

February 11, 2005

**FEB 14 2005**

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

**SUBJECT: ANALYTICAL RESULTS FOR SOIL AND SMEAR SAMPLES  
COLLECTED JANUARY 20, 2005 FROM KAISER ALUMINUM, TULSA,  
OKLAHOMA (INSPECTION REPORT #040-02377/05-01)  
[RFTA NO. 05-001]**

Dear Mr. Evans:

The Environmental Survey and Site Assessment Program (ESSAP) of the Oak Ridge Institute for Science and Education (ORISE) received six soil and two smear samples from Kaiser Aluminum, Tulsa, Oklahoma on January 24, 2005 that were collected January 20, 2005. The soil samples were analyzed as received (wet) for the thorium and uranium series by gamma spectroscopy (GS) (Procedure CP1, Revision 14). The soil samples were then dried and re-analyzed by GS. The percent moisture (Procedure SP3, Revision 3) was calculated for each sample.

The two smear samples were analyzed for gross alpha activity by gas flow proportional counting (Procedures SP3, Revision 3 and CP3, Revision 2). The original request for gross alpha analysis on the smear samples was for a two minute count with an MDC of 8 dpm/smear. During a phone conversation on January 27, 2005, you indicated that the acceptance criterion for gross alpha was 2.15 dpm/smear. It was agreed that ESSAP would count the smears for 60 minutes to meet this MDC requirement and ensure the smear activity was below the acceptance criterion. Accordingly, a revised MDC of 0.89 dpm/smear was calculated based on the increased count time. The activity of each smear was below the MDC.

The percent moisture and the comparison of wet to dry concentrations of GS data are presented in Tables 1 and 2, respectively. Per your request, Table 3 was added to show only our routine analysis results, which are the same as the dry sample results shown in Table 2.

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Mr. Robert Evans

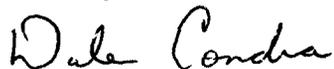
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ESSAP's Quality Control (QC) requirements were met for these analyses. The QC files are available for your review upon request.

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

Sincerely,



Dale Condra  
Laboratory Manager  
Environmental Survey and  
Site Assessment Program

RDC/WPI:dh

Enclosure

cc: T. McLaughlin, NRC/NMSS/TWFN 7F27  
E. Knox-Davin, NRC/NMSS/TWFN T8A23  
B. Schlapper, Region IV

E. Abelquist, ORISE/ESSAP  
T. Vitkus, ORISE/ESSAP  
File/1649

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

**ORISE TABLE 1**

**PERCENT MOISTURE  
IN SOIL SAMPLES  
PROCEDURE SP3, REVISION 3  
KAISER ALUMINUM  
TULSA, OKLAHOMA**

<b>ESSAP Sample ID</b>	<b>NRC Region IV Sample ID</b>	<b>Percent Moisture</b>
1649S0001	NRC-04-03-07	16.5
1649S0002	NRC-04-03-08	22.3
1649S0003	NRC-04-03-09	17.1
1649S0004	NRC-04-03-12	24.9
1649S0005	NRC-04-03-13	16.7
1649S0006	NRC-04-03-14	14.2

ORISE TABLE 2

CONCENTRATIONS OF SELECTED  
GAMMA EMITTING RADIONUCLIDES  
AND WET TO DRY CONCENTRATION RATIOS  
IN SOIL SAMPLES  
BY GAMMA SPECTROSCOPY  
PROCEDURES CPI, REVISION 14 AND SP3, REVISION 3  
KAISER ALUMINUM  
TULSA, OKLAHOMA

ESSAP Sample ID	NRC Region IV Sample ID	Radionuclide Concentrations (pCi/g wet (W) and dry (D) weight) <sup>a</sup>										
		U-238 by Th-234	WET to DRY RATIO <sup>b</sup>	U-235	Total U <sup>c</sup>	Th-230	WET to DRY RATIO <sup>b</sup>	Th-228 by Pb-212	WET to DRY RATIO <sup>b</sup>	Th-232 by Ac-228	WET to DRY RATIO <sup>b</sup>	Total Th <sup>d</sup>
1649S0001W <sup>e</sup>	NRC-04-03-07	0.37 ± 0.51 <sup>f</sup>	1.4 ± 3.4	0.08 ± 0.12	0.82 ± 0.73	4.9 ± 5.6	2.3 ± 6.1	1.90 ± 0.15	0.93 ± 0.10	1.85 ± 0.22	0.87 ± 0.14	3.75 ± 0.27
1649S0001D <sup>e</sup>	NRC-04-03-07	0.27 ± 0.55		0.07 ± 0.10	0.61 ± 0.78	2.1 ± 3.8		2.05 ± 0.16		2.13 ± 0.24		4.18 ± 0.29
1649S0002W	NRC-04-03-08	0.45 ± 0.55	0.38 ± 0.52	-0.02 ± 0.10	0.88 ± 0.78	5.8 ± 4.5	-3 ± 15	2.87 ± 0.22	0.68 ± 0.07	2.93 ± 0.31	0.67 ± 0.10	5.80 ± 0.38
1649S0002D	NRC-04-03-08	1.20 ± 0.81		-0.01 ± 0.13	2.4 ± 1.2	-2.0 ± 6.3		4.19 ± 0.31		4.35 ± 0.45		8.54 ± 0.55
1649S0003W	NRC-04-03-09	0.89 ± 0.51	1.09 ± 0.85	0.07 ± 0.09	1.85 ± 0.73	10.0 ± 4.7	0.6 ± 2.7	2.98 ± 0.21	0.82 ± 0.08	2.99 ± 0.28	0.80 ± 0.11	5.97 ± 0.35
1649S0003D	NRC-04-03-09	0.82 ± 0.44		0.03 ± 0.10	1.67 ± 0.63	16.4 ± 5.2		3.65 ± 0.25		3.75 ± 0.35		7.40 ± 0.43
1649S0004W	NRC-04-03-12	0.71 ± 0.73	0.44 ± 0.55	0.12 ± 0.17	1.5 ± 1.0	28.9 ± 7.8	0.7 ± 3.0	10.46 ± 0.78	0.76 ± 0.08	10.47 ± 0.91	0.72 ± 0.09	20.9 ± 1.2
1649S0004D	NRC-04-03-12	1.6 ± 1.1		0.14 ± 0.20	3.3 ± 1.6	39 ± 11		13.84 ± 0.99		14.6 ± 1.3		28.4 ± 1.6
1649S0005W	NRC-04-03-13	1.02 ± 0.58	1.00 ± 0.78	0.11 ± 0.09	2.15 ± 0.83	0.5 ± 4.2	0 <sup>g</sup> ± 35	2.08 ± 0.16	0.90 ± 0.10	2.16 ± 0.25	0.87 ± 0.14	4.24 ± 0.30
1649S0005D	NRC-04-03-13	1.02 ± 0.55		0.05 ± 0.13	2.09 ± 0.79	5.4 ± 4.2		2.31 ± 0.18		2.49 ± 0.28		4.80 ± 0.33
1649S0006W	NRC-04-03-14	0.76 ± 0.34	0.89 ± 0.59	0.00 <sup>g</sup> ± 0.06	1.52 ± 0.48	-1.4 ± 2.5	-0.6 ± 5.5	0.94 ± 0.07	0.85 ± 0.09	0.95 ± 0.14	0.81 ± 0.16	1.89 ± 0.16
1649S0006D	NRC-04-03-14	0.85 ± 0.41		0.07 ± 0.09	1.77 ± 0.59	2.4 ± 3.1		1.10 ± 0.09		1.18 ± 0.15		2.28 ± 0.17

<sup>a</sup>The average MDCs for these radionuclides range from 0.05 pCi/g for Th-228 by Pb-212 to 7.0 pCi/g for Th-230.

<sup>b</sup>Wet/Dry is the ratio of the concentration in the sample counted wet divided by the concentration in the sample counted dry.

<sup>c</sup>Total uranium is calculated using (2-U-238) + U-235.

<sup>d</sup>Total thorium is the sum of Th-228 and Th-232.

<sup>e</sup>W extension on sample ID is for wet samples and D extension on sample ID is for dry samples.

<sup>f</sup>Uncertainties represent the 95% confidence level, based on total propagated uncertainties.

<sup>g</sup>Zero value due to rounding.

**ORISE TABLE 3**

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

ESSAP Sample ID	NRC Region IV Sample ID	Radionuclide Concentrations (pCi/g dry weight) <sup>a</sup>							Total Th <sup>c</sup>
		U-238 by Th-234	U-235	Total U <sup>b</sup>	Th-230	Th-228 by Pb-212	Th-232 by Ac-228		
1649S0001	NRC-04-03-07	0.27 ± 0.55 <sup>d</sup>	0.07 ± 0.10	0.61 ± 0.78	2.1 ± 3.8	2.05 ± 0.16	2.13 ± 0.24	4.18 ± 0.29	
1649S0002	NRC-04-03-08	1.20 ± 0.81	-0.01 ± 0.13	2.4 ± 1.2	-2.0 ± 6.3	4.19 ± 0.31	4.35 ± 0.45	8.54 ± 0.55	
1649S0003	NRC-04-03-09	0.82 ± 0.44	0.03 ± 0.10	1.67 ± 0.63	16.4 ± 5.2	3.65 ± 0.25	3.75 ± 0.35	7.40 ± 0.43	
1649S0004	NRC-04-03-12	1.6 ± 1.1	0.14 ± 0.20	3.3 ± 1.6	39 ± 11	13.84 ± 0.99	14.6 ± 1.3	28.4 ± 1.6	
1649S0005	NRC-04-03-13	1.02 ± 0.55	0.05 ± 0.13	2.09 ± 0.79	5.4 ± 4.2	2.31 ± 0.18	2.49 ± 0.28	4.80 ± 0.33	
1649S0006	NRC-04-03-14	0.85 ± 0.41	0.07 ± 0.09	1.77 ± 0.59	2.4 ± 3.1	1.10 ± 0.09	1.18 ± 0.15	2.28 ± 0.17	

<sup>a</sup>The average MDCs for these radionuclides range from 0.05 pCi/g for Th-228 by Pb-212 to 7.5 pCi/g for Th-230.

<sup>b</sup>Total uranium is calculated using (2U-238) + U-235.

<sup>c</sup>Total thorium is the sum of Th-228 and Th-232.

<sup>d</sup>Uncertainties represent the 95% confidence level, based on total propagated uncertainties.