ORISE
OAK RIDGE INSTITUTE FOR SCIENCE AND EDUCATION

November 17, 2010

Mr. William Snell
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 FOUR SOIL SAMPLES FROM THE UNIVERSITY OF MICHIGAN FORD REACTOR, ANN ARBOR, MICHIGAN [INSPECTION REPORT NOS. 05000002/2009003]
(RFTA NO. 10-001), DCN: 2026-LR-01-0

Dear Mr. Snell:

The Oak Ridge Institute for Science and Education (ORISE) received four soil samples on September 22, 2010 from the Ford Reactor at the University of Michigan in Ann Arbor, Michigan. The samples were analyzed according to the 303 form supplied with the samples. The sample identification numbers are presented in Table 1. The gamma spectroscopy data are in Table 2. The gross alpha and gross beta data are in Table 3. The tritium, carbon-14, and iron-55 data are in Table 4. The pertinent procedure references are included with the data tables.

ORISE's Quality Control (QC) requirements were met for these analyses. The QC files are available for your review upon request. A deviation to procedure AP16—Determination of Iron-55 in Soil and Other Solid Matrices—was required. The deviation was documented in the task file and a copy of the deviation is included in the letter report.

My contact information is listed below. You may also contact Wade Ivey at 865.576.9184 with any questions or comments.

Sincerely,

Dale Condra

Dale Condra, Manager
Laboratory

RDC:WPI:jc

Enclosures

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Distribution approval and concurrence :	Initials
Technical Review	EWB
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Modifications to procedure AP16:

AP16, Revision 1: DETERMINATION OF IRON-55 IN SOIL AND OTHER SOLID MATRICES

1) Replace step 4.6.5 with "Add 3 drops of 49% HF to dissolve the precipitate, heat in a water bath briefly if needed."

2) Replace step 4.6.6 with "Carefully transfer the solution to a plastic scintillation vial with a transfer pipette. Rinse the centrifuge tube with 1mL of DI water and transfer to the scintillation vial and add 12 mL of scintillation cocktail. Mix the solution with vigorous shaking."

3) Replace steps 5.1.5 and 5.2.6 as in amendment 1 above.

4) Replace steps 5.1.6 and 5.2.7 as in amendment 2 above.

TABLE 1

SAMPLE IDENTIFICATIONS AND COLLECTION INFORMATION FORD REACTOR, UNIVERSITY OF MICHIGAN ANN ARBOR, MICHIGAN

ORISE Sample ID	NRC Region III Sample ID	Collection Date	Collection Time
2026S0001	UM-01	9/15/10	NDP[a]
2026S0002	UM-02	9/15/10	NDP
2026S0003	UM-03	9/16/10	NDP
2026S0004	UM-04	9/16/10	NDP

[a]No data provided.

TABLE 2

CONCENTRATIONS OF SELECTED GAMMA EMITTING RADIONUCLIDES IN SOIL SAMPLES BY GAMMA SPECTROSCOPY CP1, REVISION 17 FORD REACTOR, UNIVERSITY OF MICHIGAN ANN ARBOR, MICHIGAN

ORISE Sample ID	NRC Region III Sample ID	Radionuclide Concentrations, TPUs, and MDCs[a] (pCi/g)				
		Mn-54	Co-60	Ag-108m	Ag-110m	Ba-133
2026S0001	UM-01	-0.03 ± 0.03[b] , 0.05	0.02 ± 0.04 , 0.06	0.24 ± 0.03 , 0.03	0.01 ± 0.02 , 0.05	-0.17[c] ± 0.05 , 0.06
2026S0002	UM-02	0.01 ± 0.04 , 0.06	0.20 ± 0.03 , 0.04	2.37 ± 0.16 , 0.05	-0.04 ± 0.03 , 0.07	-0.51 ± 0.07 , 0.12
2026S0003	UM-03	-0.02 ± 0.03 , 0.05	0.34 ± 0.03 , 0.03	2.06 ± 0.15 , 0.04	-0.15 ± 0.04 , 0.06	-0.30 ± 0.05 , 0.08
2026S0004	UM-04	-0.02 ± 0.03 , 0.04	-0.01 ± 0.03 , 0.05	0.10 ± 0.01 , 0.02	-0.01 ± 0.02 , 0.03	-0.06 ± 0.03 , 0.04

ORISE Sample ID	NRC Region III Sample ID	Radionuclide Concentrations, TPUs, and MDCs[a] (pCi/g)			
		Cs-134	Cs-137	Eu-152	Eu-154
2026S0001	UM-01	0.04 ± 0.03 , 0.06	0.02 ± 0.01 , 0.03	-0.02 ± 0.04 , 0.07	-0.01 ± 0.03 , 0.05
2026S0002	UM-02	0.00[d] ± 0.05 , 0.07	0.04 ± 0.02 , 0.05	0.04 ± 0.07 , 0.12	0.00 ± 0.05 , 0.08
2026S0003	UM-03	0.01 ± 0.03 , 0.06	0.16 ± 0.02 , 0.03	0.02 ± 0.05 , 0.09	0.03 ± 0.03 , 0.06
2026S0004	UM-04	0.01 ± 0.02 , 0.04	0.02 ± 0.01 , 0.03	-0.01 ± 0.03 , 0.05	0.00 ± 0.02 , 0.04

[a] The MDCs appear after the commas.

[b] Uncertainties represent the 95% confidence level, based on total propagated uncertainties.

[c] Statistically negative concentrations are due to the force fit routine in Canberra's Apex Gamma Software.

[d] Zero values are due to rounding or sample and background counts being equal.

TABLE 3

CONCENTRATIONS OF GROSS ALPHA AND GROSS BETA IN SOIL SAMPLES BY GAS FLOW PROPORTIONAL COUNTING AP1, REVISION 16; CP3, REVISION 2 FORD REACTOR, UNIVERSITY OF MICHIGAN ANN ARBOR, MICHIGAN

ORISE Sample ID	NRC Region III Sample ID	Radionuclide Concentrations, TPUs, and MDCs[a] (pCi/g)	
		Gross Alpha	Gross Beta
2026S0001	UM-01	2.2 ± 2.7[b] , 4.6	17.9 ± 4.6 , 6.4
2026S0002	UM-02	3.6 ± 2.7 , 4.2	18.5 ± 4.4 , 5.9
2026S0003	UM-03	1.5 ± 2.5 , 4.4	23.6 ± 4.7 , 6.0
2026S0004	UM-04	1.4 ± 2.4 , 4.2	25.7 ± 4.9 , 6.0

[a]The MDCs are after the comma.

[b]Uncertainties represent the 95% confidence level, based on total propagated uncertainties.

TABLE 4

CONCENTRATIONS OF LOW ENERGY BETA RADIONUCLIDES IN SOIL SAMPLES BY LIQUID SCINTILLATION ANALYSIS

AP6, REVISION 18; AP16, REVISION 1[a]; CP4, REVISION 3
FORD REACTOR, UNIVERSITY OF MICHIGAN
ANN ARBOR, MICHIGAN

ORISE Sample ID	NRC Region III Sample ID	Radionuclide Concentrations, TPUs, and MDCs[b] (pCi/g)		
		C-14	Fe-55	H-3
2026S0001	UM-01	2.2 ± 1.3[c] , 2.2	3.1 ± 2.2 , 3.7	-0.7 ± 2.1 , 3.6
2026S0002	UM-02	13.7 ± 1.6 , 1.8	3.4 ± 2.3 , 3.7	-1.2 ± 1.7 , 3.0
2026S0003	UM-03	0.3 ± 1.4 , 2.4	3.1 ± 2.3 , 3.7	-0.7 ± 2.3 , 4.0
2026S0004	UM-04	1.6 ± 1.3 , 2.2	2.0 ± 2.1 , 3.5	-2.0 ± 2.1 , 3.6

[a]A deviation for AP16 was used for these analyses. The deviation is documented in the task file.

[b]The MDCs are after the comma.

[c]Uncertainties represent the 95% confidence level, based on total propagated uncertainties.