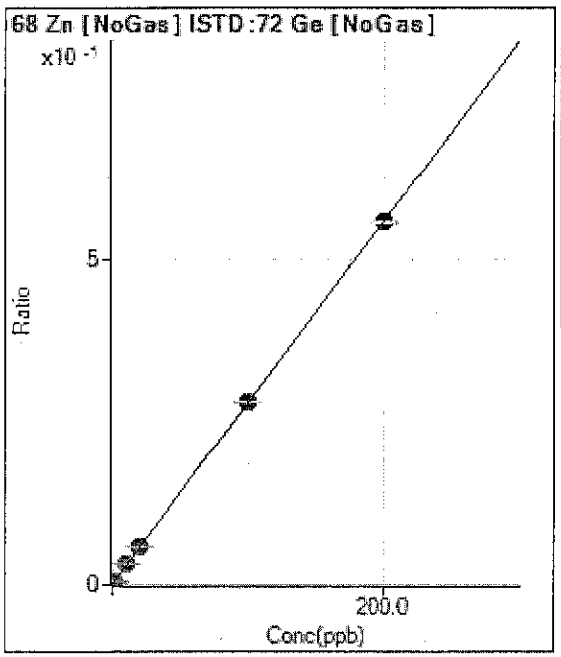
Weight: <None>
Min Conc: <None>



	Rjct	Conc.	Calc Conc.	CPS	Ratio	Det.	RSD
1	☐	0.000	0.000	1127.82	0.0004	P	0.8
2	☐	1.000	1.196	3146.95	0.0012	P	5.0
3	☐	10.000	10.830	19266.90	0.0072	P	2.2
4	☐	20.000	20.702	35398.90	0.0134	P	2.5
5	☐	100.000	100.436	158813.14	0.0634	P	0.9
6	☐	200.000	199.669	302174.50	0.1256	P	0.4

y = 6.2719E-004 * x + 4.0455E-004
R = 1.0000
DL = 0.01546
BEC = 0.645

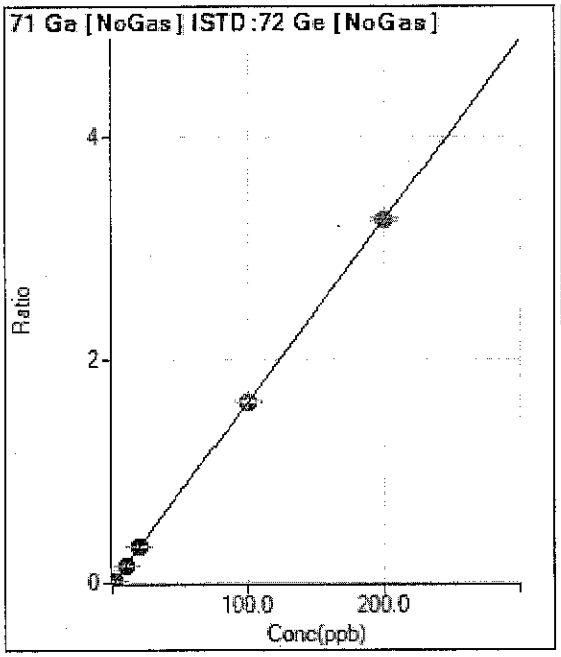
Weight: <None>
Min Conc: <None>



	Rjct	Conc.	Calc Conc.	CPS	Ratio	Det.	RSD
1	☐	0.000	0.000	5467.50	0.0020	P	2.1
2	☐	1.000	1.266	14930.62	0.0055	P	1.9
3	☐	10.000	10.625	84271.59	0.0315	P	0.6
4	☐	20.000	20.541	156070.19	0.0590	P	1.4
5	☐	100.000	100.332	703144.29	0.2807	P	0.2
6	☐	200.000	199.747	1339379.70	0.5569	P	0.4

y = 0.0028 * x + 0.0020
R = 1.0000
DL = 0.04467
BEC = 0.706

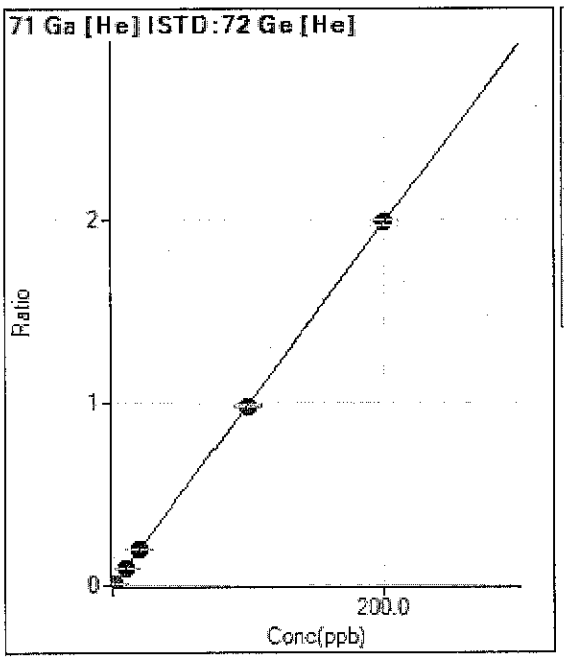
Weight: <None>
Min Conc: <None>



	Rjct	Conc.	Calc Conc.	CPS	Ratio	Det.	RSD
1	☐	0.000	0.000	144.45	0.0001	P	21.0
2	☐	1.000	0.997	44339.80	0.0163	P	1.3
3	☐	10.000	9.810	427535.34	0.1597	P	0.1
4	☐	20.000	19.865	854858.73	0.3233	P	1.1
5	☐	100.000	100.012	4077354.35	1.6277	A	0.4
6	☐	200.000	200.017	7829249.69	3.2552	A	0.9

y = 0.0163 * x + 5.1860E-005
R = 1.0000
DL = 0.002007
BEC = 0.003187

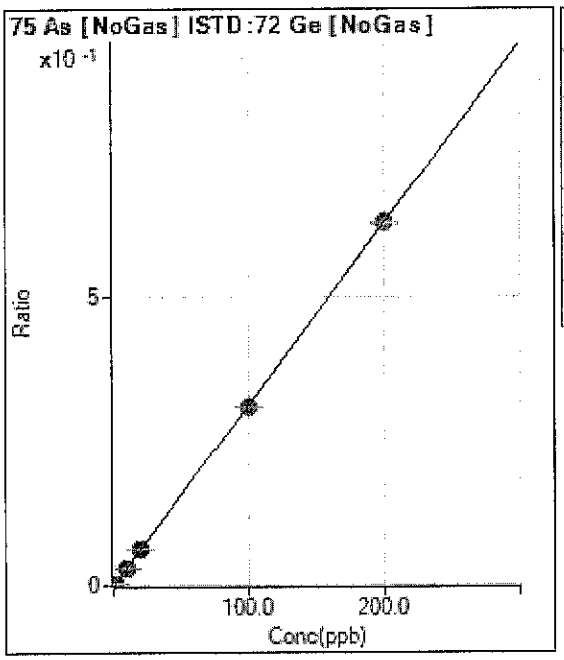
Weight: <None>
Min Conc: <None>



	Rjct	Conc.	Calc Conc.	CPS	Ratio	Det.	RSD
1	☐	0.000	0.000	12.22	0.0000	P	68.4
2	☐	1.000	0.995	2591.30	0.0099	P	6.8
3	☐	10.000	9.940	25401.18	0.0986	P	2.1
4	☐	20.000	19.966	50050.11	0.1980	P	1.0
5	☐	100.000	99.222	235159.53	0.9839	P	1.2
6	☐	200.000	200.396	461014.24	1.9871	P	1.3

y = 0.0099 * x + 4.5822E-005
R = 1.0000
DL = 0.009487
BEC = 0.004621

Weight: <None>
Min Conc: <None>



	Rjct	Conc.	Calc Conc.	CPS	Ratio	Det.	RSD
1	☐	0.000	0.000	-593.10	-0.0002	P	-60.4
2	☐	1.000	0.948	7544.42	0.0028	P	6.1
3	☐	10.000	9.989	83548.03	0.0312	P	1.1
4	☐	20.000	20.356	168735.11	0.0638	P	0.4
5	☐	100.000	98.856	778405.48	0.3107	P	0.7
6	☐	200.000	200.537	1516626.25	0.6306	A	0.7

y = 0.0031 * x - 2.1239E-004

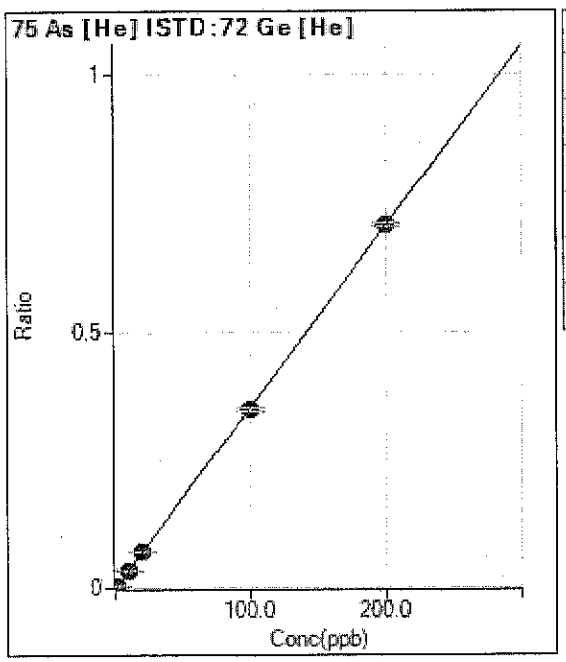
R = 1.0000

DL = 0.1223

BEC = -0.06752

Weight: <None>

Min Conc: <None>



	Rjct	Conc.	Calc Conc.	CPS	Ratio	Det.	RSD
1	☐	0.000	0.000	13.47	0.0001	P	16.1
2	☐	1.000	1.016	948.51	0.0036	P	6.2
3	☐	10.000	9.937	9030.21	0.0351	P	2.5
4	☐	20.000	20.185	17986.05	0.0712	P	1.4
5	☐	100.000	98.805	83205.09	0.3481	P	1.2
6	☐	200.000	200.582	163952.34	0.7067	P	1.0

y = 0.0035 * x + 5.0509E-005

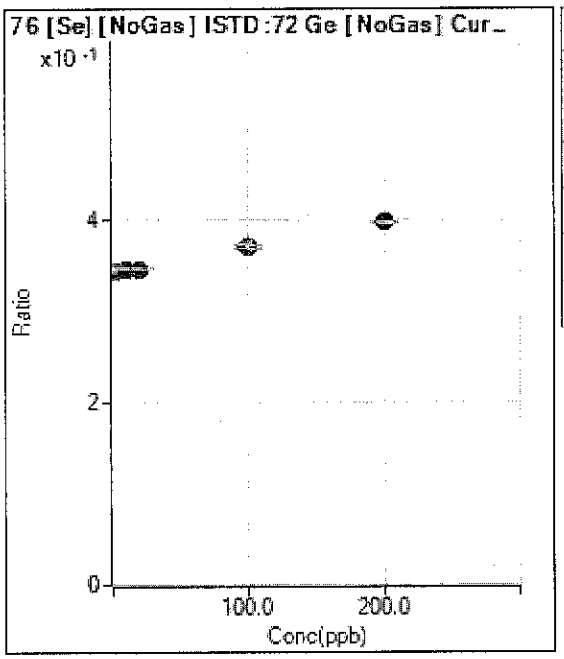
R = 1.0000

DL = 0.006921

BEC = 0.01434

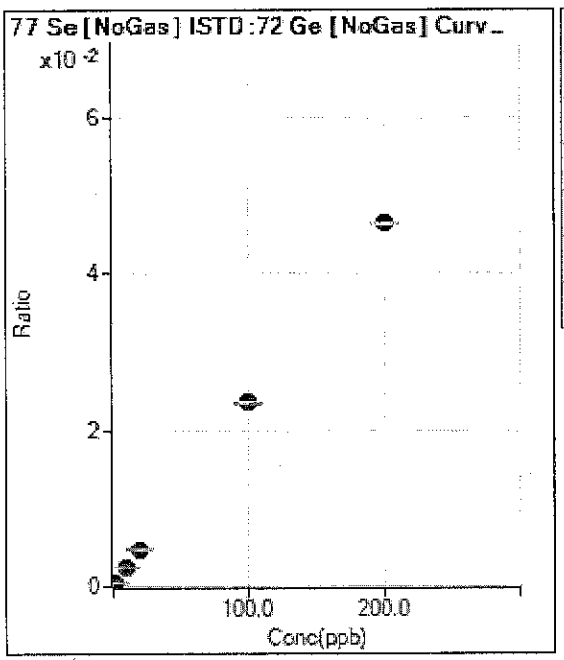
Weight: <None>

Min Conc: <None>



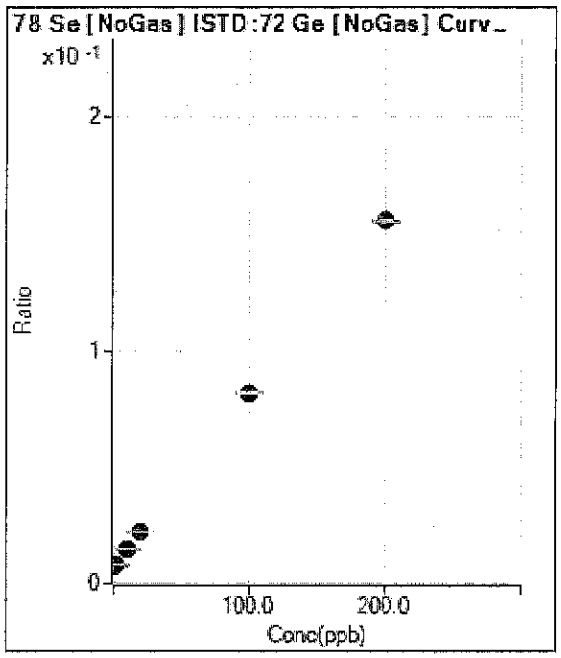
	Rjct	Conc.	Calc Conc.	CPS	Ratio	Det.	RSD
1	☐	0.000		958638.44	0.3439	P	0.3
2	☐	1.000		935597.01	0.3434	P	0.7
3	☐	10.000		925749.72	0.3458	P	0.5
4	☐	20.000		915280.66	0.3462	P	0.4
5	☐	100.000		926062.67	0.3697	P	1.1
6	☐	200.000		954975.31	0.3971	P	0.6

Excluded



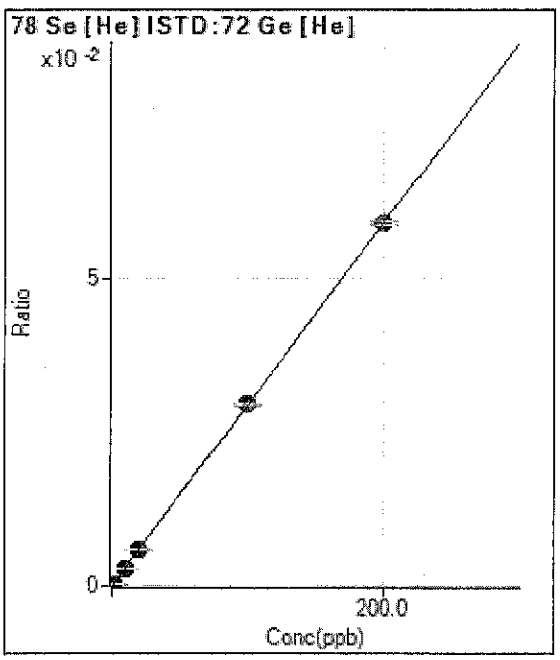
	Rjct	Conc.	Calc Conc.	CPS	Ratio	Det.	RSD
1	☐	0.000		682.24	0.0002	P	15.7
2	☐	1.000		1344.50	0.0005	P	11.4
3	☐	10.000		6765.73	0.0025	P	2.4
4	☐	20.000		12584.41	0.0048	P	2.3
5	☐	100.000		58874.89	0.0235	P	1.9
6	☐	200.000		111621.84	0.0464	P	0.3

Excluded



	Rjct	Conc.	Calc Conc.	CPS	Ratio	Det.	RSD
1	☐	0.000		20442.75	0.0073	P	1.0
2	☐	1.000		22489.63	0.0083	P	1.6
3	☐	10.000		39562.31	0.0148	P	0.5
4	☐	20.000		58766.78	0.0222	P	2.3
5	☐	100.000		204656.50	0.0817	P	1.4
6	☐	200.000		373511.10	0.1553	P	0.5

Excluded



	Rjct	Conc.	Calc Conc.	CPS	Ratio	Det.	RSD
1	☐	0.000	0.000	13.13	0.0000	P	12.9
2	☐	1.000	1.058	94.61	0.0004	P	6.0
3	☐	10.000	9.460	732.68	0.0028	P	0.2
4	☐	20.000	19.904	1498.38	0.0059	P	3.5
5	☐	100.000	100.212	7087.25	0.0297	P	1.4
6	☐	200.000	199.930	13715.67	0.0591	P	1.1

y = 2.9541E-004 * x + 4.9205E-005

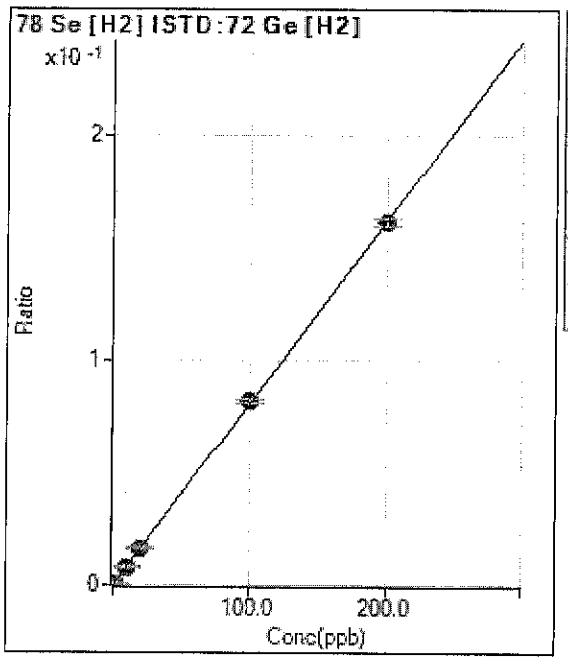
R = 1.0000

DL = 0.06462

BEC = 0.1666

Weight: <None>

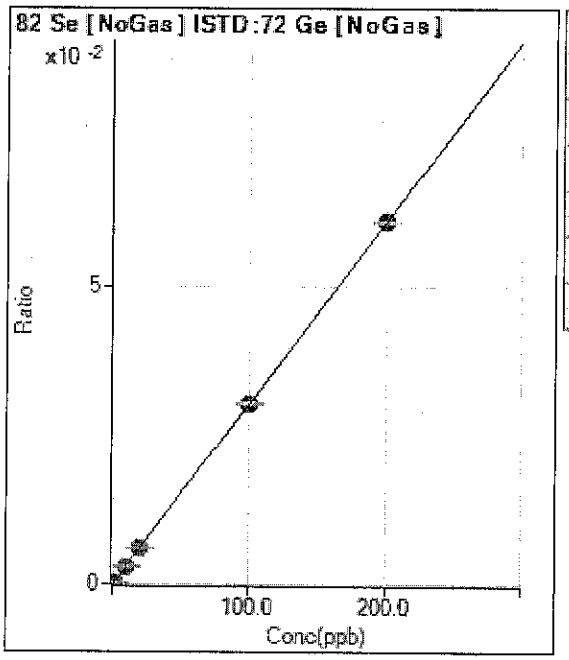
Min Conc: <None>



	Rjct	Conc.	Calc Conc.	CPS	Ratio	Det.	RSD
1	☐	0.000	0.000	22.56	0.0000	P	27.3
2	☐	1.000	1.026	1451.58	0.0008	P	4.1
3	☐	10.000	10.012	13720.38	0.0081	P	1.5
4	☐	20.000	20.364	27239.41	0.0165	P	2.4
5	☐	100.000	101.455	128209.94	0.0822	P	2.7
6	☐	200.000	199.235	247702.47	0.1614	P	2.1

y = 8.1000E-004 * x + 1.2937E-005
R = 1.0000
DL = 0.01309
BEC = 0.01597

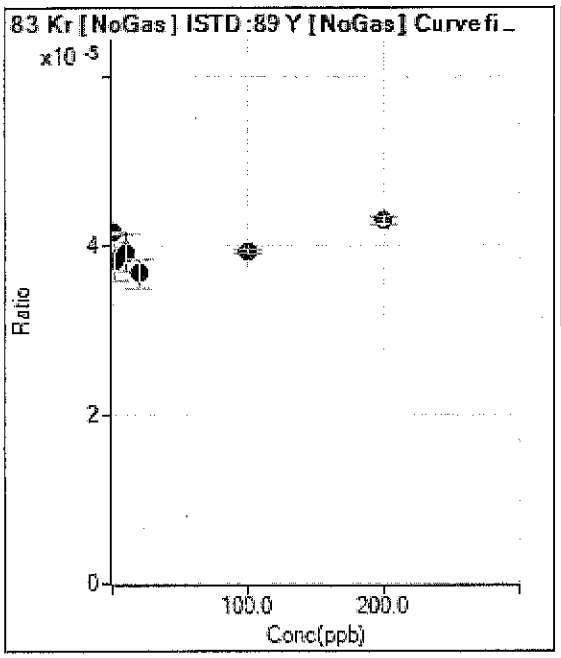
Weight: <None>
Min Conc: <None>



	Rjct	Conc.	Calc Conc.	CPS	Ratio	Det.	RSD
1	☐	0.000	0.000	101.12	0.0000	P	21.2
2	☐	1.000	1.037	956.74	0.0004	P	2.3
3	☐	10.000	9.941	8178.97	0.0031	P	1.2
4	☐	20.000	19.928	16096.87	0.0061	P	0.1
5	☐	100.000	99.949	76123.58	0.0304	P	1.5
6	☐	200.000	200.035	146188.48	0.0608	P	0.9

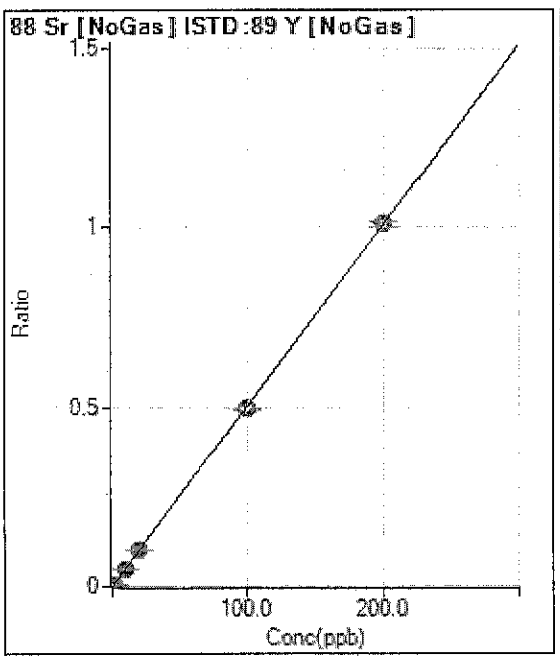
y = 3.0367E-004 * x + 3.6323E-005
R = 1.0000
DL = 0.07621
BEC = 0.1196

Weight: <None>
Min Conc: <None>



	Rjct	Conc.	Calc Conc.	CPS	Ratio	Det.	RSD
1	☐	0.000		988.92	0.0000	P	0.5
2	☐	1.000		892.25	0.0000	P	11.7
3	☐	10.000		900.03	0.0000	P	11.0
4	☐	20.000		834.47	0.0000	P	9.3
5	☐	100.000		861.14	0.0000	P	1.1
6	☐	200.000		895.58	0.0000	P	2.1

Excluded



	Rjct	Conc.	Calc Conc.	CPS	Ratio	Det.	RSD
1	☐	0.000	0.000	864.47	0.0000	P	12.1
2	☐	1.000	0.989	117204.15	0.0050	P	0.8
3	☐	10.000	9.913	1147404.71	0.0499	P	0.1
4	☐	20.000	19.968	2281766.92	0.1004	A	1.1
5	☐	100.000	98.538	10828382.07	0.4956	A	0.3
6	☐	200.000	200.739	21067722.50	1.0095	A	1.4

y = 0.0050 * x + 3.6302E-005

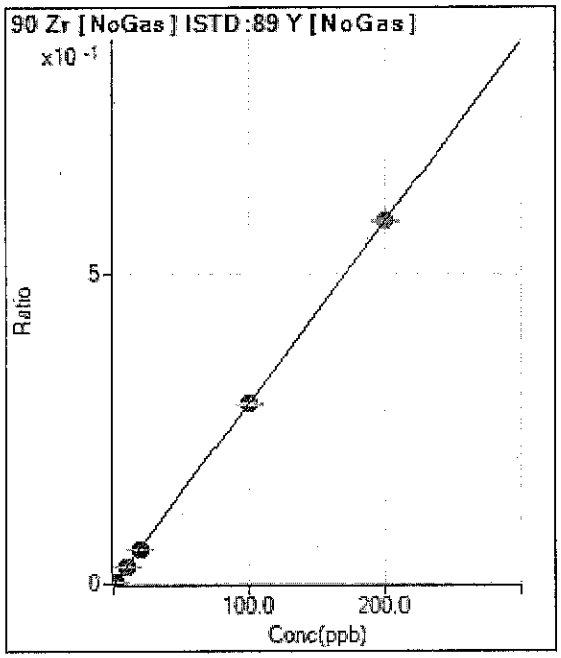
R = 1.0000

DL = 0.002621

BEC = 0.007219

Weight: <None>

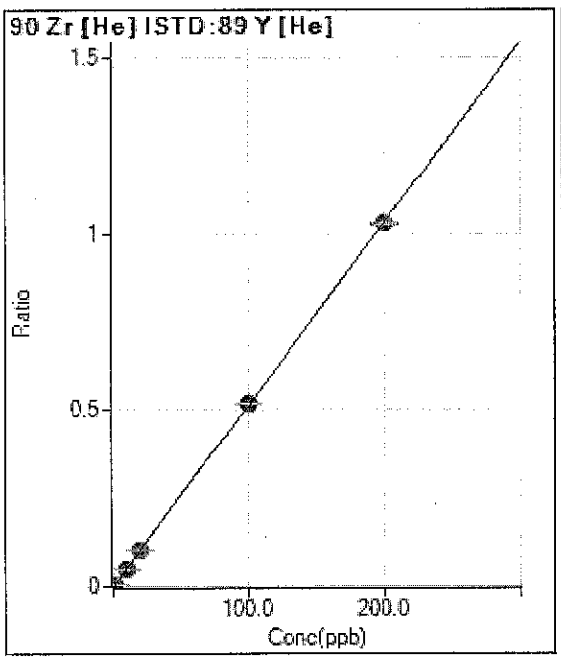
Min Conc: <None>



	Rjct	Conc.	Calc Conc.	CPS	Ratio	Det.	RSD
1	☐	0.000	0.000	2940.25	0.0001	P	3.4
2	☐	1.000	0.864	61831.35	0.0026	P	1.0
3	☐	10.000	9.240	622980.08	0.0271	P	0.8
4	☐	20.000	19.234	1277749.47	0.0562	P	0.3
5	☐	100.000	99.336	6336249.75	0.2900	A	0.4
6	☐	200.000	200.447	12209823.40	0.5850	A	0.3

y = 0.0029 * x + 1.2352E-004
R = 1.0000
DL = 0.004276
BEC = 0.04233

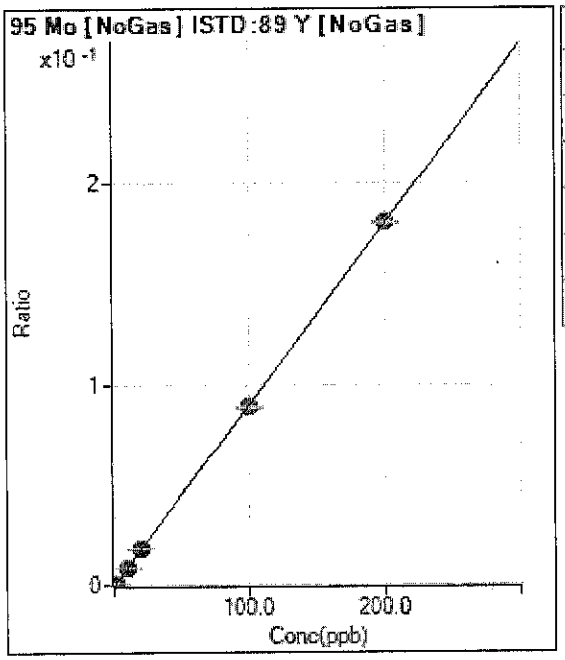
Weight: <None>
Min Conc: <None>



	Rjct	Conc.	Calc Conc.	CPS	Ratio	Det.	RSD
1	☐	0.000	0.000	392.23	0.0002	P	9.1
2	☐	1.000	0.883	11321.40	0.0047	P	2.7
3	☐	10.000	9.475	116575.91	0.0490	P	0.4
4	☐	20.000	19.670	235625.43	0.1015	P	0.1
5	☐	100.000	100.488	1133861.66	0.5180	P	0.2
6	☐	200.000	199.816	2210582.76	1.0299	A	0.2

y = 0.0052 * x + 1.6120E-004
R = 1.0000
DL = 0.008562
BEC = 0.03128

Weight: <None>
Min Conc: <None>



	Rjct	Conc.	Calc Conc.	CPS	Ratio	Det.	RSD
1	☐	0.000	0.000	137.78	0.0000	P	10.3
2	☐	1.000	0.995	21074.76	0.0009	P	2.1
3	☐	10.000	9.960	206363.46	0.0090	P	1.0
4	☐	20.000	19.804	405090.87	0.0178	P	1.1
5	☐	100.000	98.481	1937138.81	0.0887	A	0.8
6	☐	200.000	200.781	3772277.90	0.1807	A	0.3

y = 9.0019E-004 * x + 5.7884E-006

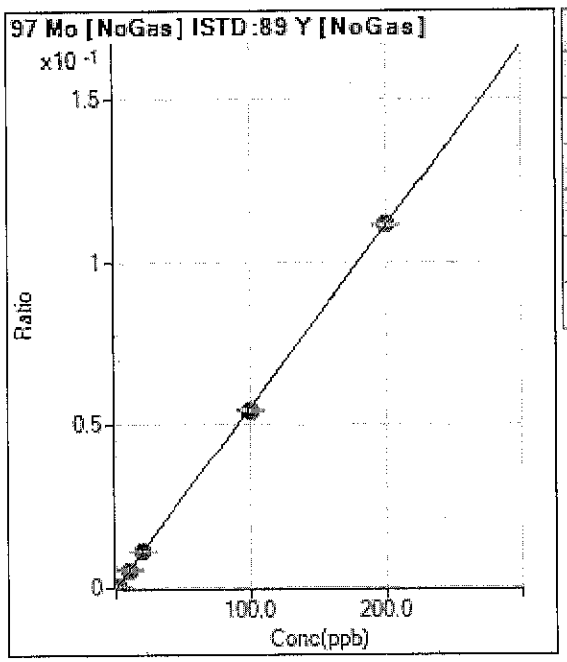
R = 1.0000

DL = 0.001992

BEC = 0.00643

Weight: <None>

Min Conc: <None>



	Rjct	Conc.	Calc Conc.	CPS	Ratio	Det.	RSD
1	☐	0.000	0.000	98.89	0.0000	P	27.4
2	☐	1.000	1.002	13108.20	0.0006	P	1.5
3	☐	10.000	10.092	129015.03	0.0056	P	0.7
4	☐	20.000	20.102	253690.12	0.0112	P	1.4
5	☐	100.000	98.356	1193573.11	0.0546	P	0.5
6	☐	200.000	200.807	2327502.75	0.1115	A	0.3

y = 5.5533E-004 * x + 4.1573E-006

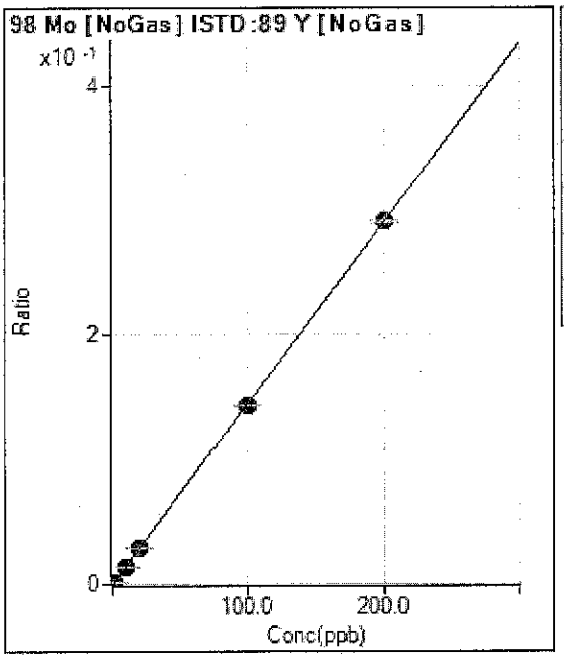
R = 0.9999

DL = 0.006162

BEC = 0.007486

Weight: <None>

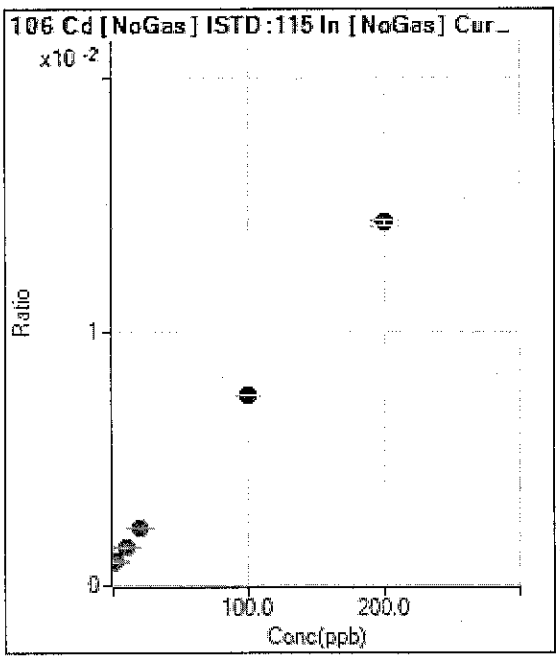
Min Conc: <None>



	Rjct	Conc.	Calc Conc.	CPS	Ratio	Det.	RSD
1	☐	0.000	0.000	330.00	0.0000	P	21.0
2	☐	1.000	0.970	33230.06	0.0014	P	0.4
3	☐	10.000	9.914	331280.86	0.0144	P	0.8
4	☐	20.000	19.961	658375.44	0.0290	P	0.7
5	☐	100.000	98.739	3131564.67	0.1433	A	0.3
6	☐	200.000	200.639	6077457.40	0.2912	A	0.8

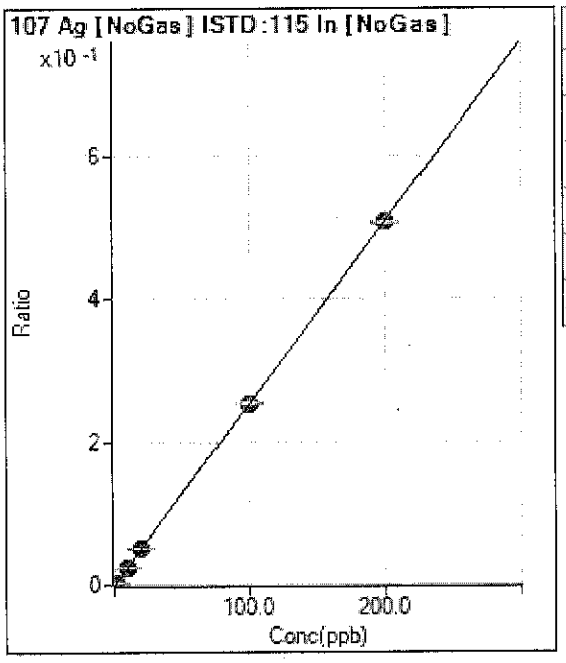
y = 0.0015 * x + 1.3870E-005
R = 1.0000
DL = 0.006025
BEC = 0.009557

Weight: <None>
Min Conc: <None>



	Rjct	Conc.	Calc Conc.	CPS	Ratio	Det.	RSD
1	☐	0.000		22162.93	0.0009	P	2.5
2	☐	1.000		23003.96	0.0010	P	2.3
3	☐	10.000		36618.19	0.0015	P	0.3
4	☐	20.000		51851.94	0.0022	P	0.4
5	☐	100.000		167409.07	0.0075	P	0.3
6	☐	200.000		309892.83	0.0143	P	1.5

Excluded



	Rjct	Conc.	Calc Conc.	CPS	Ratio	Det.	RSD
1	☐	0.000	0.000	476.68	0.0000	P	14.3
2	☐	1.000	0.968	59511.65	0.0025	P	2.0
3	☐	10.000	9.941	598302.27	0.0252	P	0.2
4	☐	20.000	20.291	1190455.40	0.0514	P	0.2
5	☐	100.000	100.059	5646262.55	0.2535	A	0.8
6	☐	200.000	199.944	10978747.90	0.5066	A	0.6

y = 0.0025 * x + 1.9401E-005

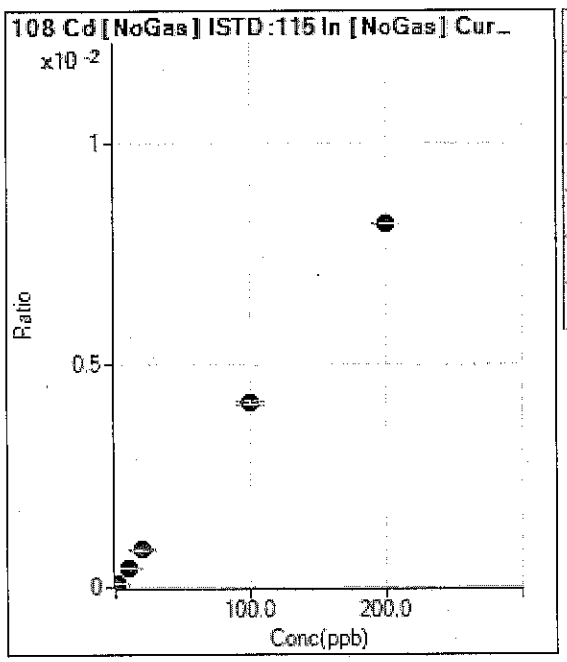
R = 1.0000

DL = 0.003283

BEC = 0.007657

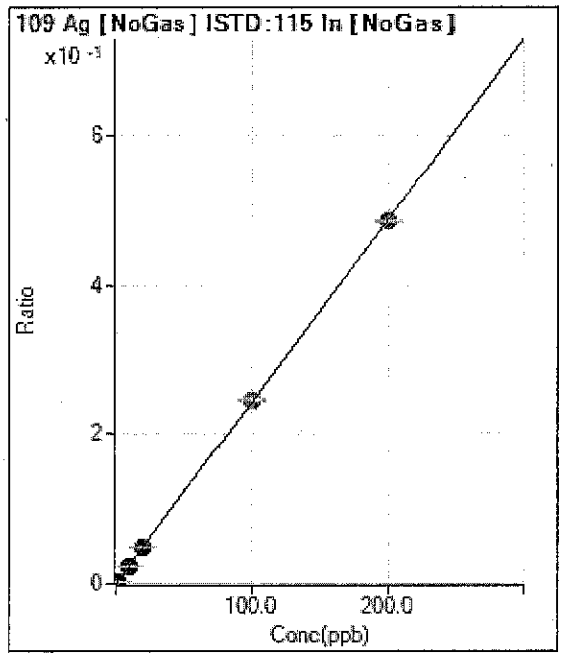
Weight: <None>

Min Conc: <None>



	Rjct	Conc.	Calc Conc.	CPS	Ratio	Det.	RSD
1	☐	0.000		690.02	0.0000	P	6.7
2	☐	1.000		1848.99	0.0001	P	6.0
3	☐	10.000		10590.99	0.0004	P	2.6
4	☐	20.000		19737.78	0.0009	P	2.4
5	☐	100.000		92138.54	0.0041	P	1.8
6	☐	200.000		176663.77	0.0082	P	0.1

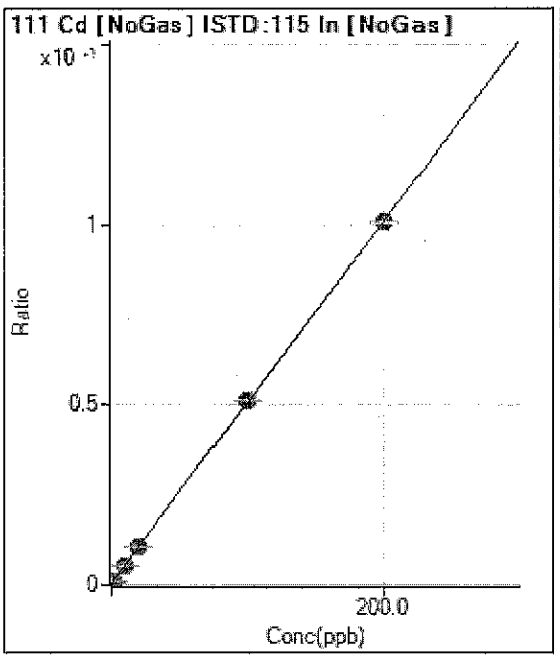
Excluded



	Rjct	Conc.	Calc Conc.	CPS	Ratio	Det.	RSD
1	☐	0.000	0.000	261.11	0.0000	P	26.2
2	☐	1.000	0.955	56257.77	0.0023	P	1.6
3	☐	10.000	9.951	575339.00	0.0242	P	1.6
4	☐	20.000	20.285	1143562.87	0.0494	P	0.4
5	☐	100.000	100.845	5468818.12	0.2456	A	1.0
6	☐	200.000	199.552	10530658.19	0.4859	A	0.4

y = 0.0024 * x + 1.0621E-005
R = 1.0000
DL = 0.003422
BEC = 0.004362

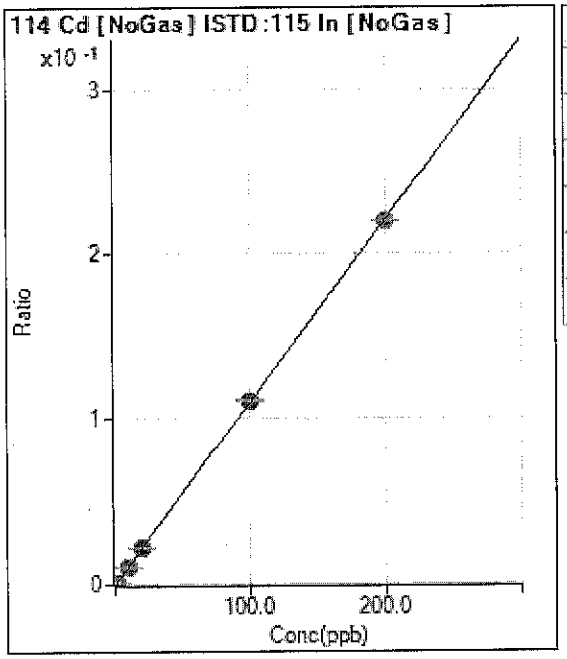
Weight: <None>
Min Conc: <None>



	Rjct	Conc.	Calc Conc.	CPS	Ratio	Det.	RSD
1	☐	0.000	0.000	16208.76	0.0007	P	2.8
2	☐	1.000	0.983	27750.84	0.0012	P	2.4
3	☐	10.000	9.827	132712.76	0.0056	P	0.5
4	☐	20.000	20.213	250080.10	0.0108	P	0.6
5	☐	100.000	100.755	1140817.43	0.0512	P	0.2
6	☐	200.000	199.610	2185239.47	0.1008	A	0.5

y = 5.0188E-004 * x + 6.5981E-004
R = 1.0000
DL = 0.1111
BEC = 1.315

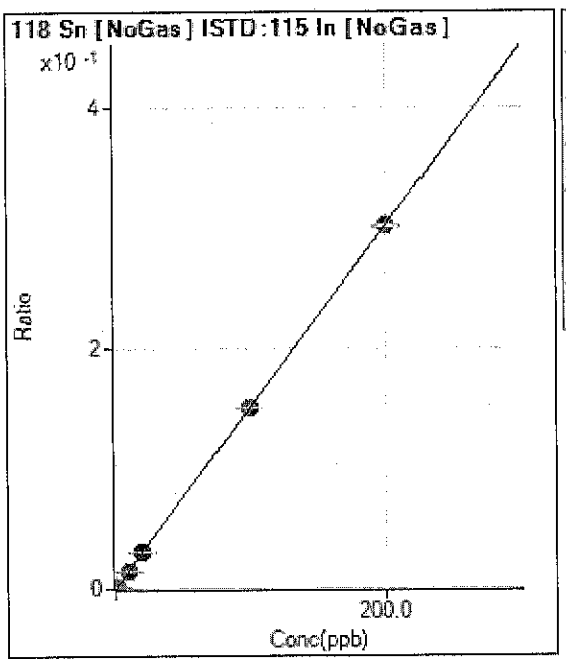
Weight: <None>
Min Conc: <None>



	Rjct	Conc.	Calc Conc.	CPS	Ratio	Det.	RSD
1		0.000	0.000	-939.48	0.0000	P	-11.2
2		1.000	1.001	25642.07	0.0011	P	0.4
3		10.000	9.925	258856.13	0.0109	P	0.7
4		20.000	20.198	514651.19	0.0222	P	0.3
5		100.000	100.887	2476736.77	0.1112	A	0.7
6		200.000	199.540	4767816.40	0.2200	A	0.2

y = 0.0011 * x - 3.8260E-005
R = 1.0000
DL = 0.01171
BEC = -0.03469

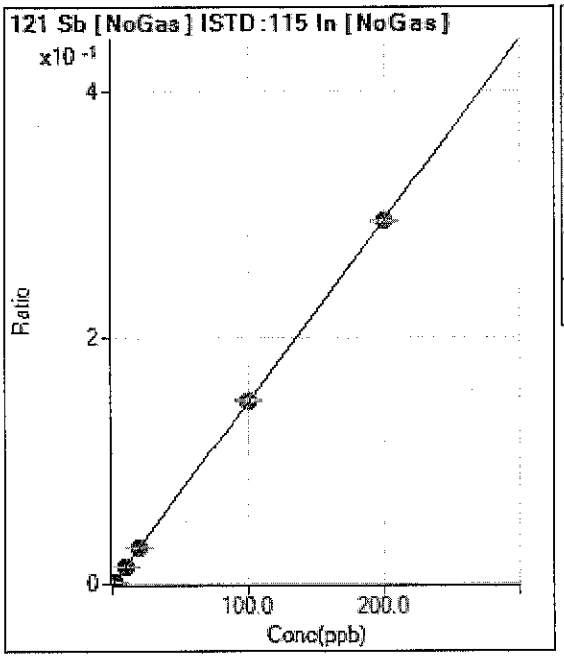
Weight: <None>
Min Conc: <None>



	Rjct	Conc.	Calc Conc.	CPS	Ratio	Det.	RSD
1		0.000	0.000	2904.70	0.0001	P	5.6
2		1.000	0.998	39018.18	0.0016	P	2.0
3		10.000	9.943	358165.25	0.0151	P	0.7
4		20.000	20.019	700488.05	0.0303	P	0.5
5		100.000	99.673	3345114.24	0.1502	A	0.6
6		200.000	200.165	6534404.05	0.3015	A	0.5

y = 0.0015 * x + 1.1823E-004
R = 1.0000
DL = 0.01318
BEC = 0.07852

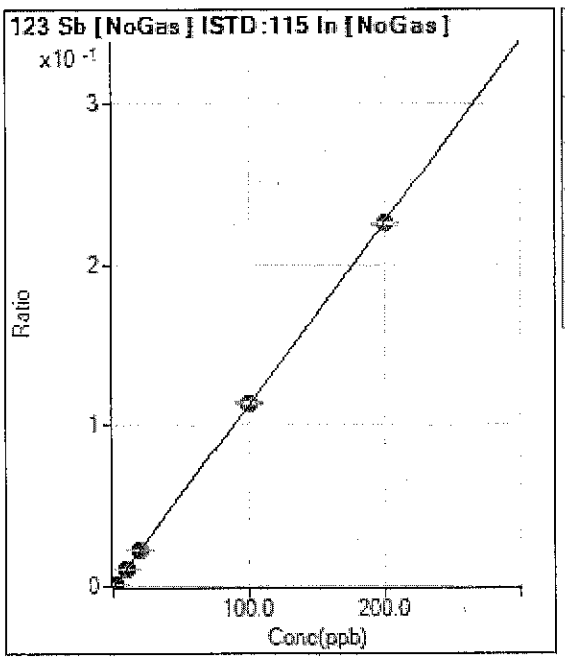
Weight: <None>
Min Conc: <None>



	Rjct	Conc.	Calc Conc.	CPS	Ratio	Det.	RSD
1	☐	0.000	0.000	146.67	0.0000	P	12.1
2	☐	1.000	1.020	36443.76	0.0015	P	0.3
3	☐	10.000	9.973	350107.26	0.0148	P	1.1
4	☐	20.000	20.126	688964.97	0.0298	P	0.6
5	☐	100.000	100.661	3314954.45	0.1489	A	0.9
6	☐	200.000	199.658	6397909.19	0.2952	A	0.5

y = 0.0015 * x + 5.9678E-006
R = 1.0000
DL = 0.001459
BEC = 0.004036

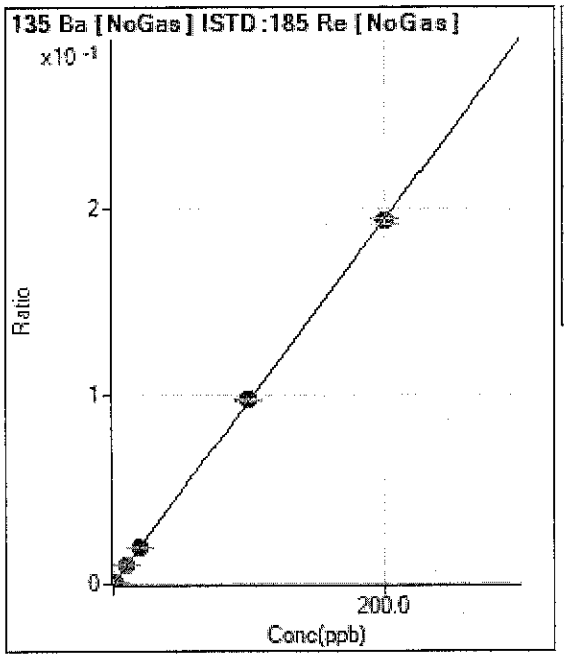
Weight: <None>
Min Conc: <None>



	Rjct	Conc.	Calc Conc.	CPS	Ratio	Det.	RSD
1	☐	0.000	0.000	143.33	0.0000	P	25.6
2	☐	1.000	1.014	27728.81	0.0012	P	1.2
3	☐	10.000	9.998	268254.25	0.0113	P	0.2
4	☐	20.000	20.117	526224.09	0.0227	P	1.1
5	☐	100.000	100.849	2537693.30	0.1140	A	0.9
6	☐	200.000	199.564	4886437.03	0.2255	A	0.7

y = 0.0011 * x + 5.8396E-006
R = 1.0000
DL = 0.003973
BEC = 0.005168

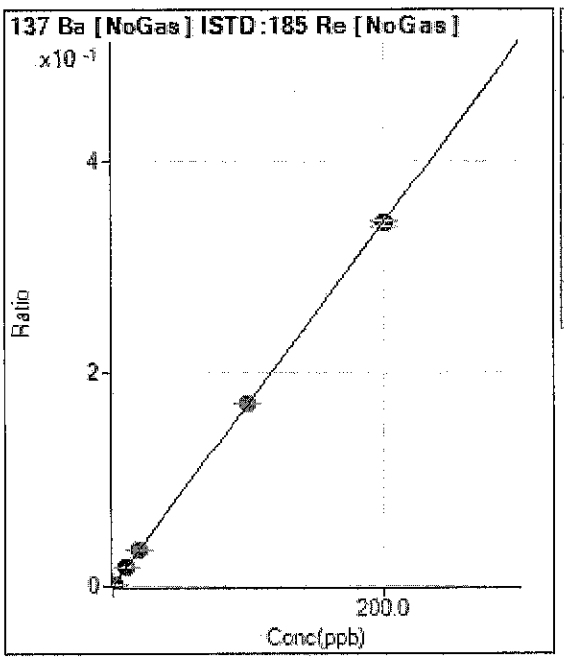
Weight: <None>
Min Conc: <None>



	Rjct	Conc.	Calc Conc.	CPS	Ratio	Det.	RSD
1	☐	0.000	0.000	473.34	0.0000	P	1.7
2	☐	1.000	1.035	10538.82	0.0010	P	1.1
3	☐	10.000	10.244	98609.62	0.0100	P	0.3
4	☐	20.000	20.466	194808.01	0.0199	P	0.4
5	☐	100.000	101.051	928126.94	0.0980	P	0.6
6	☐	200.000	199.416	1805876.04	0.1933	A	1.5

y = 9.6928E-004 * x + 4.6274E-005
R = 1.0000
DL = 0.002461
BEC = 0.04774

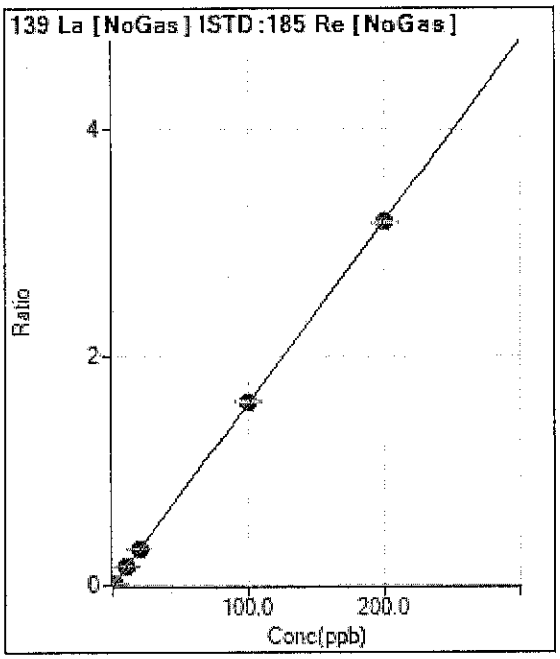
Weight: <None>
Min Conc: <None>



	Rjct	Conc.	Calc Conc.	CPS	Ratio	Det.	RSD
1	☐	0.000	0.000	665.57	0.0001	P	14.9
2	☐	1.000	1.008	17920.51	0.0018	P	2.0
3	☐	10.000	10.157	171989.69	0.0174	P	1.6
4	☐	20.000	20.318	340358.49	0.0347	P	1.4
5	☐	100.000	100.698	1628420.91	0.1719	A	0.2
6	☐	200.000	199.611	3182699.32	0.3407	A	1.5

y = 0.0017 * x + 6.5055E-005
R = 1.0000
DL = 0.01698
BEC = 0.03812

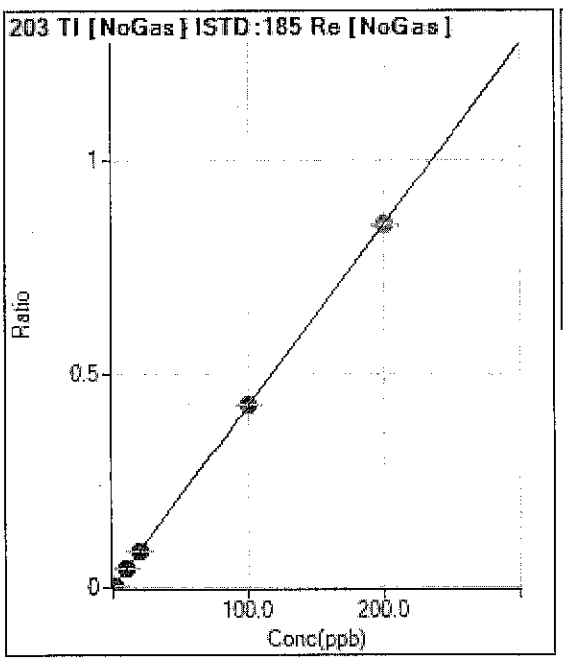
Weight: <None>
Min Conc: <None>



	Rjct	Conc.	Calc Conc.	CPS	Ratio	Det.	RSD
1	☐	0.000	0.000	144.44	0.0000	P	11.4
2	☐	1.000	1.017	162931.74	0.0162	P	1.4
3	☐	10.000	10.135	1596578.03	0.1615	A	0.3
4	☐	20.000	20.336	3174764.18	0.3240	A	0.6
5	☐	100.000	100.857	15221329.95	1.6071	A	0.7
6	☐	200.000	199.531	29700728.82	3.1794	A	0.3

y = 0.0159 * x + 1.4122E-005
R = 1.0000
DL = 0.0003038
BEC = 0.0008862

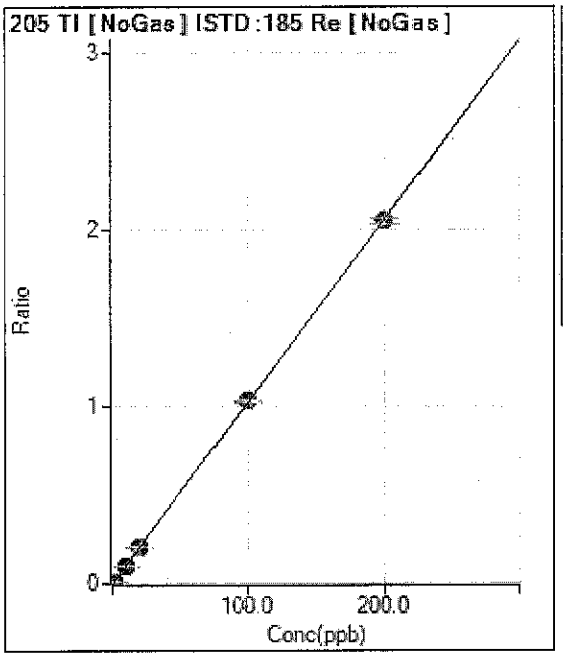
Weight: <None>
Min Conc: <None>



	Rjct	Conc.	Calc Conc.	CPS	Ratio	Det.	RSD
1	☐	0.000	0.000	19023.36	0.0019	P	4.1
2	☐	1.000	1.001	61344.16	0.0061	P	3.2
3	☐	10.000	9.879	433119.31	0.0438	P	0.6
4	☐	20.000	19.840	843707.76	0.0861	P	0.1
5	☐	100.000	100.627	4065392.76	0.4292	A	0.1
6	☐	200.000	199.709	7940343.02	0.8500	A	0.4

y = 0.0042 * x + 0.0019
R = 1.0000
DL = 0.05364
BEC = 0.4379

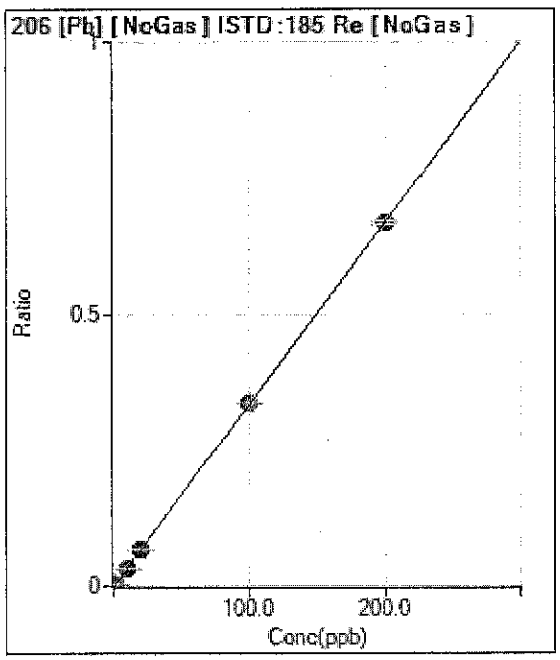
Weight: <None>
Min Conc: <None>



	Rjct	Conc.	Calc Conc.	CPS	Ratio	Det.	RSD
1	☐	0.000	0.000	885.58	0.0001	P	16.0
2	☐	1.000	0.996	103386.86	0.0103	P	1.4
3	☐	10.000	9.983	1012608.68	0.1024	P	0.4
4	☐	20.000	20.115	2021117.70	0.2063	A	1.8
5	☐	100.000	100.207	9731505.72	1.0274	A	0.3
6	☐	200.000	199.886	19143400.91	2.0494	A	1.3

y = 0.0103 * x + 8.6587E-005
R = 1.0000
DL = 0.004066
BEC = 0.008446

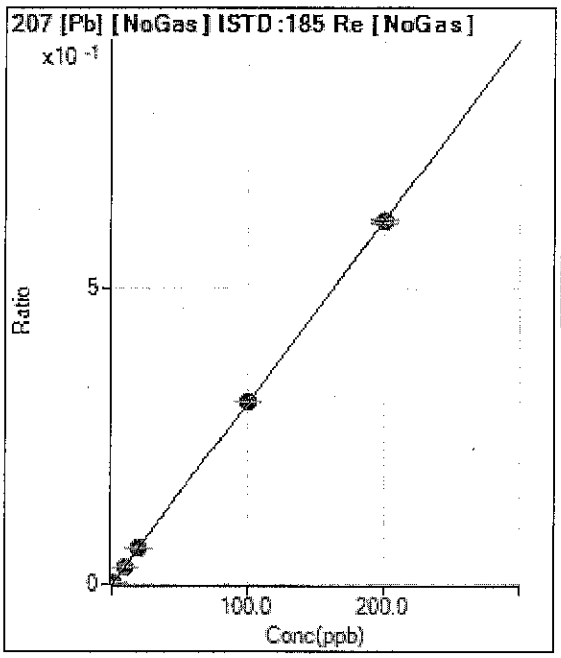
Weight: <None>
Min Conc: <None>



	Rjct	Conc.	Calc Conc.	CPS	Ratio	Det.	RSD
1	☐	0.000	0.000	654.12	0.0001	P	8.5
2	☐	1.000	0.983	33622.34	0.0033	P	1.4
3	☐	10.000	9.974	329973.51	0.0334	P	0.4
4	☐	20.000	19.923	652619.61	0.0666	P	0.5
5	☐	100.000	100.430	3177989.73	0.3355	A	0.5
6	☐	200.000	199.794	6234640.23	0.6674	A	1.1

y = 0.0033 * x + 6.3938E-005
R = 1.0000
DL = 0.004881
BEC = 0.01914

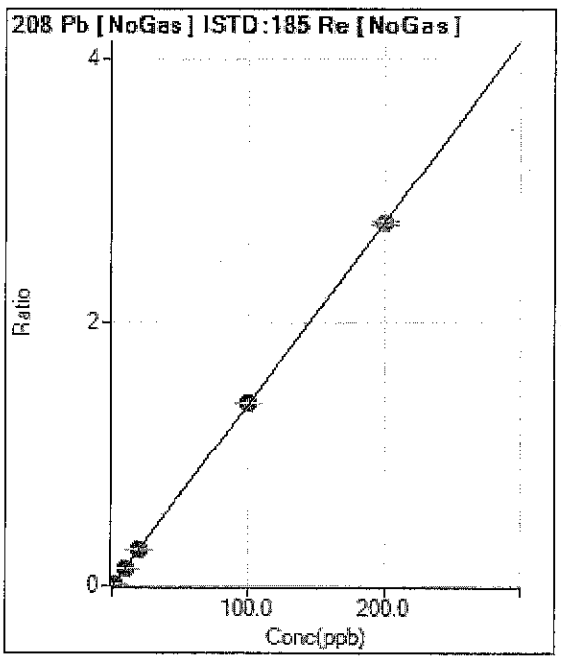
Weight: <None>
Min Conc: <None>



	Rjct	Conc.	Calc Conc.	CPS	Ratio	Det.	RSD
1	☐	0.000	0.000	577.70	0.0001	P	5.4
2	☐	1.000	0.981	30837.11	0.0031	P	0.6
3	☐	10.000	9.974	303500.02	0.0307	P	1.2
4	☐	20.000	19.965	601547.36	0.0614	P	0.3
5	☐	100.000	100.668	2930203.89	0.3094	A	0.4
6	☐	200.000	199.671	5731417.26	0.6136	A	0.9

y = 0.0031 * x + 5.6472E-005
R = 1.0000
DL = 0.002954
BEC = 0.01838

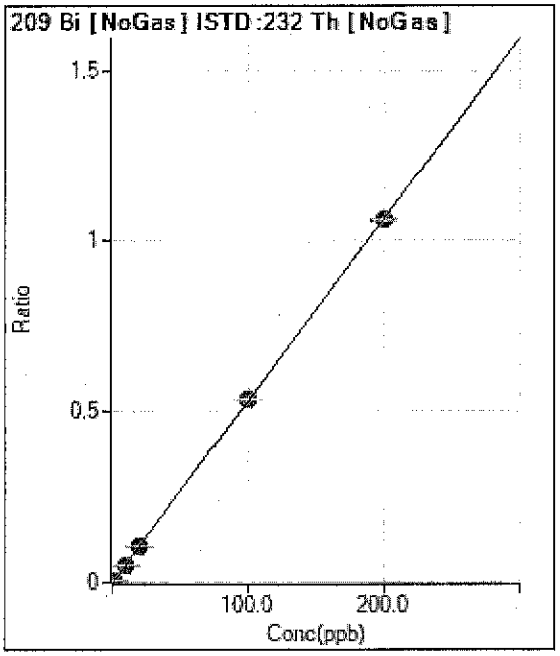
Weight: <None>
Min Conc: <None>



	Rjct	Conc.	Calc Conc.	CPS	Ratio	Det.	RSD
1	☐	0.000	0.000	2620.86	0.0003	P	6.6
2	☐	1.000	0.984	138757.04	0.0138	P	1.0
3	☐	10.000	9.945	1357920.56	0.1374	P	0.8
4	☐	20.000	19.937	2695590.13	0.2751	P	0.2
5	☐	100.000	100.600	13139184.65	1.3873	A	0.8
6	☐	200.000	199.709	25722681.07	2.7537	A	1.0

y = 0.0138 * x + 2.5619E-004
R = 1.0000
DL = 0.003702
BEC = 0.01858

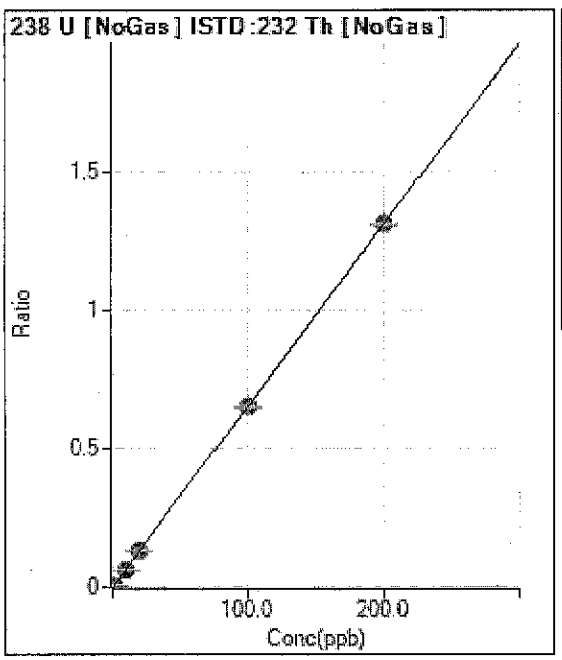
Weight: <None>
Min Conc: <None>



	Rjct	Conc.	Calc Conc.	CPS	Ratio	Det.	RSD
1	☐	0.000	0.000	271.12	0.0000	P	21.4
2	☐	1.000	0.993	111803.11	0.0053	P	1.0
3	☐	10.000	9.951	1114753.04	0.0529	P	0.6
4	☐	20.000	20.218	2245565.74	0.1076	A	1.2
5	☐	100.000	100.557	11091833.17	0.5350	A	0.2
6	☐	200.000	199.702	21324446.37	1.0624	A	0.7

y = 0.0053 * x + 1.2663E-005
R = 1.0000
DL = 0.001529
BEC = 0.00238

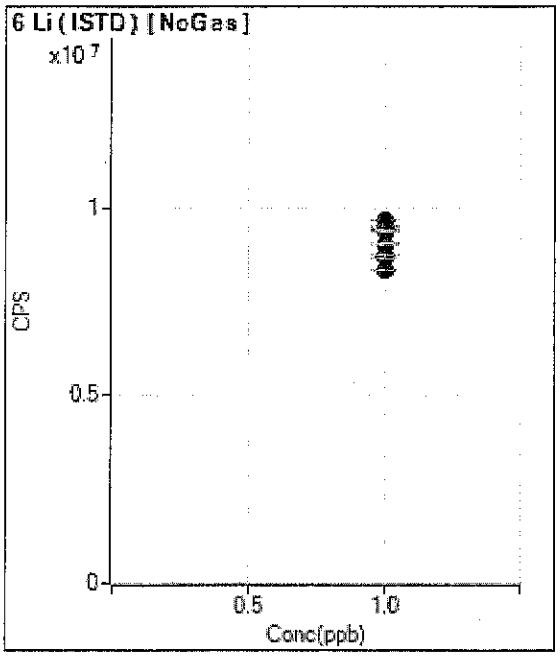
Weight: <None>
Min Conc: <None>



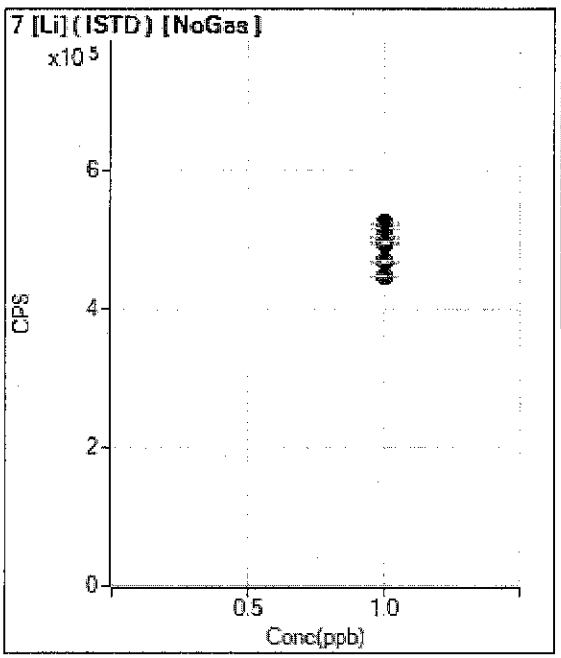
	Rjct	Conc.	Calc Conc.	CPS	Ratio	Det.	RSD
1	☐	0.000	0.000	195.00	0.0000	P	12.6
2	☐	1.000	1.001	138371.01	0.0066	P	0.9
3	☐	10.000	10.017	1378918.21	0.0655	P	0.7
4	☐	20.000	20.268	2766070.17	0.1325	A	0.5
5	☐	100.000	99.410	13474384.33	0.6499	A	1.0
6	☐	200.000	200.267	26279731.33	1.3092	A	0.2

y = 0.0065 * x + 9.1237E-006
R = 1.0000
DL = 0.0005284
BEC = 0.001396

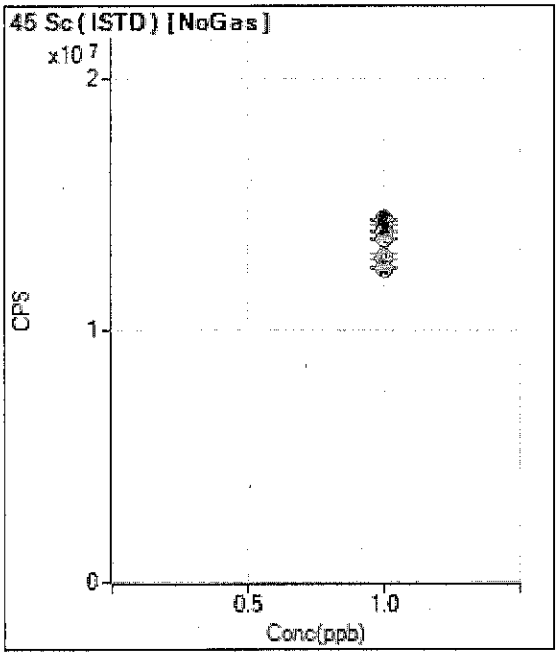
Weight: <None>
Min Conc: <None>



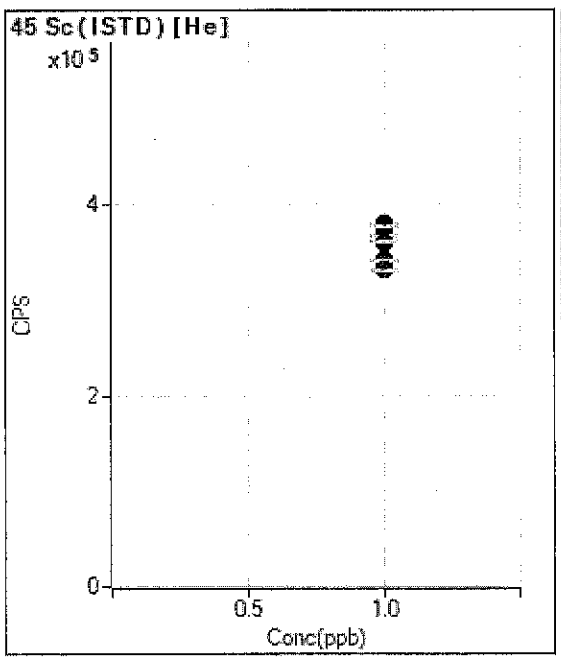
	Rjct	Conc.	Calc Conc.	CPS	Ratio	Det.	RSD
1	☐	1.000		9661181.35		A	0.0
2	☐	1.000		9507312.86		A	0.5
3	☐	1.000		9375131.22		A	0.6
4	☐	1.000		9027832.26		A	0.3
5	☐	1.000		8711965.42		A	0.8
6	☐	1.000		8357898.45		A	0.3



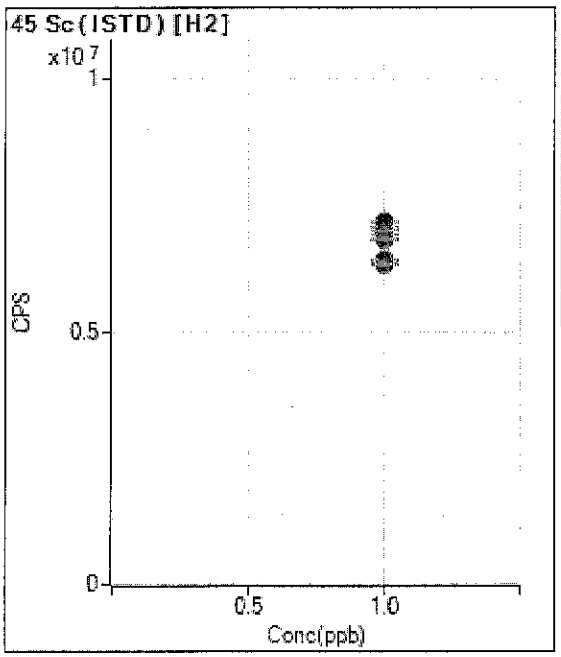
	Rjct	Conc.	Calc Conc.	CPS	Ratio	Det.	RSD
1	☐	1.000		524414.89		P	0.7
2	☐	1.000		516712.30		P	0.1
3	☐	1.000		505805.79		P	0.6
4	☐	1.000		494835.95		P	0.6
5	☐	1.000		469329.08		P	0.5
6	☐	1.000		447773.54		P	0.1



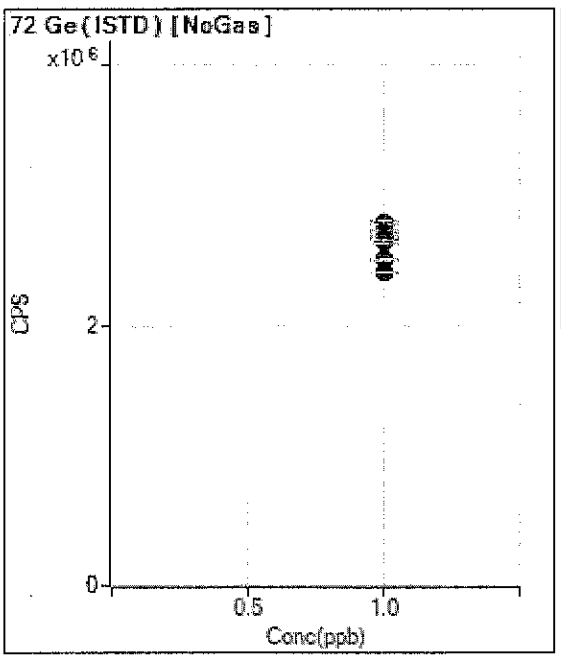
	Rjct	Conc.	Calc Conc.	CPS	Ratio	Det.	RSD
1	☐	1.000		14429421.09		A	0.4
2	☐	1.000		14216673.88		A	0.2
3	☐	1.000		13963029.17		A	0.3
4	☐	1.000		13654503.90		A	0.6
5	☐	1.000		12941503.65		A	1.5
6	☐	1.000		12494733.95		A	0.3



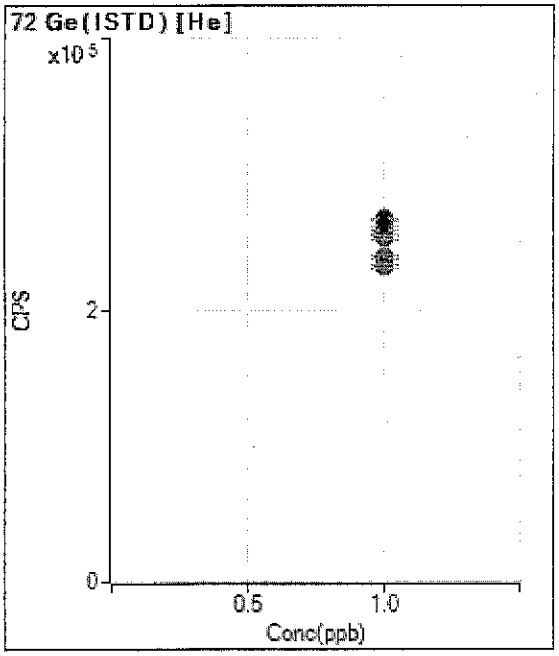
	Rjct	Conc.	Calc Conc.	CPS	Ratio	Det.	RSD
1	☐	1.000		379765.36		P	0.6
2	☐	1.000		376967.68		P	0.7
3	☐	1.000		366772.37		P	0.5
4	☐	1.000		361078.13		P	0.8
5	☐	1.000		341366.62		P	0.2
6	☐	1.000		332020.30		P	0.6



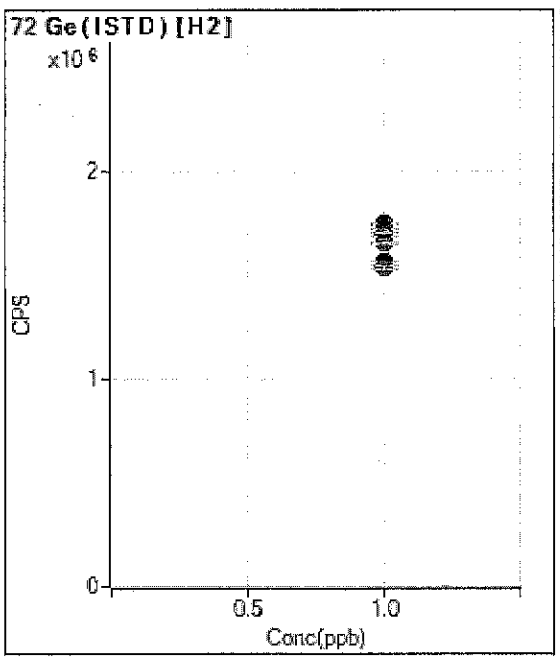
	Rjct	Conc.	Calc Conc.	CPS	Ratio	Det.	RSD
1	☐	1.000		7178986.66		A	0.6
2	☐	1.000		7066243.33		A	0.7
3	☐	1.000		6966819.59		A	0.8
4	☐	1.000		6814437.09		A	0.5
5	☐	1.000		6425610.16		A	0.7
6	☐	1.000		6326763.92		A	0.8



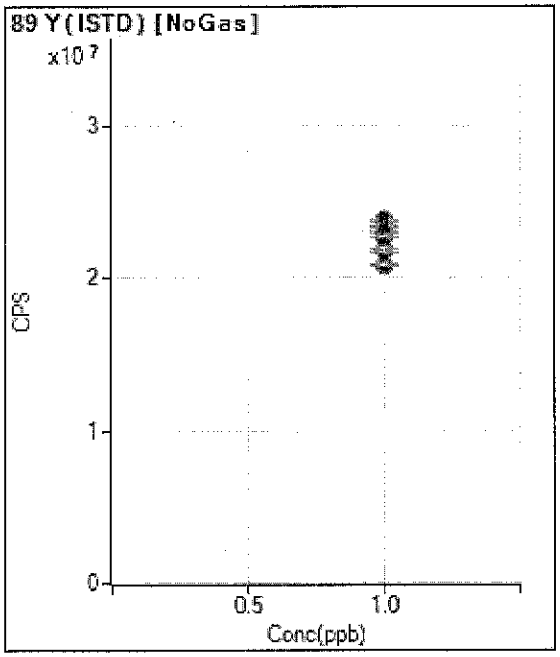
	Rjct	Conc.	Calc Conc.	CPS	Ratio	Det.	RSD
1	☐	1.000		2787931.42		A	1.1
2	☐	1.000		2724761.63		A	0.5
3	☐	1.000		2677093.02		A	0.4
4	☐	1.000		2644038.65		A	0.8
5	☐	1.000		2505037.20		A	0.1
6	☐	1.000		2405170.53		A	0.1



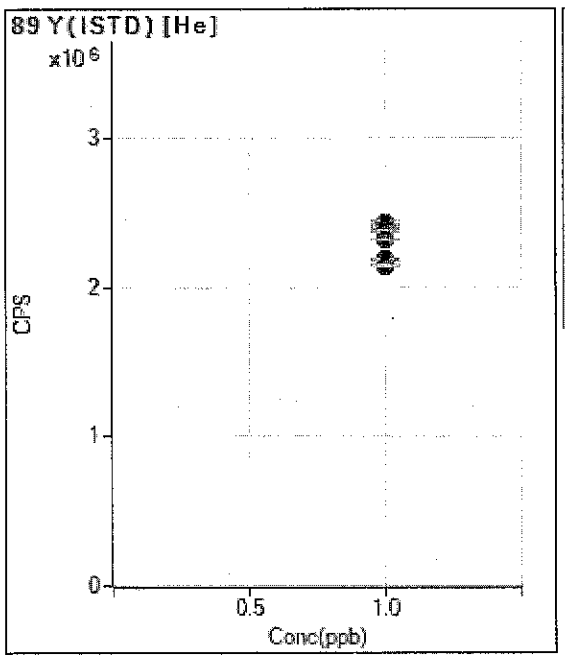
	Rjct	Conc.	Calc Conc.	CPS	Ratio	Det.	RSD
1	☐	1.000		266760.50		P	0.7
2	☐	1.000		261494.45		P	0.5
3	☐	1.000		257629.89		P	1.2
4	☐	1.000		252776.98		P	1.0
5	☐	1.000		239033.26		P	1.1
6	☐	1.000		232026.57		P	1.0



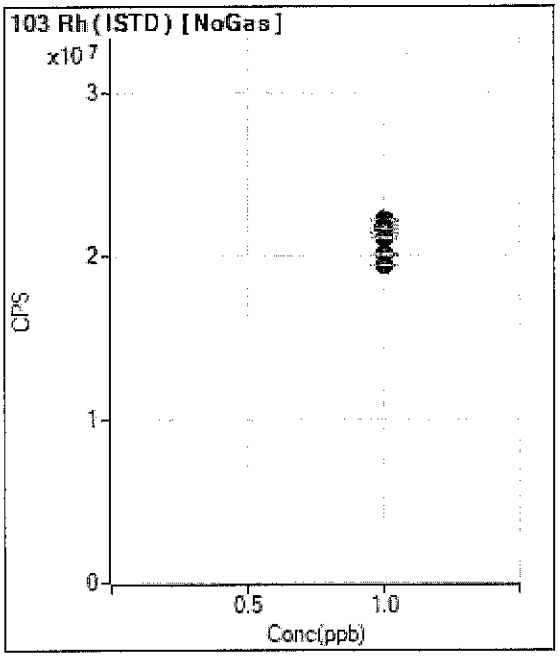
	Rjct	Conc.	Calc Conc.	CPS	Ratio	Det.	RSD
1	☐	1.000		1743323.47		A	0.4
2	☐	1.000		1720185.07		A	0.3
3	☐	1.000		1689034.93		A	0.9
4	☐	1.000		1650119.20		A	0.1
5	☐	1.000		1559823.51		A	0.3
6	☐	1.000		1534637.65		A	0.8



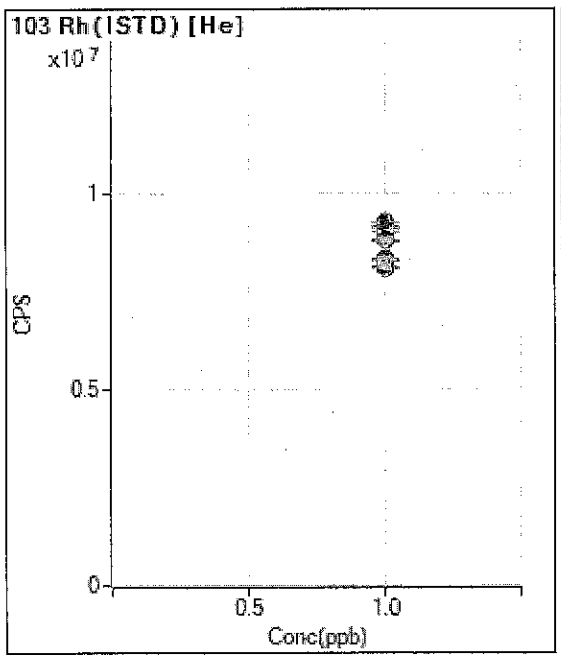
	Rjct	Conc.	Calc Conc.	CPS	Ratio	Det.	RSD
1	☐	1.000		23805999.61		A	0.5
2	☐	1.000		23384562.41		A	0.5
3	☐	1.000		23001689.64		A	0.6
4	☐	1.000		22716424.10		A	0.4
5	☐	1.000		21850913.02		A	0.9
6	☐	1.000		20870811.95		A	0.5



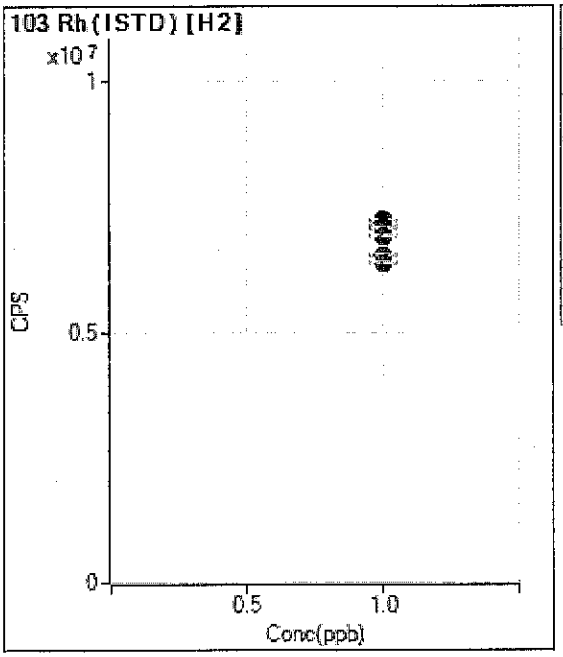
	Rjct	Conc.	Calc Conc.	CPS	Ratio	Det.	RSD
1	☐	1.000		2434148.79		A	0.9
2	☐	1.000		2403530.88		A	0.3
3	☐	1.000		2379403.45		A	0.7
4	☐	1.000		2320712.82		A	0.2
5	☐	1.000		2188783.60		A	0.5
6	☐	1.000		2146353.53		A	0.9



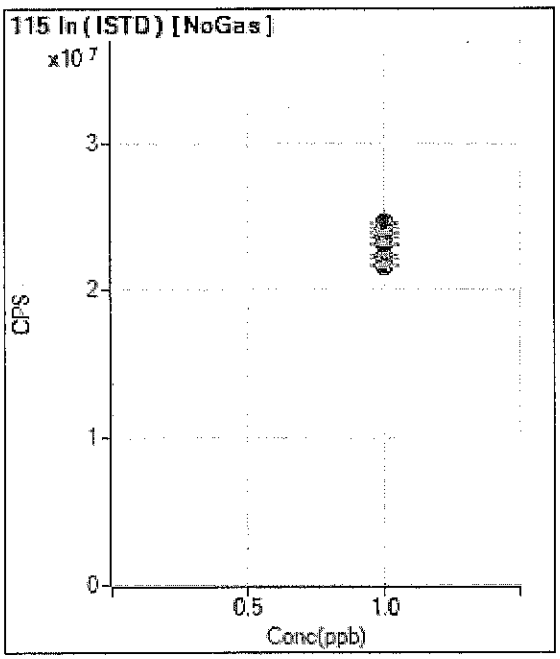
	Rjct	Conc.	Calc Conc.	CPS	Ratio	Det.	RSD
1	☐	1.000		22230679.67		A	0.8
2	☐	1.000		21806430.25		A	0.9
3	☐	1.000		21554652.48		A	1.0
4	☐	1.000		21122766.94		A	0.5
5	☐	1.000		20102159.20		A	0.5
6	☐	1.000		19427812.56		A	0.3



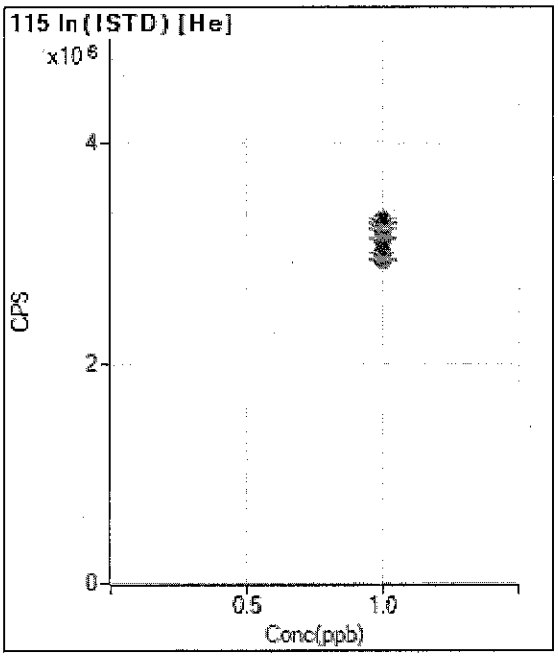
	Rjct	Conc.	Calc Conc.	CPS	Ratio	Det.	RSD
1	☐	1.000		9251224.08		A	0.0
2	☐	1.000		9138557.69		A	0.2
3	☐	1.000		9029797.97		A	0.2
4	☐	1.000		8822092.15		A	0.5
5	☐	1.000		8318141.34		A	0.3
6	☐	1.000		8097929.12		A	0.5



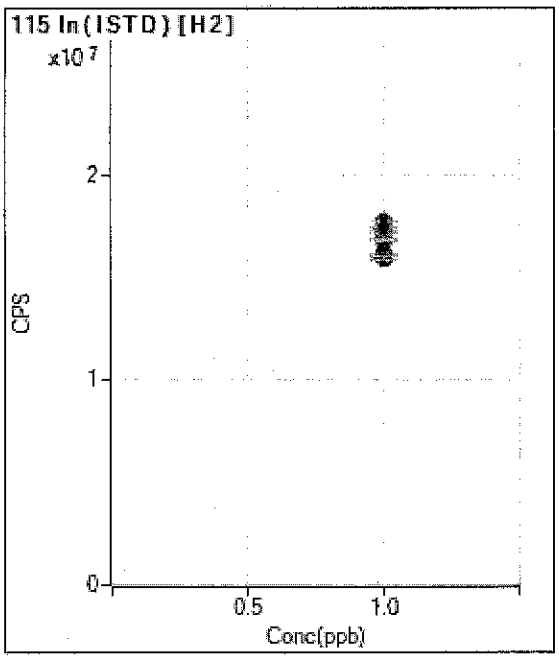
	Rjct	Conc.	Calc Conc.	CPS	Ratio	Det.	RSD
1	☐	1.000		7238106.66		A	0.5
2	☐	1.000		7184123.60		A	1.6
3	☐	1.000		7085141.94		A	0.6
4	☐	1.000		6917373.33		A	0.8
5	☐	1.000		6541087.79		A	0.9
6	☐	1.000		6379950.16		A	0.8



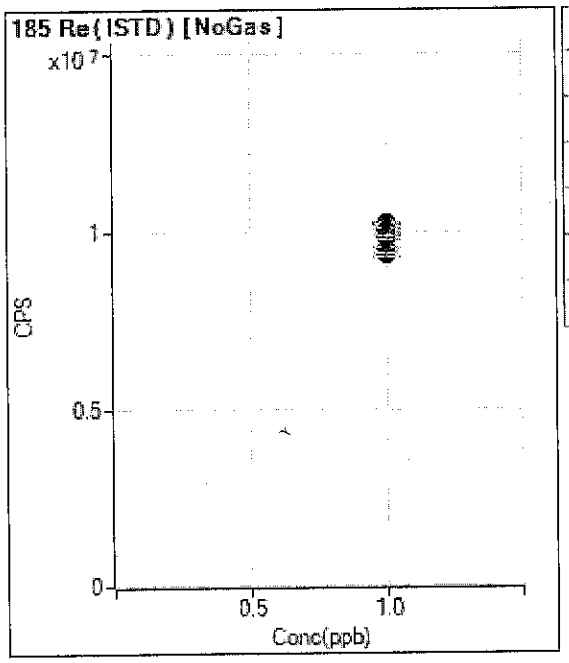
	Rjct	Conc.	Calc Conc.	CPS	Ratio	Det.	RSD
1	☐	1.000		24564983.66		A	0.6
2	☐	1.000		24071991.42		A	0.8
3	☐	1.000		23734560.64		A	1.2
4	☐	1.000		23146186.83		A	0.7
5	☐	1.000		22270300.62		A	1.1
6	☐	1.000		21670671.45		A	0.8



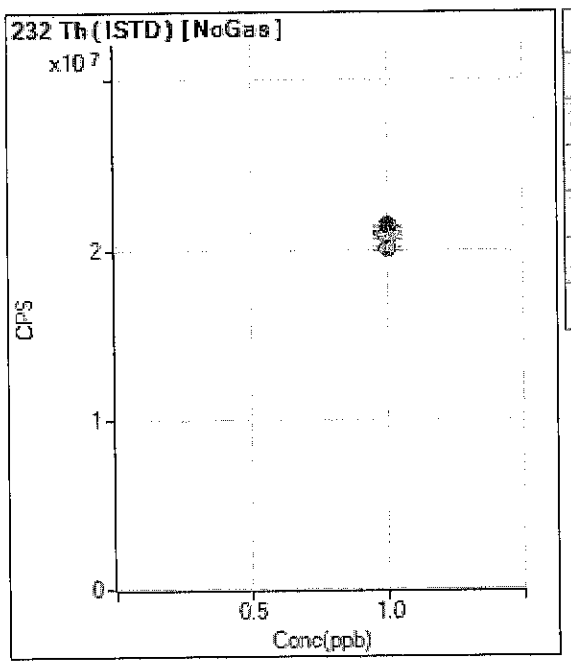
	Rjct	Conc.	Calc Conc.	CPS	Ratio	Det.	RSD
1	☐	1.000		3296958.20		A	0.9
2	☐	1.000		3251566.75		A	0.8
3	☐	1.000		3223963.00		A	0.3
4	☐	1.000		3136235.01		A	0.8
5	☐	1.000		3004152.66		A	0.4
6	☐	1.000		2942119.96		A	0.8



	Rjct	Conc.	Calc Conc.	CPS	Ratio	Det.	RSD
1	☐	1.000		17698508.18		A	0.2
2	☐	1.000		17329693.20		A	1.0
3	☐	1.000		17174148.76		A	0.4
4	☐	1.000		16831822.66		A	1.0
5	☐	1.000		16089652.69		A	0.8
6	☐	1.000		15921574.36		A	1.0



	Rjct	Conc.	Calc Conc.	CPS	Ratio	Det.	RSD
1		1.000		10228830.98		A	0.3
2		1.000		10042737.93		A	1.2
3		1.000		9885221.27		A	0.8
4		1.000		9797325.17		A	1.0
5		1.000		9471706.01		A	1.1
6		1.000		9341862.41		A	1.3



	Rjct	Conc.	Calc Conc.	CPS	Ratio	Det.	RSD
1		1.000		21385110.26		A	0.8
2		1.000		21109775.83		A	0.1
3		1.000		21053043.61		A	0.6
4		1.000		20874061.95		A	0.6
5		1.000		20733860.84		A	0.8
6		1.000		20072761.43		A	1.0

SampID	SampType	AnalDate	Units	TestCode	Uranium
ICV	ICV	12/12/2016 12:21	ppb	TOT3050_6020	20.36720916
ICB	ICB	12/12/2016 12:27	ppb	TOT3050_6020	0.001402883
QCS-ICV-Second Source	QCS	12/12/2016 12:39	ppb	TOT3050_6020	97.22260877
LLICV-1ppb	LLICV	12/12/2016 13:19	ppb	TOT3050_6020	0.991559986
CCB	CCB	12/12/2016 13:24	ppb	TOT3050_6020	-0.00022088
ics	ICSA	12/12/2016 13:30	ppb	TOT3050_6020	0.000288663
icsab	ICSAB	12/12/2016 13:36	ppb	TOT3050_6020	20.16607736
CCV	CCV	12/12/2016 13:41	ppb	TOT3050_6020	19.74719073
CCB	CCB	12/12/2016 13:47	ppb	TOT3050_6020	0.001035574
MB-12629	MBLK	12/12/2016 13:59	ppb	TOT3050_6020	0.004917914
LLQC-12629	LLQC	12/12/2016 14:04	ppb	TOT3050_6020	4.668556127
LCS-12629	LCS	12/12/2016 14:10	ppb	TOT3050_6020	478.119838
UTS-4	LCS2	12/12/2016 14:16	ppb	TOT3050_6020	930.9182076
S1611422-003A	SAMP	12/12/2016 14:21	ppb	TOT3050_6020	29.53288133
S1611422-003Ad	DUP	12/12/2016 14:27	ppb	TOT3050_6020	29.24844278
S1611422-008A	SAMP	12/12/2016 14:33	ppb	TOT3050_6020	28.22558882
S1611422-008Ax5	SD	12/12/2016 14:39	ppb	TOT3050_6020	30.55414425
S1611422-008As	MS	12/12/2016 14:44	ppb	TOT3050_6020	459.2919646
CCV	CCV	12/12/2016 14:50	ppb	TOT3050_6020	20.16775184
CCB	CCB	12/12/2016 14:56	ppb	TOT3050_6020	0.011069536
S1611422-008Amsd	MSD	12/12/2016 15:02	ppb	TOT3050_6020	463.8065977
S1611422-013A	SAMP	12/12/2016 15:19	ppb	TOT3050_6020	377.0969389
S1611422-014A	SAMP	12/12/2016 15:25	ppb	TOT3050_6020	27.6630293
S1611422-015A	SAMP	12/12/2016 15:30	ppb	TOT3050_6020	24.30314528
S1611422-019A	SAMP	12/12/2016 15:36	ppb	TOT3050_6020	26.69318713
S1611422-020A	SAMP	12/12/2016 15:42	ppb	TOT3050_6020	39.49594007
S1611422-021A	SAMP	12/12/2016 15:48	ppb	TOT3050_6020	45.29963834
S1611422-026A	SAMP	12/12/2016 15:53	ppb	TOT3050_6020	59.98010955
CCV	CCV	12/12/2016 15:59	ppb	TOT3050_6020	20.2704644
CCB	CCB	12/12/2016 16:05	ppb	TOT3050_6020	0.001274883
S1611422-027A	SAMP	12/12/2016 16:11	ppb	TOT3050_6020	27.68638608
S1611422-028A	SAMP	12/12/2016 16:16	ppb	TOT3050_6020	33.88159796
S1611422-028Ad	DUP	12/12/2016 16:22	ppb	TOT3050_6020	33.71225976
S1611422-031A	SAMP	12/12/2016 16:28	ppb	TOT3050_6020	33.63677029
S1611422-031As	MS	12/12/2016 16:40	ppb	TOT3050_6020	449.5233113
S1611422-031Amsd	MSD	12/12/2016 16:45	ppb	TOT3050_6020	449.0550144
CCV	CCV	12/12/2016 17:08	ppb	TOT3050_6020	20.25562807
CCB	CCB	12/12/2016 17:14	ppb	TOT3050_6020	0.002315206
S1611422-032A	SAMP	12/12/2016 17:20	ppb	TOT3050_6020	27.59404858
S1611422-034A	SAMP	12/12/2016 17:25	ppb	TOT3050_6020	23.56637881
S1611422-037A	SAMP	12/12/2016 17:31	ppb	TOT3050_6020	19.46932017
S1611422-043A	SAMP	12/12/2016 17:37	ppb	TOT3050_6020	22.26739917
MB-12631	MBLK	12/12/2016 17:48	ppb	TOT3050_6020	0.046251008
LLQC-12631	LLQC	12/12/2016 17:54	ppb	TOT3050_6020	4.544809231
LCS-12631	LCS	12/12/2016 18:00	ppb	TOT3050_6020	465.177088
UTS-4	LCS2	12/12/2016 18:05	ppb	TOT3050_6020	899.6586539
S1611422-044A	SAMP	12/12/2016 18:11	ppb	TOT3050_6020	32.28954662
CCV	CCV	12/12/2016 18:17	ppb	TOT3050_6020	20.20435178
CCB	CCB	12/12/2016 18:23	ppb	TOT3050_6020	0.002282322
S1611422-044Ad	DUP	12/12/2016 18:28	ppb	TOT3050_6020	32.05379719

SampID	SampType	AnalDate	Units	TestCode	Uranium
S1611422-045A	SAMP	12/12/2016 18:34	ppb	TOT3050_6020	25.95272888
S1611422-045As	MS	12/12/2016 18:46	ppb	TOT3050_6020	465.3673405
S1611422-045Amsd	MSD	12/12/2016 18:51	ppb	TOT3050_6020	468.2693352
S1611422-046A	SAMP	12/12/2016 19:09	ppb	TOT3050_6020	29.38546437
S1611422-047A	SAMP	12/12/2016 19:14	ppb	TOT3050_6020	84.14226618
S1611422-049A	SAMP	12/12/2016 19:20	ppb	TOT3050_6020	21.54259692
CCV	CCV	12/12/2016 19:26	ppb	TOT3050_6020	20.04910176
CCB	CCB	12/12/2016 19:31	ppb	TOT3050_6020	0.00170493
S1611422-050A	SAMP	12/12/2016 19:37	ppb	TOT3050_6020	19.27968097
S1611422-051A	SAMP	12/12/2016 19:43	ppb	TOT3050_6020	60.8089133
S1611422-060A	SAMP	12/12/2016 19:49	ppb	TOT3050_6020	45.25298118
S1611422-067A	SAMP	12/12/2016 19:54	ppb	TOT3050_6020	19.47235605
S1611422-071A	SAMP	12/12/2016 20:00	ppb	TOT3050_6020	44.53725626
S1611422-074A	SAMP	12/12/2016 20:06	ppb	TOT3050_6020	18.38942231
S1611422-074Ad	DUP	12/12/2016 20:12	ppb	TOT3050_6020	18.54986225
S1611422-078A	SAMP	12/12/2016 20:17	ppb	TOT3050_6020	51.97738297
S1611422-078As	MS	12/12/2016 20:29	ppb	TOT3050_6020	486.007196
CCV	CCV	12/12/2016 20:35	ppb	TOT3050_6020	19.95698308
CCB	CCB	12/12/2016 20:40	ppb	TOT3050_6020	0.001009688
S1611422-078Amsd	MSD	12/12/2016 20:46	ppb	TOT3050_6020	488.3023015
S1611422-079A	SAMP	12/12/2016 21:03	ppb	TOT3050_6020	123.2643791
S1611422-081A	SAMP	12/12/2016 21:09	ppb	TOT3050_6020	99.82806097
CCV	CCV	12/12/2016 21:15	ppb	TOT3050_6020	20.00579795
LLCCV-1ppb	LLCCV	12/12/2016 21:21	ppb	TOT3050_6020	0.970109229
CCB	CCB	12/12/2016 21:26	ppb	TOT3050_6020	0.000349475
CCV	CCV	12/12/2016 21:43	ppb	TOT3050_6020	20.09115607
CCB	CCB	12/12/2016 21:49	ppb	TOT3050_6020	0.001642486

Radium Analysis by Gamma Spectroscopy

Instrument Batch: 16-36

Omega Run 142384

SampID	SampID	SampID	Analyte	Text Rslt	Counts	Error	Time	Result	95% CI	Weight	Samp Type	Prep
MB-12699	12/29/16 10:39	RAD_GAMMA_RA_S	Radium 226		36	9	4500	-0.01	0.07	150	MBLK	12699
ROCKYFLATS-12	12/29/16 13:36	RAD_GAMMA_RA_S	Radium 226		202	20	4500	1.22	0.29	74.21	LCS	12699
S1611422-001A	12/29/16 14:57	RAD_GAMMA_RA_S	Radium 226	1.5 ± 0.2	553	30	4500	1.51	0.17	189.97	SAMP	12699
S1611422-002A	12/29/16 16:20	RAD_GAMMA_RA_S	Radium 226	1.4 ± 0.2	453	27	4500	1.45	0.18	158.91	SAMP	12699
S1611422-003A	12/30/16 8:27	RAD_GAMMA_RA_S	Radium 226	1.5 ± 0.2	481	27	4500	1.45	0.17	169.35	SAMP	12699
S1611422-004A	12/30/16 9:45	RAD_GAMMA_RA_S	Radium 226	1.7 ± 0.2	505	26	4500	1.72	0.19	150.54	SAMP	12699
S1611422-005A	12/30/16 11:02	RAD_GAMMA_RA_S	Radium 226	2.7 ± 0.3	693	32	4500	2.69	0.26	135.24	SAMP	12699
S1611422-006A	12/30/16 12:18	RAD_GAMMA_RA_S	Radium 226	1.3 ± 0.2	433	26	4500	1.32	0.17	166.63	SAMP	12699
S1611422-008A	12/30/16 13:36	RAD_GAMMA_RA_S	Radium 226	1.6 ± 0.2	509	28	4500	1.64	0.19	159.71	SAMP	12699
S1611422-007A	12/30/16 13:36	RAD_GAMMA_RA_S	Radium 226	1.6 ± 0.2	509	28	4500	1.61	0.19	162.13	SAMP	12699
S1611422-009A	12/30/16 16:10	RAD_GAMMA_RA_S	Radium 226	1.6 ± 0.2	471	26	4500	1.59	0.19	150.82	SAMP	12699
S1611422-010A	1/3/17 8:04	RAD_GAMMA_RA_S	Radium 226	1.7 ± 0.2	497	27	4500	1.69	0.19	150.85	SAMP	12699
S1611422-011A	1/3/17 9:29	RAD_GAMMA_RA_S	Radium 226	3.2 ± 0.3	532	27	4500	3.22	0.34	85.08	SAMP	12699
S1611422-012A	1/3/17 11:03	RAD_GAMMA_RA_S	Radium 226	1.4 ± 0.2	486	28	4500	1.43	0.17	174.03	SAMP	12699
S1611422-013A	1/3/17 12:27	RAD_GAMMA_RA_S	Radium 226	5.8 ± 0.3	1359	40	4500	5.78	0.34	127.09	SAMP	12699
S1611422-014A	1/3/17 16:26	RAD_GAMMA_RA_S	Radium 226	1.4 ± 0.2	418	27	4500	1.43	0.20	147.6	SAMP	12699
S1611422-015A	1/4/17 8:06	RAD_GAMMA_RA_S	Radium 226	1.6 ± 0.2	407	24	4500	1.57	0.20	130.75	SAMP	12699
S1611422-016A	1/4/17 9:22	RAD_GAMMA_RA_S	Radium 226	1.5 ± 0.2	362	23	4500	1.49	0.21	120.35	SAMP	12699
S1611422-017A	1/4/17 10:41	RAD_GAMMA_RA_S	Radium 226	2.0 ± 0.2	540	30	4500	2.03	0.24	137.16	SAMP	12699
S1611422-018A	1/4/17 14:22	RAD_GAMMA_RA_S	Radium 226	1.3 ± 0.2	413	27	4500	1.31	0.18	159.23	SAMP	12699
S1611422-019A	1/4/17 15:42	RAD_GAMMA_RA_S	Radium 226	1.4 ± 0.2	371	26	4500	1.40	0.21	131.76	SAMP	12699
S1611422-020A	1/4/17 22:21	RAD_GAMMA_RA_S	Radium 226	3.0 ± 0.3	695	32	4500	2.98	0.28	122.32	SAMP	12699
S1611422-020AD	1/5/17 8:17	RAD_GAMMA_RA_S	Radium 226		638	29	4500	3.56	0.34	93.72	DUP	12699
LCS-15-3-12699	1/5/17 11:22	RAD_GAMMA_RA_S	Radium 226		10022	107	4500	37.03	0.77	150.02	LCS	12699
UTS-4-12699	1/5/17 11:24	RAD_GAMMA_RA_S	Radium 226		3678	64	1800	1019.01	34.72	5	LCS	12699

Reviewed By MRG 1/11/17

LCS-15-3-12699	LCS	RAD_GAMMA_R.	1/5/2017 11:22	Radium 226	37.030206	pCi/g		1	0	LCS-15-3-1269
MB-12699	MBLK	RAD_GAMMA_R.	12/29/2016 10:39	Radium 226	-1.19E-02	pCi/g		1	0	MB-12699
ROCKYFLATS-12699	LCS	RAD_GAMMA_R.	12/29/2016 13:36	Radium 226	1.2206627	pCi/g		1	0	ROCKYFLATS-12
S1611422-001A	SAMP	RAD_GAMMA_R.	12/29/2016 14:57	Radium 226	1.5050362	pCi/g	1.5 ± 0.2	1	1	S1611422-001A
S1611422-002A	SAMP	RAD_GAMMA_R.	12/29/2016 16:20	Radium 226	1.4490164	pCi/g	1.4 ± 0.2	1	1	S1611422-002A
S1611422-003A	SAMP	RAD_GAMMA_R.	12/30/2016 8:27	Radium 226	1.4516964	pCi/g	1.5 ± 0.2	1	1	S1611422-003A
S1611422-004A	SAMP	RAD_GAMMA_R.	12/30/2016 9:45	Radium 226	1.7218044	pCi/g	1.7 ± 0.2	1	1	S1611422-004A
S1611422-005A	SAMP	RAD_GAMMA_R.	12/30/2016 11:02	Radium 226	2.6901781	pCi/g	2.7 ± 0.3	1	1	S1611422-005A
S1611422-006A	SAMP	RAD_GAMMA_R.	12/30/2016 12:18	Radium 226	1.3150903	pCi/g	1.3 ± 0.2	1	1	S1611422-006A
S1611422-007A	SAMP	RAD_GAMMA_R.	12/30/2016 13:36	Radium 226	1.6124492	pCi/g	1.6 ± 0.2	1	1	S1611422-007A
S1611422-008A	SAMP	RAD_GAMMA_R.	12/30/2016 13:36	Radium 226	1.6368817	pCi/g	1.6 ± 0.2	1	1	S1611422-008A
S1611422-009A	SAMP	RAD_GAMMA_R.	12/30/2016 16:10	Radium 226	1.593157	pCi/g	1.6 ± 0.2	1	1	S1611422-009A
S1611422-010A	SAMP	RAD_GAMMA_R.	1/3/2017 8:04	Radium 226	1.6887541	pCi/g	1.7 ± 0.2	1	1	S1611422-010A
S1611422-011A	SAMP	RAD_GAMMA_R.	1/3/2017 9:29	Radium 226	3.2231493	pCi/g	3.2 ± 0.3	1	1	S1611422-011A
S1611422-012A	SAMP	RAD_GAMMA_R.	1/3/2017 11:03	Radium 226	1.4286457	pCi/g	1.4 ± 0.2	1	1	S1611422-012A
S1611422-013A	SAMP	RAD_GAMMA_R.	1/3/2017 12:27	Radium 226	5.7788884	pCi/g	5.8 ± 0.3	1	1	S1611422-013A
S1611422-014A	SAMP	RAD_GAMMA_R.	1/3/2017 16:26	Radium 226	1.4280909	pCi/g	1.4 ± 0.2	1	1	S1611422-014A
S1611422-015A	SAMP	RAD_GAMMA_R.	1/4/2017 8:06	Radium 226	1.5653145	pCi/g	1.6 ± 0.2	1	1	S1611422-015A
S1611422-016A	SAMP	RAD_GAMMA_R.	1/4/2017 9:22	Radium 226	1.4925055	pCi/g	1.5 ± 0.2	1	1	S1611422-016A
S1611422-017A	SAMP	RAD_GAMMA_R.	1/4/2017 10:41	Radium 226	2.0317689	pCi/g	2.0 ± 0.2	1	1	S1611422-017A
S1611422-018A	SAMP	RAD_GAMMA_R.	1/4/2017 14:22	Radium 226	1.3063103	pCi/g	1.3 ± 0.2	1	1	S1611422-018A
S1611422-019A	SAMP	RAD_GAMMA_R.	1/4/2017 15:42	Radium 226	1.4012705	pCi/g	1.4 ± 0.2	1	1	S1611422-019A
S1611422-020A	SAMP	RAD_GAMMA_R.	1/4/2017 22:21	Radium 226	2.9834259	pCi/g	3.0 ± 0.3	1	1	S1611422-020A
S1611422-020AD	DUP	RAD_GAMMA_R.	1/5/2017 8:17	Radium 226	3.5554096	pCi/g		1	0	S1611422-020A
UTS-4-12699	LCS	RAD_GAMMA_R.	1/5/2017 11:24	Radium 226	1019.0116	pCi/g		1	0	UTS-4-12699

Radium Analysis by Gamma Spectroscopy

Instrument Batch: 17-2

Omega Run 142352

SampID	SampID	SampID	Analyte	Text Rslt	Counts	Error	Time	Result	95% CI	Weight	Samp Type	Prep
LCS2-15-3-12699	1/5/17 15:28	RAD_GAMMA_RA_S	Radium 226		10657	109	4500	37.27	0.75	150.02	LCS	12699
S1611422-021A	1/5/17 16:45	RAD_GAMMA_RA_S	Radium 226	2.8 ± 0.2	838	33	4500	2.80	0.22	152.55	SAMP	12699
S1611422-022A	1/5/17 18:01	RAD_GAMMA_RA_S	Radium 226	1.5 ± 0.2	453	27	4500	1.46	0.18	153.45	SAMP	12699
S1611422-023A	1/5/17 19:18	RAD_GAMMA_RA_S	Radium 226	1.9 ± 0.2	473	27	4500	1.92	0.23	121.98	SAMP	12699
S1611422-024A	1/5/17 20:34	RAD_GAMMA_RA_S	Radium 226	1.8 ± 0.2	575	31	4500	1.78	0.20	161.63	SAMP	12699
S1611422-025A	1/5/17 21:51	RAD_GAMMA_RA_S	Radium 226	2.0 ± 0.2	651	31	4500	1.99	0.19	164.92	SAMP	12699
S1611422-026A	1/5/17 23:07	RAD_GAMMA_RA_S	Radium 226	2.3 ± 0.2	710	31	4500	2.26	0.20	159.31	SAMP	12699
S1611422-027A	1/6/17 0:23	RAD_GAMMA_RA_S	Radium 226	1.6 ± 0.2	473	27	4500	1.55	0.18	151.24	SAMP	12699
S1611422-028A	1/6/17 1:39	RAD_GAMMA_RA_S	Radium 226	1.7 ± 0.2	517	28	4500	1.74	0.19	147.99	SAMP	12699
S1611422-029A	1/6/17 2:56	RAD_GAMMA_RA_S	Radium 226	1.8 ± 0.2	539	27	4500	1.78	0.18	151.28	SAMP	12699
S1611422-030A	1/6/17 4:12	RAD_GAMMA_RA_S	Radium 226	2.0 ± 0.2	591	27	4500	1.98	0.19	149.61	SAMP	12699
S1611422-031A	1/6/17 5:29	RAD_GAMMA_RA_S	Radium 226	1.8 ± 0.2	546	30	4500	1.83	0.21	149.55	SAMP	12699
S1611422-032A	1/6/17 6:45	RAD_GAMMA_RA_S	Radium 226	2.0 ± 0.2	585	27	4500	1.97	0.19	148.99	SAMP	12699
S1611422-033A	1/6/17 8:02	RAD_GAMMA_RA_S	Radium 226	2.3 ± 0.2	667	29	4500	2.31	0.20	145.86	SAMP	12699
S1611422-034A	1/6/17 9:18	RAD_GAMMA_RA_S	Radium 226	1.4 ± 0.2	454	28	4500	1.43	0.18	157.2	SAMP	12699
S1611422-035A	1/6/17 10:34	RAD_GAMMA_RA_S	Radium 226	1.4 ± 0.2	374	24	4500	1.42	0.19	128.16	SAMP	12699
S1611422-036A	1/6/17 11:51	RAD_GAMMA_RA_S	Radium 226	2.9 ± 0.2	882	35	4500	2.89	0.23	155.8	SAMP	12699
S1611422-037A	1/6/17 13:07	RAD_GAMMA_RA_S	Radium 226	1.3 ± 0.2	399	26	4500	1.33	0.18	147.71	SAMP	12699
S1611422-038A	1/6/17 14:24	RAD_GAMMA_RA_S	Radium 226	2.1 ± 0.2	625	31	4500	2.10	0.21	149.91	SAMP	12699
S1611422-039A	1/6/17 15:40	RAD_GAMMA_RA_S	Radium 226	2.0 ± 0.2	538	27	4500	1.97	0.20	136.45	SAMP	12699
S1611422-040A	1/6/17 16:57	RAD_GAMMA_RA_S	Radium 226	3.3 ± 0.3	629	28	4500	3.32	0.30	95.35	SAMP	12699
S1611422-040AD	1/6/17 18:14	RAD_GAMMA_RA_S	Radium 226		577	28	4500	3.34	0.33	86.7	DUP	12699
MB2-12699	1/6/17 21:42	RAD_GAMMA_RA_S	Radium 226		45	9	4500	0.06	0.06	150	MBLK	12699

Reviewed By [signature] 1/12/17

LCS2-15-3-12699	LCS	RAD_GAMI	1/5/2017 15:28	Radium 226	37.265055	pCi/g		1	0	LCS2-15-3-126	0
MB2-12699	MBLK	RAD_GAMI	1/6/2017 21:42	Radium 226	6.40E-02	pCi/g		1	0	MB2-12699	0
S1611422-021A	SAMP	RAD_GAMI	1/5/2017 16:45	Radium 226	2.7967325	pCi/g	2.8 ± 0.2	1	1	S1611422-021A	0
S1611422-022A	SAMP	RAD_GAMI	1/5/2017 18:01	Radium 226	1.4608543	pCi/g	1.5 ± 0.2	1	1	S1611422-022A	0
S1611422-023A	SAMP	RAD_GAMI	1/5/2017 19:18	Radium 226	1.9239727	pCi/g	1.9 ± 0.2	1	1	S1611422-023A	0
S1611422-024A	SAMP	RAD_GAMI	1/5/2017 20:34	Radium 226	1.7838799	pCi/g	1.8 ± 0.2	1	1	S1611422-024A	0
S1611422-025A	SAMP	RAD_GAMI	1/5/2017 21:51	Radium 226	1.9906458	pCi/g	2.0 ± 0.2	1	1	S1611422-025A	0
S1611422-026A	SAMP	RAD_GAMI	1/5/2017 23:07	Radium 226	2.2555125	pCi/g	2.3 ± 0.2	1	1	S1611422-026A	0
S1611422-027A	SAMP	RAD_GAMI	1/6/2017 0:23	Radium 226	1.5517469	pCi/g	1.6 ± 0.2	1	1	S1611422-027A	0
S1611422-028A	SAMP	RAD_GAMI	1/6/2017 1:39	Radium 226	1.7421854	pCi/g	1.7 ± 0.2	1	1	S1611422-028A	0
S1611422-029A	SAMP	RAD_GAMI	1/6/2017 2:56	Radium 226	1.7807769	pCi/g	1.8 ± 0.2	1	1	S1611422-029A	0
S1611422-030A	SAMP	RAD_GAMI	1/6/2017 4:12	Radium 226	1.9834436	pCi/g	2.0 ± 0.2	1	1	S1611422-030A	0
S1611422-031A	SAMP	RAD_GAMI	1/6/2017 5:29	Radium 226	1.8259931	pCi/g	1.8 ± 0.2	1	1	S1611422-031A	0
S1611422-032A	SAMP	RAD_GAMI	1/6/2017 6:45	Radium 226	1.9705186	pCi/g	2.0 ± 0.2	1	1	S1611422-032A	0
S1611422-033A	SAMP	RAD_GAMI	1/6/2017 8:02	Radium 226	2.3084587	pCi/g	2.3 ± 0.2	1	1	S1611422-033A	0
S1611422-034A	SAMP	RAD_GAMI	1/6/2017 9:18	Radium 226	1.4293511	pCi/g	1.4 ± 0.2	1	1	S1611422-034A	0
S1611422-035A	SAMP	RAD_GAMI	1/6/2017 10:34	Radium 226	1.42495	pCi/g	1.4 ± 0.2	1	1	S1611422-035A	0
S1611422-036A	SAMP	RAD_GAMI	1/6/2017 11:51	Radium 226	2.8869151	pCi/g	2.9 ± 0.2	1	1	S1611422-036A	0
S1611422-037A	SAMP	RAD_GAMI	1/6/2017 13:07	Radium 226	1.325362	pCi/g	1.3 ± 0.2	1	1	S1611422-037A	0
S1611422-038A	SAMP	RAD_GAMI	1/6/2017 14:24	Radium 226	2.098751	pCi/g	2.1 ± 0.2	1	1	S1611422-038A	0
S1611422-039A	SAMP	RAD_GAMI	1/6/2017 15:40	Radium 226	1.9704656	pCi/g	2.0 ± 0.2	1	1	S1611422-039A	0
S1611422-040A	SAMP	RAD_GAMI	1/6/2017 16:57	Radium 226	3.3217345	pCi/g	3.3 ± 0.3	1	1	S1611422-040A	0
S1611422-040AD	DUP	RAD_GAMI	1/6/2017 18:14	Radium 226	3.33772	pCi/g		1	0	S1611422-040A	0

Radium Analysis by Gamma Spectroscopy

Instrument Batch: 17-3

Omega Run 142359

SampID	SampID	SampID	Analyte	Text Rslt	Counts	Error	Time	Result	95% CI	Weight	Samp Type	Prep
MB3-12699	1/7/17 12:56	RAD_GAMMA_RA_S	Radium 226		21	12	4500	-0.02	0.08	150	MBLK	12699
LCS3-15-3-12699	1/7/17 14:13	RAD_GAMMA_RA_S	Radium 226		10851	110	4500	37.95	0.75	150.02	LCS	12699
S1611422-041A	1/7/17 15:30	RAD_GAMMA_RA_S	Radium 226	3.7 ± 0.3	945	35	4500	3.74	0.28	128.97	SAMP	12699
S1611422-042A	1/7/17 16:46	RAD_GAMMA_RA_S	Radium 226	2.0 ± 0.2	616	30	4500	1.97	0.20	157.17	SAMP	12699
S1611422-043A	1/7/17 18:03	RAD_GAMMA_RA_S	Radium 226	1.5 ± 0.2	408	26	4500	1.53	0.20	131.29	SAMP	12699
S1611422-044A	1/7/17 19:19	RAD_GAMMA_RA_S	Radium 226	1.7 ± 0.2	514	27	4500	1.68	0.18	152.49	SAMP	12699
S1611422-045A	1/7/17 20:36	RAD_GAMMA_RA_S	Radium 226	1.7 ± 0.2	519	29	4500	1.71	0.20	151.76	SAMP	12699
S1611422-046A	1/7/17 21:52	RAD_GAMMA_RA_S	Radium 226	1.8 ± 0.2	522	28	4500	1.81	0.20	143.88	SAMP	12699
S1611422-047A	1/7/17 23:09	RAD_GAMMA_RA_S	Radium 226	3.6 ± 0.3	962	35	4500	3.62	0.26	135.9	SAMP	12699
S1611422-048A	1/8/17 0:25	RAD_GAMMA_RA_S	Radium 226	1.8 ± 0.2	554	30	4500	1.81	0.20	153.51	SAMP	12699
S1611422-049A	1/8/17 1:42	RAD_GAMMA_RA_S	Radium 226	1.6 ± 0.2	410	24	4500	1.62	0.20	124.12	SAMP	12699
S1611422-050A	1/8/17 2:59	RAD_GAMMA_RA_S	Radium 226	1.6 ± 0.2	359	23	4500	1.60	0.22	109.06	SAMP	12699
S1611422-051A	1/8/17 4:15	RAD_GAMMA_RA_S	Radium 226	1.8 ± 0.2	548	29	4500	1.76	0.19	155.6	SAMP	12699
S1611422-052A	1/8/17 5:32	RAD_GAMMA_RA_S	Radium 226	1.9 ± 0.2	412	24	4500	1.93	0.23	105.01	SAMP	12699
S1611422-053A	1/8/17 6:48	RAD_GAMMA_RA_S	Radium 226	1.8 ± 0.2	489	26	4500	1.80	0.20	135.08	SAMP	12699
S1611422-054A	1/8/17 9:22	RAD_GAMMA_RA_S	Radium 226	1.3 ± 0.1	446	24	4500	1.32	0.15	166.69	SAMP	12699
S1611422-055A	1/8/17 9:22	RAD_GAMMA_RA_S	Radium 226	1.6 ± 0.2	446	24	4500	1.57	0.17	140.78	SAMP	12699
S1611422-056A	1/8/17 10:38	RAD_GAMMA_RA_S	Radium 226	1.4 ± 0.2	464	29	4500	1.37	0.18	167.61	SAMP	12699
S1611422-057A	1/8/17 11:55	RAD_GAMMA_RA_S	Radium 226	1.4 ± 0.2	445	26	4500	1.40	0.17	157.43	SAMP	12699
S1611422-058A	1/8/17 13:11	RAD_GAMMA_RA_S	Radium 226	0.9 ± 0.1	287	21	4500	0.91	0.14	150.19	SAMP	12699
S1611422-059A	1/8/17 14:28	RAD_GAMMA_RA_S	Radium 226	2.3 ± 0.2	755	33	4500	2.34	0.21	163.33	SAMP	12699
S1611422-060A	1/8/17 15:44	RAD_GAMMA_RA_S	Radium 226	2.0 ± 0.2	499	27	4500	2.05	0.23	121.41	SAMP	12699
S1611422-060AD	1/8/17 17:01	RAD_GAMMA_RA_S	Radium 226		190	18	4500	2.42	0.52	35.49	DUP	12699
ROCKYFLATS-00	1/8/17 18:18	RAD_GAMMA_RA_S	Radium 226		219	20	4500	1.36	0.28	74.21	LCS	12699

Reviewed By MAB 1/12/17

LCS3-15-3-12699	LCS	RAD_GAMMA_I	1/7/2017 14:13	Radium 226	37.9451349	pCi/g		1	0	LCS3-15-3-126	0
MB3-12699	MBLK	RAD_GAMMA_I	1/7/2017 12:56	Radium 226	-2.02E-02	pCi/g		1	0	MB3-12699	0
ROCKYFLATS-001-1	LCS	RAD_GAMMA_I	1/8/2017 18:18	Radium 226	1.36243503	pCi/g		1	0	ROCKYFLATS-00	0
S1611422-041A	SAMP	RAD_GAMMA_I	1/7/2017 15:30	Radium 226	3.74438547	pCi/g	3.7 ± 0.3	1	1	S1611422-041A	0
S1611422-042A	SAMP	RAD_GAMMA_I	1/7/2017 16:46	Radium 226	1.97169066	pCi/g	2.0 ± 0.2	1	1	S1611422-042A	0
S1611422-043A	SAMP	RAD_GAMMA_I	1/7/2017 18:03	Radium 226	1.52717164	pCi/g	1.5 ± 0.2	1	1	S1611422-043A	0
S1611422-044A	SAMP	RAD_GAMMA_I	1/7/2017 19:19	Radium 226	1.68042693	pCi/g	1.7 ± 0.2	1	1	S1611422-044A	0
S1611422-045A	SAMP	RAD_GAMMA_I	1/7/2017 20:36	Radium 226	1.70583704	pCi/g	1.7 ± 0.2	1	1	S1611422-045A	0
S1611422-046A	SAMP	RAD_GAMMA_I	1/7/2017 21:52	Radium 226	1.81022758	pCi/g	1.8 ± 0.2	1	1	S1611422-046A	0
S1611422-047A	SAMP	RAD_GAMMA_I	1/7/2017 23:09	Radium 226	3.61923311	pCi/g	3.6 ± 0.3	1	1	S1611422-047A	0
S1611422-048A	SAMP	RAD_GAMMA_I	1/8/2017 0:25	Radium 226	1.80629605	pCi/g	1.8 ± 0.2	1	1	S1611422-048A	0
S1611422-049A	SAMP	RAD_GAMMA_I	1/8/2017 1:42	Radium 226	1.62386541	pCi/g	1.6 ± 0.2	1	1	S1611422-049A	0
S1611422-050A	SAMP	RAD_GAMMA_I	1/8/2017 2:59	Radium 226	1.60217326	pCi/g	1.6 ± 0.2	1	1	S1611422-050A	0
S1611422-051A	SAMP	RAD_GAMMA_I	1/8/2017 4:15	Radium 226	1.76175499	pCi/g	1.8 ± 0.2	1	1	S1611422-051A	0
S1611422-052A	SAMP	RAD_GAMMA_I	1/8/2017 5:32	Radium 226	1.92939706	pCi/g	1.9 ± 0.2	1	1	S1611422-052A	0
S1611422-053A	SAMP	RAD_GAMMA_I	1/8/2017 6:48	Radium 226	1.79967927	pCi/g	1.8 ± 0.2	1	1	S1611422-053A	0
S1611422-054A	SAMP	RAD_GAMMA_I	1/8/2017 9:22	Radium 226	1.32273536	pCi/g	1.3 ± 0.1	1	1	S1611422-054A	0
S1611422-055A	SAMP	RAD_GAMMA_I	1/8/2017 9:22	Radium 226	1.56617955	pCi/g	1.6 ± 0.2	1	1	S1611422-055A	0
S1611422-056A	SAMP	RAD_GAMMA_I	1/8/2017 10:38	Radium 226	1.37195304	pCi/g	1.4 ± 0.2	1	1	S1611422-056A	0
S1611422-057A	SAMP	RAD_GAMMA_I	1/8/2017 11:55	Radium 226	1.39719782	pCi/g	1.4 ± 0.2	1	1	S1611422-057A	0
S1611422-058A	SAMP	RAD_GAMMA_I	1/8/2017 13:11	Radium 226	0.91129802	pCi/g	0.9 ± 0.1	1	1	S1611422-058A	0
S1611422-059A	SAMP	RAD_GAMMA_I	1/8/2017 14:28	Radium 226	2.34489333	pCi/g	2.3 ± 0.2	1	1	S1611422-059A	0
S1611422-060A	SAMP	RAD_GAMMA_I	1/8/2017 15:44	Radium 226	2.04562826	pCi/g	2.0 ± 0.2	1	1	S1611422-060A	0
S1611422-060AD	DUP	RAD_GAMMA_I	1/8/2017 17:01	Radium 226	2.41913374	pCi/g		1	0	S1611422-060A	0

Radium Analysis by Gamma Spectroscopy

Instrument Batch: 17-4

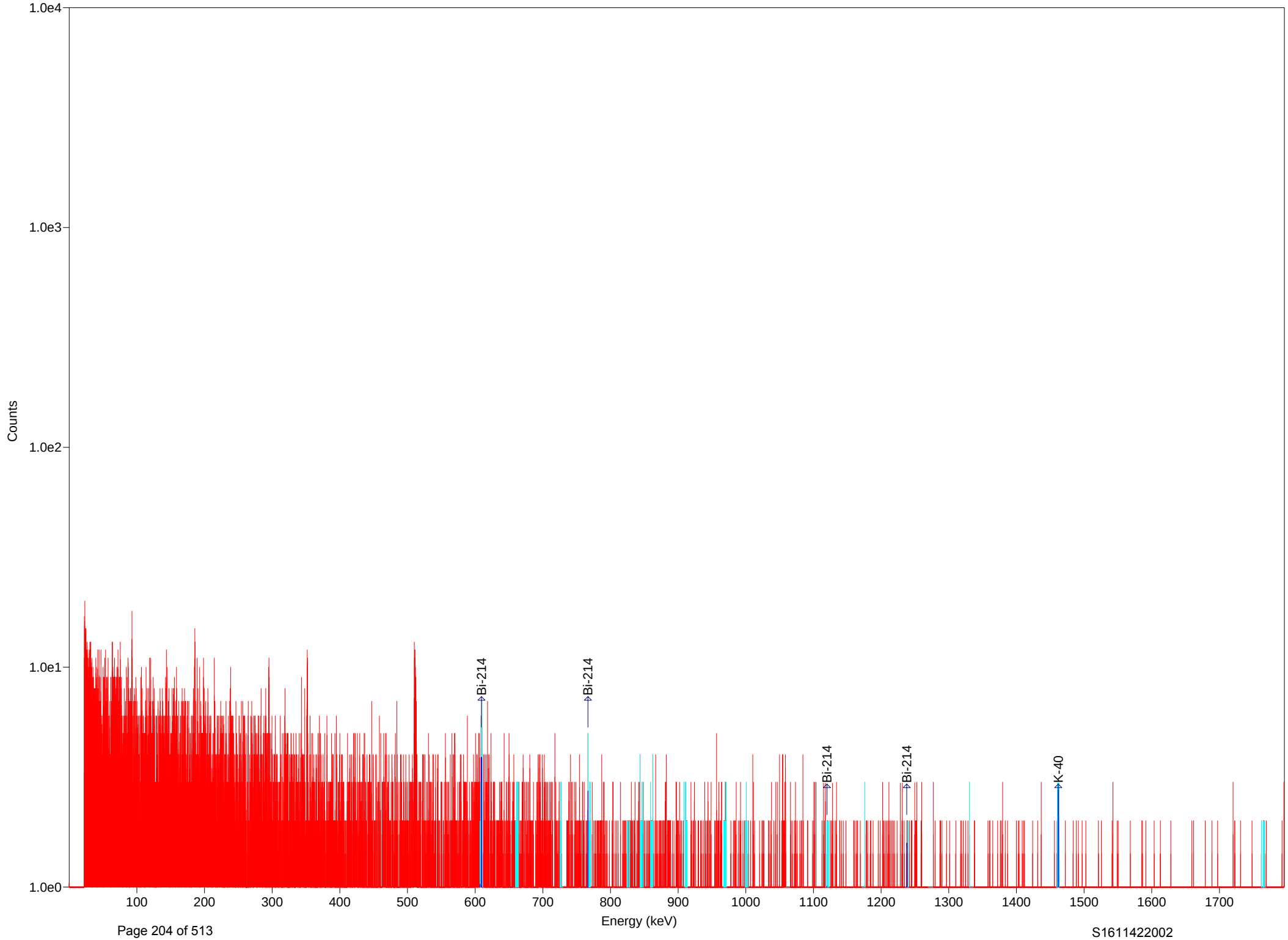
Omega Run 142369

SampID	SampID	SampID	Analyte	Text Rslt	Counts	Error	Time	Result	95% CI	Weight	Samp Type	Prep
MB4-12699	1/8/17 21:00	RAD_GAMMA_RA_S	Radium 226		17	14	4500	-0.03	0.10	150	MBLK	12699
LCS4-15-3-12699	1/8/17 22:16	RAD_GAMMA_RA_S	Radium 226		10651	109	4500	37.24	0.75	150.02	LCS	12699
S1611422-061A	1/8/17 23:33	RAD_GAMMA_RA_S	Radium 226	1.4 ± 0.2	439	27	4500	1.40	0.18	154.6	SAMP	12699
S1611422-062A	1/9/17 0:49	RAD_GAMMA_RA_S	Radium 226	1.4 ± 0.2	399	25	4500	1.37	0.18	142.74	SAMP	12699
S1611422-063A	1/9/17 2:06	RAD_GAMMA_RA_S	Radium 226	4.5 ± 0.3	1357	42	4500	4.55	0.28	153.79	SAMP	12699
S1611422-064A	1/9/17 3:22	RAD_GAMMA_RA_S	Radium 226	1.4 ± 0.2	426	26	4500	1.43	0.18	146.88	SAMP	12699
S1611422-065A	1/9/17 4:39	RAD_GAMMA_RA_S	Radium 226	1.2 ± 0.2	410	28	4500	1.19	0.17	168.73	SAMP	12699
S1611422-066A	1/9/17 5:56	RAD_GAMMA_RA_S	Radium 226	2.0 ± 0.2	566	30	4500	2.04	0.22	138.78	SAMP	12699
S1611422-067A	1/9/17 7:12	RAD_GAMMA_RA_S	Radium 226	1.6 ± 0.2	503	27	4500	1.64	0.18	152.64	SAMP	12699
S1611422-068A	1/9/17 8:28	RAD_GAMMA_RA_S	Radium 226	2.7 ± 0.2	894	34	4500	2.71	0.21	168.15	SAMP	12699
S1611422-069A	1/9/17 9:45	RAD_GAMMA_RA_S	Radium 226	1.5 ± 0.2	489	28	4500	1.49	0.18	163.65	SAMP	12699
S1611422-070A	1/9/17 11:01	RAD_GAMMA_RA_S	Radium 226	2.2 ± 0.2	758	32	4500	2.23	0.19	172.43	SAMP	12699
S1611422-071A	1/9/17 12:18	RAD_GAMMA_RA_S	Radium 226	2.0 ± 0.2	538	27	4500	1.97	0.20	136.48	SAMP	12699
S1611422-072A	1/9/17 13:34	RAD_GAMMA_RA_S	Radium 226	1.5 ± 0.2	491	27	4500	1.46	0.17	167.45	SAMP	12699
S1611422-073A	1/9/17 14:51	RAD_GAMMA_RA_S	Radium 226	1.9 ± 0.2	559	29	4500	1.85	0.20	150.95	SAMP	12699
S1611422-074A	1/9/17 16:07	RAD_GAMMA_RA_S	Radium 226	1.2 ± 0.2	418	27	4500	1.15	0.16	178.54	SAMP	12699
S1611422-075A	1/9/17 17:24	RAD_GAMMA_RA_S	Radium 226	1.3 ± 0.2	336	23	4500	1.27	0.18	128.14	SAMP	12699
S1611422-076A	1/9/17 18:40	RAD_GAMMA_RA_S	Radium 226	2.4 ± 0.2	737	32	4500	2.37	0.21	157.55	SAMP	12699
S1611422-077A	1/9/17 19:56	RAD_GAMMA_RA_S	Radium 226	1.7 ± 0.2	549	29	4500	1.72	0.19	159.91	SAMP	12699
S1611422-078A	1/9/17 21:13	RAD_GAMMA_RA_S	Radium 226	2.2 ± 0.2	612	30	4500	2.24	0.22	137.1	SAMP	12699
S1611422-079A	1/9/17 22:29	RAD_GAMMA_RA_S	Radium 226	4.3 ± 0.3	1305	40	4500	4.33	0.26	155.28	SAMP	12699
S1611422-080A	1/9/17 23:45	RAD_GAMMA_RA_S	Radium 226	1.7 ± 0.2	454	27	4500	1.67	0.21	134.34	SAMP	12699
S1611422-080AD	1/10/17 1:02	RAD_GAMMA_RA_S	Radium 226		512	30	4500	1.55	0.19	164.62	DUP	12699
UTS-4-001-12699	1/10/17 2:19	RAD_GAMMA_RA_S	Radium 226		8823	99	4500	925.20	20.31	5	LCS	12699
S1611422-081A	1/10/17 8:09	RAD_GAMMA_RA_S	Radium 226	1.8 ± 0.2	469	27	4500	1.76	0.21	132.03	SAMP	12699
S1611422-082A	1/10/17 9:25	RAD_GAMMA_RA_S	Radium 226	1.6 ± 0.2	467	27	4500	1.56	0.19	148.88	SAMP	12699
S1611422-083A	1/10/17 10:42	RAD_GAMMA_RA_S	Radium 226	1.3 ± 0.2	421	27	4500	1.30	0.17	159.24	SAMP	12699

Reviewed By MLB 1/12/17

LCS4-15-3-12699	LCS	RAD_GAMMA_	1/8/2017 22:16	Radium 226	37.2440216	pCi/g		1	0	LCS4-15-3-126	0
MB4-12699	MBLK	RAD_GAMMA_	1/8/2017 21:00	Radium 226	-3.42E-02	pCi/g		1	0	MB4-12699	0
S1611422-061A	SAMP	RAD_GAMMA_	1/8/2017 23:33	Radium 226	1.40236366	pCi/g	1.4 ± 0.2	1	1	S1611422-061A	0
S1611422-062A	SAMP	RAD_GAMMA_	1/9/2017 0:49	Radium 226	1.37150917	pCi/g	1.4 ± 0.2	1	1	S1611422-062A	0
S1611422-063A	SAMP	RAD_GAMMA_	1/9/2017 2:06	Radium 226	4.54897124	pCi/g	4.5 ± 0.3	1	1	S1611422-063A	0
S1611422-064A	SAMP	RAD_GAMMA_	1/9/2017 3:22	Radium 226	1.42952516	pCi/g	1.4 ± 0.2	1	1	S1611422-064A	0
S1611422-065A	SAMP	RAD_GAMMA_	1/9/2017 4:39	Radium 226	1.19453668	pCi/g	1.2 ± 0.2	1	1	S1611422-065A	0
S1611422-066A	SAMP	RAD_GAMMA_	1/9/2017 5:56	Radium 226	2.04348874	pCi/g	2.0 ± 0.2	1	1	S1611422-066A	0
S1611422-067A	SAMP	RAD_GAMMA_	1/9/2017 7:12	Radium 226	1.64087623	pCi/g	1.6 ± 0.2	1	1	S1611422-067A	0
S1611422-068A	SAMP	RAD_GAMMA_	1/9/2017 8:28	Radium 226	2.71241293	pCi/g	2.7 ± 0.2	1	1	S1611422-068A	0
S1611422-069A	SAMP	RAD_GAMMA_	1/9/2017 9:45	Radium 226	1.48549145	pCi/g	1.5 ± 0.2	1	1	S1611422-069A	0
S1611422-070A	SAMP	RAD_GAMMA_	1/9/2017 11:01	Radium 226	2.23029138	pCi/g	2.2 ± 0.2	1	1	S1611422-070A	0
S1611422-071A	SAMP	RAD_GAMMA_	1/9/2017 12:18	Radium 226	1.97003242	pCi/g	2.0 ± 0.2	1	1	S1611422-071A	0
S1611422-072A	SAMP	RAD_GAMMA_	1/9/2017 13:34	Radium 226	1.45806203	pCi/g	1.5 ± 0.2	1	1	S1611422-072A	0
S1611422-073A	SAMP	RAD_GAMMA_	1/9/2017 14:51	Radium 226	1.85434933	pCi/g	1.9 ± 0.2	1	1	S1611422-073A	0
S1611422-074A	SAMP	RAD_GAMMA_	1/9/2017 16:07	Radium 226	1.15246676	pCi/g	1.2 ± 0.2	1	1	S1611422-074A	0
S1611422-075A	SAMP	RAD_GAMMA_	1/9/2017 17:24	Radium 226	1.26921491	pCi/g	1.3 ± 0.2	1	1	S1611422-075A	0
S1611422-076A	SAMP	RAD_GAMMA_	1/9/2017 18:40	Radium 226	2.37083552	pCi/g	2.4 ± 0.2	1	1	S1611422-076A	0
S1611422-077A	SAMP	RAD_GAMMA_	1/9/2017 19:56	Radium 226	1.71755976	pCi/g	1.7 ± 0.2	1	1	S1611422-077A	0
S1611422-078A	SAMP	RAD_GAMMA_	1/9/2017 21:13	Radium 226	2.24498177	pCi/g	2.2 ± 0.2	1	1	S1611422-078A	0
S1611422-079A	SAMP	RAD_GAMMA_	1/9/2017 22:29	Radium 226	4.32920674	pCi/g	4.3 ± 0.3	1	1	S1611422-079A	0
S1611422-080A	SAMP	RAD_GAMMA_	1/9/2017 23:45	Radium 226	1.67257703	pCi/g	1.7 ± 0.2	1	1	S1611422-080A	0
S1611422-080AD	DUP	RAD_GAMMA_	1/10/2017 1:02	Radium 226	1.55021561	pCi/g		1	0	S1611422-080A	0
S1611422-081A	SAMP	RAD_GAMMA_	1/10/2017 8:09	Radium 226	1.76158884	pCi/g	1.8 ± 0.2	1	1	S1611422-081A	0
S1611422-082A	SAMP	RAD_GAMMA_	1/10/2017 9:25	Radium 226	1.55515022	pCi/g	1.6 ± 0.2	1	1	S1611422-082A	0
S1611422-083A	SAMP	RAD_GAMMA_	1/10/2017 10:42	Radium 226	1.30205432	pCi/g	1.3 ± 0.2	1	1	S1611422-083A	0
UTS-4-001-12699	LCS	RAD_GAMMA_	1/10/2017 2:19	Radium 226	925.198726	pCi/g		1	0	UTS-4-001-126	0

BACKGROUND 16-36. Real/Live Time = 4504/4500 (s).

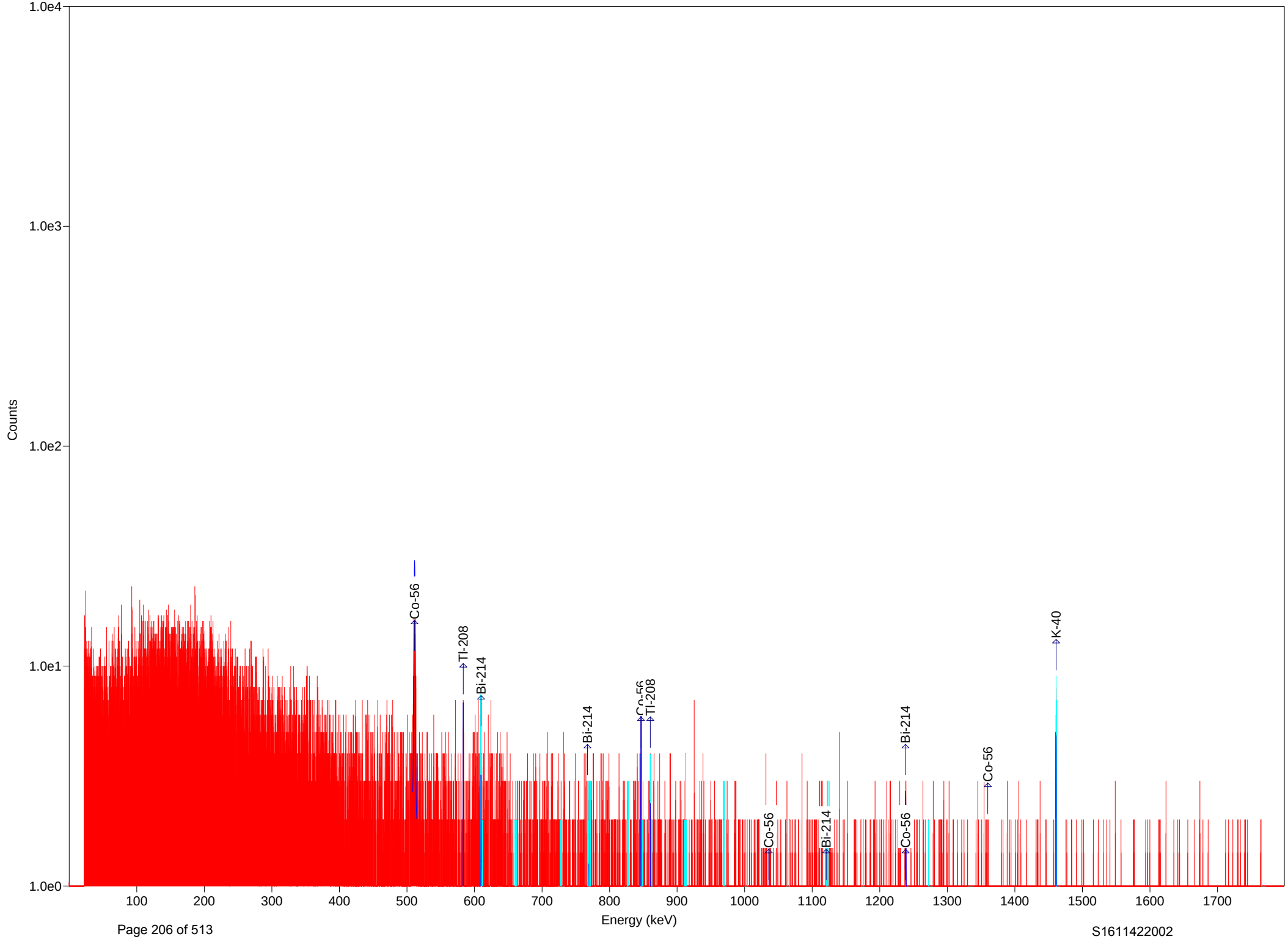


S1611422002

Detector #2 ACQ 29-Dec-2016 at 10:39:16 RT = 4504.6 LT = 4500.0
Rad Chem 2
BACKGROUND 16-36

ROI#	RANGE(keV)		GROSS	NET	+/-	CENTROID	FWHM	FW(1/5)M	LIBRARY	(keV)	µCi	+/-
1	606.93	611.75	55	36	9	609.70	0.57	1.87	Bi-214	609.31	0.0000	0.0000
2	659.29	664.11	30	-12	10	Could not properly fit the peak.						
3	724.58	729.84	21	8	6	726.33	0.99	1.40	Bi-212	727.00	0.0000	0.0000
4	765.77	771.02	29	16	7	766.42	0.22	0.35	Bi-214	768.36	0.0001	0.0000
5	823.38	828.64	22	1	8	Could not properly fit the peak.						
6	843.53	848.79	26	-20	11	Could not properly fit the peak.						
7	857.99	863.25	30	13	8	862.16	0.22	0.35	Tl-208	860.56	0.0000	0.0000
8	908.38	914.07	24	6	8	910.35	2.63	2.76	Ac-228	911.20	0.0000	0.0000
9	966.21	971.90	21	12	6	968.95	1.50	1.65	Ac-228	968.97	0.0000	0.0000
10	998.19	1003.88	23	-9	10	1000.59	0.22	0.35	Pa-234M	1001.03	0.0000	0.0004
11	1059.08	1065.21	6	-4	5	Could not properly fit the peak.						
12	1117.34	1123.47	18	-11	10	Could not properly fit the peak.						
13	1170.34	1176.47	9	-1	6	1175.60	0.27	0.48	Co-60	1173.24	0.0000	0.0000
14	1235.17	1241.30	24	5	8	Could not properly fit the peak.						
15	1269.55	1276.12	5	0	4	Could not properly fit the peak.						
16	1329.34	1335.91	15	10	5	1329.99	0.27	0.48	Co-60	1332.50	0.0000	0.0000
17	1457.88	1464.45	39	29	8	1461.74	1.91	2.08	K-40	1461.00	0.0001	0.0000
18	1761.13	1768.13	15	4	7	1763.86	2.39	2.53	Bi-214	1764.49	0.0000	0.0000

BACKGROUND. Real/Live Time = 4525/4500 (s).

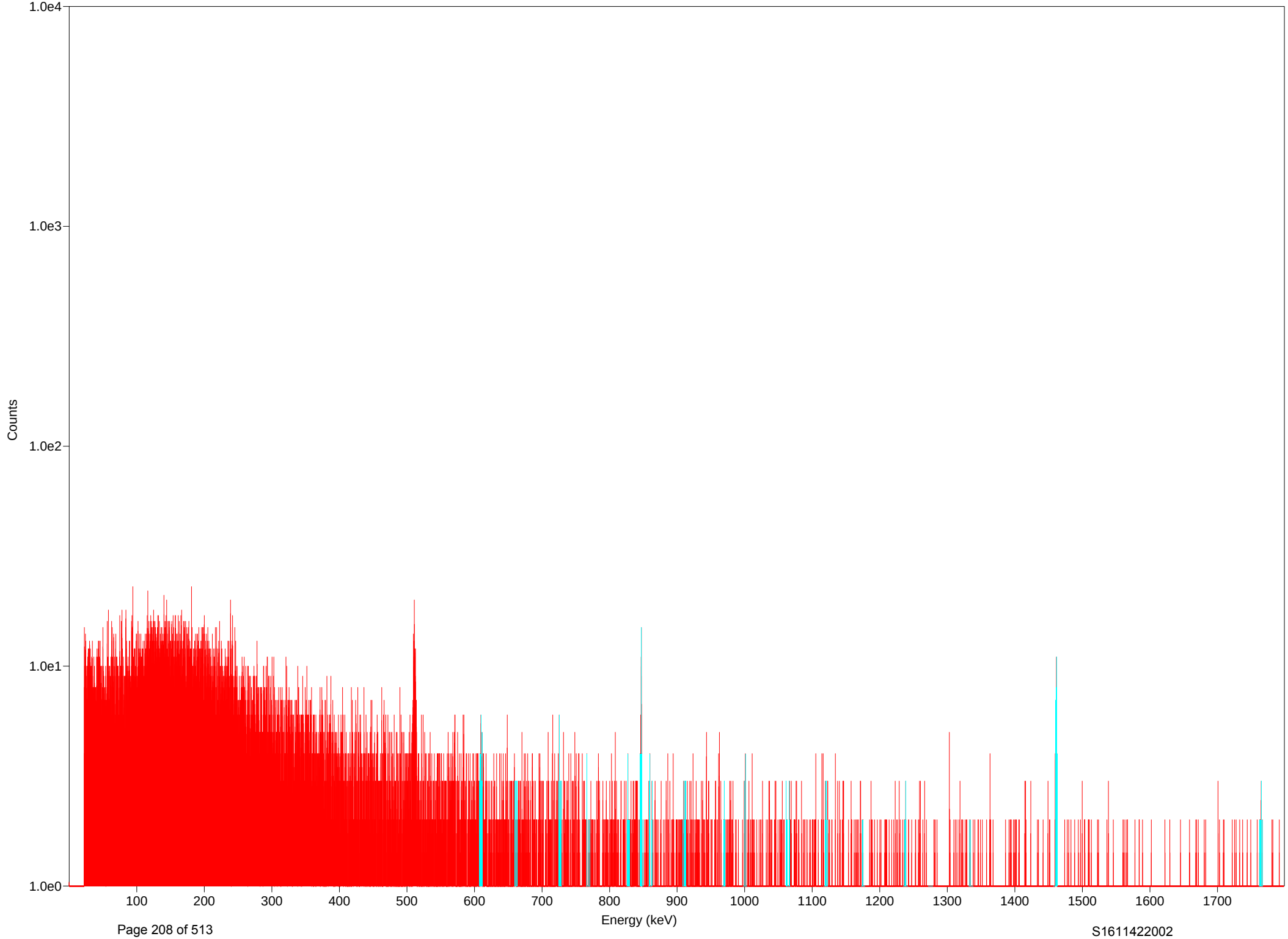


S1611422002

Detector #4 ACQ 06-Jan-2017 at 19:30:53 RT = 4525.6 LT = 4500.0
Rad Chem 1
BACKGROUND

ROI#	RANGE(keV)		GROSS	NET	+/-	CENTROID	FWHM	FW(1/5)M	LIBRARY	(keV)	µCi	+/-
1	607.88	612.71	59	40	9	609.11	0.43	1.40	Bi-214	609.31	0.0000	0.0000
2	659.24	664.07	29	-6	9	660.56	1.21	1.40	Cs-137	661.66	0.0000	0.0000
3	725.75	731.02	33	-5	10	726.63	0.22	0.35	Bi-212	727.00	0.0000	0.0000
4	767.02	772.28	36	7	9	768.77	2.85	3.34	Bi-214	768.36	0.0000	0.0001
5	824.75	830.01	27	6	8	826.50	1.10	1.23	Co-60	826.28	0.0227	0.0302
6	844.94	850.21	59	34	10	846.87	0.80	1.60	Co-56	846.77	0.0000	0.0000
7	859.43	864.70	22	-3	8	860.31	0.22	0.35	Tl-208	860.56	0.0000	0.0000
8	909.92	915.62	24	6	8	912.11	0.22	0.35	Ac-228	911.20	0.0000	0.0000
9	967.87	973.57	22	-5	9	969.40	0.66	0.79	Ac-228	968.97	0.0000	0.0000
10	999.92	1005.62	17	3	7	1003.87	0.77	0.97	Pa-234M	1001.03	0.0001	0.0003
11	1060.94	1067.09	20	-4	9	1062.70	0.22	0.35	No close library match!			
12	1119.33	1125.48	23	18	6	1122.63	2.47	2.68	Bi-214	1120.29	0.0000	0.0000
13	1172.46	1178.61	15	-4	8	Could not properly fit the peak.						
14	1237.44	1243.59	16	-3	8	1238.10	0.88	1.01	Bi-214	1238.11	0.0000	0.0001
15	1271.90	1278.49	10	-11	8	Could not properly fit the peak.						
16	1331.84	1338.42	12	2	6	Could not properly fit the peak.						
17	1460.70	1467.29	46	-47	18	1461.80	0.22	0.35	K-40	1461.00	0.0000	0.0001
18	1764.78	1771.80	6	-11	7	Could not properly fit the peak.						

BACKGROUND-00-1 17-3. Real/Live Time = 4526/4500 (s).

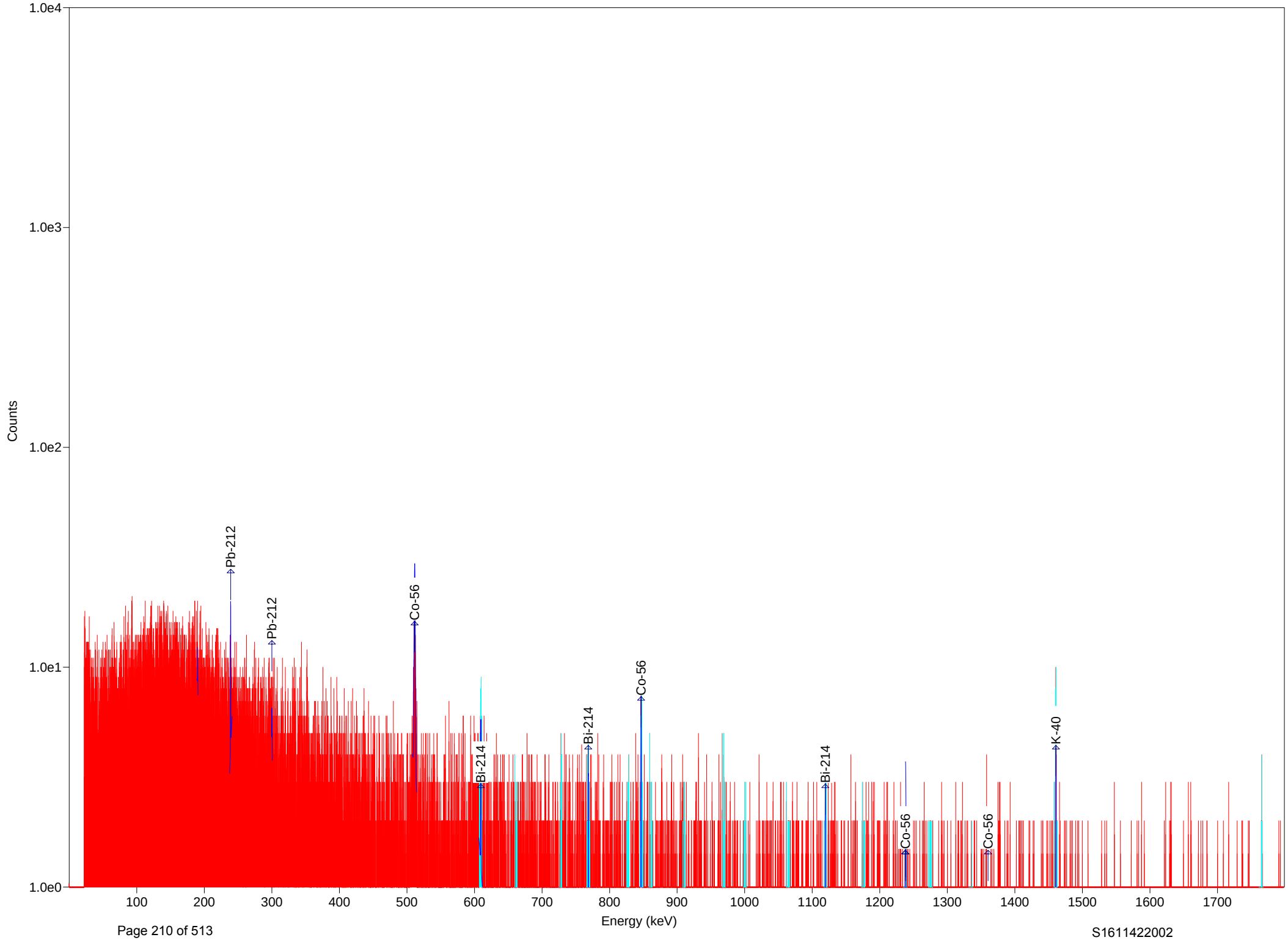


S1611422002

Detector #4 ACQ 08-Jan-2017 at 19:34:29 RT = 4526.3 LT = 4500.0
Rad Chem 1
BACKGROUND-00-1 17-3

ROI#	RANGE(keV)		GROSS	NET	+/-	CENTROID	FWHM	FW(1/5)M	LIBRARY	(keV)	µCi	+/-
1	606.78	611.61	57	-1	12	609.52	0.47	0.70	Bi-214	609.31	0.0000	0.0000
2	659.24	664.07	32	5	9	662.32	0.88	1.01	Cs-137	661.66	0.0000	0.0000
3	724.43	729.70	38	5	10	725.31	0.26	0.44	Bi-212	727.00	0.0000	0.0000
4	765.70	770.97	23	-15	10	766.36	0.22	0.35	Bi-214	768.36	0.0000	0.0001
5	824.75	830.01	28	-5	10	827.16	0.22	0.35	Co-60	826.28	0.0000	0.0378
6	844.94	850.21	74	41	12	846.87	0.75	1.34	Co-56	846.77	0.0000	0.0000
7	857.89	863.16	27	-19	11	859.65	0.22	0.35	Tl-208	860.56	0.0000	0.0000
8	908.38	913.87	28	6	8	909.70	3.07	3.20	Ac-228	911.20	0.0000	0.0000
9	966.11	971.82	25	11	7	969.94	0.47	1.36	Ac-228	968.97	0.0000	0.0000
10	997.94	1003.65	21	7	7	999.26	1.98	2.11	Pa-234M	1001.03	0.0003	0.0003
11	1060.94	1067.09	25	1	9	1066.19	0.59	0.76	No close library match!			
12	1117.36	1123.07	28	-17	11	1119.55	0.33	0.53	Bi-214	1120.29	0.0000	0.0000
13	1172.46	1178.61	15	0	7	1174.00	1.54	1.67	Co-60	1173.24	0.0000	0.0000
14	1235.02	1241.17	22	12	7	1238.32	0.33	1.56	Co-56	1238.28	0.0000	0.0000
15	1271.90	1278.49	13	3	6	Could not properly fit the peak.						
16	1331.84	1338.42	15	-6	8	Could not properly fit the peak.						
17	1457.63	1463.78	63	53	9	1461.44	0.49	1.74	K-40	1461.00	0.0003	0.0000
18	1761.27	1767.85	20	15	6	1764.68	0.47	0.98	Bi-214	1764.49	0.0001	0.0000

BACKGROUND. Real/Live Time = 4521/4500 (s).



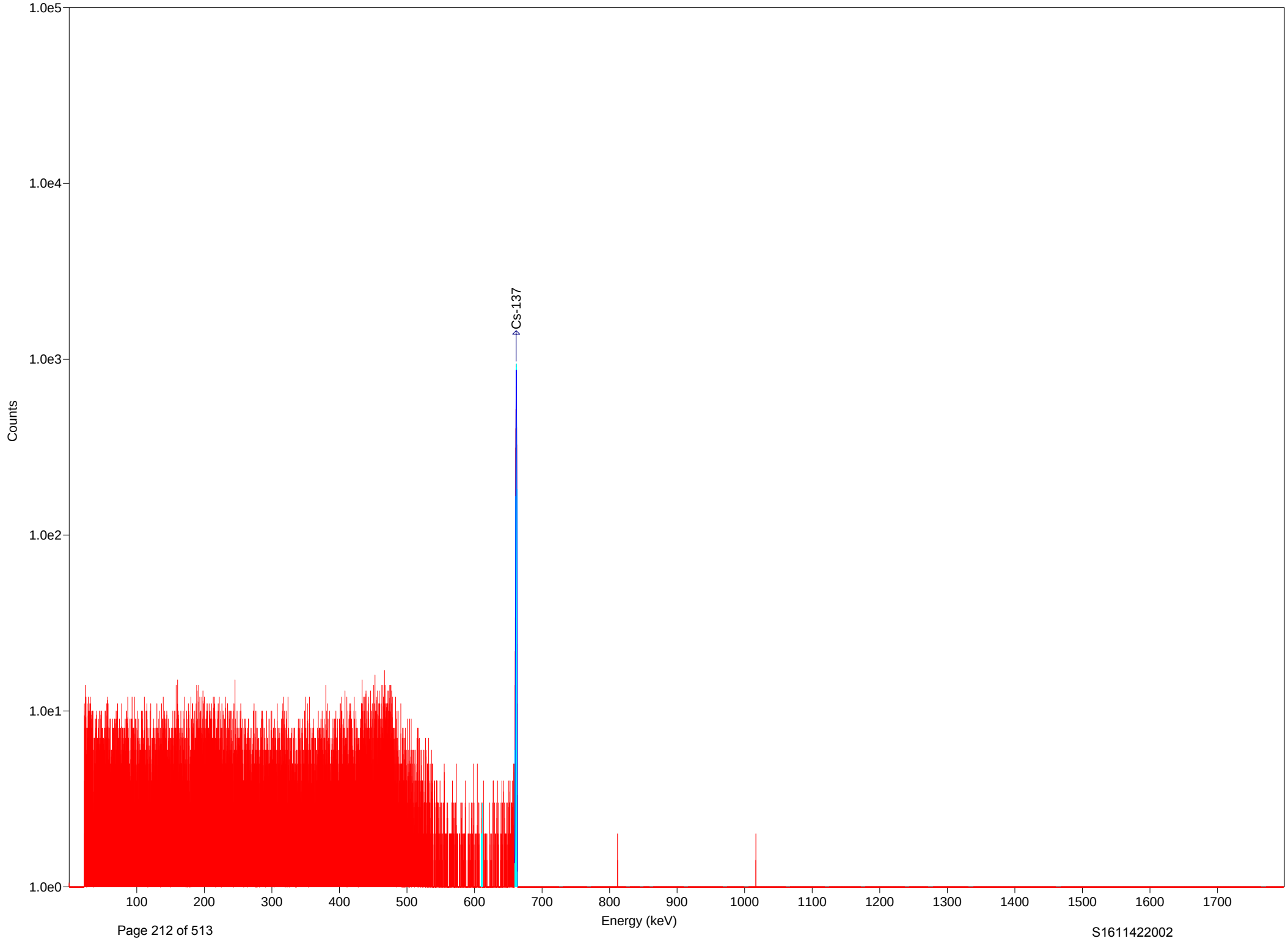
S1611422002

BACKGROUND-001 17-4.Rpt

Detector #4 ACQ 10-Jan-2017 at 3:35:58 RT = 4521.4 LT = 4500.0
Rad Chem 1
BACKGROUND-001 17-4

ROI#	RANGE(keV)		GROSS	NET	+/-	CENTROID	FWHM	FW(1/5)M	LIBRARY	(keV)	µCi	+/-
1	606.78	611.61	81	39	12	609.69	0.48	0.73	Bi-214	609.31	0.0000	0.0000
2	659.24	664.07	34	-20	11	Could not properly fit the peak.						
3	724.43	729.70	36	15	9	727.95	0.22	0.35	Bi-212	727.00	0.0001	0.0000
4	765.70	770.97	45	7	11	768.55	0.25	0.61	Bi-214	768.36	0.0000	0.0001
5	824.75	830.01	30	9	8	828.48	0.27	0.48	Co-60	826.28	0.0340	0.0302
6	844.94	850.21	75	33	12	847.19	0.46	1.75	Co-56	846.77	0.0000	0.0000
7	857.89	863.16	24	11	7	859.43	0.27	1.32	Tl-208	860.56	0.0000	0.0000
8	908.38	913.87	27	-8	10	909.70	1.76	1.89	Ac-228	911.20	0.0000	0.0000
9	966.11	971.82	30	16	7	966.77	0.22	0.35	Ac-228	968.97	0.0000	0.0000
10	997.94	1003.65	27	-5	10	999.92	2.09	2.28	Pa-234M	1001.03	0.0000	0.0004
11	1060.94	1067.09	23	23	4	1061.94	0.41	0.56	No close library match!			
12	1117.36	1123.07	30	12	8	1119.99	1.10	1.23	Bi-214	1120.29	0.0000	0.0000
13	1172.46	1178.61	21	11	6	1174.65	0.27	0.48	Co-60	1173.24	0.0000	0.0000
14	1235.02	1241.17	19	0	8	Could not properly fit the peak.						
15	1271.90	1278.49	19	-12	10	Could not properly fit the peak.						
16	1331.84	1338.42	9	4	5	1335.79	0.22	0.35	Co-60	1332.50	0.0000	0.0000
17	1457.63	1463.78	56	56	7	1460.67	0.37	1.74	K-40	1461.00	0.0003	0.0000
18	1761.27	1767.85	18	18	4	1765.66	0.26	1.32	Bi-214	1764.49	0.0001	0.0000

CS-137-001 CAL. Real/Live Time = 196/193 (s).

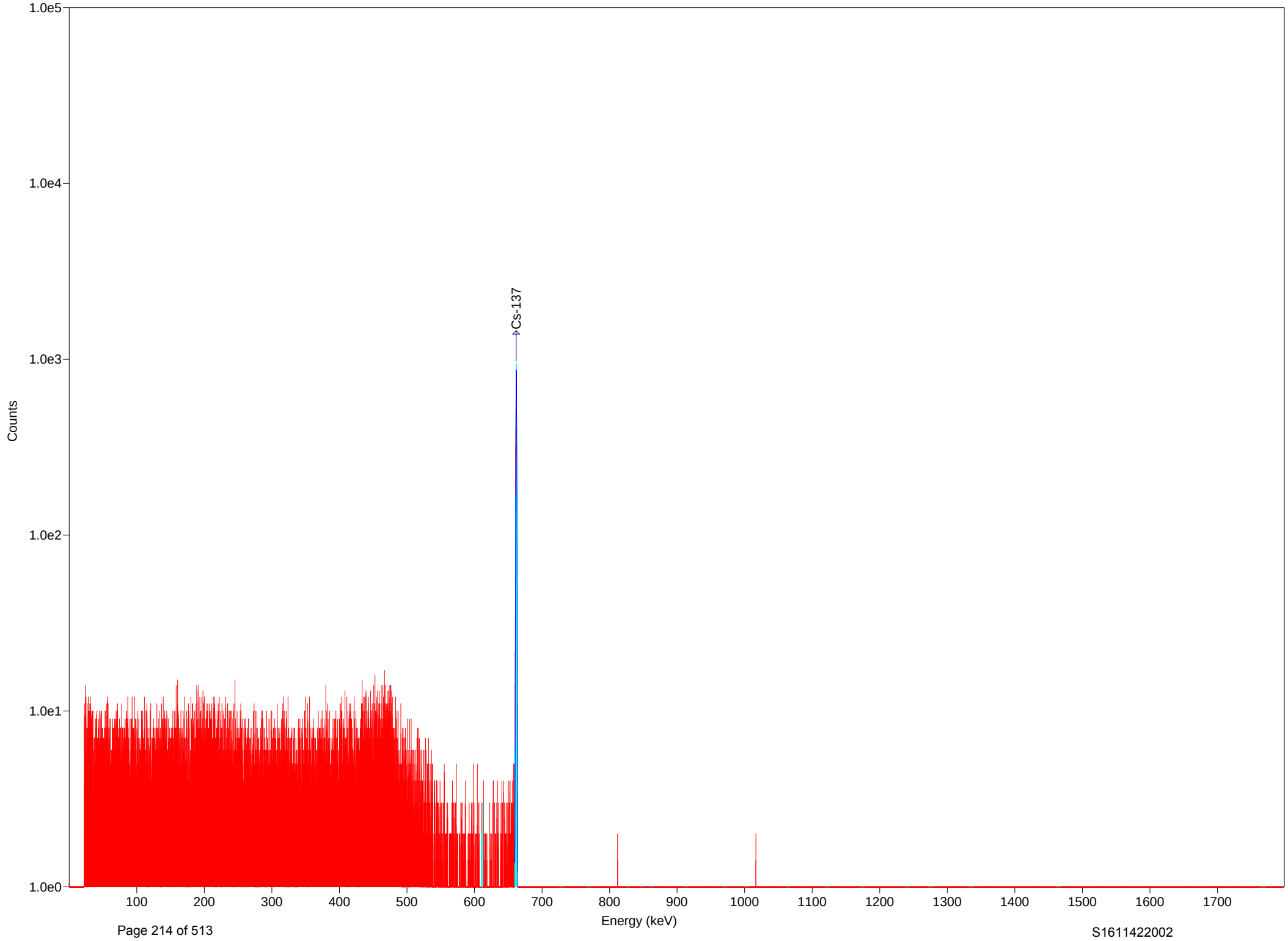


S1611422002

Detector #4 ACQ 07-Jan-2017 at 12:48:13 RT = 196.6 LT = 193.3
Rad Chem 1
CS-137-001 CAL

ROI#	RANGE(keV)		GROSS	NET	+/-	CENTROID	FWHM	FW(1/5)M	LIBRARY	(keV)	µCi	+/-
1	607.88	612.71	22	7	7	611.06	0.52	0.95	Bi-214	609.31	0.0001	0.0001
2	659.24	664.07	5532	5517	74	661.77	1.25	1.96	Cs-137	661.66	0.0366	0.0005
3	725.75	731.02	1	1	1	Could not properly fit the peak.						
4	767.02	772.28	0	0	0	Could not properly fit the peak.						
5	824.75	830.01	0	0	0	Could not properly fit the peak.						
6	844.94	850.21	3	3	1	Could not properly fit the peak.						
7	859.43	864.70	0	0	0	Could not properly fit the peak.						
8	909.92	915.62	1	-4	3	Could not properly fit the peak.						
9	967.87	973.57	0	0	0	Could not properly fit the peak.						
10	999.92	1005.62	2	2	1	Could not properly fit the peak.						
11	1060.94	1067.09	0	0	0	Could not properly fit the peak.						
12	1119.33	1125.48	1	1	1	Could not properly fit the peak.						
13	1172.46	1178.61	1	1	1	Could not properly fit the peak.						
14	1237.44	1243.59	2	2	1	Could not properly fit the peak.						
15	1271.90	1278.49	0	0	0	Could not properly fit the peak.						
16	1331.84	1338.42	1	1	1	Could not properly fit the peak.						
17	1460.70	1467.29	2	2	1	Could not properly fit the peak.						
18	1764.78	1771.80	0	0	0	Could not properly fit the peak.						

CS-137 CAL 17-3. Real/Live Time = 196/193 (s).

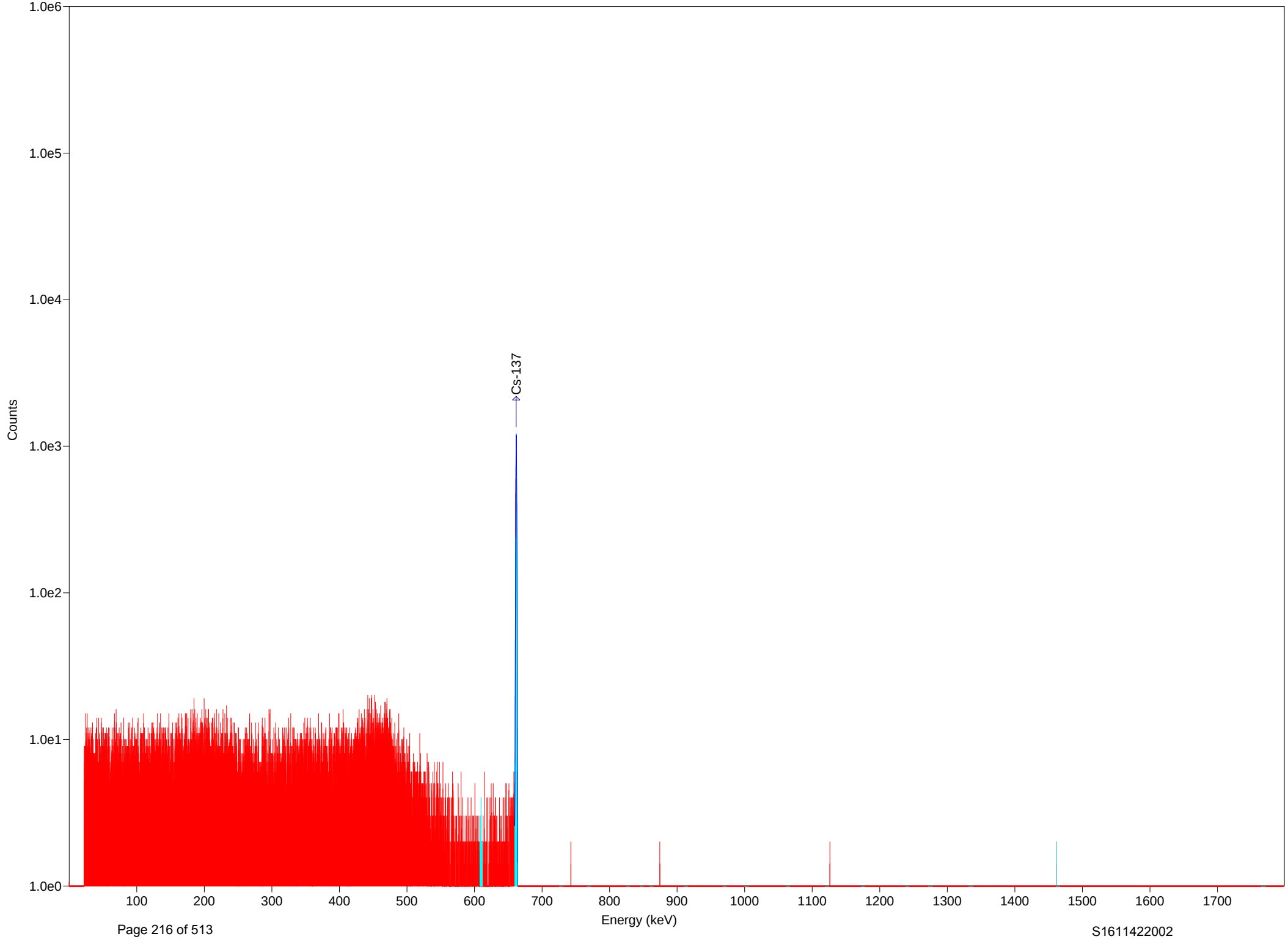


S1611422002

Detector #4 ACQ 07-Jan-2017 at 12:48:13 RT = 196.6 LT = 193.3
Rad Chem 1
CS-137 CAL 17-3

ROI#	RANGE(keV)		GROSS	NET	+/-	CENTROID	FWHM	FW(1/5)M	LIBRARY	(keV)	µCi	+/-
1	607.88	612.71	22	7	7	611.06	0.52	0.95	Bi-214	609.31	0.0001	0.0001
2	659.24	664.07	5532	5517	74	661.77	1.25	1.96	Cs-137	661.66	0.0366	0.0005
3	725.75	731.02	1	1	1	Could not properly fit the peak.						
4	767.02	772.28	0	0	0	Could not properly fit the peak.						
5	824.75	830.01	0	0	0	Could not properly fit the peak.						
6	844.94	850.21	3	3	1	Could not properly fit the peak.						
7	859.43	864.70	0	0	0	Could not properly fit the peak.						
8	909.92	915.62	1	-4	3	Could not properly fit the peak.						
9	967.87	973.57	0	0	0	Could not properly fit the peak.						
10	999.92	1005.62	2	2	1	Could not properly fit the peak.						
11	1060.94	1067.09	0	0	0	Could not properly fit the peak.						
12	1119.33	1125.48	1	1	1	Could not properly fit the peak.						
13	1172.46	1178.61	1	1	1	Could not properly fit the peak.						
14	1237.44	1243.59	2	2	1	Could not properly fit the peak.						
15	1271.90	1278.49	0	0	0	Could not properly fit the peak.						
16	1331.84	1338.42	1	1	1	Could not properly fit the peak.						
17	1460.70	1467.29	2	2	1	Could not properly fit the peak.						
18	1764.78	1771.80	0	0	0	Could not properly fit the peak.						

CS-137 001 CAL 17-4. Real/Live Time = 264/259 (s).

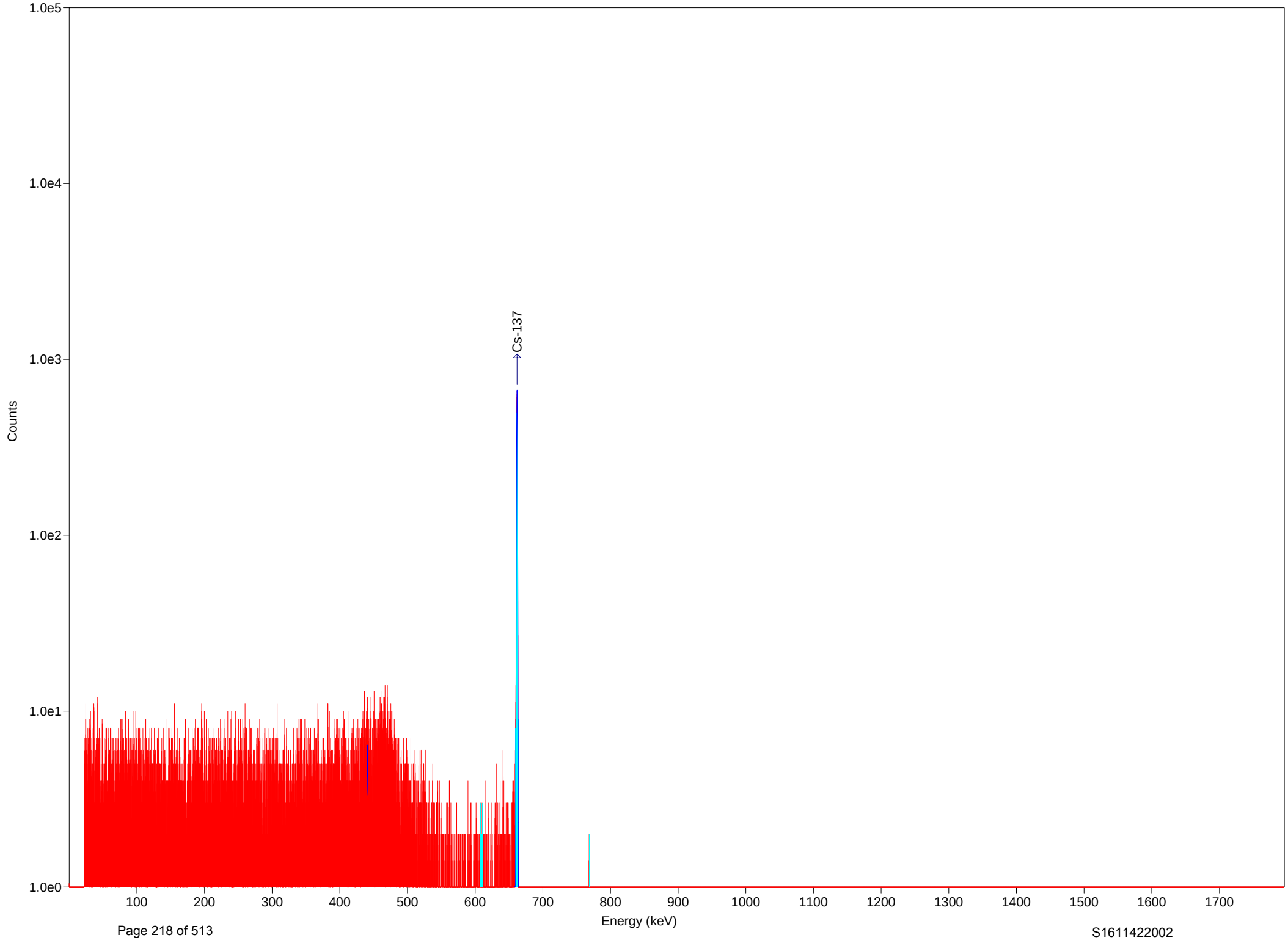


S1611422002

Detector #4 ACQ 08-Jan-2017 at 20:53:43 RT = 264.3 LT = 259.8
Rad Chem 1
CS-137 001 CAL 17-4

ROI#	RANGE(keV)		GROSS	NET	+/-	CENTROID	FWHM	FW(1/5)M	LIBRARY	(keV)	µCi	+/-
1	607.88	612.71	32	1	9	609.64	0.27	0.92	Bi-214	609.31	0.0000	0.0001
2	659.24	664.07	7617	7559	87	661.75	1.27	1.91	Cs-137	661.66	0.0373	0.0004
3	725.75	731.02	2	2	1	Could not properly fit the peak.						
4	767.02	772.28	3	-1	3	Could not properly fit the peak.						
5	824.75	830.01	1	1	1	Could not properly fit the peak.						
6	844.94	850.21	5	5	2	Could not properly fit the peak.						
7	859.43	864.70	2	2	1	Could not properly fit the peak.						
8	909.92	915.62	1	1	1	Could not properly fit the peak.						
9	967.87	973.57	2	2	1	Could not properly fit the peak.						
10	999.92	1005.62	3	3	1	Could not properly fit the peak.						
11	1060.94	1067.09	0	0	0	Could not properly fit the peak.						
12	1119.33	1125.48	1	1	1	Could not properly fit the peak.						
13	1172.46	1178.61	1	-4	3	Could not properly fit the peak.						
14	1237.44	1243.59	1	1	1	Could not properly fit the peak.						
15	1271.90	1278.49	0	0	0	Could not properly fit the peak.						
16	1331.84	1338.42	1	-4	4	Could not properly fit the peak.						
17	1460.70	1467.29	3	-2	4	1461.36	0.22	0.35	K-40	1461.00	0.0000	0.0003
18	1764.78	1771.80	1	1	1	Could not properly fit the peak.						

CS-137 002 CAL 16-36. Real/Live Time = 164/163 (s).

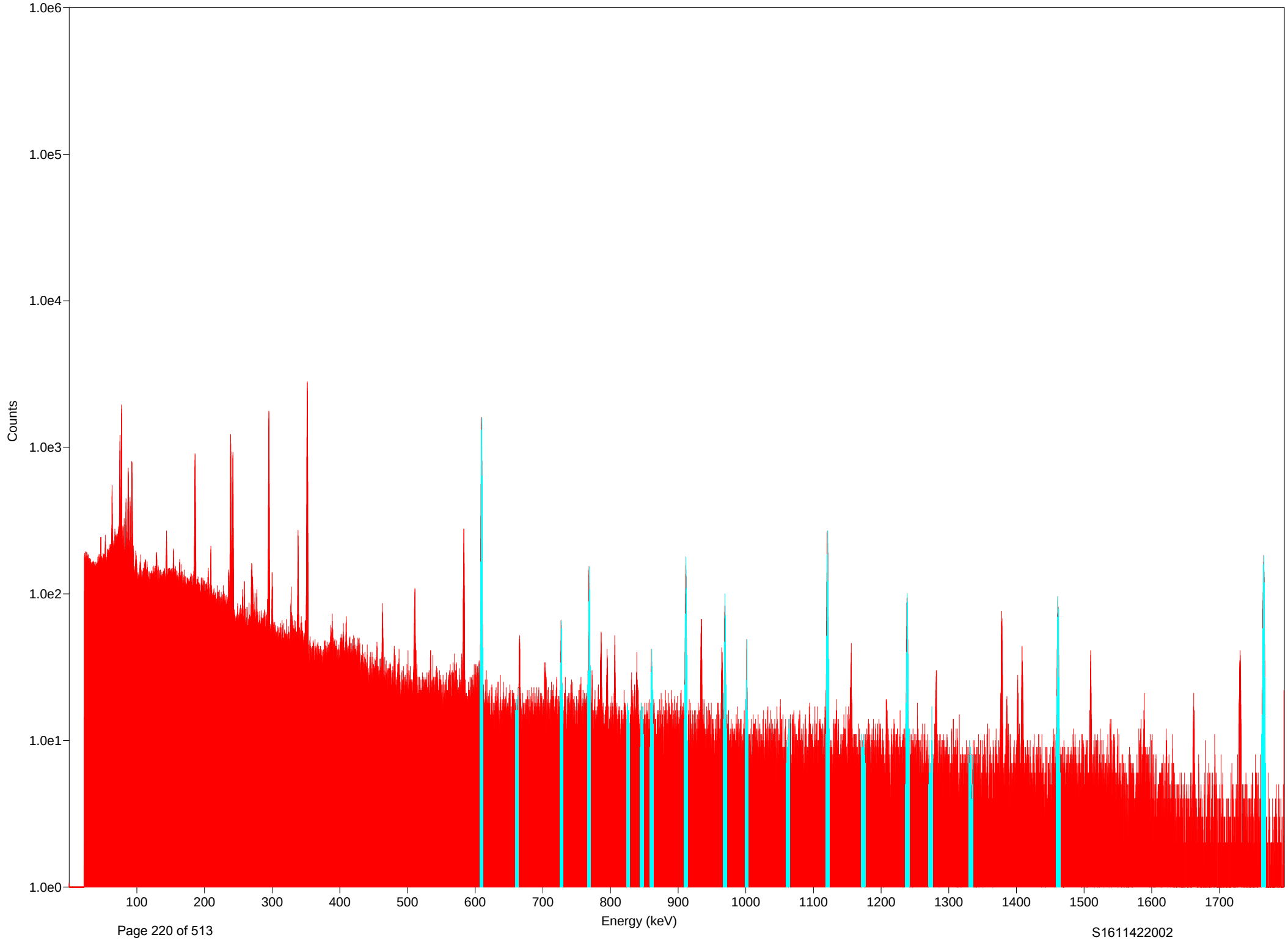


S1611422002

Detector #2 ACQ 29-Dec-2016 at 10:33:22 RT = 164.5 LT = 163.8
Rad Chem 2
CS-137 002 CAL 16-36

ROI#	RANGE(keV)		GROSS	NET	+/-	CENTROID	FWHM	FW(1/5)M	LIBRARY (keV)		µCi	+/-
1	606.93	611.75	22	-1	8	610.00	0.33	0.53	Bi-214	609.31	0.0000	0.0001
2	659.29	664.11	4216	4132	66	661.65	1.36	2.02	Cs-137	661.66	0.0324	0.0005
3	724.58	729.84	1	1	1	Could not properly fit the peak.						
4	765.77	771.02	3	-1	3	768.18	0.22	0.35	Bi-214	768.36	0.0000	0.0005
5	823.38	828.64	1	1	1	Could not properly fit the peak.						
6	843.53	848.79	2	2	1	Could not properly fit the peak.						
7	857.99	863.25	0	0	0	Could not properly fit the peak.						
8	908.38	914.07	3	3	1	Could not properly fit the peak.						
9	966.21	971.90	0	0	0	Could not properly fit the peak.						
10	998.19	1003.88	3	3	1	Could not properly fit the peak.						
11	1059.08	1065.21	2	2	1	Could not properly fit the peak.						
12	1117.34	1123.47	0	0	0	Could not properly fit the peak.						
13	1170.34	1176.47	0	0	0	Could not properly fit the peak.						
14	1235.17	1241.30	0	0	0	Could not properly fit the peak.						
15	1269.55	1276.12	0	0	0	Could not properly fit the peak.						
16	1329.34	1335.91	0	0	0	Could not properly fit the peak.						
17	1457.88	1464.45	0	0	0	Could not properly fit the peak.						
18	1761.13	1768.13	0	0	0	Could not properly fit the peak.						

LCS-15-3-12699. Real/Live Time = 4522/4500 (s).



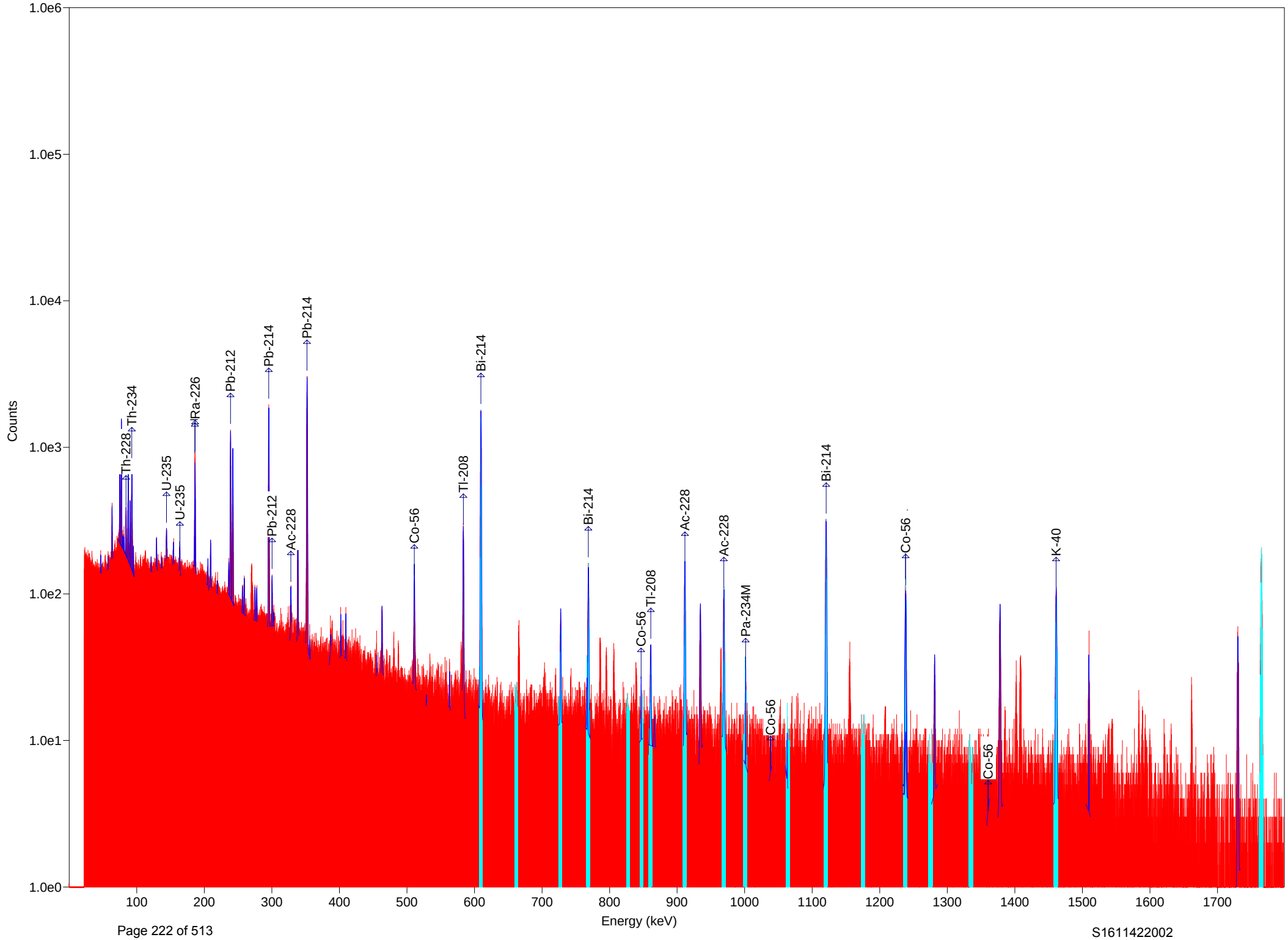
S1611422002

LCS-15-3-12699.Rpt

Detector #2 ACQ 05-Jan-2017 at 11:22:29 RT = 4522.3 LT = 4500.0
Rad Chem 2
LCS-15-3-12699

ROI#	RANGE(keV)		GROSS	NET	+/-	CENTROID	FWHM	FW(1/5)M	LIBRARY	(keV)	µCi	+/-
1	606.93	611.75	10551	10022	107	609.25	1.28	1.95	Bi-214	609.31	0.0051	0.0001
2	659.29	664.11	382	-13	33	661.36	0.41	0.56	Cs-137	661.66	0.0000	0.0000
3	724.58	729.84	722	305	40	727.14	1.35	1.84	Bi-212	727.00	0.0011	0.0002
4	765.77	771.02	1336	928	47	768.30	1.33	2.35	Bi-214	768.36	0.0053	0.0003
5	823.38	828.64	321	38	30	824.70	0.58	0.79	Co-60	826.28	0.1472	0.1162
6	843.53	848.79	317	46	30	845.51	0.23	0.38	Co-56	846.77	0.0000	0.0000
7	857.99	863.25	488	192	33	860.07	1.57	2.13	Tl-208	860.56	0.0005	0.0001
8	908.38	914.07	1386	1062	46	911.16	1.44	2.31	Ac-228	911.20	0.0012	0.0001
9	966.21	971.90	868	544	40	968.94	1.53	2.27	Ac-228	968.97	0.0011	0.0001
10	998.19	1003.88	428	180	32	1001.11	0.52	1.67	Pa-234M	1001.03	0.0075	0.0013
11	1059.08	1065.21	252	1	31	1059.85	3.68	3.84	No close library match!			
12	1117.34	1123.47	2384	2099	56	1120.23	1.58	2.60	Bi-214	1120.29	0.0055	0.0001
13	1170.34	1176.47	223	-14	29	1173.53	0.91	1.15	Co-60	1173.24	0.0000	0.0000
14	1235.17	1241.30	987	823	38	1238.10	1.69	2.64	Bi-214	1238.11	0.0061	0.0003
15	1269.55	1276.12	185	14	26	1274.59	0.22	0.35	No close library match!			
16	1329.34	1335.91	174	-12	27	1330.43	0.26	0.44	Co-60	1332.50	0.0000	0.0000
17	1457.88	1464.45	978	771	40	1460.77	1.73	2.96	K-40	1461.00	0.0037	0.0002
18	1761.13	1768.13	1814	1671	48	1764.43	2.03	3.13	Bi-214	1764.49	0.0070	0.0002

LCS2-15-3-12699. Real/Live Time = 4557/4500 (s).

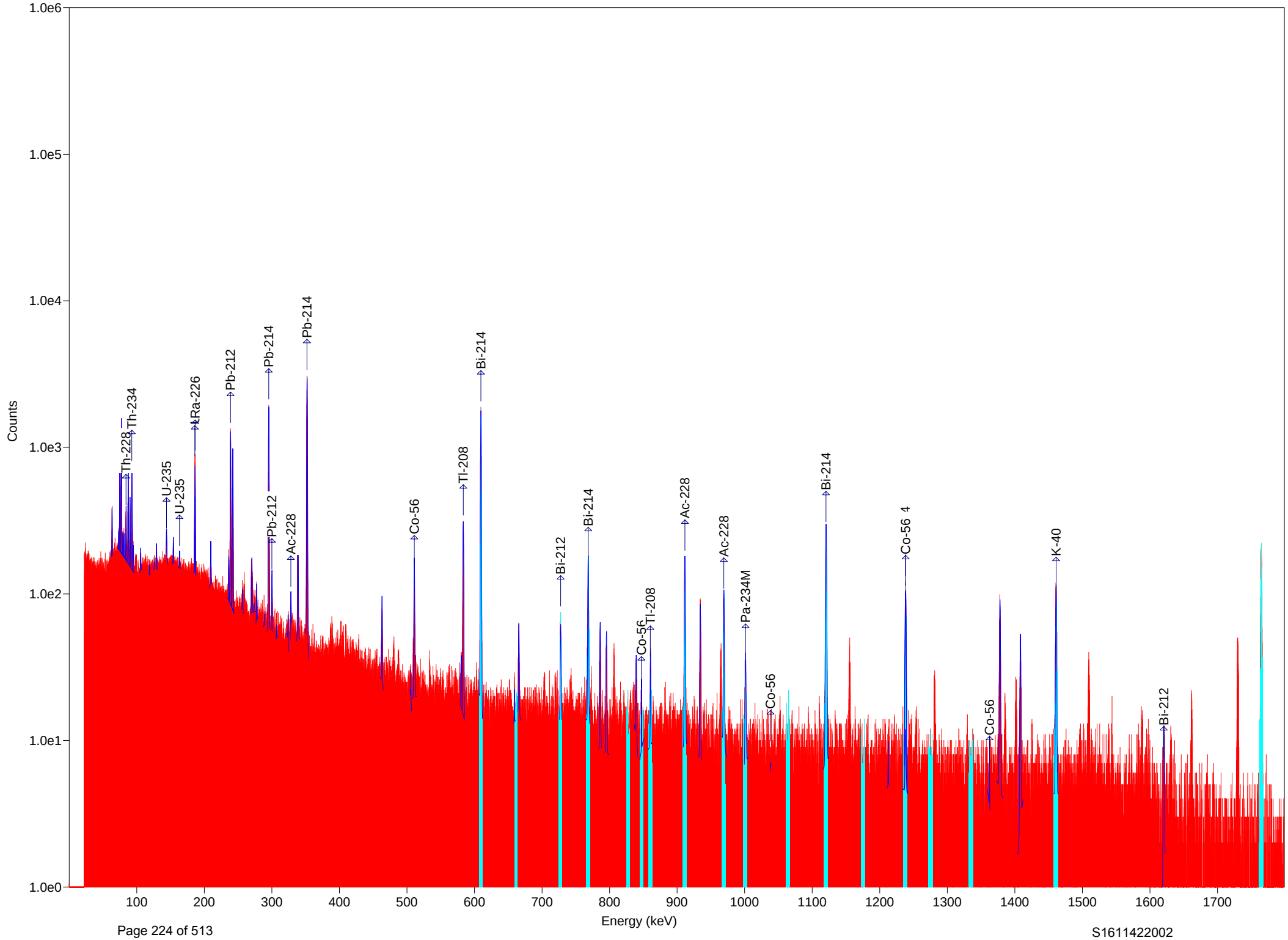


S1611422002

Detector #4 ACQ 05-Jan-2017 at 15:28:36 RT = 4557.9 LT = 4500.0
Rad Chem 1
LCS2-15-3-12699

ROI#	RANGE(keV)		GROSS	NET	+/-	CENTROID	FWHM	FW(1/5)M	LIBRARY	(keV)	µCi	+/-
1	607.00	611.83	11136	10657	109	609.49	1.22	1.87	Bi-214	609.31	0.0054	0.0001
2	659.24	664.07	387	11	32	659.92	3.07	3.20	Cs-137	661.66	0.0000	0.0000
3	724.43	729.70	736	344	39	727.48	1.12	2.09	Bi-212	727.00	0.0013	0.0001
4	765.70	770.97	1343	935	47	768.56	1.43	2.10	Bi-214	768.36	0.0053	0.0003
5	824.75	830.01	347	-3	33	826.25	0.70	0.92	Co-60	826.28	0.0000	0.1247
6	844.94	850.21	358	75	31	846.71	0.35	1.35	Co-56	846.77	0.0000	0.0000
7	857.89	863.16	505	230	33	861.11	1.01	2.02	Tl-208	860.56	0.0006	0.0001
8	908.38	913.87	1377	1039	46	911.42	1.48	2.17	Ac-228	911.20	0.0012	0.0001
9	966.11	971.82	982	694	41	969.25	1.38	2.08	Ac-228	968.97	0.0014	0.0001
10	997.94	1003.65	416	168	32	1000.79	0.38	2.10	Pa-234M	1001.03	0.0068	0.0013
11	1060.94	1067.09	247	-9	31	1063.17	0.27	0.50	No close library match!			
12	1117.36	1123.07	2521	2269	56	1120.61	1.62	2.28	Bi-214	1120.29	0.0058	0.0001
13	1172.46	1178.61	244	17	29	1173.12	0.22	0.35	Co-60	1173.24	0.0000	0.0000
14	1235.02	1241.17	1043	859	39	1238.42	1.59	2.39	Co-56	1238.28	0.0005	0.0000
15	1271.90	1278.49	194	-2	28	1273.88	3.59	4.27	No close library match!			
16	1331.84	1338.42	185	-42	30	1333.15	0.22	0.35	Co-60	1332.50	0.0000	0.0000
17	1457.63	1463.78	1022	814	40	1461.24	1.67	2.68	K-40	1461.00	0.0039	0.0002
18	1761.27	1767.85	1953	1850	47	1765.17	1.86	2.94	Bi-214	1764.49	0.0079	0.0002

LCS3-15-3-12699. Real/Live Time = 4565/4500 (s).

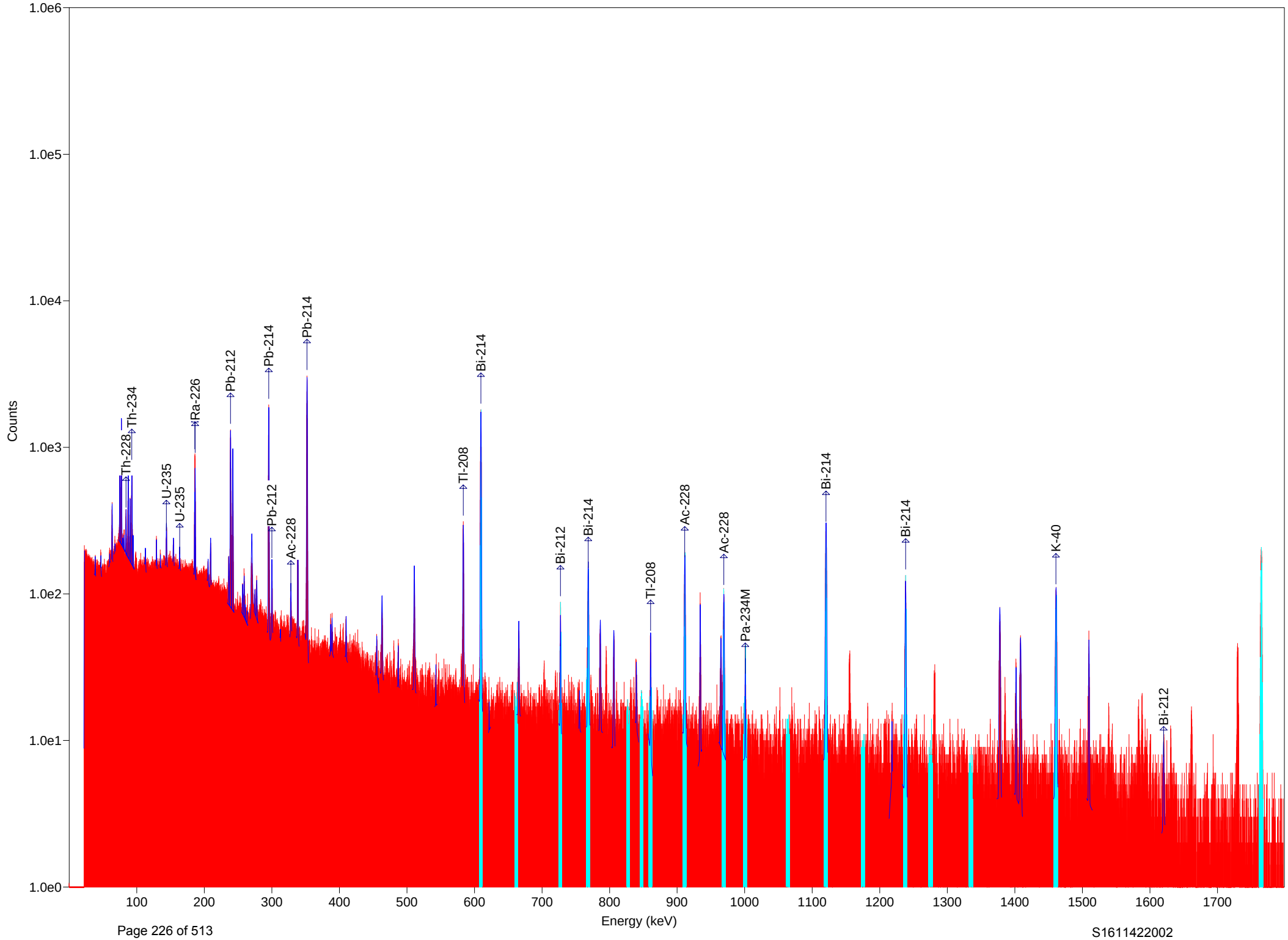


S1611422002

Detector #4 ACQ 07-Jan-2017 at 14:13:01 RT = 4565.5 LT = 4500.0
Rad Chem 1
LCS3-15-3-12699

ROI#	RANGE(keV)		GROSS	NET	+/-	CENTROID	FWHM	FW(1/5)M	LIBRARY	(keV)	µCi	+/-
1	606.78	611.61	11315	10851	110	609.43	1.23	1.89	Bi-214	609.31	0.0055	0.0001
2	659.24	664.07	391	4	33	661.48	0.29	0.75	Cs-137	661.66	0.0000	0.0000
3	724.43	729.70	699	328	38	727.42	1.25	1.72	Bi-212	727.00	0.0012	0.0001
4	765.70	770.97	1448	1023	48	768.52	1.30	2.13	Bi-214	768.36	0.0058	0.0003
5	824.75	830.01	316	-5	31	826.92	0.67	0.88	Co-60	826.28	0.0000	0.1172
6	844.94	850.21	349	91	30	846.48	0.38	2.08	Co-56	846.77	0.0000	0.0000
7	857.89	863.16	445	166	32	860.56	0.81	2.41	Tl-208	860.56	0.0004	0.0001
8	908.38	913.87	1460	1139	46	911.36	1.38	2.13	Ac-228	911.20	0.0013	0.0001
9	966.11	971.82	961	700	40	969.09	1.34	2.28	Ac-228	968.97	0.0014	0.0001
10	997.94	1003.65	451	163	34	1001.20	1.35	1.72	Pa-234M	1001.03	0.0066	0.0014
11	1060.94	1067.09	286	-19	33	1065.11	0.22	0.35	No close library match!			
12	1117.36	1123.07	2431	2192	55	1120.53	1.63	2.39	Bi-214	1120.29	0.0056	0.0001
13	1172.46	1178.61	215	-17	29	1177.12	0.31	0.52	Co-60	1173.24	0.0000	0.0000
14	1235.02	1241.17	1065	847	41	1238.31	1.70	2.33	Co-56	1238.28	0.0005	0.0000
15	1271.90	1278.49	212	0	29	1275.20	2.61	2.76	No close library match!			
16	1331.84	1338.42	187	22	26	1337.59	0.29	0.50	Co-60	1332.50	0.0000	0.0000
17	1457.63	1463.78	1093	919	39	1461.16	1.45	2.77	K-40	1461.00	0.0044	0.0002
18	1761.27	1767.85	2040	1973	47	1765.04	2.15	2.91	Bi-214	1764.49	0.0085	0.0002

LCS4-15-3-12699. Real/Live Time = 4564/4500 (s).

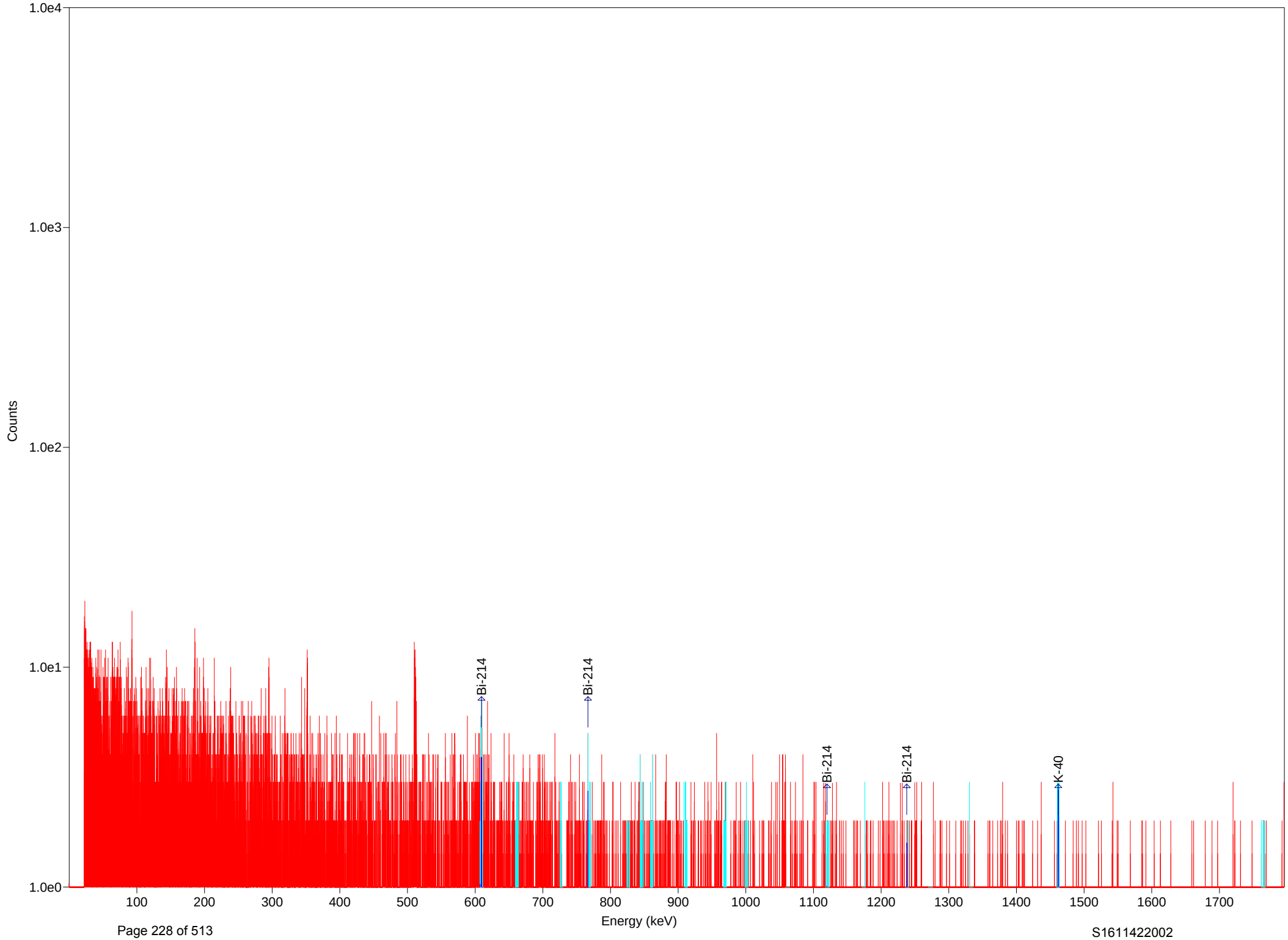


S1611422002

Detector #4 ACQ 08-Jan-2017 at 22:16:34 RT = 4564.2 LT = 4500.0
Rad Chem 1
LCS4-15-3-12699

ROI#	RANGE(keV)		GROSS	NET	+/-	CENTROID	FWHM	FW(1/5)M	LIBRARY	(keV)	µCi	+/-
1	606.78	611.61	11115	10651	109	609.41	1.19	1.87	Bi-214	609.31	0.0054	0.0001
2	659.24	664.07	356	26	30	662.94	0.25	0.46	Cs-137	661.66	0.0000	0.0000
3	724.43	729.70	749	357	39	727.41	0.60	1.95	Bi-212	727.00	0.0013	0.0001
4	765.70	770.97	1347	868	48	768.48	1.44	2.01	Bi-214	768.36	0.0049	0.0003
5	824.75	830.01	347	-7	33	826.71	0.66	0.87	Co-60	826.28	0.0000	0.1247
6	844.94	850.21	367	59	32	847.36	0.56	0.75	Co-56	846.77	0.0000	0.0000
7	857.89	863.16	520	170	35	860.58	0.71	1.40	Tl-208	860.56	0.0004	0.0001
8	908.38	913.87	1504	1136	48	911.35	1.61	2.40	Ac-228	911.20	0.0013	0.0001
9	966.11	971.82	935	669	39	969.09	1.62	2.47	Ac-228	968.97	0.0014	0.0001
10	997.94	1003.65	434	146	33	1001.22	0.88	1.72	Pa-234M	1001.03	0.0059	0.0013
11	1060.94	1067.09	281	-38	34	1064.89	0.26	0.44	No close library match!			
12	1117.36	1123.07	2499	2229	56	1120.47	1.59	2.40	Bi-214	1120.29	0.0057	0.0001
13	1172.46	1178.61	223	-4	29	1174.45	2.46	2.68	Co-60	1173.24	0.0000	0.0000
14	1235.02	1241.17	1069	818	42	1238.37	1.54	2.34	Co-56	1238.28	0.0005	0.0000
15	1271.90	1278.49	209	-18	30	1276.51	0.22	0.35	No close library match!			
16	1331.84	1338.42	161	-4	26	1335.53	0.32	0.52	Co-60	1332.50	0.0000	0.0000
17	1457.63	1463.78	1029	894	37	1461.13	1.84	2.70	K-40	1461.00	0.0043	0.0002
18	1761.27	1767.85	2024	1952	47	1765.02	2.02	2.90	Bi-214	1764.49	0.0084	0.0002

MB-12699. Real/Live Time = 4504/4500 (s).

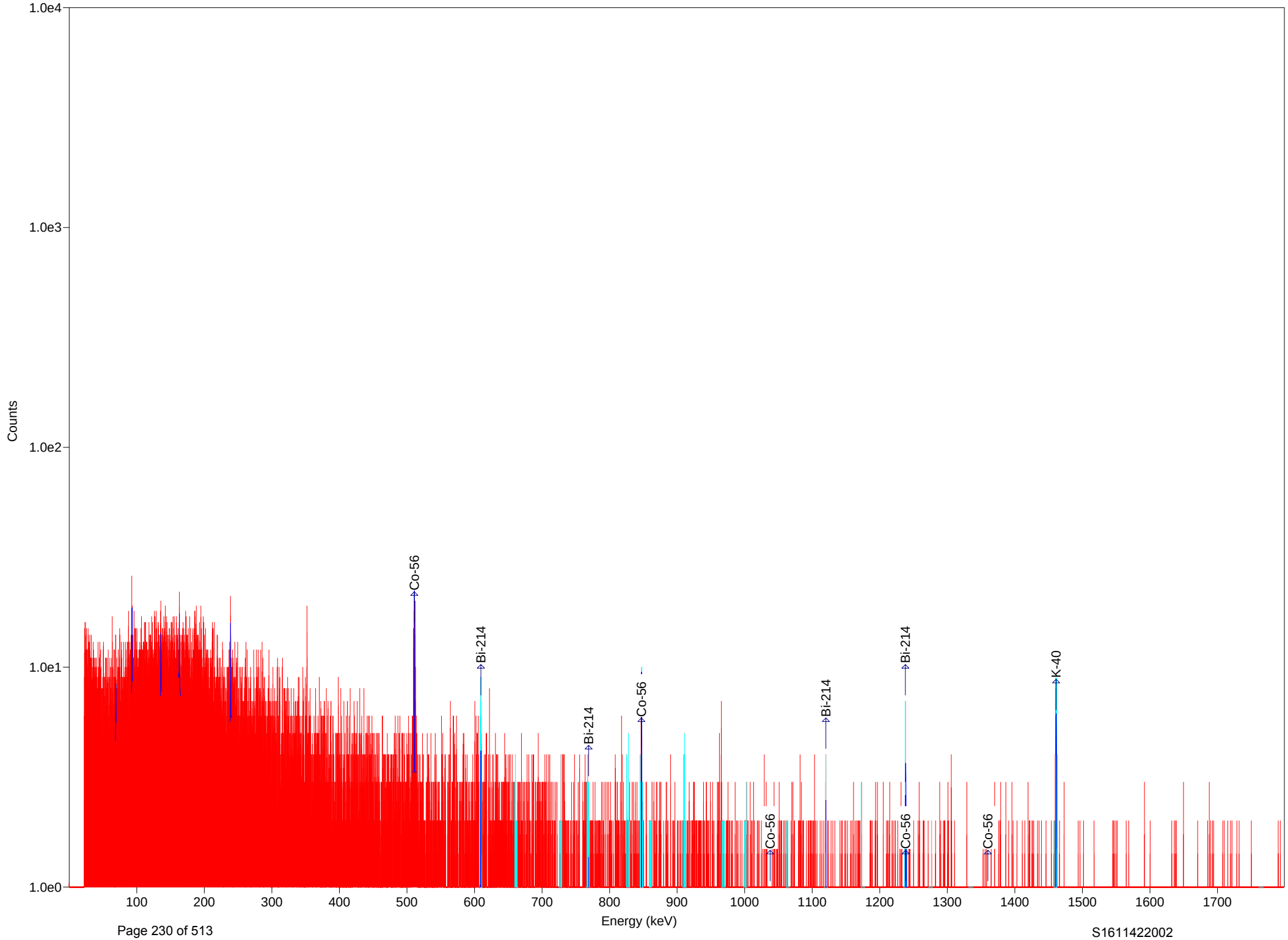


S1611422002

Detector #2 ACQ 29-Dec-2016 at 10:39:16 RT = 4504.6 LT = 4500.0
Rad Chem 2
MB-12699

ROI#	RANGE(keV)		GROSS	NET	+/-	CENTROID	FWHM	FW(1/5)M	LIBRARY	(keV)	µCi	+/-
1	606.93	611.75	55	36	9	609.70	0.57	1.87	Bi-214	609.31	0.0000	0.0000
2	659.29	664.11	30	-12	10	Could not properly fit the peak.						
3	724.58	729.84	21	8	6	726.33	0.99	1.40	Bi-212	727.00	0.0000	0.0000
4	765.77	771.02	29	16	7	766.42	0.22	0.35	Bi-214	768.36	0.0001	0.0000
5	823.38	828.64	22	1	8	Could not properly fit the peak.						
6	843.53	848.79	26	-20	11	Could not properly fit the peak.						
7	857.99	863.25	30	13	8	862.16	0.22	0.35	Tl-208	860.56	0.0000	0.0000
8	908.38	914.07	24	6	8	910.35	2.63	2.76	Ac-228	911.20	0.0000	0.0000
9	966.21	971.90	21	12	6	968.95	1.50	1.65	Ac-228	968.97	0.0000	0.0000
10	998.19	1003.88	23	-9	10	1000.59	0.22	0.35	Pa-234M	1001.03	0.0000	0.0004
11	1059.08	1065.21	6	-4	5	Could not properly fit the peak.						
12	1117.34	1123.47	18	-11	10	Could not properly fit the peak.						
13	1170.34	1176.47	9	-1	6	1175.60	0.27	0.48	Co-60	1173.24	0.0000	0.0000
14	1235.17	1241.30	24	5	8	Could not properly fit the peak.						
15	1269.55	1276.12	5	0	4	Could not properly fit the peak.						
16	1329.34	1335.91	15	10	5	1329.99	0.27	0.48	Co-60	1332.50	0.0000	0.0000
17	1457.88	1464.45	39	29	8	1461.74	1.91	2.08	K-40	1461.00	0.0001	0.0000
18	1761.13	1768.13	15	4	7	1763.86	2.39	2.53	Bi-214	1764.49	0.0000	0.0000

MB2-12699. Real/Live Time = 4527/4500 (s).

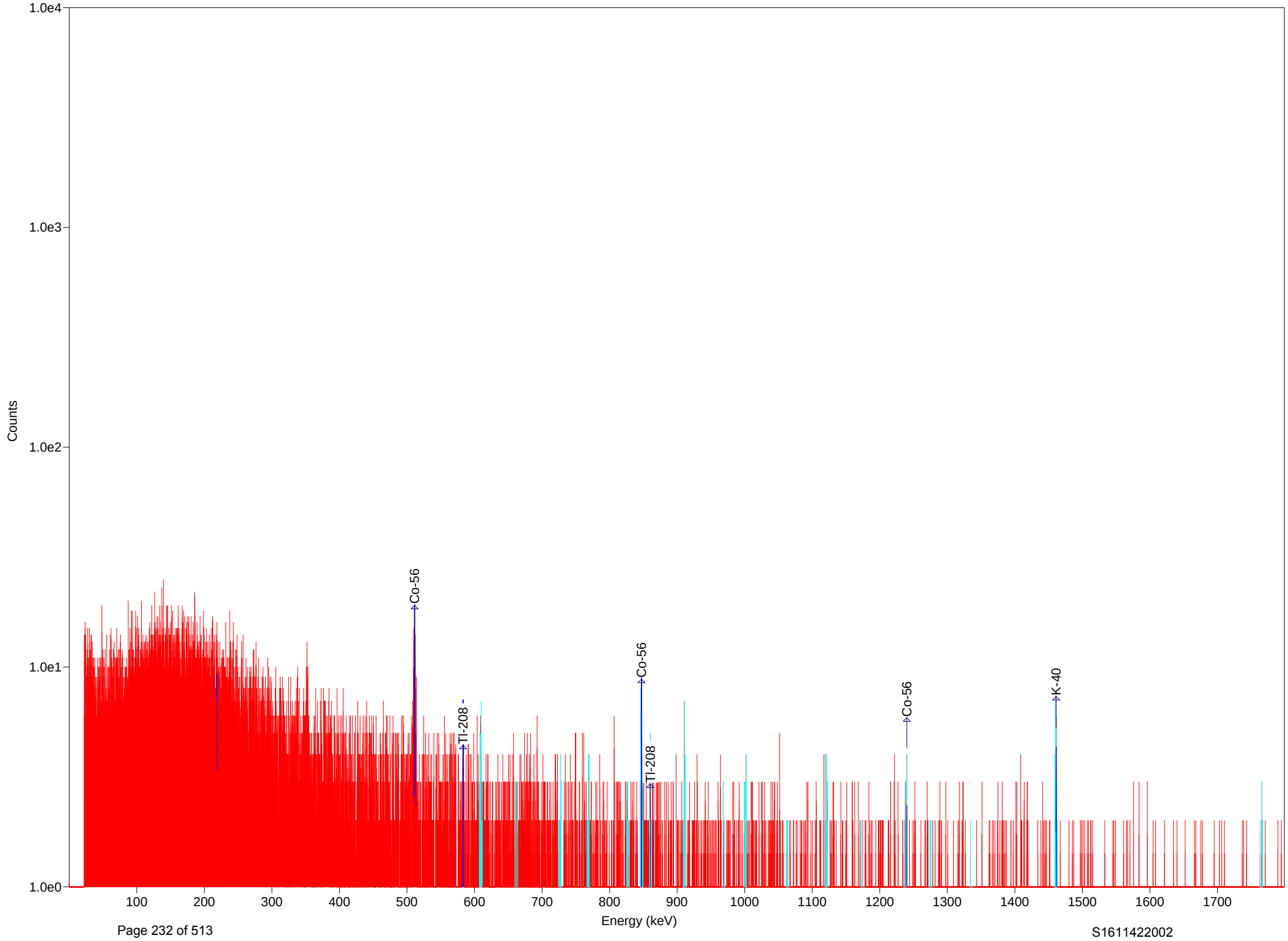


S1611422002

Detector #4 ACQ 06-Jan-2017 at 21:42:01 RT = 4527.7 LT = 4500.0
Rad Chem 1
MB2-12699

ROI#	RANGE(keV)		GROSS	NET	+/-	CENTROID	FWHM	FW(1/5)M	LIBRARY	(keV)	µCi	+/-
1	606.78	611.61	64	45	9	609.33	0.67	1.70	Bi-214	609.31	0.0000	0.0000
2	659.24	664.07	31	4	8	660.56	0.22	0.35	Cs-137	661.66	0.0000	0.0000
3	724.43	729.70	22	5	7	728.16	0.27	0.70	Bi-212	727.00	0.0000	0.0000
4	765.70	770.97	31	2	9	767.46	0.22	0.35	Bi-214	768.36	0.0000	0.0001
5	824.75	830.01	34	1	10	827.82	0.22	0.35	Co-60	826.28	0.0038	0.0378
6	844.94	850.21	73	44	11	847.58	0.40	1.70	Co-56	846.77	0.0000	0.0000
7	857.89	863.16	21	0	8	862.50	0.22	0.35	Tl-208	860.56	0.0000	0.0000
8	908.38	913.87	28	6	8	911.01	0.22	0.35	Ac-228	911.20	0.0000	0.0000
9	966.11	971.82	21	-6	9	Could not properly fit the peak.						
10	997.94	1003.65	19	19	4	1002.99	0.27	0.48	Pa-234M	1001.03	0.0008	0.0002
11	1060.94	1067.09	20	-4	9	Could not properly fit the peak.						
12	1117.36	1123.07	21	3	8	1120.11	0.41	0.56	Bi-214	1120.29	0.0000	0.0000
13	1172.46	1178.61	15	-9	9	Could not properly fit the peak.						
14	1235.02	1241.17	22	17	5	1237.90	0.26	0.52	Bi-214	1238.11	0.0001	0.0000
15	1271.90	1278.49	14	-2	7	1276.73	0.33	0.53	No close library match!			
16	1331.84	1338.42	9	4	5	Could not properly fit the peak.						
17	1457.63	1463.78	65	55	9	1461.06	1.22	1.52	K-40	1461.00	0.0003	0.0000
18	1761.27	1767.85	8	-2	6	Could not properly fit the peak.						

MB3-12699. Real/Live Time = 4526/4500 (s).

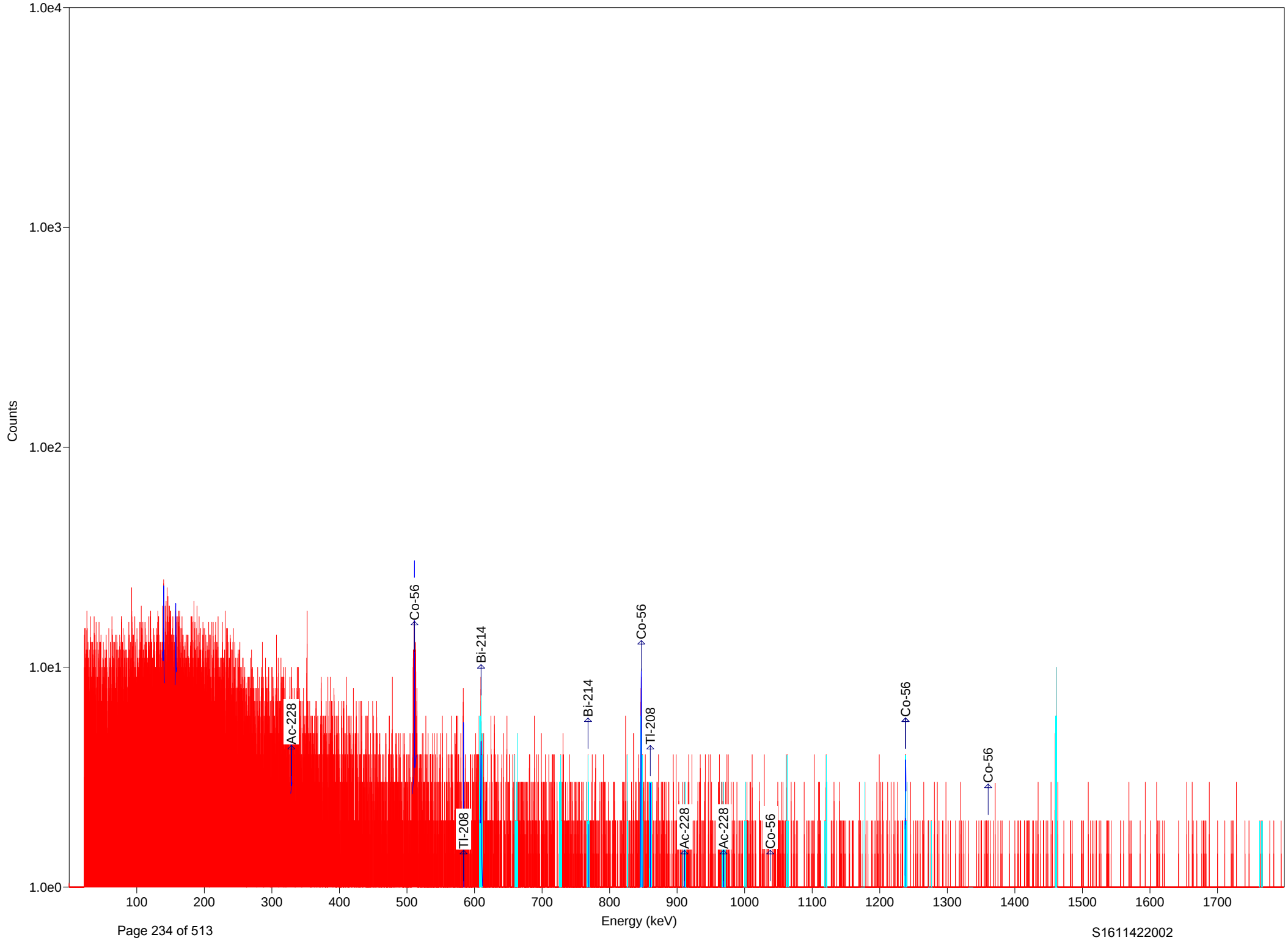


S1611422002

Detector #4 ACQ 07-Jan-2017 at 12:56:47 RT = 4526.5 LT = 4500.0
Rad Chem 1
MB3-12699

ROI#	RANGE(keV)		GROSS	NET	+/-	CENTROID	FWHM	FW(1/5)M	LIBRARY	(keV)	µCi	+/-
1	606.78	611.61	67	21	12	609.44	1.09	1.34	Bi-214	609.31	0.0000	0.0000
2	659.24	664.07	28	-7	9	660.67	0.42	0.56	Cs-137	661.66	0.0000	0.0000
3	724.43	729.70	32	3	9	727.51	0.27	0.77	Bi-212	727.00	0.0000	0.0000
4	765.70	770.97	29	16	7	768.77	1.32	1.45	Bi-214	768.36	0.0001	0.0000
5	824.75	830.01	20	-13	9	Could not properly fit the peak.						
6	844.94	850.21	77	44	12	846.96	0.34	1.41	Co-56	846.77	0.0000	0.0000
7	857.89	863.16	32	7	9	860.53	0.29	0.97	Tl-208	860.56	0.0000	0.0000
8	908.38	913.87	38	16	9	910.82	0.27	0.48	Ac-228	911.20	0.0000	0.0000
9	966.11	971.82	16	2	7	968.31	1.43	1.84	Ac-228	968.97	0.0000	0.0000
10	997.94	1003.65	27	13	7	1002.11	0.26	0.75	Pa-234M	1001.03	0.0005	0.0003
11	1060.94	1067.09	19	-5	9	1062.04	0.33	0.53	No close library match!			
12	1117.36	1123.07	34	16	8	1119.77	0.93	1.36	Bi-214	1120.29	0.0000	0.0000
13	1172.46	1178.61	21	-13	10	Could not properly fit the peak.						
14	1235.02	1241.17	28	13	8	1240.07	0.22	0.35	Co-56	1238.28	0.0000	0.0000
15	1271.90	1278.49	20	-11	10	Could not properly fit the peak.						
16	1331.84	1338.42	11	6	5	1334.47	0.22	0.35	Co-60	1332.50	0.0000	0.0000
17	1457.63	1463.78	55	50	8	1461.03	0.74	1.44	K-40	1461.00	0.0002	0.0000
18	1761.27	1767.85	23	18	6	1765.78	0.41	0.56	Bi-214	1764.49	0.0001	0.0000

MB4-12699. Real/Live Time = 4525/4500 (s).

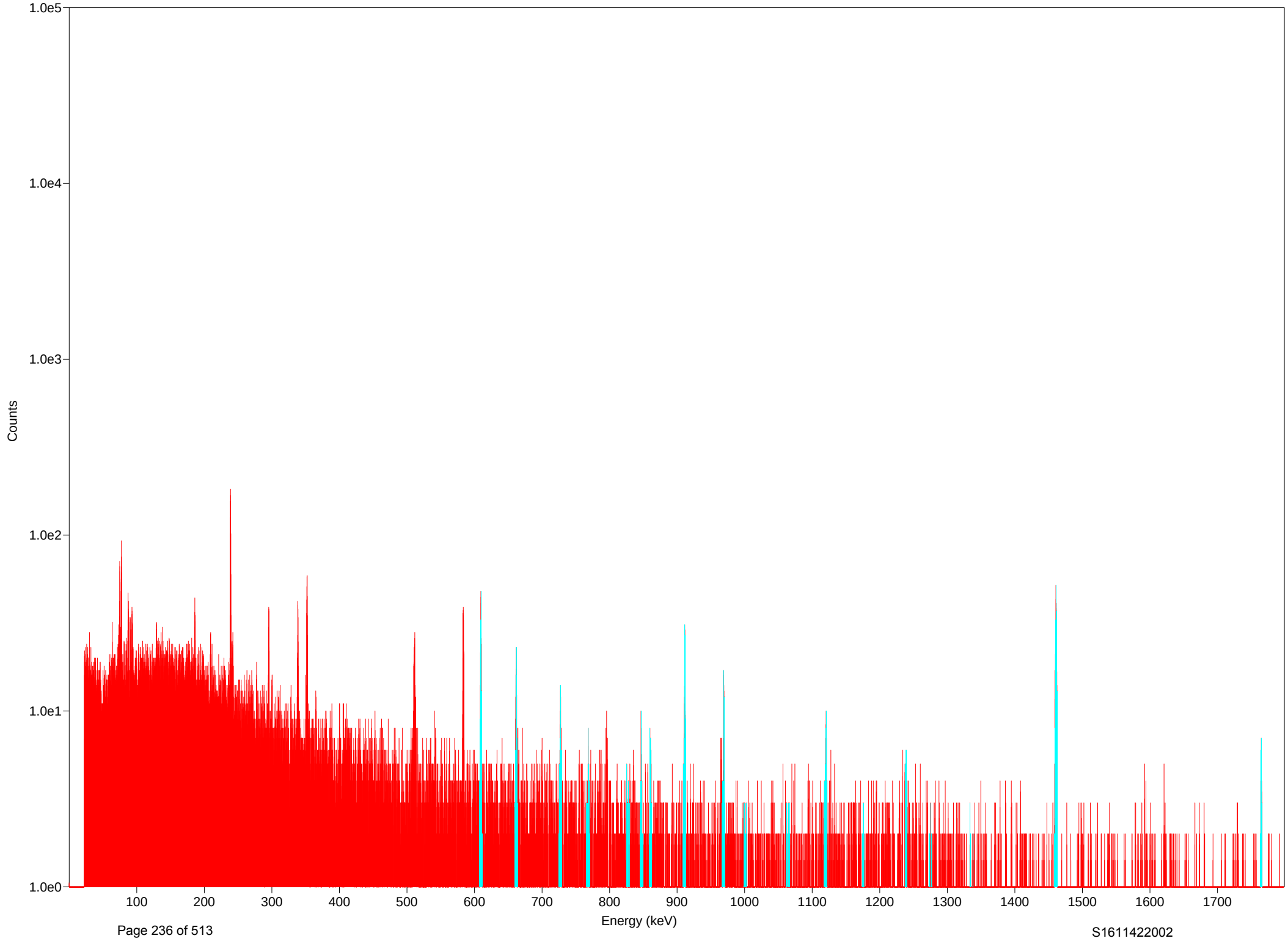


S1611422002

Detector #4 ACQ 08-Jan-2017 at 21:00:09 RT = 4525.7 LT = 4500.0
Rad Chem 1
MB4-12699

ROI#	RANGE(keV)		GROSS	NET	+/-	CENTROID	FWHM	FW(1/5)M	LIBRARY	(keV)	µCi	+/-
1	606.78	611.61	82	17	14	609.54	0.77	1.17	Bi-214	609.31	0.0000	0.0000
2	659.24	664.07	35	-15	11	663.19	0.22	0.35	Cs-137	661.66	0.0000	0.0000
3	724.43	729.70	35	10	9	727.73	0.27	0.48	Bi-212	727.00	0.0000	0.0000
4	765.70	770.97	33	-5	10	768.11	0.22	0.35	Bi-214	768.36	0.0000	0.0001
5	824.75	830.01	28	3	9	825.84	0.22	0.35	Co-60	826.28	0.0113	0.0340
6	844.94	850.21	78	45	12	847.03	0.54	1.61	Co-56	846.77	0.0000	0.0000
7	857.89	863.16	34	13	8	858.99	3.62	3.82	Tl-208	860.56	0.0000	0.0000
8	908.38	913.87	27	10	8	910.35	2.96	3.16	Ac-228	911.20	0.0000	0.0000
9	966.11	971.82	33	-17	12	Could not properly fit the peak.						
10	997.94	1003.65	23	5	8	1001.45	0.22	0.35	Pa-234M	1001.03	0.0002	0.0003
11	1060.94	1067.09	23	23	4	1061.64	1.53	1.67	No close library match!			
12	1117.36	1123.07	24	15	6	1120.70	0.55	1.52	Bi-214	1120.29	0.0000	0.0000
13	1172.46	1178.61	16	-3	8	Could not properly fit the peak.						
14	1235.02	1241.17	29	10	9	1237.88	0.66	0.79	Bi-214	1238.11	0.0001	0.0001
15	1271.90	1278.49	21	-10	10	Could not properly fit the peak.						
16	1331.84	1338.42	9	-1	6	Could not properly fit the peak.						
17	1457.63	1463.78	65	41	11	1461.57	0.63	0.83	K-40	1461.00	0.0002	0.0001
18	1761.27	1767.85	16	6	6	1762.80	2.42	2.90	Bi-214	1764.49	0.0000	0.0000

ROCKYFLAT-001-12699. Real/Live Time = 4529/4500 (s).

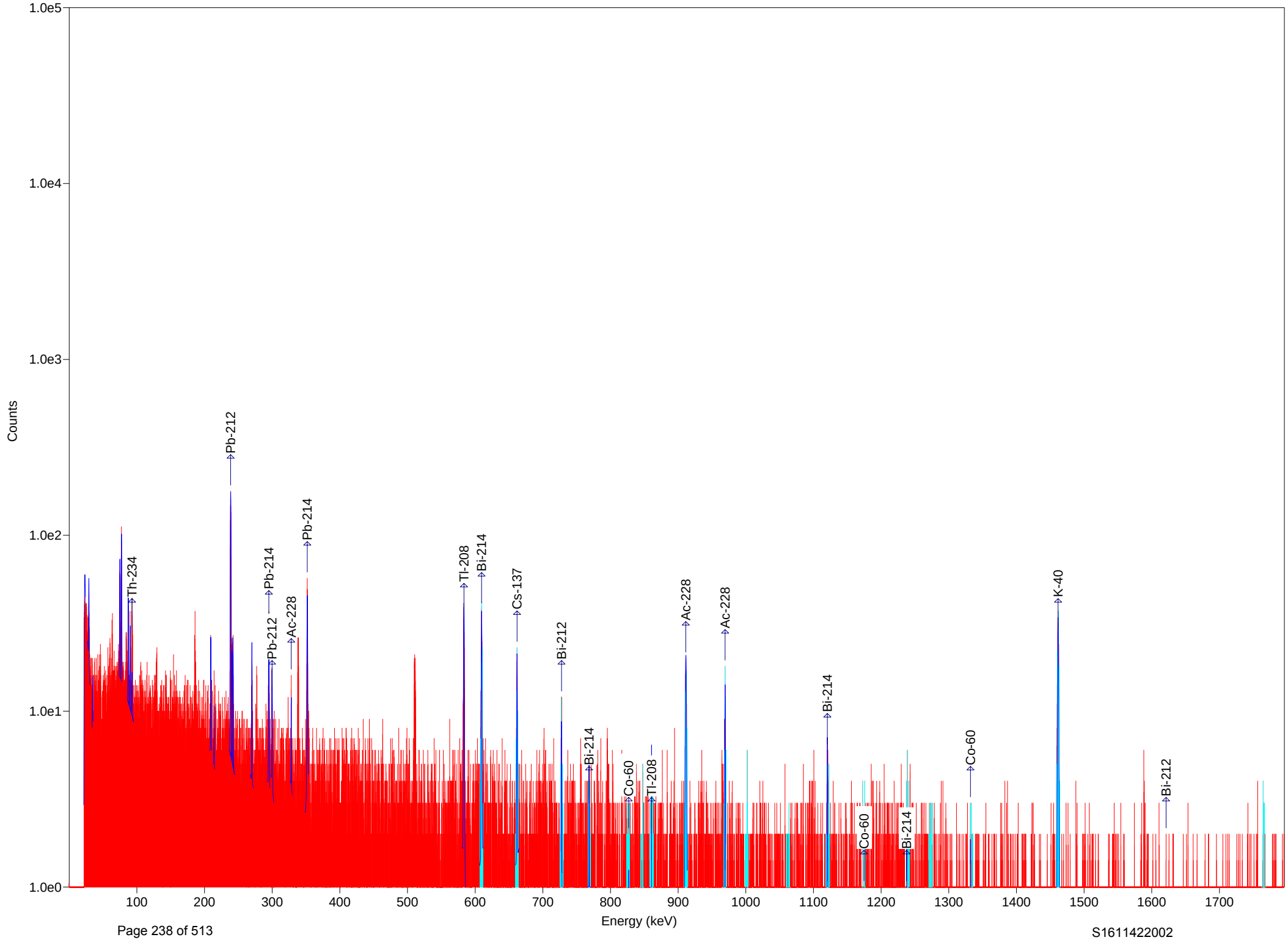


S1611422002

Detector #4 ACQ 08-Jan-2017 at 18:18:13 RT = 4529.1 LT = 4500.0
Rad Chem 1
ROCKYFLAT-001-12699

ROI#	RANGE(keV)		GROSS	NET	+/-	CENTROID	FWHM	FW(1/5)M	LIBRARY	(keV)	µCi	+/-
1	606.78	611.61	284	219	20	609.48	1.22	1.67	Bi-214	609.31	0.0001	0.0000
2	659.24	664.07	162	112	15	661.77	1.44	2.31	Cs-137	661.66	0.0000	0.0000
3	724.43	729.70	114	89	12	727.40	1.23	1.66	Bi-212	727.00	0.0003	0.0000
4	765.70	770.97	68	10	13	768.29	0.31	0.91	Bi-214	768.36	0.0001	0.0001
5	824.75	830.01	43	-3	11	825.40	0.26	0.44	Co-60	826.28	0.0000	0.0416
6	844.94	850.21	64	14	13	846.48	0.24	0.38	Co-56	846.77	0.0000	0.0000
7	857.89	863.16	70	45	11	859.75	0.41	0.63	Tl-208	860.56	0.0001	0.0000
8	908.38	913.87	189	163	15	911.43	1.13	2.02	Ac-228	911.20	0.0002	0.0000
9	966.11	971.82	124	79	15	969.08	1.04	1.59	Ac-228	968.97	0.0002	0.0000
10	997.94	1003.65	35	-6	11	1002.11	0.22	0.35	Pa-234M	1001.03	0.0000	0.0004
11	1060.94	1067.09	40	-8	13	Could not properly fit the peak.						
12	1117.36	1123.07	86	45	13	1120.62	0.47	1.36	Bi-214	1120.29	0.0001	0.0000
13	1172.46	1178.61	25	6	8	1175.31	2.41	2.55	Co-60	1173.24	0.0000	0.0000
14	1235.02	1241.17	62	14	14	1237.33	2.38	2.53	Bi-214	1238.11	0.0001	0.0001
15	1271.90	1278.49	26	10	8	1273.11	2.49	2.71	No close library match!			
16	1331.84	1338.42	19	-2	9	1333.59	0.22	0.35	Co-60	1332.50	0.0000	0.0000
17	1457.63	1463.78	408	398	20	1461.11	1.86	3.01	K-40	1461.00	0.0019	0.0001
18	1761.27	1767.85	48	38	8	1764.98	0.34	2.34	Bi-214	1764.49	0.0002	0.0000

ROCKYFLATS-12699. Real/Live Time = 4505/4500 (s).

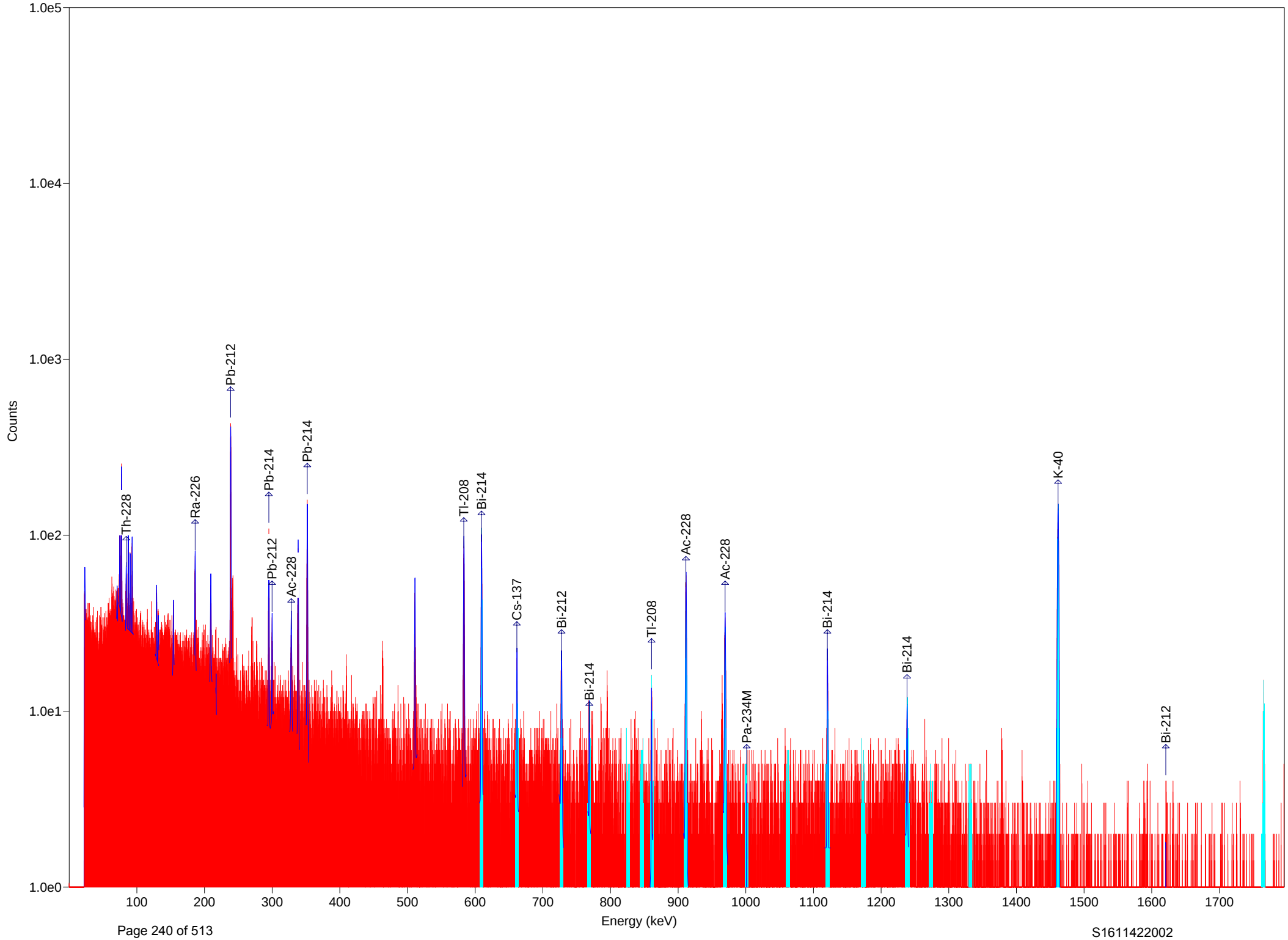


S1611422002

Detector #2 ACQ 29-Dec-2016 at 13:36:46 RT = 4505.3 LT = 4500.0
Rad Chem 2
ROCKYFLATS-12699

ROI#	RANGE(keV)		GROSS	NET	+/-	CENTROID	FWHM	FW(1/5)M	LIBRARY	(keV)	µCi	+/-
1	606.93	611.75	279	202	20	609.50	1.15	2.19	Bi-214	609.31	0.0001	0.0000
2	659.29	664.11	155	113	15	661.54	0.96	1.93	Cs-137	661.66	0.0000	0.0000
3	724.58	729.84	92	63	12	727.19	0.81	1.25	Bi-212	727.00	0.0002	0.0000
4	765.77	771.02	61	19	12	767.96	0.84	0.99	Bi-214	768.36	0.0001	0.0001
5	823.38	828.64	38	0	10	826.45	1.75	1.88	Co-60	826.28	0.0000	0.0387
6	843.53	848.79	38	-4	11	847.16	0.47	0.70	Co-56	846.77	0.0000	0.0000
7	857.99	863.25	56	6	12	859.53	1.48	1.64	Tl-208	860.56	0.0000	0.0000
8	908.38	914.07	167	126	16	910.91	1.68	2.49	Ac-228	911.20	0.0001	0.0000
9	966.21	971.90	117	90	13	969.23	1.38	1.93	Ac-228	968.97	0.0002	0.0000
10	998.19	1003.88	35	-1	11	1001.72	0.29	0.50	Pa-234M	1001.03	0.0000	0.0005
11	1059.08	1065.21	31	-13	12	Could not properly fit the peak.						
12	1117.34	1123.47	69	45	11	1120.22	0.68	1.45	Bi-214	1120.29	0.0001	0.0000
13	1170.34	1176.47	27	3	9	1172.09	3.50	3.64	Co-60	1173.24	0.0000	0.0000
14	1235.17	1241.30	35	16	9	1238.45	0.27	0.44	Co-56	1238.28	0.0000	0.0000
15	1269.55	1276.12	31	21	7	1272.42	3.56	3.79	No close library match!			
16	1329.34	1335.91	27	11	8	1331.43	0.41	0.56	Co-60	1332.50	0.0000	0.0000
17	1457.88	1464.45	321	295	20	1460.72	2.34	3.26	K-40	1461.00	0.0014	0.0001
18	1761.13	1768.13	35	29	7	1763.75	0.44	3.37	Bi-214	1764.49	0.0001	0.0000

S1611422-001A. Real/Live Time = 4506/4500 (s).

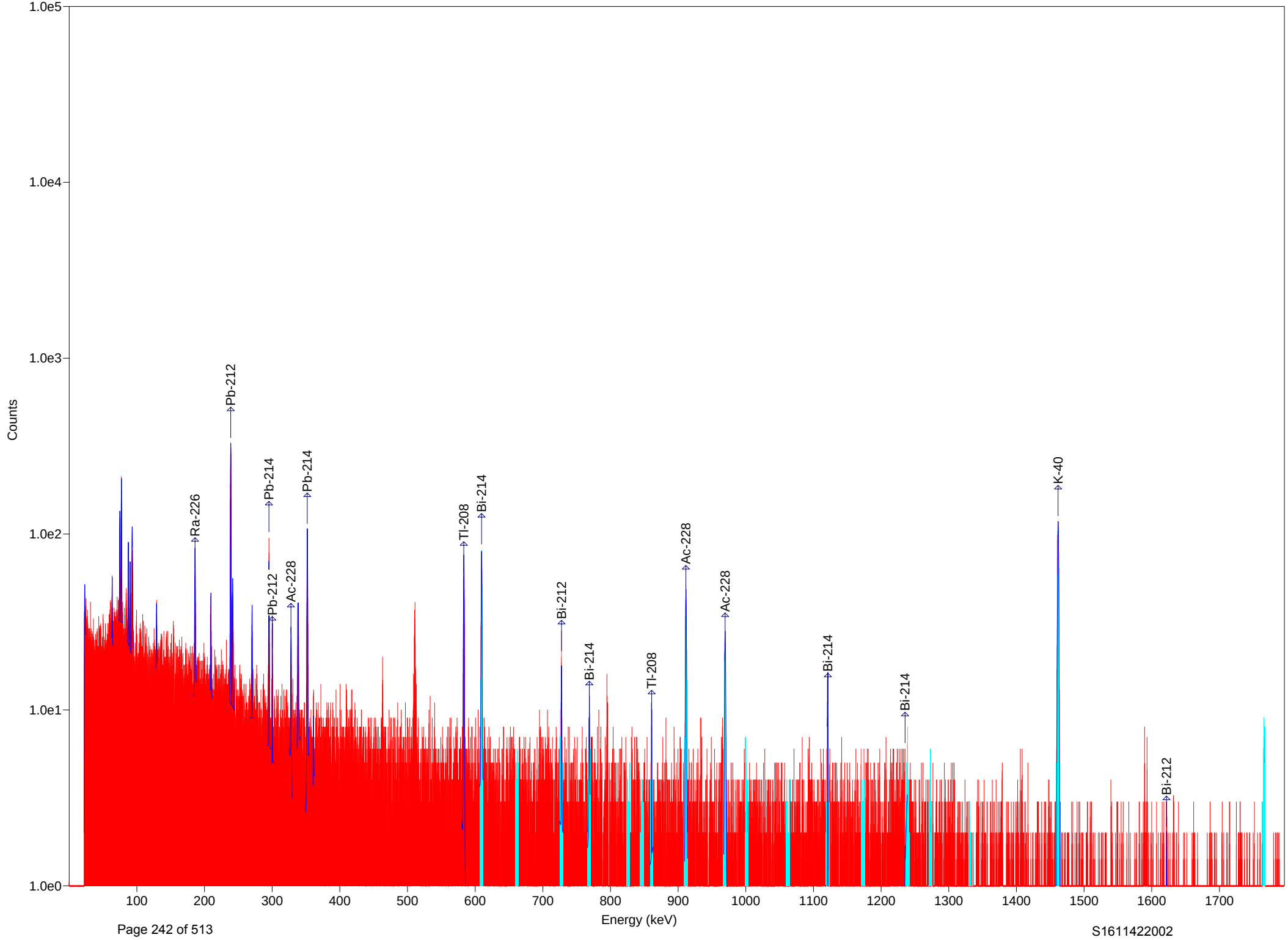


S1611422002

Detector #2 ACQ 29-Dec-2016 at 14:57:39 RT = 4506.5 LT = 4500.0
Rad Chem 2
S1611422-001A

ROI#	RANGE(keV)		GROSS	NET	+/-	CENTROID	FWHM	FW(1/5)M	LIBRARY	(keV)	µCi	+/-
1	606.93	611.75	676	553	30	609.33	1.27	1.78	Bi-214	609.31	0.0003	0.0000
2	659.29	664.11	188	104	18	661.77	1.14	1.67	Cs-137	661.66	0.0000	0.0000
3	724.58	729.84	215	102	21	727.28	1.41	2.05	Bi-212	727.00	0.0004	0.0001
4	765.77	771.02	134	67	16	768.03	1.33	1.63	Bi-214	768.36	0.0004	0.0001
5	823.38	828.64	68	-28	16	Could not properly fit the peak.						
6	843.53	848.79	81	6	15	847.80	0.40	0.55	Co-56	846.77	0.0000	0.0000
7	857.99	863.25	128	74	15	860.57	0.74	1.60	Tl-208	860.56	0.0002	0.0000
8	908.38	914.07	471	367	27	911.28	1.59	2.14	Ac-228	911.20	0.0004	0.0000
9	966.21	971.90	304	236	21	969.05	1.95	2.50	Ac-228	968.97	0.0005	0.0000
10	998.19	1003.88	65	6	14	1001.22	0.79	1.26	Pa-234M	1001.03	0.0003	0.0006
11	1059.08	1065.21	82	-15	18	1060.83	1.81	2.02	No close library match!			
12	1117.34	1123.47	204	122	20	1120.36	1.12	2.35	Bi-214	1120.29	0.0003	0.0001
13	1170.34	1176.47	78	20	15	1171.00	4.60	4.73	Co-60	1173.24	0.0000	0.0000
14	1235.17	1241.30	134	52	19	1238.37	1.37	1.93	Co-56	1238.28	0.0000	0.0000
15	1269.55	1276.12	65	24	13	1271.91	0.83	1.20	No close library match!			
16	1329.34	1335.91	58	-9	16	1332.84	0.22	0.35	Co-60	1332.50	0.0000	0.0000
17	1457.88	1464.45	1371	1278	40	1460.95	1.92	2.89	K-40	1461.00	0.0062	0.0002
18	1761.13	1768.13	113	96	13	1764.75	1.47	2.03	Bi-214	1764.49	0.0004	0.0001

S1611422-002A. Real/Live Time = 4519/4500 (s).

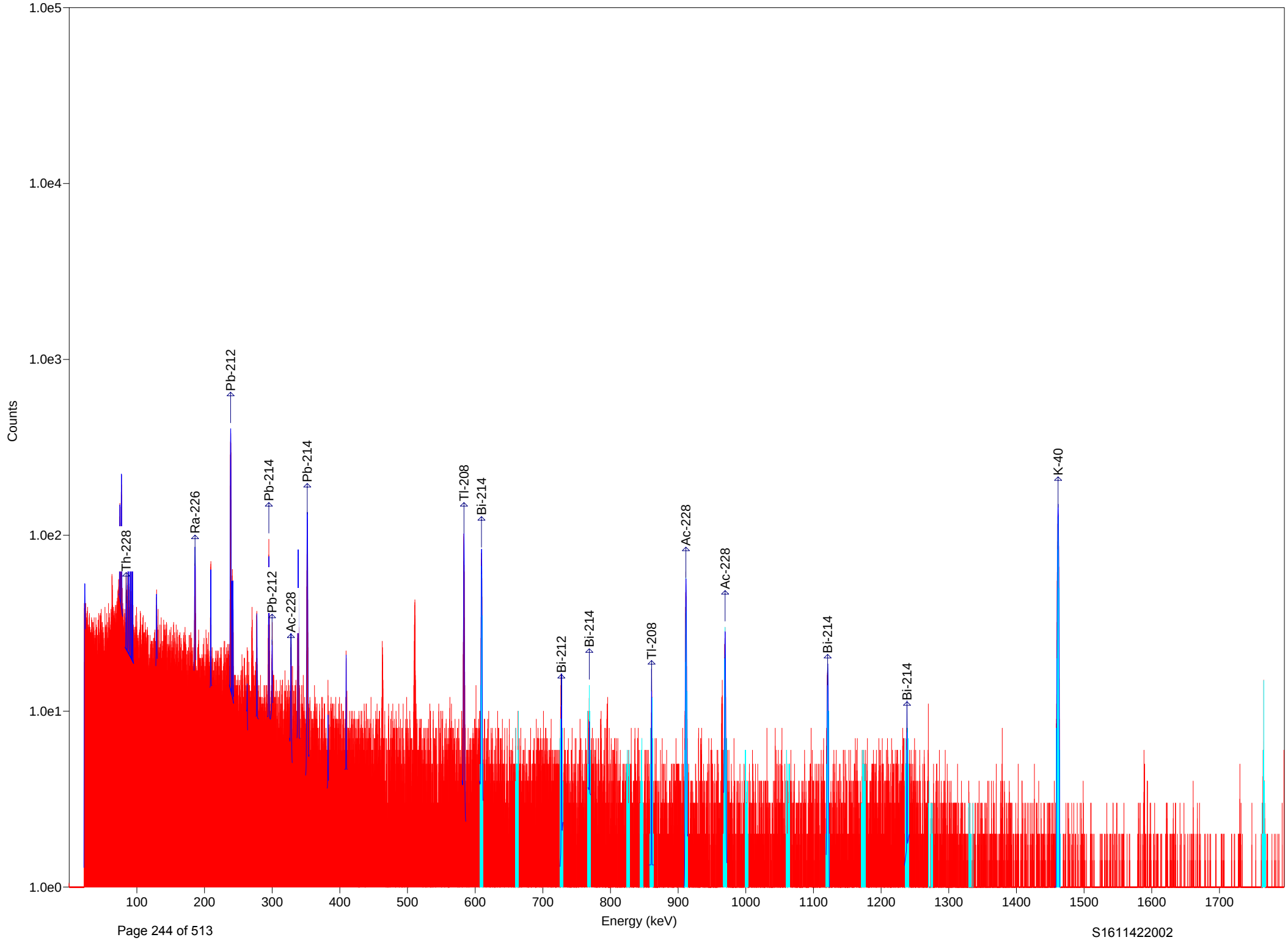


S1611422002

Detector #2 ACQ 29-Dec-2016 at 16:20:17 RT = 4519.5 LT = 4500.0
Rad Chem 2
S1611422-002A

ROI#	RANGE(keV)		GROSS	NET	+/-	CENTROID	FWHM	FW(1/5)M	LIBRARY	(keV)	µCi	+/-
1	606.93	611.75	568	453	27	609.37	1.23	1.79	Bi-214	609.31	0.0002	0.0000
2	659.29	664.11	76	-1	14	661.92	0.22	0.35	Cs-137	661.66	0.0000	0.0000
3	724.58	729.84	185	102	19	727.46	0.94	1.59	Bi-212	727.00	0.0004	0.0001
4	765.77	771.02	118	43	16	768.82	0.97	1.20	Bi-214	768.36	0.0002	0.0001
5	823.38	828.64	57	-10	14	Could not properly fit the peak.						
6	843.53	848.79	65	-14	15	Could not properly fit the peak.						
7	857.99	863.25	101	51	14	860.20	0.36	1.90	Tl-208	860.56	0.0001	0.0000
8	908.38	914.07	384	307	23	911.30	1.50	2.28	Ac-228	911.20	0.0004	0.0000
9	966.21	971.90	227	155	20	968.94	1.64	2.02	Ac-228	968.97	0.0003	0.0000
10	998.19	1003.88	62	26	12	999.06	0.22	0.35	Pa-234M	1001.03	0.0011	0.0005
11	1059.08	1065.21	55	-37	17	Could not properly fit the peak.						
12	1117.34	1123.47	144	86	17	1120.40	0.44	2.19	Bi-214	1120.29	0.0002	0.0000
13	1170.34	1176.47	68	0	16	1174.10	1.96	2.10	Co-60	1173.24	0.0000	0.0000
14	1235.17	1241.30	81	13	16	1238.62	0.33	0.80	Co-56	1238.28	0.0000	0.0000
15	1269.55	1276.12	58	-4	15	1272.40	0.22	0.35	No close library match!			
16	1329.34	1335.91	35	-12	13	Could not properly fit the peak.						
17	1457.88	1464.45	1064	992	35	1460.93	1.74	2.65	K-40	1461.00	0.0048	0.0002
18	1761.13	1768.13	80	63	11	1764.91	0.71	2.56	Bi-214	1764.49	0.0003	0.0000

S1611422-003A. Real/Live Time = 4506/4500 (s).

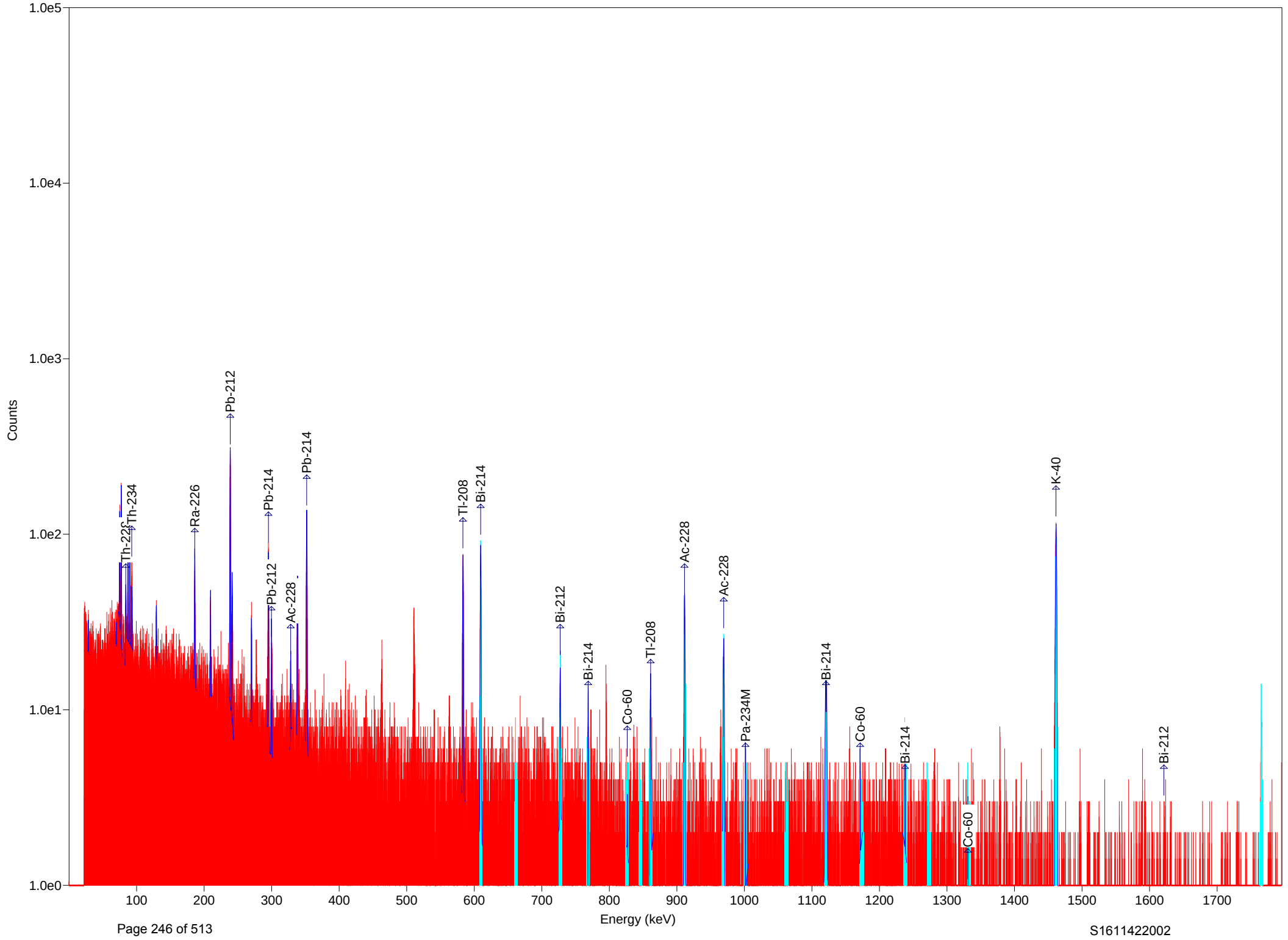


S1611422002

Detector #2 ACQ 30-Dec-2016 at 8:27:23 RT = 4506.1 LT = 4500.0
Rad Chem 2
S1611422-003A

ROI#	RANGE(keV)		GROSS	NET	+/-	CENTROID	FWHM	FW(1/5)M	LIBRARY	(keV)	µCi	+/-
1	606.93	611.75	577	481	27	609.29	1.26	1.98	Bi-214	609.31	0.0002	0.0000
2	659.29	664.11	97	16	15	663.19	0.30	0.53	Cs-137	661.66	0.0000	0.0000
3	724.58	729.84	185	89	19	727.59	0.75	1.93	Bi-212	727.00	0.0003	0.0001
4	765.77	771.02	146	-33	23	768.35	0.28	0.50	Bi-214	768.36	0.0000	0.0001
5	823.38	828.64	68	-3	14	824.70	2.19	2.32	Co-60	826.28	0.0000	0.0542
6	843.53	848.79	69	15	13	846.16	0.25	0.72	Co-56	846.77	0.0000	0.0000
7	857.99	863.25	137	70	16	860.54	0.55	1.40	Tl-208	860.56	0.0002	0.0000
8	908.38	914.07	436	386	23	911.20	1.52	2.15	Ac-228	911.20	0.0004	0.0000
9	966.21	971.90	262	181	21	968.85	1.75	2.30	Ac-228	968.97	0.0004	0.0000
10	998.19	1003.88	71	-10	16	999.50	2.74	2.94	Pa-234M	1001.03	0.0000	0.0007
11	1059.08	1065.21	95	-2	19	1059.95	0.27	0.48	No close library match!			
12	1117.34	1123.47	172	124	17	1120.40	1.92	3.25	Bi-214	1120.29	0.0003	0.0000
13	1170.34	1176.47	100	18	18	1171.76	2.80	3.06	Co-60	1173.24	0.0000	0.0000
14	1235.17	1241.30	129	32	20	1237.96	0.86	1.64	Bi-214	1238.11	0.0002	0.0001
15	1269.55	1276.12	55	-28	17	Could not properly fit the peak.						
16	1329.34	1335.91	32	-9	12	1335.03	0.33	0.53	Co-60	1332.50	0.0000	0.0000
17	1457.88	1464.45	1360	1282	40	1460.90	1.97	3.10	K-40	1461.00	0.0062	0.0002
18	1761.13	1768.13	77	60	11	1764.59	0.30	0.81	Bi-214	1764.49	0.0003	0.0000

S1611422-004A. Real/Live Time = 4505/4500 (s).

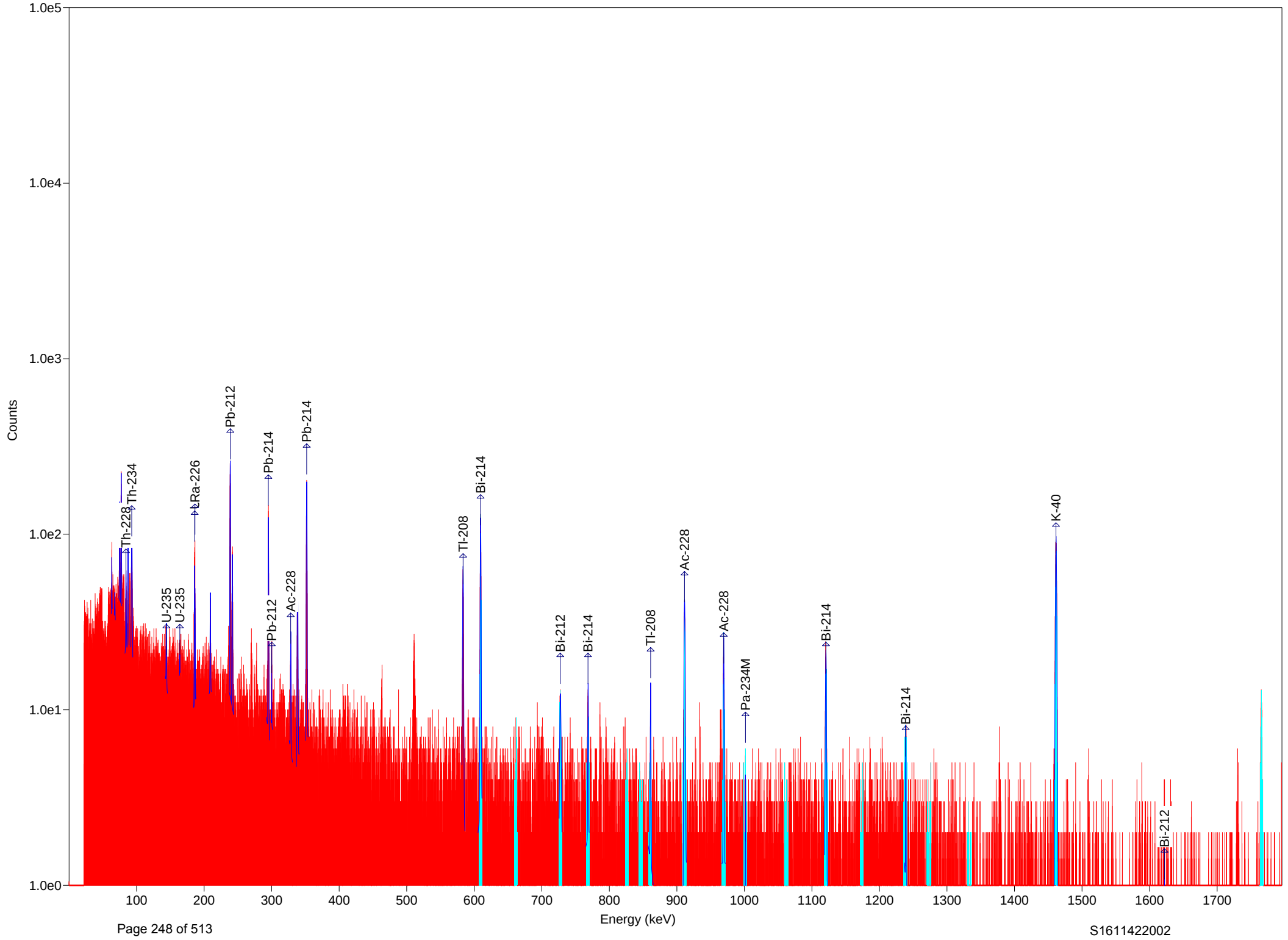


S1611422002

Detector #2 ACQ 30-Dec-2016 at 9:45:15 RT = 4505.7 LT = 4500.0
Rad Chem 2
S1611422-004A

ROI#	RANGE(keV)		GROSS	NET	+/-	CENTROID	FWHM	FW(1/5)M	LIBRARY	(keV)	µCi	+/-
1	606.93	611.75	582	505	26	609.33	1.35	1.84	Bi-214	609.31	0.0003	0.0000
2	659.29	664.11	84	0	15	660.83	0.25	0.61	Cs-137	661.66	0.0000	0.0000
3	724.58	729.84	189	97	19	727.18	1.05	1.90	Bi-212	727.00	0.0004	0.0001
4	765.77	771.02	113	67	14	768.31	0.79	1.08	Bi-214	768.36	0.0004	0.0001
5	823.38	828.64	72	-11	15	824.91	0.22	0.35	Co-60	826.28	0.0000	0.0581
6	843.53	848.79	57	-6	13	844.19	0.22	0.35	Co-56	846.77	0.0000	0.0000
7	857.99	863.25	126	55	16	860.51	1.06	1.77	Tl-208	860.56	0.0001	0.0000
8	908.38	914.07	348	276	22	911.23	1.11	2.33	Ac-228	911.20	0.0003	0.0000
9	966.21	971.90	221	153	19	969.07	1.68	2.34	Ac-228	968.97	0.0003	0.0000
10	998.19	1003.88	78	1	16	1000.59	0.24	0.39	Pa-234M	1001.03	0.0000	0.0007
11	1059.08	1065.21	70	7	15	1060.51	3.20	3.38	No close library match!			
12	1117.34	1123.47	173	139	16	1120.47	2.23	3.45	Bi-214	1120.29	0.0004	0.0000
13	1170.34	1176.47	89	-8	19	1174.06	1.31	1.45	Co-60	1173.24	0.0000	0.0000
14	1235.17	1241.30	104	31	17	1236.92	0.24	0.39	Bi-214	1238.11	0.0002	0.0001
15	1269.55	1276.12	45	-17	15	1271.74	0.22	0.35	No close library match!			
16	1329.34	1335.91	43	-19	15	1330.21	0.22	0.35	Co-60	1332.50	0.0000	0.0000
17	1457.88	1464.45	1041	953	36	1460.84	1.89	2.76	K-40	1461.00	0.0046	0.0002
18	1761.13	1768.13	98	87	11	1764.39	0.39	2.51	Bi-214	1764.49	0.0004	0.0000

S1611422-005A. Real/Live Time = 4506/4500 (s).

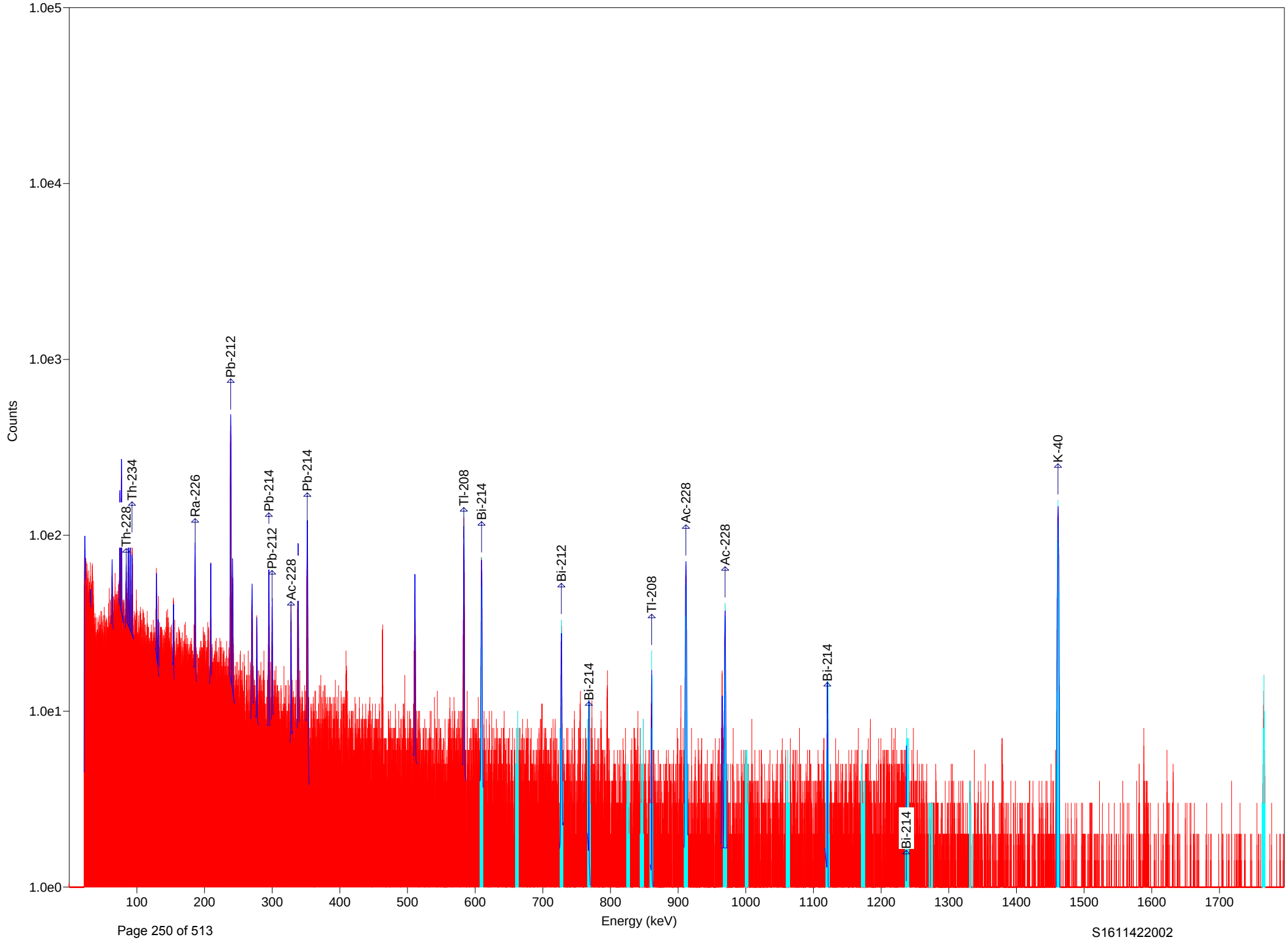


S1611422002

Detector #2 ACQ 30-Dec-2016 at 11:02:16 RT = 4506.4 LT = 4500.0
Rad Chem 2
S1611422-005A

ROI#	RANGE(keV)		GROSS	NET	+/-	CENTROID	FWHM	FW(1/5)M	LIBRARY	(keV)	µCi	+/-
1	606.93	611.75	820	693	32	609.22	1.29	1.94	Bi-214	609.31	0.0004	0.0000
2	659.29	664.11	94	33	14	661.48	0.24	0.39	Cs-137	661.66	0.0000	0.0000
3	724.58	729.84	146	75	17	727.21	2.05	2.65	Bi-212	727.00	0.0003	0.0001
4	765.77	771.02	134	46	17	768.38	0.85	1.65	Bi-214	768.36	0.0003	0.0001
5	823.38	828.64	65	11	13	825.79	0.22	0.35	Co-60	826.28	0.0426	0.0504
6	843.53	848.79	61	-18	15	844.63	0.33	0.53	Co-56	846.77	0.0000	0.0000
7	857.99	863.25	112	37	16	860.84	0.96	1.26	Tl-208	860.56	0.0001	0.0000
8	908.38	914.07	323	260	21	911.24	1.42	2.08	Ac-228	911.20	0.0003	0.0000
9	966.21	971.90	216	175	17	968.94	1.59	2.94	Ac-228	968.97	0.0004	0.0000
10	998.19	1003.88	59	5	13	1001.15	0.43	0.64	Pa-234M	1001.03	0.0002	0.0005
11	1059.08	1065.21	57	-30	17	Could not properly fit the peak.						
12	1117.34	1123.47	206	133	20	1120.30	1.68	2.38	Bi-214	1120.29	0.0004	0.0001
13	1170.34	1176.47	57	-16	16	1172.09	2.41	2.54	Co-60	1173.24	0.0000	0.0000
14	1235.17	1241.30	115	71	15	1238.90	0.41	2.09	Co-56	1238.28	0.0000	0.0000
15	1269.55	1276.12	42	1	13	1275.46	0.22	0.35	No close library match!			
16	1329.34	1335.91	31	10	9	1330.87	0.33	1.55	Co-60	1332.50	0.0000	0.0000
17	1457.88	1464.45	875	803	33	1460.93	1.78	2.78	K-40	1461.00	0.0039	0.0002
18	1761.13	1768.13	132	126	12	1764.64	2.36	3.59	Bi-214	1764.49	0.0005	0.0001

S1611422-006A. Real/Live Time = 4506/4500 (s).

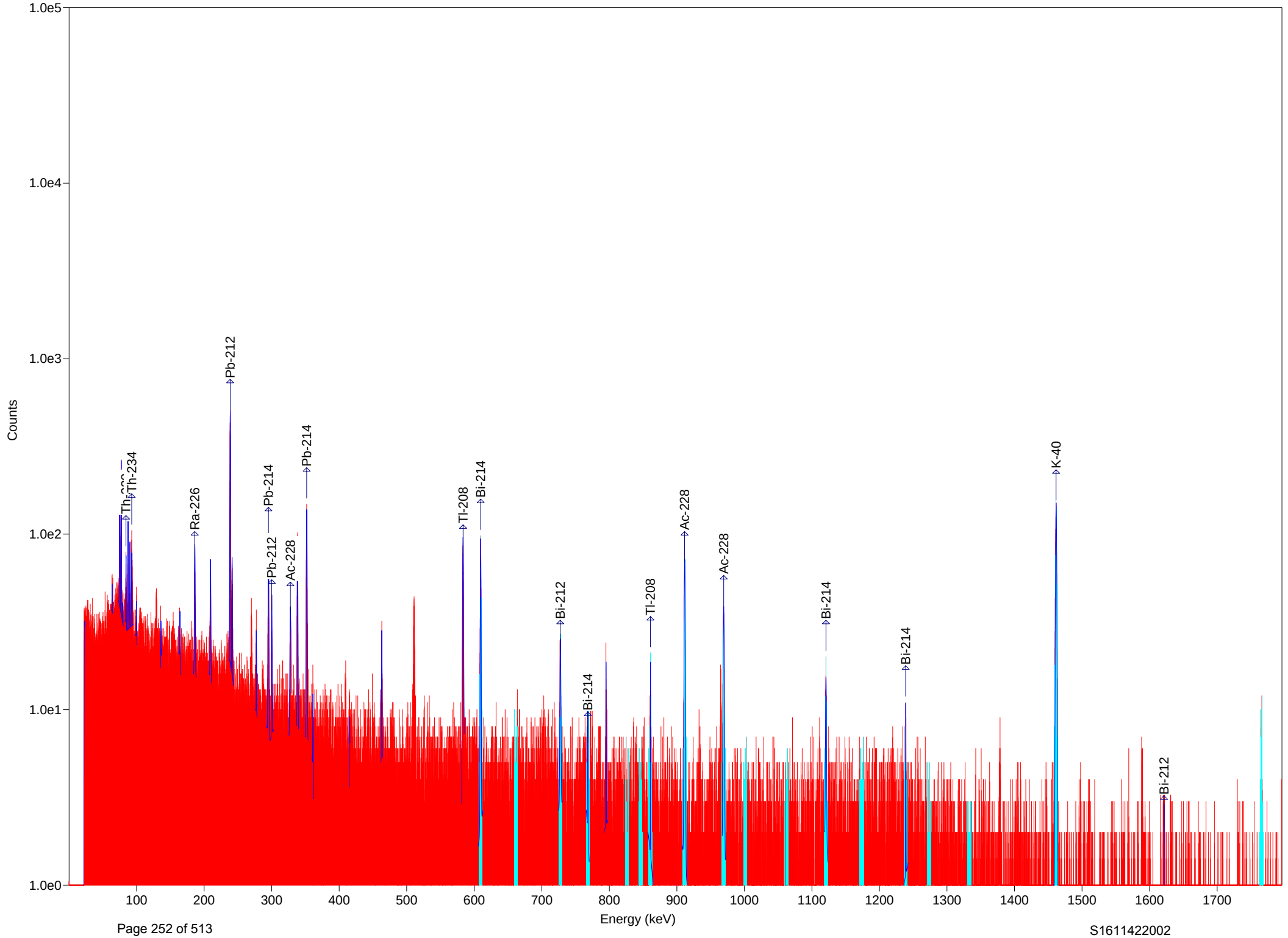


S1611422002

Detector #2 ACQ 30-Dec-2016 at 12:18:28 RT = 4506.2 LT = 4500.0
Rad Chem 2
S1611422-006A

ROI#	RANGE(keV)		GROSS	NET	+/-	CENTROID	FWHM	FW(1/5)M	LIBRARY	(keV)	µCi	+/-
1	606.93	611.75	529	433	26	609.26	1.25	2.00	Bi-214	609.31	0.0002	0.0000
2	659.29	664.11	105	24	15	662.85	0.31	0.98	Cs-137	661.66	0.0000	0.0000
3	724.58	729.84	247	151	21	727.19	1.22	1.80	Bi-212	727.00	0.0006	0.0001
4	765.77	771.02	124	-9	20	768.35	0.25	0.47	Bi-214	768.36	0.0000	0.0001
5	823.38	828.64	64	10	13	824.26	2.30	2.58	Co-60	826.28	0.0387	0.0504
6	843.53	848.79	84	-12	17	848.14	0.24	0.39	Co-56	846.77	0.0000	0.0000
7	857.99	863.25	147	93	16	860.55	0.93	1.98	Tl-208	860.56	0.0002	0.0000
8	908.38	914.07	549	472	27	911.18	1.68	2.26	Ac-228	911.20	0.0005	0.0000
9	966.21	971.90	337	233	24	969.02	1.49	2.11	Ac-228	968.97	0.0005	0.0001
10	998.19	1003.88	85	8	16	999.00	0.55	0.75	Pa-234M	1001.03	0.0003	0.0007
11	1059.08	1065.21	68	0	16	1061.71	0.22	0.35	No close library match!			
12	1117.34	1123.47	173	125	17	1119.82	0.63	2.42	Bi-214	1120.29	0.0003	0.0000
13	1170.34	1176.47	76	-1	17	1171.33	0.41	0.56	Co-60	1173.24	0.0000	0.0000
14	1235.17	1241.30	103	30	17	1236.92	0.24	0.39	Bi-214	1238.11	0.0002	0.0001
15	1269.55	1276.12	56	15	13	1270.21	5.04	5.17	No close library match!			
16	1329.34	1335.91	46	15	12	1330.41	1.95	2.10	Co-60	1332.50	0.0000	0.0000
17	1457.88	1464.45	1303	1236	38	1460.92	1.89	2.83	K-40	1461.00	0.0060	0.0002
18	1761.13	1768.13	118	107	12	1764.55	1.61	2.98	Bi-214	1764.49	0.0004	0.0001

S1611422-007A. Real/Live Time = 4506/4500 (s).

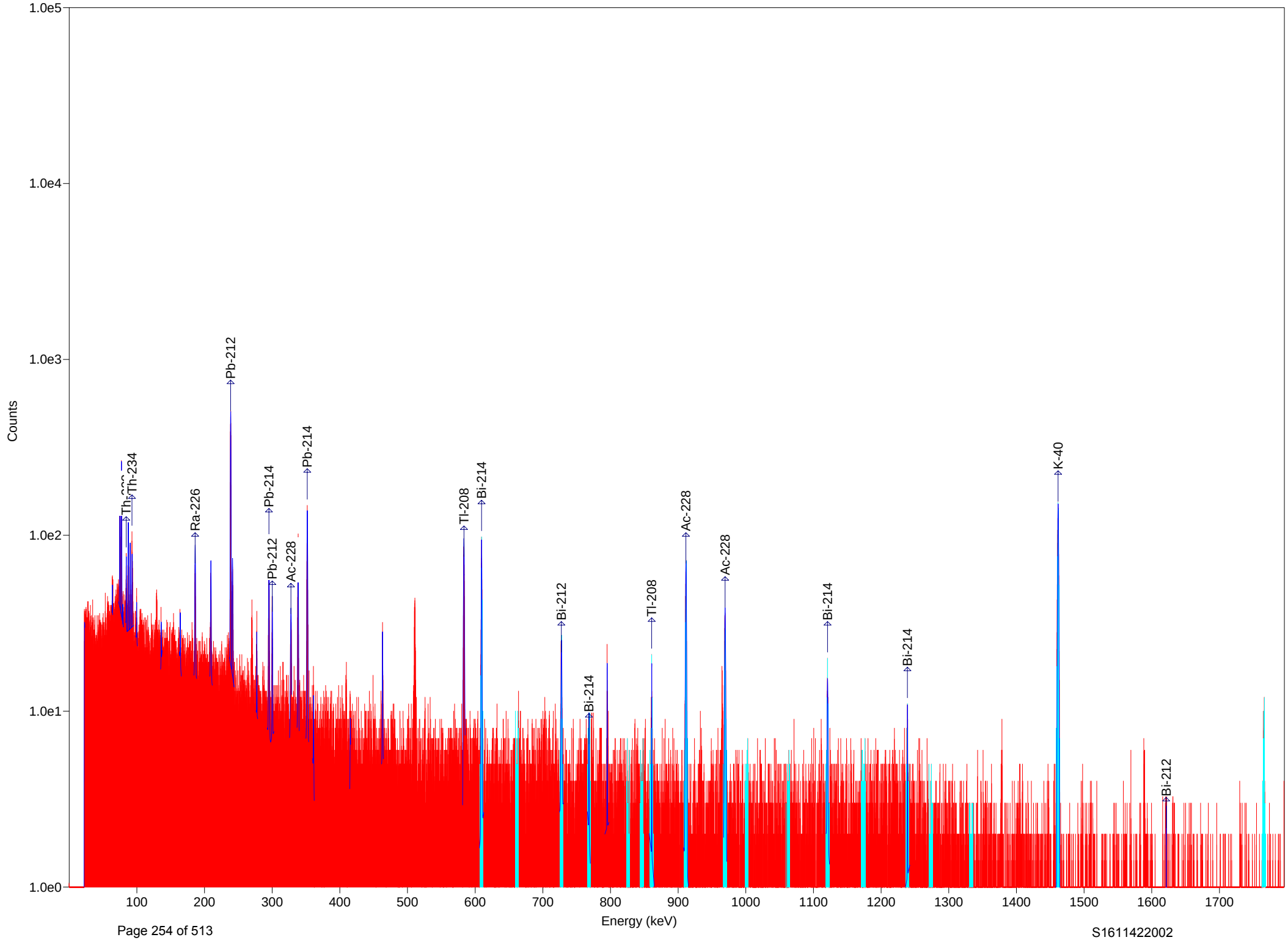


S1611422002

Detector #2 ACQ 30-Dec-2016 at 13:36:54 RT = 4506.6 LT = 4500.0
Rad Chem 2
S1611422-007A

ROI#	RANGE(keV)		GROSS	NET	+/-	CENTROID	FWHM	FW(1/5)M	LIBRARY	(keV)	µCi	+/-
1	606.93	611.75	620	509	28	609.34	1.20	2.01	Bi-214	609.31	0.0003	0.0000
2	659.29	664.11	123	-46	20	663.02	0.22	0.35	Cs-137	661.66	0.0000	0.0000
3	724.58	729.84	243	143	21	727.29	1.40	2.32	Bi-212	727.00	0.0005	0.0001
4	765.77	771.02	133	41	18	768.28	0.48	1.16	Bi-214	768.36	0.0002	0.0001
5	823.38	828.64	71	8	14	824.70	0.25	0.61	Co-60	826.28	0.0310	0.0542
6	843.53	848.79	90	-14	17	847.48	0.27	0.48	Co-56	846.77	0.0000	0.0000
7	857.99	863.25	155	72	18	860.61	0.33	1.52	Tl-208	860.56	0.0002	0.0000
8	908.38	914.07	533	429	28	911.20	1.59	2.06	Ac-228	911.20	0.0005	0.0000
9	966.21	971.90	321	258	21	969.00	1.65	2.46	Ac-228	968.97	0.0005	0.0000
10	998.19	1003.88	84	-11	17	1002.57	0.22	0.35	Pa-234M	1001.03	0.0000	0.0007
11	1059.08	1065.21	77	-15	18	1063.24	0.22	0.35	No close library match!			
12	1117.34	1123.47	161	93	18	1120.42	1.60	2.15	Bi-214	1120.29	0.0002	0.0000
13	1170.34	1176.47	84	11	17	1171.00	5.04	5.17	Co-60	1173.24	0.0000	0.0000
14	1235.17	1241.30	111	48	17	1238.39	0.90	1.76	Co-56	1238.28	0.0000	0.0000
15	1269.55	1276.12	55	-2	15	1273.71	0.22	0.35	No close library match!			
16	1329.34	1335.91	45	4	13	1333.50	1.97	2.10	Co-60	1332.50	0.0000	0.0000
17	1457.88	1464.45	1367	1274	40	1460.92	1.66	3.00	K-40	1461.00	0.0061	0.0002
18	1761.13	1768.13	101	90	11	1765.27	0.41	2.52	Bi-214	1764.49	0.0004	0.0000

S1611422-008A. Real/Live Time = 4506/4500 (s).

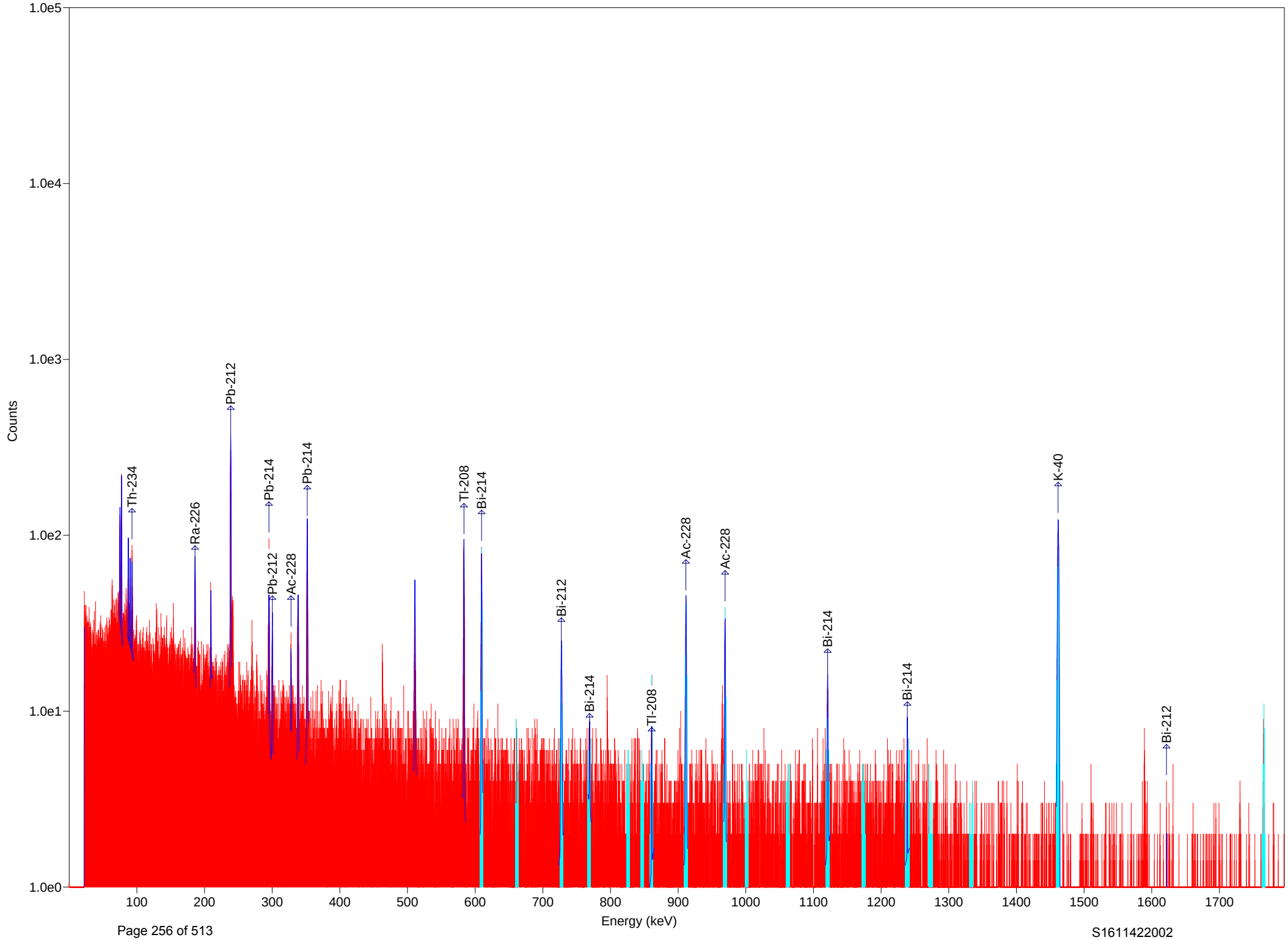


S1611422002

Detector #2 ACQ 30-Dec-2016 at 13:36:53 RT = 4506.6 LT = 4500.0
Rad Chem 2
S1611422-008A

ROI#	RANGE(keV)		GROSS	NET	+/-	CENTROID	FWHM	FW(1/5)M	LIBRARY	(keV)	µCi	+/-
1	606.93	611.75	620	509	28	609.34	1.20	2.01	Bi-214	609.31	0.0003	0.0000
2	659.29	664.11	123	-46	20	663.02	0.22	0.35	Cs-137	661.66	0.0000	0.0000
3	724.58	729.84	243	143	21	727.29	1.40	2.32	Bi-212	727.00	0.0005	0.0001
4	765.77	771.02	133	41	18	768.28	0.48	1.16	Bi-214	768.36	0.0002	0.0001
5	823.38	828.64	71	8	14	824.70	0.25	0.61	Co-60	826.28	0.0310	0.0542
6	843.53	848.79	90	-14	17	847.48	0.27	0.48	Co-56	846.77	0.0000	0.0000
7	857.99	863.25	155	72	18	860.61	0.33	1.52	Tl-208	860.56	0.0002	0.0000
8	908.38	914.07	533	429	28	911.20	1.59	2.06	Ac-228	911.20	0.0005	0.0000
9	966.21	971.90	321	258	21	969.00	1.65	2.46	Ac-228	968.97	0.0005	0.0000
10	998.19	1003.88	84	-11	17	1002.57	0.22	0.35	Pa-234M	1001.03	0.0000	0.0007
11	1059.08	1065.21	77	-15	18	1063.24	0.22	0.35	No close library match!			
12	1117.34	1123.47	161	93	18	1120.42	1.60	2.15	Bi-214	1120.29	0.0002	0.0000
13	1170.34	1176.47	84	11	17	1171.00	5.04	5.17	Co-60	1173.24	0.0000	0.0000
14	1235.17	1241.30	111	48	17	1238.39	0.90	1.76	Co-56	1238.28	0.0000	0.0000
15	1269.55	1276.12	55	-2	15	1273.71	0.22	0.35	No close library match!			
16	1329.34	1335.91	45	4	13	1333.50	1.97	2.10	Co-60	1332.50	0.0000	0.0000
17	1457.88	1464.45	1367	1274	40	1460.92	1.66	3.00	K-40	1461.00	0.0061	0.0002
18	1761.13	1768.13	101	90	11	1765.27	0.41	2.52	Bi-214	1764.49	0.0004	0.0000

S1611422-009A. Real/Live Time = 4541/4500 (s).

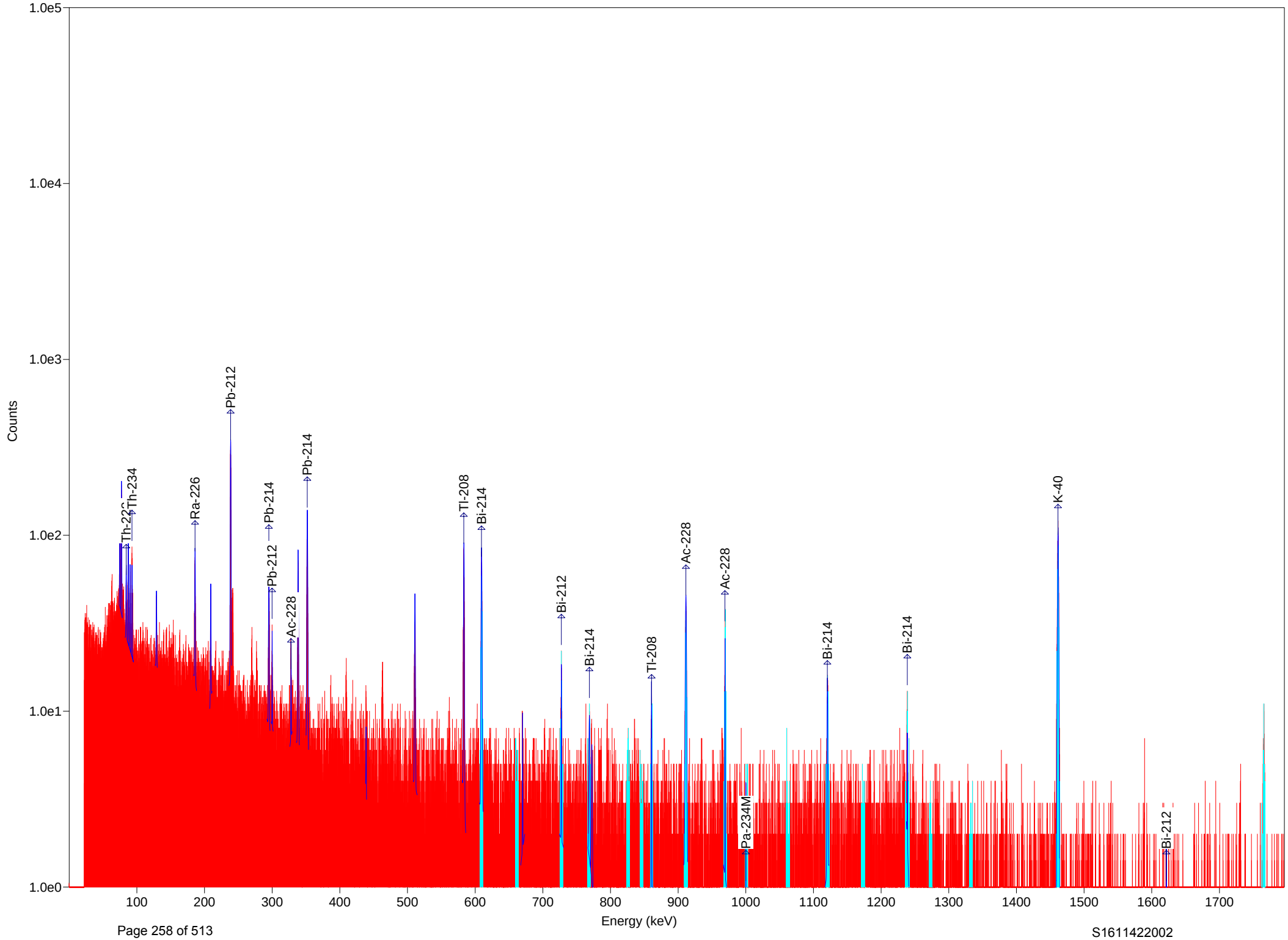


S1611422002

Detector #2 ACQ 30-Dec-2016 at 16:10:35 RT = 4541.9 LT = 4500.0
Rad Chem 2
S1611422-009A

ROI#	RANGE(keV)		GROSS	NET	+/-	CENTROID	FWHM	FW(1/5)M	LIBRARY	(keV)	µCi	+/-
1	606.93	611.75	559	471	26	609.36	1.07	2.21	Bi-214	609.31	0.0002	0.0000
2	659.29	664.11	79	6	14	660.39	0.24	0.39	Cs-137	661.66	0.0000	0.0000
3	724.58	729.84	222	101	21	727.29	1.52	1.96	Bi-212	727.00	0.0004	0.0001
4	765.77	771.02	121	17	18	768.54	0.54	1.61	Bi-214	768.36	0.0001	0.0001
5	823.38	828.64	70	24	13	825.46	2.62	2.81	Co-60	826.28	0.0930	0.0504
6	843.53	848.79	73	-2	15	846.16	0.22	0.35	Co-56	846.77	0.0000	0.0000
7	857.99	863.25	122	51	16	861.01	0.57	0.98	Tl-208	860.56	0.0001	0.0000
8	908.38	914.07	355	296	22	911.37	1.31	2.29	Ac-228	911.20	0.0003	0.0000
9	966.21	971.90	295	200	23	969.03	1.25	2.30	Ac-228	968.97	0.0004	0.0000
10	998.19	1003.88	57	3	13	1000.59	0.22	0.35	Pa-234M	1001.03	0.0001	0.0005
11	1059.08	1065.21	76	8	16	1062.46	2.43	2.55	No close library match!			
12	1117.34	1123.47	161	84	19	1120.46	1.15	2.09	Bi-214	1120.29	0.0002	0.0001
13	1170.34	1176.47	74	16	15	1172.21	2.23	2.75	Co-60	1173.24	0.0000	0.0000
14	1235.17	1241.30	108	50	16	1238.38	0.54	1.84	Co-56	1238.28	0.0000	0.0000
15	1269.55	1276.12	51	-6	15	1273.06	0.22	0.35	No close library match!			
16	1329.34	1335.91	37	1	12	1334.69	0.47	0.70	Co-60	1332.50	0.0000	0.0000
17	1457.88	1464.45	1130	1089	35	1461.03	2.03	2.96	K-40	1461.00	0.0053	0.0002
18	1761.13	1768.13	80	80	8	1764.56	1.67	2.83	Bi-214	1764.49	0.0003	0.0000

S1611422-010A. Real/Live Time = 4504/4500 (s).

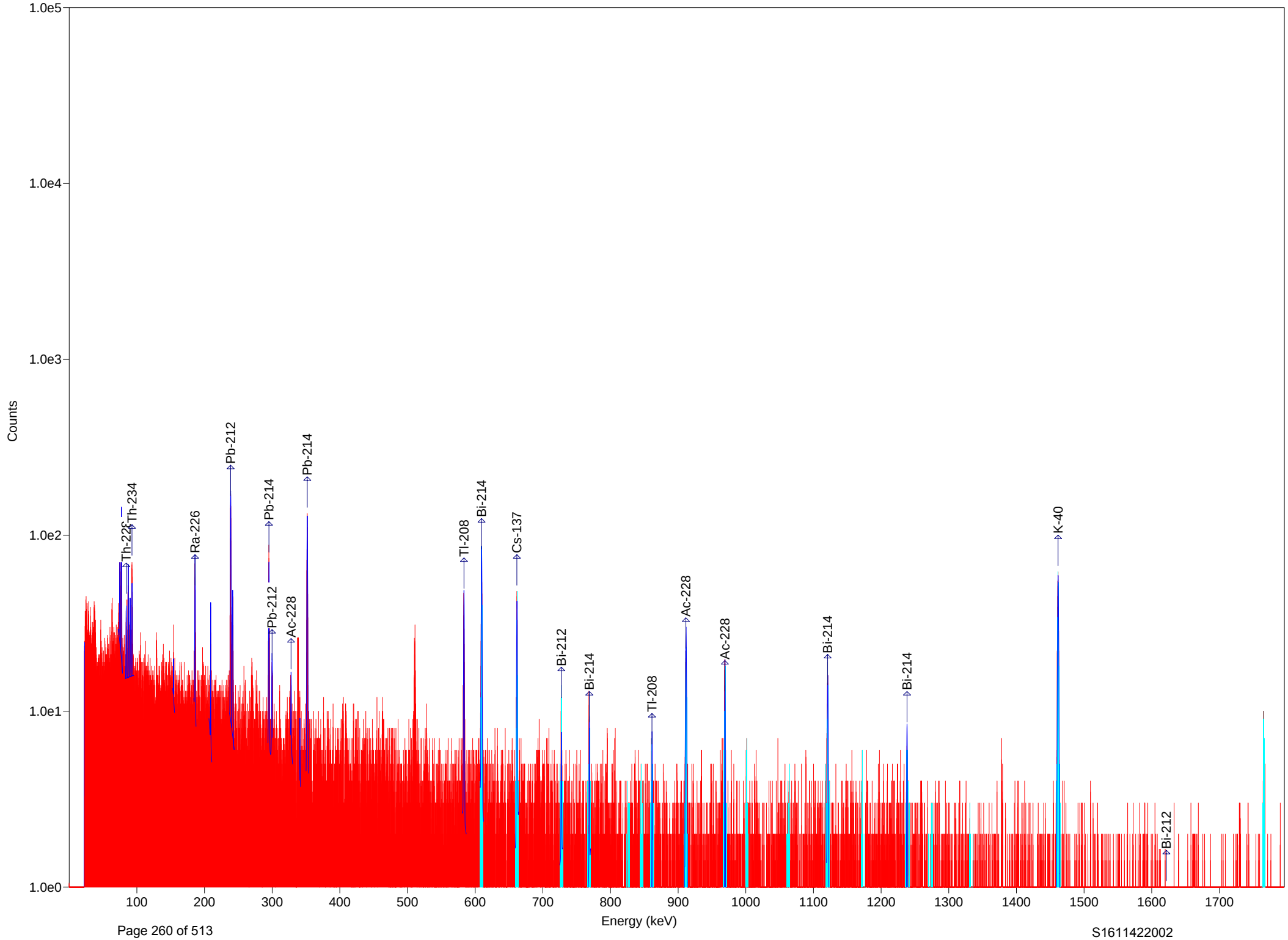


S1611422002

Detector #2 ACQ 03-Jan-2017 at 8:04:02 RT = 4504.7 LT = 4500.0
Rad Chem 2
S1611422-010A

ROI#	RANGE(keV)		GROSS	NET	+/-	CENTROID	FWHM	FW(1/5)M	LIBRARY	(keV)	µCi	+/-
1	606.93	611.75	581	497	27	609.29	1.33	1.84	Bi-214	609.31	0.0003	0.0000
2	659.29	664.11	103	-8	17	663.02	0.22	0.35	Cs-137	661.66	0.0000	0.0000
3	724.58	729.84	181	85	19	727.29	0.52	1.37	Bi-212	727.00	0.0003	0.0001
4	765.77	771.02	114	43	16	768.72	0.76	0.99	Bi-214	768.36	0.0002	0.0001
5	823.38	828.64	73	10	14	826.01	0.22	0.35	Co-60	826.28	0.0387	0.0542
6	843.53	848.79	69	-27	16	Could not properly fit the peak.						
7	857.99	863.25	116	78	14	860.08	2.10	2.93	Tl-208	860.56	0.0002	0.0000
8	908.38	914.07	355	305	21	911.19	1.74	2.31	Ac-228	911.20	0.0004	0.0000
9	966.21	971.90	229	184	18	969.29	0.40	1.93	Ac-228	968.97	0.0004	0.0000
10	998.19	1003.88	49	22	10	999.50	3.10	3.29	Pa-234M	1001.03	0.0009	0.0004
11	1059.08	1065.21	56	12	13	1060.17	0.24	0.39	No close library match!			
12	1117.34	1123.47	152	104	16	1120.55	1.12	1.70	Bi-214	1120.29	0.0003	0.0000
13	1170.34	1176.47	62	4	15	1171.87	0.22	0.35	Co-60	1173.24	0.0000	0.0000
14	1235.17	1241.30	112	44	17	1238.10	0.99	1.32	Bi-214	1238.11	0.0003	0.0001
15	1269.55	1276.12	45	9	12	1272.18	0.27	0.48	No close library match!			
16	1329.34	1335.91	32	-4	12	1334.59	0.22	0.35	Co-60	1332.50	0.0000	0.0000
17	1457.88	1464.45	1000	964	33	1460.85	1.89	3.22	K-40	1461.00	0.0047	0.0002
18	1761.13	1768.13	102	85	12	1764.85	0.81	2.93	Bi-214	1764.49	0.0004	0.0001

S1611422-011A. Real/Live Time = 4504/4500 (s).

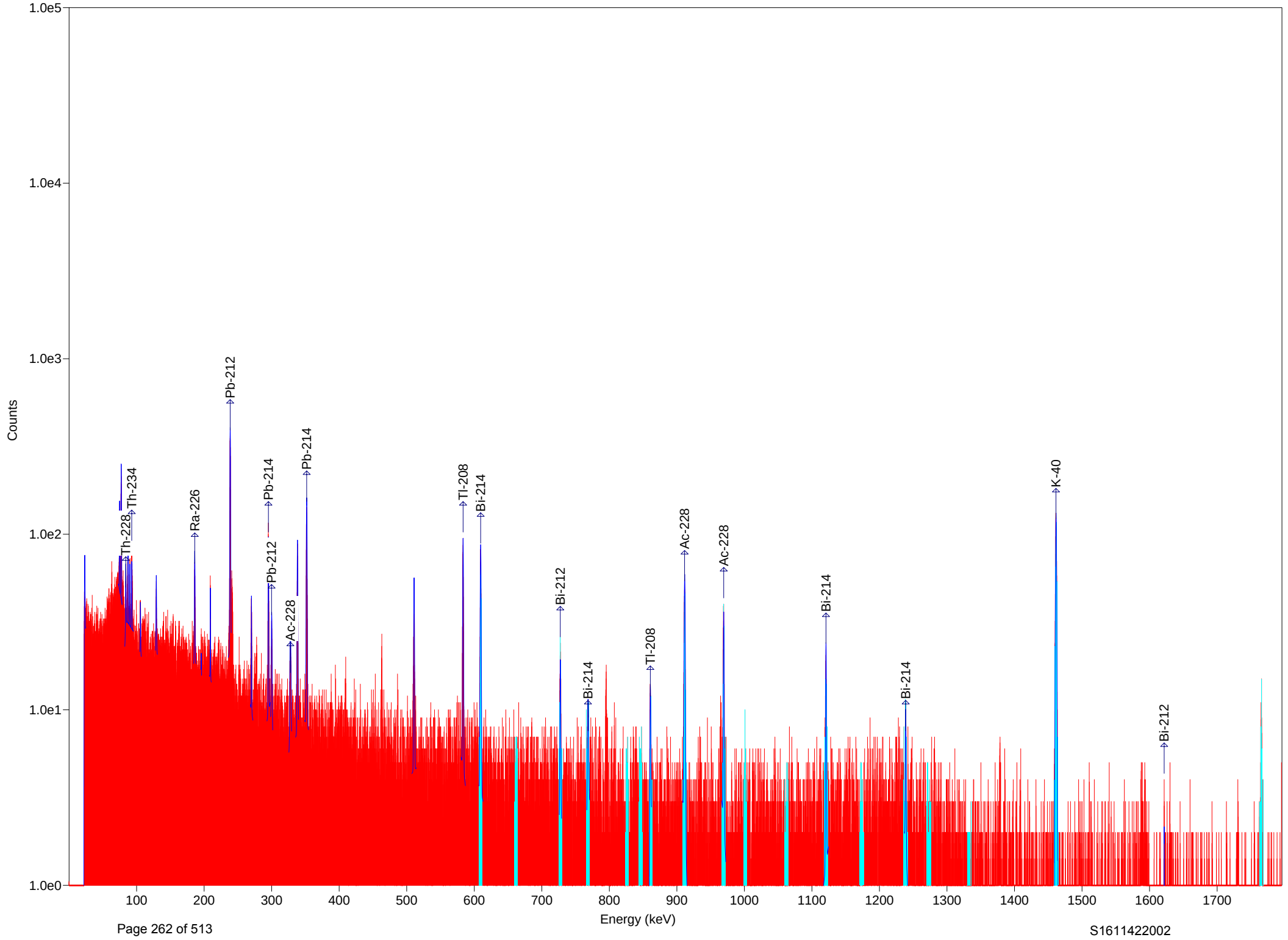


S1611422002

Detector #2 ACQ 03-Jan-2017 at 9:29:04 RT = 4504.2 LT = 4500.0
Rad Chem 2
S1611422-011A

ROI#	RANGE(keV)		GROSS	NET	+/-	CENTROID	FWHM	FW(1/5)M	LIBRARY	(keV)	µCi	+/-
1	606.93	611.75	605	532	27	609.29	1.21	2.01	Bi-214	609.31	0.0003	0.0000
2	659.29	664.11	304	235	20	661.63	1.26	1.88	Cs-137	661.66	0.0001	0.0000
3	724.58	729.84	110	64	14	727.20	0.83	1.62	Bi-212	727.00	0.0002	0.0001
4	765.77	771.02	99	45	14	768.17	0.80	1.83	Bi-214	768.36	0.0003	0.0001
5	823.38	828.64	44	-10	12	824.04	0.33	0.53	Co-60	826.28	0.0000	0.0465
6	843.53	848.79	56	2	13	845.07	0.22	0.35	Co-56	846.77	0.0000	0.0000
7	857.99	863.25	69	11	13	860.28	0.42	1.05	Tl-208	860.56	0.0000	0.0000
8	908.38	914.07	219	151	19	911.21	1.61	2.37	Ac-228	911.20	0.0002	0.0000
9	966.21	971.90	171	144	15	969.22	1.48	2.26	Ac-228	968.97	0.0003	0.0000
10	998.19	1003.88	55	23	11	1001.08	0.33	0.80	Pa-234M	1001.03	0.0010	0.0005
11	1059.08	1065.21	49	20	11	1064.55	0.26	0.77	No close library match!			
12	1117.34	1123.47	157	75	19	1120.59	1.26	2.24	Bi-214	1120.29	0.0002	0.0001
13	1170.34	1176.47	36	-12	13	1171.66	0.22	0.35	Co-60	1173.24	0.0000	0.0000
14	1235.17	1241.30	78	15	16	1237.75	0.31	1.20	Bi-214	1238.11	0.0001	0.0001
15	1269.55	1276.12	33	-3	12	1273.71	1.97	2.10	No close library match!			
16	1329.34	1335.91	29	13	8	1330.65	4.93	5.34	Co-60	1332.50	0.0000	0.0000
17	1457.88	1464.45	531	469	26	1460.86	1.69	2.84	K-40	1461.00	0.0023	0.0001
18	1761.13	1768.13	89	72	12	1764.21	0.77	1.34	Bi-214	1764.49	0.0003	0.0001

S1611422-012A. Real/Live Time = 4504/4500 (s).

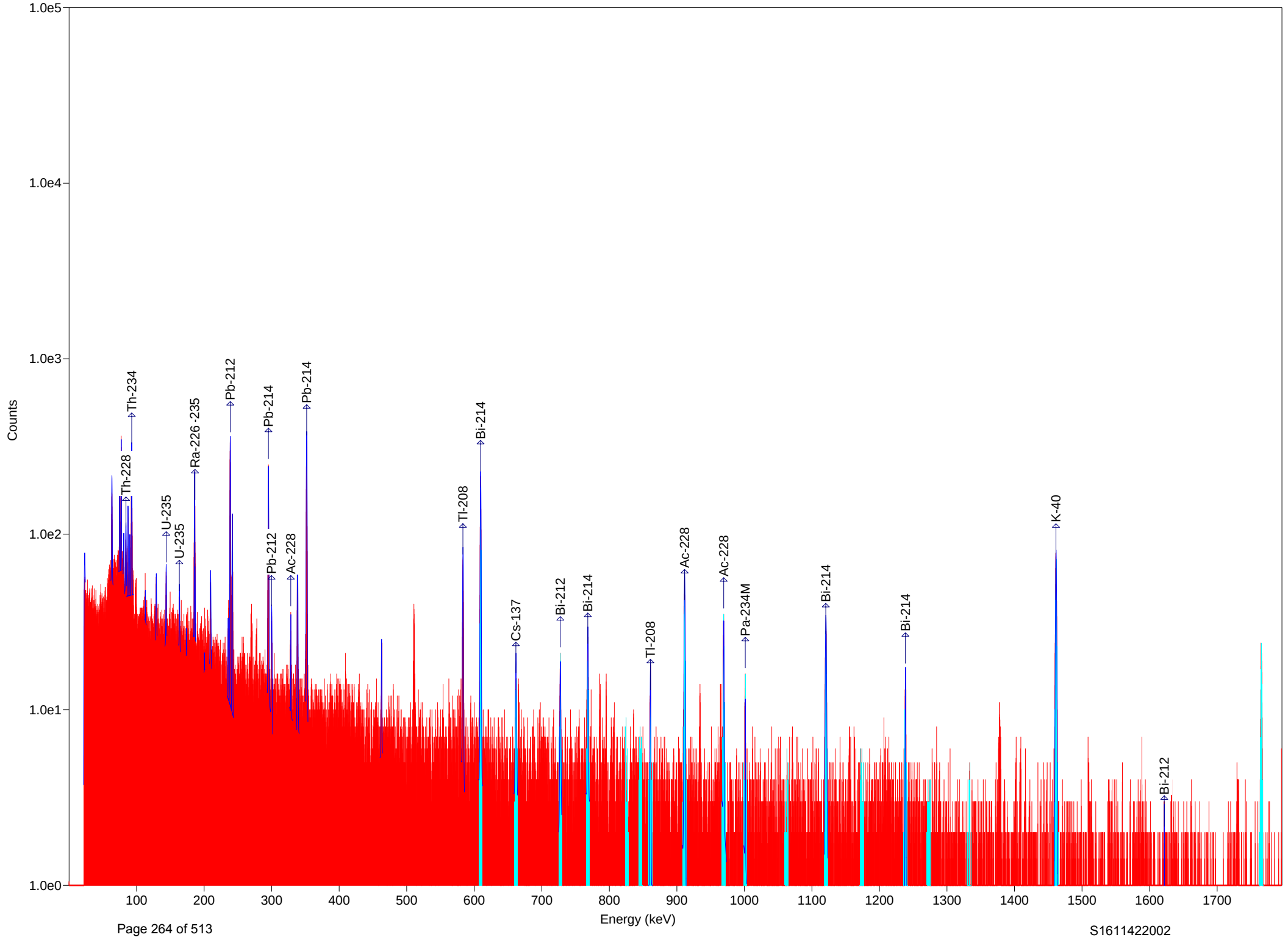


S1611422002

Detector #2 ACQ 03-Jan-2017 at 11:03:19 RT = 4504.8 LT = 4500.0
Rad Chem 2
S1611422-012A

ROI#	RANGE(keV)		GROSS	NET	+/-	CENTROID	FWHM	FW(1/5)M	LIBRARY	(keV)	µCi	+/-
1	606.93	611.75	605	486	28	609.30	1.34	1.99	Bi-214	609.31	0.0002	0.0000
2	659.29	664.11	112	-11	18	661.92	1.64	1.84	Cs-137	661.66	0.0000	0.0000
3	724.58	729.84	212	116	20	727.12	1.23	2.03	Bi-212	727.00	0.0004	0.0001
4	765.77	771.02	145	41	19	767.87	1.66	2.28	Bi-214	768.36	0.0002	0.0001
5	823.38	828.64	72	30	12	824.38	2.82	3.04	Co-60	826.28	0.1162	0.0465
6	843.53	848.79	86	11	15	847.26	0.25	0.39	Co-56	846.77	0.0000	0.0000
7	857.99	863.25	134	80	15	860.55	1.26	1.91	Tl-208	860.56	0.0002	0.0000
8	908.38	914.07	456	375	25	911.18	1.55	2.41	Ac-228	911.20	0.0004	0.0000
9	966.21	971.90	310	233	22	968.98	1.17	2.23	Ac-228	968.97	0.0005	0.0000
10	998.19	1003.88	82	14	15	1000.55	0.28	0.50	Pa-234M	1001.03	0.0006	0.0006
11	1059.08	1065.21	66	-36	18	1063.46	0.22	0.35	No close library match!			
12	1117.34	1123.47	217	101	23	1120.52	1.19	2.13	Bi-214	1120.29	0.0003	0.0001
13	1170.34	1176.47	69	6	15	1171.87	0.93	1.49	Co-60	1173.24	0.0000	0.0000
14	1235.17	1241.30	114	41	17	1237.85	0.28	1.84	Bi-214	1238.11	0.0003	0.0001
15	1269.55	1276.12	74	-14	18	1270.43	0.88	1.01	No close library match!			
16	1329.34	1335.91	27	6	9	1335.03	0.22	0.35	Co-60	1332.50	0.0000	0.0000
17	1457.88	1464.45	1183	1111	37	1460.91	1.71	2.87	K-40	1461.00	0.0054	0.0002
18	1761.13	1768.13	101	95	10	1764.92	1.20	2.26	Bi-214	1764.49	0.0004	0.0000

S1611422-013A. Real/Live Time = 4505/4500 (s).

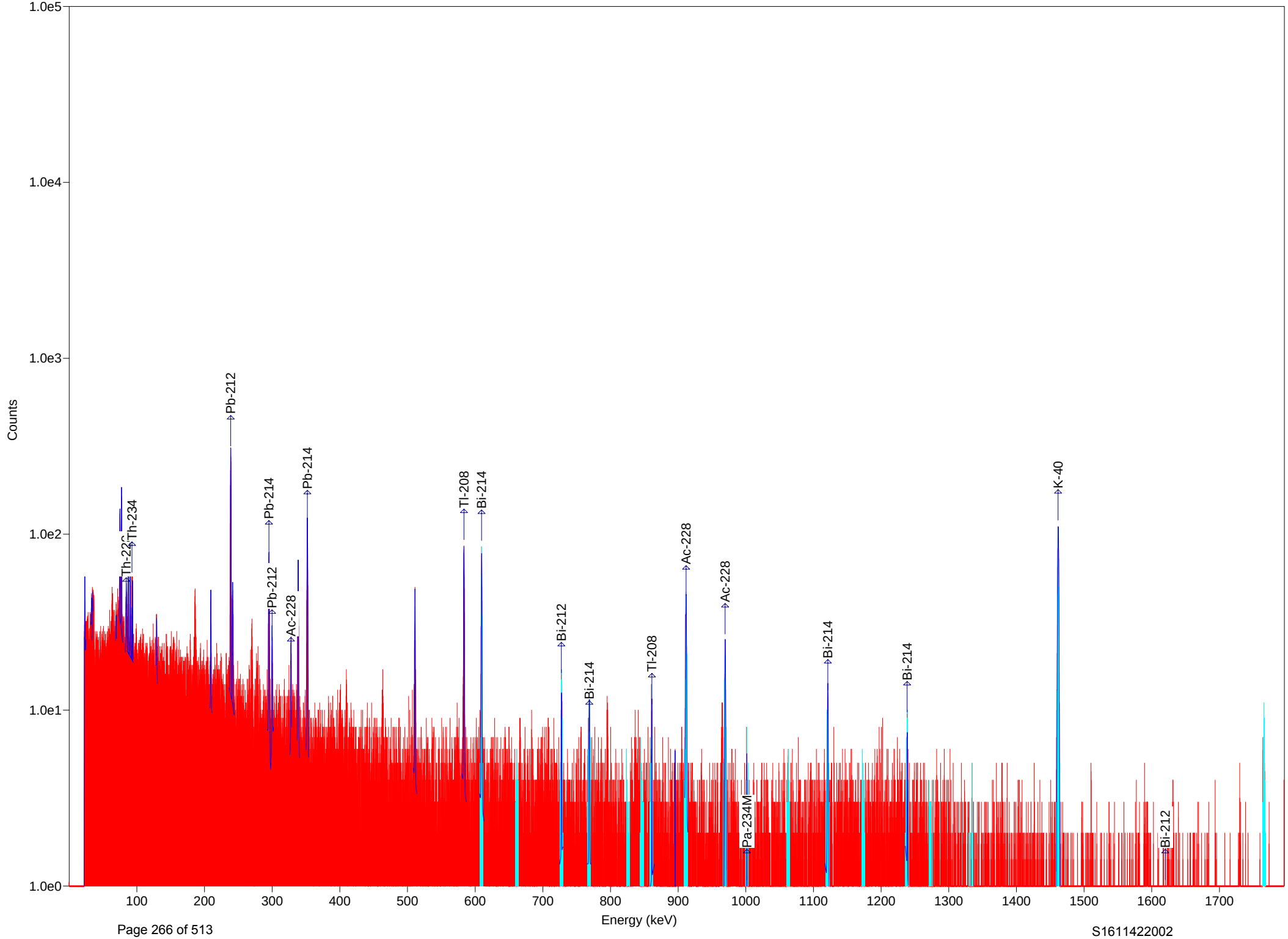


S1611422002

Detector #2 ACQ 03-Jan-2017 at 12:27:51 RT = 4505.6 LT = 4500.0
Rad Chem 2
S1611422-013A

ROI#	RANGE(keV)		GROSS	NET	+/-	CENTROID	FWHM	FW(1/5)M	LIBRARY	(keV)	µCi	+/-
1	606.93	611.75	1470	1359	40	609.22	1.32	2.02	Bi-214	609.31	0.0007	0.0000
2	659.29	664.11	178	101	17	661.70	1.92	2.84	Cs-137	661.66	0.0000	0.0000
3	724.58	729.84	193	139	17	727.29	1.60	2.59	Bi-212	727.00	0.0005	0.0001
4	765.77	771.02	252	119	23	768.45	0.54	1.50	Bi-214	768.36	0.0007	0.0001
5	823.38	828.64	76	-16	16	824.48	0.22	0.35	Co-60	826.28	0.0000	0.0620
6	843.53	848.79	87	16	15	845.29	0.22	0.35	Co-56	846.77	0.0000	0.0000
7	857.99	863.25	144	61	18	860.50	1.07	1.61	Tl-208	860.56	0.0001	0.0000
8	908.38	914.07	447	361	25	911.10	1.66	2.45	Ac-228	911.20	0.0004	0.0000
9	966.21	971.90	283	206	21	968.90	1.06	1.78	Ac-228	968.97	0.0004	0.0000
10	998.19	1003.88	131	45	18	1001.07	0.61	1.18	Pa-234M	1001.03	0.0019	0.0008
11	1059.08	1065.21	66	-2	16	1062.58	0.26	0.44	No close library match!			
12	1117.34	1123.47	306	258	21	1120.21	1.90	2.99	Bi-214	1120.29	0.0007	0.0001
13	1170.34	1176.47	78	15	16	1171.44	2.52	2.72	Co-60	1173.24	0.0000	0.0000
14	1235.17	1241.30	158	129	15	1237.89	1.39	2.60	Bi-214	1238.11	0.0009	0.0001
15	1269.55	1276.12	60	-2	16	1271.52	3.72	3.85	No close library match!			
16	1329.34	1335.91	40	14	11	1332.96	0.40	0.55	Co-60	1332.50	0.0000	0.0000
17	1457.88	1464.45	743	671	31	1460.89	1.69	3.00	K-40	1461.00	0.0032	0.0001
18	1761.13	1768.13	224	196	17	1764.68	1.87	3.16	Bi-214	1764.49	0.0008	0.0001

S1611422-014A. Real/Live Time = 4532/4500 (s).

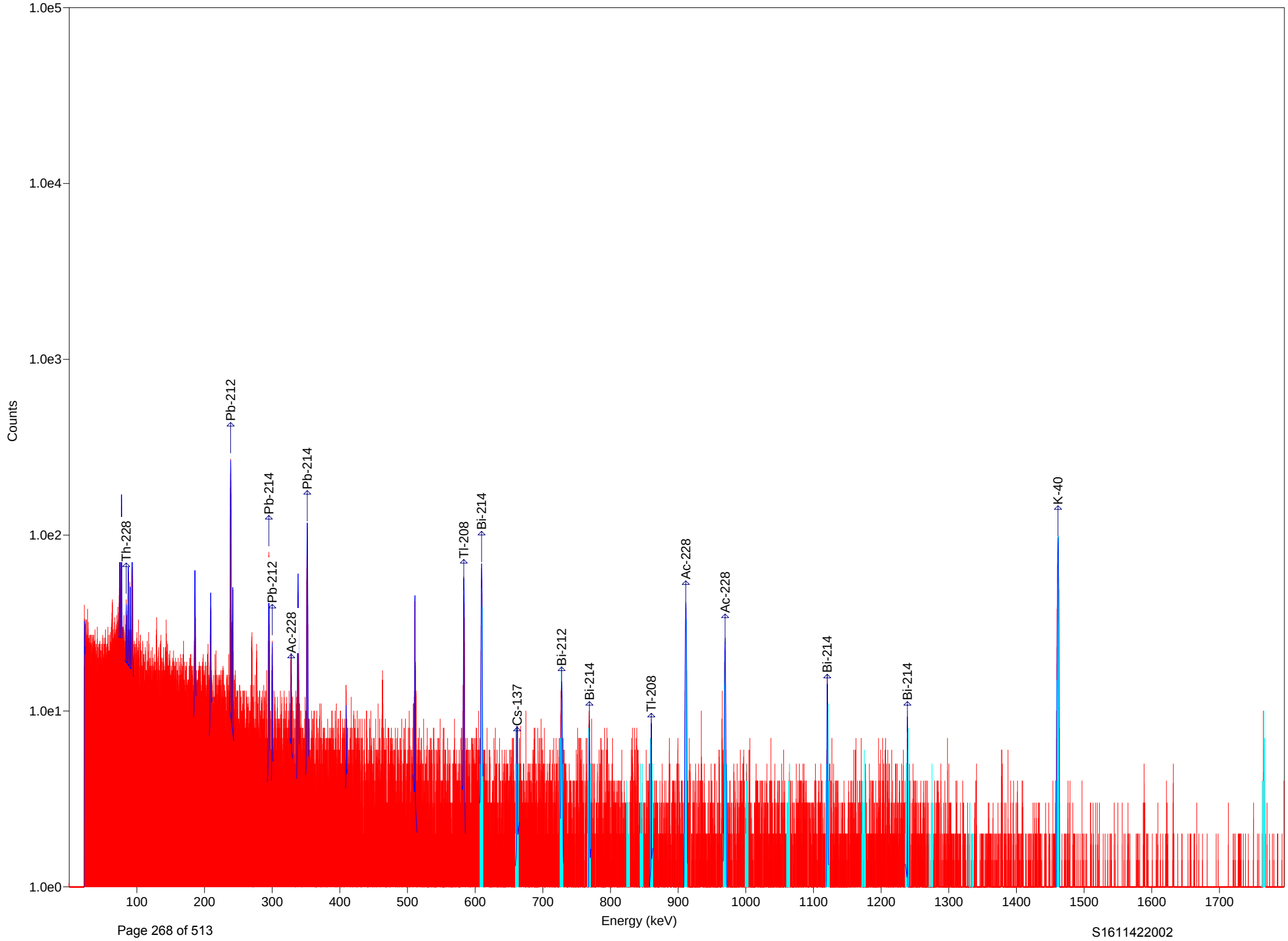


S1611422002

Detector #2 ACQ 03-Jan-2017 at 16:26:17 RT = 4532.7 LT = 4500.0
Rad Chem 2
S1611422-014A

ROI#	RANGE(keV)		GROSS	NET	+/-	CENTROID	FWHM	FW(1/5)M	LIBRARY	(keV)	µCi	+/-
1	606.93	611.75	529	418	27	609.36	1.16	2.07	Bi-214	609.31	0.0002	0.0000
2	659.29	664.11	66	-7	14	661.26	0.22	0.35	Cs-137	661.66	0.0000	0.0000
3	724.58	729.84	143	80	16	727.43	0.61	0.86	Bi-212	727.00	0.0003	0.0001
4	765.77	771.02	127	48	17	768.82	0.97	2.05	Bi-214	768.36	0.0003	0.0001
5	823.38	828.64	50	-17	13	Could not properly fit the peak.						
6	843.53	848.79	60	-11	14	845.51	0.33	0.53	Co-56	846.77	0.0000	0.0000
7	857.99	863.25	107	19	17	860.20	0.29	1.42	Tl-208	860.56	0.0000	0.0000
8	908.38	914.07	383	297	24	911.38	1.40	2.40	Ac-228	911.20	0.0003	0.0000
9	966.21	971.90	209	150	18	969.33	1.33	1.61	Ac-228	968.97	0.0003	0.0000
10	998.19	1003.88	62	44	10	1000.84	0.34	1.38	Pa-234M	1001.03	0.0018	0.0004
11	1059.08	1065.21	73	20	14	1062.52	0.55	0.75	No close library match!			
12	1117.34	1123.47	128	70	17	1120.61	1.28	1.89	Bi-214	1120.29	0.0002	0.0000
13	1170.34	1176.47	71	-21	18	1171.87	0.27	0.77	Co-60	1173.24	0.0000	0.0000
14	1235.17	1241.30	100	42	16	1238.06	0.49	0.78	Bi-214	1238.11	0.0003	0.0001
15	1269.55	1276.12	49	13	12	1275.35	0.41	0.56	No close library match!			
16	1329.34	1335.91	41	-6	13	1333.94	0.22	0.35	Co-60	1332.50	0.0000	0.0000
17	1457.88	1464.45	1002	971	33	1461.10	1.87	2.88	K-40	1461.00	0.0047	0.0002
18	1761.13	1768.13	96	90	10	1764.85	0.40	3.25	Bi-214	1764.49	0.0004	0.0000

S1611422-015A. Real/Live Time = 4503/4500 (s).

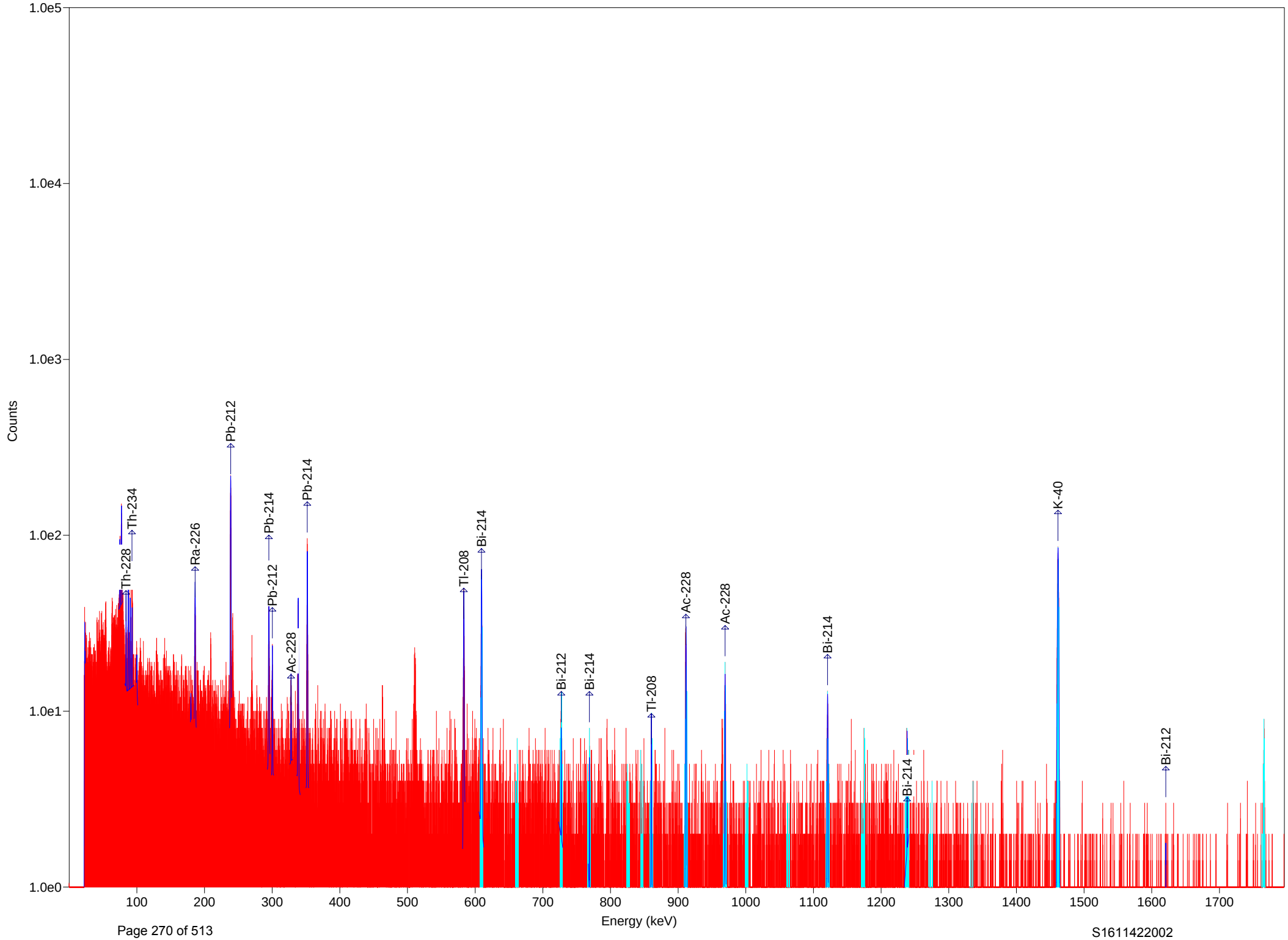


S1611422002

Detector #2 ACQ 04-Jan-2017 at 8:06:32 RT = 4503.2 LT = 4500.0
Rad Chem 2
S1611422-015A

ROI#	RANGE(keV)		GROSS	NET	+/-	CENTROID	FWHM	FW(1/5)M	LIBRARY	(keV)	µCi	+/-
1	606.93	611.75	484	407	24	609.36	1.54	2.25	Bi-214	609.31	0.0002	0.0000
2	659.29	664.11	115	50	15	661.55	0.67	1.42	Cs-137	661.66	0.0000	0.0000
3	724.58	729.84	167	54	20	726.99	0.38	1.90	Bi-212	727.00	0.0002	0.0001
4	765.77	771.02	92	54	13	768.23	1.30	1.81	Bi-214	768.36	0.0003	0.0001
5	823.38	828.64	45	-13	13	Could not properly fit the peak.						
6	843.53	848.79	53	-5	13	844.19	2.85	2.98	Co-56	846.77	0.0000	0.0000
7	857.99	863.25	83	33	13	860.08	0.41	0.62	Tl-208	860.56	0.0001	0.0000
8	908.38	914.07	314	269	20	911.14	2.00	2.47	Ac-228	911.20	0.0003	0.0000
9	966.21	971.90	212	185	16	968.89	1.75	2.43	Ac-228	968.97	0.0004	0.0000
10	998.19	1003.88	50	18	11	1000.71	0.43	0.64	Pa-234M	1001.03	0.0008	0.0005
11	1059.08	1065.21	61	13	14	1064.23	0.48	0.72	No close library match!			
12	1117.34	1123.47	151	59	20	1120.31	1.15	1.43	Bi-214	1120.29	0.0002	0.0001
13	1170.34	1176.47	51	-2	14	1174.72	0.22	0.35	Co-60	1173.24	0.0000	0.0000
14	1235.17	1241.30	92	39	15	1238.54	0.42	1.23	Co-56	1238.28	0.0000	0.0000
15	1269.55	1276.12	31	0	11	1274.81	0.22	0.35	No close library match!			
16	1329.34	1335.91	34	13	9	1330.65	4.82	4.95	Co-60	1332.50	0.0000	0.0000
17	1457.88	1464.45	886	845	31	1460.94	1.91	2.97	K-40	1461.00	0.0041	0.0001
18	1761.13	1768.13	79	62	11	1764.16	0.31	0.76	Bi-214	1764.49	0.0003	0.0000

S1611422-016A. Real/Live Time = 4510/4500 (s).

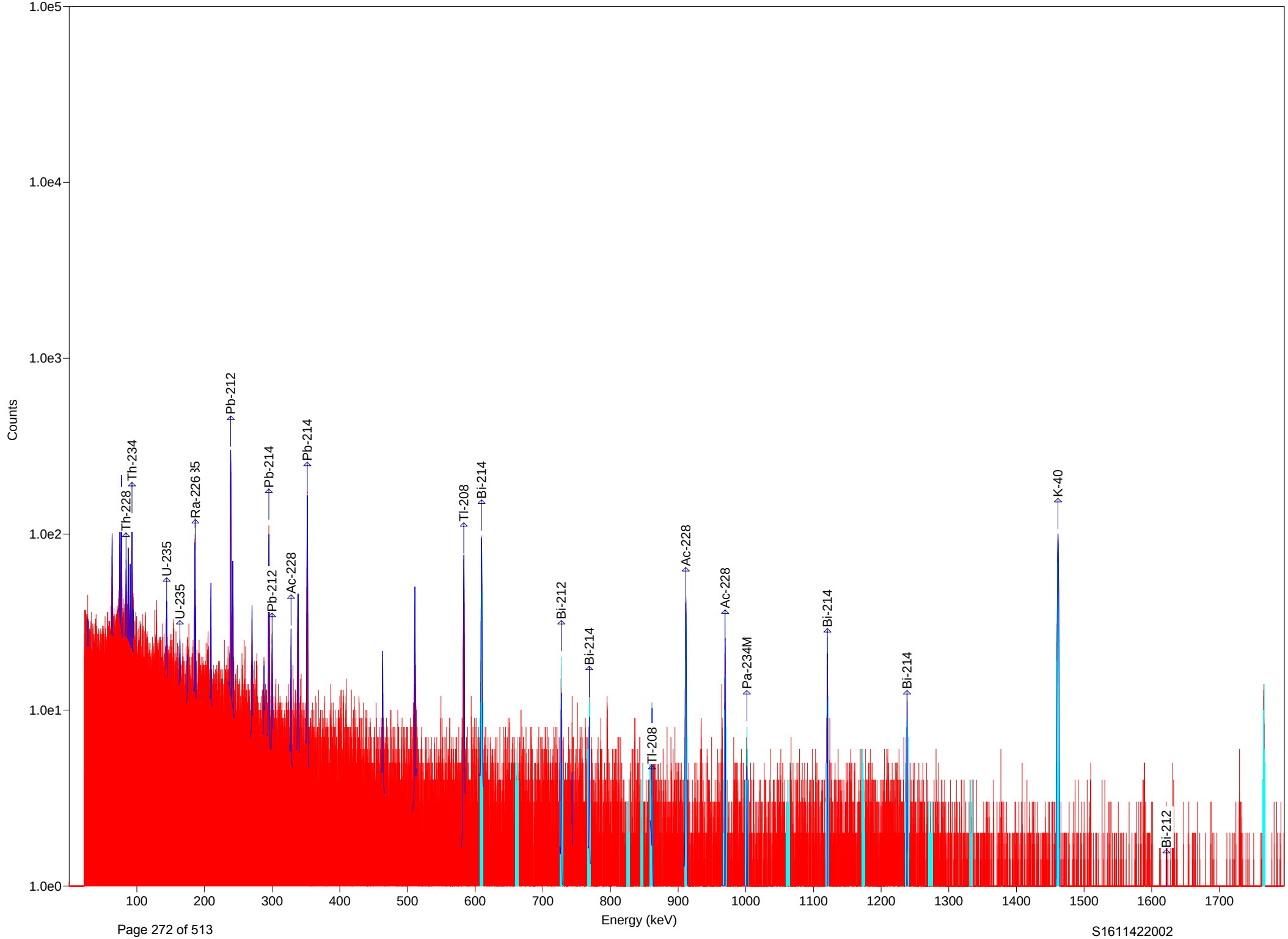


S1611422002

Detector #2 ACQ 04-Jan-2017 at 9:22:53 RT = 4510.3 LT = 4500.0
Rad Chem 2
S1611422-016A

ROI#	RANGE(keV)		GROSS	NET	+/-	CENTROID	FWHM	FW(1/5)M	LIBRARY	(keV)	µCi	+/-
1	606.93	611.75	435	362	23	609.20	1.13	1.85	Bi-214	609.31	0.0002	0.0000
2	659.29	664.11	57	11	11	661.92	0.22	0.35	Cs-137	661.66	0.0000	0.0000
3	724.58	729.84	115	48	16	727.41	0.25	0.41	Bi-212	727.00	0.0002	0.0001
4	765.77	771.02	80	-12	16	768.61	0.26	0.44	Bi-214	768.36	0.0000	0.0001
5	823.38	828.64	53	-14	14	824.04	0.22	0.35	Co-60	826.28	0.0000	0.0542
6	843.53	848.79	53	15	11	844.52	0.39	0.55	Co-56	846.77	0.0000	0.0000
7	857.99	863.25	78	32	13	860.42	0.49	1.16	Tl-208	860.56	0.0001	0.0000
8	908.38	914.07	232	191	18	911.09	1.23	2.41	Ac-228	911.20	0.0002	0.0000
9	966.21	971.90	149	86	17	969.01	1.11	2.50	Ac-228	968.97	0.0002	0.0000
10	998.19	1003.88	54	9	12	1001.47	1.81	2.02	Pa-234M	1001.03	0.0004	0.0005
11	1059.08	1065.21	39	20	9	1064.15	1.06	1.21	No close library match!			
12	1117.34	1123.47	114	61	16	1120.61	1.30	1.66	Bi-214	1120.29	0.0002	0.0000
13	1170.34	1176.47	59	-4	15	1174.28	0.22	0.35	Co-60	1173.24	0.0000	0.0000
14	1235.17	1241.30	93	59	13	1237.34	0.34	0.91	Bi-214	1238.11	0.0004	0.0001
15	1269.55	1276.12	36	10	10	1274.81	0.27	0.70	No close library match!			
16	1329.34	1335.91	27	-4	11	1335.03	0.22	0.35	Co-60	1332.50	0.0000	0.0000
17	1457.88	1464.45	763	722	29	1460.96	2.14	2.91	K-40	1461.00	0.0035	0.0001
18	1761.13	1768.13	74	52	12	1765.06	1.01	2.39	Bi-214	1764.49	0.0002	0.0001

S1611422-017A. Real/Live Time = 4510/4500 (s).

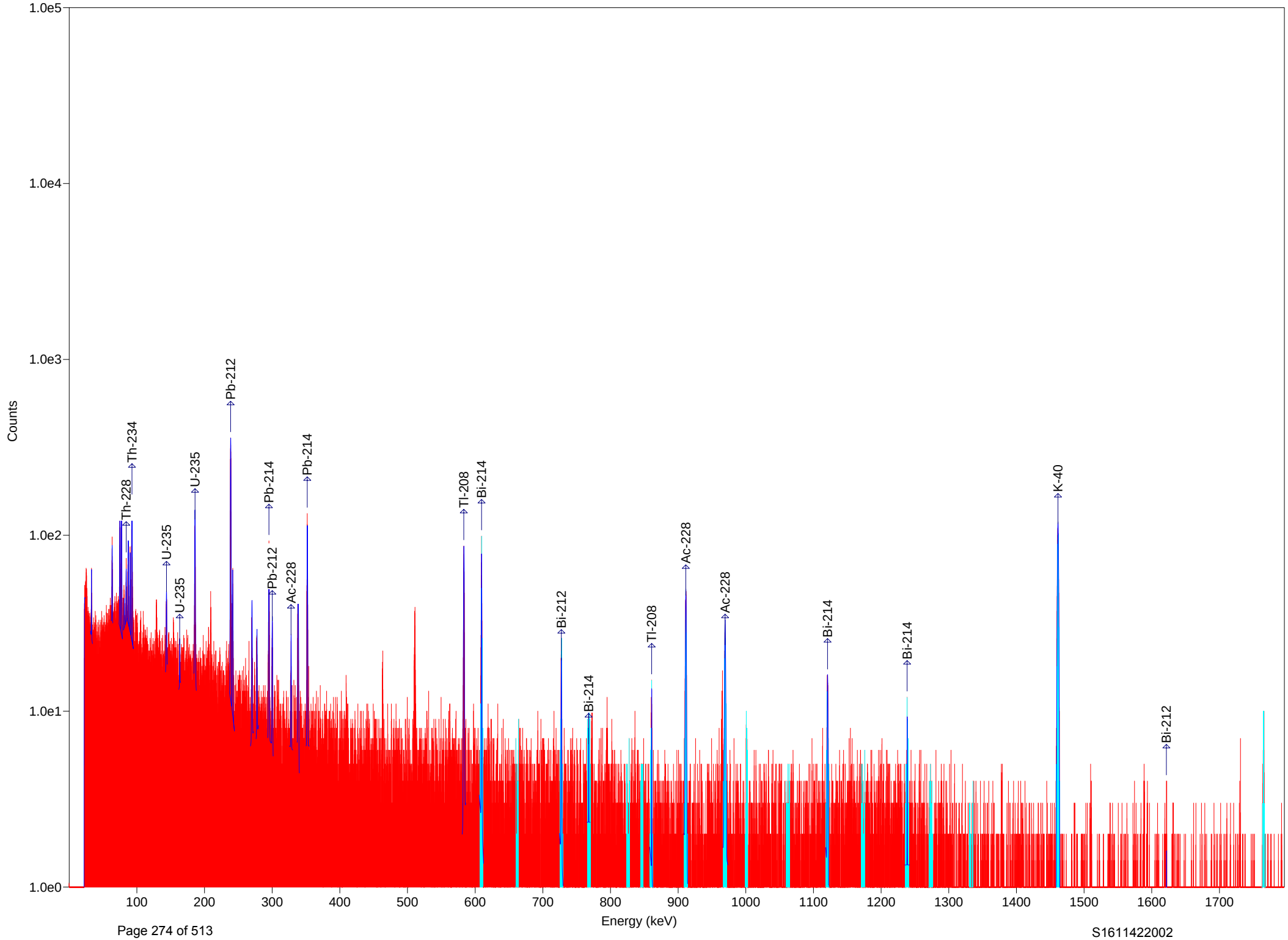


S1611422002

Detector #2 ACQ 04-Jan-2017 at 10:41:51 RT = 4510.7 LT = 4500.0
Rad Chem 2
S1611422-017A

ROI#	RANGE(keV)		GROSS	NET	+/-	CENTROID	FWHM	FW(1/5)M	LIBRARY	(keV)	µCi	+/-
1	606.93	611.75	670	540	30	609.30	1.23	1.85	Bi-214	609.31	0.0003	0.0000
2	659.29	664.11	78	5	14	662.14	0.22	0.35	Cs-137	661.66	0.0000	0.0000
3	724.58	729.84	148	69	17	727.00	0.78	1.39	Bi-212	727.00	0.0003	0.0001
4	765.77	771.02	110	10	18	768.68	0.70	0.97	Bi-214	768.36	0.0001	0.0001
5	823.38	828.64	53	-5	13	827.65	0.42	0.56	Co-60	826.28	0.0000	0.0504
6	843.53	848.79	53	11	11	847.26	0.22	0.35	Co-56	846.77	0.0000	0.0000
7	857.99	863.25	106	18	17	860.82	0.25	1.15	Tl-208	860.56	0.0000	0.0000
8	908.38	914.07	341	282	22	911.16	1.35	2.11	Ac-228	911.20	0.0003	0.0000
9	966.21	971.90	219	156	19	968.95	0.98	2.15	Ac-228	968.97	0.0003	0.0000
10	998.19	1003.88	75	16	14	1000.99	0.72	0.96	Pa-234M	1001.03	0.0007	0.0006
11	1059.08	1065.21	57	-35	17	Could not properly fit the peak.						
12	1117.34	1123.47	175	131	17	1120.33	0.69	2.61	Bi-214	1120.29	0.0003	0.0000
13	1170.34	1176.47	67	-20	17	1171.66	0.22	0.35	Co-60	1173.24	0.0000	0.0000
14	1235.17	1241.30	129	52	18	1238.05	0.51	2.54	Bi-214	1238.11	0.0004	0.0001
15	1269.55	1276.12	47	-15	15	Could not properly fit the peak.						
16	1329.34	1335.91	43	-9	14	1331.09	3.72	3.85	Co-60	1332.50	0.0000	0.0000
17	1457.88	1464.45	910	858	32	1460.83	1.94	2.94	K-40	1461.00	0.0041	0.0002
18	1761.13	1768.13	121	104	13	1764.55	1.41	2.11	Bi-214	1764.49	0.0004	0.0001

S1611422-018A. Real/Live Time = 4510/4500 (s).

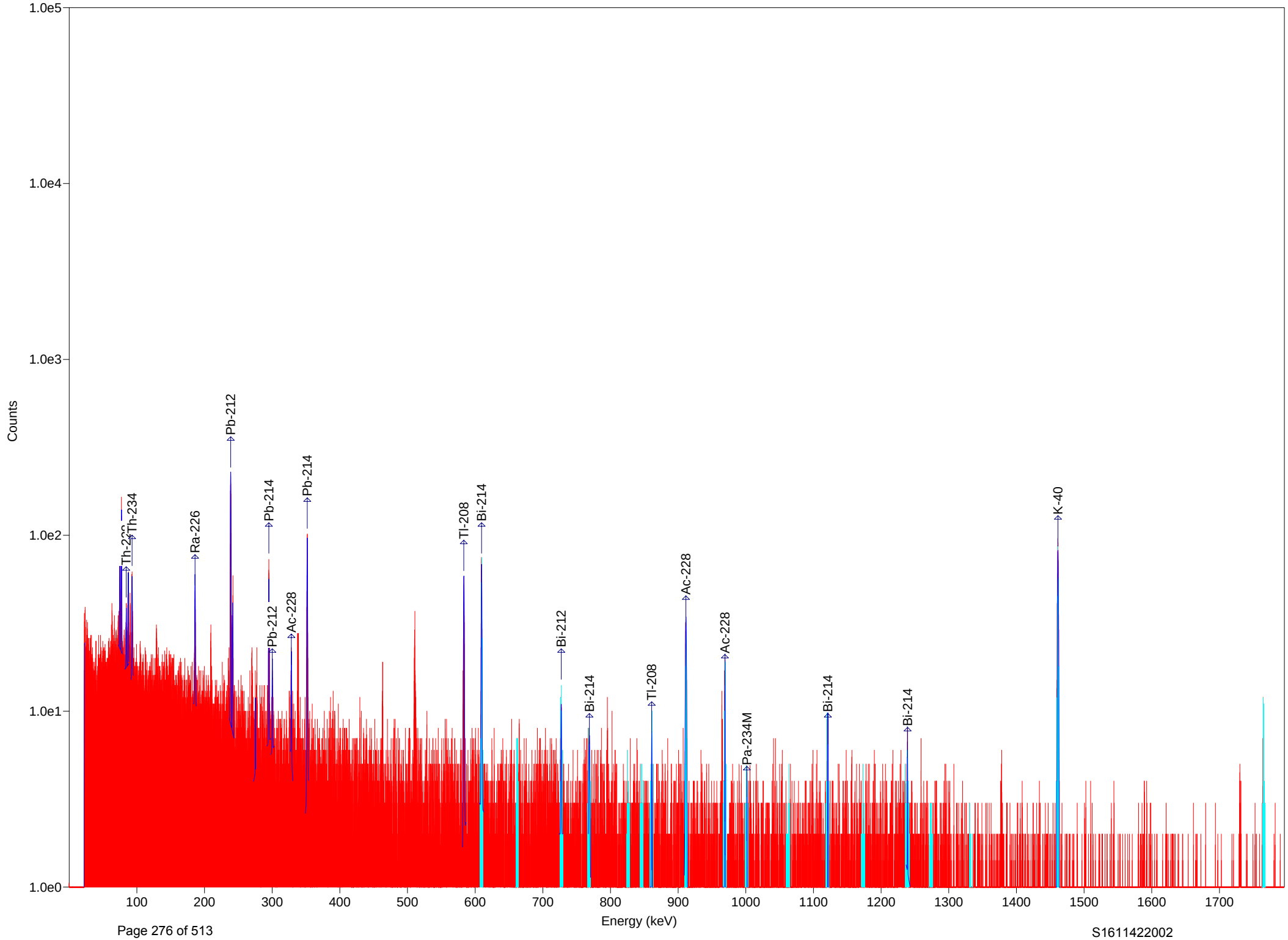


S1611422002

Detector #2 ACQ 04-Jan-2017 at 14:22:16 RT = 4510.8 LT = 4500.0
Rad Chem 2
S1611422-018A

ROI#	RANGE(keV)		GROSS	NET	+/-	CENTROID	FWHM	FW(1/5)M	LIBRARY	(keV)	µCi	+/-
1	606.93	611.75	536	413	27	609.30	0.93	1.93	Bi-214	609.31	0.0002	0.0000
2	659.29	664.11	85	-19	16	659.98	0.29	0.94	Cs-137	661.66	0.0000	0.0000
3	724.58	729.84	186	115	18	727.16	0.92	1.63	Bi-212	727.00	0.0004	0.0001
4	765.77	771.02	137	16	19	767.96	0.22	0.35	Bi-214	768.36	0.0001	0.0001
5	823.38	828.64	65	-6	14	827.32	0.22	0.35	Co-60	826.28	0.0000	0.0542
6	843.53	848.79	73	6	14	845.18	3.15	3.36	Co-56	846.77	0.0000	0.0000
7	857.99	863.25	119	52	16	860.63	0.35	1.47	Tl-208	860.56	0.0001	0.0000
8	908.38	914.07	385	313	23	911.17	1.51	2.34	Ac-228	911.20	0.0004	0.0000
9	966.21	971.90	268	173	22	968.88	1.71	2.14	Ac-228	968.97	0.0004	0.0000
10	998.19	1003.88	81	45	13	1000.37	0.60	1.03	Pa-234M	1001.03	0.0019	0.0005
11	1059.08	1065.21	70	-7	17	1063.68	0.22	0.35	No close library match!			
12	1117.34	1123.47	158	110	17	1119.99	1.14	1.73	Bi-214	1120.29	0.0003	0.0000
13	1170.34	1176.47	71	-11	17	1175.38	0.22	0.35	Co-60	1173.24	0.0000	0.0000
14	1235.17	1241.30	110	33	18	1237.99	0.26	0.45	Bi-214	1238.11	0.0002	0.0001
15	1269.55	1276.12	61	9	14	1272.40	0.33	1.05	No close library match!			
16	1329.34	1335.91	37	1	12	1330.21	0.88	1.14	Co-60	1332.50	0.0000	0.0000
17	1457.88	1464.45	1089	1032	35	1460.75	1.86	2.89	K-40	1461.00	0.0050	0.0002
18	1761.13	1768.13	85	74	11	1764.06	1.53	3.07	Bi-214	1764.49	0.0003	0.0000

S1611422-019A. Real/Live Time = 4512/4500 (s).

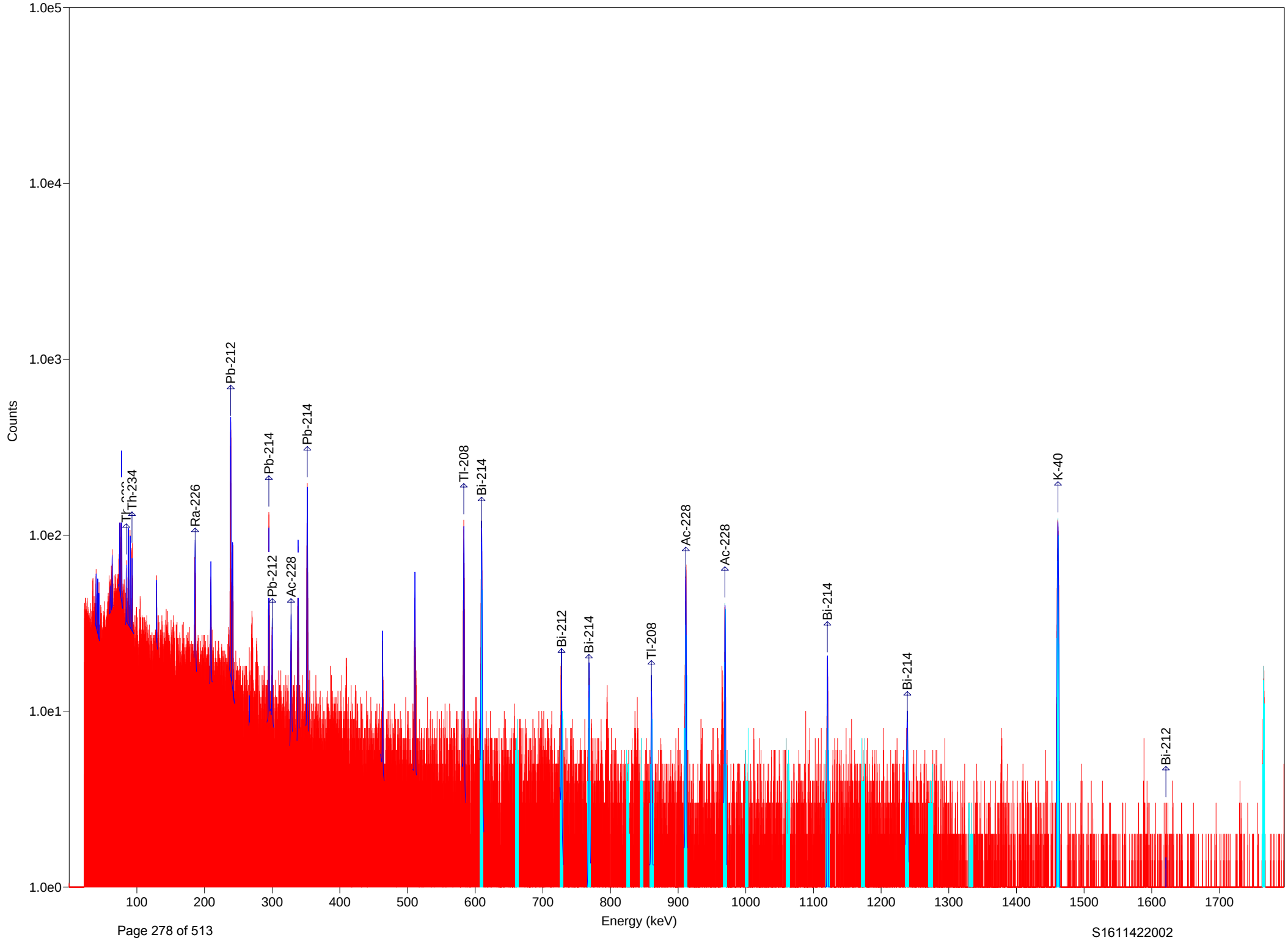


S1611422002

Detector #2 ACQ 04-Jan-2017 at 15:42:40 RT = 4512.2 LT = 4500.0
Rad Chem 2
S1611422-019A

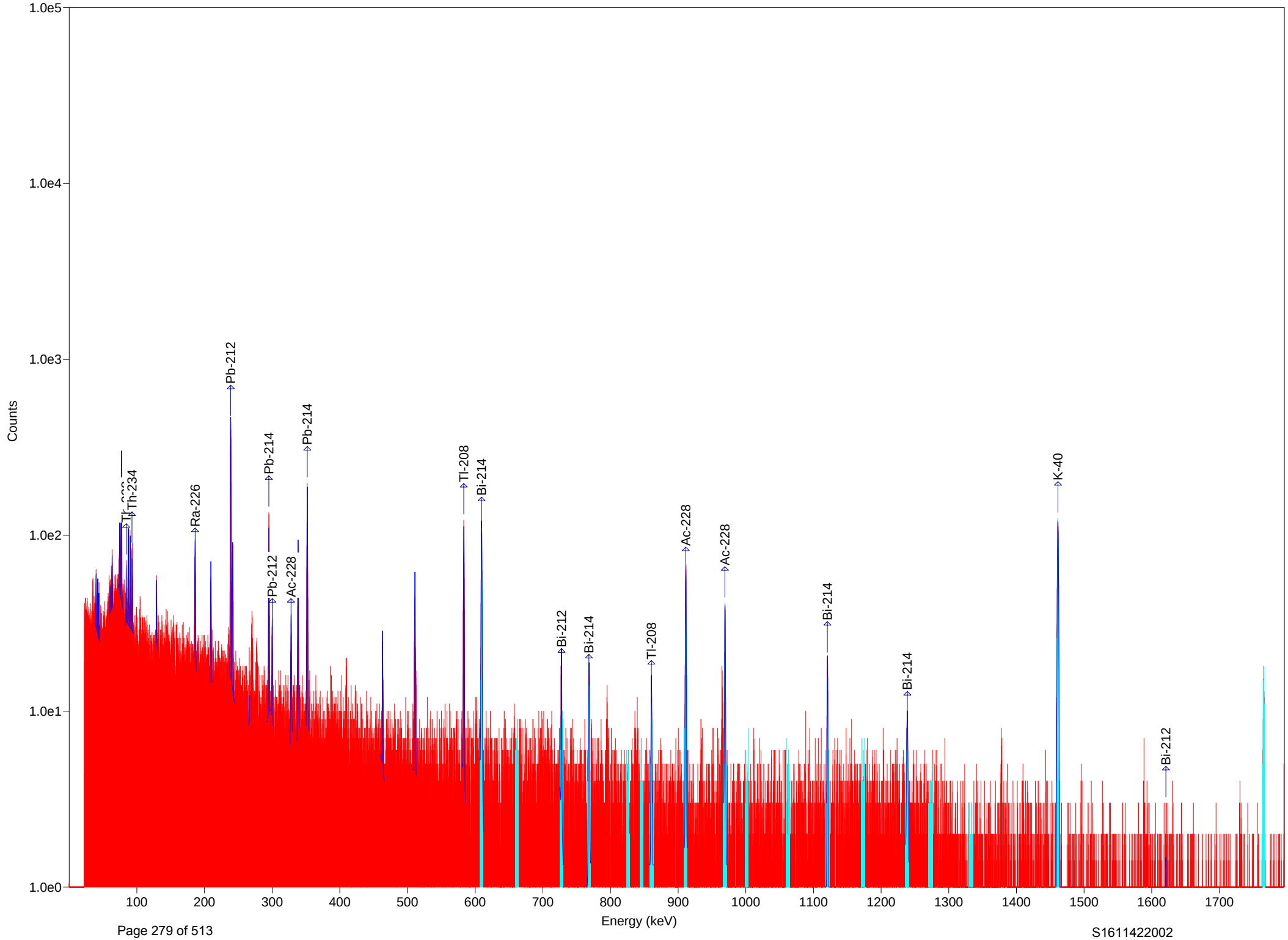
ROI#	RANGE(keV)		GROSS	NET	+/-	CENTROID	FWHM	FW(1/5)M	LIBRARY	(keV)	µCi	+/-
1	606.93	611.75	482	371	26	609.20	1.07	1.77	Bi-214	609.31	0.0002	0.0000
2	659.29	664.11	75	14	13	661.26	1.53	1.67	Cs-137	661.66	0.0000	0.0000
3	724.58	729.84	139	72	16	727.31	1.00	2.09	Bi-212	727.00	0.0003	0.0001
4	765.77	771.02	82	44	12	766.64	2.85	3.37	Bi-214	768.36	0.0003	0.0001
5	823.38	828.64	52	6	12	824.70	0.26	0.74	Co-60	826.28	0.0232	0.0465
6	843.53	848.79	56	6	12	845.94	2.46	2.89	Co-56	846.77	0.0000	0.0000
7	857.99	863.25	76	22	13	860.86	0.68	0.98	Tl-208	860.56	0.0001	0.0000
8	908.38	914.07	251	219	18	911.20	1.80	2.30	Ac-228	911.20	0.0003	0.0000
9	966.21	971.90	158	126	15	969.05	0.42	1.96	Ac-228	968.97	0.0003	0.0000
10	998.19	1003.88	54	27	11	1000.64	0.33	0.94	Pa-234M	1001.03	0.0011	0.0005
11	1059.08	1065.21	43	4	12	1063.68	0.27	0.48	No close library match!			
12	1117.34	1123.47	120	91	14	1120.31	0.58	2.17	Bi-214	1120.29	0.0002	0.0000
13	1170.34	1176.47	53	5	13	1172.85	0.41	0.56	Co-60	1173.24	0.0000	0.0000
14	1235.17	1241.30	84	16	16	1238.45	0.38	1.39	Co-56	1238.28	0.0000	0.0000
15	1269.55	1276.12	42	-10	14	Could not properly fit the peak.						
16	1329.34	1335.91	22	-4	10	1330.21	0.22	0.35	Co-60	1332.50	0.0000	0.0000
17	1457.88	1464.45	756	720	29	1460.75	1.59	2.59	K-40	1461.00	0.0035	0.0001
18	1761.13	1768.13	75	64	10	1763.79	0.31	0.83	Bi-214	1764.49	0.0003	0.0000

S1611422-020A. Real/Live Time = 4512/4500 (s).



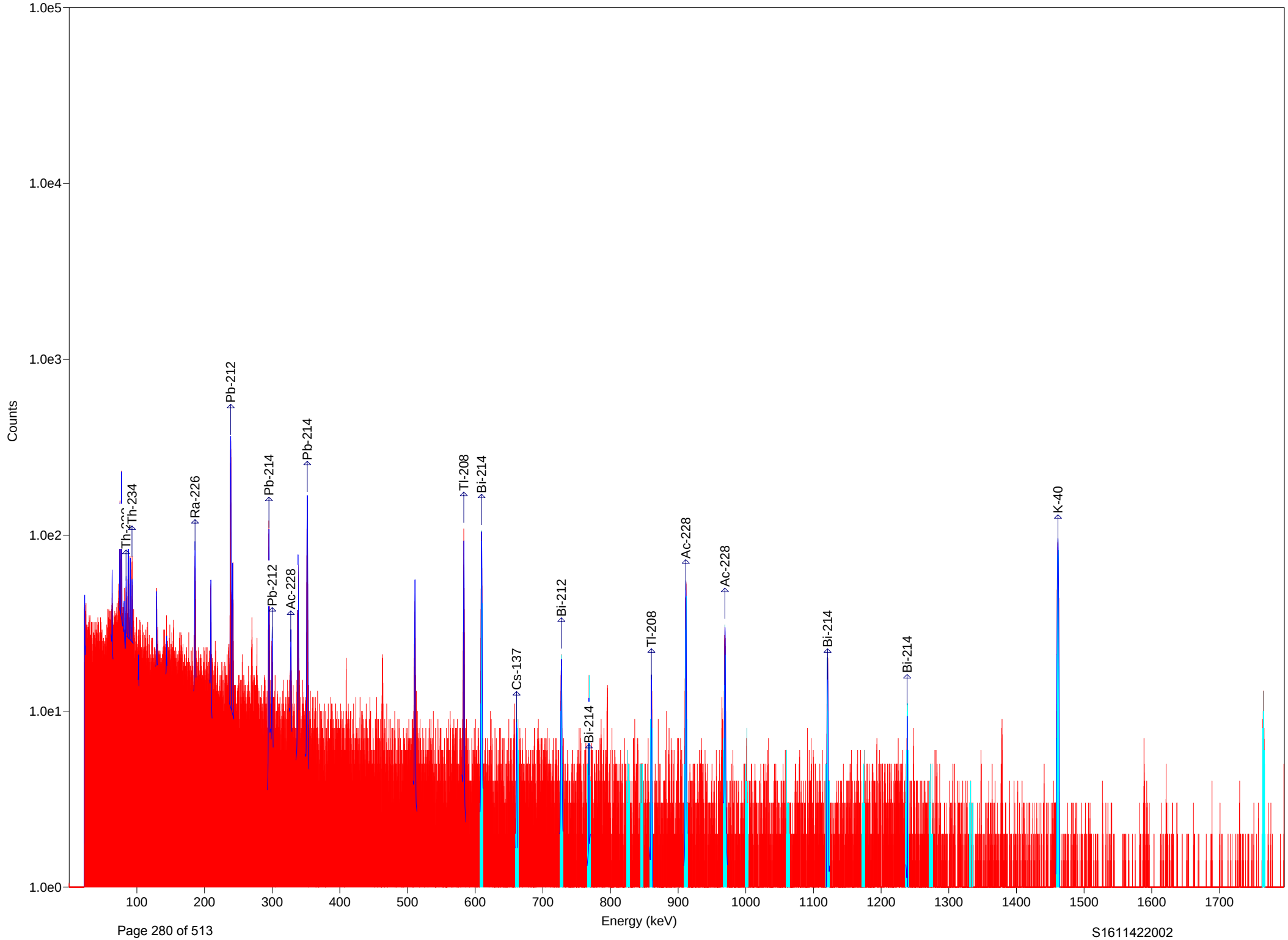
S1611422002

S1611422-020A. Real/Live Time = 4512/4500 (s).



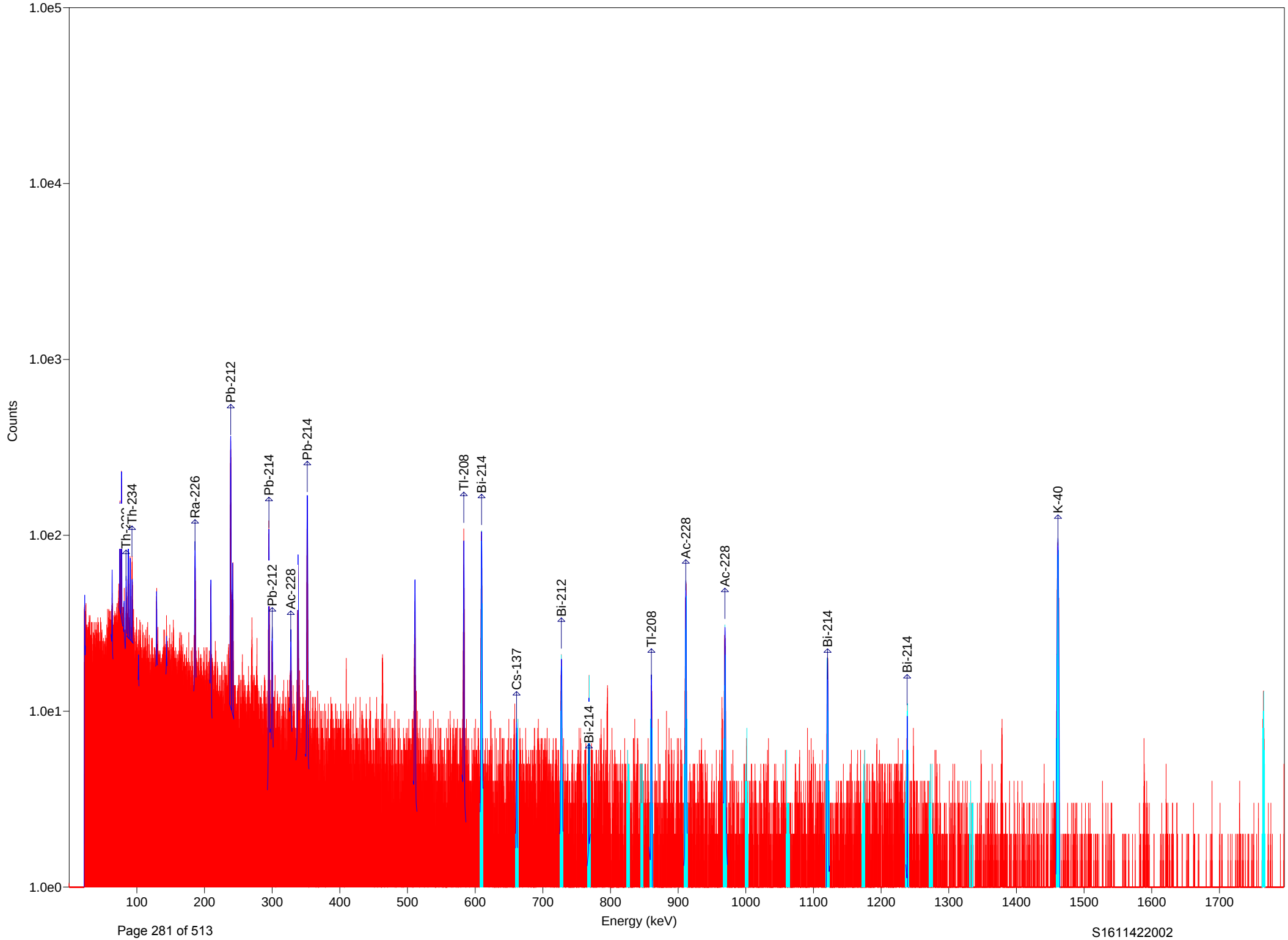
S1611422002

S1611422-020A DUP. Real/Live Time = 4510/4500 (s).



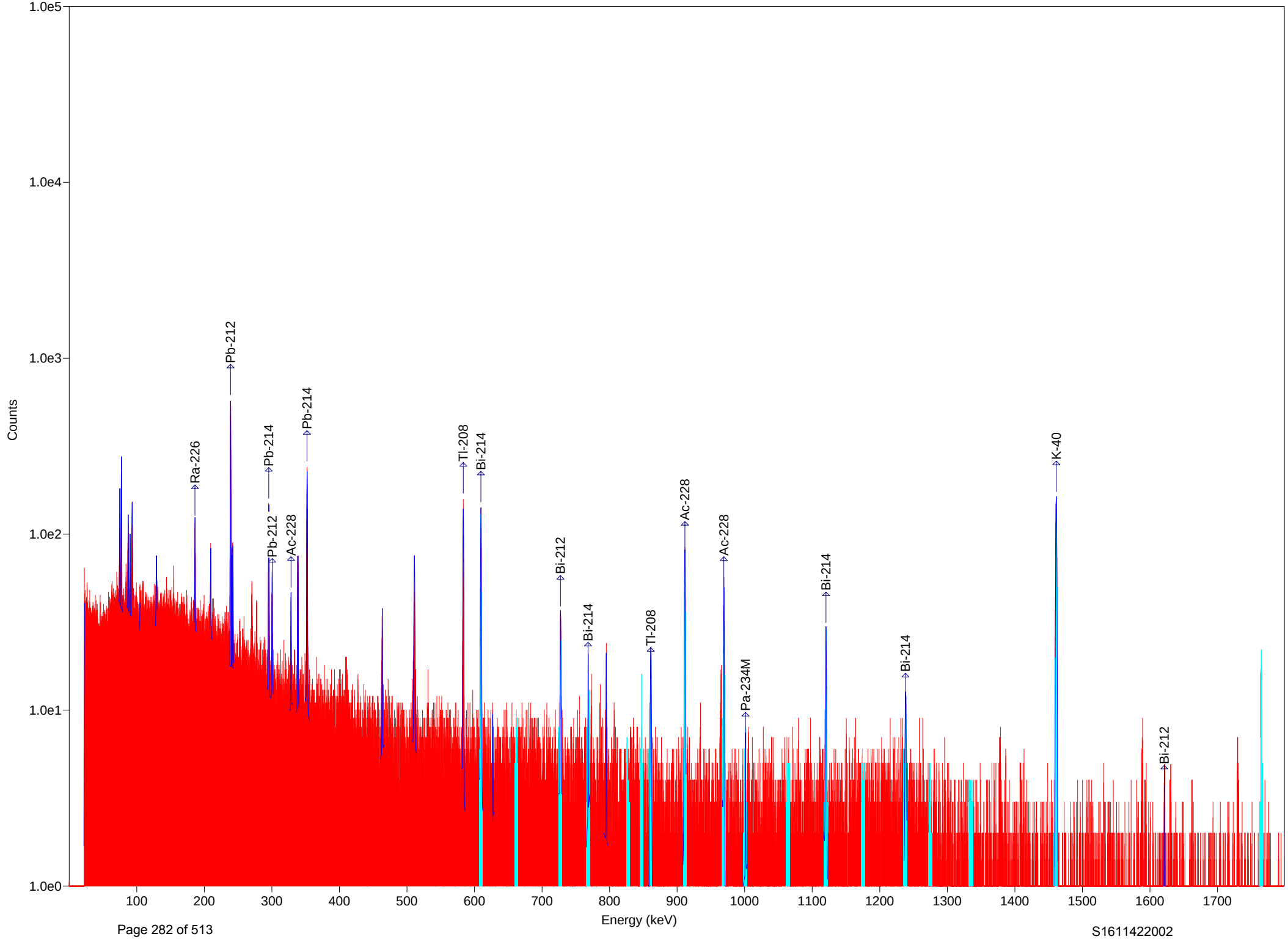
S1611422002

S1611422-020A DUP. Real/Live Time = 4510/4500 (s).



S1611422002

S1611422-021A. Real/Live Time = 4522/4500 (s).

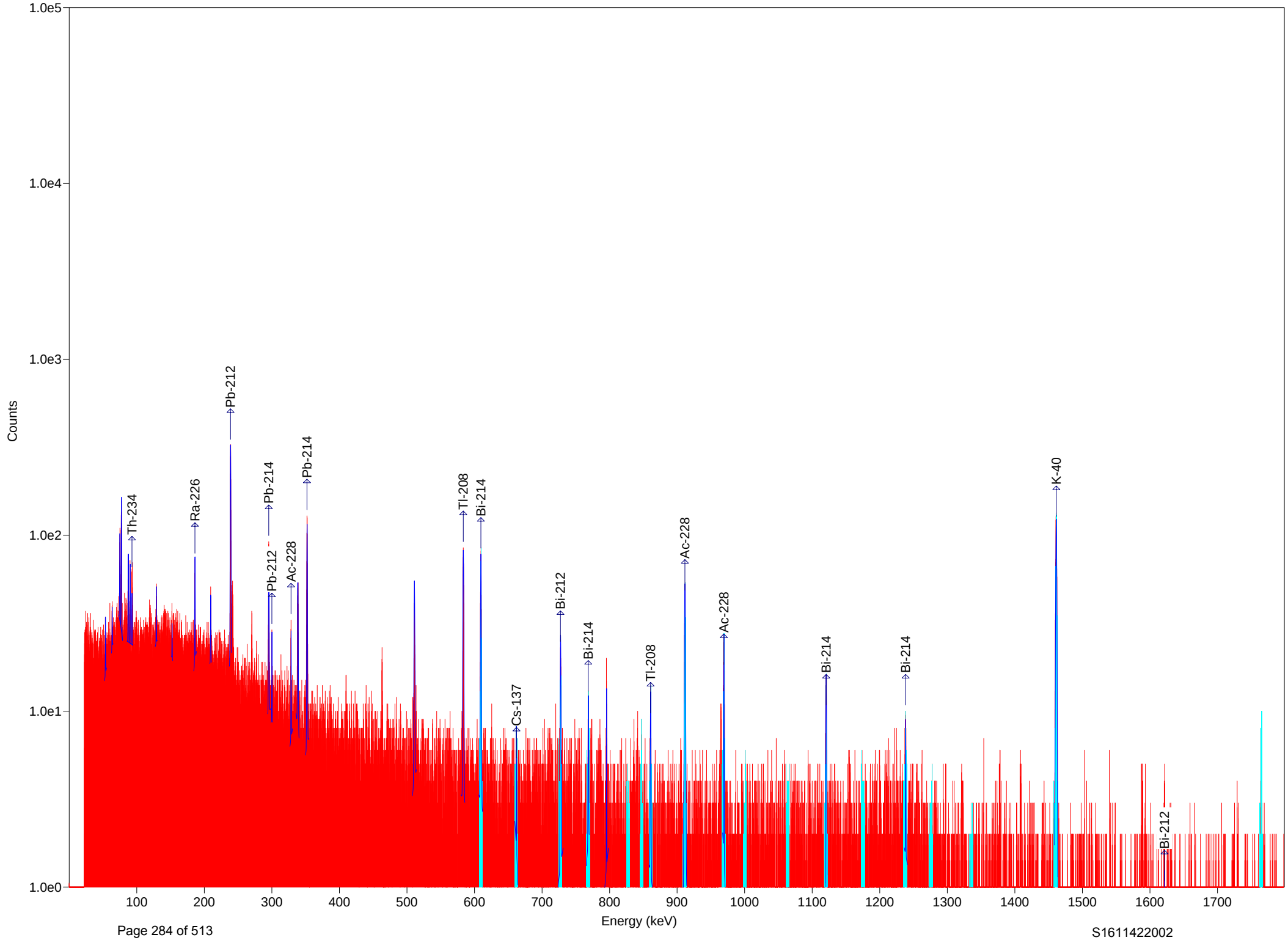


S1611422002

Detector #4 ACQ 05-Jan-2017 at 16:45:36 RT = 4522.6 LT = 4500.0
Rad Chem 1
S1611422-021A

ROI#	RANGE(keV)		GROSS	NET	+/-	CENTROID	FWHM	FW(1/5)M	LIBRARY	(keV)	µCi	+/-
1	606.78	611.61	949	838	33	609.49	1.26	1.90	Bi-214	609.31	0.0004	0.0000
2	659.24	664.07	131	35	17	662.36	0.33	0.95	Cs-137	661.66	0.0000	0.0000
3	724.43	729.70	322	172	25	727.59	0.99	1.97	Bi-212	727.00	0.0006	0.0001
4	765.70	770.97	192	63	21	768.55	0.35	1.49	Bi-214	768.36	0.0004	0.0001
5	824.75	830.01	88	0	16	825.95	0.40	0.55	Co-60	826.28	0.0000	0.0605
6	844.94	850.21	115	36	16	847.56	0.25	0.40	Co-56	846.77	0.0000	0.0000
7	857.89	863.16	172	93	18	860.82	1.22	1.94	Tl-208	860.56	0.0002	0.0000
8	908.38	913.87	625	556	28	911.54	1.44	2.26	Ac-228	911.20	0.0006	0.0000
9	966.11	971.82	420	294	27	969.21	1.16	2.21	Ac-228	968.97	0.0006	0.0001
10	997.94	1003.65	85	17	15	1001.64	0.29	0.76	Pa-234M	1001.03	0.0007	0.0006
11	1060.94	1067.09	89	26	16	1062.58	3.29	3.42	No close library match!			
12	1117.36	1123.07	261	207	19	1120.65	1.43	2.94	Bi-214	1120.29	0.0005	0.0000
13	1172.46	1178.61	92	0	18	1174.11	0.48	1.00	Co-60	1173.24	0.0000	0.0000
14	1235.02	1241.17	155	29	22	1238.00	1.58	2.05	Bi-214	1238.11	0.0002	0.0002
15	1271.90	1278.49	56	20	13	1274.28	0.32	0.52	No close library match!			
16	1331.84	1338.42	63	27	13	1334.03	4.01	4.43	Co-60	1332.50	0.0000	0.0000
17	1457.63	1463.78	1393	1316	40	1461.33	1.64	2.60	K-40	1461.00	0.0063	0.0002
18	1761.27	1767.85	171	155	14	1765.12	1.40	2.33	Bi-214	1764.49	0.0007	0.0001

S1611422-022A. Real/Live Time = 4519/4500 (s).

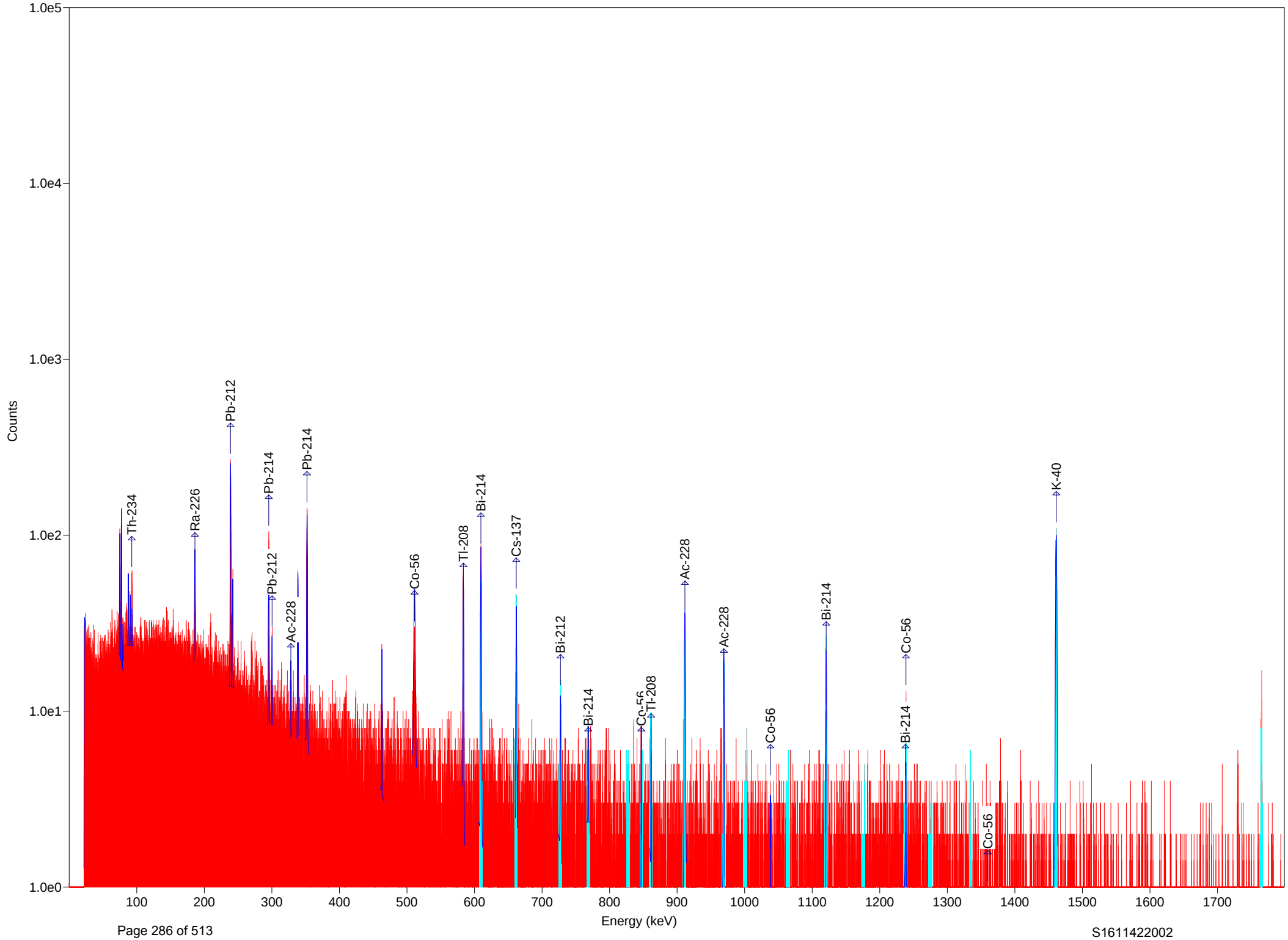


S1611422002

Detector #4 ACQ 05-Jan-2017 at 18:01:46 RT = 4519.3 LT = 4500.0
Rad Chem 1
S1611422-022A

ROI#	RANGE(keV)		GROSS	NET	+/-	CENTROID	FWHM	FW(1/5)M	LIBRARY	(keV)	µCi	+/-
1	606.78	611.61	557	453	27	609.42	1.23	1.87	Bi-214	609.31	0.0002	0.0000
2	659.24	664.07	98	29	14	661.42	0.34	0.74	Cs-137	661.66	0.0000	0.0000
3	724.43	729.70	212	66	22	727.49	0.87	1.18	Bi-212	727.00	0.0002	0.0001
4	765.70	770.97	125	21	18	768.45	0.68	0.96	Bi-214	768.36	0.0001	0.0001
5	824.75	830.01	60	-19	15	825.62	0.88	1.01	Co-60	826.28	0.0000	0.0567
6	844.94	850.21	84	9	15	847.18	0.31	0.52	Co-56	846.77	0.0000	0.0000
7	857.89	863.16	113	71	14	860.86	1.15	2.45	Tl-208	860.56	0.0002	0.0000
8	908.38	913.87	396	340	22	911.50	1.66	2.23	Ac-228	911.20	0.0004	0.0000
9	966.11	971.82	252	157	22	969.50	0.60	2.04	Ac-228	968.97	0.0003	0.0000
10	997.94	1003.65	63	0	14	1000.79	0.26	0.44	Pa-234M	1001.03	0.0000	0.0006
11	1060.94	1067.09	54	6	13	1065.99	0.22	0.35	No close library match!			
12	1117.36	1123.07	134	84	16	1120.66	1.19	1.85	Bi-214	1120.29	0.0002	0.0000
13	1172.46	1178.61	57	-20	16	1173.81	0.32	0.52	Co-60	1173.24	0.0000	0.0000
14	1235.02	1241.17	109	61	15	1238.23	0.50	2.06	Co-56	1238.28	0.0000	0.0000
15	1271.90	1278.49	56	15	13	1277.61	0.22	0.35	No close library match!			
16	1331.84	1338.42	29	13	8	1332.50	5.05	5.18	Co-60	1332.50	0.0000	0.0000
17	1457.63	1463.78	1080	1012	35	1461.33	1.62	2.55	K-40	1461.00	0.0048	0.0002
18	1761.27	1767.85	86	81	10	1765.22	0.99	2.52	Bi-214	1764.49	0.0003	0.0000

S1611422-023A. Real/Live Time = 4521/4500 (s).

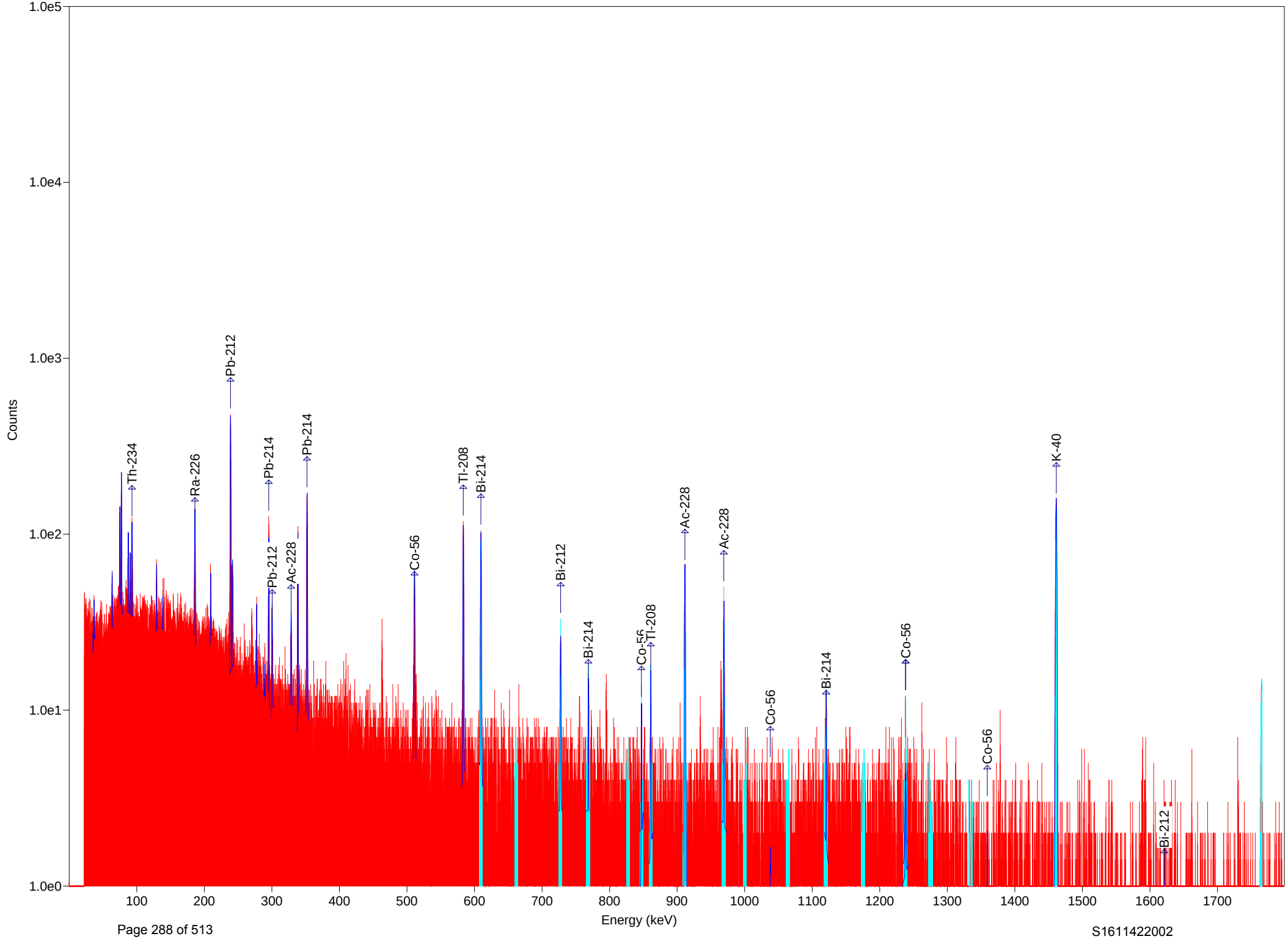


S1611422002

Detector #4 ACQ 05-Jan-2017 at 19:18:20 RT = 4521.4 LT = 4500.0
Rad Chem 1
S1611422-023A

ROI#	RANGE(keV)		GROSS	NET	+/-	CENTROID	FWHM	FW(1/5)M	LIBRARY	(keV)	µCi	+/-
1	606.78	611.61	580	473	27	609.48	1.30	1.92	Bi-214	609.31	0.0002	0.0000
2	659.24	664.07	296	227	20	661.84	1.13	1.94	Cs-137	661.66	0.0001	0.0000
3	724.43	729.70	143	89	16	727.48	1.56	2.41	Bi-212	727.00	0.0003	0.0001
4	765.70	770.97	123	44	17	768.72	0.55	0.98	Bi-214	768.36	0.0002	0.0001
5	824.75	830.01	68	-24	16	827.38	1.76	1.89	Co-60	826.28	0.0000	0.0605
6	844.94	850.21	88	42	13	846.63	0.42	0.75	Co-56	846.77	0.0000	0.0000
7	857.89	863.16	92	34	14	860.74	0.63	0.78	Tl-208	860.56	0.0001	0.0000
8	908.38	913.87	280	241	19	911.47	1.52	2.32	Ac-228	911.20	0.0003	0.0000
9	966.11	971.82	185	126	18	968.88	1.21	2.21	Ac-228	968.97	0.0003	0.0000
10	997.94	1003.65	69	-21	17	1001.45	0.22	0.35	Pa-234M	1001.03	0.0000	0.0007
11	1060.94	1067.09	59	6	14	1065.66	0.44	0.65	No close library match!			
12	1117.36	1123.07	189	139	17	1120.74	0.95	2.14	Bi-214	1120.29	0.0004	0.0000
13	1172.46	1178.61	45	11	11	1173.12	4.99	5.16	Co-60	1173.24	0.0000	0.0000
14	1235.02	1241.17	95	47	15	1238.70	0.71	1.14	Co-56	1238.28	0.0000	0.0000
15	1271.90	1278.49	45	14	11	1273.44	3.13	3.34	No close library match!			
16	1331.84	1338.42	31	0	11	1334.28	0.29	0.50	Co-60	1332.50	0.0000	0.0000
17	1457.63	1463.78	859	825	30	1461.32	1.80	2.48	K-40	1461.00	0.0039	0.0001
18	1761.27	1767.85	111	101	11	1765.27	0.85	2.37	Bi-214	1764.49	0.0004	0.0000

S1611422-024A. Real/Live Time = 4524/4500 (s).

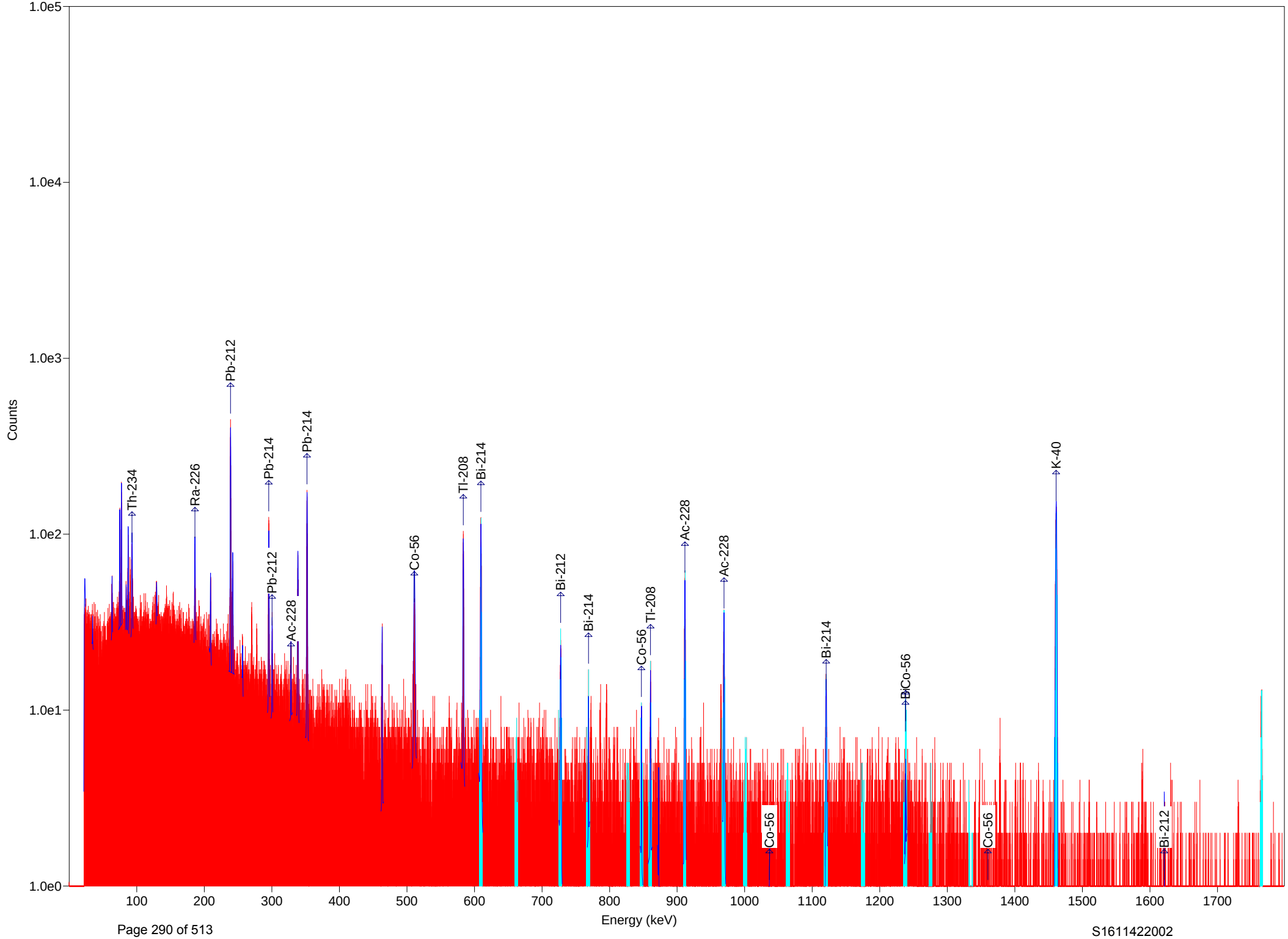


S1611422002

Detector #4 ACQ 05-Jan-2017 at 20:34:47 RT = 4524.2 LT = 4500.0
Rad Chem 1
S1611422-024A

ROI#	RANGE(keV)		GROSS	NET	+/-	CENTROID	FWHM	FW(1/5)M	LIBRARY	(keV)	µCi	+/-
1	606.78	611.61	725	575	31	609.51	1.22	1.89	Bi-214	609.31	0.0003	0.0000
2	659.24	664.07	99	-8	17	660.78	0.22	0.35	Cs-137	661.66	0.0000	0.0000
3	724.43	729.70	253	178	20	727.60	1.26	2.06	Bi-212	727.00	0.0007	0.0001
4	765.70	770.97	156	64	18	769.12	0.64	1.58	Bi-214	768.36	0.0004	0.0001
5	824.75	830.01	84	-12	17	826.06	2.63	2.77	Co-60	826.28	0.0000	0.0642
6	844.94	850.21	115	40	16	847.05	0.77	1.78	Co-56	846.77	0.0000	0.0000
7	857.89	863.16	140	77	16	860.83	1.08	2.09	Tl-208	860.56	0.0002	0.0000
8	908.38	913.87	488	432	24	911.38	1.37	2.16	Ac-228	911.20	0.0005	0.0000
9	966.11	971.82	346	238	24	969.10	0.99	2.14	Ac-228	968.97	0.0005	0.0000
10	997.94	1003.65	85	35	14	1001.01	0.22	0.35	Pa-234M	1001.03	0.0014	0.0006
11	1060.94	1067.09	76	28	14	1064.92	0.94	1.16	No close library match!			
12	1117.36	1123.07	171	90	19	1120.32	0.54	2.08	Bi-214	1120.29	0.0002	0.0000
13	1172.46	1178.61	82	0	17	1176.85	0.22	0.35	Co-60	1173.24	0.0000	0.0000
14	1235.02	1241.17	127	25	20	1238.32	0.85	1.34	Co-56	1238.28	0.0000	0.0000
15	1271.90	1278.49	67	-21	18	1273.44	0.22	0.35	No close library match!			
16	1331.84	1338.42	42	-10	14	1335.79	0.22	0.35	Co-60	1332.50	0.0000	0.0000
17	1457.63	1463.78	1374	1321	39	1461.25	1.76	2.64	K-40	1461.00	0.0063	0.0002
18	1761.27	1767.85	125	109	13	1765.60	0.94	2.49	Bi-214	1764.49	0.0005	0.0001

S1611422-025A. Real/Live Time = 4524/4500 (s).

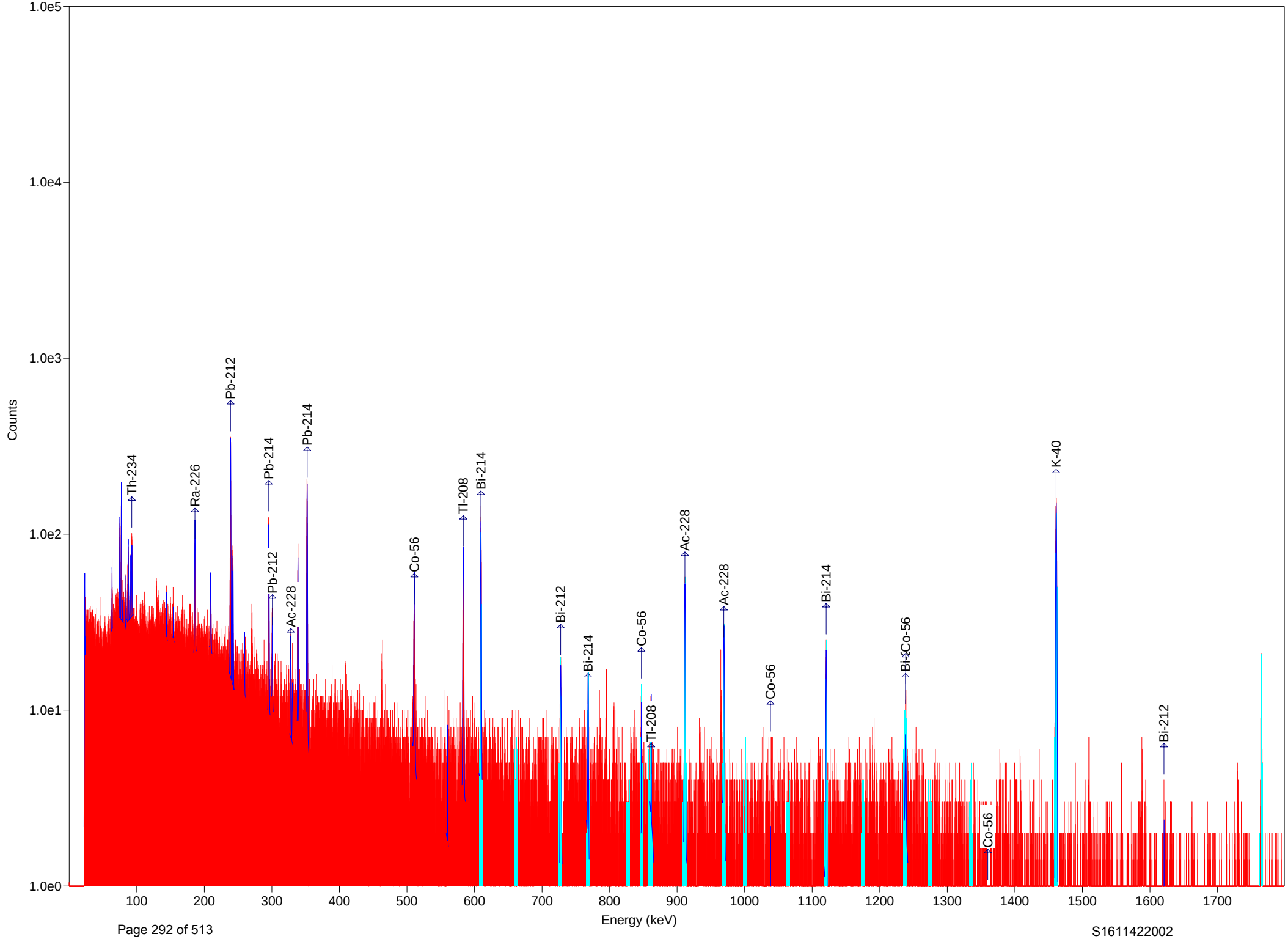


S1611422002

Detector #4 ACQ 05-Jan-2017 at 21:51:00 RT = 4524.1 LT = 4500.0
Rad Chem 1
S1611422-025A

ROI#	RANGE(keV)		GROSS	NET	+/-	CENTROID	FWHM	FW(1/5)M	LIBRARY	(keV)	µCi	+/-
1	606.78	611.61	778	651	31	609.48	1.26	1.81	Bi-214	609.31	0.0003	0.0000
2	659.24	664.07	91	-1	16	662.53	0.22	0.35	Cs-137	661.66	0.0000	0.0000
3	724.43	729.70	224	149	19	727.53	1.36	1.89	Bi-212	727.00	0.0006	0.0001
4	765.70	770.97	132	40	18	768.94	0.55	0.80	Bi-214	768.36	0.0002	0.0001
5	824.75	830.01	70	-9	15	825.40	2.30	2.72	Co-60	826.28	0.0000	0.0567
6	844.94	850.21	105	47	15	847.08	0.60	1.73	Co-56	846.77	0.0000	0.0000
7	857.89	863.16	142	84	16	860.62	0.79	1.99	Tl-208	860.56	0.0002	0.0000
8	908.38	913.87	422	357	23	911.57	1.10	2.18	Ac-228	911.20	0.0004	0.0000
9	966.11	971.82	305	219	22	969.25	1.10	2.29	Ac-228	968.97	0.0004	0.0000
10	997.94	1003.65	78	24	14	1000.74	2.37	2.53	Pa-234M	1001.03	0.0010	0.0006
11	1060.94	1067.09	66	22	13	1063.14	3.02	3.18	No close library match!			
12	1117.36	1123.07	147	97	16	1120.53	1.48	2.39	Bi-214	1120.29	0.0002	0.0000
13	1172.46	1178.61	59	6	14	1174.10	3.09	3.31	Co-60	1173.24	0.0000	0.0000
14	1235.02	1241.17	135	48	19	1237.92	0.27	1.85	Bi-214	1238.11	0.0003	0.0001
15	1271.90	1278.49	50	-7	15	1275.20	0.22	0.35	No close library match!			
16	1331.84	1338.42	32	-25	14	Could not properly fit the peak.						
17	1457.63	1463.78	1301	1253	37	1461.30	1.77	2.74	K-40	1461.00	0.0060	0.0002
18	1761.27	1767.85	122	117	11	1765.41	2.06	3.28	Bi-214	1764.49	0.0005	0.0000

S1611422-026A. Real/Live Time = 4523/4500 (s).

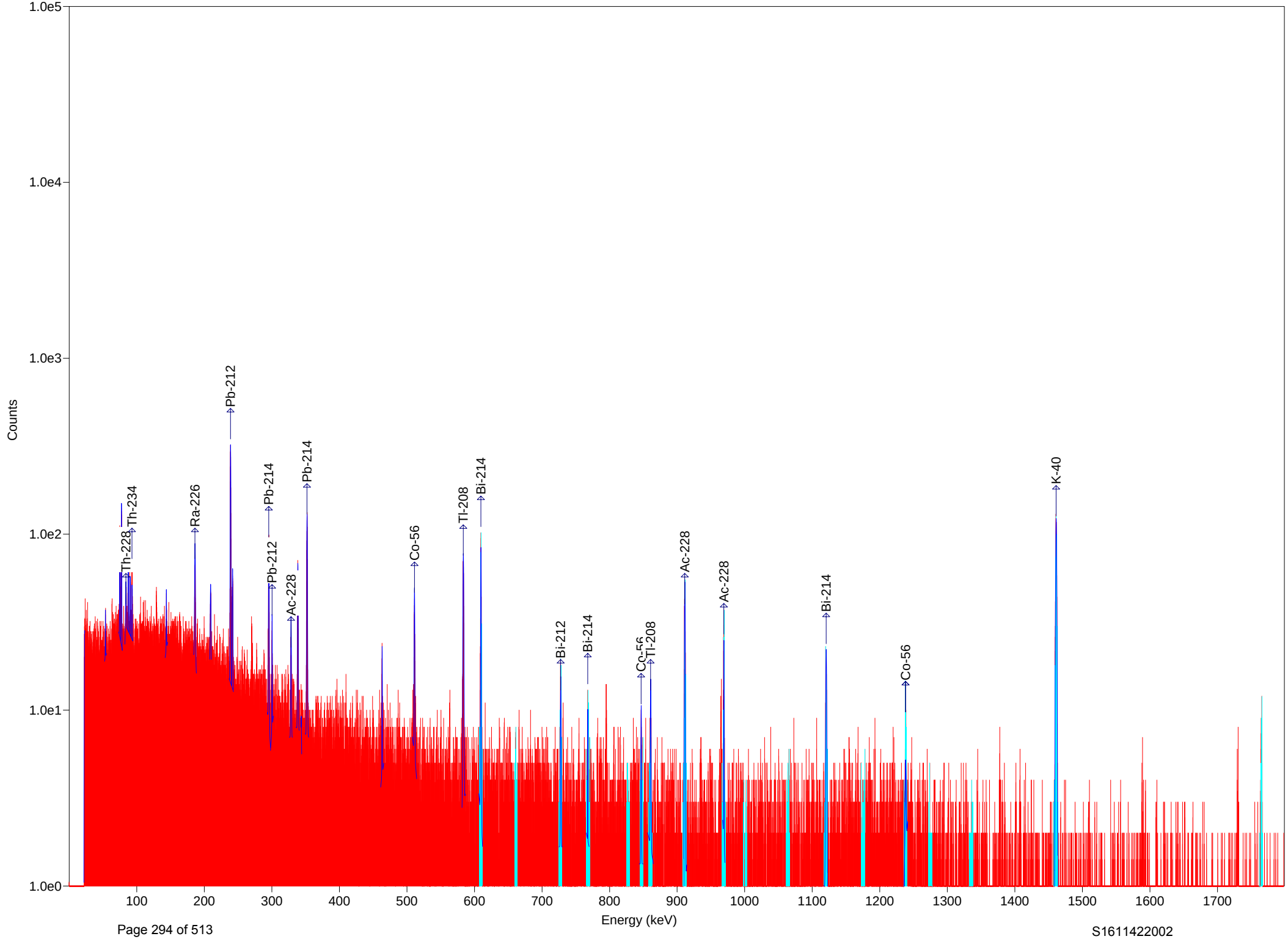


S1611422002

Detector #4 ACQ 05-Jan-2017 at 23:07:16 RT = 4523.9 LT = 4500.0
Rad Chem 1
S1611422-026A

ROI#	RANGE(keV)		GROSS	NET	+/-	CENTROID	FWHM	FW(1/5)M	LIBRARY	(keV)	µCi	+/-
1	606.78	611.61	817	710	31	609.50	1.24	1.87	Bi-214	609.31	0.0004	0.0000
2	659.24	664.07	81	16	14	661.26	0.29	0.72	Cs-137	661.66	0.0000	0.0000
3	724.43	729.70	185	118	18	727.39	1.03	2.36	Bi-212	727.00	0.0004	0.0001
4	765.70	770.97	154	75	18	768.63	1.02	1.39	Bi-214	768.36	0.0004	0.0001
5	824.75	830.01	59	5	13	827.16	2.41	2.55	Co-60	826.28	0.0189	0.0491
6	844.94	850.21	122	34	17	847.12	0.32	1.57	Co-56	846.77	0.0000	0.0000
7	857.89	863.16	131	31	18	860.95	0.32	1.63	Tl-208	860.56	0.0001	0.0000
8	908.38	913.87	409	335	24	911.35	1.39	1.99	Ac-228	911.20	0.0004	0.0000
9	966.11	971.82	269	201	20	969.37	1.37	2.34	Ac-228	968.97	0.0004	0.0000
10	997.94	1003.65	71	-10	16	1001.05	0.32	0.52	Pa-234M	1001.03	0.0000	0.0006
11	1060.94	1067.09	82	-10	18	1063.80	0.22	0.35	No close library match!			
12	1117.36	1123.07	188	125	18	1120.48	1.27	1.92	Bi-214	1120.29	0.0003	0.0000
13	1172.46	1178.61	63	-10	16	1175.31	0.22	0.35	Co-60	1173.24	0.0000	0.0000
14	1235.02	1241.17	173	52	22	1238.53	0.96	2.57	Co-56	1238.28	0.0000	0.0000
15	1271.90	1278.49	63	-20	18	Could not properly fit the peak.						
16	1331.84	1338.42	42	32	8	1335.82	0.31	0.76	Co-60	1332.50	0.0000	0.0000
17	1457.63	1463.78	1283	1239	37	1461.27	1.63	2.59	K-40	1461.00	0.0059	0.0002
18	1761.27	1767.85	154	138	14	1765.37	0.88	2.27	Bi-214	1764.49	0.0006	0.0001

S1611422-027A. Real/Live Time = 4523/4500 (s).

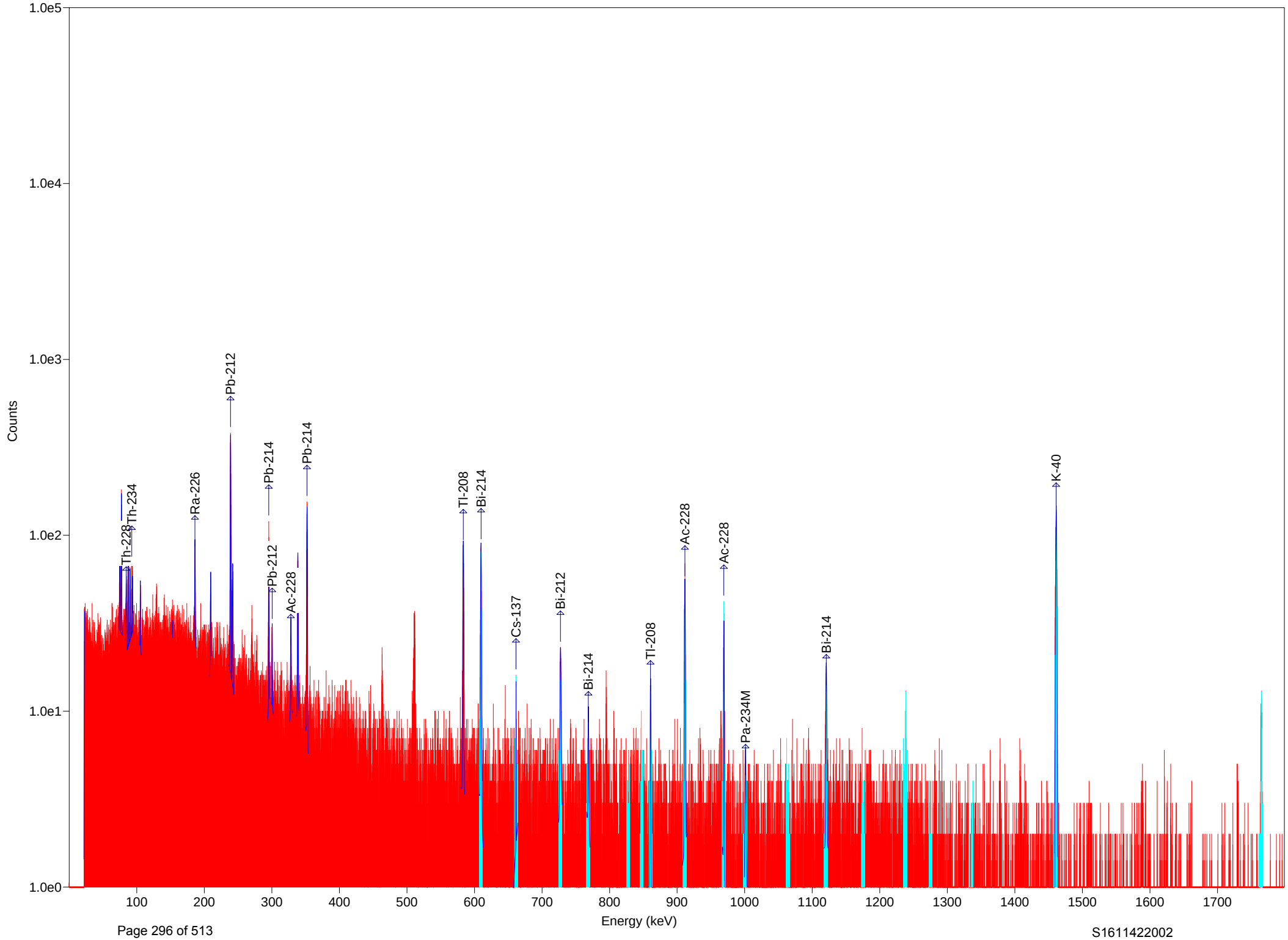


S1611422002

Detector #4 ACQ 06-Jan-2017 at 0:23:30 RT = 4523.0 LT = 4500.0
Rad Chem 1
S1611422-027A

ROI#	RANGE(keV)		GROSS	NET	+/-	CENTROID	FWHM	FW(1/5)M	LIBRARY	(keV)	µCi	+/-
1	606.78	611.61	580	473	27	609.47	0.92	1.63	Bi-214	609.31	0.0002	0.0000
2	659.24	664.07	88	-4	16	661.11	0.40	0.55	Cs-137	661.66	0.0000	0.0000
3	724.43	729.70	162	83	18	727.58	0.97	2.36	Bi-212	727.00	0.0003	0.0001
4	765.70	770.97	113	25	17	767.68	0.22	0.35	Bi-214	768.36	0.0001	0.0001
5	824.75	830.01	59	9	12	825.84	1.59	1.93	Co-60	826.28	0.0340	0.0454
6	844.94	850.21	92	38	14	846.88	0.80	1.11	Co-56	846.77	0.0000	0.0000
7	857.89	863.16	125	46	17	861.17	0.40	1.68	Tl-208	860.56	0.0001	0.0000
8	908.38	913.87	396	314	24	911.33	1.20	1.92	Ac-228	911.20	0.0004	0.0000
9	966.11	971.82	228	151	20	969.30	1.01	1.95	Ac-228	968.97	0.0003	0.0000
10	997.94	1003.65	40	-1	11	1002.11	0.22	0.35	Pa-234M	1001.03	0.0000	0.0004
11	1060.94	1067.09	64	16	14	1065.59	0.32	0.52	No close library match!			
12	1117.36	1123.07	185	104	19	1120.54	1.62	1.83	Bi-214	1120.29	0.0003	0.0000
13	1172.46	1178.61	62	-25	17	Could not properly fit the peak.						
14	1235.02	1241.17	120	72	16	1238.09	1.40	2.04	Bi-214	1238.11	0.0005	0.0001
15	1271.90	1278.49	42	-10	14	1274.10	0.22	0.35	No close library match!			
16	1331.84	1338.42	36	10	10	1336.23	1.76	1.89	Co-60	1332.50	0.0000	0.0000
17	1457.63	1463.78	1041	1002	33	1461.22	1.85	2.79	K-40	1461.00	0.0048	0.0002
18	1761.27	1767.85	90	90	9	1765.73	1.67	2.79	Bi-214	1764.49	0.0004	0.0000

S1611422-028A. Real/Live Time = 4523/4500 (s).

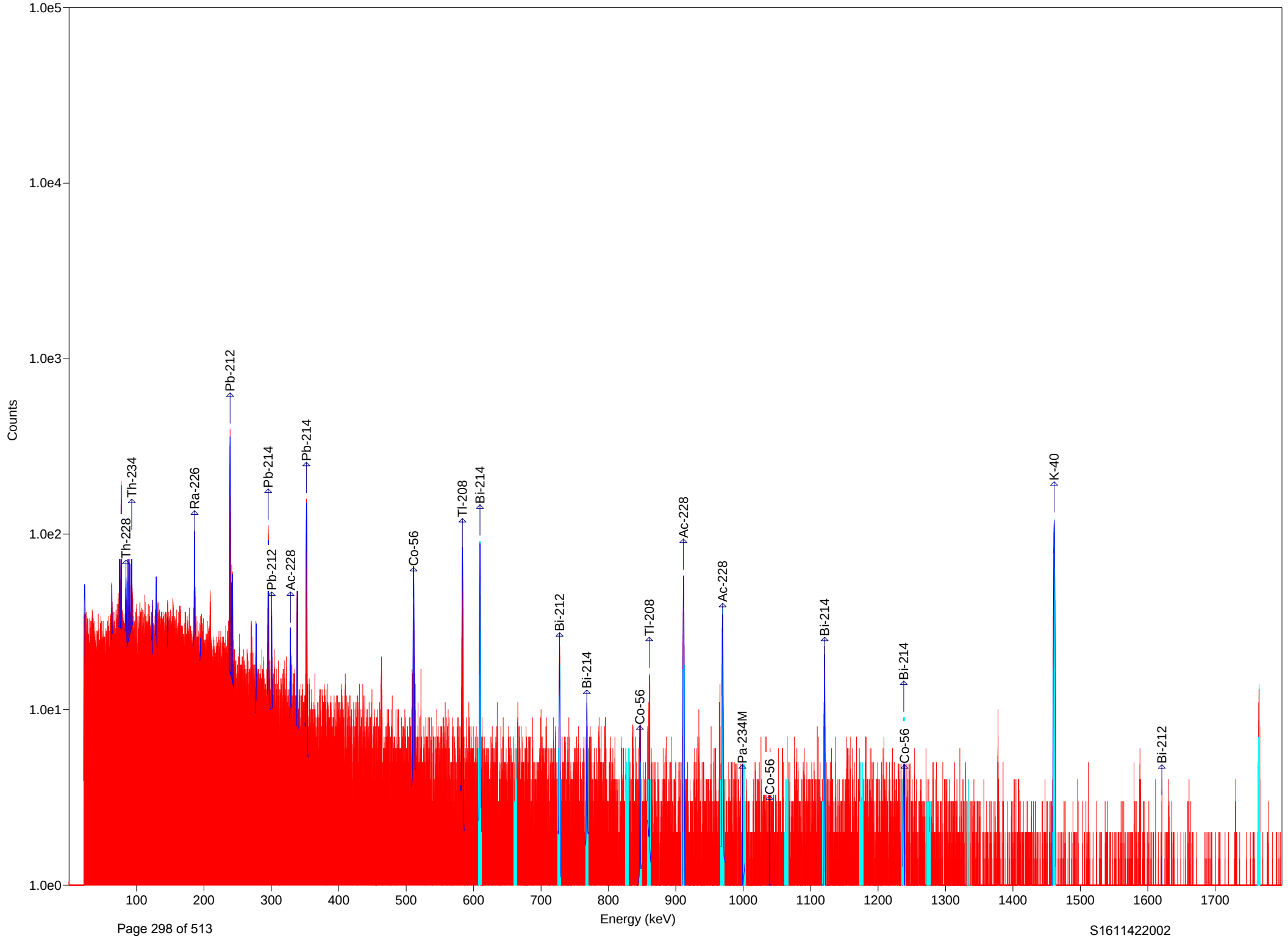


S1611422002

Detector #4 ACQ 06-Jan-2017 at 1:39:56 RT = 4523.9 LT = 4500.0
Rad Chem 1
S1611422-028A

ROI#	RANGE(keV)		GROSS	NET	+/-	CENTROID	FWHM	FW(1/5)M	LIBRARY	(keV)	µCi	+/-
1	606.78	611.61	621	517	28	609.53	1.22	1.96	Bi-214	609.31	0.0003	0.0000
2	659.24	664.07	112	28	16	661.42	0.25	0.40	Cs-137	661.66	0.0000	0.0000
3	724.43	729.70	227	110	21	727.33	1.29	1.87	Bi-212	727.00	0.0004	0.0001
4	765.70	770.97	115	40	16	768.68	1.17	2.49	Bi-214	768.36	0.0002	0.0001
5	824.75	830.01	74	-14	16	828.26	0.22	0.35	Co-60	826.28	0.0000	0.0605
6	844.94	850.21	90	40	14	846.74	0.52	1.11	Co-56	846.77	0.0000	0.0000
7	857.89	863.16	117	63	15	860.68	0.95	1.46	Tl-208	860.56	0.0002	0.0000
8	908.38	913.87	433	377	23	911.43	1.35	1.92	Ac-228	911.20	0.0004	0.0000
9	966.11	971.82	276	181	22	969.17	0.89	1.89	Ac-228	968.97	0.0004	0.0000
10	997.94	1003.65	77	23	14	998.92	3.32	3.55	Pa-234M	1001.03	0.0009	0.0006
11	1060.94	1067.09	70	-7	17	1062.26	0.22	0.35	No close library match!			
12	1117.36	1123.07	173	92	19	1120.51	1.83	2.64	Bi-214	1120.29	0.0002	0.0000
13	1172.46	1178.61	66	3	15	1174.00	0.22	0.35	Co-60	1173.24	0.0000	0.0000
14	1235.02	1241.17	133	31	20	1238.54	0.68	1.25	Co-56	1238.28	0.0000	0.0000
15	1271.90	1278.49	54	28	11	1273.00	5.31	5.55	No close library match!			
16	1331.84	1338.42	40	-32	16	Could not properly fit the peak.						
17	1457.63	1463.78	1190	1132	36	1461.32	1.80	2.86	K-40	1461.00	0.0054	0.0002
18	1761.27	1767.85	106	80	13	1765.16	1.39	1.82	Bi-214	1764.49	0.0003	0.0001

S1611422-029A. Real/Live Time = 4523/4500 (s).

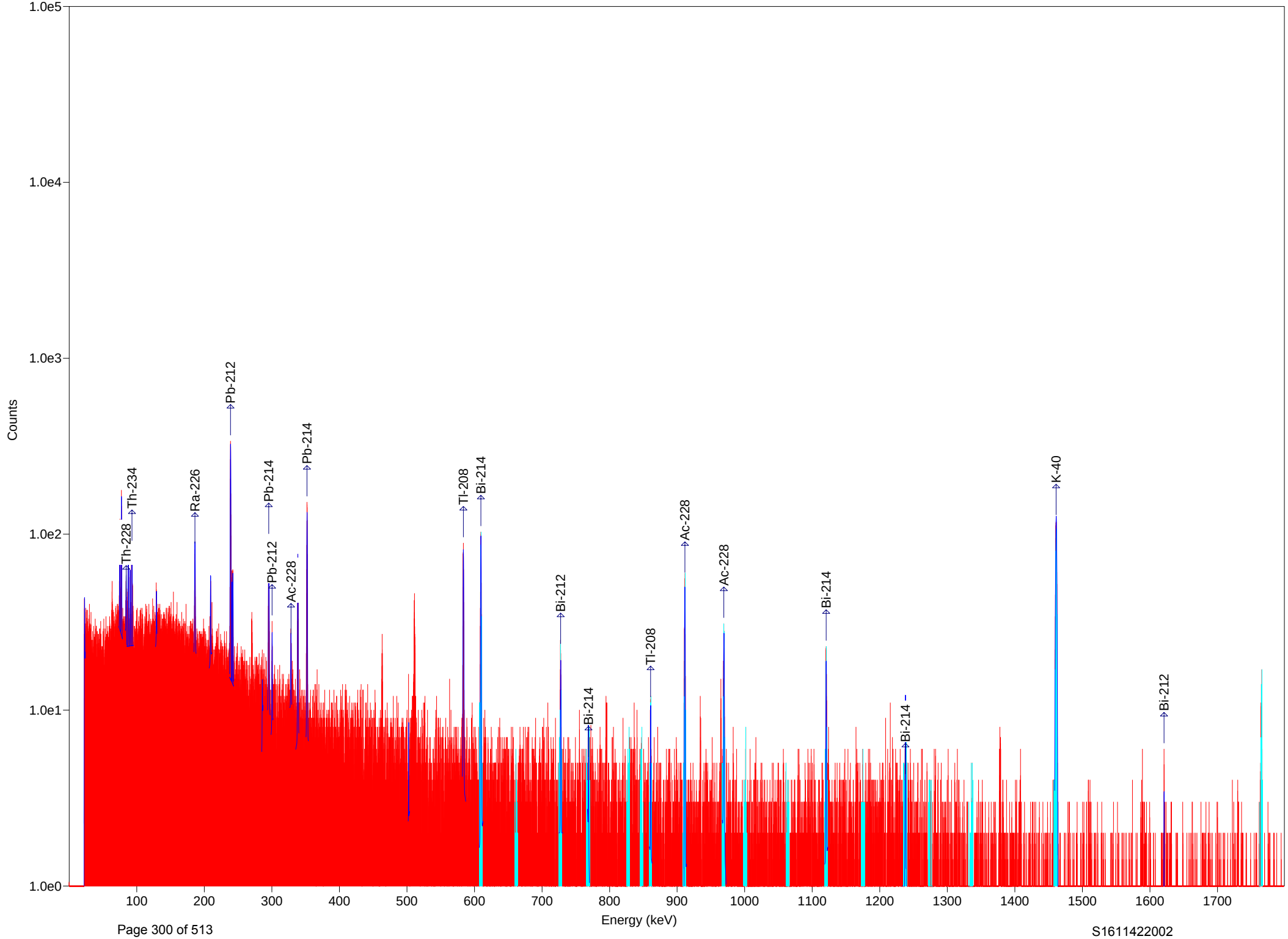


S1611422002

Detector #4 ACQ 06-Jan-2017 at 2:56:26 RT = 4523.9 LT = 4500.0
Rad Chem 1
S1611422-029A

ROI#	RANGE(keV)		GROSS	NET	+/-	CENTROID	FWHM	FW(1/5)M	LIBRARY	(keV)	µCi	+/-
1	606.78	611.61	608	539	27	609.47	1.15	2.00	Bi-214	609.31	0.0003	0.0000
2	659.24	664.07	87	10	15	661.34	0.39	0.55	Cs-137	661.66	0.0000	0.0000
3	724.43	729.70	185	135	17	727.53	1.40	2.30	Bi-212	727.00	0.0005	0.0001
4	765.70	770.97	117	25	17	767.93	1.13	1.53	Bi-214	768.36	0.0001	0.0001
5	824.75	830.01	70	-5	15	825.62	0.22	0.35	Co-60	826.28	0.0000	0.0567
6	844.94	850.21	97	59	13	847.10	0.75	1.55	Co-56	846.77	0.0000	0.0000
7	857.89	863.16	144	48	18	860.57	1.08	1.24	Tl-208	860.56	0.0001	0.0000
8	908.38	913.87	423	384	22	911.45	1.36	2.40	Ac-228	911.20	0.0004	0.0000
9	966.11	971.82	281	209	21	969.15	1.28	2.02	Ac-228	968.97	0.0004	0.0000
10	997.94	1003.65	83	11	16	1001.42	0.29	0.50	Pa-234M	1001.03	0.0004	0.0006
11	1060.94	1067.09	55	7	13	1065.74	0.29	0.50	No close library match!			
12	1117.36	1123.07	174	102	18	1120.56	1.02	1.96	Bi-214	1120.29	0.0003	0.0000
13	1172.46	1178.61	64	6	15	1173.12	3.79	4.00	Co-60	1173.24	0.0000	0.0000
14	1235.02	1241.17	111	24	18	1238.10	1.12	1.26	Bi-214	1238.11	0.0002	0.0001
15	1271.90	1278.49	50	9	13	1275.00	0.64	0.78	No close library match!			
16	1331.84	1338.42	39	-13	14	1334.25	3.51	3.64	Co-60	1332.50	0.0000	0.0000
17	1457.63	1463.78	1022	993	33	1461.26	1.75	2.66	K-40	1461.00	0.0047	0.0002
18	1761.27	1767.85	116	106	12	1765.29	1.08	1.99	Bi-214	1764.49	0.0005	0.0001

S1611422-030A. Real/Live Time = 4523/4500 (s).

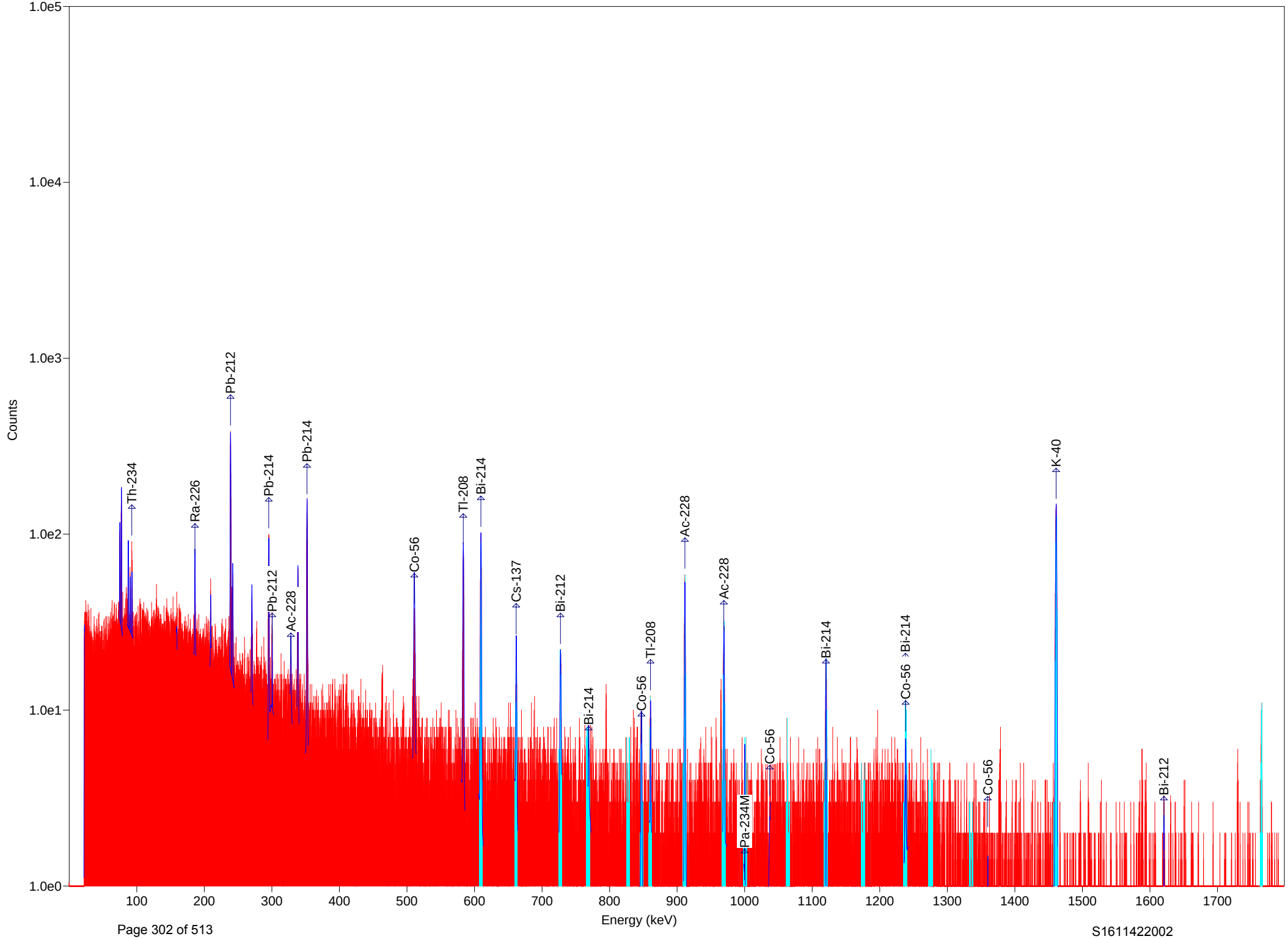


S1611422002

Detector #4 ACQ 06-Jan-2017 at 4:12:36 RT = 4523.8 LT = 4500.0
Rad Chem 1
S1611422-030A

ROI#	RANGE(keV)		GROSS	NET	+/-	CENTROID	FWHM	FW(1/5)M	LIBRARY	(keV)	µCi	+/-
1	606.78	611.61	652	591	27	609.43	1.05	1.96	Bi-214	609.31	0.0003	0.0000
2	659.24	664.07	65	11	12	661.18	0.36	1.70	Cs-137	661.66	0.0000	0.0000
3	724.43	729.70	193	105	19	727.45	0.89	1.74	Bi-212	727.00	0.0004	0.0001
4	765.70	770.97	124	7	19	768.41	0.42	0.63	Bi-214	768.36	0.0000	0.0001
5	824.75	830.01	87	4	16	828.92	0.22	0.35	Co-60	826.28	0.0151	0.0605
6	844.94	850.21	84	17	15	847.76	0.29	1.38	Co-56	846.77	0.0000	0.0000
7	857.89	863.16	104	62	13	861.01	0.60	1.39	Tl-208	860.56	0.0001	0.0000
8	908.38	913.87	380	345	21	911.54	1.25	1.93	Ac-228	911.20	0.0004	0.0000
9	966.11	971.82	243	166	20	969.21	1.28	2.35	Ac-228	968.97	0.0003	0.0000
10	997.94	1003.65	65	6	14	1001.53	0.45	0.80	Pa-234M	1001.03	0.0002	0.0006
11	1060.94	1067.09	51	-7	14	1065.11	0.27	0.48	No close library match!			
12	1117.36	1123.07	183	124	18	1120.63	0.86	1.82	Bi-214	1120.29	0.0003	0.0000
13	1172.46	1178.61	61	-7	15	1174.91	0.32	0.52	Co-60	1173.24	0.0000	0.0000
14	1235.02	1241.17	108	50	16	1238.93	0.29	1.99	Co-56	1238.28	0.0000	0.0000
15	1271.90	1278.49	47	-10	15	1273.22	3.40	3.60	No close library match!			
16	1331.84	1338.42	50	3	14	1335.57	1.79	1.98	Co-60	1332.50	0.0000	0.0000
17	1457.63	1463.78	1103	1050	35	1461.21	1.81	2.64	K-40	1461.00	0.0050	0.0002
18	1761.27	1767.85	124	108	13	1765.67	0.41	2.55	Bi-214	1764.49	0.0005	0.0001

S1611422-031A. Real/Live Time = 4524/4500 (s).

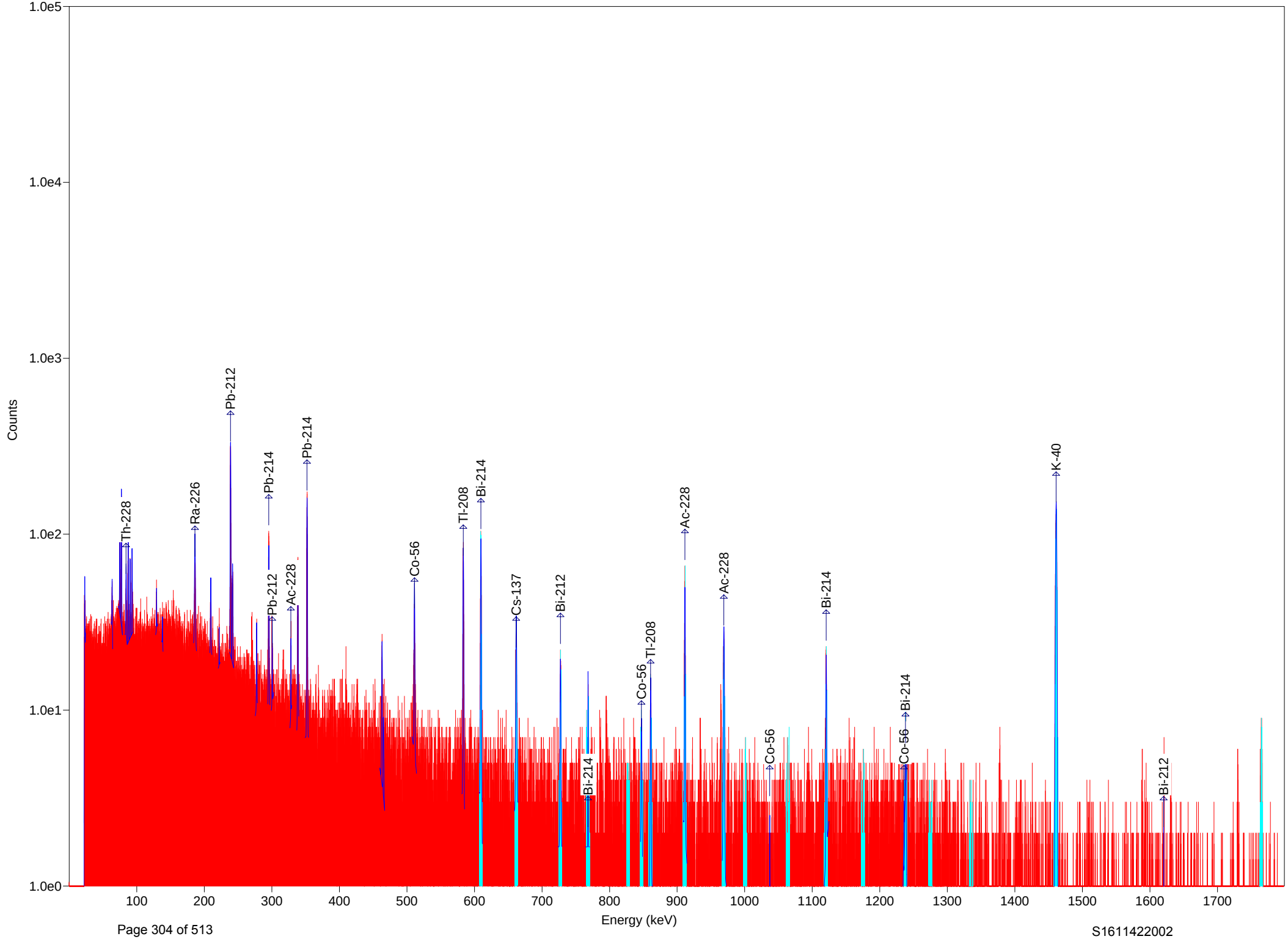


S1611422002

Detector #4 ACQ 06-Jan-2017 at 5:29:02 RT = 4524.3 LT = 4500.0
Rad Chem 1
S1611422-031A

ROI#	RANGE(keV)		GROSS	NET	+/-	CENTROID	FWHM	FW(1/5)M	LIBRARY	(keV)	µCi	+/-
1	606.78	611.61	676	546	30	609.43	1.39	1.81	Bi-214	609.31	0.0003	0.0000
2	659.24	664.07	221	144	19	661.89	1.32	2.21	Cs-137	661.66	0.0000	0.0000
3	724.43	729.70	226	151	19	727.26	1.48	2.45	Bi-212	727.00	0.0006	0.0001
4	765.70	770.97	128	24	18	768.72	0.75	1.47	Bi-214	768.36	0.0001	0.0001
5	824.75	830.01	78	11	14	825.40	0.25	0.40	Co-60	826.28	0.0416	0.0529
6	844.94	850.21	112	37	16	846.71	1.10	1.36	Co-56	846.77	0.0000	0.0000
7	857.89	863.16	118	64	15	860.56	0.76	1.68	Tl-208	860.56	0.0002	0.0000
8	908.38	913.87	410	349	23	911.38	1.52	2.23	Ac-228	911.20	0.0004	0.0000
9	966.11	971.82	249	177	20	969.05	1.45	2.24	Ac-228	968.97	0.0004	0.0000
10	997.94	1003.65	75	34	13	999.67	0.27	0.56	Pa-234M	1001.03	0.0014	0.0005
11	1060.94	1067.09	67	23	13	1062.70	0.24	0.38	No close library match!			
12	1117.36	1123.07	201	129	19	1120.66	0.84	2.00	Bi-214	1120.29	0.0003	0.0000
13	1172.46	1178.61	82	-15	18	1177.51	0.63	0.78	Co-60	1173.24	0.0000	0.0000
14	1235.02	1241.17	126	53	18	1237.94	0.68	1.71	Bi-214	1238.11	0.0004	0.0001
15	1271.90	1278.49	73	-5	17	1275.89	0.32	0.65	No close library match!			
16	1331.84	1338.42	36	-5	12	1332.50	1.10	1.23	Co-60	1332.50	0.0000	0.0000
17	1457.63	1463.78	1269	1225	37	1461.21	1.67	2.68	K-40	1461.00	0.0059	0.0002
18	1761.27	1767.85	95	79	12	1765.49	1.69	2.35	Bi-214	1764.49	0.0003	0.0001

S1611422-032A. Real/Live Time = 4525/4500 (s).

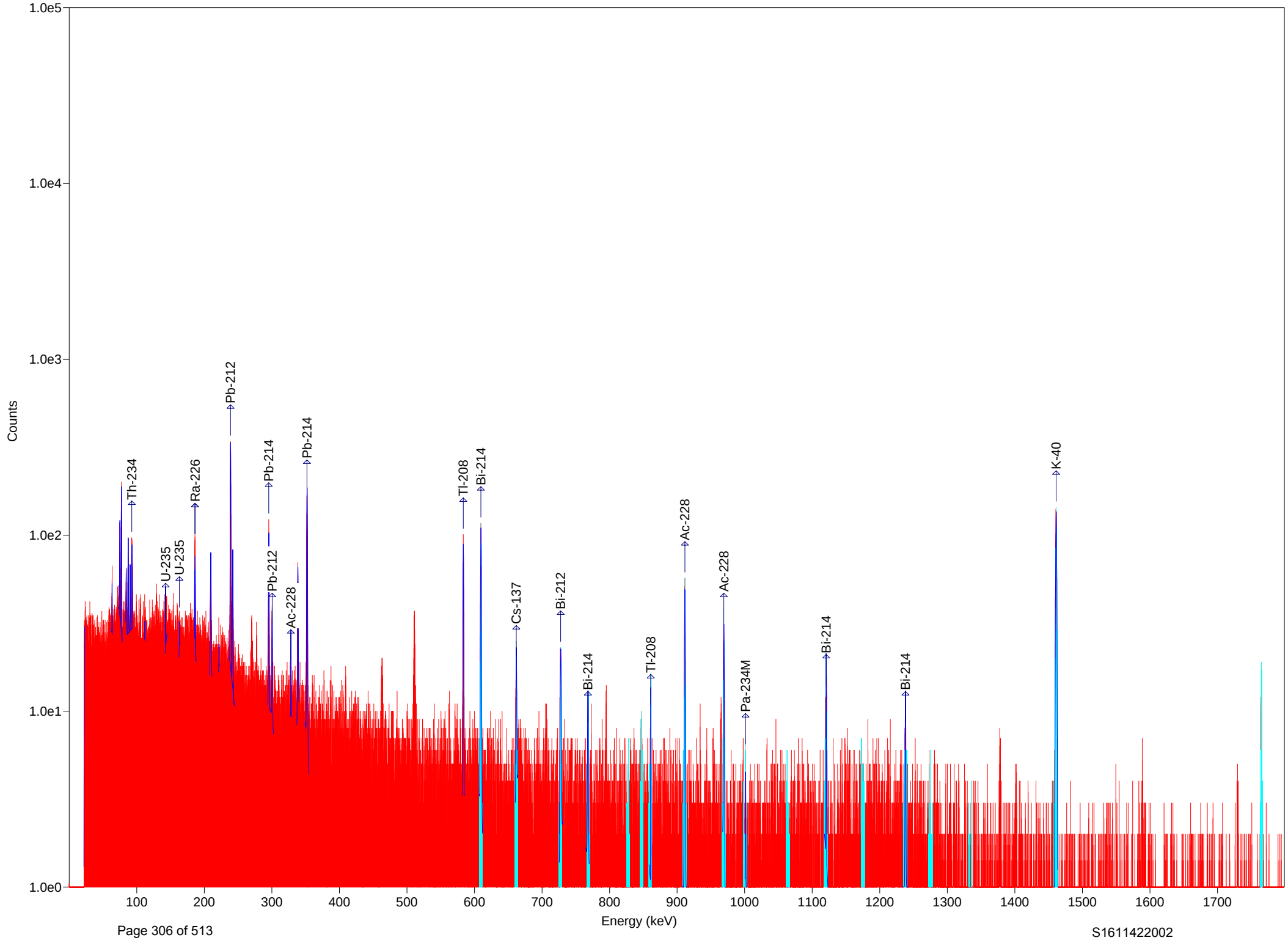


S1611422002

Detector #4 ACQ 06-Jan-2017 at 6:45:40 RT = 4525.6 LT = 4500.0
Rad Chem 1
S1611422-032A

ROI#	RANGE(keV)		GROSS	NET	+/-	CENTROID	FWHM	FW(1/5)M	LIBRARY	(keV)	µCi	+/-
1	606.78	611.61	646	585	27	609.42	1.20	1.75	Bi-214	609.31	0.0003	0.0000
2	659.24	664.07	266	178	20	661.74	1.44	2.06	Cs-137	661.66	0.0001	0.0000
3	724.43	729.70	177	123	17	727.52	1.26	1.83	Bi-212	727.00	0.0005	0.0001
4	765.70	770.97	142	13	20	768.44	0.37	0.54	Bi-214	768.36	0.0001	0.0001
5	824.75	830.01	79	25	14	825.73	1.96	2.10	Co-60	826.28	0.0945	0.0529
6	844.94	850.21	107	11	17	846.92	0.44	1.28	Co-56	846.77	0.0000	0.0000
7	857.89	863.16	122	64	15	860.74	0.79	1.40	Tl-208	860.56	0.0002	0.0000
8	908.38	913.87	396	327	23	911.47	1.20	2.12	Ac-228	911.20	0.0004	0.0000
9	966.11	971.82	247	184	20	969.10	1.61	2.28	Ac-228	968.97	0.0004	0.0000
10	997.94	1003.65	70	7	15	1001.26	0.29	0.50	Pa-234M	1001.03	0.0003	0.0006
11	1060.94	1067.09	81	-6	18	1065.74	0.29	0.50	No close library match!			
12	1117.36	1123.07	186	123	18	1120.49	1.12	2.26	Bi-214	1120.29	0.0003	0.0000
13	1172.46	1178.61	71	-16	17	1175.75	0.22	0.35	Co-60	1173.24	0.0000	0.0000
14	1235.02	1241.17	103	50	15	1238.72	0.26	1.39	Co-56	1238.28	0.0000	0.0000
15	1271.90	1278.49	49	-3	14	1273.66	3.73	3.86	No close library match!			
16	1331.84	1338.42	50	-2	14	1333.37	0.22	0.35	Co-60	1332.50	0.0000	0.0000
17	1457.63	1463.78	1298	1225	38	1461.20	1.83	2.80	K-40	1461.00	0.0059	0.0002
18	1761.27	1767.85	104	88	12	1765.35	1.47	3.25	Bi-214	1764.49	0.0004	0.0001

S1611422-033A. Real/Live Time = 4530/4500 (s).

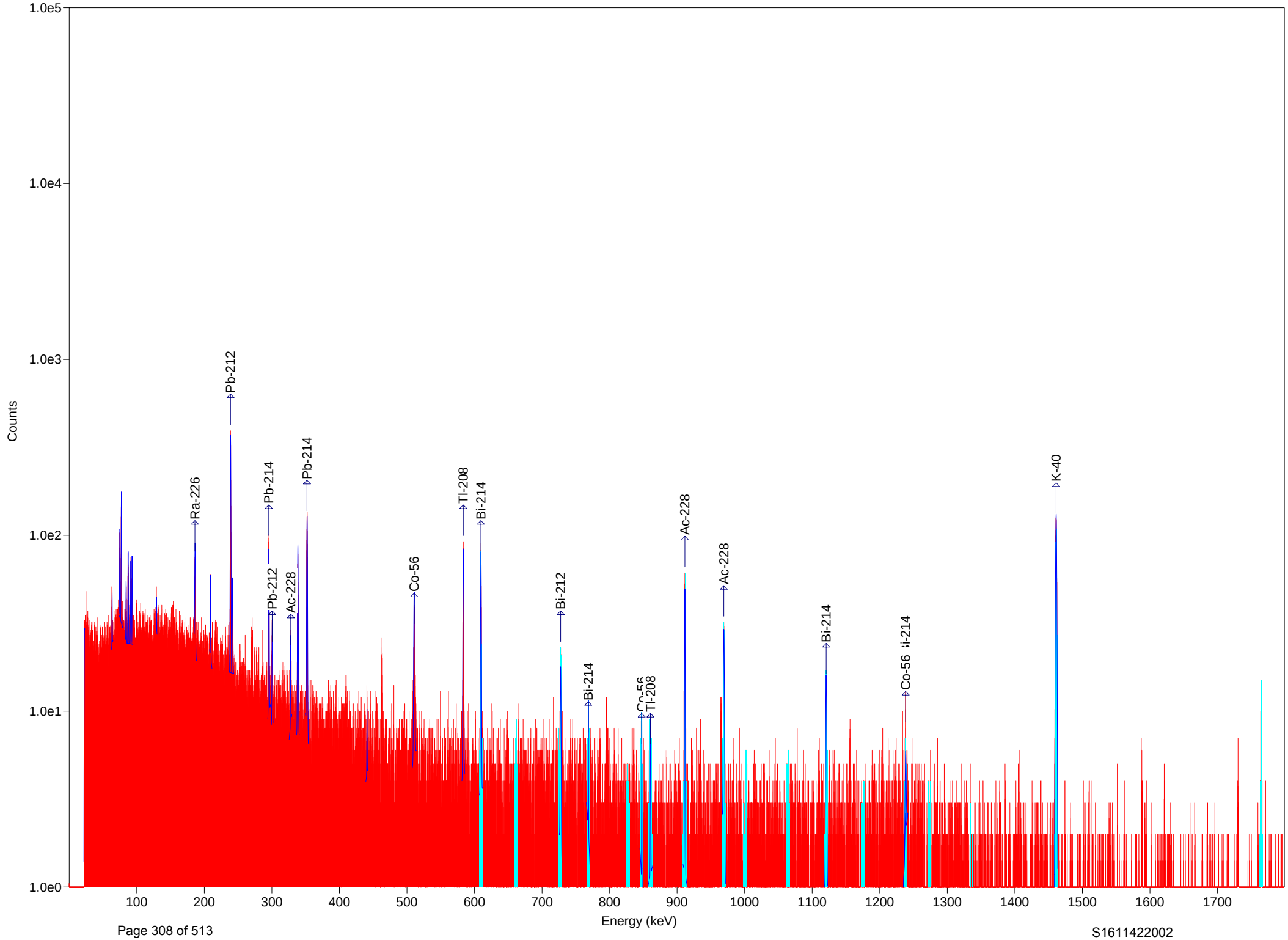


S1611422002

Detector #4 ACQ 06-Jan-2017 at 8:02:07 RT = 4530.1 LT = 4500.0
Rad Chem 1
S1611422-033A

ROI#	RANGE(keV)		GROSS	NET	+/-	CENTROID	FWHM	FW(1/5)M	LIBRARY	(keV)	µCi	+/-
1	606.78	611.61	748	667	29	609.47	1.24	1.78	Bi-214	609.31	0.0003	0.0000
2	659.24	664.07	209	98	20	661.64	1.04	1.77	Cs-137	661.66	0.0000	0.0000
3	724.43	729.70	210	127	19	727.60	1.50	2.08	Bi-212	727.00	0.0005	0.0001
4	765.70	770.97	148	60	18	768.44	1.08	1.68	Bi-214	768.36	0.0003	0.0001
5	824.75	830.01	63	13	13	827.96	0.51	0.74	Co-60	826.28	0.0491	0.0491
6	844.94	850.21	109	38	16	847.53	0.30	0.53	Co-56	846.77	0.0000	0.0000
7	857.89	863.16	119	56	15	860.79	0.30	0.75	Tl-208	860.56	0.0001	0.0000
8	908.38	913.87	372	320	22	911.43	1.47	2.10	Ac-228	911.20	0.0004	0.0000
9	966.11	971.82	266	194	21	969.07	1.30	2.25	Ac-228	968.97	0.0004	0.0000
10	997.94	1003.65	65	29	12	1000.79	0.80	1.69	Pa-234M	1001.03	0.0012	0.0005
11	1060.94	1067.09	64	-18	17	1063.14	0.22	0.35	No close library match!			
12	1117.36	1123.07	210	151	18	1120.38	0.46	1.56	Bi-214	1120.29	0.0004	0.0000
13	1172.46	1178.61	88	1	18	1173.12	0.22	0.35	Co-60	1173.24	0.0000	0.0000
14	1235.02	1241.17	137	74	17	1238.26	1.01	2.50	Co-56	1238.28	0.0000	0.0000
15	1271.90	1278.49	56	20	13	1274.68	0.48	0.72	No close library match!			
16	1331.84	1338.42	38	-9	13	1335.57	0.22	0.35	Co-60	1332.50	0.0000	0.0000
17	1457.63	1463.78	1173	1110	36	1461.18	1.70	2.58	K-40	1461.00	0.0053	0.0002
18	1761.27	1767.85	124	119	11	1765.21	1.47	2.03	Bi-214	1764.49	0.0005	0.0000

S1611422-034A. Real/Live Time = 4530/4500 (s).

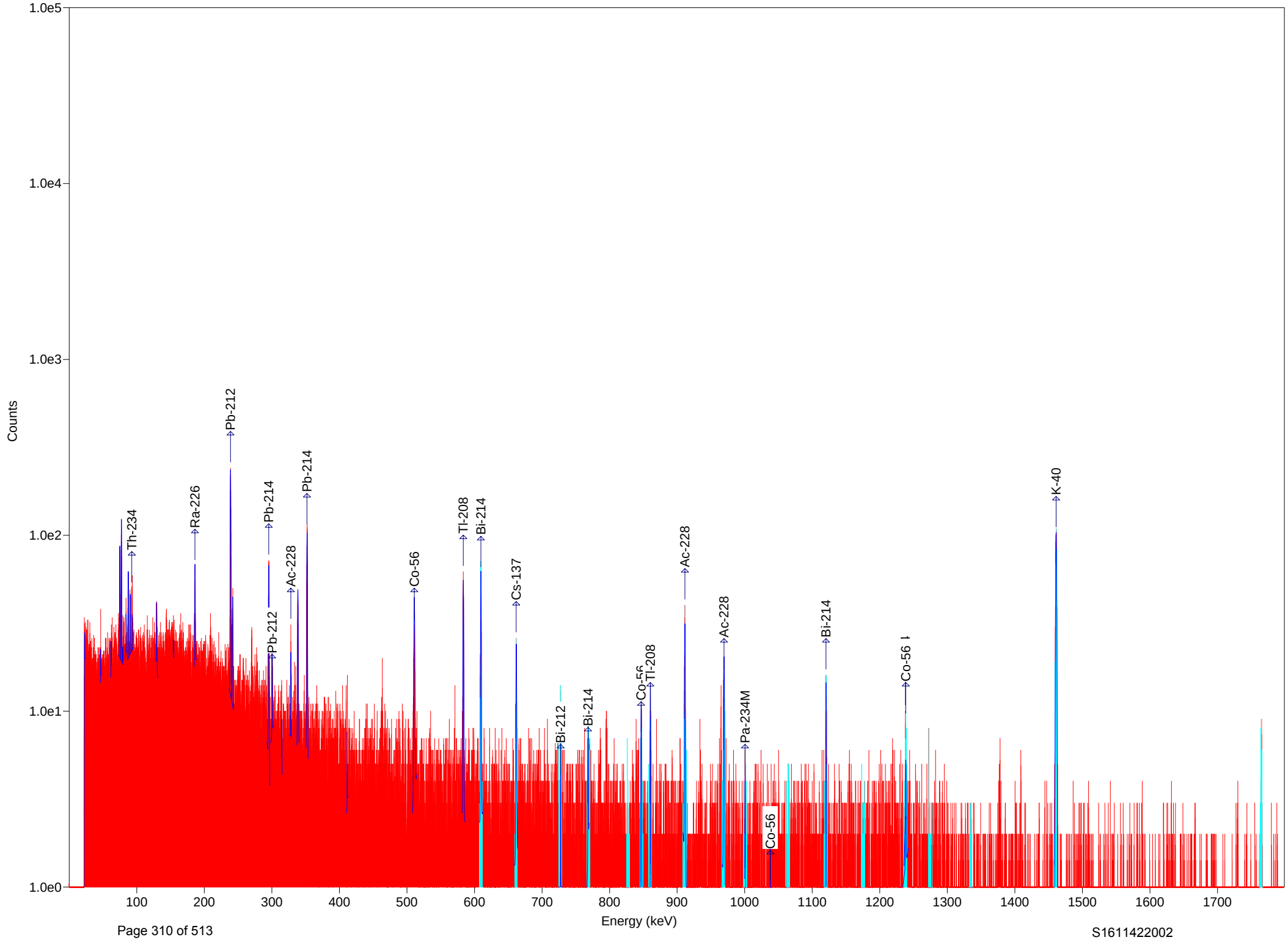


S1611422002

Detector #4 ACQ 06-Jan-2017 at 9:18:32 RT = 4530.7 LT = 4500.0
Rad Chem 1
S1611422-034A

ROI#	RANGE(keV)		GROSS	NET	+/-	CENTROID	FWHM	FW(1/5)M	LIBRARY	(keV)	µCi	+/-
1	606.78	611.61	573	454	28	609.44	1.15	1.72	Bi-214	609.31	0.0002	0.0000
2	659.24	664.07	92	8	15	661.88	0.22	0.35	Cs-137	661.66	0.0000	0.0000
3	724.43	729.70	194	94	20	727.55	1.17	1.58	Bi-212	727.00	0.0003	0.0001
4	765.70	770.97	122	64	15	768.63	0.64	2.51	Bi-214	768.36	0.0004	0.0001
5	824.75	830.01	76	-7	16	825.84	1.32	1.45	Co-60	826.28	0.0000	0.0605
6	844.94	850.21	107	32	16	846.86	0.80	1.09	Co-56	846.77	0.0000	0.0000
7	857.89	863.16	114	51	15	861.00	0.52	1.24	Tl-208	860.56	0.0001	0.0000
8	908.38	913.87	376	315	22	911.36	1.47	2.40	Ac-228	911.20	0.0004	0.0000
9	966.11	971.82	255	187	20	969.28	1.42	2.02	Ac-228	968.97	0.0004	0.0000
10	997.94	1003.65	65	-16	16	1001.45	1.54	1.67	Pa-234M	1001.03	0.0000	0.0006
11	1060.94	1067.09	72	28	13	1062.08	3.32	3.51	No close library match!			
12	1117.36	1123.07	151	106	16	1120.34	1.43	1.85	Bi-214	1120.29	0.0003	0.0000
13	1172.46	1178.61	60	-13	16	1173.12	0.22	0.35	Co-60	1173.24	0.0000	0.0000
14	1235.02	1241.17	119	46	18	1238.16	0.30	0.73	Bi-214	1238.11	0.0003	0.0001
15	1271.90	1278.49	60	3	15	1275.20	0.26	0.75	No close library match!			
16	1331.84	1338.42	38	22	9	1334.91	0.22	0.35	Co-60	1332.50	0.0000	0.0000
17	1457.63	1463.78	1141	1097	35	1461.14	1.75	2.60	K-40	1461.00	0.0052	0.0002
18	1761.27	1767.85	115	94	13	1765.33	0.96	2.18	Bi-214	1764.49	0.0004	0.0001

S1611422-035A. Real/Live Time = 4528/4500 (s).

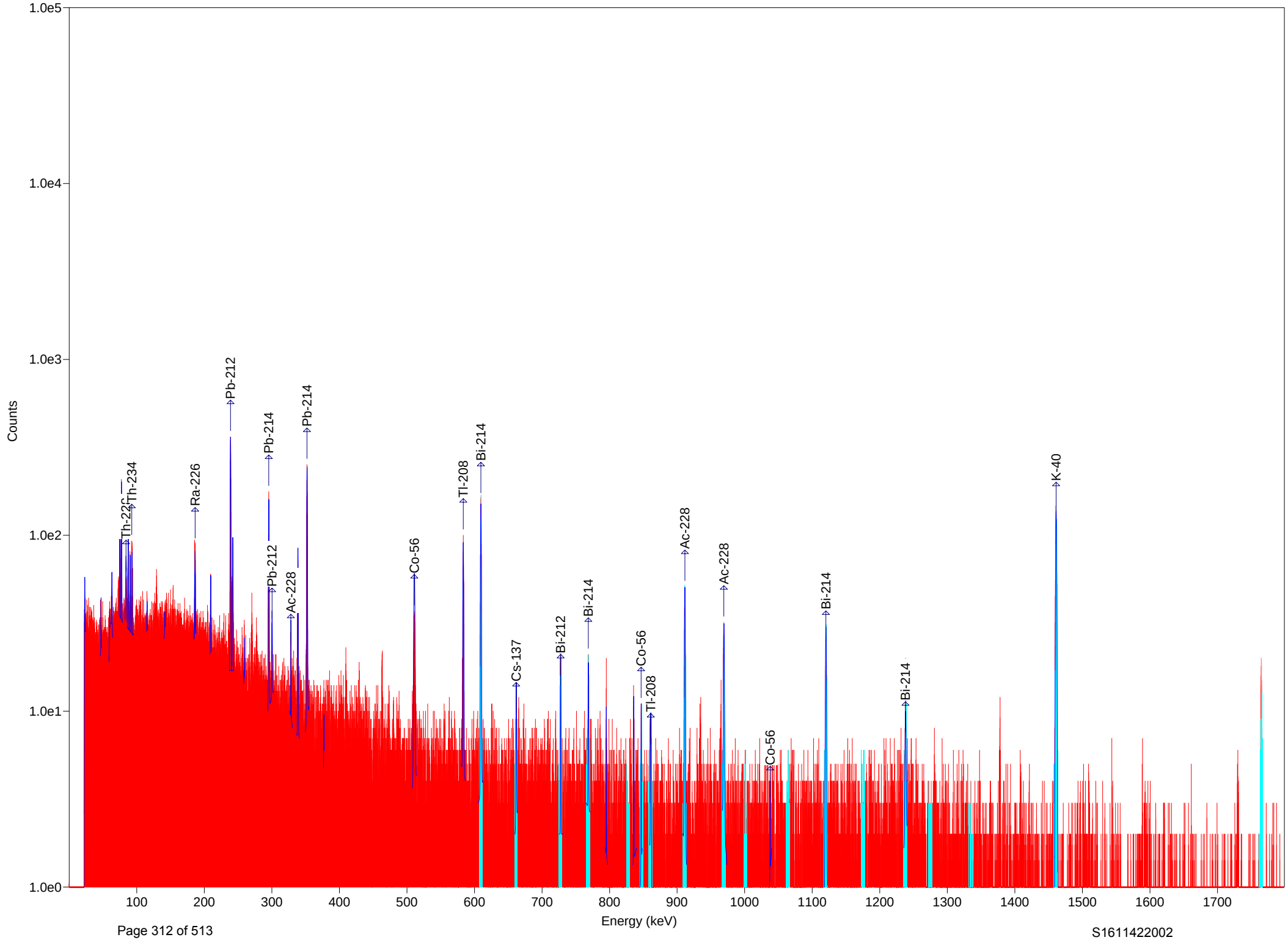


S1611422002

Detector #4 ACQ 06-Jan-2017 at 10:34:58 RT = 4528.9 LT = 4500.0
Rad Chem 1
S1611422-035A

ROI#	RANGE(keV)		GROSS	NET	+/-	CENTROID	FWHM	FW(1/5)M	LIBRARY	(keV)	µCi	+/-
1	606.78	611.61	451	374	24	609.38	0.95	1.81	Bi-214	609.31	0.0002	0.0000
2	659.24	664.07	179	141	15	661.81	1.14	2.16	Cs-137	661.66	0.0000	0.0000
3	724.43	729.70	117	38	16	727.25	0.26	0.97	Bi-212	727.00	0.0001	0.0001
4	765.70	770.97	96	50	13	768.83	0.73	1.13	Bi-214	768.36	0.0003	0.0001
5	824.75	830.01	46	13	10	826.06	0.22	0.35	Co-60	826.28	0.0491	0.0378
6	844.94	850.21	103	36	15	847.15	0.40	2.11	Co-56	846.77	0.0000	0.0000
7	857.89	863.16	102	52	14	860.15	1.23	2.72	Tl-208	860.56	0.0001	0.0000
8	908.38	913.87	254	185	20	911.40	1.22	1.96	Ac-228	911.20	0.0002	0.0000
9	966.11	971.82	169	106	18	969.21	1.29	2.06	Ac-228	968.97	0.0002	0.0000
10	997.94	1003.65	60	24	12	1000.57	0.65	0.79	Pa-234M	1001.03	0.0010	0.0005
11	1060.94	1067.09	56	12	13	1061.82	3.51	3.64	No close library match!			
12	1117.36	1123.07	129	79	15	1120.40	0.76	1.63	Bi-214	1120.29	0.0002	0.0000
13	1172.46	1178.61	60	-3	15	1173.34	0.22	0.35	Co-60	1173.24	0.0000	0.0000
14	1235.02	1241.17	108	40	17	1238.21	0.89	1.81	Co-56	1238.28	0.0000	0.0000
15	1271.90	1278.49	43	12	11	1272.56	0.22	0.35	No close library match!			
16	1331.84	1338.42	24	-2	10	1334.03	1.87	2.06	Co-60	1332.50	0.0000	0.0000
17	1457.63	1463.78	893	845	32	1461.10	1.57	2.56	K-40	1461.00	0.0040	0.0002
18	1761.27	1767.85	84	84	9	1764.97	1.71	3.14	Bi-214	1764.49	0.0004	0.0000

S1611422-036A. Real/Live Time = 4530/4500 (s).

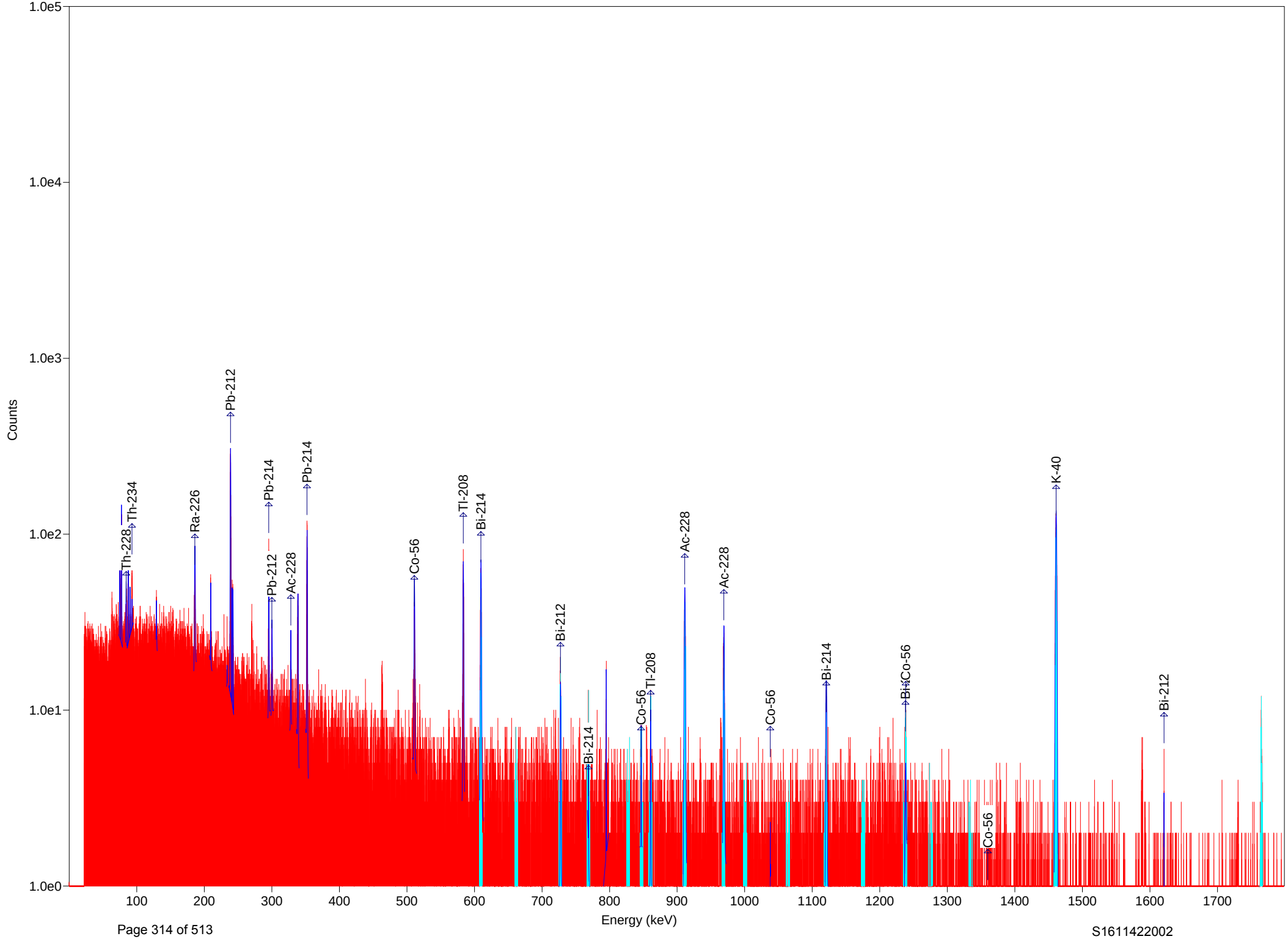


S1611422002

Detector #4 ACQ 06-Jan-2017 at 11:51:24 RT = 4530.8 LT = 4500.0
Rad Chem 1
S1611422-036A

ROI#	RANGE(keV)		GROSS	NET	+/-	CENTROID	FWHM	FW(1/5)M	LIBRARY	(keV)	µCi	+/-
1	606.78	611.61	1012	882	35	609.43	1.28	1.82	Bi-214	609.31	0.0005	0.0000
2	659.24	664.07	141	45	17	661.47	0.81	1.53	Cs-137	661.66	0.0000	0.0000
3	724.43	729.70	194	106	19	727.18	0.56	1.46	Bi-212	727.00	0.0004	0.0001
4	765.70	770.97	183	70	20	768.61	0.89	1.78	Bi-214	768.36	0.0004	0.0001
5	824.75	830.01	68	-40	17	Could not properly fit the peak.						
6	844.94	850.21	115	36	16	846.85	1.09	1.32	Co-56	846.77	0.0000	0.0000
7	857.89	863.16	129	46	17	860.52	0.74	1.82	Tl-208	860.56	0.0001	0.0000
8	908.38	913.87	397	336	23	911.39	1.28	2.12	Ac-228	911.20	0.0004	0.0000
9	966.11	971.82	274	166	23	969.18	1.46	1.91	Ac-228	968.97	0.0003	0.0000
10	997.94	1003.65	71	21	13	1001.12	0.43	1.38	Pa-234M	1001.03	0.0009	0.0005
11	1060.94	1067.09	81	4	17	1064.45	0.22	0.35	No close library match!			
12	1117.36	1123.07	243	207	18	1120.57	1.67	2.06	Bi-214	1120.29	0.0005	0.0000
13	1172.46	1178.61	74	6	16	1176.63	0.26	0.44	Co-60	1173.24	0.0000	0.0000
14	1235.02	1241.17	154	57	20	1238.28	0.25	0.49	Co-56	1238.28	0.0000	0.0000
15	1271.90	1278.49	55	3	14	1272.56	3.95	4.08	No close library match!			
16	1331.84	1338.42	36	-5	12	1334.91	0.27	0.48	Co-60	1332.50	0.0000	0.0000
17	1457.63	1463.78	1181	1075	38	1461.18	1.82	2.70	K-40	1461.00	0.0051	0.0002
18	1761.27	1767.85	171	155	14	1765.06	1.05	2.30	Bi-214	1764.49	0.0007	0.0001

S1611422-037A. Real/Live Time = 4528/4500 (s).

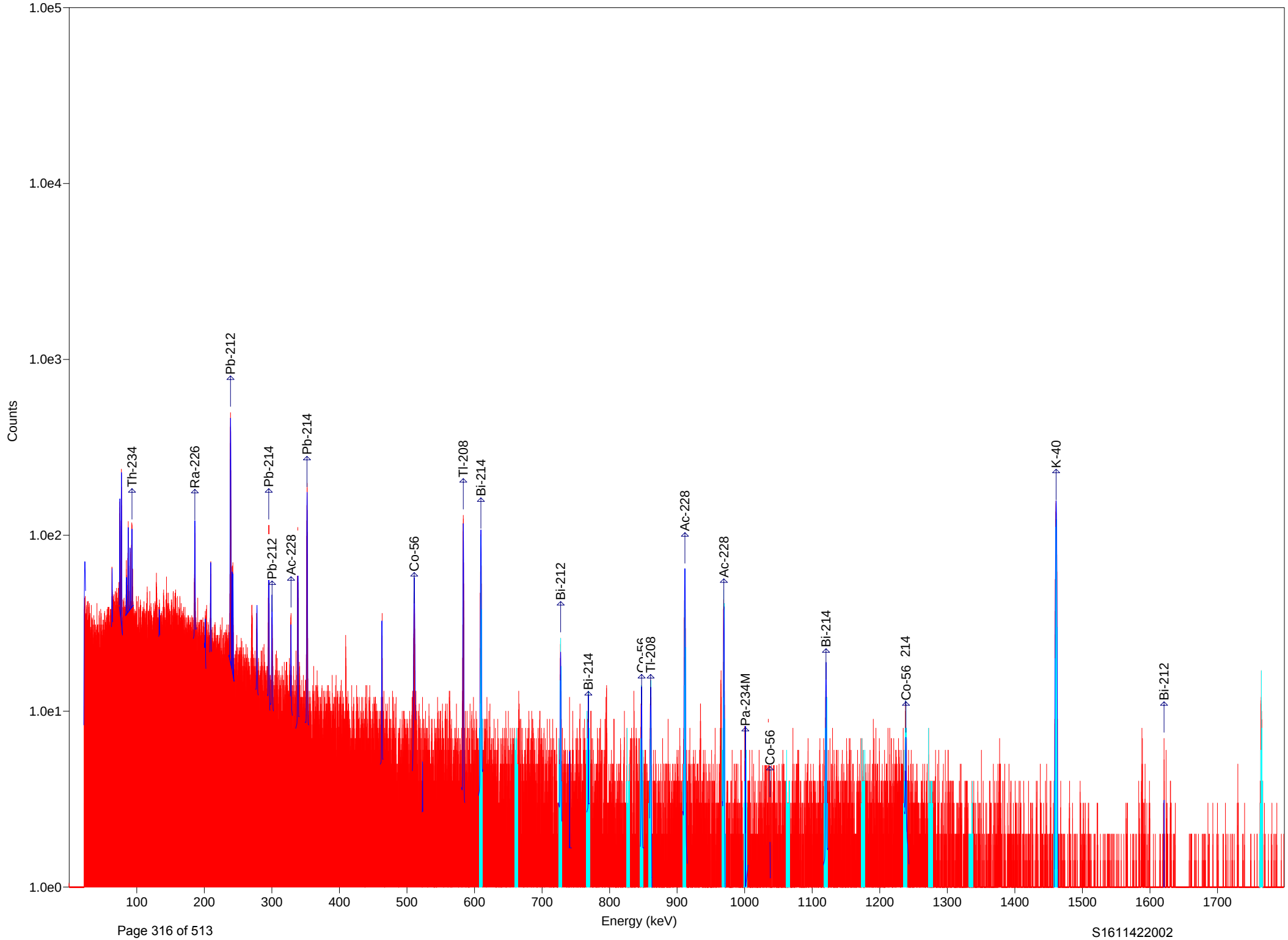


S1611422002

Detector #4 ACQ 06-Jan-2017 at 13:07:57 RT = 4528.6 LT = 4500.0
Rad Chem 1
S1611422-037A

ROI#	RANGE(keV)		GROSS	NET	+/-	CENTROID	FWHM	FW(1/5)M	LIBRARY	(keV)	µCi	+/-
1	606.78	611.61	506	399	26	609.46	1.28	1.86	Bi-214	609.31	0.0002	0.0000
2	659.24	664.07	68	-13	14	661.00	0.22	0.35	Cs-137	661.66	0.0000	0.0000
3	724.43	729.70	147	105	15	727.16	1.05	1.70	Bi-212	727.00	0.0004	0.0001
4	765.70	770.97	97	34	15	768.55	0.24	0.39	Bi-214	768.36	0.0002	0.0001
5	824.75	830.01	65	-23	15	826.28	0.22	0.35	Co-60	826.28	0.0000	0.0567
6	844.94	850.21	114	51	15	847.04	0.50	1.43	Co-56	846.77	0.0000	0.0000
7	857.89	863.16	103	20	16	860.57	0.34	0.98	Tl-208	860.56	0.0000	0.0000
8	908.38	913.87	373	321	22	911.38	1.90	2.29	Ac-228	911.20	0.0004	0.0000
9	966.11	971.82	250	200	19	969.08	1.41	2.19	Ac-228	968.97	0.0004	0.0000
10	997.94	1003.65	65	2	14	1002.55	0.33	1.05	Pa-234M	1001.03	0.0001	0.0006
11	1060.94	1067.09	46	-17	14	1065.33	0.44	0.70	No close library match!			
12	1117.36	1123.07	137	83	16	1120.61	1.60	2.52	Bi-214	1120.29	0.0002	0.0000
13	1172.46	1178.61	57	23	12	1173.79	3.70	4.55	Co-60	1173.24	0.0000	0.0000
14	1235.02	1241.17	117	35	18	1238.04	1.72	1.87	Bi-214	1238.11	0.0003	0.0001
15	1271.90	1278.49	41	-6	13	1273.44	0.22	0.35	No close library match!			
16	1331.84	1338.42	40	-7	13	1334.47	0.22	0.35	Co-60	1332.50	0.0000	0.0000
17	1457.63	1463.78	1174	1140	35	1461.19	1.98	2.72	K-40	1461.00	0.0054	0.0002
18	1761.27	1767.85	85	69	11	1765.01	0.79	2.14	Bi-214	1764.49	0.0003	0.0000

S1611422-038A. Real/Live Time = 4530/4500 (s).

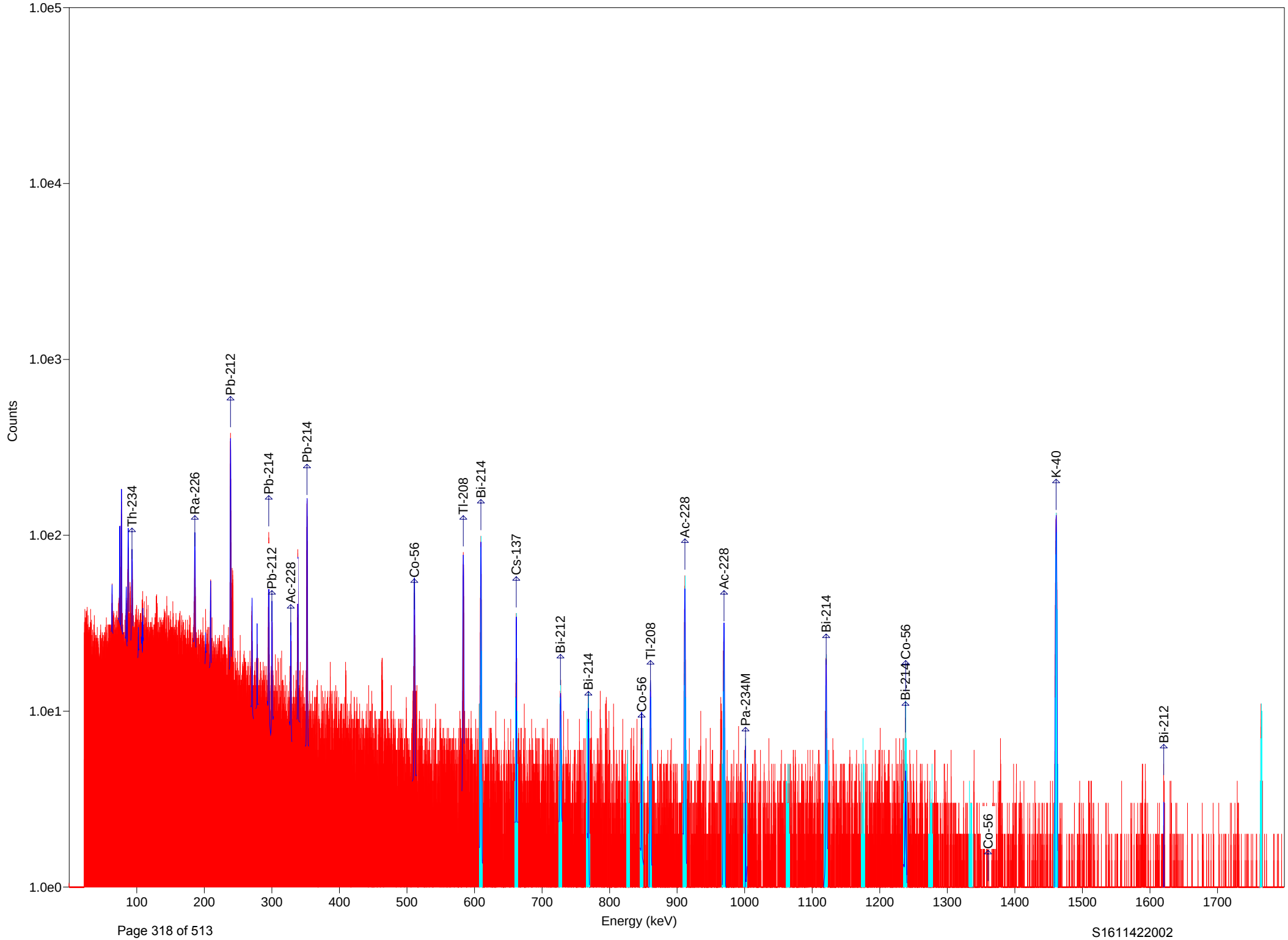


S1611422002

Detector #4 ACQ 06-Jan-2017 at 14:24:10 RT = 4530.4 LT = 4500.0
Rad Chem 1
S1611422-038A

ROI#	RANGE(keV)		GROSS	NET	+/-	CENTROID	FWHM	FW(1/5)M	LIBRARY	(keV)	µCi	+/-
1	606.78	611.61	744	625	31	609.43	1.25	2.00	Bi-214	609.31	0.0003	0.0000
2	659.24	664.07	100	0	16	662.10	0.22	0.35	Cs-137	661.66	0.0000	0.0000
3	724.43	729.70	223	115	21	727.42	1.15	2.14	Bi-212	727.00	0.0004	0.0001
4	765.70	770.97	147	39	19	768.84	0.53	1.52	Bi-214	768.36	0.0002	0.0001
5	824.75	830.01	69	-19	16	825.62	0.22	0.35	Co-60	826.28	0.0000	0.0605
6	844.94	850.21	128	36	18	846.93	0.40	1.65	Co-56	846.77	0.0000	0.0000
7	857.89	863.16	129	83	15	860.82	1.58	2.13	Tl-208	860.56	0.0002	0.0000
8	908.38	913.87	495	421	25	911.44	1.66	2.20	Ac-228	911.20	0.0005	0.0000
9	966.11	971.82	337	238	24	969.23	1.27	1.82	Ac-228	968.97	0.0005	0.0000
10	997.94	1003.65	87	51	13	1000.12	0.32	2.69	Pa-234M	1001.03	0.0021	0.0005
11	1060.94	1067.09	69	11	15	1062.26	0.26	0.44	No close library match!			
12	1117.36	1123.07	176	99	19	1120.23	1.17	2.38	Bi-214	1120.29	0.0003	0.0000
13	1172.46	1178.61	89	21	16	1173.78	0.25	0.83	Co-60	1173.24	0.0000	0.0000
14	1235.02	1241.17	145	48	20	1238.13	2.17	2.46	Bi-214	1238.11	0.0003	0.0001
15	1271.90	1278.49	68	-46	20	Could not properly fit the peak.						
16	1331.84	1338.42	46	-1	13	1336.67	0.22	0.35	Co-60	1332.50	0.0000	0.0000
17	1457.63	1463.78	1352	1289	39	1461.21	1.82	2.68	K-40	1461.00	0.0062	0.0002
18	1761.27	1767.85	115	105	12	1765.08	1.26	2.56	Bi-214	1764.49	0.0005	0.0001

S1611422-039A. Real/Live Time = 4528/4500 (s).

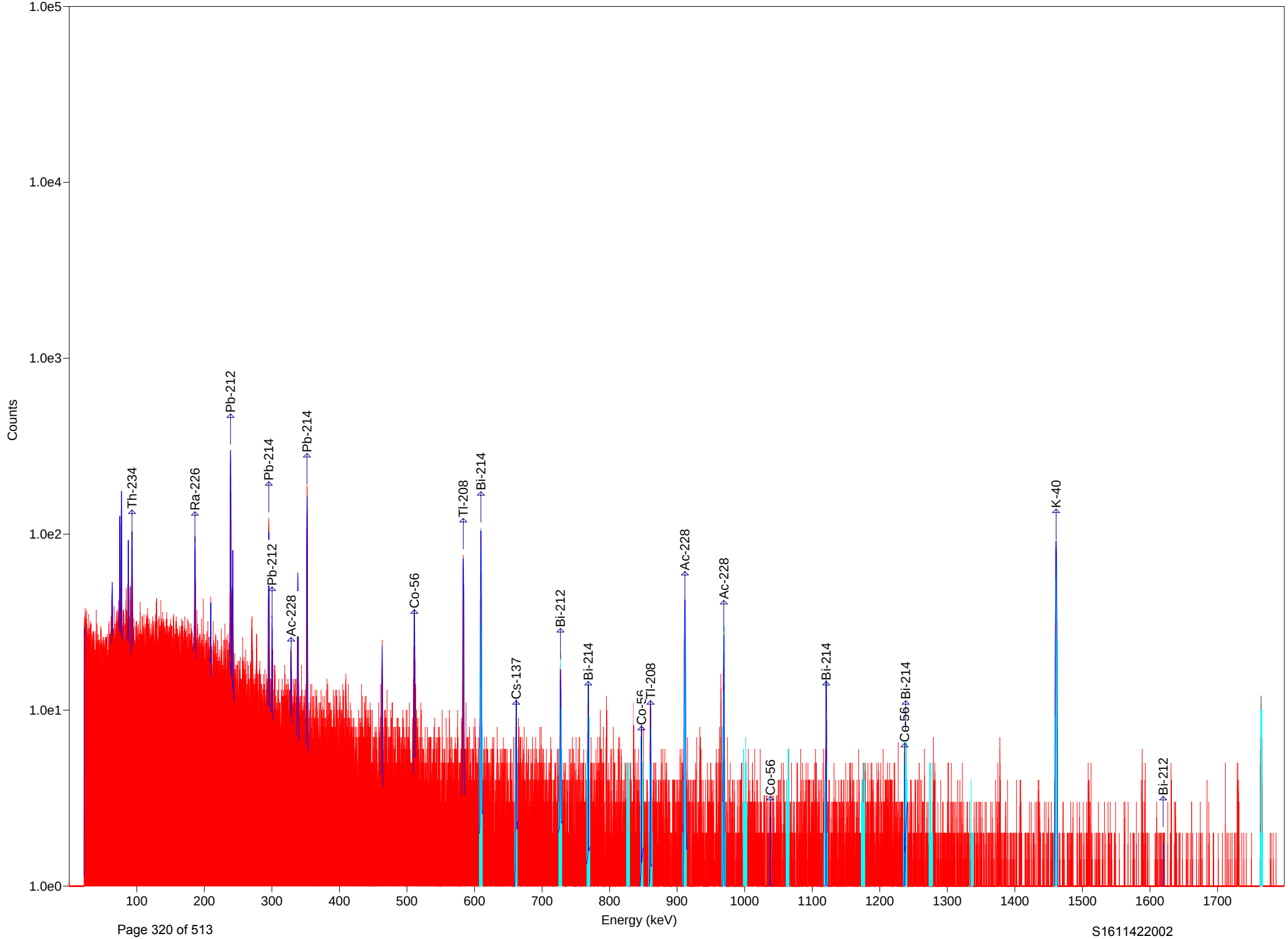


S1611422002

Detector #4 ACQ 06-Jan-2017 at 15:40:44 RT = 4528.8 LT = 4500.0
Rad Chem 1
S1611422-039A

ROI#	RANGE(keV)		GROSS	NET	+/-	CENTROID	FWHM	FW(1/5)M	LIBRARY	(keV)	µCi	+/-
1	606.78	611.61	622	538	27	609.45	1.18	1.81	Bi-214	609.31	0.0003	0.0000
2	659.24	664.07	258	154	21	661.95	0.52	2.09	Cs-137	661.66	0.0000	0.0000
3	724.43	729.70	159	80	18	727.34	1.01	1.80	Bi-212	727.00	0.0003	0.0001
4	765.70	770.97	123	2	19	768.75	0.32	0.86	Bi-214	768.36	0.0000	0.0001
5	824.75	830.01	62	-1	14	826.47	0.32	0.74	Co-60	826.28	0.0000	0.0529
6	844.94	850.21	102	52	14	846.70	0.73	2.82	Co-56	846.77	0.0000	0.0000
7	857.89	863.16	125	75	15	860.74	1.09	2.04	Tl-208	860.56	0.0002	0.0000
8	908.38	913.87	390	325	23	911.40	1.42	2.12	Ac-228	911.20	0.0004	0.0000
9	966.11	971.82	255	169	21	969.12	1.48	2.03	Ac-228	968.97	0.0003	0.0000
10	997.94	1003.65	72	22	13	1001.35	0.42	0.64	Pa-234M	1001.03	0.0009	0.0005
11	1060.94	1067.09	72	-5	17	1061.82	3.73	3.86	No close library match!			
12	1117.36	1123.07	182	119	18	1120.63	1.32	2.24	Bi-214	1120.29	0.0003	0.0000
13	1172.46	1178.61	66	-36	18	1175.31	0.22	0.35	Co-60	1173.24	0.0000	0.0000
14	1235.02	1241.17	110	42	17	1238.29	0.37	0.87	Co-56	1238.28	0.0000	0.0000
15	1271.90	1278.49	48	-4	14	1277.39	0.27	0.48	No close library match!			
16	1331.84	1338.42	35	4	11	1332.71	0.22	0.35	Co-60	1332.50	0.0000	0.0000
17	1457.63	1463.78	1103	1059	35	1461.15	1.78	2.73	K-40	1461.00	0.0051	0.0002
18	1761.27	1767.85	91	86	10	1765.04	1.83	2.77	Bi-214	1764.49	0.0004	0.0000

S1611422-040A. Real/Live Time = 4525/4500 (s).

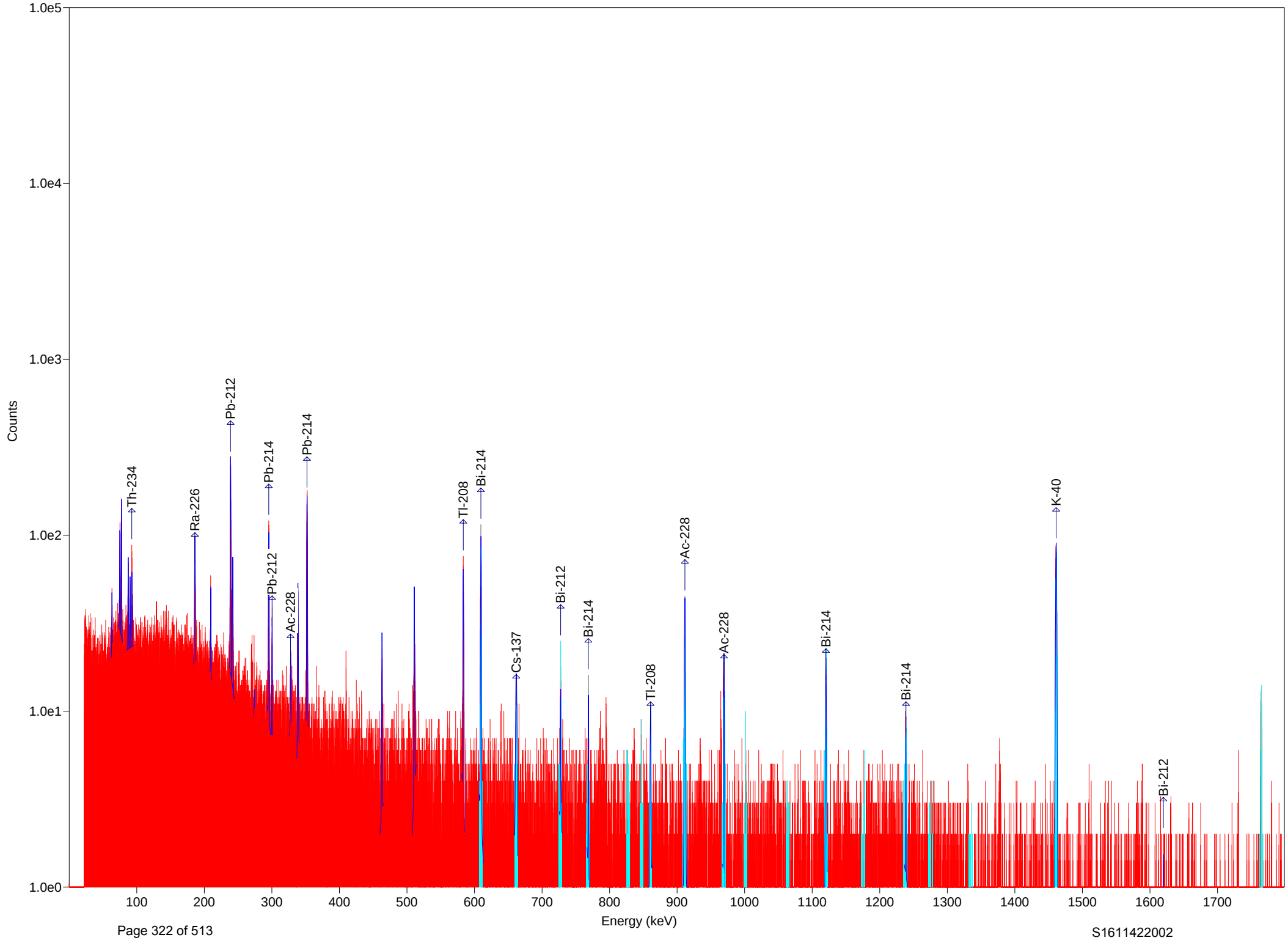


S1611422002

Detector #4 ACQ 06-Jan-2017 at 16:57:45 RT = 4525.9 LT = 4500.0
Rad Chem 1
S1611422-040A

ROI#	RANGE(keV)		GROSS	NET	+/-	CENTROID	FWHM	FW(1/5)M	LIBRARY	(keV)	µCi	+/-
1	606.78	611.61	698	629	28	609.43	1.18	1.85	Bi-214	609.31	0.0003	0.0000
2	659.24	664.07	120	78	14	662.09	0.74	1.95	Cs-137	661.66	0.0000	0.0000
3	724.43	729.70	174	107	17	727.37	1.07	1.72	Bi-212	727.00	0.0004	0.0001
4	765.70	770.97	127	89	14	768.06	0.53	2.28	Bi-214	768.36	0.0005	0.0001
5	824.75	830.01	63	-4	14	825.62	3.07	3.20	Co-60	826.28	0.0000	0.0529
6	844.94	850.21	100	42	15	846.93	0.28	1.00	Co-56	846.77	0.0000	0.0000
7	857.89	863.16	106	56	14	860.83	1.51	2.14	Tl-208	860.56	0.0001	0.0000
8	908.38	913.87	318	270	20	911.43	1.66	2.14	Ac-228	911.20	0.0003	0.0000
9	966.11	971.82	216	148	19	969.20	0.94	1.94	Ac-228	968.97	0.0003	0.0000
10	997.94	1003.65	78	6	16	1001.67	0.26	0.44	Pa-234M	1001.03	0.0002	0.0006
11	1060.94	1067.09	63	34	12	1064.07	1.64	1.84	No close library match!			
12	1117.36	1123.07	150	100	16	1120.32	0.56	1.67	Bi-214	1120.29	0.0003	0.0000
13	1172.46	1178.61	72	-5	17	1173.78	3.84	4.26	Co-60	1173.24	0.0000	0.0000
14	1235.02	1241.17	118	94	13	1238.75	0.90	1.24	Co-56	1238.28	0.0001	0.0000
15	1271.90	1278.49	42	16	11	1273.88	3.95	4.08	No close library match!			
16	1331.84	1338.42	40	4	12	1335.35	0.27	0.70	Co-60	1332.50	0.0000	0.0000
17	1457.63	1463.78	790	775	28	1461.19	1.66	2.78	K-40	1461.00	0.0037	0.0001
18	1761.27	1767.85	122	112	12	1764.60	1.59	2.94	Bi-214	1764.49	0.0005	0.0001

S1611422-040AD. Real/Live Time = 4529/4500 (s).

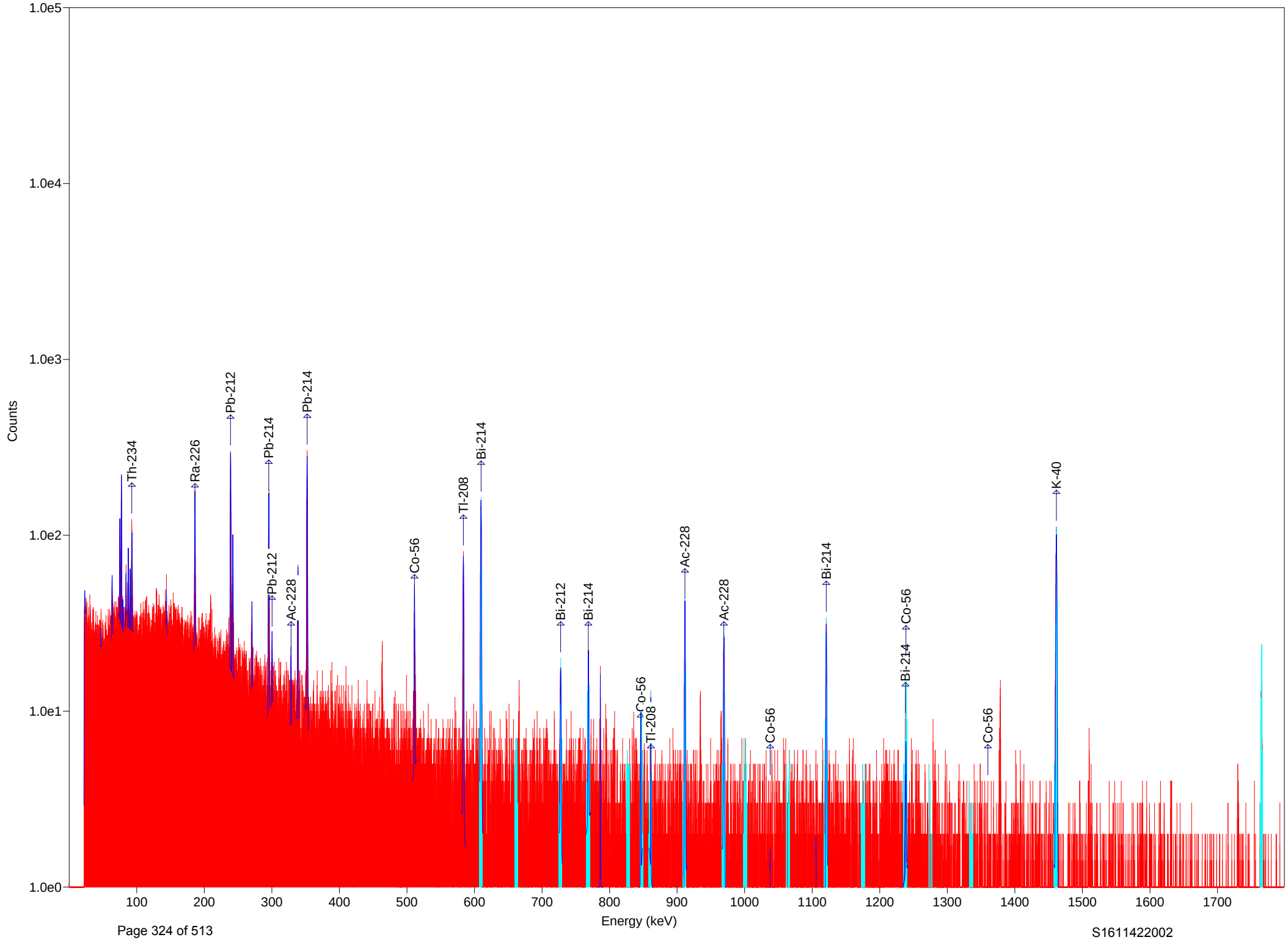


S1611422002

Detector #4 ACQ 06-Jan-2017 at 18:14:09 RT = 4529.5 LT = 4500.0
Rad Chem 1
S1611422-040AD

ROI#	RANGE(keV)		GROSS	NET	+/-	CENTROID	FWHM	FW(1/5)M	LIBRARY	(keV)	µCi	+/-
1	606.78	611.61	661	577	28	609.47	1.19	1.87	Bi-214	609.31	0.0003	0.0000
2	659.24	664.07	145	72	16	661.49	1.83	2.31	Cs-137	661.66	0.0000	0.0000
3	724.43	729.70	167	88	18	727.52	0.86	1.76	Bi-212	727.00	0.0003	0.0001
4	765.70	770.97	112	74	13	768.58	0.79	1.71	Bi-214	768.36	0.0004	0.0001
5	824.75	830.01	64	14	13	826.83	0.43	1.20	Co-60	826.28	0.0529	0.0491
6	844.94	850.21	89	26	14	846.99	1.33	1.65	Co-56	846.77	0.0000	0.0000
7	857.89	863.16	97	55	13	860.78	1.09	2.19	Tl-208	860.56	0.0001	0.0000
8	908.38	913.87	326	278	20	911.36	1.49	1.97	Ac-228	911.20	0.0003	0.0000
9	966.11	971.82	206	134	19	968.90	1.03	2.23	Ac-228	968.97	0.0003	0.0000
10	997.94	1003.65	55	14	12	1001.45	0.24	0.38	Pa-234M	1001.03	0.0006	0.0005
11	1060.94	1067.09	55	-13	15	Could not properly fit the peak.						
12	1117.36	1123.07	175	116	17	1120.50	1.37	1.64	Bi-214	1120.29	0.0003	0.0000
13	1172.46	1178.61	36	7	10	1176.63	0.22	0.35	Co-60	1173.24	0.0000	0.0000
14	1235.02	1241.17	107	54	16	1238.02	0.42	1.96	Bi-214	1238.11	0.0004	0.0001
15	1271.90	1278.49	47	-20	16	1275.20	1.98	2.11	No close library match!			
16	1331.84	1338.42	30	-1	11	1336.23	0.22	0.35	Co-60	1332.50	0.0000	0.0000
17	1457.63	1463.78	783	739	30	1461.16	1.65	2.71	K-40	1461.00	0.0035	0.0001
18	1761.27	1767.85	120	120	10	1765.16	1.75	2.73	Bi-214	1764.49	0.0005	0.0000

S1611422-041A. Real/Live Time = 4532/4500 (s).

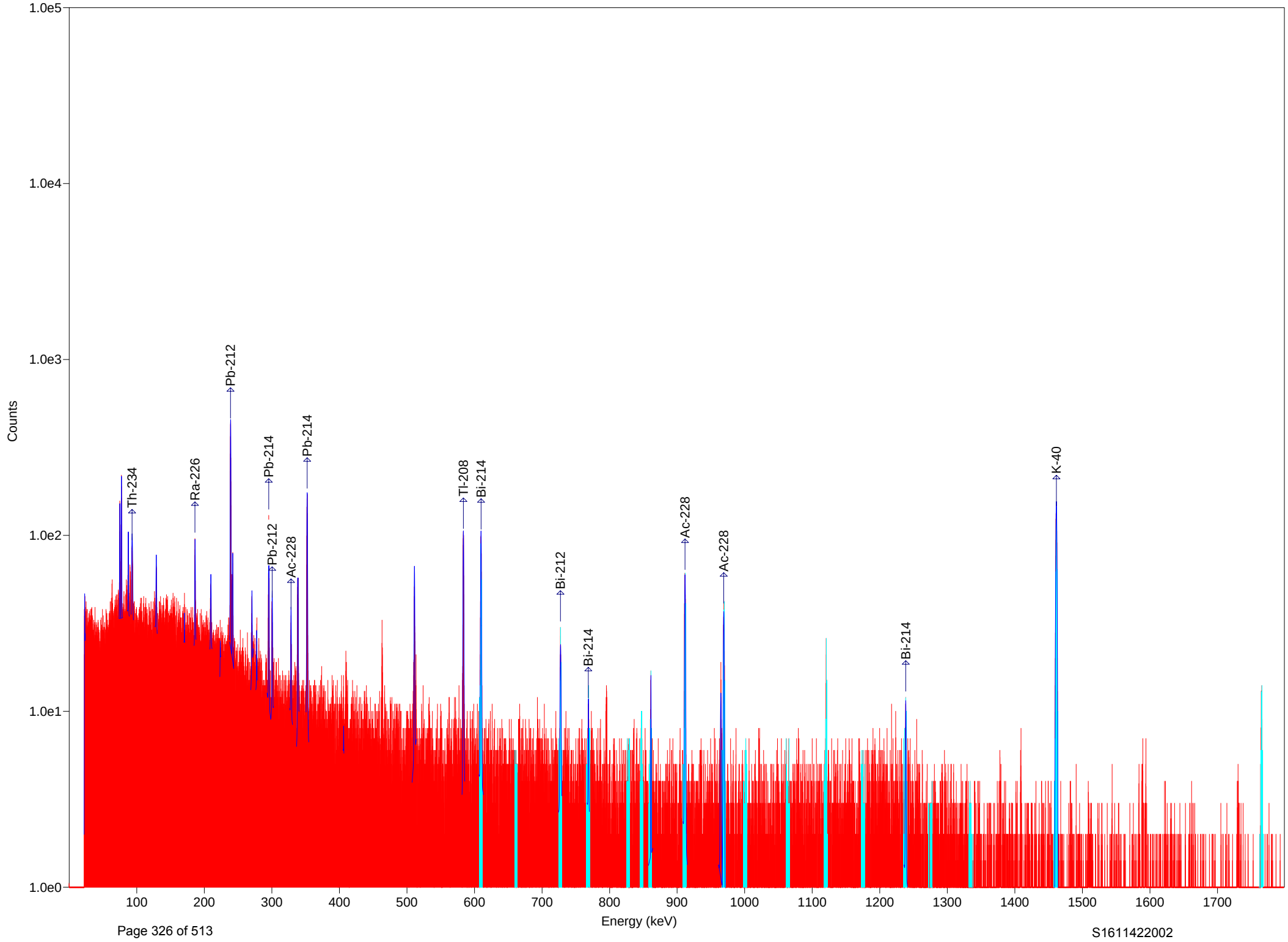


S1611422002

Detector #4 ACQ 07-Jan-2017 at 15:30:18 RT = 4532.3 LT = 4500.0
Rad Chem 1
S1611422-041A

ROI#	RANGE(keV)		GROSS	NET	+/-	CENTROID	FWHM	FW(1/5)M	LIBRARY	(keV)	µCi	+/-
1	606.78	611.61	1060	945	35	609.55	1.30	1.87	Bi-214	609.31	0.0005	0.0000
2	659.24	664.07	94	6	15	660.56	3.07	3.20	Cs-137	661.66	0.0000	0.0000
3	724.43	729.70	184	80	20	727.32	1.29	2.13	Bi-212	727.00	0.0003	0.0001
4	765.70	770.97	193	85	20	768.56	0.86	1.63	Bi-214	768.36	0.0005	0.0001
5	824.75	830.01	76	-28	17	826.28	0.22	0.35	Co-60	826.28	0.0000	0.0642
6	844.94	850.21	123	40	17	846.49	0.40	1.60	Co-56	846.77	0.0000	0.0000
7	857.89	863.16	100	58	13	860.92	0.32	1.18	Tl-208	860.56	0.0001	0.0000
8	908.38	913.87	319	267	20	911.52	1.15	2.10	Ac-228	911.20	0.0003	0.0000
9	966.11	971.82	223	160	19	969.27	1.38	1.81	Ac-228	968.97	0.0003	0.0000
10	997.94	1003.65	80	30	14	998.82	2.44	2.59	Pa-234M	1001.03	0.0012	0.0006
11	1060.94	1067.09	79	16	16	1066.17	0.32	1.31	No close library match!			
12	1117.36	1123.07	273	192	21	1120.73	1.28	2.15	Bi-214	1120.29	0.0005	0.0001
13	1172.46	1178.61	60	-8	15	1174.65	0.22	0.35	Co-60	1173.24	0.0000	0.0000
14	1235.02	1241.17	146	54	20	1238.65	1.01	1.32	Co-56	1238.28	0.0000	0.0000
15	1271.90	1278.49	42	-10	14	1272.78	0.26	0.75	No close library match!			
16	1331.84	1338.42	44	8	12	1332.50	4.72	4.92	Co-60	1332.50	0.0000	0.0000
17	1457.63	1463.78	885	832	32	1461.53	1.61	2.29	K-40	1461.00	0.0040	0.0002
18	1761.27	1767.85	197	187	15	1765.47	1.90	2.93	Bi-214	1764.49	0.0008	0.0001

S1611422-042A. Real/Live Time = 4529/4500 (s).

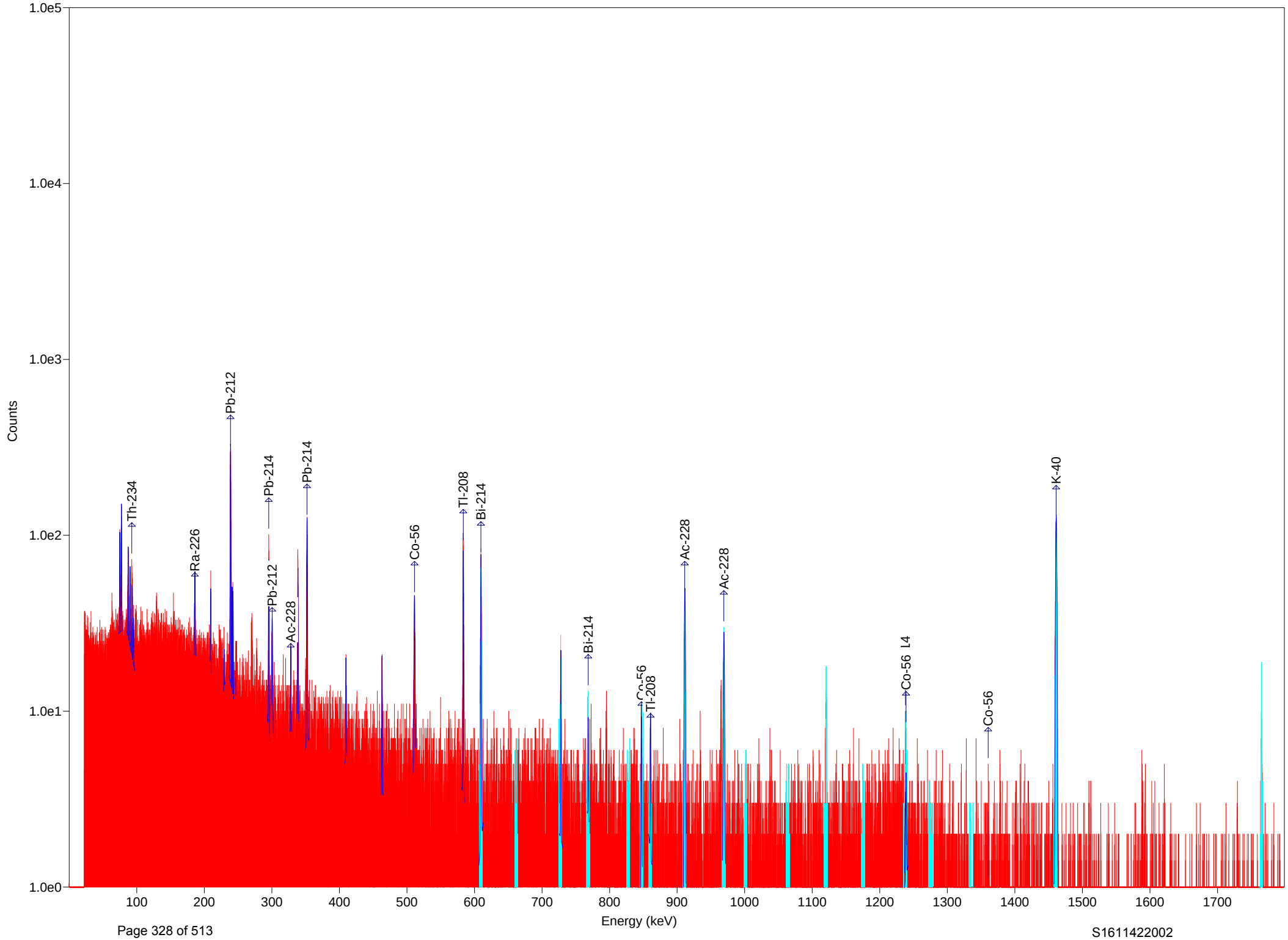


S1611422002

Detector #4 ACQ 07-Jan-2017 at 16:46:49 RT = 4529.7 LT = 4500.0
Rad Chem 1
S1611422-042A

ROI#	RANGE(keV)		GROSS	NET	+/-	CENTROID	FWHM	FW(1/5)M	LIBRARY	(keV)	µCi	+/-
1	606.78	611.61	735	616	30	609.60	1.31	1.93	Bi-214	609.31	0.0003	0.0000
2	659.24	664.07	89	5	15	659.90	1.32	1.45	Cs-137	661.66	0.0000	0.0000
3	724.43	729.70	241	141	21	727.41	1.58	1.85	Bi-212	727.00	0.0005	0.0001
4	765.70	770.97	145	32	19	768.87	0.69	1.27	Bi-214	768.36	0.0002	0.0001
5	824.75	830.01	94	15	16	826.25	3.17	3.63	Co-60	826.28	0.0567	0.0605
6	844.94	850.21	112	33	16	846.81	1.41	1.65	Co-56	846.77	0.0000	0.0000
7	857.89	863.16	138	55	17	861.11	0.53	2.20	Tl-208	860.56	0.0001	0.0000
8	908.38	913.87	468	403	24	911.73	1.77	2.14	Ac-228	911.20	0.0005	0.0000
9	966.11	971.82	346	256	23	969.36	1.45	2.09	Ac-228	968.97	0.0005	0.0000
10	997.94	1003.65	80	-10	17	1001.67	0.26	0.44	Pa-234M	1001.03	0.0000	0.0007
11	1060.94	1067.09	90	-12	19	1061.60	0.26	0.44	No close library match!			
12	1117.36	1123.07	178	88	20	1120.77	0.48	0.88	Bi-214	1120.29	0.0002	0.0001
13	1172.46	1178.61	77	-10	17	1173.88	1.99	2.11	Co-60	1173.24	0.0000	0.0000
14	1235.02	1241.17	128	41	19	1238.65	1.05	1.73	Co-56	1238.28	0.0000	0.0000
15	1271.90	1278.49	56	9	14	1277.17	0.27	0.99	No close library match!			
16	1331.84	1338.42	40	14	11	1333.81	0.22	0.35	Co-60	1332.50	0.0000	0.0000
17	1457.63	1463.78	1321	1248	39	1461.47	1.77	2.69	K-40	1461.00	0.0060	0.0002
18	1761.27	1767.85	118	92	14	1765.85	0.75	2.29	Bi-214	1764.49	0.0004	0.0001

S1611422-043A. Real/Live Time = 4528/4500 (s).

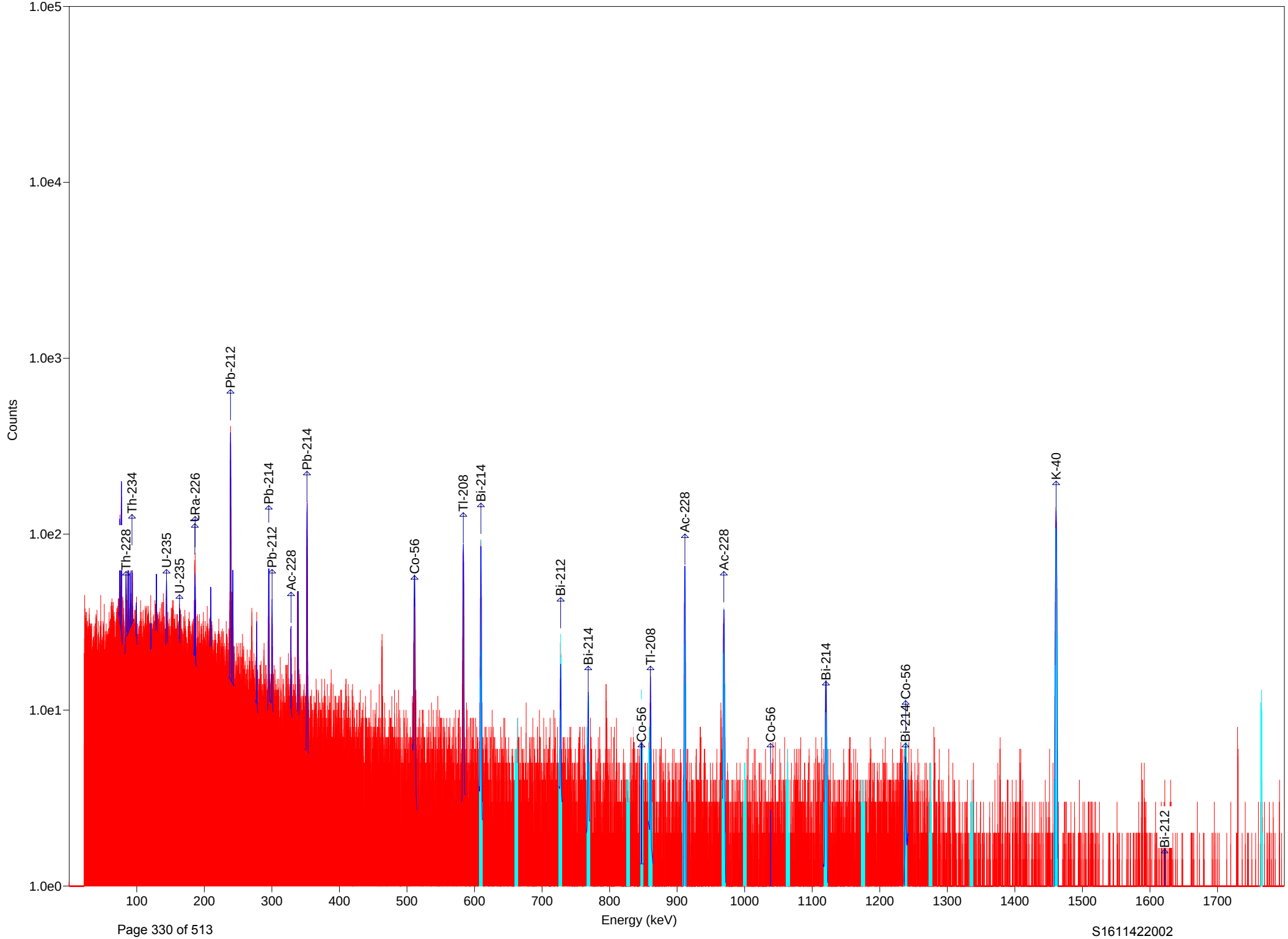


S1611422002

Detector #4 ACQ 07-Jan-2017 at 18:03:06 RT = 4528.6 LT = 4500.0
Rad Chem 1
S1611422-043A

ROI#	RANGE(keV)		GROSS	NET	+/-	CENTROID	FWHM	FW(1/5)M	LIBRARY	(keV)	µCi	+/-
1	606.78	611.61	519	408	26	609.48	1.07	1.91	Bi-214	609.31	0.0002	0.0000
2	659.24	664.07	79	14	14	661.88	1.43	1.76	Cs-137	661.66	0.0000	0.0000
3	724.43	729.70	191	95	19	727.67	0.71	1.63	Bi-212	727.00	0.0004	0.0001
4	765.70	770.97	120	32	17	767.27	1.45	2.01	Bi-214	768.36	0.0002	0.0001
5	824.75	830.01	91	-17	18	826.06	0.33	0.53	Co-60	826.28	0.0000	0.0680
6	844.94	850.21	105	34	16	846.85	0.98	1.52	Co-56	846.77	0.0000	0.0000
7	857.89	863.16	103	40	15	860.96	0.82	1.83	Tl-208	860.56	0.0001	0.0000
8	908.38	913.87	369	291	23	911.35	1.63	2.06	Ac-228	911.20	0.0003	0.0000
9	966.11	971.82	236	173	19	969.21	1.69	2.41	Ac-228	968.97	0.0004	0.0000
10	997.94	1003.65	63	18	13	1001.35	1.28	1.43	Pa-234M	1001.03	0.0007	0.0005
11	1060.94	1067.09	66	-11	16	1062.04	3.73	3.86	No close library match!			
12	1117.36	1123.07	130	89	15	1120.78	0.63	2.27	Bi-214	1120.29	0.0002	0.0000
13	1172.46	1178.61	64	6	15	1174.43	0.93	1.14	Co-60	1173.24	0.0000	0.0000
14	1235.02	1241.17	107	44	16	1238.15	1.07	1.86	Bi-214	1238.11	0.0003	0.0001
15	1271.90	1278.49	54	2	14	1272.78	4.72	4.92	No close library match!			
16	1331.84	1338.42	30	-11	12	1332.71	2.31	2.50	Co-60	1332.50	0.0000	0.0000
17	1457.63	1463.78	1124	1076	35	1461.25	1.72	2.53	K-40	1461.00	0.0051	0.0002
18	1761.27	1767.85	101	80	12	1765.18	0.35	2.17	Bi-214	1764.49	0.0003	0.0001

S1611422-044A. Real/Live Time = 4528/4500 (s).

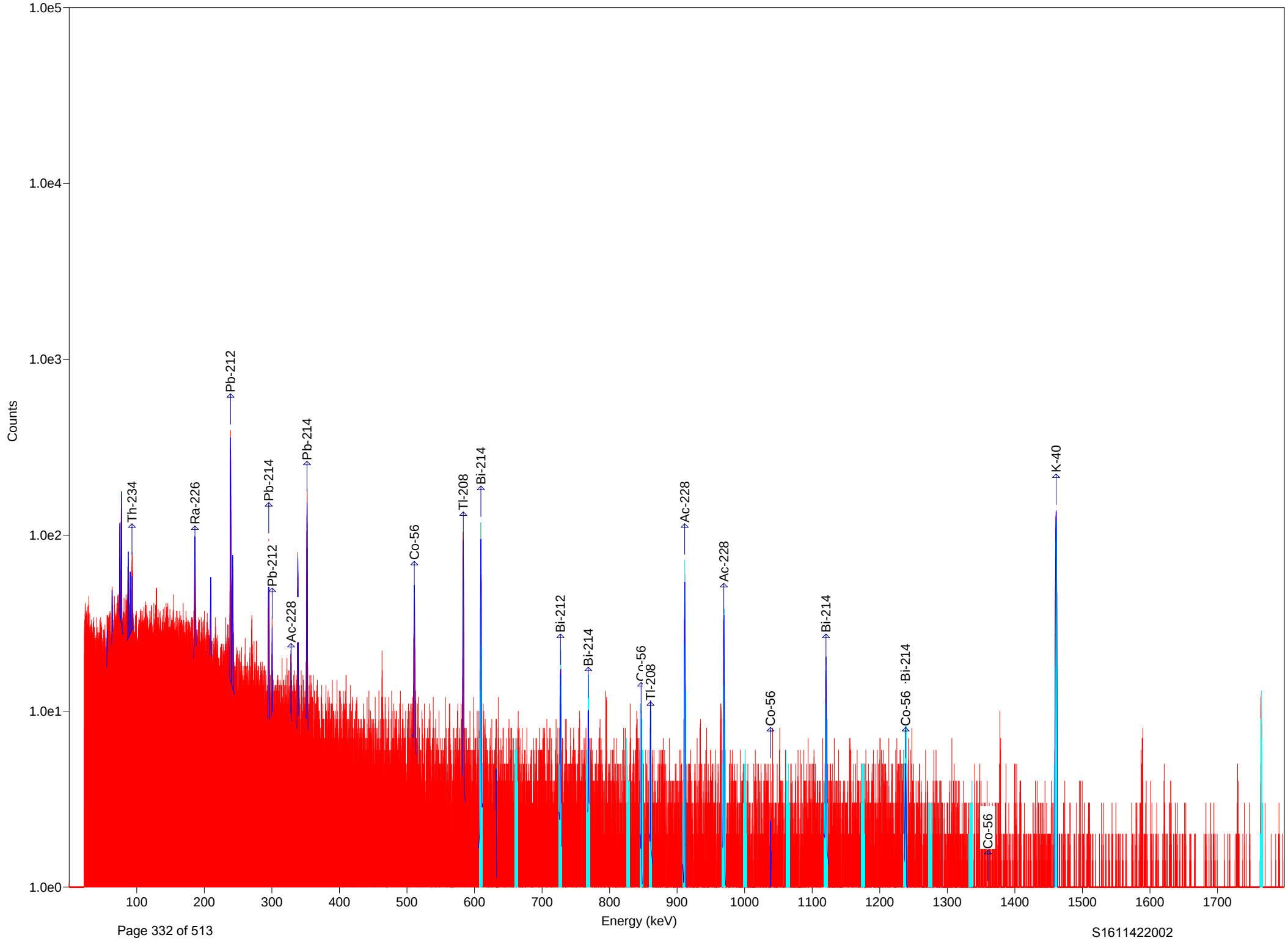


S1611422002

Detector #4 ACQ 07-Jan-2017 at 19:19:38 RT = 4528.8 LT = 4500.0
Rad Chem 1
S1611422-044A

ROI#	RANGE(keV)		GROSS	NET	+/-	CENTROID	FWHM	FW(1/5)M	LIBRARY	(keV)	µCi	+/-
1	606.78	611.61	602	514	27	609.44	1.23	1.79	Bi-214	609.31	0.0003	0.0000
2	659.24	664.07	107	-12	18	660.02	0.41	0.56	Cs-137	661.66	0.0000	0.0000
3	724.43	729.70	212	112	20	727.52	0.92	1.28	Bi-212	727.00	0.0004	0.0001
4	765.70	770.97	130	59	16	768.52	1.11	1.71	Bi-214	768.36	0.0003	0.0001
5	824.75	830.01	52	6	12	825.40	2.20	2.33	Co-60	826.28	0.0227	0.0454
6	844.94	850.21	101	55	14	846.88	0.32	0.63	Co-56	846.77	0.0000	0.0000
7	857.89	863.16	135	56	17	860.54	0.92	1.21	Tl-208	860.56	0.0001	0.0000
8	908.38	913.87	463	394	24	911.37	1.38	2.23	Ac-228	911.20	0.0004	0.0000
9	966.11	971.82	317	245	22	969.04	1.61	2.02	Ac-228	968.97	0.0005	0.0000
10	997.94	1003.65	61	2	14	999.92	0.88	1.01	Pa-234M	1001.03	0.0001	0.0006
11	1060.94	1067.09	67	-20	17	1063.36	0.22	0.35	No close library match!			
12	1117.36	1123.07	144	76	17	1120.51	1.79	2.46	Bi-214	1120.29	0.0002	0.0000
13	1172.46	1178.61	62	-11	16	1176.85	0.33	0.53	Co-60	1173.24	0.0000	0.0000
14	1235.02	1241.17	139	71	18	1237.76	0.45	2.37	Bi-214	1238.11	0.0005	0.0001
15	1271.90	1278.49	46	15	12	1274.32	1.35	1.54	No close library match!			
16	1331.84	1338.42	37	-4	12	1336.35	0.48	0.72	Co-60	1332.50	0.0000	0.0000
17	1457.63	1463.78	1177	1148	35	1461.11	1.79	2.65	K-40	1461.00	0.0055	0.0002
18	1761.27	1767.85	105	84	13	1765.20	0.41	2.31	Bi-214	1764.49	0.0004	0.0001

S1611422-045A. Real/Live Time = 4529/4500 (s).

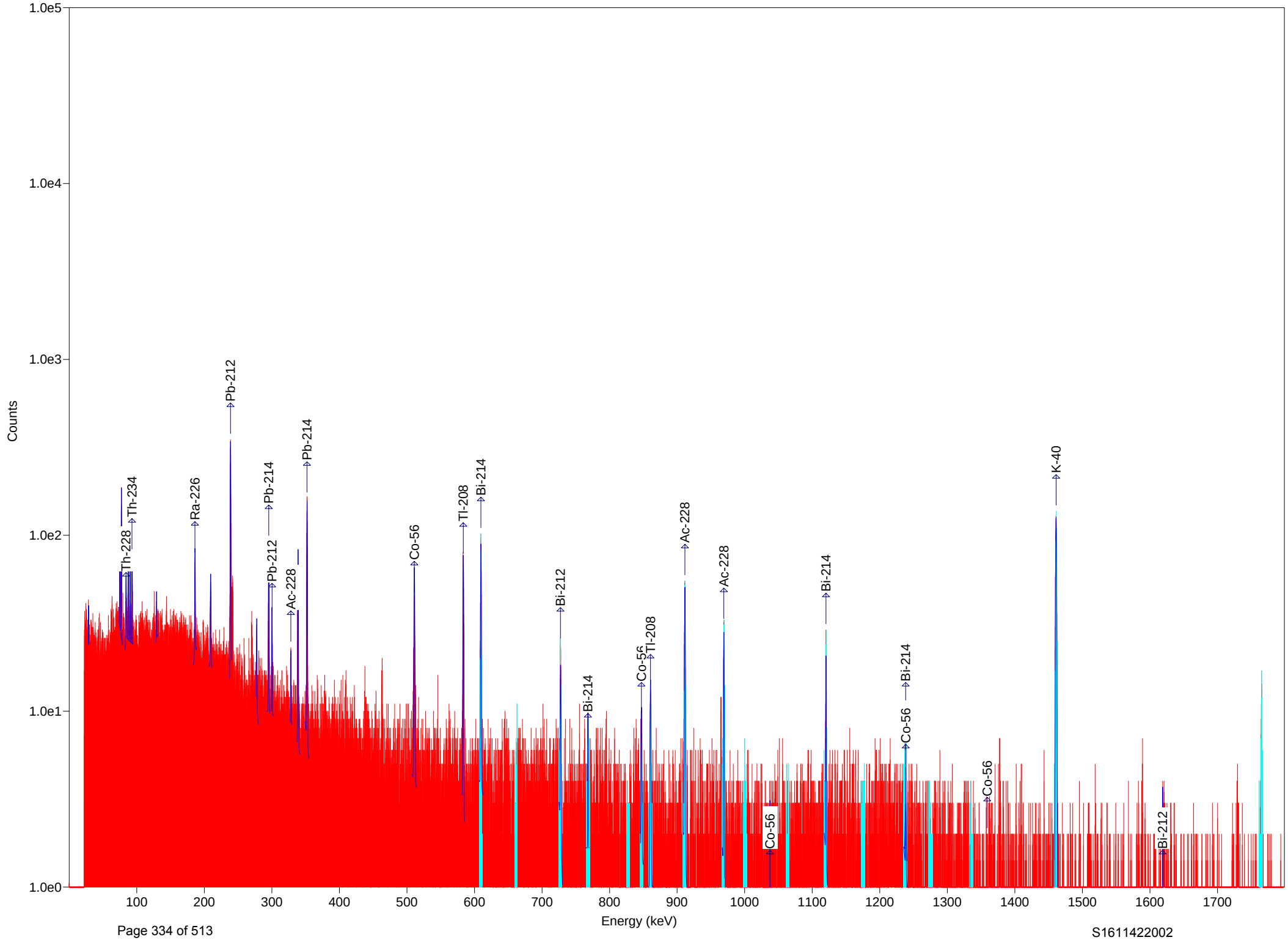


S1611422002

Detector #4 ACQ 07-Jan-2017 at 20:36:16 RT = 4529.2 LT = 4500.0
Rad Chem 1
S1611422-045A

ROI#	RANGE(keV)		GROSS	NET	+/-	CENTROID	FWHM	FW(1/5)M	LIBRARY	(keV)	µCi	+/-
1	606.78	611.61	638	519	29	609.46	1.30	1.72	Bi-214	609.31	0.0003	0.0000
2	659.24	664.07	100	-7	17	660.44	0.48	0.72	Cs-137	661.66	0.0000	0.0000
3	724.43	729.70	191	103	19	727.58	0.82	1.85	Bi-212	727.00	0.0004	0.0001
4	765.70	770.97	144	48	18	768.56	0.74	1.65	Bi-214	768.36	0.0003	0.0001
5	824.75	830.01	74	-22	16	825.40	0.22	0.35	Co-60	826.28	0.0000	0.0605
6	844.94	850.21	108	62	14	845.62	0.25	2.49	Co-56	846.77	0.0000	0.0000
7	857.89	863.16	120	66	15	860.29	0.41	1.74	Tl-208	860.56	0.0002	0.0000
8	908.38	913.87	403	377	21	911.42	1.24	2.10	Ac-228	911.20	0.0004	0.0000
9	966.11	971.82	295	205	22	969.13	1.17	2.28	Ac-228	968.97	0.0004	0.0000
10	997.94	1003.65	69	19	13	1000.79	0.64	0.95	Pa-234M	1001.03	0.0008	0.0005
11	1060.94	1067.09	74	-13	17	1064.89	0.33	0.53	No close library match!			
12	1117.36	1123.07	189	112	19	1120.23	1.17	2.30	Bi-214	1120.29	0.0003	0.0000
13	1172.46	1178.61	74	1	16	1173.32	1.80	2.45	Co-60	1173.24	0.0000	0.0000
14	1235.02	1241.17	124	56	17	1237.71	0.33	2.14	Bi-214	1238.11	0.0004	0.0001
15	1271.90	1278.49	46	10	12	1272.89	5.25	5.39	No close library match!			
16	1331.84	1338.42	44	3	13	1336.45	0.22	0.35	Co-60	1332.50	0.0000	0.0000
17	1457.63	1463.78	1176	1147	35	1461.13	1.65	2.69	K-40	1461.00	0.0055	0.0002
18	1761.27	1767.85	117	96	13	1764.86	1.72	2.55	Bi-214	1764.49	0.0004	0.0001

S1611422-046A. Real/Live Time = 4528/4500 (s).

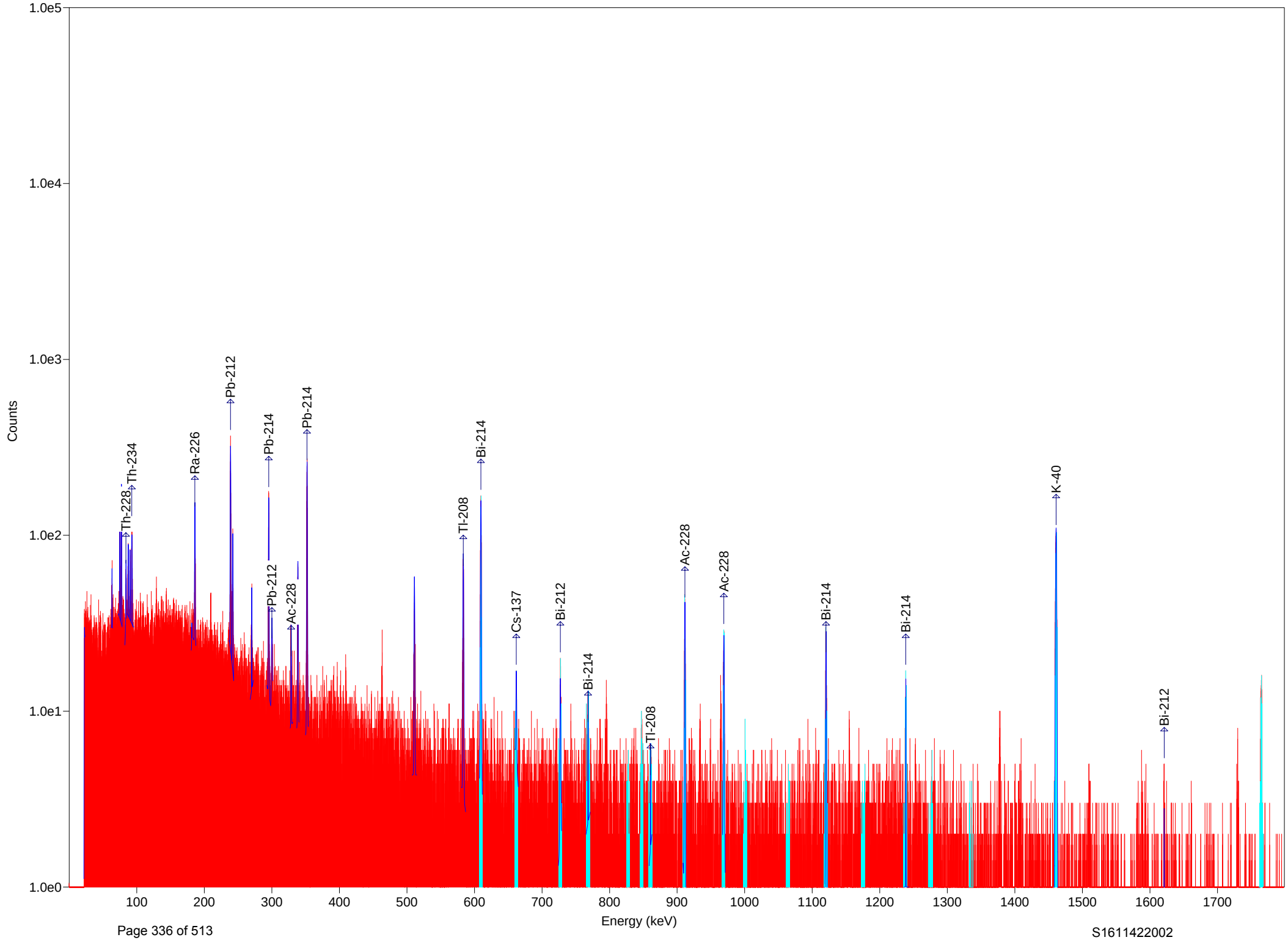


S1611422002

Detector #4 ACQ 07-Jan-2017 at 21:52:43 RT = 4528.1 LT = 4500.0
Rad Chem 1
S1611422-046A

ROI#	RANGE(keV)		GROSS	NET	+/-	CENTROID	FWHM	FW(1/5)M	LIBRARY	(keV)	µCi	+/-
1	606.78	611.61	633	522	28	609.50	1.05	1.76	Bi-214	609.31	0.0003	0.0000
2	659.24	664.07	85	-11	16	662.97	0.22	0.35	Cs-137	661.66	0.0000	0.0000
3	724.43	729.70	197	122	18	727.46	1.01	1.58	Bi-212	727.00	0.0005	0.0001
4	765.70	770.97	130	47	17	768.25	0.53	1.91	Bi-214	768.36	0.0003	0.0001
5	824.75	830.01	57	-14	14	826.50	0.22	0.35	Co-60	826.28	0.0000	0.0529
6	844.94	850.21	101	51	14	846.77	1.06	1.88	Co-56	846.77	0.0000	0.0000
7	857.89	863.16	115	48	16	860.46	1.32	1.82	Tl-208	860.56	0.0001	0.0000
8	908.38	913.87	385	303	24	911.42	1.24	2.01	Ac-228	911.20	0.0003	0.0000
9	966.11	971.82	238	179	19	969.16	0.94	2.32	Ac-228	968.97	0.0004	0.0000
10	997.94	1003.65	61	20	12	999.95	0.29	0.50	Pa-234M	1001.03	0.0008	0.0005
11	1060.94	1067.09	61	-2	15	1062.48	2.63	2.77	No close library match!			
12	1117.36	1123.07	200	137	18	1120.23	0.78	1.75	Bi-214	1120.29	0.0004	0.0000
13	1172.46	1178.61	73	0	16	1177.07	0.33	0.83	Co-60	1173.24	0.0000	0.0000
14	1235.02	1241.17	119	51	17	1238.94	0.59	1.59	Co-56	1238.28	0.0000	0.0000
15	1271.90	1278.49	50	-12	15	1273.22	0.88	1.01	No close library match!			
16	1331.84	1338.42	35	4	11	1334.91	0.22	0.35	Co-60	1332.50	0.0000	0.0000
17	1457.63	1463.78	1090	1046	34	1461.06	1.57	2.64	K-40	1461.00	0.0050	0.0002
18	1761.27	1767.85	117	81	15	1765.25	1.00	1.88	Bi-214	1764.49	0.0003	0.0001

S1611422-047A. Real/Live Time = 4528/4500 (s).

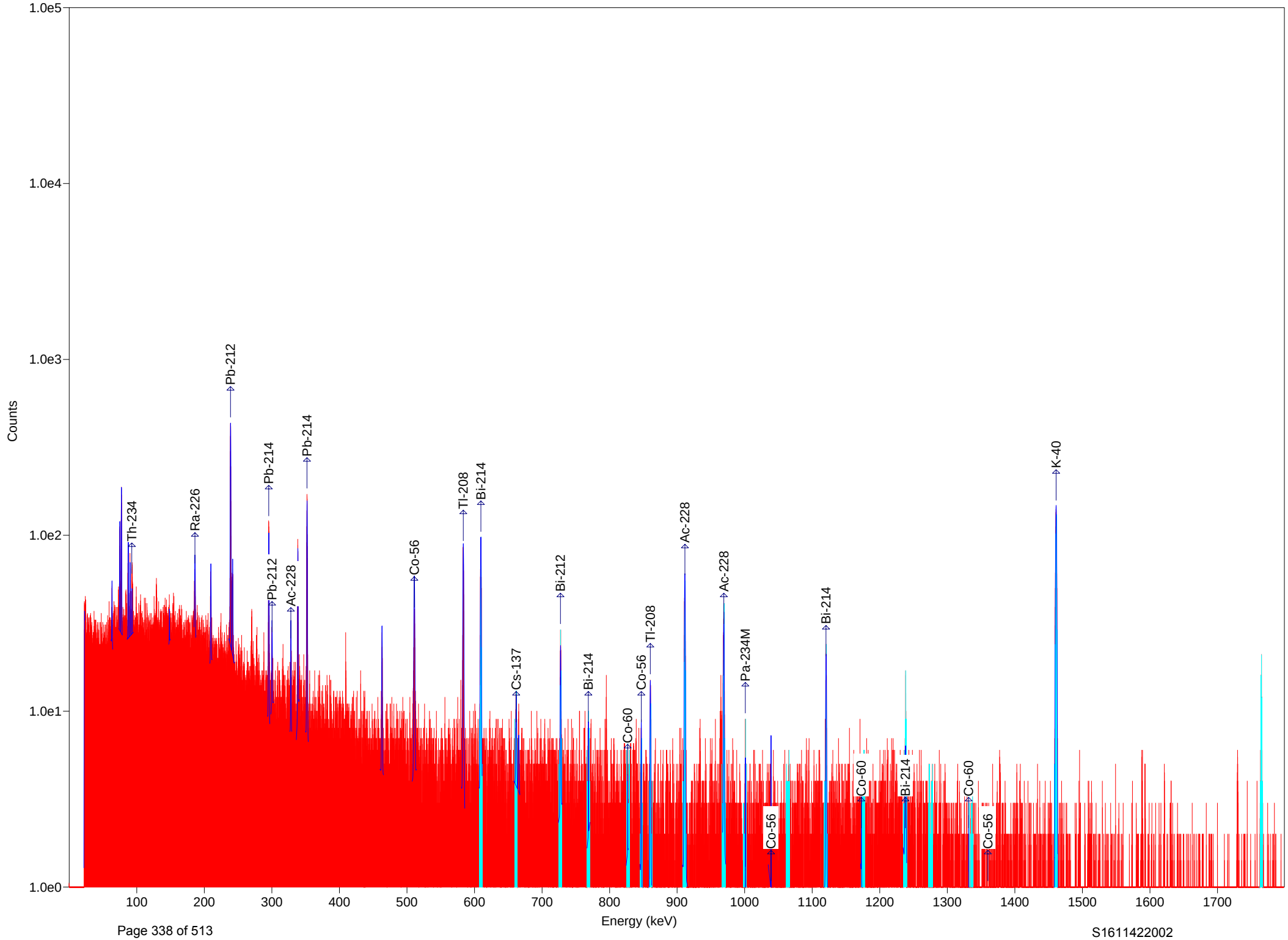


S1611422002

Detector #4 ACQ 07-Jan-2017 at 23:09:20 RT = 4528.2 LT = 4500.0
Rad Chem 1
S1611422-047A

ROI#	RANGE(keV)		GROSS	NET	+/-	CENTROID	FWHM	FW(1/5)M	LIBRARY	(keV)	µCi	+/-
1	606.78	611.61	1058	962	35	609.41	1.30	1.82	Bi-214	609.31	0.0005	0.0000
2	659.24	664.07	192	69	20	661.90	1.10	1.60	Cs-137	661.66	0.0000	0.0000
3	724.43	729.70	164	85	18	727.43	1.43	2.03	Bi-212	727.00	0.0003	0.0001
4	765.70	770.97	180	51	21	768.34	0.29	1.10	Bi-214	768.36	0.0003	0.0001
5	824.75	830.01	75	-13	16	826.72	0.88	1.01	Co-60	826.28	0.0000	0.0605
6	844.94	850.21	109	38	16	847.23	0.51	1.17	Co-56	846.77	0.0000	0.0000
7	857.89	863.16	105	51	14	860.91	0.29	1.96	Tl-208	860.56	0.0001	0.0000
8	908.38	913.87	315	285	19	911.43	1.38	2.31	Ac-228	911.20	0.0003	0.0000
9	966.11	971.82	232	173	19	969.12	1.49	2.21	Ac-228	968.97	0.0004	0.0000
10	997.94	1003.65	75	-2	16	1000.57	0.22	0.35	Pa-234M	1001.03	0.0000	0.0006
11	1060.94	1067.09	60	2	14	1064.67	0.22	0.35	No close library match!			
12	1117.36	1123.07	225	175	18	1120.34	1.15	2.22	Bi-214	1120.29	0.0004	0.0000
13	1172.46	1178.61	48	-15	15	1174.21	3.40	3.60	Co-60	1173.24	0.0000	0.0000
14	1235.02	1241.17	140	72	18	1238.54	0.33	2.03	Co-56	1238.28	0.0000	0.0000
15	1271.90	1278.49	51	4	14	1277.17	0.26	0.44	No close library match!			
16	1331.84	1338.42	45	-7	14	1333.69	0.41	0.56	Co-60	1332.50	0.0000	0.0000
17	1457.63	1463.78	940	916	31	1461.05	1.69	2.87	K-40	1461.00	0.0044	0.0001
18	1761.27	1767.85	155	124	15	1764.94	1.57	2.81	Bi-214	1764.49	0.0005	0.0001

S1611422-048A. Real/Live Time = 4527/4500 (s).

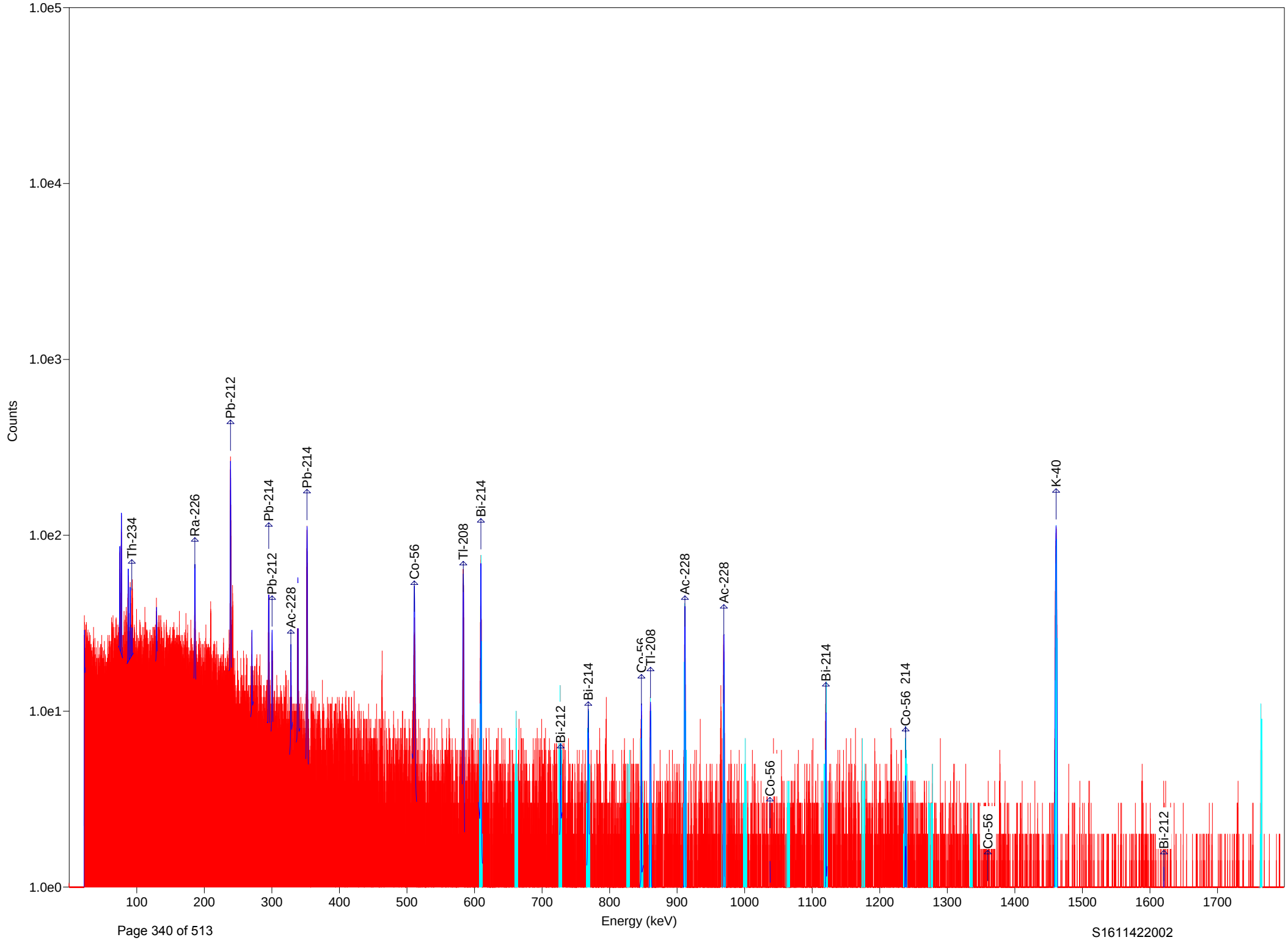


S1611422002

Detector #4 ACQ 08-Jan-2017 at 0:25:56 RT = 4528.0 LT = 4500.0
Rad Chem 1
S1611422-048A

ROI#	RANGE(keV)		GROSS	NET	+/-	CENTROID	FWHM	FW(1/5)M	LIBRARY	(keV)	µCi	+/-
1	606.78	611.61	684	554	30	609.41	1.30	1.77	Bi-214	609.31	0.0003	0.0000
2	659.24	664.07	151	44	18	662.10	0.34	1.72	Cs-137	661.66	0.0000	0.0000
3	724.43	729.70	235	139	21	727.52	1.19	2.17	Bi-212	727.00	0.0005	0.0001
4	765.70	770.97	113	17	17	768.99	0.26	0.41	Bi-214	768.36	0.0001	0.0001
5	824.75	830.01	70	-5	15	827.16	0.22	0.35	Co-60	826.28	0.0000	0.0567
6	844.94	850.21	88	13	15	846.70	0.71	0.87	Co-56	846.77	0.0000	0.0000
7	857.89	863.16	121	75	14	860.58	0.80	2.01	Tl-208	860.56	0.0002	0.0000
8	908.38	913.87	447	382	24	911.35	1.44	2.21	Ac-228	911.20	0.0004	0.0000
9	966.11	971.82	310	224	22	969.06	1.25	2.42	Ac-228	968.97	0.0005	0.0000
10	997.94	1003.65	65	6	14	1001.01	0.22	0.35	Pa-234M	1001.03	0.0002	0.0006
11	1060.94	1067.09	80	17	16	1065.38	0.73	0.95	No close library match!			
12	1117.36	1123.07	182	150	16	1120.55	1.32	2.03	Bi-214	1120.29	0.0004	0.0000
13	1172.46	1178.61	81	-11	18	1176.41	1.15	1.58	Co-60	1173.24	0.0000	0.0000
14	1235.02	1241.17	135	58	18	1238.50	0.44	1.10	Co-56	1238.28	0.0000	0.0000
15	1271.90	1278.49	62	0	16	1272.88	0.90	1.02	No close library match!			
16	1331.84	1338.42	50	-22	16	1337.32	0.22	0.35	Co-60	1332.50	0.0000	0.0000
17	1457.63	1463.78	1248	1219	36	1461.13	1.81	2.78	K-40	1461.00	0.0058	0.0002
18	1761.27	1767.85	139	134	12	1765.35	1.16	2.41	Bi-214	1764.49	0.0006	0.0001

S1611422-049A. Real/Live Time = 4526/4500 (s).

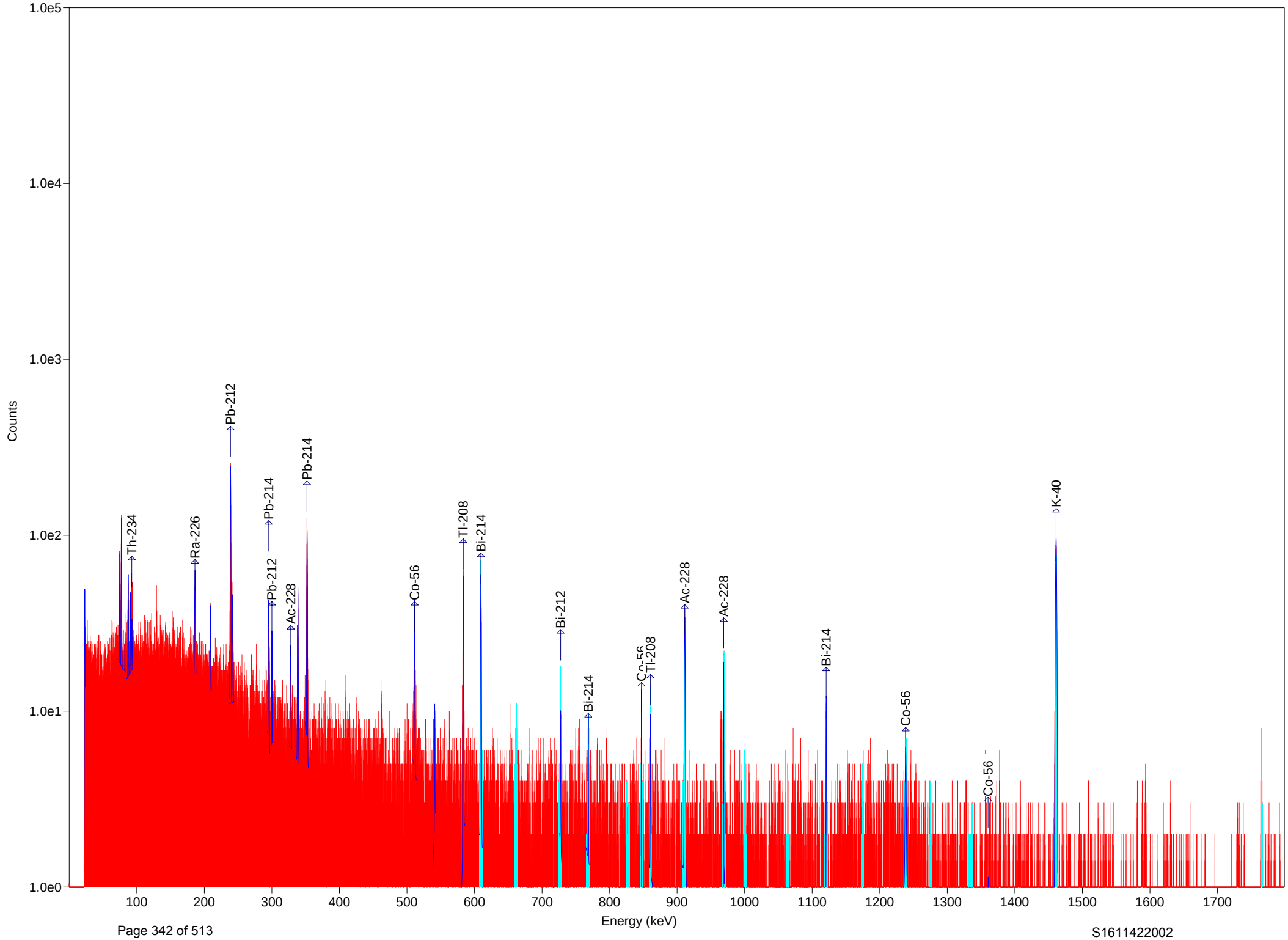


S1611422002

Detector #4 ACQ 08-Jan-2017 at 1:42:26 RT = 4526.9 LT = 4500.0
Rad Chem 1
S1611422-049A

ROI#	RANGE(keV)		GROSS	NET	+/-	CENTROID	FWHM	FW(1/5)M	LIBRARY	(keV)	µCi	+/-
1	606.78	611.61	475	410	24	609.34	0.97	1.96	Bi-214	609.31	0.0002	0.0000
2	659.24	664.07	83	10	14	661.79	0.43	0.74	Cs-137	661.66	0.0000	0.0000
3	724.43	729.70	130	34	18	726.86	0.40	1.08	Bi-212	727.00	0.0001	0.0001
4	765.70	770.97	110	35	16	768.49	1.10	1.67	Bi-214	768.36	0.0002	0.0001
5	824.75	830.01	63	5	13	825.95	0.40	0.55	Co-60	826.28	0.0189	0.0491
6	844.94	850.21	97	64	13	847.26	0.55	2.07	Co-56	846.77	0.0000	0.0000
7	857.89	863.16	94	65	12	860.57	1.41	1.75	Tl-208	860.56	0.0002	0.0000
8	908.38	913.87	290	208	21	911.36	1.17	2.10	Ac-228	911.20	0.0002	0.0000
9	966.11	971.82	203	135	19	969.04	1.21	2.30	Ac-228	968.97	0.0003	0.0000
10	997.94	1003.65	63	13	13	1000.79	0.22	0.35	Pa-234M	1001.03	0.0005	0.0005
11	1060.94	1067.09	49	25	10	1062.92	3.29	3.53	No close library match!			
12	1117.36	1123.07	119	38	17	1120.50	0.55	0.87	Bi-214	1120.29	0.0001	0.0000
13	1172.46	1178.61	65	7	15	1174.00	0.25	0.72	Co-60	1173.24	0.0000	0.0000
14	1235.02	1241.17	83	35	14	1238.51	0.34	1.59	Co-56	1238.28	0.0000	0.0000
15	1271.90	1278.49	59	-34	18	1272.78	0.22	0.35	No close library match!			
16	1331.84	1338.42	33	7	10	1334.25	2.09	2.28	Co-60	1332.50	0.0000	0.0000
17	1457.63	1463.78	957	938	31	1461.08	1.84	2.87	K-40	1461.00	0.0045	0.0001
18	1761.27	1767.85	84	84	9	1764.52	1.85	2.52	Bi-214	1764.49	0.0004	0.0000

S1611422-050A. Real/Live Time = 4527/4500 (s).

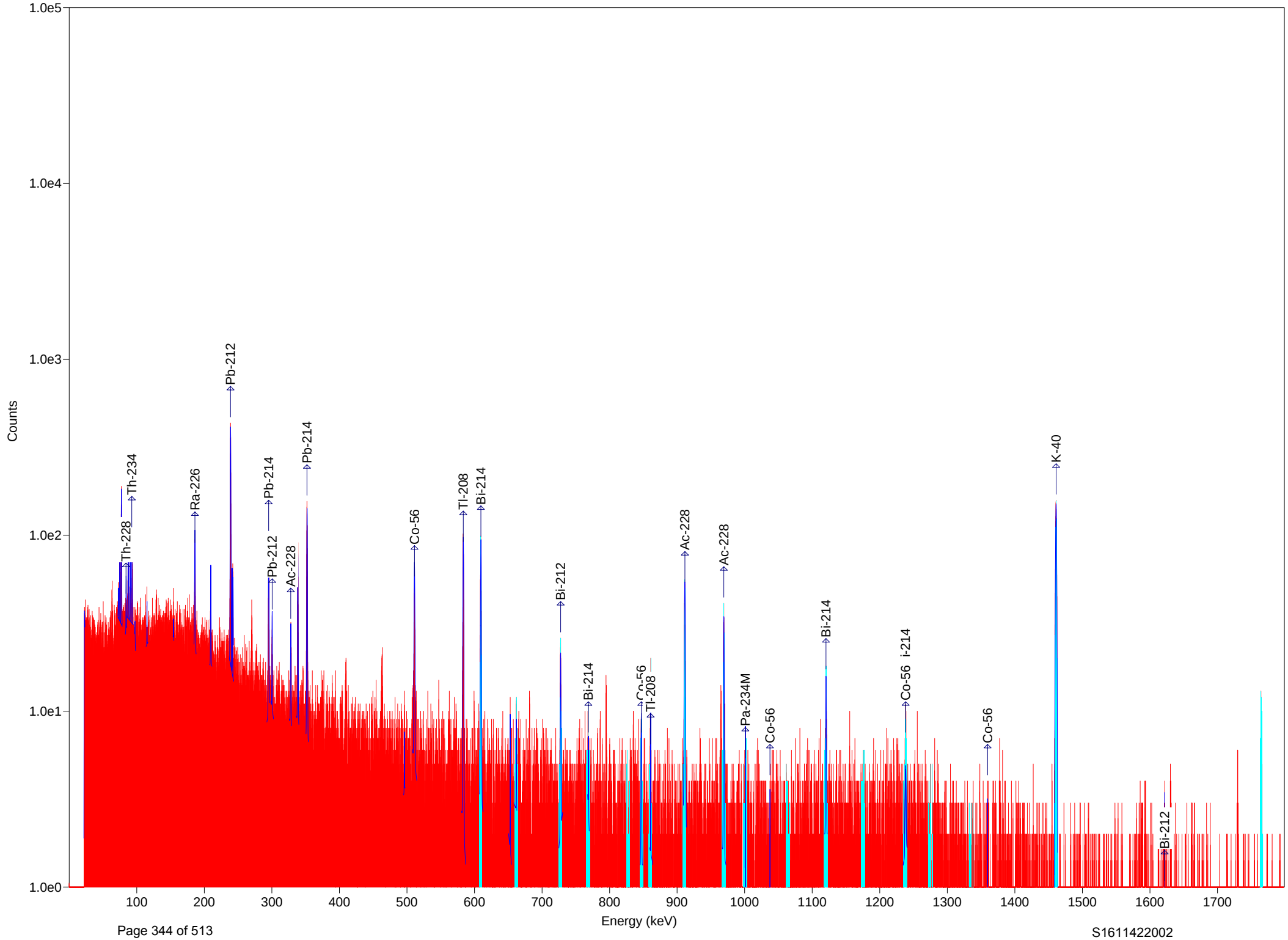


S1611422002

Detector #4 ACQ 08-Jan-2017 at 2:59:04 RT = 4527.5 LT = 4500.0
Rad Chem 1
S1611422-050A

ROI#	RANGE(keV)		GROSS	NET	+/-	CENTROID	FWHM	FW(1/5)M	LIBRARY	(keV)	µCi	+/-
1	606.78	611.61	424	359	23	609.45	1.18	1.81	Bi-214	609.31	0.0002	0.0000
2	659.24	664.07	124	36	16	661.98	1.15	1.43	Cs-137	661.66	0.0000	0.0000
3	724.43	729.70	140	73	16	727.43	0.57	1.59	Bi-212	727.00	0.0003	0.0001
4	765.70	770.97	110	10	18	768.64	0.43	1.04	Bi-214	768.36	0.0001	0.0001
5	824.75	830.01	52	-15	14	Could not properly fit the peak.						
6	844.94	850.21	92	34	14	847.25	0.52	1.76	Co-56	846.77	0.0000	0.0000
7	857.89	863.16	91	33	14	860.78	0.74	1.35	Tl-208	860.56	0.0001	0.0000
8	908.38	913.87	262	210	19	911.46	1.39	2.15	Ac-228	911.20	0.0002	0.0000
9	966.11	971.82	160	133	15	969.58	0.30	1.72	Ac-228	968.97	0.0003	0.0000
10	997.94	1003.65	58	13	13	999.70	0.26	0.44	Pa-234M	1001.03	0.0005	0.0005
11	1060.94	1067.09	48	9	12	1063.36	0.26	0.44	No close library match!			
12	1117.36	1123.07	111	57	15	1120.62	0.66	2.66	Bi-214	1120.29	0.0001	0.0000
13	1172.46	1178.61	55	11	13	1175.53	0.22	0.35	Co-60	1173.24	0.0000	0.0000
14	1235.02	1241.17	88	40	14	1235.90	2.58	3.12	Bi-214	1238.11	0.0003	0.0001
15	1271.90	1278.49	37	21	9	1274.32	3.57	3.91	No close library match!			
16	1331.84	1338.42	34	-18	14	Could not properly fit the peak.						
17	1457.63	1463.78	829	810	29	1461.07	1.86	2.72	K-40	1461.00	0.0039	0.0001
18	1761.27	1767.85	60	55	8	1765.58	1.06	1.87	Bi-214	1764.49	0.0002	0.0000

S1611422-051A. Real/Live Time = 4531/4500 (s).

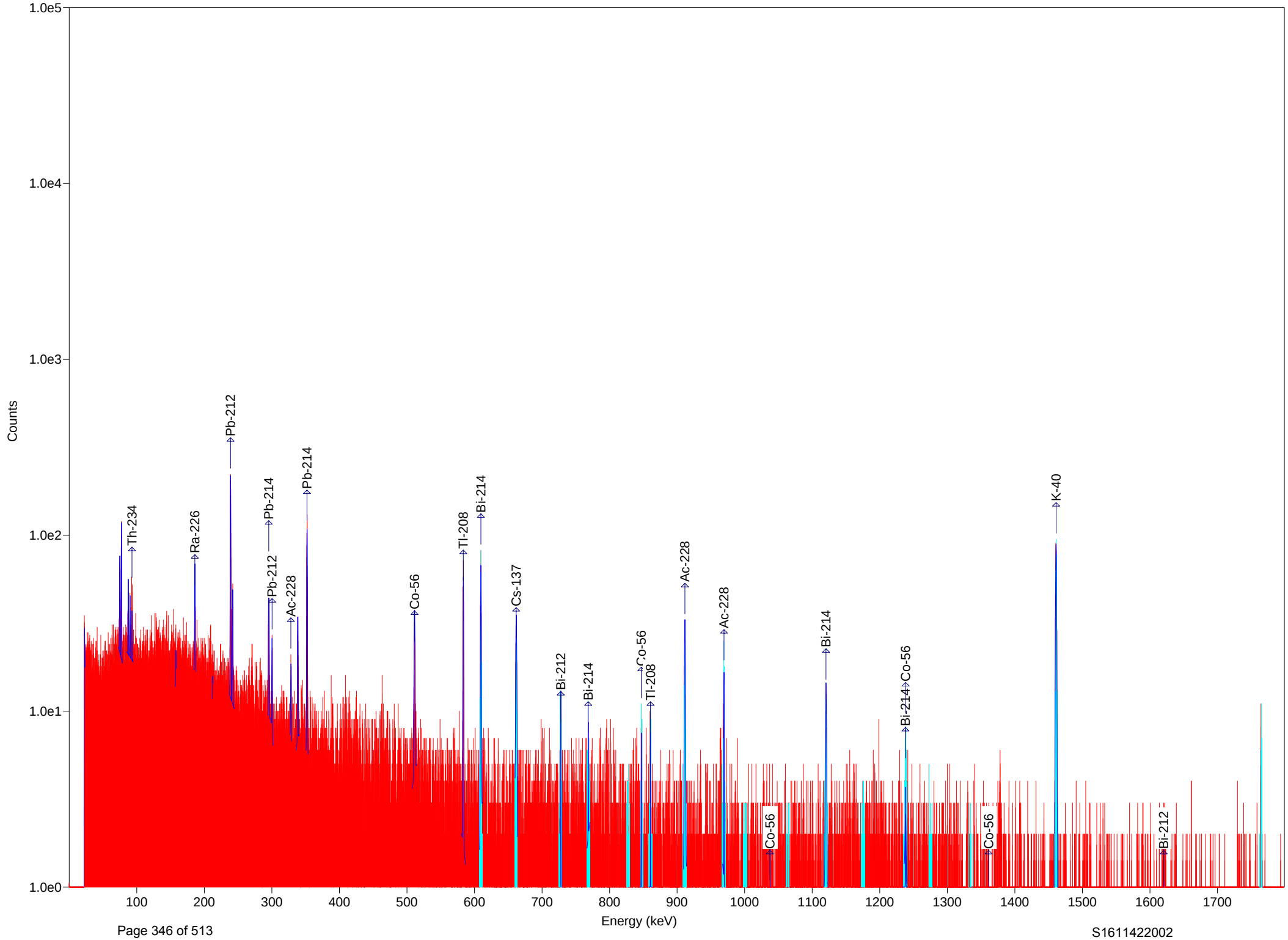


S1611422002

Detector #4 ACQ 08-Jan-2017 at 4:15:30 RT = 4531.3 LT = 4500.0
Rad Chem 1
S1611422-051A

ROI#	RANGE(keV)		GROSS	NET	+/-	CENTROID	FWHM	FW(1/5)M	LIBRARY	(keV)	µCi	+/-
1	606.78	611.61	652	548	29	609.36	1.24	1.84	Bi-214	609.31	0.0003	0.0000
2	659.24	664.07	114	14	17	662.06	0.47	0.71	Cs-137	661.66	0.0000	0.0000
3	724.43	729.70	206	118	19	727.38	0.88	1.83	Bi-212	727.00	0.0004	0.0001
4	765.70	770.97	121	4	19	768.33	0.33	1.00	Bi-214	768.36	0.0000	0.0001
5	824.75	830.01	56	-19	14	826.94	0.22	0.35	Co-60	826.28	0.0000	0.0529
6	844.94	850.21	98	48	14	846.67	1.36	1.69	Co-56	846.77	0.0000	0.0000
7	857.89	863.16	127	60	16	860.99	0.30	0.54	Tl-208	860.56	0.0001	0.0000
8	908.38	913.87	439	348	25	911.33	1.54	1.96	Ac-228	911.20	0.0004	0.0000
9	966.11	971.82	294	181	23	969.10	1.07	2.16	Ac-228	968.97	0.0004	0.0000
10	997.94	1003.65	86	23	15	1001.79	0.93	1.23	Pa-234M	1001.03	0.0009	0.0006
11	1060.94	1067.09	69	-8	16	1061.60	0.22	0.35	No close library match!			
12	1117.36	1123.07	171	90	19	1120.56	1.07	2.08	Bi-214	1120.29	0.0002	0.0000
13	1172.46	1178.61	79	-32	19	1175.75	1.54	1.67	Co-60	1173.24	0.0000	0.0000
14	1235.02	1241.17	121	53	17	1238.40	1.29	1.98	Co-56	1238.28	0.0000	0.0000
15	1271.90	1278.49	56	-22	17	1277.61	0.22	0.35	No close library match!			
16	1331.84	1338.42	35	-6	12	1332.50	3.51	3.64	Co-60	1332.50	0.0000	0.0000
17	1457.63	1463.78	1285	1246	37	1461.12	1.83	2.52	K-40	1461.00	0.0060	0.0002
18	1761.27	1767.85	110	105	11	1764.85	1.24	2.92	Bi-214	1764.49	0.0005	0.0000

S1611422-052A. Real/Live Time = 4527/4500 (s).

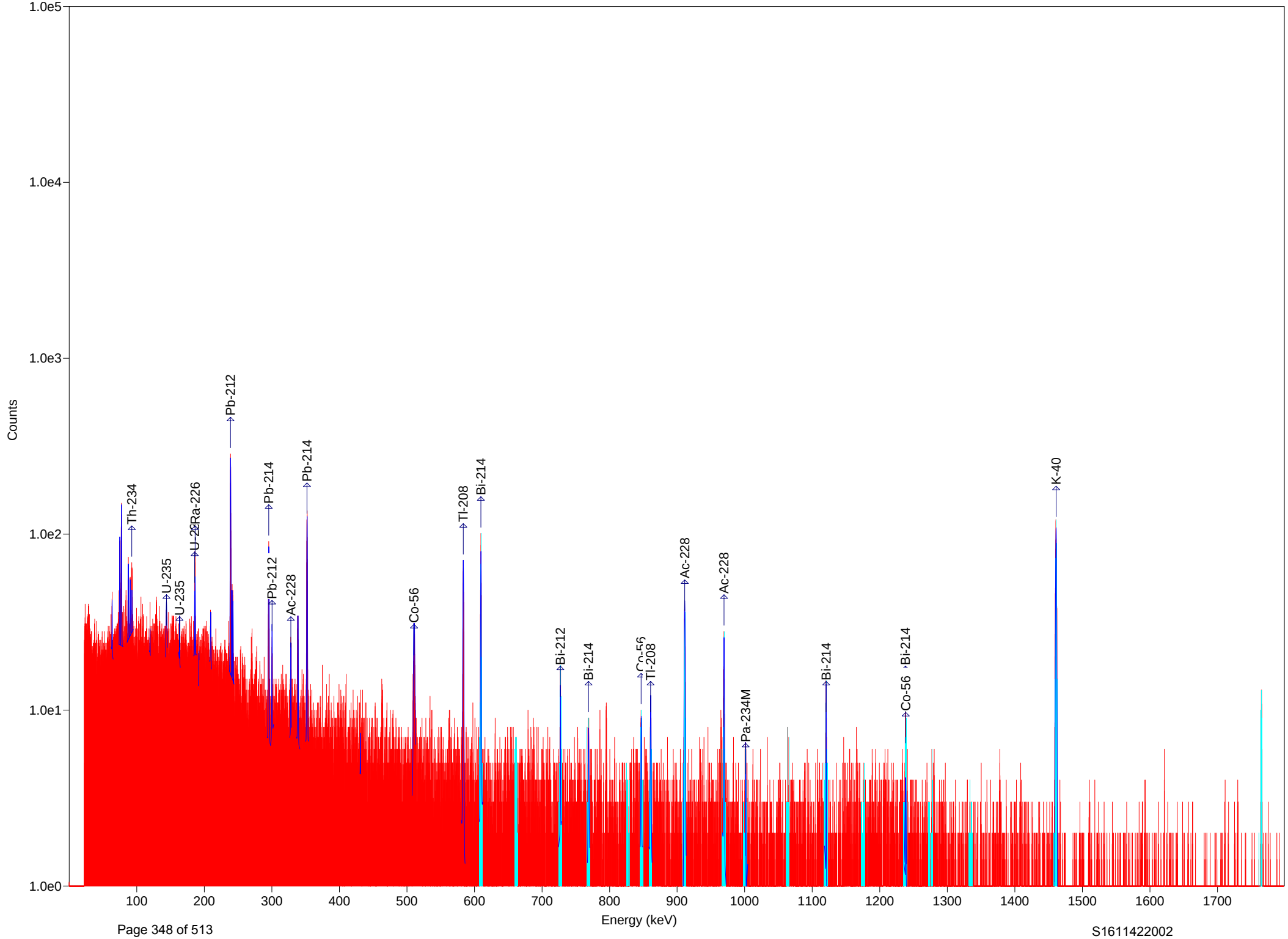


S1611422002

Detector #4 ACQ 08-Jan-2017 at 5:32:04 RT = 4527.6 LT = 4500.0
Rad Chem 1
S1611422-052A

ROI#	RANGE(keV)		GROSS	NET	+/-	CENTROID	FWHM	FW(1/5)M	LIBRARY	(keV)	µCi	+/-
1	606.78	611.61	481	412	24	609.38	1.36	1.84	Bi-214	609.31	0.0002	0.0000
2	659.24	664.07	262	201	19	661.76	1.66	2.31	Cs-137	661.66	0.0001	0.0000
3	724.43	729.70	127	69	15	726.80	0.46	2.06	Bi-212	727.00	0.0003	0.0001
4	765.70	770.97	106	35	16	768.15	0.33	1.78	Bi-214	768.36	0.0002	0.0001
5	824.75	830.01	48	6	11	828.48	0.22	0.35	Co-60	826.28	0.0227	0.0416
6	844.94	850.21	73	40	12	846.94	0.63	1.14	Co-56	846.77	0.0000	0.0000
7	857.89	863.16	76	38	12	859.90	0.27	1.65	Tl-208	860.56	0.0001	0.0000
8	908.38	913.87	267	206	20	911.39	1.31	2.11	Ac-228	911.20	0.0002	0.0000
9	966.11	971.82	154	91	17	968.97	0.33	1.71	Ac-228	968.97	0.0002	0.0000
10	997.94	1003.65	45	13	11	1000.35	1.98	2.11	Pa-234M	1001.03	0.0005	0.0004
11	1060.94	1067.09	41	2	12	1064.56	1.62	1.83	No close library match!			
12	1117.36	1123.07	132	91	15	1120.40	1.74	2.07	Bi-214	1120.29	0.0002	0.0000
13	1172.46	1178.61	43	-5	13	1174.87	1.43	1.62	Co-60	1173.24	0.0000	0.0000
14	1235.02	1241.17	98	45	15	1238.46	0.56	2.14	Co-56	1238.28	0.0000	0.0000
15	1271.90	1278.49	36	15	10	1272.93	0.51	0.74	No close library match!			
16	1331.84	1338.42	39	-13	14	Could not properly fit the peak.						
17	1457.63	1463.78	769	750	28	1461.02	1.63	2.48	K-40	1461.00	0.0036	0.0001
18	1761.27	1767.85	82	82	9	1764.83	1.57	2.79	Bi-214	1764.49	0.0004	0.0000

S1611422-053A. Real/Live Time = 4528/4500 (s).

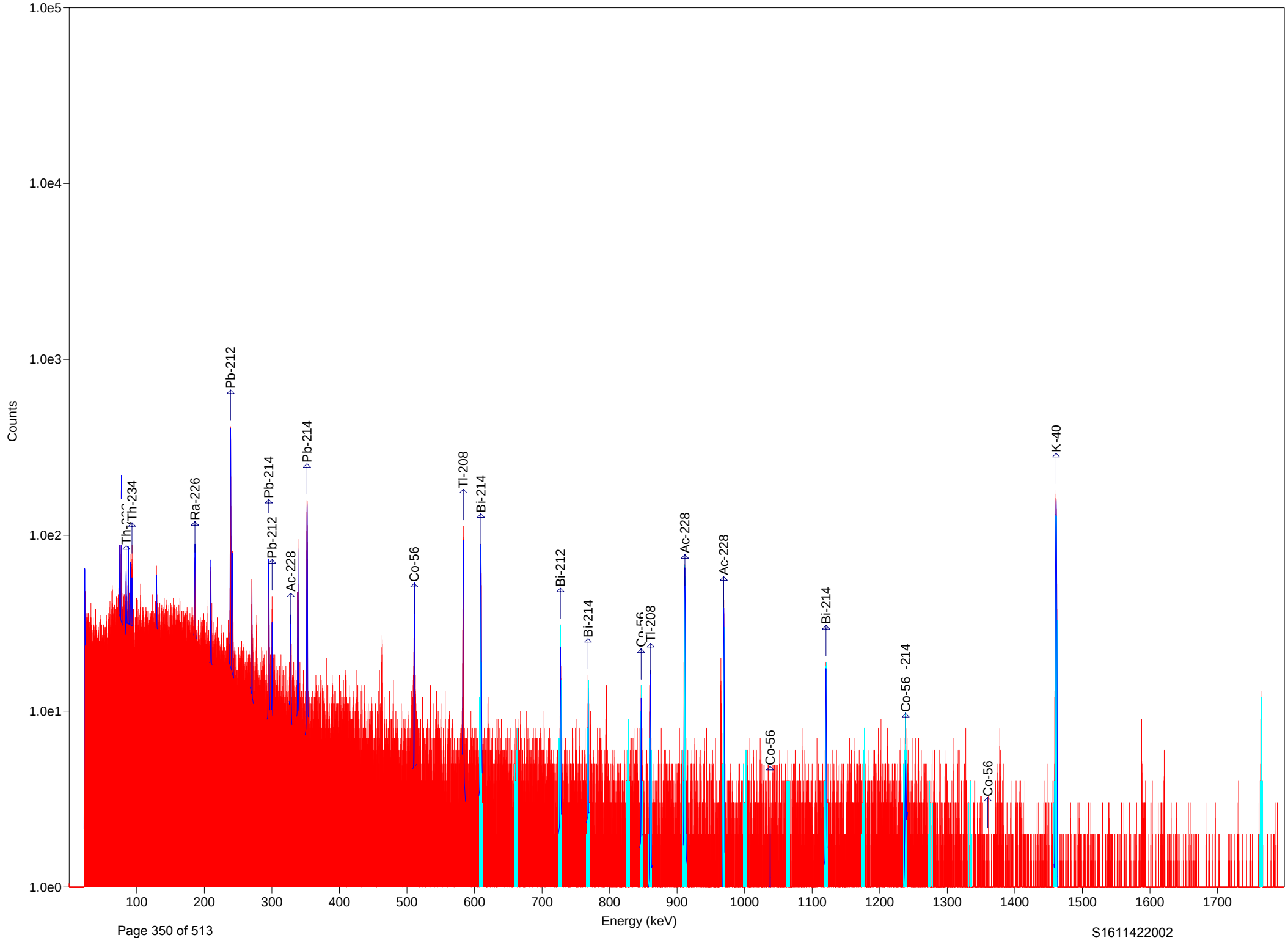


S1611422002

Detector #4 ACQ 08-Jan-2017 at 6:48:50 RT = 4528.5 LT = 4500.0
Rad Chem 1
S1611422-053A

ROI#	RANGE(keV)		GROSS	NET	+/-	CENTROID	FWHM	FW(1/5)M	LIBRARY	(keV)	µCi	+/-
1	606.78	611.61	558	489	26	609.45	1.25	1.69	Bi-214	609.31	0.0002	0.0000
2	659.24	664.07	96	19	15	660.88	1.86	2.06	Cs-137	661.66	0.0000	0.0000
3	724.43	729.70	162	87	18	727.38	0.52	1.76	Bi-212	727.00	0.0003	0.0001
4	765.70	770.97	97	30	15	768.66	0.98	1.38	Bi-214	768.36	0.0002	0.0001
5	824.75	830.01	48	-27	14	Could not properly fit the peak.						
6	844.94	850.21	102	23	16	846.67	0.85	1.13	Co-56	846.77	0.0000	0.0000
7	857.89	863.16	112	62	14	860.83	1.32	2.11	Tl-208	860.56	0.0001	0.0000
8	908.38	913.87	318	262	21	911.21	1.61	2.11	Ac-228	911.20	0.0003	0.0000
9	966.11	971.82	226	131	21	969.30	0.95	1.90	Ac-228	968.97	0.0003	0.0000
10	997.94	1003.65	77	5	16	1000.80	0.62	0.78	Pa-234M	1001.03	0.0002	0.0006
11	1060.94	1067.09	65	17	14	1063.58	0.22	0.35	No close library match!			
12	1117.36	1123.07	142	65	18	1120.87	0.35	1.12	Bi-214	1120.29	0.0002	0.0000
13	1172.46	1178.61	56	8	13	1176.63	0.22	0.35	Co-60	1173.24	0.0000	0.0000
14	1235.02	1241.17	117	35	18	1238.23	0.48	1.83	Co-56	1238.28	0.0000	0.0000
15	1271.90	1278.49	57	0	15	1277.17	0.26	0.44	No close library match!			
16	1331.84	1338.42	35	-1	12	1333.59	0.27	0.77	Co-60	1332.50	0.0000	0.0000
17	1457.63	1463.78	927	908	31	1461.09	1.63	2.62	K-40	1461.00	0.0043	0.0001
18	1761.27	1767.85	110	89	13	1765.06	2.00	2.40	Bi-214	1764.49	0.0004	0.0001

S1611422-054A. Real/Live Time = 4535/4500 (s).

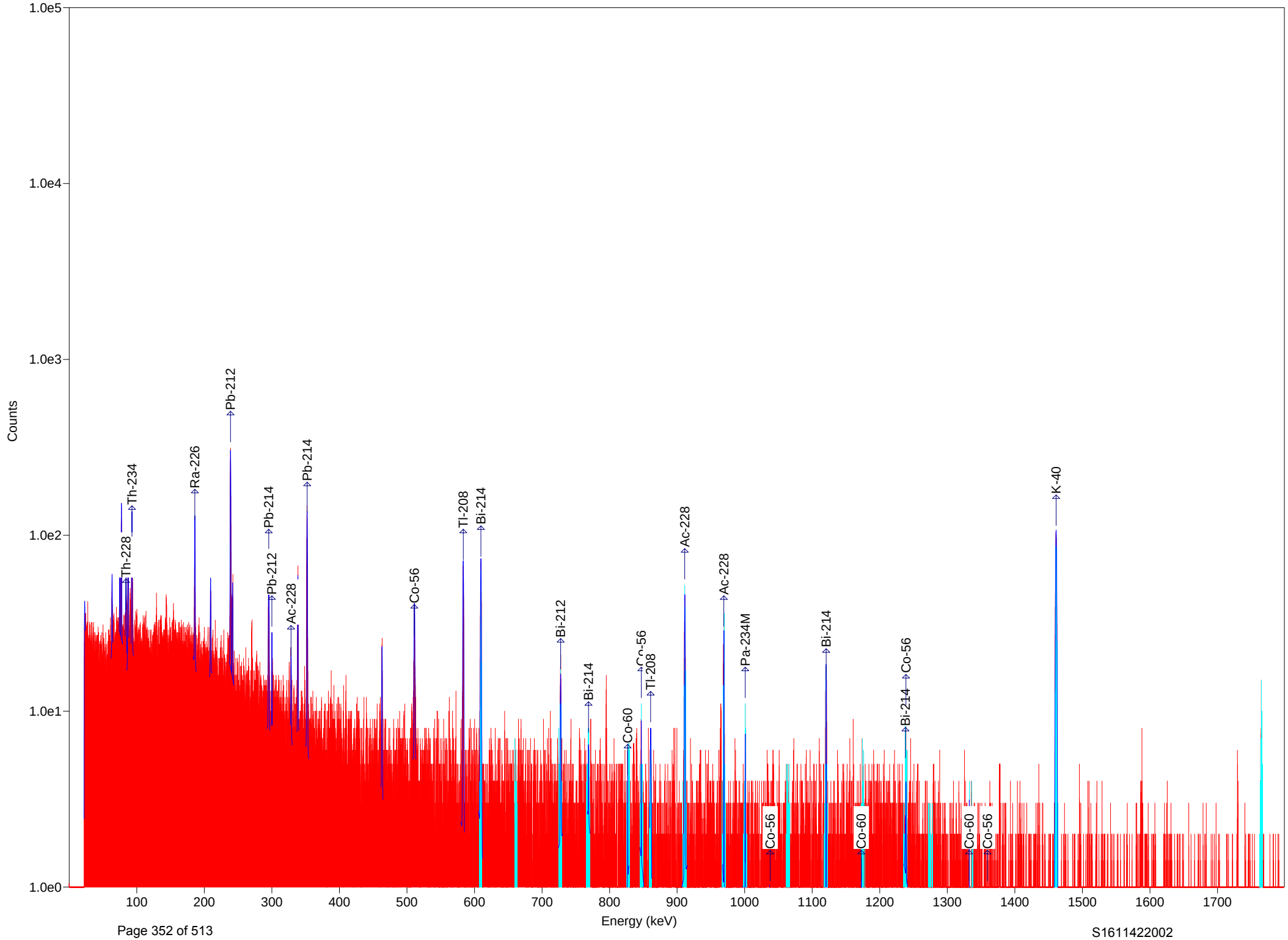


S1611422002

Detector #4 ACQ 08-Jan-2017 at 9:22:06 RT = 4535.2 LT = 4500.0
Rad Chem 1
S1611422-055A

ROI#	RANGE(keV)		GROSS	NET	+/-	CENTROID	FWHM	FW(1/5)M	LIBRARY	(keV)	µCi	+/-
1	606.78	611.61	507	446	24	609.42	1.32	1.90	Bi-214	609.31	0.0002	0.0000
2	659.24	664.07	74	13	13	659.90	0.25	0.40	Cs-137	661.66	0.0000	0.0000
3	724.43	729.70	167	75	19	727.44	1.07	1.56	Bi-212	727.00	0.0003	0.0001
4	765.70	770.97	98	19	16	768.55	1.28	1.51	Bi-214	768.36	0.0001	0.0001
5	824.75	830.01	71	-8	15	827.60	0.22	0.35	Co-60	826.28	0.0000	0.0567
6	844.94	850.21	87	8	16	846.89	0.25	0.81	Co-56	846.77	0.0000	0.0000
7	857.89	863.16	82	36	13	860.65	1.11	1.87	Tl-208	860.56	0.0001	0.0000
8	908.38	913.87	343	287	21	911.27	1.20	2.38	Ac-228	911.20	0.0003	0.0000
9	966.11	971.82	238	170	20	969.61	0.35	1.99	Ac-228	968.97	0.0003	0.0000
10	997.94	1003.65	76	22	14	1000.92	0.51	1.35	Pa-234M	1001.03	0.0009	0.0006
11	1060.94	1067.09	59	11	13	1061.82	0.22	0.35	No close library match!			
12	1117.36	1123.07	154	95	17	1119.93	0.48	1.97	Bi-214	1120.29	0.0002	0.0000
13	1172.46	1178.61	69	-4	16	1174.00	0.22	0.35	Co-60	1173.24	0.0000	0.0000
14	1235.02	1241.17	103	26	17	1237.90	1.15	1.36	Bi-214	1238.11	0.0002	0.0001
15	1271.90	1278.49	50	-12	15	Could not properly fit the peak.						
16	1331.84	1338.42	34	-2	12	1332.71	3.46	3.62	Co-60	1332.50	0.0000	0.0000
17	1457.63	1463.78	921	892	31	1461.10	1.80	2.80	K-40	1461.00	0.0043	0.0001
18	1761.27	1767.85	109	99	11	1764.98	1.97	3.26	Bi-214	1764.49	0.0004	0.0000

S1611422-055A. Real/Live Time = 4535/4500 (s).

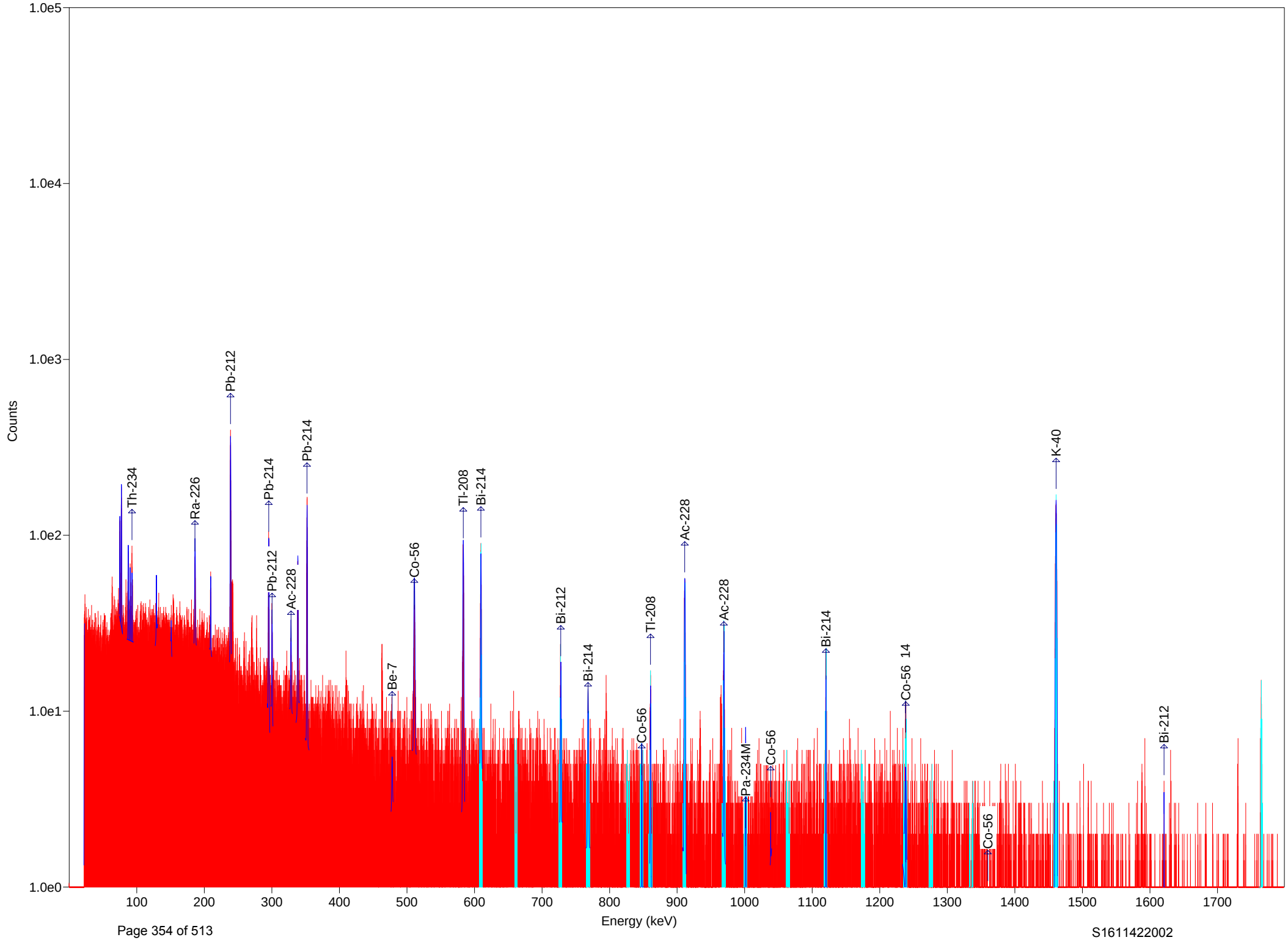


S1611422002

Detector #4 ACQ 08-Jan-2017 at 9:22:06 RT = 4535.2 LT = 4500.0
Rad Chem 1
S1611422-055A

ROI#	RANGE(keV)		GROSS	NET	+/-	CENTROID	FWHM	FW(1/5)M	LIBRARY	(keV)	µCi	+/-
1	606.78	611.61	507	446	24	609.42	1.32	1.90	Bi-214	609.31	0.0002	0.0000
2	659.24	664.07	74	13	13	659.90	0.25	0.40	Cs-137	661.66	0.0000	0.0000
3	724.43	729.70	167	75	19	727.44	1.07	1.56	Bi-212	727.00	0.0003	0.0001
4	765.70	770.97	98	19	16	768.55	1.28	1.51	Bi-214	768.36	0.0001	0.0001
5	824.75	830.01	71	-8	15	827.60	0.22	0.35	Co-60	826.28	0.0000	0.0567
6	844.94	850.21	87	8	16	846.89	0.25	0.81	Co-56	846.77	0.0000	0.0000
7	857.89	863.16	82	36	13	860.65	1.11	1.87	Tl-208	860.56	0.0001	0.0000
8	908.38	913.87	343	287	21	911.27	1.20	2.38	Ac-228	911.20	0.0003	0.0000
9	966.11	971.82	238	170	20	969.61	0.35	1.99	Ac-228	968.97	0.0003	0.0000
10	997.94	1003.65	76	22	14	1000.92	0.51	1.35	Pa-234M	1001.03	0.0009	0.0006
11	1060.94	1067.09	59	11	13	1061.82	0.22	0.35	No close library match!			
12	1117.36	1123.07	154	95	17	1119.93	0.48	1.97	Bi-214	1120.29	0.0002	0.0000
13	1172.46	1178.61	69	-4	16	1174.00	0.22	0.35	Co-60	1173.24	0.0000	0.0000
14	1235.02	1241.17	103	26	17	1237.90	1.15	1.36	Bi-214	1238.11	0.0002	0.0001
15	1271.90	1278.49	50	-12	15	Could not properly fit the peak.						
16	1331.84	1338.42	34	-2	12	1332.71	3.46	3.62	Co-60	1332.50	0.0000	0.0000
17	1457.63	1463.78	921	892	31	1461.10	1.80	2.80	K-40	1461.00	0.0043	0.0001
18	1761.27	1767.85	109	99	11	1764.98	1.97	3.26	Bi-214	1764.49	0.0004	0.0000

S1611422-056A. Real/Live Time = 4534/4500 (s).

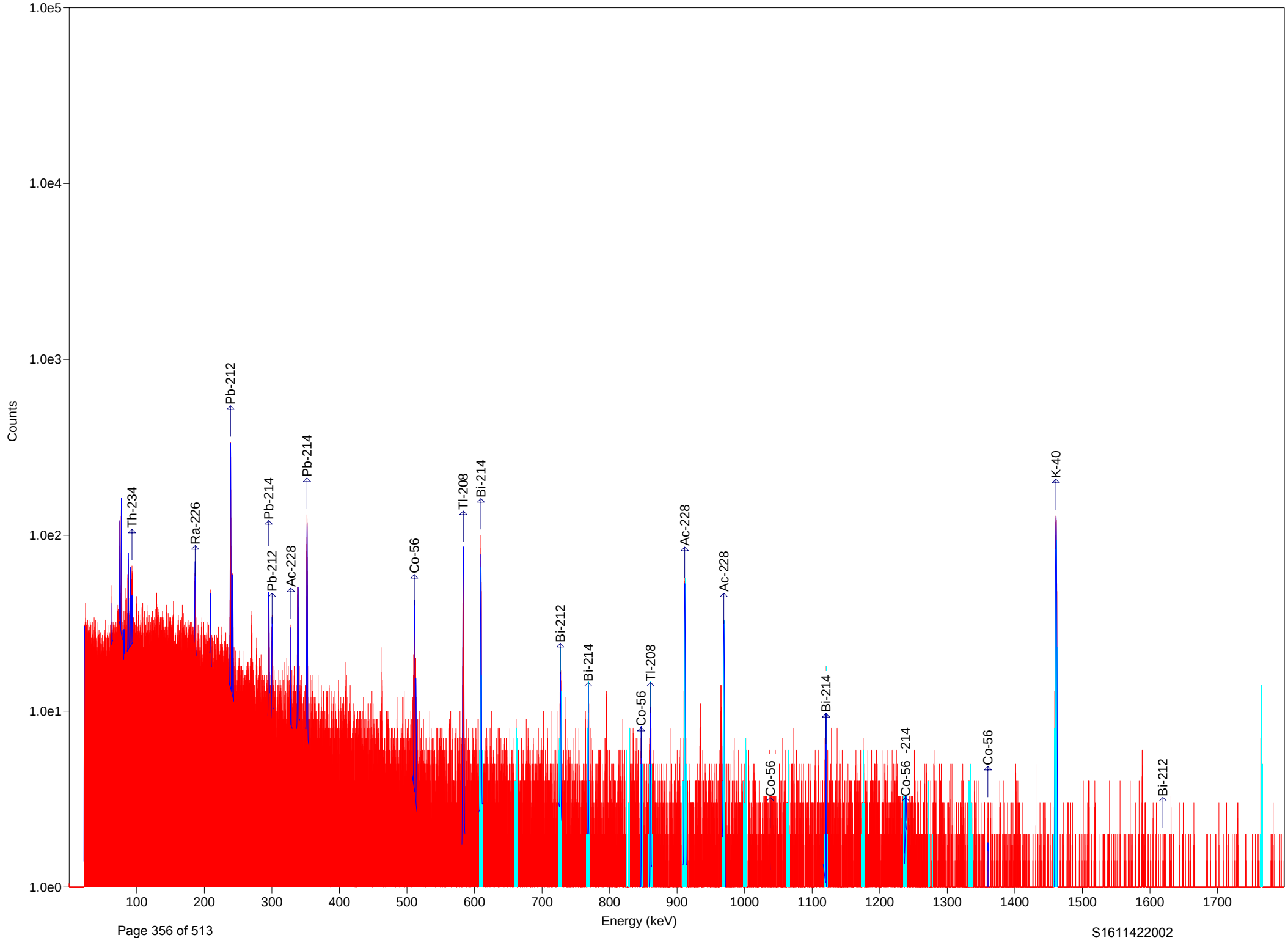


S1611422002

Detector #4 ACQ 08-Jan-2017 at 10:38:47 RT = 4534.1 LT = 4500.0
Rad Chem 1
S1611422-056A

ROI#	RANGE(keV)		GROSS	NET	+/-	CENTROID	FWHM	FW(1/5)M	LIBRARY (keV)		µCi	+/-
1	606.78	611.61	598	464	29	609.44	1.16	1.80	Bi-214	609.31	0.0002	0.0000
2	659.24	664.07	96	-38	18	Could not properly fit the peak.						
3	724.43	729.70	200	96	20	727.49	1.03	1.76	Bi-212	727.00	0.0004	0.0001
4	765.70	770.97	120	37	17	768.71	1.28	1.52	Bi-214	768.36	0.0002	0.0001
5	824.75	830.01	78	-26	17	826.28	0.22	0.35	Co-60	826.28	0.0000	0.0642
6	844.94	850.21	90	19	15	846.94	0.38	0.72	Co-56	846.77	0.0000	0.0000
7	857.89	863.16	125	75	15	860.73	1.42	2.06	Tl-208	860.56	0.0002	0.0000
8	908.38	913.87	435	361	24	911.39	1.37	2.06	Ac-228	911.20	0.0004	0.0000
9	966.11	971.82	245	195	19	969.30	1.06	2.32	Ac-228	968.97	0.0004	0.0000
10	997.94	1003.65	77	32	13	1002.38	0.55	1.64	Pa-234M	1001.03	0.0013	0.0005
11	1060.94	1067.09	67	-6	16	1062.48	0.26	0.44	No close library match!			
12	1117.36	1123.07	161	111	16	1120.65	0.39	1.60	Bi-214	1120.29	0.0003	0.0000
13	1172.46	1178.61	72	-34	19	Could not properly fit the peak.						
14	1235.02	1241.17	140	63	18	1238.23	0.60	2.46	Co-56	1238.28	0.0000	0.0000
15	1271.90	1278.49	57	0	15	1277.17	0.22	0.35	No close library match!			
16	1331.84	1338.42	40	-1	13	1337.54	0.27	0.48	Co-60	1332.50	0.0000	0.0000
17	1457.63	1463.78	1347	1294	38	1461.11	1.86	2.59	K-40	1461.00	0.0062	0.0002
18	1761.27	1767.85	104	94	11	1765.15	1.13	2.25	Bi-214	1764.49	0.0004	0.0000

S1611422-057A. Real/Live Time = 4536/4500 (s).

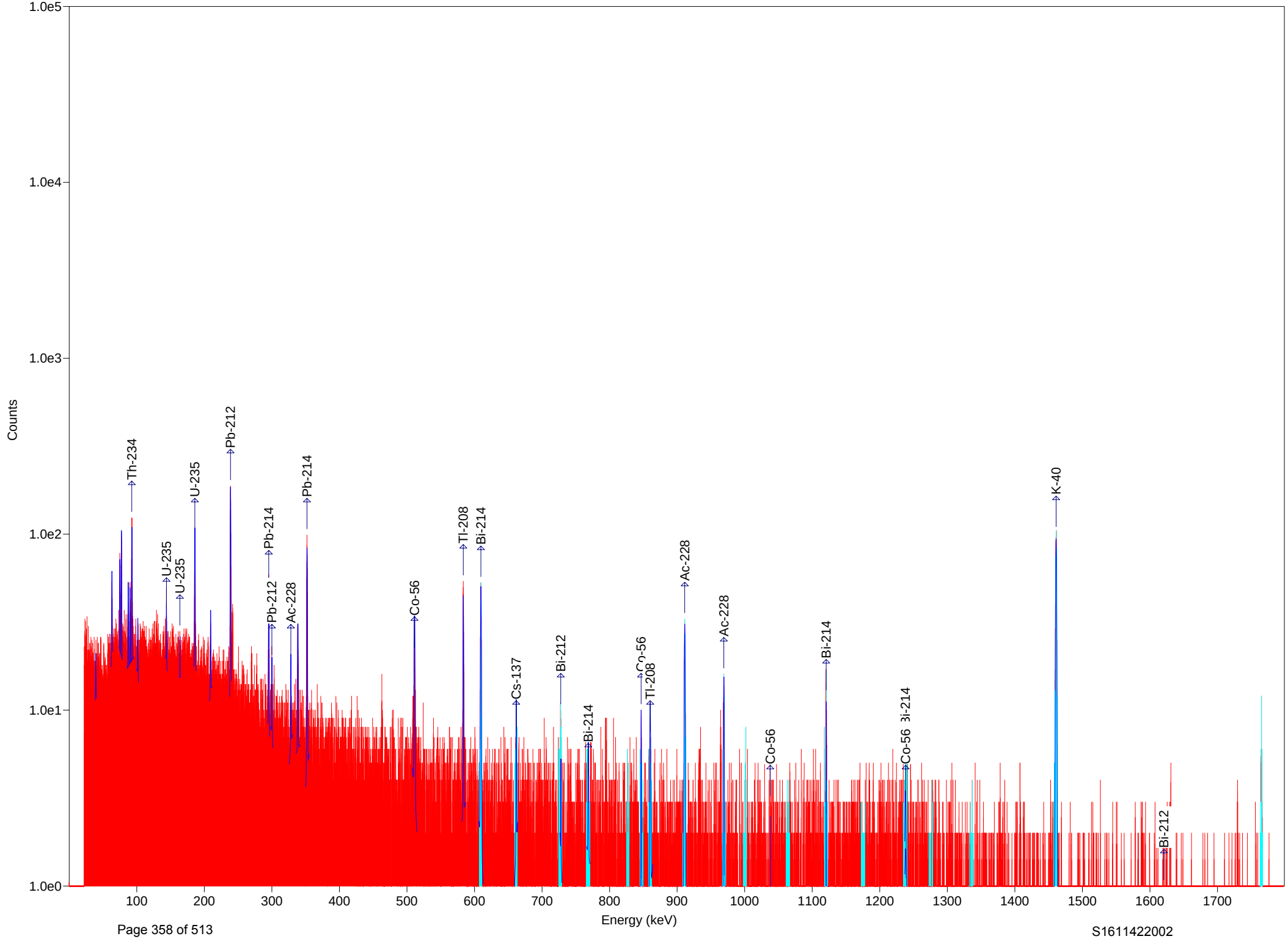


S1611422002

Detector #4 ACQ 08-Jan-2017 at 11:55:31 RT = 4536.3 LT = 4500.0
Rad Chem 1
S1611422-057A

ROI#	RANGE(keV)		GROSS	NET	+/-	CENTROID	FWHM	FW(1/5)M	LIBRARY	(keV)	µCi	+/-
1	606.78	611.61	545	445	26	609.48	1.26	1.70	Bi-214	609.31	0.0002	0.0000
2	659.24	664.07	88	23	14	661.66	0.24	0.39	Cs-137	661.66	0.0000	0.0000
3	724.43	729.70	189	106	19	727.43	1.63	2.02	Bi-212	727.00	0.0004	0.0001
4	765.70	770.97	135	68	16	768.66	0.88	1.42	Bi-214	768.36	0.0004	0.0001
5	824.75	830.01	61	-43	16	829.36	0.22	0.35	Co-60	826.28	0.0000	0.0605
6	844.94	850.21	84	30	14	846.99	0.42	1.13	Co-56	846.77	0.0000	0.0000
7	857.89	863.16	104	46	15	860.81	0.77	1.22	Tl-208	860.56	0.0001	0.0000
8	908.38	913.87	397	315	24	911.36	1.31	1.86	Ac-228	911.20	0.0004	0.0000
9	966.11	971.82	264	205	20	969.11	1.60	2.09	Ac-228	968.97	0.0004	0.0000
10	997.94	1003.65	60	6	13	1001.67	0.25	0.40	Pa-234M	1001.03	0.0002	0.0005
11	1060.94	1067.09	70	7	15	1065.15	0.32	0.74	No close library match!			
12	1117.36	1123.07	149	72	18	1120.73	0.42	1.49	Bi-214	1120.29	0.0002	0.0000
13	1172.46	1178.61	71	27	13	1175.56	0.29	1.27	Co-60	1173.24	0.0000	0.0000
14	1235.02	1241.17	101	33	17	1238.86	0.78	1.02	Co-56	1238.28	0.0000	0.0000
15	1271.90	1278.49	41	-26	15	1275.42	0.22	0.35	No close library match!			
16	1331.84	1338.42	50	-2	14	1334.03	0.22	0.35	Co-60	1332.50	0.0000	0.0000
17	1457.63	1463.78	1110	1076	34	1461.06	1.76	2.66	K-40	1461.00	0.0051	0.0002
18	1761.27	1767.85	85	85	9	1764.95	0.91	2.76	Bi-214	1764.49	0.0004	0.0000

S1611422-058A. Real/Live Time = 4534/4500 (s).

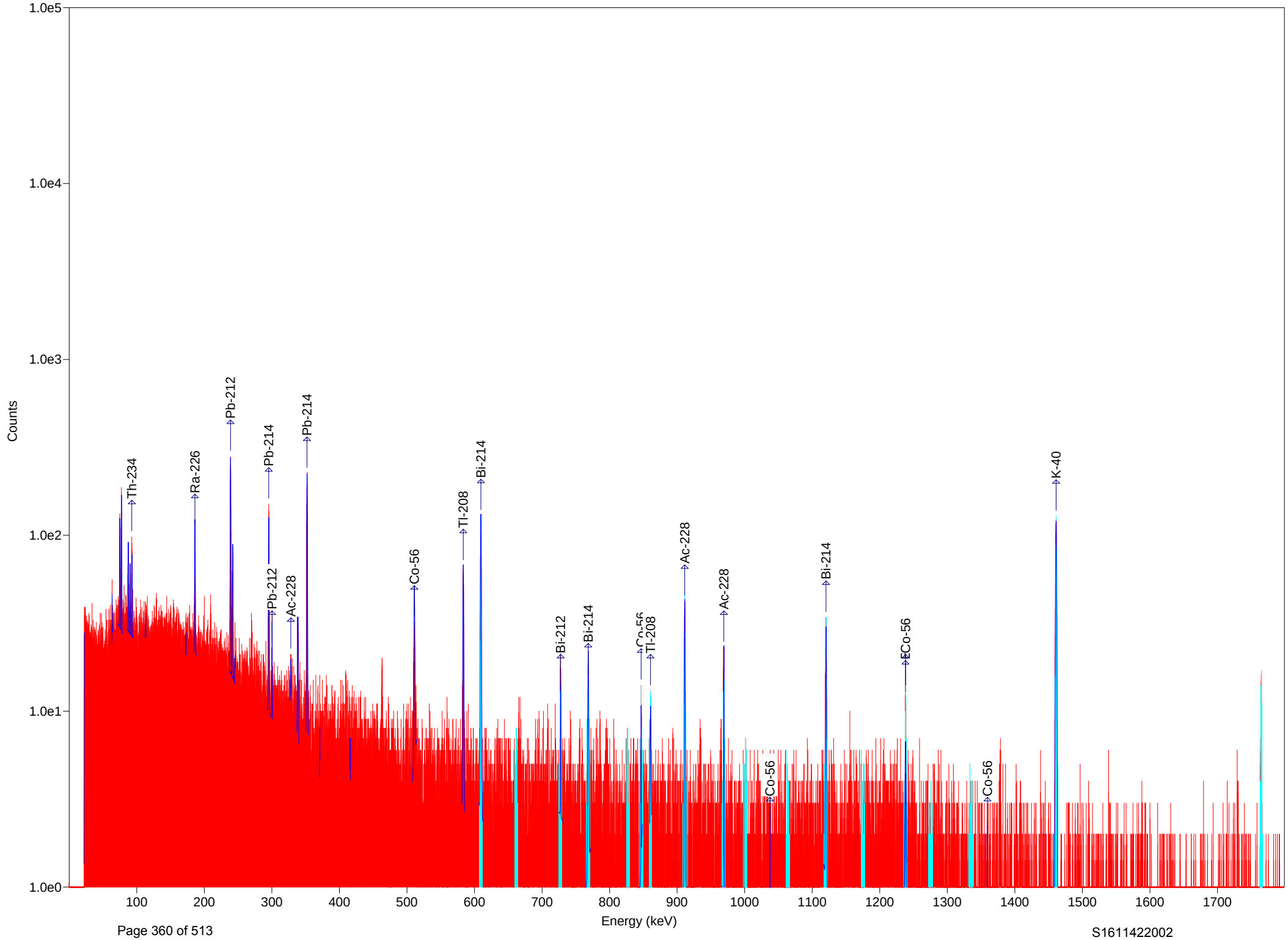


S1611422002

Detector #4 ACQ 08-Jan-2017 at 13:11:53 RT = 4534.4 LT = 4500.0
Rad Chem 1
S1611422-058A

ROI#	RANGE(keV)		GROSS	NET	+/-	CENTROID	FWHM	FW(1/5)M	LIBRARY	(keV)	µCi	+/-
1	606.78	611.61	356	287	21	609.43	1.26	1.67	Bi-214	609.31	0.0001	0.0000
2	659.24	664.07	116	66	14	662.00	0.69	1.96	Cs-137	661.66	0.0000	0.0000
3	724.43	729.70	108	50	15	727.25	0.33	2.38	Bi-212	727.00	0.0002	0.0001
4	765.70	770.97	81	43	12	768.82	0.90	1.41	Bi-214	768.36	0.0002	0.0001
5	824.75	830.01	48	-2	12	826.28	0.22	0.35	Co-60	826.28	0.0000	0.0454
6	844.94	850.21	81	23	14	846.90	0.61	0.84	Co-56	846.77	0.0000	0.0000
7	857.89	863.16	86	7	16	860.12	0.98	1.40	Tl-208	860.56	0.0000	0.0000
8	908.38	913.87	232	193	17	911.33	1.49	1.97	Ac-228	911.20	0.0002	0.0000
9	966.11	971.82	121	94	13	969.06	1.43	2.26	Ac-228	968.97	0.0002	0.0000
10	997.94	1003.65	55	23	11	1001.70	0.26	0.95	Pa-234M	1001.03	0.0009	0.0004
11	1060.94	1067.09	55	-32	17	Could not properly fit the peak.						
12	1117.36	1123.07	106	74	13	1120.53	0.52	1.87	Bi-214	1120.29	0.0002	0.0000
13	1172.46	1178.61	39	-9	13	Could not properly fit the peak.						
14	1235.02	1241.17	73	15	15	1237.82	0.69	1.02	Bi-214	1238.11	0.0001	0.0001
15	1271.90	1278.49	34	-7	12	1276.95	0.22	0.35	No close library match!			
16	1331.84	1338.42	31	10	9	1336.89	0.27	0.48	Co-60	1332.50	0.0000	0.0000
17	1457.63	1463.78	825	791	30	1461.04	1.51	2.40	K-40	1461.00	0.0038	0.0001
18	1761.27	1767.85	68	68	8	1765.23	0.41	2.15	Bi-214	1764.49	0.0003	0.0000

S1611422-059A. Real/Live Time = 4532/4500 (s).

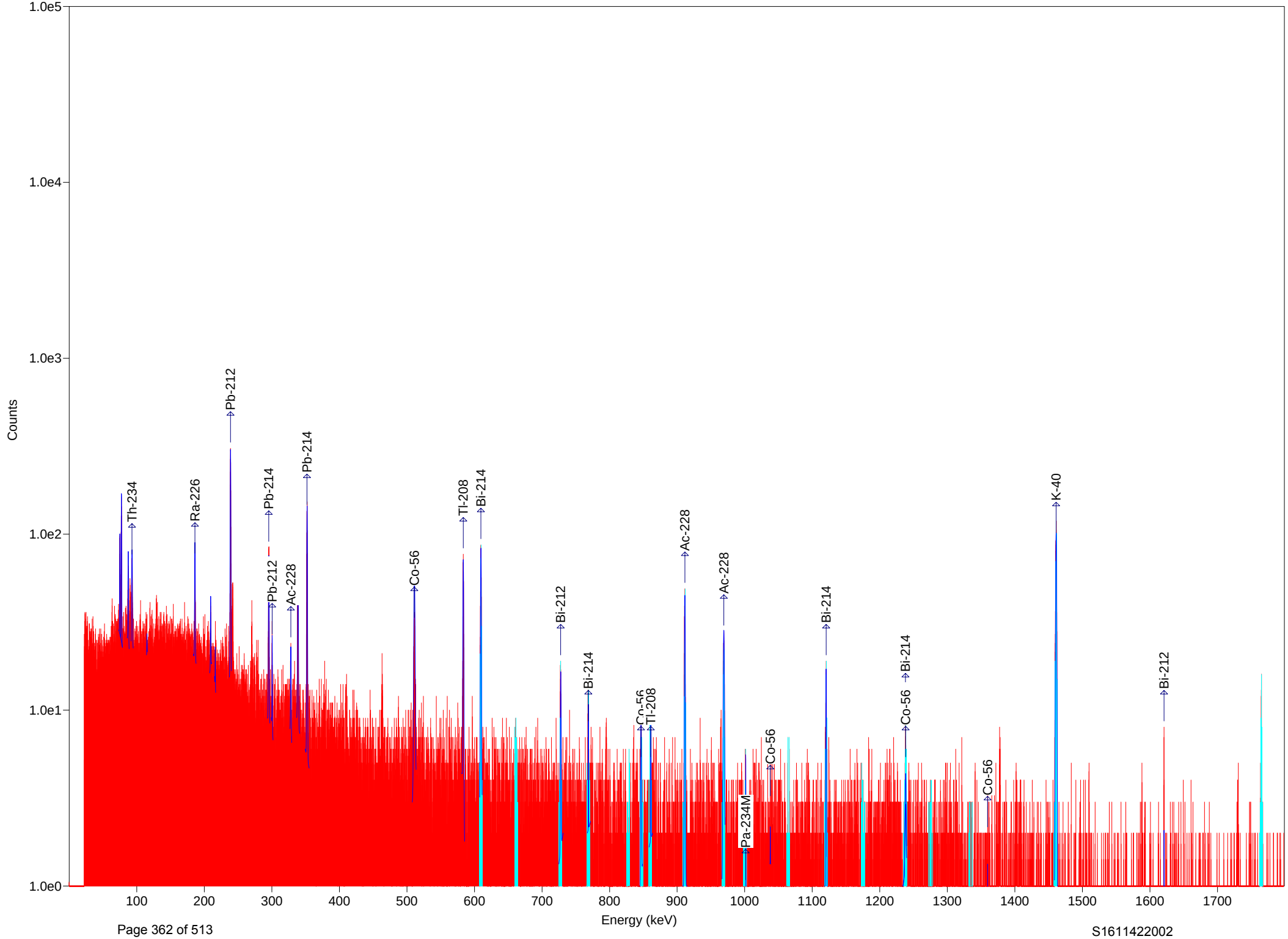


S1611422002

Detector #4 ACQ 08-Jan-2017 at 14:28:12 RT = 4532.4 LT = 4500.0
Rad Chem 1
S1611422-059A

ROI#	RANGE(keV)		GROSS	NET	+/-	CENTROID	FWHM	FW(1/5)M	LIBRARY	(keV)	µCi	+/-
1	606.78	611.61	874	755	33	609.40	1.34	2.02	Bi-214	609.31	0.0004	0.0000
2	659.24	664.07	97	-3	16	661.62	0.79	1.05	Cs-137	661.66	0.0000	0.0000
3	724.43	729.70	184	80	20	727.17	0.60	1.59	Bi-212	727.00	0.0003	0.0001
4	765.70	770.97	171	67	19	768.39	1.21	1.65	Bi-214	768.36	0.0004	0.0001
5	824.75	830.01	77	-6	16	826.53	0.29	0.78	Co-60	826.28	0.0000	0.0605
6	844.94	850.21	115	7	18	846.68	0.26	0.41	Co-56	846.77	0.0000	0.0000
7	857.89	863.16	123	48	16	860.60	1.31	1.94	Tl-208	860.56	0.0001	0.0000
8	908.38	913.87	309	261	20	911.29	1.19	1.98	Ac-228	911.20	0.0003	0.0000
9	966.11	971.82	196	164	16	968.50	1.80	2.14	Ac-228	968.97	0.0003	0.0000
10	997.94	1003.65	93	12	17	1001.56	0.40	0.55	Pa-234M	1001.03	0.0005	0.0007
11	1060.94	1067.09	71	-31	18	Could not properly fit the peak.						
12	1117.36	1123.07	253	194	19	1120.38	1.45	2.13	Bi-214	1120.29	0.0005	0.0000
13	1172.46	1178.61	69	-4	16	1176.63	1.10	1.36	Co-60	1173.24	0.0000	0.0000
14	1235.02	1241.17	120	96	13	1238.26	1.22	2.01	Co-56	1238.28	0.0001	0.0000
15	1271.90	1278.49	51	10	13	1275.76	0.41	0.56	No close library match!			
16	1331.84	1338.42	58	6	14	1333.59	4.39	4.52	Co-60	1332.50	0.0000	0.0000
17	1457.63	1463.78	1022	983	33	1461.03	1.60	2.53	K-40	1461.00	0.0047	0.0002
18	1761.27	1767.85	153	148	13	1764.89	2.04	3.00	Bi-214	1764.49	0.0006	0.0001

S1611422-060A. Real/Live Time = 4534/4500 (s).

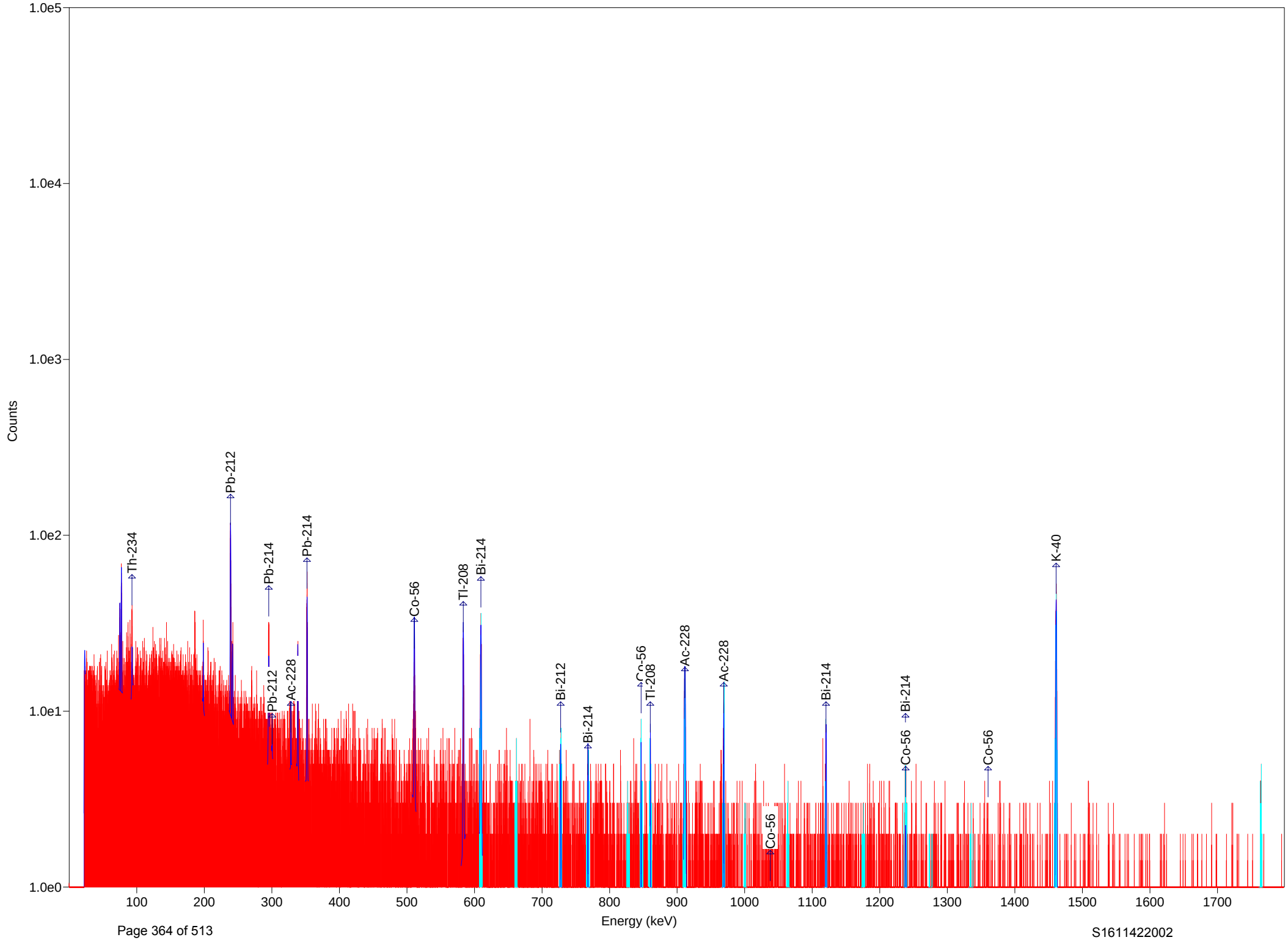


S1611422002

Detector #4 ACQ 08-Jan-2017 at 15:44:58 RT = 4534.0 LT = 4500.0
Rad Chem 1
S1611422-060A

ROI#	RANGE(keV)		GROSS	NET	+/-	CENTROID	FWHM	FW(1/5)M	LIBRARY	(keV)	µCi	+/-
1	606.78	611.61	591	499	27	609.47	1.22	2.07	Bi-214	609.31	0.0003	0.0000
2	659.24	664.07	115	11	17	661.00	0.26	0.97	Cs-137	661.66	0.0000	0.0000
3	724.43	729.70	158	95	17	727.38	1.01	1.72	Bi-212	727.00	0.0004	0.0001
4	765.70	770.97	121	42	17	768.75	0.33	0.89	Bi-214	768.36	0.0002	0.0001
5	824.75	830.01	46	0	12	828.92	0.22	0.35	Co-60	826.28	0.0000	0.0454
6	844.94	850.21	89	43	13	846.92	0.92	1.45	Co-56	846.77	0.0000	0.0000
7	857.89	863.16	113	25	17	860.70	0.28	0.77	Tl-208	860.56	0.0001	0.0000
8	908.38	913.87	335	283	21	911.23	1.16	1.91	Ac-228	911.20	0.0003	0.0000
9	966.11	971.82	229	184	18	968.98	1.94	2.62	Ac-228	968.97	0.0004	0.0000
10	997.94	1003.65	56	29	11	1000.98	0.29	0.83	Pa-234M	1001.03	0.0012	0.0004
11	1060.94	1067.09	52	23	11	1063.91	2.36	2.56	No close library match!			
12	1117.36	1123.07	152	120	15	1120.41	1.04	2.11	Bi-214	1120.29	0.0003	0.0000
13	1172.46	1178.61	57	4	14	1173.56	0.22	0.35	Co-60	1173.24	0.0000	0.0000
14	1235.02	1241.17	100	37	16	1238.10	0.76	1.81	Bi-214	1238.11	0.0003	0.0001
15	1271.90	1278.49	40	9	11	1275.20	1.10	1.23	No close library match!			
16	1331.84	1338.42	41	0	13	1333.92	3.49	3.64	Co-60	1332.50	0.0000	0.0000
17	1457.63	1463.78	897	863	31	1461.16	1.63	2.58	K-40	1461.00	0.0041	0.0001
18	1761.27	1767.85	112	102	12	1765.05	1.12	2.26	Bi-214	1764.49	0.0004	0.0001

S1611422-060AD. Real/Live Time = 4530/4500 (s).

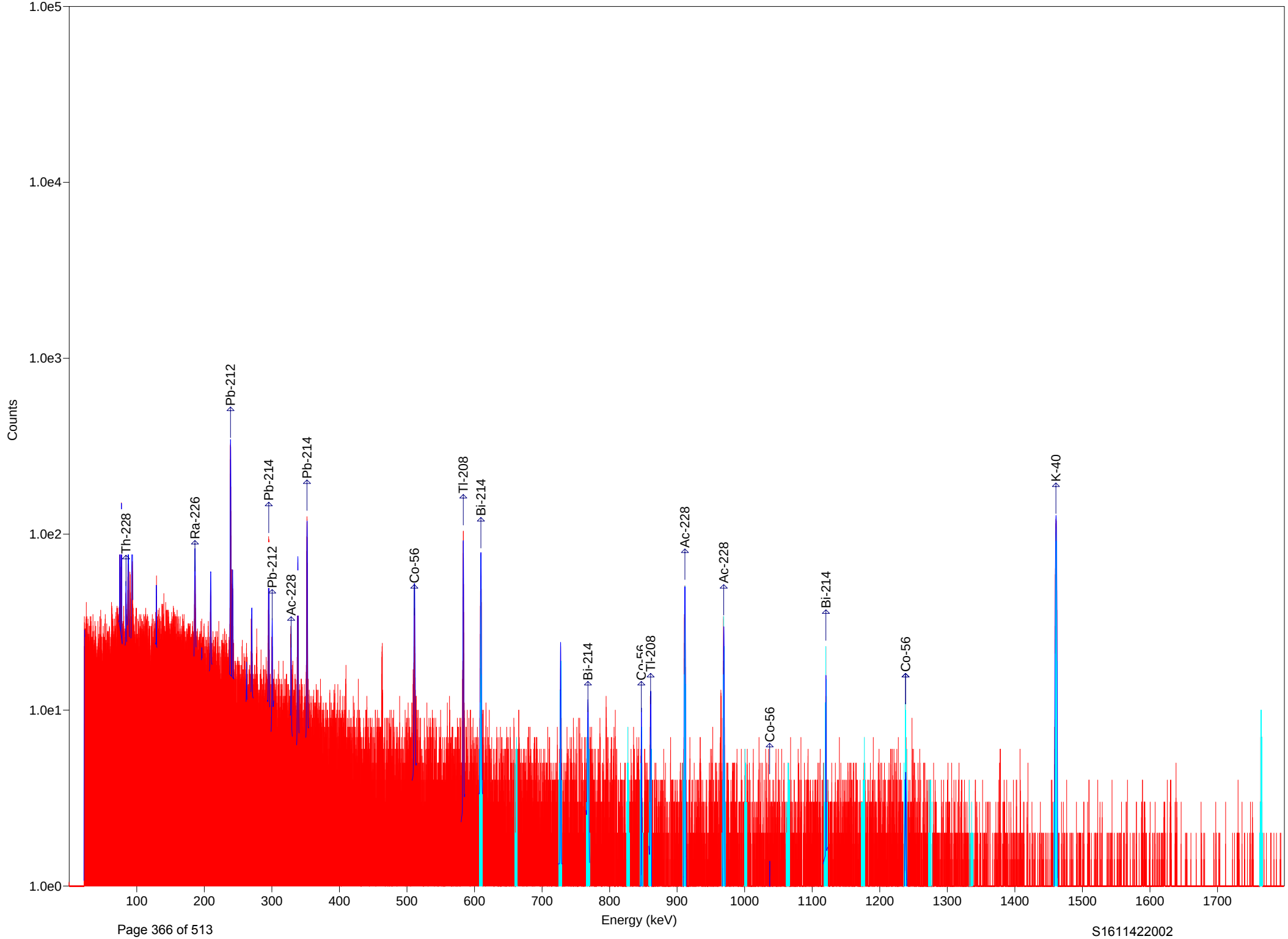


S1611422002

Detector #4 ACQ 08-Jan-2017 at 17:01:38 RT = 4530.6 LT = 4500.0
Rad Chem 1
S1611422-060AD

ROI#	RANGE(keV)		GROSS	NET	+/-	CENTROID	FWHM	FW(1/5)M	LIBRARY	(keV)	µCi	+/-
1	607.00	611.83	240	190	18	609.44	1.48	1.83	Bi-214	609.31	0.0001	0.0000
2	659.24	664.07	69	15	12	662.21	0.41	0.59	Cs-137	661.66	0.0000	0.0000
3	724.43	729.70	82	40	13	727.90	0.31	1.90	Bi-212	727.00	0.0001	0.0000
4	765.70	770.97	63	25	12	768.73	0.78	0.97	Bi-214	768.36	0.0001	0.0001
5	824.75	830.01	39	10	10	826.72	0.27	0.48	Co-60	826.28	0.0378	0.0378
6	844.94	850.21	66	28	12	846.70	0.31	1.10	Co-56	846.77	0.0000	0.0000
7	857.89	863.16	66	37	11	859.70	1.19	1.69	Tl-208	860.56	0.0001	0.0000
8	908.38	913.87	165	117	16	911.25	1.81	2.48	Ac-228	911.20	0.0001	0.0000
9	966.11	971.82	92	83	10	969.20	1.56	2.32	Ac-228	968.97	0.0002	0.0000
10	997.94	1003.65	28	1	9	1000.03	1.84	2.05	Pa-234M	1001.03	0.0000	0.0004
11	1060.94	1067.09	33	9	10	1064.23	0.22	0.35	No close library match!			
12	1117.36	1123.07	72	54	10	1120.16	1.12	2.51	Bi-214	1120.29	0.0001	0.0000
13	1172.46	1178.61	38	19	9	1175.97	0.73	0.95	Co-60	1173.24	0.0000	0.0000
14	1235.02	1241.17	53	38	9	1237.44	0.24	0.39	Bi-214	1238.11	0.0003	0.0001
15	1271.90	1278.49	22	6	8	1273.00	1.43	1.84	No close library match!			
16	1331.84	1338.42	26	0	10	1335.13	0.22	0.35	Co-60	1332.50	0.0000	0.0000
17	1457.63	1463.78	376	371	19	1461.23	1.87	2.39	K-40	1461.00	0.0018	0.0001
18	1761.27	1767.85	37	27	8	1764.68	0.88	1.09	Bi-214	1764.49	0.0001	0.0000

S1611422-061A. Real/Live Time = 4531/4500 (s).

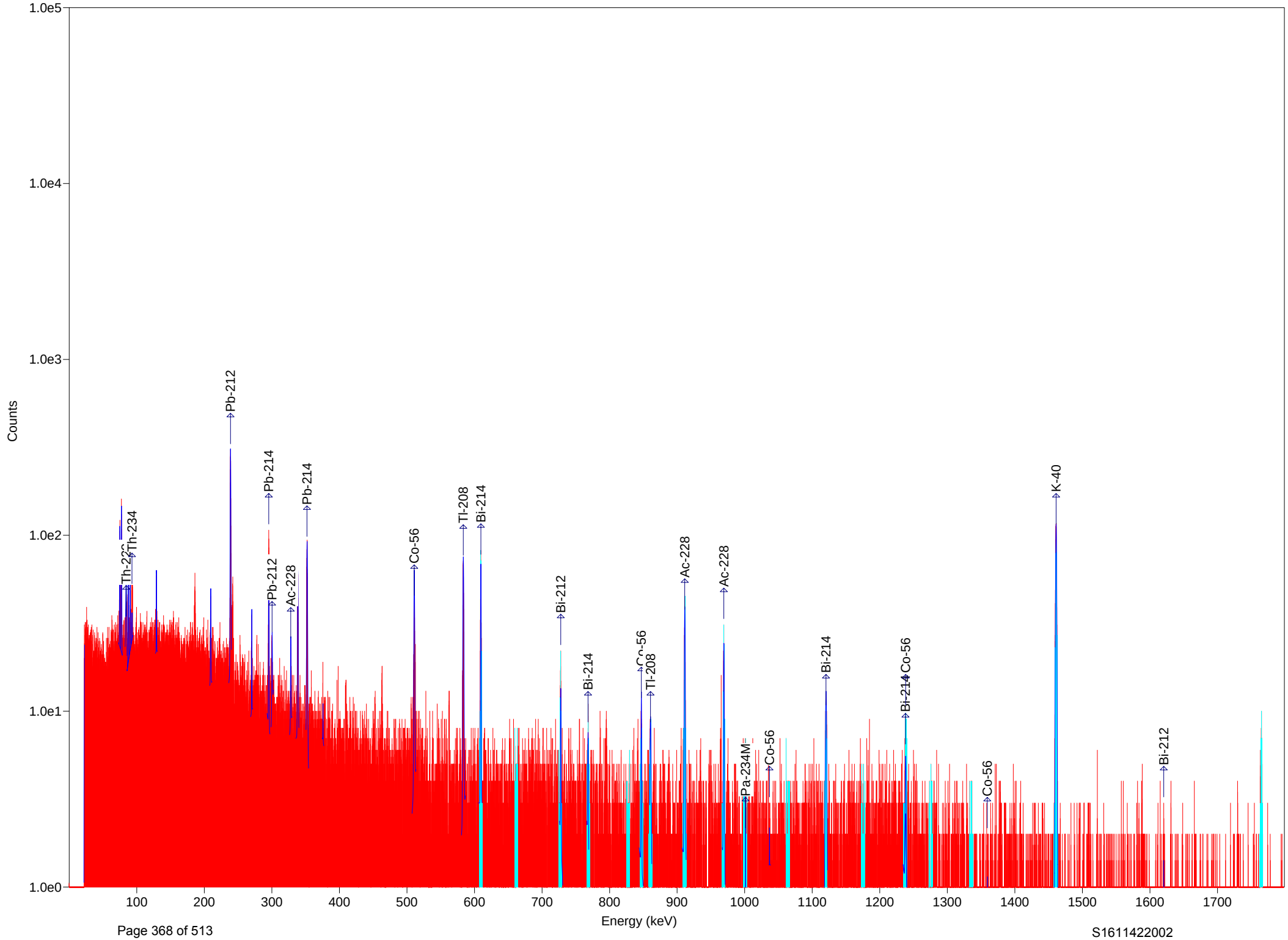


S1611422002

Detector #4 ACQ 08-Jan-2017 at 23:33:36 RT = 4531.4 LT = 4500.0
Rad Chem 1
S1611422-061A

ROI#	RANGE(keV)		GROSS	NET	+/-	CENTROID	FWHM	FW(1/5)M	LIBRARY	(keV)	µCi	+/-
1	606.78	611.61	558	439	27	609.42	1.27	1.82	Bi-214	609.31	0.0002	0.0000
2	659.24	664.07	84	15	14	662.32	0.22	0.35	Cs-137	661.66	0.0000	0.0000
3	724.43	729.70	181	106	18	727.64	0.76	1.63	Bi-212	727.00	0.0004	0.0001
4	765.70	770.97	122	9	19	768.01	0.57	1.76	Bi-214	768.36	0.0001	0.0001
5	824.75	830.01	67	17	13	827.16	0.24	0.39	Co-60	826.28	0.0642	0.0491
6	844.94	850.21	87	29	14	847.09	0.68	1.57	Co-56	846.77	0.0000	0.0000
7	857.89	863.16	105	59	14	860.59	1.17	1.52	Tl-208	860.56	0.0001	0.0000
8	908.38	913.87	374	313	22	911.38	1.49	2.25	Ac-228	911.20	0.0004	0.0000
9	966.11	971.82	234	207	17	969.01	1.53	2.05	Ac-228	968.97	0.0004	0.0000
10	997.94	1003.65	58	26	11	1000.32	0.31	0.76	Pa-234M	1001.03	0.0011	0.0004
11	1060.94	1067.09	62	18	13	1065.08	0.32	1.53	No close library match!			
12	1117.36	1123.07	153	81	18	1120.30	0.73	1.41	Bi-214	1120.29	0.0002	0.0000
13	1172.46	1178.61	78	-4	17	1177.07	0.22	0.35	Co-60	1173.24	0.0000	0.0000
14	1235.02	1241.17	116	53	17	1238.06	0.62	0.83	Bi-214	1238.11	0.0004	0.0001
15	1271.90	1278.49	58	6	14	1272.89	3.05	3.20	No close library match!			
16	1331.84	1338.42	44	13	11	1332.53	0.32	0.74	Co-60	1332.50	0.0000	0.0000
17	1457.63	1463.78	1092	1058	34	1461.07	1.94	2.68	K-40	1461.00	0.0051	0.0002
18	1761.27	1767.85	95	85	11	1764.64	1.19	2.39	Bi-214	1764.49	0.0004	0.0000

S1611422-062A. Real/Live Time = 4530/4500 (s).

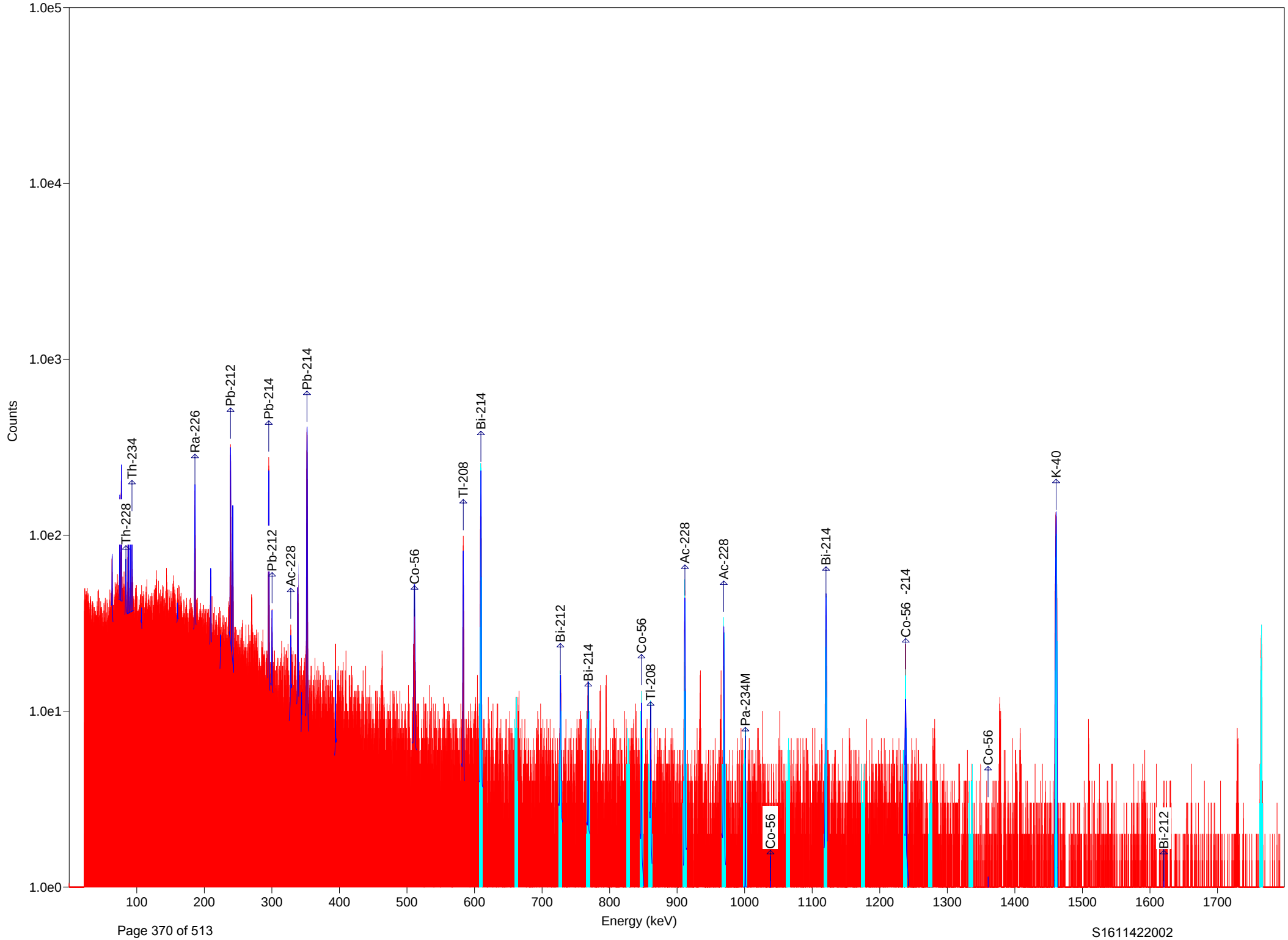


S1611422002

Detector #4 ACQ 09-Jan-2017 at 0:49:58 RT = 4530.1 LT = 4500.0
Rad Chem 1
S1611422-062A

ROI#	RANGE(keV)		GROSS	NET	+/-	CENTROID	FWHM	FW(1/5)M	LIBRARY	(keV)	µCi	+/-
1	606.78	611.61	491	399	25	609.33	1.00	1.97	Bi-214	609.31	0.0002	0.0000
2	659.24	664.07	91	-5	16	663.38	0.29	0.61	Cs-137	661.66	0.0000	0.0000
3	724.43	729.70	154	71	18	727.48	0.91	1.59	Bi-212	727.00	0.0003	0.0001
4	765.70	770.97	95	32	15	768.33	0.99	1.75	Bi-214	768.36	0.0002	0.0001
5	824.75	830.01	55	-16	14	829.14	0.22	0.35	Co-60	826.28	0.0000	0.0529
6	844.94	850.21	104	50	14	847.27	0.86	1.42	Co-56	846.77	0.0000	0.0000
7	857.89	863.16	97	39	14	860.45	1.60	1.86	Tl-208	860.56	0.0001	0.0000
8	908.38	913.87	309	244	21	911.41	1.36	1.81	Ac-228	911.20	0.0003	0.0000
9	966.11	971.82	209	159	18	969.23	1.59	2.01	Ac-228	968.97	0.0003	0.0000
10	997.94	1003.65	65	2	14	1001.01	0.22	0.35	Pa-234M	1001.03	0.0001	0.0006
11	1060.94	1067.09	70	-7	17	1065.33	1.65	1.84	No close library match!			
12	1117.36	1123.07	119	83	14	1120.49	2.27	2.66	Bi-214	1120.29	0.0002	0.0000
13	1172.46	1178.61	59	1	14	1173.56	2.69	3.12	Co-60	1173.24	0.0000	0.0000
14	1235.02	1241.17	107	44	16	1238.32	0.44	1.16	Co-56	1238.28	0.0000	0.0000
15	1271.90	1278.49	52	11	13	1275.86	0.22	0.35	No close library match!			
16	1331.84	1338.42	39	3	12	1333.37	3.29	3.42	Co-60	1332.50	0.0000	0.0000
17	1457.63	1463.78	1005	961	33	1461.09	1.68	2.81	K-40	1461.00	0.0046	0.0002
18	1761.27	1767.85	87	77	10	1765.06	1.57	2.90	Bi-214	1764.49	0.0003	0.0000

S1611422-063A. Real/Live Time = 4532/4500 (s).

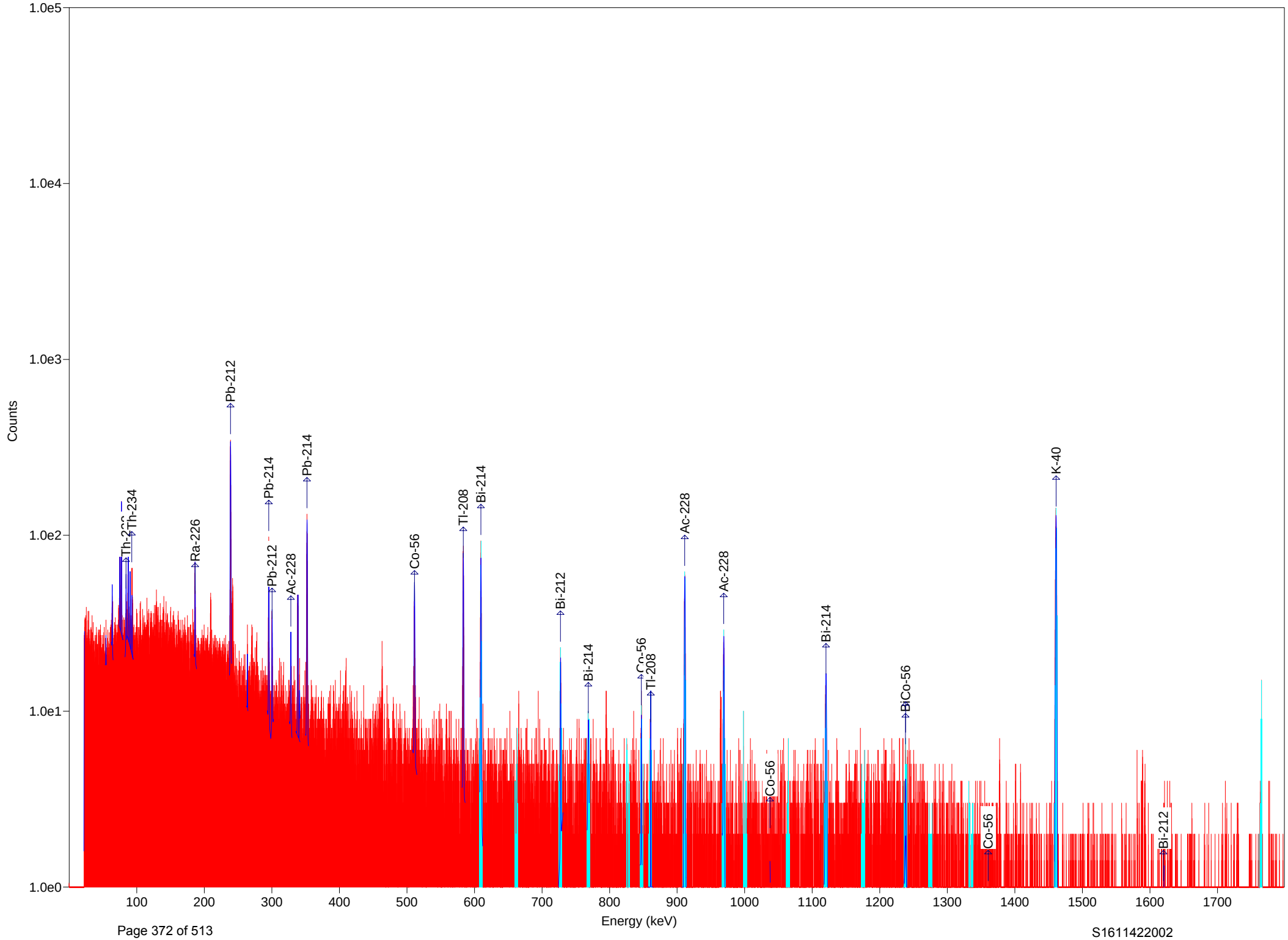


S1611422002

Detector #4 ACQ 09-Jan-2017 at 2:06:19 RT = 4532.7 LT = 4500.0
Rad Chem 1
S1611422-063A

ROI#	RANGE(keV)		GROSS	NET	+/-	CENTROID	FWHM	FW(1/5)M	LIBRARY	(keV)	µCi	+/-
1	606.78	611.61	1522	1357	42	609.41	1.11	1.76	Bi-214	609.31	0.0007	0.0000
2	659.24	664.07	160	18	20	661.36	1.49	1.65	Cs-137	661.66	0.0000	0.0000
3	724.43	729.70	182	82	19	727.39	1.21	1.70	Bi-212	727.00	0.0003	0.0001
4	765.70	770.97	206	102	20	768.77	0.71	2.00	Bi-214	768.36	0.0006	0.0001
5	824.75	830.01	95	20	16	825.59	0.29	0.50	Co-60	826.28	0.0756	0.0605
6	844.94	850.21	107	57	14	846.92	1.22	1.62	Co-56	846.77	0.0000	0.0000
7	857.89	863.16	118	47	16	860.41	0.75	1.61	Tl-208	860.56	0.0001	0.0000
8	908.38	913.87	348	274	22	911.34	1.32	1.99	Ac-228	911.20	0.0003	0.0000
9	966.11	971.82	254	177	21	969.10	1.29	1.90	Ac-228	968.97	0.0004	0.0000
10	997.94	1003.65	84	25	15	1001.21	0.38	1.00	Pa-234M	1001.03	0.0010	0.0006
11	1060.94	1067.09	105	23	18	1064.93	0.32	0.52	No close library match!			
12	1117.36	1123.07	398	330	23	1120.43	1.50	2.43	Bi-214	1120.29	0.0008	0.0001
13	1172.46	1178.61	82	-10	18	Could not properly fit the peak.						
14	1235.02	1241.17	192	76	22	1238.15	0.70	1.15	Bi-214	1238.11	0.0005	0.0002
15	1271.90	1278.49	49	-8	15	1273.00	3.29	3.42	No close library match!			
16	1331.84	1338.42	53	-14	16	1336.67	0.22	0.35	Co-60	1332.50	0.0000	0.0000
17	1457.63	1463.78	1168	1134	35	1461.13	1.65	2.75	K-40	1461.00	0.0054	0.0002
18	1761.27	1767.85	261	251	17	1764.93	2.15	2.53	Bi-214	1764.49	0.0011	0.0001

S1611422-064A. Real/Live Time = 4530/4500 (s).

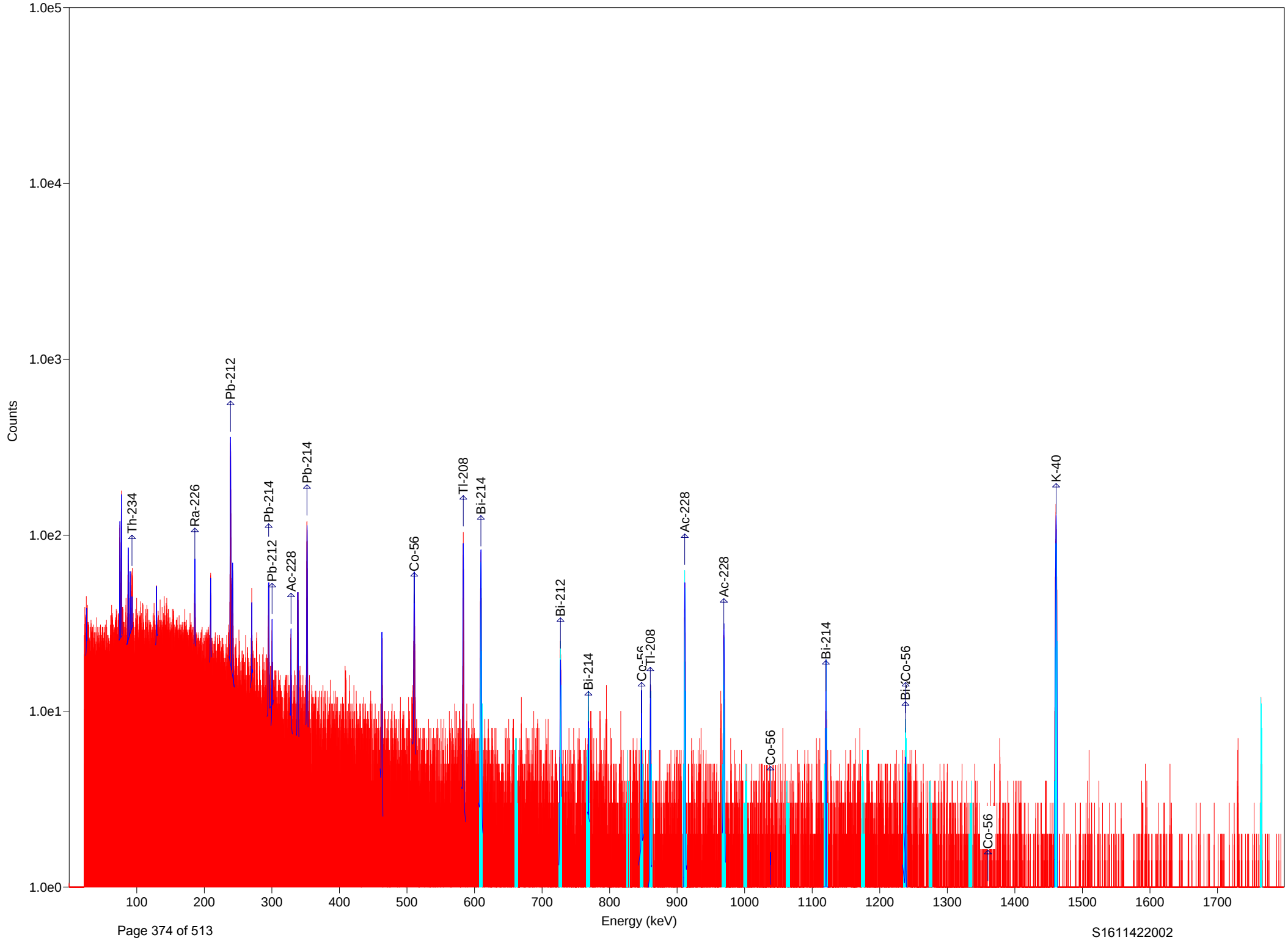


S1611422002

Detector #4 ACQ 09-Jan-2017 at 3:22:51 RT = 4530.1 LT = 4500.0
Rad Chem 1
S1611422-064A

ROI#	RANGE(keV)		GROSS	NET	+/-	CENTROID	FWHM	FW(1/5)M	LIBRARY	(keV)	µCi	+/-
1	606.78	611.61	530	426	26	609.42	1.20	1.82	Bi-214	609.31	0.0002	0.0000
2	659.24	664.07	67	13	12	662.75	0.26	0.42	Cs-137	661.66	0.0000	0.0000
3	724.43	729.70	187	108	18	727.06	0.76	2.11	Bi-212	727.00	0.0004	0.0001
4	765.70	770.97	105	55	14	768.63	1.12	1.65	Bi-214	768.36	0.0003	0.0001
5	824.75	830.01	70	-18	16	825.51	0.40	0.55	Co-60	826.28	0.0000	0.0605
6	844.94	850.21	99	53	14	847.15	0.70	1.69	Co-56	846.77	0.0000	0.0000
7	857.89	863.16	120	70	15	861.13	0.27	1.39	Tl-208	860.56	0.0002	0.0000
8	908.38	913.87	426	370	23	911.38	1.45	2.08	Ac-228	911.20	0.0004	0.0000
9	966.11	971.82	224	183	18	969.09	1.47	2.32	Ac-228	968.97	0.0004	0.0000
10	997.94	1003.65	62	-24	16	1001.89	0.99	1.19	Pa-234M	1001.03	0.0000	0.0006
11	1060.94	1067.09	61	3	15	1064.67	0.25	0.72	No close library match!			
12	1117.36	1123.07	150	105	16	1120.64	0.90	2.14	Bi-214	1120.29	0.0003	0.0000
13	1172.46	1178.61	65	2	15	1173.56	4.23	4.65	Co-60	1173.24	0.0000	0.0000
14	1235.02	1241.17	88	1	18	1238.32	0.58	0.76	Co-56	1238.28	0.0000	0.0000
15	1271.90	1278.49	46	5	13	1273.22	0.22	0.35	No close library match!			
16	1331.84	1338.42	36	-11	13	1337.32	0.66	0.79	Co-60	1332.50	0.0000	0.0000
17	1457.63	1463.78	1109	1080	34	1461.04	1.85	2.76	K-40	1461.00	0.0052	0.0002
18	1761.27	1767.85	99	83	12	1765.16	0.69	2.03	Bi-214	1764.49	0.0004	0.0001

S1611422-065A. Real/Live Time = 4531/4500 (s).

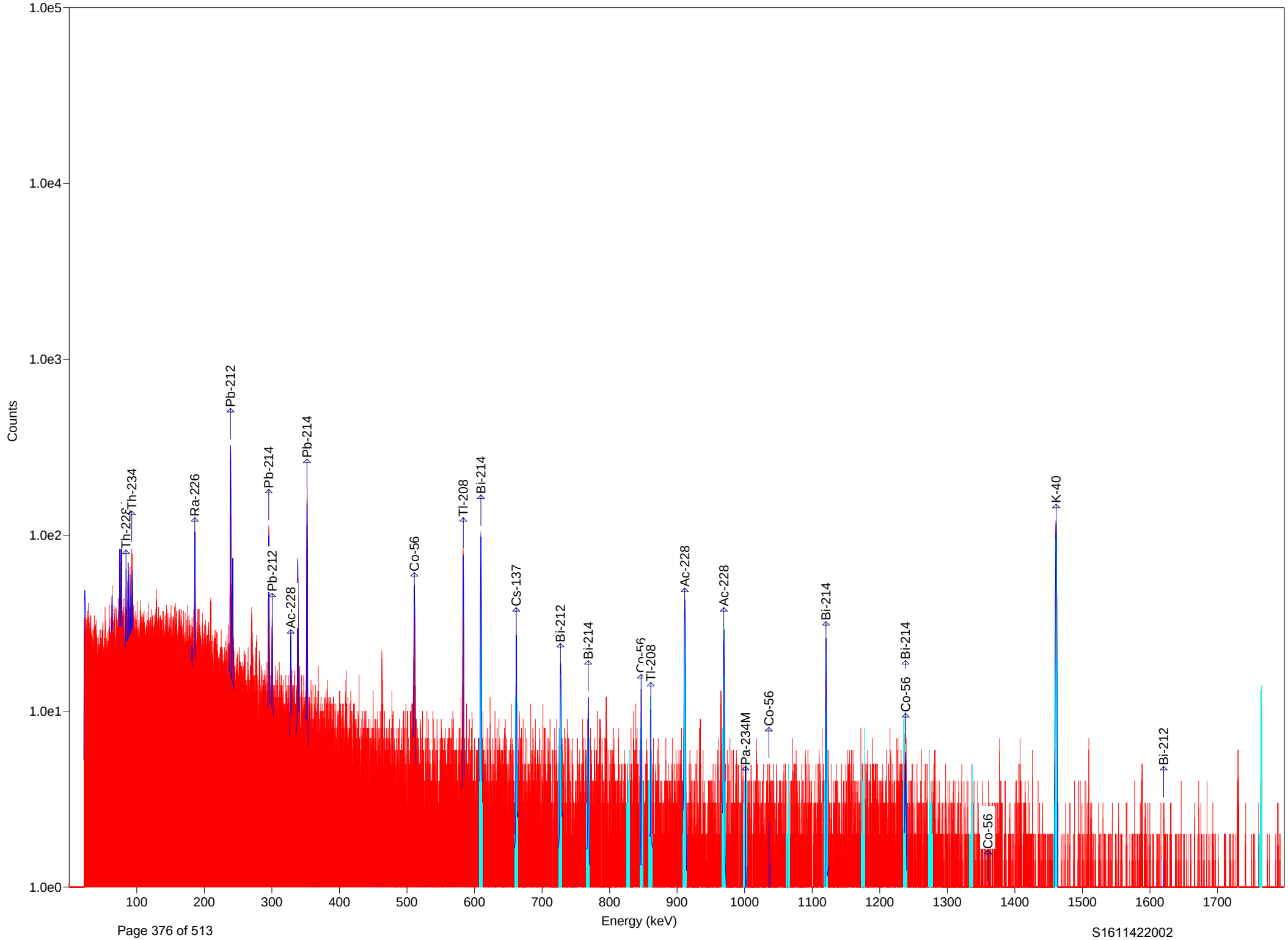


S1611422002

Detector #4 ACQ 09-Jan-2017 at 4:39:19 RT = 4531.1 LT = 4500.0
Rad Chem 1
S1611422-065A

ROI#	RANGE(keV)		GROSS	NET	+/-	CENTROID	FWHM	FW(1/5)M	LIBRARY	(keV)	µCi	+/-
1	606.78	611.61	560	410	28	609.38	1.33	1.74	Bi-214	609.31	0.0002	0.0000
2	659.24	664.07	90	-10	16	660.78	1.32	1.45	Cs-137	661.66	0.0000	0.0000
3	724.43	729.70	200	142	18	727.30	1.37	2.03	Bi-212	727.00	0.0005	0.0001
4	765.70	770.97	121	29	17	768.74	0.30	0.79	Bi-214	768.36	0.0002	0.0001
5	824.75	830.01	64	10	13	826.69	0.32	0.52	Co-60	826.28	0.0378	0.0491
6	844.94	850.21	114	22	17	847.28	0.44	0.91	Co-56	846.77	0.0000	0.0000
7	857.89	863.16	121	54	16	860.70	0.80	1.63	Tl-208	860.56	0.0001	0.0000
8	908.38	913.87	405	340	23	911.40	1.39	2.08	Ac-228	911.20	0.0004	0.0000
9	966.11	971.82	266	212	20	969.29	1.47	2.34	Ac-228	968.97	0.0004	0.0000
10	997.94	1003.65	57	12	13	1001.67	1.54	1.67	Pa-234M	1001.03	0.0005	0.0005
11	1060.94	1067.09	63	0	15	1062.04	2.30	2.50	No close library match!			
12	1117.36	1123.07	168	87	19	1120.49	0.51	1.24	Bi-214	1120.29	0.0002	0.0000
13	1172.46	1178.61	66	18	14	1174.18	0.36	1.95	Co-60	1173.24	0.0000	0.0000
14	1235.02	1241.17	107	49	16	1238.29	0.91	2.09	Co-56	1238.28	0.0000	0.0000
15	1271.90	1278.49	54	13	13	1273.54	1.83	2.25	No close library match!			
16	1331.84	1338.42	41	-11	14	1336.23	0.22	0.35	Co-60	1332.50	0.0000	0.0000
17	1457.63	1463.78	1121	1092	34	1461.11	2.02	2.61	K-40	1461.00	0.0052	0.0002
18	1761.27	1767.85	90	69	12	1764.29	0.26	0.48	Bi-214	1764.49	0.0003	0.0001

S1611422-066A. Real/Live Time = 4531/4500 (s).

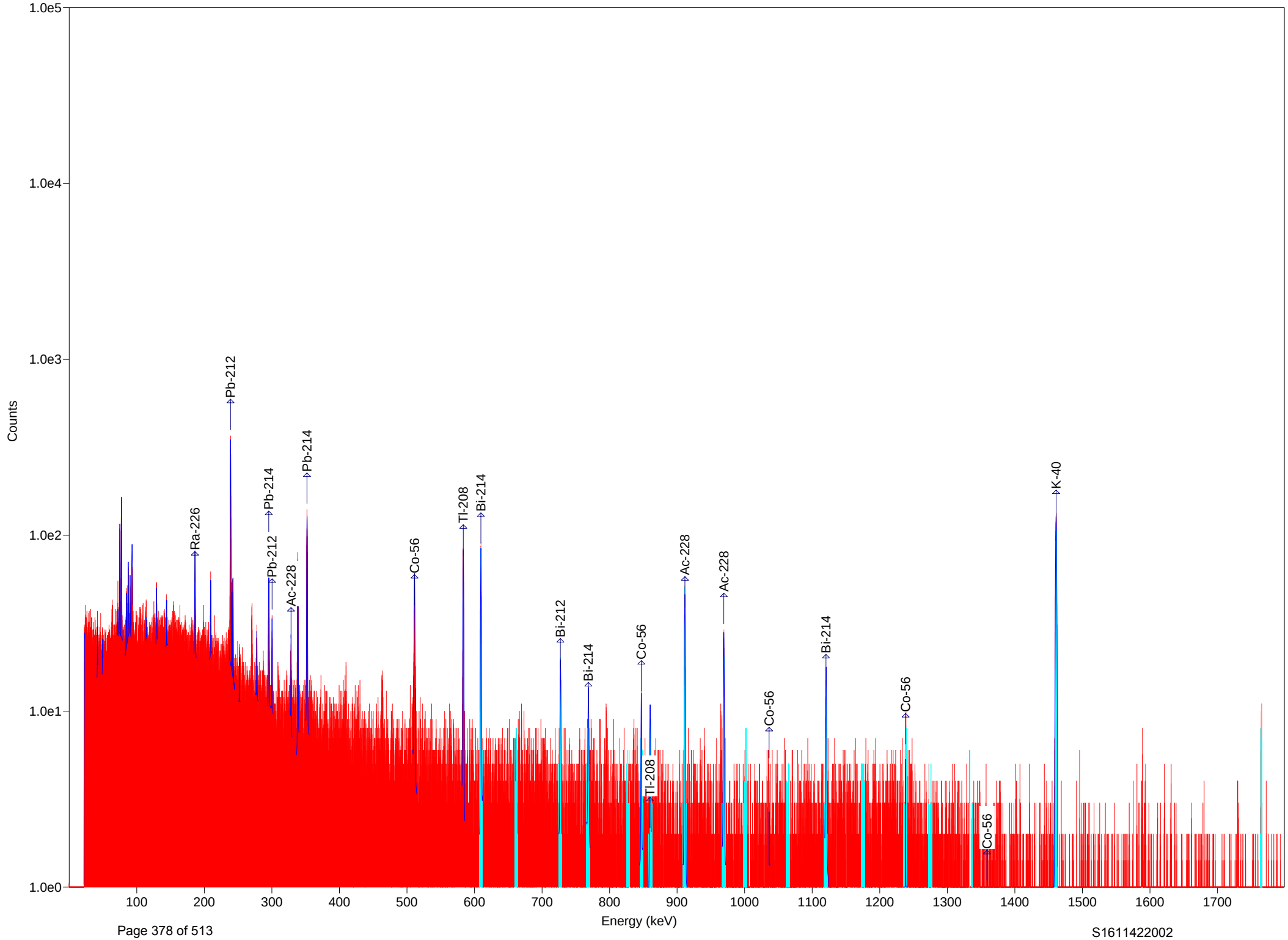


S1611422002

Detector #4 ACQ 09-Jan-2017 at 5:56:01 RT = 4531.1 LT = 4500.0
Rad Chem 1
S1611422-066A

ROI#	RANGE(keV)		GROSS	NET	+/-	CENTROID	FWHM	FW(1/5)M	LIBRARY	(keV)	µCi	+/-
1	606.78	611.61	685	566	30	609.42	1.15	1.72	Bi-214	609.31	0.0003	0.0000
2	659.24	664.07	204	135	18	661.76	1.11	1.82	Cs-137	661.66	0.0000	0.0000
3	724.43	729.70	191	58	21	727.38	1.25	1.70	Bi-212	727.00	0.0002	0.0001
4	765.70	770.97	115	61	15	768.29	0.52	1.31	Bi-214	768.36	0.0003	0.0001
5	824.75	830.01	76	18	14	826.39	0.45	0.68	Co-60	826.28	0.0680	0.0529
6	844.94	850.21	113	46	16	846.92	0.54	0.77	Co-56	846.77	0.0000	0.0000
7	857.89	863.16	114	39	16	860.42	0.46	1.91	Tl-208	860.56	0.0001	0.0000
8	908.38	913.87	344	288	21	911.33	1.74	2.48	Ac-228	911.20	0.0003	0.0000
9	966.11	971.82	252	184	20	968.98	1.33	1.73	Ac-228	968.97	0.0004	0.0000
10	997.94	1003.65	64	1	14	1001.56	0.44	1.30	Pa-234M	1001.03	0.0000	0.0006
11	1060.94	1067.09	57	-11	15	1064.89	0.72	1.08	No close library match!			
12	1117.36	1123.07	196	128	19	1120.17	1.06	2.57	Bi-214	1120.29	0.0003	0.0000
13	1172.46	1178.61	71	13	15	1177.04	0.29	0.51	Co-60	1173.24	0.0000	0.0000
14	1235.02	1241.17	128	36	19	1238.55	0.32	1.91	Co-56	1238.28	0.0000	0.0000
15	1271.90	1278.49	62	0	16	1273.22	0.22	0.35	No close library match!			
16	1331.84	1338.42	40	14	11	1336.67	0.22	0.35	Co-60	1332.50	0.0000	0.0000
17	1457.63	1463.78	1035	991	34	1461.08	1.67	2.65	K-40	1461.00	0.0047	0.0002
18	1761.27	1767.85	117	101	12	1765.36	1.38	2.39	Bi-214	1764.49	0.0004	0.0001

S1611422-067A. Real/Live Time = 4531/4500 (s).

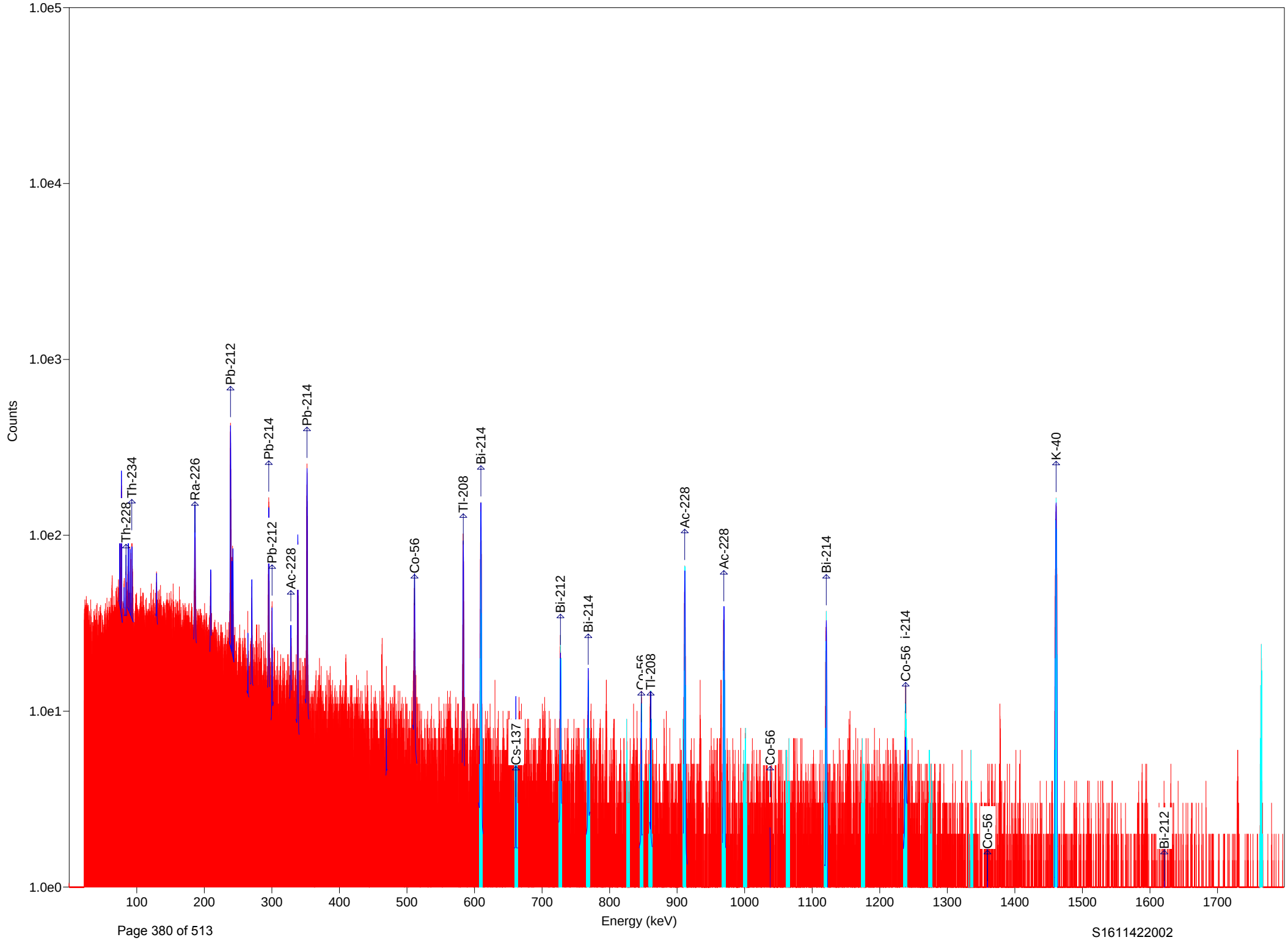


S1611422002

Detector #4 ACQ 09-Jan-2017 at 7:12:38 RT = 4531.6 LT = 4500.0
Rad Chem 1
S1611422-067A

ROI#	RANGE(keV)		GROSS	NET	+/-	CENTROID	FWHM	FW(1/5)M	LIBRARY	(keV)	µCi	+/-
1	606.78	611.61	591	503	27	609.41	1.17	1.88	Bi-214	609.31	0.0003	0.0000
2	659.24	664.07	94	33	14	662.14	0.91	1.25	Cs-137	661.66	0.0000	0.0000
3	724.43	729.70	193	114	19	727.49	1.35	2.02	Bi-212	727.00	0.0004	0.0001
4	765.70	770.97	132	49	17	768.25	1.25	2.46	Bi-214	768.36	0.0003	0.0001
5	824.75	830.01	74	3	15	826.06	0.26	0.75	Co-60	826.28	0.0113	0.0567
6	844.94	850.21	118	43	16	847.36	0.80	1.28	Co-56	846.77	0.0000	0.0000
7	857.89	863.16	103	49	14	860.72	1.38	1.60	Tl-208	860.56	0.0001	0.0000
8	908.38	913.87	353	301	21	911.33	1.57	2.39	Ac-228	911.20	0.0003	0.0000
9	966.11	971.82	235	176	19	968.99	1.39	2.40	Ac-228	968.97	0.0004	0.0000
10	997.94	1003.65	70	20	13	1002.13	0.26	0.46	Pa-234M	1001.03	0.0008	0.0005
11	1060.94	1067.09	53	5	13	1065.51	0.32	0.52	No close library match!			
12	1117.36	1123.07	157	94	17	1120.44	1.54	2.25	Bi-214	1120.29	0.0002	0.0000
13	1172.46	1178.61	74	1	16	1176.41	0.22	0.35	Co-60	1173.24	0.0000	0.0000
14	1235.02	1241.17	107	49	16	1237.82	1.70	2.13	Bi-214	1238.11	0.0004	0.0001
15	1271.90	1278.49	62	0	16	1272.78	3.29	3.42	No close library match!			
16	1331.84	1338.42	43	12	11	1333.15	0.25	0.72	Co-60	1332.50	0.0000	0.0000
17	1457.63	1463.78	1116	1082	34	1461.11	1.86	2.72	K-40	1461.00	0.0052	0.0002
18	1761.27	1767.85	87	71	11	1764.97	1.16	1.91	Bi-214	1764.49	0.0003	0.0000

S1611422-068A. Real/Live Time = 4539/4500 (s).

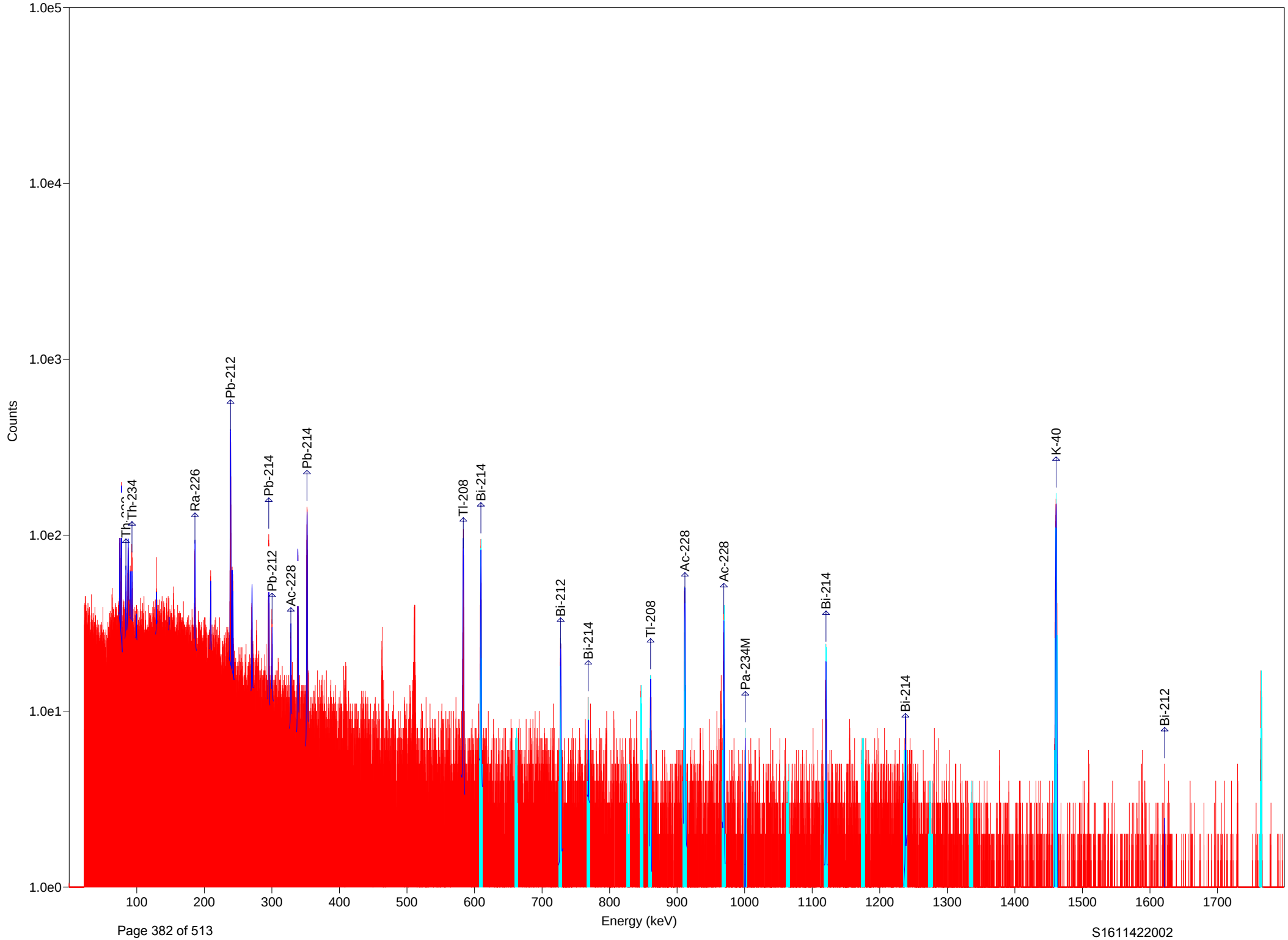


S1611422002

Detector #4 ACQ 09-Jan-2017 at 8:28:56 RT = 4539.0 LT = 4500.0
Rad Chem 1
S1611422-068A

ROI#	RANGE(keV)		GROSS	NET	+/-	CENTROID	FWHM	FW(1/5)M	LIBRARY	(keV)	µCi	+/-
1	606.78	611.61	990	894	34	609.42	1.31	1.85	Bi-214	609.31	0.0005	0.0000
2	659.24	664.07	100	27	15	660.66	0.42	0.64	Cs-137	661.66	0.0000	0.0000
3	724.43	729.70	227	148	19	727.18	1.02	1.92	Bi-212	727.00	0.0005	0.0001
4	765.70	770.97	162	95	17	768.31	0.91	1.68	Bi-214	768.36	0.0005	0.0001
5	824.75	830.01	75	-17	16	825.40	0.25	0.40	Co-60	826.28	0.0000	0.0605
6	844.94	850.21	120	32	17	847.20	0.51	1.92	Co-56	846.77	0.0000	0.0000
7	857.89	863.16	143	93	15	860.94	0.29	1.48	Tl-208	860.56	0.0002	0.0000
8	908.38	913.87	481	403	25	911.37	1.32	2.02	Ac-228	911.20	0.0005	0.0000
9	966.11	971.82	328	215	24	969.11	1.35	1.99	Ac-228	968.97	0.0004	0.0000
10	997.94	1003.65	80	26	14	1001.02	0.61	0.80	Pa-234M	1001.03	0.0011	0.0006
11	1060.94	1067.09	76	13	15	1065.52	0.29	0.50	No close library match!			
12	1117.36	1123.07	265	184	21	1120.44	1.33	1.89	Bi-214	1120.29	0.0005	0.0001
13	1172.46	1178.61	70	36	12	1174.00	0.27	1.54	Co-60	1173.24	0.0000	0.0000
14	1235.02	1241.17	162	85	19	1238.08	2.04	2.59	Bi-214	1238.11	0.0006	0.0001
15	1271.90	1278.49	65	3	16	1273.00	0.88	1.01	No close library match!			
16	1331.84	1338.42	43	7	12	1335.13	0.22	0.35	Co-60	1332.50	0.0000	0.0000
17	1457.63	1463.78	1308	1284	37	1461.11	1.68	2.70	K-40	1461.00	0.0061	0.0002
18	1761.27	1767.85	176	160	15	1764.98	1.40	2.41	Bi-214	1764.49	0.0007	0.0001

S1611422-069A. Real/Live Time = 4539/4500 (s).

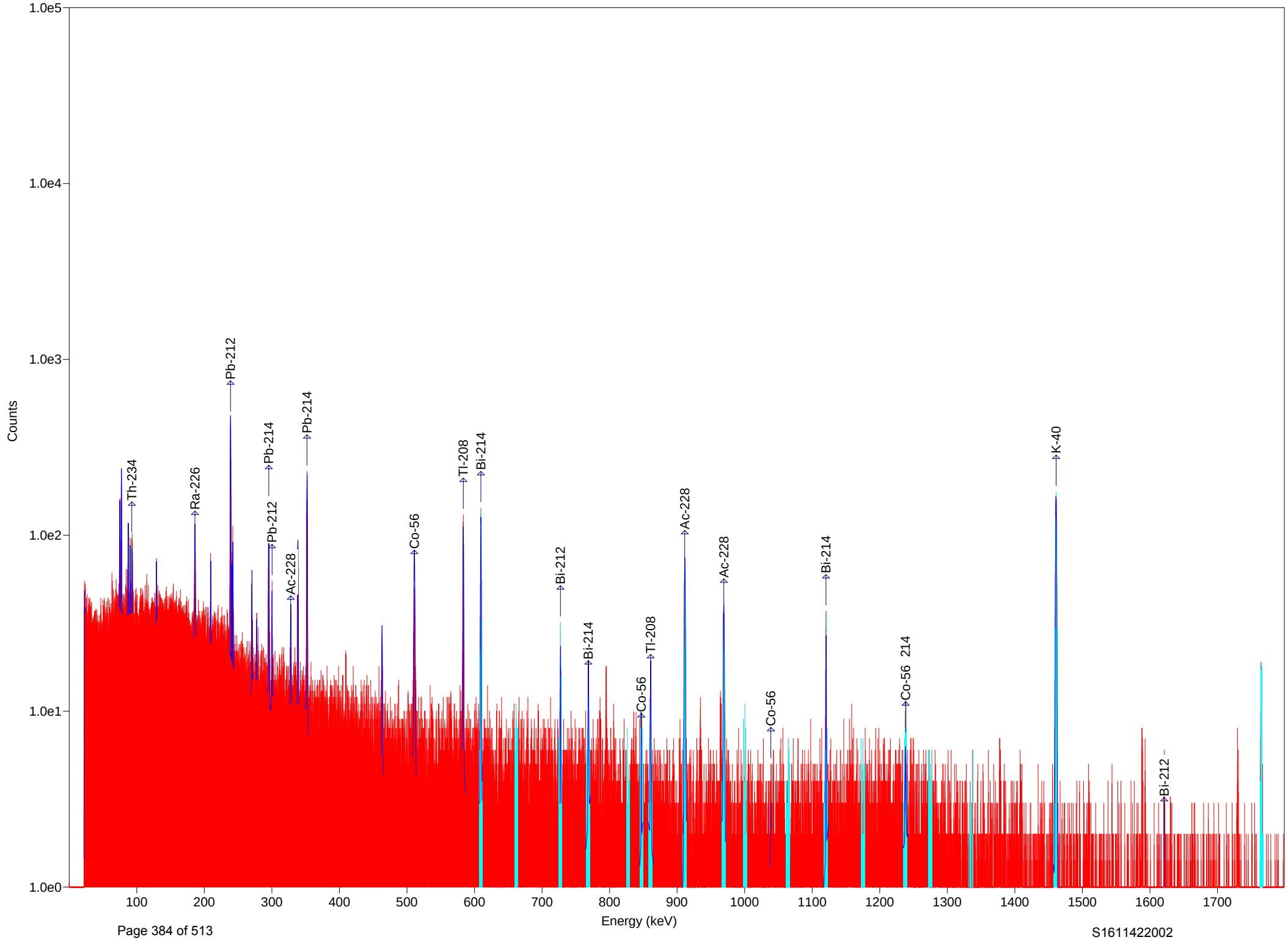


S1611422002

Detector #4 ACQ 09-Jan-2017 at 9:45:22 RT = 4539.7 LT = 4500.0
Rad Chem 1
S1611422-069A

ROI#	RANGE(keV)		GROSS	NET	+/-	CENTROID	FWHM	FW(1/5)M	LIBRARY	(keV)	µCi	+/-
1	606.78	611.61	612	489	28	609.44	1.17	1.73	Bi-214	609.31	0.0002	0.0000
2	659.24	664.07	102	29	15	660.71	2.22	3.56	Cs-137	661.66	0.0000	0.0000
3	724.43	729.70	201	143	18	727.28	1.12	1.99	Bi-212	727.00	0.0005	0.0001
4	765.70	770.97	126	30	18	768.25	0.41	0.60	Bi-214	768.36	0.0002	0.0001
5	824.75	830.01	57	-22	15	825.62	0.33	0.53	Co-60	826.28	0.0000	0.0567
6	844.94	850.21	123	40	17	846.37	0.38	0.58	Co-56	846.77	0.0000	0.0000
7	857.89	863.16	142	67	17	860.90	1.20	2.33	Tl-208	860.56	0.0002	0.0000
8	908.38	913.87	399	312	24	911.25	1.39	1.94	Ac-228	911.20	0.0004	0.0000
9	966.11	971.82	281	218	20	969.31	1.51	2.10	Ac-228	968.97	0.0004	0.0000
10	997.94	1003.65	73	28	13	1000.77	0.38	1.61	Pa-234M	1001.03	0.0011	0.0005
11	1060.94	1067.09	77	0	17	1065.43	0.41	0.56	No close library match!			
12	1117.36	1123.07	178	137	16	1120.43	1.12	2.06	Bi-214	1120.29	0.0004	0.0000
13	1172.46	1178.61	86	-1	18	1174.00	2.41	2.55	Co-60	1173.24	0.0000	0.0000
14	1235.02	1241.17	114	41	17	1238.61	0.43	1.90	Co-56	1238.28	0.0000	0.0000
15	1271.90	1278.49	67	10	15	1273.88	4.17	4.30	No close library match!			
16	1331.84	1338.42	47	21	11	1335.67	2.43	2.55	Co-60	1332.50	0.0000	0.0000
17	1457.63	1463.78	1303	1250	38	1461.07	1.49	2.49	K-40	1461.00	0.0060	0.0002
18	1761.27	1767.85	127	117	12	1764.82	1.16	2.89	Bi-214	1764.49	0.0005	0.0001

S1611422-070A. Real/Live Time = 4534/4500 (s).

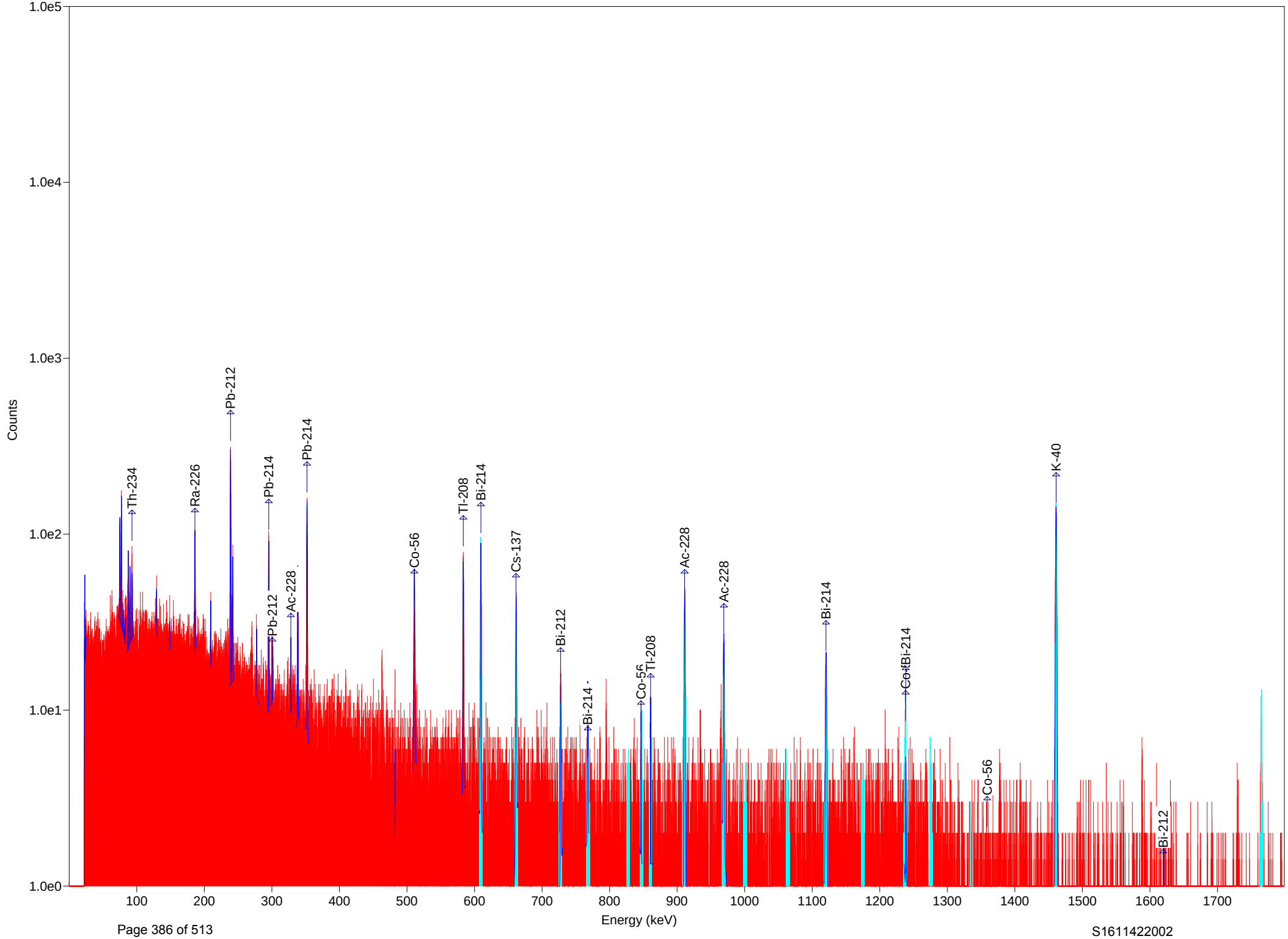


S1611422002

Detector #4 ACQ 09-Jan-2017 at 11:01:49 RT = 4534.6 LT = 4500.0
Rad Chem 1
S1611422-070A

ROI#	RANGE(keV)		GROSS	NET	+/-	CENTROID	FWHM	FW(1/5)M	LIBRARY	(keV)	µCi	+/-
1	606.78	611.61	854	758	32	609.41	1.07	1.85	Bi-214	609.31	0.0004	0.0000
2	659.24	664.07	117	10	17	661.44	0.24	0.39	Cs-137	661.66	0.0000	0.0000
3	724.43	729.70	250	129	22	727.44	0.56	2.17	Bi-212	727.00	0.0005	0.0001
4	765.70	770.97	171	58	20	768.69	1.09	1.39	Bi-214	768.36	0.0003	0.0001
5	824.75	830.01	77	-15	16	826.06	0.22	0.35	Co-60	826.28	0.0000	0.0605
6	844.94	850.21	133	50	17	847.21	0.43	1.46	Co-56	846.77	0.0000	0.0000
7	857.89	863.16	156	73	18	860.65	1.19	1.82	Tl-208	860.56	0.0002	0.0000
8	908.38	913.87	558	484	27	911.34	1.59	2.28	Ac-228	911.20	0.0005	0.0000
9	966.11	971.82	336	282	21	969.08	1.62	2.11	Ac-228	968.97	0.0006	0.0000
10	997.94	1003.65	93	12	17	1000.54	0.27	0.49	Pa-234M	1001.03	0.0005	0.0007
11	1060.94	1067.09	86	13	17	1064.67	0.29	0.53	No close library match!			
12	1117.36	1123.07	236	146	21	1120.42	0.81	1.56	Bi-214	1120.29	0.0004	0.0001
13	1172.46	1178.61	83	-23	19	1175.09	0.27	0.48	Co-60	1173.24	0.0000	0.0000
14	1235.02	1241.17	147	50	20	1238.64	0.55	1.82	Co-56	1238.28	0.0000	0.0000
15	1271.90	1278.49	75	-13	18	1277.17	0.26	0.44	No close library match!			
16	1331.84	1338.42	49	2	14	1337.54	0.22	0.35	Co-60	1332.50	0.0000	0.0000
17	1457.63	1463.78	1426	1382	39	1461.06	1.61	2.65	K-40	1461.00	0.0066	0.0002
18	1761.27	1767.85	176	160	15	1764.60	1.53	3.18	Bi-214	1764.49	0.0007	0.0001

S1611422-071A. Real/Live Time = 4529/4500 (s).

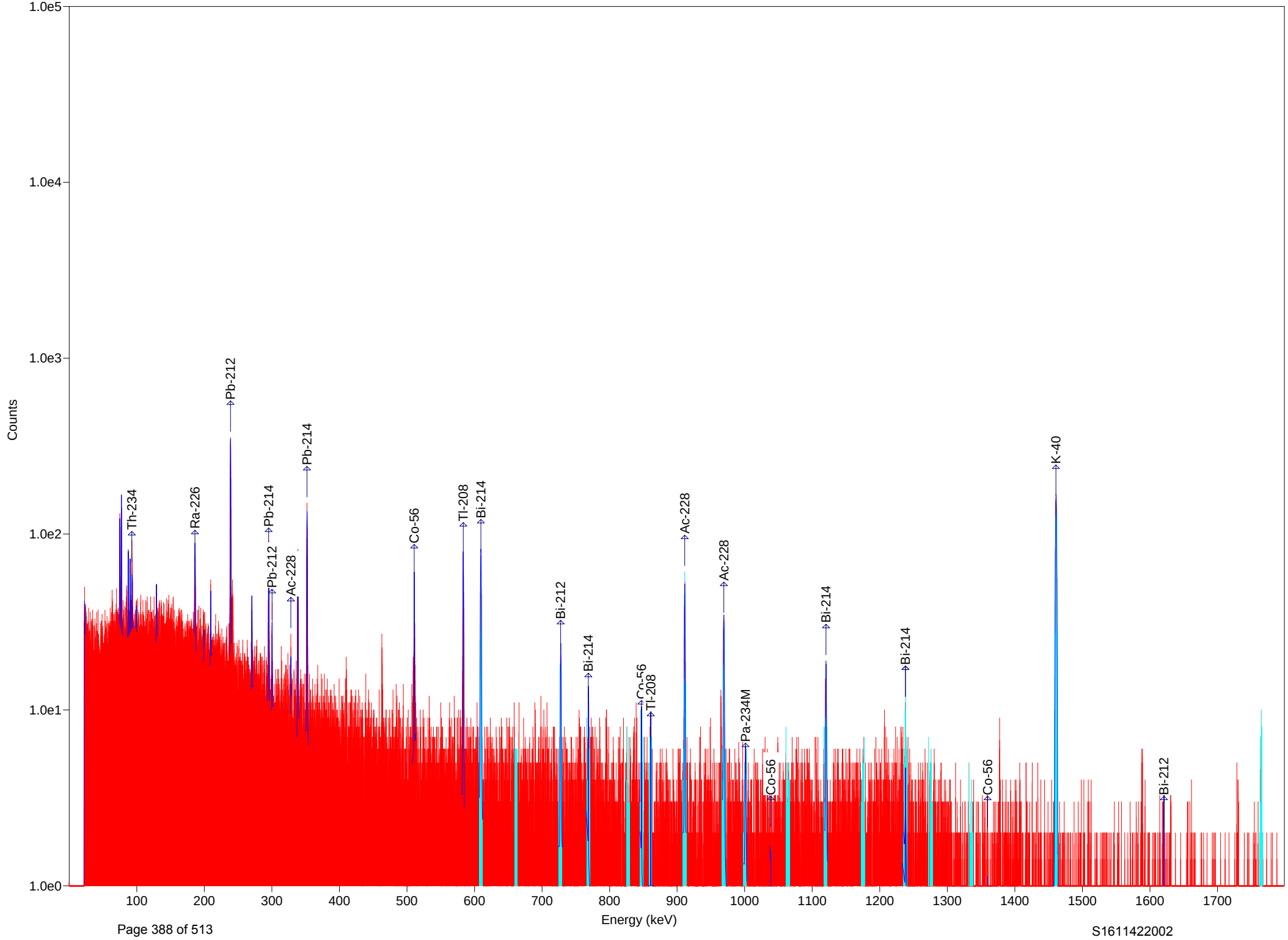


S1611422002

Detector #4 ACQ 09-Jan-2017 at 12:18:07 RT = 4529.0 LT = 4500.0
Rad Chem 1
S1611422-071A

ROI#	RANGE(keV)		GROSS	NET	+/-	CENTROID	FWHM	FW(1/5)M	LIBRARY	(keV)	µCi	+/-
1	606.78	611.61	607	538	27	609.39	1.07	1.67	Bi-214	609.31	0.0003	0.0000
2	659.24	664.07	328	228	22	661.73	1.20	1.79	Cs-137	661.66	0.0001	0.0000
3	724.43	729.70	157	82	17	727.37	0.92	2.29	Bi-212	727.00	0.0003	0.0001
4	765.70	770.97	137	20	19	767.93	0.26	1.28	Bi-214	768.36	0.0001	0.0001
5	824.75	830.01	64	-7	14	827.82	0.22	0.35	Co-60	826.28	0.0000	0.0529
6	844.94	850.21	101	13	17	846.68	1.40	1.61	Co-56	846.77	0.0000	0.0000
7	857.89	863.16	103	49	14	860.09	0.37	2.22	Tl-208	860.56	0.0001	0.0000
8	908.38	913.87	359	290	22	911.28	1.42	2.26	Ac-228	911.20	0.0003	0.0000
9	966.11	971.82	228	156	20	968.99	1.31	1.71	Ac-228	968.97	0.0003	0.0000
10	997.94	1003.65	71	8	15	1001.56	1.55	1.77	Pa-234M	1001.03	0.0003	0.0006
11	1060.94	1067.09	63	-19	17	Could not properly fit the peak.						
12	1117.36	1123.07	187	110	19	1120.33	1.74	2.21	Bi-214	1120.29	0.0003	0.0000
13	1172.46	1178.61	62	9	14	1175.09	2.41	2.55	Co-60	1173.24	0.0000	0.0000
14	1235.02	1241.17	135	62	18	1238.00	0.56	1.45	Bi-214	1238.11	0.0004	0.0001
15	1271.90	1278.49	57	0	15	1274.54	0.22	0.35	No close library match!			
16	1331.84	1338.42	49	-8	15	1332.93	3.95	4.08	Co-60	1332.50	0.0000	0.0000
17	1457.63	1463.78	1222	1178	36	1461.09	1.75	2.82	K-40	1461.00	0.0056	0.0002
18	1761.27	1767.85	110	89	13	1765.23	0.87	2.92	Bi-214	1764.49	0.0004	0.0001

S1611422-072A. Real/Live Time = 4529/4500 (s).

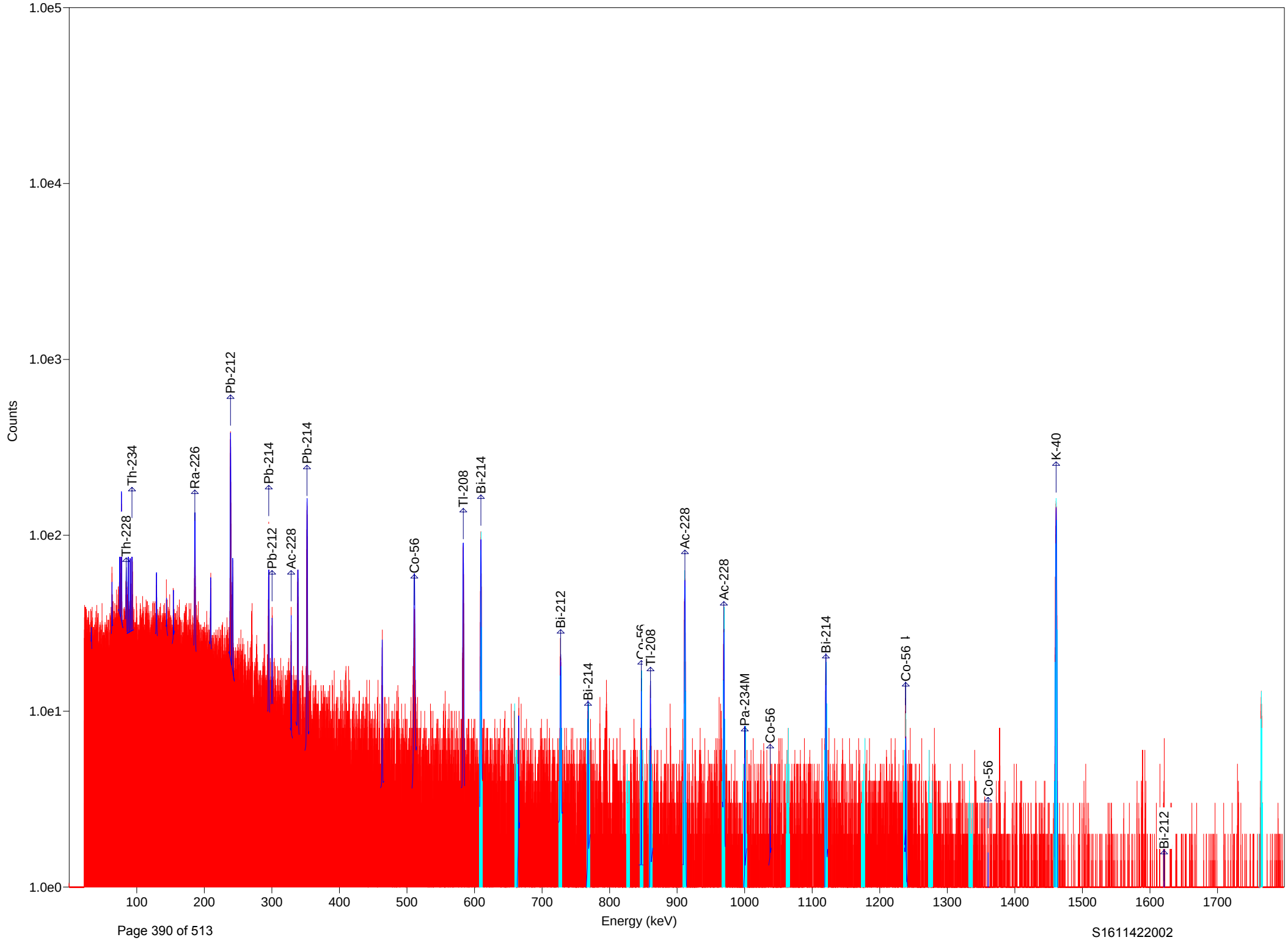


S1611422002

Detector #4 ACQ 09-Jan-2017 at 13:34:51 RT = 4529.9 LT = 4500.0
Rad Chem 1
S1611422-072A

ROI#	RANGE(keV)		GROSS	NET	+/-	CENTROID	FWHM	FW(1/5)M	LIBRARY	(keV)	µCi	+/-
1	606.78	611.61	575	491	27	609.41	1.41	1.97	Bi-214	609.31	0.0003	0.0000
2	659.24	664.07	100	-7	17	663.30	0.42	0.56	Cs-137	661.66	0.0000	0.0000
3	724.43	729.70	200	112	19	727.24	1.23	2.32	Bi-212	727.00	0.0004	0.0001
4	765.70	770.97	128	28	18	769.25	0.27	0.71	Bi-214	768.36	0.0002	0.0001
5	824.75	830.01	69	36	11	825.67	0.46	0.71	Co-60	826.28	0.1361	0.0416
6	844.94	850.21	101	26	16	846.36	1.00	1.24	Co-56	846.77	0.0000	0.0000
7	857.89	863.16	119	36	17	861.38	0.25	2.05	Tl-208	860.56	0.0001	0.0000
8	908.38	913.87	414	353	23	911.23	1.36	2.15	Ac-228	911.20	0.0004	0.0000
9	966.11	971.82	287	210	21	969.04	1.38	2.17	Ac-228	968.97	0.0004	0.0000
10	997.94	1003.65	81	31	14	1002.62	0.48	0.72	Pa-234M	1001.03	0.0013	0.0006
11	1060.94	1067.09	85	-7	18	1065.33	0.27	0.70	No close library match!			
12	1117.36	1123.07	188	98	20	1120.41	1.27	2.22	Bi-214	1120.29	0.0003	0.0001
13	1172.46	1178.61	82	34	14	1176.66	0.29	0.61	Co-60	1173.24	0.0000	0.0000
14	1235.02	1241.17	125	77	16	1238.40	0.69	1.71	Co-56	1238.28	0.0000	0.0000
15	1271.90	1278.49	64	-8	17	1275.86	0.22	0.35	No close library match!			
16	1331.84	1338.42	50	-22	16	1336.23	0.22	0.35	Co-60	1332.50	0.0000	0.0000
17	1457.63	1463.78	1439	1405	39	1461.03	1.85	2.72	K-40	1461.00	0.0067	0.0002
18	1761.27	1767.85	91	75	11	1765.22	1.45	2.87	Bi-214	1764.49	0.0003	0.0000

S1611422-073A. Real/Live Time = 4530/4500 (s).

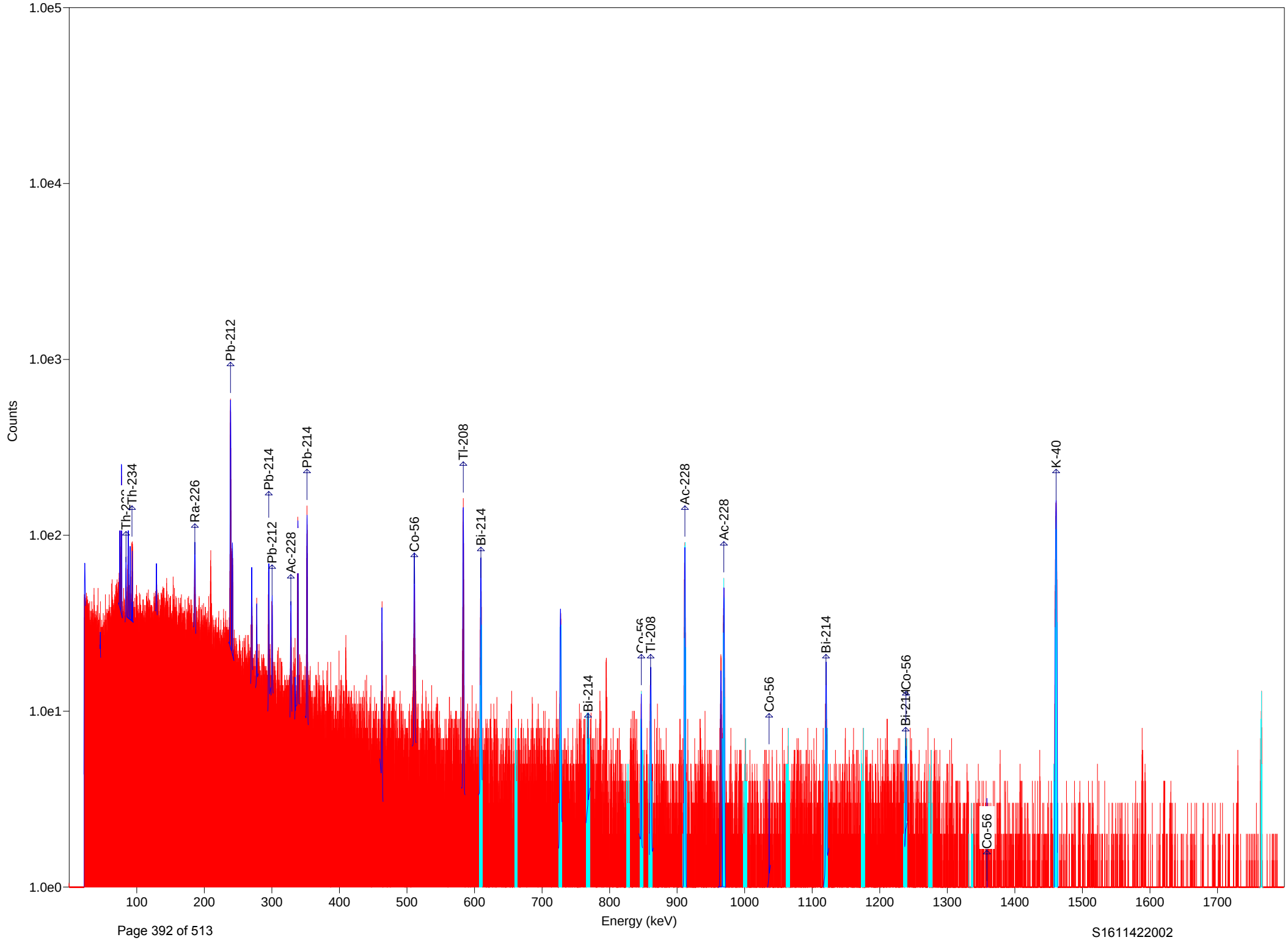


S1611422002

Detector #4 ACQ 09-Jan-2017 at 14:51:23 RT = 4531.0 LT = 4500.0
Rad Chem 1
S1611422-073A

ROI#	RANGE(keV)		GROSS	NET	+/-	CENTROID	FWHM	FW(1/5)M	LIBRARY	(keV)	µCi	+/-
1	606.78	611.61	670	559	29	609.43	1.29	1.95	Bi-214	609.31	0.0003	0.0000
2	659.24	664.07	89	-34	17	Could not properly fit the peak.						
3	724.43	729.70	205	126	19	727.38	1.33	1.77	Bi-212	727.00	0.0005	0.0001
4	765.70	770.97	131	56	17	768.67	0.56	2.27	Bi-214	768.36	0.0003	0.0001
5	824.75	830.01	74	16	14	826.06	3.51	3.64	Co-60	826.28	0.0605	0.0529
6	844.94	850.21	127	52	17	847.34	0.32	1.50	Co-56	846.77	0.0000	0.0000
7	857.89	863.16	119	56	15	860.40	0.77	2.17	Tl-208	860.56	0.0001	0.0000
8	908.38	913.87	423	358	23	911.28	1.38	1.93	Ac-228	911.20	0.0004	0.0000
9	966.11	971.82	268	191	21	969.13	1.03	1.80	Ac-228	968.97	0.0004	0.0000
10	997.94	1003.65	95	9	17	1001.01	0.24	0.39	Pa-234M	1001.03	0.0004	0.0007
11	1060.94	1067.09	76	13	15	1064.45	0.24	0.39	No close library match!			
12	1117.36	1123.07	184	116	18	1120.33	1.19	3.32	Bi-214	1120.29	0.0003	0.0000
13	1172.46	1178.61	66	-11	16	1177.95	0.22	0.35	Co-60	1173.24	0.0000	0.0000
14	1235.02	1241.17	116	68	15	1238.31	0.86	1.54	Co-56	1238.28	0.0000	0.0000
15	1271.90	1278.49	65	-2	16	1273.22	0.26	0.44	No close library match!			
16	1331.84	1338.42	48	12	12	1332.71	4.28	4.48	Co-60	1332.50	0.0000	0.0000
17	1457.63	1463.78	1222	1174	36	1461.16	1.50	2.49	K-40	1461.00	0.0056	0.0002
18	1761.27	1767.85	106	90	12	1764.76	0.88	2.68	Bi-214	1764.49	0.0004	0.0001

S1611422-074A. Real/Live Time = 4531/4500 (s).

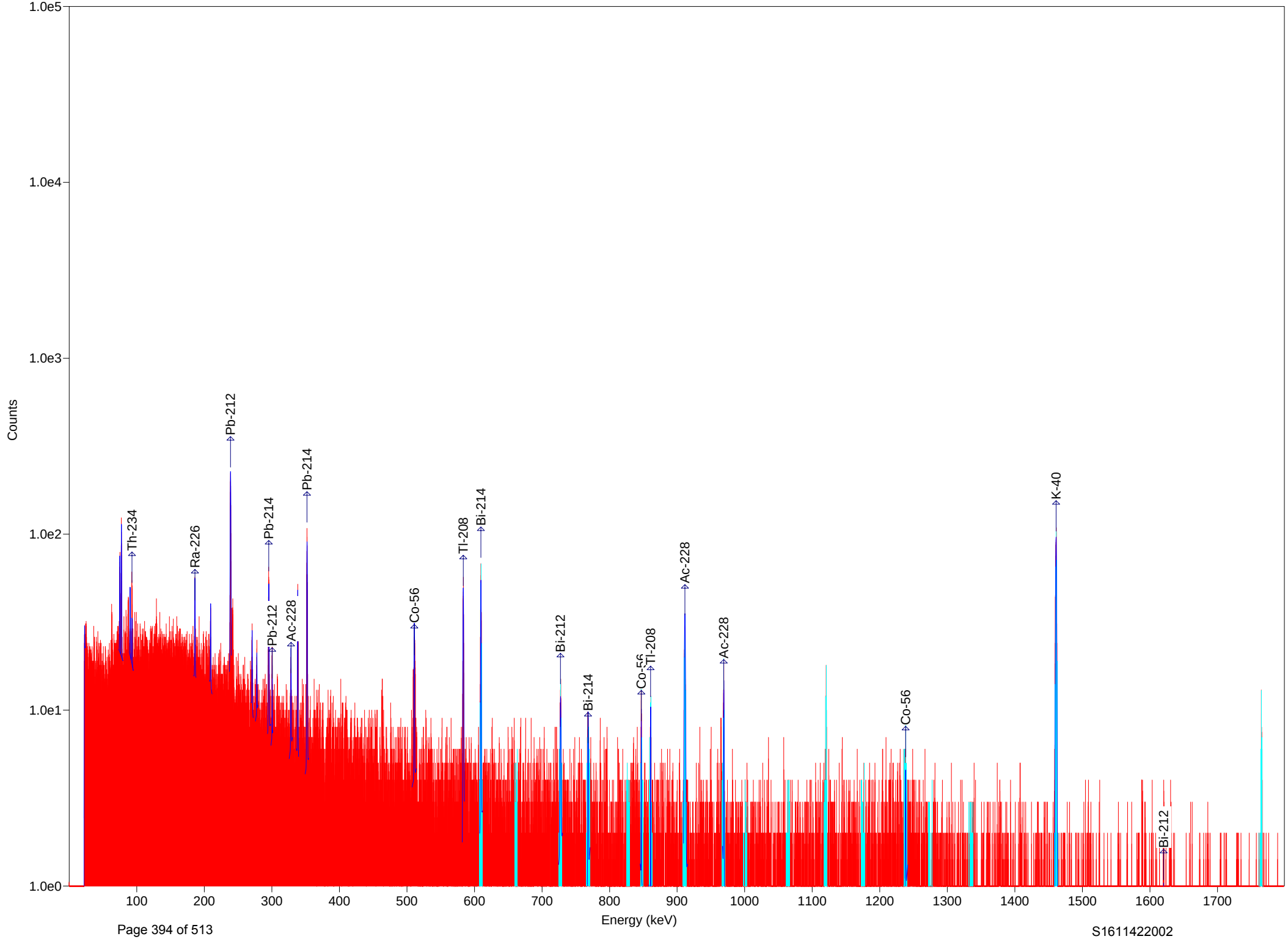


S1611422002

Detector #4 ACQ 09-Jan-2017 at 16:07:42 RT = 4531.7 LT = 4500.0
Rad Chem 1
S1611422-074A

ROI#	RANGE(keV)		GROSS	NET	+/-	CENTROID	FWHM	FW(1/5)M	LIBRARY	(keV)	µCi	+/-
1	606.78	611.61	533	418	27	609.45	1.32	2.05	Bi-214	609.31	0.0002	0.0000
2	659.24	664.07	110	26	16	660.25	1.07	1.35	Cs-137	661.66	0.0000	0.0000
3	724.43	729.70	287	224	20	727.35	1.59	2.31	Bi-212	727.00	0.0008	0.0001
4	765.70	770.97	159	51	19	767.68	0.97	1.39	Bi-214	768.36	0.0003	0.0001
5	824.75	830.01	75	4	15	825.84	2.30	2.50	Co-60	826.28	0.0151	0.0567
6	844.94	850.21	124	57	16	846.88	0.72	2.24	Co-56	846.77	0.0000	0.0000
7	857.89	863.16	150	75	17	860.68	1.40	2.01	Tl-208	860.56	0.0002	0.0000
8	908.38	913.87	630	578	27	911.35	1.30	2.28	Ac-228	911.20	0.0007	0.0000
9	966.11	971.82	416	344	24	969.14	1.69	2.20	Ac-228	968.97	0.0007	0.0000
10	997.94	1003.65	83	-12	17	1001.01	0.27	0.48	Pa-234M	1001.03	0.0000	0.0007
11	1060.94	1067.09	94	2	18	1064.45	0.37	0.88	No close library match!			
12	1117.36	1123.07	169	79	19	1120.65	1.22	2.17	Bi-214	1120.29	0.0002	0.0000
13	1172.46	1178.61	75	-22	18	1175.75	0.25	0.40	Co-60	1173.24	0.0000	0.0000
14	1235.02	1241.17	119	42	18	1238.66	0.63	2.70	Co-56	1238.28	0.0000	0.0000
15	1271.90	1278.49	62	10	15	1276.18	0.39	0.55	No close library match!			
16	1331.84	1338.42	39	-18	14	Could not properly fit the peak.						
17	1457.63	1463.78	1366	1313	38	1461.08	1.81	2.82	K-40	1461.00	0.0063	0.0002
18	1761.27	1767.85	97	76	12	1765.41	0.38	2.63	Bi-214	1764.49	0.0003	0.0001

S1611422-075A. Real/Live Time = 4525/4500 (s).

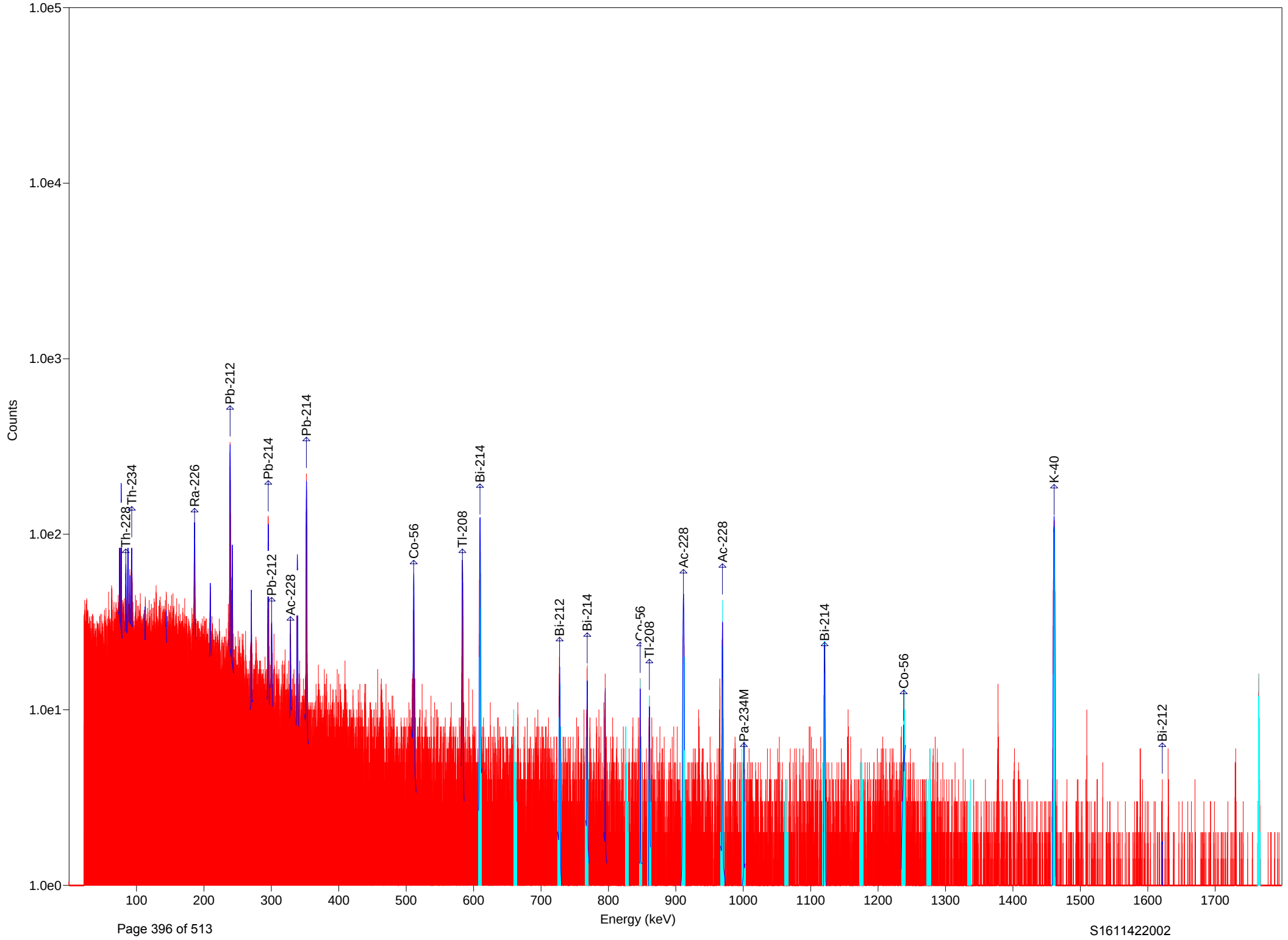


S1611422002

Detector #4 ACQ 09-Jan-2017 at 17:24:02 RT = 4525.6 LT = 4500.0
Rad Chem 1
S1611422-075A

ROI#	RANGE(keV)		GROSS	NET	+/-	CENTROID	FWHM	FW(1/5)M	LIBRARY	(keV)	µCi	+/-
1	606.78	611.61	405	336	23	609.33	1.01	1.85	Bi-214	609.31	0.0002	0.0000
2	659.24	664.07	59	9	12	663.22	0.29	0.50	Cs-137	661.66	0.0000	0.0000
3	724.43	729.70	138	80	16	727.33	1.34	1.61	Bi-212	727.00	0.0003	0.0001
4	765.70	770.97	109	51	15	767.73	0.30	1.02	Bi-214	768.36	0.0003	0.0001
5	824.75	830.01	54	25	10	826.06	0.22	0.35	Co-60	826.28	0.0945	0.0378
6	844.94	850.21	99	61	13	846.70	0.41	1.16	Co-56	846.77	0.0000	0.0000
7	857.89	863.16	92	54	13	861.17	0.34	1.23	Tl-208	860.56	0.0001	0.0000
8	908.38	913.87	276	202	21	911.27	1.80	2.38	Ac-228	911.20	0.0002	0.0000
9	966.11	971.82	133	92	15	969.16	0.38	1.86	Ac-228	968.97	0.0002	0.0000
10	997.94	1003.65	52	-7	14	1000.68	0.52	0.95	Pa-234M	1001.03	0.0000	0.0006
11	1060.94	1067.09	50	16	12	1063.36	2.41	2.55	No close library match!			
12	1117.36	1123.07	114	78	14	1120.66	0.36	1.10	Bi-214	1120.29	0.0002	0.0000
13	1172.46	1178.61	48	0	13	1176.67	0.32	0.52	Co-60	1173.24	0.0000	0.0000
14	1235.02	1241.17	87	29	15	1238.51	0.34	1.33	Co-56	1238.28	0.0000	0.0000
15	1271.90	1278.49	35	-12	13	1277.61	0.22	0.35	No close library match!			
16	1331.84	1338.42	40	4	12	1333.59	4.28	4.48	Co-60	1332.50	0.0000	0.0000
17	1457.63	1463.78	828	799	30	1461.10	1.58	2.62	K-40	1461.00	0.0038	0.0001
18	1761.27	1767.85	83	62	12	1765.02	0.38	2.20	Bi-214	1764.49	0.0003	0.0001

S1611422-076A. Real/Live Time = 4527/4500 (s).

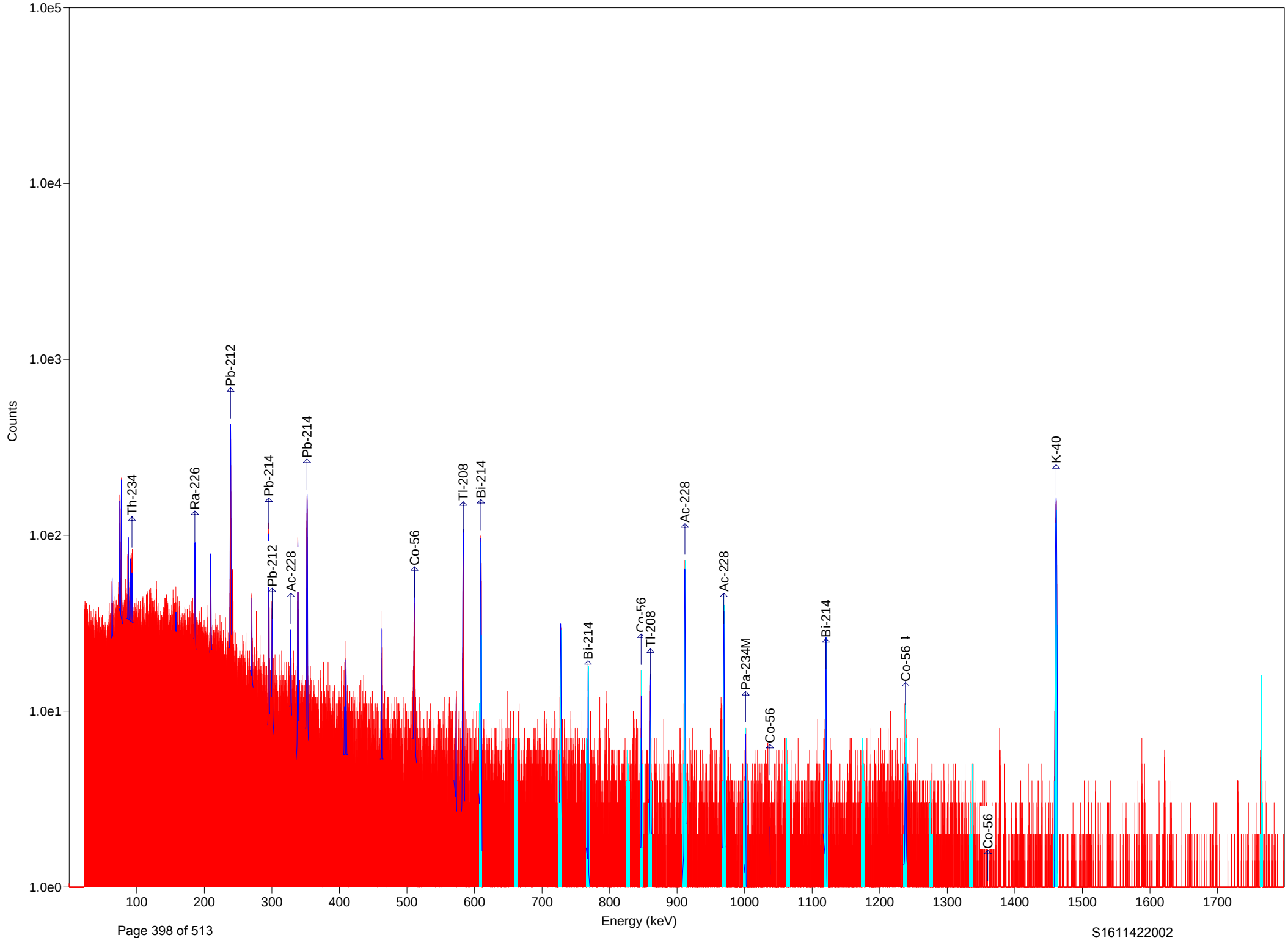


S1611422002

Detector #4 ACQ 09-Jan-2017 at 18:40:25 RT = 4527.1 LT = 4500.0
Rad Chem 1
S1611422-076A

ROI#	RANGE(keV)		GROSS	NET	+/-	CENTROID	FWHM	FW(1/5)M	LIBRARY	(keV)	µCi	+/-
1	606.78	611.61	848	737	32	609.44	1.20	1.85	Bi-214	609.31	0.0004	0.0000
2	659.24	664.07	96	-15	17	661.22	0.33	0.53	Cs-137	661.66	0.0000	0.0000
3	724.43	729.70	172	101	18	727.40	1.08	1.69	Bi-212	727.00	0.0004	0.0001
4	765.70	770.97	142	59	17	768.50	0.98	1.63	Bi-214	768.36	0.0003	0.0001
5	824.75	830.01	66	3	14	825.62	0.26	0.42	Co-60	826.28	0.0113	0.0529
6	844.94	850.21	112	70	14	846.92	0.61	1.54	Co-56	846.77	0.0000	0.0000
7	857.89	863.16	106	27	16	860.82	0.58	1.67	Tl-208	860.56	0.0001	0.0000
8	908.38	913.87	351	286	22	911.40	1.89	2.32	Ac-228	911.20	0.0003	0.0000
9	966.11	971.82	255	205	19	969.16	1.24	2.29	Ac-228	968.97	0.0004	0.0000
10	997.94	1003.65	91	28	15	1001.10	0.41	0.61	Pa-234M	1001.03	0.0011	0.0006
11	1060.94	1067.09	55	11	13	1062.26	1.37	1.58	No close library match!			
12	1117.36	1123.07	207	144	19	1120.30	0.68	1.54	Bi-214	1120.29	0.0004	0.0000
13	1172.46	1178.61	68	15	14	1173.52	1.64	1.84	Co-60	1173.24	0.0000	0.0000
14	1235.02	1241.17	136	63	18	1238.77	0.41	0.78	Co-56	1238.28	0.0000	0.0000
15	1271.90	1278.49	60	-7	16	1276.95	0.26	0.44	No close library match!			
16	1331.84	1338.42	39	13	10	1337.11	0.27	0.92	Co-60	1332.50	0.0000	0.0000
17	1457.63	1463.78	1087	1039	34	1461.08	1.68	2.74	K-40	1461.00	0.0050	0.0002
18	1761.27	1767.85	112	102	12	1764.96	1.28	1.91	Bi-214	1764.49	0.0004	0.0001

S1611422-077A. Real/Live Time = 4528/4500 (s).

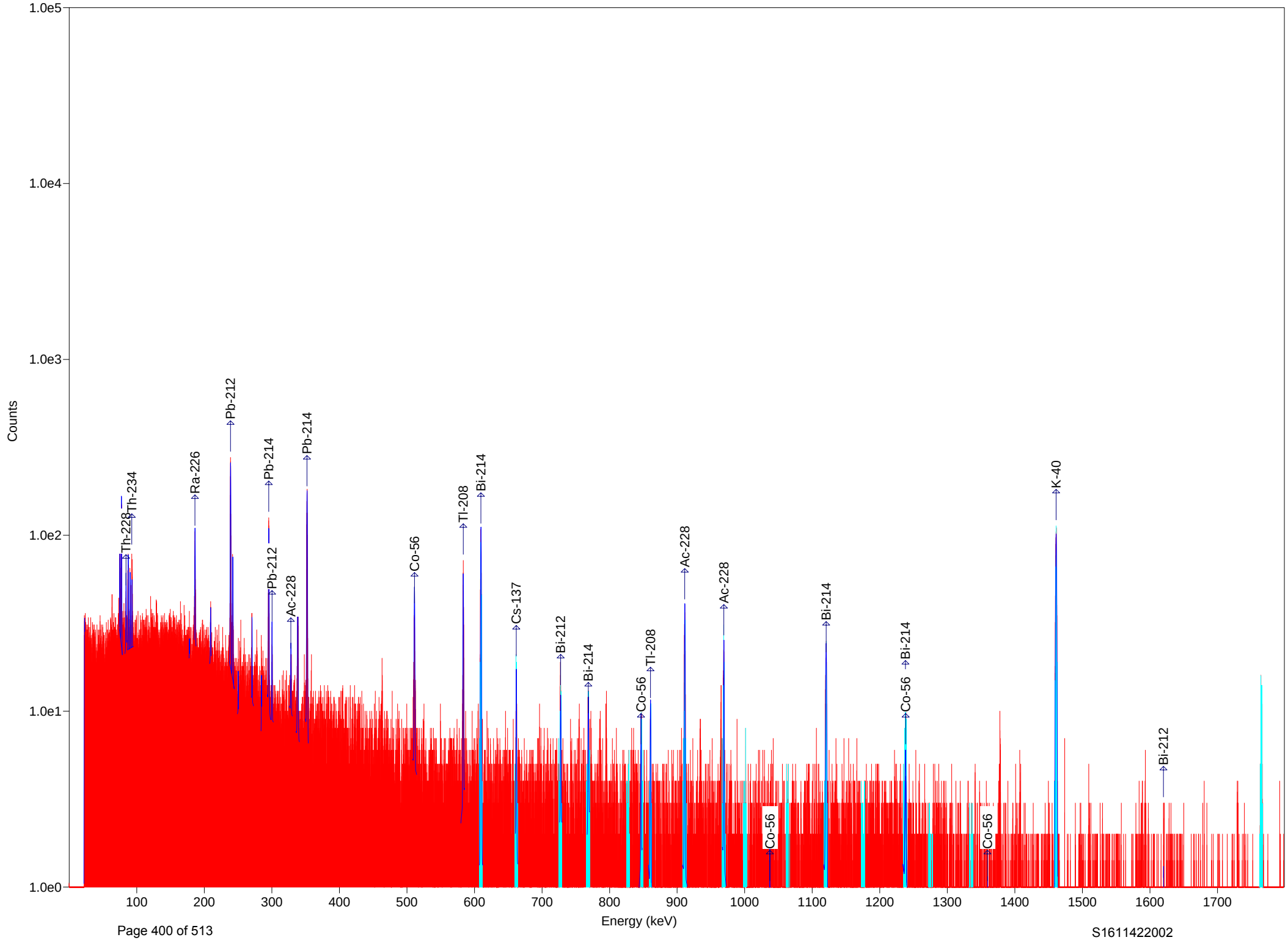


S1611422002

Detector #4 ACQ 09-Jan-2017 at 19:56:50 RT = 4528.2 LT = 4500.0
Rad Chem 1
S1611422-077A

ROI#	RANGE(keV)		GROSS	NET	+/-	CENTROID	FWHM	FW(1/5)M	LIBRARY	(keV)	µCi	+/-
1	606.78	611.61	656	549	29	609.53	1.06	1.73	Bi-214	609.31	0.0003	0.0000
2	659.24	664.07	103	30	15	661.77	1.09	1.28	Cs-137	661.66	0.0000	0.0000
3	724.43	729.70	258	179	20	727.53	1.24	2.26	Bi-212	727.00	0.0007	0.0001
4	765.70	770.97	149	49	19	768.79	0.45	0.79	Bi-214	768.36	0.0003	0.0001
5	824.75	830.01	86	7	16	825.94	0.48	0.72	Co-60	826.28	0.0265	0.0605
6	844.94	850.21	126	47	17	846.71	0.36	0.97	Co-56	846.77	0.0000	0.0000
7	857.89	863.16	146	67	17	860.46	0.92	1.74	Tl-208	860.56	0.0002	0.0000
8	908.38	913.87	492	427	25	911.35	1.42	2.31	Ac-228	911.20	0.0005	0.0000
9	966.11	971.82	316	217	23	969.24	1.26	2.28	Ac-228	968.97	0.0004	0.0000
10	997.94	1003.65	87	33	14	1001.23	1.04	1.21	Pa-234M	1001.03	0.0013	0.0006
11	1060.94	1067.09	81	13	16	1062.26	1.54	1.67	No close library match!			
12	1117.36	1123.07	240	154	21	1120.08	1.01	2.30	Bi-214	1120.29	0.0004	0.0001
13	1172.46	1178.61	92	15	17	1173.15	1.53	1.67	Co-60	1173.24	0.0000	0.0000
14	1235.02	1241.17	128	80	16	1237.20	0.30	2.86	Bi-214	1238.11	0.0006	0.0001
15	1271.90	1278.49	65	34	12	1277.33	0.78	1.38	No close library match!			
16	1331.84	1338.42	42	1	13	1335.13	2.20	2.33	Co-60	1332.50	0.0000	0.0000
17	1457.63	1463.78	1399	1355	39	1461.11	1.88	2.66	K-40	1461.00	0.0065	0.0002
18	1761.27	1767.85	122	101	13	1764.96	1.45	2.61	Bi-214	1764.49	0.0004	0.0001

S1611422-078A. Real/Live Time = 4529/4500 (s).

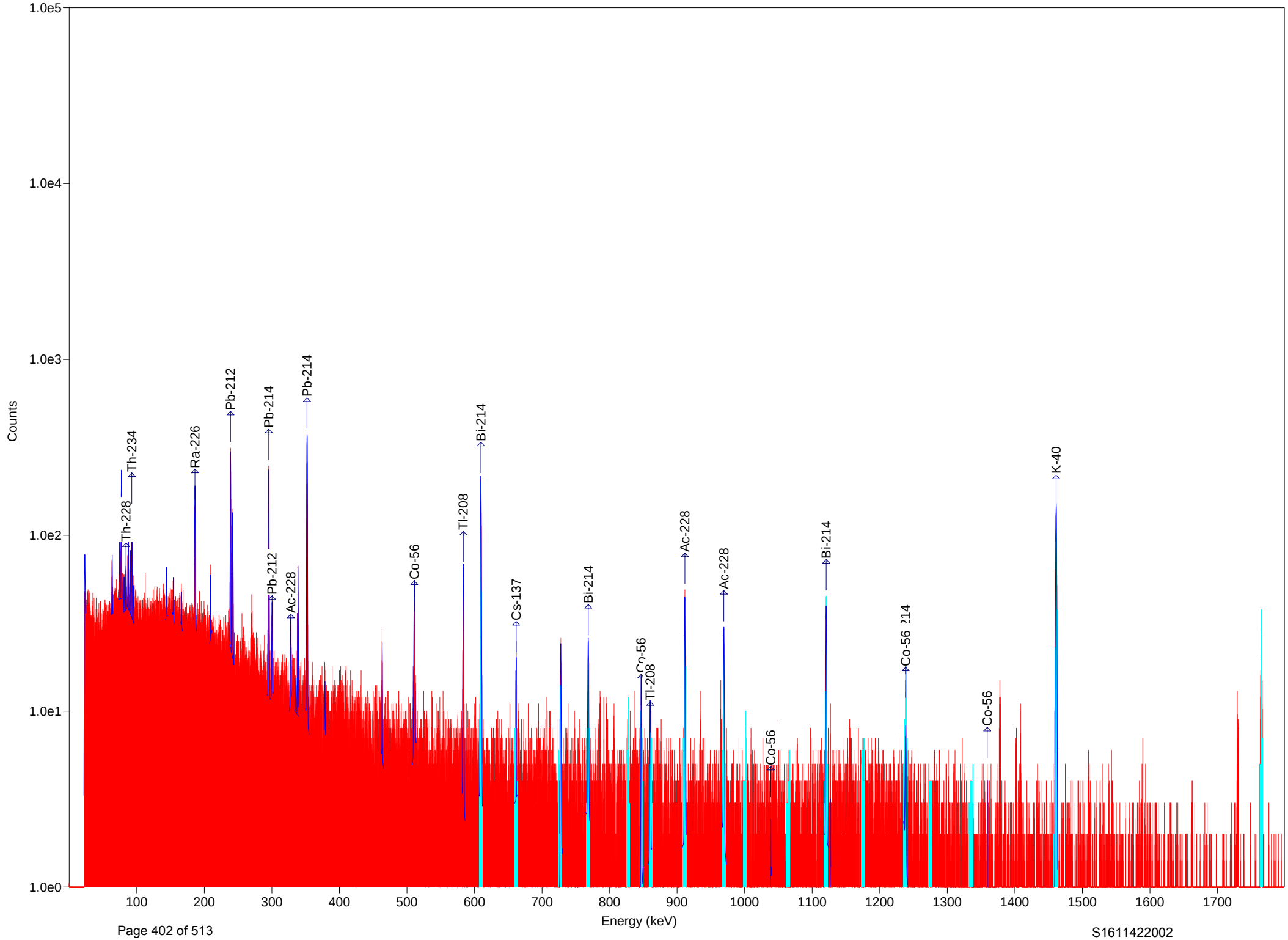


S1611422002

Detector #4 ACQ 09-Jan-2017 at 21:13:01 RT = 4529.8 LT = 4500.0
Rad Chem 1
S1611422-078A

ROI#	RANGE(keV)		GROSS	NET	+/-	CENTROID	FWHM	FW(1/5)M	LIBRARY	(keV)	µCi	+/-
1	606.78	611.61	723	612	30	609.43	1.15	1.90	Bi-214	609.31	0.0003	0.0000
2	659.24	664.07	141	103	14	661.68	0.89	1.24	Cs-137	661.66	0.0000	0.0000
3	724.43	729.70	164	60	19	727.33	1.03	1.71	Bi-212	727.00	0.0002	0.0001
4	765.70	770.97	139	31	19	768.33	1.04	1.22	Bi-214	768.36	0.0002	0.0001
5	824.75	830.01	69	-2	14	828.48	0.22	0.35	Co-60	826.28	0.0000	0.0529
6	844.94	850.21	96	33	15	847.10	0.76	1.30	Co-56	846.77	0.0000	0.0000
7	857.89	863.16	94	52	13	860.86	1.09	1.65	Tl-208	860.56	0.0001	0.0000
8	908.38	913.87	303	221	22	911.14	1.09	1.93	Ac-228	911.20	0.0002	0.0000
9	966.11	971.82	215	147	19	969.21	1.57	1.92	Ac-228	968.97	0.0003	0.0000
10	997.94	1003.65	71	8	15	1001.48	0.38	0.83	Pa-234M	1001.03	0.0003	0.0006
11	1060.94	1067.09	57	9	13	1062.08	0.32	1.09	No close library match!			
12	1117.36	1123.07	206	134	19	1120.53	1.70	2.04	Bi-214	1120.29	0.0003	0.0000
13	1172.46	1178.61	52	-16	15	Could not properly fit the peak.						
14	1235.02	1241.17	129	71	17	1238.03	0.49	1.46	Bi-214	1238.11	0.0005	0.0001
15	1271.90	1278.49	36	-5	12	1273.00	1.10	1.23	No close library match!			
16	1331.84	1338.42	31	21	7	1332.71	4.36	4.51	Co-60	1332.50	0.0000	0.0000
17	1457.63	1463.78	881	847	31	1461.09	1.76	2.54	K-40	1461.00	0.0040	0.0001
18	1761.27	1767.85	139	139	11	1764.94	1.65	2.73	Bi-214	1764.49	0.0006	0.0000

S1611422-079A. Real/Live Time = 4530/4500 (s).

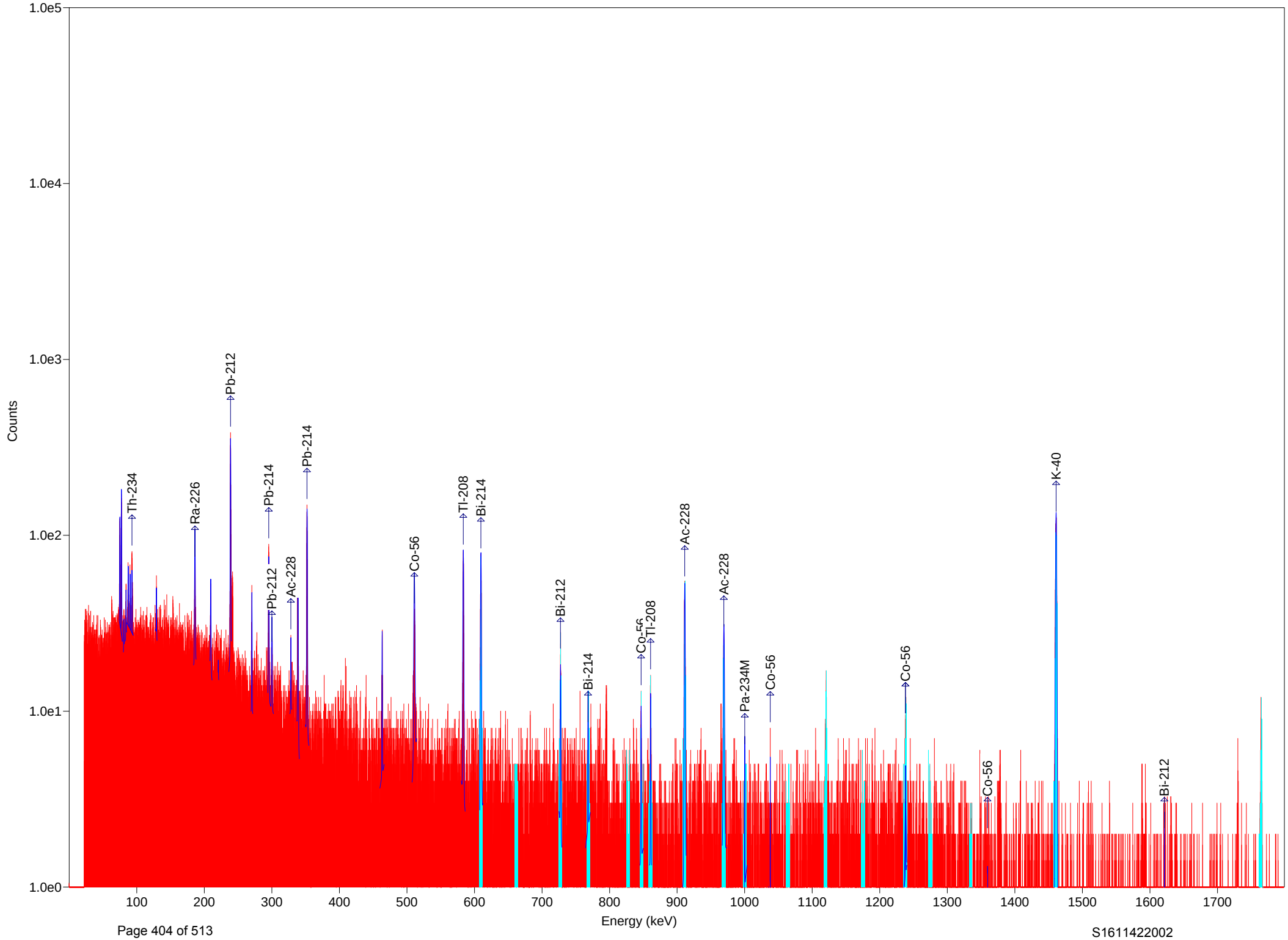


S1611422002

Detector #4 ACQ 09-Jan-2017 at 22:29:17 RT = 4530.5 LT = 4500.0
Rad Chem 1
S1611422-079A

ROI#	RANGE(keV)		GROSS	NET	+/-	CENTROID	FWHM	FW(1/5)M	LIBRARY	(keV)	µCi	+/-
1	606.78	611.61	1420	1305	40	609.40	1.28	1.85	Bi-214	609.31	0.0007	0.0000
2	659.24	664.07	207	77	21	662.27	0.28	1.67	Cs-137	661.66	0.0000	0.0000
3	724.43	729.70	187	70	20	727.56	1.31	1.76	Bi-212	727.00	0.0003	0.0001
4	765.70	770.97	219	131	20	768.56	1.40	1.73	Bi-214	768.36	0.0007	0.0001
5	824.75	830.01	99	16	16	827.60	0.23	0.37	Co-60	826.28	0.0605	0.0605
6	844.94	850.21	128	61	16	847.01	0.73	0.98	Co-56	846.77	0.0000	0.0000
7	857.89	863.16	127	56	16	860.97	1.12	1.26	Tl-208	860.56	0.0001	0.0000
8	908.38	913.87	353	271	23	911.53	1.33	2.09	Ac-228	911.20	0.0003	0.0000
9	966.11	971.82	256	161	22	969.08	1.21	2.27	Ac-228	968.97	0.0003	0.0000
10	997.94	1003.65	96	28	16	1001.19	0.45	0.96	Pa-234M	1001.03	0.0011	0.0006
11	1060.94	1067.09	76	18	15	1065.45	1.28	1.43	No close library match!			
12	1117.36	1123.07	341	251	23	1120.73	1.03	2.19	Bi-214	1120.29	0.0006	0.0001
13	1172.46	1178.61	91	-1	18	1174.21	2.67	2.85	Co-60	1173.24	0.0000	0.0000
14	1235.02	1241.17	191	123	19	1238.43	1.40	2.72	Co-56	1238.28	0.0001	0.0000
15	1271.90	1278.49	71	4	16	1272.56	4.61	4.74	No close library match!			
16	1331.84	1338.42	54	-24	17	1334.69	0.22	0.35	Co-60	1332.50	0.0000	0.0000
17	1457.63	1463.78	1257	1184	38	1461.19	1.61	2.68	K-40	1461.00	0.0057	0.0002
18	1761.27	1767.85	288	278	17	1764.88	1.74	2.96	Bi-214	1764.49	0.0012	0.0001

S1611422-080A. Real/Live Time = 4525/4500 (s).

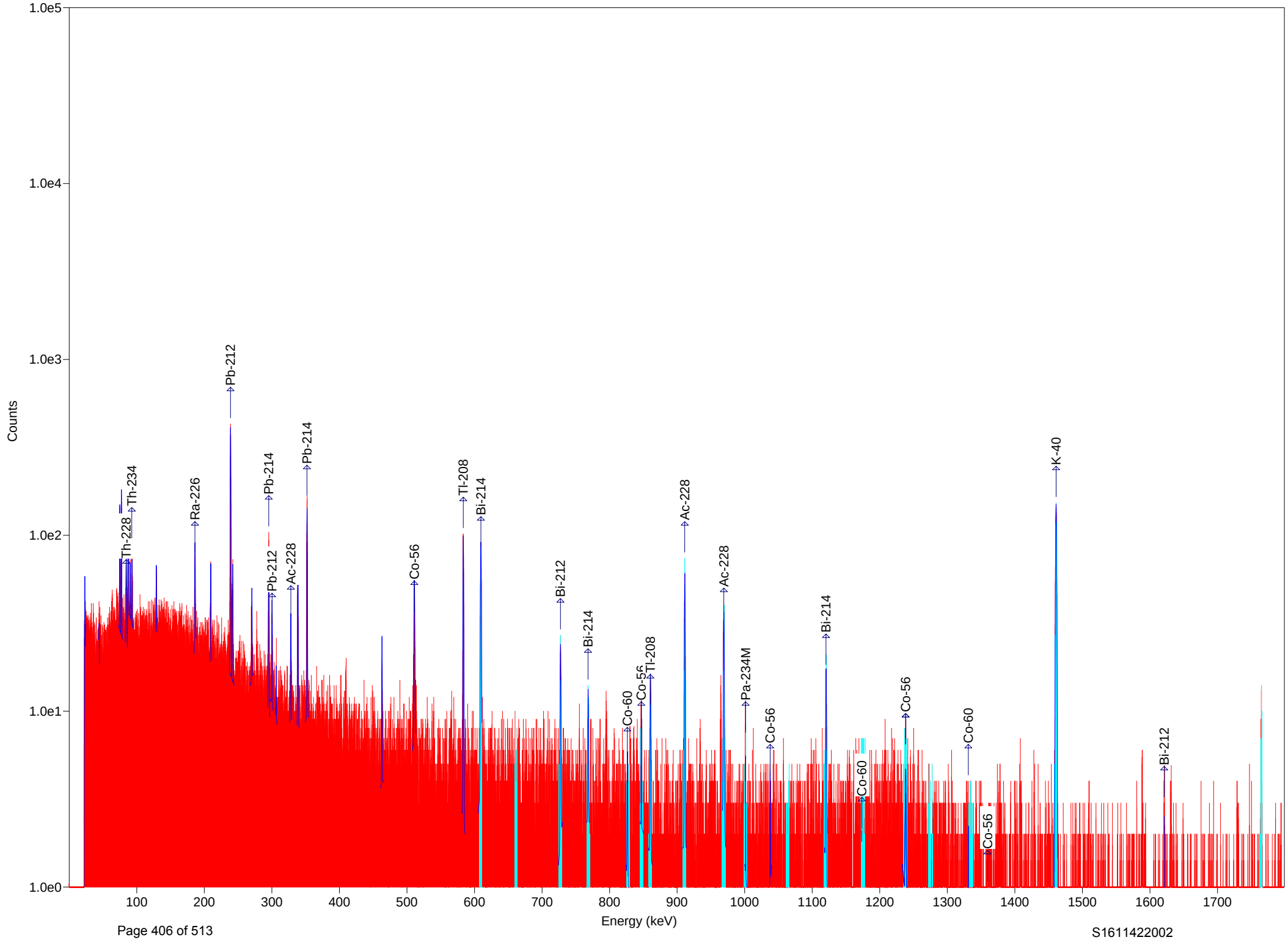


S1611422002

Detector #4 ACQ 09-Jan-2017 at 23:45:51 RT = 4525.7 LT = 4500.0
Rad Chem 1
S1611422-080A

ROI#	RANGE(keV)		GROSS	NET	+/-	CENTROID	FWHM	FW(1/5)M	LIBRARY (keV)		µCi	+/-
1	606.78	611.61	561	454	27	609.43	1.24	1.78	Bi-214	609.31	0.0002	0.0000
2	659.24	664.07	82	-10	15	Could not properly fit the peak.						
3	724.43	729.70	197	126	18	727.50	0.94	1.81	Bi-212	727.00	0.0005	0.0001
4	765.70	770.97	148	52	18	768.72	0.53	1.12	Bi-214	768.36	0.0003	0.0001
5	824.75	830.01	71	-50	18	829.14	0.22	0.35	Co-60	826.28	0.0000	0.0680
6	844.94	850.21	104	62	13	846.68	1.40	1.71	Co-56	846.77	0.0000	0.0000
7	857.89	863.16	118	64	15	860.73	0.41	1.75	Tl-208	860.56	0.0002	0.0000
8	908.38	913.87	412	334	24	911.30	1.33	2.09	Ac-228	911.20	0.0004	0.0000
9	966.11	971.82	255	187	20	969.00	1.75	2.34	Ac-228	968.97	0.0004	0.0000
10	997.94	1003.65	75	30	13	1000.24	2.45	2.94	Pa-234M	1001.03	0.0012	0.0005
11	1060.94	1067.09	67	-1	16	1064.89	0.71	0.92	No close library match!			
12	1117.36	1123.07	149	95	16	1120.80	0.74	2.31	Bi-214	1120.29	0.0002	0.0000
13	1172.46	1178.61	54	-4	14	1174.00	0.26	0.44	Co-60	1173.24	0.0000	0.0000
14	1235.02	1241.17	120	38	18	1238.82	0.43	1.56	Co-56	1238.28	0.0000	0.0000
15	1271.90	1278.49	51	-21	16	1274.10	1.10	1.23	No close library match!			
16	1331.84	1338.42	34	-7	12	1334.25	2.52	2.72	Co-60	1332.50	0.0000	0.0000
17	1457.63	1463.78	1147	1113	35	1461.08	1.67	2.80	K-40	1461.00	0.0053	0.0002
18	1761.27	1767.85	94	84	11	1764.77	1.14	2.71	Bi-214	1764.49	0.0004	0.0000

S1611422-080AD. Real/Live Time = 4528/4500 (s).

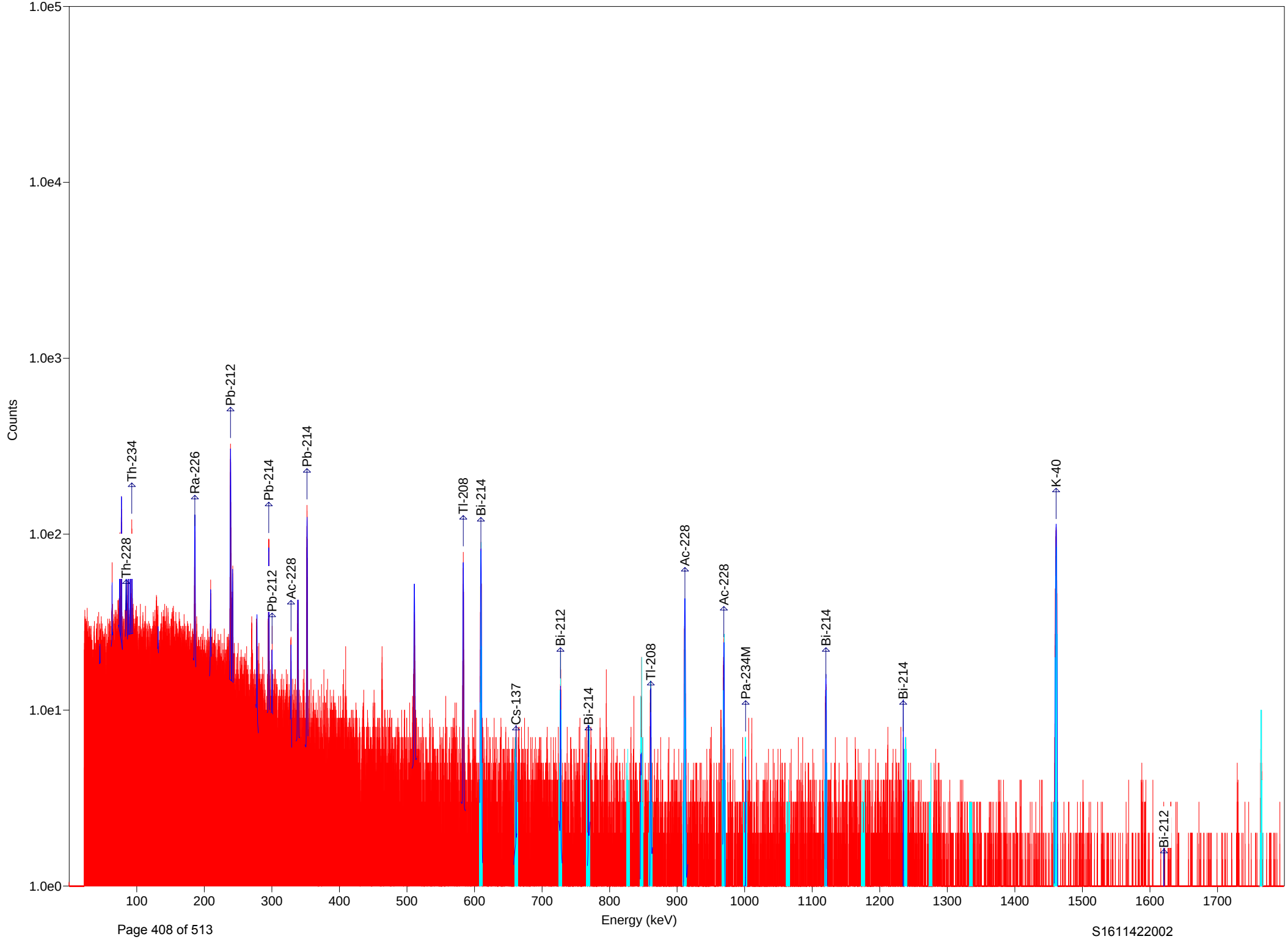


S1611422002

Detector #4 ACQ 10-Jan-2017 at 1:02:27 RT = 4528.4 LT = 4500.0
Rad Chem 1
S1611422-080AD

ROI#	RANGE(keV)		GROSS	NET	+/-	CENTROID	FWHM	FW(1/5)M	LIBRARY	(keV)	µCi	+/-
1	606.78	611.61	654	512	30	609.39	1.40	1.89	Bi-214	609.31	0.0003	0.0000
2	659.24	664.07	103	-20	18	660.12	0.22	0.35	Cs-137	661.66	0.0000	0.0000
3	724.43	729.70	220	132	20	727.34	1.22	2.24	Bi-212	727.00	0.0005	0.0001
4	765.70	770.97	135	64	16	768.43	1.00	2.52	Bi-214	768.36	0.0004	0.0001
5	824.75	830.01	74	-26	17	826.06	0.44	0.70	Co-60	826.28	0.0000	0.0642
6	844.94	850.21	124	57	16	846.61	0.53	1.64	Co-56	846.77	0.0000	0.0000
7	857.89	863.16	143	68	17	860.67	1.06	2.11	Tl-208	860.56	0.0002	0.0000
8	908.38	913.87	463	381	25	911.38	1.27	2.09	Ac-228	911.20	0.0004	0.0000
9	966.11	971.82	320	225	23	969.11	1.40	2.08	Ac-228	968.97	0.0005	0.0000
10	997.94	1003.65	79	25	14	1001.04	0.25	0.75	Pa-234M	1001.03	0.0010	0.0006
11	1060.94	1067.09	62	-6	15	1065.77	0.33	1.34	No close library match!			
12	1117.36	1123.07	167	113	17	1120.49	1.24	2.02	Bi-214	1120.29	0.0003	0.0000
13	1172.46	1178.61	86	-40	21	1174.21	1.76	1.89	Co-60	1173.24	0.0000	0.0000
14	1235.02	1241.17	116	48	17	1238.52	1.38	1.85	Co-56	1238.28	0.0000	0.0000
15	1271.90	1278.49	58	6	14	1272.67	5.24	5.39	No close library match!			
16	1331.84	1338.42	44	3	13	1334.25	1.04	1.21	Co-60	1332.50	0.0000	0.0000
17	1457.63	1463.78	1285	1256	36	1461.11	1.79	2.65	K-40	1461.00	0.0060	0.0002
18	1761.27	1767.85	104	99	10	1765.15	1.44	2.56	Bi-214	1764.49	0.0004	0.0000

S1611422-081A. Real/Live Time = 4530/4500 (s).

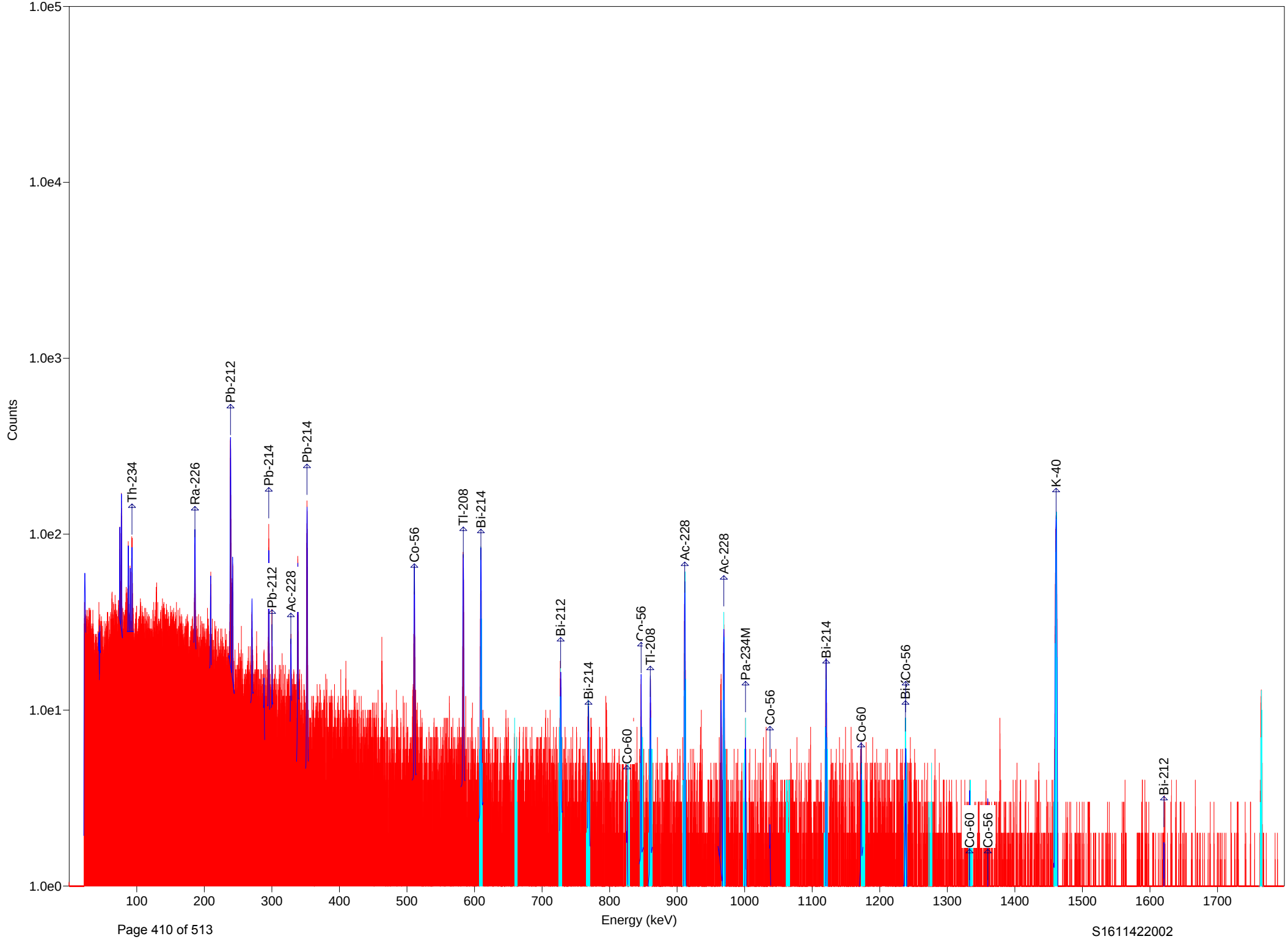


S1611422002

Detector #4 ACQ 10-Jan-2017 at 8:09:27 RT = 4530.2 LT = 4500.0
Rad Chem 1
S1611422-081A

ROI#	RANGE(keV)		GROSS	NET	+/-	CENTROID	FWHM	FW(1/5)M	LIBRARY	(keV)	µCi	+/-
1	606.78	611.61	569	469	27	609.43	1.29	1.80	Bi-214	609.31	0.0002	0.0000
2	659.24	664.07	96	-4	16	661.66	0.25	0.40	Cs-137	661.66	0.0000	0.0000
3	724.43	729.70	154	100	16	727.54	0.72	1.77	Bi-212	727.00	0.0004	0.0001
4	765.70	770.97	121	17	18	768.01	0.39	0.58	Bi-214	768.36	0.0001	0.0001
5	824.75	830.01	69	-23	16	826.94	0.22	0.35	Co-60	826.28	0.0000	0.0605
6	844.94	850.21	116	70	14	847.45	0.50	0.96	Co-56	846.77	0.0000	0.0000
7	857.89	863.16	124	53	16	860.75	0.44	1.28	Tl-208	860.56	0.0001	0.0000
8	908.38	913.87	316	268	20	911.30	1.58	1.93	Ac-228	911.20	0.0003	0.0000
9	966.11	971.82	209	150	18	969.01	1.35	2.32	Ac-228	968.97	0.0003	0.0000
10	997.94	1003.65	73	28	13	1000.79	1.13	1.76	Pa-234M	1001.03	0.0011	0.0005
11	1060.94	1067.09	56	-2	14	1062.26	3.07	3.20	No close library match!			
12	1117.36	1123.07	135	117	13	1120.15	1.33	2.51	Bi-214	1120.29	0.0003	0.0000
13	1172.46	1178.61	60	12	14	1175.09	2.41	2.55	Co-60	1173.24	0.0000	0.0000
14	1235.02	1241.17	103	30	17	1238.61	0.85	1.81	Co-56	1238.28	0.0000	0.0000
15	1271.90	1278.49	40	24	9	1275.86	0.25	0.40	No close library match!			
16	1331.84	1338.42	41	15	11	1332.93	0.27	0.77	Co-60	1332.50	0.0000	0.0000
17	1457.63	1463.78	990	951	33	1461.23	1.74	2.88	K-40	1461.00	0.0045	0.0002
18	1761.27	1767.85	85	64	12	1764.76	1.51	2.30	Bi-214	1764.49	0.0003	0.0001

S1611422-082A. Real/Live Time = 4529/4500 (s).

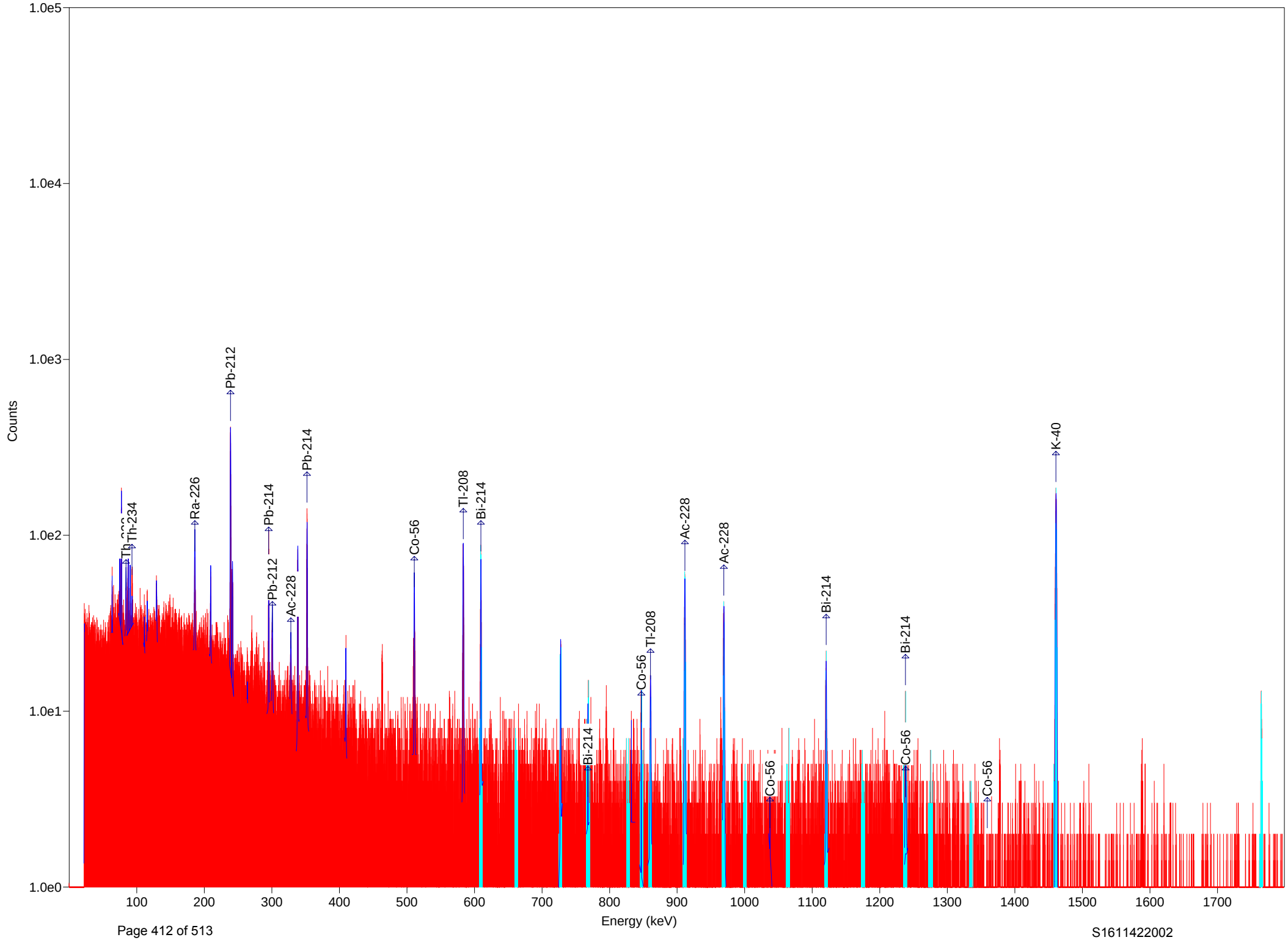


S1611422002

Detector #4 ACQ 10-Jan-2017 at 9:25:39 RT = 4529.4 LT = 4500.0
Rad Chem 1
S1611422-082A

ROI#	RANGE(keV)		GROSS	NET	+/-	CENTROID	FWHM	FW(1/5)M	LIBRARY	(keV)	µCi	+/-
1	606.78	611.61	571	467	27	609.41	1.15	1.92	Bi-214	609.31	0.0002	0.0000
2	659.24	664.07	89	1	15	662.53	0.26	0.78	Cs-137	661.66	0.0000	0.0000
3	724.43	729.70	189	81	20	727.33	1.16	1.73	Bi-212	727.00	0.0003	0.0001
4	765.70	770.97	116	53	15	767.98	1.44	2.84	Bi-214	768.36	0.0003	0.0001
5	824.75	830.01	60	6	13	825.62	0.29	0.53	Co-60	826.28	0.0227	0.0491
6	844.94	850.21	131	52	17	846.73	0.64	1.05	Co-56	846.77	0.0000	0.0000
7	857.89	863.16	131	43	17	860.59	1.05	1.35	Tl-208	860.56	0.0001	0.0000
8	908.38	913.87	398	337	23	911.35	1.20	2.04	Ac-228	911.20	0.0004	0.0000
9	966.11	971.82	249	172	20	969.04	1.16	2.16	Ac-228	968.97	0.0003	0.0000
10	997.94	1003.65	83	20	15	1001.36	0.57	1.61	Pa-234M	1001.03	0.0008	0.0006
11	1060.94	1067.09	69	6	15	1061.60	5.05	5.18	No close library match!			
12	1117.36	1123.07	173	105	18	1120.35	1.30	1.93	Bi-214	1120.29	0.0003	0.0000
13	1172.46	1178.61	73	-14	17	Could not properly fit the peak.						
14	1235.02	1241.17	120	67	16	1238.10	1.26	2.76	Bi-214	1238.11	0.0005	0.0001
15	1271.90	1278.49	53	-4	15	1276.73	0.27	0.70	No close library match!			
16	1331.84	1338.42	41	0	13	1333.15	1.10	1.23	Co-60	1332.50	0.0000	0.0000
17	1457.63	1463.78	1115	1067	35	1461.15	1.86	2.69	K-40	1461.00	0.0051	0.0002
18	1761.27	1767.85	103	82	12	1764.64	1.03	1.98	Bi-214	1764.49	0.0004	0.0001

S1611422-083A. Real/Live Time = 4532/4500 (s).

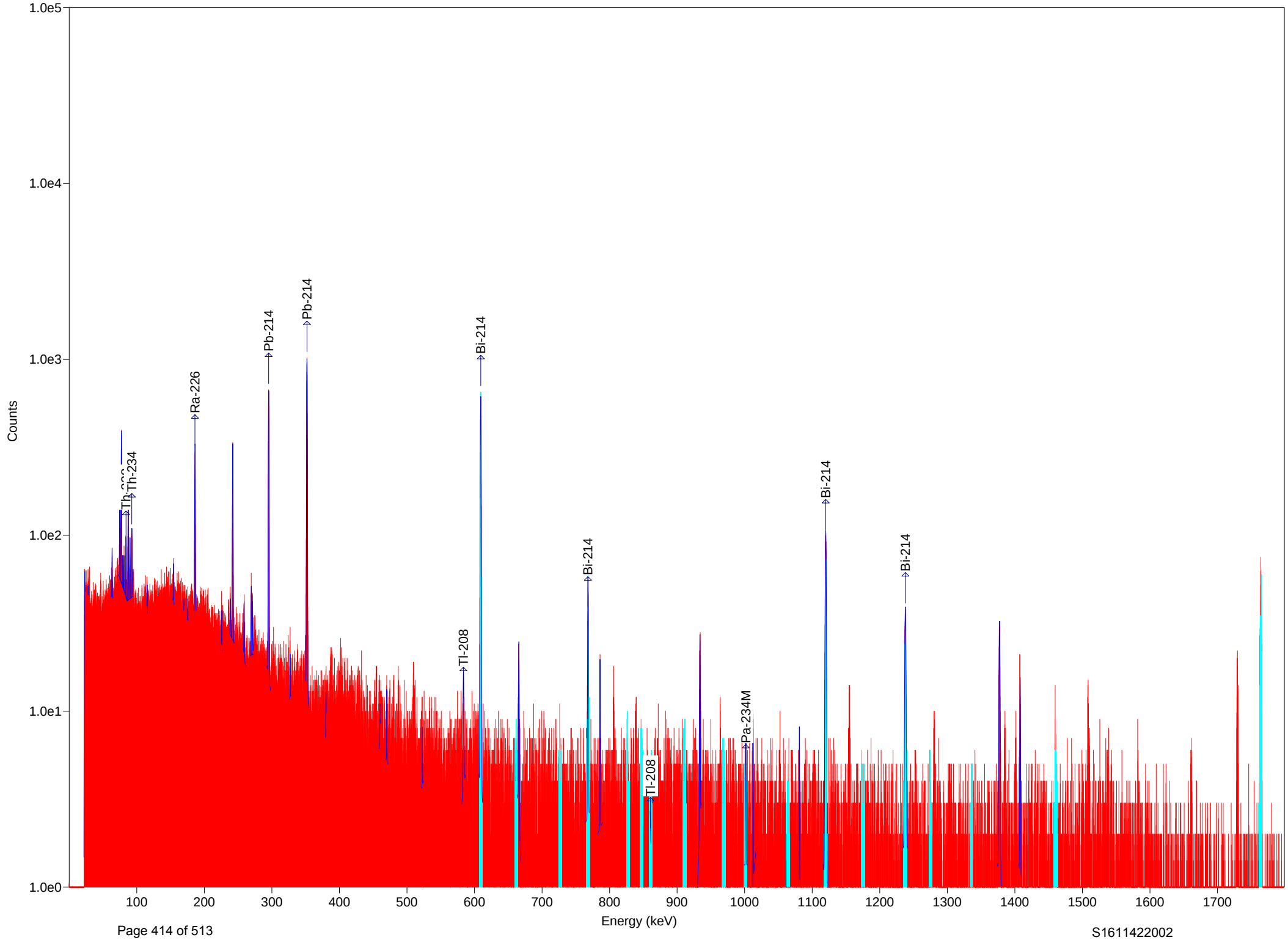


S1611422002

Detector #4 ACQ 10-Jan-2017 at 10:42:24 RT = 4532.3 LT = 4500.0
Rad Chem 1
S1611422-083A

ROI#	RANGE(keV)		GROSS	NET	+/-	CENTROID	FWHM	FW(1/5)M	LIBRARY	(keV)	µCi	+/-
1	606.78	611.61	536	421	27	609.45	0.99	1.83	Bi-214	609.31	0.0002	0.0000
2	659.24	664.07	96	19	15	660.56	0.88	1.01	Cs-137	661.66	0.0000	0.0000
3	724.43	729.70	204	125	19	727.83	0.61	1.80	Bi-212	727.00	0.0005	0.0001
4	765.70	770.97	129	4	19	768.45	0.37	0.54	Bi-214	768.36	0.0000	0.0001
5	824.75	830.01	71	-25	16	827.82	0.22	0.35	Co-60	826.28	0.0000	0.0605
6	844.94	850.21	116	74	14	846.48	0.31	1.57	Co-56	846.77	0.0000	0.0000
7	857.89	863.16	135	72	16	860.81	1.35	2.17	Tl-208	860.56	0.0002	0.0000
8	908.38	913.87	446	364	25	911.46	1.35	2.16	Ac-228	911.20	0.0004	0.0000
9	966.11	971.82	327	259	22	969.13	1.47	2.15	Ac-228	968.97	0.0005	0.0000
10	997.94	1003.65	68	27	13	1001.25	2.28	2.48	Pa-234M	1001.03	0.0011	0.0005
11	1060.94	1067.09	79	31	14	1065.54	0.65	0.85	No close library match!			
12	1117.36	1123.07	170	116	17	1120.41	1.25	1.87	Bi-214	1120.29	0.0003	0.0000
13	1172.46	1178.61	76	3	16	1174.00	0.22	0.35	Co-60	1173.24	0.0000	0.0000
14	1235.02	1241.17	121	24	19	1238.10	0.22	0.35	Bi-214	1238.11	0.0002	0.0001
15	1271.90	1278.49	65	-18	18	1275.20	0.22	0.35	No close library match!			
16	1331.84	1338.42	38	2	12	1333.37	1.87	2.37	Co-60	1332.50	0.0000	0.0000
17	1457.63	1463.78	1466	1398	40	1461.04	1.73	2.72	K-40	1461.00	0.0067	0.0002
18	1761.27	1767.85	99	83	12	1765.20	1.24	2.19	Bi-214	1764.49	0.0004	0.0001

UTS-4-12699. Real/Live Time = 1818/1800 (s).

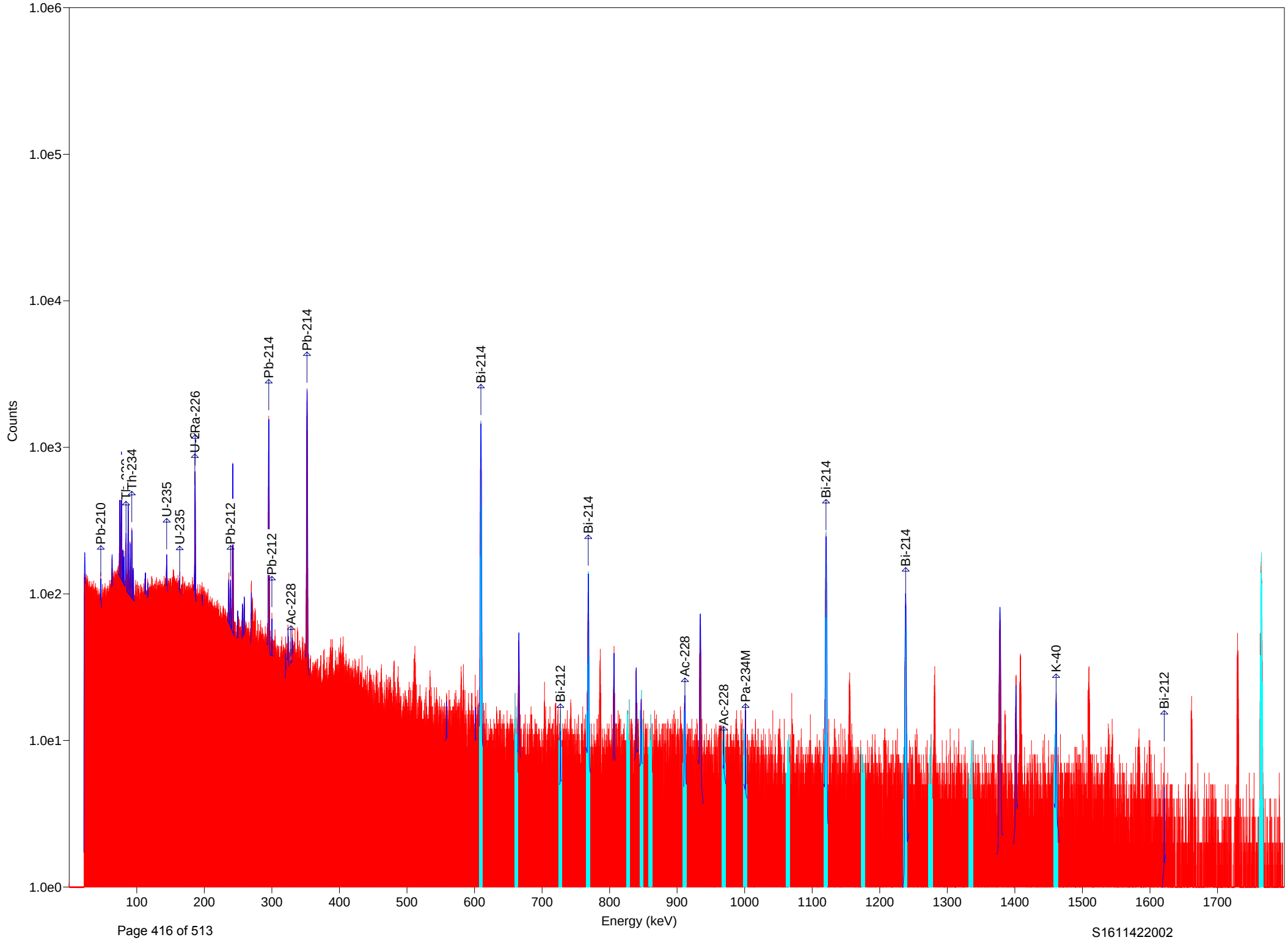


S1611422002

Detector #4 ACQ 05-Jan-2017 at 11:24:04 RT = 1818.4 LT = 1800.0
Rad Chem 1
UTS-4-12699

ROI#	RANGE(keV)		GROSS	NET	+/-	CENTROID	FWHM	FW(1/5)M	LIBRARY	(keV)	µCi	+/-
1	606.78	611.61	3851	3678	64	609.18	1.21	1.87	Bi-214	609.31	0.0047	0.0001
2	659.24	664.07	99	-12	17	661.66	0.22	0.35	Cs-137	661.66	0.0000	0.0000
3	724.43	729.70	92	13	16	725.75	0.24	0.38	Bi-212	727.00	0.0001	0.0001
4	765.70	770.97	432	311	26	768.26	1.18	2.07	Bi-214	768.36	0.0044	0.0004
5	824.75	830.01	104	37	15	826.24	0.29	0.78	Co-60	826.28	0.3496	0.1417
6	844.94	850.21	110	14	17	846.70	0.22	0.35	Co-56	846.77	0.0000	0.0000
7	857.89	863.16	78	11	14	858.55	3.51	3.64	Tl-208	860.56	0.0001	0.0001
8	908.38	913.87	124	3	20	910.96	1.28	1.43	Ac-228	911.20	0.0000	0.0001
9	966.11	971.82	84	16	15	967.21	3.77	4.26	Ac-228	968.97	0.0001	0.0001
10	997.94	1003.65	97	34	15	1000.75	0.74	1.39	Pa-234M	1001.03	0.0034	0.0015
11	1060.94	1067.09	52	4	13	1065.55	0.22	0.35	No close library match!			
12	1117.36	1123.07	837	769	31	1120.05	1.54	2.43	Bi-214	1120.29	0.0049	0.0002
13	1172.46	1178.61	77	-10	17	1174.00	4.28	4.48	Co-60	1173.24	0.0000	0.0000
14	1235.02	1241.17	347	270	23	1237.81	1.80	2.43	Bi-214	1238.11	0.0048	0.0004
15	1271.90	1278.49	61	35	11	1274.32	0.22	0.35	No close library match!			
16	1331.84	1338.42	61	25	13	1335.57	2.17	2.32	Co-60	1332.50	0.0000	0.0000
17	1457.63	1463.78	112	49	17	1459.99	0.43	1.66	K-40	1461.00	0.0006	0.0002
18	1761.27	1767.85	681	655	27	1764.33	1.84	3.16	Bi-214	1764.49	0.0070	0.0003

UTS-4-001-12699. Real/Live Time = 4545/4500 (s).



S1611422002

Detector #4 ACQ 10-Jan-2017 at 2:19:04 RT = 4545.9 LT = 4500.0
Rad Chem 1
UTS-4-001-12699

ROI#	RANGE(keV)		GROSS	NET	+/-	CENTROID	FWHM	FW(1/5)M	LIBRARY	(keV)	µCi	+/-
1	606.78	611.61	9172	8823	99	609.42	1.25	1.91	Bi-214	609.31	0.0045	0.0001
2	659.24	664.07	249	-16	27	660.12	0.22	0.35	Cs-137	661.66	0.0000	0.0000
3	724.43	729.70	224	3	26	727.39	0.41	0.61	Bi-212	727.00	0.0000	0.0001
4	765.70	770.97	1049	716	42	768.45	1.06	1.91	Bi-214	768.36	0.0040	0.0002
5	824.75	830.01	266	28	27	829.31	0.28	0.50	Co-60	826.28	0.1058	0.1020
6	844.94	850.21	268	18	28	846.82	0.74	0.95	Co-56	846.77	0.0000	0.0000
7	857.89	863.16	233	-5	27	860.97	0.22	0.35	Tl-208	860.56	0.0000	0.0001
8	908.38	913.87	257	97	25	911.17	1.32	1.83	Ac-228	911.20	0.0001	0.0000
9	966.11	971.82	222	-3	28	968.58	0.30	0.51	Ac-228	968.97	0.0000	0.0001
10	997.94	1003.65	230	32	26	1001.52	0.39	0.58	Pa-234M	1001.03	0.0013	0.0011
11	1060.94	1067.09	174	-10	26	1063.36	2.20	2.33	No close library match!			
12	1117.36	1123.07	1984	1831	48	1120.51	1.49	2.43	Bi-214	1120.29	0.0047	0.0001
13	1172.46	1178.61	156	-8	24	1173.56	3.73	4.00	Co-60	1173.24	0.0000	0.0000
14	1235.02	1241.17	808	658	35	1238.35	1.47	2.40	Co-56	1238.28	0.0004	0.0000
15	1271.90	1278.49	133	19	22	1276.08	0.24	0.38	No close library match!			
16	1331.84	1338.42	143	9	23	1335.63	1.82	2.29	Co-60	1332.50	0.0000	0.0000
17	1457.63	1463.78	245	119	24	1461.28	1.17	2.81	K-40	1461.00	0.0006	0.0001
18	1761.27	1767.85	1662	1574	44	1764.98	1.84	2.94	Bi-214	1764.49	0.0068	0.0002

Table B-17 – Results of Dixon r tests applied to laboratory mean results

Material	Isotope	Set	No. sets	Test ratio	Critical Value, r** P = 10%	P = 5%
UTS-1	^{210}Pb	Lab-7	7	.63	.51	.57
UTS-1	^{228}Ra	Lab-5*	4	.90	.77	.82
UTS-2	^{210}Pb	Lab-7	7	.63	.51	.57
UTS-4	^{230}Th	Lab-3	7	.71	.51	.57

Test result overruled; set means of the other three sets were judged to be fortuitously close.
***Relevant probabilities are twice values for predesignated end of the set values (B2).*

Table B-18 – Consensus values and related statistical parameters for isotope activities in tailings reference materials

Isotope	Consensus value, [CL], Bq g^{-1}[a.] (No. sets, No. values, RSD (%), $\overline{CV}$(%)			
	UTS-1	UTS-2	UTS-3	UTS-4
^{230}Th	3.6 [3.0 – 4.2] (7,28,21,10)	4.4 [3.3 – 5.5] (2,79,26,24)	11.3 [10.5 – 12.1] (7,29,9,5)	22.9[b] [20.3 – 25.5] (6,24,13,7)
^{226}Ra	3.67 [3.52 – 3.82] (8,31,9,7)	5.6 [6.2 – 6.0] (8,37,13,8)	13.3 [12.7 – 13.9] (8,30,11,6)	38.6 [36.2 – 40.9] (6,33,9,5)
^{210}Pb	3.25[b] [3.03 – 3.47] (6,23,9,7)	4.55[b] [4.36 – 4.75] (6,39,12,9)	12.6 [12.1 – 13.2] (7,30,9,7)	32.4 [29.6 – 35.3] (7,26,9,4)
^{210}Po	3.1 [2.7 – 3.5] (6,27,10,4)	4.4 [3.7 – 5.1] (6,29,14,6)	11.8 [10.8 – 12.9] (6,29,8,4)	30.8 [25.8 – 35.9] (6,28,14,4)
^{232}Th[c,d]	.68 [.59 – .77] (5,18,16,11)	.88 [.67 – 1.08] (5,19,24,17)	(.16 ± .04)	(.48 ± .06)
^{228}Ra	.68 [.47 – .89] (4,14,19,10)	1.0 [0.7 – 1.4] (4,15,17,6)	–	–
^{228}Th[d]	.71 [.58 – .84] (5,20,21,13)	.92 [.58 – 1.25] (5,21,29,11)	(.16 ± .04)	(.23 ± .04)
^{231}Pa[d]	(.21 ± .03)	(.37 ± .05)	(.70 ± 1.0)	(2.4 ± .3)

a. CL = statistical uncertainty range at 95% confidence level, RSD = relative standard deviation of individual results (%), $\overline{CV}$ = average within-laboratory rel. std. dev. (%).
b. Data are exclusive of an outlying set.
c. ^{232}Th results from alpha spectrometry only. ^{232}Th concs. by NAA are incorporated with chemical results.
d. Single laboratory results and uncertaintly estimates in brackets are for information only.

National Institute of Standards & Technology

Certificate

Standard Reference Material® 4353A

Rocky Flats Soil Number 2

This Standard Reference Material (SRM) has been developed in cooperation with member laboratories of the International Committee for Radionuclide Metrology and other experienced metrology laboratories. The SRM consists of approximately 90 grams of air-dried, pulverized soil in a polyethylene bottle. The SRM is intended: for use in tests of measurements of radioactivity contained in matrices similar to the sample, for evaluating analytical methods, and as a generally available calibrated "real" sample matrix for laboratory intercomparison.

Radiological Hazards: This SRM contains low levels of anthropogenic and natural radioactivity and poses no radiological hazard. The SRM should be used only by qualified persons.

Chemical Hazards: The SRM is a dried sterilized soil and poses no chemical or biological hazard. However, inhalation or ingestion of the material should be avoided.

Storage and Handling: The SRM should be stored in a dry location at room temperature. The bottle should be shaken before opening in a chemical hood and should be recapped tightly as soon as subsamples are removed. The bottle (or any subsequent container) should always be clearly marked. If the SRM is transported, it should be packed, marked, labeled, and shipped in accordance with applicable national, international, and carrier regulations.

Preparation: This Standard Reference Material was prepared under the leadership of the Physics Laboratory, Ionizing Radiation Division, Radioactivity Group, Michael Unterweger, Acting Group Leader. The overall technical direction leading to the certification of this SRM was provided by Svetlana Nour and Kenneth G.W. Inn of the Radioactivity Group.

Statistical support was provided by James J. Filliben of the Information Technology Laboratory, Statistical Engineering Division.

The support aspects involved in the preparation, certification, and issuance of this SRM were coordinated through the NIST Measurement Services Division.

Technical Contacts: Svetlana Nour (e-mail: svetlana.nour@nist.gov; phone: 1-301-975-4927) and Kenneth G.W. Inn (e-mail: kenneth.inn@nist.gov; phone: 1-301-975-5541), NIST, Building 245, Room C114, Gaithersburg, MD 20899-8462, fax 1-301-926-7416.

Lisa Karam, Deputy Chief
Ionizing Radiation Division

Gaithersburg, Maryland 20899
July 2007

Robert L. Watters, Jr., Chief
Measurement Services Division

Details of the SRM preparation: This SRM is from the Rocky Flats Plant in north-central Colorado. The material was obtained from Rockwell International's Rocky Flats Plant (RFP) by the National Institute of Standards and Technology (NIST) of the U.S. Departments of Commerce and by the Environmental Measurements Laboratory (EML) of the U.S. Department of Homeland Security. The material was first coarsely sieved in the field to remove rocks larger than about 1.5 cm diameter. After air drying, the soil was blade milled twice. The soil was pulverized with a "pancake" style air jet mill to an average particle diameter of 8 μm. More than 99 percent, by weight, of the particles are less than 20 μm in diameter. The SRM was "V-cone" blended to optimize homogeneity and bottled in polyethylene bottles. The final bottled SRM was sterilized with > 50 kGy of ^{60}Co radiation to satisfy export regulations and to increase shelf-life time.

Instructions for Drying: When nonvolatile radionuclides are to be determined, working samples of this SRM should be dried at 40°C for 24 hours prior to weighing. Volatile radionuclides (e.g., ^{210}Po, ^{137}Cs, ^{210}Pb, ^{212}Pb and ^{214}Pb) should be determined on samples as received. Separate samples should be dried as previously described to obtain a correction factor for moisture. Correction for moisture content is to be made to the data for volatile radionuclides before comparing with the values given by this certificate. This procedure ensures that these radionuclides are not lost during drying (see Reference [1]*). The weight loss on drying is typically less than 4 percent.

Heterogeneity: Twenty-three bottles of the SRM were examined for gamma-ray heterogeneity by measuring their emission rates by counting them on a "5-in" (12.7 cm) NaI(Tl) detector coupled to a multichannel analyzer. The count rates from each measurement were analyzed for statistical difference for ten selected energy regions, and no detectable heterogeneity was observed.

This material has also been measured for alpha-particle emitting radionuclides using sample sizes of 1 gram to 100 grams. There are variations of results due to sample size. Based on over 100 plutonium and ^{241}Am measurements it was concluded that the material contains "hot" particles, and it is recommended that a sample size of 5 grams to 10 grams be used for radiochemical analysis and a sample size of 30 grams to 100 grams for gamma isotopic analysis. Statement of uncertainties, tolerance limits, and ranges of reported results incorporate the effects of heterogeneity.

Material Stability and Changes in Certified Values: This matrix is considered to be stable; however, its stability has not been rigorously assessed. NIST will monitor this material and will report any substantive changes in certification to the purchaser. Return of the enclosed registration card is mandatory to receive such notifications. The properties of the SRM are given in Table 1.

Calculation of Certified Massic Activity Values: The certified massic activity value for each nuclide (see Tables 2, 3 and 4) was determined from the evaluated average of the individual laboratory means. This approach was selected because of the well-behaved normal distribution of the laboratories' data.

Calculation of the Uncertainties for the Certified Values: The standard combined uncertainties (u_c) for each of the certified values were computed by incorporating components from three sources: 1) the estimated standard deviation of the mean of the laboratory mean values, 2) the $k = 1$ uncertainty associated with the radiochemical tracer SRMs, and 3) Type B scientific judgment. The uncertainty components were combined in quadrature as specified by the GUM. The expanded uncertainties (U) were computed using the Welch-Satterthwaite coverage factor. The expanded uncertainty (U) is taken as the 95 percent confidence interval.

*Notes and references are on page 11

Calculation of Certified Tolerance Limits: In addition to the certified massic activities and activity ratios, and their respective uncertainty values, Tables 2, 3, and 4 also provide 95/95 (normal) tolerance limits. Whereas the certified value is the mean of the population of measurements of the SRM and the expanded uncertainty for the certified value is at the 95 percent confidence limit, the tolerance limits are a measure of the spread of the population of measurements across the SRM. A 95/95 tolerance limit means that NIST is 95% confident that 95% of the population of SRM measurements fall within the specified limits. The tolerance limits are used when the number of replicates is small (n<5), e.g., when the material is used as a periodic QC sample. For guidance on the use of tolerance limits in connection with this SRM, see Appendix 1.

Uncertified Massic Activities and Mass Ratios: The massic activities and mass ratios for the radionuclides given in Table 5 and 6 are not certified at this time, but may be certified at some future time if additional data become available. Users are invited to submit measurement data to contribute to the certification process. The data should be sent to one of the technical contacts listed on page 1.

Elemental Composition: Semi-quantitative elemental analysis of the Rocky Flats Number 2 matrix is listed in Table 8.

Table 1: Properties of SRM 4353A.

Certified Properties

Radionuclides	**See Table 2, 3 and 4**
Reference time	**1 April 1998**
Certified massic activities	**See Table 2, and 3**
Certified activity ratios	**See Table 4**
Uncertainties (See Note 1)*	**See Table 2, 3 and 4**
Tolerance Limits	**See Table 2, 3 and 4**

Uncertified Properties

Source description	Rocky Flats Soil Number 2, approximately 90 g in a polyethylene bottle
Uncertified massic activities	See Table 5
Uncertified activity ratios	See Table 6
Range of reported values	See Tables 5 and 6
Half-lives used	See Table 7
Radiochemical and detection methods	See Table 7 and 9
Elemental composition	See Table 8
Participating laboratories and personnel	See Table 7 and 10

*Notes and references are on page 11

Table 2: Certified Massic Activities.†

Radionuclide	Massic Activity and uncertainty ($mBq \cdot g^{-1}$) (See Note 2)*	95/95 Tolerance Limit ($mBq \cdot g^{-1}$) (See Note 3)
^{238}Pu	0.278 ± 0.041	0.18 to 0.51
$^{239,240}Pu$	16.8 ± 1.8	6.0 to 26.8
^{238}U	39.6 ± 3.0	31.9 to 48.1
^{234}U	40.4± 3.0	33.7 to 47.7
^{235}U	1.88 ± 0.53	0.82 to 2.68
^{90}Sr	10.5 ±1.3	6.5 to 15.1

† Recommended sample size of at least 5 grams for radiochemical analysis. Refer to table 7 for uncertified information.

Table 3: Certified Massic Activities.‡

Radionuclide	Massic Activity and uncertainty ($mBq \cdot g^{-1}$) (See Note 2)	95/95 Tolerance Limit ($mBq \cdot g^{-1}$) (See Note 3)
^{137}Cs	21.6 ± 2.6	13.7 to 30.0
^{228}Ra (See Note 4)	74.9 ± 7.5	61.4 to 91.6
^{210}Pb	58.0 ± 9.9	41.8 to 79.7

‡ Recommended sample size of at least 30 grams for gamma-ray measurement. Refer to table 7 for uncertified information.

Table 4: Certified Activity Ratios.ϒ

Radionuclides Ratio	Ratio and uncertainty	95/95 Tolerance Limit (See Note 3)
^{234}U / ^{238}U	1.028 ± 0.036	0.92 to 1.14
^{238}Pu / (^{239}Pu+^{240}Pu)	0.017 ± 0.001	0.013 to 0.020
^{228}Th / ^{232}Th	1.01 ± 0.10	0.84 to 1.14
^{230}Th / ^{232}Th	0.671 ± 0.067	0.55 to 0.76

ϒ Refer to table 7 for uncertified information.

*Notes and references are on page 11

Table 5: Uncertified Massic Activities.†

Radionuclide	Massic Activity ($mBq \cdot g^{-1}$)	Lower and Upper Values of Reported Results ($mBq \cdot g^{-1}$)
^{228}Th	72.4	61.6 to 88.4
^{230}Th	47.9	40.9 to 57.8
^{232}Th	73.6	62.1 to 90.2
^{234}Th	60.1	28.9 to 103.3
^{226}Ra	42.4	28.4 to 52.7
^{214}Pb	43.2	34.9 to 51.9
^{214}Bi	40.6	28.4 to 53.2
^{212}Pb	90.2	83.3 to 95.7
^{212}Bi	79.5	68.8 to 87.3
^{208}Tl	51.3	26.8 to 67.7
^{40}K	589	533 to 719
^{241}Pu	17.0	13.0 to 30.0
^{241}Am (alpha spectrometry)	2.5	0.6 to 5.4
^{241}Am (gamma spectrometry)	4.7	3.7 to 6.6

† Radionuclides for which insufficient numbers of data sets or for which unresolved discrepant data sets were obtained. No uncertainties are provided because no meaningful estimates could be made. Refer to table 7 for uncertified information.

Table 6: Uncertified Mass Ratios.‡

Radionuclides	Mass Ratio	Lower and Upper Values of Reported Results
^{240}Pu / ^{239}Pu	$5.6\ 10^{-2}$	$(5.3 \text{ to } 6.0)\ 10^{-2}$
^{241}Pu / ^{239}Pu	$5.8\ 10^{-4}$	$(0.4 \text{ to } 1.3)\ 10^{-3}$
^{241}Pu / ^{240}Pu	$1.0\ 10^{-2}$	$(0.8 \text{ to } 2.3)\ 10^{-2}$

‡ Ratios for which insufficient numbers of data sets or for which unresolved discrepant data sets were obtained. No uncertainties are provided because no meaningful estimate could be made. Refer to table 7 for uncertified information.

Table 7: Uncertified Information for Tables 2 through 6.

Radionuclides	Number of Laboratories (and total assays)	Half Life (See Note 5)*	Methods (Table 9)	Contributing Laboratories Acronym (Table 10)
^{238}Pu	14 (169)	(87.7 ± 0.1) a	2b, 3b	BIL-GSL, CEMRC, EML, FSU, GSF, IAEA, LANL, NIST, OSU, RESL, SRNL, WHOI
$^{239,240}Pu$	14 (172)	(24110 ± 30) a (6561 ± 7) a	2b, 3b	BIL-GSL, CEMRC, EML, FSU, GSF, IAEA, LANL, NIST, OSU, RESL, SRNL, , WHOI
^{238}U	7 (72)	(4.468 ± 0.003) 10^9 a	2b, 3b, 3 e	CEMRC, EML, FSU, NIST, RESL, SRNL,
^{234}U	7 (72)	(2.455 ± 0.006) 10^5 a	2b, 3b	CEMRC, EML, FSU, NIST, RESL, SRNL,
^{235}U	4 (38)	(7.04 ± 0.01) 10^8 a	2b, 3b	CEMRC, EML NIST, SRNL,
^{90}Sr	5 (38)	(28.79 ± 0.06) a	2c, 3c	EML, IAEA, RESL, WHOI
^{137}Cs	9 (82)	(30.07 ± 0.03) a	1a	BIL-GSL, EML, FSU, LANL, NIST, OSU, RESL, SRNL, , WHOI
^{228}Ra (Note 4)	5 (42)	(5.75 ± 0.03) a	1a	BIL-GSL, FSU, NIST, RESL, SRNL
^{210}Pb	3 (24)	(22.20 ± 0.22) a	1a	FSU, NIST, SRNL
^{234}U / ^{238}U	8 (87)	(2.455 ± 0.006) 10^5 a (4.468 ± 0.003) 10^9 a	2b, 2e	BIL-GSL, CEMRC, EML, FSU, NIST, RESL, SRNL
^{238}Pu / (^{239}Pu+^{240}Pu)	14 (169)	(87.7 ± 0.1) a (24110 ± 30) a (6561 ± 7) a	2b	BIL-GSL, CEMRC, EML, FSU, GSF, IAEA, LANL, NIST, OSU, RESL, SRNL, , WHOI,
^{228}Th / ^{232}Th	3 (27)	(1.9116 ± 0.0016) a (1.40 ± 0.01) 10^{10} a	2b	CEMRC, NIST, RESL
^{230}Th / ^{232}Th	3 (27)	(7.538 ± 0.030) 10^4 a (1.40 ± 0.01) 10^{10} a	2b	CEMRC, NIST, RESL
^{228}Th	3 (27)	(1.9116 ± 0.0016) a	2b, 3b	CEMRC, NIST, RESL
^{230}Th	3 (27)	(7.538 ± 0.030) 10^4 a	2b, 3b	CEMRC, NIST, RESL
^{232}Th	4 (42)	(1.40 ± 0.01) 10^{10} a	2b, 3b, 3 e	CEMRC, IAEA, NIST, RESL
^{234}Th	2 (21)	(24.10 ± 0.03) d	1a	FSU, SRNL
^{226}Ra	4 (38)	(1600 ± 7) a	1a	BIL-GSL, FSU, RESL, SRNL
^{214}Pb	3 (21)	(26.8 ± 0.9) min	1a	BIL-GSL, FSU, SRNL
^{214}Bi	3 (32)	(19.9 ± 0.4) min	1 a	BIL-GSL, FSU, SRNL
^{212}Pb	1 (15)	(10.64 ± 0.01) h	1a	SRNL
^{212}Bi	1 (15)	(60.55 ± 0.06) min	1a	SRNL
^{208}Tl	3 (33)	(3.053 ± 0.004) min	1a	BIL-GSL, FSU, SRNL
^{40}K	2 (30)	(1.248 ± 0.003) 10^9 a	1a	BIL-GSL, SRNL
^{241}Pu	2 (20)	(14.290 ± 0.006) a	2d	IAEA
^{241}Am (α spectrometry)	13 (115)	(432.6 ± 0.6) a	2b, 3b	BIL-GSL, CEMRC, EML, FSU, IAEA, LANL, NIST, OSU, RESL, SRNL, , WHOI

Table 7 (cont.): Uncertified Information for Tables 2 through 6.

Radionuclides	Number of Laboratories (and total assays)	Half Life (See Note 5)*	Methods (Table 9)	Contributing Laboratories Acronym (Table 10)
^{241}Am (γ spectrometry)	3 (24)	(432.6 ± 0.6) a	1a	FSU, NIST, SRNL
^{240}Pu / ^{239}Pu	1 (15)	(24110 ± 30) a (6561 ± 7) a	2e	SRNL
^{241}Pu / ^{239}Pu	1 (15)	(14.290 ± 0.006) a (6561 ± 7) a	2e	SRNL
^{241}Pu / ^{240}Pu	1 (15)	(14.290 ± 0.006) a (24110 ± 30) a	2e	SRNL

Table 8: Elemental Composition Based on Semi-quantitative X-Ray Fluorescence (XRF) analysis†. These values are not certified.

Element	Percent by mass (%)	Element	Percent by mass (%)
Si	36	Cl	0.004
Al	4.5	Cr	0.033
Fe	2.6	Cu	0.003
Mg	0.29	Ga	<0.001
Ca	0.40	Ni	0.018
Na	0.65	Pb	0.003
K	1.7	Rb	0.007
Ti	0.20	Sr	0.011
P	0.07	V	0.004
Mn	0.054	Y	0.002
C	1.5	Zn	0.007
S	0.02	Zr	0.02

† The estimated relative combined standard uncertainty for each reported concentration is from -33 % to +50 %. Data presented by John Sieber, Chemical Science and Technology Laboratory (CSTL).

Table 9: Radiochemical aud Detection Methods.

1	Non-destructive
2	Fusion/total decomposition
3	Acid leach (any combination of the following HNO_3, HCl, HF, $HClO_4$)
a	Germanium gamma-ray spectrometer
b	Silicon surface-barrier alpha-particle spectrometer
c	Beta-particle counter
d	Liquid scintillation counter
e	Inductively Coupled Plasma-Mass Spectroscopy (ICP-MS), Atomic Mass Spectroscopy (AMS)

Table 10: Participating Laboratories and Personnel.

Laboratory Acronym	Laboratory	Country	Technical Contact
BIL - GSL	British Nuclear Group Sellfield Ltd.	United Kingdom	Dr. M.Froggatt
CEMRC	Carlsbad Environmental Monitoring & Research Center	United States of America	Dr. B. Stewart
EML	Environmental Measurements Laboratory	United States of America	Dr. H. Volchok, M. Feiner
FSU	Florida State University	United States of America	Dr. W. Burnett
GSF	National Research Center for Environment and Health, Institute of Radiation Protection	Germany	Dr. K.Bunzl
IAEA †	International Atomic Energy Agency	Austria	Dr. J. Moreno, Dr. K.Burns, Dr. G. Kis-Benedek
LANL	Los Alamos National Laboratory	United States of America	Dr. D. Decker, Dr. N. Koski, Dr. S.R. Garcia
NIST	National Institute of Standards and Technology	United States of America	S. Nour, Dr. K. Inn
OSU	Oregon State University	United States of America	Dr. T. Beasley
RESL †	Radiological and Environmental Sciences Laboratory (RESL)	United States of America	Dr. D. Olson , Dr. S. Bohrer
SRNL	Savannah River National Laboratory	United States of America	J. Cadieux
WHOI	Woods Hole Oceanographic Institution	United States of America	Dr. V. Bowen, Dr. H. Livingston

† Note: These laboratories participated twice, reporting two sets of data.

Appendix 1

Recommendations on the use of the certified values for validation of measurements or methods

Case 1. Single Observation

Recommendation.

If a single observation is made, check to see if that value is within the certified 95/95 (95% confidence / 95% coverage) tolerance interval as provided in column 3 of Tables 2, 3, and 4 . If yes, then conclude that the measurement/method process is acceptable; if no, then conclude that the process is questionable and adjust accordingly.

Example.

A laboratory analyzed ^{235}U with a single measurement of this SRM to validate its method. The measured result was 1.86 mBq/g. The NIST certified value (see column 2 of Table 2) is 1.88 mBq/g. Is the laboratory method valid?

Procedure.

Check to determine if the measured value 1.86 is within the tolerance interval as provided in column 3 of Table 2. The tolerance interval for ^{235}U is (0.82, 2.68). Since 1.86 falls within this interval, then conclude that no evidence exists that this process is invalid (that is, in practice, we conclude that the process is valid).

Case 2. Multiple Observations

Recommendation.

If multiple observations are made, then:

1. check that at least 95% of the data points are within the provided tolerance interval (if yes, then accept the process; otherwise, reject the process);
2. check (via the appropriate t-test) that the mean of the collected data points is "close enough" to the provided certified value.

Example.

A laboratory analyzed ^{235}U in 5 replicates of this SRM to validate its method. The analytical results were 1.86, 1.99, 1.85, 1.87, and 1.86 mBq/g. The NIST certified value is 1.88 mBq/g. Is the laboratory method valid?

Procedure.

1. Check to determine the proportion of the 5 measured values that are within the 95/95 tolerance interval (0.82, 2.68) as provided in column 3 of Table 2 (at least 95% of the 5 values should fall within). Since 5 out of 5 of the values fall within the interval, then we conclude that the process is valid.

2: Compare the mean of the 5 collected points (1.866) with the certified value (1.88) by performing the t-test .

2.1. NIST's Certified Value: m = 1.88 mBq/g (see Table 2)

2.2. Compute Laboratory Data Summary Statistics:

Sample size	$n = 5$
Sample mean	$x = 1.866$ mBq/g
Sample standard deviation	$s = 0.015$ mBq/g
Significant level of the t-test	$\alpha = 0.05$

2.3. Compute t-test Statistic Value:

t-test statistic value $= (x - m)/(s/(n)^{1/2})$
$= (1.866 - 1.88)/(0.015/(5)^{1/2})$
$= -2.064$

2.4. Determine Cutoff Values for 95 % Confidence:

Upper 2.5% point of $t_{(n-1)}$ distribution = 2.776 (See Table A1)
Lower 2.5% point of $t_{(n-1)}$ distribution = -2.776 (See Table A1)

3. Conclusions:

3.1 If test statistic value < lower cutoff value, then conclude method is invalid with negative bias relative to the certified value.

3.2 If test statistic value > upper cutoff value, then conclude method is invalid with positive bias relative to the certified value.

3.3 If neither of the above, then conclude method is valid.

Example's Conclusion: Since the laboratory's test statistic value of -2.064 is neither > the upper cutoff value of 2.776 nor < the lower cutoff value of -2.776, case 3 applies and it can be concluded that the laboratory's method for ^{235}U analysis is valid.

Table A1: Probability points of the t distribution with (n-1) degrees of freedom.

Degrees of freedom	Tail area probability, $t_{(n-1)}$ (cutoff values)	
(n-1)	Upper 2.5 %	Lower 2.5 %
1	12.706	-12.706
2	4.303	-4.303
3	3.182	-3.182
4	2.776	-2.776
5	2.571	-2.571
6	2.447	-2.447
7	2.365	-2.365
8	2.306	-2.306
9	2.262	-2.262
10	2.228	-2.228

NOTES FOR TABLES 1, 2, 3 AND 7

Note 1. For further information on the expression of uncertainties, see references [3] and [4].

Note 2. The mean is the evaluated reference value from measurement results by the participating laboratories. The stated uncertainty is the 95% confidence interval based on a student-t distribution.

Note 3. The tolerance limits are for 95 percent confidence and 95 percent coverage. Differences between laboratories have been eliminated so that the given limits reflect only between-measurement differences.

Note 4. Radium-228 activity values are based on measurements of its ^{228}Ac daughter.

Note 5. The stated uncertainty of the half-life is the standard uncertainty. See reference [5].

REFERENCES

[1] R. Bock, *A Handbook of Decomposition Methods in Analytical Chemistry*, International Textbook Company, Limited. T. & A. Constable Ltd., Great Britain, 1979.

[2] M. G. Natrella, Experimental Statistics, Handbook 91, 1963, United States Department of Commerce National Bureau of Standards

[3] International Organization for Standardization (ISO), *Guide to the Expression of Uncertainty in Measurement*, 1993. Available from the American National Standards Institute, 11 West 42nd street, New York, NY 10036, USA. 1-212-642-4900. (Listed under ISO miscellaneous publications as "ISO Guide to the Expression 1993".)

[4] B.N. Taylor and C.E.Kuyatt, *Guidelines for Evaluating and Expressing the Uncertainty of NIST Measurement Results*, NIST Technical Note 1297, 1994. Available from the Superintendent of Documents, U.S. Government Printing Office, Washington, DC 20402, USA.

[5] Evaluated Nuclear Structure Data File (ENSDF), online database, National Nuclear Data Center, Brookhaven Laboratory (Upton, NY), November 2006. Refer to http://www.nndc.bnl.gov/ensdf/

Energy, Mines and Resources Canada

CANADA CENTRE FOR MINERAL AND ENERGY TECHNOLOGY

REFERENCE URANIUM-THORIUM ORE DL-1a

CERTIFICATE OF ANALYSIS

	Recommended Value		95% Confidence Interval	
	U	0.0116%	±	0.0003%
	Th	0.0076%	±	0.0004%
	Ra-226	1.40 Bq/g	±	0.04 Bq/g
	Pb-210	1.40 Bq/g	±	0.02 Bq/g

DESCRIPTION

DL-1a is intended as a replacement for DL-1 of which the stock is exhausted. It is waste rock typical of the property of Denison Mines Limited in Elliot Lake, Ontario, and is a pale yellow arkose sandstone containing uraninite and brannerite and possibly traces of monazite and uranothorite. The bulk material was dry-ground to minus 74 µm, blended, sampled systematically for analysis by optical fluorimetric and chemical methods to demonstrate homogeneity suitable for use as a reference material, and bottled in 200-g units. Evidence is available that DL-1a is in secular equilibrium.

CERTIFICATION

The consensus value for uranium is the unweighted mean of 286 accepted analytical determinations by 20 laboratories. Methods included titrimetry, colorimetry, fluorimetry, X-ray fluorescence, neutron activation analysis and radiochemistry.

The consensus value for thorium is the unweighted mean of 187 accepted analytical determinations by 14 laboratories. Methods included colorimetry, X-ray fluorescence, neutron activation analysis, radiometry and isotope dilution-mass spectrometry.

CANADIAN CERTIFIED REFERENCE MATERIALS PROJECT

NON-CERTIFIED CONSTITUENTS

The concentration of the following constituents are given for information only.

	Value
Fe	0.93%
S	0.41%

INSTRUCTIONS FOR USE

The recommended values for DL-1a pertain to an "as is" basis.

LEGAL NOTICE

The Canadian Certified Reference Materials Project has prepared this reference material and statistically evaluated the analytical data for the interlaboratory certification program to the best of its ability. The Purchaser by receipt hereof releases and indemnifies the Canadian Certified Reference Materials Project from and against all liability and costs arising out of the use of this material and information.

REFERENCE

The preparation and certification procedures used for DL-1a are given in CANMET Reports 80-10 "DL-1a: A Certified Uranium-Thorium Reference Ore", 83-9E "Radium-226 in Certified Uranium References Ores DL-1a, BL-4a, DH-1a and BL-5" and 84-11E "Lead-210 in Certified Uranium Reference Ores DL-1a, BL-4a, DH-1a and BL-5" which are available free of charge on application to:

Coordinator, CCRMP

CANMET

555 Booth Street

Ottawa, Ontario K1A 0G1

Canada

This Certificate of Analysis is available in French on request to the Coordinator, CCRMP.

S1611422002

Inter-Mountain Laboratories - RadChem Standards Notebook

Date: 1/28/16	Standard: Radium 226 per 1/2mL 5.54 pCi/mL L 11.0g Radium 226 standard 7-5 and 2mL Nitric Acid (2014093036) was brought up to 100mL DI	RADSTD-15-1
Expires: 1/28/17	Reference Date: 1/1/07	Initials: MB
Date: 2/16/16	Standard: Po-210 standard MB 2/16/17 24.778 ~~22.809~~ pCi/mL L 0.3259g Po-210 (18234A) and 2mL Nitric Acid (2014093036) was brought up to 100mL DI	RADSTD-15-2
Expires: 2/16/17	Reference Date: 8/1/15 11:00 MST	Initials: MB
Date: 3/10/16	Standard: DL-1a pCi/mL L Canned DL-1a - 150.02 grams	RADSTD-15-3
Expires: Never	Reference Date:	Initials: T.P.
Date: 3/21/16	Standard: Thorium 229 pCi/mL L 0.9444g thorium 229 (SRM4328C) and 4mL nitric (2014093036) was brought up to 200mL DI	RADSTD-15-4
Expires: 3/21/17	Reference Date: 12/31/07 EST 12:00	Initials: MB
Date: 3/22/16	Standard: Radium 228 standard 39.48 pCi/mL L 2.8902g Radium 228 (43395) and 4mL Nitric Acid (2014093036) brought up to 200mL DI	RADSTD-15-5
Expires: 3/22/16	Reference Date: 10/7/10 12:00 EST	Initials: MB
Date: 4/15/16	Standard: Radon-222 pCi/mL L 1mL RADSTD 1-1 and 9mL DI and scintillator oil 10mL	RADSTD-15-6
Expires:	Reference Date: 9/9/1991 12:00 EST	Initials: MB
Date: 4/18/16	Standard: BL-4A 3 made pCi/mL L Canned BL-4A ~~157.73~~ 157.39	RADSTD-15-7
Expires: Never	Reference Date:	Initials:

om Page No. ___

Preparation of Radium 226 Standard from UTS-4

by Tom Pitts 11-12-10

OHAUS Balance check with weights 54106

100 g = 100.01 g
50 g = 50.00
5 g = 5.00

TARE 190.20 grams Sand => 211.35 g

UTS-4 = 5.00 grams

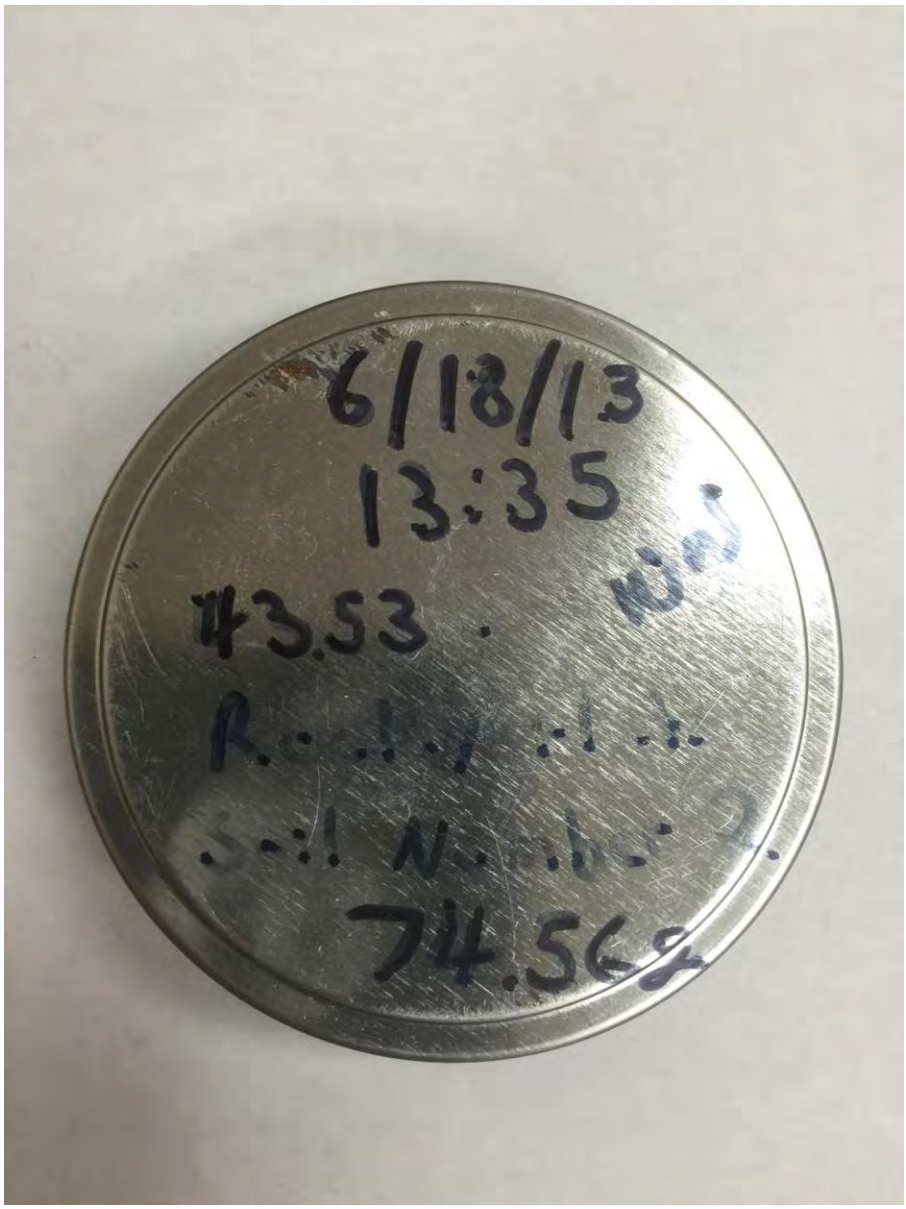
Total weight = 195.20 grams

Canned & Sealed 11-12-10

UTS-4-CAN

Homogenized with a loss of 0.04 grams T.P.

To Page No. _____


6/18/13
13:35
43.53
74.568

Radium 226 Analysis by the Gamma Spectrometry

Calibration Date 1/5/2017 Performed by Wade Nieuwsma

Samples	Grams	Run Date	pCi	KEV 609	seconds	per sec KEV 609	per sec Blank Sub KEV 609	pCi per sec per pCi KEV 609
RADSTD-15-3 DL-1A Cal (RADCHEM-001)	150.02	1/5/2017	37.92	65063	27000	2.409741	2.403796	2366.572579
Blank	150	1/4/2017	0	214	36000	0.005944		

Seq	GAMMA# GB 12210-001 Sample_id	Result pCi/g	Error pCi/g	Gamma Date Time	Radium 226 Analysis by the Gamma Spectrometry Grams	Recovery	Factor	KEV 609	Time	KEV 609	Result pCi/g	ave count error	Error pCi/g	Recovery %	RPD %
1	MBLK GB 12210-001	0	0.011109743		150	1	1	214	36000	0	0	13	0.011109743		
2	RADSTD-15-3-1	39.23517153	0.724600501		150.02	1	1	11219	4500	5886.06	39.23517	106	0.724600501	103.71%	
3	RADSTD-15-3-2	39.23517153	2.454071507		150.02	1	1	11219	4500	5886.06	39.23517	359	2.454071507	103.71%	
4	RADSTD-15-3-3	40.36396379	0.574211718		150.02	1	1	11541	4500	6055.402	40.36396	84	0.574211718	106.70%	
5	RADSTD-15-3-1-2	36.2028569	0.724600501		150.02	1	1	10354	4500	5431.153	36.20286	106	0.724600501	95.70%	
6	RADSTD-15-3-2-2	36.43772983	2.454071507		150.02	1	1	10421	4500	5466.388	36.43773	359	2.454071507	96.32%	
7	RADSTD-15-3-3-3	36.04510643	0.574211718		150.02	1	1	10309	4500	5407.487	36.04511	84	0.574211718	95.28%	
8	Rocky Flats	1.278437291	0.233821772		74.56	1	1	208	4500	95.32028	1.278437	17	0.233821772	111.56%	
9	UTS-4	964.3257354	49.22470964		5	1	1	3678	1800	4821.629	964.3257	96	49.22470964	93.62%	
10	RADSTD-15-7 BL-4A	432.6737428	1.726675251		157.39	1	1	51806	1800	68098.52	432.6737	106	1.726675251	103.28%	
11	CAL Check	37.92	0.12076675		150.02	1	1	65063	27000	5688.758	37.92	106	0.12076675	100.00%	

Reviewed and Approved By _____

Detector #4 ACQ 04-Jan-2017 at 18:09:15 RT = 36171.4 LT = 36000.0
Rad Chem 1
MBLK

ROI#	RANGE(keV)		GROSS	NET	+/-	CENTROID	FWHM	FW(1/5)M	LIBRARY	(keV)	µCi	+/-
1	606.78	611.61	517	214	32	609.20	1.28	1.76	Bi-214	609.31	0.0000	0.0000
2	659.24	664.07	246	-45	27	660.56	0.22	0.35	Cs-137	661.66	0.0000	0.0000
3	724.43	729.70	263	25	27	727.79	0.41	0.64	Bi-212	727.00	0.0000	0.0000
4	765.70	770.97	228	-26	27	768.06	0.88	1.10	Bi-214	768.36	0.0000	0.0000
5	824.75	830.01	221	8	26	827.82	0.22	0.35	Co-60	826.28	0.0038	0.0123
6	844.94	850.21	535	247	34	846.57	1.38	1.91	Co-56	846.77	0.0000	0.0000
7	857.89	863.16	180	-20	24	860.63	1.99	2.11	Tl-208	860.56	0.0000	0.0000
8	908.38	913.87	248	70	25	910.67	0.43	0.63	Ac-228	911.20	0.0000	0.0000
9	966.11	971.82	211	31	25	969.02	0.28	0.78	Ac-228	968.97	0.0000	0.0000
10	997.94	1003.65	149	23	21	999.26	0.22	0.35	Pa-234M	1001.03	0.0001	0.0001
11	1060.94	1067.09	147	31	21	1063.55	0.27	0.48	No close library match!			
12	1117.36	1123.07	181	68	21	1119.34	0.68	1.06	Bi-214	1120.29	0.0000	0.0000
13	1172.46	1178.61	137	-47	25	1174.00	0.24	0.39	Co-60	1173.24	0.0000	0.0000
14	1235.02	1241.17	167	90	19	1237.55	1.52	1.79	Bi-214	1238.11	0.0001	0.0000
15	1271.90	1278.49	119	16	21	1274.94	0.32	0.74	No close library match!			
16	1331.84	1338.42	132	-39	25	1336.67	0.22	0.35	Co-60	1332.50	0.0000	0.0000
17	1457.63	1463.78	464	362	27	1460.50	1.78	2.57	K-40	1461.00	0.0002	0.0000
18	1761.27	1767.85	112	34	18	1763.95	0.46	0.88	Bi-214	1764.49	0.0000	0.0000

Detector #4 ACQ 04-Jan-2017 at 14:23:19 RT = 4562.6 LT = 4500.0
Rad Chem 1
RADSTD15-3

ROI#	RANGE(keV)		GROSS	NET	+/-	CENTROID	FWHM	FW(1/5)M	LIBRARY	(keV)	µCi	+/-
1	606.78	611.61	11748	11219	112	609.24	1.24	1.87	Bi-214	609.31	0.0057	0.0001
2	659.24	664.07	399	8	33	660.30	0.26	0.48	Cs-137	661.66	0.0000	0.0000
3	724.43	729.70	766	383	39	727.26	1.21	1.77	Bi-212	727.00	0.0014	0.0001
4	765.70	770.97	1469	886	52	768.26	1.20	1.90	Bi-214	768.36	0.0050	0.0003
5	824.75	830.01	387	41	33	827.36	0.70	1.19	Co-60	826.28	0.1549	0.1247
6	844.94	850.21	333	54	30	845.88	0.41	0.70	Co-56	846.77	0.0000	0.0000
7	857.89	863.16	539	260	33	860.37	1.12	2.37	Tl-208	860.56	0.0006	0.0001
8	908.38	913.87	1622	1280	49	911.08	1.51	2.27	Ac-228	911.20	0.0014	0.0001
9	966.11	971.82	1010	731	41	968.83	1.32	2.20	Ac-228	968.97	0.0015	0.0001
10	997.94	1003.65	454	157	34	1001.00	1.28	2.30	Pa-234M	1001.03	0.0064	0.0014
11	1060.94	1067.09	290	-34	34	1062.92	0.22	0.35	No close library match!			
12	1117.36	1123.07	2591	2352	56	1120.19	1.54	2.44	Bi-214	1120.29	0.0060	0.0001
13	1172.46	1178.61	233	20	28	1173.34	0.24	0.38	Co-60	1173.24	0.0000	0.0000
14	1235.02	1241.17	1119	858	43	1237.95	1.57	2.46	Bi-214	1238.11	0.0062	0.0003
15	1271.90	1278.49	236	3	31	1276.51	0.22	0.35	No close library match!			
16	1331.84	1338.42	196	41	26	1335.74	0.49	1.19	Co-60	1332.50	0.0000	0.0000
17	1457.63	1463.78	1136	889	42	1460.64	1.42	2.55	K-40	1461.00	0.0042	0.0002
18	1761.27	1767.85	2139	2056	48	1764.50	1.92	2.86	Bi-214	1764.49	0.0088	0.0002

Detector #4 ACQ 12-Jan-2017 at 10:24:10 RT = 4556.4 LT = 4500.0
Rad Chem 1
CAL-1 15-3

ROI#	RANGE(keV)		GROSS	NET	+/-	CENTROID	FWHM	FW(1/5)M	LIBRARY	(keV)	µCi	+/-
1	607.00	611.83	10799	10354	107	609.43	1.22	1.88	Bi-214	609.31	0.0053	0.0001
2	659.24	664.07	310	-27	30	661.00	0.88	1.01	Cs-137	661.66	0.0000	0.0000
3	724.43	729.70	710	389	37	727.47	1.41	2.12	Bi-212	727.00	0.0014	0.0001
4	765.70	770.97	1372	889	49	768.48	1.44	1.98	Bi-214	768.36	0.0050	0.0003
5	824.75	830.01	299	20	30	827.35	0.24	0.68	Co-60	826.28	0.0756	0.1134
6	844.94	850.21	353	-5	33	847.91	0.39	0.55	Co-56	846.77	0.0000	0.0000
7	857.89	863.16	520	212	34	860.36	0.67	1.84	Tl-208	860.56	0.0005	0.0001
8	908.38	913.87	1438	1152	45	911.34	1.46	2.30	Ac-228	911.20	0.0013	0.0001
9	966.11	971.82	869	504	42	969.13	1.17	2.08	Ac-228	968.97	0.0010	0.0001
10	997.94	1003.65	422	179	32	1001.32	2.10	2.51	Pa-234M	1001.03	0.0073	0.0013
11	1060.94	1067.09	289	-1	33	1065.55	0.24	0.38	No close library match!			
12	1117.36	1123.07	2493	2178	57	1120.52	1.57	2.32	Bi-214	1120.29	0.0056	0.0001
13	1172.46	1178.61	196	3	27	1173.45	4.56	4.72	Co-60	1173.24	0.0000	0.0000
14	1235.02	1241.17	969	737	40	1238.41	1.49	2.36	Co-56	1238.28	0.0005	0.0000
15	1271.90	1278.49	204	8	28	1277.17	0.22	0.35	No close library match!			
16	1331.84	1338.42	177	32	25	1337.76	0.22	0.35	Co-60	1332.50	0.0000	0.0000
17	1457.63	1463.78	1023	830	39	1461.13	1.82	2.75	K-40	1461.00	0.0040	0.0002
18	1761.27	1767.85	1853	1781	45	1765.07	1.83	2.86	Bi-214	1764.49	0.0076	0.0002

Detector #4 ACQ 04-Jan-2017 at 14:23:19 RT = 4562.6 LT = 4500.0
Rad Chem 1
RADSTD15-3

ROI#	RANGE(keV)		GROSS	NET	+/-	CENTROID	FWHM	FW(1/5)M	LIBRARY	(keV)	µCi	+/-
1	606.78	611.61	11748	11219	112	609.24	1.24	1.87	Bi-214	609.31	0.0057	0.0001
2	659.24	664.07	399	8	33	660.30	0.26	0.48	Cs-137	661.66	0.0000	0.0000
3	724.43	729.70	766	383	39	727.26	1.21	1.77	Bi-212	727.00	0.0014	0.0001
4	765.70	770.97	1469	886	52	768.26	1.20	1.90	Bi-214	768.36	0.0050	0.0003
5	824.75	830.01	387	41	33	827.36	0.70	1.19	Co-60	826.28	0.1549	0.1247
6	844.94	850.21	333	54	30	845.88	0.41	0.70	Co-56	846.77	0.0000	0.0000
7	857.89	863.16	539	260	33	860.37	1.12	2.37	Tl-208	860.56	0.0006	0.0001
8	908.38	913.87	1622	1280	49	911.08	1.51	2.27	Ac-228	911.20	0.0014	0.0001
9	966.11	971.82	1010	731	41	968.83	1.32	2.20	Ac-228	968.97	0.0015	0.0001
10	997.94	1003.65	454	157	34	1001.00	1.28	2.30	Pa-234M	1001.03	0.0064	0.0014
11	1060.94	1067.09	290	-34	34	1062.92	0.22	0.35	No close library match!			
12	1117.36	1123.07	2591	2352	56	1120.19	1.54	2.44	Bi-214	1120.29	0.0060	0.0001
13	1172.46	1178.61	233	20	28	1173.34	0.24	0.38	Co-60	1173.24	0.0000	0.0000
14	1235.02	1241.17	1119	858	43	1237.95	1.57	2.46	Bi-214	1238.11	0.0062	0.0003
15	1271.90	1278.49	236	3	31	1276.51	0.22	0.35	No close library match!			
16	1331.84	1338.42	196	41	26	1335.74	0.49	1.19	Co-60	1332.50	0.0000	0.0000
17	1457.63	1463.78	1136	889	42	1460.64	1.42	2.55	K-40	1461.00	0.0042	0.0002
18	1761.27	1767.85	2139	2056	48	1764.50	1.92	2.86	Bi-214	1764.49	0.0088	0.0002

Detector #4 ACQ 12-Jan-2017 at 11:55:39 RT = 4557.1 LT = 4500.0
Rad Chem 1
CAL-2-15-3

ROI#	RANGE(keV)		GROSS	NET	+/-	CENTROID	FWHM	FW(1/5)M	LIBRARY	(keV)	µCi	+/-
1	606.78	611.61	10935	10421	108	609.42	1.20	1.86	Bi-214	609.31	0.0053	0.0001
2	659.24	664.07	360	23	31	660.01	3.64	3.83	Cs-137	661.66	0.0000	0.0000
3	724.43	729.70	719	386	37	727.41	1.43	1.98	Bi-212	727.00	0.0014	0.0001
4	765.70	770.97	1369	902	48	768.53	1.24	2.06	Bi-214	768.36	0.0051	0.0003
5	824.75	830.01	323	-31	33	825.40	0.27	0.48	Co-60	826.28	0.0000	0.1247
6	844.94	850.21	340	23	32	846.67	0.29	0.51	Co-56	846.77	0.0000	0.0000
7	857.89	863.16	480	238	31	860.77	1.58	2.57	Tl-208	860.56	0.0006	0.0001
8	908.38	913.87	1424	1121	46	911.33	1.52	2.24	Ac-228	911.20	0.0013	0.0001
9	966.11	971.82	949	643	41	969.16	1.25	2.04	Ac-228	968.97	0.0013	0.0001
10	997.94	1003.65	421	124	34	1001.20	1.15	2.00	Pa-234M	1001.03	0.0050	0.0014
11	1060.94	1067.09	260	42	29	1065.79	0.25	0.81	No close library match!			
12	1117.36	1123.07	2508	2233	56	1120.50	1.58	2.44	Bi-214	1120.29	0.0057	0.0001
13	1172.46	1178.61	258	55	28	1175.34	2.41	2.54	Co-60	1173.24	0.0000	0.0000
14	1235.02	1241.17	986	793	39	1238.37	1.80	2.47	Co-56	1238.28	0.0005	0.0000
15	1271.90	1278.49	212	52	26	1274.64	0.37	0.54	No close library match!			
16	1331.84	1338.42	161	-4	26	1336.01	1.32	1.45	Co-60	1332.50	0.0000	0.0000
17	1457.63	1463.78	1026	842	39	1461.05	1.95	2.83	K-40	1461.00	0.0040	0.0002
18	1761.27	1767.85	2013	1941	47	1765.05	1.99	3.07	Bi-214	1764.49	0.0083	0.0002

Detector #4 ACQ 05-Jan-2017 at 7:58:30 RT = 4562.6 LT = 4500.0
Rad Chem 1
RADSTD15-3

ROI#	RANGE(keV)		GROSS	NET	+/-	CENTROID	FWHM	FW(1/5)M	LIBRARY	(keV)	µCi	+/-
1	606.78	611.61	11986	11541	113	609.20	1.22	1.89	Bi-214	609.31	0.0059	0.0001
2	659.24	664.07	389	-25	33	660.34	0.22	0.35	Cs-137	661.66	0.0000	0.0000
3	724.43	729.70	742	384	38	727.25	1.31	2.12	Bi-212	727.00	0.0014	0.0001
4	765.70	770.97	1504	900	53	768.19	1.17	1.89	Bi-214	768.36	0.0051	0.0003
5	824.75	830.01	355	1	33	827.16	0.22	0.35	Co-60	826.28	0.0038	0.1247
6	844.94	850.21	372	1	34	845.80	0.26	0.46	Co-56	846.77	0.0000	0.0000
7	857.89	863.16	542	238	34	860.26	1.10	1.87	Tl-208	860.56	0.0006	0.0001
8	908.38	913.87	1539	1114	50	910.99	1.46	2.12	Ac-228	911.20	0.0013	0.0001
9	966.11	971.82	1000	716	41	968.71	1.44	2.29	Ac-228	968.97	0.0015	0.0001
10	997.94	1003.65	476	156	35	1000.77	1.35	1.65	Pa-234M	1001.03	0.0063	0.0014
11	1060.94	1067.09	257	1	31	1065.55	0.24	0.38	No close library match!			
12	1117.36	1123.07	2579	2300	57	1120.05	1.38	2.31	Bi-214	1120.29	0.0059	0.0001
13	1172.46	1178.61	253	11	30	1173.44	3.04	3.19	Co-60	1173.24	0.0000	0.0000
14	1235.02	1241.17	1100	824	43	1237.79	1.48	2.34	Bi-214	1238.11	0.0059	0.0003
15	1271.90	1278.49	210	8	29	1274.10	0.22	0.35	No close library match!			
16	1331.84	1338.42	216	45	27	1332.50	4.50	5.14	Co-60	1332.50	0.0000	0.0000
17	1457.63	1463.78	1224	1035	41	1460.57	1.84	2.81	K-40	1461.00	0.0049	0.0002
18	1761.27	1767.85	2153	2060	49	1764.31	1.80	2.81	Bi-214	1764.49	0.0088	0.0002

Detector #4 ACQ 12-Jan-2017 at 13:20:52 RT = 4556.7 LT = 4500.0
Rad Chem 1
CAL-3 15-3

ROI#	RANGE(keV)		GROSS	NET	+/-	CENTROID	FWHM	FW(1/5)M	LIBRARY	(keV)	µCi	+/-
1	606.78	611.61	10804	10309	108	609.44	1.21	1.86	Bi-214	609.31	0.0053	0.0001
2	659.24	664.07	361	-15	32	660.78	2.63	2.77	Cs-137	661.66	0.0000	0.0000
3	724.43	729.70	683	375	36	727.47	1.42	1.93	Bi-212	727.00	0.0014	0.0001
4	765.70	770.97	1346	938	47	768.54	1.22	2.02	Bi-214	768.36	0.0053	0.0003
5	824.75	830.01	328	7	31	825.88	0.26	0.74	Co-60	826.28	0.0265	0.1172
6	844.94	850.21	330	92	29	845.60	2.40	2.54	Co-56	846.77	0.0000	0.0000
7	857.89	863.16	461	223	31	860.70	1.05	2.26	Tl-208	860.56	0.0005	0.0001
8	908.38	913.87	1461	1184	45	911.34	1.49	2.17	Ac-228	911.20	0.0013	0.0001
9	966.11	971.82	942	645	41	969.16	1.27	2.11	Ac-228	968.97	0.0013	0.0001
10	997.94	1003.65	441	171	33	1001.47	1.31	2.35	Pa-234M	1001.03	0.0069	0.0013
11	1060.94	1067.09	259	17	30	1064.67	0.24	0.39	No close library match!			
12	1117.36	1123.07	2450	2279	53	1120.52	1.61	2.44	Bi-214	1120.29	0.0058	0.0001
13	1172.46	1178.61	228	-62	32	1173.89	0.41	0.56	Co-60	1173.24	0.0000	0.0000
14	1235.02	1241.17	983	761	40	1238.30	1.81	2.31	Co-56	1238.28	0.0005	0.0000
15	1271.90	1278.49	193	22	27	1275.86	1.80	2.00	No close library match!			
16	1331.84	1338.42	167	43	23	1333.52	2.59	2.75	Co-60	1332.50	0.0000	0.0000
17	1457.63	1463.78	1082	898	40	1461.11	1.97	2.68	K-40	1461.00	0.0043	0.0002
18	1761.27	1767.85	1856	1768	46	1765.02	1.88	2.83	Bi-214	1764.49	0.0076	0.0002

	GAMMA# GB 12210-001	Result	Error	Gamma	Radium 226 Analysis by the Gamma Spectrometry						Result		Error	Recovery
Seq	Sample_id	pCi/g	pCi/g	Date Time	Grams	Recovery	Factor	KEV 609	Time	KEV 609	pCi/g	ave count error	pCi/g	%
1	MBLK GB 12210-001	0	0.01063535		150	1	1	214	36000	0	0	13	0.01063535	
2	RADSTD-15-3-1	37.55980265	0.69365956		150.02	1	1	11219	4500	5634.722	37.5598	106	0.69365956	99.29%
3	RADSTD-15-3-2	37.55980265	2.349280962		150.02	1	1	11219	4500	5634.722	37.5598	359	2.349280962	99.29%
4	RADSTD-15-3-3	38.6403947	0.549692481		150.02	1	1	11541	4500	5796.832	38.64039	84	0.549692481	102.14%
5	Rocky Flats	1.223847137	0.223837421		74.56	1	1	208	4500	91.25004	1.223847	17	0.223837421	106.79%
6	UTS-4	923.1483615	47.1227806		5	1	1	3678	1800	4615.742	923.1484	96	47.1227806	89.63%
7	RADSTD-15-7 BL-4A	414.1982757	1.652945027		157.39	1	1	51806	1800	65190.67	414.1983	106	1.652945027	98.87%

Validated by Tom Patten 1/11/17

Reviewed and Approved By _____

Detector #4 ACQ 04-Jan-2017 at 18:09:15 RT = 36171.4 LT = 36000.0
Rad Chem 1
MBLK

ROI#	RANGE(keV)		GROSS	NET	+/-	CENTROID	FWHM	FW(1/5)M	LIBRARY	(keV)	µCi	+/-
1	606.78	611.61	517	214	32	609.20	1.28	1.76	Bi-214	609.31	0.0000	0.0000
2	659.24	664.07	246	-45	27	660.56	0.22	0.35	Cs-137	661.66	0.0000	0.0000
3	724.43	729.70	263	25	27	727.79	0.41	0.64	Bi-212	727.00	0.0000	0.0000
4	765.70	770.97	228	-26	27	768.06	0.88	1.10	Bi-214	768.36	0.0000	0.0000
5	824.75	830.01	221	8	26	827.82	0.22	0.35	Co-60	826.28	0.0038	0.0123
6	844.94	850.21	535	247	34	846.57	1.38	1.91	Co-56	846.77	0.0000	0.0000
7	857.89	863.16	180	-20	24	860.63	1.99	2.11	Tl-208	860.56	0.0000	0.0000
8	908.38	913.87	248	70	25	910.67	0.43	0.63	Ac-228	911.20	0.0000	0.0000
9	966.11	971.82	211	31	25	969.02	0.28	0.78	Ac-228	968.97	0.0000	0.0000
10	997.94	1003.65	149	23	21	999.26	0.22	0.35	Pa-234M	1001.03	0.0001	0.0001
11	1060.94	1067.09	147	31	21	1063.55	0.27	0.48	No close library match!			
12	1117.36	1123.07	181	68	21	1119.34	0.68	1.06	Bi-214	1120.29	0.0000	0.0000
13	1172.46	1178.61	137	-47	25	1174.00	0.24	0.39	Co-60	1173.24	0.0000	0.0000
14	1235.02	1241.17	167	90	19	1237.55	1.52	1.79	Bi-214	1238.11	0.0001	0.0000
15	1271.90	1278.49	119	16	21	1274.94	0.32	0.74	No close library match!			
16	1331.84	1338.42	132	-39	25	1336.67	0.22	0.35	Co-60	1332.50	0.0000	0.0000
17	1457.63	1463.78	464	362	27	1460.50	1.78	2.57	K-40	1461.00	0.0002	0.0000
18	1761.27	1767.85	112	34	18	1763.95	0.46	0.88	Bi-214	1764.49	0.0000	0.0000

Detector #4 ACQ 04-Jan-2017 at 14:23:19 RT = 4562.6 LT = 4500.0
Rad Chem 1
RADSTD15-3

ROI#	RANGE(keV)		GROSS	NET	+/-	CENTROID	FWHM	FW(1/5)M	LIBRARY	(keV)	µCi	+/-
1	606.78	611.61	11748	11219	112	609.24	1.24	1.87	Bi-214	609.31	0.0057	0.0001
2	659.24	664.07	399	8	33	660.30	0.26	0.48	Cs-137	661.66	0.0000	0.0000
3	724.43	729.70	766	383	39	727.26	1.21	1.77	Bi-212	727.00	0.0014	0.0001
4	765.70	770.97	1469	886	52	768.26	1.20	1.90	Bi-214	768.36	0.0050	0.0003
5	824.75	830.01	387	41	33	827.36	0.70	1.19	Co-60	826.28	0.1549	0.1247
6	844.94	850.21	333	54	30	845.88	0.41	0.70	Co-56	846.77	0.0000	0.0000
7	857.89	863.16	539	260	33	860.37	1.12	2.37	Tl-208	860.56	0.0006	0.0001
8	908.38	913.87	1622	1280	49	911.08	1.51	2.27	Ac-228	911.20	0.0014	0.0001
9	966.11	971.82	1010	731	41	968.83	1.32	2.20	Ac-228	968.97	0.0015	0.0001
10	997.94	1003.65	454	157	34	1001.00	1.28	2.30	Pa-234M	1001.03	0.0064	0.0014
11	1060.94	1067.09	290	-34	34	1062.92	0.22	0.35	No close library match!			
12	1117.36	1123.07	2591	2352	56	1120.19	1.54	2.44	Bi-214	1120.29	0.0060	0.0001
13	1172.46	1178.61	233	20	28	1173.34	0.24	0.38	Co-60	1173.24	0.0000	0.0000
14	1235.02	1241.17	1119	858	43	1237.95	1.57	2.46	Bi-214	1238.11	0.0062	0.0003
15	1271.90	1278.49	236	3	31	1276.51	0.22	0.35	No close library match!			
16	1331.84	1338.42	196	41	26	1335.74	0.49	1.19	Co-60	1332.50	0.0000	0.0000
17	1457.63	1463.78	1136	889	42	1460.64	1.42	2.55	K-40	1461.00	0.0042	0.0002
18	1761.27	1767.85	2139	2056	48	1764.50	1.92	2.86	Bi-214	1764.49	0.0088	0.0002

Detector #4 ACQ 04-Jan-2017 at 14:23:19 RT = 4562.6 LT = 4500.0
Rad Chem 1
RADSTD15-3

ROI#	RANGE(keV)		GROSS	NET	+/-	CENTROID	FWHM	FW(1/5)M	LIBRARY	(keV)	µCi	+/-
1	606.78	611.61	11748	11219	112	609.24	1.24	1.87	Bi-214	609.31	0.0057	0.0001
2	659.24	664.07	399	8	33	660.30	0.26	0.48	Cs-137	661.66	0.0000	0.0000
3	724.43	729.70	766	383	39	727.26	1.21	1.77	Bi-212	727.00	0.0014	0.0001
4	765.70	770.97	1469	886	52	768.26	1.20	1.90	Bi-214	768.36	0.0050	0.0003
5	824.75	830.01	387	41	33	827.36	0.70	1.19	Co-60	826.28	0.1549	0.1247
6	844.94	850.21	333	54	30	845.88	0.41	0.70	Co-56	846.77	0.0000	0.0000
7	857.89	863.16	539	260	33	860.37	1.12	2.37	Tl-208	860.56	0.0006	0.0001
8	908.38	913.87	1622	1280	49	911.08	1.51	2.27	Ac-228	911.20	0.0014	0.0001
9	966.11	971.82	1010	731	41	968.83	1.32	2.20	Ac-228	968.97	0.0015	0.0001
10	997.94	1003.65	454	157	34	1001.00	1.28	2.30	Pa-234M	1001.03	0.0064	0.0014
11	1060.94	1067.09	290	-34	34	1062.92	0.22	0.35	No close library match!			
12	1117.36	1123.07	2591	2352	56	1120.19	1.54	2.44	Bi-214	1120.29	0.0060	0.0001
13	1172.46	1178.61	233	20	28	1173.34	0.24	0.38	Co-60	1173.24	0.0000	0.0000
14	1235.02	1241.17	1119	858	43	1237.95	1.57	2.46	Bi-214	1238.11	0.0062	0.0003
15	1271.90	1278.49	236	3	31	1276.51	0.22	0.35	No close library match!			
16	1331.84	1338.42	196	41	26	1335.74	0.49	1.19	Co-60	1332.50	0.0000	0.0000
17	1457.63	1463.78	1136	889	42	1460.64	1.42	2.55	K-40	1461.00	0.0042	0.0002
18	1761.27	1767.85	2139	2056	48	1764.50	1.92	2.86	Bi-214	1764.49	0.0088	0.0002

Detector #4 ACQ 05-Jan-2017 at 7:58:30 RT = 4562.6 LT = 4500.0
Rad Chem 1
RADSTD15-3

ROI#	RANGE(keV)		GROSS	NET	+/-	CENTROID	FWHM	FW(1/5)M	LIBRARY	(keV)	µCi	+/-
1	606.78	611.61	11986	11541	113	609.20	1.22	1.89	Bi-214	609.31	0.0059	0.0001
2	659.24	664.07	389	-25	33	660.34	0.22	0.35	Cs-137	661.66	0.0000	0.0000
3	724.43	729.70	742	384	38	727.25	1.31	2.12	Bi-212	727.00	0.0014	0.0001
4	765.70	770.97	1504	900	53	768.19	1.17	1.89	Bi-214	768.36	0.0051	0.0003
5	824.75	830.01	355	1	33	827.16	0.22	0.35	Co-60	826.28	0.0038	0.1247
6	844.94	850.21	372	1	34	845.80	0.26	0.46	Co-56	846.77	0.0000	0.0000
7	857.89	863.16	542	238	34	860.26	1.10	1.87	Tl-208	860.56	0.0006	0.0001
8	908.38	913.87	1539	1114	50	910.99	1.46	2.12	Ac-228	911.20	0.0013	0.0001
9	966.11	971.82	1000	716	41	968.71	1.44	2.29	Ac-228	968.97	0.0015	0.0001
10	997.94	1003.65	476	156	35	1000.77	1.35	1.65	Pa-234M	1001.03	0.0063	0.0014
11	1060.94	1067.09	257	1	31	1065.55	0.24	0.38	No close library match!			
12	1117.36	1123.07	2579	2300	57	1120.05	1.38	2.31	Bi-214	1120.29	0.0059	0.0001
13	1172.46	1178.61	253	11	30	1173.44	3.04	3.19	Co-60	1173.24	0.0000	0.0000
14	1235.02	1241.17	1100	824	43	1237.79	1.48	2.34	Bi-214	1238.11	0.0059	0.0003
15	1271.90	1278.49	210	8	29	1274.10	0.22	0.35	No close library match!			
16	1331.84	1338.42	216	45	27	1332.50	4.50	5.14	Co-60	1332.50	0.0000	0.0000
17	1457.63	1463.78	1224	1035	41	1460.57	1.84	2.81	K-40	1461.00	0.0049	0.0002
18	1761.27	1767.85	2153	2060	49	1764.31	1.80	2.81	Bi-214	1764.49	0.0088	0.0002

Radium 226 Analysis by the Gamma Spectrometry

Calibration Date 6/22/2016 Performed by Wade Nieuwsma

Samples	Grams	Run Date	pCi	KEV 609	seconds	per sec KEV 609	per sec Blank Sub KEV 609	per sec per pCi KEV 609	pCi
RADSTD-15-3 DL1 A (RAD CHEM - 002)	150.02	6/22/2016	37.92	32838	14400	2.280417	2.271701	2504.184057	
Blank	150	4/13/2016	0	62.75	7200	0.008715			

GAMMA# GB 12210-001 Sample_id	Result pCi/g	Error pCi/g	Gamma Date Time	Radium 226 Analysis by the Gamma Spectrometry Grams	Recovery	Factor	KEV 609	Time	KEV 609	Result pCi/g	ave count error	Error pCi/g		Recovery %	RPD %
MBLK GB 12210-001	-0.013332461	0.067821652		150	1	1	57	7200	-1.99987	-0.01333	15		0.067821652		
RADSTD-15-3	37.52355705	0.426767358		150.02	1	1	60930	27000	5629.284	37.52356	354		0.426767358	98.95%	
LCS	412.3631771	12.42492656		150	1	1	29651	1200	61854.48	412.3632	458		12.42492656	77.22%	
UTS-4	860.4132957	99.3994125		5	1	1	7770	4500	4302.066	860.4133	458		99.3994125	87.98%	
Rockey Flats	1.233785603	0.228478815		74.21	1	1	326	7200	91.55923	1.233786	25		0.228478815	107.66%	
RADSTD-15-7 BL-4A	406.7110267	2.740616963		157.39	1	1	30685	1200	64012.25	406.711	106		2.740616963	97.09%	
RADSTD-15-3	38.11242553	1.600377593	6/19/2013 0:00	150.02	1	1	16502	7200	5717.626	38.11243	354		1.600377593	100.51%	
RADSTD-15-3	37.72757447	1.600377593	6/22/2019 0:00	150.02	1	1	16336	7200	5659.891	37.72757	354		1.600377593	99.49%	
RADSTD-15-3	37.92	0.800188796	6/22/2019 0:00	150.02	1	1	32838	14400	5688.758	37.92	354		0.800188796	100.00%	

Reviewed and Approved By _____

Speadsheet Validated on 6/23/16 by Tom Patten

Tom Patten

Detector #2 ACQ 19-Jun-2016 at 10:50:05 RT = 7238.5 LT = 7200.0
Rad Chem 2
RADSTD15-2HRS

ROI#	RANGE(keV)		GROSS	NET	+/-	CENTROID	FWHM	FW(1/5)M	LIBRARY (keV)		µCi	+/-
1	606.93	611.75	17537	16502	139	609.13	1.28	1.98	Bi-214	609.00	0.0050	0.0000
2	659.29	664.11	609	-43	42	661.15	0.38	0.55	Cs-137	661.66	0.0000	0.0000
3	724.58	729.84	1143	643	47	727.03	1.25	2.34	Bi-212	727.00	0.0015	0.0001
4	765.77	771.02	2161	1290	63	768.15	1.22	1.97	No close library match!			
5	857.99	863.25	757	290	42	860.43	1.07	2.17	No close library match!			
6	908.38	914.07	2273	1598	62	910.92	1.43	2.25	Ac-228	911.00	0.0012	0.0000
7	966.21	971.90	1509	1027	52	968.73	1.47	2.33	Ac-228	968.97	0.0013	0.0001
8	998.19	1003.88	623	200	40	1000.67	1.44	2.05	No close library match!			
9	1059.08	1065.21	420	62	37	1064.21	0.68	1.35	Bi-207	1063.00	0.0000	0.0000
10	1117.34	1123.47	3766	3307	71	1119.99	1.63	2.50	No close library match!			
11	1170.34	1176.47	359	69	34	1173.51	0.54	1.05	Co-60	1173.20	0.0000	0.0000
12	1235.17	1241.30	1582	1219	51	1237.76	1.55	2.50	No close library match!			
13	1269.55	1276.12	364	80	35	1273.73	0.33	1.17	No close library match!			
14	1329.34	1335.91	321	26	35	1333.69	0.27	0.48	No close library match!			
15	1457.88	1464.45	1476	1083	52	1460.38	1.87	2.84	No close library match!			
16	1761.13	1768.13	2905	2679	60	1764.00	2.04	3.05	No close library match!			

Detector #2 ACQ 22-Jun-2016 at 12:53:53 RT = 7237.1 LT = 7200.0
Rad Chem 2
RADSTD15-3.2HRS

ROI#	RANGE(keV)		GROSS	NET	+/-	CENTROID	FWHM	FW(1/5)M	LIBRARY (keV)		Bq	+/-
1	606.93	611.75	17314	16336	138	609.07	1.27	1.96	Bi-214	609.00	182.18	1.54
2	659.29	664.11	634	-45	43	660.17	0.22	0.35	Cs-137	661.66	0.00	0.28
3	724.58	729.84	1220	612	50	726.95	1.40	2.00	Bi-212	727.00	53.25	4.35
4	765.77	771.02	2118	1218	63	768.10	1.18	2.00	No close library match!			
5	857.99	863.25	799	295	43	860.23	1.36	1.99	No close library match!			
6	908.38	914.07	2296	1697	61	910.83	1.54	2.32	Ac-228	911.00	45.50	1.64
7	966.21	971.90	1401	1018	48	968.60	1.33	2.25	Ac-228	968.97	49.38	2.33
8	998.19	1003.88	692	287	41	1000.87	0.86	1.85	No close library match!			
9	1059.08	1065.21	431	30	39	1062.20	0.31	0.58	Bi-207	1063.00	0.33	0.43
10	1117.34	1123.47	3788	3208	73	1119.96	1.57	2.44	No close library match!			
11	1170.34	1176.47	371	28	36	1173.63	0.24	0.38	Co-60	1173.20	0.26	0.34
12	1235.17	1241.30	1548	1181	50	1237.71	1.75	2.48	No close library match!			
13	1269.55	1276.12	317	-14	36	1275.27	0.46	0.71	No close library match!			
14	1329.34	1335.91	337	-20	38	1333.72	0.22	0.35	No close library match!			
15	1457.88	1464.45	1616	1197	54	1460.30	1.75	2.84	No close library match!			
16	1761.13	1768.13	2820	2594	60	1763.86	1.88	3.10	No close library match!			

Detector #1 ACQ 24-Dec-2015 at 10:58:28 RT = 7206.8 LT = 7200.0
Rad Chem 1
MB-358

ROI#	RANGE(keV)		GROSS	NET	+/-	CENTROID	FWHM	FW(1/5)M	LIBRARY	(keV)	µCi	+/-
1	607.80	612.63	127	35	17	609.80	0.34	0.91	Bi-214	609.31	0.0000	0.0000
2	660.21	665.47	52	-15	14	664.81	0.22	0.35	Cs-137	661.66	0.0000	0.0000
3	724.23	729.94	69	15	14	725.11	3.44	3.68	Bi-212	727.00	0.0000	0.0000
4	766.11	772.03	52	24	11	768.55	0.29	1.16	Bi-214	768.36	0.0001	0.0000
5	823.77	829.47	47	-3	13	824.65	0.22	0.35	Co-60	826.28	0.0000	0.0320
6	844.60	850.30	114	51	16	847.73	0.56	1.90	Co-56	846.77	0.0000	0.0000
7	857.32	863.02	49	-23	15	857.97	0.22	0.35	Tl-208	860.56	0.0000	0.0000
8	908.62	914.32	41	5	11	912.34	1.16	1.39	Ac-228	911.20	0.0000	0.0000
9	965.83	971.97	47	13	11	969.81	0.32	1.09	Ac-228	968.97	0.0000	0.0000
10	998.71	1004.85	37	3	11	1000.91	3.51	3.64	Pa-234M	1001.03	0.0001	0.0003
11	1060.09	1066.23	29	-10	11	Could not properly fit the peak.						
12	1118.17	1124.31	54	10	13	1121.06	0.35	0.95	Bi-214	1120.29	0.0000	0.0000
13	1170.34	1176.48	22	17	5	1171.00	3.07	3.20	Co-60	1173.24	0.0000	0.0000
14	1233.24	1241.13	43	18	12	1234.55	4.93	5.13	Bi-214	1238.11	0.0001	0.0001
15	1270.72	1277.29	13	8	5	1273.78	0.33	0.53	No close library match!			
16	1329.88	1336.46	24	-12	11	Could not properly fit the peak.						
17	1457.64	1464.65	85	57	13	1461.64	0.75	2.50	K-40	1461.00	0.0002	0.0000
18	1762.38	1769.83	43	25	10	1765.67	0.65	0.79	Bi-214	1764.49	0.0001	0.0000

Detector #1 ACQ 10-Nov-2015 at 9:24:46 RT = 7206.8 LT = 7200.0
Rad Chem 1
MB-297

ROI#	RANGE(keV)		GROSS	NET	+/-	CENTROID	FWHM	FW(1/5)M	LIBRARY	(keV)	µCi	+/-
1	607.80	612.63	146	54	17	610.12	0.47	0.75	Bi-214	609.31	0.0000	0.0000
2	660.21	665.47	51	-3	12	661.09	0.22	0.35	Cs-137	661.66	0.0000	0.0000
3	724.23	729.94	64	1	14	727.74	0.22	0.35	Bi-212	727.00	0.0000	0.0000
4	766.11	772.03	65	4	15	768.62	0.54	1.29	Bi-214	768.36	0.0000	0.0001
5	823.77	829.47	36	-5	11	825.21	0.41	0.56	Co-60	826.28	0.0000	0.0271
6	844.60	850.30	99	58	14	847.00	0.28	0.49	Co-56	846.77	0.0000	0.0000
7	857.32	863.02	44	21	10	859.61	1.61	1.81	Tl-208	860.56	0.0000	0.0000
8	908.62	914.32	43	-7	12	911.47	1.42	1.84	Ac-228	911.20	0.0000	0.0000
9	965.83	971.97	46	12	11	968.46	1.48	1.64	Ac-228	968.97	0.0000	0.0000
10	998.71	1004.85	39	5	11	1001.34	0.22	0.35	Pa-234M	1001.03	0.0001	0.0003
11	1060.09	1066.23	38	-1	12	1062.28	0.22	0.35	No close library match!			
12	1118.17	1124.31	58	19	12	1120.96	0.80	1.27	Bi-214	1120.29	0.0000	0.0000
13	1170.34	1176.48	30	-14	12	1172.31	0.22	0.35	Co-60	1173.24	0.0000	0.0000
14	1233.24	1241.13	52	9	15	1239.27	0.42	0.83	Co-56	1238.28	0.0000	0.0000
15	1270.72	1277.29	35	4	11	1272.25	0.27	0.48	No close library match!			
16	1329.88	1336.46	16	0	8	Could not properly fit the peak.						
17	1457.64	1464.65	77	66	10	1461.86	0.53	1.83	K-40	1461.00	0.0002	0.0000
18	1762.38	1769.83	52	46	8	1766.55	0.25	0.40	Bi-214	1764.49	0.0001	0.0000

MB-11050.Rpt

Detector #1 ACQ 17-Nov-2015 at 15:37:14 RT = 7207.1 LT = 7200.0
Rad Chem 1
MB-321

ROI#	RANGE(keV)		GROSS	NET	+/-	CENTROID	FWHM	FW(1/5)M	LIBRARY	(keV)	µCi	+/-
1	607.80	612.63	115	73	13	610.02	0.38	1.52	Bi-214	609.31	0.0000	0.0000
2	660.21	665.47	53	7	12	661.63	0.47	1.05	Cs-137	661.66	0.0000	0.0000
3	724.23	729.94	50	-9	14	728.18	1.43	1.62	Bi-212	727.00	0.0000	0.0000
4	766.11	772.03	55	-1	14	769.84	0.22	0.35	Bi-214	768.36	0.0000	0.0001
5	823.77	829.47	44	-6	12	825.97	0.22	0.35	Co-60	826.28	0.0000	0.0295
6	844.60	850.30	85	49	13	847.82	0.60	1.60	Co-56	846.77	0.0000	0.0000
7	857.32	863.02	46	1	12	860.61	1.21	1.40	Tl-208	860.56	0.0000	0.0000
8	908.62	914.32	50	32	9	912.34	0.24	0.38	Ac-228	911.20	0.0000	0.0000
9	965.83	971.97	27	12	8	967.59	2.85	2.98	Ac-228	968.97	0.0000	0.0000
10	998.71	1004.85	50	11	12	1001.22	0.48	0.94	Pa-234M	1001.03	0.0003	0.0003
11	1060.09	1066.23	27	12	8	1060.75	0.22	0.35	No close library match!			
12	1118.17	1124.31	46	12	11	1121.78	0.41	0.56	Bi-214	1120.29	0.0000	0.0000
13	1170.34	1176.48	28	-30	13	Could not properly fit the peak.						
14	1233.24	1241.13	63	-17	19	1239.16	0.44	0.92	Co-56	1238.28	0.0000	0.0000
15	1270.72	1277.29	20	-1	9	Could not properly fit the peak.						
16	1329.88	1336.46	16	-10	9	Could not properly fit the peak.						
17	1457.64	1464.65	74	63	10	1461.66	0.64	2.38	K-40	1461.00	0.0002	0.0000
18	1762.38	1769.83	53	30	11	1765.13	1.33	1.68	Bi-214	1764.49	0.0001	0.0000

Detector #1 ACQ 19-Nov-2015 at 15:10:18 RT = 7207.5 LT = 7200.0
Rad Chem 1
MB-323

ROI#	RANGE(keV)		GROSS	NET	+/-	CENTROID	FWHM	FW(1/5)M	LIBRARY	(keV)	µCi	+/-
1	607.80	612.63	152	87	16	609.95	1.22	1.86	Bi-214	609.31	0.0000	0.0000
2	660.21	665.47	64	-11	15	661.74	0.33	0.75	Cs-137	661.66	0.0000	0.0000
3	724.23	729.94	45	13	11	725.99	0.88	1.01	Bi-212	727.00	0.0000	0.0000
4	766.11	772.03	61	0	14	768.96	0.29	1.62	Bi-214	768.36	0.0000	0.0001
5	823.77	829.47	45	0	12	824.98	4.03	4.46	Co-60	826.28	0.0000	0.0295
6	844.60	850.30	95	45	14	848.31	0.25	0.41	Co-56	846.77	0.0000	0.0000
7	857.32	863.02	32	9	9	859.91	0.32	0.52	Tl-208	860.56	0.0000	0.0000
8	908.62	914.32	49	22	10	911.69	1.70	1.86	Ac-228	911.20	0.0000	0.0000
9	965.83	971.97	45	-3	13	968.90	0.27	0.70	Ac-228	968.97	0.0000	0.0000
10	998.71	1004.85	36	-8	12	1001.13	0.33	0.53	Pa-234M	1001.03	0.0000	0.0003
11	1060.09	1066.23	24	-5	10	1063.16	0.22	0.35	No close library match!			
12	1118.17	1124.31	64	20	13	1120.59	0.37	1.21	Bi-214	1120.29	0.0000	0.0000
13	1170.34	1176.48	29	0	10	1171.43	0.33	0.53	Co-60	1173.24	0.0000	0.0000
14	1233.24	1241.13	42	11	13	1234.12	6.47	6.66	Bi-214	1238.11	0.0001	0.0001
15	1270.72	1277.29	36	5	11	1274.44	0.33	0.53	No close library match!			
16	1329.88	1336.46	23	18	6	1334.49	0.22	0.35	Co-60	1332.50	0.0000	0.0000
17	1457.64	1464.65	64	47	11	1461.66	1.14	2.59	K-40	1461.00	0.0002	0.0000
18	1762.38	1769.83	41	35	7	1765.42	0.29	0.95	Bi-214	1764.49	0.0001	0.0000

MB-11089.Rpt

Detector #1 ACQ 27-Nov-2015 at 21:11:20 RT = 7206.8 LT = 7200.0
Rad Chem 1
MB-331

ROI#	RANGE(keV)		GROSS	NET	+/-	CENTROID	FWHM	FW(1/5)M	LIBRARY (keV)		µCi	+/-
1	607.80	612.63	129	79	14	609.88	0.95	1.38	Bi-214	609.31	0.0000	0.0000
2	660.21	665.47	63	-12	15	Could not properly fit the peak.						
3	724.23	729.94	54	-9	14	728.40	0.33	0.53	Bi-212	727.00	0.0000	0.0000
4	766.11	772.03	66	10	14	769.62	0.26	0.44	Bi-214	768.36	0.0000	0.0001
5	823.77	829.47	43	2	12	825.75	0.22	0.35	Co-60	826.28	0.0049	0.0295
6	844.60	850.30	76	49	11	847.44	0.36	2.22	Co-56	846.77	0.0000	0.0000
7	857.32	863.02	48	3	12	859.29	0.22	0.35	Tl-208	860.56	0.0000	0.0000
8	908.62	914.32	56	24	11	912.32	0.27	1.14	Ac-228	911.20	0.0000	0.0000
9	965.83	971.97	44	15	11	969.34	0.25	0.39	Ac-228	968.97	0.0000	0.0000
10	998.71	1004.85	40	16	10	999.37	4.60	4.73	Pa-234M	1001.03	0.0004	0.0003
11	1060.09	1066.23	29	10	9	1064.47	0.22	0.35	No close library match!			
12	1118.17	1124.31	58	24	12	1121.20	1.37	1.72	Bi-214	1120.29	0.0000	0.0000
13	1170.34	1176.48	18	-1	8	1174.50	0.33	0.53	Co-60	1173.24	0.0000	0.0000
14	1233.24	1241.13	39	8	12	1238.50	0.22	0.35	Co-56	1238.28	0.0000	0.0000
15	1270.72	1277.29	28	2	10	1275.76	0.22	0.35	No close library match!			
16	1329.88	1336.46	25	20	6	1330.54	5.37	5.57	Co-60	1332.50	0.0000	0.0000
17	1457.64	1464.65	47	30	10	1462.68	0.33	1.82	K-40	1461.00	0.0001	0.0000
18	1762.38	1769.83	43	20	11	1765.45	0.82	1.24	Bi-214	1764.49	0.0001	0.0000

Detector #1 ACQ 02-Dec-2015 at 19:18:00 RT = 7207.4 LT = 7200.0
Rad Chem 1
MB-336

ROI#	RANGE(keV)		GROSS	NET	+/-	CENTROID	FWHM	FW(1/5)M	LIBRARY	(keV)	µCi	+/-
1	607.80	612.63	130	69	15	609.75	1.30	1.61	Bi-214	609.31	0.0000	0.0000
2	660.21	665.47	64	6	13	663.94	0.22	0.35	Cs-137	661.66	0.0000	0.0000
3	724.23	729.94	58	4	13	726.65	0.27	0.70	Bi-212	727.00	0.0000	0.0000
4	766.11	772.03	57	20	12	771.12	0.32	0.52	Bi-214	768.36	0.0001	0.0000
5	823.77	829.47	47	-16	14	827.28	0.22	0.35	Co-60	826.28	0.0000	0.0345
6	844.60	850.30	97	61	13	847.25	1.18	2.00	Co-56	846.77	0.0000	0.0000
7	857.32	863.02	46	10	11	861.26	0.24	0.39	Tl-208	860.56	0.0000	0.0000
8	908.62	914.32	53	-1	13	912.34	0.82	1.12	Ac-228	911.20	0.0000	0.0000
9	965.83	971.97	42	13	11	971.15	0.51	1.17	Ac-228	968.97	0.0000	0.0000
10	998.71	1004.85	36	-3	12	1000.57	0.41	0.56	Pa-234M	1001.03	0.0000	0.0003
11	1060.09	1066.23	27	-7	11	1061.62	0.22	0.35	No close library match!			
12	1118.17	1124.31	52	37	9	1121.46	0.22	0.35	Bi-214	1120.29	0.0001	0.0000
13	1170.34	1176.48	26	-13	11	1172.09	0.33	0.53	Co-60	1173.24	0.0000	0.0000
14	1233.24	1241.13	50	31	11	1238.72	0.22	0.35	Co-56	1238.28	0.0000	0.0000
15	1270.72	1277.29	33	2	11	1275.54	0.88	1.01	No close library match!			
16	1329.88	1336.46	22	-25	13	Could not properly fit the peak.						
17	1457.64	1464.65	72	33	14	1461.95	1.84	2.45	K-40	1461.00	0.0001	0.0000
18	1762.38	1769.83	43	37	8	1765.89	0.37	1.42	Bi-214	1764.49	0.0001	0.0000

Detector #1 ACQ 15-Dec-2015 at 10:28:51 RT = 7208.2 LT = 7200.0
Rad Chem 1
MB-336

ROI#	RANGE(keV)		GROSS	NET	+/-	CENTROID	FWHM	FW(1/5)M	LIBRARY	(keV)	µCi	+/-
1	607.80	612.63	132	74	15	609.75	0.73	2.20	Bi-214	609.31	0.0000	0.0000
2	660.21	665.47	62	-5	14	663.72	0.22	0.35	Cs-137	661.66	0.0000	0.0000
3	724.23	729.94	48	-11	13	727.96	0.22	0.35	Bi-212	727.00	0.0000	0.0000
4	766.11	772.03	74	18	14	767.87	0.66	0.79	Bi-214	768.36	0.0001	0.0001
5	823.77	829.47	44	-15	13	826.62	0.22	0.35	Co-60	826.28	0.0000	0.0320
6	844.60	850.30	99	54	14	847.64	1.32	2.02	Co-56	846.77	0.0000	0.0000
7	857.32	863.02	43	2	12	858.41	1.75	1.89	Tl-208	860.56	0.0000	0.0000
8	908.62	914.32	52	29	10	912.05	0.42	0.63	Ac-228	911.20	0.0000	0.0000
9	965.83	971.97	36	-3	12	968.68	0.27	0.99	Ac-228	968.97	0.0000	0.0000
10	998.71	1004.85	40	25	9	1003.72	0.35	1.39	Pa-234M	1001.03	0.0007	0.0002
11	1060.09	1066.23	21	-3	9	1060.75	0.22	0.35	No close library match!			
12	1118.17	1124.31	55	21	12	1120.75	0.47	2.15	Bi-214	1120.29	0.0000	0.0000
13	1170.34	1176.48	28	-6	11	1172.75	0.22	0.35	Co-60	1173.24	0.0000	0.0000
14	1233.24	1241.13	39	39	6	1239.32	0.55	1.96	Co-56	1238.28	0.0000	0.0000
15	1270.72	1277.29	28	-13	12	1272.25	0.33	0.53	No close library match!			
16	1329.88	1336.46	17	-4	9	Could not properly fit the peak.						
17	1457.64	1464.65	66	38	12	1462.04	0.48	1.20	K-40	1461.00	0.0001	0.0000
18	1762.38	1769.83	41	35	7	1766.28	0.33	0.85	Bi-214	1764.49	0.0001	0.0000

Detector #1 ACQ 18-Jan-2016 at 16:35:25 RT = 7210.3 LT = 7200.0
Rad Chem 1
MB-018

ROI#	RANGE(keV)		GROSS	NET	+/-	CENTROID	FWHM	FW(1/5)M	LIBRARY	(keV)	µCi	+/-
1	607.80	612.63	141	76	16	609.85	0.52	1.47	Bi-214	609.31	0.0000	0.0000
2	660.21	665.47	59	9	12	662.18	0.22	0.35	Cs-137	661.66	0.0000	0.0000
3	724.23	729.94	60	1	14	725.11	3.29	3.42	Bi-212	727.00	0.0000	0.0000
4	766.11	772.03	51	4	13	766.77	0.22	0.35	Bi-214	768.36	0.0000	0.0000
5	823.77	829.47	47	2	12	828.63	0.29	0.50	Co-60	826.28	0.0049	0.0295
6	844.60	850.30	102	43	15	847.53	0.52	1.77	Co-56	846.77	0.0000	0.0000
7	857.32	863.02	34	-7	11	861.04	0.26	0.44	Tl-208	860.56	0.0000	0.0000
8	908.62	914.32	70	20	13	912.23	0.92	1.64	Ac-228	911.20	0.0000	0.0000
9	965.83	971.97	41	2	12	969.56	0.22	0.35	Ac-228	968.97	0.0000	0.0000
10	998.71	1004.85	41	36	7	1000.80	0.39	0.55	Pa-234M	1001.03	0.0010	0.0002
11	1060.09	1066.23	31	21	7	1063.12	0.35	1.83	No close library match!			
12	1118.17	1124.31	53	24	11	1120.69	0.40	0.61	Bi-214	1120.29	0.0000	0.0000
13	1170.34	1176.48	34	15	9	1174.72	0.22	0.35	Co-60	1173.24	0.0000	0.0000
14	1233.24	1241.13	40	3	13	1238.54	0.32	1.31	Co-56	1238.28	0.0000	0.0000
15	1270.72	1277.29	20	15	6	1276.06	0.87	1.00	No close library match!			
16	1329.88	1336.46	19	14	5	1335.58	0.27	0.48	Co-60	1332.50	0.0000	0.0000
17	1457.64	1464.65	60	38	11	1461.14	0.25	0.40	K-40	1461.00	0.0001	0.0000
18	1762.38	1769.83	54	25	12	1765.35	1.63	1.84	Bi-214	1764.49	0.0001	0.0000

MB-11304.Rpt

Detector #1 ACQ 19-Jan-2016 at 16:25:39 RT = 7210.2 LT = 7200.0
Rad Chem 1
MB-019

ROI#	RANGE(keV)		GROSS	NET	+/-	CENTROID	FWHM	FW(1/5)M	LIBRARY	(keV)	µCi	+/-
1	607.80	612.63	163	105	16	609.63	1.02	1.77	Bi-214	609.31	0.0000	0.0000
2	660.21	665.47	67	9	13	663.75	0.31	0.54	Cs-137	661.66	0.0000	0.0000
3	724.23	729.94	42	19	9	727.82	0.89	2.02	Bi-212	727.00	0.0000	0.0000
4	766.11	772.03	65	18	13	768.30	0.26	0.44	Bi-214	768.36	0.0001	0.0000
5	823.77	829.47	45	0	12	824.43	2.19	2.32	Co-60	826.28	0.0000	0.0295
6	844.60	850.30	101	42	15	847.01	0.95	1.59	Co-56	846.77	0.0000	0.0000
7	857.32	863.02	47	2	12	859.29	0.22	0.35	Tl-208	860.56	0.0000	0.0000
8	908.62	914.32	58	17	12	912.56	0.25	0.39	Ac-228	911.20	0.0000	0.0000
9	965.83	971.97	44	-14	14	966.49	0.22	0.35	Ac-228	968.97	0.0000	0.0000
10	998.71	1004.85	38	9	10	1003.54	0.26	0.44	Pa-234M	1001.03	0.0002	0.0003
11	1060.09	1066.23	30	-14	12	Could not properly fit the peak.						
12	1118.17	1124.31	54	15	12	1120.89	0.45	0.99	Bi-214	1120.29	0.0000	0.0000
13	1170.34	1176.48	30	-4	11	1171.00	0.88	1.01	Co-60	1173.24	0.0000	0.0000
14	1233.24	1241.13	45	26	11	1234.12	5.37	5.65	Bi-214	1238.11	0.0001	0.0001
15	1270.72	1277.29	37	6	11	1273.24	0.43	0.65	No close library match!			
16	1329.88	1336.46	27	-4	11	1330.98	4.82	4.95	Co-60	1332.50	0.0000	0.0000
17	1457.64	1464.65	71	54	11	1461.97	0.88	1.75	K-40	1461.00	0.0002	0.0000
18	1762.38	1769.83	38	38	6	1765.67	1.17	1.62	Bi-214	1764.49	0.0001	0.0000

Detector #1 ACQ 22-Jan-2016 at 15:59:31 RT = 7209.2 LT = 7200.0
Rad Chem 1
MB-022

ROI#	RANGE(keV)		GROSS	NET	+/-	CENTROID	FWHM	FW(1/5)M	LIBRARY	(keV)	µCi	+/-
1	607.80	612.63	162	85	17	609.81	1.20	1.97	Bi-214	609.31	0.0000	0.0000
2	660.21	665.47	48	6	11	664.37	0.26	0.44	Cs-137	661.66	0.0000	0.0000
3	724.23	729.94	52	20	11	726.74	1.82	3.34	Bi-212	727.00	0.0000	0.0000
4	766.11	772.03	60	-1	14	768.63	0.80	0.98	Bi-214	768.36	0.0000	0.0001
5	823.77	829.47	46	14	11	826.66	0.32	0.74	Co-60	826.28	0.0345	0.0271
6	844.60	850.30	85	49	13	847.59	0.46	0.75	Co-56	846.77	0.0000	0.0000
7	857.32	863.02	48	-11	13	860.17	0.22	0.35	Tl-208	860.56	0.0000	0.0000
8	908.62	914.32	50	5	12	911.47	0.25	0.39	Ac-228	911.20	0.0000	0.0000
9	965.83	971.97	41	-3	12	969.88	0.39	0.55	Ac-228	968.97	0.0000	0.0000
10	998.71	1004.85	40	11	11	1002.12	0.41	0.56	Pa-234M	1001.03	0.0003	0.0003
11	1060.09	1066.23	21	11	6	1060.75	1.42	1.62	No close library match!			
12	1118.17	1124.31	59	59	7	1121.33	0.79	1.78	Bi-214	1120.29	0.0001	0.0000
13	1170.34	1176.48	23	8	8	1171.00	0.26	0.96	Co-60	1173.24	0.0000	0.0000
14	1233.24	1241.13	36	17	10	1235.43	1.75	1.88	Bi-214	1238.11	0.0001	0.0000
15	1270.72	1277.29	21	5	8	1271.37	2.63	2.76	No close library match!			
16	1329.88	1336.46	23	-3	10	Could not properly fit the peak.						
17	1457.64	1464.65	70	64	9	1461.08	1.84	3.60	K-40	1461.00	0.0002	0.0000
18	1762.38	1769.83	42	24	10	1765.08	1.00	1.19	Bi-214	1764.49	0.0001	0.0000

MB-11381.Rpt

Detector #1 ACQ 09-Feb-2016 at 13:22:38 RT = 7210.0 LT = 7200.0
Rad Chem 1
MB-11372

ROI#	RANGE(keV)		GROSS	NET	+/-	CENTROID	FWHM	FW(1/5)M	LIBRARY	(keV)	µCi	+/-
1	607.80	612.63	145	45	18	609.89	0.65	0.96	Bi-214	609.31	0.0000	0.0000
2	660.21	665.47	56	6	12	661.20	0.84	1.00	Cs-137	661.66	0.0000	0.0000
3	724.23	729.94	59	27	11	727.55	0.29	0.50	Bi-212	727.00	0.0001	0.0000
4	766.11	772.03	68	17	14	768.78	0.35	0.83	Bi-214	768.36	0.0001	0.0001
5	823.77	829.47	48	-11	13	824.87	0.22	0.35	Co-60	826.28	0.0000	0.0320
6	844.60	850.30	90	40	14	847.45	0.40	0.93	Co-56	846.77	0.0000	0.0000
7	857.32	863.02	36	9	10	858.19	0.27	0.48	Tl-208	860.56	0.0000	0.0000
8	908.62	914.32	56	24	11	911.58	0.91	2.34	Ac-228	911.20	0.0000	0.0000
9	965.83	971.97	36	17	9	970.54	0.42	1.49	Ac-228	968.97	0.0000	0.0000
10	998.71	1004.85	40	11	11	999.37	0.22	0.35	Pa-234M	1001.03	0.0003	0.0003
11	1060.09	1066.23	29	-10	11	1061.19	0.33	0.53	No close library match!			
12	1118.17	1124.31	48	0	13	1120.37	1.37	1.58	Bi-214	1120.29	0.0000	0.0000
13	1170.34	1176.48	19	0	8	Could not properly fit the peak.						
14	1233.24	1241.13	36	-7	14	1239.48	0.41	0.56	Co-56	1238.28	0.0000	0.0000
15	1270.72	1277.29	19	-7	10	Could not properly fit the peak.						
16	1329.88	1336.46	23	-8	11	1335.80	0.22	0.35	Co-60	1332.50	0.0000	0.0000
17	1457.64	1464.65	55	38	10	1461.97	0.44	1.23	K-40	1461.00	0.0001	0.0000
18	1762.38	1769.83	42	30	9	1766.33	0.24	0.39	Bi-214	1764.49	0.0001	0.0000

Detector #1 ACQ 18-Feb-2016 at 8:43:01 RT = 7207.5 LT = 7200.0
Rad Chem 1
MB-11412

ROI#	RANGE(keV)		GROSS	NET	+/-	CENTROID	FWHM	FW(1/5)M	LIBRARY (keV)		µCi	+/-
1	607.80	612.63	136	67	16	609.35	0.38	1.48	Bi-214	609.31	0.0000	0.0000
2	660.21	665.47	55	17	11	663.16	0.39	0.55	Cs-137	661.66	0.0000	0.0000
3	724.23	729.94	56	-25	16	Could not properly fit the peak.						
4	766.11	772.03	63	-2	15	770.28	0.22	0.35	Bi-214	768.36	0.0000	0.0001
5	823.77	829.47	50	5	12	825.53	2.96	3.16	Co-60	826.28	0.0123	0.0295
6	844.60	850.30	104	63	14	847.31	0.51	1.32	Co-56	846.77	0.0000	0.0000
7	857.32	863.02	49	4	12	858.19	0.27	0.48	Tl-208	860.56	0.0000	0.0000
8	908.62	914.32	63	-5	15	910.15	1.75	1.89	Ac-228	911.20	0.0000	0.0000
9	965.83	971.97	40	16	10	968.90	0.26	0.66	Ac-228	968.97	0.0000	0.0000
10	998.71	1004.85	46	-7	14	1002.88	0.22	0.35	Pa-234M	1001.03	0.0000	0.0004
11	1060.09	1066.23	27	8	9	1063.60	0.22	0.35	No close library match!			
12	1118.17	1124.31	60	26	12	1120.63	0.31	0.99	Bi-214	1120.29	0.0000	0.0000
13	1170.34	1176.48	32	27	6	1172.97	0.24	0.39	Co-60	1173.24	0.0000	0.0000
14	1233.24	1241.13	48	11	14	1233.90	6.79	6.93	Bi-214	1238.11	0.0001	0.0001
15	1270.72	1277.29	28	18	7	1274.00	2.47	2.67	No close library match!			
16	1329.88	1336.46	26	-15	12	Could not properly fit the peak.						
17	1457.64	1464.65	82	60	12	1461.35	0.92	1.18	K-40	1461.00	0.0002	0.0000
18	1762.38	1769.83	44	26	10	1766.11	0.27	1.10	Bi-214	1764.49	0.0001	0.0000

Detector #1 ACQ 01-Mar-2016 at 16:12:34 RT = 7208.6 LT = 7200.0
Rad Chem 1
MB-061

ROI#	RANGE(keV)		GROSS	NET	+/-	CENTROID	FWHM	FW(1/5)M	LIBRARY	(keV)	µCi	+/-
1	607.80	612.63	117	44	15	609.57	0.40	1.41	Bi-214	609.31	0.0000	0.0000
2	660.21	665.47	64	22	12	664.37	0.25	0.39	Cs-137	661.66	0.0000	0.0000
3	724.23	729.94	56	-7	14	727.74	0.22	0.35	Bi-212	727.00	0.0000	0.0000
4	766.11	772.03	47	-4	13	769.18	2.30	2.50	Bi-214	768.36	0.0000	0.0000
5	823.77	829.47	33	-8	11	824.43	1.97	2.10	Co-60	826.28	0.0000	0.0271
6	844.60	850.30	92	47	14	846.54	0.27	0.65	Co-56	846.77	0.0000	0.0000
7	857.32	863.02	42	-21	14	Could not properly fit the peak.						
8	908.62	914.32	46	-8	13	911.69	0.27	0.48	Ac-228	911.20	0.0000	0.0000
9	965.83	971.97	38	-1	12	970.00	0.22	0.35	Ac-228	968.97	0.0000	0.0000
10	998.71	1004.85	47	-16	15	1003.20	0.40	0.55	Pa-234M	1001.03	0.0000	0.0004
11	1060.09	1066.23	34	-10	12	1065.13	0.33	0.53	No close library match!			
12	1118.17	1124.31	55	21	12	1120.67	0.48	1.05	Bi-214	1120.29	0.0000	0.0000
13	1170.34	1176.48	30	1	10	1173.63	1.10	1.23	Co-60	1173.24	0.0000	0.0000
14	1233.24	1241.13	41	29	9	1238.06	0.29	3.93	Bi-214	1238.11	0.0001	0.0000
15	1270.72	1277.29	28	2	10	1271.81	0.22	0.35	No close library match!			
16	1329.88	1336.46	20	-11	10	Could not properly fit the peak.						
17	1457.64	1464.65	44	33	9	1462.07	0.46	1.66	K-40	1461.00	0.0001	0.0000
18	1762.38	1769.83	44	26	10	1765.53	0.51	0.96	Bi-214	1764.49	0.0001	0.0000

Detector #1 ACQ 15-Mar-2016 at 16:23:17 RT = 7208.7 LT = 7200.0
Rad Chem 1
MB-075

ROI#	RANGE(keV)		GROSS	NET	+/-	CENTROID	FWHM	FW(1/5)M	LIBRARY	(keV)	µCi	+/-
1	607.80	612.63	118	49	15	609.08	0.53	1.71	Bi-214	609.31	0.0000	0.0000
2	660.21	665.47	59	-4	13	661.96	0.26	0.44	Cs-137	661.66	0.0000	0.0000
3	724.23	729.94	61	11	13	728.58	0.32	0.74	Bi-212	727.00	0.0000	0.0000
4	766.11	772.03	56	23	11	768.30	0.25	0.39	Bi-214	768.36	0.0001	0.0000
5	823.77	829.47	42	-21	14	Could not properly fit the peak.						
6	844.60	850.30	99	81	12	847.54	0.59	1.74	Co-56	846.77	0.0000	0.0000
7	857.32	863.02	39	-15	13	Could not properly fit the peak.						
8	908.62	914.32	48	25	10	911.23	0.69	1.47	Ac-228	911.20	0.0000	0.0000
9	965.83	971.97	50	2	13	969.56	0.22	0.35	Ac-228	968.97	0.0000	0.0000
10	998.71	1004.85	39	15	10	1003.64	0.88	1.14	Pa-234M	1001.03	0.0004	0.0003
11	1060.09	1066.23	30	11	9	1062.72	0.22	0.35	No close library match!			
12	1118.17	1124.31	57	23	12	1120.15	1.83	2.05	Bi-214	1120.29	0.0000	0.0000
13	1170.34	1176.48	34	15	9	1173.63	1.32	1.45	Co-60	1173.24	0.0000	0.0000
14	1233.24	1241.13	51	20	13	1238.72	0.22	0.35	Co-56	1238.28	0.0000	0.0000
15	1270.72	1277.29	23	13	7	1271.59	3.84	4.03	No close library match!			
16	1329.88	1336.46	22	-9	10	Could not properly fit the peak.						
17	1457.64	1464.65	55	49	8	1461.20	1.03	2.37	K-40	1461.00	0.0002	0.0000
18	1762.38	1769.83	38	32	7	1764.87	0.93	1.98	Bi-214	1764.49	0.0001	0.0000

MB-11552.Rpt

Detector #1 ACQ 26-Mar-2016 at 18:57:32 RT = 7207.5 LT = 7200.0
Rad Chem 1
MB-086

ROI#	RANGE(keV)		GROSS	NET	+/-	CENTROID	FWHM	FW(1/5)M	LIBRARY	(keV)	µCi	+/-
1	607.80	612.63	128	17	18	609.78	0.51	0.76	Bi-214	609.31	0.0000	0.0000
2	660.21	665.47	60	14	12	661.96	0.22	0.35	Cs-137	661.66	0.0000	0.0000
3	724.23	729.94	43	-7	12	725.33	2.19	2.32	Bi-212	727.00	0.0000	0.0000
4	766.11	772.03	57	15	13	766.99	0.88	1.01	Bi-214	768.36	0.0001	0.0000
5	823.77	829.47	41	5	11	825.97	0.27	0.70	Co-60	826.28	0.0123	0.0271
6	844.60	850.30	101	60	14	847.31	0.48	1.42	Co-56	846.77	0.0000	0.0000
7	857.32	863.02	34	-16	12	Could not properly fit the peak.						
8	908.62	914.32	54	9	12	909.49	1.97	2.10	Ac-228	911.20	0.0000	0.0000
9	965.83	971.97	45	21	10	969.12	0.88	1.01	Ac-228	968.97	0.0000	0.0000
10	998.71	1004.85	30	11	9	1003.10	0.27	0.48	Pa-234M	1001.03	0.0003	0.0002
11	1060.09	1066.23	24	-10	10	1062.94	0.22	0.35	No close library match!			
12	1118.17	1124.31	55	26	11	1120.75	0.78	1.47	Bi-214	1120.29	0.0000	0.0000
13	1170.34	1176.48	22	3	8	Could not properly fit the peak.						
14	1233.24	1241.13	39	8	12	1239.16	0.27	0.77	Co-56	1238.28	0.0000	0.0000
15	1270.72	1277.29	30	-6	12	1275.10	0.22	0.35	No close library match!			
16	1329.88	1336.46	25	-1	10	1335.58	0.27	0.48	Co-60	1332.50	0.0000	0.0000
17	1457.64	1464.65	65	43	11	1461.16	0.34	1.58	K-40	1461.00	0.0001	0.0000
18	1762.38	1769.83	41	23	10	1765.56	1.03	1.85	Bi-214	1764.49	0.0001	0.0000

Detector #1 ACQ 07-Apr-2016 at 11:52:35 RT = 7210.1 LT = 7200.0
Rad Chem 1
MB-098

ROI#	RANGE(keV)		GROSS	NET	+/-	CENTROID	FWHM	FW(1/5)M	LIBRARY (keV)		µCi	+/-
1	607.80	612.63	114	45	15	610.01	0.36	1.72	Bi-214	609.31	0.0000	0.0000
2	660.21	665.47	70	3	14	661.33	0.29	0.61	Cs-137	661.66	0.0000	0.0000
3	724.23	729.94	57	16	12	727.18	2.11	2.89	Bi-212	727.00	0.0000	0.0000
4	766.11	772.03	55	8	13	768.09	0.26	0.75	Bi-214	768.36	0.0000	0.0000
5	823.77	829.47	39	-11	12	Could not properly fit the peak.						
6	844.60	850.30	74	56	10	847.26	0.35	1.46	Co-56	846.77	0.0000	0.0000
7	857.32	863.02	44	17	10	859.61	2.66	2.89	Tl-208	860.56	0.0000	0.0000
8	908.62	914.32	45	4	12	911.47	0.29	1.27	Ac-228	911.20	0.0000	0.0000
9	965.83	971.97	44	-9	13	969.56	0.22	0.35	Ac-228	968.97	0.0000	0.0000
10	998.71	1004.85	41	-3	12	1000.25	0.22	0.35	Pa-234M	1001.03	0.0000	0.0003
11	1060.09	1066.23	40	-8	13	1061.19	1.10	1.23	No close library match!			
12	1118.17	1124.31	67	23	13	1120.59	0.91	2.41	Bi-214	1120.29	0.0000	0.0000
13	1170.34	1176.48	23	4	8	1172.97	0.27	0.48	Co-60	1173.24	0.0000	0.0000
14	1233.24	1241.13	39	8	12	1238.72	1.31	1.45	Co-56	1238.28	0.0000	0.0000
15	1270.72	1277.29	21	-15	11	1276.19	0.22	0.35	No close library match!			
16	1329.88	1336.46	16	6	6	1331.20	0.27	0.48	Co-60	1332.50	0.0000	0.0000
17	1457.64	1464.65	71	54	11	1461.57	0.83	1.73	K-40	1461.00	0.0002	0.0000
18	1762.38	1769.83	43	31	9	1765.39	0.61	1.95	Bi-214	1764.49	0.0001	0.0000

Background Report

Batch Name: Batch_18822
Procedure: Official Background
Calibration: Gross Alpha Beta

Count Date: 10/2/2016 12:20:42 PM
Preset Count Time: 7200
Count Mode: Simultaneous

Calculated Background (cpm)

Detector Name	Alpha Bkg Rate (cpm)			Beta Bkg Rate (cpm)		
D1	4.0278E-002	+/-	1.4353E-002	1.0653E+000	+/-	6.1332E-002

Assay Date	Detector name	Iteration	Alpha Bkg Rate (cpm)		Alpha Bkg. Unc.	Beta Bkg Rate (cpm)		Beta Bkg. Unc.	Live Time (min)
10/2/2016 12:20:34 PM	D1	1	3.3333E-002	+/-	1.6667E-002	1.0000E+000	+/-	9.1287E-002	120
10/2/2016 2:21:24 PM	D1	2	4.1667E-002	+/-	1.8634E-002	1.0250E+000	+/-	9.2421E-002	120
10/2/2016 4:22:06 PM	D1	3	4.1667E-002	+/-	1.8634E-002	1.1167E+000	+/-	9.6465E-002	120
10/2/2016 6:22:42 PM	D1	4	5.0000E-002	+/-	2.0412E-002	1.0083E+000	+/-	9.1667E-002	120
10/2/2016 8:23:23 PM	D1	5	5.8333E-002	+/-	2.2048E-002	1.1000E+000	+/-	9.5743E-002	120
10/2/2016 10:24:01 PM	D1	6	1.6667E-002	+/-	1.1785E-002	1.1417E+000	+/-	9.7539E-002	120

Calculated Background (cpm)

Detector Name	Alpha Bkg Rate (cpm)			Beta Bkg Rate (cpm)		
D2	6.1111E-002	+/-	3.2347E-002	1.1639E+000	+/-	1.0563E-001

Assay Date	Detector name	Iteration	Alpha Bkg Rate (cpm)		Alpha Bkg. Unc.	Beta Bkg Rate (cpm)		Beta Bkg. Unc.	Live Time (min)
10/2/2016 12:20:34 PM	D2	1	1.2500E-001	+/-	3.2275E-002	1.3333E+000	+/-	1.0541E-001	120
10/2/2016 2:21:24 PM	D2	2	5.8333E-002	+/-	2.2048E-002	1.1250E+000	+/-	9.6825E-002	120
10/2/2016 4:22:07 PM	D2	3	5.0000E-002	+/-	2.0412E-002	1.2000E+000	+/-	1.0000E-001	120
10/2/2016 6:22:43 PM	D2	4	5.0000E-002	+/-	2.0412E-002	1.0583E+000	+/-	9.3912E-002	120
10/2/2016 8:23:23 PM	D2	5	3.3333E-002	+/-	1.6667E-002	1.2083E+000	+/-	1.0035E-001	120
10/2/2016 10:24:03 PM	D2	6	5.0000E-002	+/-	2.0412E-002	1.0583E+000	+/-	9.3912E-002	120

Calculated Background (cpm)

Detector Name	Alpha Bkg Rate (cpm)			Beta Bkg Rate (cpm)		
D3	6.6667E-002	+/-	3.7639E-002	9.9722E-001	+/-	7.3535E-002

Assay Date	Detector name	Iteration	Alpha Bkg Rate (cpm)		Alpha Bkg. Unc.	Beta Bkg Rate (cpm)		Beta Bkg. Unc.	Live Time (min)
10/2/2016 12:20:35 PM	D3	1	9.1667E-002	+/-	2.7639E-002	1.0833E+000	+/-	9.5015E-002	120
10/2/2016 2:21:25 PM	D3	2	5.8333E-002	+/-	2.2048E-002	9.3333E-001	+/-	8.8192E-002	120
10/2/2016 4:22:08 PM	D3	3	9.1667E-002	+/-	2.7639E-002	1.0250E+000	+/-	9.2421E-002	120
10/2/2016 6:22:55 PM	D3	4	8.3333E-003	+/-	8.3333E-003	9.0000E-001	+/-	8.6603E-002	120
10/2/2016 8:23:37 PM	D3	5	4.1667E-002	+/-	1.8634E-002	9.7500E-001	+/-	9.0139E-002	120
10/2/2016 10:24:17 PM	D3	6	1.0833E-001	+/-	3.0046E-002	1.0667E+000	+/-	9.4281E-002	120

Calculated Background (cpm)

Detector Name	Alpha Bkg Rate (cpm)			Beta Bkg Rate (cpm)		
D4	5.1389E-002	+/-	3.3089E-002	1.0847E+000	+/-	1.0102E-001

Assay Date	Detector name	Iteration	Alpha Bkg Rate (cpm)		Alpha Bkg. Unc.	Beta Bkg Rate (cpm)		Beta Bkg. Unc.	Live Time (min)
10/2/2016 12:20:35 PM	D4	1	1.0000E-001	+/-	2.8868E-002	1.2000E+000	+/-	1.0000E-001	120
10/2/2016 2:21:25 PM	D4	2	8.3333E-002	+/-	2.6352E-002	1.1250E+000	+/-	9.6825E-002	120
10/2/2016 4:22:08 PM	D4	3	4.1667E-002	+/-	1.8634E-002	9.2500E-001	+/-	8.7797E-002	120
10/2/2016 6:22:57 PM	D4	4	1.6667E-002	+/-	1.1785E-002	1.0250E+000	+/-	9.2421E-002	120
10/2/2016 8:23:38 PM	D4	5	2.5000E-002	+/-	1.4434E-002	1.1667E+000	+/-	9.8601E-002	120
10/2/2016 10:24:17 PM	D4	6	4.1667E-002	+/-	1.8634E-002	1.0667E+000	+/-	9.4281E-002	120

Batch Name: Batch_18824

Count Date: 10/2/2016 12:20:39 PM

Procedure: Official Background

Preset Count Time: 7200

Calibration: Gross Alpha Beta

Count Mode: Simultaneous

Calculated Background (cpm)

Detector Name	Alpha Bkg Rate (cpm)			Beta Bkg Rate (cpm)		
B1	8.7500E-002	+/-	3.2382E-002	1.3292E+000	+/-	1.0176E-001

Assay Date	Detector name	Iteration	Alpha Bkg Rate (cpm)		Alpha Bkg. Unc.	Beta Bkg Rate (cpm)		Beta Bkg. Unc.	Live Time (min)
10/2/2016 12:20:33 PM	B1	1	1.1667E-001	+/-	3.1180E-002	1.2167E+000	+/-	1.0069E-001	120
10/2/2016 2:21:17 PM	B1	2	1.0000E-001	+/-	2.8868E-002	1.4083E+000	+/-	1.0833E-001	120
10/2/2016 4:21:52 PM	B1	3	1.0000E-001	+/-	2.8868E-002	1.2667E+000	+/-	1.0274E-001	120
10/2/2016 6:22:27 PM	B1	4	2.5000E-002	+/-	1.4434E-002	1.4917E+000	+/-	1.1149E-001	120
10/2/2016 8:23:07 PM	B1	5	1.0000E-001	+/-	2.8868E-002	1.3083E+000	+/-	1.0442E-001	120
10/2/2016 10:23:44 PM	B1	6	8.3333E-002	+/-	2.6352E-002	1.2833E+000	+/-	1.0341E-001	120

Calculated Background (cpm)

Detector Name	Alpha Bkg Rate (cpm)			Beta Bkg Rate (cpm)		
B2	3.7500E-002	+/-	1.9543E-002	1.0861E+000	+/-	6.7013E-002

Assay Date	Detector name	Iteration	Alpha Bkg Rate (cpm)		Alpha Bkg. Unc.	Beta Bkg Rate (cpm)		Beta Bkg. Unc.	Live Time (min)
10/2/2016 12:20:33 PM	B2	1	7.5000E-002	+/-	2.5000E-002	1.0583E+000	+/-	9.3912E-002	120
10/2/2016 2:21:18 PM	B2	2	2.5000E-002	+/-	1.4434E-002	1.0917E+000	+/-	9.5379E-002	120
10/2/2016 4:21:52 PM	B2	3	2.5000E-002	+/-	1.4434E-002	1.1000E+000	+/-	9.5743E-002	120
10/2/2016 6:22:28 PM	B2	4	4.1667E-002	+/-	1.8634E-002	1.2083E+000	+/-	1.0035E-001	120
10/2/2016 8:23:08 PM	B2	5	2.5000E-002	+/-	1.4434E-002	1.0250E+000	+/-	9.2421E-002	120
10/2/2016 10:23:45 PM	B2	6	3.3333E-002	+/-	1.6667E-002	1.0333E+000	+/-	9.2796E-002	120

Calculated Background (cpm)

Detector Name	Alpha Bkg Rate (cpm)			Beta Bkg Rate (cpm)		
B3	4.5833E-002	+/-	2.3422E-002	1.3569E+000	+/-	5.6376E-002

Assay Date	Detector name	Iteration	Alpha Bkg Rate (cpm)		Alpha Bkg. Unc.	Beta Bkg Rate (cpm)		Beta Bkg. Unc.	Live Time (min)
10/2/2016 12:20:33 PM	B3	1	5.8333E-002	+/-	2.2048E-002	1.2917E+000	+/-	1.0375E-001	120
10/2/2016 2:21:19 PM	B3	2	1.6667E-002	+/-	1.1785E-002	1.3417E+000	+/-	1.0574E-001	120
10/2/2016 4:21:53 PM	B3	3	3.3333E-002	+/-	1.6667E-002	1.4417E+000	+/-	1.0961E-001	120
10/2/2016 6:22:28 PM	B3	4	5.0000E-002	+/-	2.0412E-002	1.3583E+000	+/-	1.0639E-001	120
10/2/2016 8:23:08 PM	B3	5	3.3333E-002	+/-	1.6667E-002	1.3083E+000	+/-	1.0442E-001	120
10/2/2016 10:23:45 PM	B3	6	8.3333E-002	+/-	2.6352E-002	1.4000E+000	+/-	1.0801E-001	120

Calculated Background (cpm)

Detector Name	Alpha Bkg Rate (cpm)			Beta Bkg Rate (cpm)		
B4	5.1389E-002	+/-	1.1076E-002	1.2139E+000	+/-	6.7013E-002

Assay Date	Detector name	Iteration	Alpha Bkg Rate (cpm)		Alpha Bkg. Unc.	Beta Bkg Rate (cpm)		Beta Bkg. Unc.	Live Time (min)
10/2/2016 12:20:34 PM	B4	1	4.1667E-002	+/-	1.8634E-002	1.2167E+000	+/-	1.0069E-001	120
10/2/2016 2:21:20 PM	B4	2	5.8333E-002	+/-	2.2048E-002	1.2000E+000	+/-	1.0000E-001	120
10/2/2016 4:21:54 PM	B4	3	4.1667E-002	+/-	1.8634E-002	1.1167E+000	+/-	9.6465E-002	120
10/2/2016 6:22:29 PM	B4	4	4.1667E-002	+/-	1.8634E-002	1.2500E+000	+/-	1.0206E-001	120
10/2/2016 8:23:09 PM	B4	5	6.6667E-002	+/-	2.3570E-002	1.3167E+000	+/-	1.0475E-001	120
10/2/2016 10:23:46 PM	B4	6	5.8333E-002	+/-	2.2048E-002	1.1833E+000	+/-	9.9303E-002	120

Batch Name: Batch_18823

Count Date: 10/2/2016 12:20:39 PM

Procedure: Official Background

Preset Count Time: 7200

Calibration: Gross Alpha Beta

Count Mode: Simultaneous

Calculated Background (cpm)

Detector Name	Alpha Bkg Rate (cpm)			Beta Bkg Rate (cpm)		
C1	4.1667E-002	+/-	1.9003E-002	1.0972E+000	+/-	1.1531E-001

Assay Date	Detector name	Iteration	Alpha Bkg Rate (cpm)		Alpha Bkg. Unc.	Beta Bkg Rate (cpm)		Beta Bkg. Unc.	Live Time (min)
10/2/2016 12:20:34 PM	C1	1	3.3333E-002	+/-	1.6667E-002	1.2333E+000	+/-	1.0138E-001	120
10/2/2016 2:21:11 PM	C1	2	2.5000E-002	+/-	1.4434E-002	1.1250E+000	+/-	9.6825E-002	120
10/2/2016 4:21:50 PM	C1	3	4.1667E-002	+/-	1.8634E-002	9.8333E-001	+/-	9.0523E-002	120
10/2/2016 6:22:27 PM	C1	4	5.0000E-002	+/-	2.0412E-002	1.2083E+000	+/-	1.0035E-001	120
10/2/2016 8:23:07 PM	C1	5	7.5000E-002	+/-	2.5000E-002	1.0833E+000	+/-	9.5015E-002	120
10/2/2016 10:23:45 PM	C1	6	2.5000E-002	+/-	1.4434E-002	9.5000E-001	+/-	8.8976E-002	120

Calculated Background (cpm)

Detector Name	Alpha Bkg Rate (cpm)			Beta Bkg Rate (cpm)		
C2	6.2500E-002	+/-	3.0162E-002	9.7500E-001	+/-	8.7242E-002

Assay Date	Detector name	Iteration	Alpha Bkg Rate (cpm)		Alpha Bkg. Unc.	Beta Bkg Rate (cpm)		Beta Bkg. Unc.	Live Time (min)
10/2/2016 12:20:34 PM	C2	1	7.5000E-002	+/-	2.5000E-002	1.0167E+000	+/-	9.2045E-002	120
10/2/2016 2:21:11 PM	C2	2	1.6667E-002	+/-	1.1785E-002	8.3333E-001	+/-	8.3333E-002	120
10/2/2016 4:21:52 PM	C2	3	8.3333E-002	+/-	2.6352E-002	1.1000E+000	+/-	9.5743E-002	120
10/2/2016 6:22:28 PM	C2	4	5.8333E-002	+/-	2.2048E-002	9.5833E-001	+/-	8.9365E-002	120
10/2/2016 8:23:08 PM	C2	5	4.1667E-002	+/-	1.8634E-002	9.8333E-001	+/-	9.0523E-002	120
10/2/2016 10:23:45 PM	C2	6	1.0000E-001	+/-	2.8868E-002	9.5833E-001	+/-	8.9365E-002	120

Calculated Background (cpm)

Detector Name	Alpha Bkg Rate (cpm)			Beta Bkg Rate (cpm)		
C3	5.9722E-002	+/-	3.3506E-002	1.0750E+000	+/-	7.8174E-002

Assay Date	Detector name	Iteration	Alpha Bkg Rate (cpm)		Alpha Bkg. Unc.	Beta Bkg Rate (cpm)		Beta Bkg. Unc.	Live Time (min)
10/2/2016 12:20:34 PM	C3	1	5.0000E-002	+/-	2.0412E-002	1.0000E+000	+/-	9.1287E-002	120
10/2/2016 2:21:12 PM	C3	2	8.3333E-002	+/-	2.6352E-002	1.1500E+000	+/-	9.7895E-002	120
10/2/2016 4:21:52 PM	C3	3	1.0833E-001	+/-	3.0046E-002	1.1000E+000	+/-	9.5743E-002	120
10/2/2016 6:22:28 PM	C3	4	6.6667E-002	+/-	2.3570E-002	9.9167E-001	+/-	9.0906E-002	120
10/2/2016 8:23:08 PM	C3	5	3.3333E-002	+/-	1.6667E-002	1.0333E+000	+/-	9.2796E-002	120
10/2/2016 10:23:46 PM	C3	6	1.6667E-002	+/-	1.1785E-002	1.1750E+000	+/-	9.8953E-002	120

Calculated Background (cpm)

Detector Name	Alpha Bkg Rate (cpm)			Beta Bkg Rate (cpm)		
C4	5.4167E-002	+/-	2.5685E-002	1.0653E+000	+/-	9.4489E-002

Assay Date	Detector name	Iteration	Alpha Bkg Rate (cpm)		Alpha Bkg. Unc.	Beta Bkg Rate (cpm)		Beta Bkg. Unc.	Live Time (min)
10/2/2016 12:20:34 PM	C4	1	2.5000E-002	+/-	1.4434E-002	1.0083E+000	+/-	9.1667E-002	120
10/2/2016 2:21:12 PM	C4	2	5.8333E-002	+/-	2.2048E-002	1.0667E+000	+/-	9.4281E-002	120
10/2/2016 4:21:53 PM	C4	3	7.5000E-002	+/-	2.5000E-002	1.0917E+000	+/-	9.5379E-002	120
10/2/2016 6:22:29 PM	C4	4	3.3333E-002	+/-	1.6667E-002	1.2333E+000	+/-	1.0138E-001	120
10/2/2016 8:23:09 PM	C4	5	9.1667E-002	+/-	2.7639E-002	9.5833E-001	+/-	8.9365E-002	120
10/2/2016 10:23:47 PM	C4	6	4.1667E-002	+/-	1.8634E-002	1.0333E+000	+/-	9.2796E-002	120

ERA

A Waters Company

Intermountain Labs

Custom RadChem™ Standard

Catalog #: 089

Lot #: 12081503B

Reference Date: December 29, 2015 12:00 MST

Certificate of Calibration

Isotope	Certified Value pCi/mL	Half-life	Uncertainty (95% confidence level) Type A (Random) (%)	Type B (Systematic) (%)	Total (%)
Lead-210	25.0	22.3 years	0.1	1.4	1.4

Packaging and Volume: (1) 60 mL clear glass boston round bottle containing 60mL

Matrix and Preservative: This aqueous standard is preserved with 0.1M nitric acid

Radioimpurities: gamma impurities < 0.1%

Standard Preparation Instructions and User Notes: Standards are ready for preparation and analysis as received. Shake the standard well prior to removing an aliquot. If the standard is to be diluted, it is recommended that the diluting solution have an acidic composition comparable to that of the standard, especially if the standard is not analyzed immediately after dilution. Certified values are decay corrected to the reference date provided. Comparison of analytical results to these values should incorporate this correction.

NIST Traceability: This derived source standard complies with NIST traceability requirements in accordance with the guidelines set forth in ANSI N42.22 section 6.3. The derived source parent solution is traceable to a provider participating in the NIST Measurement Assurance Program.

Calibration Method: This derived source standard was manufactured via a documented and unbroken chain of gravimetric and volumetric measurements in accordance with ERA's internal Measurement Assurance Program directly from a liquid source traceable to NIST. All gravimetric and volumetric measurements were performed using balances and volumetric glassware calibrated with NIST traceable weights. Furthermore, this standard was analytically verified by ERA using an alpha/beta discriminating liquid scintillation counting system. This standard was analytically verified using a calibration solution from a separate independent source traceable to NIST.

Certified Values are equal to 100% of the "made to" values as determined by volumetric and/or gravimetric measurements of NIST SRMs or NIST traceable reference material analytically verified by ERA. Total Uncertainty is calculated at the 95% confidence level.

Manufactured by: MJ

Date: 17 Dec 2015

Reviewed by: HMS

Date: 22 DEC 2015

16341 Table Mountain Pkwy ▪ Golden, CO 80403 ▪ 800.372.0122 ▪ 303.431.8454 ▪ fax 303.421.0159 ▪ www.eraqc.com

National Institute of Standards & Technology

Certificate

Standard Reference Material 4337
Lead -210 Radioactivity Standard

This Standard Reference Material (SRM) consists of a solution of a standardized and certified quantity of radioactive lead-210 in a suitably stable and homogeneous matrix. It is intended primarily for the calibration of instruments that are used to measure radioactivity and for the monitoring of radiochemical procedures. The solution, whose composition is specified in Table 1, is contained in a flame-sealed, 5 mL, NIST, borosilicate-glass ampoule (see Note 1)*.

The certified **lead-210** massic activity value, at a **Reference Time of 1200 EST, 15 June 2006**, is:

$$(9.037 \pm 0.22)\ \mathbf{kBq{\cdot}g^{-1}}$$

Additional physical, chemical, and radiological properties for the SRM, as well as details on the standardization method, are given in Table 1. Uncertainty intervals for certified quantities are expanded ($k = 2$) uncertainties calculated according to the ISO and NIST Guidelines (see Note 2). Table 2 contains a specification of the components that comprise the uncertainty analyses.

The certification of this SRM, within the measurement uncertainties specified, is valid for at least five (5) years after receipt. The solution matrix, in an unopened ampoule, is believed to be indefinitely homogeneous and stable, within its half-life-dependent, useful lifetime. NIST will monitor this material and will report any substantive changes in certification to the purchaser. Should any of the certified values change, purchasers of this SRM will be notified of the change by NIST.

This SRM may represent a radiological hazard and a chemical hazard. Consult the Material Safety Data Sheet (MSDS), enclosed with the SRM shipment, for details (see Note 1).

This Standard Reference Material was prepared in the Physics Laboratory, Ionizing Radiation Division, Radioactivity Group, Dr. M.P. Unterweger, Acting Group Leader. The overall technical direction and physical measurements leading to certification were provided by Drs. R. Collé, and L. Laureano-Pérez of the Radioactivity Group with production assistance by D.B. Golas and O. Palabrica, Research Associates of the Nuclear Energy Institute and with measurement assistance by Drs. I.Outola, L. Pibida and R.Fitzgerald of the Radioactivity Group. The support aspects involved in the preparation, certification, and issuance of this SRM were coordinated through the Standard Reference Materials Program.

Lisa R. Karam, Deputy Chief
Ionizing Radiation Division

Robert L. Watters, Jr., Chief
Measurement Services Division

Gaithersburg, Maryland 20899
November 2006

*Notes and references are in page 4

Background Report

Batch Name: Batch_19321
Procedure: Daily Background Check
Calibration: Gross Alpha Beta

Count Date: 1/12/2017 8:19:06 AM
Preset Count Time: 7200
Count Mode: Simultaneous

Detector Name	Calculated Background (cpm) Alpha Bkg Rate (cpm)	Beta Bkg Rate (cpm)
B1	6.6667E-002 +/- 2.3570E-002	1.2917E+000 +/- 1.0375E-001
B2	3.3333E-002 +/- 1.6667E-002	1.1667E+000 +/- 9.8601E-002
B3	5.8333E-002 +/- 2.2048E-002	1.1750E+000 +/- 9.8953E-002
B4	9.1667E-002 +/- 2.7639E-002	1.2417E+000 +/- 1.0172E-001

Batch Name: Batch_19320
Procedure: Daily Background Check
Calibration: Gross Alpha Beta

Count Date: 1/12/2017 8:19:06 AM
Preset Count Time: 7200
Count Mode: Simultaneous

Detector Name	Calculated Background (cpm) Alpha Bkg Rate (cpm)	Beta Bkg Rate (cpm)
C1	9.1667E-002 +/- 2.7639E-002	1.1167E+000 +/- 9.6465E-002
C2	6.6667E-002 +/- 2.3570E-002	1.0667E+000 +/- 9.4281E-002
C3	1.6667E-002 +/- 1.1785E-002	1.1000E+000 +/- 9.5743E-002
C4	2.5000E-002 +/- 1.4434E-002	9.4167E-001 +/- 8.8585E-002

Batch Name: Batch_19319
Procedure: Daily Background Check
Calibration: Gross Alpha Beta

Count Date: 1/12/2017 8:19:08 AM
Preset Count Time: 7200
Count Mode: Simultaneous

	Calculated Background (cpm)	
Detector Name	**Alpha Bkg Rate (cpm)**	**Beta Bkg Rate (cpm)**
D1	9.1667E-002 **+/-** 2.7639E-002	1.0417E+000 **+/-** 9.3169E-002

	Calculated Background (cpm)	
Detector Name	**Alpha Bkg Rate (cpm)**	**Beta Bkg Rate (cpm)**
D2	7.5000E-002 **+/-** 2.5000E-002	9.4167E-001 **+/-** 8.8585E-002

	Calculated Background (cpm)	
Detector Name	**Alpha Bkg Rate (cpm)**	**Beta Bkg Rate (cpm)**
D3	7.5000E-002 **+/-** 2.5000E-002	9.1667E-001 **+/-** 8.7401E-002

	Calculated Background (cpm)	
Detector Name	**Alpha Bkg Rate (cpm)**	**Beta Bkg Rate (cpm)**
D4	1.0833E-001 **+/-** 3.0046E-002	9.9167E-001 **+/-** 9.0906E-002

Background Report

Batch Name: Batch_19345
Procedure: Daily Background Check
Calibration: Gross Alpha Beta

Count Date: 1/16/2017 11:03:11 AM
Preset Count Time: 7200
Count Mode: Simultaneous

Detector Name	Calculated Background (cpm) Alpha Bkg Rate (cpm)	Beta Bkg Rate (cpm)
B1	8.3333E-002 +/- 2.6352E-002	1.3500E+000 +/- 1.0607E-001
B2	4.1667E-002 +/- 1.8634E-002	1.1667E+000 +/- 9.8601E-002
B3	4.1667E-002 +/- 1.8634E-002	1.3333E+000 +/- 1.0541E-001
B4	8.3333E-003 +/- 8.3333E-003	1.3167E+000 +/- 1.0475E-001

Batch Name: Batch_19344
Procedure: Daily Background Check
Calibration: Gross Alpha Beta

Count Date: 1/16/2017 11:03:16 AM
Preset Count Time: 7200
Count Mode: Simultaneous

Detector Name	Calculated Background (cpm) Alpha Bkg Rate (cpm)	Beta Bkg Rate (cpm)
C1	1.3333E-001 +/- 3.3333E-002	1.2333E+000 +/- 1.0138E-001
C2	6.6667E-002 +/- 2.3570E-002	1.1583E+000 +/- 9.8249E-002
C3	4.1667E-002 +/- 1.8634E-002	9.5833E-001 +/- 8.9365E-002
C4	3.3333E-002 +/- 1.6667E-002	9.0000E-001 +/- 8.6603E-002

Batch Name: Batch_19343
Procedure: Daily Background Check
Calibration: Gross Alpha Beta

Count Date: 1/16/2017 11:03:20 AM
Preset Count Time: 7200
Count Mode: Simultaneous

	Calculated Background (cpm)	
Detector Name	**Alpha Bkg Rate (cpm)**	**Beta Bkg Rate (cpm)**
D1	9.1667E-002 **+/-** 2.7639E-002	1.1667E+000 **+/-** 9.8601E-002

	Calculated Background (cpm)	
Detector Name	**Alpha Bkg Rate (cpm)**	**Beta Bkg Rate (cpm)**
D2	4.1667E-002 **+/-** 1.8634E-002	1.2500E+000 **+/-** 1.0206E-001

	Calculated Background (cpm)	
Detector Name	**Alpha Bkg Rate (cpm)**	**Beta Bkg Rate (cpm)**
D3	8.3333E-002 **+/-** 2.6352E-002	8.4167E-001 **+/-** 8.3749E-002

	Calculated Background (cpm)	
Detector Name	**Alpha Bkg Rate (cpm)**	**Beta Bkg Rate (cpm)**
D4	8.3333E-002 **+/-** 2.6352E-002	1.0667E+000 **+/-** 9.4281E-002

Lead 210

Start of Ingrowth: 12/15/16 12:50

Analyst MRB 1/17/17

Instrument Data File: Batch 16 Pb-909 RRR.csv

Instrument Batch 142420

RAD_PB210_909.0M

ID	SampID	Analyte	Assay Date	Result	CI	MDA	Amount	Counts	± Result
B1	MB-16	Lead 210	1/12/17 10:51	0.757	0.514	0.805	1	360	
B2	LCS-16	Lead 210	1/12/17 10:51	12.650	0.663	0.555	1	1160	
B3	UTS-4	Lead 210	1/12/17 10:51	738.599	15.085	6.850	0.1	5080	
B4	S1611422-003A DUP	Lead 210	1/12/17 10:51	4.846	0.780	1.030	1	488	
C1	S1611422-003A	Lead 210	1/12/17 10:51	2.462	0.500	0.686	1	406	2.5 ± 0.5
C2	S1611422-008A	Lead 210	1/12/17 10:51	1.946	0.481	0.675	1	342	1.9 ± 0.5
C3	S1611422-008A MS	Lead 210	1/12/17 10:51	15.801	1.043	0.990	1	886	
C4	S1611422-008A MSD	Lead 210	1/12/17 10:51	15.223	0.968	0.899	1	919	
D1	S1611422-013A	Lead 210	1/12/17 10:51	6.195	0.572	0.628	1	642	6.2 ± 0.6
D2	S1611422-014A	Lead 210	1/12/17 10:51	1.956	0.526	0.758	1	385	2.0 ± 0.5
D3	S1611422-015A	Lead 210	1/12/17 10:51	3.080	0.541	0.713	1	403	3.1 ± 0.5
D4	S1611422-019A	Lead 210	1/12/17 10:51	2.278	0.415	0.557	1	422	2.3 ± 0.4
B1	S1611422-020A	Lead 210	1/12/17 14:57	1.070	0.259	0.372	1	445	1.1 ± 0.3
B2	S1611422-021A	Lead 210	1/12/17 14:57	1.734	0.340	0.462	1	409	1.7 ± 0.3
B3	S1611422-026A	Lead 210	1/12/17 14:57	1.538	0.433	0.634	1	433	1.5 ± 0.4
B4	S1611422-027A	Lead 210	1/12/17 14:57	2.102	0.380	0.515	1	462	2.1 ± 0.4
C1	S1611422-028A	Lead 210	1/12/17 14:57	2.071	0.426	0.585	1	404	2.1 ± 0.4
C2	S1611422-031A	Lead 210	1/12/17 14:57	1.050	0.437	0.656	1	294	1.0 ± 0.4
C3	S1611422-032A	Lead 210	1/12/17 14:57	1.734	0.579	0.853	1	338	1.7 ± 0.6
C4	S1611422-034A	Lead 210	1/12/17 14:57	1.467	0.365	0.516	1	367	1.5 ± 0.4
D1	S1611422-037A	Lead 210	1/12/17 14:57	2.116	0.394	0.530	1	412	2.1 ± 0.4
D2	S1611422-043A	Lead 210	1/12/17 14:57	1.915	0.373	0.510	1	433	1.9 ± 0.4

Lead 210

Start of Ingrowth: 12/20/16 13:20

Analyst MAB 1/17/17

Instrument Data File: Batch 17 Pb-909 1-16-17.csv

Instrument Batch 142471

RAD_PB210_909.0M

ID	SampID	Analyte	Assay Date	Result	CI	MDA	Amount	Counts	± Result
B1	MB-17	Lead 210	1/16/17 14:08	1.303	0.742	1.151	1	366	
B2	LCS-17	Lead 210	1/16/17 14:08	13.560	1.100	1.168	1	696	
B3	UTS-4	Lead 210	1/16/17 14:08	848.928	17.650	8.448	0.1	4538	
B4	S1611422-044A DUP	Lead 210	1/16/17 14:08	4.427	0.821	1.124	1	448	
C1	S1611422-044A	Lead 210	1/16/17 14:08	2.901	0.956	1.412	1	341	2.9 ± 1.0
C2	S1611422-045A	Lead 210	1/16/17 14:08	1.819	0.475	0.675	1	330	1.8 ± 0.5
C3	S1611422-045A MS	Lead 210	1/16/17 14:08	13.834	0.759	0.669	1	1032	13.8 ± 0.8
C4	S1611422-045A MSD	Lead 210	1/16/17 14:08	13.327	0.705	0.607	1	1074	13.3 ± 0.7
D1	S1611422-046A	Lead 210	1/16/17 14:08	2.413	0.808	1.193	1	331	2.4 ± 0.8
D2	S1611422-047A	Lead 210	1/16/17 14:08	2.859	0.635	0.893	1	404	2.9 ± 0.6
D3	S1611422-049A	Lead 210	1/16/17 14:08	2.359	0.837	1.238	1	308	2.4 ± 0.8
D4	S1611422-050A	Lead 210	1/16/17 14:08	1.717	0.584	0.864	1	335	1.7 ± 0.6
B1	S1611422-051A	Lead 210	1/16/17 22:25	2.965	0.633	0.895	1	457	3.0 ± 0.6
B2	S1611422-060A	Lead 210	1/16/17 22:25	2.162	0.399	0.541	1	411	2.2 ± 0.4
B3	S1611422-067A	Lead 210	1/16/17 22:25	1.472	0.558	0.845	1	399	1.5 ± 0.6
B4	S1611422-071A	Lead 210	1/16/17 22:25	2.302	0.429	0.589	1	447	2.3 ± 0.4
C1	S1611422-074A	Lead 210	1/16/17 22:25	1.382	0.608	0.923	1	320	1.4 ± 0.6
C2	S1611422-078A	Lead 210	1/16/17 22:25	2.630	0.500	0.675	1	373	2.6 ± 0.5
C3	S1611422-079A	Lead 210	1/16/17 22:25	4.284	0.564	0.707	1	485	4.3 ± 0.6
C4	S1611422-081A	Lead 210	1/16/17 22:25	1.842	0.294	0.385	1	434	1.8 ± 0.3

Efficiency Report

Batch Name: Batch_19324 **Count Date:** 1/12/2017 10:21:57 AM
Procedure: Daily Source Check **Preset Count Time:** 600
Calibration: Gross Alpha Beta **Count Mode:** Simultaneous
Decay Mode: Alpha

	Calculated Efficiency (%)		
DetectorName	**Avg. Efficiency (%)**	**Count Rate (cpm)**	**Avg. Spillover (%)**
B1	3.7628E+001 +/- 1.5722E+000	2.8350E+002 +/- 5.3245E+000	2.9183E+000 +/- 3.5187E-001

	Calculated Efficiency (%)		
DetectorName	**Avg. Efficiency (%)**	**Count Rate (cpm)**	**Avg. Spillover (%)**
B2	3.6188E+001 +/- 1.5120E+000	2.8420E+002 +/- 5.3310E+000	2.1515E+000 +/- 3.0224E-001

	Calculated Efficiency (%)		
DetectorName	**Avg. Efficiency (%)**	**Count Rate (cpm)**	**Avg. Spillover (%)**
B3	3.6789E+001 +/- 1.5536E+000	2.5650E+002 +/- 5.0646E+000	3.0583E+000 +/- 3.7949E-001

	Calculated Efficiency (%)		
DetectorName	**Avg. Efficiency (%)**	**Count Rate (cpm)**	**Avg. Spillover (%)**
B4	3.7312E+001 +/- 1.5614E+000	2.7980E+002 +/- 5.2896E+000	1.3534E+000 +/- 2.5518E-001

Batch Name: Batch_19323 **Count Date:** 1/12/2017 10:22:00 AM
Procedure: Daily Source Check **Preset Count Time:** 600
Calibration: Gross Alpha Beta **Count Mode:** Simultaneous
Decay Mode: Beta

	Calculated Efficiency (%)		
DetectorName	**Avg. Efficiency (%)**	**Count Rate (cpm)**	**Avg. Spillover (%)**
C1	4.6337E+001 +/- 9.4630E-002	4.1443E+004 +/- 6.4376E+001	1.0269E-001 +/- 4.9832E-003

	Calculated Efficiency (%)		
DetectorName	**Avg. Efficiency (%)**	**Count Rate (cpm)**	**Avg. Spillover (%)**
C2	4.6670E+001 +/- 8.9526E-002	3.7018E+004 +/- 6.0842E+001	1.0276E-001 +/- 5.2764E-003

	Calculated Efficiency (%)		
DetectorName	**Avg. Efficiency (%)**	**Count Rate (cpm)**	**Avg. Spillover (%)**
C3	4.5061E+001 +/- 7.6876E-002	3.8694E+004 +/- 6.2205E+001	8.2290E-002 +/- 4.6187E-003

	Calculated Efficiency (%)		
DetectorName	**Avg. Efficiency (%)**	**Count Rate (cpm)**	**Avg. Spillover (%)**
C4	4.6684E+001 +/- 1.1099E-001	3.7720E+004 +/- 6.1416E+001	9.3179E-002 +/- 4.9769E-003

Batch Name: Batch_19322 **Count Date:** 1/12/2017 10:22:02 AM
Procedure: Daily Source Check **Preset Count Time:** 600
Calibration: Gross Alpha Beta **Count Mode:** Simultaneous
Decay Mode: Beta

	Calculated Efficiency (%)		
DetectorName	**Avg. Efficiency (%)**	**Count Rate (cpm)**	**Avg. Spillover (%)**
D1	4.7828E+001 +/- 1.5077E-001	4.9265E+004 +/- 7.0189E+001	8.9233E-002 +/- 4.2599E-003

	Calculated Efficiency (%)		
DetectorName	**Avg. Efficiency (%)**	**Count Rate (cpm)**	**Avg. Spillover (%)**
D2	4.8289E+001 +/- 1.2227E-001	4.9533E+004 +/- 7.0380E+001	8.7497E-002 +/- 4.2082E-003

	Calculated Efficiency (%)		
DetectorName	Avg. Efficiency (%)	Count Rate (cpm)	Avg. Spillover (%)
D3	4.6780E+001 +/- 1.2390E-001	4.9532E+004 +/- 7.0379E+001	6.1241E-002 +/- 3.5220E-003

	Calculated Efficiency (%)		
DetectorName	Avg. Efficiency (%)	Count Rate (cpm)	Avg. Spillover (%)
D4	4.7218E+001 +/- 1.5005E-001	5.1340E+004 +/- 7.1652E+001	1.2008E-001 +/- 4.8417E-003

Batch Name: Batch_19329 **Count Date:** 1/12/2017 10:36:11 AM
Procedure: Daily Source Check **Preset Count Time:** 600
Calibration: Gross Alpha Beta **Count Mode:** Simultaneous
Decay Mode: Alpha

	Calculated Efficiency (%)		
DetectorName	Avg. Efficiency (%)	Count Rate (cpm)	Avg. Spillover (%)
C1	3.3256E+001 +/- 1.4055E+000	2.5430E+002 +/- 5.0428E+000	2.0069E+000 +/- 3.1551E-001

	Calculated Efficiency (%)		
DetectorName	Avg. Efficiency (%)	Count Rate (cpm)	Avg. Spillover (%)
C2	3.2475E+001 +/- 1.3813E+000	2.4130E+002 +/- 4.9122E+000	3.0364E+000 +/- 3.8439E-001

	Calculated Efficiency (%)		
DetectorName	Avg. Efficiency (%)	Count Rate (cpm)	Avg. Spillover (%)
C3	3.7425E+001 +/- 1.5701E+000	2.7250E+002 +/- 5.2202E+000	2.6887E+000 +/- 3.4154E-001

	Calculated Efficiency (%)		
DetectorName	Avg. Efficiency (%)	Count Rate (cpm)	Avg. Spillover (%)
C4	3.2527E+001 +/- 1.3729E+000	2.3520E+002 +/- 4.8497E+000	1.7584E+000 +/- 3.1141E-001

Batch Name: Batch_19330 **Count Date:** 1/12/2017 10:36:12 AM
Procedure: Daily Source Check **Preset Count Time:** 600
Calibration: Gross Alpha Beta **Count Mode:** Simultaneous
Decay Mode: Beta

	Calculated Efficiency (%)		
DetectorName	Avg. Efficiency (%)	Count Rate (cpm)	Avg. Spillover (%)
B1	4.9642E+001 +/- 1.2580E-001	4.9800E+004 +/- 7.0569E+001	1.5284E-001 +/- 5.5478E-003

	Calculated Efficiency (%)		
DetectorName	Avg. Efficiency (%)	Count Rate (cpm)	Avg. Spillover (%)
B2	5.1475E+001 +/- 1.3361E-001	5.0101E+004 +/- 7.0782E+001	1.0392E-001 +/- 4.5585E-003

	Calculated Efficiency (%)		
DetectorName	Avg. Efficiency (%)	Count Rate (cpm)	Avg. Spillover (%)
B3	5.1334E+001 +/- 1.5775E-001	5.0541E+004 +/- 7.1092E+001	7.8264E-002 +/- 3.9393E-003

	Calculated Efficiency (%)		
DetectorName	Avg. Efficiency (%)	Count Rate (cpm)	Avg. Spillover (%)
B4	4.9466E+001 +/- 1.2866E-001	5.1955E+004 +/- 7.2080E+001	1.0865E-001 +/- 4.5777E-003

Batch Name: Batch_19325 **Count Date:** 1/12/2017 10:36:13 AM
Procedure: Daily Source Check **Preset Count Time:** 600
Calibration: Gross Alpha Beta **Count Mode:** Simultaneous
Decay Mode: Alpha

	Calculated Efficiency (%)		
DetectorName	Avg. Efficiency (%)	Count Rate (cpm)	Avg. Spillover (%)
D1	3.4968E+001 +/- 1.4722E+000	2.6340E+002 +/- 5.1323E+000	3.5065E+000 +/- 3.9207E-001

	Calculated Efficiency (%)		
DetectorName	Avg. Efficiency (%)	Count Rate (cpm)	Avg. Spillover (%)
D2	3.4964E+001 +/- 1.4660E+000	2.7460E+002 +/- 5.2402E+000	1.9437E+000 +/- 2.9849E-001

	Calculated Efficiency (%)		
DetectorName	**Avg. Efficiency (%)**	**Count Rate (cpm)**	**Avg. Spillover (%)**
D3	3.2943E+001 **+/-** 1.4089E+000	2.2970E+002 **+/-** 4.7927E+000	2.8318E+000 **+/-** 3.8308E-001

	Calculated Efficiency (%)		
DetectorName	**Avg. Efficiency (%)**	**Count Rate (cpm)**	**Avg. Spillover (%)**
D4	3.7020E+001 **+/-** 1.5505E+000	2.7760E+002 **+/-** 5.2688E+000	1.6268E+000 **+/-** 2.7381E-001

Efficiency Report

Batch Name: Batch_19350 **Count Date:** 1/16/2017 1:47:55 PM
Procedure: Daily Source Check **Preset Count Time:** 600
Calibration: Gross Alpha Beta **Count Mode:** Simultaneous
Decay Mode: Alpha

	Calculated Efficiency (%)		
DetectorName	**Avg. Efficiency (%)**	**Count Rate (cpm)**	**Avg. Spillover (%)**
C1	3.2977E+001 +/- 1.4026E+000	2.4700E+002 +/- 4.9699E+000	1.6208E+000 +/- 2.9473E-001

	Calculated Efficiency (%)		
DetectorName	**Avg. Efficiency (%)**	**Count Rate (cpm)**	**Avg. Spillover (%)**
C2	3.3923E+001 +/- 1.4436E+000	2.4690E+002 +/- 4.9689E+000	3.3322E+000 +/- 3.9591E-001

	Calculated Efficiency (%)		
DetectorName	**Avg. Efficiency (%)**	**Count Rate (cpm)**	**Avg. Spillover (%)**
C3	3.5753E+001 +/- 1.5154E+000	2.5500E+002 +/- 5.0498E+000	2.2456E+000 +/- 3.2794E-001

	Calculated Efficiency (%)		
DetectorName	**Avg. Efficiency (%)**	**Count Rate (cpm)**	**Avg. Spillover (%)**
C4	3.2671E+001 +/- 1.3860E+000	2.3140E+002 +/- 4.8104E+000	1.8737E+000 +/- 3.2262E-001

Batch Name: Batch_19351 **Count Date:** 1/16/2017 1:47:57 PM
Procedure: Daily Source Check **Preset Count Time:** 600
Calibration: Gross Alpha Beta **Count Mode:** Simultaneous
Decay Mode: Beta

	Calculated Efficiency (%)		
DetectorName	**Avg. Efficiency (%)**	**Count Rate (cpm)**	**Avg. Spillover (%)**
B1	4.9623E+001 +/- 1.2596E-001	4.9768E+004 +/- 7.0546E+001	1.6379E-001 +/- 5.7450E-003

	Calculated Efficiency (%)		
DetectorName	**Avg. Efficiency (%)**	**Count Rate (cpm)**	**Avg. Spillover (%)**
B2	5.1372E+001 +/- 1.3358E-001	4.9986E+004 +/- 7.0701E+001	1.2576E-001 +/- 5.0208E-003

	Calculated Efficiency (%)		
DetectorName	**Avg. Efficiency (%)**	**Count Rate (cpm)**	**Avg. Spillover (%)**
B3	5.0964E+001 +/- 1.5690E-001	5.0163E+004 +/- 7.0826E+001	8.7028E-002 +/- 4.1695E-003

	Calculated Efficiency (%)		
DetectorName	**Avg. Efficiency (%)**	**Count Rate (cpm)**	**Avg. Spillover (%)**
B4	4.9215E+001 +/- 1.2829E-001	5.1676E+004 +/- 7.1886E+001	1.2201E-001 +/- 4.8641E-003

Batch Name: Batch_19349 **Count Date:** 1/16/2017 1:47:57 PM
Procedure: Daily Source Check **Preset Count Time:** 600
Calibration: Gross Alpha Beta **Count Mode:** Simultaneous
Decay Mode: Alpha

	Calculated Efficiency (%)		
DetectorName	**Avg. Efficiency (%)**	**Count Rate (cpm)**	**Avg. Spillover (%)**
D1	3.5875E+001 +/- 1.5144E+000	2.6470E+002 +/- 5.1449E+000	3.6404E+000 +/- 3.9788E-001

	Calculated Efficiency (%)		
DetectorName	**Avg. Efficiency (%)**	**Count Rate (cpm)**	**Avg. Spillover (%)**
D2	3.5422E+001 +/- 1.4911E+000	2.7250E+002 +/- 5.2202E+000	2.3257E+000 +/- 3.2332E-001

	Calculated Efficiency (%)		
DetectorName	Avg. Efficiency (%)	Count Rate (cpm)	Avg. Spillover (%)
D3	3.5287E+001 +/- 1.5053E+000	2.4100E+002 +/- 4.9092E+000	2.4500E+000 +/- 3.4970E-001

	Calculated Efficiency (%)		
DetectorName	Avg. Efficiency (%)	Count Rate (cpm)	Avg. Spillover (%)
D4	3.7686E+001 +/- 1.5839E+000	2.7680E+002 +/- 5.2612E+000	1.5593E+000 +/- 2.6966E-001

Batch Name: Batch_19348 **Count Date:** 1/16/2017 1:29:45 PM
Procedure: Daily Source Check **Preset Count Time:** 600
Calibration: Gross Alpha Beta **Count Mode:** Simultaneous
Decay Mode: Alpha

	Calculated Efficiency (%)		
DetectorName	Avg. Efficiency (%)	Count Rate (cpm)	Avg. Spillover (%)
B1	3.7534E+001 +/- 1.5770E+000	2.7700E+002 +/- 5.2631E+000	3.2757E+000 +/- 3.7531E-001

	Calculated Efficiency (%)		
DetectorName	Avg. Efficiency (%)	Count Rate (cpm)	Avg. Spillover (%)
B2	3.6268E+001 +/- 1.5230E+000	2.7900E+002 +/- 5.2820E+000	1.8690E+000 +/- 2.8772E-001

	Calculated Efficiency (%)		
DetectorName	Avg. Efficiency (%)	Count Rate (cpm)	Avg. Spillover (%)
B3	3.6562E+001 +/- 1.5534E+000	2.4970E+002 +/- 4.9970E+000	3.0615E+000 +/- 3.8557E-001

	Calculated Efficiency (%)		
DetectorName	Avg. Efficiency (%)	Count Rate (cpm)	Avg. Spillover (%)
B4	3.9236E+001 +/- 1.6423E+000	2.8820E+002 +/- 5.3684E+000	1.3139E+000 +/- 2.4771E-001

Batch Name: Batch_19347 **Count Date:** 1/16/2017 1:29:48 PM
Procedure: Daily Source Check **Preset Count Time:** 600
Calibration: Gross Alpha Beta **Count Mode:** Simultaneous
Decay Mode: Beta

	Calculated Efficiency (%)		
DetectorName	Avg. Efficiency (%)	Count Rate (cpm)	Avg. Spillover (%)
C1	4.6430E+001 +/- 9.4773E-002	4.1515E+004 +/- 6.4432E+001	1.1962E-001 +/- 5.3735E-003

	Calculated Efficiency (%)		
DetectorName	Avg. Efficiency (%)	Count Rate (cpm)	Avg. Spillover (%)
C2	4.6645E+001 +/- 8.9505E-002	3.6989E+004 +/- 6.0818E+001	1.2230E-001 +/- 5.7584E-003

	Calculated Efficiency (%)		
DetectorName	Avg. Efficiency (%)	Count Rate (cpm)	Avg. Spillover (%)
C3	4.5014E+001 +/- 7.6841E-002	3.8643E+004 +/- 6.2164E+001	8.2656E-002 +/- 4.6320E-003

	Calculated Efficiency (%)		
DetectorName	Avg. Efficiency (%)	Count Rate (cpm)	Avg. Spillover (%)
C4	4.6436E+001 +/- 1.1054E-001	3.7509E+004 +/- 6.1245E+001	1.1263E-001 +/- 5.4869E-003

Batch Name: Batch_19346 **Count Date:** 1/16/2017 1:29:50 PM
Procedure: Daily Source Check **Preset Count Time:** 600
Calibration: Gross Alpha Beta **Count Mode:** Simultaneous
Decay Mode: Beta

	Calculated Efficiency (%)		
DetectorName	Avg. Efficiency (%)	Count Rate (cpm)	Avg. Spillover (%)
D1	4.7823E+001 +/- 1.5091E-001	4.9247E+004 +/- 7.0176E+001	7.8098E-002 +/- 3.9861E-003

	Calculated Efficiency (%)		
DetectorName	Avg. Efficiency (%)	Count Rate (cpm)	Avg. Spillover (%)
D2	4.8255E+001 +/- 1.2239E-001	4.9485E+004 +/- 7.0345E+001	8.0307E-002 +/- 4.0338E-003

	Calculated Efficiency (%)		
DetectorName	**Avg. Efficiency (%)**	**Count Rate (cpm)**	**Avg. Spillover (%)**
D3	4.6906E+001 **+/-** 1.2437E-001	4.9652E+004 **+/-** 7.0464E+001	6.3107E-002 **+/-** 3.5708E-003

	Calculated Efficiency (%)		
DetectorName	**Avg. Efficiency (%)**	**Count Rate (cpm)**	**Avg. Spillover (%)**
D4	4.7172E+001 **+/-** 1.5007E-001	5.1276E+004 **+/-** 7.1607E+001	1.1848E-001 **+/-** 4.8122E-003

Efficiency Report

Batch Name: Batch_18825 **Count Date:** 10/3/2016 9:56:07 AM

Procedure: Official Efficiency **Preset Count Time:** 120

Calibration: Gross Alpha Beta **Count Mode:** Simultaneous

Decay Mode: Alpha

Calculated Efficiency (%)

DetectorName	Avg. Efficiency (%)	Count Rate (cpm)	Avg. Spillover (%)
B1	3.8407E+001 +/- 2.5146E-001	5.3001E+003 +/- 3.4700E+001	1.7090E+001 +/- 1.7819E-001

Assay Date	Iteration	Efficiency (%)	Alpha Count Rate (cpm)	Spillover	Beta Count Rate (cpm)
10/3/2016 9:56:04 AM	1	38.65 +/- 1.22E+000	5.334E+003 +/- 5.164E+001	1.699E+001 +/- 4.319E-001	9.062E+002 +/- 2.130E+001
10/3/2016 9:58:15 AM	2	38.60 +/- 1.21E+000	5.327E+003 +/- 5.161E+001	1.706E+001 +/- 4.332E-001	9.087E+002 +/- 2.133E+001
10/3/2016 10:00:24 AM	3	38.54 +/- 1.21E+000	5.319E+003 +/- 5.157E+001	1.720E+001 +/- 4.355E-001	9.147E+002 +/- 2.140E+001
10/3/2016 10:02:34 AM	4	38.44 +/- 1.21E+000	5.304E+003 +/- 5.150E+001	1.690E+001 +/- 4.318E-001	8.962E+002 +/- 2.118E+001
10/3/2016 10:04:42 AM	5	38.41 +/- 1.21E+000	5.301E+003 +/- 5.148E+001	1.736E+001 +/- 4.386E-001	9.202E+002 +/- 2.147E+001
10/3/2016 10:06:52 AM	6	37.94 +/- 1.19E+000	5.235E+003 +/- 5.116E+001	1.712E+001 +/- 4.378E-001	8.962E+002 +/- 2.118E+001
10/3/2016 10:09:01 AM	7	38.28 +/- 1.20E+000	5.282E+003 +/- 5.139E+001	1.690E+001 +/- 4.327E-001	8.927E+002 +/- 2.114E+001
10/3/2016 10:11:10 AM	8	38.04 +/- 1.20E+000	5.249E+003 +/- 5.123E+001	1.740E+001 +/- 4.414E-001	9.132E+002 +/- 2.138E+001
10/3/2016 10:13:21 AM	9	38.67 +/- 1.22E+000	5.336E+003 +/- 5.166E+001	1.703E+001 +/- 4.324E-001	9.087E+002 +/- 2.133E+001
10/3/2016 10:15:30 AM	10	38.50 +/- 1.21E+000	5.312E+003 +/- 5.154E+001	1.695E+001 +/- 4.323E-001	9.007E+002 +/- 2.124E+001

Calculated Efficiency (%)

DetectorName	Avg. Efficiency (%)	Count Rate (cpm)	Avg. Spillover (%)
B2	3.9329E+001 +/- 5.5758E-001	5.8991E+003 +/- 8.3632E+001	1.7160E+001 +/- 2.8740E-001

Assay Date	Iteration	Efficiency (%)	Alpha Count Rate (cpm)	Spillover	Beta Count Rate (cpm)
10/3/2016 9:56:04 AM	1	40.23 +/- 1.26E+000	6.034E+003 +/- 5.493E+001	1.703E+001 +/- 4.066E-001	1.028E+003 +/- 2.268E+001
10/3/2016 9:58:16 AM	2	39.47 +/- 1.24E+000	5.920E+003 +/- 5.441E+001	1.709E+001 +/- 4.113E-001	1.012E+003 +/- 2.251E+001
10/3/2016 10:00:25 AM	3	39.47 +/- 1.24E+000	5.920E+003 +/- 5.441E+001	1.708E+001 +/- 4.111E-001	1.011E+003 +/- 2.249E+001
10/3/2016 10:02:35 AM	4	39.92 +/- 1.25E+000	5.988E+003 +/- 5.472E+001	1.707E+001 +/- 4.087E-001	1.022E+003 +/- 2.262E+001
10/3/2016 10:04:43 AM	5	38.47 +/- 1.21E+000	5.770E+003 +/- 5.371E+001	1.756E+001 +/- 4.232E-001	1.013E+003 +/- 2.252E+001
10/3/2016 10:06:53 AM	6	38.59 +/- 1.21E+000	5.787E+003 +/- 5.379E+001	1.757E+001 +/- 4.227E-001	1.017E+003 +/- 2.256E+001
10/3/2016 10:09:02 AM	7	39.20 +/- 1.23E+000	5.879E+003 +/- 5.422E+001	1.674E+001 +/- 4.078E-001	9.839E+002 +/- 2.219E+001
10/3/2016 10:11:11 AM	8	39.71 +/- 1.24E+000	5.955E+003 +/- 5.457E+001	1.730E+001 +/- 4.130E-001	1.030E+003 +/- 2.271E+001
10/3/2016 10:13:22 AM	9	39.29 +/- 1.23E+000	5.893E+003 +/- 5.428E+001	1.679E+001 +/- 4.081E-001	9.894E+002 +/- 2.225E+001
10/3/2016 10:15:31 AM	10	38.95 +/- 1.22E+000	5.842E+003 +/- 5.405E+001	1.736E+001 +/- 4.178E-001	1.014E+003 +/- 2.253E+001

Calculated Efficiency (%)

DetectorName	Avg. Efficiency (%)	Count Rate (cpm)	Avg. Spillover (%)
B3	3.9228E+001 +/- 3.7863E-001	6.1194E+003 +/- 5.9063E+001	1.6923E+001 +/- 2.1630E-001

Assay Date	Iteration	Efficiency (%)	Alpha Count Rate (cpm)	Spillover	Beta Count Rate (cpm)
10/3/2016 9:56:05 AM	1	39.56 +/- 1.24E+000	6.170E+003 +/- 5.555E+001	1.677E+001 +/- 3.985E-001	1.035E+003 +/- 2.276E+001
10/3/2016 9:58:17 AM	2	39.91 +/- 1.25E+000	6.225E+003 +/- 5.579E+001	1.659E+001 +/- 3.943E-001	1.033E+003 +/- 2.274E+001
10/3/2016 10:00:26 AM	3	39.22 +/- 1.23E+000	6.118E+003 +/- 5.531E+001	1.684E+001 +/- 4.012E-001	1.030E+003 +/- 2.271E+001
10/3/2016 10:02:36 AM	4	38.88 +/- 1.22E+000	6.065E+003 +/- 5.507E+001	1.690E+001 +/- 4.038E-001	1.025E+003 +/- 2.266E+001
10/3/2016 10:04:45 AM	5	38.59 +/- 1.21E+000	6.019E+003 +/- 5.486E+001	1.706E+001 +/- 4.076E-001	1.027E+003 +/- 2.268E+001
10/3/2016 10:06:55 AM	6	39.15 +/- 1.22E+000	6.107E+003 +/- 5.526E+001	1.717E+001 +/- 4.061E-001	1.049E+003 +/- 2.291E+001
10/3/2016 10:09:03 AM	7	39.07 +/- 1.22E+000	6.095E+003 +/- 5.520E+001	1.734E+001 +/- 4.087E-001	1.057E+003 +/- 2.300E+001
10/3/2016 10:11:12 AM	8	39.17 +/- 1.22E+000	6.109E+003 +/- 5.527E+001	1.688E+001 +/- 4.020E-001	1.031E+003 +/- 2.272E+001

Assay Date	Iteration	Efficiency (%)	Alpha Count Rate (cpm)	Spillover	Beta Count Rate (cpm)
10/3/2016 10:13:23 AM	9	39.61 +/- 1.24E+000	6.179E+003 +/- 5.558E+001	1.691E+001 +/- 4.003E-001	1.045E+003 +/- 2.287E+001
10/3/2016 10:15:32 AM	10	39.13 +/- 1.22E+000	6.103E+003 +/- 5.524E+001	1.677E+001 +/- 4.008E-001	1.024E+003 +/- 2.264E+001

Calculated Efficiency (%)

DetectorName	Avg. Efficiency (%)	Count Rate (cpm)	Avg. Spillover (%)
B4	3.9554E+001 +/- 2.6993E-001	7.7676E+003 +/- 5.3009E+001	1.6777E+001 +/- 3.5878E-001

Assay Date	Iteration	Efficiency (%)	Alpha Count Rate (cpm)	Spillover	Beta Count Rate (cpm)
10/3/2016 9:56:05 AM	1	39.45 +/- 6.78E-001	7.747E+003 +/- 6.224E+001	1.706E+001 +/- 3.592E-001	1.322E+003 +/- 2.572E+001
10/3/2016 9:58:17 AM	2	39.32 +/- 6.76E-001	7.721E+003 +/- 6.213E+001	1.742E+001 +/- 3.640E-001	1.345E+003 +/- 2.594E+001
10/3/2016 10:00:27 AM	3	39.19 +/- 6.74E-001	7.696E+003 +/- 6.203E+001	1.675E+001 +/- 3.565E-001	1.289E+003 +/- 2.540E+001
10/3/2016 10:02:36 AM	4	39.96 +/- 6.86E-001	7.848E+003 +/- 6.264E+001	1.649E+001 +/- 3.499E-001	1.294E+003 +/- 2.545E+001
10/3/2016 10:04:45 AM	5	39.27 +/- 6.75E-001	7.711E+003 +/- 6.209E+001	1.690E+001 +/- 3.581E-001	1.303E+003 +/- 2.554E+001
10/3/2016 10:06:56 AM	6	39.36 +/- 6.77E-001	7.729E+003 +/- 6.217E+001	1.686E+001 +/- 3.572E-001	1.303E+003 +/- 2.554E+001
10/3/2016 10:09:13 AM	7	39.75 +/- 6.83E-001	7.807E+003 +/- 6.248E+001	1.701E+001 +/- 3.571E-001	1.328E+003 +/- 2.578E+001
10/3/2016 10:11:22 AM	8	39.83 +/- 6.84E-001	7.822E+003 +/- 6.254E+001	1.612E+001 +/- 3.460E-001	1.261E+003 +/- 2.512E+001
10/3/2016 10:13:32 AM	9	39.77 +/- 6.83E-001	7.810E+003 +/- 6.249E+001	1.662E+001 +/- 3.524E-001	1.298E+003 +/- 2.549E+001
10/3/2016 10:15:42 AM	10	39.63 +/- 6.81E-001	7.782E+003 +/- 6.238E+001	1.656E+001 +/- 3.523E-001	1.289E+003 +/- 2.540E+001

Batch Name: Batch_18826 **Count Date:** 10/3/2016 9:56:07 AM

Procedure: Official Efficiency **Preset Count Time:** 120

Calibration: Gross Alpha Beta **Count Mode:** Simultaneous

Decay Mode: Beta

Calculated Efficiency (%)

DetectorName	Avg. Efficiency (%)	Count Rate (cpm)	Avg. Spillover (%)
C1	4.6651E+001 +/- 9.8979E-001	1.6427E+003 +/- 3.4829E+001	5.3397E-001 +/- 1.1170E-001

Assay Date	Iteration	Efficiency (%)	Beta Count Rate (cpm)	Spillover	Alpha Count Rate (cpm)
10/3/2016 9:56:05 AM	1	46.99 +/- 2.41E+000	5.958E+000 +/- 1.732E+000	3.604E-001 +/- 1.050E-001	1.653E+003 +/- 2.876E+001
10/3/2016 9:58:18 AM	2	45.75 +/- 2.35E+000	8.958E+000 +/- 2.121E+000	5.565E-001 +/- 1.321E-001	1.610E+003 +/- 2.838E+001
10/3/2016 10:00:27 AM	3	47.13 +/- 2.42E+000	5.958E+000 +/- 1.732E+000	3.593E-001 +/- 1.046E-001	1.658E+003 +/- 2.881E+001
10/3/2016 10:02:36 AM	4	46.46 +/- 2.39E+000	1.046E+001 +/- 2.291E+000	6.397E-001 +/- 1.406E-001	1.635E+003 +/- 2.860E+001
10/3/2016 10:04:45 AM	5	46.42 +/- 2.39E+000	1.096E+001 +/- 2.345E+000	6.709E-001 +/- 1.441E-001	1.633E+003 +/- 2.859E+001
10/3/2016 10:06:56 AM	6	48.24 +/- 2.47E+000	8.958E+000 +/- 2.121E+000	5.278E-001 +/- 1.253E-001	1.697E+003 +/- 2.914E+001
10/3/2016 10:09:04 AM	7	45.11 +/- 2.32E+000	8.458E+000 +/- 2.062E+000	5.328E-001 +/- 1.302E-001	1.587E+003 +/- 2.818E+001
10/3/2016 10:11:14 AM	8	47.97 +/- 2.46E+000	1.046E+001 +/- 2.291E+000	6.196E-001 +/- 1.362E-001	1.688E+003 +/- 2.906E+001
10/3/2016 10:13:24 AM	9	45.68 +/- 2.35E+000	9.958E+000 +/- 2.236E+000	6.195E-001 +/- 1.395E-001	1.607E+003 +/- 2.836E+001
10/3/2016 10:15:33 AM	10	46.76 +/- 2.40E+000	7.458E+000 +/- 1.937E+000	4.533E-001 +/- 1.180E-001	1.645E+003 +/- 2.869E+001

Calculated Efficiency (%)

DetectorName	Avg. Efficiency (%)	Count Rate (cpm)	Avg. Spillover (%)
C2	4.5984E+001 +/- 4.6596E-001	4.0765E+003 +/- 4.1298E+001	4.1798E-001 +/- 6.8808E-002

Assay Date	Iteration	Efficiency (%)	Beta Count Rate (cpm)	Spillover	Alpha Count Rate (cpm)
10/3/2016 9:56:05 AM	1	46.53 +/- 1.95E+000	1.394E+001 +/- 2.646E+000	3.380E-001 +/- 6.427E-002	4.124E+003 +/- 4.541E+001
10/3/2016 9:58:18 AM	2	46.55 +/- 1.95E+000	2.144E+001 +/- 3.279E+000	5.196E-001 +/- 7.967E-002	4.126E+003 +/- 4.543E+001
10/3/2016 10:00:28 AM	3	45.53 +/- 1.91E+000	1.694E+001 +/- 2.916E+000	4.197E-001 +/- 7.240E-002	4.036E+003 +/- 4.493E+001
10/3/2016 10:02:37 AM	4	45.50 +/- 1.91E+000	1.694E+001 +/- 2.916E+000	4.200E-001 +/- 7.245E-002	4.033E+003 +/- 4.491E+001
10/3/2016 10:04:46 AM	5	46.41 +/- 1.95E+000	1.394E+001 +/- 2.646E+000	3.388E-001 +/- 6.443E-002	4.114E+003 +/- 4.536E+001
10/3/2016 10:06:56 AM	6	46.42 +/- 1.95E+000	2.044E+001 +/- 3.202E+000	4.968E-001 +/- 7.802E-002	4.114E+003 +/- 4.536E+001
10/3/2016 10:09:05 AM	7	45.79 +/- 1.92E+000	1.294E+001 +/- 2.550E+000	3.188E-001 +/- 6.293E-002	4.058E+003 +/- 4.505E+001
10/3/2016 10:11:14 AM	8	45.30 +/- 1.90E+000	1.644E+001 +/- 2.872E+000	4.094E-001 +/- 7.169E-002	4.015E+003 +/- 4.481E+001
10/3/2016 10:13:25 AM	9	45.91 +/- 1.93E+000	1.894E+001 +/- 3.082E+000	4.655E-001 +/- 7.594E-002	4.069E+003 +/- 4.511E+001
10/3/2016 10:15:33 AM	10	45.90 +/- 1.93E+000	1.844E+001 +/- 3.042E+000	4.532E-001 +/- 7.494E-002	4.068E+003 +/- 4.511E+001

Calculated Efficiency (%)

DetectorName	Avg. Efficiency (%)	Count Rate (cpm)	Avg. Spillover (%)
C3	4.4787E+001 +/- 7.8188E-001	2.3356E+003 +/- 4.0755E+001	5.2451E-001 +/- 1.1792E-001

Assay Date	Iteration	Efficiency (%)	Beta Count Rate (cpm)	Spillover	Alpha Count Rate (cpm)
10/3/2016 9:56:05 AM	1	45.19 +/- 1.94E+000	1.294E+001 +/- 2.550E+000	5.494E-001 +/- 1.085E-001	2.355E+003 +/- 3.433E+001
10/3/2016 9:58:19 AM	2	43.97 +/- 1.90E+000	1.244E+001 +/- 2.500E+000	5.428E-001 +/- 1.094E-001	2.292E+003 +/- 3.386E+001
10/3/2016 10:00:29 AM	3	44.79 +/- 1.93E+000	1.044E+001 +/- 2.292E+000	4.472E-001 +/- 9.838E-002	2.334E+003 +/- 3.417E+001
10/3/2016 10:02:37 AM	4	44.24 +/- 1.91E+000	9.940E+000 +/- 2.236E+000	4.311E-001 +/- 9.719E-002	2.306E+003 +/- 3.396E+001
10/3/2016 10:04:46 AM	5	46.02 +/- 1.98E+000	1.194E+001 +/- 2.450E+000	4.977E-001 +/- 1.024E-001	2.399E+003 +/- 3.464E+001
10/3/2016 10:06:57 AM	6	44.62 +/- 1.92E+000	1.194E+001 +/- 2.450E+000	5.134E-001 +/- 1.056E-001	2.326E+003 +/- 3.411E+001
10/3/2016 10:09:05 AM	7	44.33 +/- 1.91E+000	7.440E+000 +/- 1.937E+000	3.220E-001 +/- 8.394E-002	2.311E+003 +/- 3.400E+001
10/3/2016 10:11:15 AM	8	45.66 +/- 1.96E+000	1.444E+001 +/- 2.693E+000	6.068E-001 +/- 1.135E-001	2.380E+003 +/- 3.450E+001
10/3/2016 10:13:25 AM	9	43.60 +/- 1.88E+000	1.744E+001 +/- 2.958E+000	7.675E-001 +/- 1.307E-001	2.272E+003 +/- 3.372E+001
10/3/2016 10:15:34 AM	10	45.45 +/- 1.96E+000	1.344E+001 +/- 2.598E+000	5.674E-001 +/- 1.100E-001	2.369E+003 +/- 3.442E+001

Calculated Efficiency (%)

DetectorName	Avg. Efficiency (%)	Count Rate (cpm)	Avg. Spillover (%)
C4	4.5466E+001 +/- 4.7208E-001	2.6702E+003 +/- 2.7714E+001	4.4420E-001 +/- 8.3764E-002

Assay Date	Iteration	Efficiency (%)	Beta Count Rate (cpm)	Spillover	Alpha Count Rate (cpm)
10/3/2016 9:56:05 AM	1	46.11 +/- 1.97E+000	9.946E+000 +/- 2.236E+000	3.674E-001 +/- 8.276E-002	2.707E+003 +/- 3.680E+001
10/3/2016 9:58:20 AM	2	45.19 +/- 1.93E+000	1.295E+001 +/- 2.550E+000	4.880E-001 +/- 9.634E-002	2.653E+003 +/- 3.643E+001
10/3/2016 10:00:29 AM	3	45.92 +/- 1.96E+000	7.446E+000 +/- 1.937E+000	2.762E-001 +/- 7.193E-002	2.696E+003 +/- 3.672E+001
10/3/2016 10:02:38 AM	4	45.74 +/- 1.95E+000	1.295E+001 +/- 2.550E+000	4.822E-001 +/- 9.519E-002	2.685E+003 +/- 3.665E+001
10/3/2016 10:04:47 AM	5	44.65 +/- 1.91E+000	1.445E+001 +/- 2.693E+000	5.512E-001 +/- 1.030E-001	2.621E+003 +/- 3.621E+001
10/3/2016 10:06:57 AM	6	45.57 +/- 1.95E+000	1.195E+001 +/- 2.450E+000	4.465E-001 +/- 9.176E-002	2.675E+003 +/- 3.658E+001
10/3/2016 10:09:06 AM	7	45.62 +/- 1.95E+000	1.295E+001 +/- 2.550E+000	4.834E-001 +/- 9.544E-002	2.678E+003 +/- 3.660E+001
10/3/2016 10:11:15 AM	8	45.61 +/- 1.95E+000	1.445E+001 +/- 2.693E+000	5.395E-001 +/- 1.008E-001	2.677E+003 +/- 3.660E+001
10/3/2016 10:13:26 AM	9	45.51 +/- 1.94E+000	1.045E+001 +/- 2.291E+000	3.910E-001 +/- 8.594E-002	2.671E+003 +/- 3.655E+001
10/3/2016 10:15:34 AM	10	44.76 +/- 1.91E+000	1.095E+001 +/- 2.345E+000	4.166E-001 +/- 8.945E-002	2.627E+003 +/- 3.625E+001

Batch Name: Batch_18827 **Count Date:** 10/3/2016 10:22:02 AM

Procedure: Official Efficiency **Preset Count Time:** 120

Calibration: Gross Alpha Beta **Count Mode:** Simultaneous

Decay Mode: Alpha

Calculated Efficiency (%)

DetectorName	Avg. Efficiency (%)	Count Rate (cpm)	Avg. Spillover (%)
C1	3.5762E+001 +/- 2.9579E-001	4.9349E+003 +/- 4.0817E+001	1.7408E+001 +/- 4.0694E-001

Assay Date	Iteration	Efficiency (%)	Alpha Count Rate (cpm)	Spillover	Beta Count Rate (cpm)
10/3/2016 10:21:59 AM	1	36.08 +/- 1.14E+000	4.979E+003 +/- 4.989E+001	1.766E+001 +/- 4.571E-001	8.794E+002 +/- 2.098E+001
10/3/2016 10:24:11 AM	2	35.32 +/- 1.12E+000	4.874E+003 +/- 4.937E+001	1.782E+001 +/- 4.643E-001	8.684E+002 +/- 2.085E+001
10/3/2016 10:26:25 AM	3	36.15 +/- 1.14E+000	4.989E+003 +/- 4.994E+001	1.730E+001 +/- 4.512E-001	8.629E+002 +/- 2.078E+001
10/3/2016 10:28:42 AM	4	35.64 +/- 1.13E+000	4.917E+003 +/- 4.959E+001	1.732E+001 +/- 4.549E-001	8.519E+002 +/- 2.065E+001
10/3/2016 10:30:54 AM	5	35.66 +/- 1.13E+000	4.921E+003 +/- 4.960E+001	1.810E+001 +/- 4.664E-001	8.909E+002 +/- 2.112E+001
10/3/2016 10:33:08 AM	6	35.48 +/- 1.12E+000	4.896E+003 +/- 4.948E+001	1.744E+001 +/- 4.576E-001	8.539E+002 +/- 2.068E+001
10/3/2016 10:35:23 AM	7	35.82 +/- 1.13E+000	4.943E+003 +/- 4.972E+001	1.677E+001 +/- 4.453E-001	8.289E+002 +/- 2.037E+001
10/3/2016 10:37:37 AM	8	36.19 +/- 1.14E+000	4.994E+003 +/- 4.997E+001	1.726E+001 +/- 4.504E-001	8.619E+002 +/- 2.077E+001
10/3/2016 10:39:50 AM	9	35.55 +/- 1.12E+000	4.906E+003 +/- 4.953E+001	1.755E+001 +/- 4.588E-001	8.609E+002 +/- 2.076E+001
10/3/2016 10:42:04 AM	10	35.72 +/- 1.13E+000	4.928E+003 +/- 4.964E+001	1.686E+001 +/- 4.473E-001	8.309E+002 +/- 2.040E+001

Calculated Efficiency (%)

DetectorName	Avg. Efficiency (%)	Count Rate (cpm)	Avg. Spillover (%)
C2	3.5233E+001 +/- 2.2335E-001	5.2848E+003 +/- 3.3501E+001	1.8364E+001 +/- 4.6258E-001

Assay Date	Iteration	Efficiency (%)	Alpha Count Rate (cpm)	Spillover	Beta Count Rate (cpm)
10/3/2016 10:22:00 AM	1	35.26 +/- 1.11E+000	5.288E+003 +/- 5.142E+001	1.844E+001 +/- 4.546E-001	9.750E+002 +/- 2.209E+001
10/3/2016 10:24:11 AM	2	34.99 +/- 1.10E+000	5.248E+003 +/- 5.123E+001	1.903E+001 +/- 4.647E-001	9.985E+002 +/- 2.236E+001
10/3/2016 10:26:26 AM	3	35.41 +/- 1.11E+000	5.311E+003 +/- 5.153E+001	1.838E+001 +/- 4.528E-001	9.760E+002 +/- 2.210E+001
10/3/2016 10:28:43 AM	4	35.46 +/- 1.12E+000	5.319E+003 +/- 5.157E+001	1.839E+001 +/- 4.525E-001	9.780E+002 +/- 2.212E+001
10/3/2016 10:30:55 AM	5	34.72 +/- 1.09E+000	5.208E+003 +/- 5.103E+001	1.908E+001 +/- 4.673E-001	9.940E+002 +/- 2.230E+001
10/3/2016 10:33:09 AM	6	35.20 +/- 1.11E+000	5.280E+003 +/- 5.138E+001	1.806E+001 +/- 4.495E-001	9.535E+002 +/- 2.185E+001
10/3/2016 10:35:24 AM	7	35.39 +/- 1.11E+000	5.308E+003 +/- 5.152E+001	1.760E+001 +/- 4.417E-001	9.340E+002 +/- 2.162E+001
10/3/2016 10:37:37 AM	8	35.24 +/- 1.11E+000	5.285E+003 +/- 5.141E+001	1.824E+001 +/- 4.519E-001	9.640E+002 +/- 2.197E+001
10/3/2016 10:39:51 AM	9	35.35 +/- 1.11E+000	5.303E+003 +/- 5.149E+001	1.789E+001 +/- 4.461E-001	9.485E+002 +/- 2.179E+001
10/3/2016 10:42:04 AM	10	35.30 +/- 1.11E+000	5.295E+003 +/- 5.145E+001	1.855E+001 +/- 4.558E-001	9.820E+002 +/- 2.217E+001

Calculated Efficiency (%)

DetectorName	Avg. Efficiency (%)	Count Rate (cpm)	Avg. Spillover (%)
C3	3.6514E+001 +/- 3.9021E-001	5.6959E+003 +/- 6.0870E+001	1.5762E+001 +/- 3.9189E-001

Assay Date	Iteration	Efficiency (%)	Alpha Count Rate (cpm)	Spillover	Beta Count Rate (cpm)
10/3/2016 10:22:00 AM	1	36.79 +/- 1.15E+000	5.739E+003 +/- 5.357E+001	1.658E+001 +/- 4.105E-001	9.514E+002 +/- 2.182E+001
10/3/2016 10:24:24 AM	2	36.92 +/- 1.16E+000	5.760E+003 +/- 5.367E+001	1.557E+001 +/- 3.955E-001	8.969E+002 +/- 2.119E+001
10/3/2016 10:26:39 AM	3	36.58 +/- 1.15E+000	5.707E+003 +/- 5.342E+001	1.537E+001 +/- 3.943E-001	8.769E+002 +/- 2.095E+001
10/3/2016 10:28:56 AM	4	36.22 +/- 1.14E+000	5.650E+003 +/- 5.315E+001	1.580E+001 +/- 4.026E-001	8.929E+002 +/- 2.114E+001
10/3/2016 10:31:08 AM	5	35.97 +/- 1.13E+000	5.610E+003 +/- 5.296E+001	1.614E+001 +/- 4.089E-001	9.054E+002 +/- 2.129E+001
10/3/2016 10:33:22 AM	6	36.37 +/- 1.14E+000	5.673E+003 +/- 5.326E+001	1.601E+001 +/- 4.048E-001	9.084E+002 +/- 2.133E+001
10/3/2016 10:35:37 AM	7	37.26 +/- 1.17E+000	5.812E+003 +/- 5.391E+001	1.557E+001 +/- 3.937E-001	9.049E+002 +/- 2.128E+001
10/3/2016 10:37:50 AM	8	36.19 +/- 1.14E+000	5.646E+003 +/- 5.313E+001	1.528E+001 +/- 3.951E-001	8.624E+002 +/- 2.078E+001
10/3/2016 10:40:04 AM	9	36.28 +/- 1.14E+000	5.659E+003 +/- 5.319E+001	1.576E+001 +/- 4.017E-001	8.919E+002 +/- 2.113E+001
10/3/2016 10:42:17 AM	10	36.55 +/- 1.15E+000	5.701E+003 +/- 5.339E+001	1.555E+001 +/- 3.972E-001	8.864E+002 +/- 2.107E+001

Calculated Efficiency (%)

DetectorName	Avg. Efficiency (%)	Count Rate (cpm)	Avg. Spillover (%)
C4	3.7591E+001 +/- 1.9722E-001	7.3822E+003 +/- 3.8729E+001	1.6288E+001 +/- 4.0717E-001

Assay Date	Iteration	Efficiency (%)	Alpha Count Rate (cpm)	Spillover	Beta Count Rate (cpm)
10/3/2016 10:22:00 AM	1	37.53 +/- 6.49E-001	7.369E+003 +/- 6.070E+001	1.718E+001 +/- 3.698E-001	1.266E+003 +/- 2.517E+001
10/3/2016 10:24:25 AM	2	37.76 +/- 6.52E-001	7.415E+003 +/- 6.089E+001	1.591E+001 +/- 3.528E-001	1.180E+003 +/- 2.430E+001
10/3/2016 10:26:40 AM	3	37.60 +/- 6.50E-001	7.384E+003 +/- 6.076E+001	1.603E+001 +/- 3.551E-001	1.184E+003 +/- 2.434E+001
10/3/2016 10:28:56 AM	4	37.89 +/- 6.54E-001	7.441E+003 +/- 6.100E+001	1.626E+001 +/- 3.566E-001	1.210E+003 +/- 2.461E+001
10/3/2016 10:31:09 AM	5	37.73 +/- 6.52E-001	7.408E+003 +/- 6.086E+001	1.584E+001 +/- 3.520E-001	1.173E+003 +/- 2.423E+001
10/3/2016 10:33:22 AM	6	37.42 +/- 6.47E-001	7.348E+003 +/- 6.061E+001	1.614E+001 +/- 3.573E-001	1.186E+003 +/- 2.436E+001
10/3/2016 10:35:38 AM	7	37.32 +/- 6.46E-001	7.328E+003 +/- 6.053E+001	1.673E+001 +/- 3.652E-001	1.226E+003 +/- 2.477E+001
10/3/2016 10:37:51 AM	8	37.38 +/- 6.46E-001	7.340E+003 +/- 6.058E+001	1.635E+001 +/- 3.602E-001	1.200E+003 +/- 2.451E+001
10/3/2016 10:40:04 AM	9	37.49 +/- 6.48E-001	7.362E+003 +/- 6.067E+001	1.637E+001 +/- 3.598E-001	1.205E+003 +/- 2.456E+001
10/3/2016 10:42:17 AM	10	37.81 +/- 6.53E-001	7.425E+003 +/- 6.093E+001	1.606E+001 +/- 3.544E-001	1.192E+003 +/- 2.443E+001

Batch Name: Batch_18828 **Count Date:** 10/3/2016 10:22:05 AM

Procedure: Official Efficiency **Preset Count Time:** 120

Calibration: Gross Alpha Beta **Count Mode:** Simultaneous

Decay Mode: Beta

Calculated Efficiency (%)

DetectorName	Avg. Efficiency (%)	Count Rate (cpm)	Avg. Spillover (%)
D1	4.6230E+001 +/- 1.0409E+000	1.6278E+003 +/- 3.6627E+001	1.8211E-001 +/- 9.0040E-002

Assay Date	Iteration	Efficiency (%)	Beta Count Rate (cpm)	Spillover	Alpha Count Rate (cpm)
10/3/2016 10:22:00 AM	1	45.48 +/- 2.34E+000	1.460E+000 +/- 8.661E-001	9.121E-002 +/- 5.414E-002	1.600E+003 +/- 2.830E+001
10/3/2016 10:24:25 AM	2	46.85 +/- 2.41E+000	1.960E+000 +/- 1.000E+000	1.189E-001 +/- 6.071E-002	1.648E+003 +/- 2.872E+001

Assay Date	Iteration	Efficiency (%)	Beta Count Rate (cpm)	Spillover	Alpha Count Rate (cpm)
10/3/2016 10:26:40 AM	3	44.76 +/- 2.30E+000	3.460E+000 +/- 1.323E+000	2.197E-001 +/- 8.409E-002	1.575E+003 +/- 2.807E+001
10/3/2016 10:28:57 AM	4	47.34 +/- 2.43E+000	4.960E+000 +/- 1.581E+000	2.977E-001 +/- 9.505E-002	1.666E+003 +/- 2.887E+001
10/3/2016 10:31:09 AM	5	44.87 +/- 2.31E+000	2.460E+000 +/- 1.118E+000	1.558E-001 +/- 7.087E-002	1.579E+003 +/- 2.811E+001
10/3/2016 10:33:23 AM	6	46.85 +/- 2.41E+000	-4.028E-002 +/- 1.435E-002	0.000E+000 +/- 8.707E-004	1.648E+003 +/- 2.872E+001
10/3/2016 10:35:38 AM	7	47.77 +/- 2.45E+000	3.460E+000 +/- 1.323E+000	2.058E-001 +/- 7.878E-002	1.681E+003 +/- 2.900E+001
10/3/2016 10:37:51 AM	8	46.21 +/- 2.37E+000	3.960E+000 +/- 1.414E+000	2.435E-001 +/- 8.709E-002	1.626E+003 +/- 2.852E+001
10/3/2016 10:40:05 AM	9	46.70 +/- 2.40E+000	3.960E+000 +/- 1.414E+000	2.409E-001 +/- 8.616E-002	1.643E+003 +/- 2.867E+001
10/3/2016 10:42:18 AM	10	45.47 +/- 2.34E+000	3.960E+000 +/- 1.414E+000	2.475E-001 +/- 8.850E-002	1.600E+003 +/- 2.829E+001

Calculated Efficiency (%)

DetectorName	Avg. Efficiency (%)	Count Rate (cpm)	Avg. Spillover (%)
D2	4.6123E+001 +/- 5.2805E-001	4.0890E+003 +/- 4.6800E+001	3.2792E-001 +/- 7.0625E-002

Assay Date	Iteration	Efficiency (%)	Beta Count Rate (cpm)	Spillover	Alpha Count Rate (cpm)
10/3/2016 10:22:00 AM	1	45.59 +/- 1.92E+000	1.744E+001 +/- 2.958E+000	4.316E-001 +/- 7.337E-002	4.041E+003 +/- 4.496E+001
10/3/2016 10:24:26 AM	2	45.80 +/- 1.92E+000	1.744E+001 +/- 2.958E+000	4.297E-001 +/- 7.304E-002	4.059E+003 +/- 4.506E+001
10/3/2016 10:26:41 AM	3	47.28 +/- 1.98E+000	1.144E+001 +/- 2.398E+000	2.730E-001 +/- 5.731E-002	4.190E+003 +/- 4.578E+001
10/3/2016 10:28:57 AM	4	45.56 +/- 1.91E+000	1.394E+001 +/- 2.646E+000	3.452E-001 +/- 6.563E-002	4.038E+003 +/- 4.494E+001
10/3/2016 10:31:10 AM	5	46.38 +/- 1.95E+000	1.044E+001 +/- 2.292E+000	2.540E-001 +/- 5.582E-002	4.110E+003 +/- 4.534E+001
10/3/2016 10:33:23 AM	6	46.37 +/- 1.95E+000	1.544E+001 +/- 2.784E+000	3.757E-001 +/- 6.788E-002	4.109E+003 +/- 4.533E+001
10/3/2016 10:35:39 AM	7	46.11 +/- 1.94E+000	1.344E+001 +/- 2.598E+000	3.288E-001 +/- 6.368E-002	4.087E+003 +/- 4.521E+001
10/3/2016 10:37:52 AM	8	46.23 +/- 1.94E+000	8.939E+000 +/- 2.122E+000	2.182E-001 +/- 5.184E-002	4.097E+003 +/- 4.527E+001
10/3/2016 10:40:06 AM	9	46.33 +/- 1.95E+000	1.244E+001 +/- 2.500E+000	3.029E-001 +/- 6.098E-002	4.106E+003 +/- 4.532E+001
10/3/2016 10:42:19 AM	10	45.58 +/- 1.92E+000	1.294E+001 +/- 2.550E+000	3.203E-001 +/- 6.321E-002	4.040E+003 +/- 4.495E+001

Calculated Efficiency (%)

DetectorName	Avg. Efficiency (%)	Count Rate (cpm)	Avg. Spillover (%)
D3	4.5371E+001 +/- 7.5651E-001	2.3659E+003 +/- 3.9433E+001	3.2229E-001 +/- 1.0553E-001

Assay Date	Iteration	Efficiency (%)	Beta Count Rate (cpm)	Spillover	Alpha Count Rate (cpm)
10/3/2016 10:22:00 AM	1	46.71 +/- 2.01E+000	9.433E+000 +/- 2.180E+000	3.875E-001 +/- 8.971E-002	2.435E+003 +/- 3.490E+001
10/3/2016 10:24:26 AM	2	45.29 +/- 1.95E+000	1.343E+001 +/- 2.598E+000	5.691E-001 +/- 1.104E-001	2.361E+003 +/- 3.436E+001
10/3/2016 10:26:41 AM	3	44.28 +/- 1.91E+000	5.433E+000 +/- 1.659E+000	2.354E-001 +/- 7.195E-002	2.308E+003 +/- 3.398E+001
10/3/2016 10:28:58 AM	4	45.58 +/- 1.96E+000	4.933E+000 +/- 1.582E+000	2.076E-001 +/- 6.663E-002	2.376E+003 +/- 3.447E+001
10/3/2016 10:31:10 AM	5	45.80 +/- 1.97E+000	7.433E+000 +/- 1.937E+000	3.113E-001 +/- 8.125E-002	2.388E+003 +/- 3.456E+001
10/3/2016 10:33:24 AM	6	45.05 +/- 1.94E+000	8.933E+000 +/- 2.122E+000	3.805E-001 +/- 9.053E-002	2.348E+003 +/- 3.427E+001
10/3/2016 10:35:39 AM	7	45.08 +/- 1.94E+000	6.433E+000 +/- 1.803E+000	2.738E-001 +/- 7.685E-002	2.350E+003 +/- 3.428E+001
10/3/2016 10:37:52 AM	8	46.11 +/- 1.98E+000	7.933E+000 +/- 2.000E+000	3.301E-001 +/- 8.336E-002	2.404E+003 +/- 3.467E+001
10/3/2016 10:40:06 AM	9	45.53 +/- 1.96E+000	6.933E+000 +/- 1.871E+000	2.922E-001 +/- 7.897E-002	2.373E+003 +/- 3.445E+001
10/3/2016 10:42:19 AM	10	44.29 +/- 1.91E+000	5.433E+000 +/- 1.659E+000	2.354E-001 +/- 7.194E-002	2.309E+003 +/- 3.398E+001

Calculated Efficiency (%)

DetectorName	Avg. Efficiency (%)	Count Rate (cpm)	Avg. Spillover (%)
D4	4.4428E+001 +/- 5.3052E-001	2.6093E+003 +/- 3.1144E+001	4.0476E-001 +/- 8.5025E-002

Assay Date	Iteration	Efficiency (%)	Beta Count Rate (cpm)	Spillover	Alpha Count Rate (cpm)
10/3/2016 10:22:00 AM	1	44.51 +/- 1.90E+000	1.395E+001 +/- 2.646E+000	5.338E-001 +/- 1.015E-001	2.613E+003 +/- 3.615E+001
10/3/2016 10:24:27 AM	2	43.32 +/- 1.85E+000	1.345E+001 +/- 2.598E+000	5.288E-001 +/- 1.024E-001	2.543E+003 +/- 3.567E+001
10/3/2016 10:26:42 AM	3	44.00 +/- 1.88E+000	9.949E+000 +/- 2.236E+000	3.852E-001 +/- 8.675E-002	2.583E+003 +/- 3.594E+001
10/3/2016 10:28:58 AM	4	44.66 +/- 1.91E+000	9.949E+000 +/- 2.236E+000	3.794E-001 +/- 8.545E-002	2.622E+003 +/- 3.621E+001
10/3/2016 10:31:11 AM	5	43.87 +/- 1.88E+000	9.949E+000 +/- 2.236E+000	3.863E-001 +/- 8.700E-002	2.575E+003 +/- 3.589E+001
10/3/2016 10:33:25 AM	6	44.81 +/- 1.91E+000	9.449E+000 +/- 2.180E+000	3.592E-001 +/- 8.301E-002	2.630E+003 +/- 3.627E+001
10/3/2016 10:35:40 AM	7	44.94 +/- 1.92E+000	1.195E+001 +/- 2.450E+000	4.529E-001 +/- 9.306E-002	2.638E+003 +/- 3.633E+001
10/3/2016 10:37:53 AM	8	44.93 +/- 1.92E+000	9.449E+000 +/- 2.180E+000	3.582E-001 +/- 8.278E-002	2.638E+003 +/- 3.633E+001

Assay Date	Iteration	Efficiency (%)	Beta Count Rate (cpm)	Spillover	Alpha Count Rate (cpm)
10/3/2016 10:40:07 AM	9	44.72 +/- 1.91E+000	1.095E+001 +/- 2.345E+000	4.170E-001 +/- 8.952E-002	2.625E+003 +/- 3.624E+001
10/3/2016 10:42:20 AM	10	44.51 +/- 1.90E+000	6.449E+000 +/- 1.803E+000	2.468E-001 +/- 6.909E-002	2.613E+003 +/- 3.615E+001

Batch Name: Batch_18830 **Count Date:** 10/3/2016 10:58:11 AM

Procedure: Official Efficiency **Preset Count Time:** 120

Calibration: Gross Alpha Beta **Count Mode:** Simultaneous

Decay Mode: Beta

Calculated Efficiency (%)

DetectorName	Avg. Efficiency (%)	Count Rate (cpm)	Avg. Spillover (%)
B1	5.0999E+001 +/- 1.0336E+000	1.7959E+003 +/- 3.6369E+001	6.1288E-001 +/- 1.4514E-001

Assay Date	Iteration	Efficiency (%)	Beta Count Rate (cpm)	Spillover	Alpha Count Rate (cpm)
10/3/2016 10:58:08 AM	1	52.59 +/- 2.68E+000	1.191E+001 +/- 2.450E+000	6.437E-001 +/- 1.328E-001	1.851E+003 +/- 3.043E+001
10/3/2016 11:00:18 AM	2	51.46 +/- 2.63E+000	1.241E+001 +/- 2.500E+000	6.855E-001 +/- 1.386E-001	1.811E+003 +/- 3.010E+001
10/3/2016 11:02:28 AM	3	51.50 +/- 2.63E+000	1.641E+001 +/- 2.872E+000	9.057E-001 +/- 1.592E-001	1.812E+003 +/- 3.011E+001
10/3/2016 11:04:38 AM	4	49.64 +/- 2.54E+000	6.913E+000 +/- 1.871E+000	3.958E-001 +/- 1.073E-001	1.747E+003 +/- 2.956E+001
10/3/2016 11:06:47 AM	5	51.33 +/- 2.62E+000	7.413E+000 +/- 1.937E+000	4.104E-001 +/- 1.074E-001	1.806E+003 +/- 3.006E+001
10/3/2016 11:08:56 AM	6	52.42 +/- 2.68E+000	1.091E+001 +/- 2.345E+000	5.916E-001 +/- 1.275E-001	1.845E+003 +/- 3.038E+001
10/3/2016 11:11:01 AM	7	50.63 +/- 2.59E+000	1.041E+001 +/- 2.292E+000	5.844E-001 +/- 1.290E-001	1.782E+003 +/- 2.986E+001
10/3/2016 11:13:10 AM	8	50.26 +/- 2.57E+000	1.241E+001 +/- 2.500E+000	7.018E-001 +/- 1.419E-001	1.769E+003 +/- 2.975E+001
10/3/2016 11:15:20 AM	9	50.43 +/- 2.58E+000	1.091E+001 +/- 2.345E+000	6.149E-001 +/- 1.326E-001	1.775E+003 +/- 2.980E+001
10/3/2016 11:17:28 AM	10	49.72 +/- 2.54E+000	1.041E+001 +/- 2.292E+000	5.951E-001 +/- 1.314E-001	1.750E+003 +/- 2.959E+001

Calculated Efficiency (%)

DetectorName	Avg. Efficiency (%)	Count Rate (cpm)	Avg. Spillover (%)
B2	5.0188E+001 +/- 2.9919E-001	4.4492E+003 +/- 2.6516E+001	3.9253E-001 +/- 7.8899E-002

Assay Date	Iteration	Efficiency (%)	Beta Count Rate (cpm)	Spillover	Alpha Count Rate (cpm)
10/3/2016 10:58:08 AM	1	49.91 +/- 2.09E+000	1.546E+001 +/- 2.784E+000	3.496E-001 +/- 6.305E-002	4.423E+003 +/- 4.703E+001
10/3/2016 11:00:19 AM	2	50.29 +/- 2.11E+000	1.746E+001 +/- 2.958E+000	3.918E-001 +/- 6.649E-002	4.457E+003 +/- 4.721E+001
10/3/2016 11:02:29 AM	3	49.92 +/- 2.09E+000	1.346E+001 +/- 2.598E+000	3.043E-001 +/- 5.882E-002	4.424E+003 +/- 4.704E+001
10/3/2016 11:04:39 AM	4	49.70 +/- 2.08E+000	1.446E+001 +/- 2.693E+000	3.283E-001 +/- 6.123E-002	4.405E+003 +/- 4.694E+001
10/3/2016 11:06:49 AM	5	50.53 +/- 2.12E+000	2.146E+001 +/- 3.279E+000	4.792E-001 +/- 7.339E-002	4.478E+003 +/- 4.733E+001
10/3/2016 11:08:57 AM	6	50.17 +/- 2.10E+000	1.946E+001 +/- 3.123E+000	4.377E-001 +/- 7.037E-002	4.447E+003 +/- 4.716E+001
10/3/2016 11:11:02 AM	7	50.51 +/- 2.12E+000	1.396E+001 +/- 2.646E+000	3.119E-001 +/- 5.919E-002	4.477E+003 +/- 4.732E+001
10/3/2016 11:13:12 AM	8	49.99 +/- 2.09E+000	2.446E+001 +/- 3.500E+000	5.521E-001 +/- 7.922E-002	4.430E+003 +/- 4.707E+001
10/3/2016 11:15:21 AM	9	50.55 +/- 2.12E+000	1.646E+001 +/- 2.872E+000	3.675E-001 +/- 6.423E-002	4.480E+003 +/- 4.733E+001
10/3/2016 11:17:29 AM	10	50.30 +/- 2.11E+000	1.796E+001 +/- 3.000E+000	4.029E-001 +/- 6.743E-002	4.458E+003 +/- 4.722E+001

Calculated Efficiency (%)

DetectorName	Avg. Efficiency (%)	Count Rate (cpm)	Avg. Spillover (%)
B3	4.9127E+001 +/- 3.6015E-001	2.5621E+003 +/- 1.8773E+001	4.8842E-001 +/- 1.1163E-001

Assay Date	Iteration	Efficiency (%)	Beta Count Rate (cpm)	Spillover	Alpha Count Rate (cpm)
10/3/2016 10:58:08 AM	1	49.18 +/- 2.11E+000	1.145E+001 +/- 2.398E+000	4.468E-001 +/- 9.375E-002	2.564E+003 +/- 3.581E+001
10/3/2016 11:00:20 AM	2	49.66 +/- 2.13E+000	1.195E+001 +/- 2.450E+000	4.618E-001 +/- 9.485E-002	2.589E+003 +/- 3.599E+001
10/3/2016 11:02:30 AM	3	48.70 +/- 2.09E+000	1.345E+001 +/- 2.598E+000	5.300E-001 +/- 1.026E-001	2.539E+003 +/- 3.564E+001
10/3/2016 11:04:40 AM	4	48.81 +/- 2.09E+000	1.595E+001 +/- 2.829E+000	6.271E-001 +/- 1.115E-001	2.544E+003 +/- 3.568E+001
10/3/2016 11:06:50 AM	5	48.91 +/- 2.10E+000	1.545E+001 +/- 2.784E+000	6.062E-001 +/- 1.095E-001	2.549E+003 +/- 3.571E+001
10/3/2016 11:08:58 AM	6	49.53 +/- 2.12E+000	1.295E+001 +/- 2.550E+000	5.018E-001 +/- 9.901E-002	2.582E+003 +/- 3.594E+001
10/3/2016 11:11:11 AM	7	48.99 +/- 2.10E+000	8.954E+000 +/- 2.121E+000	3.506E-001 +/- 8.322E-002	2.554E+003 +/- 3.574E+001
10/3/2016 11:13:21 AM	8	48.73 +/- 2.09E+000	1.295E+001 +/- 2.550E+000	5.100E-001 +/- 1.006E-001	2.540E+003 +/- 3.565E+001
10/3/2016 11:15:31 AM	9	49.59 +/- 2.12E+000	1.495E+001 +/- 2.739E+000	5.786E-001 +/- 1.063E-001	2.585E+003 +/- 3.596E+001
10/3/2016 11:17:38 AM	10	49.16 +/- 2.11E+000	6.954E+000 +/- 1.871E+000	2.714E-001 +/- 7.311E-002	2.563E+003 +/- 3.581E+001

Calculated Efficiency (%)

DetectorName	Avg. Efficiency (%)	Count Rate (cpm)	Avg. Spillover (%)
B4	4.7642E+001 +/- 8.0969E-001	2.7981E+003 +/- 4.7533E+001	5.6480E-001 +/- 9.7444E-002

Assay Date	Iteration	Efficiency (%)	Beta Count Rate (cpm)	Spillover	Alpha Count Rate (cpm)
10/3/2016 10:58:08 AM	1	47.87 +/- 2.04E+000	1.745E+001 +/- 2.958E+000	6.209E-001 +/- 1.056E-001	2.810E+003 +/- 3.749E+001
10/3/2016 11:00:22 AM	2	47.61 +/- 2.03E+000	1.245E+001 +/- 2.500E+000	4.454E-001 +/- 8.965E-002	2.795E+003 +/- 3.739E+001
10/3/2016 11:02:32 AM	3	46.19 +/- 1.97E+000	1.645E+001 +/- 2.872E+000	6.066E-001 +/- 1.062E-001	2.712E+003 +/- 3.683E+001
10/3/2016 11:04:41 AM	4	48.19 +/- 2.05E+000	1.445E+001 +/- 2.693E+000	5.107E-001 +/- 9.541E-002	2.829E+003 +/- 3.762E+001
10/3/2016 11:06:51 AM	5	47.33 +/- 2.02E+000	1.995E+001 +/- 3.162E+000	7.179E-001 +/- 1.142E-001	2.779E+003 +/- 3.728E+001
10/3/2016 11:09:07 AM	6	47.10 +/- 2.01E+000	1.245E+001 +/- 2.500E+000	4.502E-001 +/- 9.061E-002	2.765E+003 +/- 3.719E+001
10/3/2016 11:11:13 AM	7	49.31 +/- 2.10E+000	1.795E+001 +/- 3.000E+000	6.200E-001 +/- 1.040E-001	2.895E+003 +/- 3.805E+001
10/3/2016 11:13:22 AM	8	47.86 +/- 2.04E+000	1.295E+001 +/- 2.550E+000	4.608E-001 +/- 9.095E-002	2.810E+003 +/- 3.749E+001
10/3/2016 11:15:32 AM	9	47.18 +/- 2.01E+000	1.495E+001 +/- 2.739E+000	5.397E-001 +/- 9.914E-002	2.770E+003 +/- 3.722E+001
10/3/2016 11:17:39 AM	10	47.76 +/- 2.03E+000	1.895E+001 +/- 3.082E+000	6.758E-001 +/- 1.103E-001	2.804E+003 +/- 3.745E+001

Batch Name: Batch_18829 **Count Date:** 10/3/2016 10:58:14 AM

Procedure: Official Efficiency **Preset Count Time:** 120

Calibration: Gross Alpha Beta **Count Mode:** Simultaneous

Decay Mode: Alpha

Calculated Efficiency (%)

DetectorName	Avg. Efficiency (%)	Count Rate (cpm)	Avg. Spillover (%)
D1	3.5177E+001 +/- 4.7043E-001	4.8542E+003 +/- 6.4917E+001	2.0189E+001 +/- 6.8815E-001

Assay Date	Iteration	Efficiency (%)	Alpha Count Rate (cpm)	Spillover	Beta Count Rate (cpm)
10/3/2016 10:58:08 AM	1	34.46 +/- 1.09E+000	4.755E+003 +/- 4.876E+001	2.040E+001 +/- 5.084E-001	9.699E+002 +/- 2.203E+001
10/3/2016 11:00:22 AM	2	36.02 +/- 1.14E+000	4.970E+003 +/- 4.985E+001	1.910E+001 +/- 4.786E-001	9.494E+002 +/- 2.180E+001
10/3/2016 11:02:32 AM	3	34.92 +/- 1.10E+000	4.819E+003 +/- 4.909E+001	2.039E+001 +/- 5.049E-001	9.824E+002 +/- 2.218E+001
10/3/2016 11:04:42 AM	4	35.39 +/- 1.12E+000	4.883E+003 +/- 4.941E+001	2.008E+001 +/- 4.971E-001	9.804E+002 +/- 2.215E+001
10/3/2016 11:06:52 AM	5	34.69 +/- 1.10E+000	4.787E+003 +/- 4.893E+001	2.131E+001 +/- 5.199E-001	1.020E+003 +/- 2.260E+001
10/3/2016 11:09:00 AM	6	35.50 +/- 1.12E+000	4.898E+003 +/- 4.949E+001	2.018E+001 +/- 4.977E-001	9.884E+002 +/- 2.224E+001
10/3/2016 11:11:06 AM	7	35.53 +/- 1.12E+000	4.902E+003 +/- 4.951E+001	1.991E+001 +/- 4.936E-001	9.759E+002 +/- 2.210E+001
10/3/2016 11:13:13 AM	8	34.86 +/- 1.10E+000	4.811E+003 +/- 4.905E+001	2.047E+001 +/- 5.065E-001	9.849E+002 +/- 2.220E+001
10/3/2016 11:15:23 AM	9	34.98 +/- 1.11E+000	4.827E+003 +/- 4.913E+001	2.089E+001 +/- 5.117E-001	1.008E+003 +/- 2.247E+001
10/3/2016 11:17:32 AM	10	35.42 +/- 1.12E+000	4.888E+003 +/- 4.944E+001	1.916E+001 +/- 4.835E-001	9.364E+002 +/- 2.165E+001

Calculated Efficiency (%)

DetectorName	Avg. Efficiency (%)	Count Rate (cpm)	Avg. Spillover (%)
D2	3.5261E+001 +/- 2.6873E-001	5.2890E+003 +/- 4.0307E+001	1.8330E+001 +/- 4.5082E-001

Assay Date	Iteration	Efficiency (%)	Alpha Count Rate (cpm)	Spillover	Beta Count Rate (cpm)
10/3/2016 10:58:08 AM	1	35.00 +/- 1.10E+000	5.250E+003 +/- 5.123E+001	1.793E+001 +/- 4.490E-001	9.413E+002 +/- 2.171E+001
10/3/2016 11:00:23 AM	2	35.39 +/- 1.11E+000	5.308E+003 +/- 5.152E+001	1.790E+001 +/- 4.462E-001	9.503E+002 +/- 2.181E+001
10/3/2016 11:02:33 AM	3	35.31 +/- 1.11E+000	5.296E+003 +/- 5.146E+001	1.861E+001 +/- 4.568E-001	9.858E+002 +/- 2.222E+001
10/3/2016 11:04:43 AM	4	35.51 +/- 1.12E+000	5.326E+003 +/- 5.160E+001	1.797E+001 +/- 4.463E-001	9.568E+002 +/- 2.189E+001
10/3/2016 11:06:53 AM	5	35.17 +/- 1.11E+000	5.275E+003 +/- 5.136E+001	1.819E+001 +/- 4.517E-001	9.598E+002 +/- 2.192E+001
10/3/2016 11:09:00 AM	6	35.52 +/- 1.12E+000	5.328E+003 +/- 5.162E+001	1.815E+001 +/- 4.489E-001	9.673E+002 +/- 2.201E+001
10/3/2016 11:11:06 AM	7	35.51 +/- 1.12E+000	5.327E+003 +/- 5.161E+001	1.853E+001 +/- 4.543E-001	9.873E+002 +/- 2.223E+001
10/3/2016 11:13:14 AM	8	34.97 +/- 1.10E+000	5.245E+003 +/- 5.121E+001	1.940E+001 +/- 4.702E-001	1.018E+003 +/- 2.257E+001
10/3/2016 11:15:23 AM	9	35.45 +/- 1.12E+000	5.318E+003 +/- 5.157E+001	1.842E+001 +/- 4.530E-001	9.793E+002 +/- 2.214E+001
10/3/2016 11:17:33 AM	10	34.77 +/- 1.10E+000	5.215E+003 +/- 5.107E+001	1.818E+001 +/- 4.541E-001	9.483E+002 +/- 2.179E+001

Calculated Efficiency (%)

DetectorName	Avg. Efficiency (%)	Count Rate (cpm)	Avg. Spillover (%)
D3	3.5948E+001 +/- 4.6992E-001	5.6077E+003 +/- 7.3305E+001	1.7607E+001 +/- 4.0911E-001

Assay Date	Iteration	Efficiency (%)	Alpha Count Rate (cpm)	Spillover	Beta Count Rate (cpm)
10/3/2016 10:58:08 AM	1	35.46 +/- 1.11E+000	5.532E+003 +/- 5.259E+001	1.843E+001 +/- 4.443E-001	1.020E+003 +/- 2.259E+001
10/3/2016 11:00:23 AM	2	35.58 +/- 1.12E+000	5.550E+003 +/- 5.268E+001	1.790E+001 +/- 4.362E-001	9.935E+002 +/- 2.230E+001
10/3/2016 11:02:33 AM	3	36.30 +/- 1.14E+000	5.662E+003 +/- 5.321E+001	1.780E+001 +/- 4.305E-001	1.008E+003 +/- 2.246E+001
10/3/2016 11:04:43 AM	4	36.37 +/- 1.14E+000	5.674E+003 +/- 5.326E+001	1.746E+001 +/- 4.253E-001	9.905E+002 +/- 2.227E+001
10/3/2016 11:06:53 AM	5	35.29 +/- 1.11E+000	5.504E+003 +/- 5.246E+001	1.782E+001 +/- 4.369E-001	9.810E+002 +/- 2.216E+001
10/3/2016 11:09:01 AM	6	36.33 +/- 1.14E+000	5.668E+003 +/- 5.324E+001	1.737E+001 +/- 4.243E-001	9.845E+002 +/- 2.220E+001
10/3/2016 11:11:16 AM	7	35.74 +/- 1.12E+000	5.574E+003 +/- 5.279E+001	1.770E+001 +/- 4.324E-001	9.865E+002 +/- 2.222E+001
10/3/2016 11:13:24 AM	8	36.74 +/- 1.15E+000	5.731E+003 +/- 5.353E+001	1.704E+001 +/- 4.173E-001	9.765E+002 +/- 2.211E+001
10/3/2016 11:15:44 AM	9	35.96 +/- 1.13E+000	5.609E+003 +/- 5.296E+001	1.715E+001 +/- 4.234E-001	9.620E+002 +/- 2.194E+001
10/3/2016 11:17:51 AM	10	35.72 +/- 1.12E+000	5.571E+003 +/- 5.278E+001	1.740E+001 +/- 4.284E-001	9.695E+002 +/- 2.203E+001

Calculated Efficiency (%)

DetectorName	Avg. Efficiency (%)	Count Rate (cpm)	Avg. Spillover (%)
D4	3.7034E+001 +/- 3.6500E-001	7.2728E+003 +/- 7.1679E+001	1.6763E+001 +/- 2.1340E-001

Assay Date	Iteration	Efficiency (%)	Alpha Count Rate (cpm)	Spillover	Beta Count Rate (cpm)
10/3/2016 10:58:08 AM	1	36.67 +/- 6.36E-001	7.202E+003 +/- 6.001E+001	1.677E+001 +/- 3.689E-001	1.208E+003 +/- 2.459E+001
10/3/2016 11:00:24 AM	2	37.67 +/- 6.51E-001	7.397E+003 +/- 6.082E+001	1.690E+001 +/- 3.656E-001	1.250E+003 +/- 2.502E+001
10/3/2016 11:02:34 AM	3	37.49 +/- 6.48E-001	7.361E+003 +/- 6.067E+001	1.649E+001 +/- 3.614E-001	1.214E+003 +/- 2.465E+001
10/3/2016 11:04:44 AM	4	36.99 +/- 6.41E-001	7.263E+003 +/- 6.026E+001	1.695E+001 +/- 3.696E-001	1.231E+003 +/- 2.482E+001
10/3/2016 11:06:54 AM	5	36.85 +/- 6.38E-001	7.236E+003 +/- 6.015E+001	1.649E+001 +/- 3.644E-001	1.193E+003 +/- 2.443E+001
10/3/2016 11:09:01 AM	6	37.12 +/- 6.42E-001	7.289E+003 +/- 6.037E+001	1.713E+001 +/- 3.712E-001	1.249E+003 +/- 2.500E+001
10/3/2016 11:11:16 AM	7	36.90 +/- 6.39E-001	7.245E+003 +/- 6.019E+001	1.683E+001 +/- 3.685E-001	1.219E+003 +/- 2.470E+001
10/3/2016 11:13:25 AM	8	37.29 +/- 6.45E-001	7.322E+003 +/- 6.051E+001	1.673E+001 +/- 3.653E-001	1.225E+003 +/- 2.476E+001
10/3/2016 11:15:45 AM	9	36.91 +/- 6.39E-001	7.248E+003 +/- 6.020E+001	1.680E+001 +/- 3.681E-001	1.218E+003 +/- 2.469E+001
10/3/2016 11:17:52 AM	10	36.47 +/- 6.33E-001	7.162E+003 +/- 5.984E+001	1.652E+001 +/- 3.668E-001	1.183E+003 +/- 2.434E+001

Project No. _____

Confidential Book No. _____ TITLE 909 Pb 210 # 16

From Page No. ____

#	Sample	Volume	Spike	Tare Wt	Final W
1	MB (digest Blk)	100ml		0.0081	0.0111
2	LCS			0.0087	0.0127
3	UTS-4			0.0086	0.0123
4	S1611422-003			0.0087	0.0111
5	-003D			0.0088	0.0123
6	-008			0.0086	0.0120
7	-008D			0.0085	0.0110
8	-008D			0.0086	0.0113
9	-013			0.0081	0.0119
10	-014			0.0080	0.0113
11	-015			0.0076	0.0109
12	-019			0.0078	0.0123
13	-020			0.0084	0.0149
14	-021			0.0082	0.0130
15	-026			0.0087	0.0127
16	-027			0.0084	0.0132
17	-028			0.0087	0.0128
18	-031			0.0080	0.0115
19	-032			0.0083	0.0112
20	-034			0.0084	0.0131
21	-037			0.0083	0.0128
22	-043			0.0078	0.0127

- Drop 12/13/2016
- SOI 12/15/2016 @ 12:50

- Reagents

Conc HNO3 - C688521
Glacial Acetic - C582143
Pb Carrier - RAD 8-2-12
Ba Carrier - RAD 8-1-4
Bi Carrier - RAD 8-1-3
Pb LCS - RAD Std 16-4

1.5 Sodium Chromate - RAD 8-2-10
Conc HCl - C584046
6M Amm Hydroxide - RAD 8-2-7
Sulfide Std Stock - WET 2-16-6
1.5M HCl RAD 8-2-13
6M HCl RAD 8-2-9

1.5M Amm Carbonate RAD 8
Sodium Nitrite RAD 8-2-8
Ethanol C 6627002-00RE200-6
0.45 mm filters RF04081
Glass filters 974653

To Page No

Witnessed & Understood by me, | Date | Invented by: | Date

Recorded by:

S1611422002

Project No. _____

TITLE 909 Pb210 #17 Book No. _____ Confid

From Page No. ____

#	Sample	Volume	Spike	Tare Wt	Final W
1	MB (Digest Blk)	100mL		0.0085	0.0106
2	LCS			0.0085	0.0104
3	UTB-4			0.0086	0.0116
4	S1611422-044			0.0085	0.0107
5	-044D			0.0089	0.0106
6	-045			0.0089	0.0123
7	-045D			0.0087	0.0124
8	-045D			0.0088	0.0128
9	-046			0.0087	0.0107
10	-047			0.0087	0.0115
11	-049			0.0086	0.0105
12	-050			0.0087	0.0116
13	-051			0.0086	0.0113
14	-060			0.0088	0.0129
15	-067			0.0085	0.0115
16	-071			0.0087	0.0129
17	-074			0.0083	0.0109
18	-078			0.0086	0.0120
19	-079			0.0086	0.0121
20	-081			0.0082	0.0145

• Drop 12/19/2016
• SOT 12/20/2016 @ 13:20

• Reagents
Conc HNO_3 C688821
Glacial Acetic C582143
Pb Carrier RAD 8-2-12
Ba Carrier RAD 8-1-4
Bi Carrier RAD 8-1-3
Pb LCS RAD Std 16-4

1.5 Sodium Chromate RAD 8-2-10
Conc HCl C584046
6m Amm Hydrox RAD 8-2-7
Sulfide Std Stock WET 2-24-1
1.5m HCl RAD 8-2-13
6m HCl RAD 8-2-13
1.5m Amm Carbonate RAD 8-2-14

Sodium Nitri
Ethanol ORE
0.45 um filters
Glass filters 9

To Page No

Witnessed & Understood by me, Date

Invented by: S1611422002 Date

Recorded by:

Apex-Alpha/Beta™

CANBERRA

Plateau Report

Plateau: Plateau 1137

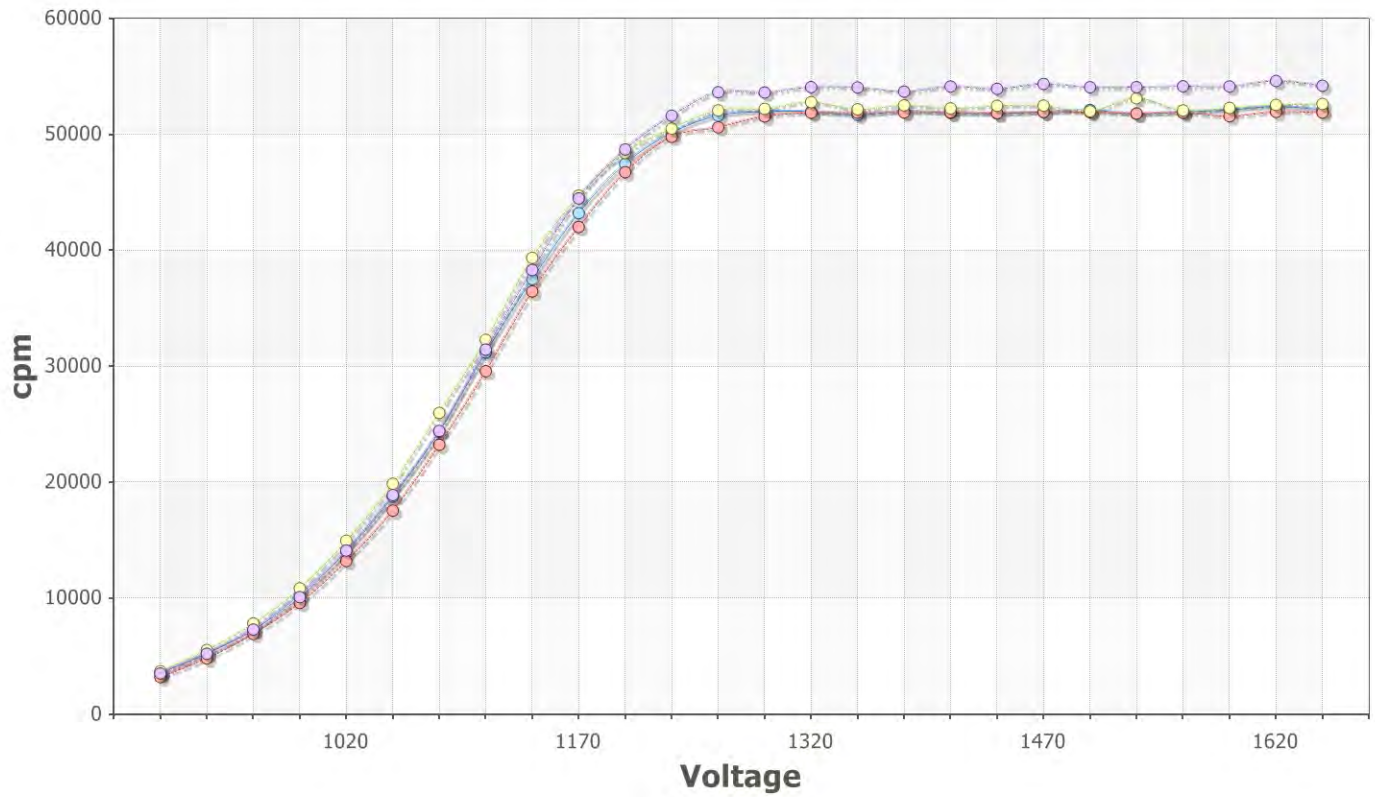
Plateau Date: 9/29/2016 9:28:24 AM

Decay Mode: Beta

Drawer: Drawer_B

Device: LB4110AB

Operating Voltage: 1320



	B1		B2		B3		B4		Voltage
Iteration	cpm	Slope (%)	cpm	Slope (%)	cpm	Slope (%)	cpm	Slope (%)	
1	3555		3188		3697		3510		900
2	5254		4801		5528		5209		930
3	7254	119.3	6917	119.6	7818	118.7	7297	119.1	960
4	1.031E+04	109.1	9591	110.5	1.085E+04	110.1	1.009E+04	113	990
5	1.401E+04	101.4	1.321E+04	102.5	1.496E+04	101.1	1.411E+04	101.7	1020
6	1.875E+04	92.58	1.755E+04	94.94	1.987E+04	90.39	1.889E+04	93.55	1050
7	2.434E+04	81.44	2.323E+04	83.98	2.598E+04	78.52	2.442E+04	83.18	1080
8	3.119E+04	66.36	2.958E+04	70.04	3.228E+04	65.12	3.144E+04	68.97	1110
9	3.752E+04	51.76	3.646E+04	54.34	3.935E+04	48.52	3.831E+04	53.6	1140
10	4.321E+04	36.89	4.201E+04	40.23	4.472E+04	33.92	4.448E+04	38.02	1170
11	4.746E+04	24.66	4.674E+04	25.73	4.839E+04	21.52	4.87E+04	25.87	1200
12	5.012E+04	14.41	4.979E+04	15.36	5.051E+04	12.31	5.161E+04	14.99	1230
13	5.162E+04	7.009	5.061E+04	7.918	5.207E+04	6.708	5.364E+04	7.931	1260
14	5.196E+04	2.226	5.155E+04	3.504	5.221E+04	2.575	5.361E+04	3.308	1290
15	5.197E+04	0.3277	5.187E+04	1.862	5.278E+04	0.5292	5.408E+04	0.3298	1320
16	5.168E+04	-0.12	5.187E+04	0.4736	5.217E+04	-0.1265	5.405E+04	0.404	1350
17	5.202E+04	-0.1089	5.19E+04	-0.01285	5.251E+04	-0.3517	5.369E+04	-0.1304	1380
18	5.185E+04	0.18	5.19E+04	0.05652	5.224E+04	0.3764	5.414E+04	0.5197	1410
19	5.181E+04	0.1589	5.184E+04	0.03729	5.247E+04	-0.4987	5.393E+04	0.5965	1440
20	5.193E+04	0.09629	5.194E+04	-0.07829	5.248E+04	0.8098	5.435E+04	0.00552	1470

	B1		B2		B3		B4		Voltage
Iteration	cpm	Slope (%)	cpm	Slope (%)	cpm	Slope (%)	cpm	Slope (%)	
21	5.21E+04	0.0819	5.191E+04	-0.06358	5.199E+04	-0.1109	5.407E+04	0.09556	1500
22	5.178E+04	0.141	5.181E+04	-0.5122	5.312E+04	-0.2033	5.407E+04	-0.2158	1530
23	5.195E+04	0.6154	5.186E+04	-0.1144	5.206E+04	0.1729	5.415E+04	0.7067	1560
24	5.211E+04	0.7477	5.157E+04	0.1416	5.229E+04	-0.3175	5.414E+04	0.4372	1590
25	5.241E+04		5.194E+04		5.254E+04		5.461E+04		1620
26	5.213E+04		5.188E+04		5.263E+04		5.42E+04		1650

Apex-Alpha/Beta™

CANBERRA

Plateau Report

Plateau: Plateau 1140

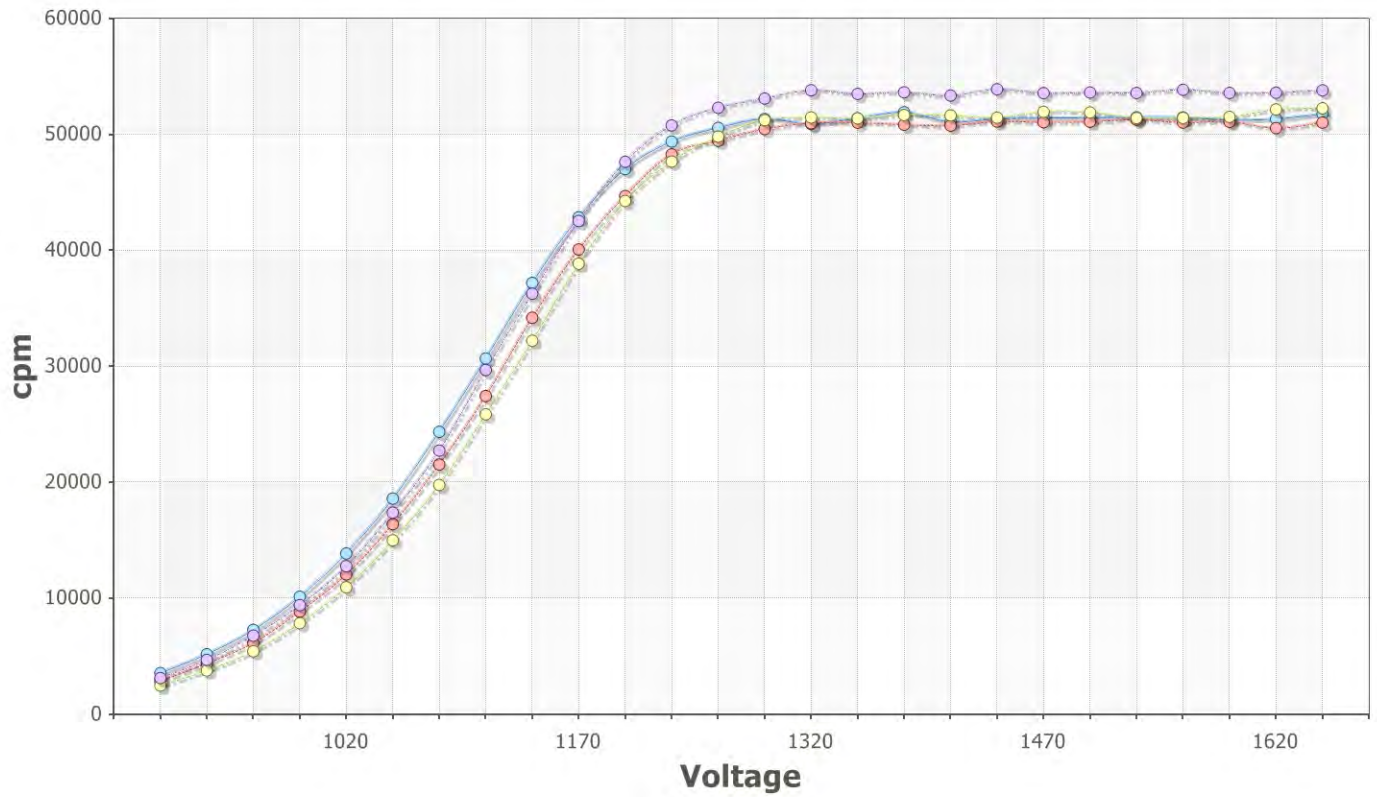
Plateau Date: 9/29/2016 9:34:39 AM

Decay Mode: Beta

Drawer: Drawer_C

Device: LB4110CD

Operating Voltage: 1350



	C1		C2		C3		C4		Voltage
Iteration	cpm	Slope (%)	cpm	Slope (%)	cpm	Slope (%)	cpm	Slope (%)	
1	3542		2863		2468		3109		900
2	5169		4361		3764		4676		930
3	7259	117.5	6148	124	5424	129.2	6767	118.3	960
4	1.013E+04	110	8848	112.9	7841	118.9	9401	111.3	990
5	1.386E+04	102.6	1.205E+04	105.9	1.094E+04	109.2	1.276E+04	104.2	1020
6	1.859E+04	92.48	1.639E+04	94.86	1.499E+04	99.74	1.738E+04	96.96	1050
7	2.435E+04	80.43	2.153E+04	85.65	1.977E+04	90.02	2.273E+04	86.97	1080
8	3.067E+04	66.69	2.743E+04	72.94	2.586E+04	77.54	2.969E+04	71.69	1110
9	3.719E+04	51.54	3.419E+04	57.49	3.22E+04	64.15	3.626E+04	57.61	1140
10	4.285E+04	36.75	4.008E+04	43.41	3.885E+04	47.76	4.253E+04	41.98	1170
11	4.701E+04	23.6	4.469E+04	28.88	4.426E+04	33.16	4.764E+04	28.21	1200
12	4.938E+04	13.84	4.828E+04	17.63	4.766E+04	21.2	5.078E+04	16.92	1230
13	5.056E+04	6.416	4.944E+04	9.925	4.981E+04	12.03	5.229E+04	9.341	1260
14	5.133E+04	2.82	5.046E+04	4.617	5.123E+04	5.922	5.309E+04	4.36	1290
15	5.091E+04	1.794	5.096E+04	2.187	5.146E+04	2.511	5.381E+04	1.906	1320
16	5.138E+04	0.338	5.101E+04	0.3136	5.138E+04	0.6676	5.349E+04	0.2131	1350
17	5.191E+04	0.3648	5.084E+04	0.03475	5.167E+04	0.1374	5.363E+04	0.02051	1380
18	5.109E+04	-0.3399	5.076E+04	0.2246	5.164E+04	0.579	5.335E+04	0.2512	1410
19	5.134E+04	-0.3987	5.111E+04	0.5243	5.144E+04	0.4866	5.389E+04	0.1082	1440
20	5.141E+04	0.5654	5.105E+04	0.6562	5.194E+04	0.001283	5.356E+04	0.1039	1470

	C1		C2		C3		C4		Voltage
Iteration	cpm	Slope (%)	cpm	Slope (%)	cpm	Slope (%)	cpm	Slope (%)	
21	5.144E+04	0.1989	5.11E+04	0.02609	5.189E+04	-0.3732	5.361E+04	-0.0516	1500
22	5.147E+04	-0.1962	5.127E+04	0.003251	5.141E+04	-0.8649	5.357E+04	0.1643	1530
23	5.146E+04	-0.2889	5.102E+04	-0.8415	5.142E+04	0.4032	5.385E+04	-0.02352	1560
24	5.125E+04	0.2881	5.109E+04	-0.6388	5.151E+04	1.559	5.358E+04	0.1238	1590
25	5.133E+04		5.054E+04		5.215E+04		5.359E+04		1620
26	5.176E+04		5.102E+04		5.225E+04		5.38E+04		1650

Apex-Alpha/Beta™

CANBERRA

Plateau Report

Plateau: Plateau 1142

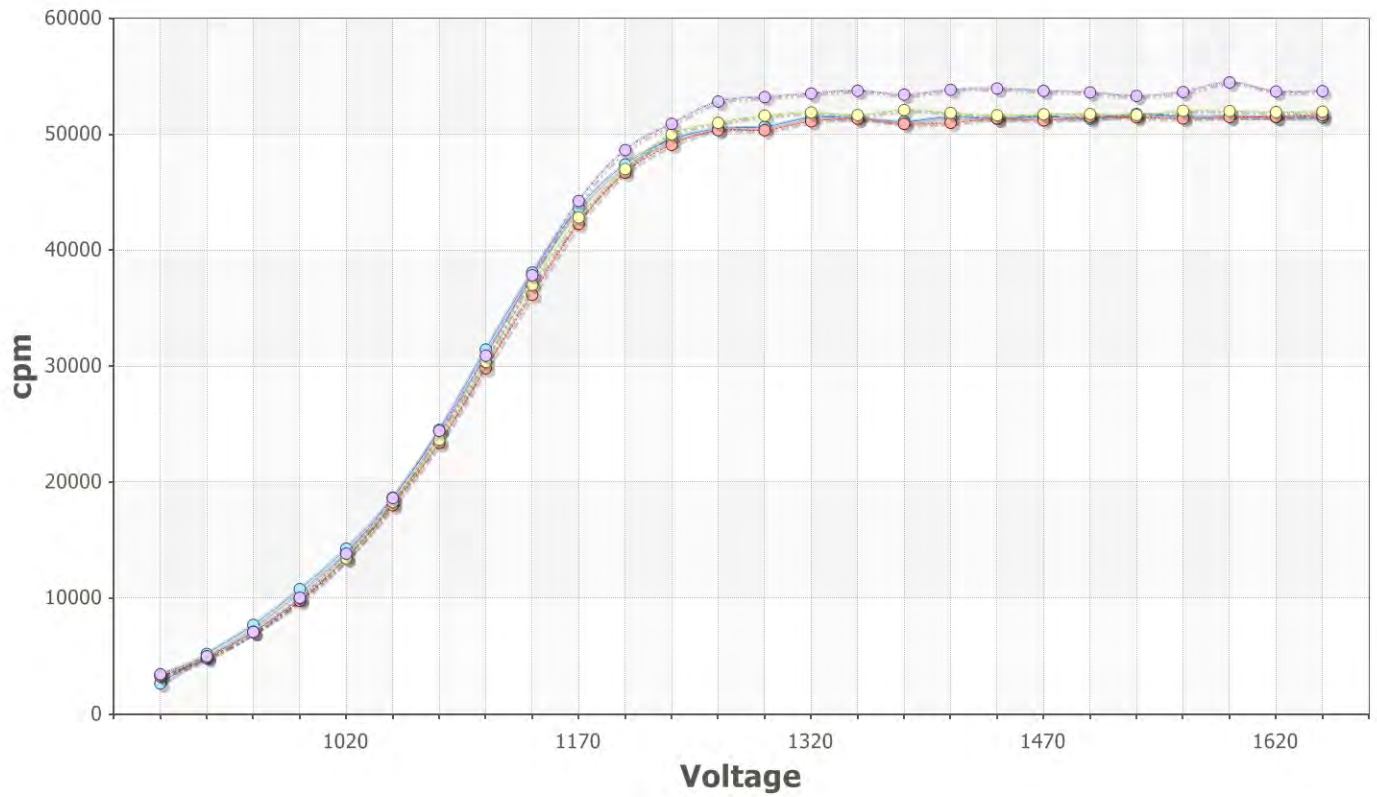
Plateau Date: 9/29/2016 9:36:36 AM

Decay Mode: Beta

Drawer: Drawer_D

Device: LB4110CD

Operating Voltage: 1320



	D1		D2		D3		D4		Voltage
Iteration	cpm	Slope (%)	cpm	Slope (%)	cpm	Slope (%)	cpm	Slope (%)	
1	2638		3250		3418		3434		900
2	5195		4802		4951		4989		930
3	7693	125.1	7094	119.2	7096	117.8	7089	121.6	960
4	1.078E+04	103.6	9762	111.9	9987	110.1	1.004E+04	113	990
5	1.428E+04	97	1.345E+04	101.2	1.344E+04	102.8	1.384E+04	104.2	1020
6	1.867E+04	92.12	1.801E+04	92.68	1.828E+04	93.03	1.864E+04	93.61	1050
7	2.452E+04	82.11	2.339E+04	81.62	2.368E+04	83.44	2.443E+04	82.28	1080
8	3.145E+04	67.39	2.983E+04	68.54	3.037E+04	68.55	3.091E+04	69.73	1110
9	3.808E+04	50.76	3.617E+04	54.44	3.702E+04	53.23	3.786E+04	54.39	1140
10	4.367E+04	34.72	4.228E+04	38.69	4.283E+04	38.33	4.426E+04	38.26	1170
11	4.741E+04	21.56	4.67E+04	25.13	4.701E+04	24.91	4.864E+04	25.09	1200
12	4.954E+04	11.48	4.91E+04	13.46	5E+04	14.38	5.092E+04	14.49	1230
13	5.048E+04	6.057	5.037E+04	6.692	5.1E+04	7.444	5.283E+04	7.615	1260
14	5.067E+04	3.088	5.036E+04	3.489	5.163E+04	2.73	5.322E+04	4.001	1290
15	5.143E+04	1.298	5.113E+04	1.365	5.189E+04	1.441	5.352E+04	1.08	1320
16	5.141E+04	0.865	5.136E+04	0.6932	5.167E+04	0.4309	5.377E+04	0.7161	1350
17	5.111E+04	-0.03848	5.092E+04	0.09558	5.21E+04	-0.1862	5.343E+04	0.5902	1380
18	5.149E+04	0.3334	5.1E+04	0.1111	5.186E+04	-0.2076	5.385E+04	0.3101	1410
19	5.136E+04	0.3459	5.138E+04	0.9084	5.166E+04	-0.515	5.396E+04	0.1755	1440
20	5.154E+04	0.3415	5.121E+04	0.6997	5.173E+04	-0.1656	5.375E+04	-0.8657	1470

	D1		D2		D3		D4		Voltage
Iteration	cpm	Slope (%)	cpm	Slope (%)	cpm	Slope (%)	cpm	Slope (%)	
21	5.136E+04	0.383	5.151E+04	0.1663	5.176E+04	0.4521	5.362E+04	-0.6441	1500
22	5.176E+04	0.1513	5.147E+04	0.2875	5.167E+04	0.5457	5.332E+04	0.9265	1530
23	5.155E+04	0.03815	5.137E+04	0.02985	5.204E+04	0.4279	5.366E+04	0.8182	1560
24	5.156E+04	-0.4254	5.15E+04	0.3268	5.202E+04	0.3044	5.448E+04	0.5366	1590
25	5.148E+04		5.152E+04		5.192E+04		5.37E+04		1620
26	5.146E+04		5.165E+04		5.197E+04		5.374E+04		1650

Sample Na	Sample Or	Sample An	Residual M	Alpha Cou	Beta Coun	Guard Cou	Assay Date	Live Time (
MB-16	1	1000 mL	0.003	46	360	159961	1/12/2017	240
LCS-16	2	1000 mL	0.004	102	1160	159962	1/12/2017	240
UTS-4	3	1000 mL	0.0037	357	5080	159968	1/12/2017	240
S1611422-(	4	1000 mL	0.0024	66	488	159966	1/12/2017	240
S1611422-(	5	1000 mL	0.0035	67	406	165655	1/12/2017	240
S1611422-(	6	1000 mL	0.0034	36	342	165652	1/12/2017	240
S1611422-(	7	1000 mL	0.0025	61	886	165657	1/12/2017	240
S1611422-(	8	1000 mL	0.0027	64	919	165655	1/12/2017	240
S1611422-(	9	1000 mL	0.0038	58	642	168392	1/12/2017	240
S1611422-(	10	1000 mL	0.0033	69	385	168388	1/12/2017	240
S1611422-(	11	1000 mL	0.0033	66	403	168384	1/12/2017	240
S1611422-(	12	1000 mL	0.0045	61	422	168384	1/12/2017	240
S1611422-(	13	1000 mL	0.0065	38	445	159726	1/12/2017	240
S1611422-(	14	1000 mL	0.0048	33	409	159721	1/12/2017	240
S1611422-(	15	1000 mL	0.004	42	433	159731	1/12/2017	240
S1611422-(	16	1000 mL	0.0048	67	462	159736	1/12/2017	240
S1611422-(	17	1000 mL	0.0041	47	404	165540	1/12/2017	240
S1611422-(	18	1000 mL	0.0035	23	294	165539	1/12/2017	240
S1611422-(	19	1000 mL	0.0029	25	338	165544	1/12/2017	240
S1611422-(	20	1000 mL	0.0047	23	367	165543	1/12/2017	240
S1611422-(	21	1000 mL	0.0045	88	412	168221	1/12/2017	240
S1611422-(	22	1000 mL	0.0049	63	433	168220	1/12/2017	240

Gross Alph	Gross Beta Count Rate (CPM)
0.1917	1.5
0.425	4.833
1.488	21.17
0.275	2.033
0.2792	1.692
0.15	1.425
0.2542	3.692
0.2667	3.829
0.2417	2.675
0.2875	1.604
0.275	1.679
0.2542	1.758
0.1583	1.854
0.1375	1.704
0.175	1.804
0.2792	1.925
0.1958	1.683
0.09583	1.225
0.1042	1.408
0.09583	1.529
0.3667	1.717
0.2625	1.804

Sample Na	Sample Or	Sample An	Residual M	Alpha Cou	Beta Coun	Guard Cou	Assay Date	Live Time (
MB-17	1	1000 mL	0.0021	46	366	156726	1/16/2017	240
LCS-17	2	1000 mL	0.0019	65	696	156727	1/16/2017	240
UTS-4	3	1000 mL	0.003	215	4538	156726	1/16/2017	240
S1611422-(	4	1000 mL	0.0022	56	448	156726	1/16/2017	240
S1611422-(	5	1000 mL	0.0017	32	341	162916	1/16/2017	240
S1611422-(	6	1000 mL	0.0034	34	330	162912	1/16/2017	240
S1611422-(	7	1000 mL	0.0037	54	1032	162908	1/16/2017	240
S1611422-(	8	1000 mL	0.004	65	1074	162911	1/16/2017	240
S1611422-(	9	1000 mL	0.002	26	331	165407	1/16/2017	240
S1611422-(	10	1000 mL	0.0028	34	404	165412	1/16/2017	240
S1611422-(	11	1000 mL	0.0019	38	308	165414	1/16/2017	240
S1611422-(	12	1000 mL	0.0029	31	335	165408	1/16/2017	240
S1611422-(	13	1000 mL	0.0027	52	457	156202	1/16/2017	240
S1611422-(	14	1000 mL	0.0041	37	411	156205	1/16/2017	240
S1611422-(	15	1000 mL	0.003	46	399	156207	1/16/2017	240
S1611422-(	16	1000 mL	0.0042	40	447	156201	1/16/2017	240
S1611422-(	17	1000 mL	0.0026	29	320	161688	1/16/2017	240
S1611422-(	18	1000 mL	0.0034	32	373	161693	1/16/2017	240
S1611422-(	19	1000 mL	0.0035	50	485	161686	1/16/2017	240
S1611422-(	20	1000 mL	0.0063	42	434	161685	1/16/2017	240

Gross Alph	Gross Beta Count Rate (CPM)
0.1917	1.525
0.2708	2.9
0.8958	18.91
0.2333	1.867
0.1333	1.421
0.1417	1.375
0.225	4.3
0.2708	4.475
0.1083	1.379
0.1417	1.683
0.1583	1.283
0.1292	1.396
0.2167	1.904
0.1542	1.713
0.1917	1.663
0.1667	1.863
0.1208	1.333
0.1333	1.554
0.2083	2.021
0.175	1.808

Inter-Mountain Labs
Sheridan, WY and Gillette, WY

- CHAIN OF CUSTODY RECORD -

All shaded fields must be completed.
This is a legal document; any misrepresentation may be construed as fraud.

#WEB

Client Name	Project Identification	Sampler (Signature/Attestation of Authenticity)	Telephone #
Environmental Restoration Group (ERG)	Midnite Mine Remedial Action	Randy Whicker	970-556-1174

Report Address
8809 Washington St. NE, Suite 150
Albuquerque, NM 87113

Contact Name
Randy Whicker
Email randywhicker@ergoffice.com
Phone 970-556-1174

Invoice Address
Same as report address

Purchase Order #

Quote # 1265

ANALYSES / PARAMETERS

ITEM	LAB ID (Lab Use Only)	DATE SAMPLED	TIME SAMPLED	SAMPLE IDENTIFICATION	Matrix	# of Containers	Ra-226 (901.1)	U-nat (3050/6020)	Pb-210 (3050/909.0						REMARKS
1	S1611422-001	11/16/16	hrs	P1R1-1-0015-SOI-DIS-01	SL	1	x								Instructions Attached*
2	002	11/16/16	hrs	P1R1-2-0015-SOI-DIS-01	SL	1	x								Instructions Attached*
3	003	11/16/16	hrs	P1R1-3-0015-SOI-DIS-01	SL	1	x	x	x						Instructions Attached*
4	004	11/16/16	hrs	P1R1-4-0015-SOI-DIS-01	SL	1	x								Instructions Attached*
5	005	11/16/16	hrs	P1R1-5-0015-SOI-DIS-01	SL	1	x								Instructions Attached*
6	006	11/16/16	hrs	P1R1-6-0015-SOI-DIS-01	SL	1	x								Instructions Attached*
7	007	11/16/16	hrs	P1R1-7-0015-SOI-DIS-01	SL	1	x								Instructions Attached*
8	.008	11/16/16	hrs	P1R1-8-0015-SOI-DIS-01	SL	1	x	x	x						Instructions Attached*
9	.009	11/16/16	hrs	P1R1-9-0015-SOI-DIS-01	SL	1	x								Instructions Attached*
10	010	11/16/16	hrs	P1R1-10-0015-SOI-DIS-01	SL	1	x								Instructions Attached*
11	011	11/16/16	hrs	P1R1-11-0015-SOI-DIS-01	SL	1	x								Instructions Attached*
12	012	11/16/16	hrs	P1R1-12-0015-SOI-DIS-01	SL	1	x								Instructions Attached*
13	013	11/16/16	hrs	P1R1-13-0015-SOI-DIS-01	SL	1	x	x	x						Instructions Attached*
14	014	11/16/16	hrs	P1R1-14-0015-SOI-DIS-01	SL	1	x	x	x						Instructions Attached*

LAB COMMENTS	Relinquished By (Signature/Printed)	DATE	TIME	Received By (Signature/Printed)	DATE	TIME
10.8°	[signature] (Randy Whicker)	11-17-16	1300	[signature]	11/23/16	12:20

SHIPPING INFO	MATRIX CODES		TURN AROUND TIMES	COMPLIANCE INFORMATION		ADDITIONAL REMARKS
☐ UPS	Water	WT	Check desired service	Compliance Monitoring ?	N	*Note Attached letter with special instructions
☐ FedEx	Soil	SL	☒ Standard turnaround	Program (SDWA, NPDES,...)	N	
☐ USPS	Solid	SD	☐ RUSH - 5 Working Days	PWSID / Permit # N		
☐ Hand Carried	Filter	FT	☐ URGENT - < 2 Working Days	Chlorinated?	N	
☐ Other	Other	OT	*Rush & Urgent Surcharges will be applied*	Sample Disposal: Lab x	Client	

Inter-Mountain Labs
Sheridan, WY and Gillette, WY

- CHAIN OF CUSTODY RECORD -

All shaded fields must be completed.
This is a legal document; any misrepresentation may be construed as fraud.

#WEB

Client Name	Project Identification	Sampler (Signature/Attestation of Authenticity)	Telephone #
Environmental Restoration Group (ERG)	Midnite Mine Remedial Action	Randy Whicker	970-556-1174

Report Address
8809 Washington St. NE, Suite 150
Albuquerque, NM 87113

Contact Name
Randy Whicker
Email randywhicker@ergoffice.com
Phone 970-556-1174

Invoice Address
Same as report address

Purchase Order #

Quote # 1265

ITEM	LAB ID (Lab Use Only)	DATE SAMPLED	TIME SAMPLED	SAMPLE IDENTIFICATION	Matrix	# of Containers	Ra-226 (901.1)	U-nat (3050/6020)	Pb-210 (3050/909.0						REMARKS
1	S1611422 015	11/16/16	hrs	P1R1-15-0015-SOI-DIS-01	SL	1	x	x	x						Instructions Attached*
2	016	11/16/16	hrs	P1R1-16-0015-SOI-DIS-01	SL	1	x								Instructions Attached*
3	017	11/16/16	hrs	P1R1-17-0015-SOI-DIS-01	SL	1	x								Instructions Attached*
4	018	11/16/16	hrs	P1R1-18-0015-SOI-DIS-01	SL	1	x								Instructions Attached*
5	019	11/16/16	hrs	P1R1-19-0015-SOI-DIS-01	SL	1	x	x	x						Instructions Attached*
6	020	11/17/16	hrs	P1R1-20-0015-SOI-DIS-01	SL	1	x	x	x						Instructions Attached*
7	021	11/17/16	hrs	P1R1-20-0015-SOI-DIS-02	SL	1	x	x	x						Instructions Attached*
8	022	11/17/16	hrs	P1R1-21-0015-SOI-DIS-01	SL	1	x								Instructions Attached*
9	023	11/17/16	hrs	P1R1-22-0015-SOI-DIS-01	SL	1	x								Instructions Attached*
10	024	11/17/16	hrs	P1R1-23-0015-SOI-DIS-01	SL	1	x								Instructions Attached*
11	025	11/17/16	hrs	P1R1-24-0015-SOI-DIS-01	SL	1	x								Instructions Attached*
12	026	11/17/16	hrs	P1R1-25-0015-SOI-DIS-01	SL	1	x	x	x						Instructions Attached*
13	027	11/17/16	hrs	P1R1-26-0015-SOI-DIS-01	SL	1	x	x	x						Instructions Attached*
14	028	11/17/16	hrs	P1R1-27-0015-SOI-DIS-01	SL	1	x	x	x						Instructions Attached*

LAB COMMENTS	Relinquished By (Signature/Printed)	DATE	TIME	Received By (Signature/Printed)	DATE	TIME
10.8°	Randy Whicker	11-18-16	1300	[illegible]	11/23/16	12:21

SHIPPING INFO	MATRIX CODES		TURN AROUND TIMES	COMPLIANCE INFORMATION		ADDITIONAL REMARKS
☐ UPS	Water	WT	Check desired service	Compliance Monitoring ?	N	*Note Attached letter with special instructions
☐ FedEx	Soil	SL	☒ Standard turnaround	Program (SDWA, NPDES,...)	N	
☐ USPS	Solid	SD	☐ RUSH - 5 Working Days	PWSID / Permit #	N	
☐ Hand Carried	Filter	FT	☐ URGENT - < 2 Working Days	Chlorinated?	N	
☐ Other	Other	OT	*Rush & Urgent Surcharges will be applied*	Sample Disposal: Lab x	Client	

Inter-Mountain Labs
Sheridan, WY and Gillette, WY

- CHAIN OF CUSTODY RECORD -

All shaded fields must be completed.
This is a legal document; any misrepresentation may be construed as fraud.

#WEB

Client Name	Project Identification	Sampler (Signature/Attestation of Authenticity)	Telephone #
Environmental Restoration Group (ERG)	Midnite Mine Remedial Action	Randy Whicker	970-556-1174

Report Address	Contact Name
8809 Washington St. NE, Suite 150 Albuquerque, NM 87113	Randy Whicker Email randywhicker@ergoffice.com Phone 970-556-1174

Invoice Address	Purchase Order #	Quote #
Same as report address		1265

ANALYSES / PARAMETERS

ITEM	LAB ID (Lab Use Only)	DATE SAMPLED	TIME SAMPLED	SAMPLE IDENTIFICATION	Matrix	# of Containers	Ra-226 (901.1)	U-nat (3050/6020)	Pb-210 (3050/909.0						REMARKS
1	S1611422 029	11/17/16	hrs	P1R1-28-0015-SOI-DIS-01	SL	1	x								Instructions Attached*
2	030	11/17/16	hrs	P1R1-29-0015-SOI-DIS-01	SL	1	x								Instructions Attached*
3	031	11/16/16	hrs	P1R1-30-0015-SOI-DIS-01	SL	1	x	x	x						Instructions Attached*
4	032	11/16/16	hrs	P1R1-30-0015-SOI-DIS-02	SL	1	x	x	x						Instructions Attached*
5	033	11/17/16	hrs	P1R1-31-0015-SOI-DIS-01	SL	1	x								Instructions Attached*
6	034	11/17/16	hrs	P1R1-32-0015-SOI-DIS-01	SL	1	x	x	x						Instructions Attached*
7	035	11/16/16	hrs	P1R1-33-0015-SOI-DIS-01	SL	1	x								Instructions Attached*
8	036	11/16/16	hrs	P1R1-34-0015-SOI-DIS-01	SL	1	x								Instructions Attached*
9	037	11/16/16	hrs	P1R1-35-0015-SOI-DIS-01	SL	1	x	x	x						Instructions Attached*
10	038	11/17/16	hrs	P1R1-36-0015-SOI-DIS-01	SL	1	x								Instructions Attached*
11	039	11/16/16	hrs	P1R1-37-0015-SOI-DIS-01	SL	1	x								Instructions Attached*
12	040	11/16/16	hrs	P1R1-38-0015-SOI-DIS-01	SL	1	x								Instructions Attached*
13	041	11/16/16	hrs	P1R1-39-0015-SOI-DIS-01	SL	1	x								Instructions Attached*
14	042	11/16/16	hrs	P1R1-40-0015-SOI-DIS-01	SL	1	x								Instructions Attached*

LAB COMMENTS	Relinquished By (Signature/Printed)	DATE	TIME	Received By (Signature/Printed)	DATE	TIME
10.8°	Randy Whicker (Randy Whicker)	11-17-16	1300	[signature]	11/23/16	12:21

SHIPPING INFO	MATRIX CODES		TURN AROUND TIMES	COMPLIANCE INFORMATION		ADDITIONAL REMARKS
☐ UPS	Water	WT	Check desired service	Compliance Monitoring ?	N	*Note Attached letter with special instructions
☐ FedEx	Soil	SL	☒ Standard turnaround	Program (SDWA, NPDES,...)	N	
☐ USPS	Solid	SD	☐ RUSH - 5 Working Days	PWSID / Permit # N		
☐ Hand Carried	Filter	FT	☐ URGENT - < 2 Working Days	Chlorinated?	N	
☐ Other	Other	OT	*Rush & Urgent Surcharges will be applied*	Sample Disposal: Lab x	Client	

Inter-Mountain Labs
Sheridan, WY and Gillette, WY

- CHAIN OF CUSTODY RECORD -

All shaded fields must be completed.
This is a legal document; any misrepresentation may be construed as fraud.

#WEB

Client Name	Project Identification	Sampler (Signature/Attestation of Authenticity)	Telephone #
Environmental Restoration Group (ERG)	Midnite Mine Remedial Action	Randy Whicker	970-556-1174

Report Address	Contact Name
8809 Washington St. NE, Suite 150 Albuquerque, NM 87113	Randy Whicker Email randywhicker@ergoffice.com Phone 970-556-1174

Invoice Address	Purchase Order #	Quote #
Same as report address		1265

ANALYSES / PARAMETERS

ITEM	LAB ID (Lab Use Only)	DATE SAMPLED	TIME SAMPLED	SAMPLE IDENTIFICATION	Matrix	# of Containers	Ra-226 (901.1)	U-nat (3050/6020)	Pb-210 (3050/909.0						REMARKS
1	S1611422-043	11/16/16	hrs	P1R1-41-0015-SOI-DIS-01	SL	1	x	x	x						Instructions Attached*
2	044	11/16/16	hrs	P1R1-42-0015-SOI-DIS-01	SL	1	x	x	x						Instructions Attached*
3	045	11/16/16	hrs	P1R1-43-0015-SOI-DIS-01	SL	1	x	x	x						Instructions Attached*
4	046	11/16/16	hrs	P1R1-43-0015-SOI-DIS-02	SL	1	x	x	x						Instructions Attached*
5	047	11/16/16	hrs	P1R1-44-0015-SOI-DIS-01	SL	1	x	x	x						Instructions Attached*
6	048	11/16/16	hrs	P1R1-45-0015-SOI-DIS-01	SL	1	x								Instructions Attached*
7	049	11/16/16	hrs	P1R1-46-0015-SOI-DIS-01	SL	1	x	x	x						Instructions Attached*
8	050	11/16/16	hrs	P1R1-46-0015-SOI-DIS-02	SL	1	x	x	x						Instructions Attached*
9	051	11/16/16	hrs	P1R1-47-0015-SOI-DIS-01	SL	1	x	x	x						Instructions Attached*
10	052	11/16/16	hrs	P1R1-48-0015-SOI-DIS-01	SL	1	x								Instructions Attached*
11	053	11/17/16	hrs	P1R1-49-0015-SOI-DIS-01	SL	1	x								Instructions Attached*
12	054	11/17/16	hrs	P1R1-50-0015-SOI-DIS-01	SL	1	x								Instructions Attached*
13	055	11/17/16	hrs	P1R1-51-0015-SOI-DIS-01	SL	1	x								Instructions Attached*
14	056	11/17/16	hrs	P1R1-52-0015-SOI-DIS-01	SL	1	x								Instructions Attached*

LAB COMMENTS	Relinquished By (Signature/Printed)	DATE	TIME	Received By (Signature/Printed)	DATE	TIME
10.8°	Randy Whicker (Randy Whicker)	11-17-16	1300	[signature]	11/23/16	12:21

SHIPPING INFO	MATRIX CODES		TURN AROUND TIMES	COMPLIANCE INFORMATION		ADDITIONAL REMARKS
☐ UPS	Water	WT	Check desired service	Compliance Monitoring ?	N	*Note Attached letter with special instructions
☐ FedEx	Soil	SL	☒ Standard turnaround	Program (SDWA, NPDES,...)	N	
☐ USPS	Solid	SD	☐ RUSH - 5 Working Days	PWSID / Permit # N		
☐ Hand Carried	Filter	FT	☐ URGENT - < 2 Working Days	Chlorinated?	N	
☐ Other	Other	OT	*Rush & Urgent Surcharges will be applied*	Sample Disposal: Lab x	Client	

Inter-Mountain Labs
Sheridan, WY and Gillette, WY

- CHAIN OF CUSTODY RECORD -

All shaded fields must be completed.
This is a legal document; any misrepresentation may be construed as fraud.

#WEB

Client Name	Project Identification	Sampler (Signature/Attestation of Authenticity)	Telephone #
Environmental Restoration Group (ERG)	Midnite Mine Remedial Action	Randy Whicker	970-556-1174

Report Address	Contact Name
8809 Washington St. NE, Suite 150 Albuquerque, NM 87113	Randy Whicker Email randywhicker@ergoffice.com Phone 970-556-1174

Invoice Address	Purchase Order #	Quote #
Same as report address		1265

ANALYSES / PARAMETERS

ITEM	LAB ID (Lab Use Only)	DATE SAMPLED	TIME SAMPLED	SAMPLE IDENTIFICATION	Matrix	# of Containers	Ra-226 (901.1)	U-nat (3050/6020)	Pb-210 (3050/909.0						REMARKS
1	S1611422 057	11/17/16	hrs	P1R1-53-0015-SOI-DIS-01	SL	1	x								Instructions Attached*
2	058	11/17/16	hrs	P1R1-54-0015-SOI-DIS-01	SL	1	x								Instructions Attached*
3	059	11/17/16	hrs	P1R1-55-0015-SOI-DIS-01	SL	1	x								Instructions Attached*
4	060	11/17/16	hrs	P1R1-56-0015-SOI-DIS-01	SL	1	x	x	x						Instructions Attached*
5	061	11/17/16	hrs	P1R1-57-0015-SOI-DIS-01	SL	1	x								Instructions Attached*
6	062	11/17/16	hrs	P1R1-58-0015-SOI-DIS-01	SL	1	x								Instructions Attached*
7	63 ~~062~~	11/17/16	hrs	P1R1-59-0015-SOI-DIS-01	SL	1	x								Instructions Attached*
8	64 ~~063~~	11/17/16	hrs	P1R1-60-0015-SOI-DIS-01	SL	1	x								Instructions Attached*
9	65 ~~064~~	11/17/16	hrs	P1R1-61-0015-SOI-DIS-01	SL	1	x								Instructions Attached*
10	66 ~~065~~	11/17/16	hrs	P1R1-62-0015-SOI-DIS-01	SL	1	x								Instructions Attached*
11	67 ~~066~~	11/17/16	hrs	P1R1-63-0015-SOI-DIS-01	SL	1	x	x	x						Instructions Attached*
12	68 ~~067~~	11/17/16	hrs	P1R1-64-0015-SOI-DIS-01	SL	1	x								Instructions Attached*
13	69 ~~068~~	11/17/16	hrs	P1R1-65-0015-SOI-DIS-01	SL	1	x								Instructions Attached*
14	70 ~~069~~	11/17/16	hrs	P1R1-66-0015-SOI-DIS-01	SL	1	x								Instructions Attached*

LAB COMMENTS	Relinquished By (Signature/Printed)	DATE	TIME	Received By (Signature/Printed)	DATE	TIME
10.80 KB 11.28.16	[signature] (Randy Whicker)	11/17/16	1300	[signature]	11/23/16	12:21

SHIPPING INFO	MATRIX CODES		TURN AROUND TIMES	COMPLIANCE INFORMATION		ADDITIONAL REMARKS
☐ UPS	Water	WT	Check desired service	Compliance Monitoring ?	N	*Note Attached letter with special instructions
☐ FedEx	Soil	SL	☒ Standard turnaround	Program (SDWA, NPDES,...)	N	
☐ USPS	Solid	SD	☐ RUSH - 5 Working Days	PWSID / Permit # N		
☐ Hand Carried	Filter	FT	☐ URGENT - < 2 Working Days	Chlorinated?	N	
☐ Other	Other	OT	*Rush & Urgent Surcharges will be applied*	Sample Disposal: Lab x	Client	

Inter-Mountain Labs
Sheridan, WY and Gillette, WY

- CHAIN OF CUSTODY RECORD -

All shaded fields must be completed.
This is a legal document; any misrepresentation may be construed as fraud.

#WEB

Client Name	Project Identification	Sampler (Signature/Attestation of Authenticity)	Telephone #
Environmental Restoration Group (ERG)	Midnite Mine Remedial Action	Randy Whicker	970-556-1174

Report Address
8809 Washington St. NE, Suite 150
Albuquerque, NM 87113

Contact Name
Randy Whicker
Email randywhicker@ergoffice.com
Phone 970-556-1174

Invoice Address
Same as report address

Purchase Order #

Quote # 1265

ITEM	LAB ID (Lab Use Only)	DATE SAMPLED	TIME SAMPLED	SAMPLE IDENTIFICATION	Matrix	# of Containers	Ra-226 (901.1)	U-nat (3050/6020)	Pb-210 (3050/909.0						REMARKS
1	S1611422 71 ~~070~~	11/17/16	hrs	P1R1-67-0015-SOI-DIS-01	SL	1	x	x	x						Instructions Attached*
2	72 071	11/17/16	hrs	P1R1-68-0015-SOI-DIS-01	SL	1	x								Instructions Attached*
3	73 ~~072~~	11/17/16	hrs	P1R1-69-0015-SOI-DIS-01	SL	1	x								Instructions Attached*
4	74 ~~073~~	11/17/16	hrs	P1R1-70-0015-SOI-DIS-01	SL	1	x	x	x						Instructions Attached*
5	75 ~~074~~	11/17/16	hrs	P1R1-71-0015-SOI-DIS-01	SL	1	x								Instructions Attached*
6	76 ~~075~~	11/17/16	hrs	P1R1-72-0015-SOI-DIS-01	SL	1	x								Instructions Attached*
7	77 ~~076~~	11/17/16	hrs	P1R1-73-0015-SOI-DIS-01	SL	1	x								Instructions Attached*
8	78 ~~077~~	11/17/16	hrs	P1R1-74-0015-SOI-DIS-01	SL	1	x	x	x						Instructions Attached*
9	79 ~~078~~	11/17/16	hrs	P1R1-75-0015-SOI-DIS-01	SL	1	x	x	x						Instructions Attached*
10	80 079	11/17/16		P1R1-B1-0015-SOI-1	SL	1	X								//
11	81 080	11/17/16		P1R1-B2-0015-SOI-1	SL	1	X	X	X						//
12	82 081	11/17/16		P1R1-B3-0015-SOI-1	SL	1	X								//
13	83 082	11/16/16		P1R1-3-0015-SOI-2	SL	1	X								//
14	KB 11.28.16														

LAB COMMENTS	Relinquished By (Signature/Printed)	DATE	TIME	Received By (Signature/Printed)	DATE	TIME
10.8°	(Randy Whicker)	11/17/16	1300		11/23/16	1:12:21

SHIPPING INFO	MATRIX CODES		TURN AROUND TIMES	COMPLIANCE INFORMATION	ADDITIONAL REMARKS
☐ UPS	Water	WT	Check desired service	Compliance Monitoring ? N	*Note Attached letter with special instructions
☐ FedEx	Soil	SL	☒ Standard turnaround	Program (SDWA, NPDES,...) N	
☐ USPS	Solid	SD	☐ RUSH - 5 Working Days	PWSID / Permit # N	
☐ Hand Carried	Filter	FT	☐ URGENT - < 2 Working Days	Chlorinated? N	
☐ Other	Other	OT	*Rush & Urgent Surcharges will be applied*	Sample Disposal: Lab x Client	

Environmental Restoration Group, Inc.
8809 Washington St NE, Suite 150
Albuquerque, NM 87113
ph: (505) 298-4224
fax: (505) 797-1404
www.ERGoffice.com

To: Tom Patten, Inter-Mountain Labs (IML)	**Date**: November 2, 2016
From: Randy Whicker (ERG)	**Project**: Midnite Mine Remedial Action
Direct: 970-556-1174	**Task(s)**: Analytical Support and Verification
Subject: Final status survey (FSS) samples for West Access Road survey unit P1R1.	

Tom,

Please ensure that the Final Status Survey (FSS) samples in this batch are analyzed in accordance with the methods and detection limits indicated in Table S-5 of the Analytical Support and Verification Plan for Midnite Mine (Appendix S) as reproduced below. Note that these samples have not been processed (dried, sieved or ground) or canned/sealed as has previously been done by ERG for the purposes of onsite NaI-based gamma-spec in ERG's onsite laboratory (the onsite laboratory is not operational at this time). Please process/prepare all samples for analysis in accordance with IML's normal procedures, and also please observe the special considerations determined in recent analytical results for Pb-210 analysis by EPA Method 909.0 (e.g. full ingrowth and longer count times to maximize accuracy and minimize factors that may introduce systemic bias in results and cause problems with data QC metrics such as analyte detection in method blanks).

If you have any questions regarding this information, please feel free to contact me.

Regards,

Randy Whicker, CHP
Senior Health Physicist

Environmental Restoration Group, Inc.
8809 Washington St. NE, Suite 150
Albuquerque, NM 87113
Email: RandyWhicker@ergoffice.com
Phone: 970-556-1174

Table S-5 – Analytical Parameters, Cleanup Levels, Analysis Methods and Detection Limits for Surface Materials

ROD Parameter	Cleanup Level	Proposed Method	Method Detection Limit
Uranium (total)	43 mg/kg	EPA 3050/EPA 6020	0.05 mg/kg
Lead-210	7.5 pCi/g	EPA 3050/EPA 909.0M	0.1 pCi/g
Radium-226	4.7 pCi/g	EPA 901.1 (soil, full Rn ingrowth)	0.4 pCi/g

sn #182115

Survey Meter # Model 2241-2
pH strip lot # HC681919
Thermometer SN# 27130475

INTER-MOUNTAIN LABS

Condition Upon Receipt (Attach to COC)

Sample Receipt

1 Number of ice chests/packages received: 1

*Note as "**OTC**" if samples are received over the counter, unpackaged*

2 Temperature of cooler/samples. *(If more then 8 coolers, please write on back)*

Temps Observed (°C):	10.8							
Temps Corrected (°C):	✓							

***Acceptable is**: **0.1° to 10°C** for Bacteria; and 0.1° to 6°C for most other water parameters. Samples may not have had adequate time to cool following collection. Indicate ROI (Received on Ice) for iced samples received on the same day as sampled, in addition to temperature at receipt.*

Client contact for temperatures outside method criteria must be documented below.

3 Emission rate of samples for radiochemical analyses < 0.5mR/hr? Yes No N/A

4 COC Number (If applicable): WCB 6pgs

5 Do the number of bottles agree with the COC? Yes No N/A

6 Were the samples received intact? *(no broken bottles, leaks, etc.)* Yes No N/A

7 Were the sample custody seals intact? Yes No N/A

8 Is the COC properly completed, legible, and signed? Yes No

Sample Verification, Labeling & Distribution

1 Were all requested analyses understood and appropriate? Yes No

2 Did the bottle labels correspond with the COC information? Yes No

3 Samples collected in proper containers? Yes No

4 Sample Preservation:

pH at Receipt:	Final pH (if added in lab):	Preservative/Lot#	Date/Time Added:
_____ Total Metals	_____ Total Metals	HNO3 _____	_____
_____ Diss Metals	_____ Diss Metals	*Filtered and preserved in metals*	*Filtered and preserved in metals*
_____ Nutrient	_____ Nutrient	H_2SO_4 _____	
_____ Cyanide	_____ Cyanide	NaOH _____	
_____ Sulfide	_____ Sulfide	ZnAcet _____	
_____ Phenol	_____ Phenol	H_2SO_4 _____	
_____ TOC	_____ TOC	HCl _____	

pH of each WY STP (LAUST) sample must be checked and recorded. _____

5 VOA vials have <6mm headspace? Yes No N/A

6 Were all analyses within holding time at the time of receipt? Yes No

7 Have rush or project due dates been checked and accepted? Yes No N/A

8 Do samples require subcontracted analyses? Yes No

If "Yes", which type of subcontracting is required? **General** **Customer-Specified** **Certified**

Sample Receipt, Verification, Login, Labeling & Distribution completed by *(initials)*: KB

Set ID: S1611422

Discrepancy Documentation *(use back of sheet for notes on discrepancies)*

Any items listed above with a response of "No" or do not meet specifications must be resolved.

Person Contacted: _____ Method of Contact: __ Phone: _____

Initiated By: _____ Date/Time: _____ __ Email: _____

Problem:

Resolution:

Report Review Checklist

	Log Review (1/23/16 WN)	Report Review (1/12/17)
COC Review Information on COC matches that on report; spelling accurate.		
1 Original COC attached, signed and dated.	✓	✓
2 Parameters requested.	✓	✓
3 Client.	✓	✓
4 Report recipient/address.	✓	✓
5 Invoice recipient/address.	✓	✓
6 Project.	✓	✓
7 Appropriate PQLs selected.	✓	✓
8 Prices may need to be adjusted prior to invoicing.	Yes or No	✓
9 P. O. number.	NA	✓
10 Sample IDs.	✓	✓
11 Sample dates.	✓	✓
12 Date received.	✓	✓
13 Date due.	NA	✓
14 Matrix.	✓	✓
15 PWSID included for safe drinking water compliance samples.	NA	✓
16 Field data entered appropriately, matches lab data.	NA	✓
17 Special requests indicated in "Comments" section of Work Order summary.	✓	✓

Data Review	WN	1/17/17
1 Automated QC (Check Data button) review performed, discrepancies resolved.		✓
2 Worksheet/instrument data sheet for all requested parameters attached to data packet.		✓
3 Worksheet/instrument data sheet initialed and dated by analyst, indicating review.		✓
4 Worksheet/instrument data compared to report results for calculation, transcription and data entry errors.		✓
5 Analysis date and time.		✓
6 Analytical method.		✓
7 Appropriate units of measure.		✓
8 Analyst's initials.		✓
9 Calculations checked?		✓
10 Subcontracted analyses identified as such with qualifier.		NA
11 Invoice parameters match those on COC.		✓

Final Review	
1 Report appears complete and appropriate.	✓
2 Condition Upon Receipt form completed, attached to packet, and related qualifiers included in report.	✓
3 All necessary qualifiers included in report.	✓
4 Qualifiers referenced in case narrative; which includes descriptions of all sample/analysis anomalies.	✓
5 Anomalies explained in Case Narrative.	✓
6 Copies of report sent to all recipients requested on COC. Hard copies. _____ Emailed copies.	✓
7 All special requests listed on COC honored.	✓
8 Special report format per client request.	✓
9 Report pages signed.	✓

Inter-Mountain Labs
Your Environmental Monitoring Partner
1673 Terra Avenue, Sheridan, Wyoming 82801 ph: (307) 672-8945

Date: 6/19/2017

CLIENT: Dawn Mining Company
Project: Midnite Mine Remedial Action
Lab Order: S1705070

CASE NARRATIVE

Report ID: S1705070002
(Replaces S1705070001)

This report contains:

Case Narrative - 1 page
Sample Analysis Report -2 pages
Analytical QC Summary Report - 1 page
Gamma Spec LIMS Report and Export File - 2 pages
Gamma Spec Ra 226 Spectrum and ROI Data - 20 pages
Gamma Spec Ra 226 Standards Certificates - 17 pages
Gamma Spec Ra 226 ROI Calibration and Blanks - 32 pages
Original COC, Condition Upon Receipt and Supporting Documentation - 5 page

---

Samples P1R1-13(R1)-0015-SOI-DIS-01, and P1R1-13(R2)-0015-SOI-DIS-01 were received on May 3, 2017. .

All samples were received and analyzed within the EPA recommended holding times, except those noted below in this case narrative. Samples were analyzed using the methods outlined in the following references:

U.S.E.P.A. 600 "Methods for Chemical Analysis of Water and Wastes", 1993
"Standard Methods For The Examination of Water and Wastewater", 20th ed., 1998
Test Methods for Evaluating Solid Waste, Physical/Chemical Methods, SW846, 3rd Edition
Methods indicated with the Monday, March 12, 2007 Federal Register, 40 CFR Part 122, 136 et al.
US EPA Methods from Technology Transfer Network Ambient Monitoring Technology Information Center, 2009

In order to compare 28 days ingrowth versus zero days ingrowth of radium 226 daughter products, day zero results analyzed 5/5/17 and shown below:
S1705070-001 (P1R1-13(R1)-0015-SOI-DIS-01) = 1.0 ± 0.2 pCi/g.
S1705070-001 (P1R1-13(R2)-0015-SOI-DIS-01) = 1.8 ± 0.2 pCi/g

All Quality objectives were achieved except as noted below:

Report S1705070002 replaces reportS1705070001.

Page 1 and page 3 of this report were revised on 6/19/17 due to clerical error in the case narrative and sample S1705070-002. The Client Sample ID was changed from P1R1-13(R12)-0015-SOI-DIS-01 to P1R1-13(R2)-0015-SOI-DIS-01 to correspond with the COC.

Reviewed by:
Wade Nieuwsma, Assistant Laboratory Manager

Inter-Mountain Labs
Your Environmental Monitoring Partner
1673 Terra Avenue, Sheridan, Wyoming 82801 ph: (307) 672-8945

Sample Analysis Report

Company: Dawn Mining Company
8809 Washington St. NE Suite 150
Albuquerque, NM 87113

Date Reported 5/30/2017
Report ID S1705070001

ProjectName: Midnite Mine Remedial Action
Lab ID: S1705070-001
ClientSample ID: P1R1-13(R1)-0015-SOI-DIS-01
COC: WEB

WorkOrder: S1705070
CollectionDate: 5/1/2017 1:15:00 PM
DateReceived: 5/3/2017 11:05:00 AM
FieldSampler:
Matrix: Soil

Comments

Analyses	Result	Units	Qual	RL	Method	Date Analyzed/Init	
Radionuclides - Total							
Radium 226	1.1	pCi/g		0.2	EPA 901.1 Mod.	05/26/2017 833	MB
Radium 226 Precision (±)	0.1	pCi/g			EPA 901.1 Mod.	05/26/2017 833	MB

These results apply only to the samples tested.

RL - Reporting Limit

Qualifiers:

B	Analyte detected in the associated Method Blank
E	Value above quantitation range
H	Holding times for preparation or analysis exceeded
L	Analyzed by another laboratory
ND	Not Detected at the Reporting Limit
S	Spike Recovery outside accepted recovery limits
C	Calculated Value
G	Analyzed at IML Gillette laboratory
J	Analyte detected below quantitation limits
M	Value exceeds Monthly Ave or MCL or is less than LCL
O	Outside the Range of Dilutions
X	Matrix Effect

Reviewed by: _____
Wade Nieuwsma, Assistant Laboratory Manager

Sample Analysis Report

Company: Dawn Mining Company
8809 Washington St. NE Suite 150
Albuquerque, NM 87113

Date Reported 6/19/2017
Report ID S1705070002
(Replaces S1705070001)

ProjectName: Midnite Mine Remedial Action
Lab ID: S1705070-002
ClientSample ID: P1R1-13(R2)-0015-SOI-DIS-01
COC: WEB

WorkOrder: S1705070
CollectionDate: 5/1/2017 1:22:00 PM
DateReceived: 5/3/2017 11:05:00 AM
FieldSampler:
Matrix: Soil

Comments

Analyses	Result	Units	Qual	RL	Method	Date Analyzed/Init	
Radionuclides - Total							
Radium 226	2.1	pCi/g		0.2	EPA 901.1 Mod.	05/26/2017 950	MB
Radium 226 Precision (±)	0.2	pCi/g			EPA 901.1 Mod.	05/26/2017 950	MB

These results apply only to the samples tested.

RL - Reporting Limit

Qualifiers:

B	Analyte detected in the associated Method Blank
E	Value above quantitation range
H	Holding times for preparation or analysis exceeded
L	Analyzed by another laboratory
ND	Not Detected at the Reporting Limit
S	Spike Recovery outside accepted recovery limits
C	Calculated Value
G	Analyzed at IML Gillette laboratory
J	Analyte detected below quantitation limits
M	Value exceeds Monthly Ave or MCL or is less than LCL
O	Outside the Range of Dilutions
X	Matrix Effect

Reviewed by:
Wade Nieuwsma, Assistant Laboratory Manager

Inter-Mountain Labs
Your Environmental Monitoring Partner
1673 Terra Avenue, Sheridan, Wyoming 82801 ph: (307) 672-8945

ANALYTICAL QC SUMMARY REPORT

CLIENT: Dawn Mining Company
Work Order: S1705070
Project: Midnite Mine Remedial Action

Date: 5/30/2017
Report ID: S1705070001

Radium By Gamma Spectroscopy in Soil Sample Type **MBLK** Units: pCi/g

MB-13214 (05/26/17 05:58) RunNo: 146168 PrepDate: 05/05/17 8:30 BatchID 13214

Analyte	Result	RL	Spike	Ref Samp	%REC	% Rec Limits	Qual
Radium 226	ND	0.2					

Radium By Gamma Spectroscopy in Soil Sample Type **LCS** Units: pCi/g

LCS-15-3-13214 (05/26/17 07:15) RunNo: 146168 PrepDate: 05/05/17 8:30 BatchID 13214

Analyte	Result	RL	Spike	Ref Samp	%REC	% Rec Limits	Qual
Radium 226	34.3	0.2	37.9		90.4	70 - 130	

ROCKYFLATS-13214 (05/26/17 12:24) RunNo: 146168 PrepDate: 05/05/17 8:30 BatchID 13214

Analyte	Result	RL	Spike	Ref Samp	%REC	% Rec Limits	Qual
Radium 226	1.0	0.2	1.15		84.0	70 - 130	

UTS-4-13214 (05/26/17 13:42) RunNo: 146168 PrepDate: 05/05/17 8:30 BatchID 13214

Analyte	Result	RL	Spike	Ref Samp	%REC	% Rec Limits	Qual
Radium 226	840	0.2	978		85.9	70 - 130	

Radium By Gamma Spectroscopy in Soil Sample Type **DUP** Units: pCi/g

S1705070-002A DUP (05/26/17 11:07) RunNo: 146168 PrepDate: 05/05/17 8:30 BatchID 13214

Analyte	Result	RL	Ref Samp	%RPD	%REC	% RPD Limits	Qual
Radium 226	2.1	0.2	2.1	2.17		30	

Qualifiers:

B	Analyte detected in the associated Method Blank	E	Value above quantitation range
G	Analyzed at IML Gillette laboratory	H	Holding times for preparation or analysis exceeded
J	Analyte detected below quantitation limits	L	Analyzed by another laboratory
ND	Not Detected at the Reporting Limit	O	Outside the Range of Dilutions
R	RPD outside accepted recovery limits	S	Spike Recovery outside accepted recovery limits
X	Matrix Effect		

Radium Analysis by Gamma Spectroscopy

Instrument Batch: 17-26

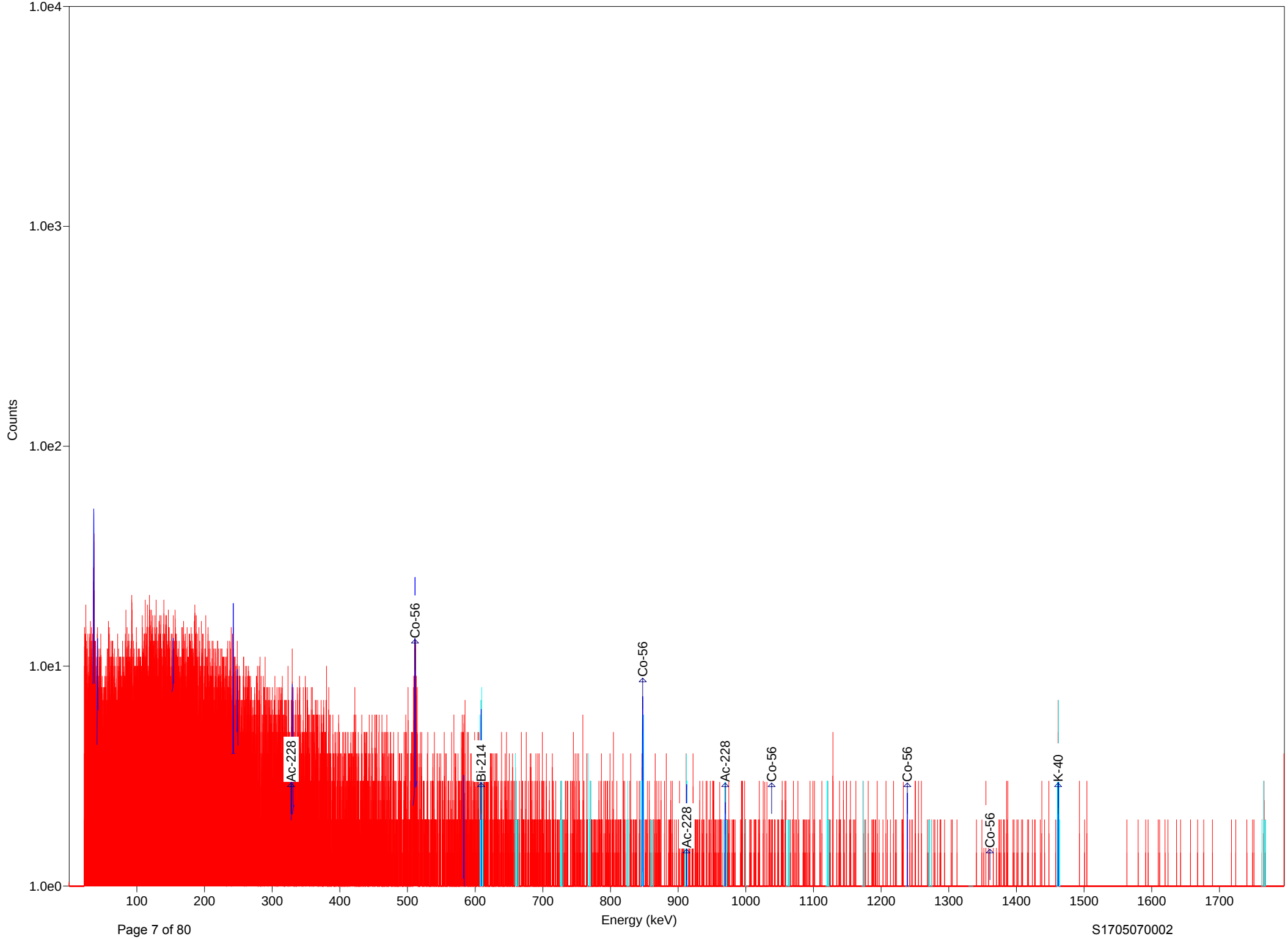
Omega Run 146168

SampID	SampID	SampID	Analyte	Text Rslt	Counts	Error	Time	Result	95% CI	Weight	Samp Type	Prep
MB-13214	5/26/17 5:58	RAD_GAMMA_RA_S	Radium 226		44	9	4500	0.02	0.07	150	MBLK	13214
LCS-13214	5/26/17 7:15	RAD_GAMMA_RA_S	Radium 226		9282	103	4500	34.29	0.75	150.02	LCS	13214
S1705070-001A-2	5/26/17 8:33	RAD_GAMMA_RA_S	Radium 226	1.1 ± 0.1	383	24	4500	1.10	0.15	174.04	SAMP	13214
S1705070-002A-2	5/26/17 9:50	RAD_GAMMA_RA_S	Radium 226	2.1 ± 0.2	604	30	4500	2.05	0.21	153.06	SAMP	13214
S1705070-002A D	5/26/17 11:07	RAD_GAMMA_RA_S	Radium 226		623	31	4500	2.10	0.22	154.81	DUP	13214
ROCKYFLATS-13	5/26/17 12:24	RAD_GAMMA_RA_S	Radium 226		168	16	4500	0.97	0.23	74.21	LCS	13214
UTS-4-13214	5/26/17 13:42	RAD_GAMMA_RA_S	Radium 226		7585	92	4500	839.82	19.97	5	LCS	13214

Reviewed By [signature] 5/30/17

S1705070-002ADUP	DUP	RAD_GAMMA_	5/26/2017 11:07	Radium 226	2.0985	pCi/g		1	0	S1705070-002A	0
LCS-13214	LCS	RAD_GAMMA_	5/26/2017 7:15	Radium 226	34.28524	pCi/g		1	0	LCS-13214	0
MB-13214	MBLK	RAD_GAMMA_	5/26/2017 5:58	Radium 226	1.77E-02	pCi/g		1	0	MB-13214	0
ROCKYFLATS-13214	LCS	RAD_GAMMA_	5/26/2017 12:24	Radium 226	0.965704	pCi/g		1	0	ROCKYFLATS-13	0
S1705070-001A	SAMP	RAD_GAMMA_	5/26/2017 8:33	Radium 226	1.099226	pCi/g	1.1 ± 0.1	1	1	S1705070-001A	0
S1705070-002A	SAMP	RAD_GAMMA_	5/26/2017 9:50	Radium 226	2.053394	pCi/g	2.1 ± 0.2	1	1	S1705070-002A	0
S1705070-002A DUP	DUP	RAD_GAMMA_	5/26/2017 11:07	Radium 226	2.09848	pCi/g		1	0	S1705070-002A	0
UTS-4-13214	LCS	RAD_GAMMA_	5/26/2017 13:42	Radium 226	839.8233	pCi/g		1	0	UTS-4-13214	0

BACKGROUND. Real/Live Time = 4567/4500 (s).

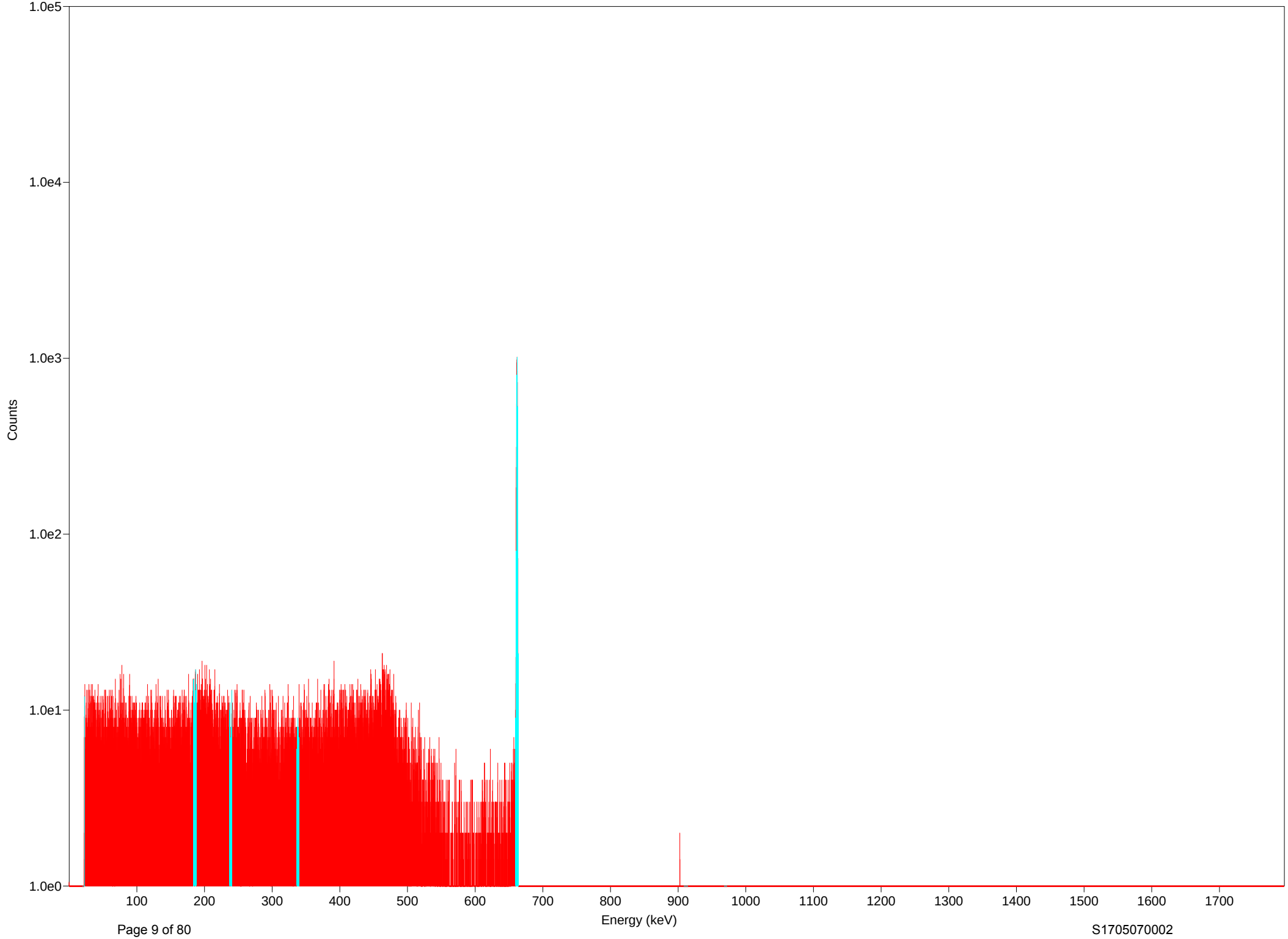


S1705070002

Detector #2 ACQ 26-May-2017 at 15:00:07 RT = 4567.2 LT = 4500.0
Rad Chem 2
BACKGROUND

ROI#	RANGE(keV)		GROSS	NET	+/-	CENTROID	FWHM	FW(1/5)M	LIBRARY (keV)		µCi	+/-
1	606.93	611.75	68	-1	13	609.56	0.25	0.76	Bi-214	609.31	0.0000	0.0000
2	659.29	664.11	35	-15	11	Could not properly fit the peak.						
3	724.58	729.84	34	17	8	726.66	1.71	2.66	Bi-212	727.00	0.0001	0.0000
4	765.77	771.02	33	-9	11	766.64	0.22	0.35	Bi-214	768.36	0.0000	0.0001
5	823.38	828.64	23	-2	8	825.35	0.33	0.53	Co-60	826.28	0.0000	0.0310
6	843.53	848.79	58	25	11	847.23	0.81	1.90	Co-56	846.77	0.0000	0.0000
7	857.99	863.25	24	-5	9	Could not properly fit the peak.						
8	908.38	914.07	25	16	6	911.66	0.29	2.58	Ac-228	911.20	0.0000	0.0000
9	966.21	971.90	29	11	8	969.93	0.22	0.35	Ac-228	968.97	0.0000	0.0000
10	998.19	1003.88	14	5	6	999.28	0.73	1.17	Pa-234M	1001.03	0.0002	0.0003
11	1059.08	1065.21	16	1	7	1063.02	2.52	2.72	No close library match!			
12	1117.34	1123.47	23	13	7	1119.75	1.59	2.58	Bi-214	1120.29	0.0000	0.0000
13	1170.34	1176.47	18	18	4	1172.75	0.71	1.14	Co-60	1173.24	0.0000	0.0000
14	1235.17	1241.30	13	-6	8	Could not properly fit the peak.						
15	1269.55	1276.12	14	-2	7	1274.15	0.33	0.53	No close library match!			
16	1329.34	1335.91	7	2	4	Could not properly fit the peak.						
17	1457.88	1464.45	45	35	8	1461.27	0.49	2.25	K-40	1461.00	0.0002	0.0000
18	1761.13	1768.13	17	6	7	1764.41	1.04	1.20	Bi-214	1764.49	0.0000	0.0000

CS-137 START CAL. Real/Live Time = 266/261 (s).



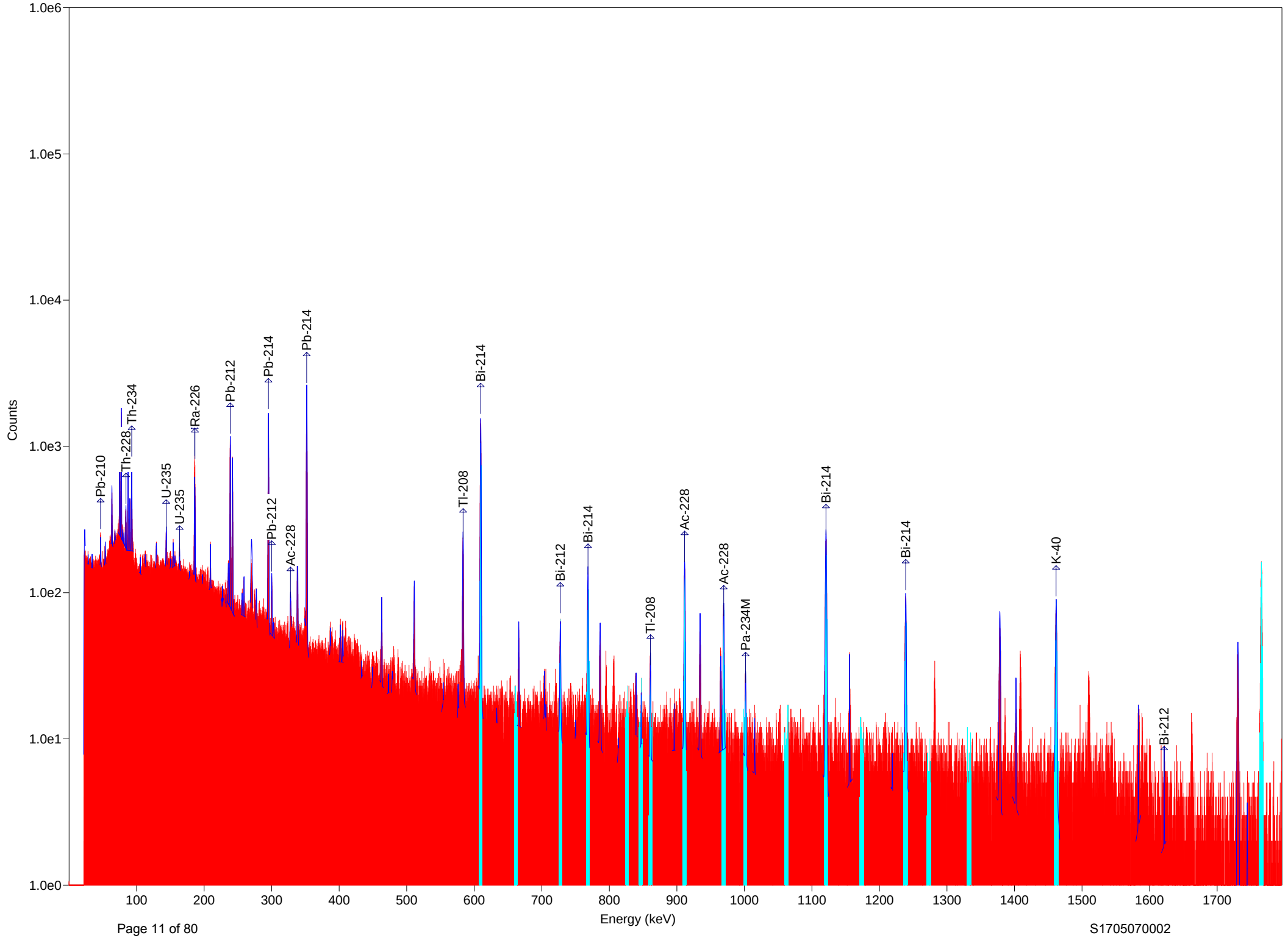
S1705070002

CS-137 START.Rpt

Detector #2 ACQ 26-May-2017 at 5:50:09 RT = 266.8 LT = 261.5
Rad Chem 2
CS-137 START CAL

ROI#	RANGE(keV)		GROSS	NET	+/-	CENTROID	FWHM	FW(1/5)M	LIBRARY (keV)		Bq	+/-
1	20.07	22.92	43	-36	8	Could not properly fit the peak.						
2	183.13	187.95	237	18	25	186.48	0.44	0.98	Ra-226	186.21	28.99	40.26
3	236.17	240.99	167	21	20	240.14	0.28	0.49	Pb-212	238.63	3.31	3.15
4	336.10	339.82	124	-14	16	336.76	0.33	0.53	Ac-228	327.99	0.00	47.05
5	659.51	664.33	6841	6691	84	661.70	1.35	2.09	Cs-137	661.66	1217.01	15.28
6	907.94	913.85	3	-2	3	Could not properly fit the peak.						
7	967.30	971.90	1	1	1	Could not properly fit the peak.						

LCS-15-3-13214. Real/Live Time = 4585/4500 (s).

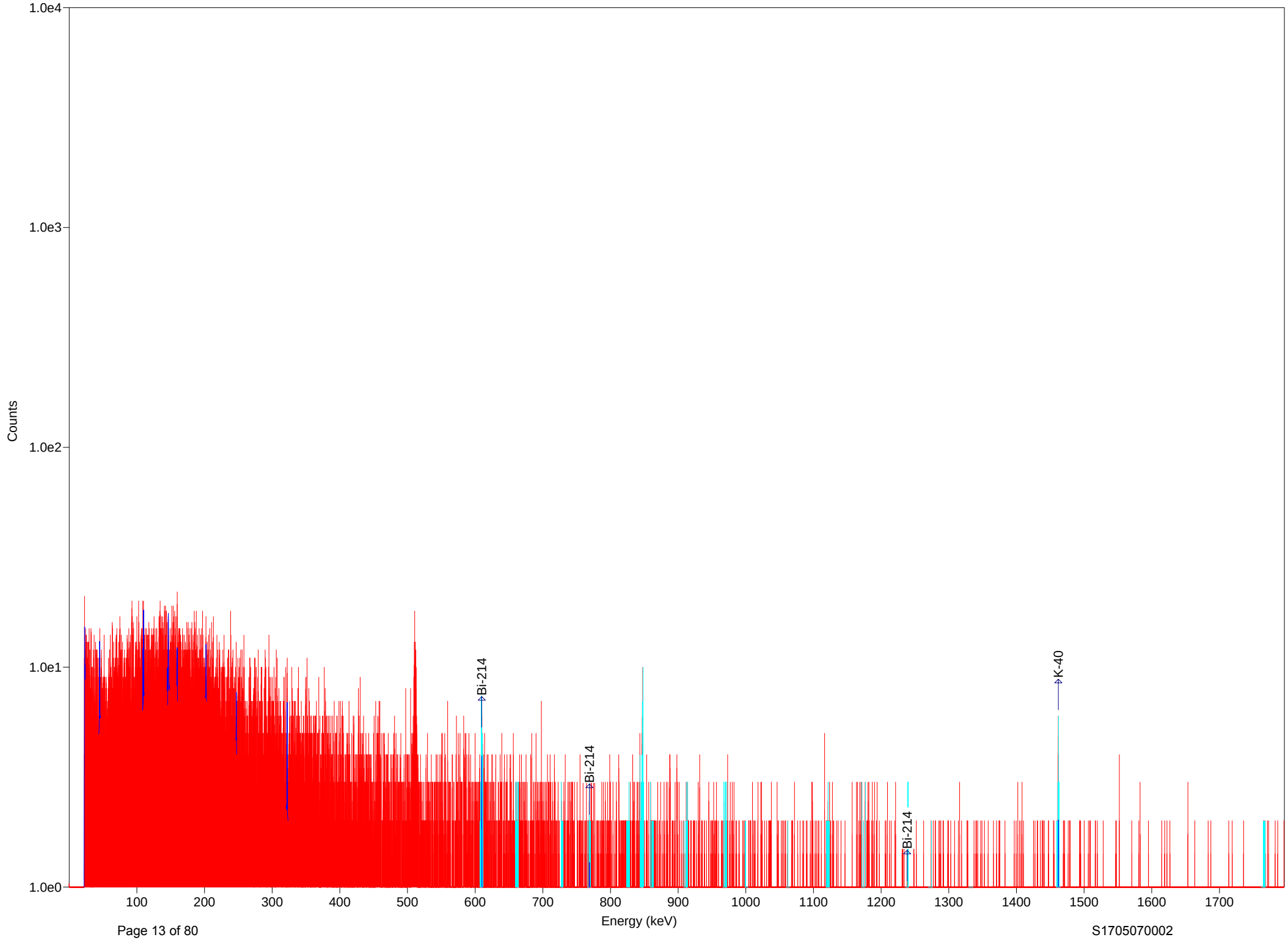


S1705070002

Detector #2 ACQ 26-May-2017 at 7:15:58 RT = 4585.6 LT = 4500.0
Rad Chem 2
LCS-15-3-13214

ROI#	RANGE(keV)		GROSS	NET	+/-	CENTROID	FWHM	FW(1/5)M	LIBRARY	(keV)	µCi	+/-
1	606.93	611.75	9796	9282	103	609.35	1.27	1.99	Bi-214	609.31	0.0047	0.0001
2	659.29	664.11	354	-14	32	659.95	0.22	0.35	Cs-137	661.66	0.0000	0.0000
3	724.58	729.84	638	350	35	727.16	1.53	2.09	Bi-212	727.00	0.0013	0.0001
4	765.77	771.02	1158	745	45	768.44	1.62	2.25	Bi-214	768.36	0.0043	0.0003
5	823.38	828.64	341	53	31	827.12	0.28	0.47	Co-60	826.28	0.2053	0.1201
6	843.53	848.79	318	64	29	847.27	0.44	0.77	Co-56	846.77	0.0000	0.0000
7	857.99	863.25	403	132	31	860.46	1.06	1.83	Tl-208	860.56	0.0003	0.0001
8	908.38	914.07	1338	1045	45	911.26	1.58	2.29	Ac-228	911.20	0.0012	0.0001
9	966.21	971.90	861	568	39	969.05	1.60	2.56	Ac-228	968.97	0.0012	0.0001
10	998.19	1003.88	358	70	32	1001.21	1.13	1.56	Pa-234M	1001.03	0.0029	0.0013
11	1059.08	1065.21	269	-36	33	1063.90	0.25	0.39	No close library match!			
12	1117.34	1123.47	2198	2019	52	1120.48	1.80	2.67	Bi-214	1120.29	0.0053	0.0001
13	1170.34	1176.47	235	-7	30	1171.22	1.12	1.26	Co-60	1173.24	0.0000	0.0000
14	1235.17	1241.30	919	706	39	1238.31	1.82	2.78	Co-56	1238.28	0.0005	0.0000
15	1269.55	1276.12	169	-27	28	1273.06	0.22	0.35	No close library match!			
16	1329.34	1335.91	163	-49	28	1334.37	0.25	0.39	Co-60	1332.50	0.0000	0.0000
17	1457.88	1464.45	898	733	37	1461.00	1.90	2.88	K-40	1461.00	0.0035	0.0002
18	1761.13	1768.13	1654	1566	44	1764.70	2.34	3.25	Bi-214	1764.49	0.0066	0.0002

MB-13214. Real/Live Time = 4567/4500 (s).

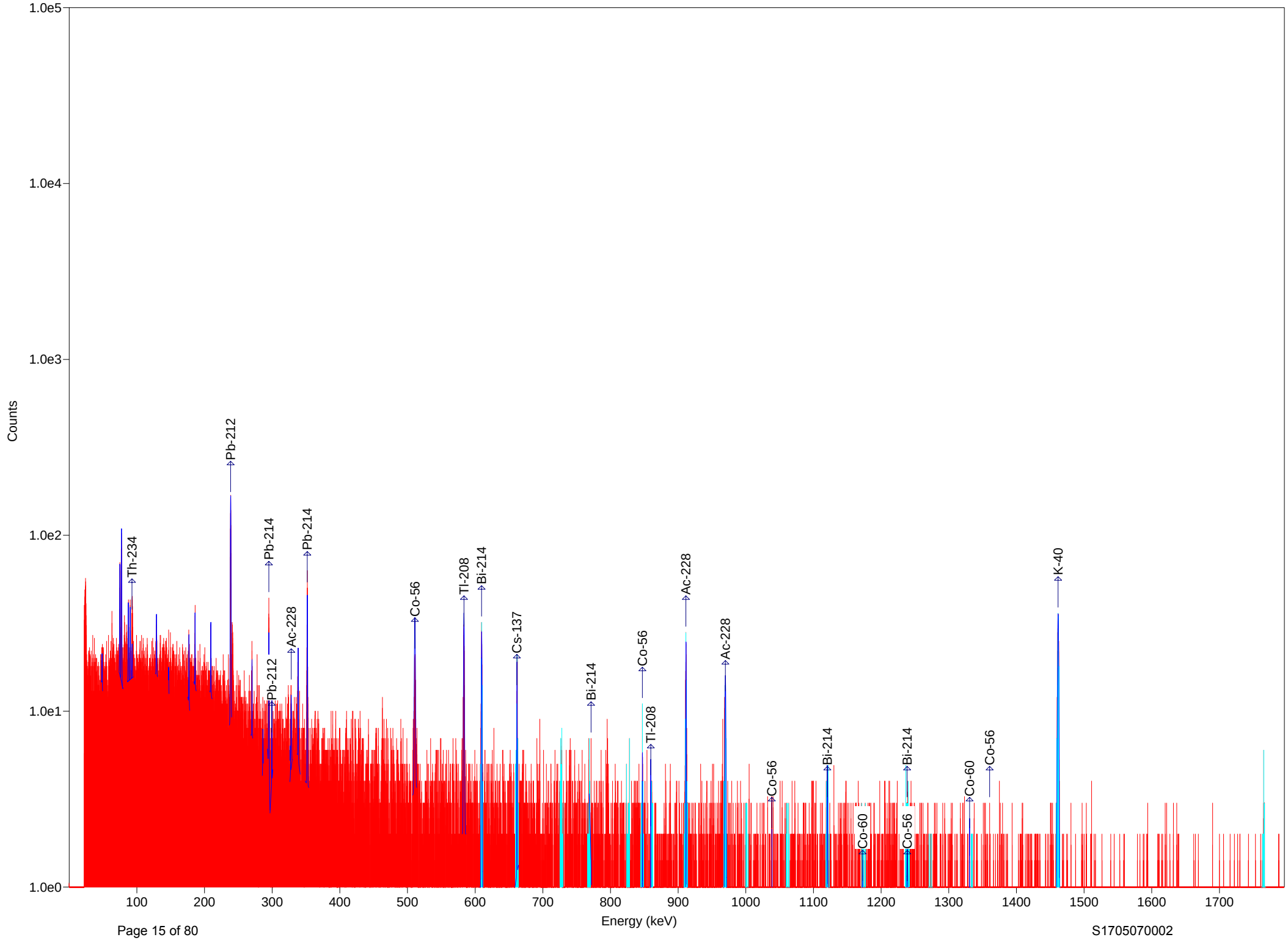


S1705070002

Detector #2 ACQ 26-May-2017 at 5:58:54 RT = 4567.5 LT = 4500.0
Rad Chem 2
MB-13214

ROI#	RANGE(keV)		GROSS	NET	+/-	CENTROID	FWHM	FW(1/5)M	LIBRARY (keV)		µCi	+/-
1	606.93	611.75	59	44	9	608.79	0.40	0.58	Bi-214	609.31	0.0000	0.0000
2	659.29	664.11	39	-15	11	Could not properly fit the peak.						
3	724.58	729.84	20	-1	8	727.21	0.33	0.53	Bi-212	727.00	0.0000	0.0000
4	765.77	771.02	31	-2	10	768.39	0.44	0.70	Bi-214	768.36	0.0000	0.0001
5	823.38	828.64	25	4	8	827.11	0.22	0.35	Co-60	826.28	0.0155	0.0310
6	843.53	848.79	64	14	13	847.50	0.27	0.46	Co-56	846.77	0.0000	0.0000
7	857.99	863.25	29	12	8	858.88	0.59	0.76	Tl-208	860.56	0.0000	0.0000
8	908.38	914.07	30	3	9	911.66	1.97	2.10	Ac-228	911.20	0.0000	0.0000
9	966.21	971.90	27	-5	10	967.08	2.85	2.98	Ac-228	968.97	0.0000	0.0000
10	998.19	1003.88	15	-8	8	Could not properly fit the peak.						
11	1059.08	1065.21	12	12	3	1061.49	0.44	0.92	No close library match!			
12	1117.34	1123.47	33	-1	11	1121.28	0.33	0.53	Bi-214	1120.29	0.0000	0.0000
13	1170.34	1176.47	22	-22	12	1171.22	0.22	0.35	Co-60	1173.24	0.0000	0.0000
14	1235.17	1241.30	16	-8	9	1238.89	0.66	0.79	Co-56	1238.28	0.0000	0.0000
15	1269.55	1276.12	12	7	5	1273.49	0.22	0.35	No close library match!			
16	1329.34	1335.91	12	-9	8	Could not properly fit the peak.						
17	1457.88	1464.45	37	21	9	1461.38	0.59	1.80	K-40	1461.00	0.0001	0.0000
18	1761.13	1768.13	12	6	5	1763.97	3.17	3.37	Bi-214	1764.49	0.0000	0.0000

ROCKYFLATS-13214. Real/Live Time = 4573/4500 (s).

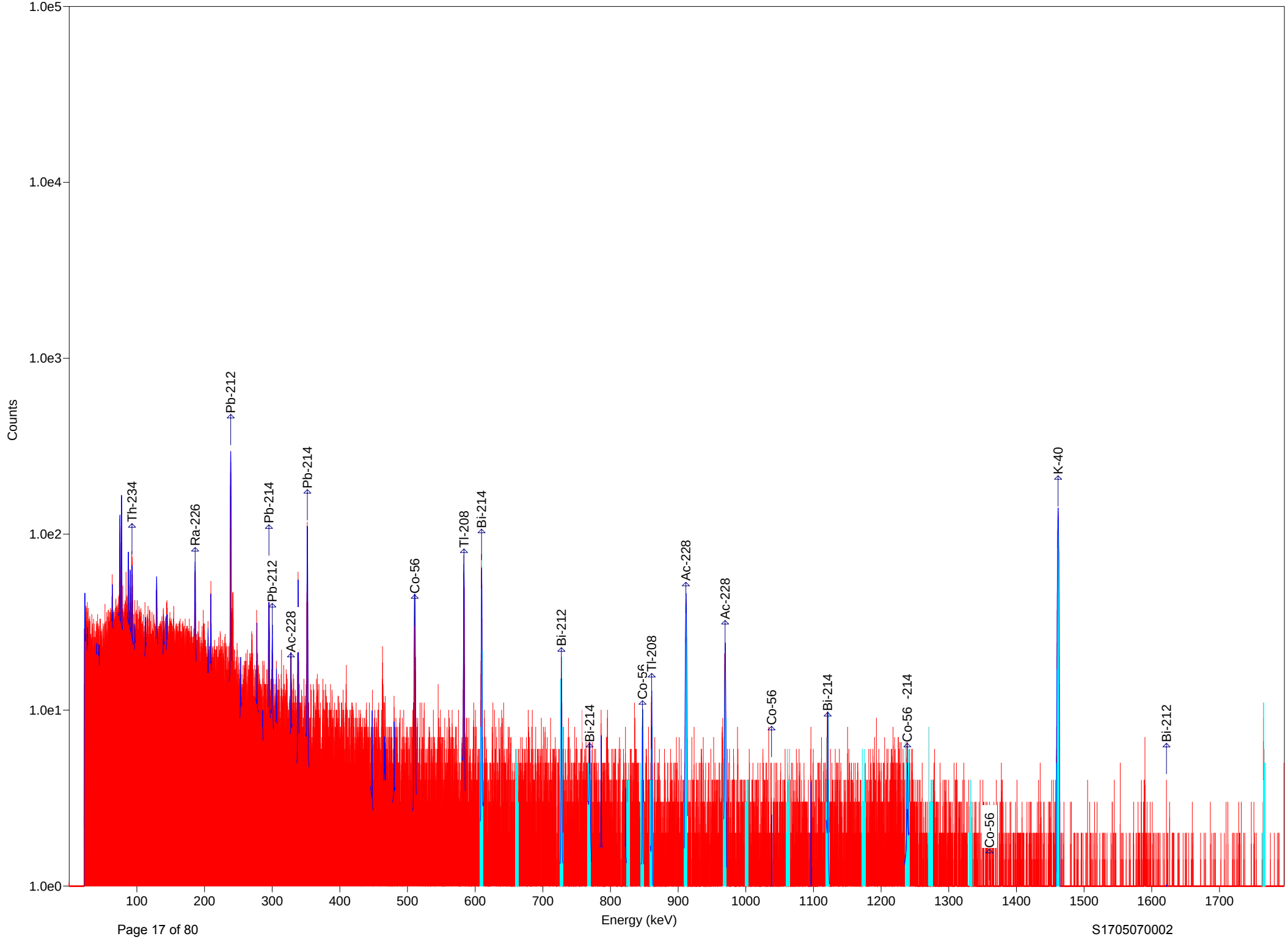


S1705070002

Detector #2 ACQ 26-May-2017 at 12:24:57 RT = 4573.3 LT = 4500.0
Rad Chem 2
ROCKYFLATS-13214

ROI#	RANGE(keV)		GROSS	NET	+/-	CENTROID	FWHM	FW(1/5)M	LIBRARY	(keV)	µCi	+/-
1	606.93	611.75	206	168	16	609.43	1.16	2.07	Bi-214	609.31	0.0001	0.0000
2	659.29	664.11	141	91	15	661.99	0.51	1.31	Cs-137	661.66	0.0000	0.0000
3	724.58	729.84	75	21	13	727.90	0.79	1.02	Bi-212	727.00	0.0001	0.0000
4	765.77	771.02	63	0	14	767.99	0.29	0.72	Bi-214	768.36	0.0000	0.0001
5	823.38	828.64	42	-8	12	827.76	0.22	0.35	Co-60	826.28	0.0000	0.0465
6	843.53	848.79	63	21	12	846.87	0.28	1.12	Co-56	846.77	0.0000	0.0000
7	857.99	863.25	41	28	8	859.31	1.20	1.87	Tl-208	860.56	0.0001	0.0000
8	908.38	914.07	187	128	18	911.22	1.18	1.76	Ac-228	911.20	0.0001	0.0000
9	966.21	971.90	121	80	14	968.96	1.47	1.98	Ac-228	968.97	0.0002	0.0000
10	998.19	1003.88	29	11	8	999.06	2.19	2.32	Pa-234M	1001.03	0.0005	0.0003
11	1059.08	1065.21	28	-11	11	1063.02	0.33	0.53	No close library match!			
12	1117.34	1123.47	74	55	11	1120.66	0.72	2.11	Bi-214	1120.29	0.0001	0.0000
13	1170.34	1176.47	30	-14	12	Could not properly fit the peak.						
14	1235.17	1241.30	50	6	13	1236.04	0.22	0.35	Bi-214	1238.11	0.0000	0.0001
15	1269.55	1276.12	23	2	9	Could not properly fit the peak.						
16	1329.34	1335.91	21	21	4	1330.21	4.71	4.91	Co-60	1332.50	0.0000	0.0000
17	1457.88	1464.45	329	303	20	1461.08	1.89	3.00	K-40	1461.00	0.0015	0.0001
18	1761.13	1768.13	31	31	5	1764.58	0.31	0.91	Bi-214	1764.49	0.0001	0.0000

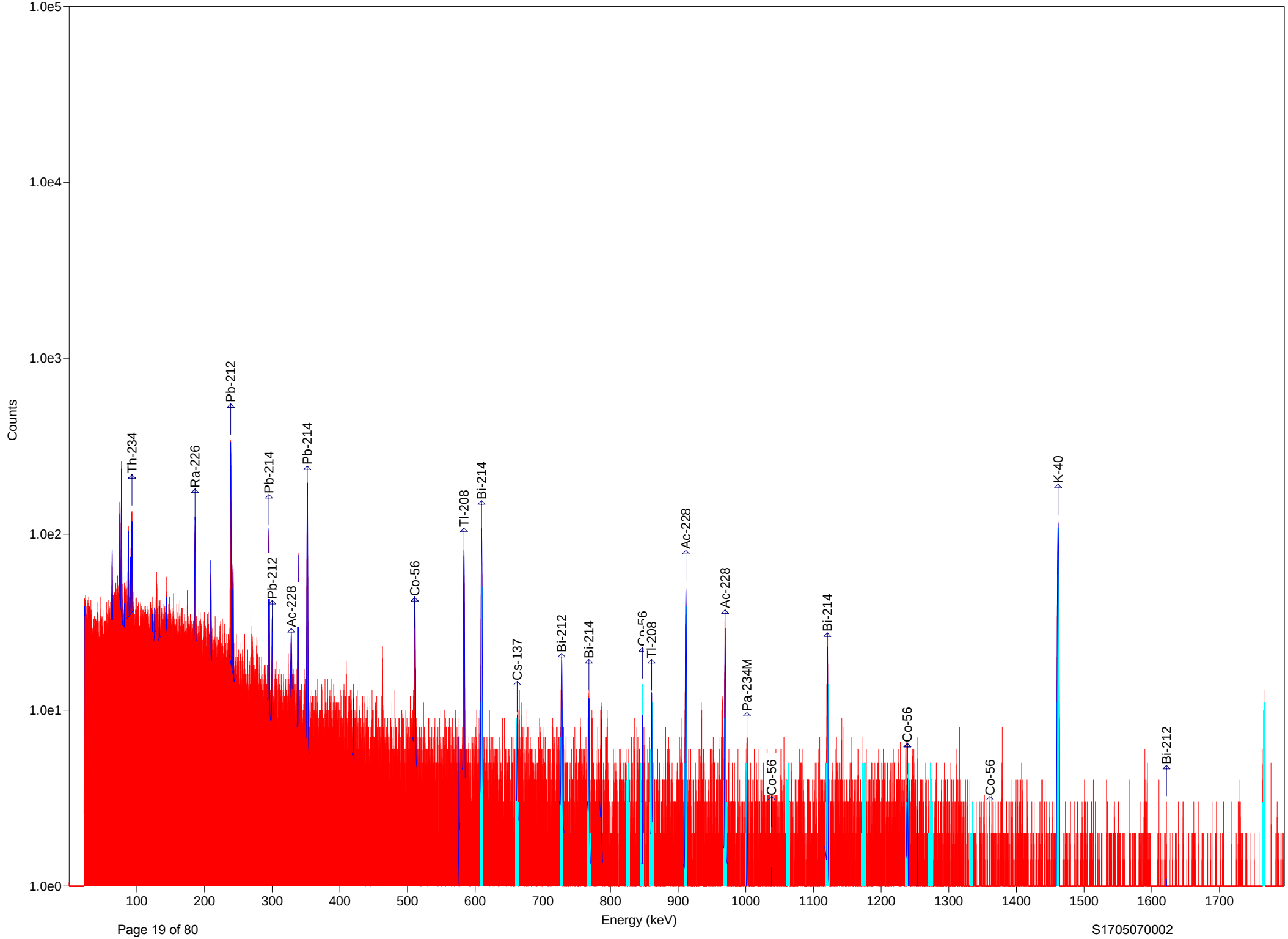
S1705070-001A. Real/Live Time = 4578/4500 (s).



Detector #2 ACQ 26-May-2017 at 8:33:20 RT = 4578.1 LT = 4500.0
Rad Chem 2
S1705070-001A

ROI#	RANGE(keV)		GROSS	NET	+/-	CENTROID	FWHM	FW(1/5)M	LIBRARY	(keV)	µCi	+/-
1	606.93	611.75	460	383	24	609.32	1.05	1.93	Bi-214	609.31	0.0002	0.0000
2	659.29	664.11	80	-12	15	661.70	0.33	0.53	Cs-137	661.66	0.0000	0.0000
3	724.58	729.84	157	107	16	727.32	1.38	1.64	Bi-212	727.00	0.0004	0.0001
4	765.77	771.02	98	27	15	767.96	1.24	1.93	Bi-214	768.36	0.0002	0.0001
5	823.38	828.64	68	1	14	824.04	2.96	3.15	Co-60	826.28	0.0039	0.0542
6	843.53	848.79	95	37	14	847.16	0.86	1.02	Co-56	846.77	0.0000	0.0000
7	857.99	863.25	116	70	14	860.29	0.87	2.04	Tl-208	860.56	0.0002	0.0000
8	908.38	914.07	356	324	20	911.27	1.91	2.44	Ac-228	911.20	0.0004	0.0000
9	966.21	971.90	216	148	19	969.20	1.48	1.87	Ac-228	968.97	0.0003	0.0000
10	998.19	1003.88	57	16	12	1001.59	1.94	2.09	Pa-234M	1001.03	0.0007	0.0005
11	1059.08	1065.21	73	20	14	1061.15	3.72	3.93	No close library match!			
12	1117.34	1123.47	134	66	18	1120.28	1.87	2.11	Bi-214	1120.29	0.0002	0.0000
13	1170.34	1176.47	77	14	15	1171.87	0.26	0.88	Co-60	1173.24	0.0000	0.0000
14	1235.17	1241.30	115	4	20	1238.48	0.28	0.50	Co-56	1238.28	0.0000	0.0000
15	1269.55	1276.12	62	-5	16	1270.21	0.22	0.35	No close library match!			
16	1329.34	1335.91	50	9	13	1331.77	0.78	1.36	Co-60	1332.50	0.0000	0.0000
17	1457.88	1464.45	1278	1211	38	1460.90	1.98	3.02	K-40	1461.00	0.0058	0.0002
18	1761.13	1768.13	73	73	8	1764.68	1.05	2.42	Bi-214	1764.49	0.0003	0.0000

S1705070-002A. Real/Live Time = 4578/4500 (s).

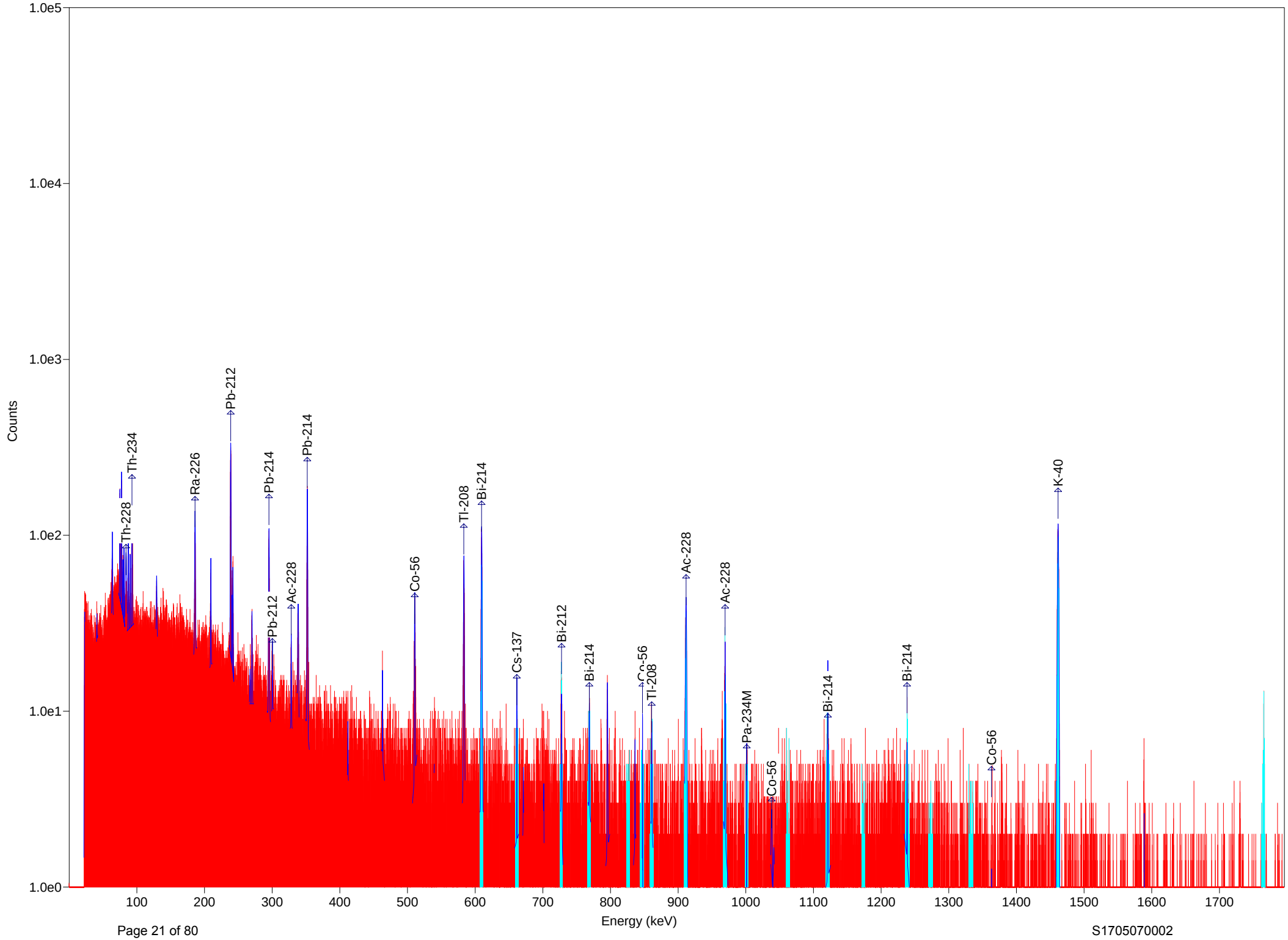


S1705070002

Detector #2 ACQ 26-May-2017 at 9:50:34 RT = 4578.5 LT = 4500.0
Rad Chem 2
S1705070-002A

ROI#	RANGE(keV)		GROSS	NET	+/-	CENTROID	FWHM	FW(1/5)M	LIBRARY	(keV)	µCi	+/-
1	606.93	611.75	715	604	30	609.30	1.37	2.01	Bi-214	609.31	0.0003	0.0000
2	659.29	664.11	116	16	17	662.06	0.68	1.40	Cs-137	661.66	0.0000	0.0000
3	724.58	729.84	197	72	21	727.51	1.58	2.06	Bi-212	727.00	0.0003	0.0001
4	765.77	771.02	125	37	17	768.28	0.52	1.01	Bi-214	768.36	0.0002	0.0001
5	823.38	828.64	66	8	13	826.67	0.22	0.35	Co-60	826.28	0.0310	0.0504
6	843.53	848.79	96	54	13	846.40	0.73	1.70	Co-56	846.77	0.0000	0.0000
7	857.99	863.25	140	65	17	860.44	0.76	1.54	Tl-208	860.56	0.0002	0.0000
8	908.38	914.07	371	312	22	911.24	1.50	2.56	Ac-228	911.20	0.0004	0.0000
9	966.21	971.90	244	181	20	969.11	1.45	2.24	Ac-228	968.97	0.0004	0.0000
10	998.19	1003.88	83	33	14	1001.21	1.36	1.63	Pa-234M	1001.03	0.0014	0.0006
11	1059.08	1065.21	64	16	14	1059.73	3.45	3.61	No close library match!			
12	1117.34	1123.47	216	143	20	1120.35	1.01	2.06	Bi-214	1120.29	0.0004	0.0001
13	1170.34	1176.47	77	4	16	1171.32	0.42	0.61	Co-60	1173.24	0.0000	0.0000
14	1235.17	1241.30	108	26	18	1237.90	1.10	1.23	Bi-214	1238.11	0.0002	0.0001
15	1269.55	1276.12	57	-10	16	1272.18	0.22	0.35	No close library match!			
16	1329.34	1335.91	34	18	9	1330.65	4.16	4.29	Co-60	1332.50	0.0000	0.0000
17	1457.88	1464.45	1045	1009	34	1461.06	2.10	3.01	K-40	1461.00	0.0049	0.0002
18	1761.13	1768.13	127	110	13	1765.10	1.27	2.27	Bi-214	1764.49	0.0005	0.0001

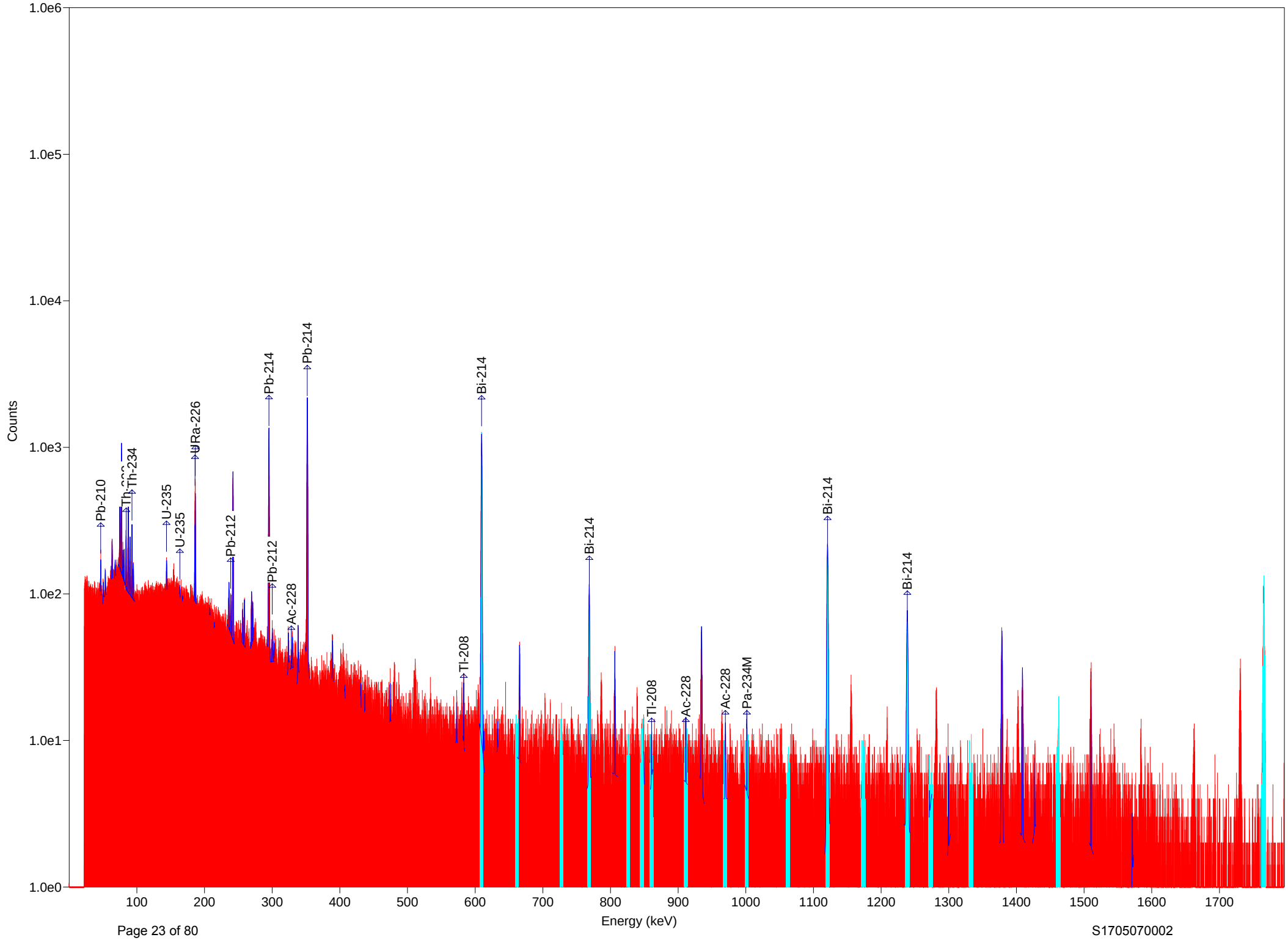
S1705070-002A DUP. Real/Live Time = 4572/4500 (s).



Detector #2 ACQ 26-May-2017 at 11:07:49 RT = 4572.6 LT = 4500.0
Rad Chem 2
S1705070-002A DUP

ROI#	RANGE(keV)		GROSS	NET	+/-	CENTROID	FWHM	FW(1/5)M	LIBRARY	(keV)	µCi	+/-
1	606.93	611.75	746	623	31	609.36	1.24	2.07	Bi-214	609.31	0.0003	0.0000
2	659.29	664.11	123	31	17	661.24	1.18	1.86	Cs-137	661.66	0.0000	0.0000
3	724.58	729.84	159	92	17	727.01	0.94	1.26	Bi-212	727.00	0.0003	0.0001
4	765.77	771.02	134	42	18	768.63	0.48	0.96	Bi-214	768.36	0.0002	0.0001
5	823.38	828.64	76	13	14	827.65	0.43	1.38	Co-60	826.28	0.0504	0.0542
6	843.53	848.79	78	15	14	847.00	0.28	0.56	Co-56	846.77	0.0000	0.0000
7	857.99	863.25	102	35	15	860.18	0.44	1.77	Tl-208	860.56	0.0001	0.0000
8	908.38	914.07	360	279	23	911.23	1.71	2.38	Ac-228	911.20	0.0003	0.0000
9	966.21	971.90	219	115	21	968.87	0.93	1.82	Ac-228	968.97	0.0002	0.0000
10	998.19	1003.88	77	45	12	1001.49	0.46	1.33	Pa-234M	1001.03	0.0019	0.0005
11	1059.08	1065.21	64	-9	16	1059.73	0.22	0.35	No close library match!			
12	1117.34	1123.47	176	103	19	1120.37	0.68	1.52	Bi-214	1120.29	0.0003	0.0001
13	1170.34	1176.47	64	-4	15	1171.37	0.49	0.72	Co-60	1173.24	0.0000	0.0000
14	1235.17	1241.30	111	63	15	1237.93	0.47	2.11	Bi-214	1238.11	0.0005	0.0001
15	1269.55	1276.12	58	-4	15	1272.84	0.22	0.35	No close library match!			
16	1329.34	1335.91	54	-8	15	1335.13	0.41	0.56	Co-60	1332.50	0.0000	0.0000
17	1457.88	1464.45	1052	1000	34	1460.95	2.01	2.86	K-40	1461.00	0.0048	0.0002
18	1761.13	1768.13	101	73	14	1764.78	0.57	2.03	Bi-214	1764.49	0.0003	0.0001

UTS-4. Real/Live Time = 4578/4500 (s).

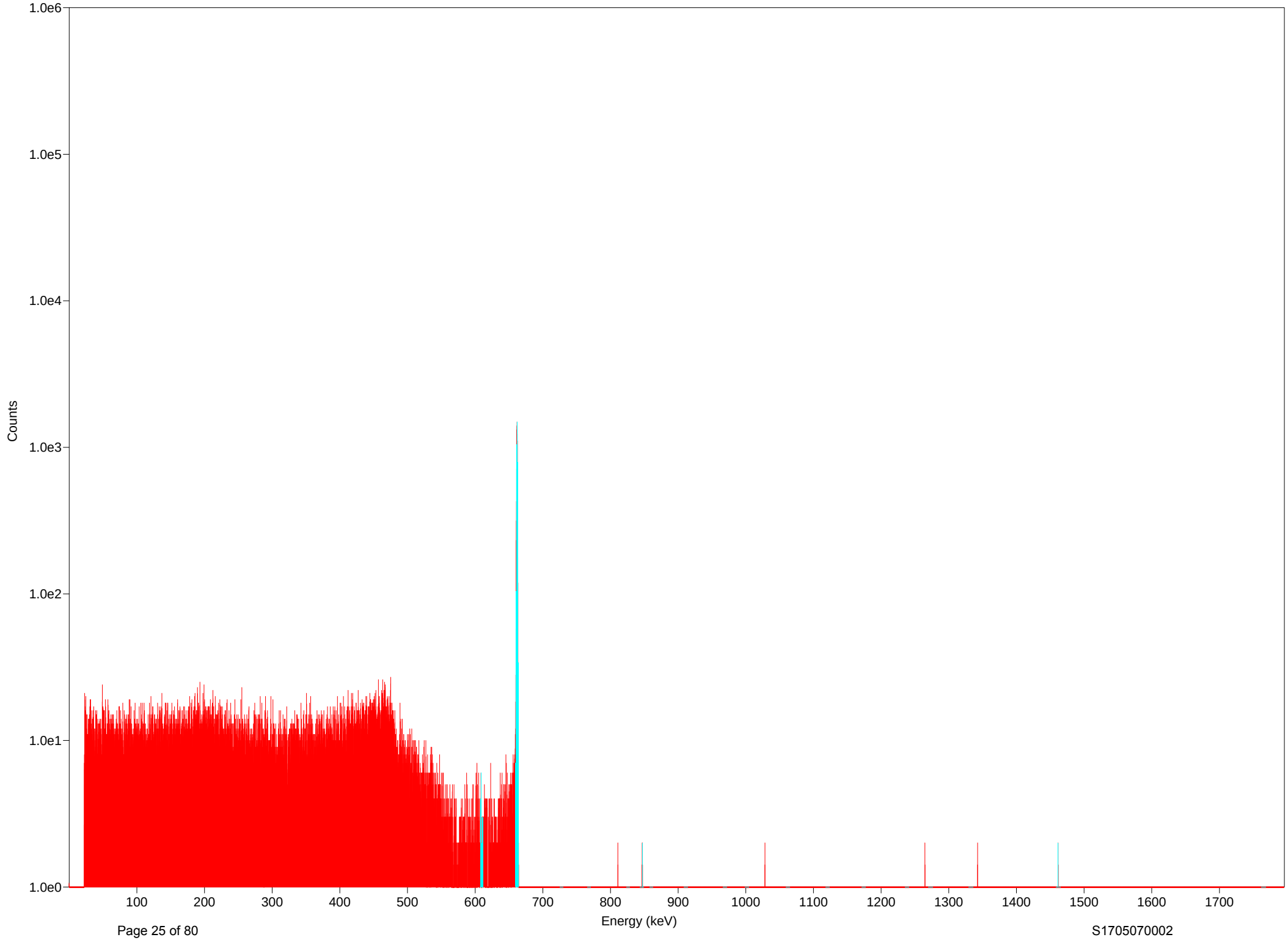


S1705070002

Detector #2 ACQ 26-May-2017 at 13:42:07 RT = 4578.7 LT = 4500.0
Rad Chem 2
UTS-4-13214

ROI#	RANGE(keV)		GROSS	NET	+/-	CENTROID	FWHM	FW(1/5)M	LIBRARY	(keV)	µCi	+/-
1	606.93	611.75	7945	7585	92	609.35	1.32	2.03	Bi-214	609.31	0.0038	0.0000
2	659.29	664.11	213	14	24	660.39	0.24	0.38	Cs-137	661.66	0.0000	0.0000
3	724.58	729.84	221	29	25	727.60	0.27	0.67	Bi-212	727.00	0.0001	0.0001
4	765.77	771.02	864	556	39	768.50	1.27	2.30	Bi-214	768.36	0.0032	0.0002
5	823.38	828.64	196	-29	26	827.11	0.22	0.35	Co-60	826.28	0.0000	0.1007
6	843.53	848.79	231	35	25	846.54	1.50	1.70	Co-56	846.77	0.0000	0.0000
7	857.99	863.25	191	8	24	860.67	0.33	0.72	Tl-208	860.56	0.0000	0.0001
8	908.38	914.07	237	70	25	910.70	0.40	0.60	Ac-228	911.20	0.0001	0.0000
9	966.21	971.90	176	5	24	969.32	0.50	2.23	Ac-228	968.97	0.0000	0.0001
10	998.19	1003.88	216	85	23	1001.49	0.40	1.50	Pa-234M	1001.03	0.0036	0.0010
11	1059.08	1065.21	150	-5	24	1062.58	0.22	0.35	No close library match!			
12	1117.34	1123.47	1766	1592	47	1120.41	1.84	2.65	Bi-214	1120.29	0.0042	0.0001
13	1170.34	1176.47	150	5	23	1174.20	0.45	0.80	Co-60	1173.24	0.0000	0.0000
14	1235.17	1241.30	665	496	33	1238.26	1.73	2.38	Co-56	1238.28	0.0003	0.0000
15	1269.55	1276.12	134	-11	24	1274.70	0.39	0.55	No close library match!			
16	1329.34	1335.91	133	14	22	1332.62	0.22	0.35	Co-60	1332.50	0.0000	0.0000
17	1457.88	1464.45	202	93	23	1461.66	0.78	1.52	K-40	1461.00	0.0004	0.0001
18	1761.13	1768.13	1304	1221	39	1764.73	2.00	3.32	Bi-214	1764.49	0.0051	0.0002

CS-137 END CAL. Real/Live Time = 379/371 (s).



S1705070002

Detector #2 ACQ 26-May-2017 at 19:05:27 RT = 379.2 LT = 371.7
Rad Chem 2
CS-137 END CAL

ROI#	RANGE(keV)		GROSS	NET	+/-	CENTROID	FWHM	FW(1/5)M	LIBRARY (keV)		µCi	+/-
1	606.93	611.75	48	2	11	608.46	0.22	0.35	Bi-214	609.31	0.0000	0.0001
2	659.29	664.11	9658	9539	99	661.73	1.35	2.09	Cs-137	661.66	0.0330	0.0003
3	724.58	729.84	0	0	0	Could not properly fit the peak.						
4	765.77	771.02	5	-3	4	Could not properly fit the peak.						
5	823.38	828.64	1	1	1	Could not properly fit the peak.						
6	843.53	848.79	6	6	2	846.60	0.66	0.79	Co-56	846.77	0.0000	0.0000
7	857.99	863.25	2	-2	3	Could not properly fit the peak.						
8	908.38	914.07	3	-6	5	Could not properly fit the peak.						
9	966.21	971.90	2	2	1	Could not properly fit the peak.						
10	998.19	1003.88	2	2	1	Could not properly fit the peak.						
11	1059.08	1065.21	2	2	1	Could not properly fit the peak.						
12	1117.34	1123.47	2	2	1	Could not properly fit the peak.						
13	1170.34	1176.47	0	0	0	Could not properly fit the peak.						
14	1235.17	1241.30	1	1	1	Could not properly fit the peak.						
15	1269.55	1276.12	2	-3	4	Could not properly fit the peak.						
16	1329.34	1335.91	2	-3	4	Could not properly fit the peak.						
17	1457.88	1464.45	6	6	2	1460.95	0.33	0.53	K-40	1461.00	0.0004	0.0001
18	1761.13	1768.13	0	0	0	Could not properly fit the peak.						

Table B-17 – Results of Dixon r tests applied to laboratory mean results

Material	Isotope	Set	No. sets	Test ratio	Critical Value, r** P = 10%	P = 5%
UTS-1	^{210}Pb	Lab-7	7	.63	.51	.57
UTS-1	^{228}Ra	Lab-5*	4	.90	.77	.82
UTS-2	^{210}Pb	Lab-7	7	.63	.51	.57
UTS-4	^{230}Th	Lab-3	7	.71	.51	.57

**Test result overruled; set means of the other three sets were judged to be fortuitously close.*
***Relevant probabilities are twice values for predesignated end of the set values (B2).*

Table B-18 – Consensus values and related statistical parameters for isotope activities in tailings reference materials

Isotope	Consensus value, [CL], Bq g^{-1}[a.] (No. sets, No. values, RSD (%), $\overline{CV}$(%)			
	UTS-1	UTS-2	UTS-3	UTS-4
^{230}Th	3.6 [3.0 – 4.2] (7,28,21,10)	4.4 [3.3 – 5.5] (2,79,26,24)	11.3 [10.5 – 12.1] (7,29,9,5)	22.9[b] [20.3 – 25.5] (6,24,13,7)
^{226}Ra	3.67 [3.52 – 3.82] (8,31,9,7)	5.6 [6.2 – 6.0] (8,37,13,8)	13.3 [12.7 – 13.9] (8,30,11,6)	38.6 [36.2 – 40.9] (8,33,9,5)
^{210}Pb	3.25[b] [3.03 – 3.47] (6,23,9,7)	4.55[b] [4.36 – 4.75] (6,39,12,9)	12.6 [12.1 – 13.2] (7,30,9,7)	32.4 [29.6 – 35.3] (7,28,9,4)
^{210}Po	3.1 [2.7 – 3.5] (6,27,10,4)	4.4 [3.7 – 5.1] (6,29,14,6)	11.8 [10.8 – 12.9] (6,29,8,4)	30.8 [25.8 – 35.9] (6,28,14,4)
^{232}Th[c,d]	.68 [.59 – .77] (5,18,16,11)	.88 [.67 – 1.08] (5,19,24,17)	(.16 ± .04)	(.48 ± .06)
^{228}Ra	.68 [.47 – .89] (4,14,19,10)	1.0 [0.7 – 1.4] (4,15,17,6)	–	–
^{228}Th[d]	.71 [.58 – .84] (5,20,21,13)	.92 [.58 – 1.25] (5,21,29,11)	(.16 ± .04)	(.23 ± .04)
^{231}Pa[d]	(.21 ± .03)	(.37 ± .05)	(.70 ± 1.0)	(2.4 ± .3)

a. CL = statistical uncertainty range at 95% confidence level, RSD = relative standard deviation of individual results (%), $\overline{CV}$ = average within-laboratory rel. std. dev. (%).
b. Data are exclusive of an outlying set.
c. ^{232}Th results from alpha spectrometry only. ^{232}Th concs. by NAA are incorporated with chemical results.
d. Single laboratory results and uncertaintly estimates in brackets are for information only.

National Institute of Standards & Technology

Certificate

Standard Reference Material® 4353A

Rocky Flats Soil Number 2

This Standard Reference Material (SRM) has been developed in cooperation with member laboratories of the International Committee for Radionuclide Metrology and other experienced metrology laboratories. The SRM consists of approximately 90 grams of air-dried, pulverized soil in a polyethylene bottle. The SRM is intended: for use in tests of measurements of radioactivity contained in matrices similar to the sample, for evaluating analytical methods, and as a generally available calibrated "real" sample matrix for laboratory intercomparison.

Radiological Hazards: This SRM contains low levels of anthropogenic and natural radioactivity and poses no radiological hazard. The SRM should be used only by qualified persons.

Chemical Hazards: The SRM is a dried sterilized soil and poses no chemical or biological hazard. However, inhalation or ingestion of the material should be avoided.

Storage and Handling: The SRM should be stored in a dry location at room temperature. The bottle should be shaken before opening in a chemical hood and should be recapped tightly as soon as subsamples are removed. The bottle (or any subsequent container) should always be clearly marked. If the SRM is transported, it should be packed, marked, labeled, and shipped in accordance with applicable national, international, and carrier regulations.

Preparation: This Standard Reference Material was prepared under the leadership of the Physics Laboratory, Ionizing Radiation Division, Radioactivity Group, Michael Unterweger, Acting Group Leader. The overall technical direction leading to the certification of this SRM was provided by Svetlana Nour and Kenneth G.W. Inn of the Radioactivity Group.

Statistical support was provided by James J. Filliben of the Information Technology Laboratory, Statistical Engineering Division.

The support aspects involved in the preparation, certification, and issuance of this SRM were coordinated through the NIST Measurement Services Division.

Technical Contacts: Svetlana Nour (e-mail: svetlana.nour@nist.gov; phone: 1-301-975-4927) and Kenneth G.W. Inn (e-mail: kenneth.inn@nist.gov; phone: 1-301-975-5541), NIST, Building 245, Room C114, Gaithersburg, MD 20899-8462, fax 1-301-926-7416.

Lisa Karam, Deputy Chief
Ionizing Radiation Division

Gaithersburg, Maryland 20899
July 2007

Robert L. Watters, Jr., Chief
Measurement Services Division

Details of the SRM preparation: This SRM is from the Rocky Flats Plant in north-central Colorado. The material was obtained from Rockwell International's Rocky Flats Plant (RFP) by the National Institute of Standards and Technology (NIST) of the U.S. Departments of Commerce and by the Environmental Measurements Laboratory (EML) of the U.S. Department of Homeland Security. The material was first coarsely sieved in the field to remove rocks larger than about 1.5 cm diameter. After air drying, the soil was blade milled twice. The soil was pulverized with a "pancake" style air jet mill to an average particle diameter of 8 μm. More than 99 percent, by weight, of the particles are less than 20 μm in diameter. The SRM was "V-cone" blended to optimize homogeneity and bottled in polyethylene bottles. The final bottled SRM was sterilized with > 50 kGy of ^{60}Co radiation to satisfy export regulations and to increase shelf-life time.

Instructions for Drying: When nonvolatile radionuclides are to be determined, working samples of this SRM should be dried at 40°C for 24 hours prior to weighing. Volatile radionuclides (e.g., ^{210}Po, ^{137}Cs, ^{210}Pb, ^{212}Pb and ^{214}Pb) should be determined on samples as received. Separate samples should be dried as previously described to obtain a correction factor for moisture. Correction for moisture content is to be made to the data for volatile radionuclides before comparing with the values given by this certificate. This procedure ensures that these radionuclides are not lost during drying (see Reference [1]*). The weight loss on drying is typically less than 4 percent.

Heterogeneity: Twenty-three bottles of the SRM were examined for gamma-ray heterogeneity by measuring their emission rates by counting them on a "5-in" (12.7 cm) NaI(Tl) detector coupled to a multichannel analyzer. The count rates from each measurement were analyzed for statistical difference for ten selected energy regions, and no detectable heterogeneity was observed.

This material has also been measured for alpha-particle emitting radionuclides using sample sizes of 1 gram to 100 grams. There are variations of results due to sample size. Based on over 100 plutonium and ^{241}Am measurements it was concluded that the material contains "hot" particles, and it is recommended that a sample size of 5 grams to 10 grams be used for radiochemical analysis and a sample size of 30 grams to 100 grams for gamma isotopic analysis. Statement of uncertainties, tolerance limits, and ranges of reported results incorporate the effects of heterogeneity.

Material Stability and Changes in Certified Values: This matrix is considered to be stable; however, its stability has not been rigorously assessed. NIST will monitor this material and will report any substantive changes in certification to the purchaser. Return of the enclosed registration card is mandatory to receive such notifications. The properties of the SRM are given in Table 1.

Calculation of Certified Massic Activity Values: The certified massic activity value for each nuclide (see Tables 2, 3 and 4) was determined from the evaluated average of the individual laboratory means. This approach was selected because of the well-behaved normal distribution of the laboratories' data.

Calculation of the Uncertainties for the Certified Values: The standard combined uncertainties (u_c) for each of the certified values were computed by incorporating components from three sources: 1) the estimated standard deviation of the mean of the laboratory mean values, 2) the k = 1 uncertainty associated with the radiochemical tracer SRMs, and 3) Type B scientific judgment. The uncertainty components were combined in quadrature as specified by the GUM. The expanded uncertainties (U) were computed using the Welch-Satterthwaite coverage factor. The expanded uncertainty (U) is taken as the 95 percent confidence interval.

*Notes and references are on page 11

Calculation of Certified Tolerance Limits: In addition to the certified massic activities and activity ratios, and their respective uncertainty values, Tables 2, 3, and 4 also provide 95/95 (normal) tolerance limits. Whereas the certified value is the mean of the population of measurements of the SRM and the expanded uncertainty for the certified value is at the 95 percent confidence limit, the tolerance limits are a measure of the spread of the population of measurements across the SRM. A 95/95 tolerance limit means that NIST is 95% confident that 95% of the population of SRM measurements fall within the specified limits. The tolerance limits are used when the number of replicates is small (n<5), e.g., when the material is used as a periodic QC sample. For guidance on the use of tolerance limits in connection with this SRM, see Appendix 1.

Uncertified Massic Activities and Mass Ratios: The massic activities and mass ratios for the radionuclides given in Table 5 and 6 are not certified at this time, but may be certified at some future time if additional data become available. Users are invited to submit measurement data to contribute to the certification process. The data should be sent to one of the technical contacts listed on page 1.

Elemental Composition: Semi-quantitative elemental analysis of the Rocky Flats Number 2 matrix is listed in Table 8.

Table 1: Properties of SRM 4353A.

Certified Properties

Radionuclides	**See Table 2, 3 and 4**
Reference time	**1 April 1998**
Certified massic activities	**See Table 2, and 3**
Certified activity ratios	**See Table 4**
Uncertainties (See Note 1)*	**See Table 2, 3 and 4**
Tolerance Limits	**See Table 2, 3 and 4**

Uncertified Properties

Source description	Rocky Flats Soil Number 2, approximately 90 g in a polyethylene bottle
Uncertified massic activities	See Table 5
Uncertified activity ratios	See Table 6
Range of reported values	See Tables 5 and 6
Half-lives used	See Table 7
Radiochemical and detection methods	See Table 7 and 9
Elemental composition	See Table 8
Participating laboratories and personnel	See Table 7 and 10

*Notes and references are on page 11

Table 2: Certified Massic Activities.†

Radionuclide	Massic Activity and uncertainty ($mBq \cdot g^{-1}$) (See Note 2)*	95/95 Tolerance Limit ($mBq \cdot g^{-1}$) (See Note 3)
^{238}Pu	0.278 ± 0.041	0.18 to 0.51
$^{239,240}Pu$	16.8 ± 1.8	6.0 to 26.8
^{238}U	39.6 ± 3.0	31.9 to 48.1
^{234}U	40.4± 3.0	33.7 to 47.7
^{235}U	1.88 ± 0.53	0.82 to 2.68
^{90}Sr	10.5 ±1.3	6.5 to 15.1

† Recommended sample size of at least 5 grams for radiochemical analysis. Refer to table 7 for uncertified information.

Table 3: Certified Massic Activities.‡

Radionuclide	Massic Activity and uncertainty ($mBq \cdot g^{-1}$) (See Note 2)	95/95 Tolerance Limit ($mBq \cdot g^{-1}$) (See Note 3)
^{137}Cs	21.6 ± 2.6	13.7 to 30.0
^{228}Ra (See Note 4)	74.9 ± 7.5	61.4 to 91.6
^{210}Pb	58.0 ± 9.9	41.8 to 79.7

‡ Recommended sample size of at least 30 grams for gamma-ray measurement. Refer to table 7 for uncertified information.

Table 4: Certified Activity Ratios.ϒ

Radionuclides Ratio	Ratio and uncertainty	95/95 Tolerance Limit (See Note 3)
^{234}U / ^{238}U	1.028 ± 0.036	0.92 to 1.14
^{238}Pu / (^{239}Pu+^{240}Pu)	0.017 ± 0.001	0.013 to 0.020
^{228}Th / ^{232}Th	1.01 ± 0.10	0.84 to 1.14
^{230}Th / ^{232}Th	0.671 ± 0.067	0.55 to 0.76

ϒ Refer to table 7 for uncertified information.

*Notes and references are on page 11

Table 5: Uncertified Massic Activities.†

Radionuclide	Massic Activity ($mBq \cdot g^{-1}$)	Lower and Upper Values of Reported Results ($mBq \cdot g^{-1}$)
^{228}Th	72.4	61.6 to 88.4
^{230}Th	47.9	40.9 to 57.8
^{232}Th	73.6	62.1 to 90.2
^{234}Th	60.1	28.9 to 103.3
^{226}Ra	42.4	28.4 to 52.7
^{214}Pb	43.2	34.9 to 51.9
^{214}Bi	40.6	28.4 to 53.2
^{212}Pb	90.2	83.3 to 95.7
^{212}Bi	79.5	68.8 to 87.3
^{208}Tl	51.3	26.8 to 67.7
^{40}K	589	533 to 719
^{241}Pu	17.0	13.0 to 30.0
^{241}Am (alpha spectrometry)	2.5	0.6 to 5.4
^{241}Am (gamma spectrometry)	4.7	3.7 to 6.6

† Radionuclides for which insufficient numbers of data sets or for which unresolved discrepant data sets were obtained. No uncertainties are provided because no meaningful estimates could be made. Refer to table 7 for uncertified information.

Table 6: Uncertified Mass Ratios.‡

Radionuclides	Mass Ratio	Lower and Upper Values of Reported Results
^{240}Pu / ^{239}Pu	$5.6\ 10^{-2}$	$(5.3 \text{ to } 6.0)\ 10^{-2}$
^{241}Pu / ^{239}Pu	$5.8\ 10^{-4}$	$(0.4 \text{ to } 1.3)\ 10^{-3}$
^{241}Pu / ^{240}Pu	$1.0\ 10^{-2}$	$(0.8 \text{ to } 2.3)\ 10^{-2}$

‡ Ratios for which insufficient numbers of data sets or for which unresolved discrepant data sets were obtained. No uncertainties are provided because no meaningful estimate could be made. Refer to table 7 for uncertified information.

Table 7: Uncertified Information for Tables 2 through 6.

Radionuclides	Number of Laboratories (and total assays)	Half Life (See Note 5)*	Methods (Table 9)	Contributing Laboratories Acronym (Table 10)
^{238}Pu	14 (169)	(87.7 ± 0.1) a	2b, 3b	BIL-GSL, CEMRC, EML, FSU, GSF, IAEA, LANL, NIST, OSU, RESL, SRNL, WHOI
$^{239,240}Pu$	14 (172)	(24110 ± 30) a (6561 ± 7) a	2b, 3b	BIL-GSL, CEMRC, EML, FSU, GSF, IAEA, LANL, NIST, OSU, RESL, SRNL, , WHOI
^{238}U	7 (72)	(4.468 ± 0.003) 10^9 a	2b, 3b, 3 e	CEMRC, EML, FSU, NIST, RESL, SRNL,
^{234}U	7 (72)	(2.455 ± 0.006) 10^5 a	2b, 3b	CEMRC, EML, FSU, NIST, RESL, SRNL,
^{235}U	4 (38)	(7.04 ± 0.01) 10^8 a	2b, 3b	CEMRC, EML NIST, SRNL,
^{90}Sr	5 (38)	(28.79 ± 0.06) a	2c, 3c	EML, IAEA, RESL, WHOI
^{137}Cs	9 (82)	(30.07 ± 0.03) a	1a	BIL-GSL, EML, FSU, LANL, NIST, OSU, RESL, SRNL, , WHOI
^{228}Ra (Note 4)	5 (42)	(5.75 ± 0.03) a	1a	BIL-GSL, FSU, NIST, RESL, SRNL
^{210}Pb	3 (24)	(22.20 ± 0.22) a	1a	FSU, NIST, SRNL
^{234}U / ^{238}U	8 (87)	(2.455 ± 0.006) 10^5 a (4.468 ± 0.003) 10^9 a	2b, 2e	BIL-GSL, CEMRC, EML, FSU, NIST, RESL, SRNL
^{238}Pu / (^{239}Pu+^{240}Pu)	14 (169)	(87.7 ± 0.1) a (24110 ± 30) a (6561 ± 7) a	2b	BIL-GSL, CEMRC, EML, FSU, GSF, IAEA, LANL, NIST, OSU, RESL, SRNL, , WHOI,
^{228}Th / ^{232}Th	3 (27)	(1.9116 ± 0.0016) a (1.40 ± 0.01) 10^{10} a	2b	CEMRC, NIST, RESL
^{230}Th / ^{232}Th	3 (27)	(7.538 ± 0.030) 10^4 a (1.40 ± 0.01) 10^{10} a	2b	CEMRC, NIST, RESL
^{228}Th	3 (27)	(1.9116 ± 0.0016) a	2b, 3b	CEMRC, NIST, RESL
^{230}Th	3 (27)	(7.538 ± 0.030) 10^4 a	2b, 3b	CEMRC, NIST, RESL
^{232}Th	4 (42)	(1.40 ± 0.01) 10^{10} a	2b, 3b, 3 e	CEMRC, IAEA, NIST, RESL
^{234}Th	2 (21)	(24.10 ± 0.03) d	1a	FSU, SRNL
^{226}Ra	4 (38)	(1600 ± 7) a	1a	BIL-GSL, FSU, RESL, SRNL
^{214}Pb	3 (21)	(26.8 ± 0.9) min	1a	BIL-GSL, FSU, SRNL
^{214}Bi	3 (32)	(19.9 ± 0.4) min	1 a	BIL-GSL, FSU, SRNL
^{212}Pb	1 (15)	(10.64 ± 0.01) h	1a	SRNL
^{212}Bi	1 (15)	(60.55 ± 0.06) min	1a	SRNL
^{208}Tl	3 (33)	(3.053 ± 0.004) min	1a	BIL-GSL, FSU, SRNL
^{40}K	2 (30)	(1.248 ± 0.003) 10^9 a	1a	BIL-GSL, SRNL
^{241}Pu	2 (20)	(14.290 ± 0.006) a	2d	IAEA
^{241}Am (α spectrometry)	13 (115)	(432.6 ± 0.6) a	2b, 3b	BIL-GSL, CEMRC, EML, FSU, IAEA, LANL, NIST, OSU, RESL, SRNL, , WHOI

Table 7 (cont.): Uncertified Information for Tables 2 through 6.

Radionuclides	Number of Laboratories (and total assays)	Half Life (See Note 5)*	Methods (Table 9)	Contributing Laboratories Acronym (Table 10)
^{241}Am (γ spectrometry)	3 (24)	(432.6 ± 0.6) a	1a	FSU, NIST, SRNL
^{240}Pu / ^{239}Pu	1 (15)	(24110 ± 30) a (6561 ± 7) a	2e	SRNL
^{241}Pu / ^{239}Pu	1 (15)	(14.290 ± 0.006) a (6561 ± 7) a	2e	SRNL
^{241}Pu / ^{240}Pu	1 (15)	(14.290 ± 0.006) a (24110 ± 30) a	2e	SRNL

Table 8: Elemental Composition Based on Semi-quantitative X-Ray Fluorescence (XRF) analysis†. These values are not certified.

Element	Percent by mass (%)	Element	Percent by mass (%)
Si	36	Cl	0.004
Al	4.5	Cr	0.033
Fe	2.6	Cu	0.003
Mg	0.29	Ga	<0.001
Ca	0.40	Ni	0.018
Na	0.65	Pb	0.003
K	1.7	Rb	0.007
Ti	0.20	Sr	0.011
P	0.07	V	0.004
Mn	0.054	Y	0.002
C	1.5	Zn	0.007
S	0.02	Zr	0.02

† The estimated relative combined standard uncertainty for each reported concentration is from -33 % to +50 %. Data presented by John Sieber, Chemical Science and Technology Laboratory (CSTL).

Table 9: Radiochemical and Detection Methods.

1	Non-destructive
2	Fusion/total decomposition
3	Acid leach (any combination of the following HNO_3, HCl, HF, $HClO_4$)
a	Germanium gamma-ray spectrometer
b	Silicon surface-barrier alpha-particle spectrometer
c	Beta-particle counter
d	Liquid scintillation counter
e	Inductively Coupled Plasma-Mass Spectroscopy (ICP-MS), Atomic Mass Spectroscopy (AMS)

Table 10: Participating Laboratories and Personnel.

Laboratory Acronym	Laboratory	Country	Technical Contact
BIL - GSL	British Nuclear Group Sellfield Ltd.	United Kingdom	Dr. M.Froggatt
CEMRC	Carlsbad Environmental Monitoring & Research Center	United States of America	Dr. B. Stewart
EML	Environmental Measurements Laboratory	United States of America	Dr. H. Volchok, M. Feiner
FSU	Florida State University	United States of America	Dr. W. Burnett
GSF	National Research Center for Environment and Health, Institute of Radiation Protection	Germany	Dr. K.Bunzl
IAEA †	International Atomic Energy Agency	Austria	Dr. J. Moreno, Dr. K.Burns, Dr. G. Kis-Benedek
LANL	Los Alamos National Laboratory	United States of America	Dr. D. Decker, Dr. N. Koski, Dr. S.R. Garcia
NIST	National Institute of Standards and Technology	United States of America	S. Nour, Dr. K. Inn
OSU	Oregon State University	United States of America	Dr. T. Beasley
RESL †	Radiological and Environmental Sciences Laboratory (RESL)	United States of America	Dr. D. Olson , Dr. S. Bohrer
SRNL	Savannah River National Laboratory	United States of America	J. Cadieux
WHOI	Woods Hole Oceanographic Institution	United States of America	Dr. V. Bowen, Dr. H. Livingston

† Note: These laboratories participated twice, reporting two sets of data.

Appendix 1

Recommendations on the use of the certified values for validation of measurements or methods

Case 1. Single Observation

Recommendation.

If a single observation is made, check to see if that value is within the certified 95/95 (95% confidence / 95% coverage) tolerance interval as provided in column 3 of Tables 2, 3, and 4 . If yes, then conclude that the measurement/method process is acceptable; if no, then conclude that the process is questionable and adjust accordingly.

Example.

A laboratory analyzed ^{235}U with a single measurement of this SRM to validate its method. The measured result was 1.86 mBq/g. The NIST certified value (see column 2 of Table 2) is 1.88 mBq/g. Is the laboratory method valid?

Procedure.

Check to determine if the measured value 1.86 is within the tolerance interval as provided in column 3 of Table 2. The tolerance interval for ^{235}U is (0.82, 2.68). Since 1.86 falls within this interval, then conclude that no evidence exists that this process is invalid (that is, in practice, we conclude that the process is valid).

Case 2. Multiple Observations

Recommendation.

If multiple observations are made, then:

1. check that at least 95% of the data points are within the provided tolerance interval (if yes, then accept the process; otherwise, reject the process);
2. check (via the appropriate t-test) that the mean of the collected data points is "close enough" to the provided certified value.

Example.

A laboratory analyzed ^{235}U in 5 replicates of this SRM to validate its method. The analytical results were 1.86, 1.99, 1.85, 1.87, and 1.86 mBq/g. The NIST certified value is 1.88 mBq/g. Is the laboratory method valid?

Procedure.

1. Check to determine the proportion of the 5 measured values that are within the 95/95 tolerance interval (0.82, 2.68) as provided in column 3 of Table 2 (at least 95% of the 5 values should fall within). Since 5 out of 5 of the values fall within the interval, then we conclude that the process is valid.

2: Compare the mean of the 5 collected points (1.866) with the certified value (1.88) by performing the t-test .

2.1. NIST's Certified Value: m = 1.88 mBq/g (see Table 2)

2.2. Compute Laboratory Data Summary Statistics:

Sample size	$n = 5$
Sample mean	$x = 1.866$ mBq/g
Sample standard deviation	$s = 0.015$ mBq/g
Significant level of the t-test	$\alpha = 0.05$

2.3. Compute t-test Statistic Value:

t-test statistic value $= (x - m)/(s/(n)^{1/2})$
$= (1.866 - 1.88)/(0.015/(5)^{1/2})$
$= -2.064$

2.4. Determine Cutoff Values for 95 % Confidence:

Upper 2.5% point of $t_{(n-1)}$ distribution = 2.776 (See Table A1)
Lower 2.5% point of $t_{(n-1)}$ distribution = -2.776 (See Table A1)

3. Conclusions:

3.1 If test statistic value < lower cutoff value, then conclude method is invalid with negative bias relative to the certified value.

3.2 If test statistic value > upper cutoff value, then conclude method is invalid with positive bias relative to the certified value.

3.3 If neither of the above, then conclude method is valid.

Example's Conclusion: Since the laboratory's test statistic value of -2.064 is neither > the upper cutoff value of 2.776 nor < the lower cutoff value of -2.776, case 3 applies and it can be concluded that the laboratory's method for ^{235}U analysis is valid.

Table A1: Probability points of the t distribution with (n-1) degrees of freedom.

Degrees of freedom	Tail area probability, $t_{(n-1)}$ (cutoff values)	
(n-1)	Upper 2.5 %	Lower 2.5 %
1	12.706	-12.706
2	4.303	-4.303
3	3.182	-3.182
4	2.776	-2.776
5	2.571	-2.571
6	2.447	-2.447
7	2.365	-2.365
8	2.306	-2.306
9	2.262	-2.262
10	2.228	-2.228

NOTES FOR TABLES 1, 2, 3 AND 7

Note 1. For further information on the expression of uncertainties, see references [3] and [4].

Note 2. The mean is the evaluated reference value from measurement results by the participating laboratories. The stated uncertainty is the 95% confidence interval based on a student-t distribution.

Note 3. The tolerance limits are for 95 percent confidence and 95 percent coverage. Differences between laboratories have been eliminated so that the given limits reflect only between-measurement differences.

Note 4. Radium-228 activity values are based on measurements of its ^{228}Ac daughter.

Note 5. The stated uncertainty of the half-life is the standard uncertainty. See reference [5].

REFERENCES

[1] R. Bock, *A Handbook of Decomposition Methods in Analytical Chemistry*, International Textbook Company, Limited. T. & A. Constable Ltd., Great Britain, 1979.

[2] M. G. Natrella, Experimental Statistics, Handbook 91, 1963, United States Department of Commerce National Bureau of Standards

[3] International Organization for Standardization (ISO), *Guide to the Expression of Uncertainty in Measurement*, 1993. Available from the American National Standards Institute, 11 West 42nd street, New York, NY 10036, USA. 1-212-642-4900. (Listed under ISO miscellaneous publications as "ISO Guide to the Expression 1993".)

[4] B.N. Taylor and C.E.Kuyatt, *Guidelines for Evaluating and Expressing the Uncertainty of NIST Measurement Results*, NIST Technical Note 1297, 1994. Available from the Superintendent of Documents, U.S. Government Printing Office, Washington, DC 20402, USA.

[5] Evaluated Nuclear Structure Data File (ENSDF), online database, National Nuclear Data Center, Brookhaven Laboratory (Upton, NY), November 2006. Refer to http://www.nndc.bnl.gov/ensdf/

Energy, Mines and Resources Canada

CANADA CENTRE FOR MINERAL AND ENERGY TECHNOLOGY

REFERENCE URANIUM-THORIUM ORE DL-1a

CERTIFICATE OF ANALYSIS

	Recommended Value		95% Confidence Interval	
	U	0.0116%	±	0.0003%
	Th	0.0076%	±	0.0004%
	Ra-226	1.40 Bq/g	±	0.04 Bq/g
	Pb-210	1.40 Bq/g	±	0.02 Bq/g

DESCRIPTION

DL-1a is intended as a replacement for DL-1 of which the stock is exhausted. It is waste rock typical of the property of Denison Mines Limited in Elliot Lake, Ontario, and is a pale yellow arkose sandstone containing uraninite and brannerite and possibly traces of monazite and uranothorite. The bulk material was dry-ground to minus 74 µm, blended, sampled systematically for analysis by optical fluorimetric and chemical methods to demonstrate homogeneity suitable for use as a reference material, and bottled in 200-g units. Evidence is available that DL-1a is in secular equilibrium.

CERTIFICATION

The consensus value for uranium is the unweighted mean of 286 accepted analytical determinations by 20 laboratories. Methods included titrimetry, colorimetry, fluorimetry, X-ray fluorescence, neutron activation analysis and radiochemistry.

The consensus value for thorium is the unweighted mean of 187 accepted analytical determinations by 14 laboratories. Methods included colorimetry, X-ray fluorescence, neutron activation analysis, radiometry and isotope dilution-mass spectrometry.

CANADIAN CERTIFIED REFERENCE MATERIALS PROJECT

NON-CERTIFIED CONSTITUENTS

The concentration of the following constituents are given for information only.

	Value
Fe	0.93%
S	0.41%

INSTRUCTIONS FOR USE

The recommended values for DL-1a pertain to an "as is" basis.

LEGAL NOTICE

The Canadian Certified Reference Materials Project has prepared this reference material and statistically evaluated the analytical data for the interlaboratory certification program to the best of its ability. The Purchaser by receipt hereof releases and indemnifies the Canadian Certified Reference Materials Project from and against all liability and costs arising out of the use of this material and information.

REFERENCE

The preparation and certification procedures used for DL-1a are given in CANMET Reports 80-10 "DL-1a: A Certified Uranium-Thorium Reference Ore", 83-9E "Radium-226 in Certified Uranium References Ores DL-1a, BL-4a, DH-1a and BL-5" and 84-11E "Lead-210 in Certified Uranium Reference Ores DL-1a, BL-4a, DH-1a and BL-5" which are available free of charge on application to:

Coordinator, CCRMP

CANMET

555 Booth Street

Ottawa, Ontario K1A 0G1

Canada

This Certificate of Analysis is available in French on request to the Coordinator, CCRMP.

S1705070002

Inter-Mountain Laboratories - RadChem Standards Notebook

Date: 1/28/16	Standard: Radium 226 per 1/2mL 5.54 pCi/mL L	RADSTD-15-1
	11.0g Radium 226 standard 7-5 and 2mL Nitric Acid (2014093036) was brought up to 100mL DI	
		Initials: MB
Expires: 1/28/17	Reference Date: 1/1/07	
Date: 2/16/16	Standard: Po-210 standard MB 2/16/17 24.778 ~~22.809~~ pCi/mL L	RADSTD-15-2
	0.3259g Po-210 (13234) and 2mL Nitric Acid (2014093036) was brought up to 100mL DI	
		Initials: MB
Expires: 2/16/17	Reference Date: 8/1/15 11:00 MST	
Date: 3/10/16	Standard: DL-1a pCi/mL L	RADSTD-15-3
	Canned DL-1a - 150.02 grams	
		Initials: T.P.
Expires: Never	Reference Date:	
Date: 3/21/16	Standard: Thorium 229 pCi/mL L	RADSTD-15-4
	0.9444g thorium 229 (SRM4328C) and 4mL nitric (2014093036) was brought up to 200mL DI	
		Initials: MB
Expires: 3/21/17	Reference Date: 12/31/07 EST 12:00	
Date: 3/22/16	Standard: Radium 228 standard 39.48 pCi/mL L	RADSTD-15-5
	2.8902g Radium 228 (43395) and 4mL Nitric Acid (2014093036) brought up to 200mL DI	
		Initials: MB
Expires: 3/22/16	Reference Date: 10/7/10 12:00 EST	
Date: 4/15/16	Standard: Radon-222 pCi/mL L	RADSTD-15-6
	1mL RADSTD 1-1 and 9mL DI and scintillator oil 10mL	
		Initials: MB
Expires:	Reference Date: 9/9/1991 12:00 EST	
	3 made	
Date: 4/18/16	Standard: BL-4A pCi/mL L	RADSTD-15-7
	Canned BL-4A ~~157.73~~ 157.39 WW	
		Initials: WW
Expires: Never	Reference Date:	

om Page No. ___

Preparation of Radium 226 Standard from UTS-4

by Tom Pitts 11-12-10

OHAUS Balance check with weights 54106

100 g = 100.01 g
50 g = 50.00
5 g = 5.00

TARE 190.20 grams Sand => 211.35 g

UTS-4 = 5.00 grams

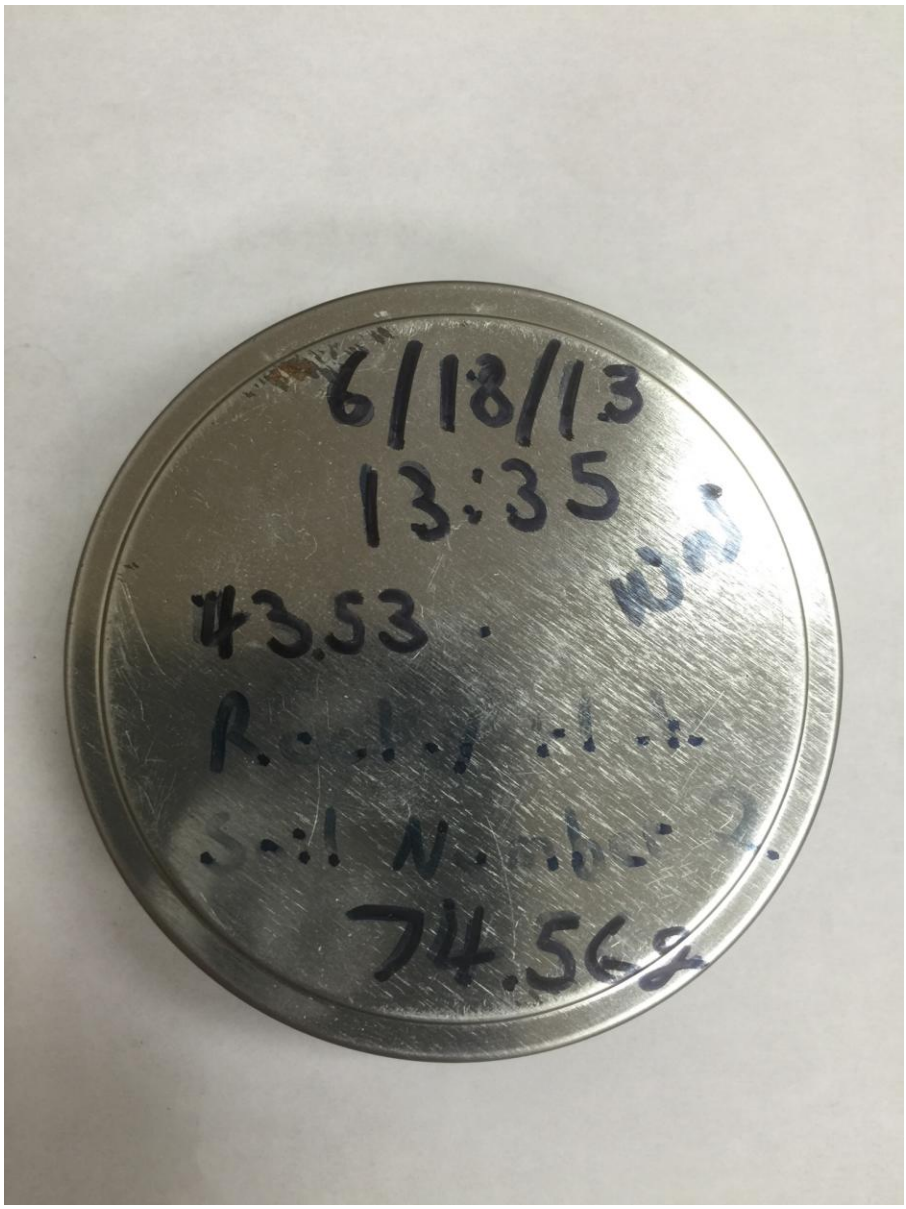
Total weight = 195.20 grams

Canned & Sealed 11-12-10

UTS-4-CAN

Homogenized with a loss of 0.04 grams T.P.

To Page No. _____


6/18/13
13:35
43.53
74.568

Radium 226 Analysis by the Gamma Spectrometry

Calibration Date 1/5/2017 Performed by Wade Nieuwsma

Samples	Grams	Run Date	pCi	KEV 609	seconds	per sec KEV 609	per sec Blank Sub KEV 609	pCi per sec per pCi KEV 609
RADSTD-15-3 DL-1A Cal (RADCHEM-001)	150.02	1/5/2017	37.92	65063	27000	2.409741	2.403796	2366.572579
Blank	150	1/4/2017	0	214	36000	0.005944		

Seq	GAMMA# GB 12210-001 Sample_id	Result pCi/g	Error pCi/g	Gamma Date Time	Radium 226 Analysis by the Gamma Spectrometry Grams	Recovery	Factor	KEV 609	Time	KEV 609	Result pCi/g	ave count error	Error pCi/g	Recovery %	RPD %
1	MBLK GB 12210-001	0	0.011109743		150	1	1	214	36000	0	0	13	0.011109743		
2	RADSTD-15-3-1	39.23517153	0.724600501		150.02	1	1	11219	4500	5886.06	39.23517	106	0.724600501	103.71%	
3	RADSTD-15-3-2	39.23517153	2.454071507		150.02	1	1	11219	4500	5886.06	39.23517	359	2.454071507	103.71%	
4	RADSTD-15-3-3	40.36396379	0.574211718		150.02	1	1	11541	4500	6055.402	40.36396	84	0.574211718	106.70%	
5	RADSTD-15-3-1-2	36.2028569	0.724600501		150.02	1	1	10354	4500	5431.153	36.20286	106	0.724600501	95.70%	
6	RADSTD-15-3-2-2	36.43772983	2.454071507		150.02	1	1	10421	4500	5466.388	36.43773	359	2.454071507	96.32%	
7	RADSTD-15-3-3-3	36.04510643	0.574211718		150.02	1	1	10309	4500	5407.487	36.04511	84	0.574211718	95.28%	
8	Rocky Flats	1.278437291	0.233821772		74.56	1	1	208	4500	95.32028	1.278437	17	0.233821772	111.56%	
9	UTS-4	964.3257354	49.22470964		5	1	1	3678	1800	4821.629	964.3257	96	49.22470964	93.62%	
10	RADSTD-15-7 BL-4A	432.6737428	1.726675251		157.39	1	1	51806	1800	68098.52	432.6737	106	1.726675251	103.28%	
11	CAL Check	37.92	0.12076675		150.02	1	1	65063	27000	5688.758	37.92	106	0.12076675	100.00%	

Reviewed and Approved By _____

Detector #4 ACQ 04-Jan-2017 at 18:09:15 RT = 36171.4 LT = 36000.0
Rad Chem 1
MBLK

ROI#	RANGE(keV)		GROSS	NET	+/-	CENTROID	FWHM	FW(1/5)M	LIBRARY	(keV)	µCi	+/-
1	606.78	611.61	517	214	32	609.20	1.28	1.76	Bi-214	609.31	0.0000	0.0000
2	659.24	664.07	246	-45	27	660.56	0.22	0.35	Cs-137	661.66	0.0000	0.0000
3	724.43	729.70	263	25	27	727.79	0.41	0.64	Bi-212	727.00	0.0000	0.0000
4	765.70	770.97	228	-26	27	768.06	0.88	1.10	Bi-214	768.36	0.0000	0.0000
5	824.75	830.01	221	8	26	827.82	0.22	0.35	Co-60	826.28	0.0038	0.0123
6	844.94	850.21	535	247	34	846.57	1.38	1.91	Co-56	846.77	0.0000	0.0000
7	857.89	863.16	180	-20	24	860.63	1.99	2.11	Tl-208	860.56	0.0000	0.0000
8	908.38	913.87	248	70	25	910.67	0.43	0.63	Ac-228	911.20	0.0000	0.0000
9	966.11	971.82	211	31	25	969.02	0.28	0.78	Ac-228	968.97	0.0000	0.0000
10	997.94	1003.65	149	23	21	999.26	0.22	0.35	Pa-234M	1001.03	0.0001	0.0001
11	1060.94	1067.09	147	31	21	1063.55	0.27	0.48	No close library match!			
12	1117.36	1123.07	181	68	21	1119.34	0.68	1.06	Bi-214	1120.29	0.0000	0.0000
13	1172.46	1178.61	137	-47	25	1174.00	0.24	0.39	Co-60	1173.24	0.0000	0.0000
14	1235.02	1241.17	167	90	19	1237.55	1.52	1.79	Bi-214	1238.11	0.0001	0.0000
15	1271.90	1278.49	119	16	21	1274.94	0.32	0.74	No close library match!			
16	1331.84	1338.42	132	-39	25	1336.67	0.22	0.35	Co-60	1332.50	0.0000	0.0000
17	1457.63	1463.78	464	362	27	1460.50	1.78	2.57	K-40	1461.00	0.0002	0.0000
18	1761.27	1767.85	112	34	18	1763.95	0.46	0.88	Bi-214	1764.49	0.0000	0.0000

Detector #4 ACQ 04-Jan-2017 at 14:23:19 RT = 4562.6 LT = 4500.0
Rad Chem 1
RADSTD15-3

ROI#	RANGE(keV)		GROSS	NET	+/-	CENTROID	FWHM	FW(1/5)M	LIBRARY	(keV)	µCi	+/-
1	606.78	611.61	11748	11219	112	609.24	1.24	1.87	Bi-214	609.31	0.0057	0.0001
2	659.24	664.07	399	8	33	660.30	0.26	0.48	Cs-137	661.66	0.0000	0.0000
3	724.43	729.70	766	383	39	727.26	1.21	1.77	Bi-212	727.00	0.0014	0.0001
4	765.70	770.97	1469	886	52	768.26	1.20	1.90	Bi-214	768.36	0.0050	0.0003
5	824.75	830.01	387	41	33	827.36	0.70	1.19	Co-60	826.28	0.1549	0.1247
6	844.94	850.21	333	54	30	845.88	0.41	0.70	Co-56	846.77	0.0000	0.0000
7	857.89	863.16	539	260	33	860.37	1.12	2.37	Tl-208	860.56	0.0006	0.0001
8	908.38	913.87	1622	1280	49	911.08	1.51	2.27	Ac-228	911.20	0.0014	0.0001
9	966.11	971.82	1010	731	41	968.83	1.32	2.20	Ac-228	968.97	0.0015	0.0001
10	997.94	1003.65	454	157	34	1001.00	1.28	2.30	Pa-234M	1001.03	0.0064	0.0014
11	1060.94	1067.09	290	-34	34	1062.92	0.22	0.35	No close library match!			
12	1117.36	1123.07	2591	2352	56	1120.19	1.54	2.44	Bi-214	1120.29	0.0060	0.0001
13	1172.46	1178.61	233	20	28	1173.34	0.24	0.38	Co-60	1173.24	0.0000	0.0000
14	1235.02	1241.17	1119	858	43	1237.95	1.57	2.46	Bi-214	1238.11	0.0062	0.0003
15	1271.90	1278.49	236	3	31	1276.51	0.22	0.35	No close library match!			
16	1331.84	1338.42	196	41	26	1335.74	0.49	1.19	Co-60	1332.50	0.0000	0.0000
17	1457.63	1463.78	1136	889	42	1460.64	1.42	2.55	K-40	1461.00	0.0042	0.0002
18	1761.27	1767.85	2139	2056	48	1764.50	1.92	2.86	Bi-214	1764.49	0.0088	0.0002

Detector #4 ACQ 12-Jan-2017 at 10:24:10 RT = 4556.4 LT = 4500.0
Rad Chem 1
CAL-1 15-3

ROI#	RANGE(keV)		GROSS	NET	+/-	CENTROID	FWHM	FW(1/5)M	LIBRARY	(keV)	µCi	+/-
1	607.00	611.83	10799	10354	107	609.43	1.22	1.88	Bi-214	609.31	0.0053	0.0001
2	659.24	664.07	310	-27	30	661.00	0.88	1.01	Cs-137	661.66	0.0000	0.0000
3	724.43	729.70	710	389	37	727.47	1.41	2.12	Bi-212	727.00	0.0014	0.0001
4	765.70	770.97	1372	889	49	768.48	1.44	1.98	Bi-214	768.36	0.0050	0.0003
5	824.75	830.01	299	20	30	827.35	0.24	0.68	Co-60	826.28	0.0756	0.1134
6	844.94	850.21	353	-5	33	847.91	0.39	0.55	Co-56	846.77	0.0000	0.0000
7	857.89	863.16	520	212	34	860.36	0.67	1.84	Tl-208	860.56	0.0005	0.0001
8	908.38	913.87	1438	1152	45	911.34	1.46	2.30	Ac-228	911.20	0.0013	0.0001
9	966.11	971.82	869	504	42	969.13	1.17	2.08	Ac-228	968.97	0.0010	0.0001
10	997.94	1003.65	422	179	32	1001.32	2.10	2.51	Pa-234M	1001.03	0.0073	0.0013
11	1060.94	1067.09	289	-1	33	1065.55	0.24	0.38	No close library match!			
12	1117.36	1123.07	2493	2178	57	1120.52	1.57	2.32	Bi-214	1120.29	0.0056	0.0001
13	1172.46	1178.61	196	3	27	1173.45	4.56	4.72	Co-60	1173.24	0.0000	0.0000
14	1235.02	1241.17	969	737	40	1238.41	1.49	2.36	Co-56	1238.28	0.0005	0.0000
15	1271.90	1278.49	204	8	28	1277.17	0.22	0.35	No close library match!			
16	1331.84	1338.42	177	32	25	1337.76	0.22	0.35	Co-60	1332.50	0.0000	0.0000
17	1457.63	1463.78	1023	830	39	1461.13	1.82	2.75	K-40	1461.00	0.0040	0.0002
18	1761.27	1767.85	1853	1781	45	1765.07	1.83	2.86	Bi-214	1764.49	0.0076	0.0002

Detector #4 ACQ 04-Jan-2017 at 14:23:19 RT = 4562.6 LT = 4500.0
Rad Chem 1
RADSTD15-3

ROI#	RANGE(keV)		GROSS	NET	+/-	CENTROID	FWHM	FW(1/5)M	LIBRARY	(keV)	µCi	+/-
1	606.78	611.61	11748	11219	112	609.24	1.24	1.87	Bi-214	609.31	0.0057	0.0001
2	659.24	664.07	399	8	33	660.30	0.26	0.48	Cs-137	661.66	0.0000	0.0000
3	724.43	729.70	766	383	39	727.26	1.21	1.77	Bi-212	727.00	0.0014	0.0001
4	765.70	770.97	1469	886	52	768.26	1.20	1.90	Bi-214	768.36	0.0050	0.0003
5	824.75	830.01	387	41	33	827.36	0.70	1.19	Co-60	826.28	0.1549	0.1247
6	844.94	850.21	333	54	30	845.88	0.41	0.70	Co-56	846.77	0.0000	0.0000
7	857.89	863.16	539	260	33	860.37	1.12	2.37	Tl-208	860.56	0.0006	0.0001
8	908.38	913.87	1622	1280	49	911.08	1.51	2.27	Ac-228	911.20	0.0014	0.0001
9	966.11	971.82	1010	731	41	968.83	1.32	2.20	Ac-228	968.97	0.0015	0.0001
10	997.94	1003.65	454	157	34	1001.00	1.28	2.30	Pa-234M	1001.03	0.0064	0.0014
11	1060.94	1067.09	290	-34	34	1062.92	0.22	0.35	No close library match!			
12	1117.36	1123.07	2591	2352	56	1120.19	1.54	2.44	Bi-214	1120.29	0.0060	0.0001
13	1172.46	1178.61	233	20	28	1173.34	0.24	0.38	Co-60	1173.24	0.0000	0.0000
14	1235.02	1241.17	1119	858	43	1237.95	1.57	2.46	Bi-214	1238.11	0.0062	0.0003
15	1271.90	1278.49	236	3	31	1276.51	0.22	0.35	No close library match!			
16	1331.84	1338.42	196	41	26	1335.74	0.49	1.19	Co-60	1332.50	0.0000	0.0000
17	1457.63	1463.78	1136	889	42	1460.64	1.42	2.55	K-40	1461.00	0.0042	0.0002
18	1761.27	1767.85	2139	2056	48	1764.50	1.92	2.86	Bi-214	1764.49	0.0088	0.0002

Detector #4 ACQ 12-Jan-2017 at 11:55:39 RT = 4557.1 LT = 4500.0
Rad Chem 1
CAL-2-15-3

ROI#	RANGE(keV)		GROSS	NET	+/-	CENTROID	FWHM	FW(1/5)M	LIBRARY	(keV)	µCi	+/-
1	606.78	611.61	10935	10421	108	609.42	1.20	1.86	Bi-214	609.31	0.0053	0.0001
2	659.24	664.07	360	23	31	660.01	3.64	3.83	Cs-137	661.66	0.0000	0.0000
3	724.43	729.70	719	386	37	727.41	1.43	1.98	Bi-212	727.00	0.0014	0.0001
4	765.70	770.97	1369	902	48	768.53	1.24	2.06	Bi-214	768.36	0.0051	0.0003
5	824.75	830.01	323	-31	33	825.40	0.27	0.48	Co-60	826.28	0.0000	0.1247
6	844.94	850.21	340	23	32	846.67	0.29	0.51	Co-56	846.77	0.0000	0.0000
7	857.89	863.16	480	238	31	860.77	1.58	2.57	Tl-208	860.56	0.0006	0.0001
8	908.38	913.87	1424	1121	46	911.33	1.52	2.24	Ac-228	911.20	0.0013	0.0001
9	966.11	971.82	949	643	41	969.16	1.25	2.04	Ac-228	968.97	0.0013	0.0001
10	997.94	1003.65	421	124	34	1001.20	1.15	2.00	Pa-234M	1001.03	0.0050	0.0014
11	1060.94	1067.09	260	42	29	1065.79	0.25	0.81	No close library match!			
12	1117.36	1123.07	2508	2233	56	1120.50	1.58	2.44	Bi-214	1120.29	0.0057	0.0001
13	1172.46	1178.61	258	55	28	1175.34	2.41	2.54	Co-60	1173.24	0.0000	0.0000
14	1235.02	1241.17	986	793	39	1238.37	1.80	2.47	Co-56	1238.28	0.0005	0.0000
15	1271.90	1278.49	212	52	26	1274.64	0.37	0.54	No close library match!			
16	1331.84	1338.42	161	-4	26	1336.01	1.32	1.45	Co-60	1332.50	0.0000	0.0000
17	1457.63	1463.78	1026	842	39	1461.05	1.95	2.83	K-40	1461.00	0.0040	0.0002
18	1761.27	1767.85	2013	1941	47	1765.05	1.99	3.07	Bi-214	1764.49	0.0083	0.0002

Detector #4 ACQ 05-Jan-2017 at 7:58:30 RT = 4562.6 LT = 4500.0
Rad Chem 1
RADSTD15-3

ROI#	RANGE(keV)		GROSS	NET	+/-	CENTROID	FWHM	FW(1/5)M	LIBRARY	(keV)	µCi	+/-
1	606.78	611.61	11986	11541	113	609.20	1.22	1.89	Bi-214	609.31	0.0059	0.0001
2	659.24	664.07	389	-25	33	660.34	0.22	0.35	Cs-137	661.66	0.0000	0.0000
3	724.43	729.70	742	384	38	727.25	1.31	2.12	Bi-212	727.00	0.0014	0.0001
4	765.70	770.97	1504	900	53	768.19	1.17	1.89	Bi-214	768.36	0.0051	0.0003
5	824.75	830.01	355	1	33	827.16	0.22	0.35	Co-60	826.28	0.0038	0.1247
6	844.94	850.21	372	1	34	845.80	0.26	0.46	Co-56	846.77	0.0000	0.0000
7	857.89	863.16	542	238	34	860.26	1.10	1.87	Tl-208	860.56	0.0006	0.0001
8	908.38	913.87	1539	1114	50	910.99	1.46	2.12	Ac-228	911.20	0.0013	0.0001
9	966.11	971.82	1000	716	41	968.71	1.44	2.29	Ac-228	968.97	0.0015	0.0001
10	997.94	1003.65	476	156	35	1000.77	1.35	1.65	Pa-234M	1001.03	0.0063	0.0014
11	1060.94	1067.09	257	1	31	1065.55	0.24	0.38	No close library match!			
12	1117.36	1123.07	2579	2300	57	1120.05	1.38	2.31	Bi-214	1120.29	0.0059	0.0001
13	1172.46	1178.61	253	11	30	1173.44	3.04	3.19	Co-60	1173.24	0.0000	0.0000
14	1235.02	1241.17	1100	824	43	1237.79	1.48	2.34	Bi-214	1238.11	0.0059	0.0003
15	1271.90	1278.49	210	8	29	1274.10	0.22	0.35	No close library match!			
16	1331.84	1338.42	216	45	27	1332.50	4.50	5.14	Co-60	1332.50	0.0000	0.0000
17	1457.63	1463.78	1224	1035	41	1460.57	1.84	2.81	K-40	1461.00	0.0049	0.0002
18	1761.27	1767.85	2153	2060	49	1764.31	1.80	2.81	Bi-214	1764.49	0.0088	0.0002

Detector #4 ACQ 12-Jan-2017 at 13:20:52 RT = 4556.7 LT = 4500.0
Rad Chem 1
CAL-3 15-3

ROI#	RANGE(keV)		GROSS	NET	+/-	CENTROID	FWHM	FW(1/5)M	LIBRARY	(keV)	µCi	+/-
1	606.78	611.61	10804	10309	108	609.44	1.21	1.86	Bi-214	609.31	0.0053	0.0001
2	659.24	664.07	361	-15	32	660.78	2.63	2.77	Cs-137	661.66	0.0000	0.0000
3	724.43	729.70	683	375	36	727.47	1.42	1.93	Bi-212	727.00	0.0014	0.0001
4	765.70	770.97	1346	938	47	768.54	1.22	2.02	Bi-214	768.36	0.0053	0.0003
5	824.75	830.01	328	7	31	825.88	0.26	0.74	Co-60	826.28	0.0265	0.1172
6	844.94	850.21	330	92	29	845.60	2.40	2.54	Co-56	846.77	0.0000	0.0000
7	857.89	863.16	461	223	31	860.70	1.05	2.26	Tl-208	860.56	0.0005	0.0001
8	908.38	913.87	1461	1184	45	911.34	1.49	2.17	Ac-228	911.20	0.0013	0.0001
9	966.11	971.82	942	645	41	969.16	1.27	2.11	Ac-228	968.97	0.0013	0.0001
10	997.94	1003.65	441	171	33	1001.47	1.31	2.35	Pa-234M	1001.03	0.0069	0.0013
11	1060.94	1067.09	259	17	30	1064.67	0.24	0.39	No close library match!			
12	1117.36	1123.07	2450	2279	53	1120.52	1.61	2.44	Bi-214	1120.29	0.0058	0.0001
13	1172.46	1178.61	228	-62	32	1173.89	0.41	0.56	Co-60	1173.24	0.0000	0.0000
14	1235.02	1241.17	983	761	40	1238.30	1.81	2.31	Co-56	1238.28	0.0005	0.0000
15	1271.90	1278.49	193	22	27	1275.86	1.80	2.00	No close library match!			
16	1331.84	1338.42	167	43	23	1333.52	2.59	2.75	Co-60	1332.50	0.0000	0.0000
17	1457.63	1463.78	1082	898	40	1461.11	1.97	2.68	K-40	1461.00	0.0043	0.0002
18	1761.27	1767.85	1856	1768	46	1765.02	1.88	2.83	Bi-214	1764.49	0.0076	0.0002

	GAMMA# GB 12210-001	Result	Error	Gamma	Radium 226 Analysis by the Gamma Spectrometry						Result		Error	Recovery
Seq	Sample_id	pCi/g	pCi/g	Date Time	Grams	Recovery	Factor	KEV 609	Time	KEV 609	pCi/g	ave count error	pCi/g	%
1	MBLK GB 12210-001	0	0.01063535		150	1	1	214	36000	0	0	13	0.01063535	
2	RADSTD-15-3-1	37.55980265	0.69365956		150.02	1	1	11219	4500	5634.722	37.5598	106	0.69365956	99.29%
3	RADSTD-15-3-2	37.55980265	2.349280962		150.02	1	1	11219	4500	5634.722	37.5598	359	2.349280962	99.29%
4	RADSTD-15-3-3	38.6403947	0.549692481		150.02	1	1	11541	4500	5796.832	38.64039	84	0.549692481	102.14%
5	Rocky Flats	1.223847137	0.223837421		74.56	1	1	208	4500	91.25004	1.223847	17	0.223837421	106.79%
6	UTS-4	923.1483615	47.1227806		5	1	1	3678	1800	4615.742	923.1484	96	47.1227806	89.63%
7	RADSTD-15-7 BL-4A	414.1982757	1.652945027		157.39	1	1	51806	1800	65190.67	414.1983	106	1.652945027	98.87%

Validated by Tom Patten 1/11/17

Reviewed and Approved By _____

Detector #4 ACQ 04-Jan-2017 at 18:09:15 RT = 36171.4 LT = 36000.0
Rad Chem 1
MBLK

ROI#	RANGE(keV)		GROSS	NET	+/-	CENTROID	FWHM	FW(1/5)M	LIBRARY	(keV)	µCi	+/-
1	606.78	611.61	517	214	32	609.20	1.28	1.76	Bi-214	609.31	0.0000	0.0000
2	659.24	664.07	246	-45	27	660.56	0.22	0.35	Cs-137	661.66	0.0000	0.0000
3	724.43	729.70	263	25	27	727.79	0.41	0.64	Bi-212	727.00	0.0000	0.0000
4	765.70	770.97	228	-26	27	768.06	0.88	1.10	Bi-214	768.36	0.0000	0.0000
5	824.75	830.01	221	8	26	827.82	0.22	0.35	Co-60	826.28	0.0038	0.0123
6	844.94	850.21	535	247	34	846.57	1.38	1.91	Co-56	846.77	0.0000	0.0000
7	857.89	863.16	180	-20	24	860.63	1.99	2.11	Tl-208	860.56	0.0000	0.0000
8	908.38	913.87	248	70	25	910.67	0.43	0.63	Ac-228	911.20	0.0000	0.0000
9	966.11	971.82	211	31	25	969.02	0.28	0.78	Ac-228	968.97	0.0000	0.0000
10	997.94	1003.65	149	23	21	999.26	0.22	0.35	Pa-234M	1001.03	0.0001	0.0001
11	1060.94	1067.09	147	31	21	1063.55	0.27	0.48	No close library match!			
12	1117.36	1123.07	181	68	21	1119.34	0.68	1.06	Bi-214	1120.29	0.0000	0.0000
13	1172.46	1178.61	137	-47	25	1174.00	0.24	0.39	Co-60	1173.24	0.0000	0.0000
14	1235.02	1241.17	167	90	19	1237.55	1.52	1.79	Bi-214	1238.11	0.0001	0.0000
15	1271.90	1278.49	119	16	21	1274.94	0.32	0.74	No close library match!			
16	1331.84	1338.42	132	-39	25	1336.67	0.22	0.35	Co-60	1332.50	0.0000	0.0000
17	1457.63	1463.78	464	362	27	1460.50	1.78	2.57	K-40	1461.00	0.0002	0.0000
18	1761.27	1767.85	112	34	18	1763.95	0.46	0.88	Bi-214	1764.49	0.0000	0.0000

Detector #4 ACQ 04-Jan-2017 at 14:23:19 RT = 4562.6 LT = 4500.0
Rad Chem 1
RADSTD15-3

ROI#	RANGE(keV)		GROSS	NET	+/-	CENTROID	FWHM	FW(1/5)M	LIBRARY	(keV)	µCi	+/-
1	606.78	611.61	11748	11219	112	609.24	1.24	1.87	Bi-214	609.31	0.0057	0.0001
2	659.24	664.07	399	8	33	660.30	0.26	0.48	Cs-137	661.66	0.0000	0.0000
3	724.43	729.70	766	383	39	727.26	1.21	1.77	Bi-212	727.00	0.0014	0.0001
4	765.70	770.97	1469	886	52	768.26	1.20	1.90	Bi-214	768.36	0.0050	0.0003
5	824.75	830.01	387	41	33	827.36	0.70	1.19	Co-60	826.28	0.1549	0.1247
6	844.94	850.21	333	54	30	845.88	0.41	0.70	Co-56	846.77	0.0000	0.0000
7	857.89	863.16	539	260	33	860.37	1.12	2.37	Tl-208	860.56	0.0006	0.0001
8	908.38	913.87	1622	1280	49	911.08	1.51	2.27	Ac-228	911.20	0.0014	0.0001
9	966.11	971.82	1010	731	41	968.83	1.32	2.20	Ac-228	968.97	0.0015	0.0001
10	997.94	1003.65	454	157	34	1001.00	1.28	2.30	Pa-234M	1001.03	0.0064	0.0014
11	1060.94	1067.09	290	-34	34	1062.92	0.22	0.35	No close library match!			
12	1117.36	1123.07	2591	2352	56	1120.19	1.54	2.44	Bi-214	1120.29	0.0060	0.0001
13	1172.46	1178.61	233	20	28	1173.34	0.24	0.38	Co-60	1173.24	0.0000	0.0000
14	1235.02	1241.17	1119	858	43	1237.95	1.57	2.46	Bi-214	1238.11	0.0062	0.0003
15	1271.90	1278.49	236	3	31	1276.51	0.22	0.35	No close library match!			
16	1331.84	1338.42	196	41	26	1335.74	0.49	1.19	Co-60	1332.50	0.0000	0.0000
17	1457.63	1463.78	1136	889	42	1460.64	1.42	2.55	K-40	1461.00	0.0042	0.0002
18	1761.27	1767.85	2139	2056	48	1764.50	1.92	2.86	Bi-214	1764.49	0.0088	0.0002

Detector #4 ACQ 04-Jan-2017 at 14:23:19 RT = 4562.6 LT = 4500.0
Rad Chem 1
RADSTD15-3

ROI#	RANGE(keV)		GROSS	NET	+/-	CENTROID	FWHM	FW(1/5)M	LIBRARY	(keV)	µCi	+/-
1	606.78	611.61	11748	11219	112	609.24	1.24	1.87	Bi-214	609.31	0.0057	0.0001
2	659.24	664.07	399	8	33	660.30	0.26	0.48	Cs-137	661.66	0.0000	0.0000
3	724.43	729.70	766	383	39	727.26	1.21	1.77	Bi-212	727.00	0.0014	0.0001
4	765.70	770.97	1469	886	52	768.26	1.20	1.90	Bi-214	768.36	0.0050	0.0003
5	824.75	830.01	387	41	33	827.36	0.70	1.19	Co-60	826.28	0.1549	0.1247
6	844.94	850.21	333	54	30	845.88	0.41	0.70	Co-56	846.77	0.0000	0.0000
7	857.89	863.16	539	260	33	860.37	1.12	2.37	Tl-208	860.56	0.0006	0.0001
8	908.38	913.87	1622	1280	49	911.08	1.51	2.27	Ac-228	911.20	0.0014	0.0001
9	966.11	971.82	1010	731	41	968.83	1.32	2.20	Ac-228	968.97	0.0015	0.0001
10	997.94	1003.65	454	157	34	1001.00	1.28	2.30	Pa-234M	1001.03	0.0064	0.0014
11	1060.94	1067.09	290	-34	34	1062.92	0.22	0.35	No close library match!			
12	1117.36	1123.07	2591	2352	56	1120.19	1.54	2.44	Bi-214	1120.29	0.0060	0.0001
13	1172.46	1178.61	233	20	28	1173.34	0.24	0.38	Co-60	1173.24	0.0000	0.0000
14	1235.02	1241.17	1119	858	43	1237.95	1.57	2.46	Bi-214	1238.11	0.0062	0.0003
15	1271.90	1278.49	236	3	31	1276.51	0.22	0.35	No close library match!			
16	1331.84	1338.42	196	41	26	1335.74	0.49	1.19	Co-60	1332.50	0.0000	0.0000
17	1457.63	1463.78	1136	889	42	1460.64	1.42	2.55	K-40	1461.00	0.0042	0.0002
18	1761.27	1767.85	2139	2056	48	1764.50	1.92	2.86	Bi-214	1764.49	0.0088	0.0002

Detector #4 ACQ 05-Jan-2017 at 7:58:30 RT = 4562.6 LT = 4500.0
Rad Chem 1
RADSTD15-3

ROI#	RANGE(keV)		GROSS	NET	+/-	CENTROID	FWHM	FW(1/5)M	LIBRARY	(keV)	µCi	+/-
1	606.78	611.61	11986	11541	113	609.20	1.22	1.89	Bi-214	609.31	0.0059	0.0001
2	659.24	664.07	389	-25	33	660.34	0.22	0.35	Cs-137	661.66	0.0000	0.0000
3	724.43	729.70	742	384	38	727.25	1.31	2.12	Bi-212	727.00	0.0014	0.0001
4	765.70	770.97	1504	900	53	768.19	1.17	1.89	Bi-214	768.36	0.0051	0.0003
5	824.75	830.01	355	1	33	827.16	0.22	0.35	Co-60	826.28	0.0038	0.1247
6	844.94	850.21	372	1	34	845.80	0.26	0.46	Co-56	846.77	0.0000	0.0000
7	857.89	863.16	542	238	34	860.26	1.10	1.87	Tl-208	860.56	0.0006	0.0001
8	908.38	913.87	1539	1114	50	910.99	1.46	2.12	Ac-228	911.20	0.0013	0.0001
9	966.11	971.82	1000	716	41	968.71	1.44	2.29	Ac-228	968.97	0.0015	0.0001
10	997.94	1003.65	476	156	35	1000.77	1.35	1.65	Pa-234M	1001.03	0.0063	0.0014
11	1060.94	1067.09	257	1	31	1065.55	0.24	0.38	No close library match!			
12	1117.36	1123.07	2579	2300	57	1120.05	1.38	2.31	Bi-214	1120.29	0.0059	0.0001
13	1172.46	1178.61	253	11	30	1173.44	3.04	3.19	Co-60	1173.24	0.0000	0.0000
14	1235.02	1241.17	1100	824	43	1237.79	1.48	2.34	Bi-214	1238.11	0.0059	0.0003
15	1271.90	1278.49	210	8	29	1274.10	0.22	0.35	No close library match!			
16	1331.84	1338.42	216	45	27	1332.50	4.50	5.14	Co-60	1332.50	0.0000	0.0000
17	1457.63	1463.78	1224	1035	41	1460.57	1.84	2.81	K-40	1461.00	0.0049	0.0002
18	1761.27	1767.85	2153	2060	49	1764.31	1.80	2.81	Bi-214	1764.49	0.0088	0.0002

Radium 226 Analysis by the Gamma Spectrometry

Calibration Date 6/22/2016 Performed by Wade Nieuwsma

Samples	Grams	Run Date	pCi	KEV 609	seconds	per sec KEV 609	per sec Blank Sub KEV 609	per sec per pCi KEV 609	pCi
RADSTD-15-3 DL1 A (RAD CHEM - 002)	150.02	6/22/2016	37.92	32838	14400	2.280417	2.271701	2504.184057	
Blank	150	4/13/2016	0	62.75	7200	0.008715			

GAMMA# GB 12210-001 Sample_id	Result pCi/g	Error pCi/g	Gamma Date Time	Radium 226 Analysis by the Gamma Spectrometry Grams	Recovery	Factor	KEV 609	Time	KEV 609	Result pCi/g	ave count error	Error pCi/g		Recovery %	RPD %
MBLK GB 12210-001	-0.013332461	0.067821652		150	1	1	57	7200	-1.99987	-0.01333	15		0.067821652		
RADSTD-15-3	37.52355705	0.426767358		150.02	1	1	60930	27000	5629.284	37.52356	354		0.426767358	98.95%	
LCS	412.3631771	12.42492656		150	1	1	29651	1200	61854.48	412.3632	458		12.42492656	77.22%	
UTS-4	860.4132957	99.3994125		5	1	1	7770	4500	4302.066	860.4133	458		99.3994125	87.98%	
Rockey Flats	1.233785603	0.228478815		74.21	1	1	326	7200	91.55923	1.233786	25		0.228478815	107.66%	
RADSTD-15-7 BL-4A	406.7110267	2.740616963		157.39	1	1	30685	1200	64012.25	406.711	106		2.740616963	97.09%	
RADSTD-15-3	38.11242553	1.600377593	6/19/2013 0:00	150.02	1	1	16502	7200	5717.626	38.11243	354		1.600377593	100.51%	
RADSTD-15-3	37.72757447	1.600377593	6/22/2019 0:00	150.02	1	1	16336	7200	5659.891	37.72757	354		1.600377593	99.49%	
RADSTD-15-3	37.92	0.800188796	6/22/2019 0:00	150.02	1	1	32838	14400	5688.758	37.92	354		0.800188796	100.00%	

Reviewed and Approved By _____

Speadsheet Validated on 6/23/16 by Tom Patten

Tom Patten

Detector #2 ACQ 19-Jun-2016 at 10:50:05 RT = 7238.5 LT = 7200.0
Rad Chem 2
RADSTD15-2HRS

ROI#	RANGE(keV)		GROSS	NET	+/-	CENTROID	FWHM	FW(1/5)M	LIBRARY (keV)		µCi	+/-
1	606.93	611.75	17537	16502	139	609.13	1.28	1.98	Bi-214	609.00	0.0050	0.0000
2	659.29	664.11	609	-43	42	661.15	0.38	0.55	Cs-137	661.66	0.0000	0.0000
3	724.58	729.84	1143	643	47	727.03	1.25	2.34	Bi-212	727.00	0.0015	0.0001
4	765.77	771.02	2161	1290	63	768.15	1.22	1.97	No close library match!			
5	857.99	863.25	757	290	42	860.43	1.07	2.17	No close library match!			
6	908.38	914.07	2273	1598	62	910.92	1.43	2.25	Ac-228	911.00	0.0012	0.0000
7	966.21	971.90	1509	1027	52	968.73	1.47	2.33	Ac-228	968.97	0.0013	0.0001
8	998.19	1003.88	623	200	40	1000.67	1.44	2.05	No close library match!			
9	1059.08	1065.21	420	62	37	1064.21	0.68	1.35	Bi-207	1063.00	0.0000	0.0000
10	1117.34	1123.47	3766	3307	71	1119.99	1.63	2.50	No close library match!			
11	1170.34	1176.47	359	69	34	1173.51	0.54	1.05	Co-60	1173.20	0.0000	0.0000
12	1235.17	1241.30	1582	1219	51	1237.76	1.55	2.50	No close library match!			
13	1269.55	1276.12	364	80	35	1273.73	0.33	1.17	No close library match!			
14	1329.34	1335.91	321	26	35	1333.69	0.27	0.48	No close library match!			
15	1457.88	1464.45	1476	1083	52	1460.38	1.87	2.84	No close library match!			
16	1761.13	1768.13	2905	2679	60	1764.00	2.04	3.05	No close library match!			

Detector #2 ACQ 22-Jun-2016 at 12:53:53 RT = 7237.1 LT = 7200.0
Rad Chem 2
RADSTD15-3.2HRS

ROI#	RANGE(keV)		GROSS	NET	+/-	CENTROID	FWHM	FW(1/5)M	LIBRARY (keV)		Bq	+/-
1	606.93	611.75	17314	16336	138	609.07	1.27	1.96	Bi-214	609.00	182.18	1.54
2	659.29	664.11	634	-45	43	660.17	0.22	0.35	Cs-137	661.66	0.00	0.28
3	724.58	729.84	1220	612	50	726.95	1.40	2.00	Bi-212	727.00	53.25	4.35
4	765.77	771.02	2118	1218	63	768.10	1.18	2.00	No close library match!			
5	857.99	863.25	799	295	43	860.23	1.36	1.99	No close library match!			
6	908.38	914.07	2296	1697	61	910.83	1.54	2.32	Ac-228	911.00	45.50	1.64
7	966.21	971.90	1401	1018	48	968.60	1.33	2.25	Ac-228	968.97	49.38	2.33
8	998.19	1003.88	692	287	41	1000.87	0.86	1.85	No close library match!			
9	1059.08	1065.21	431	30	39	1062.20	0.31	0.58	Bi-207	1063.00	0.33	0.43
10	1117.34	1123.47	3788	3208	73	1119.96	1.57	2.44	No close library match!			
11	1170.34	1176.47	371	28	36	1173.63	0.24	0.38	Co-60	1173.20	0.26	0.34
12	1235.17	1241.30	1548	1181	50	1237.71	1.75	2.48	No close library match!			
13	1269.55	1276.12	317	-14	36	1275.27	0.46	0.71	No close library match!			
14	1329.34	1335.91	337	-20	38	1333.72	0.22	0.35	No close library match!			
15	1457.88	1464.45	1616	1197	54	1460.30	1.75	2.84	No close library match!			
16	1761.13	1768.13	2820	2594	60	1763.86	1.88	3.10	No close library match!			

Detector #1 ACQ 24-Dec-2015 at 10:58:28 RT = 7206.8 LT = 7200.0
Rad Chem 1
MB-358

ROI#	RANGE(keV)		GROSS	NET	+/-	CENTROID	FWHM	FW(1/5)M	LIBRARY	(keV)	µCi	+/-
1	607.80	612.63	127	35	17	609.80	0.34	0.91	Bi-214	609.31	0.0000	0.0000
2	660.21	665.47	52	-15	14	664.81	0.22	0.35	Cs-137	661.66	0.0000	0.0000
3	724.23	729.94	69	15	14	725.11	3.44	3.68	Bi-212	727.00	0.0000	0.0000
4	766.11	772.03	52	24	11	768.55	0.29	1.16	Bi-214	768.36	0.0001	0.0000
5	823.77	829.47	47	-3	13	824.65	0.22	0.35	Co-60	826.28	0.0000	0.0320
6	844.60	850.30	114	51	16	847.73	0.56	1.90	Co-56	846.77	0.0000	0.0000
7	857.32	863.02	49	-23	15	857.97	0.22	0.35	Tl-208	860.56	0.0000	0.0000
8	908.62	914.32	41	5	11	912.34	1.16	1.39	Ac-228	911.20	0.0000	0.0000
9	965.83	971.97	47	13	11	969.81	0.32	1.09	Ac-228	968.97	0.0000	0.0000
10	998.71	1004.85	37	3	11	1000.91	3.51	3.64	Pa-234M	1001.03	0.0001	0.0003
11	1060.09	1066.23	29	-10	11	Could not properly fit the peak.						
12	1118.17	1124.31	54	10	13	1121.06	0.35	0.95	Bi-214	1120.29	0.0000	0.0000
13	1170.34	1176.48	22	17	5	1171.00	3.07	3.20	Co-60	1173.24	0.0000	0.0000
14	1233.24	1241.13	43	18	12	1234.55	4.93	5.13	Bi-214	1238.11	0.0001	0.0001
15	1270.72	1277.29	13	8	5	1273.78	0.33	0.53	No close library match!			
16	1329.88	1336.46	24	-12	11	Could not properly fit the peak.						
17	1457.64	1464.65	85	57	13	1461.64	0.75	2.50	K-40	1461.00	0.0002	0.0000
18	1762.38	1769.83	43	25	10	1765.67	0.65	0.79	Bi-214	1764.49	0.0001	0.0000

Detector #1 ACQ 10-Nov-2015 at 9:24:46 RT = 7206.8 LT = 7200.0
Rad Chem 1
MB-297

ROI#	RANGE(keV)		GROSS	NET	+/-	CENTROID	FWHM	FW(1/5)M	LIBRARY	(keV)	µCi	+/-
1	607.80	612.63	146	54	17	610.12	0.47	0.75	Bi-214	609.31	0.0000	0.0000
2	660.21	665.47	51	-3	12	661.09	0.22	0.35	Cs-137	661.66	0.0000	0.0000
3	724.23	729.94	64	1	14	727.74	0.22	0.35	Bi-212	727.00	0.0000	0.0000
4	766.11	772.03	65	4	15	768.62	0.54	1.29	Bi-214	768.36	0.0000	0.0001
5	823.77	829.47	36	-5	11	825.21	0.41	0.56	Co-60	826.28	0.0000	0.0271
6	844.60	850.30	99	58	14	847.00	0.28	0.49	Co-56	846.77	0.0000	0.0000
7	857.32	863.02	44	21	10	859.61	1.61	1.81	Tl-208	860.56	0.0000	0.0000
8	908.62	914.32	43	-7	12	911.47	1.42	1.84	Ac-228	911.20	0.0000	0.0000
9	965.83	971.97	46	12	11	968.46	1.48	1.64	Ac-228	968.97	0.0000	0.0000
10	998.71	1004.85	39	5	11	1001.34	0.22	0.35	Pa-234M	1001.03	0.0001	0.0003
11	1060.09	1066.23	38	-1	12	1062.28	0.22	0.35	No close library match!			
12	1118.17	1124.31	58	19	12	1120.96	0.80	1.27	Bi-214	1120.29	0.0000	0.0000
13	1170.34	1176.48	30	-14	12	1172.31	0.22	0.35	Co-60	1173.24	0.0000	0.0000
14	1233.24	1241.13	52	9	15	1239.27	0.42	0.83	Co-56	1238.28	0.0000	0.0000
15	1270.72	1277.29	35	4	11	1272.25	0.27	0.48	No close library match!			
16	1329.88	1336.46	16	0	8	Could not properly fit the peak.						
17	1457.64	1464.65	77	66	10	1461.86	0.53	1.83	K-40	1461.00	0.0002	0.0000
18	1762.38	1769.83	52	46	8	1766.55	0.25	0.40	Bi-214	1764.49	0.0001	0.0000

Detector #1 ACQ 17-Nov-2015 at 15:37:14 RT = 7207.1 LT = 7200.0
Rad Chem 1
MB-321

ROI#	RANGE(keV)		GROSS	NET	+/-	CENTROID	FWHM	FW(1/5)M	LIBRARY	(keV)	µCi	+/-
1	607.80	612.63	115	73	13	610.02	0.38	1.52	Bi-214	609.31	0.0000	0.0000
2	660.21	665.47	53	7	12	661.63	0.47	1.05	Cs-137	661.66	0.0000	0.0000
3	724.23	729.94	50	-9	14	728.18	1.43	1.62	Bi-212	727.00	0.0000	0.0000
4	766.11	772.03	55	-1	14	769.84	0.22	0.35	Bi-214	768.36	0.0000	0.0001
5	823.77	829.47	44	-6	12	825.97	0.22	0.35	Co-60	826.28	0.0000	0.0295
6	844.60	850.30	85	49	13	847.82	0.60	1.60	Co-56	846.77	0.0000	0.0000
7	857.32	863.02	46	1	12	860.61	1.21	1.40	Tl-208	860.56	0.0000	0.0000
8	908.62	914.32	50	32	9	912.34	0.24	0.38	Ac-228	911.20	0.0000	0.0000
9	965.83	971.97	27	12	8	967.59	2.85	2.98	Ac-228	968.97	0.0000	0.0000
10	998.71	1004.85	50	11	12	1001.22	0.48	0.94	Pa-234M	1001.03	0.0003	0.0003
11	1060.09	1066.23	27	12	8	1060.75	0.22	0.35	No close library match!			
12	1118.17	1124.31	46	12	11	1121.78	0.41	0.56	Bi-214	1120.29	0.0000	0.0000
13	1170.34	1176.48	28	-30	13	Could not properly fit the peak.						
14	1233.24	1241.13	63	-17	19	1239.16	0.44	0.92	Co-56	1238.28	0.0000	0.0000
15	1270.72	1277.29	20	-1	9	Could not properly fit the peak.						
16	1329.88	1336.46	16	-10	9	Could not properly fit the peak.						
17	1457.64	1464.65	74	63	10	1461.66	0.64	2.38	K-40	1461.00	0.0002	0.0000
18	1762.38	1769.83	53	30	11	1765.13	1.33	1.68	Bi-214	1764.49	0.0001	0.0000

Detector #1 ACQ 19-Nov-2015 at 15:10:18 RT = 7207.5 LT = 7200.0
Rad Chem 1
MB-323

ROI#	RANGE(keV)		GROSS	NET	+/-	CENTROID	FWHM	FW(1/5)M	LIBRARY	(keV)	µCi	+/-
1	607.80	612.63	152	87	16	609.95	1.22	1.86	Bi-214	609.31	0.0000	0.0000
2	660.21	665.47	64	-11	15	661.74	0.33	0.75	Cs-137	661.66	0.0000	0.0000
3	724.23	729.94	45	13	11	725.99	0.88	1.01	Bi-212	727.00	0.0000	0.0000
4	766.11	772.03	61	0	14	768.96	0.29	1.62	Bi-214	768.36	0.0000	0.0001
5	823.77	829.47	45	0	12	824.98	4.03	4.46	Co-60	826.28	0.0000	0.0295
6	844.60	850.30	95	45	14	848.31	0.25	0.41	Co-56	846.77	0.0000	0.0000
7	857.32	863.02	32	9	9	859.91	0.32	0.52	Tl-208	860.56	0.0000	0.0000
8	908.62	914.32	49	22	10	911.69	1.70	1.86	Ac-228	911.20	0.0000	0.0000
9	965.83	971.97	45	-3	13	968.90	0.27	0.70	Ac-228	968.97	0.0000	0.0000
10	998.71	1004.85	36	-8	12	1001.13	0.33	0.53	Pa-234M	1001.03	0.0000	0.0003
11	1060.09	1066.23	24	-5	10	1063.16	0.22	0.35	No close library match!			
12	1118.17	1124.31	64	20	13	1120.59	0.37	1.21	Bi-214	1120.29	0.0000	0.0000
13	1170.34	1176.48	29	0	10	1171.43	0.33	0.53	Co-60	1173.24	0.0000	0.0000
14	1233.24	1241.13	42	11	13	1234.12	6.47	6.66	Bi-214	1238.11	0.0001	0.0001
15	1270.72	1277.29	36	5	11	1274.44	0.33	0.53	No close library match!			
16	1329.88	1336.46	23	18	6	1334.49	0.22	0.35	Co-60	1332.50	0.0000	0.0000
17	1457.64	1464.65	64	47	11	1461.66	1.14	2.59	K-40	1461.00	0.0002	0.0000
18	1762.38	1769.83	41	35	7	1765.42	0.29	0.95	Bi-214	1764.49	0.0001	0.0000

Detector #1 ACQ 27-Nov-2015 at 21:11:20 RT = 7206.8 LT = 7200.0
Rad Chem 1
MB-331

ROI#	RANGE(keV)		GROSS	NET	+/-	CENTROID	FWHM	FW(1/5)M	LIBRARY (keV)		µCi	+/-
1	607.80	612.63	129	79	14	609.88	0.95	1.38	Bi-214	609.31	0.0000	0.0000
2	660.21	665.47	63	-12	15	Could not properly fit the peak.						
3	724.23	729.94	54	-9	14	728.40	0.33	0.53	Bi-212	727.00	0.0000	0.0000
4	766.11	772.03	66	10	14	769.62	0.26	0.44	Bi-214	768.36	0.0000	0.0001
5	823.77	829.47	43	2	12	825.75	0.22	0.35	Co-60	826.28	0.0049	0.0295
6	844.60	850.30	76	49	11	847.44	0.36	2.22	Co-56	846.77	0.0000	0.0000
7	857.32	863.02	48	3	12	859.29	0.22	0.35	Tl-208	860.56	0.0000	0.0000
8	908.62	914.32	56	24	11	912.32	0.27	1.14	Ac-228	911.20	0.0000	0.0000
9	965.83	971.97	44	15	11	969.34	0.25	0.39	Ac-228	968.97	0.0000	0.0000
10	998.71	1004.85	40	16	10	999.37	4.60	4.73	Pa-234M	1001.03	0.0004	0.0003
11	1060.09	1066.23	29	10	9	1064.47	0.22	0.35	No close library match!			
12	1118.17	1124.31	58	24	12	1121.20	1.37	1.72	Bi-214	1120.29	0.0000	0.0000
13	1170.34	1176.48	18	-1	8	1174.50	0.33	0.53	Co-60	1173.24	0.0000	0.0000
14	1233.24	1241.13	39	8	12	1238.50	0.22	0.35	Co-56	1238.28	0.0000	0.0000
15	1270.72	1277.29	28	2	10	1275.76	0.22	0.35	No close library match!			
16	1329.88	1336.46	25	20	6	1330.54	5.37	5.57	Co-60	1332.50	0.0000	0.0000
17	1457.64	1464.65	47	30	10	1462.68	0.33	1.82	K-40	1461.00	0.0001	0.0000
18	1762.38	1769.83	43	20	11	1765.45	0.82	1.24	Bi-214	1764.49	0.0001	0.0000

Detector #1 ACQ 02-Dec-2015 at 19:18:00 RT = 7207.4 LT = 7200.0
Rad Chem 1
MB-336

ROI#	RANGE(keV)		GROSS	NET	+/-	CENTROID	FWHM	FW(1/5)M	LIBRARY	(keV)	µCi	+/-
1	607.80	612.63	130	69	15	609.75	1.30	1.61	Bi-214	609.31	0.0000	0.0000
2	660.21	665.47	64	6	13	663.94	0.22	0.35	Cs-137	661.66	0.0000	0.0000
3	724.23	729.94	58	4	13	726.65	0.27	0.70	Bi-212	727.00	0.0000	0.0000
4	766.11	772.03	57	20	12	771.12	0.32	0.52	Bi-214	768.36	0.0001	0.0000
5	823.77	829.47	47	-16	14	827.28	0.22	0.35	Co-60	826.28	0.0000	0.0345
6	844.60	850.30	97	61	13	847.25	1.18	2.00	Co-56	846.77	0.0000	0.0000
7	857.32	863.02	46	10	11	861.26	0.24	0.39	Tl-208	860.56	0.0000	0.0000
8	908.62	914.32	53	-1	13	912.34	0.82	1.12	Ac-228	911.20	0.0000	0.0000
9	965.83	971.97	42	13	11	971.15	0.51	1.17	Ac-228	968.97	0.0000	0.0000
10	998.71	1004.85	36	-3	12	1000.57	0.41	0.56	Pa-234M	1001.03	0.0000	0.0003
11	1060.09	1066.23	27	-7	11	1061.62	0.22	0.35	No close library match!			
12	1118.17	1124.31	52	37	9	1121.46	0.22	0.35	Bi-214	1120.29	0.0001	0.0000
13	1170.34	1176.48	26	-13	11	1172.09	0.33	0.53	Co-60	1173.24	0.0000	0.0000
14	1233.24	1241.13	50	31	11	1238.72	0.22	0.35	Co-56	1238.28	0.0000	0.0000
15	1270.72	1277.29	33	2	11	1275.54	0.88	1.01	No close library match!			
16	1329.88	1336.46	22	-25	13	Could not properly fit the peak.						
17	1457.64	1464.65	72	33	14	1461.95	1.84	2.45	K-40	1461.00	0.0001	0.0000
18	1762.38	1769.83	43	37	8	1765.89	0.37	1.42	Bi-214	1764.49	0.0001	0.0000

Detector #1 ACQ 15-Dec-2015 at 10:28:51 RT = 7208.2 LT = 7200.0
Rad Chem 1
MB-336

ROI#	RANGE(keV)		GROSS	NET	+/-	CENTROID	FWHM	FW(1/5)M	LIBRARY	(keV)	µCi	+/-
1	607.80	612.63	132	74	15	609.75	0.73	2.20	Bi-214	609.31	0.0000	0.0000
2	660.21	665.47	62	-5	14	663.72	0.22	0.35	Cs-137	661.66	0.0000	0.0000
3	724.23	729.94	48	-11	13	727.96	0.22	0.35	Bi-212	727.00	0.0000	0.0000
4	766.11	772.03	74	18	14	767.87	0.66	0.79	Bi-214	768.36	0.0001	0.0001
5	823.77	829.47	44	-15	13	826.62	0.22	0.35	Co-60	826.28	0.0000	0.0320
6	844.60	850.30	99	54	14	847.64	1.32	2.02	Co-56	846.77	0.0000	0.0000
7	857.32	863.02	43	2	12	858.41	1.75	1.89	Tl-208	860.56	0.0000	0.0000
8	908.62	914.32	52	29	10	912.05	0.42	0.63	Ac-228	911.20	0.0000	0.0000
9	965.83	971.97	36	-3	12	968.68	0.27	0.99	Ac-228	968.97	0.0000	0.0000
10	998.71	1004.85	40	25	9	1003.72	0.35	1.39	Pa-234M	1001.03	0.0007	0.0002
11	1060.09	1066.23	21	-3	9	1060.75	0.22	0.35	No close library match!			
12	1118.17	1124.31	55	21	12	1120.75	0.47	2.15	Bi-214	1120.29	0.0000	0.0000
13	1170.34	1176.48	28	-6	11	1172.75	0.22	0.35	Co-60	1173.24	0.0000	0.0000
14	1233.24	1241.13	39	39	6	1239.32	0.55	1.96	Co-56	1238.28	0.0000	0.0000
15	1270.72	1277.29	28	-13	12	1272.25	0.33	0.53	No close library match!			
16	1329.88	1336.46	17	-4	9	Could not properly fit the peak.						
17	1457.64	1464.65	66	38	12	1462.04	0.48	1.20	K-40	1461.00	0.0001	0.0000
18	1762.38	1769.83	41	35	7	1766.28	0.33	0.85	Bi-214	1764.49	0.0001	0.0000

MB-11303.Rpt

Detector #1 ACQ 18-Jan-2016 at 16:35:25 RT = 7210.3 LT = 7200.0
Rad Chem 1
MB-018

ROI#	RANGE(keV)		GROSS	NET	+/-	CENTROID	FWHM	FW(1/5)M	LIBRARY	(keV)	µCi	+/-
1	607.80	612.63	141	76	16	609.85	0.52	1.47	Bi-214	609.31	0.0000	0.0000
2	660.21	665.47	59	9	12	662.18	0.22	0.35	Cs-137	661.66	0.0000	0.0000
3	724.23	729.94	60	1	14	725.11	3.29	3.42	Bi-212	727.00	0.0000	0.0000
4	766.11	772.03	51	4	13	766.77	0.22	0.35	Bi-214	768.36	0.0000	0.0000
5	823.77	829.47	47	2	12	828.63	0.29	0.50	Co-60	826.28	0.0049	0.0295
6	844.60	850.30	102	43	15	847.53	0.52	1.77	Co-56	846.77	0.0000	0.0000
7	857.32	863.02	34	-7	11	861.04	0.26	0.44	Tl-208	860.56	0.0000	0.0000
8	908.62	914.32	70	20	13	912.23	0.92	1.64	Ac-228	911.20	0.0000	0.0000
9	965.83	971.97	41	2	12	969.56	0.22	0.35	Ac-228	968.97	0.0000	0.0000
10	998.71	1004.85	41	36	7	1000.80	0.39	0.55	Pa-234M	1001.03	0.0010	0.0002
11	1060.09	1066.23	31	21	7	1063.12	0.35	1.83	No close library match!			
12	1118.17	1124.31	53	24	11	1120.69	0.40	0.61	Bi-214	1120.29	0.0000	0.0000
13	1170.34	1176.48	34	15	9	1174.72	0.22	0.35	Co-60	1173.24	0.0000	0.0000
14	1233.24	1241.13	40	3	13	1238.54	0.32	1.31	Co-56	1238.28	0.0000	0.0000
15	1270.72	1277.29	20	15	6	1276.06	0.87	1.00	No close library match!			
16	1329.88	1336.46	19	14	5	1335.58	0.27	0.48	Co-60	1332.50	0.0000	0.0000
17	1457.64	1464.65	60	38	11	1461.14	0.25	0.40	K-40	1461.00	0.0001	0.0000
18	1762.38	1769.83	54	25	12	1765.35	1.63	1.84	Bi-214	1764.49	0.0001	0.0000

MB-11304.Rpt

Detector #1 ACQ 19-Jan-2016 at 16:25:39 RT = 7210.2 LT = 7200.0
Rad Chem 1
MB-019

ROI#	RANGE(keV)		GROSS	NET	+/-	CENTROID	FWHM	FW(1/5)M	LIBRARY	(keV)	µCi	+/-
1	607.80	612.63	163	105	16	609.63	1.02	1.77	Bi-214	609.31	0.0000	0.0000
2	660.21	665.47	67	9	13	663.75	0.31	0.54	Cs-137	661.66	0.0000	0.0000
3	724.23	729.94	42	19	9	727.82	0.89	2.02	Bi-212	727.00	0.0000	0.0000
4	766.11	772.03	65	18	13	768.30	0.26	0.44	Bi-214	768.36	0.0001	0.0000
5	823.77	829.47	45	0	12	824.43	2.19	2.32	Co-60	826.28	0.0000	0.0295
6	844.60	850.30	101	42	15	847.01	0.95	1.59	Co-56	846.77	0.0000	0.0000
7	857.32	863.02	47	2	12	859.29	0.22	0.35	Tl-208	860.56	0.0000	0.0000
8	908.62	914.32	58	17	12	912.56	0.25	0.39	Ac-228	911.20	0.0000	0.0000
9	965.83	971.97	44	-14	14	966.49	0.22	0.35	Ac-228	968.97	0.0000	0.0000
10	998.71	1004.85	38	9	10	1003.54	0.26	0.44	Pa-234M	1001.03	0.0002	0.0003
11	1060.09	1066.23	30	-14	12	Could not properly fit the peak.						
12	1118.17	1124.31	54	15	12	1120.89	0.45	0.99	Bi-214	1120.29	0.0000	0.0000
13	1170.34	1176.48	30	-4	11	1171.00	0.88	1.01	Co-60	1173.24	0.0000	0.0000
14	1233.24	1241.13	45	26	11	1234.12	5.37	5.65	Bi-214	1238.11	0.0001	0.0001
15	1270.72	1277.29	37	6	11	1273.24	0.43	0.65	No close library match!			
16	1329.88	1336.46	27	-4	11	1330.98	4.82	4.95	Co-60	1332.50	0.0000	0.0000
17	1457.64	1464.65	71	54	11	1461.97	0.88	1.75	K-40	1461.00	0.0002	0.0000
18	1762.38	1769.83	38	38	6	1765.67	1.17	1.62	Bi-214	1764.49	0.0001	0.0000

Detector #1 ACQ 22-Jan-2016 at 15:59:31 RT = 7209.2 LT = 7200.0
Rad Chem 1
MB-022

ROI#	RANGE(keV)		GROSS	NET	+/-	CENTROID	FWHM	FW(1/5)M	LIBRARY	(keV)	µCi	+/-
1	607.80	612.63	162	85	17	609.81	1.20	1.97	Bi-214	609.31	0.0000	0.0000
2	660.21	665.47	48	6	11	664.37	0.26	0.44	Cs-137	661.66	0.0000	0.0000
3	724.23	729.94	52	20	11	726.74	1.82	3.34	Bi-212	727.00	0.0000	0.0000
4	766.11	772.03	60	-1	14	768.63	0.80	0.98	Bi-214	768.36	0.0000	0.0001
5	823.77	829.47	46	14	11	826.66	0.32	0.74	Co-60	826.28	0.0345	0.0271
6	844.60	850.30	85	49	13	847.59	0.46	0.75	Co-56	846.77	0.0000	0.0000
7	857.32	863.02	48	-11	13	860.17	0.22	0.35	Tl-208	860.56	0.0000	0.0000
8	908.62	914.32	50	5	12	911.47	0.25	0.39	Ac-228	911.20	0.0000	0.0000
9	965.83	971.97	41	-3	12	969.88	0.39	0.55	Ac-228	968.97	0.0000	0.0000
10	998.71	1004.85	40	11	11	1002.12	0.41	0.56	Pa-234M	1001.03	0.0003	0.0003
11	1060.09	1066.23	21	11	6	1060.75	1.42	1.62	No close library match!			
12	1118.17	1124.31	59	59	7	1121.33	0.79	1.78	Bi-214	1120.29	0.0001	0.0000
13	1170.34	1176.48	23	8	8	1171.00	0.26	0.96	Co-60	1173.24	0.0000	0.0000
14	1233.24	1241.13	36	17	10	1235.43	1.75	1.88	Bi-214	1238.11	0.0001	0.0000
15	1270.72	1277.29	21	5	8	1271.37	2.63	2.76	No close library match!			
16	1329.88	1336.46	23	-3	10	Could not properly fit the peak.						
17	1457.64	1464.65	70	64	9	1461.08	1.84	3.60	K-40	1461.00	0.0002	0.0000
18	1762.38	1769.83	42	24	10	1765.08	1.00	1.19	Bi-214	1764.49	0.0001	0.0000

MB-11381.Rpt

Detector #1 ACQ 09-Feb-2016 at 13:22:38 RT = 7210.0 LT = 7200.0
Rad Chem 1
MB-11372

ROI#	RANGE(keV)		GROSS	NET	+/-	CENTROID	FWHM	FW(1/5)M	LIBRARY	(keV)	µCi	+/-
1	607.80	612.63	145	45	18	609.89	0.65	0.96	Bi-214	609.31	0.0000	0.0000
2	660.21	665.47	56	6	12	661.20	0.84	1.00	Cs-137	661.66	0.0000	0.0000
3	724.23	729.94	59	27	11	727.55	0.29	0.50	Bi-212	727.00	0.0001	0.0000
4	766.11	772.03	68	17	14	768.78	0.35	0.83	Bi-214	768.36	0.0001	0.0001
5	823.77	829.47	48	-11	13	824.87	0.22	0.35	Co-60	826.28	0.0000	0.0320
6	844.60	850.30	90	40	14	847.45	0.40	0.93	Co-56	846.77	0.0000	0.0000
7	857.32	863.02	36	9	10	858.19	0.27	0.48	Tl-208	860.56	0.0000	0.0000
8	908.62	914.32	56	24	11	911.58	0.91	2.34	Ac-228	911.20	0.0000	0.0000
9	965.83	971.97	36	17	9	970.54	0.42	1.49	Ac-228	968.97	0.0000	0.0000
10	998.71	1004.85	40	11	11	999.37	0.22	0.35	Pa-234M	1001.03	0.0003	0.0003
11	1060.09	1066.23	29	-10	11	1061.19	0.33	0.53	No close library match!			
12	1118.17	1124.31	48	0	13	1120.37	1.37	1.58	Bi-214	1120.29	0.0000	0.0000
13	1170.34	1176.48	19	0	8	Could not properly fit the peak.						
14	1233.24	1241.13	36	-7	14	1239.48	0.41	0.56	Co-56	1238.28	0.0000	0.0000
15	1270.72	1277.29	19	-7	10	Could not properly fit the peak.						
16	1329.88	1336.46	23	-8	11	1335.80	0.22	0.35	Co-60	1332.50	0.0000	0.0000
17	1457.64	1464.65	55	38	10	1461.97	0.44	1.23	K-40	1461.00	0.0001	0.0000
18	1762.38	1769.83	42	30	9	1766.33	0.24	0.39	Bi-214	1764.49	0.0001	0.0000

Page 1

Detector #1 ACQ 18-Feb-2016 at 8:43:01 RT = 7207.5 LT = 7200.0
Rad Chem 1
MB-11412

ROI#	RANGE(keV)		GROSS	NET	+/-	CENTROID	FWHM	FW(1/5)M	LIBRARY (keV)		µCi	+/-
1	607.80	612.63	136	67	16	609.35	0.38	1.48	Bi-214	609.31	0.0000	0.0000
2	660.21	665.47	55	17	11	663.16	0.39	0.55	Cs-137	661.66	0.0000	0.0000
3	724.23	729.94	56	-25	16	Could not properly fit the peak.						
4	766.11	772.03	63	-2	15	770.28	0.22	0.35	Bi-214	768.36	0.0000	0.0001
5	823.77	829.47	50	5	12	825.53	2.96	3.16	Co-60	826.28	0.0123	0.0295
6	844.60	850.30	104	63	14	847.31	0.51	1.32	Co-56	846.77	0.0000	0.0000
7	857.32	863.02	49	4	12	858.19	0.27	0.48	Tl-208	860.56	0.0000	0.0000
8	908.62	914.32	63	-5	15	910.15	1.75	1.89	Ac-228	911.20	0.0000	0.0000
9	965.83	971.97	40	16	10	968.90	0.26	0.66	Ac-228	968.97	0.0000	0.0000
10	998.71	1004.85	46	-7	14	1002.88	0.22	0.35	Pa-234M	1001.03	0.0000	0.0004
11	1060.09	1066.23	27	8	9	1063.60	0.22	0.35	No close library match!			
12	1118.17	1124.31	60	26	12	1120.63	0.31	0.99	Bi-214	1120.29	0.0000	0.0000
13	1170.34	1176.48	32	27	6	1172.97	0.24	0.39	Co-60	1173.24	0.0000	0.0000
14	1233.24	1241.13	48	11	14	1233.90	6.79	6.93	Bi-214	1238.11	0.0001	0.0001
15	1270.72	1277.29	28	18	7	1274.00	2.47	2.67	No close library match!			
16	1329.88	1336.46	26	-15	12	Could not properly fit the peak.						
17	1457.64	1464.65	82	60	12	1461.35	0.92	1.18	K-40	1461.00	0.0002	0.0000
18	1762.38	1769.83	44	26	10	1766.11	0.27	1.10	Bi-214	1764.49	0.0001	0.0000

Detector #1 ACQ 01-Mar-2016 at 16:12:34 RT = 7208.6 LT = 7200.0
Rad Chem 1
MB-061

ROI#	RANGE(keV)		GROSS	NET	+/-	CENTROID	FWHM	FW(1/5)M	LIBRARY	(keV)	µCi	+/-
1	607.80	612.63	117	44	15	609.57	0.40	1.41	Bi-214	609.31	0.0000	0.0000
2	660.21	665.47	64	22	12	664.37	0.25	0.39	Cs-137	661.66	0.0000	0.0000
3	724.23	729.94	56	-7	14	727.74	0.22	0.35	Bi-212	727.00	0.0000	0.0000
4	766.11	772.03	47	-4	13	769.18	2.30	2.50	Bi-214	768.36	0.0000	0.0000
5	823.77	829.47	33	-8	11	824.43	1.97	2.10	Co-60	826.28	0.0000	0.0271
6	844.60	850.30	92	47	14	846.54	0.27	0.65	Co-56	846.77	0.0000	0.0000
7	857.32	863.02	42	-21	14	Could not properly fit the peak.						
8	908.62	914.32	46	-8	13	911.69	0.27	0.48	Ac-228	911.20	0.0000	0.0000
9	965.83	971.97	38	-1	12	970.00	0.22	0.35	Ac-228	968.97	0.0000	0.0000
10	998.71	1004.85	47	-16	15	1003.20	0.40	0.55	Pa-234M	1001.03	0.0000	0.0004
11	1060.09	1066.23	34	-10	12	1065.13	0.33	0.53	No close library match!			
12	1118.17	1124.31	55	21	12	1120.67	0.48	1.05	Bi-214	1120.29	0.0000	0.0000
13	1170.34	1176.48	30	1	10	1173.63	1.10	1.23	Co-60	1173.24	0.0000	0.0000
14	1233.24	1241.13	41	29	9	1238.06	0.29	3.93	Bi-214	1238.11	0.0001	0.0000
15	1270.72	1277.29	28	2	10	1271.81	0.22	0.35	No close library match!			
16	1329.88	1336.46	20	-11	10	Could not properly fit the peak.						
17	1457.64	1464.65	44	33	9	1462.07	0.46	1.66	K-40	1461.00	0.0001	0.0000
18	1762.38	1769.83	44	26	10	1765.53	0.51	0.96	Bi-214	1764.49	0.0001	0.0000

Detector #1 ACQ 15-Mar-2016 at 16:23:17 RT = 7208.7 LT = 7200.0
Rad Chem 1
MB-075

ROI#	RANGE(keV)		GROSS	NET	+/-	CENTROID	FWHM	FW(1/5)M	LIBRARY (keV)		µCi	+/-
1	607.80	612.63	118	49	15	609.08	0.53	1.71	Bi-214	609.31	0.0000	0.0000
2	660.21	665.47	59	-4	13	661.96	0.26	0.44	Cs-137	661.66	0.0000	0.0000
3	724.23	729.94	61	11	13	728.58	0.32	0.74	Bi-212	727.00	0.0000	0.0000
4	766.11	772.03	56	23	11	768.30	0.25	0.39	Bi-214	768.36	0.0001	0.0000
5	823.77	829.47	42	-21	14	Could not properly fit the peak.						
6	844.60	850.30	99	81	12	847.54	0.59	1.74	Co-56	846.77	0.0000	0.0000
7	857.32	863.02	39	-15	13	Could not properly fit the peak.						
8	908.62	914.32	48	25	10	911.23	0.69	1.47	Ac-228	911.20	0.0000	0.0000
9	965.83	971.97	50	2	13	969.56	0.22	0.35	Ac-228	968.97	0.0000	0.0000
10	998.71	1004.85	39	15	10	1003.64	0.88	1.14	Pa-234M	1001.03	0.0004	0.0003
11	1060.09	1066.23	30	11	9	1062.72	0.22	0.35	No close library match!			
12	1118.17	1124.31	57	23	12	1120.15	1.83	2.05	Bi-214	1120.29	0.0000	0.0000
13	1170.34	1176.48	34	15	9	1173.63	1.32	1.45	Co-60	1173.24	0.0000	0.0000
14	1233.24	1241.13	51	20	13	1238.72	0.22	0.35	Co-56	1238.28	0.0000	0.0000
15	1270.72	1277.29	23	13	7	1271.59	3.84	4.03	No close library match!			
16	1329.88	1336.46	22	-9	10	Could not properly fit the peak.						
17	1457.64	1464.65	55	49	8	1461.20	1.03	2.37	K-40	1461.00	0.0002	0.0000
18	1762.38	1769.83	38	32	7	1764.87	0.93	1.98	Bi-214	1764.49	0.0001	0.0000

Detector #1 ACQ 26-Mar-2016 at 18:57:32 RT = 7207.5 LT = 7200.0
Rad Chem 1
MB-086

ROI#	RANGE(keV)		GROSS	NET	+/-	CENTROID	FWHM	FW(1/5)M	LIBRARY	(keV)	µCi	+/-
1	607.80	612.63	128	17	18	609.78	0.51	0.76	Bi-214	609.31	0.0000	0.0000
2	660.21	665.47	60	14	12	661.96	0.22	0.35	Cs-137	661.66	0.0000	0.0000
3	724.23	729.94	43	-7	12	725.33	2.19	2.32	Bi-212	727.00	0.0000	0.0000
4	766.11	772.03	57	15	13	766.99	0.88	1.01	Bi-214	768.36	0.0001	0.0000
5	823.77	829.47	41	5	11	825.97	0.27	0.70	Co-60	826.28	0.0123	0.0271
6	844.60	850.30	101	60	14	847.31	0.48	1.42	Co-56	846.77	0.0000	0.0000
7	857.32	863.02	34	-16	12	Could not properly fit the peak.						
8	908.62	914.32	54	9	12	909.49	1.97	2.10	Ac-228	911.20	0.0000	0.0000
9	965.83	971.97	45	21	10	969.12	0.88	1.01	Ac-228	968.97	0.0000	0.0000
10	998.71	1004.85	30	11	9	1003.10	0.27	0.48	Pa-234M	1001.03	0.0003	0.0002
11	1060.09	1066.23	24	-10	10	1062.94	0.22	0.35	No close library match!			
12	1118.17	1124.31	55	26	11	1120.75	0.78	1.47	Bi-214	1120.29	0.0000	0.0000
13	1170.34	1176.48	22	3	8	Could not properly fit the peak.						
14	1233.24	1241.13	39	8	12	1239.16	0.27	0.77	Co-56	1238.28	0.0000	0.0000
15	1270.72	1277.29	30	-6	12	1275.10	0.22	0.35	No close library match!			
16	1329.88	1336.46	25	-1	10	1335.58	0.27	0.48	Co-60	1332.50	0.0000	0.0000
17	1457.64	1464.65	65	43	11	1461.16	0.34	1.58	K-40	1461.00	0.0001	0.0000
18	1762.38	1769.83	41	23	10	1765.56	1.03	1.85	Bi-214	1764.49	0.0001	0.0000

Detector #1 ACQ 07-Apr-2016 at 11:52:35 RT = 7210.1 LT = 7200.0
Rad Chem 1
MB-098

ROI#	RANGE(keV)		GROSS	NET	+/-	CENTROID	FWHM	FW(1/5)M	LIBRARY	(keV)	µCi	+/-
1	607.80	612.63	114	45	15	610.01	0.36	1.72	Bi-214	609.31	0.0000	0.0000
2	660.21	665.47	70	3	14	661.33	0.29	0.61	Cs-137	661.66	0.0000	0.0000
3	724.23	729.94	57	16	12	727.18	2.11	2.89	Bi-212	727.00	0.0000	0.0000
4	766.11	772.03	55	8	13	768.09	0.26	0.75	Bi-214	768.36	0.0000	0.0000
5	823.77	829.47	39	-11	12	Could not properly fit the peak.						
6	844.60	850.30	74	56	10	847.26	0.35	1.46	Co-56	846.77	0.0000	0.0000
7	857.32	863.02	44	17	10	859.61	2.66	2.89	Tl-208	860.56	0.0000	0.0000
8	908.62	914.32	45	4	12	911.47	0.29	1.27	Ac-228	911.20	0.0000	0.0000
9	965.83	971.97	44	-9	13	969.56	0.22	0.35	Ac-228	968.97	0.0000	0.0000
10	998.71	1004.85	41	-3	12	1000.25	0.22	0.35	Pa-234M	1001.03	0.0000	0.0003
11	1060.09	1066.23	40	-8	13	1061.19	1.10	1.23	No close library match!			
12	1118.17	1124.31	67	23	13	1120.59	0.91	2.41	Bi-214	1120.29	0.0000	0.0000
13	1170.34	1176.48	23	4	8	1172.97	0.27	0.48	Co-60	1173.24	0.0000	0.0000
14	1233.24	1241.13	39	8	12	1238.72	1.31	1.45	Co-56	1238.28	0.0000	0.0000
15	1270.72	1277.29	21	-15	11	1276.19	0.22	0.35	No close library match!			
16	1329.88	1336.46	16	6	6	1331.20	0.27	0.48	Co-60	1332.50	0.0000	0.0000
17	1457.64	1464.65	71	54	11	1461.57	0.83	1.73	K-40	1461.00	0.0002	0.0000
18	1762.38	1769.83	43	31	9	1765.39	0.61	1.95	Bi-214	1764.49	0.0001	0.0000

Inter-Mountain Labs
Sheridan, WY and Gillette, WY

- CHAIN OF CUSTODY RECORD -

All shaded fields must be completed.
This is a legal document; any misrepresentation may be construed as fraud.

#WEB

Client Name	**Project Identification**	**Sampler (Signature/Attestation of Authenticity)**	**Telephone #**
Environmental Restoration Group (ERG)	Midnite Mine Remedial Action		970-556-1174

Report Address
8809 Washington St. NE, Suite 150
Albuquerque, NM 87113

Contact Name
Randy Whicker
Email randywhicker@ergoffice.com
Phone 970-556-1174

Invoice Address
Same as report address

Purchase Order #

Quote # 1265

ITEM	LAB ID (Lab Use Only)	DATE SAMPLED	TIME SAMPLED	SAMPLE IDENTIFICATION	Matrix	# of Containers	Ra-226 (901.1)	U-nat (3050/6020)	Pb-210 (3050/909.0)						REMARKS
1	S1705070-001	05/01/17	1315 hrs	P1R1-13(R1)-0015-SOI-DIS-01	SL	1	x								See Add'l Remaks
2	↓ 002	05/01/17	1322 hrs	P1R1-13(R2)-0015-SOI-DIS-01	SL	1	x								See Add'l Remaks
3															
4															
5															
6															
7															
8															
9															
10															
11															
12															
13															
14															

ANALYSES / PARAMETERS

LAB COMMENTS	Relinquished By (Signature/Printed)	DATE	TIME	Received By (Signature/Printed)	DATE	TIME
16.7	[signature]	5/2/17	1530	Kathy Boyd	5.3.17	11:05

SHIPPING INFO	MATRIX CODES		TURN AROUND TIMES	COMPLIANCE INFORMATION		ADDITIONAL REMARKS
☐ UPS	Water	WT	**Check desired service**	Compliance Monitoring ?	N	*Randy Wicker will contact you with
☐ FedEx	Soil	SL	☒ Standard turnaround	Program (SDWA, NPDES,...)	N	special instructions
☐ USPS	Solid	SD	☐ **RUSH - 5 Working Days**	PWSID / Permit #	N	
☐ Hand Carried	Filter	FT	☐ URGENT - < 2 Working Days	Chlorinated?	N	
☐ Other	Other	OT	*Rush & Urgent Surcharges will be applied*	Sample Disposal: Lab x	Client	

Wade Nieuwsma

From: Randy Whicker [randywhicker@ergoffice.com]
Sent: Thursday, May 04, 2017 11:30 AM
To: Tom Patten
Cc: 'Wade Nieuwsma'
Subject: Midnite Mine soil samples - RUSH request

Tom,

To follow up on our discussion this morning, I need to add something to the request on the two new samples from Midnite Mine you received – in addition to a day zero count (the same day the samples are canned/sealed), I want to request a rush on the processing (drying and pulverizing) and getting the day zero count done ASAP. Whatever the cost on the rush processing is fine.

Please let me know if this is possible and if so, could you please give me an estimated date that you can send me the day zero Ra-226 result?

Finally, as we discussed, the final counting on these two samples (after full radon ingrowth) will need to be reported as Level 4, and you had indicated plans to include in the lab notes a description of the day zero counting and respective results (i.e. values documented in the report, but not appearing with final official results).

Thanks for your help with this.

Randy

Randy Whicker, CHP
Senior Health Physicist

ERG
Environmental Restoration Group, Inc.
8809 Washington St. NE, Suite 150
Albuquerque, NM 87113
Email: RandyWhicker@ergoffice.com
Primary (cell): 970-556-1174
Office: 505-298-4224

check us out at: http://www.ERGoffice.com

**** NOTICE : This communication may contain confidential and/or privileged information for use only by the individual to which it is addressed. If you have received this communication in error, please immediately notify the sender and delete this e-mail and any attachments. Thank you.****

sn # 182115

Survey Meter # Model 2241-2
pH strip lot # HC681919
Thermometer SN# 27130475

INTER-MOUNTAIN LABS

Condition Upon Receipt (Attach to COC)

Sample Receipt

1 Number of ice chests/packages received: 1

*Note as "**OTC**" if samples are received over the counter, unpackaged*

2 Temperature of cooler/samples. *(If more then 8 coolers, please write on back)*

Temps Observed (°C):	16.7							
Temps Corrected (°C):	4							

***Acceptable is**: **0.1° to 10°C** for Bacteria; and 0.1° to 6°C for most other water parameters. Samples may not have had adequate time to cool following collection. Indicate ROI (Received on Ice) for iced samples received on the same day as sampled, in addition to temperature at receipt.*

Client contact for temperatures outside method criteria must be documented below.

3 Emission rate of samples for radiochemical analyses < 0.5mR/hr? **Yes** **No** **N/A**

4 COC Number (If applicable): WCB

5 Do the number of bottles agree with the COC? **Yes** **No** **N/A**

6 Were the samples received intact? *(no broken bottles, leaks, etc.)* **Yes** **No** **N/A**

7 Were the sample custody seals intact? **Yes** **No** **N/A**

8 Is the COC properly completed, legible, and signed? **Yes** **No**

Sample Verification, Labeling & Distribution

1 Were all requested analyses understood and appropriate? **Yes** **No**

2 Did the bottle labels correspond with the COC information? **Yes** **No**

3 Samples collected in proper containers? **Yes** **No**

4 Sample Preservation:

pH at Receipt:	**Final pH** (if added in lab):	**Preservative/Lot#**	**Date/Time Added:**
_____ Total Metals	_____ Total Metals	HNO3 _____	_____
_____ Diss Metals	_____ Diss Metals	*Filtered and preserved in metals*	*Filtered and preserved in metals*
_____ Nutrient	_____ Nutrient	H_2SO_4 _____	
_____ Cyanide	_____ Cyanide	NaOH _____	
_____ Sulfide	_____ Sulfide	ZnAcet _____	
_____ Phenol	_____ Phenol	H_2SO_4 _____	
_____ TOC	_____ TOC	HCl _____	

pH of each WY STP (LAUST) sample must be checked and recorded. _____

5 VOA vials have <6mm headspace? **Yes** **No** **N/A**

6 Were all analyses within holding time at the time of receipt? **Yes** **No**

7 Have rush or project due dates been checked and accepted? **Yes** **No** **N/A**

8 Do samples require subcontracted analyses? **Yes** **No**

If "Yes", which type of subcontracting is required? **General** **Customer-Specified** **Certified**

Sample Receipt, Verification, Login, Labeling & Distribution completed by *(initials)*: KB

Set ID: S1705070

Discrepancy Documentation *(use back of sheet for notes on discrepancies)*

Any items listed above with a response of "No" or do not meet specifications must be resolved.

Person Contacted: _____ Method of Contact: __ Phone: _____

Initiated By: _____ Date/Time: _____ __ Email: _____

Problem:

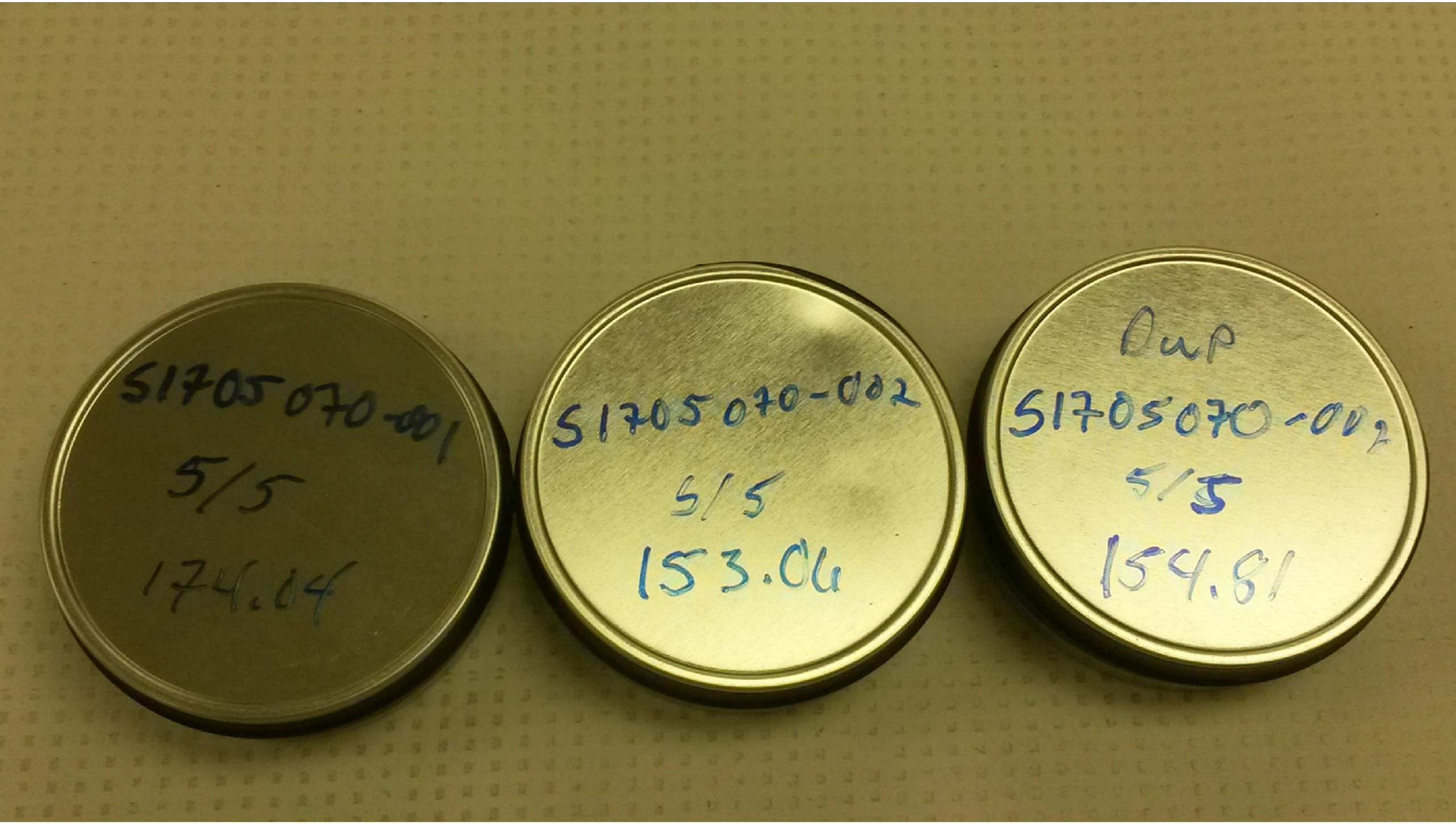
Resolution:

Report Review Checklist

		Log Review (WW 5/4/17)	Report Review (WW 5/30/17)
COC Review	Information on COC matches that on report; spelling accurate.		
1	Original COC attached, signed and dated.	✓	✓
2	Parameters requested.	✓	✓
3	Client.	✓	✓
4	Report recipient/address.	✓	✓
5	Invoice recipient/address.	✓	✓
6	Project.	✓	✓
7	Appropriate PQLs selected.	✓	✓
8	Prices may need to be adjusted prior to invoicing.	Yes or No (No)	NA
9	P. O. number.	NA	NA
10	Sample IDs.	✓	✓
11	Sample dates.	✓	✓
12	Date received.	✓	✓
13	Date due.	✓	✓
14	Matrix.	✓	✓
15	PWSID included for safe drinking water compliance samples.	NA	NA
16	Field data entered appropriately, matches lab data.	NA	NA
17	Special requests indicated in "Comments" section of Work Order summary.	✓	✓

Data Review		
1	Automated QC (Check Data button) review performed, discrepancies resolved.	✓
2	Worksheet/instrument data sheet for all requested parameters attached to data packet.	✓
3	Worksheet/instrument data sheet initialed and dated by analyst, indicating review.	✓
4	Worksheet/instrument data compared to report results for calculation, transcription and data entry errors.	✓
5	Analysis date and time.	✓
6	Analytical method.	✓
7	Appropriate units of measure.	✓
8	Analyst's initials.	✓
9	Calculations checked?	✓
10	Subcontracted analyses identified as such with qualifier.	NA
11	Invoice parameters match those on COC.	✓

Final Review		
1	Report appears complete and appropriate.	✓
2	Condition Upon Receipt form completed, attached to packet, and related qualifiers included in report.	✓
3	All necessary qualifiers included in report.	✓
4	Qualifiers referenced in case narrative; which includes descriptions of all sample/analysis anomalies.	NA
5	Anomalies explained in Case Narrative.	NA ✓
6	Copies of report sent to all recipients requested on COC. Hard copies. _____ Emailed copies.	✓
7	All special requests listed on COC honored.	✓
8	Special report format per client request.	✓
9	Report pages signed.	✓


S1705070-001
5/5
174.04
S1705070-002
5/5
153.06
Dup
S1705070-002
5/5
154.81

Updated NELAP Certification

Texas Commission on Environmental Quality

NELAP-Recognized Laboratory Accreditation is hereby awarded to

Inter-Mountain Laboratories, Inc.

1673 Terra Avenue
Sheridan, WY 82801-6116

in accordance with Texas Water Code Chapter 5, Subchapter R, Title 30 Texas Administrative Code Chapter 25, and the National Environmental Laboratory Accreditation Program.

The laboratory's scope of accreditation includes the fields of accreditation that accompany this certificate. Continued accreditation depends upon successful ongoing participation in the program. The Texas Commission on Environmental Quality urges customers to verify the laboratory's current location(s) and accreditation status for particular methods and analyses (www.tceq.texas.gov/goto/lab). Accreditation does not imply that a product, process, system or person is approved by the Texas Commission on Environmental Quality.

Certificate Number: T104704507-17-8
Effective Date: 2/1/2017
Expiration Date: 1/31/2018

Executive Director Texas Commission on Environmental Quality

Texas Commission on Environmental Quality

NELAP - Recognized Laboratory Fields of Accreditation

Certificate:	T104704507-17-8
Expiration Date:	1/31/2018
Issue Date:	2/1/2017

Inter-Mountain Laboratories, Inc.

1673 Terra Avenue
Sheridan, WY 82801-6116

These fields of accreditation supercede all previous fields. The Texas Commission on Environmental Quality urges customers to verify the laboratory's current accreditation status for particular methods and analyses.

Matrix: ***Air & Emissions***

Method 40 CFR Part 50 Appendix B

Analyte	AB	Analyte ID	Method ID
Total Suspended Particulate	TX	3973	10000304

Method 40 CFR Part 50 Appendix J

Analyte	AB	Analyte ID	Method ID
Particulates <10 um	TX	3950	10000507

Method 40 CFR Part 50 Appendix L

Analyte	AB	Analyte ID	Method ID
Fine particulates <2.5 um	TX	3805	40 CFR 50 App L

Method EPA EQL-0310-189

Analyte	AB	Analyte ID	Method ID
Lead	TX	1075	10245622

Texas Commission on Environmental Quality

NELAP - Recognized Laboratory Fields of Accreditation

Certificate:	T104704507-17-8
Expiration Date:	1/31/2018
Issue Date:	2/1/2017

Inter-Mountain Laboratories, Inc.

1673 Terra Avenue
Sheridan, WY 82801-6116

These fields of accreditation supercede all previous fields. The Texas Commission on Environmental Quality urges customers to verify the laboratory's current accreditation status for particular methods and analyses.

Matrix: ***Non-Potable Water***

Method EPA 1631E

Analyte	AB	Analyte ID	Method ID
Mercury	TX	1095	10237204

Method EPA 1664

Analyte	AB	Analyte ID	Method ID
n-Hexane Extractable Material (HEM) (O&G)	TX	1803	10127807
Silica Gel Treated n-Hexane Extractable Material (SGT-HEM)	TX	10220	10127807

Method EPA 200.7

Analyte	AB	Analyte ID	Method ID
Aluminum	TX	1000	10013806
Antimony	TX	1005	10013806
Arsenic	TX	1010	10013806
Barium	TX	1015	10013806
Beryllium	TX	1020	10013806
Boron	TX	1025	10013806
Cadmium	TX	1030	10013806
Calcium	TX	1035	10013806
Chromium	TX	1040	10013806
Cobalt	TX	1050	10013806
Copper	TX	1055	10013806
Iron	TX	1070	10013806
Lead	TX	1075	10013806
Lithium	TX	1080	10013806
Magnesium	TX	1085	10013806
Manganese	TX	1090	10013806
Molybdenum	TX	1100	10013806
Nickel	TX	1105	10013806
Phosphorus	TX	1910	10013806
Potassium	TX	1125	10013806
Selenium	TX	1140	10013806
Silica as SiO2	TX	1990	10013806

Texas Commission on Environmental Quality

NELAP - Recognized Laboratory Fields of Accreditation

Inter-Mountain Laboratories, Inc.	Certificate:	T104704507-17-8
	Expiration Date:	1/31/2018
1673 Terra Avenue Sheridan, WY 82801-6116	Issue Date:	2/1/2017

These fields of accreditation supercede all previous fields. The Texas Commission on Environmental Quality urges customers to verify the laboratory's current accreditation status for particular methods and analyses.

Matrix: ***Non-Potable Water***

Silver	TX	1150	10013806
Sodium	TX	1155	10013806
Strontium	TX	1160	10013806
Thallium	TX	1165	10013806
Tin	TX	1175	10013806
Titanium	TX	1180	10013806
Vanadium	TX	1185	10013806
Zinc	TX	1190	10013806

Method EPA 200.8

Analyte	AB	Analyte ID	Method ID
Aluminum	TX	1000	10014605
Antimony	TX	1005	10014605
Arsenic	TX	1010	10014605
Barium	TX	1015	10014605
Beryllium	TX	1020	10014605
Cadmium	TX	1030	10014605
Chromium	TX	1040	10014605
Cobalt	TX	1050	10014605
Copper	TX	1055	10014605
Lead	TX	1075	10014605
Manganese	TX	1090	10014605
Molybdenum	TX	1100	10014605
Nickel	TX	1105	10014605
Selenium	TX	1140	10014605
Silver	TX	1150	10014605
Strontium	TX	1160	10014605
Thallium	TX	1165	10014605
Tin	TX	1175	10014605
Titanium	TX	1180	10014605
Uranium	TX	3035	10014605

Texas Commission on Environmental Quality

NELAP - Recognized Laboratory Fields of Accreditation

	Certificate:	T104704507-17-8
Inter-Mountain Laboratories, Inc.	Expiration Date:	1/31/2018
1673 Terra Avenue Sheridan, WY 82801-6116	Issue Date:	2/1/2017

These fields of accreditation supercede all previous fields. The Texas Commission on Environmental Quality urges customers to verify the laboratory's current accreditation status for particular methods and analyses.

Matrix: ***Non-Potable Water***

Vanadium	TX	1185	10014605
Zinc	TX	1190	10014605

Method EPA 245.1

Analyte	AB	Analyte ID	Method ID
Mercury	TX	1095	10036609

Method EPA 300.0

Analyte	AB	Analyte ID	Method ID
Bromide	TX	1540	10053006
Chloride	TX	1575	10053006
Fluoride	TX	1730	10053006
Nitrate as N	TX	1810	10053006
Nitrate-nitrite	TX	1820	10053006
Nitrite as N	TX	1840	10053006
Orthophosphate as P	TX	1870	10053006
Sulfate	TX	2000	10053006

Method EPA 335.4

Analyte	AB	Analyte ID	Method ID
Total cyanide	TX	1645	10061402

Method EPA 350.1

Analyte	AB	Analyte ID	Method ID
Ammonia as N	TX	1515	10063408

Method EPA 351.2

Analyte	AB	Analyte ID	Method ID
Kjeldahl Nitrogen (Total Kjeldahl Nitrogen-TKN)	TX	1790	10065200

Method EPA 353.2

Analyte	AB	Analyte ID	Method ID
Nitrate as N	TX	1810	10067400
Nitrate-nitrite	TX	1820	10067400
Nitrite as N	TX	1840	10067400

Method EPA 6010

Analyte	AB	Analyte ID	Method ID

Texas Commission on Environmental Quality

NELAP - Recognized Laboratory Fields of Accreditation

	Certificate:	T104704507-17-8
Inter-Mountain Laboratories, Inc.	Expiration Date:	1/31/2018
1673 Terra Avenue Sheridan, WY 82801-6116	Issue Date:	2/1/2017

These fields of accreditation supercede all previous fields. The Texas Commission on Environmental Quality urges customers to verify the laboratory's current accreditation status for particular methods and analyses.

Matrix: ***Non-Potable Water***

Aluminum	TX	1000	10155803
Antimony	TX	1005	10155803
Arsenic	TX	1010	10155803
Barium	TX	1015	10155803
Beryllium	TX	1020	10155803
Boron	TX	1025	10155803
Cadmium	TX	1030	10155803
Chromium	TX	1040	10155803
Cobalt	TX	1050	10155803
Copper	TX	1055	10155803
Iron	TX	1070	10155803
Lead	TX	1075	10155803
Lithium	TX	1080	10155803
Manganese	TX	1090	10155803
Molybdenum	TX	1100	10155803
Nickel	TX	1105	10155803
Selenium	TX	1140	10155803
Silica as SiO2	TX	1990	10155803
Silver	TX	1150	10155803
Strontium	TX	1160	10155803
Thallium	TX	1165	10155803
Tin	TX	1175	10155803
Titanium	TX	1180	10155803
Vanadium	TX	1185	10155803
Zinc	TX	1190	10155803

Method EPA 6020

Analyte	AB	Analyte ID	Method ID
Aluminum	TX	1000	10156408
Antimony	TX	1005	10156408
Arsenic	TX	1010	10156408

Texas Commission on Environmental Quality

NELAP - Recognized Laboratory Fields of Accreditation

	Certificate:	T104704507-17-8
Inter-Mountain Laboratories, Inc.	Expiration Date:	1/31/2018
1673 Terra Avenue Sheridan, WY 82801-6116	Issue Date:	2/1/2017

These fields of accreditation supercede all previous fields. The Texas Commission on Environmental Quality urges customers to verify the laboratory's current accreditation status for particular methods and analyses.

Matrix: ***Non-Potable Water***

Barium	TX	1015	10156408
Beryllium	TX	1020	10156408
Cadmium	TX	1030	10156408
Chromium	TX	1040	10156408
Cobalt	TX	1050	10156408
Copper	TX	1055	10156408
Lead	TX	1075	10156408
Manganese	TX	1090	10156408
Molybdenum	TX	1100	10156408
Nickel	TX	1105	10156408
Selenium	TX	1140	10156408
Silver	TX	1150	10156408
Strontium	TX	1160	10156408
Thallium	TX	1165	10156408
Tin	TX	1175	10156408
Titanium	TX	1180	10156408
Vanadium	TX	1185	10156408
Zinc	TX	1190	10156408

Method OIA-1677

Analyte	**AB**	**Analyte ID**	**Method ID**
Amenable cyanide	TX	1510	60031405

Method SM 2320 B

Analyte	**AB**	**Analyte ID**	**Method ID**
Alkalinity as CaCO3	TX	1505	20045005

Method SM 2340 B

Analyte	**AB**	**Analyte ID**	**Method ID**
Total hardness as CaCO3	TX	1755	20046008

Method SM 2510 B

Analyte	**AB**	**Analyte ID**	**Method ID**
Conductivity	TX	1610	20048004

Texas Commission on Environmental Quality

NELAP - Recognized Laboratory Fields of Accreditation

Certificate:	T104704507-17-8
Expiration Date:	1/31/2018
Issue Date:	2/1/2017

Inter-Mountain Laboratories, Inc.

1673 Terra Avenue
Sheridan, WY 82801-6116

These fields of accreditation supercede all previous fields. The Texas Commission on Environmental Quality urges customers to verify the laboratory's current accreditation status for particular methods and analyses.

Matrix: ***Non-Potable Water***

Method SM 2540 C

Analyte	AB	Analyte ID	Method ID
Residue-filterable (TDS)	TX	1955	20049803

Method SM 2540 D

Analyte	AB	Analyte ID	Method ID
Residue-nonfilterable (TSS)	TX	1960	20004802

Method SM 4500-F^- C

Analyte	AB	Analyte ID	Method ID
Fluoride	TX	1730	20101808

Method SM 4500-H+ B

Analyte	AB	Analyte ID	Method ID
pH	TX	1900	20104603

Method SM 7110 B

Analyte	AB	Analyte ID	Method ID
Gross-alpha	TX	2830	20157033
Gross-beta	TX	2840	20157033

Method SM 7500 Ra B

Analyte	AB	Analyte ID	Method ID
Total radium	TX	2975	20170007

Texas Commission on Environmental Quality

NELAP - Recognized Laboratory Fields of Accreditation

Certificate:	T104704507-17-8
Expiration Date:	1/31/2018
Issue Date:	2/1/2017

Inter-Mountain Laboratories, Inc.

1673 Terra Avenue
Sheridan, WY 82801-6116

These fields of accreditation supercede all previous fields. The Texas Commission on Environmental Quality urges customers to verify the laboratory's current accreditation status for particular methods and analyses.

Matrix: ***Solid & Chemical Materials***

Method EPA 1311

Analyte	AB	Analyte ID	Method ID
TCLP	TX	849	10118806

Method EPA 6010

Analyte	AB	Analyte ID	Method ID
Arsenic	TX	1010	10155803
Barium	TX	1015	10155803
Cadmium	TX	1030	10155803
Chromium	TX	1040	10155803
Lead	TX	1075	10155803
Selenium	TX	1140	10155803
Silver	TX	1150	10155803

Method EPA 7470

Analyte	AB	Analyte ID	Method ID
Mercury	TX	1095	10165807