

ORISE

OAK RIDGE INSTITUTE FOR SCIENCE AND EDUCATION

December 19, 2005

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

**SUBJECT: ANALYTICAL RESULTS FOR SOIL, VEGETATION AND WATER SAMPLES
FROM THE WESTINGHOUSE FACILITY, HEMATITE, MISSOURI
[TAC NO. 070-00036/2005-001] (RFTA NO. 06-001)**

Dear Mr. Bonano:

The Environmental Survey and Site Assessment Program (ESSAP) of the Oak Ridge Institute for Science and Education (ORISE) received two water samples on September 26, 2005 from the Westinghouse Facility in Hematite, Missouri. On October 17, 2005, 11 additional water samples, seven soil samples, and four vegetation samples were received. The sample identifications and collection dates and times are listed in Table 1. All samples were analyzed by gamma spectroscopy (GS) (Procedure CP1, Revision 15). The samples were also analyzed by gas-flow proportional counting for gross alpha and gross beta (GAB) activities (Procedure AP1, Revision 14; Procedure CP3, Revision 2) and for technetium-99 (Tc-99) by liquid scintillation analysis (Procedure AP5, Revision 16; CP4 Revision 3). The results for soil by GS, for vegetation and water by GS, GAB, and Tc-99 are presented in Tables 2 through 5, respectively.

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

If you have any questions, please call me at (865) 241-3242 or Wade Ivey at (865) 576-9184.

Sincerely,



Dale Condra
Laboratory Manager
Environmental Survey and
Site Assessment Program

RDC:WPI:ar

Enclosure

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ORISE TABLE 1**SAMPLE IDENTIFICATIONS
AND COLLECTION DATA
WESTINGHOUSE HEMATITE FACILITY
HEMATITE, MISSOURI**

ESSAP Sample ID	NRC Region III Sample ID	Collection Date	Collection Time
1674S0001	NRC-14-SS-10	10/12/2005	11:55 AM
1674S0002	NRC-15-SS-11	10/12/2005	11:18 AM
1674S0003	NRC-16-SS-12	10/12/2005	1:37 PM
1674S0004	NRC-17-SS-13	10/12/2005	11:47 AM
1674S0005	NRC-18-SS-14	10/12/2005	11:05 PM
1674S0006	NRC-19-SS-15	10/12/2005	11:35 AM
1674S0007	NRC-20-SS-16	10/12/2005	3:40 PM
1674V0001	NRC-21-VS-12	10/12/2005	1:35 PM
1674V0002	NRC-22-VS-13	10/12/2005	11:45 PM
1674V0003	NRC-23-VS-14	10/12/2005	11:05 AM
1674V0004	NRC-24-VS-15	10/12/2005	11:33 AM
1674W0001	NRC-1, BR-1-RB	9/21/2005	9:25 AM
1674W0002	NRC-2, BR-4-JC	9/21/2005	3:05 PM
1674W0003	NRC-3-WS-4	10/12/2005	11:00 AM
1674W0004	NRC-4-WS-5	10/12/2005	11:15 AM
1674W0005	NRC-5-WS-6	10/12/2005	1:55 PM
1674W0006	NRC-6-WS-7	10/12/2005	2:44 PM
1674W0007	NRC-7-WS-8	10/12/2005	2:48 PM
1674W0008	NRC-8-WS-9	10/12/2005	2:08 PM
1674W0009	NRC-9-WS-13	10/12/2005	3:00 PM
1674W0010	NRC-10-WS-15	10/12/2005	2:27 PM
1674W0011	NRC-11-WS-16	10/12/2005	2:33 PM
1674W0012	NRC-12-WS-17B	10/12/2005	2:20 PM
1674W0013	NRC-13-WS-18	10/12/2005	11:30 AM

ORISE TABLE 2

**CONCENTRATIONS OF SELECTED
GAMMA EMITTING RADIONUCLIDES
IN SOIL SAMPLES
BY GAMMA SPECTROSCOPY CP1, REVISION 15
WESTINGHOUSE HEMATITE FACILITY
HEMATITE, MISSOURI**

ESSAP Sample ID	NRC Region III Sample ID	Radionuclide Concentrations (pCi/g dry weight) ^a			
		Am-241	U-238 by Th-234	U-235	Total U ^b
1674S0001	NRC-14-SS-10	0.01 ± 0.04 ^c	1.49 ± 0.48	0.32 ± 0.10	8.8 ± 2.2
1674S0002	NRC-15-SS-11	0.01 ± 0.03	2.29 ± 0.47	0.47 ± 0.13	13.0 ± 2.9
1674S0003	NRC-16-SS-12	0.01 ± 0.03	0.97 ± 0.39	0.10 ± 0.11	3.2 ± 2.4
1674S0004	NRC-17-SS-13	-0.01 ± 0.03	0.64 ± 0.44	0.14 ± 0.10	3.8 ± 2.2
1674S0005	NRC-18-SS-14	-0.01 ± 0.05	1.12 ± 0.62	0.08 ± 0.11	2.9 ± 2.5
1674S0006	NRC-19-SS-15	0.02 ± 0.03	1.11 ± 0.60	0.25 ± 0.12	6.8 ± 2.7
1674S0007	NRC-20-SS-16	0.01 ± 0.04	2.92 ± 0.56	0.48 ± 0.15	13.8 ± 3.3

^aThe range of MDCs for the selected radionuclides is 0.05 pCi/g for Am-241 to 0.50 pCi/g U-238.

^bTotal uranium is calculated using the equation U-238 + U-235 + (21.7*U-235).

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

ORISE TABLE 3

**CONCENTRATIONS OF SELECTED
GAMMA EMITTING RADIONUCLIDES
IN VEGETATION AND WATER SAMPLES
BY GAMMA SPECTROSCOPY CP1, REVISION 15
WESTINGHOUSE HEMATITE FACILITY
HEMATITE, MISSOURI**

ESSAP Sample ID	NRC Region III Sample ID	Radionuclide Concentrations (pCi/g wet weight ^a for vegetation- V and pCi/L ^b for water-W)		
		Am-241	U-238 by Th-234	U-235
1674V0001	NRC-21-VS-12	0.00 ^c ± 0.02 ^d	0.00 ± 0.18	0.01 ± 0.06
1674V0002	NRC-22-VS-13	0.00 ± 0.02	0.18 ± 0.29	0.03 ± 0.09
1674V0003	NRC-23-VS-14	0.01 ± 0.02	0.13 ± 0.33	0.05 ± 0.07
1674V0004	NRC-24-VS-15	-0.01 ± 0.02	-0.18 ± 0.40	0.08 ± 0.08
1674W0001	NRC-1, BR-1-RB	0.4 ± 4.1	-36 ± 52	-13 ± 15
1674W0002	NRC-2, BR-4-JC	3.2 ± 2.6	45 ± 43	-2.1 ± 8.3
1674W0003	NRC-3-WS-4	-1.5 ± 4.1	2 ± 49	7 ± 11
1674W0004	NRC-4-WS-5	1.0 ± 3.2	24 ± 59	-1 ± 16
1674W0005	NRC-5-WS-6	2.7 ± 3.5	-9 ± 48	2 ± 11
1674W0006	NRC-6-WS-7	-0.6 ± 2.7	-31 ± 37	-3 ± 13
1674W0007	NRC-7-WS-8	2.1 ± 4.3	21 ± 46	-1 ± 11
1674W0008	NRC-8-WS-9	-2.0 ± 2.9	10 ± 57	11 ± 17
1674W0009	NRC-9-WS-13	-2.5 ± 4.8	-27 ± 53	-13 ± 16
1674W0010	NRC-10-WS-15	-0.4 ± 3.2	39 ± 56	-6 ± 16
1674W0011	NRC-11-WS-16	2.6 ± 2.9	-3 ± 40	2.7 ± 8.9
1674W0012	NRC-12-WS-17B	0.2 ± 2.8	12 ± 47	1.8 ± 9.7
1674W0013	NRC-13-WS-18	2.2 ± 3.0	-21 ± 45	3 ± 11

^aThe range of MDCs in vegetation for the selected radionuclides is 0.03 pCi/g wet weight for Am-241 to 0.28 pCi/g wet weight for U-238.

^bThe range of MDCs in water for the selected radionuclides is 4.7 pCi/L for Am-241 to 53 pCi/L for U-238.

^cZero values are due to rounding.

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

ORISE TABLE 4

**CONCENTRATIONS OF GROSS ALPHA AND GROSS BETA
BY GAS-LOW PROPPORTIONAL COUNTING
AP1, REVISION 14 AND CP3, REVISION 2
WESTINGHOUSE HEMATITE FACILITY
HEMATITE, MISSOURI**

ESSAP Sample ID	NRC Region III Sample ID	Concentrations, TPU ^s , and MDC ^s ^a (pCi/g for soil, pCi/g as received for vegetation, pCi/L for water)	
		Gross Alpha	Gross Beta
1674S0001	NRC-14-SS-10	10.6 ± 3.6 ^b (4.2)	22.8 ± 3.6 (3.9)
1674S0002	NRC-15-SS-11	19.2 ± 4.4 (4.2)	67.4 ± 6.8 (4.0)
1674S0003	NRC-16-SS-12	8.4 ± 3.3 (4.2)	13.6 ± 3.1 (4.1)
1674S0004	NRC-17-SS-13	6.7 ± 3.0 (4.0)	22.6 ± 3.6 (4.1)
1674S0005	NRC-18-SS-14	12.2 ± 3.6 (4.0)	29.1 ± 4.1 (4.1)
1674S0006	NRC-19-SS-15	12.2 ± 3.6 (4.0)	28.0 ± 4.0 (4.1)
1674S0007	NRC-20-SS-16	11.5 ± 3.2 (3.5)	39.5 ± 4.7 (4.0)
1674V0001	NRC-21-VS-12	0.77 ± 0.26 (0.33)	6.14 ± 0.57 (0.27)
1674V0002	NRC-22-VS-13	0.71 ± 0.21 (0.26)	7.60 ± 0.66 (0.21)
1674V0003	NRC-23-VS-14	1.29 ± 0.38 (0.44)	8.13 ± 0.75 (0.34)
1674V0004	NRC-24-VS-15	0.86 ± 0.19 (0.20)	7.04 ± 0.60 (0.16)
1674W0001	NRC-1, BR-1-RB	2.1 ± 1.3 (2.1)	2.9 ± 1.2 (1.8)
1674W0002	NRC-2, BR-4-JC	5.6 ± 2.0 (2.6)	7.9 ± 1.5 (1.8)
1674W0003	NRC-3-WS-4	4.7 ± 2.1 (2.8)	2.2 ± 1.8 (2.9)
1674W0004	NRC-4-WS-5	2.9 ± 1.2 (1.5)	5.4 ± 1.3 (1.7)
1674W0005	NRC-5-WS-6	8.7 ± 1.8 (1.6)	8.7 ± 1.5 (1.7)
1674W0006	NRC-6-WS-7	15.0 ± 2.6 (1.7)	272 ± 23 (1.7)
1674W0007	NRC-7-WS-8	1.1 ± 1.1 (1.9)	4.9 ± 1.2 (1.7)
1674W0008	NRC-8-WS-9	0.85 ± 0.69 (1.1)	3.4 ± 1.1 (1.6)
1674W0009	NRC-9-WS-13	2.2 ± 1.1 (1.4)	89.9 ± 8.1 (1.7)
1674W0010	NRC-10-WS-15	5.1 ± 1.5 (1.7)	22.1 ± 2.5 (1.7)
1674W0011	NRC-11-WS-16	8.9 ± 2.1 (1.9)	52.2 ± 4.9 (1.7)
1674W0012	NRC-12-WS-17B	2.05 ± 0.74 (0.84)	2080 ± 180 (1.6)
1674W0013	NRC-13-WS-18	3.6 ± 1.4 (1.7)	41.1 ± 4.0 (1.7)

^aMDCs are in parenthesis.

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

ORISE TABLE 5

**CONCENTRATIONS OF TECHNETIUM-99 (Tc-99)
BY LIQUID SCINTILLATION ANALYSIS
AP5, REVISION 16 AND CP4, REVISION 3
WESTINGHOUSE HEMATITE FACILITY
HEMATITE, MISSOURI**

ESSAP Sample ID	NRC Region III Sample ID	Concentrations, TPUs, and MDCs ^a (pCi/g for soil and vegetation, pCi/L for water)
1674S0001	NRC-14-SS-10	0.50 ± 0.21 ^b (0.34)
1674S0002	NRC-15-SS-11	55.6 ± 4.1 (0.34)
1674S0003	NRC-16-SS-12	0.22 ± 0.20 (0.33)
1674S0004	NRC-17-SS-13	0.85 ± 0.22 (0.33)
1674S0005	NRC-18-SS-14	0.32 ± 0.21 (0.34)
1674S0006	NRC-19-SS-15	0.56 ± 0.21 (0.34)
1674S0007	NRC-20-SS-16	28.1 ± 2.1 (0.34)
1674V0001	NRC-21-VS-12	0.24 ± 0.20 (0.33)
1674V0002	NRC-22-VS-13	0.29 ± 0.21 (0.34)
1674V0003	NRC-23-VS-14	0.15 ± 0.20 (0.33)
1674V0004	NRC-24-VS-15	1.47 ± 0.26 (0.34)
1674W0001	NRC-1, BR-1-RB	12.5 ± 9.3 (15)
1674W0002	NRC-2, BR-4-JC	8.3 ± 9.2 (15)
1674W0003	NRC-3-WS-4	22 ± 25 (42)
1674W0004	NRC-4-WS-5	2 ± 24 (42)
1674W0005	NRC-5-WS-6	-3 ± 24 (42)
1674W0006	NRC-6-WS-7	435 ± 46 (42)
1674W0007	NRC-7-WS-8	-3 ± 24 (42)
1674W0008	NRC-8-WS-9	-8 ± 24 (42)
1674W0009	NRC-9-WS-13	234 ± 34 (42)
1674W0010	NRC-10-WS-15	28 ± 25 (42)
1674W0011	NRC-11-WS-16	13 ± 25 (42)
1674W0012	NRC-12-WS-17B	4,860 ± 360 (40)
1674W0013	NRC-13-WS-18	4 ± 24 (42)

^aMDCs are in parenthesis.

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