

November 5, 2004

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 WATER SAMPLES COLLECTED
AUGUST 24 AND 25, 2004 FROM KERR McGEE CIMARRON,
CIMARRON, OKLAHOMA (INSPECTION REPORT #070-00925/04-02)
[RFTA NO. 04-001; 05-001]**

Dear Mr. Munoz:

The Environmental Survey and Site Assessment Program (ESSAP) of the Oak Ridge Institute for Science and Education (ORISE) received 24 water samples on August 26, 2004 that were collected on August 24 and 25, 2004. A gamma spectroscopy scan was performed on each sample (Procedure CP1, Revision 14). The gamma scans did not indicate the presence of any radionuclides that are not associated with the site. All samples were analyzed for gross alpha, gross beta, and isotopic uranium. Tc-99 analysis was performed on the eight samples designated by you in the Request for Analysis. The results for gross alpha and gross beta (Procedures AP1, Revision 14 and CP3 Revision 2), Tc-99 (Procedure AP5, Revision 15 and Procedure CP4, Revision 3), and isotopic uranium (Procedure AP11, Revision 2 and Procedure CP2, Revision 12) are presented in Tables 1, 2, and 3, respectively. A case narrative is included that discusses the differences between the gross alpha and total uranium concentrations.

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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Mr. Rick Munoz

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November 5, 2004

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:ar

Enclosure

cc: T. McLaughlin, NRC/NMSS/TWFN 7F27 E. Abelquist, ORISE/ESSAP
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File/1619

Distribution approval and concurrence:	Initials	Date
Technical Management Team Member	TJW	11/5/2004
Quality Manager	ATP	11/5/2004

CASE NARRATIVE

The gross alpha measurement is routinely used as a screening tool to determine the need for further analysis. The results of the specific isotopic analysis better represent the concentration of contamination in the sample due to lower total propagated uncertainties associated with the procedure. A comparison of gross alpha and any specific isotopic analysis will not always result in agreement. However, during the laboratory data review and comparison process, it was noted that several of the gross alpha concentrations and the total uranium concentrations were significantly different and the gross alpha concentrations were lower than the total uranium concentrations in almost every case. It is not uncommon for the concentrations from these analyses to differ statistically, but it is uncommon for the gross alpha concentrations to be consistently lower than the concentrations of uranium.

After discussing this problem with Rick Munoz on October 13, 2004, the decision was made to select several of the water samples and reanalyze them for gross alpha. The results of the reanalysis did not resolve the discrepancies between the original gross alpha and total uranium concentrations.

Re-evaluation of the analytical process indicated that the amount of solids in this set of water samples was higher than one would normally expect to find. Even with the use of relatively small sample volumes—20 to 25 mL—for the gross alpha analysis, the sample masses on the counting planchets were at the upper limit of the gross alpha efficiency/mass attenuation curve. The alpha emissions from uranium were attenuated by the sample mass deposited on the counting planchets. This mass attenuation of the alpha emissions of uranium was the cause of the difference between the gross alpha concentrations and the total uranium concentrations.

ORISE TABLE 1

**CONCENTRATIONS OF GROSS ALPHA AND GROSS BETA
IN WATER SAMPLES
BY LOW BACKGROUND ALPHA AND BETA COUNTING
API, REVISION 14; CP3, REVISION 2
CIMARRON (KERR-McGEE)
CIMARRON, OKLAHOMA**

ESSAP Sample ID	NRC Region IV Sample ID	NRC Region IV Sample Description	Concentrations (pCi/L)	
			Gross Alpha ^a	Gross Beta ^b
1619W0001	04-02-01	Well 1336-A	28.0 ± 6.2 ^c	733 ± 75
1619W0002	04-02-02	Well 1319-C1	19.7 ± 4.3	11.6 ± 3.0
1619W0003	04-02-03	Well 1319-B1	107.3 ± 9.4	23.0 ± 2.8
1619W0004	04-02-04	Well 1319-A1	14.4 ± 3.2	53.4 ± 5.2
1619W0005	04-02-05	Well 1319-B3	46.0 ± 5.8	20.2 ± 2.5
1619W0006	04-02-06	Well 1312	28.4 ± 9.6	451 ± 55
1619W0007	04-02-07	Well T-54	1.8 ± 3.5	528 ± 55
1619W0008	04-02-08	Seep 1208	6.2 ± 7.4	2,120 ± 240
1619W0009	04-02-09	Well T-57	14.5 ± 5.4	368 ± 38
1619W0010	04-02-10	Well 02W43	156 ± 18	63.1 ± 9.0
1619W0011	04-02-11	Well 02W37	335 ± 38	133 ± 19
1619W0012	04-02-12	Well 02W05	3,160 ± 290	1,120 ± 130
1619W0013	04-02-13	Well 02W04	1,920 ± 150	582 ± 59
1619W0014	04-02-14	Well TMW09	4,730 ± 350	1,780 ± 180
1619W0015	04-02-15	Well 1315R	793 ± 66	557 ± 57
1619W0016	04-02-16	Seep 1206	106 ± 13	50.4 ± 7.7
1619W0017	04-02-17	Well TMW8	1,620 ± 120	1,080 ± 110
1619W0018	04-02-18	Well TMW25	100 ± 12	38.8 ± 6.6
1619W0019	04-02-19	Well 02W47	354 ± 32	115 ± 14
1619W0020	04-02-20	Well 1352	762 ± 62	483 ± 49
1619W0021	04-02-21	Well 1356	106 ± 13	80 ± 10
1619W0022	04-02-22	Well T-77	235 ± 32	45 ± 11
1619W0023	04-02-23	Well T-67	171 ± 23	113 ± 17
1619W0024	04-02-24	Well T-63	29.9 ± 9.9	980 ± 110

^aThe average MDC for gross alpha for a 200 minute count for this sample set is 7.3 pCi/L.

^bThe average MDC for gross beta for a 200 minute count for this sample set is 8.6 pCi/L.

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

ORISE TABLE 2

**CONCENTRATIONS OF Tc-99
IN WATER SAMPLES
BY LIQUID SCINTILLATION ANALYSIS
AP5, REVISION 15; CP4, REVISION 3
CIMARRON (KERR-McGEE)
CIMARRON, OKLAHOMA**

ESSAP Sample ID	NRC Region IV Sample ID	NRC Region IV Sample Description	Tc-99^a Concentrations (pCi/L)
1619W0001	04-02-01	Well 1336-A	900 ± 110 ^b
1619W0006	04-02-06	Well 1312	700 ± 85
1619W0007	04-02-07	Well T-54	910 ± 110
1619W0008	04-02-08	Seep 1208	2,630 ± 310
1619W0009	04-02-09	Well T-57	522 ± 64
1619W0015	04-02-15	Well 1315R	11.3 ± 8.9
1619W0016	04-02-16	Seep 1206	14.6 ± 9.1
1619W0024	04-02-24	Well T-63	1,300 ± 160

^aThe average MDC for Tc-99 for a 60 minute count using a 0.1 L sample is 15 pCi/L.

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

ORISE TABLE 3

CONCENTRATIONS OF URANIUM ISOTOPES
IN WATER SAMPLES
BY ALPHA SPECTROSCOPY
AP11, REVISION 2; CP2, REVISION 12
CIMARRON (KERR-McGEE)
CIMARRON, OKLAHOMA

ESSAP Sample ID	NRC Region IV Sample ID	NRC Region IV Sample Description	Radionuclide Concentrations ^a (pCi/L)			
			U-234	U-235	U-238	U Total ^b
1619W0001	04-02-01	Well 1336-A	20.2 ± 1.8 ^c	0.88 ± 0.28	6.87 ± 0.84	28.0 ± 2.0
1619W0002	04-02-02	Well 1319-C1	22.0 ± 2.1	0.91 ± 0.32	4.23 ± 0.68	27.1 ± 2.2
1619W0003	04-02-03	Well 1319-B1	112.3 ± 8.6	4.73 ± 0.77	16.9 ± 1.6	133.9 ± 8.8
1619W0004	04-02-04	Well 1319-A1	13.9 ± 1.3	0.57 ± 0.21	3.22 ± 0.49	17.7 ± 1.4
1619W0005	04-02-05	Well 1319-B3	63.4 ± 5.2	3.70 ± 0.66	10.4 ± 1.2	77.5 ± 5.3
1619W0006	04-02-06	Well 1312	2.19 ± 0.47	0.14 ± 0.19	0.91 ± 0.34	3.24 ± 0.61
1619W0007	04-02-07	Well T-54	38.6 ± 3.4	1.89 ± 0.46	12.2 ± 1.3	52.7 ± 3.6
1619W0008	04-02-08	Seep 1208	5.44 ± 0.77	0.17 ± 0.13	1.60 ± 0.37	7.21 ± 0.86
1619W0009	04-02-09	Well T-57	13.7 ± 1.4	0.57 ± 0.23	5.02 ± 0.68	19.3 ± 1.5
1619W0010	04-02-10	Well 02W43	117.5 ± 8.7	6.70 ± 0.91	68.4 ± 5.3	193 ± 10
1619W0011	04-02-11	Well 02W37	244 ± 18	13.1 ± 1.4	146 ± 11	403 ± 21
1619W0012	04-02-12	Well 02W05	2,040 ± 150	99 ± 12	1,170 ± 87	3,270 ± 170
1619W0013	04-02-13	Well 02W04	1,100 ± 110	63 ± 14	629 ± 66	1,790 ± 130
1619W0014	04-02-14	Well TMW09	3,060 ± 220	160 ± 17	1,930 ± 140	5,160 ± 260
1619W0015	04-02-15	Well 1315R	1,209 ± 88	73.4 ± 9.2	756 ± 56	2,040 ± 110
1619W0016	04-02-16	Seep 1206	86.4 ± 6.8	4.02 ± 0.68	23.9 ± 2.2	114.4 ± 7.2
1619W0017	04-02-17	Well TMW8	1,460 ± 120	98 ± 14	1,600 ± 130	3,160 ± 170
1619W0018	04-02-18	Well TMW25	125 ± 10	7.1 ± 1.3	82.6 ± 7.0	215 ± 12
1619W0019	04-02-19	Well 02W47	266 ± 21	12.5 ± 1.8	113.1 ± 9.4	392 ± 23
1619W0020	04-02-20	Well 1352	385 ± 29	23.6 ± 2.7	563 ± 42	971 ± 51
1619W0021	04-02-21	Well 1356	176 ± 14	8.0 ± 1.4	90.3 ± 7.6	274 ± 16
1619W0022	04-02-22	Well T-77	188 ± 15	9.4 ± 1.5	32.9 ± 3.2	230 ± 15
1619W0023	04-02-23	Well T-67	162 ± 13	7.7 ± 1.4	49.3 ± 4.6	219 ± 14
1619W0024	04-02-24	Well T-63	36.6 ± 3.6	1.71 ± 0.62	12.5 ± 1.7	50.7 ± 4.1

^aThe average MDC for individual uranium isotopes for a sixteen hour count using 0.01 L to 0.1 L of sample is 0.82 pCi/L.

^bU Total is the sum of U-234 + U-235 + U-238.

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