

January 2, 2013

Mr. Navid Tehrani
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 THREE SOIL
SAMPLES FROM THE MALLINCKRODT PLANT, ST. LOUIS, MISSOURI
[DOCKET NO./TAC NO. 040-06563/2012001] (RFTA NO. 12-001)
DCN: 5166-LR-03-0**


Dear Mr. Tehrani:

Oak Ridge Associated Universities (ORAU), working under the Oak Ridge Institute for Science and Education (ORISE) contract, received three soil samples on December 13, 2012 from the Mallinckrodt Plant in St. Louis, Missouri. The samples were analyzed according to the NRC Form 303 supplied with the samples. Uranium-234 (U-234) cannot be measured by gamma spectroscopy under normal conditions. Therefore, the U-234 is assumed to be in secular equilibrium with the measureable uranium-238 since the samples have naturally occurring isotopic ratios. The sample identification numbers are presented in Table 1 and the gamma spectroscopy results for the requested radionuclides are provided in Table 2. The formulas used to calculate total uranium and total thorium are shown as footnotes in Table 2. The pertinent procedure reference is included with the data table.

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:km

Enclosures

c: T. Carter, NRC/FSME/DWMEP T-8F5
S. Nesmith, NRC/FSME/PBPA/TWFN 8A23

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File/5166

Distribution approval and concurrence:	Initials
Technical Review	ENB
Quality Review	PB
Group Manager Review	WPI

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TABLE 1
SAMPLE IDENTIFICATIONS
AND COLLECTION INFORMATION
MALLINCKRODT PLANT
ST. LOUIS, MISSOURI

ORAU/ORISE Sample ID	NRC Region III Sample ID	Collection Date	Collection Time
5166S0011	M-12-2-01-S	12/11/2012	10:30 AM
5166S0012	M-12-2-02-S	12/11/2012	10:35 AM
5166S0013	M-12-2-03-S	12/11/2012	10:39 AM

TABLE 2
CONCENTRATIONS OF SELECTED GAMMA EMITTERS
IN SOIL SAMPLES
BY GAMMA SPECTROSCOPY CP1, REVISION 17
MALLINCKRODT PLANT
ST. LOUIS, MISSOURI

ORAU/ORISE Sample ID	NRC Region III Sample ID	Radionuclide Concentrations, TPU ^a , and MDCs ^b (pCi/g)					
		Th-228 by Pb-212	Th-232 by Ac-228	Th-230	Ra-226 by Pb-214	Pb-210	Total Th ^c
5166S0011	M-12-2-01-S	1.17 ± 0.10 , 0.09	1.13 ± 0.17 , 0.17	6.2 ± 4.8 , 11.0	3.20 ± 0.20 , 0.08	4.15 ± 0.64 , 1.00	2.30 ± 0.20
5166S0012	M-12-2-02-S	1.15 ± 0.10 , 0.09	1.18 ± 0.20 , 0.22	-0.4 ± 9.2 , 15.0	3.31 ± 0.23 , 0.11	7.01 ± 0.97 , 1.40	2.33 ± 0.22
5166S0013	M-12-2-03-S	1.11 ± 0.10 , 0.11	1.13 ± 0.18 , 0.24	10.4 ± 6.1 , 14.0	12.08 ± 0.71 , 0.14	14.3 ± 1.5 , 1.9	2.24 ± 0.21

ORAU/ORISE Sample ID	NRC Region III Sample ID	Radionuclide Concentrations, TPU ^a , and MDCs ^b (pCi/g)			
		K-40	U-238 by Th-234	U-235	Total U ^d
5166S0011	M-12-2-01-S	17.7 ± 1.4 , 0.7	2.66 ± 0.55 , 1.10	0.09 ± 0.11 , 0.26	5.4 ± 1.1
5166S0012	M-12-2-02-S	16.0 ± 1.4 , 1.0	3.16 ± 0.68 , 1.40	0.26 ± 0.12 , 0.26	6.6 ± 1.4
5166S0013	M-12-2-03-S	12.9 ± 1.1 , 0.9	4.16 ± 0.82 , 1.80	0.34 ± 0.16 , 0.36	8.7 ± 1.6

^aUncertainties represent the 95% confidence level, based on total propagated uncertainties.

^bMDCs are after the commas.

^cTotal thorium is calculated using Th-228 + Th-232 for natural thorium.

^dTotal uranium is calculated using U-238*2 + U-235 for natural uranium.