

August 27, 2012

Mr. Gene Bonano  
U.S. Nuclear Regulatory Commission  
Region III  
2443 Warrenville Road  
Lisle, IL 60532-4351

**SUBJECT: ORISE CONTRACT NO. DE-AC05-06OR23100  
LETTER REPORT FOR ANALYTICAL RESULTS FOR TWENTY-EIGHT SOIL  
SAMPLES FROM THE UNIVERSITY OF ILLINOIS, URBANA, ILLINOIS  
[DOCKET NO. 05000151; NRC CONTROL NO. UIL-12-1] (RFTA NO. 12-001)  
DCN: 5197-LR-01-0**

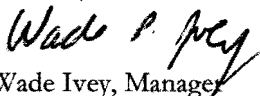
Dear Mr. Bonano:

Oak Ridge Associated Universities (ORAU), under the Oak Ridge Institute for Science and Education (ORISE) contract, received twenty-eight soil samples on July 26, 2012 from the University of Illinois research reactor in Urbana, Illinois. The samples were analyzed for selected gamma emitting radionuclides, tritium, carbon-14, nickel-63, and iron-55 according to the NRC Form 303 supplied with the samples. The sample identification numbers are presented in Table 1 and the gamma spectroscopy results for the requested radionuclides are provided in Table 2. The tritium, carbon-14, nickel-63, and iron-55 results are provided in Table 3. The pertinent procedure references are included with the data tables.

ORAU's Quality Control (QC) requirements were met for these analyses. The QC files are available for your review upon request.

My contact information is listed below. You may also contact Dale Condra at 865.241.3242 with any questions or comments.

Sincerely,



Wade Ivey, Manager  
Laboratory

WPI:RDC:km

Enclosures

c: T. Carter, NRC/FSME/DWMEP T-8F5  
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File 5197

Distribution approval and concurrence:	Initials
Technical Review	TUV
Quality Review	TUV
Group Manager Review	TUV

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**TABLE 1**  
**SAMPLE IDENTIFICATIONS**  
**AND COLLECTION INFORMATION**  
**UNIVERSITY OF ILLINOIS RESEARCH REACTOR**  
**URBANA, ILLINOIS**

<b>ORISE Sample ID</b>	<b>NRC Region III Sample ID</b>	<b>Collection Date</b>	<b>Collection Time</b>
5197S0001	UIL-12-1-01	7/23/2012	8:45 AM
5197S0002	UIL-12-1-02	7/23/2012	8:49 AM
5197S0003	UIL-12-1-03	7/23/2012	10:35 AM
5197S0004	UIL-12-1-04	7/23/2012	10:40 AM
5197S0005	UIL-12-1-05	7/23/2012	10:44 AM
5197S0006	UIL-12-1-06	7/23/2012	10:48 AM
5197S0007	UIL-12-1-07	7/23/2012	10:52 AM
5197S0008	UIL-12-1-08	7/23/2012	10:57 AM
5197S0009	UIL-12-1-09	7/23/2012	11:00 AM
5197S0010	UIL-12-1-10	7/23/2012	11:03 AM
5197S0011	UIL-12-1-11	7/23/2012	11:06 AM
5197S0012	UIL-12-1-12	7/23/2012	11:09 AM
5197S0013	UIL-12-1-13	7/23/2012	11:13 AM
5197S0014	UIL-12-1-14	7/23/2012	11:17 AM
5197S0015	UIL-12-1-15	7/23/2012	11:20 AM
5197S0016	UIL-12-1-16	7/23/2012	11:23 AM
5197S0017	UIL-12-1-17	7/23/2012	11:27 AM
5197S0018	UIL-12-1-18	7/23/2012	1:37 PM
5197S0019	UIL-12-1-19	7/23/2012	1:42 PM
5197S0020	UIL-12-1-20	7/23/2012	1:45 PM
5197S0021	UIL-12-1-21	7/23/2012	1:49 PM
5197S0022	UIL-12-1-22	7/23/2012	1:54 PM
5197S0023	UIL-12-1-23	7/23/2012	1:57 PM
5197S0024	UIL-12-1-24	7/23/2012	2:00 PM
5197S0025	UIL-12-1-25	7/23/2012	2:02 PM
5197S0026	UIL-12-1-26	7/23/2012	2:06 PM
5197S0027	UIL-12-1-27	7/23/2012	2:10 PM
5197S0028	UIL-12-1-28	7/23/2012	2:14 PM

**TABLE 2**  
**CONCENTRATIONS OF SELECTED GAMMA EMITTERS**  
**IN SOIL SAMPLES**  
**BY GAMMA SPECTROSCOPY CP1, REVISION 17**  
**UNIVERSITY OF ILLINOIS RESEARCH REACTOR**  
**URBANA, ILLINOIS**

ORISE Sample ID	NRC Region III Sample ID	Radionuclide Concentrations, TPU <sup>s</sup> <sup>a</sup> , and MDC <sup>s</sup> <sup>b</sup> (pCi/g)			
		Eu-152	Eu-154	Cs-137	Co-60
5197S0001	UIL-12-1-01	-0.01 ± 0.05 , 0.10	0.00 <sup>c</sup> ± 0.04 , 0.07	0.16 ± 0.03 , 0.04	0.01 ± 0.06 , 0.09
5197S0002	UIL-12-1-02	0.04 ± 0.07 , 0.12	0.02 ± 0.05 , 0.09	0.05 ± 0.02 , 0.04	-0.05 ± 0.06 , 0.09
5197S0003	UIL-12-1-03	0.01 ± 0.04 , 0.08	0.04 ± 0.03 , 0.06	-0.01 ± 0.02 , 0.05	-0.02 ± 0.05 , 0.07
5197S0004	UIL-12-1-04	-0.03 ± 0.06 , 0.09	0.02 ± 0.04 , 0.06	0.03 ± 0.03 , 0.06	0.01 ± 0.04 , 0.08
5197S0005	UIL-12-1-05	0.02 ± 0.03 , 0.06	0.00 ± 0.01 , 0.04	0.01 ± 0.01 , 0.02	-0.01 ± 0.04 , 0.06
5197S0006	UIL-12-1-06	0.01 ± 0.03 , 0.07	-0.01 ± 0.01 , 0.05	0.02 ± 0.01 , 0.02	0.02 ± 0.03 , 0.07
5197S0007	UIL-12-1-07	-0.01 ± 0.03 , 0.06	0.00 ± 0.02 , 0.05	0.01 ± 0.01 , 0.03	0.03 ± 0.03 , 0.06
5197S0008	UIL-12-1-08	0.00 ± 0.03 , 0.06	0.00 ± 0.02 , 0.04	0.02 ± 0.02 , 0.04	-0.02 ± 0.04 , 0.06
5197S0009	UIL-12-1-09	-0.01 ± 0.04 , 0.08	-0.01 ± 0.03 , 0.05	-0.02 ± 0.02 , 0.05	-0.03 ± 0.05 , 0.07
5197S0010	UIL-12-1-10	-0.01 ± 0.04 , 0.07	-0.01 ± 0.03 , 0.05	0.02 ± 0.01 , 0.03	0.01 ± 0.04 , 0.07
5197S0011	UIL-12-1-11	-0.01 ± 0.06 , 0.10	0.00 ± 0.04 , 0.07	0.02 ± 0.04 , 0.07	0.01 ± 0.05 , 0.09
5197S0012	UIL-12-1-12	0.02 ± 0.03 , 0.06	0.02 ± 0.02 , 0.04	0.00 ± 0.02 , 0.04	-0.01 ± 0.03 , 0.05
5197S0013	UIL-12-1-13	-0.01 ± 0.03 , 0.06	-0.01 ± 0.02 , 0.04	0.00 ± 0.01 , 0.04	-0.04 ± 0.04 , 0.05
5197S0014	UIL-12-1-14	-0.02 ± 0.05 , 0.09	0.04 ± 0.04 , 0.06	0.00 ± 0.02 , 0.05	-0.01 ± 0.04 , 0.08
5197S0015	UIL-12-1-15	-0.02 ± 0.03 , 0.06	0.00 ± 0.02 , 0.04	0.00 ± 0.02 , 0.04	-0.02 ± 0.03 , 0.05
5197S0016	UIL-12-1-16	0.00 ± 0.04 , 0.08	0.01 ± 0.03 , 0.06	0.03 ± 0.03 , 0.06	-0.01 ± 0.05 , 0.07
5197S0017	UIL-12-1-17	-0.01 ± 0.07 , 0.11	-0.04 ± 0.05 , 0.08	0.07 ± 0.02 , 0.04	-0.05 ± 0.07 , 0.10
5197S0018	UIL-12-1-18	0.02 ± 0.05 , 0.09	0.00 ± 0.03 , 0.06	0.11 ± 0.02 , 0.04	0.04 ± 0.04 , 0.08
5197S0019	UIL-12-1-19	0.06 ± 0.02 , 0.04	-0.02 ± 0.01 , 0.05	0.00 ± 0.02 , 0.04	0.11 ± 0.02 , 0.03
5197S0020	UIL-12-1-20	0.01 ± 0.03 , 0.06	0.01 ± 0.02 , 0.05	0.05 ± 0.02 , 0.03	0.03 ± 0.03 , 0.06
5197S0021	UIL-12-1-21	0.00 ± 0.03 , 0.06	-0.01 ± 0.02 , 0.04	0.01 ± 0.01 , 0.04	-0.02 ± 0.04 , 0.06
5197S0022	UIL-12-1-22	0.00 ± 0.03 , 0.06	0.00 ± 0.02 , 0.04	0.02 ± 0.01 , 0.02	0.01 ± 0.03 , 0.06
5197S0023	UIL-12-1-23	0.02 ± 0.04 , 0.08	0.00 ± 0.03 , 0.05	0.04 ± 0.02 , 0.05	0.02 ± 0.04 , 0.07
5197S0024	UIL-12-1-24	0.02 ± 0.03 , 0.06	0.00 ± 0.02 , 0.04	0.01 ± 0.02 , 0.04	-0.03 ± 0.03 , 0.05
5197S0025	UIL-12-1-25	0.02 ± 0.03 , 0.06	-0.02 ± 0.02 , 0.04	0.02 ± 0.01 , 0.03	-0.01 ± 0.03 , 0.05
5197S0026	UIL-12-1-26	0.01 ± 0.03 , 0.05	-0.01 ± 0.02 , 0.04	0.01 ± 0.02 , 0.03	0.00 ± 0.02 , 0.05
5197S0027	UIL-12-1-27	0.03 ± 0.03 , 0.06	-0.01 ± 0.01 , 0.04	0.02 ± 0.01 , 0.03	0.04 ± 0.02 , 0.04
5197S0028	UIL-12-1-28	-0.04 ± 0.08 , 0.12	0.00 ± 0.05 , 0.09	0.08 ± 0.03 , 0.05	0.00 ± 0.07 , 0.12

<sup>a</sup>Uncertainties represent the 95% confidence level, based on total propagated uncertainties.

<sup>b</sup>MDCs are after the commas.

<sup>c</sup>Zero value is due to rounding or sample and background count rates being equal.

**TABLE 3**  
**CONCENTRATIONS OF SELECTED HARD TO DETECT**  
**BETA EMITTING RADIONUCLIDES**  
**IN SOIL SAMPLES**  
**BY LIQUID SCINTILLATION COUNTING CP4, REVISION 4,**  
**AP6, REVISION 19, AP12, REVISION 6, AND AP16, REVISION 2**  
**UNIVERSITY OF ILLINOIS RESEARCH REACTOR**  
**URBANA, ILLINOIS**

ORISE Sample ID	NRC Region III Sample ID	Radionuclide Concentrations, TPU <sup>s</sup> <sup>a</sup> , and MDC <sup>s</sup> <sup>b</sup> (pCi/g)			
		H-3	C-14	Ni-63	Fe-55
5197S0001	UIL-12-1-01	-1.9 ± 2.5 , 4.5	0.7 ± 2.0 , 3.4	0.42 ± 0.49 , 0.82	-0.7 ± 4.4 , 8.0
5197S0002	UIL-12-1-02	0.0 <sup>c</sup> ± 2.6 , 4.5	0.9 ± 2.0 , 3.4	0.09 ± 0.48 , 0.82	-4.7 ± 3.8 , 7.5
5197S0003	UIL-12-1-03	0.3 ± 2.6 , 4.4	0.5 ± 2.0 , 3.4	0.20 ± 0.48 , 0.81	-3.6 ± 4.4 , 8.4
5197S0004	UIL-12-1-04	-1.1 ± 2.5 , 4.4	-0.5 ± 2.0 , 3.4	0.44 ± 0.48 , 0.80	-0.3 ± 4.3 , 7.7
5197S0005	UIL-12-1-05	-1.1 ± 2.5 , 4.4	-1.2 ± 2.0 , 3.4	0.38 ± 0.49 , 0.82	4.8 ± 5.1 , 8.6
5197S0006	UIL-12-1-06	0.5 ± 2.6 , 4.4	1.8 ± 2.0 , 3.4	0.10 ± 0.48 , 0.82	-3.6 ± 3.9 , 7.5
5197S0007	UIL-12-1-07	-1.0 ± 2.5 , 4.4	-0.8 ± 2.0 , 3.4	0.76 ± 0.50 , 0.82	-2.0 ± 4.1 , 7.6
5197S0008	UIL-12-1-08	0.3 ± 2.6 , 4.4	-0.2 ± 2.0 , 3.4	0.31 ± 0.48 , 0.81	0.9 ± 4.3 , 7.5
5197S0009	UIL-12-1-09	-0.6 ± 2.5 , 4.4	0.7 ± 2.0 , 3.4	0.43 ± 0.49 , 0.82	-1.4 ± 4.4 , 8.1
5197S0010	UIL-12-1-10	-0.2 ± 2.5 , 4.4	1.1 ± 2.0 , 3.4	0.56 ± 0.49 , 0.82	-2.4 ± 3.6 , 6.8
5197S0011	UIL-12-1-11	-1.5 ± 2.5 , 4.4	-0.3 ± 2.0 , 3.4	0.43 ± 0.54 , 0.91	-0.1 ± 4.3 , 7.7
5197S0012	UIL-12-1-12	-0.3 ± 2.5 , 4.4	-0.4 ± 2.0 , 3.4	0.21 ± 0.52 , 0.89	2.6 ± 4.1 , 6.9
5197S0013	UIL-12-1-13	-0.6 ± 2.6 , 4.4	1.1 ± 2.0 , 3.4	0.66 ± 0.55 , 0.91	-1.9 ± 3.4 , 6.4
5197S0014	UIL-12-1-14	-3.6 ± 2.5 , 4.4	-0.2 ± 2.0 , 3.4	0.55 ± 0.54 , 0.90	-3.5 ± 4.2 , 8.0
5197S0015	UIL-12-1-15	0.7 ± 2.5 , 4.4	-0.8 ± 1.8 , 3.0	0.33 ± 0.54 , 0.91	1.8 ± 3.8 , 6.6
5197S0016	UIL-12-1-16	1.6 ± 2.6 , 4.3	-0.4 ± 1.8 , 3.0	0.66 ± 0.54 , 0.89	-0.6 ± 3.0 , 5.4
5197S0017	UIL-12-1-17	0.8 ± 2.5 , 4.3	0.3 ± 1.7 , 3.0	0.74 ± 0.54 , 0.88	2.2 ± 4.3 , 7.4
5197S0018	UIL-12-1-18	2.3 ± 2.6 , 4.3	-0.5 ± 1.8 , 3.0	0.50 ± 0.55 , 0.92	1.8 ± 4.4 , 7.7
5197S0019	UIL-12-1-19	2.1 ± 2.6 , 4.3	1.4 ± 1.8 , 3.0	0.44 ± 0.55 , 0.92	1.5 ± 3.7 , 6.5
5197S0020	UIL-12-1-20	1.1 ± 2.5 , 4.3	0.5 ± 1.8 , 3.0	-0.06 ± 0.51 , 0.87	3.3 ± 4.2 , 7.1
5197S0021	UIL-12-1-21	1.5 ± 2.6 , 4.3	0.0 ± 1.8 , 3.0	0.11 ± 0.50 , 0.86	2.4 ± 3.5 , 5.9
5197S0022	UIL-12-1-22	0.7 ± 2.5 , 4.3	-0.2 ± 1.8 , 3.0	0.51 ± 0.53 , 0.88	-0.3 ± 3.0 , 5.5
5197S0023	UIL-12-1-23	2.7 ± 2.6 , 4.3	-1.1 ± 1.7 , 3.0	0.28 ± 0.51 , 0.87	0.9 ± 4.1 , 7.3
5197S0024	UIL-12-1-24	2.5 ± 2.6 , 4.3	0.3 ± 1.8 , 3.0	0.52 ± 0.51 , 0.85	1.2 ± 4.3 , 7.7
5197S0025	UIL-12-1-25	1.1 ± 2.5 , 4.3	0.2 ± 1.8 , 3.0	0.23 ± 0.51 , 0.87	7.9 ± 4.7 , 7.4
5197S0026	UIL-12-1-26	1.8 ± 2.6 , 4.3	-1.0 ± 1.8 , 3.0	0.18 ± 0.49 , 0.84	1.4 ± 3.8 , 6.7
5197S0027	UIL-12-1-27	-0.1 ± 2.5 , 4.3	0.5 ± 1.8 , 3.0	0.29 ± 0.49 , 0.83	1.6 ± 4.4 , 7.6
5197S0028	UIL-12-1-28	1.6 ± 2.6 , 4.3	0.2 ± 1.8 , 3.0	0.04 ± 0.51 , 0.87	2.2 ± 4.2 , 7.2

<sup>a</sup>Uncertainties represent the 95% confidence level, based on total propagated uncertainties.

<sup>b</sup>MDCs are after the commas.

<sup>c</sup>Zero value is due to rounding or sample and background count rates being equal.