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ORISE
OAK RIDGE INSTITUTE FOR SCIENCE AND EDUCATION

2007 OCT 11 PM 12:45
October 8, 2007

Mr. Mark Roberts
U.S. Nuclear Regulatory Commission
Region 1
475 Allendale Road
King of Prussia, Pennsylvania 19406

**SUBJECT: ANALYTICAL RESULTS FOR THIRTY-FOUR WATER SAMPLES
ASSOCIATED WITH SHIELDALLOY METALLURGICAL
COMPANY, SWEDESBORO, NEW JERSEY
(INSPECTION REPORT #04007102/2006-001)[RFTA NO. 07-001]**

Dear Mr. Roberts:

The Oak Ridge Institute for Science and Education (ORISE) received water samples from 17 different wells associated with the ShieldAlloy Metallurgical Company in Swedesboro, New Jersey. Each well had two 1 liter bottles associated with it. One bottle was used to analyze for gross alpha and gross beta using low background (LB) proportional counting, isotopic thorium and uranium using alpha spectroscopy, and radium-226 using alpha spectroscopy. The second bottle was used to analyze radium-228 via LB proportional counting. The water sample identifications are listed in Table 1. The LB results for gross alpha and gross beta are presented in Table 2, the radium-226 results are presented in Table 3, the radium-228 results are presented in Table 4, the thorium isotopic results are presented in Table 5, and the uranium isotopic results are presented in Table 6. The pertinent procedure references are provided in the tables.

ORISE'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 Wade Ivey at 865.576.9184 with any questions or comments.

Sincerely,

Dale Condra
Dale Condra, Manager
Laboratory

RDC/WPI:bf

Enclosures

c: T. Carter, NRC/FSME/DWMEP T-8F5 E. Abelquist, ORISE
E. Knox-Davin, NRC/FSME/TWFN 8A23 S. Roberts, ORISE
File 1747

Distribution approval and concurrence:	Initials
Technical Management Team Member	<i>DJR</i>
Quality Manager	<i>GTP</i>

TABLE 1
SAMPLE IDENTIFICATIONS
AND COLLECTION DATA
SHIELDALLOY METALLURGICAL COMPANY
SWEDESBORO, NEW JERSEY

ORISE Sample ID	NRC Region I Sample ID	Collection Date	Collection Time
1747W0001	NRC-1	07/24/2007	0730-1230 ^a
1747W0002	NRC-1D ^b	07/24/2007	0730-1230
1747W0003	NRC-2	07/24/2007	0730-1230
1747W0004	NRC-2D	07/24/2007	0730-1230
1747W0005	NRC-3	07/24/2007	0730-1230
1747W0006	NRC-3D	07/24/2007	0730-1230
1747W0007	NRC-4	07/24/2007	0730-1230
1747W0008	NRC-4D	07/24/2007	0730-1230
1747W0009	NRC-5	07/24/2007	0730-1230
1747W0010	NRC-5D	07/24/2007	0730-1230
1747W0011	NRC-6	07/24/2007	0730-1230
1747W0012	NRC-6D	07/24/2007	0730-1230
1747W0013	NRC-7	07/24/2007	0730-1230
1747W0014	NRC-7D	07/24/2007	0730-1230
1747W0015	NRC-8	07/24/2007	0730-1230
1747W0016	NRC-8D	07/24/2007	0730-1230
1747W0017	NRC-9	07/24/2007	1400-1557
1747W0018	NRC-9D	07/24/2007	1400-1557
1747W0019	NRC-10	07/24/2007	1400-1557
1747W0020	NRC-10D	07/24/2007	1400-1557
1747W0021	NRC-11	07/24/2007	1400-1557
1747W0022	NRC-11D	07/24/2007	1400-1557
1747W0023	NRC-12	07/24/2007	1400-1557
1747W0024	NRC-12D	07/24/2007	1400-1557
1747W0025	NRC-13	07/24/2007	1400-1557
1747W0026	NRC-13D	07/24/2007	1400-1557

TABLE 1 (cont.)

**SAMPLE IDENTIFICATIONS
AND COLLECTION DATA
SHIELDALLOY METALLURGICAL COMPANY
SWEDESBORO, NEW JERSEY**

ORISE Sample ID	NRC Region I Sample ID	Collection Date	Collection Time
1747W0027	NRC-14	07/25/2007	7:05
1747W0028	NRC-14D	07/25/2007	7:05
1747W0029	NRC-15	07/25/2007	7:25
1747W0030	NRC-15D	07/25/2007	7:25
1747W0031	NRC-16	07/25/2007	NDP ^c
1747W0032	NRC-17	07/25/2007	10:30
1747W0033	NRC-17D	07/25/2007	10:30
1747W0034	NRC-16D	07/25/2007	0830-0845

^aA time range was given for samples labeled NRC-1 through NRC-13.

^bThe NRC sent two bottles of water from each well. ORISE added "D" to the sample ID for the second container for tracking purposes.

^cNo data provided.

TABLE 2
CONCENTRATIONS OF ALPHA AND BETA EMITTING RADIONUCLIDES
IN WATER SAMPLES
BY GROSS ALPHA AND GROSS BETA ANALYSIS
API, REVISION 15 AND CP1, REVISION 15
SHIELDALLOY METALLURGICAL COMPANY
SWEDESBORO, NEW JERSEY

ORISE Sample ID	NRC Region I Sample ID	Radionuclide Concentrations (pCi/L)	
		Gross Alpha	Gross Beta
1747W0001	NRC-1	0.72 ± 0.68 ^a , 1.10 ^b	2.54 ± 0.97 , 1.49
1747W0003	NRC-2	1.17 ± 0.57 , 0.79	4.99 ± 0.91 , 1.11
1747W0005	NRC-3	0.41 ± 0.34 , 0.55	1.77 ± 0.58 , 0.86
1747W0007	NRC-4	3.5 ± 2.7 , 4.4	99 ± 11 , 5
1747W0009	NRC-5	3.79 ± 0.60 , 0.45	2.79 ± 0.61 , 0.82
1747W0011	NRC-6	3.29 ± 0.56 , 0.45	2.79 ± 0.61 , 0.82
1747W0013	NRC-7	0.58 ± 0.90 , 1.57	4.0 ± 1.5 , 2.2
1747W0015	NRC-8	0.9 ± 1.1 , 1.9	9.9 ± 1.9 , 2.3
1747W0017	NRC-9	3.7 ± 2.4 , 3.6	50.2 ± 6.1 , 4.5
1747W0019	NRC-10	1.8 ± 2.5 , 4.3	6.9 ± 3.7 , 5.9
1747W0021	NRC-11	2.75 ± 0.69 , 0.73	6.80 ± 0.92 , 0.91
1747W0023	NRC-12	1.0 ± 1.1 , 1.8	8.3 ± 1.7 , 2.3
1747W0025	NRC-13	7.27 ± 0.89 , 0.52	8.6 ± 1.0 , 0.9
1747W0027	NRC-14	2.27 ± 0.70 , 0.81	4.9 ± 1.1 , 1.4
1747W0029	NRC-15	2.54 ± 0.80 , 0.93	5.7 ± 1.2 , 1.5
1747W0031	NRC-16	1.92 ± 0.95 , 1.32	8.1 ± 1.4 , 1.6
1747W0032	NRC-17	0.08 ± 0.50 , 0.95	2.01 ± 0.95 , 1.48

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

^bMDCs are after the comma.

TABLE 3

CONCENTRATIONS OF RADIUM-226 IN WATER SAMPLES
 AP7, REVISION 17 AND CP2, REVISION 12
 SHIELDALLOY METALLURGICAL COMPANY
 SWEDESBORO, NEW JERSEY

ORISE Sample ID	NRC Region I Sample ID	Radionuclide Concentrations (pCi/L)			
1747W0001	NRC-1	-0.06	±	0.09 ^a	, 0.20 ^b
1747W0003	NRC-2	0.03	±	0.09	, 0.16
1747W0005	NRC-3	0.00 ^c	±	0.08	, 0.16
1747W0007	NRC-4	0.43	±	0.13	, 0.03
1747W0009	NRC-5	2.05	±	0.28	, 0.08
1747W0011	NRC-6	2.18	±	0.30	, 0.03
1747W0013	NRC-7	0.09	±	0.08	, 0.12
1747W0015	NRC-8	0.01	±	0.07	, 0.14
1747W0017	NRC-9	0.16	±	0.10	, 0.14
1747W0019	NRC-10	0.75	±	0.15	, 0.09
1747W0021	NRC-11	0.12	±	0.07	, 0.07
1747W0023	NRC-12	0.21	±	0.08	, 0.06
1747W0025	NRC-13	2.28	±	0.24	, 0.08
1747W0027	NRC-14	0.84	±	0.15	, 0.07
1747W0029	NRC-15	0.91	±	0.18	, 0.13
1747W0031	NRC-16	0.04	±	0.07	, 0.12
1747W0032	NRC-17	0.13	±	0.08	, 0.10

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

^bMDCs are after the comma.

^cZero value is due to rounding.

TABLE 4

CONCENTRATIONS OF RADIUM-228 IN WATER SAMPLES
 AP8, REVISION 3 AND CP1, REVISION 15
 SHIELDALLOY METALLURGICAL COMPANY
 SWEDESBORO, NEW JERSEY

ORISE Sample ID	NRC Region I Sample ID	Radionuclide Concentrations (pCi/L)			
1747W0002	NRC-1D	0.52	±	0.53 ^a	, 0.88 ^b
1747W0004	NRC-2D	0.45	±	0.47	, 0.78
1747W0006	NRC-3D	1.14	±	0.61	, 0.96
1747W0008	NRC-4D	1.48	±	0.54	, 0.79
1747W0010	NRC-5D	2.28	±	0.63	, 0.89
1747W0012	NRC-6D	4.55	±	0.74	, 0.89
1747W0014	NRC-7D	1.18	±	0.47	, 0.68
1747W0016	NRC-8D	1.09	±	0.51	, 0.76
1747W0018	NRC-9D	2.17	±	0.55	, 0.71
1747W0020	NRC-10D	1.72	±	0.56	, 0.78
1747W0022	NRC-11D	3.53	±	0.63	, 0.75
1747W0024	NRC-12D	1.70	±	0.59	, 0.86
1747W0026	NRC-13D	6.03	±	0.75	, 0.77
1747W0028	NRC-14D	1.89	±	0.63	, 0.90
1747W0030	NRC-15D	3.81	±	0.68	, 0.83
1747W0033	NRC-17D	1.56	±	0.61	, 0.91
1747W0034	NRC-16D	1.40	±	0.53	, 0.81

^aUncertainties represent the 95% confidence level, based on counting uncertainty.

^bMDCs are after the comma.

TABLE 5

**CONCENTRATIONS OF THORIUM RADIONUCLIDES
IN WATER SAMPLES
BY ALPHA SPECTROSCOPY AP11, REVISION 3 AND CP2, REVISION 12
SHIELDALLOY METALLURGICAL COMPANY
SWEDESBORO, NEW JERSEY**

ORISE Sample ID	NRC Region I Sample ID	Radionuclide Concentrations (pCi/L)														
		Th-228			Th-230			Th-232								
1747W0001	NRC-1	-0.11	±	0.56 ^a	,	1.06 ^b	1.03	±	0.41	,	0.28	-0.04	±	0.07	,	0.28
1747W0003	NRC-2	0.16	±	0.20	,	0.31	1.13	±	0.49	,	0.50	-0.12	±	0.18	,	0.50
1747W0005	NRC-3	0.51	±	0.46	,	0.72	0.58	±	0.37	,	0.49	0.00 ^c	±	0.15	,	0.35
1747W0007	NRC-4	0.71	±	0.43	,	0.57	0.71	±	0.36	,	0.36	-0.04	±	0.07	,	0.28
1747W0009	NRC-5	0.57	±	0.49	,	0.76	0.92	±	0.38	,	0.12	0.11	±	0.13	,	0.11
1747W0011	NRC-6	0.82	±	0.46	,	0.59	1.40	±	0.54	,	0.52	0.04	±	0.13	,	0.30
1747W0013	NRC-7	0.26	±	0.45	,	0.78	0.81	±	0.37	,	0.28	0.00	±	0.10	,	0.28
1747W0015	NRC-8	0.60	±	0.46	,	0.68	1.12	±	0.46	,	0.38	0.04	±	0.14	,	0.31
1747W0017	NRC-9	0.65	±	0.56	,	0.87	0.53	±	0.39	,	0.54	-0.12	±	0.18	,	0.50
1747W0019	NRC-10	0.42	±	0.48	,	0.79	0.26	±	0.23	,	0.29	0.08	±	0.11	,	0.11
1747W0021	NRC-11	1.25	±	0.59	,	0.67	0.51	±	0.34	,	0.35	0.05	±	0.16	,	0.35
1747W0023	NRC-12	1.19	±	0.58	,	0.72	1.11	±	0.44	,	0.13	0.04	±	0.09	,	0.13
1747W0025	NRC-13	1.15	±	0.54	,	0.64	0.24	±	0.19	,	0.12	-0.12	±	0.18	,	0.49
1747W0027	NRC-14	0.88	±	0.49	,	0.59	0.31	±	0.23	,	0.13	0.04	±	0.15	,	0.34
1747W0029	NRC-15	0.39	±	0.58	,	0.99	0.44	±	0.29	,	0.15	0.05	±	0.22	,	0.46
1747W0031	NRC-16	0.96	±	0.50	,	0.62	0.35	±	0.28	,	0.37	0.04	±	0.13	,	0.29
1747W0032	NRC-17	1.16	±	0.55	,	0.69	0.25	±	0.25	,	0.39	0.00	±	0.14	,	0.34

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

^bMDCs are after the comma.

^cZero values are due to rounding.

TABLE 6

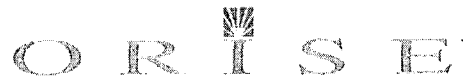
**CONCENTRATIONS OF URANIUM RADIONUCLIDES
IN WATER SAMPLES
BY ALPHA SPECTROSCOPY AP11, REVISION 3 AND CP2, REVISION 12
SHIELDALLOY METALLURGICAL COMPANY
SWEDESBORO, NEW JERSEY**

ORISE Sample ID	NRC Region I Sample ID	Radionuclide Concentrations (pCi/L)														
		U-234			U-235			U-238								
1747W0001	NRC-1	0.08	±	0.31 ^a	,	0.59 ^b	0.14	±	0.21	,	0.36	0.23	±	0.22	,	0.29
1747W0003	NRC-2	-0.40	±	0.32	,	0.77	-0.14	±	0.20	,	0.56	0.07	±	0.15	,	0.28
1747W0005	NRC-3	-0.04	±	0.26	,	0.59	-0.05	±	0.11	,	0.41	0.22	±	0.20	,	0.13
1747W0007	NRC-4	0.25	±	0.20	,	0.12	-0.05	±	0.10	,	0.39	0.12	±	0.22	,	0.39
1747W0009	NRC-5	-0.12	±	0.21	,	0.54	0.20	±	0.20	,	0.15	0.16	±	0.16	,	0.12
1747W0011	NRC-6	0.42	±	0.27	,	0.13	0.00 ^c	±	0.15	,	0.40	0.59	±	0.34	,	0.32
1747W0013	NRC-7	-0.13	±	0.32	,	0.72	-0.17	±	0.19	,	0.61	0.00	±	0.18	,	0.43
1747W0015	NRC-8	0.04	±	0.17	,	0.36	0.05	±	0.09	,	0.14	0.04	±	0.17	,	0.36
1747W0017	NRC-9	0.10	±	0.17	,	0.32	0.00	±	0.20	,	0.45	-0.10	±	0.20	,	0.47
1747W0019	NRC-10	0.11	±	0.16	,	0.28	0.05	±	0.09	,	0.14	-0.04	±	0.16	,	0.40
1747W0021	NRC-11	0.11	±	0.13	,	0.11	0.05	±	0.09	,	0.14	0.04	±	0.08	,	0.11
1747W0023	NRC-12	0.20	±	0.21	,	0.32	0.12	±	0.14	,	0.12	0.10	±	0.15	,	0.25
1747W0025	NRC-13	0.14	±	0.17	,	0.27	-0.04	±	0.15	,	0.41	0.03	±	0.18	,	0.39
1747W0027	NRC-14	0.44	±	0.36	,	0.52	0.04	±	0.24	,	0.50	0.18	±	0.24	,	0.40
1747W0029	NRC-15	0.04	±	0.22	,	0.45	0.14	±	0.16	,	0.14	0.11	±	0.13	,	0.11
1747W0031	NRC-16	0.07	±	0.20	,	0.39	0.09	±	0.12	,	0.13	0.17	±	0.19	,	0.27
1747W0032	NRC-17	0.07	±	0.17	,	0.32	0.13	±	0.15	,	0.13	0.07	±	0.14	,	0.26

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

^bMDCs are after the comma.

^cZero values are due to rounding.



OAK RIDGE INSTITUTE FOR SCIENCE AND EDUCATION

November 26, 2007

Mr. Mark Roberts
U.S. Nuclear Regulatory Commission
Region 1
475 Allendale Road
King of Prussia, Pennsylvania 19406

**SUBJECT: ADDENDUM TO ANALYTICAL RESULTS FOR THIRTY-FOUR WATER SAMPLES ASSOCIATED WITH SHIELDALLOY METALLURGICAL COMPANY, SWEDESBORO, NEW JERSEY
DCN 1747-LR-002-0
(INSPECTION REPORT #04007102/2006-001)[RFTA NO. 07-001]**

Dear Mr. Roberts:

The Oak Ridge Institute for Science and Education (ORISE) received water samples from 17 different wells associated with the ShieldAlloy Metallurgical Company in Swedesboro, New Jersey. The original results were submitted in a letter report dated October 8, 2007. After reviewing the results, you requested gamma counts on samples W0007 and W0017 to determine if potassium-40 (K-40) was present in the samples and the reason for the elevated gross beta concentrations when compared to the other samples. The samples were counted for four days by gamma spectroscopy (Procedure CP1, Revision 15). The K-40 concentration for W0007 was 59 ± 66 pCi/L compared to the gross beta concentration of 99 ± 11 pCi/L. The K-40 concentration for W0017 was 56 ± 66 pCi/L compared to the gross beta concentration of 50.2 ± 6.1 pCi/L.

ORISE'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 Wade Ivey at 865.576.9184 with any questions or comments.

Sincerely,

Dale Condra
Dale Condra, Manager
Laboratory

RDC/WPI:km

c: T. Carter, NRC/FSME/DWMEP T-8F5
E. Knox-Davin, NRC/FSME/TWPN 8A23
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E. Abelquist, ORISE
S. Roberts, ORISE

Distribution approval and concurrence:	Initials
Technical Management Team Member	<i>JJR</i>
Quality Manager	<i>CDP</i>

SHIELDALLOY METALURGICAL CO. (License No. SMB-743, Docket No. 04007102)

Table of NRC Sample Numbers (used in the ORISE Data Reports)

versus Well Locations

For July 23-24, 2007 Sampling Period

NRC Sample No.	SMC Well Location
NRC 1	SC25S
NRC 2	SC14S
NRC 3	SC11SR
NRC 4	SC12S
NRC 5	SC12D
NRC 6	Duplicate sample of SC12D
NRC 7	W2R
NRC 8	WC22S
NRC 9	IWC1
NRC 10	IWC2
NRC 11	IWC3
NRC 12	SC20S
NRC 13	SC20D
NRC 14	Newfield Well #3
NRC 15	Newfield Well #5
NRC 16	SC26A
NRC 17	A

All NRC samples were shipped as two, one-liter aliquots from each of the wells that had been sampled. For tracking purpose, ORISE designated the second one-liter sample from each well with a "D" on their data report, although both samples were taken from the same well. For example, samples NRC 1 and NRC 1D were both obtained from Well SC25S.