PROJECT NOTE WESTON SOLUTIONS, INC.

To: Canadian Radium & Uranium Corp. Site File
Date: February 28, 2014

W.O. No.: 20405.012.013.2222.00

From: Nels R. Johnson, CHP, Weston Solutions, Inc.

Subject: Review of Test America Analytical Report for the Canadian Radium and Uranium Site

1. Data Verification

The subject data package was reviewed and the data appear valid. The data package contained analytical results for nine soil samples, one water sample, and appropriate laboratory control samples (LCS). Analytical methods employed are alpha spectrometry for isotopic thorium and isotopic uranium, gamma spectrometry for Ra-226 and -228 for soil samples, and gas flow proportional counting for Ra-226 and -228 on the water sample.

The analytical methods cited are generally accepted industry methods for the requested radioisotopes. Appropriate tracers for isotopic thorium (Th-229) and isotopic uranium (U-232) were used, and percent recoveries were within tolerances. The suite of LCS included blanks, duplicates, and spikes for all lab methods and most were within tolerances. The exception to this is discussed later in this review. The minimum detectable concentration (MDC) for each result, for both client samples and LCS, were acceptable. All analytical data complied with the requested detection limits (RL) of 1.0 pCi/g for soil and 1.0 pCi/L for water. The data package indicated a minimum 21-day holding time to allow for the ingrowth of radon daughters.

The aforementioned exception to the acceptance of LCS relates to the spike of the method duplicate for Th-230 on sample 2222-S04. It appears that the reported result is greater than the actual spike by an amount greater than the allowable control limit and may be due to the percent recovery being above the allowable tolerance. The case narrative also mentions this exception, along with possible matrix interference due to rocks present in the sample. The data package is still considered acceptable since this deficiency was not observed with the tracer recovery reported for the actual client sample.

2. Data Interpretation

The soil data was first grouped into the radioisotopes included in the Th-232 decay series (Th-232, Th-228, Ra-228) and the U-238 decay series (U-238, U-234, Th-230 and Ra-226). The Hazard Ranking System (HRS) states that in order to establish observed contamination for a site-attributable radionuclide: 1) value equal or exceeds a value of 2 standard deviations above the mean site-specific background concentration for that radionuclide and 2) values that exceeds the upper-limit value of the range of regional background concentration. Employing the aforementioned criteria, as well as using professional judgment, significant values were established for the site.

To compare values which equal or exceed a value of 2 standard deviations above the site-specific background concentration, two soil samples were collected which exhibit and represent

background soil conditions (2222-S07, -S08). For each individual radionuclide, the standard deviation was found for the two background sample values. The standard deviation was then multiplied by two and added to the mean site-specific value for the specific radionuclide. This value was then compared to each analytical result.

To compare which values exceed the upper-limit value of the range of regional background concentrations, a range of approximately 0.5 pCi/g to 1.5 pCi/g was used to evaluate individual analytical results within each radionuclide. In typical soil in the eastern U.S. the concentration of the individual radioisotopes of the Th-232 and U-238 decay series range from approximately 0.5 to 1.5 pCi/g. These concentrations are considered to be general background values for these isotopes.

In background soil sample 2222-S08, there was a significantly higher concentration of Radium-226 documented (3.44 +/- 0.487 pCi/g); this alters the standard deviation significantly for comparison of background values for Ra-226. Comparison of the value which equals or exceeds a value of 2 standard deviations above the mean site-specific background concentration is interpreted as accurate for all radionuclides except for Ra-226; Ra-226 results are therefore compared to the background value of 2222-S07 (0.894 pCi/g) and the upper-limit value of the regional background range. Explanation of this anomaly is examined in section 2.1 of this Project Note.

Complete validated analytical data for radionuclides can be found on Table 1 of this Project Note. Significant analytical results, established in accordance with the aforementioned criteria, can be found on Table 2 of this Project Note as well as on Figure 4, included in the report.

2.1 Soil Samples

It has been reported in historical documentation that this site was originally used for processing of uranium, and in later years for Ra-226. It was also reported that the site underwent a remedial action to remove or reduce residual contaminants to concentrations acceptable at the time. Based on data reported in historical documentation and data collected by Weston, it appears that measureable residual contamination remains at the site.

The soil data was first grouped into the radioisotopes included in the Th-232 decay series (Th-232, Th-228, Ra-228) and the U-238 decay series (U-238, U-234, Th-230 and Ra-226).

All analytical results reported for the Th-232 decay series ranged from 0.6 to 1.2 pCi/g, and are therefore considered to be at background levels. In addition, all of the individual radioisotopes were observed to be in equilibrium in each sample.

There were seven sample locations which exhibit significant concentrations of the radionuclides within the U-238 decay series: 2222-S01, -S02, -S03, -S04 (duplicate -S09), -S05, -S06, and -S08. Analytical results reported for the U-238 decay series did not appear to be in equilibrium. Concentrations of the parent isotope U-238 and U-234 were at background levels ranging from 0.327 +/- 0.129 pCi/g to 0.849 +/- 0.177 pCi/g. Th-230 concentrations in samples 2222-S02, -S03, -S04, -S05, -S06, and -S09 exhibited significantly elevated levels ranging from 4.63 +/-

0.605 (222-S04) to 83.3 +/- 7.27 pCi/g (2222-S06); the concentrations of Th-230 were documented at background concentrations in 2222-S01, -S07 (background sample) and –S08 (background sample). Ra-226 concentrations in samples 222-S01, -S02, -S03, -S04 (duplicate -S09), -S05, -S06 exhibited significantly elevated levels ranging from 14.0 +/- 1.59 pCi/g (2222-S04) to 135 pCi/g +/- 14.1 pCi/g (2222-S02). An unexpected analytical result was observed for sample 2222-S08 (background sample) with the reported Ra-226 concentration being 3.44 +/- 0.487 pCi/g, which is slightly elevated above the background level but does not come close to the lowest Ra-226 concentration in source samples. This anomaly could be due to site-attributable contamination but could not be definite.

Analytical results reported for U-235/236 were either at below the MDC or at such low concentrations that it cannot be accurately quantified. Since there is no prior knowledge that either depleted or enriched uranium were present at this site, it is assumed that U-235/236 to U-238 would be at the naturally occurring ratio of 0.0071% by weight or 4.5% by activity.

Field duplicate samples were collected (S04 and S09) and the analytical results compared favorably.

Based upon the above, it can be concluded that the contaminants are from processed material, and not uranium ore.

The maximum concentrations were detected as follows:
U-238 at 0.849 +/- 0.177 pCi/g (2222-S02)
Th-230 at 83.3 +/- 7.27 pCi/g (2222-S06)
U-233/234 at 0.781 +/- 0.168 pCi/g (2222-S02)
Ra-226 at 135 +/- 14.1 pCi/g (2222-S02)
Th-232 at 0.879 +/- 0.216 pCi/g (2222-S04)
Ra-228 at 1.79 +/- 0.963 pCi/g (2222-S05)
Th-228 at 1.07 +/- 0.165 pCi/g (2222-S02)
U-235/236 at 0.0741 +/- 0.0546 pCi/g (2222-S02)

2.2 Water Sample

The one water sample is the rinsate blank. All of the analytical results except one were below the detection level for the method. The one positive result was for Th-230 at 0.196 +/- 0.132 pCi/L. This result is above the minimum detectable concentration of 0.0654 pCi/L, and therefore appears positive. However, the concentration is very low and it is not considered to be a significant contributor to the soil sample analytical results.

Nels R. Johnson, CHP
Certified Health Physicist

Table 1. CRU Complete Analytical Results for Soil Samples

Location ID	S01				S02				S03				S04				S09 Duplicate of S04			
	Result	Total Uncertainty	Qualifier	Unit	Result	Total Uncertainty	Qualifier	Unit	Result	Total Uncertainty	Qualifier	Unit	Result	Total Uncertainty	Qualifier	Unit	Result	Total Uncertainty	Qualifier	Unit
Uranium-238	0.380	+/- .123	V	pCi/g	0.849	+/- .177	V	pCi/g	0.749	+/- .159	V	pCi/g	0.327	+/- .129	V	pCi/g	0.516	+/- .159	V	pCi/g
Thorium-230	0.999	+/- .163	V	pCi/g	64.6	+/- 5.53	V	pCi/g	58.1	+/- 4.99	V	pCi/g	4.63	+/- .605	V	pCi/g	5.82	+/- .691	V	pCi/g
Uranium-233/234	0.428	+/- .132	V	pCi/g	0.781	+/- .168	V	pCi/g	0.769	+/- .0501	V	pCi/g	0.383	+/- .138	V	pCi/g	0.356	+/- .131	V	pCi/g
Radium-226	22.0	+/- 2.40	V	pCi/g	135	+/- 14.1	V	pCi/g	129	+/- 13.5	V	pCi/g	14.0	+/- 1.59	V	pCi/g	15.4	+/- 1.72	V	pCi/g
Location ID	S01				S02				S03				S04				S09			
Thorium-232	0.557	+/- .115	V	pCi/g	0.842	+/- .140	V	pCi/g	0.766	+/- .134	V	pCi/g	0.879	+/- .216	V	pCi/g	0.624	+/- .171	V	pCi/g
Radium-228	1.05	+/- .389	V	pCi/g	1.17	+/- .788	UV	pCi/g	0.946	+/- .773	UV	pCi/g	0.975	+/- .369	V	pCi/g	1.25	+/- .350	V	pCi/g
Thorium-228	0.626	+/- .125	V	pCi/g	1.07	+/- .165	V	pCi/g	0.884	+/- .148	V	pCi/g	0.850	+/- .210	V	pCi/g	0.808	+/- .197	V	pCi/g
Location ID	S01				S02				S03				S04				S09			
Uranium-235/236	0.000	+/- .00555	UV	pCi/g	0.0741	+/- .0546	V	pCi/g	0.0704	+/- .0501	V	pCi/g	0.0316	+/- .0625	UV	pCi/g	0.0415	+/- .0555	UV	pCi/g
Reference	Ref. 40, p.10				Ref. 40, p.11				Ref. 40, p.13				Ref. 40, p.14				Ref. 40, p.19			

Location ID	S05				S06				S07 Background				S08			
	Result	Total Uncertainty	Qualifier	Unit	Result	Total Uncertainty	Qualifier	Unit	Result	Total Uncertainty	Qualifier	Unit	Result	Total Uncertainty	Qualifier	Unit
Uranium-238	0.429	+/- .151	V	pCi/g	0.773	+/- .187	V	pCi/g	0.462	+/- .150	V	pCi/g	0.417	+/- .143	V	pCi/g
Thorium-230	1.81	+/- .311	V	pCi/g	83.3	+/- 7.27	V	pCi/g	0.407	+/- .140	V	pCi/g	0.575	+/- .175	V	pCi/g
Uranium-233/234	0.606	+/- .181	V	pCi/g	0.702	+/- .179	V	pCi/g	0.374	+/- .133	V	pCi/g	0.299	+/- .0401	V	pCi/g
Radium-226	109	+/- 11.5	V	pCi/g	109	+/- 11.5	+/- 11.5	+/- 11.	0.894	+/- .235	V	pCi/g	3.44	+/- .487	V	pCi/g
Location ID	S05				S06				S07 Background				S08			
Thorium-232	0.605	+/- .165	V	pCi/g	0.739	+/- .194	V	pCi/g	0.508	+/- .153	V	pCi/g	0.547	+/- .169	V	pCi/g
Radium-228	1.79	+/- .963	V	pCi/g	0.710	+/- .832	UV	pCi/g	0.843	+/- .239	V	pCi/g	1.35	+/- .342	V	pCi/g
Thorium-228	0.589	+/- .168	V	pCi/g	0.794	+/- .207	V	pCi/g	0.430	+/- .145	V	pCi/g	0.567	+/- .175	V	pCi/g
Location ID	S05				S06				S07 Background				S08			
Uranium-235/236	0.0178	+/- .0416	UV	pCi/g	0.0053	+/- .0259	UV	pCi/g	0.0620	+/- .0606	UV	pCi/g	0.0254	+/- .0401	UV	pCi/g
Reference	Ref. 40, p.15				Ref. 40, p.16				Ref. 40, p.17				Ref. 40, p.18			

V = Verified by Certified Health Physicist
UV = Indicates the analyte was analyzed for but not detected and verified by a Certified Health Physicist
pCi/g = picocurie per gram

Table 2. CRU Significant Analytical Results for Soil Samples

Location ID	S07 Background				S08 Background				2x Standard Deviations of the Site Specific Mean	S01				S02				S03				S04			
	Result	Total Uncertainty	Qualifier	Unit	Result	Total Uncertainty	Qualifier	Unit		Result	Total Uncertainty	Qualifier	Unit	Result	Total Uncertainty	Qualifier	Unit	Result	Total Uncertainty	Qualifier	Unit	Result	Total Uncertainty	Qualifier	Unit
Uranium-238	0.462	+/- .150	V	pCi/g	0.417	+/- .143	V	pCi/g	0.814	0.380	+/- .123	V	pCi/g	0.849	+/- .177	V	pCi/g	0.749	+/- .159	V	pCi/g	0.327	+/- .129	V	pCi/g
Thorium-230	0.407	+/- .140	V	pCi/g	0.575	+/- .175	V	pCi/g	0.7715	0.999	+/- .163	V	pCi/g	64.6	+/- 5.53	V	pCi/g	58.1	+/- 4.99	V	pCi/g	4.63	+/- .605	V	pCi/g
Uranium-233/234	0.374	+/- .133	V	pCi/g	0.299	+/- .0401	V	pCi/g	0.6725	0.428	+/- .132	V	pCi/g	0.781	+/- .168	V	pCi/g	0.769	+/- .0501	V	pCi/g	0.383	+/- .138	V	pCi/g
Radium-226	0.894	+/- .235	V	pCi/g	3.44	+/- .487	V	pCi/g	1.1455	22.0	+/- 2.40	V	pCi/g	135	+/- 14.1	V	pCi/g	129	+/- 13.5	V	pCi/g	14.0	+/- 1.59	V	pCi/g
Location ID	S07 Background				S08					S01				S02				S03				S04			
Thorium-232	0.508	+/- .153	V	pCi/g	0.547	+/- .169	V	pCi/g	1.01	0.557	+/- .115	V	pCi/g	0.842	+/- .140	V	pCi/g	0.766	+/- .134	V	pCi/g	0.879	+/- .216	V	pCi/g
Radium-228	0.843	+/- .239	V	pCi/g	1.35	+/- .342	V	pCi/g	0.8445	1.05	+/- .389	V	pCi/g	1.17	+/- .788	UV	pCi/g	0.946	+/- .773	UV	pCi/g	0.975	+/- .369	V	pCi/g
Thorium-228	0.430	+/- .145	V	pCi/g	0.567	+/- .175	V	pCi/g	1.048	0.626	+/- .125	V	pCi/g	1.07	+/- .165	V	pCi/g	0.884	+/- .148	V	pCi/g	0.850	+/- .210	V	pCi/g
Location ID	S07 Background				S08					S01				S02				S03				S04			
Uranium-235/236	0.0620	+/- .0606	UV	pCi/g	0.0254	+/- .0401	UV	pCi/g	0.0913	0.000	+/- .00555	UV	pCi/g	0.0741	+/- .0546	V	pCi/g	0.0704	+/- .0501	V	pCi/g	0.0316	+/- .0625	UV	pCi/g
Reference	Ref. 40, p.17				Ref. 40, p.18					Ref. 40, p.10				Ref. 40, p.11				Ref. 40, p.13				Ref. 40, p.14			

Location ID	S07 Background				S08 Background				2x Standard Deviations of the Site Specific Mean	S05				S06				S09 Duplicate of 504			
	Result	Total Uncertainty	Qualifier	Unit	Result	Total Uncertainty	Qualifier	Unit		Result	Total Uncertainty	Qualifier	Unit	Result	Total Uncertainty	Qualifier	Unit	Result	Total Uncertainty	Qualifier	Unit
Uranium-238	0.462	+/- .150	V	pCi/g	0.417	+/- .143	V	pCi/g	0.814	0.429	+/- .151	V	pCi/g	0.773	+/- .187	V	pCi/g	0.516	+/- .159	V	pCi/g
Thorium-230	0.407	+/- .140	V	pCi/g	0.575	+/- .175	V	pCi/g	0.7715	1.81	+/- .311	V	pCi/g	83.3	+/- 7.27	V	pCi/g	5.82	+/- .691	V	pCi/g
Uranium-233/234	0.374	+/- .133	V	pCi/g	0.299	+/- .0401	V	pCi/g	0.6725	0.606	+/- .181	V	pCi/g	0.702	+/- .179	V	pCi/g	0.356	+/- .131	V	pCi/g
Radium-226	0.894	+/- .235	V	pCi/g	3.44	+/- .487	V	pCi/g	1.1455	109	+/- 11.5	V	pCi/g	109	+/- 11.5	V	pCi/g	15.4	+/- 1.72	V	pCi/g
Location ID	S07 Background				S08					S05				S06				S09			
Thorium-232	0.508	+/- .153	V	pCi/g	0.547	+/- .169	V	pCi/g	1.01	0.605	+/- .165	V	pCi/g	0.739	+/- .194	V	pCi/g	0.624	+/- .171	V	pCi/g
Radium-228	0.843	+/- .239	V	pCi/g	1.35	+/- .342	V	pCi/g	0.8445	1.79	+/- .963	V	pCi/g	0.710	+/- .832	UV	pCi/g	1.25	+/- .350	V	pCi/g
Thorium-228	0.430	+/- .145	V	pCi/g	0.567	+/- .175	V	pCi/g	1.048	0.589	+/- .168	V	pCi/g	0.794	+/- .207	V	pCi/g	0.808	+/- .197	V	pCi/g
Location ID	S07 Background				S08					S05				S06				S09			
Uranium-235/236	0.0620	+/- .0606	UV	pCi/g	0.0254	+/- .0401	UV	pCi/g	0.0913	0.0178	+/- .0416	UV	pCi/g	0.00539	+/- .0259	UV	pCi/g	0.0415	+/- .0555	UV	pCi/g
Reference	Ref. 40, p.17				Ref. 40, p.18					Ref. 40, p.15				Ref. 40, p.16				Ref. 40, p.19			

Sample Locations with Significant Concentrations

V = Verified by Certified Health Physicist

UV = Indicates the analyte was analyzed for but not detected and verified by a Certified Health Physicist

pCi/g = picocurie per gram