From: Whittaker, Laura [laura.whittaker@aptim.com]
Sent: Thursday, September 13, 2018 12:13 PM
To: Liscio, Matthew P CIV SEA 04, NAVSEA DET RASO [matthew.liscio@navy.mil]
CC: Howard, Leslie A CIV NAVFAC SW [leslie.howard@navy.mil]; Fowler, Janet CIV NAVSEA, SEA 04N [janet.fowler1@navy.mil]; Johnson, Nels [Nels.Johnson@aptim.com]; Schul, Raymond [raymond.schul@aptim.com]; Guillory, Jeffrey [jeffrey.guillory@aptim.com]; Amy Mangel [amy.mangel@aptim.com]; Hanelt, Norm [Norm.Hanelt@aptim.com]; Killpack, Randall [randall.killpack@aptim.com]; Chi, Minhsec [minhsec.chi@aptim.com]; Orman, Sean [sean.orman@aptim.com]; Rogers, Bryon [bryon.rogers@aptim.com]
Subject: [Non-DoD Source] Data package ready for review - HPNS PE-2, RSY C6 (DC)
Attachments: HPNS APTIM RSY C6 (DC) Soil Non-LLRW Concurrence Request 09132018 (reduced).pdf

Mr. Liscio,

APTIM request RASO concurrence to designate this soil as Non-LLRW soil.

If there are any questions or if additional data is required, please contact me.

Thank you.

LAURA WHITTAKER
Radiological Technician 4 (RCT IV)

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Hunters Point Naval Shipyard, Parcel E-2
RSY Data Report

Contract No. EMAC III CTO-0013		
RSY Pad: C6	RSY Pad Use Number: Deconstruction (DC)	First Submittal ☑ Second Submittal ☐
Data attached and submitted by: Laura Whittaker		Data Report Submittal Date: 09/13/2018

Soil Sample Data					
Sample Identification	Survey Location	Type of Sample	^{226}Ra Final Analytical Results (pCi/g)	^{137}Cs Final Analytical Results (pCi/g)	Total Sr Final Analytical Results (pCi/g)
Upper limit of site reference background			1.633	0.113	0.331
PE2-RSYC6-DC-S001	1	Systematic	0.687	-0.0216	0.0562
PE2-RSYC6-DC-S002	2	Systematic	0.742	0.00806	N/A
PE2-RSYC6-DC-S003	3	Systematic	0.757	0.00198	N/A
PE2-RSYC6-DC-S004	4	Systematic	0.560	-0.00474	N/A
PE2-RSYC6-DC-S005	5	Systematic	0.442	-0.0176	N/A
PE2-RSYC6-DC-S006	6	Systematic	0.697	-0.0446	N/A
PE2-RSYC6-DC-S007	7	Systematic	0.616	-0.00384	N/A
PE2-RSYC6-DC-S008	8	Systematic	0.556	-0.00395	N/A
PE2-RSYC6-DC-S009	9	Systematic	0.558	-0.0122	N/A
PE2-RSYC6-DC-S010	10	Systematic	0.666	0.0157	N/A
PE2-RSYC6-DC-S011	11	Systematic	0.470	0.0217	0.0881
PE2-RSYC6-DC-S012	12	Systematic	0.234	-0.0430	N/A
PE2-RSYC6-DC-S013	13	Systematic	0.661	0.00331	N/A
PE2-RSYC6-DC-S014	14	Systematic	1.00	-0.0508	N/A
PE2-RSYC6-DC-S015	15	Systematic	0.765	0.0172	N/A
PE2-RSYC6-DC-S016	16	Systematic	0.624	0.0411	N/A
PE2-RSYC6-DC-S017	17	Systematic	0.718	0.0370	N/A
PE2-RSYC6-DC-S018	18	Systematic	0.943	0.0237	N/A
Biased Soil Sample Data					
PE2-RSYC6-DC-B-S001	1	Biased	0.775	0.0185	N/A

^{226}Ra Radium-226
^{137}Cs Cesium-137
Sr Strontium
pCi/g Picocuries per gram

Instrument and Survey Data										
Activity	Survey #	Date	Meter	Calibration Due Date	Serial #	Reference Area Static Bkgd	Reference Area Static 3σ IL	Reference Area Scan Bkgd	Reference Area Scan 3σ IL	Range
RSI Gamma Walkover Survey	HPRS-08022018-PE2-ROV2-2876	08/02/2018	RS-701/ RSX-1	N/A	Console: 7236 Detectors: 5447,5448	N/A	N/A	3,400 CPS	4,842 CPS	3,509-**4,936**$^{+}$CPS
RSI Follow-up Static Survey	HPRS-08082018-PE2-JSS2-2897	08/08/2018	RS-701/ RSX-1	N/A	Console: 7236 Detectors: 5447,5448	3,612 CPS	4,255 CPS	N/A	N/A	4,135-**4,646**$^{+}$CPS
Systematic Sample Survey	HPRS-07312018-PE2-JSS-2862	07/31/2018	2221	06/29/2019	117634	15,069 CPM	17,241 CPM	N/A	N/A	17,158-**20,190**$^{+}$ CPM
Biased Sample Survey	HPRS-08092018-PE2-JSS-2902	08/09/2018	2221	06/29/2019	117634	15,069 CPM	17,241 CPM	N/A	N/A	**19,100**$^{+}$ CPM

\+ Gamma readings exceeding the Reference Area 3σ IL are attributable to the presence of naturally-occurring non-Navy program radionuclides in the excavated soil—see Note(s) in the Summary table (page 2) for more details.

3σ IL Investigation Level (established at 3σ above the mean of the Reference Area dataset)

CPS Counts per second

CPM Counts per minute

Summary
1) RSI gamma walkover survey and data review—upon review of initial scan data, follow-up static investigations were deemed necessary, and investigation locations were identified as per the RSI Data Evaluation Process (pages 3-4). Gamma scan coverage is shown on the Systematic Sample Survey map (page 8). Contour maps of scan data are shown on RSI Data Plots (page 5). Data review results are summarized on RSI Review Summary (page 6).
2) RSI Follow-up static survey—29 locations identified during the data review process were investigated. One follow-up location exceeded the Reference Area static IL for region of interest (ROI) 8 (VD1). Follow-up locations are shown on the RSI Follow-up Static Survey map (page 7). Note: Gamma readings reported in the Instrument and Survey Data table (page 1) for the gamma walkover and follow-up static surveys show the mean gamma gross count rate range(ROI 10,VD1) for all surveyed follow-up locations. Spectral analysis result of follow-up location 23 exceeded the Reference Area Static IL for regions of interests (ROI) 8. Count rates in all radionuclide-specific ROIs (3, 6, 7 and 8) were less than the radionuclide-specific Reference Area static ILs for all other follow-up investigation locations. Biased soil samples PE2-RSYC6-DC-B-S001 was collected and submitted for gamma spectroscopy analysis to further characterize the elevated soil readings at follow-up locations 23 (see Summary Note 4 below).
3) Eighteen systematic soil samples (001-018) were obtained and submitted for gamma spectroscopy analysis. Sample locations for systematic samples are shown on the Systematic Sample Survey map (page 8). TestAmerica sample results are attached (pages 41-64). Ten percent of the systematic soil samples (two samples in total, PE2-RSYC6-DC-S001 & PE2-RSYC6-DC-S011) were also analyzed for total strontium. Total Strontium results are also included in the TestAmerica sample results report (pages 45-64).
4) Biased sample survey—sample PE2-RSYC6-DC-B-S001 was obtained and analyzed to support the evaluation of elevated gamma readings collected at follow-up location 23. Biased soil sample location is shown on the Biased Sample Survey map (page 9). TestAmerica sample results are attached (pages 65-76). Note: Static gamma measurements collected at systematic and biased sample locations were obtained with a handheld Ludlum 2221 Scaler/Ratemeter and 3"x3" NaI probe; the results show gamma readings exceeding the instrument-specific Reference Area Static IL at several sample locations. Sample results indicate that this activity is due to the presence of naturally-occurring non-Navy program radionuclides in the excavated soil.
Conclusions: **All locations with elevated Z-scores identified by the RSI gamma walkover survey were determined to be consistent with background. 29 locations were investigated during the follow-up static survey, with one reading greater than the Reference Area static IL at follow-up location 23 for ROI 8 (VD1). Spectral analysis results and gamma static data for each region of interest (ROI) are provided (pages 10-38).** **Final analytical results for systematic and biased samples from this RSY pad are concluded to be comparable to background. Histograms showing systematic soil sample activity concentrations are provided (pages 39-40). Ten percent of the systematic soil samples (two samples in total, PE2-RSYC6-DC-S001 & PE2-RSYC6-DC-S011) were also analyzed for total strontium, with concentrations less than the Project Action Limit of 0.331 pCi/g, as shown in the Soil Sample Data table (page 1).** **This data package characterizes the construction base layer for RSY C6 pad. The soil was initially import clean material.** **APTIM request RASO concurrence to release this soil as Non-LLRW.** **Disposition: This soil shall be dispositioned as non-LLRW waste. The soil will be stockpiled onsite for reuse following appropriate chemical characterization.**

RSI Data Evaluation Process

RS-700 Mobile Radiation Monitoring System

- Self-contained gamma-ray radiation detection and monitoring system
- (2) RSX-1 4-liter NaI(Tl) gamma detectors oriented perpendicular to the direction of travel (VD1 denotes both detectors summed; VD3 refers to the left detector; and VD4 refers to the right detector)
- Multi-Channel Analyzer, allowing for monitoring of energy-specific regions of interest (ROIs)
- RadAssist survey software for control, monitoring, and recording

Ten ROIs have been established for radium and progeny, cesium, and cobalt, as well as other naturally-occurring or anthropogenic gamma-emitting radionuclides that may be of interest:

ROI	Description	Energy Range (keV)	Primary Peak (keV)
1	Total counts	411 – 2811	N/A
2	Potassium	1371 – 1569	1460
3	U/Ra-226	1659 – 1860	1764 (Bi-214)
4	Thorium	2409 – 2811	2614 (Tl-208)
5	Annihilation	456 – 570	511
6	Ra-226	546 – 666	609 (Bi-214)
7	Cs-137	600 - 720	662
8	Pb-214/Ra-226	327 – 399	351
9	Co-60	1085 - 1370	1173/1332
10	Gross Counts	24 – 2811	N/A

A tiered approach is used during data review to identify follow-up locations. Raw data are exported to a comma delimited format using RadAsssist and imported into an Excel spreadsheet for review and analysis. The following review steps are completed to determine if additional follow-up measurements are necessary:

- **Playback Review**: The data file is replayed in RadAssist and reviewed for elevated count rates in ROIs 6, 7, 9, and 10 for virtual detector (VD) 1 (both detectors summed). The scan screen is also monitored for elevated count rates and alarms.
- **Count Rate Time Series Review**: The count rates for ROIs 6, 7, 9, and 10 for VDs 1, 3 (detector 1), and 4 (detector 2) are plotted in a time series and reviewed for additional peaks in count rate.
- **All ROIs**:
    - **Z-Scores**: The Z-Scores are calculated for each location in all ROIs for VDs 1, 3, and 4. Any location with four or more ROIs having a Z-Score greater than three (Z>3) is marked for follow-up.
    - **Local Z-Scores**: Local Z-Scores are calculated using a moving average for each data point in all ROIs for VDs 1, 3, and 4 to identify elevated count rates where the background is variable (e.g. multiple surface types). Any location (in a survey unit that meets this condition) with four or more ROIs having a local Z>3 is marked for follow-up.
    - **Semi-local Z-Scores**: Semi- local Z-Scores are calculated using the global average, but with a moving average for the standard deviation for VDs 1, 3, and 4. This is used for survey data that have a consistent background but an area or areas of highly elevated count rates, in order to identify smaller areas of elevated count rates that may not otherwise be identified by the initial Z-score review. Any location (in a survey unit that meets this condition) with four or more ROIs having a semi-local Z>3 is marked for follow-up.
- **ROIs 3, 6, 8, and 10 (radium-specific ROIs):**
    - Z-Scores: The Z-Scores are calculated for each location in the radium-specific ROIs for VDs 1, 3, and 4. Any location with three or more radium-specific ROIs having a Z>3 is marked for follow-up.
    - Local Z-Scores: Local Z-Scores are calculated using a moving average for each data point in the radium-specific ROIs for VDs 1, 3, and 4 to identify elevated count rates where the background is variable (e.g. multiple surface types). Any location (in a survey unit that meets this condition) with three or more radium-specific ROIs having a local Z>3 is marked for follow-up.
    - Semi-local Z-Scores: Semi- local Z-Scores are calculated using the global average, but with a moving average for the standard deviation for VDs 1, 3, and 4. This is used for survey data that have a consistent background but an area or areas of highly elevated count rates, in order to identify smaller areas of elevated count rates that may not otherwise

be identified by the initial Z-score review. Any location (in a survey unit that meets this condition) with three or more radium-specific ROIs having a semi-local Z>3 is marked for follow-up.

- **ROI 7 (cesium-specific ROI):**
  - Z-Scores: Z-Scores are calculated for each location in ROI 7 for VDs 1, 3, and 4. Any location having a Z>3 is marked for follow-up.
  - Local Z-Scores: Local Z-Scores are calculated using a moving average for each data point in ROI 7 for VDs 1, 3, and 4 to identify elevated count rates where the background is variable (e.g. multiple surface types). Any location (in a survey unit that meets this condition) having a local Z>3 is marked for follow-up.
  - Semi-local Z-Scores: Semi- local Z-Scores are calculated using the global average, but with a moving average for the standard deviation in ROI 7 for VDs 1, 3, and 4. This is used for survey data that have a consistent background but an area or areas of highly elevated count rates, in order to identify smaller areas of elevated count rates that may not otherwise be identified by the initial Z-score review. Any location (in a survey unit that meets this condition) having a semi-local Z>3 is marked for follow-up.
- **ROI 9 (cobalt-specific ROI):**
  - Z-Scores: Z-Scores are calculated for each location in ROI 9 for VDs 1, 3, and 4. Any location having a Z>3 is marked for follow-up.
  - Local Z-Scores: Local Z-Scores are calculated using a moving average for each data point in ROI 9 for VDs 1, 3, and 4 to identify elevated count rates where the background is variable (e.g. multiple surface types). Any location (in a survey unit that meets this condition) having a local Z>3 is marked for follow-up.
  - Semi-local Z-Scores: Semi- local Z-Scores are calculated using the global average, but with a moving average for the standard deviation in ROI 9 for VDs 1, 3, and 4. This is used for survey data that have a consistent background but an area or areas of highly elevated count rates, in order to identify smaller areas of elevated count rates that may not otherwise be identified by the initial Z-score review. Any location (in a survey unit that meets this condition) having a semi-local Z>3 is marked for follow-up.

- **Z-Score Time Series Review**: The three types of Z-Scores for ROIs 6, 7, 9, and 10 for VDs 1, 3, and 4 are plotted in a time series and reviewed for additional peaks in Z-Scores.

Any location selected for follow-up or with a Z-Score > 3 in a radium-, cesium-, or cobalt-specific ROI will undergo spectral analysis to determine if it is statistically likely that there are ROC concentrations present at that location in quantities greater than background.

A background spectrum is subtracted from the local spectral data for a given location, and the resulting net spectrum is plotted. Critical levels, as defined in Section 6.7.1 of the Multi Agency Radiation Survey and Site Investigation Manual are calculated and plotted based on background levels. The critical level is the level, in counts, at which there is a statistical probability (with a predetermined confidence) of incorrectly identifying a measurement system background value as greater than background. Any response above this level is considered to be greater than background. The critical level is calculated for ROIs 6, 7, 8, and 9 according to the equation shown below:

$$L_C = 2.33\sqrt{B}$$

Where:

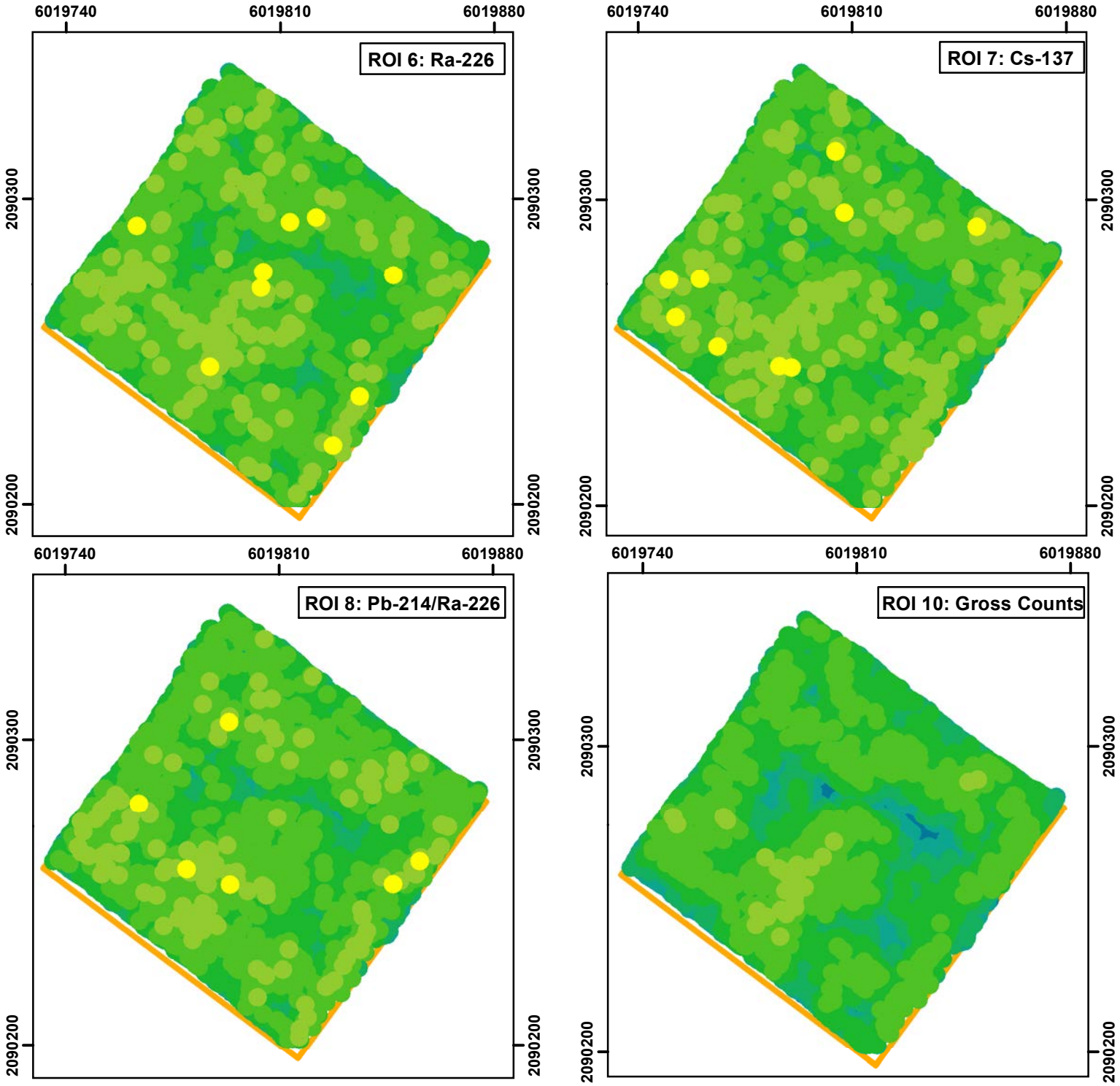
LC	=	critical level (counts)
B	=	average background in the ROI

When count rates in the net gamma spectrum at a given location do not exceed critical levels for any radium-, cesium-, or cobalt-specific energy ranges, it is unlikely that ROC concentrations exist at that location above background.

Any data point that is both above the critical level and within the energy range of a given ROI is considered above background for that radionuclide and will be flagged for further investigation in the field.

Contour Map

HPNS Parcel E-2
RSY Pad C6 Deconstruction



RS-700 Gamma Walkover Data (VD1)

- > 3 std dev
- > 2 to < 3 std dev
- > 1 to < 2 std dev
- > 0 to < 1 std dev
- > -1 to < 0 std dev
- > -2 to < -1 std dev
- > -3 to < -2 std dev
- < -3 std dev
- RSY Pad Boundaries

0 20 40 80 Feet

Coordinate system: CSP Zone III. NAD83, US Survey Foot

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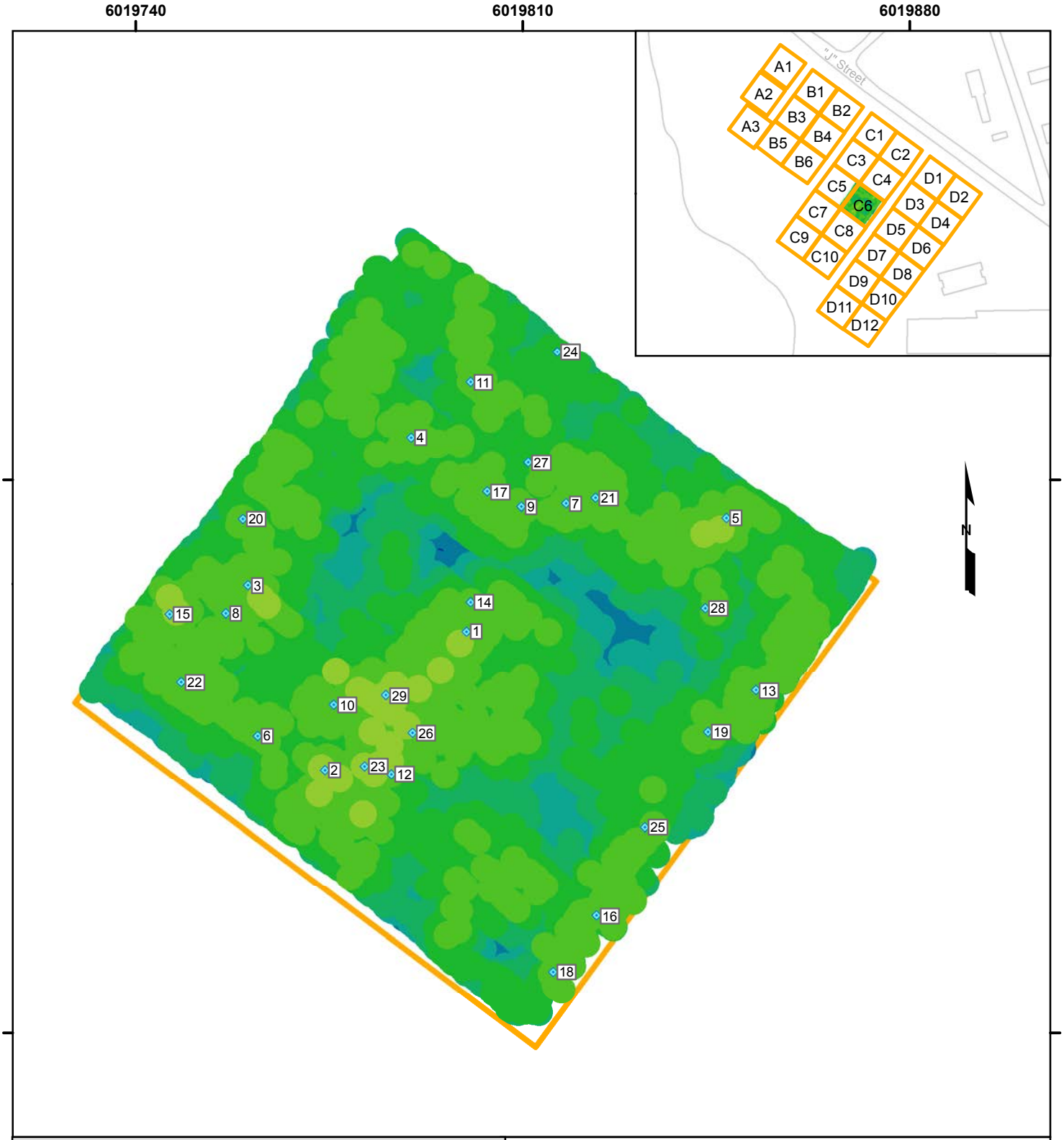
RSI Review Summary

Summary:

29 locations were initially selected for follow-up investigation. Locations were identified by elevated peaks noted in the playback review and/or time series charts, and by using the Z-Score, Local Z-Score, and Semi-Local Z-Score reviews as described in the RSI Data Evaluation Process on pages 3-4. Spectral analyses performed on gamma static data at location #23 exceeded the Reference Area Static IL for region of interest (ROI) 8. All other gamma static readings at follow-up locations were less than the Reference Area static IL for ROIs 3, 6, 7, and 8; figures for all locations are provided on pages 10-38.

RSI Follow-up Static Survey
HPRS-08082018-PE2-JSS2-2897

HPNS Parcel E-2
RSY Pad C6 (DC)



RS 700 Gamma Walkover Survey Data (VD1, ROI 10)

- Follow-up Locations
- > 3 std dev
- > 2 to < 3 std dev
- > 1 to < 2 std dev
- > 0 to < 1 std dev
- > -1 to < 0 std dev
- > -2 to < -1 std dev
- > -3 to < -2 std dev
- < -3 std dev
- RSY Pad Boundaries

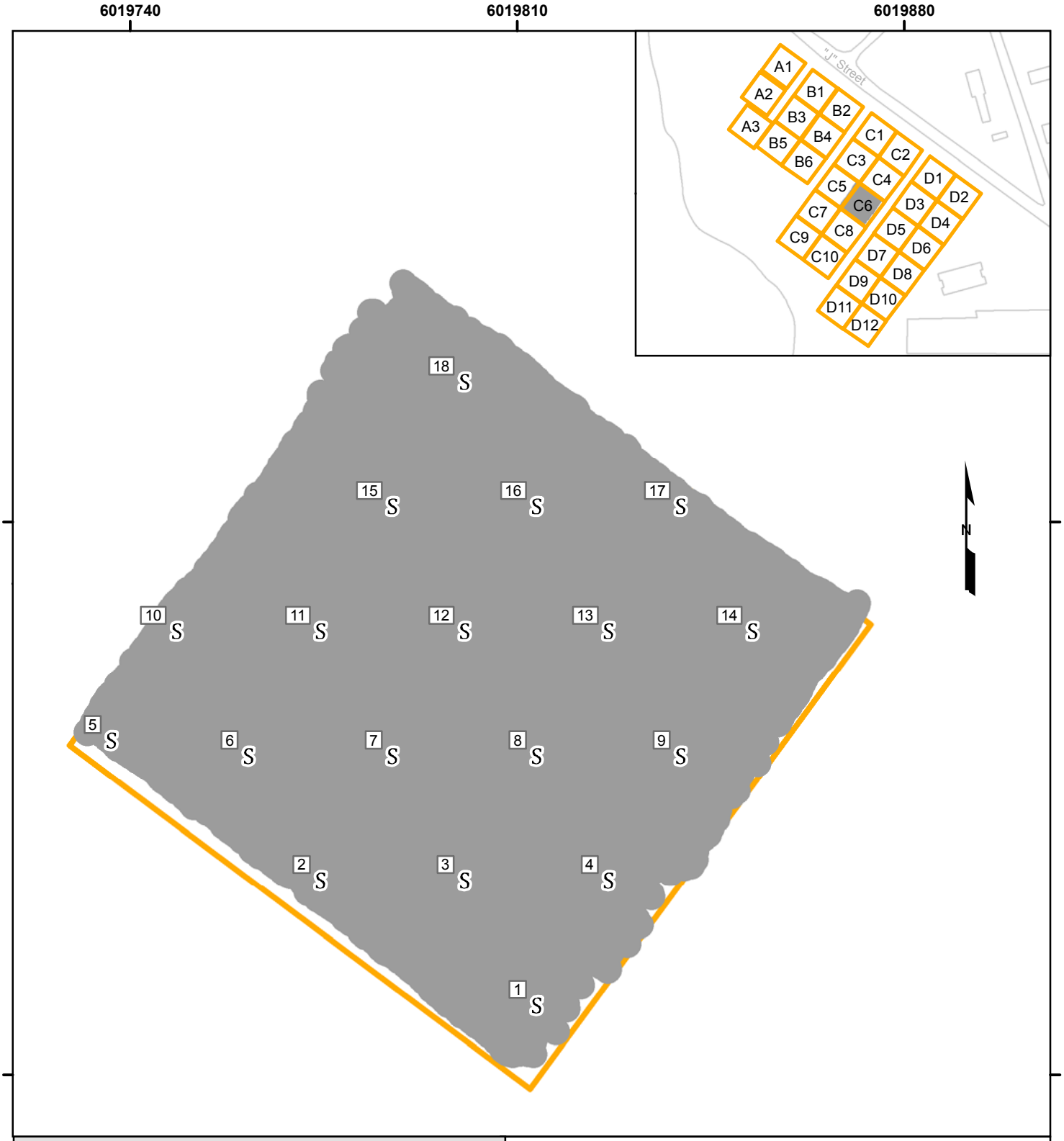
0 10 20 40 Feet

Coordinate system: CSP Zone III. NAD83, US Survey Foot

APTIM

Systematic Sample Survey
HPRS-07312018-PE2-JSS-2862

HPNS Parcel E-2
RSY Pad C6-DC



Survey Instrument: Model 2221/ 44-20
Serial Number: 117634

S Systematic Sample Locations

RS-700 GWS Scan Coverage

RSY Pad Boundaries

0 10 20 40 Feet

Coordinate system: CSP Zone III. NAD83, US Survey Foot

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Biased Sample Survey
HPRS-08092018-PE2-JSS-2902

HPNS Parcel E-2
RSY Pad C6-DC

Survey Instrument: Model 2221/ 44-20
Serial Number: 117634

B Biased Sample Location

RS-700 GWS Scan Coverage

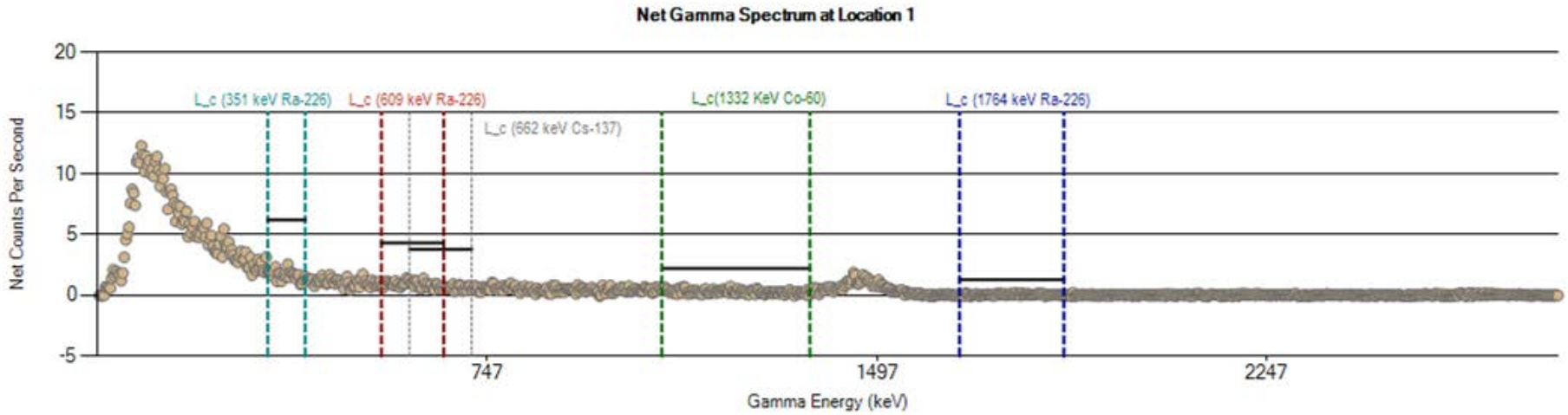
RSY Pad Boundaries

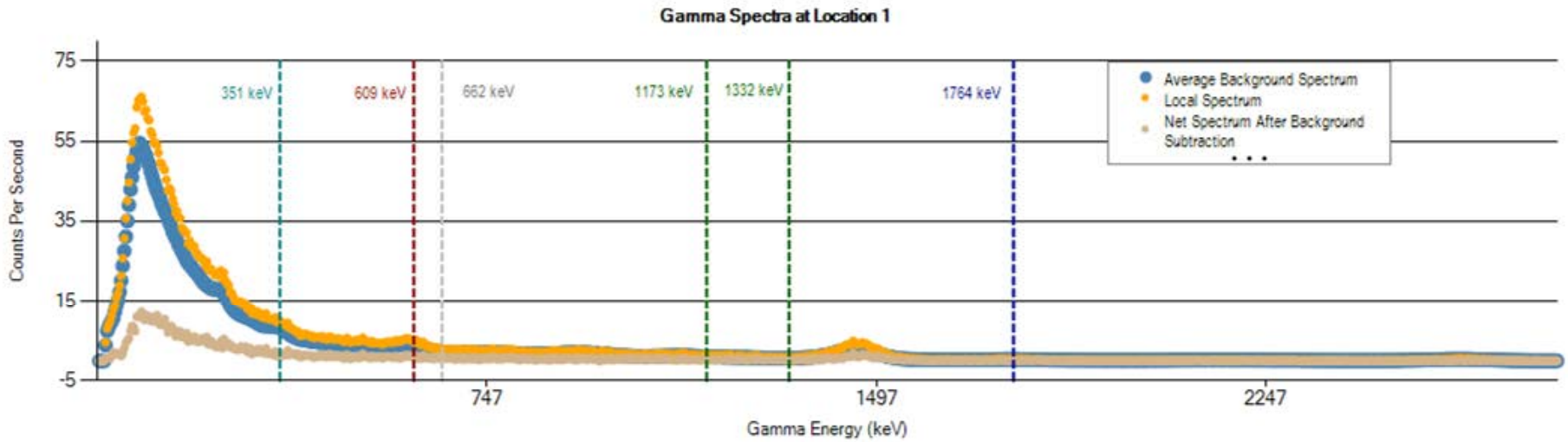
0 10 20 40 Feet

Coordinate system: CSP Zone III. NAD83, US Survey Foot

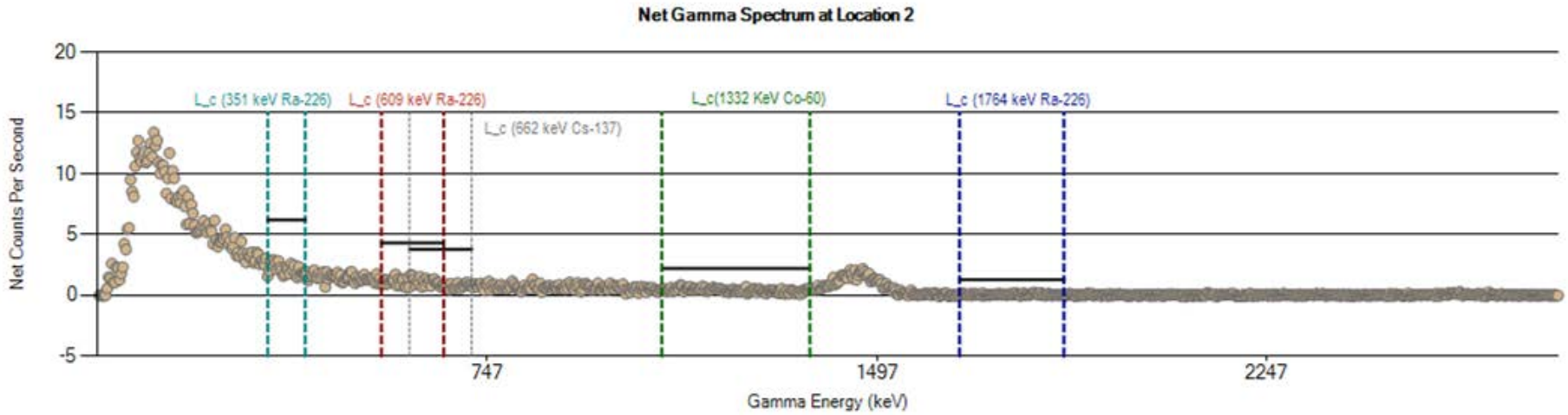
APTIM

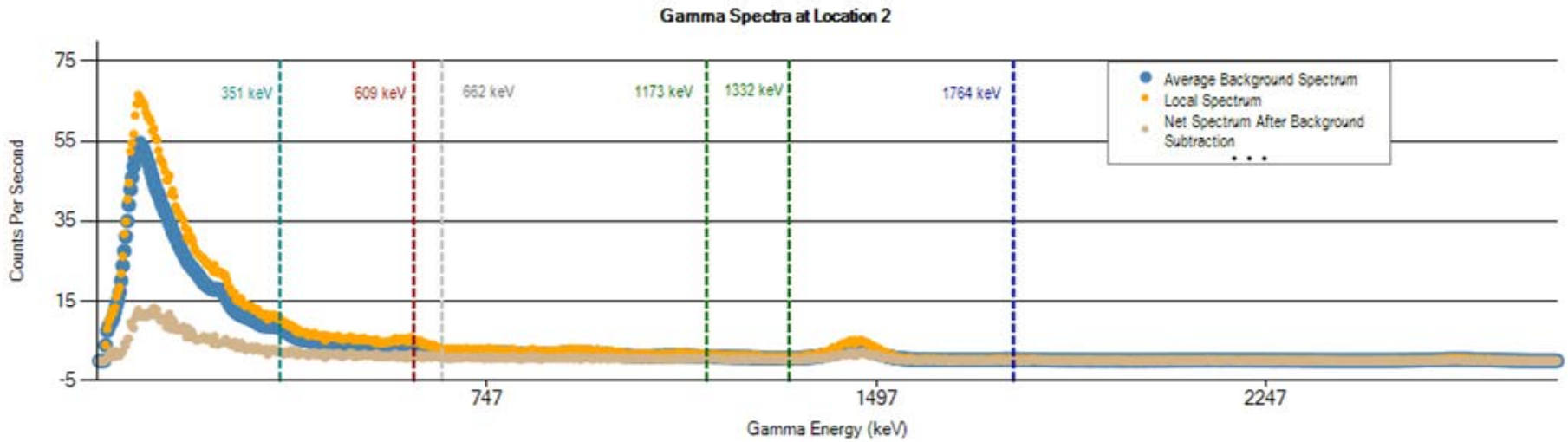
C:\Users\laura.whittaker\Desktop\GIS\RSY Pads\RSY-C\RSY-C6\1RSY C6-DC Biased.mxd



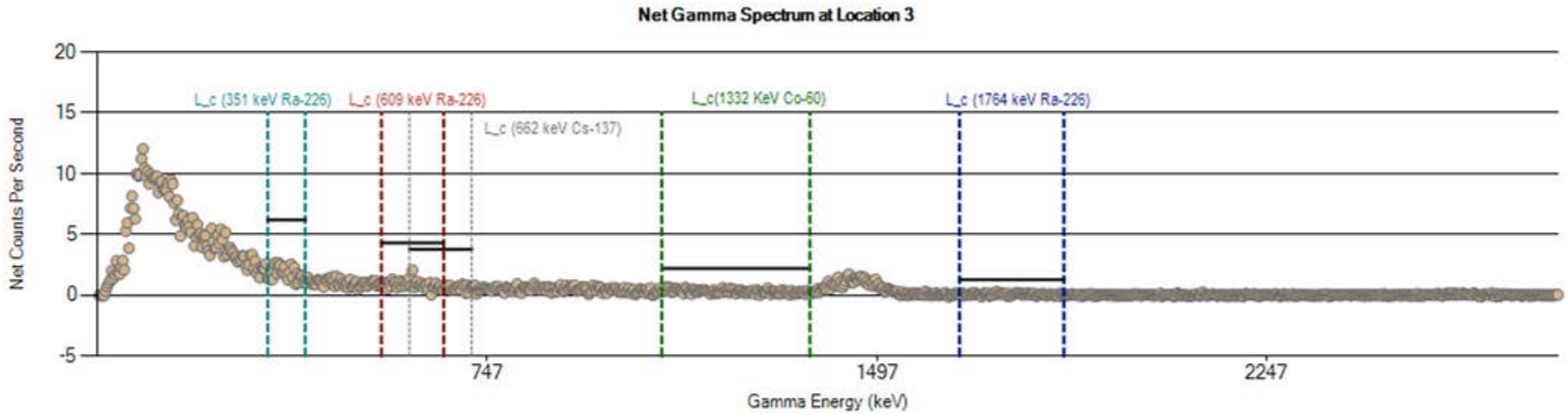


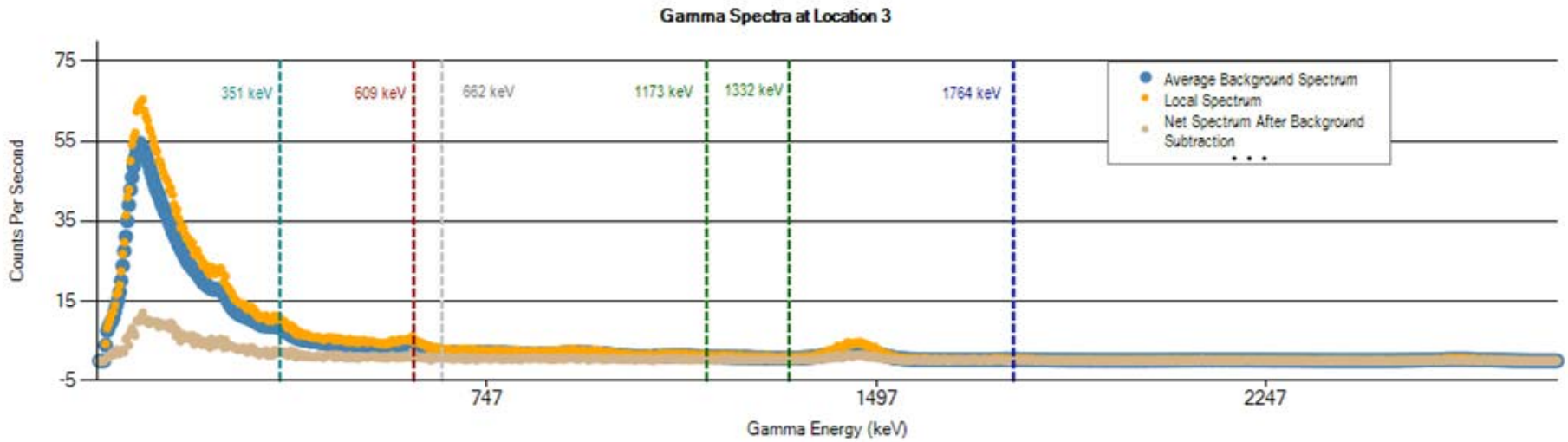
	ROI1	ROI2	ROI3	ROI4	ROI5	ROI6	ROI7	ROI8	ROI9	ROI10
Location 1 (cps)	**1096**	**161**	24	28	190	176	137	215	116	**4461**
Static IL (cps)	1052	150	35	41	201	189	146	229	120	4255



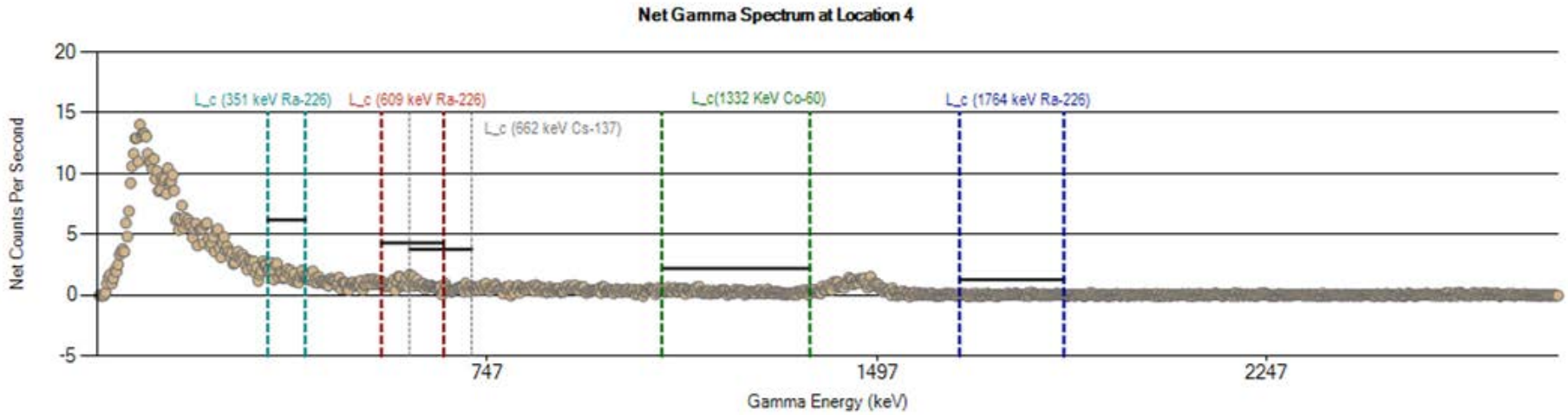


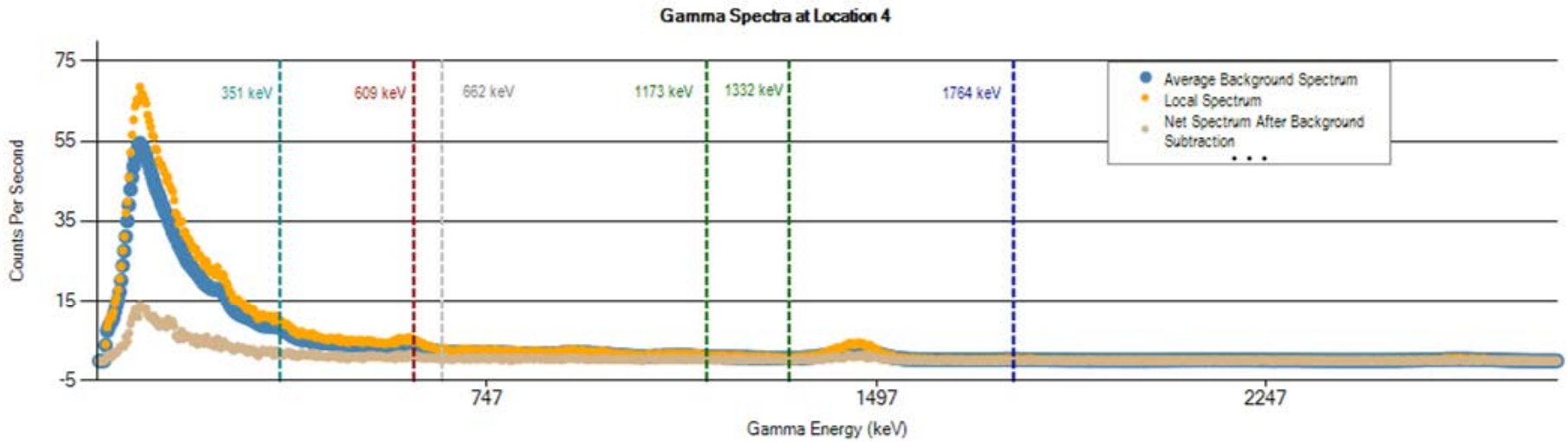
	ROI1	ROI2	ROI3	ROI4	ROI5	ROI6	ROI7	ROI8	ROI9	ROI10
Location 2 (cps)	**1178**	**180**	25	29	**204**	186	146	228	**128**	**4630**
Static IL (cps)	1052	150	35	41	201	189	146	229	120	4255



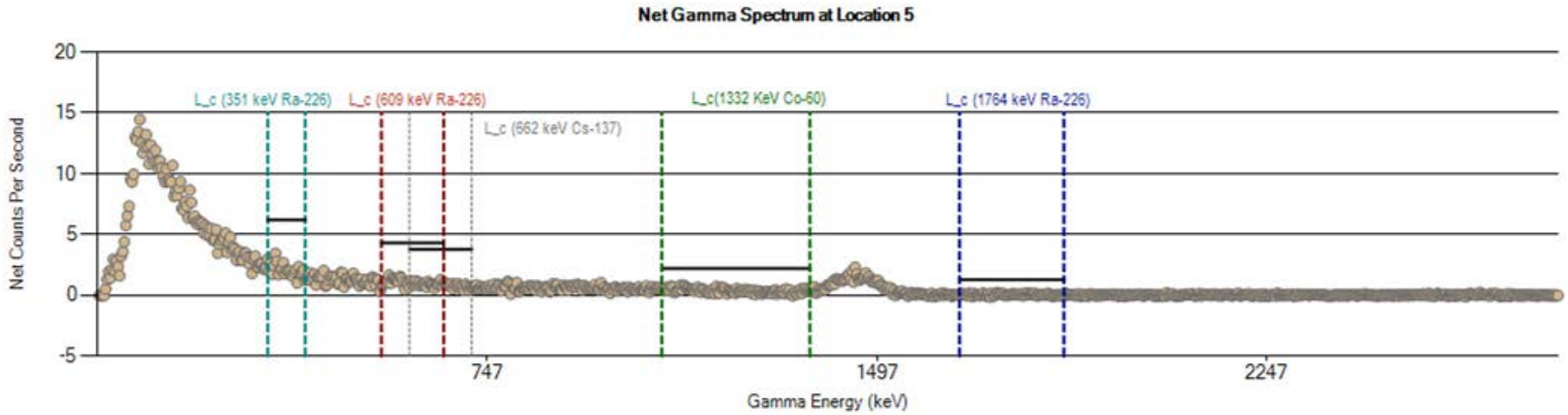


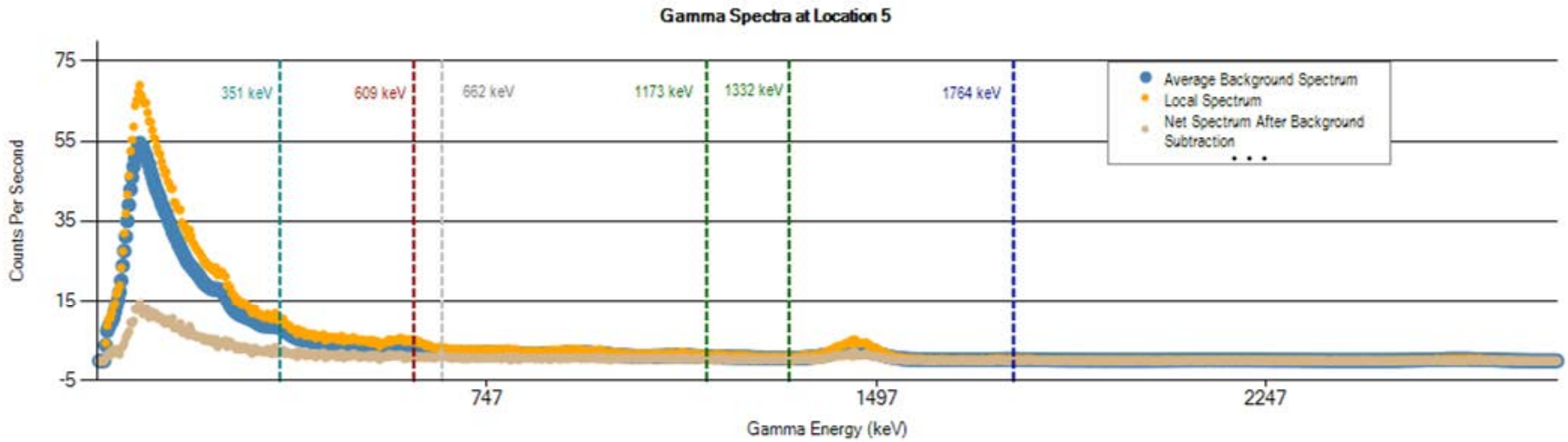
	ROI1	ROI2	ROI3	ROI4	ROI5	ROI6	ROI7	ROI8	ROI9	ROI10
Location 3 (cps)	**1099**	**163**	26	28	189	176	137	219	119	**4449**
Static IL (cps)	1052	150	35	41	201	189	146	229	120	4255



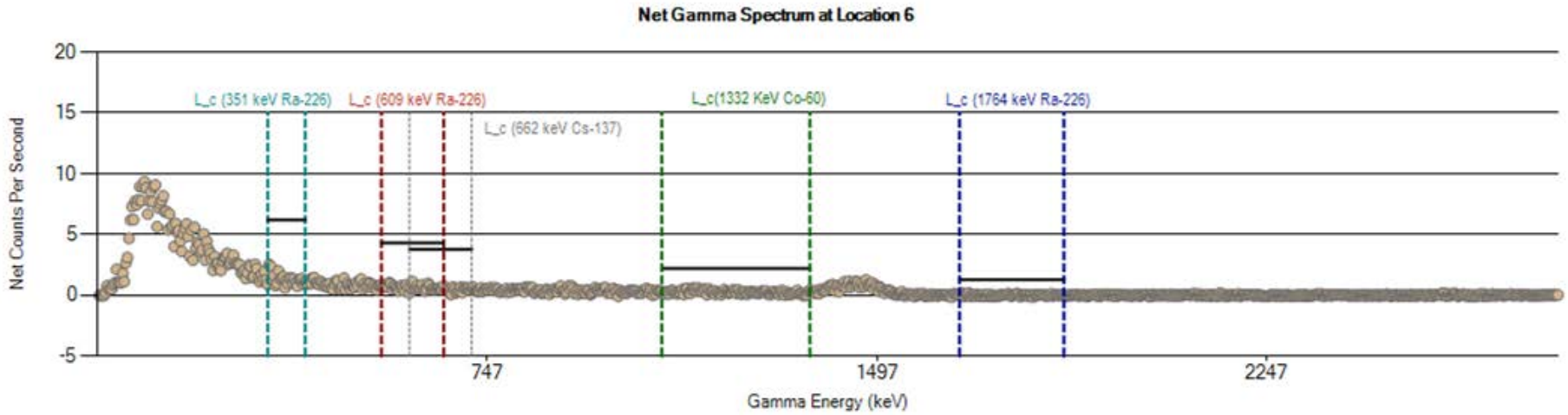


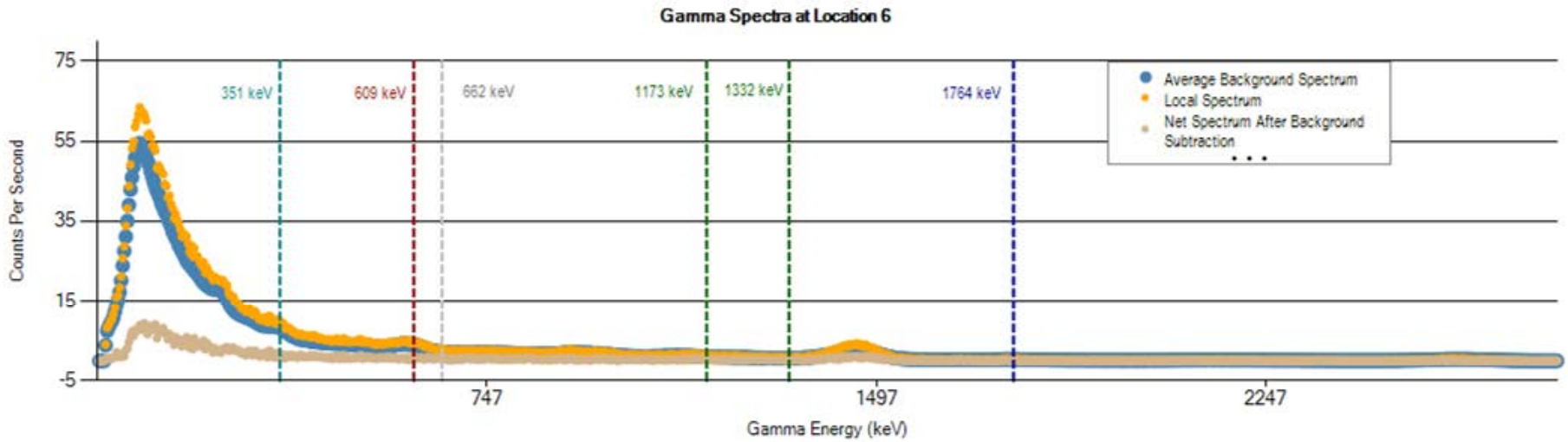
	ROI1	ROI2	ROI3	ROI4	ROI5	ROI6	ROI7	ROI8	ROI9	ROI10
Location 4 (cps)	**1093**	**158**	24	29	188	177	135	218	117	**4497**
Static IL (cps)	1052	150	35	41	201	189	146	229	120	4255



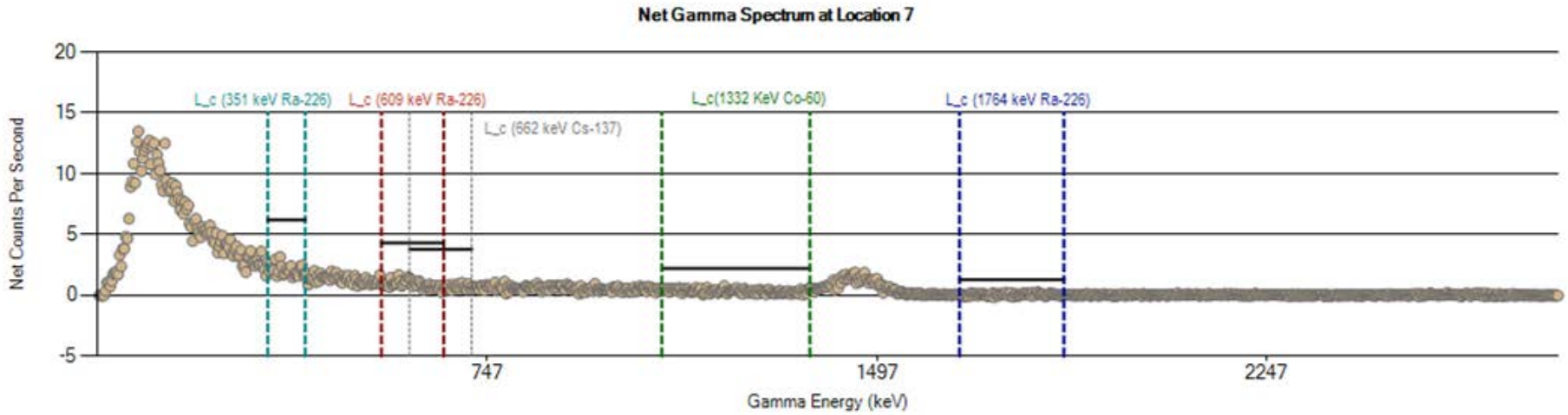


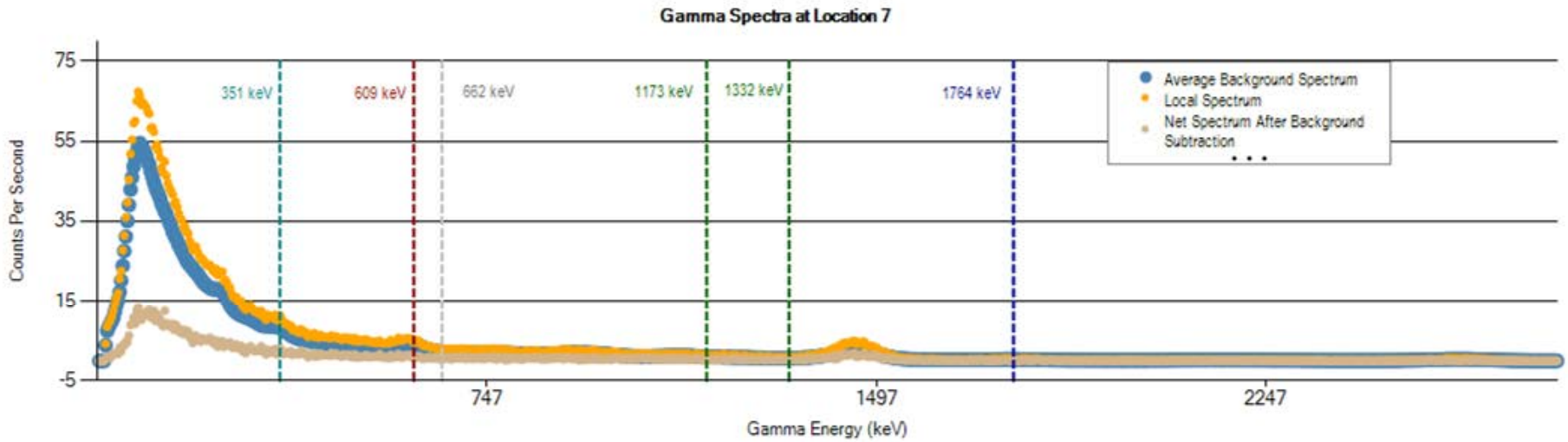
	ROI1	ROI2	ROI3	ROI4	ROI5	ROI6	ROI7	ROI8	ROI9	ROI10
Location 5 (cps)	**1147**	**172**	24	27	198	183	142	225	**124**	**4613**
Static IL (cps)	1052	150	35	41	201	189	146	229	120	4255



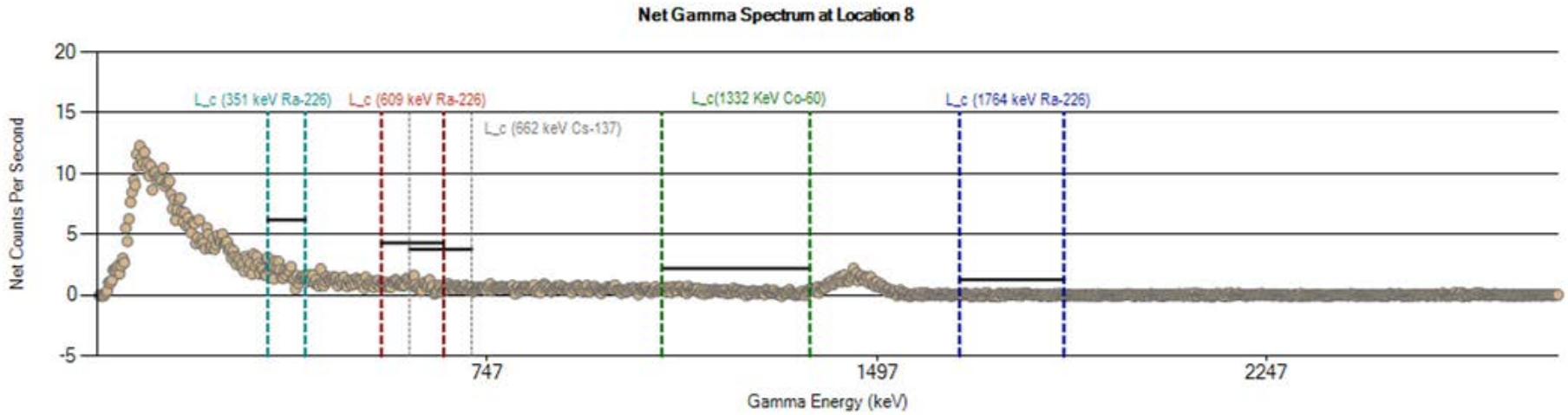


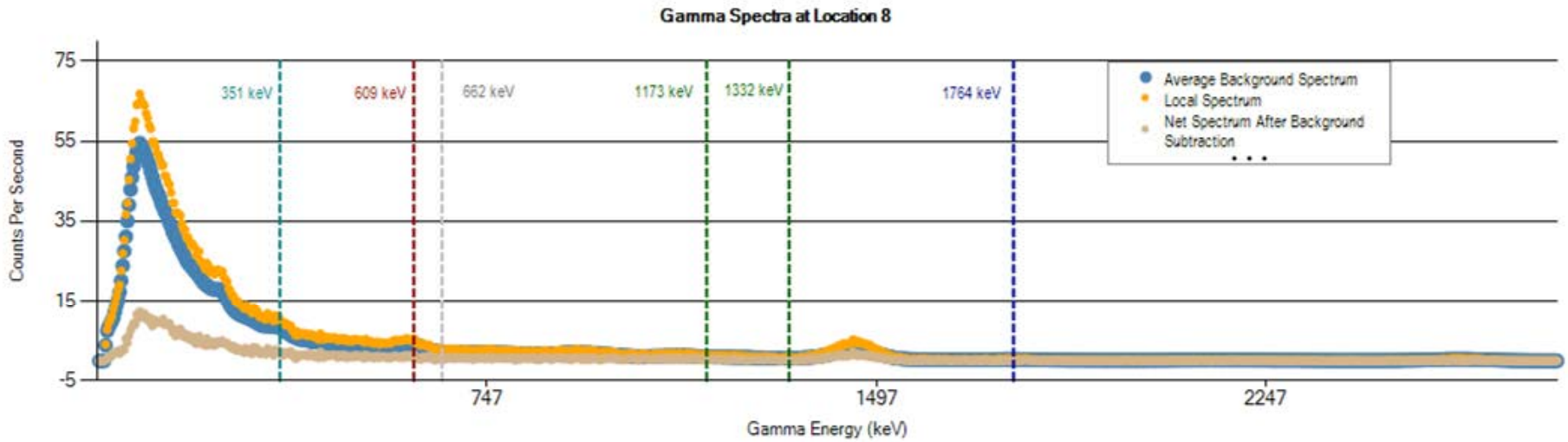
	ROI1	ROI2	ROI3	ROI4	ROI5	ROI6	ROI7	ROI8	ROI9	ROI10
Location 6 (cps)	1040	151	21	26	184	166	129	207	113	4253
Static IL (cps)	1052	150	35	41	201	189	146	229	120	4255



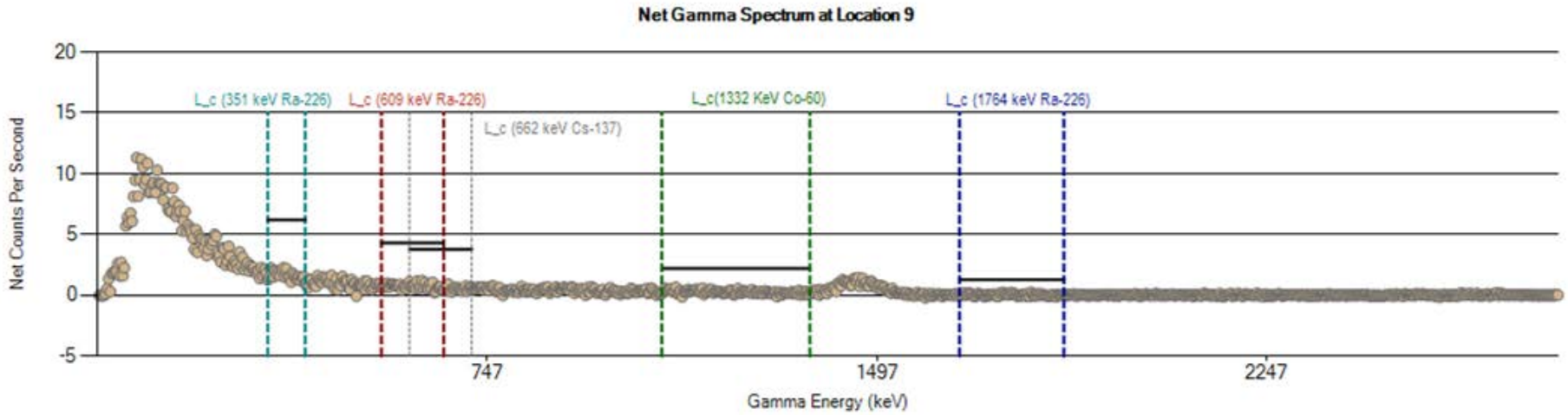


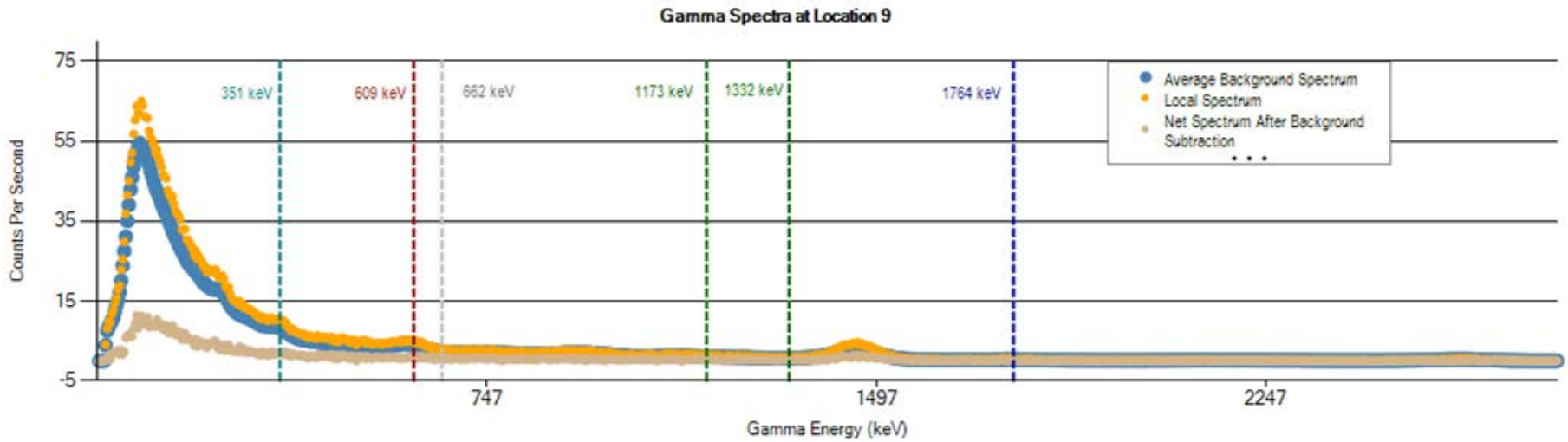
	ROI1	ROI2	ROI3	ROI4	ROI5	ROI6	ROI7	ROI8	ROI9	ROI10
Location 7 (cps)	**1136**	**171**	25	28	196	177	137	226	**122**	**4566**
Static IL (cps)	1052	150	35	41	201	189	146	229	120	4255



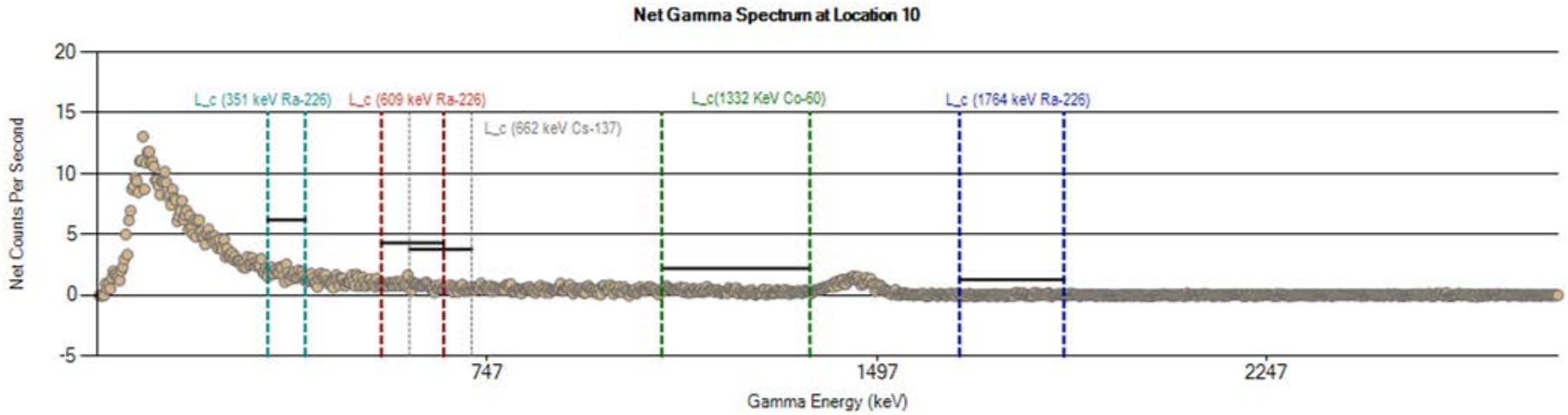


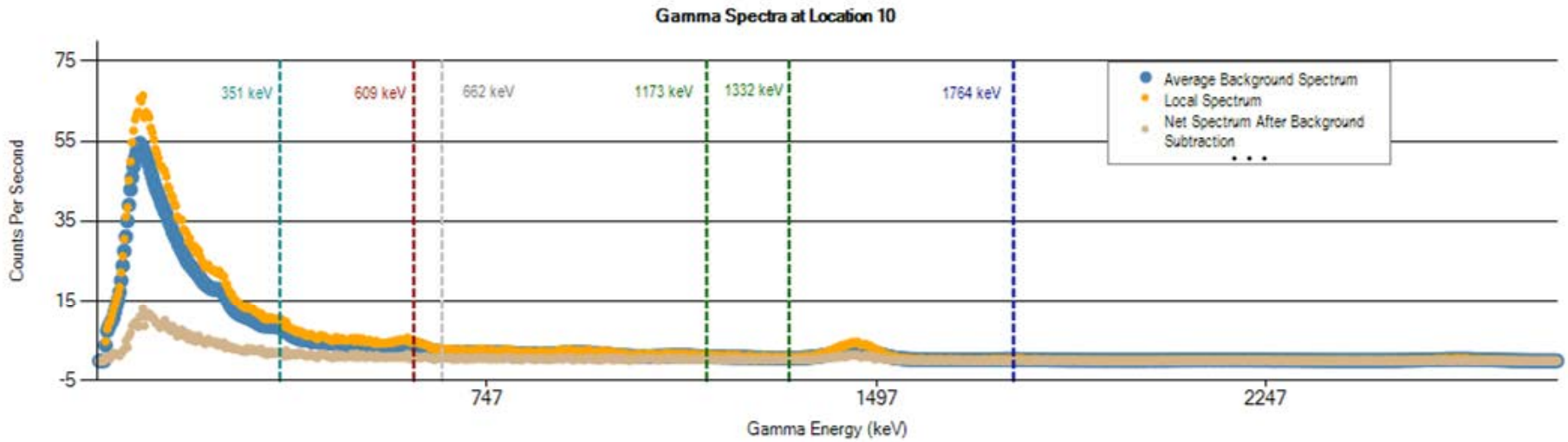
	ROI1	ROI2	ROI3	ROI4	ROI5	ROI6	ROI7	ROI8	ROI9	ROI10
Location 8 (cps)	**1113**	**170**	23	28	192	174	135	219	119	**4488**
Static IL (cps)	1052	150	35	41	201	189	146	229	120	4255



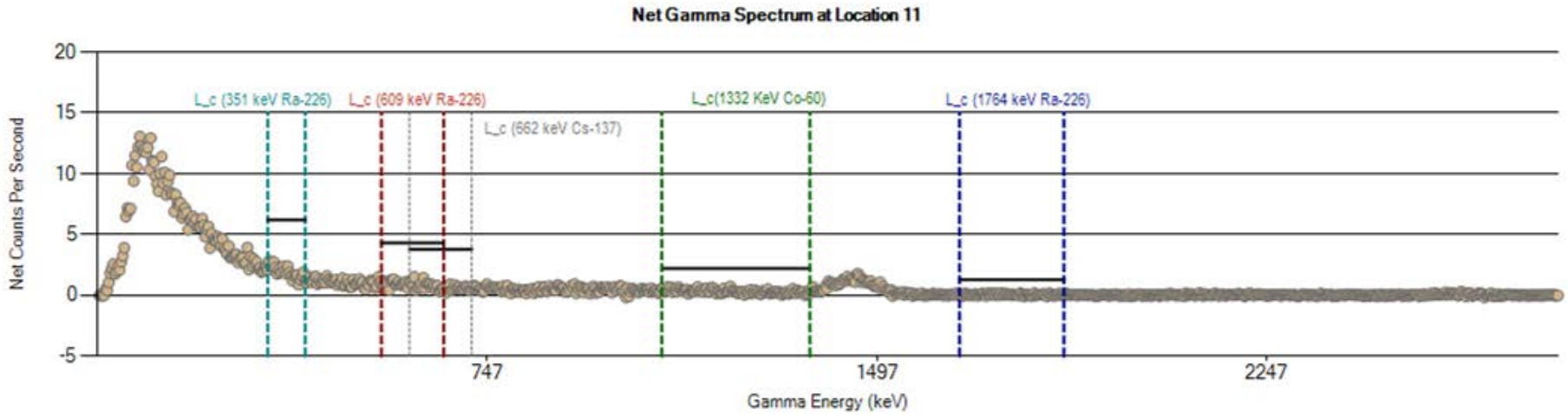


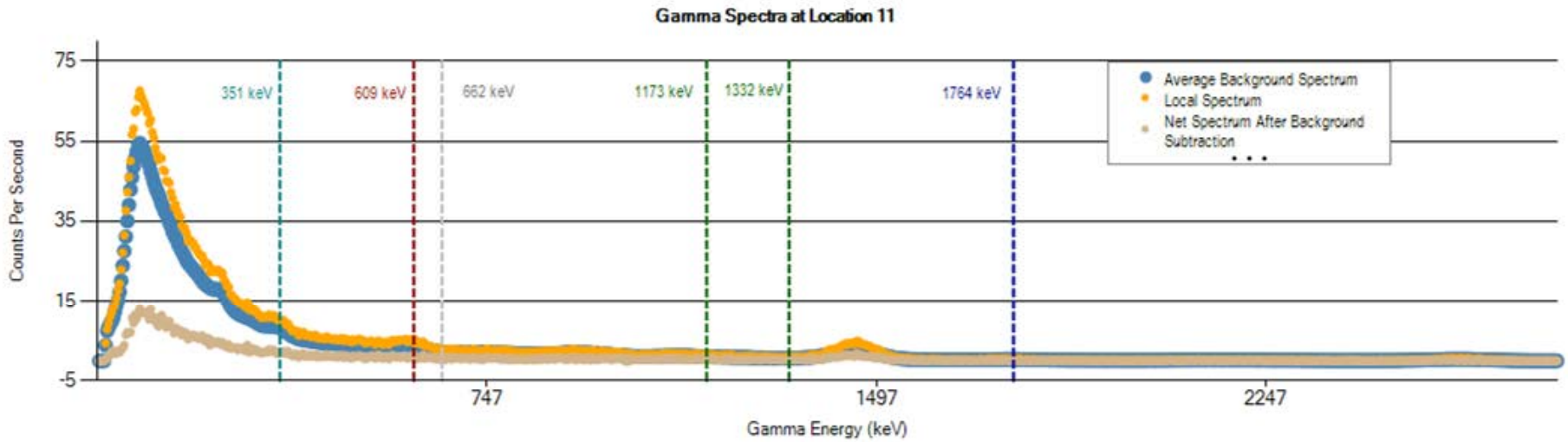
	ROI1	ROI2	ROI3	ROI4	ROI5	ROI6	ROI7	ROI8	ROI9	ROI10
Location 9 (cps)	**1065**	**155**	23	27	185	171	133	215	115	**4380**
Static IL (cps)	1052	150	35	41	201	189	146	229	120	4255



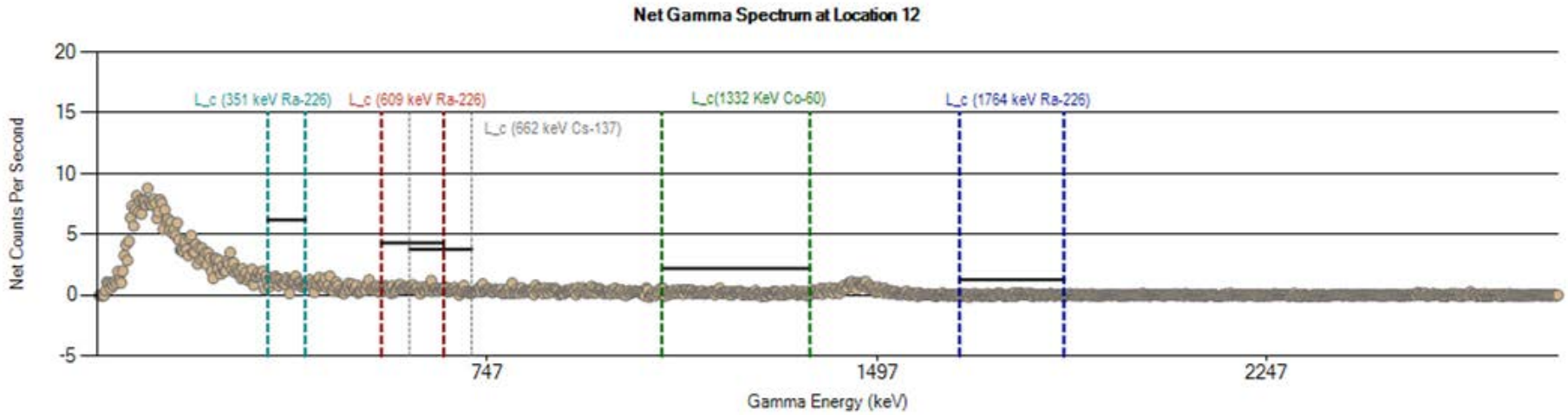


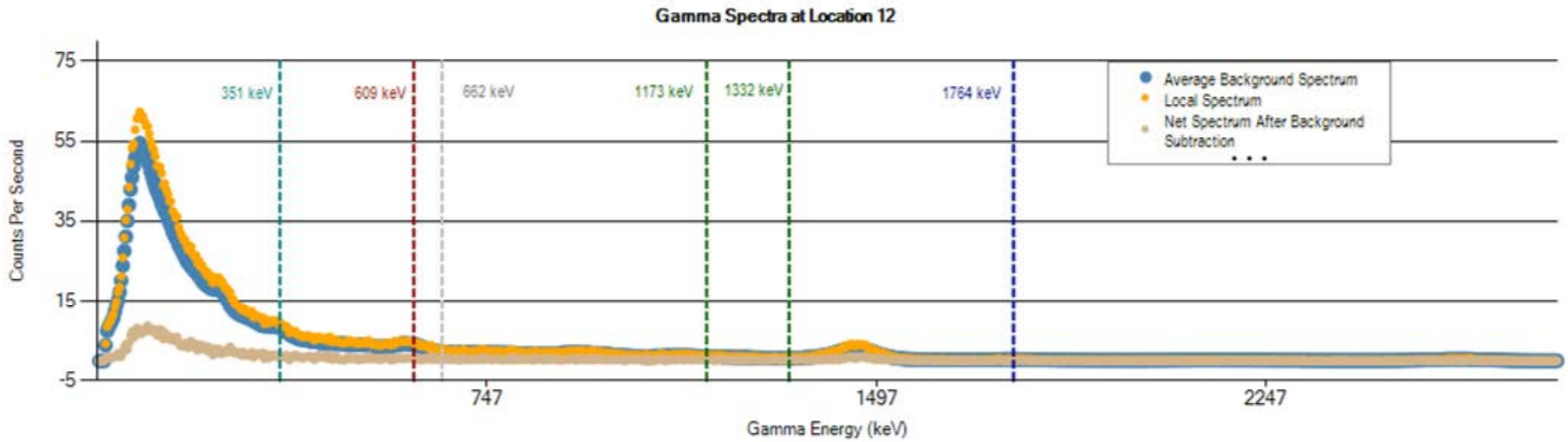
	ROI1	ROI2	ROI3	ROI4	ROI5	ROI6	ROI7	ROI8	ROI9	ROI10
Location 10 (cps)	**1099**	**162**	23	27	193	174	135	219	**121**	**4466**
Static IL (cps)	1052	150	35	41	201	189	146	229	120	4255



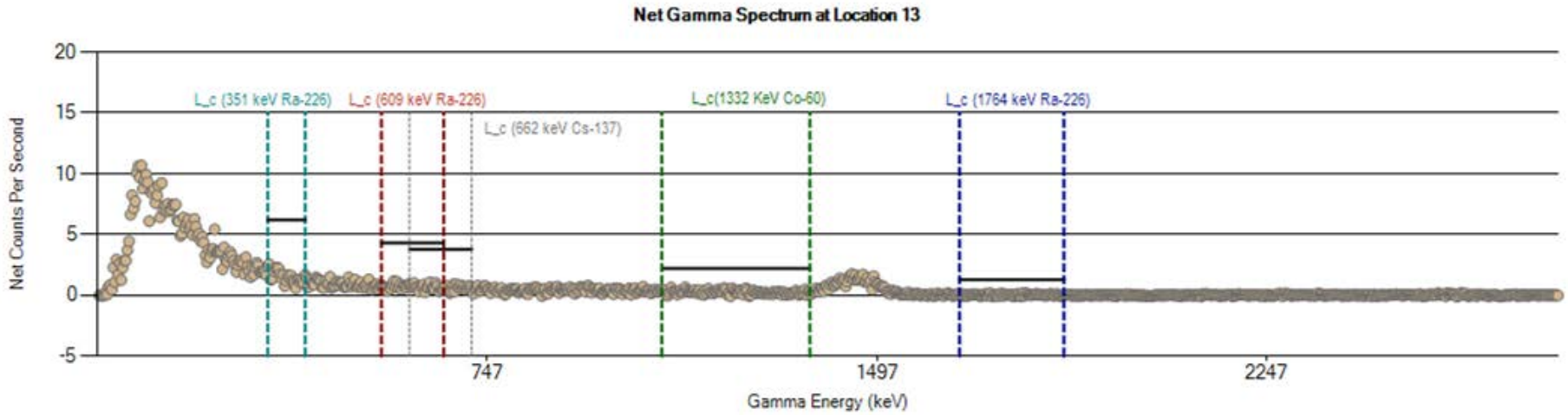


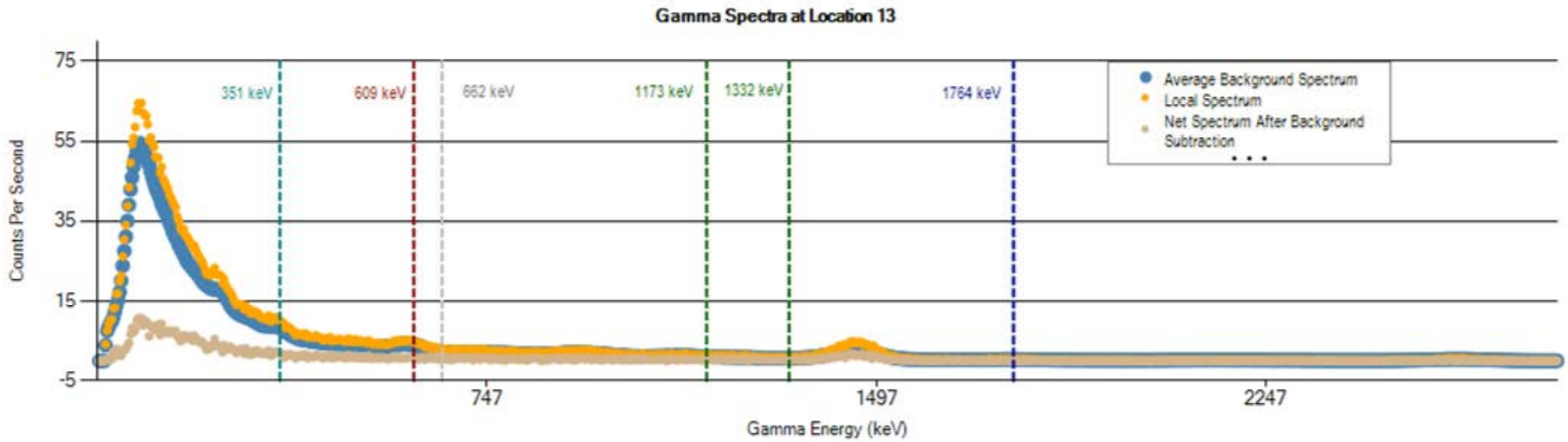
	ROI1	ROI2	ROI3	ROI4	ROI5	ROI6	ROI7	ROI8	ROI9	ROI10
Location 11 (cps)	**1103**	**163**	24	29	191	175	136	221	120	**4518**
Static IL (cps)	1052	150	35	41	201	189	146	229	120	4255



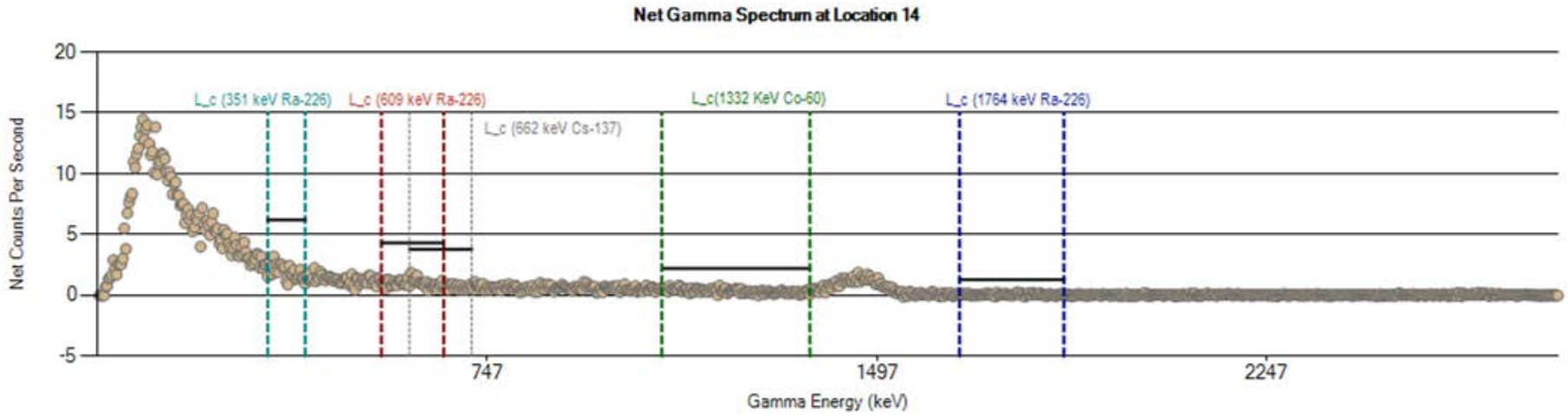


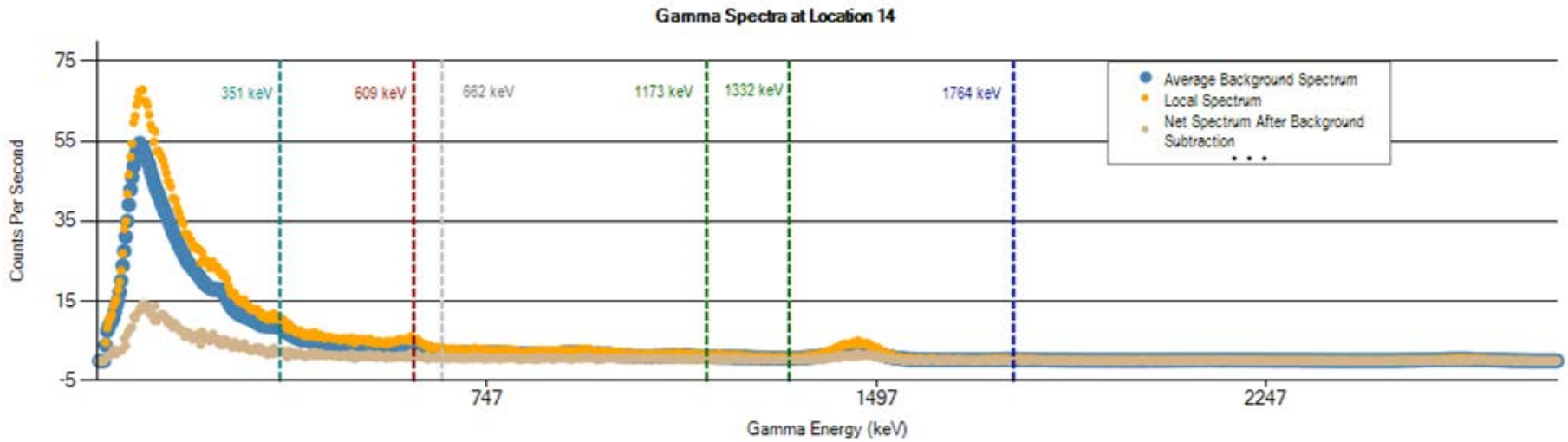
	ROI1	ROI2	ROI3	ROI4	ROI5	ROI6	ROI7	ROI8	ROI9	ROI10
Location 12 (cps)	1016	145	23	27	174	163	126	201	109	4189
Static IL (cps)	1052	150	35	41	201	189	146	229	120	4255



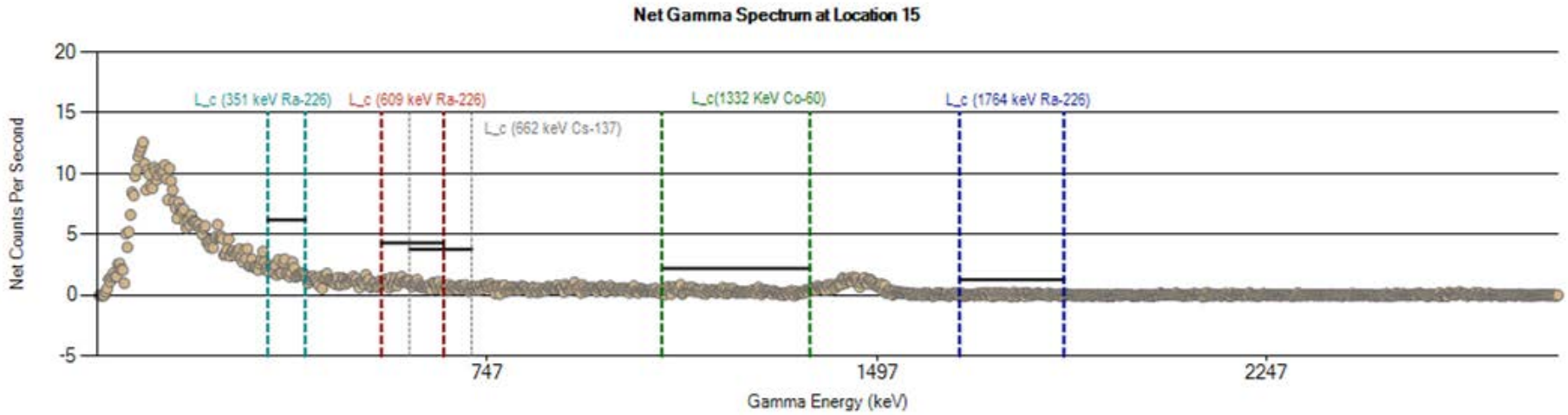


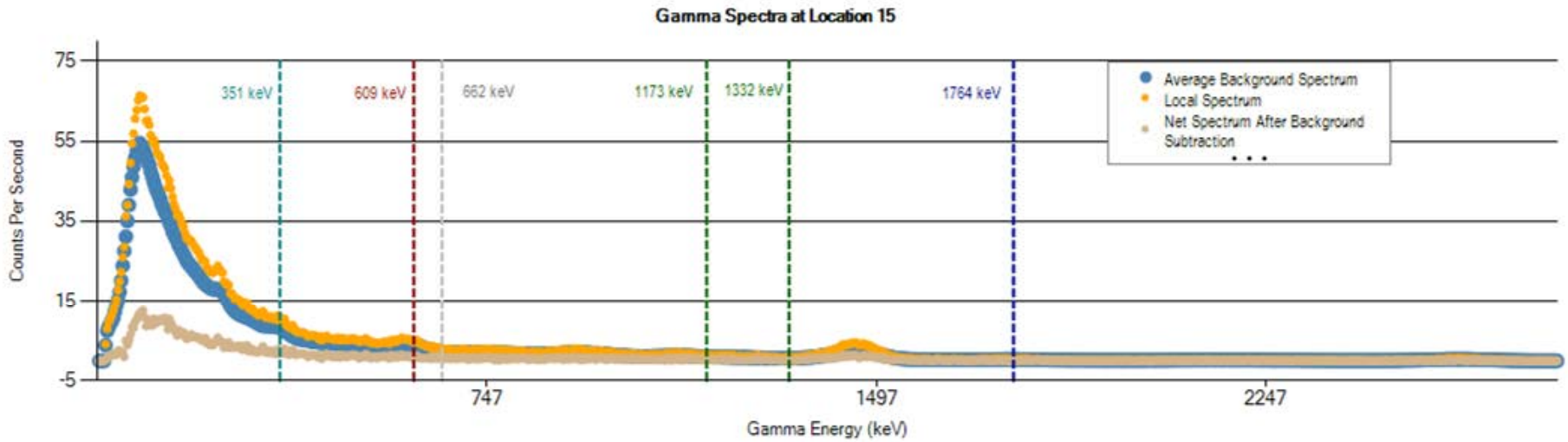
	ROI1	ROI2	ROI3	ROI4	ROI5	ROI6	ROI7	ROI8	ROI9	ROI10
Location 13 (cps)	**1074**	**165**	23	27	184	169	133	212	114	**4358**
Static IL (cps)	1052	150	35	41	201	189	146	229	120	4255



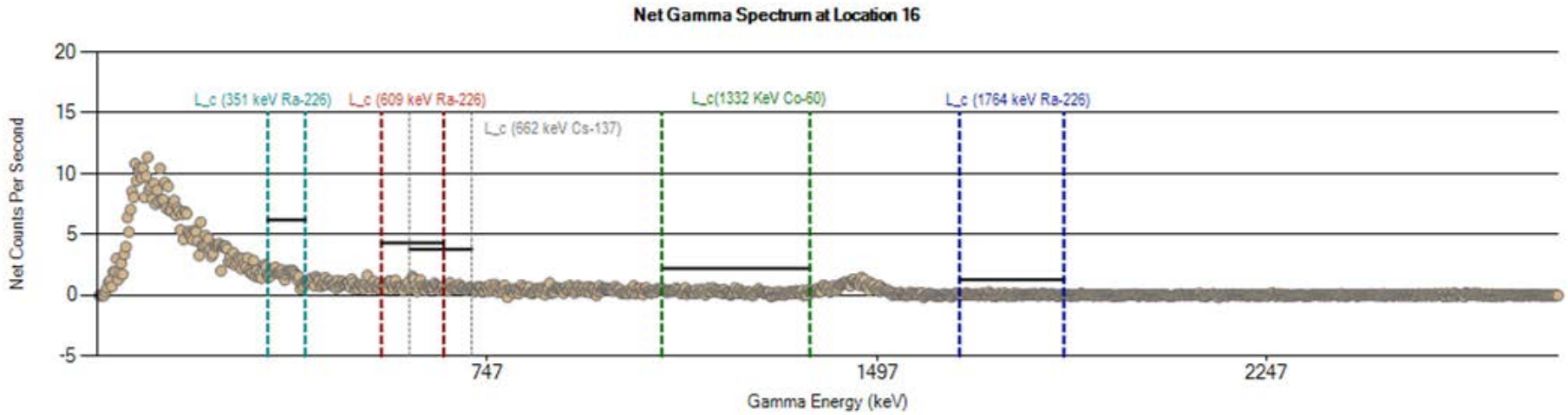


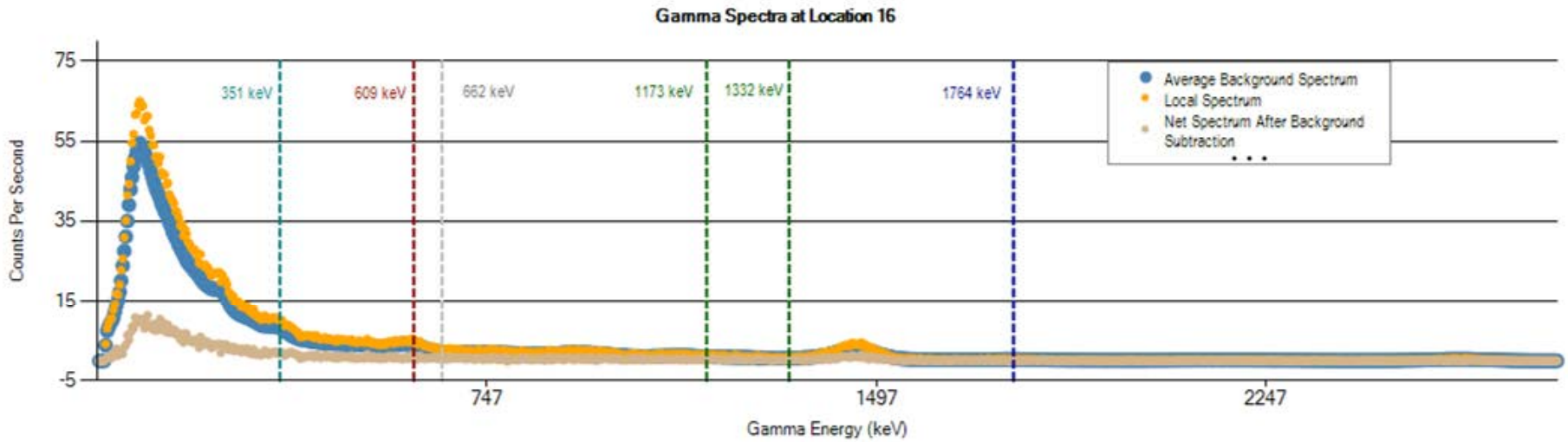
	ROI1	ROI2	ROI3	ROI4	ROI5	ROI6	ROI7	ROI8	ROI9	ROI10
Location 14 (cps)	**1142**	**169**	25	29	196	181	142	223	**123**	**4613**
Static IL (cps)	1052	150	35	41	201	189	146	229	120	4255



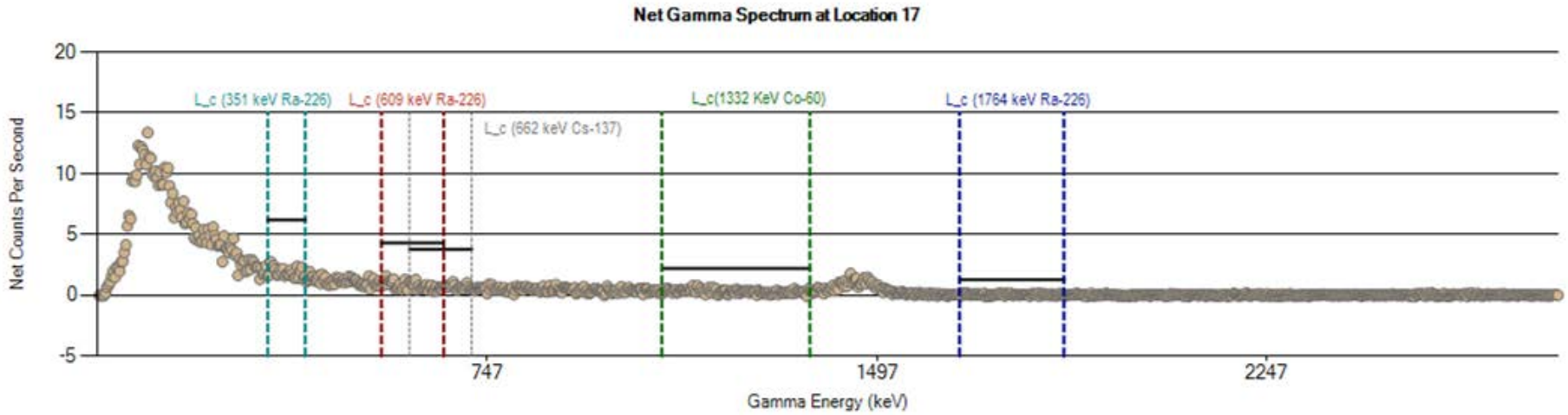


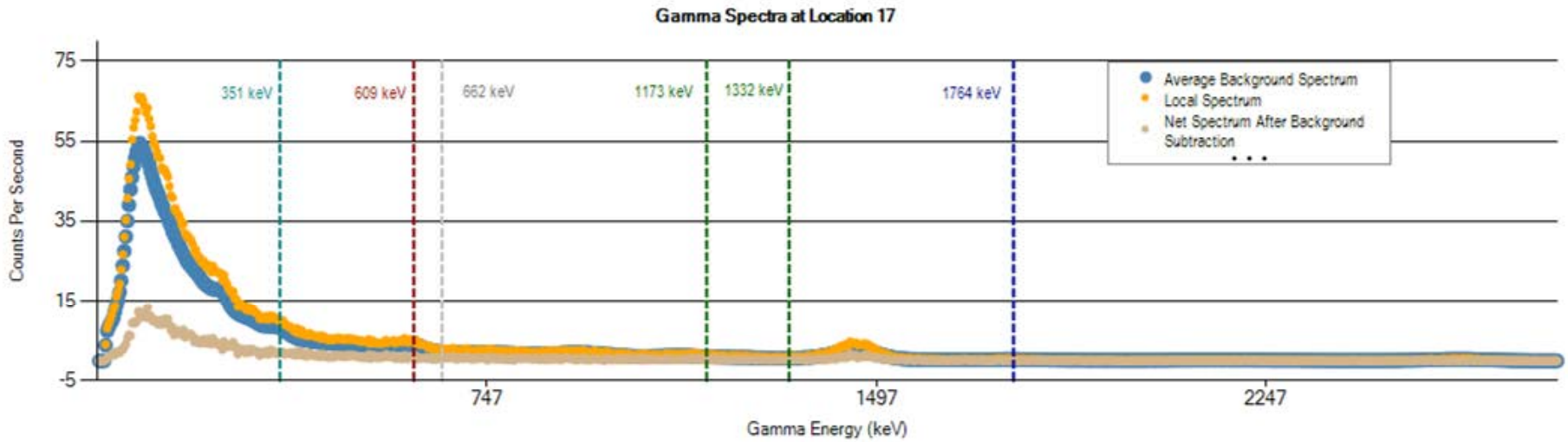
	ROI1	ROI2	ROI3	ROI4	ROI5	ROI6	ROI7	ROI8	ROI9	ROI10
Location 15 (cps)	**1115**	**163**	25	29	195	178	137	225	120	**4506**
Static IL (cps)	1052	150	35	41	201	189	146	229	120	4255



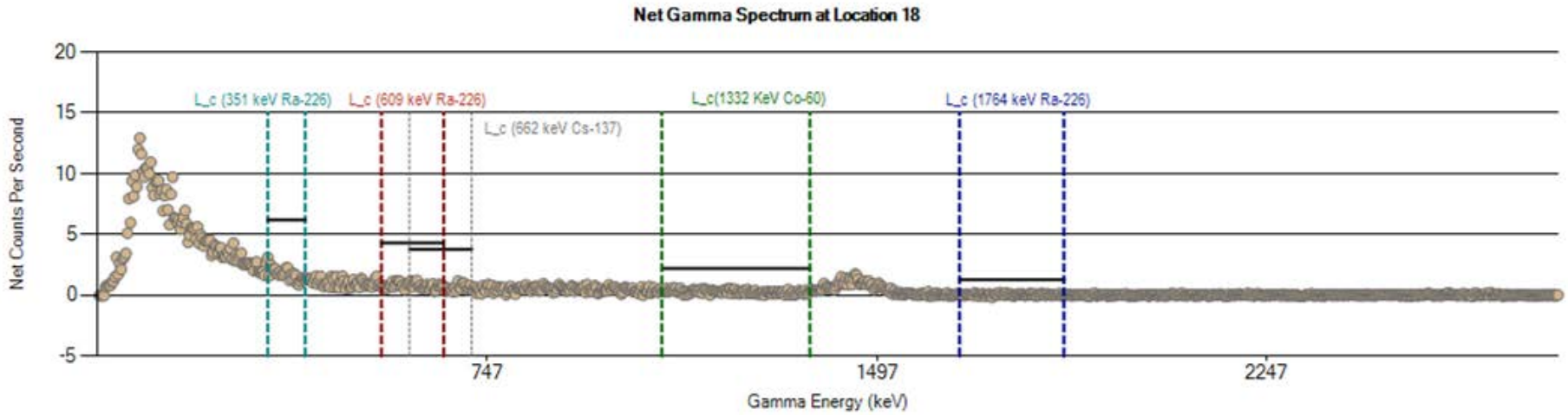


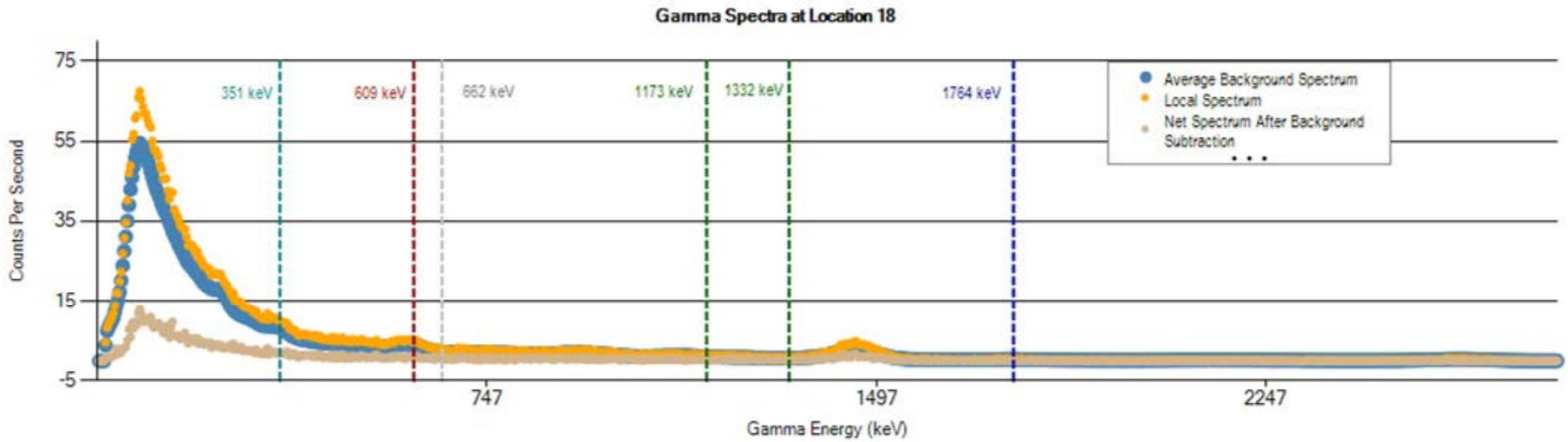
	ROI1	ROI2	ROI3	ROI4	ROI5	ROI6	ROI7	ROI8	ROI9	ROI10
Location 16 (cps)	**1066**	**152**	24	27	185	172	136	216	114	**4380**
Static IL (cps)	1052	150	35	41	201	189	146	229	120	4255



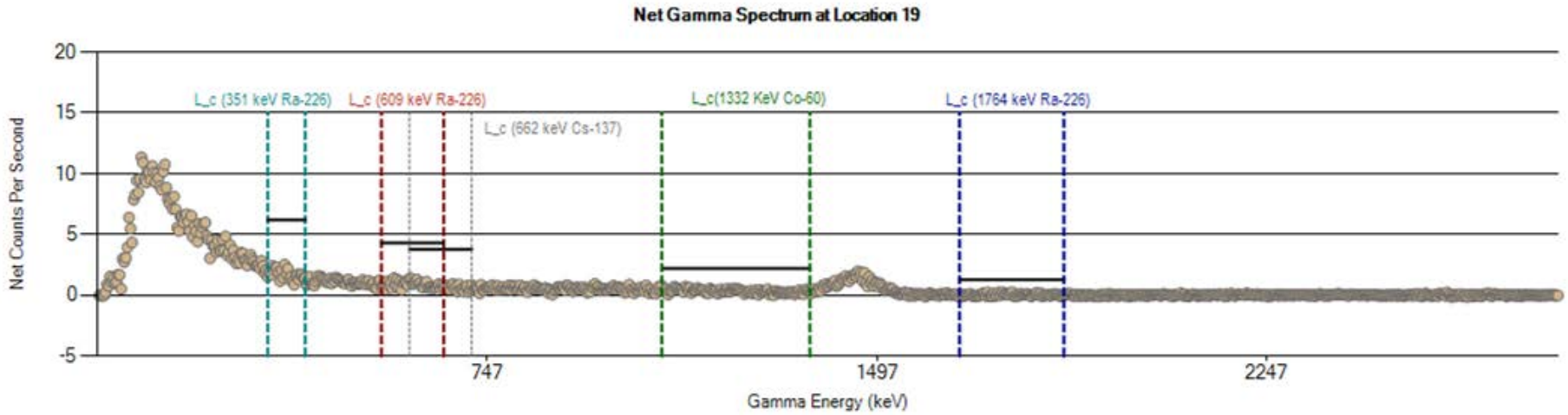


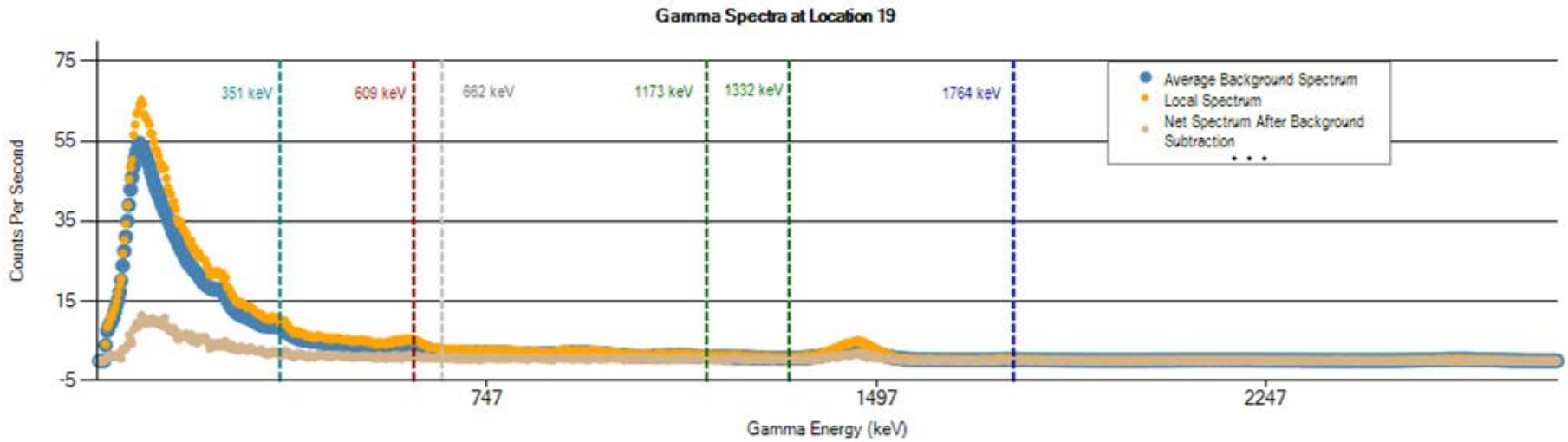
	ROI1	ROI2	ROI3	ROI4	ROI5	ROI6	ROI7	ROI8	ROI9	ROI10
Location 17 (cps)	**1092**	**157**	24	28	195	173	136	221	120	**4478**
Static IL (cps)	1052	150	35	41	201	189	146	229	120	4255



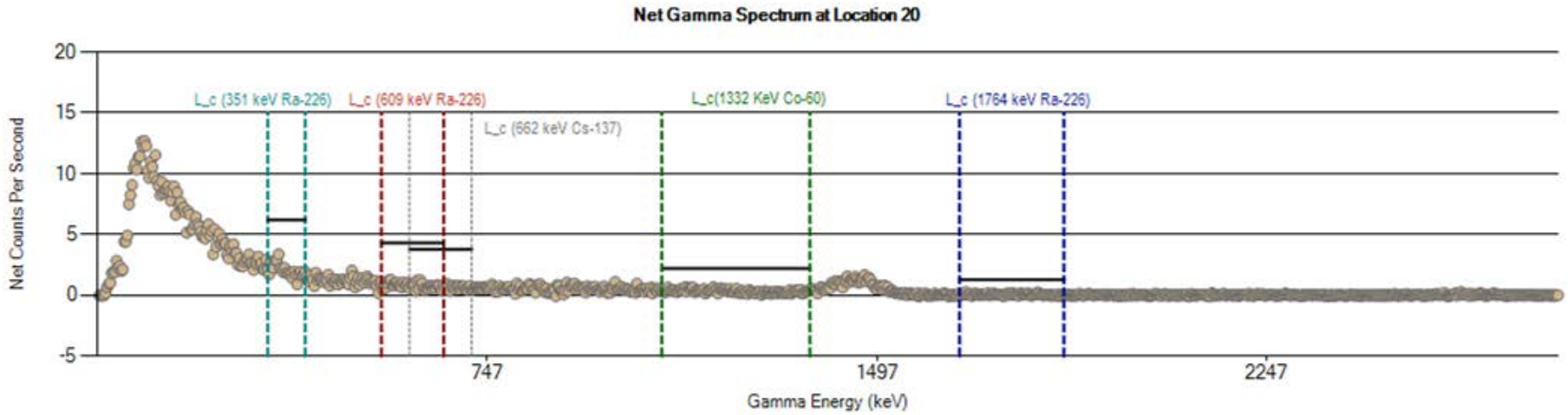


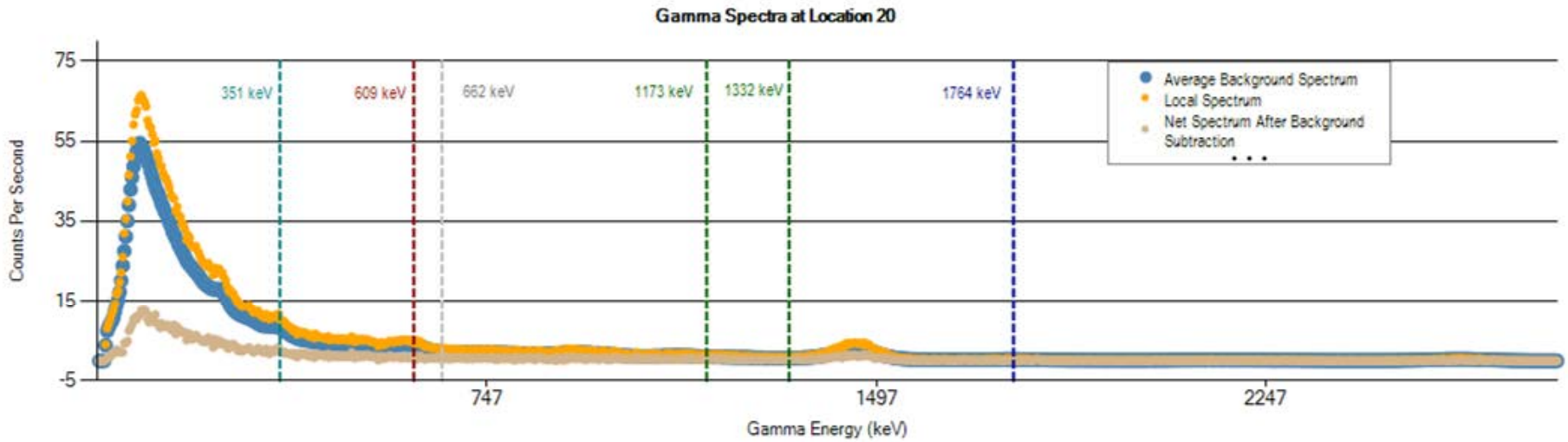
	ROI1	ROI2	ROI3	ROI4	ROI5	ROI6	ROI7	ROI8	ROI9	ROI10
Location 18 (cps)	**1091**	**160**	24	28	188	173	136	216	117	**4427**
Static IL (cps)	1052	150	35	41	201	189	146	229	120	4255



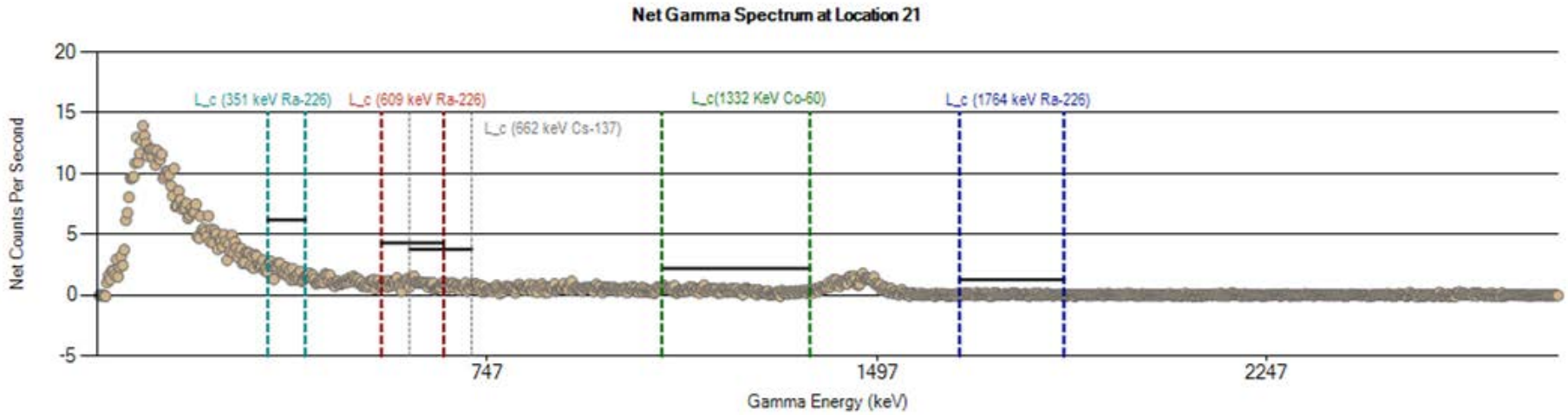


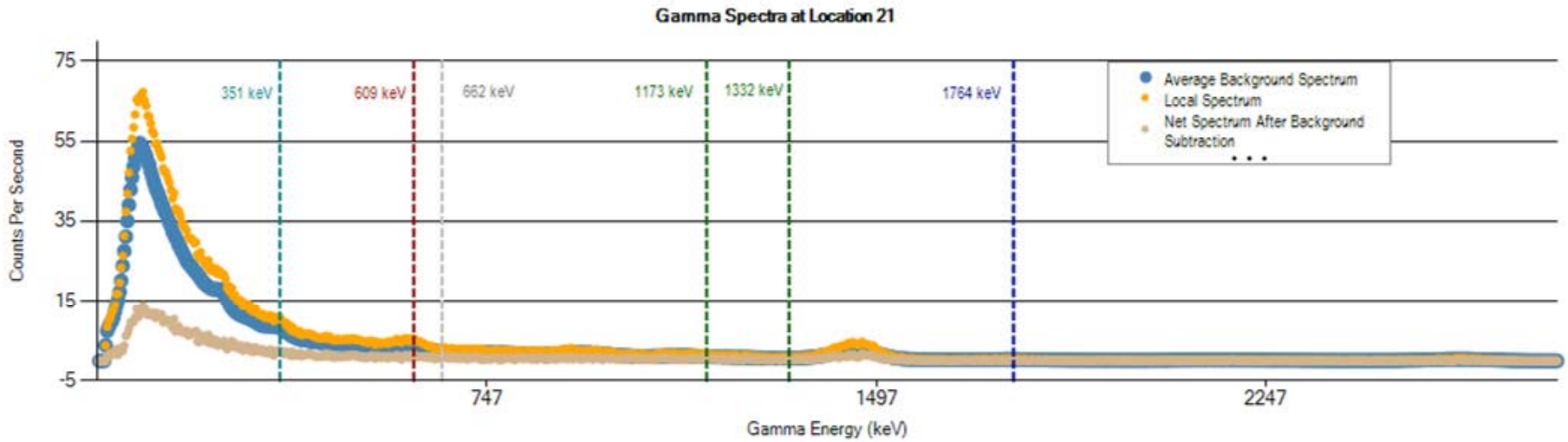
	ROI1	ROI2	ROI3	ROI4	ROI5	ROI6	ROI7	ROI8	ROI9	ROI10
Location 19 (cps)	**1117**	**169**	24	27	191	177	138	217	**121**	**4456**
Static IL (cps)	1052	150	35	41	201	189	146	229	120	4255



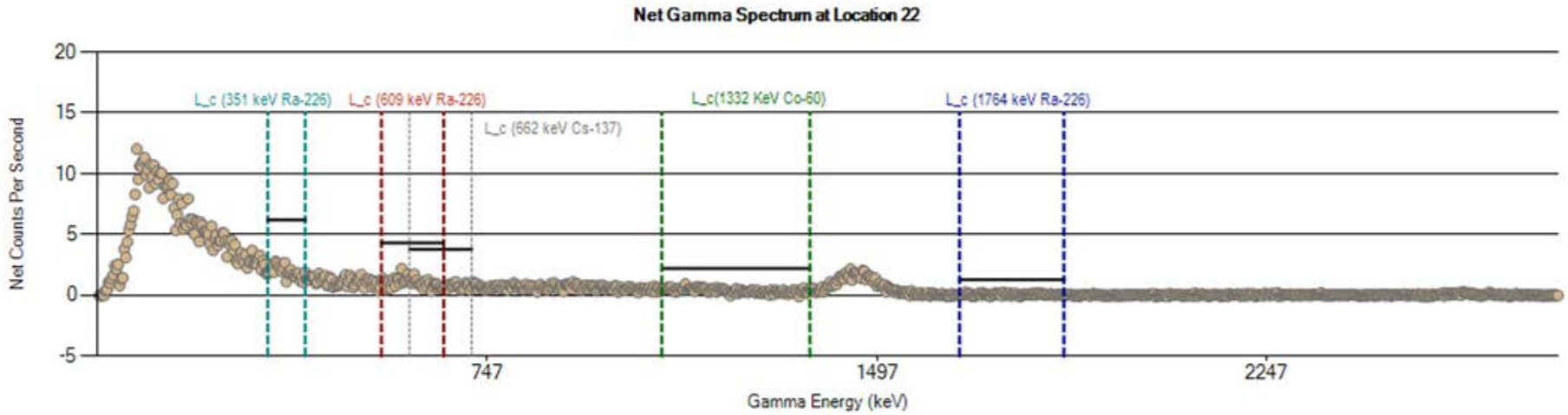


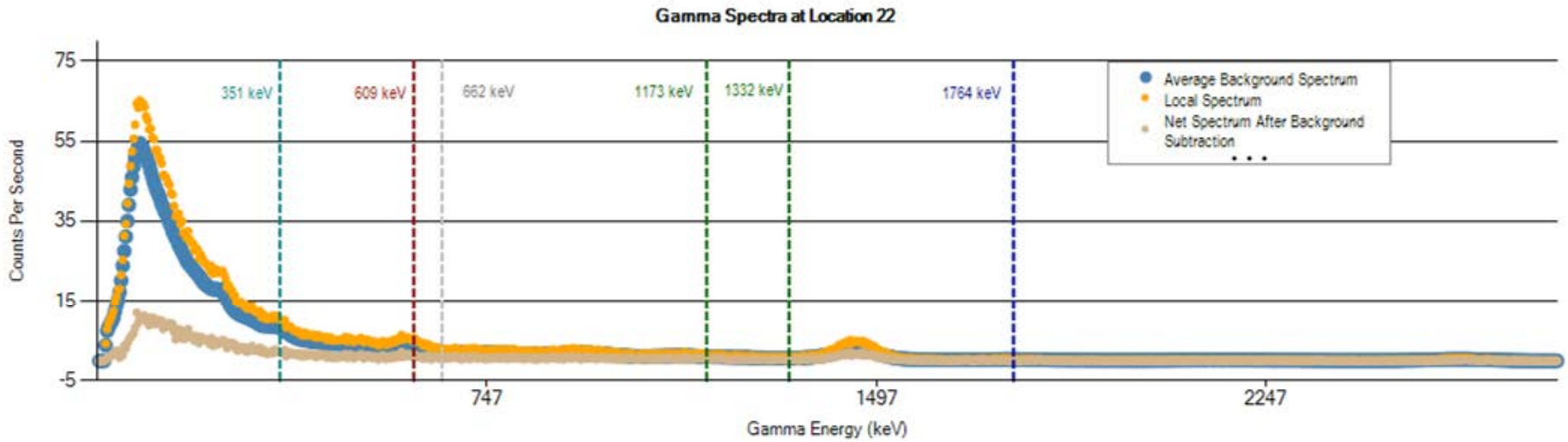
	ROI1	ROI2	ROI3	ROI4	ROI5	ROI6	ROI7	ROI8	ROI9	ROI10
Location 20 (cps)	**1112**	**163**	25	28	194	173	136	225	**122**	**4515**
Static IL (cps)	1052	150	35	41	201	189	146	229	120	4255



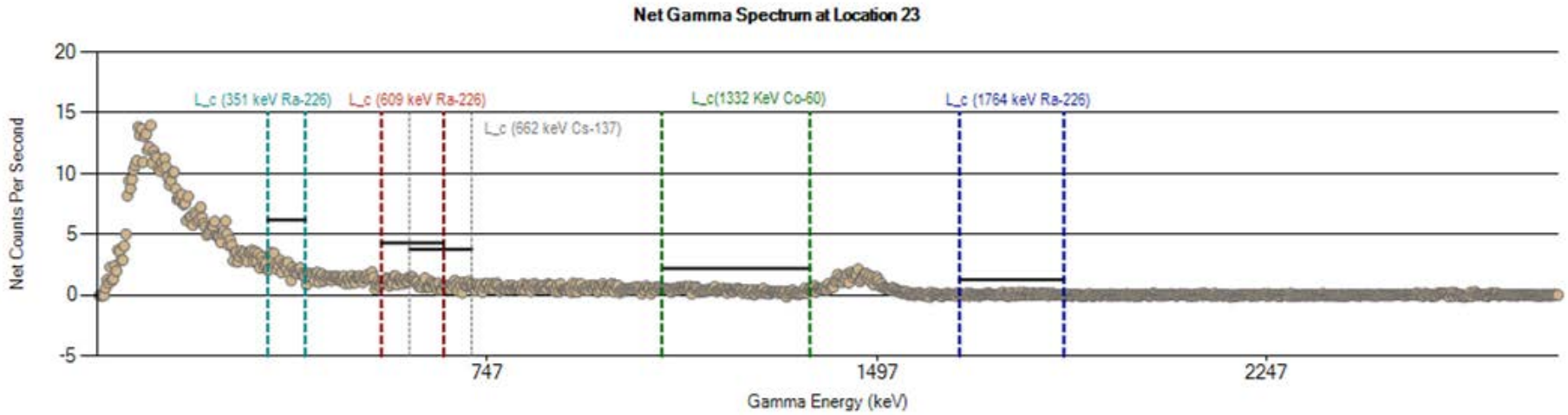


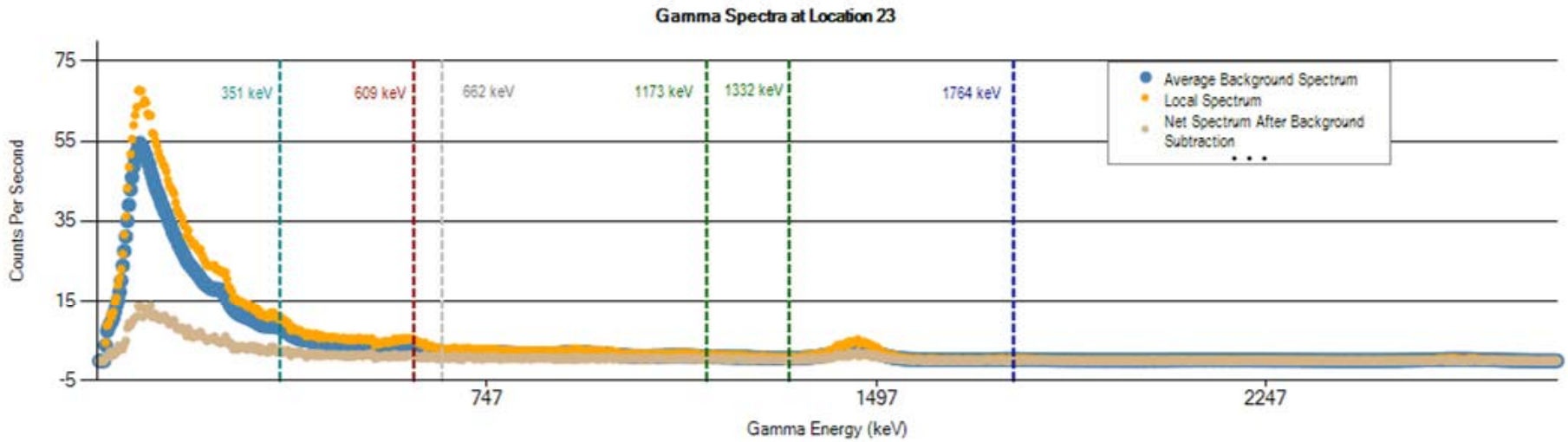
	ROI1	ROI2	ROI3	ROI4	ROI5	ROI6	ROI7	ROI8	ROI9	ROI10
Location 21 (cps)	**1125**	**166**	25	28	192	180	143	222	**123**	**4580**
Static IL (cps)	1052	150	35	41	201	189	146	229	120	4255



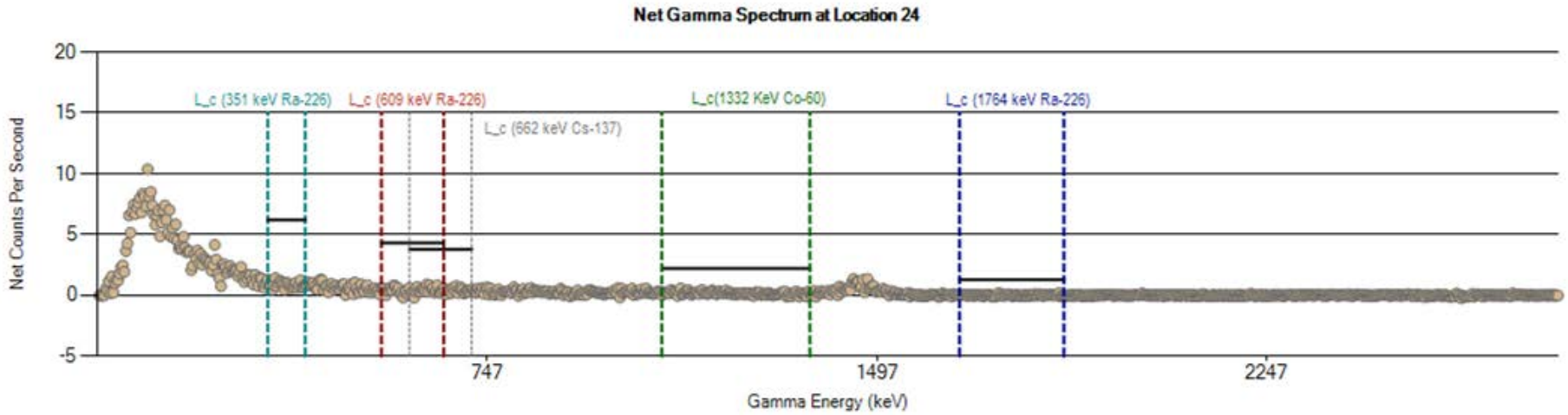


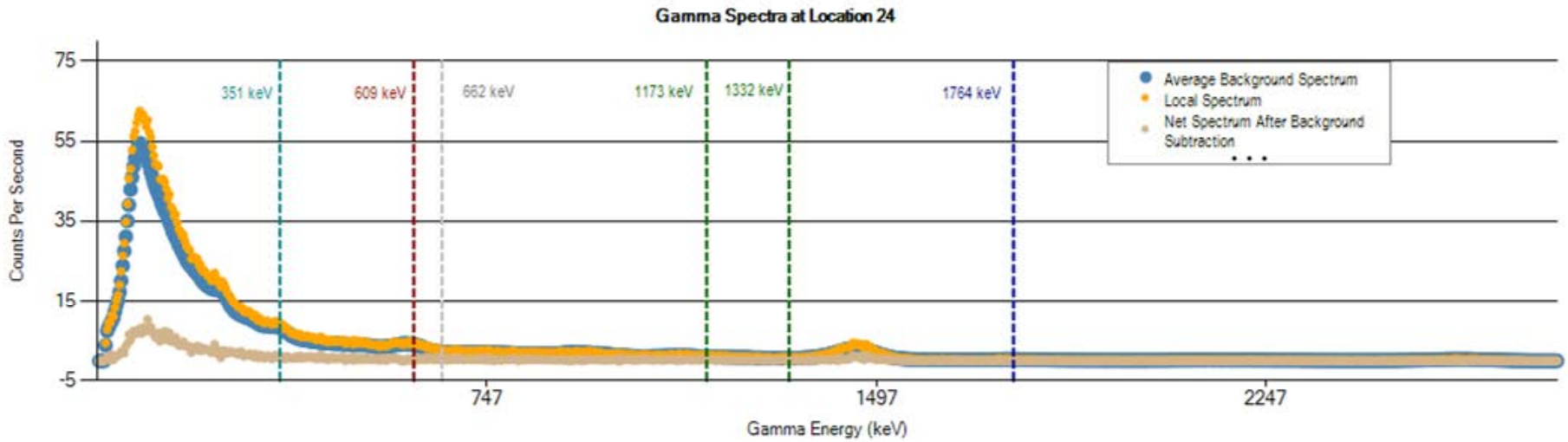
	ROI1	ROI2	ROI3	ROI4	ROI5	ROI6	ROI7	ROI8	ROI9	ROI10
Location 22 (cps)	**1152**	**176**	25	30	192	182	142	222	**125**	**4528**
Static IL (cps)	1052	150	35	41	201	189	146	229	120	4255



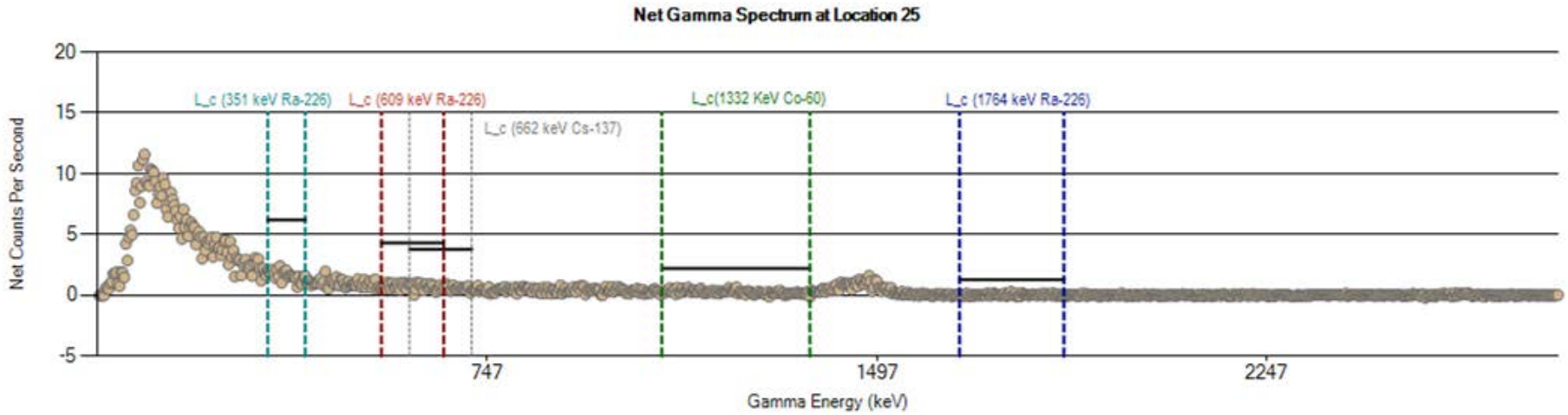


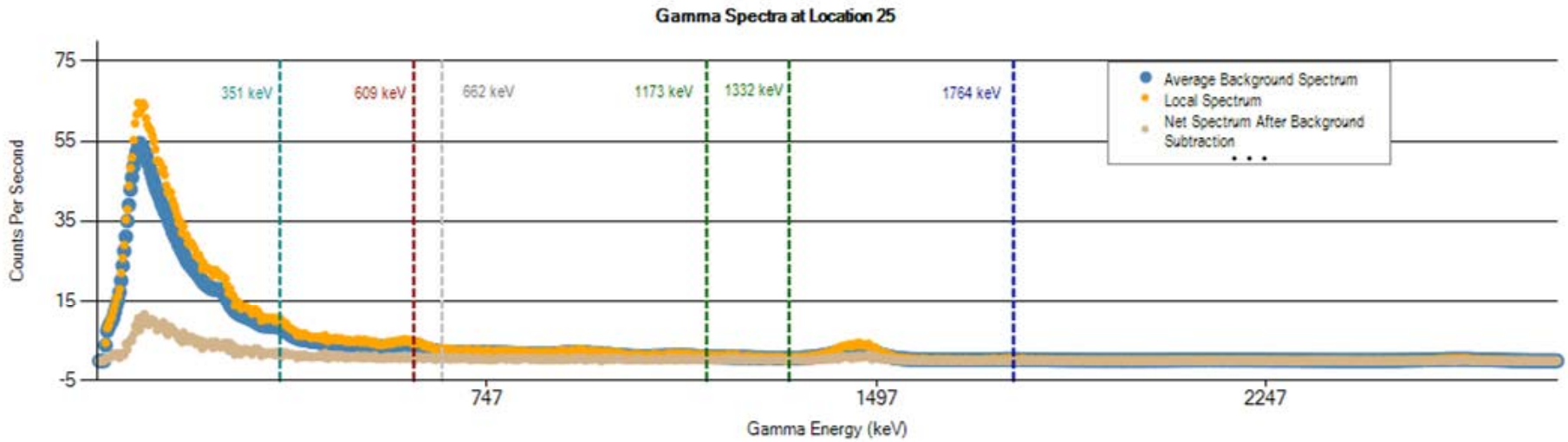
	ROI1	ROI2	ROI3	ROI4	ROI5	ROI6	ROI7	ROI8	ROI9	ROI10
Location 23 (cps)	**1159**	**175**	25	29	**202**	183	142	**230**	**125**	**4646**
Static IL (cps)	1052	150	35	41	201	189	146	229	120	4255



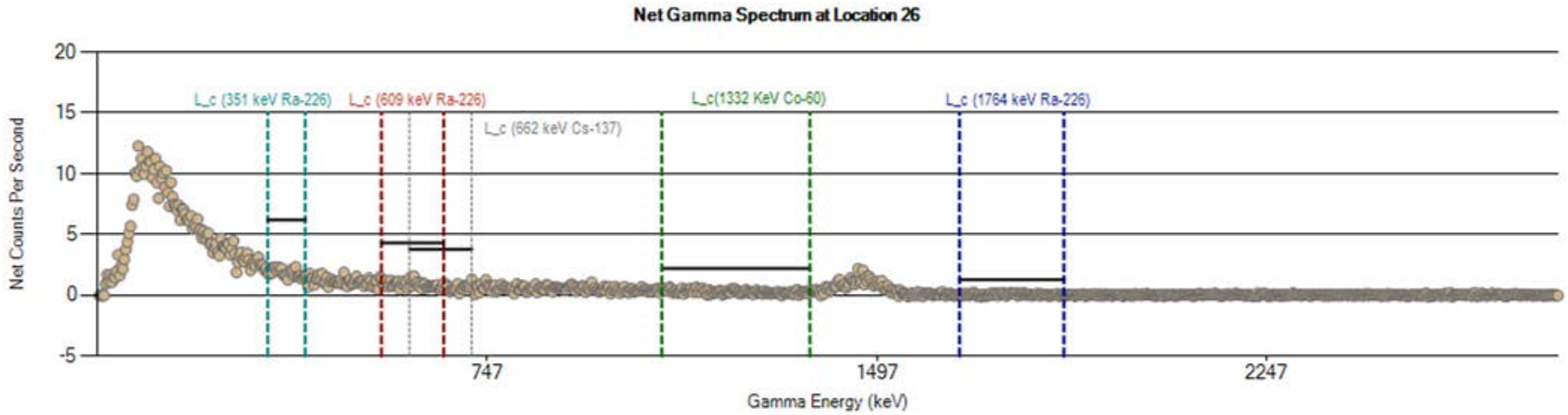


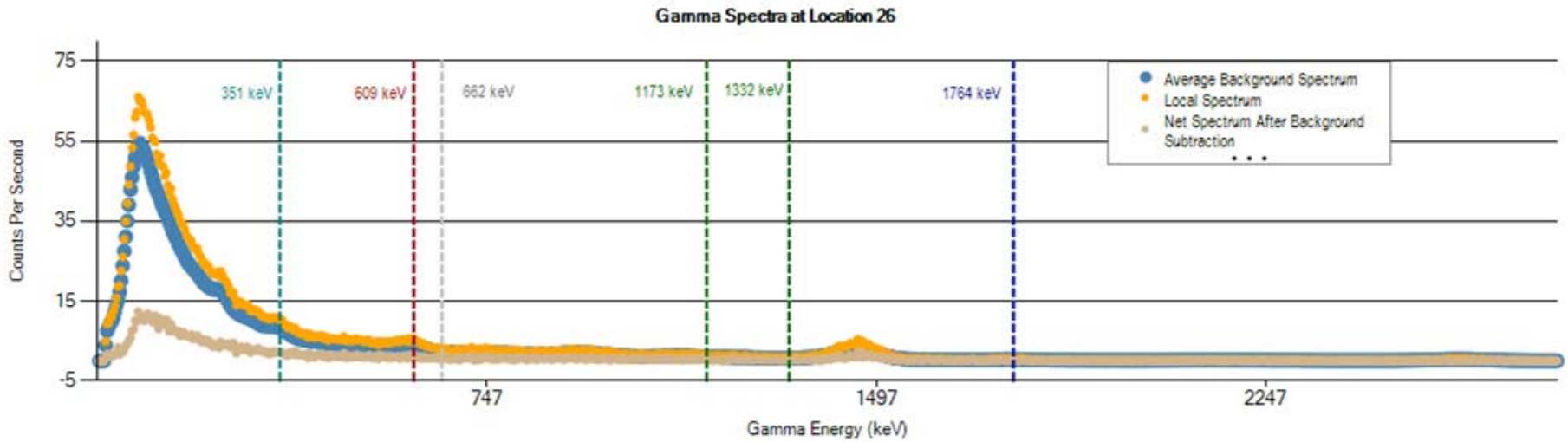
	ROI1	ROI2	ROI3	ROI4	ROI5	ROI6	ROI7	ROI8	ROI9	ROI10
Location 24 (cps)	983	141	21	24	172	157	124	196	105	4135
Static IL (cps)	1052	150	35	41	201	189	146	229	120	4255



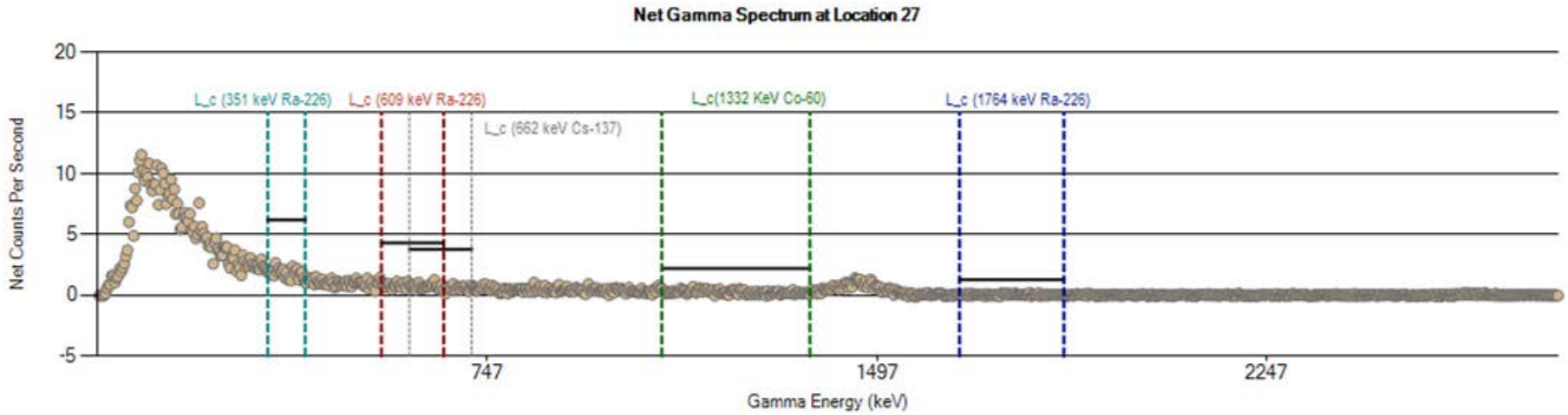


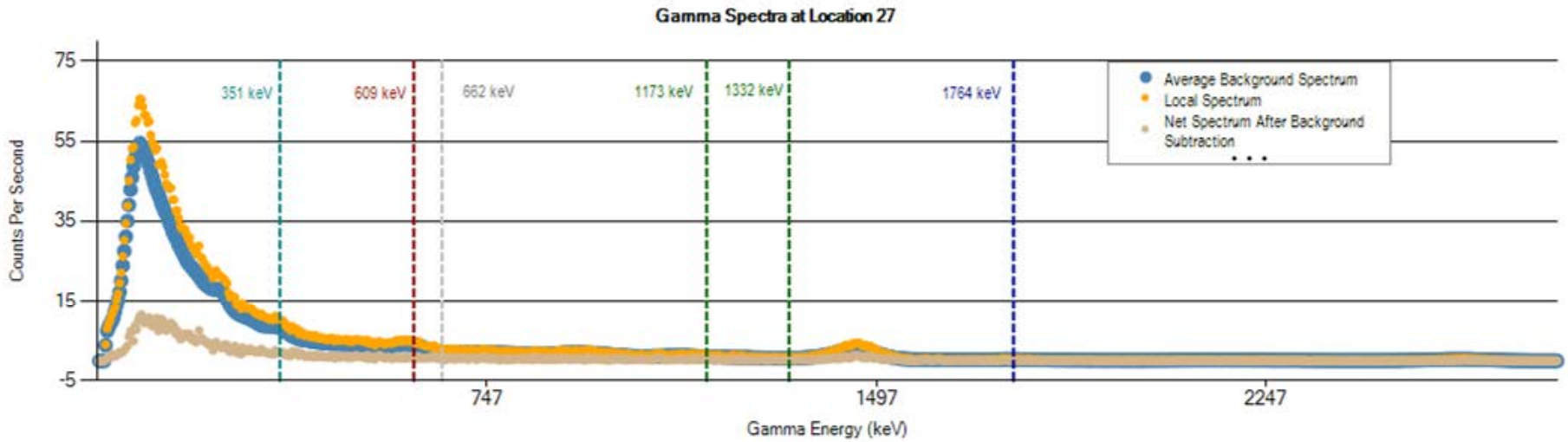
	ROI1	ROI2	ROI3	ROI4	ROI5	ROI6	ROI7	ROI8	ROI9	ROI10
Location 25 (cps)	**1063**	**154**	23	26	186	170	133	214	115	**4368**
Static IL (cps)	1052	150	35	41	201	189	146	229	120	4255



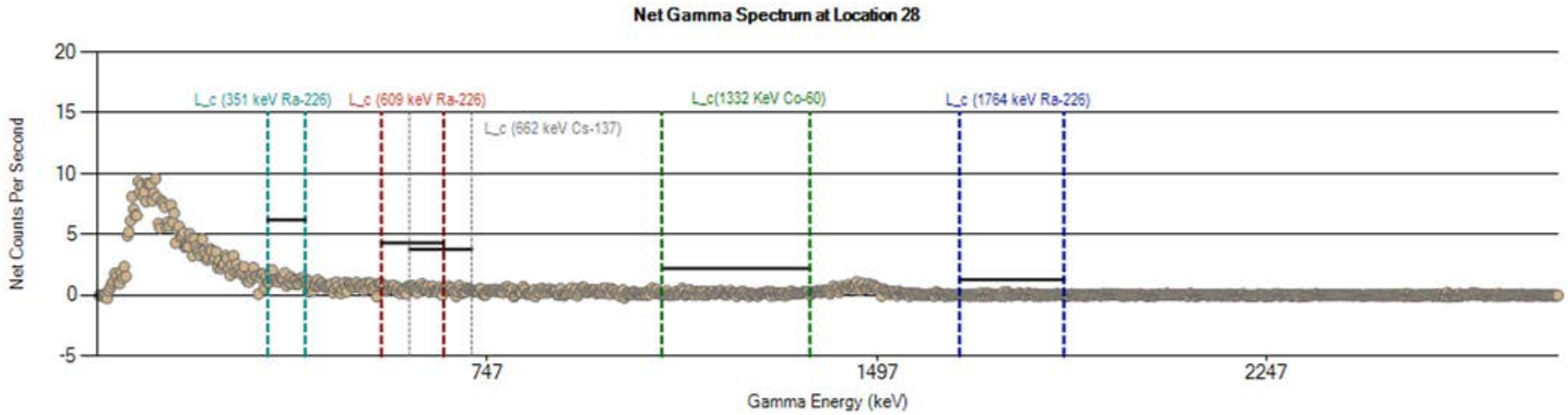


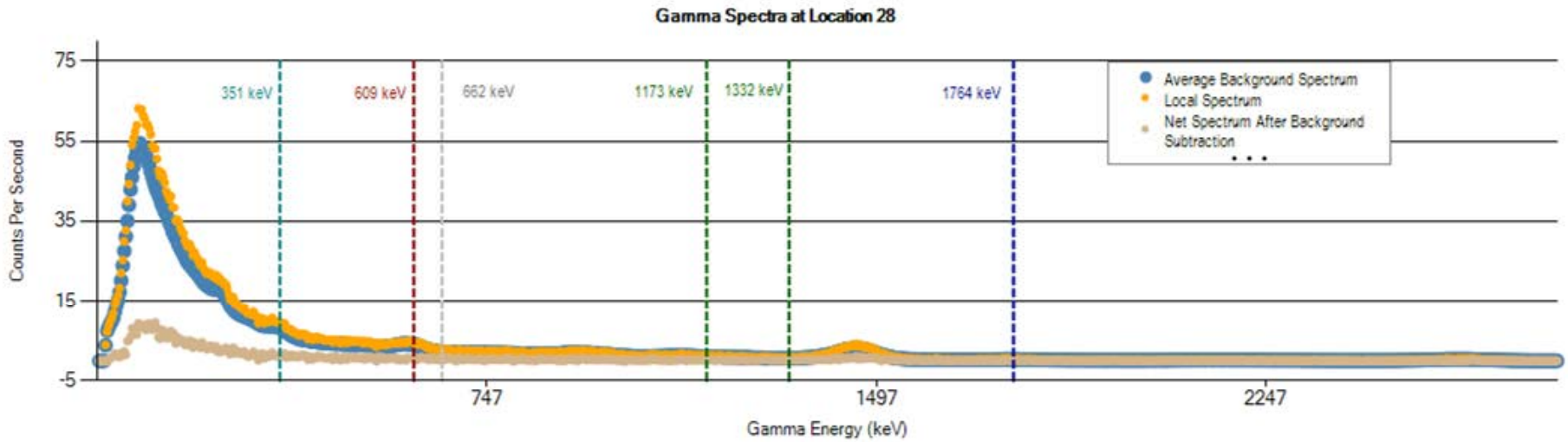
	ROI1	ROI2	ROI3	ROI4	ROI5	ROI6	ROI7	ROI8	ROI9	ROI10
Location 26 (cps)	**1111**	**161**	25	28	193	177	138	221	117	**4485**
Static IL (cps)	1052	150	35	41	201	189	146	229	120	4255



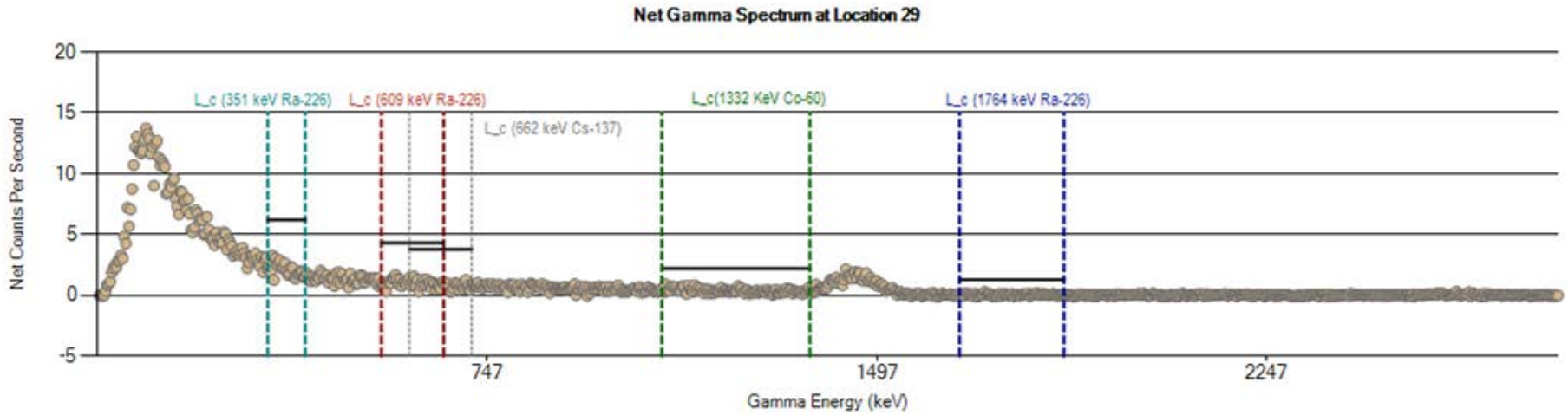


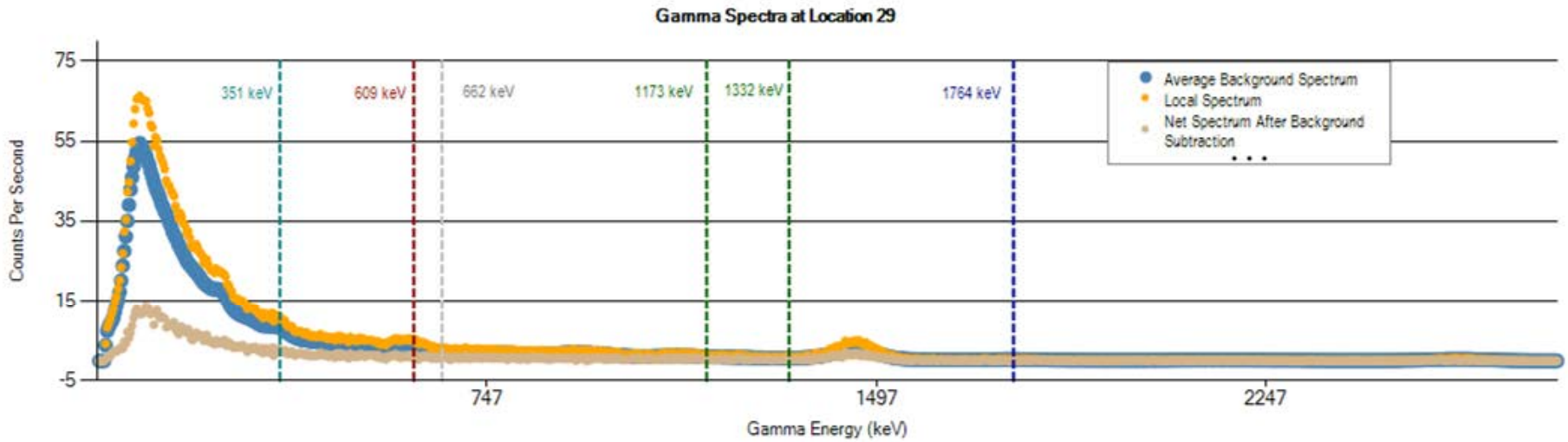
	ROI1	ROI2	ROI3	ROI4	ROI5	ROI6	ROI7	ROI8	ROI9	ROI10
Location 27 (cps)	**1073**	**153**	24	28	188	171	135	219	114	**4408**
Static IL (cps)	1052	150	35	41	201	189	146	229	120	4255





	ROI1	ROI2	ROI3	ROI4	ROI5	ROI6	ROI7	ROI8	ROI9	ROI10
Location 28 (cps)	1007	143	24	26	178	162	127	207	105	4215
Static IL (cps)	1052	150	35	41	201	189	146	229	120	4255





	ROI1	ROI2	ROI3	ROI4	ROI5	ROI6	ROI7	ROI8	ROI9	ROI10
Location 29 (cps)	**1149**	**173**	24	29	200	182	142	227	**125**	**4610**
Static IL (cps)	1052	150	35	41	201	189	146	229	120	4255

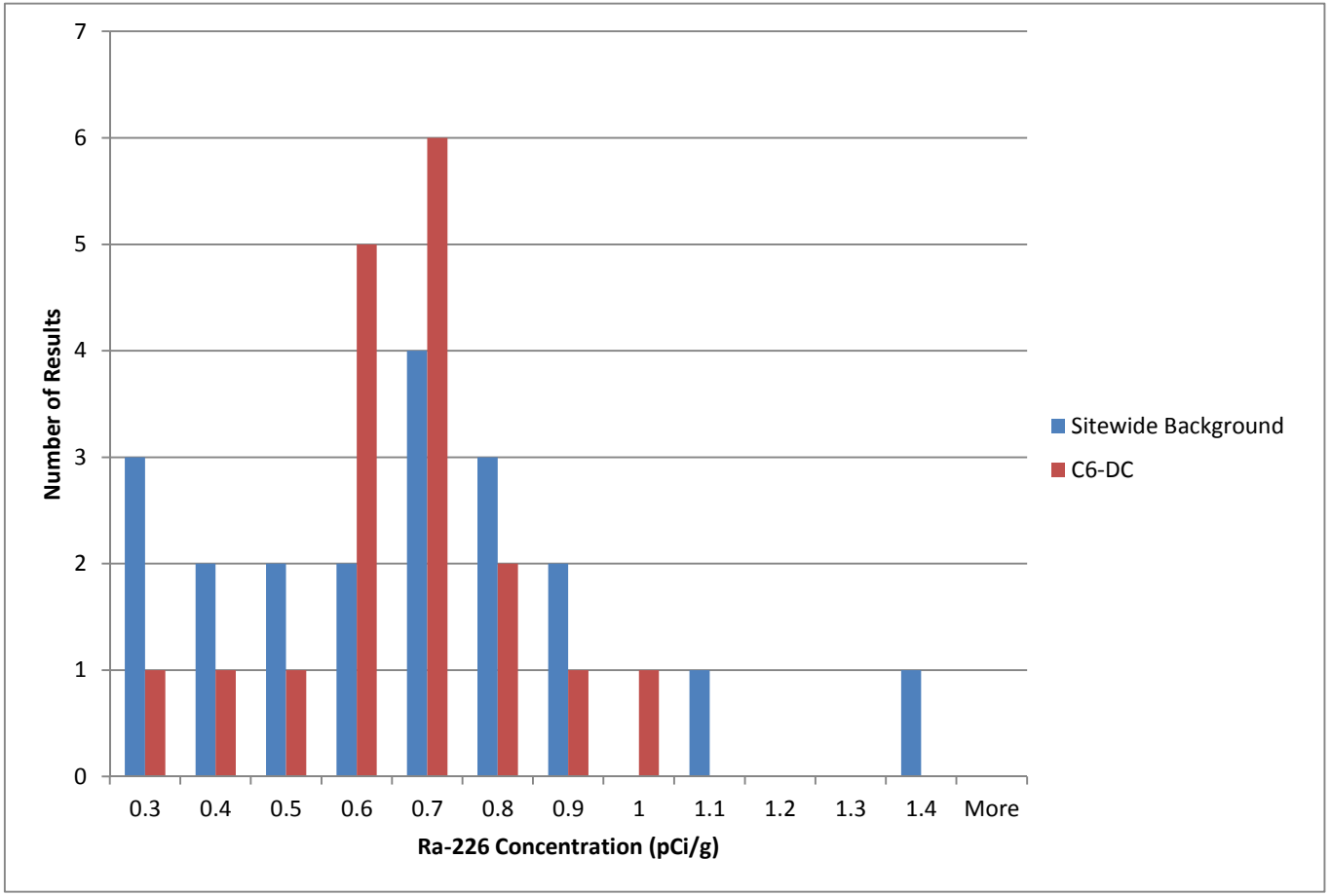
Histogram, RSY C6 (DC) vs. Sitewide Background

Background

Bin	Frequency
0.3	3
0.4	2
0.5	2
0.6	2
0.7	4
0.8	3
0.9	2
1	0
1.1	1
1.2	0
1.3	0
1.4	1
More	0

C6-DC

Bin	Frequency
0.3	1
0.4	1
0.5	1
0.6	5
0.7	6
0.8	2
0.9	1
1	1
1.1	0
1.2	0
1.3	0
1.4	0
More	0



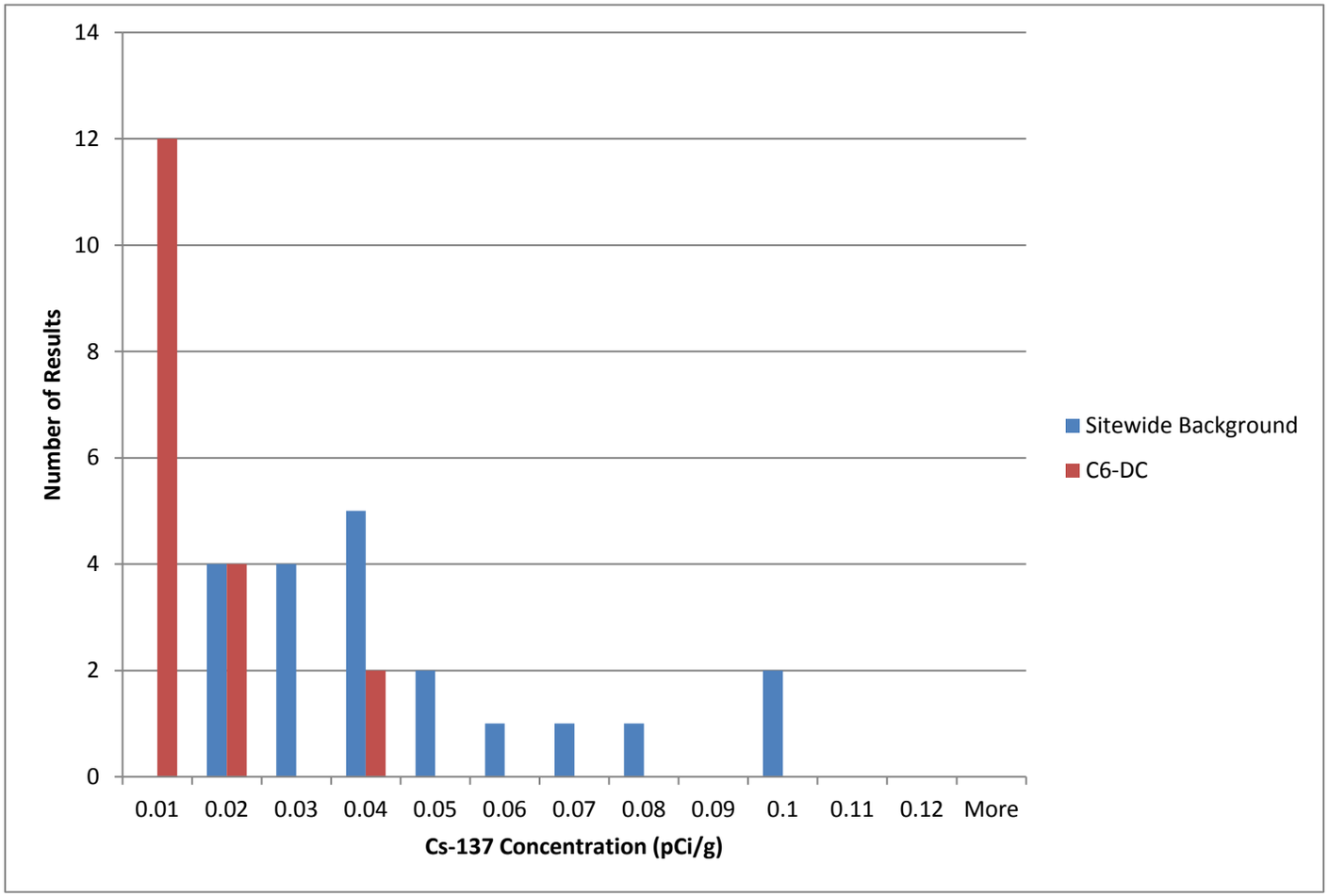
Histogram, RSY C6 (DC) vs. Sitewide Background

Background

Bin	*Frequency*
0.01	0
0.02	4
0.03	4
0.04	5
0.05	2
0.06	1
0.07	1
0.08	1
0.09	0
0.1	2
0.11	0
0.12	0
More	0

C6-DC

Bin	*Frequency*
0.01	12
0.02	4
0.03	0
0.04	2
0.05	0
0.06	0
0.07	0
0.08	0
0.09	0
0.1	0
0.11	0
0.12	0
More	0



TestAmerica

THE LEADER IN ENVIRONMENTAL TESTING

ANALYTICAL REPORT

TestAmerica Laboratories, Inc.
TestAmerica St. Louis
13715 Rider Trail North
Earth City, MO 63045
Tel: (314)298-8566

TestAmerica Job ID: 160-29934-2
Client Project/Site: Hunters Point Naval Shipyard - Parcel E2

For:
Aptim Federal Services LLC
4005 Port Chicago Hwy, Suite 200
Concord, California 94520

Attn: Eddie Kalombo

Rhonda Ridenhower

Authorized for release by:
8/31/2018 2:36:26 PM

Rhonda Ridenhower, Manager of Project Management
(314)298-8566
rhonda.ridenhower@testamericainc.com

LINKS

Review your project results through TotalAccess

Have a Question? Ask The Expert

Visit us at: www.testamericainc.com

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

Results relate only to the items tested and the sample(s) as received by the laboratory.

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QC Association Summary 23
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Case Narrative

Client: Aptim Federal Services LLC
Project/Site: Hunters Point Naval Shipyard - Parcel E2

TestAmerica Job ID: 160-29934-2

Job ID: 160-29934-2

Laboratory: TestAmerica St. Louis

Narrative

CASE NARRATIVE

Client: Aptim Federal Services LLC

Project: Hunters Point Naval Shipyard - Parcel E2

Report Number: 160-29934-2

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

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

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

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

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

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

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

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

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

The following clean-up methods for Organic analyses may have been used on the samples in this data set. Specific methods employed are documented on the batch extraction logs:

Method 3600C: Cleanup
Method 3620C: Florisil Cleanup
Method 3630C: Silica Gel Cleanup
Method 3640A: Gel-Permeation Cleanup
Method 3650B: Acid-Base Partition Cleanup
Method 3660B: Sulfur Cleanup

Case Narrative

Client: Aptim Federal Services LLC
Project/Site: Hunters Point Naval Shipyard - Parcel E2

TestAmerica Job ID: 160-29934-2

Job ID: 160-29934-2 (Continued)

Laboratory: TestAmerica St. Louis (Continued)

Method 3665A: Sulfuric Acid/Permanganate Cleanup

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

RECEIPT
The samples were received on 08/02/2018; the samples arrived in good condition, properly preserved. The temperature of the coolers at receipt was 20.0 C.

TOTAL BETA STRONTIUM (GFPC)
Samples PE2-RSYC6-DC-S001 (160-29934-1) and PE2-RSYC6-DC-S011 (160-29934-11) were analyzed for Total Beta Strontium (GFPC) in accordance with EPA 905. The samples were dried on 08/03/2018, prepared on 08/10/2018 and analyzed on 08/29/2018.

The following samples could not be thoroughly homogenized before sub-sampling was performed due to sample matrix: PE2-RSYC6-DC-S001 (160-29934-1) and PE2-RSYC6-DC-S011 (160-29934-11). Samples contained rocks of varying sizes and detritus material.

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

RADIUM-226 BY GAMMA SPEC (21 DAY INGROWTH)
Samples PE2-RSYC6-DC-S001 (160-29934-1), PE2-RSYC6-DC-S002 (160-29934-2), PE2-RSYC6-DC-S003 (160-29934-3), PE2-RSYC6-DC-S004 (160-29934-4), PE2-RSYC6-DC-S005 (160-29934-5), PE2-RSYC6-DC-S006 (160-29934-6), PE2-RSYC6-DC-S007 (160-29934-7), PE2-RSYC6-DC-S008 (160-29934-8), PE2-RSYC6-DC-S009 (160-29934-9), PE2-RSYC6-DC-S010 (160-29934-10), PE2-RSYC6-DC-S011 (160-29934-11), PE2-RSYC6-DC-S012 (160-29934-12), PE2-RSYC6-DC-S013 (160-29934-13), PE2-RSYC6-DC-S014 (160-29934-14), PE2-RSYC6-DC-S015 (160-29934-15), PE2-RSYC6-DC-S016 (160-29934-16), PE2-RSYC6-DC-S017 (160-29934-17) and PE2-RSYC6-DC-S018 (160-29934-18) were analyzed for Radium-226 by gamma spec (21 day ingrowth) in accordance with EPA GA_01_R. The samples were dried on 08/03/2018, prepared on 08/06/2018 and analyzed on 08/28/2018.

The cesium-137 detection goal of 0.0700 pCi/g was not met. This is caused by statistical fluctuations in the Compton background due to low level activity in the samples in conjunction with the software attempting to fit a peak into the noise of this baseline.
PE2-RSYC6-DC-S002 (160-29934-2) and PE2-RSYC6-DC-S014 (160-29934-14)

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

APTIM

CHAIN OF CUSTODY

Ref. Document # PE2_RSYC6_DC#595

Page 1 of 2

APTIM Federal Services, LLC
4005 Port Chicago Hwy
Concord, CA 94520

Project Manager: *Nels Johnson*
(Name & phone #)

Send Report To: *Eddie Kalombo*
Phone/Fax Number: *415-987-0760*
Address: *4005 Port Chicago Hwy*
City: *Concord, CA, 94520*
Sampler's Name(s): JOAQUIN RAMIREZ

Project Number: 500506
Project Name: CTO-013 RSYC6 Deconstruction Systematic
Project Location: HPNS - Parcel E-2
Purchase Order #: 202296
Shipment/Pickup Date: 8.1.18
Waybill Number: 1266 5451 3914 0415 2
Lab Destination: TestAmerica (St. Louis Lab) 13715 Rider Trail North Earth City, MO 63045
Lab Contact Name / ph. #: Rhonda Ridenhower (314) 298-8566

Sample ID Number	Sample Description	Collection Information: Date	Time	Method	Matrix	# of containers	Container Type	Gamma Spec (EPA 191.1 M) – (7 day in-growth preliminary results and full 21 day in growth for full gamma results)	Total Strontium (EPA 905 MOD)		Strontium 90 (EPA 905 MOD)			Dose Rate µR/Hr
							Preservative (water)							
							Preservative (soil)	N/A	N/A		N/A			
PE2-RSYC6-DC-S001	Parcel E-2 RSYC6 Deconstruction Systematic	7/31/18	1235	G	SO	1	16 oz. plastic jar	X	X		X			5
PE2-RSYC6-DC-S002	Parcel E-2 RSYC6 Deconstruction Systematic	7/31/18	1239	G	SO	1	16 oz. plastic jar	X						5
PE2-RSYC6-DC-S003	Parcel E-2 RSYC6 Deconstruction Systematic	7/31/18	1245	G	SO	1	16 oz. plastic jar	X						5
PE2-RSYC6-DC-S004	Parcel E-2 RSYC6 Deconstruction Systematic	7/31/18	1252	G	SO	1	16 oz. plastic jar	X						5
PE2-RSYC6-DC-S005	Parcel E-2 RSYC6 Deconstruction Systematic	7/31/18	1300	G	SO	1	16 oz. plastic jar	X						5
PE2-RSYC6-DC-S006	Parcel E-2 RSYC6 Deconstruction Systematic	7/31/18	1308	G	SO	1	16 oz. plastic jar	X						5
PE2-RSYC6-DC-S007	Parcel E-2 RSYC6 Deconstruction Systematic	7/31/18	1319	G	SO	1	16 oz. plastic jar	X						5
PE2-RSYC6-DC-S008	Parcel E-2 RSYC6 Deconstruction Systematic	7/31/18	1326	G	SO	1	16 oz. plastic jar	X						5
PE2-RSYC6-DC-S009	Parcel E-2 RSYC6 Deconstruction Systematic	7/31/18	1333	G	SO	1	16 oz. plastic jar	X						5
PE2-RSYC6-DC-S010	Parcel E-2 RSYC6 Deconstruction Systematic	7/31/18	1340	G	SO	1	16 oz. plastic jar	X						5

Special Instructions:

7 days ingrown draft and follow with 21 days final.
Analyze for Total Strontium as a screening step, and isotopic Sr-90 only if Total Strontium is above project action limit of 0.331 pCi/g.

☐ 24-hr
Standard TAT -10-day ☐ 3-day ☐ 10-day

Level Of QC Required: I II III Project Specific:

Relinquished By	Date	Time	Received By	Date	Time
JOAQUIN RAMIREZ	8.1.18	1000	EDDIE KALOMBO	8.1.18	1000
EDDIE KALOMBO	8.1.18	1600	Nicholas Ress	8-2-18	0830

Method Codes C = Composite G = Grab

Matrix Codes
DW = Drinking Water SO = Soil
GW = Ground Water SL = Sludge
WW = Waste Water CP = Chip Samples
A = Air ABS=Asbestos, PO=Pipe Openning

160-29934 Chain of Custody

APTIM

CHAIN OF CUSTODY

Ref. Document # PE2_RSYC6_DC#595

APTIM Federal Services, LLC
4005 Port Chicago Hwy
Concord, CA 94520

Project Number: 500506
Project Name: CTO-013 RSYC6 Deconstruction Systematic
Project Location: HPNS - Parcel E-2
Purchase Order #: 202296
Shipment/Pickup Date: 8.1.18
Waybill Number: 1266454512914041 52
Lab Destination: TestAmerica (St. Louis Lab) 13715 Rider Trail North Earth City, MO 63045
Lab Contact Name / ph. #: Rhonda Ridenhower (314) 298-8566

Project Manager: *Nels Johnson*
(Name & phone #)

Send Report To: *Eddie Kalombo*
Phone/Fax Number: *415-987-0760*
Address: *4005 Port Chicago Hwy*
City: *Concord, CA, 94520*
Sampler's Name(s): Joaquin Ramirez

Sample ID Number	Sample Description	Collection Information Date	Time	Method	Matrix	# of containers	Preservative (water) / Preservative (soil) / Container Type	Gamma Spec (EPA 191.1 M) – (7 day in-growth preliminary results and full 21 day in growth for full gamma results)	Total Strontium (EPA 905 MOD)		Strontium 90 (EPA 905 MOD)			Dose Rate µR/Hr	
							Preservative (water)								
							Preservative (soil)	N/A	N/A		N/A				
PE2-RSYC6-DC-S011	Parcel E-2 RSYC6 Deconstruction Systematic	7/31/18	1347	G	SO	1	16 oz. plastic jar	X	X		X			5	
PE2-RSYC6-DC-S012	Parcel E-2 RSYC6 Deconstruction Systematic	7/31/18	1353	G	SO	1	16 oz. plastic jar	X						5	
PE2-RSYC6-DC-S013	Parcel E-2 RSYC6 Deconstruction Systematic	7/31/18	1359	G	SO	1	16 oz. plastic jar	X						5	
PE2-RSYC6-DC-S014	Parcel E-2 RSYC6 Deconstruction Systematic	7/31/18	1406	G	SO	1	16 oz. plastic jar	X						5	
PE2-RSYC6-DC-S015	Parcel E-2 RSYC6 Deconstruction Systematic	7/31/18	1413	G	SO	1	16 oz. plastic jar	X						5	
PE2-RSYC6-DC-S016	Parcel E-2 RSYC6 Deconstruction Systematic	7/31/18	1420	G	SO	1	16 oz. plastic jar	X						5	
PE2-RSYC6-DC-S017	Parcel E-2 RSYC6 Deconstruction Systematic	7/31/18	1425	G	SO	1	16 oz. plastic jar	X						5	
PE2-RSYC6-DC-S018	Parcel E-2 RSYC6 Deconstruction Systematic	7/31/18	1431	G	SO	1	16 oz. plastic jar	X						5	

Special Instructions:

7 days ingrown draft and follow with 21 days final.
Analyze for Total Strontium as a screening step, and isotopic Sr-90 only if Total Strontium is above project action limit of 0.331 pCi/g.

Standard TAT -10-day ☐ 24-hr ☐ 3-day ☐ 10-day

Level Of QC Required: I II III Project Specific:

Relinquished By	Date	Time	Received By	Date	Time
Joaquin Ramirez	8.1.18	1000	EDDIE KALOMBO	8.1.18	1000
EDDIE KALOMBO	8.1.18	1600	Nicholas Perez	8-2-18	0830

Method Codes C = Composite G = Grab

Matrix Codes
DW = Drinking Water SO = Soil
GW = Ground Water SL = Sludge
WW = Waste Water CP = Chip Samples
A = Air ABS=Asbestos, PO=Pipe Openning

Login Sample Receipt Checklist

Client: Aptim Federal Services LLC

Job Number: 160-29934-2

Login Number: 29934
List Number: 1
Creator: Press, Nicholas B

List Source: TestAmerica St. Louis

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

Definitions/Glossary

Client: Aptim Federal Services LLC
Project/Site: Hunters Point Naval Shipyard - Parcel E2

TestAmerica Job ID: 160-29934-2

Qualifiers

Rad

Qualifier	Qualifier Description
U	Undetected at the Limit of Detection.

Glossary

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

Method Summary

Client: Aptim Federal Services LLC
Project/Site: Hunters Point Naval Shipyard - Parcel E2

TestAmerica Job ID: 160-29934-2

Method	Method Description	Protocol	Laboratory
905.0	Total Beta Strontium (GFPC)	DOE	TAL SL
GA-01-R	Radium-226 & Other Gamma Emitters (GS)	DOE	TAL SL
DPS-0	Preparation, Digestion/ Precipitate	None	TAL SL
Dry and Grind	Preparation, Dry and Grind	None	TAL SL
Fill_Geo-21	Fill Geometry, 21-Day In-Growth	None	TAL SL

Protocol References:

DOE = U.S. Department of Energy

None = None

Laboratory References:

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

Sample Summary

Client: Aptim Federal Services LLC
Project/Site: Hunters Point Naval Shipyard - Parcel E2

TestAmerica Job ID: 160-29934-2

Lab Sample ID	Client Sample ID	Matrix	Collected	Received
160-29934-1	PE2-RSYC6-DC-S001	Solid	07/31/18 12:35	08/02/18 08:30
160-29934-2	PE2-RSYC6-DC-S002	Solid	07/31/18 12:39	08/02/18 08:30
160-29934-3	PE2-RSYC6-DC-S003	Solid	07/31/18 12:45	08/02/18 08:30
160-29934-4	PE2-RSYC6-DC-S004	Solid	07/31/18 12:52	08/02/18 08:30
160-29934-5	PE2-RSYC6-DC-S005	Solid	07/31/18 13:00	08/02/18 08:30
160-29934-6	PE2-RSYC6-DC-S006	Solid	07/31/18 13:08	08/02/18 08:30
160-29934-7	PE2-RSYC6-DC-S007	Solid	07/31/18 13:19	08/02/18 08:30
160-29934-8	PE2-RSYC6-DC-S008	Solid	07/31/18 13:26	08/02/18 08:30
160-29934-9	PE2-RSYC6-DC-S009	Solid	07/31/18 13:33	08/02/18 08:30
160-29934-10	PE2-RSYC6-DC-S010	Solid	07/31/18 13:40	08/02/18 08:30
160-29934-11	PE2-RSYC6-DC-S011	Solid	07/31/18 13:47	08/02/18 08:30
160-29934-12	PE2-RSYC6-DC-S012	Solid	07/31/18 13:53	08/02/18 08:30
160-29934-13	PE2-RSYC6-DC-S013	Solid	07/31/18 13:59	08/02/18 08:30
160-29934-14	PE2-RSYC6-DC-S014	Solid	07/31/18 14:06	08/02/18 08:30
160-29934-15	PE2-RSYC6-DC-S015	Solid	07/31/18 14:13	08/02/18 08:30
160-29934-16	PE2-RSYC6-DC-S016	Solid	07/31/18 14:20	08/02/18 08:30
160-29934-17	PE2-RSYC6-DC-S017	Solid	07/31/18 14:25	08/02/18 08:30
160-29934-18	PE2-RSYC6-DC-S018	Solid	07/31/18 14:31	08/02/18 08:30

Client Sample Results

Client: Aptim Federal Services LLC
Project/Site: Hunters Point Naval Shipyard - Parcel E2

TestAmerica Job ID: 160-29934-2

Client Sample ID: PE2-RSYC6-DC-S001

Lab Sample ID: 160-29934-1
Date Collected: 07/31/18 12:35
Matrix: Solid
Date Received: 08/02/18 08:30

Method: 905.0 - Total Beta Strontium (GFPC)

Analyte	Result	Qualifier	Count Uncert. (2σ+/-)	Total Uncert. (2σ+/-)	LOQ	DLC	Unit	Prepared	Analyzed	Dil Fac
Total Beta Strontium	**0.0562**		0.0689	0.0690	0.331	0.0522	pCi/g	08/10/18 15:22	08/29/18 05:58	1

Carrier	*%Yield*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
Sr Carrier	*88.0*		*40 - 110*	*08/10/18 15:22*	*08/29/18 05:58*	*1*

Method: GA-01-R - Radium-226 & Other Gamma Emitters (GS)

Analyte	Result	Qualifier	Count Uncert. (2σ+/-)	Total Uncert. (2σ+/-)	LOQ	DLC	Unit	Prepared	Analyzed	Dil Fac
Actinium 228	**0.965**		0.246	0.265		0.114	pCi/g	08/06/18 22:21	08/28/18 15:18	1
Actinium-227	0.423	U	0.959	0.961		0.772	pCi/g	08/06/18 22:21	08/28/18 15:18	1
Bismuth-212	-0.840	U	0.889	0.893		1.07	pCi/g	08/06/18 22:21	08/28/18 15:18	1
Bismuth-214	**0.687**		0.196	0.208		0.0763	pCi/g	08/06/18 22:21	08/28/18 15:18	1
Cesium-137	-0.0216	U	0.0851	0.0851	0.0700	0.0683	pCi/g	08/06/18 22:21	08/28/18 15:18	1
Cobalt-60	0.00707	U	0.0129	0.0129	0.200	0.0493	pCi/g	08/06/18 22:21	08/28/18 15:18	1
Lead-210	-0.998	U	2.18	2.19		1.83	pCi/g	08/06/18 22:21	08/28/18 15:18	1
Lead-212	**0.739**		0.133	0.154		0.0648	pCi/g	08/06/18 22:21	08/28/18 15:18	1
Lead-214	**0.925**		0.191	0.212		0.0715	pCi/g	08/06/18 22:21	08/28/18 15:18	1
Potassium-40	**15.4**		2.03	2.56		0.415	pCi/g	08/06/18 22:21	08/28/18 15:18	1
Protactinium-231	-0.833	U	2.85	2.85		2.31	pCi/g	08/06/18 22:21	08/28/18 15:18	1
Radium-226	**0.687**		0.196	0.208	0.700	0.0763	pCi/g	08/06/18 22:21	08/28/18 15:18	1
Radium-228	**0.965**		0.246	0.265		0.114	pCi/g	08/06/18 22:21	08/28/18 15:18	1
Thallium-208	**0.295**		0.0925	0.0972		0.0365	pCi/g	08/06/18 22:21	08/28/18 15:18	1
Thorium-228	**0.739**		0.133	0.154		0.0648	pCi/g	08/06/18 22:21	08/28/18 15:18	1
Thorium-232	**0.965**		0.246	0.265		0.114	pCi/g	08/06/18 22:21	08/28/18 15:18	1
Thorium-234	0.147	U	0.644	0.644		1.76	pCi/g	08/06/18 22:21	08/28/18 15:18	1
Uranium-235	0.000	U	0.235	0.235		0.679	pCi/g	08/06/18 22:21	08/28/18 15:18	1
Uranium-238	0.147	U	0.644	0.644		1.76	pCi/g	08/06/18 22:21	08/28/18 15:18	1

Client Sample ID: PE2-RSYC6-DC-S002

Lab Sample ID: 160-29934-2
Date Collected: 07/31/18 12:39
Matrix: Solid
Date Received: 08/02/18 08:30

Method: GA-01-R - Radium-226 & Other Gamma Emitters (GS)

Analyte	Result	Qualifier	Count Uncert. (2σ+/-)	Total Uncert. (2σ+/-)	LOQ	DLC	Unit	Prepared	Analyzed	Dil Fac
Actinium 228	**0.939**		0.250	0.268		0.0425	pCi/g	08/06/18 22:21	08/28/18 15:58	1
Actinium-227	-0.404	U	0.884	0.885		0.596	pCi/g	08/06/18 22:21	08/28/18 15:58	1
Bismuth-212	0.0290	U	1.16	1.16		0.951	pCi/g	08/06/18 22:21	08/28/18 15:58	1
Bismuth-214	**0.742**		0.188	0.203		0.0619	pCi/g	08/06/18 22:21	08/28/18 15:58	1
Cesium-137	0.00806	U	0.111	0.111	0.0700	0.0908	pCi/g	08/06/18 22:21	08/28/18 15:58	1
Cobalt-60	-0.0364	U	0.136	0.136	0.200	0.0679	pCi/g	08/06/18 22:21	08/28/18 15:58	1
Lead-210	0.0556	U	1.84	1.84		1.29	pCi/g	08/06/18 22:21	08/28/18 15:58	1
Lead-212	**0.845**		0.134	0.173		0.0550	pCi/g	08/06/18 22:21	08/28/18 15:58	1
Lead-214	**0.753**		0.158	0.176		0.0713	pCi/g	08/06/18 22:21	08/28/18 15:58	1
Potassium-40	**18.1**		2.35	2.99		0.348	pCi/g	08/06/18 22:21	08/28/18 15:58	1
Protactinium-231	0.425	U	1.79	1.79		2.81	pCi/g	08/06/18 22:21	08/28/18 15:58	1

Client Sample Results

Client: Aptim Federal Services LLC
Project/Site: Hunters Point Naval Shipyard - Parcel E2

TestAmerica Job ID: 160-29934-2

Client Sample ID: PE2-RSYC6-DC-S002

Lab Sample ID: 160-29934-2
Date Collected: 07/31/18 12:39
Matrix: Solid
Date Received: 08/02/18 08:30

Method: GA-01-R - Radium-226 & Other Gamma Emitters (GS) (Continued)

Analyte	Result	Qualifier	Count Uncert. (2σ+/-)	Total Uncert. (2σ+/-)	LOQ	DLC	Unit	Prepared	Analyzed	Dil Fac
Radium-226	0.742		0.188	0.203	0.700	0.0619	pCi/g	08/06/18 22:21	08/28/18 15:58	1
Radium-228	0.939		0.250	0.268		0.0425	pCi/g	08/06/18 22:21	08/28/18 15:58	1
Thallium-208	0.418		0.101	0.110		0.0301	pCi/g	08/06/18 22:21	08/28/18 15:58	1
Thorium-228	0.845		0.134	0.173		0.0550	pCi/g	08/06/18 22:21	08/28/18 15:58	1
Thorium-232	0.939		0.250	0.268		0.0425	pCi/g	08/06/18 22:21	08/28/18 15:58	1
Thorium-234	0.295	U	0.515	0.516		1.19	pCi/g	08/06/18 22:21	08/28/18 15:58	1
Uranium-235	0.208	U	0.428	0.428		0.355	pCi/g	08/06/18 22:21	08/28/18 15:58	1
Uranium-238	0.295	U	0.515	0.516		1.19	pCi/g	08/06/18 22:21	08/28/18 15:58	1

Client Sample ID: PE2-RSYC6-DC-S003

Lab Sample ID: 160-29934-3
Date Collected: 07/31/18 12:45
Matrix: Solid
Date Received: 08/02/18 08:30

Method: GA-01-R - Radium-226 & Other Gamma Emitters (GS)

Analyte	Result	Qualifier	Count Uncert. (2σ+/-)	Total Uncert. (2σ+/-)	LOQ	DLC	Unit	Prepared	Analyzed	Dil Fac
Actinium 228	0.819		0.258	0.271		0.0825	pCi/g	08/06/18 22:21	08/28/18 16:00	1
Actinium-227	0.314	U	0.769	0.770		0.622	pCi/g	08/06/18 22:21	08/28/18 16:00	1
Bismuth-212	0.255	U	0.814	0.815		0.652	pCi/g	08/06/18 22:21	08/28/18 16:00	1
Bismuth-214	0.757		0.142	0.163		0.0350	pCi/g	08/06/18 22:21	08/28/18 16:00	1
Cesium-137	0.00198	U	0.0630	0.0630	0.0700	0.0517	pCi/g	08/06/18 22:21	08/28/18 16:00	1
Cobalt-60	0.00171	U	0.0756	0.0756	0.200	0.0377	pCi/g	08/06/18 22:21	08/28/18 16:00	1
Lead-210	-1.20	U	2.12	2.13		1.53	pCi/g	08/06/18 22:21	08/28/18 16:00	1
Lead-212	0.605		0.106	0.132		0.0599	pCi/g	08/06/18 22:21	08/28/18 16:00	1
Lead-214	0.794		0.126	0.150		0.0306	pCi/g	08/06/18 22:21	08/28/18 16:00	1
Potassium-40	16.7		1.82	2.50		0.195	pCi/g	08/06/18 22:21	08/28/18 16:00	1
Protactinium-231	-0.727	U	2.82	2.83		2.31	pCi/g	08/06/18 22:21	08/28/18 16:00	1
Radium-226	0.757		0.142	0.163	0.700	0.0350	pCi/g	08/06/18 22:21	08/28/18 16:00	1
Radium-228	0.819		0.258	0.271		0.0825	pCi/g	08/06/18 22:21	08/28/18 16:00	1
Thallium-208	0.292		0.0797	0.0853		0.0285	pCi/g	08/06/18 22:21	08/28/18 16:00	1
Thorium-228	0.605		0.106	0.132		0.0599	pCi/g	08/06/18 22:21	08/28/18 16:00	1
Thorium-232	0.819		0.258	0.271		0.0825	pCi/g	08/06/18 22:21	08/28/18 16:00	1
Thorium-234	1.14		1.22	1.22		0.961	pCi/g	08/06/18 22:21	08/28/18 16:00	1
Uranium-235	0.179	U	0.284	0.285		0.252	pCi/g	08/06/18 22:21	08/28/18 16:00	1
Uranium-238	1.14		1.22	1.22		0.961	pCi/g	08/06/18 22:21	08/28/18 16:00	1

Client Sample ID: PE2-RSYC6-DC-S004

Lab Sample ID: 160-29934-4
Date Collected: 07/31/18 12:52
Matrix: Solid
Date Received: 08/02/18 08:30

Method: GA-01-R - Radium-226 & Other Gamma Emitters (GS)

Analyte	Result	Qualifier	Count Uncert. (2σ+/-)	Total Uncert. (2σ+/-)	LOQ	DLC	Unit	Prepared	Analyzed	Dil Fac
Actinium 228	0.915		0.232	0.250		0.0344	pCi/g	08/06/18 22:21	08/28/18 16:01	1
Actinium-227	0.407	U	0.873	0.875		0.703	pCi/g	08/06/18 22:21	08/28/18 16:01	1
Bismuth-212	0.311	U	0.867	0.867		0.685	pCi/g	08/06/18 22:21	08/28/18 16:01	1

Client Sample Results

Client: Aptim Federal Services LLC
Project/Site: Hunters Point Naval Shipyard - Parcel E2

TestAmerica Job ID: 160-29934-2

Client Sample ID: PE2-RSYC6-DC-S004

Lab Sample ID: 160-29934-4
Date Collected: 07/31/18 12:52
Matrix: Solid
Date Received: 08/02/18 08:30

Method: GA-01-R - Radium-226 & Other Gamma Emitters (GS) (Continued)

Analyte	Result	Qualifier	Count Uncert. (2σ+/-)	Total Uncert. (2σ+/-)	LOQ	DLC	Unit	Prepared	Analyzed	Dil Fac
Bismuth-214	**0.560**		0.157	0.168		0.0589	pCi/g	08/06/18 22:21	08/28/18 16:01	1
Cesium-137	-0.00474	U	0.0643	0.0643	0.0700	0.0531	pCi/g	08/06/18 22:21	08/28/18 16:01	1
Cobalt-60	0.0401	U	0.0306	0.0309	0.200	0.0402	pCi/g	08/06/18 22:21	08/28/18 16:01	1
Lead-210	-1.10	U	1.34	1.35		1.88	pCi/g	08/06/18 22:21	08/28/18 16:01	1
Lead-212	**0.665**		0.114	0.143		0.0531	pCi/g	08/06/18 22:21	08/28/18 16:01	1
Lead-214	**0.588**		0.149	0.161		0.0606	pCi/g	08/06/18 22:21	08/28/18 16:01	1
Potassium-40	**13.8**		1.86	2.33		0.274	pCi/g	08/06/18 22:21	08/28/18 16:01	1
Protactinium-231	-1.04	U	3.60	3.60		2.94	pCi/g	08/06/18 22:21	08/28/18 16:01	1
Radium-226	**0.560**		0.157	0.168	0.700	0.0589	pCi/g	08/06/18 22:21	08/28/18 16:01	1
Radium-228	**0.915**		0.232	0.250		0.0344	pCi/g	08/06/18 22:21	08/28/18 16:01	1
Thallium-208	**0.131**		0.105	0.106		0.0560	pCi/g	08/06/18 22:21	08/28/18 16:01	1
Thorium-228	**0.665**		0.114	0.143		0.0531	pCi/g	08/06/18 22:21	08/28/18 16:01	1
Thorium-232	**0.915**		0.232	0.250		0.0344	pCi/g	08/06/18 22:21	08/28/18 16:01	1
Thorium-234	**0.951**		1.45	1.45		0.894	pCi/g	08/06/18 22:21	08/28/18 16:01	1
Uranium-235	0.153	U	0.619	0.620		0.506	pCi/g	08/06/18 22:21	08/28/18 16:01	1
Uranium-238	**0.951**		1.45	1.45		0.894	pCi/g	08/06/18 22:21	08/28/18 16:01	1

Client Sample ID: PE2-RSYC6-DC-S005

Lab Sample ID: 160-29934-5
Date Collected: 07/31/18 13:00
Matrix: Solid
Date Received: 08/02/18 08:30

Method: GA-01-R - Radium-226 & Other Gamma Emitters (GS)

Analyte	Result	Qualifier	Count Uncert. (2σ+/-)	Total Uncert. (2σ+/-)	LOQ	DLC	Unit	Prepared	Analyzed	Dil Fac
Actinium 228	**0.747**		0.169	0.186		0.0513	pCi/g	08/06/18 22:21	08/28/18 15:59	1
Actinium-227	0.292	U	0.666	0.666		0.536	pCi/g	08/06/18 22:21	08/28/18 15:59	1
Bismuth-212	0.0000000298	U	0.761	0.761		0.627	pCi/g	08/06/18 22:21	08/28/18 15:59	1
Bismuth-214	**0.442**		0.114	0.123		0.0474	pCi/g	08/06/18 22:21	08/28/18 15:59	1
Cesium-137	-0.0176	U	0.0469	0.0469	0.0700	0.0370	pCi/g	08/06/18 22:21	08/28/18 15:59	1
Cobalt-60	-0.0392	U	0.0978	0.0979	0.200	0.0470	pCi/g	08/06/18 22:21	08/28/18 15:59	1
Lead-210	-0.430	U	0.830	0.831		1.06	pCi/g	08/06/18 22:21	08/28/18 15:59	1
Lead-212	**0.525**		0.0906	0.113		0.0452	pCi/g	08/06/18 22:21	08/28/18 15:59	1
Lead-214	**0.769**		0.131	0.153		0.0435	pCi/g	08/06/18 22:21	08/28/18 15:59	1
Potassium-40	**13.1**		1.45	1.97		0.238	pCi/g	08/06/18 22:21	08/28/18 15:59	1
Protactinium-231	0.000	U	0.674	0.674		1.99	pCi/g	08/06/18 22:21	08/28/18 15:59	1
Radium-226	**0.442**		0.114	0.123	0.700	0.0474	pCi/g	08/06/18 22:21	08/28/18 15:59	1
Radium-228	**0.747**		0.169	0.186		0.0513	pCi/g	08/06/18 22:21	08/28/18 15:59	1
Thallium-208	**0.125**		0.0754	0.0765		0.0373	pCi/g	08/06/18 22:21	08/28/18 15:59	1
Thorium-228	**0.525**		0.0906	0.113		0.0452	pCi/g	08/06/18 22:21	08/28/18 15:59	1
Thorium-232	**0.747**		0.169	0.186		0.0513	pCi/g	08/06/18 22:21	08/28/18 15:59	1
Thorium-234	0.384	U	0.901	0.902		1.13	pCi/g	08/06/18 22:21	08/28/18 15:59	1
Uranium-235	0.149	U	0.319	0.319		0.369	pCi/g	08/06/18 22:21	08/28/18 15:59	1
Uranium-238	0.384	U	0.901	0.902		1.13	pCi/g	08/06/18 22:21	08/28/18 15:59	1

Client Sample Results

Client: Aptim Federal Services LLC
Project/Site: Hunters Point Naval Shipyard - Parcel E2

TestAmerica Job ID: 160-29934-2

Client Sample ID: PE2-RSYC6-DC-S006

Lab Sample ID: 160-29934-6
Date Collected: 07/31/18 13:08
Matrix: Solid
Date Received: 08/02/18 08:30

Method: GA-01-R - Radium-226 & Other Gamma Emitters (GS)

Analyte	Result	Qualifier	Count Uncert. (2σ+/-)	Total Uncert. (2σ+/-)	LOQ	DLC	Unit	Prepared	Analyzed	Dil Fac
Actinium 228	**0.629**		0.176	0.187		0.0311	pCi/g	08/06/18 22:21	08/28/18 16:00	1
Actinium-227	0.242	U	0.487	0.488		0.742	pCi/g	08/06/18 22:21	08/28/18 16:00	1
Bismuth-212	**1.17**		0.452	0.468		0.101	pCi/g	08/06/18 22:21	08/28/18 16:00	1
Bismuth-214	**0.697**		0.142	0.159		0.0279	pCi/g	08/06/18 22:21	08/28/18 16:00	1
Cesium-137	-0.0446	U	0.0739	0.0740	0.0700	0.0572	pCi/g	08/06/18 22:21	08/28/18 16:00	1
Cobalt-60	**0.0325**		0.0628	0.0629	0.200	0.0284	pCi/g	08/06/18 22:21	08/28/18 16:00	1
Lead-210	-0.793	U	1.83	1.83		1.54	pCi/g	08/06/18 22:21	08/28/18 16:00	1
Lead-212	**0.603**		0.114	0.130		0.0578	pCi/g	08/06/18 22:21	08/28/18 16:00	1
Lead-214	**0.749**		0.159	0.176		0.0580	pCi/g	08/06/18 22:21	08/28/18 16:00	1
Potassium-40	**14.1**		1.71	2.22		0.120	pCi/g	08/06/18 22:21	08/28/18 16:00	1
Protactinium-231	-0.000000225	U	3.28	3.28		2.70	pCi/g	08/06/18 22:21	08/28/18 16:00	1
Radium-226	**0.697**		0.142	0.159	0.700	0.0279	pCi/g	08/06/18 22:21	08/28/18 16:00	1
Radium-228	**0.629**		0.176	0.187		0.0311	pCi/g	08/06/18 22:21	08/28/18 16:00	1
Thallium-208	**0.136**		0.120	0.121		0.0583	pCi/g	08/06/18 22:21	08/28/18 16:00	1
Thorium-228	**0.603**		0.114	0.130		0.0578	pCi/g	08/06/18 22:21	08/28/18 16:00	1
Thorium-232	**0.629**		0.176	0.187		0.0311	pCi/g	08/06/18 22:21	08/28/18 16:00	1
Thorium-234	-0.849	U	1.33	1.34		1.43	pCi/g	08/06/18 22:21	08/28/18 16:00	1
Uranium-235	0.000	U	0.239	0.239		0.484	pCi/g	08/06/18 22:21	08/28/18 16:00	1
Uranium-238	-0.849	U	1.33	1.34		1.43	pCi/g	08/06/18 22:21	08/28/18 16:00	1

Client Sample ID: PE2-RSYC6-DC-S007

Lab Sample ID: 160-29934-7
Date Collected: 07/31/18 13:19
Matrix: Solid
Date Received: 08/02/18 08:30

Method: GA-01-R - Radium-226 & Other Gamma Emitters (GS)

Analyte	Result	Qualifier	Count Uncert. (2σ+/-)	Total Uncert. (2σ+/-)	LOQ	DLC	Unit	Prepared	Analyzed	Dil Fac
Actinium 228	**1.02**		0.266	0.286		0.0661	pCi/g	08/06/18 22:21	08/28/18 15:58	1
Actinium-227	-0.0614	U	0.599	0.599		0.492	pCi/g	08/06/18 22:21	08/28/18 15:58	1
Bismuth-212	-0.0132	U	0.807	0.807		0.813	pCi/g	08/06/18 22:21	08/28/18 15:58	1
Bismuth-214	**0.616**		0.173	0.185		0.0717	pCi/g	08/06/18 22:21	08/28/18 15:58	1
Cesium-137	-0.00384	U	0.100	0.100	0.0700	0.0671	pCi/g	08/06/18 22:21	08/28/18 15:58	1
Cobalt-60	-0.000750	U	0.00203	0.00204	0.200	0.0595	pCi/g	08/06/18 22:21	08/28/18 15:58	1
Lead-210	0.655	U	1.26	1.27		0.832	pCi/g	08/06/18 22:21	08/28/18 15:58	1
Lead-212	**0.763**		0.113	0.150		0.0513	pCi/g	08/06/18 22:21	08/28/18 15:58	1
Lead-214	**0.690**		0.128	0.147		0.0528	pCi/g	08/06/18 22:21	08/28/18 15:58	1
Potassium-40	**18.4**		1.94	2.70		0.225	pCi/g	08/06/18 22:21	08/28/18 15:58	1
Protactinium-231	0.439	U	1.90	1.90		2.31	pCi/g	08/06/18 22:21	08/28/18 15:58	1
Radium-226	**0.616**		0.173	0.185	0.700	0.0717	pCi/g	08/06/18 22:21	08/28/18 15:58	1
Radium-228	**1.02**		0.266	0.286		0.0661	pCi/g	08/06/18 22:21	08/28/18 15:58	1
Thallium-208	**0.285**		0.0670	0.0732		0.0204	pCi/g	08/06/18 22:21	08/28/18 15:58	1
Thorium-228	**0.763**		0.113	0.150		0.0513	pCi/g	08/06/18 22:21	08/28/18 15:58	1
Thorium-232	**1.02**		0.266	0.286		0.0661	pCi/g	08/06/18 22:21	08/28/18 15:58	1
Thorium-234	-0.378	U	0.989	0.990		1.03	pCi/g	08/06/18 22:21	08/28/18 15:58	1
Uranium-235	0.230	U	0.325	0.326		0.311	pCi/g	08/06/18 22:21	08/28/18 15:58	1
Uranium-238	-0.378	U	0.989	0.990		1.03	pCi/g	08/06/18 22:21	08/28/18 15:58	1

Client Sample Results

Client: Aptim Federal Services LLC
Project/Site: Hunters Point Naval Shipyard - Parcel E2

TestAmerica Job ID: 160-29934-2

Client Sample ID: PE2-RSYC6-DC-S008

Lab Sample ID: 160-29934-8
Date Collected: 07/31/18 13:26
Matrix: Solid
Date Received: 08/02/18 08:30

Method: GA-01-R - Radium-226 & Other Gamma Emitters (GS)

Analyte	Result	Qualifier	Count Uncert. (2σ+/-)	Total Uncert. (2σ+/-)	LOQ	DLC	Unit	Prepared	Analyzed	Dil Fac
Actinium 228	**0.983**		0.212	0.235		0.0344	pCi/g	08/06/18 22:21	08/28/18 15:59	1
Actinium-227	-0.374	U	0.907	0.907		0.582	pCi/g	08/06/18 22:21	08/28/18 15:59	1
Bismuth-212	-0.0405	U	0.639	0.639		0.756	pCi/g	08/06/18 22:21	08/28/18 15:59	1
Bismuth-214	**0.556**		0.149	0.160		0.0581	pCi/g	08/06/18 22:21	08/28/18 15:59	1
Cesium-137	-0.00395	U	0.0873	0.0873	0.0700	0.0645	pCi/g	08/06/18 22:21	08/28/18 15:59	1
Cobalt-60	0.0193	U	0.0697	0.0697	0.200	0.0471	pCi/g	08/06/18 22:21	08/28/18 15:59	1
Lead-210	0.0194	U	1.59	1.59		1.31	pCi/g	08/06/18 22:21	08/28/18 15:59	1
Lead-212	**0.772**		0.122	0.158		0.0546	pCi/g	08/06/18 22:21	08/28/18 15:59	1
Lead-214	**0.822**		0.162	0.183		0.0687	pCi/g	08/06/18 22:21	08/28/18 15:59	1
Potassium-40	**14.1**		1.88	2.37		0.279	pCi/g	08/06/18 22:21	08/28/18 15:59	1
Protactinium-231	-0.992	U	3.60	3.60		2.94	pCi/g	08/06/18 22:21	08/28/18 15:59	1
Radium-226	**0.556**		0.149	0.160	0.700	0.0581	pCi/g	08/06/18 22:21	08/28/18 15:59	1
Radium-228	**0.983**		0.212	0.235		0.0344	pCi/g	08/06/18 22:21	08/28/18 15:59	1
Thallium-208	**0.293**		0.0892	0.0942		0.0325	pCi/g	08/06/18 22:21	08/28/18 15:59	1
Thorium-228	**0.772**		0.122	0.158		0.0546	pCi/g	08/06/18 22:21	08/28/18 15:59	1
Thorium-232	**0.983**		0.212	0.235		0.0344	pCi/g	08/06/18 22:21	08/28/18 15:59	1
Thorium-234	0.523	U	0.545	0.548		0.928	pCi/g	08/06/18 22:21	08/28/18 15:59	1
Uranium-235	-0.0194	U	0.782	0.782		0.621	pCi/g	08/06/18 22:21	08/28/18 15:59	1
Uranium-238	0.523	U	0.545	0.548		0.928	pCi/g	08/06/18 22:21	08/28/18 15:59	1

Client Sample ID: PE2-RSYC6-DC-S009

Lab Sample ID: 160-29934-9
Date Collected: 07/31/18 13:33
Matrix: Solid
Date Received: 08/02/18 08:30

Method: GA-01-R - Radium-226 & Other Gamma Emitters (GS)

Analyte	Result	Qualifier	Count Uncert. (2σ+/-)	Total Uncert. (2σ+/-)	LOQ	DLC	Unit	Prepared	Analyzed	Dil Fac
Actinium 228	**0.807**		0.247	0.260		0.0789	pCi/g	08/06/18 22:21	08/28/18 15:59	1
Actinium-227	-0.0820	U	0.133	0.133		0.995	pCi/g	08/06/18 22:21	08/28/18 15:59	1
Bismuth-212	0.351	U	0.828	0.829		0.646	pCi/g	08/06/18 22:21	08/28/18 15:59	1
Bismuth-214	**0.558**		0.149	0.159		0.0640	pCi/g	08/06/18 22:21	08/28/18 15:59	1
Cesium-137	-0.0122	U	0.0705	0.0705	0.0700	0.0569	pCi/g	08/06/18 22:21	08/28/18 15:59	1
Cobalt-60	-0.000946	U	0.0116	0.0116	0.200	0.0464	pCi/g	08/06/18 22:21	08/28/18 15:59	1
Lead-210	**2.67**		2.30	2.33		1.30	pCi/g	08/06/18 22:21	08/28/18 15:59	1
Lead-212	**0.858**		0.135	0.162		0.0618	pCi/g	08/06/18 22:21	08/28/18 15:59	1
Lead-214	**0.770**		0.158	0.177		0.0643	pCi/g	08/06/18 22:21	08/28/18 15:59	1
Potassium-40	**13.7**		1.86	2.32		0.391	pCi/g	08/06/18 22:21	08/28/18 15:59	1
Protactinium-231	-0.194	U	3.75	3.75		3.08	pCi/g	08/06/18 22:21	08/28/18 15:59	1
Radium-226	**0.558**		0.149	0.159	0.700	0.0640	pCi/g	08/06/18 22:21	08/28/18 15:59	1
Radium-228	**0.807**		0.247	0.260		0.0789	pCi/g	08/06/18 22:21	08/28/18 15:59	1
Thallium-208	**0.309**		0.0875	0.0929		0.0332	pCi/g	08/06/18 22:21	08/28/18 15:59	1
Thorium-228	**0.858**		0.135	0.162		0.0618	pCi/g	08/06/18 22:21	08/28/18 15:59	1
Thorium-232	**0.807**		0.247	0.260		0.0789	pCi/g	08/06/18 22:21	08/28/18 15:59	1
Thorium-234	**1.21**		1.03	1.03		0.761	pCi/g	08/06/18 22:21	08/28/18 15:59	1
Uranium-235	**0.323**		0.274	0.276		0.173	pCi/g	08/06/18 22:21	08/28/18 15:59	1
Uranium-238	**1.21**		1.03	1.03		0.761	pCi/g	08/06/18 22:21	08/28/18 15:59	1

Client Sample Results

Client: Aptim Federal Services LLC
Project/Site: Hunters Point Naval Shipyard - Parcel E2

TestAmerica Job ID: 160-29934-2

Client Sample ID: PE2-RSYC6-DC-S010

Lab Sample ID: 160-29934-10
Date Collected: 07/31/18 13:40
Matrix: Solid
Date Received: 08/02/18 08:30

Method: GA-01-R - Radium-226 & Other Gamma Emitters (GS)

Analyte	Result	Qualifier	Count Uncert. (2σ+/-)	Total Uncert. (2σ+/-)	LOQ	DLC	Unit	Prepared	Analyzed	Dil Fac
Actinium 228	**0.630**		0.233	0.241		0.180	pCi/g	08/06/18 22:21	08/28/18 16:37	1
Actinium-227	0.0266	U	0.0263	0.0264		0.597	pCi/g	08/06/18 22:21	08/28/18 16:37	1
Bismuth-212	-0.313	U	1.06	1.06		0.846	pCi/g	08/06/18 22:21	08/28/18 16:37	1
Bismuth-214	**0.666**		0.157	0.171		0.0447	pCi/g	08/06/18 22:21	08/28/18 16:37	1
Cesium-137	0.0157	U	0.0672	0.0672	0.0700	0.0536	pCi/g	08/06/18 22:21	08/28/18 16:37	1
Cobalt-60	0.0467	U	0.101	0.101	0.200	0.0485	pCi/g	08/06/18 22:21	08/28/18 16:37	1
Lead-210	**1.18**		1.70	1.70		1.15	pCi/g	08/06/18 22:21	08/28/18 16:37	1
Lead-212	**0.719**		0.121	0.153		0.0556	pCi/g	08/06/18 22:21	08/28/18 16:37	1
Lead-214	**0.666**		0.130	0.147		0.0409	pCi/g	08/06/18 22:21	08/28/18 16:37	1
Potassium-40	**14.1**		1.94	2.42		0.304	pCi/g	08/06/18 22:21	08/28/18 16:37	1
Protactinium-231	0.000	U	0.747	0.747		2.55	pCi/g	08/06/18 22:21	08/28/18 16:37	1
Radium-226	**0.666**		0.157	0.171	0.700	0.0447	pCi/g	08/06/18 22:21	08/28/18 16:37	1
Radium-228	**0.630**		0.233	0.241		0.180	pCi/g	08/06/18 22:21	08/28/18 16:37	1
Thallium-208	**0.231**		0.0687	0.0728		0.0209	pCi/g	08/06/18 22:21	08/28/18 16:37	1
Thorium-228	**0.719**		0.121	0.153		0.0556	pCi/g	08/06/18 22:21	08/28/18 16:37	1
Thorium-232	**0.630**		0.233	0.241		0.180	pCi/g	08/06/18 22:21	08/28/18 16:37	1
Thorium-234	-1.20	U	1.38	1.39		1.36	pCi/g	08/06/18 22:21	08/28/18 16:37	1
Uranium-235	0.317	U	0.317	0.319		0.343	pCi/g	08/06/18 22:21	08/28/18 16:37	1
Uranium-238	-1.20	U	1.38	1.39		1.36	pCi/g	08/06/18 22:21	08/28/18 16:37	1

Client Sample ID: PE2-RSYC6-DC-S011

Lab Sample ID: 160-29934-11
Date Collected: 07/31/18 13:47
Matrix: Solid
Date Received: 08/02/18 08:30

Method: 905.0 - Total Beta Strontium (GFPC)

Analyte	Result	Qualifier	Count Uncert. (2σ+/-)	Total Uncert. (2σ+/-)	LOQ	DLC	Unit	Prepared	Analyzed	Dil Fac
Total Beta Strontium	**0.0881**		0.0690	0.0693	0.331	0.0495	pCi/g	08/10/18 15:22	08/29/18 05:58	1

Carrier	*%Yield*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
Sr Carrier	*85.1*		*40 - 110*	*08/10/18 15:22*	*08/29/18 05:58*	*1*

Method: GA-01-R - Radium-226 & Other Gamma Emitters (GS)

Analyte	Result	Qualifier	Count Uncert. (2σ+/-)	Total Uncert. (2σ+/-)	LOQ	DLC	Unit	Prepared	Analyzed	Dil Fac
Actinium 228	**0.292**		0.241	0.243		0.136	pCi/g	08/06/18 22:21	08/28/18 16:38	1
Actinium-227	-0.318	U	0.799	0.800		0.646	pCi/g	08/06/18 22:21	08/28/18 16:38	1
Bismuth-212	0.0818	U	0.784	0.784		0.639	pCi/g	08/06/18 22:21	08/28/18 16:38	1
Bismuth-214	**0.470**		0.104	0.115		0.0133	pCi/g	08/06/18 22:21	08/28/18 16:38	1
Cesium-137	0.0217	U	0.0487	0.0488	0.0700	0.0376	pCi/g	08/06/18 22:21	08/28/18 16:38	1
Cobalt-60	0.00192	U	0.0848	0.0848	0.200	0.0424	pCi/g	08/06/18 22:21	08/28/18 16:38	1
Lead-210	-1.20	U	1.93	1.94		1.32	pCi/g	08/06/18 22:21	08/28/18 16:38	1
Lead-212	**0.480**		0.101	0.118		0.0574	pCi/g	08/06/18 22:21	08/28/18 16:38	1
Lead-214	**0.634**		0.122	0.139		0.0569	pCi/g	08/06/18 22:21	08/28/18 16:38	1
Potassium-40	**12.2**		1.65	2.07		0.219	pCi/g	08/06/18 22:21	08/28/18 16:38	1
Protactinium-231	0.462	U	1.64	1.64		1.80	pCi/g	08/06/18 22:21	08/28/18 16:38	1

Client Sample Results

Client: Aptim Federal Services LLC
Project/Site: Hunters Point Naval Shipyard - Parcel E2

TestAmerica Job ID: 160-29934-2

Client Sample ID: PE2-RSYC6-DC-S011

Lab Sample ID: 160-29934-11
Date Collected: 07/31/18 13:47
Matrix: Solid
Date Received: 08/02/18 08:30

Method: GA-01-R - Radium-226 & Other Gamma Emitters (GS) (Continued)

Analyte	Result	Qualifier	Count Uncert. (2σ+/-)	Total Uncert. (2σ+/-)	LOQ	DLC	Unit	Prepared	Analyzed	Dil Fac
Radium-226	0.470		0.104	0.115	0.700	0.0133	pCi/g	08/06/18 22:21	08/28/18 16:38	1
Radium-228	0.292		0.241	0.243		0.136	pCi/g	08/06/18 22:21	08/28/18 16:38	1
Thallium-208	0.256		0.0670	0.0720		0.0190	pCi/g	08/06/18 22:21	08/28/18 16:38	1
Thorium-228	0.480		0.101	0.118		0.0574	pCi/g	08/06/18 22:21	08/28/18 16:38	1
Thorium-232	0.292		0.241	0.243		0.136	pCi/g	08/06/18 22:21	08/28/18 16:38	1
Thorium-234	0.0350	U	1.07	1.07		0.876	pCi/g	08/06/18 22:21	08/28/18 16:38	1
Uranium-235	-0.154	U	0.291	0.292		0.358	pCi/g	08/06/18 22:21	08/28/18 16:38	1
Uranium-238	0.0350	U	1.07	1.07		0.876	pCi/g	08/06/18 22:21	08/28/18 16:38	1

Client Sample ID: PE2-RSYC6-DC-S012

Lab Sample ID: 160-29934-12
Date Collected: 07/31/18 13:53
Matrix: Solid
Date Received: 08/02/18 08:30

Method: GA-01-R - Radium-226 & Other Gamma Emitters (GS)

Analyte	Result	Qualifier	Count Uncert. (2σ+/-)	Total Uncert. (2σ+/-)	LOQ	DLC	Unit	Prepared	Analyzed	Dil Fac
Actinium 228	0.664		0.180	0.192		0.0749	pCi/g	08/06/18 22:21	08/28/18 16:40	1
Actinium-227	-0.234	U	0.939	0.939		0.765	pCi/g	08/06/18 22:21	08/28/18 16:40	1
Bismuth-212	0.466	U	0.897	0.898		0.698	pCi/g	08/06/18 22:21	08/28/18 16:40	1
Bismuth-214	0.234		0.127	0.129		0.231	pCi/g	08/06/18 22:21	08/28/18 16:40	1
Cesium-137	-0.0430	U	0.151	0.151	0.0700	0.0678	pCi/g	08/06/18 22:21	08/28/18 16:40	1
Cobalt-60	-0.0241	U	0.111	0.111	0.200	0.0589	pCi/g	08/06/18 22:21	08/28/18 16:40	1
Lead-210	-0.212	U	1.45	1.45		1.46	pCi/g	08/06/18 22:21	08/28/18 16:40	1
Lead-212	0.760		0.121	0.156		0.0560	pCi/g	08/06/18 22:21	08/28/18 16:40	1
Lead-214	0.726		0.122	0.143		0.0515	pCi/g	08/06/18 22:21	08/28/18 16:40	1
Potassium-40	16.1		1.97	2.57		0.267	pCi/g	08/06/18 22:21	08/28/18 16:40	1
Protactinium-231	0.713	U	2.50	2.50		2.60	pCi/g	08/06/18 22:21	08/28/18 16:40	1
Radium-226	0.234		0.127	0.129	0.700	0.231	pCi/g	08/06/18 22:21	08/28/18 16:40	1
Radium-228	0.664		0.180	0.192		0.0749	pCi/g	08/06/18 22:21	08/28/18 16:40	1
Thallium-208	0.236		0.0698	0.0740		0.0257	pCi/g	08/06/18 22:21	08/28/18 16:40	1
Thorium-228	0.760		0.121	0.156		0.0560	pCi/g	08/06/18 22:21	08/28/18 16:40	1
Thorium-232	0.664		0.180	0.192		0.0749	pCi/g	08/06/18 22:21	08/28/18 16:40	1
Thorium-234	-0.116	U	1.66	1.66		1.37	pCi/g	08/06/18 22:21	08/28/18 16:40	1
Uranium-235	-0.0740	U	0.0994	0.0997		0.543	pCi/g	08/06/18 22:21	08/28/18 16:40	1
Uranium-238	-0.116	U	1.66	1.66		1.37	pCi/g	08/06/18 22:21	08/28/18 16:40	1

Client Sample ID: PE2-RSYC6-DC-S013

Lab Sample ID: 160-29934-13
Date Collected: 07/31/18 13:59
Matrix: Solid
Date Received: 08/02/18 08:30

Method: GA-01-R - Radium-226 & Other Gamma Emitters (GS)

Analyte	Result	Qualifier	Count Uncert. (2σ+/-)	Total Uncert. (2σ+/-)	LOQ	DLC	Unit	Prepared	Analyzed	Dil Fac
Actinium 228	0.951		0.175	0.200		0.0424	pCi/g	08/06/18 22:21	08/28/18 16:37	1
Actinium-227	0.0885	U	0.764	0.764		0.626	pCi/g	08/06/18 22:21	08/28/18 16:37	1
Bismuth-212	1.14		0.430	0.446		0.125	pCi/g	08/06/18 22:21	08/28/18 16:37	1

Client Sample Results

Client: Aptim Federal Services LLC
Project/Site: Hunters Point Naval Shipyard - Parcel E2

TestAmerica Job ID: 160-29934-2

Client Sample ID: PE2-RSYC6-DC-S013

Lab Sample ID: 160-29934-13
Date Collected: 07/31/18 13:59
Matrix: Solid
Date Received: 08/02/18 08:30

Method: GA-01-R - Radium-226 & Other Gamma Emitters (GS) (Continued)

Analyte	Result	Qualifier	Count Uncert. (2σ+/-)	Total Uncert. (2σ+/-)	LOQ	DLC	Unit	Prepared	Analyzed	Dil Fac
Bismuth-214	**0.661**		0.134	0.150		0.0491	pCi/g	08/06/18 22:21	08/28/18 16:37	1
Cesium-137	0.00331	U	0.0572	0.0572	0.0700	0.0468	pCi/g	08/06/18 22:21	08/28/18 16:37	1
Cobalt-60	0.0128	U	0.0497	0.0497	0.200	0.0350	pCi/g	08/06/18 22:21	08/28/18 16:37	1
Lead-210	0.623	U	1.62	1.62		1.31	pCi/g	08/06/18 22:21	08/28/18 16:37	1
Lead-212	**0.773**		0.101	0.142		0.0444	pCi/g	08/06/18 22:21	08/28/18 16:37	1
Lead-214	**0.761**		0.109	0.134		0.0444	pCi/g	08/06/18 22:21	08/28/18 16:37	1
Potassium-40	**18.6**		1.73	2.58		0.300	pCi/g	08/06/18 22:21	08/28/18 16:37	1
Protactinium-231	0.339	U	1.38	1.38		2.14	pCi/g	08/06/18 22:21	08/28/18 16:37	1
Radium-226	**0.661**		0.134	0.150	0.700	0.0491	pCi/g	08/06/18 22:21	08/28/18 16:37	1
Radium-228	**0.951**		0.175	0.200		0.0424	pCi/g	08/06/18 22:21	08/28/18 16:37	1
Thallium-208	**0.282**		0.0597	0.0664		0.0193	pCi/g	08/06/18 22:21	08/28/18 16:37	1
Thorium-228	**0.773**		0.101	0.142		0.0444	pCi/g	08/06/18 22:21	08/28/18 16:37	1
Thorium-232	**0.951**		0.175	0.200		0.0424	pCi/g	08/06/18 22:21	08/28/18 16:37	1
Thorium-234	-0.434	U	1.56	1.56		1.27	pCi/g	08/06/18 22:21	08/28/18 16:37	1
Uranium-235	-0.200	U	0.322	0.323		0.455	pCi/g	08/06/18 22:21	08/28/18 16:37	1
Uranium-238	-0.434	U	1.56	1.56		1.27	pCi/g	08/06/18 22:21	08/28/18 16:37	1

Client Sample ID: PE2-RSYC6-DC-S014

Lab Sample ID: 160-29934-14
Date Collected: 07/31/18 14:06
Matrix: Solid
Date Received: 08/02/18 08:30

Method: GA-01-R - Radium-226 & Other Gamma Emitters (GS)

Analyte	Result	Qualifier	Count Uncert. (2σ+/-)	Total Uncert. (2σ+/-)	LOQ	DLC	Unit	Prepared	Analyzed	Dil Fac
Actinium 228	**0.904**		0.215	0.233		0.0333	pCi/g	08/06/18 22:21	08/28/18 16:39	1
Actinium-227	0.396	U	0.960	0.961		0.774	pCi/g	08/06/18 22:21	08/28/18 16:39	1
Bismuth-212	0.342	U	0.887	0.888		0.701	pCi/g	08/06/18 22:21	08/28/18 16:39	1
Bismuth-214	**1.00**		0.189	0.215		0.0469	pCi/g	08/06/18 22:21	08/28/18 16:39	1
Cesium-137	-0.0508	U	0.0972	0.0973	0.0700	0.0767	pCi/g	08/06/18 22:21	08/28/18 16:39	1
Cobalt-60	-0.00549	U	0.107	0.107	0.200	0.0528	pCi/g	08/06/18 22:21	08/28/18 16:39	1
Lead-210	-0.792	U	2.07	2.08		1.74	pCi/g	08/06/18 22:21	08/28/18 16:39	1
Lead-212	**0.740**		0.125	0.147		0.0582	pCi/g	08/06/18 22:21	08/28/18 16:39	1
Lead-214	**0.730**		0.145	0.163		0.0802	pCi/g	08/06/18 22:21	08/28/18 16:39	1
Potassium-40	**15.8**		1.87	2.46		0.129	pCi/g	08/06/18 22:21	08/28/18 16:39	1
Protactinium-231	-1.06	U	3.91	3.91		3.19	pCi/g	08/06/18 22:21	08/28/18 16:39	1
Radium-226	**1.00**		0.189	0.215	0.700	0.0469	pCi/g	08/06/18 22:21	08/28/18 16:39	1
Radium-228	**0.904**		0.215	0.233		0.0333	pCi/g	08/06/18 22:21	08/28/18 16:39	1
Thallium-208	**0.321**		0.0821	0.0884		0.0284	pCi/g	08/06/18 22:21	08/28/18 16:39	1
Thorium-228	**0.740**		0.125	0.147		0.0582	pCi/g	08/06/18 22:21	08/28/18 16:39	1
Thorium-232	**0.904**		0.215	0.233		0.0333	pCi/g	08/06/18 22:21	08/28/18 16:39	1
Thorium-234	-0.0713	U	1.81	1.81		1.49	pCi/g	08/06/18 22:21	08/28/18 16:39	1
Uranium-235	0.140	U	0.288	0.288		0.528	pCi/g	08/06/18 22:21	08/28/18 16:39	1
Uranium-238	-0.0713	U	1.81	1.81		1.49	pCi/g	08/06/18 22:21	08/28/18 16:39	1

Client Sample Results

Client: Aptim Federal Services LLC
Project/Site: Hunters Point Naval Shipyard - Parcel E2

TestAmerica Job ID: 160-29934-2

Client Sample ID: PE2-RSYC6-DC-S015

Lab Sample ID: 160-29934-15
Date Collected: 07/31/18 14:13
Matrix: Solid
Date Received: 08/02/18 08:30

Method: GA-01-R - Radium-226 & Other Gamma Emitters (GS)

Analyte	Result	Qualifier	Count Uncert. (2σ+/-)	Total Uncert. (2σ+/-)	LOQ	DLC	Unit	Prepared	Analyzed	Dil Fac
Actinium 228	**0.857**		0.205	0.223		0.0540	pCi/g	08/06/18 22:21	08/28/18 16:37	1
Actinium-227	0.00764	U	0.0312	0.0312		0.520	pCi/g	08/06/18 22:21	08/28/18 16:37	1
Bismuth-212	**1.44**		0.581	0.600		0.182	pCi/g	08/06/18 22:21	08/28/18 16:37	1
Bismuth-214	**0.765**		0.163	0.182		0.0568	pCi/g	08/06/18 22:21	08/28/18 16:37	1
Cesium-137	0.0172	U	0.0780	0.0781	0.0700	0.0630	pCi/g	08/06/18 22:21	08/28/18 16:37	1
Cobalt-60	**0.0336**		0.0603	0.0604	0.200	0.0278	pCi/g	08/06/18 22:21	08/28/18 16:37	1
Lead-210	0.552	U	1.13	1.13		0.796	pCi/g	08/06/18 22:21	08/28/18 16:37	1
Lead-212	**0.693**		0.118	0.148		0.0615	pCi/g	08/06/18 22:21	08/28/18 16:37	1
Lead-214	**0.771**		0.138	0.159		0.0564	pCi/g	08/06/18 22:21	08/28/18 16:37	1
Potassium-40	**16.1**		1.86	2.49		0.235	pCi/g	08/06/18 22:21	08/28/18 16:37	1
Protactinium-231	0.616	U	1.96	1.96		2.14	pCi/g	08/06/18 22:21	08/28/18 16:37	1
Radium-226	**0.765**		0.163	0.182	0.700	0.0568	pCi/g	08/06/18 22:21	08/28/18 16:37	1
Radium-228	**0.857**		0.205	0.223		0.0540	pCi/g	08/06/18 22:21	08/28/18 16:37	1
Thallium-208	**0.263**		0.0733	0.0782		0.0290	pCi/g	08/06/18 22:21	08/28/18 16:37	1
Thorium-228	**0.693**		0.118	0.148		0.0615	pCi/g	08/06/18 22:21	08/28/18 16:37	1
Thorium-232	**0.857**		0.205	0.223		0.0540	pCi/g	08/06/18 22:21	08/28/18 16:37	1
Thorium-234	0.240	U	1.28	1.28		1.04	pCi/g	08/06/18 22:21	08/28/18 16:37	1
Uranium-235	-0.0321	U	0.541	0.541		0.368	pCi/g	08/06/18 22:21	08/28/18 16:37	1
Uranium-238	0.240	U	1.28	1.28		1.04	pCi/g	08/06/18 22:21	08/28/18 16:37	1

Client Sample ID: PE2-RSYC6-DC-S016

Lab Sample ID: 160-29934-16
Date Collected: 07/31/18 14:20
Matrix: Solid
Date Received: 08/02/18 08:30

Method: GA-01-R - Radium-226 & Other Gamma Emitters (GS)

Analyte	Result	Qualifier	Count Uncert. (2σ+/-)	Total Uncert. (2σ+/-)	LOQ	DLC	Unit	Prepared	Analyzed	Dil Fac
Actinium 228	**0.741**		0.200	0.214		0.0896	pCi/g	08/06/18 22:21	08/28/18 16:39	1
Actinium-227	0.253	U	0.849	0.850		0.687	pCi/g	08/06/18 22:21	08/28/18 16:39	1
Bismuth-212	-0.0290	U	0.877	0.877		0.725	pCi/g	08/06/18 22:21	08/28/18 16:39	1
Bismuth-214	**0.624**		0.168	0.180		0.0627	pCi/g	08/06/18 22:21	08/28/18 16:39	1
Cesium-137	0.0411	U	0.0827	0.0828	0.0700	0.0643	pCi/g	08/06/18 22:21	08/28/18 16:39	1
Cobalt-60	0.0131	U	0.0775	0.0775	0.200	0.0401	pCi/g	08/06/18 22:21	08/28/18 16:39	1
Lead-210	-1.94	U	1.40	1.42		1.95	pCi/g	08/06/18 22:21	08/28/18 16:39	1
Lead-212	**4.04**		0.258	0.583		0.0459	pCi/g	08/06/18 22:21	08/28/18 16:39	1
Lead-214	**0.605**		0.150	0.163		0.0722	pCi/g	08/06/18 22:21	08/28/18 16:39	1
Potassium-40	**10.9**		1.80	2.12		0.324	pCi/g	08/06/18 22:21	08/28/18 16:39	1
Protactinium-231	-1.00	U	3.66	3.67		2.99	pCi/g	08/06/18 22:21	08/28/18 16:39	1
Radium-226	**0.624**		0.168	0.180	0.700	0.0627	pCi/g	08/06/18 22:21	08/28/18 16:39	1
Radium-228	**0.741**		0.200	0.214		0.0896	pCi/g	08/06/18 22:21	08/28/18 16:39	1
Thallium-208	**0.250**		0.0752	0.0795		0.0235	pCi/g	08/06/18 22:21	08/28/18 16:39	1
Thorium-228	**4.04**		0.258	0.583		0.0459	pCi/g	08/06/18 22:21	08/28/18 16:39	1
Thorium-232	**0.741**		0.200	0.214		0.0896	pCi/g	08/06/18 22:21	08/28/18 16:39	1
Thorium-234	0.113	U	1.87	1.87		1.53	pCi/g	08/06/18 22:21	08/28/18 16:39	1
Uranium-235	0.0464	U	0.231	0.231		0.542	pCi/g	08/06/18 22:21	08/28/18 16:39	1
Uranium-238	0.113	U	1.87	1.87		1.53	pCi/g	08/06/18 22:21	08/28/18 16:39	1

Client Sample Results

Client: Aptim Federal Services LLC
Project/Site: Hunters Point Naval Shipyard - Parcel E2

TestAmerica Job ID: 160-29934-2

Client Sample ID: PE2-RSYC6-DC-S017

Lab Sample ID: 160-29934-17
Date Collected: 07/31/18 14:25
Matrix: Solid
Date Received: 08/02/18 08:30

Method: GA-01-R - Radium-226 & Other Gamma Emitters (GS)

Analyte	Result	Qualifier	Count Uncert. (2σ+/-)	Total Uncert. (2σ+/-)	LOQ	DLC	Unit	Prepared	Analyzed	Dil Fac
Actinium 228	**0.889**		0.207	0.226		0.0429	pCi/g	08/06/18 22:21	08/28/18 16:41	1
Actinium-227	0.306	U	0.677	0.678		0.456	pCi/g	08/06/18 22:21	08/28/18 16:41	1
Bismuth-212	0.0649	U	0.807	0.807		0.660	pCi/g	08/06/18 22:21	08/28/18 16:41	1
Bismuth-214	**0.718**		0.161	0.178		0.0614	pCi/g	08/06/18 22:21	08/28/18 16:41	1
Cesium-137	0.0370	U	0.0693	0.0694	0.0700	0.0544	pCi/g	08/06/18 22:21	08/28/18 16:41	1
Cobalt-60	0.0237	U	0.0436	0.0436	0.200	0.0239	pCi/g	08/06/18 22:21	08/28/18 16:41	1
Lead-210	-1.31	U	1.35	1.35		1.35	pCi/g	08/06/18 22:21	08/28/18 16:41	1
Lead-212	**0.745**		0.109	0.145		0.0467	pCi/g	08/06/18 22:21	08/28/18 16:41	1
Lead-214	**0.692**		0.149	0.166		0.0641	pCi/g	08/06/18 22:21	08/28/18 16:41	1
Potassium-40	**18.7**		1.84	2.65		0.275	pCi/g	08/06/18 22:21	08/28/18 16:41	1
Protactinium-231	-0.640	U	2.93	2.93		2.40	pCi/g	08/06/18 22:21	08/28/18 16:41	1
Radium-226	**0.718**		0.161	0.178	0.700	0.0614	pCi/g	08/06/18 22:21	08/28/18 16:41	1
Radium-228	**0.889**		0.207	0.226		0.0429	pCi/g	08/06/18 22:21	08/28/18 16:41	1
Thallium-208	**0.309**		0.0730	0.0797		0.0238	pCi/g	08/06/18 22:21	08/28/18 16:41	1
Thorium-228	**0.745**		0.109	0.145		0.0467	pCi/g	08/06/18 22:21	08/28/18 16:41	1
Thorium-232	**0.889**		0.207	0.226		0.0429	pCi/g	08/06/18 22:21	08/28/18 16:41	1
Thorium-234	**1.44**		1.43	1.44		0.968	pCi/g	08/06/18 22:21	08/28/18 16:41	1
Uranium-235	0.156	U	0.259	0.259		0.328	pCi/g	08/06/18 22:21	08/28/18 16:41	1
Uranium-238	**1.44**		1.43	1.44		0.968	pCi/g	08/06/18 22:21	08/28/18 16:41	1

Client Sample ID: PE2-RSYC6-DC-S018

Lab Sample ID: 160-29934-18
Date Collected: 07/31/18 14:31
Matrix: Solid
Date Received: 08/02/18 08:30

Method: GA-01-R - Radium-226 & Other Gamma Emitters (GS)

Analyte	Result	Qualifier	Count Uncert. (2σ+/-)	Total Uncert. (2σ+/-)	LOQ	DLC	Unit	Prepared	Analyzed	Dil Fac
Actinium 228	**0.920**		0.296	0.311		0.119	pCi/g	08/06/18 22:21	08/28/18 16:38	1
Actinium-227	-0.381	U	1.22	1.22		0.988	pCi/g	08/06/18 22:21	08/28/18 16:38	1
Bismuth-212	0.648	U	1.14	1.14		0.885	pCi/g	08/06/18 22:21	08/28/18 16:38	1
Bismuth-214	**0.943**		0.223	0.243		0.0826	pCi/g	08/06/18 22:21	08/28/18 16:38	1
Cesium-137	0.0237	U	0.0758	0.0759	0.0700	0.0600	pCi/g	08/06/18 22:21	08/28/18 16:38	1
Cobalt-60	-0.0463	U	0.109	0.109	0.200	0.0751	pCi/g	08/06/18 22:21	08/28/18 16:38	1
Lead-210	**1.64**		2.38	2.39		1.44	pCi/g	08/06/18 22:21	08/28/18 16:38	1
Lead-212	**0.879**		0.147	0.174		0.0689	pCi/g	08/06/18 22:21	08/28/18 16:38	1
Lead-214	**0.712**		0.178	0.192		0.0779	pCi/g	08/06/18 22:21	08/28/18 16:38	1
Potassium-40	**15.5**		2.13	2.64		0.449	pCi/g	08/06/18 22:21	08/28/18 16:38	1
Protactinium-231	0.853	U	3.88	3.88		3.17	pCi/g	08/06/18 22:21	08/28/18 16:38	1
Radium-226	**0.943**		0.223	0.243	0.700	0.0826	pCi/g	08/06/18 22:21	08/28/18 16:38	1
Radium-228	**0.920**		0.296	0.311		0.119	pCi/g	08/06/18 22:21	08/28/18 16:38	1
Thallium-208	**0.349**		0.0821	0.0895		0.0214	pCi/g	08/06/18 22:21	08/28/18 16:38	1
Thorium-228	**0.879**		0.147	0.174		0.0689	pCi/g	08/06/18 22:21	08/28/18 16:38	1
Thorium-232	**0.920**		0.296	0.311		0.119	pCi/g	08/06/18 22:21	08/28/18 16:38	1
Thorium-234	**1.88**		1.26	1.28		0.923	pCi/g	08/06/18 22:21	08/28/18 16:38	1
Uranium-235	-0.0422	U	0.0776	0.0778		0.690	pCi/g	08/06/18 22:21	08/28/18 16:38	1
Uranium-238	**1.88**		1.26	1.28		0.923	pCi/g	08/06/18 22:21	08/28/18 16:38	1

QC Sample Results

Client: Aptim Federal Services LLC
Project/Site: Hunters Point Naval Shipyard - Parcel E2

TestAmerica Job ID: 160-29934-2

Method: 905.0 - Total Beta Strontium (GFPC)

Lab Sample ID: MB 160-381633/7-A
Matrix: Solid
Analysis Batch: 386104

Client Sample ID: Method Blank
Prep Type: Total/NA
Prep Batch: 381633

Analyte	MB Result	MB Qualifier	Count Uncert. (2σ+/-)	Total Uncert. (2σ+/-)	LOQ	DLC	Unit	Prepared	Analyzed	Dil Fac
Total Beta Strontium	0.0006384	U	0.0559	0.0559	0.331	0.0459	pCi/g	08/10/18 15:22	08/29/18 05:58	1

Carrier	*MB %Yield*	*MB Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
Sr Carrier	*87.1*		*40 - 110*	*08/10/18 15:22*	*08/29/18 05:58*	*1*

Lab Sample ID: LCS 160-381633/1-A
Matrix: Solid
Analysis Batch: 386104

Client Sample ID: Lab Control Sample
Prep Type: Total/NA
Prep Batch: 381633

Analyte	Spike Added	LCS Result	LCS Qual	Total Uncert. (2σ+/-)	LOQ	DLC	Unit	%Rec	%Rec. Limits
Total Beta Strontium	8.20	8.332		0.672	0.331	0.0508	pCi/g	102	75 - 125

Carrier	*LCS %Yield*	*LCS Qualifier*	*Limits*
Sr Carrier	*85.9*		*40 - 110*

Method: GA-01-R - Radium-226 & Other Gamma Emitters (GS)

Lab Sample ID: MB 160-380724/1-A
Matrix: Solid
Analysis Batch: 385996

Client Sample ID: Method Blank
Prep Type: Total/NA
Prep Batch: 380724

Analyte	MB Result	MB Qualifier	Count Uncert. (2σ+/-)	Total Uncert. (2σ+/-)	LOQ	DLC	Unit	Prepared	Analyzed	Dil Fac
Actinium 228	-0.04454	U	0.0915	0.0916		0.204	pCi/g	08/06/18 22:21	08/29/18 01:34	1
Actinium-227	0.06408	U	0.336	0.336		0.224	pCi/g	08/06/18 22:21	08/29/18 01:34	1
Bismuth-212	0.0000	U	0.421	0.421		0.576	pCi/g	08/06/18 22:21	08/29/18 01:34	1
Bismuth-214	-0.06022	U	0.105	0.106		0.251	pCi/g	08/06/18 22:21	08/29/18 01:34	1
Cesium-137	-0.02713	U	0.0486	0.0487	0.0700	0.0431	pCi/g	08/06/18 22:21	08/29/18 01:34	1
Cobalt-60	-0.07171	U	0.148	0.148	0.200	0.0712	pCi/g	08/06/18 22:21	08/29/18 01:34	1
Lead-210	0.4501	U	1.08	1.08		0.764	pCi/g	08/06/18 22:21	08/29/18 01:34	1
Lead-212	-0.005905	U	0.0954	0.0954		0.0786	pCi/g	08/06/18 22:21	08/29/18 01:34	1
Lead-214	-0.04887	U	0.166	0.166		0.104	pCi/g	08/06/18 22:21	08/29/18 01:34	1
Potassium-40	-0.5145	U	1.20	1.20		0.678	pCi/g	08/06/18 22:21	08/29/18 01:34	1
Protactinium-231	0.0000	U	0.798	0.798		2.39	pCi/g	08/06/18 22:21	08/29/18 01:34	1
Radium-226	-0.06022	U	0.105	0.106	0.700	0.251	pCi/g	08/06/18 22:21	08/29/18 01:34	1
Radium-228	-0.04454	U	0.0915	0.0916		0.204	pCi/g	08/06/18 22:21	08/29/18 01:34	1
Thallium-208	0.04658		0.0821	0.0822		0.0365	pCi/g	08/06/18 22:21	08/29/18 01:34	1
Thorium-228	-0.005905	U	0.0954	0.0954		0.0786	pCi/g	08/06/18 22:21	08/29/18 01:34	1
Thorium-232	-0.04454	U	0.0915	0.0916		0.204	pCi/g	08/06/18 22:21	08/29/18 01:34	1
Thorium-234	-0.3507	U	0.810	0.811		0.692	pCi/g	08/06/18 22:21	08/29/18 01:34	1
Uranium-235	-0.1630	U	0.306	0.307		0.311	pCi/g	08/06/18 22:21	08/29/18 01:34	1
Uranium-238	-0.3507	U	0.810	0.811		0.692	pCi/g	08/06/18 22:21	08/29/18 01:34	1

QC Sample Results

Client: Aptim Federal Services LLC
Project/Site: Hunters Point Naval Shipyard - Parcel E2

TestAmerica Job ID: 160-29934-2

Method: GA-01-R - Radium-226 & Other Gamma Emitters (GS) (Continued)

Lab Sample ID: LCS 160-380724/2-A
Matrix: Solid
Analysis Batch: 385704

Client Sample ID: Lab Control Sample
Prep Type: Total/NA
Prep Batch: 380724

Analyte	Spike Added	LCS Result	LCS Qual	Total Uncert. (2σ+/-)	LOQ	DLC	Unit	%Rec	%Rec. Limits
Americium-241	96.8	93.81		9.87		0.580	pCi/g	97	87 - 116
Cesium-137	28.2	27.89		2.98	0.0700	0.0991	pCi/g	99	87 - 120
Cobalt-60	12.8	13.16		1.37	0.200	0.0500	pCi/g	103	87 - 115

Lab Sample ID: 160-29934-1 DU
Matrix: Solid
Analysis Batch: 385704

Client Sample ID: PE2-RSYC6-DC-S001
Prep Type: Total/NA
Prep Batch: 380724

Analyte	Sample Result	Sample Qual	DU Result	DU Qual	Total Uncert. (2σ+/-)	LOQ	DLC	Unit	RER	RER Limit
Actinium 228	0.965		0.7529		0.197		0.0507	pCi/g	0.46	1
Actinium-227	0.423	U	0.07892	U	0.530		0.502	pCi/g	0.23	1
Bismuth-212	-0.840	U	0.3830	U	0.793		0.620	pCi/g	0.73	1
Bismuth-214	0.687		0.5665		0.153		0.0539	pCi/g	0.33	1
Cesium-137	-0.0216	U	0.03392	U	0.0644	0.0700	0.0500	pCi/g	0.37	1
Cobalt-60	0.00707	U	0.01497	U	0.0728	0.200	0.0364	pCi/g	0.09	1
Lead-210	-0.998	U	0.8795	U	1.30		0.901	pCi/g	0.54	1
Lead-212	0.739		0.6794		0.142		0.0515	pCi/g	0.20	1
Lead-214	0.925		0.6984		0.158		0.0587	pCi/g	0.61	1
Potassium-40	15.4		15.57		2.38		0.298	pCi/g	0.04	1
Protactinium-231	-0.833	U	0.5518	U	1.81		1.98	pCi/g	0.30	1
Radium-226	0.687		0.5665		0.153	0.700	0.0539	pCi/g	0.33	1
Radium-228	0.965		0.7529		0.197		0.0507	pCi/g	0.46	1
Thallium-208	0.295		0.2276		0.0671		0.0225	pCi/g	0.41	1
Thorium-228	0.739		0.6794		0.142		0.0515	pCi/g	0.20	1
Thorium-232	0.965		0.7529		0.197		0.0507	pCi/g	0.46	1
Thorium-234	0.147	U	0.5732	U	0.528		1.07	pCi/g	0.36	1
Uranium-235	0.000	U	-0.2353	U	0.318		0.383	pCi/g	0.43	1
Uranium-238	0.147	U	0.5732	U	0.528		1.07	pCi/g	0.36	1

QC Association Summary

Client: Aptim Federal Services LLC
Project/Site: Hunters Point Naval Shipyard - Parcel E2

TestAmerica Job ID: 160-29934-2

Rad

Leach Batch: 380165

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
160-29934-1	PE2-RSYC6-DC-S001	Total/NA	Solid	Dry and Grind	
160-29934-2	PE2-RSYC6-DC-S002	Total/NA	Solid	Dry and Grind	
160-29934-3	PE2-RSYC6-DC-S003	Total/NA	Solid	Dry and Grind	
160-29934-4	PE2-RSYC6-DC-S004	Total/NA	Solid	Dry and Grind	
160-29934-5	PE2-RSYC6-DC-S005	Total/NA	Solid	Dry and Grind	
160-29934-6	PE2-RSYC6-DC-S006	Total/NA	Solid	Dry and Grind	
160-29934-7	PE2-RSYC6-DC-S007	Total/NA	Solid	Dry and Grind	
160-29934-8	PE2-RSYC6-DC-S008	Total/NA	Solid	Dry and Grind	
160-29934-9	PE2-RSYC6-DC-S009	Total/NA	Solid	Dry and Grind	
160-29934-10	PE2-RSYC6-DC-S010	Total/NA	Solid	Dry and Grind	
160-29934-11	PE2-RSYC6-DC-S011	Total/NA	Solid	Dry and Grind	
160-29934-12	PE2-RSYC6-DC-S012	Total/NA	Solid	Dry and Grind	
160-29934-13	PE2-RSYC6-DC-S013	Total/NA	Solid	Dry and Grind	
160-29934-14	PE2-RSYC6-DC-S014	Total/NA	Solid	Dry and Grind	
160-29934-15	PE2-RSYC6-DC-S015	Total/NA	Solid	Dry and Grind	
160-29934-16	PE2-RSYC6-DC-S016	Total/NA	Solid	Dry and Grind	
160-29934-17	PE2-RSYC6-DC-S017	Total/NA	Solid	Dry and Grind	
160-29934-18	PE2-RSYC6-DC-S018	Total/NA	Solid	Dry and Grind	
160-29934-1 DU	PE2-RSYC6-DC-S001	Total/NA	Solid	Dry and Grind	

Prep Batch: 380724

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
160-29934-1	PE2-RSYC6-DC-S001	Total/NA	Solid	Fill_Geo-21	380165
160-29934-2	PE2-RSYC6-DC-S002	Total/NA	Solid	Fill_Geo-21	380165
160-29934-3	PE2-RSYC6-DC-S003	Total/NA	Solid	Fill_Geo-21	380165
160-29934-4	PE2-RSYC6-DC-S004	Total/NA	Solid	Fill_Geo-21	380165
160-29934-5	PE2-RSYC6-DC-S005	Total/NA	Solid	Fill_Geo-21	380165
160-29934-6	PE2-RSYC6-DC-S006	Total/NA	Solid	Fill_Geo-21	380165
160-29934-7	PE2-RSYC6-DC-S007	Total/NA	Solid	Fill_Geo-21	380165
160-29934-8	PE2-RSYC6-DC-S008	Total/NA	Solid	Fill_Geo-21	380165
160-29934-9	PE2-RSYC6-DC-S009	Total/NA	Solid	Fill_Geo-21	380165
160-29934-10	PE2-RSYC6-DC-S010	Total/NA	Solid	Fill_Geo-21	380165
160-29934-11	PE2-RSYC6-DC-S011	Total/NA	Solid	Fill_Geo-21	380165
160-29934-12	PE2-RSYC6-DC-S012	Total/NA	Solid	Fill_Geo-21	380165
160-29934-13	PE2-RSYC6-DC-S013	Total/NA	Solid	Fill_Geo-21	380165
160-29934-14	PE2-RSYC6-DC-S014	Total/NA	Solid	Fill_Geo-21	380165
160-29934-15	PE2-RSYC6-DC-S015	Total/NA	Solid	Fill_Geo-21	380165
160-29934-16	PE2-RSYC6-DC-S016	Total/NA	Solid	Fill_Geo-21	380165
160-29934-17	PE2-RSYC6-DC-S017	Total/NA	Solid	Fill_Geo-21	380165
160-29934-18	PE2-RSYC6-DC-S018	Total/NA	Solid	Fill_Geo-21	380165
MB 160-380724/1-A	Method Blank	Total/NA	Solid	Fill_Geo-21	
LCS 160-380724/2-A	Lab Control Sample	Total/NA	Solid	Fill_Geo-21	
160-29934-1 DU	PE2-RSYC6-DC-S001	Total/NA	Solid	Fill_Geo-21	380165

Prep Batch: 381633

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
160-29934-1	PE2-RSYC6-DC-S001	Total/NA	Solid	DPS-0	380165
160-29934-11	PE2-RSYC6-DC-S011	Total/NA	Solid	DPS-0	380165
MB 160-381633/7-A	Method Blank	Total/NA	Solid	DPS-0	
LCS 160-381633/1-A	Lab Control Sample	Total/NA	Solid	DPS-0	

Tracer/Carrier Summary

Client: Aptim Federal Services LLC
Project/Site: Hunters Point Naval Shipyard - Parcel E2

TestAmerica Job ID: 160-29934-2

Method: 905.0 - Total Beta Strontium (GFPC)

Matrix: Solid **Prep Type: Total/NA**

		Percent Yield (Acceptance Limits)							
Lab Sample ID	**Client Sample ID**	**Sr Carrier (40-110)**							
160-29934-1	PE2-RSYC6-DC-S001	88.0							
160-29934-11	PE2-RSYC6-DC-S011	85.1							
LCS 160-381633/1-A	Lab Control Sample	85.9							
MB 160-381633/7-A	Method Blank	87.1							

Tracer/Carrier Legend

Sr Carrier = Sr Carrier

TestAmerica

THE LEADER IN ENVIRONMENTAL TESTING

ANALYTICAL REPORT

TestAmerica Laboratories, Inc.
TestAmerica St. Louis
13715 Rider Trail North
Earth City, MO 63045
Tel: (314)298-8566

TestAmerica Job ID: 160-30228-2
Client Project/Site: Hunters Point Naval Shipyard - Parcel E2

For:
Aptim Federal Services LLC
4005 Port Chicago Hwy, Suite 200
Concord, California 94520

Attn: Eddie Kalombo

Micha Korrinhizer

Authorized for release by:
9/11/2018 1:31:43 PM
Micha Korrinhizer, Project Management Assistant II
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micha.korrinhizer@testamericainc.com

Designee for

Rhonda Ridenhower, Manager of Project Management
(314)298-8566
rhonda.ridenhower@testamericainc.com

LINKS

Review your project results through TotalAccess

Have a Question? Ask The Expert

Visit us at: www.testamericainc.com

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

Results relate only to the items tested and the sample(s) as received by the laboratory.

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Case Narrative

Client: Aptim Federal Services LLC
Project/Site: Hunters Point Naval Shipyard - Parcel E2

TestAmerica Job ID: 160-30228-2

Job ID: 160-30228-2

Laboratory: TestAmerica St. Louis

Narrative

CASE NARRATIVE

Client: Aptim Federal Services LLC

Project: Hunters Point Naval Shipyard - Parcel E2

Report Number: 160-30228-2

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

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

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

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

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

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

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

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

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

The following clean-up methods for Organic analyses may have been used on the samples in this data set. Specific methods employed are documented on the batch extraction logs:

Method 3600C: Cleanup
Method 3620C: Florisil Cleanup
Method 3630C: Silica Gel Cleanup
Method 3640A: Gel-Permeation Cleanup
Method 3650B: Acid-Base Partition Cleanup
Method 3660B: Sulfur Cleanup
Method 3665A: Sulfuric Acid/Permanganate Cleanup

Case Narrative

Client: Aptim Federal Services LLC
Project/Site: Hunters Point Naval Shipyard - Parcel E2

TestAmerica Job ID: 160-30228-2

Job ID: 160-30228-2 (Continued)

Laboratory: TestAmerica St. Louis (Continued)

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

RECEIPT

The samples were received on 08/17/2018; the samples arrived in good condition, properly preserved. The temperature of the coolers at receipt was 18.0° C.

RADIUM-226 BY GAMMA SPEC (21 DAY INGROWTH)

Sample PE2-RSYC6-DC-B-S001 (160-30228-1) was analyzed for Radium-226 by gamma spec (21 day ingrowth) in accordance with EPA GA_01_R. The samples were dried on 08/17/2018, prepared on 08/20/2018 and analyzed on 09/10/2018.

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

APTIM

CHAIN OF CUSTODY

Ref. Document # PE2_RSYC6_DC_BIASED#608

Page 1 of 1

APTIM Federal Services, LLC
4005 Port Chicago Hwy
Concord, CA 94520

Project Manager: *Nels Johnson*
(Name & phone #)

Send Report To: *Eddie Kalombo*
Phone/Fax Number: *415-987-0760*
Address: *4005 Port Chicago Hwy*
City: *Concord, CA, 94520*

Sampler's Name(s): J. RAMIREZ

Project Number: 500506
Project Name: CTO-013 RSYC6 Deconstruction biased sample
Project Location: HPNS - Parcel E-2
Purchase Order #: 202296
Shipment/Pickup Date: 8.16.18
Waybill Number: 1266 5451 3913 9152 58
Lab Destination: TestAmerica (St. Louis Lab) 13715 Rider Trail North Earth City, MO 63045
Lab Contact Name / ph. #: Rhonda Ridenhower (314) 298-8566

Sample ID Number	Sample Description	Collection Information: Date	Time	Method	Matrix	# of containers	Container Type	Gamma Spec (EPA 191.1 M) – (7 day in-growth preliminary results and full 21 day in growth for full gamma results)	Total Strontium (EPA 905 MOD)		Strontium 90 (EPA 905 MOD)			Dose Rate µR/Hr	
							Preservative (water)								
							Preservative (soil)	N/A	N/A		N/A				
PE2-RSYC6-DC-B-S001	Parcel E-2 RSYC6 Biased	8/9/18	0913	G	SO	1	16 oz. plastic jar	X						5	

Analyses Requested

Special Instructions:
7 days ingrown draft and follow with 21 days final.
Analyze for Total Strontium as a screening step, and isotopic Sr-90 only if Total Strontium is above project action limit of 0.331 pCi/g.

☐ 24-hr
Standard TAT -10-day ☐ 3-day ☐ 10-day

Level Of QC Required: I II III Project Specific:

Relinquished By	Date/Time	Received By	Date/Time
JOAQUIN RAMIREZ	Date: 8.16.18 Time: 1000	EDDIE KALOMBO	Date: 8.16.18 Time: 1000
EDDIE KALOMBO	Date: 8.16.18 Time: 1600	[illegible]	Date: 8-17-18 Time: 0830
	Date: Time:		Date: Time:
	Date: Time:		Date: Time:

Method Codes C = Composite G = Grab

Matrix Codes
DW = Drinking Water SO = Soil
GW = Ground Water SL = Sludge
WW = Waste Water CP = Chip Samples
A = Air ABS=Asbestos, PO=Pipe Openning

160-30228 Chain of Custody

Login Sample Receipt Checklist

Client: Aptim Federal Services LLC

Job Number: 160-30228-2

Login Number: 30228
List Number: 1
Creator: Press, Nicholas B

List Source: TestAmerica St. Louis

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

Definitions/Glossary

Client: Aptim Federal Services LLC
Project/Site: Hunters Point Naval Shipyard - Parcel E2

TestAmerica Job ID: 160-30228-2

Qualifiers

Rad

Qualifier	Qualifier Description
U	Undetected at the Limit of Detection.

Glossary

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

Method Summary

Client: Aptim Federal Services LLC
Project/Site: Hunters Point Naval Shipyard - Parcel E2

TestAmerica Job ID: 160-30228-2

Method	Method Description	Protocol	Laboratory
GA-01-R	Radium-226 & Other Gamma Emitters (GS)	DOE	TAL SL
Dry and Grind	Preparation, Dry and Grind	None	TAL SL
Fill_Geo-21	Fill Geometry, 21-Day In-Growth	None	TAL SL

Protocol References:

DOE = U.S. Department of Energy
None = None

Laboratory References:

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

Sample Summary

Client: Aptim Federal Services LLC
Project/Site: Hunters Point Naval Shipyard - Parcel E2

TestAmerica Job ID: 160-30228-2

Lab Sample ID	Client Sample ID	Matrix	Collected	Received
160-30228-1	PE2-RSYC6-DC-B-S001	Solid	08/09/18 09:13	08/17/18 08:30

Client Sample Results

Client: Aptim Federal Services LLC
Project/Site: Hunters Point Naval Shipyard - Parcel E2

TestAmerica Job ID: 160-30228-2

Client Sample ID: PE2-RSYC6-DC-B-S001

Lab Sample ID: 160-30228-1

Date Collected: 08/09/18 09:13

Matrix: Solid

Date Received: 08/17/18 08:30

Method: GA-01-R - Radium-226 & Other Gamma Emitters (GS)

Analyte	Result	Qualifier	Count Uncert. (2σ+/-)	Total Uncert. (2σ+/-)	LOQ	DLC	Unit	Prepared	Analyzed	Dil Fac
Actinium 228	**0.848**		0.176	0.196		0.0505	pCi/g	08/20/18 11:54	09/10/18 03:30	1
Actinium-227	-0.0389	U	0.706	0.706		0.396	pCi/g	08/20/18 11:54	09/10/18 03:30	1
Bismuth-212	0.0190	U	0.881	0.881		0.724	pCi/g	08/20/18 11:54	09/10/18 03:30	1
Bismuth-214	**0.775**		0.157	0.177		0.0529	pCi/g	08/20/18 11:54	09/10/18 03:30	1
Cesium-137	0.0185	U	0.0815	0.0815	0.0700	0.0656	pCi/g	08/20/18 11:54	09/10/18 03:30	1
Cobalt-60	**0.0871**		0.0501	0.0509	0.200	0.0215	pCi/g	08/20/18 11:54	09/10/18 03:30	1
Lead-210	**1.49**		1.12	1.13		0.657	pCi/g	08/20/18 11:54	09/10/18 03:30	1
Lead-212	**0.769**		0.108	0.147		0.0422	pCi/g	08/20/18 11:54	09/10/18 03:30	1
Lead-214	**0.670**		0.111	0.131		0.0441	pCi/g	08/20/18 11:54	09/10/18 03:30	1
Potassium-40	**15.0**		1.80	2.36		0.239	pCi/g	08/20/18 11:54	09/10/18 03:30	1
Protactinium-231	0.163	U	1.58	1.58		2.44	pCi/g	08/20/18 11:54	09/10/18 03:30	1
Radium-226	**0.775**		0.157	0.177	0.700	0.0529	pCi/g	08/20/18 11:54	09/10/18 03:30	1
Radium-228	**0.848**		0.176	0.196		0.0505	pCi/g	08/20/18 11:54	09/10/18 03:30	1
Thallium-208	**0.268**		0.0678	0.0733		0.0207	pCi/g	08/20/18 11:54	09/10/18 03:30	1
Thorium-228	**0.769**		0.108	0.147		0.0422	pCi/g	08/20/18 11:54	09/10/18 03:30	1
Thorium-232	**0.848**		0.176	0.196		0.0505	pCi/g	08/20/18 11:54	09/10/18 03:30	1
Thorium-234	0.414	U	0.565	0.567		0.501	pCi/g	08/20/18 11:54	09/10/18 03:30	1
Uranium-235	-0.259	U	0.240	0.242		0.496	pCi/g	08/20/18 11:54	09/10/18 03:30	1
Uranium-238	0.414	U	0.565	0.567		0.501	pCi/g	08/20/18 11:54	09/10/18 03:30	1

QC Sample Results

Client: Aptim Federal Services LLC
Project/Site: Hunters Point Naval Shipyard - Parcel E2

TestAmerica Job ID: 160-30228-2

Method: GA-01-R - Radium-226 & Other Gamma Emitters (GS)

Lab Sample ID: MB 160-384024/1-A
Matrix: Solid
Analysis Batch: 388150

Client Sample ID: Method Blank
Prep Type: Total/NA
Prep Batch: 384024

Analyte	MB Result	MB Qualifier	Count Uncert. (2σ+/-)	Total Uncert. (2σ+/-)	LOQ	DLC	Unit	Prepared	Analyzed	Dil Fac
Actinium 228	0.1249		0.240	0.241		0.118	pCi/g	08/20/18 11:54	09/10/18 01:24	1
Actinium-227	0.002771	U	0.00596	0.00597		0.368	pCi/g	08/20/18 11:54	09/10/18 01:24	1
Bismuth-212	-0.09344	U	1.60	1.60		1.31	pCi/g	08/20/18 11:54	09/10/18 01:24	1
Bismuth-214	0.05949	U	0.131	0.131		0.129	pCi/g	08/20/18 11:54	09/10/18 01:24	1
Cesium-137	0.001817	U	0.0720	0.0720	0.0700	0.0587	pCi/g	08/20/18 11:54	09/10/18 01:24	1
Cobalt-60	0.0000	U	0.0187	0.0187	0.200	0.0218	pCi/g	08/20/18 11:54	09/10/18 01:24	1
Lead-210	-0.4855	U	1.24	1.24		0.940	pCi/g	08/20/18 11:54	09/10/18 01:24	1
Lead-212	-0.02045	U	0.136	0.137		0.0919	pCi/g	08/20/18 11:54	09/10/18 01:24	1
Lead-214	-0.1156	U	0.161	0.162		0.121	pCi/g	08/20/18 11:54	09/10/18 01:24	1
Potassium-40	0.2746	U	0.644	0.644		0.447	pCi/g	08/20/18 11:54	09/10/18 01:24	1
Protactinium-231	-0.7606	U	2.39	2.39		1.92	pCi/g	08/20/18 11:54	09/10/18 01:24	1
Radium-226	0.05949	U	0.131	0.131	0.700	0.129	pCi/g	08/20/18 11:54	09/10/18 01:24	1
Radium-228	0.1249		0.240	0.241		0.118	pCi/g	08/20/18 11:54	09/10/18 01:24	1
Thallium-208	0.008807	U	0.0633	0.0633		0.0365	pCi/g	08/20/18 11:54	09/10/18 01:24	1
Thorium-228	-0.02045	U	0.136	0.137		0.0919	pCi/g	08/20/18 11:54	09/10/18 01:24	1
Thorium-232	0.1249		0.240	0.241		0.118	pCi/g	08/20/18 11:54	09/10/18 01:24	1
Thorium-234	-0.7349	U	0.519	0.525		0.696	pCi/g	08/20/18 11:54	09/10/18 01:24	1
Uranium-235	-0.01447	U	0.358	0.358		0.246	pCi/g	08/20/18 11:54	09/10/18 01:24	1
Uranium-238	-0.7349	U	0.519	0.525		0.696	pCi/g	08/20/18 11:54	09/10/18 01:24	1

Lab Sample ID: LCS 160-384024/2-A
Matrix: Solid
Analysis Batch: 388149

Client Sample ID: Lab Control Sample
Prep Type: Total/NA
Prep Batch: 384024

Analyte	Spike Added	LCS Result	LCS Qual	Total Uncert. (2σ+/-)	LOQ	DLC	Unit	%Rec	%Rec. Limits
Americium-241	96.8	103.4		10.8		0.409	pCi/g	107	87 - 116
Cesium-137	28.2	27.83		2.99	0.0700	0.115	pCi/g	99	87 - 120
Cobalt-60	12.7	12.50		1.32	0.200	0.0447	pCi/g	98	87 - 115

QC Association Summary

Client: Aptim Federal Services LLC
Project/Site: Hunters Point Naval Shipyard - Parcel E2

TestAmerica Job ID: 160-30228-2

Rad

Leach Batch: 383231

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
160-30228-1	PE2-RSYC6-DC-B-S001	Total/NA	Solid	Dry and Grind	

Prep Batch: 384024

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
160-30228-1	PE2-RSYC6-DC-B-S001	Total/NA	Solid	Fill_Geo-21	383231
MB 160-384024/1-A	Method Blank	Total/NA	Solid	Fill_Geo-21	
LCS 160-384024/2-A	Lab Control Sample	Total/NA	Solid	Fill_Geo-21	