ORISE
OAK RIDGE INSTITUTE FOR SCIENCE AND EDUCATION

October 12, 2004

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Mr. Rick Munoz
U.S. Nuclear Regulatory Commission
Region IV: DNMS: NMLB
Suite 400
611 Ryan Plaza Drive
Arlington, TX 76011

SUBJECT: ANALYTICAL RESULTS FOR SOIL SAMPLES COLLECTED AUGUST 3-5, 2004 AND AUGUST 16-17, 2004 FROM KAISER ALUMINUM, TULSA, OKLAHOMA (INSPECTION REPORT #040-02377/04-02) [RFTA NO. 04-001]

Dear Mr. Munoz:

The Environmental Survey and Site Assessment Program (ESSAP) of the Oak Ridge Institute for Science and Education (ORISE) received 27 soil samples on August 9, 2004 that were collected August 3-5, 2004. An additional seven soil samples were received on August 18, 2004 that were collected August 16-17, 2004. The samples were analyzed for the thorium series by gamma spectroscopy (GS) (Procedure CP1, Revision 14). After reviewing the preliminary GS data, you selected six samples to be analyzed by alpha spectroscopy (AS) (Procedure AP11, Revision 2; Procedure CP2, Revision 12). The GS and AS data are presented in Tables 1 and 2, respectively.

Although the samples were well blended, some of the GS and AS data are not statistically equivalent. The difference in values can be attributed to sample inhomogeneity. For the GS analysis, approximately 300 to 400 grams of each sample was counted, whereas an aliquot of only 0.1 to 1 gram of each sample was counted for the AS analysis. The more activity that was determined by GS, the smaller the aliquot that was used for the AS analysis to achieve reasonable spectral resolution.

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

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Please contact me at (865) 241-3242 or Wade Ivey at (865) 576-9184 with any questions or comments.

Sincerely,

Dale Condra

Dale Condra
Laboratory Manager
Environmental Survey and
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RDC/WPI:ar

Enclosure

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ORISE TABLE 1

CONCENTRATIONS OF SELECTED GAMMA EMITTING RADIONUCLIDES IN SOIL SAMPLES BY GAMMA SPECTROSCOPY CP1, REVISION 14 KAISER ALUMINUM TULSA, OKLAHOMA

ESSAP Sample ID	NRC Region IV Sample ID	Radionuclide Concentrations[a] (pCi/g dry weight)			
		Th-230	Th-228 by Pb-212	Th-232 by Ac-228	Total Th[b]
1618S0001	NRC04-02-01	0.3 ± 3.6[c]	1.01 ± 0.09	1.18 ± 0.18	2.19 ± 0.20
1618S0002	NRC04-02-02	5.1 ± 5.1	1.09 ± 0.09	1.11 ± 0.20	2.20 ± 0.22
1618S0003	NRC04-02-03	-0.4 ± 3.2	1.12 ± 0.09	1.28 ± 0.17	2.40 ± 0.19
1618S0004	NRC04-02-04	48 ± 11	13.52 ± 0.97	14.2 ± 1.3	27.7 ± 1.6
1618S0005	NRC04-02-05	56 ± 16	15.7 ± 1.1	16.3 ± 1.4	32.0 ± 1.8
1618S0006	NRC04-02-06	-0.1 ± 3.0	1.09 ± 0.09	1.16 ± 0.15	2.25 ± 0.17
1618S0007	NRC04-02-07	-1.3 ± 3.6	1.04 ± 0.09	1.07 ± 0.18	2.11 ± 0.20
1618S0008	NRC04-02-08	-0.5 ± 2.8	0.93 ± 0.08	0.97 ± 0.14	1.90 ± 0.16
1618S0009	NRC04-02-09	0.7 ± 3.7	1.19 ± 0.10	1.16 ± 0.18	2.35 ± 0.21
1618S0010	NRC04-02-10	0.8 ± 3.6	0.95 ± 0.09	0.91 ± 0.19	1.86 ± 0.21
1618S0011	NRC04-02-11	0.2 ± 3.1	1.02 ± 0.08	1.07 ± 0.15	2.09 ± 0.17
1618S0012	NRC04-02-12	-1.2 ± 3.0	1.02 ± 0.08	1.08 ± 0.14	2.10 ± 0.16
1618S0013	NRC04-02-13	-1.4 ± 3.7	1.35 ± 0.11	1.40 ± 0.20	2.75 ± 0.23
1618S0014	NRC04-02-14	3.8 ± 3.9	1.34 ± 0.11	1.29 ± 0.19	2.63 ± 0.22
1618S0015	NRC04-02-15	1.0 ± 3.0	1.19 ± 0.09	1.11 ± 0.16	2.30 ± 0.18
1618S0016	NRC04-02-16	3.8 ± 3.9	1.02 ± 0.09	1.13 ± 0.17	2.15 ± 0.19
1618S0017	NRC04-02-17	-2.3 ± 2.9	1.02 ± 0.08	1.04 ± 0.15	2.06 ± 0.17
1618S0018	NRC04-02-18	5.5 ± 3.5	1.17 ± 0.10	1.21 ± 0.17	2.38 ± 0.20
1618S0019	NRC04-02-19	-0.1 ± 4.1	1.07 ± 0.09	1.13 ± 0.20	2.20 ± 0.22
1618S0020	NRC04-02-20	0.3 ± 3.1	1.32 ± 0.10	1.46 ± 0.19	2.78 ± 0.21
1618S0021	NRC04-02-21	3.5 ± 3.4	1.04 ± 0.09	1.01 ± 0.16	2.05 ± 0.18
1618S0022	NRC04-02-22	1.8 ± 3.2	1.14 ± 0.10	1.16 ± 0.17	2.30 ± 0.20
1618S0023	NRC04-02-23	0.8 ± 4.1	1.26 ± 0.11	1.26 ± 0.20	2.52 ± 0.23
1618S0024	NRC04-02-24	9.5 ± 5.1	2.21 ± 0.16	2.04 ± 0.23	4.25 ± 0.28
1618S0025	NRC04-02-25	8.6 ± 5.7	3.49 ± 0.26	3.46 ± 0.36	6.95 ± 0.44

ORISE TABLE 1 (continued)

CONCENTRATIONS OF SELECTED GAMMA EMITTING RADIONUCLIDES IN SOIL SAMPLES BY GAMMA SPECTROSCOPY CP1, REVISION 14 KAISER ALUMINUM TULSA, OKLAHOMA

ESSAP Sample ID	NRC Region IV Sample ID	Radionuclide Concentrations[a] (pCi/g dry weight)			
		Th-230	Th-228 by Pb-212	Th-232 by Ac-228	Total Th[b]
1618S0026	NRC04-02-26	364 ± 45	105.2 ± 7.4	101.8 ± 8.5	207 ± 11
1618S0027	NRC04-02-27	285 ± 31	68.7 ± 4.8	66.4 ± 5.5	135.1 ± 7.3
1618S0028	NRC04-02-28	2.9 ± 3.7	1.33 ± 0.11	1.43 ± 0.18	2.76 ± 0.21
1618S0029	NRC04-02-29	0.2 ± 4.5	1.49 ± 0.13	1.40 ± 0.20	2.89 ± 0.24
1618S0030	NRC04-02-30	6.3 ± 5.9	1.43 ± 0.12	1.46 ± 0.25	2.89 ± 0.28
1618S0031	NRC04-02-31	3.0 ± 5.3	1.78 ± 0.15	1.84 ± 0.26	3.62 ± 0.30
1618S0032	NRC04-02-32	8.2 ± 7.7	1.78 ± 0.15	1.71 ± 0.26	3.49 ± 0.30
1618S0033	NRC04-02-33	-1.5 ± 4.1	1.57 ± 0.12	1.49 ± 0.20	3.06 ± 0.23
1618S0034	NRC04-02-34	13.8 ± 6.7	3.41 ± 0.26	3.34 ± 0.38	6.75 ± 0.46

[a]The average MDCs for these radionuclides range from 0.06 pCi/g for Th-228 by Pb-212 to 7.9 pCi/g for Th-230.

[b]Total thorium is the sum of Th-228 and Th-232.

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

ORISE TABLE 2

CONCENTRATIONS OF THORIUM ALPHA EMITTING RADIONUCLIDES IN SOIL SAMPLES BY ALPHA SPECTROSCOPY AP11, REVISION 2 AND ALPHA SPECTROSCOPY CP2, REVISION 12 KAISER ALUMINUM TULSA, OKLAHOMA

ESSAP Sample ID	NRC Region IV Sample ID	Radionuclide Concentrations[a] (pCi/g)			
		Th-228	Th-230	Th-232	Total Th[b]
1618S0004	NRC04-02-04	25.2 ± 1.8[c]	61.6 ± 4.4	25.5 ± 1.9	50.7 ± 2.6
1618S0005	NRC04-02-05	19.5 ± 1.5	50.8 ± 3.7	19.6 ± 1.5	39.1 ± 2.1
1618S0025	NRC04-02-25	4.17 ± 0.35	9.46 ± 0.73	4.00 ± 0.34	8.17 ± 0.49
1618S0026	NRC04-02-26	113.0 ± 8.2	385 ± 27	113.6 ± 8.3	227 ± 12
1618S0027	NRC04-02-27	90.2 ± 6.9	260 ± 19	92.5 ± 7.0	182.7 ± 9.8
1618S0034	NRC04-02-34	5.03 ± 0.41	18.9 ± 1.4	5.95 ± 0.48	10.98 ± 0.63

[a]The average MDC by alpha spectroscopy for Th isotopes is 0.08 pCi/g.

[b]Total thorium is the sum of Th-228 and Th-232.

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