DETERMINATION OF RADIONUCLIDE ACTIVITY CONCENTRATIONS IN SOILS IN NON-IMPACTED SOILS ADJACENT TO THE ZION NUCLEAR STATION

July 2012

Prepared By; _____ Date; 7/26/12
Doug Schult, CHP
Radiological Engineer

Reviewed By; _____ Date; 7/26/12
Bob Decker
LTP Radiological Engineering Manager
ZionSolutions, LLC

Approved By; _____ Date; 7/26/12
Steve Horvath
Characterization/License Termination Manager
ZionSolutions, LLC

TABLE OF CONTENETS

List of Attachments;

- Attachment 1 - Sampling Location GPS Coordinates
- Attachment 2 - Ludlum Model 44-10 Detector 1 Minute Readings Collected at Various Heights
- Attachment 3 – Surface Soil Sample Results
- Attachment 4 – Subsurface Soil Sample Results

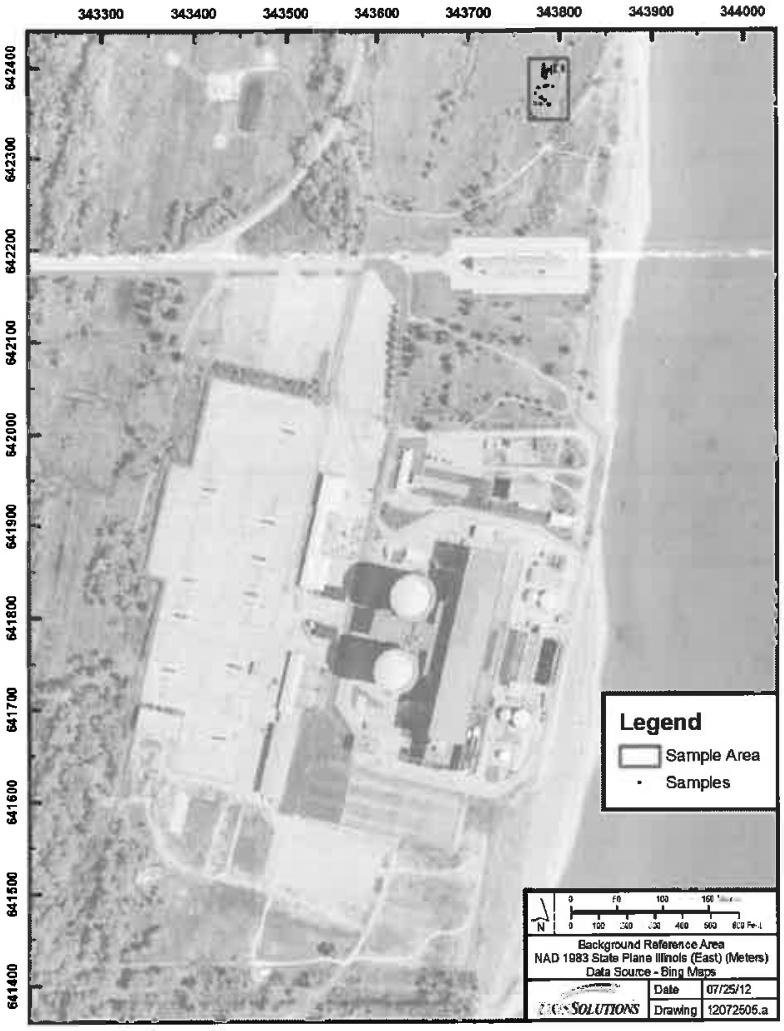
1.0 INTRODUCTION

In support of the decommissioning of the Zion Nuclear Station in Zion, Illinois a survey was performed to determine the radionuclide activity concentration of key radionuclides in non impacted soils adjacent to the Zion Nuclear Station. The area chosen for the survey was the Zion City Park District's Hosah Park, located north of the Zion Nuclear Station, at the end of Shiloh Blvd. The park consists of open land areas with a small shelter and several asphalt walking trails. There is evidence of several old foundations present. The land area is covered with native grasses and low lying brush. For the most part the open land area appears not to have been disturbed for a number of years. Figure 1 shows the location of the area chosen for survey relative to the location of the Zion Nuclear Station.

In November of 2011 an open land area adjacent to the southern boundary of Hosah Park was surveyed to confirm that the soils in this area could be free released. An area measuring approximately 600 feet by 275 feet, covering an area of approximately 165,000 ft^2 (15,300 m^2) was surveyed in accordance with Zion Nuclear Station's MARSAME Program. See MARSAME survey package U0-EXT-VCC-592-001. The intent of the survey was to allow soils that may be excavated during constructions activities associated with the Vertical Cask Construction (VCC) area to be moved and/or free released from the site without further radiological concerns. The survey consisted of gamma scans and systematic surface and subsurface soil sampling at 30 sampling locations. The gamma scans failed to identify any areas of elevated activity. The combined data sets, consisting of 60 soil sample analysis results had a mean Cs-137 activity concentration of 1.50E-2 pCi/g and a maximum Cs-137 activity concentration of 1.28E-1 pCi/g. The mean Cs-137 activity concentration for the 30 surface soil samples was 1.14E-2 pCi/g. The sample analysis results were considered to be consistent with expected Cs-137 activity concentrations in disturbed soils due to global fallout and not due to licensed activities associated with the Zion Nuclear Station. This MARSAME survey provided assurance that the open land areas in Hosah Park were not impacted by licensed activities associated with the Zion Nuclear Station.

The survey in Hosah Park was designed to determine the radionuclide activity concentrations of key radionuclides, both naturally occurring and manmade, in surface and subsurface soil. Of particular interest is the activity concentration of Cs-137 in soil due to global fallout since Cs-137 is also one of the more predominant, and easily identified, radionuclides associated with licensed activities at the Zion Nuclear Station. The results of this survey will be used in the future evaluation of soils associated with the Zion Nuclear Station to help ensure that soils impacted by site operations are identified.

Figure 1
Survey Area Relative to Zion Nuclear Station



2.0 Survey Design

The survey design included surface and subsurface soil samples as well as static gamma measurements using a Ludlum 44-10 sodium iodide detector at several distances above the surface of the ground. The survey was designed to;

- Determine the mean activity concentration and related statistical parameters of key radionuclides in surface soils (0 -15 cm) that have not been impacted by Zion Nuclear Station operations.

- Determine the mean activity concentration and related statistical parameters of key radionuclides in subsurface soils (30 - 60 cm) that have not been impacted by Zion Nuclear Station operations.

- Determine the mean response and related statistical parameters of a Ludlum Model 44-10 detector at various distances above soils that have not been impacted by site operations.

Prior to the survey, thirty (30) soil sampling locations were identified in Hosah Park. The sampling locations were chosen in areas that appeared to be undisturbed with minimal vegetation. Each sampling location was flagged and labeled with a sequential number beginning with 001. A GPS device was used to record the GPS coordinates of each of the sampling locations. Attachment 1 contains a listing of the GPS coordinates for each of the sampling locations.

Prior to sampling, all vegetation was cleared from an area of approximately 2 ft^2 surrounding each sample location. Once the vegetation was cleared, a one minute count using a Ludlum Model 44-10 detector was collected in contact with the ground and at a height of 15 cm above the ground's surface at each of the sampling locations. Attachment 2 contains a listing of the measurement results collected at each of the sampling locations.

At each sampling location a surface (0 -15 cm) and a subsurface (30 – 60 cm) soil sample was collected. As they were collected each soil sample was screened in the field to remove debris, vegetation, and rocks greater than 1 cm in diameter. Each sample was then placed in a pre labeled sample container and chain of custody paperwork initiated in anticipation of sending the samples to an offsite laboratory for analysis. The surface and subsurface samples collected from two of the sampling locations (01, and 16) were split and submitted to the offsite laboratory as separate samples. A total of 64 samples were submitted to the offsite laboratory for analysis.

Sample containers were pre labeled with a 17 digit alpha numeric sample number. The following example is the sample number for a surface soil sample collected at sample location 001;

L4BKG01BJGSSA001

- The first digit "L" designates that the sample came from an open land area.
- The second digit "4" designates that the sample came from a non-impacted area.
- The third, fourth, and fifth digits indicates the survey area, "BKG" was chosen to designate a survey area for conducting a background study.
- The sixth and seventh digit indicates the survey unit, "01" was chosen to represent Hosah Park.
- The eighth digit "B' designates that the sample as a background sample.
- The ninth digit designates whether the sample is a biased (judgmental) sample "J" or if the sample is a QC sample "Q".
- The tenth digit "G" designates that the sample was from the ground.
- The eleventh digit "S" designates that the sample is a soil sample.
- The twelfth and thirteenth digits designate whether the sample is a surface "SS" or a subsurface "BS" soil sample.
- The fourteenth digit "A" allows for the survey unit to be subdivided if necessary
- The fifteenth, sixteenth, and seventeenth digits "001" designate which sample location the sample was obtained from.

At the completion of sampling each sample location was backfilled. Once the GPS data for each of the sampling locations was validated, the flags marking the sample locations were removed.

3.0 Sample Analyses

Each soil sample was shipped to Teledyne Brown in Knoxville, Tennessee for analysis. Prior to analysis each soil sample was dried and homogenized. Each soil sample was analyzed for gamma emitting nuclides by gamma spectroscopy (Co-60 and Cs-137), Sr-90, thorium isotopic (Th-228, Th-230, and Th-232), and uranium isotopic (U-234, U-235, and U-238).

Teledyne Brown performed a receipt inspection for each of the samples received and validated that;

- The sample containers were received in good condition,
- A chain of custody form was received with each sample,
- All of the samples listed on the chain of custody were received,
- Each sample container contained a label, and
- The information on the labels matched the information on the chain of custody form.

Four batches of samples were sent to Teledyne Brown using four separate chain of custody forms. For each batch of samples received for analysis Teledyne Brown analyzed a method blank, a laboratory control sample, and performed a duplicate analysis on an arbitrary sample.

4.0 Minimum Detectable Activity

The minimum detectable activity specified for the four required analyses; gamma spectroscopy (Co-60, Cs-137), Sr-90, thorium isotopic (Th-228, Th-230, and Th-232), and uranium isotopic (U-234, U-235, and U-238) was less than 0.1 pCi/g. In all cases the offsite laboratory was able to achieve this MDA, except in those cases where the radionuclide specific activity concentration in the sample exceeded the MDA.

5.0 Survey Results

The sample analysis results for select radionuclides are provided in Attachment 3 for the surface soil samples and in Attachment 4 for the subsurface soil samples. Analysis results associated with the gamma spectroscopy analyses for K-40, Co-60, and Cs-137 are included. While other radionuclides were identified by gamma spectroscopy, none of these other radionuclides could be attributed to licensed activities. The radionuclides identified by the gamma spectroscopy analyses not listed in Attachments 3 and Attachments 4 are primarily due to decay products associated with the naturally occurring thorium and uranium decay chains.

5.1 Surface Soil Samples

Table 5-1 provides a summary of the surface soil sample results;

Table 5-1
Surface Soil Samples

Radionuclide	Mean Activity Concentration (pCi/g)	Maximum Activity Concentration (pCi/g)	Standard Deviation (pCi/g)
K-40	6.96E+0	8.95E+0	9.01E-1
Co-60	-3.19E-2	2.87E-2	1.88E-1
Sr-90	-6.03E-4	5.26E-2	2.41E-2
Cs-137	2.11E-1	6.51E-1	1.48E-1
Th-228	1.72E-1	4.30E-1	1.18E-1
Th-230	3.45E-1	2.07E+0	3.55E-1
Th-232	1.53E-1	5.11E-1	1.04E-1
U-234	2.03E-1	1.74E+0	3.23E-1
U-235	1.40E-2	1.37E-1	3.24E-2
U-238	2.11E-1	1.86E+0	3.24E-1

With the exception of the naturally occurring radionuclides, the only other radionuclide identified in the surface soil samples was Cs-137. Although Cs-137 is a licensed radionuclide associated with operation/decommissioning of the Zion Nuclear Station it is assumed that the Cs-137 activity concentrations in surface soils summarized in Table 5-1 are due to radioactive fallout.

5.2 Subsurface Soil Samples

Table 5-2 provides a summary of the subsurface soil sample results;

Table 5-2
Subsurface Soil Samples

Radionuclide	Mean Activity Concentration (pCi/g)	Maximum Activity Concentration (pCi/g)	Standard Deviation (pCi/g)
K-40	6.62E+0	8.59E+0	9.49E-1
Co-60	3.72E-4	3.79E-2	1.38E-2
Sr-90	4.40E-3	5.30E-2	2.16E-2
Cs-137	2.64E-2	2.41E-1	6.00E-2
Th-228	1.26E-1	4.50E-1	1.14E-1
Th-230	3.28E-1	8.11E-1	2.09E-1
Th-232	1.21E-1	4.05E-1	9.54E-2
U-234	1.25E-1	7.36E-1	1.57E-1
U-235	1.05E-2	1.10E-1	2.43E-2
U-238	1.31E-01	6.65E-1	1.47E-1

As with the surface soil samples, the only other radionuclide, with the exception of the naturally occurring radionuclides, identified in the subsurface soil samples was Cs-137. However, Cs-137 was only detected in 5 out of 30 subsurface soil samples as compared to 26 out of 30 of the surface soil samples. For the purpose of this report a radionuclide is considered detected when its radionuclide specific activity concentration exceeds both the MDA for the analysis and the 2 σ error term associated with the analysis.

5.3 Ludlum Model 44-10 Detector Measurement Result

Table 5-3 provides a summary of the, 1 minute, Ludlum Model 44-10 detector measurements at various distances above the ground;

Table 5-3
Ludlum 44-10 Detector Measurements

Distance Above Ground (cm)	Mean (cpm)	Maximum (cpm)	Standard Deviation (cpm)
Contact	4,464	4,759	129
15	4,432	4,733	137

The Ludlum Model 44-10 detector measurement results summarized in Table 5-3 show no difference between the contact measurements and the measurements taken at a height of 15 cm. The results also show no indication of elevated activity at any of the measurement locations.

6.0 Predicted Cs-137 Activity Concentration in Surface Soils

A review of the Cs-137 sample analysis results for surface and subsurface soil samples summarized in Tables 5-1 and 5-2 show a clear difference in the results. Clearly the sample results can be attributed to two distinct populations. It is postulated that some portions of the open land areas comprising Hosah Park that were sampled during this survey were in fact disturbed areas, allowing surface and subsurface soils to mix. In order to determine the mean activity concentration of Cs-137 in surface soil that have not been impacted by Zion Station operations the surface soil sample analysis results for Cs-137 provided in Attachment 3 have been further analyzed. Of the 32 sample analysis results seven have been eliminated since Cs-137 was not detected in these samples. The analysis results for the remaining 25 samples is provided in Table 6-1

Table 6-1
Cs-137 Activity Concentrations in Surface Soil

Sample Number	Activity (pCi/g)	2 σ error (pCi/g)	MDA (pCi/g)
L4BKG01BJGSSSA02	1.37E-1	5.77E-2	5.29E-2
L4BKG01BJGSSSA03	8.32E-2	5.16E-2	5.94E-2
L4BKG01BJGSSSA04	1.23E-1	6.75E-2	5.01E-2
L4BKG01BJGSSSA05	1.72E-1	5.37E-2	4.01E-2
L4BKG01BJGSSSA06	4.97E-1	8.54E-2	5.58E-2
L4BKG01BJGSSSA07	3.34E-1	9.21E-2	5.27E-2
L4BKG01BJGSSSA09	2.66E-1	5.53E-2	4.46E-2
L4BKG01BJGSSSA10	1.94E-1	5.57E-2	5.41E-2
L4BKG01BJGSSSA11	1.51E-1	4.74E-2	4.39E-2
L4BKG01BJGSSSA12	3.12E-1	6.09E-2	5.09E-2
L4BKG01BJGSSSA13	3.17E-1	6.99E-2	4.46E-2
L4BKG01BJGSSSA15	2.80E-1	7.38E-2	5.17E-2
L4BKG01BJGSSSA16	2.18E-1	5.72E-2	5.00E-2
L4BKG01BJGSSSA17	2.52E-1	6.53E-2	6.11E-2
L4BKG01BJGSSSA19	8.06E-2	5.21E-2	4.87E-2
L4BKG01BJGSSSA20	4.02E-1	6.32E-2	4.71E-2
L4BKG01BJGSSSA21	6.51E-1	8.77E-2	5.85E-2
L4BKG01BJGSSSA22	2.53E-1	6.56E-2	5.56E-2
L4BKG01BJGSSSA23	2.25E-1	7.19E-2	5.97E-2
L4BKG01BJGSSSA25	2.89E-1	6.11E-2	4.76E-2
L4BKG01BJGSSSA26	2.01E-1	5.81E-2	4.79E-2
L4BKG01BJGSSSA27	2.27E-1	6.92E-2	4.40E-2
L4BKG01BJGSSSA28	2.41E-1	6.45E-2	5.01E-2
L4BKG01BJGSSSA29	2.77E-1	7.17E-2	4.90E-2
L4BKG01BJGSSSA30	2.60E-1	6.15E-2	4.13E-2
Number	25		
Mean	0.26		
Maximum	0.65		
Standard Deviation	0.13		
UCL_{mean}	0.31		

Based on the data presented in the Table 6-1 the Upper Confidence Level of the Mean of the Cs-137 activity concentrations in undisturbed surface soil in the vicinity of the Zion Nuclear Station is 3.1E-1 pCi/g. Individual activity concentrations as high as 7.4E-1 (6.51E-1 + 8.77-E-2) pCi/g for Cs-137 in undisturbed surface soil would not be unexpected. These results compare favorable to data contained in an August 2005 Human Health Fact Sheet published by Argonne National Laboratory which stated that "The concentration of cesium-137 is surface soil from fallout ranges from about 0.1 to 1 picocurie (pCi)/g, averaging less than 0.4 pCi/g."

Attachment 1

Sampling Location GPS Coordinates

Sample Location Number	Northing	Easting
001	642344.05	343772.12
002	642348.84	343768.87
03	642359.14	343773.78
004	642358.54	343779.18
005	642363.36	343784.70
006	642366.39	343779.80
007	642371.09	343773.91
008	642376.90	343777.31
009	642378.36	343783.08
010	642378.71	343787.07
011	642378.01	343792.20
012	642358.54	343788.74
013	642387.43	343785.62
014	642389.91	343781.38
015	642394.14	343782.44
016	642392.77	343785.67
017	642392.28	343791.59
018	642394.10	343795.93
019	642395.13	343792.08
020	642395.81	343787.90
021	642396.25	343783.63
022	642397.71	343782.46
023	642400.89	343783.64
024	642398.81	343791.63
025	642397.81	343793.86
026	642395.33	343804.09
027	642399.48	343803.90
028	642400.86	343796.20
029	642401.14	343794.38
030	642405.53	343797.33

Attachment 2

Ludlum Model 44-10 Detector 1 Minute Readings Collected at Various Heights

Sample Location Number	Contact Reading (counts)	15 cm Reading (counts)
001	4318	4279
002	4272	4334
003	4540	4402
004	4530	4395
005	4373	4372
006	4384	4403
007	4531	4391
008	4426	4502
009	4759	4733
010	4656	4471
011	4573	4719
012	4502	4422
013	4603	4615
014	4453	4390
015	4466	4458
016	4591	4527
017	4605	4627
018	4473	4487
019	4451	4326
020	4447	4353
021	4598	4596
022	4353	4407
023	4263	4274
024	4297	4330
025	4507	4386
026	4258	4105
027	4294	4236
028	4587	4516
029	4487	4392
030	4337	4500

Attachment 3
Surface Soil Sample Results

SAMPLE ANALYSIS RESULTS FOR SELECT RADIONUCLIDES - SURFACE SOILS

Sample Number	K-40			Sr-90			Co-60			Cs-137		
	Activity pCi/g	2 σ Error pCi/g	MDA pCi/g	Activity pCi/g	2 σ Error pCi/g	MDA pCi/g	Activity pCi/g	2 σ Error pCi/g	MDA pCi/g	Activity pCi/g	2 σ Error pCi/g	MDA pCi/g
L4BKG01BJGSSSA01	6.01E+00	7.26E-01	2.77E-01	1.18E-02	2.65E-02	5.09E-02	-1.16E-02	2.20E-02	3.34E-02	-2.61E-03	2.42E-02	3.97E-02
L4BKG01QJGSSSA01	5.85E+00	1.22E+00	4.25E-01	7.43E-03	3.04E-02	5.94E-02	1.69E-03	3.44E-02	5.59E-02		3.42E-02	6.20E-02
L4BKG01BJGSSSA02	6.06E+00	1.14E+00	5.50E-01	-7.41E-03	2.69E-02	5.46E-02	-1.66E-03	3.06E-02	4.62E-02	1.37E-01	5.77E-02	5.29E-02
L4BKG01BJGSSSA03	7.20E+00	1.09E+00	4.43E-01	8.74E-03	2.79E-02	5.41E-02	2.87E-02	3.95E-02	7.34E-02	8.32E-02	5.16E-02	5.94E-02
L4BKG01BJGSSSA04	5.65E+00	1.05E+00	5.48E-01	-3.55E-02	2.66E-02	5.75E-02	-2.71E-02	4.00E-02	6.02E-02	1.23E-01	6.75E-02	5.01E-02
L4BKG01BJGSSSA05	7.97E+00	9.41E-01	4.37E-01	-7.32E-03	3.30E-02	6.67E-02	-4.08E-03	2.78E-02	4.51E-02	1.72E-01	5.37E-02	4.01E-02
L4BKG01BJGSSSA06	6.03E+00	1.30E+00	4.04E-01	1.05E-02	2.87E-02	5.56E-02	2.49E-03	4.12E-02	6.74E-02	4.97E-01	8.54E-02	5.58E-02
L4BKG01BJGSSSA07	6.55E+00	1.15E+00	5.80E-01	1.27E-03	2.41E-02	4.77E-02	-4.17E-03	3.96E-02	6.33E-02	3.34E-01	9.21E-02	5.27E-02
L4BKG01BJGSSSA08	5.80E+00	1.05E+00	4.18E-01	-2.25E-02	2.64E-02	5.56E-02	5.72E-03	3.49E-02	5.86E-02	1.22E-02	4.24E-02	6.22E-02
L4BKG01BJGSSSA09	7.47E+00	1.09E+00	5.26E-01	1.42E-02	2.84E-02	5.44E-02	5.08E-03	2.48E-02	4.19E-02	2.66E-01	5.53E-02	4.46E-02
L4BKG01BJGSSSA10	8.59E+00	1.23E+00	5.00E-01	-3.29E-02	2.38E-02	5.21E-02	1.41E-02	3.72E-02	6.38E-02	1.94E-01	5.57E-02	5.41E-02
L4BKG01BJGSSSA11	8.57E+00	9.90E-01	3.45E-01	-1.65E-02	3.02E-02	6.23E-02	2.47E-02	3.28E-02	6.02E-02	1.51E-01	4.74E-02	4.39E-02
L4BKG01BJGSSSA12	6.55E+00	9.55E-01	5.17E-01	-3.28E-02	2.83E-02	6.08E-02	-1.15E-02	3.27E-02	5.09E-02	3.12E-01	6.09E-02	5.09E-02
L4BKG01BJGSSSA13	7.98E+00	1.03E+00	3.31E-01	-6.13E-03	3.30E-02	6.63E-02	-5.01E-03	3.28E-02	5.23E-02	3.17E-01	6.99E-02	4.46E-02
L4BKG01BJGSSSA14	6.21E+00	9.90E-01	4.18E-01	1.10E-02	3.21E-02	6.20E-02	-5.28E-03	3.36E-02	5.25E-02	1.05E-02	2.84E-02	4.42E-02
L4BKG01BJGSSSA15	6.89E+00	1.07E+00	4.71E-01	-1.21E-04	2.44E-02	4.85E-02	-1.09E-02	3.64E-02	5.55E-02	2.80E-01	7.38E-02	5.17E-02
L4BKG01BJGSSSA16	6.00E+00	9.82E-01	3.39E-01	2.02E-02	2.91E-02	4.57E-02	-1.06E+00	2.83E-02	4.18E-02	2.18E-01	5.72E-02	5.00E-02
L4BKG01QJGSSSA16	8.55E+00	9.11E-01	3.08E-01	3.41E-02	4.78E-02	7.49E-02	5.51E-03	2.92E-02	4.89E-02	7.57E-03	3.00E-02	5.06E-02
L4BKG01QJGSSSA17	7.18E+00	9.89E-01	3.79E-01	-6.22E-03	2.05E-02	3.46E-02	2.24E-02	3.12E-02	5.79E-02	2.52E-01	6.53E-02	6.11E-02
L4BKG01QJGSSSA18	6.63E+00	1.39E+00	5.01E-01	2.96E-03	2.25E-02	3.67E-02	-2.97E-02	3.57E-02	4.58E-02	8.86E-02	4.41E-02	9.22E-02
L4BKG01QJGSSSA19	7.70E+00	1.08E+00	4.03E-01	-4.79E-02	4.74E-02	8.14E-02	-1.22E-02	2.62E-02	3.90E-02	8.06E-02	5.21E-02	4.87E-02
L4BKG01QJGSSSA20	6.83E+00	9.35E-01	4.00E-01	1.45E-02	5.05E-02	9.82E-02	-1.10E-03	2.87E-02	4.77E-02	4.02E-01	6.32E-02	4.71E-02
L4BKG01QJGSSSA21	7.91E+00	1.03+00	3.92E-01	2.55E-02	6.10E-02	9.77E-02	2.87E-02	3.01E-02	5.64E-02	6.51E-01	8.77E-02	5.85E-02

Sample Number	K-40			Sr-90			Co-60			Cs-137		
	Activity pCi/g	2 σ Error pCi/g	MDA pCi/g	Activity pCi/g	2 σ Error pCi/g	MDA pCi/g	Activity pCi/g	2 σ Error pCi/g	MDA pCi/g	Activity pCi/g	2 σ Error pCi/g	MDA pCi/g
L4BKG01BJGSSSA22	6.92E+00	1.05E+00	4.22E-01	5.26E-02	5.78E-02	8.88E-02	7.70E-03	2.98E-02	5.12E-02	2.53E-01	6.56E-02	5.56E-02
L4BKG01BJGSSSA23	6.20E+00	9.62E-01	5.43E-01	1.63E-02	1.96E-02	3.68E-02	3.54E-03	2.22E-02	4.74E-02	2.25E-01	7.19E-02	5.97E-02
L4BKG01BJGSSSA24	7.89E+00	7.50E-01	2.23E-01	-3.71E-02	4.64E-02	9.79E-02	-1.08E-05	2.14E-02	3.53E-02	-7.93E-03	2.11E-02	3.35E-02
L4BKG01BJGSSSA25	7.64E+00	9.35E-01	3.71E-01	1.36E-02	4.12E-02	8.01E-02	-1.47E-02	2.18E-02	2.91E-02	2.89E-01	6.11E-02	4.76E-02
L4BKG01BJGSSSA26	6.68E+00	1.03E+00	4.02E-01	-2.99E-02	4.31E-02	8.98E-02	2.00E-02	3.08E-02	5.65E-02	2.01E-01	5.81E-02	4.79E-02
L4BKG01BJGSSSA27	7.31E+00	9.28E-01	3.42E-01	-2.06E-02	4.61E-02	9.44E-02	7.11E-03	2.69E-02	4.55E-02	2.27E-01	6.92E-02	4.40E-02
L4BKG01BJGSSSA28	7.47E+00	9.46E-01	4.20E-01	4.79E-02	4.98E-02	9.29E-02	5.69E-03	3.04E-02	5.13E-02	2.41E-01	6.45E-02	5.01E-02
L4BKG01BJGSSSA29	7.05E+00	9.61E-01	4.66E-01	-1.15E-03	1.52E-02	3.05E-02	-9.79E-03	2.18E-02	3.95E-02	2.77E-01	7.17E-02	4.90E-02
L4BKG01BJGSSSA30	5.44E+00	8.11E-01	4.27E-01	-7.83E-03	2.49E-02	5.06E-02	4.48E-03	2.78E-02	5.54E-02	2.60E-01	6.15E-02	4.13E-02
	6.96E+00	MEAN		-6.03E-04	MEAN		-3.19E-02	MEAN		2.11E-01	MEAN	
	8.59E+00	MAX		5.26E-02	MAX		2.87E-02	MAX		6.51E-01	MAX	
	9.01E-01	STDEV		2.41E-02	STDEV		1.88E-01	STDEV		1.48E-01	STDEV	

SAMPLE ANALYSIS RESULTS FOR THORIUM - SURFACE SOILS

Sample Number	Th-228			Th-230			Th-232		
	Activity pCi/g	2 σ Error pCi/g	MDA pCi/g	Activity pCi/g	2 σ Error pCi/g	MDA pCi/g	Activity pCi/g	2 σ Error pCi/g	MDA pCi/g
L4BKG01BJGSSSA01	1.90E-01	9.06E-02	9.97E-02	5.94E-01	1.38E-01	4.94E-02	2.08E-01	8.00E-02	2.85E-02
L4BKG01QJGSSSA01	1.91E-01	8.20E-02	6.62E-02	3.52E-01	1.04E-01	3.42E-02	2.18E-01	8.29E-02	4.42E-02
L4BKG01BJGSSSA02	1.55E-01	8.39E-02	9.16E-02	5.78E-01	1.41E-01	6.05E-02	1.81E-01	7.72E-02	3.02E-02
L4BKG01BJGSSSA03	1.07E-01	7.58E-02	6.11E-02	3.26E-01	1.25E-01	6.05E-02	8.81E-02	6.25E-02	1.62E-02
L4BKG01BJGSSSA04	1.46E-01	7.33E-02	4.93E-02	2.68E-01	9.85E-02	3.45E-02	1.57E-01	7.22E-02	1.99E-02
L4BKG01BJGSSSA05	1.36E-01	7.88E-02	7.16E-02	2.15E-01	9.12E-02	3.17E-02	1.52E-01	7.50E-02	2.24E-02
L4BKG01BJGSSSA06	2.49E-01	1.03E-01	6.39E-02	3.50E-01	1.20E-01	1.20E-02	1.87E-01	8.54E-02	3.88E-02
L4BKG01BJGSSSA07	1.59E-02	6.64E-02	4.71E-02	4.75E-02	5.60E-02	5.71E-02	4.80E-02	4.86E-02	1.77E-02
L4BKG01BJGSSSA08	3.88E-01	2.56E-01	3.07E-01	2.07E+00	5.07E-01	1.01E-01	5.11E-01	2.46E-01	1.43E-01
L4BKG01BJGSSSA09	4.94E-02	4.66E-02	3.61E-02	3.06E-01	1.13E-01	7.15E-02	1.10E-01	6.76E-02	4.38E-02
L4BKG01BJGSSSA10	2.46E-01	1.37E-01	1.39E-01	2.95E-01	1.40E-01	1.08E-01	9.67E-02	8.06E-02	6.61E-02
L4BKG01BJGSSSA11	4.30E-01	1.81E-01	9.99E-02	4.55E-01	1.82E-01	6.99E-02	1.71E-01	1.06E-01	4.04E-02
L4BKG01BJGSSSA12	6.23E-03	4.61E-02	8.02E-02	3.54E-01	1.84E-01	7.94E-02	2.18E-01	1.41E-01	5.62E-02
L4BKG01BJGSSSA13	2.23E-01	1.24E-01	1.01E-01	3.59E-01	1.47E-01	1.89E-02	1.79E-01	1.04E-01	6.10E-02
L4BKG01BJGSSSA14	2.99E-01	1.62E-01	2.93E-02	5.23E-02	7.01E-02	5.41E-02	1.31E-01	1.07E-01	5.41E-02
L4BKG01BJGSSSA15	1.27E-01	7.35E-02	6.68E-02	3.27E-01	1.13E-01	3.62E-02	1.27E-01	6.59E-02	2.09E-02
L4BKG01BJGSSSA16	3.19E-01	1.19E-01	1.43E-01	4.58E-01	1.18E-01	6.21E-02	2.18E-01	8.11E-02	4.59E-02
L4BKG01QJGSSSA16	2.53E-01	1.45E-01	1.64E-01	4.74E-01	1.70E-01	9.13E-02	2.76E-01	1.27E-01	5.27E-02
L4BKG01BJGSSSA17	1.97E-02	5.51E-02	9.09E-02	1.07E-01	7.51E-02	3.40E-02	2.48E-02	3.51E-02	1.83E-02
L4BKG01BJGSSSA18	3.73E-01	1.74E-01	1.88E-01	4.14E-01	1.61E-01	9.31E-02	2.12E-01	1.13E-01	5.38E-02
L4BKG01BJGSSSA19	2.44E-01	1.05E-01	9.83E-02	6.09E-01	1.53E-01	7.08E-02	2.69E-01	9.88E-02	3.34E-02
L4BKG01BJGSSSA20	5.11E-02	9.04E-02	8.48E-02	2.00E-02	6.48E-02	8.39E-02	9.17E-02	1.07E-01	4.51E-02
L4BKG01BJGSSSA21	1.06E-01	1.24E-01	5.22E-02	3.50E-02	7.03E-02	5.17E-02	0.00E+00	0.00E+00	5.17E-02

Sample Number	Th-228			Th-230			Th-232		
	Activity pCi/g	2 σ Error pCi/g	MDA pCi/g	Activity pCi/g	2 σ Error pCi/g	MDA pCi/g	Activity pCi/g	2 σ Error pCi/g	MDA pCi/g
L4BKG01BJGSSSA22	9.55E-02	1.28E-01	9.88E-02	0.00E+00	0.00E+00	5.25E-02	0.00E+00	0.00E+00	5.25E-02
L4BKG01BJGSSSA23	3.31E-01	1.92E-01	1.74E-01	3.42E-01	1.78E-01	7.68E-02	2.70E-01	1.55E-01	5.43E-02
L4BKG01BJGSSSA24	-7.29E-03	1.46E-02	5.76E-02	2.91E-01	1.63E-01	3.06E-02	0.00E+00	0.00E+00	3.06E-02
L4BKG01BJGSSSA25	1.70E-01	1.03E-01	9.31E-02	1.38E-01	8.19E-02	4.61E-02	1.88E-01	9.51E-02	4.61E-02
L4BKG01BJGSSSA26	-1.37E-02	4.30E-02	9.68E-02	1.22E-01	7.17E-02	5.87E-02	-1.21E-02	1.21E-02	4.79E-02
L4BKG01BJGSSSA27	1.49E-01	7.67E-02	5.28E-02	2.72E-01	1.02E-01	3.70E-02	1.06E-01	6.06E-02	2.14E-02
L4BKG01BJGSSSA28	1.46E-01	7.89E-02	6.82E-02	2.20E-01	9.04E-02	3.02E-02	1.68E-01	7.74E-02	2.14E-02
L4BKG01BJGSSSA29	1.65E-01	8.63E-02	6.68E-02	2.89E-01	1.09E-01	1.26E-02	1.53E-01	7.85E-02	4.05E-02
L4BKG01BJGSSSA30	1.50E-01	8.67E-02	1.30E-01	3.00E-01	8.35E-02	3.34E-02	1.59E-01	6.15E-02	3.34E-02
	1.72E-01	MEAN		3.45E-01	MEAN		1.53E-01	MEAN	
	4.30E-01	MAX		2.07E+00	MAX		5.11E-01	MAX	
	1.18E-01	STDEV		3.55E-01	STDEV		1.04E-01	STDEV	

SAMPLE ANALYSIS RESULTS FOR URANIUM - SURFACE SOILS

Sample Number	U-234			U-235			U-238		
	Activity pCi/g	2 σ Error pCi/g	MDA pCi/g	Activity pCi/g	2 σ Error pCi/g	MDA pCi/g	Activity pCi/g	2 σ Error pCi/g	MDA pCi/g
L4BKG01BJGSSSA01	2.88E-01	1.72E-01	1.60E-01	-8.32E-03	1.67E-02	6.58E-02	2.77E-01	1.61E-01	1.19E-01
L4BKG01QJGSSSA01	6.49E-03	4.73E-02	8.25E-02	1.71E-02	5.56E-02	7.21E-02	6.37E-02	7.39E-02	3.13E-02
L4BKG01BJGSSSA02	-1.55E-02	2.20E-02	8.67E-02	2.76E-02	5.52E-02	4.07E-02	1.41E-01	1.21E-01	8.67E-02
L4BKG01BJGSSSA03	4.99E-02	7.81E-02	8.41E-02	0.00E+00	2.03E-02	3.95E-02	0.00E+00	0.00E+00	3.19E-02
L4BKG01BJGSSSA04	-1.07E-02	2.14E-02	8.44E-02	0.00E+00	2.95E-02	5.60E-02	6.14E-02	8.71E-02	4.53E-02
L4BKG01BJGSSSA05	2.97E-01	1.40E-01	6.44E-02	1.67E-02	3.36E-02	2.47E-02	2.34E-01	1.22E-01	5.26E-02
L4BKG01BJGSSSA06	1.49E-01	1.36E-01	4.39E-02	0.00E+00	0.00E+00	5.43E-02	1.49E-01	1.36E-01	4.39E-02
L4BKG01BJGSSSA07	7.50E-02	7.61E-02	2.77E-02	4.64E-02	6.61E-02	3.42E-02	-1.95E-02	2.28E-02	8.92E-02
L4BKG01BJGSSSA08	1.74E+00	6.75E-01	4.22E-01	0.00E+00	2.78E-02	9.34E-02	1.86E+00	6.85E-01	3.15E-01
L4BKG01BJGSSSA09	4.37E-01	2.65E-01	2.62E-01	-1.24E-02	2.48E-02	9.78E-02	3.45E-01	2.15E-01	1.37E-01
L4BKG01BJGSSSA10	0.00E+00	2.42E-02	4.39E-02	0.00E+00	3.00E-02	5.43E-02	3.56E-01	2.21E-01	1.42E-01
L4BKG01BJGSSSA11	0.00E+00	0.00E+00	4.35E-02	0.00E+00	0.00E+00	5.38E-02	2.95E-02	5.92E-02	4.35E-02
L4BKG01BJGSSSA12	9.16E-02	8.25E-02	2.70E-02	-1.57E-02	2.23E-02	8.80E-02	7.25E-02	8.52E-02	8.72E-02
L4BKG01BJGSSSA13	2.69E-02	4.20E-02	4.53E-02	1.44E-02	2.88E-02	2.12E-02	3.45E-02	4.88E-02	5.54E-02
L4BKG01BJGSSSA14	0.00E+00	0.00E+00	5.19E-02	0.00E+00	0.00E+00	6.42E-02	0.00E+00	0.00E+00	5.19E-02
L4BKG01BJGSSSA15	0.00E+00	1.53E-02	5.45E-02	1.37E-01	1.60E-01	6.74E-02	0.00E+00	1.53E-02	5.45E-02
L4BKG01BJGSSSA16	2.67E-01	1.26E-01	5.66E-02	6.00E-02	6.07E-02	2.21E-02	2.18E-01	1.28E-01	1.13E-01
L4BKG01QJGSSSA16	1.75E-01	9.85E-02	7.83E-02	1.38E-02	2.76E-02	2.03E-02	2.42E-01	1.14E-01	7.83E-02
L4BKG01BJGSSSA17	2.57E-01	1.59E-01	1.80E-01	0.00E+00	9.72E-03	2.34E-02	2.57E-01	1.42E-01	1.34E-01
L4BKG01BJGSSSA18	2.13E-01	1.22E-01	1.37E-01	1.15E-02	3.97E-02	5.34E-02	2.04E-01	1.06E-01	9.65E-02
L4BKG01BJGSSSA19	2.99E-01	1.43E-01	1.44E-01	5.10E-02	6.25E-02	5.94E-02	3.51E-01	1.32E-01	8.32E-02
L4BKG01BJGSSSA20	2.51E-01	1.16E-01	1.76E-02	0.00E+00	0.00E+00	6.88E-02	2.39E-01	1.13E-01	1.76E-02
L4BKG01BJGSSSA21	8.23E-03	4.19E-02	7.04E-02	0.00E+00	1.14E-02	2.36E-02	4.59E-02	5.33E-02	4.07E-02

Sample Number	U-234			U-235			U-238		
	Activity pCi/g	2 σ Error pCi/g	MDA pCi/g	Activity pCi/g	2 σ Error pCi/g	MDA pCi/g	Activity pCi/g	2 σ Error pCi/g	MDA pCi/g
L4BKG01BJGSSSA22	6.34E-01	2.73E-01	1.58E-01	9.34E-02	1.08E-01	4.59E-02	4.01E-01	2.39E-01	2.37E-01
L4BKG01BJGSSSA23	2.67E-01	1.12E-01	7.03E-02	1.09E-03	2.94E-02	5.50E-02	1.66E-01	8.74E-02	5.45E-02
L4BKG01BJGSSSA24	1.48E-02	5.13E-02	6.90E-02	-1.83E-02	3.66E-02	8.53E-02	0.00E+00	9.25E-03	2.18E-02
L4BKG01BJGSSSA25	4.37E-01	1.65E-01	1.04E-01	1.59E-02	5.50E-02	7.40E-02	2.83E-01	1.42E-01	1.20E-01
L4BKG01BJGSSSA26	1.53E-01	6.71E-02	1.96E-02	7.70E-03	1.55E-02	1.14E-02	1.53E-01	6.71E-02	1.96E-02
L4BKG01BJGSSSA27	1.41E-02	4.89E-02	6.57E-02	0.00E+00	1.13E-02	8.13E-02	7.05E-02	6.33E-02	2.08E-02
L4BKG01BJGSSSA28	2.24E-02	7.26E-02	9.41E-02	0.00E+00	2.72E-02	6.24E-02	1.71E-01	1.54E-01	5.05E-02
L4BKG01BJGSSSA29	1.85E-01	8.61E-02	5.80E-02	0.00E+00	0.00E+00	1.39E-02	1.64E-01	7.64E-02	2.37E-02
L4BKG01BJGSSSA30	1.56E-01	8.21E-02	4.75E-02	-9.72E-03	1.38E-02	4.80E-02	1.77E-01	8.66E-02	3.88E-02
	2.03E-01	MEAN		1.40E-02	MEAN		2.11E-01	MEAN	
	1.74E+00	MAX		1.37E-01	MAX		1.86E+00	MAX	
	3.23E-01	STDEV		3.24E-02	STDEV		3.24E-01	STDEV	

SAMPLE ANALYSIS RESULTS FOR SELECT RADIONUCLIDES - SUB SURFACE SOILS

Sample Number	K-40			Sr-90			Co-60			Cs-137		
	Activity pCi/g	2 σ Error pCi/g	MDA pCi/g	Activity pCi/g	2 σ Error pCi/g	MDA pCi/g	Activity pCi/g	2 σ Error pCi/g	MDA pCi/g	Activity pCi/g	2 σ Error pCi/g	MDA pCi/g
L4BKG01BJGSBSA01	6.30E+00	9.26E-01	2.47E-01	4.99E-03	2.70E-02	5.30E-02	1.92E-02	2.88E-02	5.24E-02	1.98E-02	2.95E-02	5.29E-02
L4BKG01QJGSBSA01	6.80E+00	9.55E-01	3.86E-01	2.21E-02	3.41E-02	6.48E-02	-9.67E-03	2.79E-02	4.44E-02	2.19E-02	2.56E-02	4.66E-02
L4BKG01BJGSBSA02	6.82E+00	8.35E-01	4.03E-01	1.67E-02	2.94E-02	5.61E-02	-1.34E-02	2.89E-02	4.43E-02	1.59E-02	2.87E-02	5.00E-02
L4BKG01BJGSBSA03	6.41E+00	9.13E-01	2.80E-01	-2.31E-02	2.59E-02	5.48E-02	-8.91E-03	2.99E-02	4.67E-02	-1.20E-02	2.88E-02	4.46E-02
L4BKG01BJGSBSA04	5.75E+00	8.92E-01	4.21E-01	-1.35E-02	2.84E-02	5.83E-02	6.79E-03	2.48E-02	4.22E-02	1.94E-02	2.66E-02	4.84E-02
L4BKG01BJGSBSA05	5.79E+00	1.05E+00	4.90E+00	-2.68E-02	2.78E-02	5.90E-02	-1.59E-02	3.19E-02	4.61E-02	-6.27E-03	3.07E-02	5.02E-02
L4BKG01BJGSBSA06	4.48E+00	8.07E-01	3.03E-01	2.50E-03	3.24E-02	6.42E-02	-1.26E-02	3.06E-02	4.81E-02	4.61E-03	3.00E-02	5.09E-02
L4BKG01BJGSBSA07	5.56E+00	8.92E-01	4.22E-01	-1.10E-03	2.46E-02	4.90E-02	-4.69E-03	2.77E-02	4.44E-02	5.09E-03	2.57E-02	4.33E-02
L4BKG01BJGSBSA08	6.41E+00	1.20E+00	5.33E-01	9.76E-03	2.76E-02	5.35E-02	-1.08E-02	3.70E-02	5.87E-02	-6.13E-03	4.11E-02	6.52E-02
L4BKG01BJGSBSA09	6.09E+00	8.19E-01	2.65E-01	-5.47E-03	2.59E-02	5.23E-02	-9.42E-04	2.18E-02	3.61E-02	-3.70E-03	2.17E-02	3.52E-02
L4BKG01BJGSBSA10	5.17E+00	8.84E-01	3.16E-01	-5.13E-03	3.37E-02	6.77E-02	3.22E-03	2.91E-02	4.83E-02	-2.22E-02	2.69E-02	3.91E-02
L4BKG01BJGSBSA11	8.04E+00	1.08E+00	3.45E-01	-2.42E-04	2.77E-02	5.51E-02	1.25E-02	3.53E-02	6.09E-02	1.10E-02	3.14E-02	5.48E-02
L4BKG01BJGSBSA12	7.12E+00	1.03E+00	1.46E-01	9.04E-03	3.02E-02	5.88E-02	9.58E-05	3.10E-02	5.21E-02	1.32E-02	3.07E-02	5.27E-02
L4BKG01BJGSBSA13	6.23E+00	1.08E+00	4.57E-01	-2.03E-02	2.17E-02	4.63E-02	-2.54E-02	3.74E-02	5.57E-02	1.13E-02	3.51E-02	5.91E-02
L4BKG01BJGSBSA14	6.90E+00	7.14E-01	1.45E-01	2.59E-04	2.54E-02	5.03E-02	1.18E-02	2.03E-02	3.64E-02	9.30E-03	2.26E-02	3.89E-02
L4BKG01BJGSBSA15	6.92E+00	9.77E-01	3.60E-01	-1.39E-03	2.36E-02	4.71E-02	-3.15E-04	2.60E-02	4.20E-02	-2.27E-03	2.50E-02	4.11E-02
L4BKG01BJGSBSA16	6.16E+00	8.69E-01	2.58E-01	-1.30E-02	4.77E-02	7.95E-02	1.70E-02	2.63E-02	4.87E-02	1.05E-01	4.10E-02	4.46E-02
L4BKG01QJGSBSA16	6.45E+00	8.32E-01	3.85E-01	-4.08E-02	4.96E-02	8.45E-02	-3.89E-03	2.29E-02	3.62E-02	-6.13E-03	2.52E-02	3.98E-02
L4BKG01BJGSBSA17	7.13E+00	8.63E-01	2.80E-01	1.97E-02	2.26E-02	3.46E-02	3.98E-03	2.14E-02	3.71E-02	4.03E-02	3.86E-02	3.73E-02
L4BKG01BJGSBSA18	8.59E+00	8.72E-01	3.14E-01	4.96E-02	5.45E-02	8.42E-02	2.89E-03	1.82E-02	3.09E-02	-6.63E-03	2.07E-02	3.30E-02
L4BKG01BJGSBSA19	5.34E+00	9.04E-01	3.86E-01	5.30E-02	6.31E-02	9.76E-02	3.79E-02	2.97E-02	5.93E-02	5.66E-03	2.80E-02	4.77E-02
L4BKG01BJGSBSA20	6.75E+00	1.02E+00	2.03E-01	7.97E-03	5.47E-02	8.91E-02	-8.81E-03	3.20E-02	5.03E-02	-4.67E-03	3.38E-02	5.46E-02
L4BKG01BJGSBSA21	7.24E+00	9.34E-01	3.06E-01	-2.18E-02	5.30E-02	9.03E-02	-2.43E-02	2.59E-02	3.42E-02	1.26E-03	2.65E-02	4.31E-02

Sample Number	K-40			Sr-90			Co-60			Cs-137		
	Activity pCi/g	2 σ Error pCi/g	MDA pCi/g	Activity pCi/g	2 σ Error pCi/g	MDA pCi/g	Activity pCi/g	2 σ Error pCi/g	MDA pCi/g	Activity pCi/g	2 σ Error pCi/g	MDA pCi/g
L4BKG01BJGSBSA22	7.73E+00	1.00E+00	2.92E-01	-7.22E-04	1.84E-02	3.05E-02	-7.79E-03	2.78E-02	4.34E-02	4.81E-03	3.36E-02	5.53E-02
L4BKG01BJGSBSA23	5.44E+00	1.11E+00	3.19E-01	1.23E-02	1.32E-02	2.45E-02	1.44E-02	2.51E-02	5.01E-02	2.14E-01	6.89E-02	4.78E-02
L4BKG01BJGSBSA24	8.28E+00	9.91E-01	2.69E-01	3.88E-02	2.58E-02	4.59E-02	-5.58E-03	2.92E-02	4.71E-02	1.62E-02	2.87E-02	5.08E-02
L4BKG01BJGSBSA25	7.82E+00	7.84E-01	2.86E-01	-3.25E-03	1.50E-02	3.02E-02	-1.26E-02	2.00E-02	3.06E-02	1.17E-03	2.25E-02	3.67E-02
L4BKG01BJGSBSA26	7.29E+00	7.71E-01	2.51E-01	2.49E-03	1.52E-02	2.99E-02	3.57E-03	2.03E-02	3.47E-02	-1.54E-02	2.29E-02	3.52E-02
L4BKG01BJGSBSA27	5.96E+00	8.14E-01	1.19E-01	1.04E-02	2.84E-02	5.50E-02	1.97E-03	2.48E-02	4.06E-02	1.07E-01	4.10E-02	4.65E-02
L4BKG01BJGSBSA28	7.47E+00	9.46E-01	4.20E-01	4.79E-02	4.98E-02	9.29E-02	5.69E-03	3.04E-02	5.13E-02	2.41E-01	6.45E-02	5.01E-02
L4BKG01BJGSBSA29	7.33E+00	1.17E+00	2.78E+00	9.44E-03	1.26E-02	2.37E-02	1.60E-02	2.61E-02	5.03E-02	4.50E-02	3.59E-02	6.81E-02
L4BKG01BJGSBSA30	6.17E+00	1.39E+00	5.37E-01	3.43E-04	1.23E-02	2.44E-02	2.05E-02	2.81E-02	5.52E-02	1.61E-02	3.33E-02	5.74E-02
	6.62E+00	MEAN		4.40E-03	MEAN		3.72E-04	MEAN		2.64E-02	MEAN	
	8.59E+00	MAX		5.30E-02	MAX		3.79E-02	MAX		2.41E-01	MAX	
	9.49E-01	STDEV		2.16E-02	STDEV		1.38E-02	STDEV		6.00E-02	STDEV	

SAMPLE ANALYSIS RESULTS FOR THORIUM - SUB SURFACE SOILS

Sample Number	Th-228			Th-230			Th-232		
	Activity pCi/g	2 σ Error pCi/g	MDA pCi/g	Activity pCi/g	2 σ Error pCi/g	MDA pCi/g	Activity pCi/g	2 σ Error pCi/g	MDA pCi/g
L4BKG01BJGSBSA01	5.79E-02	8.20E-02	4.26E-02	6.74E-01	3.04E-01	2.08E-01	1.62E-01	1.43E-01	7.86E-02
L4BKG01QJGSBSA01	1.99E-02	5.99E-02	9.66E-02	7.79E-02	7.08E-02	2.30E-02	4.67E-02	6.45E-02	2.30E-02
L4BKG01BJGSBSA02	4.19E-02	4.63E-02	4.98E-02	4.51E-01	1.27E-01	5.51E-02	1.32E-01	7.02E-02	2.47E-02
L4BKG01BJGSBSA03	3.30E-02	4.40E-02	3.42E-02	2.83E-01	1.20E-01	1.83E-02	4.50E-02	5.01E-02	3.38E-02
L4BKG01BJGSBSA04	1.51E-01	7.25E-02	4.35E-02	2.64E-01	9.53E-02	1.93E-02	1.31E-01	6.44E-02	1.93E-02
L4BKG01BJGSBSA05	1.56E-01	8.27E-02	6.79E-02	3.34E-01	1.19E-01	5.49E-02	1.79E-01	8.12E-02	1.20E-02
L4BKG01BJGSBSA06	8.85E-02	9.03E-02	8.48E-02	2.40E-01	1.40E-01	9.70E-02	4.68E-02	6.25E-02	4.85E-02
L4BKG01BJGSBSA07	3.38E-01	1.88E-01	1.79E-01	3.69E-01	1.78E-01	9.26E-02	2.39E-01	1.50E-01	1.20E-01
L4BKG01BJGSBSA08	3.86E-02	5.50E-02	2.84E-02	5.34E-01	2.20E-01	2.81E-02	3.81E-02	5.43E-02	2.81E-02
L4BKG01BJGSBSA09	3.43E-02	6.08E-02	5.69E-02	6.29E-01	2.52E-01	5.64E-02	4.10E-02	5.85E-02	3.03E-02
L4BKG01BJGSBSA10	2.64E-01	1.50E-01	1.37E-01	3.98E-01	1.72E-01	1.01E-01	4.05E-01	1.67E-01	4.51E-02
L4BKG01BJGSBSA11	3.03E-01	1.80E-01	1.30E-01	8.11E-01	2.95E-01	5.76E-02	2.24E-01	1.45E-01	5.76E-02
L4BKG01BJGSBSA12	4.50E-01	2.42E-01	1.96E-01	3.99E-01	2.20E-01	1.59E-01	1.42E-01	1.18E-01	3.48E-02
L4BKG01BJGSBSA13	1.45E-01	1.01E-01	6.90E-02	3.68E-01	1.62E-01	7.89E-02	1.91E-01	1.13E-01	5.58E-02
L4BKG01BJGSBSA14	6.07E-02	8.65E-02	4.47E-02	5.60E-01	2.80E-01	8.25E-02	1.40E-01	1.38E-01	8.25E-02
L4BKG01BJGSBSA15	3.64E-01	1.41E-01	8.03E-02	7.80E-01	2.18E-01	6.28E-02	3.38E-01	1.29E-01	1.51E-02
L4BKG01BJGSBSA16	7.17E-02	7.99E-02	5.38E-02	5.15E-02	6.87E-02	5.33E-02	1.94E-02	3.88E-02	2.86E-02
L4BKG01QJGSBSA16	1.78E-01	1.11E-01	1.14E-01	2.39E-01	1.16E-01	7.61E-02	2.02E-01	1.04E-01	4.82E-02
L4BKG01BJGSBSA17	2.25E-01	1.28E-01	1.41E-01	5.07E-01	1.66E-01	7.54E-02	1.92E-01	1.04E-01	6.75E-02
L4BKG01BJGSBSA18	7.18E-02	8.96E-02	8.43E-02	9.99E-02	9.76E-02	5.90E-02	4.30E-02	6.09E-02	3.17E-02
L4BKG01BJGSBSA19	2.95E-02	5.47E-02	8.45E-02	3.74E-01	1.32E-01	8.36E-02	7.77E-02	5.80E-02	2.79E-02
L4BKG01BJGSBSA20	2.02E-01	1.17E-01	7.58E-02	2.68E-01	1.30E-01	3.75E-02	2.14E-01	1.15E-01	3.75E-02
L4BKG01BJGSBSA21	3.17E-02	7.30E-02	9.43E-02	7.35E-03	5.36E-02	9.34E-02	0.00E+00	0.00E+00	3.55E-02

Sample Number	Th-228			Th-230			Th-232		
	Activity pCi/g	2 σ Error pCi/g	MDA pCi/g	Activity pCi/g	2 σ Error pCi/g	MDA pCi/g	Activity pCi/g	2 σ Error pCi/g	MDA pCi/g
L4BKG01BJGSBSA22	9.22E-02	9.35E-02	3.40E-02	1.75E-01	1.33E-01	6.26E-02	-7.92E-03	1.59E-02	6.26E-02
L4BKG01BJGSBSA23	4.52E-02	5.47E-02	5.95E-02	1.79E-01	9.52E-02	7.22E-02	4.47E-02	4.78E-02	4.17E-02
L4BKG01BJGSBSA24	2.39E-02	4.80E-02	3.52E-02	1.10E-01	1.09E-01	6.49E-02	3.91E-02	6.92E-02	6.49E-02
L4BKG01BJGSBSA25	5.52E-02	7.80E-02	8.86E-02	1.35E-01	1.06E-01	7.16E-02	9.22E-02	8.28E-02	2.72E-02
L4BKG01BJGSBSA26	6.53E-02	7.08E-02	9.15E-02	3.84E-01	1.40E-01	9.06E-02	9.47E-02	7.15E-02	6.04E-02
L4BKG01BJGSBSA27	1.49E-01	7.76E-02	5.01E-02	2.48E-01	9.77E-02	2.22E-02	1.27E-01	6.77E-02	2.22E-02
L4BKG01BJGSBSA28	4.75E-03	3.27E-02	6.05E-02	6.02E-02	4.82E-02	3.20E-02	7.42E-02	5.07E-02	1.22E-02
L4BKG01BJGSBSA29	8.11E-02	6.37E-02	4.85E-02	2.35E-01	1.06E-01	3.92E-02	7.02E-02	5.93E-02	4.80E-02
L4BKG01BJGSBSA30	1.56E-01	7.73E-02	1.09E-01	2.66E-01	7.45E-02	3.92E-02	1.04E-01	4.88E-02	3.92E-02
	1.26E-01	MEAN		3.28E-01	MEAN		1.21E-01	MEAN	
	4.50E-01	MAX		8.11E-01	MAX		4.05E-01	MAX	
	1.14E-01	STDEV		2.09E-01	STDEV		9.54E-02	STDEV	

SAMPLE ANALYSIS RESULTS FOR URANIUM - SUB SURFACE SOILS

Sample Number	U-234			U-235			U-238		
	Activity pCi/g	2 σ Error pCi/g	MDA pCi/g	Activity pCi/g	2 σ Error pCi/g	MDA pCi/g	Activity pCi/g	2 σ Error pCi/g	MDA pCi/g
L4BKG01BJGSBSA01	3.06E-02	6.14E-02	4.52E-02	0.00E+00	2.79E-02	5.58E-02	0.00E+00	0.00E+00	4.52E-02
L4BKG01QJGSBSA01	4.61E-02	8.13E-02	7.66E-02	0.00E+00	2.93E-02	5.08E-02	0.00E+00	0.00E+00	4.11E-02
L4BKG01BJGSBSA02	-1.79E-02	2.54E-02	9.99E-02	-1.11E-02	2.22E-02	8.75E-02	4.26E-02	7.52E-02	7.08E-02
L4BKG01BJGSBSA03	-1.09E-02	2.19E-02	8.64E-02	0.00E+00	2.84E-02	5.73E-02	2.05E-02	6.66E-02	8.64E-02
L4BKG01BJGSBSA04	5.86E-02	7.83E-02	6.07E-02	0.00E+00	1.86E-02	4.03E-02	0.00E+00	1.51E-02	3.26E-02
L4BKG01BJGSBSA05	4.38E-02	8.80E-02	6.46E-02	0.00E+00	0.00E+00	7.99E-02	0.00E+00	0.00E+00	6.46E-02
L4BKG01BJGSBSA06	4.74E-02	8.39E-02	7.87E-02	-1.23E-02	2.47E-02	9.73E-02	1.72E-01	1.44E-01	4.23E-02
L4BKG01BJGSBSA07	0.00E+00	2.26E-02	6.54E-02	0.00E+00	2.79E-02	8.09E-02	0.00E+00	2.26E-02	6.54E-02
L4BKG01BJGSBSA08	7.36E-01	4.07E-01	3.23E-01	1.10E-01	1.56E-01	8.10E-02	6.65E-01	3.69E-01	2.11E-01
L4BKG01BJGSBSA09	6.85E-02	6.69E-02	4.05E-02	5.56E-03	4.06E-02	7.07E-02	2.43E-02	4.30E-02	4.05E-02
L4BKG01BJGSBSA10	3.01E-01	1.55E-01	8.43E-02	2.19E-02	4.39E-02	3.23E-02	2.88E-01	1.56E-01	1.09E-01
L4BKG01BJGSBSA11	5.19E-02	6.48E-02	6.10E-02	1.94E-02	3.89E-02	2.86E-02	9.42E-02	7.74E-02	2.32E-02
L4BKG01BJGSBSA12	8.09E-02	7.61E-02	7.93E-02	2.64E-02	4.66E-02	4.39E-02	7.30E-02	6.42E-02	3.55E-02
L4BKG01BJGSBSA13	3.85E-02	5.14E-02	3.98E-02	1.17E-02	3.80E-02	4.92E-02	1.89E-02	4.35E-02	5.63E-02
L4BKG01BJGSBSA14	0.00E+00	0.00E+00	4.29E-02	-1.25E-02	2.51E-02	9.88E-02	1.46E-01	1.33E-01	4.29E-02
L4BKG01BJGSBSA15	2.00E-02	6.49E-02	8.41E-02	0.00E+00	0.00E+00	5.58E-02	6.12E-02	8.74E-02	4.52E-02
L4BKG01BJGSBSA16	2.59E-01	1.21E-01	1.09E-01	1.19E-02	2.37E-02	1.75E-02	3.07E-01	1.20E-01	7.74E-02
L4BKG01QJGSBSA16	4.68E-01	1.60E-01	9.22E-02	1.41E-02	6.32E-02	9.31E-02	3.20E-01	1.46E-01	1.30E-01
L4BKG01BJGSBSA17	2.38E-01	1.17E-01	1.09E-01	2.35E-02	3.33E-02	1.74E-02	2.38E-01	1.07E-01	7.69E-02
L4BKG01BJGSBSA18	1.69E-01	9.99E-02	9.79E-02	-1.16E-02	4.02E-02	7.65E-02	2.25E-01	1.10E-01	9.79E-02
L4BKG01BJGSBSA19	2.00E-01	1.33E-01	1.43E-01	1.55E-02	3.09E-02	2.28E-02	3.38E-01	1.45E-01	1.01E-01
L4BKG01BJGSBSA20	1.57E-02	5.46E-02	7.34E-02	0.00E+00	0.00E+00	2.87E-02	4.72E-02	5.51E-02	2.32E-02
L4BKG01BJGSBSA21	5.44E-02	6.54E-02	7.17E-02	4.04E-02	4.67E-02	1.98E-02	3.27E-02	4.87E-02	5.07E-02

Sample Number	U-234			U-235			U-238		
	Activity pCi/g	2 σ Error pCi/g	MDA pCi/g	Activity pCi/g	2 σ Error pCi/g	MDA pCi/g	Activity pCi/g	2 σ Error pCi/g	MDA pCi/g
L4BKG01BJGSBSA22	9.36E-02	7.11E-02	1.97E-02	4.96E-02	7.40E-2	7.71E-02	1.34E-02	4.63E-2	6.23E-2
L4BKG01BJGSBSA23	4.79E-02	4.80E-02	1.77E-02	-2.96E-02	4.19E-02	9.76E-02	2.40E-02	3.39E-02	1.77E-02
L4BKG01BJGSBSA24	1.64E-01	9.91E-02	9.25E-02	7.47E-03	3.02E-02	4.32E-02	2.29E-01	1.08E-01	6.05E-02
L4BKG01BJGSBSA25	2.42E-01	9.72E-02	6.76E-02	8.86E-04	2.39E-02	4.47E-02	1.96E-01	8.55E-02	5.11E-02
L4BKG01BJGSBSA26	1.42E-01	7.87E-02	6.62E-02	5.35E-03	2.16E-02	3.09E-02	1.73E-01	8.43E-02	5.59E-02
L4BKG01BJGSBSA27	1.75E-01	8.74E-02	4.03E-02	2.26E-02	3.22E-02	1.67E-02	2.11E-01	9.67E-02	4.03E-02
L4BKG01BJGSBSA28	1.86E-01	7.99E-02	5.30E-02	0.00E+00	0.00E+00	1.17E-02	1.66E-01	7.40E-02	4.48E-02
L4BKG01BJGSBSA29	5.28E-02	6.59E-02	6.21E-02	2.58E-02	5.92E-02	7.67E-02	6.81E-02	8.23E-02	9.81E-02
L4BKG01BJGSBSA30	-1.04E-02	2.07E-02	8.19E-02	0.00E+00	2.84E-02	5.43E-02	0.00E+00	0.00E+00	4.40E-02
	1.25E-01	MEAN		1.05E-02	MEAN		1.31E-01	MEAN	
	7.36E-01	MAX		1.10E-01	MAX		6.65E-01	MAX	
	1.57E-01	STDEV		2.43E-02	STDEV		1.47E-01	STDEV	