

April 13, 2006

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

**SUBJECT: ANALYTICAL RESULTS FOR FOUR WATER SAMPLES FROM
THE VICINITY OF THE BRAIDWOOD NUCLEAR GENERATING
STATION, BRAIDWOOD, ILLINOIS
[INSPECTION REPORT NO. 050-456/06-008] (RFTA NO. 06-001)**

Dear Mr. Snell:

The Oak Ridge Institute for Science and Education (ORISE) received an electronic mail on March 23, 2006 requesting total radiostrontium (Sr) and iron-55 (Fe-55) analysis on four of the ten water samples received on December 30, 2005 from the vicinity of the Braidwood Generating Station. On March 24, 2006 during a phone call to ORISE, the request was expanded to include Americium-241 (Am-241), Plutonium-238, 239/240 (Pu-238,239/240), and nickel-63 (Ni-63). The ten water samples were originally analyzed by gamma spectroscopy for gamma emitting radionuclides and by liquid scintillation for tritium. The letter report for the original analyses was submitted to John House on January 13, 2006. Total radiostrontium was analyzed by low background beta counting (Procedures AP4, Revision 13; CP3, Revision 2). Fe-55 and Ni-63 were analyzed by liquid scintillation analysis (Procedures AP13, Revision 4; AP12, Revision 4; and CP4, Revision 3). Am and Pu were analyzed by alpha spectroscopy (AS) (Procedures AP11, Revision 3; CP2, Revision 12). The sample identifications and collection data are presented in Table 1. The AS, Fe, Ni, and Sr data are presented in Tables 2 through 5, respectively.

Samples 1682W0067 and 1682W0069 are from the same sample collection site but were collected on different days. An aliquot of 1682W0067 was used in the Sr analysis, but subsequently the rest of the sample was cross contaminated with another sample. Aliquots from 1682W0069 were used in the AS, Fe, and Ni analyses.

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

Mr. William Snell

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

Sincerely,



Dale Condra, Manager
Laboratory

RDC:WPI:ar

c: T. McLaughlin, NRC/NMSS/TWFN 7F27 E. Abelquist, ORISE
E. Knox-Davin, NRC/NMSS/TWFN 8A23 S. Kirk, ORISE
G. Bonano, NRC Region III File 1682

Distribution approval and concurrence :	Initials
Technical Management Team Member	JSK
Quality Manager	CR

TABLE 1

**SAMPLE IDENTIFICATIONS
AND COLLECTION DATA
BRAIDWOOD NUCLEAR GENERATING STATION
BRAIDWOOD, ILLINOIS**

ORISE Sample ID	NRC Region III Sample ID	Collection Date	Collection Time
1682W0064	NRC-64-R3	na ^a	na
1682W0065	NRC-65-R3	na	na
1682W0066	NRC-66-R3	na	na
1682W0067 ^{b,c}	NRC-67-R3	12/27/2005	4:15 PM
1682W0069 ^{b,d}	NRC-69-R3	12/8/2005	na

^aNo data provided

^bThese two samples are from the same collection site.

^cSample 1682W0067 was analyzed for total radiostrontium.

^dAliquots from 1682W0069 were used in alpha spectroscopy, iron-55, and nickel-63 analyses.

TABLE 2

**CONCENTRATIONS OF AMERICIUM-241
AND PLUTONIUM-238, 239/240
IN WATER SAMPLES
BY ALPHA SPECTROSCOPY AP11, REVISION 3; CP2, REVISION 12
BRAIDWOOD NUCLEAR GENERATING STATION
BRAIDWOOD, ILLINOIS**

ORISE Sample ID	NRC Region III Sample ID	Radionuclide Concentrations ^a (pCi/L)		
		Am-241	Pu-238	Pu-239/240
1682W0064	NRC-64-R3	-0.10 ± 0.89 ^b	0.15 ± 0.80	0.15 ± 0.30
1682W0065	NRC-65-R3	-1.0 ± 1.1	0.15 ± 0.55	0.22 ± 0.26
1682W0066	NRC-66-R3	0.7 ± 1.1	-0.21 ± 0.69	0.28 ± 0.34
1682W0069	NRC-69-R3	0.23 ± 0.95	0.07 ± 0.58	0.00 ^c ± 0.28

^aThe average MDC for Am-241 is 1.3 pCi/L, for Pu-238 is 1.3 pCi/L, and for Pu-239/240 is 0.50 pCi/L.

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

^cZero value is due to rounding.

TABLE 3

**CONCENTRATIONS OF IRON-55 (Fe-55)
IN WATER SAMPLES
BY LIQUID SCINTILLATION ANALYSIS
AP13, REVISION 4; CP4, REVISION 3
BRAIDWOOD NUCLEAR GENERATING STATION
BRAIDWOOD, ILLINOIS**

ORISE Sample ID	NRC Region III Sample ID	Fe-55 Concentrations, TPU, and MDCs^a (pCi/L)			
1682W0064	NRC-64-R3	8	±	52 ^b	(88)
1682W0065	NRC-65-R3	22	±	52	(88)
1682W0066	NRC-66-R3	16	±	52	(88)
1682W0069	NRC-69-R3	-9	±	52	(88)

^aMDCs are in parenthesis.

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

TABLE 4

CONCENTRATIONS OF NICKEL-63 (Ni-63)
IN WATER SAMPLES
BY LIQUID SCINTILLATION ANALYSIS
AP12, REVISION 4; CP4, REVISION 3
BRAIDWOOD NUCLEAR GENERATING STATION
BRAIDWOOD, ILLINOIS

ORISE Sample ID	NRC Region III Sample ID	Ni-63 Concentrations, TPUs, and MDCs ^a (pCi/L)			
1682W0064	NRC-64-R3	-12	±	15 ^b	(25)
1682W0065	NRC-65-R3	-3	±	15	(25)
1682W0066	NRC-66-R3	4	±	15	(25)
1682W0069	NRC-69-R3	1	±	15	(25)

^aMDCs are in parenthesis.

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

TABLE 5

**CONCENTRATIONS OF TOTAL RADIOSTRONTIUM (Sr)
IN WATER SAMPLES
BY LOW BACKGROUND BETA COUNTING
AP4, REVISION 13; CP3, REVISION 2
BRAIDWOOD NUCLEAR GENERATING STATION
BRAIDWOOD, ILLINOIS**

ORISE Sample ID	NRC Region III Sample ID	Sr Concentrations, TPU's, and MDCs^a (pCi/L)			
1682W0064	NRC-64-R3	0.5	±	1.1 ^b	(1.9)
1682W0065	NRC-65-R3	0.2	±	1.1	(1.9)
1682W0066	NRC-66-R3	0.8	±	1.2	(2.1)
1682W0067	NRC-67-R3	-0.8	±	1.2	(2.1)

^aMDCs are in parenthesis.

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